

# Mazda 626

## Workshop Manual



7/87

**mazda**

ECE and General



# Mazda 626 Workshop Manual

## FOREWORD

This workshop manual is intended for use by service technicians of authorized Mazda dealers to help them service Mazda vehicles. This manual can be also useful in diagnosing certain problems and performing some repair and maintenance on Mazda vehicles.

For proper repair and maintenance, it is important to be thoroughly familiarized with this manual. It is recommended that this manual always be kept in a handy place for quick and easy reference.

All the contents of this manual, including photographs, drawings, and specifications, are the latest available at the time of printing. As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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**Mazda Motor Corporation  
HIROSHIMA JAPAN**

Refer to the following wiring diagrams if necessary.

Refer to From No.	
5095-10-87G.....	L.H.D.
5096-10-87G .....	R.H.D.
5096-20-87I .....	Germany
5095-30-87I.....	French

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# GENERAL INFORMATION

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# G IMPORTANT INFORMATION/FUNDAMENTAL PROCEDURES

## IMPORTANT INFORMATION

### BASIC ASSUMPTIONS

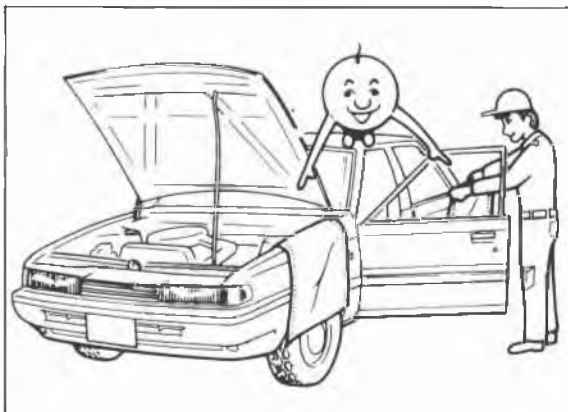
This workshop manual assumes that you have and know how to properly use certain special tools which are necessary for the safe and efficient performance of service operations on Mazda vehicles. The manual also assumes that you are familiar generally with automobile systems and basic service and repair procedures. You should not attempt to use this manual unless these assumptions are correct and you understand the consequences described below.

### SAFETY RISK

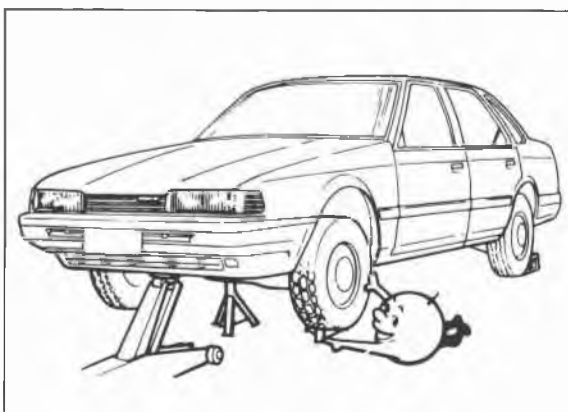
This manual contains certain notes, warnings, etc., which you should carefully read and follow in order to eliminate the risk of personal injury to yourself or others and the risk of improper service which may damage the vehicle or render it unsafe. The fact that there are no such notes, etc., with respect to any specific service method does not mean that there is no possibility that personal safety or vehicle safety will be jeopardized by the use of incorrect methods or tools.

### POSSIBLE LOSS OF WARRANTY

The manufacturer's warranty on Mazda vehicles and engines can be voided if improper service or repairs are performed by persons other than an authorized Mazda dealer.



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47U0GX-003

## FUNDAMENTAL PROCEDURES

As you read through the procedure, you will come across NOTES, CAUTIONS, and WARNINGS. Each one is there for a specific purpose. **NOTES** give you **added information** that will help you to complete a particular procedure. **CAUTIONS** are given to prevent you from making an error that could **damage the vehicle**. **WARNINGS** remind you to be especially careful in those areas where carelessness can cause **personal injury**. The following list contains some general WARNINGS that you should follow when you work on a vehicle.

### PROTECTION OF THE VEHICLE

Always be sure to cover fenders, seats, and floor areas before starting work.

### A WORD ABOUT SAFETY

The following precautions must be followed when jacking up the vehicle.

1. Block wheels.
2. Use only specified jacking positions.
3. Support vehicle with safety stands (rigid racks).

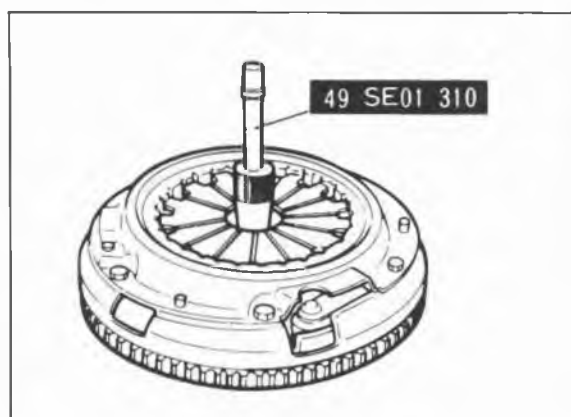
Start the engine only after making certain the engine compartment is clear of tools and people.



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## **PREPARATION OF TOOLS AND MEASURING EQUIPMENT**

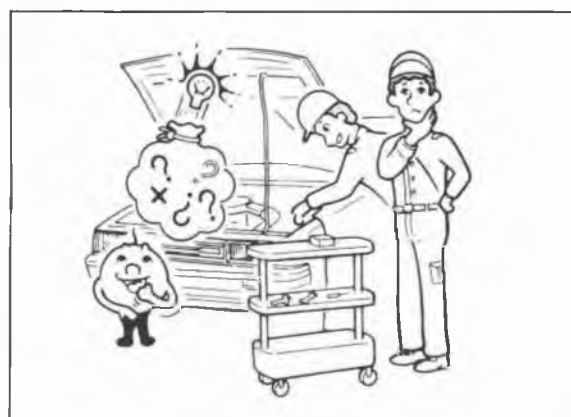
Be sure that all necessary tools and measuring equipment are available before starting any work activity.



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## **SPECIAL TOOLS**

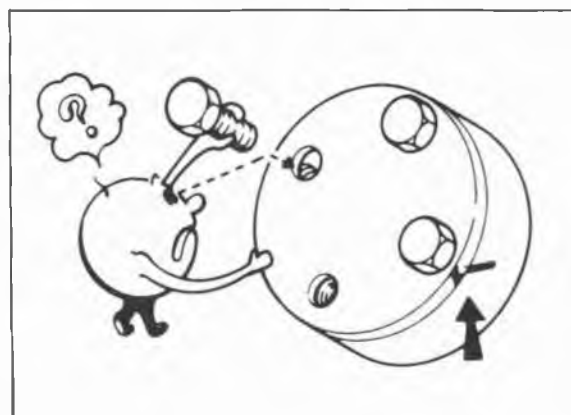
Use special tools when they are required.



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## **REMOVAL OF PARTS**

While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.

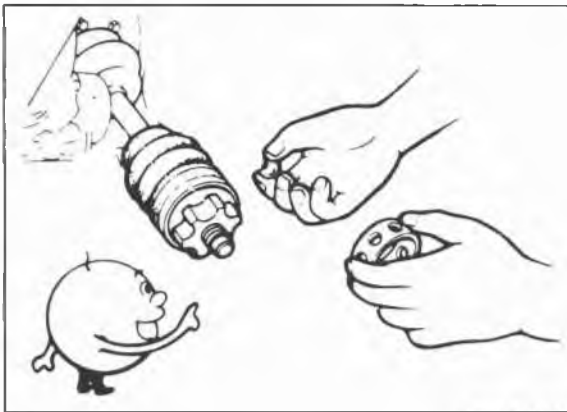


47U0GX-007

## **DISASSEMBLY**

If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance, and be identified so that reassembly can be performed easily and efficiently.

# G FUNDAMENTAL PROCEDURES

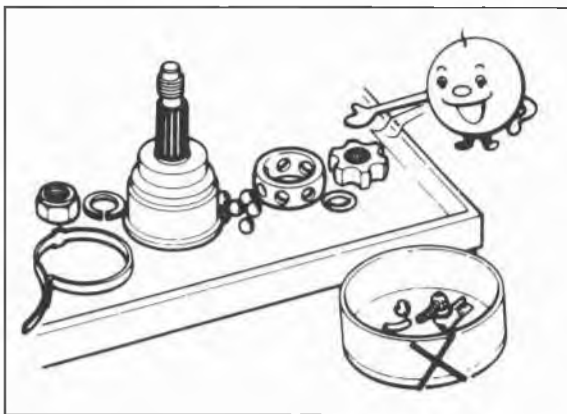


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## DISASSEMBLY

### 1. Inspection of parts

Each part when removed should be carefully inspected for malfunctioning, deformation, damage, and other problems.

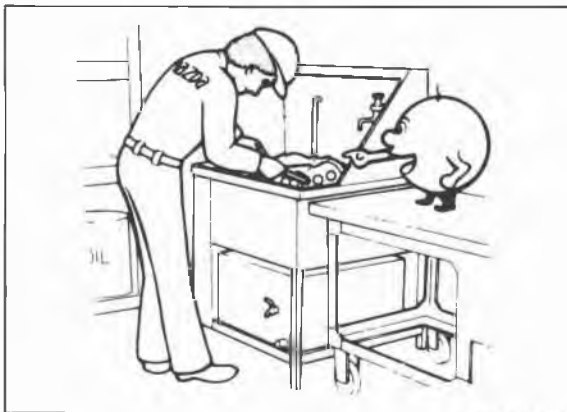


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### 2. Arrangement of parts

All disassembled parts should be carefully arranged for reassembly.

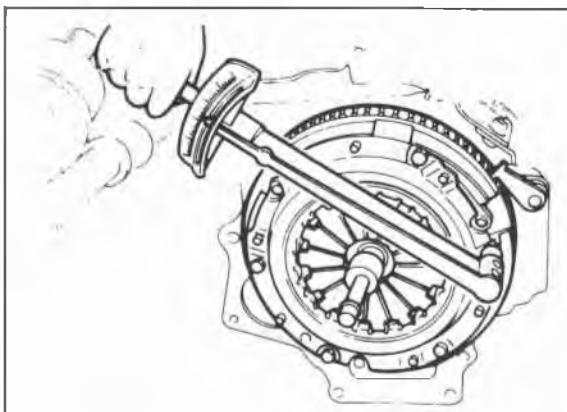
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



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### 3. Cleaning parts for reuse

All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.



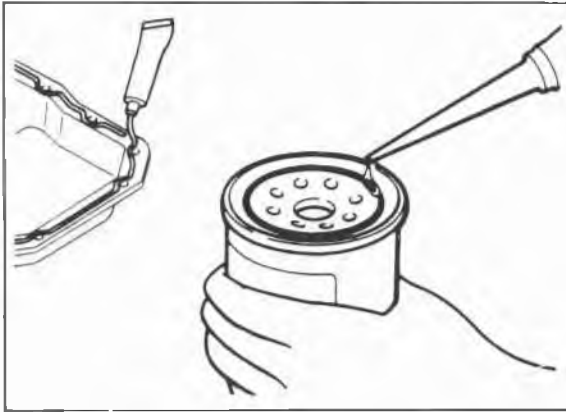
47U0GX-011

## REASSEMBLY

Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.

If removed, these parts should be replaced with new ones:

1. Oil seals
2. Gasket
3. O-rings
4. Lock washers
5. Cotter pins (split pins)
6. Nylon nuts



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Depending on where they are;

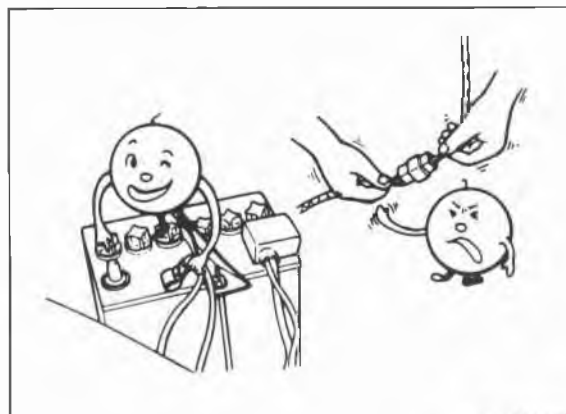
1. Sealant should be applied to gaskets
2. Oil should be applied to the moving components of parts
3. Specified oil or grease should be applied at the prescribed locations (oil seals, etc.) before assembly.



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## **ADJUSTMENTS**

Use suitable gauges and/or testers when making various adjustments.



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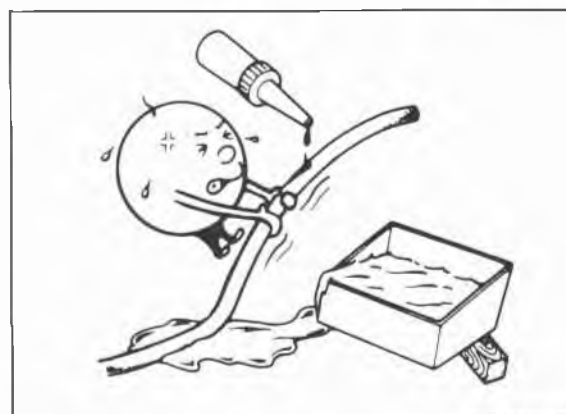
## **ELECTRICAL SYSTEM**

Be sure to disconnect the battery cable from the negative (-) terminal of the battery.

Never pull on the wiring when disconnecting connectors.

When locking connectors, make sure to listen for a click that will let you know they are securely locked.

Handle sensors and relays carefully. Be careful not to drop them or strike them against other parts.



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## **RUBBER PARTS AND TUBING**

Always prevent gasoline or oil from getting on rubber parts or tubing.



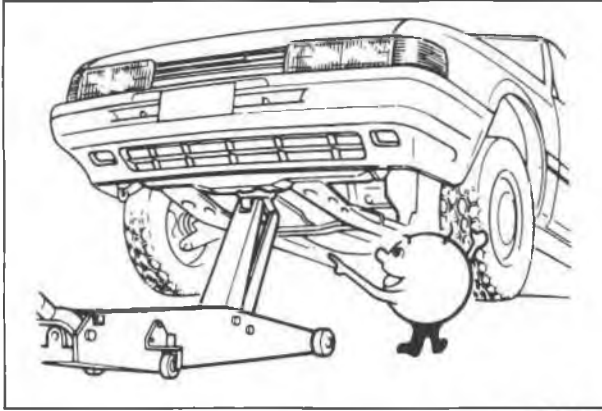
# G JACK AND SAFETY STAND (RIGID RACK) POSITIONS

## JACK AND SAFETY STAND (RIGID RACK) POSITIONS

### FRONT END

#### Jack position:

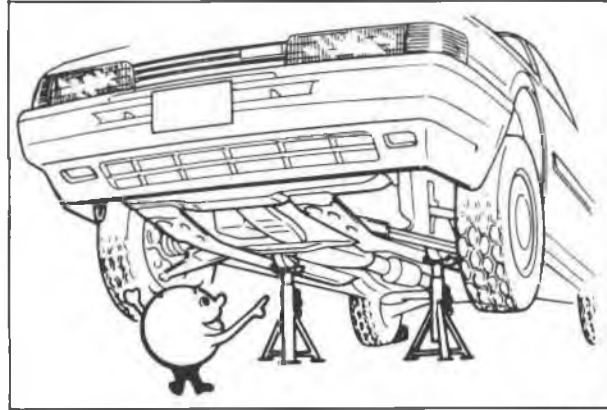
At the center of the crossmember



47U0GX-016

#### Safety stand positions:

On both sides of the body frame



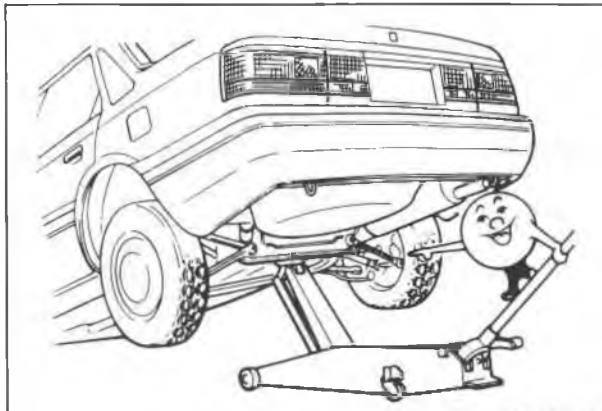
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### REAR END

#### Jack position:

At the center of the rear crossmember

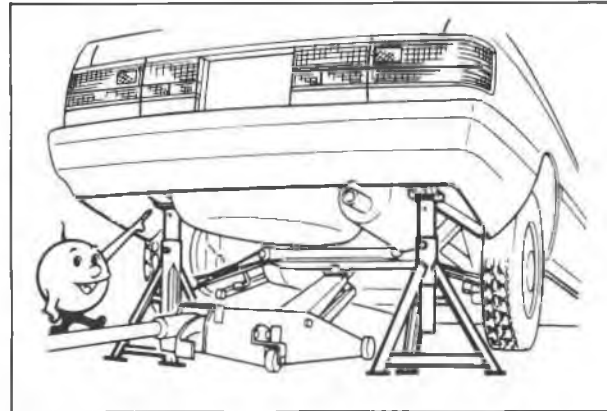
#### 2WS



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#### Safety stand positions:

On both sides of the body frame

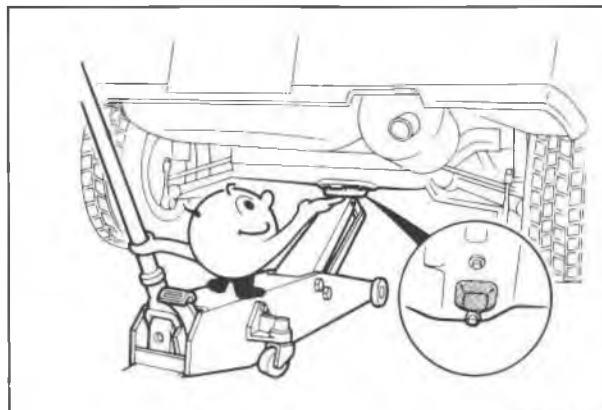


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#### Jack position:

At the center of the rear crossmember

#### 4WS



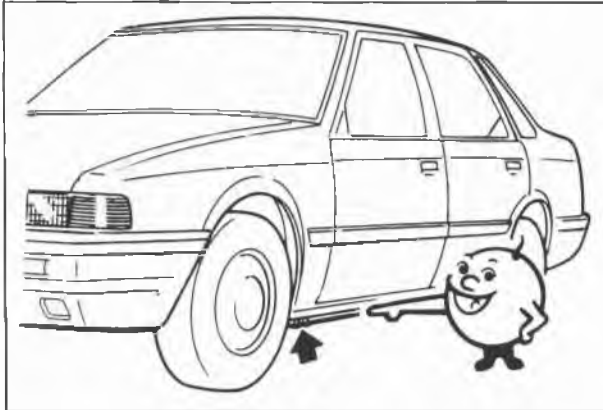
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**VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS**

**FRONT END**

**Frame**

Side sills (front)

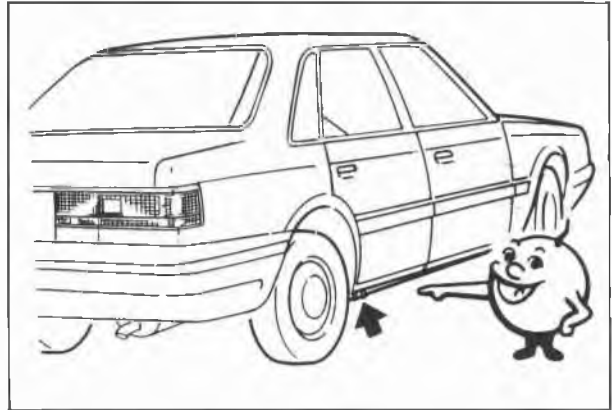


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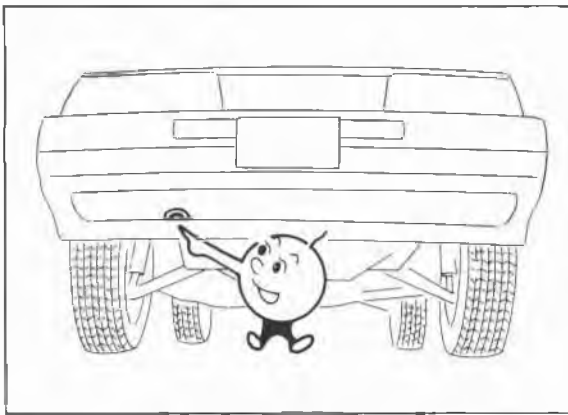
**REAR END**

**Frame**

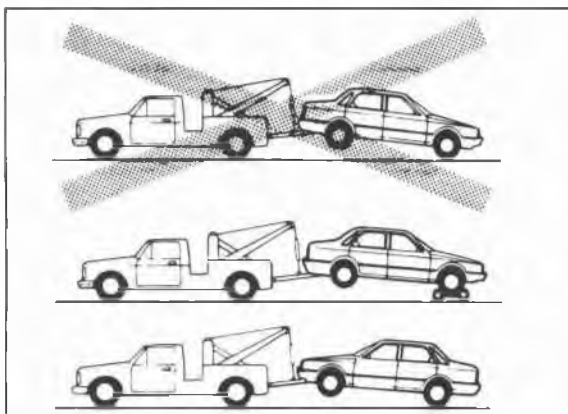
Side sills (rear)



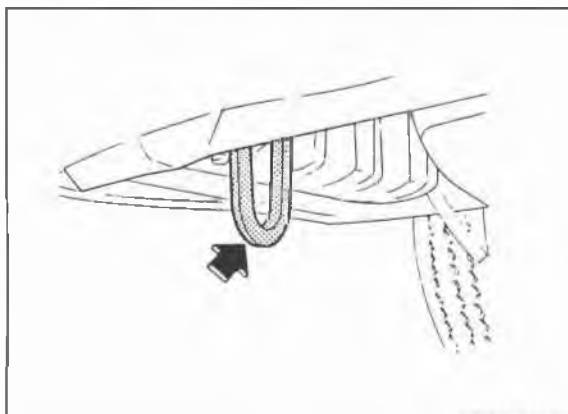
47U0GX-021



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76U0GX-003



86U0GX-004

## TOWING

Proper towing equipment is necessary to prevent damage to the vehicle during any towing operation. Laws and regulations applicable to vehicles in tow must always be observed.

Whether the vehicle is equipped with either an automatic or manual transaxle, release the parking brake, place the selector lever (shift lever) in neutral, and set the ignition key in the "ACC" position. As a rule, towed vehicles should be pulled with their drive wheels off the ground.

If excessive vehicle damage or other conditions prevent towing a vehicle with its drive wheels up, use wheel dollies. With all four wheels on the ground, the vehicle may be towed only forward. In this case, it cannot be towed at a speed exceeding 56 km/h (35 mph) for more than 80 km (50 miles) without danger of damaging the transaxle.

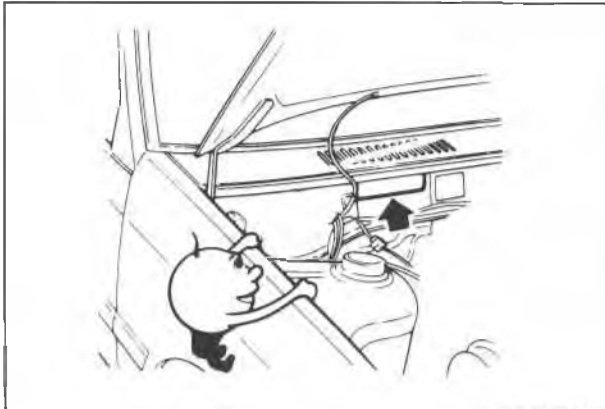
If the towing speed will exceed 56 km/h (35 mph), or if the towing distance will exceed 80 km (50 miles), use either of these two methods:

1. Place the front wheels on dollies.
2. Tow with the front wheels off the ground.

## CAUTIONS

- a) The power assist for the brakes and steering (if so equipped) will be inoperable while the engine is off.
- b) When either of the towing hooks is used, always pull the cable or chain straight away from the hook and do not apply any sideways force to it. To further help prevent damage, do not take up slack too quickly in the cable or chain.
- c) The rear towing hook should be used only in an emergency situation, (e.g., to pull the vehicle from a ditch, a snowbank, or mud).

## CHASSIS NUMBER LOCATION



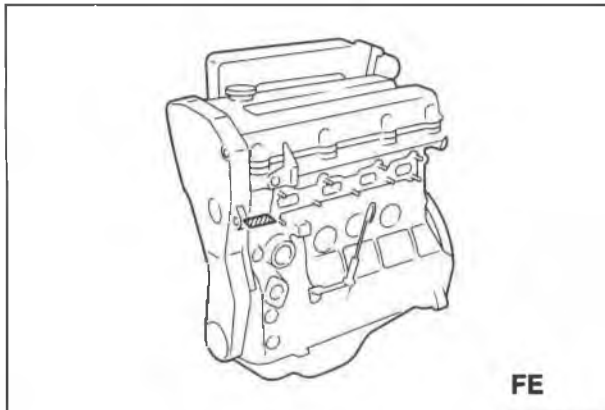
67U0GX-005

## UNITS

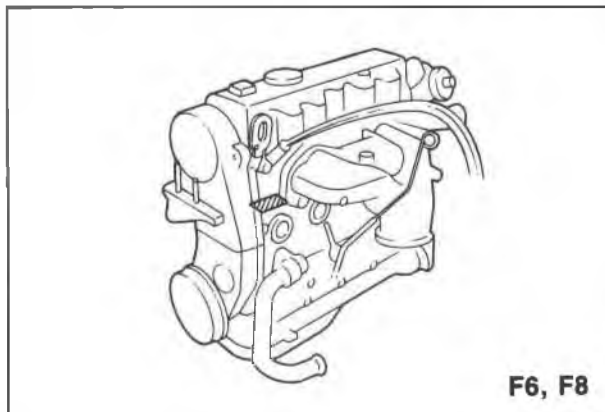
N-m (m-kg, ft-lb or in-lb)	Torque
rpm	Revolutions per minute
A	Ampere(s)
V	Volt(s)
$\Omega$	Ohm(s) (resistance)
kPa (psi)	Pressure (usually positive)
mmHg (in Hg)	Pressure (usually negative)
W	Watt

76G0GX-004

## ENGINE MODEL AND NUMBER LOCATION



67U0GX-007



F6, F8

## ABBREVIATIONS

AAS	Auto adjusting suspension
A/C	Air conditioner
ACC	Accessories
ABDC	After bottom dead center
ATDC	After top dead center
ATX	Automatic transaxle
ATF	Automatic transmission fluid
ABS	Anti-lock brake system
BBDC	Before bottom dead center
BTDC	Before top dead center
EX	Exhaust
EC-AT	Electronically controlled automatic transaxle
ESPS	Engine speed sensing power steering
ECPS	Electronically-controlled power steering
HLA	Hydraulic lash adjuster
IG	Ignition
IN	Intake
IC	Integrated circuit
INT	Intermittent
LH	Left hand
MTX	Manual transaxle
M	Motor
OFF	Switch off
ON	Switch on
PCV	Positive crankcase ventilation
P/S	Power steering
P/W	Power window
RH	Right hand
RF-CX	Comprex supercharged RF engine
RF-N	Normally aspirated RF engine
ST	Start
SW	Switch
SST	Special tools
4WS	4-wheel steering
2WS	2-wheel steering
4HAT	4-speed hydraulic automatic transaxle
FI	Fuel injection

76G0GX-005

# G CAUTION

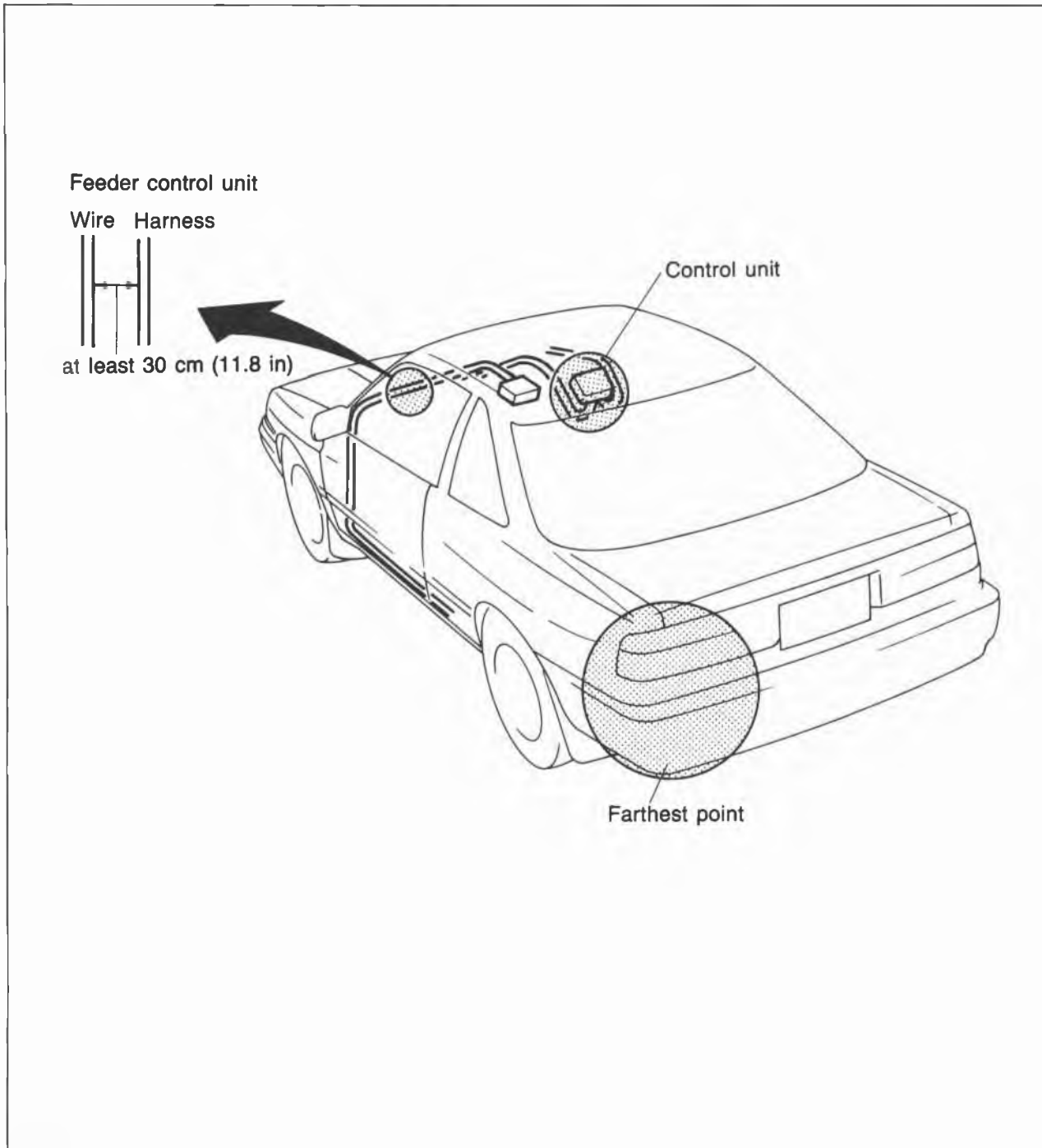
## CAUTION

### INSTALLATION OF A MOBILE TWO-WAY RADIO SYSTEM

If a mobile two-way radio system is installed improperly, or if a wrong type is used, the Fuel Injection system and other systems may be affected.

When car is equipped with a mobile two-way radio system, observe the following precautions.

1. Install the antenna at the farthest point from the control unit.
2. Keep the antenna feeder away from the control unit harness as far as possible.  
**(at least 30cm (11.8 in))**
3. Insure that the antenna and feeder are properly adjusted.
4. Do not install a powerful mobile two-way radio system.



86U0GX-002



# PRE-DELIVERY INSPECTION AND SCHEDULED MAINTENANCE SERVICES

**PRE-DELIVERY INSPECTION**..... 0— 2  
PRE-DELIVERY INSPECTION TABLE..... 0— 2  
**SCHEDULED MAINTENANCE SERVICES** .... 0— 3  
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(For ECE Leaded gasoline) ..... 0— 3  
MAINTENANCE TABLE  
(For ECE Unleaded gasoline)..... 0— 9  
MAINTENANCE TABLE (For General)..... 0—15

# 0 PRE-DELIVERY INSPECTION

## PRE-DELIVERY INSPECTION TABLE

### EXTERIOR

**INSPECT** and **ADJUST**, if necessary, the following items to the specifications:

- Glass, exterior bright metal and paint for damage
- Wheel lug nuts  
88—118 N·m (9—12 m·kg, 65—87 ft·lb)
- Tire pressures (Refer to section 12)
- All weatherstrips for damage or detachment
- Operation of bonnet release and lock
- Operation of fuel lid and trunk lid (Back door) opener
- Door operation and alignment
- Headlight aiming

**INSTALL** following parts:

- Wheel caps or rings (if equipped)
- Outside rear view mirror(s)

### UNDER BONNET—ENGINE OFF

**INSPECT** and **ADJUST**, if necessary, the following items to the specifications:

- Fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- Engine oil level
- Power steering fluid level (if equipped)
- Brake and clutch master cylinder fluid level (if equipped)
- Windshield washer reservoir fluid level
- Radiator coolant level and specific gravity

Protection °C (°F)	Specific gravity at 20°C (68°F)
-4 (25)	1.028
-16 (3)	1.054
-26 (-15)	1.066
-40 (-40)	1.078

- Tightness of water hose clamps (including heater hoses)
- Tightness of battery terminals
- Manual transaxle oil level
- Drive belt tensions (Refer to section 1)
- Accelerator cable and its linkage for free movement
- Headlight cleaner fluid level (if equipped)

**CLEAN** spark plugs

### INTERIOR

**INSTALL** the following parts:

- Rubber stopper for inside rear view mirror
- Fuse for accessories

**CHECK** the operations of the following items:

- Seat controls (sliding and reclining) and head rest
- Door locks including childproof door locks (if equipped)
- Seat belts and warning system
- Ignition switch and steering lock
- Inhibitor switch (ATX only)
- All lights including warning and indicator lights
- Sound warning system
- Headlight cleaner (if equipped)
- Horn, wipers and washers (front and rear, if equipped)
- Radio and antenna (if equipped)

- Cigarette lighter and clock
- Remote control outside rear view mirrors (if equipped)
- Power windows (if equipped)
- Heater, defroster and air conditioner at various mode selection (if equipped)
- Sunroof (if equipped)

**ADJUST** antenna trimmer on radio (if equipped)

**CHECK** the following items:

- Presence of spare fuse
- Upholstery and interior finish

**CHECK** and **ADJUST**, if necessary, the following items:

- Operation and fit of windows
- Pedal height and free play of brake and clutch pedal

	Pedal height mm (in)	free play mm (in)
Clutch pedal	216.5—221.5 (8.52—8.72)	5—13 (0.2—0.51)
Brake pedal	222—227 (8.74—8.94)	4—7 (0.16—0.28)

- Parking brake  
5—7 noches/98 N (10 kg, 22lb)

### UNDER BONNET—ENGINE RUNNING AT OPERATING TEMPERATURE

**CHECK** the following items:

- Operation of idle-up system for air conditioner or power steering (if equipped)
- Automatic transaxle fluid level
- Operation of dash pot
- Initial ignition timing
- Idle speed

### ON HOIST

**CHECK** the following items:

- Underside fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- Tires for cuts or bruises
- Steering linkage, suspension, exhaust system and all underside hardware for looseness or damage

**REMOVE** protective cover from brake discs

### ROAD TEST

**CHECK** the following items:

- Brake operation
- Clutch operation
- Steering control
- Operation of meters and gauge
- Squeaks, rattles or unusual noise
- Engine general performance (including turbo)
- Emergency locking retractors
- Cruise control system (if equipped)

### AFTER ROAD TEST

**REMOVE** seat and floor mat protective covers

**CHECK** for necessary owner information materials, tools and spare tire in vehicle

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**SCHEDULED MAINTENANCE**  
**MAINTENANCE TABLE (For ECE Leaded gasoline)**

**SCHEDULED MAINTENANCE 0**

**For ECE Leaded gasoline**

**Chart symbols:**

- I** : Inspect: Visual examination or functional measurement of a system's operation (performance)
- A** : Adjust : Examination resulting in adjustment or replacement
- R** : Replace or change
- T** : Tighten
- O** : Applicable
- X** : Not applicable
- ⊙ **1** : F8 engine with carbretor, MTX, ATX
- ⊙ **2** : FE engine with carbretor, MTX, ATX
- ⊙ **3** : FE DOHC engine with fuel injection, 4WS, MTX
- ⊙ **4** : RF-CX, RF-N engine with MTX

**REMARKS:**

Major service interval at 12 months/20,000 km (12,000 Miles), Lubrication service based on distance only 10,000 km (6,000 Miles) not time  
After 80,000 km (48,000 Miles) or 48 months, continue to follow the described maintenance items and intervals periodically.

As for \* marked items in this maintenance chart, please pay attention to the following points.

- \*1 Replacement of the timing belt is required at every 100,000 km (60,000 Miles). Failure to replace the timing belt may result in damage to the engine.
- \*2 If the vehicle is operated under the following conditions, it is suggested that the engine oil and oil filter be changed more often than at usual recommended intervals.
  - a) Driving in dusty conditions.
  - b) Extended periods of idling or low speed operation.
  - c) Driving for a prolonged period in cold temperatures or driving only short distances regularly.
- \*3. If the vehicle is operated in very dusty or sandy areas, inspect and, if necessary, replace more often than at usual recommended intervals.
- \*4. This is a full function check of all electrical systems, i.e., all lights, washers (including condition of blades) electrical windows, sunroof, horn, etc....
- \*5. Replace every two years.

If there has been continuous hard driving, mountain driving, or if the brakes are used extensively or the vehicle is operated in extremely humid climates, the brake fluid should be changed annually.

**Emission Control and Related Systems**

The ignition and fuel systems are vitally important to the proper operation of the emissions control and related systems, as well as for efficient engine operation. It is strongly recommended that all servicing related to these systems be done by your Authorized Mazda Dealer.



Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Clutch pedal											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Pedal height: 216.5—221.5 mm (8.524—8.720 in)</li> <li>• Free play: 5—13 mm (0.20—0.51 in)</li> </ul>	6—4
Brake pedal											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Pedal height: 222—227 mm (8.74—8.94 in)</li> <li>• Free play: 4—7 mm (0.16—0.28 in)</li> </ul>	11—11
Parking brake				A		A		A		A	○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Lever stroke: 5—7 notches</li> </ul>	11—65
Power brake unit and hoses											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Check the vacuum hoses and connectors</li> </ul>	11—27
Brake fluid *3						R				R	○	○	○	○	• Fluid level	11—6
Clutch fluid											○	○	○	○	• Fluid level	6—4
Power steering fluid											○	○	○	○	• Fluid level	10—11
Power steering system and hoses											○	○	○	○	• Fluid leakage or oozing	10—13
Air cleaner element *3						R				R					—	1A—6 1B—5 1C—5
Choke system											○	○	X	X	<ul style="list-style-type: none"> <li>• Carburetor linkage</li> <li>• Choke diaphragm</li> <li>• Choke valve clearance</li> <li>• Choke Unloader system</li> </ul>	4A—26 4A—34 4A—34 4A—33
Cooling system (including coolant level adjustment)											○	○	○	○	<ul style="list-style-type: none"> <li>• Hoses for cracks or wear</li> <li>• Coolant level</li> </ul>	3A—5 3B—4
Engine coolant			Replace every 2 years								○	○	○	○	—	3A—5 3B—4

MAINTENANCE TABLE (For ECE Leaded gasoline)

# 0 SCHEDULED MAINTENANCE

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
Miles x 1000	0.6	6	12	18	24	30	36	42	48							
Battery electrolyte level and specific gravity			A		A		A		A		○	○	○	○	• Electrolyte level • Specific gravity	5—8
Drive belts	A		A		A		A		A		○	○	○	○	• Cracks or damage • Tension	1A—7 1B—6 1C—7
Engine timing belts *1	Replace every 100,000 Km										○	○	○	○	—	1A—14 1B—11 1C—11
Engine valve clearance	A		A		A		A		A		○	X	X	○	• Valve clearance: F8 (Hot engine) IN: 0.30 mm (0.012 in) EX: 0.30 mm (0.012 in) FE-12-valve, FE (DOHC) IN: 0; Maintenance free EX: 0; Maintenance free RF-CX, RF-N (Cold engine) IN: 0.25 mm (0.010 in) EX: 0.35 mm (0.014 in)	1A-10  1C—85
Intake and exhaust manifold nuts and bolts	T				T				T		○	○	X	X	• Retighten the intake and exhaust manifold nuts N-m (m-kg, ft-lb)	1A—86 1B—68 1C—89
Engine oil *2	R	R	R	R	R	R	R	R	R	R	○	○	○	○	• Oil pan capacity F8, FE: 3.6 liters (3.8 US qt, 3.2 Imp qt) RF-CX, RF-N: 5.0 liters (5.3 US qt, 4.4 Imp qt)	2A—6 2B—6
Oil filter *2		R	R	R	R	R	R	R	R	R	○	○	○	○	• Oil filter capacity F8, FE 12-valve 0.3 liters (0.32 US qt, 0.26 Imp qt) FE (DOHC) 0.2 liters (0.21 US qt, 0.18 Imp qt) RF-CX, RF-N 0.4 liters (0.42 US qt, 0.35 Imp qt)	2A—6 2B—6
Fuel filter (R) for carbretor model			(R)		R		(R)		R		○	○	○	○	—	4A—37

**0 SCHEDULED MAINTENANCE**

**MAINTENANCE TABLE (For ECE Leaded gasoline)**

Interval Procedure & item	Number of Months or km, whichever comes first										①	②	③	④	Service data and inspection point	Page									
	Months	—	6	12	18	24	30	36	42	48															
	x 1000 Km	1	10	20	30	40	50	60	70	80															
	Miles x 1000	0.6	6	12	18	24	30	36	42	48															
Fuel lines and hoses			I		I		I		I		○	○	○	○	• Fittings, connections and components for leaks	4B—42									
Spark plugs				A		A		A		A	○	○	○	X	<ul style="list-style-type: none"> <li>• Plug gap: F8, FE (8-VALVE) 0.75—0.85 mm (0.030—0.033 in) FE (12-VALVE) FE (DOHC) 0.7—0.8 mm (0.028—0.031 in)</li> <li>• Recommended spark plugs</li> </ul> <table border="1"> <tr> <td></td> <td>F6,F8,FE 8-VALVE</td> <td>FE 12-VALVE DOHC</td> </tr> <tr> <td>NGK</td> <td>BPR 5ES BPR 6ES</td> <td>BCPR 5E BCPR 6E</td> </tr> <tr> <td>Nippon Denso</td> <td>W16EXR-U W20EXR-U</td> <td>Q16PR-U* Q20PR-U</td> </tr> </table>		F6,F8,FE 8-VALVE	FE 12-VALVE DOHC	NGK	BPR 5ES BPR 6ES	BCPR 5E BCPR 6E	Nippon Denso	W16EXR-U W20EXR-U	Q16PR-U* Q20PR-U	5—9
	F6,F8,FE 8-VALVE	FE 12-VALVE DOHC																							
NGK	BPR 5ES BPR 6ES	BCPR 5E BCPR 6E																							
Nippon Denso	W16EXR-U W20EXR-U	Q16PR-U* Q20PR-U																							
Initial ignition timing					I		I		I		○	○	○	X	<ul style="list-style-type: none"> <li>• Initial ignition timing 6 ± 1° BTDC 12 ± 1° BTDC (FE DOHC)</li> </ul>	5—11									
Idle speed			A		A		A		A		○	○	○	X	<ul style="list-style-type: none"> <li>• Check the idle speed (rpm) FE DOHC 700—800 Carburetor MTX 800—850, ATX 900—950 (N range)</li> </ul>	4A—38 4C—29									
Idle mixture			A		A		A		A		○	○	○	X	<ul style="list-style-type: none"> <li>• CO concentration FE DOHC 1.5 ± 0.5 % Others 2.0 ± 0.5 % HC concentration FE DOHC Less than 1000 rpm</li> </ul>	4A—38 4C—30									
Dashpot (MTX)			A		A		A		A		○	○	X	X	<ul style="list-style-type: none"> <li>• Operation</li> </ul>	4A—50 4B—67									

\* Only FE 12-VALVE

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1 MTX	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Idle-up solenoid valve											⊙	⊙	X	X	—	4A—56
All electrical system *4											⊙	⊙	⊙	⊙	• Check the all electrical system	Section 15
Head light alignment				A		A		A		A	⊙	⊙	⊙	⊙	• Check the head light aiming	14—31
Steering and front suspension											⊙	⊙	⊙	⊙	• Damage	10—28
Front and rear power steering system and hoses (For 4WS)											X	X	⊙	X	• Operation and looseness • Fluid leakage or oozing	10—44 10—14
4-Wheel steering system operation and linkage (For 4WS)											X	X	⊙	X	• Operation and looseness • Fluid leakage or oozing	10—33 10—14
Rear wheel steering steering angle (For 4WS)											X	X	⊙	X	• Steering wheel angle: Inner 5°00' ± 45' Outer 5°00' ± 45'	13—54
Solenoid valve oil filter (For 4WS)						R			R	R	X	X	⊙	X	—	10—41
Rear suspension outer ball joints (For 4WS)											X	X	⊙	X	• Damage, looseness and grease leakage	13—37
Manual transaxle oil						A			R	R	⊙	⊙	⊙	⊙	• Oil capacity 3.35 liters (3.6 US qt, 3.0 Imp qt)	7A—6
Automatic transaxle fluid level						A			A	A	⊙	⊙	X	X	• Oil capacity 4-Speed 6.8 liters (7.2 US qt, 6.0 Imp qt) 3-Speed 6.2 liters (6.6 US qt, 5.5 Imp qt)	7B—2
Bolts and nuts on chasis and body	T		T		T		T		T	T	⊙	⊙	⊙	⊙	—	—
Disk brakes/Drum brakes											⊙	⊙	⊙	⊙	• Min. pad thickness: Front 2.0 mm (0.08 in) Rear 1.0 mm (0.04 in) • Min. disc thickness: Front 14 or 15 inch-wheel 22 mm (0.87 in) 13 inch-wheel 18 mm (0.71 in) Rear 8.0 mm (0.31 in) • Disc run out: Front 0.1 mm (0.004 in) Rear 0.1 mm (0.004 in) • Min. lining thickness: 1.0 mm (0.04 in) • Max. drum inner dia: 230.1 mm (9.06 in)	11—45 11—54 11—45 11—54 11—54 11—45 11—54 11—60 11—60

# 0 SCHEDULED MAINTENANCE

MAINTENANCE TABLE (For ECE Leaded gasoline)

Interval  <b>Procedure &amp; Item</b>	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Brake lines, Hoses, and connections											○	○	○	○	• Proper attachment and connections	11—8
Body condition	Inspect annually										○	○	○	○	—	—
Tyres (including spare tyre) Inflation pressure adjustment											○	○	○	○	• Check the air pressure	12—2
Hinges and catches			A		A		A		A		○	○	○	○	—	—
Underside of vehicle											○	○	○	○	—	—
Seat belt											○	○	○	○	• Operation and looseness	14—101
Road test											○	○	○	○	—	—

**For ECE Unleaded gasoline**

**Chart symbols:**

- I** : Inspect: Visual examination or functional measurement of a system's operation (performance)
- A** : Adjust: Examination resulting in adjustment or replacement
- R** : Replace or change
- T** : Tighten
- O** : Applicable
- X** : Not applicable
- ⊙**1** : FE engine with fuel injection, MTX, ATX
- ⊙**2** : FE DOHC engine with fuel injection, 4WS, MTX
- ⊙**3** : FE engine with carburetor, MTX, ATX
- ⊙**4** : RF-CX, RF-N engine with MTX

**REMARKS:**

Major service interval at 12 months/20,000 km (12,000 Miles), Lubrication service based on distance only 10,000 km (6,000 Miles) not time  
 After 80,000 km (48,000 Miles) or 48 months, continue to follow the described maintenance items and intervals periodically.

As for \* marked items in this maintenance chart, please pay attention to the following points.

- \*1 Replacement of the timing belt is required at every 100,000 km (60,000 Miles). Failure to replace the timing belt may result in damage to the engine.
- \*2 If the vehicle is operated under the following conditions, it is suggested that the engine oil and oil filter be changed more often than at usual recommended intervals.
  - a) Driving in dusty conditions.
  - b) Extended periods of idling or low speed operation.
  - c) Driving for a prolonged period in cold temperatures or driving only short distances regularly.
- \*3. If the vehicle is operated in very dusty or sandy areas, inspect and, if necessary, replace more often than at usual recommended intervals.
- \*4. This is a full function check of all electrical systems, i.e., all lights, washers (including condition of blades) electrical windows, sunroof, horn, etc....
- \*5. Replace every two years.

If there has been continuous hard driving, mountain driving, or if the brakes are used extensively or the vehicle is operated in extremely humid climates, the brake fluid should be changed annually.

**Emission Control and Related Systems**

The ignition and fuel systems are vitally important to the proper operation of the emissions control and related systems, as well as for efficient engine operation. It is strongly recommended that all servicing related to these systems be done by your Authorized Mazda Dealer.

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
Miles x 1000	0.6	6	12	18	24	30	36	42	48							
Clutch pedal											○	○	○	○	• Operation • Pedal height: 216.5—221.5 mm (8.524—8.720 in) • Free play: 5—13 mm (0.20—0.51 in)	6—4
Brake pedal											○	○	○	○	• Operation • Pedal height: 222—227 mm (8.74—8.94 in) • Free play: 4—7 mm (0.16—0.28 in)	11—11 11—11
Parking brake				A		A		A		A	○	○	○	○	• Operation • Lever stroke: 5—7 notches	11—65
Power brake unit and hoses											○	○	○	○	• Operation • Check the vacuum hoses and connectors	11—27
Brake fluid *5						R				R	○	○	○	○	• Fluid level	11—6
Clutch fluid											○	○	○	○	• Fluid level	6—4
Power steering fluid											○	○	○	○	• Fluid level	10—11
Power steering system and hoses											○	○	○	○	• Fluid leakage or oozing	10—13
Air cleaner element *3						R				R	○	○	○	○	—	1A—6 1B—5 1C—5
Cooling system (including coolant level adjustment)											○	○	○	○	• Hoses for cracks or wear • Coolant level	3A—5 3B—4
Engine coolant			Replace every 2 years								○	○	○	○	—	3A—5 3B—4

MAINTENANCE TABLE (For ECE Unleaded gasoline)

**0 SCHEDULED MAINTENANCE**

MAINTENANCE TABLE (For ECE Unleaded gasoline)

SCHEDULED MAINTENANCE 0

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page									
	Months	—	6	12	18	24	30	36	42	48															
	x 1000 Km	1	10	20	30	40	50	60	70	80															
Battery electrolyte level and specific gravity			A		A		A		A		○	○	○	○	<ul style="list-style-type: none"> <li>Electrolyte level</li> <li>Specific gravity</li> </ul>	5—8									
Drive belts	A		A		A		A		A		○	○	○	○	<ul style="list-style-type: none"> <li>Cracks or damage</li> <li>Tension</li> </ul>	1A—7 1B—6 1C—7									
Engine timing belts *1	Replace Severy 100,000 Km										○	○	○	○	—	1A—14 1B—11 1C—11									
Engine valve clearance	A		A		A		A		A		○	X	○	○	<ul style="list-style-type: none"> <li>Valve clearance:</li> <li>FE-8-valve (Hot engine) IN: 0.30 mm (0.012 in) EX: 0.30 mm (0.012 in)</li> <li>FE (DOHC) IN: 0; Maintenance free EX: 0; Maintenance free</li> <li>RF-CX, RF-N (Cold engine) IN: 0.25 mm (0.010 in) EX: 0.35 mm (0.014 in)</li> </ul>	1A—10  1C—85									
Intake and exhaust manifold nuts and bolts	T				T				T		○	X	○	X	<ul style="list-style-type: none"> <li>Retighten the intake and exhaust manifold nuts</li> </ul> <p style="text-align: center;">N-m (m-kg, ft-lb)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>IN</th> <th>EX</th> </tr> </thead> <tbody> <tr> <td>FE</td> <td>19—30 (1.9—3.1,</td> <td>22—28 (2.2—2.9,</td> </tr> <tr> <td>FE DOHC</td> <td>14—22)</td> <td>16—21)</td> </tr> </tbody> </table>		IN	EX	FE	19—30 (1.9—3.1,	22—28 (2.2—2.9,	FE DOHC	14—22)	16—21)	1A—86 1B—68
	IN	EX																							
FE	19—30 (1.9—3.1,	22—28 (2.2—2.9,																							
FE DOHC	14—22)	16—21)																							
Engine oil *2	R	R	R	R	R	R	R	R	R	R	○	○	○	○	<ul style="list-style-type: none"> <li>Oil pan capacity</li> <li>FE: 3.6 liters (3.8 US qt, 3.17 Imp qt)</li> <li>RF-CX, RF-N: 5.0 liters (5.3 US qt, 4.4 Imp qt)</li> </ul>	2A—6 2B—6									
Oil filter *2		R	R	R	R	R	R	R	R	R	○	○	○	○	<ul style="list-style-type: none"> <li>Oil filter capacity</li> <li>FE 8-valve 0.3 liters (0.32 US qt, 0.26 Imp qt)</li> <li>FE (DOHC) 0.2 liters (0.21 US qt, 0.18 Imp qt)</li> <li>RF-CX, RF-N 0.4 liters (0.42 US qt, 0.35 Imp qt)</li> </ul>	2A—6 2B—6									



Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page																																																																																																																																	
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Fuel filter (R) for carburetor model			(R)			R		(R)		R	○	○	○	○	—	4A—37																																																																																																																																	
Fuel lines and hoses			I			I		I		I	○	○	○	○	• Fittings, connections and components for leaks	4B—42																																																																																																																																	
Spark plugs															<ul style="list-style-type: none"> <li>• Plug gap: Carburetor, FE (DOHC) 1.0—1.1 mm (0.039—0.043 in) FE 0.75—0.85 mm (0.030—0.033 in)</li> <li>• Recommended spark plugs</li> </ul> <table border="1"> <tr> <td rowspan="2">NGK</td> <td>Carburetor</td> <td>BPR5ES-11 BPR6ES-11</td> </tr> <tr> <td>FE (Fuel injection)</td> <td>BPR 5ES BPR 6ES</td> </tr> <tr> <td rowspan="3">Nippon Denso</td> <td>FE DOHC</td> <td>BCPR 5E-11 BCPR 6E-11 BCPR 7E-11</td> </tr> <tr> <td>Carburetor</td> <td>W16EXR-U11 W20EXR-U11</td> </tr> <tr> <td>FE (Fuel injection)</td> <td>W16EXR-U W20EXR-U</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>A</td> <td></td> <td></td> <td>A</td> <td></td> <td>A</td> <td></td> <td>A</td> <td>○</td> <td>○</td> <td>○</td> <td>X</td> <td></td> <td>5—9</td> </tr> <tr> <td>Initial ignition timing</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>I</td> <td></td> <td>I</td> <td></td> <td>I</td> <td>○</td> <td>○</td> <td>○</td> <td>X</td> <td> <ul style="list-style-type: none"> <li>• Initial ignition timing 6 ± 1° BTDC 12 ± 1° BTDC (FE DOHC)</li> </ul> </td> <td>5—11</td> </tr> <tr> <td>Idle Speed</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> <ul style="list-style-type: none"> <li>• Check the idle speed (rpm) Carburetor MTX 850—900, ATX 900—950 (N range) FE DOHC 700—800 FE MTX 800—850, ATX 900—950 (N range)</li> </ul> </td> <td>4A—38 4B—29 4C—29</td> </tr> <tr> <td>E.G.R. System</td> <td></td> <td></td> <td>I</td> <td></td> <td></td> <td>I</td> <td></td> <td>I</td> <td></td> <td>I</td> <td>○</td> <td>○</td> <td>○</td> <td>X</td> <td>• System inspection</td> <td>4B—72 4A—64</td> </tr> <tr> <td>Evaporative system (if equipped)</td> <td></td> <td></td> <td>I</td> <td></td> <td></td> <td>I</td> <td></td> <td>I</td> <td></td> <td>I</td> <td>○</td> <td>○</td> <td>X</td> <td>X</td> <td>• System inspection</td> <td>4B—76 4C—81</td> </tr> <tr> <td>Choke system</td> <td></td> <td></td> <td>I</td> <td></td> <td></td> <td>I</td> <td></td> <td>I</td> <td></td> <td>I</td> <td>X</td> <td>X</td> <td>○</td> <td>X</td> <td> <ul style="list-style-type: none"> <li>• Carburetor linkage</li> <li>• Choke diaphragm</li> <li>• Choke valve clearance</li> <li>• Unloader system</li> </ul> </td> <td>4A—26 4A—34 4A—34 4A—33</td> </tr> </table>	NGK	Carburetor	BPR5ES-11 BPR6ES-11	FE (Fuel injection)	BPR 5ES BPR 6ES	Nippon Denso	FE DOHC	BCPR 5E-11 BCPR 6E-11 BCPR 7E-11	Carburetor	W16EXR-U11 W20EXR-U11	FE (Fuel injection)	W16EXR-U W20EXR-U																				A			A		A		A	○	○	○	X		5—9	Initial ignition timing						I		I		I	○	○	○	X	<ul style="list-style-type: none"> <li>• Initial ignition timing 6 ± 1° BTDC 12 ± 1° BTDC (FE DOHC)</li> </ul>	5—11	Idle Speed															<ul style="list-style-type: none"> <li>• Check the idle speed (rpm) Carburetor MTX 850—900, ATX 900—950 (N range) FE DOHC 700—800 FE MTX 800—850, ATX 900—950 (N range)</li> </ul>	4A—38 4B—29 4C—29	E.G.R. System			I			I		I		I	○	○	○	X	• System inspection	4B—72 4A—64	Evaporative system (if equipped)			I			I		I		I	○	○	X	X	• System inspection	4B—76 4C—81	Choke system			I			I		I		I	X	X	○	X	<ul style="list-style-type: none"> <li>• Carburetor linkage</li> <li>• Choke diaphragm</li> <li>• Choke valve clearance</li> <li>• Unloader system</li> </ul>	4A—26 4A—34 4A—34 4A—33
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	FE (Fuel injection)	BPR 5ES BPR 6ES																																																																																																																																															
Nippon Denso	FE DOHC	BCPR 5E-11 BCPR 6E-11 BCPR 7E-11																																																																																																																																															
	Carburetor	W16EXR-U11 W20EXR-U11																																																																																																																																															
	FE (Fuel injection)	W16EXR-U W20EXR-U																																																																																																																																															
			A			A		A		A	○	○	○	X		5—9																																																																																																																																	
Initial ignition timing						I		I		I	○	○	○	X	<ul style="list-style-type: none"> <li>• Initial ignition timing 6 ± 1° BTDC 12 ± 1° BTDC (FE DOHC)</li> </ul>	5—11																																																																																																																																	
Idle Speed															<ul style="list-style-type: none"> <li>• Check the idle speed (rpm) Carburetor MTX 850—900, ATX 900—950 (N range) FE DOHC 700—800 FE MTX 800—850, ATX 900—950 (N range)</li> </ul>	4A—38 4B—29 4C—29																																																																																																																																	
E.G.R. System			I			I		I		I	○	○	○	X	• System inspection	4B—72 4A—64																																																																																																																																	
Evaporative system (if equipped)			I			I		I		I	○	○	X	X	• System inspection	4B—76 4C—81																																																																																																																																	
Choke system			I			I		I		I	X	X	○	X	<ul style="list-style-type: none"> <li>• Carburetor linkage</li> <li>• Choke diaphragm</li> <li>• Choke valve clearance</li> <li>• Unloader system</li> </ul>	4A—26 4A—34 4A—34 4A—33																																																																																																																																	

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Dashpot (only for MTX)											X	X	○	X	• Operation	4A—50
Coast enrichment solenoid valve											X	X	○	X	—	4A—54
All electrical system *4											○	○	○	○	• Check the all electrical system	Section 15
Head light alignment			A		A		A		A		○	○	○	○	• Check the head light aiming	14—31
Steering and front suspension											○	○	○	○		10—28
Front and rear power steering system and hoses (For 4WS)											X	○	X	X	• Operation and looseness • Fluid leakage or oozing	10—44 10—14
4-Wheel steering system operation and linkage (For 4WS)											X	○	X	X	• Operation and looseness • Fluid leakage or oozing	10—33 10—14
Rear wheel steering angle (For 4WS)											X	○	X	X	• Steering wheel angle: Inner 5°00' ± 45' Outer 5°00' ± 45'	13—54
Solenoid valve oil filter (For 4WS)					R				R		X	○	X	X	—	10—41
Rear suspension outer ball joints (For 4WS)											X	○	X	X	• Damage, looseness and grease leakage	13—37
Manual transaxle oil					A				R		○	○	○	○	• Oil capacity 3.35 liters (3.6 US qt, 3.0 Imp qt)	7A—6
Automatic transaxle fluid level					A				A		○	○	○	X	• Oil capacity 4-Speed and EC-AT 6.8 liters (7.2 US qt, 6.0 Imp qt) 3-Speed 6.2 liter (6.6 US qt, 5.5 Imp qt)	7B—71 7C—25
Bolts and nuts on chasis and body	T		T		T		T		T		○	○	○	○	—	—
Brake lines, Hoses, and connections											○	○	○	○	• Proper attachment and connections	11—8
Disk brake/Drum brake											○	○	○	○	• Min. pad thickness: Front 2.0 mm (0.08 in) Rear 1.0 mm (0.04 in) • Min. disc thickness: Front 14 or 15 inch-wheel 22 mm (0.87 in) 13 inch-wheel 18 mm (0.71 in) Rear 8.0 mm (0.31 in) • Disc run out: Front 0.1 mm (0.004 in) Rear 0.1 mm (0.004 in) • Min. lining thickness: 1.0 mm (0.04 in) • Max. drum inner dia: 230.1 mm (9.06 in)	11—45 11—54 11—45 11—54 11—54 11—60 11—60

# 0 SCHEDULED MAINTENANCE

## MAINTENANCE TABLE (For ECE Unleaded gasoline)

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Exhaust system heat shields (unlead)											○	○	○	○	• Clearance to body, and exhaust system	4A—97
Body condition visual only	Inspect annually										○	○	○	○	• Inspect annually	—
Tyres (including spare tyre) Inflation pressure adjustment											○	○	○	○	• Check the air pressure	12—2
Hinges and catches			A		A		A		A		○	○	○	○	—	—
Underside of vehicle											○	○	○	○	—	—
Seat belt											○	○	○	○	• Operation and looseness	14—101
Road test											○	○	○	○	—	—

**For General**

**Chart symbols:**

- I** : Inspect: Visual examination and/or functional measurement of a system's operation or performance.
- A** : Adjust: Examination resulting in adjustment or replacement.
- R** : Replace or change
- T** : Tighten
- O** : Applicable
- X** : Not applicable
- ⊙ **1** : F6, F8 engine with carburetor, MTX, ATX
- ⊙ **2** : FE engine with carbretor, MTX, ATX
- ⊙ **3** : FE DOHC engine with fuel injection, MTX
- ⊙ **4** : RF-N engine with MTX

**NOTE:**

As the result of visual examination or functional measurement of a system's operation(performance), correct, clean or replace as required.

**REMARKS:**

After 80,000 km (48,000 Miles) or 48 months, continue to follow the described maintenance items and intervals periodically.

As for \* marked items in this maintenance chart, please pay attention to the following points.

- \*1. If the vehicle is operated under the following conditions, it is suggested that the engine oil and oil filter be changed more often than at usual recommended intervals.
  - a) Driving in dusty conditions.
  - b) Extended periods of idling or low speed operation.
  - c) Driving for a prolonged period in cold temperatures or driving only short distances regularly.
- \*2. Replacement of the timing belt is required at every 100,000 km (60,000 Miles). Failure to repace the timing belt may result in damage to the engine.
- \*3 If the vehicle is operated in very dusty or sandy areas, inspect and, if necessary, replace more often than at usual recommended intervals.
- \*4 Adjust or inspect alternator and water pump drive belt, and power steering and air conditioner drive belt, vacuum pump belt, super charger belt if equipped.
- \*5 Replace every two years.
  - If there has been continuous hard driving, mountain driving, or if the brakes are used extensively or the vehicle is operated in extremely humid climates, the brake fluid should be changed annually.
- \*6. Only F6 carbretor for singapore (MTX Model)

**Emission Control and Related Systems**

The ignition and fuel systems are vitally important to the proper operation of the emissions control and related systems, as well as for efficient engine operation. It is strongly recommended that all servicing related to these systems be done by your Authorized Mazda Dealer.

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Clutch pedal											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Pedal height: 216.5—221.5 mm (8.524—8.720 in)</li> <li>• Free play: 5—13 mm (0.20—0.51 in)</li> </ul>	6—4
Brake pedal											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Pedal height: 222—227 mm (8.74—8.94 in)</li> <li>• Free play: 4—7 mm (0.16—0.28 in)</li> </ul>	11—11
Parking brake											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Lever stroke 5—7 notches</li> </ul>	11—65
Power brake unit and hoses											○	○	○	○	<ul style="list-style-type: none"> <li>• Operation</li> <li>• Check the vacuum hoses and connectors</li> </ul>	11—27
Brake fluid *5						R				R	○	○	○	○	• Fluid level	11—6
Clutch fluid											○	○	○	○	• Fluid level	6—4
Power steering fluid and line (if equipped)											○	○	○	○	<ul style="list-style-type: none"> <li>• Fluid level</li> <li>• Fluid leakage or oozing</li> </ul>	10—11 10—13
Steering operation and gear housing											○	○	○	○	<ul style="list-style-type: none"> <li>• Free play: 0—30 mm (0—1.18 in)</li> <li>• Operation and looseness</li> <li>• Fluid leakage or oozing</li> </ul>	10—10 10—28
Air Cleaner element *3						R				R	X	X	X	○	—	1C—5
Air Cleaner element *3 (I) For FE (DOHC)				(I)		R		(I)		R	○	○	○	X	—	1A—6 1B—5

MAINTENANCE TABLE (For General)

0 SCHEDULED MAINTENANCE

Interval Procedure & item	Number of Months or km, whichever comes first										①	②	③	④	Service data and inspection point	Page													
	Months	—	6	12	18	24	30	36	42	48																			
	x 1000 Km	1	10	20	30	40	50	60	70	80																			
	Miles x 1000	0.6	6	12	18	24	30	36	42	48																			
Choke system											○	○	X	X	<ul style="list-style-type: none"> <li>• Carburetor linkage</li> <li>• Choke diaphragm</li> <li>• Choke valve clearance</li> <li>• Unloader system</li> </ul>	4A—26 4A—34 4A—34 4A—33													
Cooling system											○	○	○	○	<ul style="list-style-type: none"> <li>• Hoses for cracks or wear</li> </ul>	3A—5 3B—4													
Engine coolant (with reservoir)	Repace every 24 months										○	○	○	○	<ul style="list-style-type: none"> <li>• Coolant level</li> </ul>	3A—5 3B—4													
Battery electrolyte level and specific gravity											○	○	○	○	<ul style="list-style-type: none"> <li>• Electrolyte level</li> <li>• Specific gravity</li> </ul>	5—8													
Engine timing belts * <sup>2</sup>	Replace every 100,000 km										○	○	○	○	—	1A—14 1B—11 1C—11													
Drive belts * <sup>4</sup>	A										○	○	○	○	<ul style="list-style-type: none"> <li>• Cracks or damage</li> <li>• Tension</li> </ul>	1A—7 1B—6 1C—7													
Engine valve clearance (l) For Gasoline engine		(l)		(l)		(l)		(l)		(l)	○	○	X	○	<ul style="list-style-type: none"> <li>• Valve clearance</li> <li>F6, F8, FE-8-valve (Hot engine)</li> <li>IN: 0.30 mm (0.012 in)</li> <li>EX: 0.30 mm (0.012 in)</li> <li>FE-12-valve, FE (DOHC)</li> <li>IN: 0; Maintenance free</li> <li>EX: 0; Maintenance free</li> <li>RF-N (Cold engine)</li> <li>IN: 0.25 mm (0.01 in)</li> <li>EX: 0.35 mm (0.014 in)</li> </ul>	1A—10  1C—85													
Exhaust manifold nuts and bolts	T					T					T	○	○	X	X	<ul style="list-style-type: none"> <li>• Retighten the intake and exhaust manifold nuts</li> </ul> <table border="1"> <thead> <tr> <th></th> <th colspan="2">Nm (m-kg, ft-lb)</th> </tr> <tr> <th></th> <th>IN</th> <th>EX</th> </tr> </thead> <tbody> <tr> <td>F6, F8, FE</td> <td>19—30 (1.9—3.1, 14—22)</td> <td>22—28 (2.2—2.9, 16—21)</td> </tr> <tr> <td>RF-N</td> <td>16—23 (1.6—2.3, 12—17)</td> <td>22—26 (2.2—2.7, 16—20)</td> </tr> </tbody> </table>		Nm (m-kg, ft-lb)			IN	EX	F6, F8, FE	19—30 (1.9—3.1, 14—22)	22—28 (2.2—2.9, 16—21)	RF-N	16—23 (1.6—2.3, 12—17)	22—26 (2.2—2.7, 16—20)	1A—86 1B—68 1C—89
	Nm (m-kg, ft-lb)																												
	IN	EX																											
F6, F8, FE	19—30 (1.9—3.1, 14—22)	22—28 (2.2—2.9, 16—21)																											
RF-N	16—23 (1.6—2.3, 12—17)	22—26 (2.2—2.7, 16—20)																											
Engine oil * <sup>1</sup>	Replace every 5000 km or 6 months										X	X	○	○	<ul style="list-style-type: none"> <li>• Oil pan capacity</li> <li>FE DOHC: 3.6 liters (3.8 US qt, 3.2 Imp qt)</li> <li>RF-N: 5.0 liters (5.3 US pt, 4.4 Imp qt)</li> </ul>	2A—6 2B—6													

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**0 SCHEDULED MAINTENANCE**

**MAINTENANCE TABLE (For General)**

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page									
	Months	—	6	12	18	24	30	36	42	48															
	x 1000 Km	1	10	20	30	40	50	60	70	80															
	Miles x 1000	0.6	6	12	18	24	30	36	42	48															
Engine oil *1			R	R	R	R	R	R	R	R	○	○	X	X	• Oil pan capacity F6, F8, FE 3.6 liters (3.8 US qt, 3.2 Imp qt)	2A-6									
Oil filter *1			R	R	R	R	R	R	R	R	○	○	○	○	• Oil filter capacity F8, FE 12-valve (SOHC) 0.3 liters (0.32 US qt, 0.26 Imp qt) FE (DOHC) 0.2 liters (0.21 US qt, 0.18 Imp qt) RF-N 0.4 liters (0.42 US qt, 0.35 Imp qt)	2A-6 2B-6									
Fuel filter (R) only for carbretor				(R)		R		(R)		R	○	○	○	○	—	4D-21									
Fuel lines and hoses (I) only for Diesel			(I)	I	(I)	I	(I)	I	(I)	I	○	○	○	○	• Fittings, connections and components for leaks										
Spark plugs			I	I	I	I	I	I	I	I	○	○	○	X	• Plug gap FE DOHC 0.7-0.8 mm (0.028-0.031 in) Others 0.75-0.85 mm (0.030-0.033 in) • Recommended spark plugs	5-9									
															<table border="1"> <tr> <td></td> <td>F6,F8,FE</td> <td>FE 12 VALVE, DOHC</td> </tr> <tr> <td>NGK</td> <td>BPR 5ES BPR 6ES</td> <td>BCPR 5E BCPR 6E</td> </tr> <tr> <td>Nippon Denso</td> <td>W16EXR-U W20EXR-U</td> <td>Q16PR-U* Q20PR-U</td> </tr> </table>		F6,F8,FE	FE 12 VALVE, DOHC	NGK	BPR 5ES BPR 6ES	BCPR 5E BCPR 6E	Nippon Denso	W16EXR-U W20EXR-U	Q16PR-U* Q20PR-U	
	F6,F8,FE	FE 12 VALVE, DOHC																							
NGK	BPR 5ES BPR 6ES	BCPR 5E BCPR 6E																							
Nippon Denso	W16EXR-U W20EXR-U	Q16PR-U* Q20PR-U																							
Initial ignition timing			I	I	I	I	I	I	I	I	○	○	○	X	• Initial ignition timing F6 F8 FE (8 VALVE) (12 VALVE) 6 ± 1° BTDC FE (DOHC) 12 ± 1° BTDC	5-11									
Idle speed (I) only for carbretor	(I)			I		I		I		I	○	○	○	X	• Check the idle speed MTX 800 <sup>+50</sup> rpm	4A-38 4C-29									
															<table border="1"> <tr> <td rowspan="2">ATX</td> <td>F6</td> <td>900<sup>+50</sup><sub>-0</sub> rpm</td> <td rowspan="2">(in "N" range)</td> </tr> <tr> <td>F8, FE</td> <td>900<sup>+50</sup><sub>-0</sub> rpm</td> </tr> </table> FE DOHC 700-800 rpm	ATX	F6	900 <sup>+50</sup> <sub>-0</sub> rpm	(in "N" range)	F8, FE	900 <sup>+50</sup> <sub>-0</sub> rpm				
ATX	F6	900 <sup>+50</sup> <sub>-0</sub> rpm	(in "N" range)																						
	F8, FE	900 <sup>+50</sup> <sub>-0</sub> rpm																							

\*Only FE 12 VALVE

Interval Procedure & Item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Idle mixture (l) only for carbretor	(l)										○	○	○	X	<ul style="list-style-type: none"> <li>CO concentration 2.0 ± 0.5 %</li> <li>CO concentration FE DOHC 1.5 ± 0.5 %</li> <li>HC concentration FE DOHC Less than 1000 rpm</li> </ul>	4A—38 4C—30
Evaporative system (only for middle east)										X	○	X	X	—	4A—78	
Dashpot (only for MTX)										○	X	X	X	• Operation	4A—50	
Coasting leaner system *6										○	X	X	X	—	4A—56	
Brake lines, hoses and connections										○	○	○	○	• Proper attachment and connections	11—8	
Disc brakes											○	○	○	○	<ul style="list-style-type: none"> <li>Min. pad thickness: Front 2.0 mm (0.08 in) Rear 1.0 mm (0.04 in)</li> <li>Min. disc thickness: Front 14 or 15 inch-wheel 22 mm (0.87 in) 13 inch-wheel 18 mm (0.71 in) Rear 8.0 mm (0.31 in)</li> <li>Disc run out: Front 0.1 mm (0.004 in) Rear 0.1 mm (0.004 in)</li> </ul>	11—45 11—54
											○	○	○	○	<ul style="list-style-type: none"> <li>Min. lining thickness: 1.0 mm (0.004 in)</li> <li>Max. drum inner dia: 14 or 15 inch-wheel 230.1 mm (9.06 in) 13 inch-wheel 201.5 mm (7.93 in)</li> </ul>	11—45
											○	○	X	○	<ul style="list-style-type: none"> <li>Min. lining thickness: 1.0 mm (0.004 in)</li> <li>Max. drum inner dia: 14 or 15 inch-wheel 230.1 mm (9.06 in) 13 inch-wheel 201.5 mm (7.93 in)</li> </ul>	11—54
											○	○	○	○	<ul style="list-style-type: none"> <li>Min. lining thickness: 1.0 mm (0.004 in)</li> <li>Max. drum inner dia: 14 or 15 inch-wheel 230.1 mm (9.06 in) 13 inch-wheel 201.5 mm (7.93 in)</li> </ul>	11—60
Steering linkages, rack guide and tie rod ends										○	○	○	○	• Operation and looseness	10—11	
Manual transaxle oil									R	○	○	○	○	• Oil capacity 3.35 liters (3.6 US qt, 3.0 Imp qt)	7A—6	
Automatic transaxle fluid level										○	○	X	X	• Oil capacity 4-Speed 6.8 liters (7.2 US qt, 6.0 Imp qt)	7B—71	
														3-Speed 6.2 liters (6.6 US qt, 5.5 Imp qt)	7C—25	



# 0 SCHEDULED MAINTENANCE

## MAINTENANCE TABLE (For General)

Interval Procedure & item	Number of Months or km, whichever comes first										⊙1	⊙2	⊙3	⊙4	Service data and inspection point	Page
	Months	—	6	12	18	24	30	36	42	48						
	x 1000 Km	1	10	20	30	40	50	60	70	80						
	Miles x 1000	0.6	6	12	18	24	30	36	42	48						
Front suspension ball joints											○	○	○	○	• Damage, looseness and grease leakage	13—20
Drive shaft dust boots											○	○	○	○	• Cracking and damage	9—32 9—36
Bolts and nuts on chassis and body	T			T		T		T		T	○	○	○	○	—	—

# ENGINE (SOHC)

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# 1A OUTLINE

## OUTLINE

The new 626 is equipped with F-series gasoline engine and R-series diesel engine. (R-series diesel engine — explained in section 1C.) F-series engine has following variations.

### 1. SOHC model

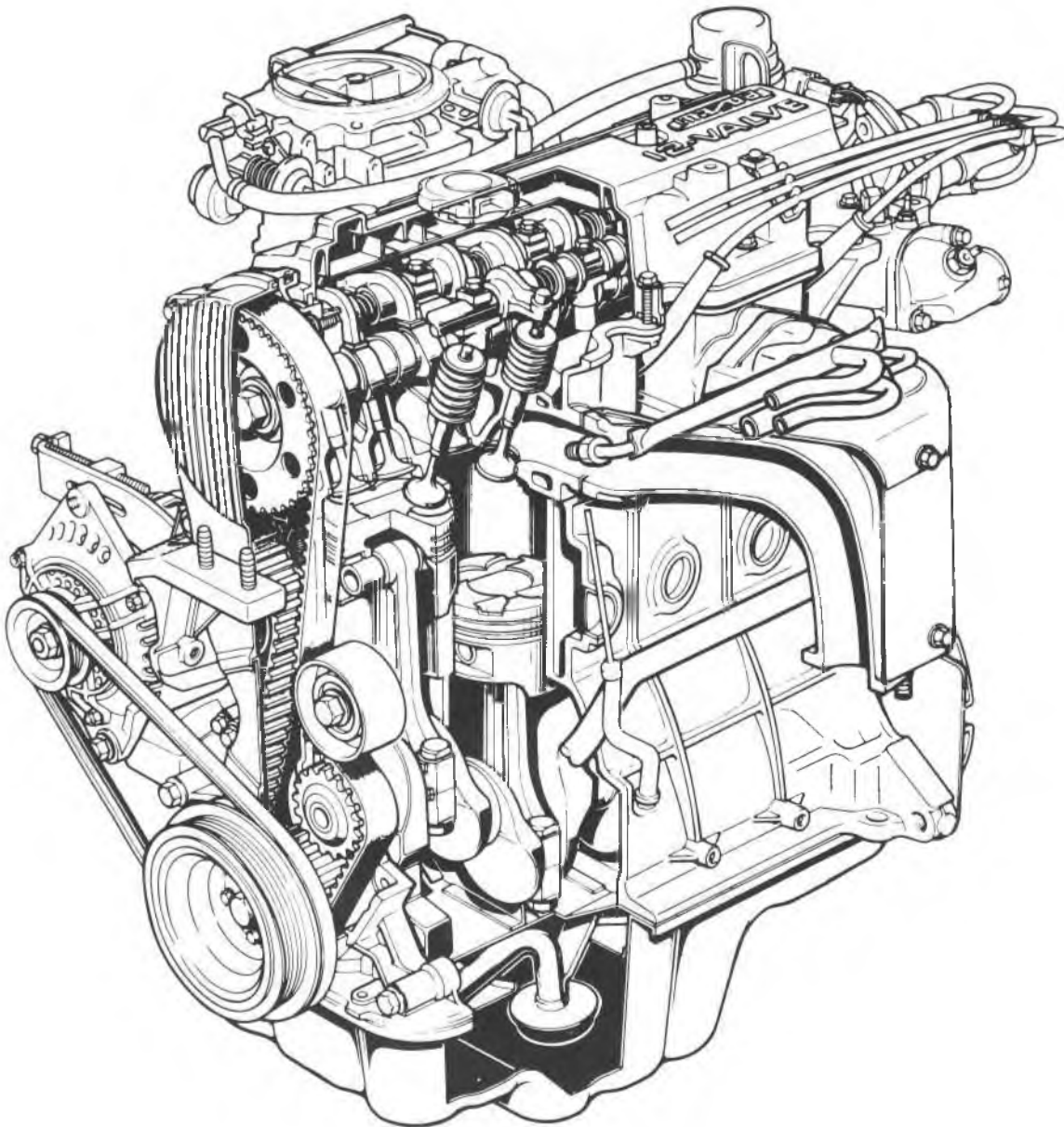
- (1) 12-valve model            2.0 l = FE engine
- (2) 8-valve model            1.6 l = F6 engine
- 1.8 l = F8 engine
- 2.0 l = FE engine

### 2. DOHC model (explained in section 1B)

- 2.0 l 16-valve = FE DOHC engine

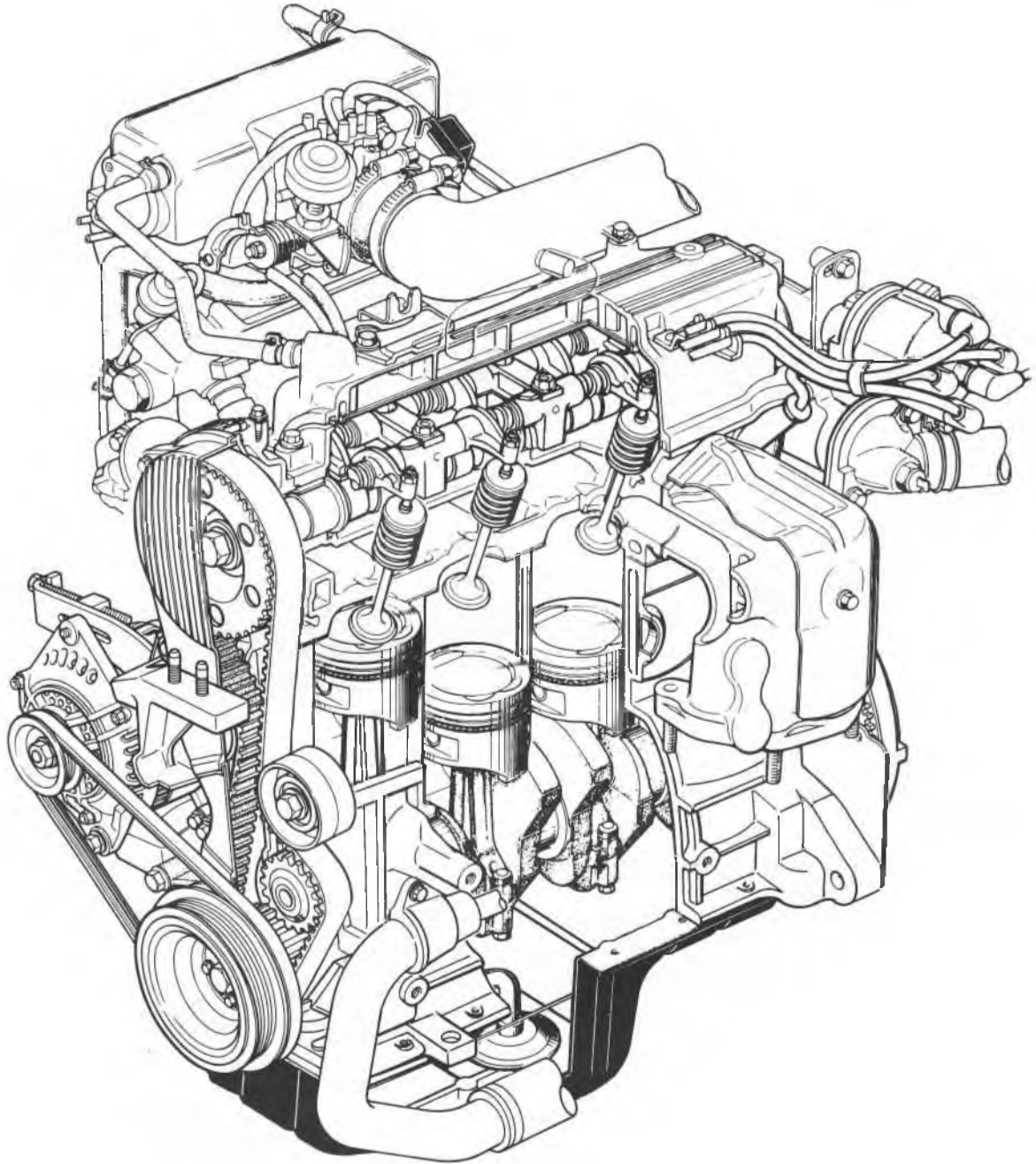
## STRUCTURAL VIEW

### 12-valve



76G01A-101

8-valve



# 1A TROUBLESHOOTING GUIDE

## SPECIFICATIONS

Item		Engine model		FE 12 -valve	FE 8-valve		F8		F6		
					ECE	Except ECE	ECE	General			
Type		Gasoline, 4 cycle									
Cylinder arrangement and number		In line, 4 cylinders									
Combustion chamber		Pentroof		Multispherical							
Valve system		OHC, belt driven									
Displacement		cc (cu in)		1,998 (121.9)			1,789 (109.1)		1,587 (96.8)		
Bore and stroke		mm (in)		86.0 x 86.0 (3.39 x 3.39)			86.0 x 77.0 (3.39 x 3.03)		81.0 x 77.0 (3.19 x 3.03)		
Compression ratio				9.5 : 1		8.6 : 1			9.0 : 1		
Compression pressure kPa (kg/cm <sup>2</sup> , psi)—rpm		Standard		1,422 (14.5, 206)—280		1,275 (13.0, 185)—270			1,128 (11.5, 164)—270		
		Minimum		996 (10.2, 144)—280		893 (9.1, 129)—270			790 (8.1, 114)—270		
Valve timing		IN		Open	BTDC	14°	16°	20°	20°	17°	17°
				Close	ABDC	56°	54°	65°	65°	56°	56°
		EX		Open	BBDC	69°	54°	65°	65°	64°	64°
				Close	ATDC	13°	16°	20°	20°	15°	15°
Valve clearance		mm (in)		IN		0; Maintenance-free		0.30 (0.012)			
				EX		0; Maintenance-free		0.30 (0.012)			
Idle speed		rpm		MTX		800 $\pm$ 5% ... carb., 850 $\pm$ 50 ... FI					
				ATX		900 $\pm$ 5% ... carb., 850 $\pm$ 50 ... FI					
Ignition timing		BTDC		6° $\pm$ 1°							
Firing order		1—3—4—2									

76G01A-003

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Difficult starting</b>	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket	Replace Replace or repair Replace	1A—49 1A—57 1A—20
	<b>Malfunction of fuel system</b>	Refer to Section 4	
	<b>Malfunction of electrical system</b>	Refer to Section 5	
<b>Poor idling</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Improper valve clearance Poor valve to valve seat contact Failed cylinder head gasket	Replace Adjust Repair or replace Replace	1A—75 1A—10 1A—51 1A—20
	<b>Malfunction of fuel system</b>	Refer to Section 4	
<b>Excessive oil consumption</b>	<b>Oil working up</b> Worn piston ring groove or sticking piston ring Worn piston or cylinder	Replace Replace or repair	1A—57 1A—57
	<b>Oil working down</b> Worn valve seal Worn valve stem or guide	Replace Replace	1A—26 1A—49
	<b>Oil leakage</b>	Refer to Section 2A	

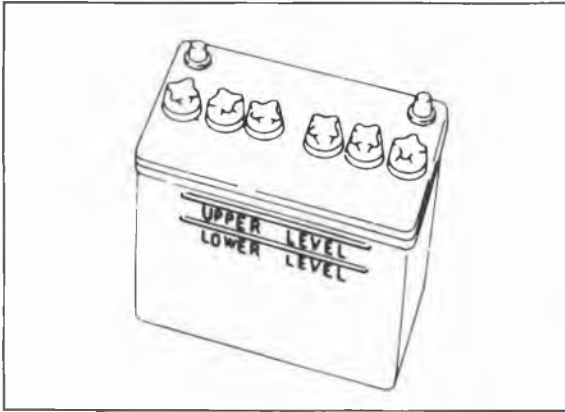
76G01A-004

Problem	Possible Cause	Remedy	Page
<b>Insufficient power</b>	<b>Insufficient compression</b> Malfunction of HLA Improper valve clearance Compression leakage from valve seat Seized valve stem Weak or broken valve spring Failed cylinder head gasket Cracked or distorted cylinder head Sticking, damaged, or worn piston ring Cracked or worn piston	Replace Adjust Repair Replace Replace Replace Replace Replace Replace	1A—75 1A—10 1A—51 1A—49 1A—53 1A—20 1A—48 1A—57 1A—57
	<b>Malfunction of fuel system</b>	Refer to Section 4	
	<b>Others</b> Slipping clutch Dragging brakes Wrong size tires	Refer to Section 6 Refer to Section 11 Refer to Section 12	
<b>Abnormal combustion</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Improper valve clearance Sticking or burned valve Weak or broken valve spring Carbon accumulation in combustion chamber	Replace Adjust Replace Replace Eliminate carbon	1A—75 1A—10 1A—49 1A—53 —
	<b>Malfunction of fuel system</b>	Refer to Section 4	
<b>Engine noise</b>	<b>Crankshaft or bearing related parts</b> Excessive main bearing oil clearance Main bearing seized or heat-damaged Excessive crankshaft end play Excessive connecting rod bearing oil clearance Connecting rod bearing seized or heat-damaged	Replace or repair Replace Replace or repair Replace or repair Replace	1A—65 1A—65 1A—66 1A—67 1A—67
	<b>Piston related parts</b> Worn cylinder Worn piston or piston pin Seized piston Damaged piston ring Bent connecting rod	Replace or repair Replace Replace Replace Replace	1A—55 1A—57 1A—57 1A—57 1A—59
	<b>Valves or timing related parts</b> Malfunction of HLA* Improper valve clearance Broken valve spring Excessive valve guide clearance Malfunction of timing belt tensioner	Replace Adjust Replace Replace Replace	1A—75 1A—10 1A—53 1A—49 1A—61
	<b>Malfunction of cooling system</b>	Refer to Section 3A	
	<b>Malfunction of fuel system</b>	Refer to Section 4	
	<b>Others</b> Malfunction of water pump bearing Improper drive belt tension Malfunction of alternator bearing Exhaust gas leakage	Replace Adjust Replace Repair	— 1A— 7 — 1A—48

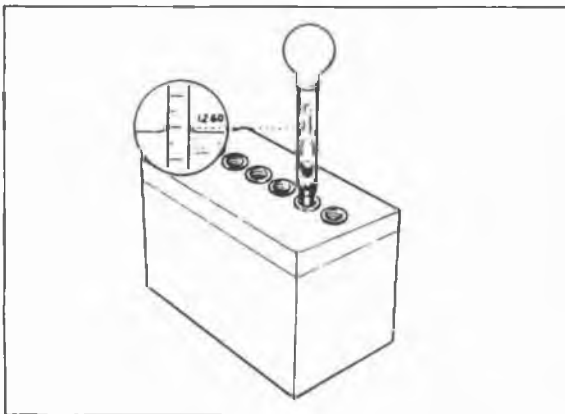
\* Tappet noise may occur if the engine is not operated for an extended period of time. The noise should stop after the engine has reached normal operating temperature.

76G01A-005

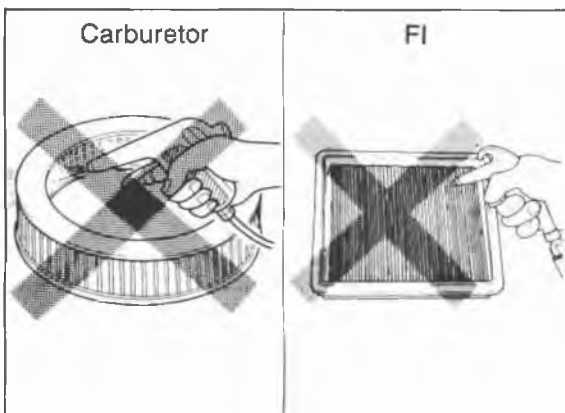
# 1A TUNE-UP PROCEDURE



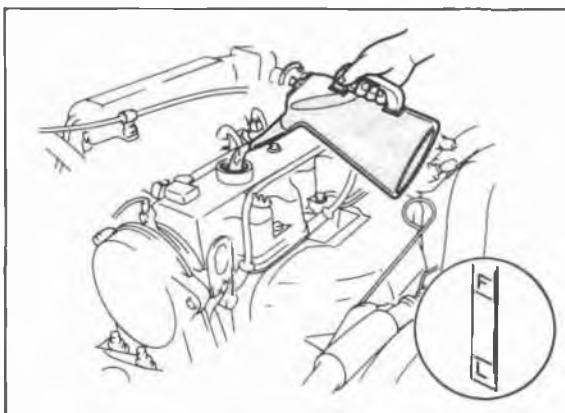
76G01A-102



76G01A-103



76G01A-104



4BG01A-010

## TUNE-UP PROCEDURE

Tune the engine according to the procedures described below.

### Battery

1. Check for corrosion on the terminals, or loose cable connections.  
If necessary, clean the clamps and tighten firmly.
2. Check that the electrolyte level is between the UPPER and LOWER marks.  
Add distilled water if necessary.
3. Check the specific gravity by using a hydrometer.  
If the specific gravity reading is 1.200 or less, recharge the battery. (Refer to Section 5.)

### Air Cleaner Element

Visually check the air cleaner element for excessive dirt, damage, or oil. Replace if necessary.

#### Caution

**Do not clean the air cleaner element with compressed air, replace if necessary.**

### Engine Oil

Check the engine oil level and condition with the oil level gauge.  
Add oil, or change it, if necessary.



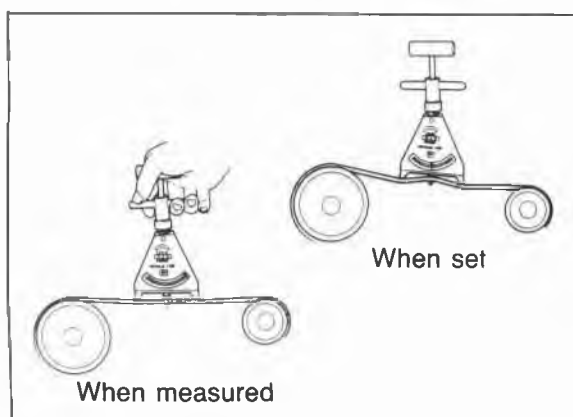
86U01X-008

## Coolant Level (Cold engine)

1. Check that the coolant level is near the radiator inlet port.
2. Check that the level in the coolant reservoir is between the FULL and LOW marks. Add coolant if necessary.

### Warning

- a) Never remove the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap and carefully remove it.



76G01A-006

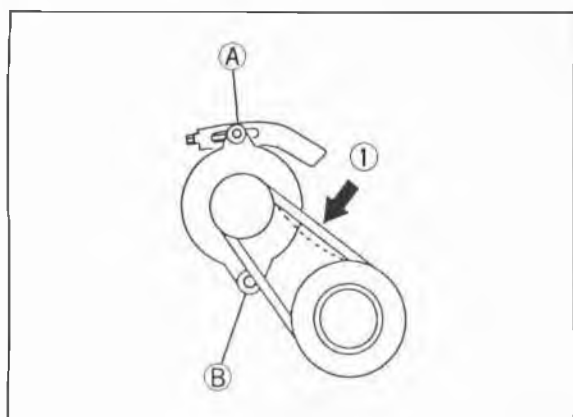
## Drive Belt

1. Check the drive belt for wear, cracks, or fraying. Replace if necessary.
2. Check the drive belt tension by using the tension gauge.

### Standard belt tension

N (kg, lb)

Belt	New	Used
Alternator	589-785 (60-80, 132-176)	491-687 (50-70, 110-154)
P/S	687-883 (70-90, 154-198)	589-785 (60-80, 132-176)
A/C	687-883 (70-90, 154-198)	589-785 (60-80, 132-176)



76G01A-007

3. Check the drive belt deflection by applying moderate pressure (**98 N, 10 kg, 22 lb**) midway between the pulleys.

- (1) Alternator belt deflection

**New : 6-8 mm (0.24-0.31 in)**

**Used: 7-9 mm (0.27-0.35 in)**

If necessary, loosen the alternator mounting bolts and adjust the belt deflection by turning the adjusting bolt.

### Tightening torque

**A: 31-46 N·m (3.2-4.7 m·kg, 23-34 ft·lb)**

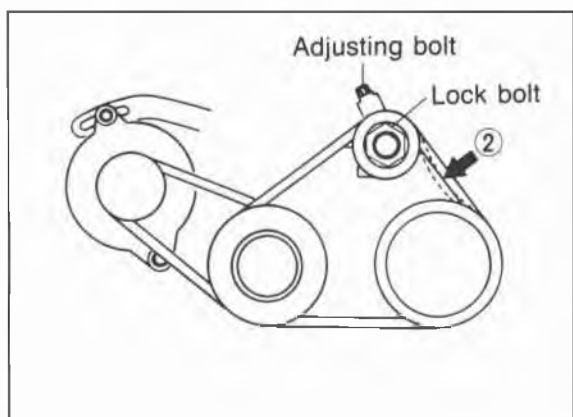
**B: 37-52 N·m (3.8-5.3 m·kg, 27-38 ft·lb)**

- (2) P/S belt deflection

**New : 8-10 mm (0.31-0.39 in)**

**Used: 9-11 mm (0.35-0.43 in)**

If necessary, loosen the idler pulley lock bolt and adjust the belt deflection by turning the adjusting bolt.



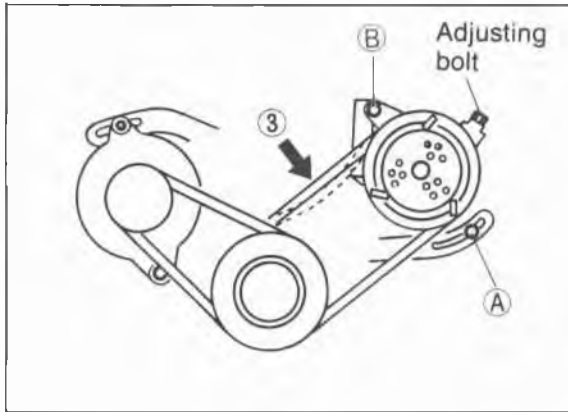
76G01A-008

### Tightening torque of lock bolt:

**37-52 N·m (3.8-5.3 m·kg, 27-38 ft·lb)**



# 1A TUNE-UP PROCEDURE



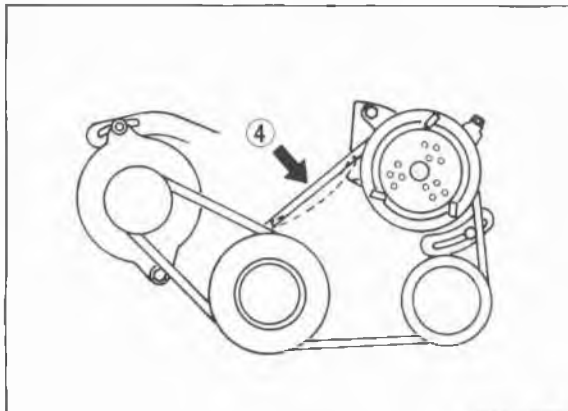
76G01A-009

- (3) A/C belt deflection  
**New : 7—9 mm (0.27—0.35 in)**  
**Used: 8—10 mm (0.31—0.39 in)**

If necessary, loosen the A/C mounting bolts and adjust the belt deflection by turning the adjusting bolt.

### Tightening torque

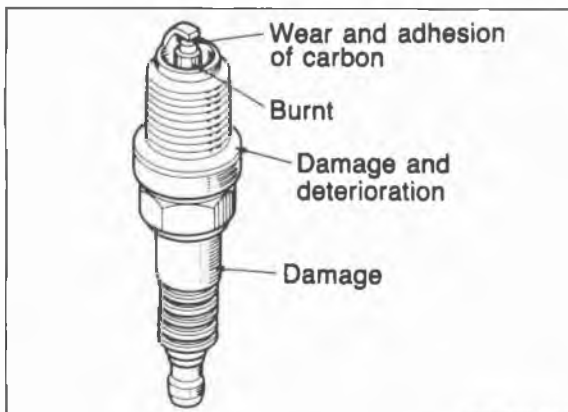
- (A) : 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**  
**(B) : 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



76G01A-010

- (4) P/S and A/C belt deflection  
**New : 7—9 mm (0.27—0.35 in)**  
**Used: 8—10 mm (0.31—0.39 in)**

If necessary, adjust the belt deflection using the same procedure as used for the A/C belt deflection.



76G01A-011

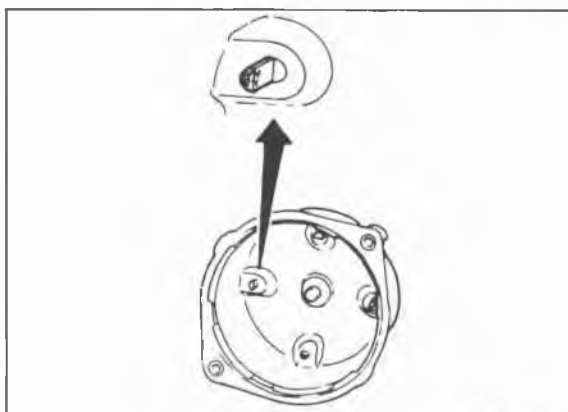
### Spark Plug

Check the following points. Clean or replace if necessary.

1. Damaged insulation
2. Worn electrodes
3. Carbon deposits
4. Damaged gasket
5. Burnt spark insulator
6. Plug gap

### Plug gap:

- 0.75—0.85 mm (0.030—0.033 in) ... 8-valve**  
**0.70—0.80 mm (0.028—0.031 in) ... 12-valve**

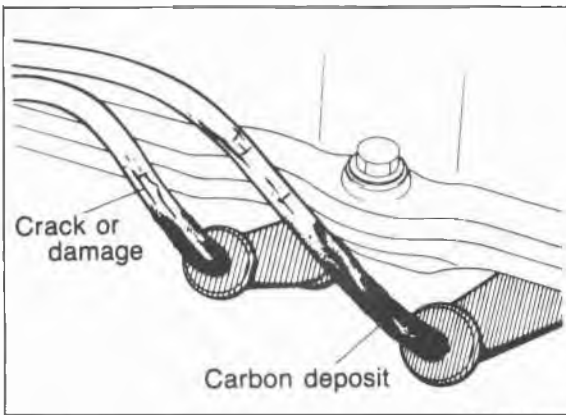


86U01X-013

### Distributor Cap

Check the following points. Replace if necessary.

1. Cracks or carbon deposits
2. Burnt or corroded terminals
3. Worn distributor center contact

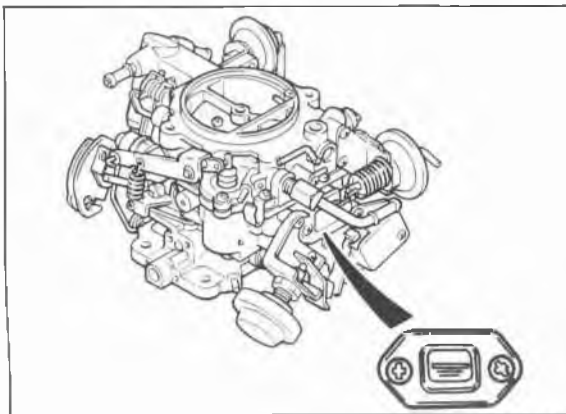


86U01X-014

## High-Tension Lead

Check the following points. Clean or replace if necessary.

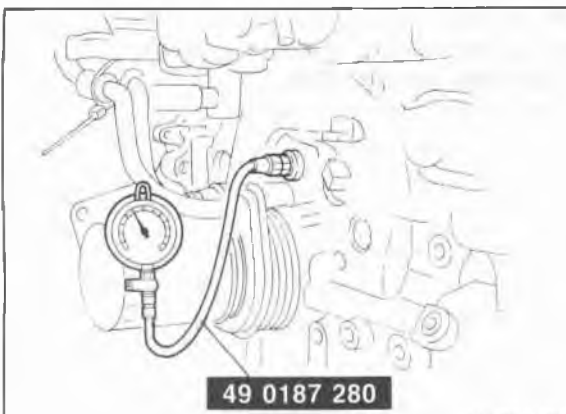
1. Damaged lead
2. Carbon deposits



76G01A-012

## Carburetor Float Level (Carburetor)

1. Run the engine at idle.
2. Check that the fuel level is at the center of the float level indicator window.  
If necessary, adjust the fuel float level. (Refer to Section 4A.)



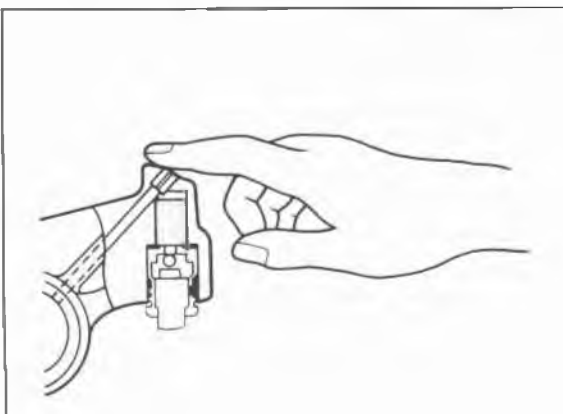
76G01A-013

## Hydraulic Lash Adjuster (12 valve)

### Note

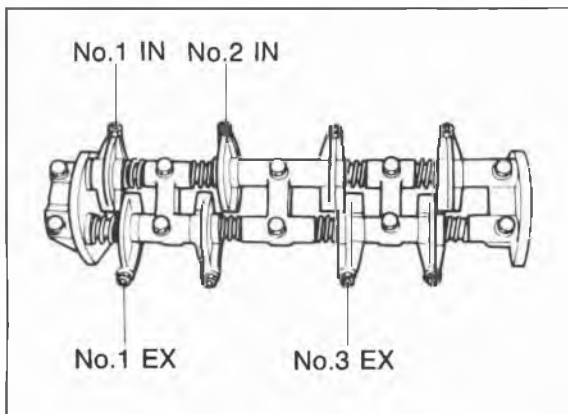
**Tappet noise may occur if the engine is not operated for an extended period of time. The noise should stop after the engine has reached normal operating temperature.**

1. Check for tappet noise. If noise exists, check the following points.
  - (1) Engine oil condition and level
  - (2) Engine oil pressure (Refer to Section 2A)
2. If the noise does not stop, check for movement of each HLA by pushing down each rocker arm by hand while at TDC of compression stroke.
3. If the rocker arm moves down, replace the HLA. (Refer to page 1A—75.)

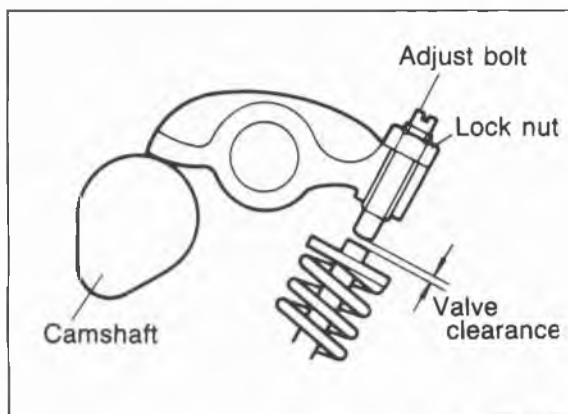


76G01A-014

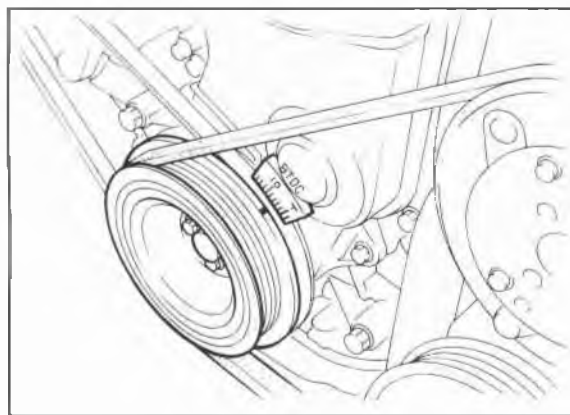
# 1A TUNE-UP PROCEDURE



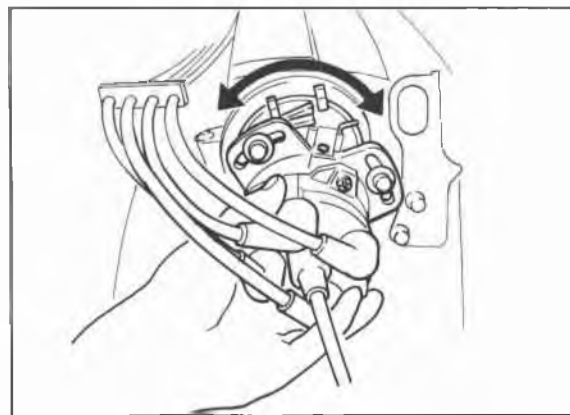
76G01A-015



76G01A-016



76G01A-017



69G01B-518

## Valve Clearance (8-valve)

1. Warm up the engine to the normal operating temperature.
2. With the piston of the No.1 cylinder at TDC of compression stroke. Adjust the valve clearance as shown in the figure.

## Valve clearance (valve side)

**IN : 0.30 mm (0.012 in)**

**EX: 0.30 mm (0.012 in)**

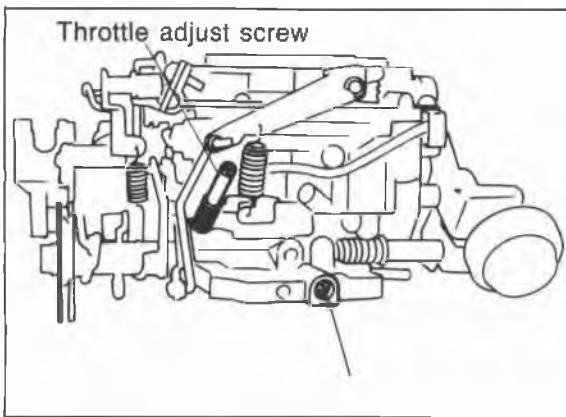
3. Turn the crankshaft one full turn so that the piston of the No.4 cylinder is at TDC of compression stroke. Adjust the clearances of the remaining valves.

## Ignition Timing

1. Warm up the engine and run it at idle.
2. Turn all electric loads OFF.
3. Connect a timing light tester.
4. Disconnect the vacuum hose from the vacuum control, and plug the hose.
5. Check that the ignition timing mark (yellow) on the crankshaft pulley and the timing mark on the timing belt cover are aligned.

**Ignition timing:  $6^\circ \pm 1^\circ$  BTDC (at idle speed)**

6. If necessary adjust the ignition timing by turning the distributor.



76G01A-105

## Idle Speed (Carburetor)

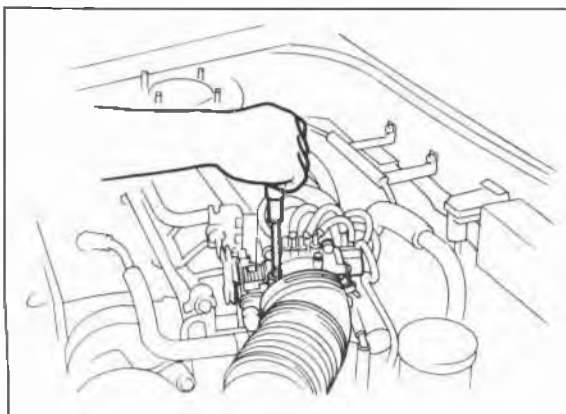
1. Connect a tachometer to the engine.
2. Turn all electric loads OFF.
3. Confirm that the choke valve has fully returned at idling speed.
4. Check the idle speed. If necessary, turn the throttle adjust screw and adjust the idle speed.

### Idle speed

MTX: 800  $\pm$  50 rpm (in neutral)

ATX: 950  $\pm$  50 rpm (in "N" range)..... F6

900  $\pm$  50 rpm (in "N" range).. FE, F8



76G01A-018

## Idle Speed (FI)

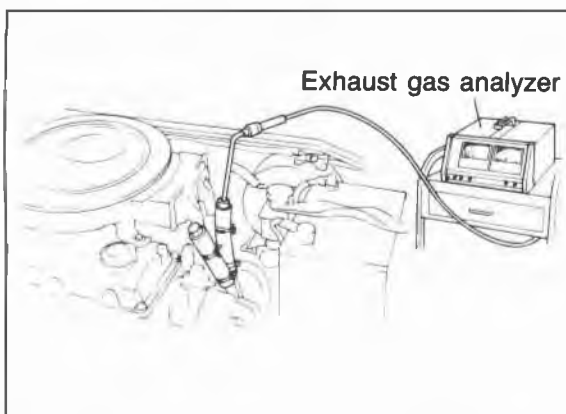
1. Connect the tachometer to the engine.
2. Check the idle speed.

### Idle speed

MTX: 850  $\pm$  50 rpm (in neutral)

ATX: 850  $\pm$  50 rpm (in "N" range)

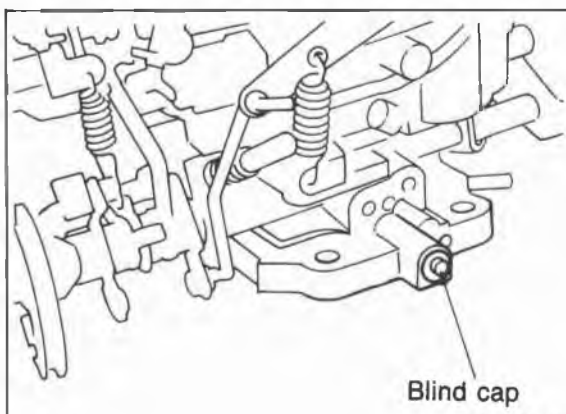
3. If necessary, remove the blind cap from the throttle body and adjust by turning the air adjust screw.
4. Install the blind cap.



76G01A-106

## Idle Mixture (Carburetor)

1. Disconnect the secondary air hoses from the reed valves and then plug the hoses (if equipped).
2. Connect an exhaust gas analyzer to the vehicle as shown in the figure and measure the CO concentration.



76G01A-019

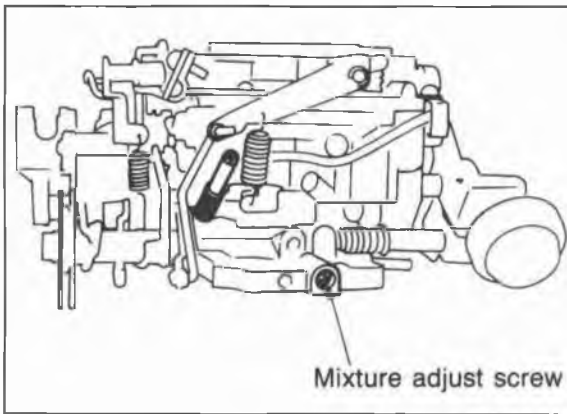
3. Remove the blind cap from the mixture adjust screw.

### Note

The blind cap will be broken when it is removed, do not attempt to reinstall it.

# 1A TUNE-UP PROCEDURE

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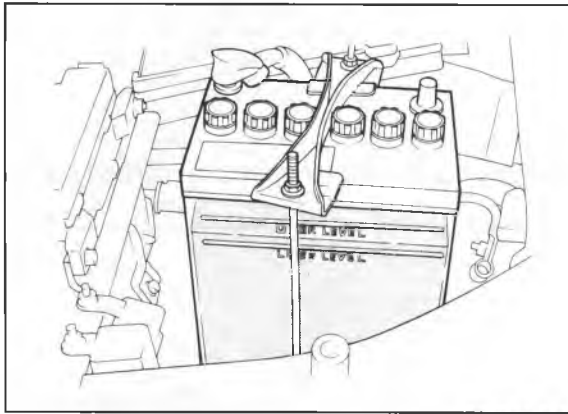


76G01A-020

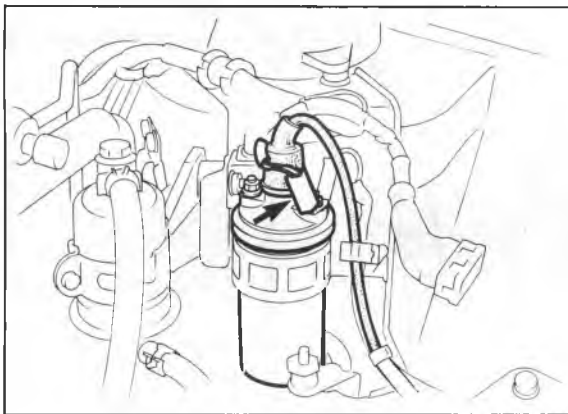
4. Turn the mixture adjust screw and adjust the CO concentration to the specified level.

**CO concentration:  $2.0 \pm 0.5\%$**

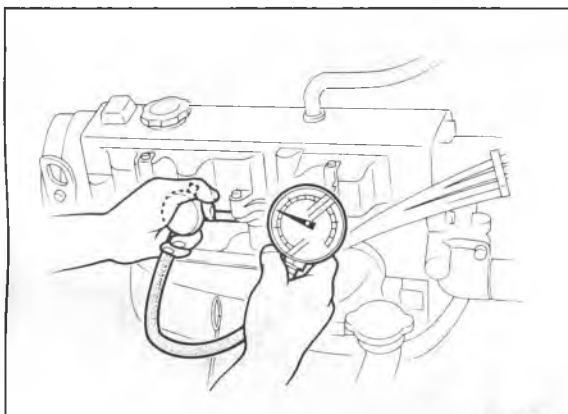
5. If the idle speed fails to meet the specification, adjust the idle speed again, then adjust the CO concentration.
6. Fit a new blind cap onto the mixture adjusting screw.
7. Connect the secondary air hoses (if equipped).



76G01A-107



86U01X-020



76G01A-023

## ON-VEHICLE INSPECTION

If the engine exhibits low power, poor fuel economy, or poor idle, check the following points.

1. Ignition system (Refer to Section 5)
2. Compression
3. Fuel system (Refer to Section 4)

### COMPRESSION

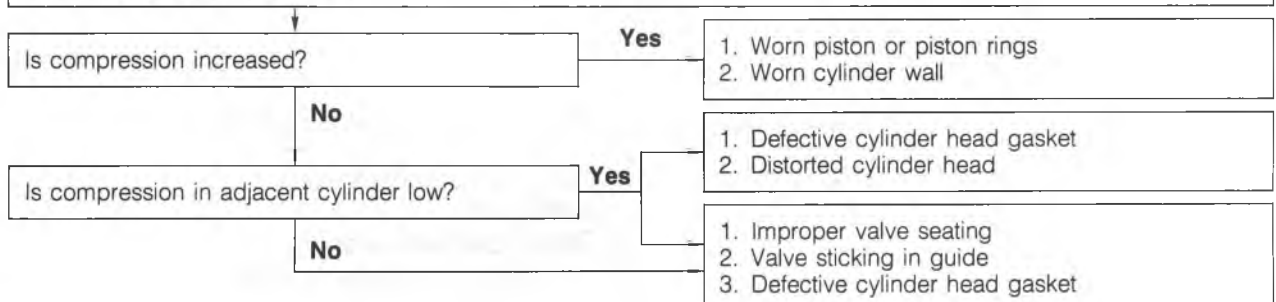
1. Check that the battery is fully charged. Recharge if necessary.
2. Warm up the engine to the normal operating temperature.
3. Turn it off for about 10 minutes to allow the exhaust manifold to cool.
4. Remove all spark plugs.
5. Disconnect the primary wire connector from the ignition coil.
6. Connect a compression gauge to No. 1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Note the maximum gauge reading.
9. Check each cylinder.

### Compression pressure kPa (kg/cm<sup>2</sup>, psi)-rpm

	Standard	Minimum
F6	1,128 (11.5, 164)—270	790 (8.1, 114)—270
F8-FE	1,275 (13.0, 185)—270	893 (9.1, 129)—270
FE 12-valve	1,422 (14.5, 206)—280	996 (10.2, 144)—280

### Possible Cause

If compression is low, pour heavy oil into the cylinder and turn the crankshaft several times  
Check compression once more



86U01X-022

# 1A ON-VEHICLE MAINTENANCE (TIMING BELT)

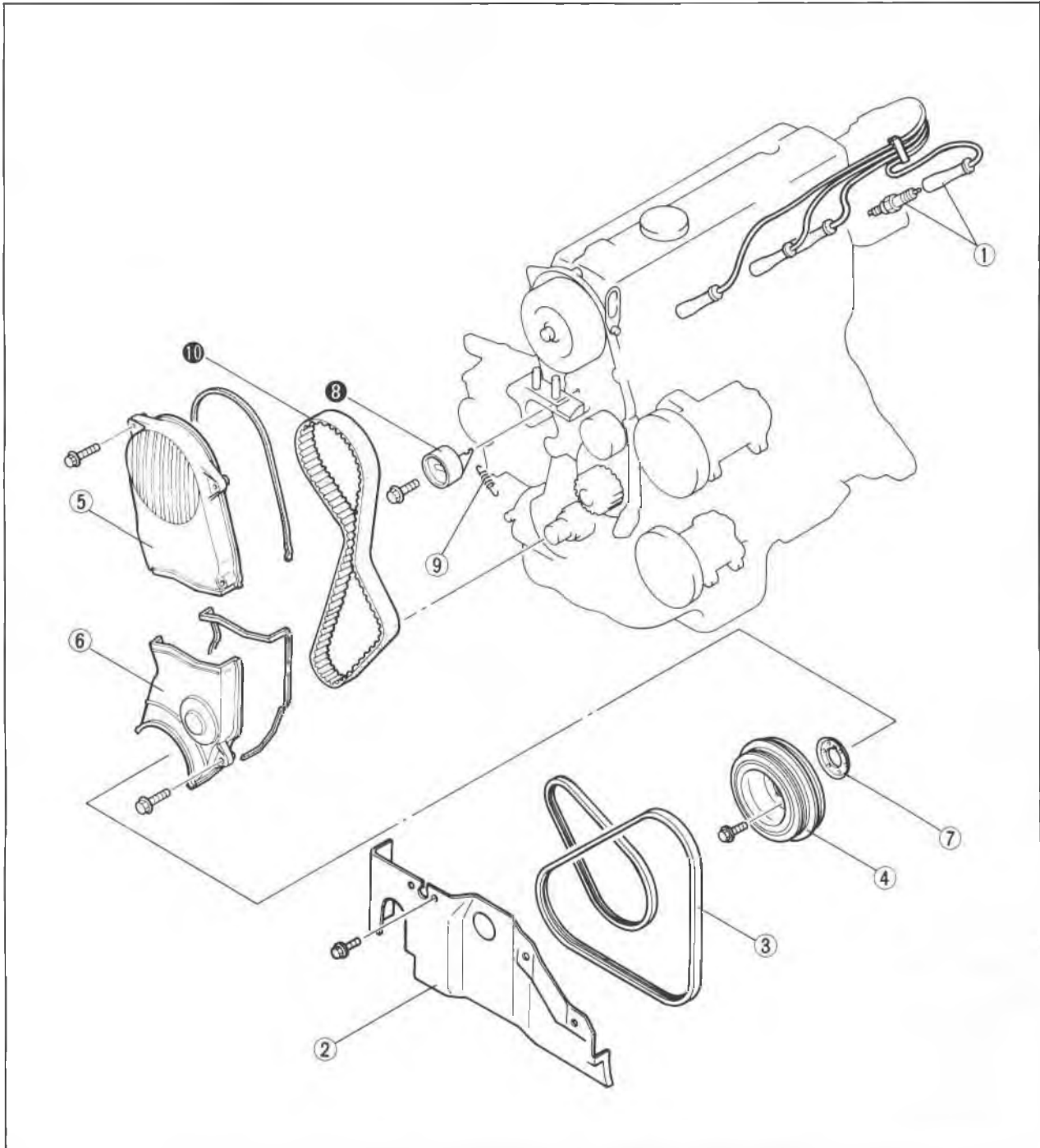
## ON-VEHICLE MAINTENANCE

### TIMING BELT

#### Removal

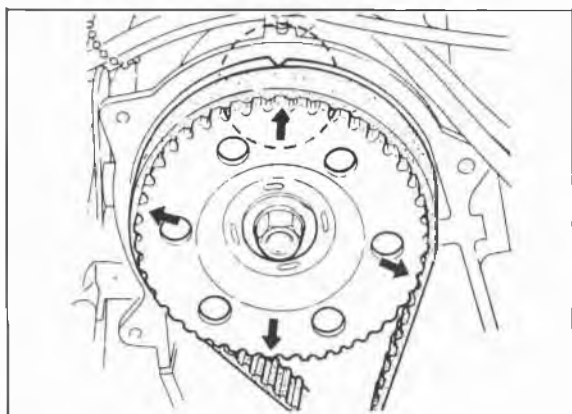
1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G01A-108

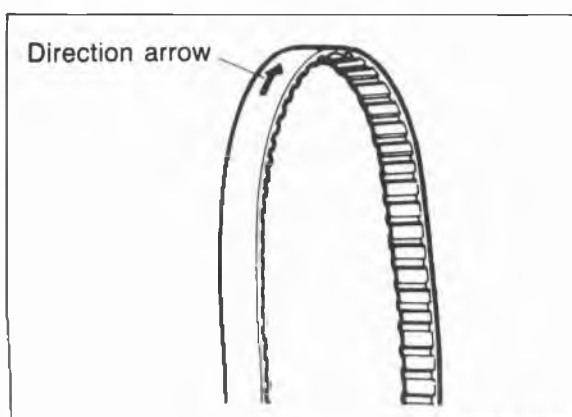


76G01A-024

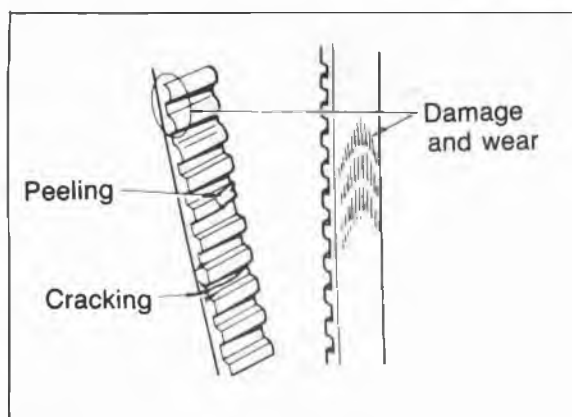
- |                                     |                                 |
|-------------------------------------|---------------------------------|
| 1. High-tension lead and spark plug | 6. Lower timing belt cover      |
| 2. Engine side cover                | 7. Baffle plate                 |
| 3. Drive belt                       | 8. Timing belt tensioner        |
| 4. Crankshaft pulley                | 9. Timing belt tensioner spring |
| 5. Upper timing belt cover          | 10. Timing belt                 |



76G01A-025



86U01X-024



76G01A-026

## Removal note

### Timing belt tensioner

1. Turn the crankshaft to align the mating mark of the camshaft pulley with the front housing timing mark.

### Note

For FE engine, align "2" mark.

For F8, F6 engine, align "3" mark.

2. Remove the tensioner.

## Timing belt

Mark the timing belt rotation for proper reinstallation if it is reused.

### Caution

Be careful not to allow oil, grease, or water on the belt.

## Inspection

Inspect the following parts.  
(Refer to page 1A—60, 61.)

1. Timing belt
2. Timing belt tensioner and spring
3. Timing belt idler pulley
4. Timing belt pulley
5. Camshaft pulley



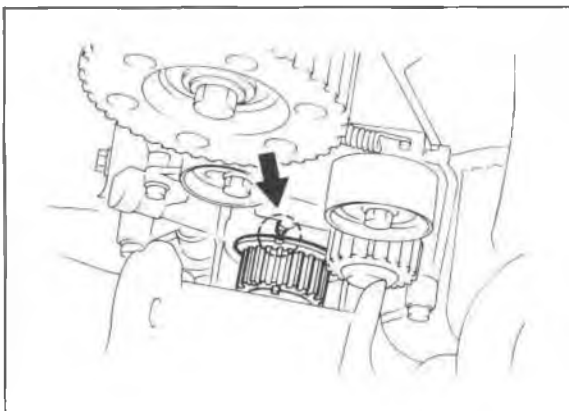
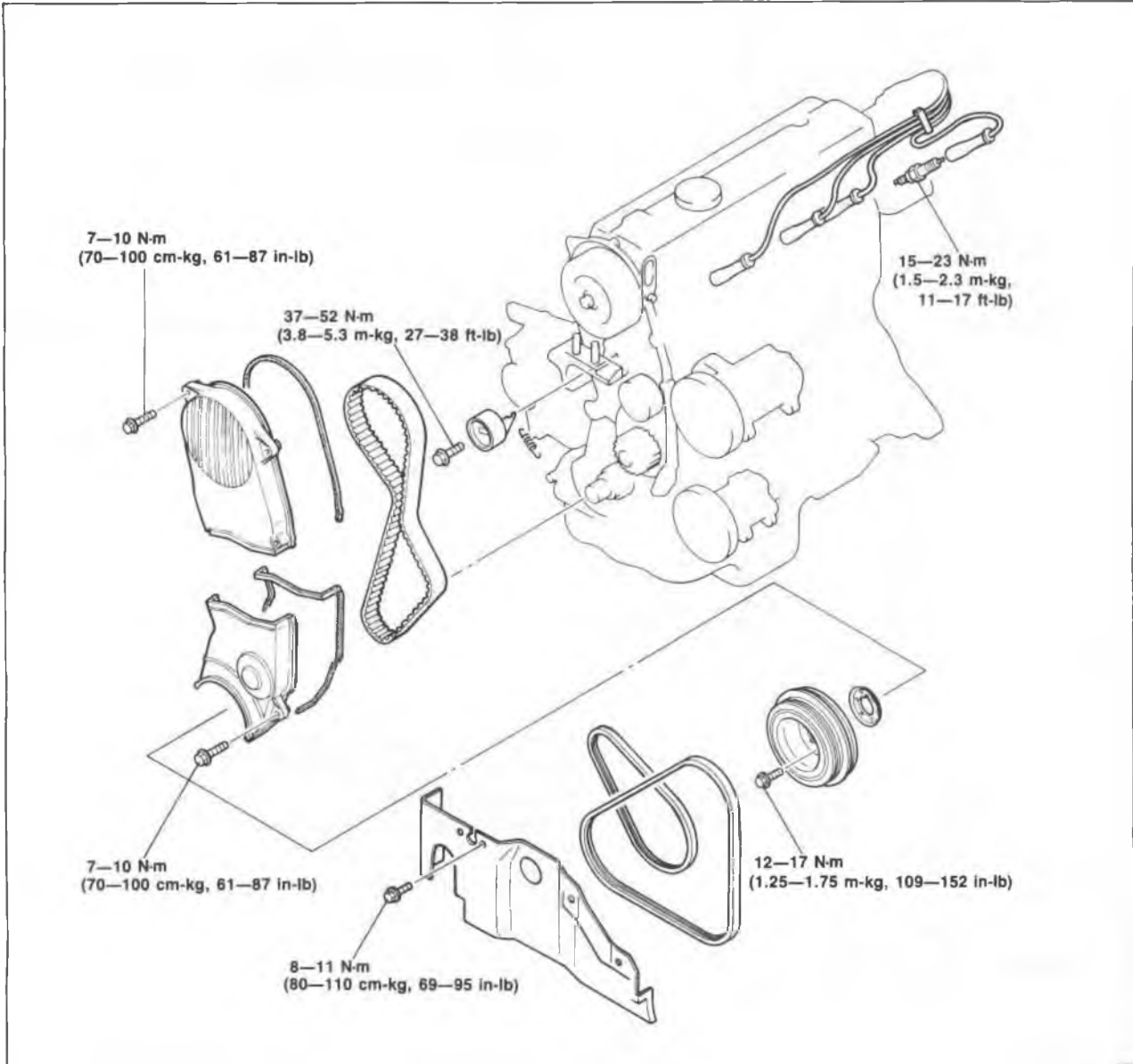
# 1A ON-VEHICLE MAINTENANCE (TIMING BELT)

## Installation

Install in the reverse order of removal referring to the installation note.

## Torque Specifications

76G01A-109



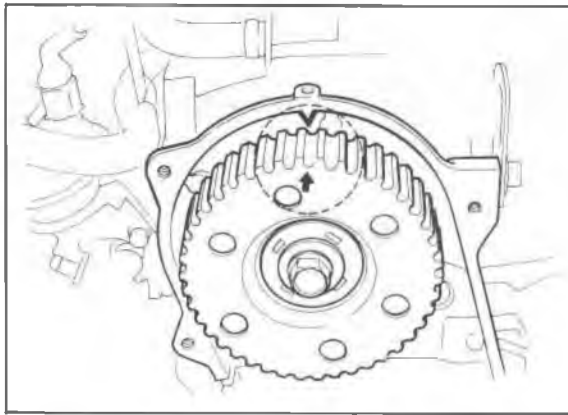
86U01X-220

## Installation note

### Timing belt

1. Check that the mark on the timing belt pulley is aligned with the mating mark.

## ON-VEHICLE MAINTENANCE (TIMING BELT) 1A



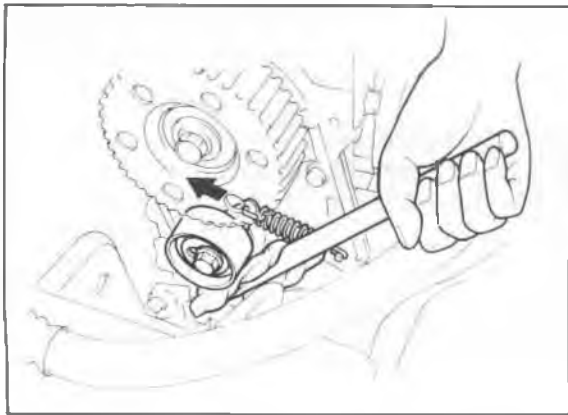
76G01A-027

2. Check that the mating mark of the camshaft pulley is aligned with the timing mark. If it is not aligned, turn the camshaft to align.

### Note

For FE engine, align "2" mark.

For F8, F6 engine, align "3" mark.

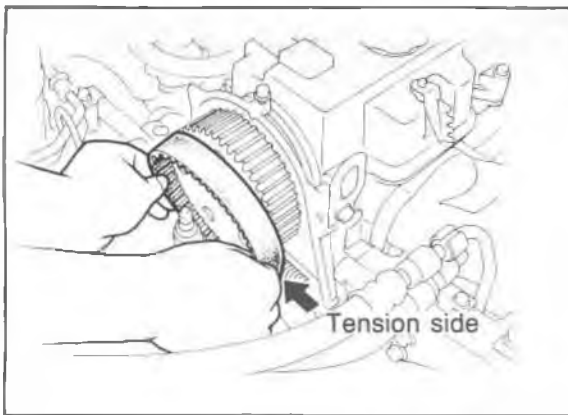


76G01B-024

3. Install the timing belt tensioner and spring. Temporarily secure it with the spring fully extended.

### Caution

Do not damage the pulleys when securing the tensioner pulley.



76G01A-028

4. Install the timing belt. (Keep the tension side of belt as tight as possible).

### Caution

a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.

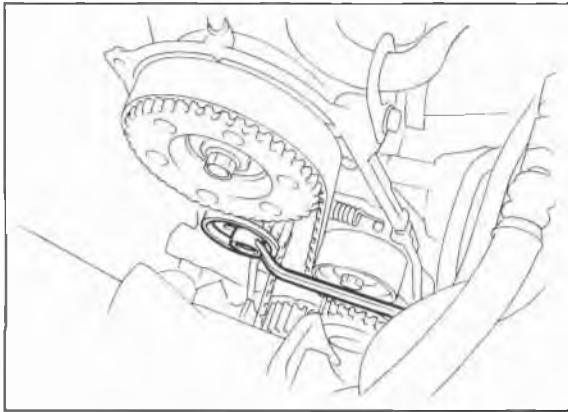
b) Check that there is no oil, grease, or dirt on the timing belt.



69G01B-027

5. Loosen the tensioner lock bolt.
6. Turn the crankshaft twice in the direction of rotation, and align the mating marks.
7. Check that the timing marks are correctly aligned. If not aligned, remove the timing belt tensioner and timing belt, and repeat steps 1—6.

# 1A ON-VEHICLE MAINTENANCE (TIMING BELT)

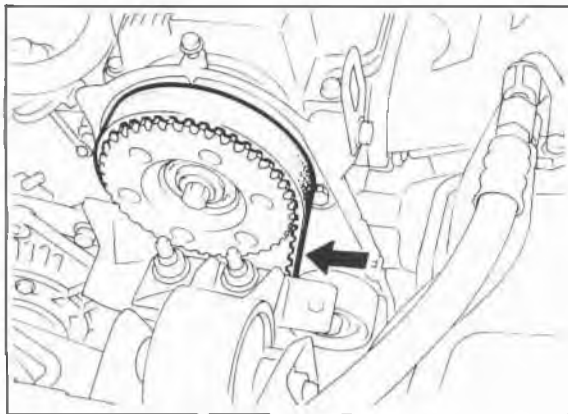


69G01B-028

8. Tighten the timing belt tensioner lock bolt.

**Tightening torque:**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



76G01A-029

9. Check the timing belt deflection. If the deflection is not correct, repeat the adjustment from step 5 above.

**Timing belt deflection**

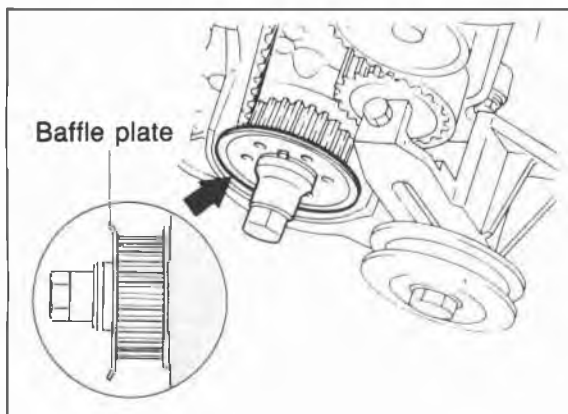
**FE: 5.5—6.5 mm (0.22—0.26 in)**

**F8, F6: 4.0—5.0 mm (0.16—0.20 in)**

**/98 N (10 kg, 22 lb)**

**Caution**

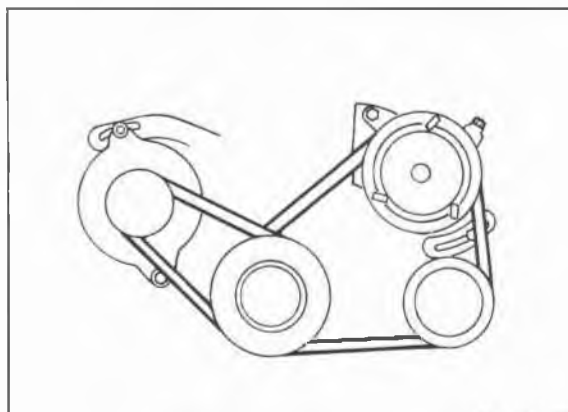
**Be sure not to apply tension other than that of the tensioner spring.**



69G01B-030

**Baffle plate**

Install the baffle plate as shown in the figure.

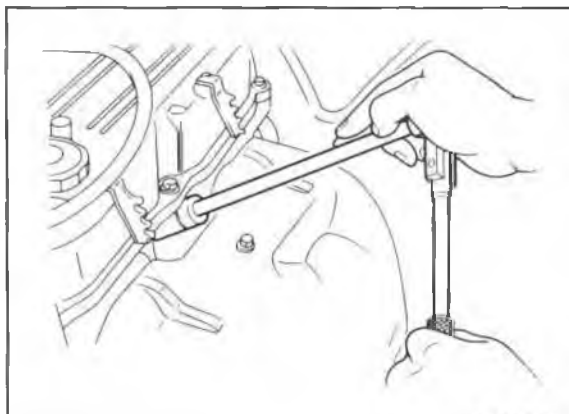


76G01A-030

**Drive belt**

Install each drive belt, and check the belt deflection. (Refer to page 1A—7.)

## ON-VEHICLE MAINTENANCE (TIMING BELT) **1A**



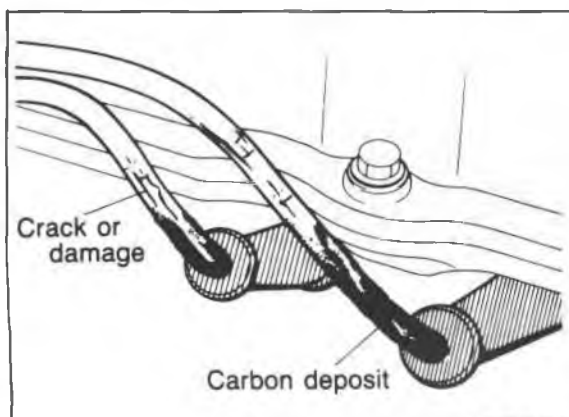
79G01C-021

### **Spark plug**

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

### **Tightening torque:**

**15—23 Nm (1.5—2.3 m-kg, 11—17 ft-lb)**



86U01X-029

### **Steps After Installation**

Perform the necessary engine adjustment. (Refer to TUNE-UP PROCEDURE.)

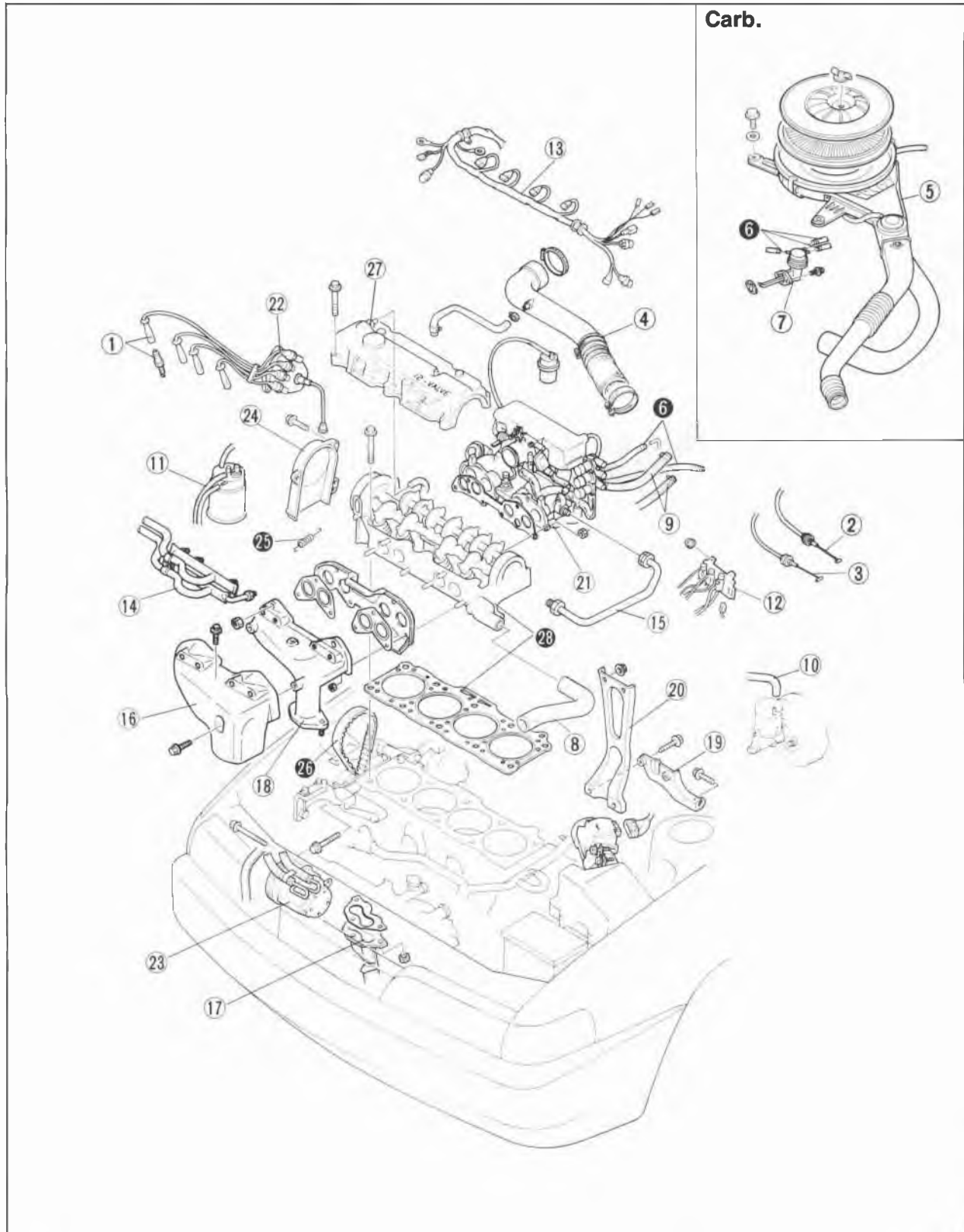
# 1A ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

## CYLINDER HEAD

### Removal

**Warning: Release the fuel pressure. (Refer to Section 4.)**

1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

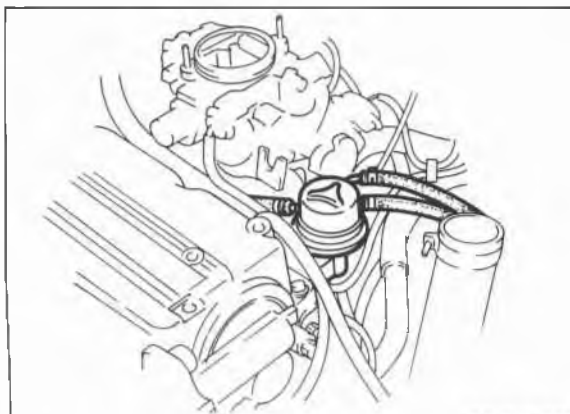


# ON-VEHICLE MAINTENANCE (CYLINDER HEAD) 1A

1. High-tension lead and spark plug
2. Accelerator cable
3. Throttle cable (ATX)
4. Air intake pipe (FI)
5. Air cleaner assembly (carb.)
6. Fuel hose
7. Fuel pump (carb.)
8. Upper radiator hose
9. Heater hose
10. Brake vacuum hose
11. Canister hose (FI, Middle East)
12. Three-way solenoid assembly
13. Engine harness connector and ground
14. Secondary air pipe assembly (except General)

15. EGR pipe (FI, Unleaded carb.)
16. Exhaust manifold insulator
17. Exhaust pipe
18. Exhaust manifold
19. Gusset plate (FI)
20. Intake manifold bracket (FI)
21. Intake manifold assembly
22. Distributor
23. A/C compressor and bracket
24. Upper timing belt cover
25. Timing belt tensioner spring
26. Timing belt
27. Cylinder head cover
28. Cylinder head and gasket

76G01A-031



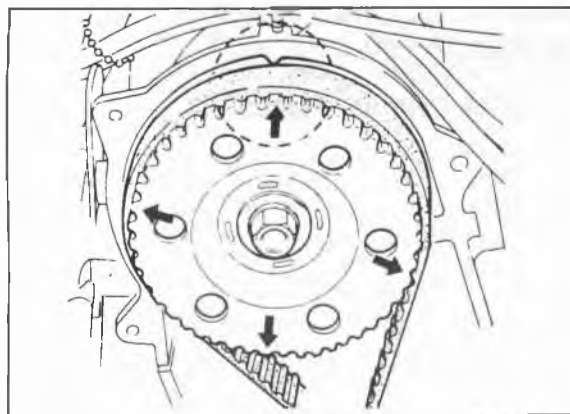
86U01X-032

## Removal note Fuel hose

### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage.



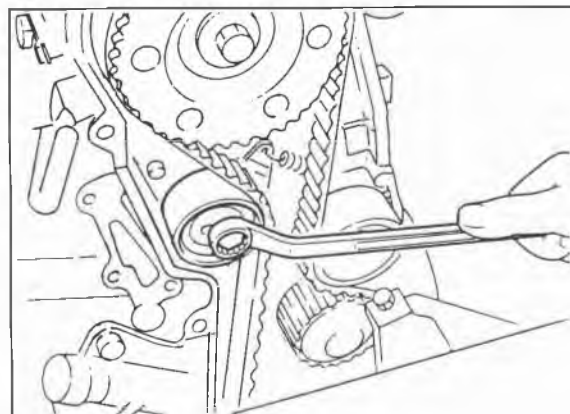
76G01A-032

## Timing belt

1. Before removing the timing belt, turn the crankshaft to align the mating mark of the camshaft pulley with the front housing timing mark.

### Note

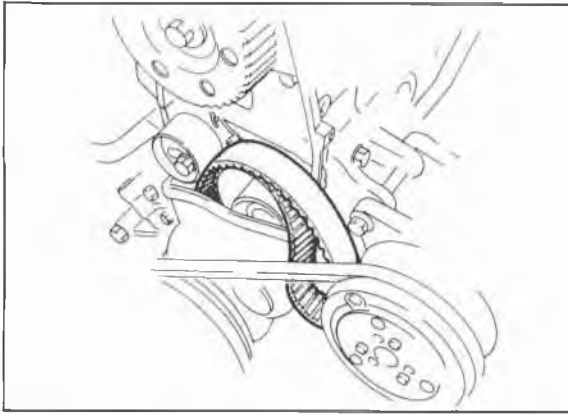
- For FE engine, align "2" mark.  
For F8, F6 engine, align "3" mark.



69G01B-036

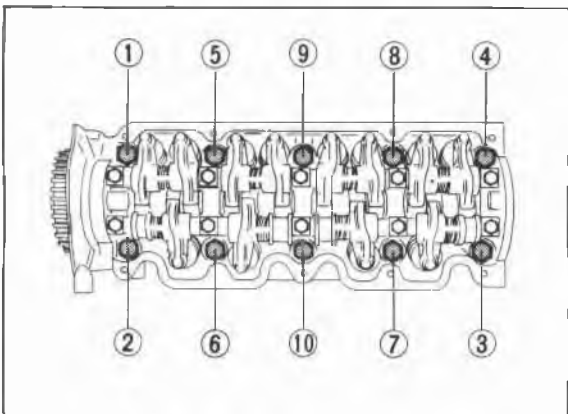
2. Loosen the timing belt tensioner lock bolt.
3. Shift the tensioner outward as far as possible, then temporarily tighten it.

# 1A ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



69G01B-037

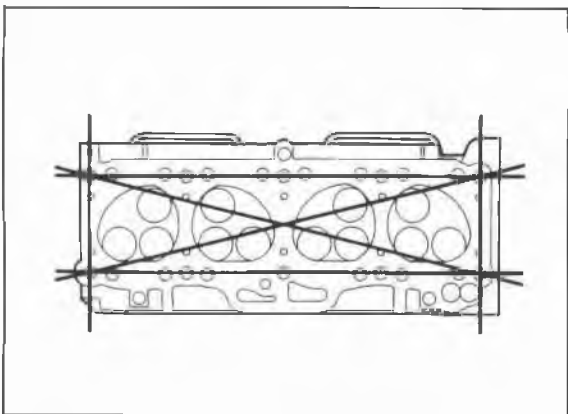
4. Remove the timing belt and secure it out of the way to prevent damage during removal and installation of the cylinder head.



76G01A-111

## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



76G01A-033

## Disassembly of Cylinder Head

Refer to page 1A—40.

## Inspection of Cylinder Head

Refer to page 1A—48.

## Assembly of Cylinder Head

Refer to page 1A—73.

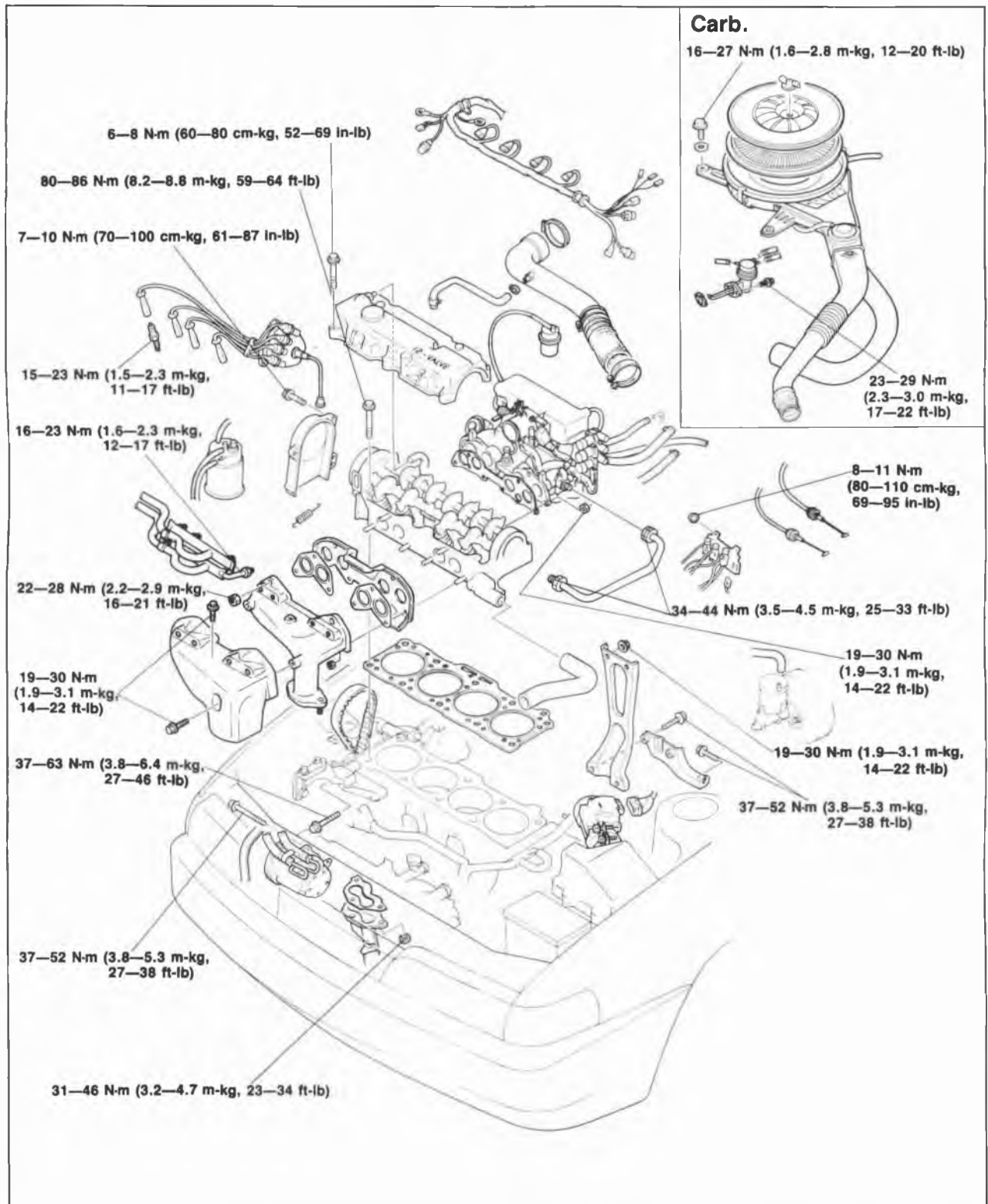
## Installation

Install in the reverse order of removal referring to the installation note.

### Note

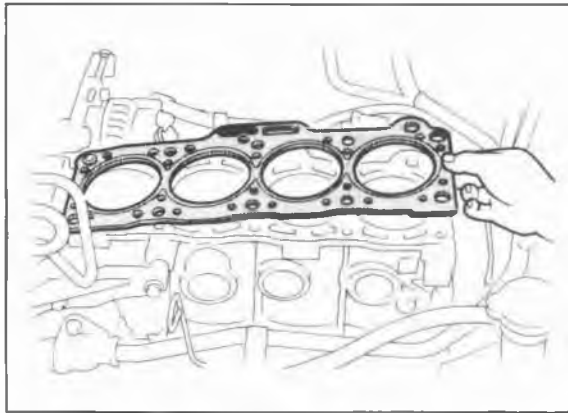
- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

## Torque Specifications





# 1A ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

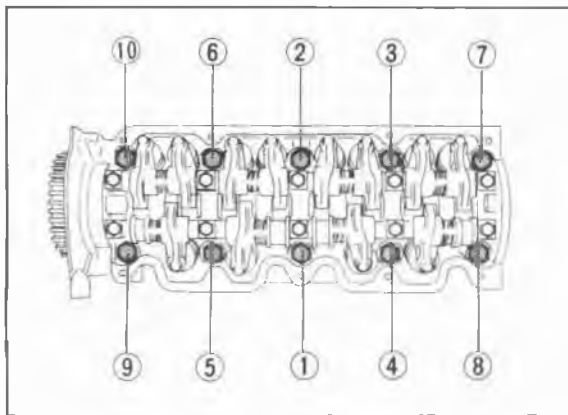


86U01X-035

## Installation note

### Cylinder head

1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Place a new cylinder head gasket in position.

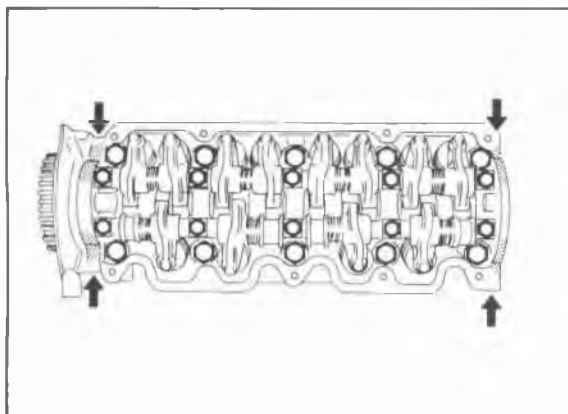


86U01X-036

3. Set the cylinder head in place.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**



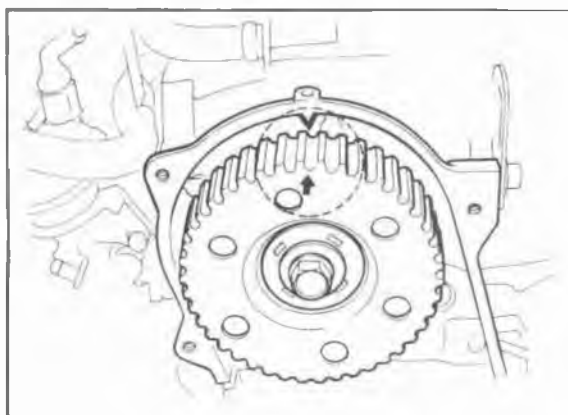
86U01X-037

### Cylinder head cover

1. Apply silicon sealant to the shaded area shown in the figure.
2. Install the cylinder head cover.

### Tightening torque:

**6—8 N·m (60—80 cm·kg, 52—69 in·lb)**



76G01A-034

### Timing belt

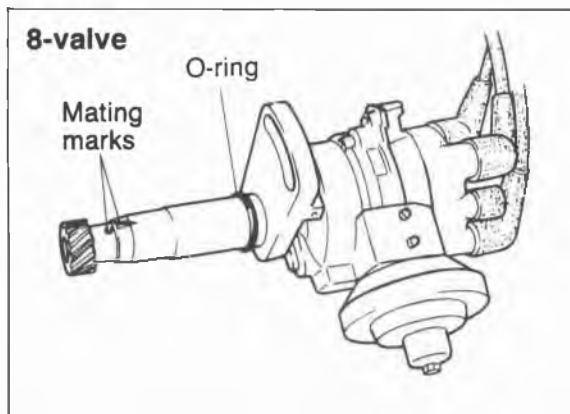
1. Align the mating mark of the camshaft pulley with the front housing timing mark.

### Note

**For FE engine, align "2" mark.**

**For F8, F6 engine, align "3" mark.**

2. Install the timing belt. (Refer to TIMING BELT of ON-VEHICLE MAINTENANCE.)



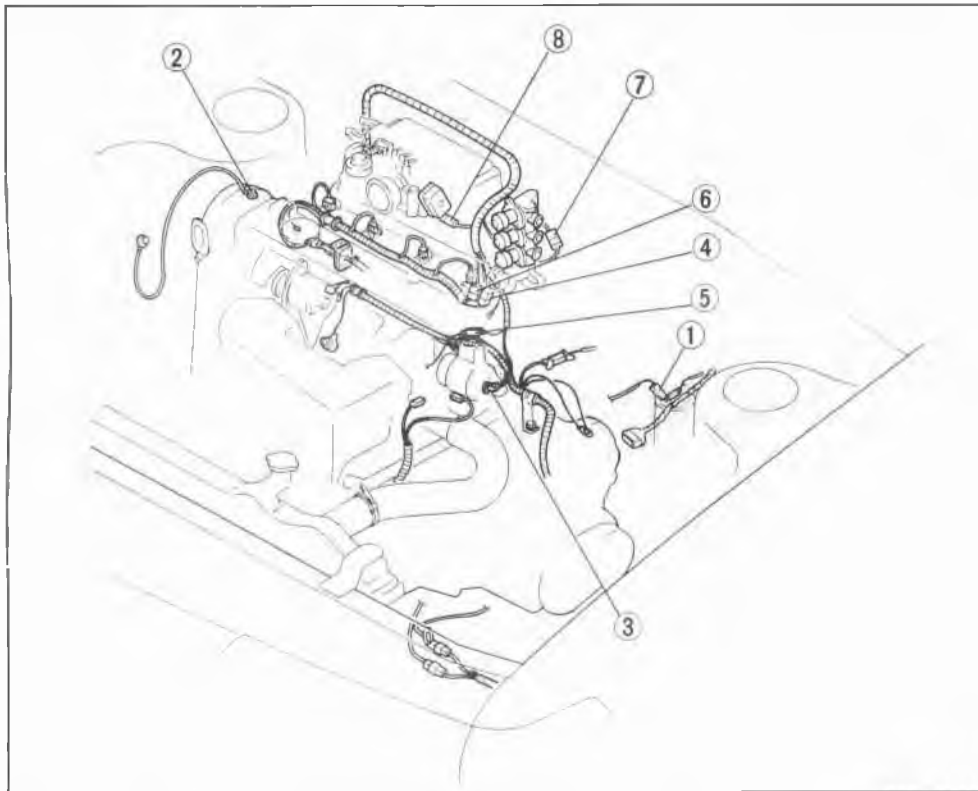
76G01A-035

## Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade or gear.
3. Align the mating marks as shown in the figure ...8-valve.
4. Install the distributor with the marks facing straight up.
5. Loosely tighten the distributor mounting bolt.

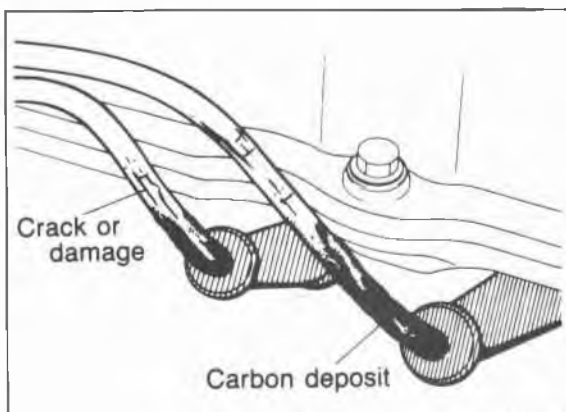
## Engine harness connector

Install the engine harness connectors.



76G01A-113

1. IG coil
2. Engine ground
3. Water temperature sensor
4. Water thermo switch
5. Oxygen sensor (FI)
6. Injection harness (FI)
7. F/I solenoid valve (FI)
8. Throttle sensor (FI)



86U01X-041

## Steps After Installation

1. Fill the radiator with the specified amount and type of coolant.
2. Perform the necessary engine adjustments. (Refer to TUNE-UP PROCEDURE.)

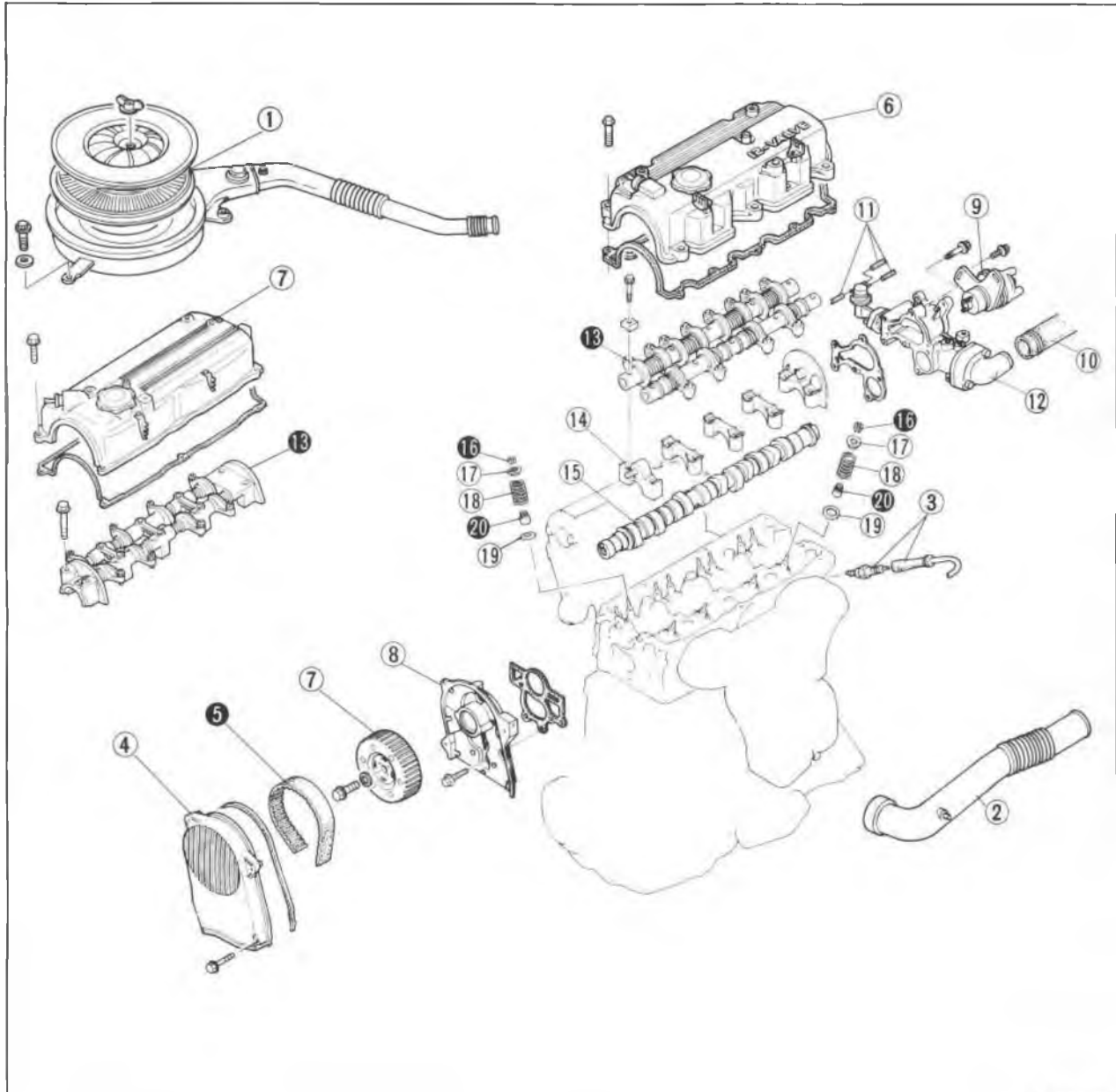
# 1A ON-VEHICLE MAINTENANCE (VALVE SEAL)

## VALVE SEAL

### Removal

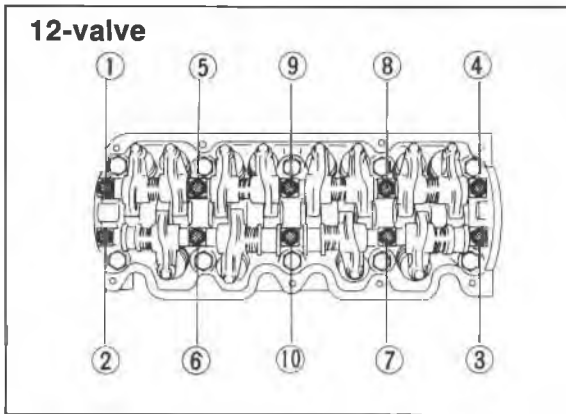
1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G01A-114



76G01A-036

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. Air cleaner assembly (carb.)     | 11. Fuel hose (carb.)             |
| 2. Air intake pipe (FI)             | 12. Rear housing                  |
| 3. High-tension lead and spark plug | 13. Rocker arm and shaft assembly |
| 4. Upper timing belt cover          | 14. Camshaft cap (12-valve)       |
| 5. Timing belt                      | 15. Camshaft                      |
| 6. Cylinder head cover              | 16. Valve keeper                  |
| 7. Camshaft pulley                  | 17. Upper valve spring seat       |
| 8. Front housing                    | 18. Valve spring                  |
| 9. Distributor                      | 19. Lower valve spring seat       |
| 10. Upper radiator hose             | 20. Valve seal                    |



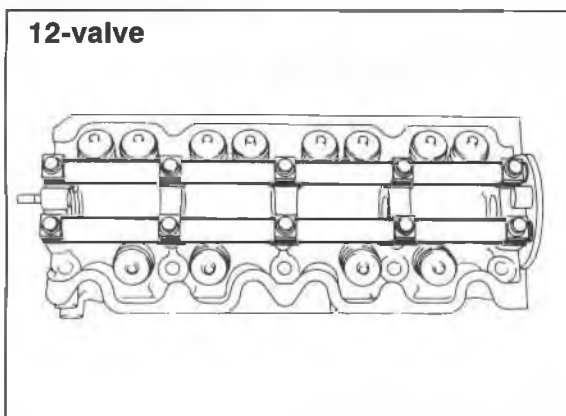
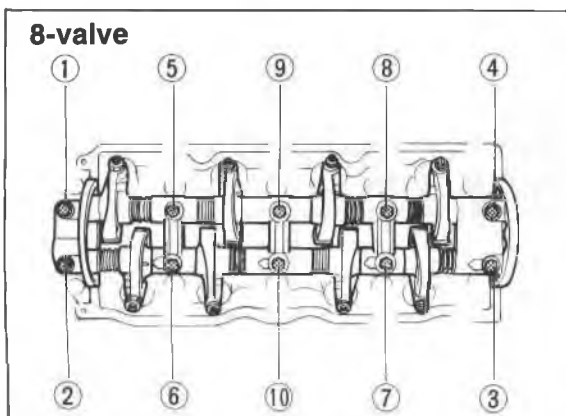
**Removal note**

**Timing belt**

Remove the timing belt. (Refer to page 1A—14.)

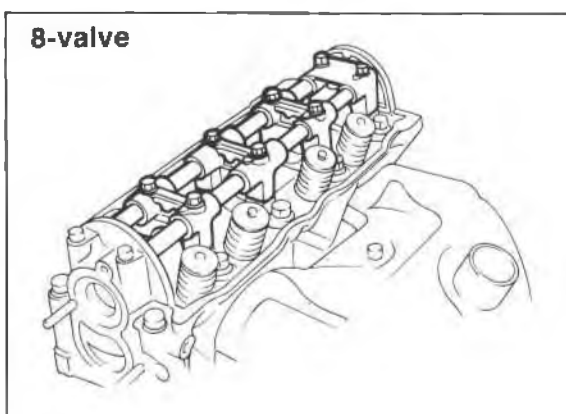
**Rocker arm and shaft assembly**

Loosen the rocker arm shaft bolts in two or three steps in the order shown in the figure.

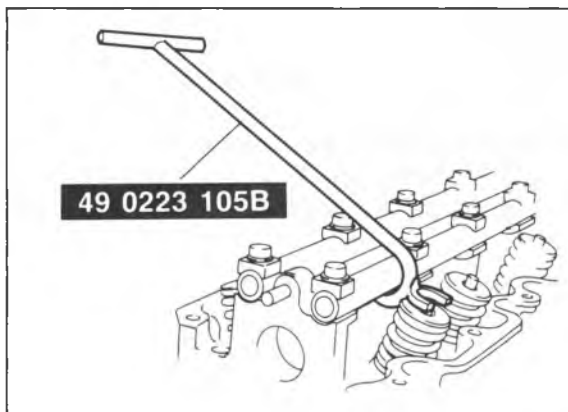


**Valve seal**

1. Remove the rocker arms and springs from the rocker arm shaft.
2. Install the camshaft caps and rocker arm shafts onto the cylinder head.
3. Plug the oil drain hole with a rag to prevent the possibility of the valve keepers from falling into the oil pan.

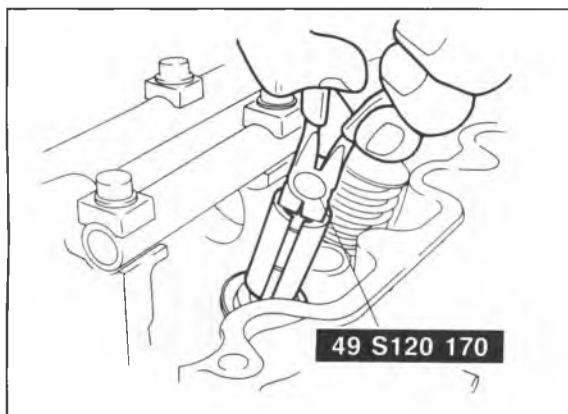


# 1A ON-VEHICLE MAINTENANCE (VALVE SEAL)



86U01X-046

4. Turn the crankshaft to position the piston of the valve seal to be replaced at top dead center.
5. Remove the valve keepers with the **SST**.
6. Remove the valve spring and spring seats.



86U01X-047

7. Remove the valve seal from the valve guide with the **SST**.

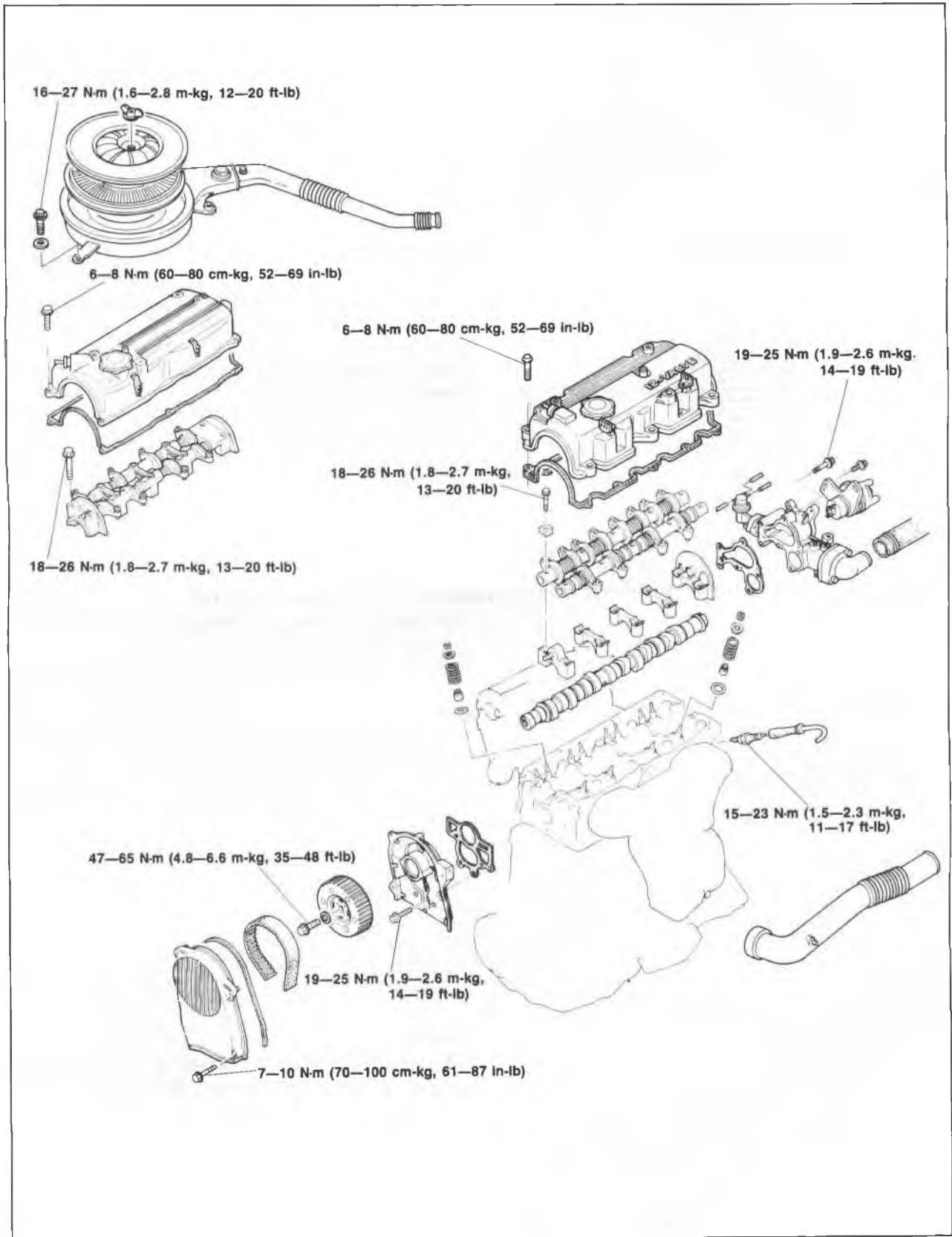
### Caution

**Do not turn the crankshaft while the valve spring is removed.  
Replace the valve seals at every cylinders.**

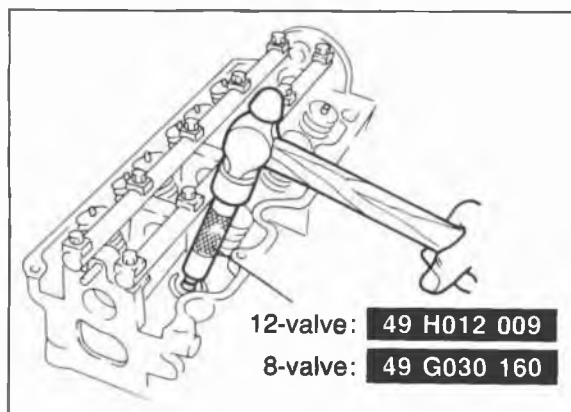
## Installation

Install in the reverse order of removal referring to the installation note.

## Torque Specifications



# 1A ON-VEHICLE MAINTENANCE (VALVE SEAL)

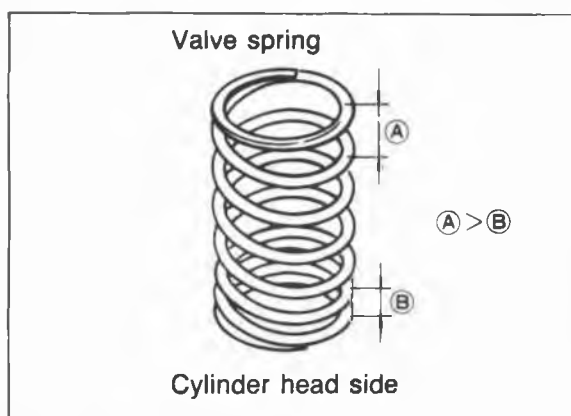


86U01X-049

## Installation note

### Valve seal

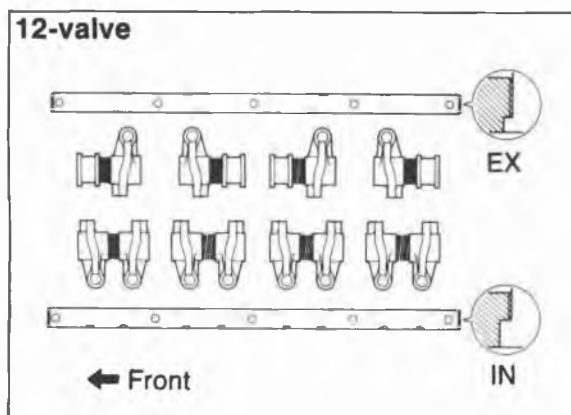
1. Apply engine oil to the inside of the new valve seal.
2. Push it on gently with the **SST**.



76G01A-038

## Valve spring

1. (12-valve)  
Install the valve spring with the narrower pitch toward the cylinder head side.  
(8-valve)  
Install the outer valve spring with the narrower pitch toward the cylinder head side.
2. Install the valve keepers, and tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



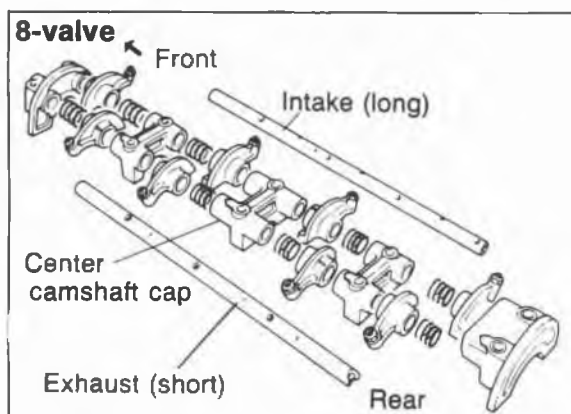
76G01A-039

## Rocker arm, rocker arm shaft

1. Remove the rocker arm shafts and camshaft caps.
2. (12-valve)  
Assemble the rocker arms and springs to the shaft.

### Note

- a) The intake side shaft has twice as many oil holes as the exhaust side shaft.
- b) The stepped ends are the rear sides of both intake and exhaust shafts.



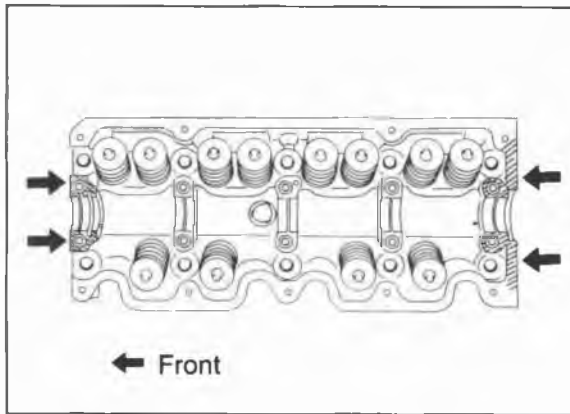
76G01A-040

(8-valve)

Assemble the camshaft caps, rocker arms, and springs, to the shafts.

### Caution

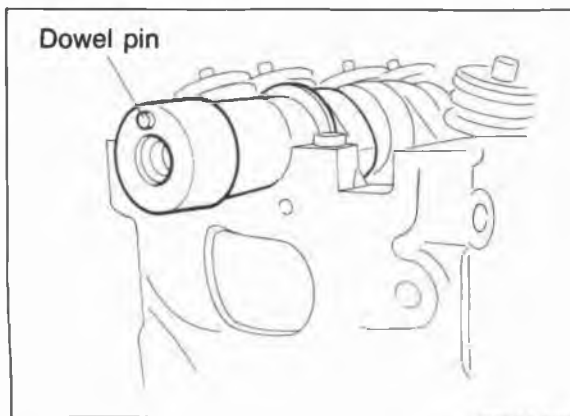
Be sure both rocker arm shaft oil holes (in the center camshaft cap) face each other.



76G01A-041

## Camshaft

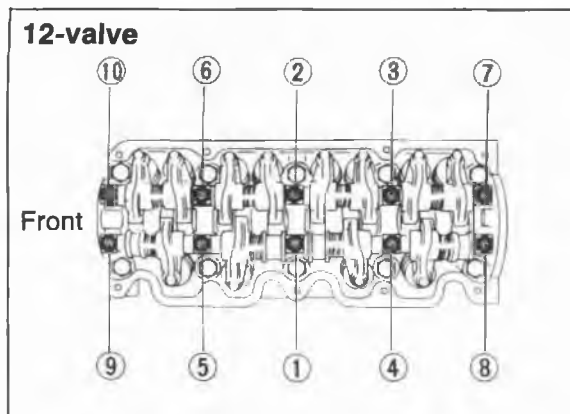
1. Apply sealant to the shaded areas as shown in the figure.



76G01A-042

2. Apply engine oil to the camshaft journals.

3. Install the camshaft with its dowel pin upward.



76G01A-043

## Rocker arm and shaft assembly

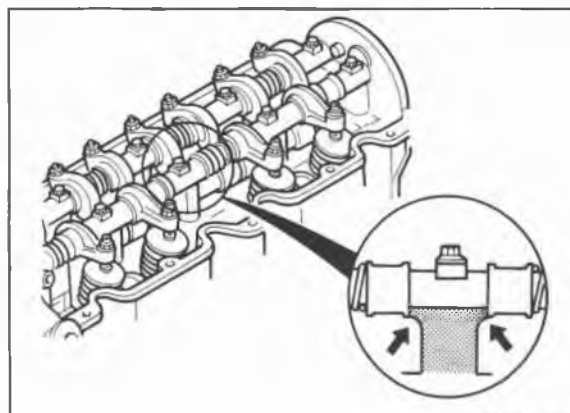
(12-valve)

1. Install the camshaft caps.

2. Install the rocker arm and shaft assemblies on the cylinder head, and tighten them in three steps in the order shown in the figure.

### Tightening torque:

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)



86U01X-052

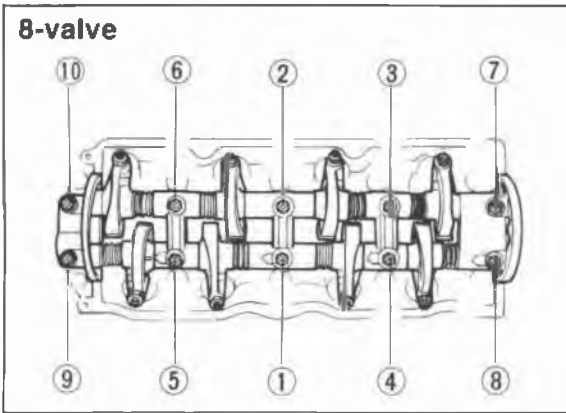
## Caution

Be careful that the rocker arms or spacers do not get caught between the shaft and camshaft cap.



# 1A ON-VEHICLE MAINTENANCE (VALVE SEAL)

## 8-valve



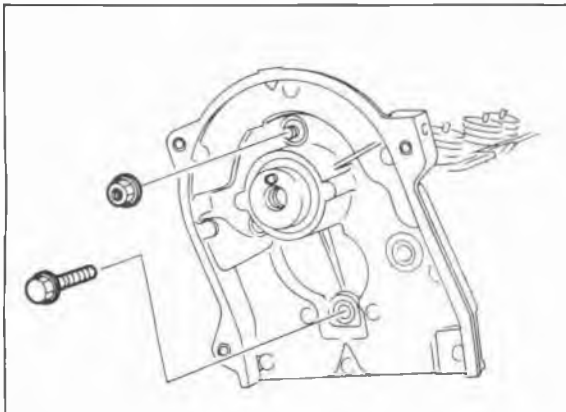
76G01A-044

(8-valve)

Install the rocker arm and shaft assemblies on the cylinder head and tighten them in three steps in the order shown in the figure.

### Tightening torque:

18–26 N·m (1.8–2.7 m·kg, 13–20 ft·lb)



86U01X-212

### Front housing

1. Replace the oil seal in the front housing.
2. Apply engine oil to the oil seal lip.
3. Install the front housing along with a new gasket.

### Tightening torque:

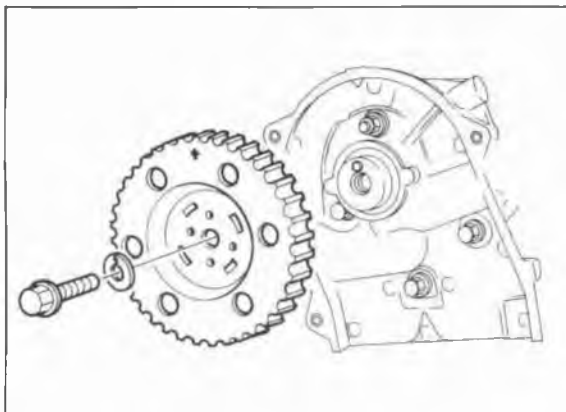
19–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)

### Rear housing

Install the rear housing along with a new gasket.

### Tightening torque:

19–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)



76G01A-045

### Camshaft pulley

1. Install the camshaft pulley so that the mating mark is aligned with the camshaft dowel pin straight up.

### Note

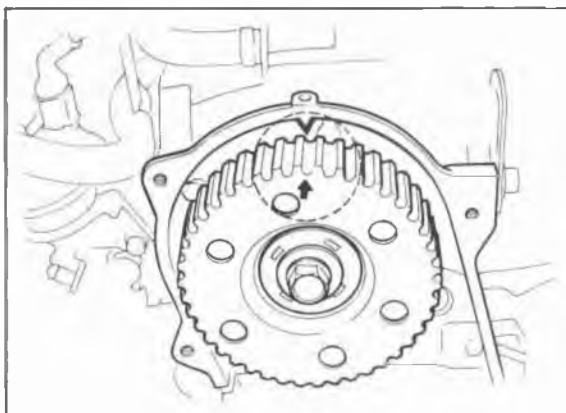
For FE engine, align "2" mark.

For F8, F6 engine, align "3" mark.

2. Tighten the lock bolt.

### Tightening torque:

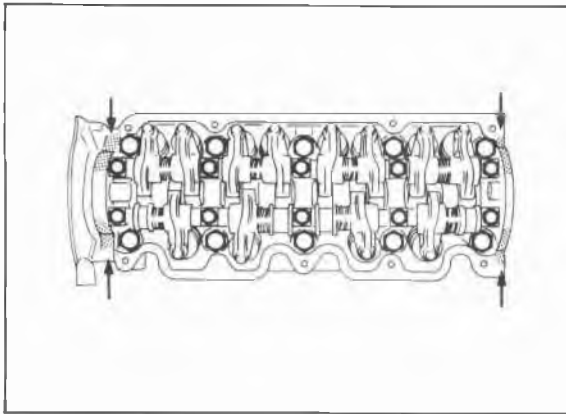
47–65 N·m (4.8–6.6 m·kg, 35–48 ft·lb)



86U01X-053

### Timing belt

Install the timing belt. (Refer to TIMING BELT of ON-VEHICLE MAINTENANCE.)



76G01A-116

## Valve clearance (8-valve)

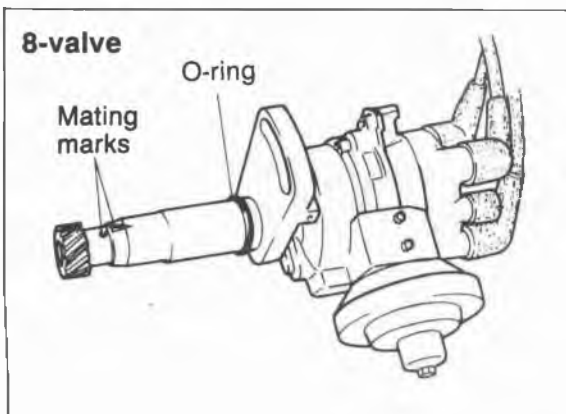
Adjust the valve clearance. (Refer to page 1A—10.)

## Cylinder head cover

1. Apply silicon sealant to the shaded areas shown in the figure.
2. Install the cylinder head cover.

## Tightening torque:

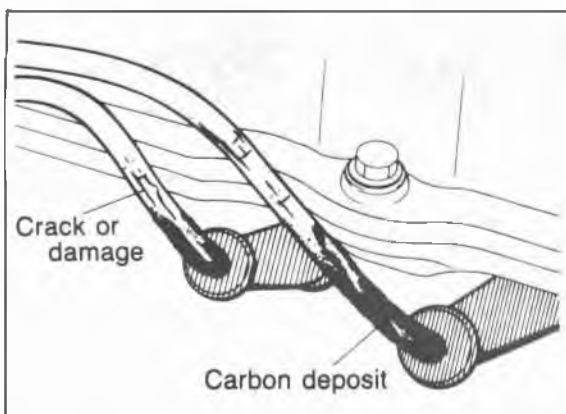
**6—8 N·m (60—80 cm·kg, 52—69 in·lb)**



76G01A-035

## Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade or gear.
3. Align the mating marks as shown in the figure ...8-valve.
4. Install the distributor with the marks facing straight up.
5. Loosely tighten the distributor mounting bolt.



86U01X-055

## Steps After Installation

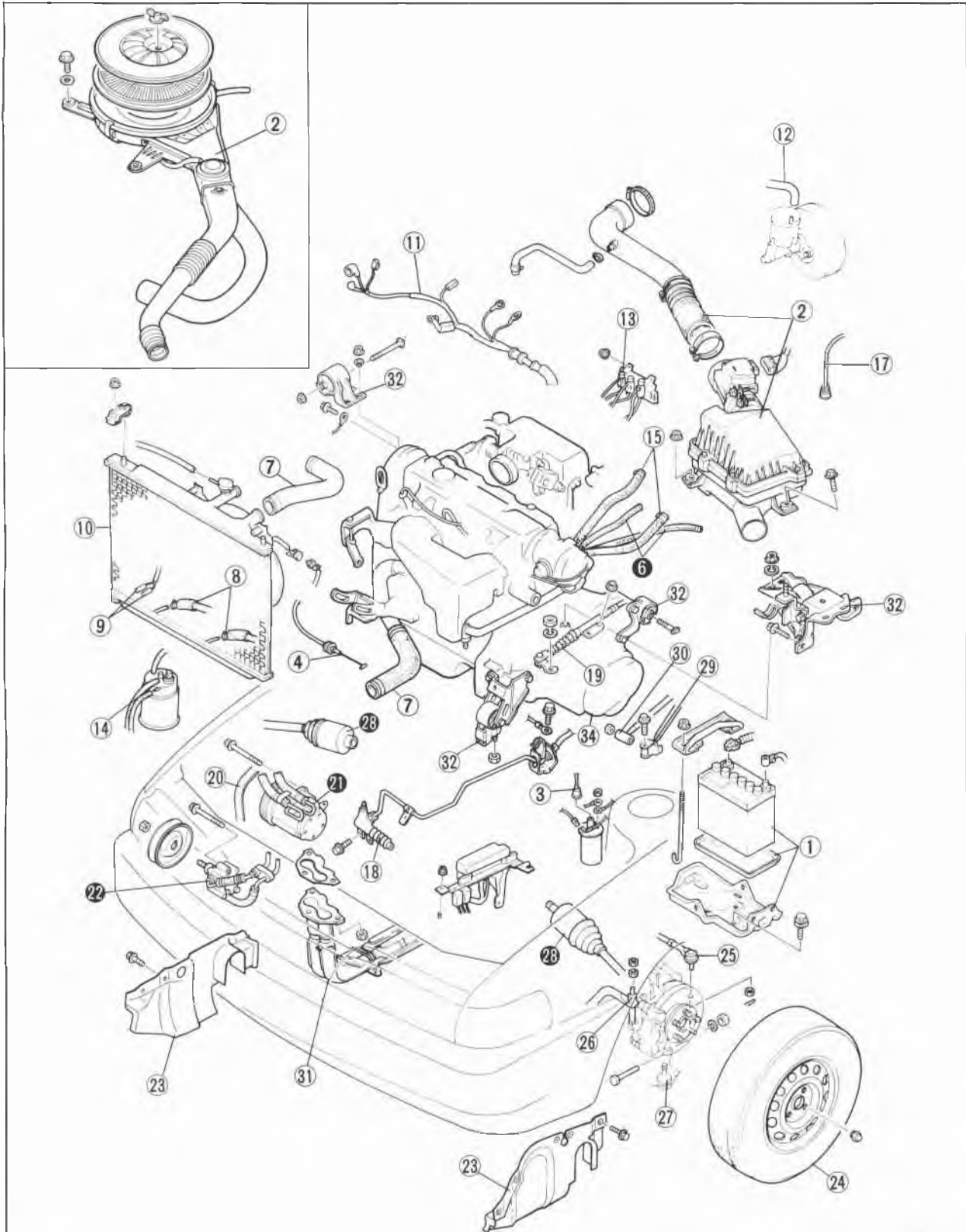
1. Fill the radiator with the specified amount and type of coolant.
2. Perform the necessary engine adjustments. (Refer to TUNE-UP PROCEDURE.)

# 1A REMOVAL

## REMOVAL

**Warning: Release the fuel pressure. (Refer to Section 4.)**

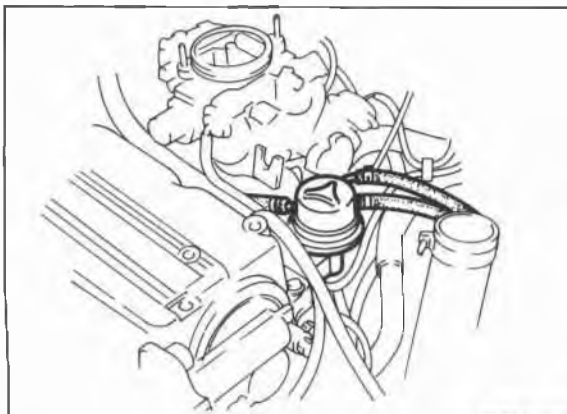
1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.



76G01A-117

- |                                |                                     |                            |
|--------------------------------|-------------------------------------|----------------------------|
| 1. Battery and battery carrier | 13. Three-way solenoid assembly     | 22. P/S oil pump           |
| 2. Air cleaner assembly        | 14. Canister hose (FI, Middle East) | 23. Engine side cover      |
| 3. High-tension lead           | 15. Heater hose                     | 24. Front wheel            |
| 4. Accelerator cable           | 16. Transaxle harness               | 25. Tie-rod end            |
| 5. Throttle cable (ATX)        | 17. Speedometer cable               | 26. Stabilizer control rod |
| 6. Fuel hose                   | 18. Clutch release cylinder (MTX)   | 27. Lower arm bushing      |
| 7. Radiator hose               | 19. Control cable (ATX)             | 28. Driveshaft             |
| 8. ATF hose (ATX)              | 20. Drive belt                      | 29. Change rod (MTX)       |
| 9. Radiator harness            | 21. A/C compressor and bracket      | 30. Extension bar (MTX)    |
| 10. Radiator and cooling fan   |                                     | 31. Exhaust pipe           |
| 11. Engine harness             |                                     | 32. Engine mount           |
| 12. Brake vacuum hose          |                                     | 33. Engine and transaxle   |
|                                |                                     | 34. Transaxle              |

76G01A-046



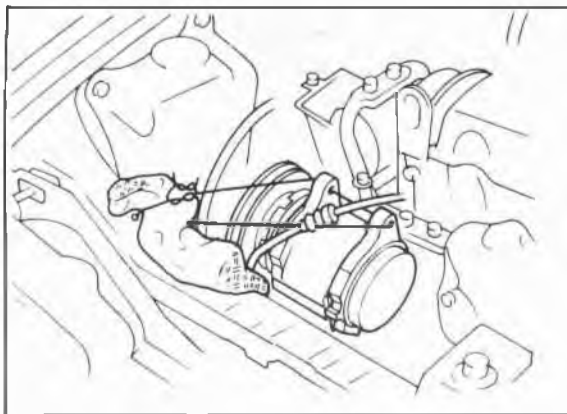
76G01A-118

### Removal Note Fuel hose

#### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

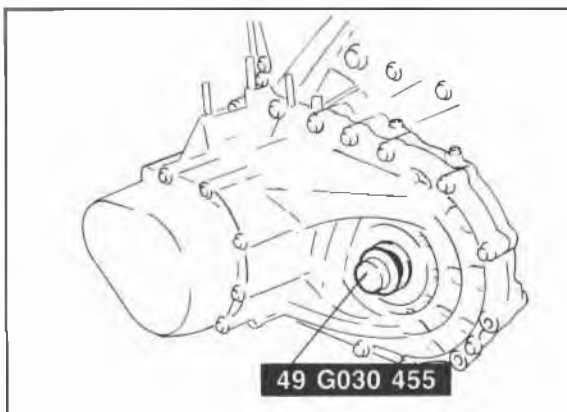
Plug the disconnected hoses to avoid fuel leakage.



67U01X-029

### P/S pump, A/C compressor

Remove the P/S pump and A/C compressor with the hoses still connected to them, secure the pump and compressor as shown in the figure.



86U01X-060

### Driveshaft

Remove the driveshafts. (Refer to Section 9.) Slide the **SST** into the transaxle.

# 1A DISASSEMBLY (AUXILIARY PARTS)

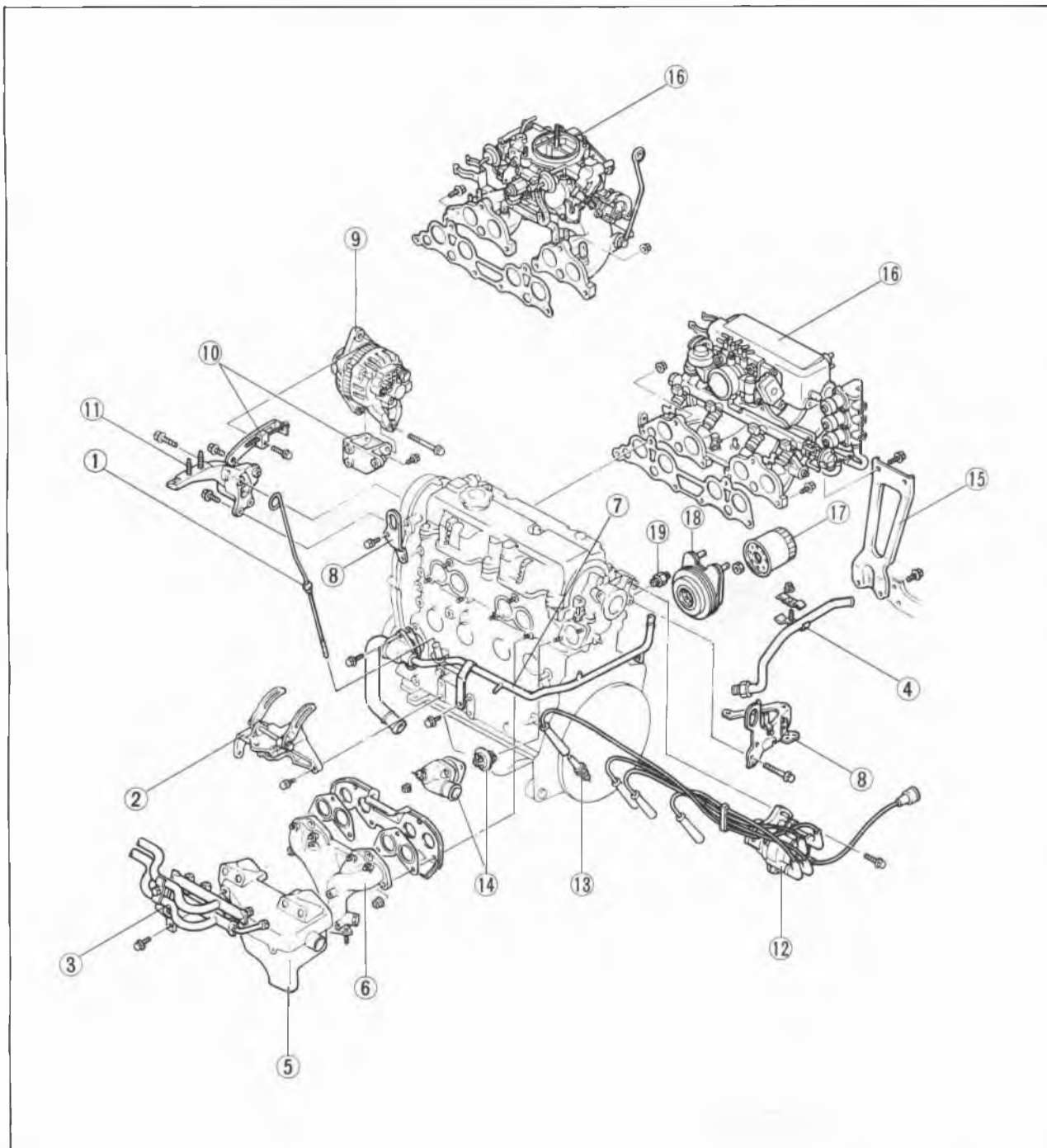
## DISASSEMBLY

1. Remove in the sequence shown in the figure referring to the disassembly note for specially marked parts.
2. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
3. Clean the parts with steam, blow off any remaining water with compressed air.

### Note

Care should be taken during the disassembly of any part or system to study its order of assembly. Any deformation, wear, or damage should also be noted.

## AUXILIARY PARTS

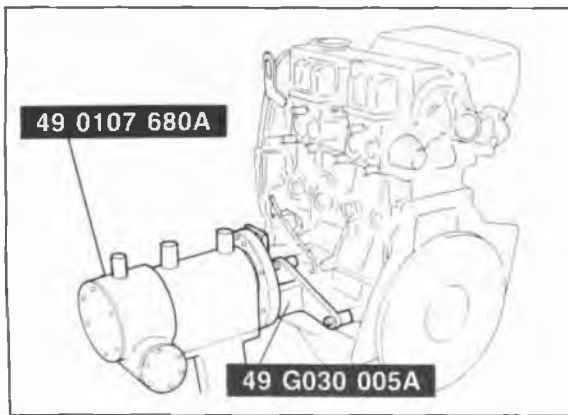


76G01A-119

## DISASSEMBLY (AUXILIARY PARTS) 1A

1. Oil level gauge
2. P/S oil pump bracket
3. Secondary air pipe assembly (except General)
4. EGR pipe (FI, Unleaded carb.)
5. Exhaust manifold insulator
6. Exhaust manifold assembly
7. Coolant inlet pipe and bypass pipe
8. Engine hanger
9. Alternator
10. Alternator strap and bracket
11. Engine mount bracket
12. Distributor and high-tension lead
13. Spark plug
14. Thermostat and thermostat cover
15. Intake manifold bracket (FI)
16. Intake manifold assembly
17. Oil filter
18. Oil cooler (8-valve...only ECE, 12-valve)
19. Oil pressure switch

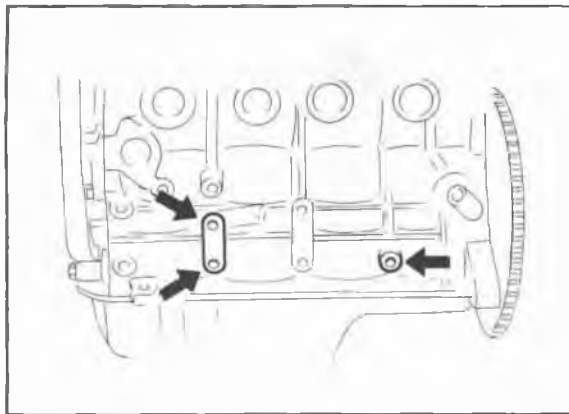
76G01A-047



76G01A-120

### Disassembly Note Engine hanger

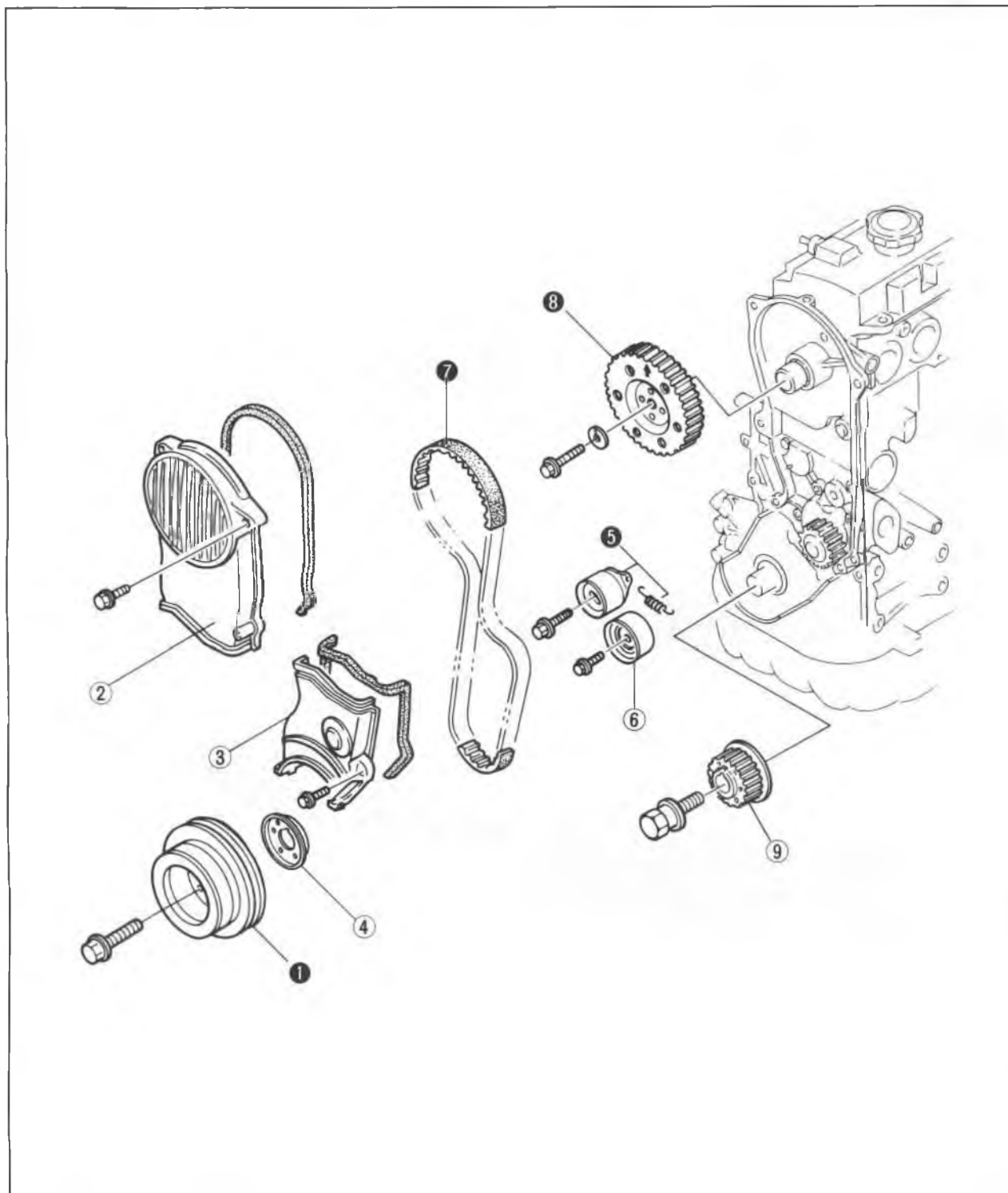
Remove the exhaust manifold; then connect the **SST** to the engine.



69G01X-000

# 1A DISASSEMBLY (TIMING BELT)

## TIMING BELT

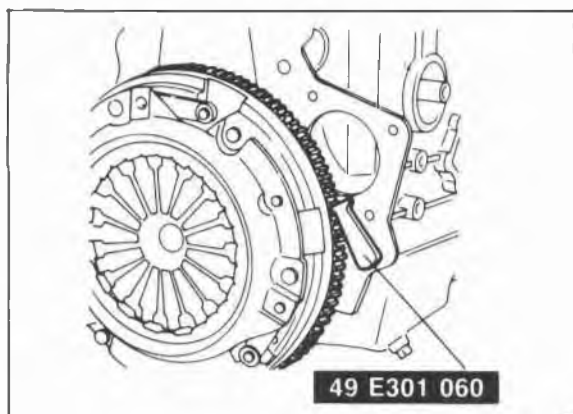


69G01B-072

1. Crankshaft pulley
2. Upper timing belt cover
3. Lower timing belt cover
4. Baffle plate
5. Timing belt tensioner and spring

6. Timing belt idler pulley
7. Timing belt
8. Camshaft pulley
9. Timing belt pulley

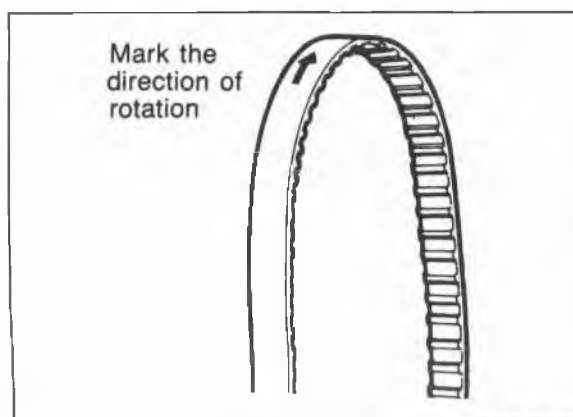
## DISASSEMBLY (TIMING BELT) 1A



76G01A-121

### Disassembly Note Crankshaft pulley

1. Set the **SST** against the flywheel.
2. Remove the crankshaft pulley.



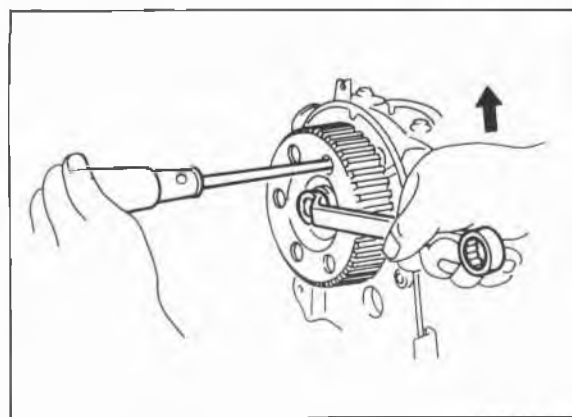
76G01A-122

### Timing belt

1. Loosen the tensioner lock bolt, and remove the tensioner spring.
2. Mark the timing belt rotation for proper reinstallation if it is reused.
3. Remove the timing belt.

### Caution

**Be careful not to allow oil or grease on the belt.**



76G01A-123

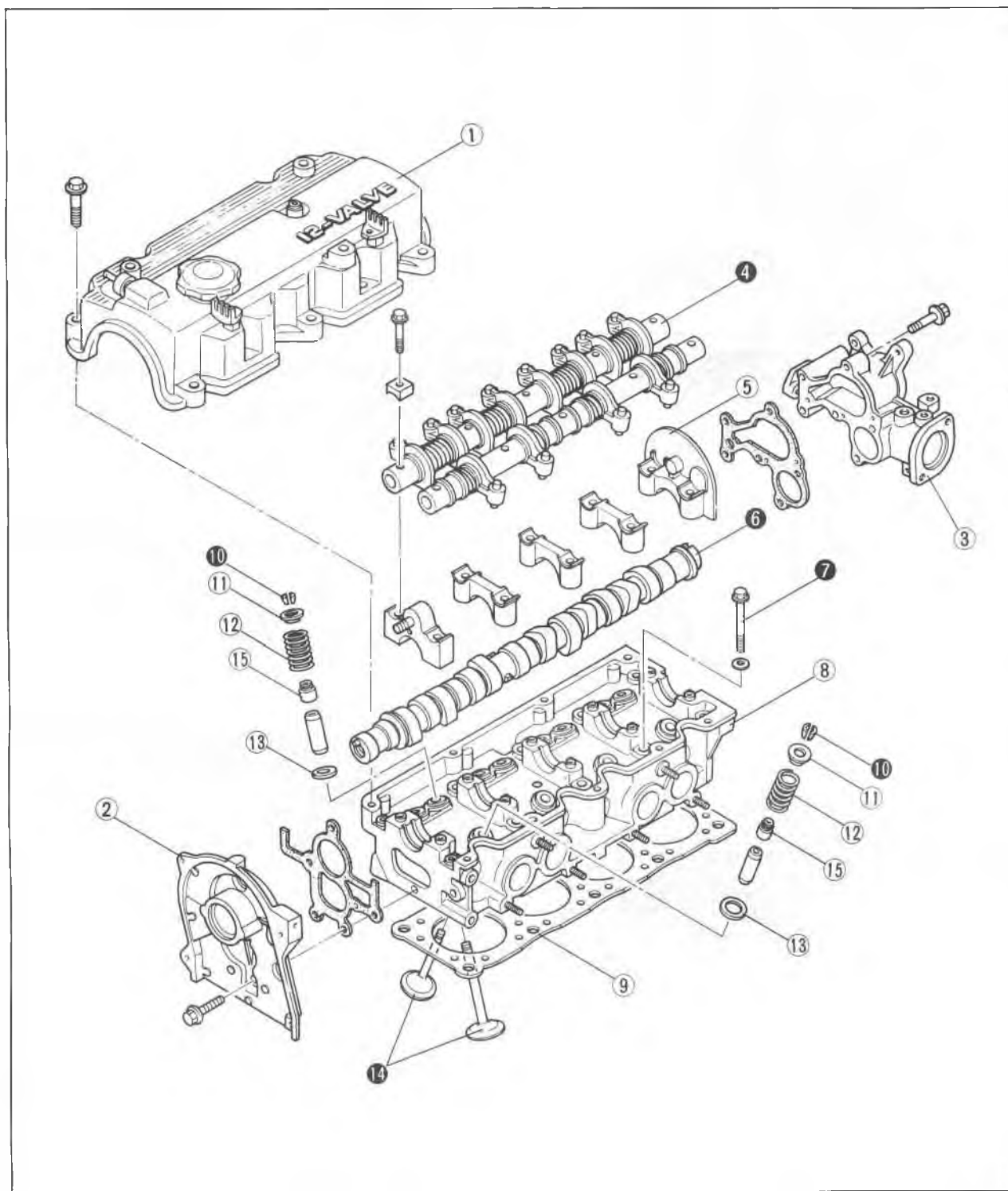
### Camshaft pulley

Remove the pulley lock bolt using a screw driver to prevent the camshaft from turning.



# 1A DISASSEMBLY (CYLINDER HEAD)

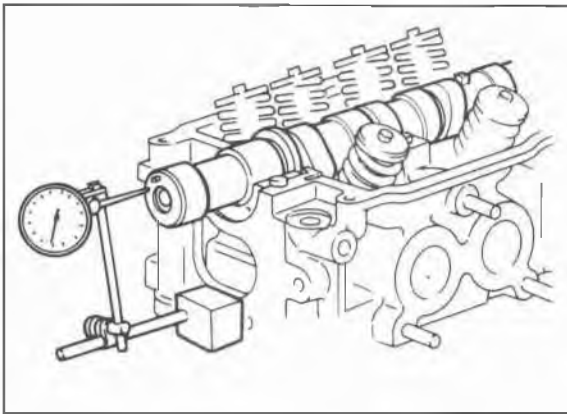
## CYLINDER HEAD (12-valve)



76G01A-048

- |                                  |                         |
|----------------------------------|-------------------------|
| 1. Cylinder head cover           | 8. Cylinder head        |
| 2. Front housing                 | 9. Cylinder head gasket |
| 3. Rear housing                  | 10. Valve keeper seat   |
| 4. Rocker arm and shaft assembly | 11. Upper spring seat   |
| 5. Camshaft cap                  | 12. Valve spring        |
| 6. Camshaft                      | 13. Lower spring seat   |
| 7. Cylinder head bolt            | 14. Valve               |
|                                  | 15. Valve seal          |

# DISASSEMBLY (CYLINDER HEAD) 1A



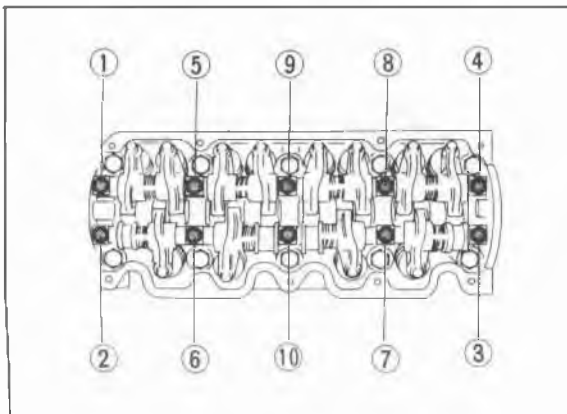
76G01A-049

## Disassembly Note

### Camshaft

Before removing the rocker arm and shaft assembly, clean the bearings and journals, and measure the following points.

1. Camshaft end play. (Refer to page 1A—54.)
2. Camshaft journal oil clearance. (Refer to page 1A—54.)



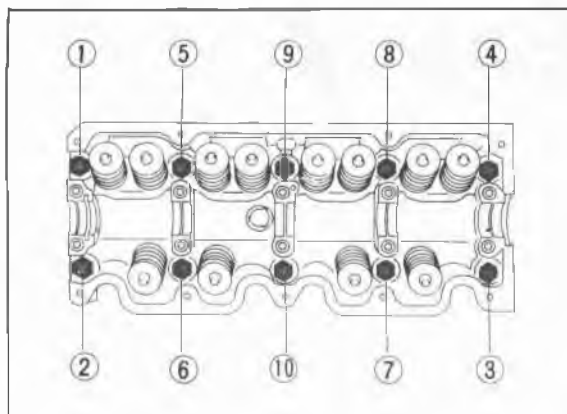
86U01X-067

## Rocker arm and shaft assembly

1. Loosen the bolts in two or three steps in the order shown in the figure.
2. Remove the rocker arm and shaft assembly together with the bolts.

### Caution

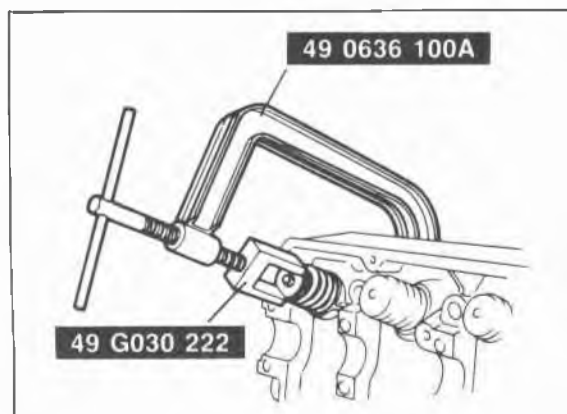
- a) Do not mix up the various parts of the rocker arm and shaft assembly.
- b) Do not remove the HLA unless necessary.



86U01X-068

## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



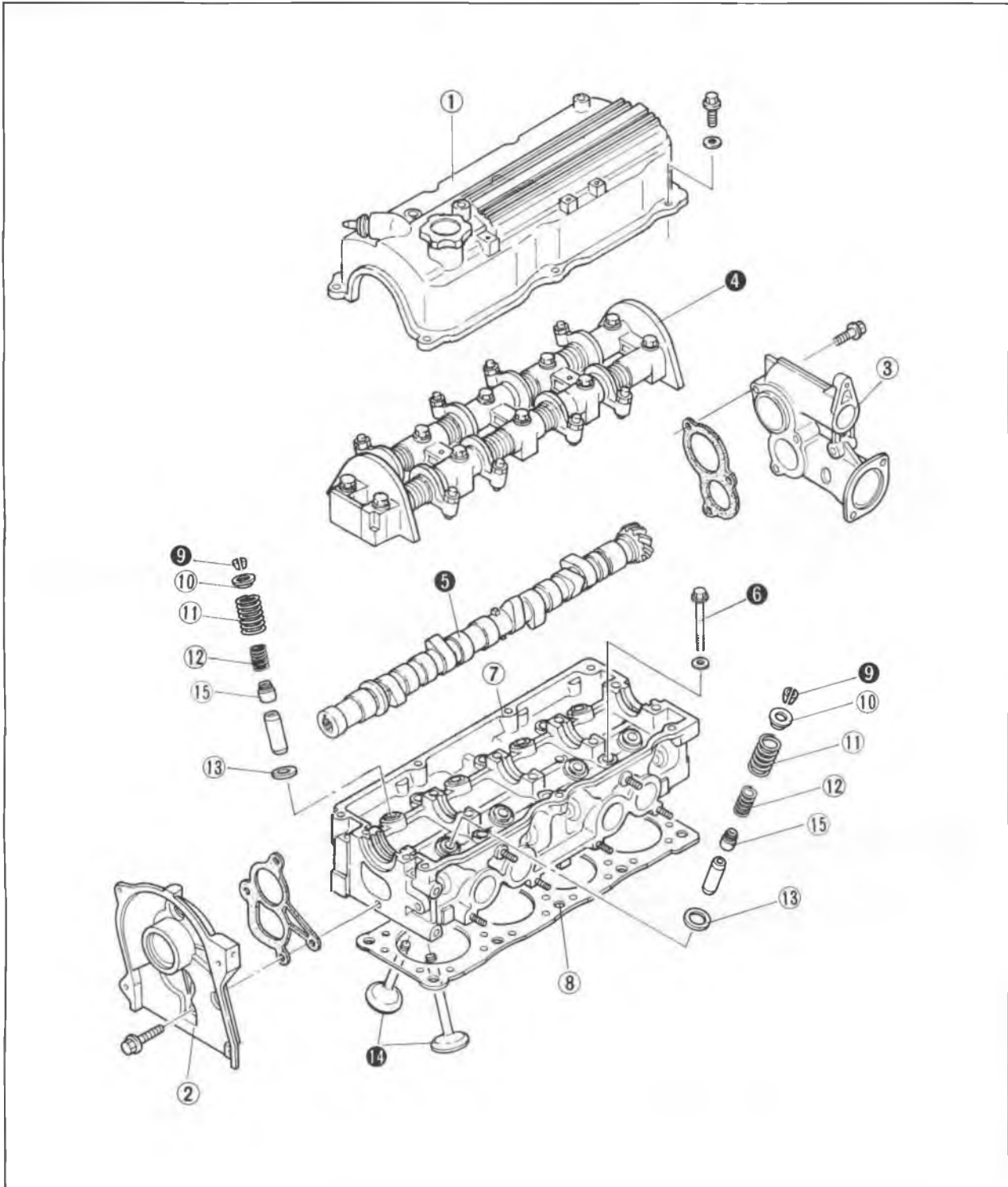
86U01X-069

## Valve

Remove the valves from the cylinder head with the SST.

# 1A DISASSEMBLY (CYLINDER HEAD)

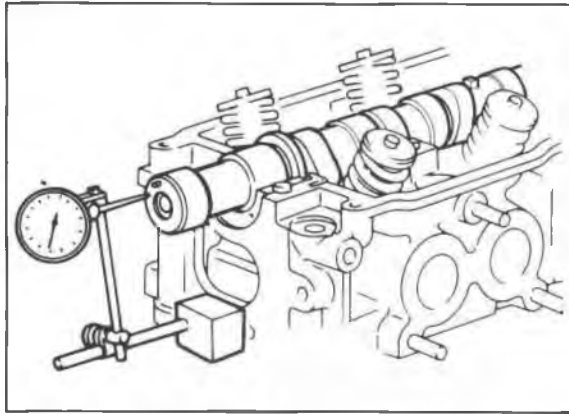
## CYLINDER HEAD (8-valve)



76G01A-050

- |                                  |                        |
|----------------------------------|------------------------|
| 1. Cylinder head cover           | 9. Valve keeper        |
| 2. Front housing                 | 10. Upper spring seat  |
| 3. Rear housing                  | 11. Outer valve spring |
| 4. Rocker arm and shaft assembly | 12. Inner valve spring |
| 5. Camshaft                      | 13. Lower spring seat  |
| 6. Cylinder head bolt            | 14. Valve              |
| 7. Cylinder head                 | 15. Valve seal         |
| 8. Cylinder head gasket          |                        |

# DISASSEMBLY (CYLINDER HEAD) 1A

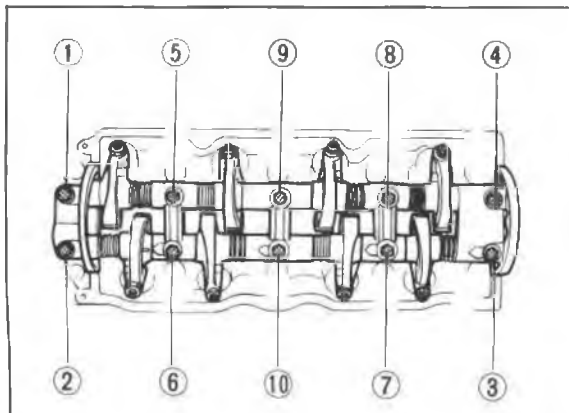


76G01A-049

## Disassembly Note Camshaft

Before removing the rocker arm and shaft assembly, clean the bearings and journals, and measure the following points.

1. Camshaft end play. (Refer to page 1A—54.)
2. Camshaft journal oil clearance. (Refer to page 1A—54.)



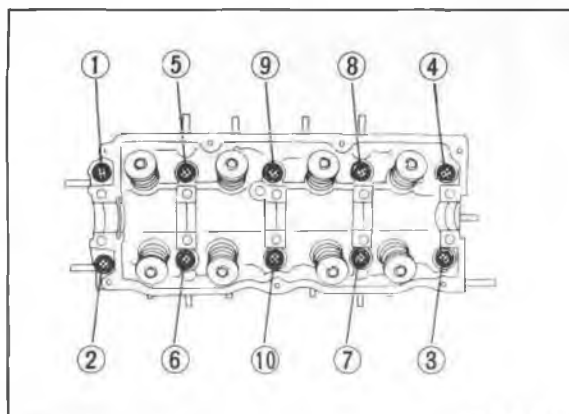
76G01A-057

## Rocker arm and shaft assembly

1. Loosen the bolts in two or three steps in the order shown in the figure.
2. Remove the rocker arm and shaft assembly together with the bolts.

### Caution

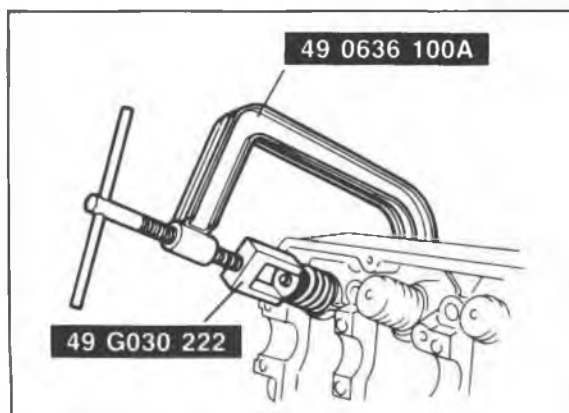
**Do not mix up the various parts of the rocker arm and shaft assembly.**



86U01X-068

## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



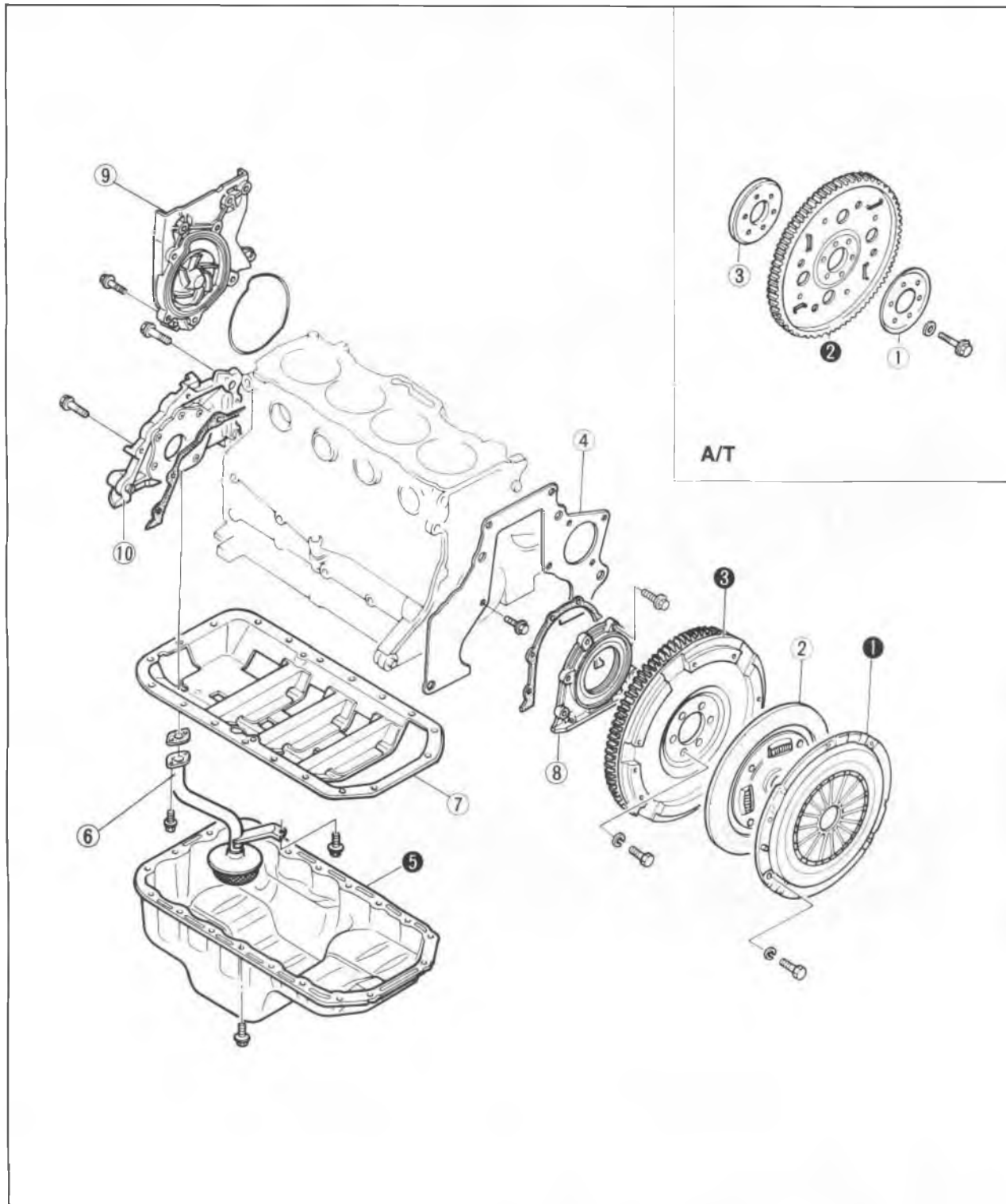
86U01X-069

## Valve

Remove the valves from the cylinder head with the SST.

# 1A DISASSEMBLY (CYLINDER BLOCK)

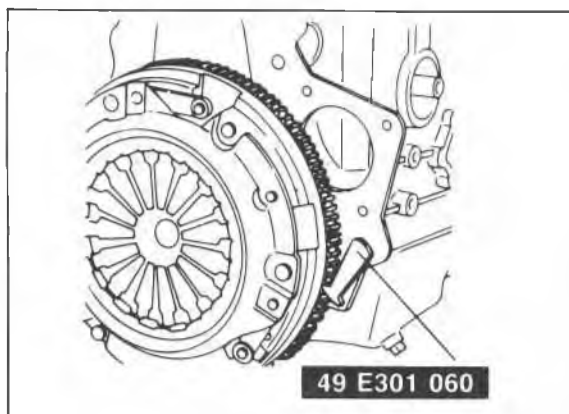
## CYLINDER BLOCK—I



76G01A-051

- |  |  |
|--|--|
| 1. Clutch cover (MTX), Backing plate (ATX) | 6. Oil strainer                                |
| 2. Clutch disc (MTX), Drive plate (ATX)    | 7. Stiffener (FE 8-valve...only ECE, 12-valve) |
| 3. Flywheel (MTX), Adaptor (ATX)           | 8. Rear cover                                  |
| 4. End plate                               | 9. Water pump assembly                         |
| 5. Oil pan                                 | 10. Oil pump assembly                          |

## DISASSEMBLY (CYLINDER BLOCK) 1A

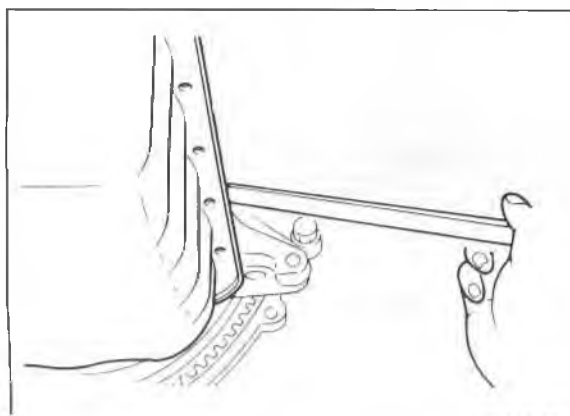


76G01A-125

### Disassembly Note

#### Clutch cover, flywheel (MTX) or drive plate (ATX)

Remove the clutch cover and flywheel (MTX), or drive plate (ATX) with the **SST**.



76G01A-052

### Oil pan

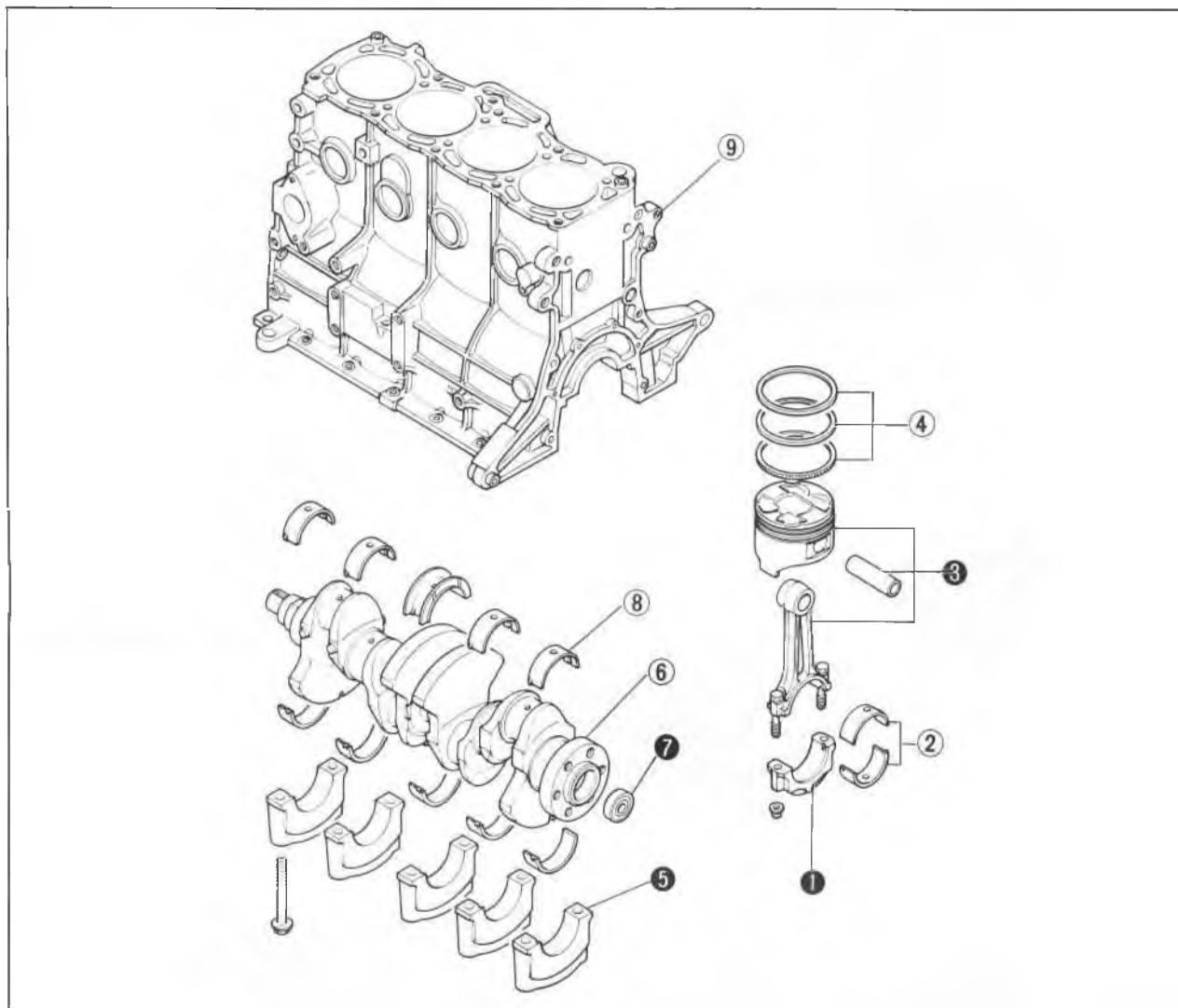
1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the stiffener or the cylinder block to separate them.
3. Remove the oil pan.

### Caution

**Do not bend the oil pan when prying loose.**

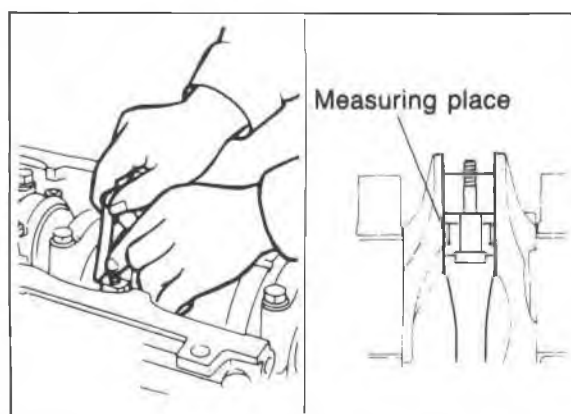
# 1A DISASSEMBLY (CYLINDER BLOCK)

## CYLINDER BLOCK—II



86U01X-073

1. Connecting rod cap
2. Connecting rod bearing
3. Connecting rod and piston
4. Piston ring
5. Main bearing cap
6. Crankshaft
7. Pilot bearing (MTX)
8. Main bearing
9. Cylinder block



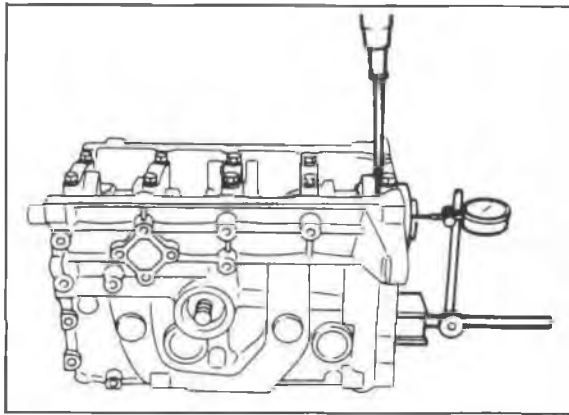
76G01A-053

### Disassembly Note Connecting rod and cap

Before removing the connecting rod, clean the bearing, connecting rod, and crankpin, and measure the following points.

1. Connecting rod side clearance. (Refer to page 1A—67.)
2. Crankpin oil clearance. (Refer to page 1A—67.)

# DISASSEMBLY (CYLINDER BLOCK) 1A

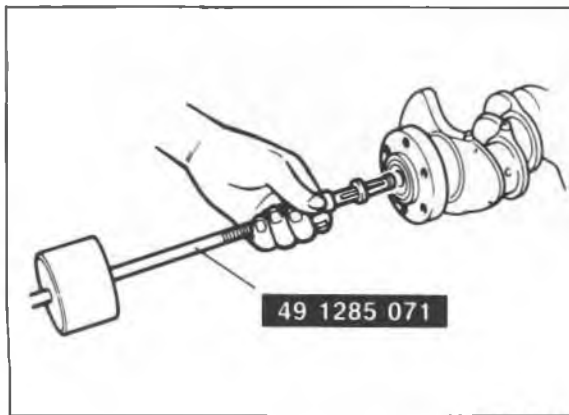


76G01A-054

## Main bearing cap

Before removing the main bearing caps, clean the bearings, main journals, and caps, and measure the following points.

1. Crankshaft end play. (Refer to page 1A—66.)
2. Main journal oil clearance. (Refer to page 1A—65.)

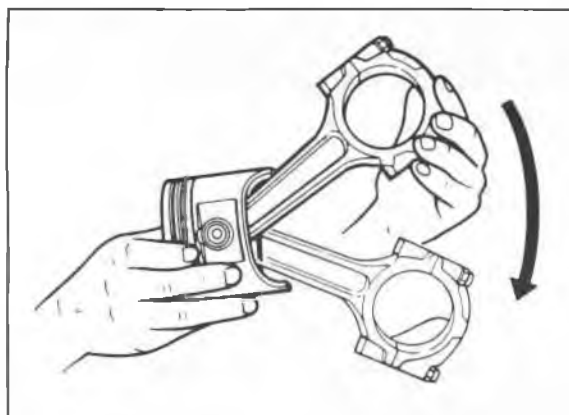


49 1285 071

86U01X-076

## Pilot bearing (MTX)

Remove the pilot bearing from the crankshaft with the **SST**.

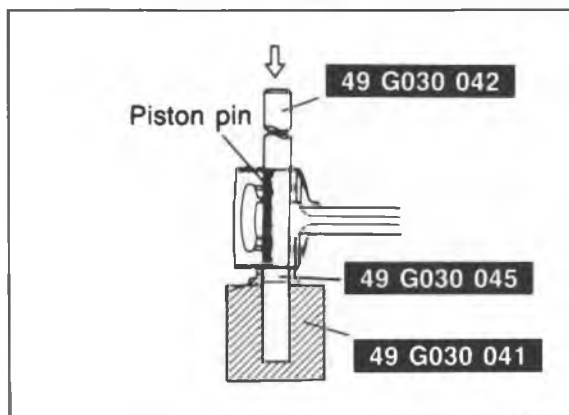


79G01C-050

## Piston and connecting rod

1. Before disassembling the piston and connecting rod, check the oscillation torque as shown in the figure.

If the large end does not drop by its own weight, replace the piston or the piston pin.



79G01C-051

2. Remove the piston pin with the **SST**.

While removing the piston pin, check the pressure. If it is lower than **5kN (500kg, 1,100 lb)**, replace the piston pin or connecting rod.



# 1A INSPECTION AND REPAIR

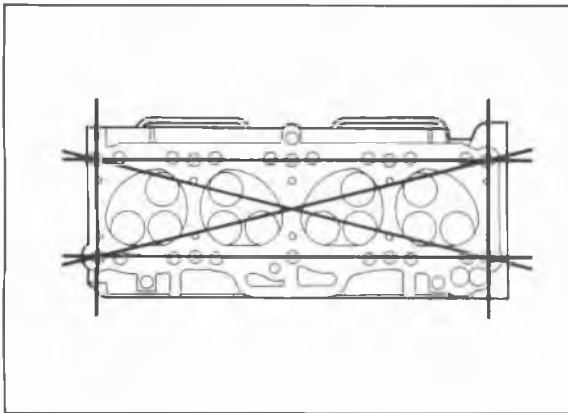
## INSPECTION AND REPAIR

1. Clean all parts, taking care to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign materials.
2. Inspect and repair must be performed in the order specified.

### Caution

Be careful not to damage the joints or friction surfaces of aluminum alloy components (such as the cylinder head or pistons).

86U01X-077

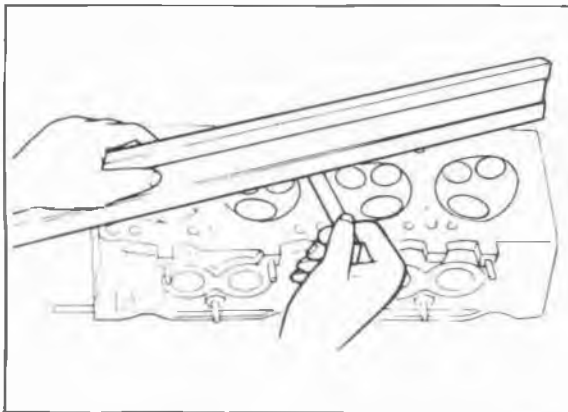


79G01C-106

### Cylinder Head

1. Inspect the cylinder head for damage, cracks, and leakage of water or oil. Replace if necessary.
2. Measure the cylinder head distortion in the six directions shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**



76G01A-126

3. If the cylinder head distortion exceeds specification, grind the cylinder head surface. If the cylinder head height is not within specification, replace it.

### Height:

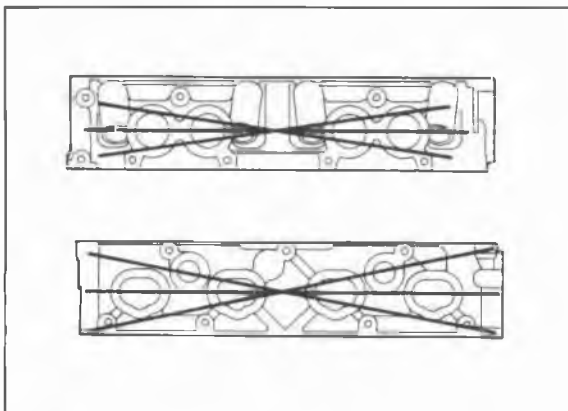
**91.95—92.05 mm (3.620—3.624 in)**

**Grinding limit: 0.20 mm (0.008 in) max.**

### Note

Before grinding the cylinder head, first check the following. Replace if necessary.

- Sinking of valve seat
- Damage of manifold contact surface
- Camshaft oil clearance and end play

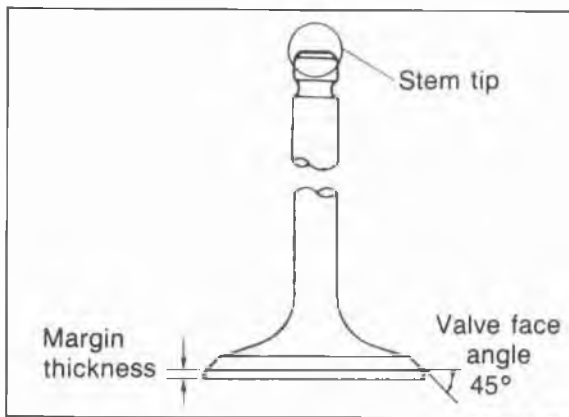


79G01C-053

4. Measure the manifold contact surface distortion in the six directions shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**

5. If distortion exceeds specification grind the surface or replace the cylinder head.



86U01X-078

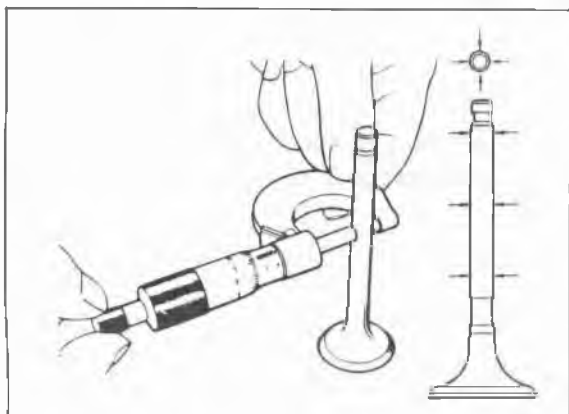
## Valve and Valve Guide

1. Inspect each valve for the following. Replace or resurface if necessary.
  - (1) Damaged or bent stem
  - (2) Roughness or damage to face
  - (3) Damage or uneven wear of stem tip
2. Check the valve head margin thickness. Replace if necessary

## Margin thickness

**IN: 0.5 mm (0.020 in) min.**

**EX: 1.0 mm (0.039 in) min.**



76G01A-055

3. Measure the valve length.

## Length

mm (in)

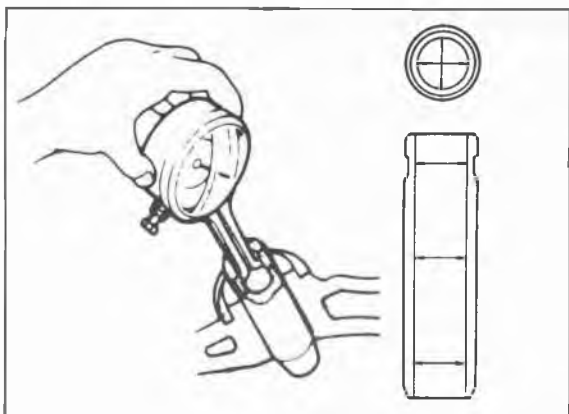
	12-valve	8-valve
IN	115.81 (4.5594)	111.89 (4.4051)
EX	116.21 (4.5752)	111.69 (4.3972)

4. Measure the valve stem diameter.

## Diameter

mm (in)

	12-valve	8-valve
IN	6.970—6.985 (0.2744—0.2750)	8.030—8.045 (0.3161—0.3167)
EX	6.965—6.980 (0.2742—0.2748)	8.025—8.040 (0.3159—0.3165)



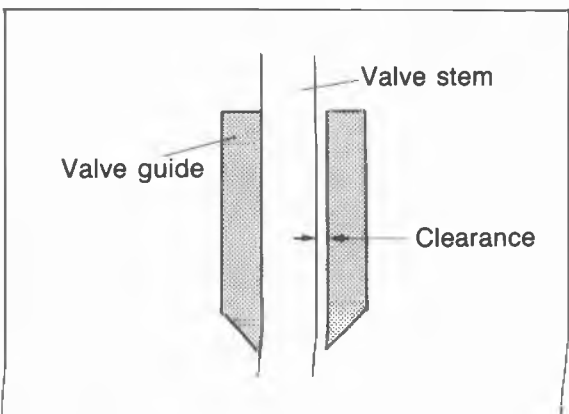
76G01A-056

5. Measure the valve guide inner diameter.

## Inner diameter

mm (in)

	12-valve	8-valve
IN	7.01—7.03 (0.2760—0.2768)	8.07—8.09 (0.3177—0.3185)
EX	7.01—7.03 (0.2760—0.2768)	8.07—8.09 (0.3177—0.3185)



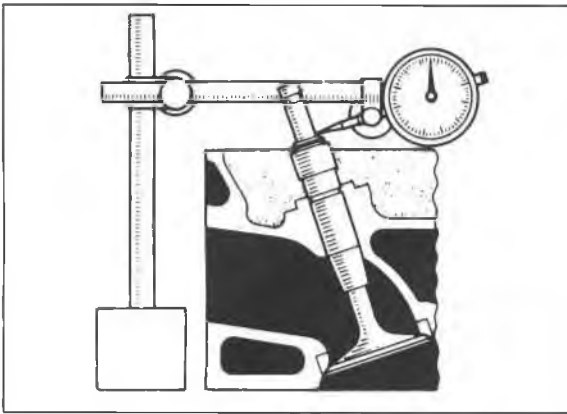
86U01X-081

6. Measure the valve stem to guide clearance.

### (1) Method No. 1

Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

# 1A INSPECTION AND REPAIR



86U01X-082

(2) Method No. 2

Measure the valve stem play at a point close to the valve guide with the valve lifted slightly off the valve seat.

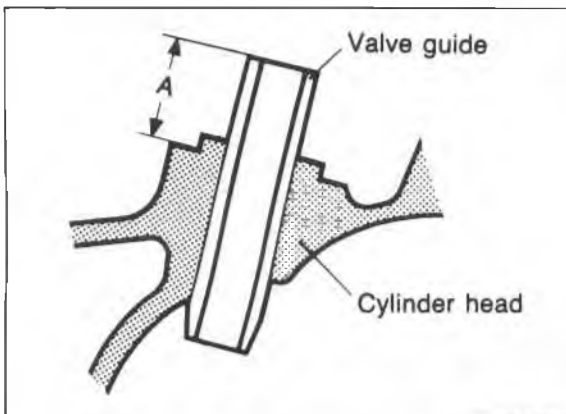
### Clearance

**IN : 0.025—0.060 mm (0.0010—0.0024 in)**

**EX : 0.030—0.065 mm (0.0012—0.0026 in)**

**Maximum: 0.20 mm (0.0079 in)**

7. If the clearance exceeds the maximum, replace the valve and/or valve guide.



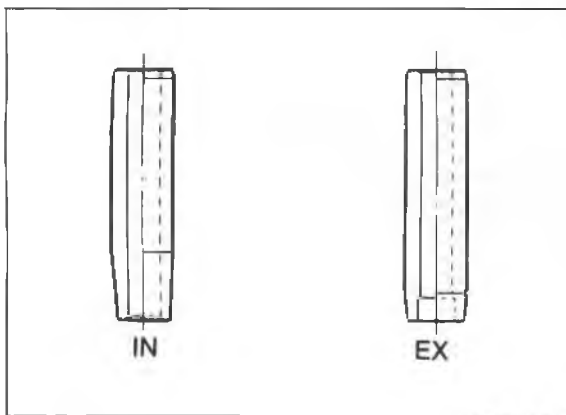
76G01A-057

8. Check that the valve guide projection height (dimension A in the figure). Replace if necessary.

### Height:

**19.8—20.3 mm (0.780—0.799 in)...12-valve**

**19.1—19.6 mm (0.752—0.772 in)...8-valve**

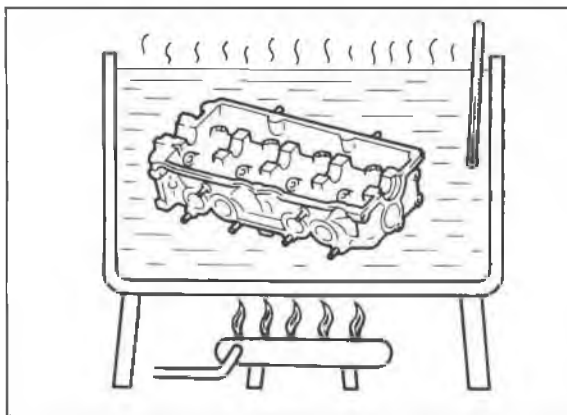


86U01X-214

## Replacement of valve guide

### Note

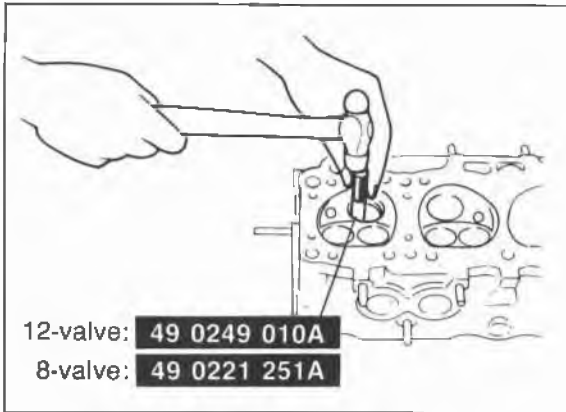
Although the shapes of the intake and exhaust valve guides are different, use the exhaust valve guide on both sides as a replacement.



76G01A-127

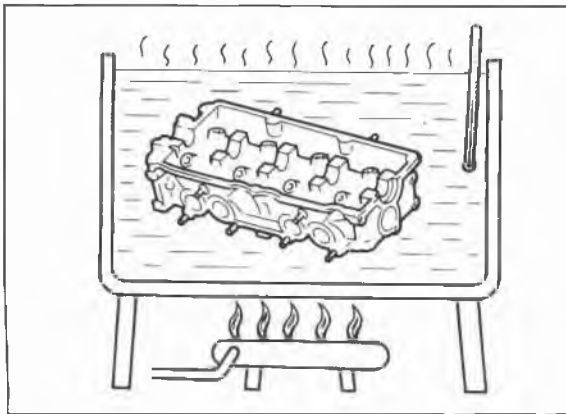
### Removal

1. Gradually heat the cylinder head in water to **approx. 90°C (194°F)**.



76G01A-058

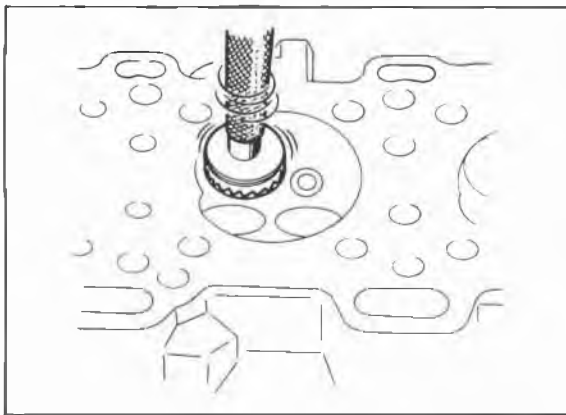
2. Remove the valve guide from the side opposite the combustion chamber with the **SST**.
3. Remove the valve guide clip (8-valve).



76G01A-059

### Installation

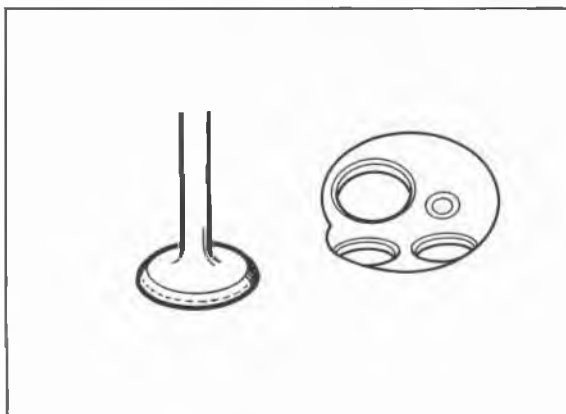
1. Fit the clip onto the valve guide (8 valve).
2. Gradually heat the cylinder head in water to **approx. 90°C (194°F)**.
3. Tap the valve guide in from the side opposite the combustion chamber with the **SST** until the projection height is as specified.



86U01X-087

### Valve Seat

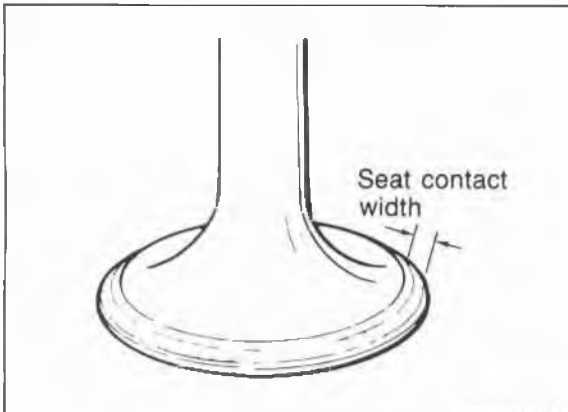
1. Inspect the contact surface of the valve seat and valve face for the following.
  - (1) Roughness
  - (2) Damage
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.



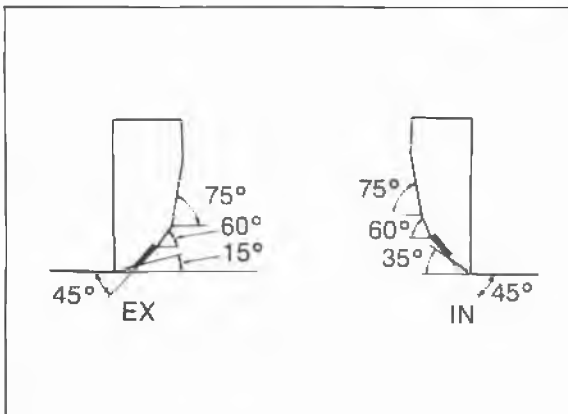
69G01A-101

3. Apply a thin coat of prussian blue to the valve face.
4. Check the valve seating by rotating the valve against the seat.
  - (1) If blue does not appear **360°** around the valve face, replace the valve.
  - (2) If blue does not appear **360°** around the valve seat, resurface the seat.

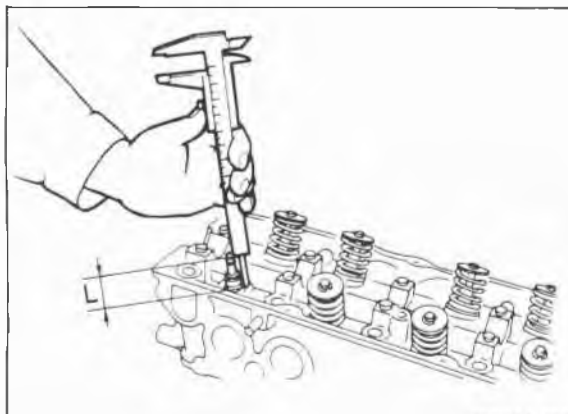
# 1A INSPECTION AND REPAIR



76G01A-128



86U01X-088



76G01A-060

5. Check the seat contact width.

**Width: 1.2—1.6 mm (0.047—0.063 in)**

6. Check that the valve seating position is at the center of the valve face.

(1) If the seating position is too high, correct the valve seat with a **60°** cutter and a **45°** cutter.

(2) If the seating position is too low, correct the valve seat with a **35° (IN)** or **15° (EX)** cutter and a **45°** cutter.

7. Seat the valve to the valve seat with a lapping compound.

8. Check the sinking of the valve seat.

Measure protruding length (dimension L) of each valve stem.

**Dimension L: 50.2 mm (1.976 in)....12-valve**  
**46.5 mm (1.831 in).... 8-valve**

(1) If L is as below, it can be used as it is.

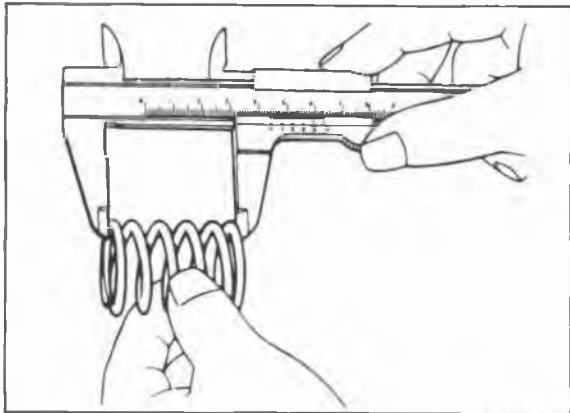
**50.2—51.0 mm (1.976—2.008 in)..12-valve**  
**46.5—48.0 mm (1.831—1.890 in).. 8-valve**

(2) If L is as below, insert a spacer between the spring seat and cylinder head to adjust.

**51.0—51.7 mm (2.008—2.035 in)..12-valve**  
**48.0—48.7 mm (1.890—1.917 in).. 8-valve**

(3) If L is more than as below, replace the cylinder head.

**51.7 mm (2.035 in) or more.....12-valve**  
**48.7 mm (1.917 in) or more..... 8-valve**



76G01A-062

### Valve Spring

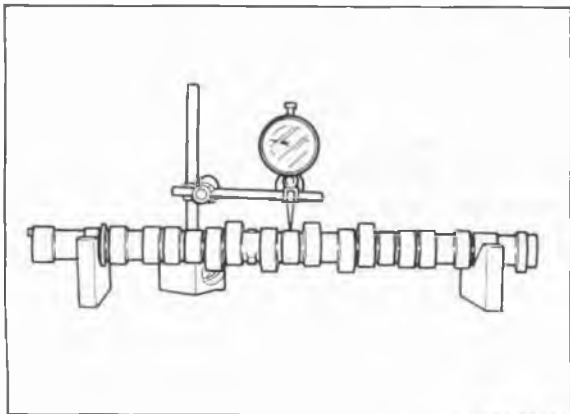
1. Inspect each valve spring for cracks or damage.
2. Check the free length and angle. Replace if necessary.

#### Free length

mm (in)

			Standard	Minimum
12-valve	IN		49.5 (1.949)	49.0 (1.929)
	EX		50.4 (1.984)	48.7 (1.917)
8-valve	FE.Middle East General	Outer	51.2 (2.016)	50.6 (1.992)
		Inner	45.7 (1.799)	43.7 (1.720)
	Others	Outer	52.0 (2.047)	51.5 (2.028)
		Inner	44.0 (1.732)	43.3 (1.705)

**Angle: 1.8 mm (0.071 in) max.**

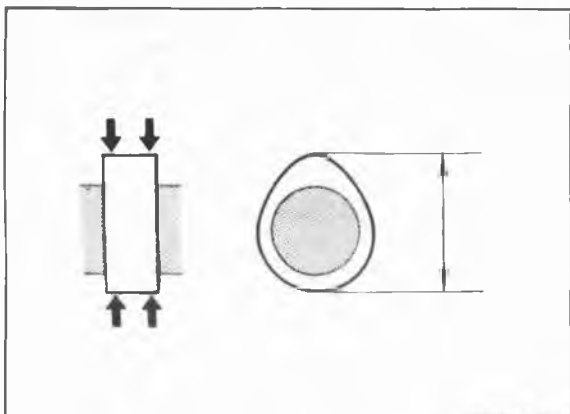


86U01X-092

### Camshaft

1. Set the front and rear journals on V-blocks. Check the camshaft runout. Replace if necessary.

**Runout: 0.03 mm (0.0012 in) max.**



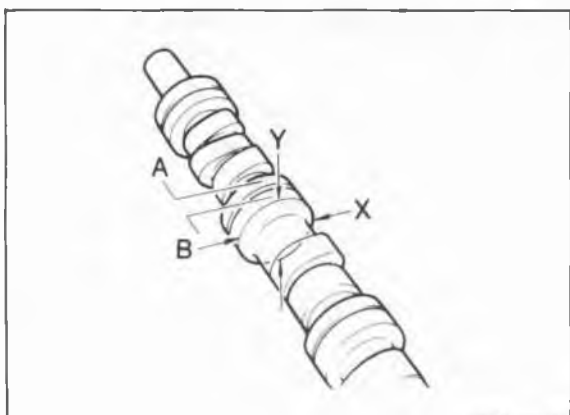
76G01A-063

2. Check the cam for wear or damage. Replace if necessary.
3. Check the cam lobe height at the two points as shown in the figure.

#### Height

mm (in)

			Standard	Minimum
12-valve	IN		41.340 (1.6276)	41.14 (1.620)
	EX		41.847 (1.6476)	41.65 (1.640)
8-valve	IN		38.157 (1.5022)	37.96 (1.494)
	EX		38.160 (1.5024)	37.96 (1.494)



76G01A-129

4. Measure wear of the journals in X and Y directions at the two points as shown in the figure.

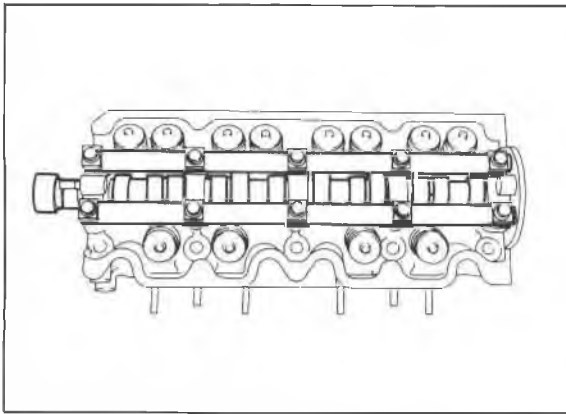
#### Diameter

mm (in)

	12-valve	8-valve
No. 1,5	31.940—31.965 (1.2575—1.2585)	31.940—32.035 (1.2575—1.2612)
No. 2,3,4	31.910—31.935 (1.2563—1.2573)	31.910—32.065 (1.2563—1.2624)

**Out-of-round: 0.05 mm (0.002 in) max.**

# 1A INSPECTION AND REPAIR



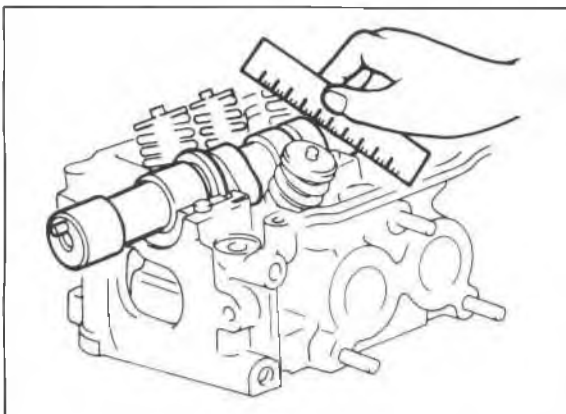
86U01X-095

5. Measure the oil clearance of the camshaft and camshaft caps.

- (1) Remove any oil, or dirt from the journals and bearing surface.
- (2) Set the camshaft onto the cylinder head.
- (3) Position plasti-gauge on top of the journals in the axial direction.
- (4) Place the camshaft caps and rocker arm shafts in position, and tighten them to the specified torque.

### Tightening torque:

**18—26 Nm (1.8—2.7 m-kg, 13—20 ft-lb)**



86U01X-096

(5) Remove the camshaft caps and measure the oil clearance at each cap.

### Oil clearance

#### Front and rear:

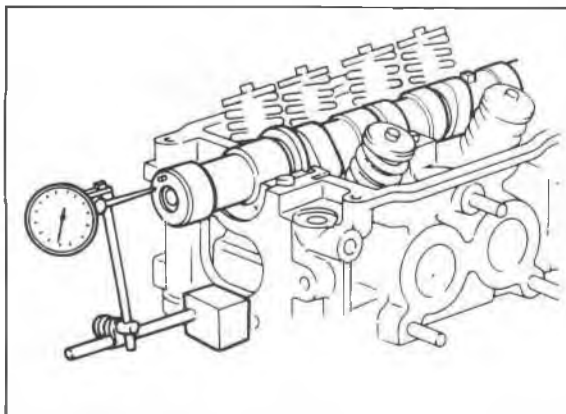
**0.035—0.085 mm (0.0014—0.0033 in)**

#### Center three journals:

**0.065—0.115 mm (0.0026—0.0045 in)**

**Maximum: 0.15 mm (0.0059 in)**

(6) If the oil clearance exceeds the maximum, replace the cylinder head.



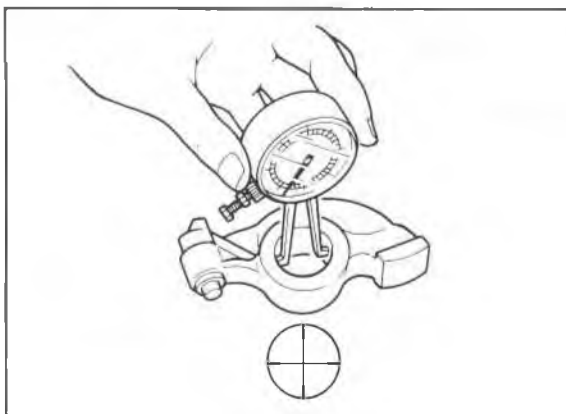
86U01X-097

6. Measure the camshaft end play. If it exceeds the maximum, replace the camshaft and/or the cylinder head.

### End play:

**0.08—0.16 mm (0.003—0.006 in)**

**Maximum: 0.20 mm (0.008 in)**



76G01A-064

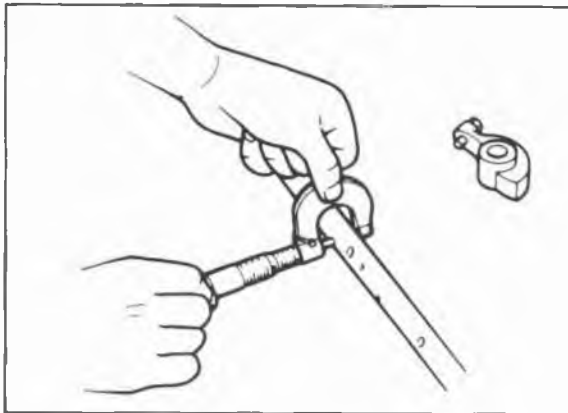
### Rocker Arm and Rocker Arm Shaft

1. Check for wear or damage to the contact surface of the rocker arm shaft and the rocker arm. Replace if necessary.
2. Check the oil clearance between the rocker arm and shaft. Replace if necessary.
  - (1) Measure the rocker arm inner diameter.

### Diameter:

**19.000—19.033 mm (0.7480—0.7493 in)**  
... 12-valve

**16.000—16.027 mm (0.6299—0.6310 in)**  
... 8-valve



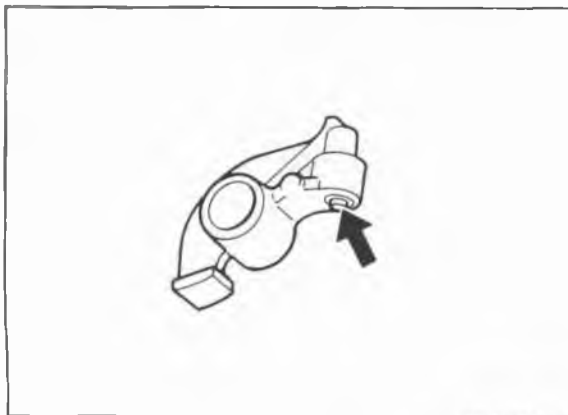
76G01A-065

(2) Measure the rocker arm shaft diameter.

**Diameter:**

- 18.959—18.980 mm (0.7464—0.7472 in)**  
... 12 valve
- 15.966—15.984 mm (0.6286—0.6293 in)**  
... 8 valve

(3) Subtract the shaft diameter from the rocker arm diameter.



76G01A-066

**Oil clearance**

mm (in)

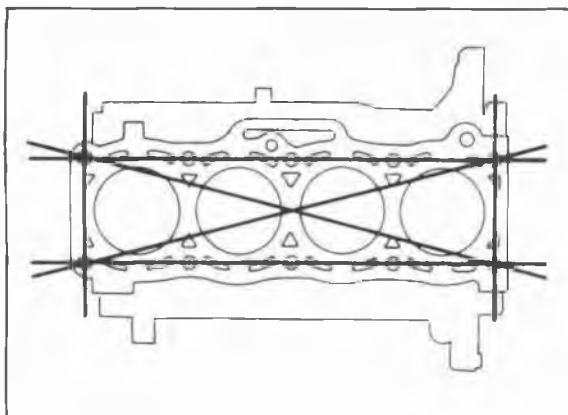
	Standard	Maximum
12-valve	0.020—0.074 (0.0008—0.0029)	0.10 (0.0039)
8-valve	0.016—0.061 (0.0006—0.0024)	0.10 (0.0039)

**Hydraulic Lash Adjuster (12-valve)**

Check the HLA face for wear or damage. Replace if necessary.

**Caution**

**Do not remove the HLA unless necessary to prevent damaging the O-ring.**

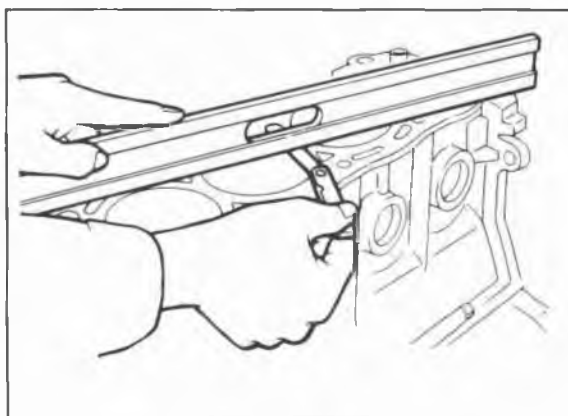


86U01X-100

**Cylinder Block**

1. Check the cylinder block. Repair or replace if necessary.
  - (1) Leakage damage
  - (2) Cracks
  - (3) Scoring of wall
2. Measure the distortion of the top surface of the cylinder block in the six directions as shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**



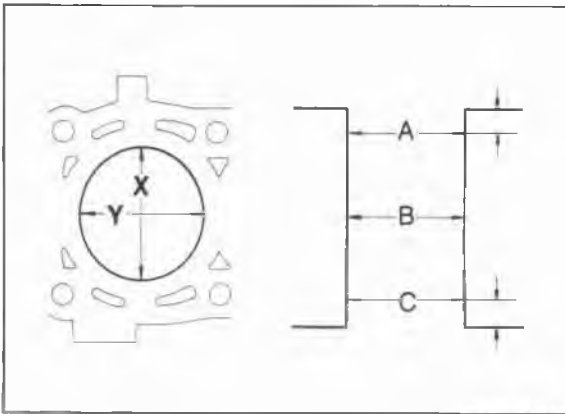
86U01X-101

3. If the distortion exceeds the maximum, repair by grinding, or replace the cylinder block.

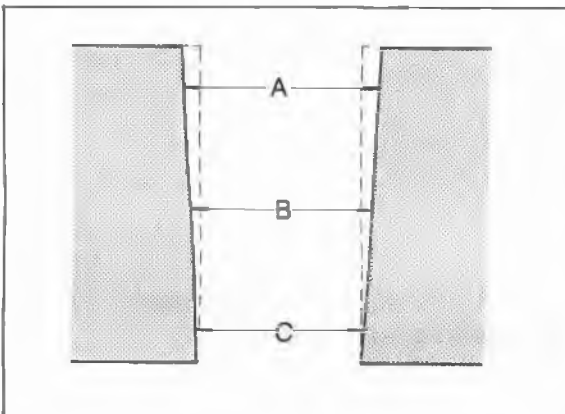
**Grinding limit: 0.20 mm (0.008 in) max.**



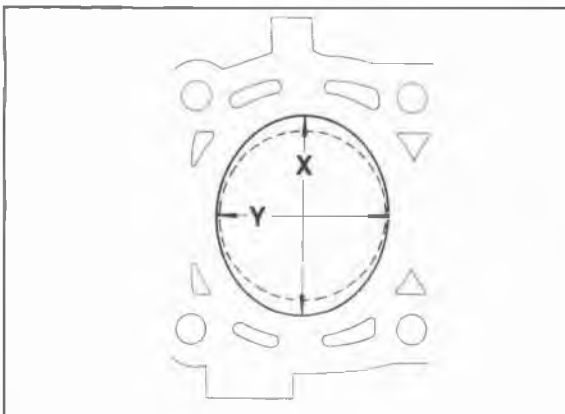
# 1A INSPECTION AND REPAIR



76G01A-067



79G01C-071



79G01C-072



86U01X-102

4. Measure the cylinder bore in directions X and Y at three levels in each cylinder as shown.

## Cylinder bore mm (in)

	Size	Bore
FE F8	Standard	86.000—86.019 (3.3858—3.3866)
	0.25 (0.010) oversize	86.250—86.269 (3.3957—3.3964)
	0.50 (0.020) oversize	86.500—86.519 (3.4055—3.4062)
F6	Standard	81.000—81.019 (3.1890—3.1897)
	0.25 (0.010) oversize	81.250—81.269 (3.1988—3.1996)
	0.50 (0.020) oversize	81.500—81.519 (3.2087—3.2094)
	0.75 (0.030) oversize	81.750—81.769 (3.2185—3.2192)
	1.00 (0.039) oversize	82.000—82.019 (3.2283—3.2291)

- (1) If the difference between the measurement A and C exceeds the maximum taper, rebore the cylinder to oversize.

**Taper: 0.019 mm (0.0007 in) max.**

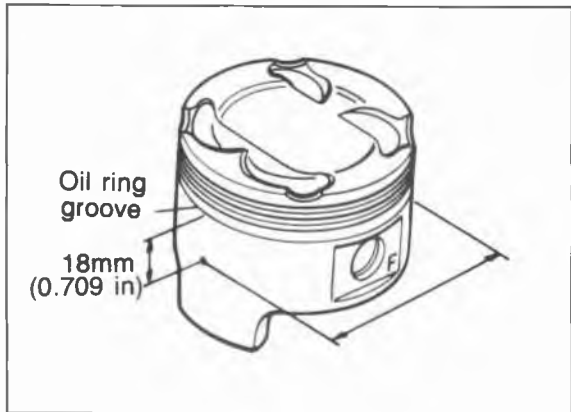
- (2) If the difference between the measurement X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

**Out-of-round: 0.019 mm (0.0007 in) max.**

### Caution

The boring size should be based on the size of an oversize piston and be the same for all cylinders.

5. If the upper part of the cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



76G01A-068

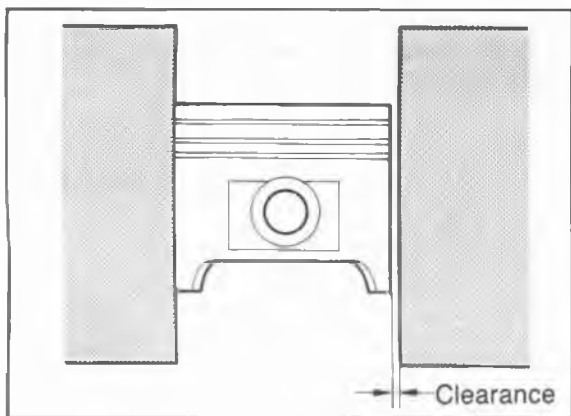
## Piston

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace if necessary.
2. Measure the outer diameter of each piston at a right angle (**90°**) to the piston pin, **18 mm (0.709 in)** below the oil ring land lower edge.

## Piston diameter

mm (in)

	Size	Diameter
FE F8	Standard	85.944—85.964 (3.3836—3.3844)
	0.25 (0.010) oversize	86.194—86.214 (3.3935—3.3942)
	0.50 (0.020) oversize	86.444—86.464 (3.4033—3.4041)
F6	Standard	80.944—80.964 (3.1868—3.1876)
	0.25 (0.010) oversize	81.194—81.214 (3.1966—3.1974)
	0.50 (0.020) oversize	81.444—81.464 (3.2065—3.2072)
	0.75 (0.030) oversize	81.694—81.714 (3.2163—3.2171)
	1.00 (0.039) oversize	81.944—81.964 (3.2261—3.2269)



76G01A-130

3. Check the piston to cylinder clearance.

### Clearance:

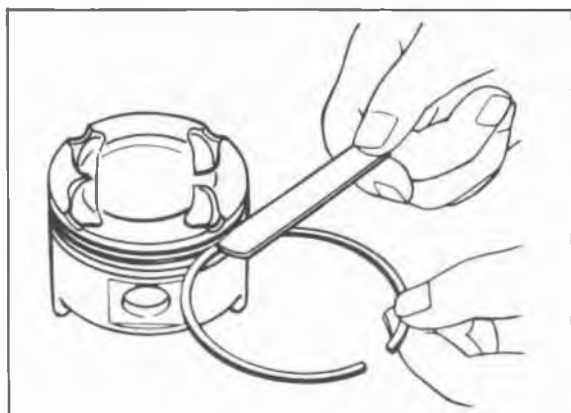
**0.036—0.075 mm (0.0014—0.0030 in)**

**Maximum: 0.15 mm (0.0059 in)**

4. If the clearance exceeds the maximum, replace the piston or rebore the cylinders to fit oversize pistons.

### Caution

**If the piston is replaced, replace the piston rings also.**



69G01A-125

## Piston and Piston Ring

1. Measure the piston ring to ring land clearance around the entire circumference using a new piston ring.

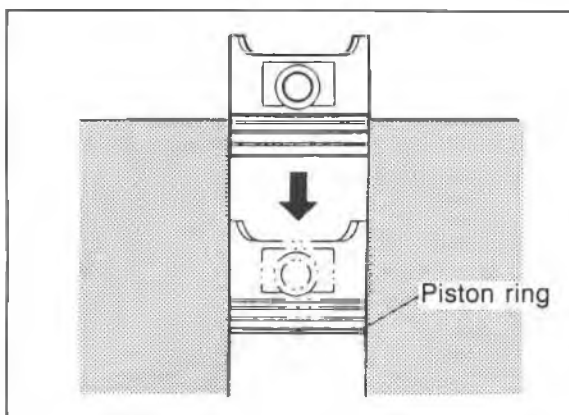
### Clearance (Top and Second):

**0.03—0.07 mm (0.001—0.003 in)**

**Maximum: 0.15 mm (0.006 in)**

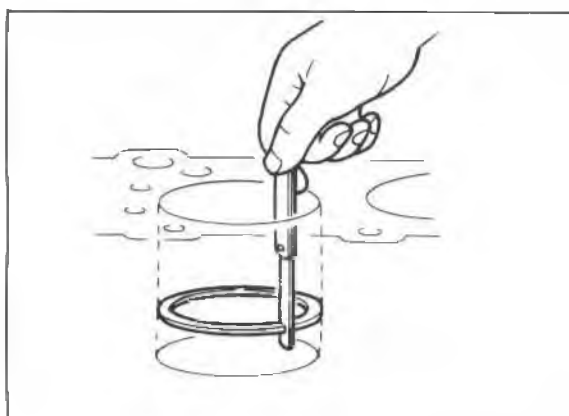
2. If the clearance exceeds the maximum, replace the piston.

# 1A INSPECTION AND REPAIR



86U01X-104

3. Inspect the piston rings for damage, abnormal wear, or breakage. Replace if necessary.
4. Insert the piston ring into the cylinder by hand and push it to the bottom of the ring travel in using the piston.



76G01A-069

5. Measure each piston ring end gap with a feeler gauge. Replace if necessary.

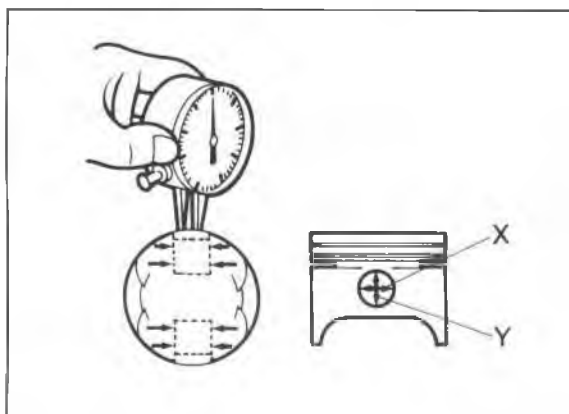
### End gap

**Top : 0.20—0.35 mm (0.008—0.014 in)**

**Second: 0.15—0.30 mm (0.006—0.012 in)**

**Oil rail : 0.20—0.70 mm (0.008—0.028 in)**

**Maximum: 1.0 mm (0.039 in)**



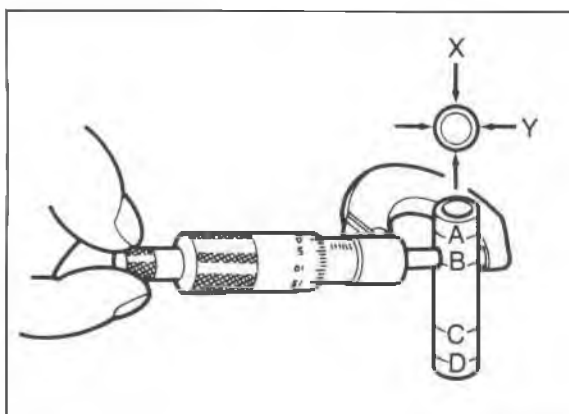
86U01X-106

### Piston and Piston Pin

1. Measure the piston pin hole diameter in X and Y directions at four points.

### Diameter:

**21.988—21.998 mm (0.8657—0.8661 in)**



86U01X-107

2. Measure the piston pin diameter.

### Diameter:

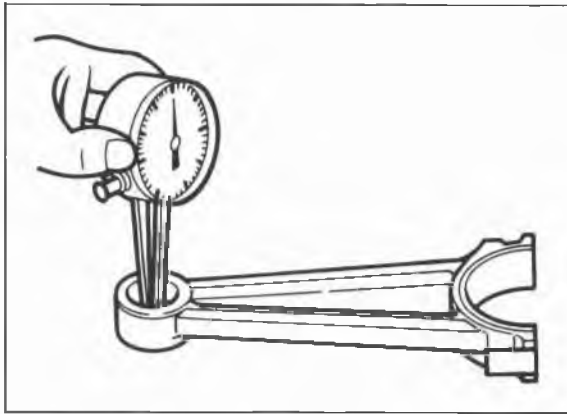
**21.974—21.980 mm (0.8651—0.8654 in)**

3. Determine the piston pin to piston clearance by subtracting the two figures.

### Clearance:

**0.008—0.024 mm (0.0003—0.0009 in)**

4. If the clearance exceeds the specification, replace the piston and/or piston pin.



76G01A-070

## Connecting Rod

1. Measure the connecting rod small end bore.

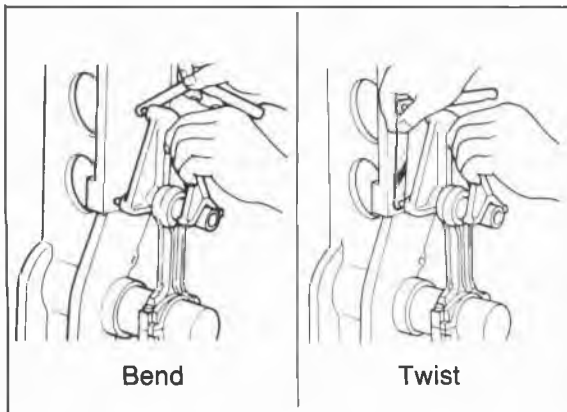
### Diameter:

**21.943—21.961 mm (0.8640—0.8646 in)**

2. Check the interference between the small end bore and piston pin.

### Interference:

**0.013—0.037 mm (0.0005—0.0015 in)**

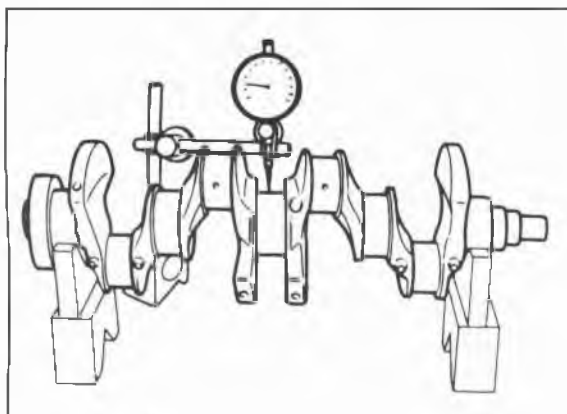


76G01A-071

3. Check each connecting rod for bending or twisting. Repair or replace if necessary.

**Bend : 0.06 mm (0.0024 in) max.**

**Twist: 0.06 mm (0.0024 in) max.**

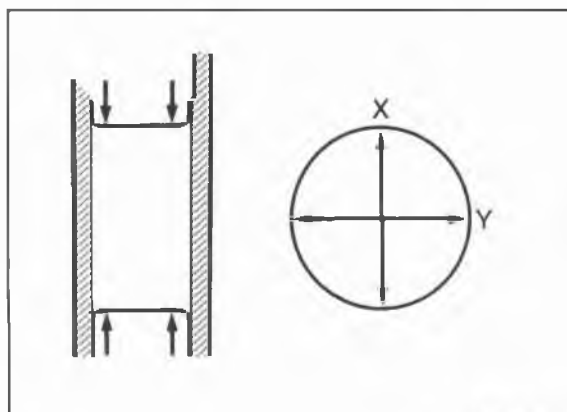


86U01X-109

## Crankshaft

1. Check the journals and pins for damage, scoring, or oil hole clogging.
2. Set the crankshaft on V-blocks.
3. Check the crankshaft runout at the center journal. Replace if necessary.

**Runout: 0.03 mm (0.0012 in) max.**



76G01A-131

4. Measure each journal diameter in X and Y directions at two points.

### Main journal

#### Diameter:

**59.937—59.955 mm (2.3597—2.3604 in)**

**Out-of-round: 0.05 mm (0.0020 in) max.**

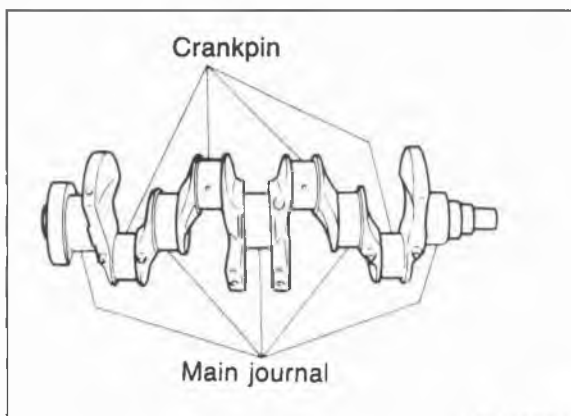
### Crankpin journal

#### Diameter:

**50.940—50.955 mm (2.0055—2.0061 in)**

**Out-of-round: 0.05 mm (0.0020 in) max.**

# 1A INSPECTION AND REPAIR



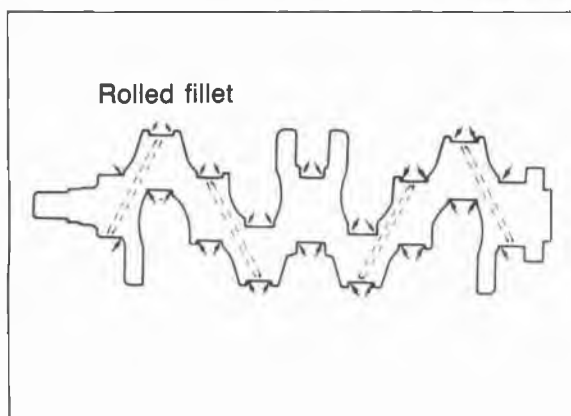
76G01A-132

- If the diameter is less than the minimum, grind the journals to match undersize bearings.

**Undersize bearing: 0.25 mm (0.010 in),  
0.50 mm (0.020 in), 0.75 mm (0.030 in)**

**Main journal diameter undersize** mm (in)

Bearing size		Journal diameter
0.25 (0.010) undersize	No.1,2,4,5	59.693—59.711 (2.3501—2.3508)
	No.3	59.687—59.705 (2.3499—2.3506)
0.50 (0.020) undersize	No.1,2,4,5	59.443—59.461 (2.3403—2.3410)
	No.3	59.437—59.455 (2.3400—2.3407)
0.75 (0.030) undersize	No.1,2,4,5	59.193—59.211 (2.3304—2.3311)
	No.3	59.187—59.205 (2.3302—2.3309)



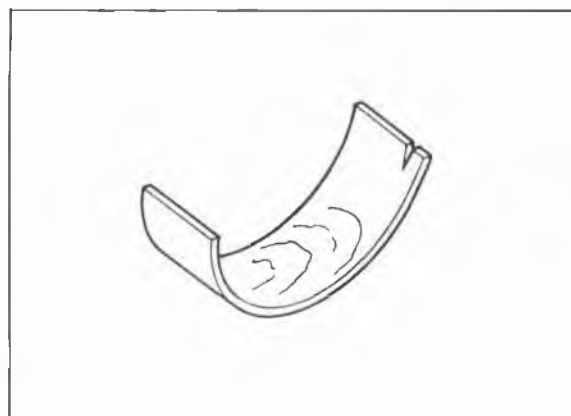
76G01A-133

**Crankpin journal diameter undersize** mm (in)

Bearing size		Journal diameter
0.25 (0.010) undersize		50.690—50.705 (1.9957—1.9963)
0.50 (0.020) undersize		50.440—50.455 (1.9858—1.9864)
0.75 (0.030) undersize		50.190—50.205 (1.9760—1.9766)

### Caution

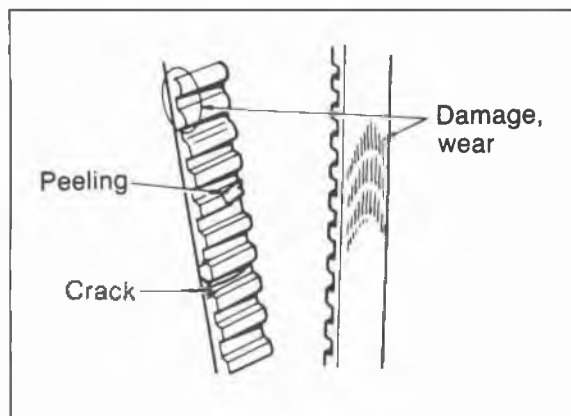
**Do not grind the rolled fillet area.**



79G01C-077

### Main Bearing and Connecting Rod Bearing

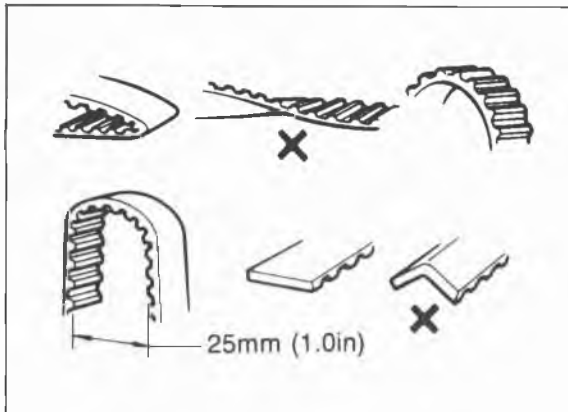
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.



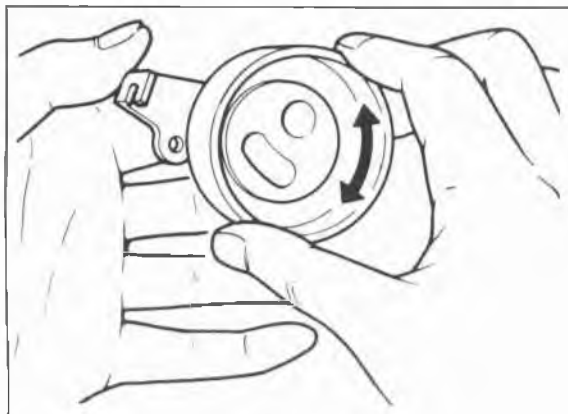
86U01X-113

### Timing Belt

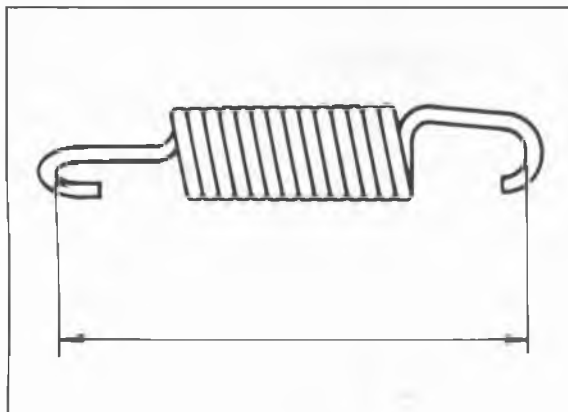
- Replace the timing belt if there is any oil or grease on it.
- Check the timing belt for damage, wear, peeling, cracks, or hardening. Replace if necessary.



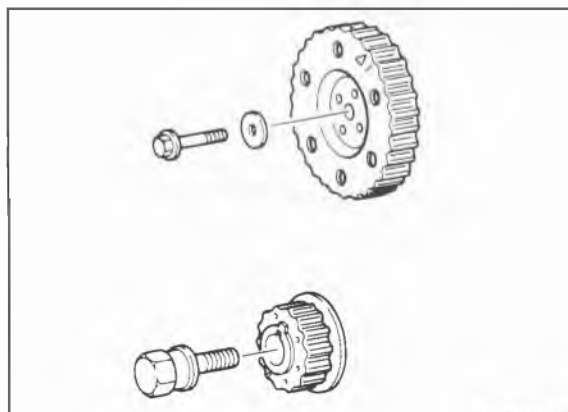
86U01X-114



86U01X-115



76G01A-134



86U01X-117

### Caution

- a) Never forcefully twist, turn inside out, or bend the timing belt.
- b) Be careful not to allow oil or grease on the belt.

### Timing Belt Tensioner and Idler Pulley

Check the timing belt tensioner and idler pulley for smooth rotation and abnormal noise. Replace if necessary.

### Caution

Do not clean the tensioner with cleaning fluids. If necessary, use a soft rag to wipe it clean, and avoid scratching it.

### Timing Belt Tensioner Spring

Check the free length of the tensioner spring. Replace if necessary.

**Free length: 56.9 mm (2.240 in).....FE**  
**64.1 mm (2.524 in).....F8, F6**

### Timing Belt Pulley and Camshaft Pulley

Inspect the pulley teeth for wear, deformation, or other damage. Replace if necessary.

### Caution

Do not clean the pulley with cleaning fluids. If necessary, use a rag to wipe it clean.

### Timing Belt Cover (lower and upper)

Inspect the timing belt covers for damage or cracks. Replace if necessary.

# 1A ASSEMBLY (CYLINDER BLOCK)

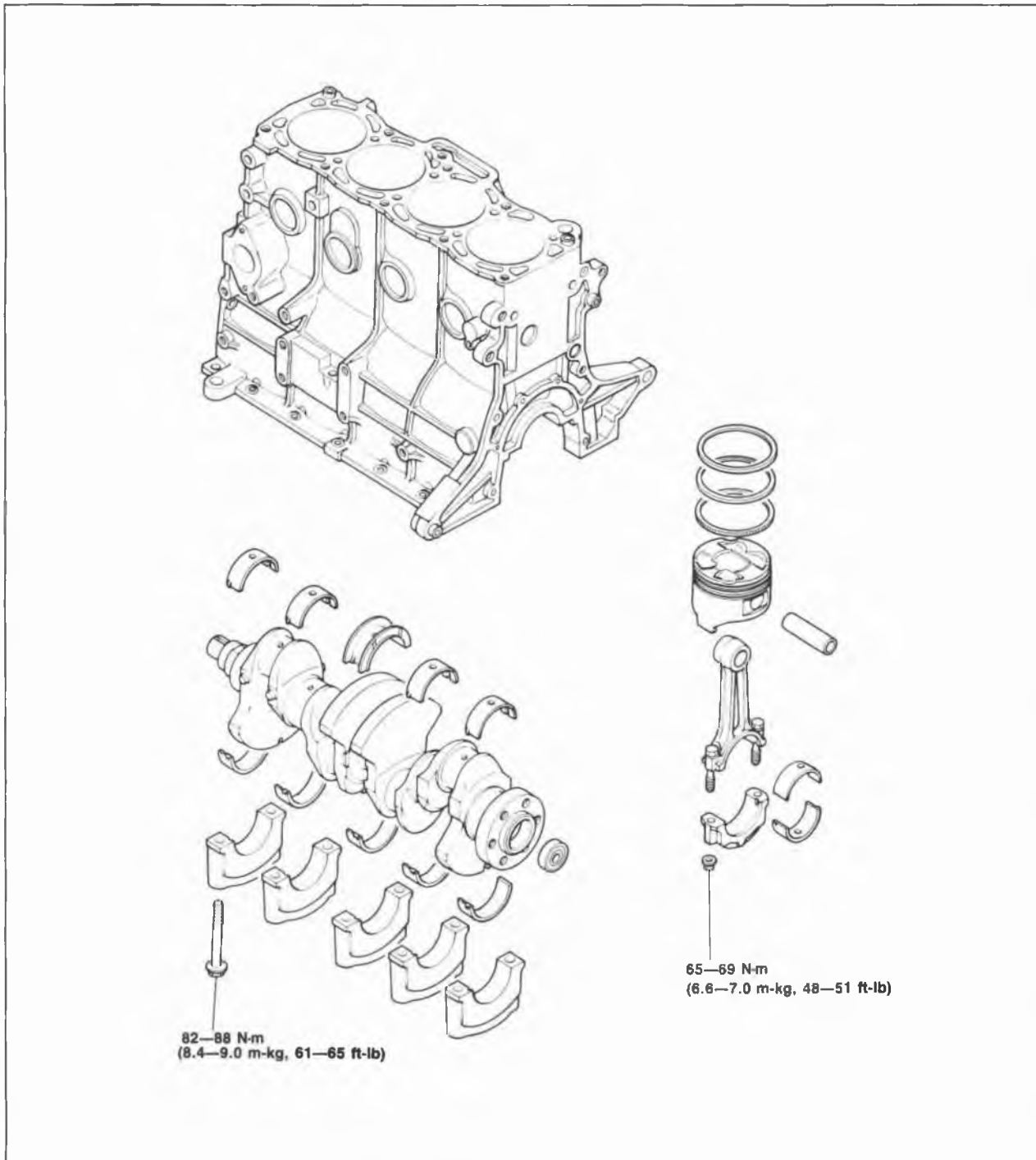
## ASSEMBLY

1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace plain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

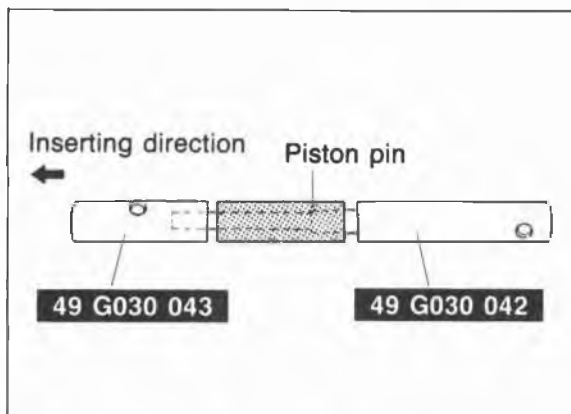
### Caution

Do not reuse gaskets or oil seals.

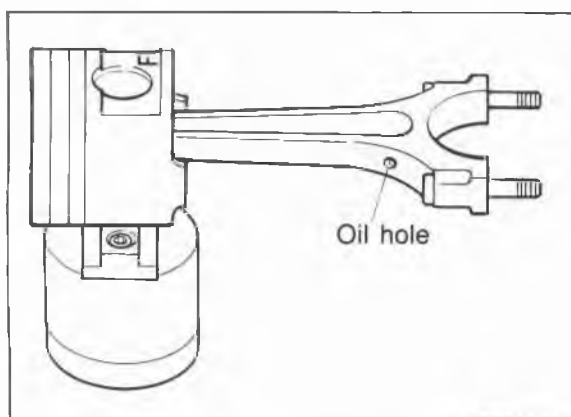
### CYLINDER BLOCK—I Torque Specifications



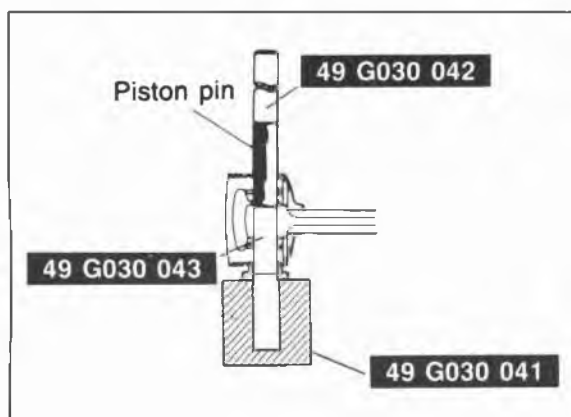
69G01A-139



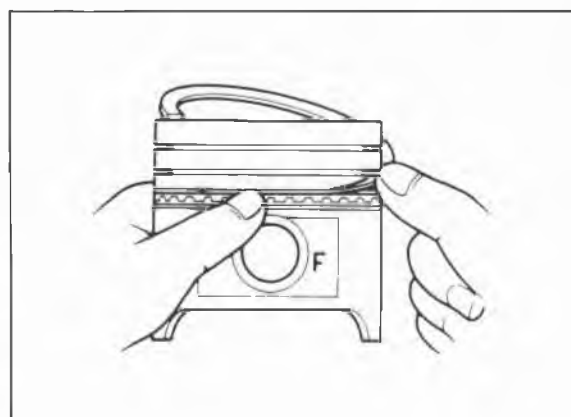
86U01X-118



76G01A-135



76G01A-072



69G01A-144

## Connecting Rod

1. Assemble the **SST** to the piston pin.
2. Apply engine oil to the piston pin.

3. Set the piston on the **SST** with the **F** mark facing upward.
4. Set the connecting rod in piston with the oil hole in the large end opposite the **F** mark.

5. Press the piston pin into the piston and connecting rod until the **SST** contacts the block.
6. While inserting the piston pin, check the pressure force. If it is less than specified, replace the piston pin or the connecting rod.

### Press force:

**5—15 kN (500—1,500 kg, 1,100—3,300 lb)**

7. Check the oscillation torque of the connecting rod. (Refer to page 1A—47.)

## Piston Ring

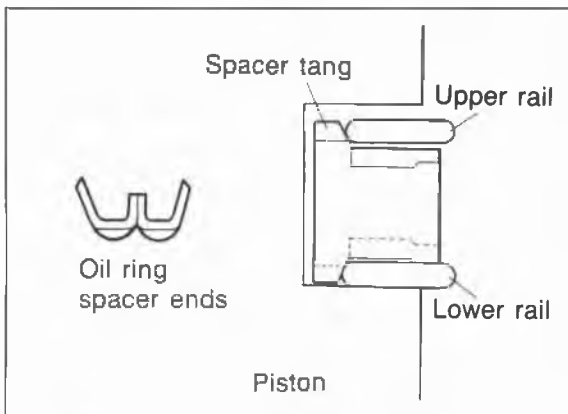
1. Install the three-piece oil rings on the pistons.
  - (1) Apply engine oil to the oil ring spacer and rails.
  - (2) Install the oil ring spacer so that the opening faces upward.
  - (3) Install the upper rail and lower rail.

### Note

- a) The upper rail and lower rail are the same.
- b) Each rail can be installed with either face upward.

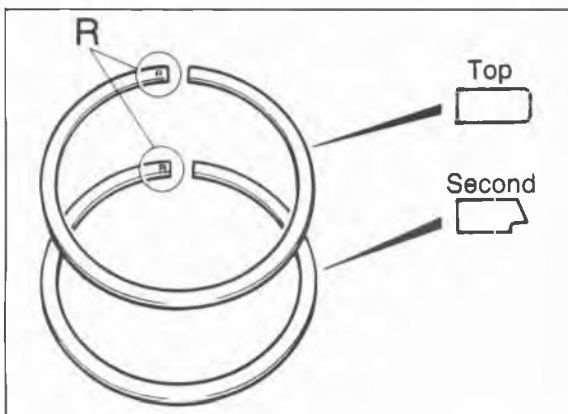


# 1A ASSEMBLY (CYLINDER BLOCK)



69G01A-145

2. Check that both rails are expanded by the spacer tangs as shown in the figure by checking that both rails turn smoothly in both directions.



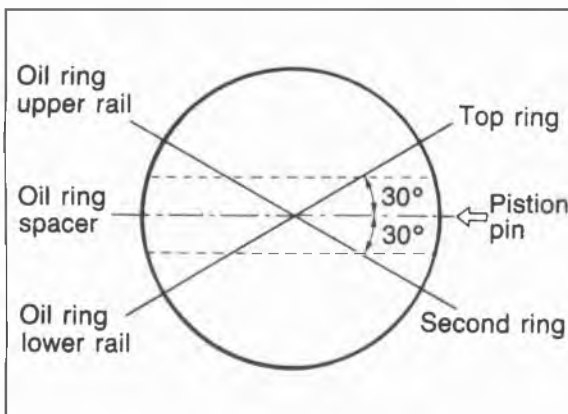
86U01X-121

3. Install the second ring to the piston first, then install the top ring. Use a piston ring expander.

### Caution

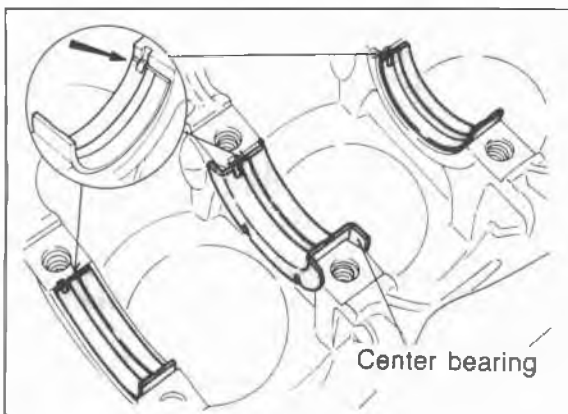
The rings must be installed with the "R" marks facing upward.

4. Apply a liberal amount of clean engine oil to the second and top piston rings.



69G01A-147

5. Position the opening of each ring as shown in the figure.



86U01X-215

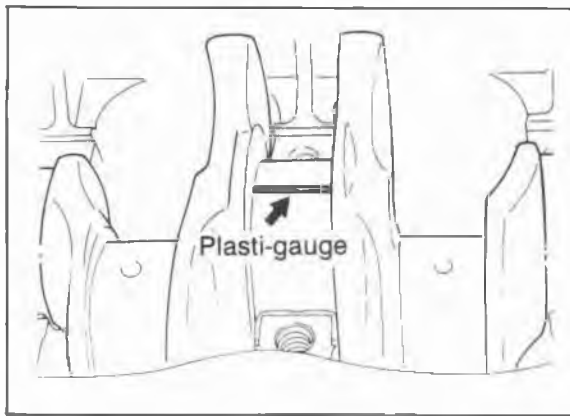
### Crankshaft

1. Before installing the crankshaft, inspect the main bearing oil clearances as described.

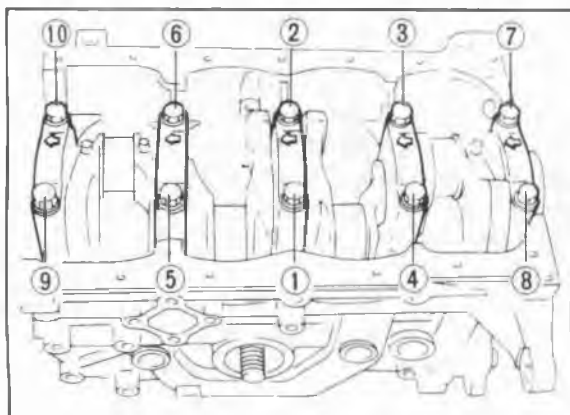
### Note

The bearing with thrust shoulders is the center bearing in the cylinder block.

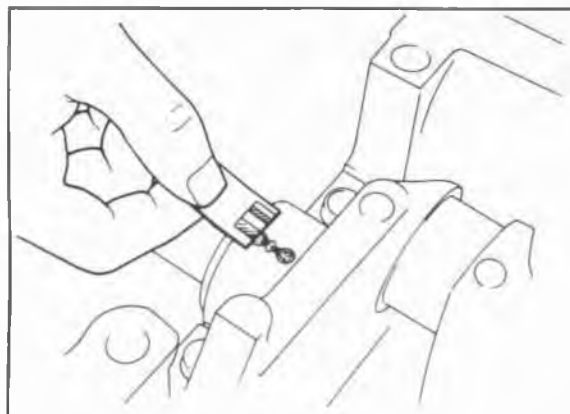
# ASSEMBLY (CYLINDER BLOCK) 1A



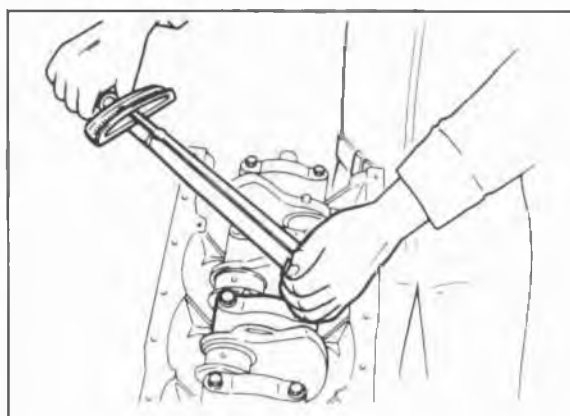
86U01X-122



86U01X-123



76G01A-073



86U01X-125

## Oil clearance inspection

- (1) Remove any foreign material and oil from the journals and bearings.
- (2) Install the upper main bearings in the cylinder block.
- (3) Set the crankshaft into the cylinder block.
- (4) Position the plasti-gauge on top of the journals in the axial direction.

- (5) Install the main bearing caps along with the lower main bearings according to the cap number and ← mark.
- (6) Tighten the caps in two or three steps in the order in the figure.

## Tightening torque:

**82—88 Nm (8.4—9.0 m·kg, 61—65 ft·lb)**

## Caution

**Do not rotate the crankshaft when measuring the oil clearances.**

- (7) Remove the main bearing caps, and measure the plasti-gauge at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance. If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings. (Refer to page 1A—59.)

## Oil clearance

**No. 1, 2, 4, 5:**

**0.025—0.043 mm (0.0010—0.0017 in)**

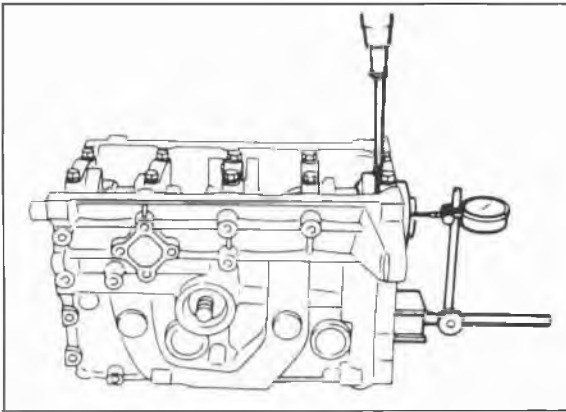
**No. 3:**

**0.031—0.049 mm (0.0012—0.0019 in)**

**Maximum: 0.08 mm (0.0031 in)**

2. Apply a liberal amount of engine oil to the main bearings and main journals.
3. Install the crankshaft and the main bearing caps according to the cap number and ← mark.

# 1A ASSEMBLY (CYLINDER BLOCK)



76G01A-074

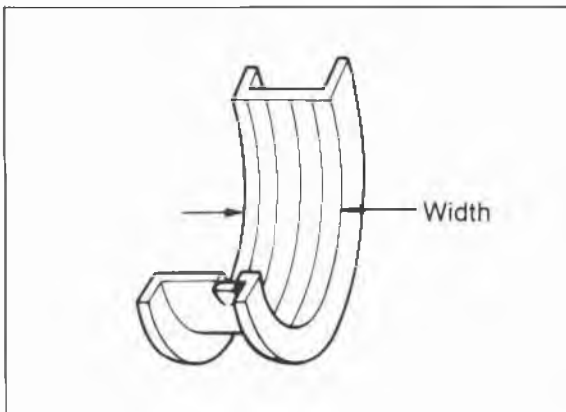
4. Inspect the crankshaft end play.

**End play:**

**0.08—0.18 mm (0.0031—0.0071 in)**

**Maximum: 0.30 mm (0.012 in)**

5. If the end play exceeds specification, grind the crankshaft and use undersize center main bearing.



86U01X-216

**Center main bearing width**

**Standard:**

**27.94—27.99 mm (1.1000—1.1020 in)**

**0.25 mm (0.010 in) undersize:**

**28.04—28.09 mm (1.1040—1.1059 in)**

**0.50 mm (0.020 in) undersize:**

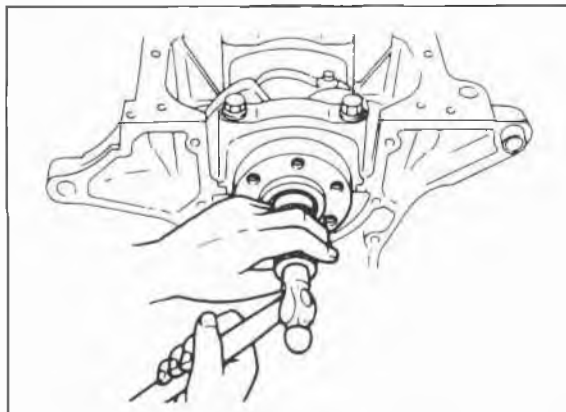
**28.12—28.17 mm (1.1071—1.1091 in)**

**0.75 mm (0.030 in) undersize:**

**28.20—28.25 mm (1.1102—1.1122 in)**

**Note**

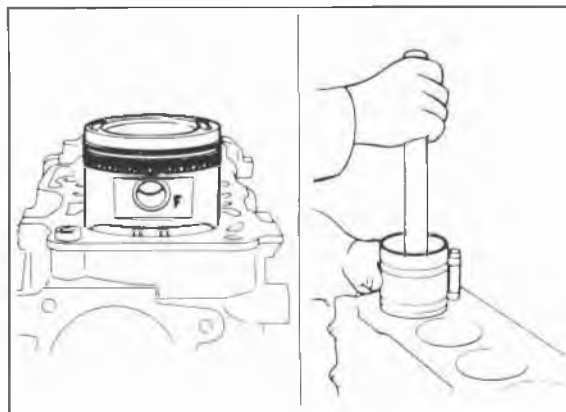
**Wider thrust width is available only in undersize center main bearing.**



86U01X-127

**Pilot Bearing (MTX)**

1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30—34 mm, 1.18—1.34 in) against the outer race of the bearing, then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.

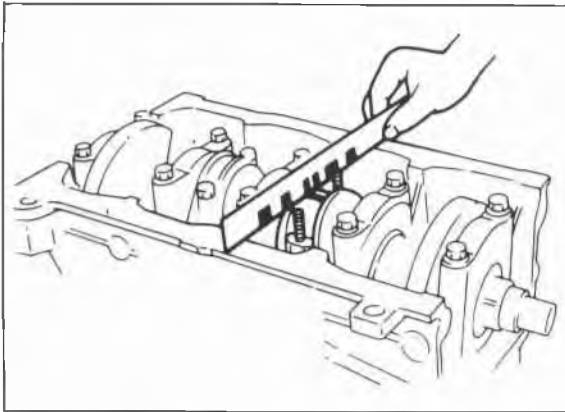


76G01A-136

**Piston and Connecting Rod Assembly**

1. Apply a liberal amount of clean engine oil to the cylinder walls, piston, and rings.
2. Check the piston rings for the end gap alignment.
3. Insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine. Use a piston installer tool (commercially available).

## ASSEMBLY (CYLINDER BLOCK) 1A



69G01B-137

### Connecting Rod Cap

1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

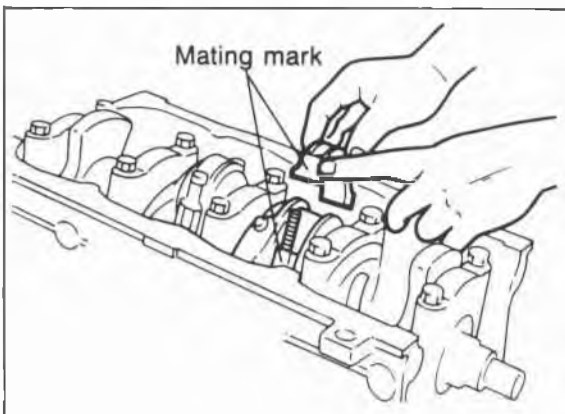
#### Connecting rod cap tightening torque:

65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)

#### Oil clearance:

0.027—0.067 mm (0.0011—0.0026 in)

Maximum: 0.10 mm (0.0039 in)

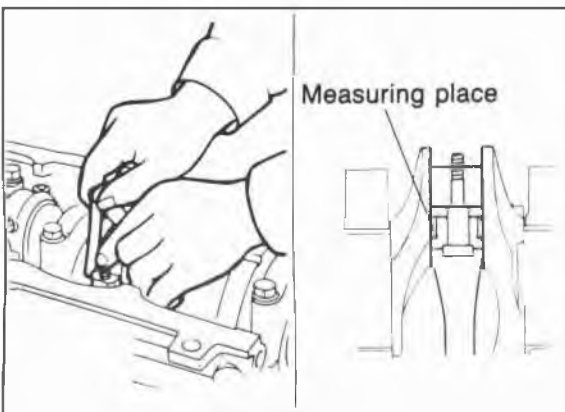


76G01A-075

### Caution

Align the alignment marks on the cap and on the connecting rod when installing the connecting rod cap.

2. If the oil clearance exceeds specification, grind the crankshaft and use undersize bearings. (Refer to page 1A—59.)



69G01B-139

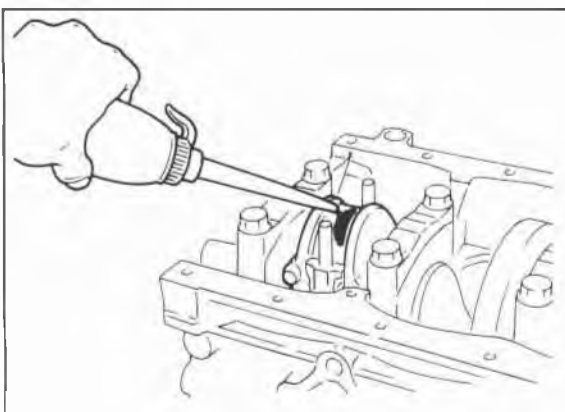
3. Check the side clearance of each connecting rod without the cap installed.

#### Side clearance:

0.110—0.262 mm (0.004—0.0103 in)

Maximum: 0.30 mm (0.012 in)

If the clearance exceeds the maximum, replace the connecting rod.



86U01X-130

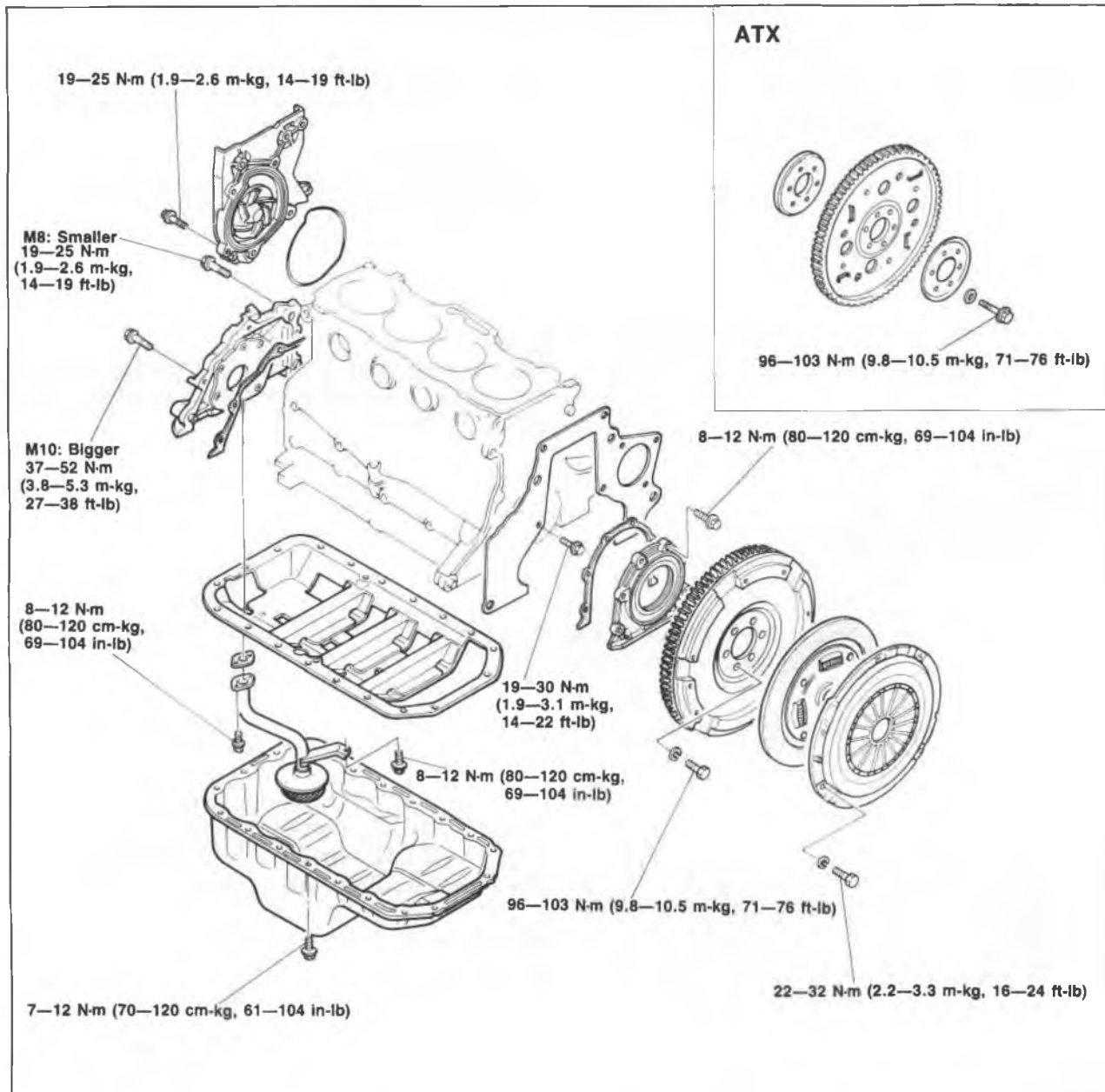
4. Apply a liberal amount of engine oil to the crankpin journal and connecting rod bearing.
5. Install the connecting rod cap with the alignment marks aligned.

#### Tightening torque:

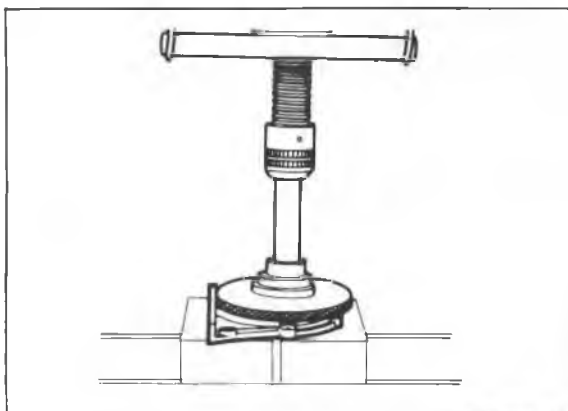
65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)

# 1A ASSEMBLY (CYLINDER BLOCK)

## CYLINDER BLOCK—II Torque Specifications



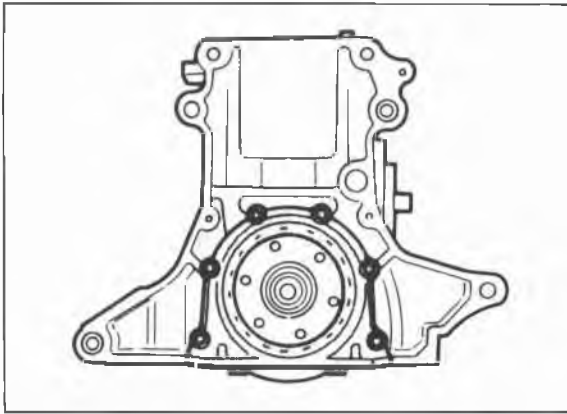
69G01A-166



### Rear Cover

1. Apply engine oil to the rear cover, oil seal and oil seal lip.
2. Press the oil seal into the rear cover.

## ASSEMBLY (CYLINDER BLOCK) 1A

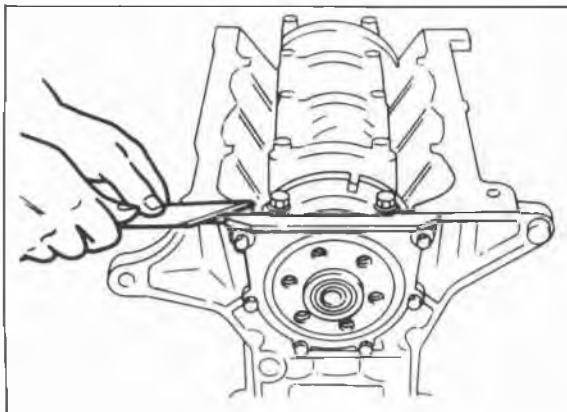


86U01X-131

3. Install the rear cover and a new gasket.

**Tightening torque:**

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

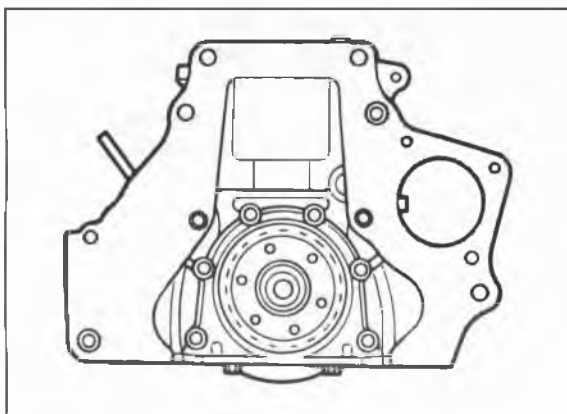


86U01X-132

4. Cut away the portion of the gasket that projects out from the rear cover assembly toward the oil pan side.

**Caution**

**Do not scratch the rear cover assembly.**



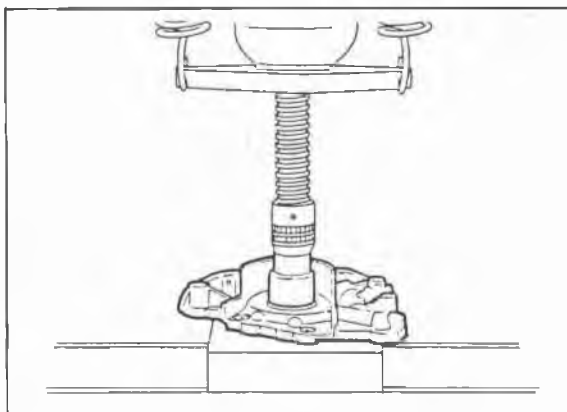
4BG01A-160

**End Plate**

Install the end plate.

**Tightening torque:**

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

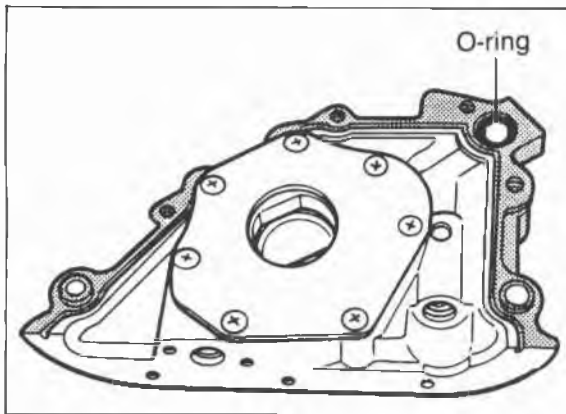


79G01C-085

**Oil Pump**

1. Apply engine oil to a new oil pump oil seal and the oil pump body.
2. Press the oil seal into the oil pump body.

# 1A ASSEMBLY (CYLINDER BLOCK)

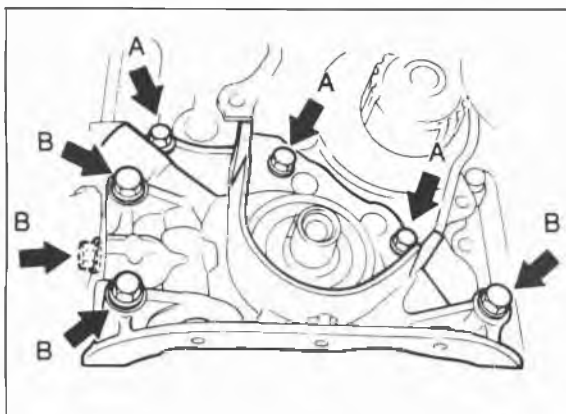


86U01X-133

3. Apply engine oil to the oil seal lip.
4. Remove any dirt or other material from the contact surfaces.
5. Apply a continuous bead of silicon sealant to the contact surface of the oil pump.

### Caution

**Do not allow any sealant to get into the oil hole.**



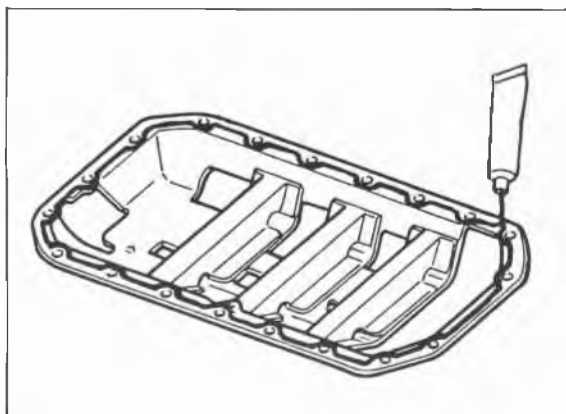
76G01A-137

6. Install a new O-ring into the pump body.
7. Install the oil pump.

### Tightening torque

- A:** 19—25 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)
- B:** 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)

8. Remove any sealant which has been squeezed out.



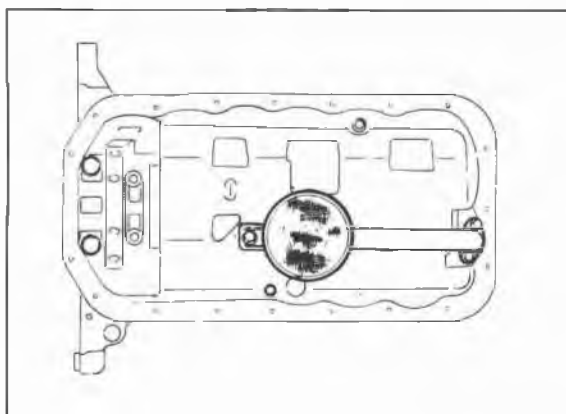
76G01A-076

### Stiffener (FE 8-valve...only ECE, 12-valve)

1. Remove any dirt or other material from the contact surface.
2. Apply a continuous bead of silicon sealant to the stiffener along the inside of the bolt holes, and overlap the ends.
3. Install the stiffener.

### Tightening torque:

**7—12 N·m (70—120 cm·kg, 61—104 in·lb)**



86U01X-136

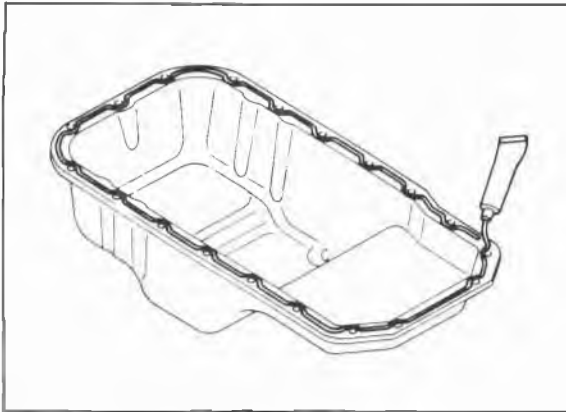
### Oil Strainer

Install the oil strainer and a new gasket.

### Tightening torque:

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

# ASSEMBLY (CYLINDER BLOCK) 1A



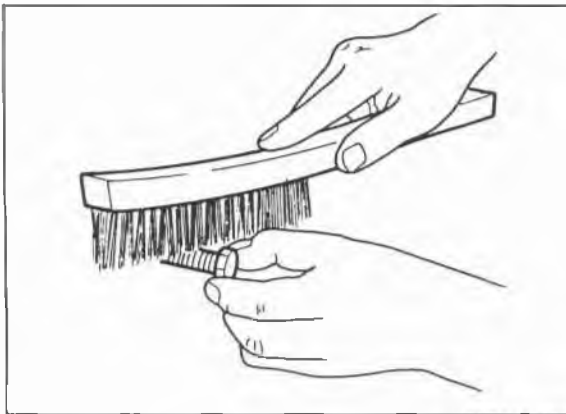
86U01X-137

## Oil Pan

1. Apply a continuous bead of silicon sealant to the oil pan along the inside of the bolt holes, and overlap the ends.
2. Install the oil pan.

### Tightening torque:

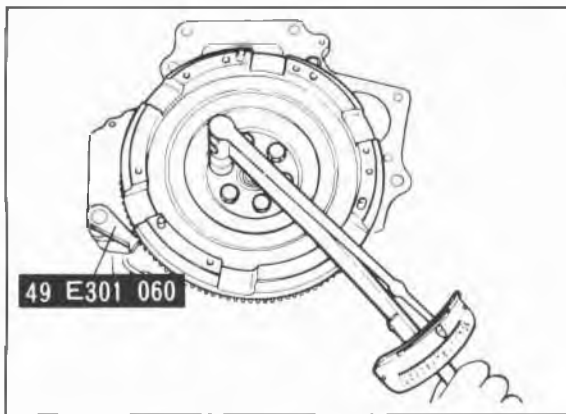
7—12 N·m (70—120 cm·kg, 61—104 in·lb)



76G01A-138

## Flywheel (MTX), Drive Plate (ATX)

1. Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it.
2. Apply sealant to the bolt threads.



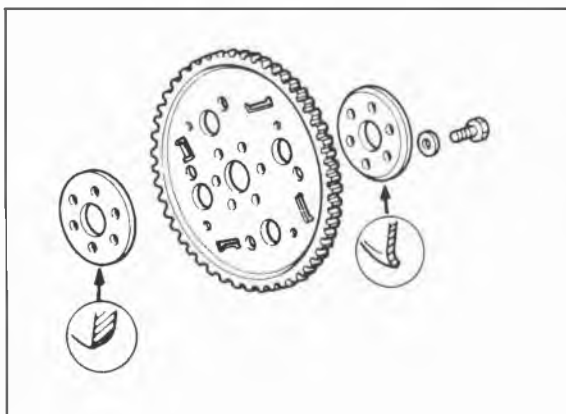
86U01X-139

(MTX)

3. Install, and tighten the flywheel with the **SST**.

### Tightening torque:

96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)



76G01A-139

(ATX)

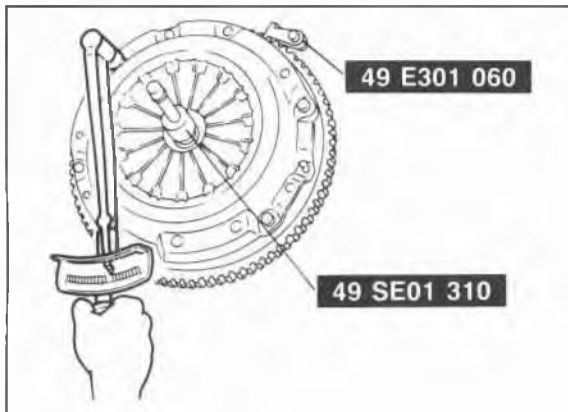
3. Install, and tighten the drive plate adaptor, drive plate, and backing plate with the **SST**.

### Tightening torque:

96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)



# 1A ASSEMBLY (CYLINDER BLOCK)



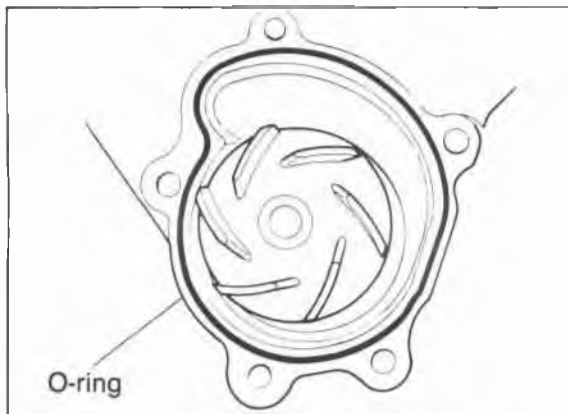
86U01X-141

## Clutch Disc and Clutch Cover (MTX)

Install the clutch disc and clutch cover using the **SST**.  
(Refer to Section 6.)

### Tightening torque:

**22—32 N·m (2.2—3.3 m·kg, 16—24 ft·lb)**



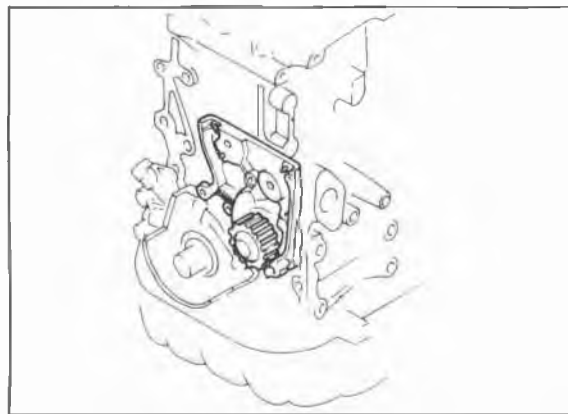
86U01X-142

## Water Pump

1. Remove all dirt, grease, and other material from the water pump mounting surface.
2. Place a new O-ring in position.

### Caution

**Do not reuse the original O-ring.**

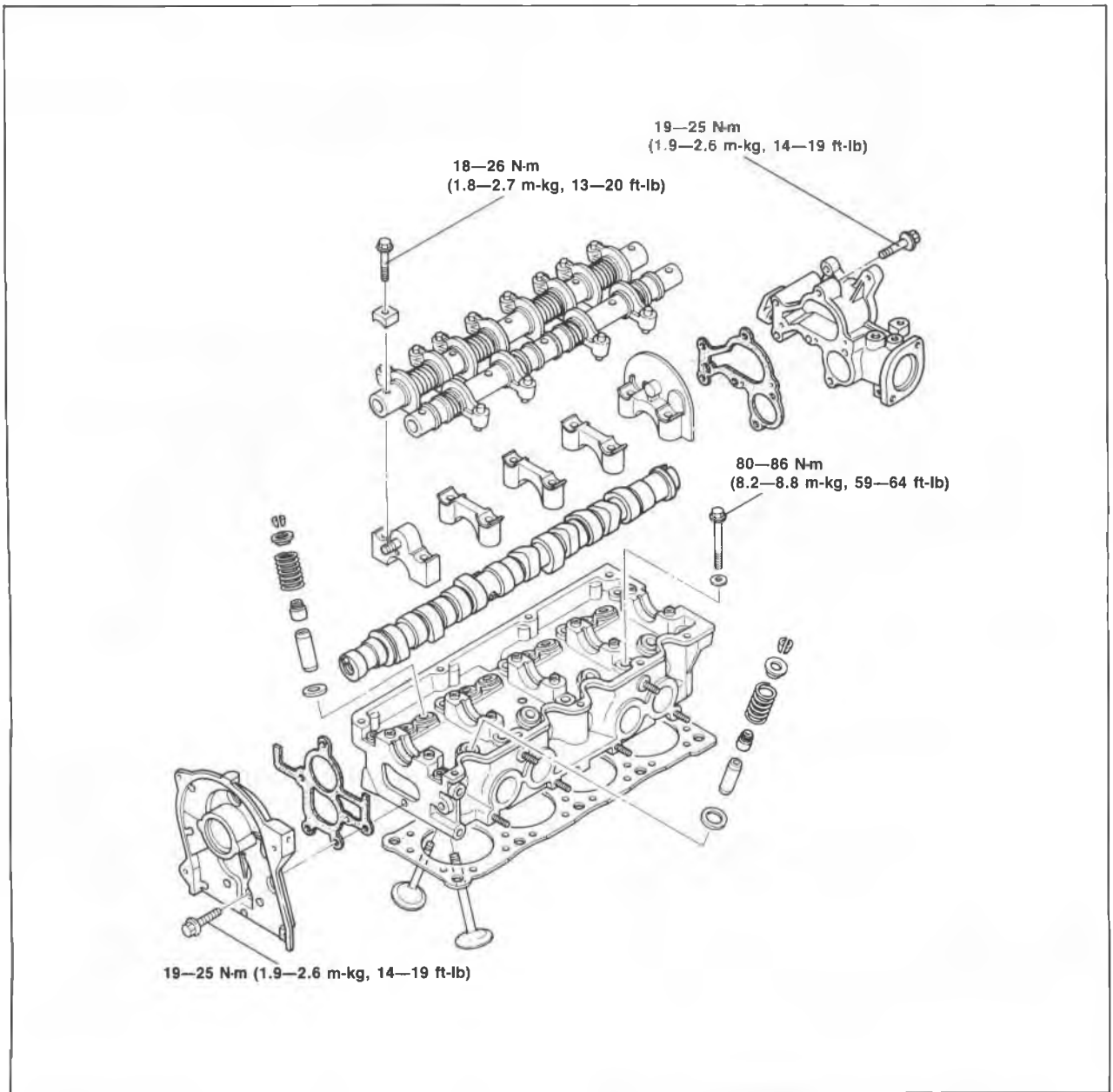


3. Install the water pump.

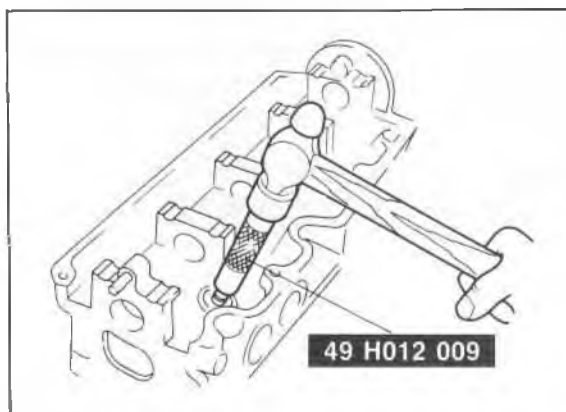
### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

## CYLINDER HEAD (12-valve) Torque Specifications



76G01A-077

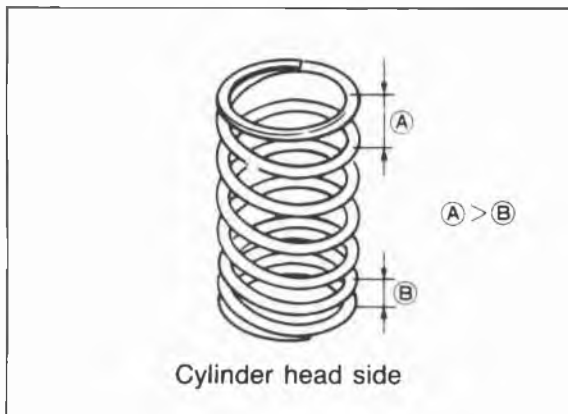


86U01X-143

### Valve Seal

1. Apply engine oil to the inside of the new valve seal.
2. Install the valve seal onto the valve guide with the **SST**.

# 1A ASSEMBLY (CYLINDER HEAD)



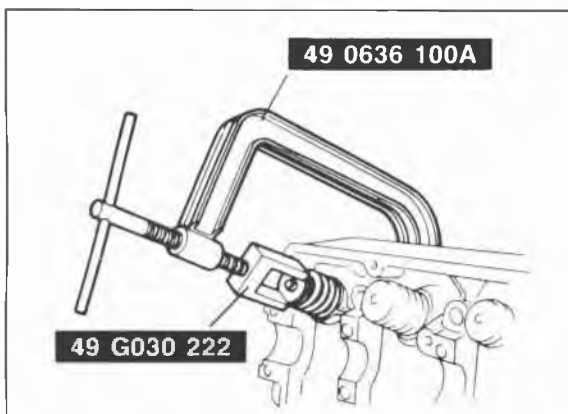
86U01X-144

## Valve and Valve Spring

1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

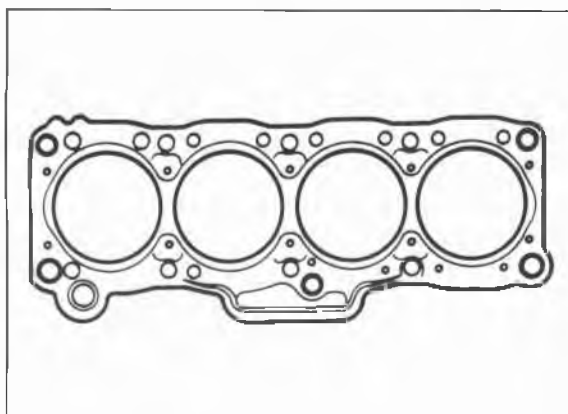
### Note

**Install the valve spring with the closer pitch toward the cylinder head.**



86U01X-145

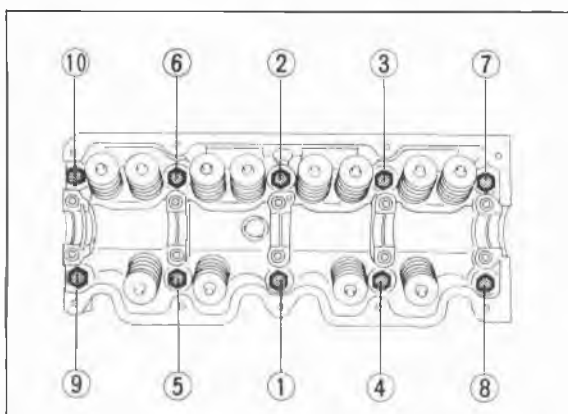
4. Compress the valve spring with the **SST**; then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



86U01X-146

## Cylinder Head

1. Thoroughly remove all dirt, oil, or other material from the top of the cylinder block.
2. Place the new cylinder head gasket in position.



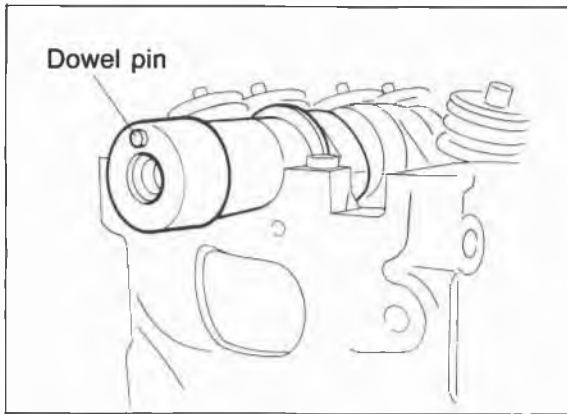
86U01X-147

3. Install the cylinder head.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**

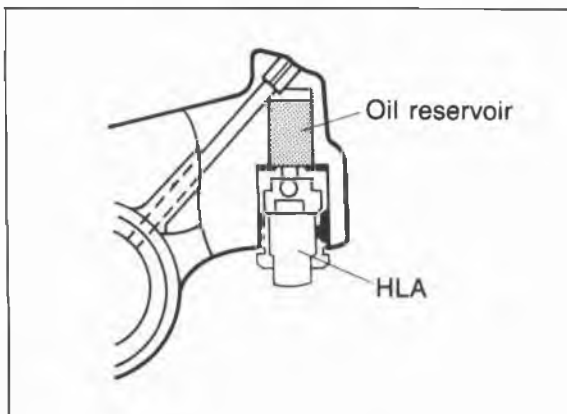
# ASSEMBLY (CYLINDER HEAD) 1A



86U01X-148

## Camshaft

1. Apply a liberal amount of engine oil to the journals and bearings.
2. Place the camshaft in position with the dowel pin facing straight up.



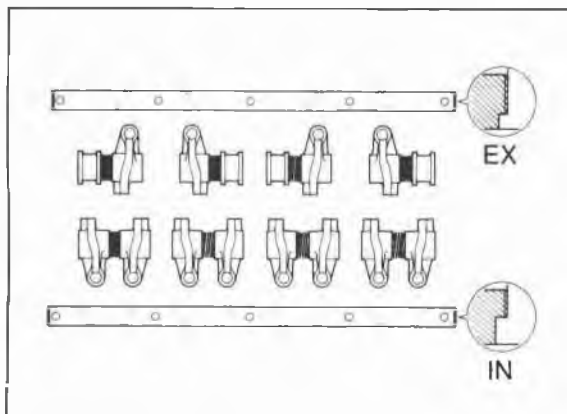
86U01X-149

## Hydraulic Lash Adjuster (HLA)

1. Pour engine oil into the oil reservoir in the rocker arm.
2. Apply engine oil to the new HLA.
3. Carefully install the HLA into the rocker arm.

## Caution

**Be careful not to damage the O-ring when installing the HLA.**



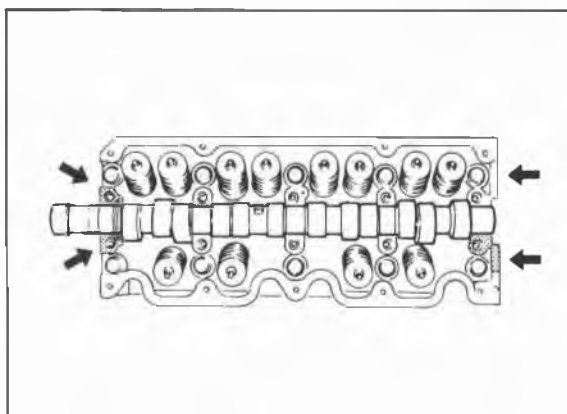
86U01X-150

## Camshaft Cap, Rocker Arm and Shaft Assembly

1. Assemble the rocker arm and shaft assembly as shown in the figure.

## Note

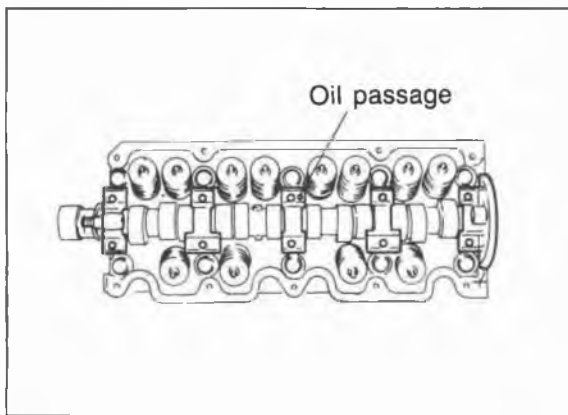
- a) The intake side shaft has twice as many oil holes as the exhaust side shaft.
- b) The stepped ends are the rear of the shafts.



76G01A-140

2. Apply silicon sealant to the shaded areas shown in the figure.

# 1A ASSEMBLY (CYLINDER HEAD)

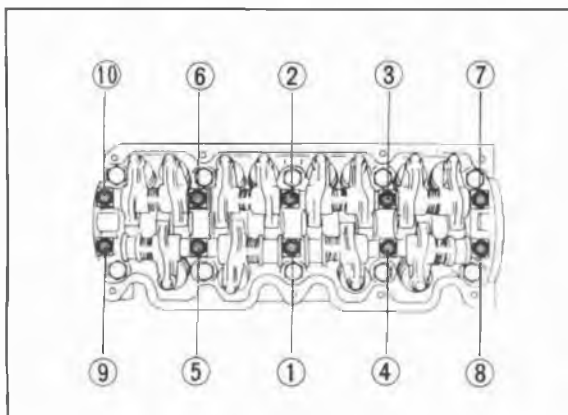


86U01X-152

3. Apply liberal amount of clean engine oil to the cam lobes and journals.
4. Position the camshaft caps according to the ← mark.

### Note

The No. 3 camshaft cap has an oil passage from the cylinder head, be certain it is installed correctly.

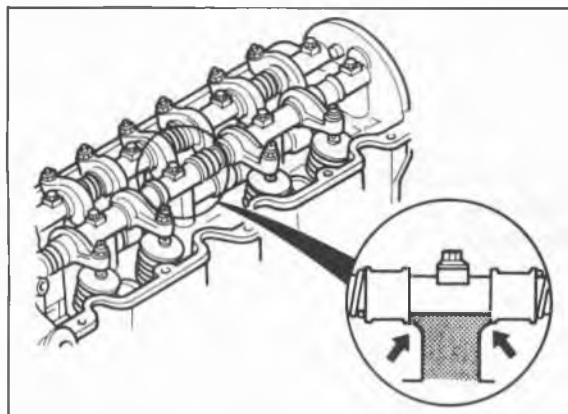


86U01X-153

5. Install the rocker arm and shaft assemblies. Tighten the bolts in two or three steps in the order shown in the figure.

### Tightening torque:

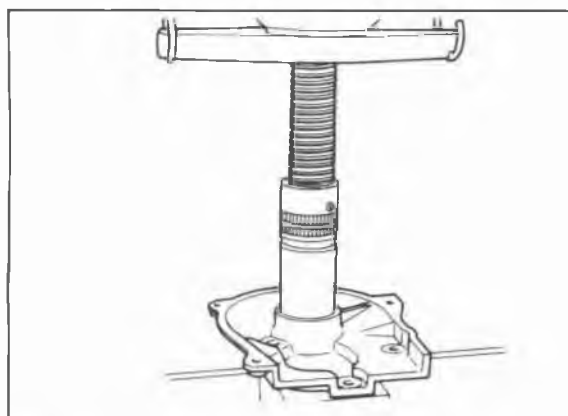
18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)



86U01X-154

### Caution

Be careful that the rocker arms or spacers do not get caught between the shaft and camshaft cap.

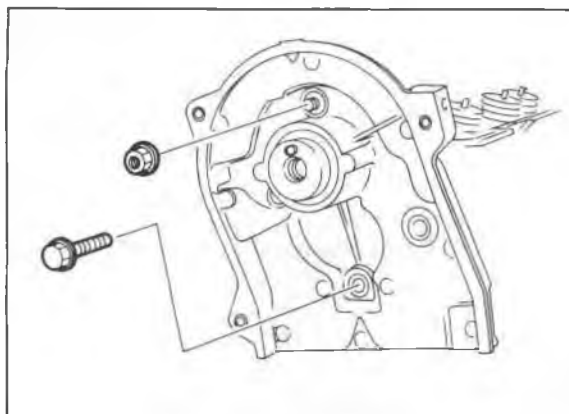


86U01X-155

### Front Housing

1. Apply engine oil to the front housing and a new oil seal.
2. Press the oil seal into the front housing.

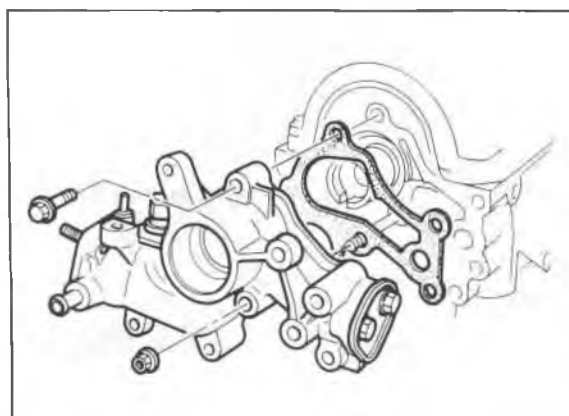
## ASSEMBLY (CYLINDER HEAD) 1A



86U01X-156

3. Apply engine oil to the oil seal lip.
4. Install the front housing and a new gasket.

**Tightening torque:**  
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



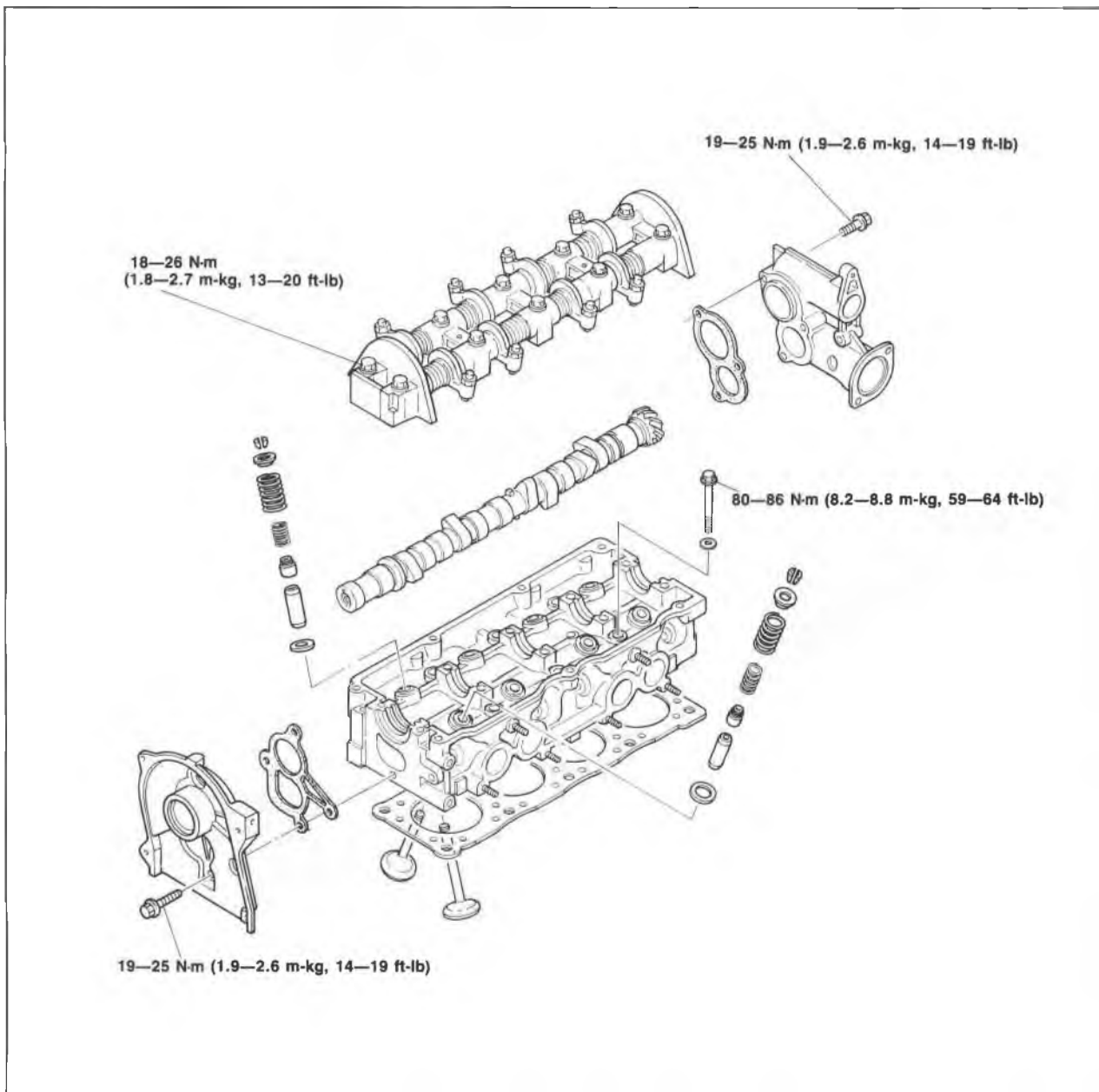
86U01X-157

- Rear Housing**  
Install the rear housing and a new gasket.

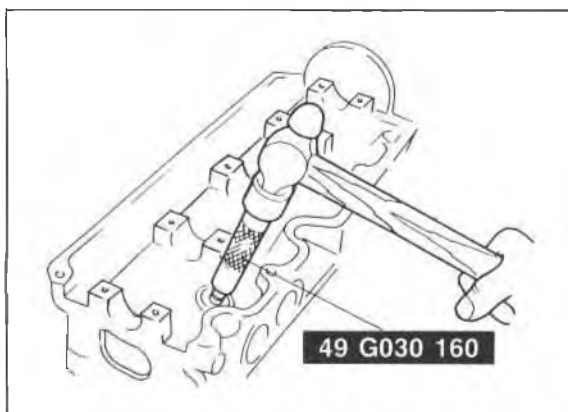
**Tightening torque:**  
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

# 1A ASSEMBLY (CYLINDER HEAD)

## CYLINDER HEAD (8-valve) Torque Specifications



76G01A-078

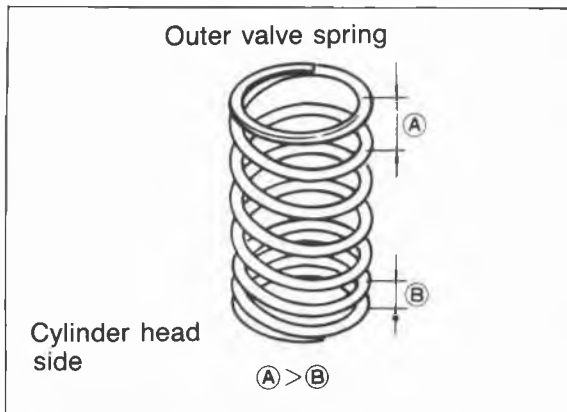


86U01X-143

### Valve Seal

1. Apply engine oil to the inside of the new valve seal.
2. Install the valve seal onto the valve guide with the **SST**.

# ASSEMBLY (CYLINDER HEAD) 1A

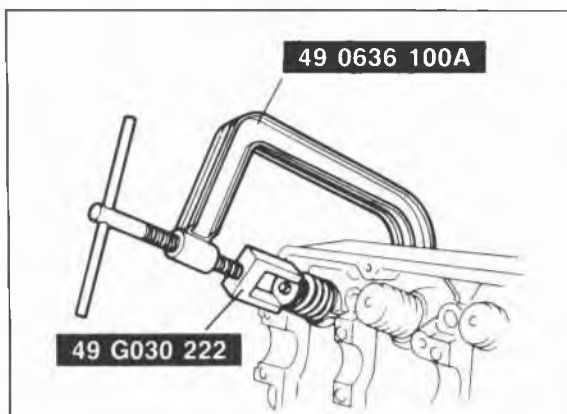


## Valve and Valve Spring

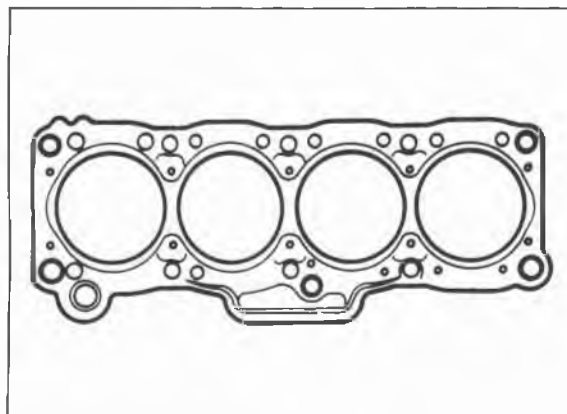
1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

### Note

**Install the outer valve spring with the closer pitch toward the cylinder head.**

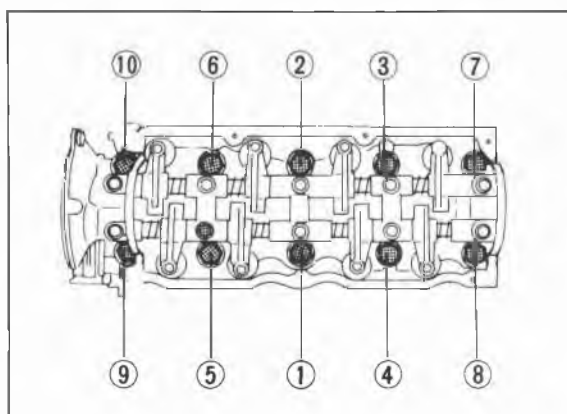


4. Compress the valve spring with the **SST**; then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



## Cylinder Head

1. Thoroughly remove all dirt, oil, or other material from the top of the cylinder block.
2. Place the new cylinder head gasket in position.



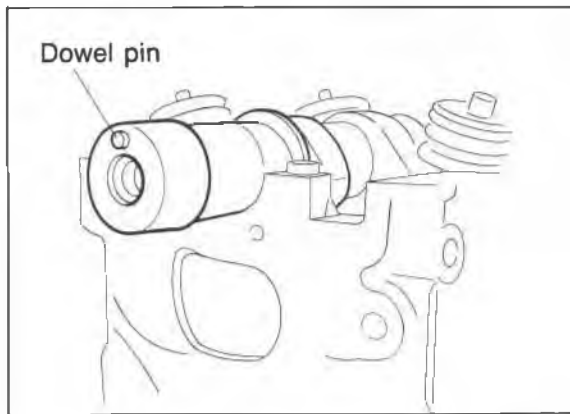
3. Install the cylinder head.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**



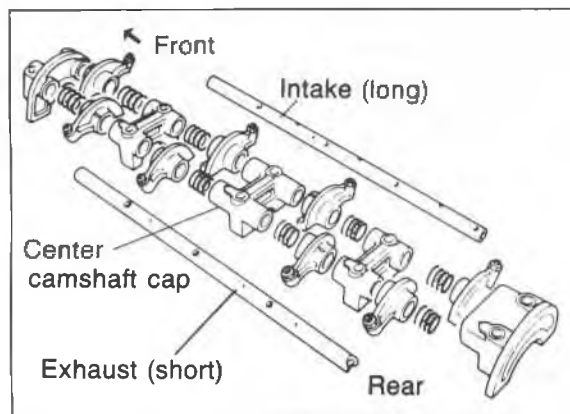
# 1A ASSEMBLY (CYLINDER HEAD)



86U01X-148

## Camshaft

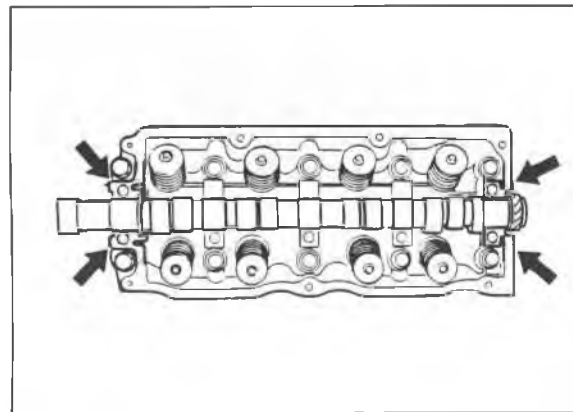
1. Apply a liberal amount of engine oil to the journals and bearings.
2. Place the camshaft in position with the dowel pin facing straight up.



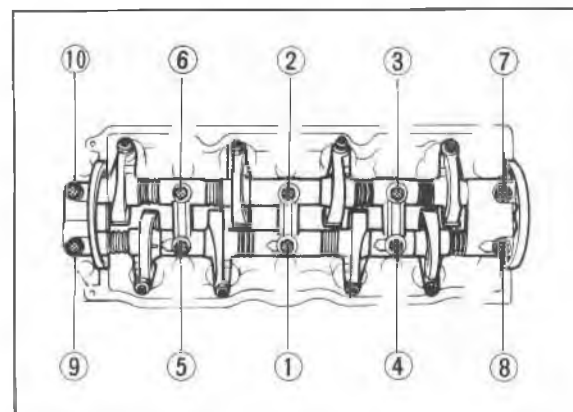
76G01A-080

## Rocker Arm and Shaft Assembly

1. Assemble the rocker arm and shaft assembly as shown in the figure.



2. Apply silicon sealant to the shaded areas shown in the figure.
3. Apply liberal amount of clean engine oil to the cam lobes and journals.



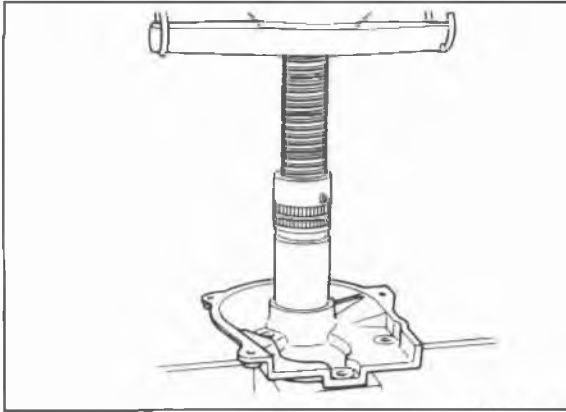
76G01A-082

5. Install the rocker arm and shaft assembly. Tighten the bolts in two or three steps in the order shown in the figure.

## Tightening torque:

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

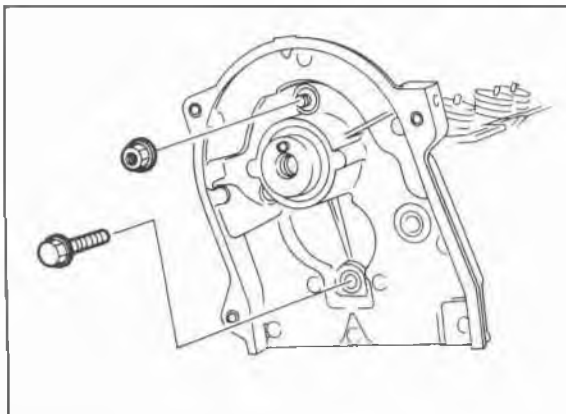
# ASSEMBLY (CYLINDER HEAD) 1A



86U01X-155

## Front Housing

1. Apply engine oil to the front housing and a new oil seal.
2. Press the oil seal into the front housing.

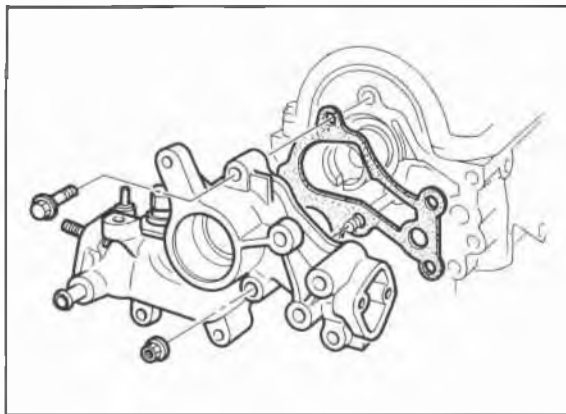


86U01X-156

3. Apply engine oil to the oil seal lip.
4. Install the front housing and a new gasket.

## Tightening torque:

**19—25 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**



86U01X-157

## Rear Housing

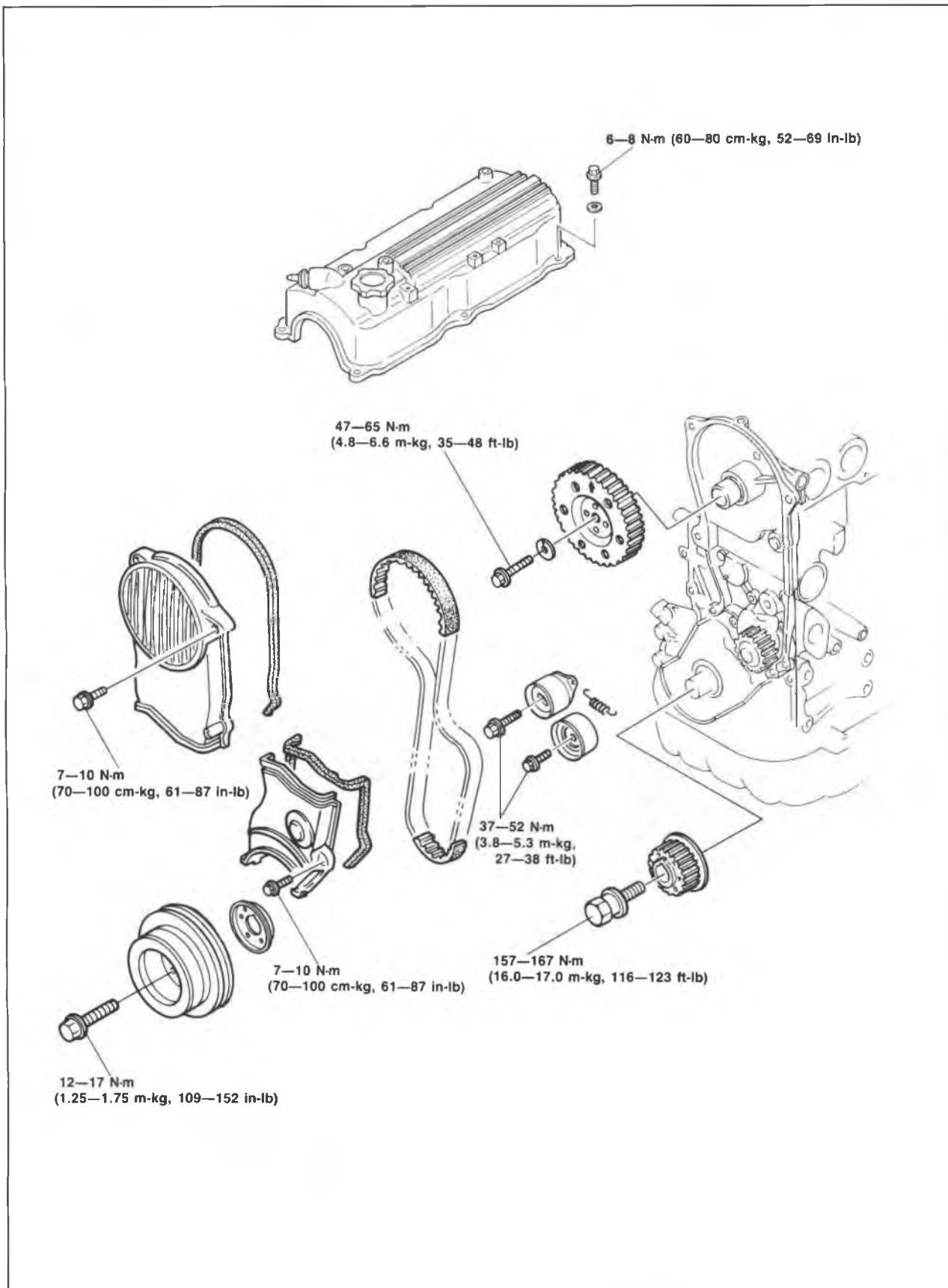
Install the rear housing and a new gasket.

## Tightening torque:

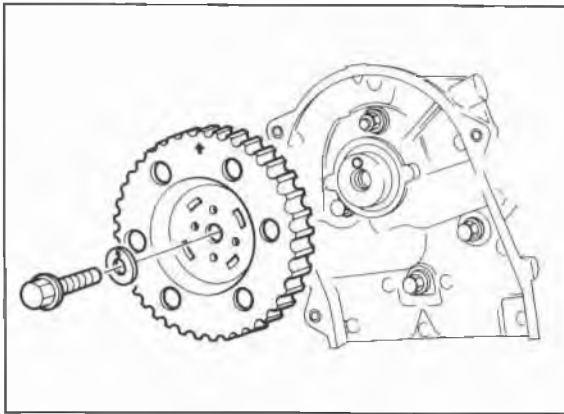
**19—25 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**

# 1A ASSEMBLY (TIMING BELT)

## TIMING BELT Torque Specifications



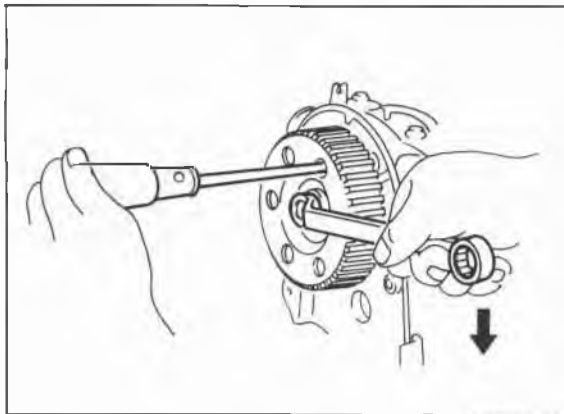
69G01B-160



76G01A-083

## Camshaft Pulley

1. Install the camshaft pulley on the camshaft with the dowel pin fit into the hole at the **2** mark (FE) or **3** mark (F8, F6).

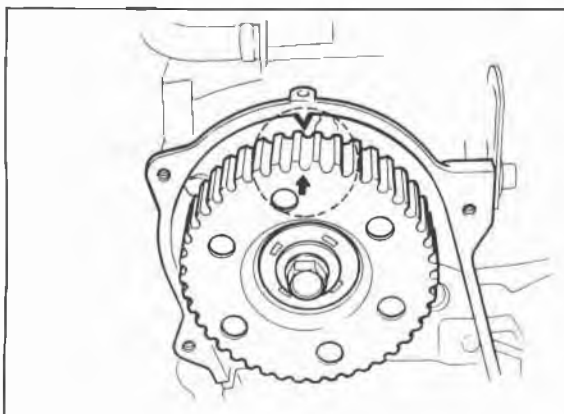


76G01A-141

2. Tighten the camshaft pulley lock bolt.

## Tightening torque:

**47—65 N·m (4.8—6.6 m·kg, 35—48 ft·lb)**



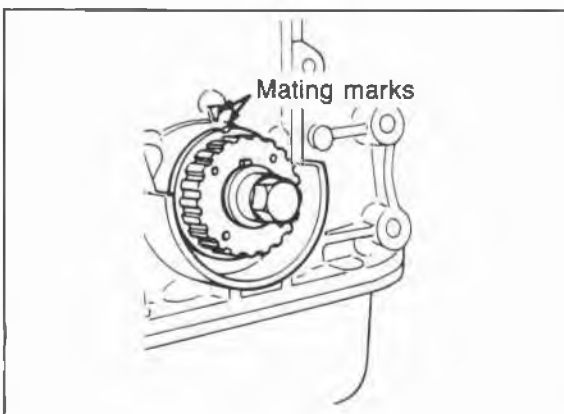
76G01A-084

3. Align the mating mark on the pulley with the alignment mark on the front housing.

## Note

**For FE engine, align "2" mark.**

**For F8, F6 engine, align "3" mark.**



86U01X-160

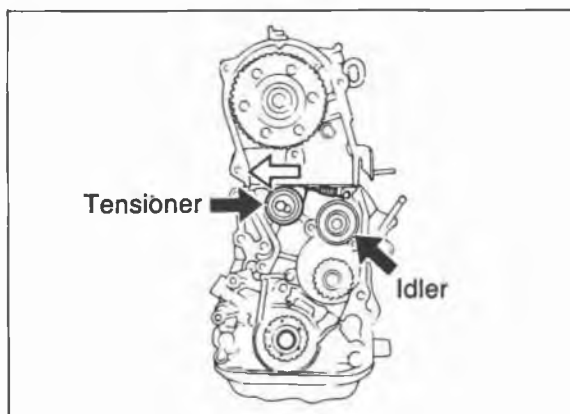
## Timing Belt Pulley

1. Reverse the direction of the **SST** (ring gear brake).
2. Install the crankshaft key.
3. Install the timing belt pulley on the crankshaft.

**Tightening torque: 157—167 N·m  
(16.0—17.0 m·kg, 116—123 ft·lb)**

4. Release the ring gear brake.
5. Align the timing belt pulley and the pump body alignment marks.

# 1A ASSEMBLY (TIMING BELT)



69G01B-165

## Timing Belt Idler Pulley

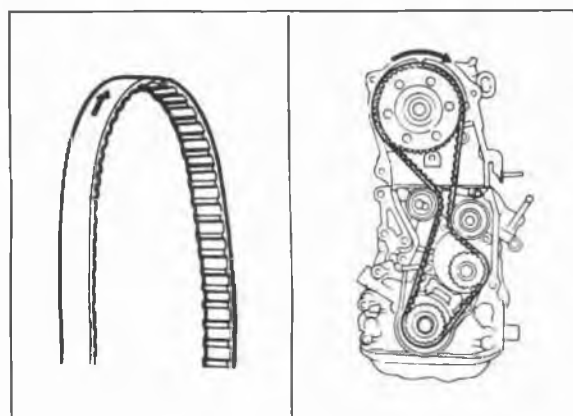
Install the timing belt idler pulley.

### Tightening torque:

**37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)**

## Timing Belt Tensioner

1. Install the timing belt tensioner and tensioner spring.
2. Tentatively secure the tensioner with the spring fully extended.



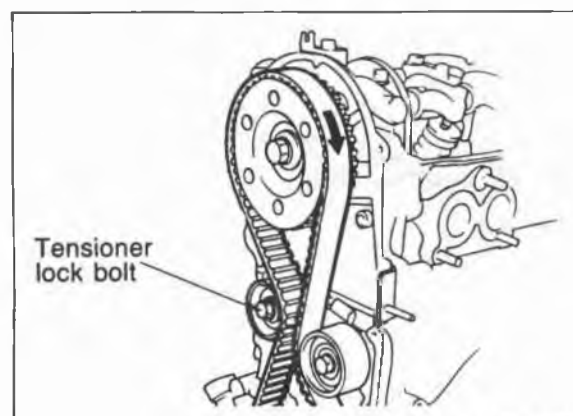
76G01A-085

## Timing Belt

1. Install the timing belt. (keep the tension side of belt as tight as possible.)

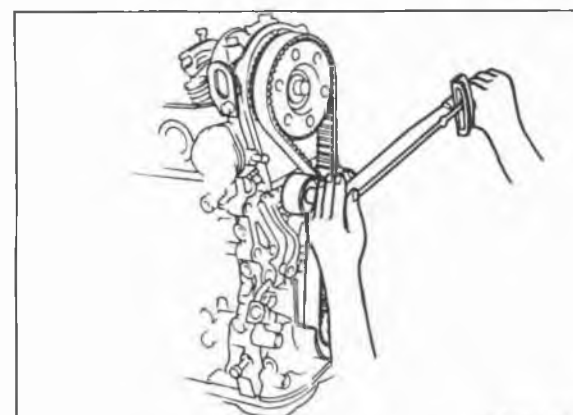
### Caution

- a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.
- b) Check that there is no oil, grease, or dirt on the timing belt.



79G01C-097

2. Loosen the tensioner lock bolt.
3. Turn the crankshaft twice in the direction of rotation.
4. Check that the mating marks are correctly aligned. If not aligned, remove the timing belt and tensioner, and repeat the above-mentioned procedure.



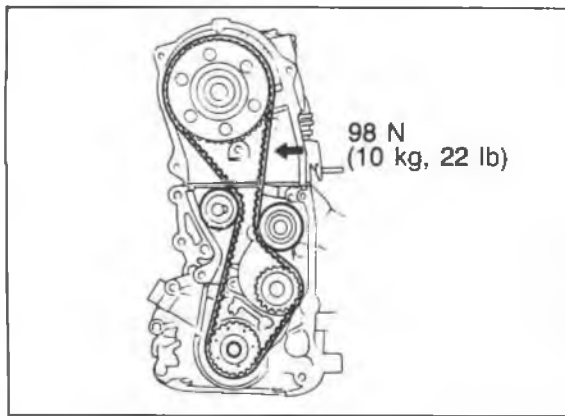
4BG01A-186

5. Tighten the timing belt tensioner lock bolt.

### Tightening torque:

**37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)**

# ASSEMBLY (TIMING BELT) 1A



76G01A-086

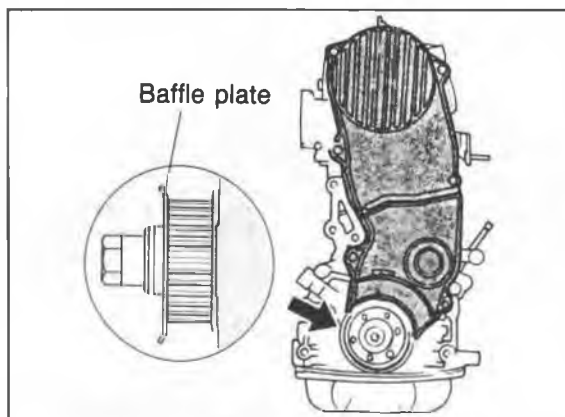
6. Check the timing belt deflection. If the deflection is not correct, loosen the tensioner lock bolt and repeat steps 3—5 above. Replace the tensioner spring if necessary.

### Belt deflection:

**FE:** 5.5—6.5 mm (0.22—0.26 in)

**F8, F6:** 4.0—5.0 mm (0.16—0.20 in)

/98 N (10kg, 22 lb)



86U01X-163

### Baffle Plate

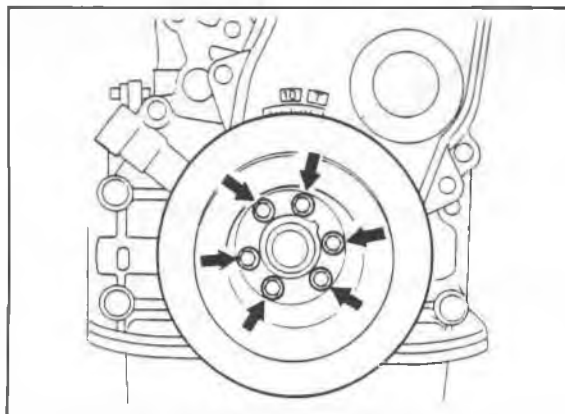
Position the baffle plate on the timing belt pulley.

### Timing Belt Cover

Install the lower timing belt cover, upper timing belt cover, and new gaskets.

### Tightening torque:

**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**



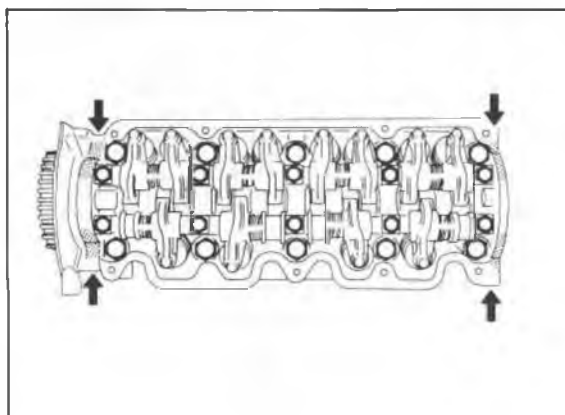
69G01B-170

### Crankshaft Pulley

Install the crankshaft pulley.

### Tightening torque: 12—17 N·m

**(1.25—1.75 m·kg, 109—152 in·lb)**



76G01A-142

### Valve Clearance (8-valve)

Adjust the valve clearance. (Refer to page 1A—10.)

### Cylinder Head Cover

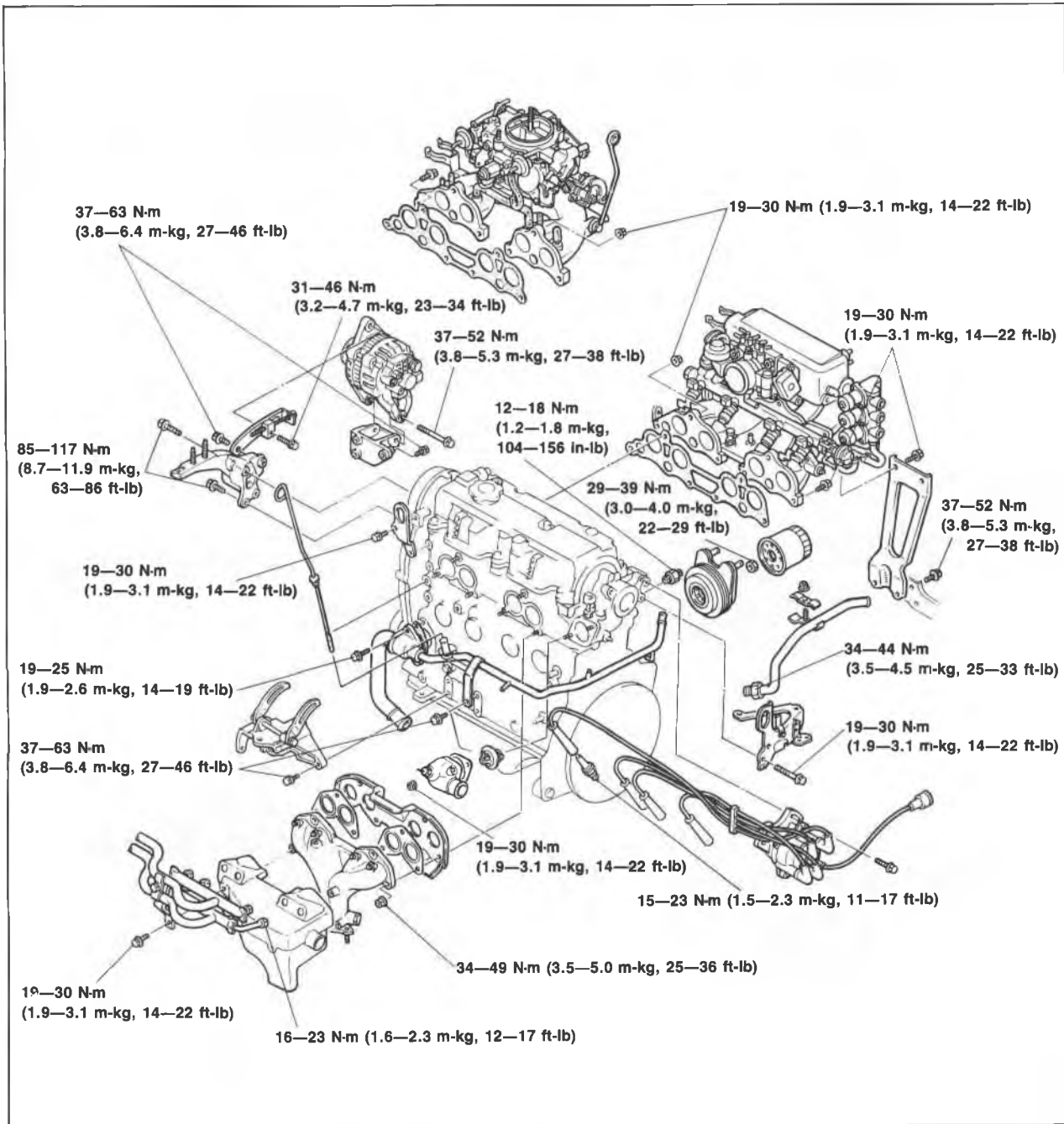
1. Apply silicon sealant to the shaded areas shown in the figure.
2. Install the cylinder head cover.

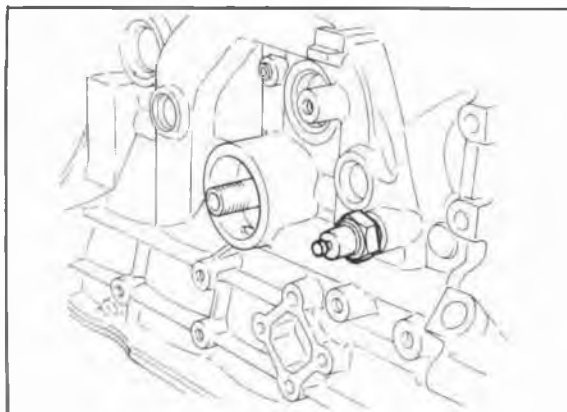
### Tightening torque:

**6—8 N·m (60—80 cm·kg, 52—69 in·lb)**

# 1A ASSEMBLY (AUXILIARY PARTS)

## AUXILIARY PARTS Torque Specifications



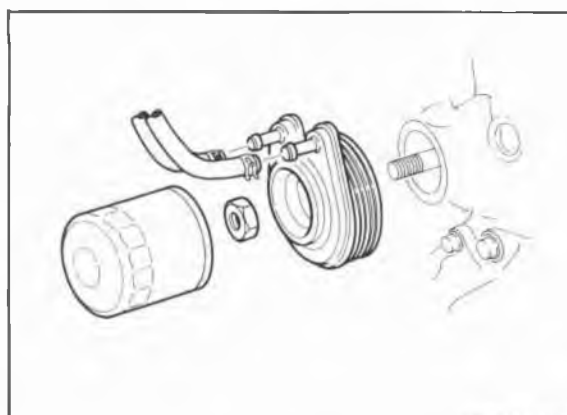


76G01A-087

## Oil Pressure Switch

Install the oil pressure switch.

**Tightening torque: 12—18 N·m  
(1.2—1.8 m·kg, 104—156 in·lb)**



76G01A-088

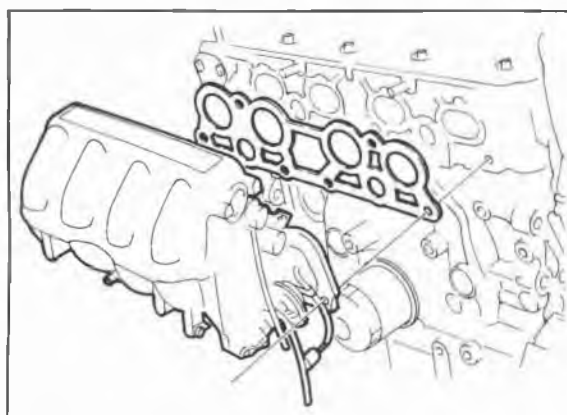
## Oil Cooler (8-valve...only ECE, 12-valve)

Install the oil cooler.

**Tightening torque:  
29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

## Oil Filter

1. Apply engine oil to the rubber gasket of the new filter.
2. Install the oil filter, and tighten it by hand only. Do not use a wrench.

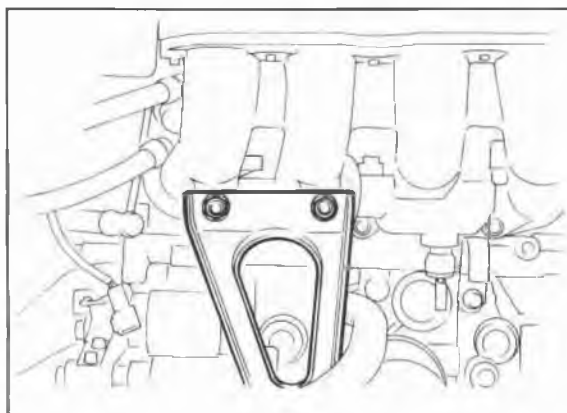


86U01X-167

## Intake Manifold Assembly

1. Place the new gasket in position.
2. Install the intake manifold assembly.
3. Tighten the nuts in two or three steps.

**Tightening torque:  
19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



76G01A-089

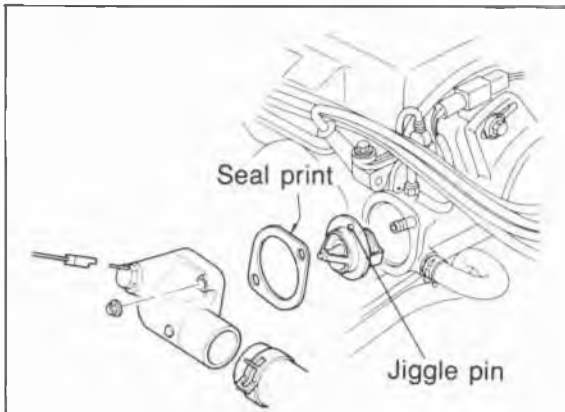
## Intake Manifold Bracket (FI)

Install the intake manifold bracket.

**Tightening torque:  
19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



# 1A ASSEMBLY (AUXILIARY PARTS)



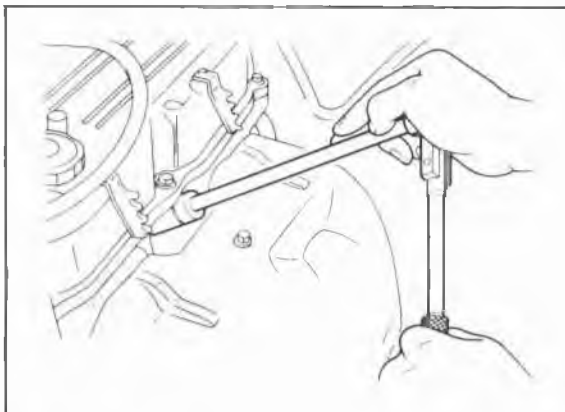
86U01X-169

## Thermostat and Thermostat Cover

1. Install the thermostat into the cylinder head with the jiggle pin at the top.
2. Position a new gasket with the printed side facing the cylinder head.
3. Install the thermostat cover.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



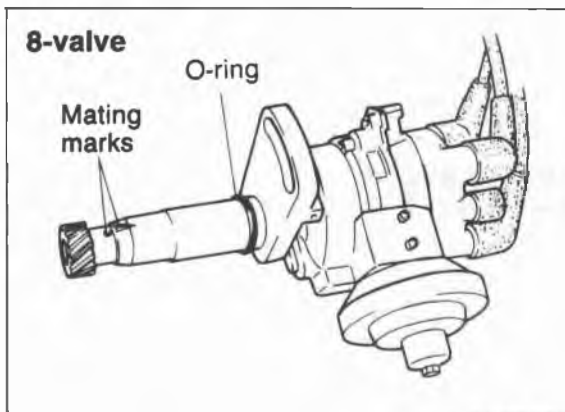
86U01X-219

## Spark Plug

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

### Tightening torque:

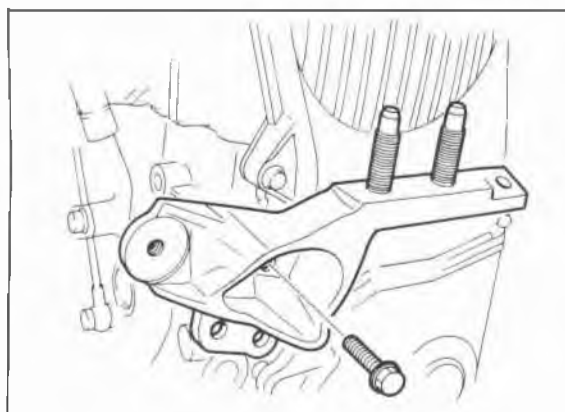
**15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)**



76G01A-035

## Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade or gear.
3. Align the mating marks as shown in the figure ...8-valve.
4. Install the distributor with the marks facing straight up.
5. Loosely tighten the distributor mounting bolt.



86U01X-170

## High-Tension Lead

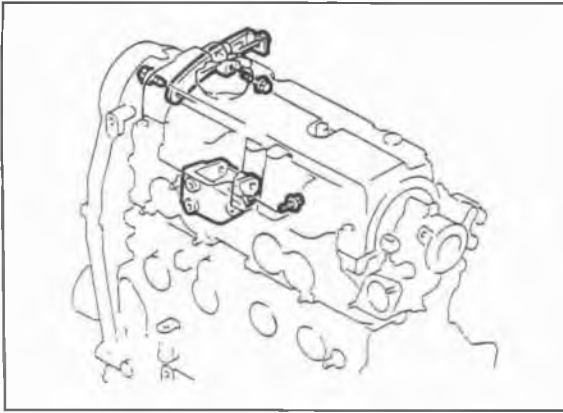
Install the high-tension leads.

## Engine Mount Bracket

Install the engine mount.

### Tightening torque:

**85—117 N·m (8.7—11.9 m·kg, 63—86 ft·lb)**



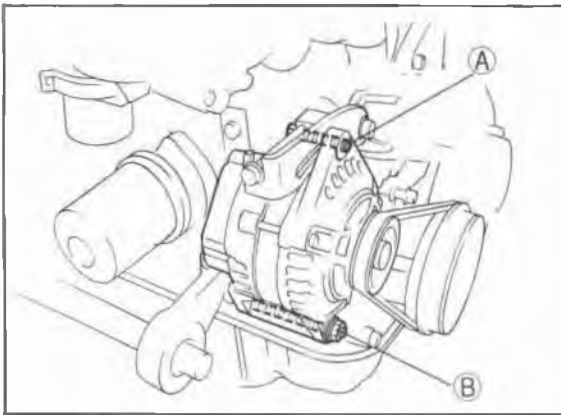
86U01X-171

## Alternator

1. Install the alternator strap and bracket.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



76G01A-090

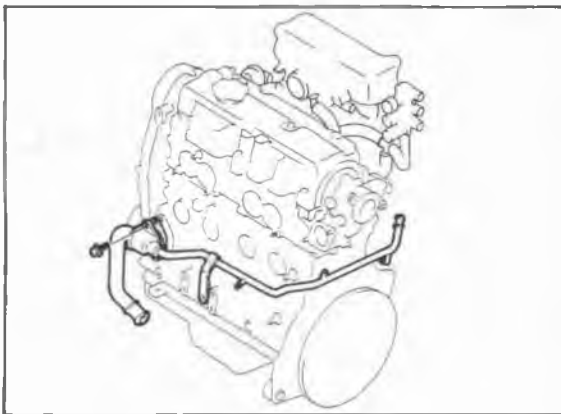
2. Install the alternator.

### Tightening torque

**A : 31—46 N·m  
(3.2—4.7 m·kg, 23—34 ft·lb)**

**B : 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)**

3. Install the alternator drive belt, and adjust the belt deflection. (Refer to page 1A—7.)



76G01A-091

## Coolant Inlet Pipe and Bypass Pipe

1. Install the coolant inlet pipe.

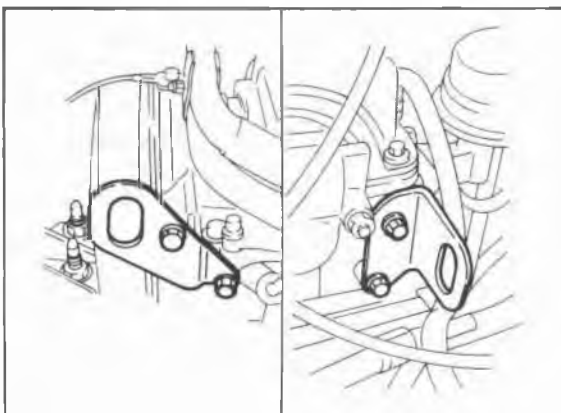
### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Apply vegetable oil to the O-ring.
3. Install the coolant bypass pipe.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



76G01A-092

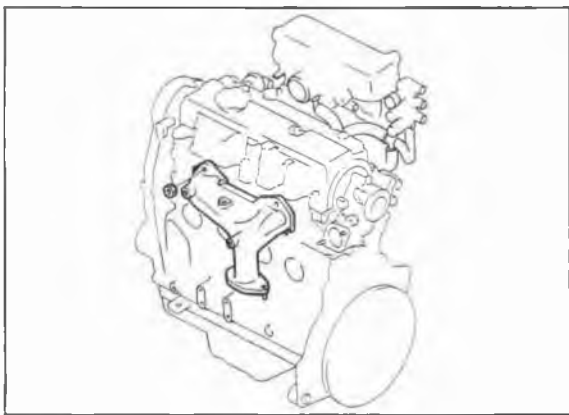
## Engine Hanger

- Install the front and rear engine hangers.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

# 1A ASSEMBLY (AUXILIARY PARTS)



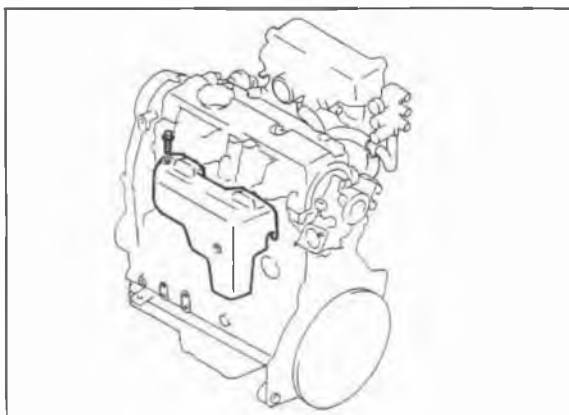
76G01A-093

## Exhaust Manifold Assembly

1. Place the new gaskets in position with the ridge facing the cylinder head.
2. Install the exhaust manifold assembly.
3. Tighten the nuts in two or three steps.

### Tightening torque:

**34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)**



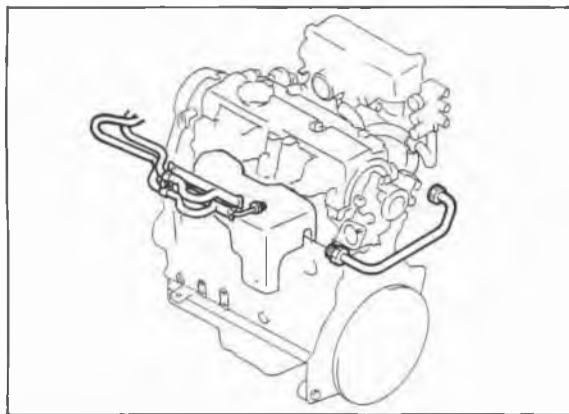
76G01A-094

## Exhaust Manifold Insulator

Install the exhaust manifold insulator.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



76G01A-095

## EGR Pipe

Install the EGR pipe.

### Tightening torque:

**34—44 N·m (3.5—4.5 m·kg, 25—33 ft·lb)**

## Secondary Air Pipe Assembly

Install the secondary air pipe assembly.

### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



86U01X-178

## P/S Oil Pump Bracket

Install the P/S oil pump bracket.

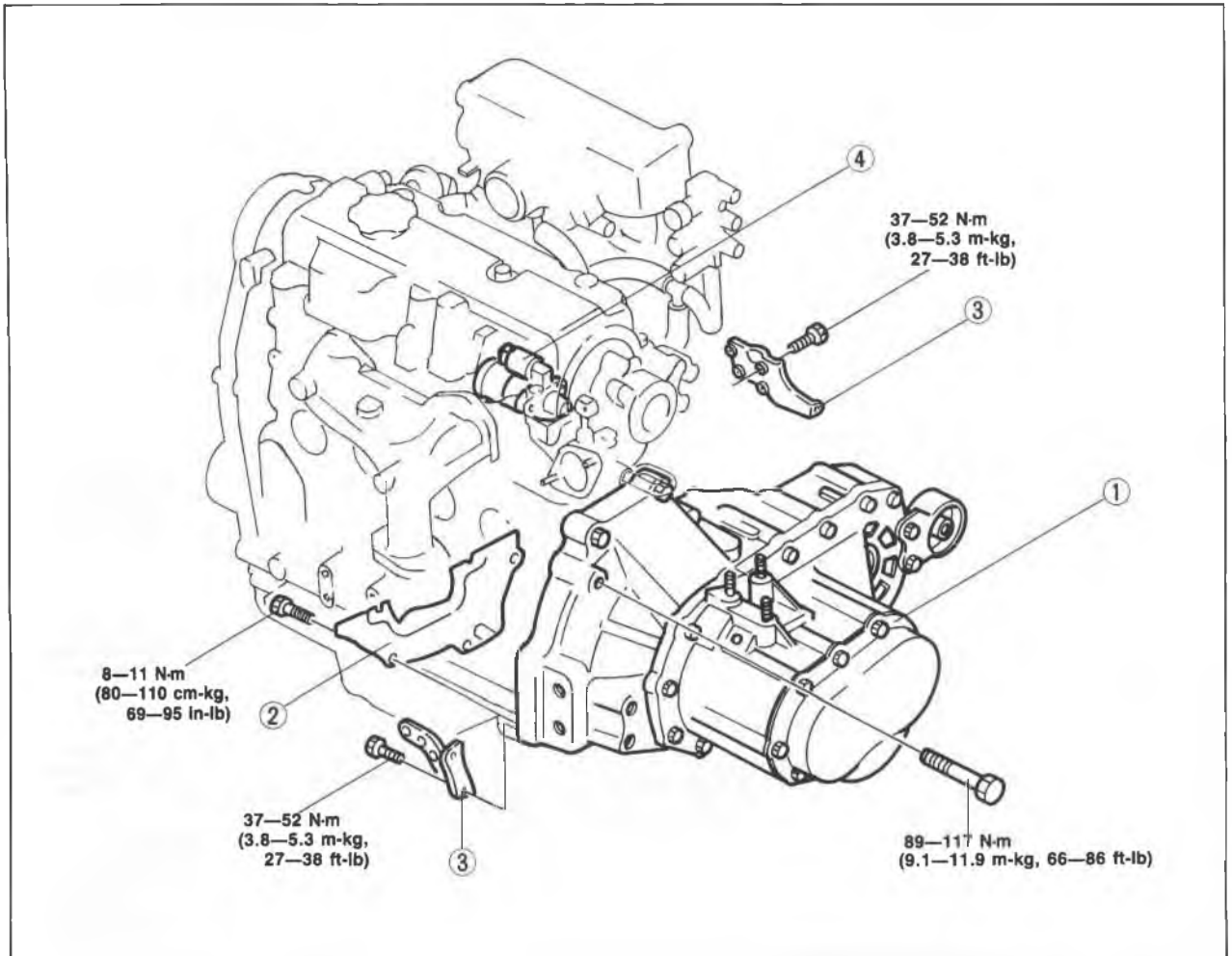
### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**

## INSTALLATION

### TRANSAXLE ASSEMBLY

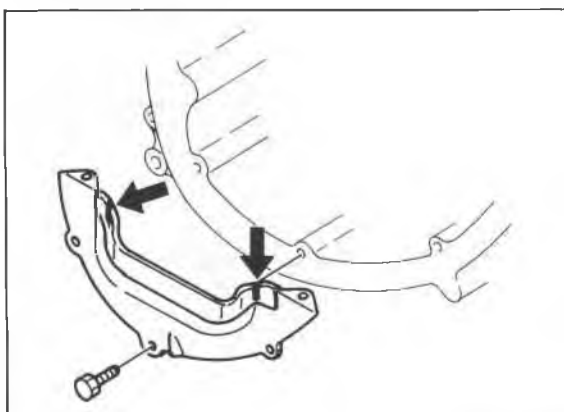
Assemble the transaxle to the engine in the sequence shown in the figure referring to the installation note.



76G01A-143

1. Transaxle
2. Clutch under cover

3. Gusset plate
4. Starter



76G01A-144

#### Installation Note Clutch under cover

Before installation, fill the notches with silicon as shown in the figure.

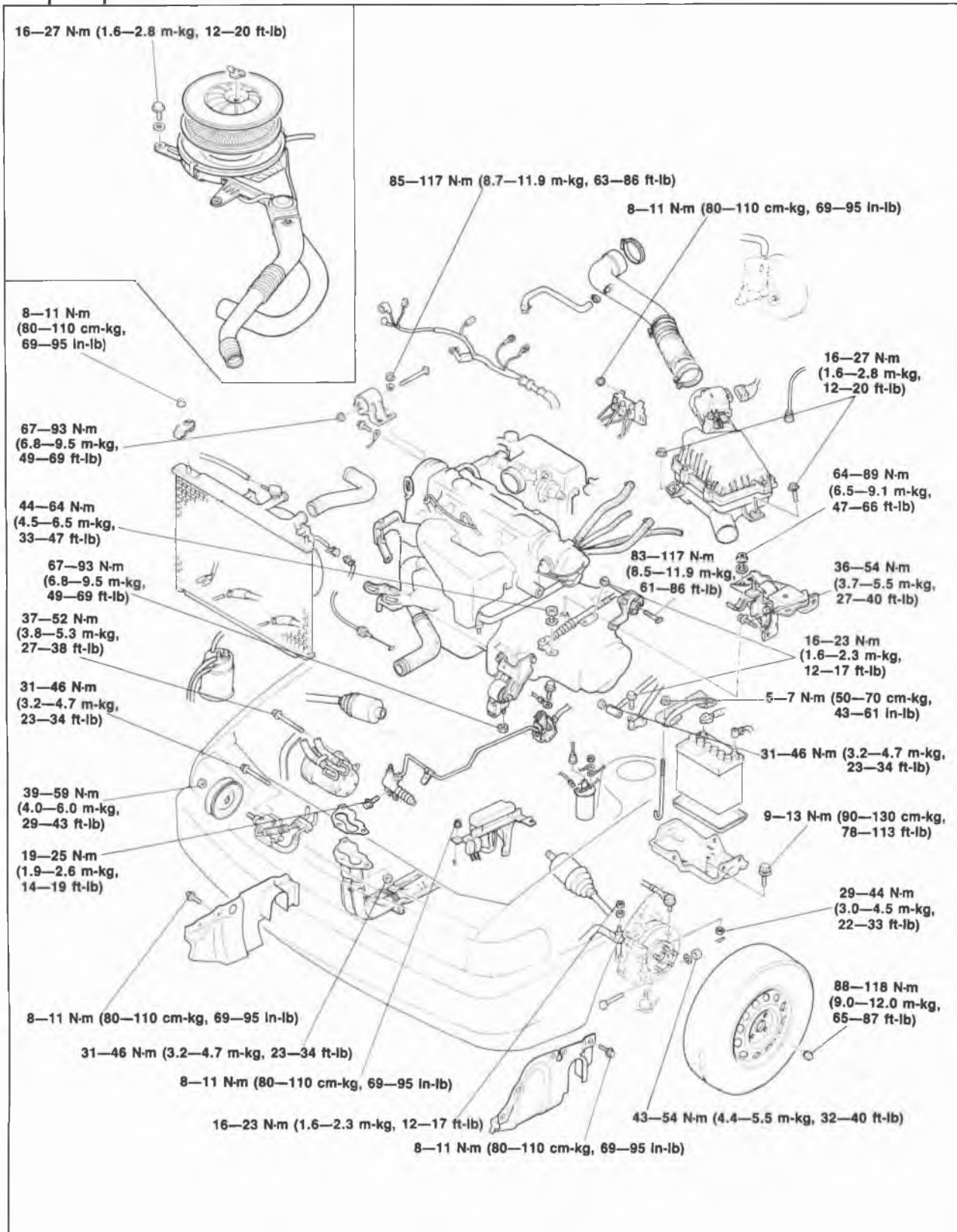
# 1A INSTALLATION

## ENGINE INSTALLATION

Install the engine and transaxle assembly.

**Warning: Be sure the vehicle is securely supported.**

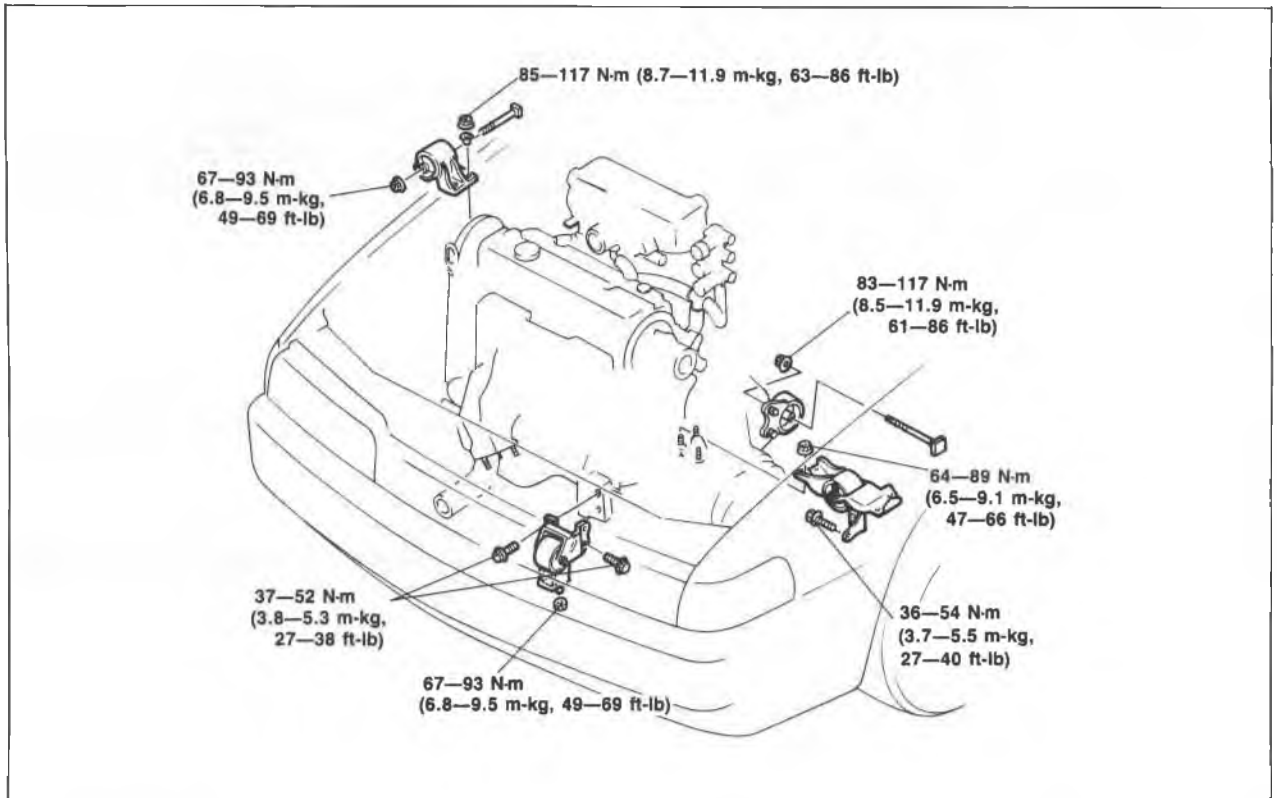
### Torque Specifications



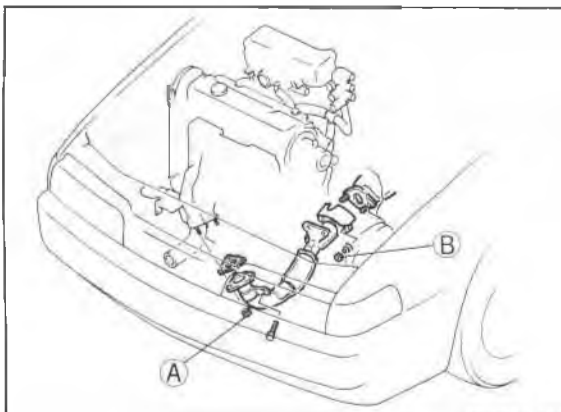
86U01X-180

## Engine Mount

Install the engine mount.



86U01X-181



86U01X-182

## Exhaust Pipe

1. Install the exhaust pipe.

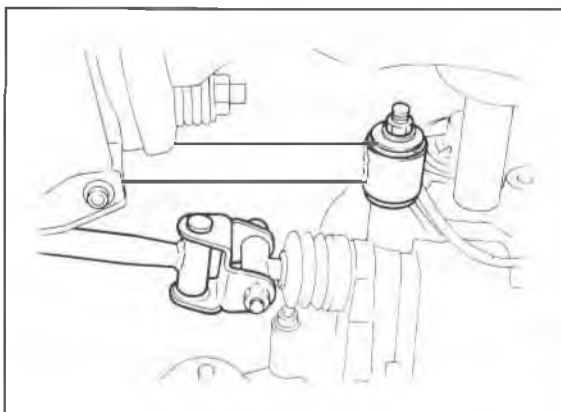
### Tightening torque

- Ⓐ : 31—46 N-m  
(3.2—4.7 m-kg, 23—34 ft-lb)
- Ⓑ : 64—89 N-m  
(6.5—9.1 m-kg, 47—66 ft-lb)

2. Tighten the bracket bolt.

### Tightening torque:

- 19—25 N-m (1.9—2.6 m-kg, 14—19 ft-lb)



76G01A-145

## Extension Bar (MTX)

Install the extension bar to the transaxle.

### Tightening torque:

- 31—46 N-m (3.2—4.7 m-kg, 23—34 ft-lb)

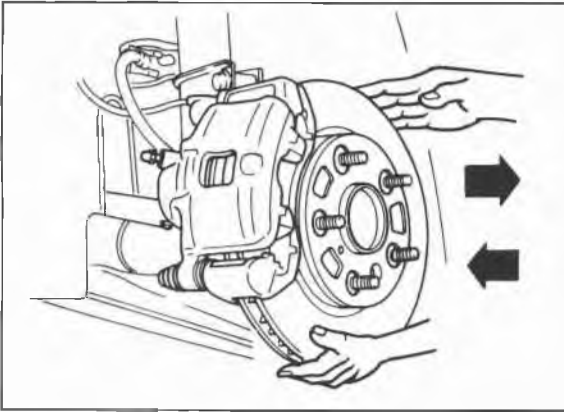
## Change Rod (MTX)

Install the change rod to the transaxle.

### Tightening torque:

- 16—23 N-m (1.6—2.3 m-kg, 12—17 ft-lb)

# 1A INSTALLATION



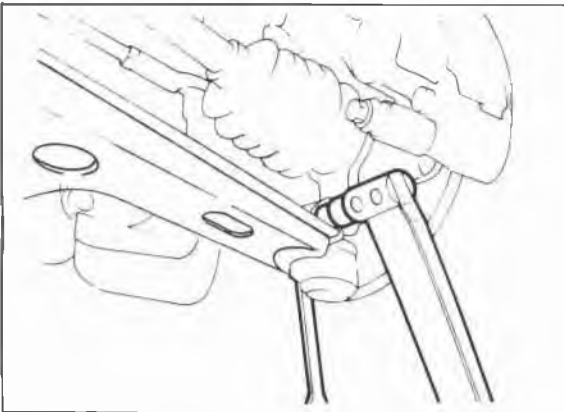
86U01X-184

## Driveshaft

1. Apply grease to the end of the driveshaft.
2. Install the driveshaft and a new clip.

### Caution

- a) When installing the driveshaft, be careful not to damage the oil seal.
- b) After installation, pull the front hub outward to confirm that the driveshaft is securely held by the clip.



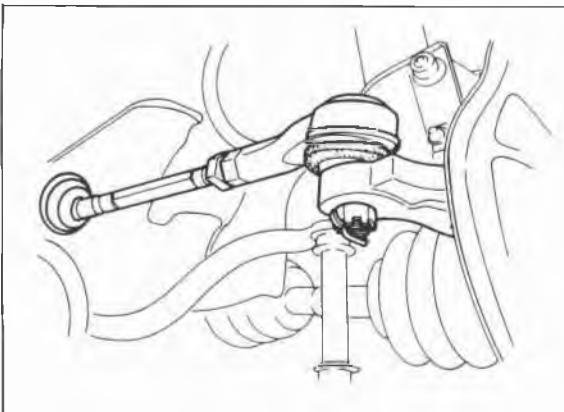
86U01X-185

## Lower Arm

Install the lower arm ball-joint to the knuckle; then tighten the lock nut.

### Tightening torque:

**43—54 N·m (4.4—5.5 m·kg, 32—40 ft·lb)**



86U01X-186

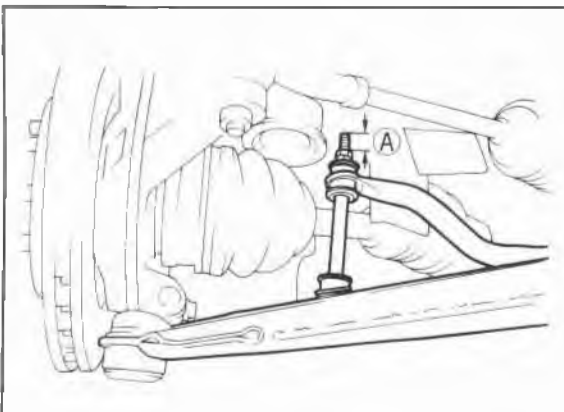
## Tie-Rod End

1. Install the tie-rod end to the knuckle.

### Tightening torque:

**29—44 N·m (3.0—4.5 m·kg, 22—33 ft·lb)**

2. Install the cotter pin.



86U01X-187

## Stabilizer Control Rod

Install and adjust the front stabilizer control rods.

**Dimension A: 20.1 mm (0.79 in)**

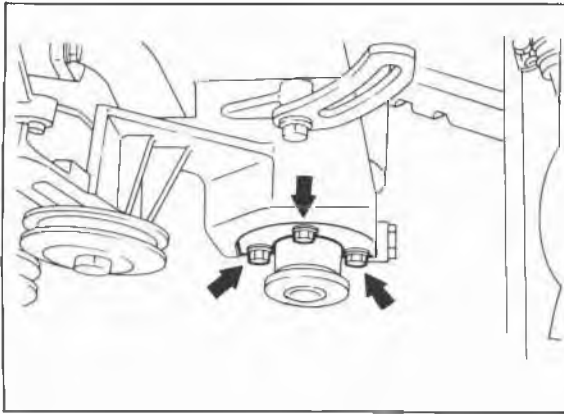
### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

Install the front wheel.

### Tightening torque:

**88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**



86U01X-188

### P/S Oil Pump

1. Install the P/S oil pump.

#### Tightening torque:

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

2. Tighten the pulley lock nut.

#### Tightening torque:

**39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)**



86U01X-189

### A/C Compressor

1. Install the A/C compressor strap to the P/S oil pump bracket.

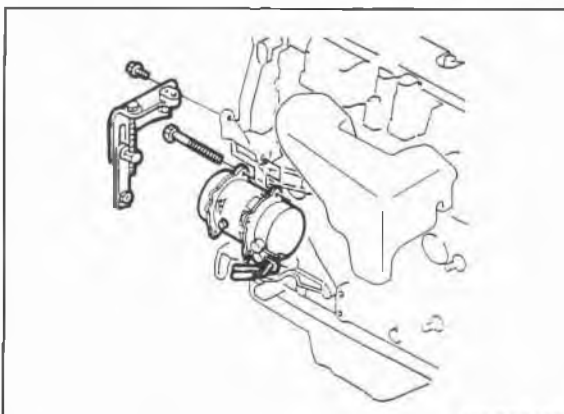
#### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Install the A/C compressor bracket.

#### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



86U01X-190

3. Install the A/C compressor.
4. Install the A/C compressor upper bracket.

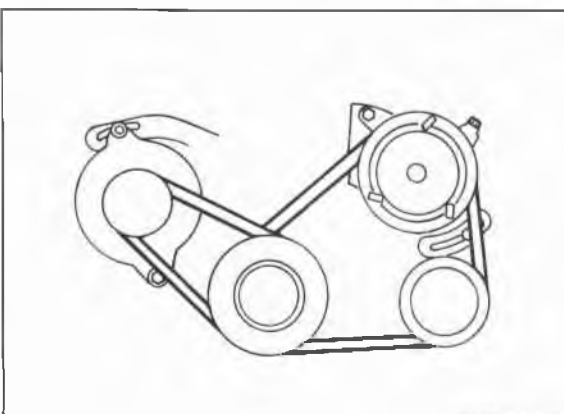
#### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**

5. Tighten to the lock nut and mounting bolts.

#### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



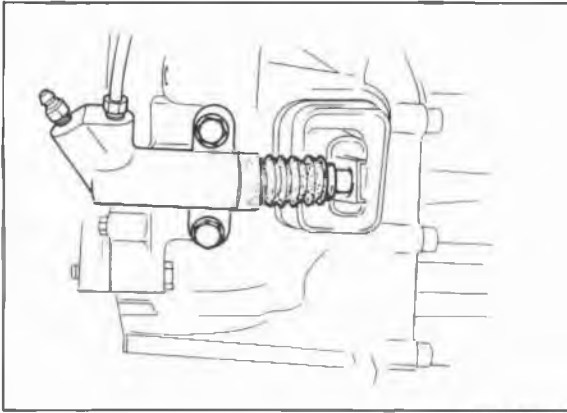
76G01A-096

### Drive Belt

Install the drive belt and adjust the belt deflection. (Refer to page 1A—7.)



# 1A INSTALLATION



86U01X-192

## Clutch Release Cylinder (MTX)

1. Set the pipe bracket in position.

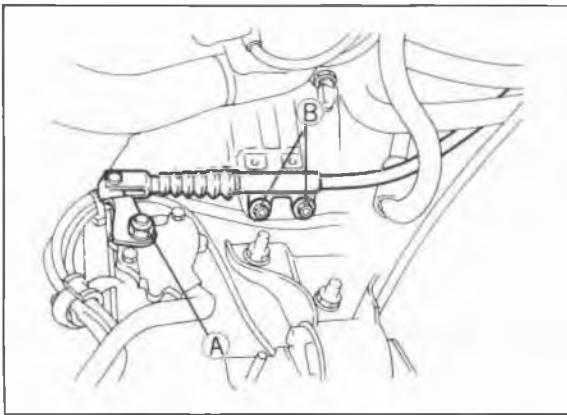
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Install the clutch release cylinder.

### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



76G01A-097

## Control Cable (ATX)

Install the control cable and adjust the shift selector position. (Refer to Section 7.)

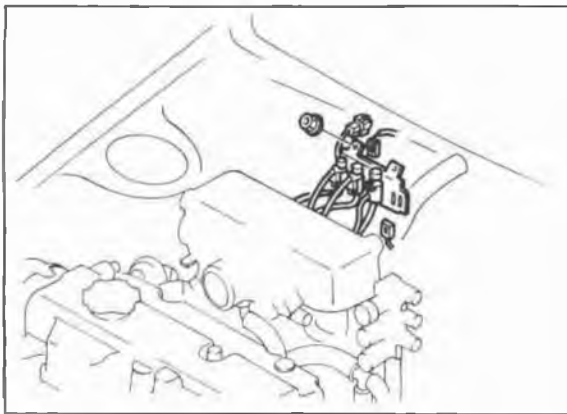
### Tightening torque

**A : 44—64 N·m  
(4.5—6.5 m·kg, 33—47 ft·lb)**

**B : 16—23 N·m  
(1.6—2.3 m·kg, 12—17 ft·lb)**

## Speedometer Cable

Install the speedometer cable.



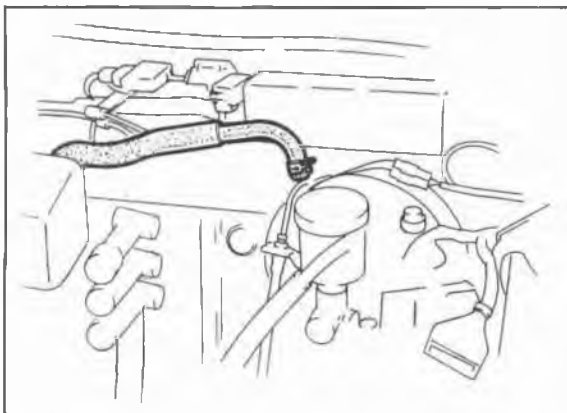
76G01A-098

## Three-Way Solenoid Assembly

Install the three-way solenoid assembly.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



86U01X-195

## Brake Vacuum Hose

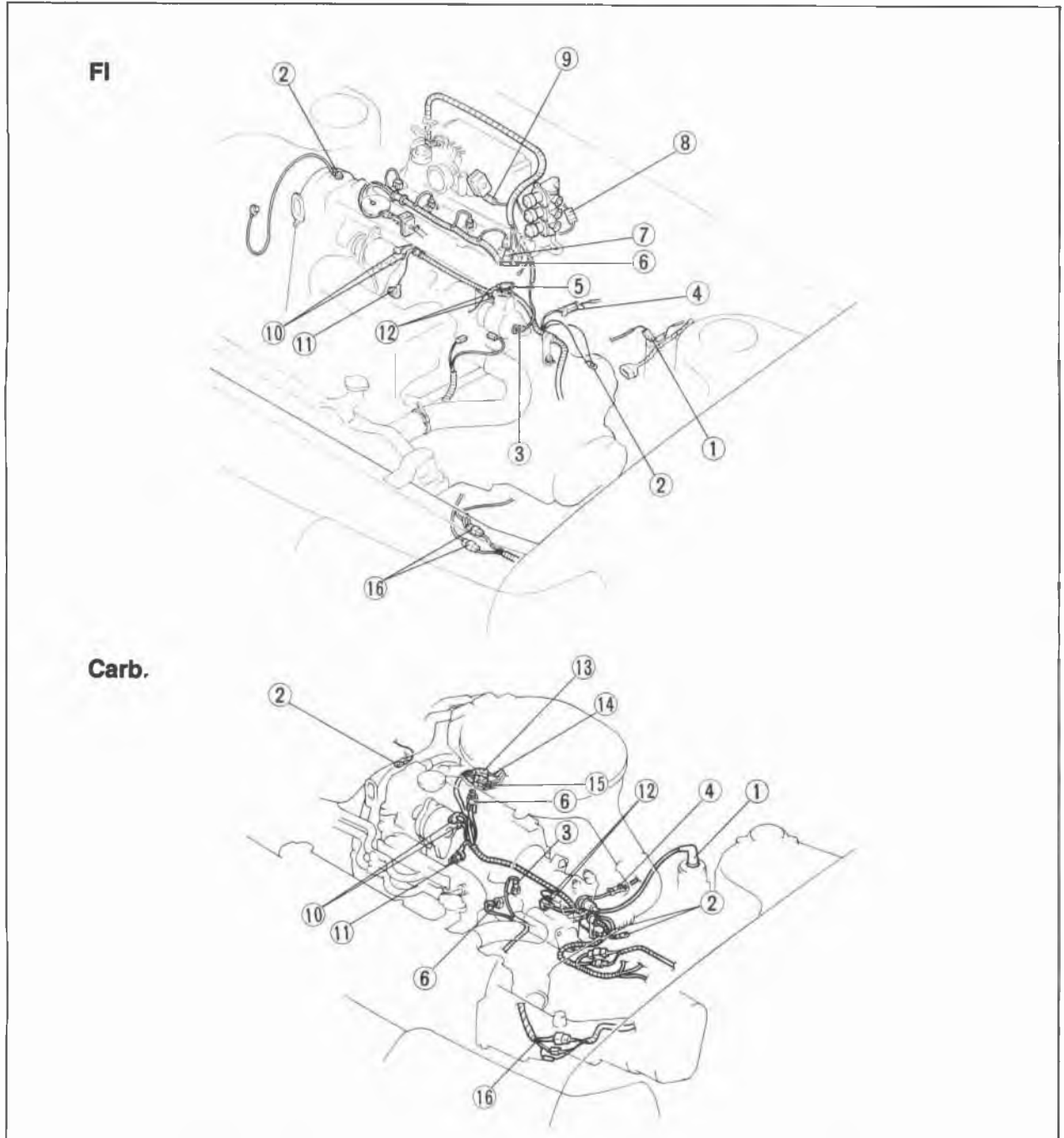
Connect the brake vacuum hose.

## Canister Hose

Connect the canister hoses.

## Connector Location

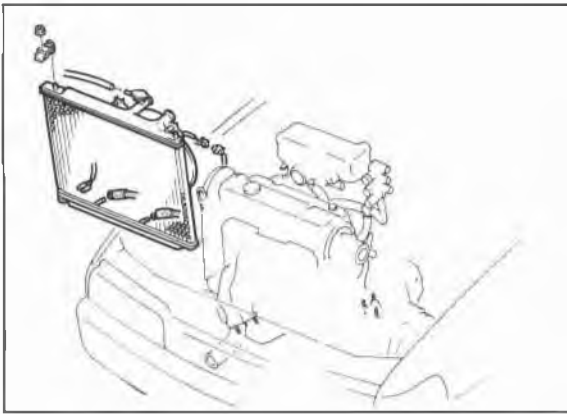
Install each harness as shown in the figure.



76G01A-146

- |                             |                                       |
|-----------------------------|---------------------------------------|
| 1. IG coil                  | 9. Throttle position sensor (FI)      |
| 2. Engine ground            | 10. Alternator                        |
| 3. Water temperature sensor | 11. Oil pressure switch               |
| 4. P/S switch               | 12. Starter                           |
| 5. Oxygen sensor (FI)       | 13. P.T.C. heater (carb.)             |
| 6. Water thermo switch      | 14. Solenoid valve (Slow cot) (carb.) |
| 7. Injection harness (FI)   | 15. Solenoid valve (carb.)            |
| 8. F/I solenoid (FI)        | 16. Transmission harness              |

# 1A INSTALLATION



76G01A-147

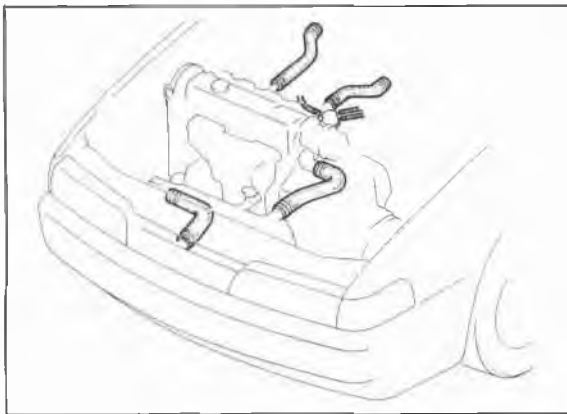
## Radiator

1. Install the radiator and cooling fan.

### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

2. Connect the radiator harness.
3. Connect the ATF hoses (ATX).



86U01X-199

4. Connect the upper and lower radiator hoses.

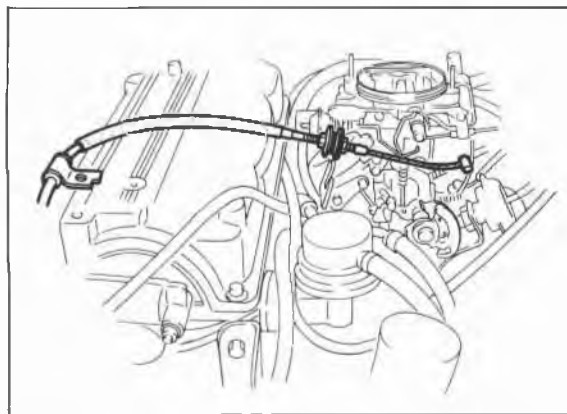
### Note

a) Position the hose clamp in the original location on the hose.

b) Squeeze the clamp lightly with large pliers to ensure a good fit.

## Heater Hose and Fuel Hose

Connect the heater hoses and the fuel hoses.



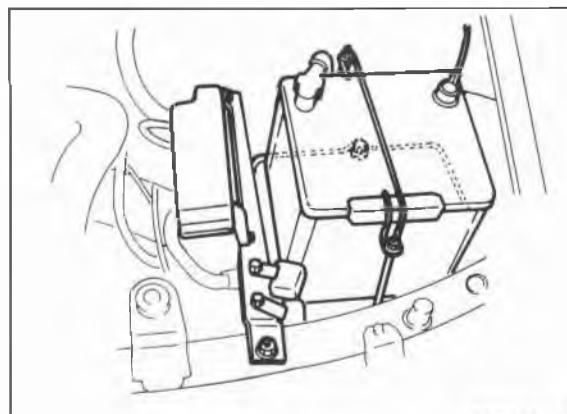
86U01X-200

## High-Tension Lead

Connect the high-tension lead to the ignition coil.

## Accelerator Cable

Install the accelerator cable and the throttle cable (ATX).



76G01A-148

## Battery and Battery Carrier

1. Install the battery carrier.

### Tightening torque:

**9—13 Nm (90—130 cm-kg, 78—113 in-lb)**

2. Install the fuse box.

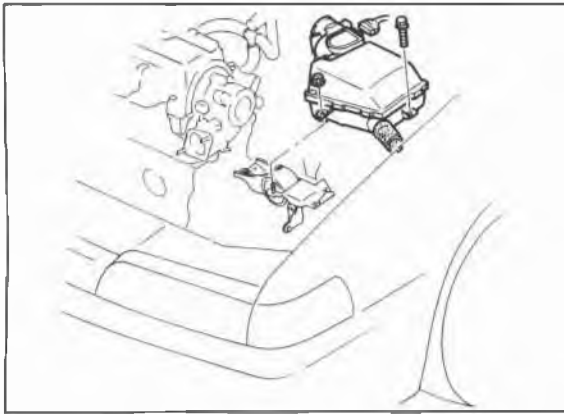
### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

3. Install the battery tray and battery.

### Tightening torque:

**5—7 Nm (50—70 cm-kg, 43—61 in-lb)**



76G01A-099

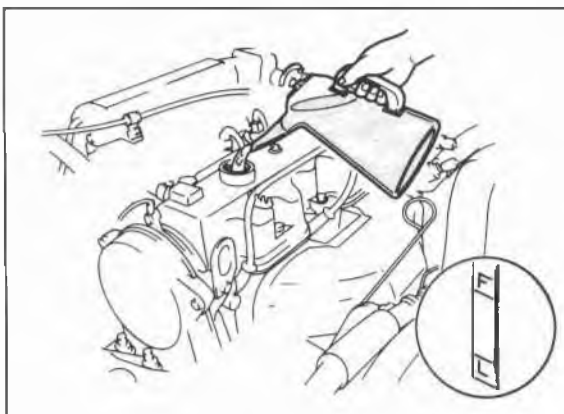
## Air Cleaner Assembly

1. Install the air cleaner assembly.

### Tightening torque:

**16—27 N·m (1.6—2.8 m·kg, 12—20 ft·lb)**

2. Connect the air flow sensor connector and air intake pipe (FI).



76G01A-100

## Engine Oil

Add the specified amount and type of engine oil. (Refer to Section 2A.)

## Coolant

Close the drain plug, fill the radiator and reservoir tank with the specified amount and type of coolant. (Refer to Section 3A.)



86U01X-204

## Check Engine Condition

1. Check for leaks.
2. Perform engine adjustments if necessary.
3. Perform a road test.
4. Recheck the oil and coolant levels.

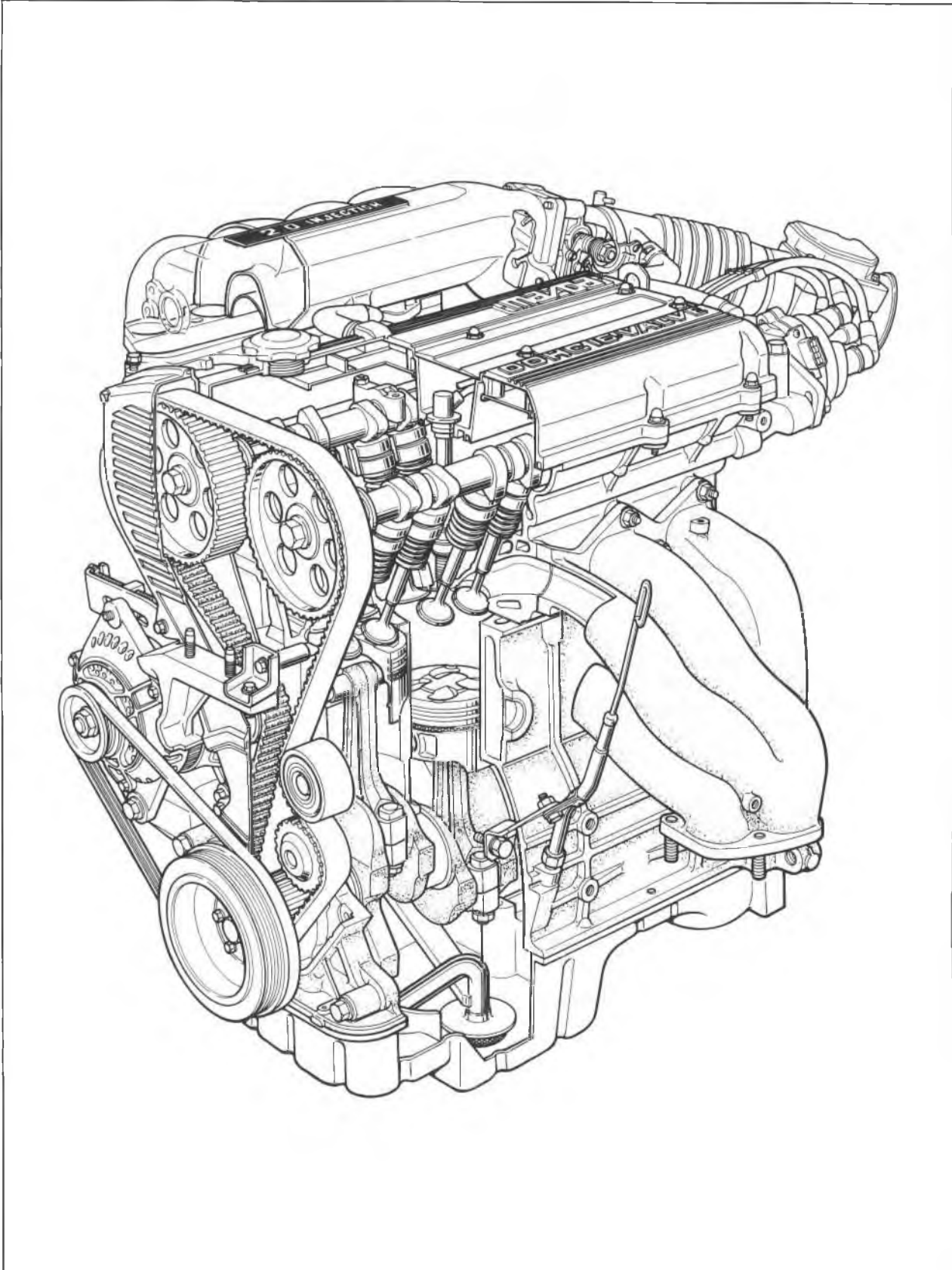
# ENGINE (DOHC)

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# 1B OUTLINE

## OUTLINE

### STRUCTURAL VIEW



4BG01A-002

## SPECIFICATIONS

Item		Engine model	FE DOHC	
			Leaded fuel	Unleaded fuel
Type			Gasoline, 4 cycle	
Cylinder arrangement and number			In line, 4 cylinders	
Combustion chamber			Pentroof	
Valve system			OHC, belt driven	
Displacement		cc (cu in)	1,998 (121.9)	
Bore and stroke		mm (in)	86.0 x 86.0 (3.39 x 3.39)	
Compression ratio			10.0 : 1	9.2 : 1
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm		Standard	1,422 (14.5, 206)—290	1,373 (14.0, 199)—310
		Minimum	996 (10.2, 144)—290	961 (9.8, 139)—310
Valve timing	IN	Open BTDC	10°	10°
		Close ABDC	60°	55°
	EX	Open BBDC	60°	55°
		Close ATDC	10°	10°
Valve clearance		mm (in)	0; Maintenance-free	
			0; Maintenance-free	
Idle speed		rpm	750 ± 50	
Ignition timing		BTDC	12° ± 1°	
Firing order			1—3—4—2	

76G01B-002

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Difficult starting</b>	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket	Replace Replace or repair Replace	1B—35 1B—43 1B—16
	<b>Malfunction of fuel system</b>	Refer to Section 4C	
	<b>Malfunction of electrical system</b>	Refer to Section 5	
	<b>Poor Idling</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Poor valve to valve seat contact Failed cylinder head gasket	Replace Repair or replace Replace
	<b>Malfunction of fuel system</b>	Refer to Section 4C	
<b>Excessive oil consumption</b>	<b>Oil working up</b> Worn piston ring groove or sticking piston ring Worn piston or cylinder	Replace Replace or repair	1B—43 1B—43
	<b>Oil working down</b> Worn valve seal Worn valve stem or guide	Replace Replace	— 1B—35
	<b>Oil leakage</b>	Refer to Section 2A	

76G01B-003

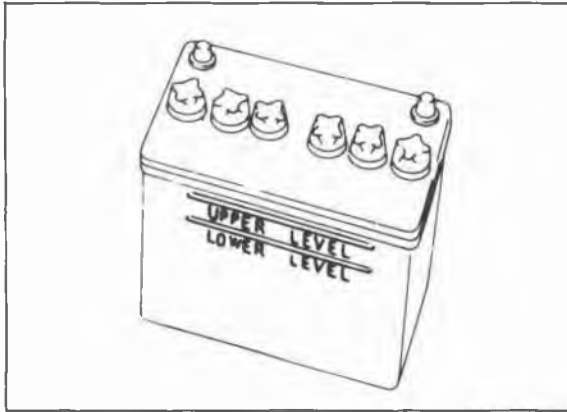
# 1B TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Insufficient power</b>	<b>Insufficient compression</b> Malfunction of HLA Compression leakage from valve seat Seized valve stem Weak or broken valve spring Failed cylinder head gasket Cracked or distorted cylinder head Sticking, damaged, or worn piston ring Cracked or worn piston	Replace Repair Replace Replace Replace Replace Replace Replace	1B—60 1B—37 1B—35 1B—38 1B—16 1B—34 1B—43 1B—43
	<b>Malfunction of fuel system</b>	Refer to Section 4C	
	<b>Others</b> Slipping clutch Dragging brakes Wrong size tires	Refer to Section 6 Refer to Section 11 Refer to Section 12	
<b>Abnormal combustion</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Sticking or burned valve Weak or broken valve spring Carbon accumulation in combustion chamber	Replace Replace Replace Eliminate carbon	1B—60 1B—35 1B—38 —
	<b>Malfunction of fuel system</b>	Refer to Section 4C	
<b>Engine noise</b>	<b>Crankshaft or bearing related parts</b> Excessive main bearing oil clearance Main bearing seized or heat-damaged Excessive crankshaft end play Excessive connecting rod bearing oil clearance Connecting rod bearing seized or heat-damaged	Replace or repair Replace Replace or repair Replace or repair Replace	1B—51 1B—51 1B—52 1B—53 1B—53
	<b>Piston related parts</b> Worn cylinder Worn piston or piston pin Seized piston Damaged piston ring Bent connecting rod	Replace or repair Replace Replace Replace Replace	1B—41 1B—44 1B—43 1B—43 1B—44
	<b>Valves or timing related parts</b> Malfunction of HLA* Broken valve spring Excessive valve guide clearance Malfunction of timing belt tensioner	Replace Replace Replace Replace	1B—60 1B—38 1B—35 1B—47
	<b>Malfunction of cooling system</b>	Refer to Section 3A	
	<b>Malfunction of fuel system</b>	Refer to Section 4C	
	<b>Others</b> Malfunction of water pump bearing Improper drive belt tension Malfunction of alternator bearing Exhaust gas leakage	Replace Adjust Replace Repair	— 1B— 6 — 1B—34

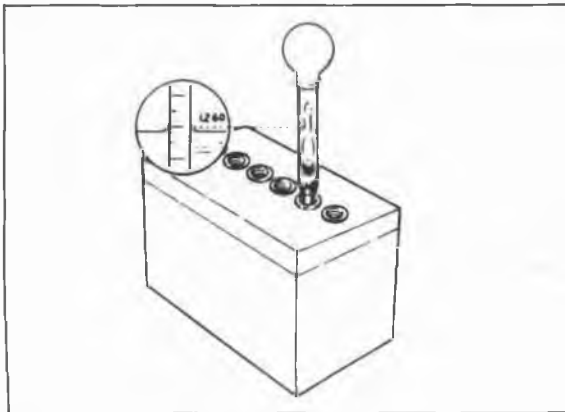
\* Tappet noise may occur if the engine is not operated for an extended period of time. The noise should stop after the engine has reached normal operating temperature.

76G01B-004

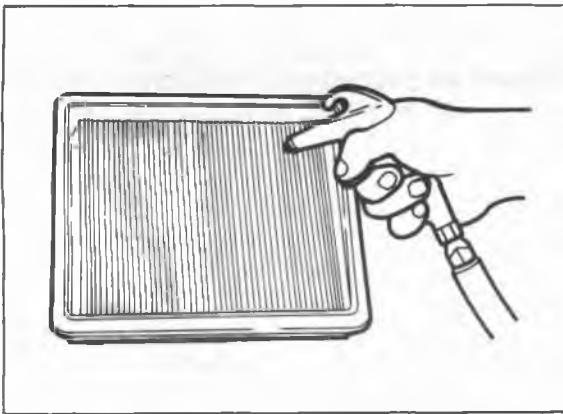




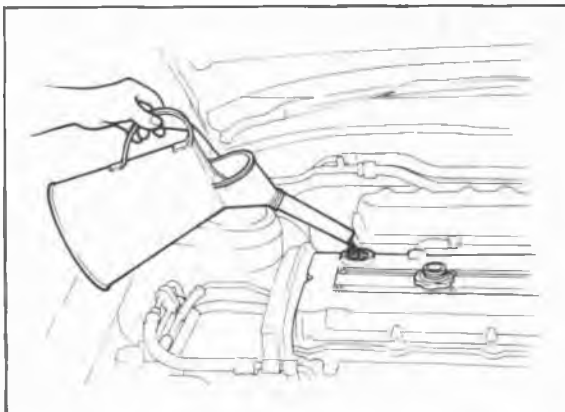
76G01A-102



76G01A-103



76G01B-005



4BG01A-010

## TUNE-UP PROCEDURE

Tune the engine according to the procedures described below.

### Battery

1. Check for corrosion on the terminals, or loose cable connections.  
If necessary, clean the clamps and tighten firmly.
2. Check that the electrolyte level is between the UPPER and LOWER marks.  
Add distilled water if necessary.
3. Check the specific gravity by using a hydrometer.  
If the specific gravity reading is 1.200 or less, recharge the battery. (Refer to Section 5.)

### Air Cleaner Element

Visually check the air cleaner element for excessive dirt, damage, or oil. Clean or replace if necessary.

#### Caution

**When cleaning the air cleaner element, blow dust off from the inside completely first, then blow from the outside.**

### Engine Oil

Check the engine oil level and condition with the oil level gauge.  
Add oil, or change it, if necessary.

# 1B TUNE-UP PROCEDURE



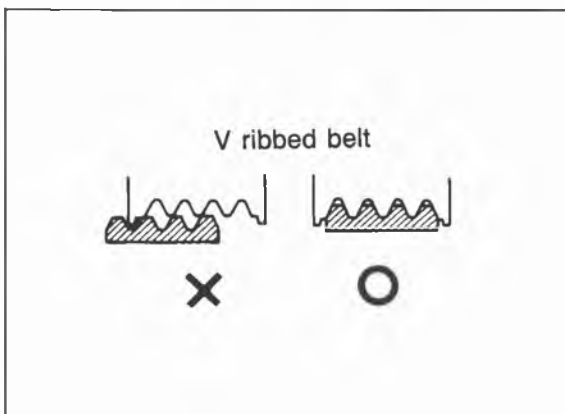
86U01X-008

## Coolant Level (Cold engine)

1. Check that the coolant level is near the radiator inlet port.
2. Check that the level in the coolant reservoir is between the FULL and LOW marks. Add coolant if necessary.

### Warning

- a) **Never remove the radiator cap while the engine is hot.**
- b) **Wrap a thick cloth around the cap and carefully remove it.**



76G01B-006

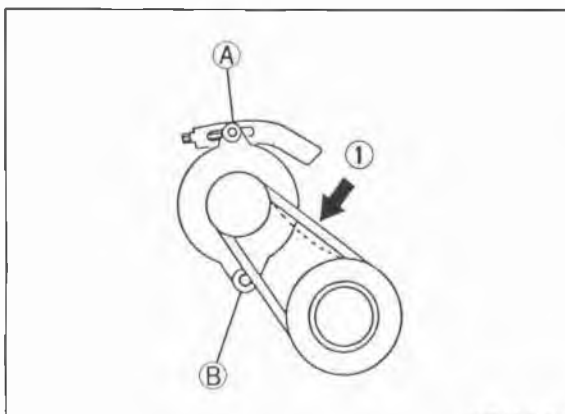
## Drive Belt

1. Check that the drive belt is positioned in the pulley groove.
2. Check the drive belt for wear, cracks, or fraying. Replace if necessary.
3. Check the drive belt tension by using the tension gauge.

### Standard belt tension

N (kg, lb)

Belt	New	Used
Alternator	589—785 (60—80, 132—176)	491—687 (50—70, 110—154)
P/S	687—883 (70—90, 154—198)	589—785 (60—80, 132—176)
A/C	687—883 (70—90, 154—198)	589—785 (60—80, 132—176)



76G01B-007

4. Check the drive belt deflection by applying moderate pressure (**98 N, 10 kg, 22 lb**) midway between the pulleys.

### (1) Alternator belt deflection

**New : 6—8 mm (0.24—0.31 in)**

**Used: 7—9 mm (0.27—0.35 in)**

If necessary, loosen the alternator mounting bolts and adjust the belt deflection by turning the adjusting bolt.

### Tightening torque

**Ⓐ : 31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

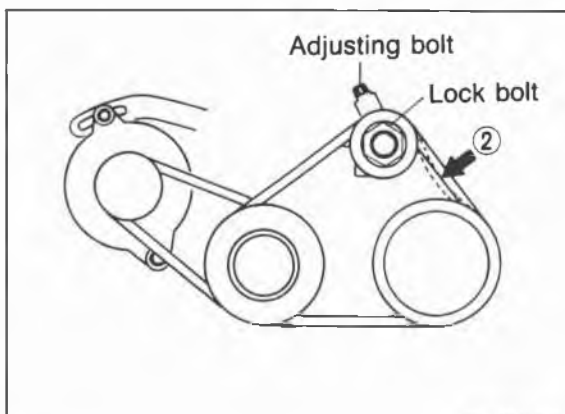
**Ⓑ : 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

### (2) P/S belt deflection

**New : 8—10 mm (0.31—0.39 in)**

**Used: 9—11 mm (0.35—0.43 in)**

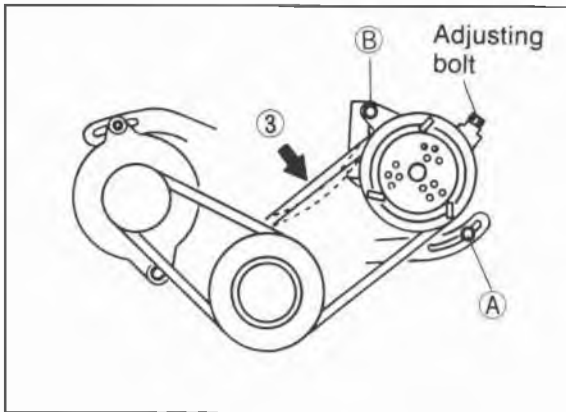
If necessary, loosen the idler pulley lock bolt and adjust the belt deflection by turning the adjusting bolt.



76G01B-008

### Tightening torque of lock bolt:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



76G01A-009

(3) A/C belt deflection

**New : 7—9 mm (0.27—0.35 in)**

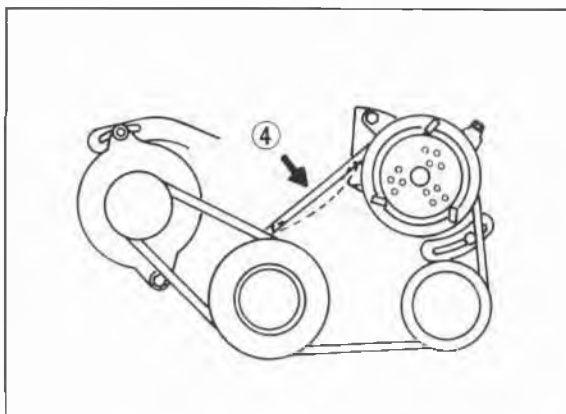
**Used: 8—10 mm (0.31—0.39 in)**

If necessary, loosen the A/C mounting bolts and adjust the belt deflection by turning the adjusting bolt.

**Tightening torque**

**(A): 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

**(B): 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



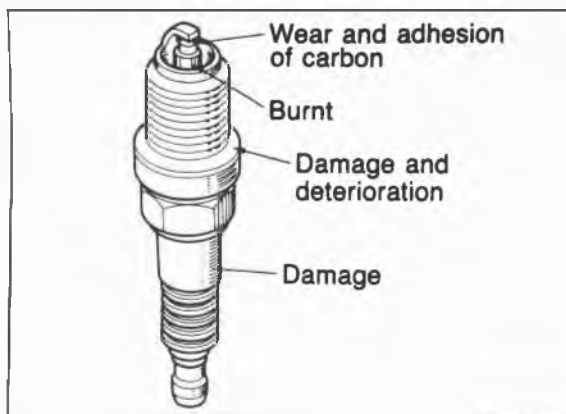
76G01A-010

(4) P/S and A/C belt deflection

**New : 7—9 mm (0.27—0.35 in)**

**Used: 8—10 mm (0.31—0.39 in)**

If necessary, adjust the belt deflection using the same procedure as used for the A/C belt deflection.



76G01B-118

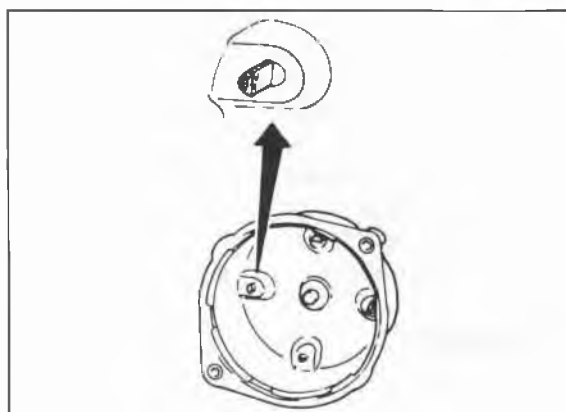
**Spark Plug**

Check the following points. Clean or replace if necessary.

1. Damaged insulation
2. Worn electrodes
3. Carbon deposits
4. Damaged gasket
5. Burnt spark insulator
6. Plug gap

**Plug gap:**

**0.7—0.8 mm (0.028—0.031 in)**



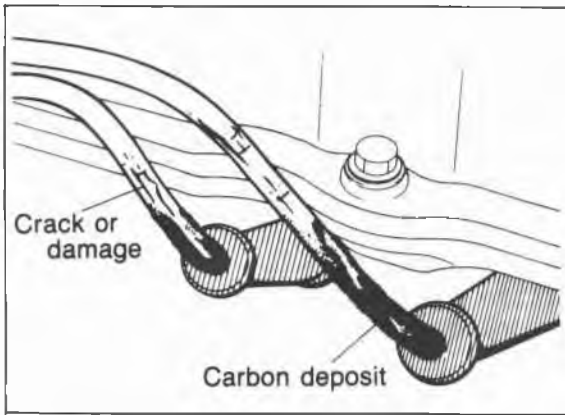
86U01X-013

**Distributor Cap**

Check the following points. Replace if necessary.

1. Cracks or carbon deposits
2. Burnt or corroded terminals
3. Worn distributor center contact

# 1B TUNE-UP PROCEDURE

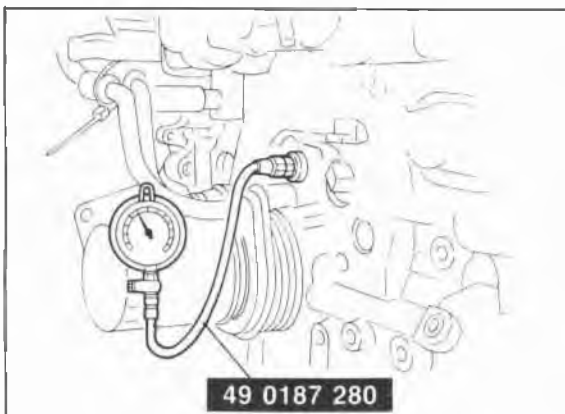


86U01X-014

## High-Tension Lead

Check the following points. Clean or replace if necessary.

1. Damaged lead
2. Carbon deposits



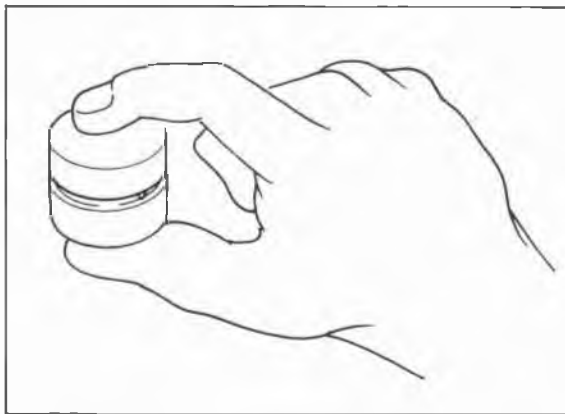
76G01B-011

## Hydraulic Lash Adjuster (HLA)

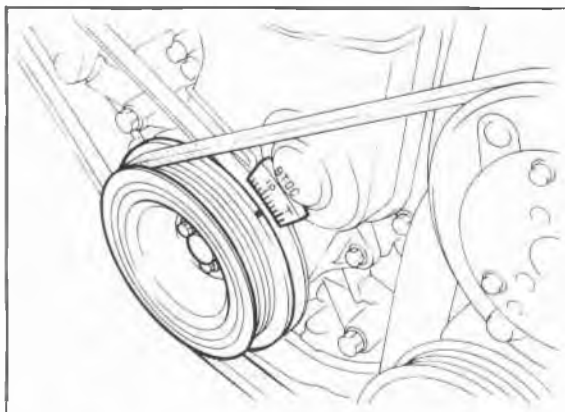
### Note

**Tappet noise may occur if the engine is not operated for an extended period of time. The noise should stop after the engine has reached normal operating temperature.**

1. Check for tappet noise. If noise exists, check the following points.
  - (1) Engine oil condition and level
  - (2) Engine oil pressure (Refer to Section 2A)
2. If the noise does not stop, check for movement of each HLA by pushing it during disassembly.
3. If the HLA moves, replace the HLA. (Refer to page 1B—60.)



76G01B-012



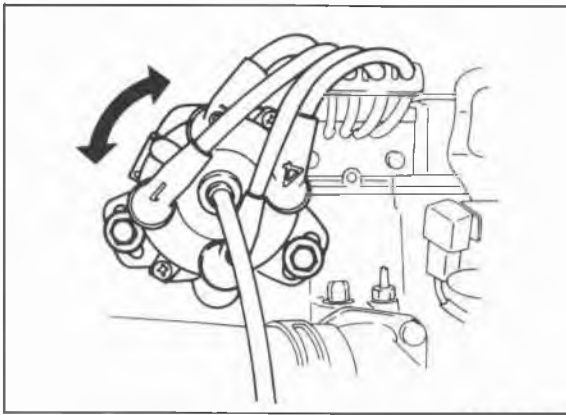
76G01B-013

## Ignition Timing

1. Warm up the engine and run it at idle.
2. Turn all electric loads OFF.
3. Connect a timing light tester.
4. Disconnect the vacuum hose from the vacuum control, and plug the hose.
5. Check that the ignition timing mark (yellow) on the crankshaft pulley and the timing mark on the timing belt cover are aligned.

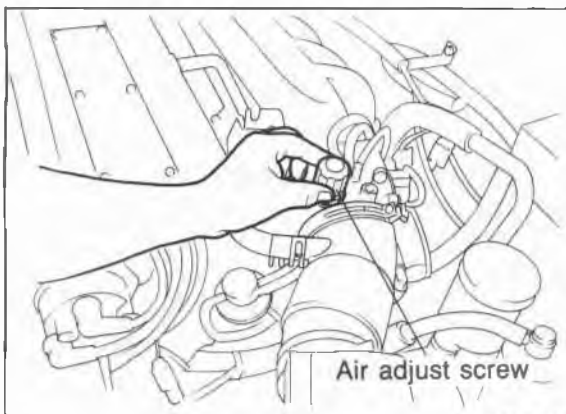
**Ignition timing:  $12^{\circ} \pm 1^{\circ}$  BTDC  
(at idle speed)**

## TUNE-UP PROCEDURE 1B



69G01B-518

6. If necessary, adjust the ignition timing by turning the distributor.



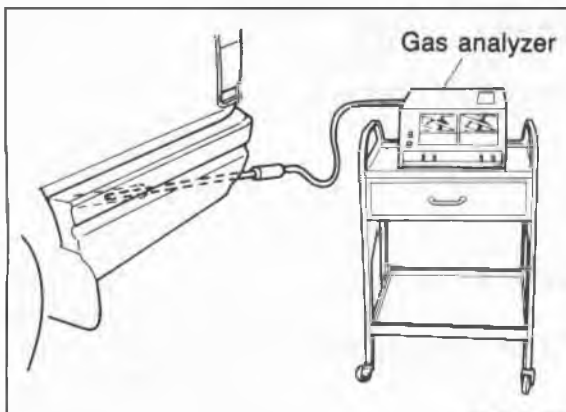
76G01B-014

### Idle Speed

1. Ground the test connector to the vehicle with a jumper wire.
2. Connect a tachometer to the engine.
3. Check the idle speed.

**Idle speed: 750 ± 50 rpm**

4. If necessary, remove the blind cap from the throttle body and adjust by turning the air adjust screw.
5. Install the blind cap and disconnect the jumper wire from the test connector.



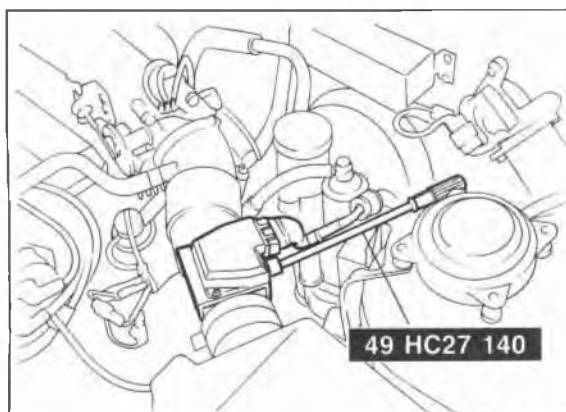
76G01B-015

### Idle Mixture

1. Connect an exhaust gas analyzer to the vehicle.
2. Measure the CO and HC concentration.

**CO concentration: 1.5 ± 0.5%**

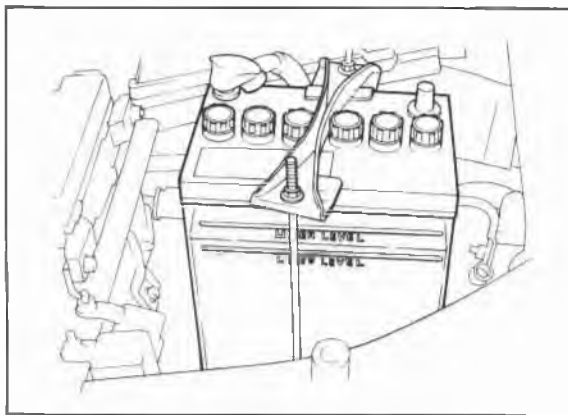
**HC concentration: Less than 1,000 ppm**



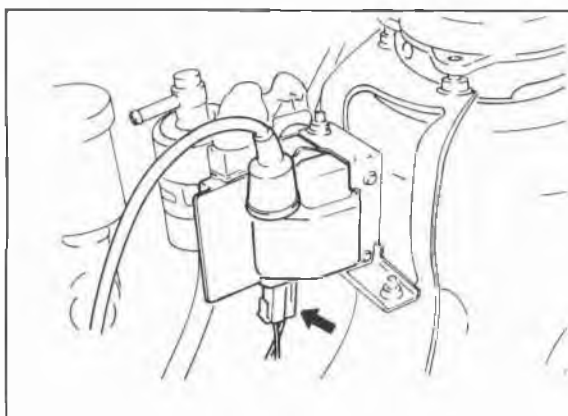
76G01B-016

3. If necessary, remove the blind cap from the air flow meter and adjust by turning the bypass air adjust screw with **SST**.
4. Install the blind cap to the air flow meter and disconnect the jumper wire from the test connector.

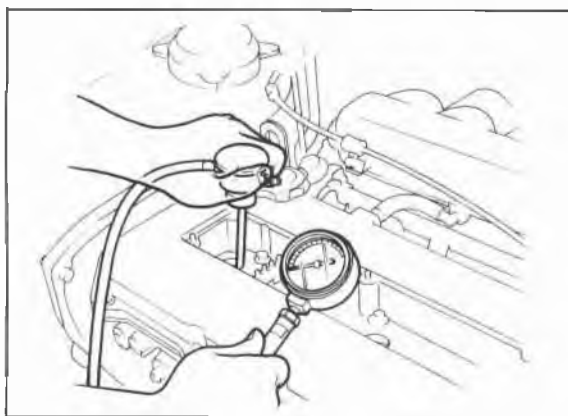
# 1B ON-VEHICLE INSPECTION



76G01B-017



86U01X-020



76G01B-018

## ON-VEHICLE INSPECTION

If the engine exhibits low power, poor fuel economy, or poor idle, check the following points.

1. Ignition system (Refer to Section 5)
2. Compression
3. Fuel system (Refer to Section 4C)

### COMPRESSION

1. Check that the battery is fully charged. Recharge if necessary.

2. Warm up the engine to the normal operating temperature.
3. Turn it off for about 10 minutes to allow the exhaust manifold to cool.
4. Remove all spark plugs.
5. Disconnect the primary wire connector from the ignition coil.

6. Connect a compression gauge to No.1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Note the maximum gauge reading.
9. Check each cylinder.

#### Standard compression:

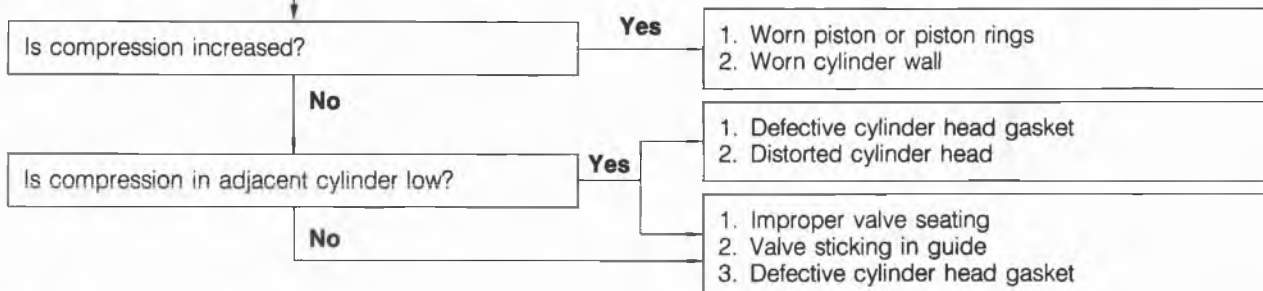
**1,422 kPa (14.5 kg/cm<sup>2</sup>, 206 psi)—290 rpm**  
 ..... **Leaded fuel**  
**1,373 kPa (14.0 kg/cm<sup>2</sup>, 199 psi)—310 rpm**  
 ... **Unleaded fuel**

#### Compression limit:

**996 kPa (10.2 kg/cm<sup>2</sup>, 144 psi)—290 rpm**  
 ..... **Leaded fuel**  
**961 kPa (9.8 kg/cm<sup>2</sup>, 139 psi)—310 rpm**  
 ... **Unleaded fuel**

### Possible Cause

If compression is low, pour heavy oil into the cylinder and turn the crankshaft several times  
 Check compression once more



86U01X-022

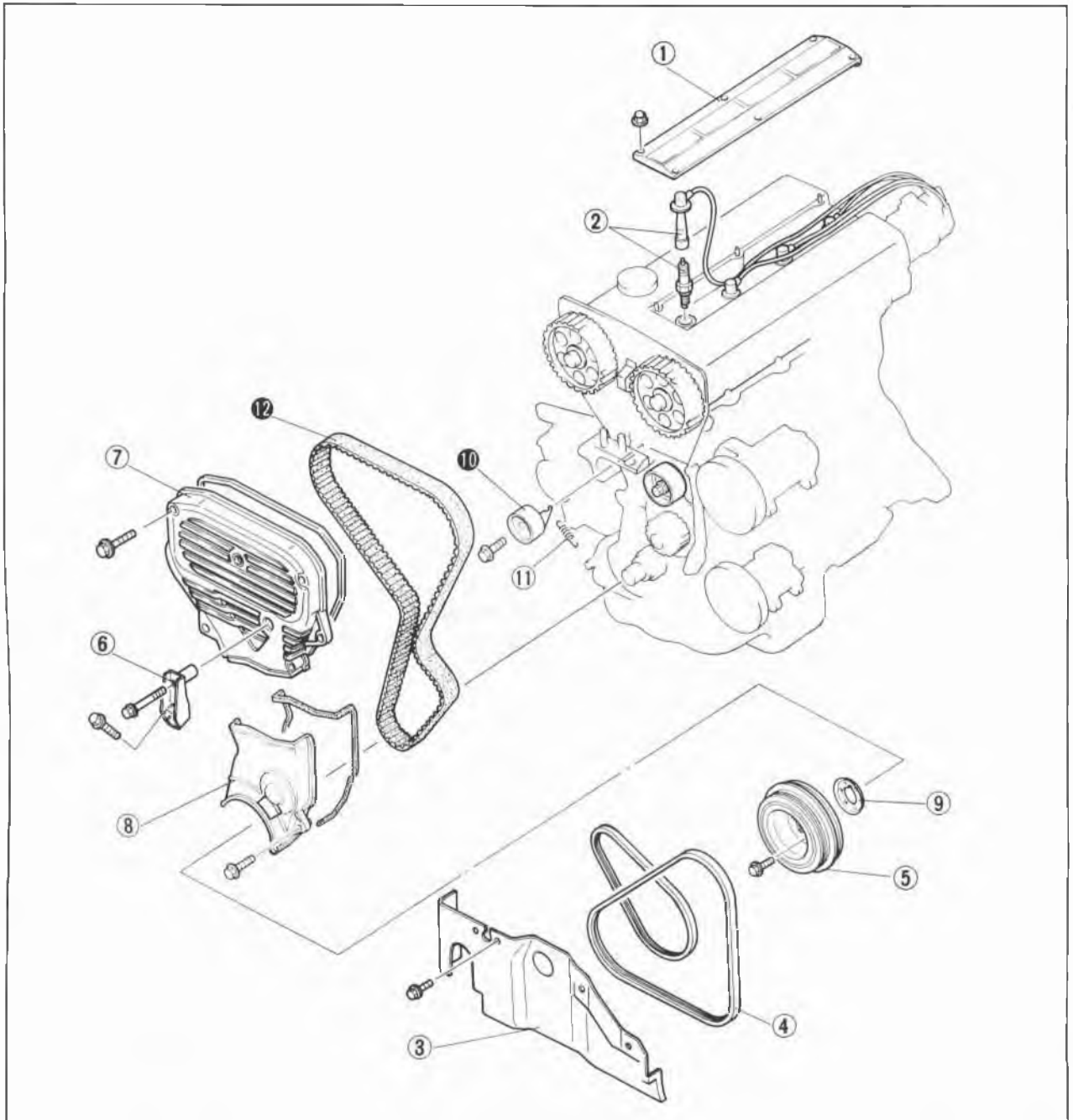
## ON-VEHICLE MAINTENANCE

### TIMING BELT

#### Removal

1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

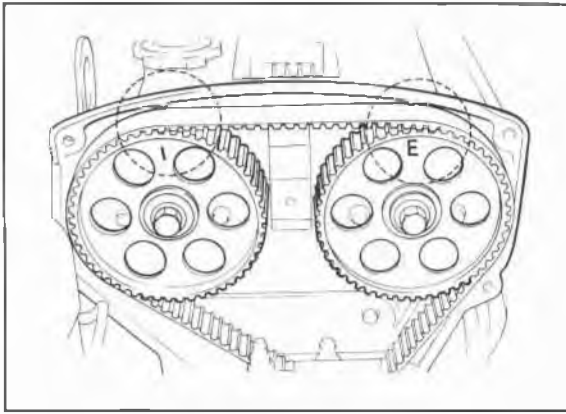
76G01A-108



76G01B-020

- |                                     |                                  |
|-------------------------------------|----------------------------------|
| 1. Center cover                     | 7. Upper timing belt cover       |
| 2. High-tension lead and spark plug | 8. Lower timing belt cover       |
| 3. Engine side cover                | 9. Baffle plate                  |
| 4. Drive belt                       | 10. Timing belt tensioner        |
| 5. Crankshaft pulley                | 11. Timing belt tensioner spring |
| 6. Engine mount bracket             | 12. Timing belt                  |

# 1B ON-VEHICLE MAINTENANCE (TIMING BELT)



76G01B-021

## Removal note

### Timing belt tensioner

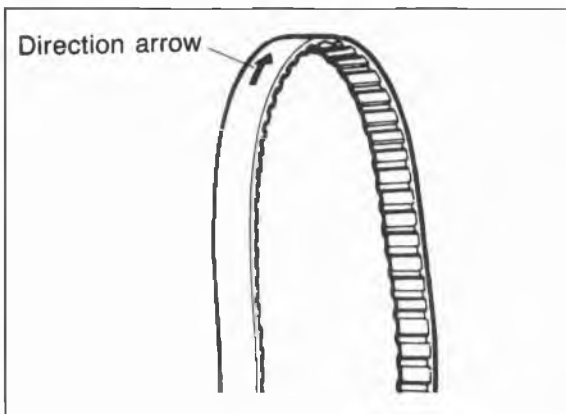
1. Turn the crankshaft to align the mating marks of the camshaft pulleys.

### Note

**For intake side camshaft pulley, align "I" mark.**

**For exhaust side camshaft pulley, align "E" mark.**

2. Remove the tensioner.



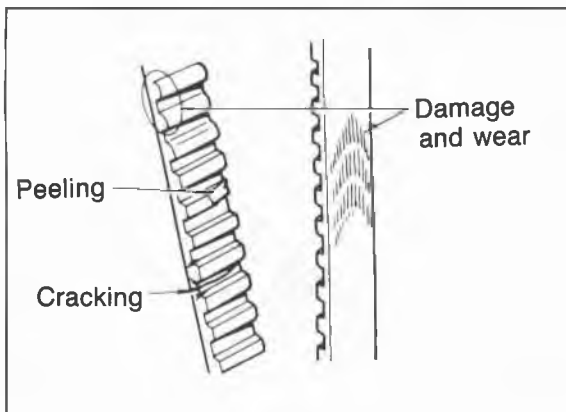
86U01X-024

## Timing belt

Mark the timing belt rotation for proper reinstallation if it is reused.

### Caution

**Be careful not to allow oil, grease, or water on the belt.**



76G01B-022

## Inspection

Inspect the following parts. (Refer to page 1B—46, 47.)

1. Timing belt
2. Timing belt tensioner and spring
3. Timing belt idler pulley
4. Timing belt pulley
5. Camshaft pulley

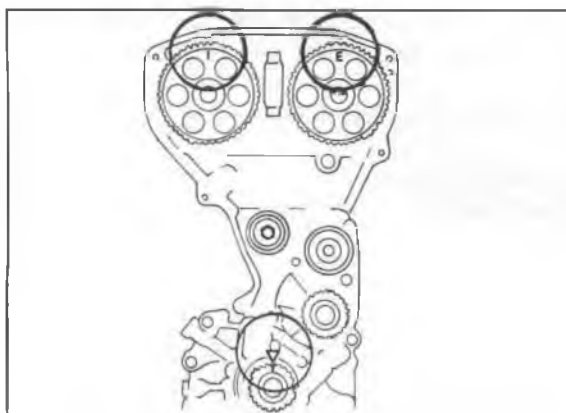
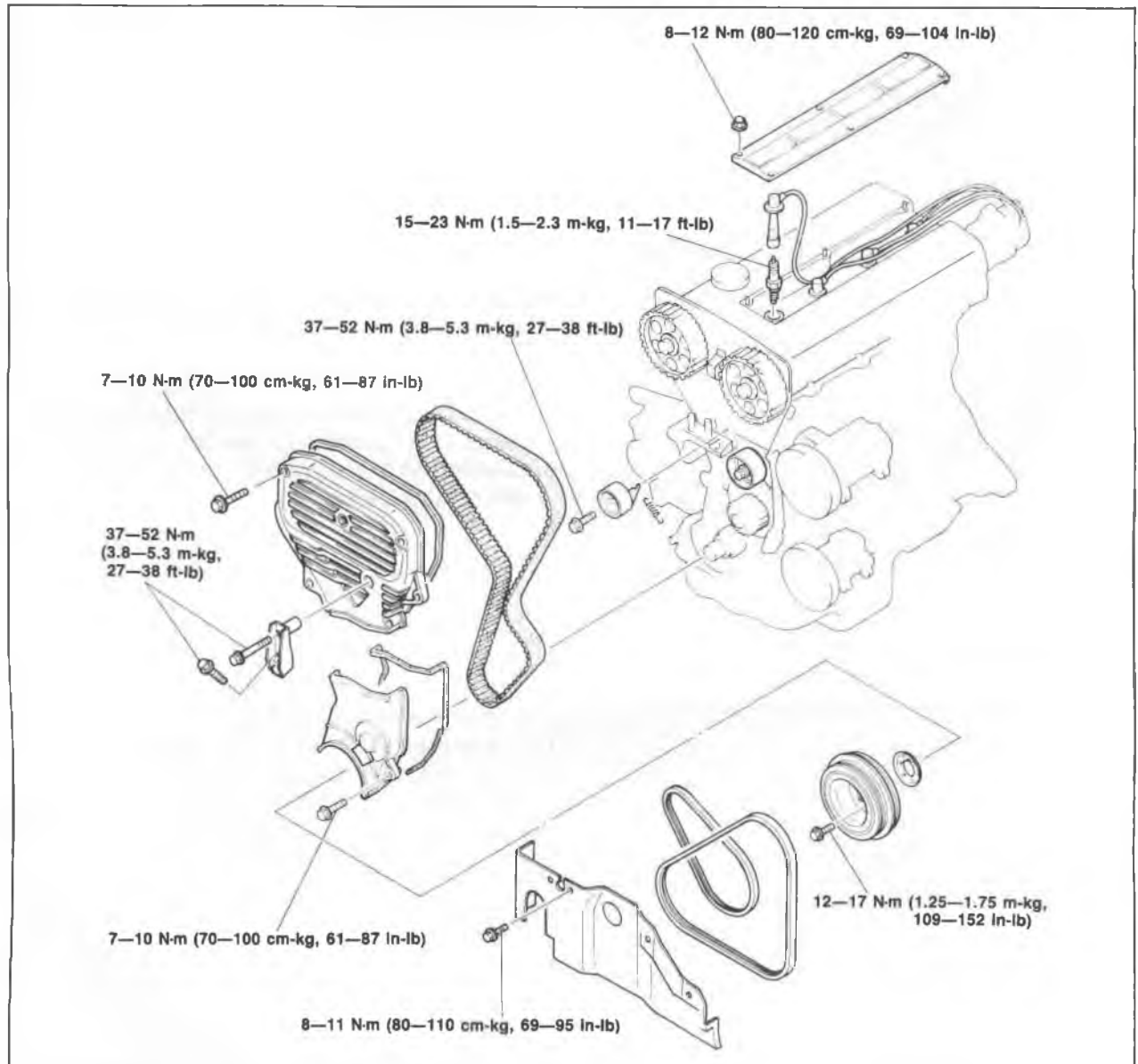


## Installation

Install in the reverse order of removal referring to the installation note.

## Torque Specifications

76G01A-109



76G01B-023

## Installation note

### Timing belt

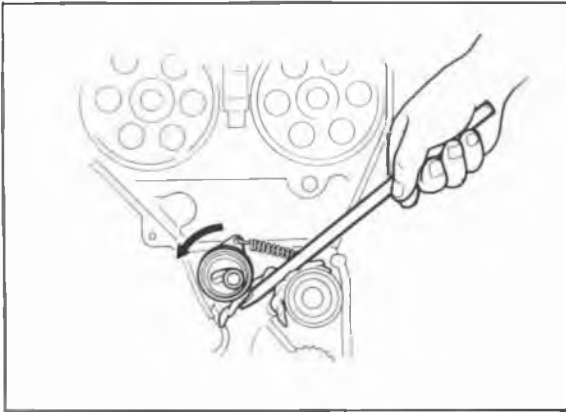
1. Check that the mark on the timing belt pulley is aligned with the mating mark.
2. Check that the mating mark of the camshaft pulleys are aligned with the seal plate mating marks.

### Note

**For intake side camshaft pulley, align "I" mark.**

**For exhaust side camshaft pulley, align "E" mark.**

# 1B ON-VEHICLE MAINTENANCE (TIMING BELT)

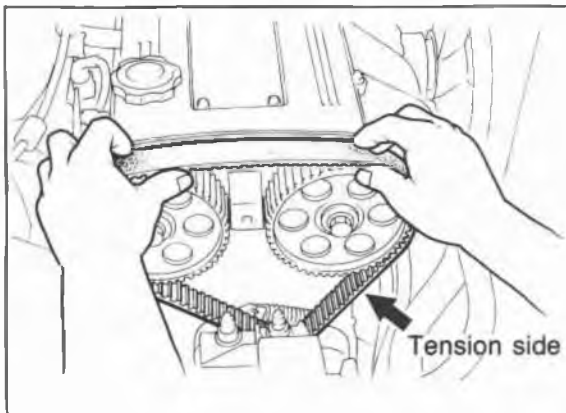


76G01B-024

3. Install the timing belt tensioner and spring. Temporarily secure it with the spring fully extended.

### Caution

**Do not damage the pulleys when securing the tensioner pulley.**



76G01B-025

4. Install the timing belt so that there is no looseness at the tension side, and at the two camshaft pulleys.

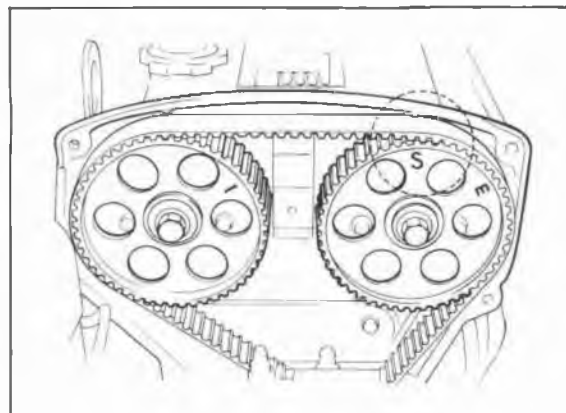
### Caution

- a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.
- b) Check that there is no oil, grease, or dirt on the timing belt.



69G01B-027

5. Loosen the tensioner lock bolt.
6. Turn the crankshaft twice in the direction of rotation, and align the mating marks.
7. Check that the timing marks are correctly aligned. If not aligned, remove the timing belt tensioner and timing belt, and repeat steps 1—6.



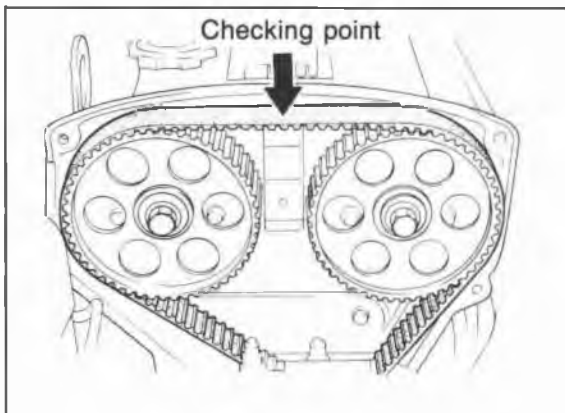
76G01B-026

8. Turn the crankshaft to align the "S" mark of the right side camshaft pulley with seal plate mating mark.
9. Tighten the timing belt tensioner lock bolt.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

## ON-VEHICLE MAINTENANCE (TIMING BELT) 1B



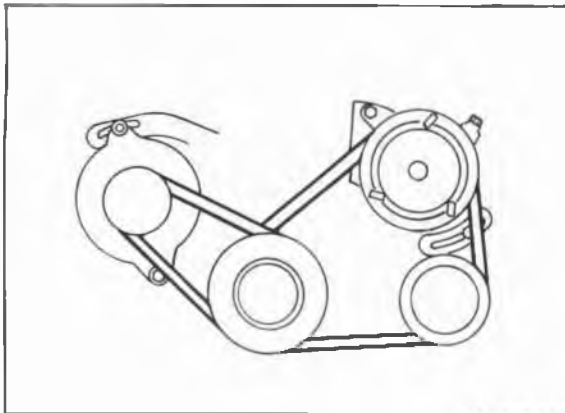
76G01B-027

10. Check the timing belt deflection. If the deflection is not correct, repeat the adjustment from step 5 above.

**Timing belt deflection: 7.5—8.5 mm  
(0.30—0.33 in) /98 N (10 kg, 22 lb)**

### Caution

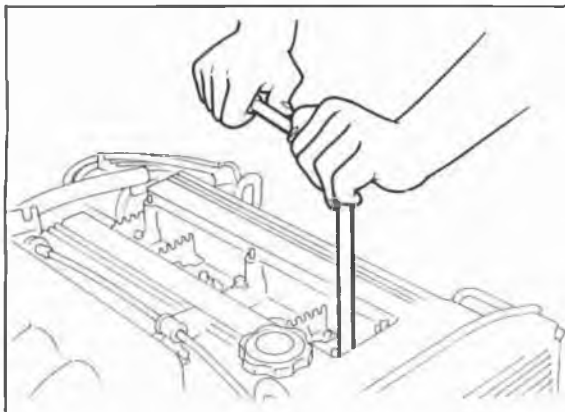
**Be sure not to apply tension other than that of the tensioner spring.**



76G01B-028

### Drive belt

Install each drive belt, and check the belt deflection. (Refer to page 1B—6.)



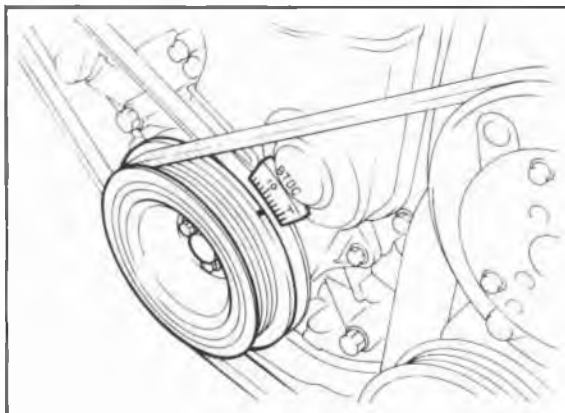
79G01C-021

### Spark plug

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

### Tightening torque:

**15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)**



86U01X-029

### Steps After Installation

Perform the necessary engine adjustment. (Refer to TUNE-UP PROCEDURE.)

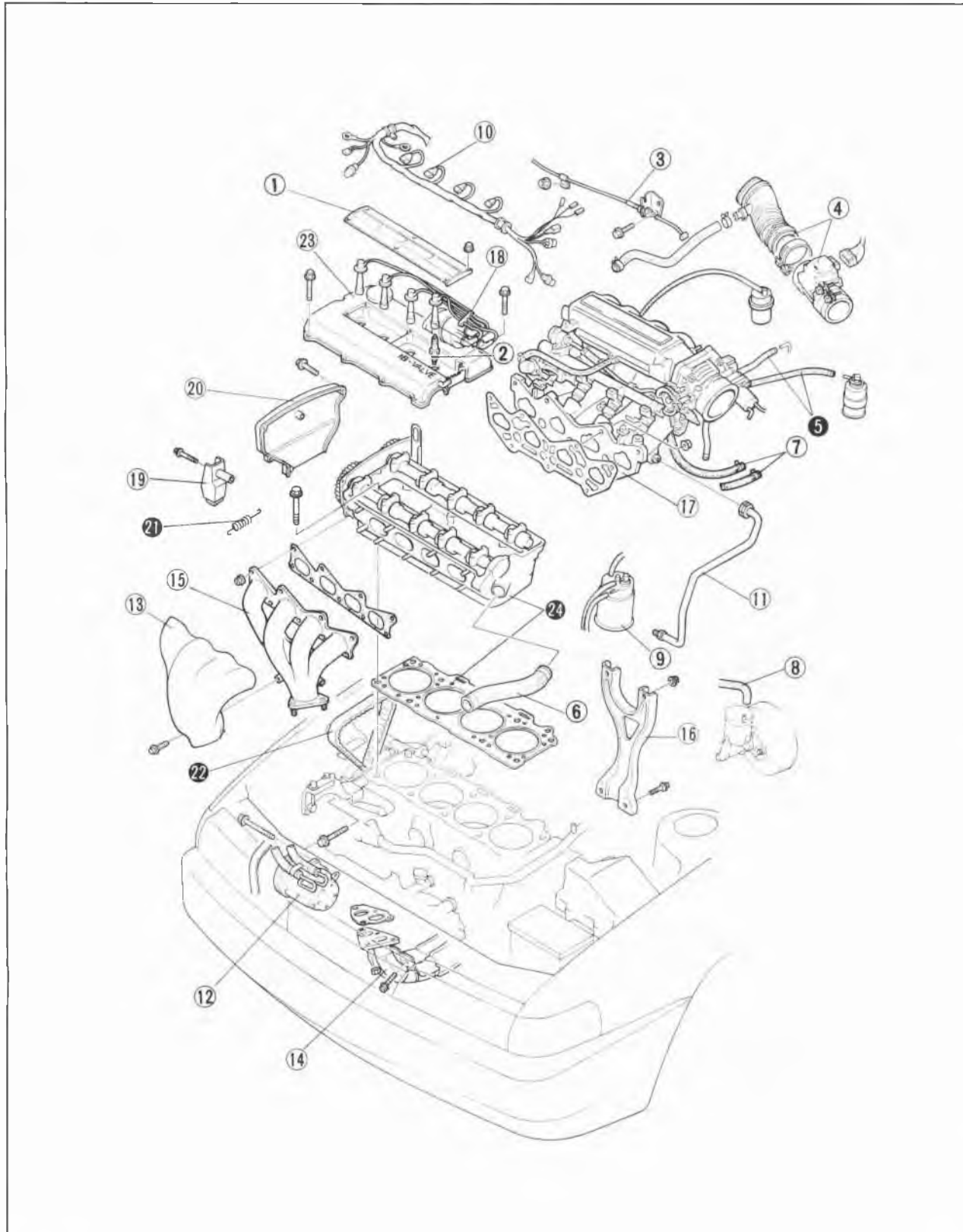
# 1B ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

## CYLINDER HEAD

### Removal

**Warning: Release the fuel pressure. (Refer to Section 4C.)**

1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.



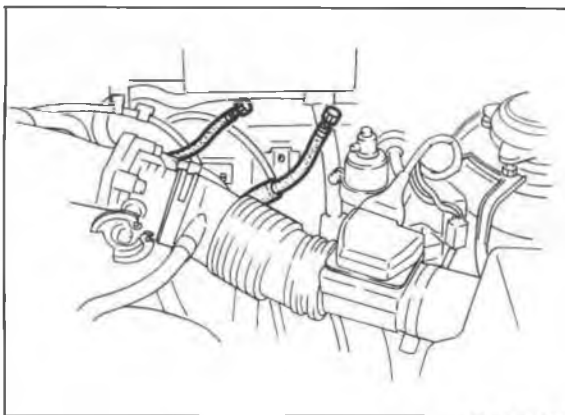
76G01B-029

## ON-VEHICLE MAINTENANCE (CYLINDER HEAD) 1B

1. Center cover
2. High-tension lead and spark plug
3. Accelerator cable
4. Air intake pipe assembly
5. Fuel hose
6. Upper radiator hose
7. Heater hose
8. Brake vacuum hose
9. Canister hose (Unleaded fuel)
10. Engine harness connector and ground
11. EGR pipe (Unleaded fuel)
12. A/C compressor and bracket

13. Exhaust manifold insulator
14. Exhaust pipe
15. Exhaust manifold
16. Intake manifold bracket
17. Intake manifold assembly
18. Distributor
19. Engine mount stay
20. Upper timing belt cover
21. Timing belt tensioner spring
22. Timing belt
23. Cylinder head cover
24. Cylinder head and gasket

76G01B-030



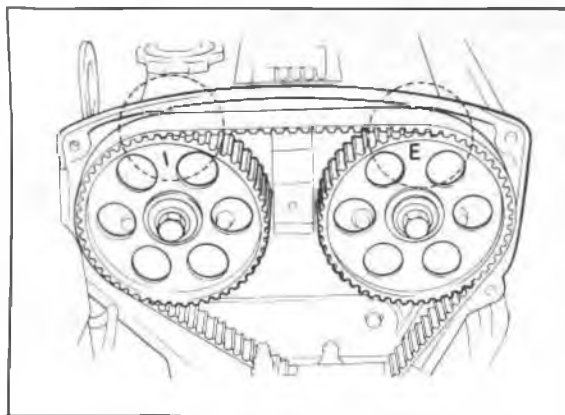
86U01X-032

### Removal note Fuel hose

#### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage.



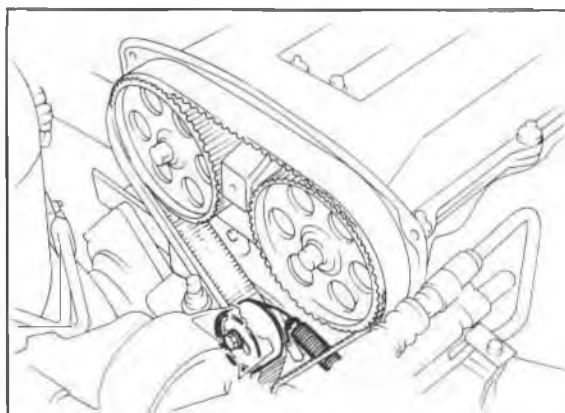
76G01B-031

### Timing belt

1. Before removing the timing belt, turn the crankshaft to align the mating marks of the camshaft pulleys with the seal plate timing mark.

#### Note

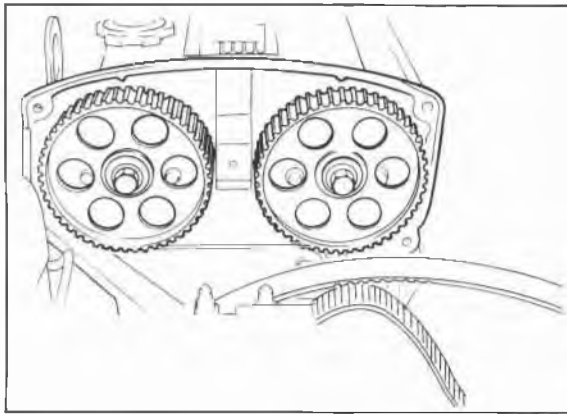
- For intake side camshaft pulley, align "I" mark.  
For exhaust side camshaft pulley, align "E" mark.



69G01B-036

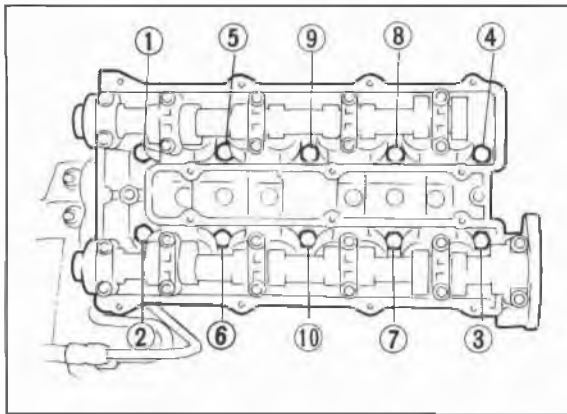
2. Loosen the timing belt tensioner lock bolt.
3. Shift the tensioner outward as far as possible, then temporarily tighten it.

# 1B ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



69G01B-037

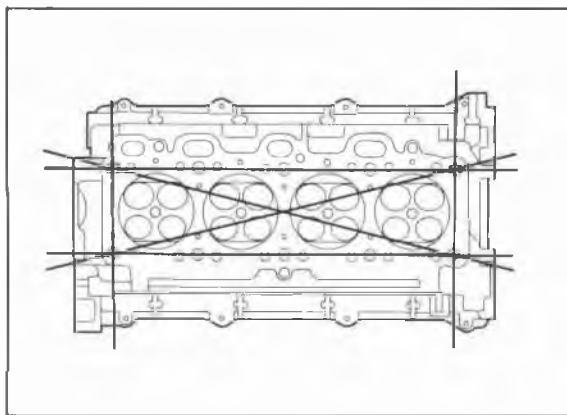
4. Remove the timing belt and secure it out of the way to prevent damage during removal and installation of the cylinder head.



76G01A-111

## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



76G01B-032

## Disassembly of Cylinder Head

Refer to page 1B—28.

## Inspection of Cylinder Head

Refer to page 1B—34.

## Assembly of Cylinder Head

Refer to page 1B—59.

# ON-VEHICLE MAINTENANCE (CYLINDER HEAD) 1B

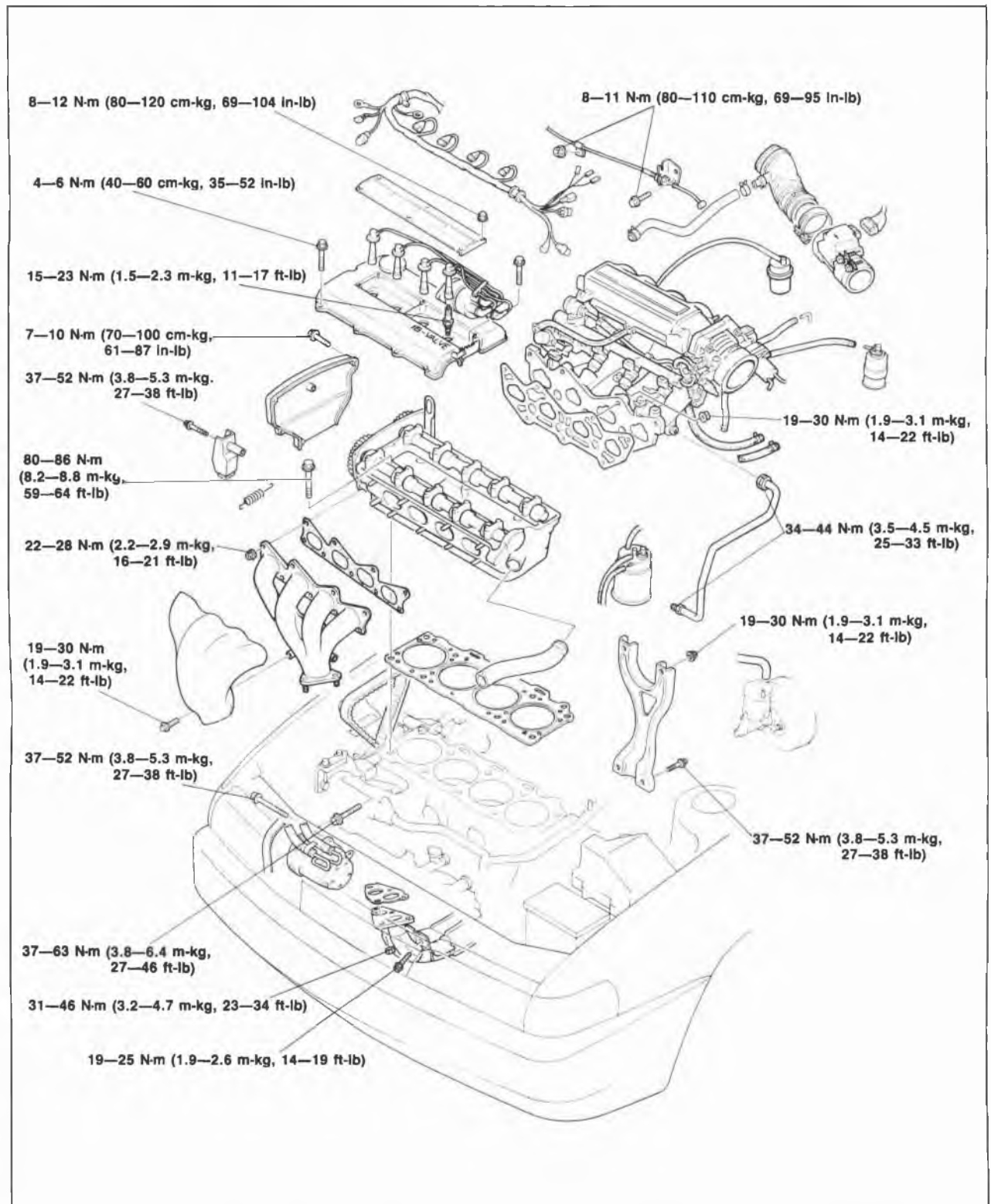
## Installation

Install in the reverse order of removal referring to the installation note.

### Note

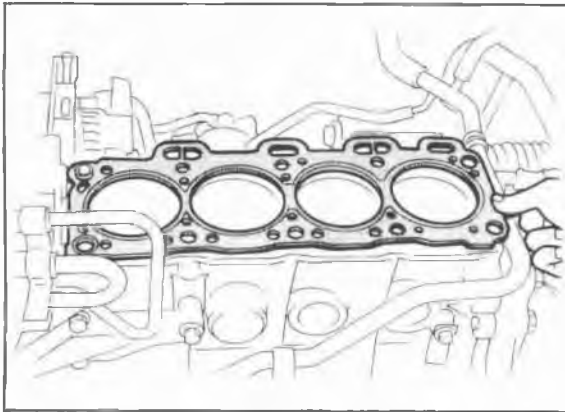
- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

## Torque Specifications



76G01A-112

# 1B ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

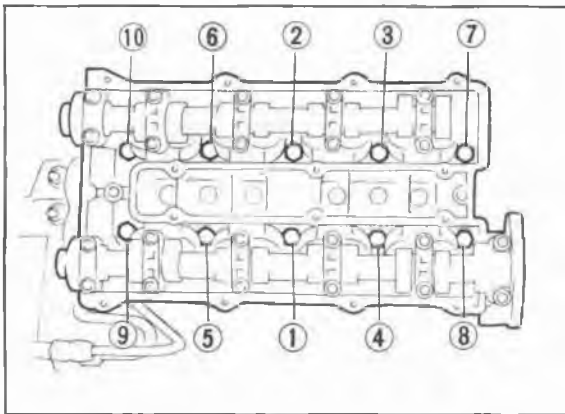


86U01X-035

## Installation note

### Cylinder head

1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Place a new cylinder head gasket in position.

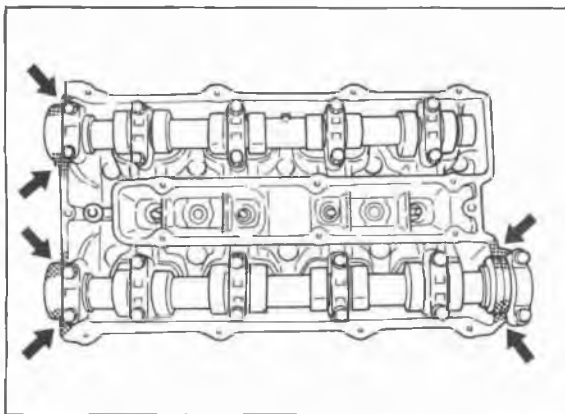


86U01X-036

3. Set the cylinder head in place.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**



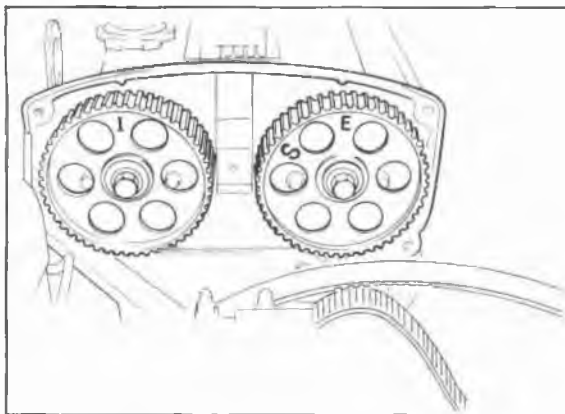
76G01B-033

### Cylinder head cover

1. Apply silicon sealant to the shaded area as shown in the figure.
2. Install the cylinder head cover and gasket.

### Tightening torque:

**4—6 N·m (40—60 cm·kg, 35—52 in·lb)**



76G01B-034

### Timing belt

1. Align the mating marks of the camshaft pulleys with the seal plate timing mark.

### Note

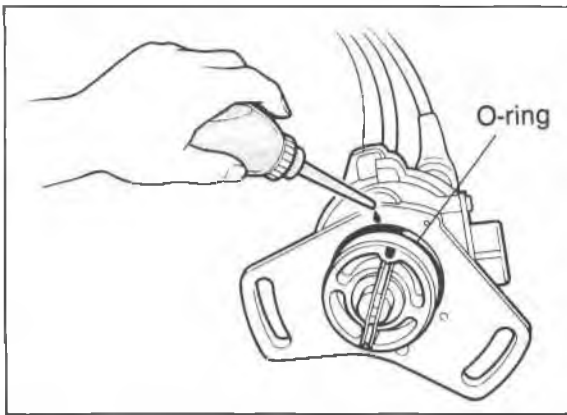
**For intake side camshaft pulley, align "I" mark.**

**For exhaust side camshaft pulley, align "E" mark.**

2. Install the timing belt. (Refer to TIMING BELT of ON-VEHICLE MAINTENANCE.)



## ON-VEHICLE MAINTENANCE (CYLINDER HEAD) 1B



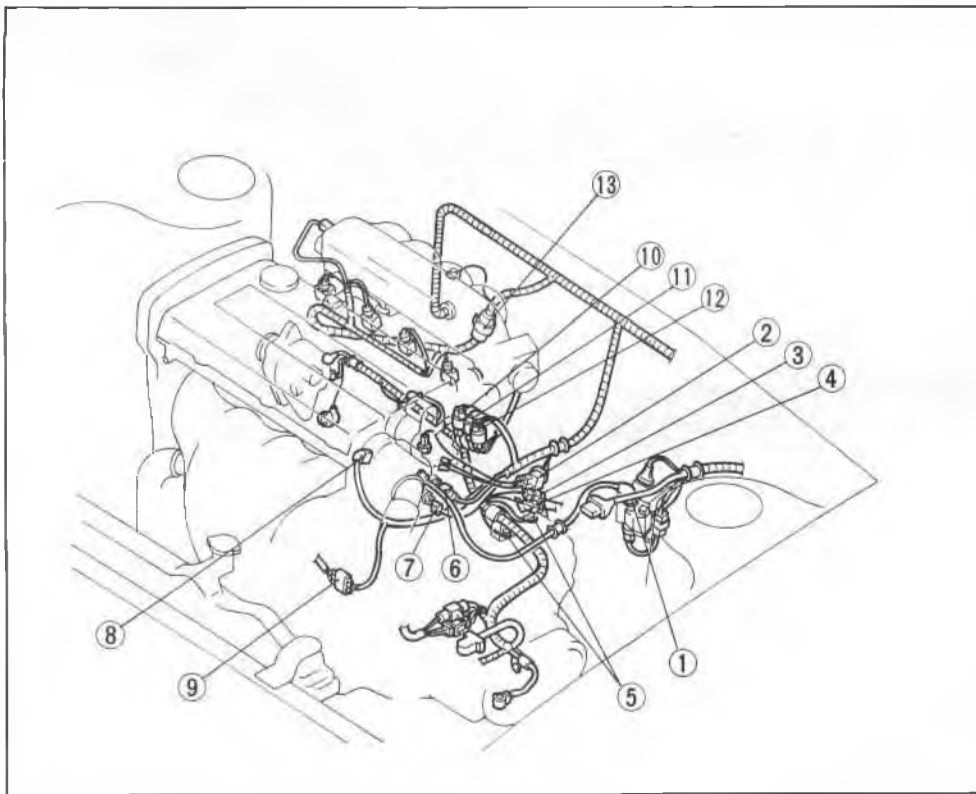
76G01A-035

### Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade.
3. Install the distributor.
4. Loosely tighten the distributor mounting bolt.

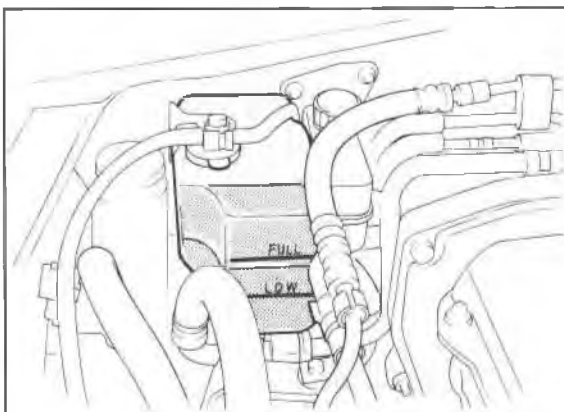
### Engine harness connector

Install the engine harness connectors.



76G01B-035

1. IG coil
2. Heat gauge unit
3. Speed sensor
4. P/S switch
5. Engine ground
6. Water temperature sensor
7. Water thermo switch
8. Crank angle sensor
9. Oxygen sensor
10. Linear solenoid
11. Solenoid valve (idle speed control)
12. Throttle position sensor
13. Injection harness



86U01X-041

### Steps After Installation

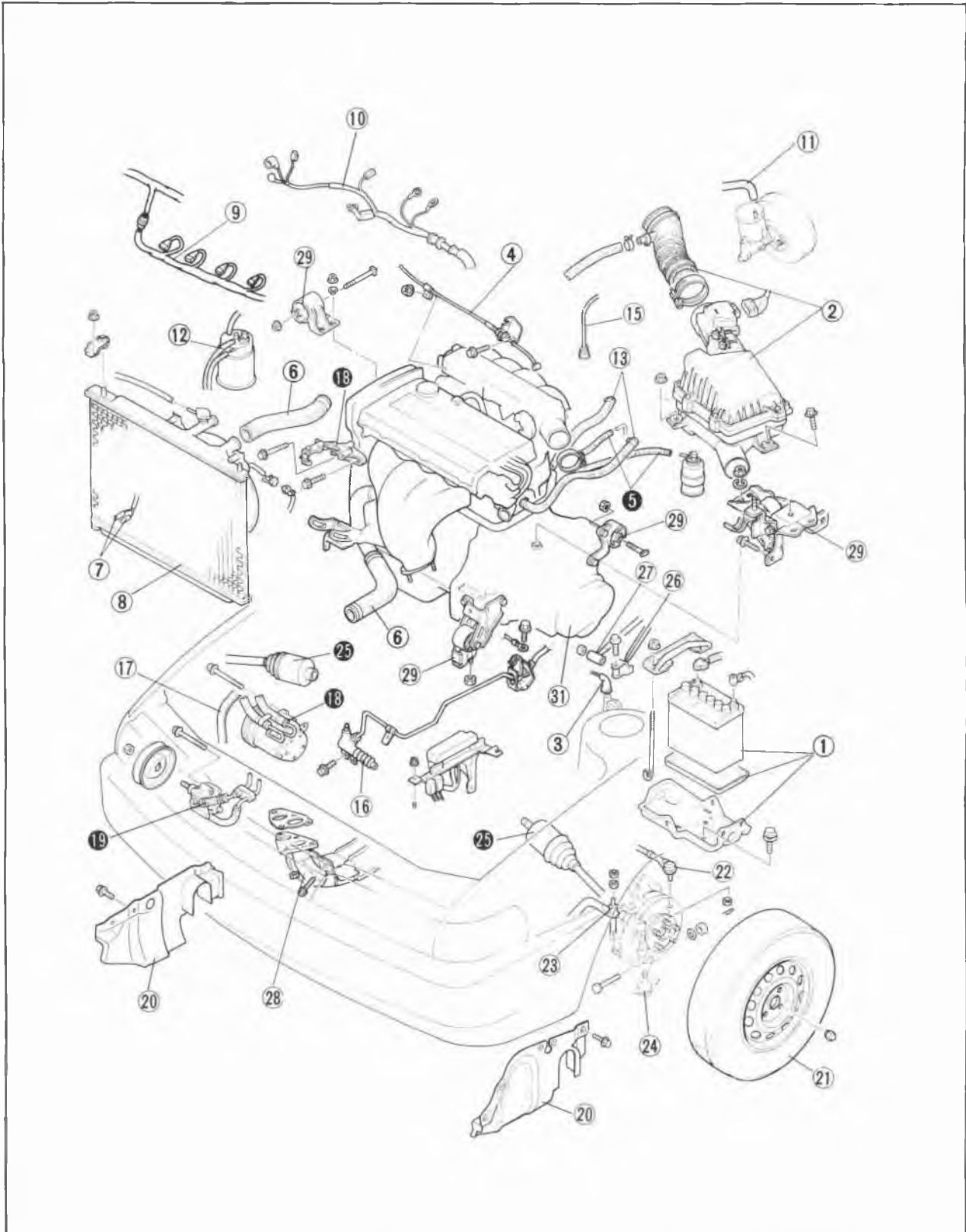
1. Fill the radiator with the specified amount and type of coolant.
2. Perform the necessary engine adjustments. (Refer to TUNE-UP PROCEDURE.)

# 1B REMOVAL

## REMOVAL

**Warning: Release the fuel pressure. (Refer to Section 4C.)**

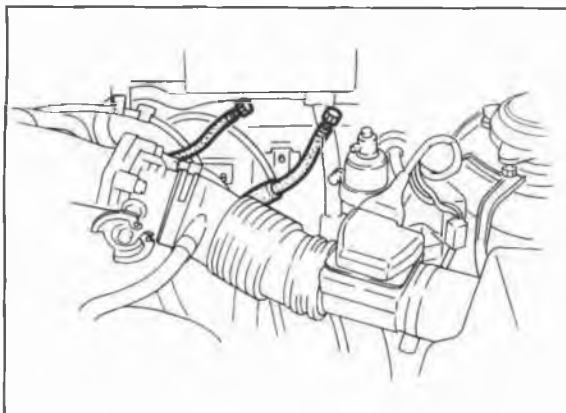
1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.



76G01B-036

- |                                |                                   |                            |
|--------------------------------|-----------------------------------|----------------------------|
| 1. Battery and battery carrier | 12. Canister hose (Unleaded fuel) | 21. Front wheel            |
| 2. Air cleaner assembly        | 13. Heater hose                   | 22. Tie-rod end            |
| 3. High-tension lead           | 14. Transaxle harness             | 23. Stabilizer control rod |
| 4. Accelerator cable           | 15. Speedometer cable             | 24. Lower arm bushing      |
| 5. Fuel hose                   | 16. Clutch release cylinder       | 25. Driveshaft             |
| 6. Radiator hose               | 17. Drive belt                    | 26. Change rod             |
| 7. Radiator harness            | 18. A/C compressor and bracket    | 27. Extension bar          |
| 8. Radiator and electric fan   | 19. P/S oil pump                  | 28. Exhaust pipe           |
| 9. EGI harness                 | 20. Engine side cover             | 29. Engine mount           |
| 10. Engine harness             |                                   | 30. Engine and transaxle   |
| 11. Brake vacuum hose          |                                   | 31. Transaxle              |

76G01B-037



76G01A-11E

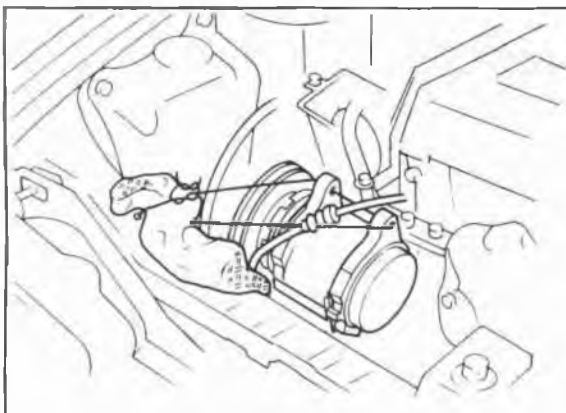
### Removal Note Fuel hose

#### Warning

a) Cover the hose with a rag because fuel will spray out when disconnecting.

b) Keep sparks and open flame away from the fuel area.

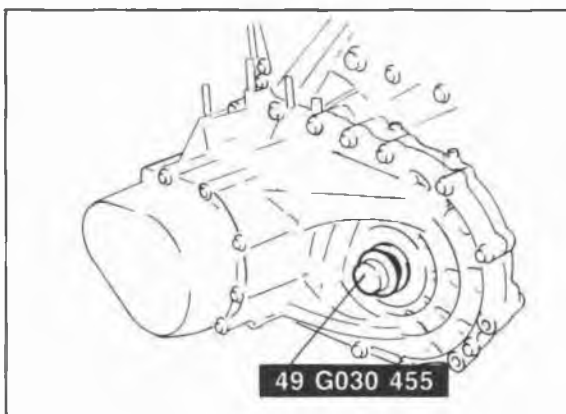
Plug the disconnected hoses to avoid fuel leakage.



67U01X-029

### P/S pump, A/C compressor

Remove the P/S pump and A/C compressor with the hoses still connected to them, secure the pump and compressor as shown in the figure.



86U01X-060

### Driveshaft

Remove the driveshafts. (Refer to Section 9.) Slide the **SST** into the transaxle.

# 1B DISASSEMBLY (AUXILIARY PARTS)

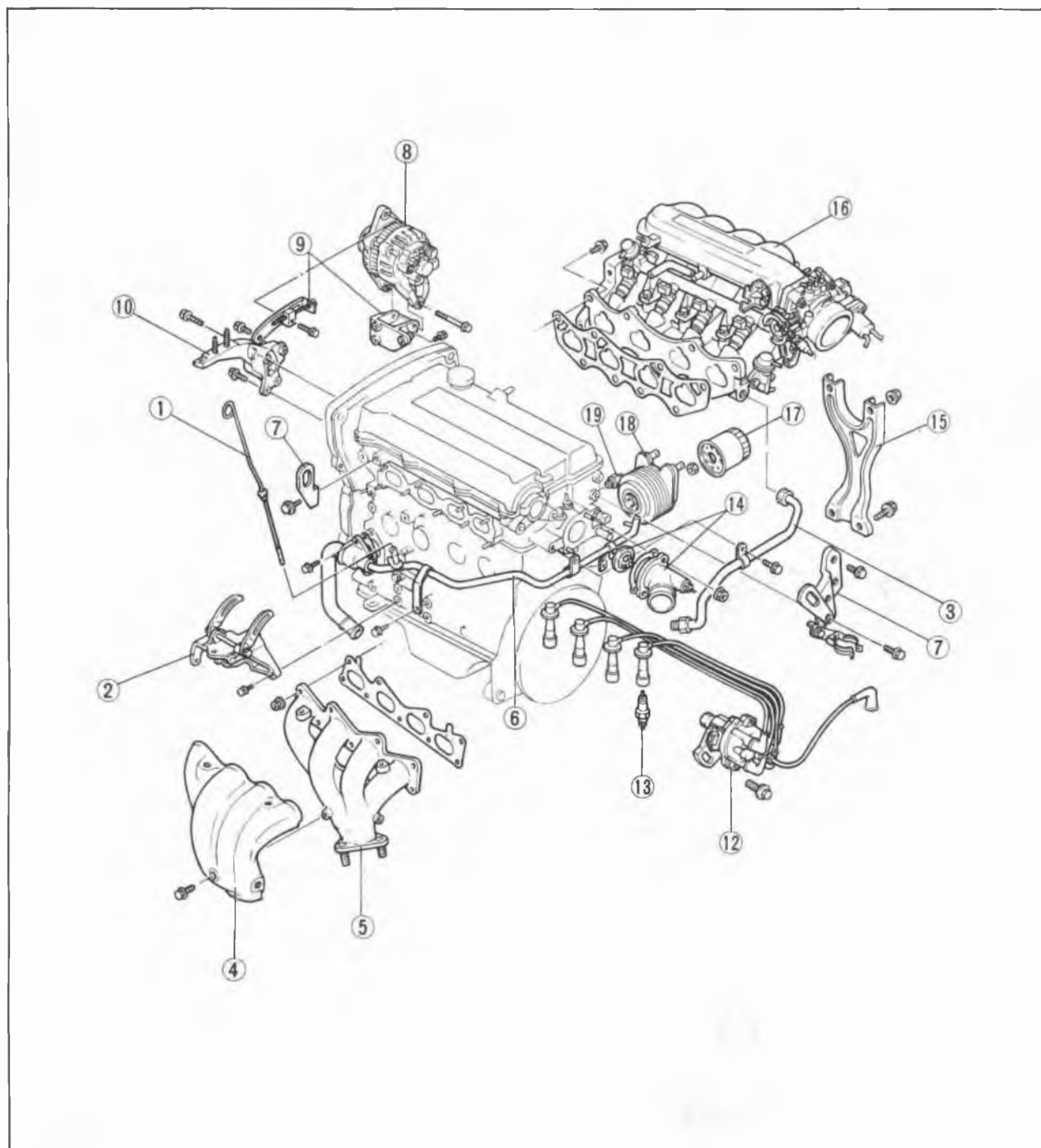
## DISASSEMBLY

1. Remove in the sequence shown in the figure referring to the disassembly note for specially marked parts.
2. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
3. Clean the parts with steam, blow off any remaining water with compressed air.

### Note

Care should be taken during the disassembly of any part or system to study its order of assembly. Any deformation, wear, or damage should also be noted.

## AUXILIARY PARTS

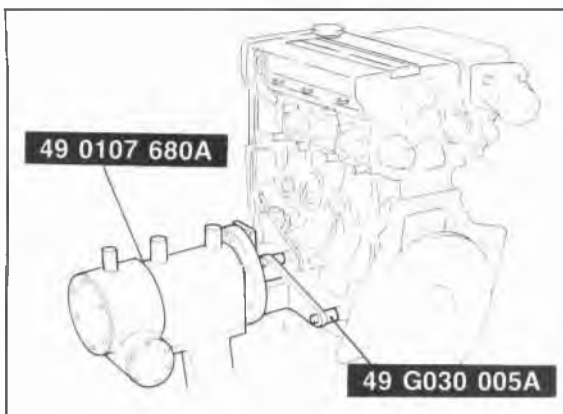


76G01A-119

## DISASSEMBLY (AUXILIARY PARTS) 1B

1. Oil level gauge
2. P/S oil pump bracket
3. EGR pipe(Unleaded fuel)
4. Exhaust manifold insulator
5. Exhaust manifold assembly
6. Coolant inlet pipe and bypass pipe
7. Engine hanger
8. Alternator
9. Alternator strap and bracket
10. Engine mount bracket
11. Center cover
12. Distributor and high-tension lead
13. Spark plug
14. Thermostat and thermostat cover
15. Intake manifold bracket
16. Intake manifold assembly
17. Oil filter
18. Oil cooler
19. Oil pressure switch

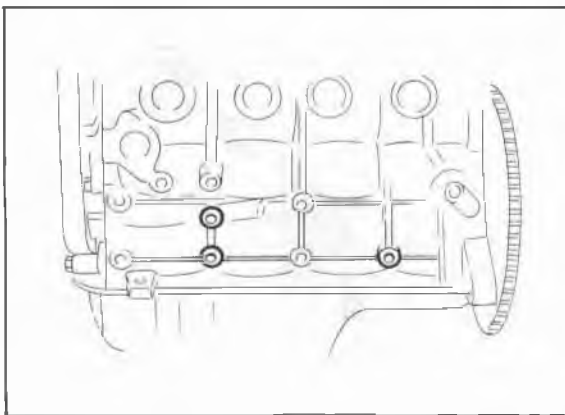
76G01B-039



76G01A-120

### Disassembly Note Engine hanger

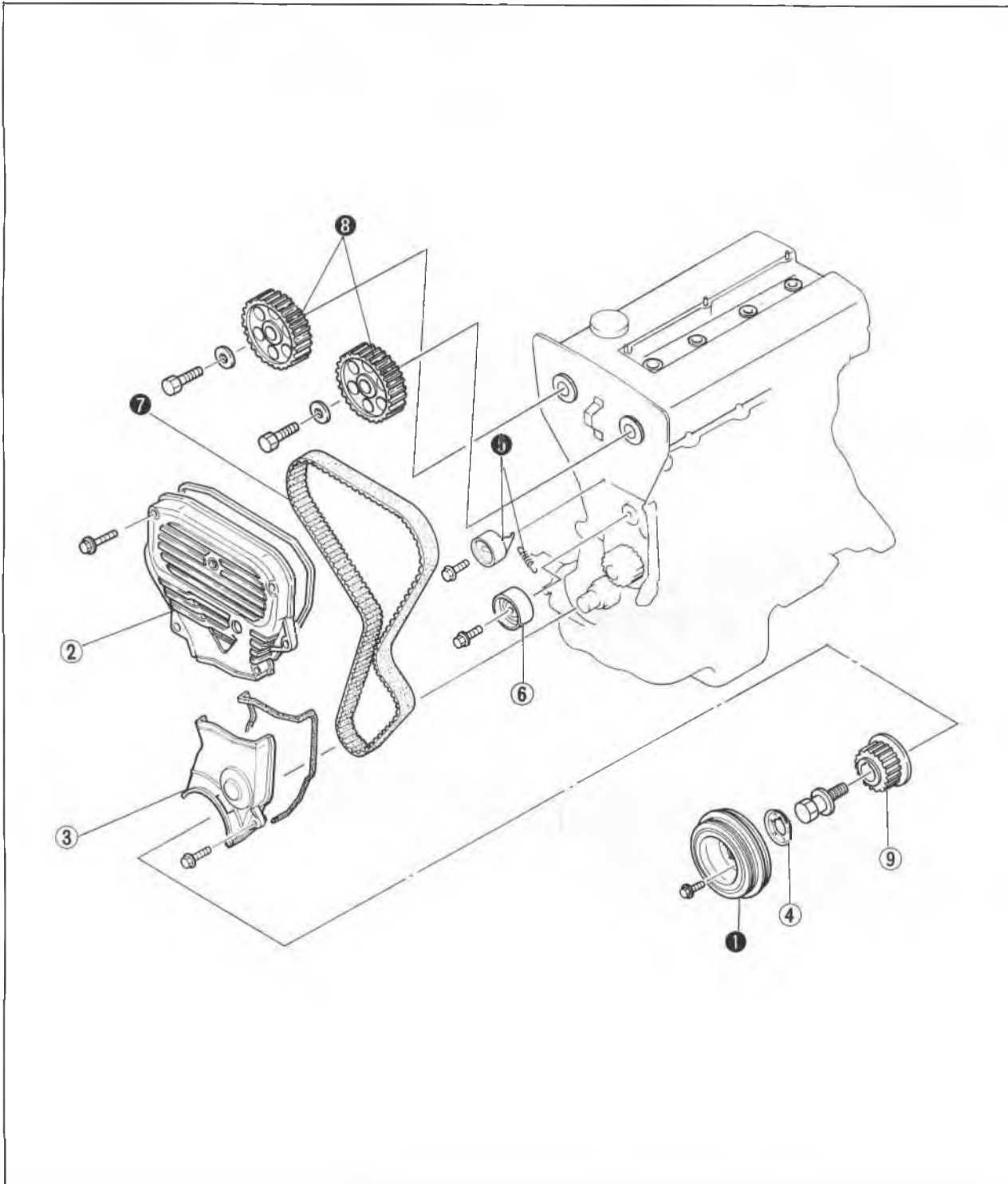
Remove the exhaust manifold; then connect the **SST** to the engine.



69G01X-000

# 1B DISASSEMBLY (TIMING BELT)

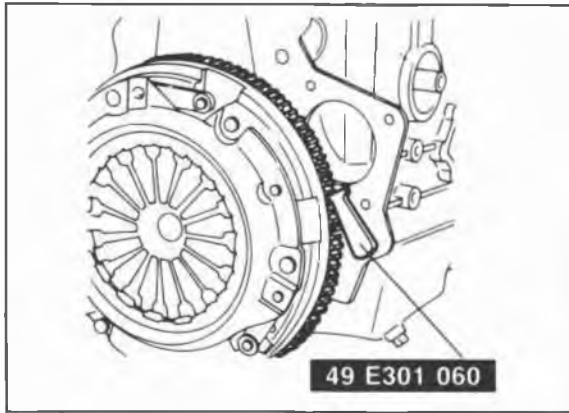
## TIMING BELT



69G01B-072

- |                                     |                             |
|-------------------------------------|-----------------------------|
| 1. Crankshaft pulley                | 6. Timing belt idler pulley |
| 2. Upper timing belt cover          | 7. Timing belt              |
| 3. Lower timing belt cover          | 8. Camshaft pulley          |
| 4. Baffle plate                     | 9. Timing belt pulley       |
| 5. Timing belt tensioner and spring |                             |

## DISASSEMBLY (TIMING BELT) 1B

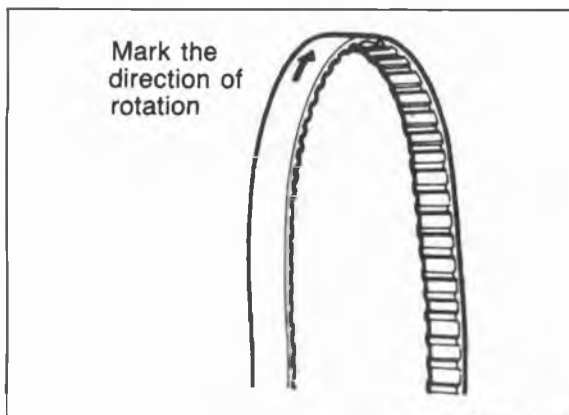


76G01A-121

### Disassembly Note

#### Crankshaft pulley

1. Set the **SST** against the flywheel.
2. Remove the crankshaft pulley.



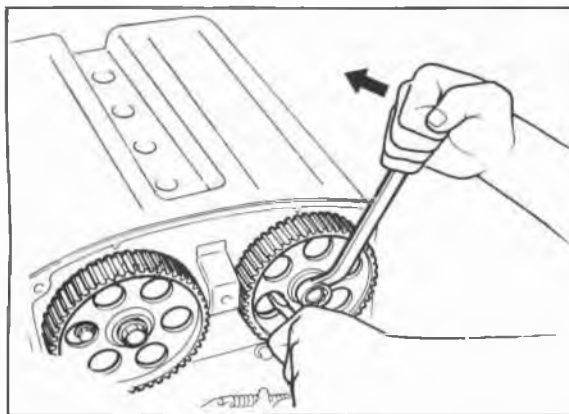
76G01B-119

### Timing belt

1. Loosen the tensioner lock bolt, and remove the tensioner spring.
2. Mark the timing belt rotation for proper reinstallation if it is reused.
3. Remove the timing belt.

### Caution

**Be careful not to allow oil or grease on the belt.**



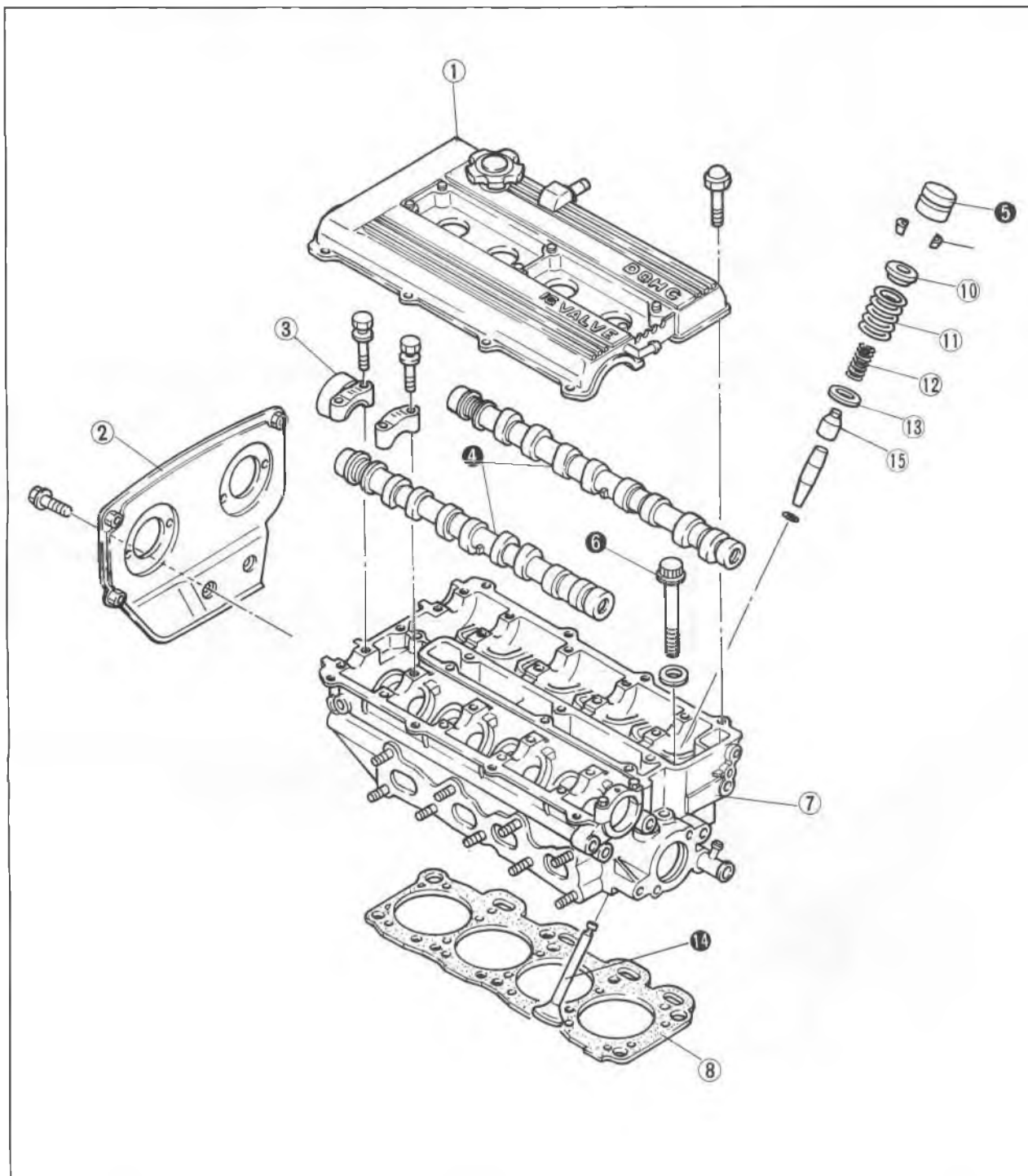
76G01A-123

### Camshaft pulley

Remove the pulley lock bolt using a screw driver to prevent the camshaft from turning.

# 1B DISASSEMBLY (CYLINDER HEAD)

## CYLINDER HEAD

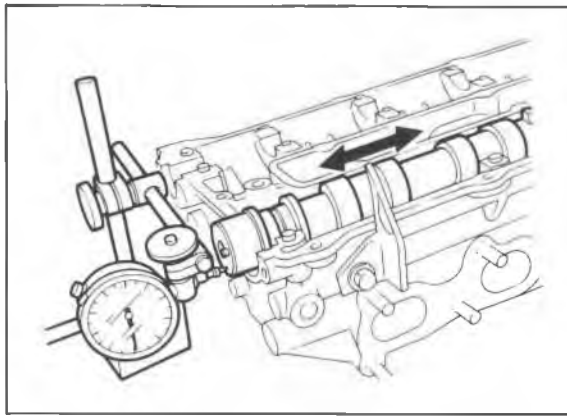


76G01B-040

- |                            |                        |
|----------------------------|------------------------|
| 1. Cylinder head cover     | 9. Valve keeper        |
| 2. Seal plate              | 10. Upper spring seat  |
| 3. Camshaft cap            | 11. Outer valve spring |
| 4. Camshaft                | 12. Inner valve spring |
| 5. Hydraulic lash adjuster | 13. Lower spring seat  |
| 6. Cylinder head bolt      | 14. Valve              |
| 7. Cylinder head           | 15. Valve seal         |
| 8. Cylinder head gasket    |                        |



# DISASSEMBLY (CYLINDER HEAD) 1B



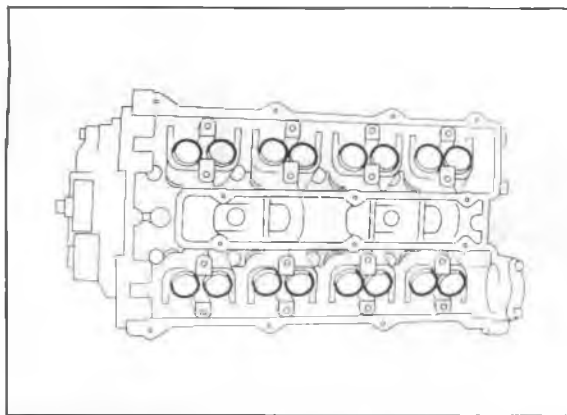
76G01B-041

## Disassembly Note

### Camshaft

Before removing the camshaft, clean the bearings and journals, and measure the following points.

1. Camshaft end play. (Refer to page 1B—41.)
2. Camshaft journal oil clearance. (Refer to page 1B—40.)



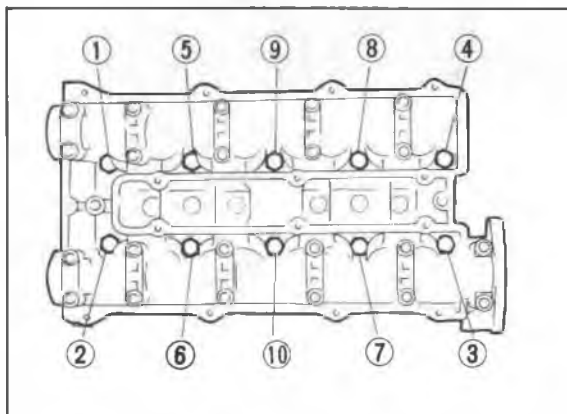
76G01B-042

### Hydraulic lash adjuster (HLA)

Remove the HLA from the cylinder head.

### Note

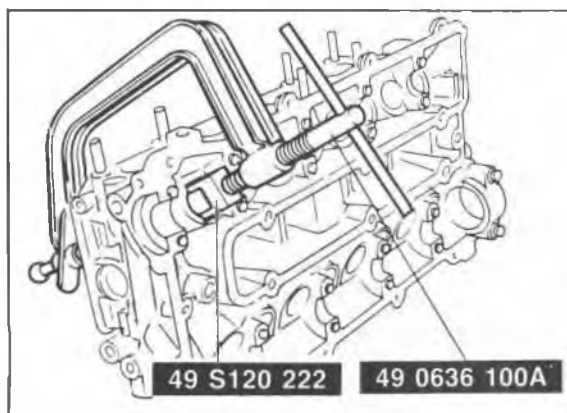
Mark each HLA so that they can be reinstalled in the position from which they were removed.



86U01X-068

### Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



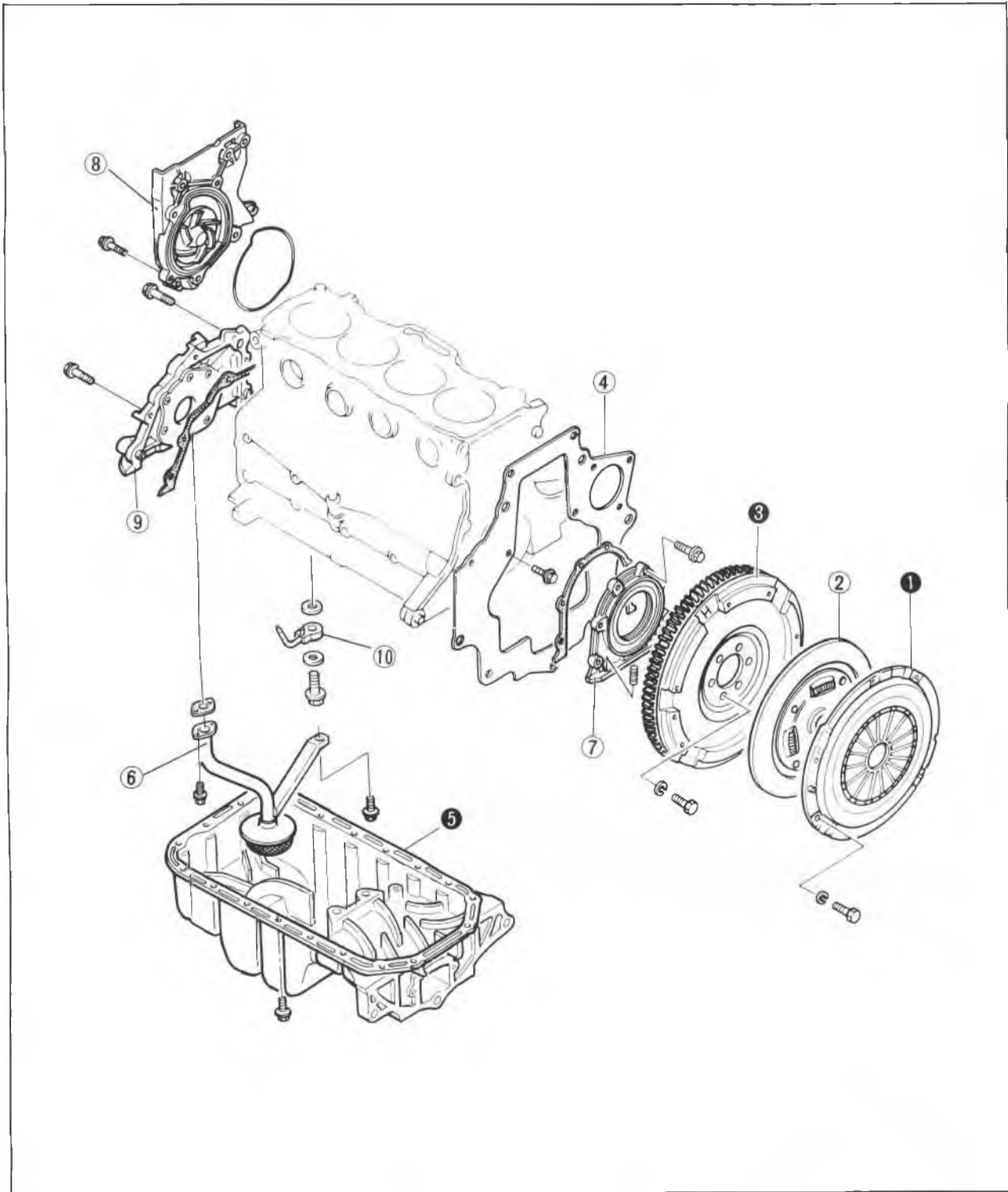
86U01X-069

### Valve

Remove the valves from the cylinder head with the SST.

# 1B DISASSEMBLY (CYLINDER BLOCK)

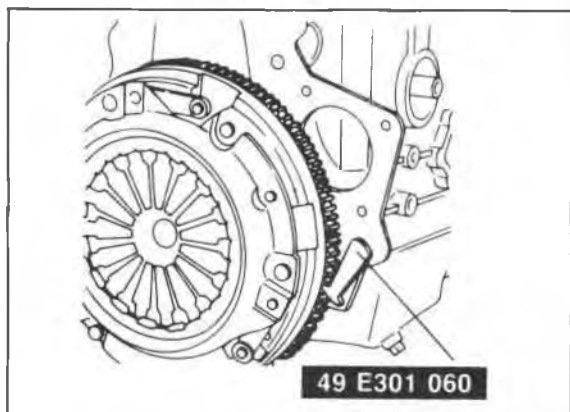
## CYLINDER BLOCK-I



76G01B-043

- |                 |                        |
|-----------------|------------------------|
| 1. Clutch cover | 6. Oil strainer        |
| 2. Clutch disc  | 7. Rear cover          |
| 3. Flywheel     | 8. Water pump assembly |
| 4. End plate    | 9. Oil pump assembly   |
| 5. Oil pan      | 10. Oil jet            |

## DISASSEMBLY (CYLINDER BLOCK) 1B

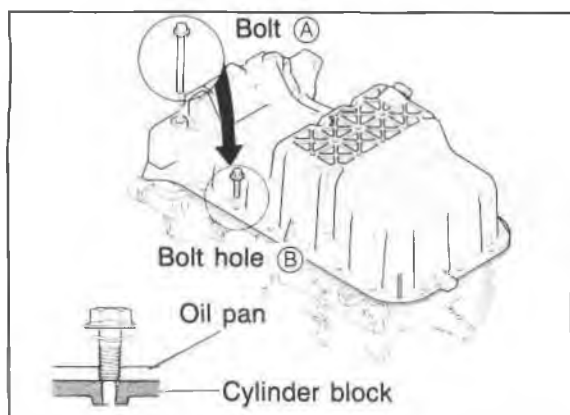


76G01B-044

### Disassembly Note

#### Clutch cover and flywheel

Remove the clutch cover and flywheel with the **SST**.



76G01B-045

### Oil pan

1. Remove the oil pan mounting bolts.
2. Install the bolt (A) from the mounting bolt or 10 mm (0.39 in) bolts in the specified bolt holes (B) (both sides).
3. Screw in the bolts gradually and alternately to remove the oil pan.

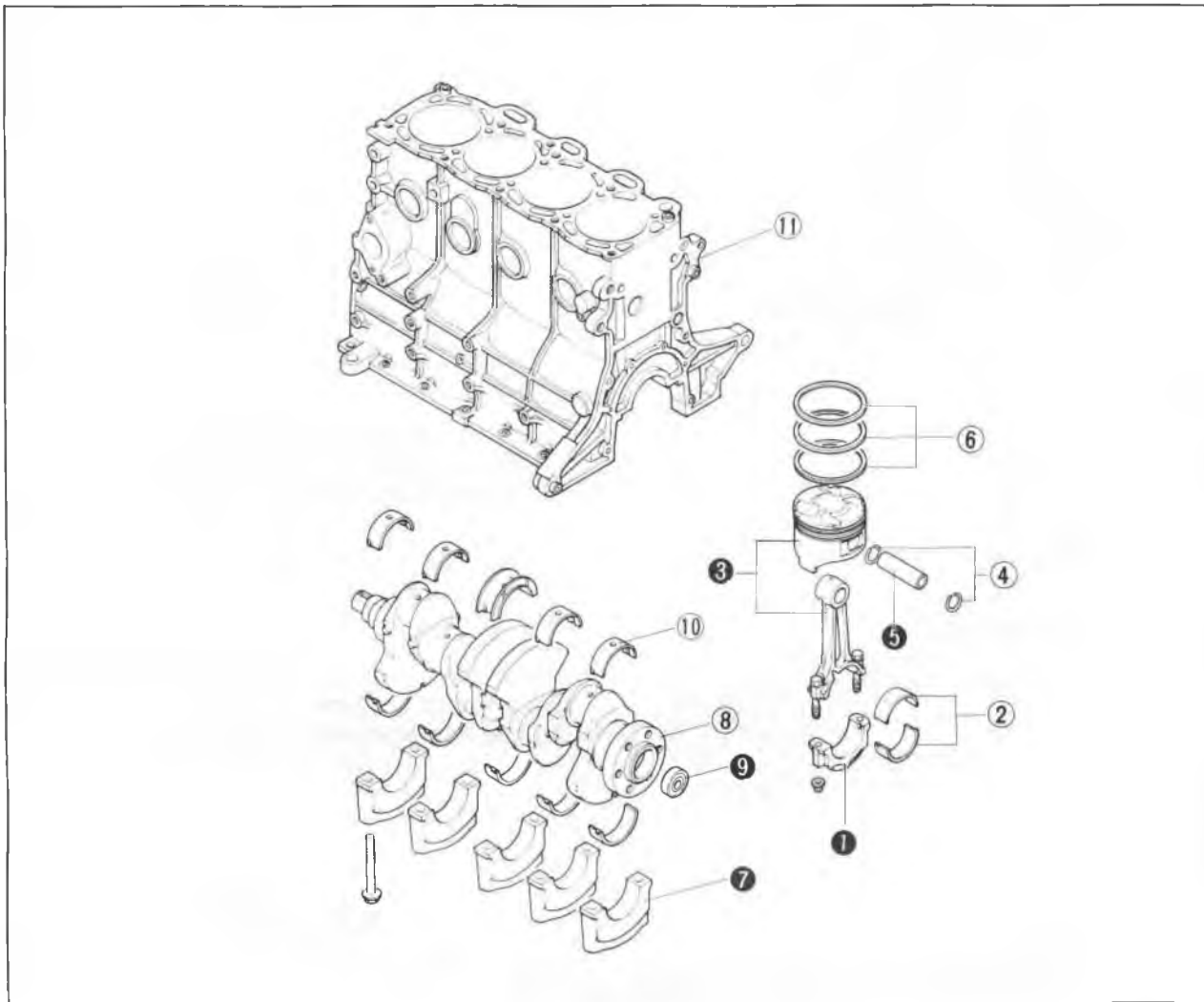
### Caution

- a) Do not pry the oil pan to prevent damaging the contact surface.
- b) Do not damage or scratch the contact surface when removing the oil sealant.

4. Remove the oil pan.

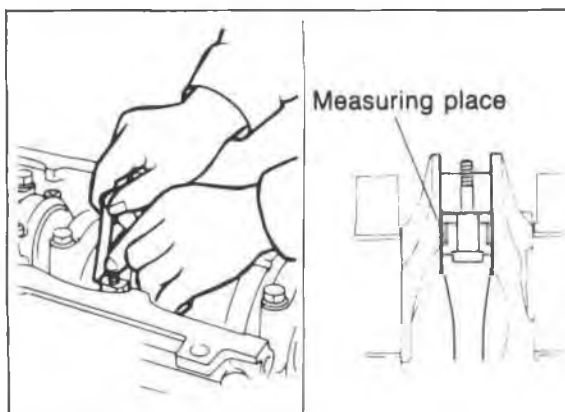
# 1B DISASSEMBLY (CYLINDER BLOCK)

## CYLINDER BLOCK-II



76G01B-046

1. Connecting rod cap
2. Connecting rod bearing
3. Connecting rod and piston
4. Clip
5. Piston pin
6. Piston ring
7. Main bearing cap
8. Crankshaft
9. Pilot bearing
10. Main bearing
11. Cylinder block



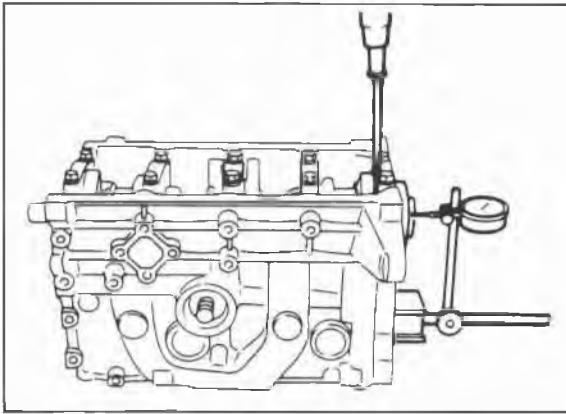
76G01B-047

### Disassembly Note Connecting rod and cap

Before removing the connecting rod, clean the bearing, connecting rod, and crank pin, and measure the following points.

1. Connecting rod side clearance. (Refer to page 1B—53.)
2. Crankpin oil clearance. (Refer to page 1B—53.)

# DISASSEMBLY (CYLINDER BLOCK) 1B

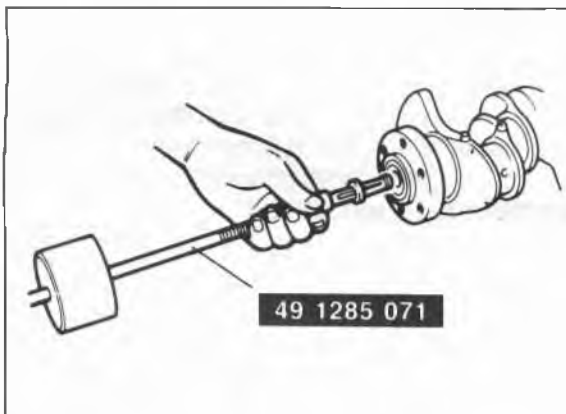


76G01B-048

## Main bearing cap

Before removing the main bearing caps, clean the bearings, main journals, and caps, and measure the following points.

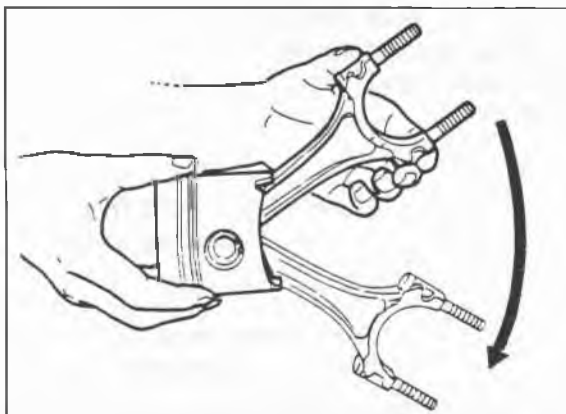
1. Crankshaft end play. (Refer to page 1B—52.)
2. Main journal oil clearance. (Refer to page 1B—51.)



76G01B-049

## Pilot bearing

Remove the pilot bearing from the crankshaft with the **SST**.

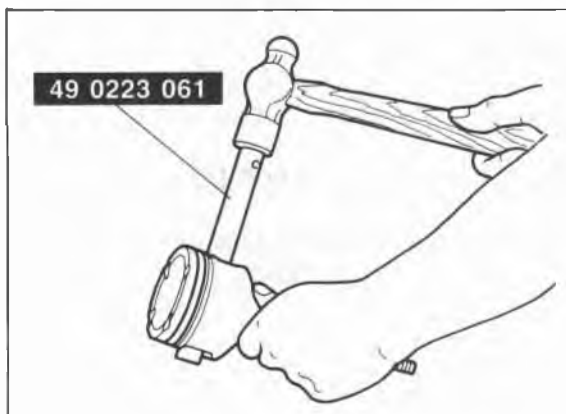


79G01C-050

## Piston and connecting rod

1. Before disassembling the piston and connecting rod, check the oscillation torque as shown in the figure.

If the large end does not drop by its own weight, replace the piston or the piston pin.



76G01B-050

2. Remove the piston pin with the **SST**.

# 1B INSPECTION AND REPAIR

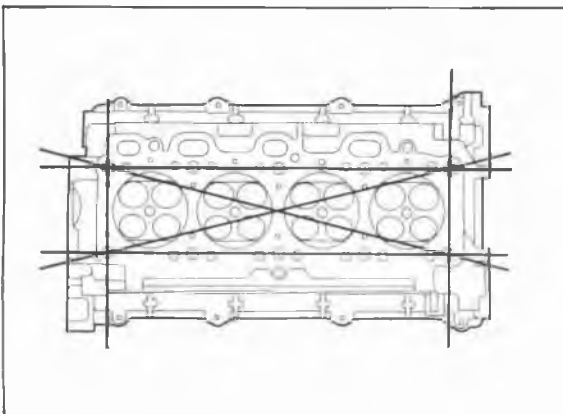
## INSPECTION AND REPAIR

1. Clean all parts, taking care to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign materials.
2. Inspect and repair must be performed in the order specified.

### Caution

Be careful not to damage the joints or friction surfaces of aluminum alloy components (such as the cylinder head or pistons).

86U01X-077

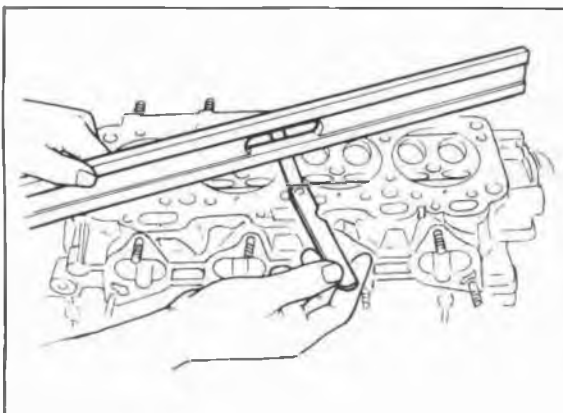


79G01C-106

### Cylinder Head

1. Inspect the cylinder head for damage, cracks, and leakage of water or oil. Replace if necessary.
2. Measure the cylinder head distortion in the six directions shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**



76G01B-051

3. If the cylinder head distortion exceeds specification, grind the cylinder head surface. If the cylinder head height is not within specification, replace it.

### Height:

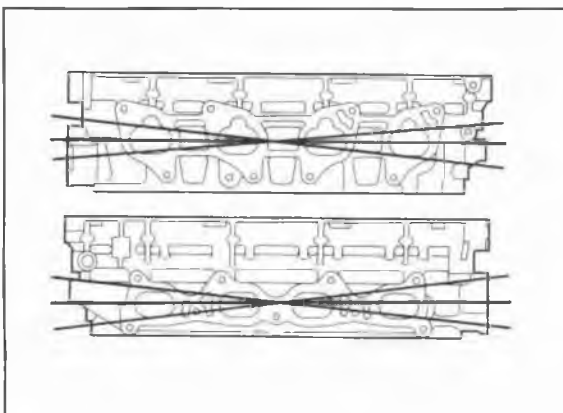
**133.95—134.05 mm (5.274—5.278 in)**

**Grinding limit: 0.20 mm (0.008 in) max.**

### Note

Before grinding the cylinder head, first check the following. Replace if necessary.

- Sinking of valve seat
- Damage of manifold contact surface
- Camshaft oil clearance and end play

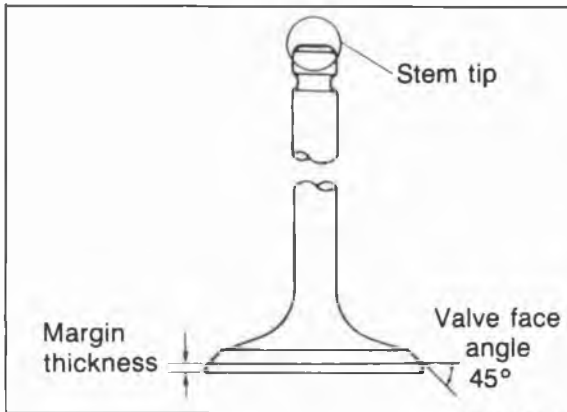


79G01C-053

4. Measure the manifold contact surface distortion in the six directions shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**

5. If distortion exceeds specification grind the surface or replace the cylinder head.



76G01B-120

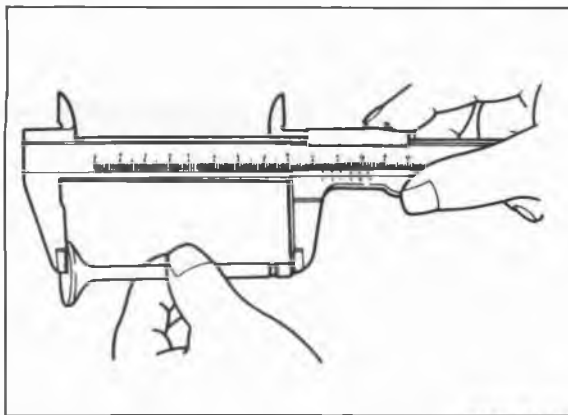
### Valve and Valve Guide

1. Inspect each valve for the following. Replace or resurface if necessary.
  - (1) Damaged or bent stem
  - (2) Roughness or damage to face
  - (3) Damage or uneven wear of stem tip
2. Check the valve head margin thickness. Replace if necessary

### Margin thickness

**IN : 0.85 mm (0.033 in) min.**

**EX: 0.9 mm (0.035 in) min.**



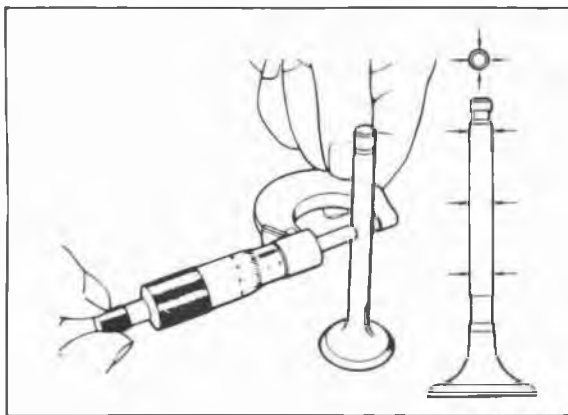
76G01B-052

3. Measure the valve length.

### Length

**IN : 103.18 mm (4.0622 in)**

**EX: 103.94 mm (4.0921 in)**



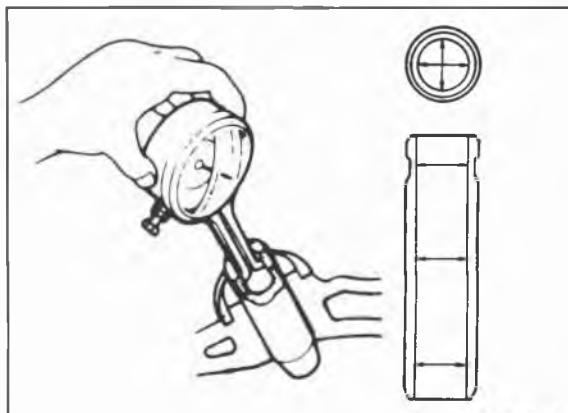
76G01B-053

4. Measure the valve stem diameter.

### Diameter

**IN : 5.970—5.985 mm (0.2350—0.2356 in)**

**EX: 5.965—5.980 mm (0.2348—0.2354 in)**



76G01B-121

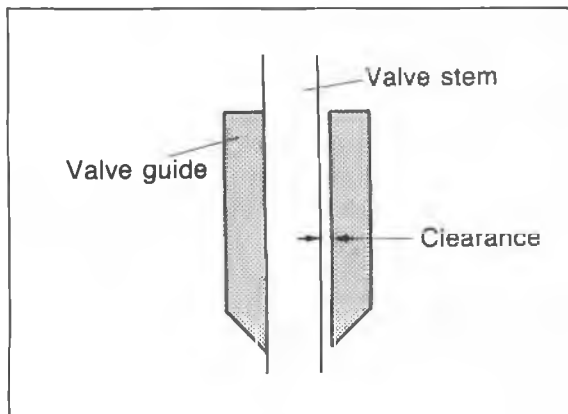
5. Measure the valve guide inner diameter.

### Inner diameter

**IN : 6.01—6.03 mm (0.2366—0.2374 in)**

**EX: 6.01—6.03 mm (0.2366—0.2374 in)**

# 1B INSPECTION AND REPAIR



76G01B-122

6. Measure the valve stem to guide clearance by subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

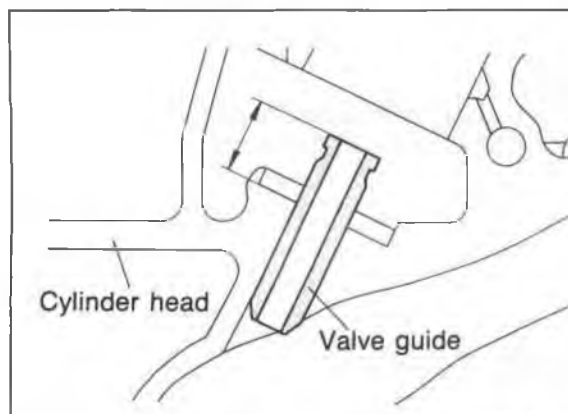
### Clearance

**IN : 0.025—0.060 mm (0.0010—0.0024 in)**

**EX: 0.030—0.065 mm (0.0012—0.0026 in)**

**Maximum: 0.20 mm (0.0079 in)**

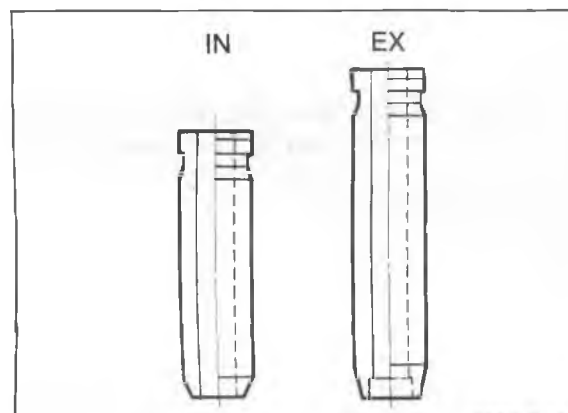
7. If the clearance exceeds the maximum, replace the valve and/or valve guide.



76G01B-054

8. Check that the valve guide projection height (dimension A in the figure). Replace if necessary.

**Height: 11.4—11.9 mm (0.449—0.469 in)**

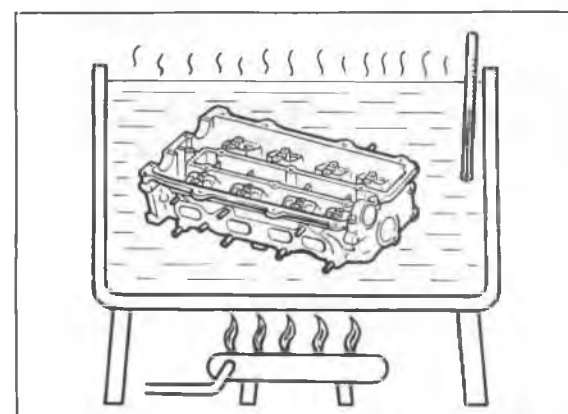


76G01B-123

### Replacement of valve guide

#### Note

Although the shapes of the intake and exhaust valve guides are different.

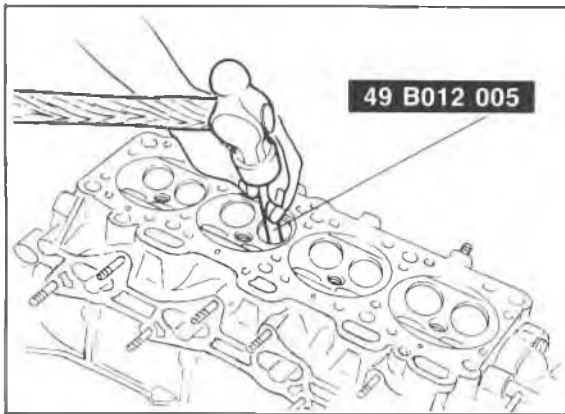


86U01X-083

### Removal

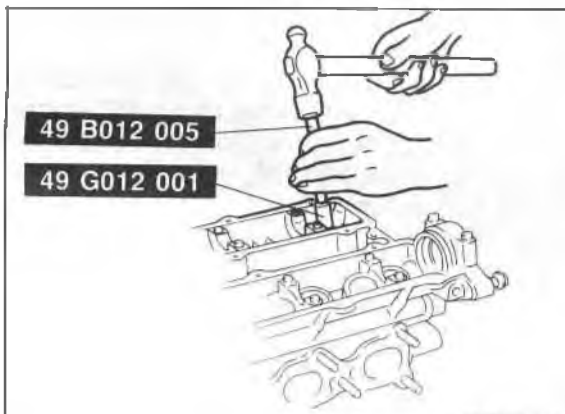
1. Gradually heat the cylinder head in water to **approx. 90°C (194°F)**.





86U01X-084

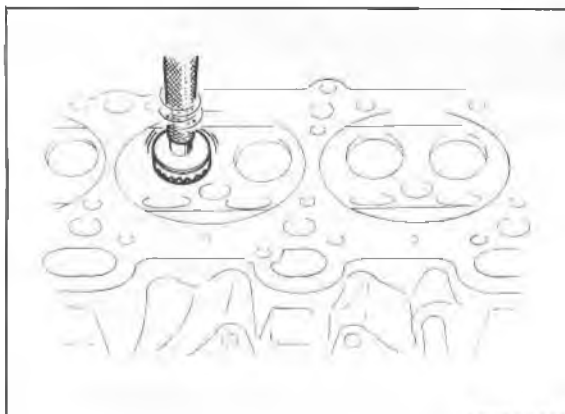
2. Remove the valve guide from the side opposite the combustion chamber with the **SST**.



76G01B-124

### Installation

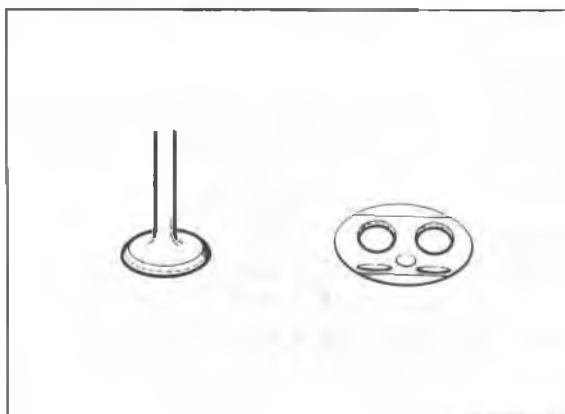
1. Gradually heat the cylinder head in water to **approx. 90°C (194°F)**.
2. Tap the valve guide in from the side opposite the combustion chamber with the **SST** until the projection height is as specified.



86U01X-087

### Valve Seat

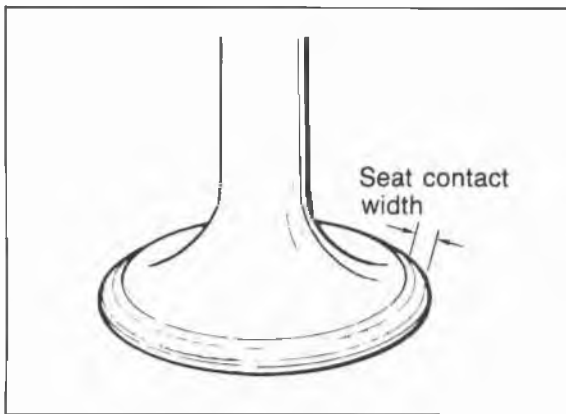
1. Inspect the contact surface of the valve seat and valve face for the following.
  - (1) Roughness
  - (2) Damage
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.



69G01A-101

3. Apply a thin coat of prussian blue to the valve face.
4. Check the valve seating by rotating the valve against the seat.
  - (1) If blue does not appear 360° around the valve face, replace the valve.
  - (2) If blue does not appear 360° around the valve seat, resurface the seat.

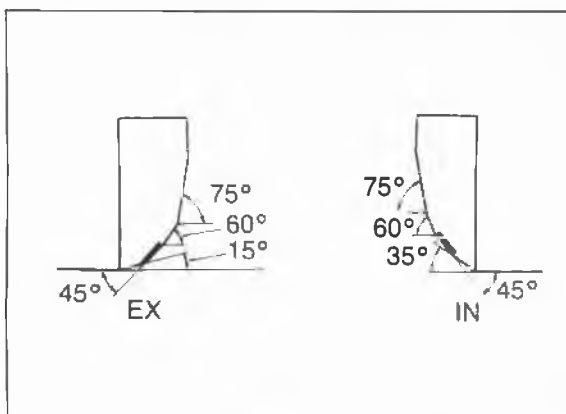
# 1B INSPECTION AND REPAIR



76G01A-128

5. Check the seat contact width.

**Width: 1.2—1.6 mm (0.047—0.063 in)**

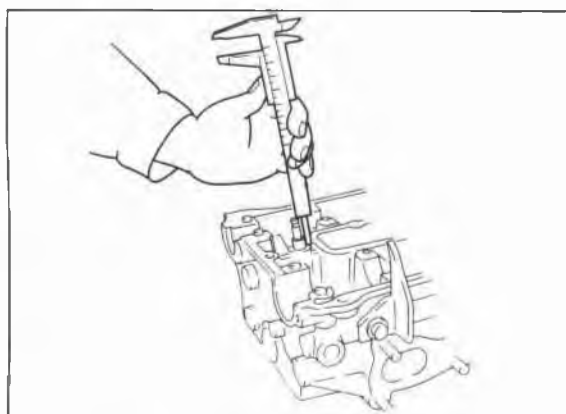


86U01X-088

6. Check that the valve seating position is at the center of the valve face.

- (1) If the seating position is too high, correct the valve seat with a **60°** cutter and a **45°** cutter.
- (2) If the seating position is too low, correct the valve seat with a **35° (IN)** or **15° (EX)** cutter and a **45°** cutter.

7. Seat the valve to the valve seat with a lapping compound.



76G01B-055

8. Check the sinking of the valve seat.

Measure protruding length (dimension L) of each valve stem.

**Dimension L: 36.8 mm (1.449 in)**

- (1) If **L** is as below, it can be used as it is.

**36.8—37.6 mm (1.449—1.480 in)**

- (2) If **L** is as below, insert a spacer between the spring seat and cylinder head to adjust.

**37.6—38.3 mm (1.480—1.508 in)**

- (3) If **L** is more than as below, replace the cylinder head.

**38.3 mm (1.508 in) or more**

## Valve Spring

1. Inspect each valve spring for cracks or damage.
2. Check the free length and angle. Replace if necessary.

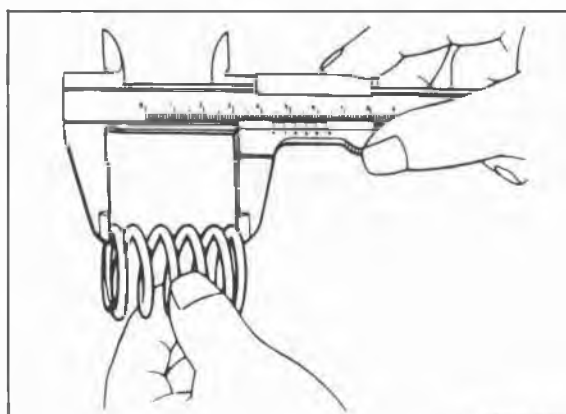
### Free length

**Outer Standard: 39.1 mm (1.539 in)**

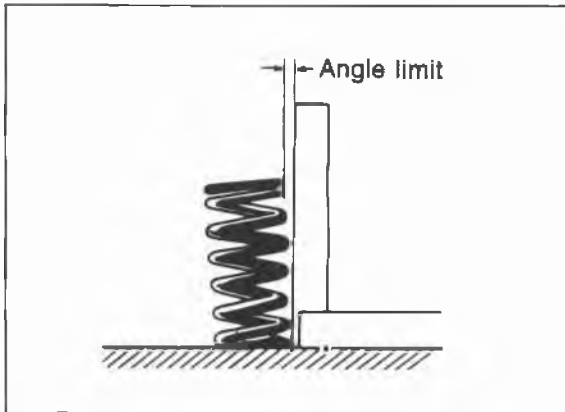
**Minimum: 38.7 mm (1.524 in)**

**Inner Standard: 38.0 mm (1.496 in)**

**Minimum: 37.7 mm (1.484 in)**



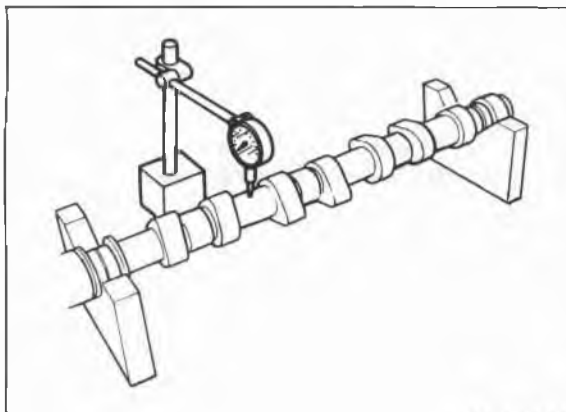
76G01B-038



76G01B-057

### Angle

**Outer: 1.4 mm (0.055 in) max.**  
**Inner: 1.3 mm (0.051 in) max.**

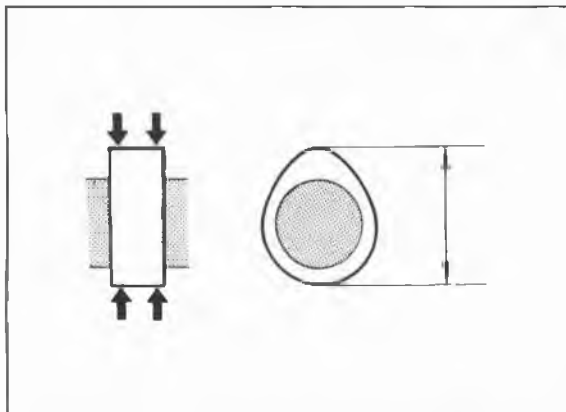


86U01X-092

### Camshaft

1. Set the front and rear journals on V-blocks. Check the camshaft runout. Replace if necessary.

**Runout: 0.03 mm (0.0012 in) max.**



76G01B-058

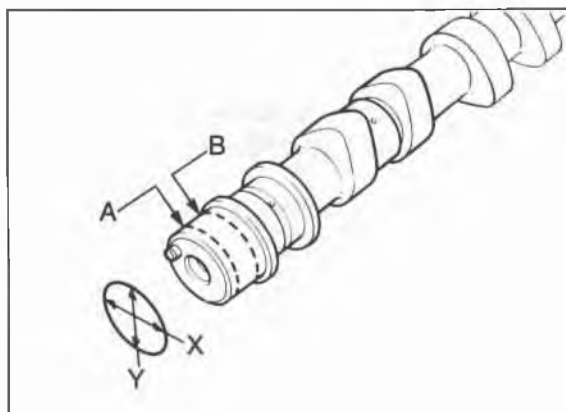
2. Check the cam for wear or damage. Replace if necessary.
3. Check the cam lobe height at the two points as shown in the figure.

### Height:

**45.055 mm (1.7738 in)..... Leaded fuel**  
**45.052 mm (1.7737 in) ..... Unleaded fuel**

### Minimum:

**44.855 mm (1.7659 in)..... Leaded fuel**  
**44.852 mm (1.7658 in) ..... Unleaded fuel**



76G01B-059

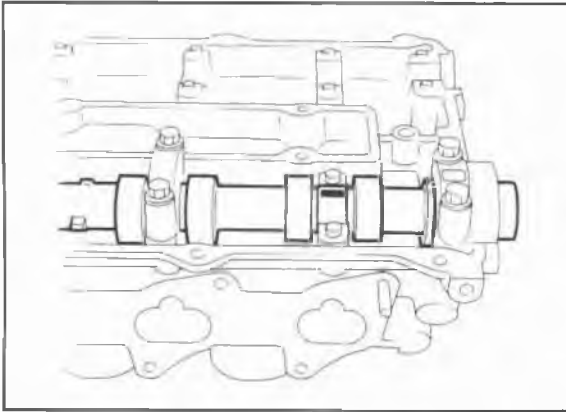
4. Measure wear of the journals in X and Y directions at the two points as shown in the figure.

### Diameter:

**29.940—29.965 mm (1.1787—1.1797 in)**

**Out-of-round: 0.05 mm (0.002 in) max.**

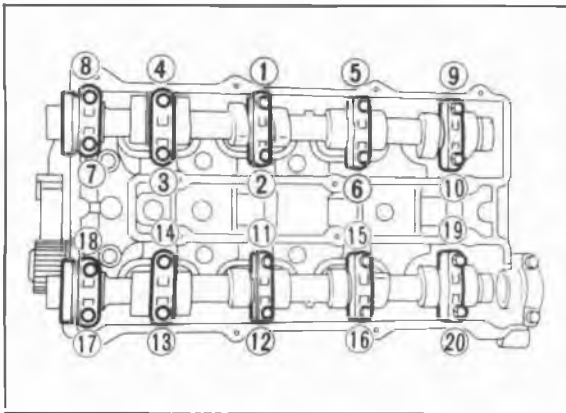
# 1B INSPECTION AND REPAIR



76G01B-060

5. Measure the oil clearance of the camshaft and camshaft caps.

- (1) Remove any oil or dirt from the journals and bearing surface.
- (2) Set the camshaft onto the cylinder head.
- (3) Position plasti-gauge on top of the journals in the axial direction.

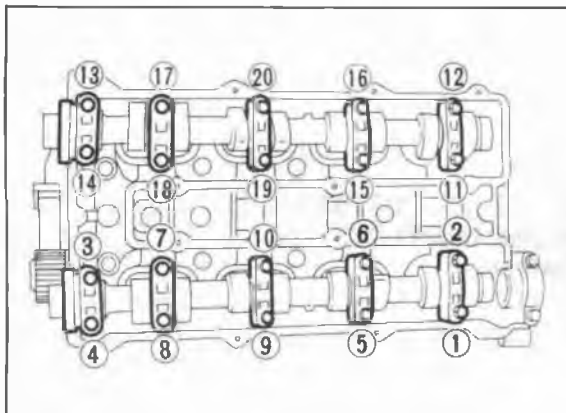


76G01B-061

- (4) Place the camshaft caps according the cap number and arrow, and tighten them in the order shown in the figure.

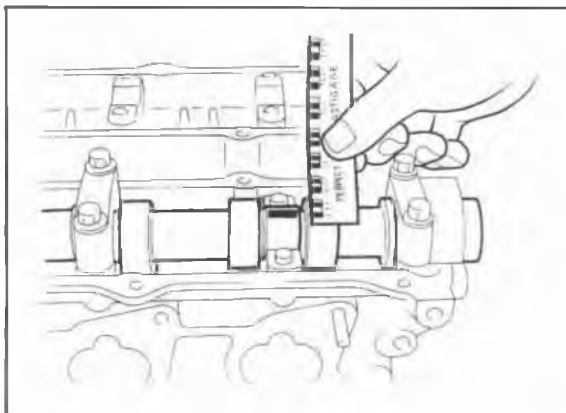
**Tightening torque:**

**18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)**



76G01B-062

- (5) Loosen the camshaft cap bolts in the order shown in the figure.



76G01B-063

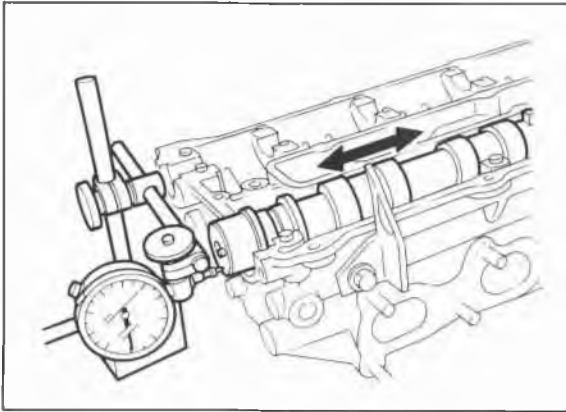
- (6) Measure the oil clearance at each cap.

**Oil clearance:**

**0.035—0.085 mm (0.0014—0.0033 in)**

**Maximum: 0.15 mm (0.0059 in)**

- (7) If the oil clearance exceeds the maximum, replace the camshaft and/ or the cylinder head.



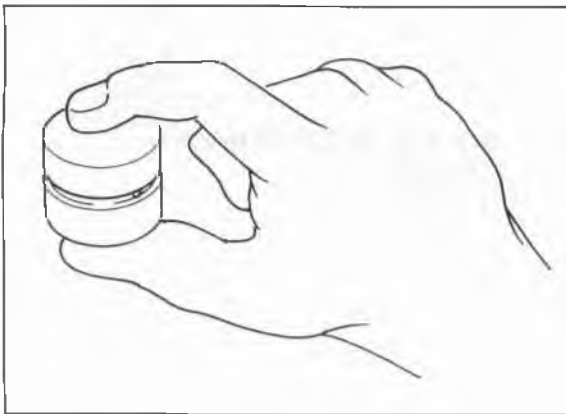
76G01B-125

6. Measure the camshaft end play. If it exceeds the maximum, replace the camshaft and/or the cylinder head.

**End play:**

**0.08—0.10 mm (0.003—0.004 in)**

**Maximum: 0.20 mm (0.008 in)**



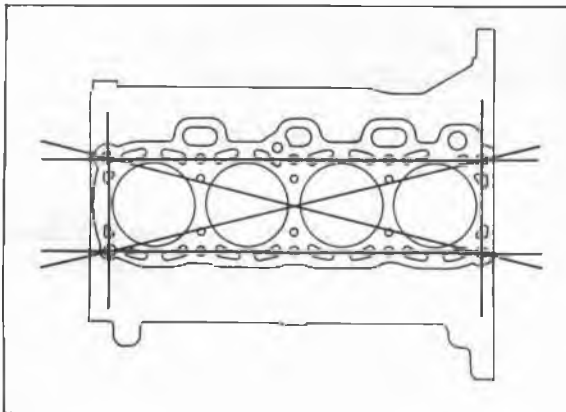
76G01B-064

**Hydraulic Lash Adjuster (HLA)**

1. Check the HLA face for wear or damage.
2. Hold the HLA between your fingers and press it. If the HLA moves, replace it.

**Caution**

**Do not disassemble the HLA.**

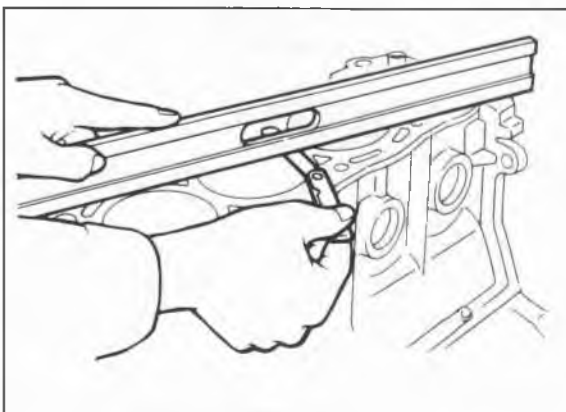


86U01X-100

**Cylinder Block**

1. Check the cylinder block. Repair or replace if necessary.
  - (1) Leakage damage
  - (2) Cracks
  - (3) Scoring of wall
2. Measure the distortion of the top surface of the cylinder block in the six directions as shown in the figure.

**Distortion: 0.15 mm (0.006 in) max.**

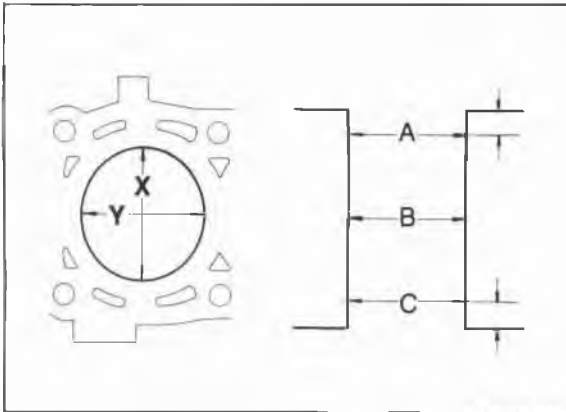


86U01X-101

3. If the distortion exceeds the maximum, repair by grinding, or replace the cylinder block.

**Grinding limit: 0.20 mm (0.008 in) max.**

# 1B INSPECTION AND REPAIR

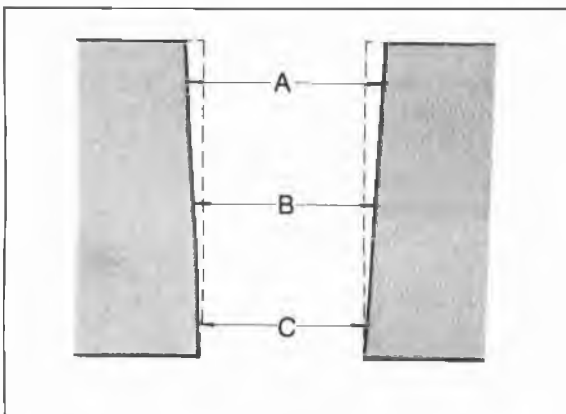


79G01C-070

4. Measure the cylinder bore in directions X and Y at three levels in each cylinder as shown.

## Cylinder bore mm (in)

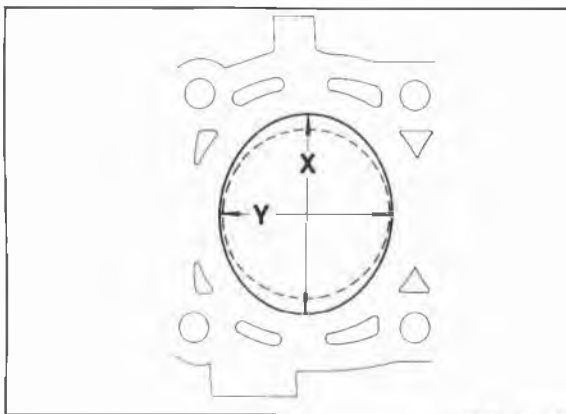
Size	Bore
Standard	86.000—86.019 (3.3858—3.3866)
0.25 (0.010) oversize	86.250—86.269 (3.3957—3.3964)
0.50 (0.020) oversize	86.500—86.519 (3.4055—3.4062)



79G01C-071

- (1) If the difference between the measurement A and C exceeds the maximum taper, rebore the cylinder to oversize.

**Taper: 0.019 mm (0.0007 in) max.**



79G01C-072

- (2) If the difference between the measurement X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

**Out-of-round: 0.019 mm (0.0007 in) max.**

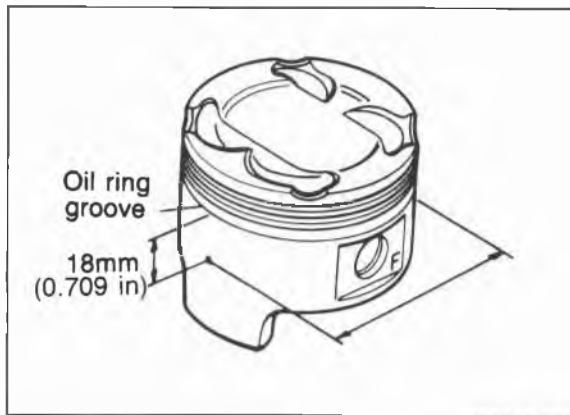
### Caution

The boring size should be based on the size of an oversize piston and be the same for all cylinders.

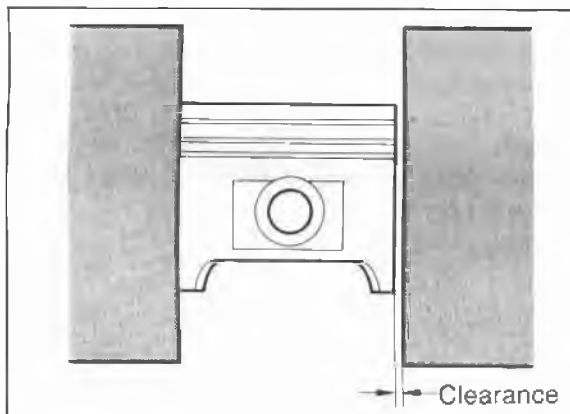


86U01X-102

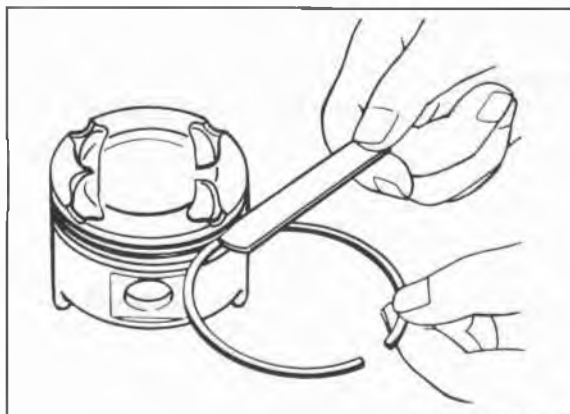
5. If the upper part of the cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



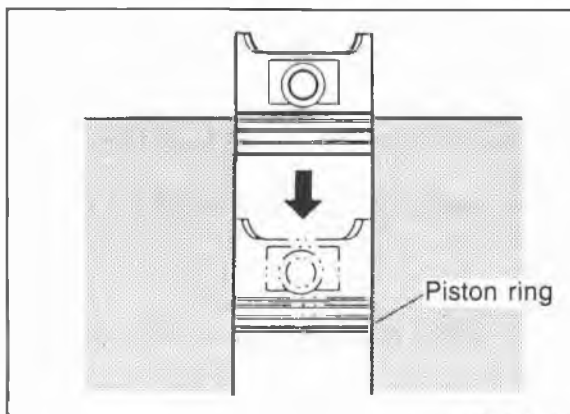
79G01C-073



76G01A-130



69G01A-125



86U01X-104

## Piston

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace if necessary.
2. Measure the outer diameter of each piston at a right angle ( $90^\circ$ ) to the piston pin, **18 mm (0.709 in) below** the oil ring land lower edge.

## Piston diameter

mm (in)

Size	Diameter
Standard	85.944—85.964 (3.3836—3.3844)
0.25 (0.010) oversize	86.194—86.214 (3.3935—3.3942)
0.50 (0.020) oversize	86.444—86.464 (3.4033—3.4041)

3. Check the piston to cylinder clearance.

## Clearance:

**0.036—0.075 mm (0.0014—0.0030 in)**

**Maximum: 0.15 mm (0.0059 in)**

4. If the clearance exceeds the maximum, replace the piston or rebore the cylinders to fit oversize pistons.

## Caution

**If the piston is replaced, replace the piston rings also.**

## Piston and Piston Ring

1. Measure the piston ring to ring land clearance around the entire circumference using a new piston ring.

## Clearance (Top and Second):

**0.03—0.07 mm (0.001—0.003 in)**

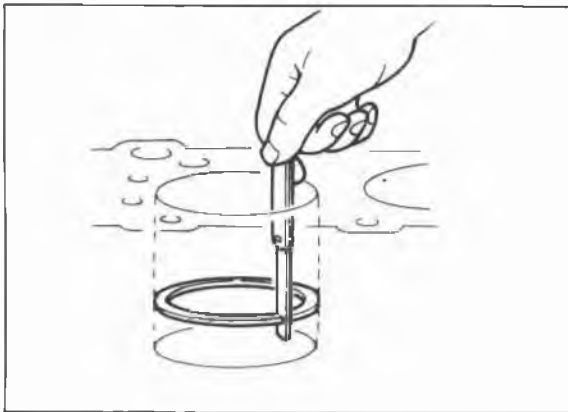
**Maximum: 0.15 mm (0.006 in)**

2. If the clearance exceeds the maximum, replace the piston.

3. Inspect the piston rings for damage, abnormal wear, or breakage. Replace if necessary.

4. Insert the piston ring into the cylinder by hand and push it to the bottom of the ring travel in using the piston.

# 1B INSPECTION AND REPAIR

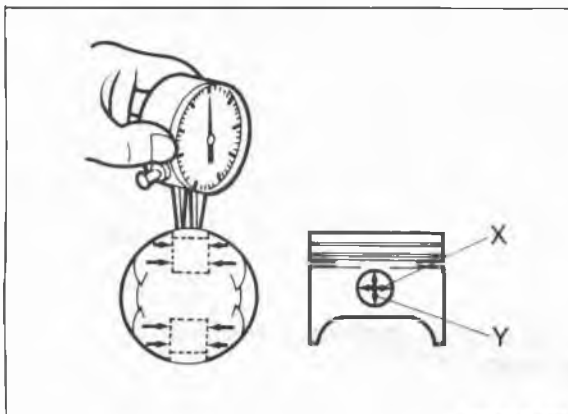


76G01B-065

5. Measure each piston ring end gap with a feeler gauge. Replace if necessary.

### End gap

**Top** : 0.20—0.35 mm (0.008—0.014 in)  
**Second**: 0.15—0.30 mm (0.006—0.012 in)  
**Oil rail** : 0.20—0.70 mm (0.008—0.028 in)  
**Maximum**: 1.0 mm (0.039 in)



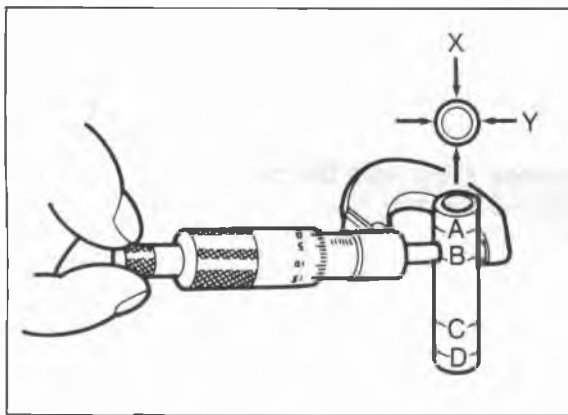
76G01B-066

### Piston and Piston Pin

1. Measure the piston pin hole diameter in X and Y directions at four points.

### Diameter:

**21.988—21.998 mm (0.8657—0.8661 in)**



76G01B-067

2. Measure the piston pin diameter.

### Diameter:

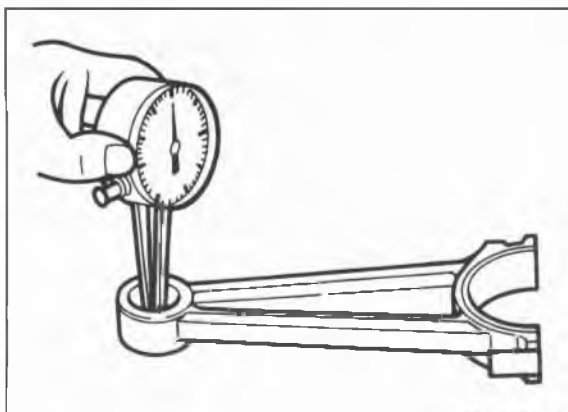
**21.987—21.993 mm (0.8656—0.8659 in)**

3. Determine the piston pin to piston clearance by subtracting the two figures.

### Clearance:

**-0.005—0.011 mm (-0.0002—0.0004 in)**

4. If the clearance exceeds the specification, replace the piston and/or piston pin.



76G01B-068

### Connecting Rod

1. Measure the connecting rod small end bore.

### Diameter:

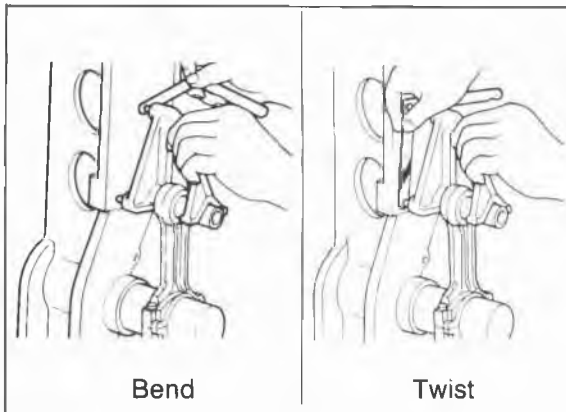
**22.003—22.014 mm (0.8663—0.8667 in)**

2. Check the clearance between the small end bore and piston pin.

### Clearance:

**0.010—0.027 mm (0.0004—0.0011 in)**

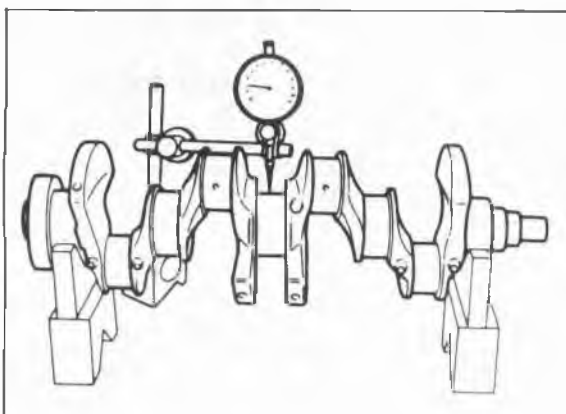




86U01X-108

3. Check each connecting rod for bending or twisting. Repair or replace if necessary.

**Bend: 0.06 mm (0.0024 in) max.**  
**Twist: 0.06 mm (0.0024 in) max.**

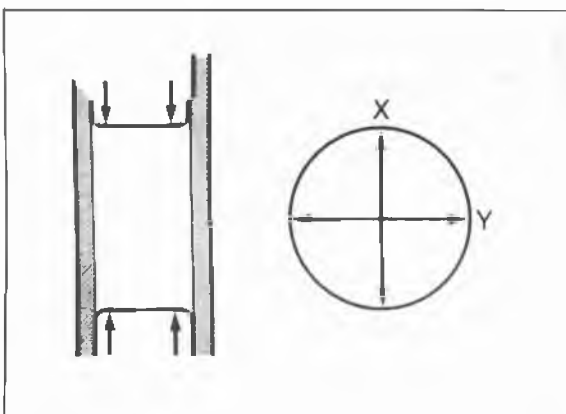


86U01X-109

### Crankshaft

1. Check the journals and pins for damage, scoring, or oil hole clogging.
2. Set the crankshaft on V-blocks.
3. Check the crankshaft runout at the center journal. Replace if necessary.

**Runout: 0.03 mm (0.0012 in) max.**



76G01A-131

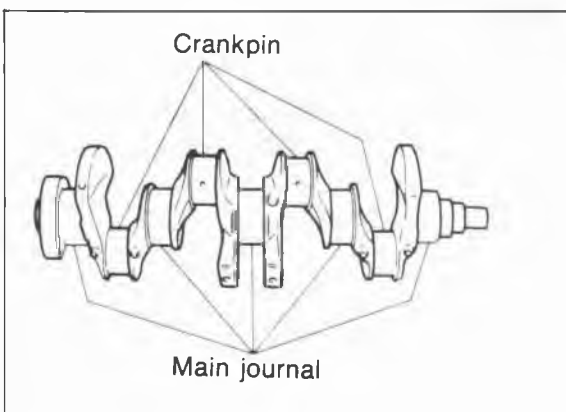
4. Measure each journal diameter in X and Y directions at two points.

### Main journal

**Diameter:**  
**59.937—59.955 mm (2.3597—2.3604 in)**  
**Out-of-round: 0.05 mm (0.0020 in) max.**

### Crankpin journal

**Diameter:**  
**50.940—50.955 mm (2.0055—2.0061 in)**  
**Out-of-round: 0.05 mm (0.0020 in) max.**



76G01A-132

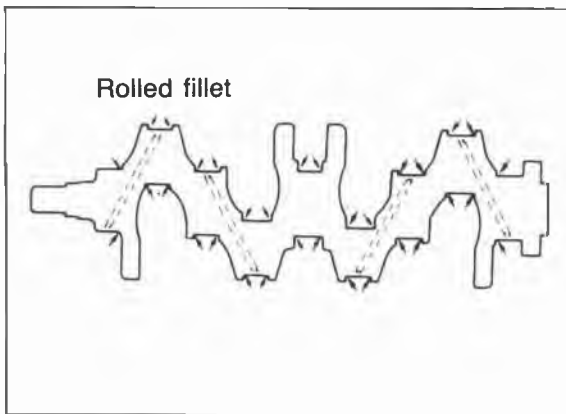
5. If the diameter is less than the minimum, grind the journals to match undersize bearings.

**Undersize bearing: 0.25 mm (0.010 in),  
 0.50 mm (0.020 in), 0.75 mm (0.030 in)**

**Main journal diameter undersize** mm (in)

Bearing size		Journal diameter
0.25 (0.010) undersize	No.1,2,4,5	59.693—59.711 (2.3501—2.3508)
	No.3	59.687—59.705 (2.3499—2.3506)
0.50 (0.020) undersize	No.1,2,4,5	59.443—59.461 (2.3403—2.3410)
	No.3	59.437—59.455 (2.3400—2.3407)
0.75 (0.030) undersize	No.1,2,4,5	59.193—59.211 (2.3304—2.3311)
	No.3	59.187—59.205 (2.3302—2.3309)

# 1B INSPECTION AND REPAIR



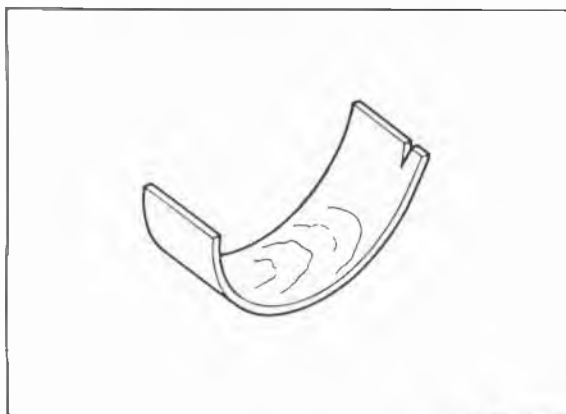
76G01A-133

## Crankpin journal diameter undersize mm (in)

Bearing size	Journal diameter
0.25 (0.010) undersize	50.690—50.705 (1.9957—1.9963)
0.50 (0.020) undersize	50.440—50.455 (1.9858—1.9864)
0.75 (0.030) undersize	50.190—50.205 (1.9760—1.9766)

### Caution

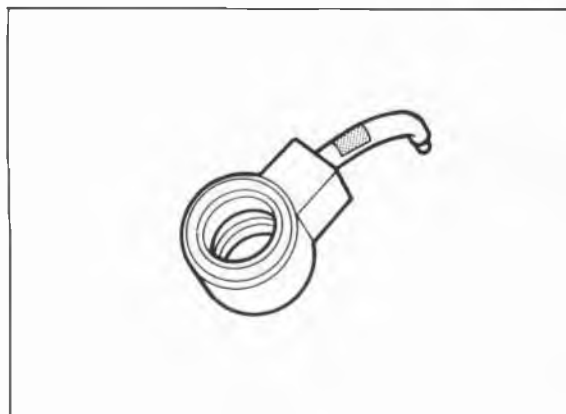
Do not grind the rolled fillet area.



79G01C-077

## Main Bearing and Connecting Rod Bearing

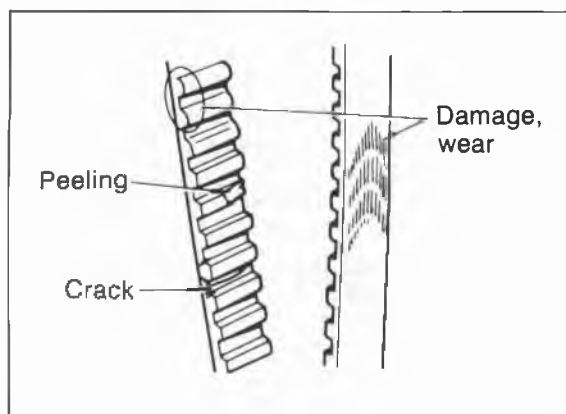
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.



76G01B-069

## Oil Jet

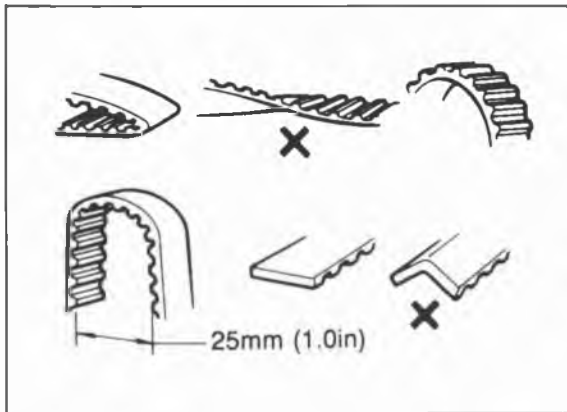
1. Check that the oil passage is not clogged.
2. Check that the check ball is not stuck.



86U01X-113

## Timing Belt

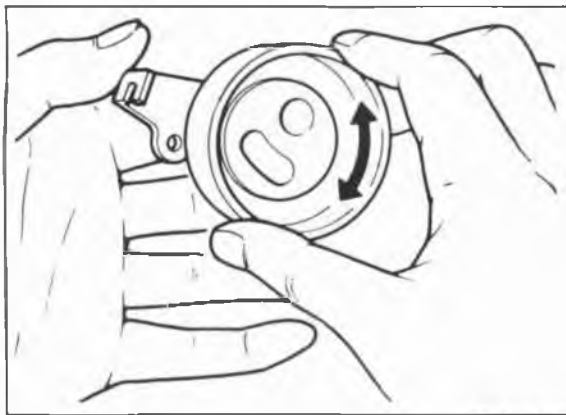
1. Replace the timing belt if there is any oil or grease on it.
2. Check the timing belt for damage, wear, peeling, cracks, or hardening. Replace if necessary.



86U01X-114

**Caution**

- a) Never forcefully twist, turn inside out, or bend the timing belt.
- b) Be careful not to allow oil or grease on the belt.



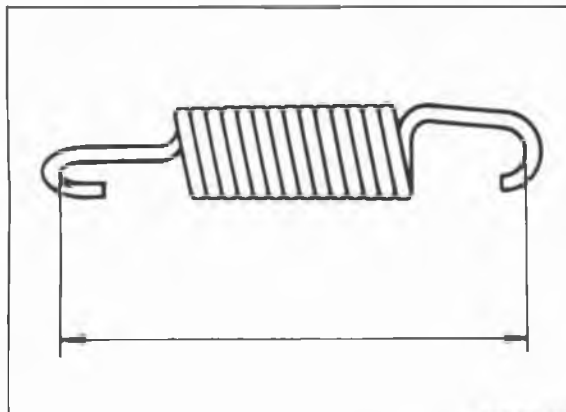
86U01X-115

**Timing Belt Tensioner and Idler Pulley**

Check the timing belt tensioner and idler pulley for smooth rotation and abnormal noise. Replace if necessary.

**Caution**

Do not clean the tensioner with cleaning fluids. If necessary, use a soft rag to wipe it clean, and avoid scratching it.

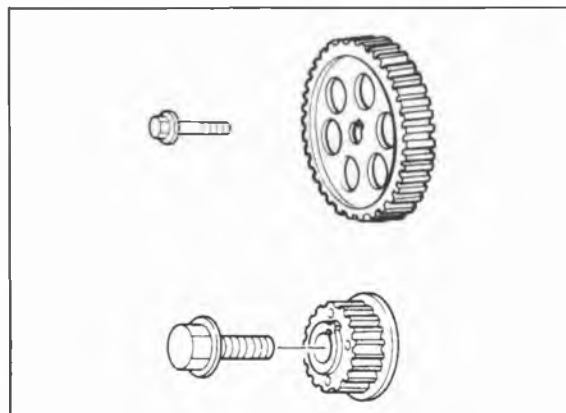


76G01B-126

**Timing Belt Tensioner Spring**

Check the free length of the tensioner spring. Replace if necessary.

**Free length: 53.3 mm (2.098 in)**



86U01X-117

**Timing Belt Pulley and Camshaft Pulley**

Inspect the pulley teeth for wear, deformation, or other damage. Replace if necessary.

**Caution**

Do not clean the pulley with cleaning fluids. If necessary, use a rag to wipe it clean.

**Timing Belt Cover (lower and upper)**

Inspect the timing belt covers for damage or cracks. Replace if necessary.

# 1B ASSEMBLY (CYLINDER BLOCK)

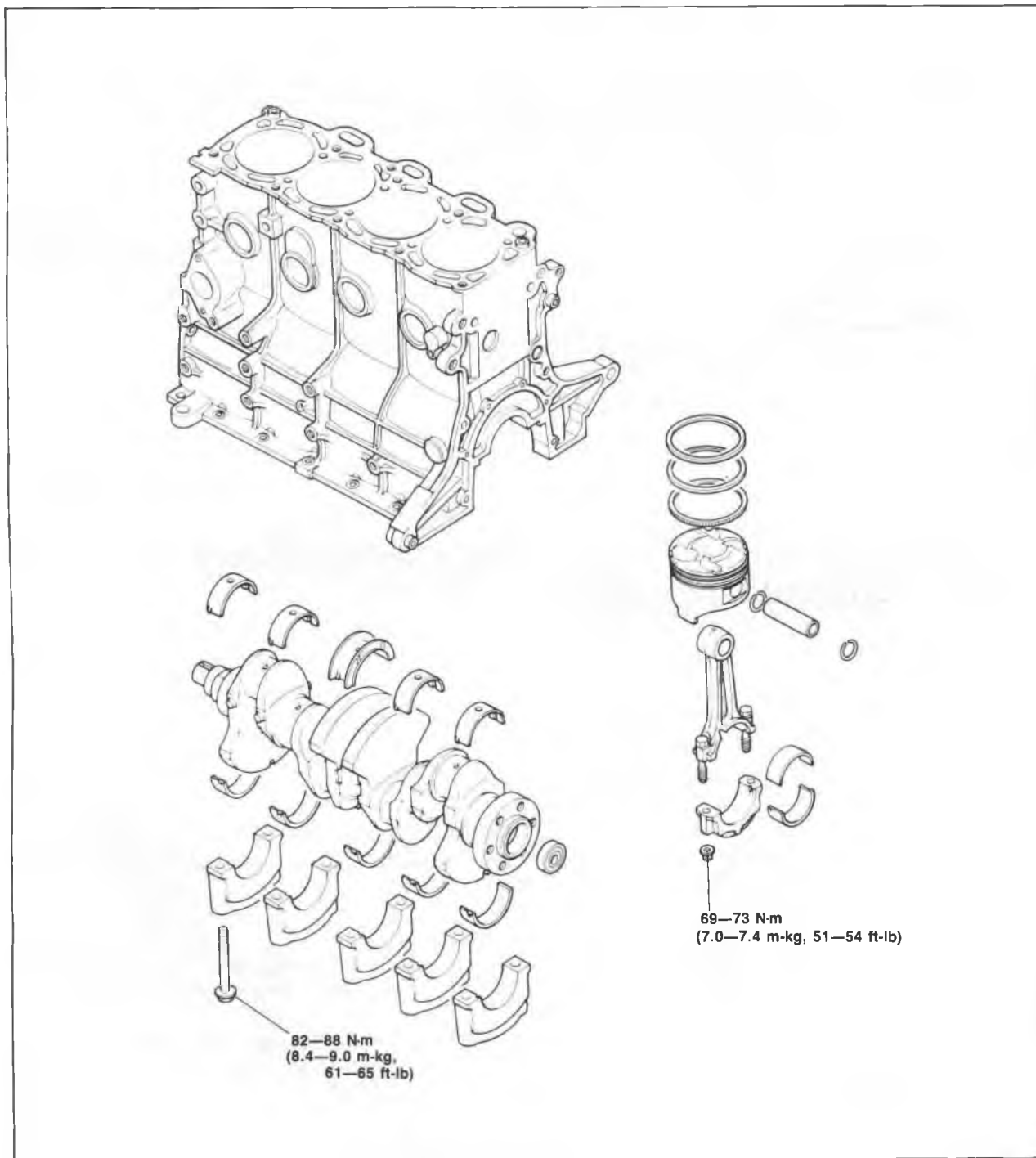
## ASSEMBLY

1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace plain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

### Caution

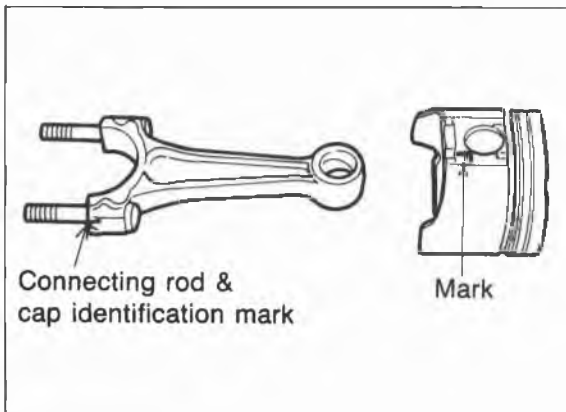
Do not reuse gaskets or oil seals.

### CYLINDER BLOCK—I Torque Specifications



69G01A-139

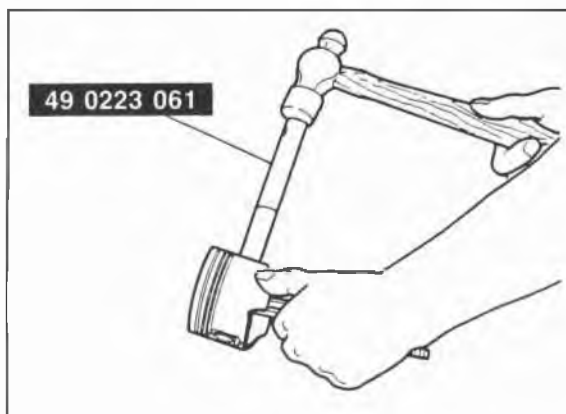
## ASSEMBLY (CYLINDER BLOCK) 1B



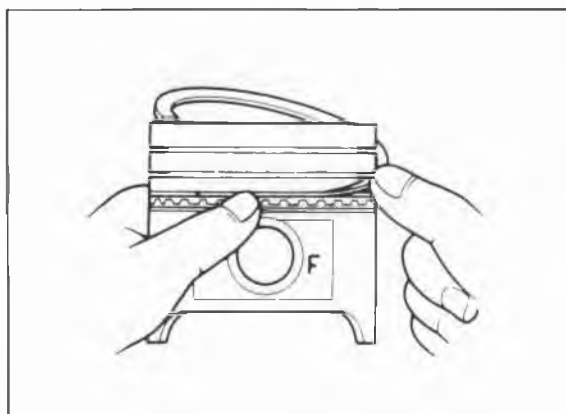
76G01B-070



76G01B-071



76G01B-072



69G01A-144

### Connecting Rod

1. Align the identification mark to the cap of large end of connecting rod and **F** mark on the piston as shown in the figure.
2. Apply a coat of engine oil to the circumference of each piston pin and to the small end of each connecting rod.

3. Set a clip into the clip groove in one side of the piston.

4. Insert the piston pin into the piston and connecting rod from the opposite side of the piston with the **SST**.
5. Tap the piston pin in until it touches the clip. Install the other clip into the groove in the piston.
6. Check the oscillation torque of the connecting rod. (Refer to page 1B—33.)

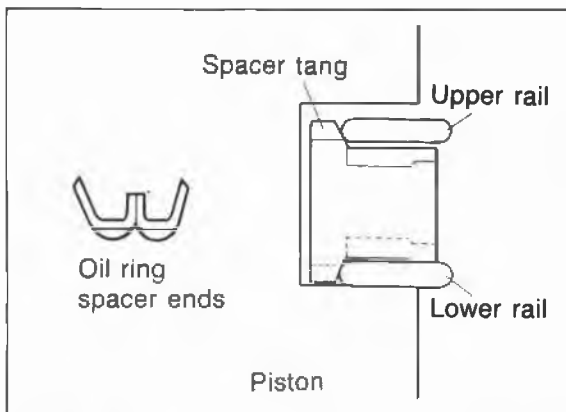
### Piston Ring

1. Install the three-piece oil rings on the pistons.
  - (1) Apply engine oil to the oil ring spacer and rails.
  - (2) Install the oil ring spacer so that the opening faces upward.
  - (3) Install the upper rail and lower rail.

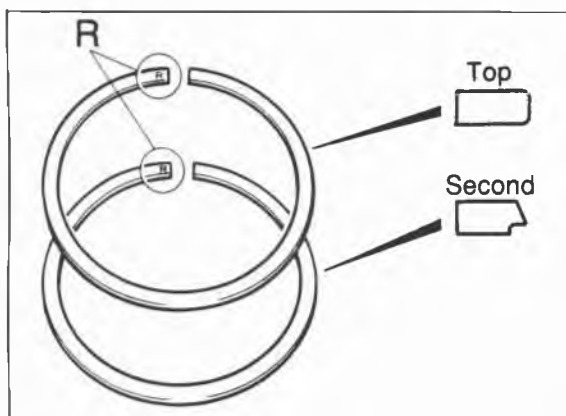
#### Note

- a) The upper rail and lower rail are the same.
- b) Each rail can be installed with either face upward.

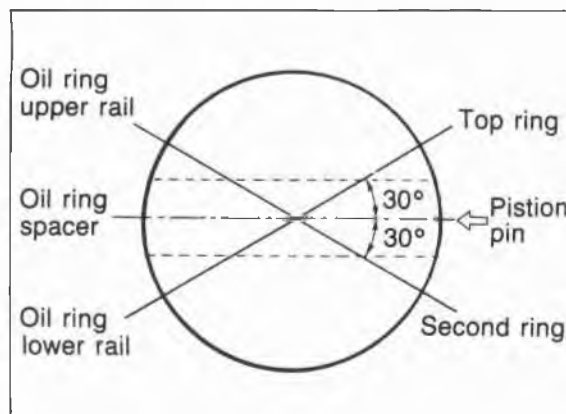
# 1B ASSEMBLY (CYLINDER BLOCK)



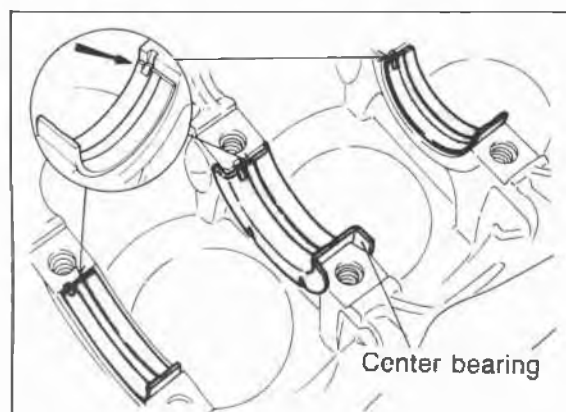
69G01A-145



86U01X-121



69G01A-147



86U01X-215

2. Check that both rails are expanded by the spacer tangs as shown in the figure by checking that both rails turn smoothly in both directions.

3. Install the second ring to the piston first, then install the top ring. Use a piston ring expander.

### Caution

The rings must be installed with the "R" marks facing upward.

4. Apply a liberal amount of clean engine oil to the second and top piston rings.

5. Position the opening of each ring as shown in the figure.

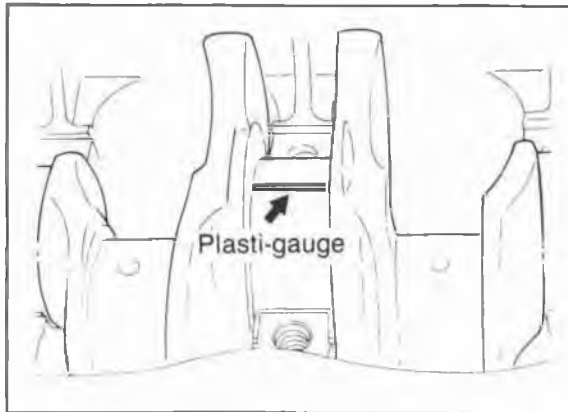
### Crankshaft

1. Before installing the crankshaft, inspect the main bearing oil clearances as described.

### Note

The bearing with thrust shoulders is the center bearing in the cylinder block.

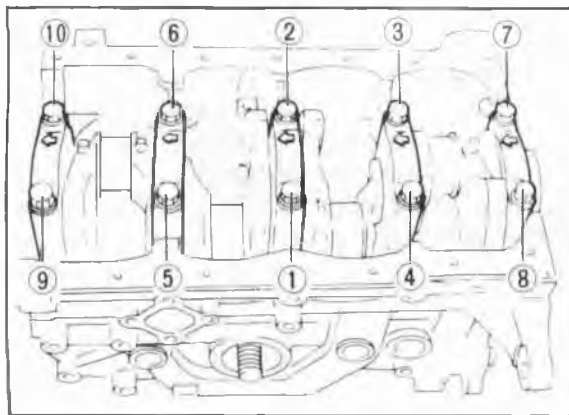
## ASSEMBLY (CYLINDER BLOCK) 1B



86U01X-122

### Oil clearance inspection

- (1) Remove any foreign material and oil from the journals and bearings.
- (2) Install the upper main bearings in the cylinder block.
- (3) Set the crankshaft into the cylinder block.
- (4) Position the plasti-gauge on top of the journals in the axial direction.



86U01X-123

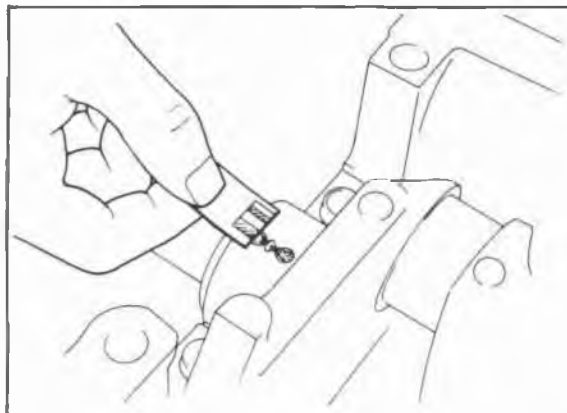
- (5) Install the main bearing caps along with the lower main bearings according to the cap number and ← mark.
- (6) Tighten the caps in two or three steps in the order in the figure.

### Tightening torque:

**82—88 N·m (8.4—9.0 m·kg, 61—65 ft·lb)**

### Caution

**Do not rotate the crankshaft when measuring the oil clearances.**



76G01B-073

- (7) Remove the main bearing caps, and measure the plasti-gauge at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance. If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings. (Refer to page 1B—45.)

### Oil clearance

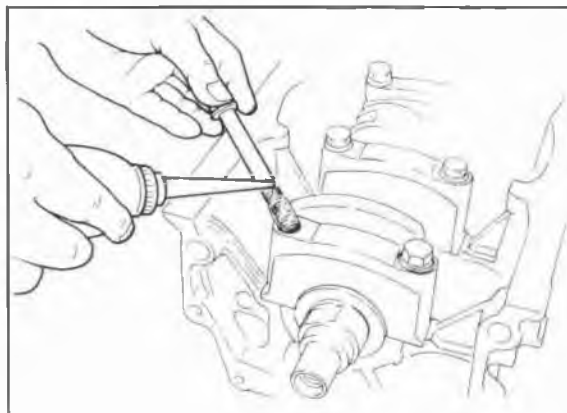
**No. 1, 2, 4, 5:**

**0.025—0.043 mm (0.0010—0.0017 in)**

**No. 3:**

**0.031—0.049 mm (0.0012—0.0019 in)**

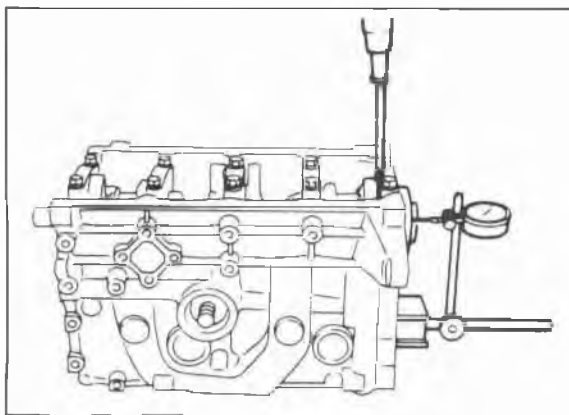
**Maximum: 0.08 mm (0.0031 in)**



86U01X-125

2. Apply a liberal amount of engine oil to the main bearings and main journals.
3. Install the crankshaft and the main bearing caps according to the cap number and ← mark.

# 1B ASSEMBLY (CYLINDER BLOCK)



76G01A-074

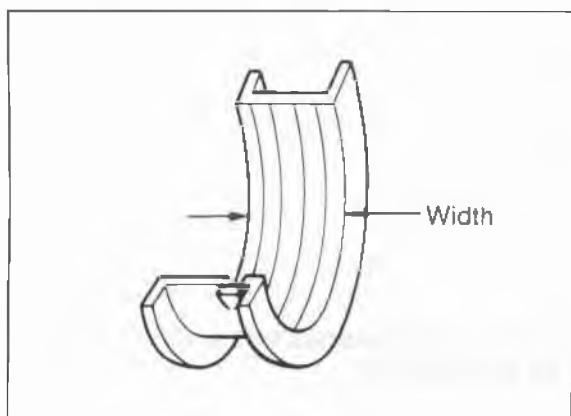
4. Inspect the crankshaft end play.

### End play:

**0.08—0.18 mm (0.0031—0.0071 in)**

**Maximum: 0.30 mm (0.012 in)**

5. If the end play exceeds specification, grind the crankshaft and use undersize center main bearing.



86U01X-216

### Center main bearing width

#### Standard:

**27.94—27.99 mm (1.1000—1.1020 in)**

**0.25 mm (0.010 in) undersize:**

**28.04—28.09 mm (1.1040—1.1059 in)**

**0.50 mm (0.020 in) undersize:**

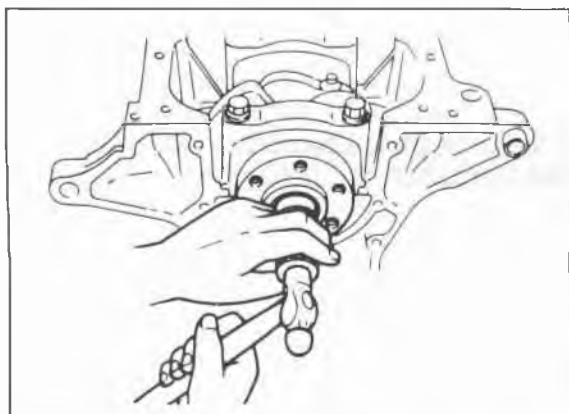
**28.12—28.17 mm (1.1071—1.1091 in)**

**0.75 mm (0.030 in) undersize:**

**28.20—28.25 mm (1.1102—1.1122 in)**

### Note

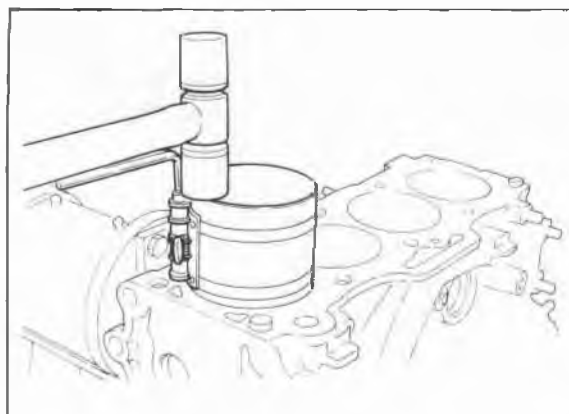
**Wider thrust width is available only in undersize center main bearing.**



76G01B-075

### Pilot Bearing

1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30—34 mm, 1.18—1.34 in) against the outer race of the bearing, then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.



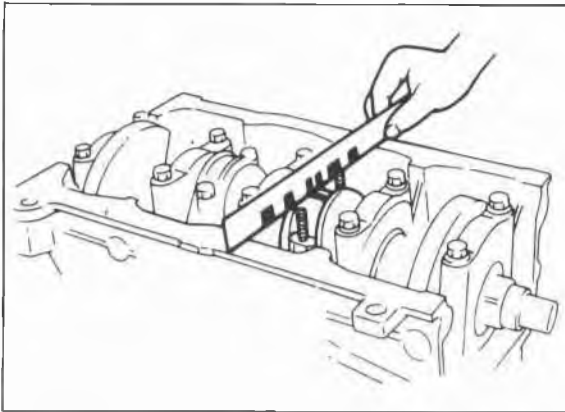
76G01A-136

### Piston and Connecting Rod Assembly

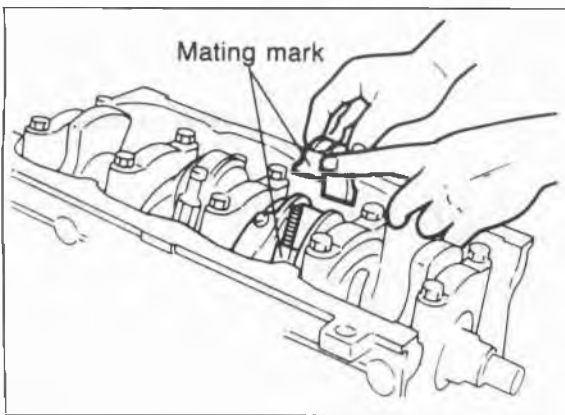
1. Apply a liberal amount of clean engine oil to the cylinder walls, piston, and rings.
2. Check the piston rings for the end gap alignment.
3. Insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine. Use a piston installer tool (commercially available).



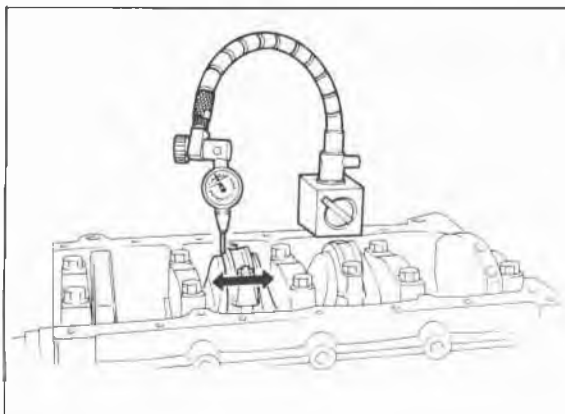
## ASSEMBLY (CYLINDER BLOCK) 1B



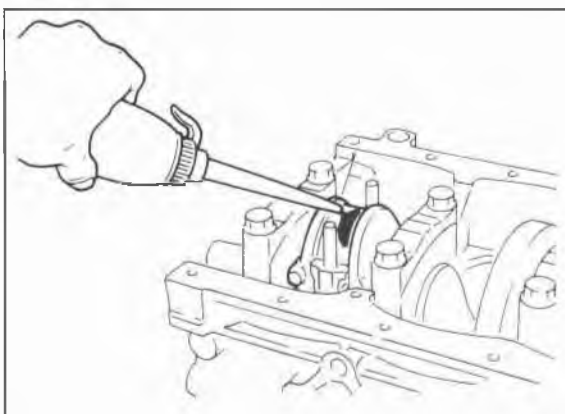
76G01B-076



76G01B-077



69G01B-139



76G01B-078

### Connecting Rod Cap

1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

### Connecting rod cap tightening torque:

69—73 N·m (7.0—7.4 m·kg, 51—54 ft·lb)

### Oil clearance:

0.027—0.067 mm (0.0011—0.0026 in)

Maximum: 0.10 mm (0.0039 in)

### Caution

Align the alignment marks on the cap and on the connecting rod when installing the connecting rod cap.

2. If the oil clearance exceeds specification grind the crankshaft and use undersize bearings. (Refer to page 1B—46.)

3. Check the side clearance of each connecting rod without the cap installed.

### Side clearance:

0.110—0.262 mm (0.004—0.0103 in)

Maximum: 0.30 mm (0.012 in)

If the clearance exceeds the maximum, replace the connecting rod.

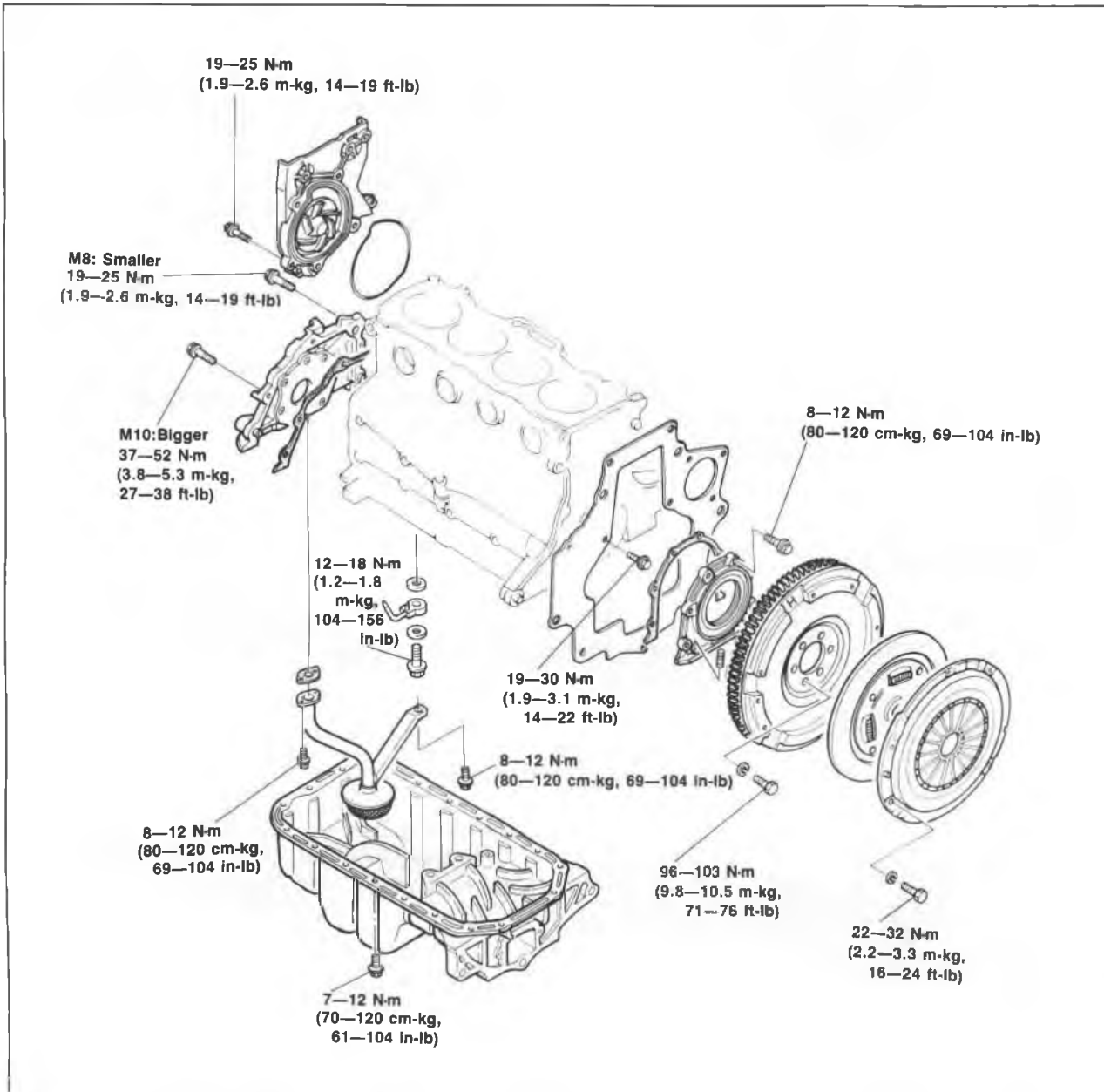
4. Apply a liberal amount of engine oil to the crankpin journal and connecting rod bearing.
5. Install the connecting rod cap with the alignment marks aligned.

### Tightening torque:

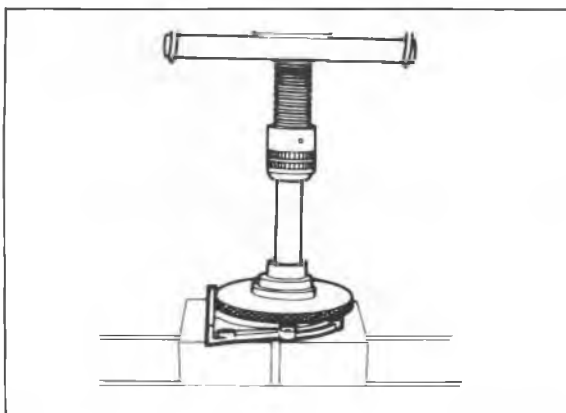
69—73 N·m (7.0—7.4 m·kg, 51—54 ft·lb)

# 1B ASSEMBLY (CYLINDER BLOCK)

## CYLINDER BLOCK—II Torque Specifications



69G01A-166

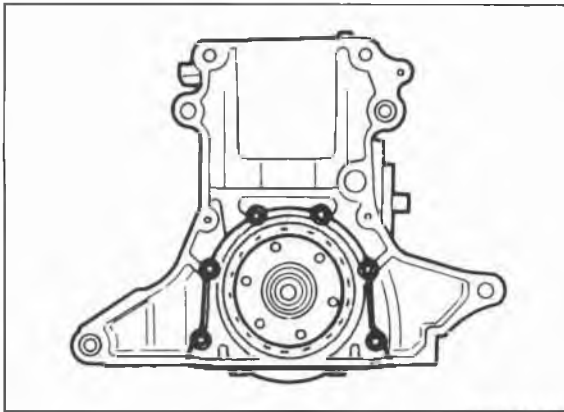


4BG01A-158

### Rear Cover

1. Apply engine oil to the rear cover, oil seal and oil seal lip.
2. Press the oil seal into the rear cover.

## ASSEMBLY (CYLINDER BLOCK) 1B

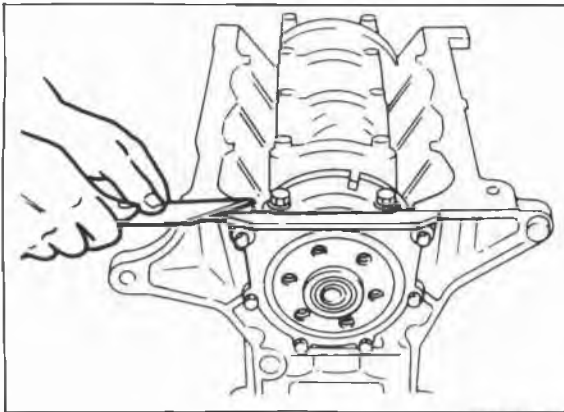


86U01X-131

3. Install the rear cover and a new gasket.

**Tightening torque:**

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

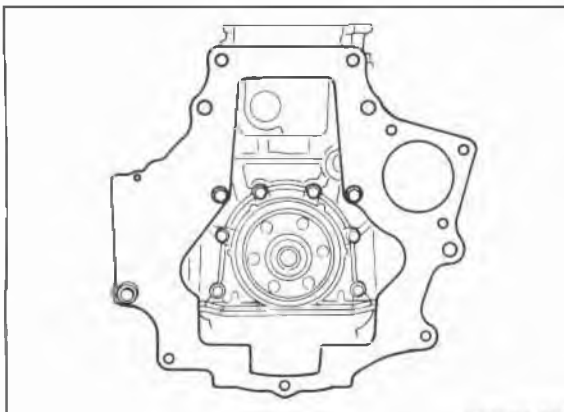


86U01X-132

4. Cut away the portion of the gasket that projects out from the rear cover assembly toward the oil pan side.

**Caution**

**Do not scratch the rear cover assembly.**



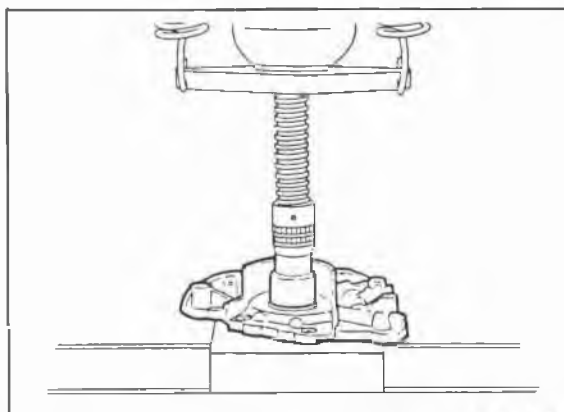
4BG01A-160

**End Plate**

Install the end plate.

**Tightening torque:**

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

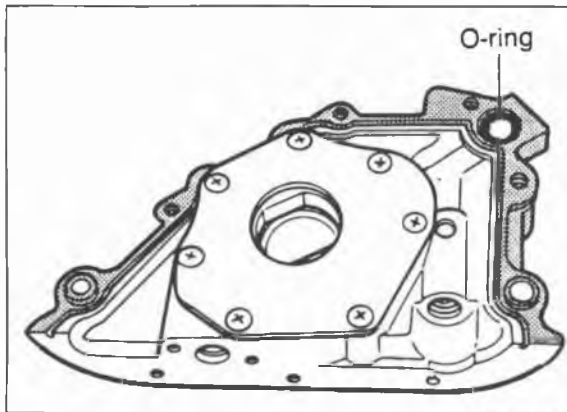


79G01C-085

**Oil Pump**

1. Apply engine oil to a new oil pump oil seal and the oil pump body.
2. Press the oil seal into the oil pump body.

# 1B ASSEMBLY (CYLINDER BLOCK)

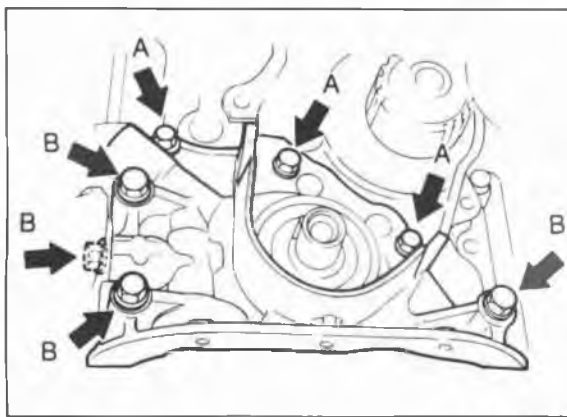


86U01X-133

3. Apply engine oil to the oil seal lip.
4. Remove any dirt or other material from the contact surfaces.
5. Apply a continuous bead of silicon sealant to the contact surface of the oil pump.

### Caution

**Do not allow any sealant to get into the oil hole.**



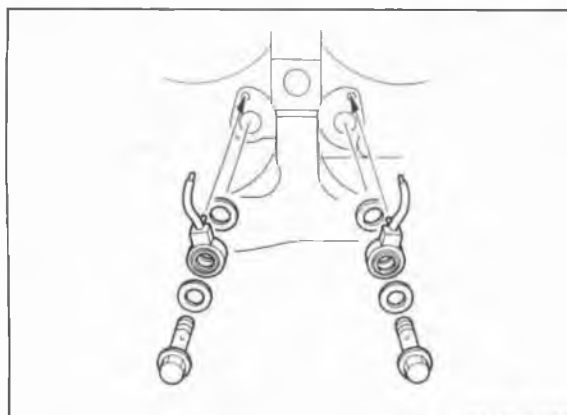
76G01A-137

6. Install a new O-ring into the pump body.
7. Install the oil pump.

### Tightening torque

- Ⓐ: 19—25 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)
- Ⓑ: 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)

8. Remove any sealant which has been squeezed out.



76G01B-079

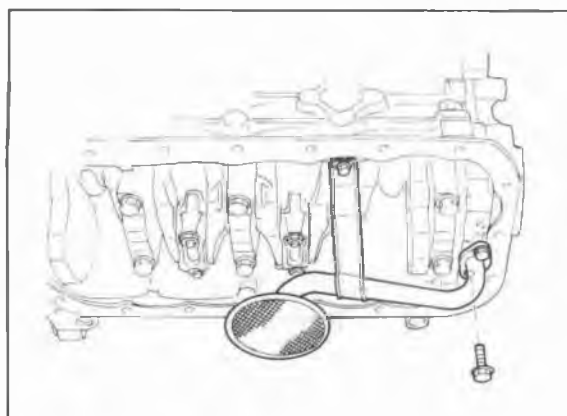
### Oil Jet

Install the oil jet as shown in the figure.

**Tightening torque: 12—18 N·m**  
(1.2—1.8 m·kg, 104—156 in·lb)

### Caution

**The shapes of the No. 1, 3 cylinders jet valves and No. 2, 4 jet valves are different.**



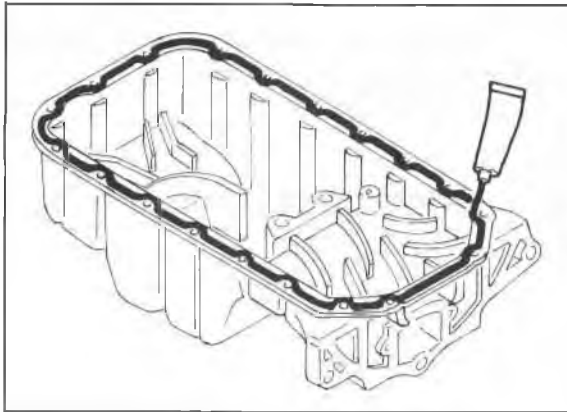
86U01X-136

### Oil Strainer

Install the oil strainer and a new gasket.

**Tightening torque:**  
8—12 N·m (80—120 cm·kg, 69—104 in·lb)

## ASSEMBLY (CYLINDER BLOCK) 1B



76G01B-080

### Oil Pan

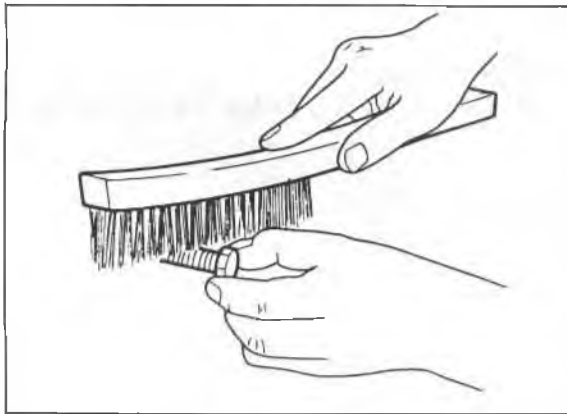
1. Apply a continuous bead of silicon sealant to the oil pan around inside of the bolt holes and overlap the ends.
2. Install the oil pan.

### Tightening torque:

7—12 N·m (70—120 cm·kg, 61—104 in·lb)

### Caution

Oil pan projection and recession from the end of the cylinder block must not be more than 1.5 mm (0.06 in).



76G01B-081

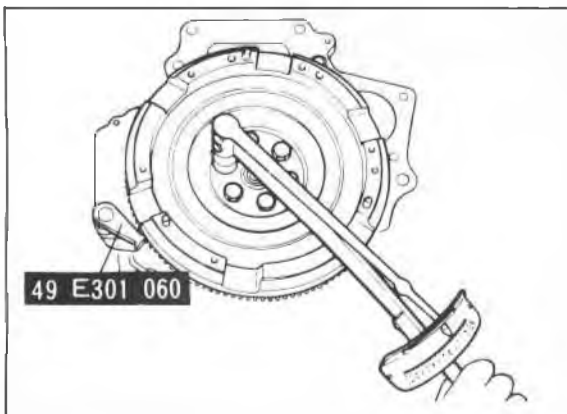
### Flywheel

1. Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it.
2. Apply sealant to the bolt threads.

3. Install, and tighten the flywheel with the **SST**.

### Tightening torque:

96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)



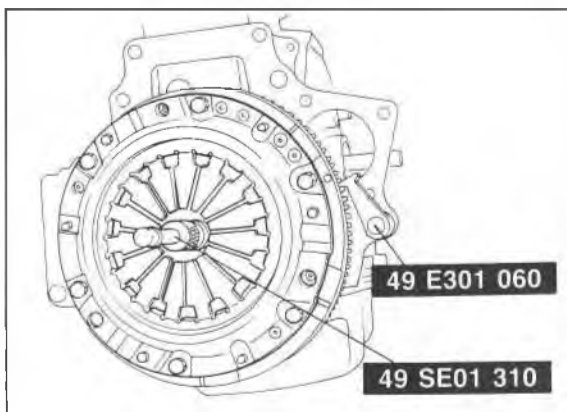
76G01B-082

### Clutch Disc and Clutch Cover

Install the clutch disc and clutch cover using the **SST**. (Refer to Section 6.)

### Tightening torque:

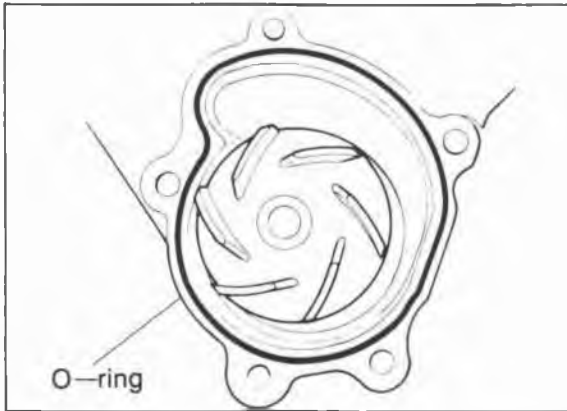
22—32 N·m (2.2—3.3 m·kg, 16—24 ft·lb)



76G01B-083

# 1B ASSEMBLY (CYLINDER BLOCK)

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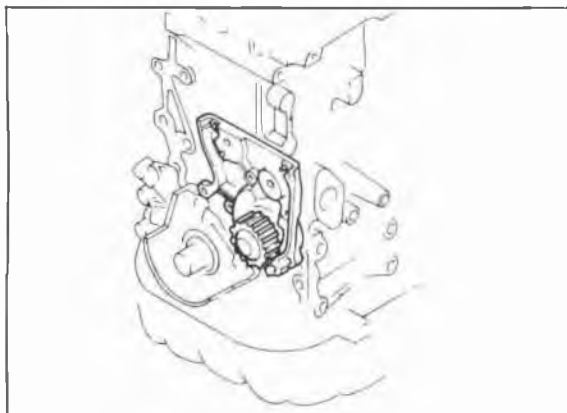
86U01X-142

## Water Pump

1. Remove all dirt, grease, and other material from the water pump mounting surface.
2. Place a new O-ring in position.

### Caution

**Do not reuse the original O-ring.**



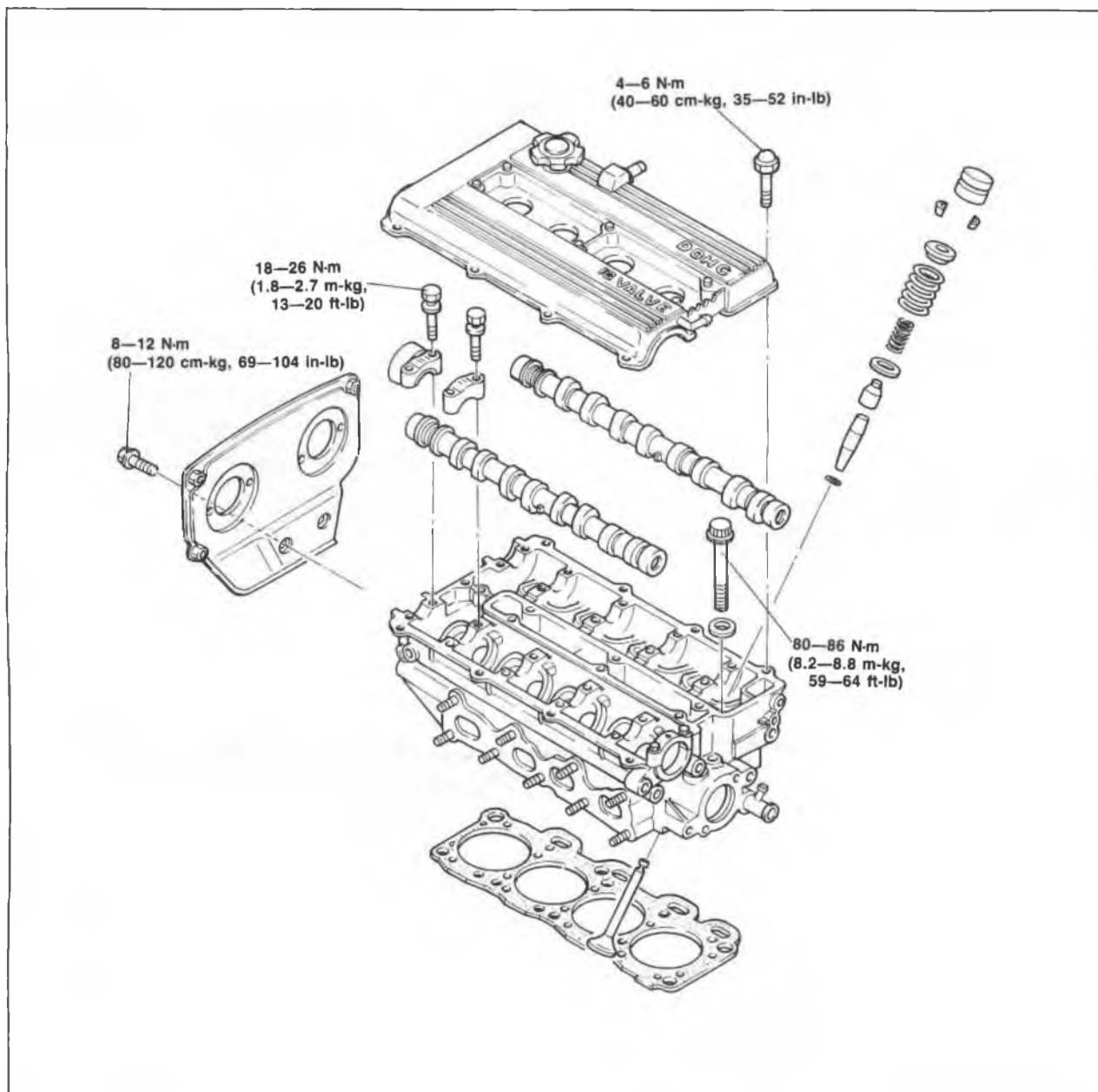
7BU01B-103

3. Install the water pump.

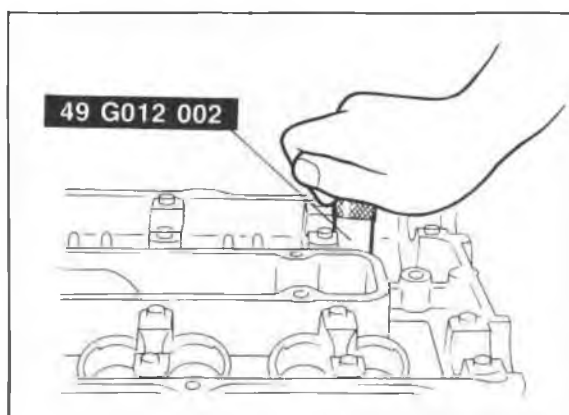
### Tightening torque:

**19—25 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**

## CYLINDER HEAD Torque Specifications



69G01B-152

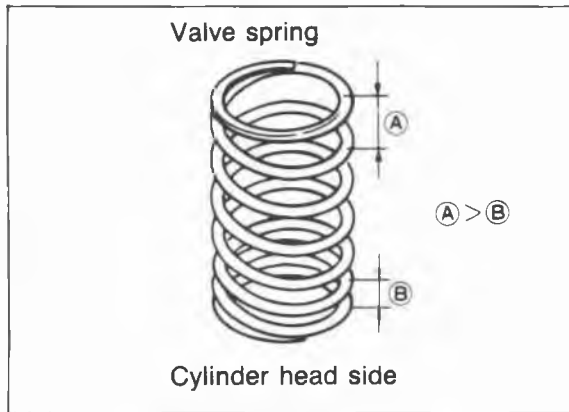


86U01X-143

### Valve Seal

1. Apply engine oil to the inside of the new valve seal.
2. Install the valve seal onto the valve guide with the **SST**.

# 1B ASSEMBLY (CYLINDER HEAD)



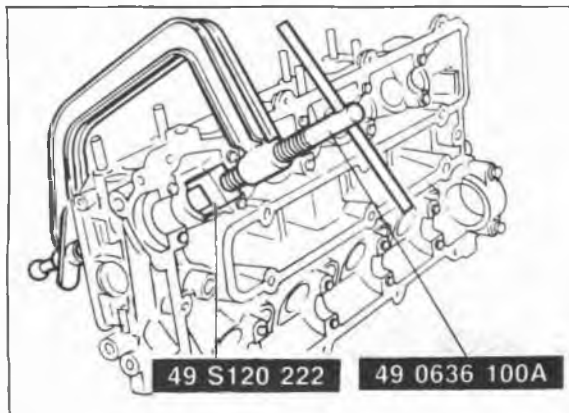
76G01B-084

## Valve and Valve Spring

1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

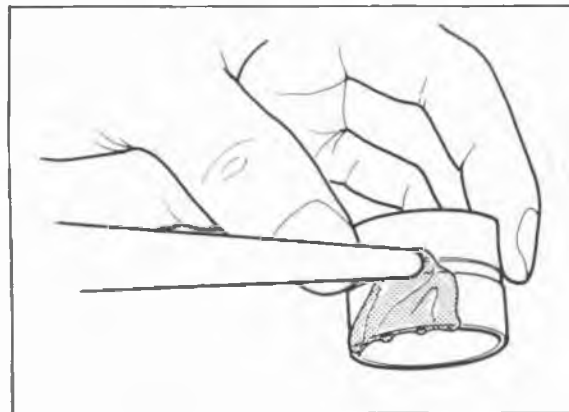
### Note

Install the outer and inner valve spring with the closer pitch toward the cylinder head.



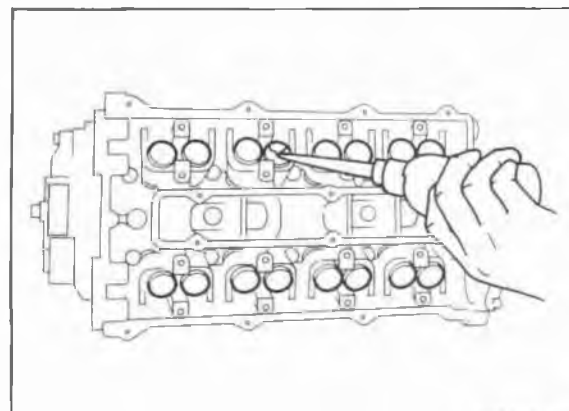
86U01X-145

4. Compress the valve spring with the **SST**; then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



## Hydraulic Lash Adjuster (HLA)

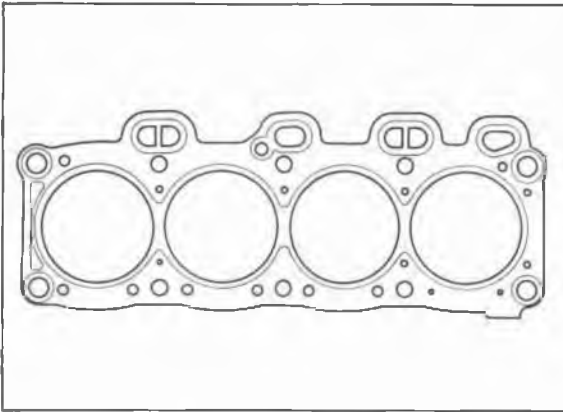
1. Apply engine oil to the sliding surface.



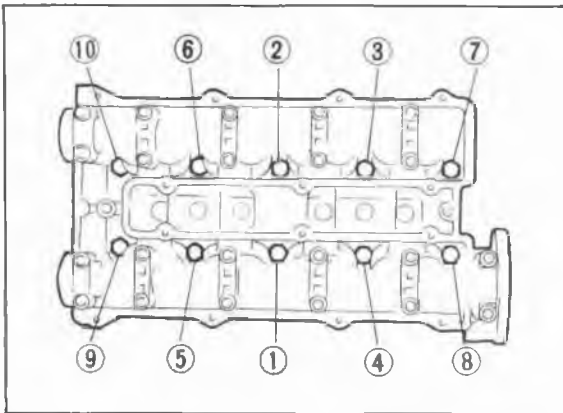
2. Install the HLA in the position from which they were removed.
3. Check for free movement.



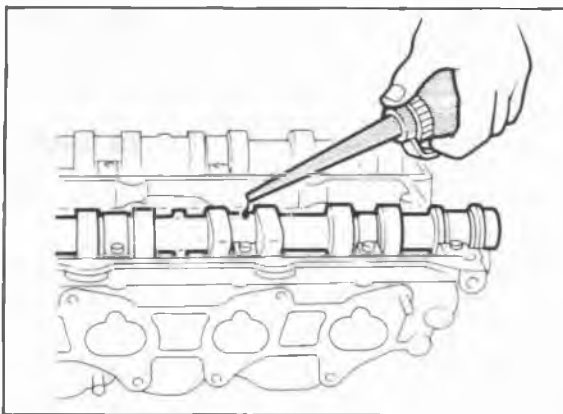
## ASSEMBLY (CYLINDER HEAD) 1B



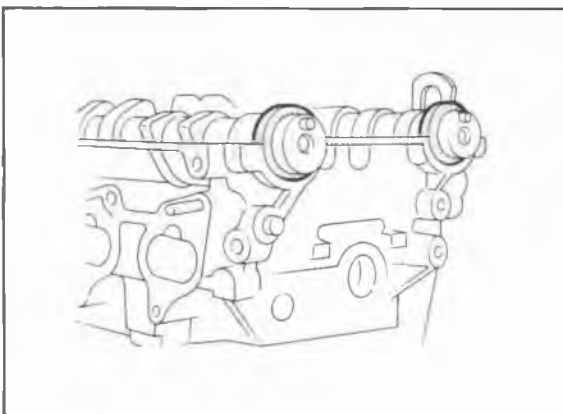
86U01X-146



86U01X-147



86U01X-148



76G01B-087

### Cylinder Head

1. Thoroughly remove all dirt, oil, or other material from the top of the cylinder block.
2. Place the new cylinder head gasket in position.

3. Install the cylinder head.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**

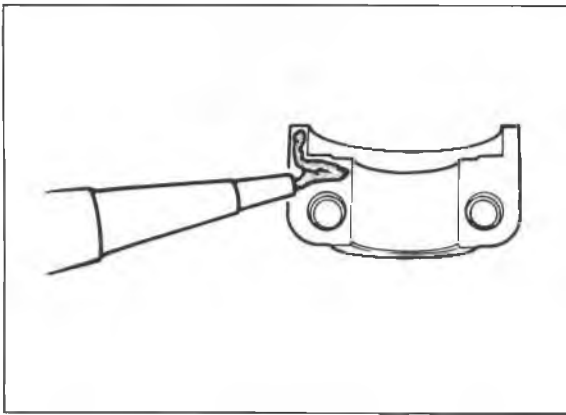
### Camshaft

1. Apply a liberal amount of engine oil to the journals and bearings.
2. Place the camshaft in position with the dowel pin facing straight up.

### Camshaft Oil Seal

1. Apply liberal amount of clean engine oil to the camshaft oil seal and cylinder head.
2. Install the camshaft oil seal.

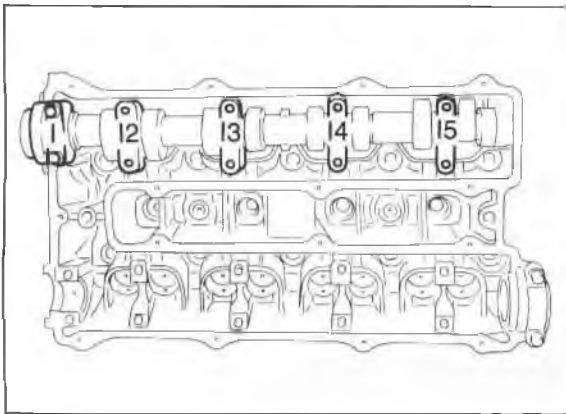
# 1B ASSEMBLY (CYLINDER HEAD)



76G01B-088

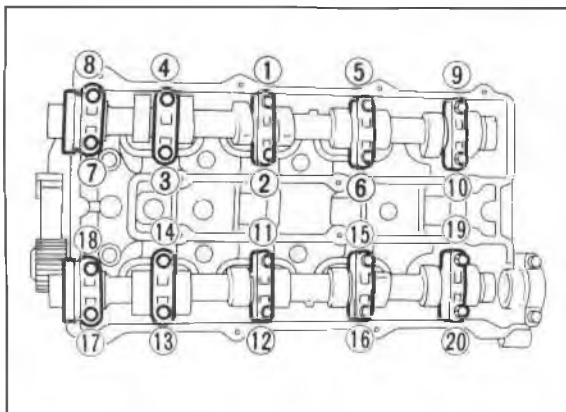
## Camshaft Cap

1. Apply liberal amount of clean engine oil to the cam lobes and journals.
2. Apply silicon sealant to the front camshaft cap surface.



76G01B-089

3. Position the camshaft caps according to the cap number and mark.

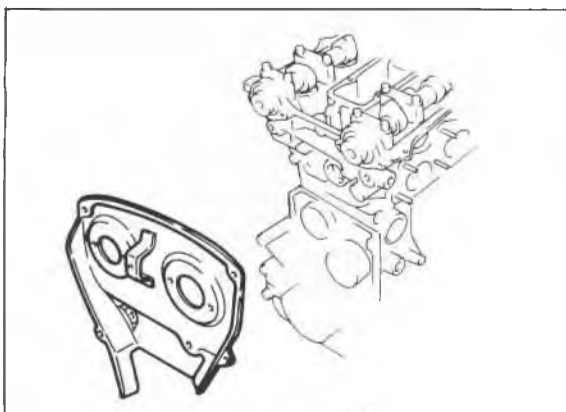


76G01B-090

4. Install the camshaft caps. Tighten the bolts in two or three steps in the order shown in the figure.

## Tightening torque:

**18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)**



76G01B-091

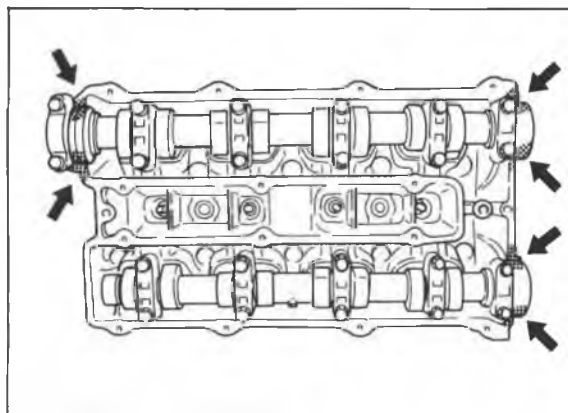
## Seal Plate

Install the seal plate.

## Tightening torque:

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

## ASSEMBLY (CYLINDER HEAD) **1B**



76G01B-092

### **Cylinder Head Cover**

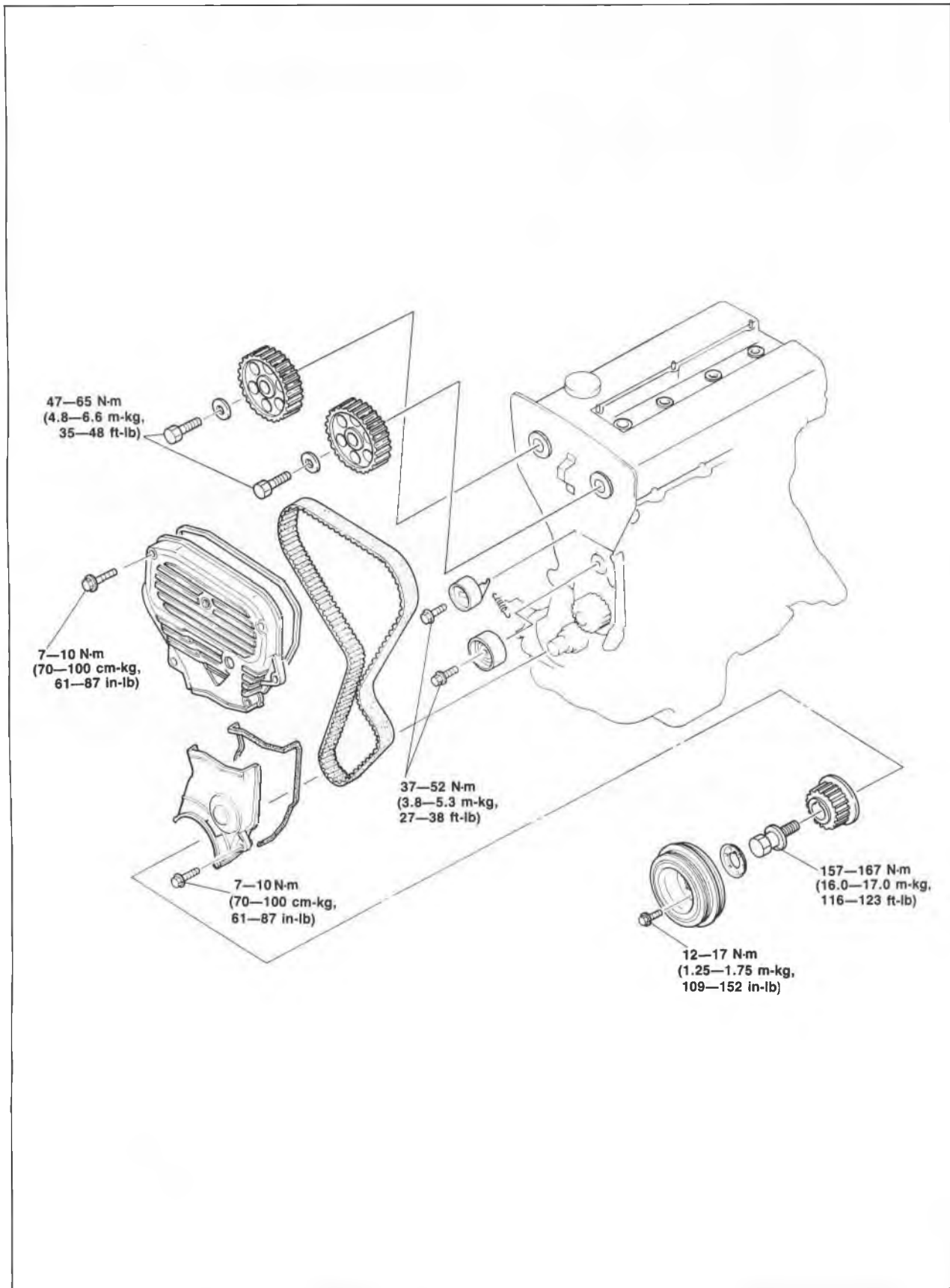
1. Apply silicon sealant to the shaded area shown in the figure.
2. Install the cylinder head cover.

### **Tightening torque:**

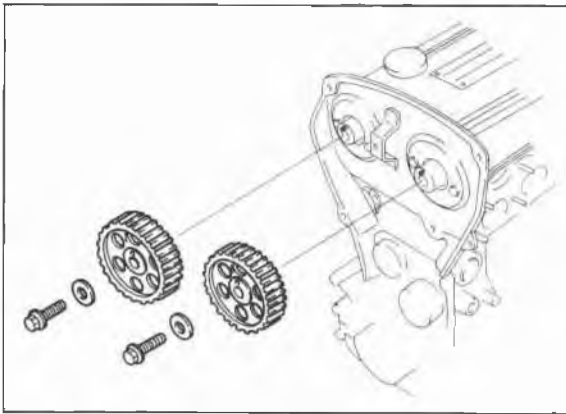
**4—6 N·m (40—60 cm·kg, 35—52 in·lb)**

# 1B ASSEMBLY (TIMING BELT)

## TIMING BELT Torque Specifications



69G01B-160



76G01B-127

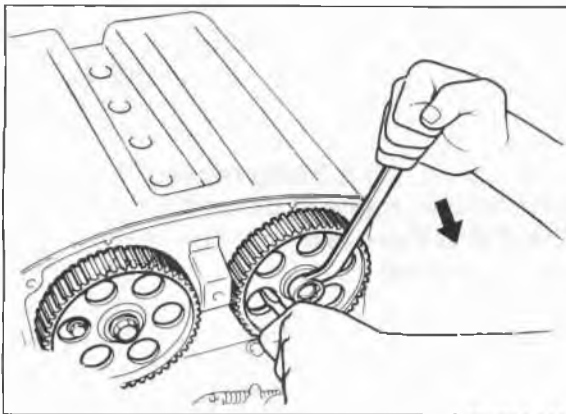
## Camshaft Pulley

1. Install the camshaft pulley on the camshaft with the dowel pin fit into the hole at the **I** mark (intake side) and **E** mark (exhaust side).

2. Tighten the camshaft pulley lock bolt.

### Tightening torque:

**47—65 N-m (4.8—6.6 m-kg, 35—48 ft-lb)**



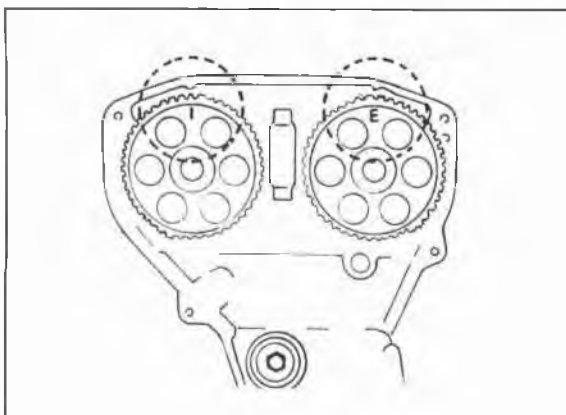
76G01A-141

3. Align the mating mark on the camshaft pulleys with the alignment mark on the seal plate.

### Note

**For intake side camshaft pulley, align “I” mark.**

**For exhaust side camshaft pulley, align “E” mark.**



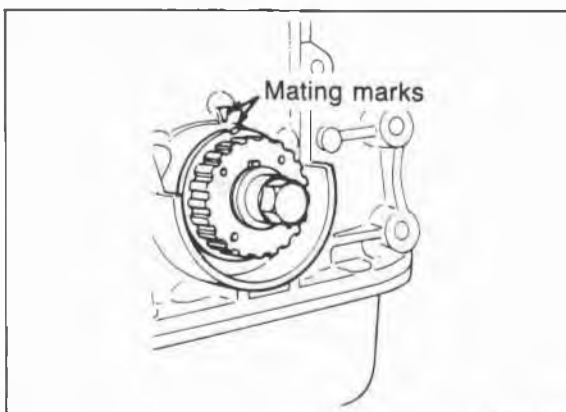
76G01B-094

## Timing Belt Pulley

1. Reverse the direction of the **SST** (ring gear brake).
2. Install the crankshaft key.
3. Install the timing belt pulley on the crankshaft.

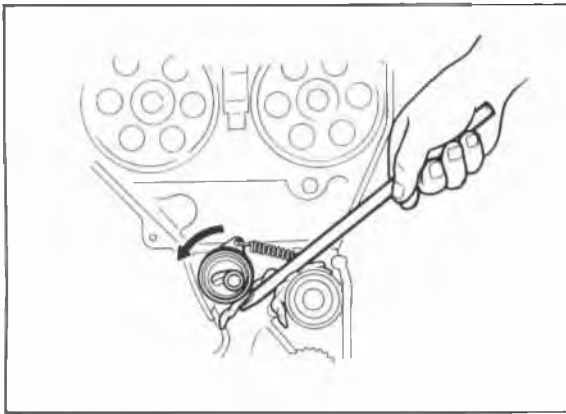
**Tightening torque: 157—167 N-m  
(16.0—17.0 m-kg, 116—123 ft-lb)**

4. Release the ring gear brake.
5. Align the timing belt pulley and the pump body alignment marks.



86U01X-160

# 1B ASSEMBLY (TIMING BELT)



69G01B-165

## Timing Belt Idler Pulley

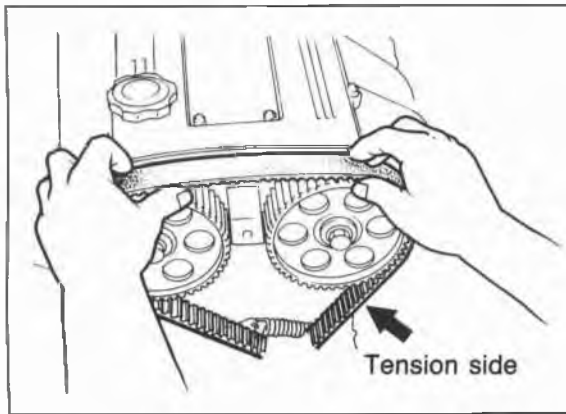
Install the timing belt idler pulley.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

## Timing Belt Tensioner

1. Install the timing belt tensioner and tensioner spring.
2. Tentatively secure the tensioner with the spring fully extended.



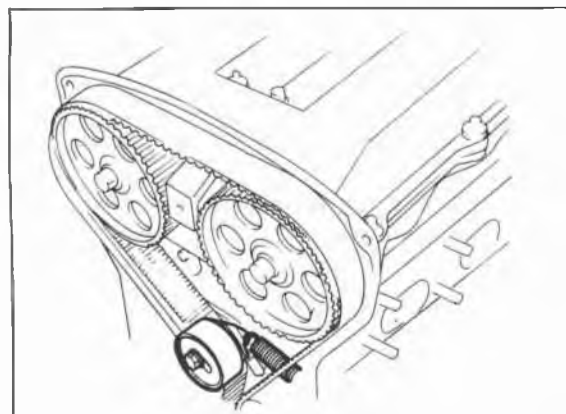
76G01B-095

## Timing Belt

1. Install the timing belt so that there is no looseness at the tension side, and at the two camshaft pulleys.

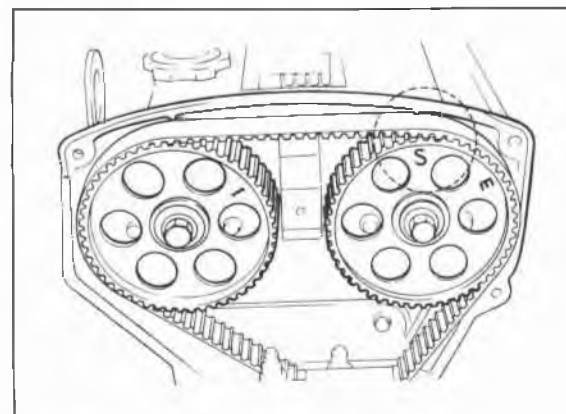
### Caution

- a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.
- b) Check that there is no oil, grease, or dirt on the timing belt.



79G01C-097

2. Loosen the tensioner lock bolt.
3. Turn the crankshaft twice in the direction of rotation.
4. Check that the mating marks are correctly aligned. If not aligned, remove the timing belt and tensioner, and repeat the above-mentioned procedure.



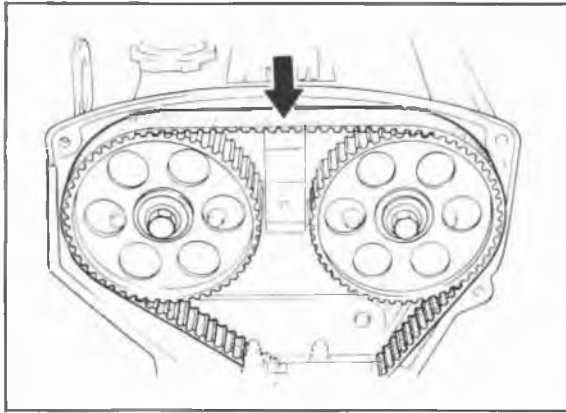
76G01B-096

5. Turn the crankshaft to align the **S** mark of the right side camshaft pulley with seal plate mating mark.
6. Tighten the timing belt tensioner lock bolt.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

## ASSEMBLY (TIMING BELT) 1B

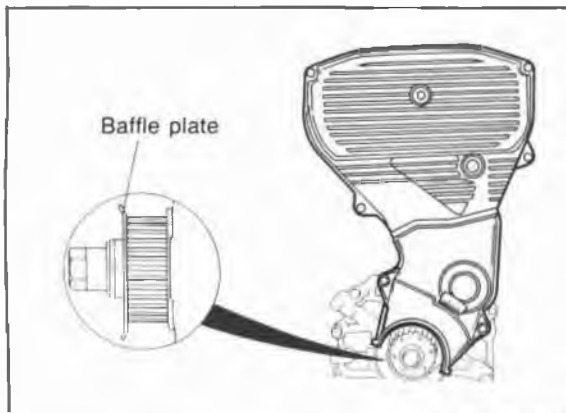


76G01B-097

7. Check the timing belt deflection. If the deflection is not correct, loosen the tensioner lock bolt and repeat steps 3—5 above. Replace the tensioner spring if necessary.

**Belt deflection:**

**7.5—8.5 mm (0.30—0.33 in)**  
**/ 98 N (10 kg, 22 lb)**



86U01X-163

**Baffle Plate**

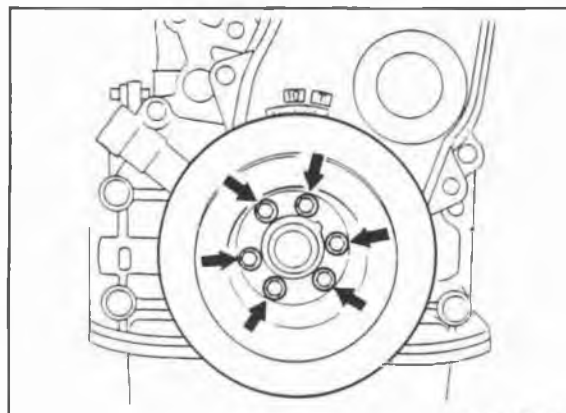
Position the baffle plate on the timing belt pulley.

**Timing Belt Cover**

Install the lower timing belt cover, upper timing belt cover, and new gaskets.

**Tightening torque:**

**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**



69G01B-170

**Crankshaft Pulley**

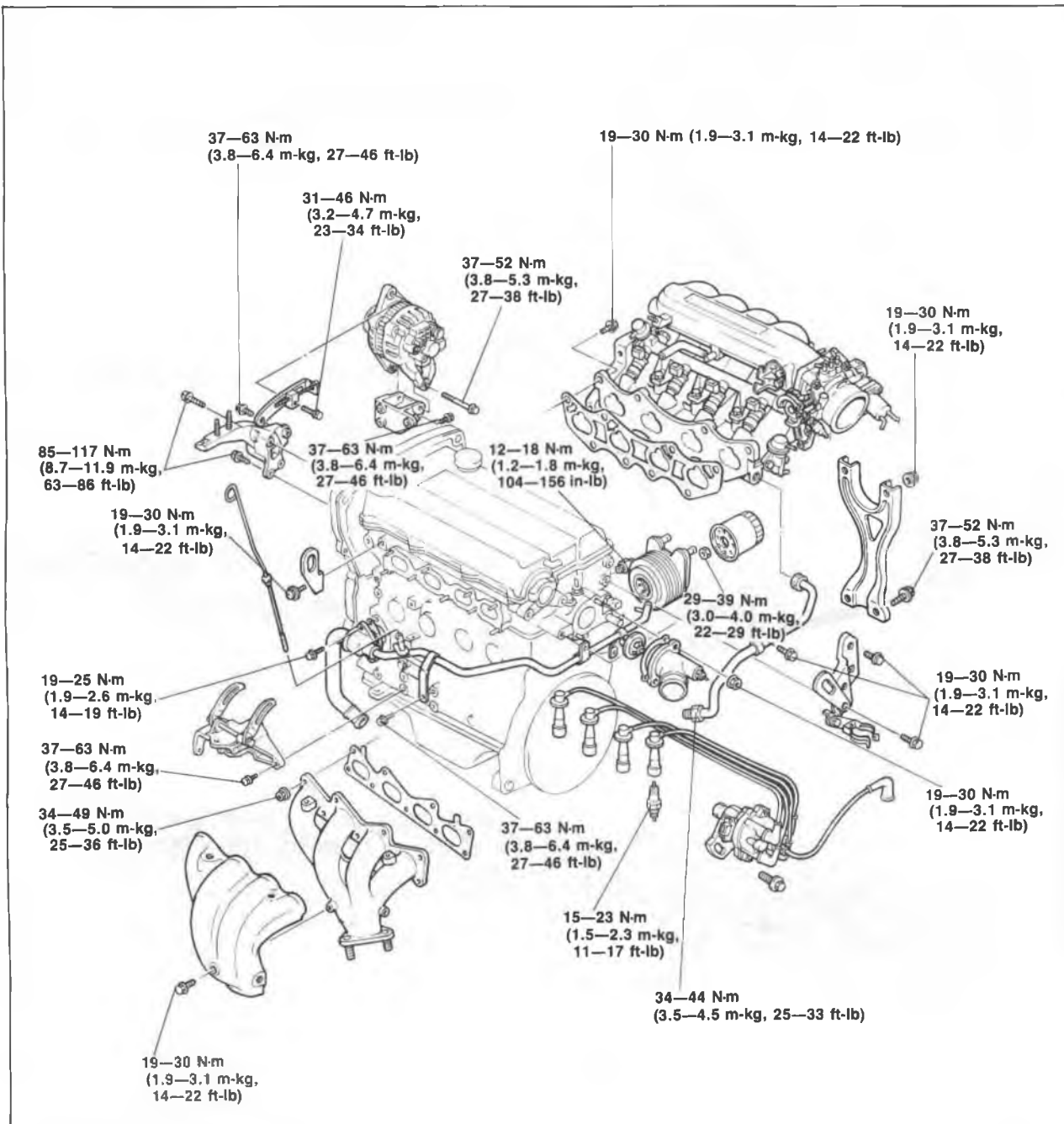
Install the crankshaft pulley.

**Tightening torque: 12—17 N·m**

**(1.25—1.75 m·kg, 109—152 in·lb)**

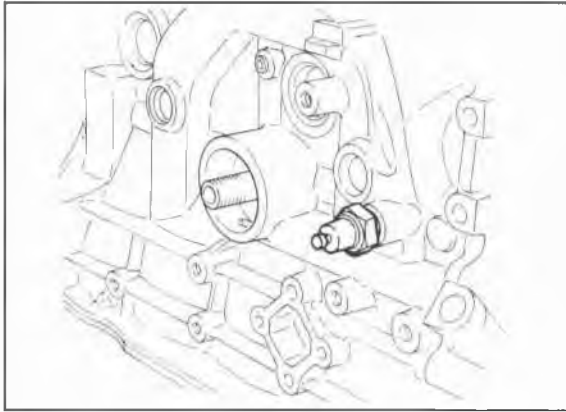
# 1B ASSEMBLY (AUXILIARY PARTS)

## AUXILIARY PARTS Torque Specifications



86U01X-164



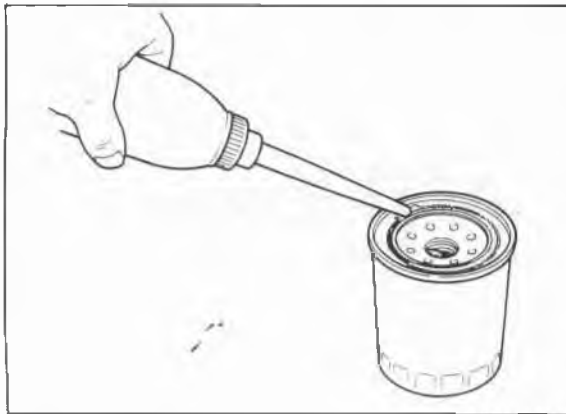


76G01A-087

### Oil Pressure Switch

Install the oil pressure switch.

**Tightening torque: 12—18 N·m  
(1.2—1.8 m·kg, 104—156 in·lb)**



76G01B-099

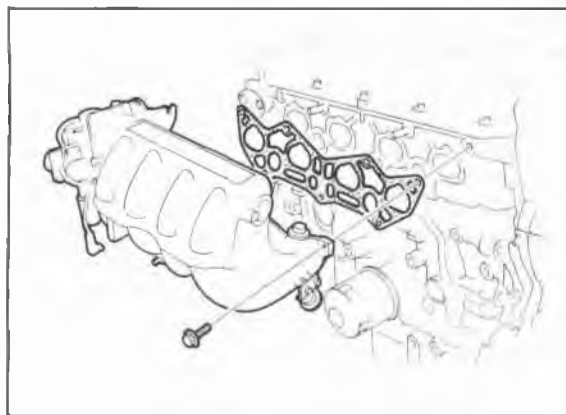
### Oil Cooler

Install the oil cooler.

**Tightening torque:  
29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

### Oil Filter

1. Apply a small amount of engine oil to the rubber seal of the new filter.
2. Install the oil filter and tighten it by hand until the rubber seal contacts the base.
3. Then tighten the filter 1 and 1/6 turn with a wrench.

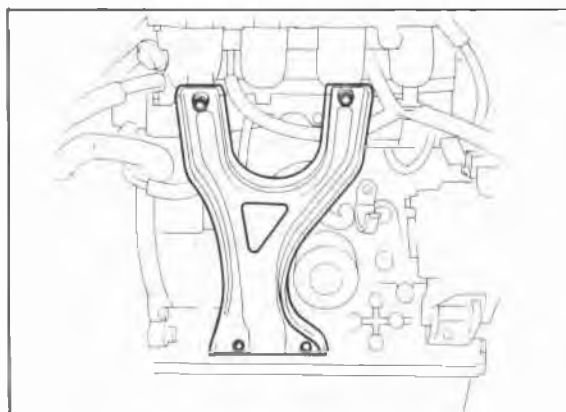


86U01X-167

### Intake Manifold Assembly

1. Place the new gasket in position.
2. Install the intake manifold assembly.
3. Tighten the nuts in two or three steps.

**Tightening torque:  
19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



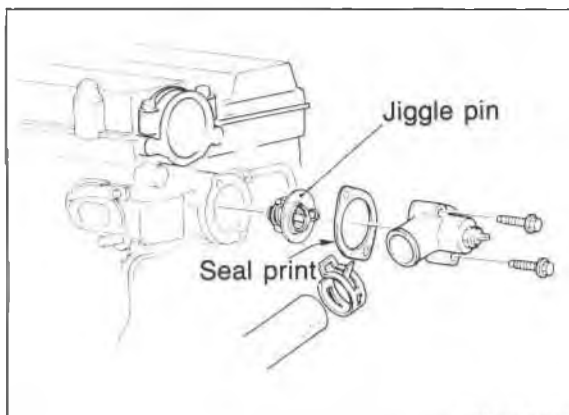
86U01X-168

### Intake Manifold Bracket

Install the intake manifold bracket.

**Tightening torque:  
19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

# 1B ASSEMBLY (AUXILIARY PARTS)



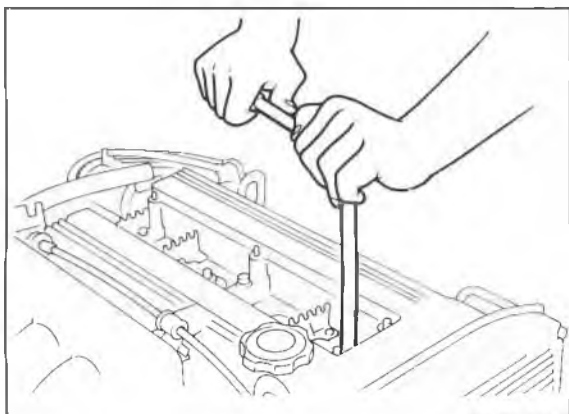
86U01X-169

## Thermostat and Thermostat Cover

1. Install the thermostat into the cylinder head with the jiggle pin at the top.
2. Position a new gasket with the printed side facing the cylinder head.
3. Install the thermostat cover.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**



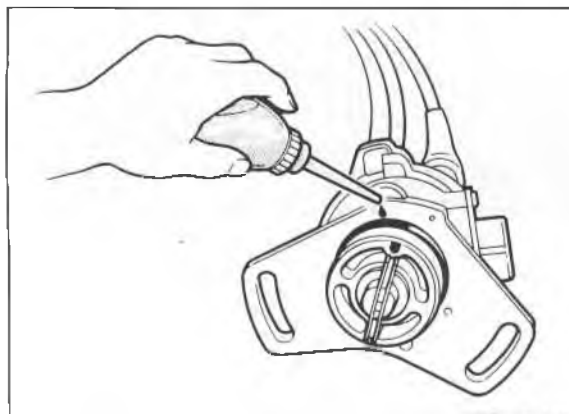
86U01X-219

## Spark Plug

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

### Tightening torque:

**15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)**



76G01B-100

## Distributor

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade.
3. Install the distributor.
4. Loosely tighten the distributor mounting bolt.

## High-Tension Lead

Install the high-tension leads.

## Center Cover

Install the center cover.

### Tightening torque:

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

## Engine Mount Bracket

1. Install the engine mount bracket.

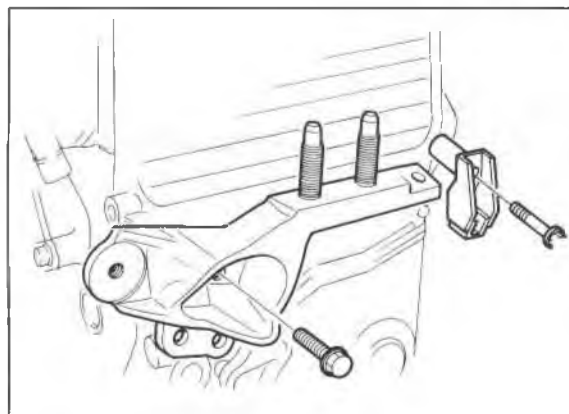
### Tightening torque:

**85—117 N·m (8.7—11.9 m·kg, 63—86 ft·lb)**

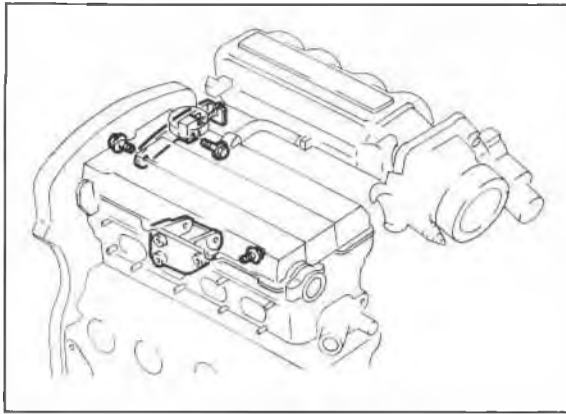
2. Install the stay to the engine mount bracket.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



76G01B-101



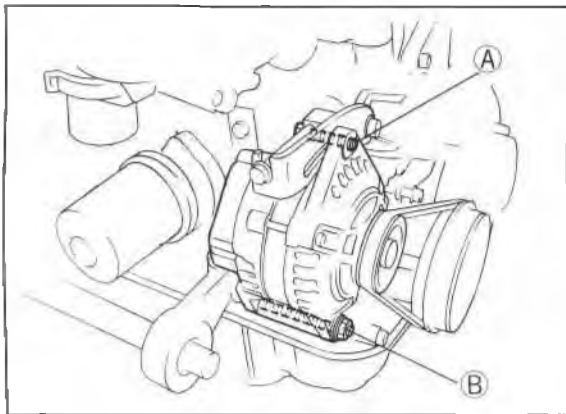
86U01X-171

## Alternator

1. Install the alternator strap and bracket.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



76G01B-102

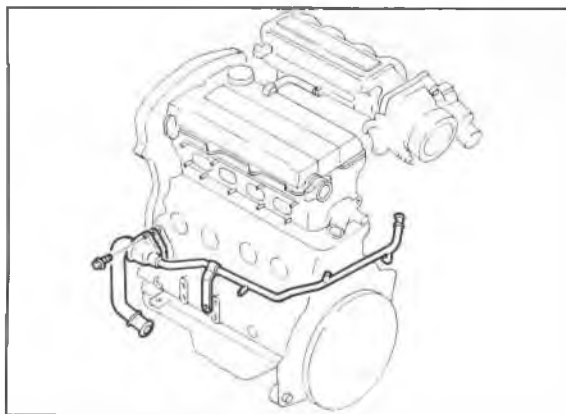
2. Install the alternator.

### Tightening torque

**A : 31—46 N·m  
(3.2—4.7 m·kg, 23—34 ft·lb)**

**B : 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)**

3. Install the alternator drive belt, and adjust the belt deflection. (Refer to page 1B—6.)



76G01B-103

## Coolant Inlet Pipe and Bypass Pipe

1. Install the coolant inlet pipe.

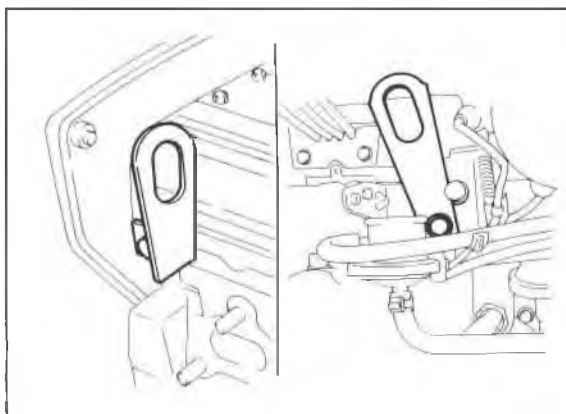
### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Apply vegetable oil to the O-ring.
3. Install the coolant bypass pipe.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



76G01A-092

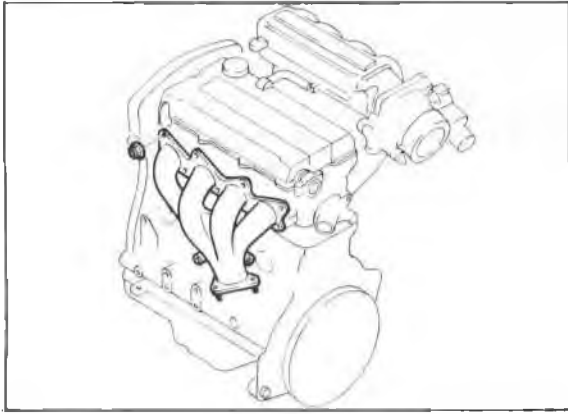
## Engine Hanger

- Install the front and rear engine hangers.

### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

# 1B ASSEMBLY (AUXILIARY PARTS)



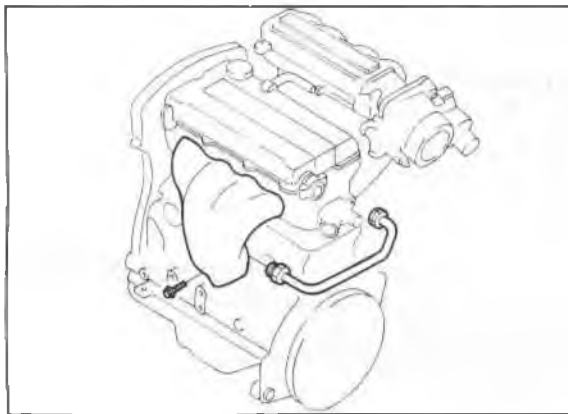
76G01B-105

### Exhaust Manifold Assembly

1. Place the new gaskets in position with the ridge facing the cylinder head.
2. Install the exhaust manifold assembly.
3. Tighten the nuts in two or three steps.

#### Tightening torque:

**34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)**



76G01B-106

### Exhaust Manifold Insulator

Install the exhaust manifold insulator.

#### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

### EGR Pipe (Unleaded fuel)

Install the EGR pipe.

#### Tightening torque:

**34—44 N·m (3.5—4.5 m·kg, 25—33 ft·lb)**



86U01X-178

### P/S Oil Pump Bracket

Install the P/S oil pump bracket.

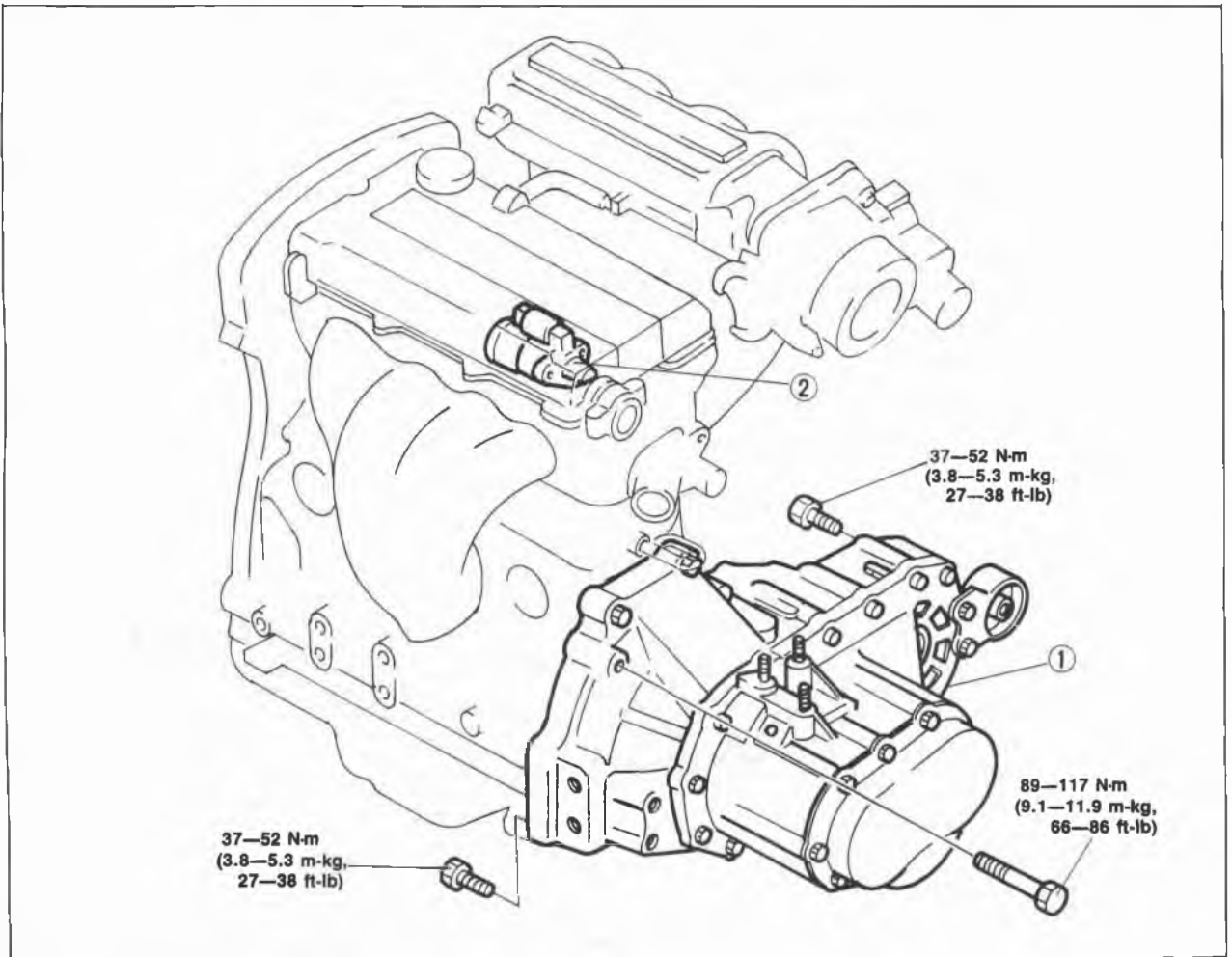
#### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**

## INSTALLATION

### TRANSAXLE ASSEMBLY

Assemble the transaxle to the engine in the sequence shown in the figure.



76G01B-107

1. Transaxle

2. Starter

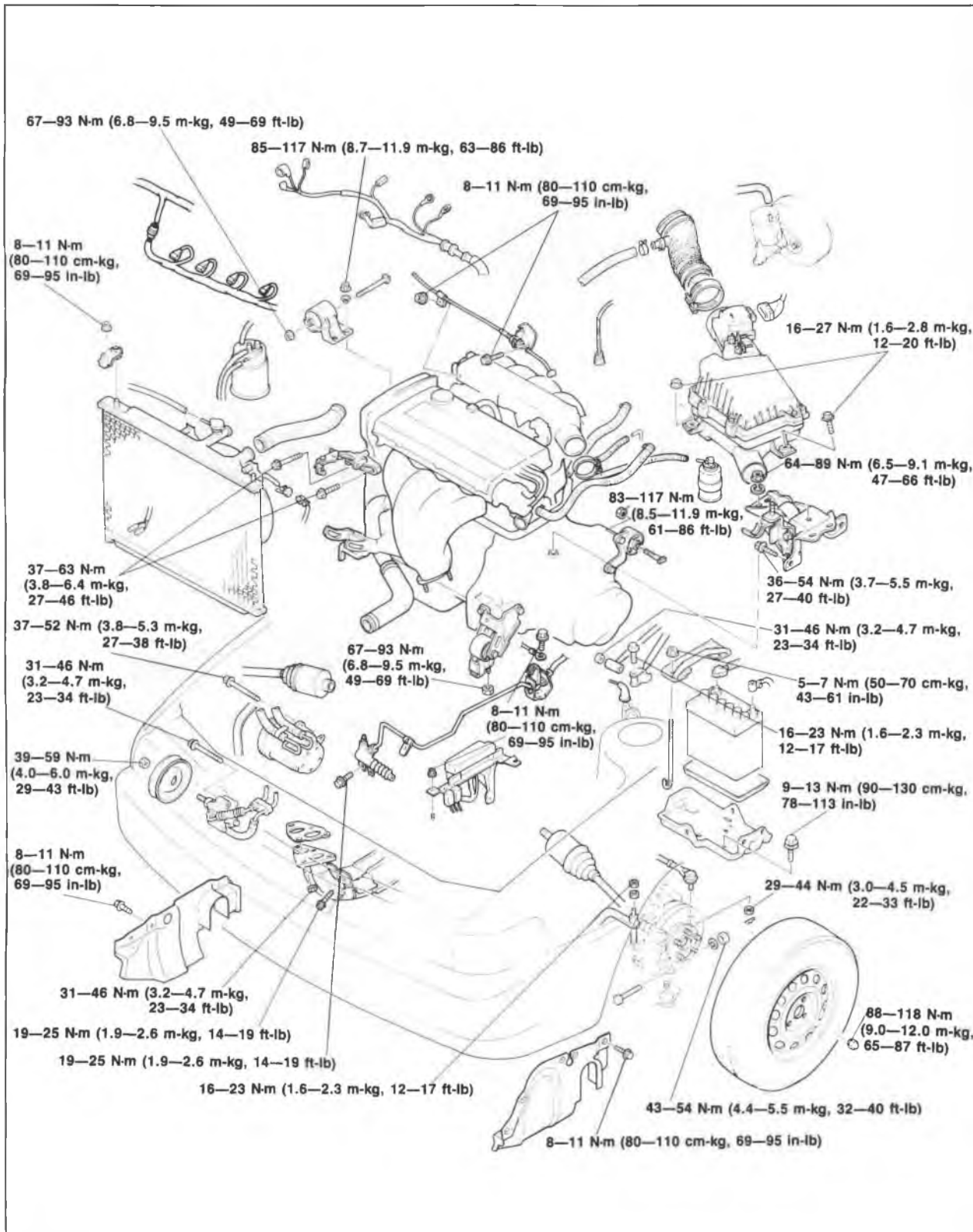
# 1B INSTALLATION

## ENGINE INSTALLATION

Install the engine and transaxle assembly.

**Warning: Be sure the vehicle is securely supported.**

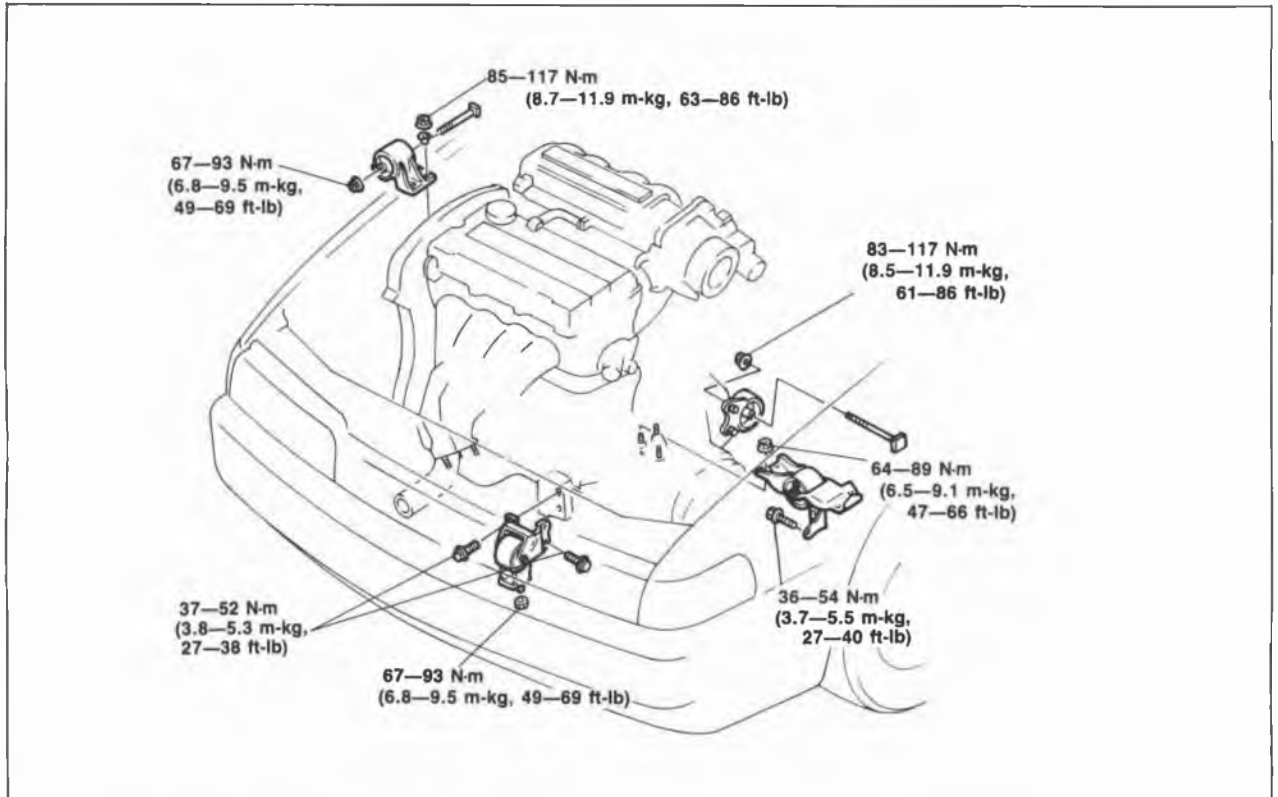
### Torque Specifications



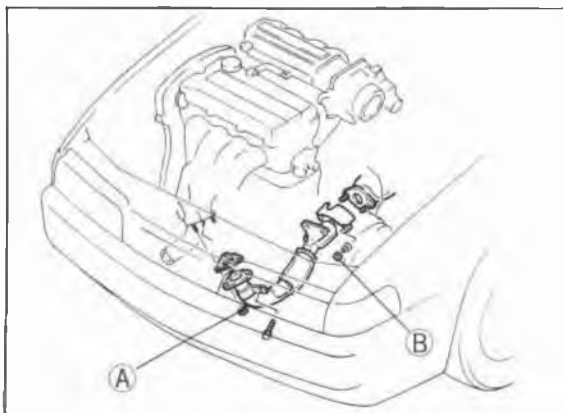
86U01X-180

## Engine Mount

Install the engine mount.



86U01X-181



86U01X-182

## Exhaust Pipe

1. Install the exhaust pipe.

### Tightening torque

- Ⓐ : 31—46 N-m  
(3.2—4.7 m-kg, 23—34 ft-lb)
- Ⓑ : 64—89 N-m  
(6.5—9.1 m-kg, 47—66 ft-lb)

2. Tighten the bracket bolt.

### Tightening torque:

- 19—25 N-m (1.9—2.6 m-kg, 14—19 ft-lb)

## Extension Bar

Install the extension bar to the transaxle.

### Tightening torque:

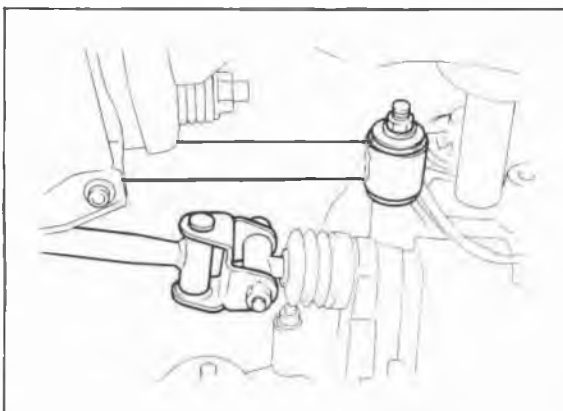
- 31—46 N-m (3.2—4.7 m-kg, 23—34 ft-lb)

## Change Rod

Install the change rod to the transaxle.

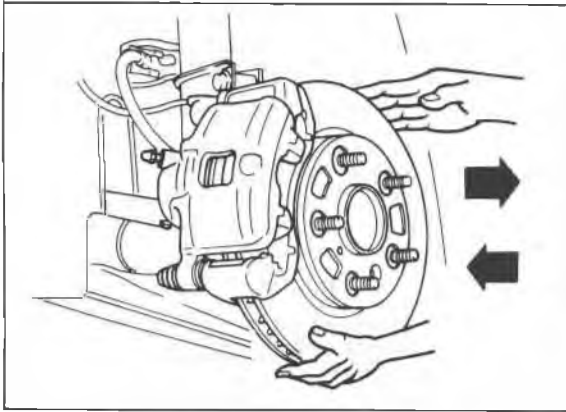
### Tightening torque:

- 16—23 N-m (1.6—2.3 m-kg, 12—17 ft-lb)



76G01B-108

# 1B INSTALLATION



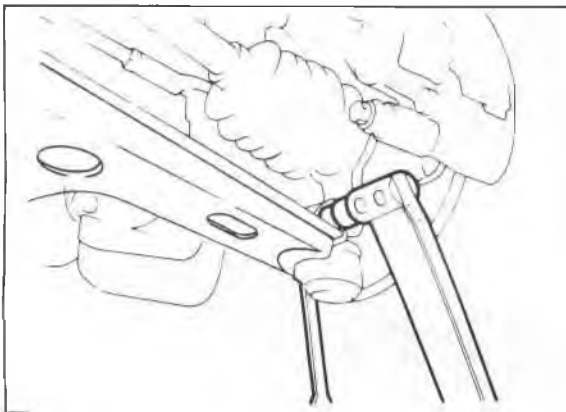
86U01X-184

## Driveshaft

1. Apply grease to the end of the driveshaft.
2. Install the driveshaft and a new clip.

### Caution

- a) When installing the driveshaft, be careful not to damage the oil seal.
- b) After installation, pull the front hub outward to confirm that the driveshaft is securely held by the clip.



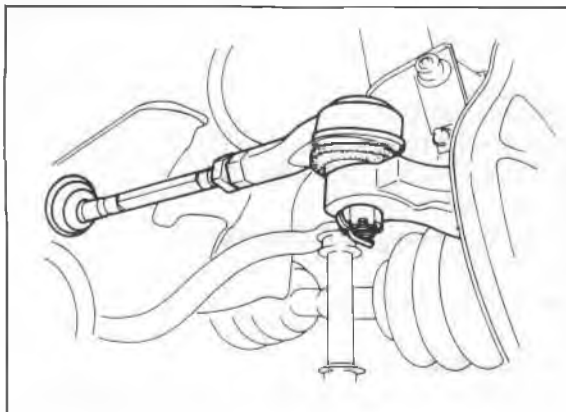
86U01X-185

## Lower Arm

Install the lower arm ball-joint to the knuckle; then tighten the lock nut.

### Tightening torque:

**43—54 N-m (4.4—5.5 m-kg, 32—40 ft-lb)**



86U01X-186

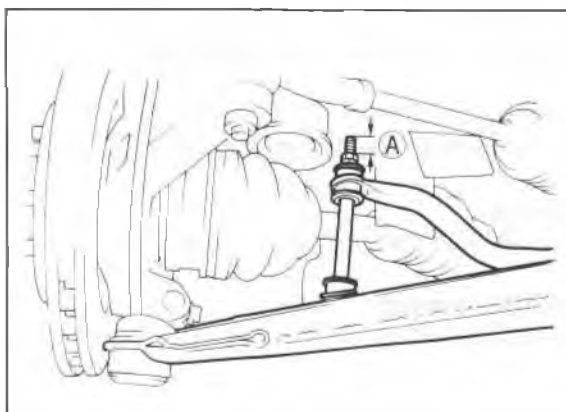
## Tie-Rod End

1. Install the tie-rod end to the knuckle.

### Tightening torque:

**29—44 N-m (3.0—4.5 m-kg, 22—33 ft-lb)**

2. Install the cotter pin.



86U01X-187

## Stabilizer Control Rod

Install and adjust the front stabilizer control rods.

**Dimension A: 20.1 mm (0.79 in)**

### Tightening torque:

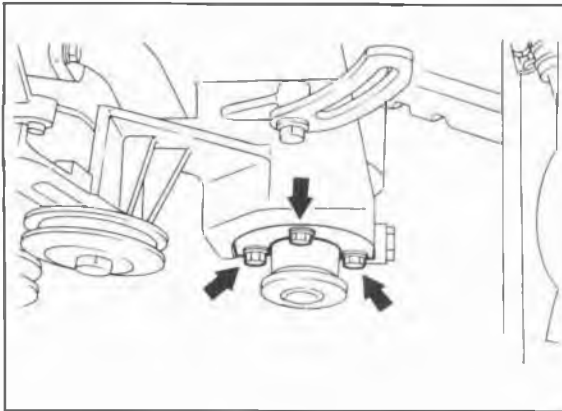
**16—23 N-m (1.6—2.3 m-kg, 12—17 ft-lb)**

Install the front wheel.

### Tightening torque:

**88—118 N-m (9.0—12.0 m-kg, 65—87 ft-lb)**





86U01X-188

## P/S Oil Pump

1. Install the P/S oil pump.

### Tightening torque:

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

2. Tighten the pulley lock nut.

### Tightening torque:

**39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)**



86U01X-189

## A/C Compressor

1. Install the A/C compressor strap to the P/S oil pump bracket.

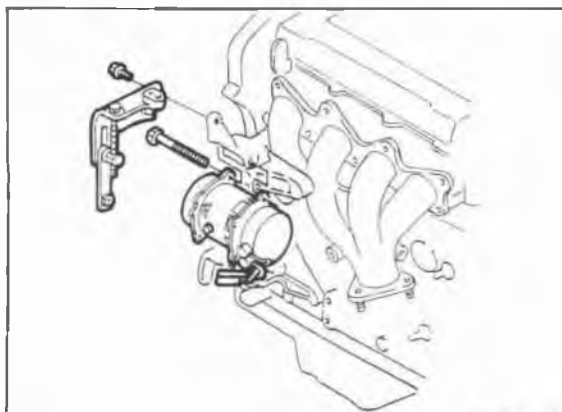
### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Install the A/C compressor bracket.

### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



86U01X-190

3. Install the A/C compressor.
4. Install the A/C compressor upper bracket.

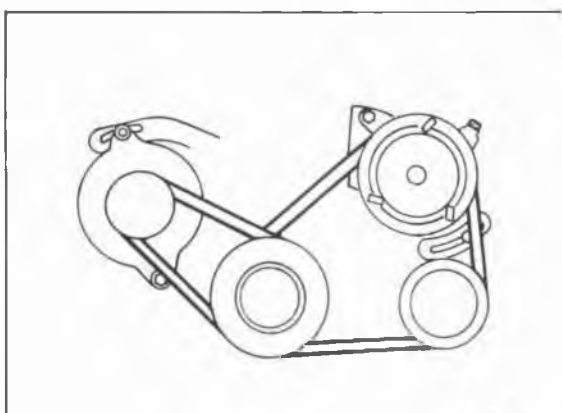
### Tightening torque:

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**

5. Tighten to the lock nut and mounting bolts.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



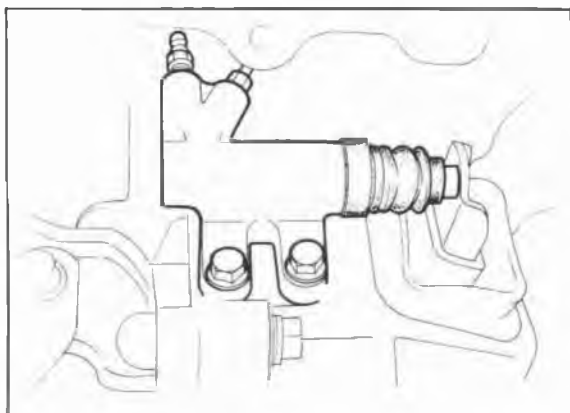
76G01B-109

## Drive Belt

- Install the drive belt and adjust the belt deflection. (Refer to page 1B—6.)

# 1B INSTALLATION

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76G01B-110

## Clutch Release Cylinder

1. Set the pipe bracket in position.

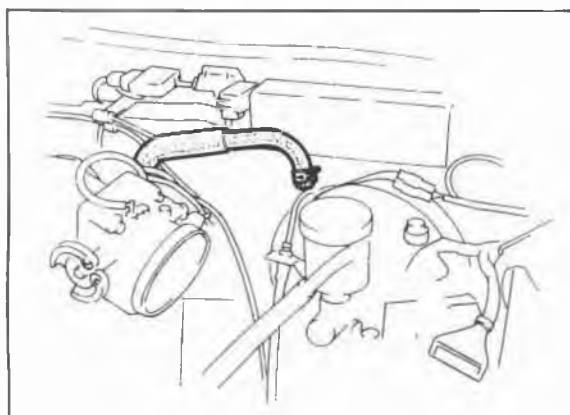
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Install the clutch release cylinder.

### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



76G01B-111

## Speedometer Cable

Install the speedometer cable.

## Brake Vacuum Hose

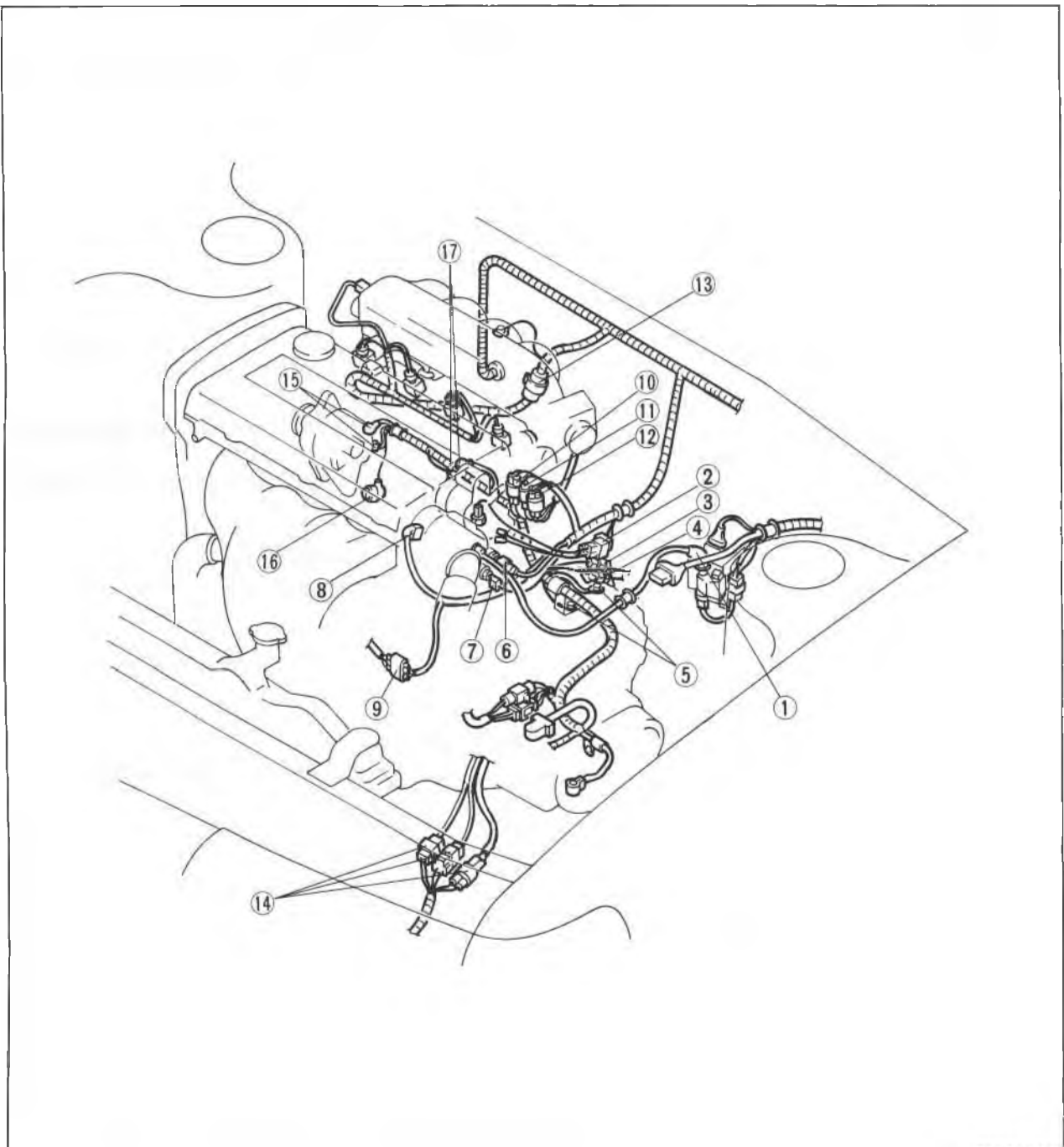
Connect the brake vacuum hose.

## Canister Hose (Unleaded fuel)

Connect the canister hoses.

## Connector Location

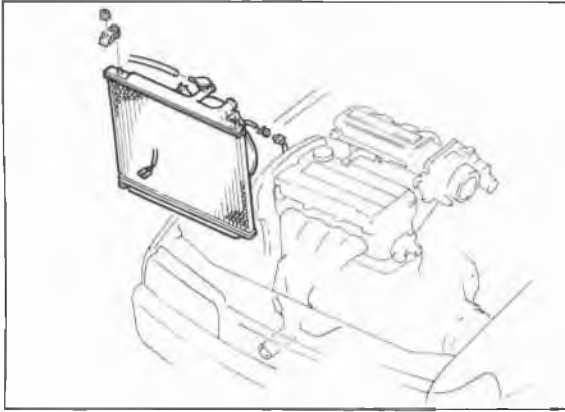
Install each harness as shown in the figure.



76G01B-112

- |                             |   |
|-----------------------------|---|
| 1. IG coil                  | 10. Linear solenoid                     |
| 2. Heat gauge unit          | 11. Solenoid valve (idle speed control) |
| 3. Speed sensor             | 12. Throttle position sensor            |
| 4. P/S switch               | 13. Injection harness                   |
| 5. Engine ground            | 14. Transmission harness                |
| 6. Water temperature sensor | 15. Alternator                          |
| 7. Water thermo switch      | 16. Oil pressure switch                 |
| 8. Crank angle sensor       | 17. Starter                             |
| 9. Oxygen sensor            |   |

# 1B INSTALLATION



76G01B-113

## Radiator

1. Install the radiator and cooling fan.

### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

2. Connect the radiator harness.



76G01B-114

3. Connect the upper and lower radiator hoses.

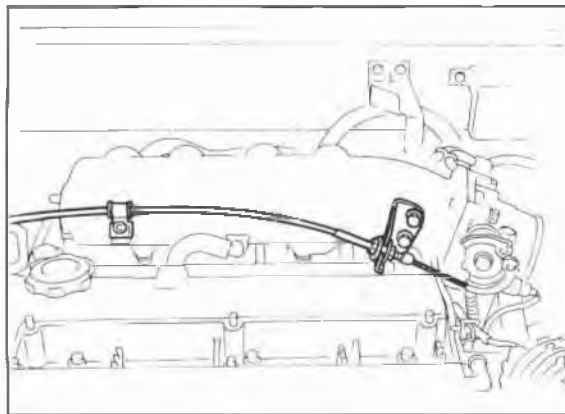
### Note

**a) Position the hose clamp in the original location on the hose.**

**b) Squeeze the clamp lightly with large pliers to ensure a good fit.**

## Heater Hose and Fuel Hose

Connect the heater hoses and the fuel hoses.



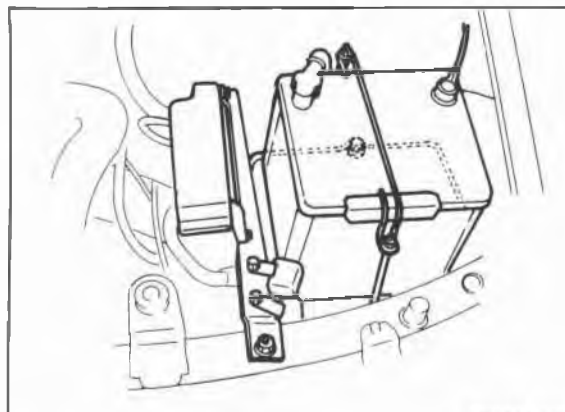
76G01B-115

## High-Tension Lead

Connect the high-tension lead to the ignition coil.

## Accelerator Cable

Install the accelerator cable.



76G01A-148

## Battery and Battery Carrier

1. Install the battery carrier.

### Tightening torque:

**9—13 Nm (90—130 cm-kg, 78—113 in-lb)**

2. Install the fuse box.

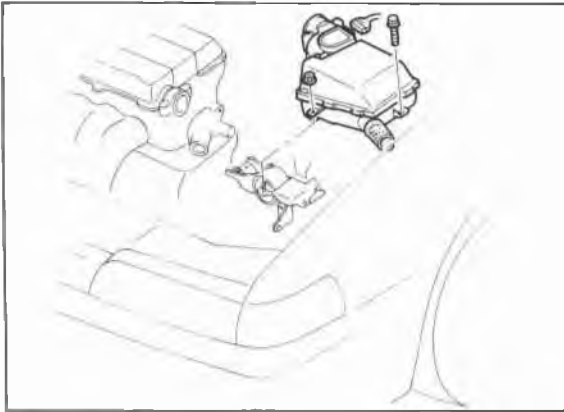
### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

3. Install the battery tray and battery.

### Tightening torque:

**5—7 Nm (50—70 cm-kg, 43—61 in-lb)**



76G01B-116

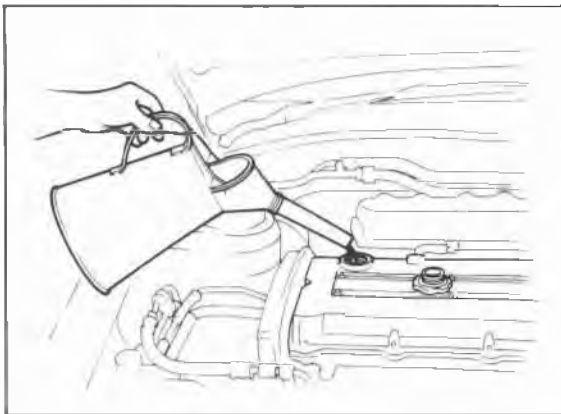
### Air Cleaner Assembly

1. Install the air cleaner assembly.

### Tightening torque:

**16—27 N·m (1.6—2.8 m·kg, 12—20 ft·lb)**

2. Connect the air flow sensor connector and air intake pipe.



76G01A-100

### Engine Oil

Add the specified amount and type of engine oil. (Refer to Section 2A.)

### Coolant

Close the drain plug, fill the radiator and reservoir tank with the specified amount and type of coolant. (Refer to Section 3A.)



86U01X-204

### Check Engine Condition

1. Check for leaks.
2. Perform engine adjustments if necessary.
3. Perform a road test.
4. Recheck the oil and coolant levels.

# ENGINE (DIESEL)

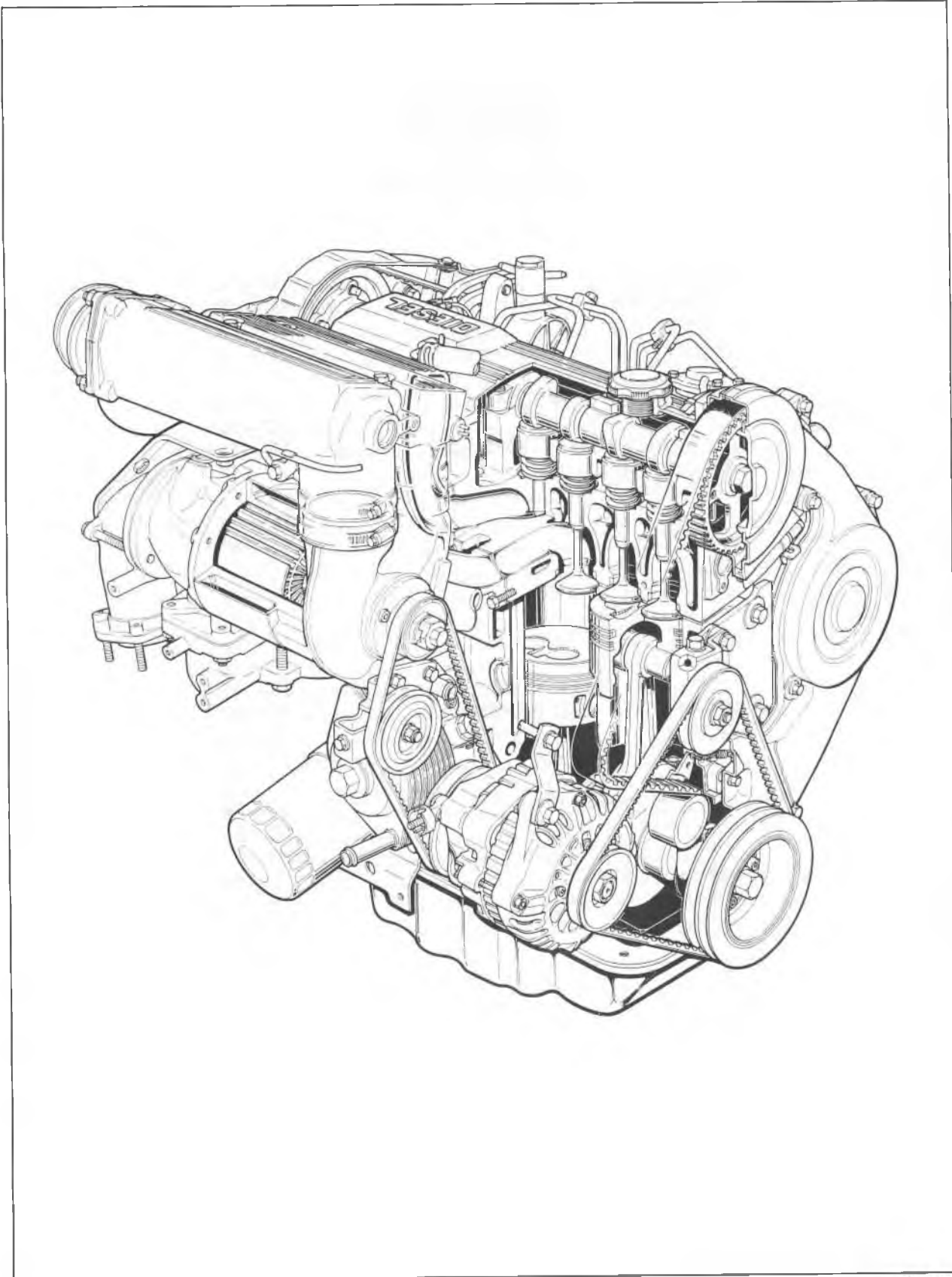
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# 1C OUTLINE

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## OUTLINE

### STRUCTURAL VIEW



4BG01A-002

## SPECIFICATIONS

Item		Engine model	RF-CX	RF-N
Type			Diesel, 4 cycle	
Cylinder arrangement and number			In line, 4 cylinders	
Combustion chamber			Swirl chamber	
Valve system			OHC, belt driven	
Displacement		cc (cu in)	1,998 (121.9)	
Bore and stroke		mm (in)	86.0 x 86.0 (3.39 x 3.39)	
Compression ratio			21.1 : 1	22.7 : 1
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm		Standard	2.943 (30, 427)-200	
		Minimum	2.649 (27, 384)-200	
Valve timing	IN	Open BTDC	13°	13°
		Close ABDC	15°	39°
	EX	Open BBDC	60°	60°
		Close ATDC	8°	8°
Valve clearance mm (in)	Cold	IN	0.25 (0.010)	
		EX	0.35 (0.014)	
	Warm (for ref.)	IN	0.30 (0.012)	
		EX	0.40 (0.016)	
Idle speed (MTX in neutral)		rpm	720 <sup>+30</sup> / <sub>-20</sub>	
Injection timing			ATDC 1°	TDC 0°
Injection order			1—3—4—2	

76G01C-002

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Difficult starting</b>	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket	Replace Replace or repair Replace	1C—48 1C—55,56 1C—16
	<b>Malfunction of fuel system</b>	Refer to Section 4D	
	<b>Malfunction of Compresx supercharger</b>	Refer to Section 4D	
	<b>Malfunction of electrical system</b>	Refer to Section 5	
<b>Poor idling</b>	<b>Malfunction of engine-related components</b> Improper valve clearance Poor valve to valve seat contact Failed cylinder head gasket	Adjust Repair or replace Replace	1C—85 1C—50 1C—16
	<b>Malfunction of fuel system</b>	Refer to Section 4D	
	<b>Malfunction of Compresx supercharger</b>	Refer to Section 4D	
<b>Excessive oil consumption</b>	<b>Oil working up</b> Worn piston ring groove or sticking piston ring Worn piston or cylinder	Replace Replace or repair	1C—57 1C—55,56
	<b>Oil working down</b> Worn valve seal Worn valve stem or guide	Replace Replace	1C—24 1C—48
	<b>Oil leakage</b>	Refer to Section 2B	

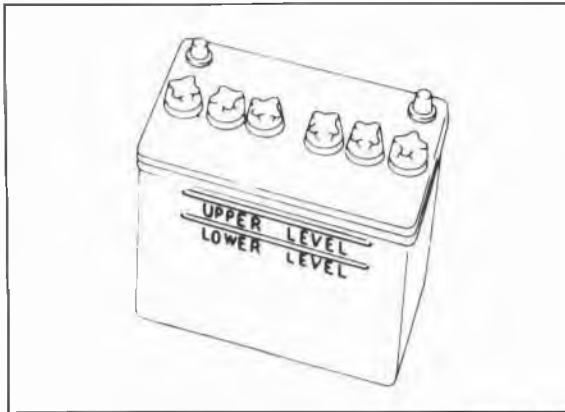
76G01C-003



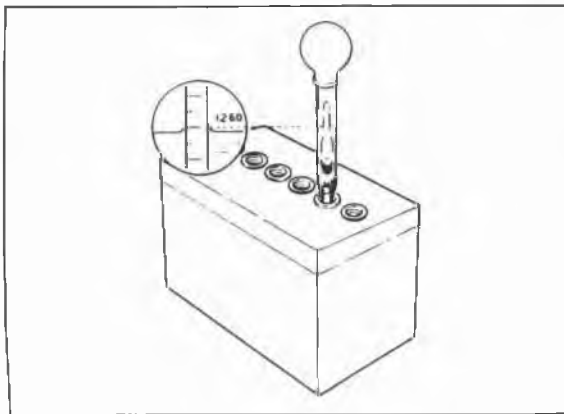
# 1C TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Insufficient power</b>	<b>Insufficient compression</b> Improper valve clearance Compression leakage from valve seat Seized valve stem Weak or broken valve spring Failed cylinder head gasket Cracked or distorted cylinder head Sticking, damaged, or worn piston ring Cracked or worn piston	Adjust Repair Replace Replace Replace Replace Replace Replace	1C—85 1C—50 1C—48 1C—52 1C—16 1C—47 1C—57 1C—56
	<b>Malfunction of fuel system</b>	Refer to Section 4D	
	<b>Malfunction of Comprex supercharger</b>	Refer to Section 4D	
	<b>Others</b> Slipping clutch Dragging brakes Wrong size tires	Refer to Section 6 Refer to Section 11 Refer to Section 12	
<b>Abnormal combustion</b>	<b>Malfunction of engine-related components</b> Improper valve clearance Sticking or burned valve Weak or broken valve spring Carbon accumulation in combustion chamber	Adjust Replace Replace Eliminate carbon	1C—85 1C—48 1C—52 —
	<b>Malfunction of fuel system</b>	Refer to Section 4D	
	<b>Malfunction of Comprex supercharger</b>	Refer to Section 4D	
<b>Engine noise</b>	<b>Crankshaft or bearing related parts</b> Excessive main bearing oil clearance Main bearing seized or heat-damaged Excessive crankshaft end play Excessive connecting rod bearing oil clearance Connecting rod bearing seized or heat-damaged	Replace or repair Replace Replace or repair Replace or repair Replace	1C—64 1C—64 1C—65 1C—66 1C—66
	<b>Piston related parts</b> Worn cylinder Worn piston or piston pin Seized piston Damaged piston ring Bent connecting rod	Replace or repair Replace Replace Replace Replace	1C—55 1C—58 1C—56 1C—57 1C—59
	<b>Valves or timing related parts</b> Excessive valve clearance Broken valve spring Excessive valve guide clearance Malfunction of timing belt tensioner	Adjust Replace Replace Replace	1C—85 1C—52 1C—48 1C—61
	<b>Malfunction of cooling system</b>	Refer to Section 3B	
	<b>Malfunction of fuel system</b>	Refer to Section 4D	
	<b>Malfunction of Comprex supercharger</b>	Refer to Section 4D	
	<b>Others</b> Malfunction of water pump bearing Improper drive-belt tension Malfunction of alternator bearing Exhaust gas leakage	Replace Adjust Replace Repair	— 1C—7 — 1C—47

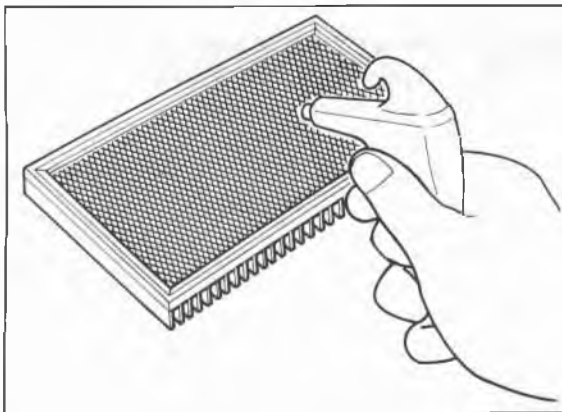
76G01C-004



4BG01B-006



4BG01B-007



76G01C-237



4BG01B-009

## TUNE-UP PROCEDURE

Turn the engine according to the procedures described below.

### Battery

1. Check for corrosion on the terminals, or loose cable connections.  
If necessary, clean the clamps and tighten firmly.
2. Check the electrolyte level.  
If the level is too low, add distilled water to the "UPPER LEVEL" mark.

3. Check the specific gravity by using a hydrometer.  
If the specific gravity reading is **1.200 or less**, recharge the battery, by referring to Section 5.

### Air Cleaner Element

Visually check the air cleaner element for being excessively dirty, damaged or oil.  
Clean or replace it if necessary.

#### Caution

#### (Wet type)

**Do not clean the air cleaner element with compressed air, replace if necessary.**

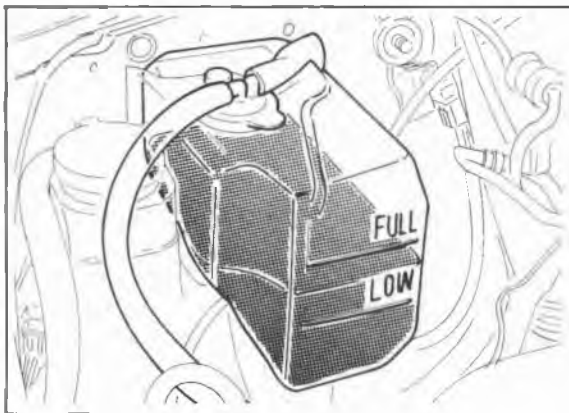
#### (Dry type)

**When cleaning the air cleaner element, blow dust off from the inside first, then blow off the outside.**

### Engine Oil

Check the engine oil level and condition with the oil level gauge.  
Add oil, or change it, if necessary.

# 1C TUNE-UP PROCEDURE



4BG01B-010

## Coolant Level

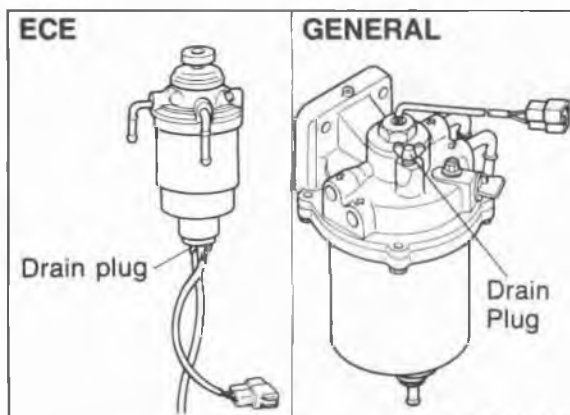
Check that the coolant level is near the radiator inlet port, and that the level in the reserve tank is between the FULL and LOW marks.

Add coolant up if the level is low.

## Warning

**Never remove the radiator cap when the engine is hot.**

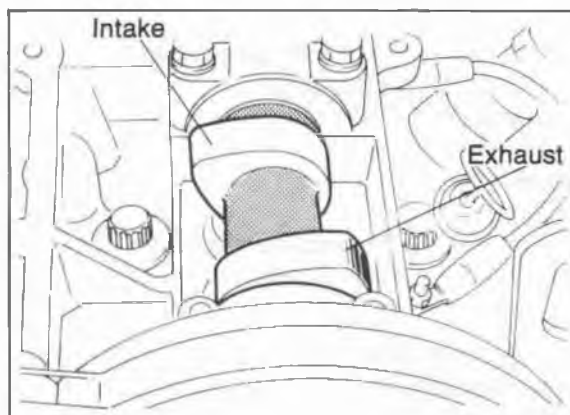
**Wrap a thick cloth around cap and carefully remove the cap.**



76G01C-005

## Water Draining

1. Drain the water from the sedimenter or fuel filter. If it is difficult to drain the water from the drain plug, loosen the air bleeding plug.
2. Bleed the air from the sedimenter or fuel filter. (Refer to Section 4D)



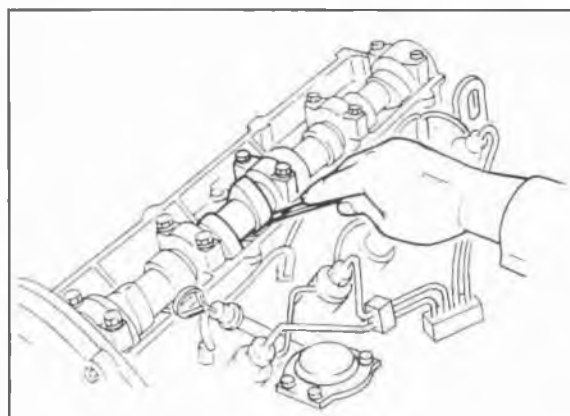
4BG01B-016

## Valve Clearance

1. Remove the cylinder head cover.
2. Set the No. 1 cylinder to compression TDC.

## Note

**Turn the crankshaft so that the intake and exhaust cam lobes face upward.**



76G01C-006

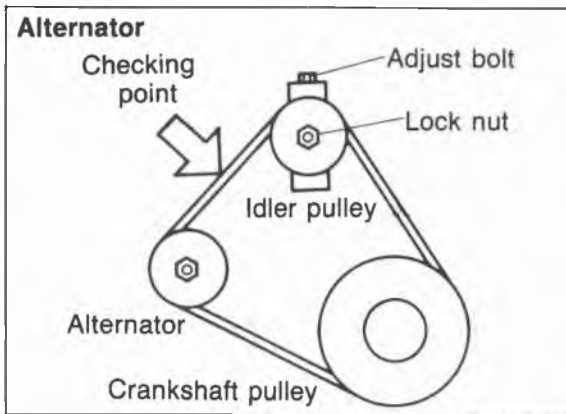
3. Measure the valve clearance of No. 1 cylinder by using a thickness gauge.

## Valve clearance (cold engine)

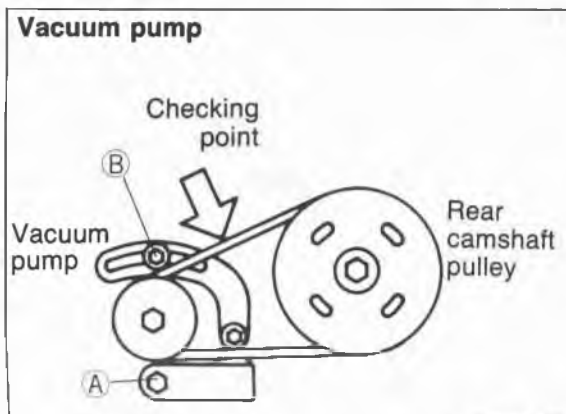
**0.20—0.30 mm (0.008—0.012 in)**

**0.30—0.40 mm (0.012—0.016 in)**

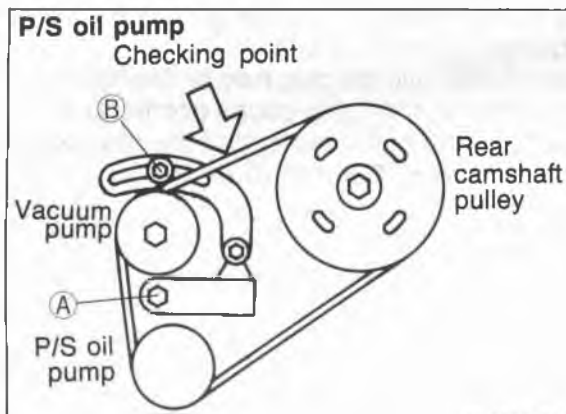
If necessary, adjust the valve clearance referring to the page 1C—85.



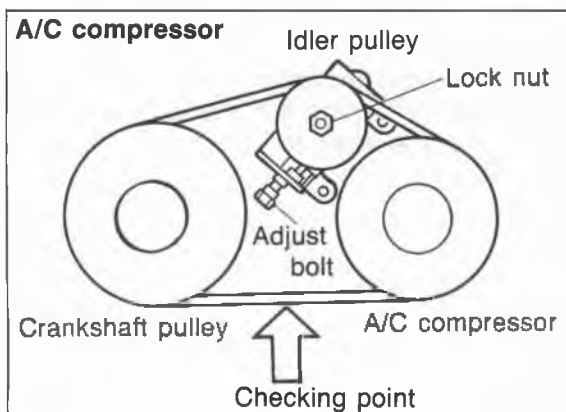
76G01C-007



76G01C-008



76G01C-009



76G01C-010

## Drive Belt

1. Check the drive belt for wear, cracks, or fraying. Replace if necessary.
2. Check the drive belt deflection by applying moderate pressure (**98 N, 10 kg, 22 lb**) midway between the pulleys.

## Alternator

Deflection mm (in)

New	8.0—10.0 (0.31—0.39)
Used	9.0—11.0 (0.35—0.43)

If necessary, loosen the idler lock nut and adjust the belt deflection by turning the adjust bolt.

## Tightening torque:

**37—52 N-m (3.8—5.3 m-kg, 27—38 ft-lb)**

## Vacuum pump and P/S oil pump

Deflection mm (in)

Vacuum pump	New	7.5—8.5 (0.30—0.33)
	Used	8.5—9.5 (0.33—0.37)
P/S oil pump	New	6.5—7.5 (0.26—0.30)
	Used	7.0—8.0 (0.28—0.31)

If necessary, adjust the belt deflection as follows.

- (1) Loosen the vacuum pump bolts (A) and (B).
- (2) Lever the vacuum pump outward and apply tension to the belt.
- (3) Tighten the adjust bolt (B).

## Tightening torque:

**19—26 N-m (1.9—2.6 m-kg, 14—19 ft-lb)**

- (4) Tighten the mounting bolt (A).

## Tightening torque:

**37—52 N-m (3.8—5.3 m-kg, 27—38 ft-lb)**

## A/C compressor

Deflection mm (in)

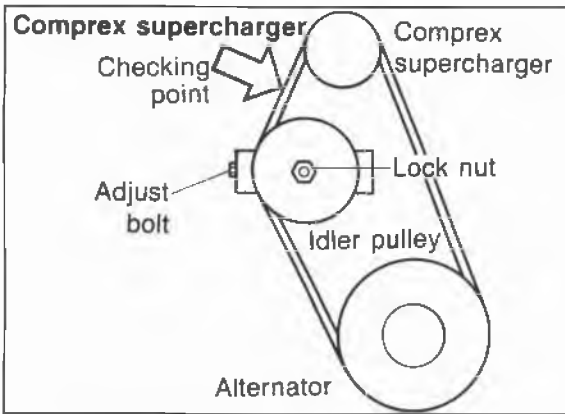
New	8.5—9.5 (0.33—0.37)
Used	9.5—10.5 (0.37—0.41)

If necessary, loosen the idler lock nut and adjust the belt deflection by turning the adjust bolt.

## Tightening torque:

**37—52 N-m (3.8—5.3 m-kg, 27—38 ft-lb)**

# 1C TUNE-UP PROCEDURE



76G01C-011

## Complex supercharger

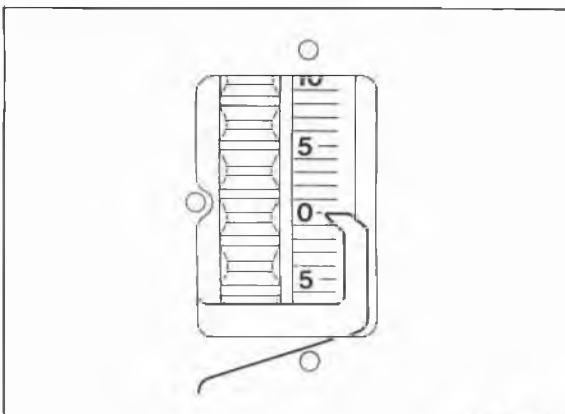
Deflection mm (in)

New	4.0—6.0 (0.16—0.23)
Used	8.0—10.0 (0.31—0.39)

If necessary, loosen the idler lock nut and adjust the belt deflection by turning the adjust bolt.

## Tightening torque:

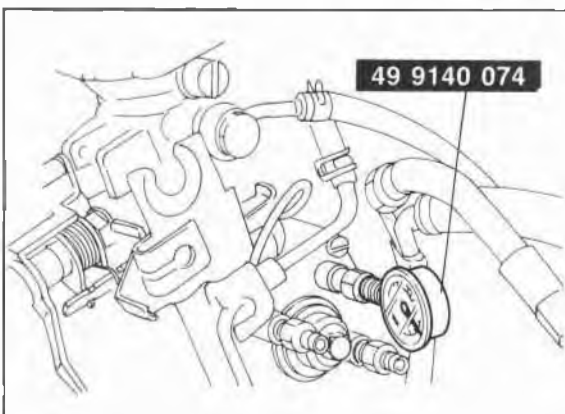
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



76G04D-008

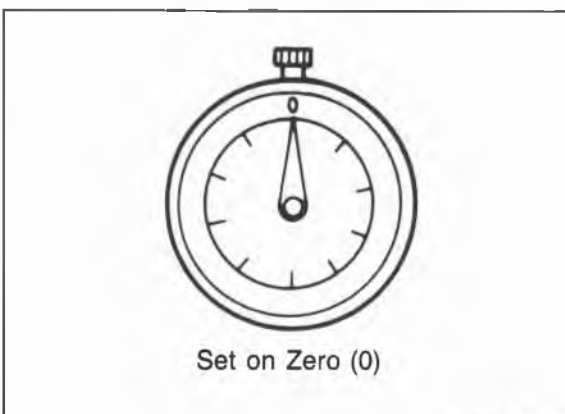
## INJECTION TIMING

1. Disconnect the negative battery cable.
2. Release the CSD using the screw driver.
3. Remove the cover on the clutch housing.
4. Turn the flywheel and set the indicator at **ATDC**.
5. Disconnect the injection pipes from the injection pump.



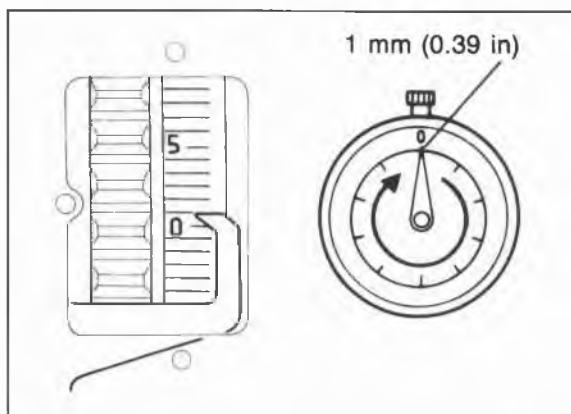
76G04D-009

6. Remove the hydraulic head plug from the injection pump.
7. Mount the **SST** into the plug hole on the hydraulic head so the tip of the dial gauge pointer touches the plunger end of the pump and the dial gauge indicates **approx. 2.0 mm (0.08 in)**.



76G04D-010

8. Turn the crankshaft slowly counterclockwise to 30—50° BTDC.
9. Make sure the dial indicator pointer no longer moves by slightly turning the crankshaft.
10. Set the dial gauge scale to Zero at the pointer.

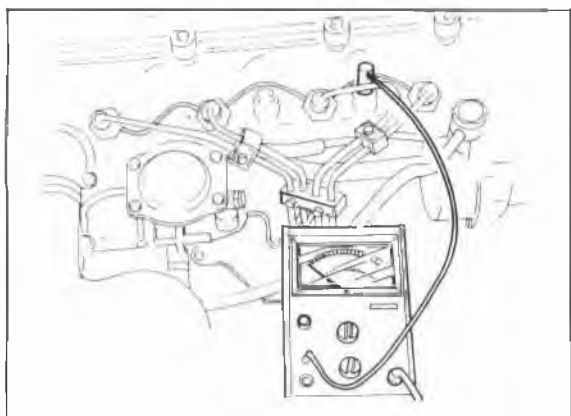


76G04D-011

11. Turn the crankshaft clockwise to align the indicator pin at **ATDC 1° (RF-CX), ATDC 2° (RF-N)**.
12. Read the dial gauge.

**Cam lift: 0.98—1.02 mm (0.038—0.040 in)**

13. If not within the specification, adjust the injection timing. (Refer to page 4D—24.)



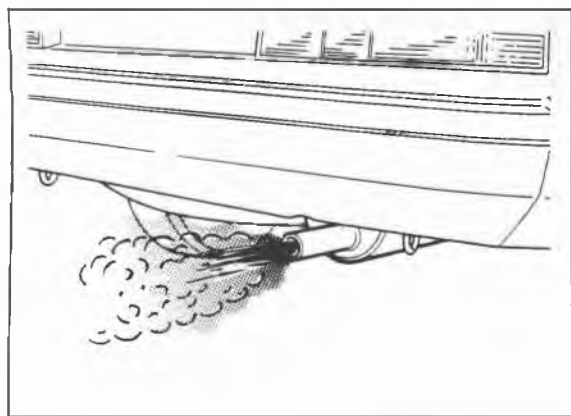
76G01C-014

### Idle Speed

1. Warm up the engine to normal operating temperature.
2. Be sure the A/C switch is OFF.
3. Connect a tachometer and check the engine speed.

**Idle speed: 720 ±<sup>30</sup>/<sub>30</sub> rpm**

If the idle speed is not within the specification, adjust the idle speed referring to Section 4D.

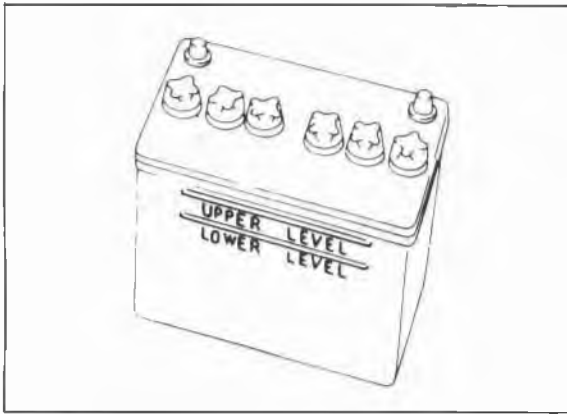


76G01C-015

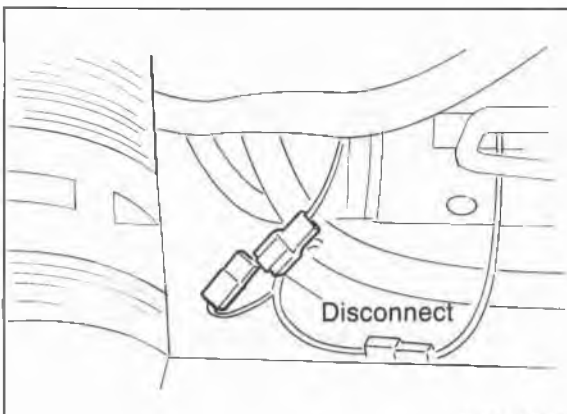
### Exhaust Smoke

Increase and decrease the engine speed several times and check that black smoke is not emitted. If there is, refer to Section 4D for the appropriate procedure.

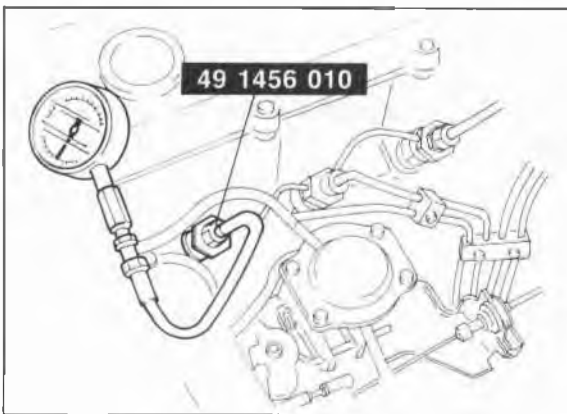
# 1C ON-VEHICLE INSPECTION



76G01C-016



76G01C-017



76G01C-018

## ON-VEHICLE INSPECTION

If the engine exhibits low power, poor fuel economy, or poor idle, check the following:

1. Compression
2. Fuel system (Refer to Section 4D)

### COMPRESSION

1. Check that the battery is fully charged. Recharge it if necessary.

2. Warm up the engine to the normal operating temperature.
3. Turn it off for about 10 minutes to allow the exhaust manifold to cool.
4. Remove all the fuel injection pipes, nozzles, washers, and corrugate washers.
5. Disconnect the fuel cut valve connector.

### Caution

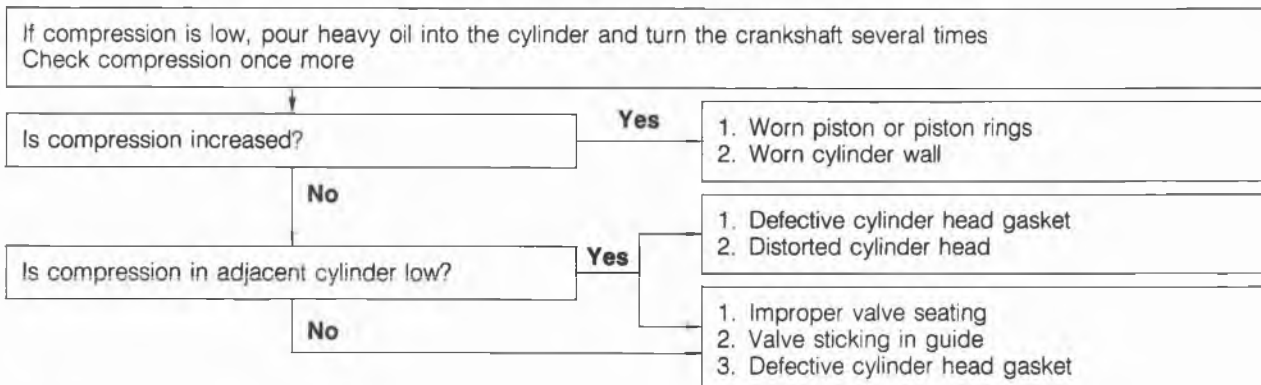
**If this is not done, fuel will be injected from the injection pump while cranking.**

6. Connect a suitable cap to the fuel return pipe on the injection pump.
7. Connect a compression gauge with **SST** to injection nozzle hole.
8. Fully depress the accelerator pedal and crank the engine.
9. Note the maximum gauge reading.
10. Check each cylinder.

### Compression pressure

		kPa (kg/cm <sup>2</sup> , psi)-rpm
Standard	Minimum	
2.943 (30, 427)—200	2.649 (27, 384)—200	

### Possible Cause



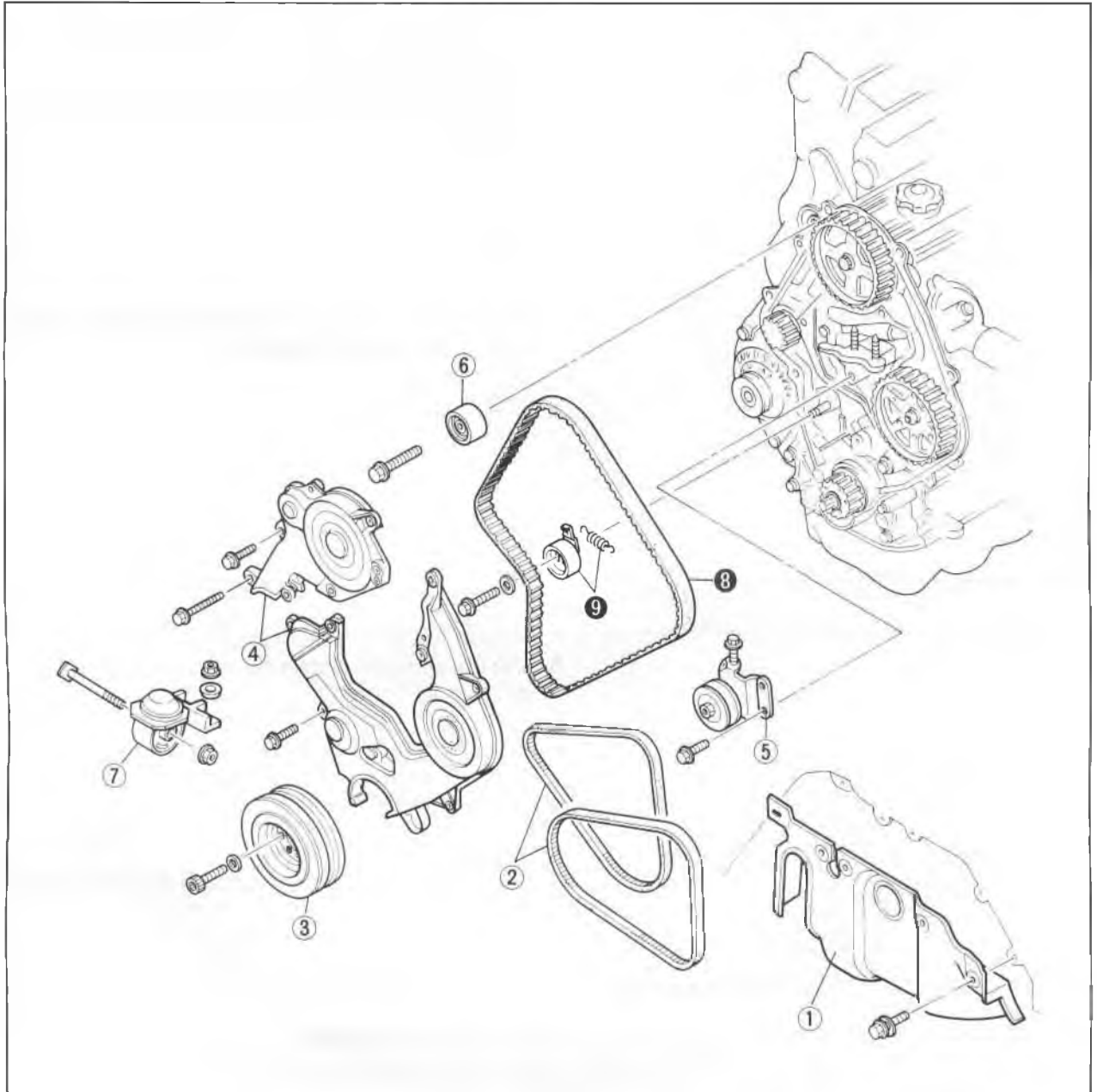
86U01X-022

## ON-VEHICLE MAINTENANCE

### TIMING BELT

#### Removal

1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.



76G01C-019

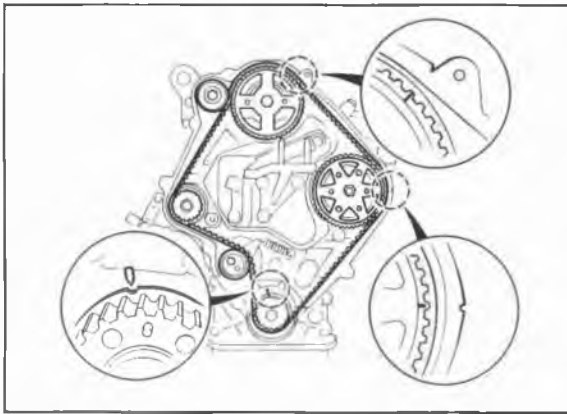
- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| 1. Engine side cover                | 6. Idler pulley                     |
| 2. A/C and alternator drive belt    | 7. No.3 engine mount                |
| 3. Crankshaft pulley                | 8. Timing belt                      |
| 4. Left and right timing belt cover | 9. Timing belt tensioner and spring |
| 5. Alternator idle pulley           |                                     |

#### Note

**Loosen the No.3 engine mount nuts and lower the engine to remove the crankshaft pulley.**



# 1C ON-VEHICLE MAINTENANCE (TIMING BELT)



76G01C-020

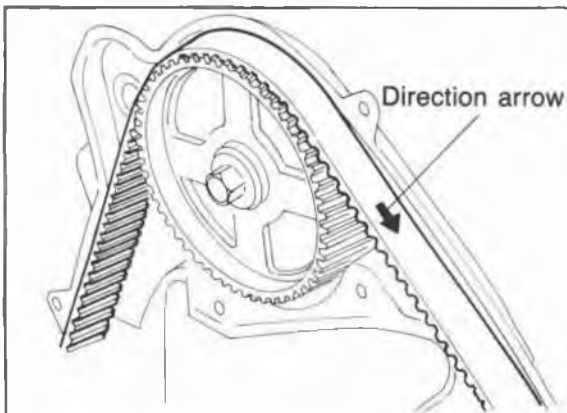
## Removal note

### Timing belt

1. Align the timing marks of each pulleys.
2. Affix the injection pump pulley to the bracket using two bolts (35—40 mm, 1.4—1.6 in).

### Caution

- a) Do not turn in the reverse direction of engine revolution.
- b) After removing the timing belt, do not rotate the crankshaft pulley or camshaft pulley.

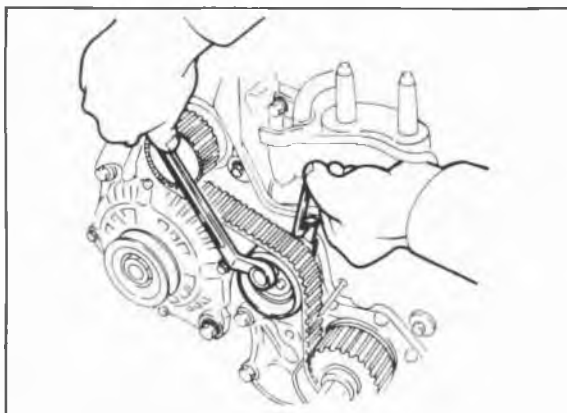


76G01C-238

3. Make the forward direction arrow on the timing belt.

### Note

**Direction arrow is to reassemble the timing belt in the same direction.**

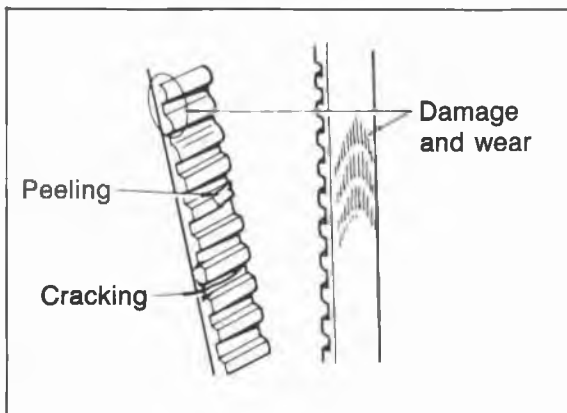


76G01C-021

4. Loosen the timing belt tensioner bolt.
5. Shift the tensioner outwards as far as possible, and temporarily tighten it.
6. Suspend the engine with chain block on the front engine hanger.
7. Remove the No.3 engine mount.
8. Remove the timing belt.

### Caution

**Do not allow any oil or grease on the timing belt.**



76G01C-022

## Inspection and Repair

Inspect the following parts. (Refer to page 1C—60, 61).

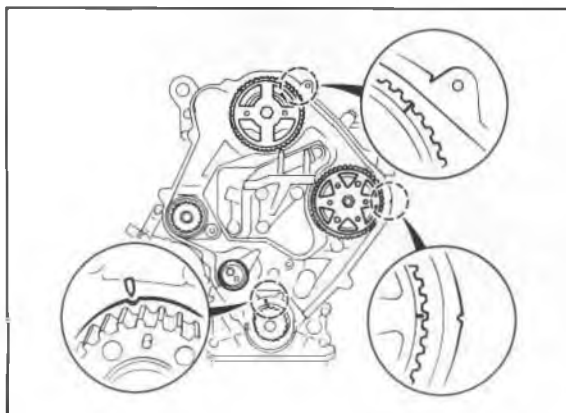
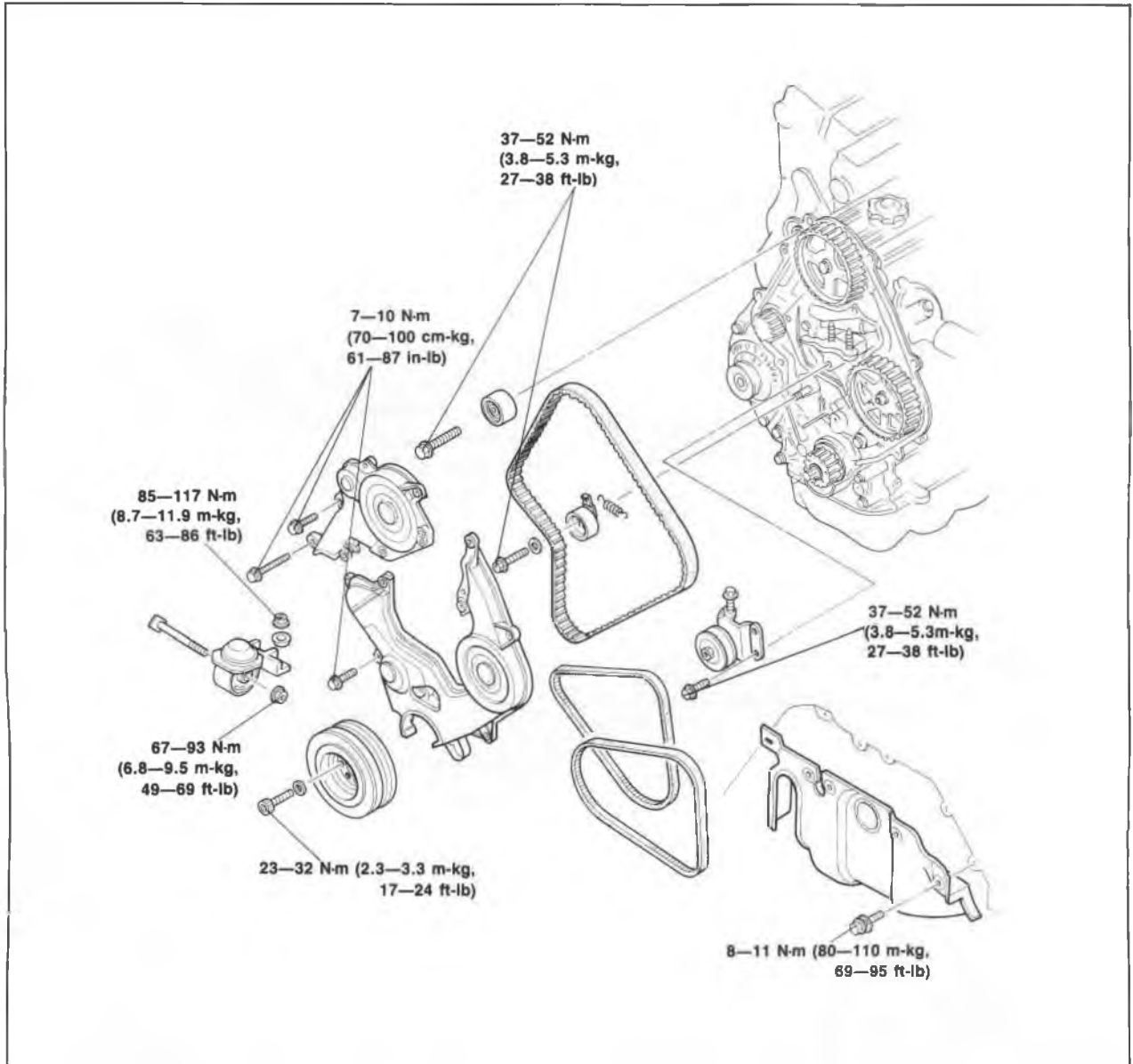
1. Timing belt
2. Timing belt tensioner and spring
3. Timing belt idler pulley
4. Timing belt pulley

## Installation

Install in the reverse order of removal referring to the installation note.

## Torque Specifications

76G01C-239



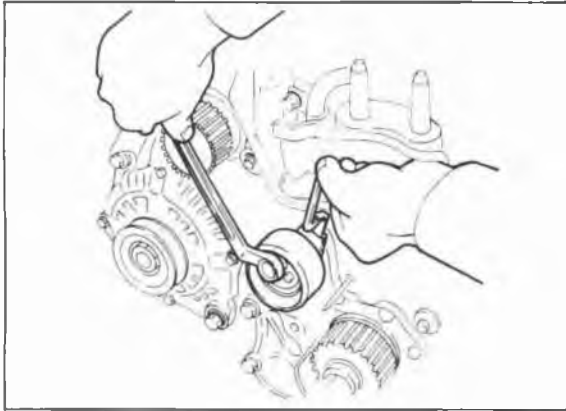
76G01C-023

## Installation note

### Timing belt

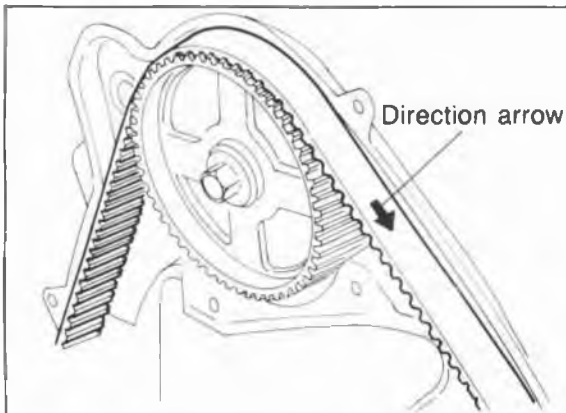
1. Check that the timing marks of camshaft pulley, timing belt pulley and injection pump pulley align with the timing marks.

# 1C ON-VEHICLE MAINTENANCE (TIMING BELT)



63G01D-330

2. Install the timing belt tensioner and spring.
3. Temporarily secure the tensioner with it shifted outwards.



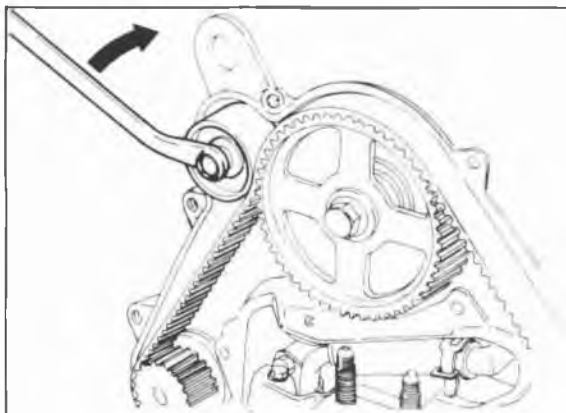
76G01C-024

4. Install the timing belt.

### Caution

a) The timing belt must be reinstalled in the same direction of previous rotation, if it is to be reused.

b) Be sure that there is no oil, grease, or dirt on the timing belt.



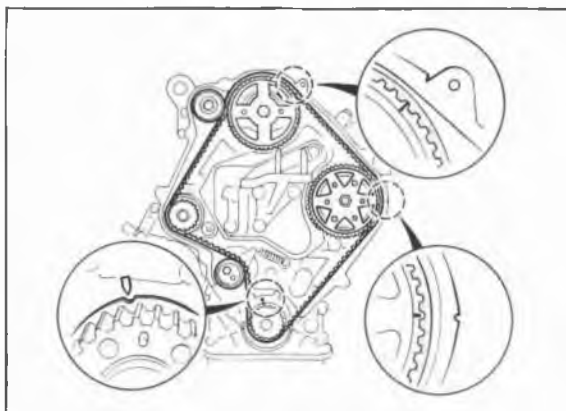
76G01C-025

5. Install the idler pulley.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

6. Remove the affixing bolts from the injection pulley.



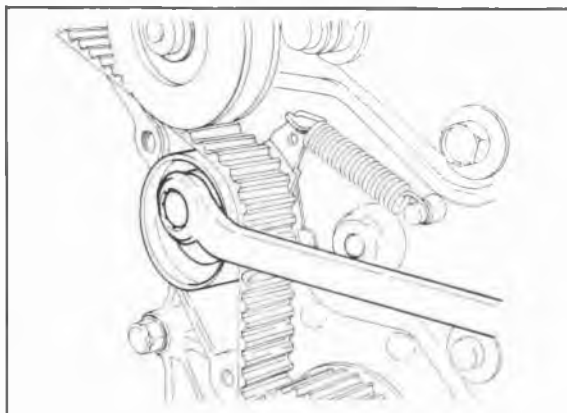
76G01C-026

7. Loosen the tensioner lock bolt.
8. Turn the crankshaft twice in the direction of rotation (clockwise).

### Caution

**Do not rotate reverse direction.**

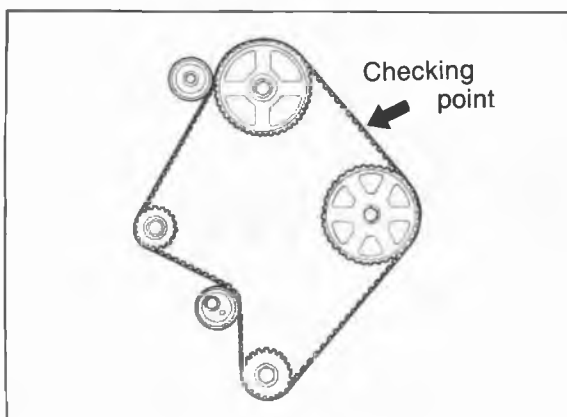
9. Check that each timing mark is correctly aligned. If not aligned, remove the timing belt. Repeat step 1—8.



76G01C-027

10. Tighten the timing belt tensioner lock bolt.

**Tightening torque:**  
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

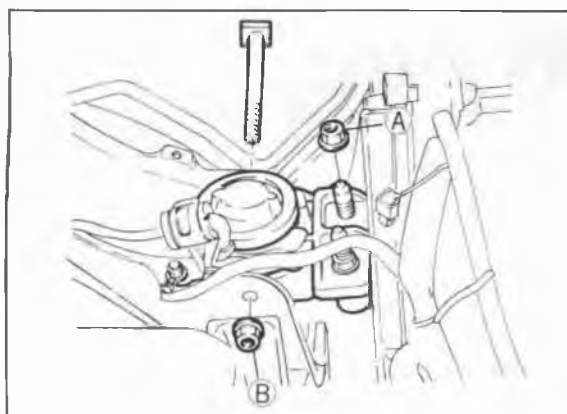


76G01C-028

11. Check the timing belt tension.  
 If the tension is not correct, loosen the tensioner lock bolt and repeat step 7—10, or replace the tensioner spring.

**Deflection: 9.0—11.5 mm**  
**(0.35—0.45 in) / 98 N (10 kg, 22 lb)**

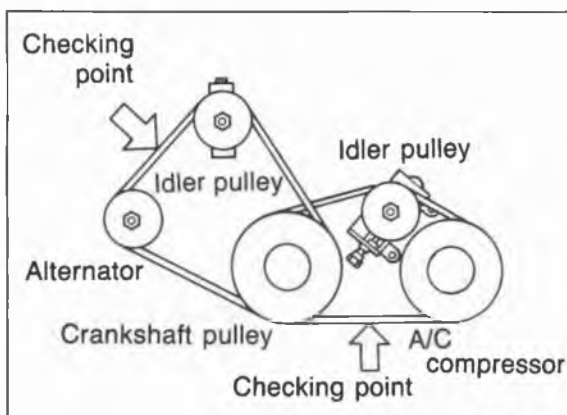
**Caution**  
**Be sure not to apply tension other than that of the tensioner spring.**



76G01C-029

**No.3 engine mount**  
 Install the No.3 engine mount.

**Tightening torque:**  
**Nut A: 85—117 N·m**  
**(8.7—11.9 m·kg, 63—86 ft·lb)**  
**Nut B: 67—93 N·m**  
**(6.8—9.5 m·kg, 49—69 ft·lb)**



76G01C-030

**Drive belt**  
 Install each drive belt, and check the belt deflection. (Refer to page 1C—7.)

**Steps after installation**  
 Perform the necessary engine adjustment. (Refer to TUNE-UP PROCEDURE.)

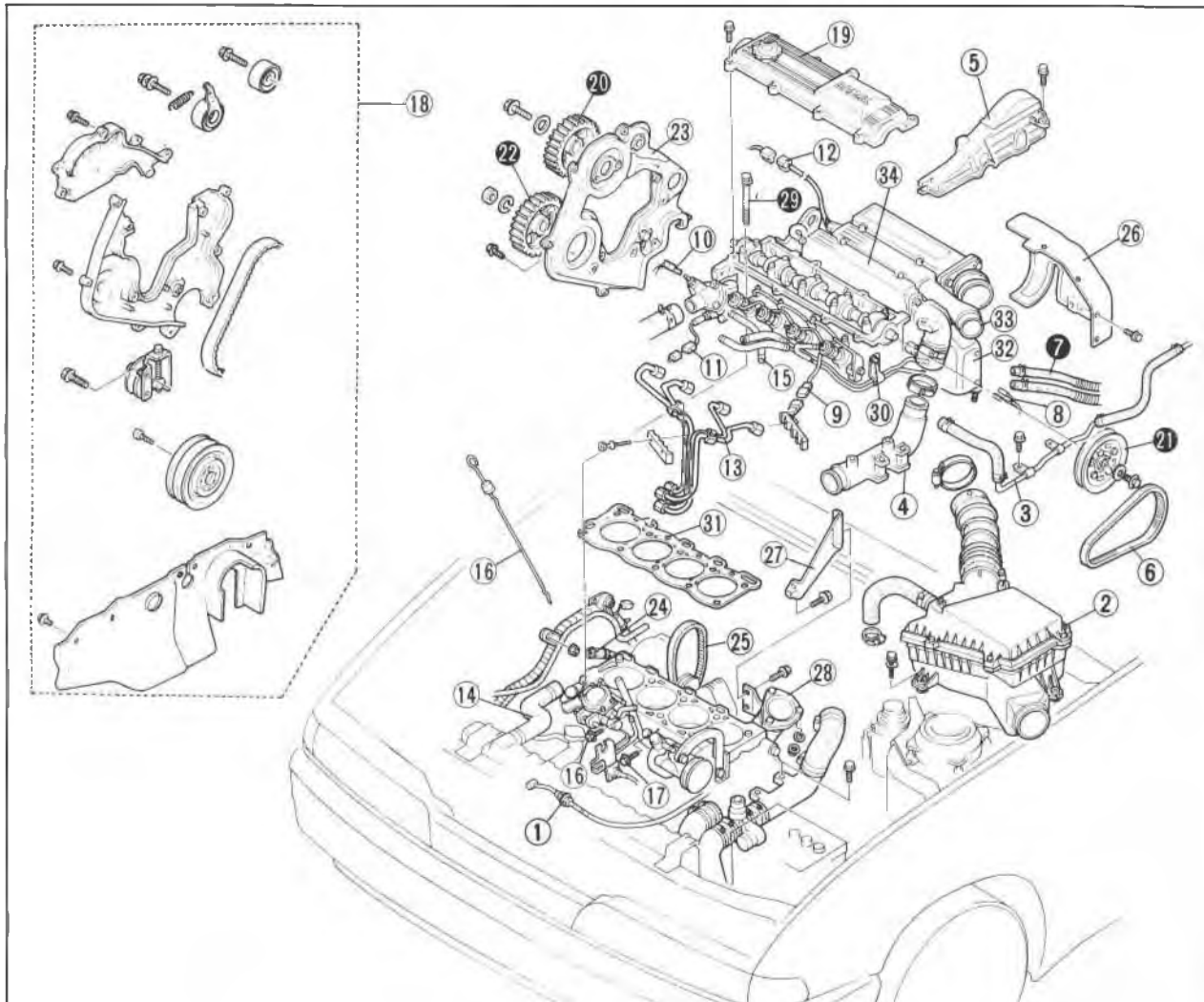
# 1C ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

## CYLINDER HEAD

### Removal

1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G01C-031

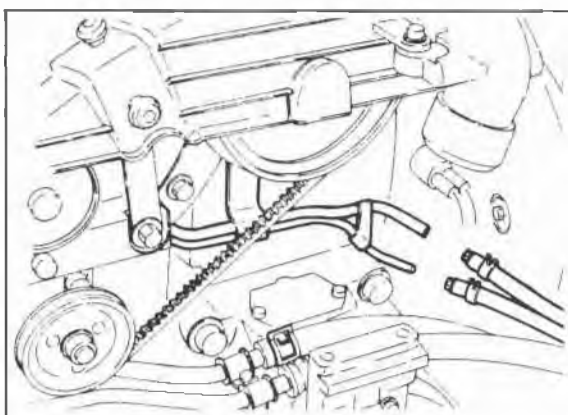


76G01C-032

- |                                       |   |                                      |
|---------------------------------------|---|--------------------------------------|
| 1. Accelerator cable                  | 12. Boost air temperature sensor connector* | 22. Injection pump pulley            |
| 2. Air cleaner                        | 13. Injection pipes                         | 23. Seal plate                       |
| 3. Brake vacuum pipe                  | 14. Upper radiator hose                     | 24. Water hose and pipe              |
| 4. Intercooler pipe and hose*         | 15. Water hose (thermostat—FIP)             | 25. Compres supercharger drive belt* |
| 5. Drive belt cover                   | 16. Oil level gauge and stay bolt           | 26. Heat insulator*                  |
| 6. Vacuum pump drive belt             | 17. Oil pipe bolt                           | 27. Exhaust manifold stay            |
| 7. Fuel hose                          | 18. Timing belt (Refer to page 1C—11)       | 28. Front exhaust pipe               |
| 8. Water temperature switch connector | 19. Cylinder head cover                     | 29. Cylinder head bolt               |
| 9. Glow plug connector                | 20. Camshaft pulley                         | 30. Cylinder head                    |
| 10. Water thermo switch connector     | 21. Rear camshaft pulley                    | 31. Cylinder head gasket             |
| 11. Heat gauge unit connector         |   | 32. Compres supercharger*            |
|                                       |   | 33. Exhaust manifold                 |
|                                       |   | 34. Intake manifold                  |

### Note

\* marked parts are equipped only for the RF-CX.



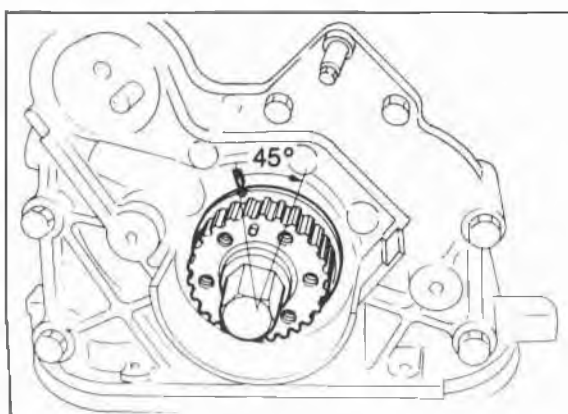
76G01C-240

## Removal note Fuel hose

### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep fire and open flame away from the fuel area.

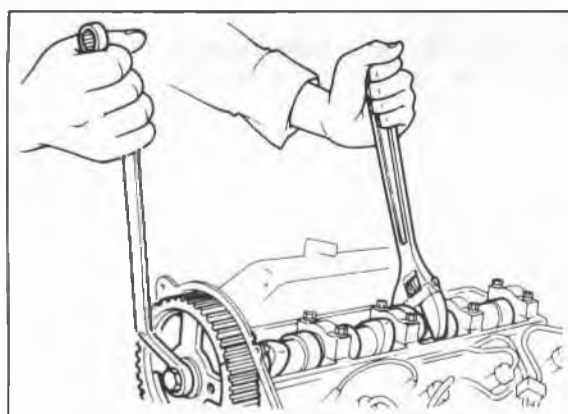
Plug the disconnected hoses to avoid fuel leakage.



76G01C-033

## Camshaft pulley

1. After removing the timing belt, turn the crankshaft 45° clockwise.

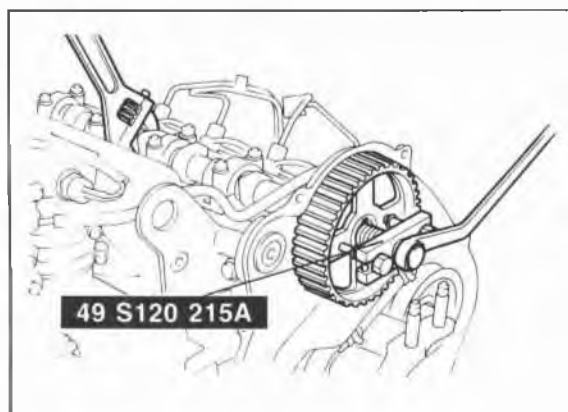


4BG01B-044

2. Hold the camshaft with a wrench (29 mm, 1.14 in) and loosen the camshaft pulley lock bolt.

### Caution

**Do not damage the cylinder head edge with the wrench.**



76G01C-034

3. Separate the camshaft pulley from the camshaft with the **SST**.

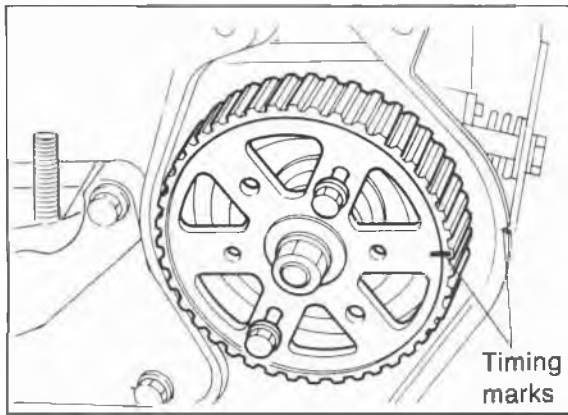
### Caution

**Do not hit the camshaft pulley with a hammer.**

## Rear camshaft pulley

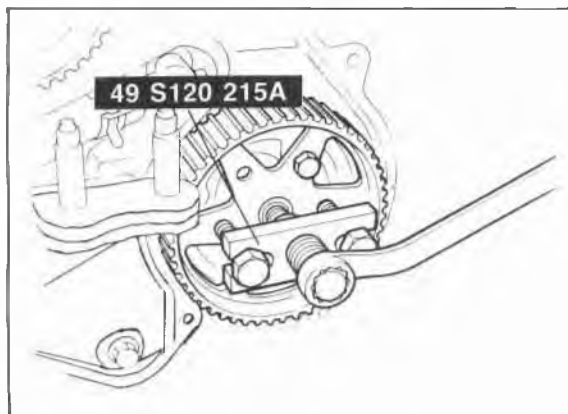
Remove the rear camshaft pulley in the same manner used for camshaft pulley.

# 1C ON-VEHICLE MAINTENANCE (CYLINDER HEAD)

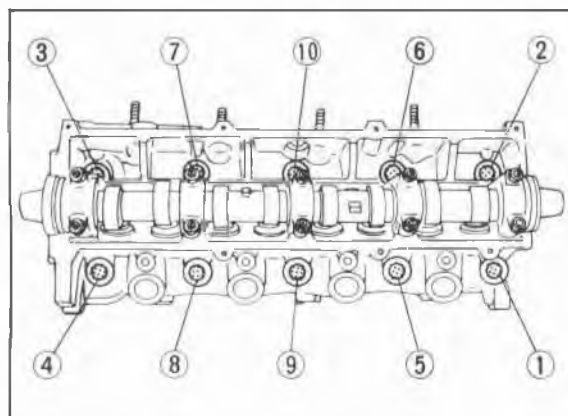


## Injection pump pulley

1. Put two bolts of 35—40 mm (1.4—1.6 in) length into the arms of the injection pump pulley and affix them in the threaded hole of the injection pump bracket.
2. Loosen the injection pump pulley lock bolt.

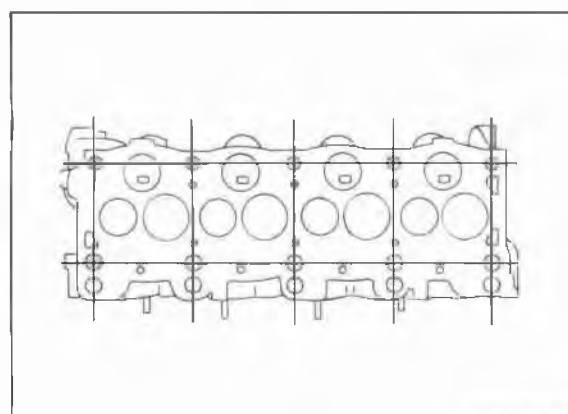


3. Separate the injection pump pulley from the injection pump shaft with the **SST**.



## Cylinder head bolt

Loosen the cylinder head bolts in two or three steps, and in the order shown in the figure.



## Disassembly of Cylinder Head

Refer to page 1C—40.

## Inspection of Cylinder Head

Refer to page 1C—47.

## Assembly of Cylinder Head

Refer to page 1C—73.

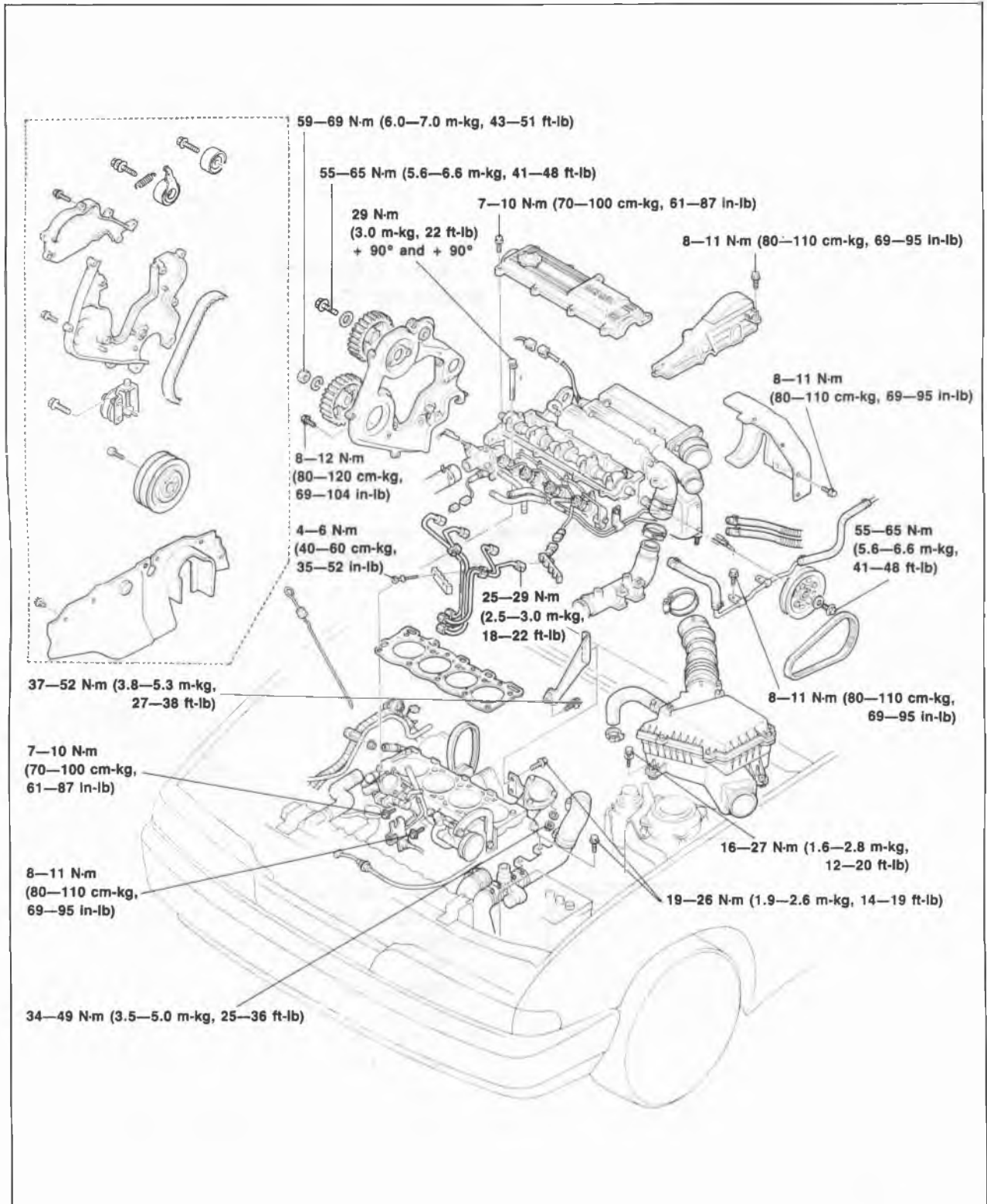
## Installation

Install in the reverse order of removal referring to the installation note.

### Note

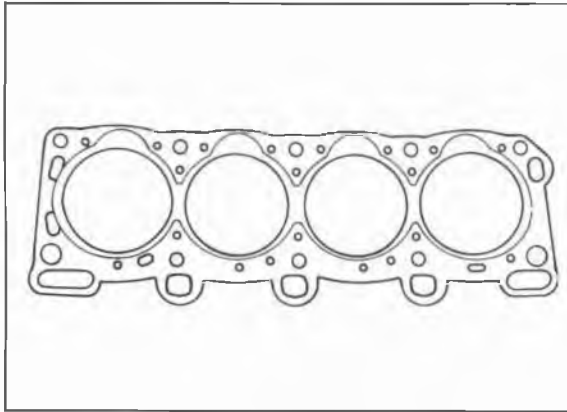
- Position the hose clamp in the original location on the hose.
- Squeeze the clamp lightly with large pliers to ensure a good fit.

## Torque Specifications





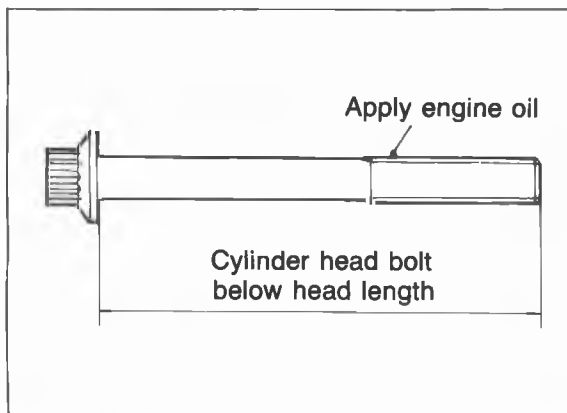
# 1C ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



76G01C-037

## Installation Cylinder head

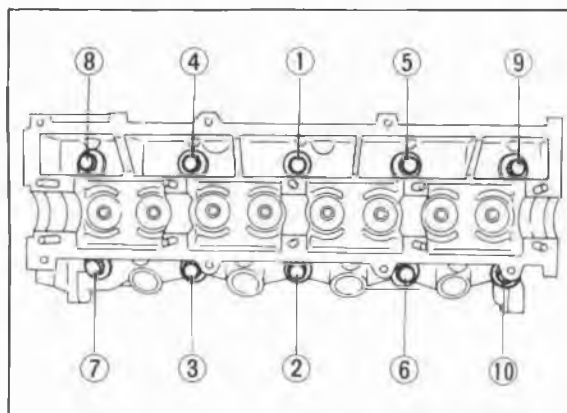
1. Thoroughly remove all dirt and grease from the top of the cylinder block with a rag.
2. Place the new cylinder head gasket in position.
3. Remove any dirt and grease from the bottom surface of the cylinder head.
4. Place the cylinder head in position.



76G01C-038

5. Measure the length of the cylinder head bolt below the head. If the length exceeds the maximum, replace the bolt.

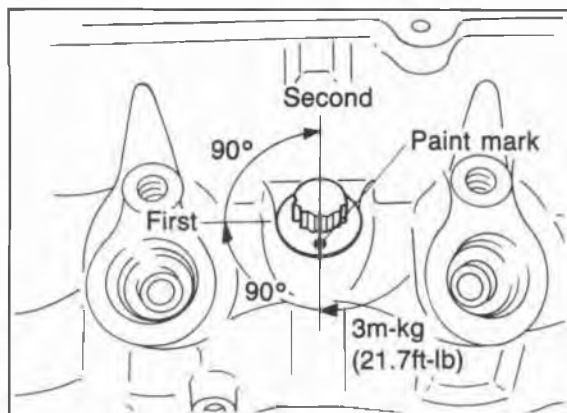
**Length: 113.2—113.8 mm (4.457—4.480 in)**  
**Maximum: 114.5 mm (4.508 in)**



76G01C-039

6. Apply engine oil to the threads and the seat face of the cylinder head bolts.
7. Tighten the cylinder head bolts.
  - (1) Tighten the bolts to the specified torque, in the order shown in the figure.

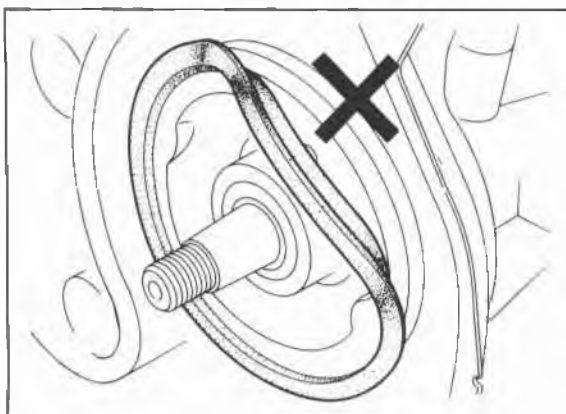
**Tightening torque:**  
**29 N·m (3.0 m·kg, 22 ft·lb)**



76G01C-040

- (2) Make paint marks on the bolt heads, as shown in the figure.
- (3) With the paint marks as a reference point, turn the cylinder head bolts **another 90° (90°—105°)** in the tightening direction. Tighten them in the order.
- (4) Then tighten them **once again 90° (90°—105°)** in the tightening order.

**Caution**  
**Be absolutely sure that the bolts are tightened in the proper order.**



76G01C-041

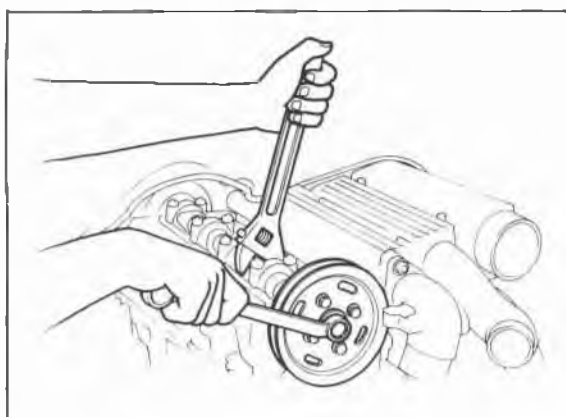
### Seal plate

1. Install the seal plate.

### Tightening torque:

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

2. Check that the seal plate sealing rubbers are installed in position.



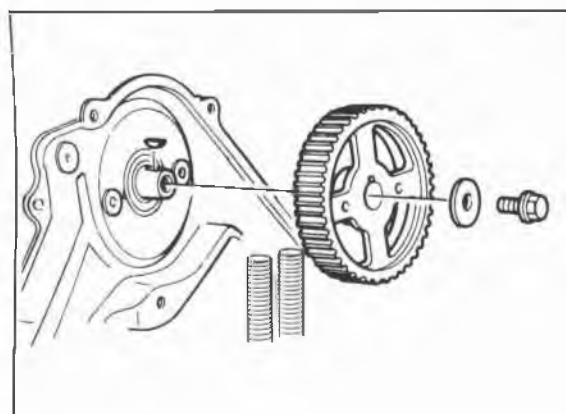
76G01C-042

### Rear camshaft pulley

1. Install the rear camshaft pulley.
2. Hold the camshaft with a wrench (29 mm, 1.14 in), and tighten to the specification.

### Tightening torque:

**55—65 N·m (5.6—6.6 m·kg, 41—48 ft·lb)**



76G01C-043

### Camshaft pulley

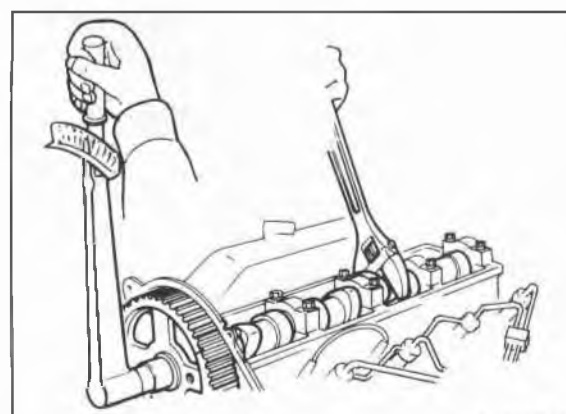
1. Connect the camshaft pulley onto the camshaft with the semicircular (woodruff) key.

2. Hold the camshaft with a wrench (29 mm, 1.14 in), tighten the camshaft pulley lock bolt.

### Tightening torque:

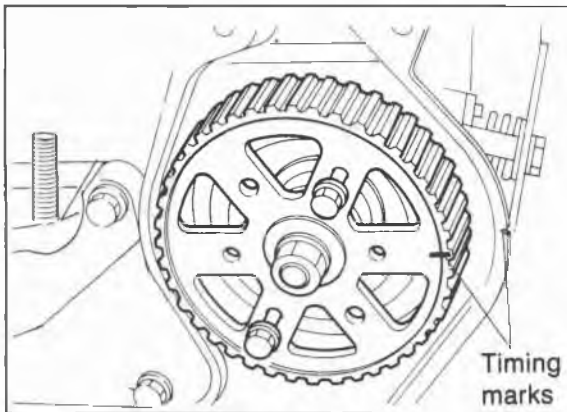
**55—65 N·m (5.6—6.6 m·kg, 41—48 ft·lb)**

3. Align the mark on the camshaft pulley with the mark on the seal plate.



76G01C-044

# 1C ON-VEHICLE MAINTENANCE (CYLINDER HEAD)



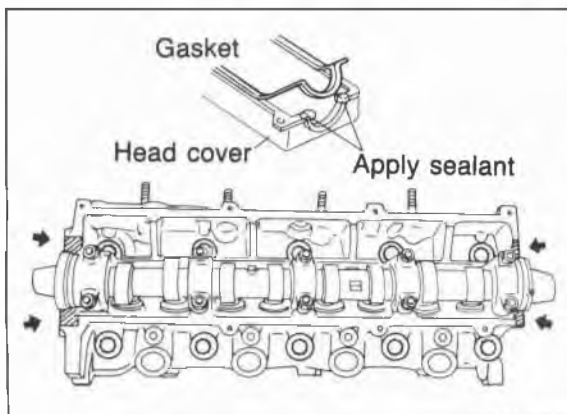
76G01C-045

## Injection pump pulley

1. Install the injection pump pulley with the semicircular (woodruff) key to the injection pump shaft.
2. Rotate the injection pump pulley until the timing marks are aligned.
3. Affix the injection pump pulley to the bracket using two bolts (35—40 mm, 1.4—1.6 in).
4. Tighten the lock nut.

## Tightening torque:

**59—69 Nm (6.0—7.0 m-kg, 43—51 ft-lb)**



76G01C-046

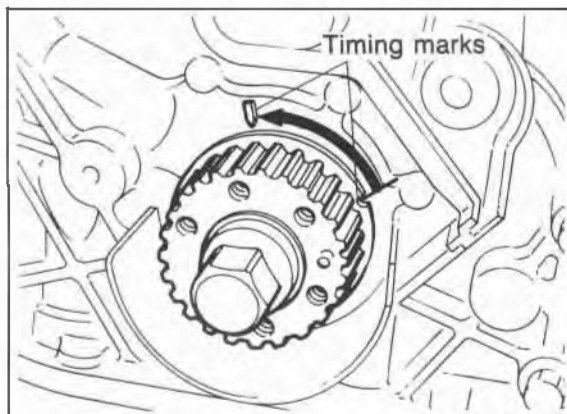
## Cylinder head cover

1. Apply sealant to the shaded areas.
2. Install the cylinder head cover.

## Tightening torque:

**7—10 Nm (70—100 cm-kg, 61—87 in-lb)**

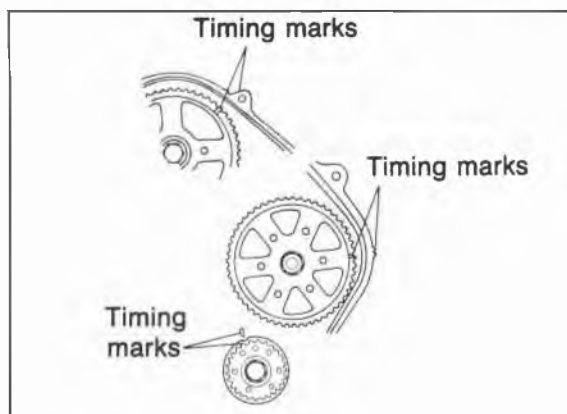
3. Install the PCV hose.



76G01C-047

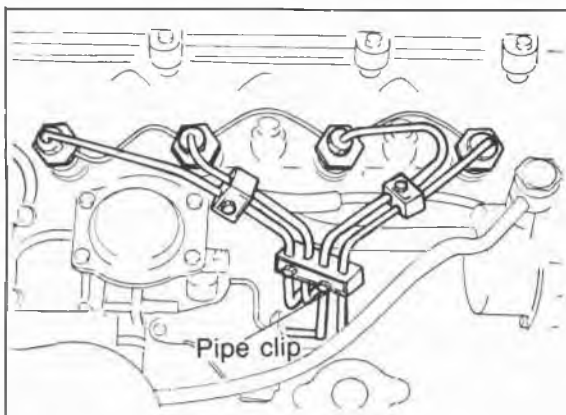
## Timing belt

1. Return the crankshaft about 45° to the timing mark on the oil pump housing.



76G01C-048

2. Check that the timing marks of the camshaft pulley and the injection pump pulley align with the timing marks on the seal plate.
3. Install the timing belt. (Refer to TIMING BELT of ON-VEHICLE MAINTENANCE)



76G01C-049

### Injection pipe

1. Check that no dirt or other foreign material is on the pipe coupling.
2. Install the injection pipes.

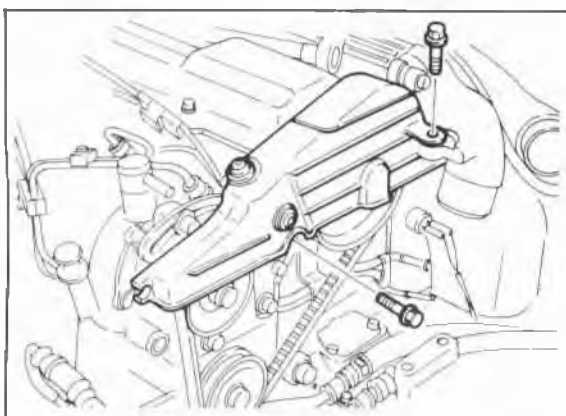
### Tightening torque:

**25—29 N·m (2.5—3.0 m·kg, 18—22 ft·lb)**

3. Install the pipe clip.

### Tightening torque:

**4—6 N·m (40—60 cm·kg, 35—52 in·lb)**



76G01C-050

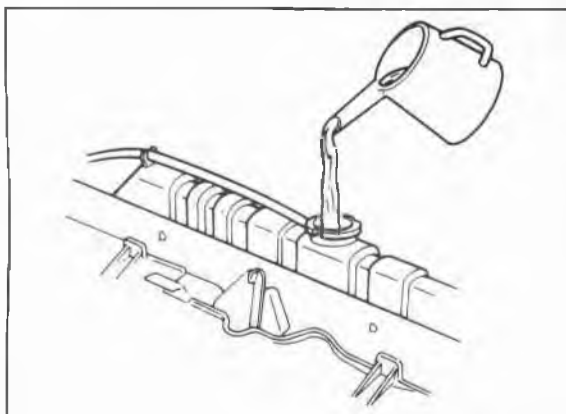
### Vacuum pump drive belt

1. Install the vacuum pump drive belt, and adjust the belt deflection. (Refer to 1C—7)
2. Install the drive belt cover.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

3. Connect the vacuum hose securely and squeeze the clamp lightly with pliers to ensure a good fit.



76G01C-051

### Steps after installation

1. Fill the radiator with the specified amount and type of coolant.
2. Perform the necessary engine adjustments. (Refer to TUNE-UP PROCEDURE.)

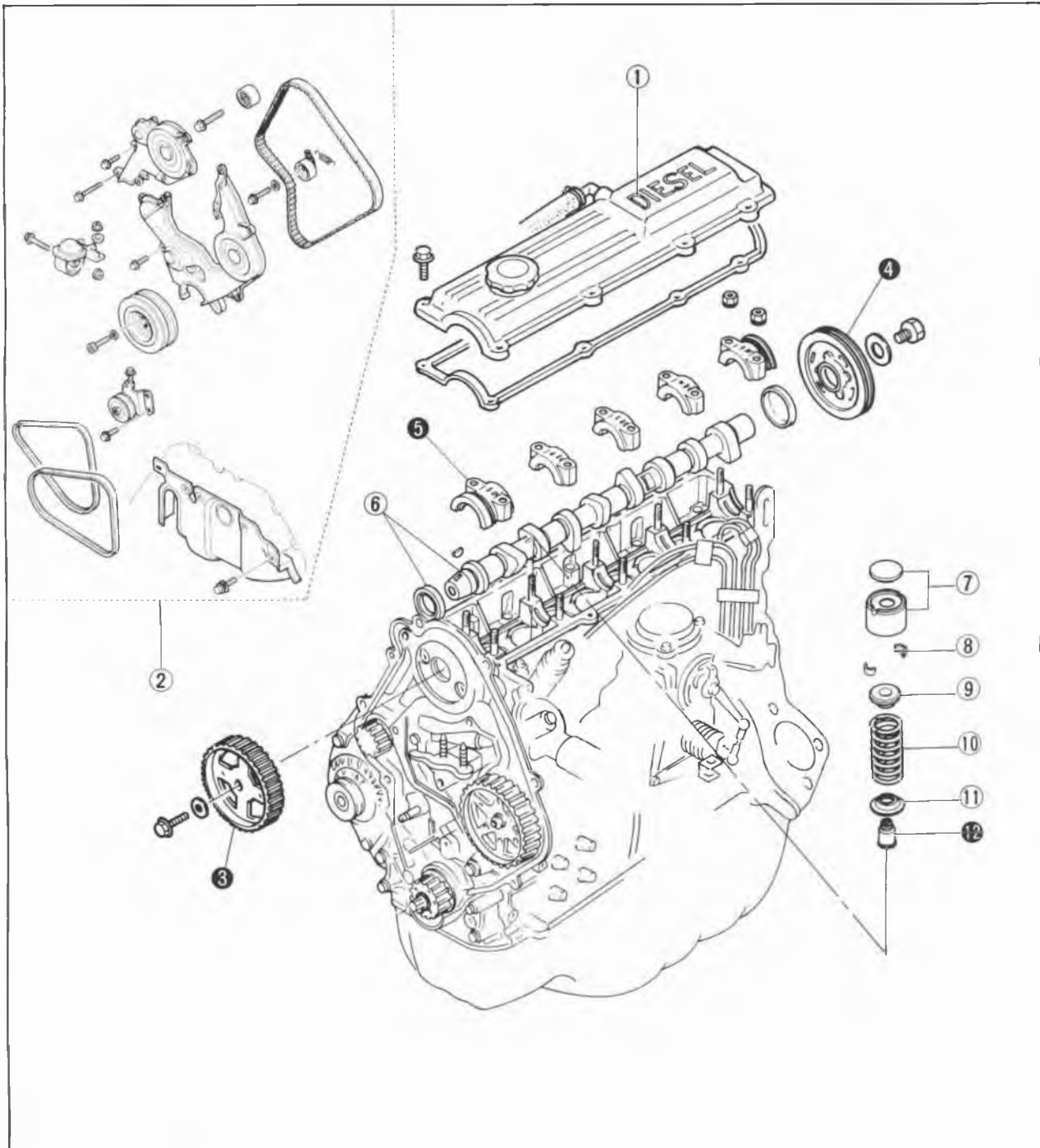
# 1C ON-VEHICLE MAINTENANCE (VALVE SEAL)

## VALVE SEAL

### Removal

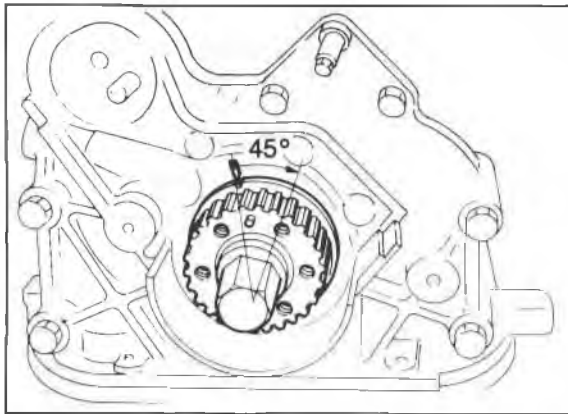
1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G01C-052



76G01C-053

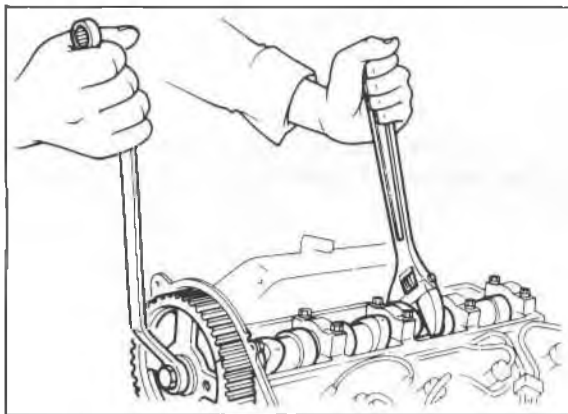
- |                                      |                              |
|--------------------------------------|------------------------------|
| 1. Cylinder head cover               | 7. Tappet and adjusting disc |
| 2. Timing belt (Refer to page 1C—11) | 8. Valve keeper              |
| 3. Camshaft pulley                   | 9. Upper valve spring seat   |
| 4. Rear camshaft pulley              | 10. Valve spring             |
| 5. Camshaft cap                      | 11. Lower valve spring seat  |
| 6. Camshaft and oil seal             | 12. Valve seal               |



76G01C-054

### Removal note Camshaft pulley

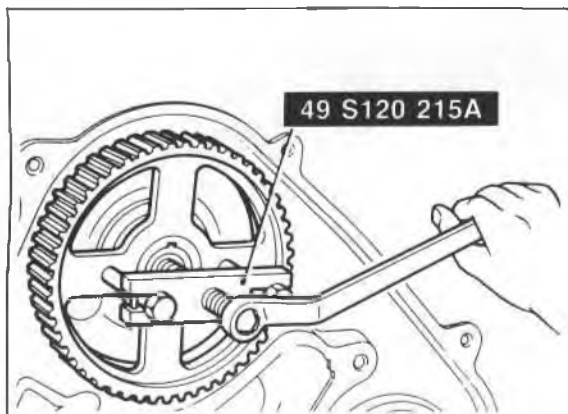
1. After removing the timing belt, turn the crankshaft 45° clockwise.



4BG01B-044

2. Hold the camshaft with a wrench (29 mm, 1.14 in) and loosen the camshaft pulley lock bolt.

**Caution**  
Do not damage the cylinder head edge with the wrench.

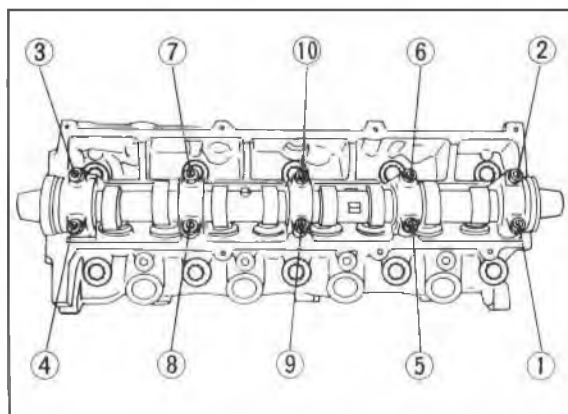


76G01C-055

3. Separate the camshaft pulley from the camshaft with the **SST**.

**Caution**  
Do not hit the camshaft pulley with a hammer.

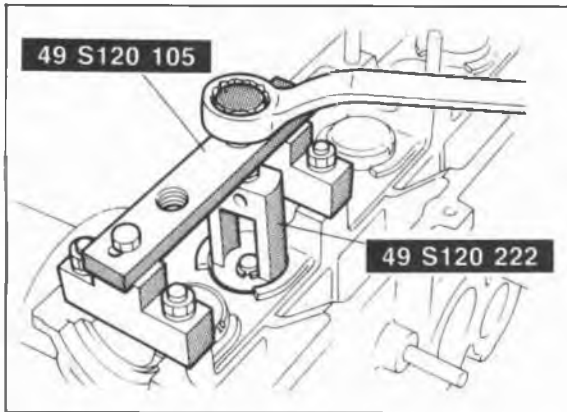
**Rear camshaft pulley**  
Remove the rear camshaft pulley in the same manner used for camshaft pulley.



76G01C-056

**Camshaft cap**  
Loosen the camshaft nuts in two or three steps in the order shown in the figure.

# 1C ON-VEHICLE MAINTENANCE (VALVE SEAL)



76G01C-057



76G01C-058

## Valve seal

1. Plug the oil drain hole with a rag to prevent the possibility of the valve keepers from falling into the oil pan.
2. Turn the crankshaft to position the piston of the valve seal to be replaced at top dead center.
3. Remove the valve keepers with the **SST**.

4. Remove the valve spring and spring seats.
5. Remove the valve seal with the **SST**.

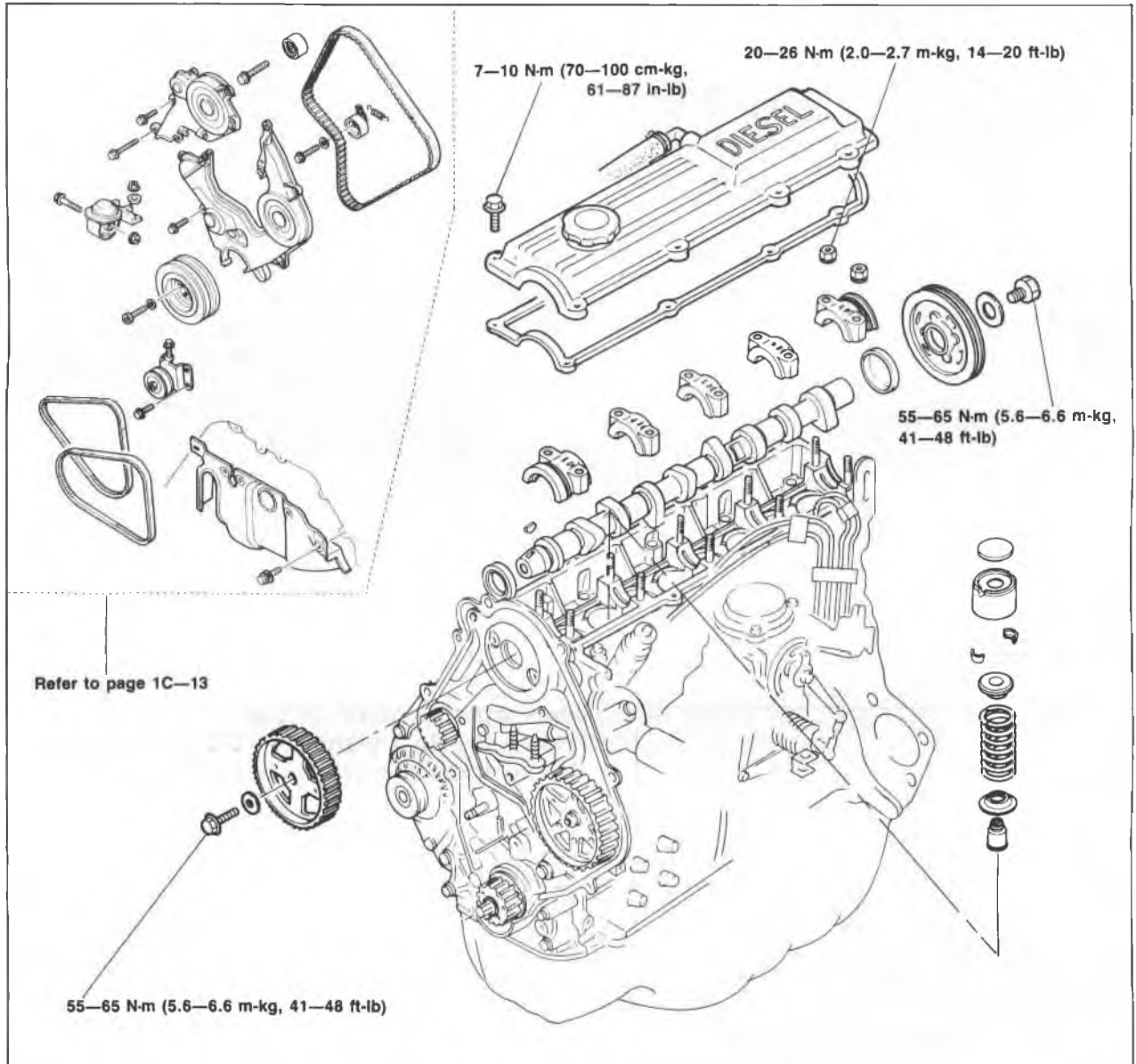
## Caution

**Do not turn the crankshaft while the valve spring is removed. Replace the valve seals at every cylinders.**

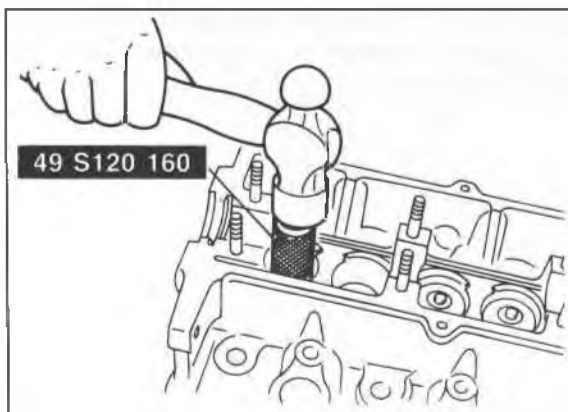
## Installation

Install in the reverse order of removal referring to the installation note.

## Torque Specifications



76G01C-243



86U01X-049

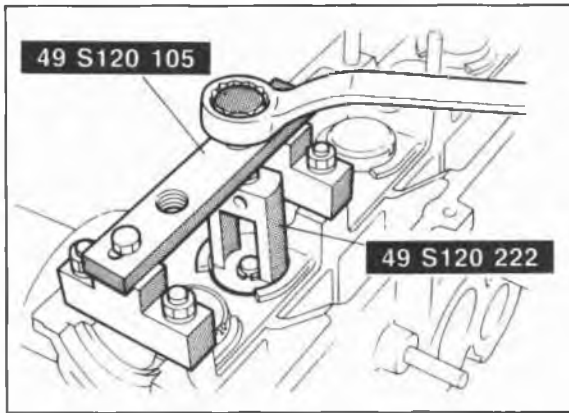
## Installation note

### Valve seal

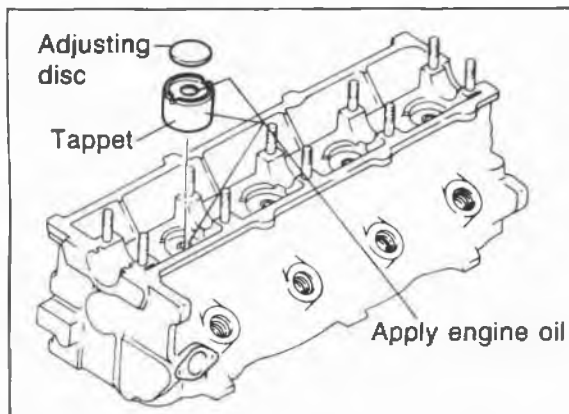
1. Apply engine oil to the inside of the new valve seal.
2. Push it on gently with the **SST**.



# 1C ON-VEHICLE MEINTENANCE (VALVE SEAL)

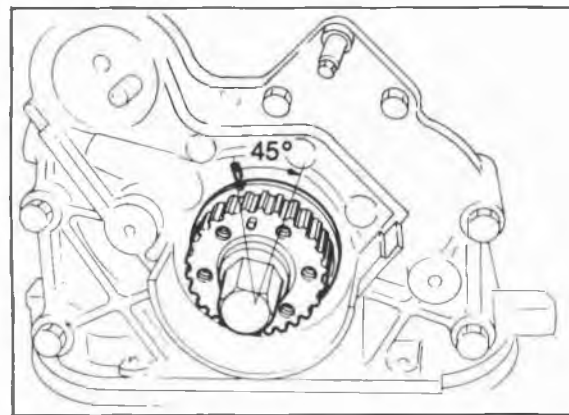


3. Install the spring seat, valve springs and valve keepers with the **SST**.



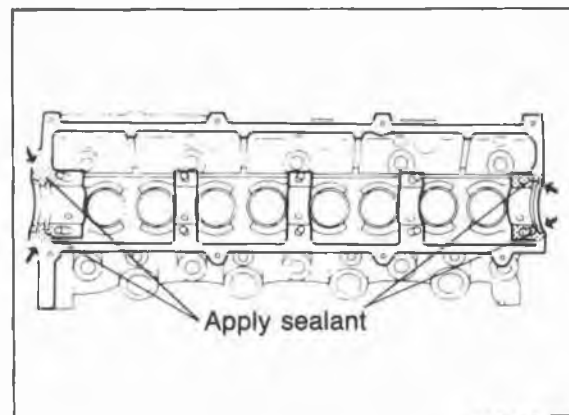
### Tappet and adjusting disc

1. Apply engine oil to the tappets.
2. Install the tappets in the hole.
3. Install the adjusting discs.

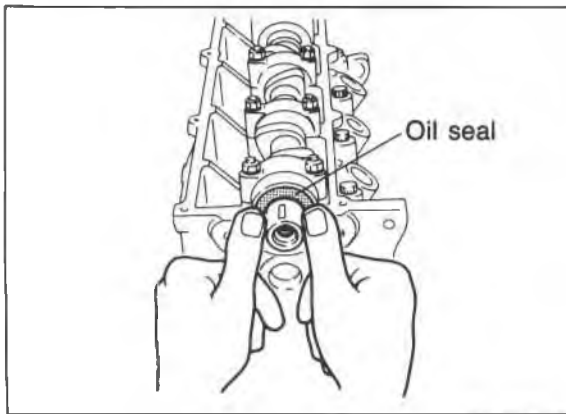


### Camshaft and camshaft cap

1. Move the **No.1 piston to TDC**, and then rotate the crankshaft approximately 45°

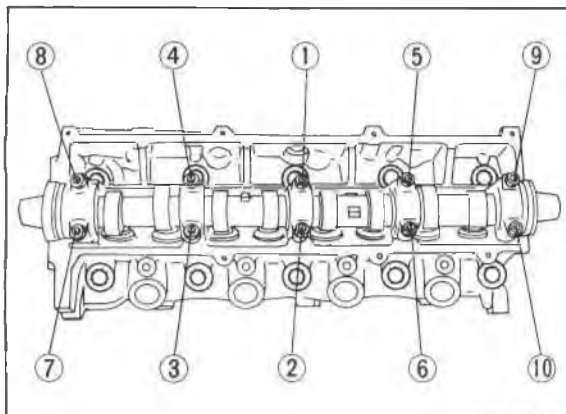


2. Apply engine oil to the camshaft and the journals.
3. Apply a coat of sealant to the shaded areas as shown in the figure.



76G01C-063

4. Set the camshaft and camshaft cap so that the key groove faces directly upward.  
And tighten the cap nuts loosely.
5. Apply a coat of engine oil to the new oil seal lip and insert it.

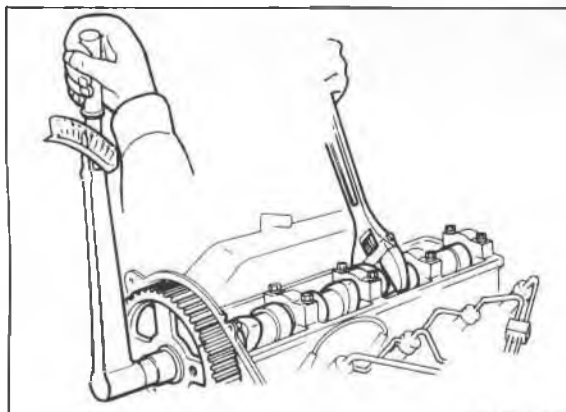


76G01C-064

6. Tighten the camshaft cap nuts gradually and in the order shown in the figure.

**Tightening torque:**

**20—26 N·m (2.0—2.7 m·kg, 14—20 ft·lb)**



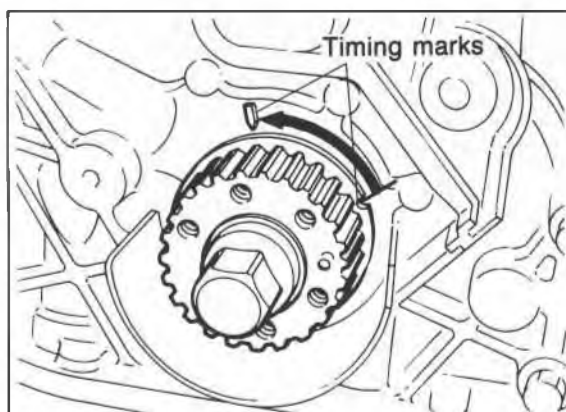
76G01C-065

**Camshaft pulley and rear camshaft pulley**

Hold the camshaft with a wrench (29 mm, 1.14 in), tighten the camshaft pulley and rear camshaft pulley lock bolts.

**Tightening torque:**

**55—65 N·m (5.6—6.6 m·kg, 41—48 ft·lb)**

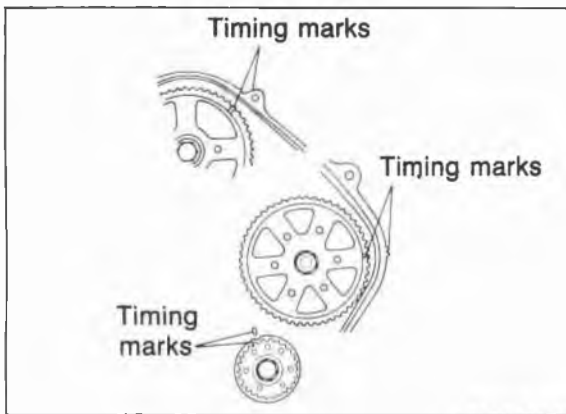


76G01C-066

**Timing belt**

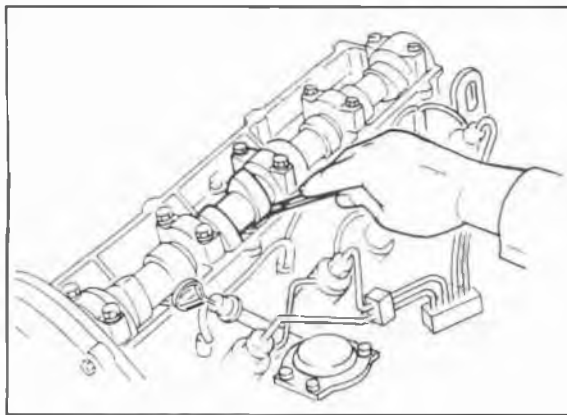
1. Return the crankshaft about 45° to the timing mark on the oil pump housing.

# 1C ON-VEHICLE MAINTENANCE (VALVE SEAL)



76G01C-067

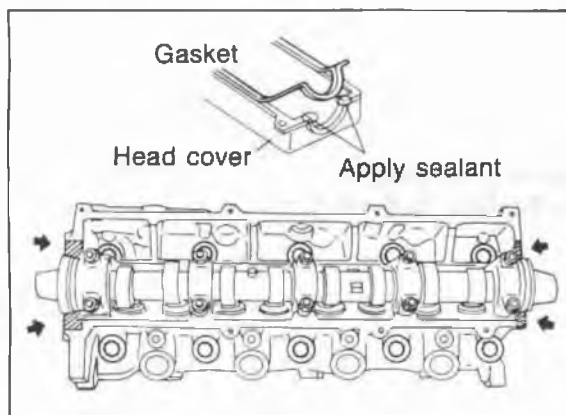
2. Check that the timing marks of the camshaft pulley and the injection pump pulley align with the timing marks on the seal plate.
3. Install the timing belt. (Refer to TIMING BELT of ON-VEHICLE MAINTENANCE)



76G01C-068

## Valve clearance

Measure the valve clearance, and adjust if necessary. (Refer to page 1C—85).



76G01C-069

## Cylinder head cover

1. Remove the rag plugged oil return hole.
2. Apply sealant to the shaded areas as shown in the figure.
3. Install the cylinder head cover.

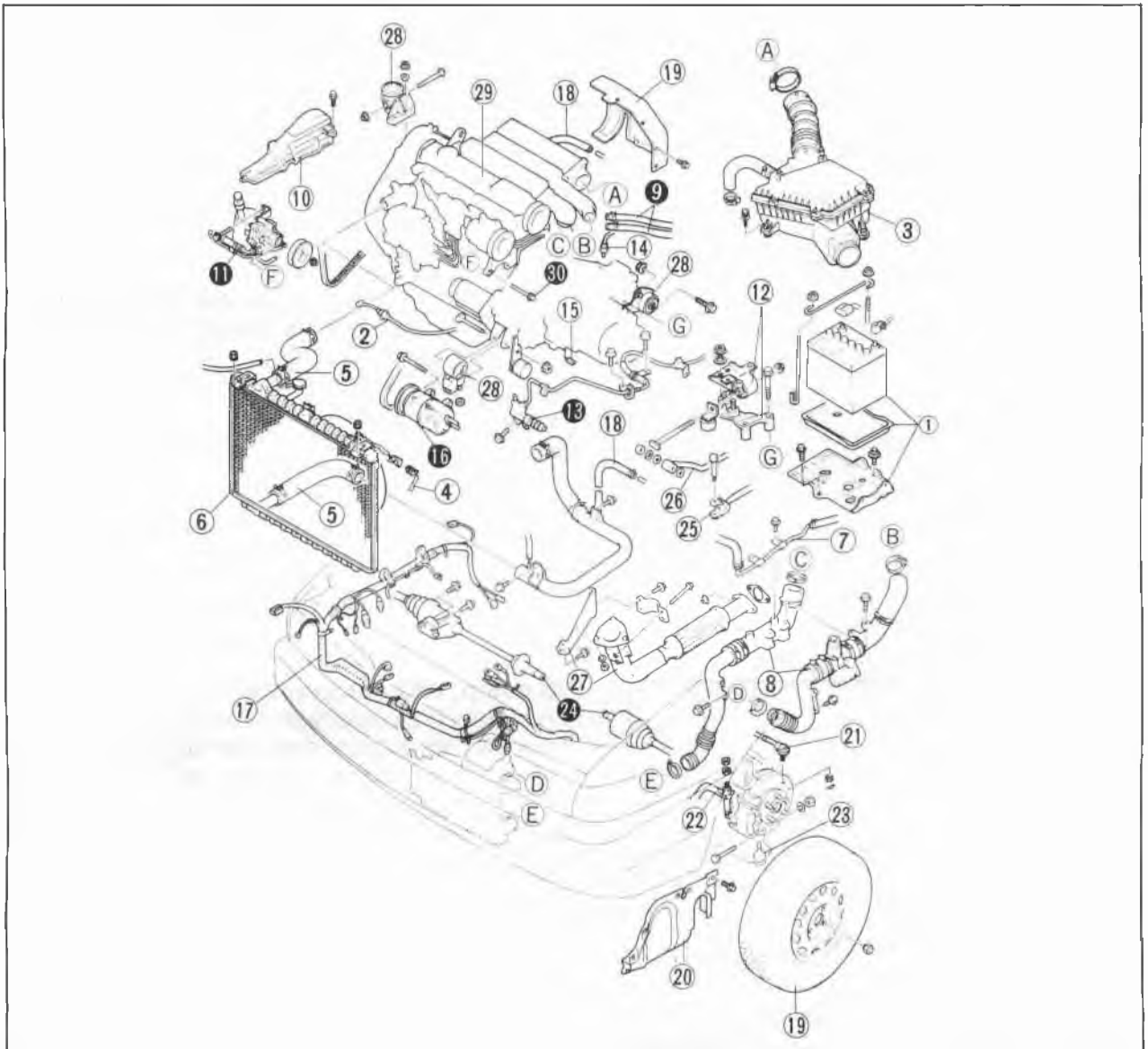
## Tightening torque:

**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**

4. Perform the necessary engine adjustments by referring to TUNE-UP PROCEDURE section.

## REMOVAL

1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.



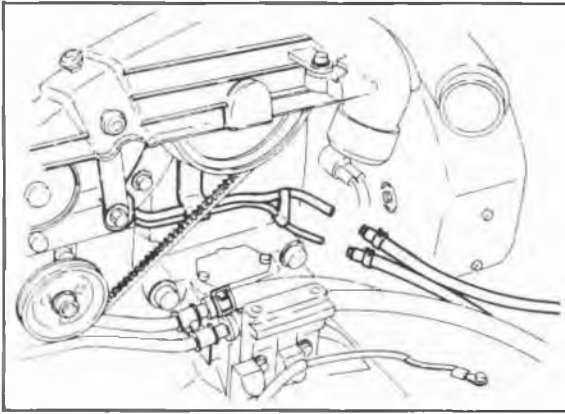
76G01C-071

- |                                |                             |                            |
|--------------------------------|-----------------------------|----------------------------|
| 1. Battery and battery carrier | 11. P/S pump                | 21. Tie-rod end            |
| 2. Accelerator cable           | 12. No.4 engine mount       | 22. Stabilizer control rod |
| 3. Air cleaner assembly        | 13. Clutch release cylinder | 23. Lower arm bushing      |
| 4. Radiator harness            | 14. Speedometer cable       | 24. Driveshaft             |
| 5. Radiator hose               | 15. Transaxle harness       | 25. Change rod             |
| 6. Radiator and cooling fan    | 16. A/C compressor          | 26. Extension bar          |
| 7. Brake vacuum hose           | 17. Engine harness          | 27. Exhaust pipe and stay  |
| 8. Intercooler pipe and hose*  | 18. Heater hose             | 28. Engine mount           |
| 9. Fuel hose                   | 19. Front wheel             | 29. Engine and transaxle   |
| 10. Drive belt cover           | 20. Engine side cover       | 30. Transaxle              |

### Note

\* marked parts are equipped only for RF-CX.

# 1C REMOVAL



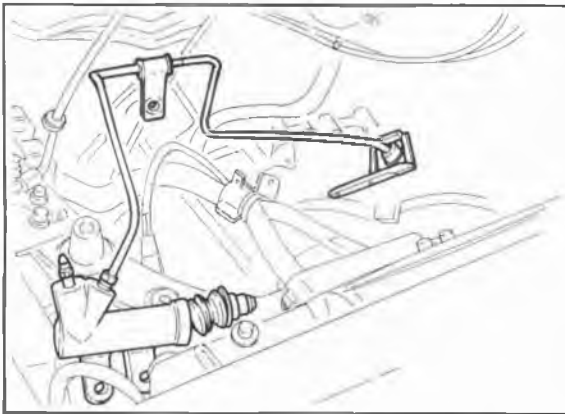
76G01C-244

## Removal Note Fuel hose

### Warning

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep fire and open flame away from the fuel area.

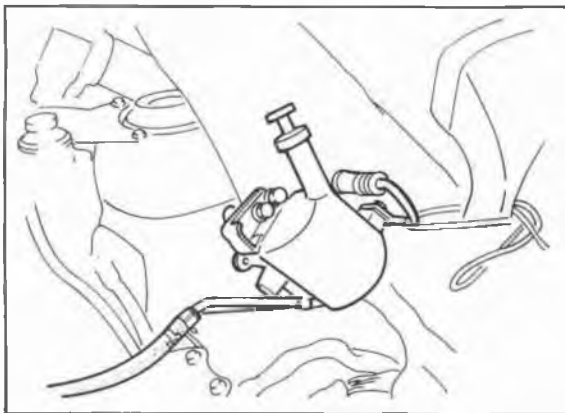
After disconnecting the fuel hoses, plug them to avoid fuel leakage.



76G01C-072

## Clutch release cylinder

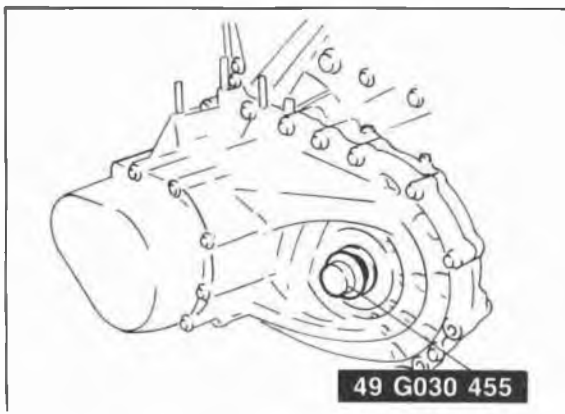
Remove the clutch release cylinder with the pipe still connected; then avoid the cylinder.



67U01X-029

## P/S pump, A/C compressor

Remove the P/S pump and A/C compressor with the hoses still connected to them, secure the pump and compressor as shown in the figure.



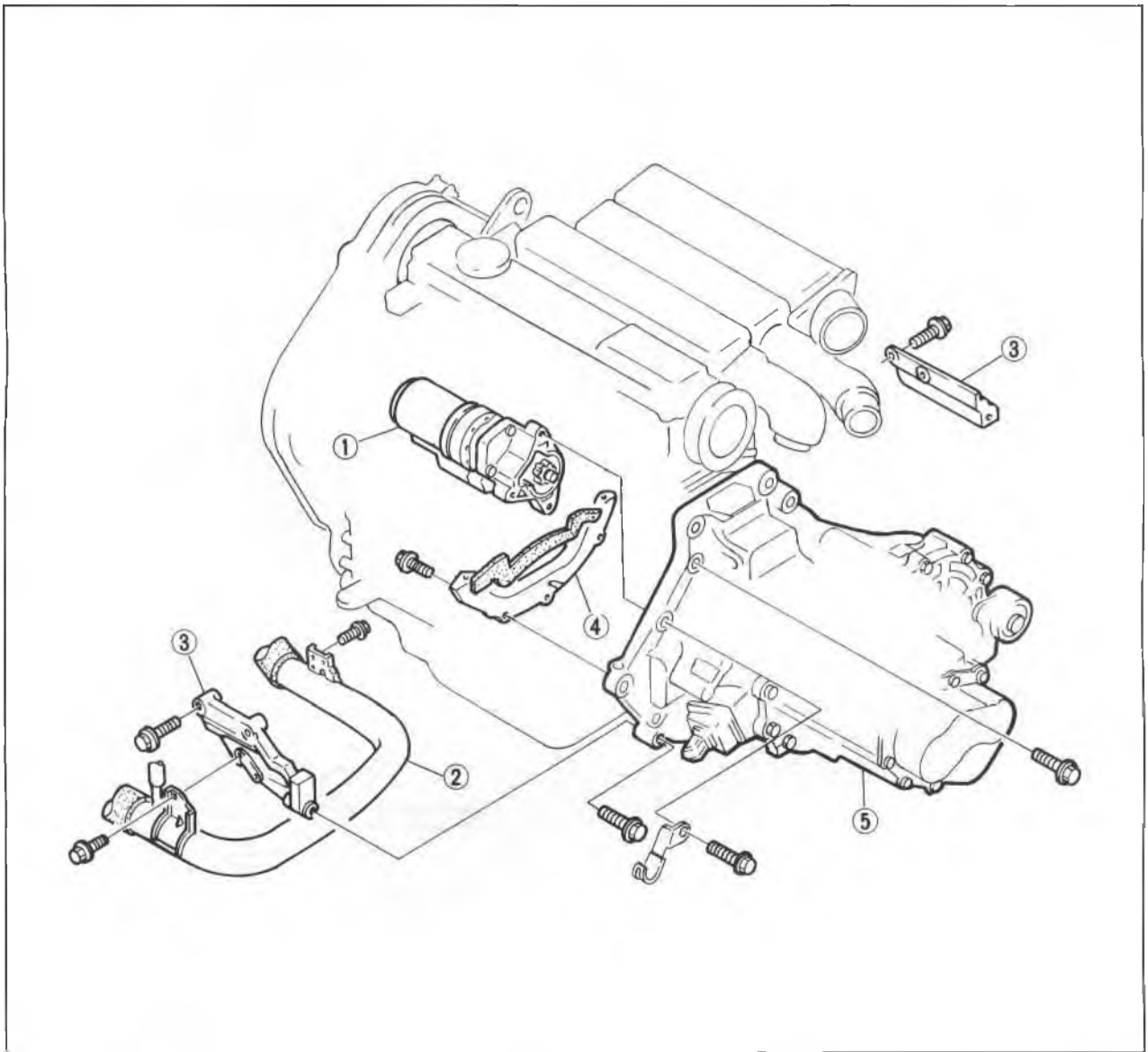
86U01X-060

## Driveshaft

Remove the driveshafts. (Refer to Section 9.) Slide the **SST** into the transaxle.

## Transaxle

Separate the transaxle from the engine in the sequence shown in the figure.



76G01C-073

1. Starter
2. Water pipe
3. Gusset plate

4. Clutch under cover
5. Transaxle

# 1C DISASSEMBLY (AUXILIARY PARTS)

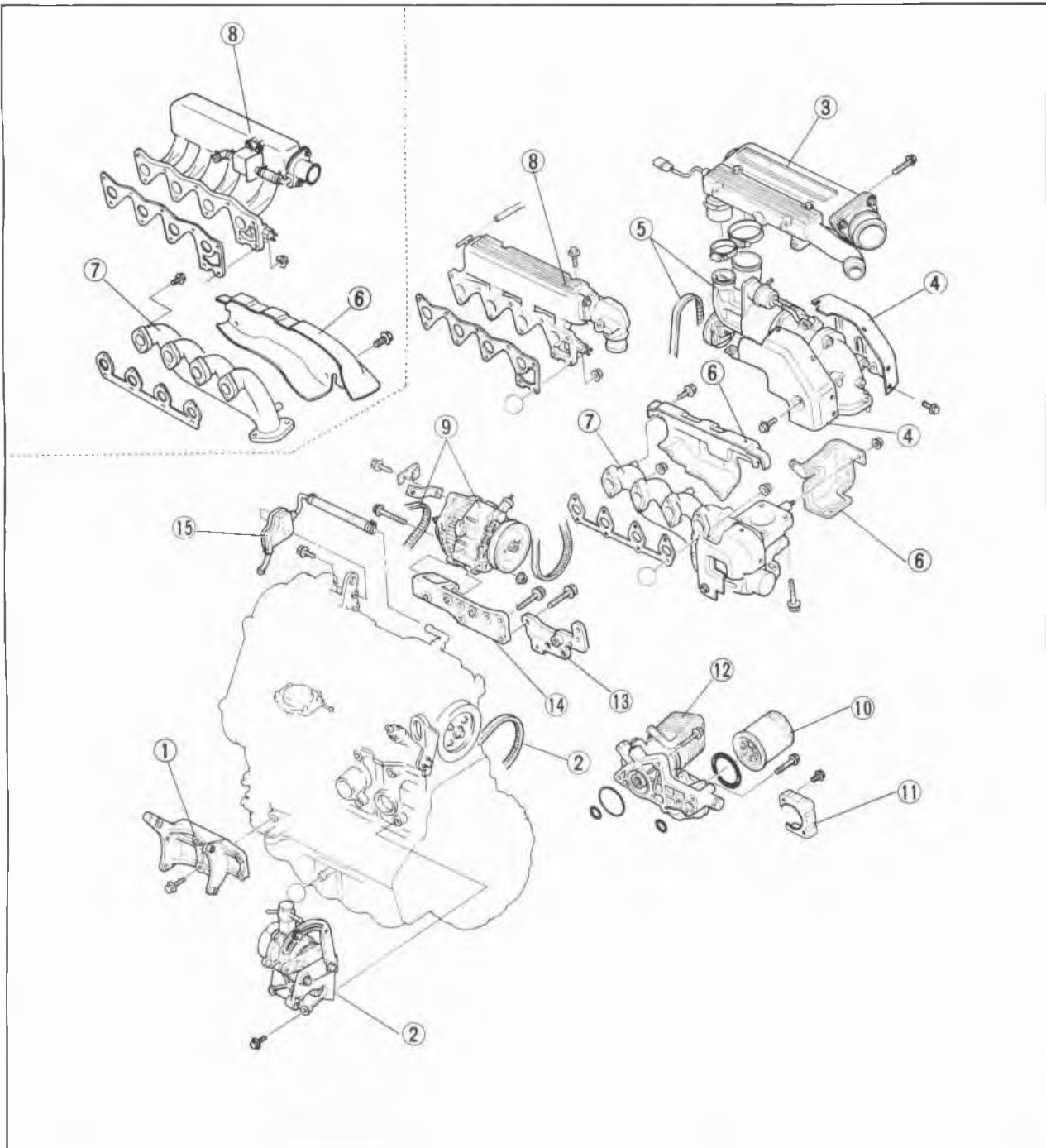
## DISASSEMBLY

1. Remove in the sequence shown in the figure referring to the disassembly note for specially marked parts.
2. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
3. Clean the parts with steam, blow off any remaining water with compressed air.

### Note

Care should be taken during the disassembly of any part or system to study its order of assembly. Any deformation, wear, or damage should also be noted.

## AUXILIARY PARTS

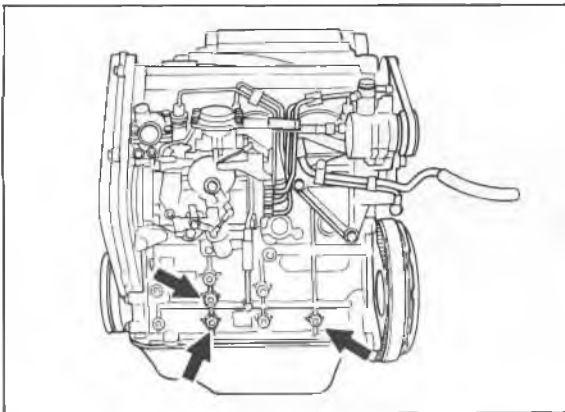


76G01C-245

## DISASSEMBLY (AUXILIARY PARTS) 1C

1. A/C compressor bracket
2. Vacuum pump and drive belt
3. Air funnel assembly
4. Comprex supercharger insulator
5. Comprex supercharger and drive belt
6. Exhaust manifold insulator
7. Exhaust manifold
8. Intake manifold
9. Alternator and drive belt
10. Oil filter
11. Oil filter cover
12. Oil cooler assembly
13. Exhaust pipe bracket
14. Alternator bracket
15. Blow-by chamber

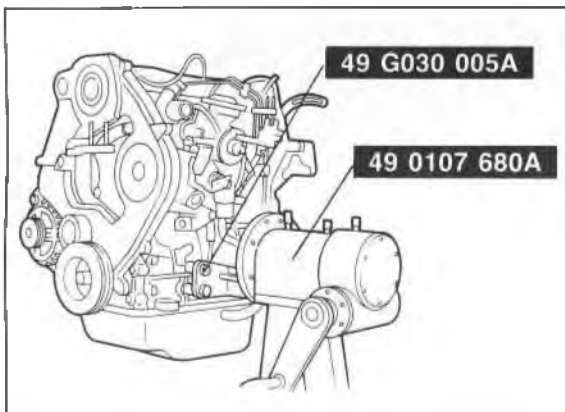
76G01C-074



76G01C-075

### Disassembly Note Engine hanger

1. Remove the CSD hose.
2. Loosen the vacuum pump oil pipe bolts.



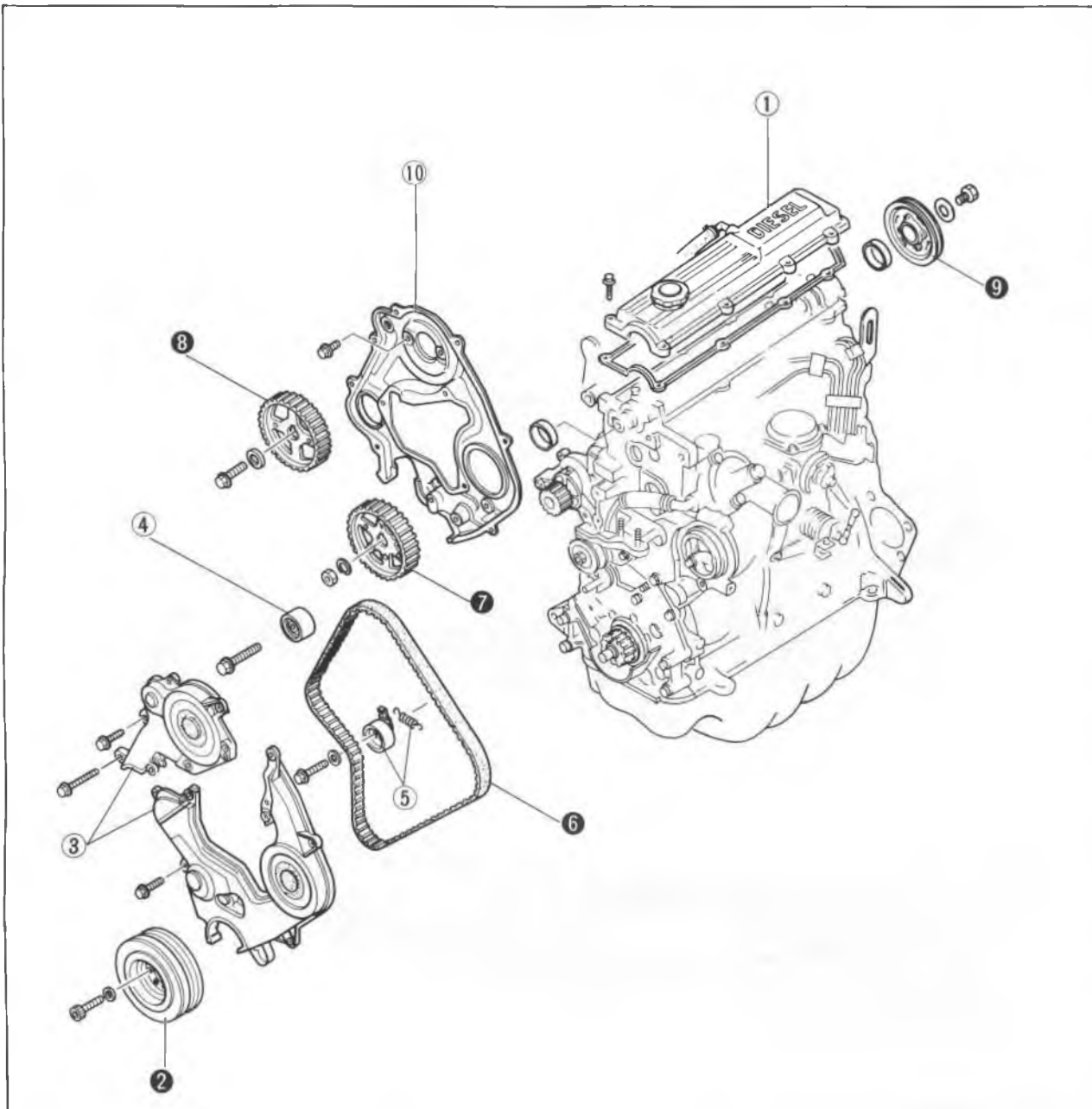
76G01C-076

3. Install the engine on the **SST**.



# 1C DISASSEMBLY (TIMING BELT)

## TIMING BELT

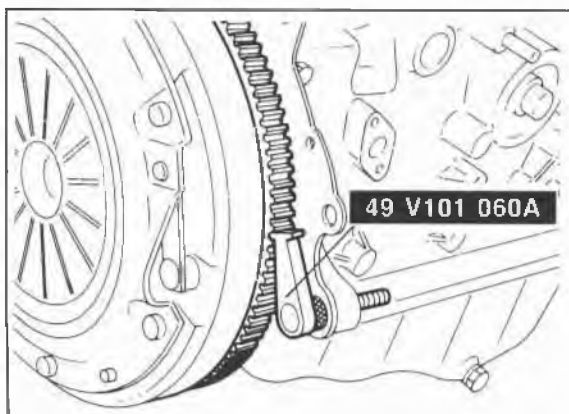


76G01C-077

1. Cylinder head cover
2. Crankshaft pulley
3. Left and right timing belt covers
4. Idler pulley
5. Timing belt tensioner and spring

6. Timing belt
7. Injection pump pulley
8. Camshaft pulley
9. Rear camshaft pulley
10. Seal plate

## DISASSEMBLY (TIMING BELT) 1C

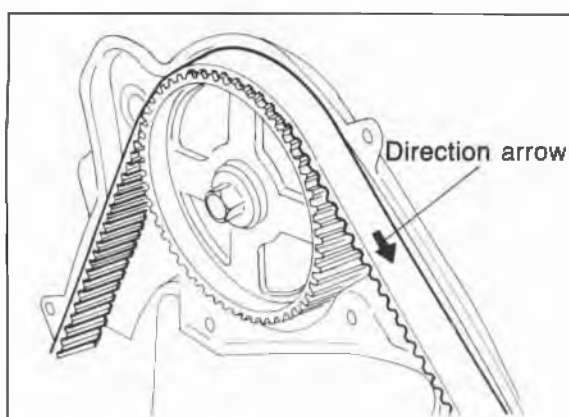


76G01C-246

### Disassembly Note

#### Crankshaft pulley

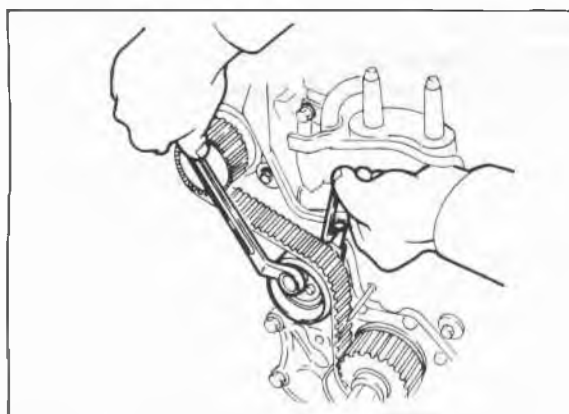
1. Set the **SST** against the flywheel.
2. Remove the crankshaft pulley.



76G01C-078

#### Timing belt

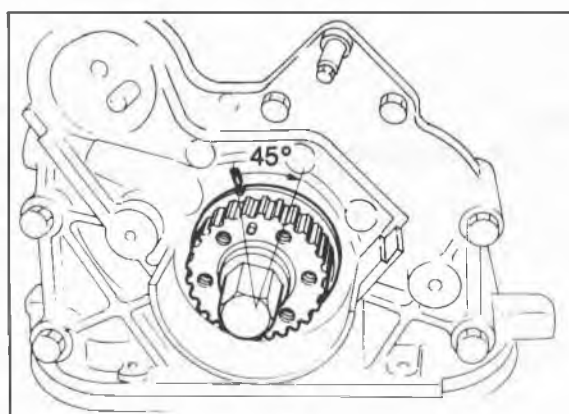
1. Draw a direction arrow in the direction of engine revolution on the timing belt, if the timing belt is to be reused.



2. Loosen the timing belt tensioner bolt.
3. Shift the tensioner outward as far as possible and temporarily tighten it.
4. Remove the timing belt, tensioner and spring.

#### Caution

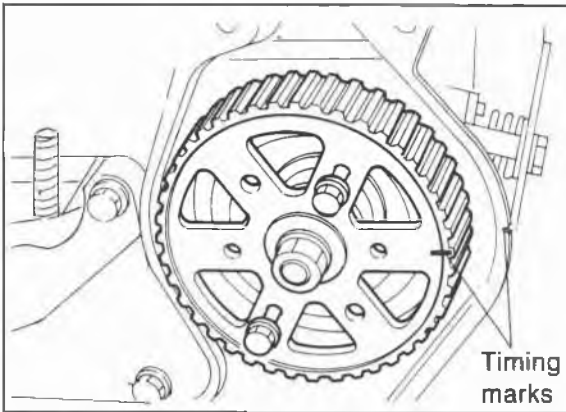
**Do not allow any oil or grease on the timing belt.**



76G01C-079

5. Turn the crankshaft about 45° from the timing mark which is marked on the oil pump housing.

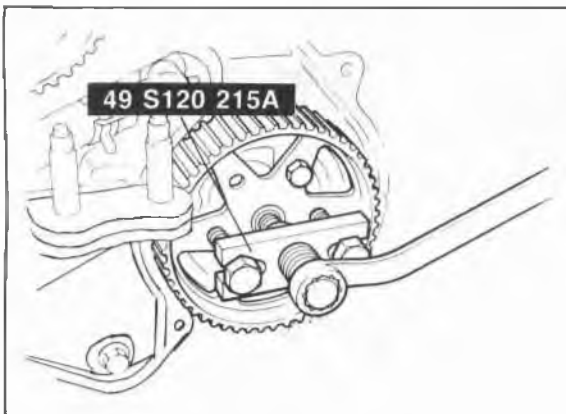
# 1C DISASSEMBLY (TIMING BELT)



76G01C-248

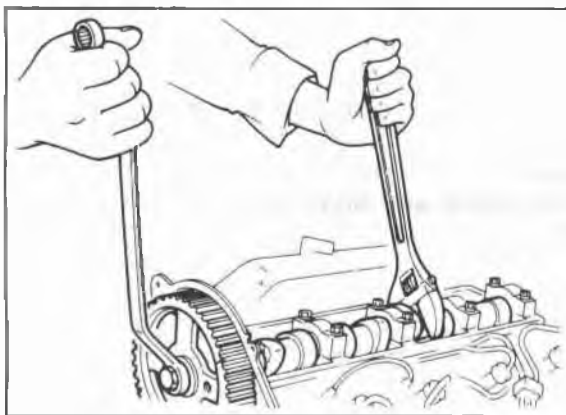
## Injection pump pulley

1. Put two bolts of 35—40 mm (1.4—1.6 in) length into the arms of the injection pump pulley and affix them in the threaded hole of the injection pump bracket.
2. Loosen the injection pump pulley lock bolt.



76G01C-080

3. Separate the injection pump pulley from the injection pump shaft with the **SST**.



4BG01B-087

## Camshaft pulley

1. Hold the camshaft with a wrench (29 mm, 1.14 in) and loosen the camshaft pulley lock bolt.

### Caution

**Do not damage the cylinder head edge with the wrench.**

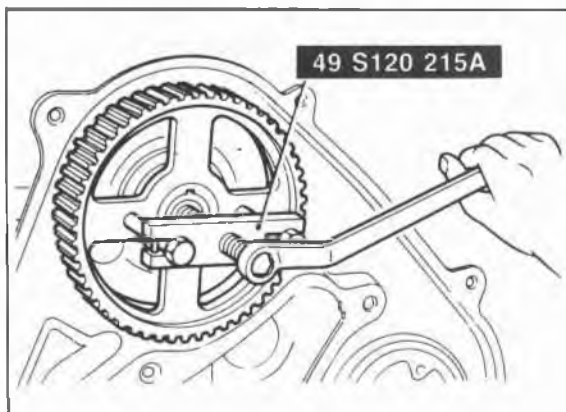
2. Separate the camshaft pulley from the camshaft with the **SST**.

### Caution

**Do not hit the camshaft pulley with a hammer.**

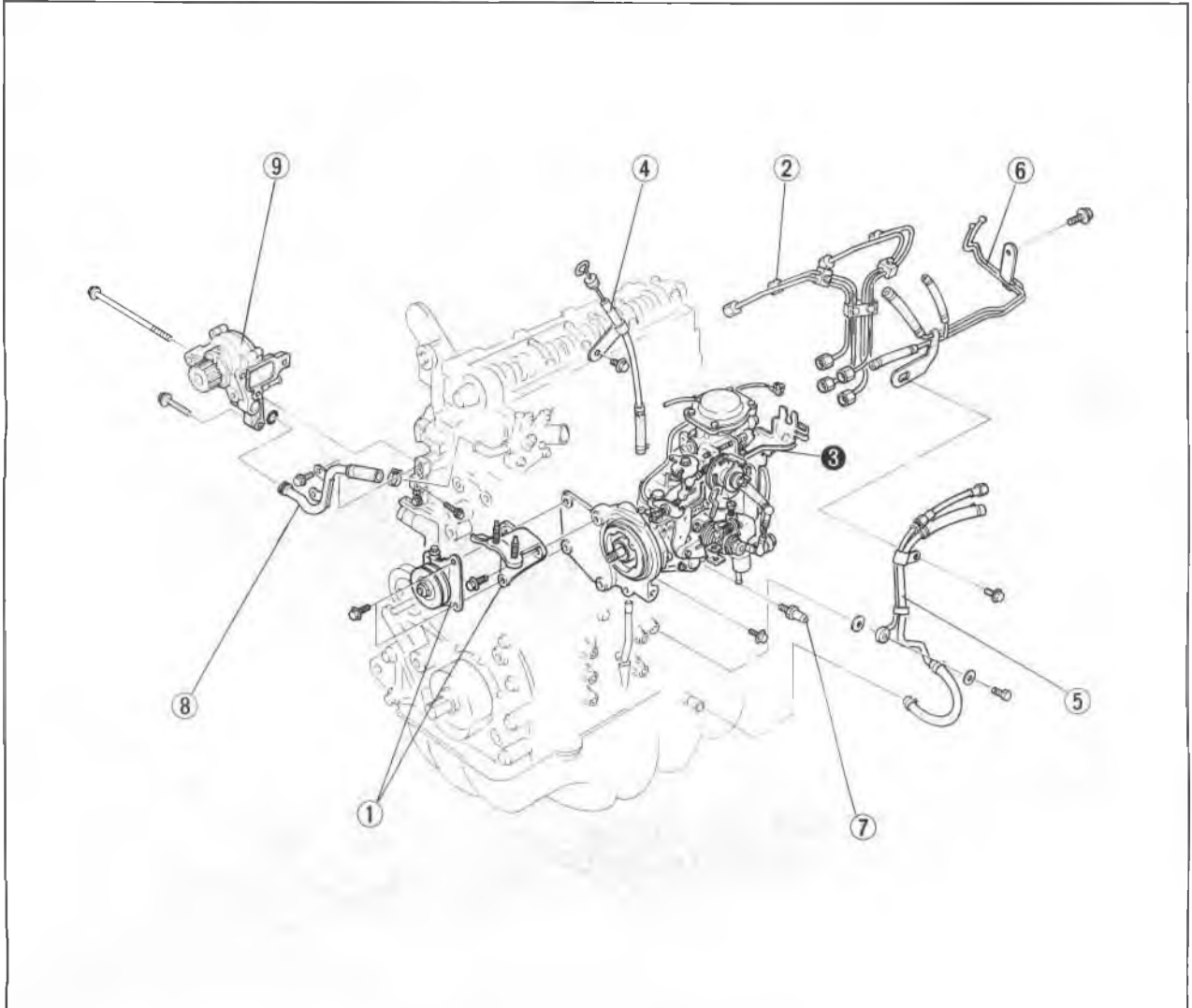
## Rear camshaft pulley

Remove the rear camshaft pulley in the same manner used for camshaft pulley.



76G01C-081

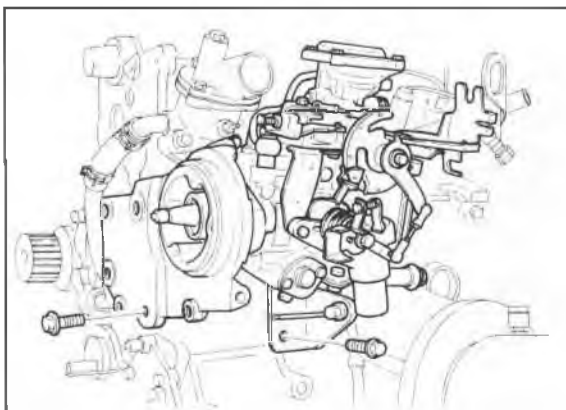
## INJECTION PUMP



76G01C-082

1. No.3 engine mount and idler
2. Injection pipe
3. Injection pump
4. Oil level gauge and stay
5. Oil pipe

6. Fuel feed pipe
7. Oil pressure switch
8. Water pipe
9. Water pump



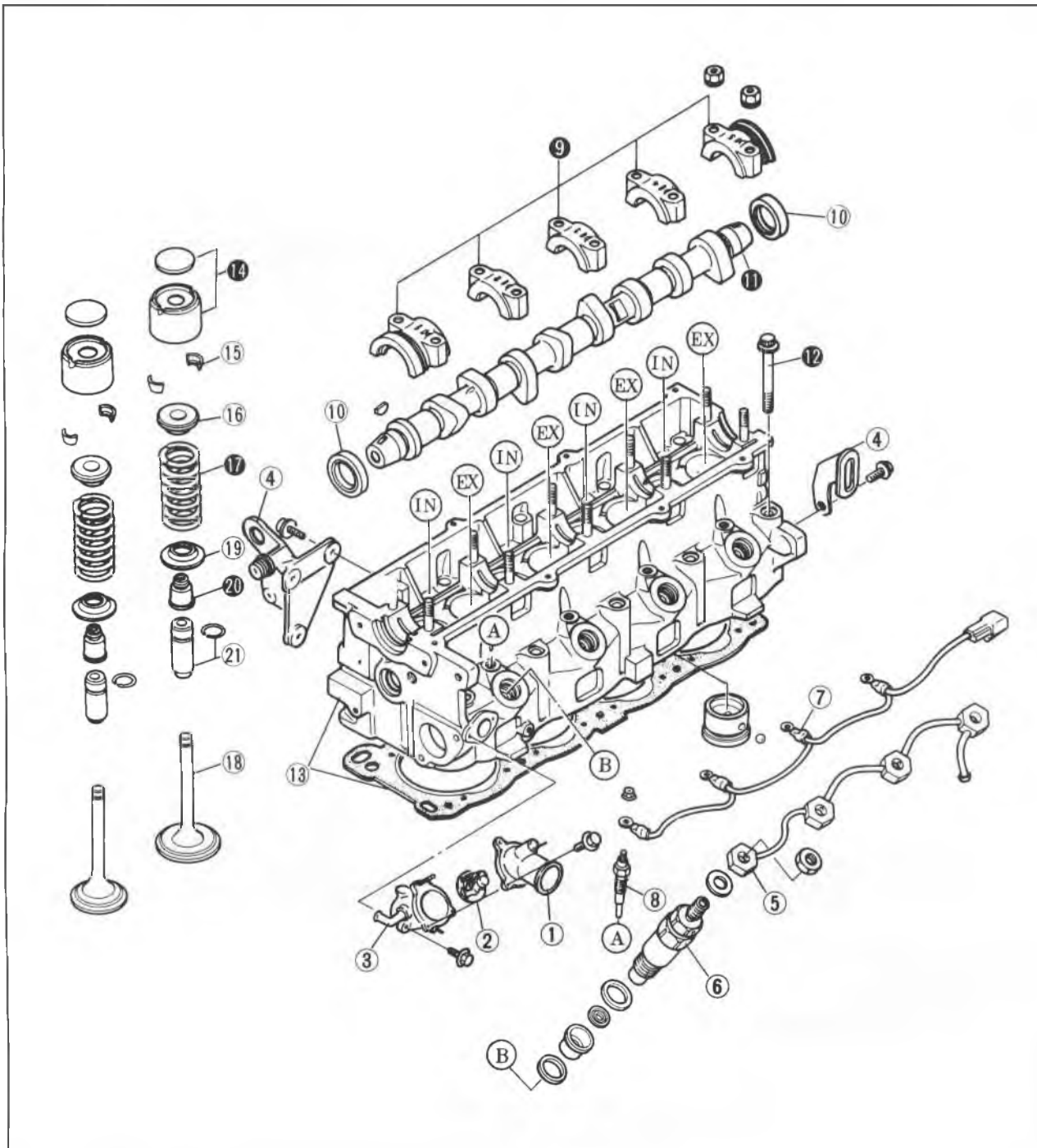
76G01C-083

### Disassembly Note Injection pump

Remove the injection pump with its brackets. If separate them, adjust the injection timing after installing the timing belt referring to Section 4D.

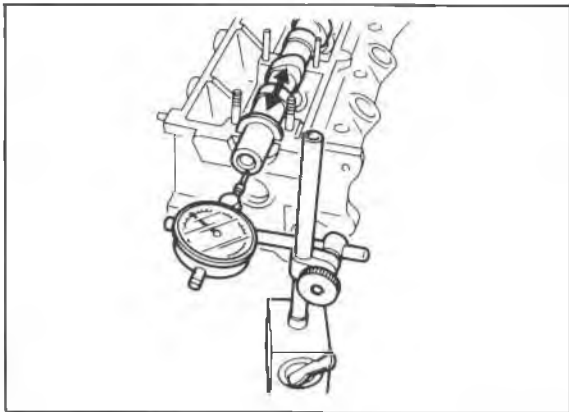
# 1C DISASSEMBLY (CYLINDER HEAD)

## CYLINDER HEAD



76G01C-079

- |                                 |                               |                          |
|---------------------------------|-------------------------------|--------------------------|
| 1. Thermostat cover             | 8. Glow plug                  | 15. Valve keepers        |
| 2. Thermostat                   | 9. Camshaft cap               | 16. Upper spring seat    |
| 3. Thermostat case              | 10. Oil seal                  | 17. Valve spring         |
| 4. Front and rear engine hanger | 11. Camshaft                  | 18. Valve                |
| 5. Fuel leak pipe               | 12. Cylinder head bolt        | 19. Lower spring seat    |
| 6. Injection nozzle             | 13. Cylinder head and gasket  | 20. Valve seal           |
| 7. Glow cord                    | 14. Tappet and adjusting disc | 21. Valve guide and clip |



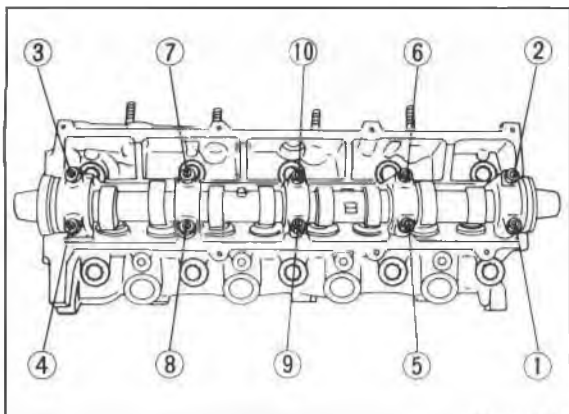
76G01C-085

### Disassembly Note

#### Camshaft

During disassembly, clean the bearings and journals, and measure the following:

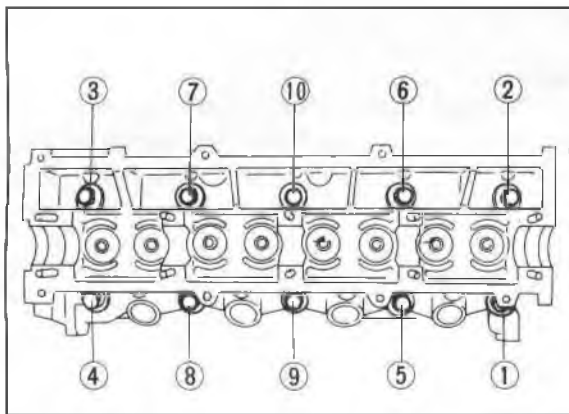
1. Camshaft end play. (Refer to page 1C—55)
2. Camshaft journal oil clearance . (Refer to page 1C—54)



76G01C-086

#### Camshaft cap

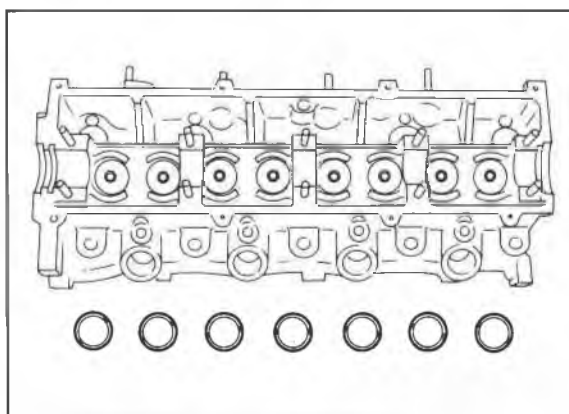
Loosen the camshaft cap nuts in two or three steps in the order shown in the figure.



76G01C-087

#### Cylinder head bolt

1. Loosen the cylinder head bolts in two or three steps in the order shown in the figure.
2. Remove the cylinder head by tapping the cylinder head with a plastic hammer.



4BG01B-094

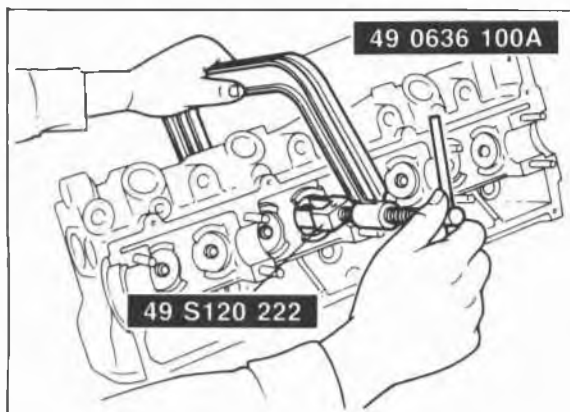
#### Adjusting disc and tappet

Remove the adjusting discs and tappets as a set.

#### Caution

**All adjusting discs and tappets should be disassembled in a way so that correct reassembly can be performed.**

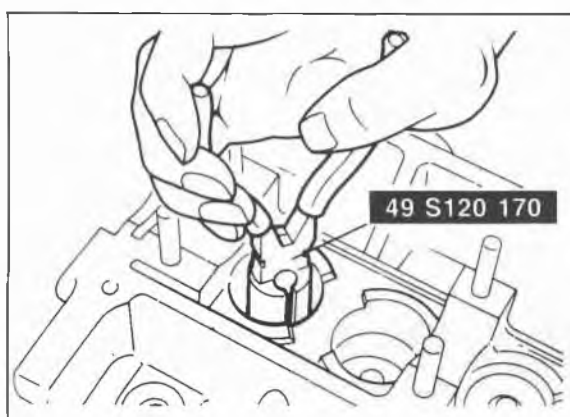
# 1C DISASSEMBLY (CYLINDER HEAD)



76G01C-088

## Valve spring

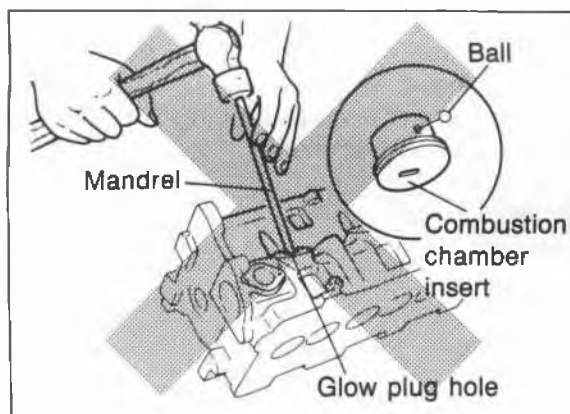
Remove the valve, spring seats and valve keepers from the cylinder head with the **SST**.



76G01C-089

## Valve seal

After removing the lower spring seats, remove the valve seals with the **SST**.



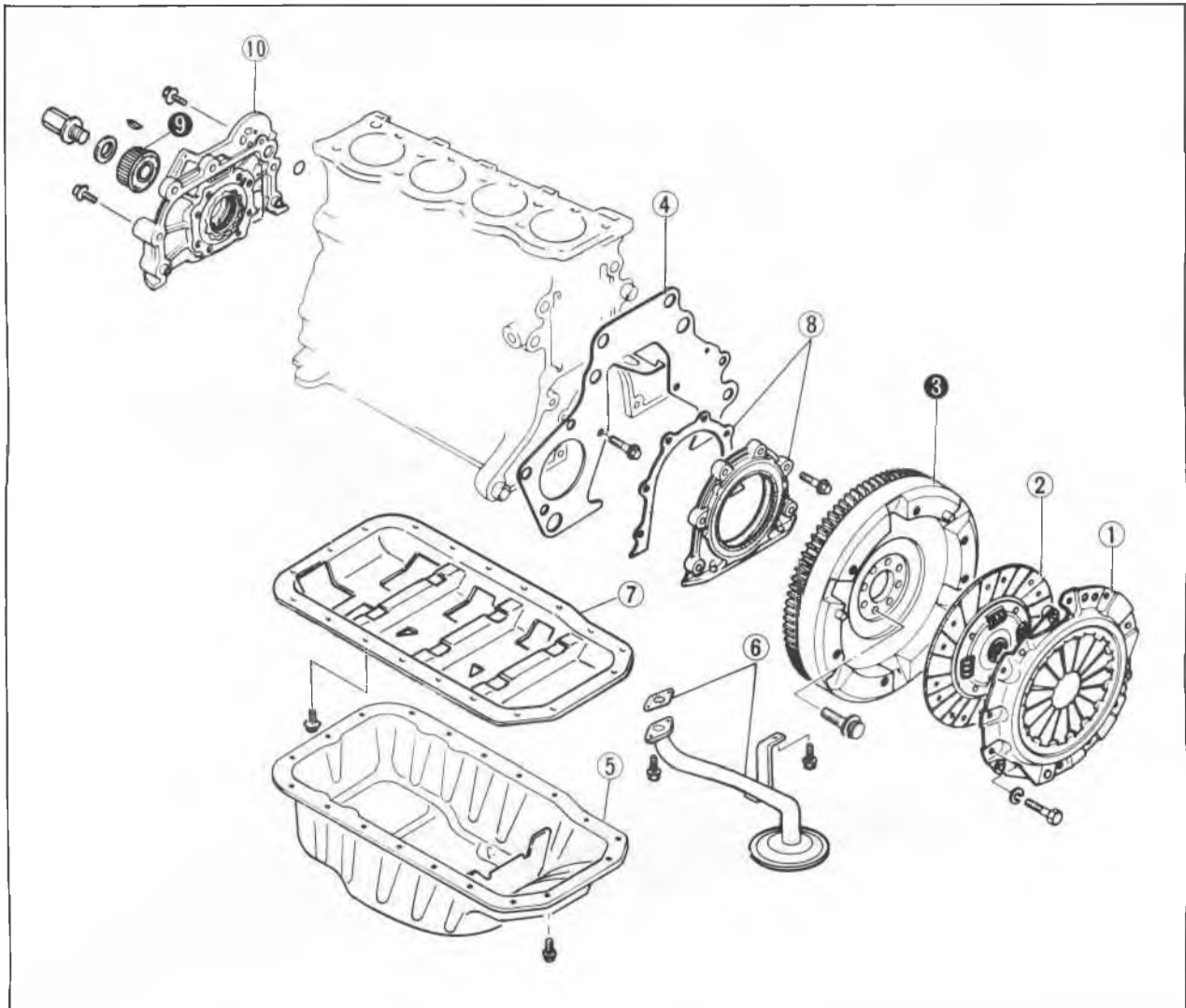
76G01C-090

## Combustion chamber insert

### Caution

Do not remove the combustion chamber insert as the cylinder head and the combustion chamber insert are machined together, replace the combustion chamber insert and cylinder head as an assembly.

## CYLINDER BLOCK—I

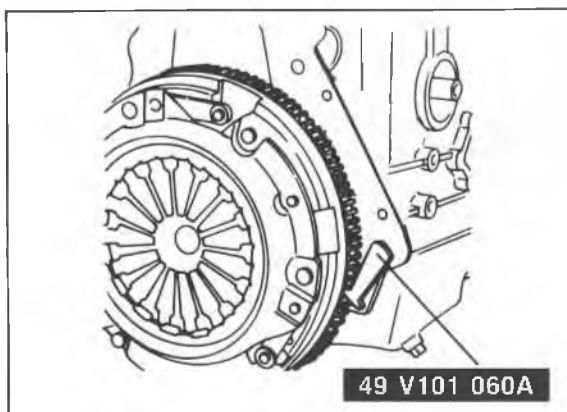


76G01C-091

- 1. Clutch cover
- 2. Clutch disc
- 3. Flywheel
- 4. End plate

- 5. Oil pan
- 6. Oil strainer
- 7. Stiffener (RF-CX)

- 8. Rear cover
- 9. Timing belt pulley
- 10. Oil pump assembly



76G01C-092

### Flywheel

1. Install the **SST** to the flywheel.
2. Remove the clutch cover, clutch disc and flywheel.

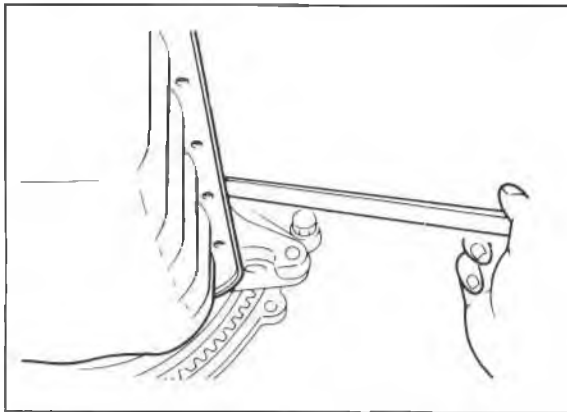
### Timing belt pulley

1. Reverse the direction of the **SST**.
2. Remove the timing belt pulley.



# 1C DISASSEMBLY (CYLINDER BLOCK)

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86U01X-072

## Oil pan

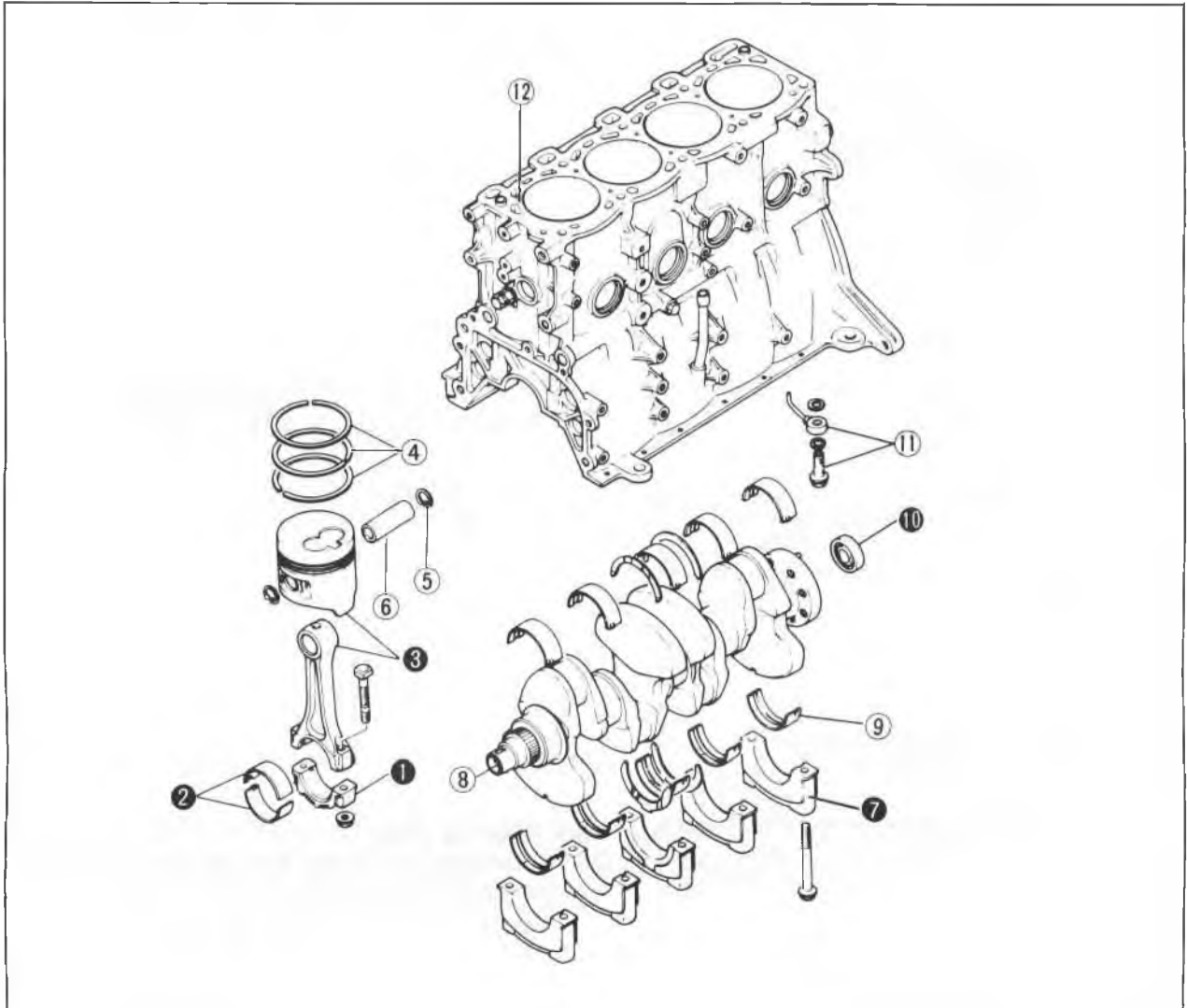
1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the stiffener to separate them.

## Caution

**Do not bend the oil pan when prying loose.**

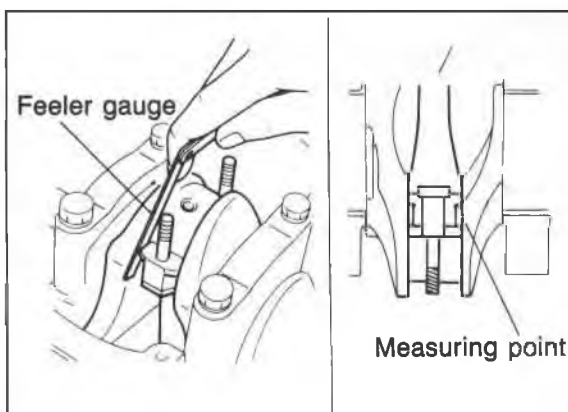
3. Remove the oil pan.

## CYLINDER BLOCK—II



76G01C-093

- |                              |                     |                    |
|------------------------------|---------------------|--------------------|
| 1. Connecting rod cap        | 5. Snap ring        | 9. Main bearing    |
| 2. Connecting rod bearing    | 6. Piston pin       | 10. Pilot bearing  |
| 3. Connecting rod and piston | 7. Main bearing cap | 11. Oil jet        |
| 4. Piston ring               | 8. Crankshaft       | 12. Cylinder block |



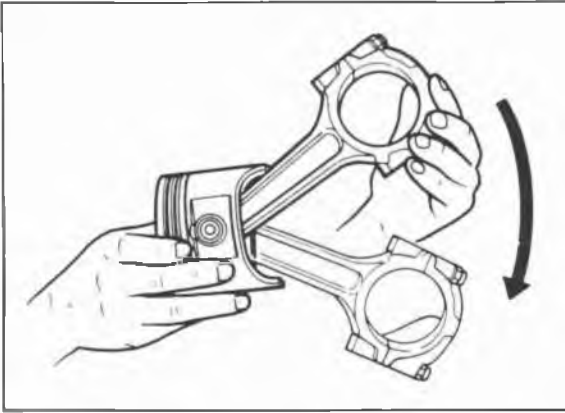
### Disassembly Note Connecting rod and cap

During disassembly, clean the bearing, connecting rod, and crankpin, and measure the following:

1. Connecting rod side clearance. (Refer to page 1C—67.)
2. Crankpin oil clearance. (Refer to page 1C—66.)

76G01C-094

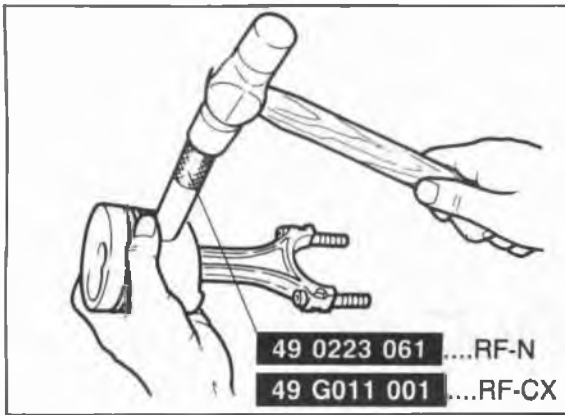
# 1C DISASSEMBLY (CYLINDER BLOCK)



76G01C-095

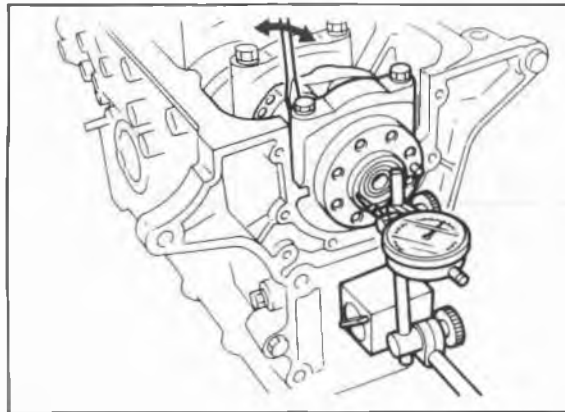
## Piston and connecting rod

1. Before disassembling the piston and connecting rod, check the oscillation torque as shown in the figure. If the large end does not drop by its own weight, replace the piston or the piston pin.



76G01C-249

2. Remove the snap rings from the piston.
3. Remove the piston pin with the **SST**.

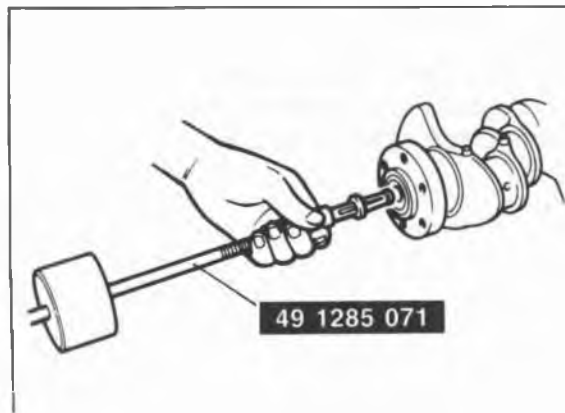


76G01C-096

## Main bearing cap

During disassembly, clean the bearings, main journals, and caps, and measure the following:

1. Crankshaft end play. (Refer to page 1C—65.)
2. Main journal oil clearance. (Refer to page 1C—64.)



76G01C-097

## Pilot bearing

Remove the pilot bearing from the crankshaft with the **SST**.

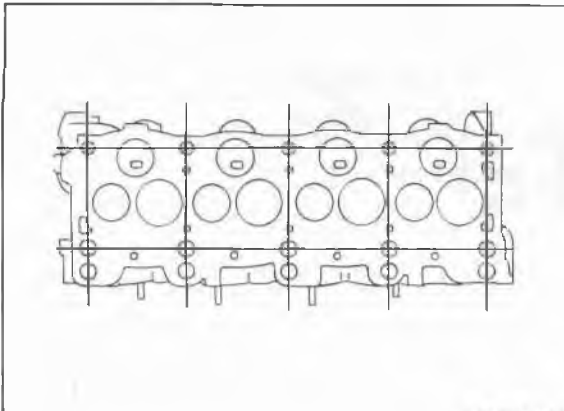
## INSPECTION AND REPAIR

1. Clean all parts, taking care to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign materials.
2. Inspect and repair must be performed in the order specified.

### Caution

**Be careful not to damage the joints or friction surfaces of aluminum alloy components (such as the cylinder head or pistons).**

86U01X-077

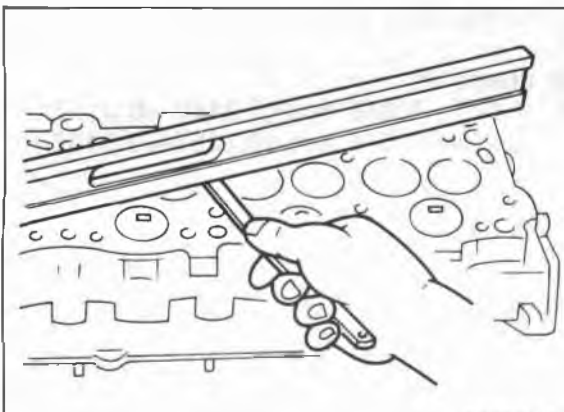


76G01C-098

### Cylinder Head

1. Inspect the cylinder head for damage, cracks, and leakage of water or oil. Replace if necessary.
2. Measure the cylinder head distortion in the seven directions shown in the figure.

**Distortion: 0.10 mm (0.004 in) max.**



76G01C-099

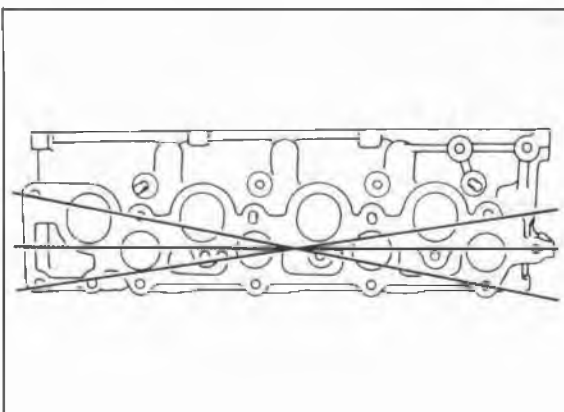
3. If the cylinder head distortion exceeds specification replace the cylinder head.

### Height:

**133.9—134.1 mm (5.272—5.280 in)**

### Caution

**Do not attempt to repair a cylinder head by milling or grinding.**

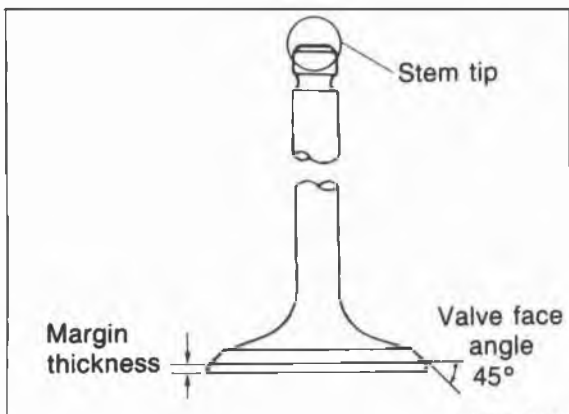


76G01C-100

4. Measure the manifold contact surface distortion in the three directions shown in the figure.

**Distortion: 0.20 mm (0.008 in) max.**

5. If distortion exceeds specification replace the cylinder head.



76G01C-101

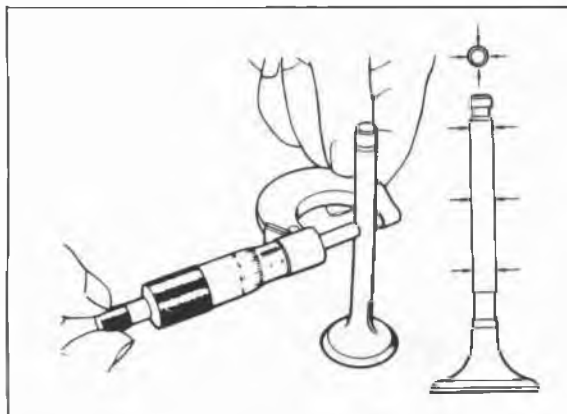
## Valve and Valve Guide

1. Inspect each valve for the following. Replace or resurface if necessary.
  - (1) Damaged or bent stem
  - (2) Roughness or damage to face
  - (3) Damage or uneven wear of stem tip
2. Check the valve head margin thickness. Replace if necessary.

### Margin thickness

mm (in)

RF-CX	IN	1.80 (0.071)
	EX	1.65 (0.065)
RF-N	IN	0.80 (0.031)
	EX	0.80 (0.031)



76G01C-102

3. Measure the valve length.

### Length

**IN : 106.9 mm (4.209 in)**

**EX: 106.8 mm (4.205 in)**

4. Measure the valve stem diameter.

### Diameter

**IN : 7.970—7.985 mm (0.3138—0.3144 in)**

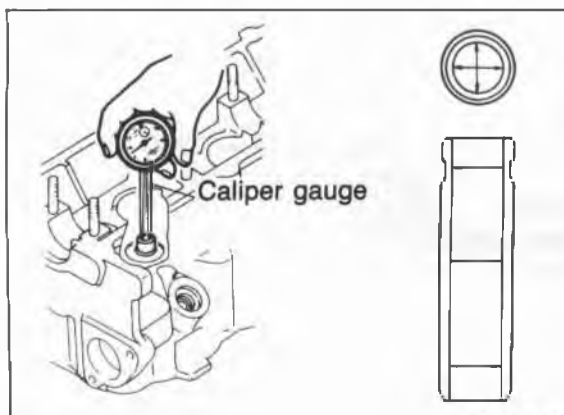
**EX: 7.965—7.980 mm (0.3136—0.3142 in)**

5. Measure the valve guide inner diameter.

### Inner diameter

**IN : 8.025—8.045 mm (0.3159—0.3167 in)**

**EX: 8.025—8.045 mm (0.3159—0.3167 in)**



76G01C-103

6. Measure the valve stem to guide clearance.

### (1) Method No. 1

Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

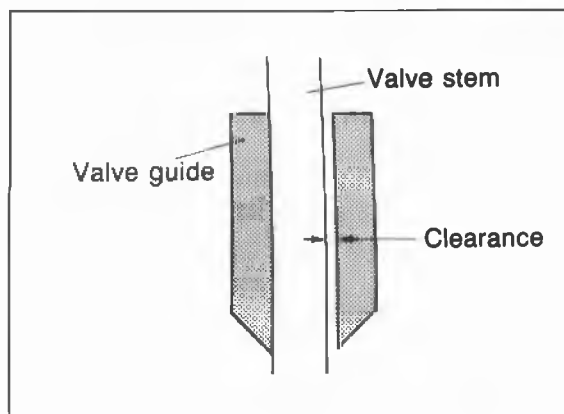
### Clearance

**IN : 0.040—0.075 mm (0.0016—0.0030 in)**

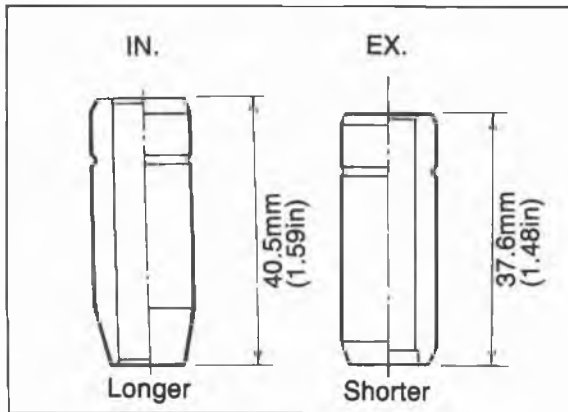
**EX: 0.045—0.080 mm (0.0018—0.0031 in)**

**Maximum: 0.10 mm (0.004 in)**

7. If the clearance exceeds the maximum, replace the valve and/or valve guide.



76G01C-104



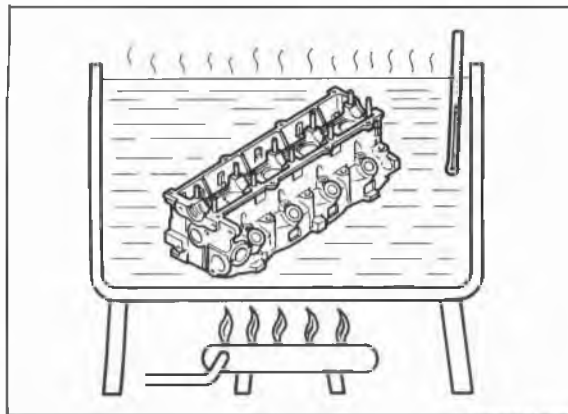
76G01C-105

## Replacement of valve guide

### Caution

When the valve guide is replaced, check the gap between the valve and guide once again. The valve seal should be installed after inspection and repair of the valve seat. Don't misassemble the valve guides because intake and exhaust valve guides have a different seat.

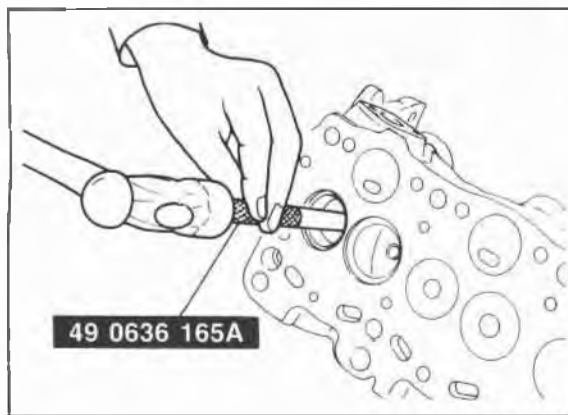
Intake side valve guide ..... longer  
 Exhaust side valve guide ..... shorter



76G01C-106

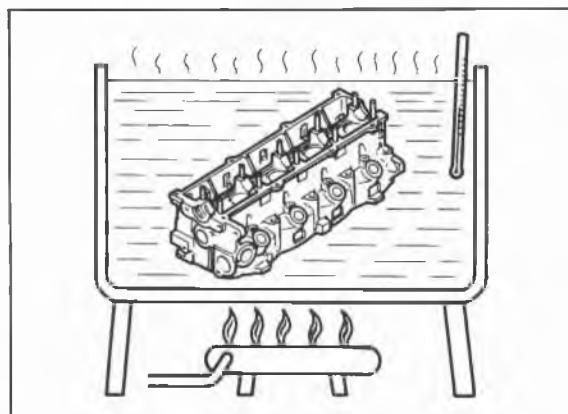
### Removal

1. Gradually heat the cylinder head in water to **approx. 90°C (194°F)**.



86U01X-084

2. Remove the valve guide from the side opposite the combustion chamber with the **SST**.

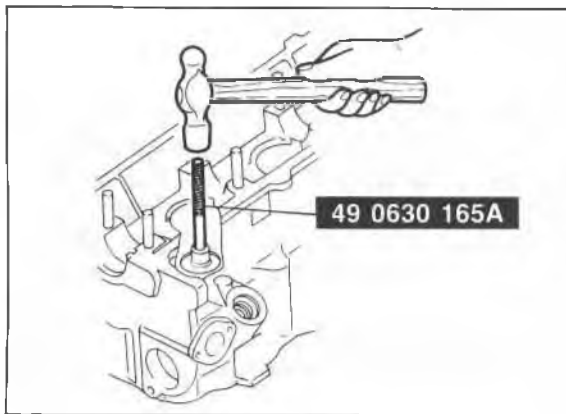


76G01C-107

### Installation

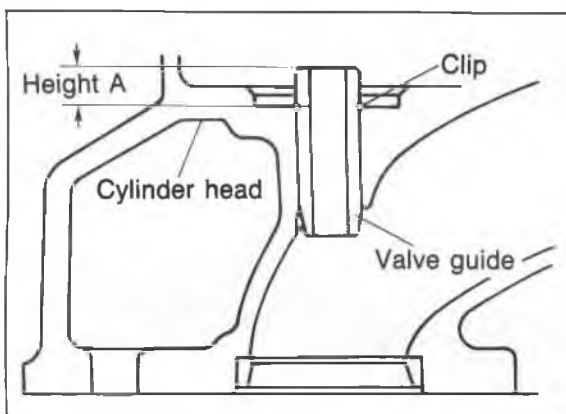
1. Gradually heat the cylinder head in water to **approx. 90°C (194°F)**.

# 1C INSPECTION AND REPAIR



76G01C-103

2. Fit the clip onto the valve guide.
3. Tap the valve guide in from the side opposite the combustion chamber with the **SST** until the clip contacts the cylinder head.

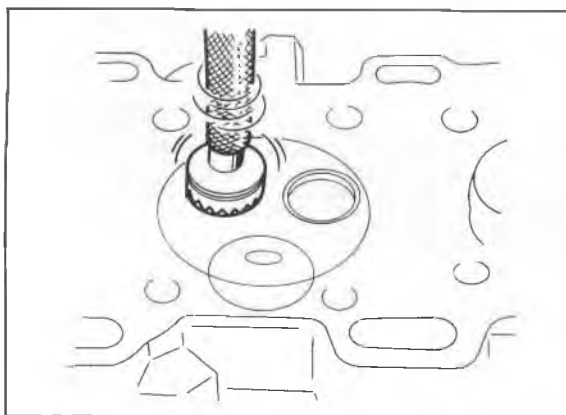


76G01C-104

4. Check the guide protrusion height (dimension A in the figure) is as specified.

**Height:**

**8.3—8.8 mm (0.327—0.346 in)**



76G01C-110

**Valve Seat**

1. Inspect the contact surface of the valve seat and valve face for the following.
  - (1) Roughness
  - (2) Damage
2. If necessary, resurface the valve seat to the specified angle with valve seat cutter and/or resurface the valve face.

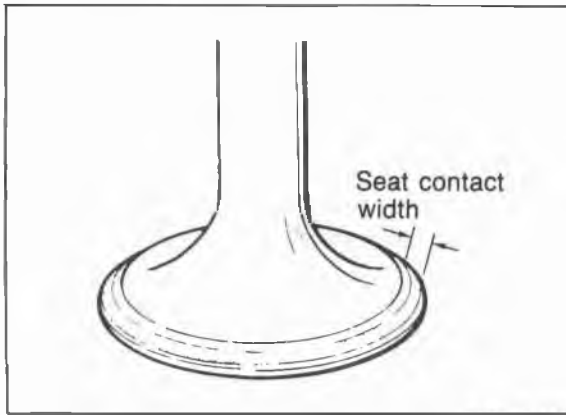
**Angle**

RF-CX	IN	60°
	EX	45°
RF-N	IN	45°
	EX	45°



76G01C-111

3. Apply a thin coat of prussian blue to the valve face.
4. Check the valve seating by pressing the valve against the seat.
  - (1) If blue does not appear 360° around the valve face, replace the valve.
  - (2) If blue does not appear 360° around the valve seat, resurface the seat.



76G01C-112

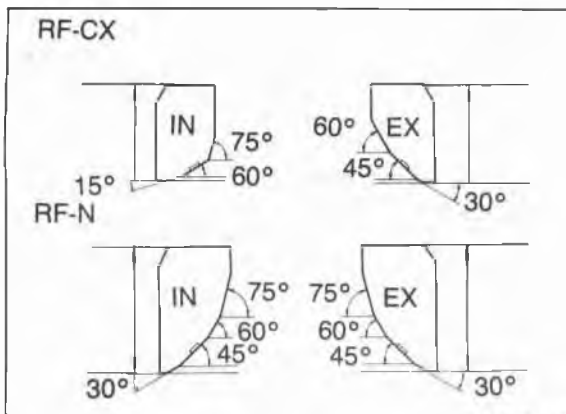
5. Check the seat contact width.

**Width** mm (in)

RF-CX	IN	1.4—1.8 (0.055—0.071)
	EX	1.64—2.04 (0.065—0.080)
RF-N	IN	1.7—2.3 (0.067—0.091)
	EX	1.7—2.3 (0.067—0.091)

6. Check that the valve seating position is at the center of the valve face.

(1) If the seating position is too high, correct the valve seat as below.



76G01C-113

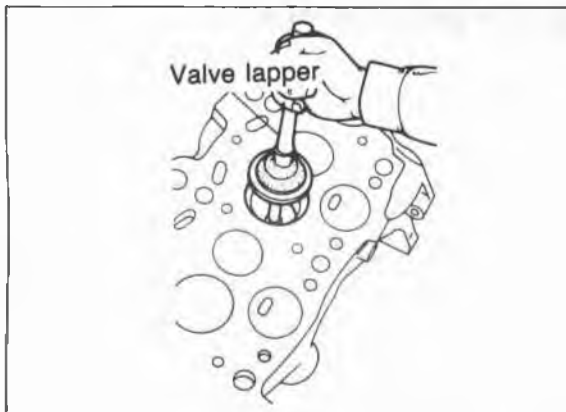
**Angle**

		1st	2nd
RF-CX	IN	75°	60°
	EX	60°	45°
RF-N	IN	60°	45°
	EX	60°	45°

(2) If the seating position is too low, correct the valve seat as below.

**Angle**

		1st	2nd
RF-CX	IN	15°	45°
	EX	30°	45°
RF-N	IN	30°	45°
	EX	30°	45°



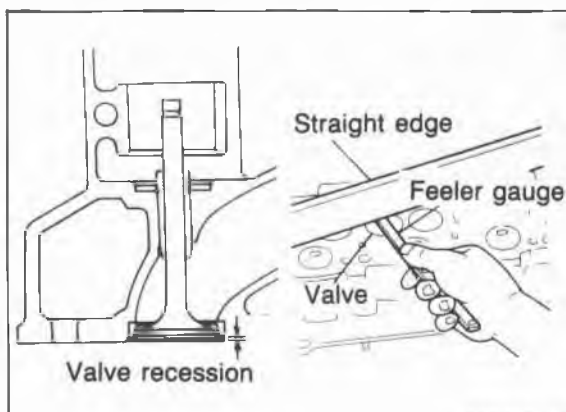
76G01C-114

7. Seat the valve to the valve seat with a lapping compound.

**Caution**

**Do not let compound adhere to the valve stem.**

8. Measure the receded amount from the cylinder head surface by using a feeler gauge.



76G01C-115

**Recession:**

**0.75—1.05 mm (0.030—0.041 in)**

**Maximum: 2.55 mm (0.100 in)**

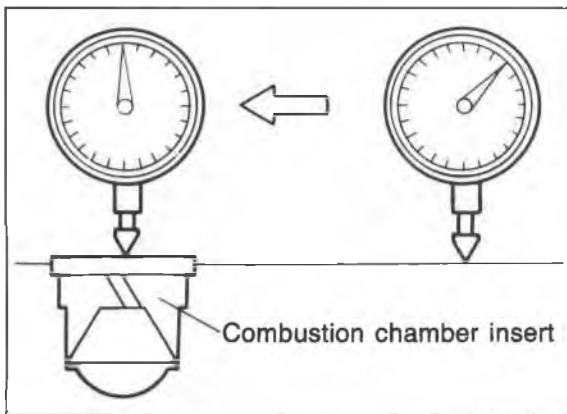
(1) If the receded amount is **1.55—2.55 mm (0.061—0.100 in)**, install the washer into the valve spring seat area.

The washer thickness should be equal to the amount subtracted **1 mm (0.04 in)** from the receded amount.

(2) If the receded amount exceeds **2.55 mm (0.100 in)**, replace the cylinder head.



# 1C INSPECTION AND REPAIR



76G01C-116

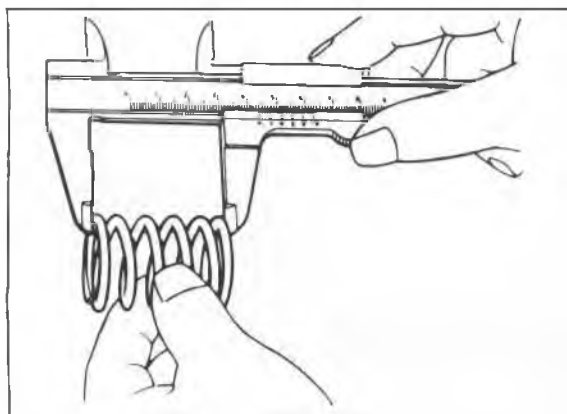
## Combustion Chamber Insert

1. Inspect the combustion chamber insert for damage or crack, replace if necessary.
2. Measure the receded or projected amount of combustion chamber insert from cylinder head surface.

**Recession: 0.020 mm (0.0008 in) max.**

**Projection: 0.005 mm (0.0001 in) max.**

If it exceeds the specification, replace the combustion chamber insert and the cylinder head as an assembly.



76G01C-117

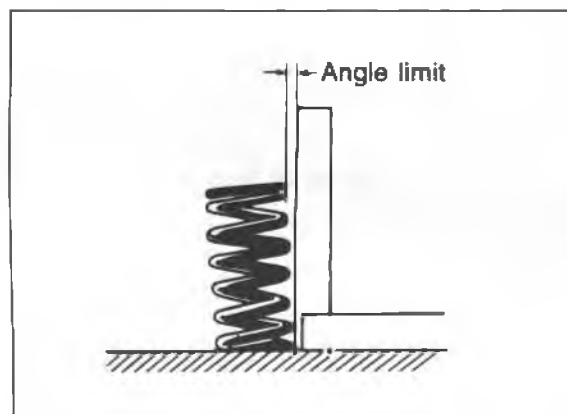
## Valve Spring

1. Inspect each valve spring for cracks or damage.
2. Check the free length and angle. Replace if necessary.

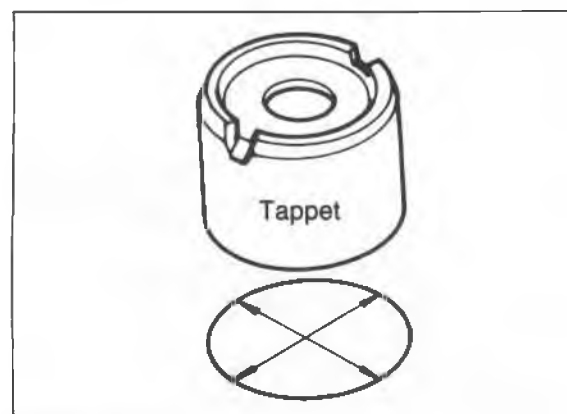
**Free length: 45.11 mm (1.776 in)**

**Minimum: 44.8 mm (1.764 in)**

**Angle: 1.6 mm (0.06 in) max.**



76G01C-118



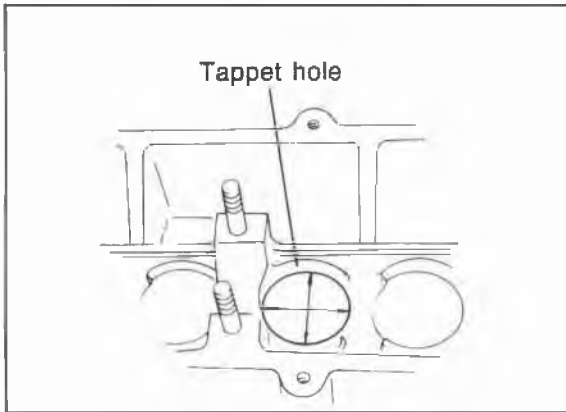
76G01C-119

## Tappet

1. Check the tappet to tappet hole clearance.  
(1) Measure the tappet outer diameter.

**Diameter:**

**34.95—34.97 mm (1.3764—1.3768 in)**



76G01C-120

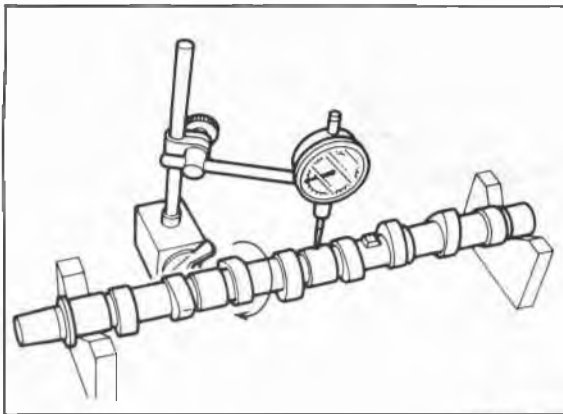
- (2). Measure the inner diameter of the tappet hole in the cylinder head.

**Hole diameter:**

**34.99—35.01 mm (1.3776—1.3787 in)**

2. Calculate the difference (clearance) between the tappet diameter and hole inner diameter. If the clearance exceeds the specification, replace the tappet or the cylinder head.

**Clearance: 0.10 mm (0.004 in) max.**

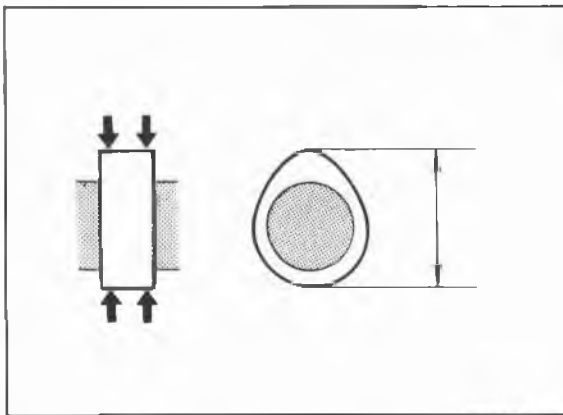


76G01C-121

**Camshaft**

1. Set the front and rear journals on V-blocks. Check the camshaft runout. Replace if necessary.

**Runout: 0.10 mm (0.004 in) max.**



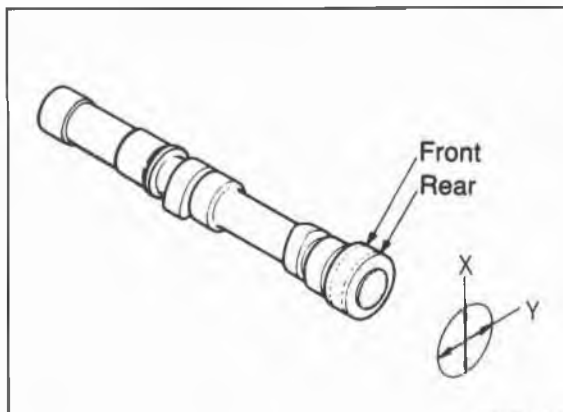
76G01C-122

2. Check the cam for wear or damage. Replace if necessary.
3. Check the cam lobe height at the two points as shown in the figure.

**Height**

mm (in)

		Standard	Mimumum
RF-CX	IN	42.521 (1.6741)	42.11 (1.658)
	EX	45.300 (1.7835)	44.90 (1.768)
RF-N	IN	44.306 (1.7443)	43.90 (1.728)
	EX	45.300 (1.7835)	44.90 (1.768)



76G01C-123

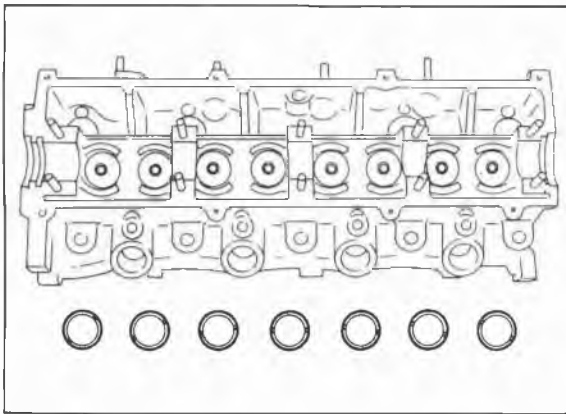
4. Measure wear of the journals in X and Y directions at the two points as shown in the figure.

**Diameter:**

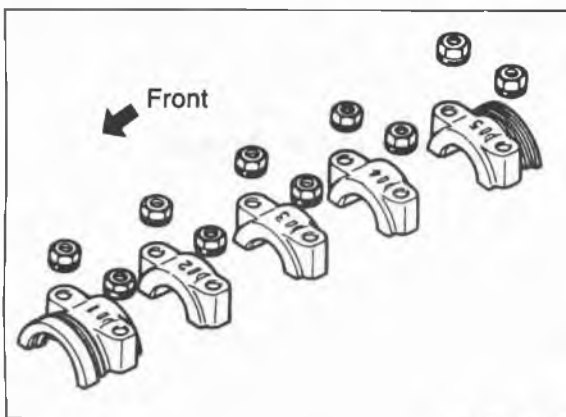
**31.959—31.975 mm (1.2582—1.2589 in)**

**Out-of-round: 0.05 mm (0.002 in) max.**

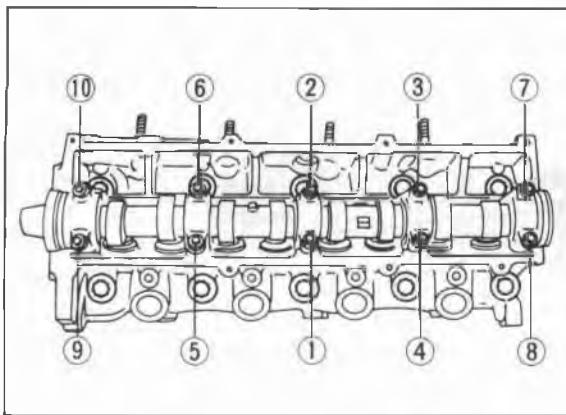
# 1C INSPECTION AND REPAIR



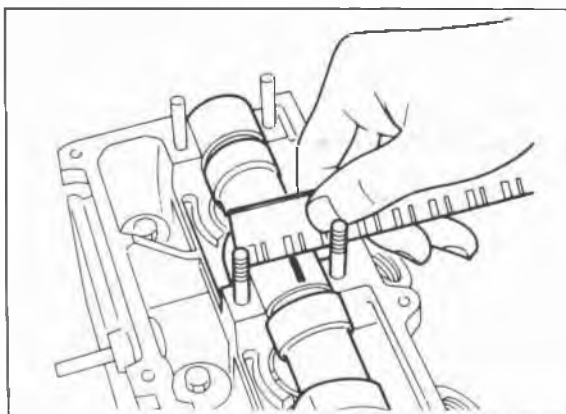
76G01C-124



76G01C-250



76G01C-125



76G01C-126

5. Measure the oil clearance of the camshaft.
- (1) Remove the tappets and adjusting discs from the cylinder head, and separate them by cylinder.

- (2) Clean the camshaft and cylinder head journal.
- (3) Install the camshaft into position.
- (4) Set a Plasti-gauge on the camshaft journal in the axial direction.
- (5) Install the camshaft caps according to the number and arrow marks.

- (6) Tighten the camshaft caps evenly and in order shown in the figure.

**Tighten torque:**

**20—26 N·m (2.0—2.7 m·kg, 14—20 ft·lb)**

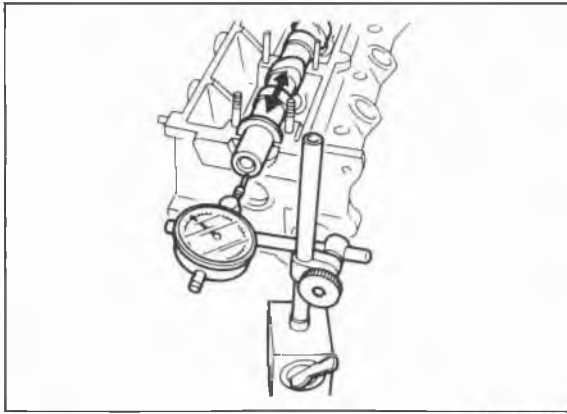
- (7) Remove the camshaft caps and measure the oil clearance.

**Oil clearance:**

**0.025—0.066 mm (0.0010—0.0026 in)**

**Maximum: 0.10 mm (0.004 in)**

- (8) If the oil clearance exceeds the maximum, replace the cylinder head or camshaft.



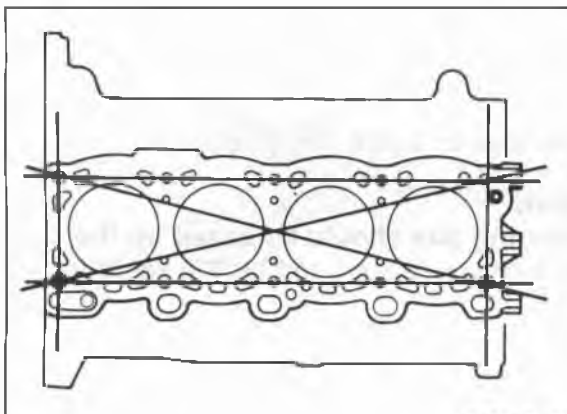
76G01C-127

6. Measure the camshaft end play. If it exceeds the maximum, replace the camshaft and/or the cylinder head.

**End play:**

**0.02—0.15 mm (0.0008—0.0059 in)**

**Maximum: 0.20 mm (0.008 in)**

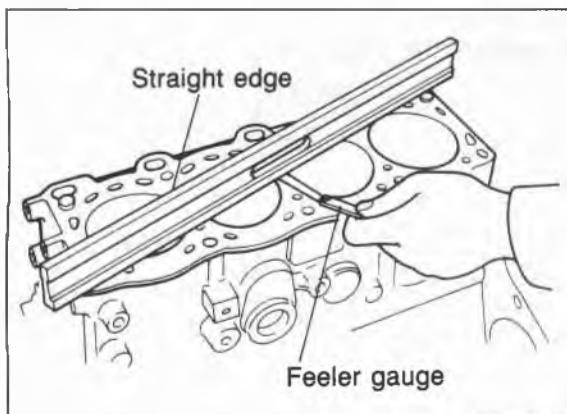


76G01C-128

**Cylinder Block**

1. Check the cylinder block. Repair or replace if necessary.
  - (1) Leakage damage
  - (2) Cracks
  - (3) Scoring of wall
2. Measure the distortion of the top surface of the cylinder block in the six directions as shown in the figure.

**Distortion: 0.10 mm (0.004 in) max.**

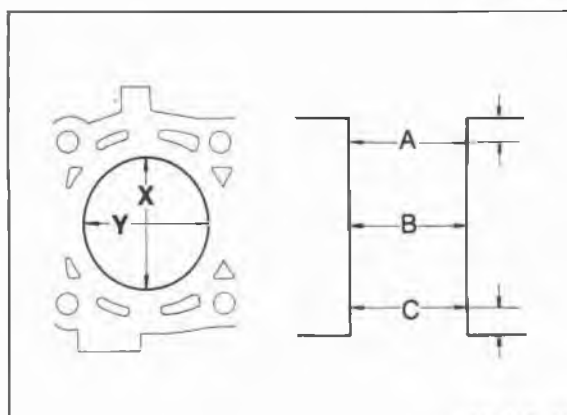


76G01C-129

3. If the distortion exceeds the maximum, replace the cylinder block.

**Caution**

**Do not grind the surface of the cylinder block.**



76G01C-130

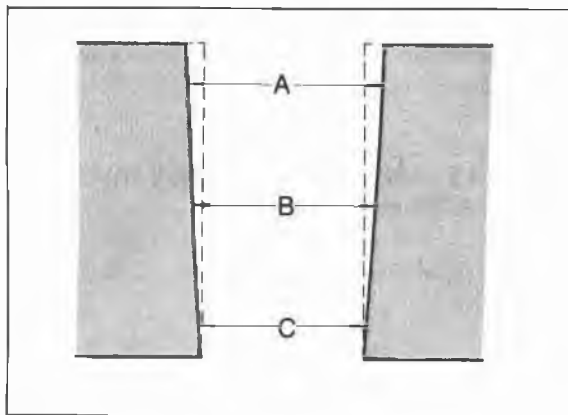
4. Measure the cylinder bore in directions X and Y at three levels in each cylinder as shown.

**Cylinder bore**

mm (in)

Size	Bore
Standard	86.000—86.022 (3.3858—3.3867)
0.25 (0.010) oversize	86.250—86.272 (3.3957—3.3965)
0.50 (0.020) oversize	86.500—86.522 (3.4055—3.4064)

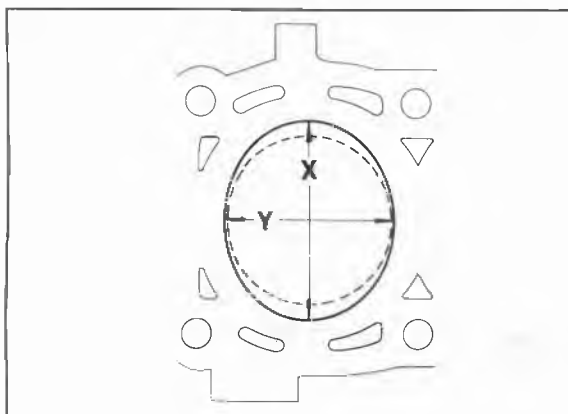
# 1C INSPECTION AND REPAIR



76G01C-131

- (1) If the difference between the measurement A and C exceeds the maximum taper, rebore the cylinder to oversize.

**Taper: 0.022 mm (0.0009 in) max.**



76G01C-132

- (2) If the difference between the measurement X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

**Out-of-round: 0.022 mm (0.0009 in) max.**

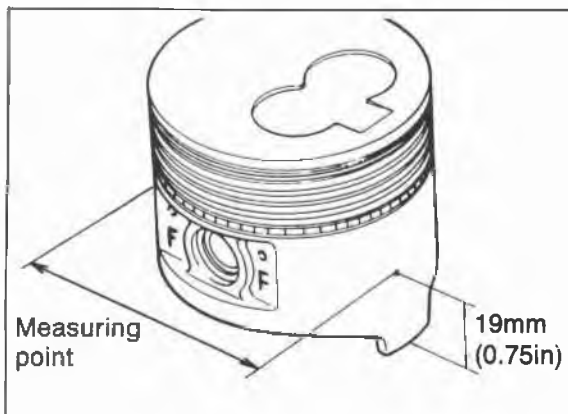
**Caution**

**The boring size should be based on the size of an oversize piston and be the same for all cylinders.**



86U01X-102

5. If the upper part of the cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



76G01C-133

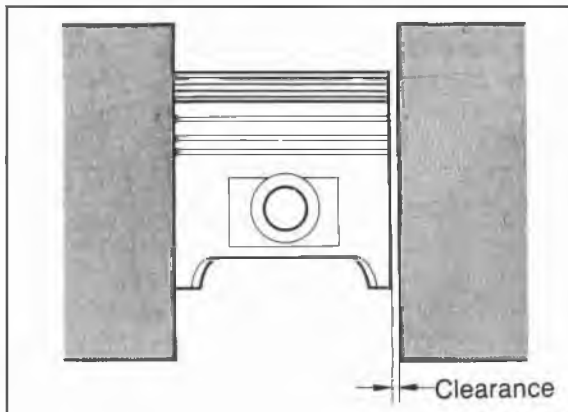
**Piston**

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace if necessary.
2. Measure the outer diameter of each piston at a right angle (90°) to the piston pin, **19 mm (0.75 in)** above the bottom of piston.

**Piston diameter**

mm (in)

Size	Diameter
Standard	85.957—85.983 (3.3841—3.3852)
0.25 (0.010) oversize	86.207—86.233 (3.3940—3.3950)
0.50 (0.020) oversize	86.457—86.483 (3.4038—3.4048)



76G01C-134

3. Check the piston to cylinder clearance.

**Clearance:**

**0.032—0.050 mm (0.0013—0.0020 in)**

**Maximum: 0.15 mm (0.0059 in)**

4. If the clearance exceeds the maximum, replace the piston or rebores the cylinders to fit oversize pistons.

**Note**

**If the piston is replaced, replace the piston rings also.**



69G01A-125

**Piston and Piston Ring**

1. Measure the piston ring to ring land clearance around the entire circumference using a new piston ring.

**Clearance (Top)**

**RF-CX: 0.18—0.22 mm (0.0071—0.0087 in)**

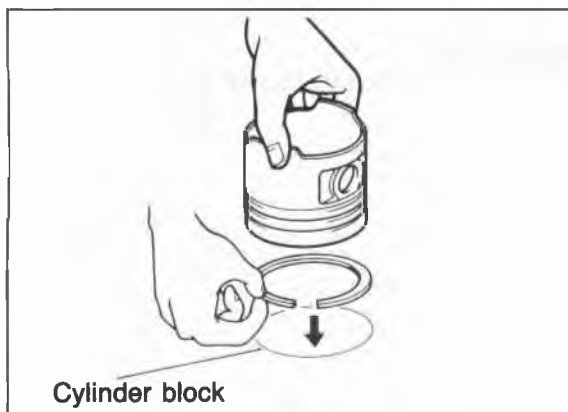
**RF-N : 0.05—0.09 mm (0.0020—0.0035 in)**

**Clearance (Second):**

**0.04—0.08 mm (0.0016—0.0031 in)**

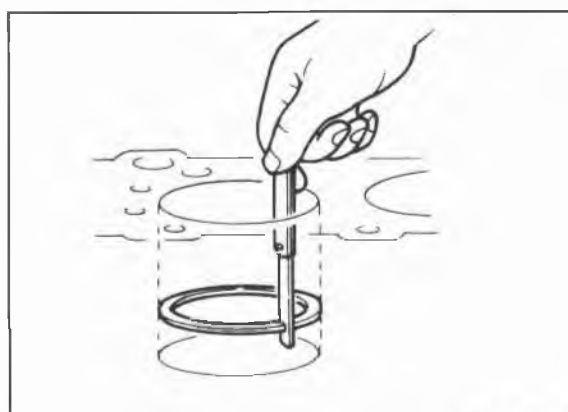
**Maximum: 0.2 mm (0.008 in)**

2. If the clearance exceeds the maximum, replace the piston.



86U01X-104

3. Inspect the piston rings for damage, abnormal wear, or breakage. Replace if necessary.
4. Insert the piston ring into the cylinder by hand and push it to the bottom of the ring travel in using the piston.



76G01C-136

5. Measure each piston ring end gap with a feeler gauge. Replace if necessary.

**End gap (Top and second)**

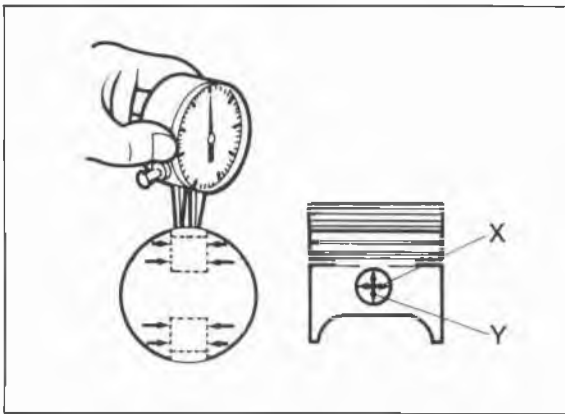
**RF-CX: 0.20—0.35 mm (0.008—0.014 in)**

**RF-N : 0.20—0.40 mm (0.008—0.016 in)**

**End gap (Oil rail):**

**0.20—0.40 mm (0.008—0.016 in)**

**Maximum: 1.0 mm (0.039 in)**



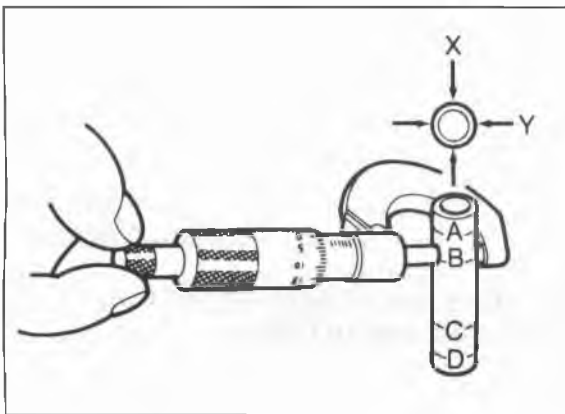
76G01C-137

## Piston and Piston Pin

1. Measure the piston pin hole diameter in X and Y directions at four points.

**Diameter** mm (in)

RF-CX	29.997—30.007 (1.1810—1.1814)
RF-N	24.997—25.007 (0.9841—0.9845)



76G01C-138

2. Measure the piston pin diameter.

**Diameter** mm (in)

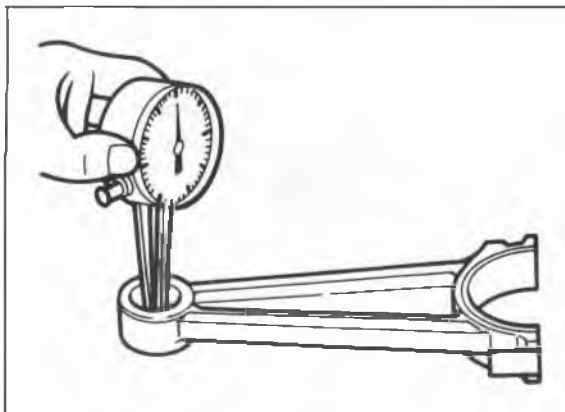
RF-CX	29.994—30.000 (1.1809—1.1811)
RF-N	24.994—25.000 (0.9840—0.9843)

3. Determine the piston pin to piston clearance by subtracting the two figures.

### Clearance:

**-0.003—0.013 mm (0.0001—0.0005 in)**

4. If the clearance exceeds the specification, replace the piston and/or piston pin.



76G01C-139

## Connecting Rod

1. Measure the connecting rod small end bore.

**Diameter** mm (in)

RF-CX	30.014—30.030 (1.1817—1.1823)
RF-N	25.014—25.030 (0.9848—0.9854)

2. Check the clearance between the small end bore and piston pin.

### Clearance:

**0.014—0.036 mm (0.0005—0.0015 in)**

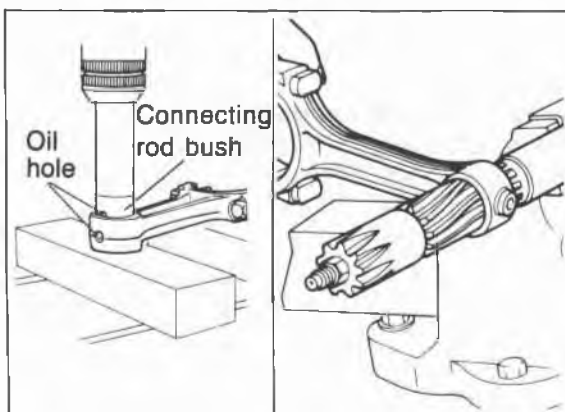
**Maximum: 0.05 mm (0.002 in)**

3. If the clearance exceeds the maximum, replace the connecting rod bushing.

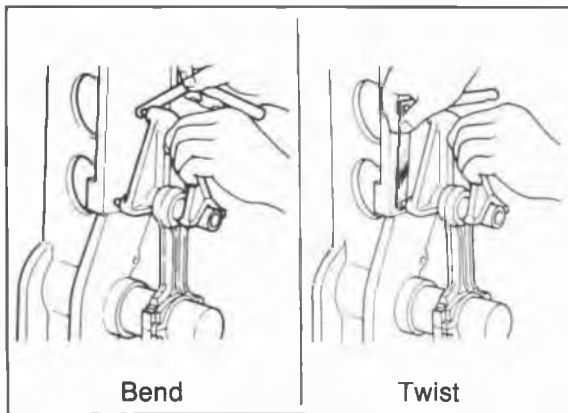
- (1) Apply engine oil to the connecting rod and the bushing.

- (2) Align the oil holes of the connecting rod and the bushing, and press the bushing in.

- (3) Correct the bushing inner diameter, so that the clearance is within the specification, by using a spiral expansion reamer.



76G01C-140

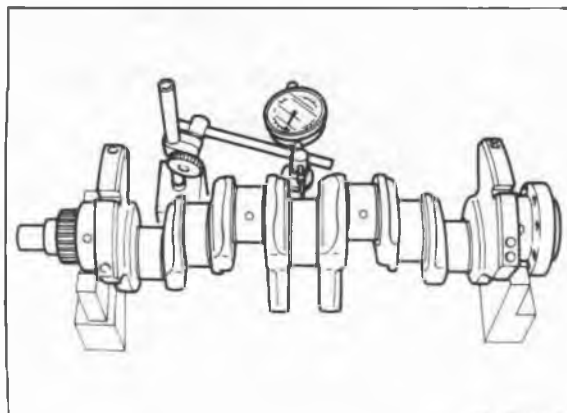


76G01C-141

4. Check each connecting rod for bending or twisting. Repair or replace if necessary.

**Bend :**  
**0.080 mm (0.0031 in) max.**  
**/50 mm (1.969 in)**

**Twist:**  
**0.080 mm (0.0031 in) max.**  
**/50 mm (1.969 in)**

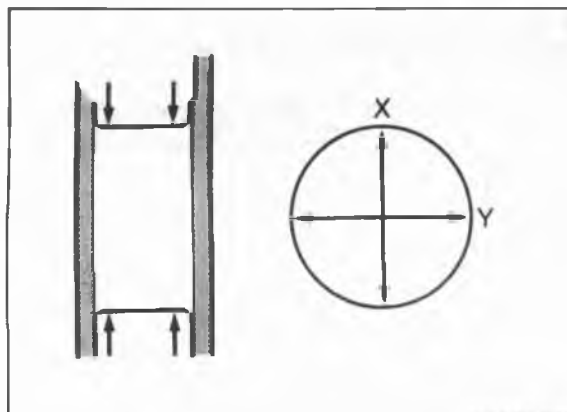


76G01C-142

### Crankshaft

1. Check the journals and pins for damage, scoring, or oil hole clogging.
2. Set the crankshaft on V-blocks.
3. Check the crankshaft runout at the center journal. Replace if necessary.

**Runout: 0.05 mm (0.002 in) max.**



76G01C-143

4. Measure each journal diameter in X and Y directions at two points.

### Main journal

**Diameter:**  
**59.937—59.955 mm (2.3597—2.3604 in)**  
**Minimum: 59.89 mm (2.358 in)**  
**Out-of-round: 0.05 mm (0.002 in) max.**

### Crankpin journal

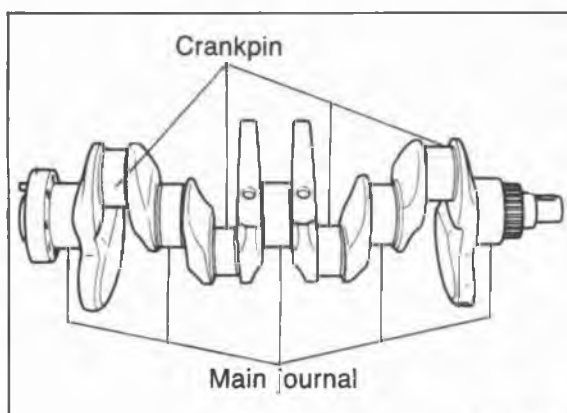
**Diameter:**  
**50.940—50.955 mm (2.0055—2.0061 in)**  
**Minimum: 50.89 mm (2.004 in)**  
**Out-of-round: 0.05 mm (0.002 in) max.**

5. If the diameter is less than the minimum, grind the journals to match undersize bearings.

**Undersize bearing: 0.25 mm (0.010 in),  
 0.50 mm (0.020 in), 0.75 mm (0.030)**

### Main journal diameter undersize mm (in)

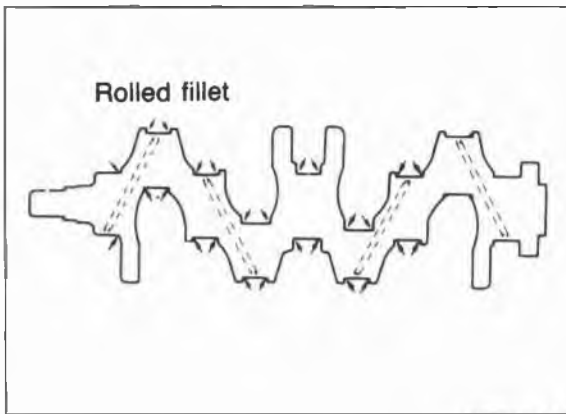
Bearing size	Journal diameter
0.25 undersize	59.687—59.705 (2.3499—2.3506)
0.50 undersize	59.437—59.455 (2.3400—2.3407)
0.75 undersize	59.187—59.205 (2.3302—2.3309)



76G01C-144



# 1C INSPECTION AND REPAIR



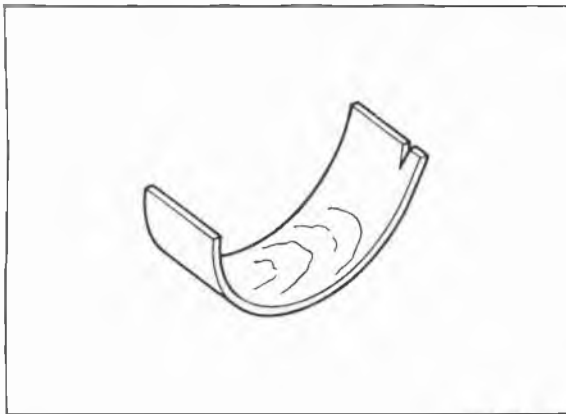
76G01C-145

## Crankpin journal diameter undersize mm (in)

Bearing size	Journal diameter
0.25 undersize	50.690—50.705 (1.9957—1.9963)
0.50 undersize	50.440—50.455 (1.9858—1.9864)
0.75 undersize	50.190—50.205 (1.9760—1.9766)

### Caution

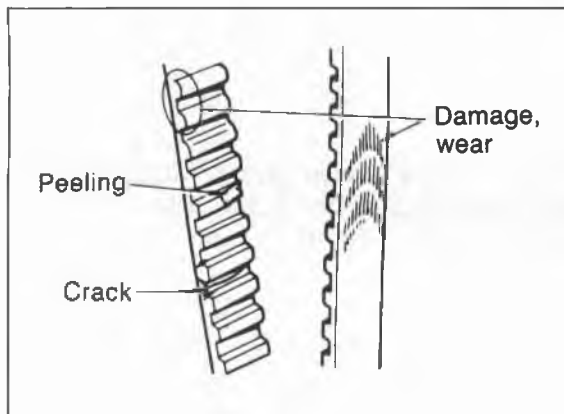
Do not grind the rolled fillet area.



79G01C-077

## Main Bearing and Connecting Rod Bearing

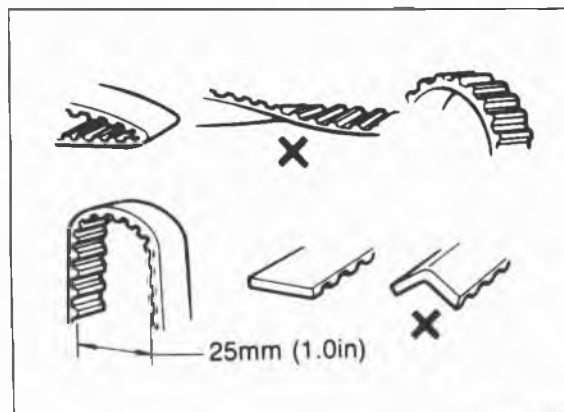
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.



86U01X-113

## Timing Belt

1. Replace the timing belt if there is any oil or grease on it.
2. Check the timing belt for damage, wear, peeling, cracks, or hardening. Replace if necessary.

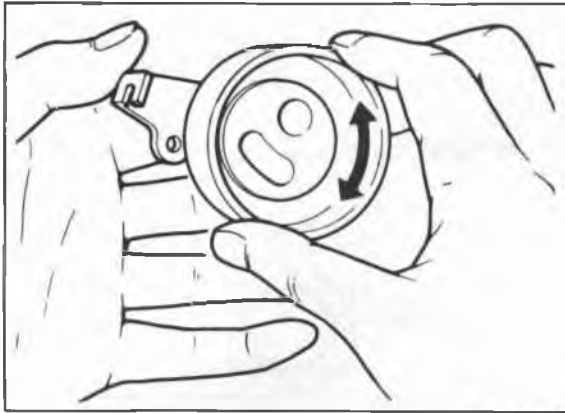


86U01X-114

### Caution

a) Never forcefully twist, turn inside out, or bend the timing belt.

b) Be careful not to allow oil or grease on the belt.



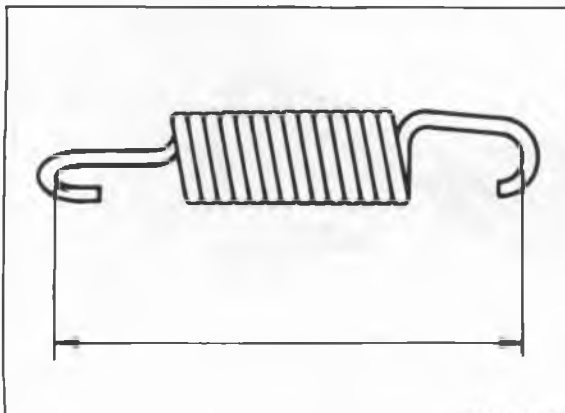
86U01X-115

### Timing Belt Tensioner and Idler Pulley

Check the timing belt tensioner and idler pulley for smooth rotation and abnormal noise. Replace if necessary.

#### Caution

**Do not clean the tensioner with cleaning fluids. If necessary, use a soft rag to wipe it clean, and avoid scratching it.**



76G01C-251

### Timing Belt Tensioner Spring

Check the free length of the tensioner spring. Replace if necessary.

#### Free length:

**52.6 mm (2.071 in)**



76G01C-146

### Timing Belt Pulley and Camshaft Pulley

Inspect the pulley teeth for wear, deformation, or other damage. Replace if necessary.

#### Caution

**Do not clean the pulley with cleaning fluids. If necessary, use a rag to wipe it clean.**

### Timing Belt Cover

Inspect the timing belt covers for damage or cracks. Replace if necessary.

# 1C ASSEMBLY (CYLINDER BLOCK)

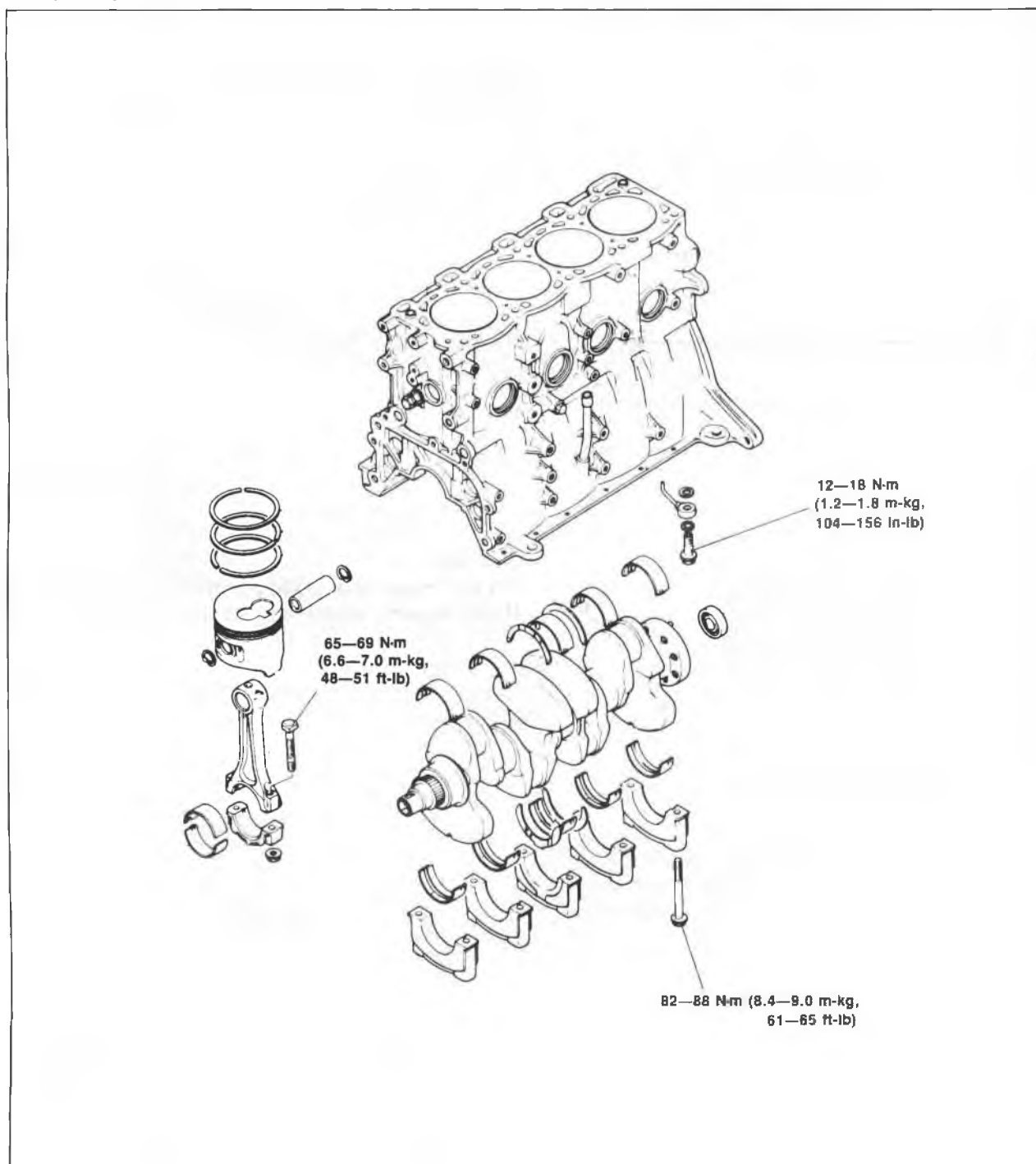
## ASSEMBLY

1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace plain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

### Caution

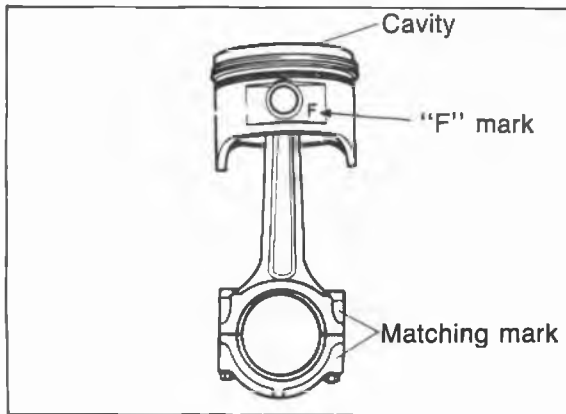
Do not reuse gaskets or oil seals.

## CYLINDER BLOCK—I Torque Specifications

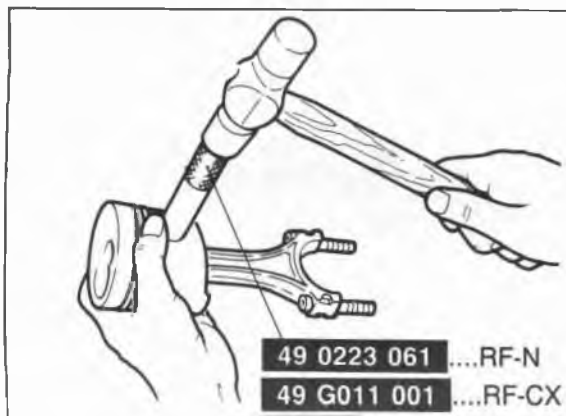


69G01A-139

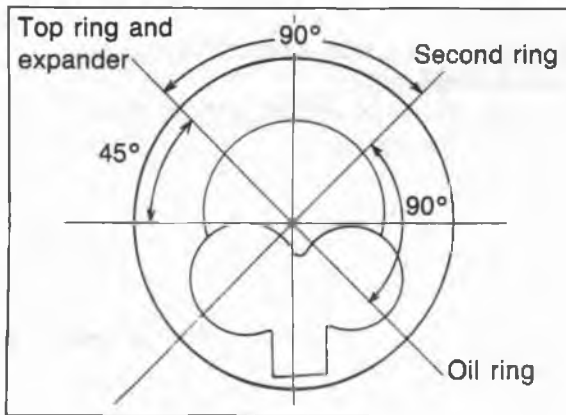
# ASSEMBLY (CYLINDER BLOCK) 1C



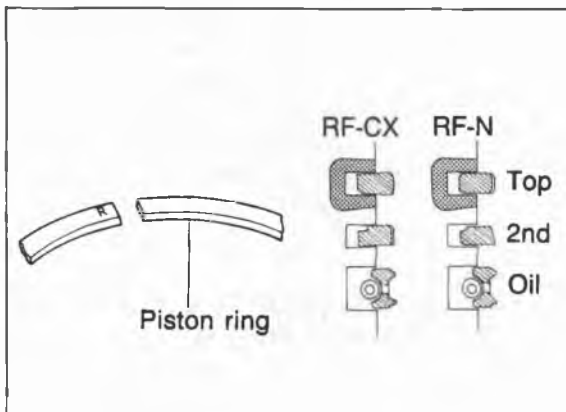
76G01C-147



76G01C-252



4BG01B-153



76G01C-148

## Connecting Rod

1. Align the piston cavity and matching mark in the large end of the connecting rod.
2. Apply engine oil to the circumference of each piston pin and to the small end of each connecting rod.

3. Insert a snap ring into one of the piston pin holes in the piston.
4. Install the piston pin using the **SST**.
5. Connect the piston and connecting rod by the piston pin, and lock the snap ring.

### Note

**Heat the piston to 50—70°C (120—170°F) for installation.**

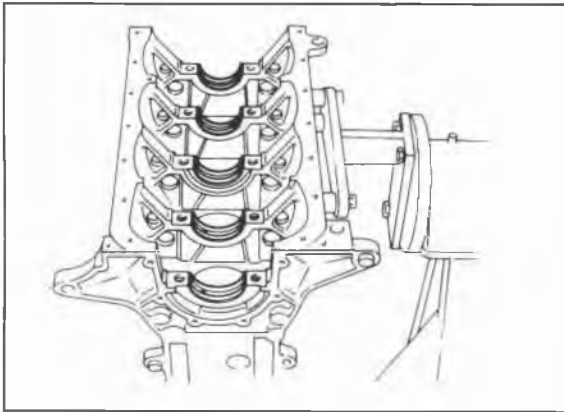
## Piston Ring

1. Apply a liberal coat of engine oil to the piston rings.
2. Install the oil ring expander and the oil ring.
3. Install the second ring.
4. Install the top ring.
5. Align the piston ring end gaps, as shown in the figure.

### Caution

**The rings must be mounted so the "R" or "N" marks face upward.**

# 1C ASSEMBLY (CYLINDER BLOCK)



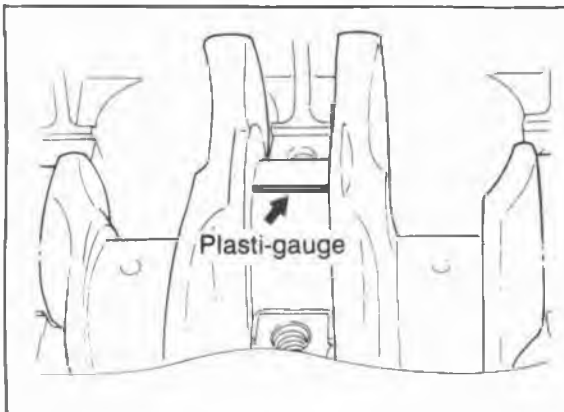
76G01C-149

## Crankshaft

1. Before installing the crankshaft, inspect the main bearing oil clearances as described.

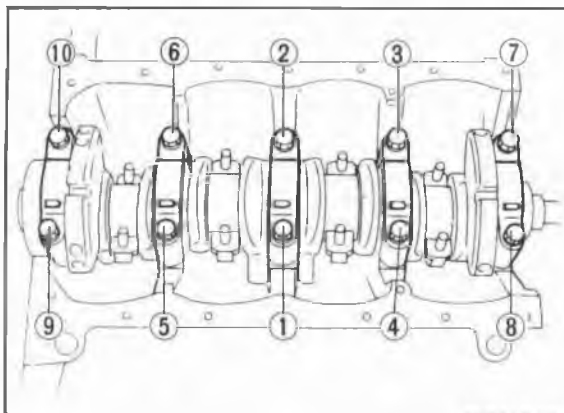
### Oil clearance inspection

- (1) Remove any foreign material and oil from the journal and bearing.
- (2) Install the upper main bearings in the cylinder block.
- (3) Set the crankshaft into the cylinder block.




76G01C-150

- (4) Position the plasti-gauge on top of the journals in the axial direction.



76G01C-151

- (5) Install the main bearing caps along with the lower main bearings according to the cap number and  mark.
- (6) Tighten the caps in two or three steps in the order in the figure.

### Tightening torque:

**82—88 N·m (8.4—9.0 m·kg, 61—65 ft·lb)**

### Caution

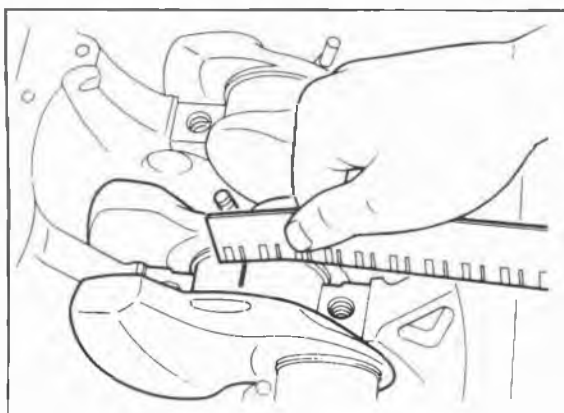
**Do not rotate the crankshaft when measuring the oil clearances.**

- (7) Remove the main bearing caps, and measure the plasti-gauge at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance. If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings. (Refer to page 1C—59.)

### Oil clearance:

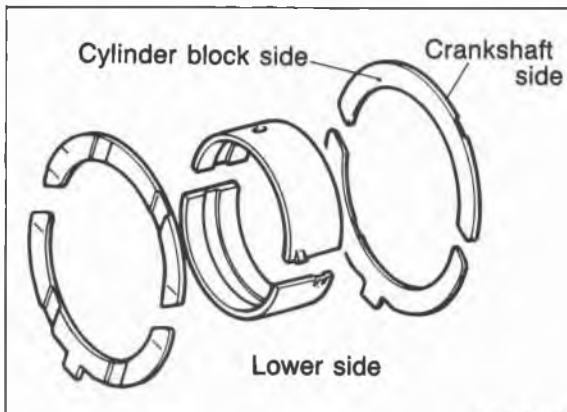
**0.031—0.050 mm (0.0012—0.0020 in)**

**Maximum: 0.08 mm (0.0031 in)**

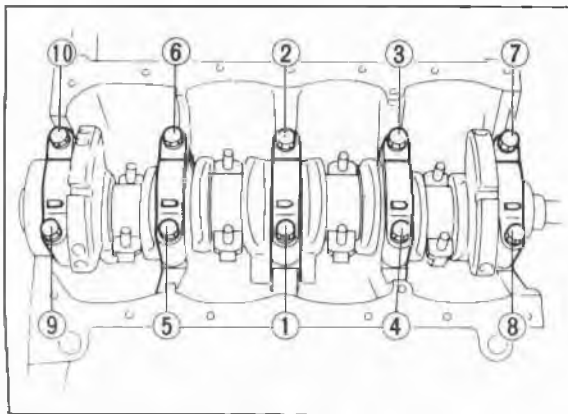


76G01C-152

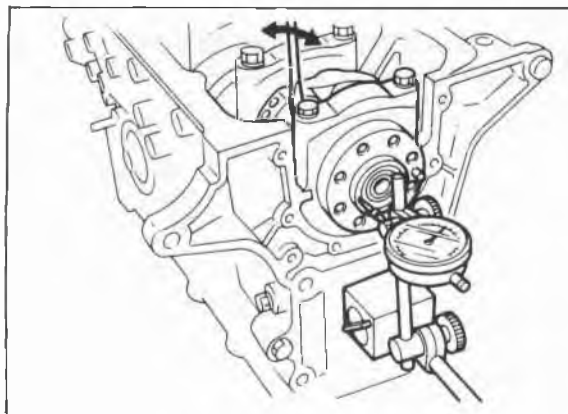
## ASSEMBLY (CYLINDER BLOCK) 1C



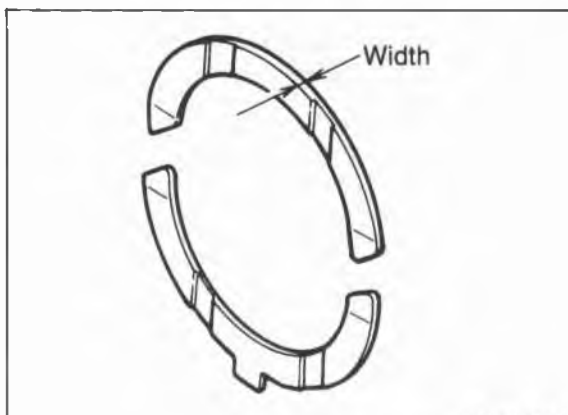
4BG01B-159



76G01C-153




76G01C-154



76G01C-155

2. Apply engine oil to the main bearings and main journals.
3. Install the crankshaft and bearings.

4. Install the main bearing cap according to the cap number and  mark, and tighten it evenly in order shown in the figure.
5. Check that the crankshaft turns easily.

6. Inspect the crankshaft end play.

### End play:

0.040—0.282 mm (0.0016—0.0111 in)  
Maximum: 0.30 mm (0.012 in)

7. If the end play is not within the specification, adjust the end play with an oversize thrust bearing.

### Standard width:

2.00—2.05 mm (0.0787—0.0807 in)

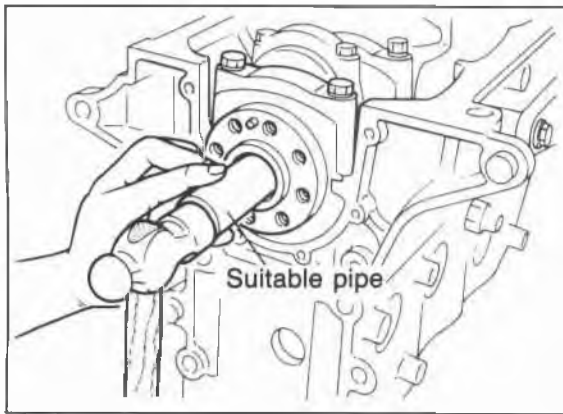
### Oversize width:

2.175—2.225 mm (0.0856—0.0876 in)

### Note

First replace the rear thrust bearings, if still not within the specification, replace the front thrust bearings also.

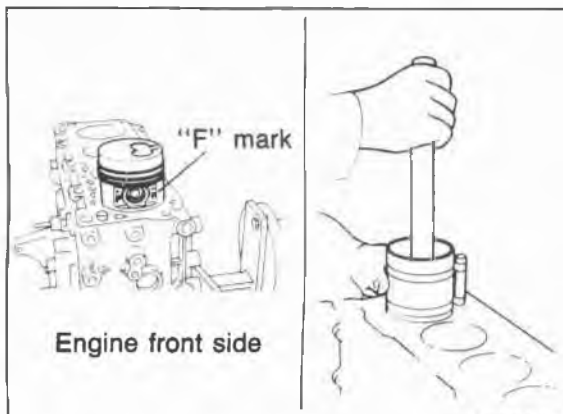
# 1C ASSEMBLY (CYLINDER BLOCK)



76G01C-156

## Pilot Bearing

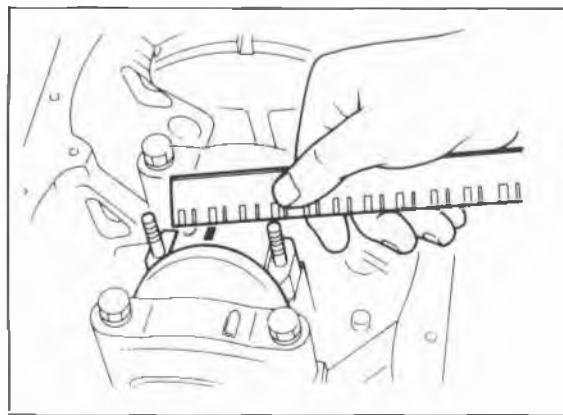
1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30—34 mm, 1.18—1.34 in) against the outer race of the bearing, then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.



86U01X-128

## Piston and Connecting Rod Assembly

1. Apply a liberal amount of clean engine oil to the cylinder walls, piston, and rings.
2. Check the piston rings for the end gap alignment.
3. Insert each piston assembly into the cylinder block with the "F" mark facing the front of the engine. Use a piston installer tool (commercially available).



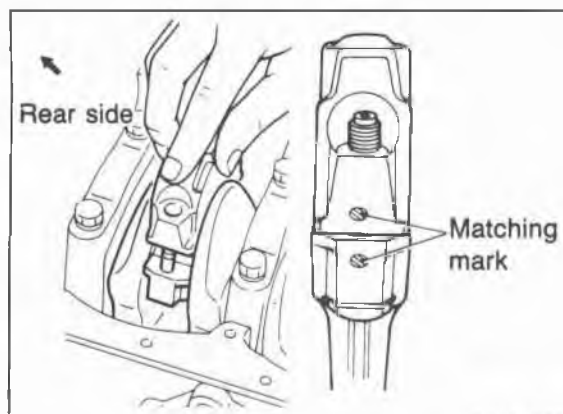
76G01C-157

## Connecting Rod Cap

1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

**Connecting rod cap tightening torque:**  
65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)

**Oil clearance:**  
0.027—0.055 mm (0.0011—0.0022 in)  
**Maximum: 0.08 mm (0.0031 in)**



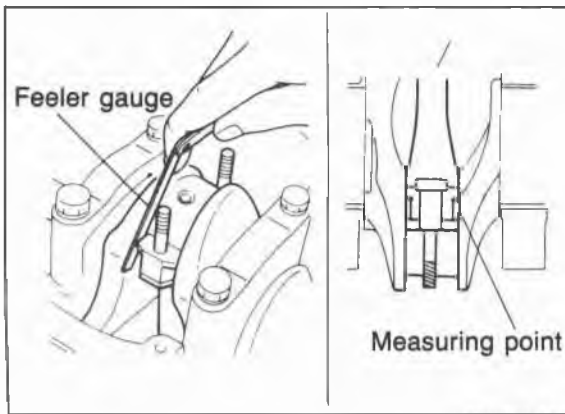
76G01C-158

## Caution

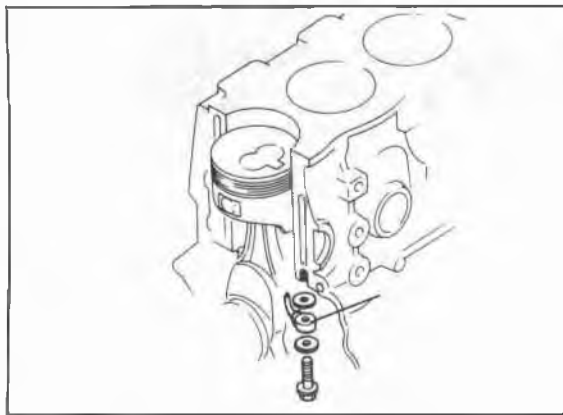
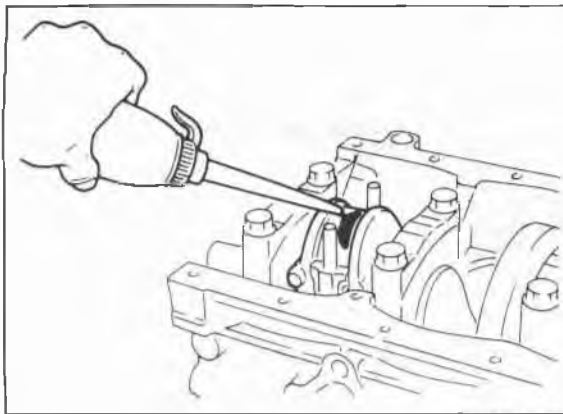
**Align the alignment marks on the cap and on the connecting rod when installing the connecting rod cap.**

2. If the oil clearance exceeds the maximum, grind the crankshaft and use undersize bearings. (Refer to page 1C—60.)

## ASSEMBLY (CYLINDER BLOCK) 1C



76G01C-159



3. Check the side clearance of each connecting rod without the cap installed.

**Side clearance:**

**0.11—0.262 mm (0.0043—0.0103 in)**

**Maximum: 0.30 mm (0.012 in)**

If the clearance exceeds the maximum, replace the connecting rod.

4. Apply a liberal amount of engine oil to the crank-pin journal and connecting rod bearing.
5. Install the connecting rod with the alignment marks aligned.

**Tightening torque:**

**65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)**

**Oil jet**

Install the oil jet into the cylinder block.

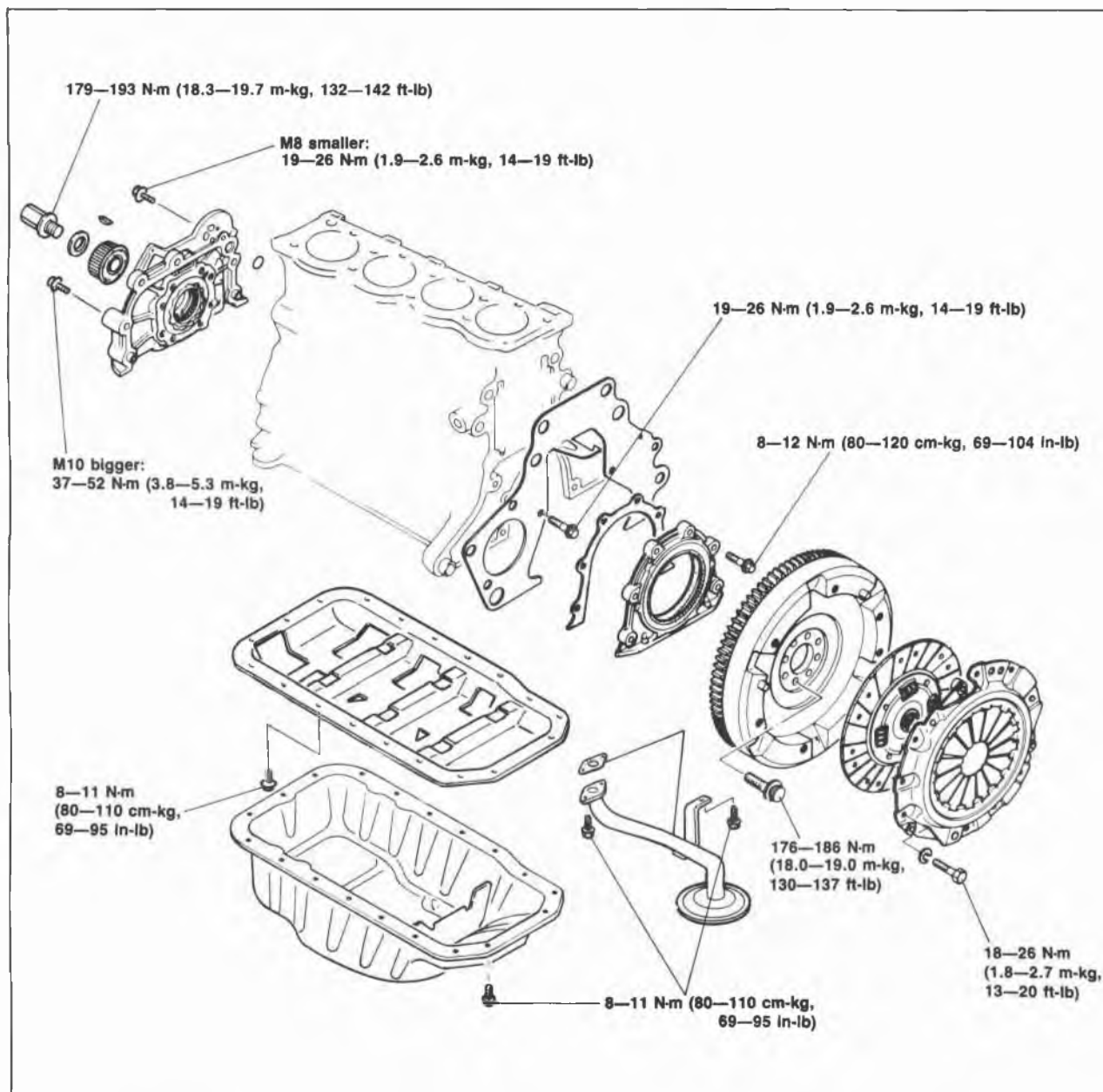
**Tightening torque: 12—18 N·m**

**(1.2—1.8 m·kg, 104—156 in·lb)**

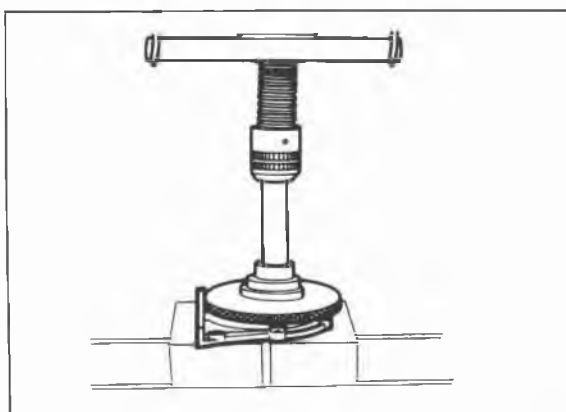


# 1C ASSEMBLY (CYLINDER BLOCK)

## CYLINDER BLOCK—II Torque Specifications



69G01A-166

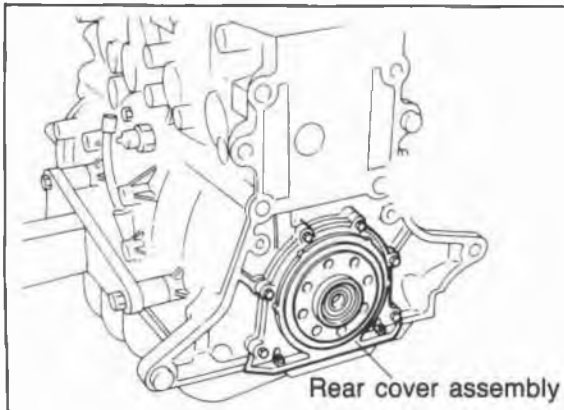


4BG01A-158

### Rear Cover

1. Apply engine oil to the rear cover, oil seal and oil seal lip.
2. Press the oil seal into the rear cover.

## ASSEMBLY (CYLINDER BLOCK) 1C

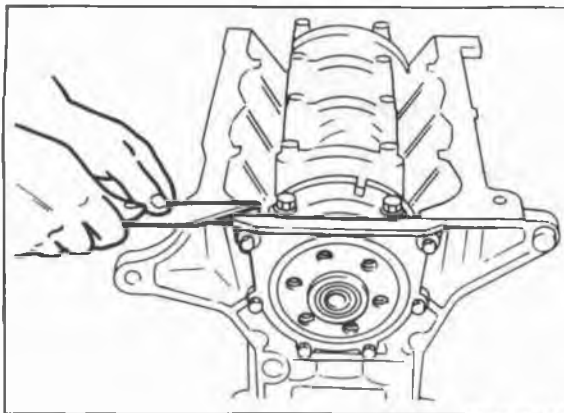


86U01X-131

3. Install the rear cover and a new gasket.

**Tightening torque:**

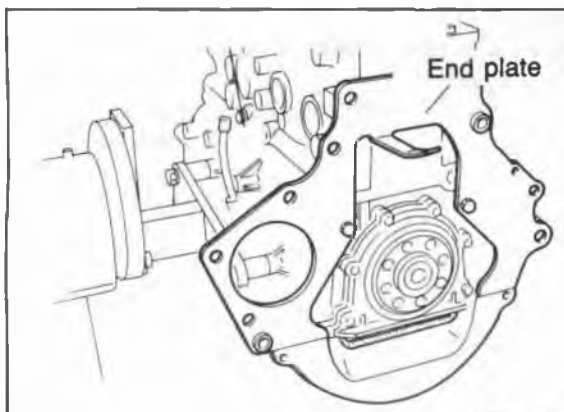
**8—12 Nm (80—120 cm-kg, 69—104 in-lb)**



4. Cut away the portion of the gasket that projects out from the rear cover assembly toward the oil pan side.

**Caution**

**Do not scratch the rear cover assembly.**



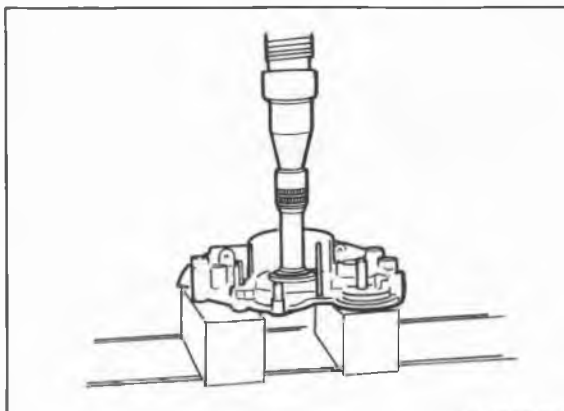
76G01C-161

**End Plate**

Install the end plate.

**Tightening torque:**

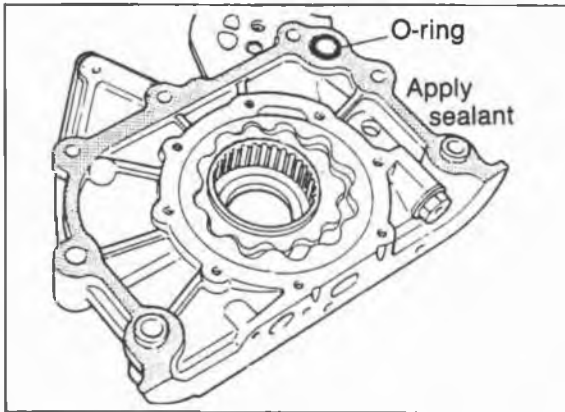
**19—26 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**



**Oil Pump**

1. Apply engine oil to a new oil pump oil seal and the oil pump body.
2. Press the oil seal into the oil pump body.

# 1C ASSEMBLY (CYLINDER BLOCK)

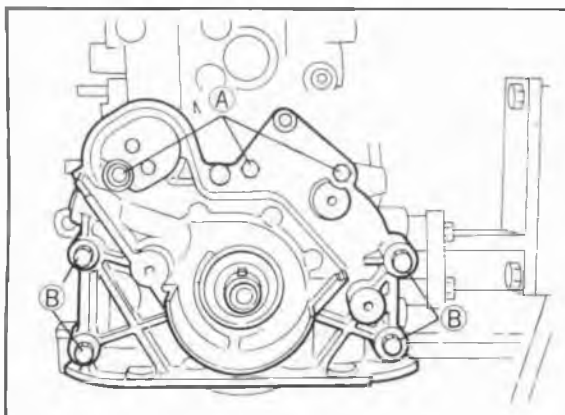


86U01X-133

3. Apply engine oil to the oil seal lip.
4. Remove any dirt or other material from the contact surfaces.
5. Apply a continuous bead of silicon sealant to the contact surface of the oil pump.

### Caution

**Do not allow any sealant to get into the oil hole.**



76G01C-162

6. Install a new O-ring into the pump body.
7. Install the oil pump.

### Tightening torque:

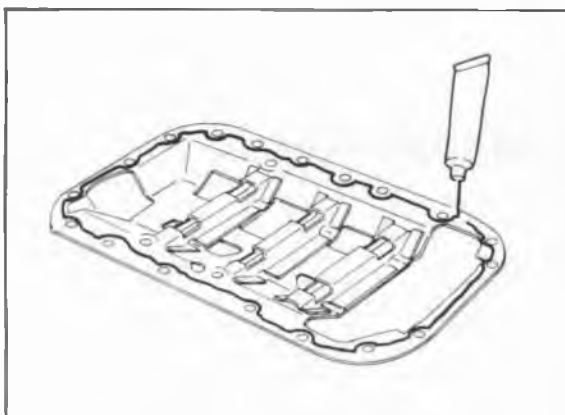
#### Bolt A:

**19—26 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**

#### Bolt B:

**37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)**

8. Remove any sealant which has been squeezed out.



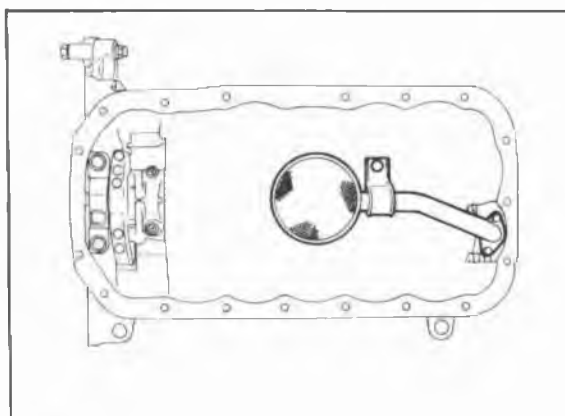
76G01C-163

### Stiffener (RF-CX)

1. Remove any dirt or other material from the contact surface.
2. Apply a continuous bead of silicone sealant to the stiffener along the inside of the bolt holes, and overlap the ends.
3. Install the stiffener.

### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



76G01C-164

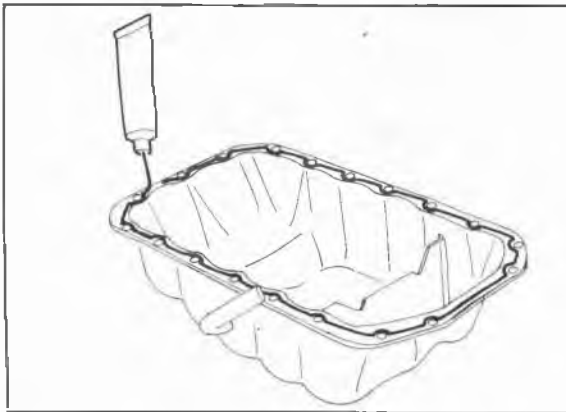
### Oil Strainer

Install the oil strainer and a new gasket.

### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

# ASSEMBLY (CYLINDER BLOCK) 1C



76G01C-165

## Oil Pan

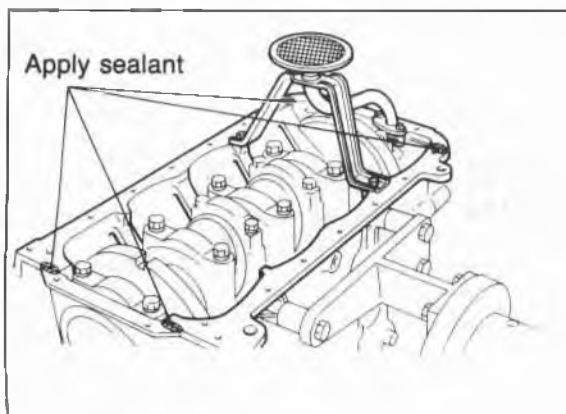
Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it.

### Without gasket

- (1) Remove any dirt or grease from the contact surfaces with a rag.
- (2) Apply continuous bead of silicon sealant to the oil pan along the inside of the bolt holes, and overlap the ends.
- (3) Install the oil pan.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



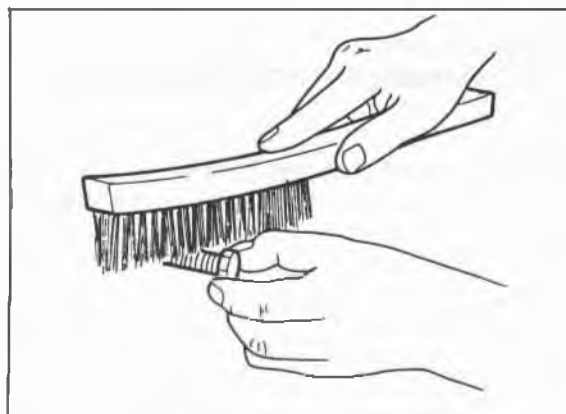
76G01C-166

### With gasket

- (1) Apply sealant to the shaded areas in the figure.
- (2) Install the gasket and the oil pan.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



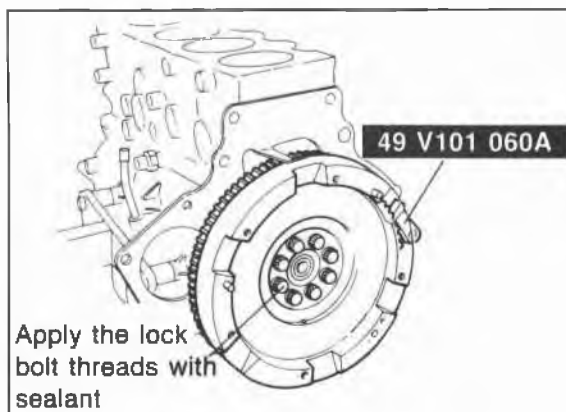
76G01C-167

## Flywheel

1. Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it.
2. Apply sealant to the bolt threads.

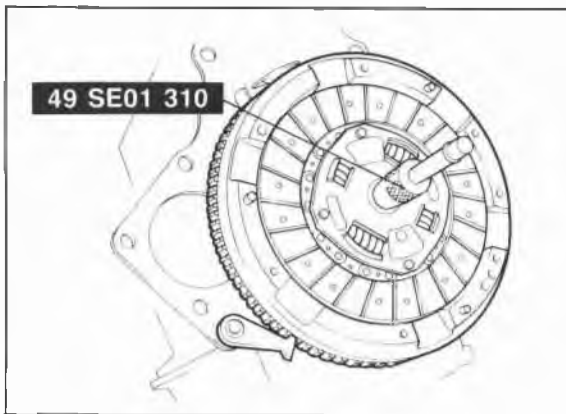
3. Install, and tighten the flywheel with the **SST**.

**Tightening torque: 176—186 N·m  
(18.0—19.0 m·kg, 130—137 ft·lb)**



76G01C-168

# 1C ASSEMBLY (CYLINDER BLOCK)



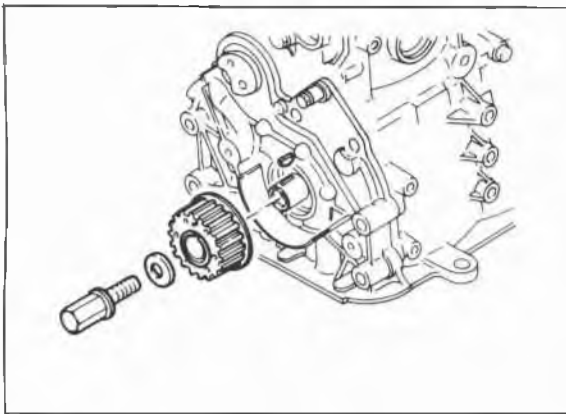
76G01C-169

## Clutch Disc and Clutch Cover

Install the clutch disc and clutch cover using the **SST**. (Refer to Section 6.)

### Tightening torque:

**18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)**



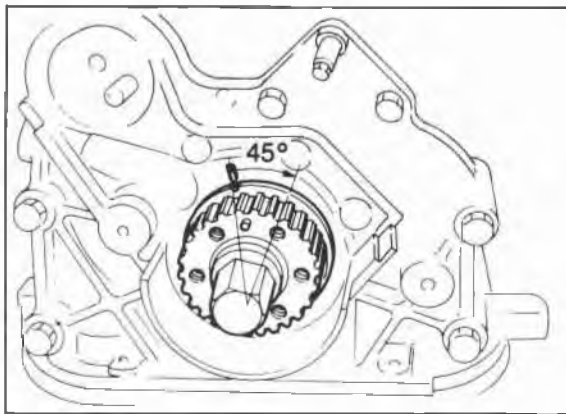
4BG01B-180

## Timing Belt Pulley

1. Install the timing belt pulley with the semicircular (woodruff) key.

### Tightening torque:

**179—193 N·m (18.3—19.7 m·kg,  
132—142 ft·lb)**



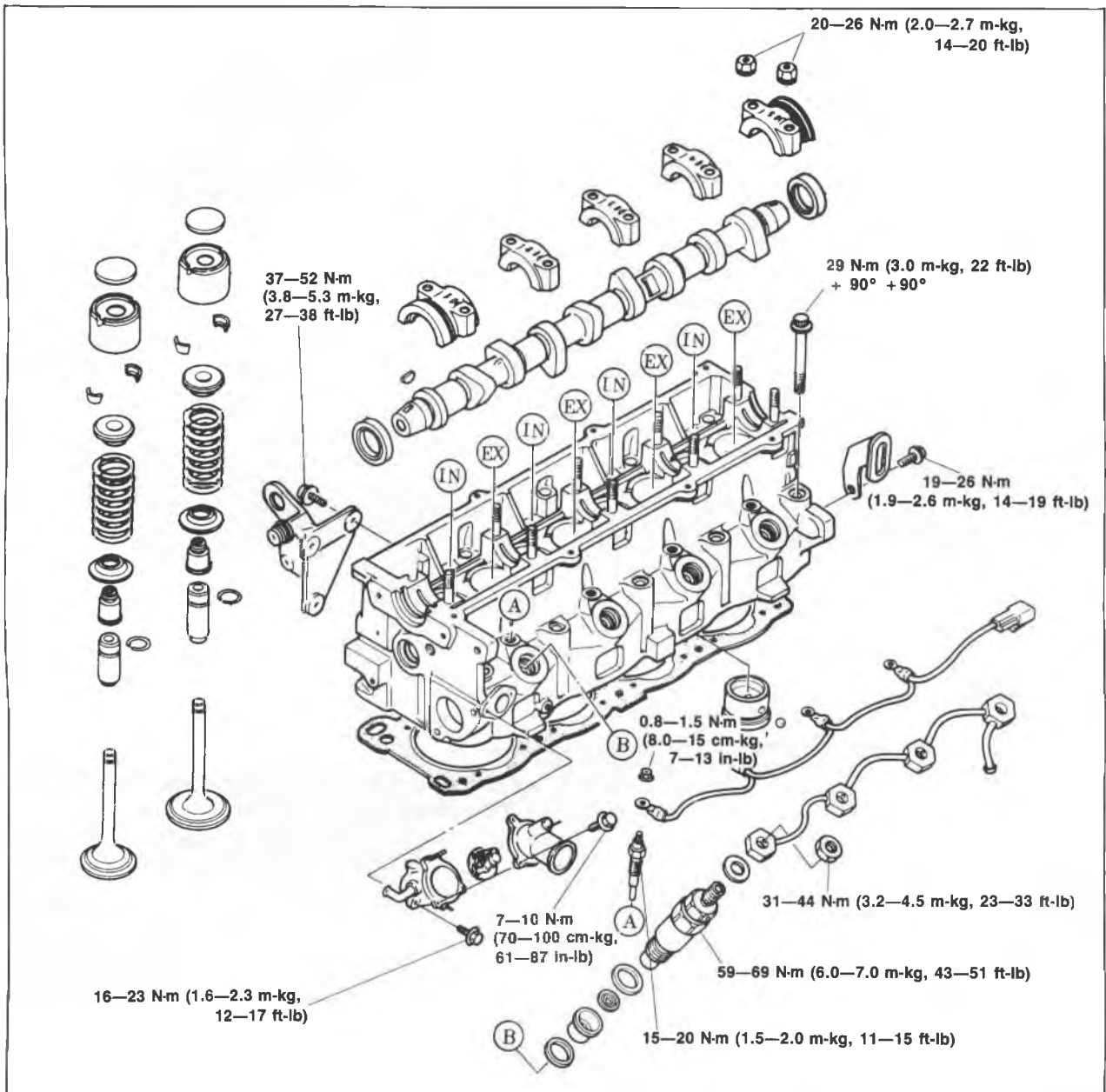
4BG01B-181

2. Release the ring gear brake, turn the flywheel, move the No. 1 piston to the top position, and then turn it approximately 45° in the forward direction.

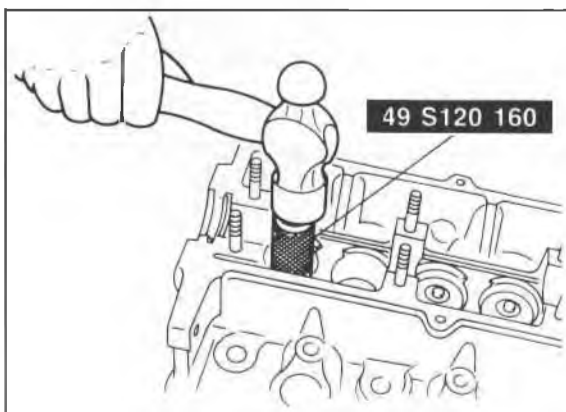
### Caution

**This is to prevent damage to the pistons and valves when the cylinder head is installed.**

## CYLINDER HEAD Torque Specifications



69G01B-152

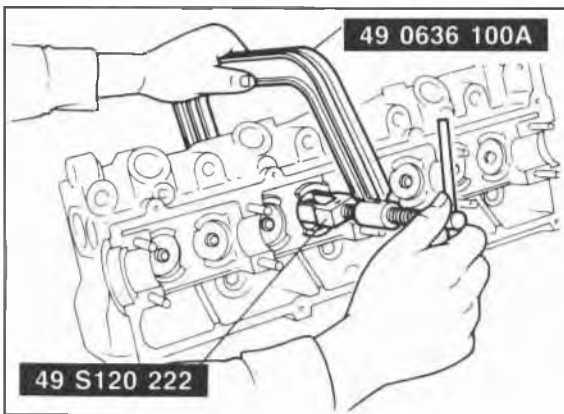


86U01X-143

### Valve Seal

1. Apply engine oil to the inside of the new valve seal.
2. Install the valve seal onto the valve guide with the SST.

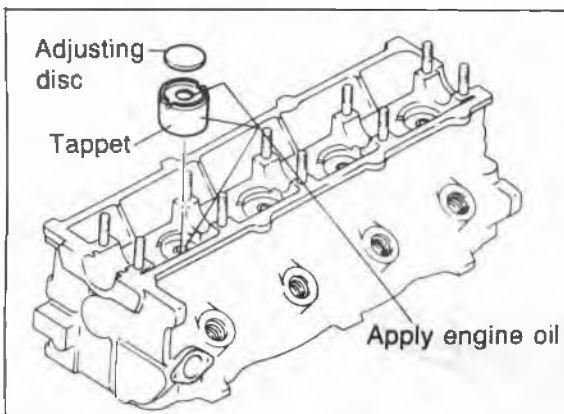
# 1C ASSEMBLY (CYLINDER HEAD)



76G01C-170

## Valve and Valve Spring

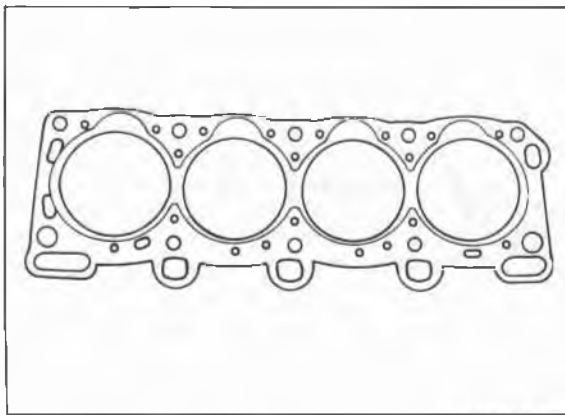
1. Install the lower spring seat.
2. Apply molybdenum disulphide grease to the valve stem.
3. Install the valve.
4. Install the valve springs and the upper spring seat.
5. Compress the valve spring with the **SST**; then install the valve keepers.
6. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



4BG01B-150

## Tappet and Adjusting Disc

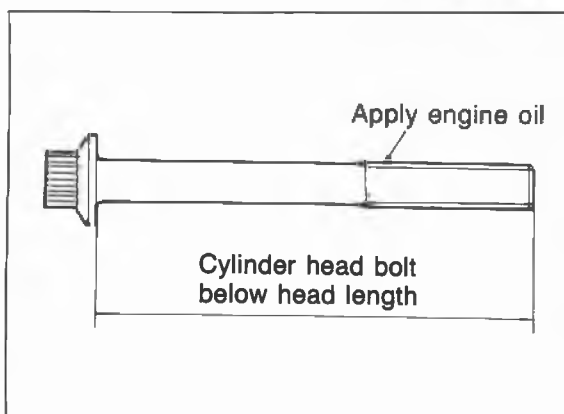
1. Apply engine oil to the tappets.
2. Install the tappets in the hole.
3. Install the adjusting discs.



4BG01B-182

## Cylinder Head

1. Thoroughly remove all dirt and grease from the top of the cylinder block with a rag.
2. Place the new cylinder head gasket in position.
3. Remove any dirt or grease from the bottom surface of the cylinder head.
4. Place the cylinder head in position.



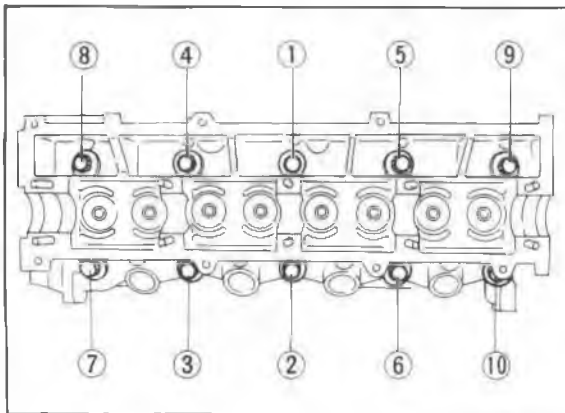
76G01C-171

5. Measure the length of the cylinder head bolt below the head. If the length exceeds the maximum, replace the bolt.

**Length: 113.2—113.8 mm (4.457—4.480 in)**

**Maximum: 114.5 mm (4.508 in)**

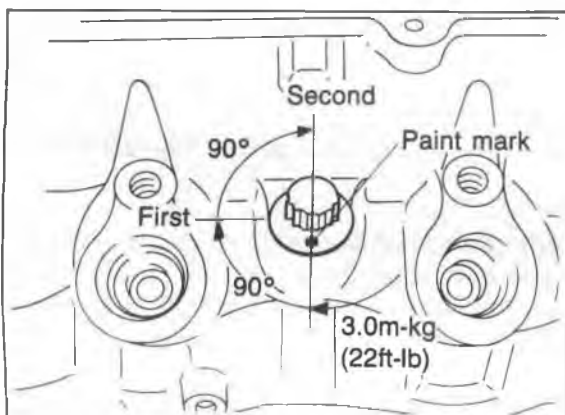
## ASSEMBLY (CYLINDER HEAD) 1C



4BG01B-184

6. Apply engine oil to the cylinder head bolts.
7. Tighten the cylinder head bolts.
  - (1) Tighten the bolts to the specified torque, in order shown in the figure.

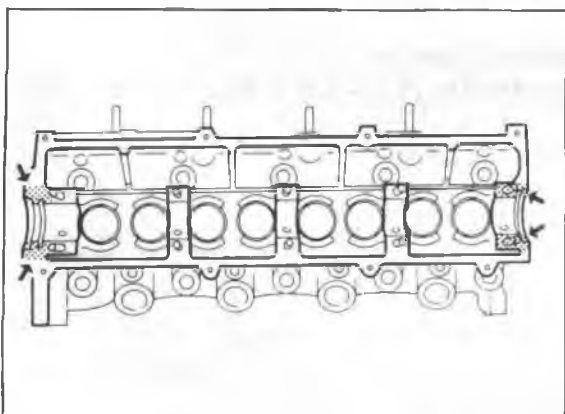
**Tightening torque:**  
**29 N-m (3.0 m-kg, 22 ft-lb)**



4BG01B-185

- (2) Make paint marks on the bolt heads, as shown in the figure.
- (3) With the paint marks as a reference point, turn the cylinder head bolts **another 90° (90°—105°)** in the tightening direction. Tighten them in the order.
- (4) Then tighten them **once again 90° (90°—105°) in the tightening order.**

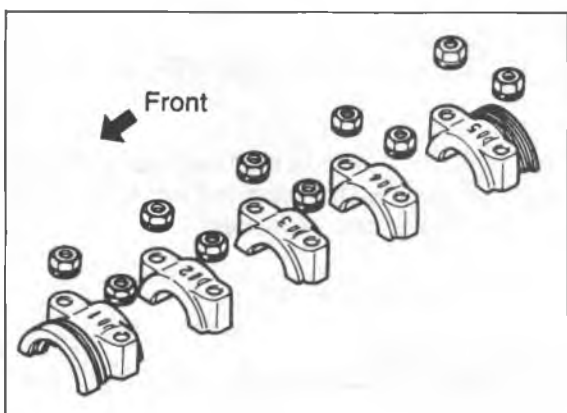
**Caution**  
**Be absolutely sure to tighten all bolts in the order.**



4BG01B-186

### Camshaft

1. Apply engine oil to the camshaft and journal part of the cylinder head.
2. Set the seal cap.
3. Apply a coat of sealant (1016 77 739) to the area shown in the figure.
4. Install the camshaft so that the key groove faces directly upward.

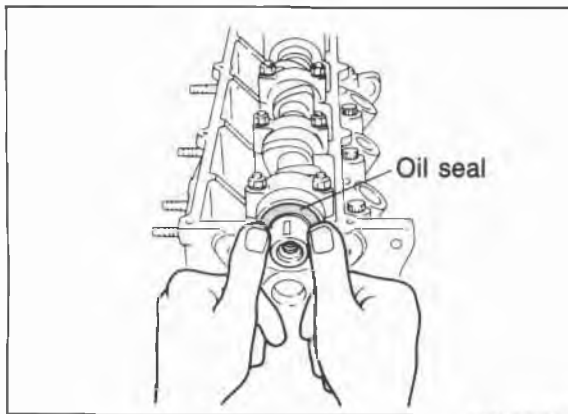


76G01C-172

5. Install the camshaft caps according to the number and ◀ mark, and loosely tighten the camshaft cap nuts.

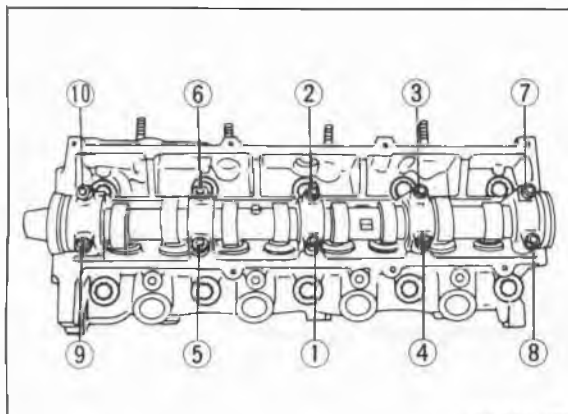


# 1C ASSEMBLY (CYLINDER HEAD)



76G01C-253

6. Apply a coat of engine oil to the new oil seal lip and insert it.



76G01C-173

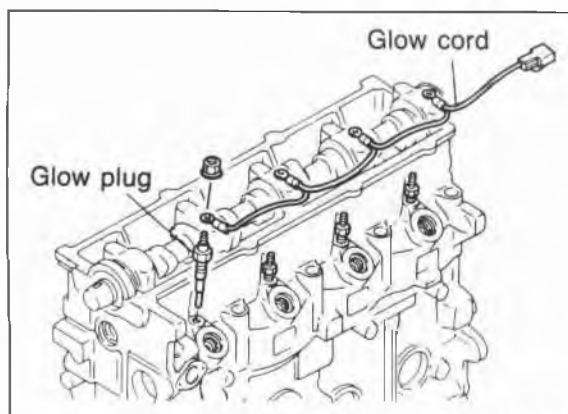
7. Tighten the camshaft cap nuts evenly in order shown in the figure.

### Tighten torque:

20—26 N·m (2.0—2.7 m·kg, 14—20 ft·lb)

### Note

The adjustment of the valve clearance should be made only after the camshaft pulley injection pump pulley and timing belt have been installed.



76G01C-174

### Glow Plug and Glow Cord

1. Install the glow plugs.

### Tightening torque:

15—20 N·m (1.5—2.0 m·kg, 11—15 ft·lb)

2. Install the glow cord.

### Tightening torque:

0.8—1.5 N·m (8.0—15 cm·kg, 7—13 in·lb)

### Injection Nozzle and Leak Pipe

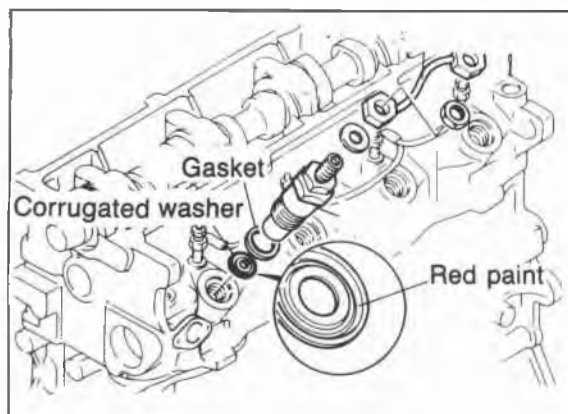
1. Install the new corrugated washers and the new copper gaskets in position.
2. Install the injection nozzles.

### Tightening torque:

59—69 N·m (6.0—7.0 m·kg, 43—51 ft·lb)

### Note

The corrugated washers and copper gaskets must be replaced with new ones each time the injection nozzles are removed.

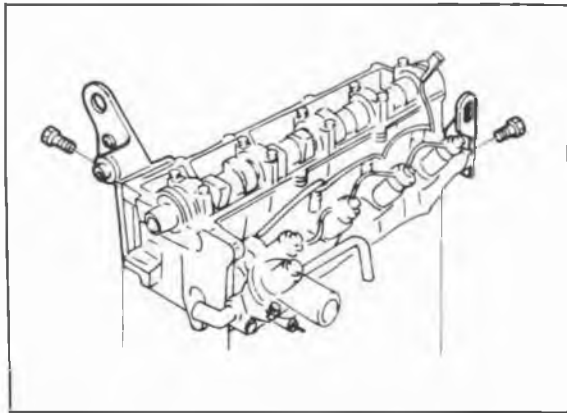


76G01C-175

3. Install the leak pipe.

### Tightening torque:

31—44 N·m (3.2—4.5 m·kg, 23—33 ft·lb)



76G01C-176

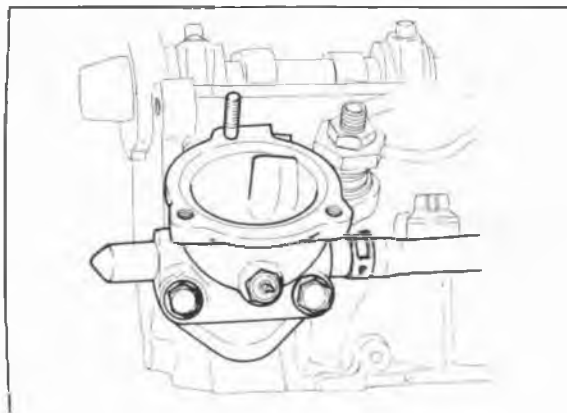
## Engine Hanger

Install the front and rear engine hanger.

### Tightening torque:

**Front: 37—52 N·m**  
(3.8—5.3 m·kg, 27—38 ft·lb)

**Rear : 19—26 N·m**  
(1.9—2.6 m·kg, 14—19 ft·lb)



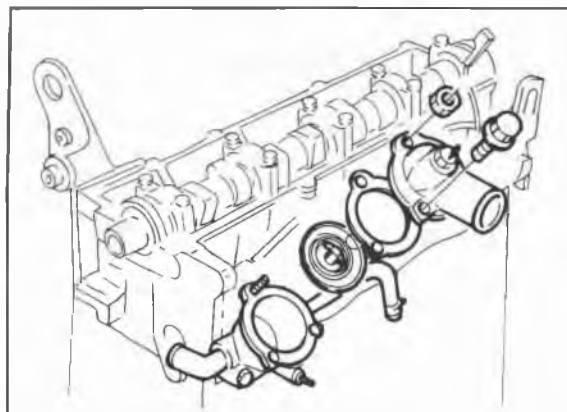
76G01C-177

## Thermostat Case

Install the thermostat case with gasket.

### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



76G01C-178

## Thermostat and Thermostat Cover

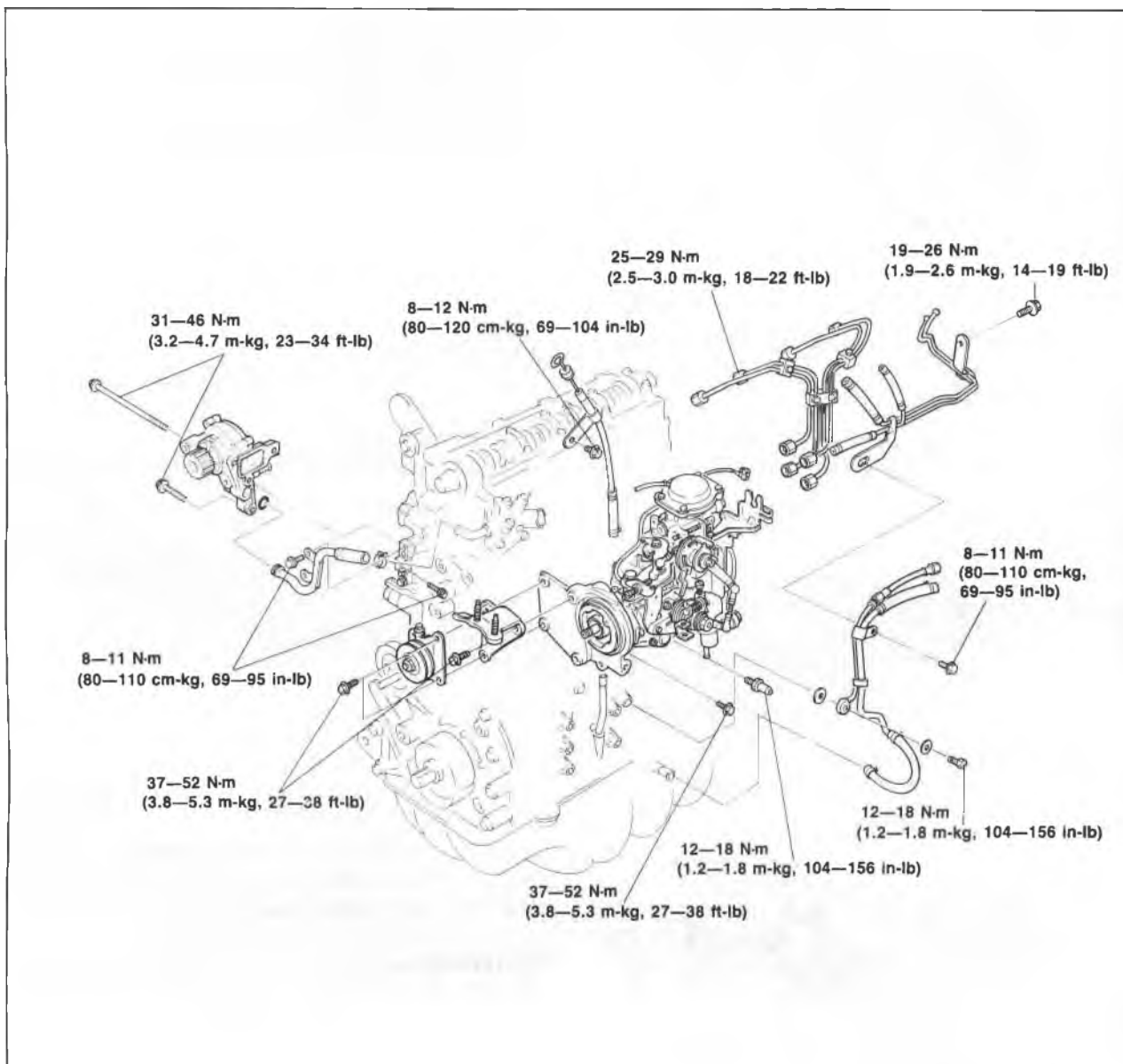
1. Install the thermostat into the thermostat case with the jiggle pin at the top.
2. Position a new gasket with the printed side facing the thermostat case.
3. Install the thermostat cover.

### Tightening torque:

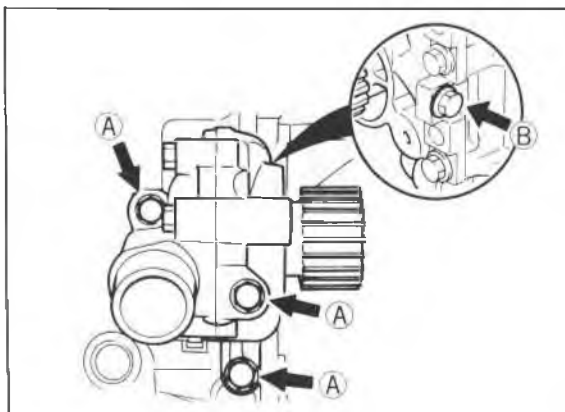
**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**

# 1C ASSEMBLY (INJECTION PUMP)

## INJECTION PUMP Torque Specifications



76G01C-179



76G01C-180

### Water Pump

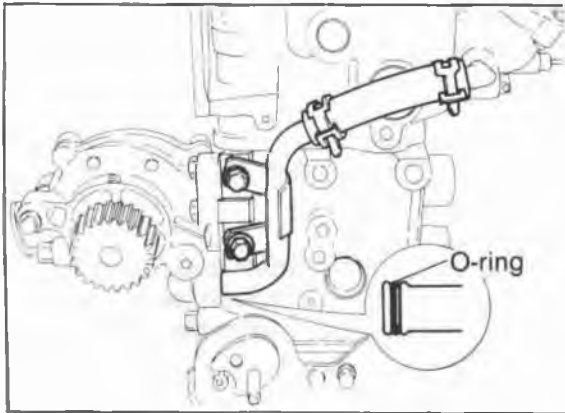
1. Remove the dirt or old gasket from the water pump mounting surface.
2. Install the water pump and new gasket so that the printed side of the gasket faces the water pump.

### Tightening torque:

**Bolt A:** 31—46 N-m  
(3.2—4.7 m-kg, 23—34 ft-lb)

**Bolt B:** 8—11 N-m  
(80—110 cm-kg, 69—95 in-lb)

## ASSEMBLY (INJECTION PUMP) 1C



76G01C-181

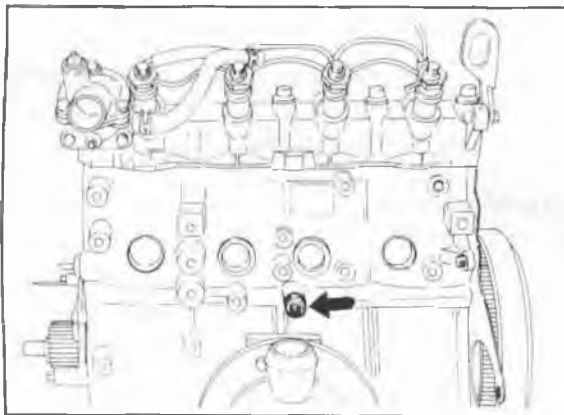
### Water Pipe

1. Apply a coat of vegetable oil to the O-ring.
2. Install the water pipe.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

3. Connect the water hose.



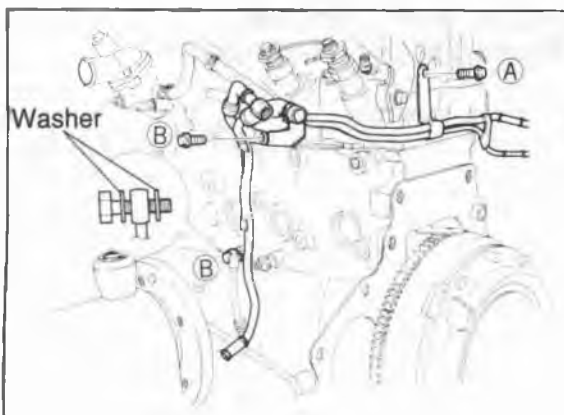
76G01C-182

### Oil Pressure Switch

Install the oil pressure switch.

### Tightening torque: 12—18 N·m

**(1.2—1.8 m·kg, 104—156 in·lb)**



76G01C-183

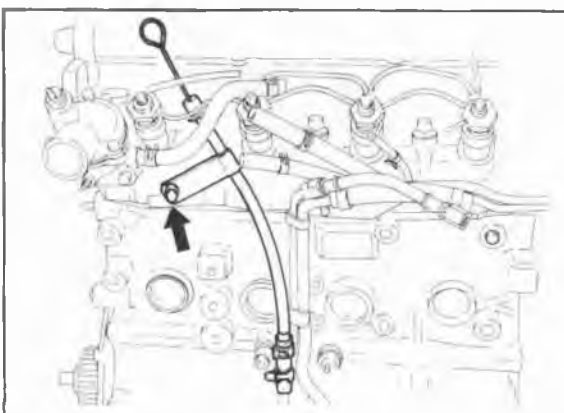
### Fuel Feed Pipe and Oil Pipe

1. Install the fuel feed pipe and tighten bolt (A).

### Tightening torque:

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Install the oil pipe and loosely tighten the bolts (B).



76G01C-184

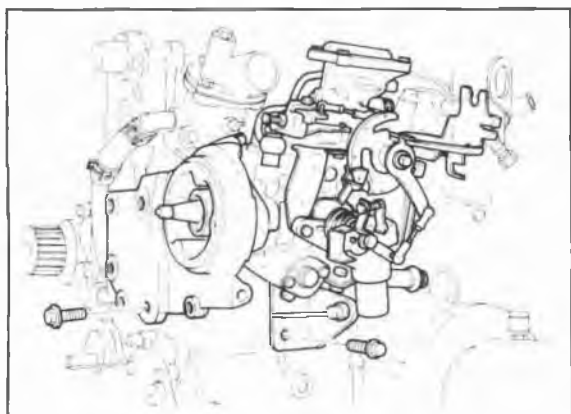
### Oil Level Gauge

Install the oil level gauge and stay.

### Tightening torque:

**8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

# 1C ASSEMBLY (INJECTION PUMP)



76G01C-185

## Injection Pump

1. Install the injection pump with the injection pump bracket.

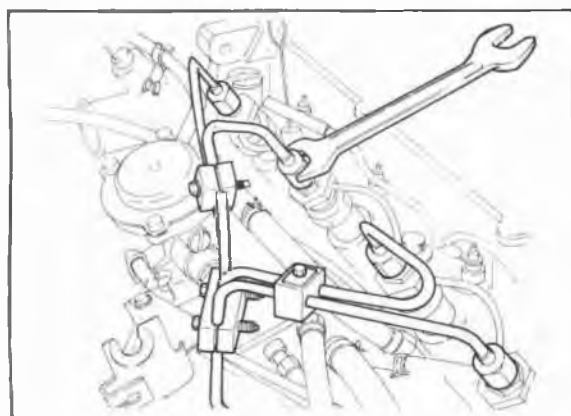
### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

### Note

**If the injection pump bracket and the injection pump are separated, injection timing adjustment is necessary after installing the timing belt.**

2. Connect the CSD water hose and fuel hoses.



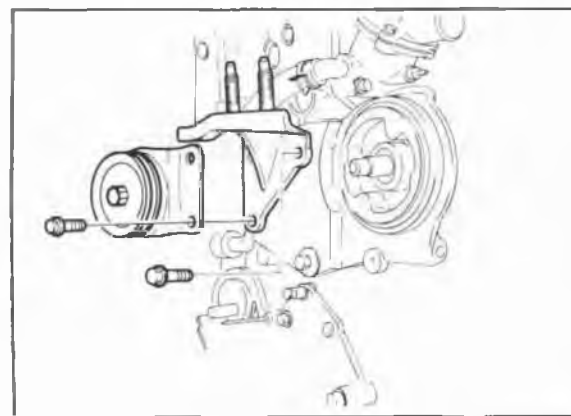
76G01C-186

## Injection Pipe

1. Check that no dirt or other foreign material is on the pipe coupling.
2. Install the fuel injection pipes.

### Tightening torque:

**25—29 N·m (2.5—3.0 m·kg, 18—22 ft·lb)**



76G01C-187

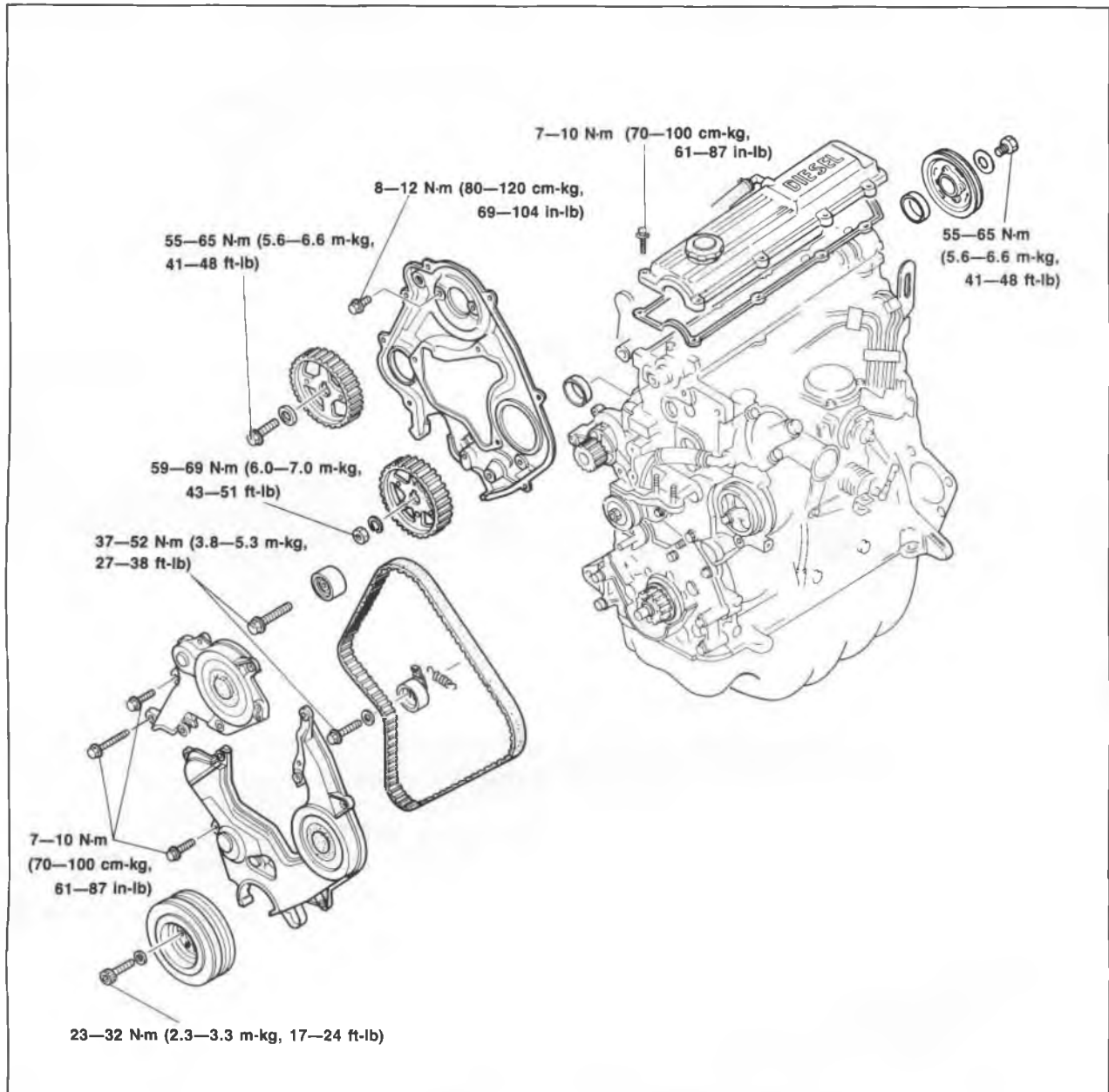
## No.3 Engine Mount and Idler

Install the No.3 engine mount and idler.

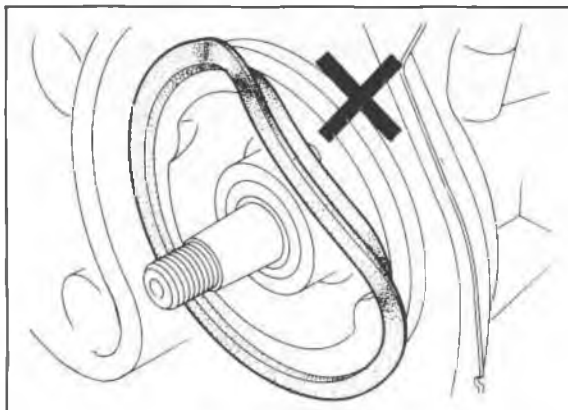
### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

## TIMING BELT Torque Specifications



69G01B-160



76G01C-188

### Seal Plate

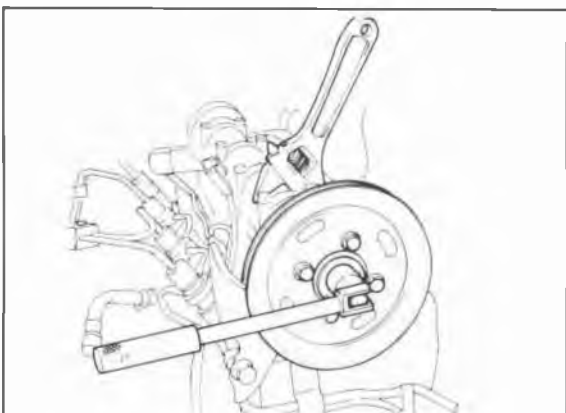
1. Install the seal plate.

### Tightening torque:

**8-12 N-m (0.8-1.2 m-kg, 69-104 in-lb)**

2. Check that the seal plate sealing rubbers are installed in position.

# 1C ASSEMBLY (TIMING BELT)



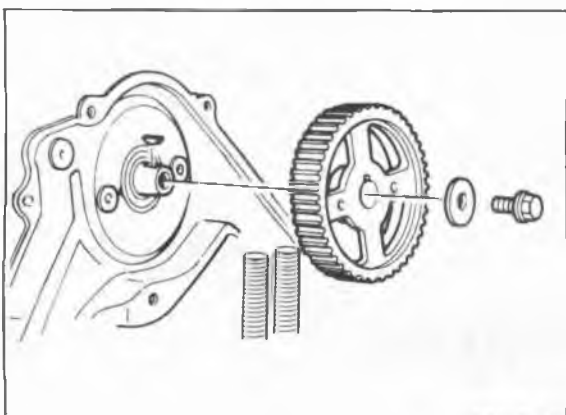
76G01C-189

## Rear Camshaft Pulley

1. Install the rear camshaft pulley.
2. Hold the camshaft with a wrench (29 mm, 1.14 in) and tighten to the specification.

### Tightening torque:

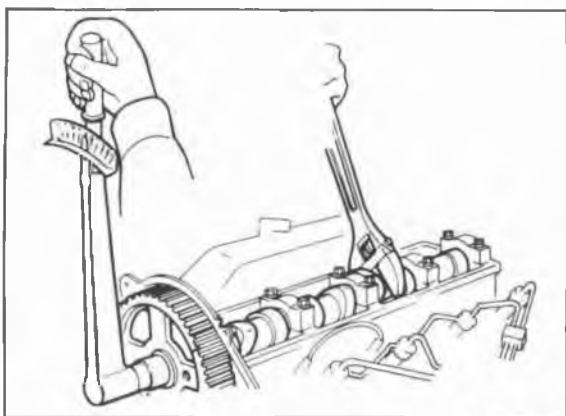
**55—65 Nm (5.6—6.6 m-kG, 41—48 ft-lb)**



48G01B-200

## Camshaft Pulley

1. Connect the camshaft pulley onto the camshaft with the semicircular (woodruff) key.



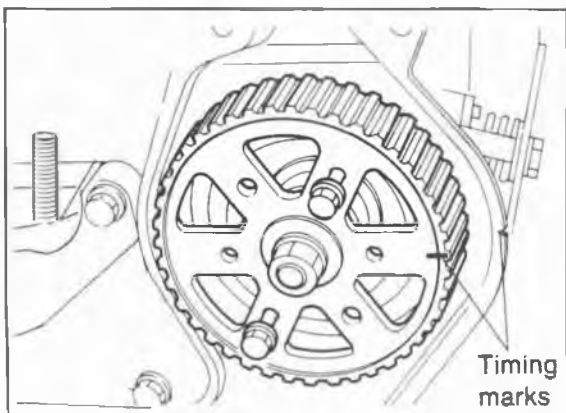
76G01C-190

2. Hold the camshaft with a wrench (29 mm, 1.14 in), tighten the camshaft pulley lock bolt.

### Tightening torque:

**55—65 Nm (5.6—6.6 m-kG, 41—48 ft-lb)**

3. Align the mark on the camshaft pulley with the mark on the seal plate.



76G01C-254

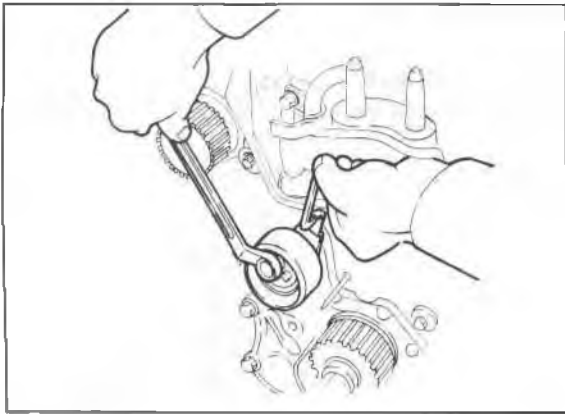
## Injection Pump Pulley

1. Install the injection pump pulley with the semicircular (woodruff) key to the injection pump shaft.
2. Rotate the injection pump pulley until the timing marks are aligned.
3. Affix the injection pump pulley to the bracket using two bolts (35—40 mm, 1.4—1.6 in).
4. Tighten the lock nut.

### Tightening torque:

**59—69 Nm (6.0—7.0 m-kG, 43—51 ft-lb)**

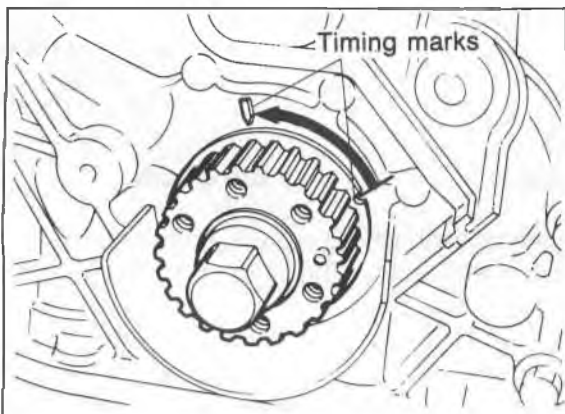
## ASSEMBLY (TIMING BELT) 1C



63G01D-431

### Timing Belt Tensioner

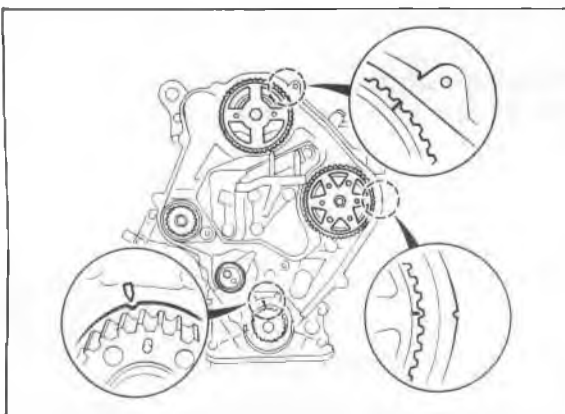
1. Install the tensioner spring onto the tensioner.
2. Install the tensioner assembly.
3. Temporarily secure it so the tensioner is shifted outward.



76G01C-191

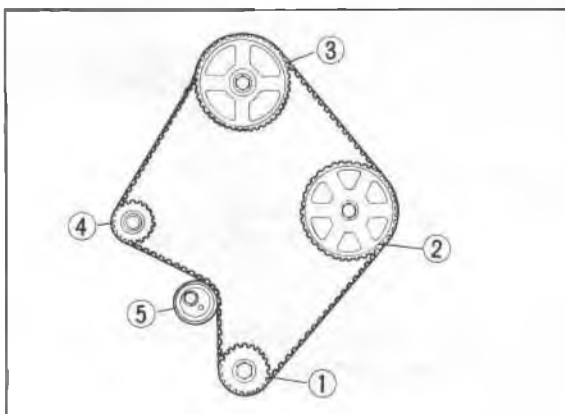
### Timing Belt

1. Return the crankshaft about 45° to the timing mark on the oil pump housing.



76G01C-192

2. Check that the timing marks of the camshaft pulley and the injection pump pulley align with the timing marks on the seal plate.



76G01C-193

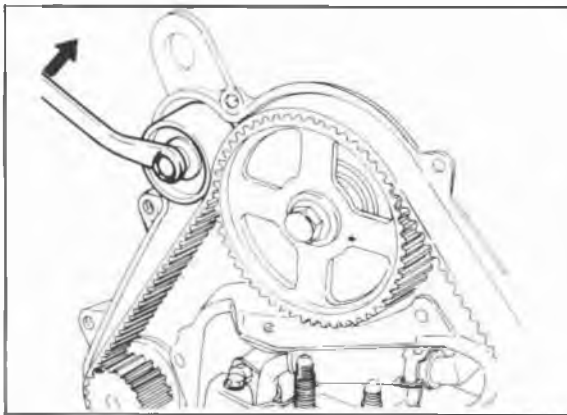
3. Install the timing belt in the sequence shown in the figure.

### Caution

**The timing belt must be reinstalled in the same direction of rotation for continued durability.**



# 1C ASSEMBLY (TIMING BELT)



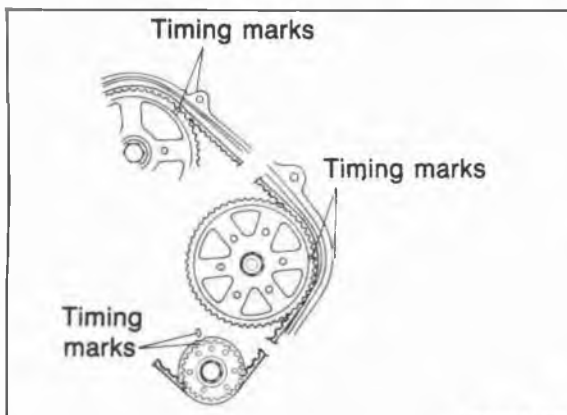
76G01C-194

4. Install the idler pulley.

**Tightening torque:**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

5. Remove the two affixing bolts from the injection pump pulley.



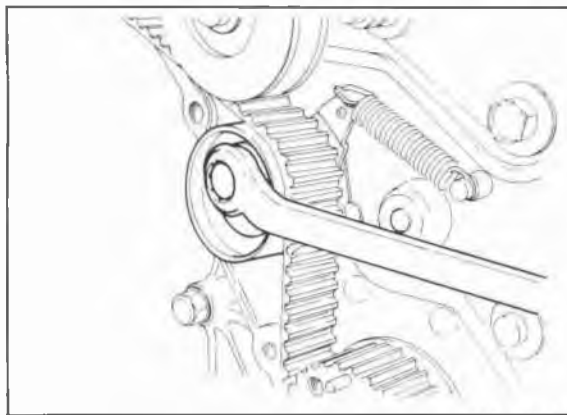
76G01C-195

6. Loosen the tensioner lock bolt.
7. Turn the crankshaft twice in the direction of rotation (clockwise).

**Caution**

**Do not rotate in reverse direction.**

8. Check that each timing mark is correctly aligned. If not aligned, remove the timing belt. Repeat step 2—9.



76G01C-196

9. Tighten the timing belt tensioner lock bolt.

**Tightening torque:**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

10. Check the timing belt tension. If the tension is not correct, loosen the tensioner lock bolt and repeat step 6—9, or replace the tensioner spring.

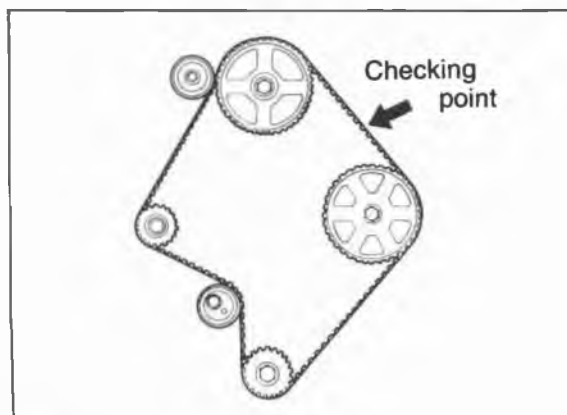
**Standard deflection:**

**9.0—11.5 mm (0.35—0.45 in)**

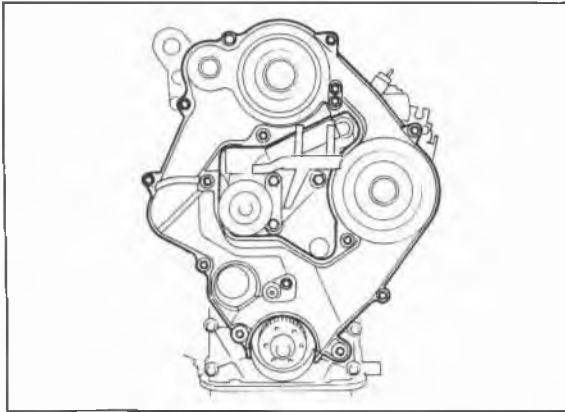
**/98 N (10 kg, 22 lb)**

**Caution**

**Be sure not to apply tension other than that of the tensioner spring.**



76G01C-197



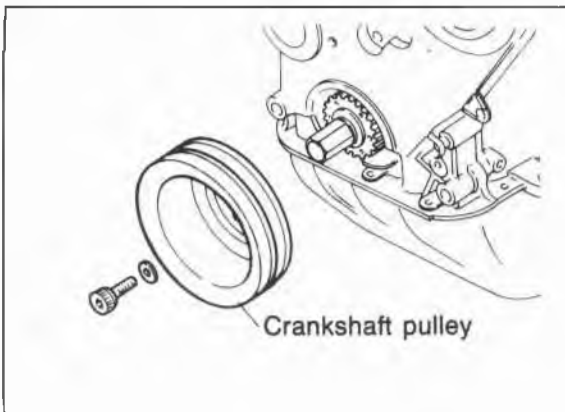
76G01C-198

### Timing Belt Cover

Install the left and right timing belt covers.

#### Tightening torque:

**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**



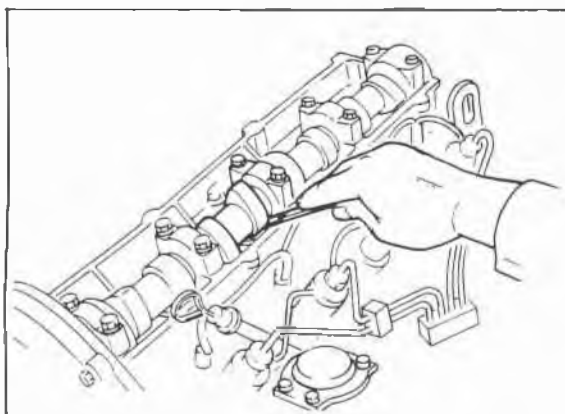
4BG01B-210

### Crankshaft Pulley

Install the crankshaft pulley.

#### Tightening torque:

**23—32 N·m (2.3—3.3 m·kg, 17—24 ft·lb)**



76G01C-199

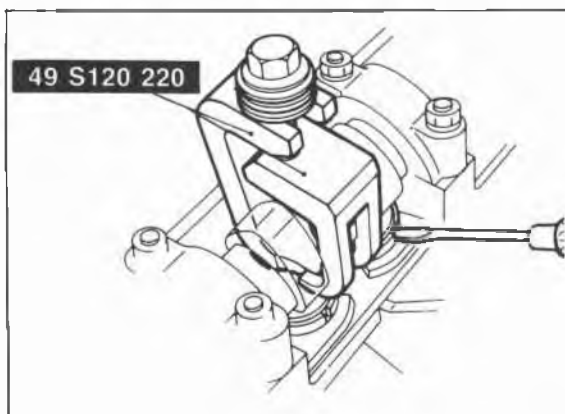
### Valve Clearance

1. Set the No.1 cylinder to compression TDC.
2. Measure the valve clearance at No.1, No.2 (intake), and No.1, No.3 (exhaust).

#### Clearance (cold engine)

**IN : 0.20—0.30 mm (0.008—0.012 in)**

**EX : 0.30—0.40 mm (0.012—0.016 in)**

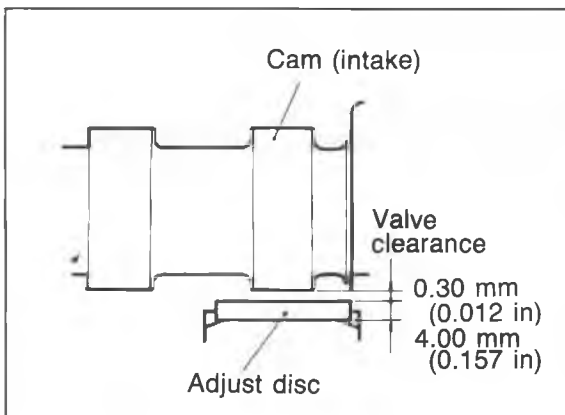


76G01C-200

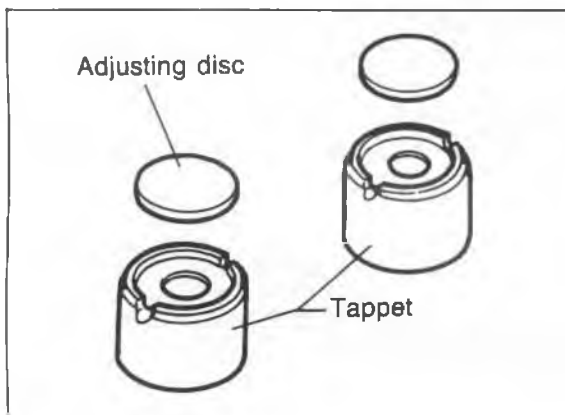
3. If the valve clearance is not within the specification, adjust the valve clearance.

- (1) Face the intake cam lobe straight upward.
- (2) Move the tappet so that its notch is at the manifold side.
- (3) Press the tappet down until the adjusting disc is accessible with the **SST**.
- (4) Take out the adjusting disc.

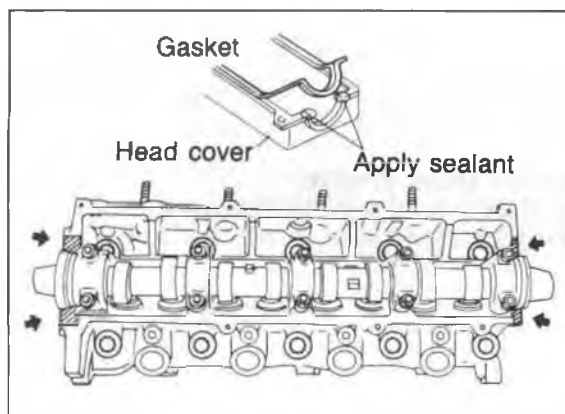
# 1C ASSEMBLY (TIMING BELT)



76G01C-201



76G01C-202



76G01C-203

(5) Select an appropriate disc depending on the valve clearance measured. And install it.

### Example (intake valve):

Thickness of original adjusting disc + (measured clearance — standard clearance) = **thickness of new adjusting disc.**

$$4.00 + (0.30 - 0.25) = 4.05 \text{ mm}$$

$$0.157 + (0.012 - 0.010) = 0.159 \text{ in}$$

### Note

a) The disc thickness is indicated by the number marked on the disc. For example, 3825 means 3.825 mm (0.1056 in).

b) Adjusting discs are available in 25 different thicknesses within the 3.40—4.60 mm (0.134—0.181 in) range, at intervals of 0.05 mm (0.002 in).

(6) Inspect the clearance again.

4. Set the No.4 cylinder to compression TDC.
5. Measure and adjust the valve clearance at No.3, No.4 (intake), and No.2, No.4 (exhaust) in the same way.

### Cylinder Head Cover

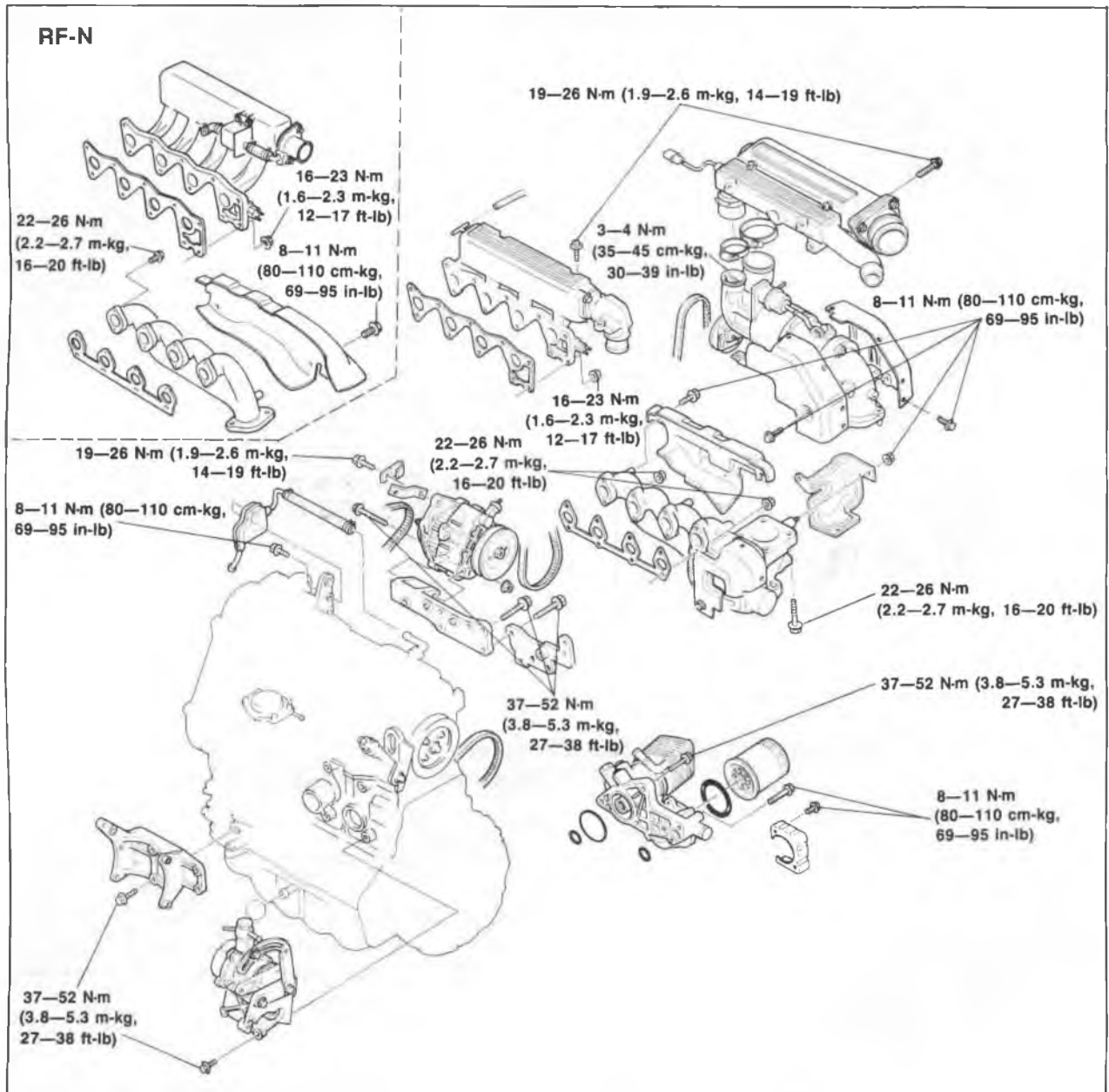
1. Apply sealant to the shaded areas.
2. Install the cylinder head cover.

### Tightening torque:

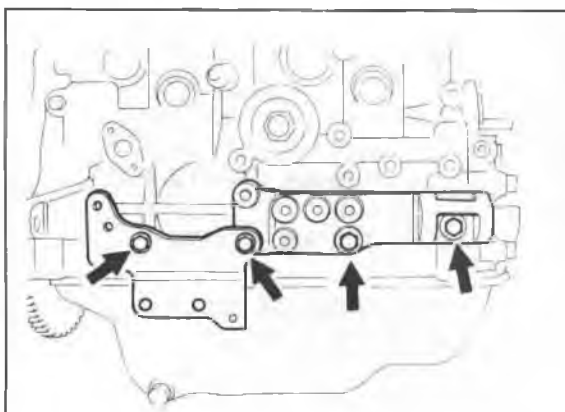
**7—10 N·m (70—100 cm·kg, 61—89 in·lb)**

3. Install the PVC hose.

## AUXILIARY PARTS Torque Specifications



86U01X-164

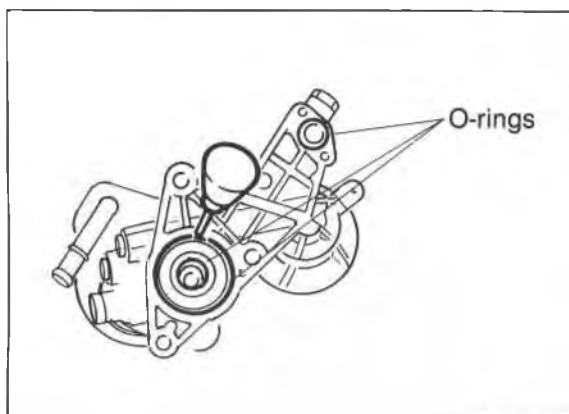


76G01C-205

**Alternator Bracket and Exhaust Pipe Bracket**  
Install the alternator bracket and exhaust pipe stay.

**Tightening torque:**  
**37-52 N-m (3.8-5.3 m-kg, 27-38 ft-lb)**

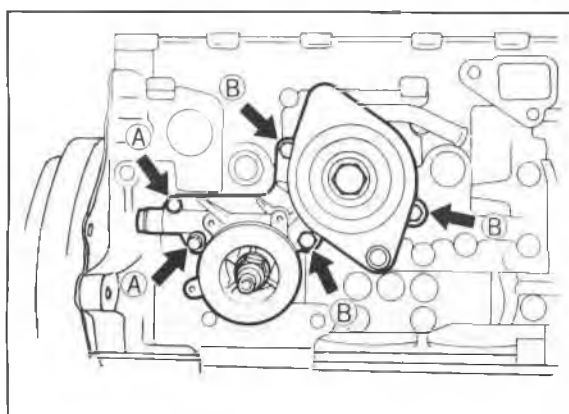
# 1C ASSEMBLY (AUXILIARY PARTS)



76G01C-205

## Oil Cooler Assembly

1. Clean the contact surfaces of the cylinder block and oil filter assembly.
2. Install new O-rings, and apply a coat of engine oil.



76G01C-206

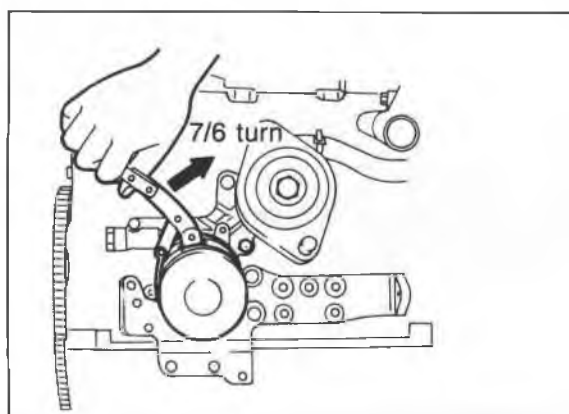
3. Install the oil cooler assembly.

## Tightening torque:

**Bolt A: 8—11 N·m**  
(80—110 cm·kg, 69—95 in·lb)

**Bolt B: 37—52 N·m**  
(3.8—5.3 m·kg, 27—38 ft·lb)

4. Connect the water hose.



76G01C-207

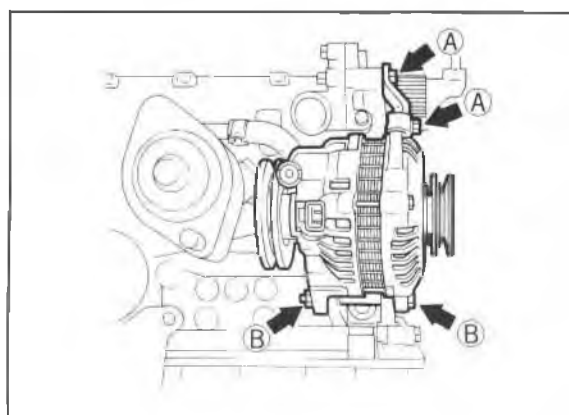
## Oil Filter

1. Install the oil filter cover.

## Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Apply a coat of engine oil to the filter rubber seal.
3. Install the oil filter until the rubber seal contacts the oil cooler by hand. Then tighten it a **7/6 turn further** with a band type wrench.



76G01C-208

## Alternator

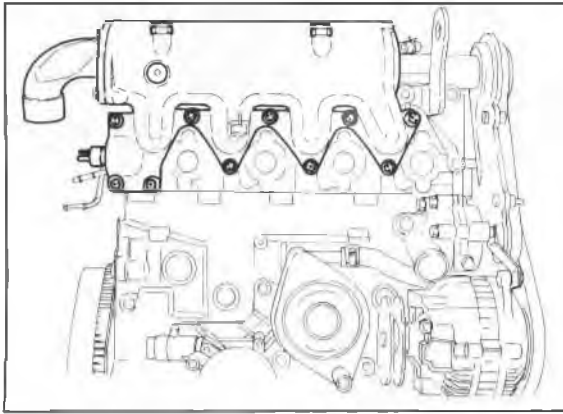
1. Install the alternator.

## Tightening torque:

**Bolt A: 19—26 N·m**  
(1.9—2.6 m·kg, 14—19 ft·lb)

**Bolt B: 37—52 N·m**  
(3.8—5.3 m·kg, 27—38 ft·lb)

2. Install the alternator drive belt, and adjust the belt deflection. (Refer to page 1C—7)



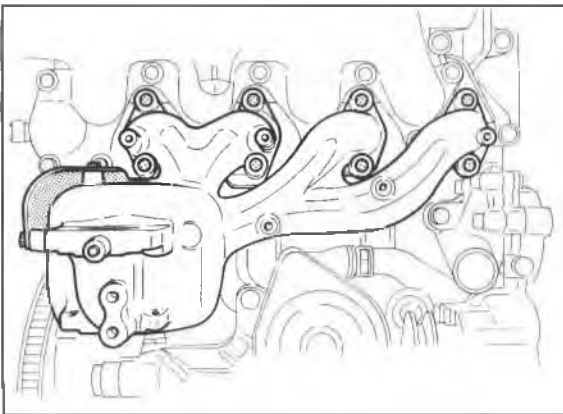
76G01C-209

### Intake Manifold

Install the intake manifold and gasket.

#### Tightening torque:

**16—23 Nm (1.6—2.3 m-kg, 12—17 ft-lb)**



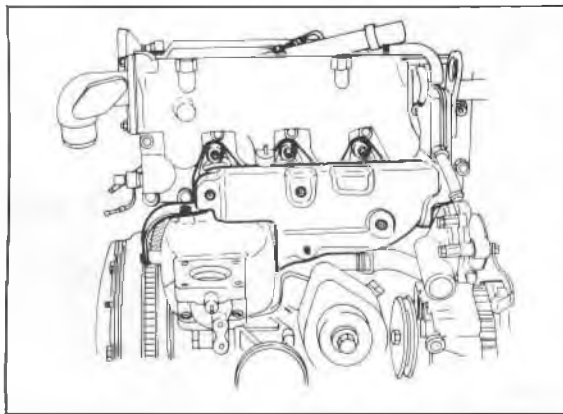
76G01C-210

### Exhaust Manifold

1. Place the exhaust manifold gasket in position.
2. Install the exhaust manifold.

#### Tightening torque:

**22—26 Nm (2.2—2.7 m-kg, 16—20 ft-lb)**



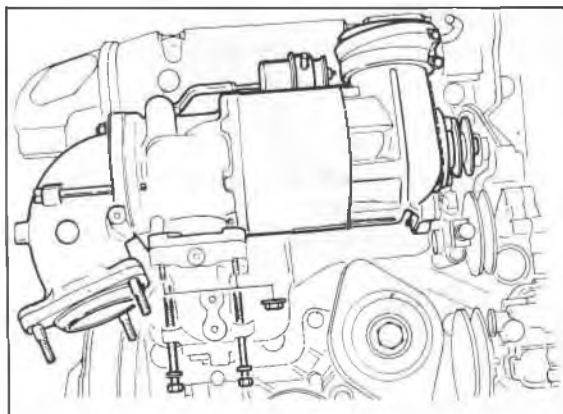
76G01C-211

### Exhaust Manifold Insulator

Install the exhaust manifold insulator.

#### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



76G01C-212

### Compex Supercharger

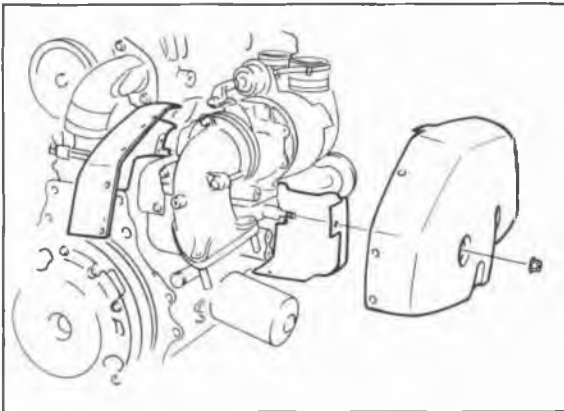
1. Install the Compex supercharger with new gasket.

#### Tightening torque:

**22—26 Nm (2.2—2.7 m-kg, 16—20 ft-lb)**

2. Install the Compex supercharger drive belt, and adjust the belt deflection. (Refer to page 1C—7)

# 1C ASSEMBLY (AUXILIARY PARTS)



76G01C-213

## Complex Supercharger Insulator

Install the complex supercharger insulator.

### Tightening torque:

8—11 N·m (80—110 cm·kg, 69—95 in·lb)

## Air Funnel Assembly

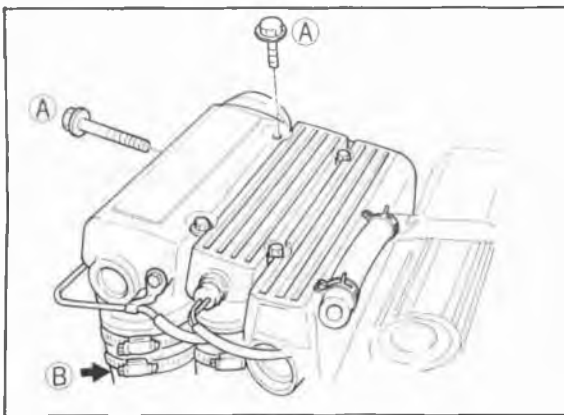
1. Install the air funnel assembly.

### Tightening torque:

**Bolt A:** 19—26 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)

**Bolt B:** 3—4 N·m  
(35—45 cm·kg, 30—39 ft·lb)

2. Connect the actuator vacuum tube.



76G01C-214

## Vacuum Pump

1. Install the vacuum pump with bracket.

### Tightening torque:

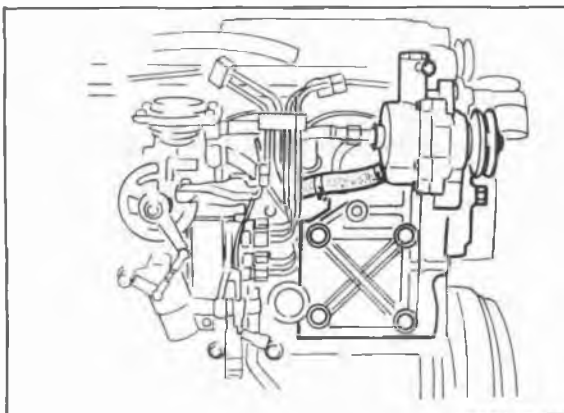
37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

2. Connect the oil pipe and hose.

### Tightening torque:

12—18 N·m (1.2—1.8 m·kg, 104—156 ft·lb)

3. Install the drive belt, and adjust the belt deflection.  
(Refer to page 1C—7)



76G01C-215

## PCV Hose

Install the PCV hose.

## CSD Water Hose

1. Remove the engine from the engine hanger.  
2. Tighten the oil pipe mounting bolts.

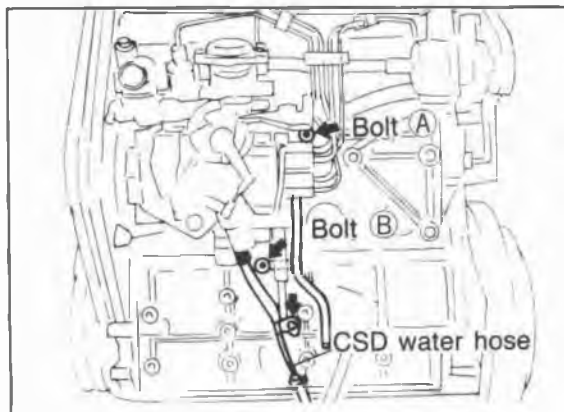
**Bolt A:** 8—11 N·m  
(80—110 cm·kg, 69—95 in·lb)

**Bolt B:** 12—18 N·m  
(1.2—1.8 m·kg, 104—156 ft·lb)

3. Install the CSD water hose.

### Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

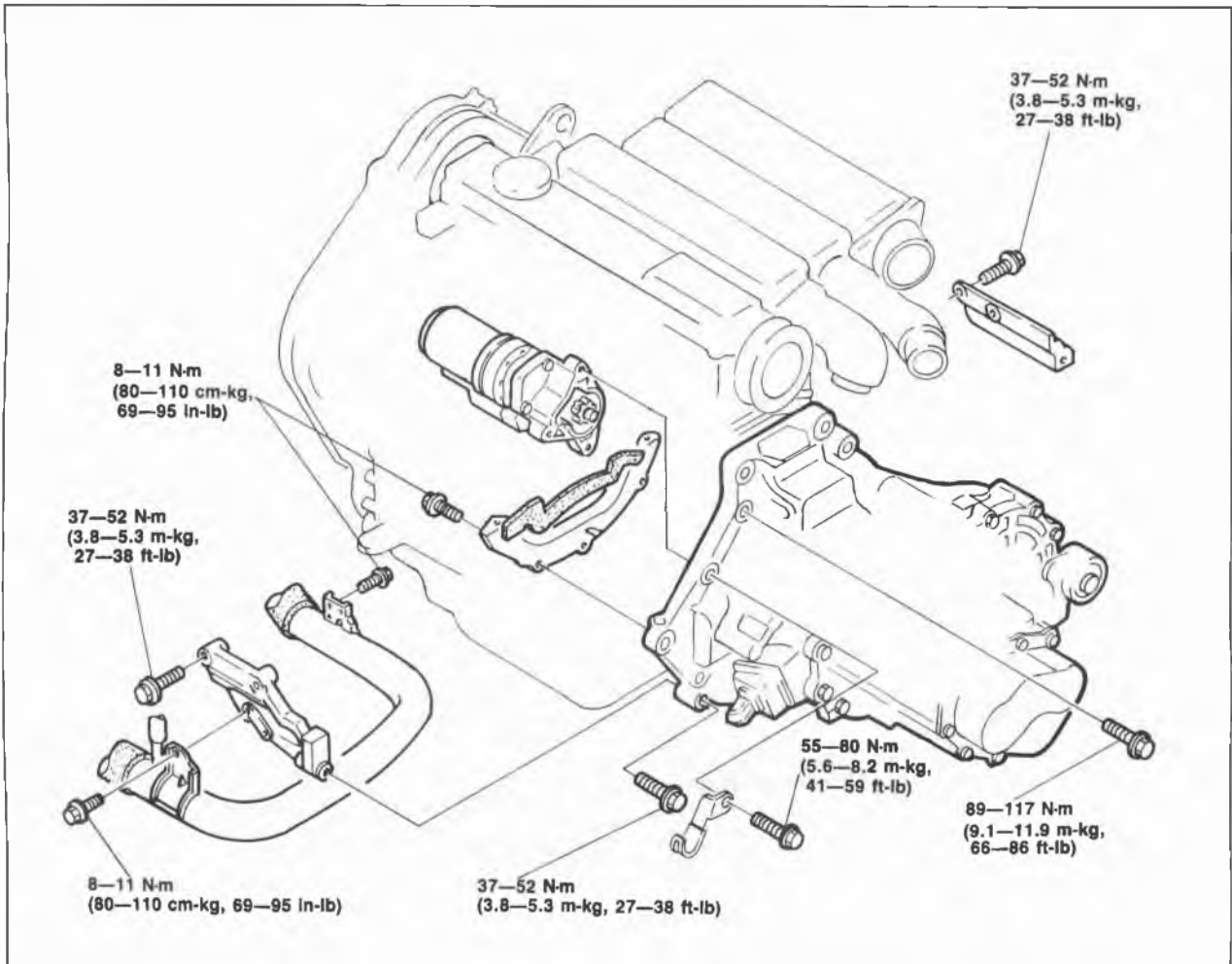


76G01C-216

## INSTALLATION

### TRANSAXLE ASSEMBLY

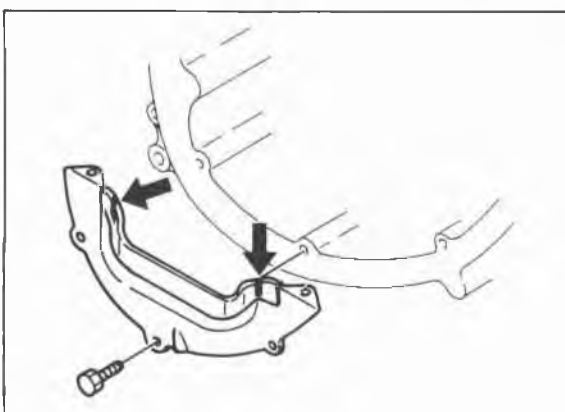
Assemble the transaxle to the engine in the sequence shown in the figure referring to the installation note.



76G01C-217

1. Transaxle
2. Clutch under cover
3. Gusset plate

4. Water pipe
5. Starter



86U01X-217

#### Installation Note Clutch under cover

Before installation, fill the notches with silicon as shown in the figure.



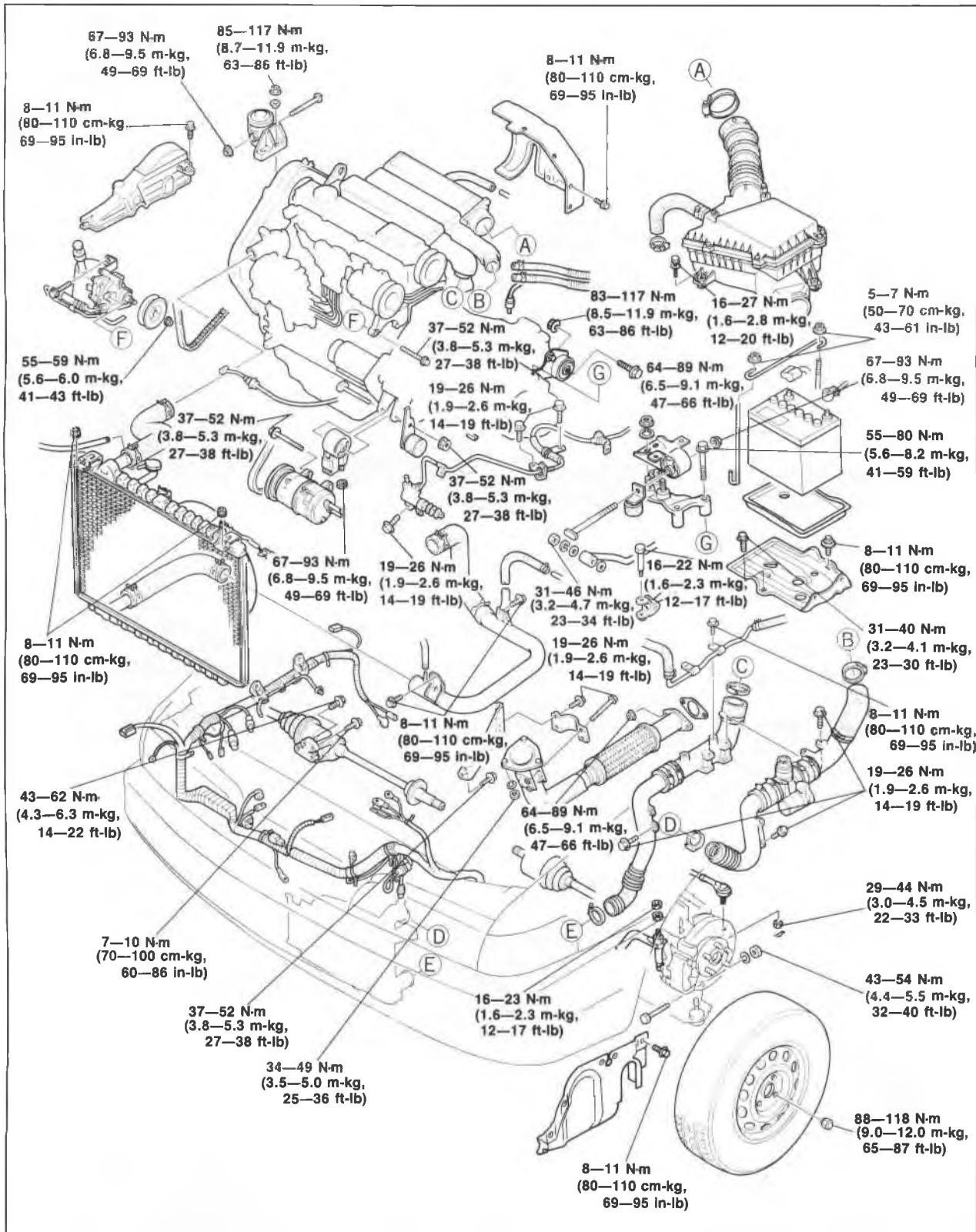
# 1C INSTALLATION

## ENGINE INSTALLATION

Install the engine and transaxle assembly.

**Warning: Be sure the vehicle is securely supported.**

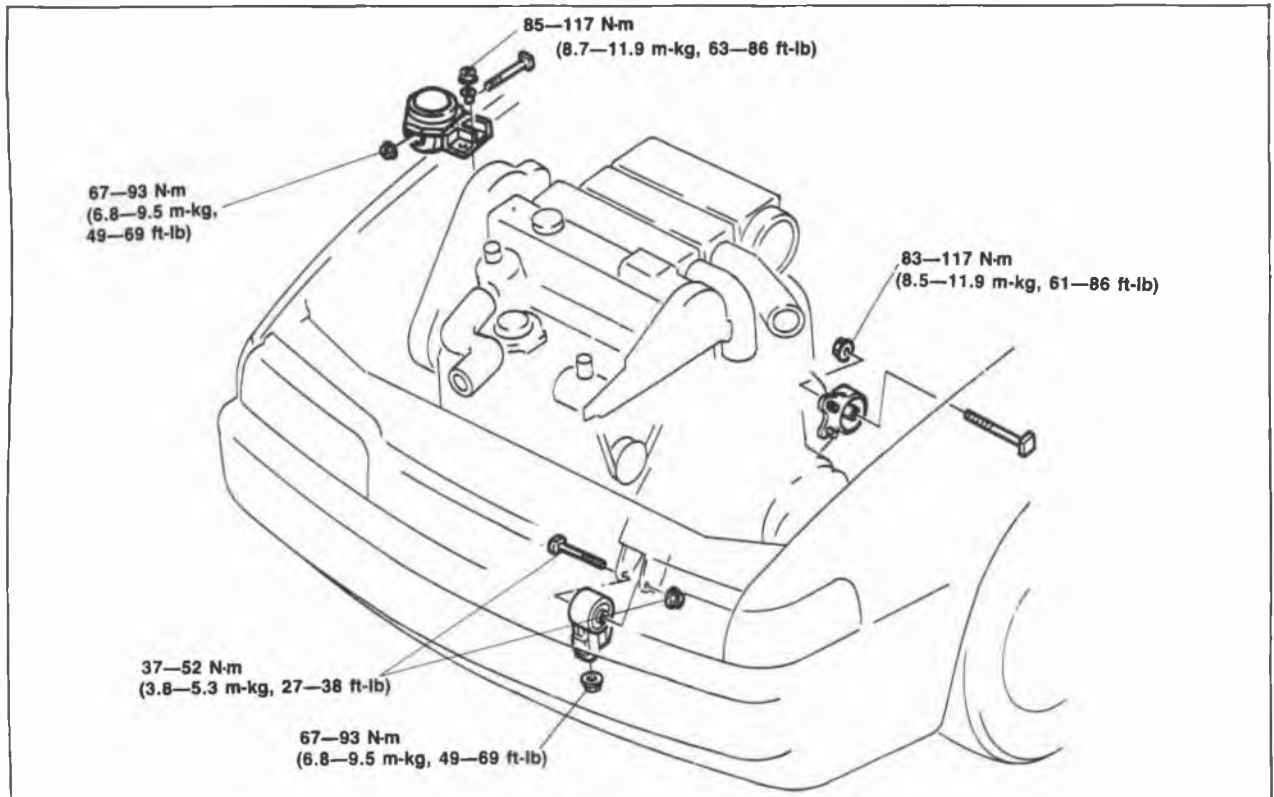
### Torque Specifications



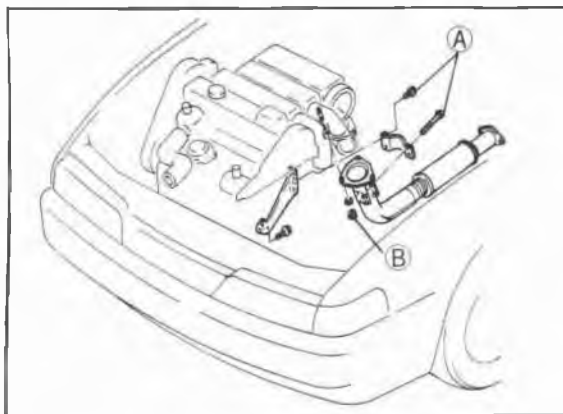
86U01X-180

## Engine Mount

Install the engine mount.



86U01X-1B1



76G01C-218

## Exhaust Pipe

1. Tighten exhaust pipe stay.

### Tightening torque:

**37—52 N-m (3.8—5.3 m-k, 27—38 ft-lb)**

2. Install the exhaust pipe.

### Tightening torque:

**A : 19—26 N-m**

**(1.9—2.6 m-k, 14—19 ft-lb)**

**B : 34—49 N-m**

**(3.5—5.0 m-k, 25—36 ft-lb)**



76G01C-219

## Extension Bar

Install the extension bar to the transaxle.

### Tightening torque:

**31—46 N-m (3.2—4.7 m-k, 23—34 ft-lb)**

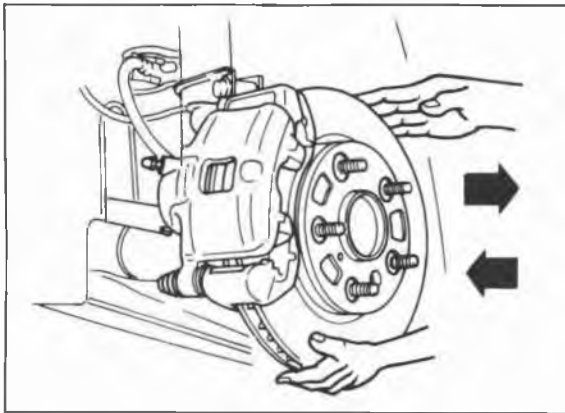
## Change Rod

Install the change rod to the transaxle.

### Tightening torque:

**16—22 N-m (1.6—2.3 m-k, 12—17 ft-lb)**

# 1C INSTALLATION



76G01C-220

## Driveshaft

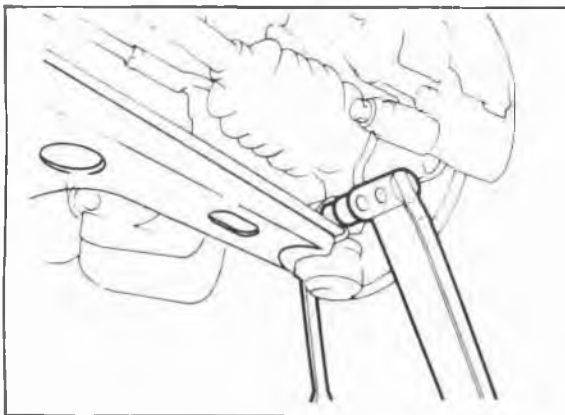
1. Apply grease to the end of the driveshaft.
2. Install the driveshaft and a new clip.

### Caution

- a) When installing the driveshaft, be careful not to damage the oil seal.
- b) After installation, pull the front hub outward to confirm that the driveshaft is securely held by the clip.

## Water Hose

Connect the water hose.



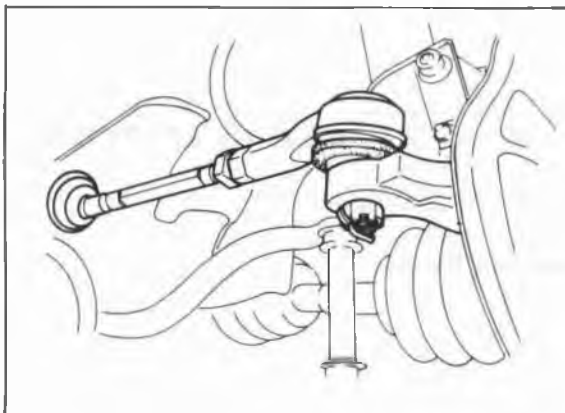
86U01X-185

## Lower Arm

Install the lower arm ball-joint to the knuckle; then tighten the lock nut.

### Tightening torque:

**43—54 N-m (4.4—5.5 m-kg, 32—40 ft-lb)**



86U01X-186

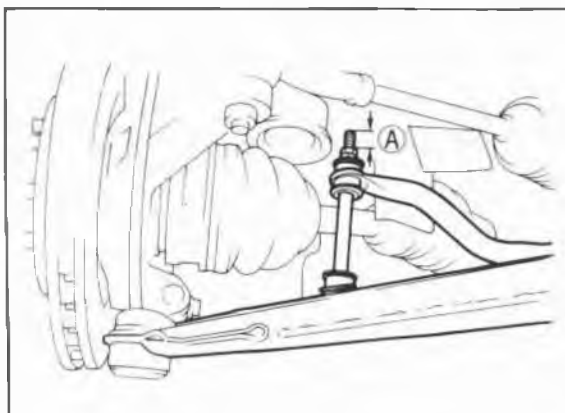
## Tie-Rod End

1. Install the tie-rod end to the knuckle.

### Tightening torque:

**29—44 N-m (3.0—4.5 m-kg, 22—33 ft-lb)**

2. Install the cotter pin.



76G01C-255

## Stabilizer Control Rod

Install and adjust the front stabilizer control rods.

**Dimension A: 20.1 mm (0.79 in)**

### Tightening torque:

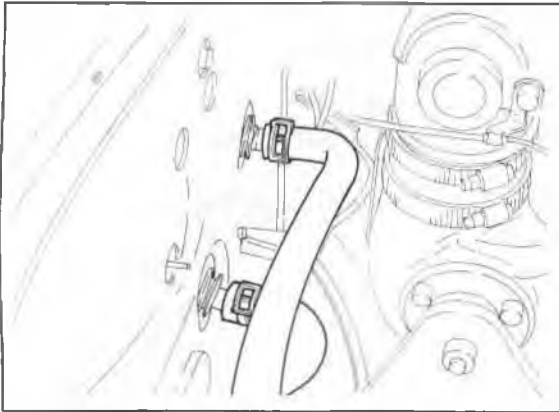
**16—23 N-m (1.6—2.3 m-kg, 12—17 ft-lb)**

## Front Wheel

Install the front wheel.

### Tightening torque:

**88—118 N-m (9.0—12.0 m-kg, 65—87 ft-lb)**



86U01X-221

## Heater Hose

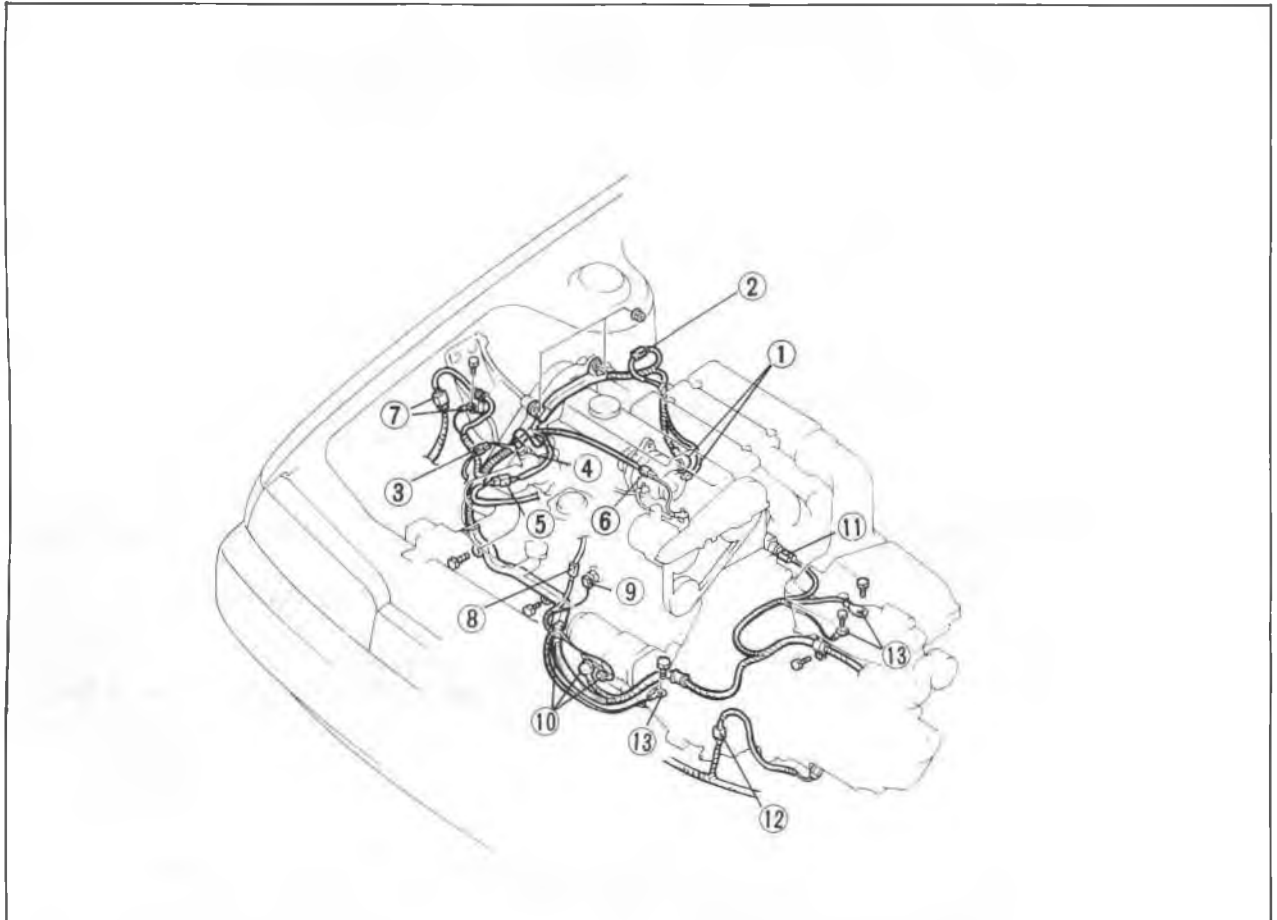
Connect the heater hoses.

### Note

Position the hose clamp in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a good fit.

## Connector Location

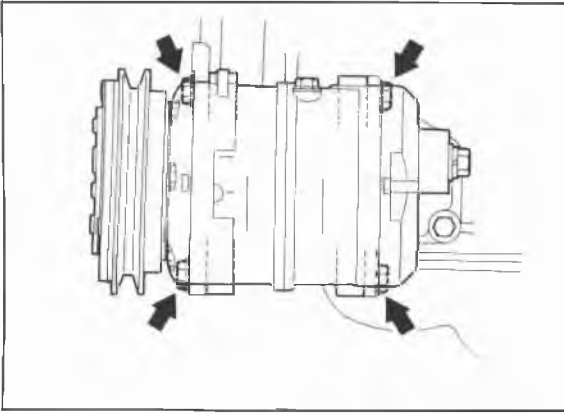
Install each harness as shown in the figure.



76G01C-222

- |   |                              |
|---|------------------------------|
| 1. Alternator                           | 8. Fuel cut valve            |
| 2. Boost air temperature sensor (RF-CX) | 9. Oil pressure switch       |
| 3. Heat gauge unit                      | 10. Starter                  |
| 4. Water thermo switch                  | 11. Water temperature switch |
| 5. Pick up coil                         | 12. Transaxle harness        |
| 6. Glow cord                            | 13. Grounds                  |
| 7. Front harness connector and ground   |                              |

# 1C INSTALLATION



76G01C-223

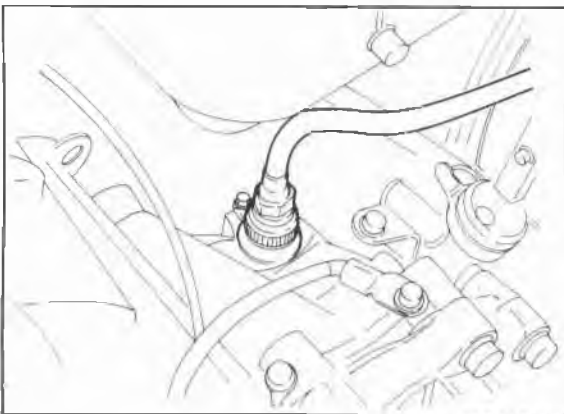
## A/C Compressor

1. Install the A/C compressor.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

2. Install the drive belt and adjust the belt deflection.  
(Refer to page 1C—7)



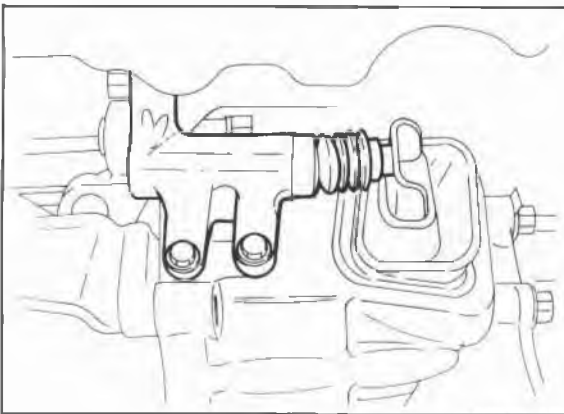
76G01C-224

## Speedometer Cable

Install the speedometer cable.

## Transaxle harness

Install the transaxle harness.



76G01C-225

## Clutch Release Cylinder

1. Set the pipe bracket in position.

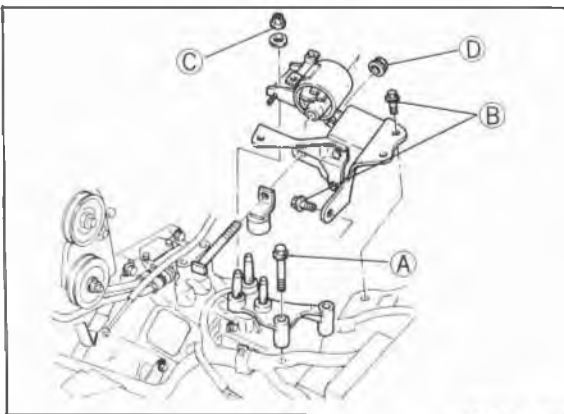
### Tightening torque:

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Install the clutch release cylinder.

### Tightening torque

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



76G01C-226

## No.4 Engine Mount

Install the No.4 engine mount.

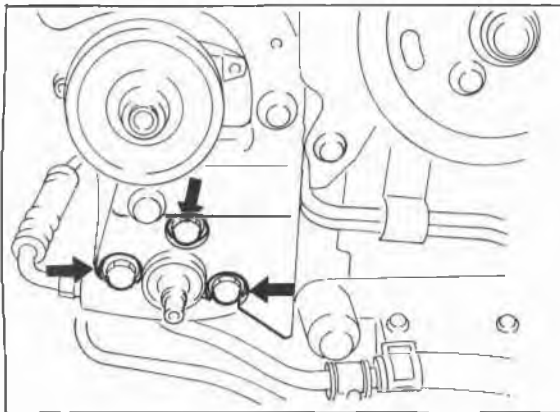
### Tightening torque:

**(A) : 55—80 N·m  
(5.6—8.2 m·kg, 41—59 ft·lb)**

**(B) : 36—54 N·m  
(3.7—5.5 m·kg, 27—40 ft·lb)**

**(C) : 64—89 N·m  
(6.5—9.1 m·kg, 47—66 ft·lb)**

**(D) : 67—93 N·m  
(6.8—9.5 m·kg, 49—69 ft·lb)**



76G01C-227

## P/S Oil Pump

1. Install the P/S oil pump.

### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

2. Install the P/S oil pump pulley. (Refer to section 10)

### Tightening torque:

**55—59 N·m (5.6—6.0 m·kg, 41—43 ft·lb)**

3. Set the pipe bracket in position.

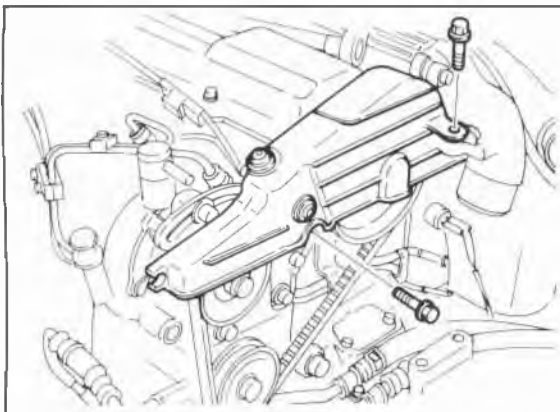
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

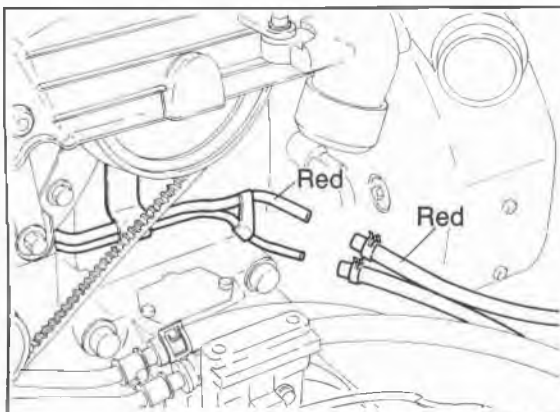
4. Install the drive belt and adjust the belt deflection. (Refer to page 1C—7)
5. Install the drive belt cover.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



76G01C-228



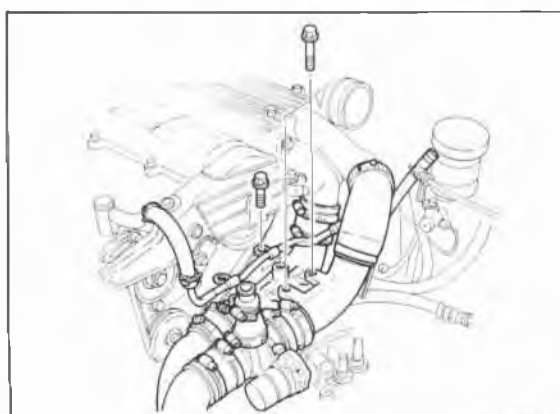
76G01C-229

## Fuel Hose

Install the fuel hose.

### Note

**Be careful of the red marks on the hose.**



76G01C-230

## Intercooler Pipe and Hose

1. Install the intercooler pipe and hose.

### Tightening torque:

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

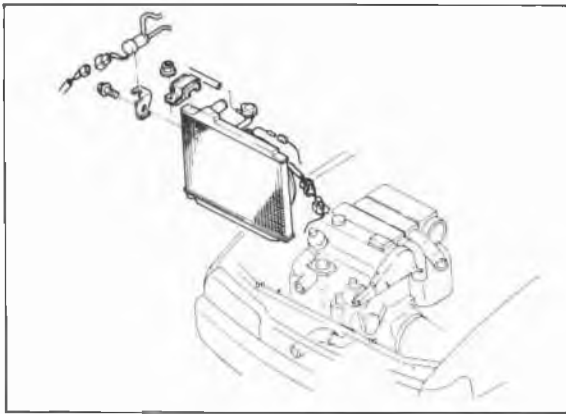
2. Install the brake vacuum pipe.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

3. Connect the brake vacuum hose securely and squeeze the clamp lightly with pliers to ensure a good fit.

# 1C INSTALLATION



76G01C-213

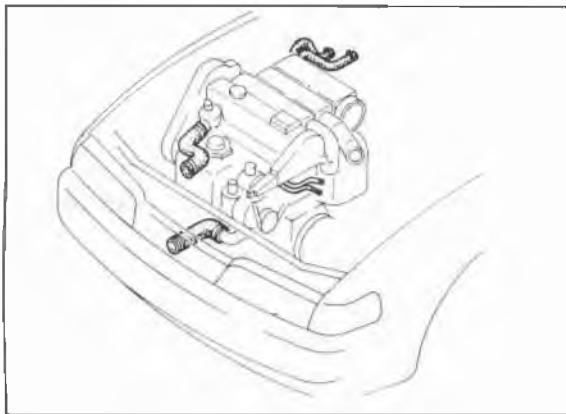
## Radiator

1. Install the radiator and cooling fan.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Connect the radiator harness.



76G01C-232

3. Connect the upper and lower radiator hoses.

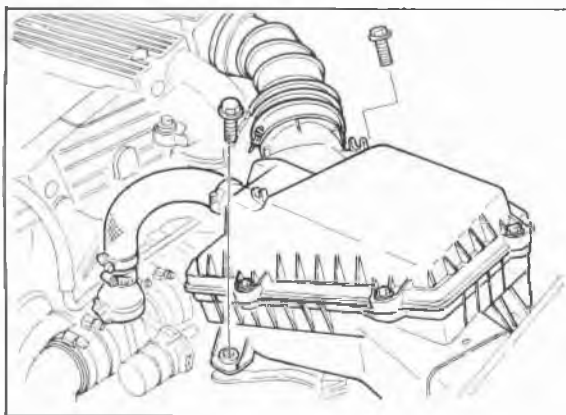
### Note

- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

4. Install the solenoid valve and ground.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



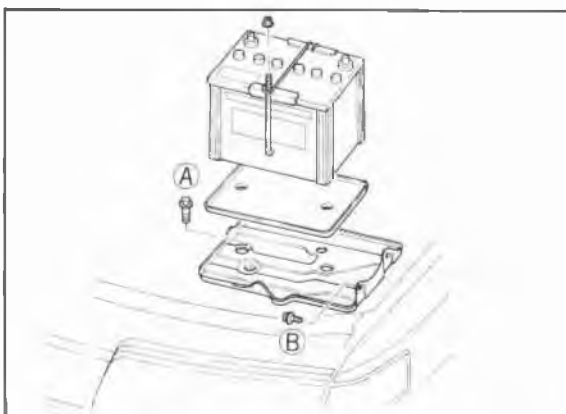
76G01C-233

## Air Cleaner Assembly

Install the air cleaner assembly.

### Tightening torque:

**16—27 N·m (1.6—2.8 m·kg, 12—20 ft·lb)**



76G01C-234

## Battery and Battery Carrier

1. Install the battery carrier.

### Tightening torque:

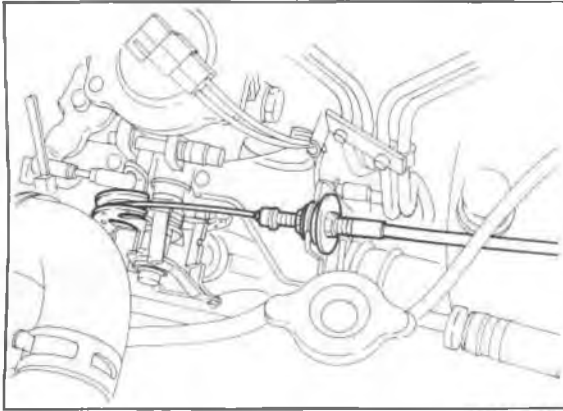
**Bolt A: 31—40 N·m  
(3.2—4.1 m·kg, 23—30 ft·lb)**

**Bolt B: 8—11 N·m  
(80—110 cm·kg, 69—95 in·lb)**

2. Install the battery tray and battery.

### Tightening torque:

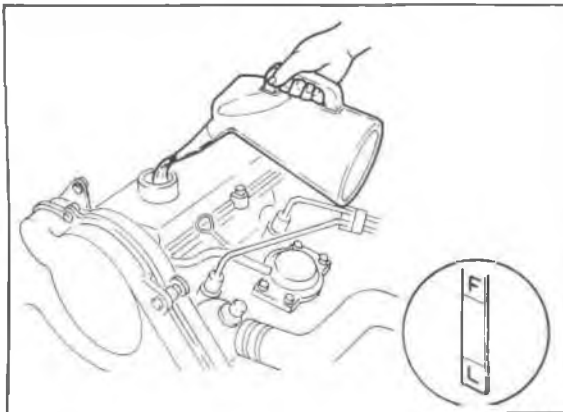
**5—7 N·m (50—70 cm·kg, 43—61 in·lb)**



76G01C-235

### Accelerator Cable

Install the accelerator cable.



76G01C-236

### Engine Oil

Add the specified amount and type of engine oil. (Refer to Section 2B)

### Coolant

Close the drain plug, fill the radiator and reservoir tank with the specified amount and type of coolant. (Refer to Section 3B)

### Check Engine Condition

1. Check for leaks.
2. Perform engine adjustments if necessary.
3. Perform a road test.
4. Recheck the oil and coolant levels.



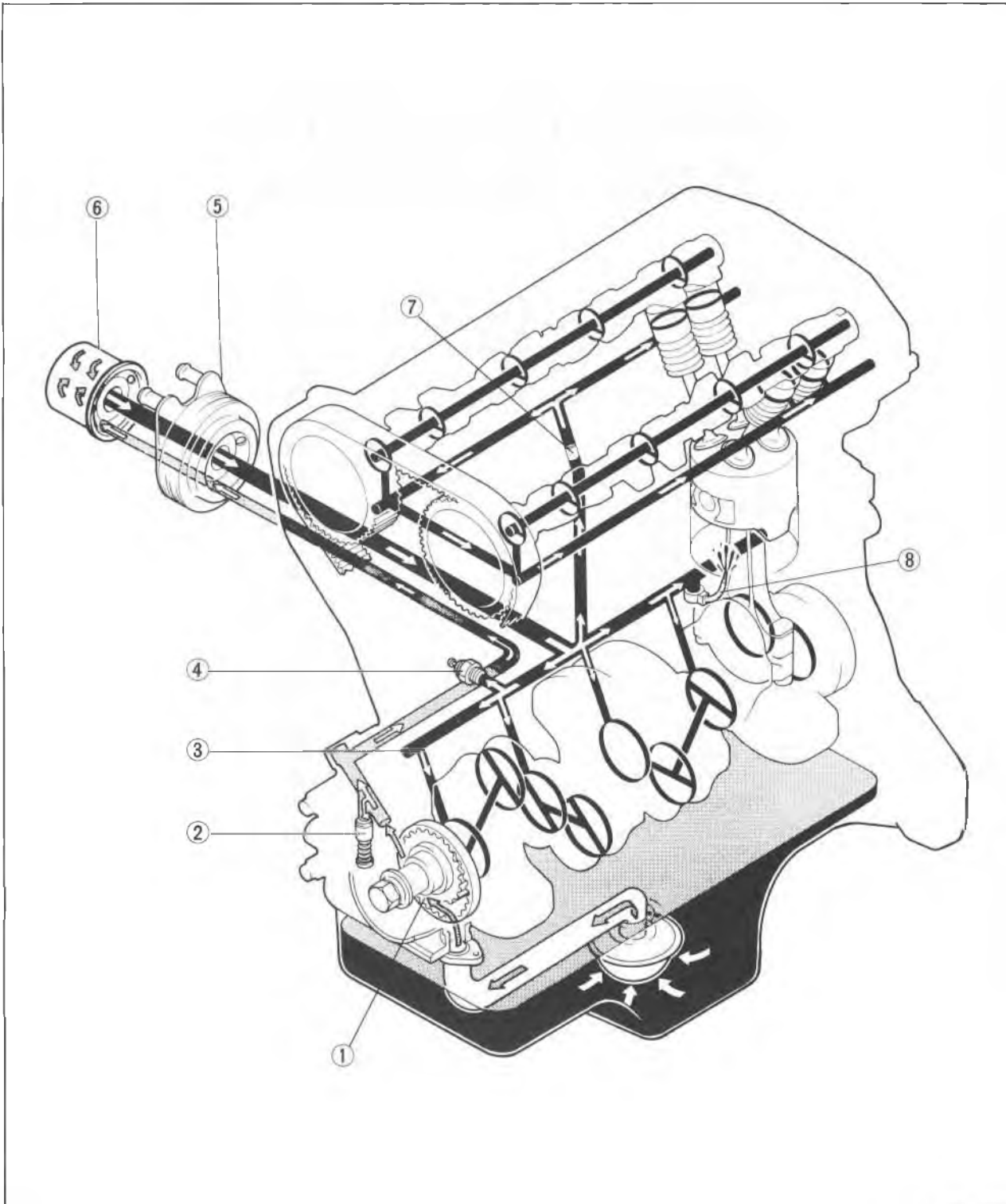
## LUBRICATION SYSTEM (GASOLINE ENGINE)

<b>OUTLINE</b> .....	2A— 2
LUBRICATION CIRCUIT (DOHC) .....	2A— 2
LUBRICATION CIRCUIT (SOHC).....	2A— 3
SPECIFICATIONS.....	2A— 4
<b>TROUBLESHOOTING GUIDE</b> .....	2A— 4
<b>INSPECTION</b> .....	2A— 5
ENGINE OIL .....	2A— 5
OIL PRESSURE .....	2A— 5
<b>ENGINE OIL</b> .....	2A— 5
REPLACEMENT .....	2A— 5
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REPLACEMENT .....	2A— 6
<b>OIL COOLER</b> .....	2A— 6
REMOVAL AND INSTALLATION.....	2A— 6
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REMOVAL .....	2A— 9
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INSPECTION.....	2A—11
ASSEMBLY.....	2A—13
INSTALLATION .....	2A—13

# 2A OUTLINE

## OUTLINE

### LUBRICATION CIRCUIT (DOHC)

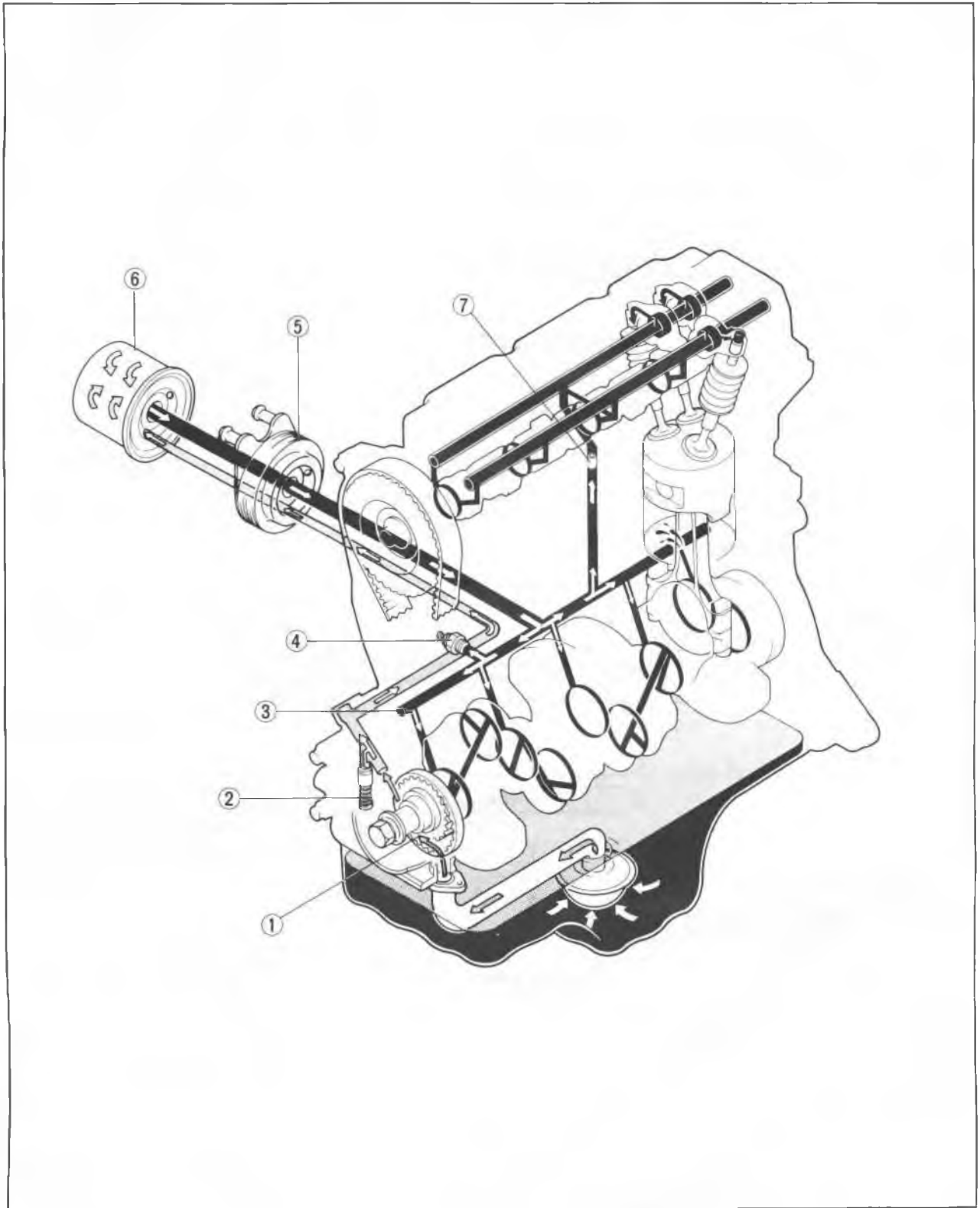


76G02A-002

- 1. Oil pump
- 2. Pressure regulator valve
- 3. Main gallery
- 4. Oil pressure switch

- 5. Oil cooler
- 6. Oil filter
- 7. Oil control plug
- 8. Oil jet

## LUBRICATION CIRCUIT (SOHC)



76G02A-025

1. Oil pump
2. Pressure regulator valve
3. Main gallery
4. Oil pressure switch

5. Oil cooler (8-valve...only ECE, 12-valve)
6. Oil filter
7. Oil control plug

# 2A TROUBLESHOOTING GUIDE

## SPECIFICATIONS

Item		Engine model	FE-DOHC	F6, F8, FE-SOHC
Lubrication system		Forced-fed		
Item		Trochoid gear		Crescent gear
Oil pump	Regulated pressure	kPa (kg/cm <sup>2</sup> , psi)	490 (5.0, 71)	392 (4.0, 57)
	Oil pressure	1,000 rpm	147—245 (1.5—2.5, 21—36)	
		3,000 rpm	343—441 (3.5—4.5, 50—64)	294—392 (3.0—4.0, 43—57)
Oil filter	Type	Full-flow, paper element		
	Relief pressure differential	kPa (kg/cm <sup>2</sup> , psi)	98 (1.0, 14)	
Oil cooler	Type	Water cooled, 6-layer	Water cooled, 4-layer	
Oil warning pressure		kPa (kg/cm <sup>2</sup> , psi)	29 (0.3, 4.3)	
Oil capacity	Total (dry engine)	liters (US qt, Imp qt)	4.3 (4.5, 3.8)	
	Oil pan	liters (US qt, Imp qt)	3.6 (3.8, 3.2)	
	Oil filter	liters (US qt, Imp qt)	0.2 (0.21, 0.18)	0.3 (0.32, 0.26)
Engine oil (API service)			SD, SE, or SF	

76G02A-003

## Recommended SAE Viscosity

Temperature	(°C)	-30	-20	-10	0	10	20	30	40	50
	(°F)	-20	0	20	40	60	80	100	120	
Engine oil	5W-30		30							
	5W-20		20W-20		40					
	10W-30									
	10W-40		10W-50							
	20W-40		20W-50							

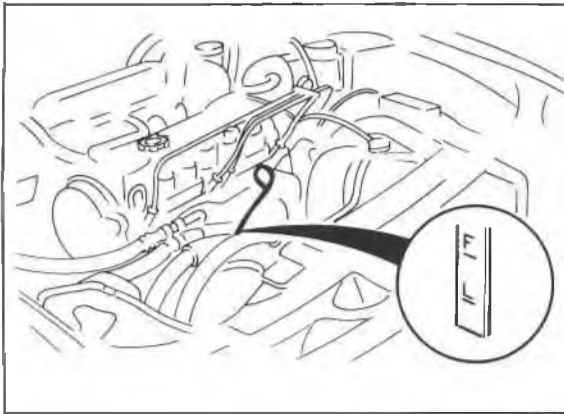
Temperature range anticipated before next oil change, °C(°F)

63G02D-303

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Engine hard starting</b>	Improper engine oil	Replace	2A— 5
	Insufficient engine oil	Add oil	2A— 5
<b>Excessive oil consumption</b>	Oil working up or working down Oil leakage	Refer to Section 1 Repair	—
<b>Oil pressure drop</b>	Insufficient oil	Add oil	2A— 5
	Oil leakage	Repair	—
	Worn or damaged oil pump gear	Replace	2A—11
	Worn plunger (inside oil pump) or weak spring	Replace	2A—11
	Clogged oil strainer	Clean	—
	Excessive main bearing or connecting rod bearing clearance	Refer to Section 1	—
<b>Warning lamp illuminated while engine running</b>	Oil pressure drop	As described above	—
	Malfunction of oil pressure switch	Refer to Section 15	—
	Malfunction of electrical system	Refer to Section 15	—

76G02A-004



86U02X-004

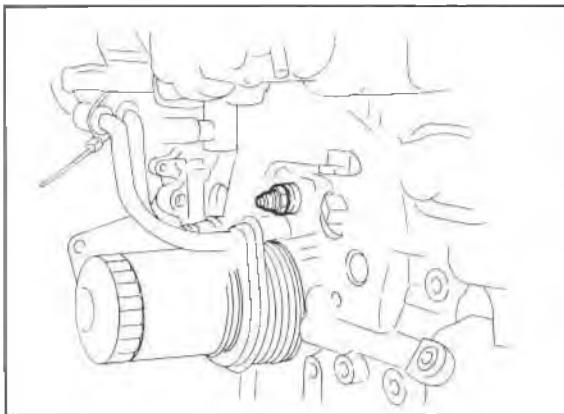
## INSPECTION

### ENGINE OIL

1. Be sure the vehicle is on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the oil level gauge and check the oil level and condition.
5. Add or replace oil if necessary.

### Note

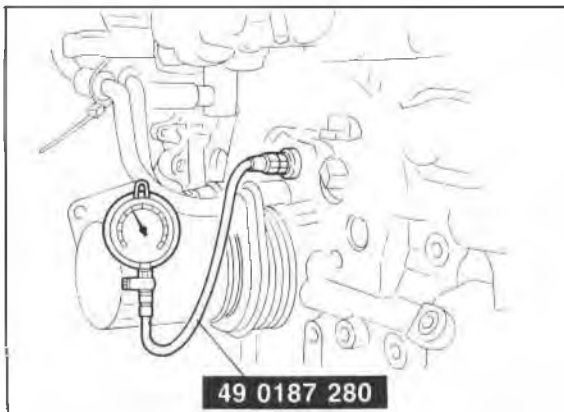
The distance between the L and F marks on the level gauge represents 1.0 liter (1.06 US qt, 0.88 Imp qt).



69G02A-006

### OIL PRESSURE

1. Remove the oil pressure switch.



49 0187 280

76G02A-005

2. Screw the **SST** into the pressure switch installation hole.
3. Warm up the engine to normal operating temperature.
4. Run the engine at **3,000 rpm**, and note the gauge reading.

### Oil pressure:

**343—441 kPa**

**(3.5—4.5 kg/cm<sup>2</sup>, 50—64 psi)...DOHC**

**294—392 kPa**

**(3.0—4.0 kg/cm<sup>2</sup>, 43—57 psi)...SOHC**

5. If the pressure is not as specified, check for the cause, and repair if necessary. (Refer to Troubleshooting Guide.)

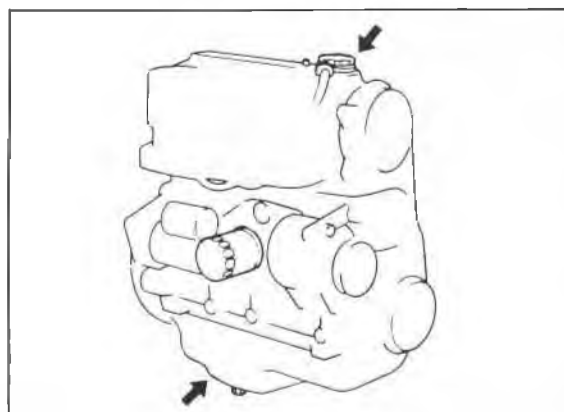
## ENGINE OIL

### REPLACEMENT

1. Warm up the engine to the normal operating temperature and stop it.
2. Remove the oil filler cap and the oil pan drain plug.
3. Drain the oil into a suitable container.

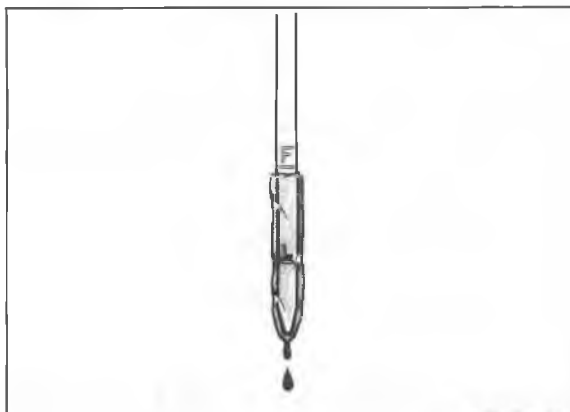
### Warning

**Be careful when draining, the oil is very hot.**



86U02X-006

## 2A OIL FILTER, OIL COOLER

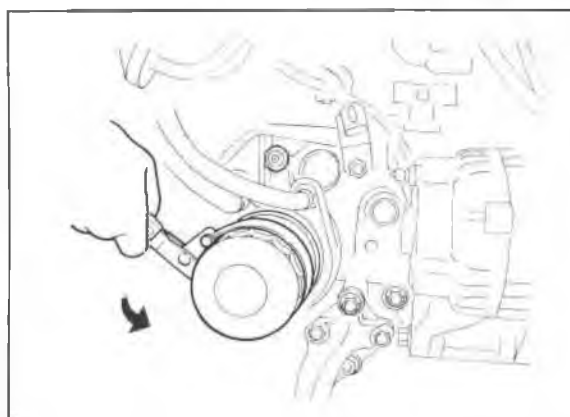


76G02A-006

4. Install the drain plug and a new gasket.
5. Refill the engine with the specified type and amount of oil.
6. Refit the oil filler cap.

**Oil pan capacity:**  
**3.6 liters (3.8 US qt, 3.2 Imp qt)**

7. Recheck the oil level after the engine has been run.



86U02X-008

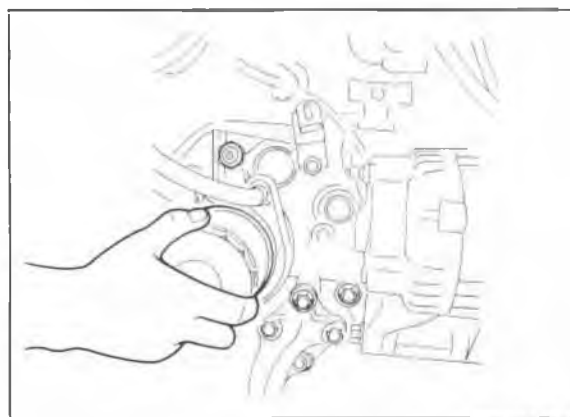
### OIL FILTER

#### REPLACEMENT

1. Remove the oil filter with a suitable wrench.
2. Use a clean rag to wipe off the mounting surface on the engine.
3. Apply a small amount of engine oil to the rubber seal of the new filter.

#### Warning

**Be careful that the engine and filter are very hot.**



76G02A-007

4. (DOHC)  
Install the oil filter until the rubber seal contacts the base and then tighten the filter 1 and 1/6 turn with a wrench.  
(SOHC)  
Install the oil filter and tighten it by hand only. Do not use a wrench.
5. Start the engine and inspect around the filter seal for leaks.
6. Check the oil level and add oil if necessary.

#### Oil filter capacity:

**0.20 liters (0.21 US qt, 0.18 Imp qt)...DOHC**  
**0.30 liters (0.32 US qt, 0.26 Imp qt)...SOHC**

### OIL COOLER (DOHC, 12-valve, ECE 8-valve)

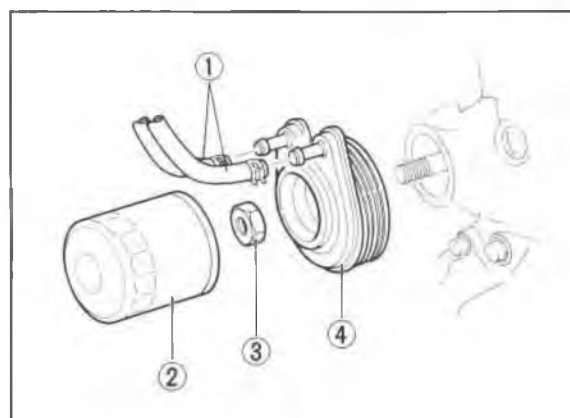
#### REMOVAL AND INSTALLATION

Remove in the sequence shown in the figure. Install in the reverse order of removal.

1. Water hose
2. Oil filter
3. Nut
4. Oil cooler

#### Nut tightening torque:

**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**



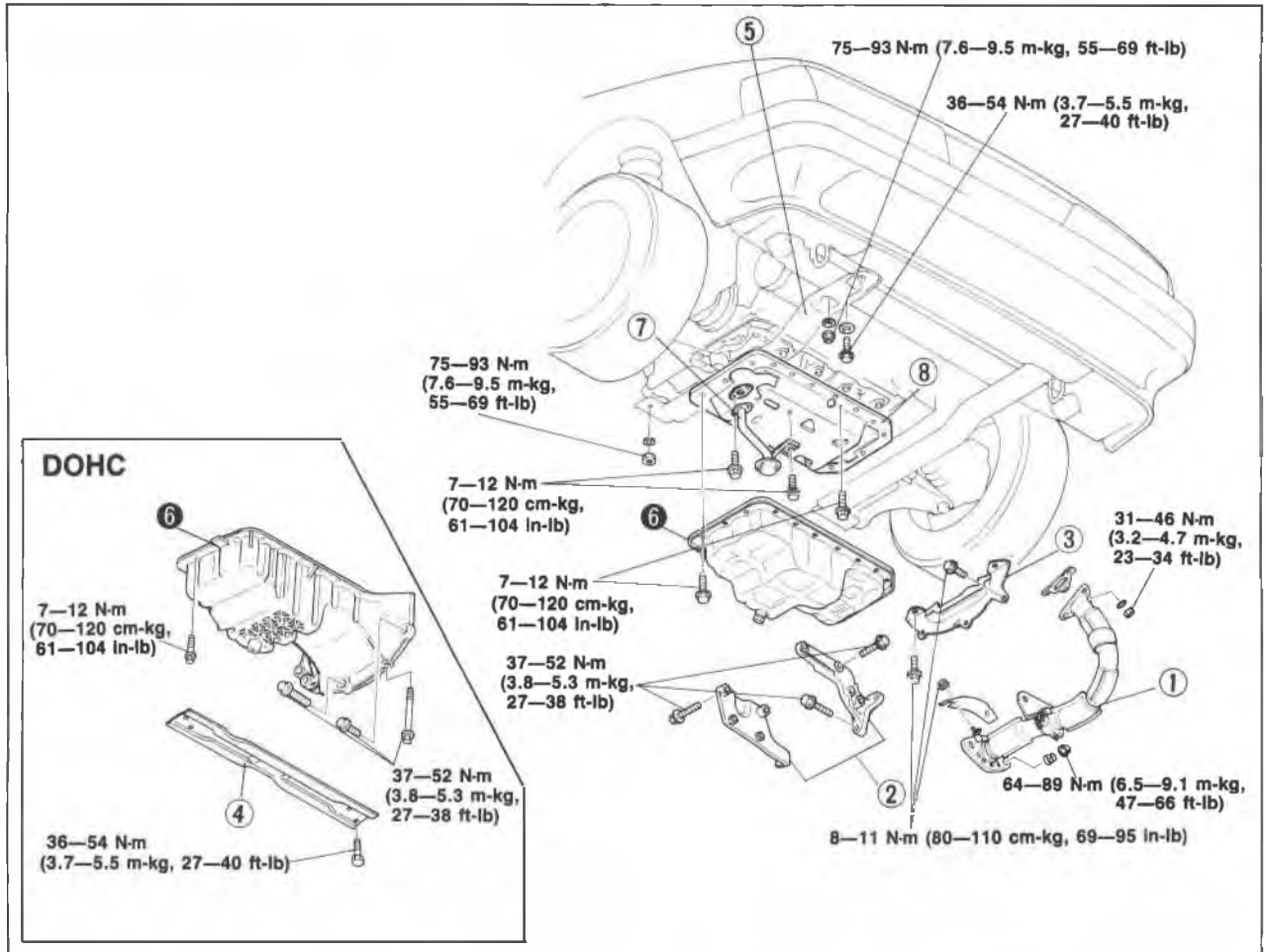
76G02A-008

## OIL PAN

### REMOVAL

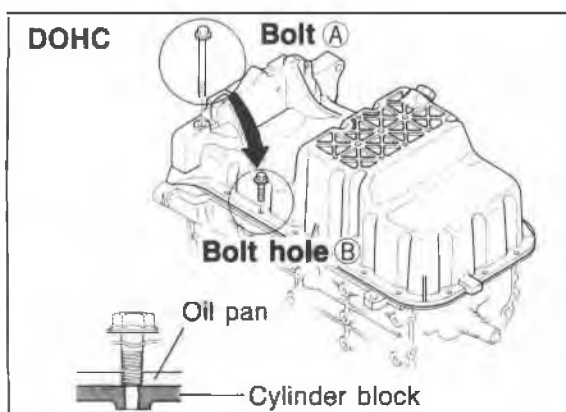
1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G02A-009



76G02A-010

- |                                      |  |
|--------------------------------------|--|
| 1. Exhaust pipe                      | 5. Sub frame (RH)                              |
| 2. Gusset plate (SOHC)               | 6. Oil pan                                     |
| 3. Clutch housing under cover (SOHC) | 7. Oil strainer                                |
| 4. Performance plate (4WS)           | 8. Stiffener (FE 8-valve...only ECE, 12-valve) |



76G02A-011

### Removal Note

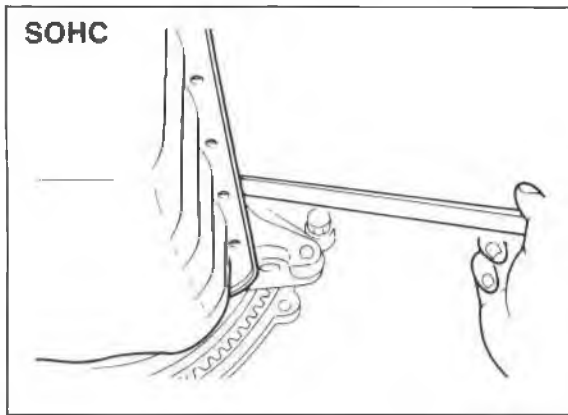
#### Oil pan (DOHC)

1. Remove the oil pan mounting bolts.
2. Install the bolt A from the mounting bolt or 10 mm (0.39 in) bolts in the specified bolt holes B (both sides).
3. Screw in the bolts gradually and alternately to remove the oil pan.

#### Caution

**Do not pry the oil pan to prevent damaging the contact surface.**

## 2A OIL PAN



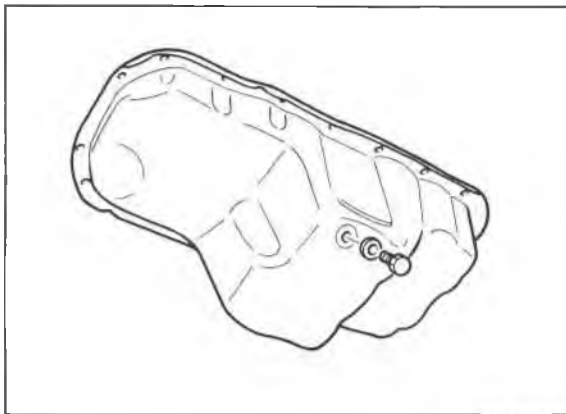
76G02A-012

(SOHC)

1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the stiffener or the cylinder block to separate them.
3. Remove the oil pan.

### Caution

**Do not bend the oil pan when prying loose.**

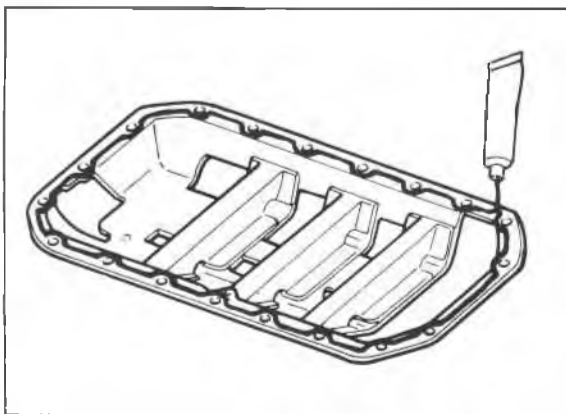


4BG02X-037

### INSPECTION

Check the following points. Repair or replace if necessary.

1. Cracks, deformation, damage
2. Damaged drain plug threads



### INSTALLATION

Install in the reverse order of removal referring to the installation note.

#### Installation Note

##### Stiffener (FE 8-valve...only ECE, 12-valve)

1. Remove any dirt or other material from the contact surface.
2. Apply silicon sealant to the stiffener around inside of the bolt holes and overlap the ends.
3. Install the stiffener.

#### Tightening torque:

**7—12 Nm (70—120 cm-kg, 61—104 in-lb)**

#### Oil pan

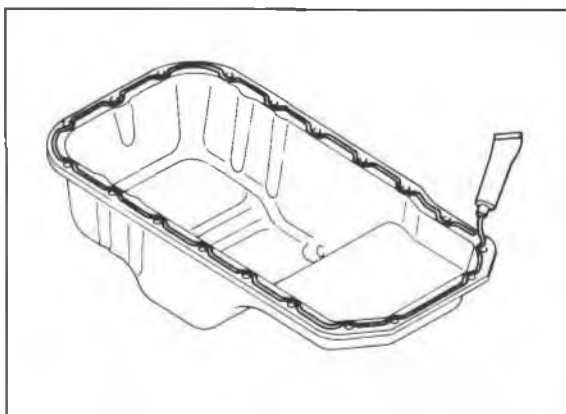
1. Apply silicon sealant to the oil pan around inside of the bolt holes and overlap the ends.
2. Install the oil pan.

#### Tightening torque:

**7—12 Nm (70—120 cm-kg, 61—104 in-lb)**

#### Caution (DOHC)

**Oil pan projection and recession from the end of the cylinder block must not be more than 1.5 mm (0.06 in).**



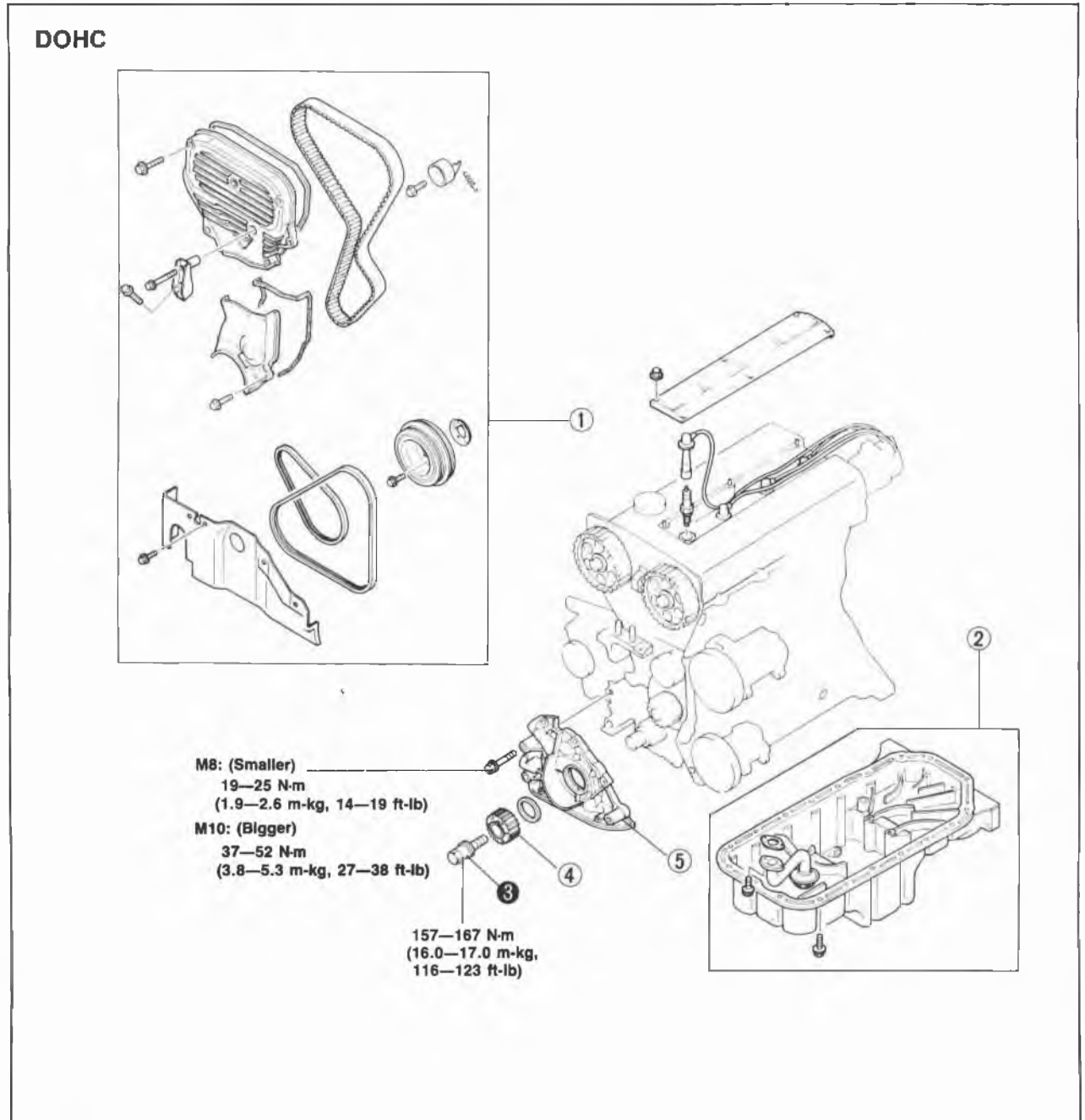


## OIL PUMP

### REMOVAL

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G02A-015

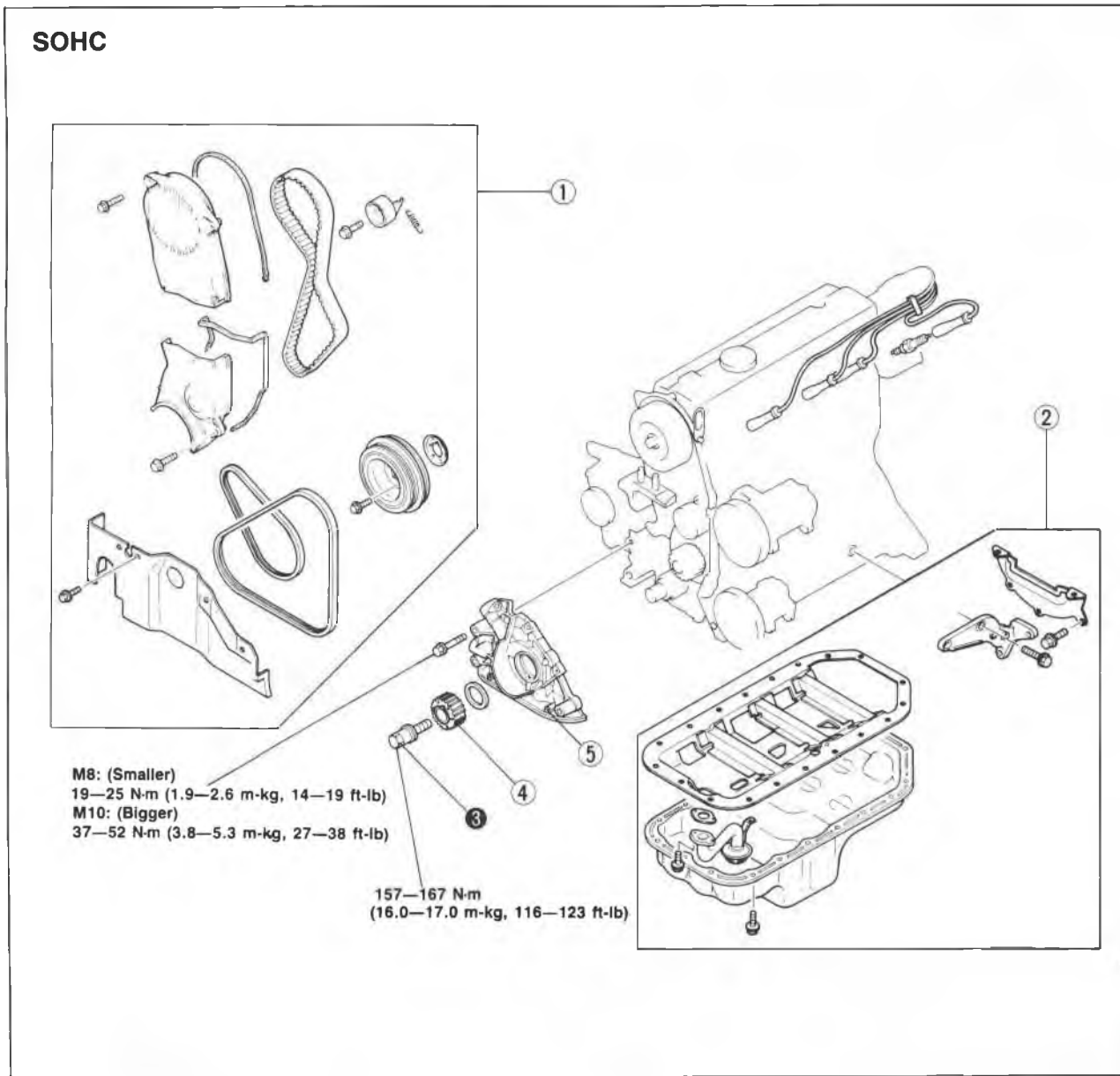


76G02A-016

1. Timing belt (Refer to Section 1B)
2. Oil pan (Refer to page 2A—7.)
3. Timing belt pulley lock bolt

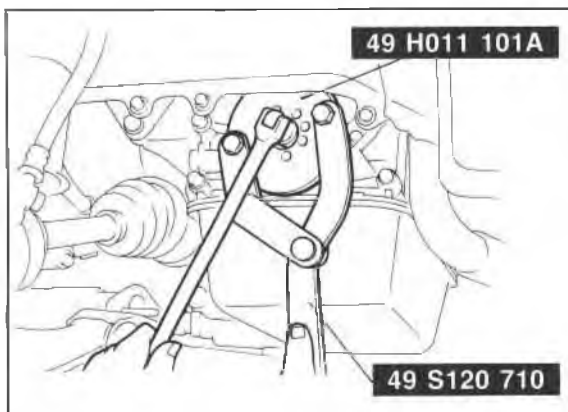
4. Timing belt pulley
5. Oil pump

# 2A OIL PUMP



1. Timing belt (Refer to Section 1A)
2. Oil pan (Refer to page 2A—7.)
3. Timing belt pulley lock bolt

4. Timing belt pulley
5. Oil pump



76G02A-026

### Removal Note

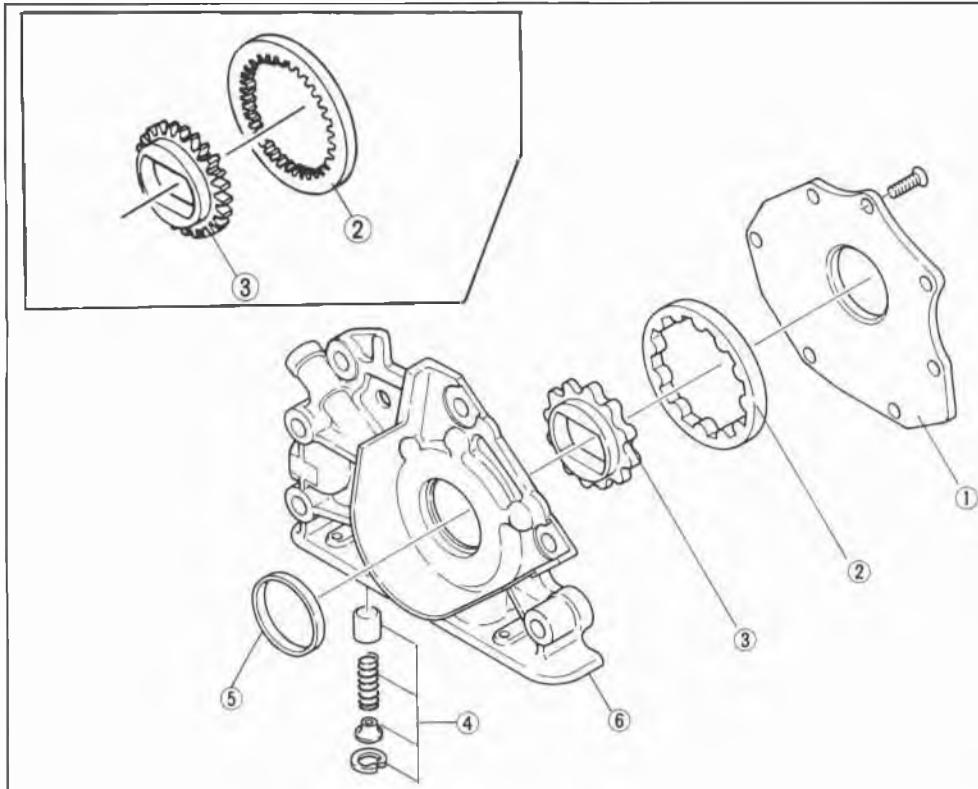
#### Timing belt pulley lock bolt

Hold the timing belt pulley with the **SST** and remove the lock bolt.

## DISASSEMBLY

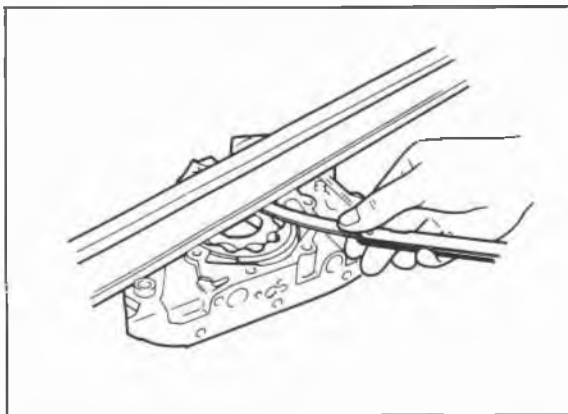
Disassemble in the sequence shown in the figure.

69G02B-012



1. Pump cover
2. Outer gear
3. Inner gear
4. Pressure relief valve
5. Oil seal
6. Oil pump body

76G02A-018

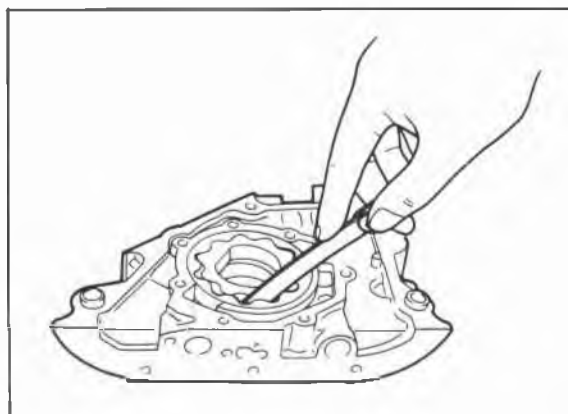


76G02A-019

## INSPECTION (DOHC)

1. Check the following and replace any faulty parts.
  - (1) Distorted or damaged oil pump body or cover
  - (2) Worn or damaged plunger
  - (3) Weak or broken plunger spring
2. Measure the side clearance.

**Clearance: 0.10 mm (0.004 in) max.**

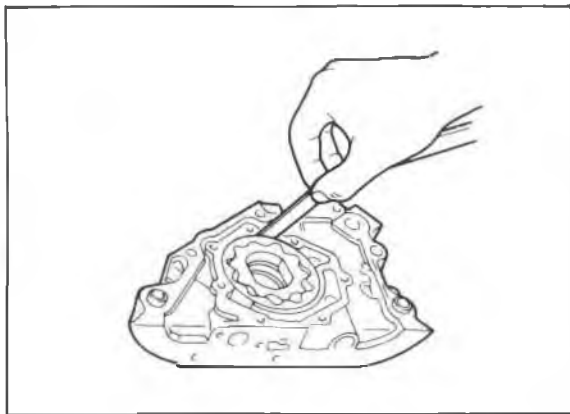


69G02B-015

3. Measure the tooth tip clearance.

**Clearance: 0.18 mm (0.007 in) max.**

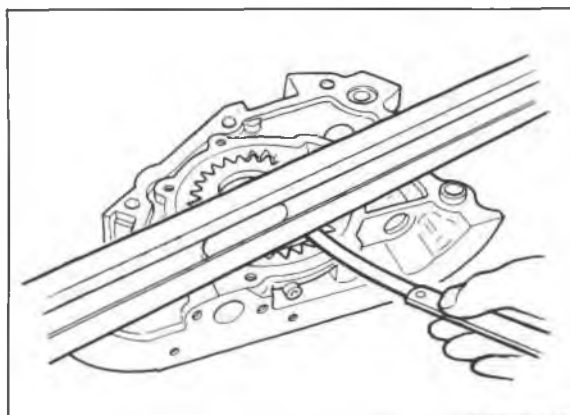
## 2A OIL PUMP



86U02X-021

4. Measure the outer gear to pump body clearance.

**Clearance: 0.20 mm (0.008 in) max.**

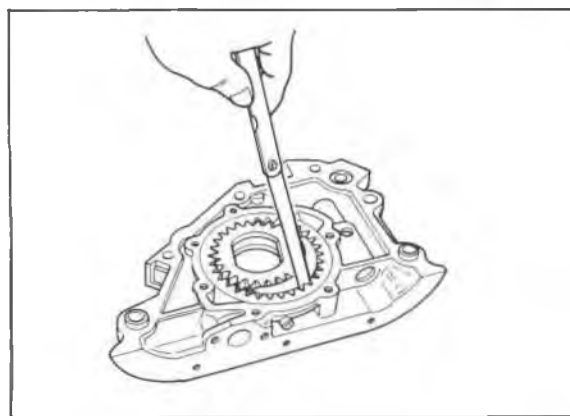


76G02A-020

(SOHC)

1. Check the following and replace any faulty parts.
  - (1) Distorted or damaged oil pump body or cover
  - (2) Worn or damaged plunger
  - (3) Weak or broken plunger spring
2. Measure the side clearance.

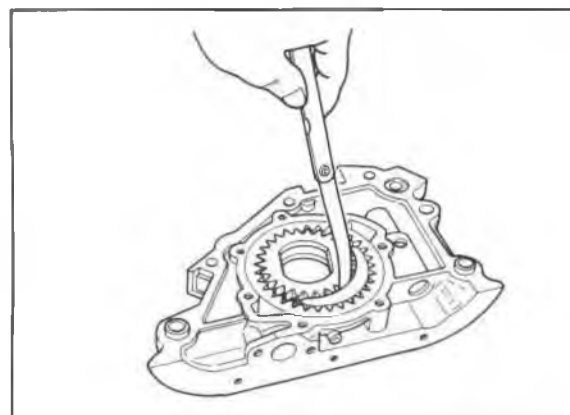
**Clearance: 0.10 mm (0.004 in) max.**



76G02A-021

3. Measure the outer gear tooth tip and crescent clearance.

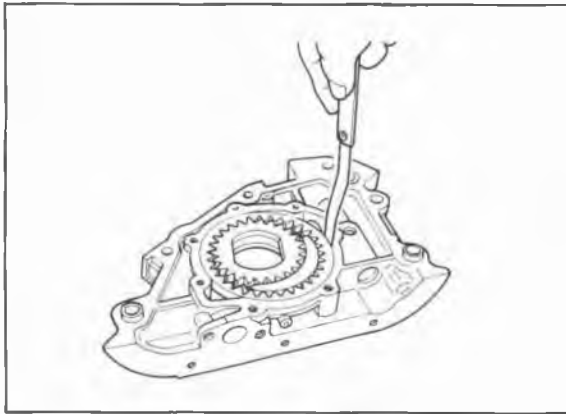
**Clearance: 0.35 mm (0.014 in) max.**



76G02A-022

4. Measure the inner gear tooth tip and crescent clearance.

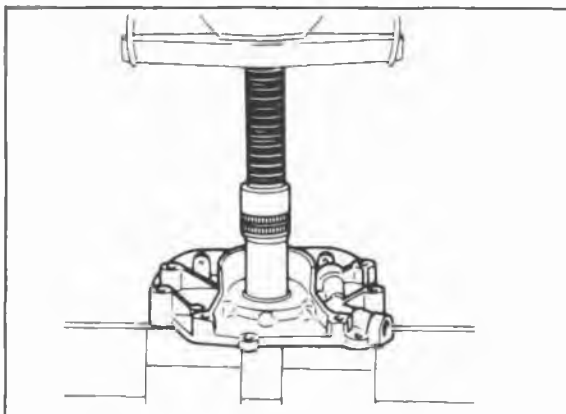
**Clearance: 0.40 mm (0.016 in) max.**



76G02A-023

5. Measure the outer gear to pump body clearance.

**Clearance: 0.20 mm (0.008 in) max.**



86U02X-022

## ASSEMBLY

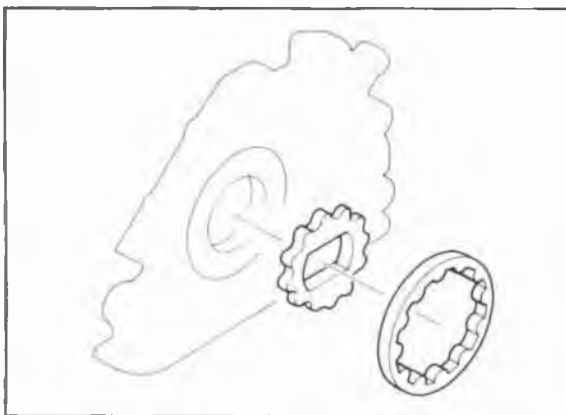
Assemble the pump as follows.

### Oil Seal

1. Apply engine oil to the pump body and the outside of the new oil seal.
2. Press in the oil seal.

### Pressure Relief Valve

1. Install the plunger and spring in the pump body.
2. Fit the snap ring.



76G02A-024

### Outer and Inner Gear

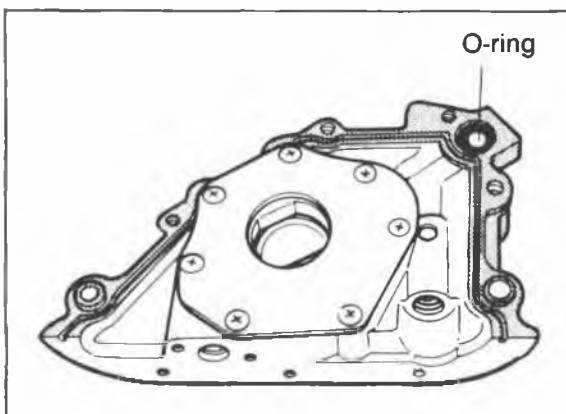
Install the gears to the pump body.

### Oil Pump Cover

1. Apply thread locking compound to the cover mounting screws' threads.
2. Attach the oil pump cover to the body.

### Tightening torque:

**6—9 N·m (60—90 cm·kg, 52—78 in·lb)**



76G02A-027

## INSTALLATION

Install in the reverse order of removal referring to the installation note.

### Installation Note

#### Oil pump

1. Apply grease to a new O-ring and install it in the oil pump body.
2. Apply silicon sealant to the shaded area as shown in the figure.
3. Apply engine oil to the oil seal lip.

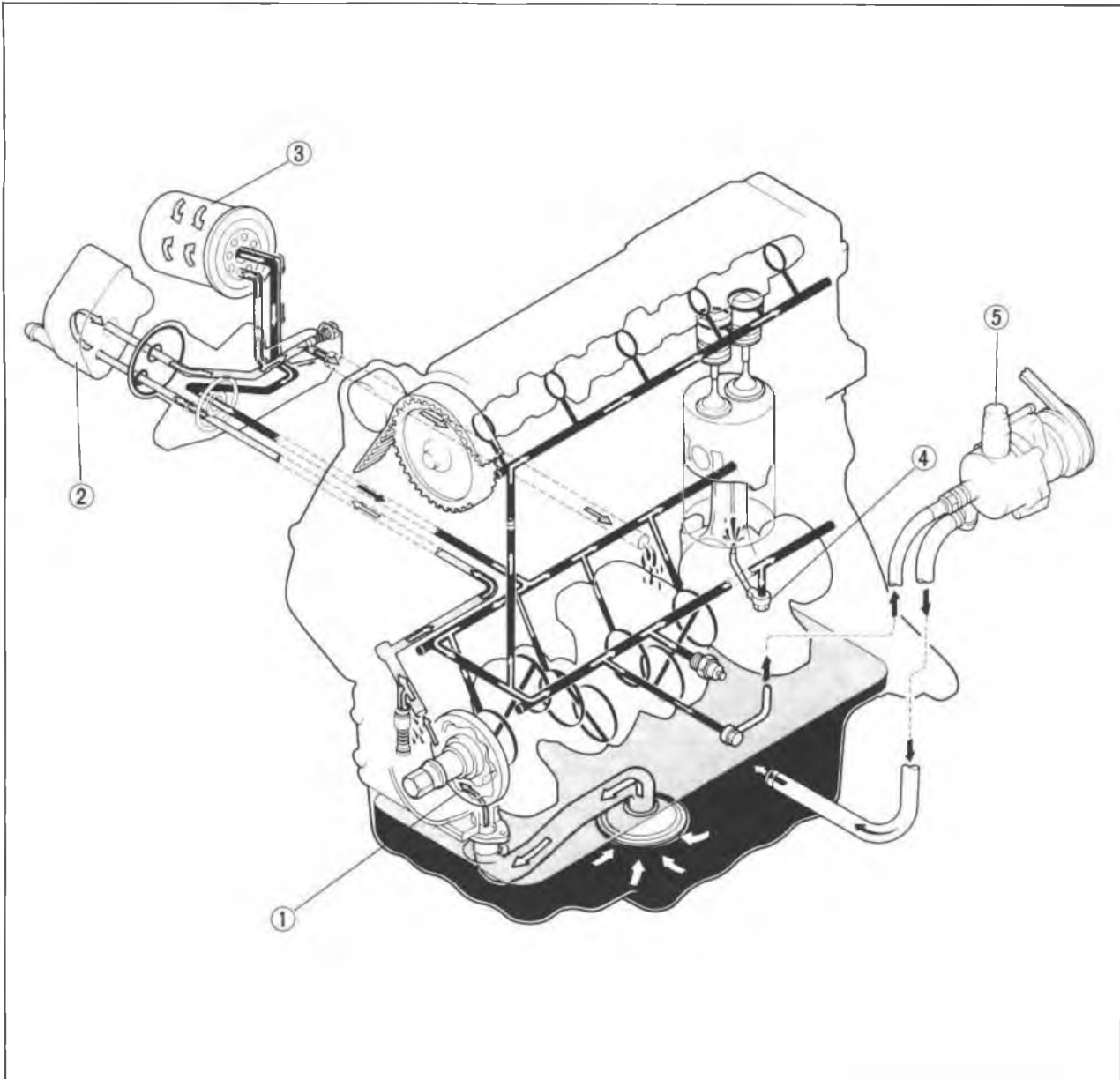
# LUBRICATION SYSTEM (DIESEL)

<b>OUTLINE</b> .....	2B— 2
LUBRICATION CIRCUIT .....	2B— 2
SPECIFICATIONS.....	2B— 3
<b>TROUBLESHOOTING GUIDE</b> .....	2B— 4
<b>INSPECTION</b> .....	2B— 5
ENGINE OIL .....	2B— 5
OIL PRESSURE .....	2B— 5
<b>ENGINE OIL</b> .....	2B— 6
REPLACEMENT .....	2B— 6
<b>OIL FILTER</b> .....	2B— 6
REPLACEMENT .....	2B— 6
<b>OIL COOLER AND OIL FILTER BODY</b> .....	2B— 7
REMOVAL .....	2B— 7
INSPECTION.....	2B— 7
INSTALLATION .....	2B— 8
<b>OIL PAN</b> .....	2B— 9
REMOVAL .....	2B— 9
INSPECTION.....	2B—10
INSTALLATION .....	2B—10
<b>OIL PUMP</b> .....	2B—12
REMOVAL .....	2B—12
DISASSEMBLY .....	2B—13
INSPECTION.....	2B—13
ASSEMBLY.....	2B—14
INSTALLATION .....	2B—14
<b>OIL JET</b> .....	2B—15
REMOVAL .....	2B—15
INSPECTION.....	2B—15
INSTALLATION .....	2B—15

# 2B OUTLINE

## OUTLINE

### LUBRICATION CIRCUIT



76G02B-002

- 1. Oil pump
- 2. Oil cooler
- 3. Combined oil filter

- 4. Oil jet
- 5. Vacuum pump

## SPECIFICATIONS

Item		Engine model		RF-CX	RF-N
Lubrication system		Force-fed			
Oil pump	Type	Trochoid gear			
	Gear width	mm (in)	7 (0.28)		
	Regulated pressure	kPa (kg/cm <sup>2</sup> , psi)	510—618 (5.2—6.3, 74—90)		
Oil filter	Type	Combined, paper element			
	Relief pressure differential	kP (kg/cm <sup>2</sup> , psi)	78—118 (0.8—1.2, 11—17)		
Oil cooler	Type			Water cooled, 10 layer	Water cooled, 4 layer
Oil filter body	Regulated pressure	kPa (kg/cm <sup>2</sup> , psi)	402—481 (4.1—4.9, 58—70)		
	Oil cooler relief pressure differential	kPa (kg/cm <sup>2</sup> , psi)	177—216 (1.8—2.2, 26—31)		
Oil warning lamp activation pressure		kPa (kg/cm <sup>2</sup> , psi)	29 (0.3, 4.3)		
Oil capacity	Total (dry engine)	liters (US qt, Imp qt)	6.1 (6.4, 5.4)		
	Oil pan	liters (US qt, Imp qt)	5.0 (5.3, 4.4)		
	Oil filter	liters (US qt, Imp qt)	0.5 (0.52, 0.44)		
Engine oil type		API service	CD	CC, CD	

76G02B-003

## Recommended SAE Viscosity

Temperature	(°C)	—30	—20	—10	0	10	20	30	40	50	
	(°F)	—20	0	20	40	60	80	100	120		
Engine oil	5W-30	→									
	10W-30	→									
	20W-20	→									
	15W-40	→									
	30	→									
									40		

Temperature range anticipated before next oil change, °C(°F)

76G02B-004

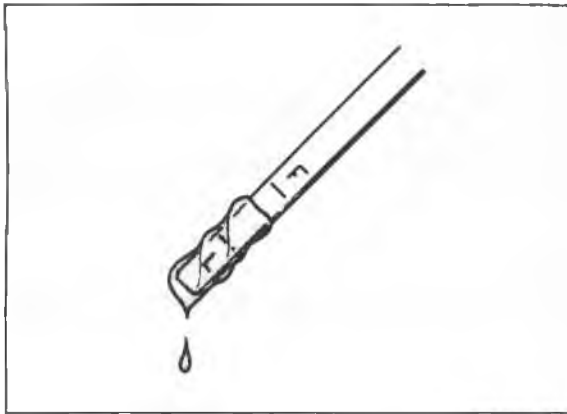


# 2B TROUBLESHOOTING GUIDE

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Engine hard starting</b>	Improper engine oil	Replace	2B— 6
	Insufficient engine oil	Add oil	2B— 5
<b>Excessive oil consumption</b>	Oil working up or working down Oil leakage	Refer to Section 1C As described below	
<b>Oil leakage</b>	Loose drain plug or damaged washer	Tighten or replace	2B—10
	Faulty seal at oil pan and cylinder block	Repair	2B—10
	Damaged cylinder head cover and its seal	Replace	—
	Loose oil pump body bolt, cylinder head cover bolt, or oil pan bolt	Tighten	—
	Damaged front housing gasket, or cylinder head gasket	Replace	—
	Faulty oil seal(s)	Replace	—
	Loose oil filter	Tighten	2B— 6
	Loose or damaged oil pressure switch	Tighten or replace	—
<b>Oil pressure drop</b>	Oil leakage	As described above	
	Insufficient oil	Add oil	2B— 5
	Worn and/or damaged oil pump gear	Replace	2B—13
	Worn plunger (inside oil pump) or weak spring	Replace	2B—14
	Clogged oil strainer	Clean	—
	Excessive oil clearance between main bearing or connecting rod bearing	Refer to Section 1C	
<b>Warning lamp illuminates while engine running</b>	Oil pressure drop	As described above	—
	Malfunction of oil pressure switch	Refer to Section 15	
	Malfunction of electrical system	Refer to Section 15	

76G02B-005



76G02B-006

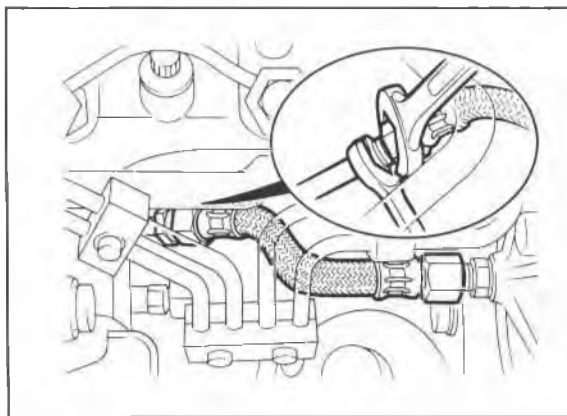
## INSPECTION

### ENGINE OIL

1. Be sure the vehicle is on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the oil level gauge and check the oil level and condition.
5. Add or replace oil if necessary.

#### Note

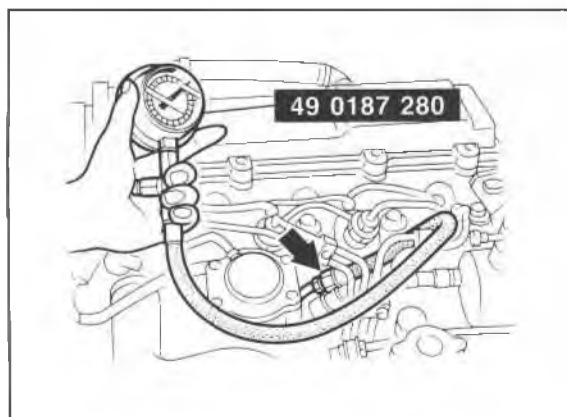
The distance between the L and F marks on the level gauge represents 1.2 liters (1.26 US qt, 1.05 Imp qt).



76G02B-007

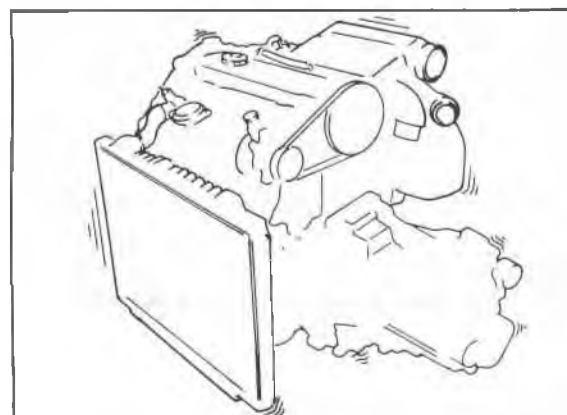
### OIL PRESSURE

1. Disconnect the oil hose (vacuum pump—cylinder block).



76G02B-008

2. Set the **SST** as shown.
3. Remove the vacuum pump drive belt to prevent heat damage to bearing.
4. Warm up the engine to normal operating temperature.



76G02B-009

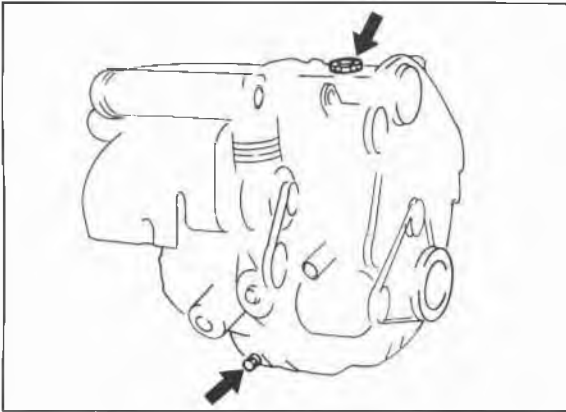
5. Run the engine first at **1,000 rpm**, then at **3,000 rpm** and note the gauge reading.

#### Standard oil pressure kPa (kg/cm<sup>2</sup>, psi)

1,000 rpm	147—245 (1.5—2.5, 21—36)
3,000 rpm	343—441 (3.5—4.5, 50—64)

6. If the pressure is not as specified, check for the cause, and repair if necessary.  
(Refer to Troubleshooting Guide.)

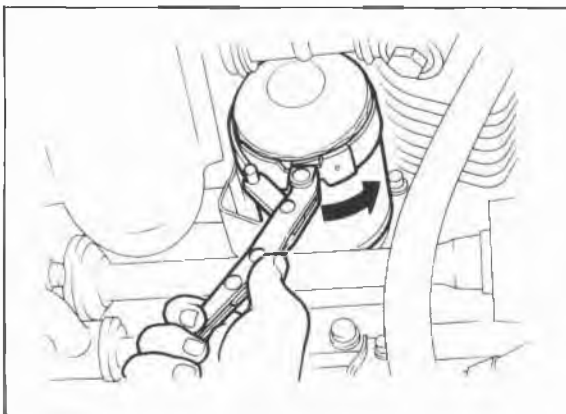
## 2B ENGINE OIL, OIL FILTER



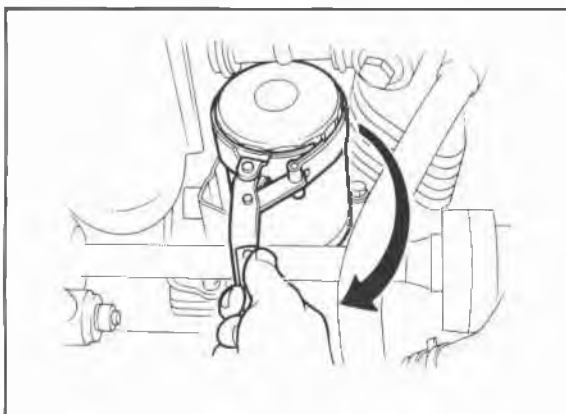
86U02X-006



76G02B-010



86U02X-008



76G02B-011

### ENGINE OIL

#### REPLACEMENT

1. Warm up the engine to the normal operating temperature and stop it.
2. Remove the oil filler cap and the oil pan drain plug.
3. Drain the oil into a suitable container.

#### Warning

**Be careful when draining, the oil is very hot.**

4. Install the drain plug and a new gasket.

#### Tightening torque:

**29—41 N·m (3.0—4.2 m·kg, 22—30 ft·lb)**

5. Refill the engine with the specified type and amount of oil.
6. Refit the oil filler cap.

#### Oil pan capacity:

**5.0 liters (5.3 US qt, 4.4 Imp qt)**

7. Recheck the oil level after the engine has been run.

### OIL FILTER

#### REPLACEMENT

1. Remove the oil filter with a suitable wrench.
2. Use a clean rag to wipe off the mounting surface on the engine.

3. Apply a coat of engine oil to the filter rubber seal.
4. Install the oil filter until the rubber seal contacts the oil cooler by hand. Then tighten it a **7/6 turn further** with a band type wrench.
5. Start the engine and inspect around the filter seal for leaks.
6. Check the oil level and add oil if necessary.

#### Oil filter capacity:

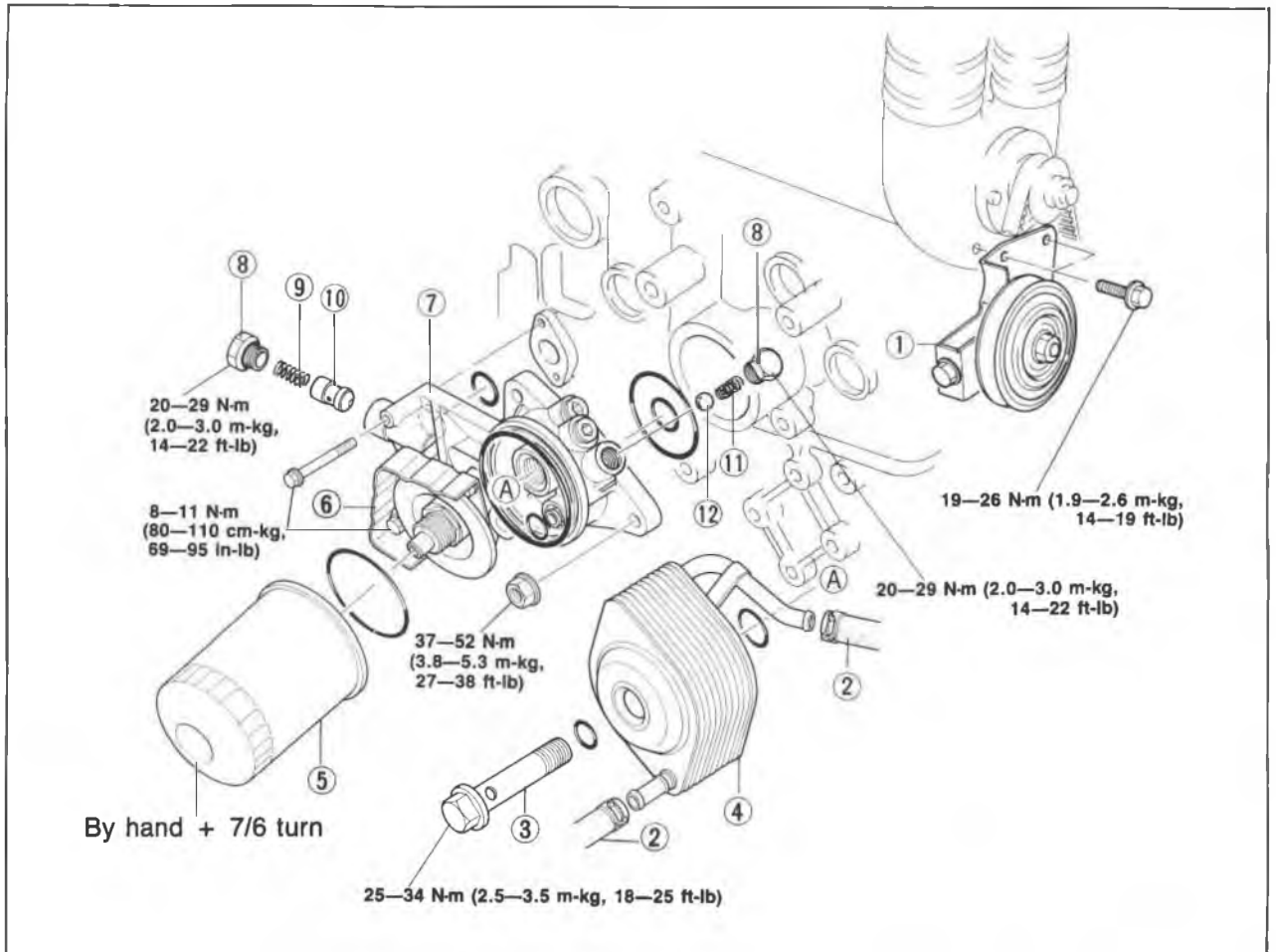
**0.50 liters (0.52 US qt, 0.44 Imp qt)**

## OIL COOLER AND OIL FILTER BODY

### REMOVAL

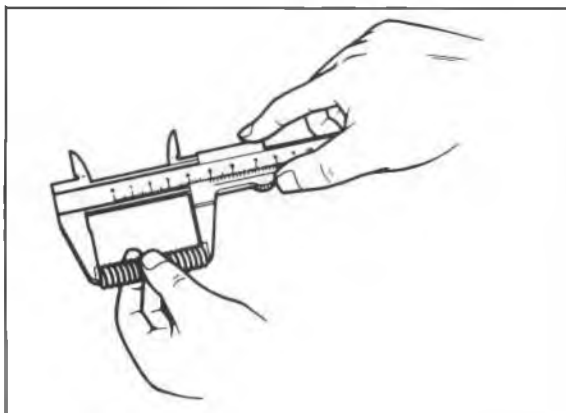
1. Disconnect the battery negative cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure.

76G02B-012



76G02B-013

- |                   |                     |                         |
|-------------------|---------------------|-------------------------|
| 1. Idler pulley   | 5. Oil filter       | 9. Pressure spring      |
| 2. Water hose     | 6. Oil filter cover | 10. Plunger control     |
| 3. Connector bolt | 7. Oil filter body  | 11. Relief valve spring |
| 4. Oil cooler     | 8. Plug             | 12. Steel ball          |



76G02B-014

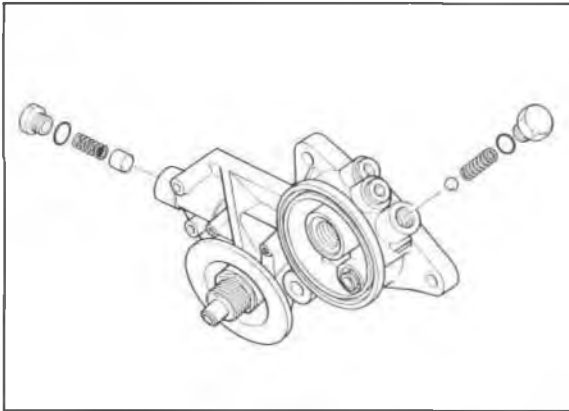
### INSPECTION

1. Inspect the oil cooler body for cracks or corroded. If necessary replace it.
2. Check the valves for damage or scoring if necessary replace it.
3. Measure free length of each valve spring. If necessary replace it.

#### Free length

**Relief valve spring: 45.5 mm (1.79 in)**  
**Pressure spring : 54.6 mm (2.15 in)**

## 2B OIL COOLER AND OIL FILTER BODY



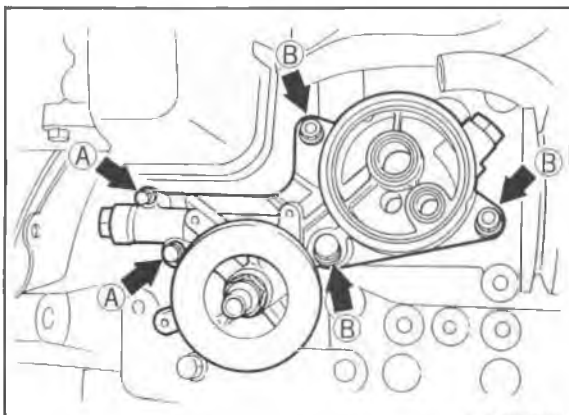
76G02B-015

### INSTALLATION

1. Apply a coat of engine oil to the valve holes.
2. Install the relief valve spring and pressure spring.

#### Tightening torque:

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**



76G02B-016

3. Clean the contact surfaces of the cylinder block and oil filter body.
4. Install new O-rings and apply a coat of engine oil.
5. Install the oil filter body.

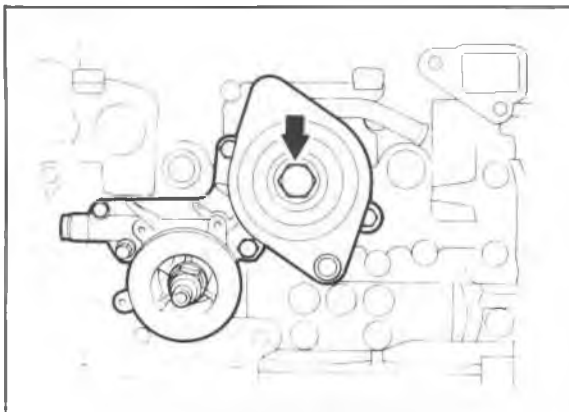
#### Tightening torque:

**Bolt A: 8—11 N·m**

**(80—110 cm·kg, 69—95 in·lb)**

**Bolt B: 37—52 N·m**

**(3.8—5.3 m·kg, 27—38 ft·lb)**



76G02B-017

6. Apply a coat of engine oil to the O-rings.
7. Install the oil cooler with new O-ring on the connector bolt.

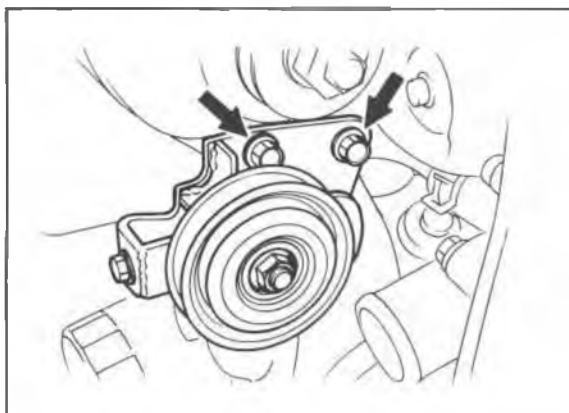
#### Tightening torque:

**25—34 N·m (2.5—3.5 m·kg, 18—25 ft·lb)**

8. Connect the water hoses.
9. Install the oil filter cover.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



76G02B-018

10. Install the oil filter. (Refer to page 2B—6)
11. Install the idler pulley.

#### Tightening torque:

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

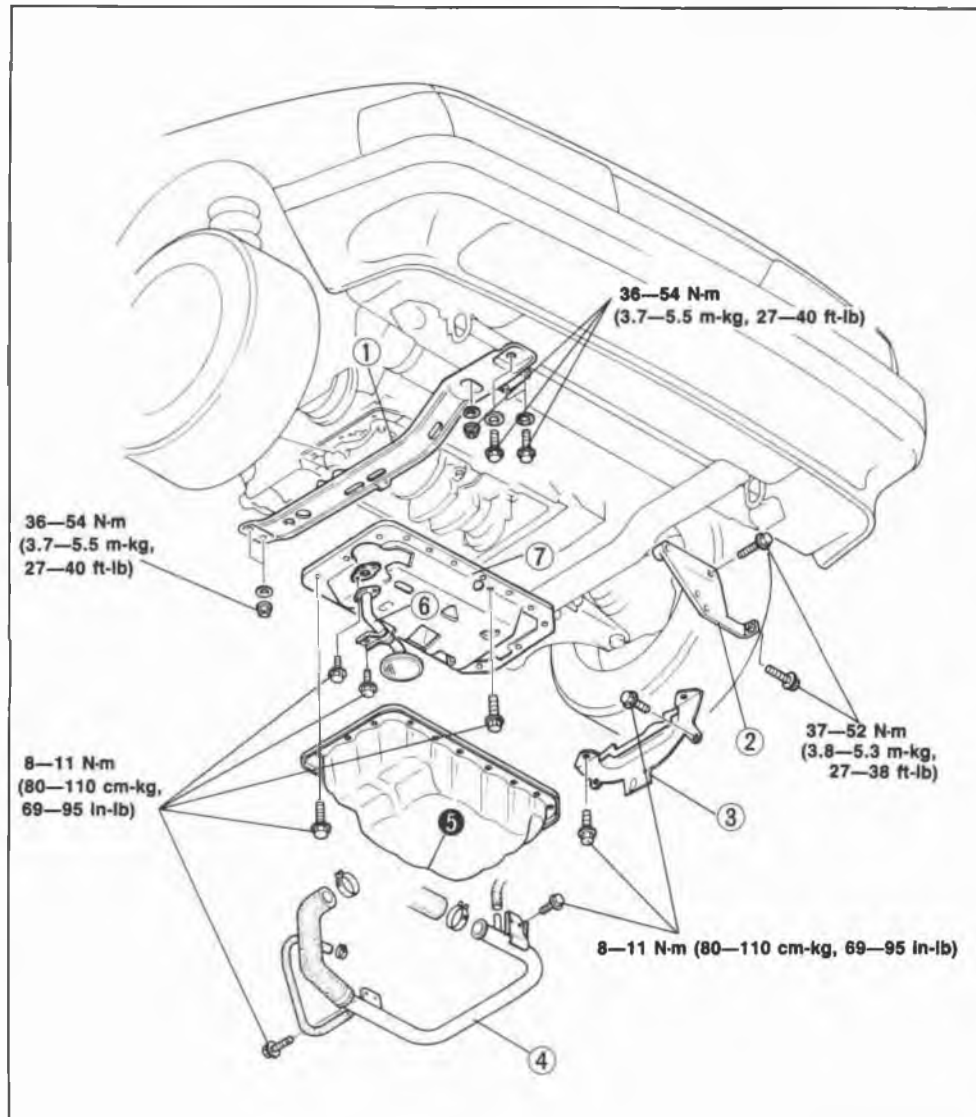
12. Install the Compex supercharger drive belt and adjust the belt deflection. (Refer to page 1C—7)
13. Add specified amount of coolant and engine oil.
14. Check for leaks.

## OIL PAN

### REMOVAL

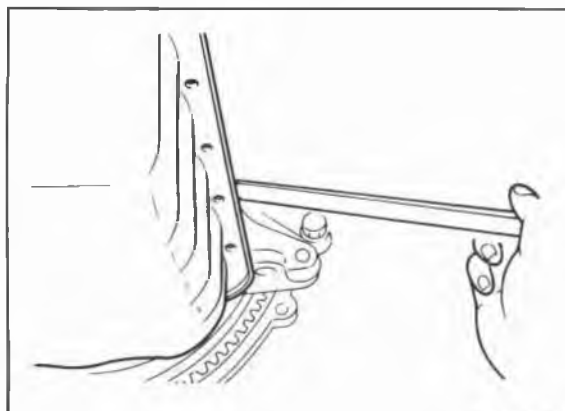
1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G02B-019



1. Sub frame
2. Gusset plate
3. Clutch housing under cover
4. Water pipe
5. Oil pan
6. Oil strainer
7. Stiffener (RF-CX)

76G02B-020



76G02B-021

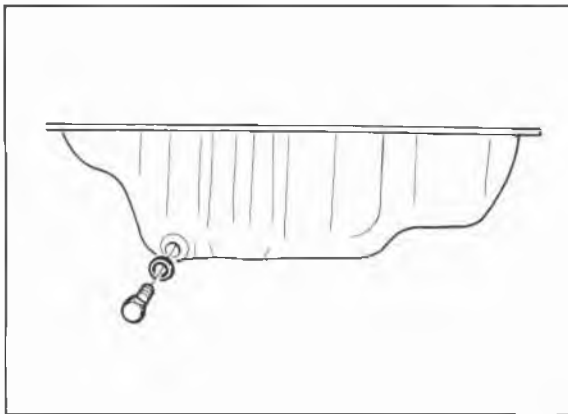
### Removal Note Oil pan

1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the stiffener to separate them.
3. Remove the oil pan.
4. Remove the oil strainer and stiffener from the engine.

### Caution

**Do not bend the oil pan when prying loose.**

## 2B OIL PAN

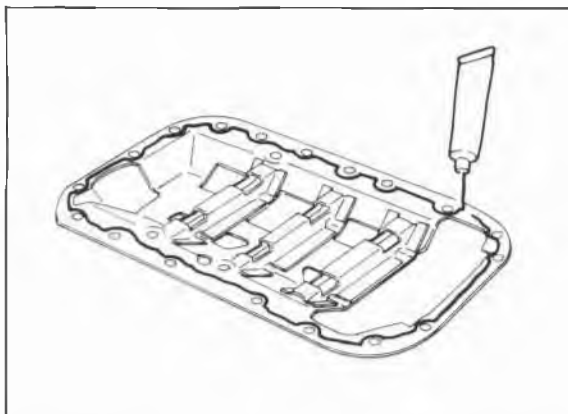


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### INSPECTION

Check the following points. Repair or replace if necessary.

1. Cracks, deformation, damage
2. Damaged drain plug threads



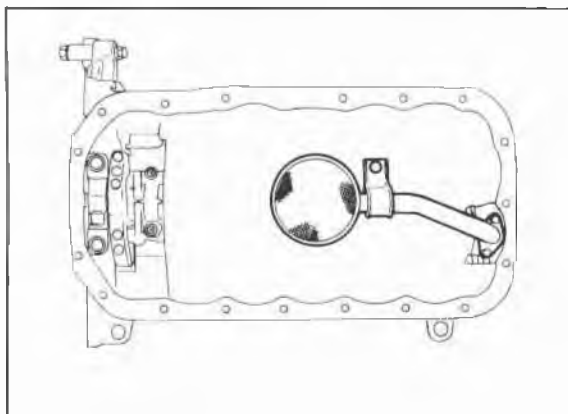
76G02B-022

### INSTALLATION

Install in the reverse order of removal referring to installation note.

#### Installation Note Stiffener (RF-CX)

1. Remove any dirt or other material from the contact surfaces.
2. Apply a continuous bead of silicone sealant to the stiffener along the inside of the bolt holes, and overlap the end.
3. Install the stiffener.



76G02B-023

#### Tightening torque:

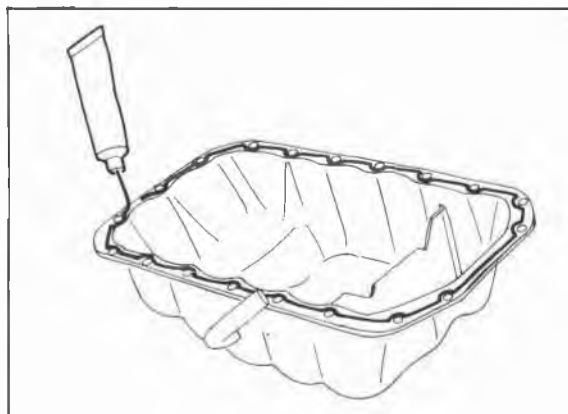
**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

#### Oil Strainer

Install the oil strainer and a new gasket.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



76G02B-024

#### Oil Pan

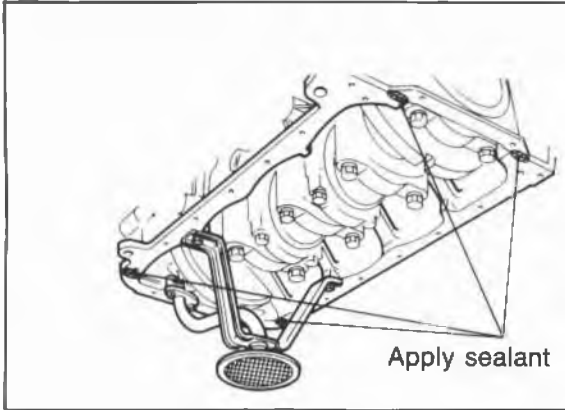
Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it.

#### Without gasket

- (1) Remove any dirt or grease from the contact surfaces with a rag.
- (2) Apply continuous bead of silicon sealant to the oil pan along the inside of the bolt holes, and overlap the ends.
- (3) Install the oil pan.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



76G02B-025

### With gasket

- (1) Apply sealant to the shaded areas in the figure.
- (2) Install the gasket and the oil pan.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



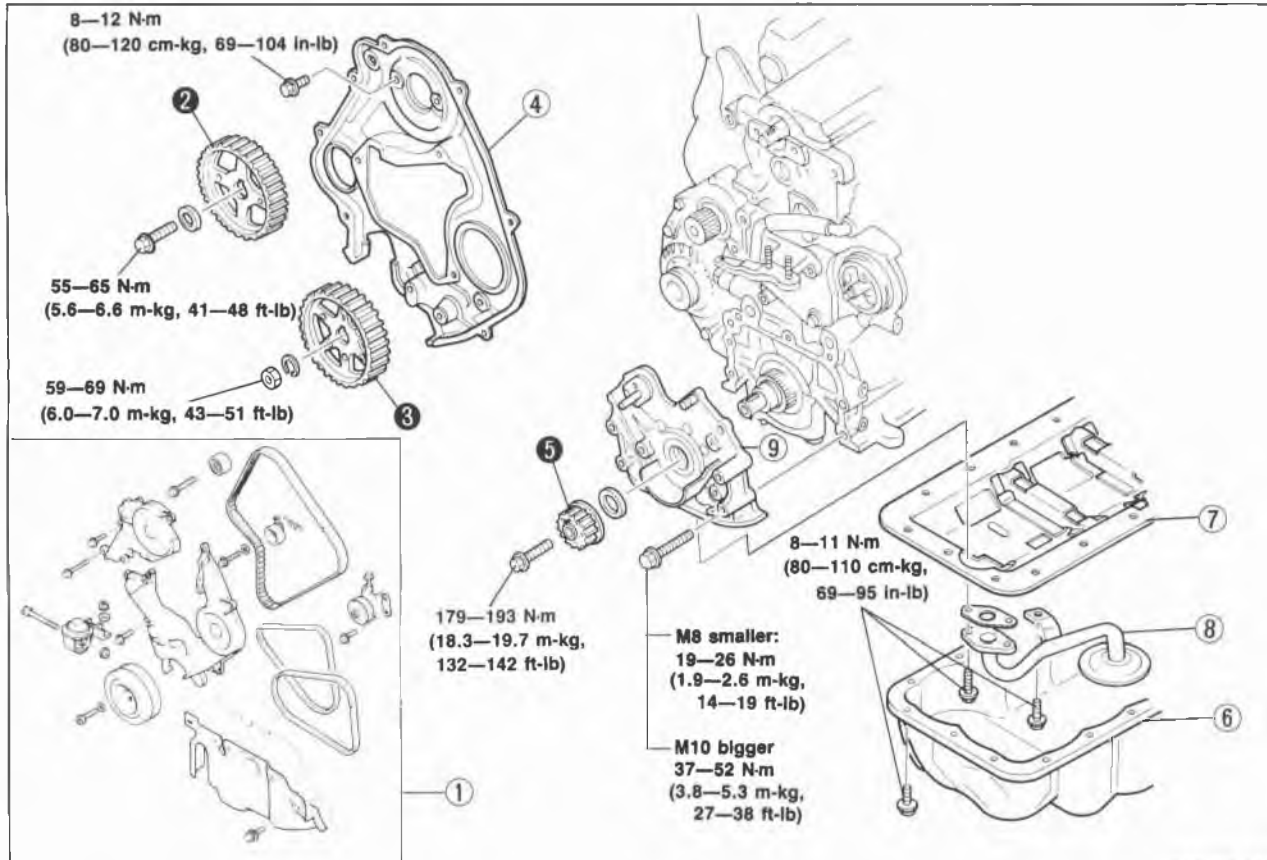
# 2B OIL PUMP

## OIL PUMP

### REMOVAL

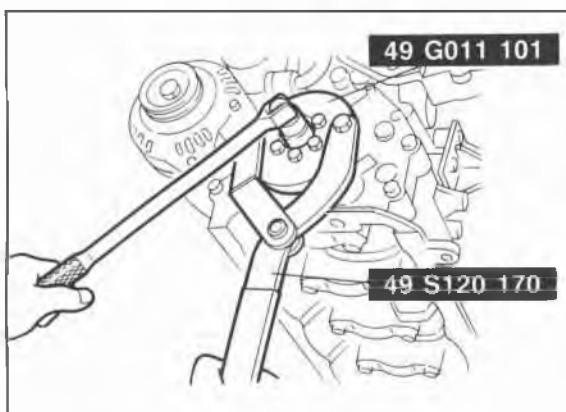
1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove in the sequence shown in the figure referring to the removal note for specially marked parts.

76G02B-026



76G02B-027

- |  |                                 |
|--|---------------------------------|
| 1. Timing belt (Refer to page 1C-11)           | 6. Oil pan (Refer to page 2B-9) |
| 2. Camshaft pulley (Refer to page 1C-36)       | 7. Stiffener (RF-CX)            |
| 3. Injection pump pulley (Refer to page 1C-36) | 8. Oil strainer                 |
| 4. Seal plate                                  | 9. Oil pump                     |
| 5. Timing belt pulley                          |                                 |



76G02B-028

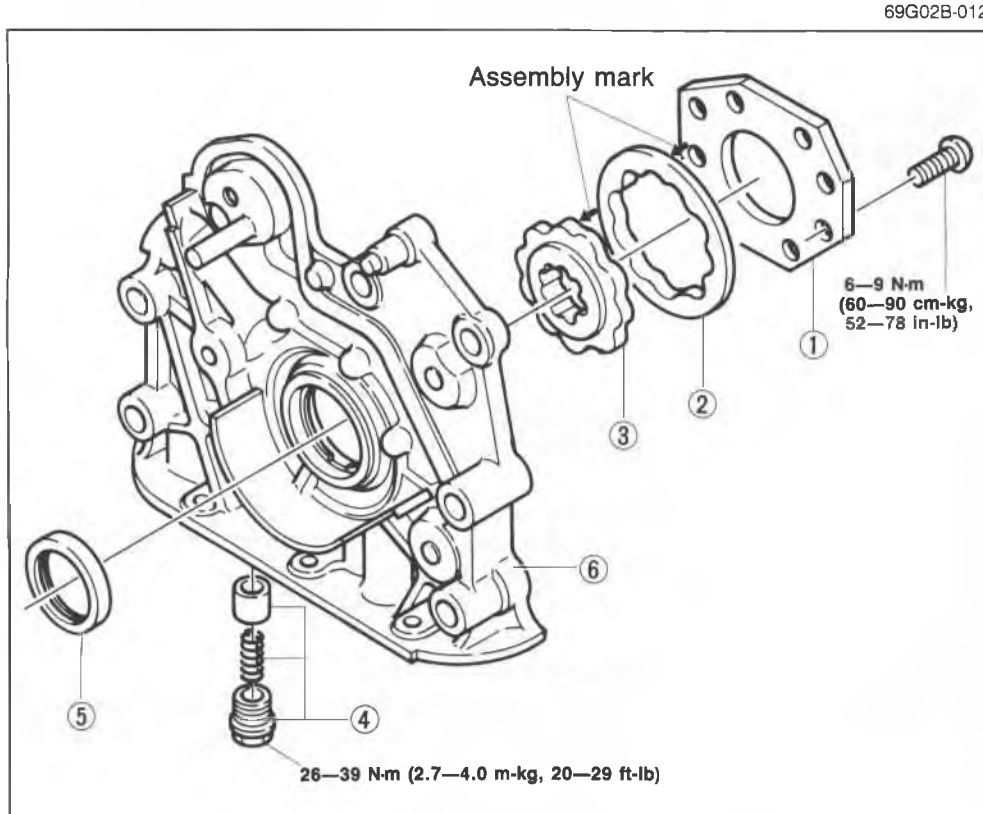
### Removal Note

#### Timing belt pulley lock bolt

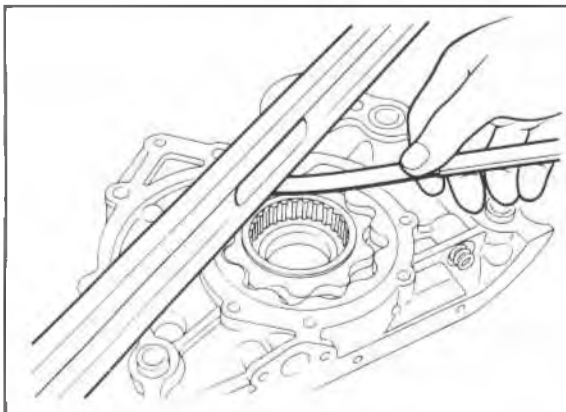
Hold the timing belt pulley with the **SST** and remove the lock bolt.

## DISASSEMBLY

Disassemble in the sequence shown in the figure.



76G02B-036

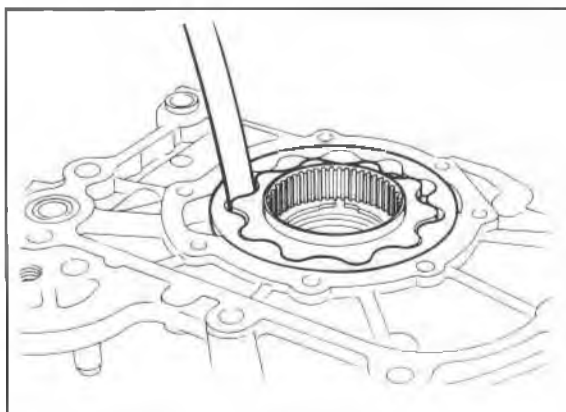


76G02B-029

## INSPECTION

1. Check the following and replace any faulty parts.
  - (1) Distorted or damaged oil pump body or cover
  - (2) Worn or damaged plunger
  - (3) Weak or broken plunger spring
2. Measure the side clearance.

**Clearance:**  
**0.14 mm (0.006 in) max.**

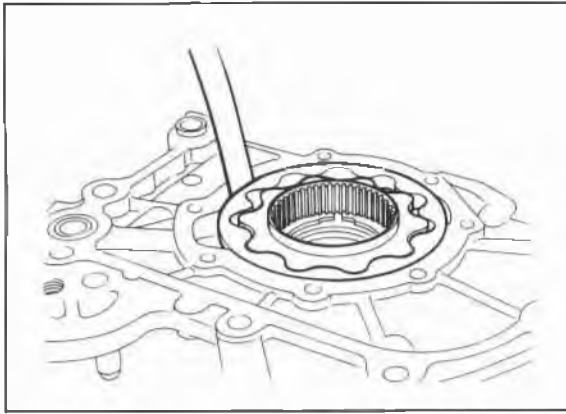


76G02B-030

3. Measure the tooth tip clearance.

**Clearance: 0.24 mm (0.009 in) max.**

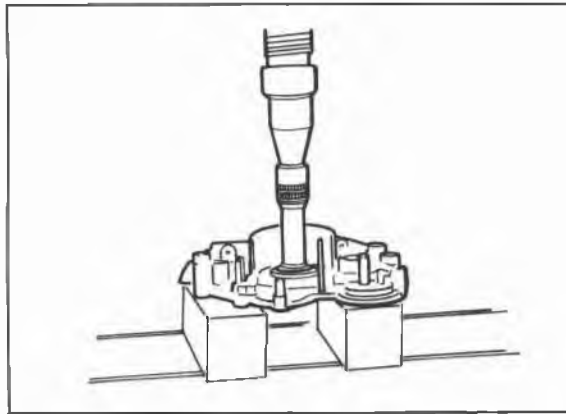
## 2B OIL PUMP



76G02B-031

4. Measure the outer rotor to pump body clearance.

**Clearance: 0.22 mm (0.009 in) max.**



76G02B-032

### ASSEMBLY

Assemble the pump as follows.

#### Oil Seal

1. Apply engine oil to the pump body and the outside of the new oil seal.
2. Press in the oil seal.

#### Pressure Relief Valve

1. Install the plunger and spring in the pump body.
2. Install the spring seat plug and tighten to specification.

#### Tightening torque:

**26—39 N·m (2.7—4.0 m·kg, 20—29 ft·lb)**

#### Outer and Inner Rotor

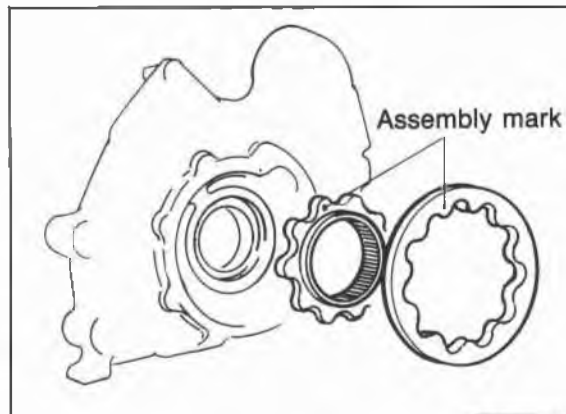
Install the rotors with the assembly mark facing the pump cover.

#### Oil Pump Cover

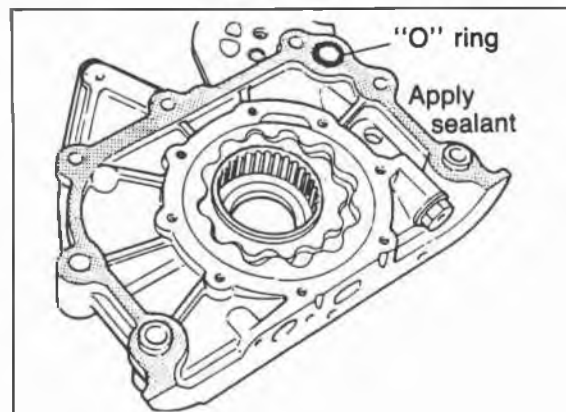
1. Apply thread locking compound to the cover mounting screws' threads.
2. Attach the oil pump cover to the body.

#### Tightening torque:

**6—9 N·m (60—90 cm·kg, 52—78 in·lb)**



76G02B-037



76G02B-033

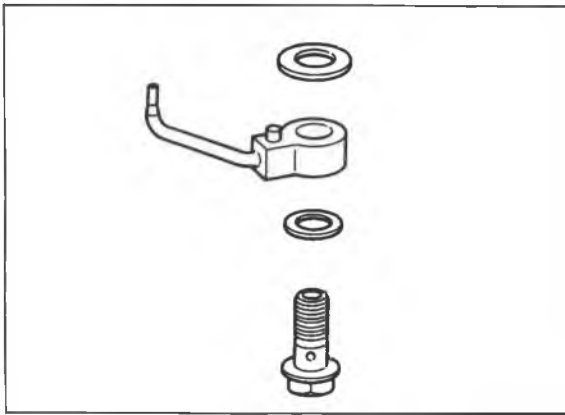
### INSTALLATION

Install in the reverse order of removal referring to installation note.

#### Installation Note

##### Oil pump

1. Apply grease to a new O-ring and install it in the oil pump body.
2. Apply silicon sealant to the shaded area as shown in the figure.
3. Apply engine oil to the oil seal lip.



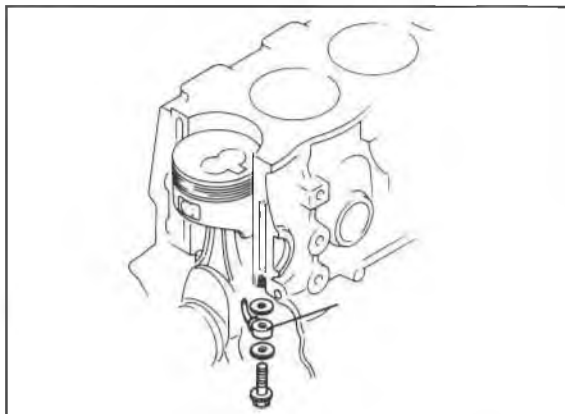
76G02B-034

## OIL JET

### REMOVAL

Remove each part in the following order.

1. Remove the oil pan. (Refer to page 2B—9).
2. Remove the oil jet valve.
3. Remove the oil jet.



76G02B-035

### INSPECTION

1. Make sure that the oil passage is not clogged.
2. Check that the oil jet valve is not stuck or damaged.

### INSTALLATION

Install in the reverse order of removal.

**Tightening torque: 12—18 Nm  
(1.2—1.8 m-kg, 104—156 in-lb)**

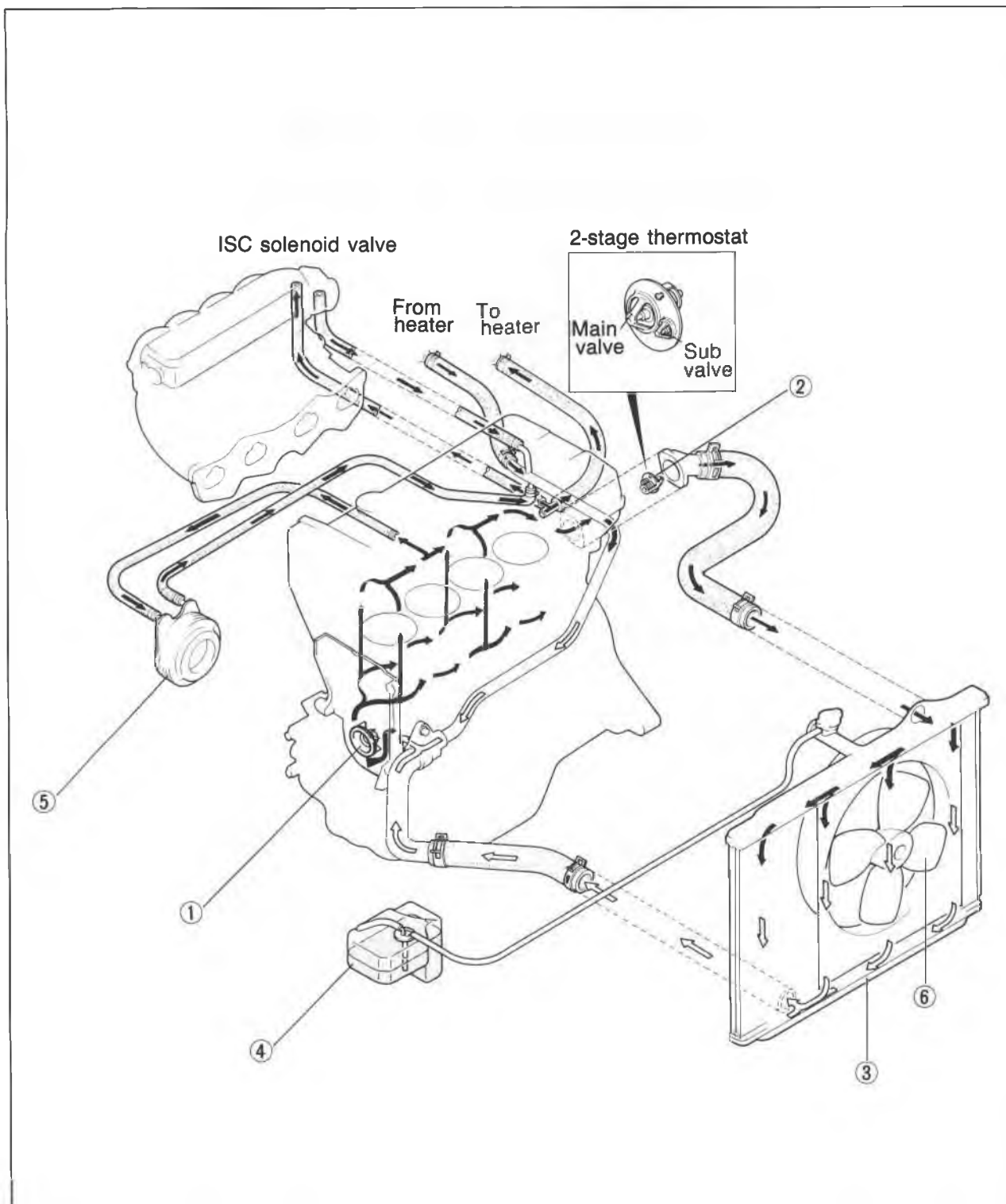
## COOLING SYSTEM (GASOLINE ENGINE)

<b>OUTLINE</b> .....	3A— 2
COOLANT FLOW CHART (DOHC) .....	3A— 2
COOLANT FLOW CHART (SOHC) .....	3A— 3
SPECIFICATIONS .....	3A— 4
<b>TROUBLESHOOTING GUIDE</b> .....	3A— 4
<b>COOLANT</b> .....	3A— 5
INSPECTION .....	3A— 5
REPLACEMENT .....	3A— 5
<b>RADIATOR CAP</b> .....	3A— 6
INSPECTION .....	3A— 6
<b>RADIATOR</b> .....	3A— 7
REMOVAL AND INSTALLATION .....	3A— 7
INSPECTION .....	3A— 7
<b>WATER PUMP</b> .....	3A— 8
REMOVAL .....	3A— 8
INSPECTION .....	3A—10
INSTALLATION .....	3A—10
<b>THERMOSTAT</b> .....	3A—11
REMOVAL .....	3A—11
INSPECTION .....	3A—11
INSTALLATION .....	3A—11
<b>COOLING FAN</b> .....	3A—12
SYSTEM CIRCUIT .....	3A—12
CIRCUIT INSPECTION .....	3A—12
FAN MOTOR .....	3A—13
WATER THERMO SWITCH .....	3A—14

# 3A OUTLINE

## OUTLINE

### COOLANT FLOW CHART (DOHC)

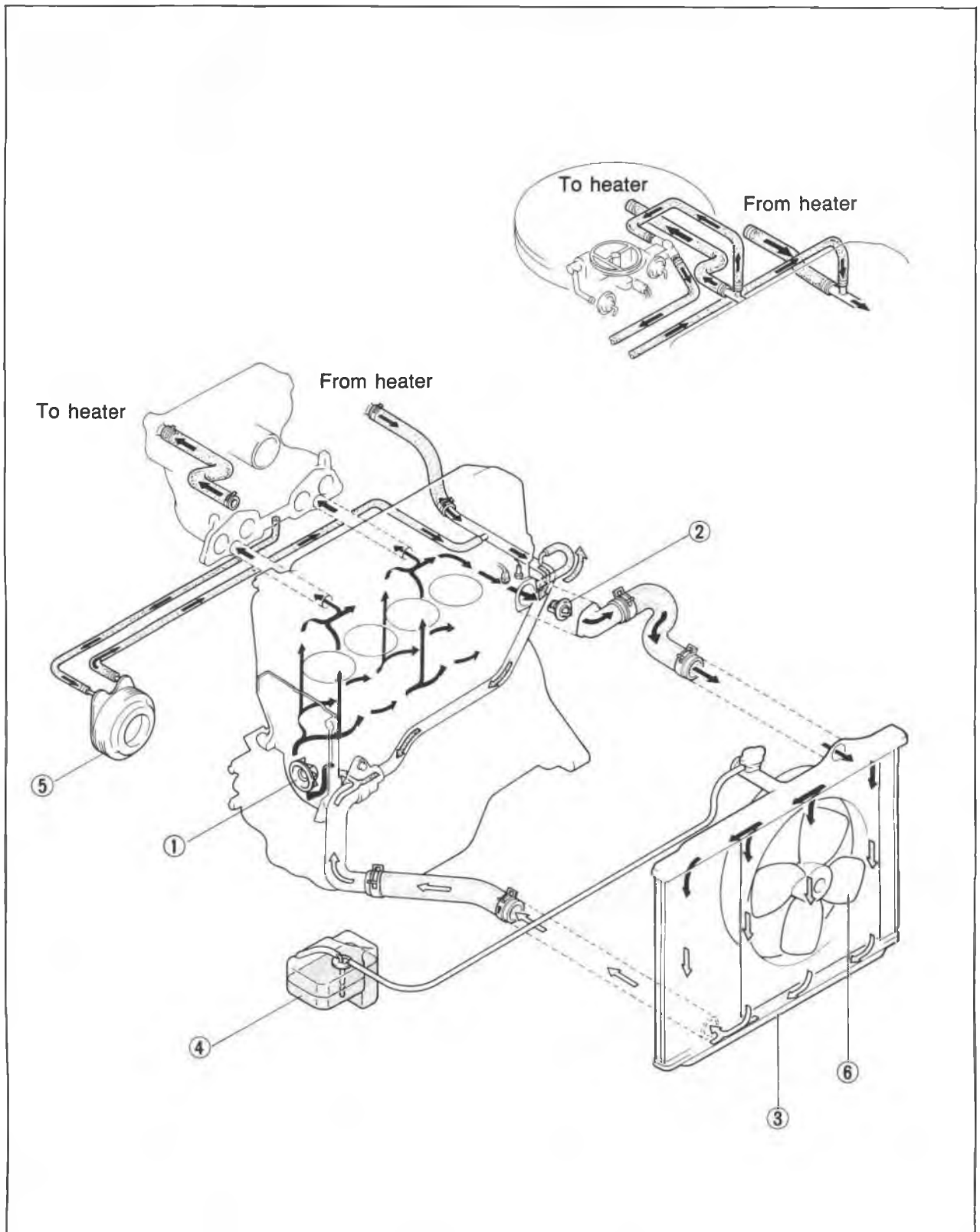


76G03A-002

- 1. Water pump
- 2. Thermostat
- 3. Radiator

- 4. Coolant reservoir
- 5. Oil cooler
- 6. Cooling fan

## COOLANT FLOW CHART (SOHC)



76G03A-015

- 1. Water pump
- 2. Thermostat
- 3. Radiator

- 4. Coolant reservoir
- 5. Oil cooler (8-valve...only ECE, 12-valve)
- 6. Cooling fan

# 3A TROUBLESHOOTING GUIDE

## SPECIFICATIONS

Item	Engine model		FE·DOHC	FE 8-valve, F8, F6...except Middle East General FE 12-valve	FE 8-valve F8, F6...only Middle East General
	Cooling system			Water cooled, forced circulation	
Coolant capacity	liters (US qt, Imp qt)	With heater	7.5 (7.9, 6.6)		
		Without heater	7.0 (7.4, 6.2)		
Water pump	Type		Centrifugal, timing belt driven		
	Water seal		Unified seal		
Thermostat	Type		Wax, 2-stage	Wax	
	Opening temperature	°C(°F)	Sub: 83.5—86.5 (182—188) Main: 86.5—89.5 (188—193)	86.5—89.5 (188—193)	80.5—83.5 (177—182)
	Full-open temperature	°C(°F)	100 (212)		95 (203)
	Full-open lift	mm (in)	Sub: 1.5 (0.06) min. Main: 8.0 (0.31) min.	8.5 (0.33) min.	
Radiator	Type		Corrugated		
	Cap valve opening pressure kPa (kg/cm <sup>2</sup> , psi)		74—103 (0.75—1.05, 11—15)		
Cooling fan	Capacity	W	MTX	80	
		ATX	120		
	Number of blade		4		
	Outer diameter of blade	mm (in)	MTX	320 (12.6)	
			ATX	340 (13.4)	

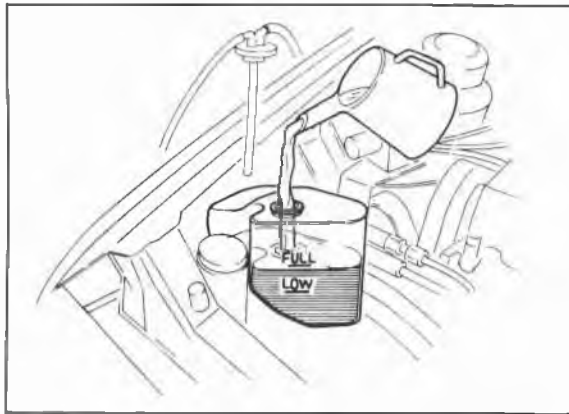
76G03A-003

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Overheating</b>	Insufficient coolant	Add	3A— 5
	Coolant leakage	Repair	—
	Radiator fins clogged	Clean	3A— 7
	Radiator cap malfunction	Replace	3A— 6
	Cooling fan malfunction	Repair	3A—12
	Thermostat malfunction	Replace	3A—11
	Water passage clogged	Clean	3A— 5
	Water pump malfunction	Repair or replace	3A— 8
<b>Corrosion</b>	Impurities in coolant	Replace	3A— 5

76G03A-004





76G03A-016

## COOLANT

### INSPECTION

#### Coolant Level (Engine cold)

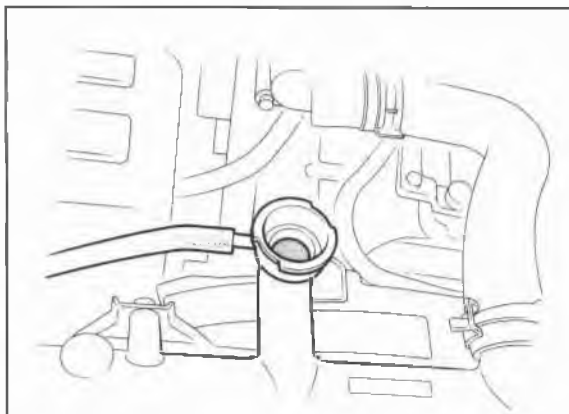
1. Check that the coolant level is near the radiator inlet port.
2. Check that the coolant level in the coolant reservoir is between the FULL and LOW marks. Add coolant if necessary.

#### Warning

- a) Never remove the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when removing it.

#### Coolant Quality

1. Check that there is no build-up of rust or scales around the radiator cap or radiator filler neck.
2. Check that coolant is free from oil.
3. Replace the coolant, if necessary.



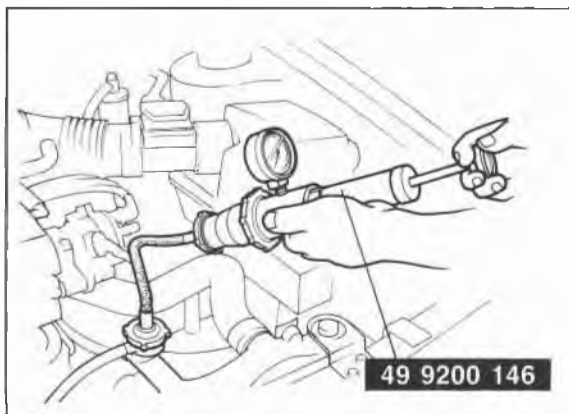
69G03A-006

#### Coolant Leakage

1. Connect a tester and SST to the radiator inlet port.
2. Apply **103 kPa (1.05 kg/cm<sup>2</sup>, 15 psi)** pressure to the system.
3. Check that the pressure is held. If not, check for coolant leakage.

#### Warning

- When removing either the radiator cap or the tester, loosen it slowly until the pressure in the radiator is released, and then remove it.



86U03X-005

### REPLACEMENT

1. Remove the radiator cap and loosen the drain plug.
2. Drain the coolant into a suitable container.

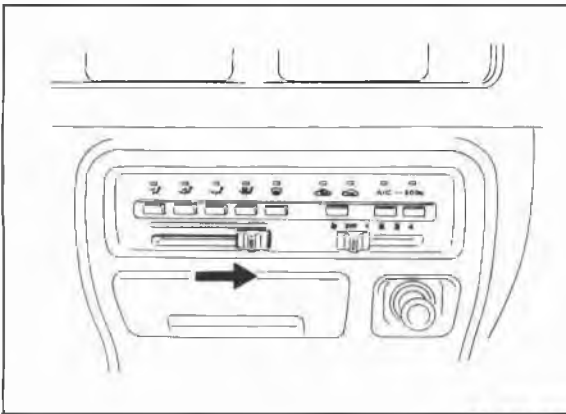
#### Warning

- a) Never open the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when loosening.
- c) Use caution when draining hot coolant.

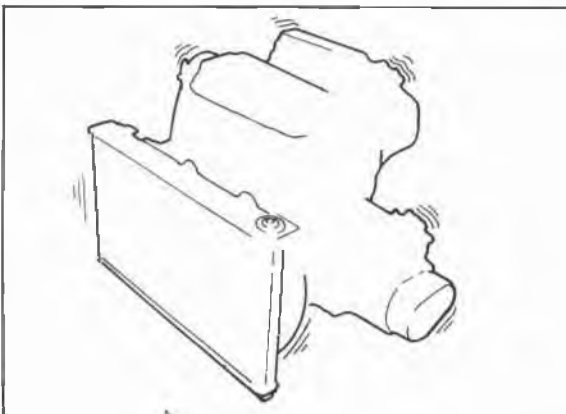


86U03X-006

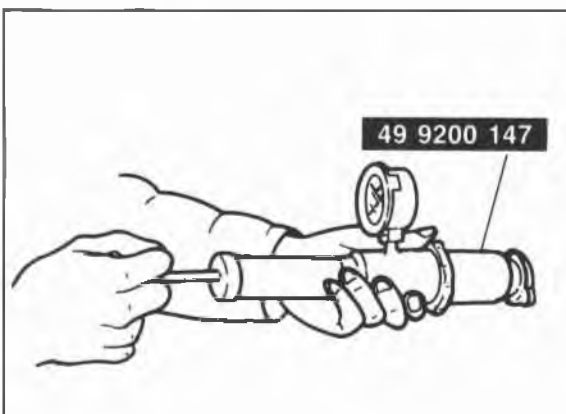
## 3A RADIATOR CAP



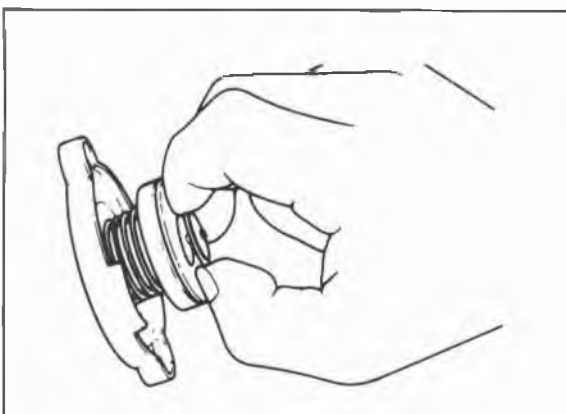
86U03X-028



86U03X-007



86U03X-008



86U03X-009

3. Set the heater control switch to the maximum heat position.
4. Flush the cooling system with water until all traces of color are gone, then let the system drain completely.
5. Fill with the proper mixture and amount of ethylene glycol-based coolant.

### Caution

- a) Do not use alcohol- or methanol-based coolant.
- b) Use only soft (demineralized) water in the coolant mixture.

### Anti-freeze solution mixture percentage

Protection	Volume percentage		Gravity at 20°C (68°F)
	Solution	Water	
Above -16°C (3°F)	35	65	1.054
Above -26°C (-15°F)	45	55	1.066
Above -40°C (-40°F)	55	45	1.078

6. Run the engine at idle with the radiator cap removed. Let any air bleed from the system, and add more coolant.
7. Install the radiator cap, and inspect all connections for leakage.

## RADIATOR CAP

### INSPECTION

#### Radiator Cap Valve

1. Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap to a tester with the SST. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm<sup>2</sup>, 11—15 psi)**.
3. Wait about 10 seconds; then check that the pressure has not decreased.

#### Negative Pressure Valve

1. Pull the negative-pressure valve to open it. Check that it closes completely when released.
2. Check for damage on the contact surfaces, and for cracked or deformed seal packing.
3. Replace the radiator cap if necessary.

## RADIATOR

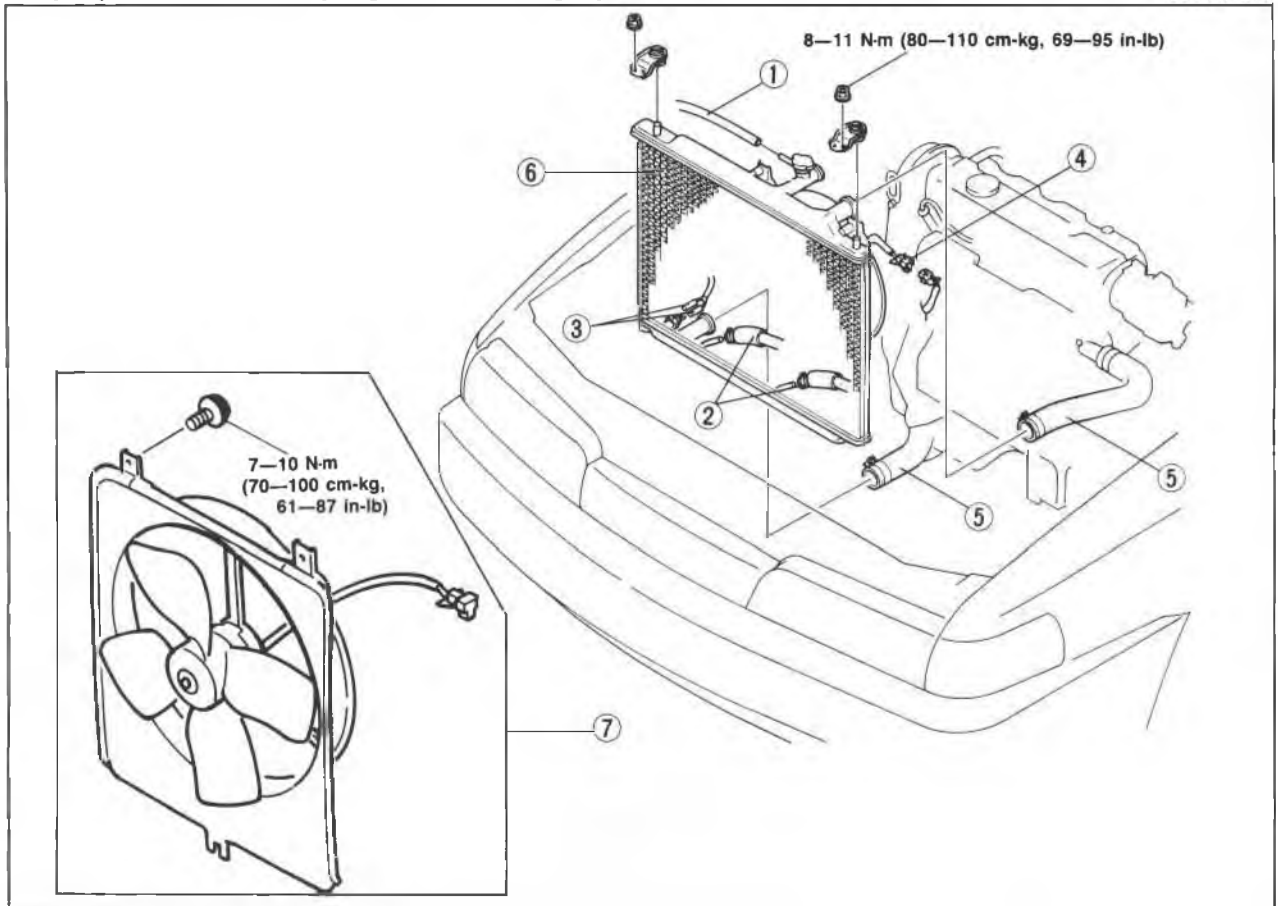
### REMOVAL AND INSTALLATION

1. Drain the engine coolant.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.

#### Note

- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

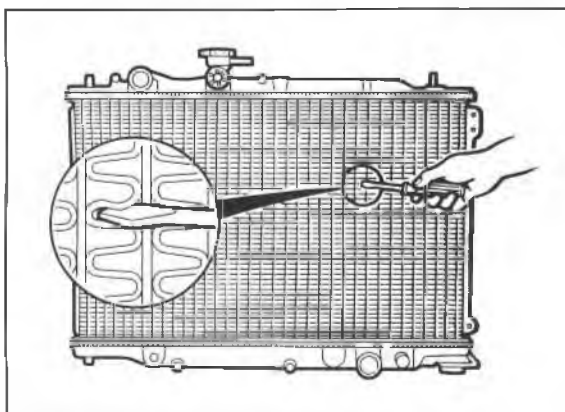
86U03X-010



76G03A-005

1. Coolant reservoir hose
2. ATF hose (ATX)
3. Water thermo switch connector
4. Cooling fan connector

5. Upper and lower radiator hose
6. Cooling fan and radiator assembly
7. Cooling fan



86U03X-012

### INSPECTION

Check the following points. Repair or replace if necessary.

1. Cracks, damage, or water leakage
2. Bent fins (Repair with a screwdriver)
3. Distorted or bent radiator inlet.

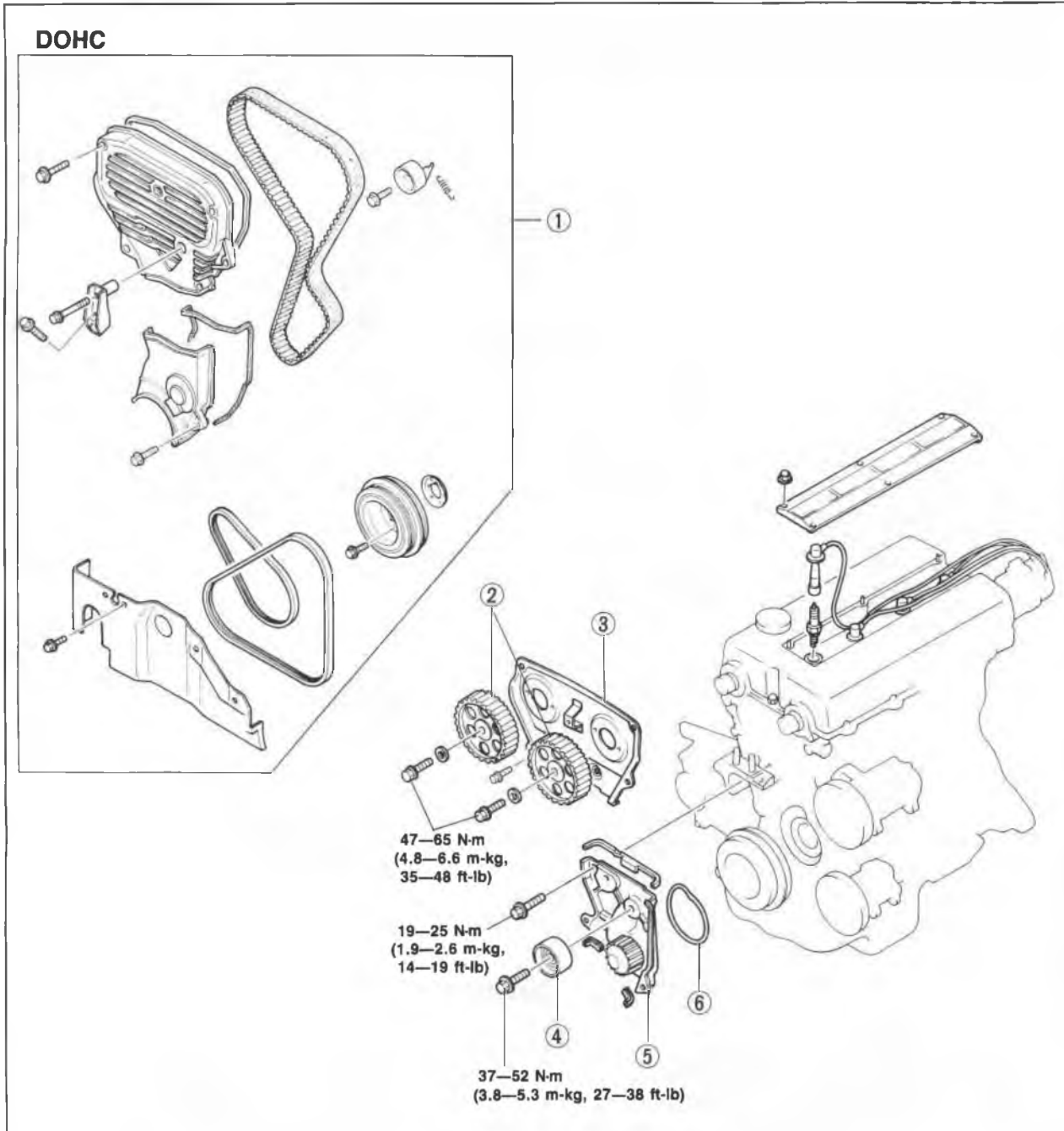
# 3A WATER PUMP

## WATER PUMP

### REMOVAL

1. Disconnect the negative battery cable.
2. Turn the crankshaft so that the No. 1 cylinder is at TDC of compression.
3. Drain the engine coolant.
4. Remove in the sequence shown in the figure.

69G03A-025

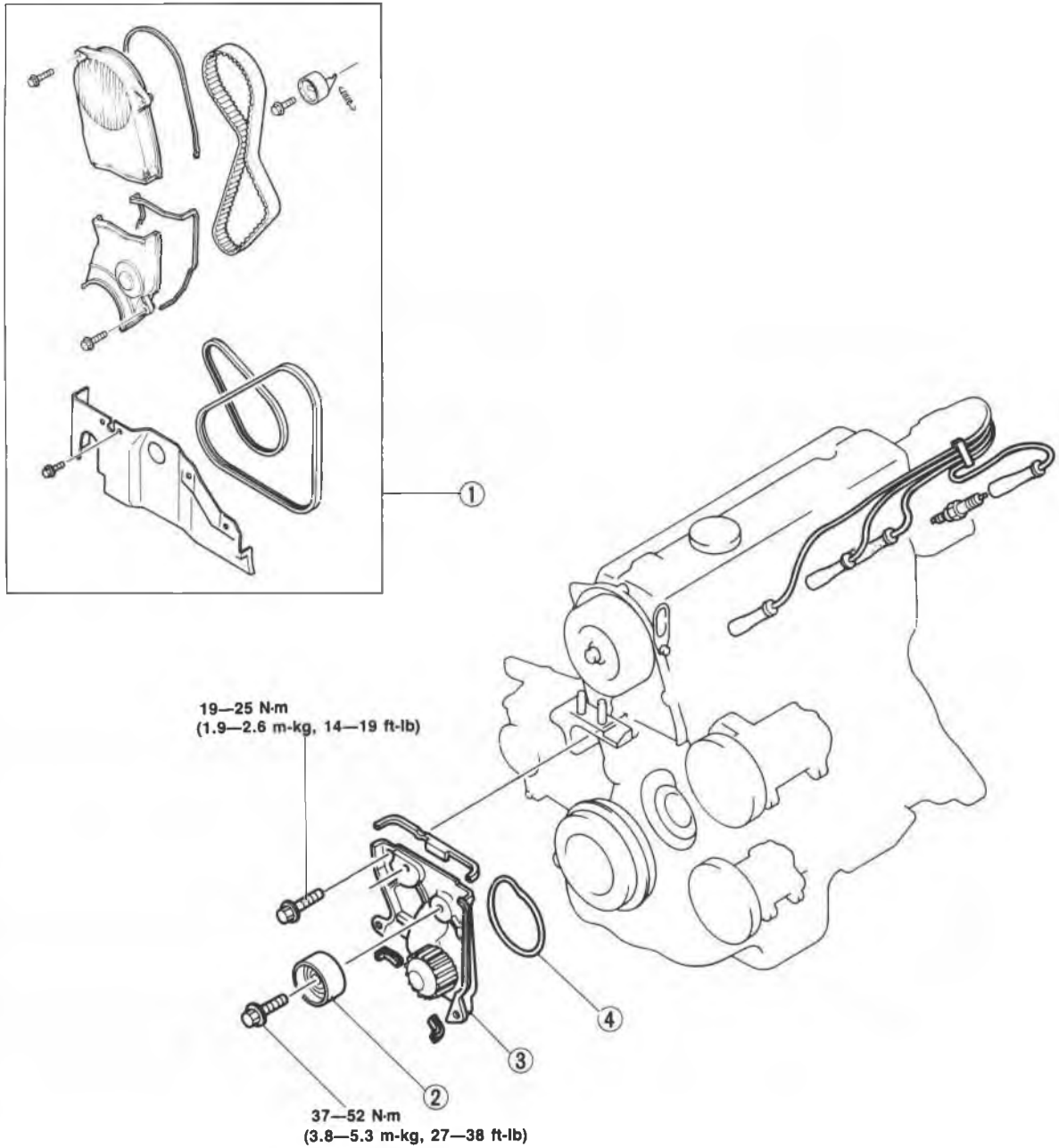


76G03A-006

1. Timing belt (Refer to Section 1B)
2. Camshaft pulley (Refer to Section 1B)
3. Seal plate

4. Idler pulley
5. Water pump
6. O-ring

## SOHC

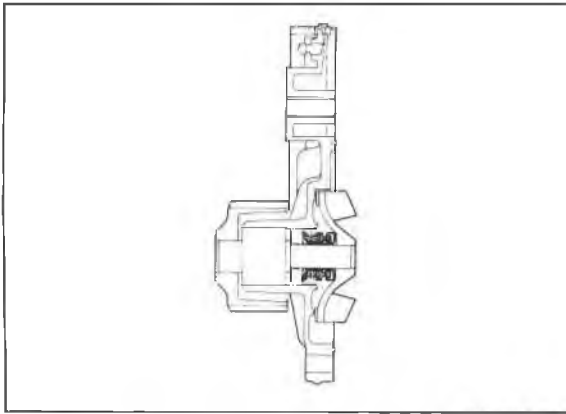


76G03A-007

1. Timing belt (Refer to Section 1A)  
2. Idler pulley

3. Water pump  
4. O-ring

## 3A WATER PUMP

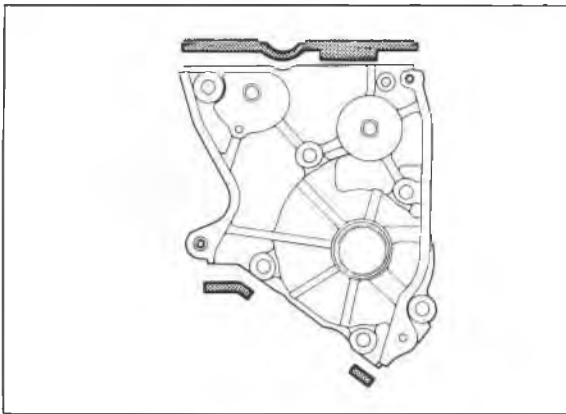


86U03X-014

### INSPECTION

Check the following. Replace the pump if necessary.

1. Cracks or damage
2. Abnormal noise, bearing sticking or loose.



76G03A-017

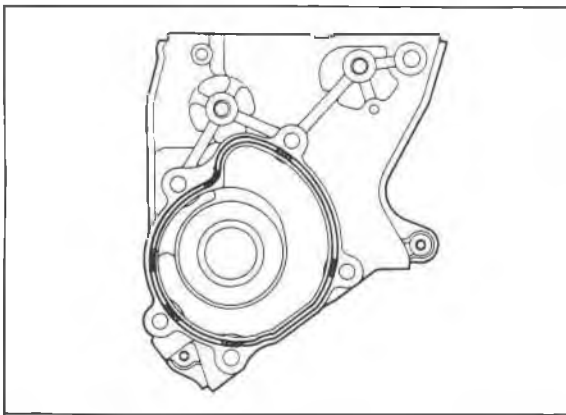
### INSTALLATION

Install in the reverse order of removal referring to the installation note.

#### Installation Note

##### Rubber seal

Install the rubber seals on the water pump.



86U03X-016

#### Water pump

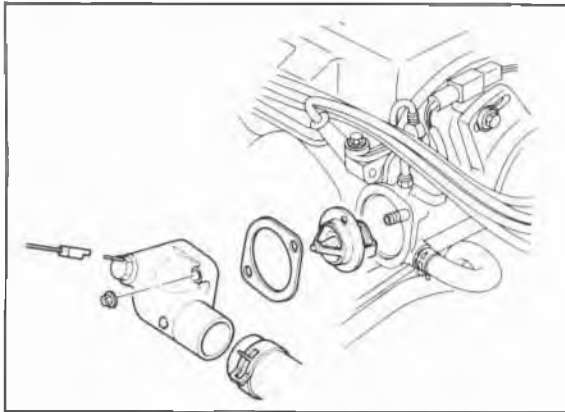
1. Remove any gasket fragments, dirt, or oil from the contact surfaces.
2. Install a new O-ring on the water pump.
3. Install the water pump.

#### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

#### Note

To prevent dropping the O-ring when installing, put silicon sealant in the O-ring groove (shaded areas) as shown. Do not apply it to the contact surfaces.

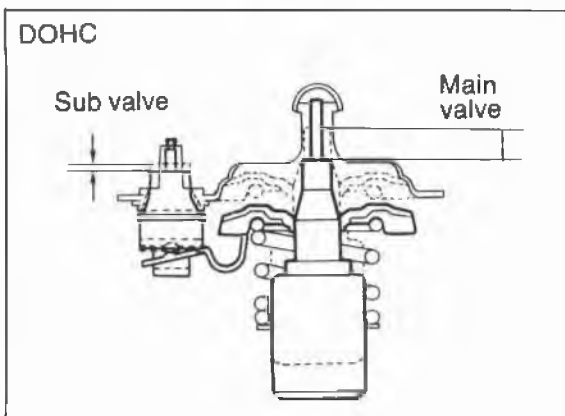


69G03B-010

## THERMOSTAT

### REMOVAL

1. Drain the engine coolant.
2. Remove the thermostat cover.
3. Remove the thermostat.



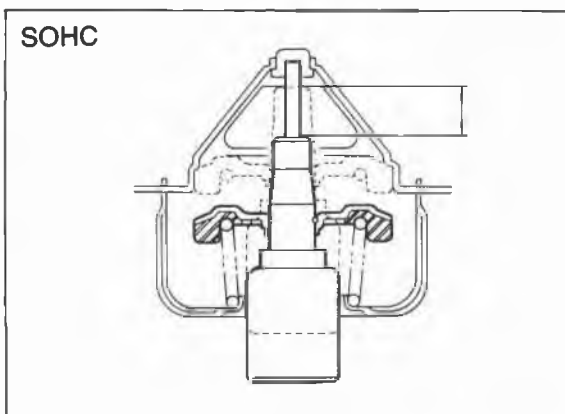
76G03A-008

### INSPECTION

Check the thermostat. Replace if necessary.

1. Visually check that the valve is airtight.
2. Place the thermostat and a thermometer in water.
3. Gradually heat the water and check the following:

Model	FE-DOHC	FE 8-valve F8,F6...except Middle East General FE 12-valve	FE 8-valve, F8,F6...only Middle East General
Item			
Initial opening temperature	Sub valve 83.5—86.5°C (182—188°F) Main valve 86.5—89.5°C (188—193°F)	86.5—89.5°C (188—193°F)	80.5—83.5°C (177—182°F)
Full-open temperature	100°C (212°F)		95°C (203°F)
Full-open lift	Sub valve 1.5 mm (0.06 in) min. Main valve 8.0 mm (0.31 in) min.	8.5 mm (0.33 in) min.	



76G03A-009

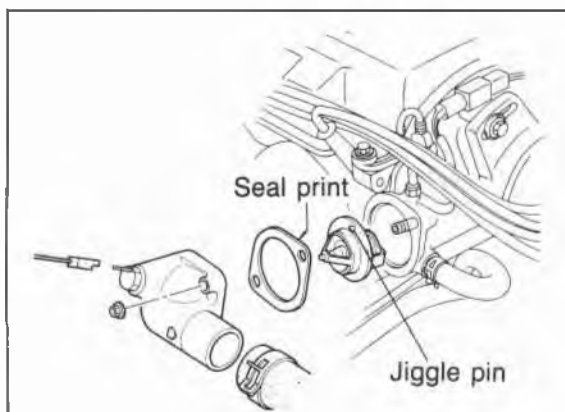
### INSTALLATION

1. Install the thermostat into the cylinder head with jiggle pin at the top.
2. Install a new gasket with the seal print side facing the cylinder head.
3. Install the thermostat cover.

#### Tightening torque:

**19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)**

4. Replenish the coolant.
5. Start the engine and check for leaks.

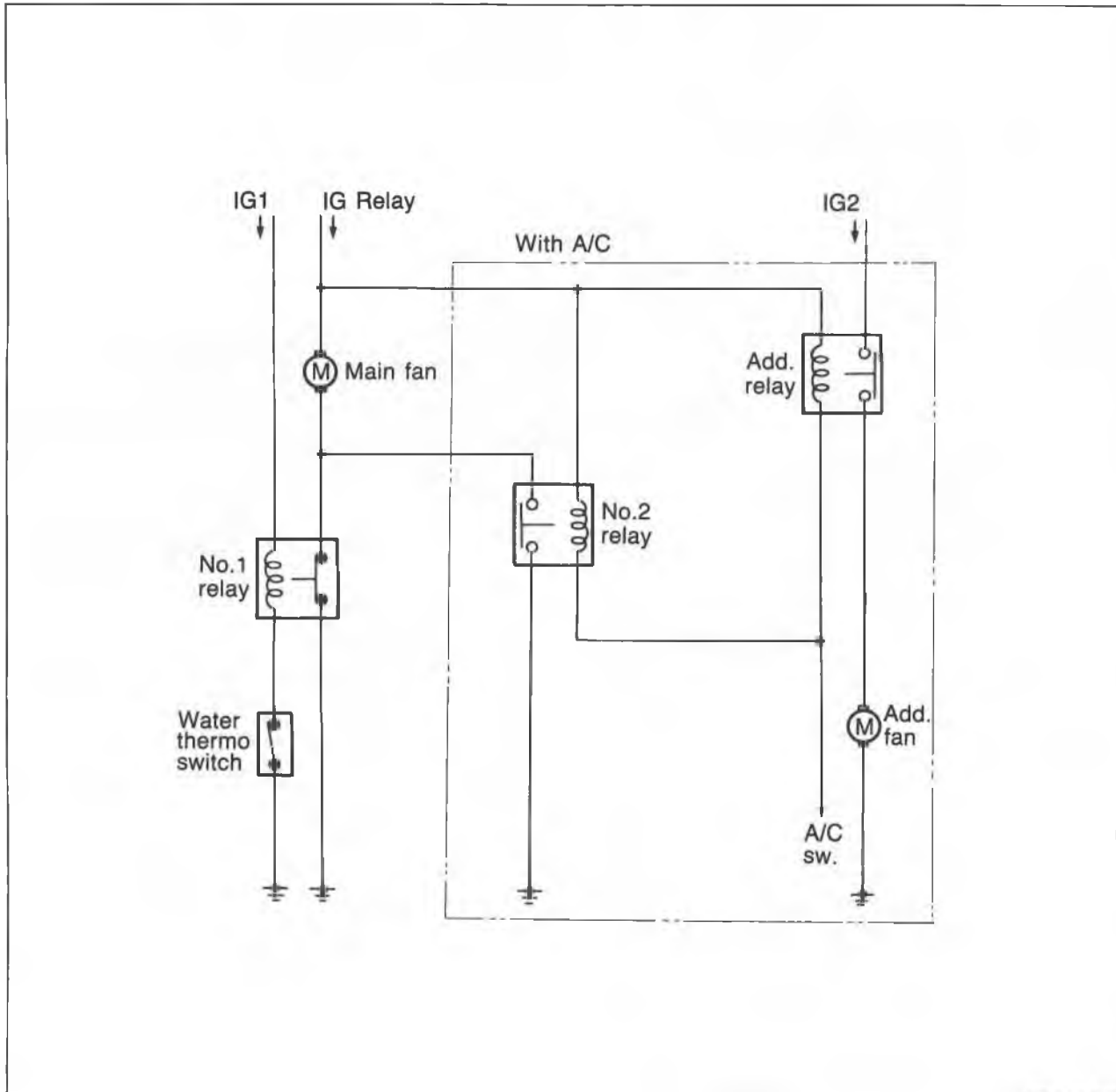


86U03X-018

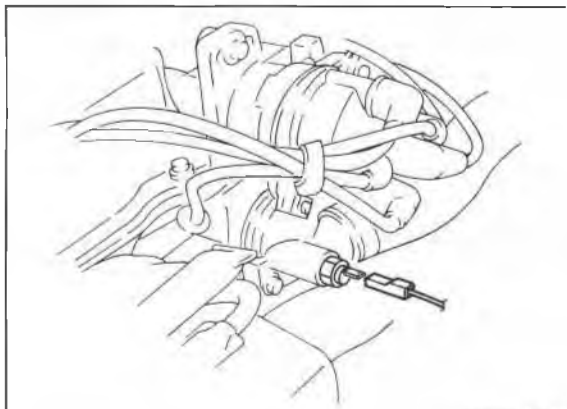
# 3A COOLING FAN

## COOLING FAN

### SYSTEM CIRCUIT



86U03X-019



76G03A-010

### CIRCUIT INSPECTION

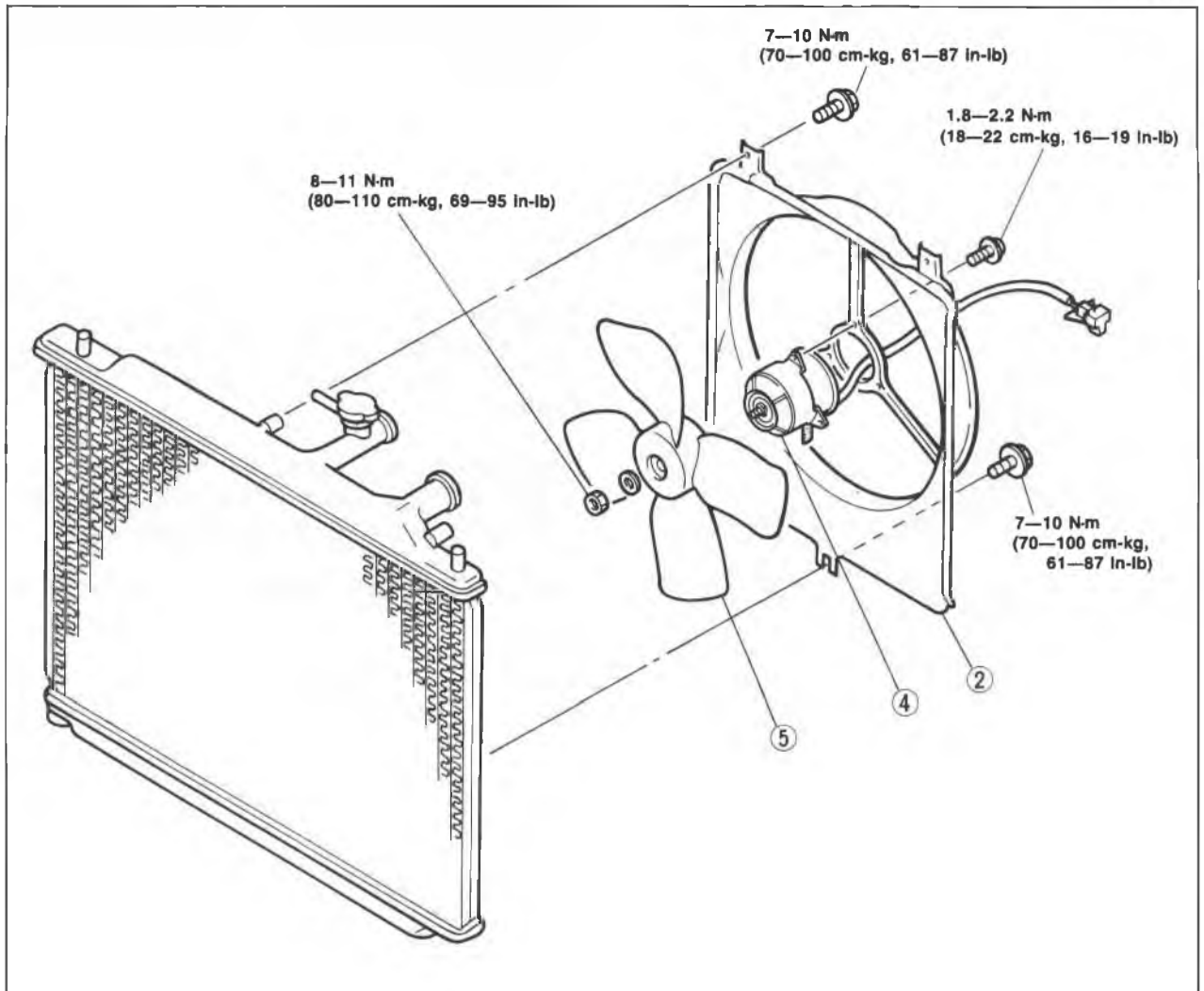
1. Turn the ignition switch ON.
2. Disconnect the water thermo switch connector, and check that the fan operates.
3. If the fan doesn't operate, check the fuse, fan relay, fan motor, thermo switch and wiring harness.



## FAN MOTOR Removal and Installation

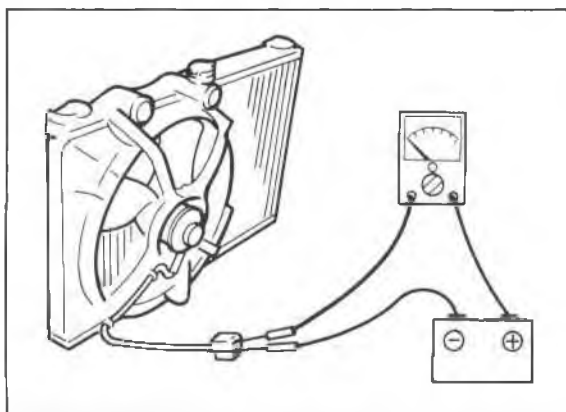
1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

86U03X-021



76G03A-011

1. Cooling fan assembly (Refer to page 3A—7)
2. Cowling
3. Fan
4. Fan motor



76G03A-012

### Inspection

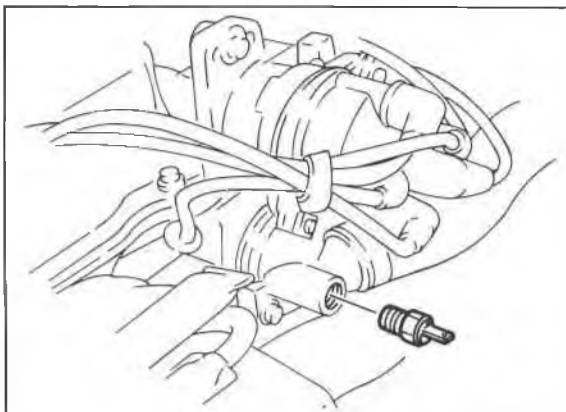
1. Connect an ammeter and battery to the fan motor connectors.
2. Check that the fan motor operates smoothly at the specified current or less.

### Current

**MTX: 5.6—7.6 A**  
**ATX: 8.0—11.0 A**

3. Replace the fan motor if necessary.

## 3A COOLING FAN



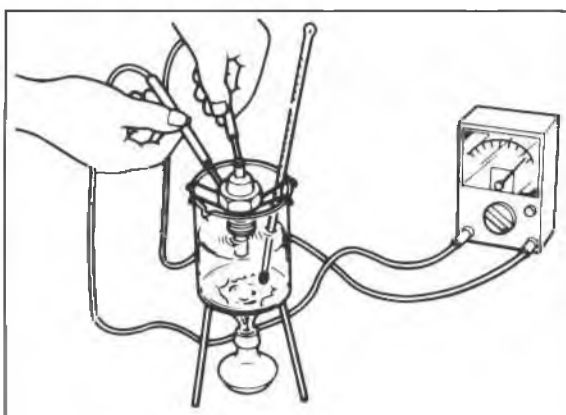
76G03A-013

### WATER THERMO SWITCH

1. Remove the cooling fan water thermo switch.

#### Note

**Make sure that the ignition switch is OFF. If not, the fan will operate when the connector is removed.**



76G03A-014

2. Place the water thermo switch in water.
3. Heat the water gradually, and check for continuity of the switch with an ohmmeter. Replace if necessary.

#### Water thermo switch (ON → OFF):

**97°C (207°F)...ECE, Hong Kong, Singapore**

**91°C (196°F)...General, Middle East**

4. Install the water thermo switch and a new O-ring.

#### Caution

**Do not use sealing tape.**

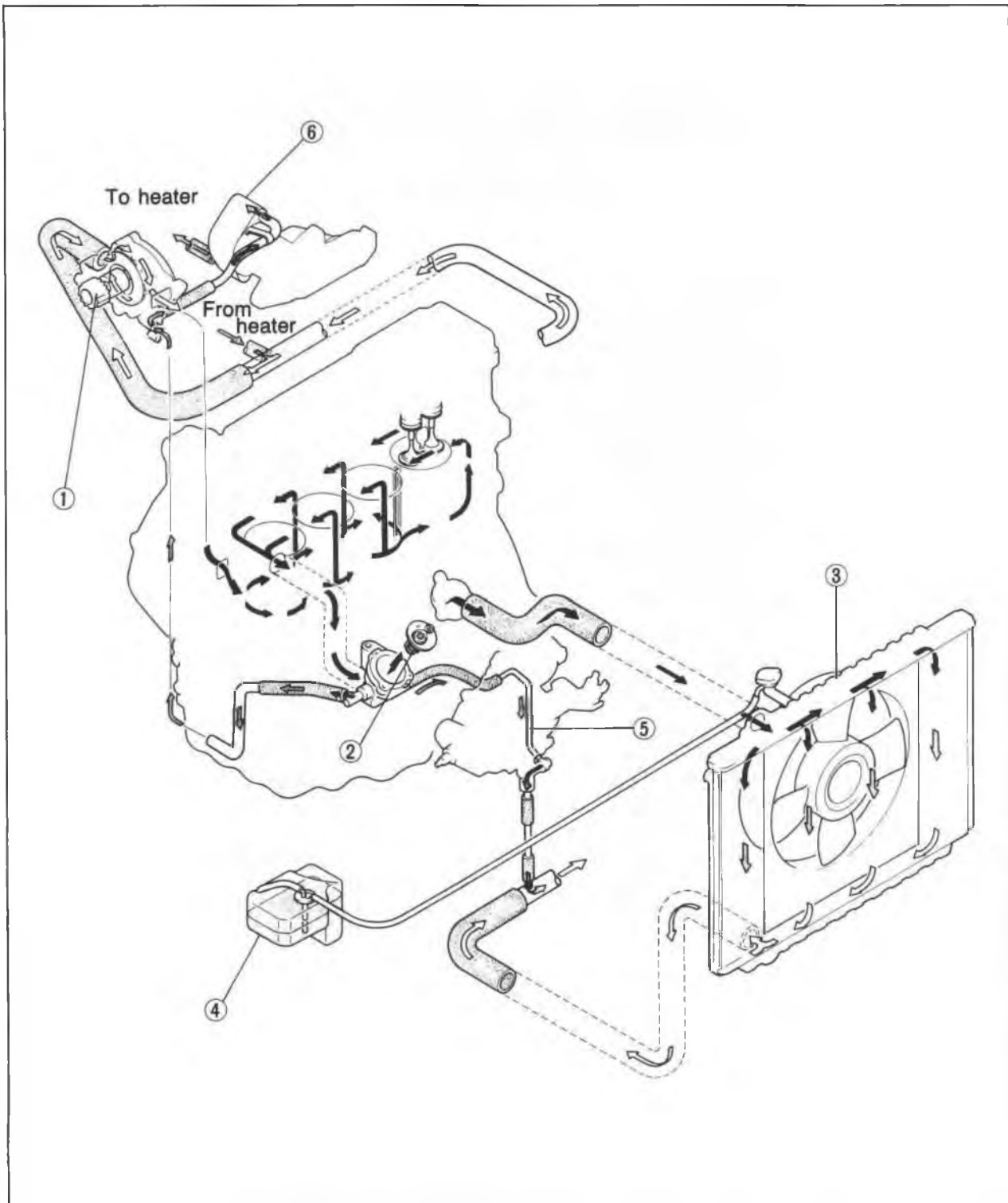
## COOLING SYSTEM (DIESEL)

<b>OUTLINE</b> .....	<b>3B— 2</b>
COOLANT FLOW CHART .....	<b>3B— 2</b>
SPECIFICATIONS.....	<b>3B— 3</b>
<b>TROUBLESHOOTING GUIDE</b> .....	<b>3B— 3</b>
<b>COOLANT</b> .....	<b>3B— 4</b>
INSPECTION.....	<b>3B— 4</b>
REPLACEMENT .....	<b>3B— 4</b>
<b>RADIATOR CAP</b> .....	<b>3B— 5</b>
INSPECTION.....	<b>3B— 5</b>
<b>RADIATOR</b> .....	<b>3B— 6</b>
REMOVAL AND INSTALLATION.....	<b>3B— 6</b>
INSPECTION.....	<b>3B— 6</b>
<b>WATER PUMP</b> .....	<b>3B— 7</b>
REMOVAL .....	<b>3B— 7</b>
INSPECTION.....	<b>3B— 8</b>
INSTALLATION .....	<b>3B— 8</b>
<b>THERMOSTAT</b> .....	<b>3B— 9</b>
REMOVAL .....	<b>3B— 9</b>
INSPECTION.....	<b>3B— 9</b>
INSTALLATION .....	<b>3B— 9</b>
<b>COOLING FAN</b> .....	<b>3B—10</b>
SYSTEM CIRCUIT .....	<b>3B—10</b>
CIRCUIT INSPECTION .....	<b>3B—10</b>
FAN MOTOR .....	<b>3B—11</b>
WATER THERMO SWITCH .....	<b>3B—12</b>

# 3B OUTLINE

## OUTLINE

### COOLANT FLOW CHART



- 1. Water pump
- 2. Thermostat
- 3. Radiator

- 4. Coolant reservoir
- 5. CSD coolant passage
- 6. Oil cooler

76G03B-002

## SPECIFICATIONS

Cooling system		Water-cooled, forced circulation	
Coolant capacity    liters (US qt, Imp qt)		With heater	9.5 (10.0, 8.4)
		Without heater	9.0 (9.5, 7.9)
Water pump	Type	Centrifugal, timing belt driven	
	Water seal	Unified mechanical seal	
Thermostat	Type	Wax, two stage	
	Opening temperature	°C(°F)	Main                      Sub
			86.5—89.5 (188—193)      78.5—81.5 (173—179)
	Full-open temperature	°C(°F)	100 (212)                      100 (212)
	Full-open lift	mm (in)	8.0 (0.31) min.                      1.5 (0.06) min.
Radiator	Type	Corrugated fin	
	Cap valve opening pressure	kPa (kg/cm <sup>2</sup> , psi)	74—103 (0.75—1.05, 11—15)
Cooling fan	Type	Electric	
	Capacity	W	120
	Switching temperature OFF → ON	°C(°F)	91 (196)
	Number of blade		4
	Outer diameter	mm (in)	340 (13.4)

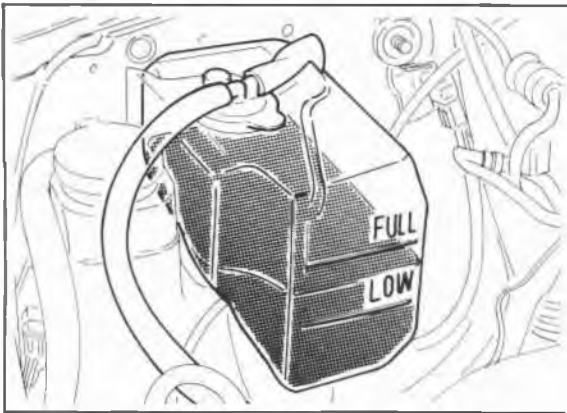
76G03B-003

## TROUBLESHOOTING GUIDE

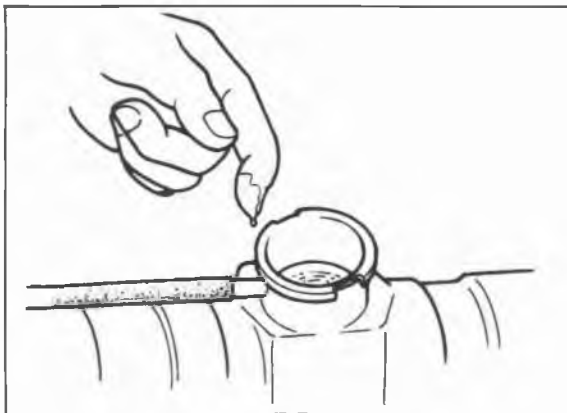
Problem	Possible Cause	Remedy	Page
<b>Overheating</b>	Insufficient coolant	Add	3B— 4
	Coolant leakage	Repair	—
	Radiator fins clogged	Clean	3B— 6
	Radiator cap malfunction	Replace	3B— 5
	Cooling fan malfunction	Repair	3B—11
	Thermostat malfunction	Replace	3B— 9
	Water passage clogged	Clean	3B— 4
Water pump malfunction	Repair or replace	3B— 7	
<b>Corrosion</b>	Impurities in coolant	Replace	3B— 4

76G03B-004

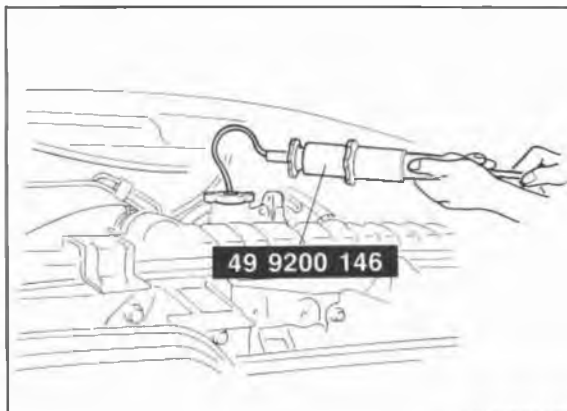
## 3B COOLANT



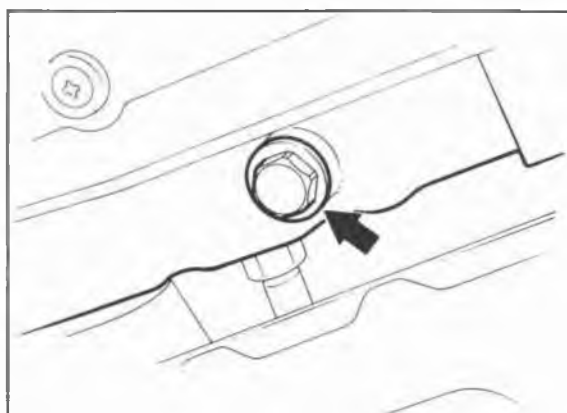
86U03X-004



69G03A-006



86U03X-005



86U03X-006

## COOLANT

### INSPECTION

#### Coolant Level (Engine cold)

1. Check that the coolant level is near the radiator inlet port.
2. Check that the coolant level in the coolant reservoir is between the FULL and Low marks. Add coolant if necessary.

#### Warning

- a) Never remove the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when removing it.

#### Coolant Quality

1. Check that there is no build-up of rust or scales around the radiator cap or radiator filler neck.
2. Check that coolant is free from oil.
3. Replace the coolant, if necessary.

#### Coolant Leakage

1. Connect a tester and **SST** to the radiator inlet port.
2. Apply **103 kPa (1.05 kg/cm<sup>2</sup>, 15 psi)** pressure to the system.
3. Check that the pressure is held. If not, check for coolant leakage.

#### Warning

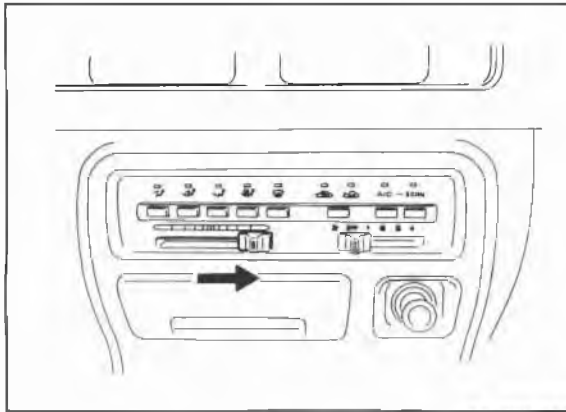
When removing either the radiator cap or the tester, loosen it slowly until the pressure in the radiator is released, and then remove it.

### REPLACEMENT

1. Remove the radiator cap and loosen the drain plug.
2. Drain the coolant into a suitable container.

#### Warning

- a) Never open the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when loosening.
- c) Use caution when draining hot coolant.



86U03X-028

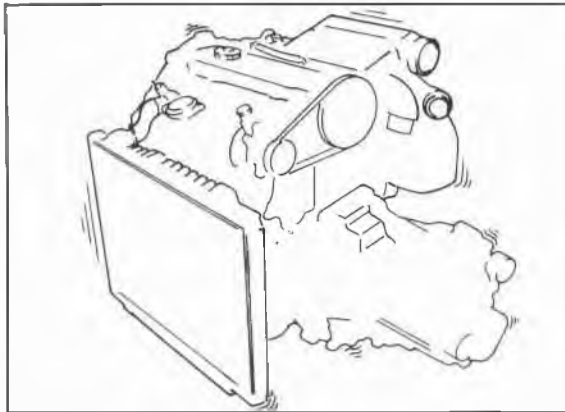
3. Set the heater control switch to the maximum heat position.
4. Flush the cooling system with water until all traces of color are gone, then let the system drain completely.
5. Fill with the proper mixture and amount of ethylene glycol-based coolant.

### Caution

- a) Do not use alcohol- or methanol-based coolant.
- b) Use only soft (demineralized) water in the coolant mixture.

### Anti-freeze solution mixture percentage

Protection	Volume percentage		Gravity at 20°C (68°F)
	Solution	Water	
Above -16°C (3°F)	35	65	1.054
Above -26°C (-15°F)	45	55	1.066
Above -40°C (-40°F)	55	45	1.078



86U03X-007

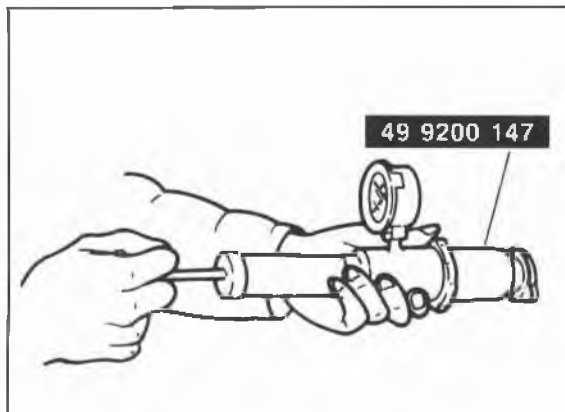
6. Run the engine at idle with the radiator cap removed. Let any air bleed from the system, and add more coolant.
7. Install the radiator cap, and inspect all connections for leakage.

## RADIATOR CAP

### INSPECTION

#### Radiator Cap Valve

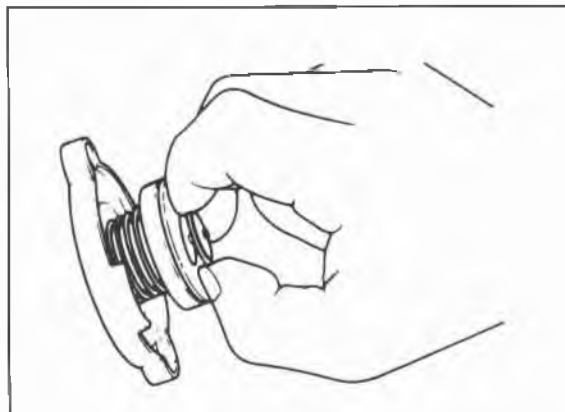
1. Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap to a tester with the **SST**. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm<sup>2</sup>, 11—15 psi)**.
3. Wait about 10 seconds; then check that the pressure has not decreased.



86U03X-008

#### Negative Pressure Valve

1. Pull the negative-pressure valve to open it. Check that it closes completely when released.
2. Check for damage on the contact surfaces, and for cracked or deformed seal packing.
3. Replace the radiator cap if necessary.



86U03X-009

# 3B RADIATOR

## RADIATOR

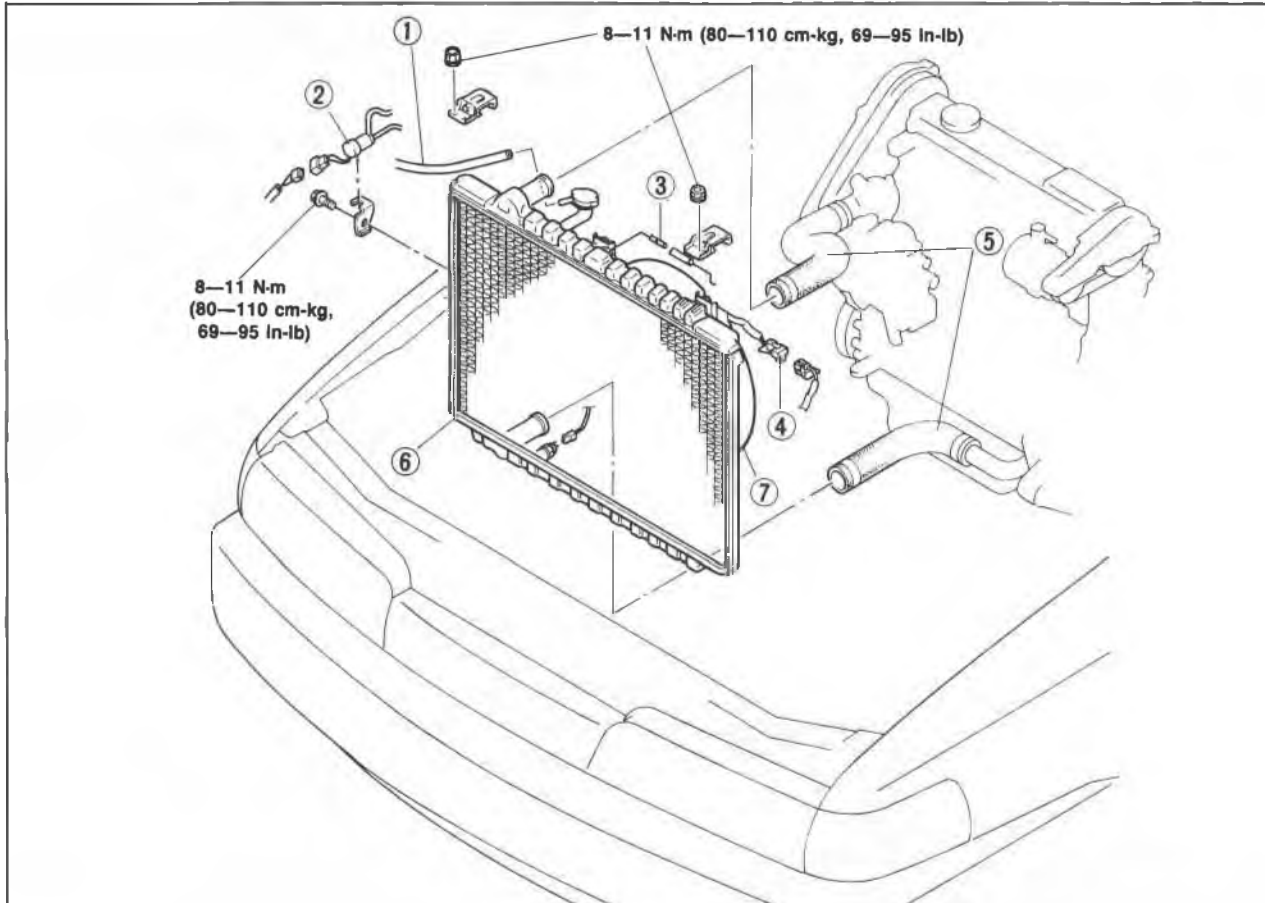
### REMOVAL AND INSTALLATION

1. Drain the engine coolant.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.

#### Note

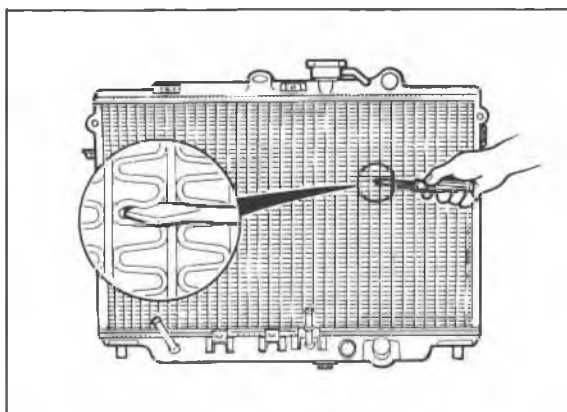
- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

86U03X-010



76G03B-005

- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| 1. Coolant reservoir hose         | 5. Upper and lower radiator hose     |
| 2. Fast idle solenoid             | 6. Cooling fan and radiator assembly |
| 3. Coolant level sensor connector | 7. Cooling fan                       |
| 4. Cooling fan connector          |                                      |



86U03X-012

### INSPECTION

Check the following points. Repair or replace if necessary.

1. Cracks, damage, or water leakage
2. Bent fins (Repair with a screwdriver)
3. Distorted or bent radiator inlet

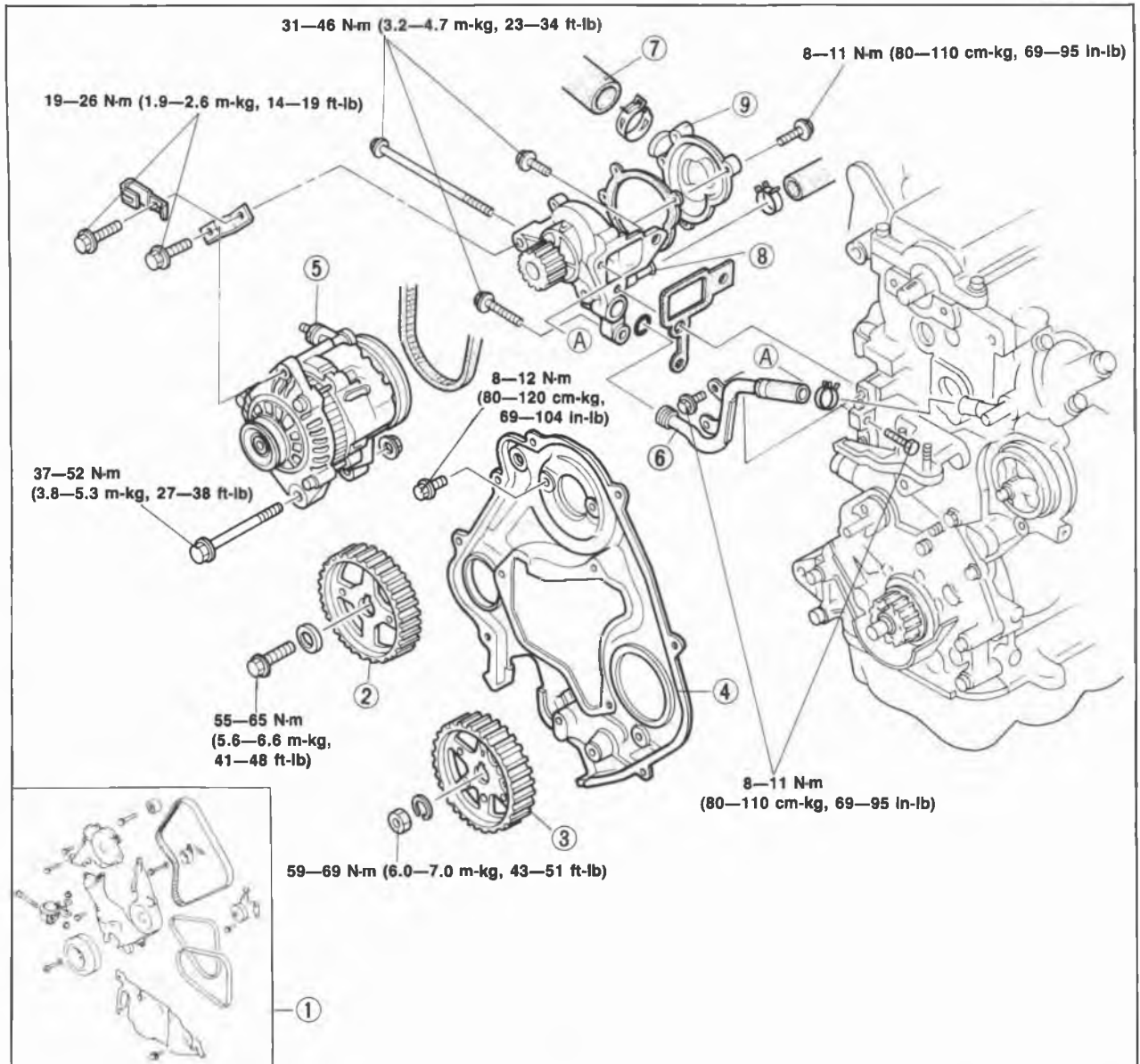


## WATER PUMP

### REMOVAL

1. Disconnect the negative battery cable.
2. Turn the crankshaft so that the No. 1 cylinder is at TDC of compression.
3. Drain the engine coolant.
4. Remove in the sequence shown in the figure.

69G03A-025



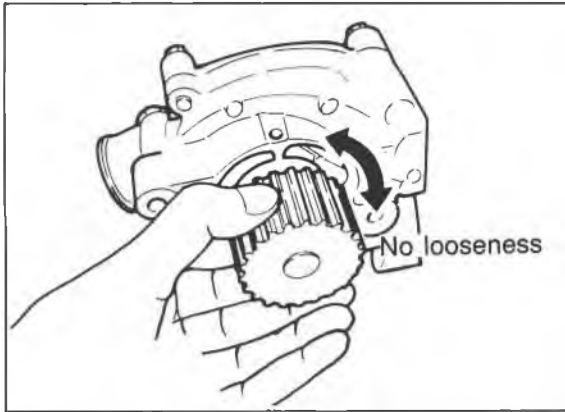
76G03B-006

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Timing belt (Refer to page 1C-11)</li> <li>2. Camshaft pulley (Refer to page 1C-36)</li> <li>3. Injection pump pulley (Refer to page 1C-36)</li> <li>4. Seal plate</li> </ol> | <ol style="list-style-type: none"> <li>5. Alternator</li> <li>6. Water pipe</li> <li>7. Water hose</li> <li>8. Water pump body</li> <li>9. Water pump inlet</li> </ol> |
|---|--|

### Note

**Do not disassemble the water pump body, if a problem is found replace it as a unit.**

## 3B WATER PUMP

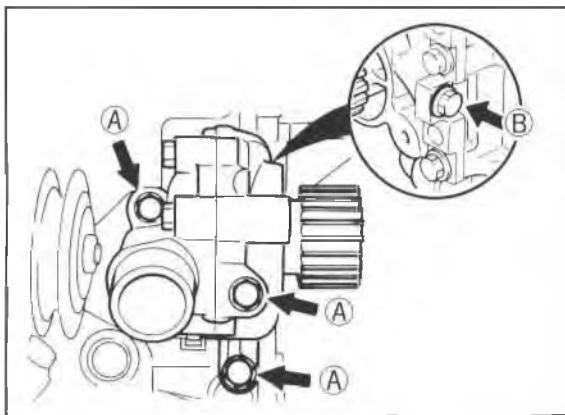


86U03X-014

### INSPECTION

Check the following. Replace the pump if necessary.

1. Cracks or damage
2. Abnormal noise, bearing sticking or loose



76G03B-007

### INSTALLATION

Install in the reverse order of removal referring to the installation note.

#### Installation Note

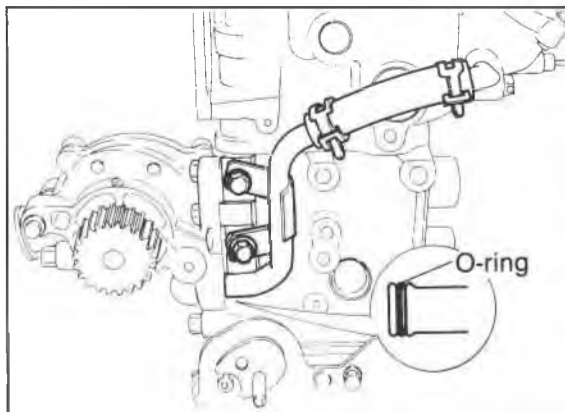
##### Water pump

1. Remove any gasket fragments, dirt or oil from the contact surfaces.
2. Install the water pump and new gasket so that the printed side of the gasket faces the water pump.

#### Tightening torque:

**Bolt A: 31—46 N·m**  
**(3.2—4.7 m·kg, 23—34 ft·lb)**

**Bolt B: 8—11 N·m**  
**(80—110 cm·kg, 69—95 in·lb)**



76G03B-008

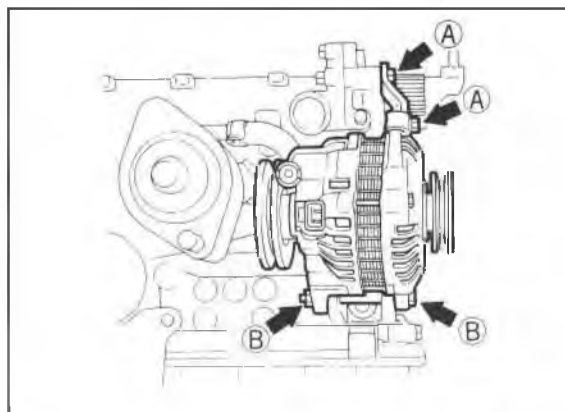
#### Water pipe

1. Apply a coat of vegetable oil to the O-ring.
2. Install the water pipe.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

3. Connect the water hose.



76G03B-009

#### Alternator

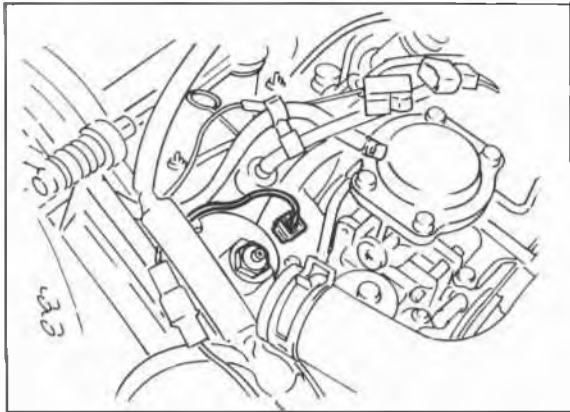
1. Install the alternator.

#### Tightening torque:

**Bolt A: 19—26 N·m**  
**(1.9—2.6 m·kg, 14—19 ft·lb)**

**Bolt B: 37—52 N·m**  
**(3.8—5.3 m·kg, 27—38 ft·lb)**

2. Install the alternator drive belt and Comperx supercharger drive belt, and adjust the belt deflection. (Refer to page 1C—7)

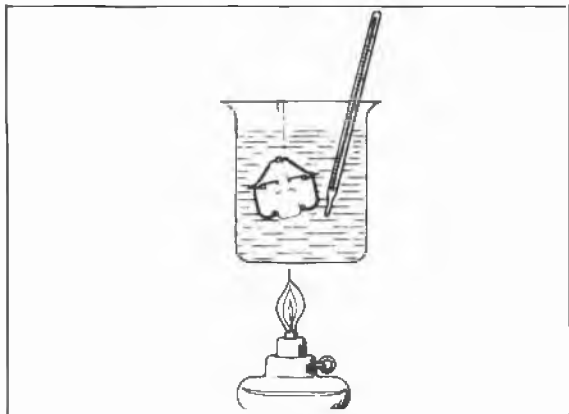


76G03B-010

## THERMOSTAT

### REMOVAL

1. Drain the engine coolant.
2. Disconnect the upper radiator hose, and water thermo switch connector.
3. Remove the thermostat cover.
4. Remove the thermostat.



76G03B-011

### INSPECTION

Check the thermostat. Replace if necessary.

1. Visually check that the valve is airtight.
2. Place the thermostat and a thermometer in water.
3. Gradually heat the water and check the following:

#### Valve opening temperature

**Sub valve : 78.5—81.5°C (173—179°F)**

**Main valve : 86.5—89.5°C (188—193°F)**

#### Full open lift

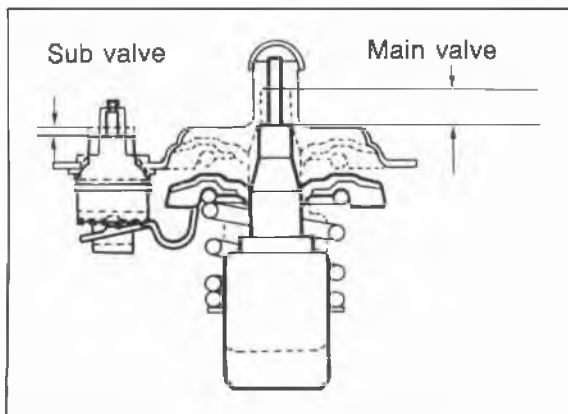
**Sub valve : 1.5 mm (0.06 in) min. at 100°C (212°F)**

**Main valve : 8 mm (0.31 in) min. at 100°C (212°F)**

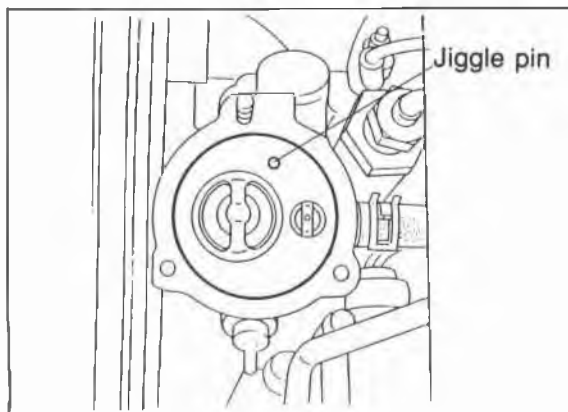
#### Valve closing temperature

**Sub valve : 75°C (167°F)**

**Main valve : 83°C (181°F)**



69G03B-012



76G03B-012

### INSTALLATION

1. Install the thermostat into the thermostat case with jiggle pin at the top.
2. Install a new gasket with the seal print side facing the thermostat case.
3. Install the thermostat cover.

#### Tightening torque:

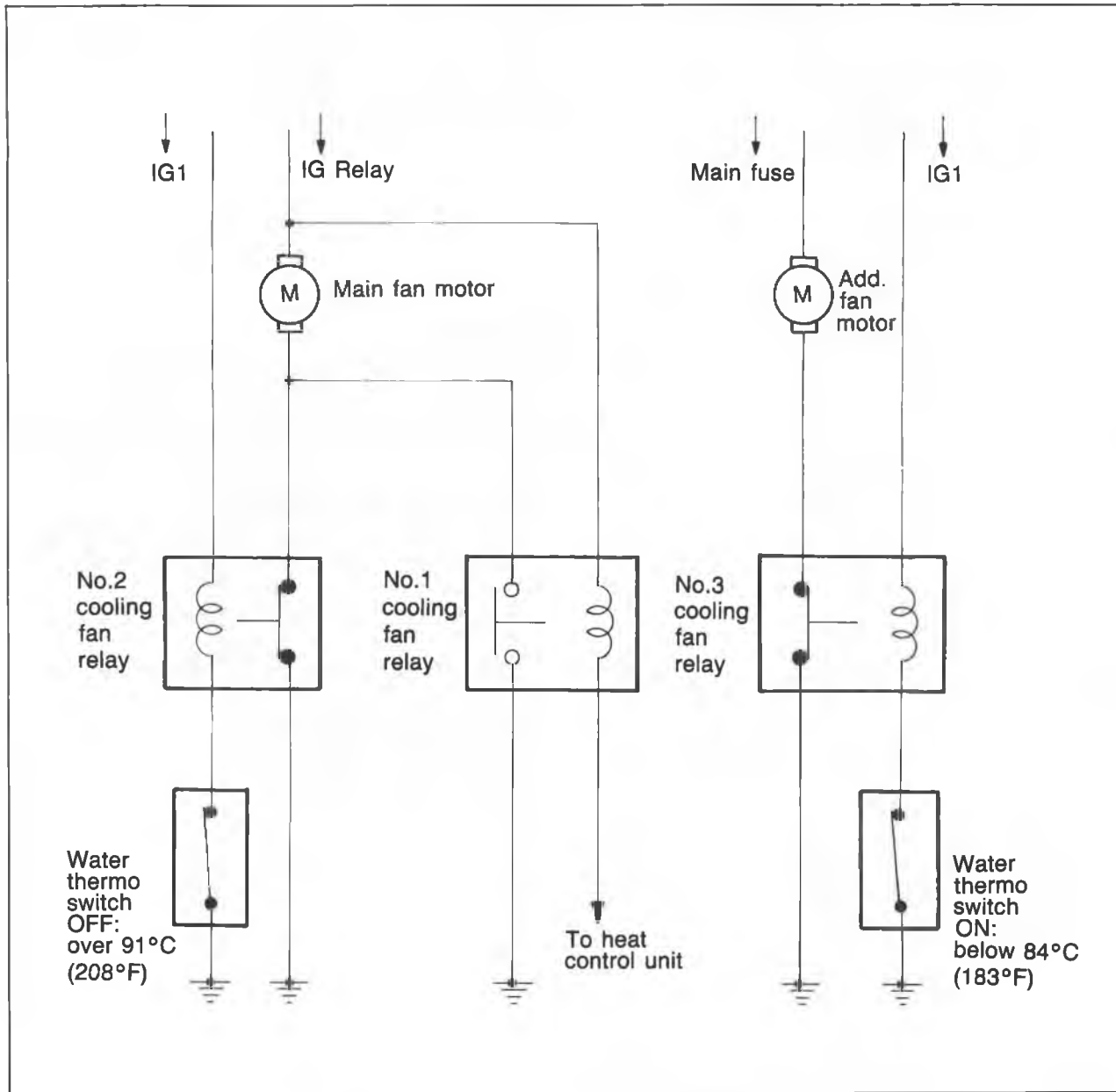
**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**

4. Install the upper radiator hose and water thermo switch connector.
5. Replenish the coolant.
6. Start the engine and check for leaks.

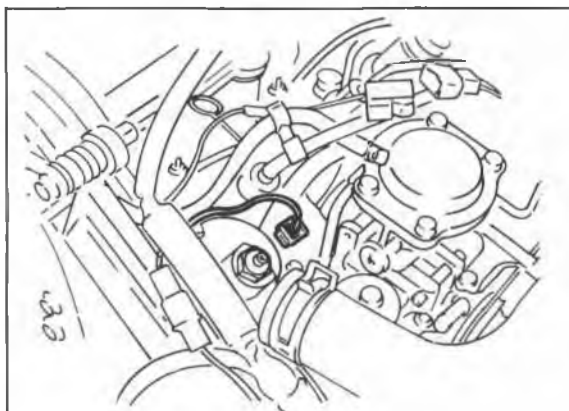
# 3B COOLING FAN

## COOLING FAN

### SYSTEM CIRCUIT



76G03B-015



76G03B-016

### CIRCUIT INSPECTION

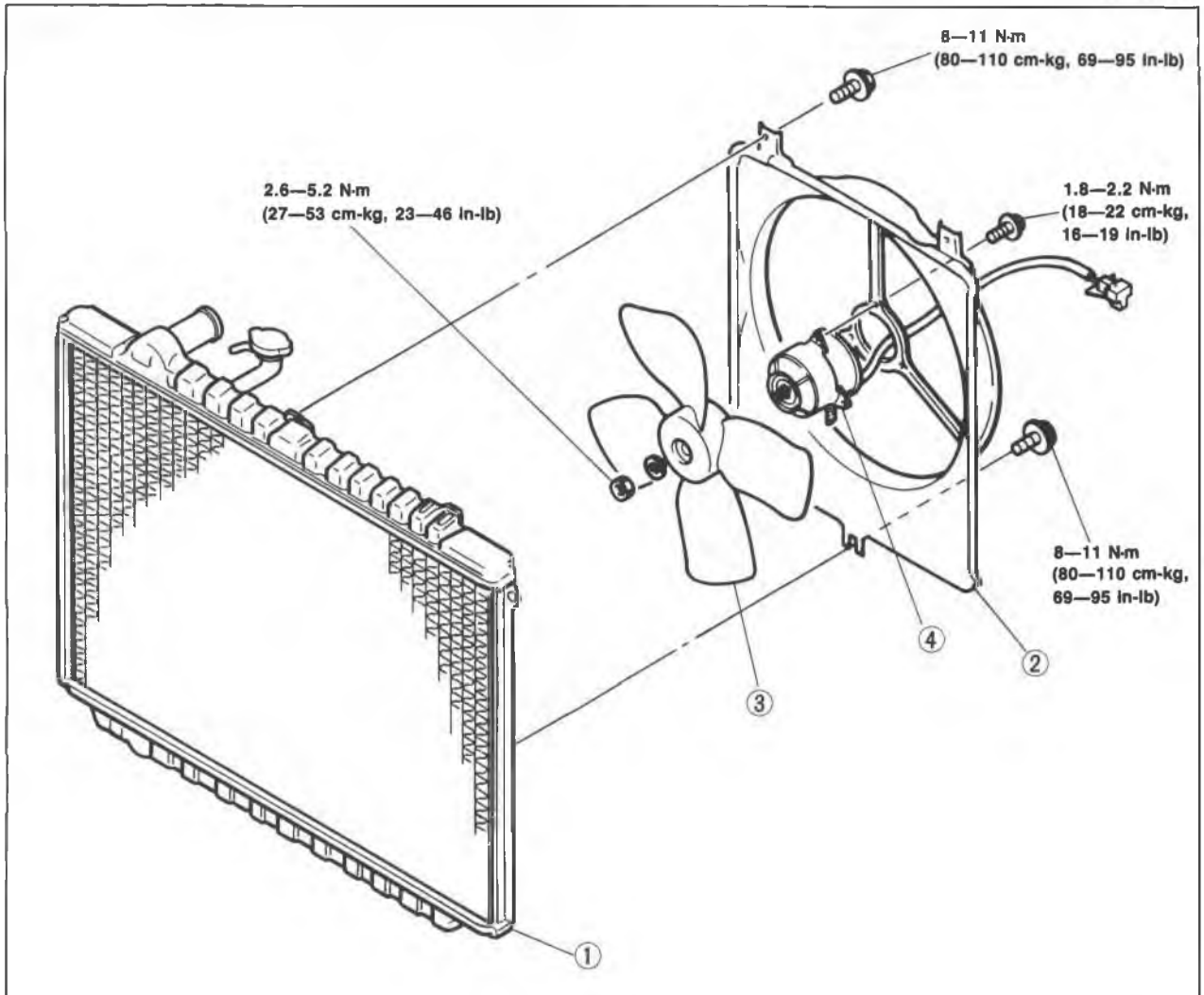
1. Turn the ignition switch ON.
2. Disconnect the water thermo switch connector, and check that the fan begins to operate.
3. If the fan doesn't operate, check the fuse, fan relay, fan motor, thermo switch, and wiring harness.

## FAN MOTOR

### Removal and Installation

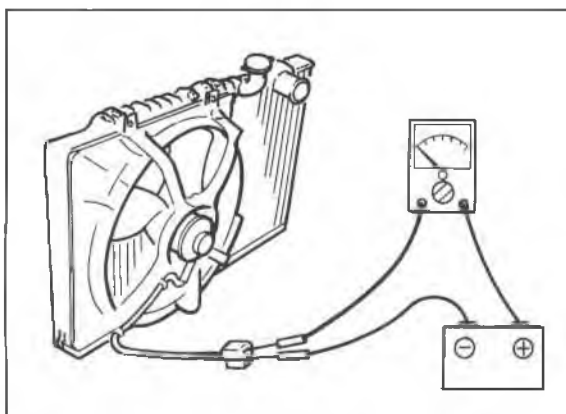
1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

86U03X-021



76G03B-013

- |  |              |
|--|--------------|
| 1. Cooling fan assembly (Refer to page 3B—6) | 3. Fan       |
| 2. Cowling                                   | 4. Fan motor |



76G03B-014

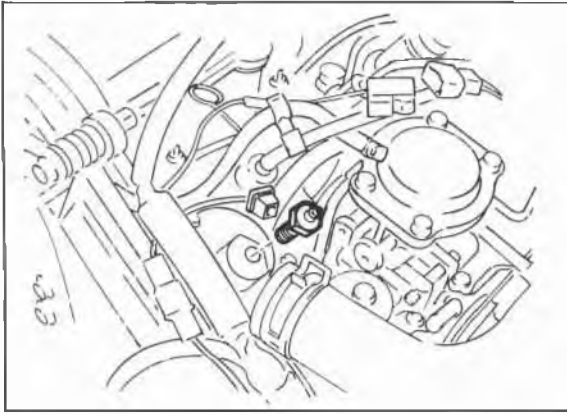
### Inspection

1. Connect an ammeter and battery to the fan motor connectors.
2. Check that the fan motor operates smoothly at the specified current or less.

**Current**  
**8.0—11.0 Amperes**

3. Replace the fan motor if necessary.

## 3B COOLING FAN



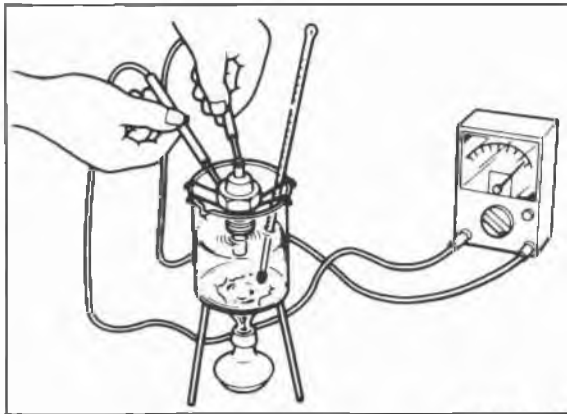
76G03B-017

### WATER THERMO SWITCH

1. Remove the cooling fan water thermo switch.

#### Note

**Make sure that the ignition switch is OFF. If not, the fan will operate when the connector is removed.**



76G03B-018

2. Place the water thermo switch in water.
3. Heat the water gradually, and check for continuity of the switch with an ohmmeter. Replace if necessary.

Temperature	Continuity
Above 91°C (208°F)	No
Below 84°C (183°F)	Yes

4. Install the water thermo switch and a new O-ring.

#### Tightening torque:

**6—9 N·m (60—90 cm·kg, 52—78 in·lb)**

#### Caution

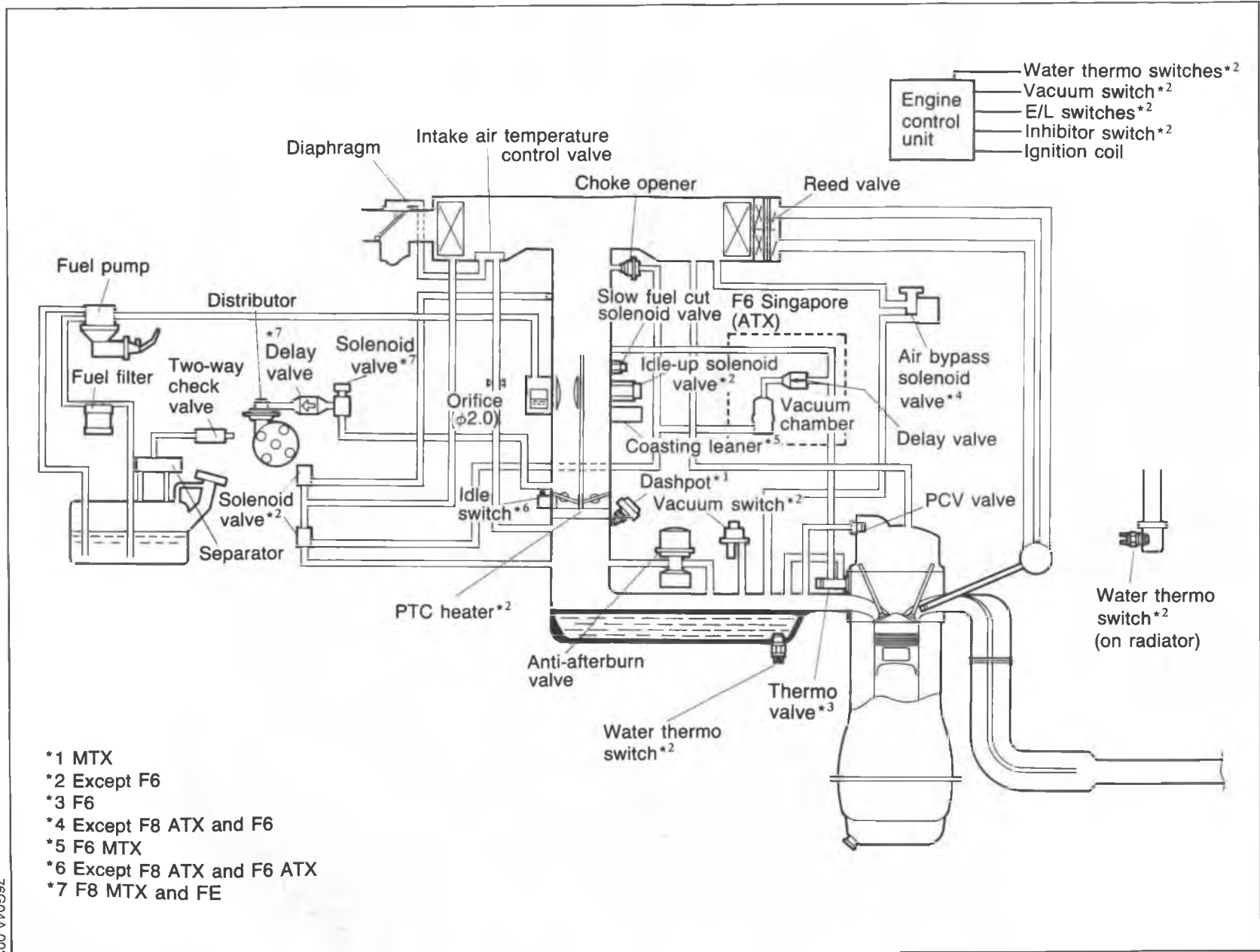
**Do not use sealing tape.**

# FUEL AND EMISSION CONTROL SYSTEMS (CARBURETOR)

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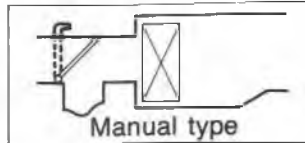
## OUTLINE

### SYSTEM DIAGRAM ECE, Hong Kong, and Singapore



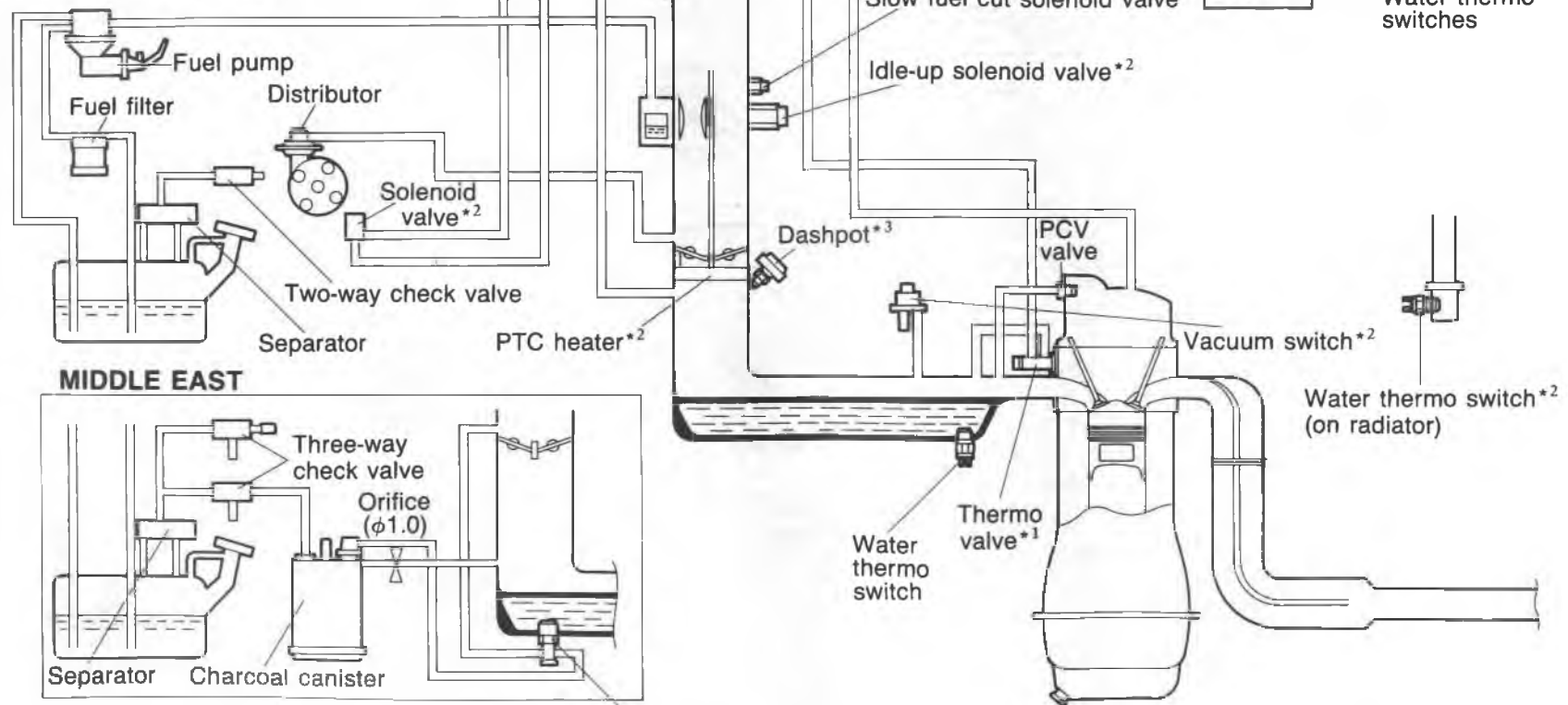


**FE MIDDLE EAST  
F6 GENERAL**

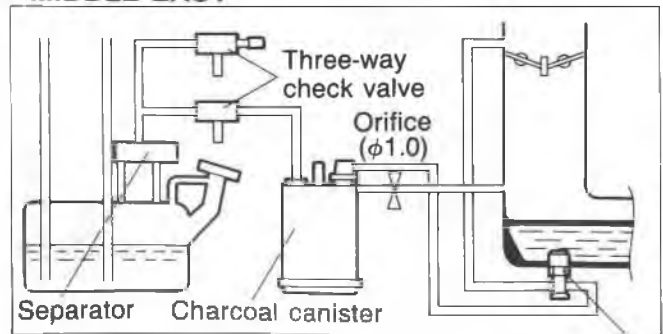


Diaphragm\*<sup>2</sup> Intake air temperature control valve\*<sup>2</sup> Choke opener\*<sup>1</sup>

Engine control unit\*<sup>2</sup>  
 Vacuum switch  
 E/L switch  
 Inhibitor switch\*<sup>4</sup>  
 Water thermo switches

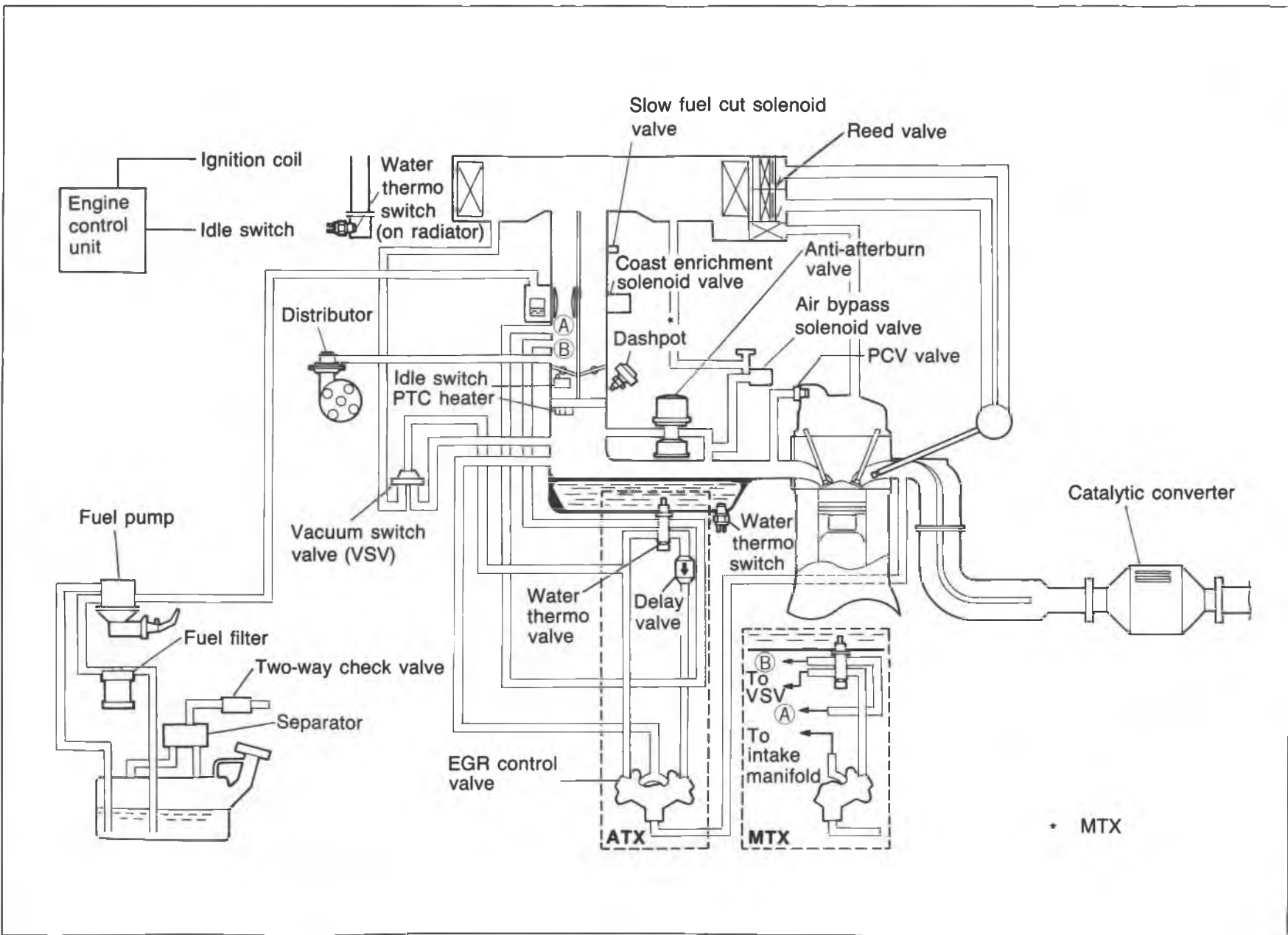


**MIDDLE EAST**

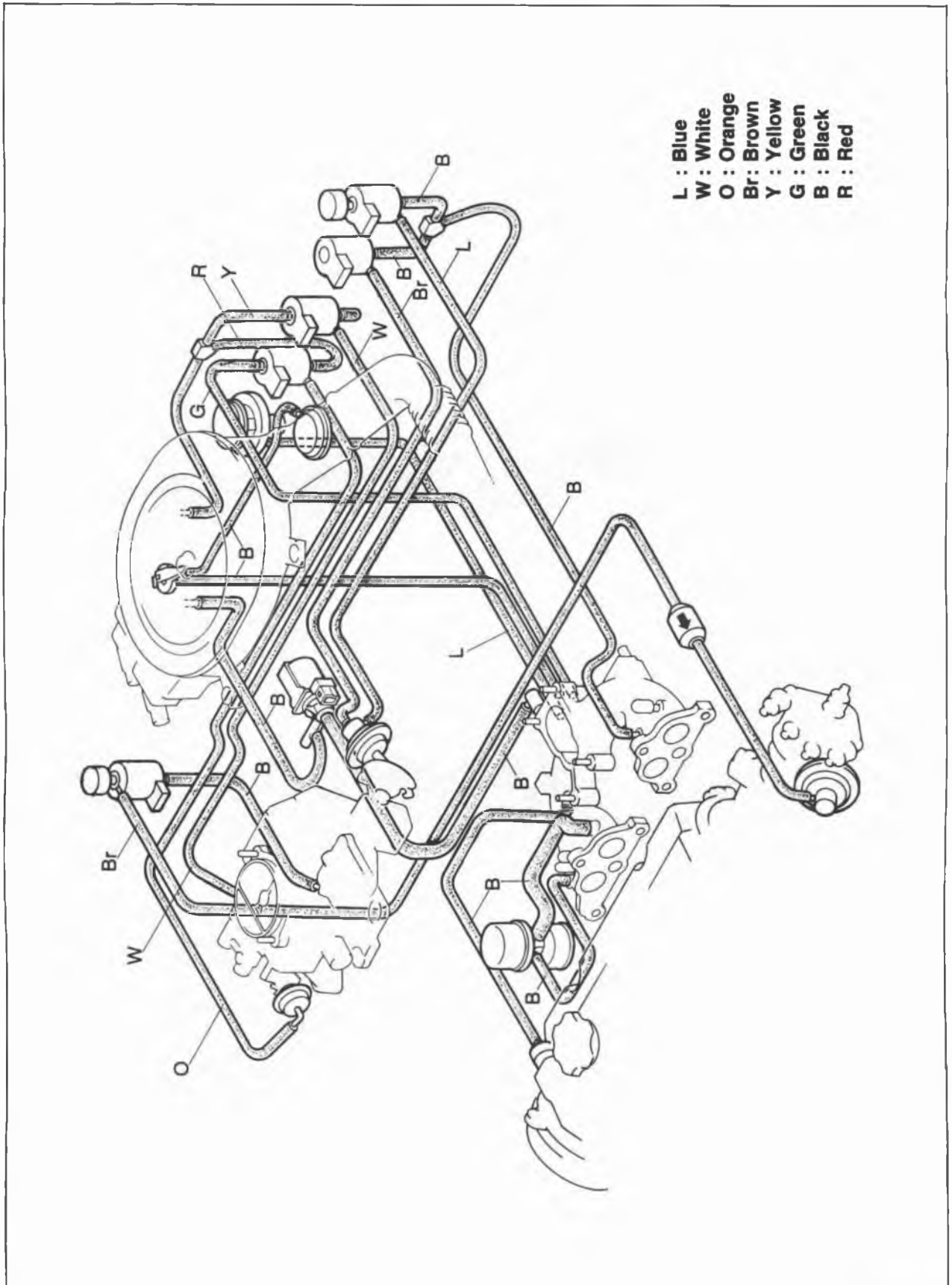


Water thermo valve

- \*1 Middle East
- \*2 FE and F8 General
- \*3 Middle East MTX
- \*4 ATX

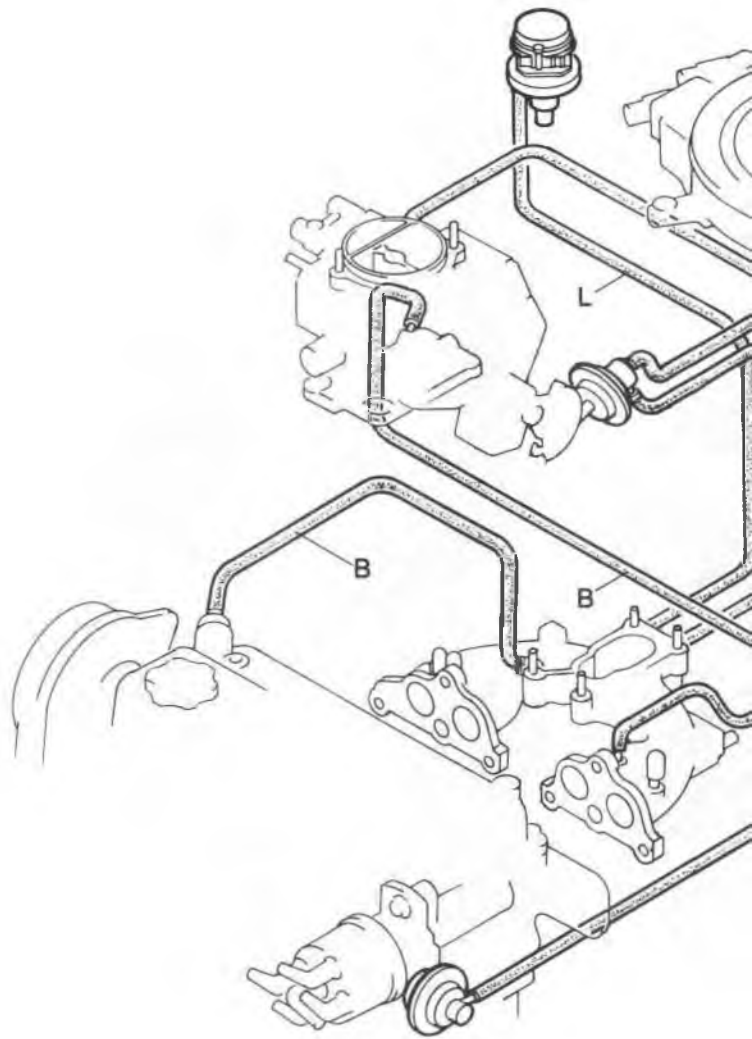


## VACUUM HOSE ROUTING DIAGRAM ECE, Hong Kong, and Singapore



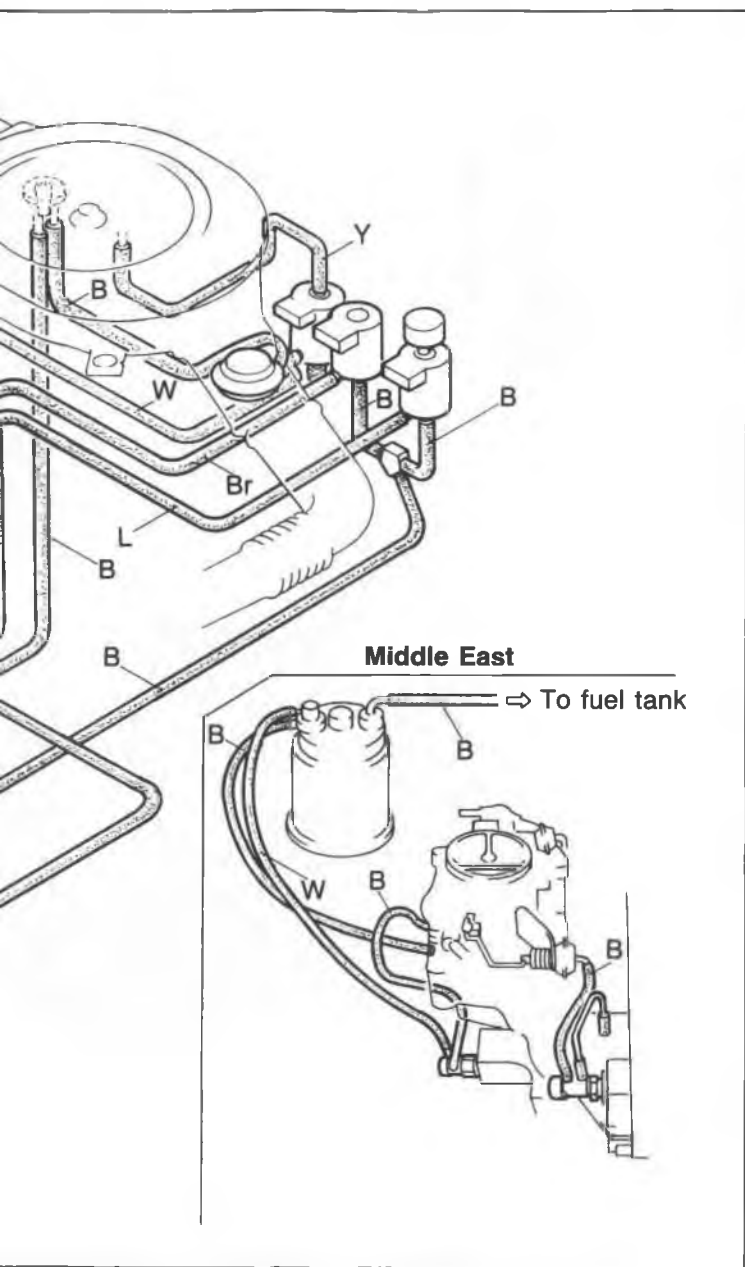
76G04A-005

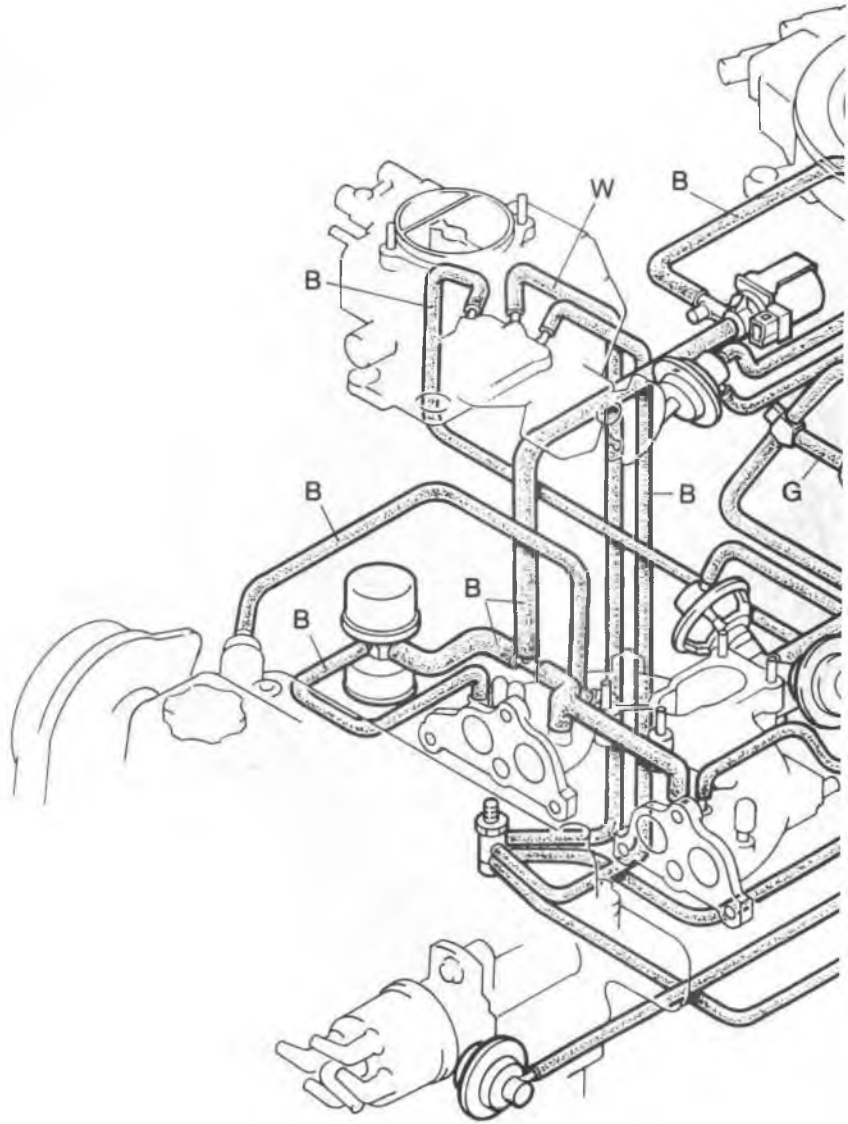
**L : Blue**  
**W : White**  
**Y : Yellow**  
**Br : Brown**  
**B : Black**



# 4A OUTLINE

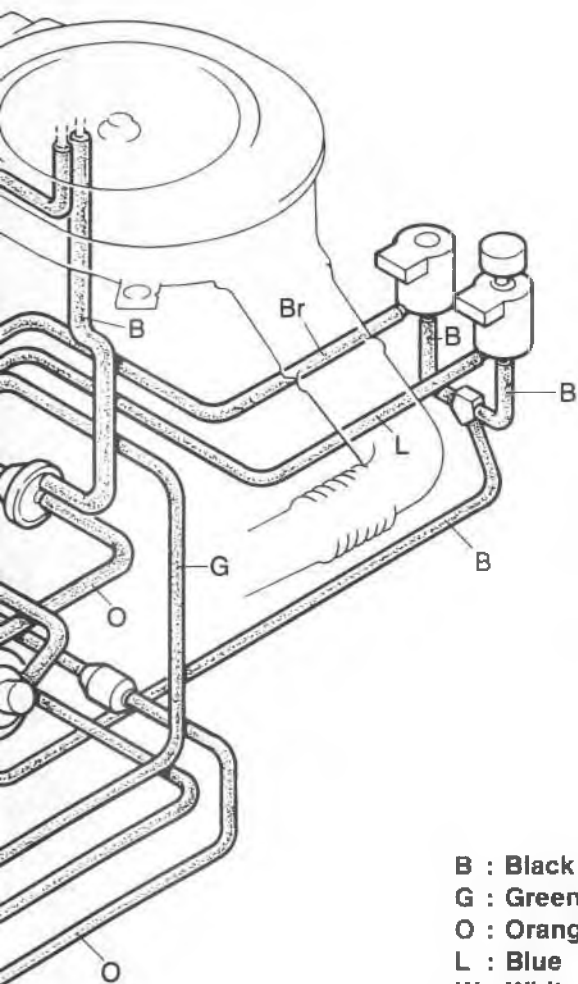
General and Middle East





76G04A-007

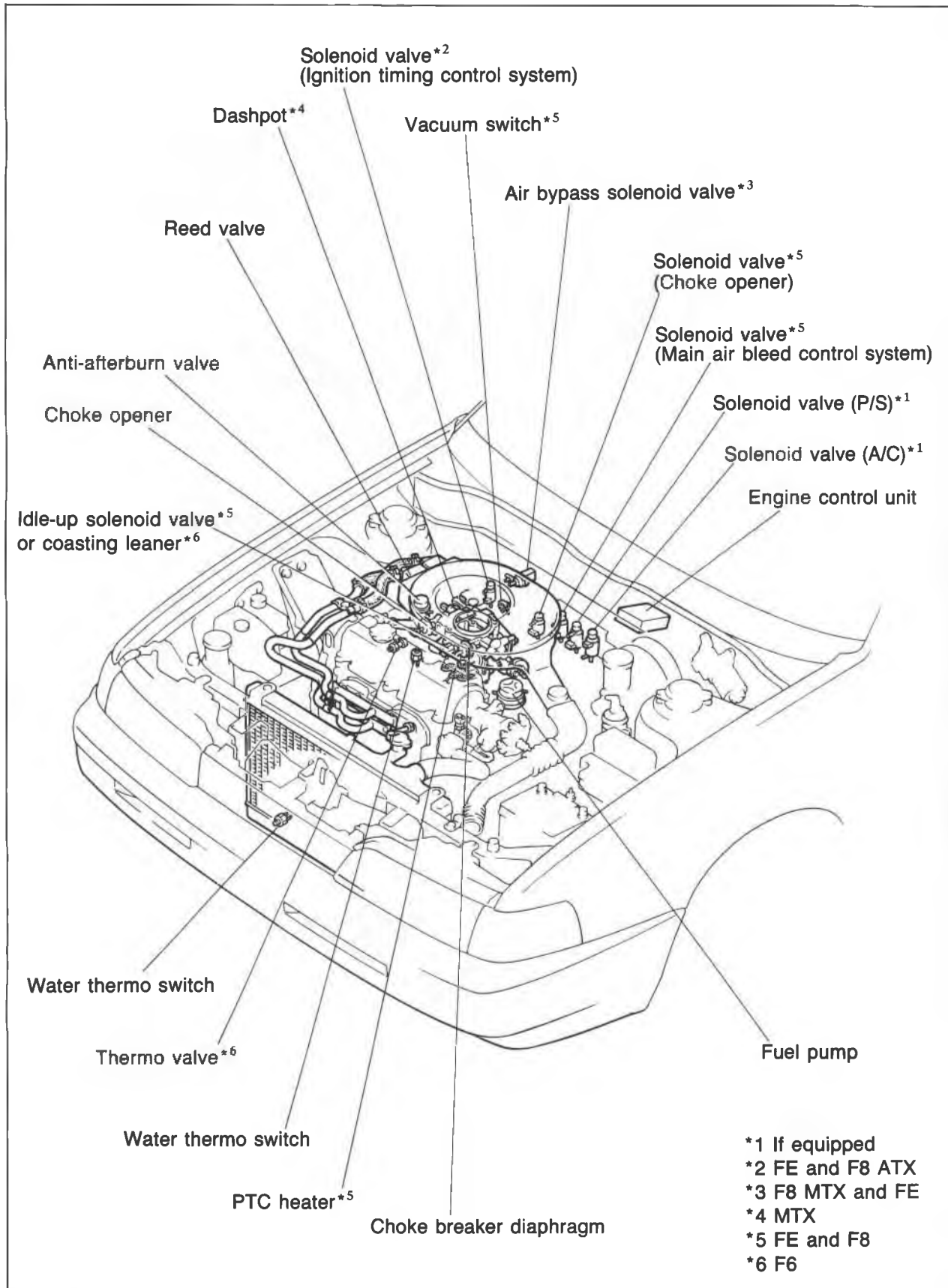
**FE 8 Valve—Unleaded Fuel**



- B : Black**
- G : Green**
- O : Orange**
- L : Blue**
- W : White**
- Br : Brown**

# 4A OUTLINE

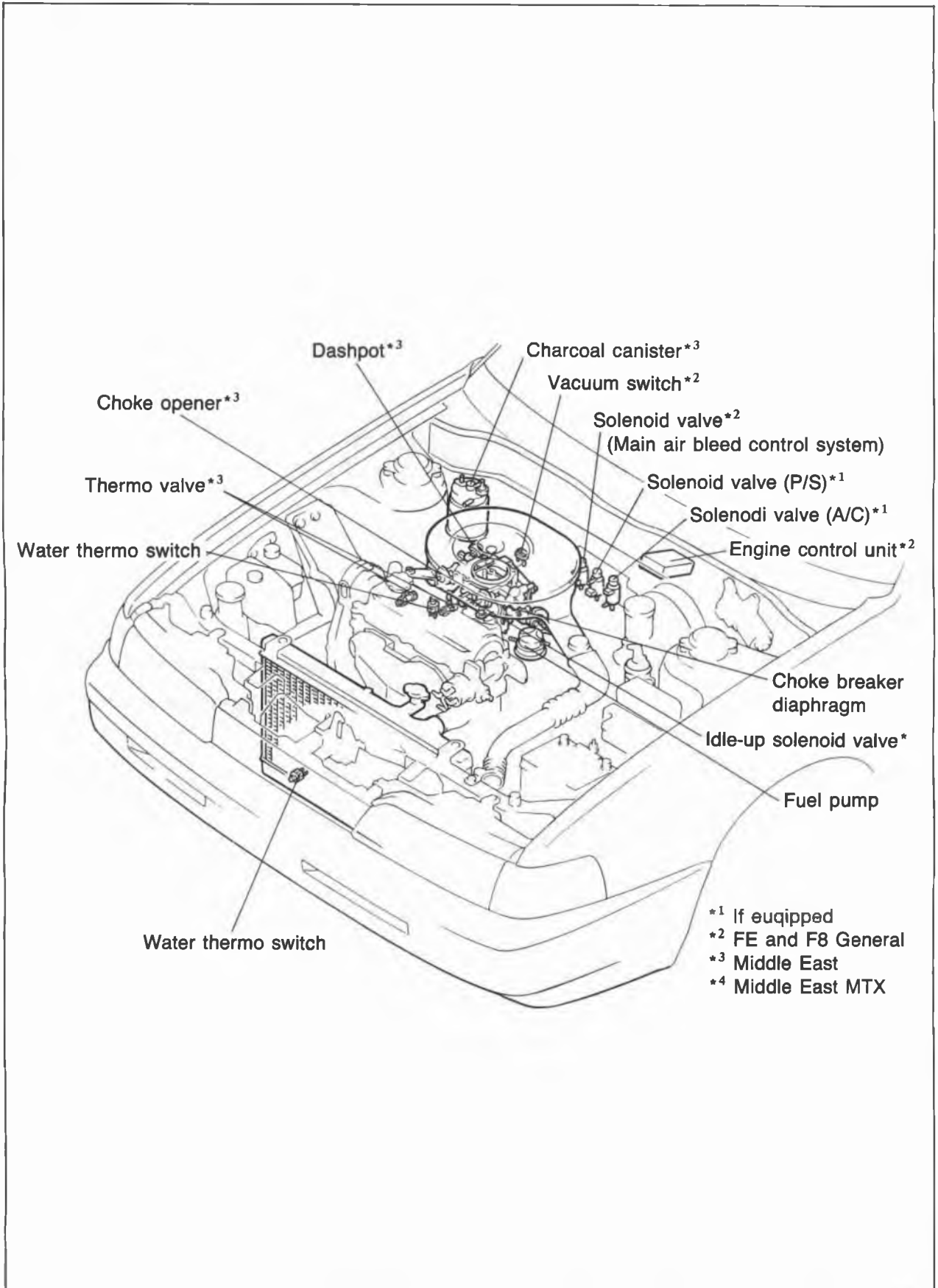
## EMISSION COMPONENTS LOCATION ECE, Hong Kong, and Singapore



76G04A-008



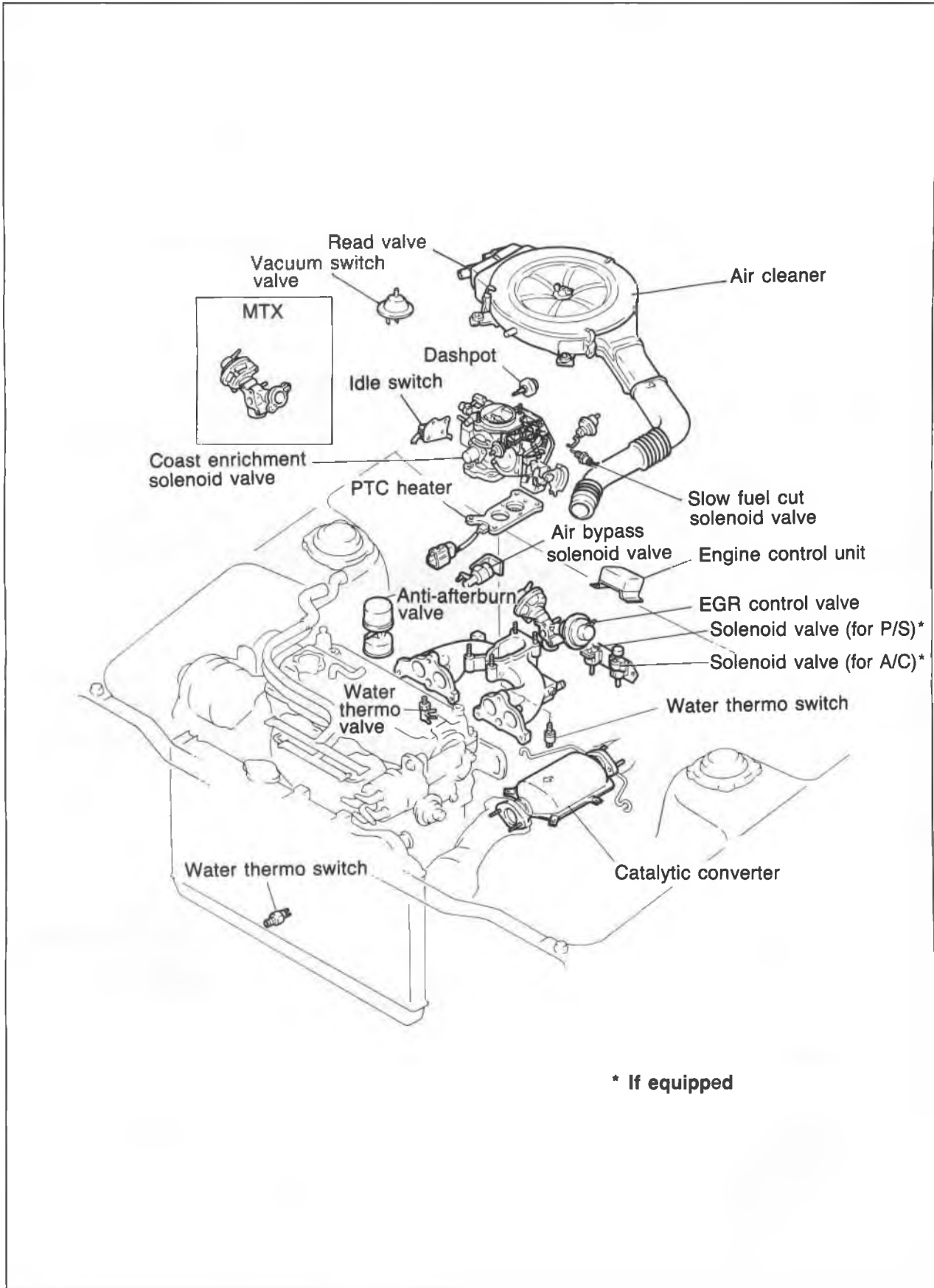
## General and Middle East



76G04A-009

# 4A OUTLINE

## FE 8Valve—Unleaded Fuel

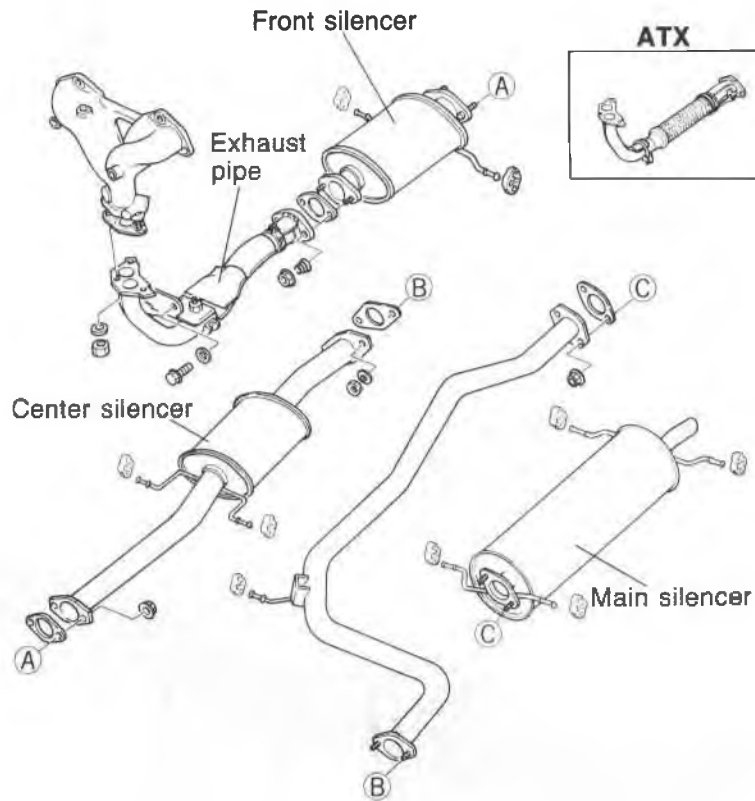


\* If equipped

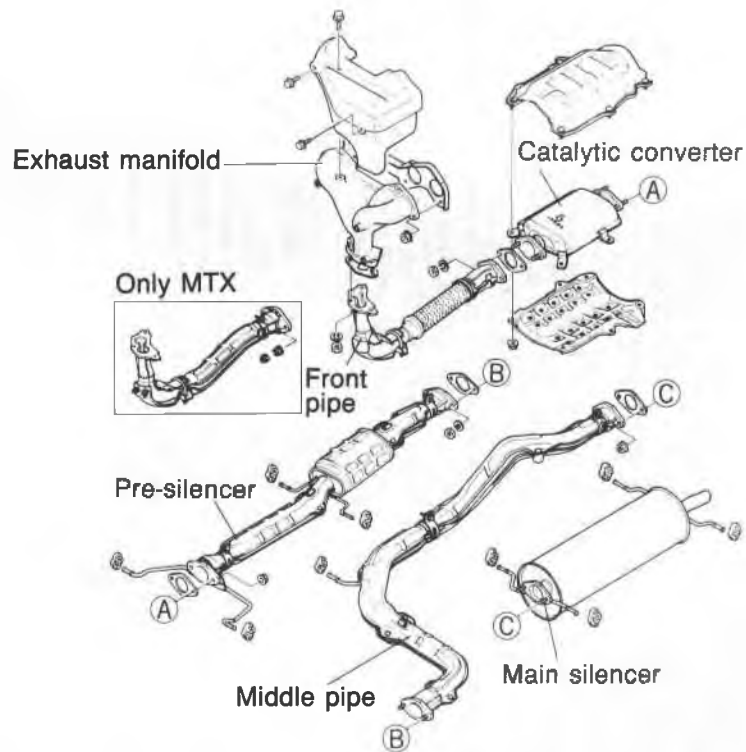
76G04A-010

Exhaust System

Except FE 8Valve—Unleaded Fuel



FE 8Valve—Unleaded Fuel



Component	Function	Remark	New 626					Previous 626	
			ECE & Hong Kong	General	Middle East	Singapore	FE 8 Valve Unleaded fuel	Leaded fuel	Unleaded fuel
Anti-afterburn Valve	Supplies fresh air to intake manifold during deceleration to prevent afterburn in exhaust system	Operated by intake manifold vacuum	○	X	X	○	○	○	○
Air Bypass Solenoid Valve	Supplies fresh air to intake manifold during deceleration.		○*1	X	X	○*1	○	X	○
Catalytic Converter	Reduce HC, CO and NOx by chemical reaction.	Mondolithic type	X	X	X	X	○	X	○
Charcoal Canister	Stores fuel tank and carburetor vapors while engine stopped.		X	X	○	X	X	X	X
Choke Opener	Opens choke valve to prevent over-rich air/fuel mixture.		○	X	○	○	X	○	X
Choke Magnet	Cancels manual choke to prevent over-rich air/fuel mixture.	• Operation: Coolant temperature more than <b>67°C (153°F)</b>	X	○ (F6)	○	X	○	X	○
Coasting Leaner	Supplies fresh air to under secondary throttle valve to prevent afterburn in exhaust system.	Operation: Engine speed more than <b>approx. 2,100 rpm</b> and idle switch ON.	X	X	X	○ (F6 MTX)	X	○	X
Choke Braker Diaphragm	Opens choke valve to prevent over-rich air/fuel mixture.	Operation: While engine running.	○	○	○	○	○	○	○
Coast Enrichment Solenoid valve	Opens fuel passage to secondary stage of carburetor during deceleration to prevent catalytic converter overheating.	• Operation: Idle switch ON and engine speed during <b>1,500—2,300 rpm</b>	X	X	X	X	○	X	○

\*1 F8 MTX and FE

○: Equipped  
X: Not equipped

## COMPONENT DESCRIPTIONS

## 4A OUTLINE

Component	Function	Remark	New 626					Previous 626	
			ECE & Hong Kong	General	Middle East	Singapore	FE 8 Valve Unleaded fuel	Leaded fuel	Unleaded fuel
Dashpot	Allows throttle to gradually close during deceleration. Reduces CO and HC emission.	<ul style="list-style-type: none"> <li>Adjustment speed: <b>2,200 ± 100 rpm</b> (in neutral).</li> <li>MTX</li> </ul>	○	X	○	○	○	○	○
Engine Control Unit	Detects electrical signal from input devices and controls output devices.		○	○ (FE & F8)	X	○	○	X	○
EGR Control Valve	Supplies exhaust gas to intake manifold to reduce NOx	<ul style="list-style-type: none"> <li>Operation: Coolant temperature more than <b>50°C (122°F)</b>.</li> </ul>	X	X	X	X	○	X	○
Fuel Filter	Filters fuel		○	○	○	○	○	○	○
Fuel Pump	Provides fuel to carburetor.	Mechanical type	○	○	○	○	○	○	○
Idle Switch	Detects when throttle valve fully closed.	Installed on carburetor.	○*1	X	X	○ <sup>3</sup>	○	○ (MTX)	○
Idle-up Solenoid Valve	Opens fuel passage to secondary stage of carburetor.		○	○ (FE & F8)	X	○ (FE & F8)	X	X	X
Intake Air Temperature Control Valve	Controls shutter valve by intake air temperature.	Improvement of product quality.	○	○ (FE & F8)	X	○	X	X	○
PTC Heater	Prevents carburetor icing.		○	○ (FE & F8)	X	○ (FE & F8)	○	X	○
Reed Valve	Supplies fresh air to exhaust manifold to reduce CO and HC emissions.		○	X	X	○	○	○	○
Separator	Prevents fuel from flowing into two-way or three-way check valve		○	○	○	○	○	X	X

\*1 F8 MTX and FE

\*2 Except F6 ATX

\*3 F6 MTX, F8 MTX, and FE

○: Equipped

X: Not equipped

Component	Function		Remark	New 626					Previous 626	
				ECE & Hong Kong	General	Middle East	Singapore	FE 8 Valve Unleaded fuel	Leaded fuel	Unleaded fuel
Slow Fuel Cut Solenoid Valve	Closes primary fuel line	Prevents run-on.	Operation: Ignition switch OFF.	○	○	○	○	X	X	X
		• Prevents run-on. • Prevents catalytic converter overheating.	Operation: • Ignition switch OFF. • Engine speed more than <b>2,300 rpm</b> on deceleration.	X	X	X	X	○	X	○
Two-way Check Valve	Releases excessive pressure or vacuum in fuel tank to atmosphere.			○	○	X	○	○	X	○
Thermo Valve	Opens vacuum port based on engine coolant temperature.		Opens when: More than <b>50°C (122°F)</b>	X	X	○	X	○	X	○
	Opens vacuum port by engine compartment temperature.		Opens when: More than <b>17°C (63°F)</b>	X	X	○	○ (F6)	X	○	X
Three-way Check Valve	Controls pressure in fuel tank.			X	X	○	X	X	X	X
Vacuum Chamber	Stores vacuum to stabilize intake manifold vacuum.			X	X	X	○ (F6 ATX)	X	○	X
Vacuum Switch	Detects intake manifold vacuum.		Controls operation of main air bleed control system.	○	○	X	○ (FE & F8)	X	X	X
Solenoid Valve (Ignition timing control system)	Controls vacuum to distributor vacuum advance diaphragm.		Operation: Radiator coolant temperature more than <b>17°C (63°F)</b> ; engine coolant temperature less than <b>72°C (162°F)</b> ; engine speed less than <b>approx. 2,300 rpm</b> , and ingear condition.	○ (ATX)	X	X	○ (FE & F8 ATX)	X	X	X
Solenoid Valve (Main air bleed control system)	Opens vacuum port to primary main air bleed.		Opens when: Radiator coolant temperature <b>more than 17°C (63°F)</b> and intake manifold vacuum <b>more than 300 mmHg (11.8 inHg)...MTX, 200 mmHg (7.9 inHg)...ATX)</b>	○	○	X	○ (FE & F8)	X	X	X
Water Thermo Switch (Intake manifold)	Detects engine coolant temperature.		Turned off when: More than <b>67°C (153°F)</b> <sup>*4</sup> , or More than <b>72°C (162°F)</b> <sup>*5</sup>	○	○	○	○ (FE & F8)	○	X	○
Water Thermo Switch (Radiator)	Detects radiator coolant temperature		Turned off when: More than <b>17°C (63°F)</b>	○	○ (FE & F8)	X	○ (FE & F8)	○	X	○

\*4 Middle East, F6 General, and FE 8 Valve—Unleaded fuel

\*5 FE and F8 (General, ECE, Hong Kong, and Singapore)

○ : Equipped  
X : Not equipped

## SPECIFICATIONS F6 & F8 Engine

Engine			F6		F8		
Specification			General	Singapore	General	ECE, Hong Kong, & Singapore	
Idle speed	rpm	MTX	800 <sup>+5%</sup>				
		ATX	950 <sup>+5%</sup> (in N range)		900 <sup>+5%</sup> (in N range)		
CO concentration		%	2.0 ± 0.5 (Without secondary air injection)				
<b>Carburetor</b>							
Type			Down draft, two barrel				
Throat diameter	mm (in)	Primary	30 (1.18)				
		Secondary	34 (1.34)				
Venturi diameter	mm (in)	Primary	23.5 (0.93)				
		Secondary	29.0 (1.14)				
Main nozzle	mm (in)	Primary	2.6 (0.10)				
		Secondary	2.8 (0.11)				
Main jet	mm (in)	Primary	MTX	1.10 (0.0433)	1.09 (0.0429)	1.14 (0.045)	
			ATX		1.08 (0.0425)	1.12 (0.044)	
		Secondary	1.50 (0.059)				
Main air bleed	mm (in)	Primary	MTX	0.60 (0.024)	0.60 (0.024)	0.55 (0.022)	
			ATX		0.80 (0.031)	0.60 (0.024)	
		Secondary	0.50 (0.020)				
Slow jet	mm (in)	Primary	0.48 (0.019)	0.46 (0.018)			
		Secondary	1.00 (0.039)		1.10 (0.043)		
Slow air bleed	mm (in)	Primary	No.1	0.80 (0.031)			
			No.2	1.90 (0.075)			
		Secondary	No.1	1.00 (0.039)		0.80 (0.031)	
			No.2	0.50 (0.020)			
Power jet		mm (in)	0.50 (0.020)				
Fast idle adjustment		mm (in)	1.40—1.76 (0.055—0.069)		MTX: 0.48—0.64 (0.019—0.025) ATX: 0.56—0.72 (0.022—0.028)		
Float level adjustment	mm (in)	Max. fuel flow "L"		44 (17.3)			
		Clearance between float and air horn without gasket					
		Fuel stop "H"		12.5 (0.49)			
Clearance between float and air horn without gasket; float lowered by own weight							
Choke breaker diaphragm	mmHg (inHg)	Start	180—240 (7.1—9.5)		100—160 (3.9—6.3)		
		Stop	290—350 (11.4—13.8)		220—280 (8.7—11.0)		
Choke opener	mmHg (inHg)	Start	35—65 (1.4—2.6)		35—65 (1.4—2.6)		
		Stop	130—190 (5.1—7.5)		130—190 (5.1—7.5)		
<b>Fuel tank capacity</b>		Liters (US gal, Imp gal)	60 (15.9, 13.2)				
<b>Fuel pump</b>							
Delivery pressure	kPa (kg/cm <sup>2</sup> , psi)		20—26 (0.20—0.27, 2.8—3.8)				
Feeding capacity	cc/min (cu in/min)		More than 860 (52.5) at idle				
<b>Fuel filter</b>							
Type			Paper element with magnet				
<b>Air cleaner</b>							
Fresh-Hot switching			Manual	Diaphragm type			
Element type			Oil permeated paper				
Fuel specification			Leaded regular				

76G04A-513

# 4A OUTLINE

## FE Engine

Engine			FE 8Valve		FE 12Valve	FE 8Valve	
Specification			General	Middle East	ECE, Hong Kong, & Singapore	Unleaded fuel	
Idle speed	rpm	MTX	800 $^{+50}_0$			850 $^{+50}_0$	
		ATX	900 $^{+50}_0$ (in N range)				
CO concentration		%	2.0 ± 0.5 (Without secondary air injection)				
<b>Carburetor</b>							
Type		Down draft, two barrel					
Throat diameter	mm (in)	Primary	30 (1.18)				
		Secondary	34 (1.34)				
Venturi diameter	mm (in)	Primary	23.5 (0.93)				
		Secondary	29.0 (1.14)				
Main nozzle	mm (in)	Primary	2.6 (0.10)				
		Secondary	2.8 (0.11)				
Main jet	mm (in)	Primary	MTX	1.14 (0.045)	1.09 (0.0429)	1.14 (0.045)	1.09 (0.0429)
			ATX	1.12 (0.044)	1.08 (0.0425)	1.12 (0.044)	
		Secondary	1.55 (0.061)				1.50 (0.059)
Main air bleed	mm (in)	Primary	MTX	0.50 (0.020)	0.60(0.024)	0.50 (0.020)	0.50 (0.020)
			ATX	0.55 (0.022)	0.80 (0.031)	0.55 (0.022)	
		Secondary	0.50 (0.020)				
Slow jet	mm (in)	Primary	0.46 (0.018)				
		Secondary	1.10 (0.043)	1.00 (0.039)	1.10 (0.043)	0.90 (0.035)	
	ATX	1.00 (0.039)					
Slow air bleed	mm (in)	Primary	No.1	0.80 (0.031)			
			No.2	1.90 (0.075)			
		Secondary	No.1	0.80 (0.031)	1.00 (0.039)	0.80 (0.031)	1.00 (0.039)
			No.2	0.50 (0.020)			
Power jet	mm (in)	MTX	0.50 (0.020)			0.50 (0.020)	
		ATX				0.40 (0.016)	
Fast idle adjustment Clearance between primary throttle valve and bore	mm (in)	MTX	0.48—0.64 (0.019—0.025)	1.40—1.76 (0.055—0.069)	0.48—0.64 (0.019—0.025)	1.40—1.76 (0.055—0.069)	
		ATX	0.56—0.72 (0.022—0.028)		0.56—0.72 (0.022—0.028)		
Float level adjust- ment	mm (in)	Max. fuel flow "L"		44 (17.3)			
		Clearance between float and air horn without gasket					
		Fuel stop "H"		12.5 (0.49)			
Clearance between float and air horn without gasket; float lowered by own weight							
Choke breaker diaphragm	mm-Hg (in-Hg)	Start	100—160 (3.9—6.3)	180—240 (7.1—9.4)	100—160 (3.9—6.3)	180—240 (7.1—9.4)	
		Stop	220—280 (8.7—11.0)	290—350 (11.4—13.8)	220—280 (8.7—11.0)	290—350 (11.4—13.8)	
Choke opener	mmHg (inHg)	Start	80—120 (3.1—8.7)		30—70 (1.2—2.8)		
		Stop	220—280 (8.7—11.0)		130—190 (5.1—7.5)		
<b>Fuel tank capacity</b>	Liters (US gal, Imp gal)		60 (15.9, 13.2)				
<b>Fuel pump</b>							
Delivery pressure	kPa (kg/cm <sup>2</sup> , psi)		20—26 (0.20—0.27, 2.8—3.8)	20—29 (0.20—0.30, 2.8—4.3)	20—26 (0.20—0.27, 2.8—3.8)		
Feeding capacity	cc/min (cu in/min)		More than 860 (52.5) at idle				
<b>Fuel filter</b>							
Type	Paper element with magnet						
<b>Air cleaner</b>							
Fresh-Hot switching	Diaphragm		Manual	Diaphragm	Bimetal		
Element type	Oil permeated paper						
Fuel specification	Leaded super Unleaded super		Leaded regular	Leaded super Unleaded super	Unleaded regular		

76G04G-514



## TROUBLESHOOTING GUIDE

### F6 (GENERAL)

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding the system(s) to check, refer to the pages shown for detailed guides for each system.

POSSIBLE CAUSE		PAGE							
		Air cleaner (Air cleaner element)	Intake air temperature control system	Idle adjustment	Fuel system (Carburetor, Fuel pump)	Idle-up control system	Exhaust system	Positive crankcase ventilation system	Auto-return choke system
SYMPTOM		4A-23	4A-60	4A-38	4A-24	4A-68	4A-96	4A-67	4A-40
1	Hard start or won't start (Crank OK)	1			2				
2	Engine stalls								
	During warm up	3	2	1	4				
	After warm up	4		2	5			1	3
3	Rough idle								
	During warm up	3	2	1	4				
	After warm up	3		2	5			1	4
4	High idle speed after warm up			1	3	2			
5	Poor acceleration, hesitation, or lack of power	1			2		3		
6	Runs rough on deceleration				1				
7	Afterburn in exhaust system				1				
8	Poor fuel consumption	2		1	4				3
9	Fails emission test	2		1	4		5		3

76G04A-015

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most Possible point in system

### TROUBLESHOOTING PROCEDURE:

**1st** Check the following items:

#### Electrical system

- 1) Battery condition
- 2) Fuses

#### Ignition system

- 1) Spark plugs
- 2) Ignition timing

#### Fuel system

- 1) Fuel level
- 2) Fuel leakage
- 3) Fuel filter
- 4) Idle speed

#### Intake air system

- 1) Vacuum or air leakage
- 2) Vacuum hose routing
- 3) Accelerator cable
- 4) Choke cable

#### Engine

- 1) Compression
- 2) Overheating

#### Others

- 1) Clutch slippage
- 2) Brake dragging

**2nd** Check Fuel and Emission Control Systems

# 4A TROUBLESHOOTING GUIDE

## F6 (SINGAPORE)

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding the system(s) to check, refer to the pages shown for detailed guides for each system.

SYMPTOM		POSSIBLE CAUSE								
		Air cleaner (Air cleaner element)	Intake air temperature control system	Idle adjustment	Fuel system (Carburetor, Fuel pump)	Air injection system	Deceleration control system	Positive crankcase ventilation system	Exhaust system	Idle-up control system
		4A-23	4A-60	4A-38	4A-24	4A-58	4A-45	4A-67	4A-96	4A-68
1	Hard start or won't start (Crank OK)	1			2					
2	Engine stalls									
	During warm up	3	2	1	4					
	After warm up	3		2	4			1		
3	Rough idle									
	During warm up	3	2	1	4					
	After warm up	3		2	4			1		
4	High idle speed after warm up			1	4		3*			2
5	Poor acceleration, hesitation, or lack of power	1			2				3	
6	Runs rough on deceleration				2		1			
7	Afterburn in exhaust system				2		1			
8	Poor fuel consumption			1	4					3
9	Fails emission test	6		4	5	3	2		1	

\* Only MTX

76G04A-016

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

### TROUBLESHOOTING PROCEDURE:

**1st** Check the following items:

#### Electrical system

- 1) Battery condition
- 2) Fuses

#### Ignition system

- 1) Spark plugs
- 2) Ignition timing

#### Fuel system

- 1) Fuel level
- 2) Fuel leakage
- 3) Fuel filter
- 4) Idle speed

#### Intake air system

- 1) Vacuum or air leakage
- 2) Vacuum hose routing
- 3) Accelerator cable

#### Engine

- 1) Compression
- 2) Overheating

#### Others

- 1) Clutch slippage
- 2) Brake dragging

**2nd** Check the Fuel and Emission Control Systems

## FE 12 VALVE and F8 (EXCEPT MIDDLE EAST and GENERAL)

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding the system(s) to check, refer to the pages shown for detailed guides for each system.

SYMPTOM		POSSIBLE CAUSE									
		Air cleaner (Air cleaner element)	Intake air temperature control system	Idle adjustment	Fuel system (Carburetor, Fuel pump)	PTC heater system	Air Injection system	Positive crankcase ventilation system	Deceleration control system	Idle-up control system	Ignition control system
		4A-23	4A-60	4A-38	4A-24	4A-42	4A-58	4A-67	4A-45	4A-68	4A-80
1	Hard start or won't start (Crank OK)	1			2						
2	Engine stalls	During warm up	5	4	1	6	2			3	
		After warm up	3		2	4			1		
3	Rough idle	During warm up	5	4	1	6	2			3	
		After warm up	3		2	4			1		
4	High idle speed after warm up			1	4				3	2	
5	Poor acceleration, hesitation, or lack of power	1			4				2		3
6	Runs rough on deceleration				2				1		
7	Afterburn in exhaust system				2				1		
8	Poor fuel consumption	3		1	4				2		
9	Falls emission test	6		2	5			3	1		4

76G04A-017

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

### TROUBLESHOOTING PROCEDURE:

**1st** Check the following items:

#### Electrical system

- 1) Battery condition
- 2) Fuses

#### Ignition system

- 1) Spark plugs
- 2) Ignition timing

#### Fuel system

- 1) Fuel level
- 2) Fuel leakage
- 3) Fuel filter
- 4) Idle speed

#### Intake air system

- 1) Vacuum or air leakage
- 2) Vacuum hose routing
- 3) Accelerator cable

#### Engine

- 1) Compression
- 2) Overheating

#### Others

- 1) Clutch slippage
- 2) Brake dragging

**2nd** Check the Fuel and Emission Control Systems

# 4A TROUBLESHOOTING GUIDE

## FE and F8 (GENERAL)

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding the system(s) to check, refer to the pages shown for detailed guides for each system.

SYMPTOM		POSSIBLE CAUSE							
		Air cleaner (Air cleaner element)	Intake air temperature control system	Idle adjustment	Fuel system (Carburetor, Fuel pump)	Idle-up control system	PTC heater system	Positive crankcase ventilation system	Deceleration control system
		4A-23	4A-60	4A-38	4A-24	4A-68	4A-42	4A-67	4A-45
1	Hard start or won't start (Crank OK)	1			2				
2	Engine stalls								
	During warm up	5	4	1	6		2		3
	After warm up	3		2	4			1	
3	Rough idle								
	During warm up	5	4	1	6		2		3
	After warm up	3		2	4			1	
4	High idle speed after warm up			1	4	2			3
5	Poor acceleration, hesitation, or lack of power	1			4		3		2
6	Runs rough on deceleration				2				1
7	Afterburn in exhaust system				2				1
8	Poor fuel consumption	2		1	3				
9	Fails emission test	3		2	4				1

76G04A-018

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

### TROUBLESHOOTING PROCEDURE:

**1st** Check the following items:

#### Electrical system

- 1) Battery condition
- 2) Fuses

#### Ignition system

- 1) Spark plugs
- 2) Ignition timing

#### Fuel system

- 1) Fuel level
- 2) Fuel leakage
- 3) Fuel filter
- 4) Idle speed

#### Intake air system

- 1) Vacuum or air leakage
- 2) Vacuum hose routing
- 3) Accelerator cable

#### Engine

- 1) Compression
- 2) Overheating

#### Others

- 1) Clutch slippage
- 2) Brake dragging

**2nd** Check the Fuel and Emission Control Systems

## FE (MIDDLE EAST)

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding the system(s) to check, refer to pages shown for detailed guides for each system.

POSSIBLE CAUSE		PAGE									
		Air cleaner (Air cleaner element)	Intake air temperature control system	Idle adjustment	Fuel system (Carburetor, Fuel pump)	Idle-up control system	Dashpot (Only MTX)	Positive crankcase ventilation system	Exhaust system	Evaporative emission control system	Auto-return choke system
SYMPTOM		4A-23	4A-60	4A-38	4A-24	4A-68	4A-50	4A-67	4A-96	4A-78	4A-40
1	Hard start or won't start (Crank OK)	1			2						3
2	Engine stalls	During warm up	3	2	1	4					
		After warm up	3		2	4		1			
3	Rough idle	During warm up	3	2	1	4					
		After warm up	3		2	4		1			
4	High idle speed after warm up			1	5	3	4				2
5	Poor acceleration, hesitation, or lack of power	1			2				3		
6	Runs rough on deceleration				2					1	
7	Afterburn in exhaust system				3		1				2
8	Poor fuel consumption	5		1	6		2			3	4
9	Fails emission test	5		4	6		3		1	2	

76G04A-019

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

### TROUBLESHOOTING PROCEDURE:

**1st** Check the following items:

#### Electrical system

- 1) Battery condition
- 2) Fuses

#### Ignition system

- 1) Spark plugs
- 2) Ignition timing

#### Fuel system

- 1) Fuel level
- 2) Fuel leakage
- 3) Fuel filter
- 4) Idle speed

#### Intake air system

- 1) Vacuum or air leakage
- 2) Vacuum hose routing
- 3) Accelerator cable
- 4) Choke cable

#### Engine

- 1) Compression
- 2) Overheating

#### Others

- 1) Clutch slippage
- 2) Brake dragging

**2nd** Check the Fuel and Emission Control Systems

# 4A TROUBLESHOOTING GUIDE

## FE 8VALVE—UNLEADED FUEL

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding the system(s) to check, refer to the pages shown for detailed guides for each system.

SYMPTOM		POSSIBLE CAUSE												
		Air cleaner (Air cleaner element)	Idle adjustment	Fuel system (Carburetor, Fuel pump)	PTC heater system	Air Injection system	Positive crankcase ventilation system	Deceleration control system	Exhaust gas recirculation (EGR) system	Exhaust system	Intake air temperature control system	Idle-up control system	Purge control system	Auto-return choke system
		4A-23	4A-38	4A-24	4A-42	4A-58	4A-67	4A-45	4A-96	4A-97	4A-60	4A-68	4A-63	4A-40
1	Hard start or won't start (Crank OK)	1		2										
2	Engine stalls													
	During warm up	6	1	2	5						3		4	
	After warm up	4	2	3			1							
3	Rough Idle													
	During warm up	5	1	2	4						3		6	
	After warm up	4	2	3			1							
4	High idle speed after warm up		1	5				4				3		2
5	Poor acceleration, hesitation, or lack of power	1		2	5				3	4				
6	Runs rough on deceleration			2				1						
7	Afterburn in exhaust system			2				1						
8	Poor fuel consumption	4	1	2				3						5
9	Falls emission test	5	1	6		4		3		2				

76G04A-020

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

### TROUBLESHOOTING PROCEDURE:

**1st** Check the following items:

#### Electrical system

- 1) Battery condition
- 2) Fuses

#### Ignition system

- 1) Spark plugs
- 2) Ignition timing

#### Fuel system

- 1) Fuel level
- 2) Fuel leakage
- 3) Fuel filter
- 4) Idle speed

#### Intake air system

- 1) Vacuum or air leakage
- 2) Vacuum hose routing
- 3) Accelerator cable
- 4) Choke cable

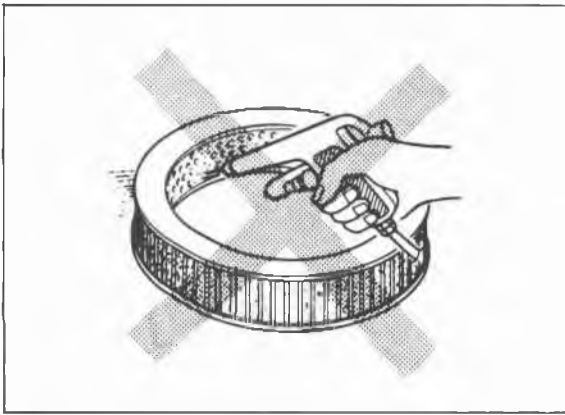
#### Engine

- 1) Compression
- 2) Overheating

#### Others

- 1) Clutch slippage
- 2) Brake dragging

**2nd** Check the Fuel and Emission Control Systems



76G04A-021

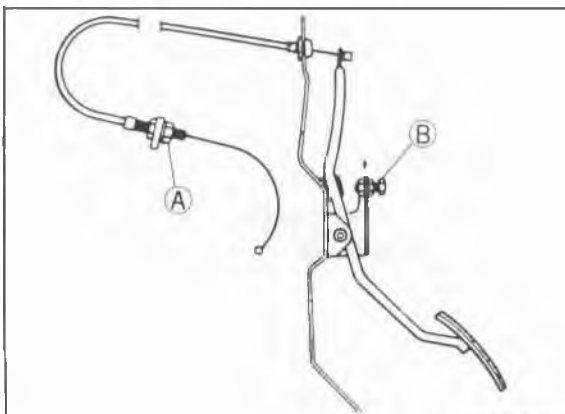
## PARTS INSPECTION

### AIR CLEANER ELEMENT

Visually check the air cleaner element for excessive dirt, damage, or oil. Replace, if necessary.

#### Caution

**Do not clean the element with compressed air.**



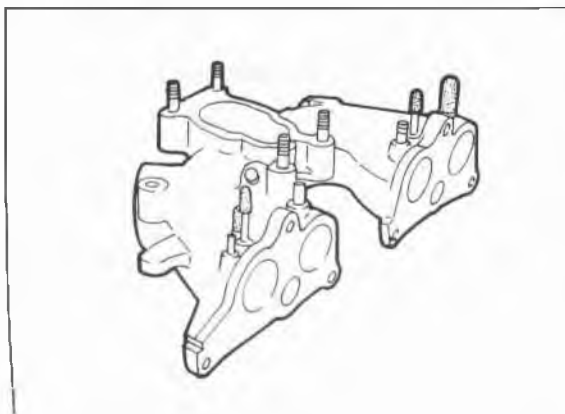
76G04A-022

### ACCELERATOR LINKAGE

#### Caution

**Confirm that the choke valve is fully open and that the throttle valve is set to the correct idle opening.**

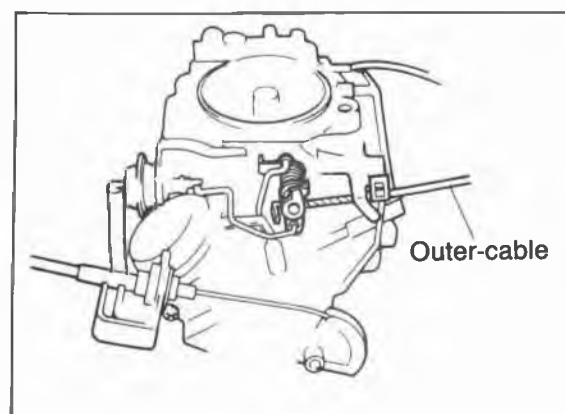
1. Inspect the deflection of the cable. If the deflection is not within **1—3 mm (0.039—0.118 in)**, adjust nuts A.
2. Depress the accelerator pedal to the floor and verify that the throttle valve is fully opened. Adjust bolt B if necessary.



76G04A-023

### INTAKE MANIFOLD

1. Visually check the intake manifold for damage.
2. Replace it if necessary.



76G04A-024

### CHOKE CABLE

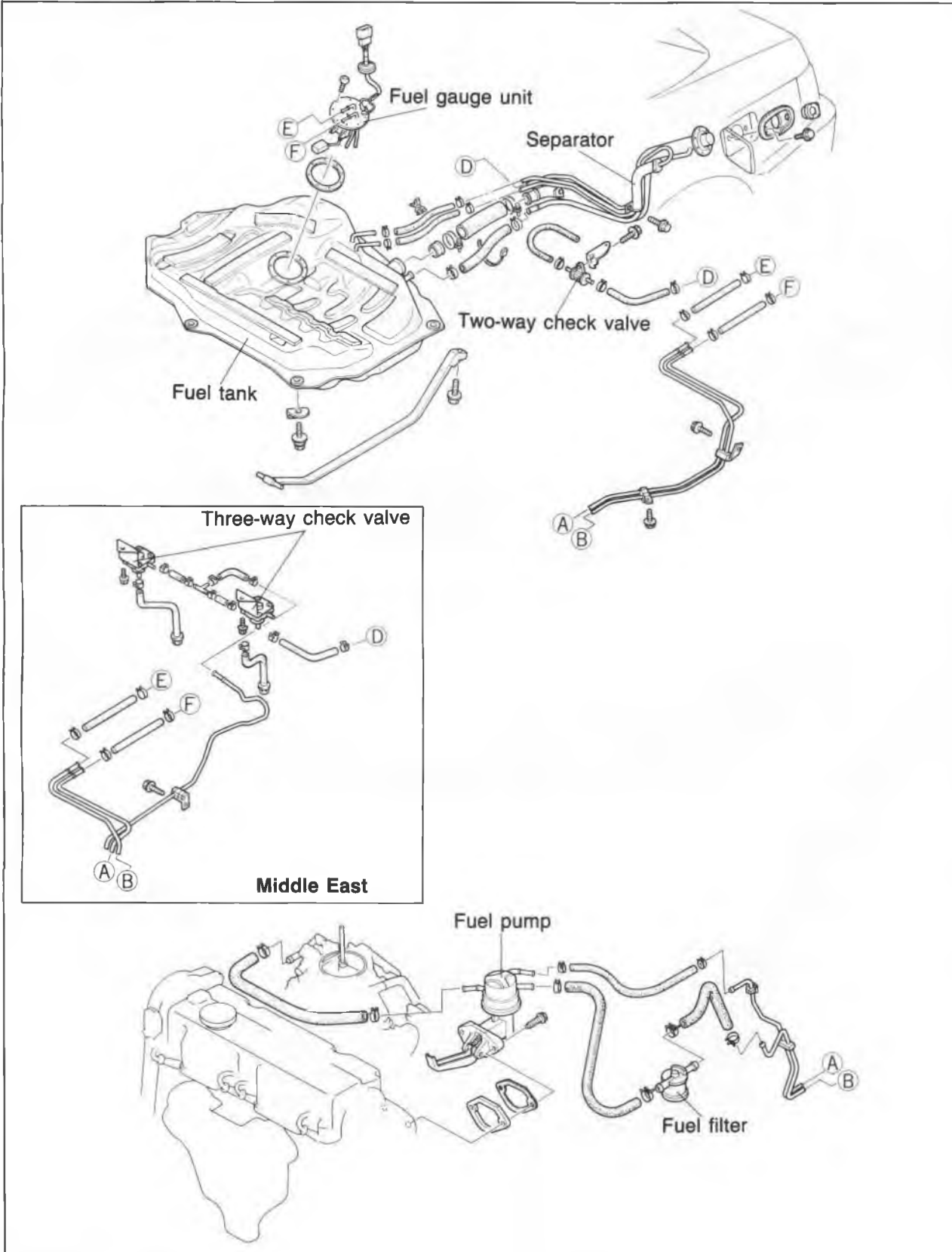
Except FE and F8 (General, ECE, Hong Kong, and Singapore)

1. Pull the choke knob and confirm that the choke valve is fully closed.
2. Return the choke knob and confirm that the choke valve is fully opened.
3. Adjust the position of the outer cable, if necessary.

# 4A FUEL SYSTEM

## FUEL SYSTEM

This system consists of the fuel pump, fuel filters, and carburetor, and supplies the necessary fuel for operation of the engine.



76G04A-025



## TROUBLESHOOTING

POSSIBLE CAUSE		Carburetor	Fuel pump	Separator	Two-way check valve (Except Middle East) Three-way check valve (Middle East)
SYMPTOM					
1	Hard start or won't start (Crank OK)	2	1		
2	Engine stalls				
	During warm up	2	1		
	After warm up	2	1		
3	Rough Idle				
	During warm up	2	1		
	After warm up	2	1		
4	High Idle speed after warm up	1			
5	Poor acceleration, hesitation, or lack of power	2	1		
6	Runs rough on deceleration	1			
7	Afterburn in exhaust system	1			
8	Poor fuel consumption	1		2	3
9	Fails emission test	1			

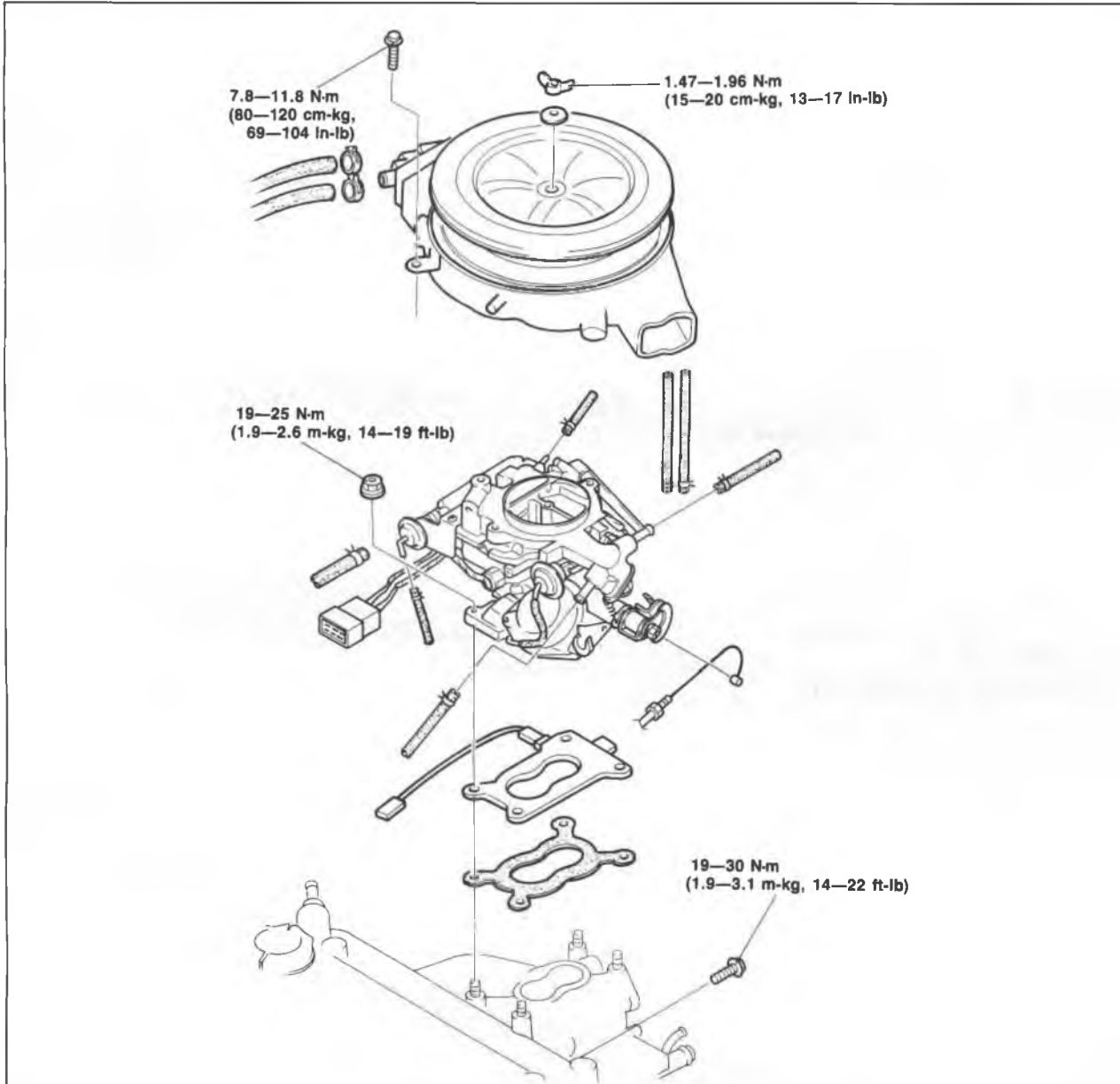
76G04A-026

# 4A FUEL SYSTEM

## CARBURETOR

### Removal

Remove in the sequence shown in the figure.



76G04A-027

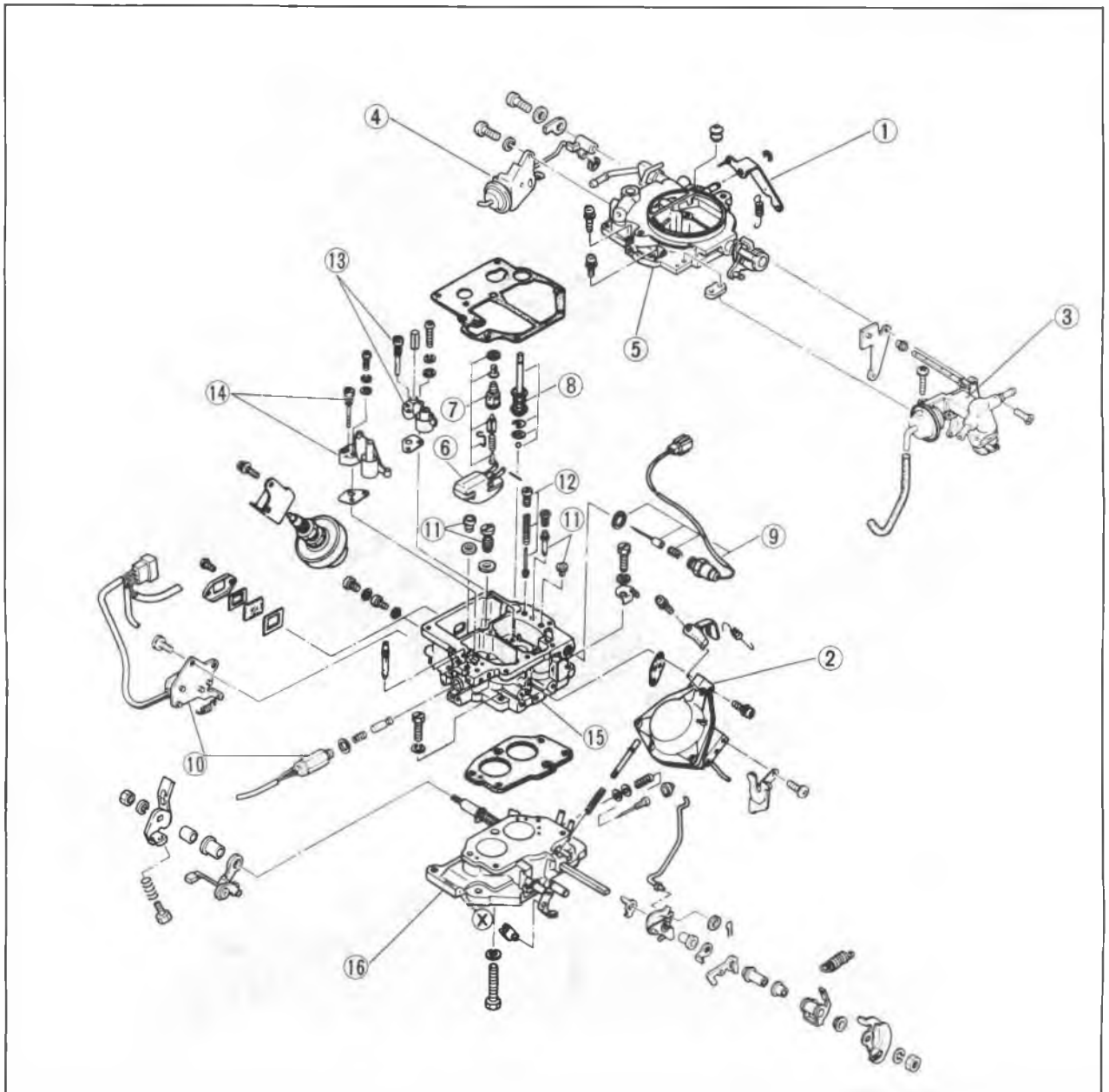
1. Secondary air hoses (If equipped) and air cleaner
2. Water hoses
3. Fuel hose
4. Vacuum hoses
5. Accelerator cable
6. Connector
7. Carburetor
8. PTC heater (If equipped)
9. Gasket (If equipped)

### Installation

Install the reverse order of removal, referring following points.

1. Check for fuel leaks.
2. Check the vacuum hose installation.
3. Check the idle speed and idle mixture (Refer to page 4A—38).
4. Warm up the engine to the normal operating temperature and check that fuel level is at the center of the float level indicator window.

## Disassembly FE and F8 (General, ECE, Hong Kong, and Singapore)



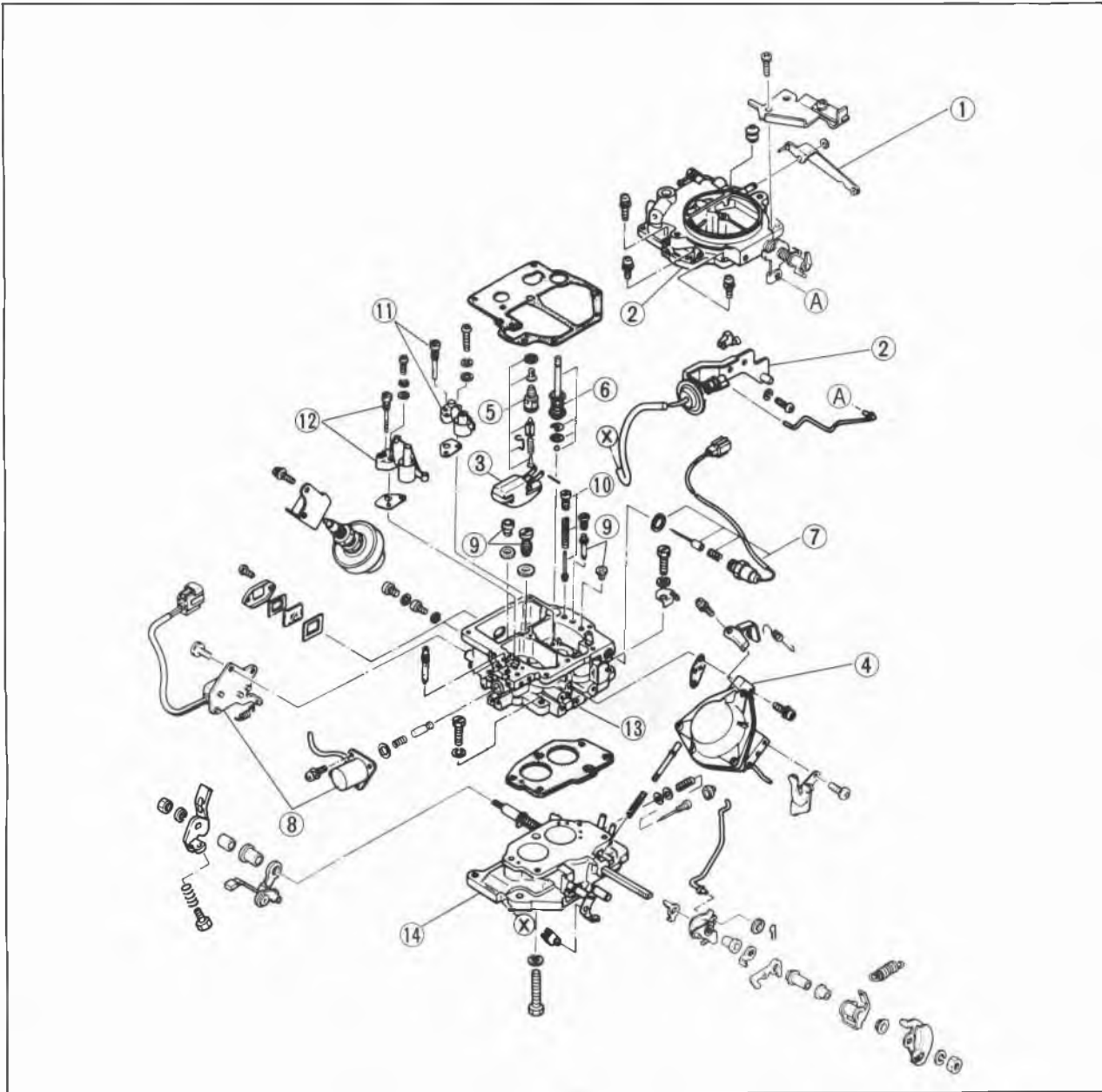
76G04A-028

Disassemble in the sequence shown in the figure.

- |  |   |
|--|---|
| 1. Lever   | 9. Slow fuel cut solenoid valve                             |
| 2. Secondary diaphragm                                     | 10. Idle-up solenoid valve and idle switch<br>(If equipped) |
| 3. Choke breaker diaphragm and thermo wax<br>(If equipped) | 11. Air bleeds and jets                                     |
| 4. Choke opener and bracket (If equipped)                  | 12. Injector weight   |
| 5. Air horn  | 13. Primary venturi and nozzle                              |
| 6. Float   | 14. Secondary venturi and nozzle                            |
| 7. Needle valve  | 15. Main body   |
| 8. Accelerator pump  | 16. Throttle body   |

# 4A FUEL SYSTEM

## FE 8 Valve (Except General) and F6



76G04A-029

Disassemble in the sequence shown in the figure.

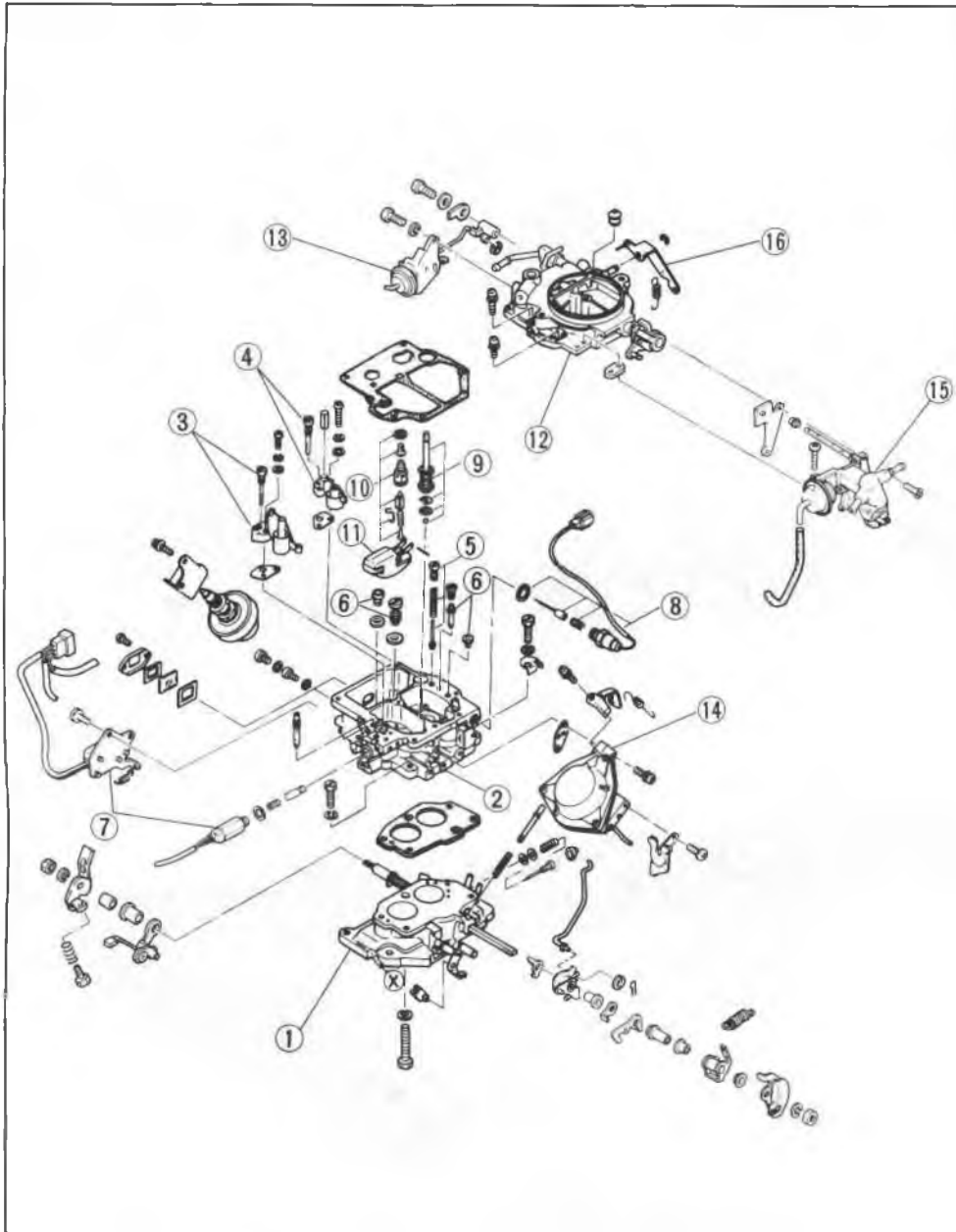
- |  |  |
|--|--|
| 1. Lever   | 8. Solenoid valve* and idle switch (If equipped) |
| 2. Air horn, choke breaker diaphragm, and choke opener (If equipped) | 9. Air bleeds and jets                           |
| 3. Float   | 10. Injector weight                              |
| 4. Secondary diaphragm   | 11. Primary venturi and nozzle                   |
| 5. Needle valve  | 12. Secondary venturi and nozzle                 |
| 6. Accelerator pump  | 13. Main body                                    |
| 7. Slow fuel cut solenoid valve                                      | 14. Throttle body                                |

### \*Solenoid valve:

Coast enrichment solenoid valve	FE 8 Valve—Unleaded fuel
Coasting leaner	F6 Singapore

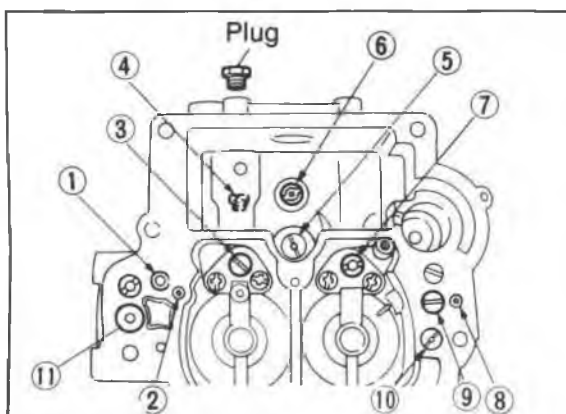
## Assembly [FE and F8 (General, ECE, Hong Kong, and Singapore)]

Assemble in the sequence shown in the figure, referring to the assembly note for specially marked parts.



1. Throttle body
2. Main body
3. Secondary venturi and nozzle
4. Primary venturi and nozzle
5. Injector weight
6. Air bleeds and jets
7. Idle-up solenoid valve and idle switch (If equipped)
8. Slow fuel cut solenoid valve
9. Accelerator pump
10. Needle valve
11. Float
12. Air horn
13. Choke opener and bracket (If equipped)
14. Choke breaker diaphragm and thermo wax (If equipped)
15. Secondary diaphragm
16. Lever

76G04A-030



76G04A-031

### Assembly note

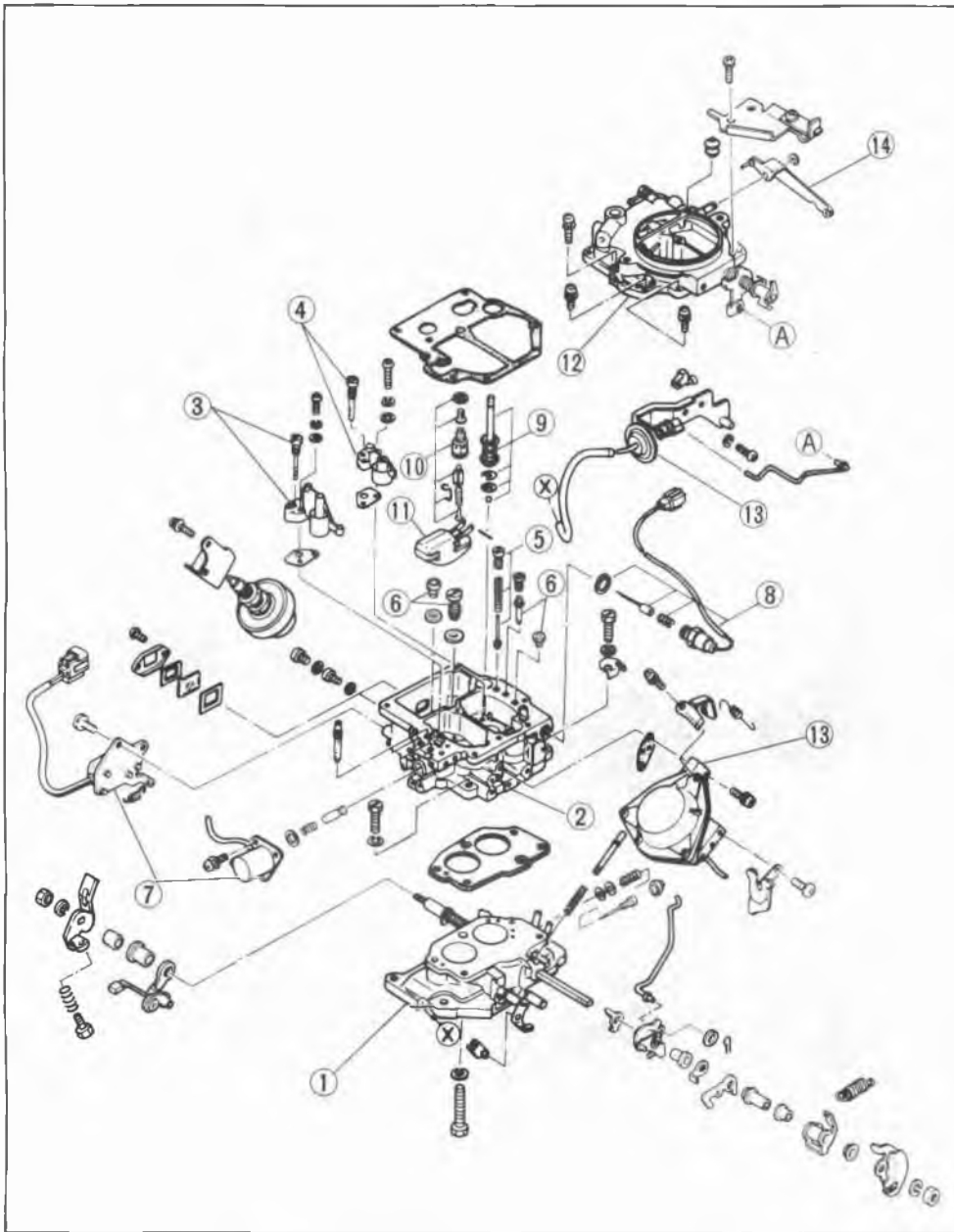
#### Air bleeds and jets

1. Step jet and plug
2. Secondary step air bleed (No. 1) (Fixed type)
3. Secondary main air bleed
4. Secondary main jet
5. Power jet
6. Primary main jet
7. Primary main air bleed
8. Primary slow air bleed (No. 1)
9. Primary slow jet and plug
10. Primary slow air bleed (No. 2)

# 4A FUEL SYSTEM

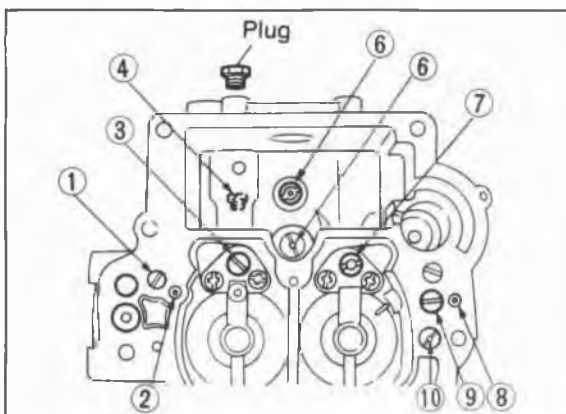
## [FE 8Valve (Except General) and F6]

Assemble in the sequence shown in the figure, referring to the assembly note for specially marked parts.



1. Throttle body
2. Main body
3. Secondary venturi and nozzle
4. Primary venturi and nozzle
5. Injector weight
6. Air bleeds and jets
7. Solenoid valve and idle switch (If equipped)
8. Slow fuel cut solenoid valve
9. Accelerator pump
10. Needle valve
11. Secondary diaphragm
12. Float
13. Air horn, choke breaker diaphragm, and choke opener (If equipped)
14. Lever

76G04A-032

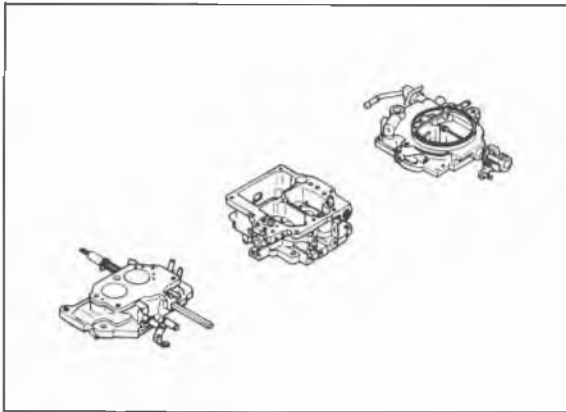


### Assembly note

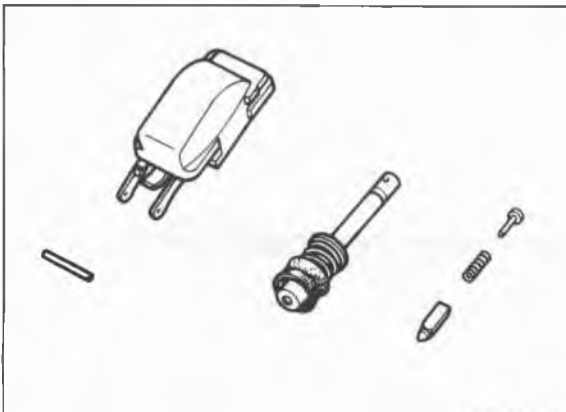
#### Air bleeds and jets

1. Step jet and plug
2. Secondary step air bleed (No. 1) (Fixed type)
3. Secondary main jet
4. Secondary main jet
5. Power jet
6. Primary main jet
7. Primary main air bleed
8. Primary slow air bleed (No. 1)
9. Primary slow jet and plug
10. Primary slow air bleed (No. 2)

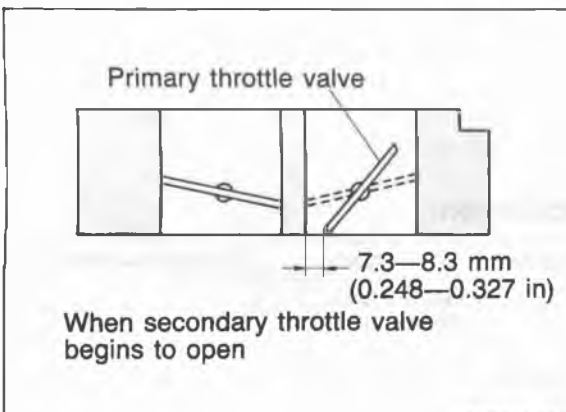
76G04A-033



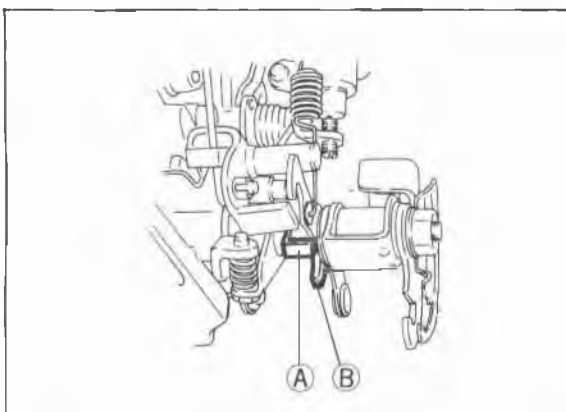
76G04A-034



76G04A-191



76G04A-035



76G04A-036

## Inspection

### Note

- a) Clean all parts with carburetor cleaner and dry with compressed air.
- b) Do not use a wire to clean the jets.

Check the following and replace any faulty parts.

1. Damaged air horn, main body, or throttle body
2. Improper operation of the choke valve or throttle valve
3. Damaged float
4. Needle valve damage or improper seating
5. Clogged or damaged jet or air bleed
6. Damaged piston cup in the accelerator pump
7. Weakened or broken spring
8. Damaged diaphragm
9. Improper solenoid operation

## Secondary Throttle Valve

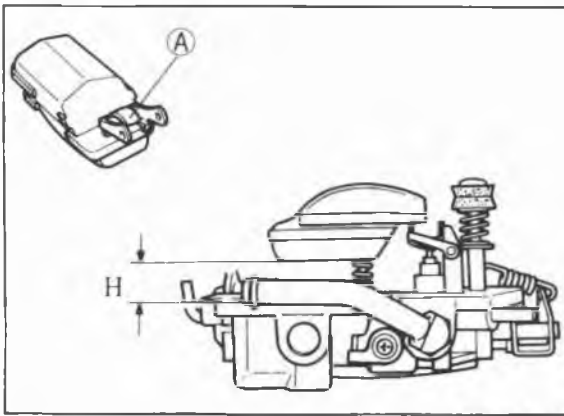
1. Check the clearance between the primary throttle valve and wall when lever A contacts lever B.

### Clearance:

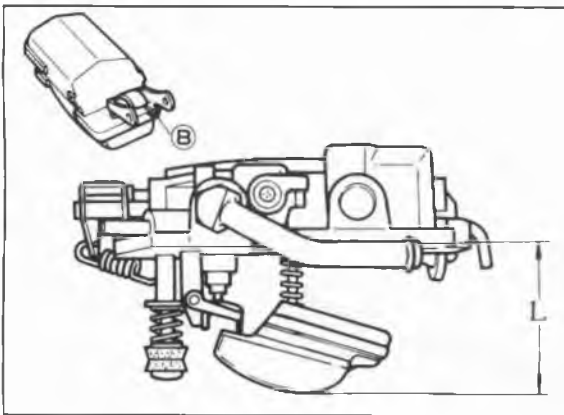
**7.3—8.3 mm (0.248—0.327 in)**

3. If not within specification, adjust it by bending lever A.

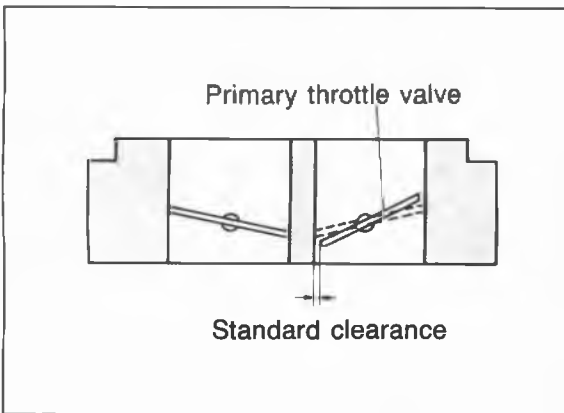
# 4A FUEL SYSTEM



76G04A-037



76G04A-038



76G04A-039

## Float Level

### Caution

**This adjustment must be made without the gasket on the air horn.**

1. Turn the air horn upside-down and allow the float to lower by its own weight.
2. Measure clearance H between the float and the air horn.

**Clearance H: 12.5 mm (0.49 in)**

3. If not as specified, bend the float seat lip A to adjust.
4. Turn the air horn to the normal position and allow the float to lower by its own weight.
5. Measure clearance L between the bottom of the float and the air horn.

**Clearance L: 44 mm (1.73 in)**

6. If not as specified, bend the float stop B to adjust.

## Fast Opening

### F6 and FE 8Valve (Except General)

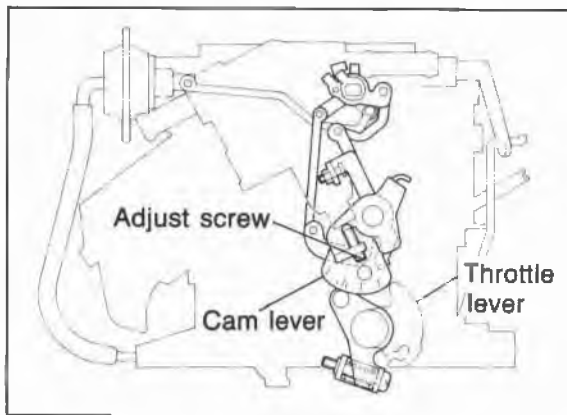
1. With the choke valve fully closed, measure the clearance between the primary throttle valve and the wall of the throttle bore.

### Specification:

Engine	Spec.	Clearance mm (in)
F6	General and Singapore	1.40—1.76 (0.055—0.069)
FE 8Valve	Middle East and Unleaded Fuel	

2. If not within specification, carefully bend the connecting rod to adjust.





76G04A-040

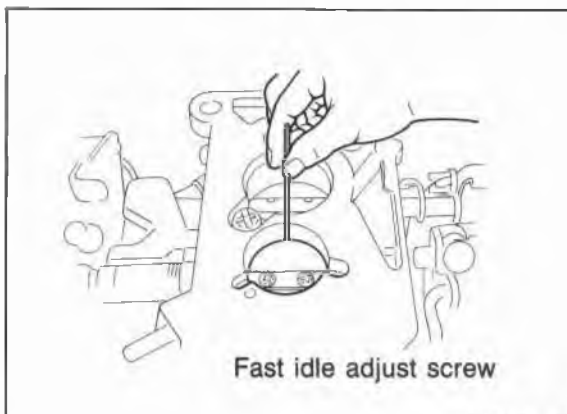
## Fast Idle Opening

**FE and F8 (General, ECE, Hong Kong, and Singapore)**

Adjustment of fast idle opening is normally unnecessary.

But if it is necessary, adjust it as shown.

1. Before adjustment, let the carburetor set at **25°C (77°F)** for at least 1 hour.
2. Check that the center of the cam lever aligns with the mark (25°) on the fast idle cam.
3. If not as specified, adjust it by turning the adjust screw.



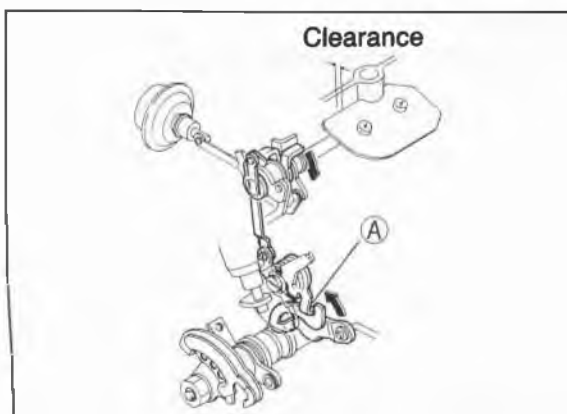
76G04A-041

4. Measure the throttle valve clearance between the throttle valve and wall with a wire gage.

## Specification

Spec.	General, ECE, Hong Kong, and Singapore	
	MTX	ATX
Transmission		
Clearance mm (in)	0.48—0.64 (0.019—0.025)	0.56—0.72 (0.022—0.028)

5. If not as specified, adjust it by turning the fast idle adjust screw.



76G04A-042

## Unloader System

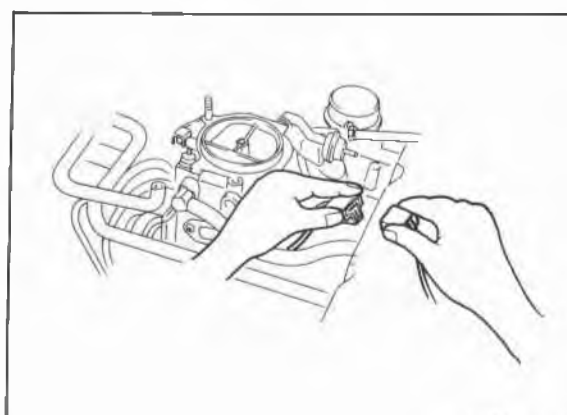
**Only FE and F8 (General, ECE, Hong Kong, and Singapore)**

1. Open the primary throttle valve fully.
2. Measure the choke valve clearance.

### Clearance:

**1.68—2.14 mm (0.066—0.084 in)**

3. If not as specified, adjust it by bending tab A.

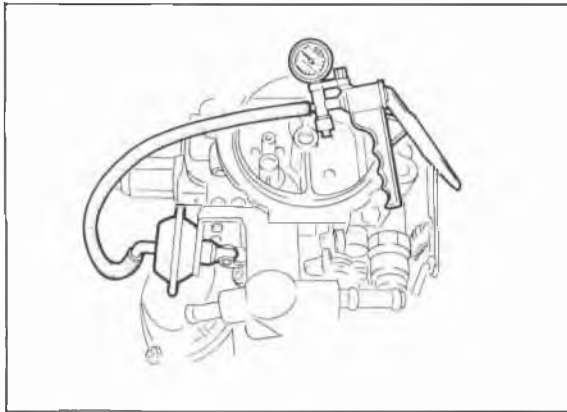


76G04A-043

## Slow Fuel Cut Solenoid Valve

1. Start the engine, and run it at idle.
2. Disconnect the connector of the carburetor.
3. Check that the engine stops.
4. If the engine does not stop, replace the slow fuel cut solenoid valve.

# 4A FUEL SYSTEM



76G04A-044

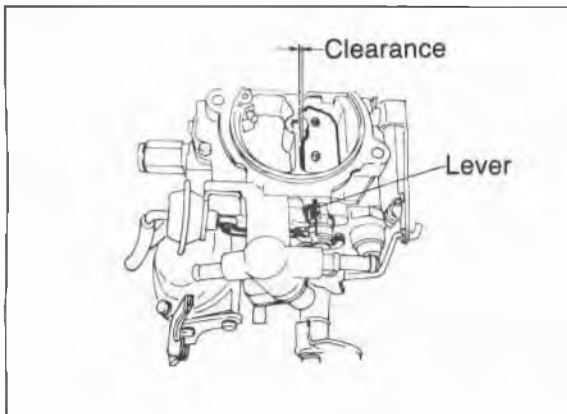
## Choke Breaker Diaphragm

1. Warm up the engine to the normal operating temperature, then stop the engine.
2. Set the choke valve to the fully closed position.
3. Apply **400 mmHg (15.7 inHg)** vacuum to the diaphragm.
4. Measure the clearance between the choke valve and air horn with a wire gauge.

### Clearance:

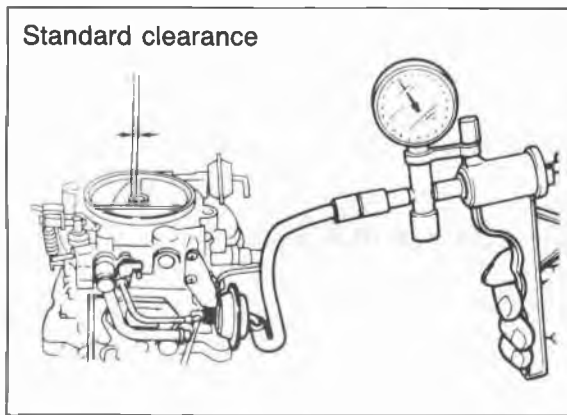
**2.45—3.11 mm (0.096—0.122)..... FE, F8**

**1.68—2.14 mm (0.066—0.084 in)..... F6**



76G04A-045

5. If not within specification, adjust by bending the lever.



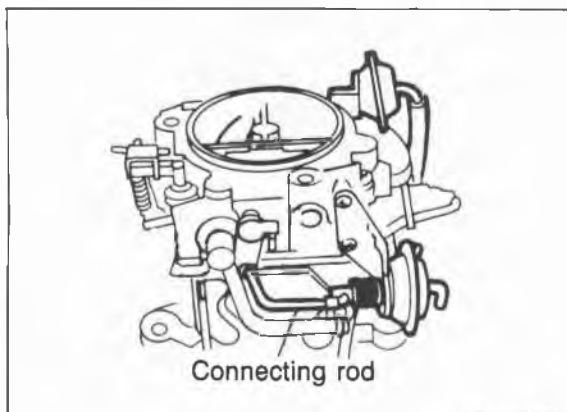
76G04A-046

## Choke Opener

### ECE, Hong Kong, Singapore, and Middle East

1. Warm up the engine to the normal operating temperature, then stop the engine.
2. Set the choke valve to the fully closed position.
3. Apply **400 mmHg (15.7 inHg)** vacuum to the diaphragm.
4. Measure the clearance between the choke valve and air horn with a wire gauge.

Specification	Clearance mm (in)
ECE, Hong Kong, and Singapore (Except F6 MTX)	3.7—4.0 (0.15—0.16)
Middle East	3.3—3.6 (0.13—0.14)
F6 Singapore MTX	3.2—3.5 (0.13—0.14)



76G04A-047

5. If not within specification, adjust by bending the connecting rod.



76G04A-048

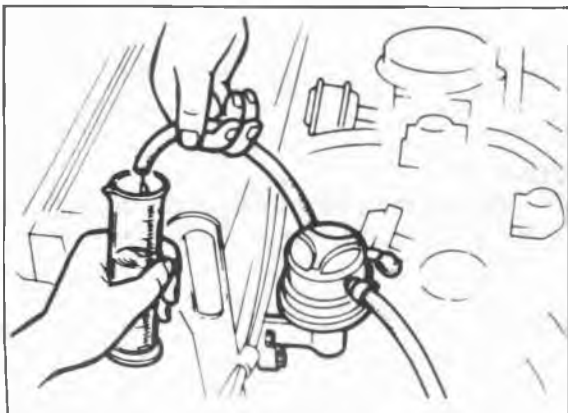
## FUEL PUMP

### Inspection

#### Fuel pressure

1. Disconnect the hose at the carburetor and connect a fuel pressure gauge.
2. Disconnect the fuel return hose from the fuel pump and plug the fuel pump return pipe as shown in the figure.
3. Measure the pressure while the engine is idling. Replace the pump, if necessary.

	FE & F8 (ECE, Hong Kong, Singapore)	Others
Pressure kPa (kg/cm <sup>2</sup> , psi)	20—29 (0.2—0.3, 2.8—4.3)	20—26 (0.20—0.27, 2.8—3.8)

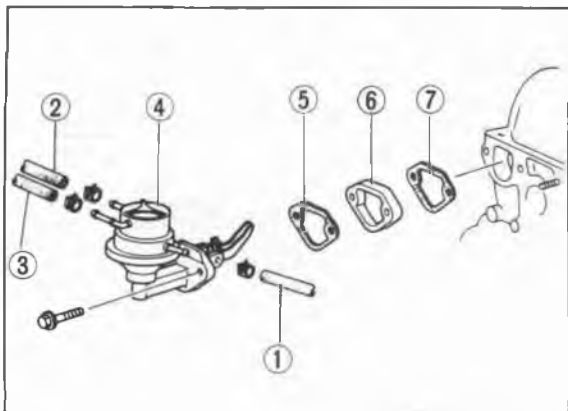


76G04A-049

#### Flow rate (volume)

1. Disconnect the carburetor fuel hose and insert the end into a measuring breaker.
2. Disconnect the fuel return hose from the fuel pump and plug the fuel pump return pipe as shown in the figure.
3. Start the engine and measure the amount of fuel pumped per minute.

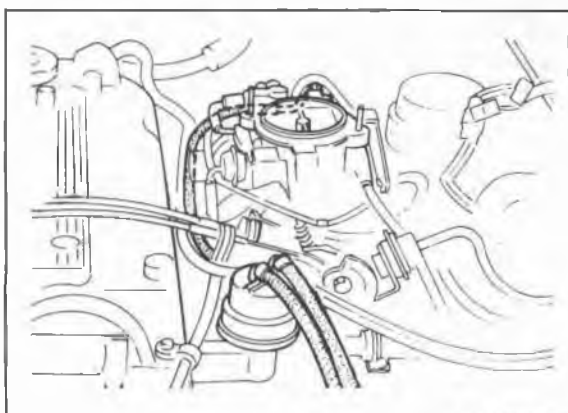
**Volume: More than 860 cc (52.5 cuin)/min**



76G04A-050

### Removal

1. Remove in the following order.
  - (1) Fuel outlet hose
  - (2) Fuel inlet hose
  - (3) Fuel return hose
  - (4) Fuel pump
  - (5) Gasket
  - (6) Insulator
  - (7) Gasket



76G04A-051

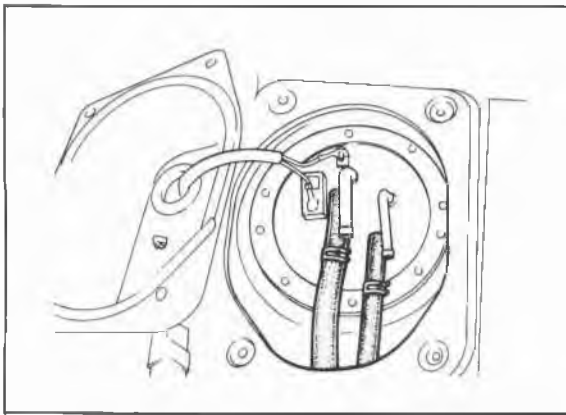
### Installation

Install in the reverse order of removal.

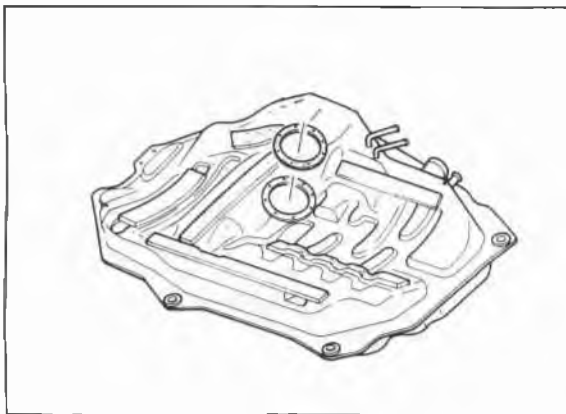
#### Caution

- a) Replace the gasket whenever the fuel pump is replaced.
- b) Be sure to connect the hoses in the correct positions.  
Check for leaks.

# 4A FUEL SYSTEM



76G04A-052



76G04A-053

## FUEL TANK

### Removal

1. Remove the rear seat cushion.
2. Remove the cover and disconnect the fuel tank gauge unit connector.
3. Disconnect the fuel main and return hoses.
4. Raise the vehicle and support it with safety stands.
5. Remove the fuel level gauge unit assembly.

### Warning

a) When repairing the fuel tank, clean it thoroughly with steam to remove all explosive gasoline and fumes.

b) Use of fire is strictly prohibited while working on the fuel tank.

6. Drain the fuel.
7. Disconnect the remaining hoses.
8. Remove the fuel tank.

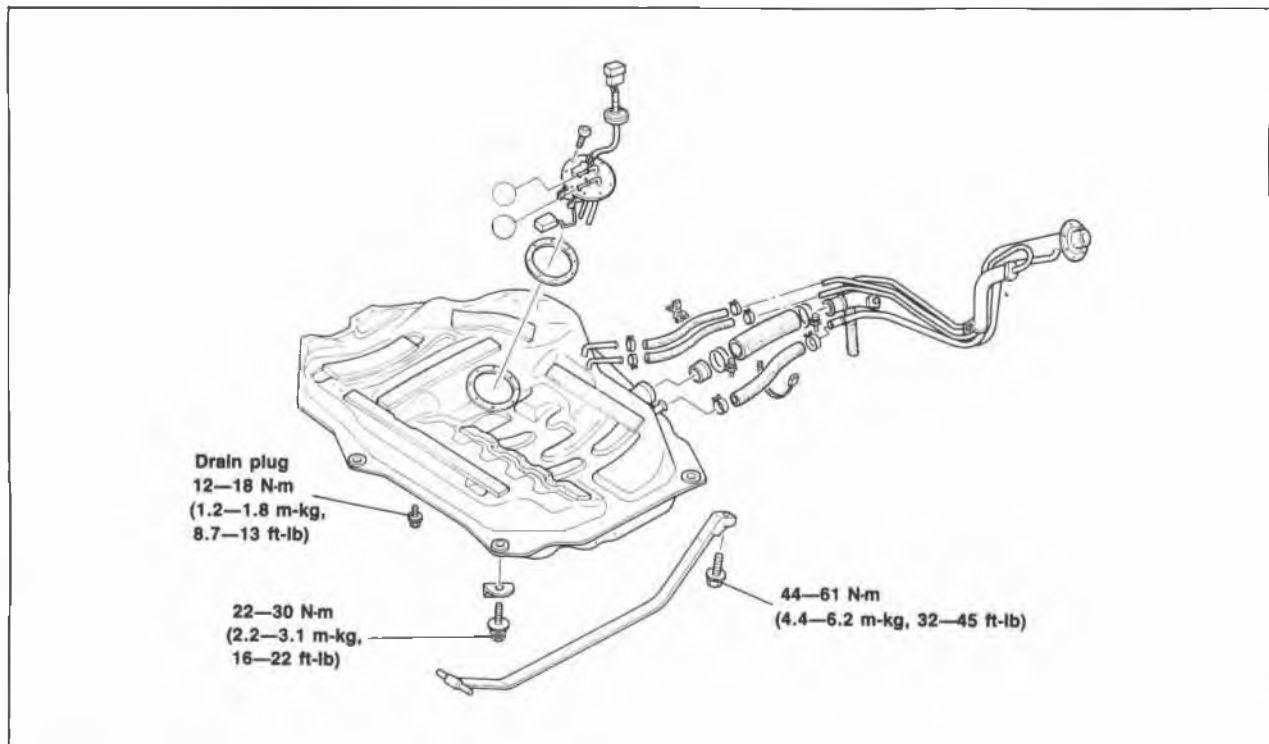
### Inspection

1. Check the fuel tank for cracks and corrosion.
2. If any defect is found, repair or replace the tank.
3. Check for leaks.

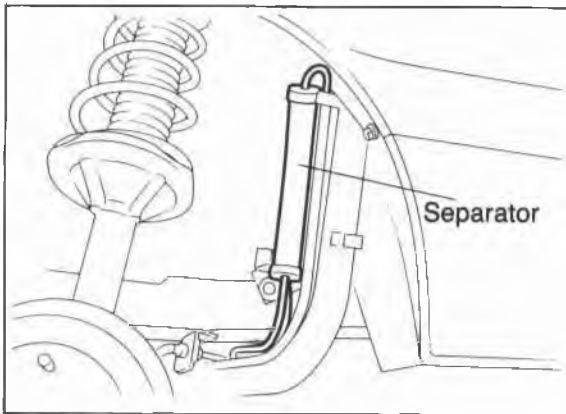
## Installation

Install in the reverse order of removal.

## Torque Specifications



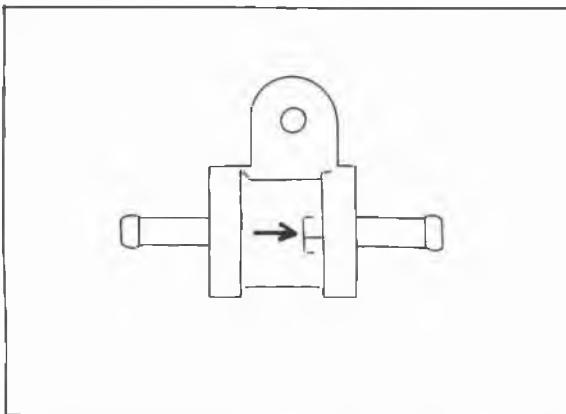
76G04A-054



76G04A-055

## SEPARATOR Inspection

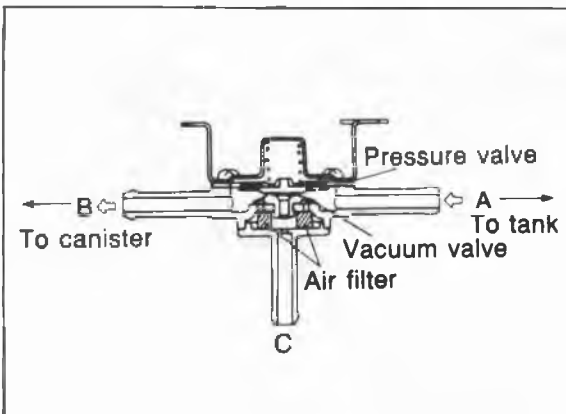
Visually check the separator for fuel leakage and damage. Replace, if necessary.



76G04A-056

## TWO-WAY CHECK VALVE (Except Middle East) Inspection

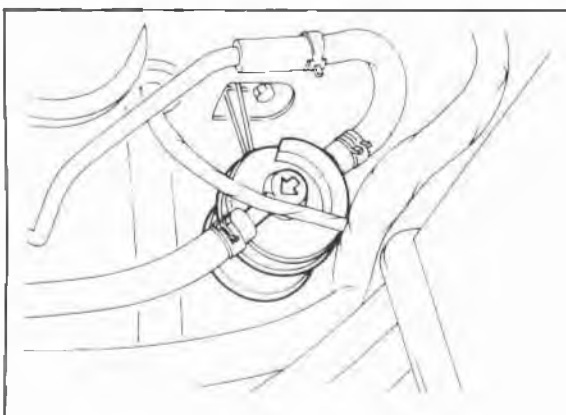
1. Disconnect the hoses, and remove the check valve.
2. Check that air flows in both directions through the valve.
3. If not as specified, replace the two-way check valve.



76G04A-057

## THREE-WAY CHECK VALVE (Middle East)

1. Blow through the valve from port (A), and check that air comes out of port (B). Next, block port (B) and check that air comes of port (C).
2. Block port (B) and apply vacuum with a vacuum pump through port (A).
3. Check that no vacuum is held.



76G04A-058

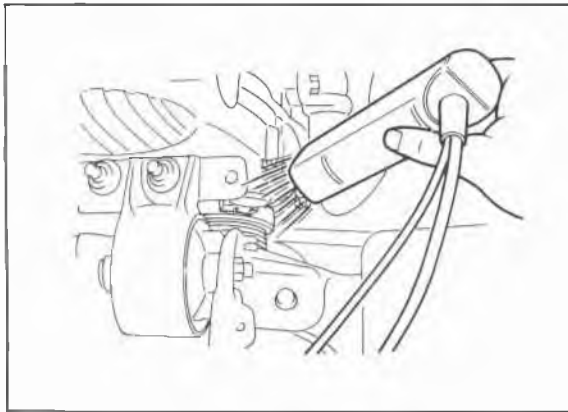
## FUEL FILTER Replacement

The fuel filter is mounted on the left side of the frame.

### Caution

- a) To prevent gasoline from draining during removal, first disconnect and plug the inlet hose.
- b) During installation be sure to install the fuel filter in the correct direction of flow.

# 4A IDLE SPEED AND IDLE MIXTURE



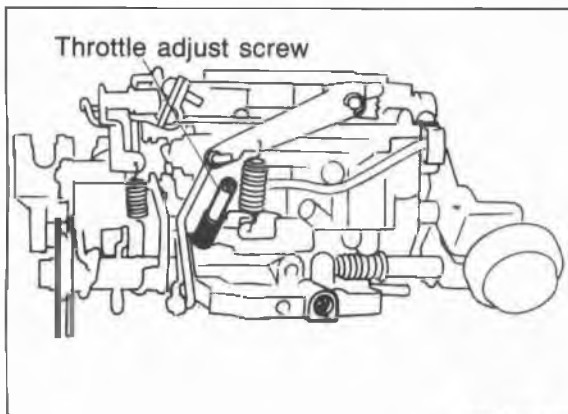
76G04A-059

## IDLE SPEED AND IDLE MIXTURE

### ADJUSTMENT

#### Note

- a) Before adjusting the idle speed and idle mixture, be sure the ignition timing, spark plugs, carburetor float level, etc., are all in normal operation condition.
- b) Turn off all electrical loads.
- c) This adjustment must be done while the fan motor is not operating.



76G04A-060

#### Idle Speed

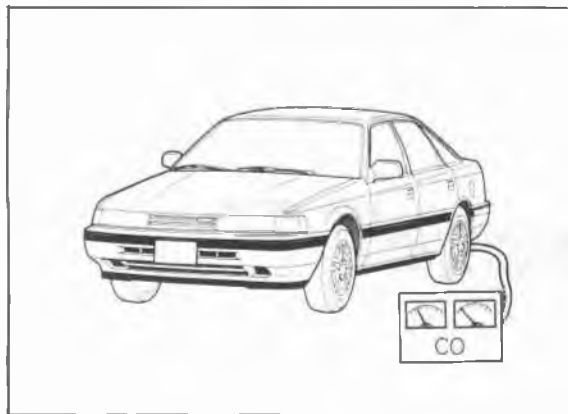
1. Connect a tachometer to the engine.
2. Warm up the engine, and check that the choke valve has fully opened.
3. Check the idle speed.

Specification	MTX		ATX (in N range)	
	Others	FE 8Valve Unleaded fuel	F6	F8 & FE
Idle speed rpm	800 $\pm$ <sub>0</sub> <sup>+50</sup>	850 $\pm$ <sub>0</sub> <sup>+50</sup>	950 $\pm$ <sub>0</sub> <sup>+50</sup>	900 $\pm$ <sub>0</sub> <sup>+50</sup>

4. If not within specification, adjust the idle speed by turning the throttle adjust screw.

#### Caution

After adjusting the idle speed, the dashpot adjustment should be checked and adjusted if necessary.



76G04A-061

#### Idle Mixture

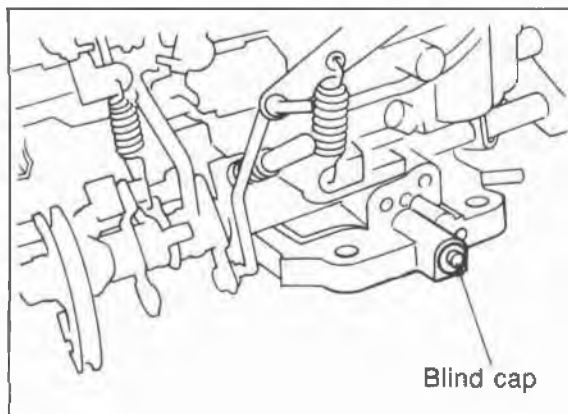
#### [Except FE 8Valve—Unleaded Fuel]

Adjust the idle mixture as follows, after adjusting the idle speed.

1. Disconnect the secondary air hoses from the reed valves and plug them. (If equipped.)
2. Insert an exhaust gas analyzer into the tail pipe and measure the CO concentration.

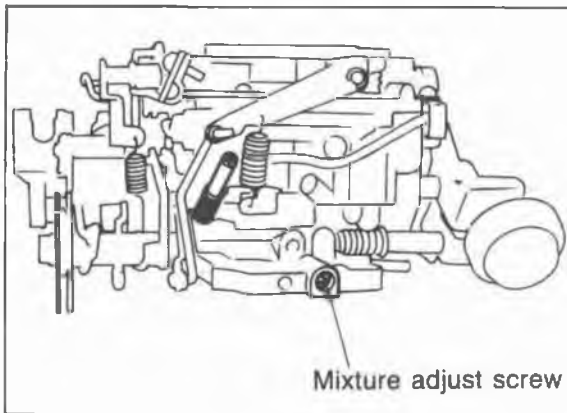
**CO concentration: 2.0 ± 0.5%**

3. If not within the specification, remove the blind cap from the mixture adjust screw.

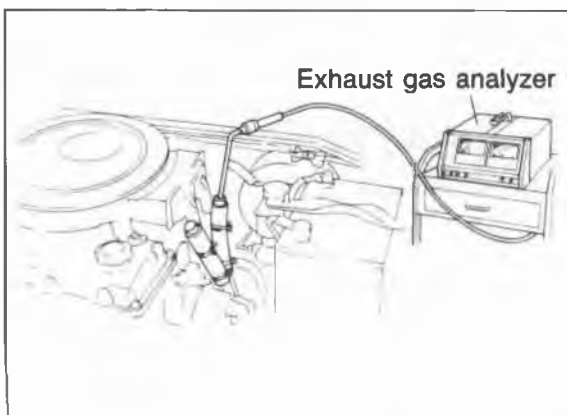


76G04A-062

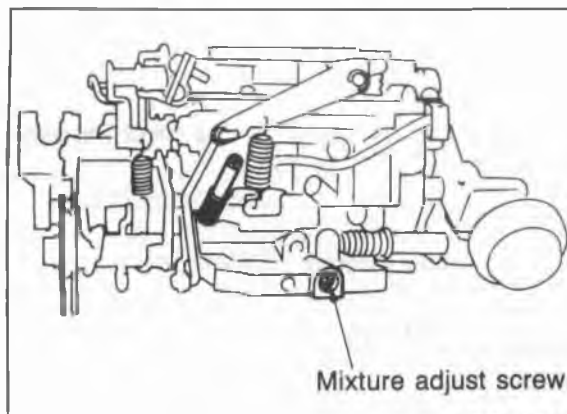
## IDLE SPEED AND IDLE MIXTURE 4A



76G04A-063



76G04A-064



76G04A-065

4. Turn the mixture adjust screw to adjust the CO concentration.
5. Recheck the idle speed.
6. Fit a new blind cap onto the mixture adjust screw.

### Idle Mixture [FE 8Valve—Unleaded Fuel]

Adjustment of the idle mixture is normally unnecessary.

But if it is necessary, adjust it as follows.

#### Note

**Do not insert the exhaust gas analyzer into the tail pipe.**

**Before adjust the idle mixture, check and set the idle speed.**

1. Disconnect the secondary air hoses.
2. Insert an exhaust gas analyzer into the hose and plug it to prevent leakage.
3. Start the engine and run it at idle.
4. Measure the CO concentration.
5. Remove the blind cap from the mixture adjust screw.
6. Turn the mixture adjust screw and adjust the CO level.

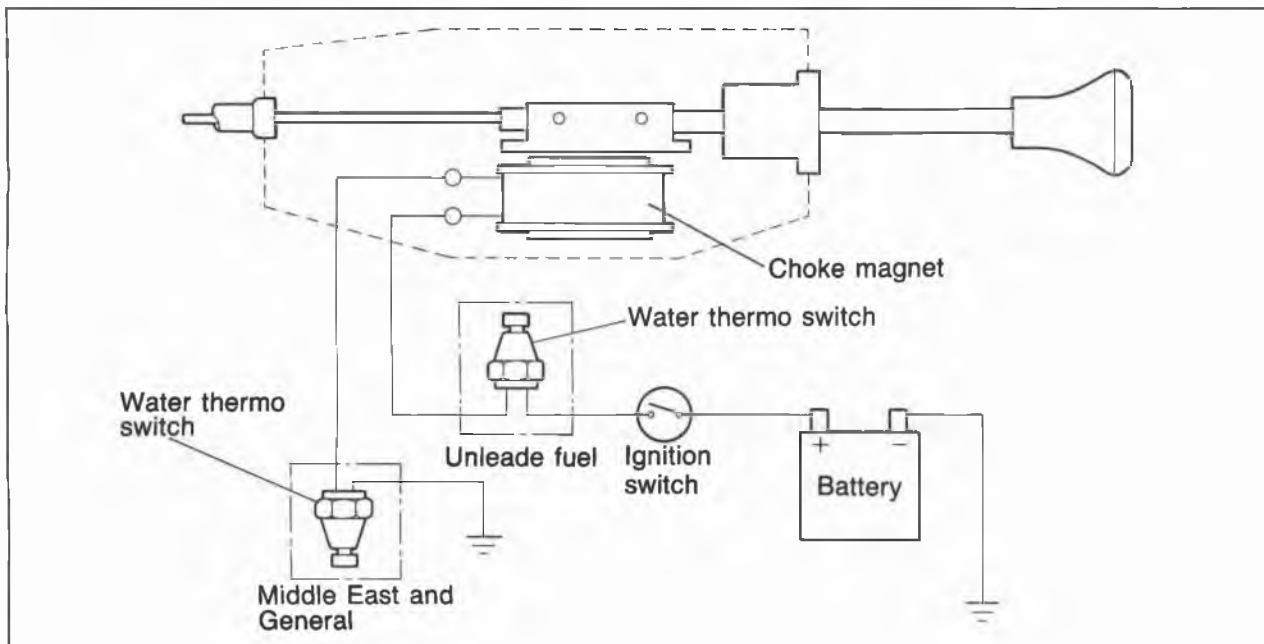
**CO concentration:  $2.0 \pm 0.5\%$**

7. If the idle speed fails to meet specification as the result of the above steps, adjust the idle.
8. Reconnect the secondary air hoses.
9. Fit a new blind cap onto the mixture adjust screw.

# 4A AUTO-RETURN CHOKE SYSTEM

## AUTO-RETURN CHOKE SYSTEM

[FE 8VALVE—UNLEADED FUEL, MIDDLE EAST, and F6—GENERAL]



76G04A-066

An auto-return choke is adopted to prevent the catalytic converter from over-heating because of over use of the choke. This system opens the choke valve by causing the choke knob to return when the engine coolant temperature is **more than 67°C (153°F)**.

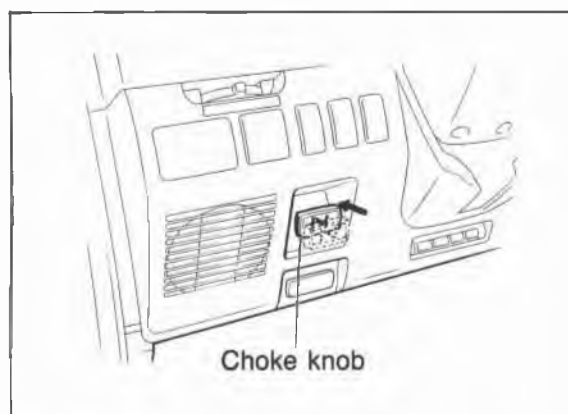
### TROUBLESHOOTING

#### Note

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting Guide. (Refer to pages 4A—16, 21, or 22)

Possible cause	Page		
	System inspection	Choke magnet	Water thermo switch
Symptom	4A—40	4A—41	4A—41
Checking order	1	2	3

76G04A-067



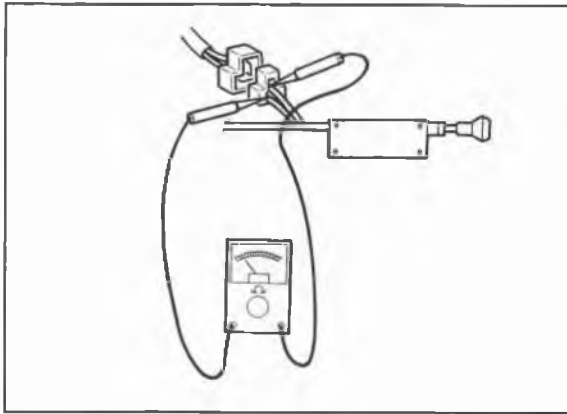
76G04A-068

#### System Inspection

1. Make sure that the engine is cold and turn the ignition switch ON.
2. Pull out the choke knob and check that it is held on.
3. Start the engine and check that the choke knob returns during warming-up.



## AUTO-RETURN CHOKE SYSTEM 4A



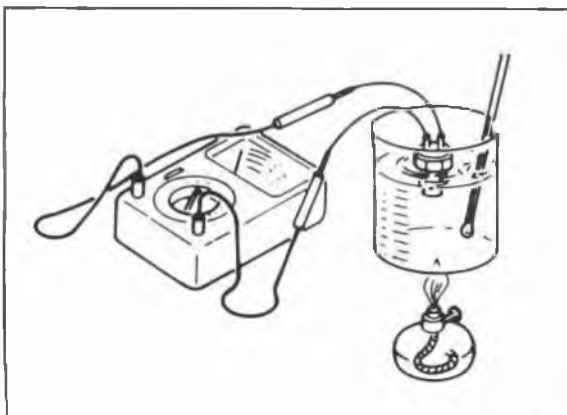
76G04A-069

### Choke Magnet

1. Remove the under dash cover.
2. Disconnect the choke magnet connector.
3. Turn the ignition switch on and check the resistance using an ohmmeter.

**Resistance: Approx. 35Ω**

4. If it is not within the specification, the choke magnet is malfunction.



76G04A-070

### Water thermo switch

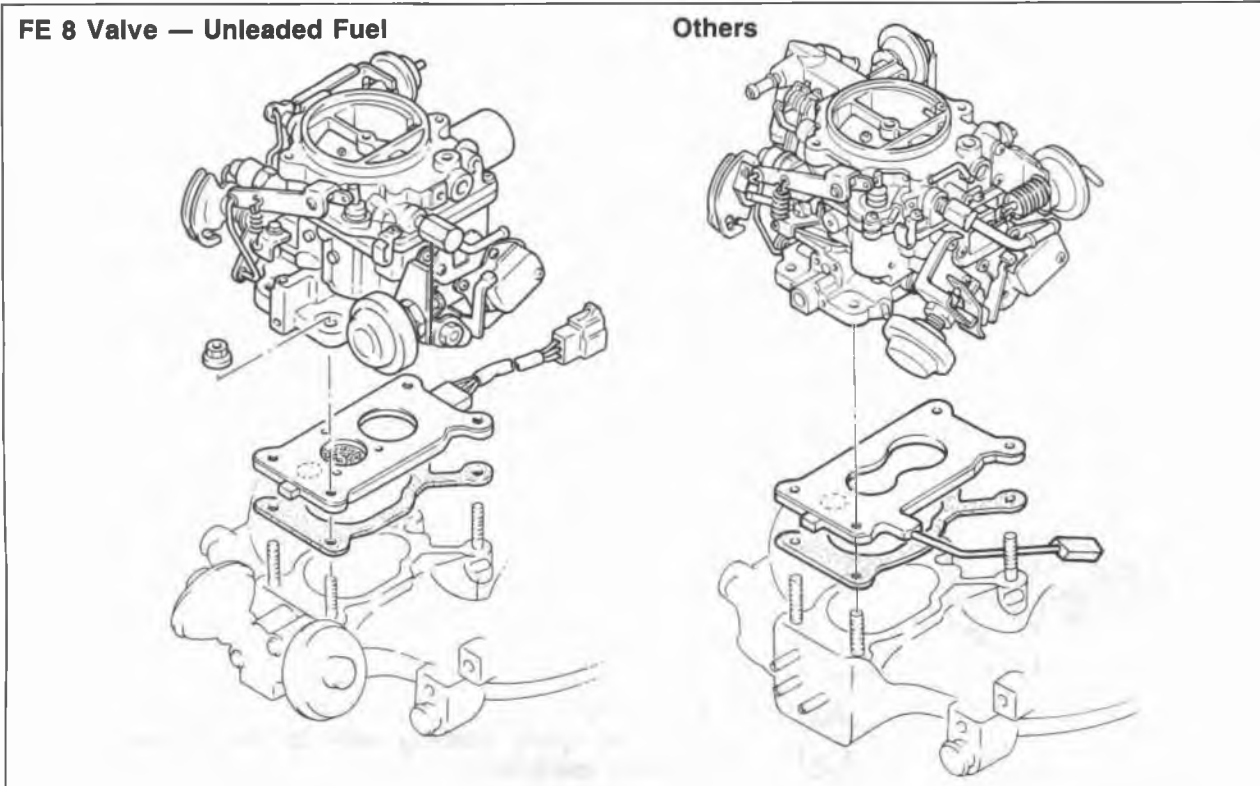
1. Remove the switch from the intake manifold.
2. Place the switch in a container of water with a thermometer.
3. Connect an ohmmeter to the switch.
4. Heat the water slowly and check that the switch has continuity at **67°C (152°F)**.
5. Replace if necessary.

### Note

- a) Apply sealing tape to the threads of the switch.
- b) After installing, check the coolant level and check for leaks.

# 4A PTC HEATER SYSTEM

## PTC HEATER SYSTEM [FE and F8 engine (except Middle East)]



76G04A-071

The PTC heater system consists of the PTC heater, relay, and water thermo switch. The system is designed to prevent carburetor icing when the engine operating temperature is low to assure optimum driveability.

### TROUBLESHOOTING

#### Note

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting Guide. (Refer to pages 4A—19, —20, or—22)

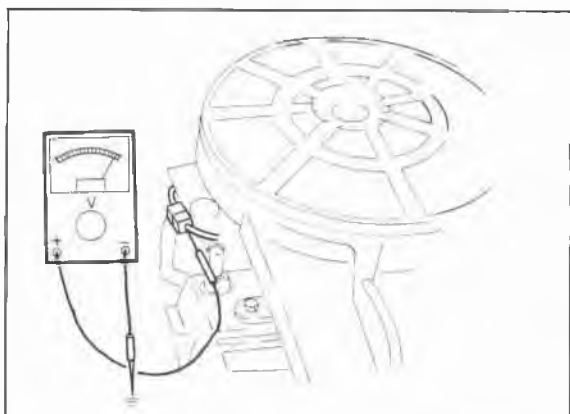
#### FE 8 Valve—Unleaded Fuel

Possible cause	System inspection	Water thermo switch (Intake manifold)	PTC heater	Water thermo switch (Radiator)	PTC heater relay
Page	4A—43	4A—41	4A—43	4A—95	4A—44
Checking order	1	2	3	4	5

#### Except FE 8 Valve—Unleaded Fuel

Possible cause	System inspection	Water thermo switch (Radiator)	PTC heater	PTC heater relay
Page	4A—43	4A—95	4A—43	4A—44
Checking order	1	2	3	4

76G04A-072



76G04A-073

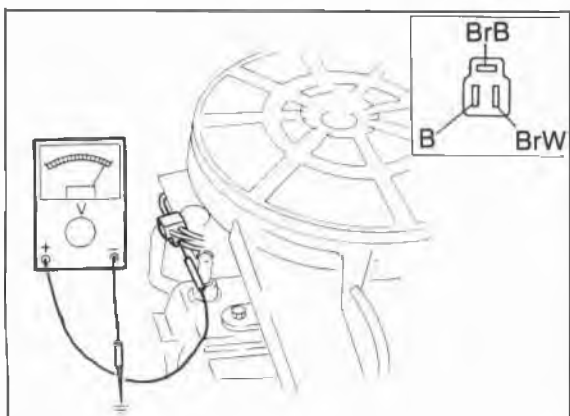
## System Inspection

### Except FE 8Valve—Unleaded Fuel

1. Connect a voltmeter to the PTC heater connector.
2. Start the engine and measure the voltage.

## Specification

Radiator coolant temperature	Below 17°C (63°F)	Above 17°C (63°F)
Voltage	<b>Approx. 12V</b>	<b>0V</b>



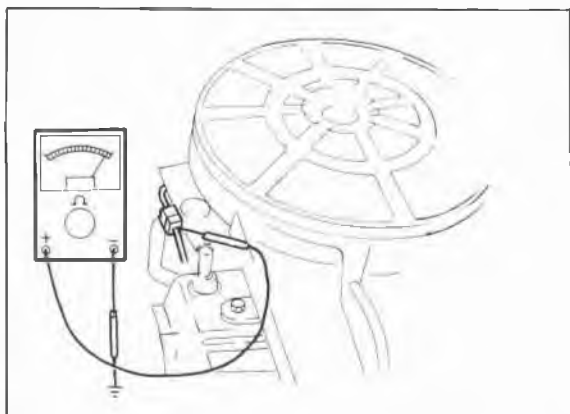
76G04A-074

## FE 8Valve—Unleaded Fuel

1. Start the engine.
2. Connect a voltmeter to the PTC heater connector terminals and measure the voltage.

## Voltage

Engine coolant temperature	Below 67°C (152°F)		Above 67°C (152°F)
Radiator coolant temperature	Below 17°C (63°F)	Above 17°C (63°F)	—
Terminal	BrB	<b>Approx. 12V</b>	<b>0V</b>
	BrW	<b>Approx. 12V</b>	<b>0V</b>

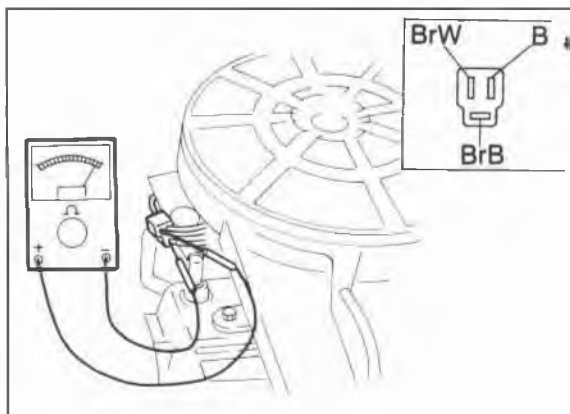


76G04A-075

## PTC Heater

### Except FE 8Valve—Unleaded Fuel

1. Disconnect the PTC heater connector.
2. Check for continuity of the heater with an ohmmeter.

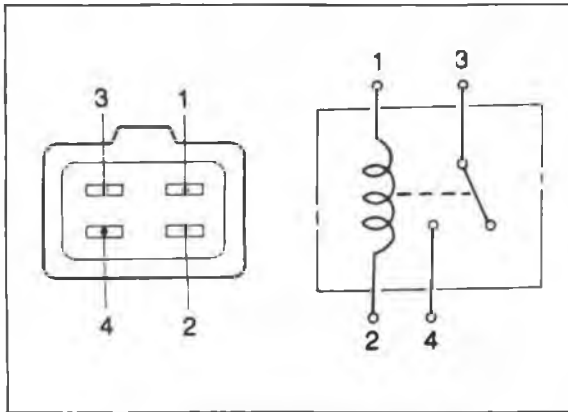


76G04A-076

## FE 8Valve—Unleaded Fuel

1. Disconnect the PTC heater connector.
2. Check for continuity between terminal wire (**BrW**) and a ground.
3. Check for continuity between terminal wire (**BrB**) and (**B**).

# 4A PTC HEATER SYSTEM



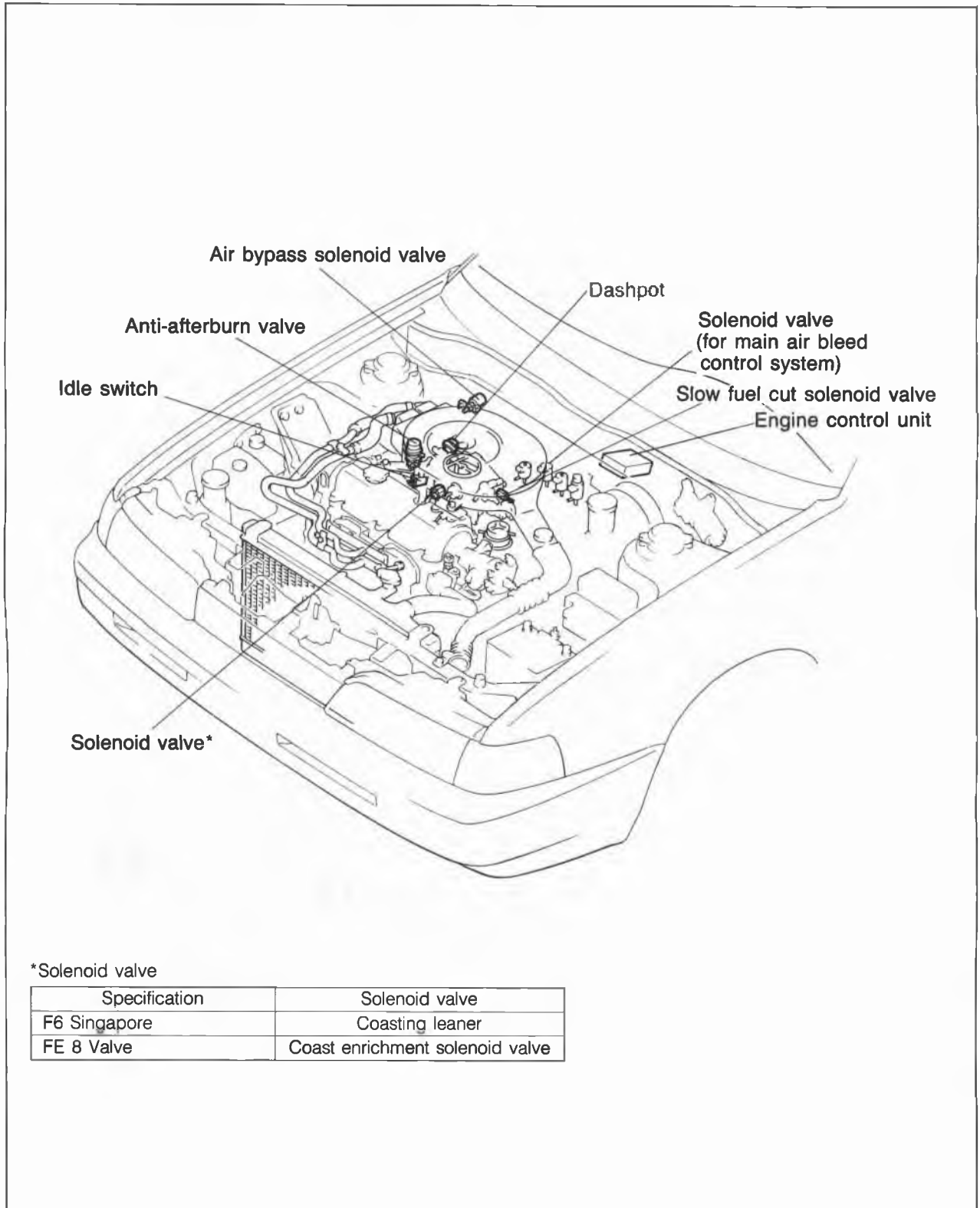
76G04A-077

## PTC Heater Relay

1. Apply 12V to No. 1 terminal and ground No. 2 terminal).
2. Check for continuity at terminals 3 and 4 with an ohmmeter.

Operation	0V	12V
Terminals 3—4	No continuity	Continuity

## DECELERATION CONTROL SYSTEM



76G04A-078

This system improves driveability during deceleration.

# 4A DECELERATION CONTROL SYSTEM

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the engine control unit or switches.

### FE 12Valve and F8 (ECE, Hong Kong and Singapore)—MTX

Possible cause						Engine control unit terminal		
	Anti-afterburn valve	Dashpot	Bypass air control system	Idle switch	main air bleed control system	E	L	M
	4A—50	4A—50	4A—48	4A—93	4A—51	4A—88		
<b>Symptom</b>								
Runs rough on deceleration			2	1	3	5	4	
Afterburn in exhaust system	1	2	4	3			5	6
Poor fuel consumption		1	2					3
Fails emission test	7		6	1	2	3	4	5
High idle speed after warm up		1			2	3		
Engine stalls during warm up					1			
Rough idle during warm up					1			
Poor acceleration, hesitation, or lack of power					1			

76G04A-079

### FE 12Valve and F8 (ECE, Hong Kong and Singapore)—ATX

Possible cause					Engine control unit terminal		
	Anti-afterburn valve	Bypass air control system (Only FE)	Main air bleed control system	Idle switch (Only FE)	B	D	2N
	4A—50	4A—48	4A—51	4A—93	4A—86		
<b>Symptom</b>							
Runs rough on deceleration		2	3	1	5		4
Afterburn in exhaust system	1	2		3		4	5
Poor fuel consumption		1				2	
Fails emission test	7	6	2	1	3	4	5
High idle speed after warm up			1		2		
Engine stall during warm up			1				
Rough idle during warm up			1				
Poor acceleration, hesitation, or lack of power			1				

76G04A-080

# DECELERATION CONTROL SYSTEM 4A

## FE 8Valve—Unleaded Fuel

Possible cause	Slow fuel cut system	Coast enrichment system	Idle switch	Anti-afterburn valve	Bypass air control system	Dashpot (only MTX)	Engine control unit terminal			
							A	C	G	I
Page	4A-53	4A-54	4A-93	4A-50	4A-48	4A-50	4A-91			
Symptom										
Runs rough on deceleration	8	6	1		7		3	4	5	2
Afterburn in exhaust system	7		3	1	4	2		5	8	6
Poor fuel consumption		2	1		6		5	4		3
High idle speed after warm up		2				1	3			
Fails emission test	4	2	1	5	3		6	7	8	9

76G04A-081

## FE 8Valve (General)

Possible cause	main air bleed control solenoid valve	Engine control unit terminal				
		MTX		ATX		
		E	F	B	2F	2I
Page	4A-51	4A-90		4A-89		
Checking order	1	2				

76G04A-082

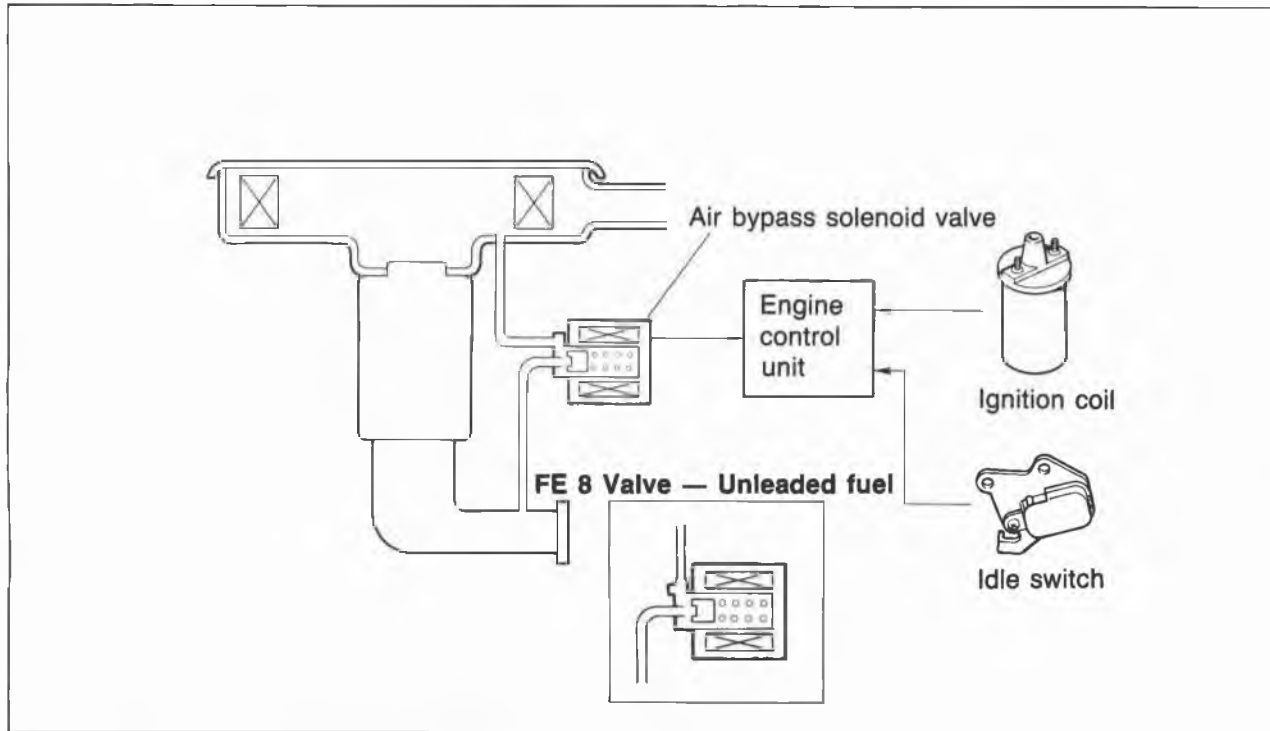
## F6 (Singapore)

Possible cause	Dashpot (Only MTX)	Anti-afterburn valve	Idle switch	Coasting leaner solenoid valve	Engine control unit terminal	
					B	D
Page	4A-50	4A-50	4A-93	4A-56	4A-92	
Symptom						
High idle speed after warm up	1					
Runs rough on deceleration			1	2		3
Afterburn in exhaust system	5	4	1	2		3
Fails emission test		4	1	2		3

76G04A-083

# 4A DECELERATION CONTROL SYSTEM

## BYPASS AIR CONTROL SYSTEM FE and F8 [Except General and Middle East]



76G04A-084

The bypass air control system consists of the bypass solenoid valve, idle switch, ignition coil, and engine control unit.

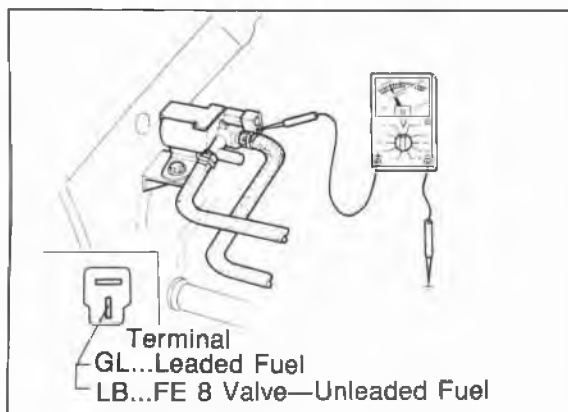
This system opens the bypass air passage to the intake manifold during deceleration above approx. **2,300 rpm** (ECE, Hong Kong, and Singapore), or above **approx. 3,500 rpm** (FE 8 Valve—Unleaded fuel).

### Note

**Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting. (Refer to page 4A—46 or 47.)**

### Troubleshooting

Possible cause	System inspection	Air bypass solenoid valve
Page	4A—48	4A—49
Checking order	1	2



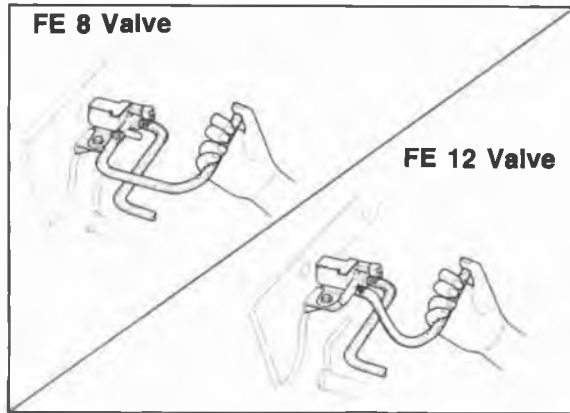
76G04A-085

### System Inspection

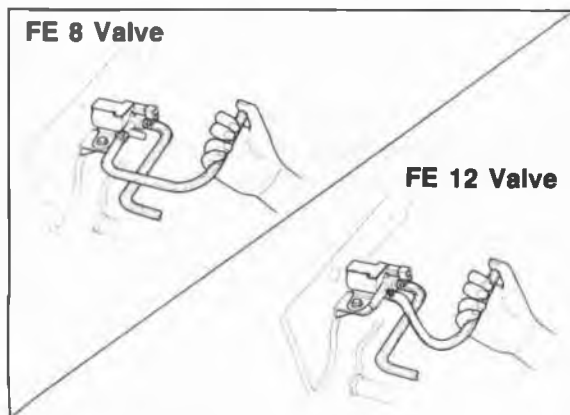
1. Warm up the engine and run it at idle.
2. Connect a tachometer.
3. Disconnect the bypass air hose from the air cleaner and place a finger over the hose opening.



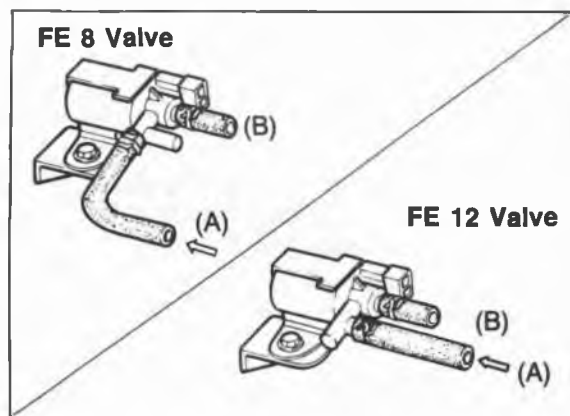
# DECELERATION CONTROL SYSTEM 4A



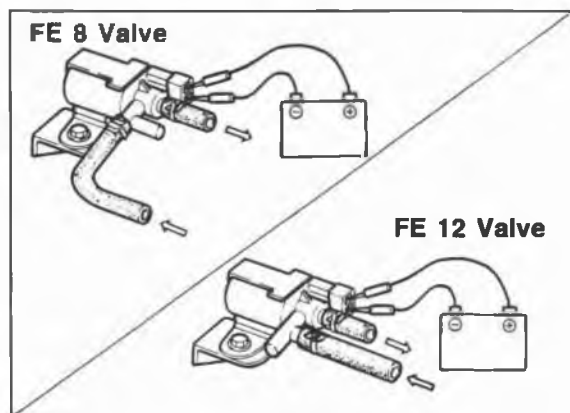
76G04A-086



76G04A-087



76G04A-088



76G04A-089

5. Increase the engine speed to 4,000 rpm.
6. Check that no vacuum is felt.

7. Quickly decrease the engine speed and check that vacuum is felt during above specified engine speed.

## Specification

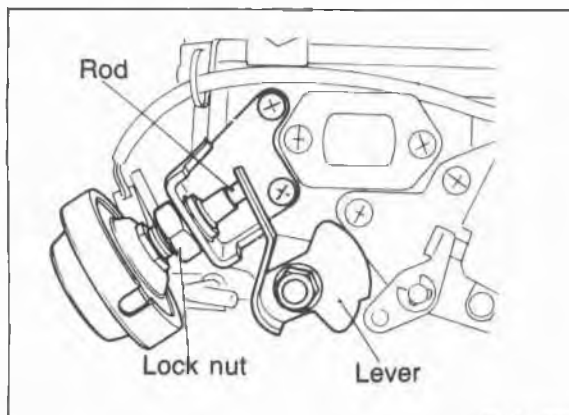
FE 8 Valve	Approx. 3,500 rpm
Others	Approx. 2,100 rpm

## Air Bypass Solenoid Valve

1. Disconnect air hose (A) from the air cleaner.
2. Disconnect air hose (B) from the intake manifold.
3. Disconnect the connector from the solenoid valve.
4. Blow air through the solenoid valve from (A) and check that air does not come out from (B).

5. Apply 12V to the connector terminal with jumper wire.
6. Blow air through the solenoid valve from (A) and check that air comes out from (B).
7. If the solenoid valve does not operate properly, replace it with a new one.

## 4A DECELERATION CONTROL SYSTEM

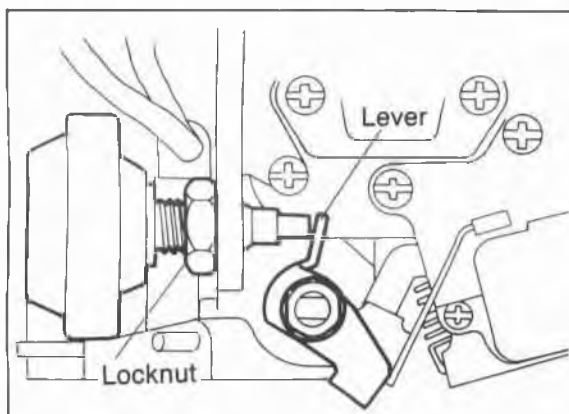


76G04A-090

### DASHPOT (MTX)

#### Inspection

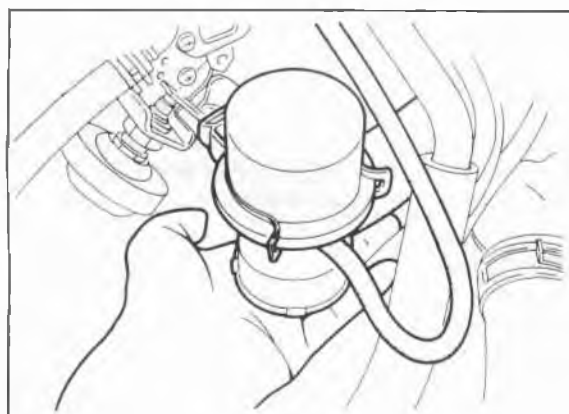
1. Suddenly move the throttle lever and check that the dashpot rod comes out to its full stroke with the throttle lever.
2. Release the throttle lever and check that it returns slowly to the idle position after contacting the dashpot rod.



76G04A-091

#### Adjustment

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect a tachometer to the engine.
3. Increase the engine speed to **3,000 rpm**.
4. Slowly decrease the engine speed and check that the dashpot rod touches the lever at **2,200 ± 100 rpm**.
5. If not within specification, loosen the locknut and turn the dash pot to adjust.



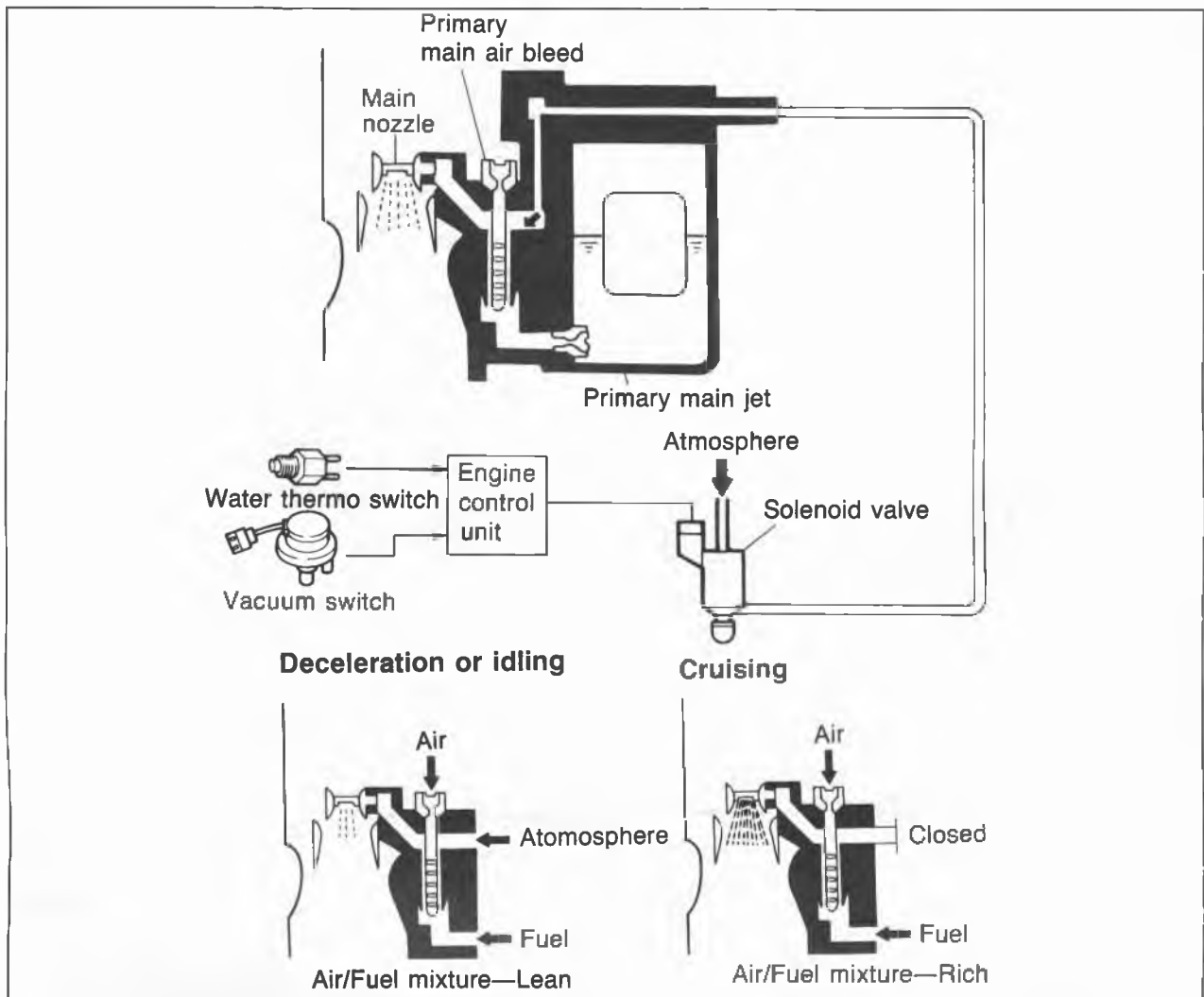
76G04A-092

### ANTI-AFTERBURN VALVE

#### Inspection

1. Start the engine and let it idle.
2. Block the intake port of the anti-afterburn valve and check that the engine speed does not change.
3. Increase the engine speed and quickly decelerate.
4. Check that air is pulled into the intake port for **1—2 seconds** after the accelerator is released.

## MAIN AIR BLEED CONTROL SYSTEM FE and F8 (ECE, Hong Kong, Singapore, and General)



76G04A-093

This system prevents the additional air from being fed to the primary air bleed circuit and causes the air/fuel mixture to become rich, improving acceleration.

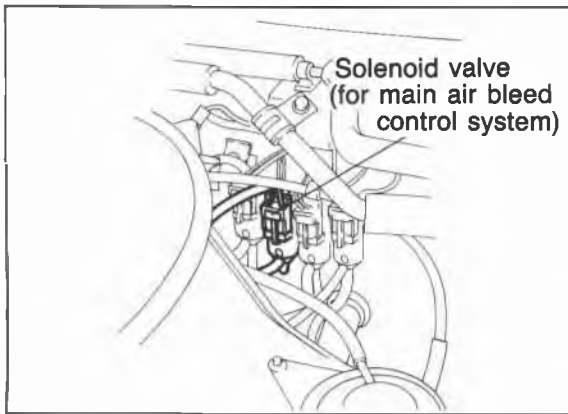
### Troubleshooting

Possible cause	System inspection	Solenoid valve	Vacuum switch	Water thermo switch (Radiator)
Page	4A-52	4A-52	4A-94	4A-95
Checking order	1	2	3	4

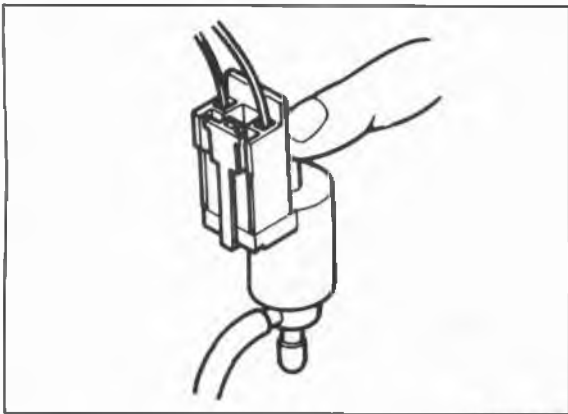
#### Note

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting. (Refer to pages 4A-46 or -47.)

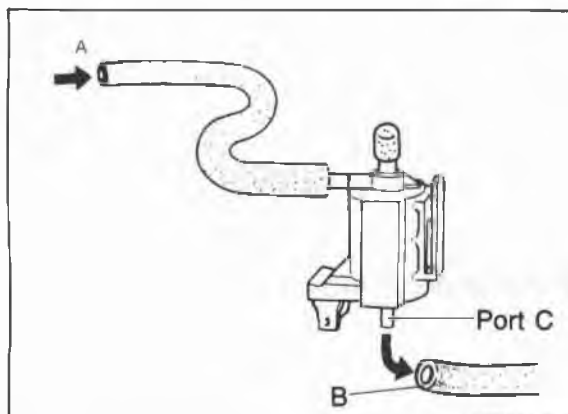
## 4A DECELERATION CONTROL SYSTEM



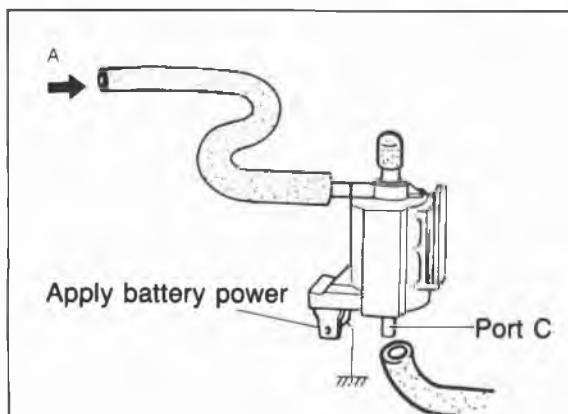
76G04A-094



76G04A-095



76G04A-191



76G04A-192

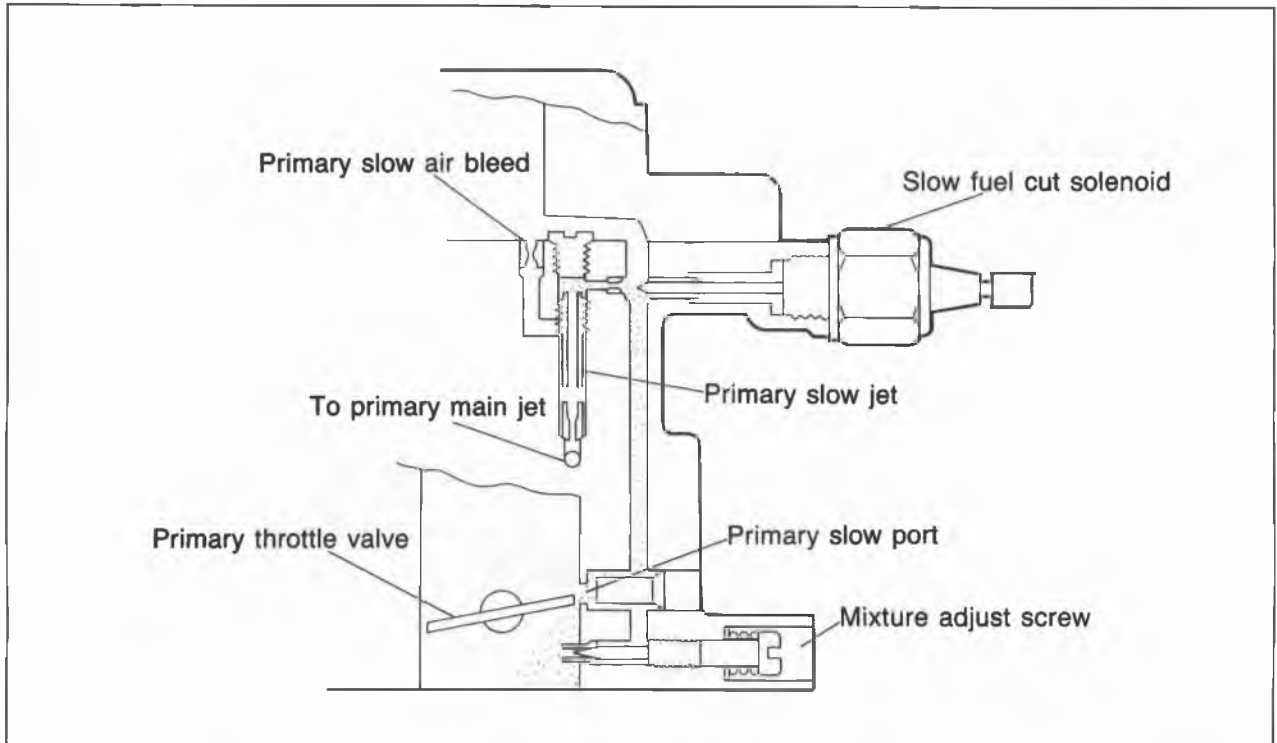
### System Inspection

1. Disconnect the vacuum switch connector.
2. Make sure that radiator coolant temperature is below 17°C (63°F).
3. Disconnect the upper vacuum hose from the solenoid valve.
4. Place a finger over the solenoid valve open port and check that vacuum is not felt when engine is running.
5. Warming up the engine.
6. Place a finger over the same open port of the solenoid valve and check that weak vacuum is felt.
7. Reconnect the vacuum switch connector.
8. Check that weak vacuum is felt at the open port of the solenoid valve at idle.
9. Accelerate the engine rapidly and check that vacuum is not felt.

### Solenoid Valve (A/C)

1. Disconnect vacuum hose A (White) from the carburetor.
2. Disconnect vacuum hose B from the solenoid valve.
3. Disconnect the solenoid valve connector.
4. Blow air through the valve from hose A and check that it comes out of port C.
5. Apply 12V and ground to the solenoid valve with jumper wires.
6. Blow air through the valve from hose A and check that air not come out.
7. Replace if necessary.

## SLOW FUEL CUT SYSTEM [FE 8VALVE—UNLEADED FUEL]



76G04A-096

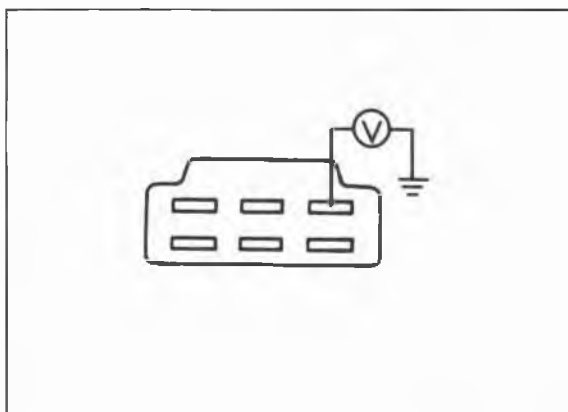
This system shuts the primary slow fuel passage to prevent run-on and overheating of the exhaust system when the ignition switch is turned OFF or during deceleration (engine speed **above 2,300 rpm** and idle switch ON). The slow fuel cut solenoid is actuated by the engine control unit and ignition switch.

### Troubleshooting

#### Note

**Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting Guide. (Refer to page 4A—47.)**

Possible cause	System inspection	Slow fuel cut solenoid valve
Page	4A—53	4A—34
Check order	1	2



76G04A-097

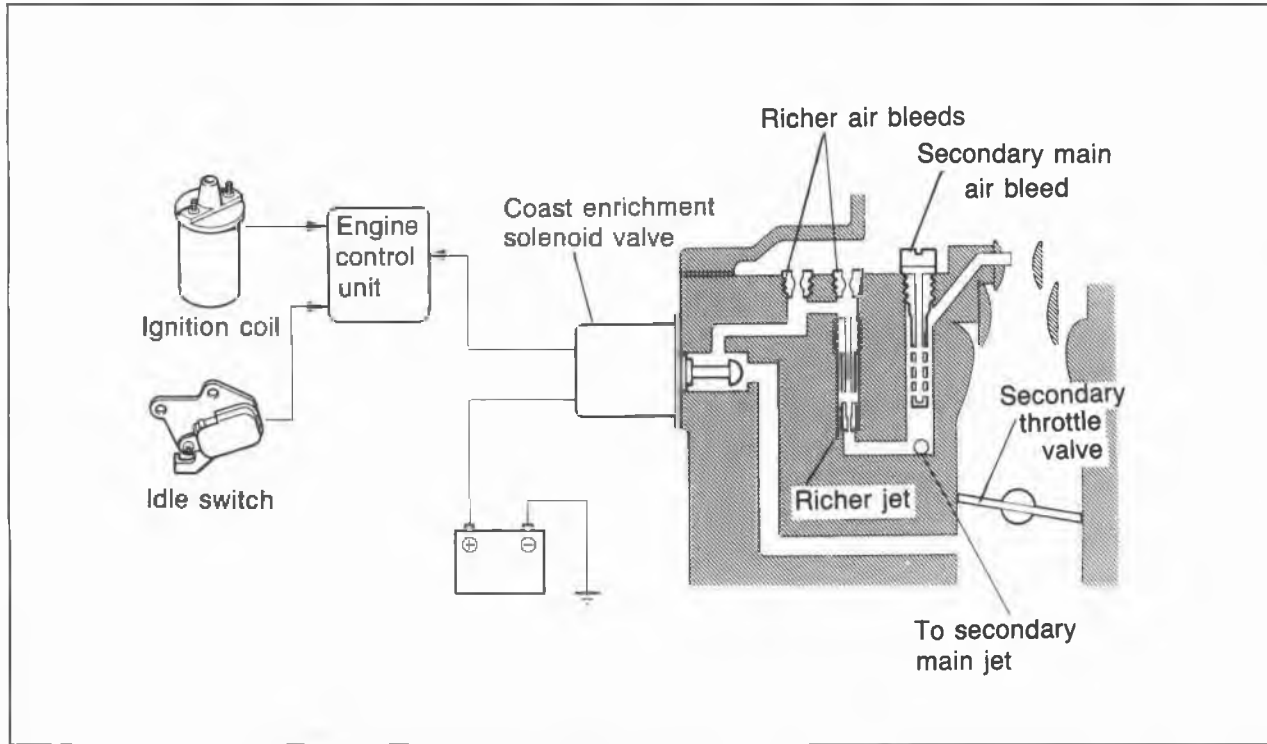
### System Inspection

1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Connect a voltmeter to the carburetor connector terminal (**BW** wire).
4. Increase the engine speed to 4,000 rpm; then release the throttle lever.
5. Measure the terminal voltage.

Engine speed	Voltage
Above approx. 2,300 rpm	Approx. 12V
Below approx. 2,300 rpm	Below 1.5V

# 4A DECELERATION CONTROL SYSTEM

## COAST ENRICHMENT SYSTEM [FE 8VALVE—UNLEADED FUEL]

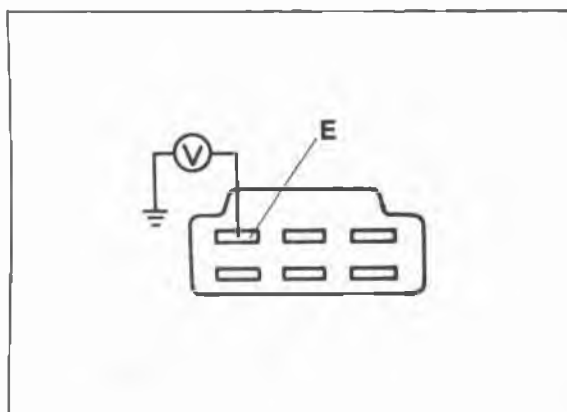


76G04A-098

This system opens the fuel passage to the secondary stage of the carburetor during deceleration at engine speeds of **2,300—1,500 rpm**. The coast enrichment solenoid valve is actuated by the engine control unit.

### Troubleshooting

Possible cause	System inspection	Coast enrichment solenoid valve	Engine control unit terminal			
			A	B	D	I
	4A—54	4A—55	4A—91			
Page	1	3	2			
Checking order						

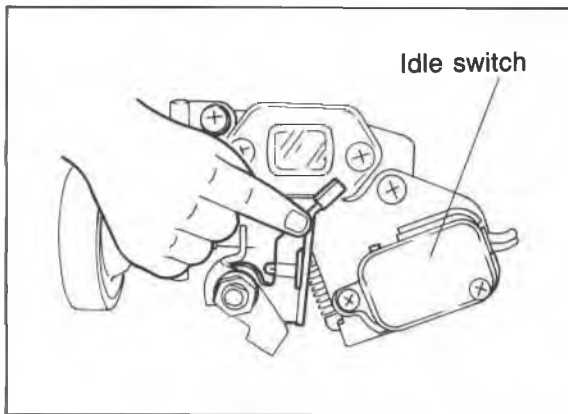


76G04A-099

### System Inspection

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect a voltmeter to the carburetor connector terminal **E**.
3. Connect a tachometer to the engine.

## DECELERATION CONTROL SYSTEM 4A

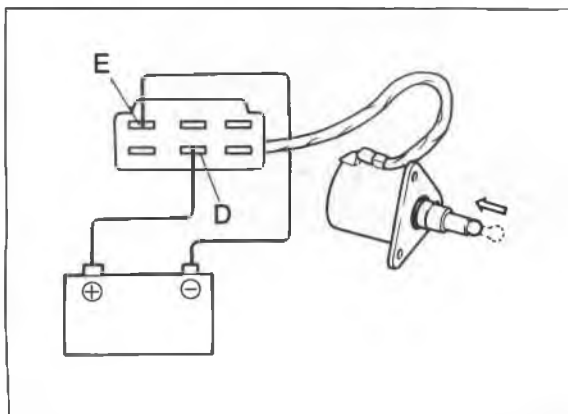


76G04A-100

4. Lift the idle switch lever. (Idle switch ON.)
5. Increase the engine speed to 3,000 rpm then decelerate.
6. Check the terminal voltage as shown.

### Voltage:

Above approx. 2,300 rpm	Approx. 12V
Approx. 2,300 rpm—1,500 rpm	Below 1.5V
Below approx. 1,500 rpm	Approx. 12V



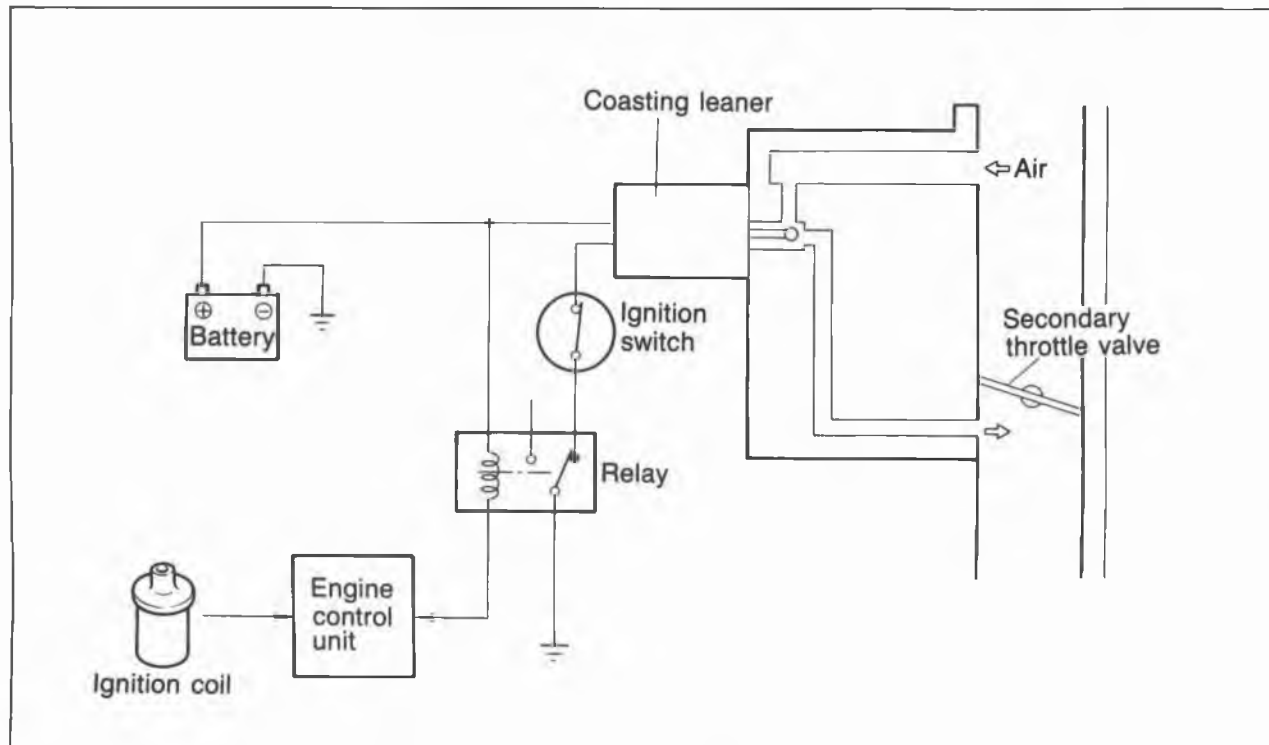
76G04A-101

### Coast Enrichment Solenoid Valve

1. Disconnect the connector of the coast enrichment solenoid valve.
2. Apply 12V to the carburetor connector terminal **D** and ground terminal **E** as shown in the illustration.
3. Check that the coast enrichment solenoid valve "clicks" when making and breaking the circuit. Replace, if necessary.

# 4A DECELERATION CONTROL SYSTEM

## COASTING LEANER SYSTEM (F6 SINGAPORE MTX)



76G04A-102

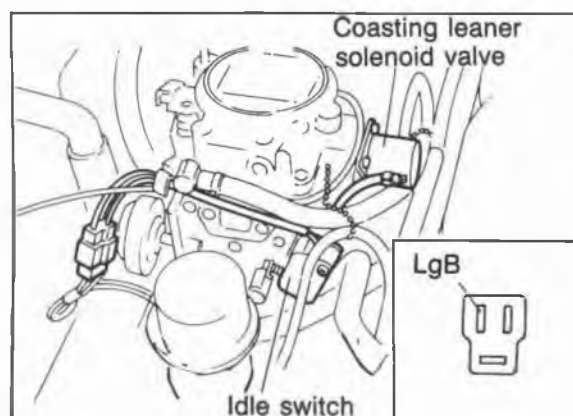
This system consists of the coasting leaner solenoid valve, engine control unit, ignition coil, and idle switch. When the idle switch is ON and the engine speed is more than approx. **2,100 rpm** (deceleration), the coasting leaner solenoid valve opens the air passage port to prevent afterburn in the exhaust system.

### Troubleshooting

#### Note

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting. (Refer to page 4A—47)

Possible cause	System inspection	Coasting leaner solenoid valve	Relay
Page	4A—56	4A—57	4A—57
Checking order	1	2	3



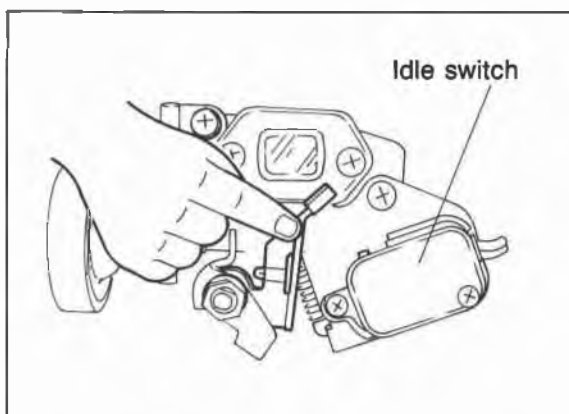
76G04A-103

### System Inspection

1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Connect a voltmeter to the coasting leaner solenoid valve connector (**LgB wire**).



## DECELERATION CONTROL SYSTEM 4A

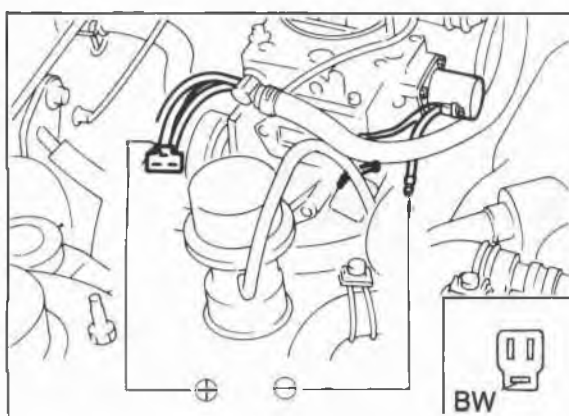


76G04A-104

- lift the idle switch lever. (Idle switch ON).
- Increase the engine speed to 3,000 rpm and then decelerate.
- Check the terminal voltage.

### Voltage:

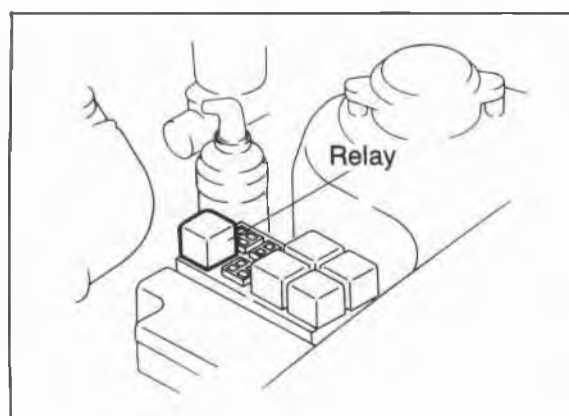
Above approx. 2,100 rpm	Below 1.5V
Below approx 2,100 rpm	Approx. 12V



76G04A-105

### Coasting Leaner Solenoid Valve

- Disconnect the connector of the coasting leaner solenoid valve.
- Disconnect the connector of the idle switch.
- Apply 12V to terminal (**BW wire**) and ground with a jumper wires as shown in the illustration.
- Check that the coasting leaner solenoid valve "clicks" when making and breaking the circuit. Replace, if necessary.



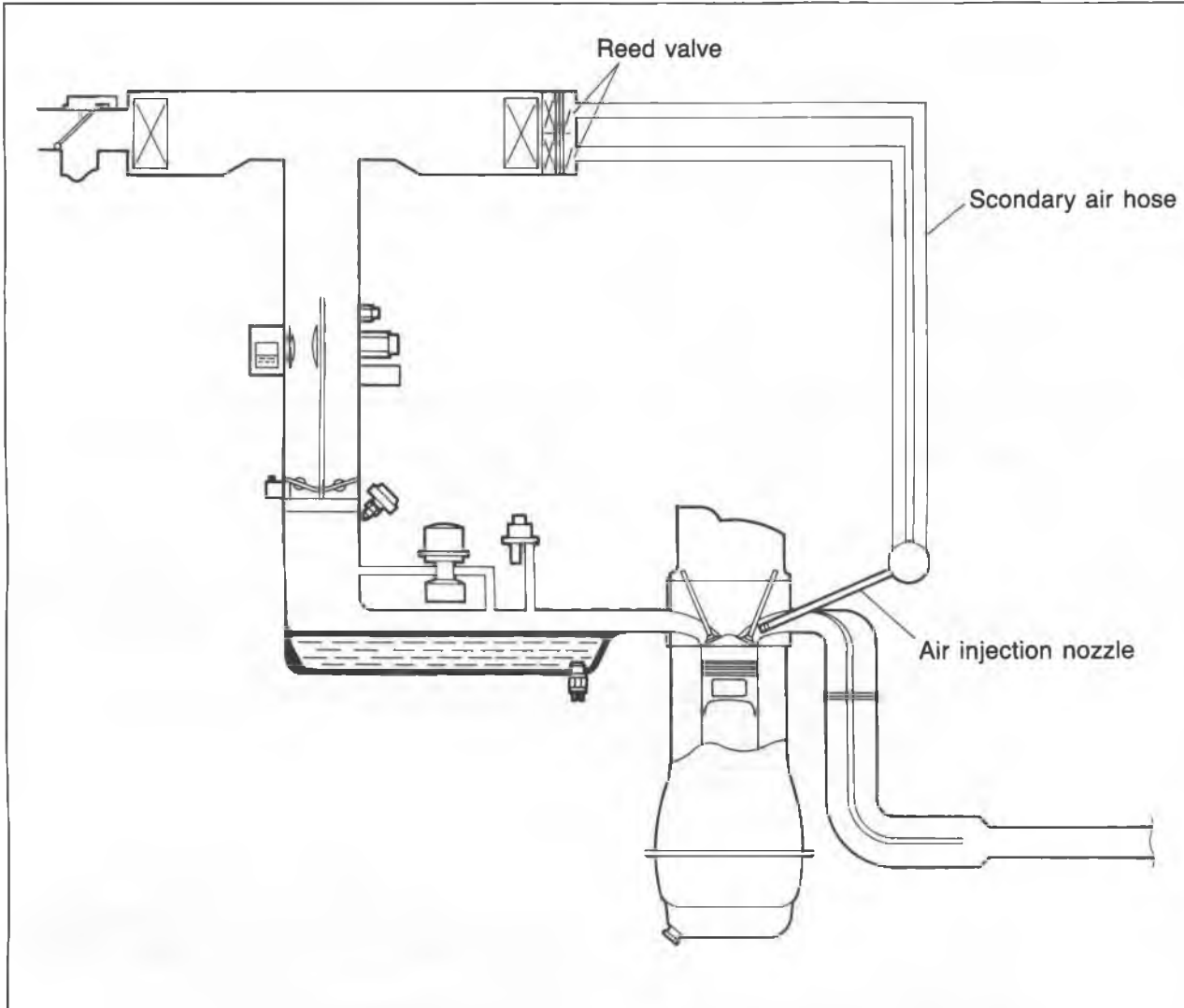
76G04A-106

### Relay

- Warm up the engine and run it at idle.
- Connect a tachometer to the engine.
- Increase and decrease the engine speed between **1,900—2,300 rpm** and check that the relay "clicks".
- Replace if necessary.

# 4A AIR INJECTION SYSTEM

## AIR INJECTION SYSTEM (EXCEPT GENERAL AND MIDDLE EAST)



76G04A-107

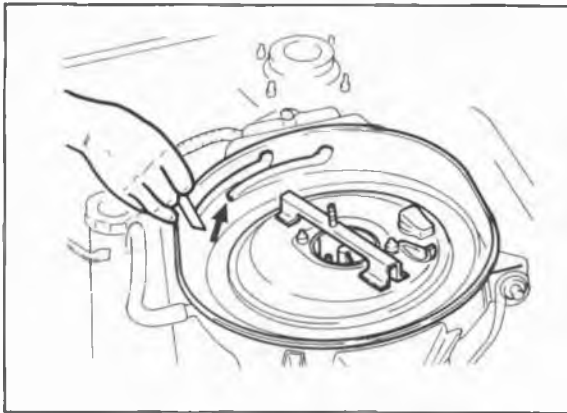
To achieve oxidization of CO and HC, the reed valve injects secondary air into the exhaust manifold.

### TROUBLESHOOTING

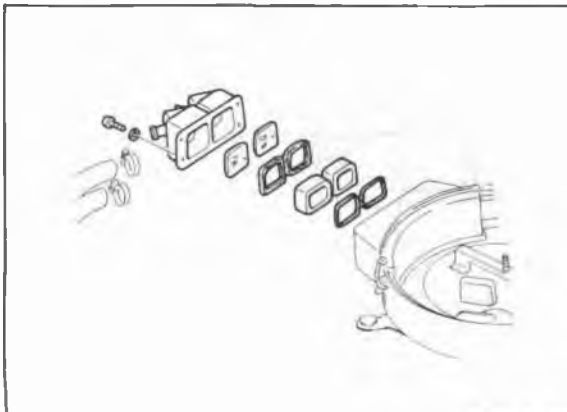
Possible cause	Reed valve	Air injection pipe
	Page	
Symptom	4A-59	4A-59
Falls emission test	1	2

76G04A-108

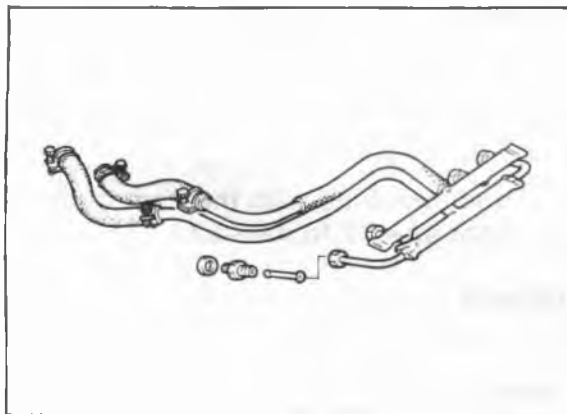
## AIR INJECTION SYSTEM 4A



76G04A-109



76G04A-110



76G04A-111

### Reed Valve

1. Warm up the engine to the normal operating temperature, and then stop the engine.
2. Remove the air cleaner cover and element.
3. Start the engine and run it at idle.
4. Place a thin paper over the reed valve inlet port and check that air is pulled in.
5. Increase the engine speed to **1,500 rpm** and check that there is no exhaust gas leakage at the inlet by placing a thin paper over the port.

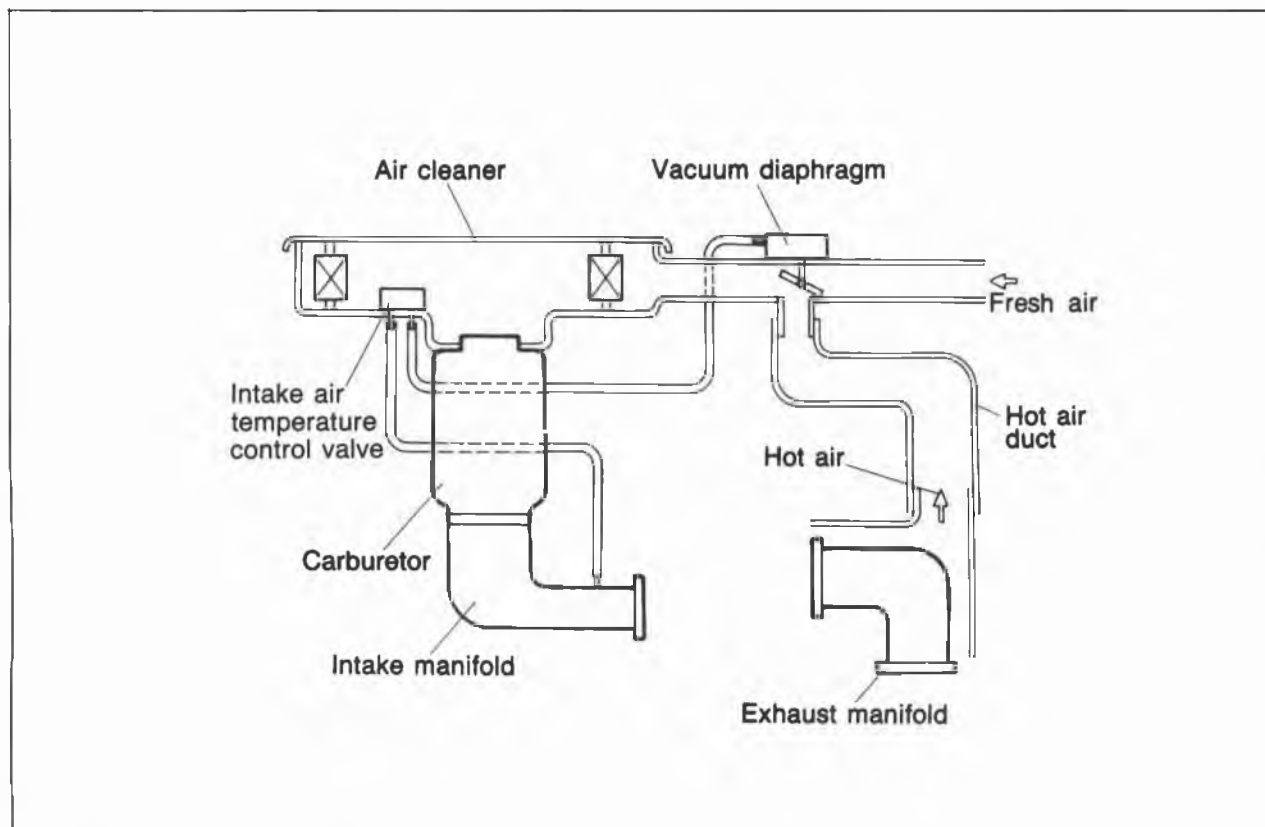
6. Replace the reed valve, if necessary.

### Air Injection Nozzle and Pipe

1. Disconnect the hoses from the air cleaner.
2. Loosen the nuts and remove the air injection nozzle and air pipe.
3. Visually check the air injection nozzle and pipe.
4. Replace if necessary.

# 4A INTAKE AIR TEMPERATURE CONTROL SYSTEM

## INTAKE AIR TEMPERATURE CONTROL SYSTEM



76G04A-112

This system controls air intake temperature to prevent icing and operates depending on air temperature around the control valve.

### TROUBLESHOOTING

**Note**

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting Guide. (Refer to pages from 4A-17 to 4A-22.)

#### FE and F8 (General, ECE, and Hong Kong) and Singapore

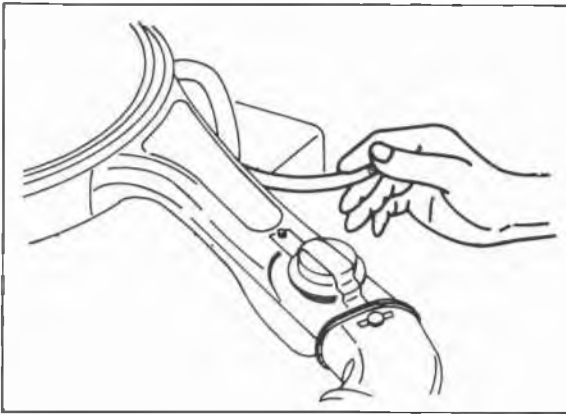
Possible cause	System inspection	Vacuum control diaphragm	Intake air temperature control valve
Page			
Symptom	4A-61	4A-61	4A-61
Checking order	1	2	3

#### FE 8 Valve—Unleaded Fuel, Middle East, and F6—General

Possible cause	System inspection
Page	4A-62
Checking order	1

76G04A-113

# INTAKE AIR TEMPERATURE CONTROL SYSTEM 4A

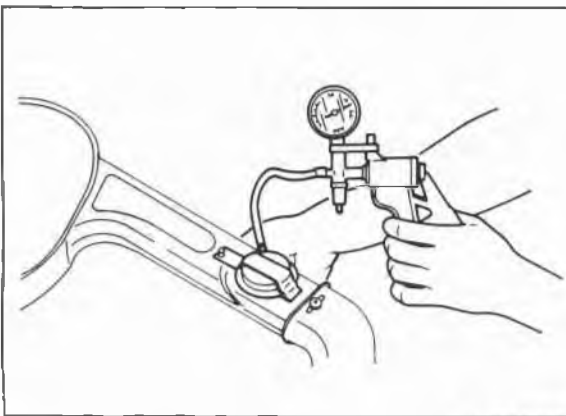


76G04A-114

## System Inspection

### [Except Manual and Bimetal Type]

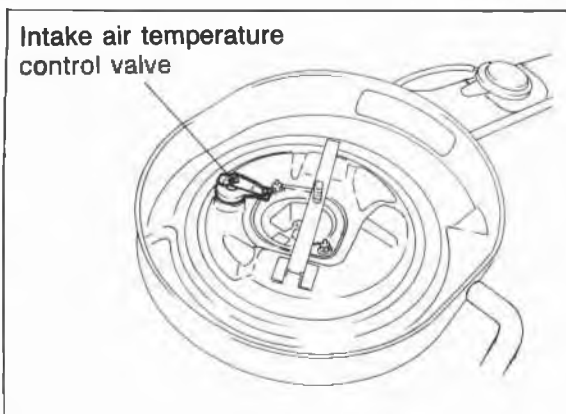
1. Disconnect the vacuum hose from the vacuum control diaphragm.
2. Start the engine and check that vacuum is felt while the engine is still cold.
3. Warm up the engine to the normal operating temperature and check that vacuum is not felt.



76G04A-115

## Vacuum Control Diaphragm

1. Remove the air cleaner.
2. Connect the vacuum pump to the vacuum control diaphragm.
3. Apply **160 mmHg (6.3 inHg)** vacuum and check that the shutter valve is opened to the hot position.
4. Replace the air cleaner if necessary.

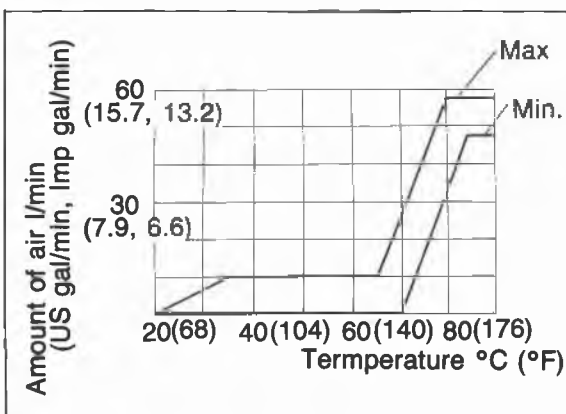


76G04A-116

## Intake air temperature control valve

1. Check that the valve is closed when the bimetal temperature is lower than specified.

**Operating temperature: 30°C (86°F)**



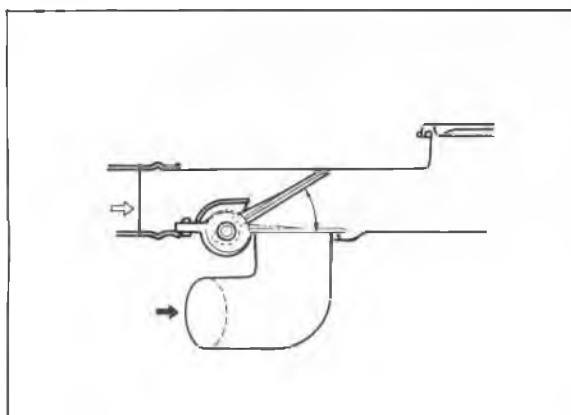
76G04A-116

2. To check, suck air through the tube. If excessive air leakage is found, replace the valve as an assembly.

3. Check that the valve opens when heated.
4. Replace if necessary.

## 4A INTAKE AIR TEMPERATURE CONTROL SYSTEM

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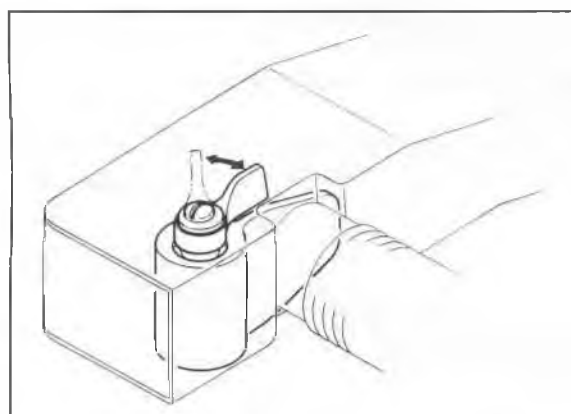
76G04A-118

### System Inspection

#### Bimetal type

#### [FE 8Valve—Unleaded Fuel]

Move the control valve inside the air cleaner, and check that it moves freely and that spring force is felt.



76G04A-119

### System Inspection

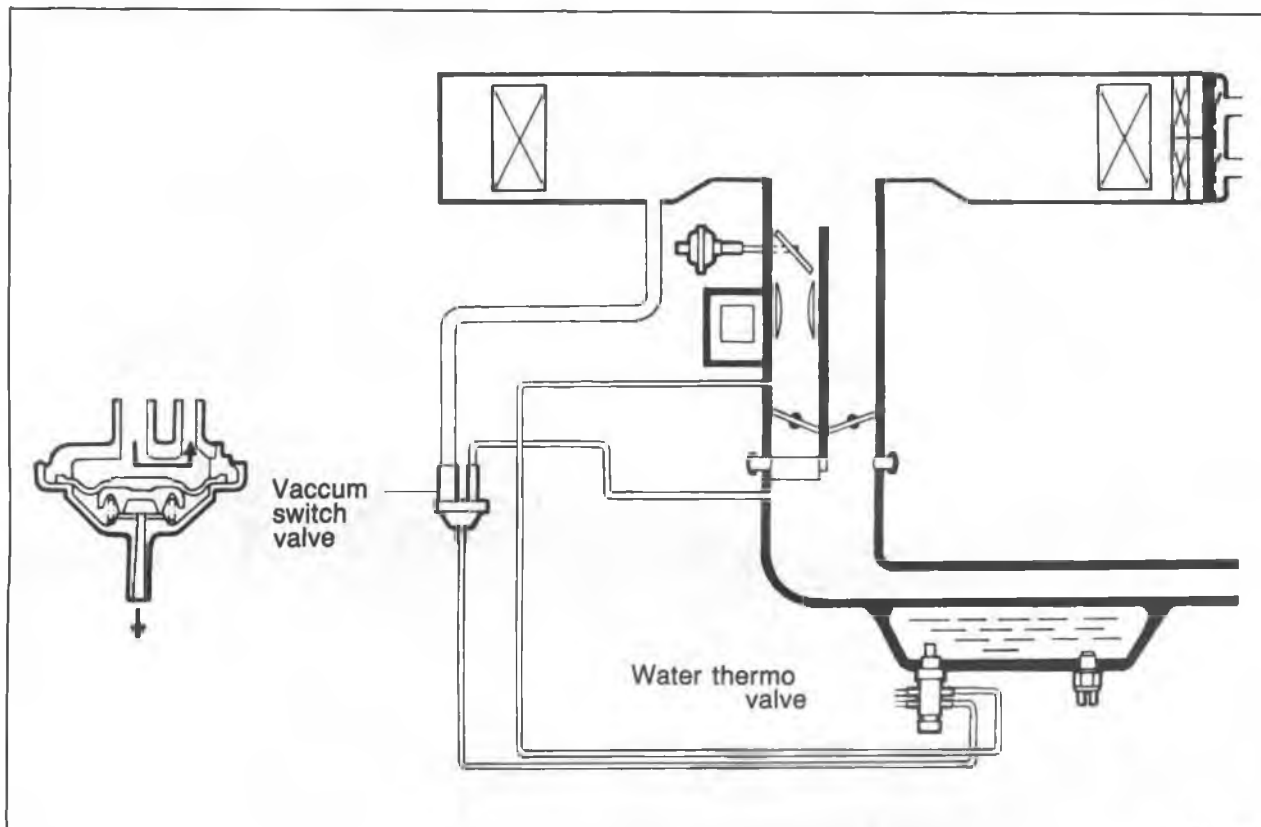
#### Manual type

#### [Middle East and F6—General]

Change the summer-winter change lever and check that it moves smoothly.

## PURGE CONTROL SYSTEM

[FE 8VALVE—UNLEADED FUEL]

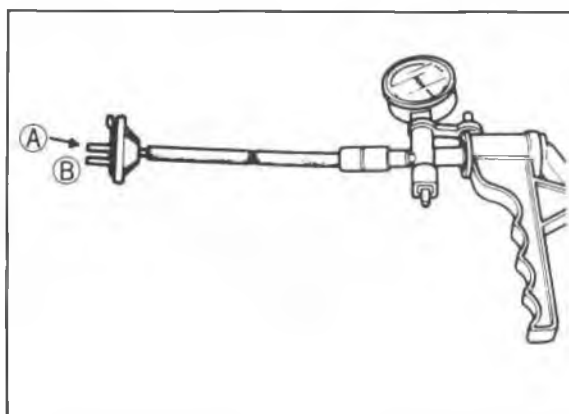


76G04A-120

This system supplies additional air to the intake manifold to improve the driveability when the engine coolant temperature is above **50°C (122°F)**.

### TROUBLESHOOTING

Possible cause	Vacuum switch valve	Water thermo valve
Page	4A-63	4A-66
Checking order	1	2



76G04A-121

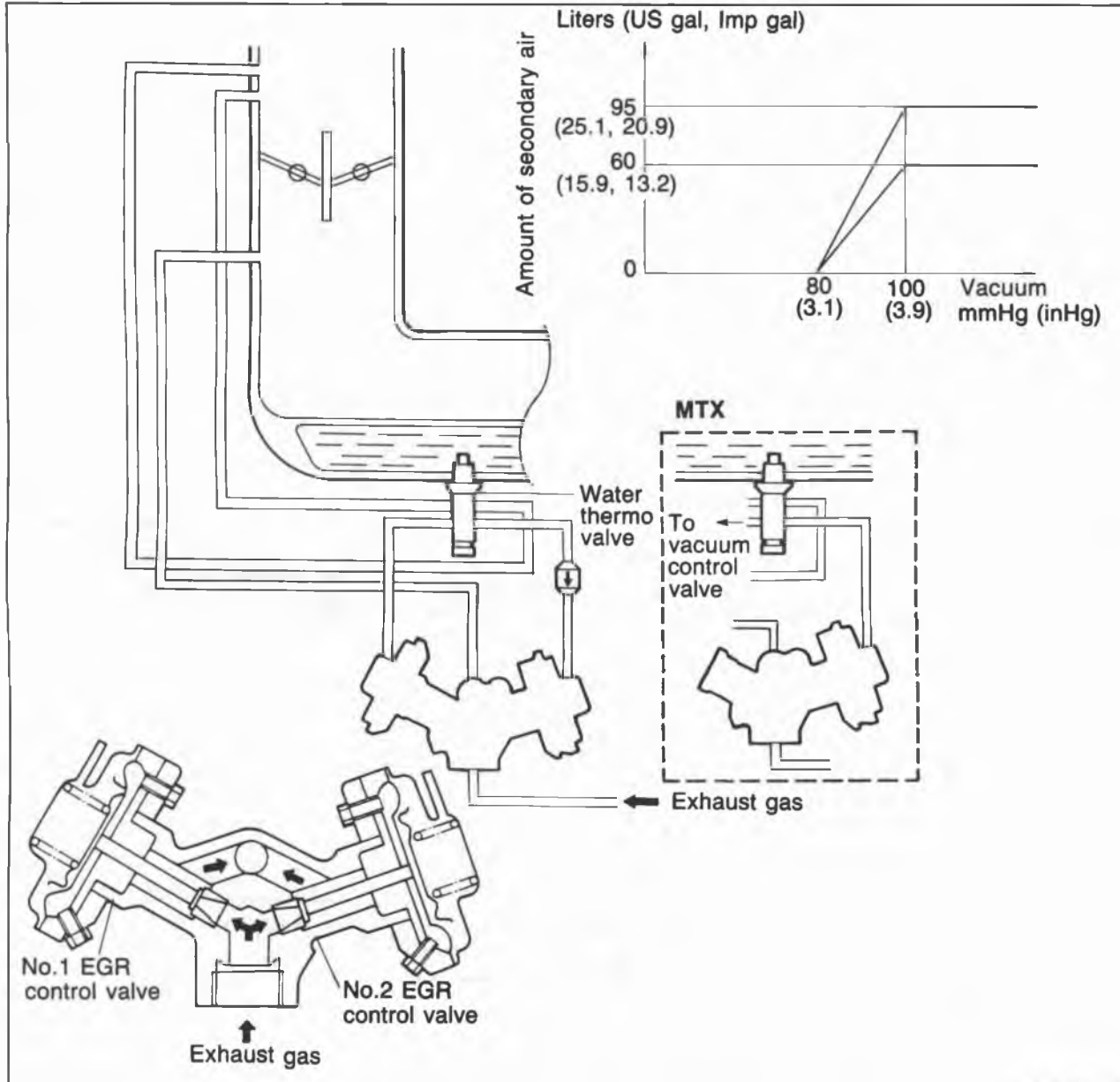
#### VACUUM SWITCH VALVE

1. Connect a vacuum pump to the purge control valve as shown in the figure.
2. Blow through the valve from port A and check that air does not come out of port B.
3. Apply **100 mm-Hg (3.94 inHg)** vacuum.
4. Blow through port A and check that air comes out of port B.
5. Replace if necessary.

# 4A EGR SYSTEM

## EXHAUST GAS RECIRCULATION (EGR) SYSTEM

FE 8VALVE—UNLEADED FUEL



76GJ4A-122

This system introduces exhaust gas into the intake manifold to reduce NOx emissions.



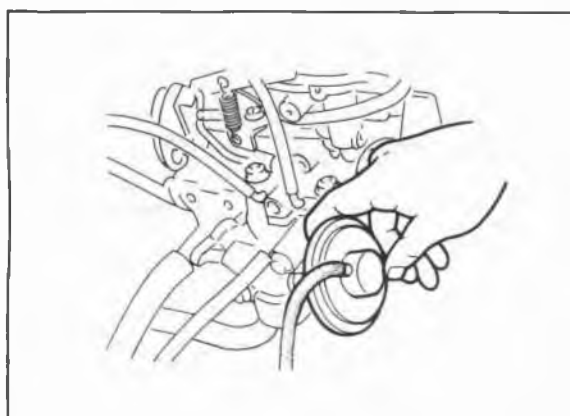
## TROUBLESHOOTING

### Note

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting Guide. (Refer to pages 4A—22.)

Possible cause	System inspection	EGR control valve	Water thermo valve
Page	4A—65	4A—65	4A—66
Checking order	1	2	3

76G04A-123



76G04A-124

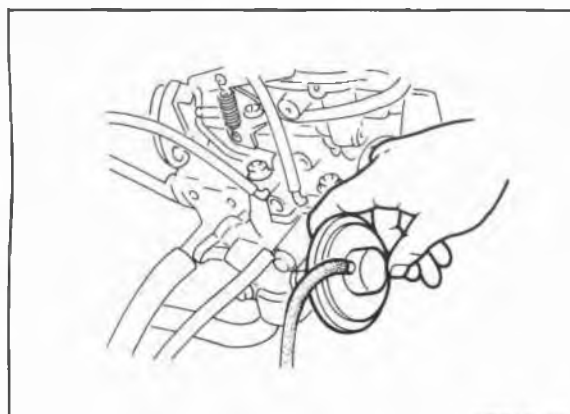
### System Inspection

1. Start the engine.
2. Accelerate the engine while it is still cold and check that the diaphragm of the EGR control valve does not move.
3. Warm up the engine to normal operating temperature and run it at idle.

### Warning

**Be careful when checking the EGR control valve, the surrounding area is very hot.**

4. Accelerate the engine and check that the diaphragm of the EGR control valve moves.

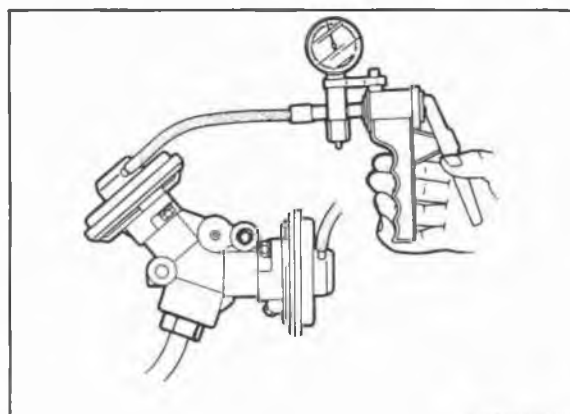


76G04A-125

### EGR Control Valve (ATX)

#### (No. 1)

1. Manually actuate the valves by pushing on the diaphragm with finger.
2. Check that the spring resistance is present and the diaphragm moves freely with no sticking or binding.



76G04A-126

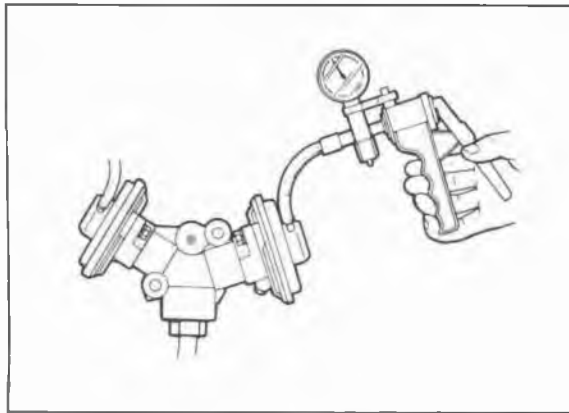
3. Warm up the engine and run it at idle.
4. Connect a vacuum pump to the valve and apply vacuum.
5. Check that the engine runs roughly or stalls at more than the specified vacuum.

### Specification:

**70—90 mmHg (2.8—3.5 inHg)**

6. If not correct, replace the EGR control valve.

# 4A EGR SYSTEM



76G04A-127

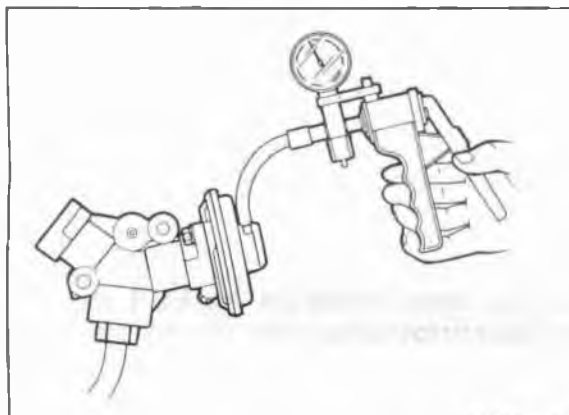
## (No. 2)

1. Check the EGR control valve manually (same as No. 1 valve).
2. Warm up the engine and run it at idle.
3. Connect a vacuum pump to the valve and apply vacuum.
4. Check that the engine runs roughly or stalls at more than the specified vacuum.

### Specification:

**70—90 mmHg (2.8—3.5 inHg)**

5. If not correct, replace the EGR control valve.



76G04A-128

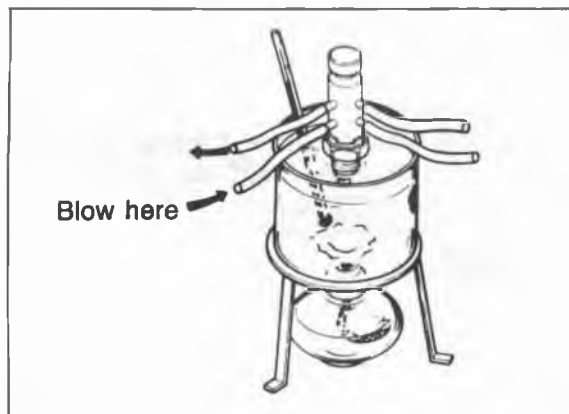
## EGR Control Valve (MTX)

1. Check the EGR control valve manually (same as above).
2. Warm up the engine and run it at idle.
3. Connect a vacuum pump to the valve and apply vacuum.
4. Check that the engine runs roughly or stalls at more than the specified vacuum.

### Specification:

**70—90 mmHg (2.8—3.5 inHg)**

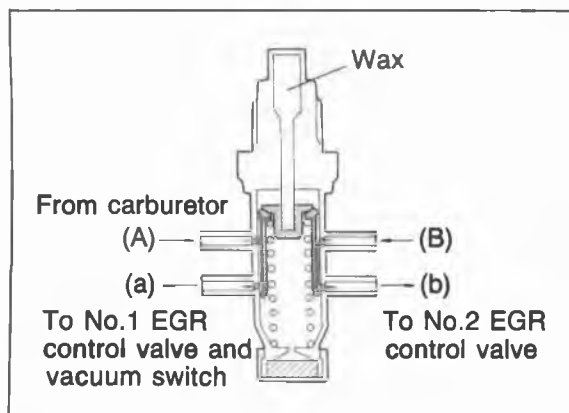
5. If not correct, replace the EGR control valve.



76G04A-129

## Water Thermo Valve

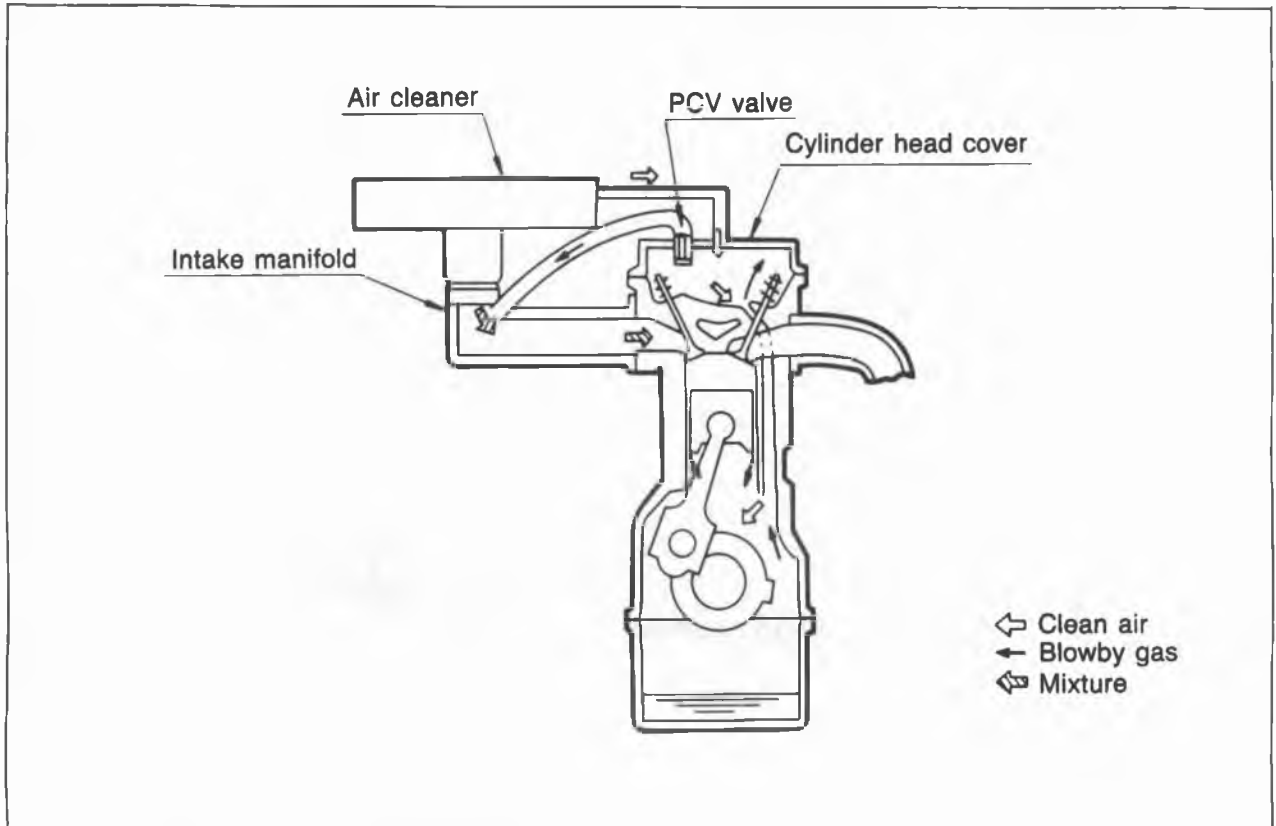
1. Remove the water thermo valve from the bottom of the inlet manifold.
2. Place the water thermo valve in a container with water and a thermometer.
3. Gradually heat the water to **50°C (122°F)**.



76G04A-130

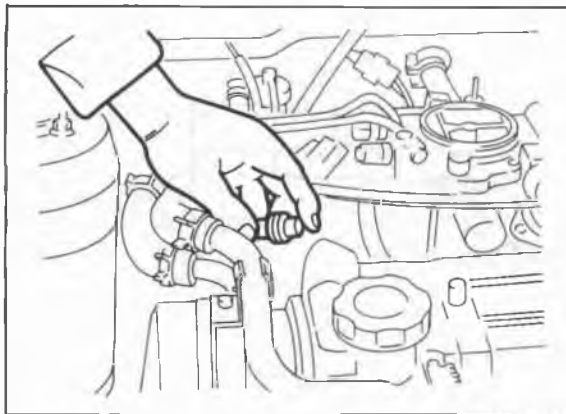
4. Blow air through the water thermo valve from (A), and check that air comes out from (a).
5. Blow air through the water thermo valve from (B) and check that air comes out from (b).
6. Replace if necessary.

## POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



76G04A-131

This system returns the blow-by gases and operates while the engine is running to reduce emissions.



76G04A-132

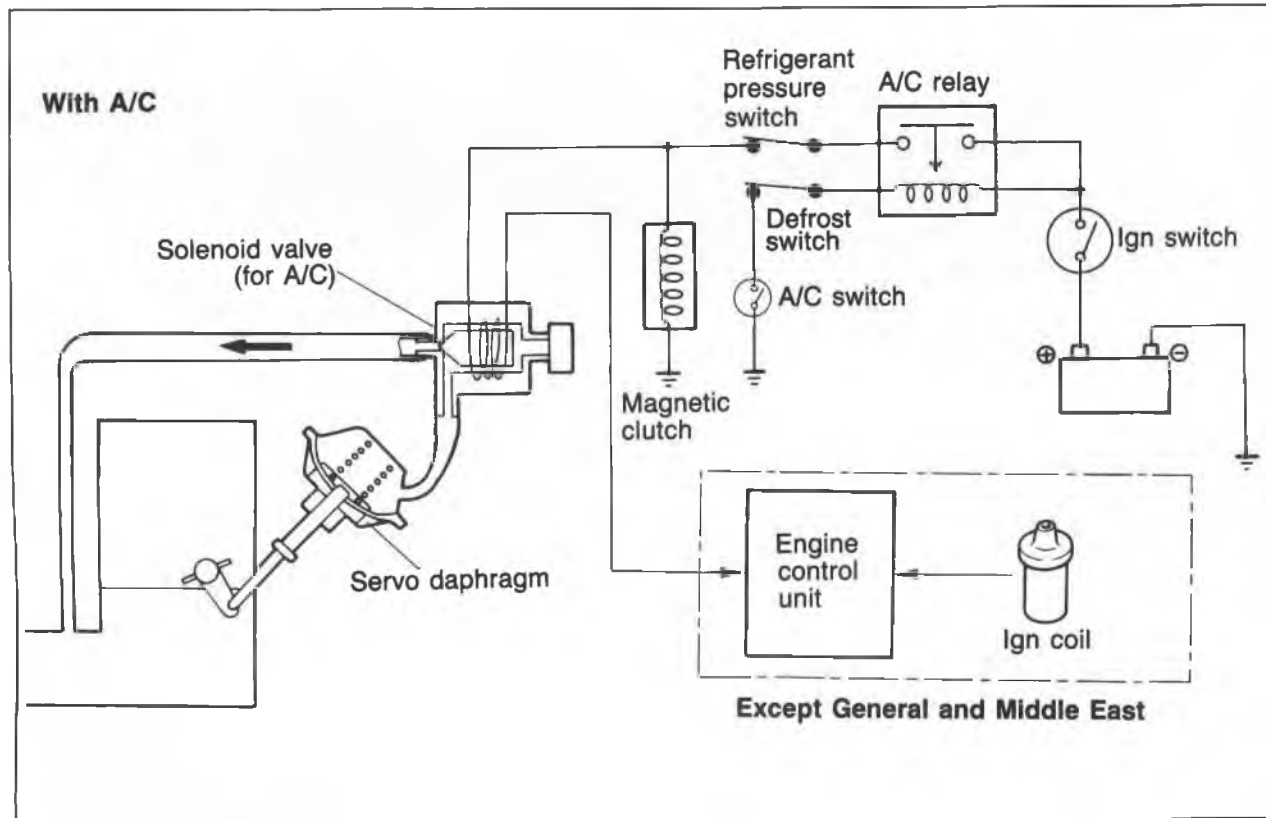
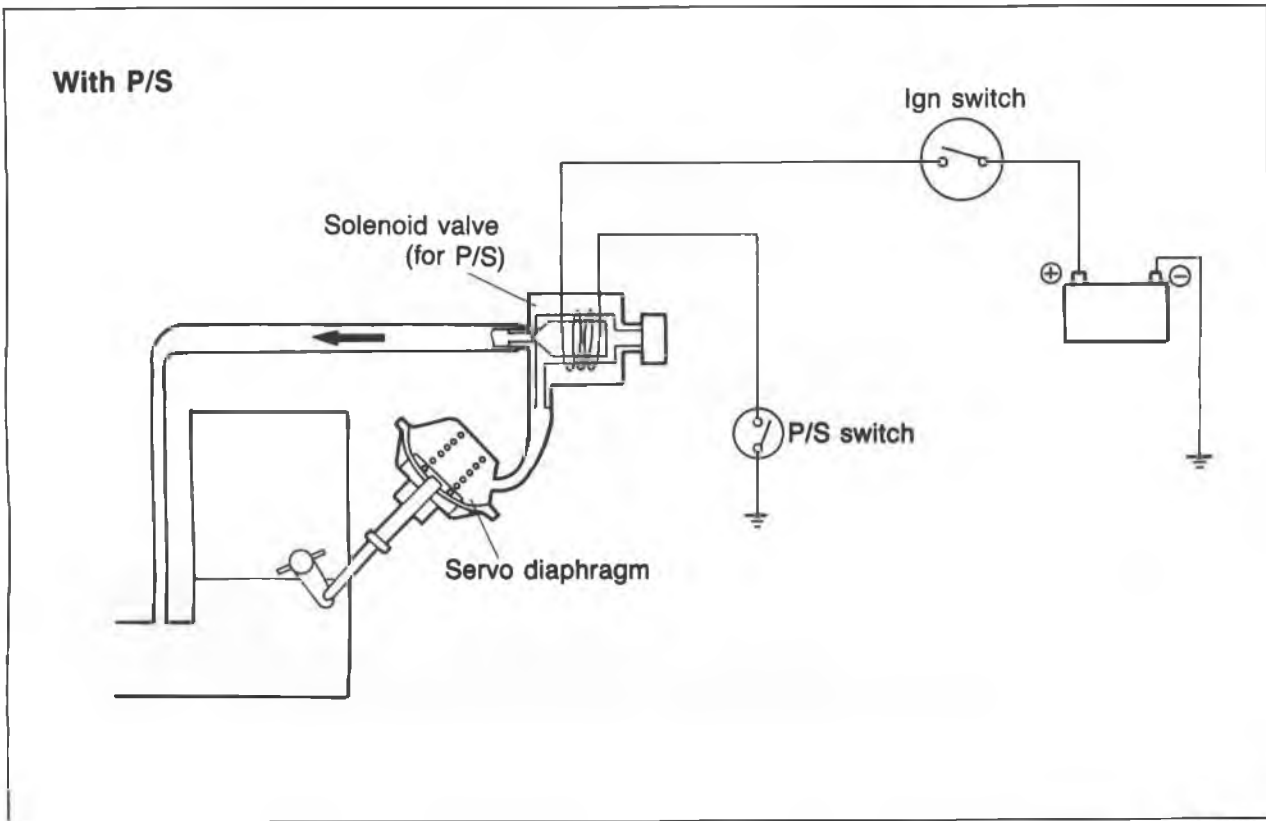
### PCV VALVE Inspection

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve and the ventilation hose from the cylinder head cover.
3. Block the PCV valve and check that the engine speed drops.
4. Replace the PCV valve if necessary.

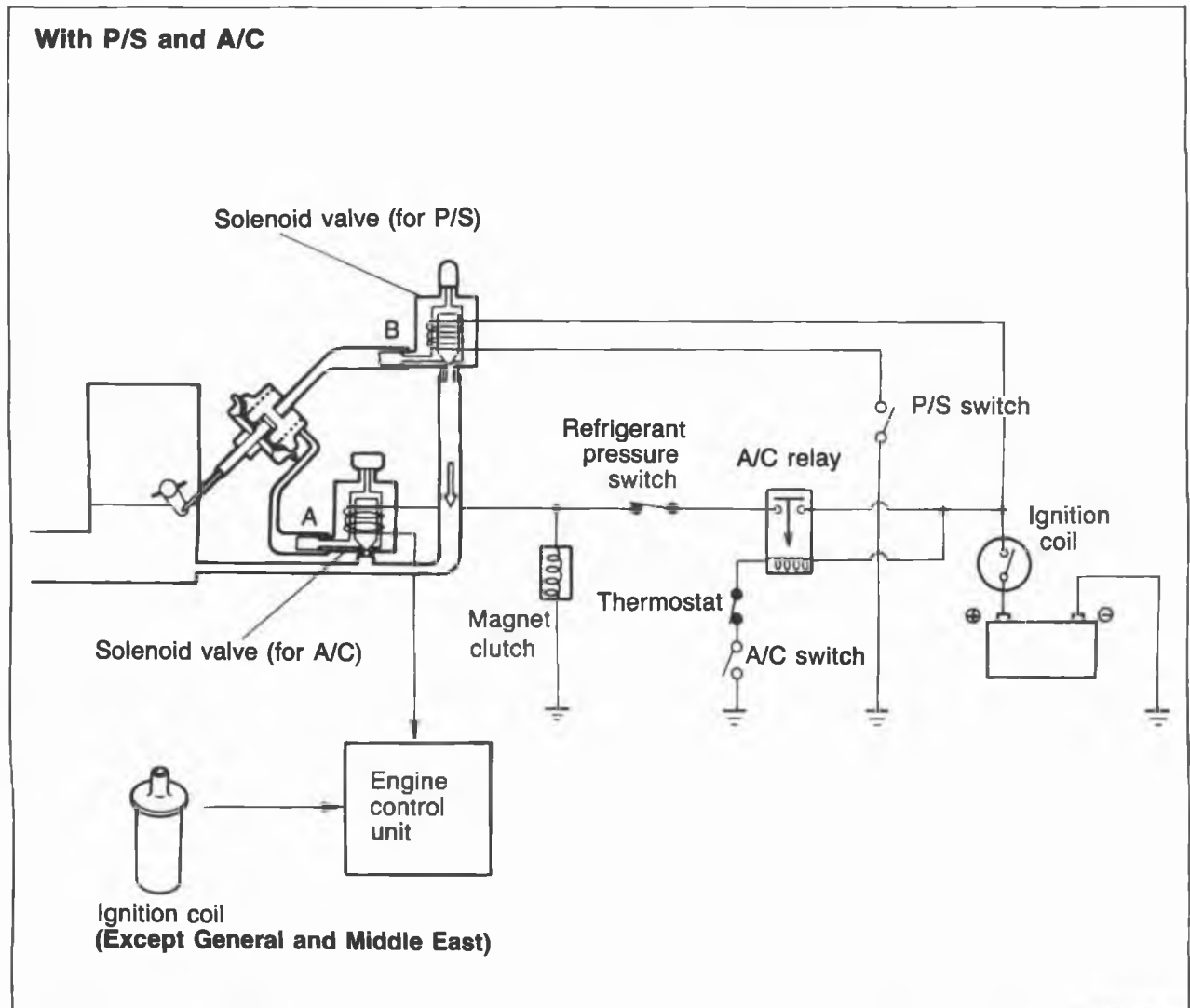
# 4A IDLE-UP CONTROL SYSTEM

## IDLE-UP CONTROL SYSTEM

### SINGLE-SERVO DIAPHRAGM TYPE



## DUAL-SERVO DIAPHRAGM TYPE



69G04B-124

### Operation

#### A/C ON and compressor operating

Current flows through the A/C relay to the two-way solenoid valve for the A/C. Vacuum port A is opened, and vacuum is applied to the servo diaphragm, which in turn pulls the throttle plates slightly open at low speeds.

#### P/S operating

Current flows through the P/S switch to the three-way solenoid valve for power steering. Vacuum port B is opened and vacuum is applied to the servo diaphragm, which in turn pulls the throttle plates slightly open.

### Relationship

Equipment	P/S	A/C	P/S & A/C
Type			
Single-servo diaphragm type	○	○	
Dual-servo diaphragm type			○

# 4A IDLE-UP CONTROL SYSTEM

## TROUBLESHOOTING

FE and F8 (ECE, Hong Kong, and Singapore)

Possible cause	Engine control unit terminal		Servo diaphragm	Vacuum signal	Solenoid valve	P/S switch	Idle-up solenoid valve	Relay (for A/C)	Thermostat	Refrigerant pressure switch
	ATX H	MTX P								
Page	4A-86	4A-88	4A-72	4A-74	4A-74	4A-75	4A-76	Section 16		
Checking order	9		2	3	4	5	1	6	7	8

76G04A-133

## F6 (Singapore)

Possible cause	Relay	All terminal	Engine control unit	Servo diaphragm	Vacuum signal	Solenoid valve	A/C switch	P/S switch	Relay (for A/C)	Thermostat	Refrigerant pressure switch
Checking order	9		10	1	2	3	4	5	6	7	8

76G04A-134

## FE and F8 (General)

Possible cause	Engine control unit terminal		Servo diaphragm	Vacuum signal	Solenoid valve	P/S switch	Idle-up solenoid valve	Relay (for A/C)	Thermostat	Refrigerant pressure switch
	ATX H	MTX P								
Page	4A-89	4A-90	4A-72	4A-74	4A-74	4A-75	4A-76	Section 16		
Checking order	9		2	3	4	5	1	6	7	8

76G04A-135



# IDLE-UP CONTROL SYSTEM 4A

## FE (Middle East) and F6 (General)

Possible cause								
	Servo diaphragm	Vacuum signal	Solenoid valve	A/C switch	P/S switch	Relay (for A/C)	Thermostat	Refrigerant pressure switch
<b>Page</b>	4A-72	4A-74	4A-74	Section 15	4A-75	Section 16		
<b>Checking order</b>	1	2	3	4	5	6	7	8

76G04A-136

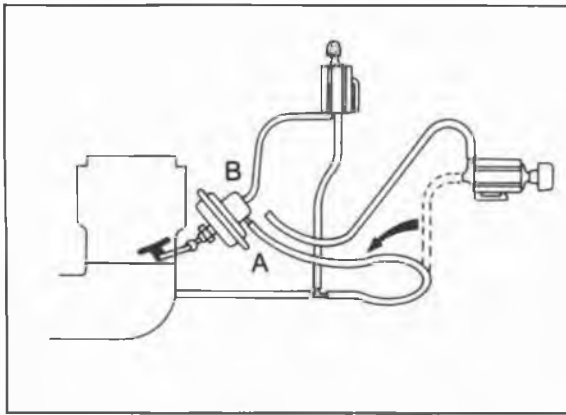
## FE 8 Valve—Unleaded Fuel

Possible cause											
	Engine control unit terminal			Servo diaphragm	Vacuum signal	Solenoid valve	A/C switch	P/S switch	Relay (for A/C)	Thermostat	Refrigerant pressure switch
<b>Page</b>	H	D	I	4A-72	4A-74	4A-74	Section 15	4A-75	Section 16		
<b>Checking order</b>				1	2	3	4	5	6	7	8

76G04A-137



# 4A IDLE-UP CONTROL SYSTEM



76G04A-138

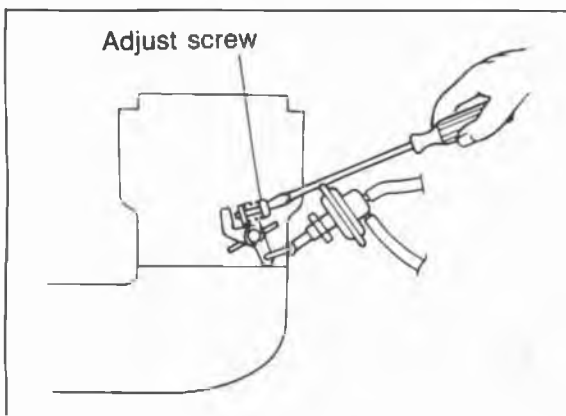
## Servo Diaphragm

### Dual servo diaphragm type

1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum hose from the servo diaphragm port A.
4. Apply intake manifold vacuum directly to the diaphragm.

### Caution

All accessories must be OFF.

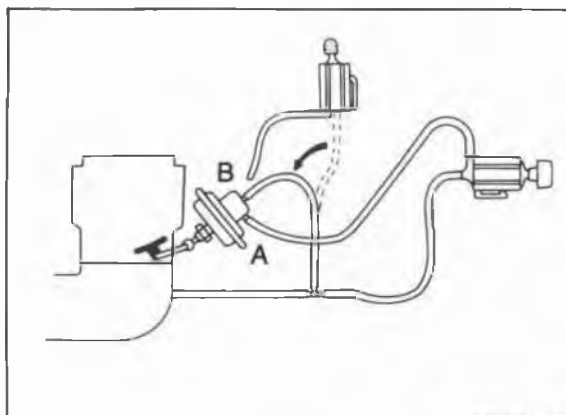


76G04A-139

5. Check that the engine speed is within the specification.

**Engine speed: 1,200—1,400 rpm**

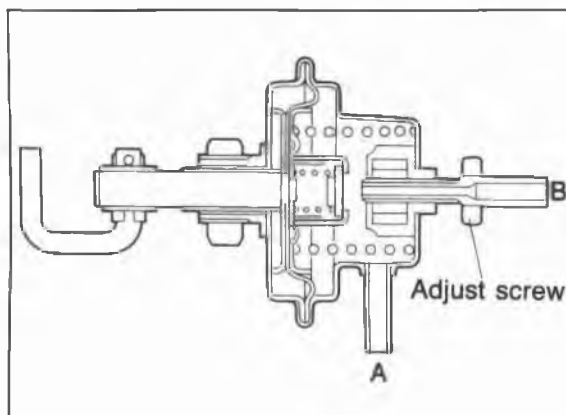
6. If not within specification, turn the adjust screw to adjust.
7. Reconnect the vacuum hoses.



76G04A-140

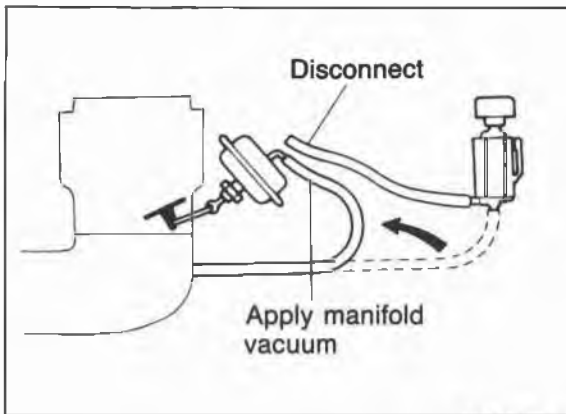
8. Disconnect the solenoid valve vacuum hose from the servo diaphragm port B.
9. Apply intake manifold vacuum directly to the diaphragm.
10. Check that the engine speed is within specification.

**Engine speed: 800—1,000 rpm (MTX)  
1,050—1,250 rpm (ATX)  
(in N range)**

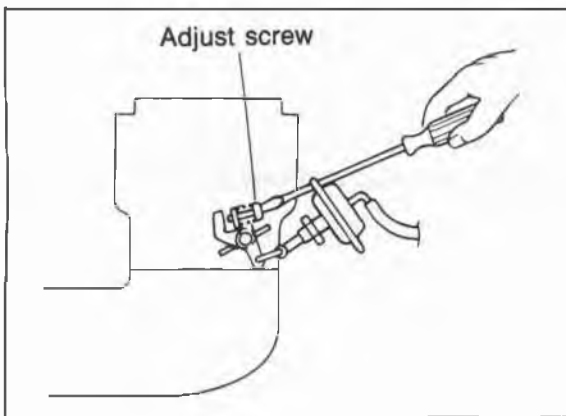


76G04A-141

11. If not within specification, turn the adjust screw to adjust.
12. Reconnect the vacuum hoses.



76G04A-142



76G04A-143

### Single servo diaphragm type

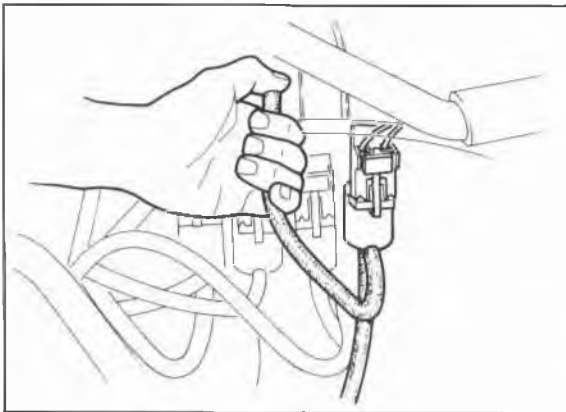
1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum hose from the servo diaphragm.
4. Check that the engine speed is within specification.

### Engine speed:

P/S operated	800—1,000 rpm (MTX)
	1,050—1,250 rpm (ATX) (in N range)
A/C operated	1,200—1,400 rpm

6. If not within specification, turn the adjust screw to adjust.

# 4A IDLE-UP CONTROL SYSTEM

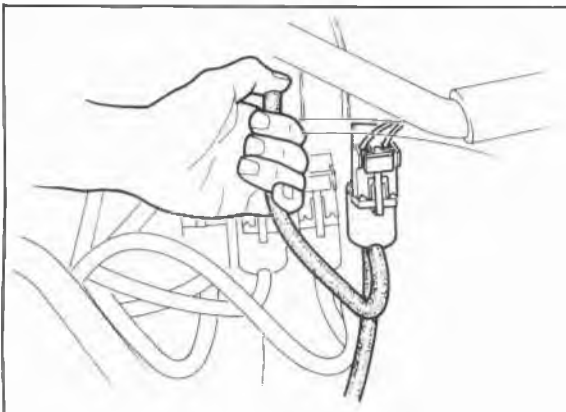


76G04A-144

## Vacuum Signal [Equipped with A/C, only FE and F8 (Except Middle East and General)]

1. Start the engine and run it at idle.
2. Disconnect the vacuum hose from the servo diaphragm.
3. Place a finger over the hose.
4. Increase the engine speed, and check for vacuum.

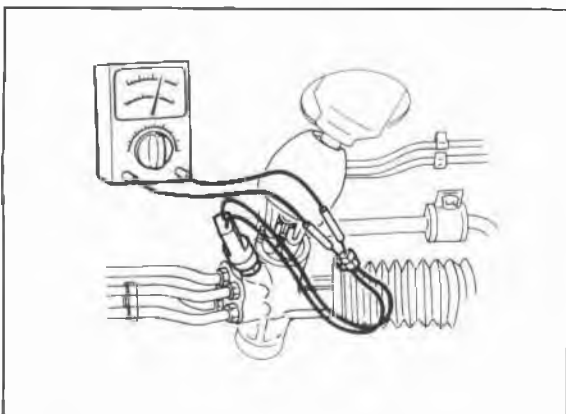
Engine model	Engine speed	Vacuum
<b>FE (Except Middle)</b>	Below 2,300 rpm	Yes
	Above 2,300 rpm	No
<b>FE (Unleaded fuel)</b>	Below 1,500 rpm	Yes
	Above 1,500 rpm	No
<b>F6 (Singapore)</b>	Below 2,100 rpm	Yes
	Above 2,100 rpm	No



76G04A-145

## General and Middle East

1. Start the engine and run it at idle.
2. Disconnect the vacuum hose from the servo diaphragm.
3. Place a finger over the hose.
4. Operate the A/C or P/S.
5. Check that vacuum is felt.



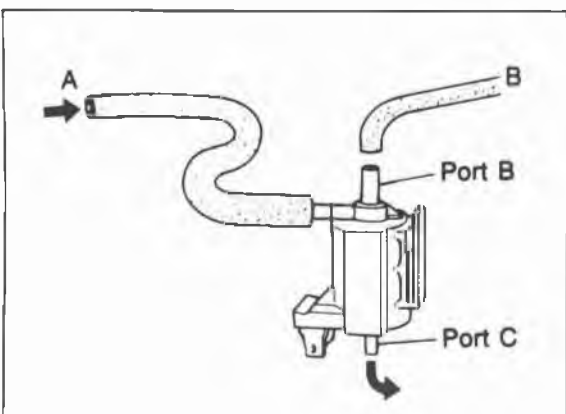
76G04A-146

## P/S Switch

1. Start the engine and run it at idle.
2. Disconnect the power steering switch connector.
3. Connect an ohmmeter to the power steering switch.
4. Turn the steering wheel all the way to either the right or left, and check for continuity.

P/S	Continuity
Operated	Yes
Not operated	No

5. Replace if necessary.

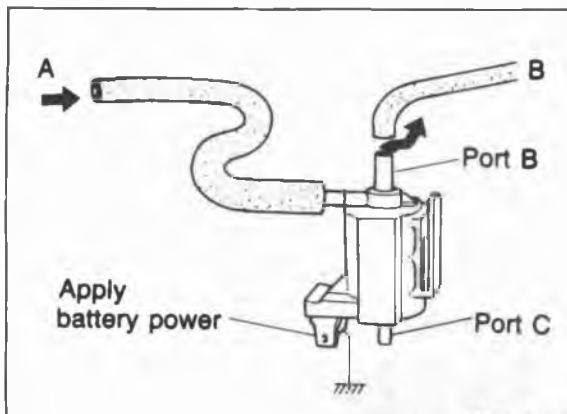


76G04A-147

## Solenoid Valve (A/C)

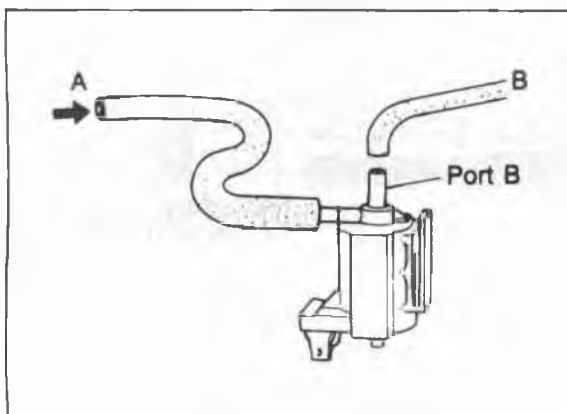
1. Disconnect vacuum hose A from the servo diaphragm.
2. Disconnect vacuum hose B from the solenoid valve.
3. Disconnect the solenoid valve connector.
4. Blow air through the valve from hose A and check that it comes out of port C.

## IDLE-UP CONTROL SYSTEM 4A



76G04A-148

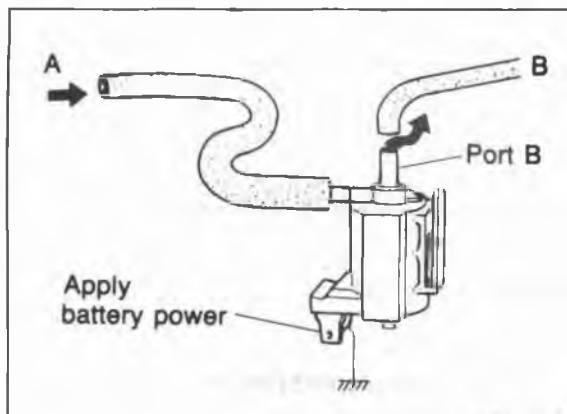
5. Apply 12V and ground to the solenoid valve with jumper wires.
6. Blow air through the valve from hose A and check that it comes out of port B.
7. Replace if necessary.



76G04A-149

### Solenoid Valve (P/S)

1. Disconnect vacuum hose A from the servo diaphragm.
2. Disconnect vacuum hose B from the solenoid valve.
3. Disconnect the solenoid valve connector.
4. Blow air through the valve from hose A and check that it not come out of port B.



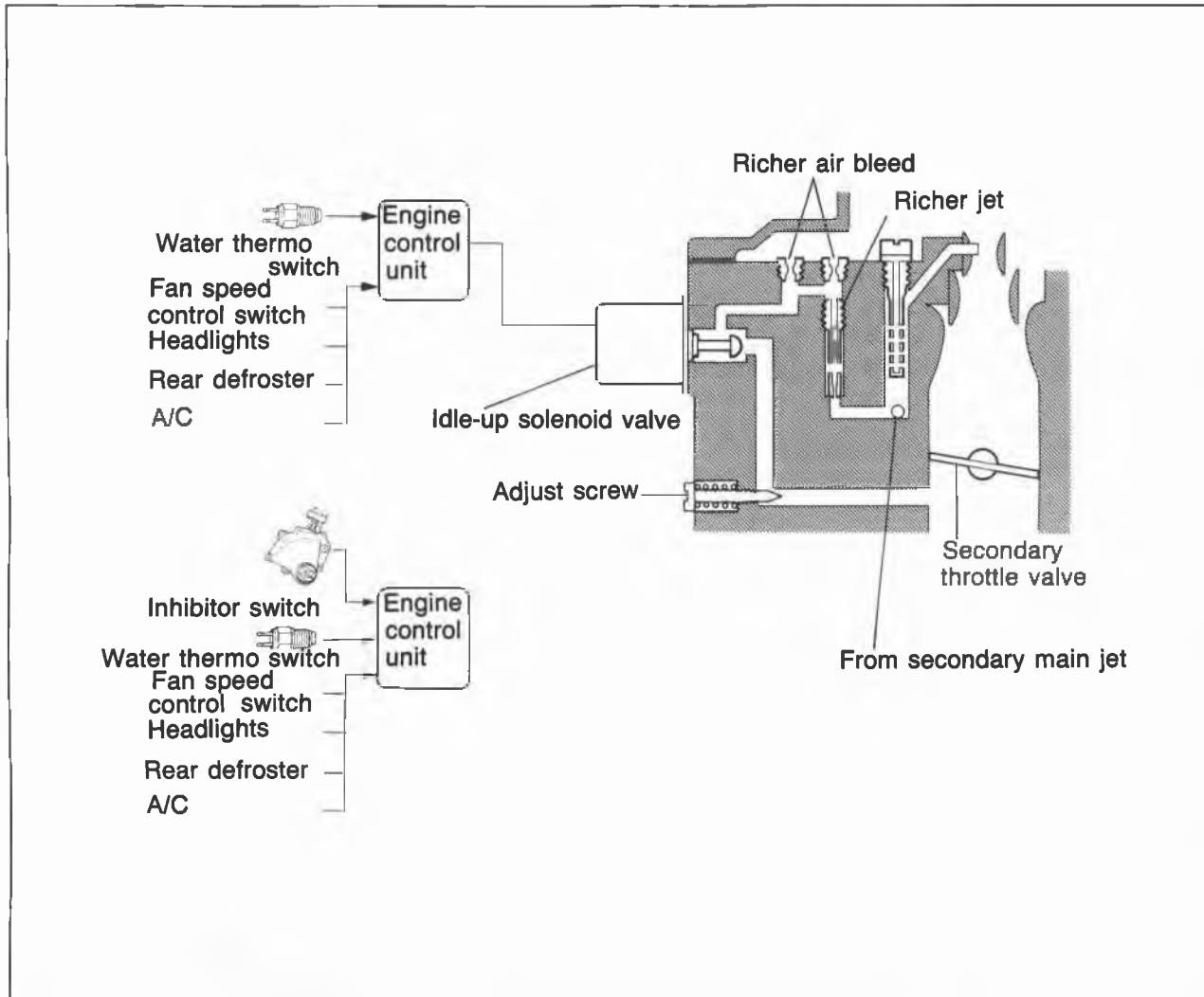
76G04A-150

5. Apply 12V and a ground to the solenoid valve with jumper wires.
6. Blow air through the valve from hose A and check that it comes out of port B.
7. Replace if necessary.

# 4A IDLE-UP CONTROL SYSTEM

## IDLE-UP SOLENOID VALVE

FE and F8 (General, ECE, Hong Kong, and Singapore)



76G04A-151

The idle-up solenoid valve opens when the following conditions are met.

### Condition

When inhibitor switch is OFF (ATX—other than “P” and “N” range) and any of the following:

- Engine coolant temperature less than 72°C (162°F).
- A/C operated.
- Fan speed control switch 3rd or 4th position.
- Headlights turned on.
- Rear defroster turned on.

## Troubleshooting

### Note

Make the system inspection first. If no problem is found, continue with the next inspection of the Troubleshooting. (Refer to page 4A—70.)

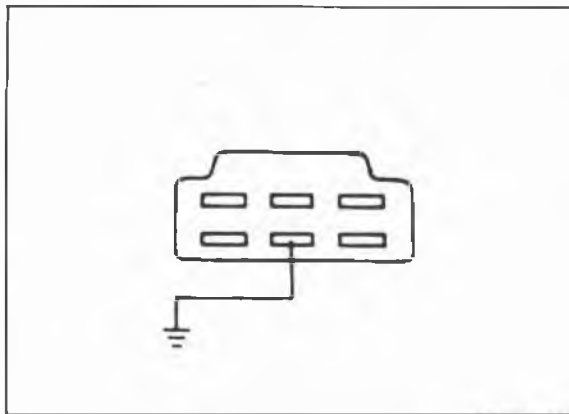
Possible cause	Combination switch	Rear defroster switch	Fan speed control switch	Water thermo switch	Inhibitor switch (ATX)	A/C switch	idle-up solenoid valve	Engine control unit terminal	System Inspection
	Section 15	Section 15	Section 15	4A—95	4A—93	Section 15	4A—77	4A—86—4A—91	4A—77
Symptom									
Checking order	3	4	5	6	7	8	2	9	1

76G04A-152

### \*Engine control unit terminal

Check the following terminal voltages

Transmission	Terminal
MTX	A, C, D, H, Q, R
ATX	I, 2B, 2C, 2D, 2E, 2H, 2M



76G04A-153

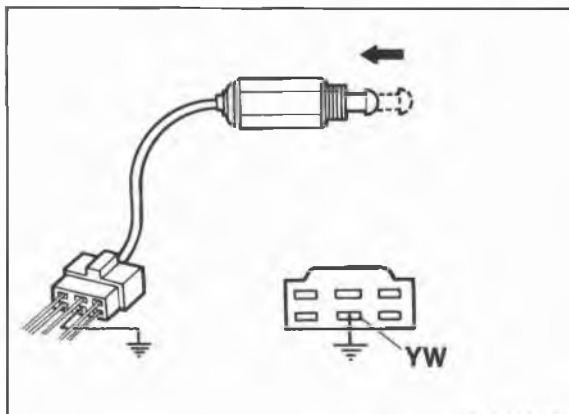
### System Inspection

1. Warm up the engine and run it at idle.
2. Connect a jumper wire to the carburetor connector terminal wire (YW) and ground.
3. Connect a tachometer to the engine.
4. Turn all accessories off.
5. Verify that the engine speed is within specification.

**Engine speed: 900—950 rpm (MTX)**

**Engine speed: 1,000—1,050 rpm (ATX; in N range)**

6. Disconnect the tachometer.



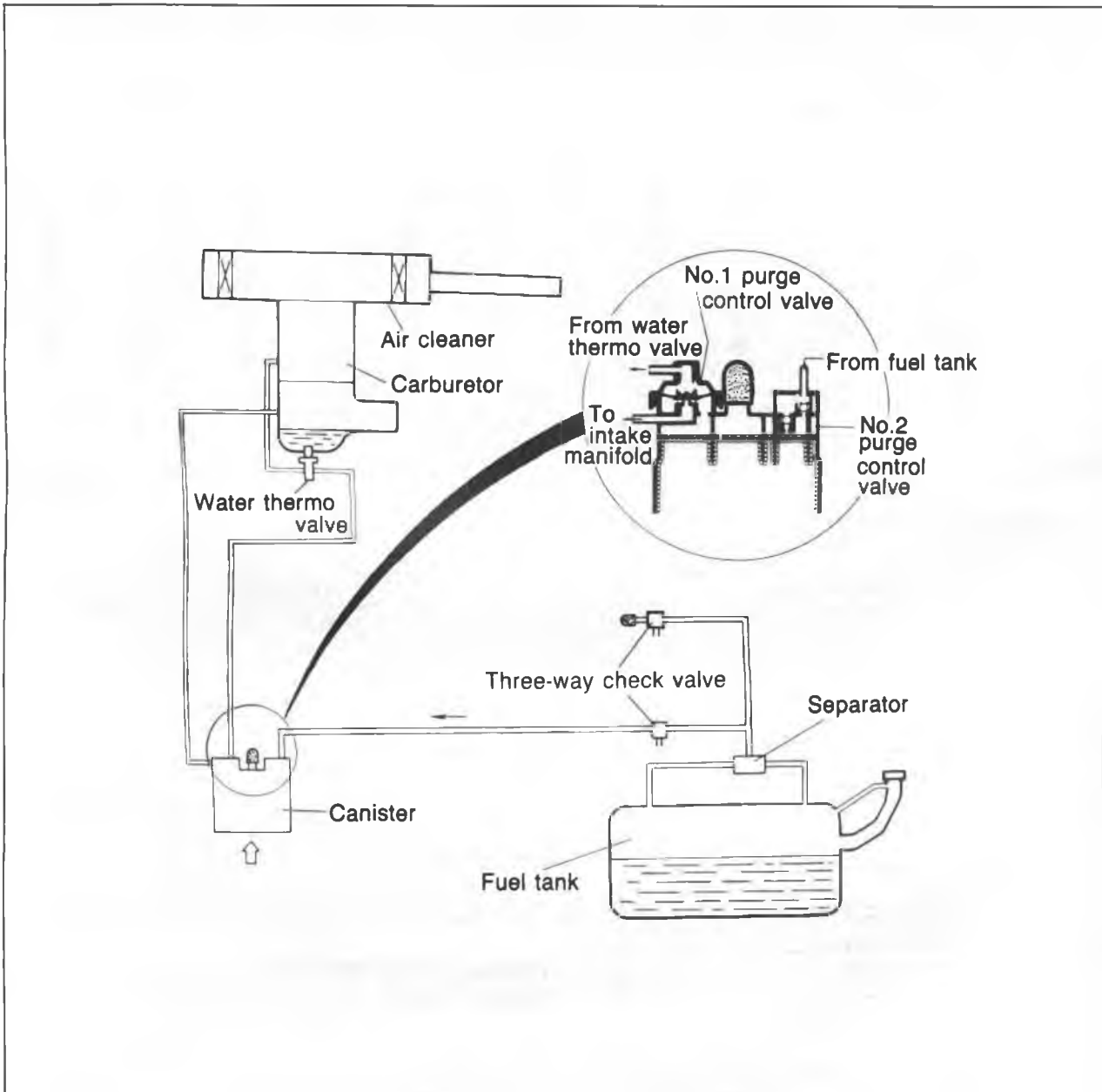
76G04A-154

### Idle-up Solenoid Valve

1. Turn all accessories OFF and turn the ignition switch ON.
2. Disconnect the idle-up solenoid valve connector.
3. Ground the carburetor connector terminal wire (YW) using with a jumper wire.
4. Check the rod is drawn into the valve.
5. Replace if necessary.

# 4A EVAPOTATIVE EMISSION CONTROL SYSTEM

## EVAPORATIVE EMISSION CONTROL SYSTEM (MIDDLE EAST)



76G04A-155

### Operation

#### Cold engine — below 50°C (122°F)

The No. 1 purge control valve does not operate because the vacuum passage of the water thermo valve is opened to the atmospheric air side.

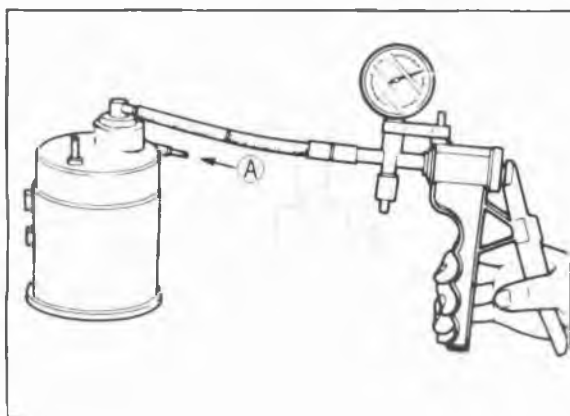
#### Warm engine — above 50°C (122°F)

1. During normal driving, the carburetor vacuum signal is led to the No. 1 purge control valve with the result that fuel vapors are drawn into the intake manifold.

## Troubleshooting

Possible cause	No. 1 purge control valve	No. 2 purge control valve	Water thermo valve	Three-way check valve
Page	4A-79	4A-79	4A-79	4A-37
Checking order	1	2	3	4

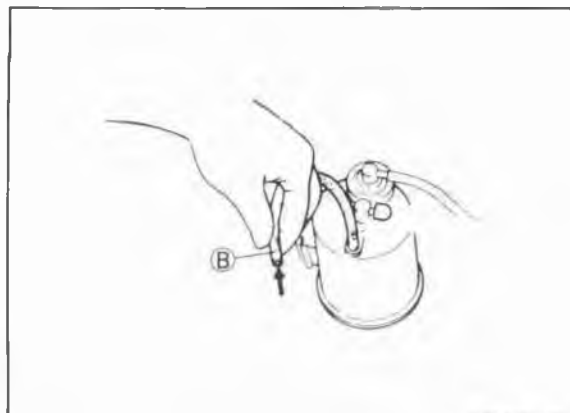
76G04A-156



76G04A-157

### No. 1 Purge Control Valve

1. Blow through the purge control valve from port A and check that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.29 inHg)** vacuum with a vacuum pump, and blow through port A again; air should flow.



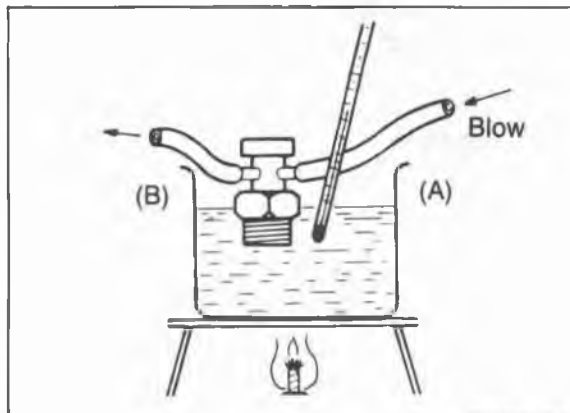
76G04A-158

### No. 2 Purge Control Valve

1. Disconnect vacuum hose A from the pipe.
2. Check the air flow of the No. 2 purge control valve.

#### Specification:

**15—35 mmHg (0.6—1.4 inHg): Below**  
**-8—-18 mmHg (0.3—0.7 inHg): Suck**



76G04A-159

### Water Thermo Valve

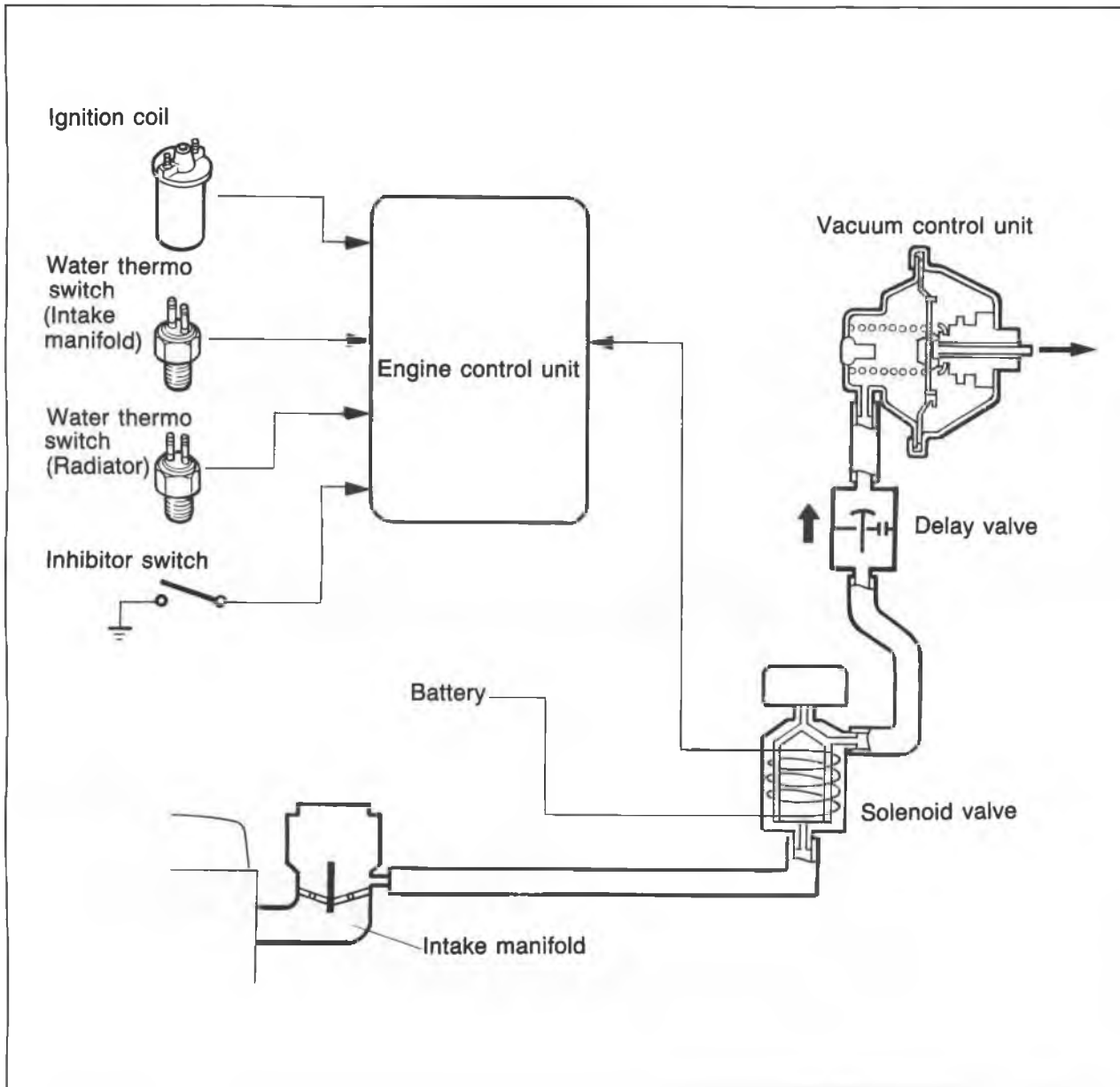
1. Remove the water thermo valve.
2. Place the valve in water with a thermometer.
3. Heat the water gradually to **50°C (122°F)**.
4. Blow through the valve from hose A and check that air comes out of port B.



# 4A IGNITION TIMING CONTROL SYSTEM

## IGNITION TIMING CONTROL SYSTEM

F8 and FE (12-VALVE)—ATX (ECE, Singapore, and Hong Kong)



76G04A-160

This system consists of the distributor, solenoid valve, and several switches, vacuum to the vacuum control unit of the distributor is cut when the conditions below are met.

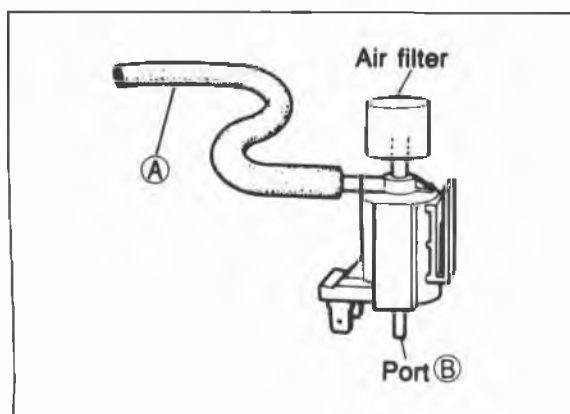
Item	Condition
Engine speed	<b>Below 2,300 rpm</b>
Selector lever position	Other than P and N range
Coolant temperature	Engine coolant: <b>below 72°C (162°F)</b> Radiator coolant: <b>above 17°C (65°F)</b>

## TROUBLESHOOTING

Check the condition of the wiring harness and components before checking the sensors or switches.

Possible cause	Water thermo switch (Intake manifold)	Water thermo switch (Radiator)	Inhibitor switch	Solenoid valve (Ignition timing control)	Delay valve	Vacuum control unit (Distributor)	Engine control unit terminal				
							1F	2A	2F	2H	2M
Symptom	4A-95	4A-95	4A-93	4A-81	4A-82	Section 5	4A-85	4A-86			
Poor acceleration, hesitation, or lack of power	5	6	4	2	3	1	11	7	8	9	10
Fails emission test	4	5	3	2	—	1	10	6	7	8	9

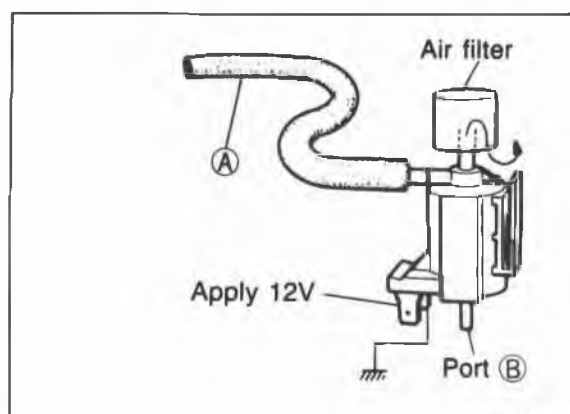
76G04A-161



76G04A-162

### Solenoid Valve (Ignition Timing Control)

1. Disconnect the vacuum hose from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from vacuum hose A.
3. Check that air flows from port B.

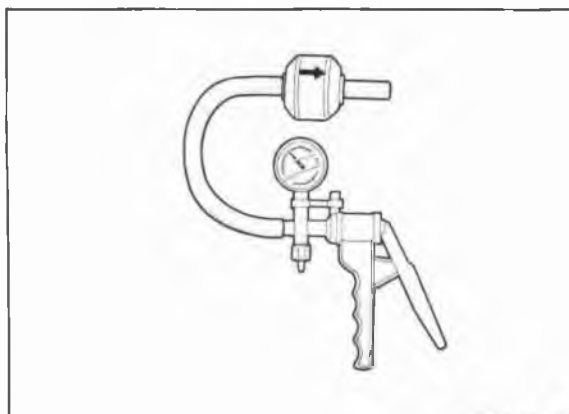


76G04A-163

4. Disconnect the solenoid valve connector.
5. Connect 12V and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from vacuum hose A.
7. Check that air flows from the valve air filter.

## 4A IGNITION TIMING CONTROL SYSTEM

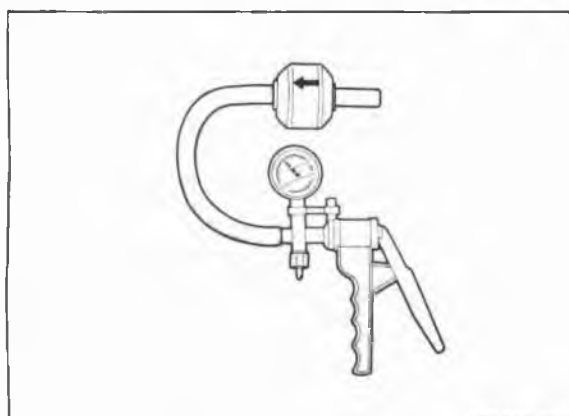
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76G04A-164

### Delay Valve

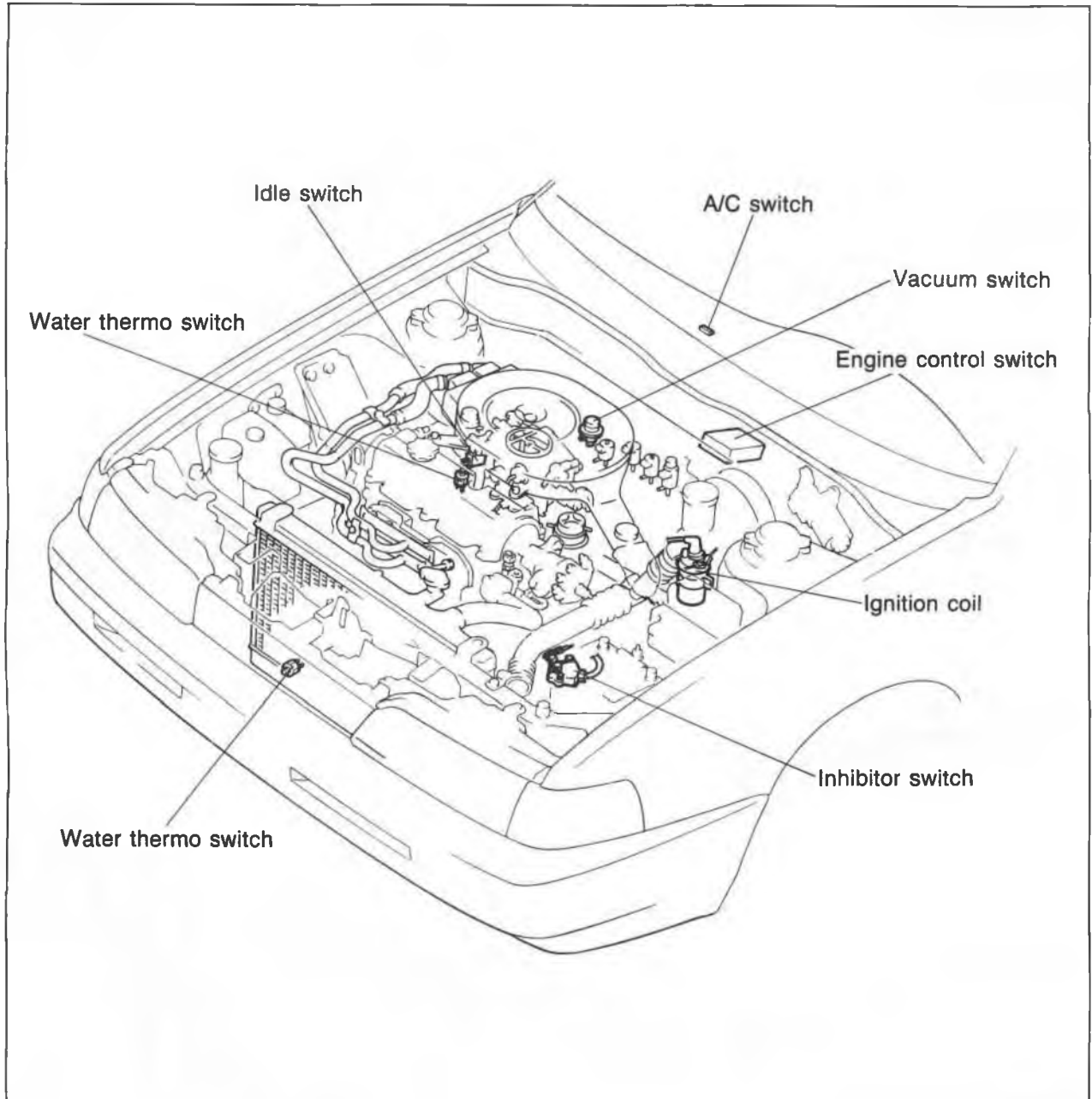
1. Remove the delay valve.
2. Connect a vacuum pump to the valve as shown in the figure.
3. Apply vacuum and check that it is released gradually.
4. If not correct, replace the delay valve.



76G04A-165

5. Connect a vacuum pump to the valve as shown in the figure.
6. Apply vacuum and check that it is not held.
7. If not correct, replace the delay valve.

## CONTROL SYSTEM



76G04A-166

The control system consists of the engine control unit, water thermo switches, A/C switch, P/S switch, inhibitor switch, vacuum switch, and idle switch.

# 4A CONTROL SYSTEM

## RELATIONSHIP CHART

- : Related  
X: Not related

IGNITION COIL		X	X	○	○	○	X	○	X
WATER THERMO SWITCH	RADIATOR	○	○	X	X	X	X	○	○
	INTAKE MANIFOLD	○*	X	X	X	X	○	○	X
VACUUM SWITCH		X	X	X	X	X	X	X	○
IDLE SWITCH		X	X	○	○	○	X	X	X
A/C SWITCH		X	X	X	X	X	○	X	X
P/S SWITCH		X	X	X	X	X	X	X	X
E/L SWITCHES (Headlight Switch Rear defroster switch Fan speed control switch)		X	X	X	X	X	○	X	X
INHIBITOR SWITCH		X	X	X	X	X	○	○	X
ENGINE CONTROL UNIT		X	○	○	○	○	○	○	○
INPUT DEVICE AND ENGINE CONTROL UNIT	OUTPUT DEVICE								
	PTC HEATER								
	CHOKE OPENER (FE and F8 — ECE, Hong Kong, & Singapore)								
	COASTING LEANER								
	COAST ENRICHMENT SOLENOID VALVE								
	AIR BYPASS SOLENOID VALVE								
	IDLE-UP SOLENOID VALVE								
	IGNITION TIMING CONTROL SYSTEM								
	MAIN AIR BLEED CONTROL SYSTEM								

\* FE 8Valve—Unleaded Fuel: ○ (Related)  
General and FE 12Valve—ECE, Hong Kong, Singapore: X (Not related)

OUTPUT DEVICE AND ENGINE CONDITIONS

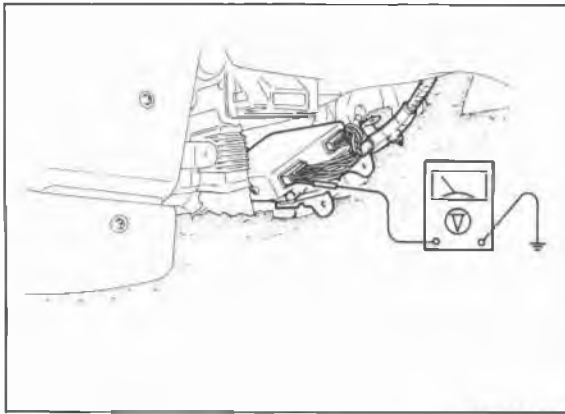
CONTROL SYSTEM 4A

ENGINE CONDITION OUTPUT DEVICE	CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELERATION	HEAVY-LOAD	DECELERATION	IDLE (THROTTLE VALVE FULLY CLOSED)	IGN: ON (ENGINE NOT RUNNING)	REMARK
			COLD	WARM						
PTC HEATER	ON*1	OFF	ON*1	OFF					OFF	*1 Radiator coolant temperature less than 17°C (63°F)
SOLENOID VALVE (CHOKE OPENER)	ON	OFF	ON*1	OFF						
COASTING LEANER			OFF				ON*2 (Mixture lean)		OFF	*2 Engine speed more than approx. 2,100 rpm
COAST ENRICHMENT SOLENOID VALVE			OFF				ON*3 (Mixture rich)		OFF	*3 Engine speed 1,500 — 2,300 rpm
AIR BYPASS SOLENOID VALVE			OFF				ON*4		OFF	*4 Engine speed more than approx. 2,100 rpm*8 or approx. 3,500 rpm*9
SOLENOID VALVE (IGNITION TIMING CONTROL SYSTEM)	OFF	ON*5 (Vacuum cut)		OFF						*5 Engine coolant temperature less than 72°C (162°F), radiator coolant temperature more than 17°C (63°F), engine speed less than approx. 2,300 rpm, and in gear condition
EGR CONTROL VALVE	CLOSED	OPEN*6	CLOSED	OPEN (Supplies exhaust gas into intake manifold)					CLOSED	*6 Engine coolant more than 50°C (122°F)
MAIN AIR BLEED CONTROL SOLENOID VALVE	CLOSED	OPEN*7	CLOSED (Mixture rich)				OPEN (Mixture lean)		DOES NOT OPERATE	*7 Radiator coolant temperature less than 17°C (63°F)

\*8 FE 12 Valve and F8

\*9 FE 8 Valve

# 4A CONTROL SYSTEM



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## ENGINE CONTROL UNIT

Check the engine control unit terminal voltages with a voltmeter.

### Caution

- a) Warm up the engine before checking the control unit.
- b) If the proper voltage is not obtained, check the wiring, connections and finally, check the component.

## FE and F8 Engine — ATX (ECE, Hong Kong, and Singapore)

Terminal (Wire color)	Connected to	Condition	Voltage
1A (BW)	Ignition switch	Ignition switch ON.	Battery voltage
1B (GR)	Solenoid valve (Main air bleed control)	Others	Battery voltage
		Radiator coolant temperature below 17°C (63°F) or intake manifold vacuum more than 200 mmHg (7.9 inHg)	Below 1.5V
1C (GO)	Solenoid valve (Choke opener)	Radiator coolant temperature below 17°C (63°F) or during cranking and 27 sec. after engine starts	Below 1.5V
		Others	Battery voltage
1D (GL)	Air bypass solenoid valve	Idle switch OFF and engine speed above approx. 2,100 rpm	Below 1.5V
		Others	Battery voltage
1E	—	—	—
1F (G)	Solenoid valve (Ignition timing control system)	Radiator coolant temperature above 17°C (63°F), engine coolant temperature below 72°C (162°F), inhibitor switch OFF and engine speed below 2,300 rpm	Below 1.5V
		Others	Battery voltage
1G	—	—	—
1H (LW)	Solenoid valve (A/C)	A/C switch ON and engine speed below approx. 2,300 rpm	Below 1.5V
		Others	Battery voltage
1I (YW)	Idle-up solenoid valve	Inhibitor switch OFF and, headlight switch ON, rear defroster switch ON, fan speed control switch is 3rd or 4th position, A/C operated, or engine coolant temperature below 72°C (162°F)	Below 1.5V
		Others	Battery voltage
1J (B)	Ground	—	Below 1.5V

Terminal (Wire color)	Connected to	Condition	Voltage
2A (YL)	Ignition coil	Ignition switch ON or engine running	Battery voltage
2B (LB)	Fan speed control switch	Fan speed control switch in 3rd or 4th position	Below 1.5V
		Fan speed control switch OFF	Battery voltage
2C (BL)	Rear defroster switch	Rear defroster switch ON	Below 1.5V
		Rear defroster switch OFF	Battery voltage
2D (LG)	A/C switch	A/C operated	Below 1.5V
		A/C not operated	Battery voltage
2E (RG)	Headlight switch	Headlight switch OFF	Below 1.5V
		Headlight switch ON	Battery voltage
2F (GW)	Water thermo switch (Radiator)	Radiator coolant temperature below 17°C (63°F)	Below 1.5V
		Radiator coolant temperature above 17°C (63°F)	Battery voltage
2G	—	—	—
2H (L)	Water thermo switch (In- take manifold)	Engine coolant temperature below 72°C (162°F)	Below 1.5V
		Engine coolant temperature above 72°C (162°F)	Battery voltage
2I (LY)	Vacuum switch	Vacuum less than 200 mmHg (7.9 inHg)	Below 1.5V
		Vacuum more than 200 mmHg (7.9 inHg)	Battery voltage
2J (RL)	OD release solenoid valve	Engine coolant temperature below 72°C (162°F)	Below 1.5V
		Engine coolant temperature above 72°C (162°F)	Battery voltage
2K (—)	—	—	—
2L (BR)	Inhibitor switch	"N" or "P" range	Below 1.5V
		Others	Battery voltage
2M (BY)	Ignition switch (START position)	Ignition switch ON	Below 1.5V
		Cranking	Battery voltage
2N (LsB)	Idle switch	Idling	Battery voltage
		Accelerator pedal depressed	Below 1.5V

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2M	2K	2I	<del>X</del>	2F	2C	2A	1I	<del>X</del>	<del>X</del>	1C	1A
2N	2L	2J	2H	2F	2D	2B	1J	1H	1F	1D	1B

### FE and F8 Engine — MTX (ECE, Hong Kong, and Singapore)

Terminal (Wire color)	Connected to	Condition	Voltage
A (RG)	Headlight switch	Headlight switch ON	Below 1.5V
		Headlight switch OFF	Battery voltage
B (B)	Ground	—	Below 1.5V



# 4A CONTROL SYSTEM

Terminal (Wire color)	Connected to	Condition	Voltage
C (BL)	Rear defroster switch	Rear defroster switch ON	Below 1.5V
		Rear defroster switch OFF	Battery voltage
D (LG)	A/C switch	A/C operated	Below 1.5V
		A/C not operated	Battery voltage
E (LY)	Solenoid valve (Main air bleed control)	Intake manifold vacuum more than 300 mmHg (11.8 inHg), and radiator coolant temperature above 17°C (63°F)	Battery voltage
		Others	Below 1.5V
F (GW)	Water thermo switch (Radiator)	Radiator coolant temperature below 17°C (63°F)	Below 1.5V
		Radiator coolant temperature above 17°C (63°F)	Battery voltage
G (YL)	Ignition coil	Ignition switch ON or engine running	Battery voltage
H (L)	Water thermo switch (Intake manifold)	Engine coolant temperature below 72°C (162°F)	Below 1.5V
		Engine coolant temperature above 72°C (162°F)	Battery voltage
J (BW)	Ignition switch	Ignition switch ON	Battery voltage
K (GO)	Solenoid valve (Choke opener)	Radiator temperature below 17°C (63°F) or during cranking and 27 sec. after engine starts	Below 1.5V
		Others	Battery voltage
L (LsB)	Idle switch	Idling	Battery voltage
		Accelerator pedal depressed	Below 1.5V
M (GL)	Air bypass solenoid valve	Idle switch OFF and engine speed above approx. 2,100 rpm	Below 1.5V
		Others	Battery voltage
O (BY)	Ignition switch (START position)	Ignition switch ON	Below 1.5V
		Cranking	Battery voltage
P (LW)	Solenoid valve (A/C)	A/C switch ON and engine speed below approx. 2,300 rpm	Below 1.5V
		Others	Battery voltage
Q (YW)	Idle-up solenoid valve	Headlight switch ON, rear defroster switch ON, fan speed control switch is 3rd or 4th position, A/C operated, or engine coolant temperature below 72°C (162°F)	Below 1.5V
		Others	Battery voltage
R (LB)	Fan speed control switch	Fan speed control switch in 3rd or 4th position	Below 1.5V
		Fan speed control switch OFF	Battery voltage

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Q	O	M	K	I	G	E	C	A
R	P	N	L	J	H	F	D	B

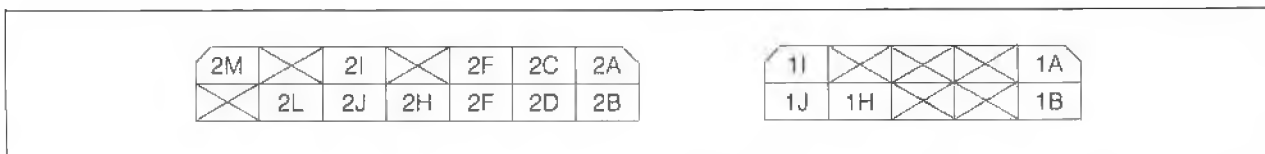
## FE and F8 Engine — ATX (General)

Terminal (Wire color)	Connected to	Condition	Voltage
1A (BW)	Ignition switch	Ignition switch ON	Battery voltage
1B (GR)	Solenoid valve (Main air bleed control)	Others	Battery voltage
		Radiator coolant temperature below 17°C (63°F) or intake manifold vacuum more than 200 mmHg (7.9 inHg)	Below 1.5V
1C	—	—	—
1D	—	—	—
1E	—	—	—
1F	—	—	—
1G	—	—	—
1H (LW)	Solenoid valve (A/C)	A/C operated	Below 1.5V
		Others	Battery voltage
1I (LW)	Idle-up solenoid valve	Inhibitor switch OFF and, headlight switch ON, rear defroster switch ON, fan speed control switch is 3rd or 4th position, A/C operated, or engine coolant temperature below 72°C (162°F)	Below 1.5V
		Others	Battery voltage
1J (B)	Ground	—	Below 1.5V
2A (YL)	Ignition coil	Ignition switch ON or engine running	Battery voltage
2B (LB)	Fan speed control switch	Fan speed control switch in 3rd or 4th position	Below 1.5V
		Fan speed control switch OFF	Battery voltage
2C (BL)	Rear defroster switch	Rear defroster switch ON	Below 1.5V
		Rear defroster switch OFF	Battery voltage
2D (LG)	A/C switch	A/C operated	Below 1.5V
		A/C not operated	Battery voltage
2E (RG)	Headlight switch	Headlight switch ON	Below 1.5V
		Headlight switch OFF	Battery voltage
2F (GW)	Water thermo switch (Radiator)	Radiator coolant temperature below 17°C (63°F)	Below 1.5V
		Radiator coolant temperature above 17°C (63°F)	Battery voltage
2G	—	—	—
2H (L)	Water thermo switch (Intake manifold)	Engine coolant temperature below 72°C (162°F)	Below 1.5V
		Engine coolant temperature above 72°C (162°F)	Battery voltage
2I (LB)	Vacuum switch	Vacuum less than 200 mmHg (7.9 inHg)	Below 1.5V
		Vacuum more than 200 mmHg (7.9 inHg)	Battery voltage
2J (RL)	OD release solenoid	Engine coolant temperature below 72°C (162°F)	Below 1.5V
		Engine coolant temperature above 72°C (162°F)	Battery voltage

# 4A CONTROL SYSTEM

Terminal (Wire color)	Connected to	Condition	Voltage
2K	—	—	—
2L (BR)	Inhibitor switch	"P" or "N" range	Below 1.5V
		Others	Battery voltage
2M (BY)	Ignition switch (START position)	Ignition switch ON	Below 1.5V
		Cranking	Battery voltage
2N	—	—	—

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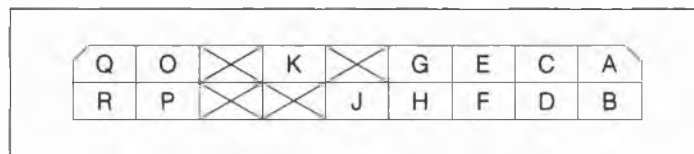
## FE and F8 Engine — MTX (General)

Terminal (Wire color)	Connected to	Condition	Voltage
A (W)	Headlight switch	Headlight switch ON	Below 1.5V
		Headlight switch OFF	Battery voltage
B (B)	Ground	—	Below 1.5V
C (BL)	Rear defroster switch	Rear defroster switch ON	Below 1.5V
		Rear defroster switch OFF	Battery voltage
D (LG)	A/C switch	A/C operated	Below 1.5V
		A/C not operated	Battery voltage
E (LB)	Solenoid valve (Main air bleed control)	Intake manifold vacuum more than 300 mmHg (11.8 inHg), and radiator coolant temperature above 17°C (63°F)	Battery voltage
		Others	Below 1.5V
F (GW)	Water thermo switch (Radiator)	Radiator coolant temperature below 17°C (63°F)	Below 1.5V
		Radiator coolant temperature above 17°C (63°F)	Battery voltage
G (YL)	Ignition coil	Ignition switch ON or engine running	Battery voltage
H (L)	Water thermo switch (Intake manifold)	Engine coolant temperature below 72°C (162°F)	Below 1.5V
		Engine coolant temperature above 72°C (162°F)	Battery voltage
I	—	—	—
J (BW)	Ignition switch	Ignition switch ON	Battery voltage
K	—	—	—
L	—	—	—
M	—	—	—
N	—	—	—

Terminal (Wire color)	Connected to	Condition	Voltage
O (BY)	Ignition switch* (START position)	Ignition switch ON	Below 1.5V
		Cranking	Battery voltage
P (LW)	Solenoid valve (A/C)	A/C switch ON and engine speed below approx. 2,300 rpm	Below 1.5V
		Others	Battery voltage
Q (YW)	Idle-up solenoid valve	Headlight switch ON, rear defroster switch ON, fan speed control switch is 3rd or 4th position, A/C oper- ated, or engine coolant temperature below 72°C (162°F)	Below 1.5V
		Others	Battery voltage
R (LB)	Fan speed control switch	Fan speed control switch in 3rd or 4th position	Below 1.5V
		Fan speed control switch OFF	Battery voltage

\* Not used

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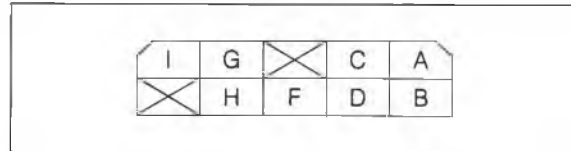
## FE 8Valve — Unleaded Fuel

Terminal (Wire color)	Connected to	Condition	Voltage
A (L)	Coast enrichment solenoid valve	Engine speed approx. 1,500—2,300 rpm and idle switch ON	Below 1.5V
		Others	Battery voltage
B (B)	Ground	—	Below 1.5V
C (LB)	Air bypass solenoid valve	Engine speed above approx. 3,500 rpm and idle switch ON	Below 1.5V
		Others	Battery voltage
D (YL)	Ignition coil	Ignition switch ON or engine running	Battery voltage
E	—	—	—
F (BW)	Ignition switch	Ignition switch ON	Battery voltage
G (YW)	Slow fuel cut solenoid valve	Engine speed above approx. 2,300 rpm and idle switch ON	Battery voltage
		Others	Below 1.5V
H (LW)	A/C switch	A/C operated and engine speed above approx. 1,500 rpm	Battery voltage
		A/C not operated or engine speed below approx. 1,500 rpm	Below 1.5V

# 4A CONTROL SYSTEM

Terminal (Wire color)	Connected to	Condition	Voltage
I (LgB)	Idle switch	Idle switch ON	Below 1.5V
		Idle switch OFF	Battery voltage
J	—	—	—

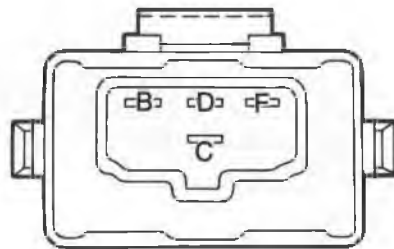
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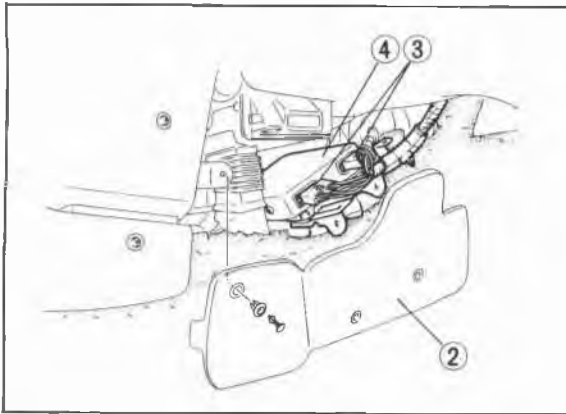


## F6 Engine (Singapore)

Terminal (Wire color)	Connected to	Condition	Voltage
A	—	—	—
B (YL)	Ignition coil	Ignition switch ON and engine running	Battery voltage
C (B)	Ground	—	—
D (GB)	Relay	Engine speed below approx. 2,100 rpm	Below 1.5V
		Engine speed above approx. 2,100 rpm	Battery voltage
F (BW)	Ignition switch	Ignition switch ON	Battery voltage

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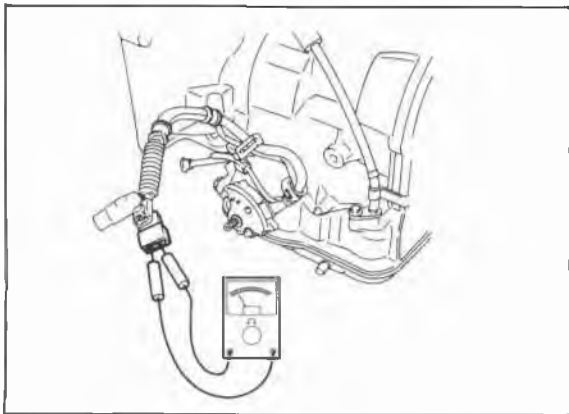




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## Replacement

1. Disconnect the negative battery cable.
2. Remove the front console covers (right or left).
3. Disconnect the connectors from the control unit.
4. Remove and replace the control unit.

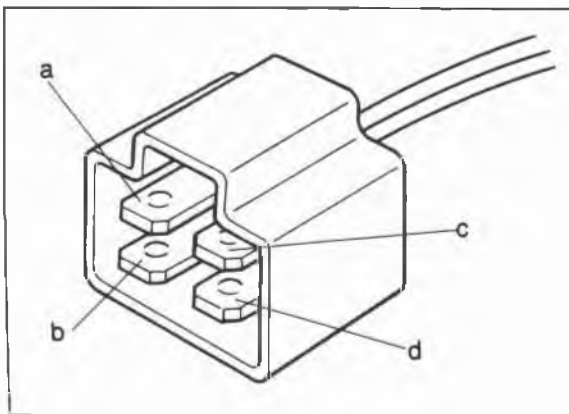


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## INHIBITOR SWITCH

### Inspection

1. Verify that the starter operates with the ignition switch at START position in P and N positions only.
2. Check that the back-up lights illuminate when R position selected and the ignition switch is ON.
3. If not as specified, check the following:
  - (1) Jack up the vehicle and support it with safety stands.
  - (2) Disconnect the inhibitor switch connector.
  - (3) Check continuity of the switch with an ohmmeter.



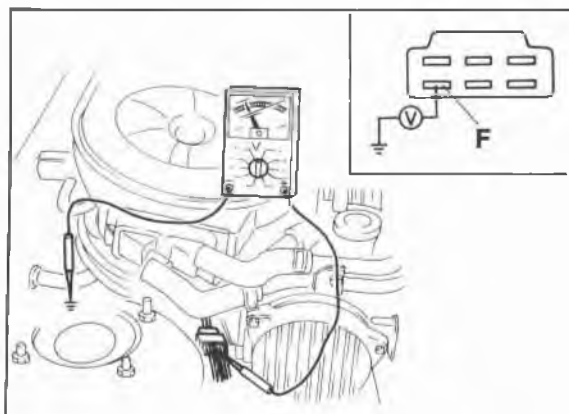
76G04A-178

### Connecting guide

Position	Connector terminal			
	a	b	c	d
P			○—○	
R	○—○			
N			○—○	
D,1,2				

○—○: indicates continuity

4. Replace if necessary.



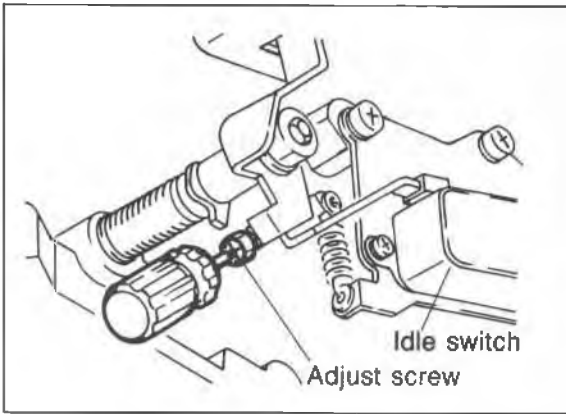
76G04A-179

## IDLE SWITCH

### Inspection

1. Warm up the engine and run it at idle.
2. Turn all accessories OFF.
3. Connect a tachometer to the engine.
4. Connect a voltmeter to the carburetor connector F terminal.

# 4A CONTROL SYSTEM

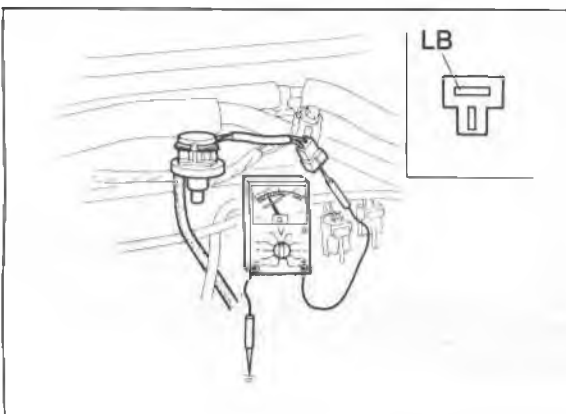


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5. Increase the engine speed to more than **2,000 rpm** and decelerate gradually.
6. Check the voltage.

Specification	FE 8Valve— Unleaded Fuel & F6 Sin- gapore	Others
Engine speed		
At idle	below 1.5V	Battery voltage
Above 1,000—1,100 rpm	Battery voltage	below 1.5V

7. If the voltage is not within specification, turn the adjust screw to adjust.



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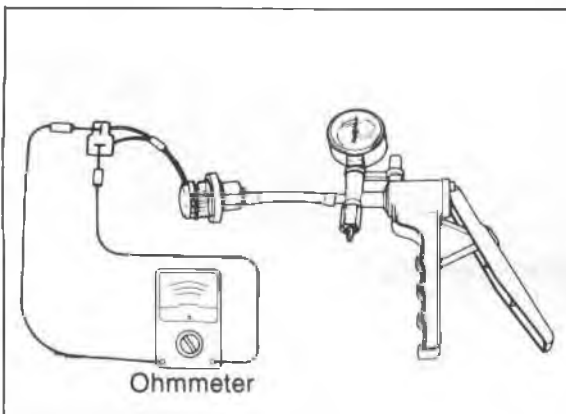
## VACUUM SWITCH On-Vehicle Inspection

1. Run the engine at idle.
2. Connect a voltmeter to the vacuum switch connector terminal wire (LB).

**Voltage: Approx. 12V**

3. Disconnect the vacuum hose from the vacuum switch, and plug it.
4. Check the voltage.

**Voltage: Less than 1.5V**

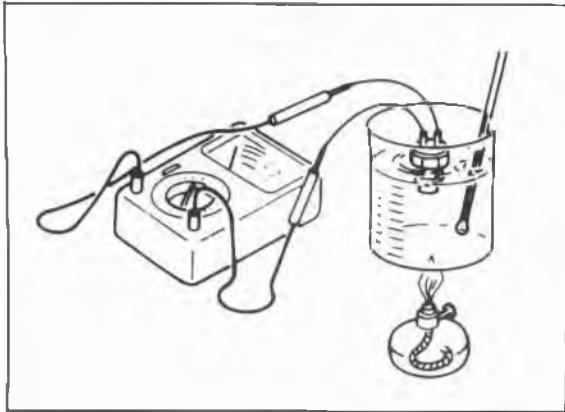


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## Off-Vehicle Inspection

1. Remove the vacuum switch.
2. Connect a vacuum pump to the vacuum switch.
3. Connect an ohmmeter to the vacuum switch, and check the continuity between the switch terminals.

Vacuum	Continuity
MTX: More than 300 mmHg (11.8 inHg)	No
ATX: More than 200 mmHg (7.9 inHg)	
Others	Yes



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## WATER THERMO SWITCH (RADIATOR) Inspection

1. Remove the switch from the radiator.
2. Place the switch in water with a thermometer and gradually heat the water.
3. Check for continuity of the switch with an ohmmeter.

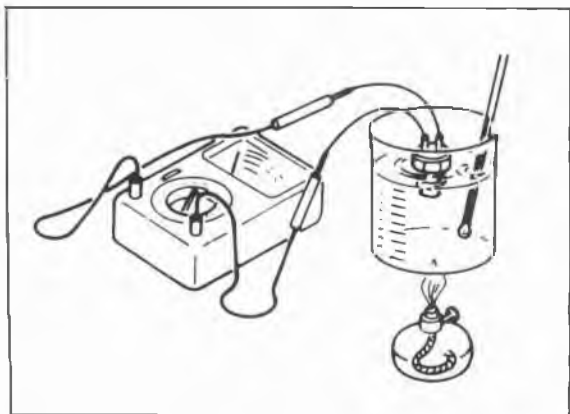
Coolant temp.	Continuity
More than approx. <b>17°C (63°F)</b>	Yes
Less than approx. <b>17°C (63°F)</b>	No

4. If not as specified, replace the water thermo switch.

### Note

- a) Apply sealing tape to the threads of the switch before installing it.
- b) After installation, check the coolant level and check for leaks.

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## WATER THERMO SWITCH (INTAKE MANIFOLD) Inspection

1. Remove the switch from the intake manifold.
2. Place the switch in water with a thermometer and gradually heat the water.
3. Check for continuity of the switch with an ohmmeter.

Coolant temp.	Continuity
More than approx. <b>72°C (162°F)</b>	Yes
Less than approx. <b>72°C (162°F)</b>	No

4. If not as specified, replace the water thermo switch.

### Note

- a) Apply sealing tape to the threads of the switch before installing it.
- b) After installation, check the coolant level and check for leaks.

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# 4A EXHAUST SYSTEM

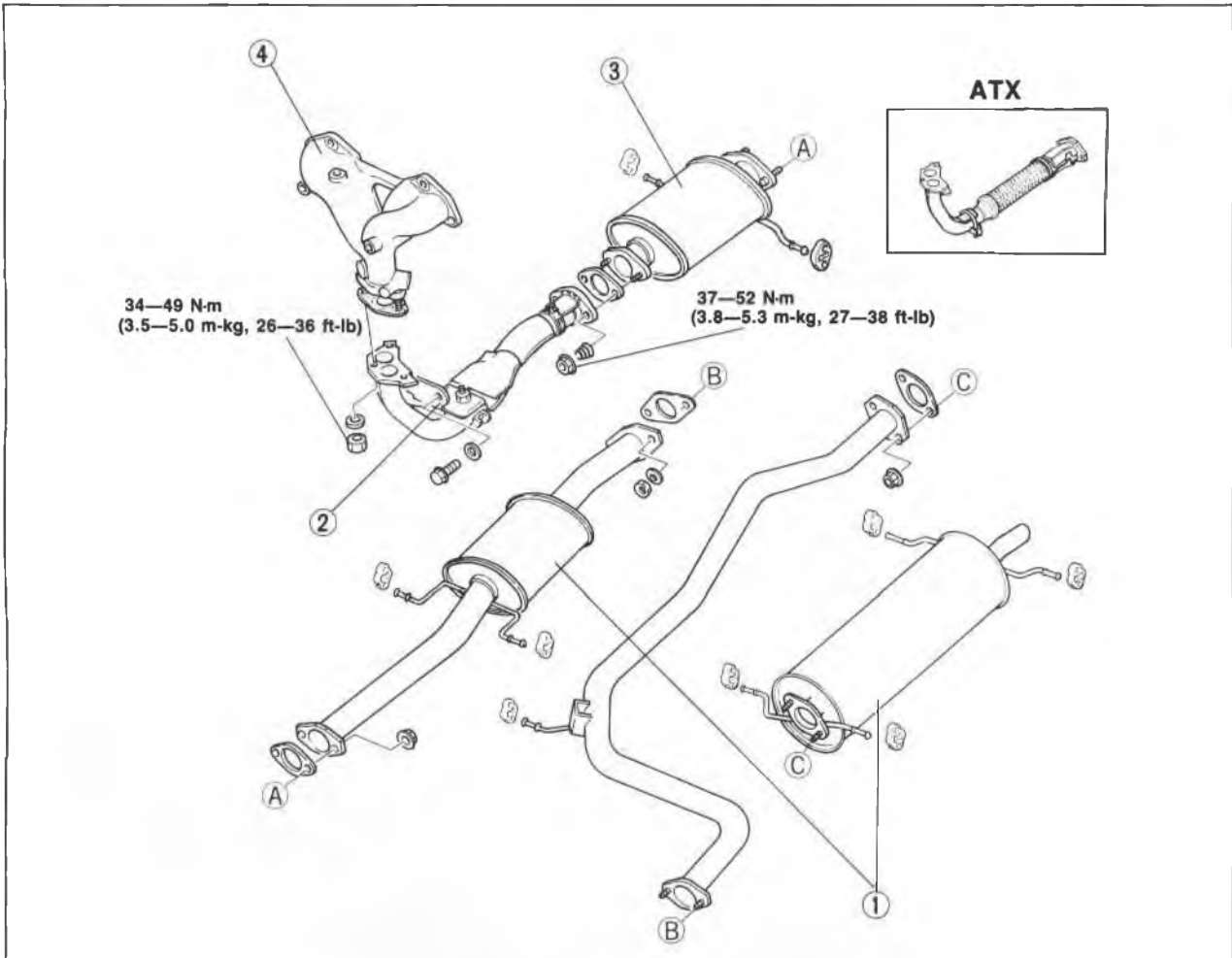
## EXHAUST SYSTEM

### EXCEPT FE 8VALVE—UNLEADED FUEL

#### Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

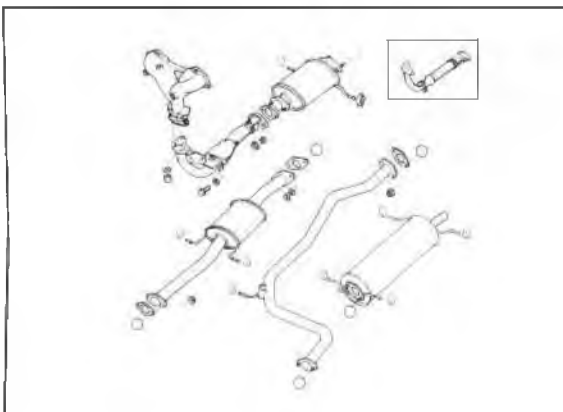
#### Torque specifications



76G04A-187

1. Center silencer and main silencer
2. Brackets

3. Front silencers
4. Exhaust manifolds



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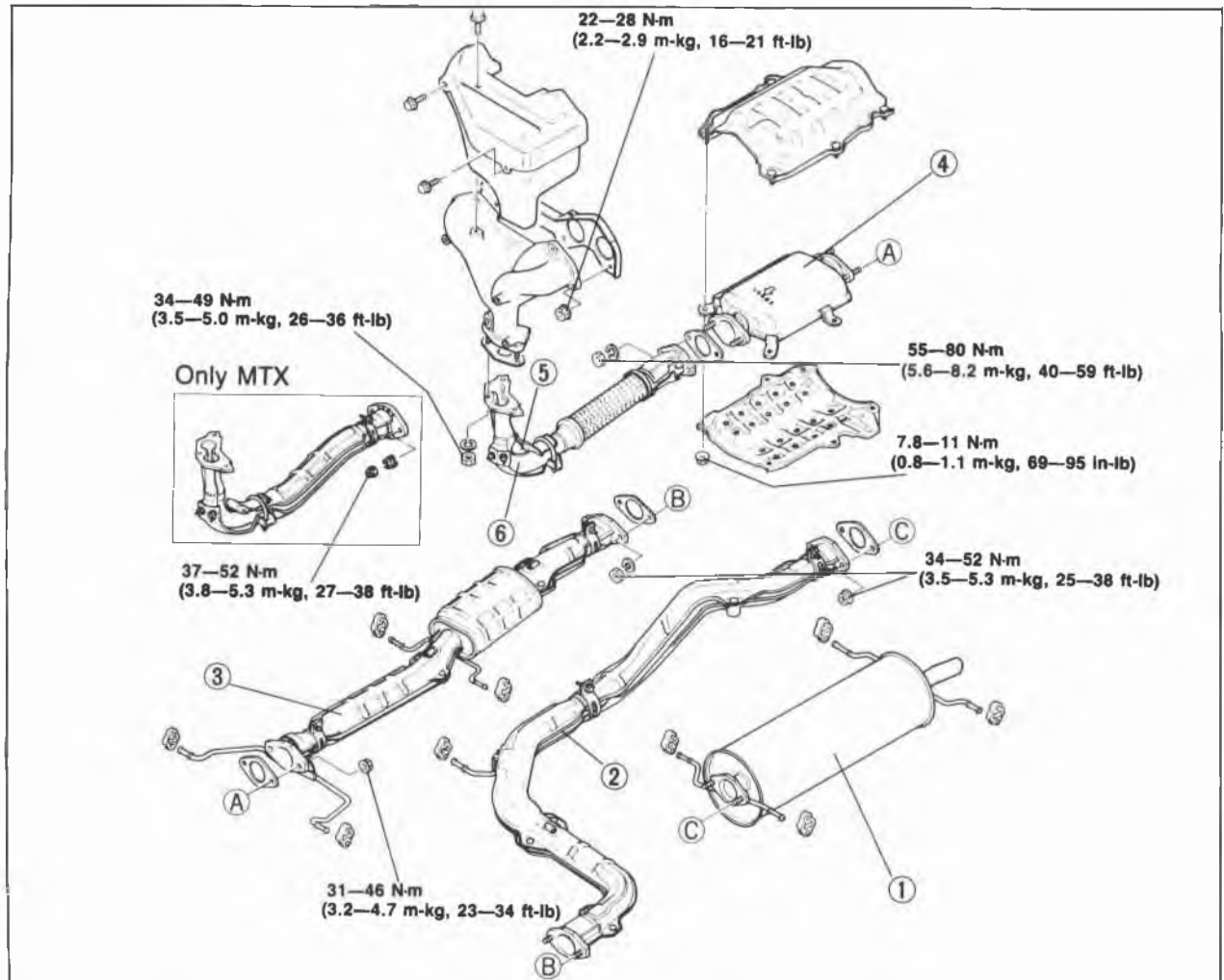
#### Inspection

Visually check the exhaust system for cracks or damage.

## FE 8 VALVE-UNLEADED FUEL Removal and Inspection

1. Remove in the sequence shown in the figure
2. Install in the reverse order of removal.

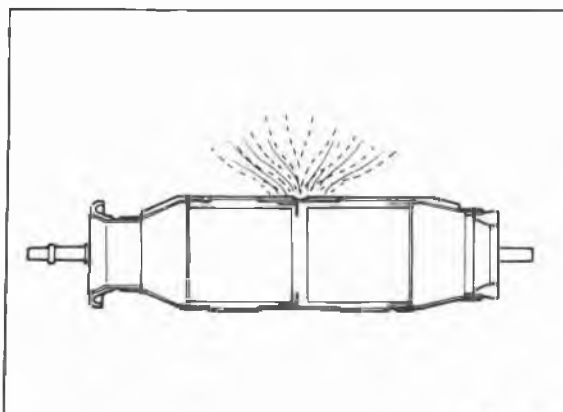
### Torque Specifications



76G04A-189

1. Main silencer
2. Middle pipe
3. Pre-silencer

4. Catalytic converter
5. Bracket
6. Front pipe



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### Inspection

1. Check the catalytic converter and exhaust pipe for deterioration or restriction.
2. Check the insulation covers welded onto the catalytic converter for damage.

### Note

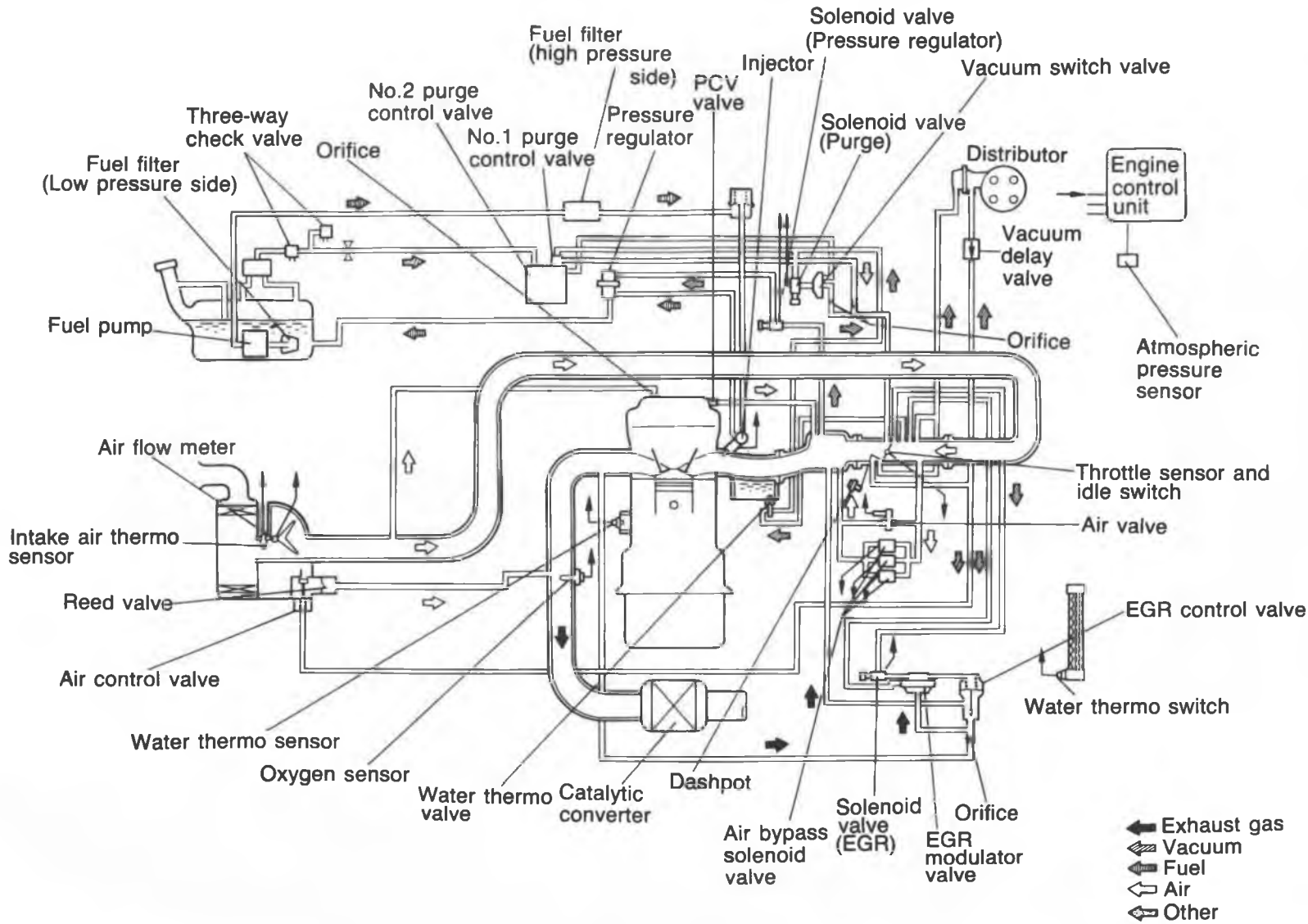
**If the insulation cover is touching the catalytic converter housing, excessive heat at the floor will occur.**

# FUEL AND EMISSION CONTROL SYSTEMS (FUEL INJECTION FE)

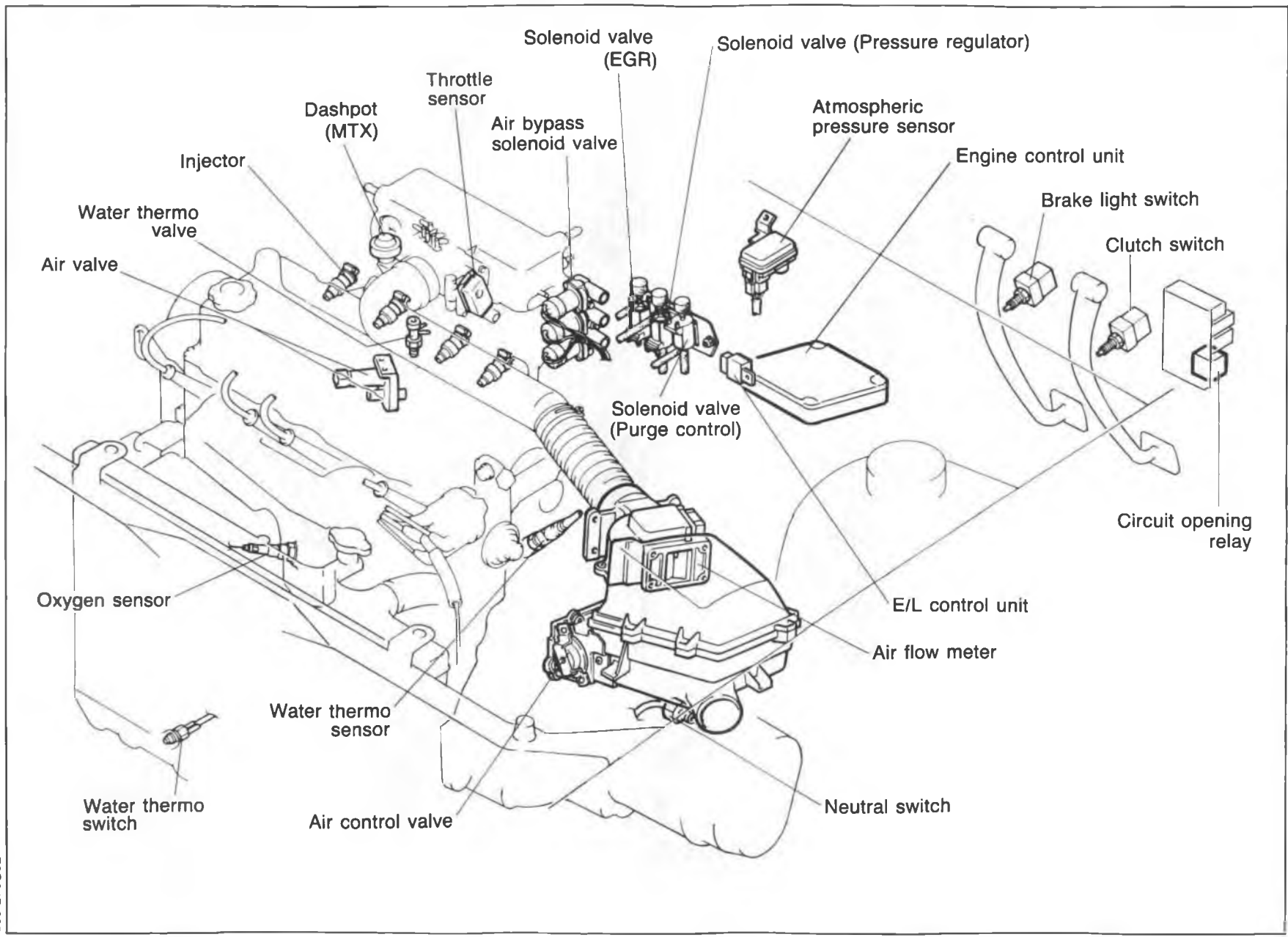
<b>OUTLINE</b> .....	4B— 2	REPLACEMENT .....	4B—57
SYSTEM DIAGRAM.....	4B— 2	FUEL TANK.....	4B—61
COMPONENT LOCATION.....	4B— 3	<b>DECELERATION CONTROL</b>	
VACUUM HOSE ROUTING		<b>SYSTEM</b> .....	4B—64
DIAGRAM.....	4B— 5	COMPONENT DESCRIPTIONS.....	4B—65
SPECIFICATIONS .....	4B— 6	TROUBLESHOOTING.....	4B—66
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<b>INTAKE AIR SYSTEM</b> .....	4B—30	<b>VENTILATION (PCV) SYSTEM</b> .....	4B—80
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<b>FUEL SYSTEM</b> .....	4B—42	ENGINE CONTROL UNIT .....	4B—87
COMPONENT DESCRIPTIONS.....	4B—43	NEUTRAL SWITCH .....	4B—91
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SERVICING FUEL SYSTEM.....	4B—45	P/S PRESSURE SWITCH.....	4B—92
MULTI-PRESSURE TESTER.....	4B—46	INHIBITOR SWITCH .....	4B—92
FUEL PRESSURE .....	4B—48	E/L CONTROL UNIT .....	4B—93
FUEL PUMP.....	4B—49	AIR FLOW METER.....	4B—94
PULSATION DAMPER .....	4B—50	THROTTLE SENSOR.....	4B—95
INJECTOR.....	4B—51	WATER THERMO SENSOR .....	4B—97
PRESSURE REGULATOR		WATER THERMO SWITCH.....	4B—97
CONTROL SYSTEM.....	4B—53	OXYGEN SENSOR.....	4B—98
COMPONENT DESCRIPTIONS.....	4B—54	ATMOSPHERIC PRESSURE	
TROUBLESHOOTING .....	4B—55	SENSOR.....	4B—99

## OUTLINE

### SYSTEM DIAGRAM

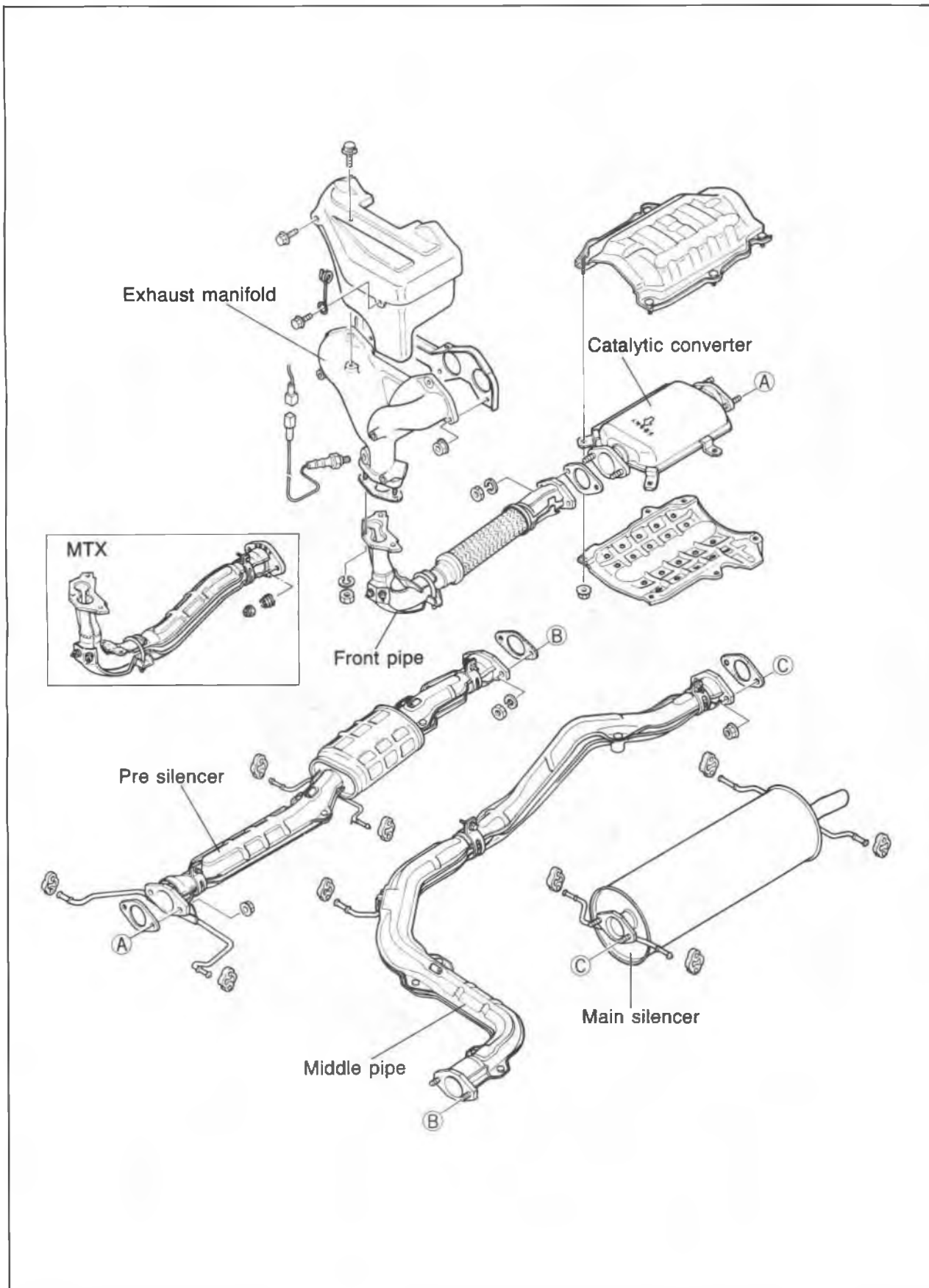


COMPONENT LOCATION



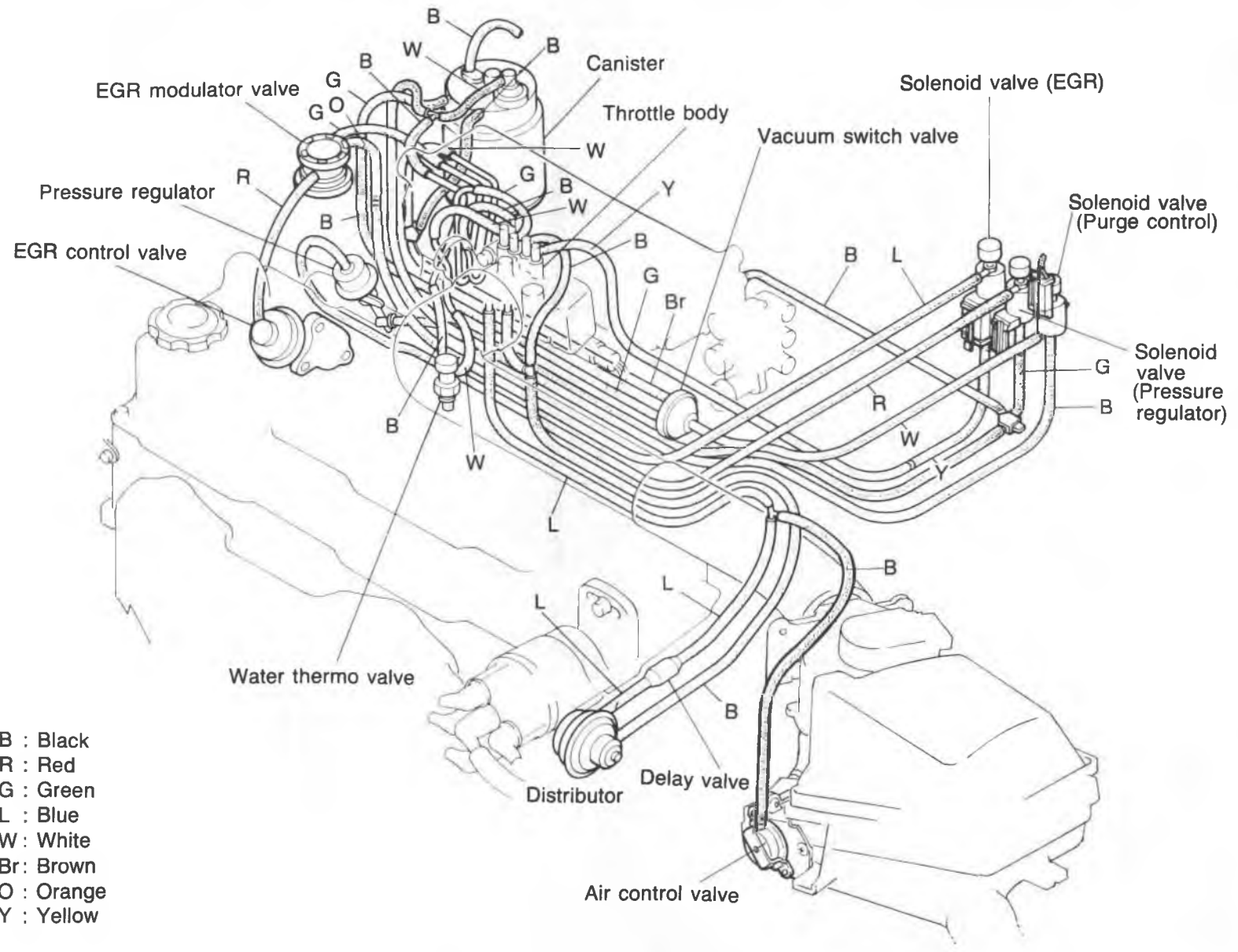
# 4B OUTLINE

## Exhaust System



86U04A-005

VACUUM HOSE ROUTING DIAGRAM



- B : Black
- R : Red
- G : Green
- L : Blue
- W : White
- Br: Brown
- O : Orange
- Y : Yellow

# 4B OUTLINE

## SPECIFICATIONS

Item		Specification	
Idle speed	rpm	MTX: 800 <sup>+50</sup> % (Neutral), ATX: 900 <sup>+50</sup> % (P range)	
<b>Throttle body</b>			
Type		Horizontal draft (1-barrel)	
Throat diameter	mm (in)	50 (2.0)	
<b>Air flow meter</b>			
Resistor	$\Omega$	E <sub>2</sub> -Vs	More than 20
		E <sub>2</sub> -Vc	100—300
		E <sub>2</sub> -Vb	200—400
		E <sub>2</sub> -THA	-20°C ( -4°F) 13,600—18,400 20°C ( 68°F) 2,210— 2,690 60°C (140°F) 493— 667
<b>Air cleaner</b>			
Element type		Oil permeated	
<b>Fuel pump</b>			
Type		Impeller (in tank)	
Output pressure	kPa (kg/cm <sup>2</sup> , psi)	441—588 (4.5—6.0, 64—85)	
Feeding capacity	cc (cu in)/10 sec.	220 (13.4) minimum	
<b>Fuel filter</b>			
Type	Low pressure side	Nylon element	
	High pressure side	Paper element	
<b>Pressure regulator</b>			
Type		Diaphragm	
Regulating pressure	kPa (kg/cm <sup>2</sup> , psi)	235—275 (2.4—2.8, 34—40)	
<b>Injector</b>			
Type		High-ohmic	
Type of drive		Voltage	
Resistance	$\Omega$	12—16	
Injection amount	cc (cu in) 15 seconds	38—53 (2.3—3.2)	
<b>Fuel tank</b>			
Capacity	liters (US gal, Imp gal)	60 (15.9, 13.2)	
<b>Fuel</b>			
Specification		Unleaded regular	

76G04B-506



## TROUBLESHOOTING GUIDE

This troubleshooting guide shows the malfunction numbers and the symptoms of various failures. Perform troubleshooting as described below.

Possible cause	Input sensors and switches							Output solenoid valves																											
	Ignition pulse	Air flow meter	Water thermo sensor	Intake air thermo sensor	Throttle sensor	Atmospheric pressure sensor	Oxygen sensor	Feedback system	Solenoid valve (Pressure regulator)	Solenoid valve (Purge)	Solenoid valve (EGR)	Air bypass solenoid valve (Idle-up C)	Air bypass solenoid valve (Idle-up B)																						
Symptom	4B-14	4B-15	4B-16	4B-17	4B-18	4B-19	4B-20	4B-21	4B-22	4B-23	4B-23	4B-23	4B-24																						
1 Fault Indicated by SST Code No.	01	08	09	10	12	14	15	17	25	26	28	34	35																						
2 Hard start or won't start (Crank OK)	<b>TROUBLESHOOTING PROCEDURE</b> <b>Note</b> <b>Step 1</b> under symptom is to quickly determine what system or unit may be at fault by use of the SST. (Self-Diagnosis Checker 49 H018 9A1) <b>1st:</b> Check input sensors and output solenoid valves with the SST. (Refer to page 4B-10.) <b>2nd:</b> Check other switches with the SST. (Refer to page 4B-26.) <b>3rd:</b> Check the following items: <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 50%; vertical-align: top;"> <b>Electrical system</b>                      1) Battery condition                      2) Fuses   <b>Fuel system</b>                      1) Fuel level                      2) Fuel leakage                      3) Fuel filter                      4) Idle speed   <b>Engine</b>                      1) Compression                      2) Overheating                 </td> <td style="width: 50%; vertical-align: top;"> <b>Ignition system</b>                      1) Ignition spark                      2) Ignition timing   <b>Intake air system</b>                      1) Air cleaner element                      2) Vacuum or air leakage                      3) Vacuum hose routing                      4) Accelerator cable   <b>Others</b>                      1) Clutch slippage                      2) Brake dragging                 </td> </tr> </table>													<b>Electrical system</b> 1) Battery condition 2) Fuses  <b>Fuel system</b> 1) Fuel level 2) Fuel leakage 3) Fuel filter 4) Idle speed  <b>Engine</b> 1) Compression 2) Overheating	<b>Ignition system</b> 1) Ignition spark 2) Ignition timing  <b>Intake air system</b> 1) Air cleaner element 2) Vacuum or air leakage 3) Vacuum hose routing 4) Accelerator cable  <b>Others</b> 1) Clutch slippage 2) Brake dragging																				
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3 Engine stalls	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">While warming up</td> <td></td> </tr> <tr> <td style="text-align: center;">After warming up</td> <td></td> </tr> <tr> <td style="text-align: center;">4 Rough idle</td> <td></td> </tr> <tr> <td style="text-align: center;">While warming up</td> <td></td> </tr> <tr> <td style="text-align: center;">After warming up</td> <td></td> </tr> <tr> <td style="text-align: center;">5 High idle speed after warming up</td> <td></td> </tr> <tr> <td style="text-align: center;">6 Poor acceleration, hesitation or lack of power</td> <td></td> </tr> <tr> <td style="text-align: center;">7 Runs rough on deceleration</td> <td></td> </tr> <tr> <td style="text-align: center;">8 Afterburn in exhaust system</td> <td></td> </tr> <tr> <td style="text-align: center;">9 Poor fuel consumption</td> <td></td> </tr> <tr> <td style="text-align: center;">10 Engine stalls or rough after hot starting</td> <td></td> </tr> </table>													While warming up		After warming up		4 Rough idle		While warming up		After warming up		5 High idle speed after warming up		6 Poor acceleration, hesitation or lack of power		7 Runs rough on deceleration		8 Afterburn in exhaust system		9 Poor fuel consumption		10 Engine stalls or rough after hot starting	
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6 Poor acceleration, hesitation or lack of power																																			
7 Runs rough on deceleration																																			
8 Afterburn in exhaust system																																			
9 Poor fuel consumption																																			
10 Engine stalls or rough after hot starting																																			
11 Fails emission test																																			

76G04B-003

# 4B TROUBLESHOOTING GUIDE

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding systems to check, refer to the pages shown for detailed guides for each system.

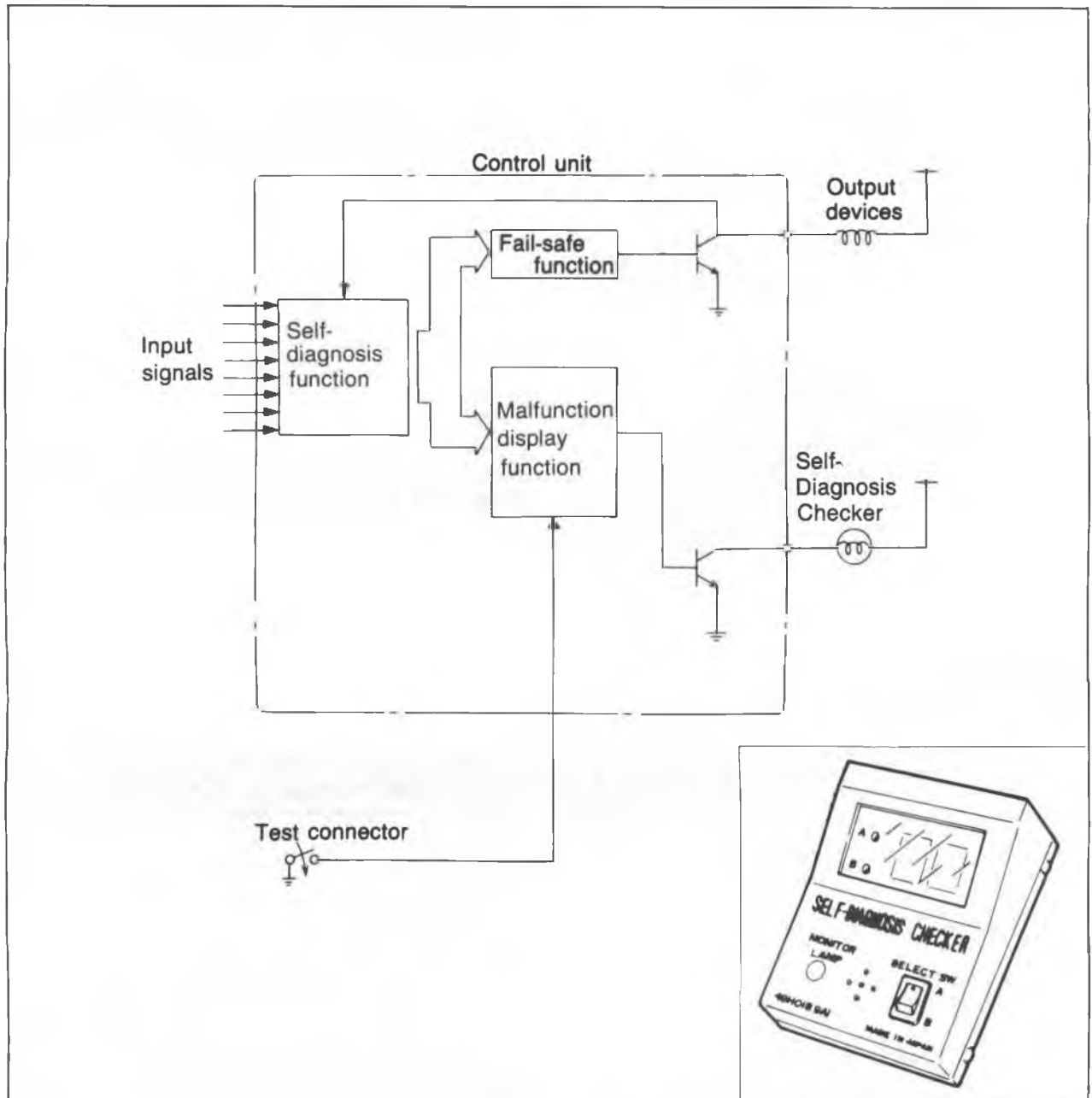
Possible cause		Fuel and Emission Control Systems									
		Intake Air System (Poor connection of components, throttle body)	Fuel System (Fuel injection, Fuel pressure)	Pressure Regulator Control System	Idle-up System (Air valve, solenoid valve malfunction)	EGR System (EGR control valve stuck and open)	EEC system (Vacuum switch valve, No.1 purge control valve malfunction)	PCV System (System clogged)	Deceleration System (Dashpot, fuel cut operation malfunction)	Air injection system (Reed valve malfunction)	Exhaust system (System clogged)
Page		4B-30	4B-42	4B-53	4B-35	4B-71	4B-74	4B-80	4B-64	4B-68	4B-81
Symptom	2	2	1								
	3	4	3		1	2					
		5	4		2	3		1			
	4	6	5		1	4		2		3	
		7	6		2	4	5	1		3	
	5	3			1				2		
	6	3	4			1	2				5
	7		3		2				1		
	8	3	4		1				2		
	9		2			3			1		4
	10		2	1							
11	7	8		5	2	6		3	4	1	

76G04B-004

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

**TROUBLESHOOTING WITH SST**

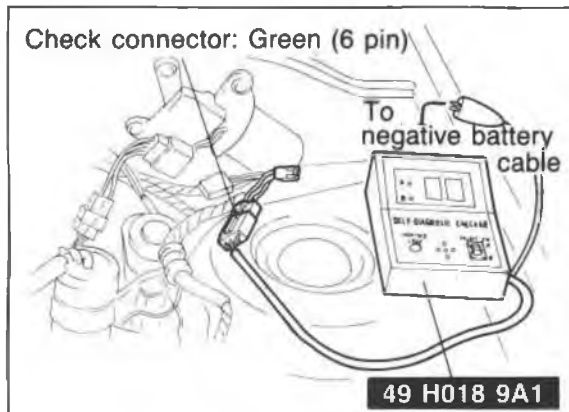
86U04A-010

When troubles occur in the main input devices or output devices, check for the cause using the **SST**. Failures of each input and output device are indicated and retrieved from the control unit as malfunction code numbers.

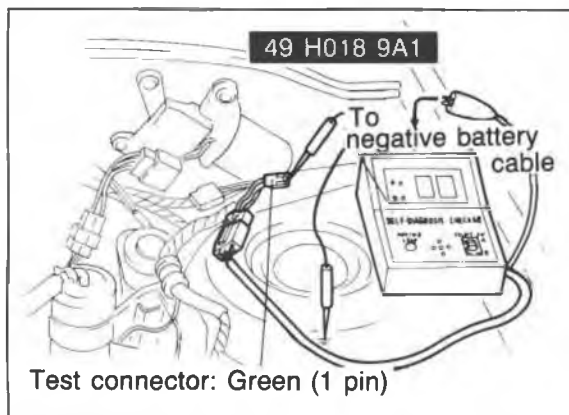
**Note**

**The control unit constantly checks for malfunction of the input devices. But, the control unit checks for malfunction of output devices only in a 3 second period after the ignition switch is turned ON and the test connector is grounded.**

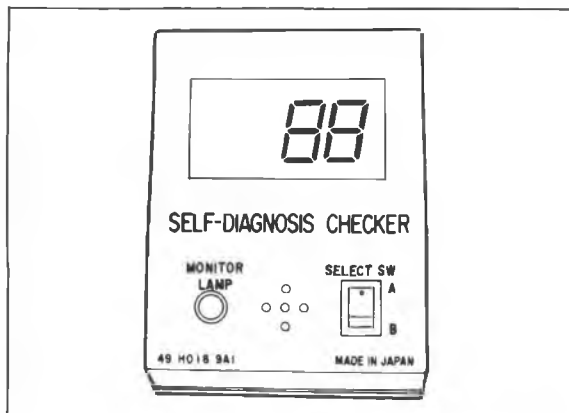
## 4B TROUBLESHOOTING WITH SST



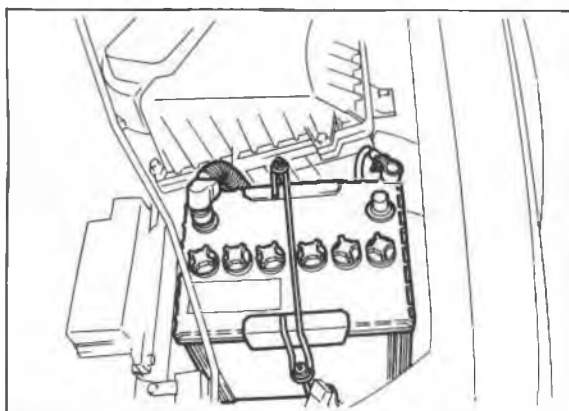
86U04A-011



86U04A-012



76G04B-005



76G04B-134

### INSPECTION PROCEDURE

1. Connect the **SST** to the check connector, (Green, 6-pin) and the negative battery terminal.
2. Set the select switch to position A.

#### Note

**The check connector is located at the rear of the left side wheel housing.**

3. Ground the test connector (Green, 1-pin) with a jumper wire.

#### Note

**The test connector is located near the Self-Diagnosis Checker check connector.**

4. Turn the ignition switch ON.
5. Verify that **88** flashes on the digital display and that the buzzer sounds for **three seconds** after turning the ignition switch ON.
6. If **88** does not flash, check the main relay (Refer to page 4B—86), power supply circuit, and check connector wiring.
7. If **88** flashes and the buzzer sounds continuously for more than **20 seconds**, replace the engine control unit and perform steps 3 and 4 again.
8. Note the code numbers and check for the causes by referring to the check sequences shown on pages **from 4B—14 to 4B—24**. Repair as necessary.

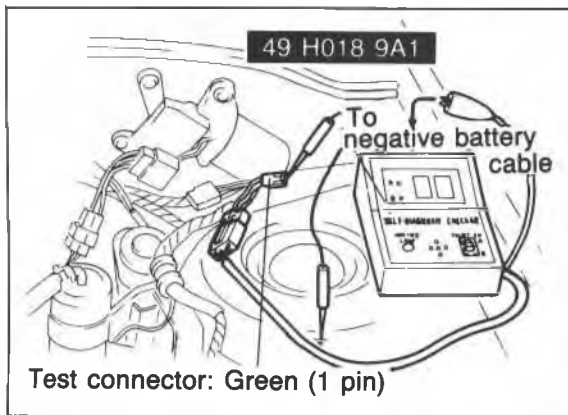
#### Note

**Cancel the code numbers by performing the after-repair procedure after repairing.**

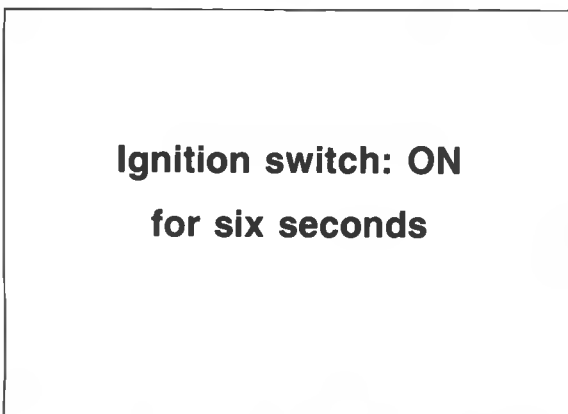
### AFTER-REPAIR PROCEDURE

1. Cancel the memory of malfunctions by disconnecting the negative battery cable and depressing the brake pedal for **at least 2 seconds**; then reconnect the negative battery cable.

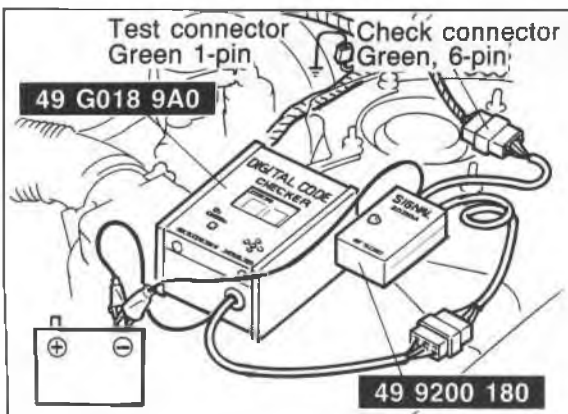
## TROUBLESHOOTING WITH SST 4B



86U04A-015



76G04B-006



76G04B-007

2. Connect the **SST** to the check connector.
3. Ground the test connector (Green, 1-pin) with a jumper wire.

4. Turn the ignition switch ON, but do not start the engine for **six seconds**.
5. Start and warm up the engine, then run it at **2,500—3,000 rpm** for **three** minutes in neutral.
6. Verify that no code numbers are displayed.

### Note

The Digital Code Checker (49 G018 9A0) with the Signal Adapter (49 9200 180) may be used in place of the Self-Diagnosis Checker (49 H018 9A1).

# 4B TROUBLESHOOTING WITH SST

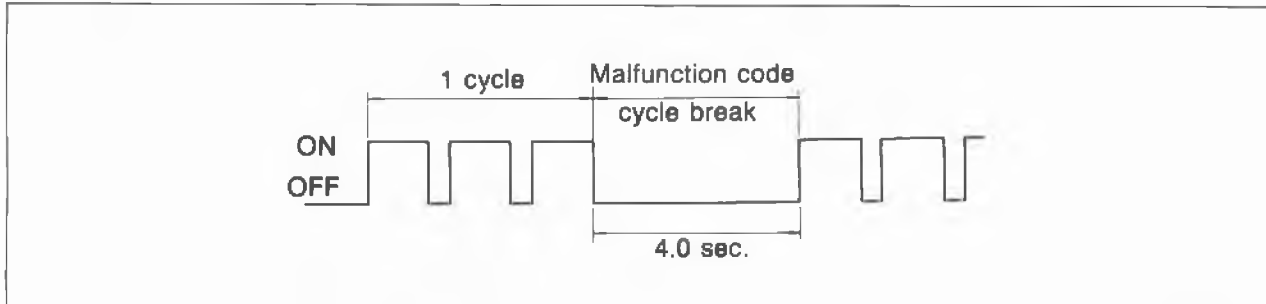
## PRINCIPLE OF CODE CYCLE

Malfunction codes are determined as shown below

86U04A-017

### 1. Code cycle break

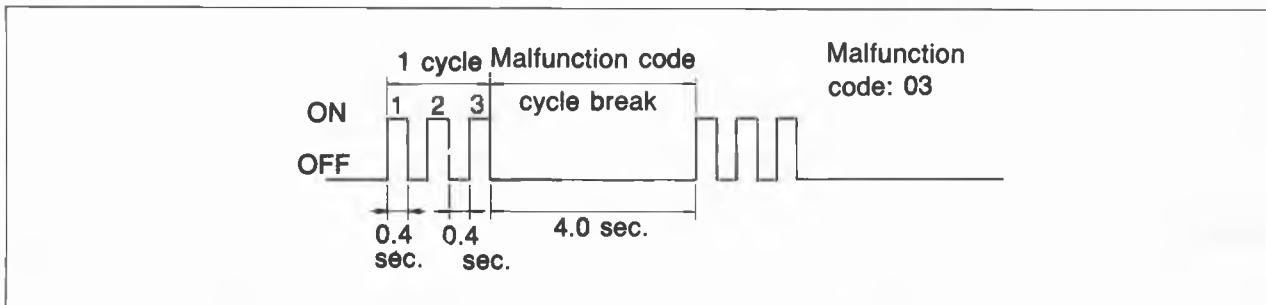
The time between malfunction code cycles is 4.0 sec (the time the light is off).



76G04B-122

### 2. Second digit of malfunction code (ones position)

The digit in the ones position of the malfunction code represents the number of times the buzzer is on 0.4 sec during one cycle.

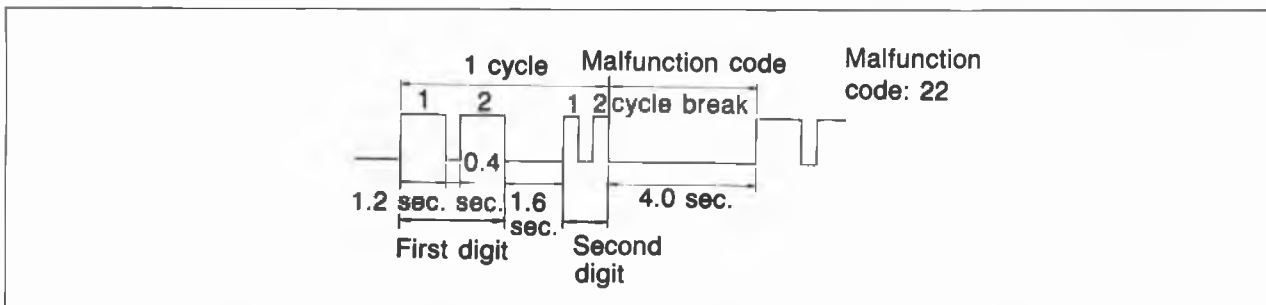


76G04B-123

### 3. First digit of malfunction code (tens position)

The digit in the tens position of the malfunction code represents the number of times the buzzer is on 1.2 sec during one cycle.

It should also be noted that the light goes off for 1.6 sec. between the long and short pulses of the buzzer.



76G04B-124

## CODE NUMBER

Malfunction display		Sensor or subsystem	Self-diagnosis	Fail-safe
Code No.	Output signal pattern			
01	ON OFF	Ignition pulse	No ignition signal	—
08	ON OFF	Air flow meter	Open or short circuit	Maintains basic signal at preset value
09	ON OFF	Water thermo sensor	Open or short circuit	Maintains constant command 35°C (95°F)
10	ON OFF	Intake air thermo sensor (air flow meter)	Open or short circuit	Maintains constant 20°C (68°F) command
12	ON OFF	Throttle sensor	Open or short circuit	Maintains constant command of throttle valve fully open
14	ON OFF	Atmospheric pressure sensor	Open or short circuit	Maintains constant command of sea level pressure
15	ON OFF	Oxygen sensor	Sensor output continues less than 0.55V 120 sec. after engine starts (1,500 rpm)	Cancels EGI feedback operation
17	ON OFF	Feedback system	Sensor output not changed 20 sec. after engine exceeds 1,500 rpm	Cancels EGI feedback operation
25	ON OFF	Solenoid valve (pressure regulator)	Open or short circuit	—
26	ON OFF	Solenoid valve (purge control)		—
28	ON OFF	Solenoid valve (EGR)		—
34	ON OFF	Air bypass solenoid valve (Idle-up C)		—
35	ON OFF	Air bypass solenoid valve (Idle-up B)		—

76G04B-008

### Caution

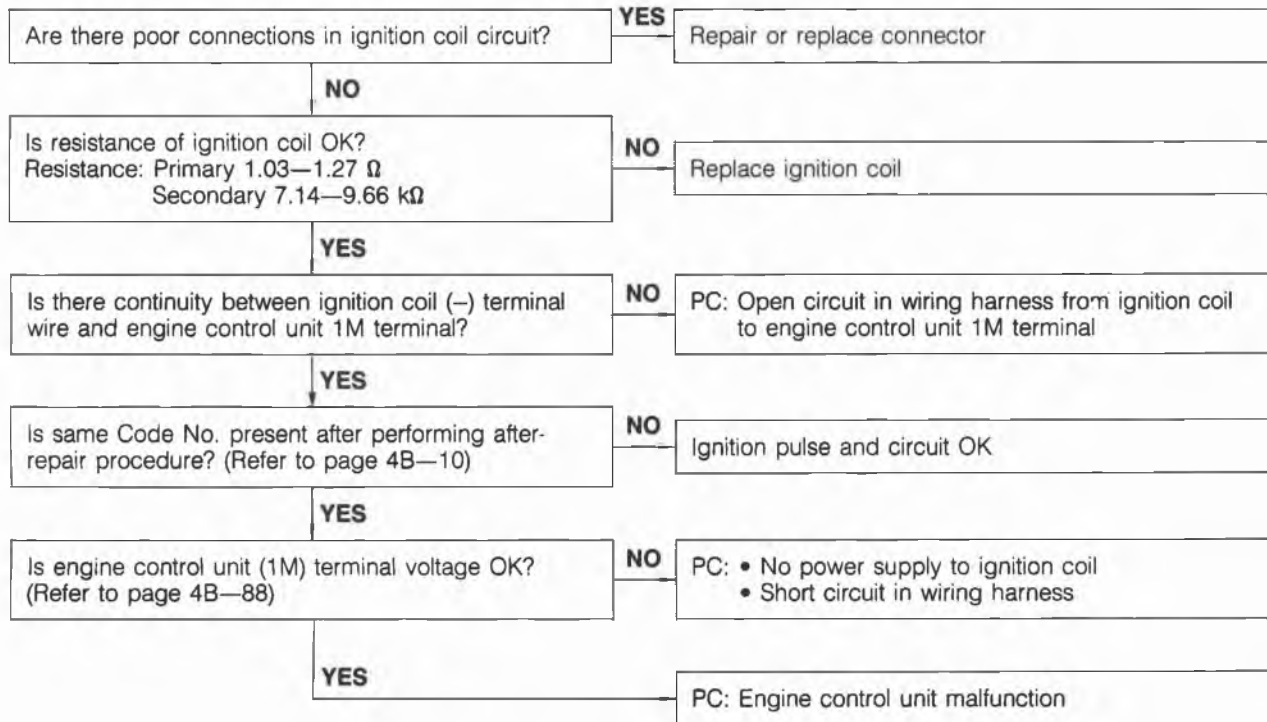
- a) If there is more than one failure present, the lowest number malfunction code is displayed first, the remaining codes are displayed sequentially.
- b) After repairing a failure, turn off the ignition switch and disconnect the negative battery cable and depress the brake pedal for at least 2 seconds to erase the memory of a malfunction code.

# 4B TROUBLESHOOTING WITH SST

If a malfunction code number is shown on the **SST**, check the following chart along with the wiring diagram.

## Code No. 01 (Ignition pulse)

## PC: Possible Cause

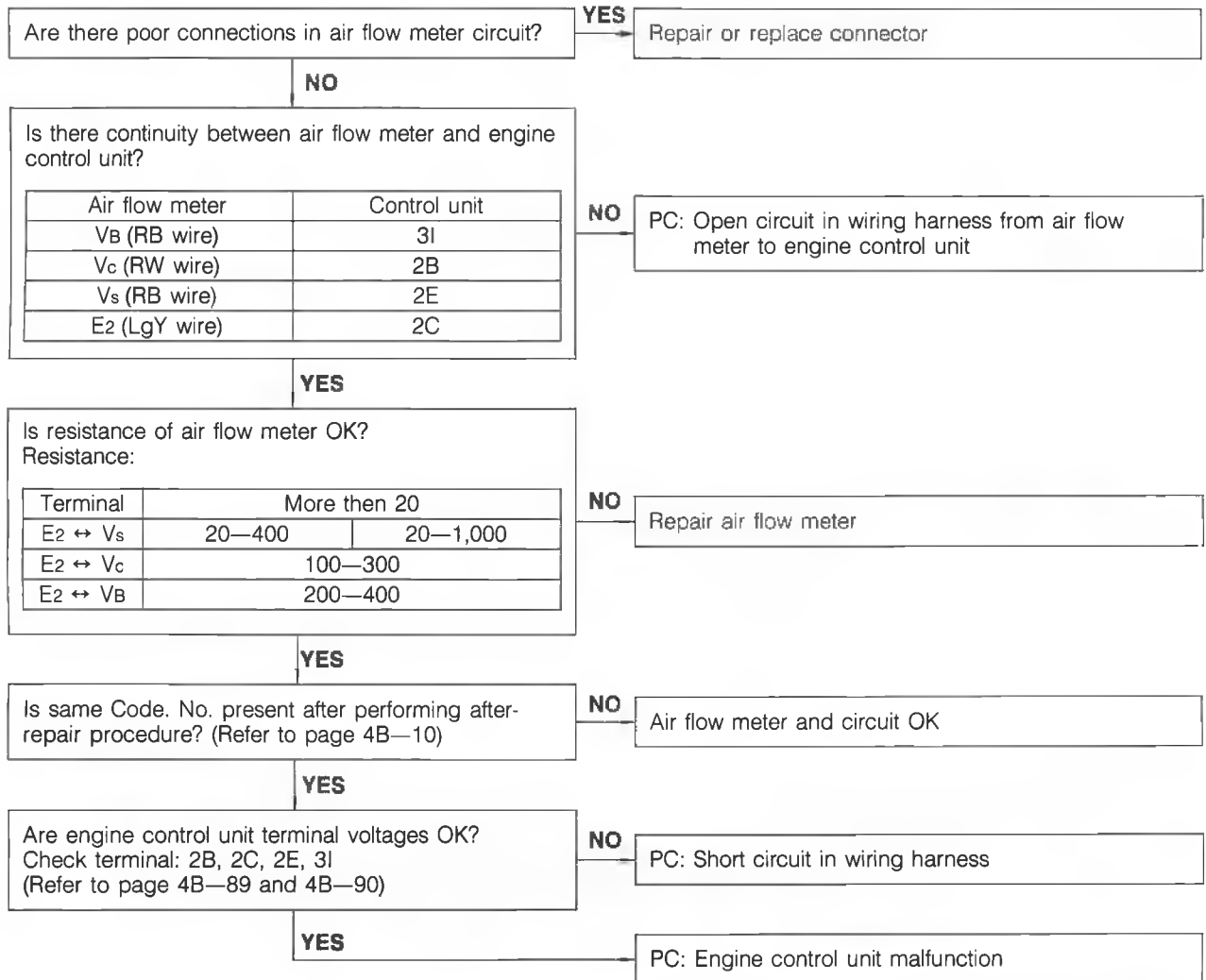


76G04B-009



## Code No. 08 (Air flow meter)

**PC: Possible Cause**

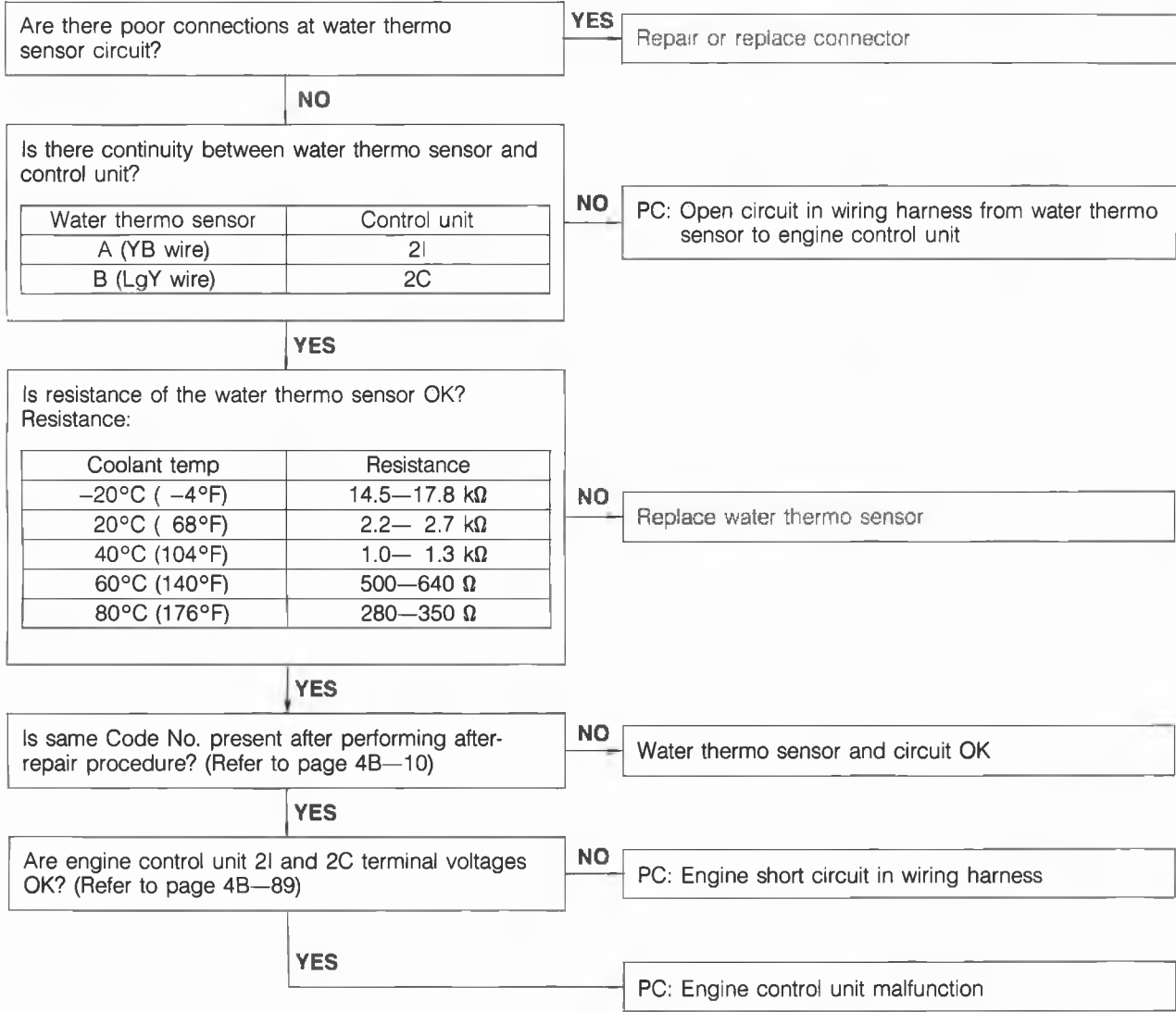


76G04B-010

# 4B TROUBLESHOOTING WITH SST

## Code No. 09 (Water thermo sensor)

PC: Possible Cause



76G04B-011

## Code No. 10 (Intake air thermo sensor)

**PC: Possible Cause**

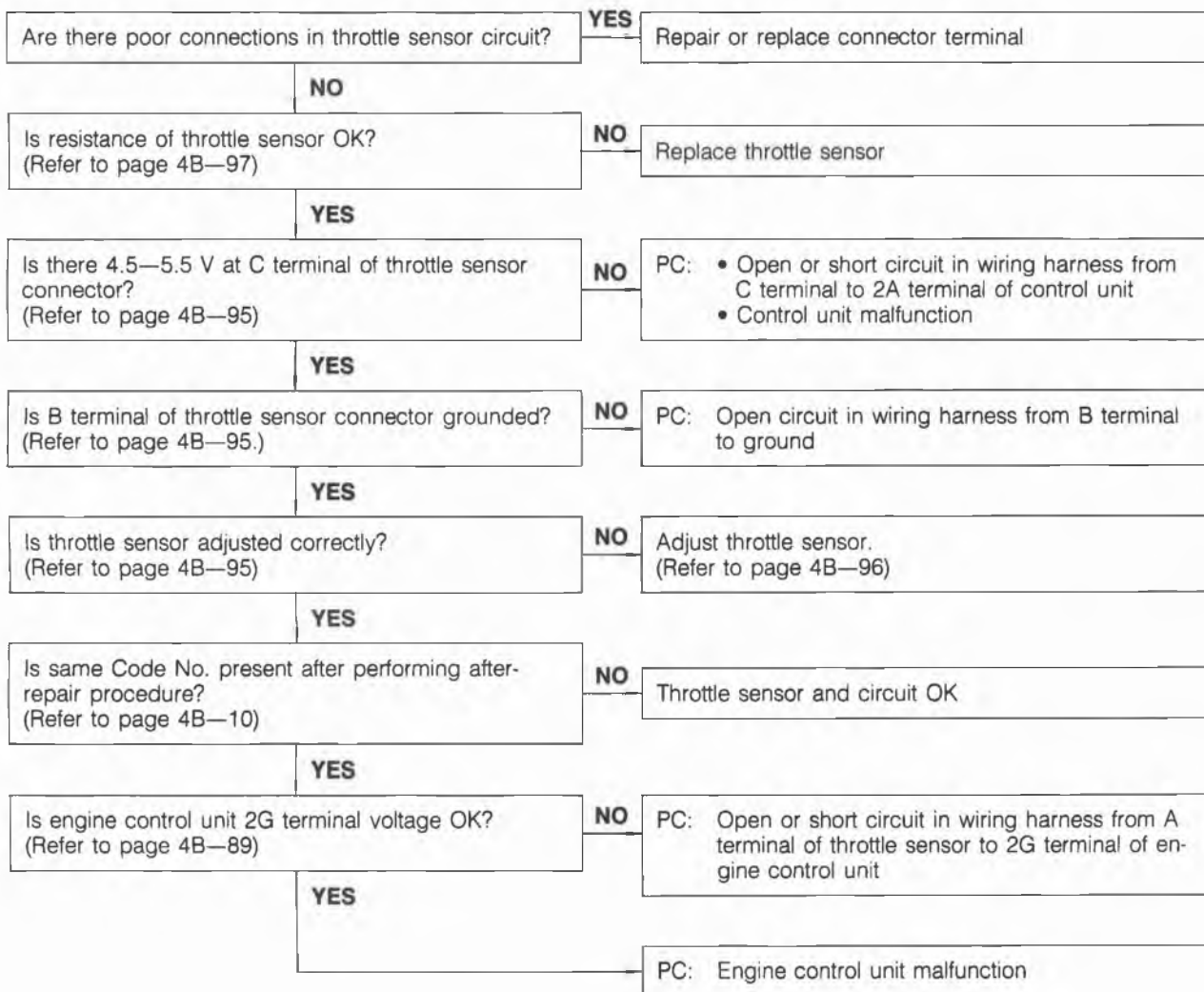
Are there poor connections in air flow meter circuit?	<b>YES</b>	Repair or replace connector						
<b>NO</b>								
Is there continuity between intake air thermo sensor (in air flow meter) and engine control unit?								
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Intake air thermo sensor (in air flow meter)</th> <th style="width: 50%;">Control unit</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">THA (R wire)</td> <td style="text-align: center;">2J</td> </tr> <tr> <td style="text-align: center;">E2 (LgY wire)</td> <td style="text-align: center;">2C</td> </tr> </tbody> </table>	Intake air thermo sensor (in air flow meter)	Control unit	THA (R wire)	2J	E2 (LgY wire)	2C	<b>NO</b>	PC: Open circuit in wiring harness from intake air thermo sensor (in air flow meter) to engine control unit
Intake air thermo sensor (in air flow meter)	Control unit							
THA (R wire)	2J							
E2 (LgY wire)	2C							
<b>YES</b>								
Is resistance of intake air thermo sensor (in air flow meter) OK? Resistance:								
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Terminal</th> <th style="width: 80%;">Resistance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">E2 ↔ THA</td> <td>                     -20°C ( -4°F) : 13.6—18.4 kΩ                      20°C ( 68°F) : 2.21— 2.69 kΩ                      60°C (140°F) : 493— 667 Ω                 </td> </tr> </tbody> </table>	Terminal	Resistance	E2 ↔ THA	-20°C ( -4°F) : 13.6—18.4 kΩ 20°C ( 68°F) : 2.21— 2.69 kΩ 60°C (140°F) : 493— 667 Ω	<b>NO</b>	Replace air flow meter		
Terminal	Resistance							
E2 ↔ THA	-20°C ( -4°F) : 13.6—18.4 kΩ 20°C ( 68°F) : 2.21— 2.69 kΩ 60°C (140°F) : 493— 667 Ω							
<b>YES</b>								
Is same Code No. present after performing after-repair procedure? (Refer to page 4B—10)								
		<b>NO</b>	Intake air thermo sensor and circuit OK					
<b>YES</b>								
Are engine control unit 2J and 2C terminal voltages OK? (Refer to page 4B—89)								
		<b>NO</b>	PC: Short circuit in wiring harness					
<b>YES</b>								
		<b>YES</b>	PC: Engine control unit malfunction					

76G04B-012

# 4B TROUBLESHOOTING WITH SST

## Code No. 12 (Throttle sensor)

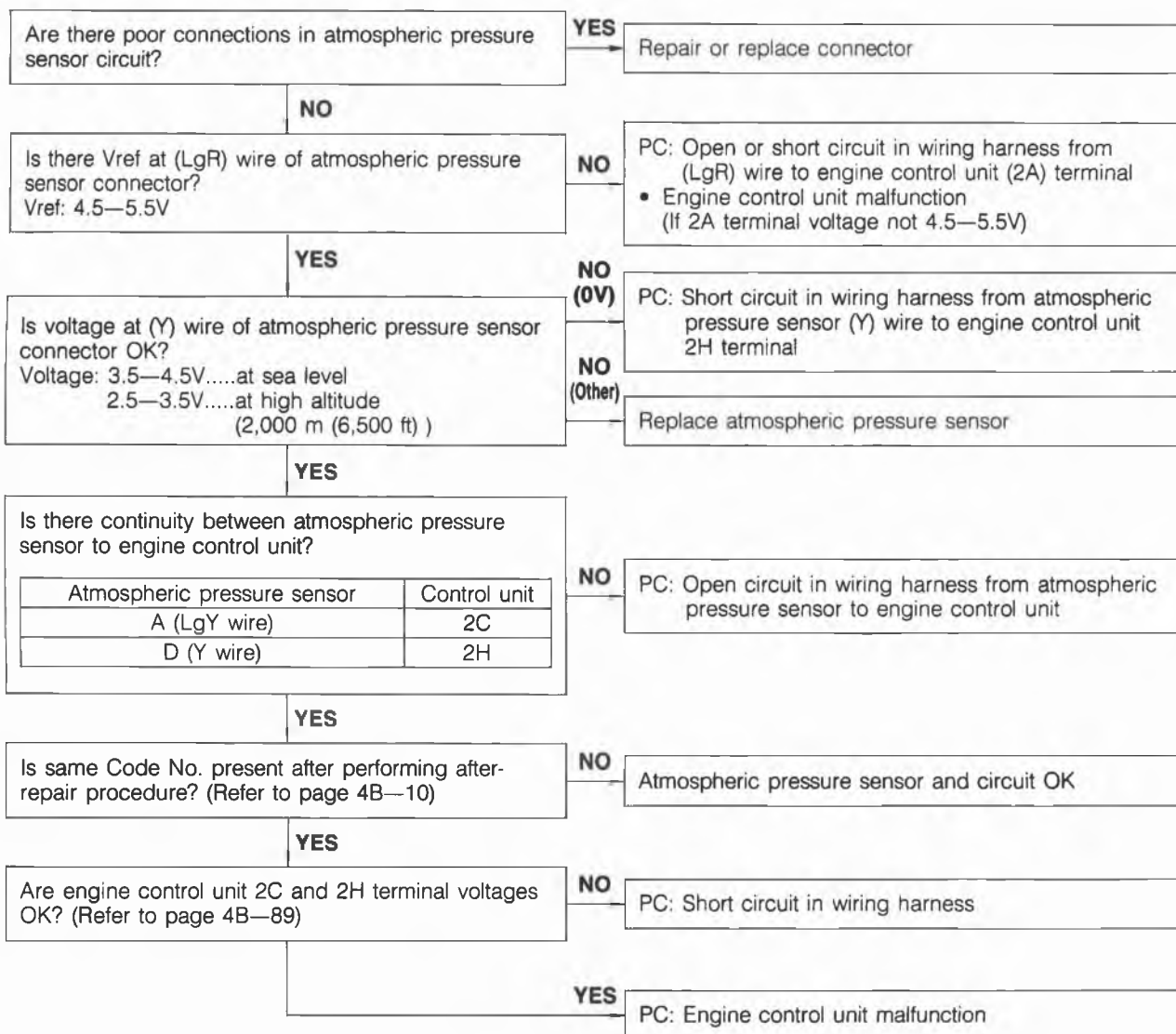
### PC: Possible cause



76G04B-013

## Code No. 14 (Atmospheric pressure sensor)

**PC: Possible cause**



76G04B-014

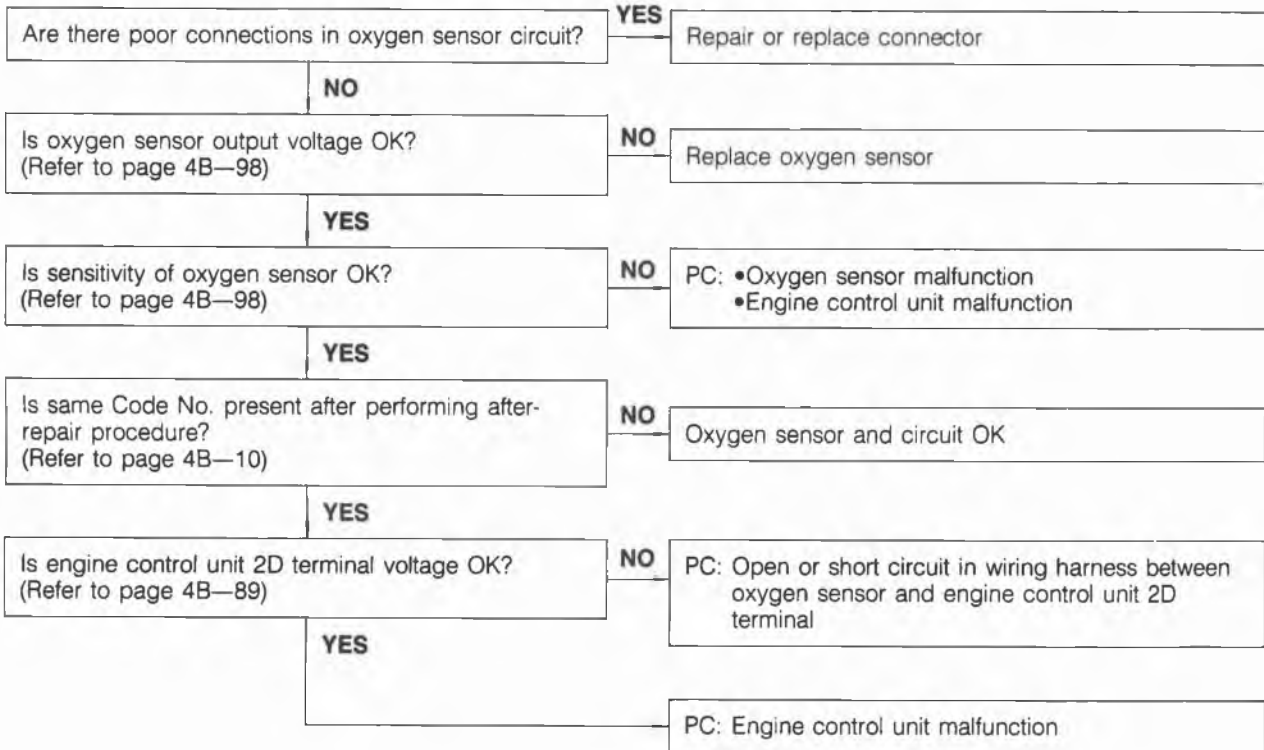
# 4B TROUBLESHOOTING WITH SST

Code No. 15 (Oxygen sensor)

PC: Possible Cause

**Note**

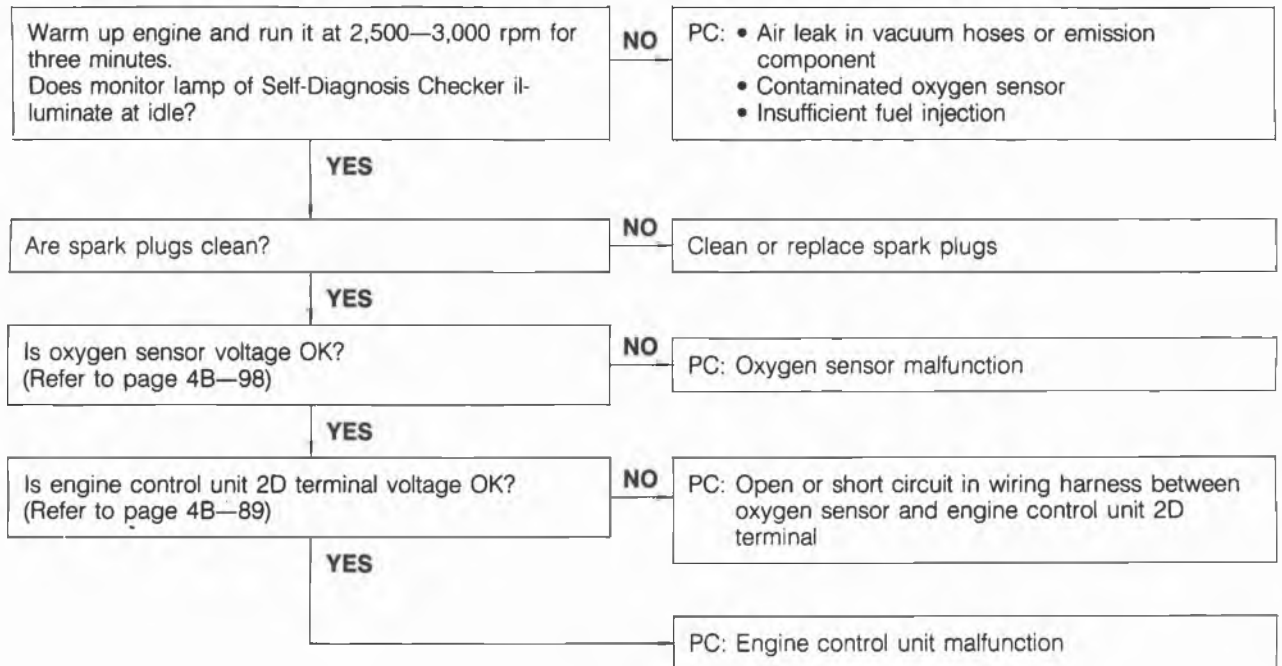
When Codes No.15 and 17 are present at the same time, first perform the checking procedure for Code No.17. (Refer to page 4B—21.)



76G04B-015

## Code No. 17 (Feedback system)

**PC: Possible Cause**

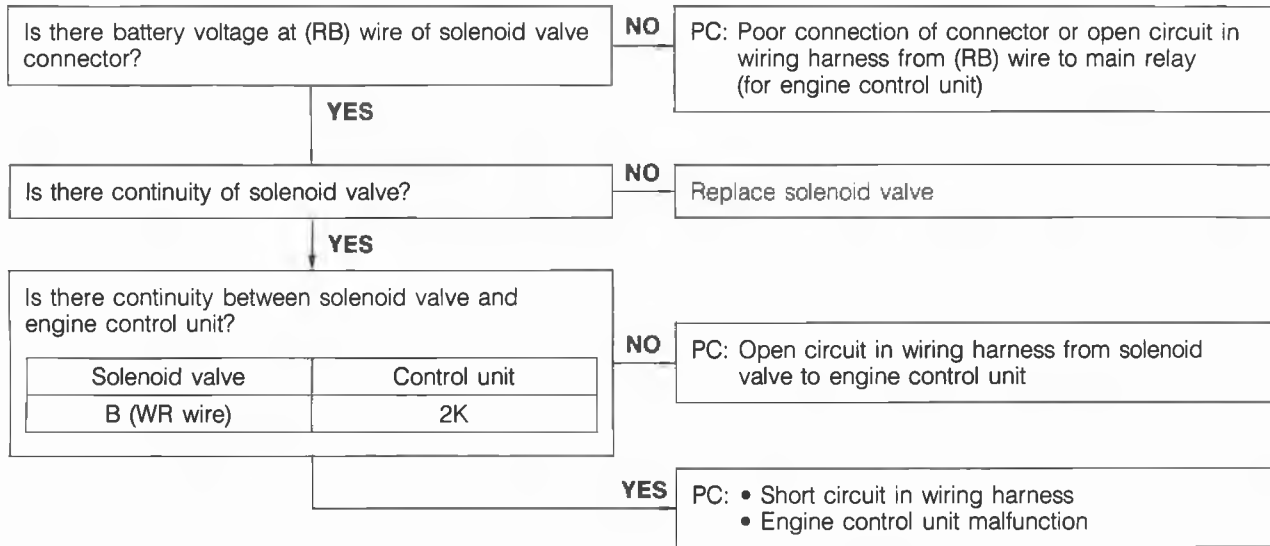


76G04B-016

# 4B TROUBLESHOOTING WITH SST

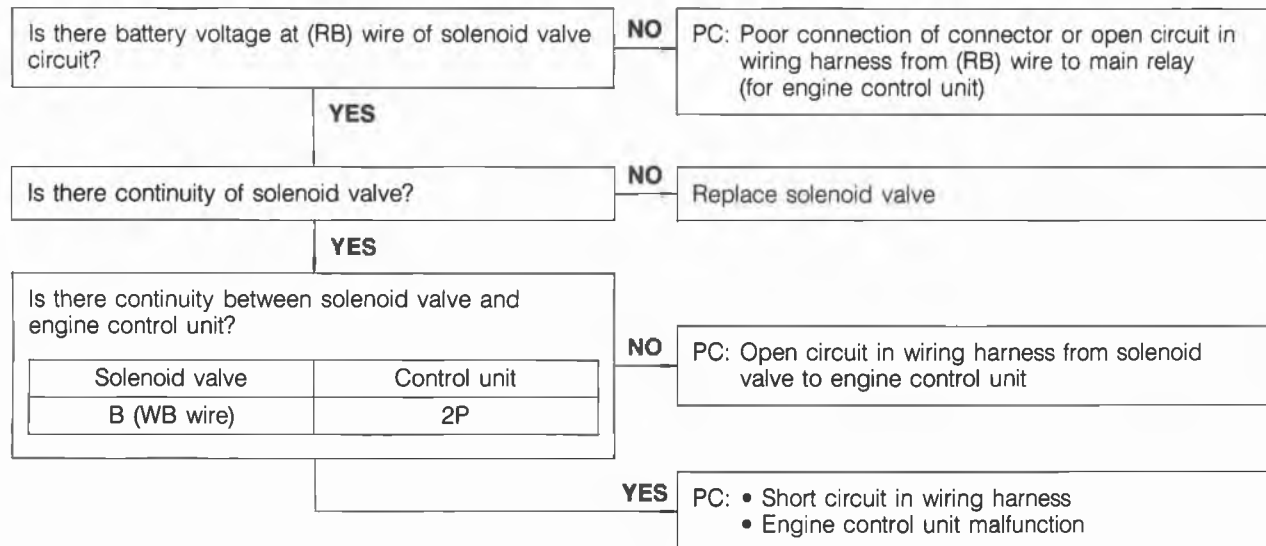
## Code No. 25 (Solenoid valve-Pressure regulator)

### PC: Possible Cause



76G04B-017

## Code No. 26 (Solenoid valve-Purge)

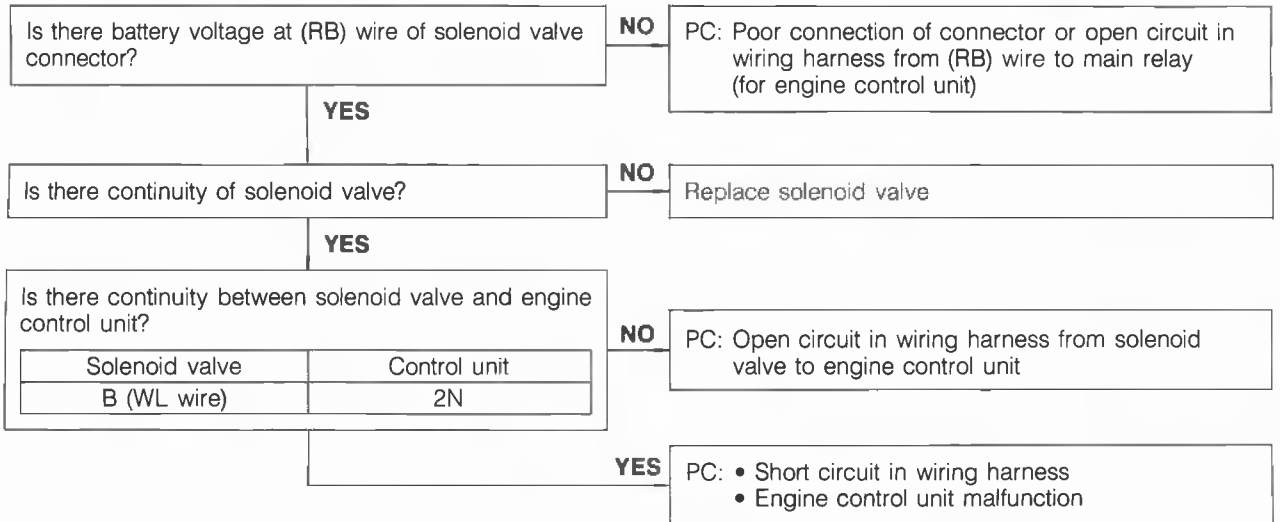


76G04B-018



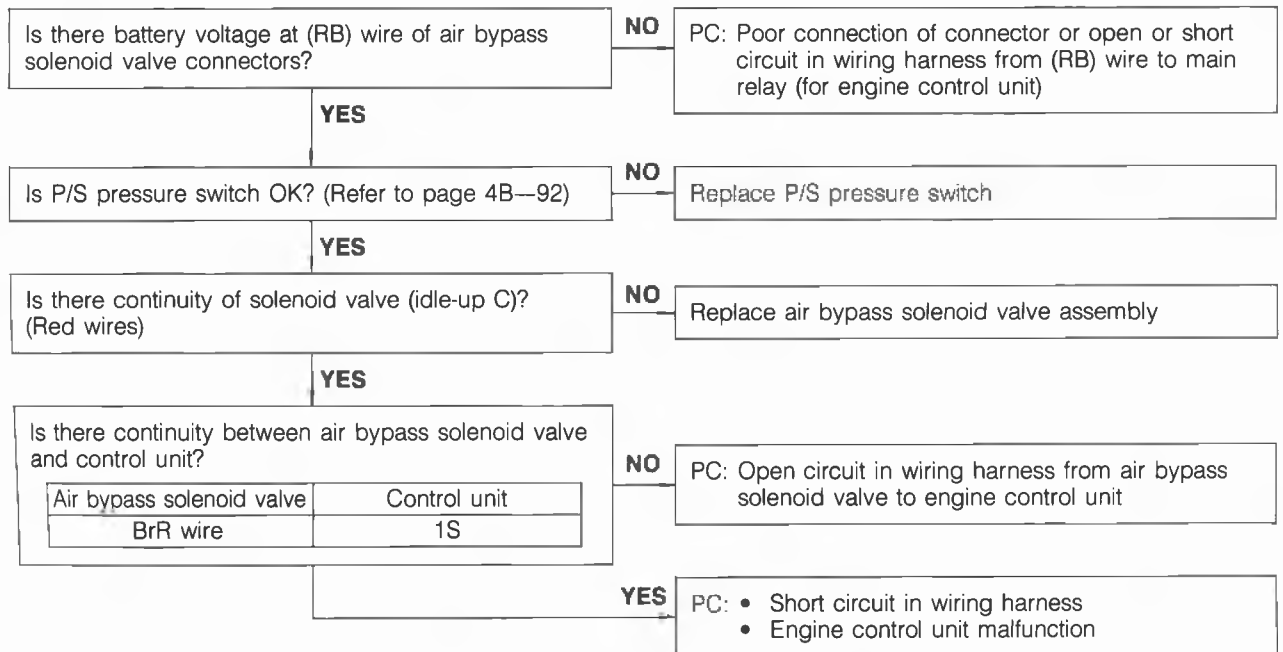
## Code No. 28 (Solenoid valve—EGR)

**PC: Possible Cause**



76G04B-019

## Code No. 34 (Air bypass solenoid valve—Idle-up C)

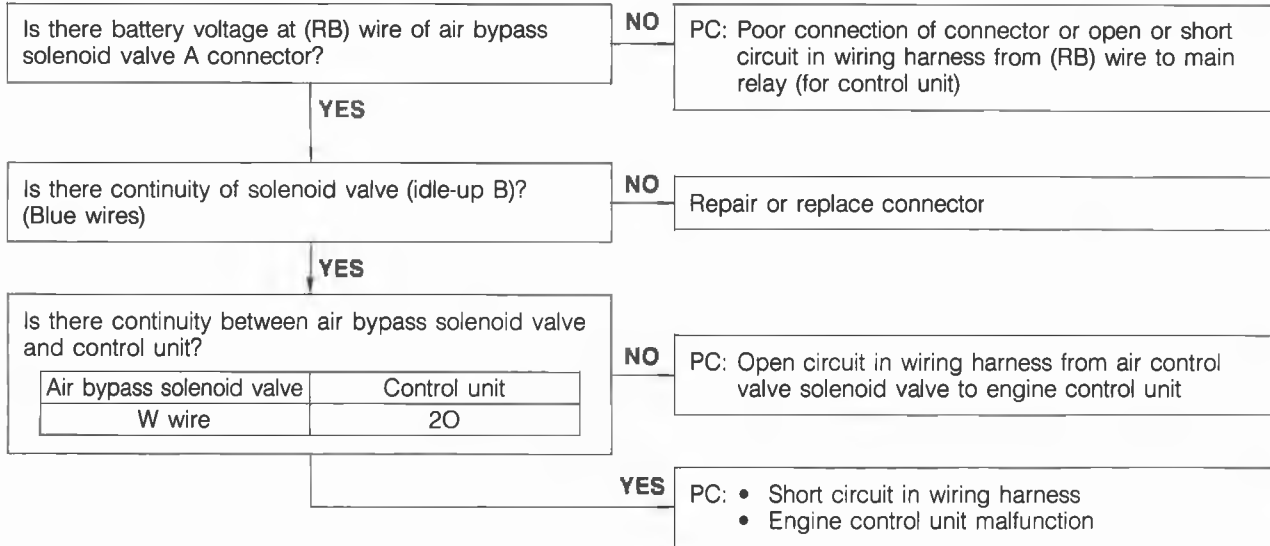


76G04B-020

# 4B TROUBLESHOOTING WITH SST

## No. 35 Code (Air bypass solenoid valve—Idle-up B)

PC: Possible Cause



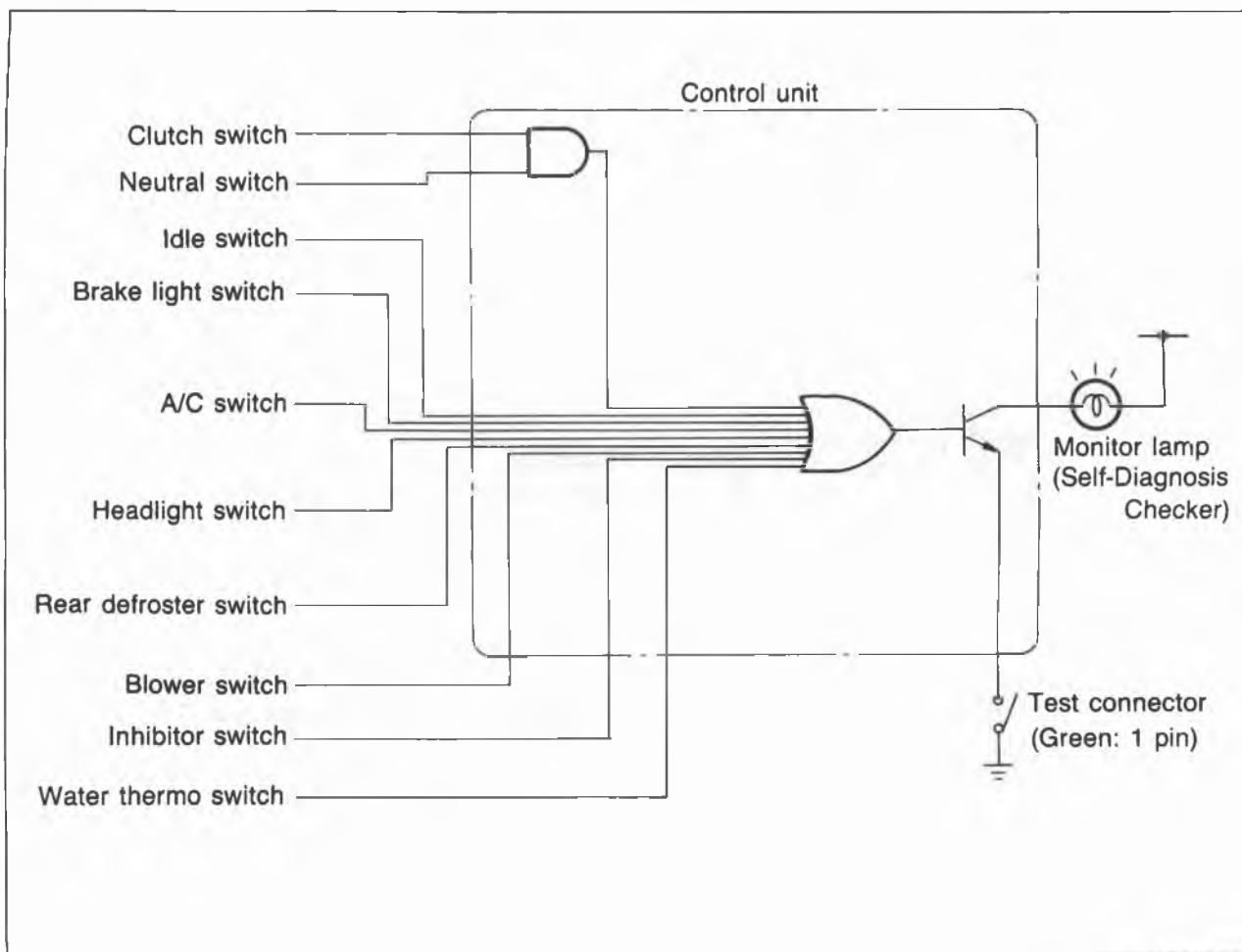
76G04B-021

## SWITCH MONITOR FUNCTION

Individual switches can be monitored by the SST.

**Note**

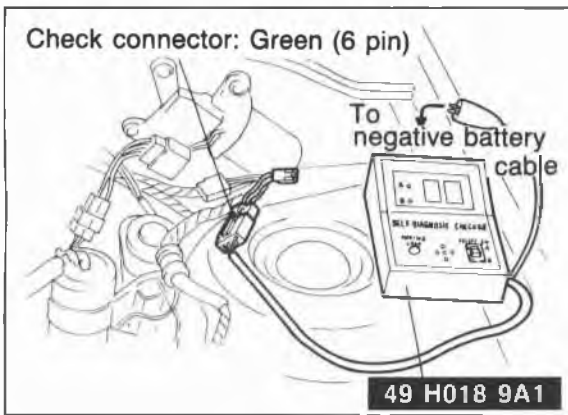
**The test connector must be grounded and the ignition switch ON (engine stopped).**



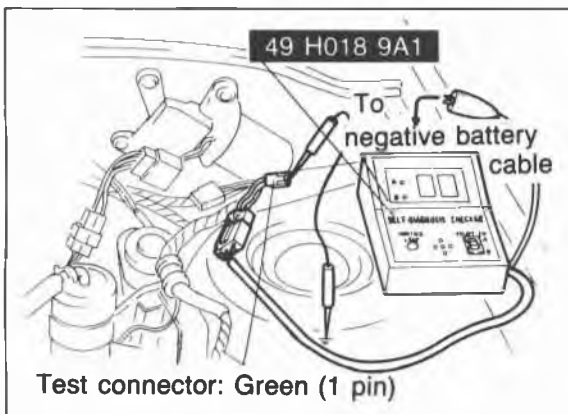
76G04B-022

Switch	Self-Diagnosis Checker (Monitor lamp)		Remarks
	Light ON	Light OFF	
Clutch switch	Pedal released	Pedal depressed	Gear: 1N
Neutral switch	In gear	Neutral	Clutch pedal released
Idle switch	Pedal depressed	Pedal released	—
Brake light switch	Pedal depressed	Pedal released	—
A/C switch	ON	OFF	Blower motor position: "1" position
Headlight switch	ON	OFF	—
Rear defroster switch	ON	OFF	—
Blower switch	ON	OFF	Blower motor position: "3" or "4" position
Inhibitor switch	D, 1, 2 and R range	P and N range	—
Water thermo switch (Electrical fan)	Terminal disconnected	Terminal connected	While fan not operating

# 4B SWITCH MONITOR FUNCTION



86U04A-034



76G04B-023

## INSPECTION PROCEDURE

1. Warm up the engine to normal operating temperature and stop it.
2. Connect the **SST** to the check connector (Green, 6-pin) and the negative battery terminal.
3. Connect a jumper wire between the test connector (Green, 1-pin) and a ground.
4. Turn the ignition switch ON. Check if monitor lamp illuminates when each switch is made to function as described below.

### Caution

- a) If any one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

### Note

The Digital Code Checker (49 G018 9A0) with the Signal Adapter (49 9200 180) may be used in place of the Self-Diagnosis Checker.

## Procedure

Set conditions to deactivate each switch

- All accessories OFF
- Transmission in neutral
- All pedals released

Verify that monitor lamp does not illuminate

YES

Check each switch as described

NO

- Check each switch and related wiring harness
- Clutch and Neutral switch :Refer to page 4B—91
  - Throttle sensor (Idle switch) :Refer to page 4B—95
  - Brake light switch :Refer to page 4B—91
  - A/C switch :Refer to section 15
  - Headlight switch :Refer to section 15
  - Rear defroster switch :Refer to section 15
  - Blower switch :Refer to section 15
  - Inhibitor switch :Refer to page 4B—92
  - Water thermo switch :Refer to section 3A

76G04B-024

## Neutral and Clutch switch (MTX)

Shift transmission into gear  
Check that monitor lamp illuminates with clutch pedal released

NO

- PC:
- Neutral or clutch switch malfunction (Refer to page 4B—91)
  - Open circuit in related wiring harness
  - Engine control unit (1V) terminal malfunction (Refer to page 4B—89)

YES

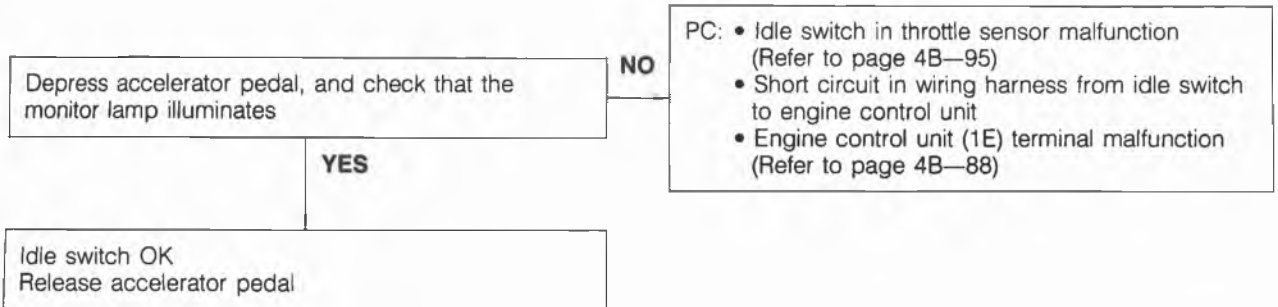
Depress clutch pedal  
Check that monitor lamp does not illuminate  
Return transmission to neutral

NO

- PC:
- Clutch switch malfunction (Refer to page 4B—91)

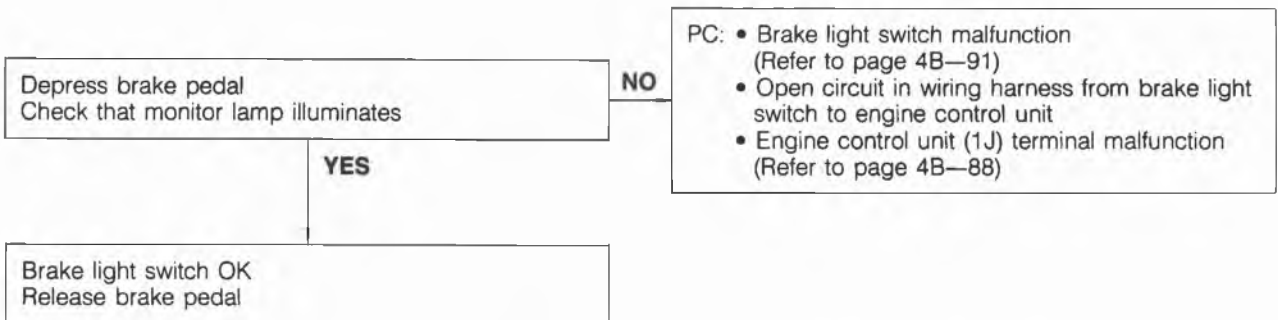
76G04B-025

## Idle switch



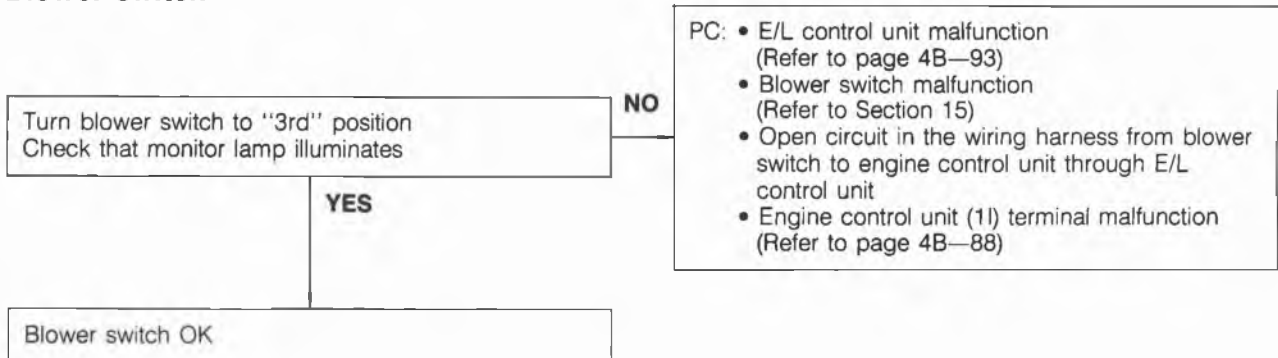
76G04B-026

## Brake light switch



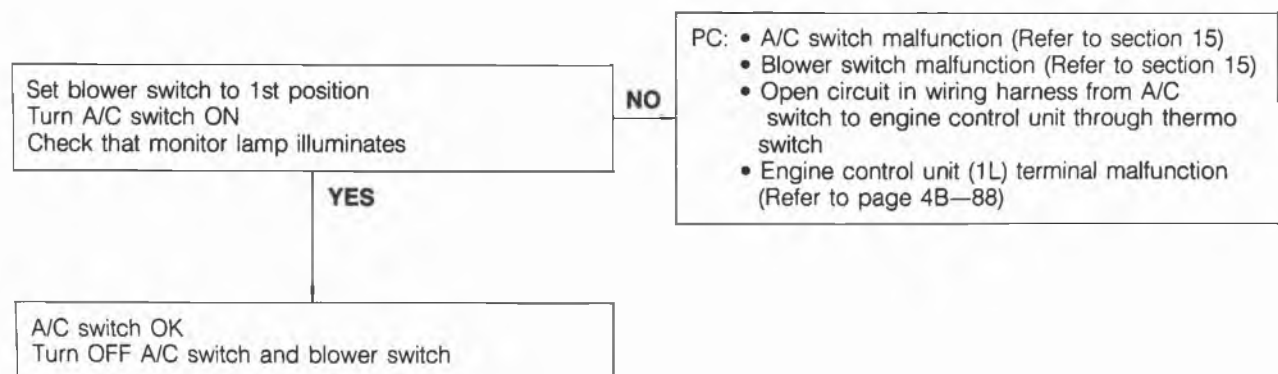
76G04B-027

## Blower switch



76G04B-028

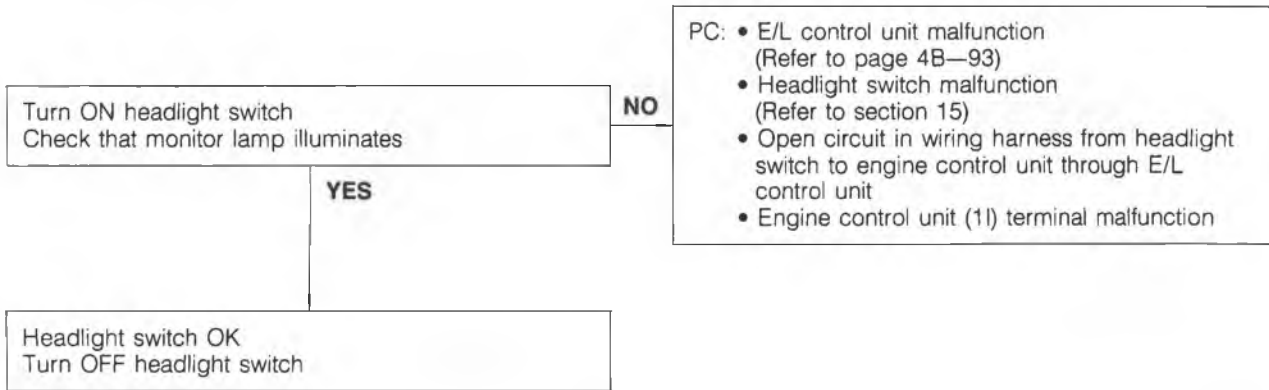
## A/C switch



76G04B-029

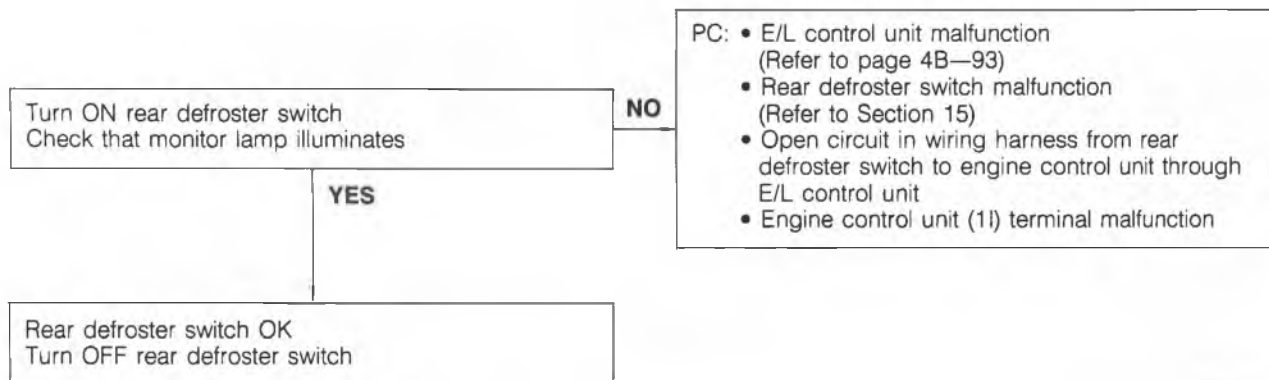
# 4B SWITCH MONITOR FUNCTION

## Headlight switch



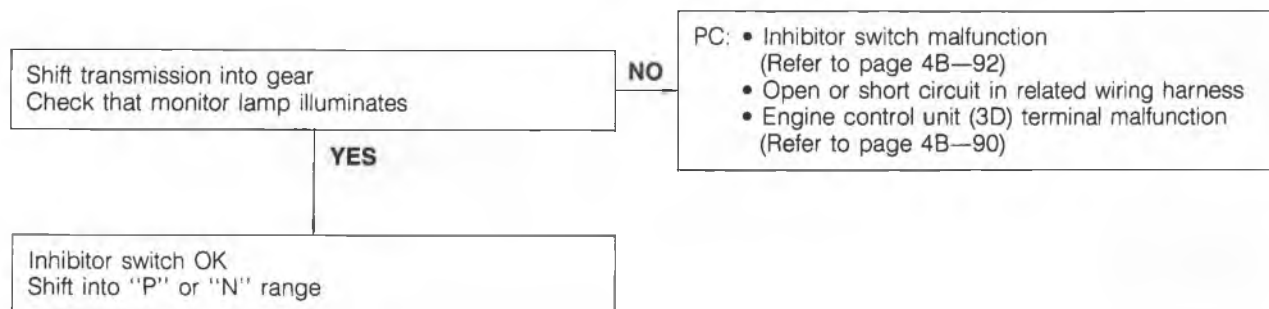
76G04B-030

## Rear defroster switch



76G04B-031

## Inhibitor switch

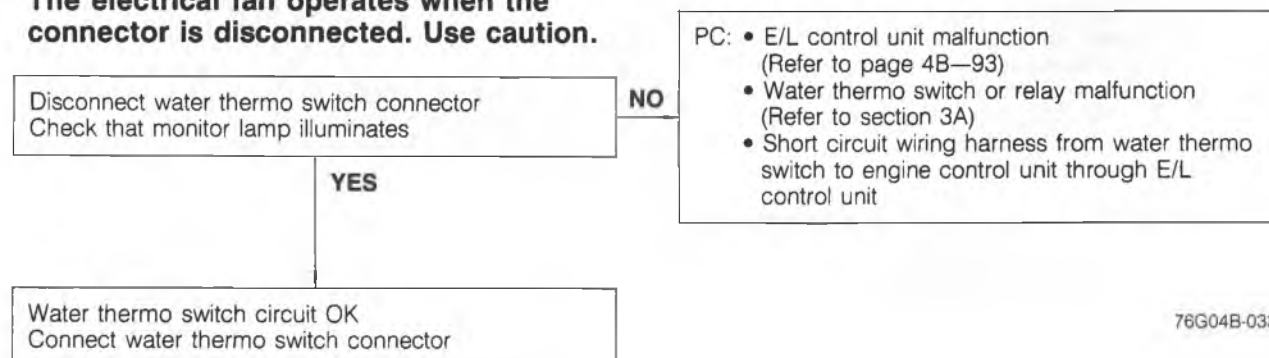


76G04B-032

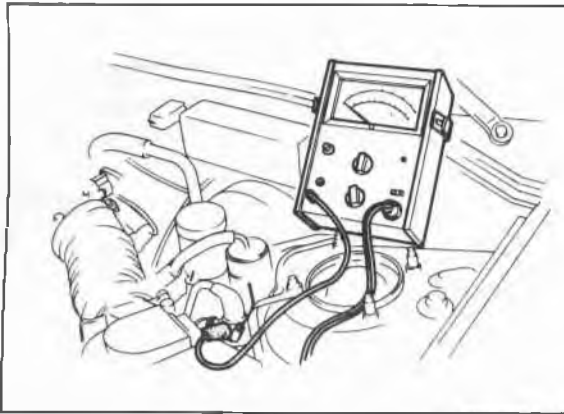
## Water thermo switch circuit (not included in switch inspection)

### Warning

**The electrical fan operates when the connector is disconnected. Use caution.**



76G04B-033



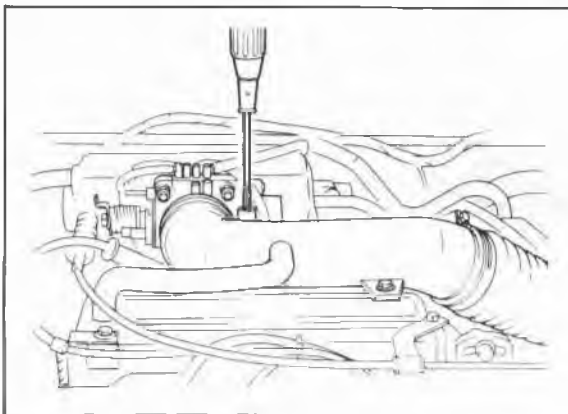
76G04B-034

## IDLE ADJUSTMENT

### IDLE SPEED

#### Preparation

- 1) Check the condition of the engine (plugs, leaks in hoses, etc.).
- 2) Make sure all accessories are OFF.
- 3) Warm up the engine and run it for **three minutes at 2,500—3,000 rpm** in neutral.
- 4) Check the initial ignition timing and adjust if necessary.



76G04B-035

### Inspection and Adjustment

#### Caution

**Disconnect the air bypass solenoid connector when checking and adjusting the idle speed.**

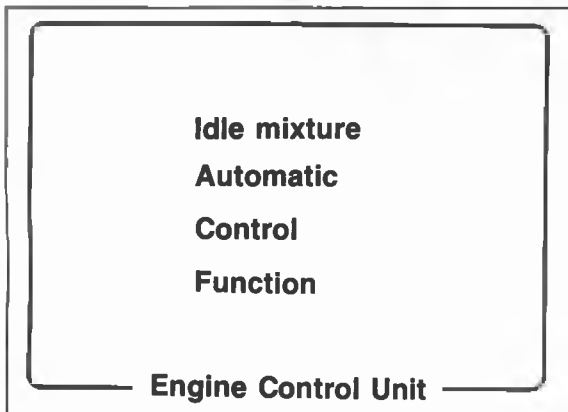
1. Check that the idle speed is within specification.

#### Specification:

**MTX—800  $\pm$ 50 rpm**

**ATX—900  $\pm$ 50 rpm (P range)**

2. If the idle speed is not within specification, remove the blind cap from the throttle body and adjust it by turning the air adjust screw.



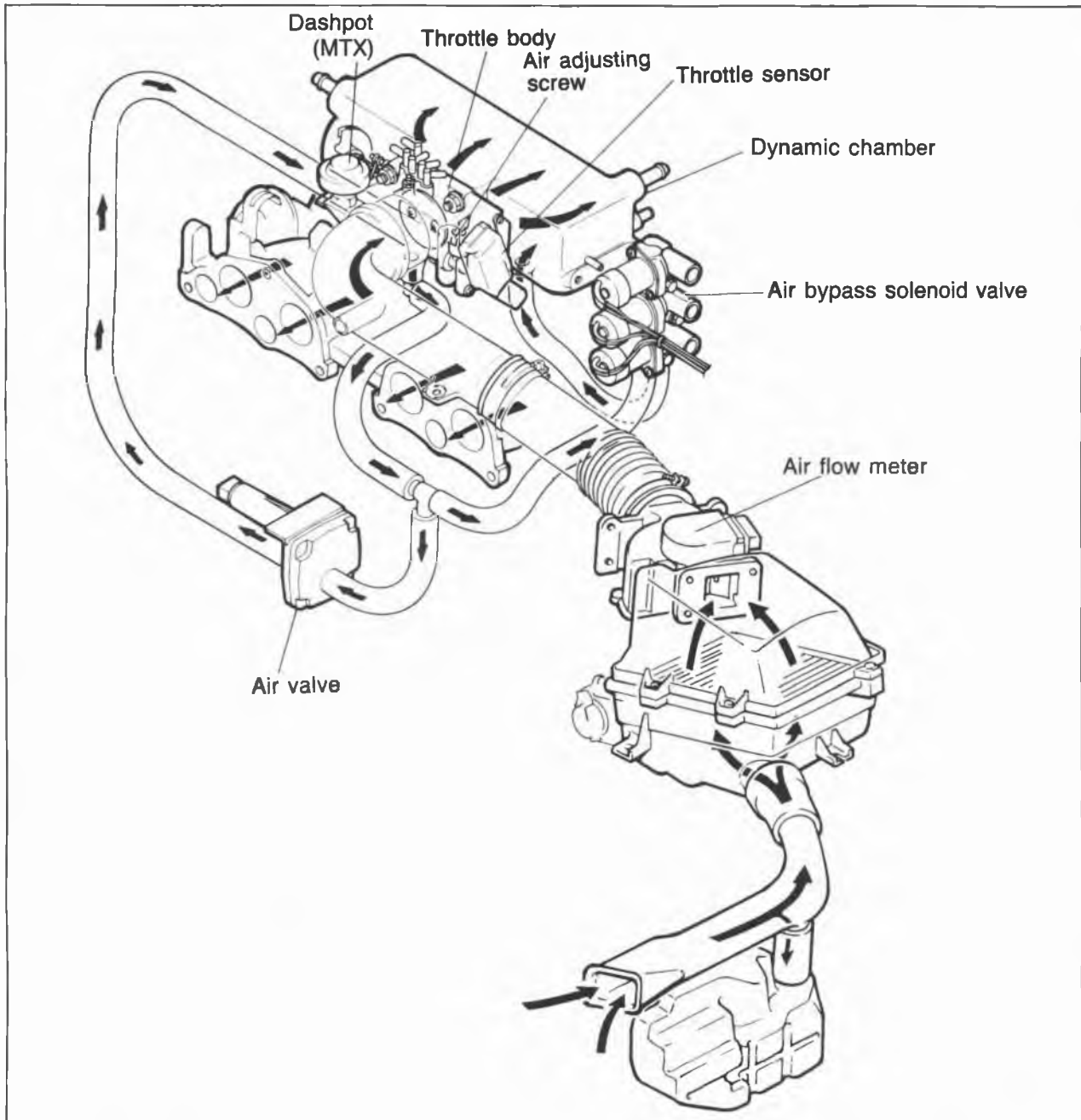
86U04A-049

### IDLE MIXTURE

**Because an automatic compensation function for air/fuel mixture is built into the engine control unit, it is not necessary to check and adjust the idle mixture.**

# 4B INTAKE AIR SYSTEM

## INTAKE AIR SYSTEM



76G04B-036

This system controls the air required by the engine for operation. The system consists of the air duct, air cleaner, air flow meter, throttle body, dynamic chamber, and intake manifold.

### COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Air cleaner</b>	Filters air into throttle body	
<b>Air flow meter</b>	Detects amount of intake air; sends signal to engine control unit	Intake air thermo sensor and fuel pump switch are integrated
<b>Throttle body</b>	Controls intake air quantity	Integrated throttle sensor and idle switch

76G04B-037

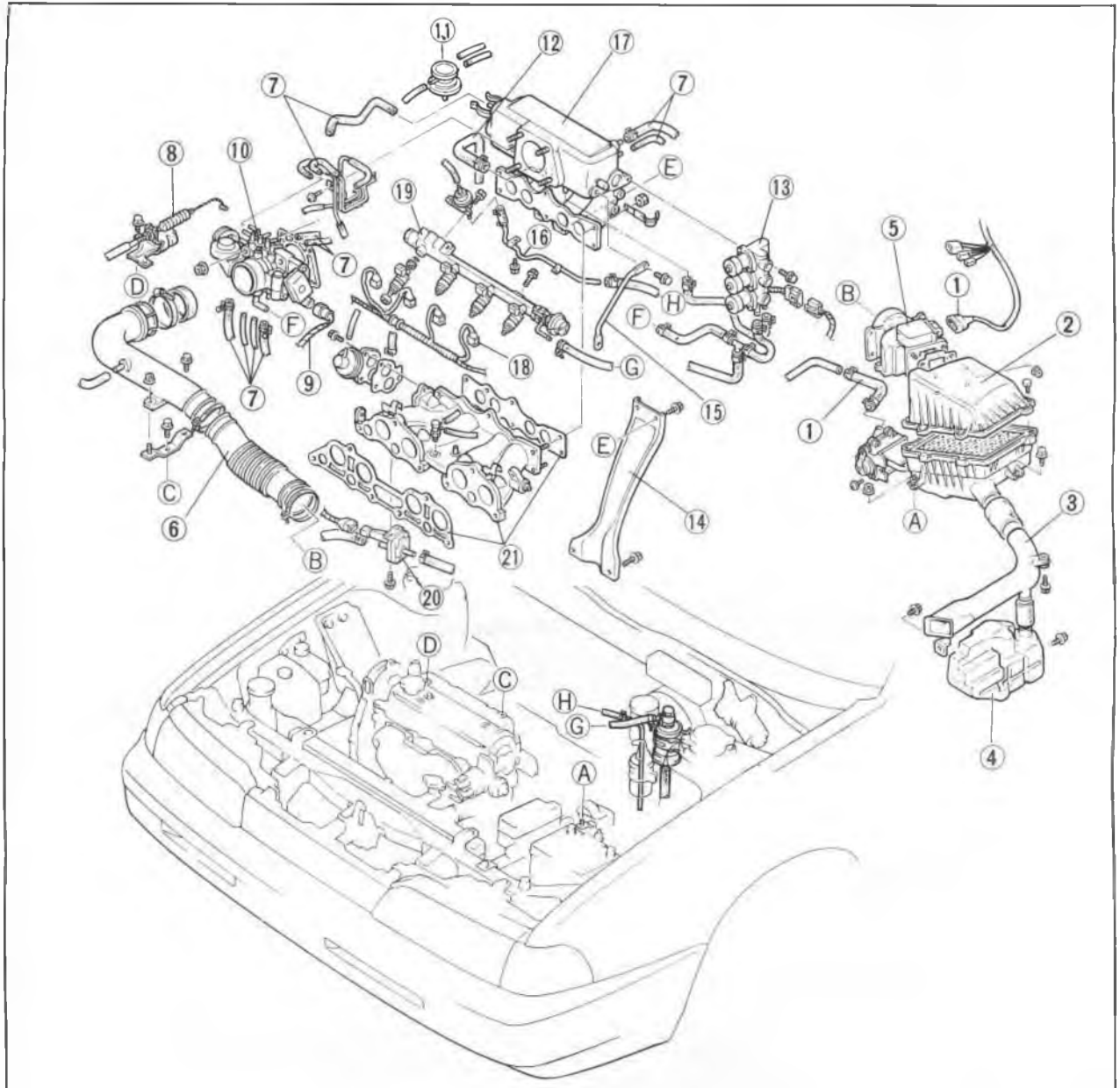


## REMOVAL

### Caution

Before removing the following parts, release the fuel pressure from fuel system to reduce the possibility of injury or fire. (Refer to page 4B—45.)

Remove in the sequence shown in the figure.



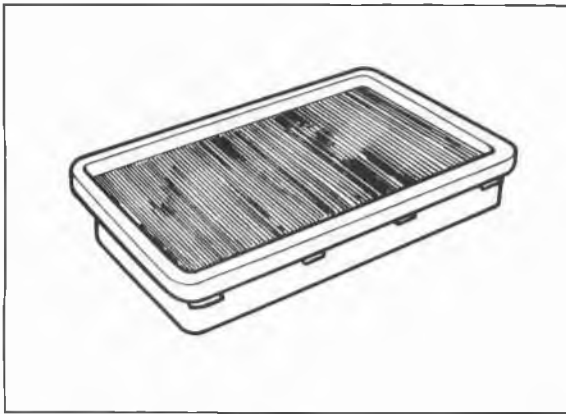
76G04B-038

1. Air flow meter connector and secondary air hose
2. Air cleaner
3. Air duct
4. Resonance chamber
5. Air flow meter
6. Air hose

7. Vacuum hoses, air hoses, and water hoses
8. Accelerator cable
9. Throttle sensor connector
10. Throttle body
11. EGR modulator valve
12. Air hose
13. Air bypass solenoid valve

14. Intake manifold bracket
15. Dynamic chamber bracket
16. Fuel return pipe
17. Dynamic chamber
18. Injector connector
19. Delivery pipe assembly
20. Air valve
21. Intake manifold and gaskets

## 4B INTAKE AIR SYSTEM



69G04A-059

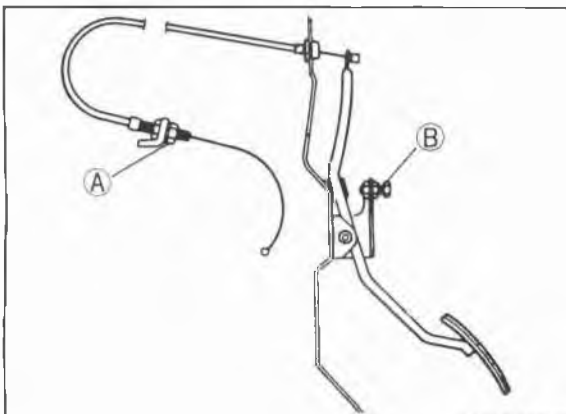
### PARTS INSPECTION

#### Air Cleaner Element

1. Check the condition of the air cleaner element.
2. Replace, if necessary.

#### Caution

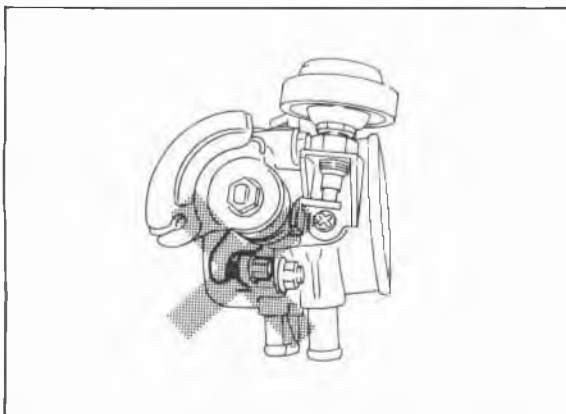
**Do not use the compressed air to clean the air cleaner element.**



86U04A-053

#### Accelerator Cable

1. Inspect the deflection of the cable. If the deflection is not within **1—3 mm (0.04—0.12 in.)**, adjust by turning nuts A.
2. Depress the accelerator pedal to the floor and confirm that the throttle valve is fully opened. Adjust by turning bolt B if necessary.



79G04D-084

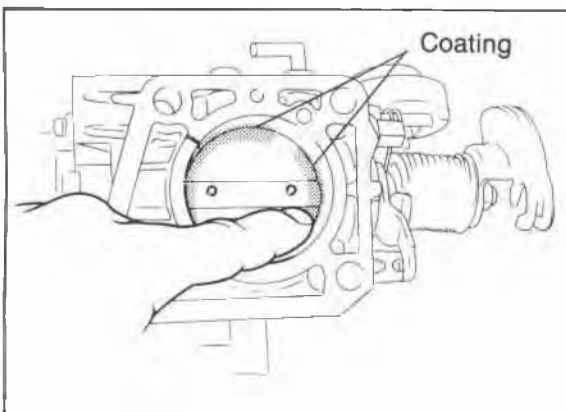
#### Throttle Body

#### Caution

- a) The throttle adjust screw is preset and sealed.

**Do not attempt to adjust it.**

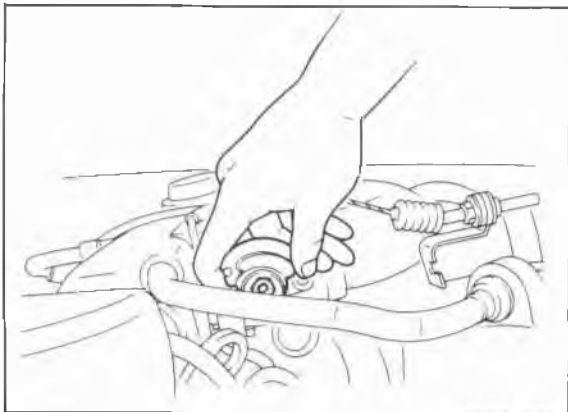
**If there is a malfunction of the throttle adjust screw, lever, or throttle valve, replace the throttle body as an assembly.**



79G04D-085

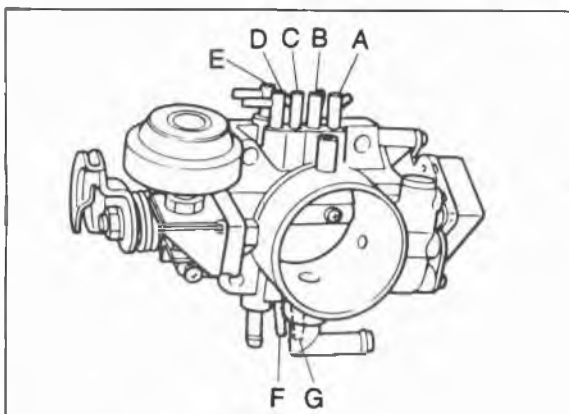
- b) Do not remove the thin sealing coating from the throttle valve or bore.

# INTAKE AIR SYSTEM 4B



76G04B-039

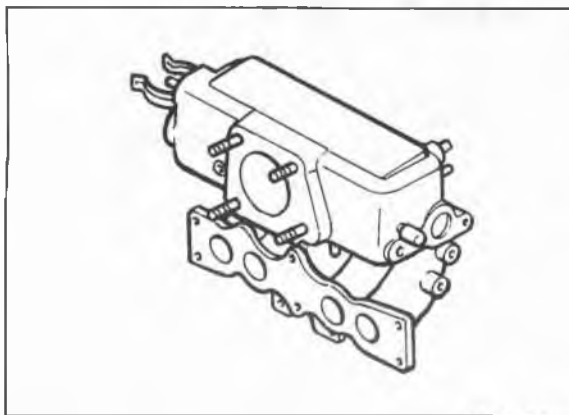
1. Check that the throttle valve moves smoothly when the throttle lever is moved from fully closed to fully open.



76G04B-040

2. Warm up the engine and run at idle.
3. Check the vacuum generated at each port as shown in the following table.

Port (Connected to)	Condition	
	Idle	Other
A (solenoid valve, EGR)	No	Yes
B (distributor, advance)	No	Yes
C (EGR modulator valve)	No	Yes
D (water thermo valve)	No	Yes
E (vacuum switch valve & charcoal canister)	Yes	
F (distributor, retard & air control valve)	Yes	
G (distributor, advance)	Yes	

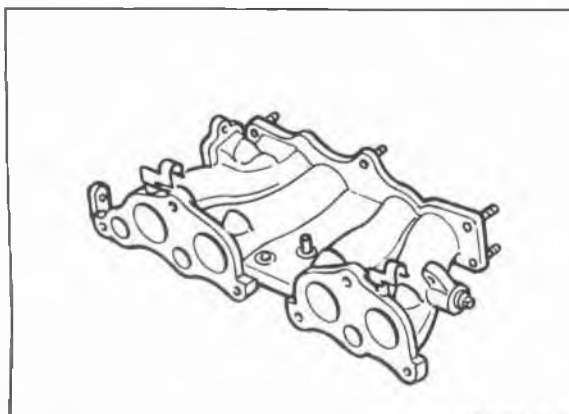


76G04B-041

4. If vacuum is not obtained as in the table, clean the necessary port.

### Dynamic Chamber

1. Visually check the dynamic chamber for damage.
2. Replace, if necessary.



76G04B-042

### Intake Manifold

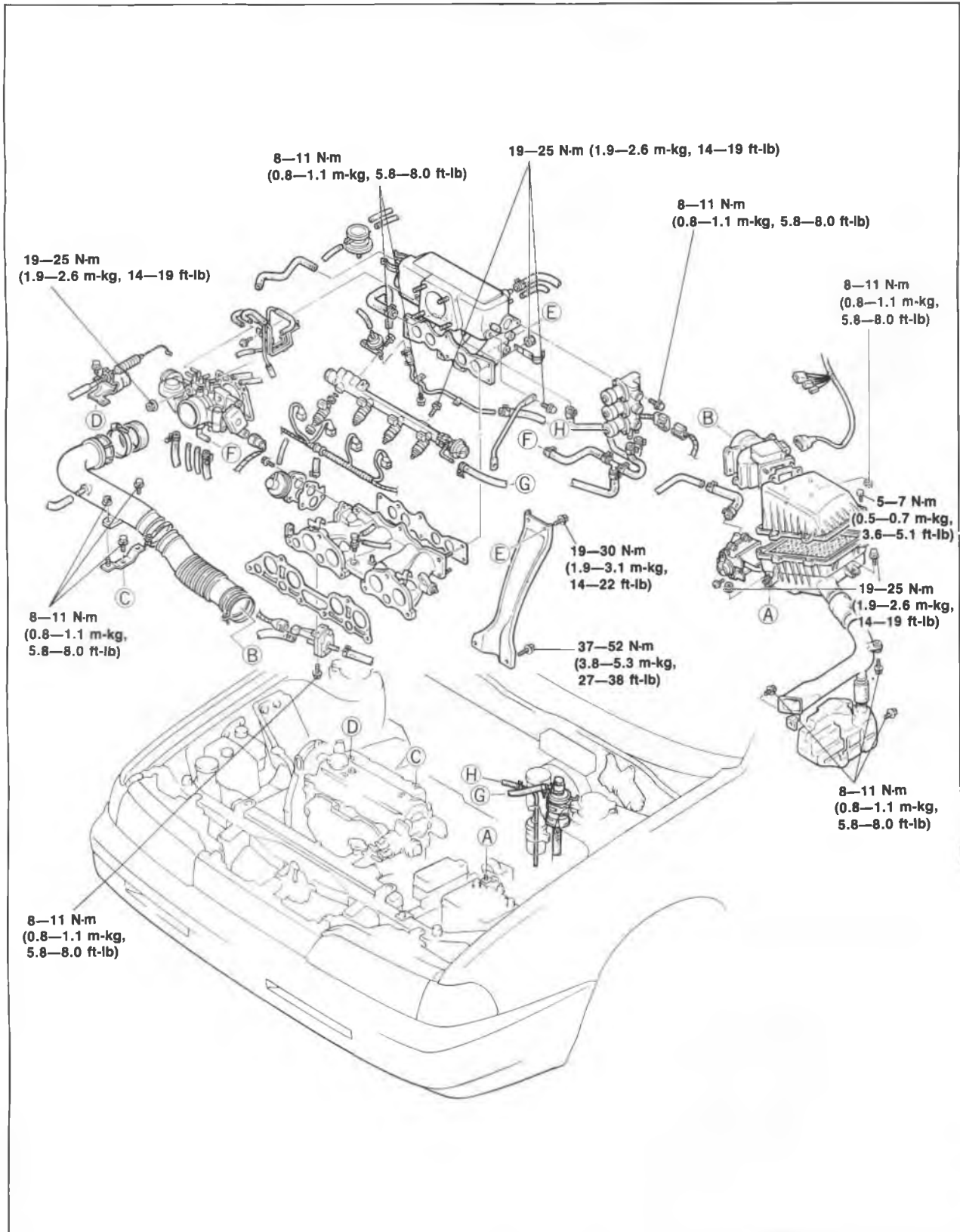
1. Visually check the intake manifold for damage.
2. Replace, if necessary.

# 4B INTAKE AIR SYSTEM

## INSTALLATION

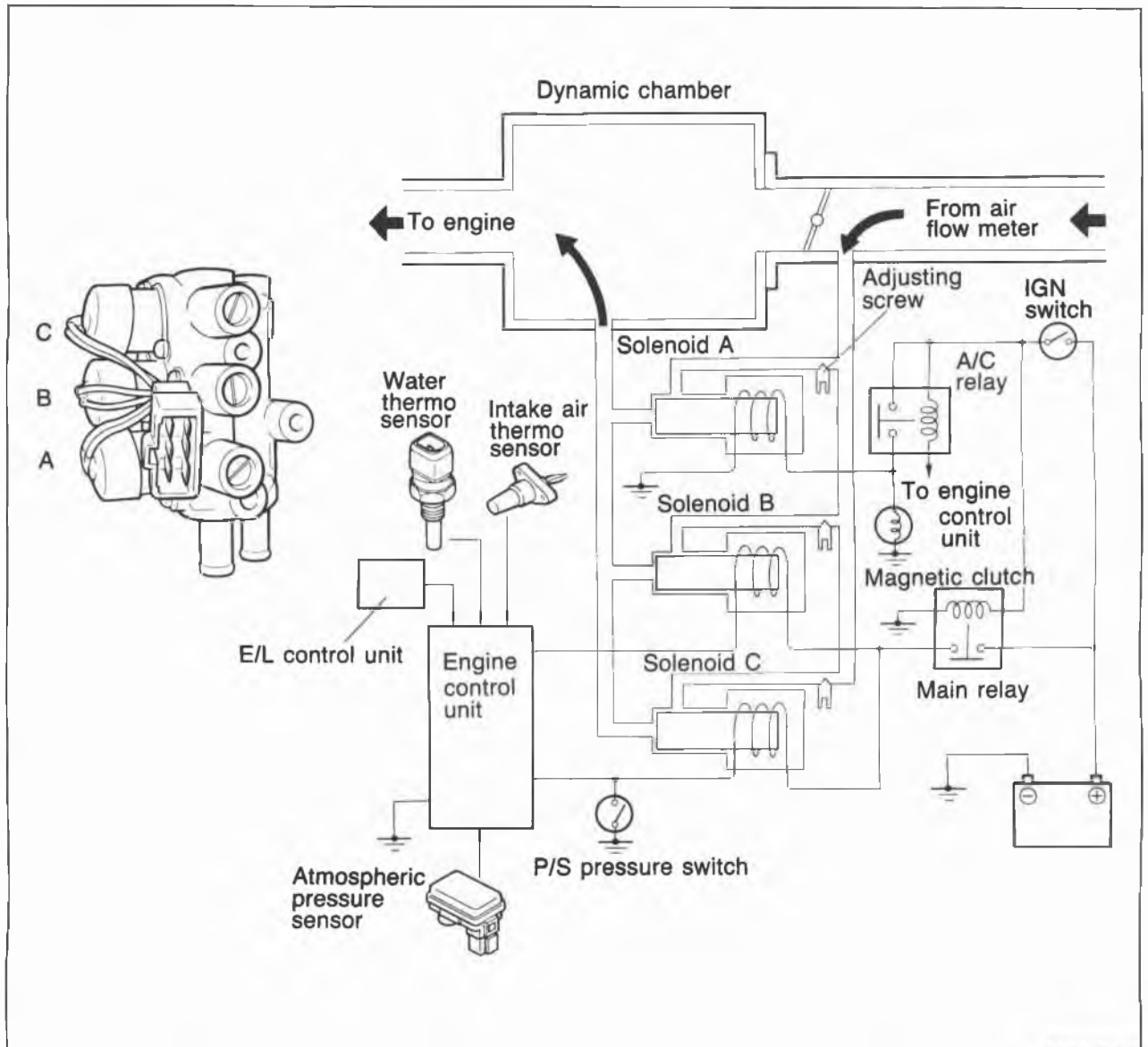
Install in the reverse order of removal.

## Torque Specification



76G04B-125

**IDLE-UP SYSTEM**



76G04B-043

**Air Valve**

This valve is constructed so that the gate valve is opened and closed by means of a bimetal strip and heat coil. It acts as a fast idle mechanism by opening the gate valve to increase intake air by bypassing the throttle valve while engine is cold, therefore engine speed is increased to shorten the warm up period.

**Air Bypass Solenoid Valve**

This valve incorporates three solenoid valves. They operate according to the signal from the engine control unit or A/C switch in order to achieve idling stability and the optimum idle speed. The operating conditions of each solenoid valve are as shown below.

Solenoid valve	Operating condition
A	A/C operated
B	Intake air temp. above 55°C (131°F) or vehicle at above 1,000 m (3,280 ft)
C	P/S operated, E/L applied, intake air temp. above 55°C (131°F), pressure regulator solenoid ON or vehicle at above 1,900 m (6,232 ft)

## 4B IDLE-UP SYSTEM

### COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Air bypass solenoid valve</b>	Controls bypass air amount	Operates A: A/C : ON B: Intake air temp. high or at high altitude C: P/S : ON, E/L applied or hot start
<b>Air valve</b>	When cold, supplies bypass air into dynamic chamber	<ul style="list-style-type: none"><li>• Engine speed increased to shorten warm-up period</li><li>• Bimetal type</li></ul>
<b>Atmospheric pressure sensor</b>	Detects atmospheric pressure; sends signal to engine control unit	
<b>E/L control unit</b>	Detects electrical load applied; sends signal to engine control unit	
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls air bypass solenoid valve	
<b>Intake air thermo sensor</b>	Detects intake air temperature; sends signal to engine control unit	Installed in air flow meter
<b>P/S pressure switch</b>	Detects P/S operation; sends signal to engine control unit	P/S: ON when steering wheel turned right or left

76G04B-044

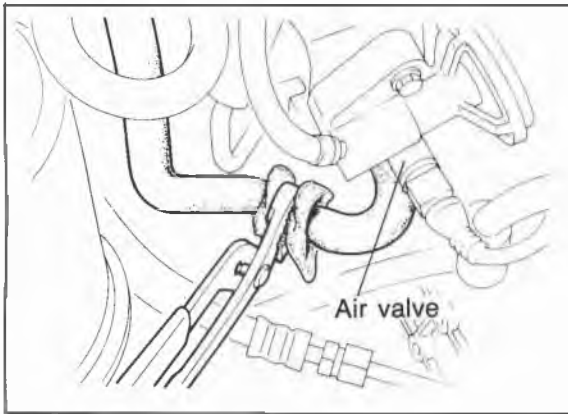
## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensors or switch.

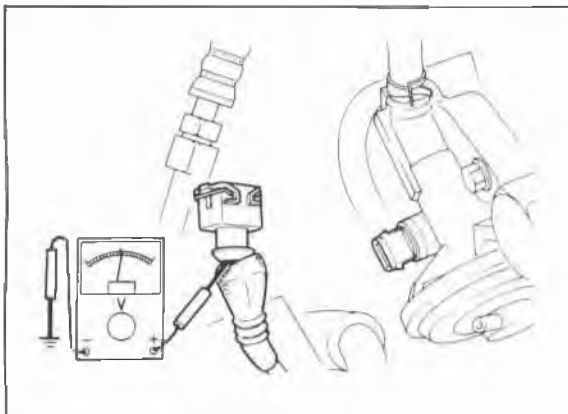
Possible cause		Air valve	Air bypass solenoid valve		Engine control unit terminal	
			Idle-up signal	Adjustment	1S	20
					4B-38	4B-39
Page						
Symptom		4B-38	4B-39	4B-40	4B-89	4B-90
Engine stalls	While warming up	1	2	3	4	5
	After warming up		1	2	3	4
Rough idle	While warming up	1	2	3	4	5
	After warming up		1	2	3	4
High idle speed after warming up		1	2	3	4	5
Runs rough on deceleration			1	2	3	4
Afterburn in exhaust system		1	2	3	4	5
Falls emission test		1	2	3	4	5

76G04B-045

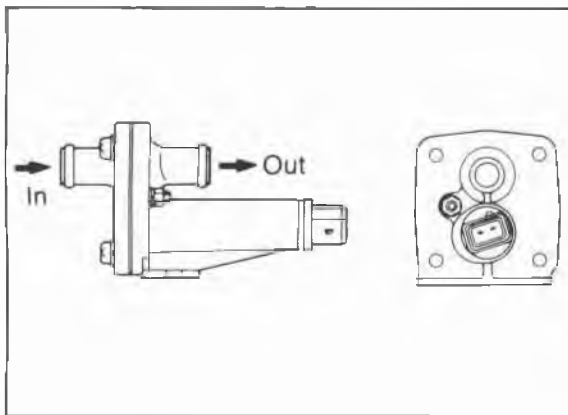
## 4B IDLE-UP SYSTEM



76U04A-120



76G04B-046



76G04B-047

### AIR VALVE

#### Pre-inspection

1. Start the engine and run it at idle.
2. Pinch the bypass air hose and check that the engine rpm drops.

**When engine still cool ..... RPM reduced  
After warming-up..... RPM drop within  
200 rpm**

3. If the speed is not reduced when cold, check the air valve, or check for vacuum leaks at the bypass air hose.
4. If the speed drop is **more than 200 rpm** when warm, check the air valve and current to the valve.

#### Inspection of Terminal Voltage

1. Disconnect the connector from the valve.
2. Remove the rubber boot from the connector.
3. Start the engine and run it at idle.
4. Check that there is battery voltage at terminal (WY), using a voltmeter.
5. If not correct, check the circuit opening relay and wiring harness.

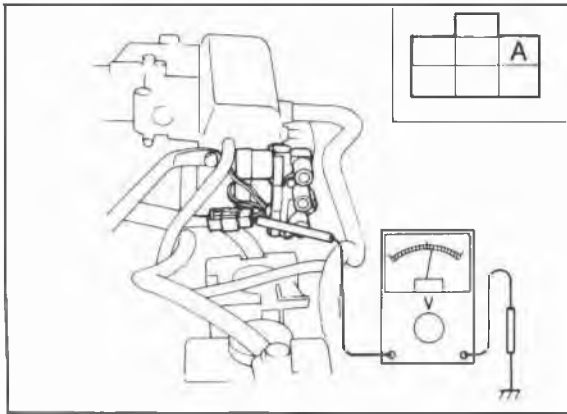
#### Inspection of Air Valve

1. Check the valve for operation.

**Temperature 20°C (68°F) ..... Valve open  
(When engine cool)  
After warming-up ..... Valve closed**

2. Replace valve if faulty.

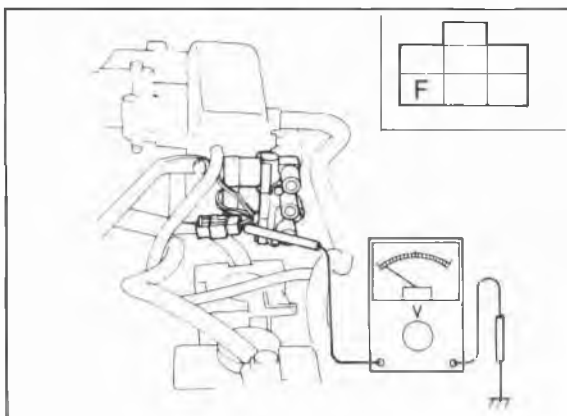




76G04B-048

### AIR BYPASS SOLENOID VALVE Inspection of Idle-up Signal A/C

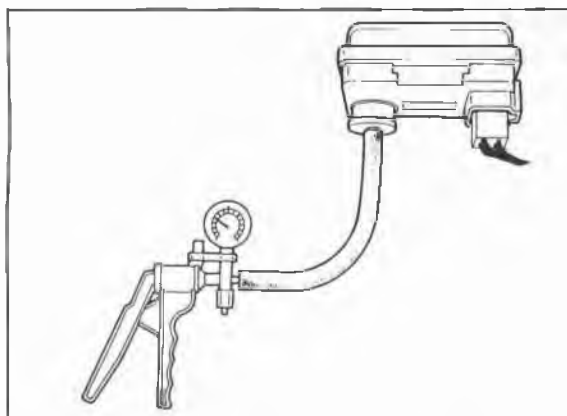
1. Warm up the engine and run it at idle.
2. Connect a voltmeter between terminal **A** and ground.
3. Turn the A/C and blower motor switches ON.
4. Check that the meter shows **battery voltage**.
5. If not correct, check the A/C relay, A/C switch, blower motor switch, fuse, and wiring harness.



76G04B-049

### P/S

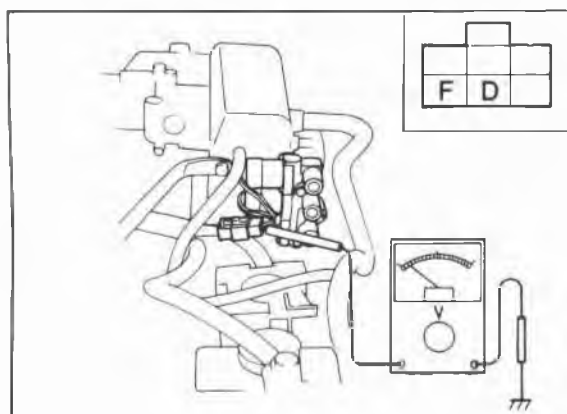
1. Warm up the engine and run it at idle.
2. Attach a voltmeter between the terminal **F** and ground.
3. Turn the steering wheel all the way to either the right or left.
4. Check that the meter shows **0V**.
5. Release the steering wheel.
6. Check that the meter shows battery voltage.
7. If not correct, check the P/S pressure switch (Refer to page 4B—92) and wiring harness.



76G04B-050

### High altitude compensation

1. Warm up the engine and run it at idle.
2. Connect a vacuum pump to the atmospheric pressure sensor.
3. Connect a voltmeter between the terminals shown in the following table and ground.
4. Apply vacuum to the atmospheric pressure sensor as shown in the table using a vacuum pump.
5. Check that the voltmeter shows **0V**.

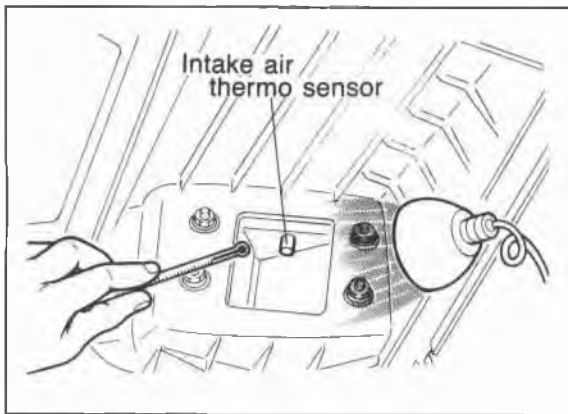


76G04B-051

6. Release the vacuum.
7. Check that the voltmeter shows battery voltage.
8. If not correct, check the atmospheric pressure sensor (Refer to page 4B—99) and wiring harness.

Terminal	Vacuum Amount
F	Approx. 155 mmHg (6.10 inHg)
D	Approx. 85 mmHg (3.35 inHg)

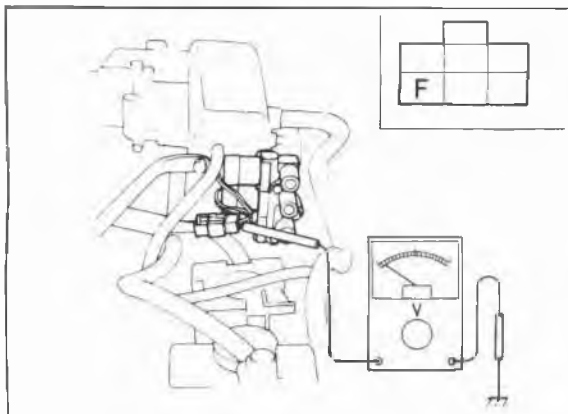
# 4B IDLE-UP SYSTEM



76G04B-052

### Hot idle compensation

1. Warm up the engine and run it at idle.
2. Connect a voltmeter between the terminal **F**, **D** and ground.
3. Remove the air cleaner upper case assembly.
4. Heat the intake air thermo sensor to more than **55°C (131°F)**.
5. Check that the meter shows **0V**.
6. If not correct, check the intake air thermo sensor (Refer to page 4B—94).



76G04B-053

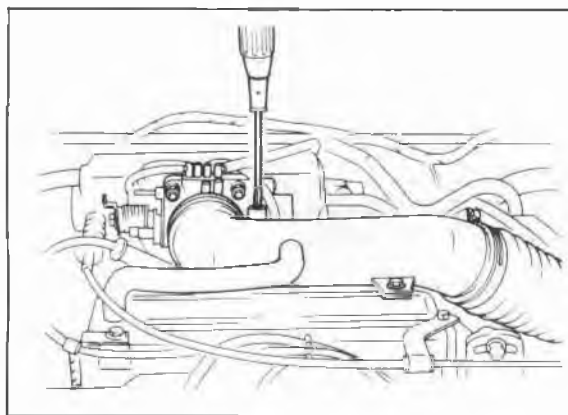
### E/L (Electrical load)

1. Warm up the engine and run it at idle.
2. Connect a voltmeter between the **F** terminal and ground.
3. Apply the E/L.

#### E/L:

- Headlight
- Rear defroster
- Electrical fan motor
- Blower motor (3rd or 4th position)

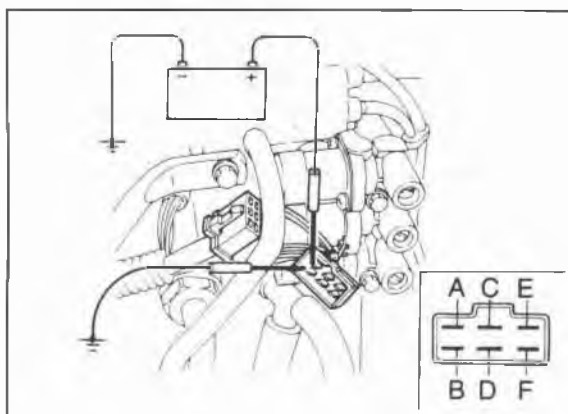
4. Check that the meter shows **0V**.
5. If not correct, check the electrical load control unit (Refer to page 4B—93).



76G04B-054

### Adjustment

1. Warm up the engine and run it at idle.
2. Turn all accessories OFF.
3. Connect a tachometer to the engine.
4. Disconnect the air bypass solenoid valve connector.
5. Check the idle speed and adjust it if necessary.

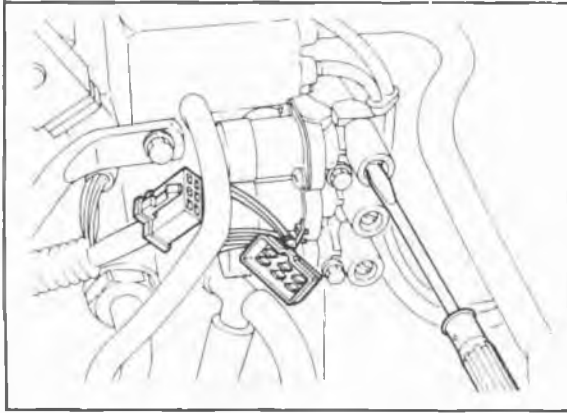


76G04B-055

6. Apply battery power to each BAT terminal and ground each GRD terminal as shown in the table.
7. Check that the engine speed is within specification.

Valve	BAT	GRD	Engine speed
A (for A/C)	A	B	1,250—1,350 rpm
B (for high altitude and high intake air temp.)	C	D	900—1,000 rpm (MTX)
C (for P/S, E/L, high intake air temp., high altitude and hot idle compensations)	E	F	1,000—1,100 rpm (ATX)

## IDLE-UP SYSTEM 4B

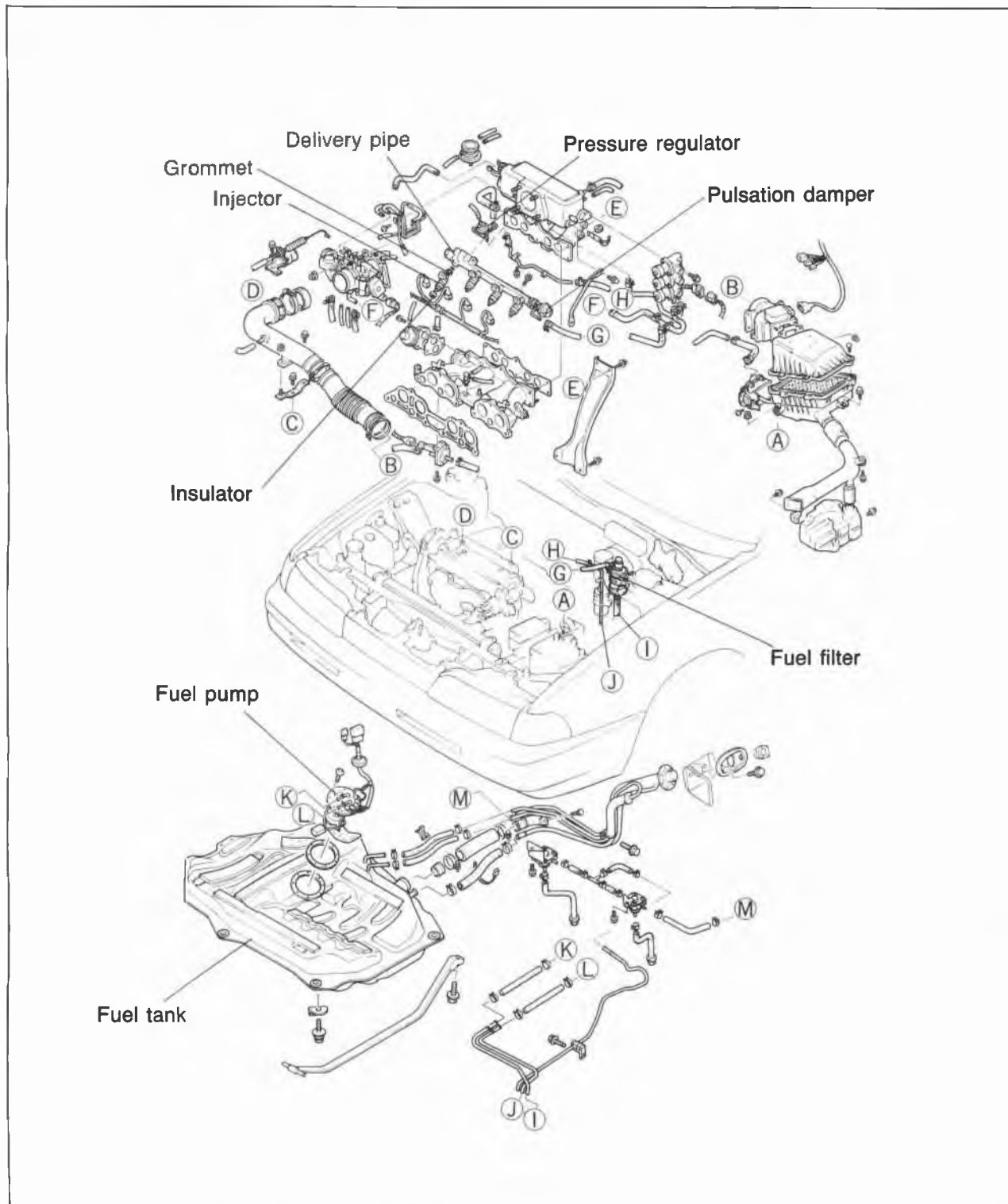


76G04B-056

8. If not correct, adjust by adjusting the respective adjusting screw.
9. If there is no idle-up, replace the air bypass solenoid valve.
10. Reconnect the connector to the valves.

# 4B FUEL SYSTEM

## FUEL SYSTEM



76G04B-057

This system supplies the fuel necessary for combustion at a constant pressure to the injectors. Fuel is metered and injected into the intake manifold according to the injection control signals from the engine control unit. It consists of the fuel pump, fuel filters, delivery pipe, pulsation damper, pressure regulator, injectors, fuel pump switch (incorporated in the air flow meter), and the circuit opening relay. The fuel pump is mounted in the fuel tank to minimize the operating noise of the fuel pump. The injectors are directly supplied with battery voltage through the main relay.

## COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Air flow meter</b>	Detects amount of intake air; sends signal to engine control unit	Intake air thermo sensor and fuel pump switch are integrated
<b>Atmospheric pressure sensor</b>	Detects atmospheric pressure; sends signal to engine control unit	
<b>Circuit opening relay</b>	Voltage for fuel pump while engine running	
<b>Clutch switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when clutch pedal released
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls injector operation	
<b>Fuel filter</b>	Filters particles from fuel	
<b>Fuel pump</b>	Provides fuel to injectors	<ul style="list-style-type: none"> <li>• Operates while engine running</li> <li>• Installed in fuel tank</li> </ul>
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	Installed in throttle sensor
<b>Ignition coil (-) terminal</b>	Detects engine speed; sends signal to engine control unit	
<b>Ignition switch (ST position)</b>	Sends engine cranking signal to engine control unit	
<b>Inhibitor switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON in "N" or "P" range
<b>Injector</b>	Injects fuel into intake port	<ul style="list-style-type: none"> <li>• Controlled by signals from engine control unit</li> <li>• High-ohmic injector</li> </ul>
<b>Intake air thermo sensor</b>	Detects intake air temperature; sends signal to engine control unit	Installed in air flow meter
<b>Main relay</b>	Supplies electric current to injectors and engine control unit	
<b>Neutral switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON in-gear
<b>Oxygen sensor</b>	Detects Oxygen concentration; sends signal to engine control unit	Zirconia ceramic and platinum coating
<b>Pressure regulator</b>	Adjusts fuel pressure supplied to injectors	
<b>Pulsation damper</b>	Absorbs fuel pulsation	
<b>Throttle sensor</b>	Detects throttle valve opening angle; sends signal to engine control unit	Integrated idle switch
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Water thermo switch</b>	Detects radiator coolant temperature; sends signal to engine control unit	ON: above 17°C (63°F)

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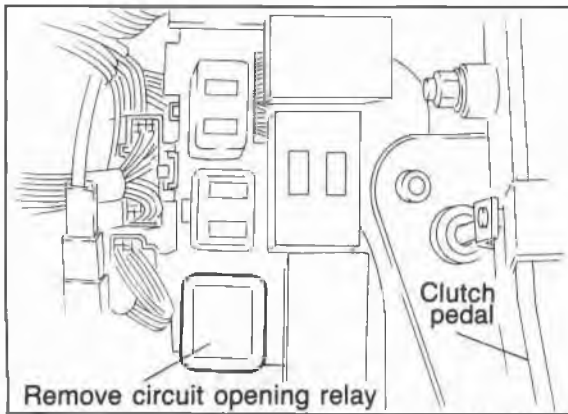
# 4B FUEL SYSTEM

## TROUBLESHOOTING

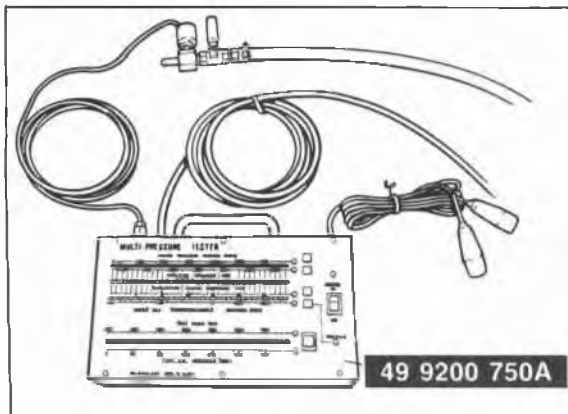
Check the condition of the wiring harness and connectors before checking the sensors or switches.

Possible cause		Page										
		Air flow meter	Atmospheric pressure sensor	Oxygen sensor	Throttle sensor	Water thermo sensor	Water thermo switch	Fuel pump	Injector	Fuel pressure	Engine control unit terminal	
		4B-94	4B-99	4B-98	4B-95	4B-97	4B-97	4B-49	4B-51	4B-48	3C 3E	3B
Symptom		4B-94	4B-99	4B-98	4B-95	4B-97	4B-97	4B-49	4B-51	4B-48	4B-90	4B-90
Hard start or won't start (Crank OK)			5			4		1	3			2
Engine stalls	While warming up	4				3			2	1	5	
	After warming up	1							3	2	4	
Rough Idle	While warming up	4				3			2	1		
	After warming up	1	2						4	3		
Poor acceleration, hesitation, or lack of power		1			3				4	2		
Runs rough on deceleration		1							2			
Afterburn in exhaust system		1							2			
Poor fuel consumption		5	6	4		3			2	1		
Falls emission test				1			2					
Engine stalls or rough after hot starting		1							3	2		

76G04B-059



86U04A-068



86U04A-069

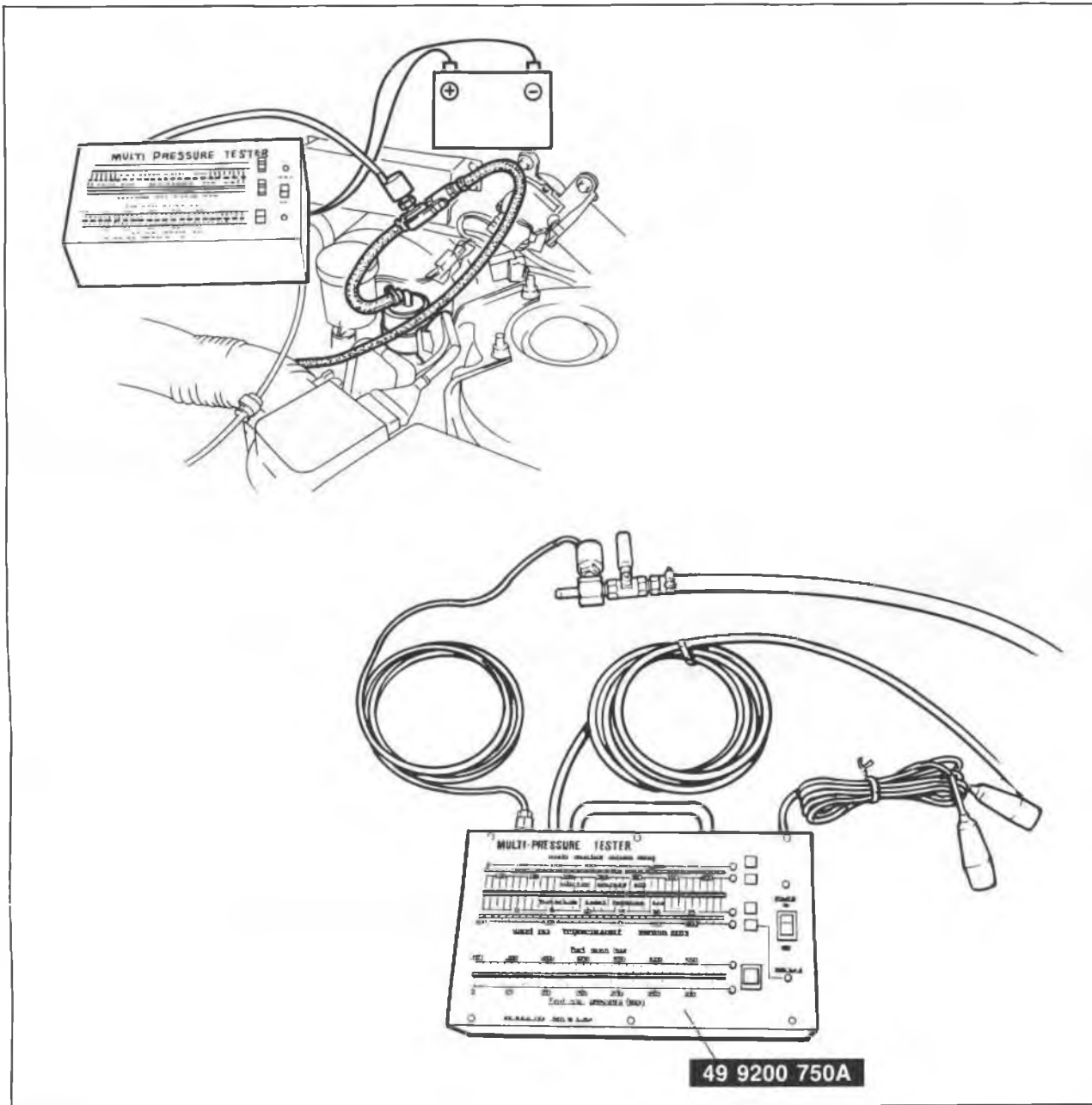
## FUEL PRESSURE RELEASE AND SERVICING FUEL SYSTEM

Fuel in the fuel system remains under high pressure even when the engine is not running.

- a) Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.
  1. Start the engine.
  2. Disconnect the circuit opening relay.
  3. After the engine stalls, turn OFF the ignition switch.
  4. Reconnect the circuit opening relay.
- b) Use a rag as protection from fuel spray when disconnecting the hoses.  
Plug the hoses after removal.
- c) When inspecting the fuel system, use the **SST**.

## 4B FUEL SYSTEM

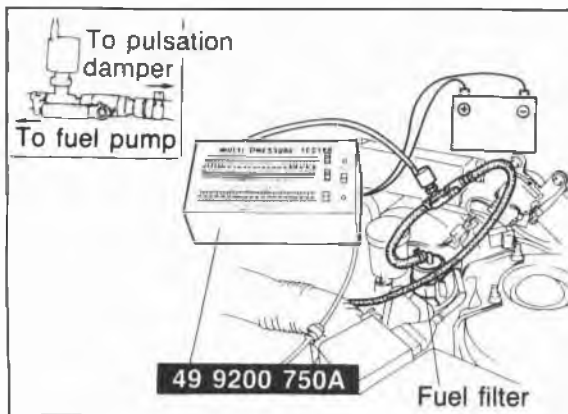
### MULTI-PRESSURE TESTER (49 9200 750A)



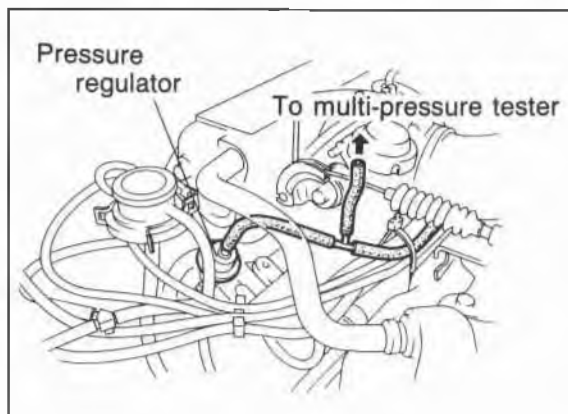
69G04A-099

The **MULTI-PRESSURE TESTER** (49 9200 750A) has been developed to check the fuel pressure and intake manifold vacuum. These can easily be inspected by setting the buttons on the tester.

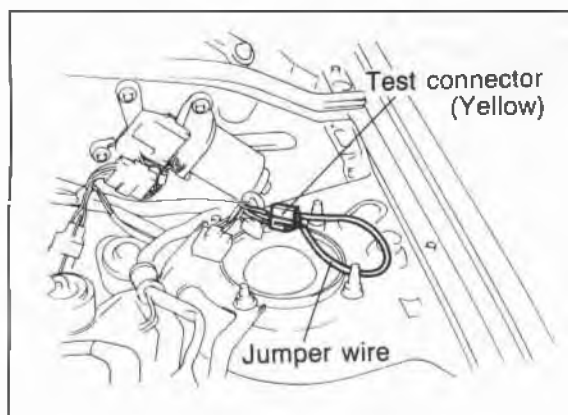




76G04B-060



86U04A-071



86U04A-072

## How to Connect Multi-Pressure Tester

### Warning

**Before connecting the SST, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4B—45.)**

1. Disconnect the negative battery terminal.
2. Disconnect the fuel main hose from the fuel filter.
3. Connect the **SST** between the fuel main hose and fuel pump with the adapter.

### Caution

**Do not reverse the adapter connection.**

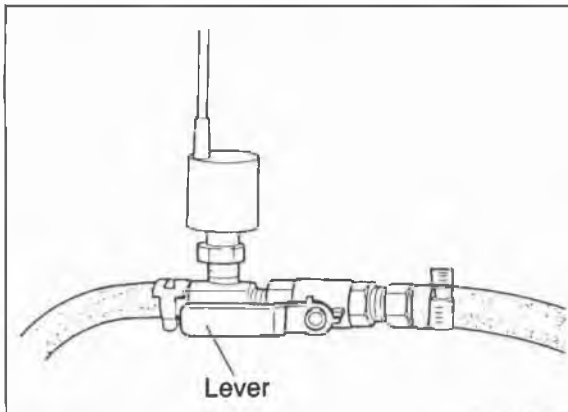
4. Disconnect the vacuum hose from the pressure regulator control solenoid valve. Connect the **SST** vacuum hose with a three-way joint.
5. Connect the negative battery terminal.
6. Connect the **SST** to the battery.

7. Connect the terminals of the test connector (Yellow) with a jumper wire. Turn the ignition switch ON to operate the fuel pump.
8. Check for fuel leaks.

### Caution

**After checking for fuel leakage, turn the ignition switch OFF and disconnect the jumper wire from the test connector.**

# 4B FUEL SYSTEM



76G04B-061

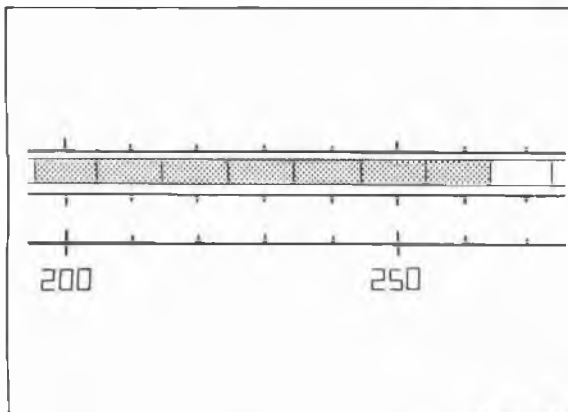
## FUEL PRESSURE

### Note

- When inspecting fuel pressure, use the SST. (Refer to page 4B—47).
- Warm up the engine to normal operating temperature.

### Injection Pressure

- Set the lever on the adapter as shown in the figure.

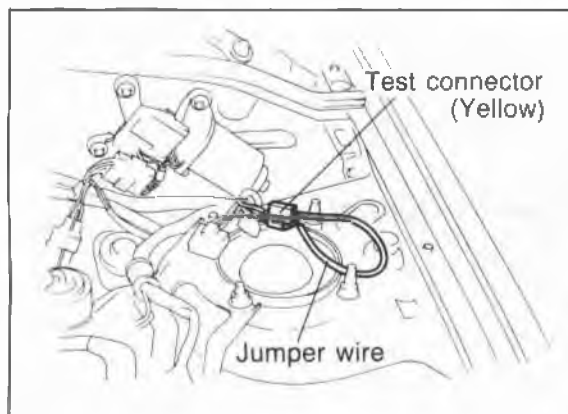


86U04A-074

- Run the engine and measure the injection pressure at various speeds.

**Injection pressure: Approx. 235—275 kPa  
(2.4—2.8 kg/cm<sup>2</sup>, 34—40 psi)**

- If not within specification, check the fuel pump pressure and fuel line pressure.



86U04A-075

### Fuel Pump Pressure

- Connect the terminals of the test connector (Yellow) with a jumper wire.
- Turn the ignition switch ON to operate the fuel pump.

- Set the lever on the adapter as shown in the figure.
- Check the fuel pump pressure.

**Fuel pump pressure: 441—588 kPa  
(4.5—6.0 kg/cm<sup>2</sup>, 64—85 psi)**

- If the fuel pump pressure is not within specification, check the following;

### No pressure

- Fuel pump operation (Refer to page 4B—49.)

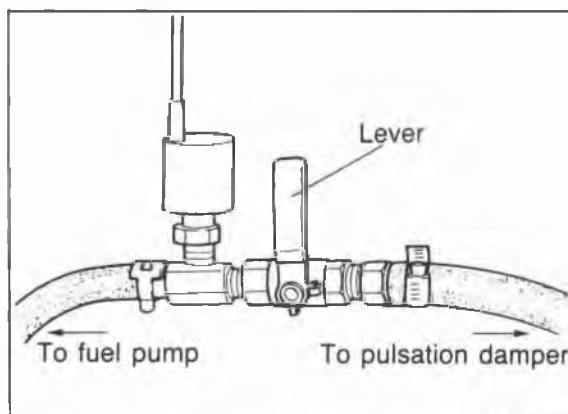
### Low pressure

- Fuel pump feeding capacity (Refer to page 4B—50.)

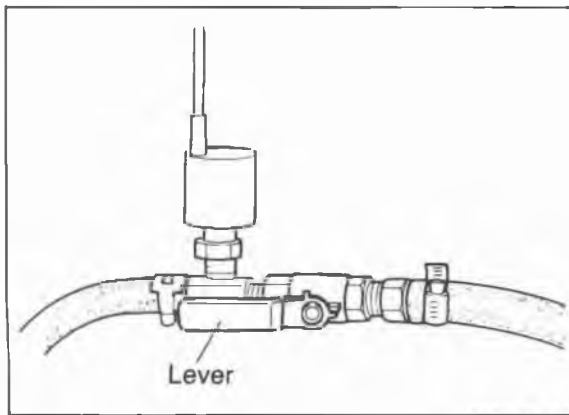
### High pressure

- Replace the fuel pump

- After checking the fuel pump pressure, disconnect the jumper wire from the test connector.



76G04B-062



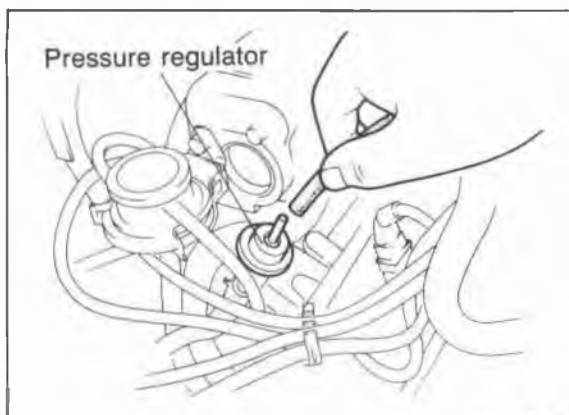
76G04B-126

## Fuel Line Pressure

1. Start the engine and run it at idle.
2. Set the lever on the adapter as shown in the figure.
3. Check the fuel line pressure.

**Fuel line pressure: Approx. 186—226 kPa  
(1.9—2.3 kg/cm<sup>2</sup>, 27—33 psi)**

4. If not within specification, check the vacuum hose.

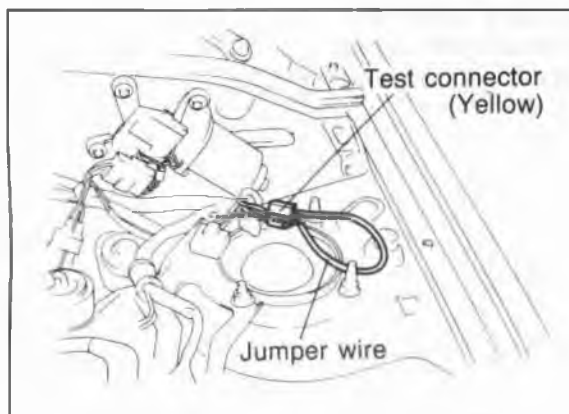


86U04A-078

5. Disconnect the vacuum hose from pressure regulator, and place a finger over the end of the hose.
6. Check the fuel line pressure.

**Fuel line pressure: 235—275 kPa  
(2.4—2.8 kg/cm<sup>2</sup>, 34—40 psi)**

7. If not within specification, replace the pressure regulator.
8. Connect the vacuum hose to pressure regulator.

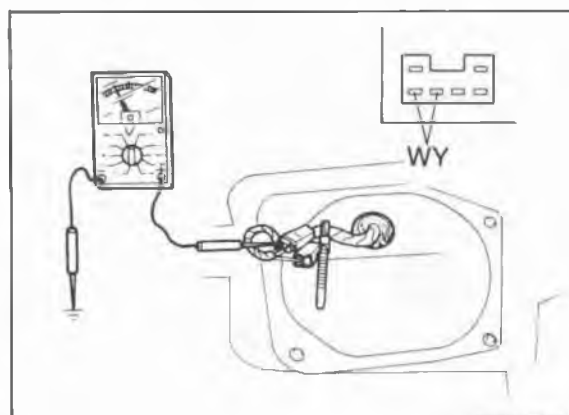


76G04B-063

## FUEL PUMP

### Operation Test

1. Connect a jumper wire to the test connector (Yellow).
2. Remove the fuel filler cap.
3. Turn the ignition switch ON.
4. Listen for operational sound of the fuel pump at the filler inlet.
5. Install the fuel filler cap.



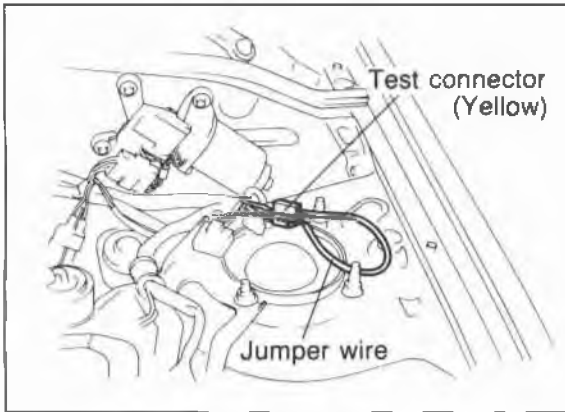
76G04B-064

6. If no sound is heard, check the voltage at the fuel pump connector (WY wire and a ground).

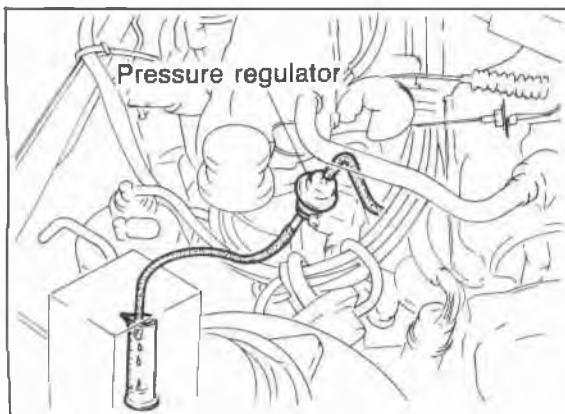
**Voltage: 12V**

7. If the voltage is normal, replace the fuel pump.
8. If not correct, check the circuit opening relay (Refer to page 4B—86) and its circuits.
9. Disconnect the jumper wire.

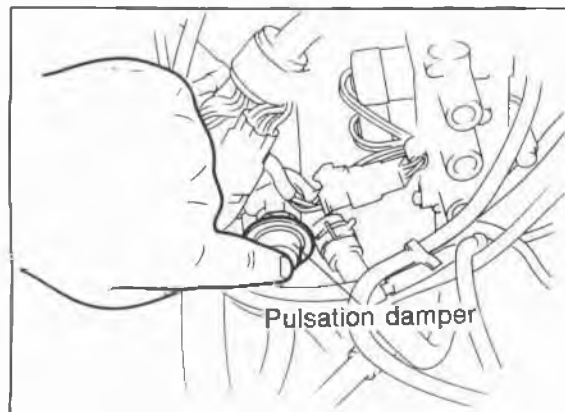
## 4B FUEL SYSTEM



76G04B-065



86U04A-082



86U04A-083

### Volume Test

#### Warning

**Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4B—45)**

1. Connect a jumper wire to test connector (Yellow).
2. Disconnect the fuel return hose from fuel return pipe.

3. Turn the ignition switch ON for 10 seconds, and check the feeding capacity with graduated cylinder.

#### Feeding capacity:

**220 cc (13.4 cu in)/10 sec. min.**

4. If not within specification, check the fuel filter, and fuel line.
5. Turn the ignition switch OFF and disconnect the jumper wire.

### PULSATION DAMPER

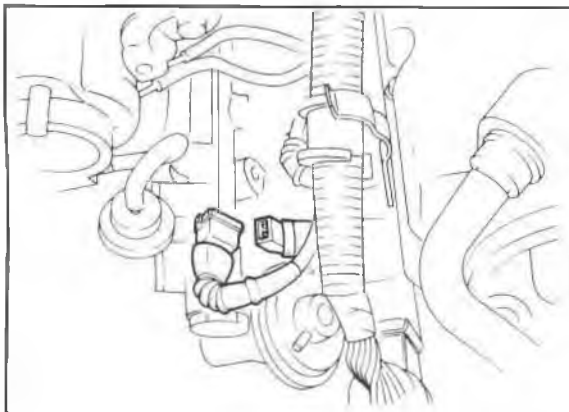
1. Run the engine at idle.
2. Place a finger on the screw of the pulsation damper head.
3. Check that pulsation is felt.



76G04B-066

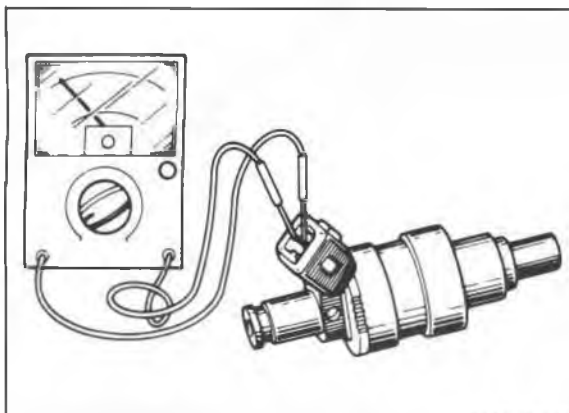
## INJECTOR On-vehicle Inspection If engine runs

1. Warm up the engine and run it at idle.
2. Listen for operational sound of the injector with a screwdriver or a sound scope.
3. If no operational sound is heard, check the main relay and injector resistance.



76G04B-067

4. Disconnect the connector from each injector respectively.
5. Check that the engine speed decreases about **100—200 rpm** each time.
6. If not correct, check the injector resistance and injection volume of the injector.



76G04B-068

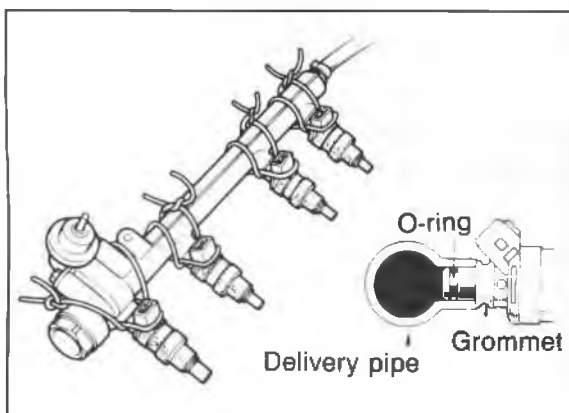
## Inspection

There are 3 inspections which must be performed for the injectors.

### Resistance

1. Remove the injectors from the engine. (Refer to page 4B—58.)
2. Check the resistance of each injector with an ohmmeter.
3. If not correct, replace the injector.

**Resistance: 12—16  $\Omega$**



76G04B-069

## Fuel leakage test and volume test

1. Lift the dynamic chamber upward.
2. Remove the injectors and delivery pipe. (Refer to pages 4B—58 and 59.)
3. Affix the injectors, pressure regulator, and pulsation damper to the delivery pipe with wire.

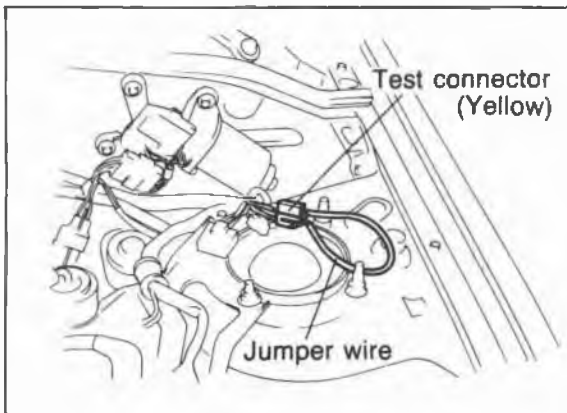
### Caution

**Affix the injectors firmly to the delivery pipe so that no movement of the injectors is possible.**

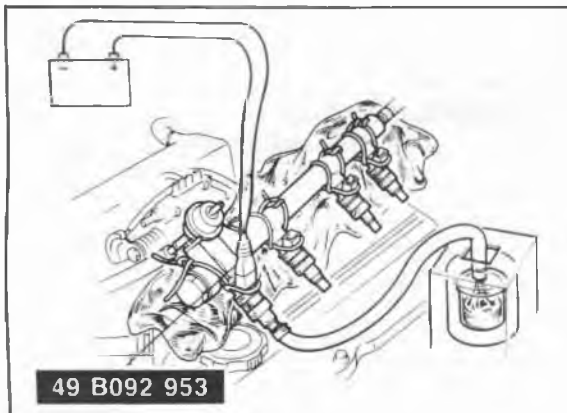
### Warning

**Be extremely careful when working with fuel. Always work away from sparks or open flames.**

## 4B FUEL SYSTEM



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4. Connect the fuel return hose and vacuum hose to the pressure regulator.
5. Connect the terminals of the fuel pump test connector with a jumper wire. Turn the ignition switch ON.
6. Check that no fuel leaks from the injector nozzles.

### Note

**After 1 minute a drop of fuel from the injector is acceptable.**

7. Connect the **SST** to the battery and injector.
8. Check the injection volume with a graduated container.

### Injection volume:

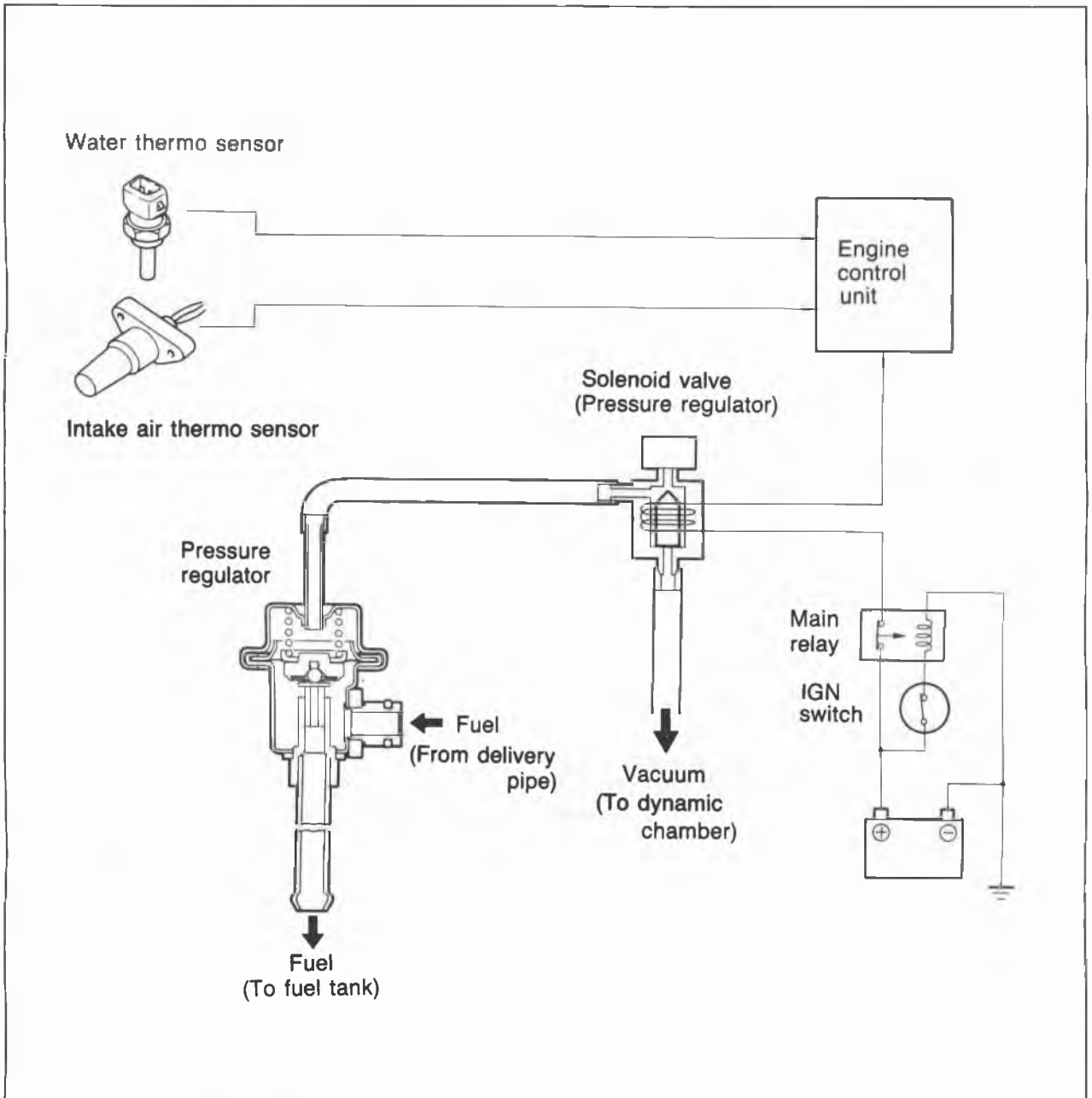
**Approx. 38—53 cc (2.3—3.2 cu in) /15 sec.**

### Caution

**When using the SST, make sure of the SST number and use correct one.**

9. If not correct, replace the injectors.

## PRESSURE REGULATOR CONTROL SYSTEM



76G04B-072

To prevent percolation of the fuel during idle after the engine is restarted, vacuum is cut to the pressure regulator, increasing the fuel pressure.

**Specified time: Approx. 120 sec.**

**Operating condition: Coolant temperature — above 70°C (158°F)  
Intake air temperature — above 10°C (50°F)**

# 4B FUEL SYSTEM

## COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valve (Pressure regulator control)	
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	Installed in throttle sensor
<b>Ignition coil (-) terminal</b>	Detects engine speed; sends signal to engine control unit	
<b>Ignition switch (ST position)</b>	Sends engine cranking signal to engine control unit	
<b>Intake air thermo sensor</b>	Detects intake air temperature; sends signal to engine control unit	Installed in air flow meter
<b>Pressure regulator</b>	Adjusts fuel pressure supplied to injectors	
<b>Solenoid valve (Pressure regulator control)</b>	Controls vacuum line to pressure regulator	Closes vacuum line when hot
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	

76G04B-073



## TROUBLESHOOTING

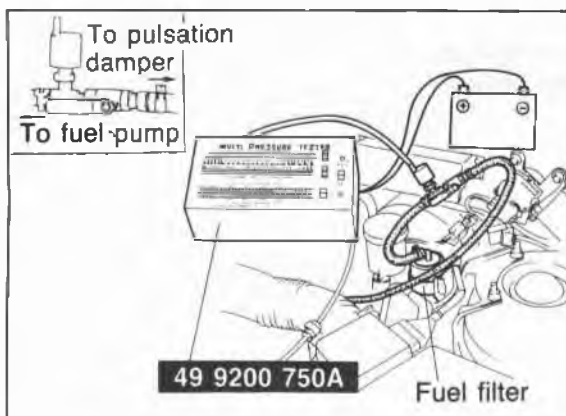
Check the condition of the wiring harness and connections before checking the sensors or switches below.

### Note

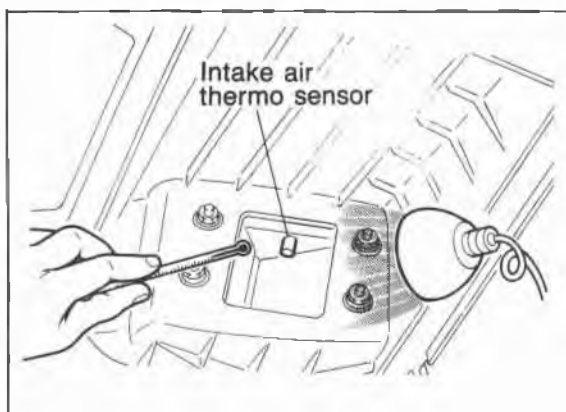
Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B—7 and 8.)

Possible cause	Solenoid valve (Pressure regulator control)	Water thermo sensor	Intake air thermo sensor	Engine control unit terminal	System inspection
Page				2K	
Symptom	4B—56	4B—97	4B—94	4B—89	4B—55
Engine stalls or rough after hot starting	2	3	4	5	1

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76G04B-075



76G04B-076

### System Inspection

1. Connect the **SST** to the engine. (Refer to page 4B—47.)
2. Start the engine.

3. Warm up the engine to normal operating temperature and stop the engine.

### Warning

**Be careful when disconnecting the water thermo sensor connector because the surrounding area is very hot.**

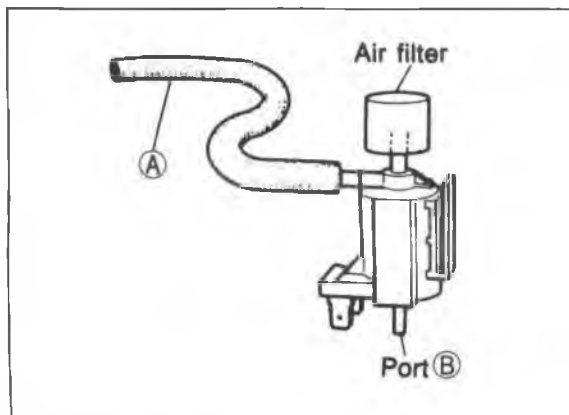
4. Lift the air cleaner upper cover assembly.
5. Heat the intake air thermo sensor to **above 10°C (50°F)**.

# 4B FUEL SYSTEM

Operating time	Fuel line pressure kPa (kg/cm <sup>2</sup> , psi)
After starting: for 120 sec.	235—275 (2.4—2.8, 34—40)
After 120 sec.	186—226 (1.9—2.3, 27—33)

76G04B-127

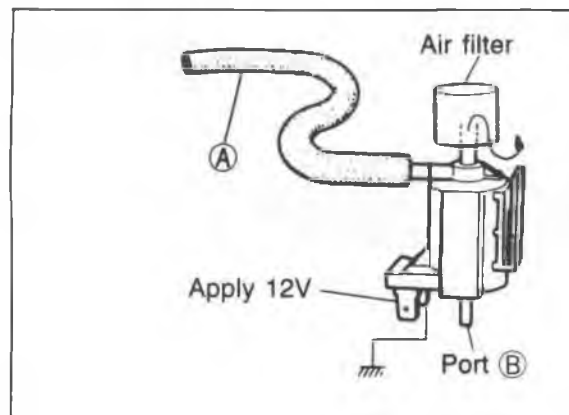
- Restart the engine.
- Check the fuel line pressure and operating times as shown in the chart.



86U04A-098

### Solenoid Valve (Pressure Regulator Control) Inspection

- Disconnect the vacuum hose from the solenoid valve and vacuum pipe.
- Blow through the solenoid valve from vacuum hose A.
- Check that air flows from port B.



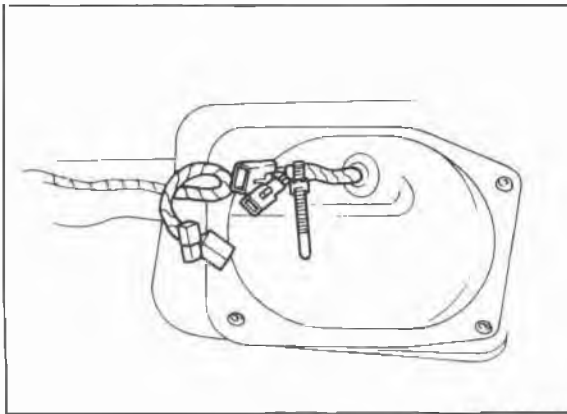
86U04A-099

- Disconnect the solenoid valve connector.
- Connect 12V and a ground to the terminals of the solenoid valve.
- Blow through the solenoid valve from the vacuum hose A.
- Check that air flows from the valve air filter.

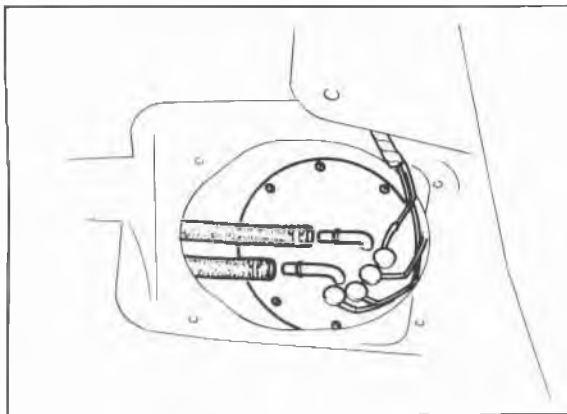
## REPLACEMENT

### Caution

- a) Before performing the following procedure, release the fuel pressure from the fuel system to reduce the possibility of injury or fire (Refer to page 4B—45).
- b) When servicing the fuel system, keep sparks, cigarettes, and open flames away from the fuel.



76G04B-077



86U04A-101

### Fuel Pump

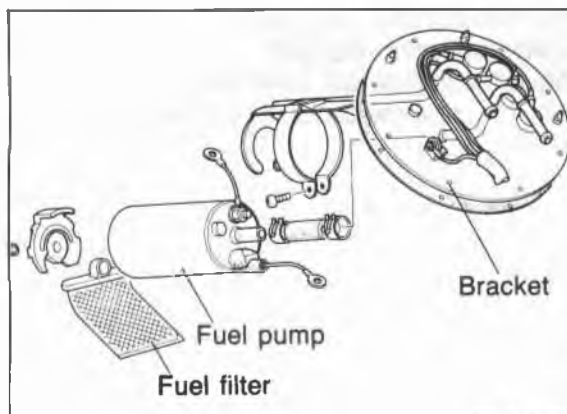
1. Remove the rear seat and disconnect the fuel pump connector.
2. Remove the service hole cover.
3. Disconnect the fuel hoses.
4. Remove the fuel pump and fuel tank gauge assembly.

5. Replace the fuel pump.

### Caution

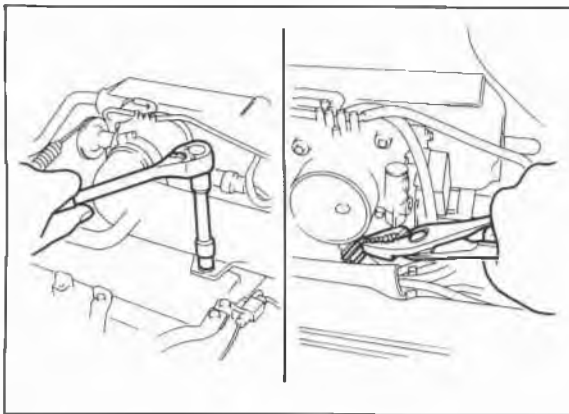
**Secure the fuel pump terminals and fuel hoses securely.**

6. Install in the reverse order of removal.

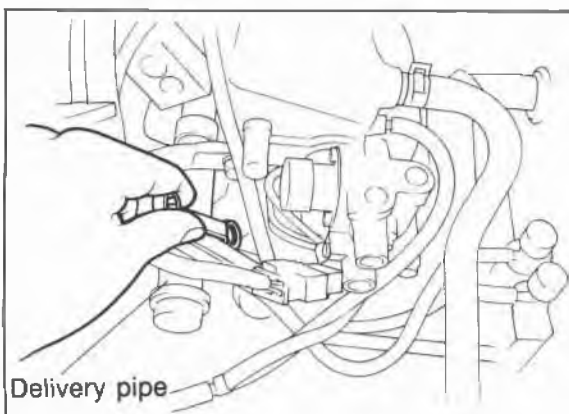


86U04A-102

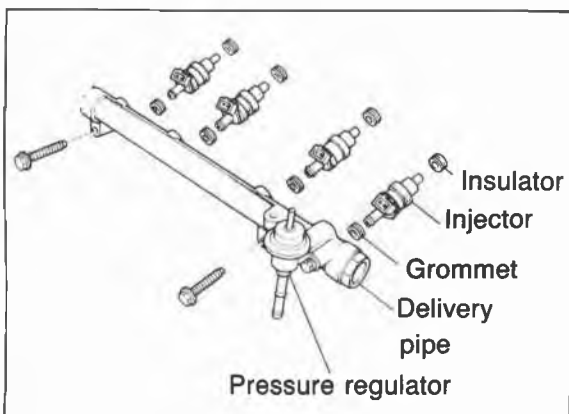
# 4B FUEL SYSTEM



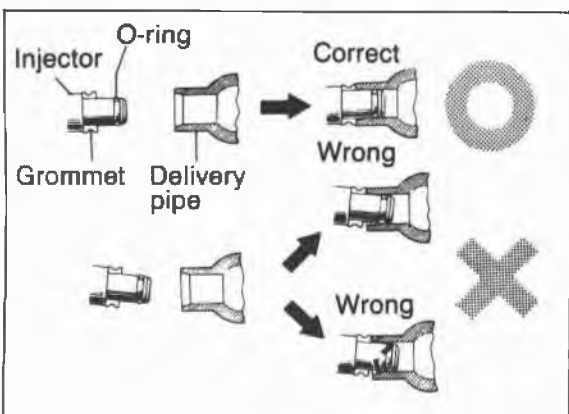
76G04B-078



76G04B-079



76G04B-080



86U04A-108

## Injector

1. Disconnect the air pipe from the throttle body.
2. Disconnect the air hose from the throttle body.

3. Disconnect the delivery pipe from the intake manifold.

4. Lift the delivery pipe along with the pressure regulator and pulsation damper.
5. Remove the grommets, injectors, and insulators.
6. Install in the reverse order of removal, referring to installation note.

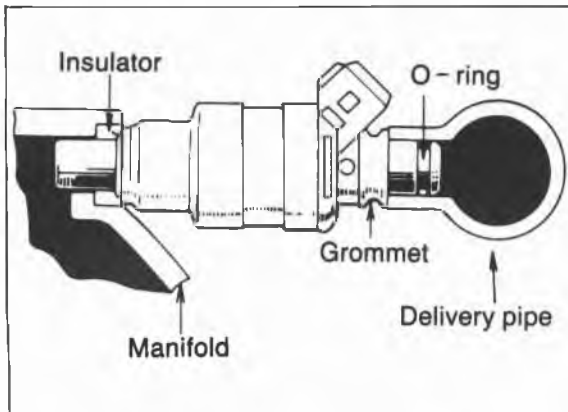
### Tightening torque:

**Delivery pipe 19—25 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)**

## Installation note

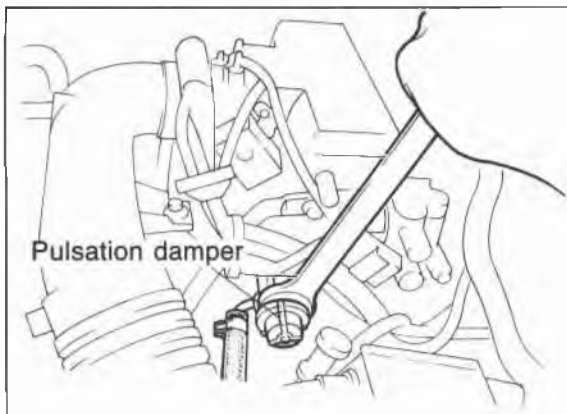
### Injector

1. Use new O-rings.
2. Apply a small amount of engine oil to the O-rings when installing.



86U04A-109

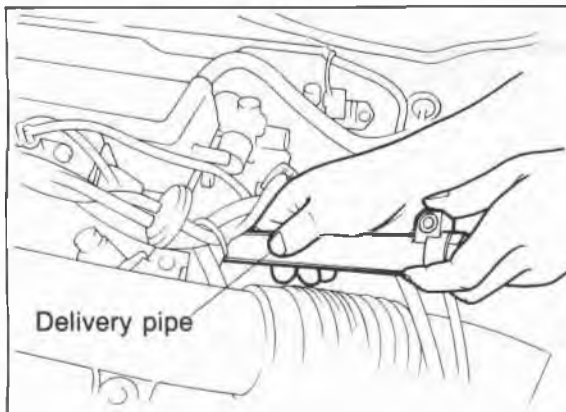
3. Install the injectors and the injector insulators.



76G04B-081

### Delivery Pipe

1. Remove the pulsation damper and pressure regulator from the delivery pipe.
2. Remove the injectors (Refer to page 4B—58).



76G04B-082

3. Replace the delivery pipe.
4. Install in the reverse order of removal, referring to installation note.

### Tightening torque:

#### Pressure regulator

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

#### Delivery pipe

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

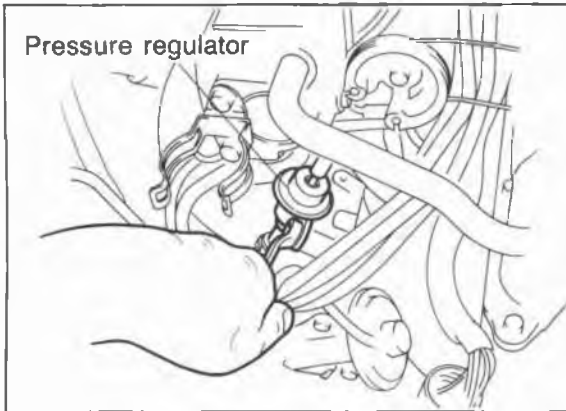
### Installation note

#### Injector

Refer to page 4B—58.

76G04B-083

## 4B FUEL SYSTEM



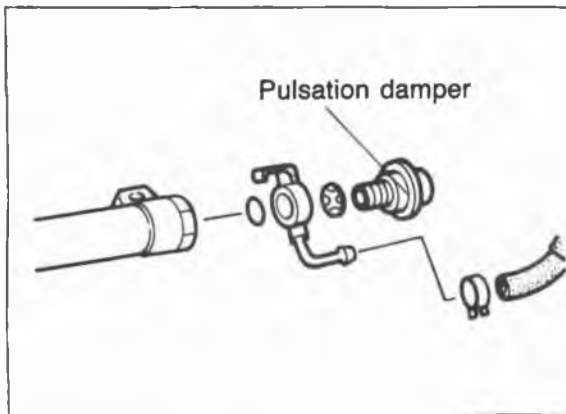
76G04B-084

### Pressure Regulator

1. Disconnect the vacuum hose and fuel return hose.
2. Remove the pressure regulator.
3. Install in the reverse order of removal.

### Tightening torque:

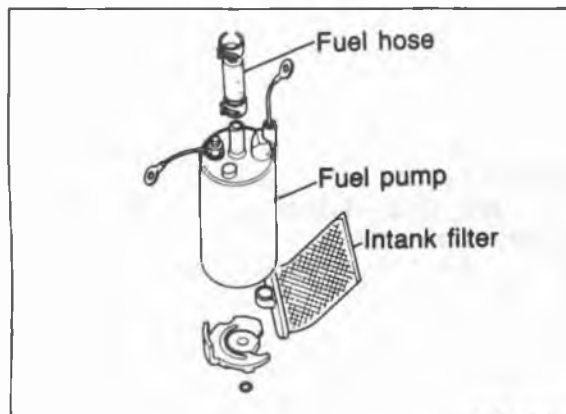
8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)



76G04B-085

### Pulsation Damper

1. Loosen the pulsation damper and remove it.
2. Install in the reverse order of removal.



76G04B-086

### Fuel Filter

#### Low pressure side

Refer to page 4B—57.

#### High pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

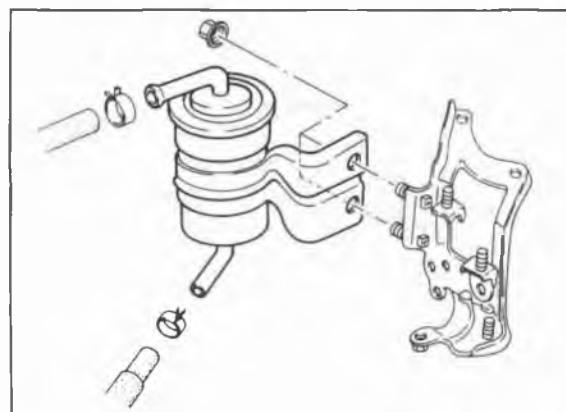
### Warning

**Always work away from sparks or open flames.**

1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and the bracket.
3. Install a new filter and the bracket.
4. Connect the fuel hoses.

### Note

**When installing the filter, push the fuel hoses fully onto the fuel filter and secure the hoses with spring clamps.**

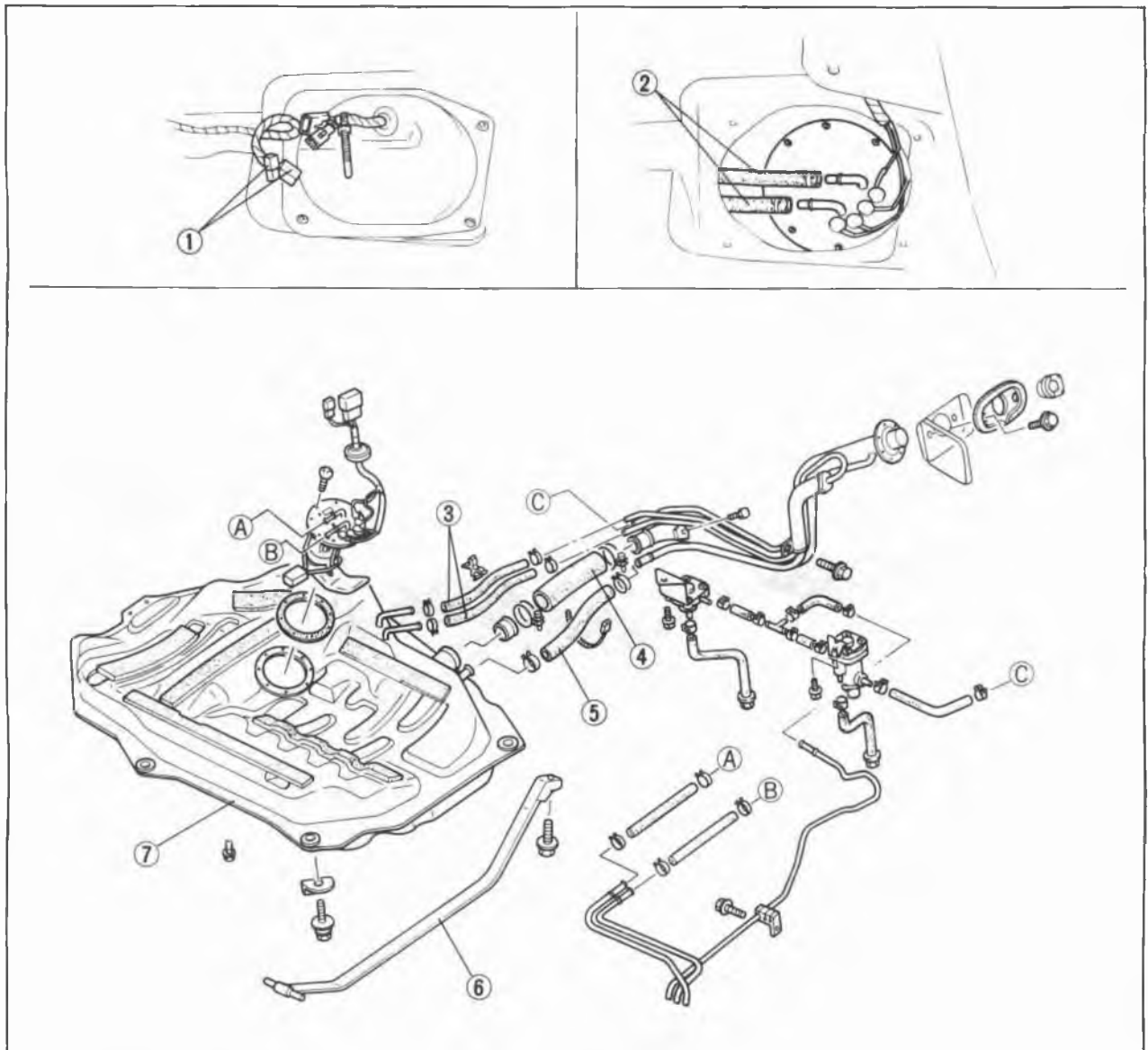


## FUEL TANK Removal

### Caution

- a) Before performing the following procedure, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4B—45)
- b) When removing the fuel tank, keep sparks, cigarettes, and open flames away from the fuel tank.

Remove in the sequence shown in the figure.



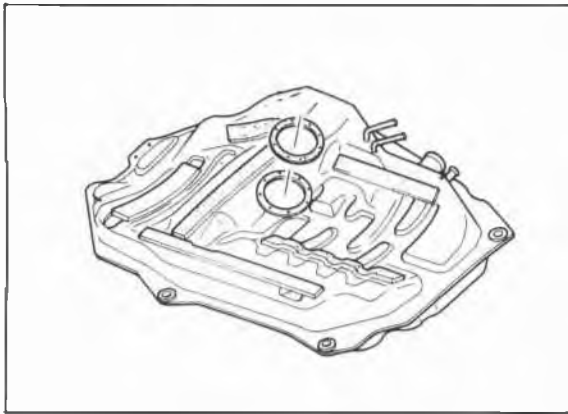
76G04B-087

### Note

**Drain the fuel from the fuel tank before removing the tank.**

- |                         |                    |
|-------------------------|--------------------|
| 1. Fuel pump connectors | 5. Breather hose   |
| 2. Fuel hoses           | 6. Fuel tank strap |
| 3. Evaporative hoses    | 7. Fuel tank       |
| 4. Fuel filler hose     |                    |

# 4B FUEL SYSTEM



86U04A-118

## Inspection

1. Check the fuel tank for cracks and corrosion.
2. If any defect is found, repair or replace the tank.

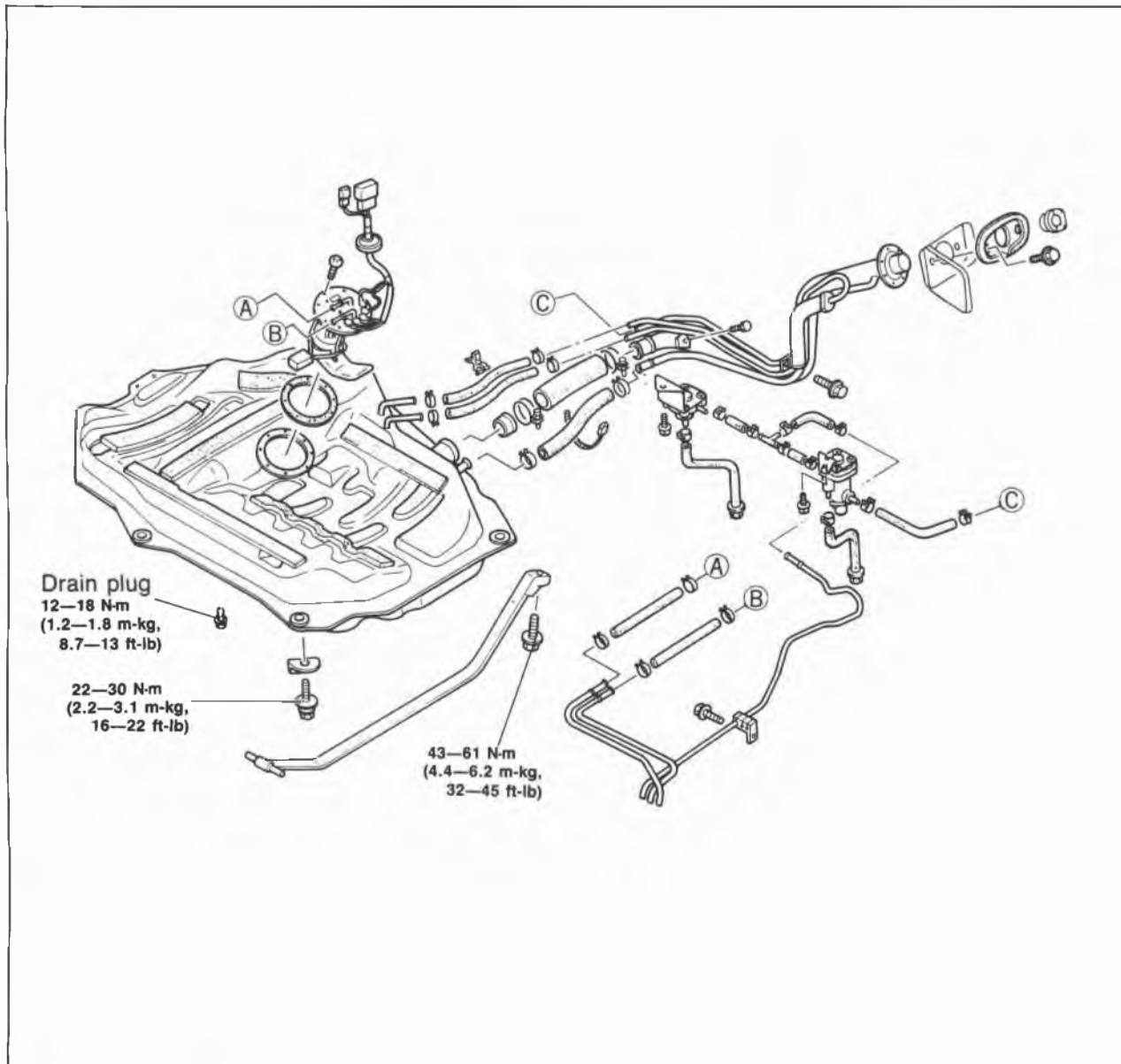
## Warning

**Before repairing, clean the fuel tank thoroughly with steam to sufficiently remove all explosive gas.**

## Installation

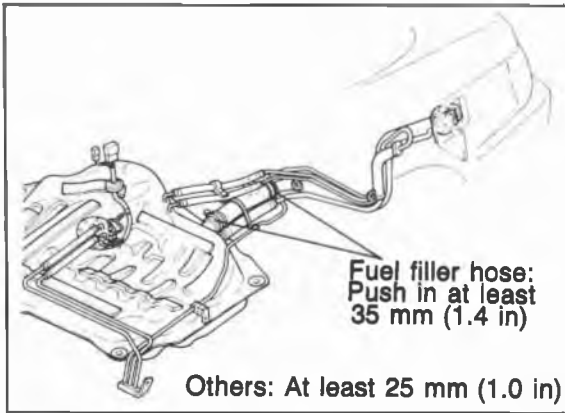
Install in the reverse order of removal, referring to the installation note.

## Torque Specifications



86U04A-119





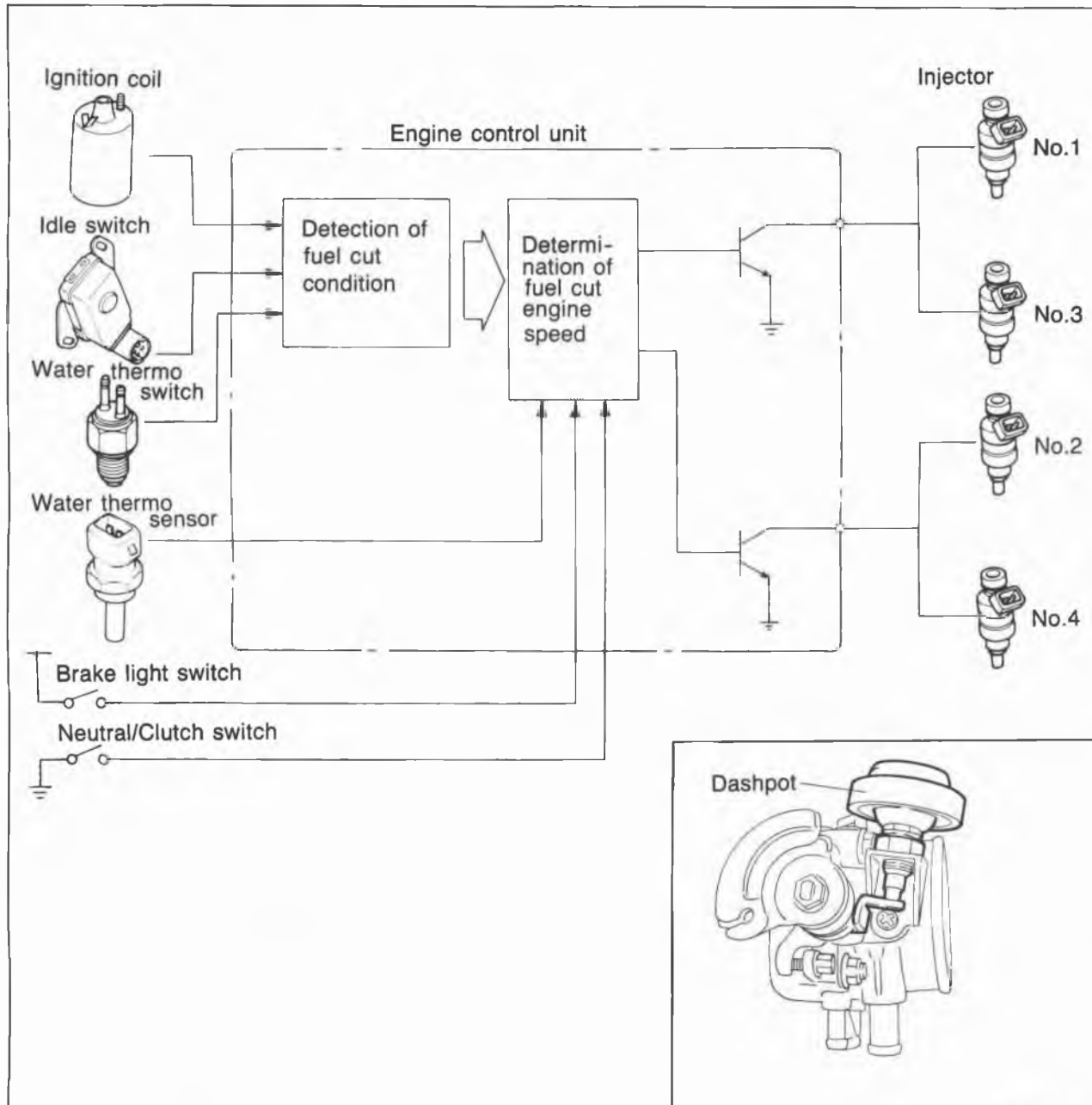
86U04A-120

### Installation note

1. Push the hose ends of the main fuel hose, fuel return hose and evaporation hoses onto the fuel tank fittings **at least 25 mm (1.0 in)**.
2. Push the fuel filler hose ends onto the fuel tank pipe and filler pipe **at least 35 mm (1.4 in)**.

# 4B DECELERATION CONTROL SYSTEM

## DECELERATION CONTROL SYSTEM



76G04B-088

This system consists of the dashpot and fuel cut system. The dashpot is to prevent after-burn so that the throttle valve gradually closes during deceleration.

The control unit detects engine deceleration judging from the engine speed and the idle switch, and signals a fuel cut operation to match the engines need, based on the coolant temperature and the driving condition.

## DECELERATION CONTROL SYSTEM 4B

### COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Brake light switch</b>	Detects braking operation (deceleration); sends signal to engine control unit	
<b>Clutch switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when clutch pedal released
<b>Dashpot (MTX)</b>	Prevents sudden closing of throttle valve during deceleration or shifting	Adjustment speed: 1,900—2,100 rpm
<b>Engine control unit</b>	Detects signals from input sensors and switches; cuts fuel injection	
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	Installed in throttle sensor
<b>Ignition coil (-) terminal</b>	Detects engine speed; sends signal to engine control unit	
<b>Neutral switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when in-gear
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Water thermo switch</b>	Detects radiator coolant temperature; sends signal to engine control unit	ON: above 17°C (63°F)

76G04B-089

# 4B DECELERATION CONTROL SYSTEM

## TROUBLESHOOTING

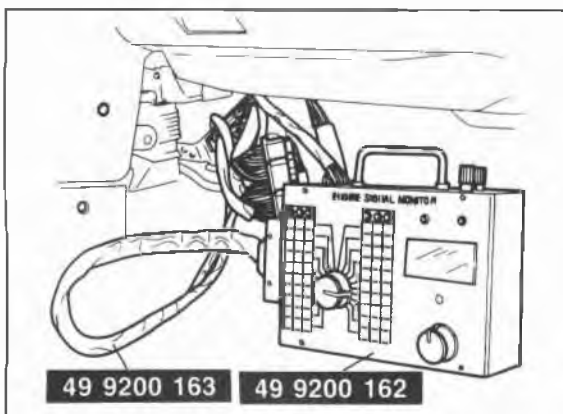
Check the condition of the wiring harness and connectors before checking the sensor or switches below.

### Note

Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to page 4B—7 and 8.)

Symptom	Possible cause	Dashpot	Water thermo sensor	Electrical signal inspection (Injector)
	Page			
		<b>4B—67</b>	<b>4B—97</b>	<b>4B—66</b>
High Idle speed after warming up		1		
Runs rough on deceleration		1	3	2
Afterburn in exhaust system		1	3	2
Poor fuel consumption		1	3	2
Falls emission test		1	3	2

76G04B-090



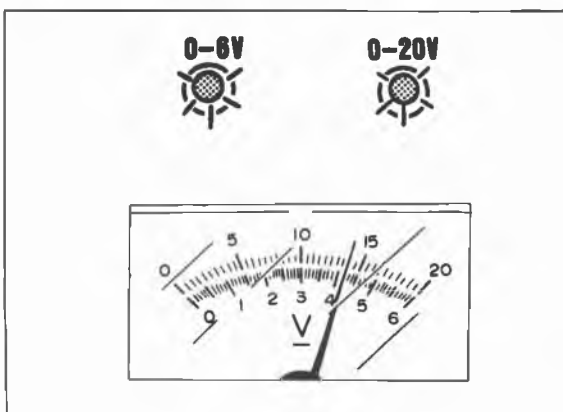
76G04B-091

### Electrical Signal Inspection (Injector)

1. Connect the **SST** between the wiring harness and engine control unit.
2. Set 3C or 3E position on the **SST**.

### Note

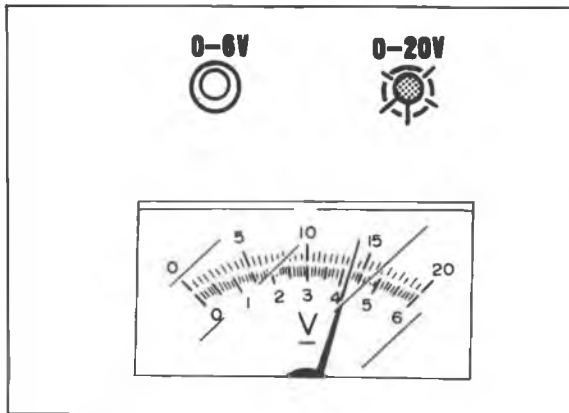
- 3C — For No. 2 and No. 4 injectors**  
**3E — For No. 1 and No. 3 injectors**



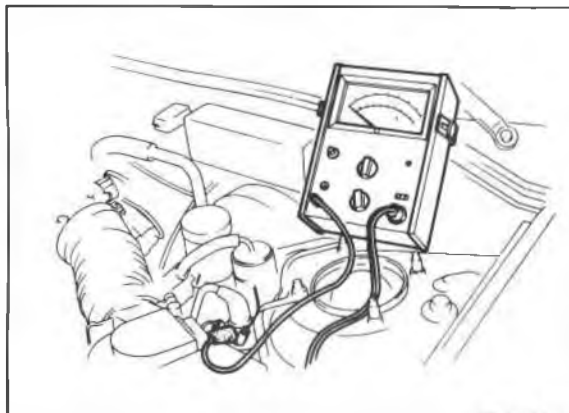
86U04A-125

3. Check that the indicator lamps alternately flash at idle.

## DECELERATION CONTROL SYSTEM 4B



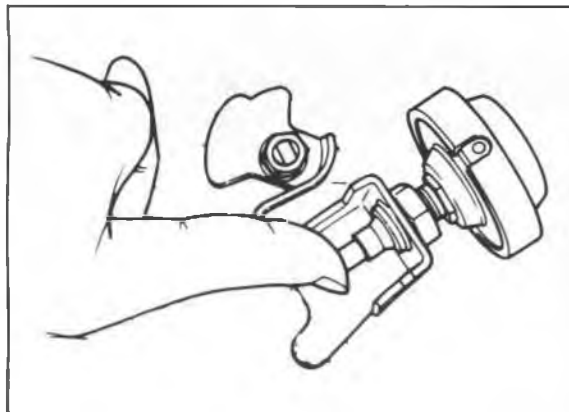
4. Increase the engine speed to **4,000 rpm**, then suddenly decrease the engine speed.
5. Check that the red indicator lamp stays illuminated during deceleration.



### Dashpot Preparation

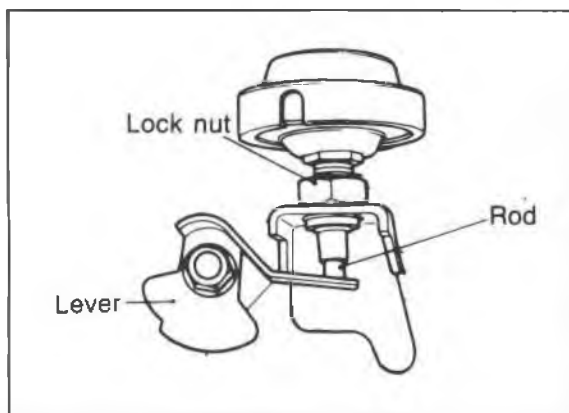
Before checking this system, follow these directions.

- Switch OFF all accessories.
- Connect a tachometer to the check connector.
- Warm up the engine to normal operating temperature.



### Inspection

1. Open the throttle valve fully and push the dashpot rod with a finger. Check that the rod goes into the dashpot slowly.
2. Release the rod and check that it comes out quickly.

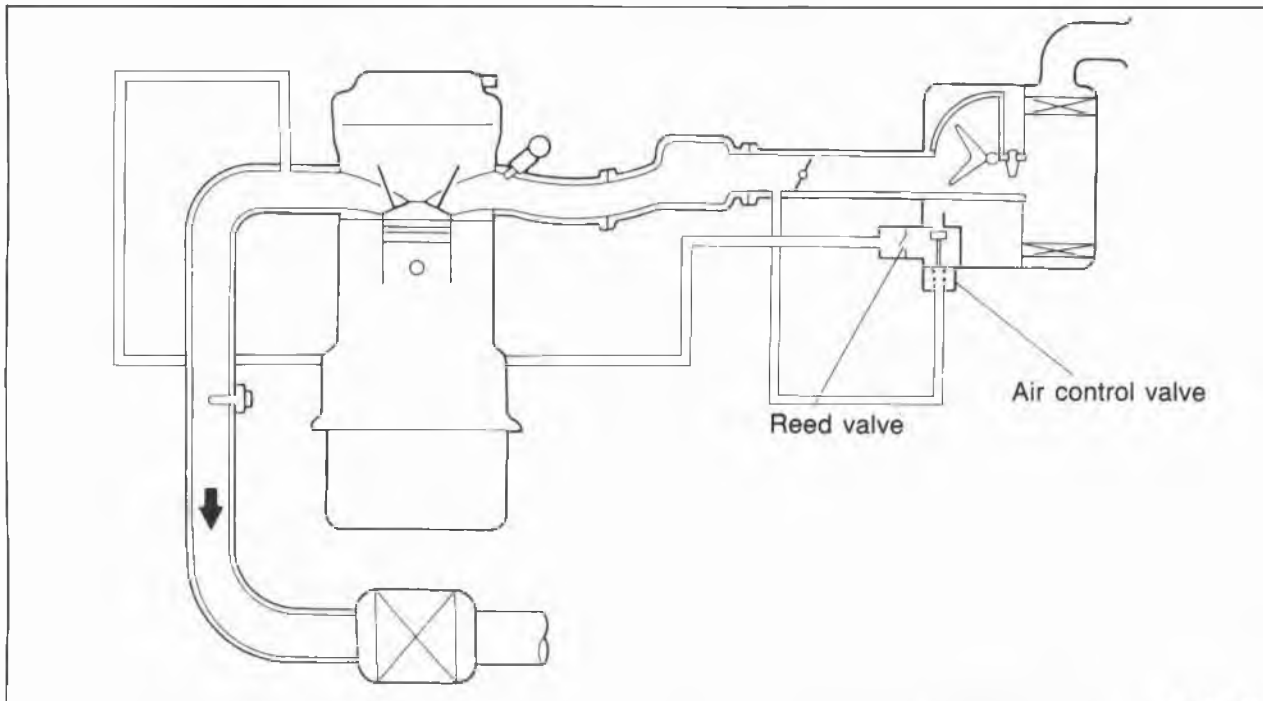


### Adjustment

1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Increase the engine speed to **2,500 rpm**.
4. Slowly decrease the engine speed and check that the dashpot rod touches the lever at **1,900—2,100 rpm**.
5. If not within specification, loosen the lock nut and adjust by turning the dashpot.

# 4B AIR INJECTION SYSTEM

## AIR INJECTION SYSTEM



76G04B-095

This system supplies secondary air into the exhaust system to improve idle stability.

### COMPONENT DESCRIPTIONS

Component	Function	Remark
<b>Air cleaner</b>	Filters air entering throttle body	
<b>Air control valve</b>	Directs air to reed valve	Installed on air cleaner
<b>Reed valve</b>	Directs air to exhaust manifold	Improves idle stability

76G04B-096

## TROUBLESHOOTING

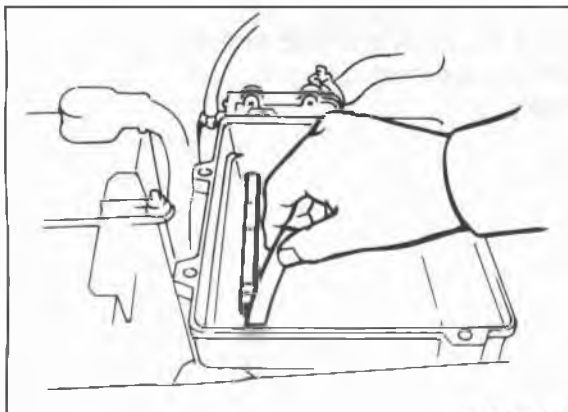
Check the condition of the wiring harness and connectors before checking the sensors or switch.

### Note

Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B—7 and 8.)

Possible cause	Air control valve	Reed valve	System inspection
Page	4B—69	4B—70	4B—69
Checking order	2	3	1

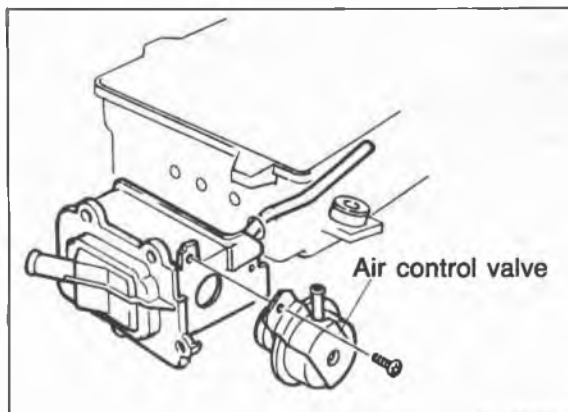
76G04B-097



76G04B-098

### System Inspection

1. Warm up the engine and run it at idle.
2. Lift up the air cleaner upper case.
3. Check that air is sucked into the air passage.
4. Increase the engine speed to **2,500 rpm** and check that no air is sucked into the passage.

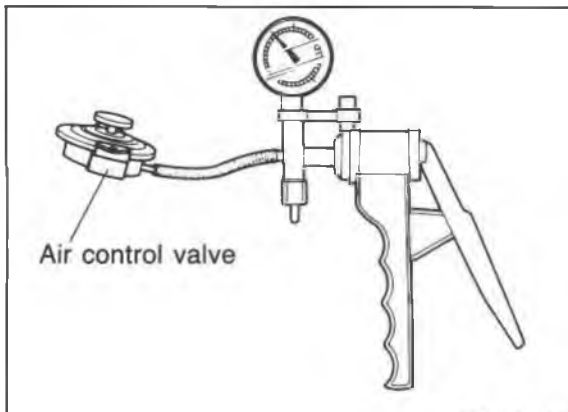


76G04B-099

### Air Control Valve Inspection

1. Remove the air control valve.

## 4B AIR INJECTION SYSTEM

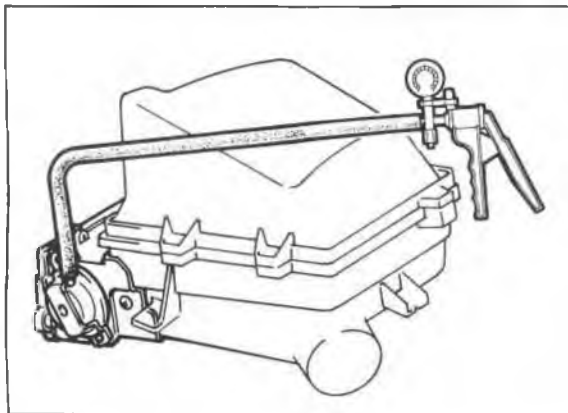


56G04B-114p

2. Connect a vacuum pump to the valve.
3. Apply vacuum gradually and check that the stem starts to move as specified.

### Specification:

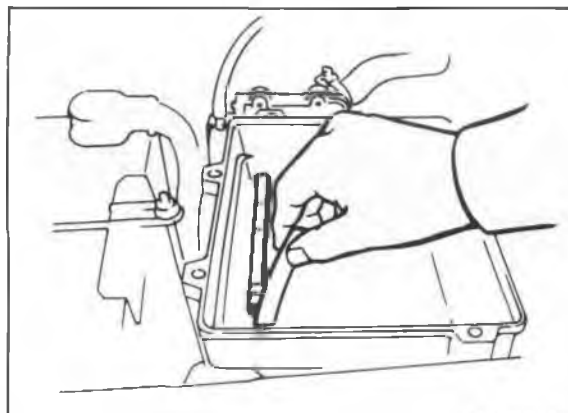
**180—280 mmHg (7.1—11.0 inHg)**



76G04B-100

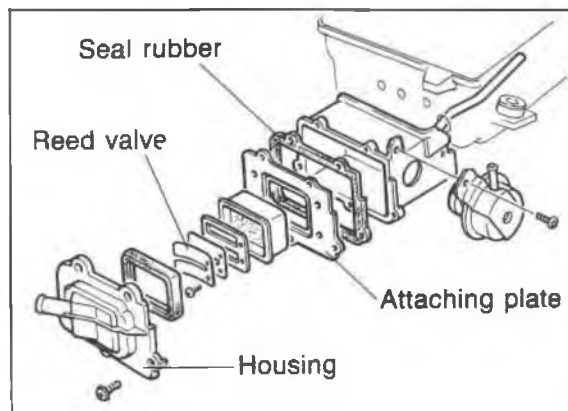
### Reed Valve Inspection

1. Warm up the engine and run it at idle.
2. Disconnect the vacuum hose from the air control valve and plug it.
3. Attach a vacuum pump to the air control valve and apply **500 mmHg (19.7 inHg)** vacuum.



76U04A-066

4. Check that air is sucked into the air passage.
5. Increase the engine speed to **2,500 rpm**.
6. Check that exhaust gas is not emitted from the passage.
7. If not correct, replace the reed valve.



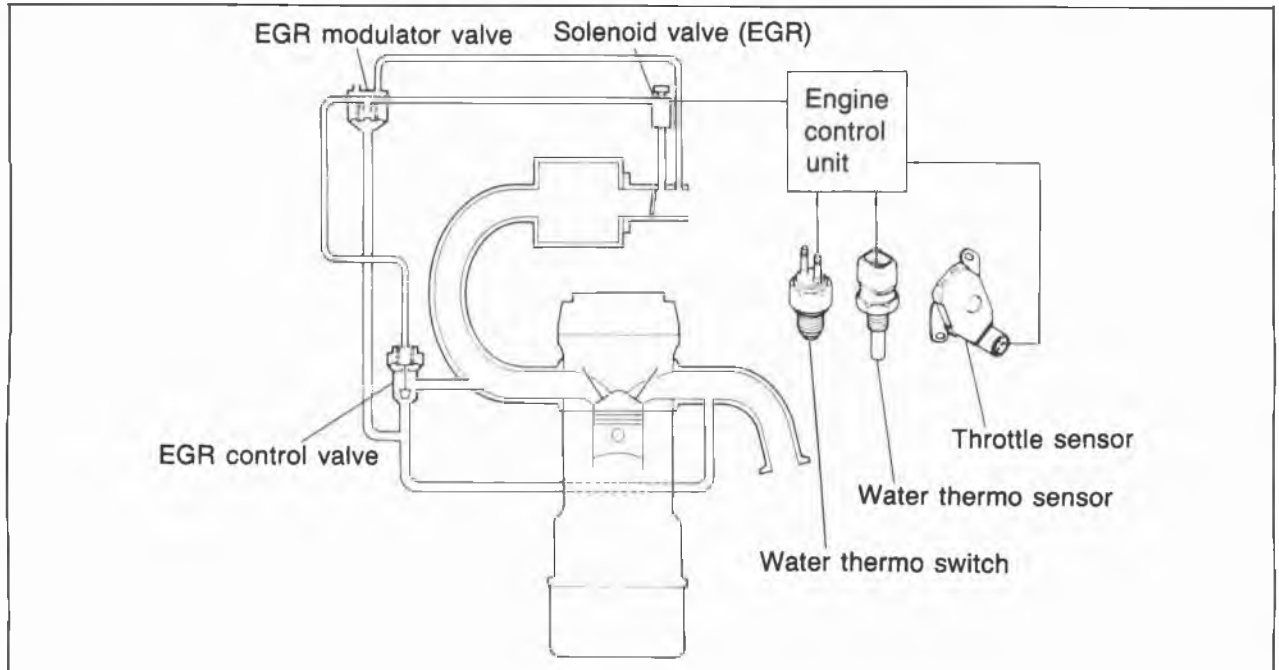
76G04B-101

### Replacement

1. Remove in the sequence shown in the figure.
  - 1) Housing
  - 2) Attaching plate
  - 3) Reed valve
  - 4) Seal rubber
2. Install in the reverse order of removal.



## EXHAUST GAS RECIRCULATION (EGR) SYSTEM



86U04A-127

This system introduces exhaust gas into the intake manifold to reduce NO<sub>x</sub> in the exhaust gas. It operates depending on the engine load, engine speed (**above 1,500 rpm**), engine coolant temperature (**above 70°C, 158°F**), and radiator coolant temperature (**above 17°C, 63°F**).

### COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>EGR control valve</b>	Recirculates portion of exhaust gas	
<b>EGR modulator valve</b>	Controls vacuum acting on EGR control valve	
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valve (EGR)	
<b>Ignition coil (-) terminal</b>	Detects engine speed; sends signal to engine control unit	
<b>Solenoid valve (EGR)</b>	Controls vacuum line to EGR control valve	
<b>Throttle sensor</b>	Detects throttle valve opening angle; sends signal to engine control unit	Integrated idle switch
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Water thermo switch</b>	Detects radiator coolant temperature; sends signal to engine control unit	ON: above 17°C (63°F)

76G04B-102

# 4B EGR SYSTEM

## TROUBLESHOOTING

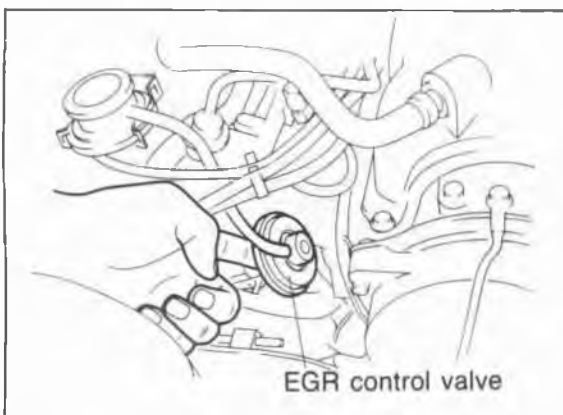
Check the condition of the wiring harness and connectors before checking the sensors or switches below.

### Note

Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B—7 and 8.)

Possible cause	Solenoid valve (EGR)	EGR modulator valve	EGR control valve	Water thermo sensor	Water thermo switch	Engine control unit terminal	System inspection
						2N	
Page	4B—72	4B—73	4B—73	4B—97	4B—97	4B—90	4B—72
Checking order	3	2	4	6	5	7	1

76G04B-103



86U04A-130

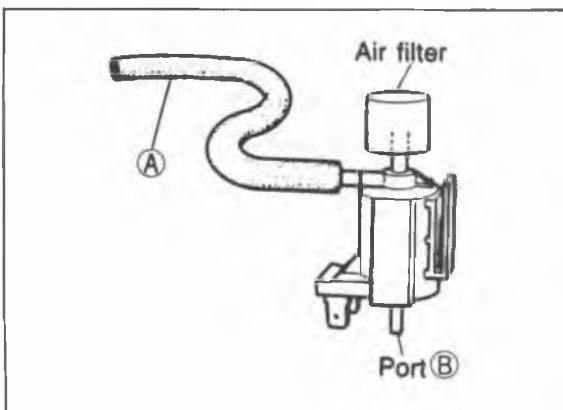
### System Inspection

1. Start the engine.
2. Accelerate the engine and verify that the diaphragm of the EGR control valve does not move while the engine is still cold.
3. Warm up the engine to normal operating temperature and run it at idle.

### Warning

**Be careful when checking the EGR control valve because the surrounding area is very hot.**

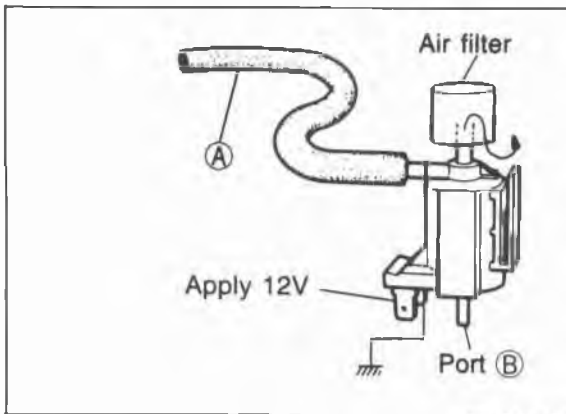
4. Accelerate the engine and check that the diaphragm of the EGR control valve moves upward.



86U04A-131

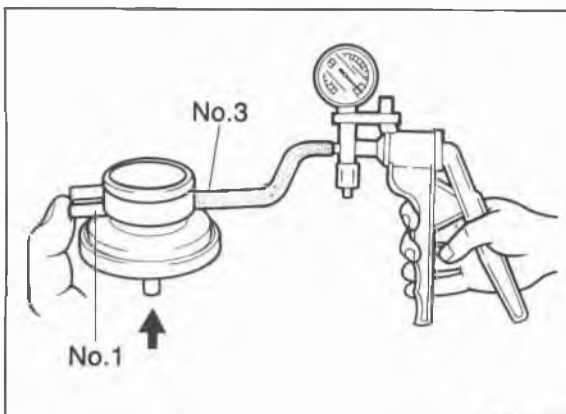
### Solenoid Valve (EGR)

1. Disconnect the vacuum hose from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from vacuum hose A.
3. Check that air flows from port B.



86U04A-132

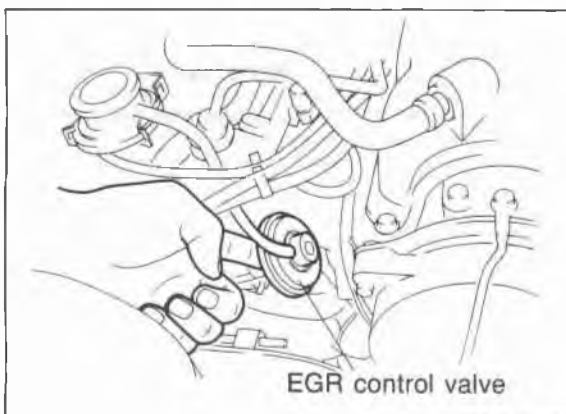
4. Disconnect the solenoid valve connector.
5. Connect 12V and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from vacuum hose A.
7. Check that air flows from the valve air filter.



86U04A-133

### EGR Modulator Valve

1. Remove the EGR modulator valve.
2. Plug the No. 1 port and connect a vacuum pump to the No. 3 port.
3. Blow into the exhaust gas port. Operate the vacuum pump and verify that vacuum is held.
4. Release the exhaust gas port and confirm that vacuum is released.



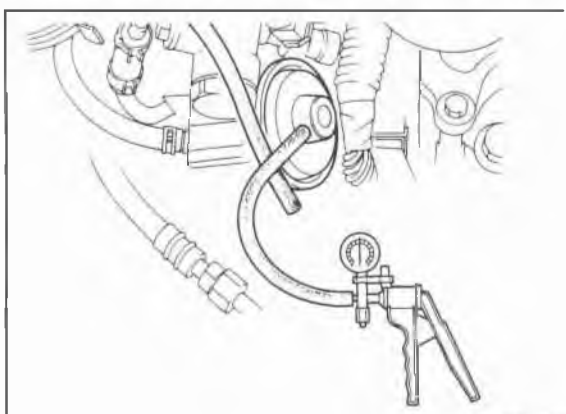
86U04A-134

### EGR Control Valve

1. Manually actuate the valve by pushing on the diaphragm with finger.
2. Check that the spring resistance is present and the diaphragm moves freely with no sticking or binding.

#### Note

**Before replacing the EGR control valve, check the intake air and control systems.**



86U04A-135

3. Warm up the engine and run it at idle.
4. Connect a vacuum pump to the valve and apply vacuum.
5. Check that the engine runs roughly or stalls at more than the specified vacuum.

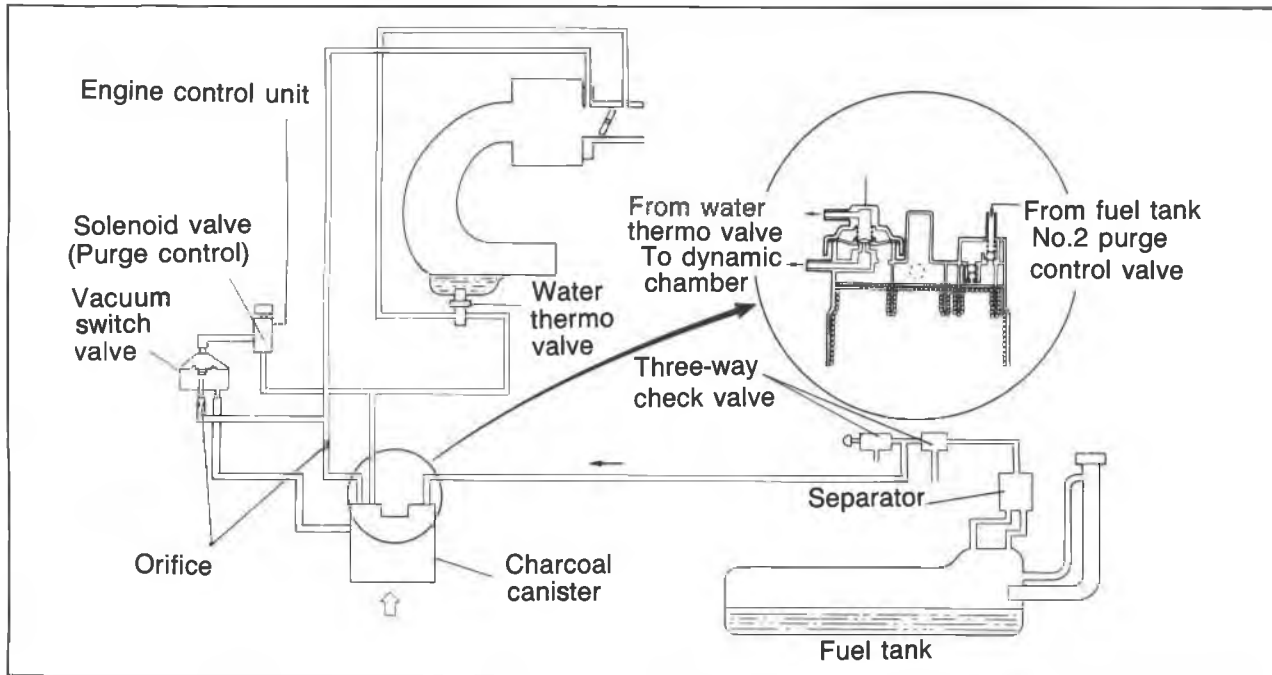
#### Specification:

**40—60 mmHg (1.6—2.4 inHg)**

6. If not correct, replace the EGR control valve.

# 4B EEC SYSTEM

## EVAPORATIVE EMISSION CONTROL (EEC) SYSTEM



86U04A-136

This system stores fuel vapor generated in the fuel tank in the canister when the engine is not running. The fuel vapor is stored in the canister until it is drawn into the dynamic chamber and burned when the engine is started.

### COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Air flow meter</b>	Detects amount of intake air; sends signal to engine control unit	Intake air thermo sensor and fuel pump switch are integrated
<b>Charcoal canister</b>	Stores fuel tank fumes when engine stopped	
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valve (Purge control)	
<b>Ignition coil (-) terminal</b>	Detects engine speed; sends signal to engine control unit	
<b>Separator</b>	Prevents fuel from flowing into charcoal canister	
<b>Solenoid valve (Purge control)</b>	Controls vacuum line to vacuum switch valve	
<b>Three-way check valve</b>	Controls pressure in fuel tank	
<b>Vacuum switch valve</b>	Regulates evaporative fumes from canister to intake manifold	
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Water thermo valve</b>	Controls vacuum applied to No.1 purge control valve and solenoid valve (Purge control)	Opens vacuum line above 54°C (129°F)

76G04B-104

## TROUBLESHOOTING

Check the condition of the wiring harness or connectors, before checking the sensors or switches.

**Note**

Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B—7 and 8.)

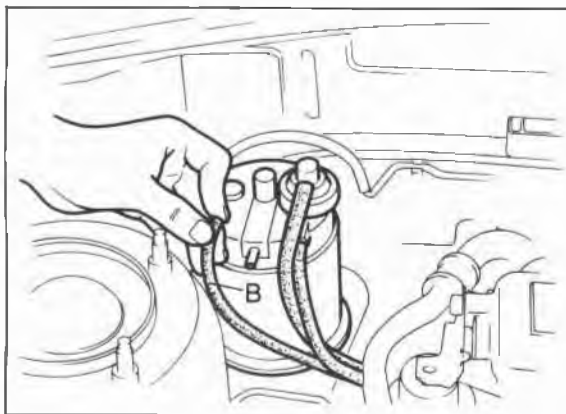
Possible cause	Vacuum switch valve	Solenoid valve (Purge control)	Three-way check valve	Separator	No.1 purge control valve	No.2 purge control valve	Water thermo valve	Water thermo valve	Engine control unit terminal	System inspection
	2P									
Page	4B—77	4B—78	4B—78	4B—79	4B—77	4B—77	4B—78	4B—97	4B—90	4B—76
Checking order	3	2	9	10	4	5	6	7	8	1

76G04B-105

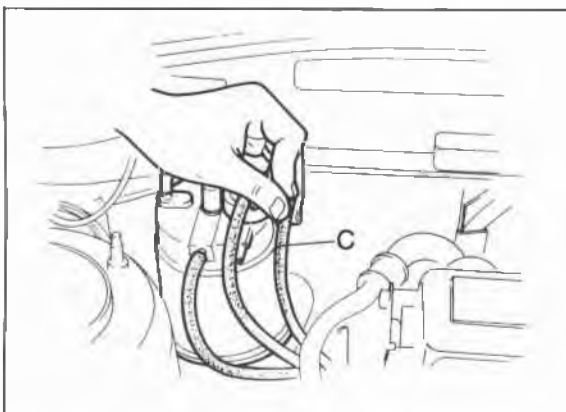
## 4B EEC SYSTEM



86U04A-139



86U04A-141



86U04A-142

### System Inspection

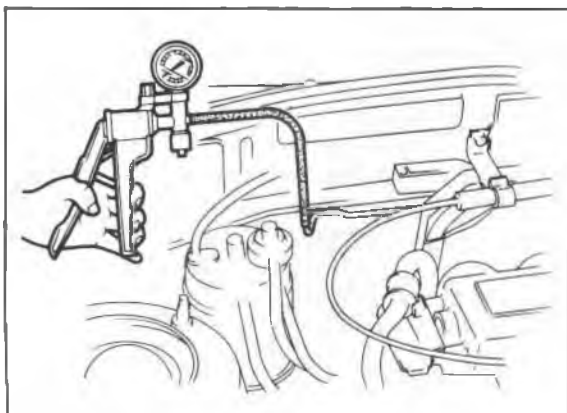
1. Check the vacuum hose routing.
2. If there is a poor connection, clog, or leak, repair or replace as necessary.
3. Warm up the engine and run it at idle.
4. Disconnect vacuum hose A from No. 1 purge control valve and connect the **SST** to the hose.

86U04A-140

5. Increase the engine speed to above **2,500 rpm** and verify that the gauge shows more than **150 mmHg (5.9 inHg)**.
6. If not correct, check the water thermo valve.
7. Reconnect hose A to No. 1 purge control valve.

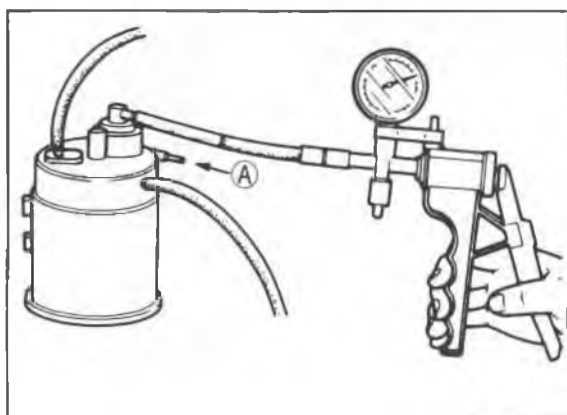
8. Disconnect vacuum hose B from the canister and place a finger over the end of the hose.
9. Accelerate the engine rapidly and check that vacuum is felt at **above 1,500 rpm**.
10. Reconnect hose B to the canister.

11. Disconnect vacuum hose C from the canister and place a finger over the end of the hose.
12. Check that vacuum is felt.
13. If not correct, check the vacuum line between the canister and the dynamic chamber for clogging.



86U04A-143

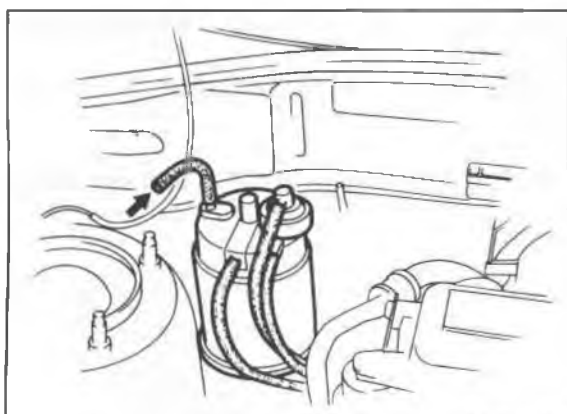
14. Disconnect the evaporation hose from the evaporation pipe.
15. Connect the vacuum pump to the evaporation pipe.
16. Operate the vacuum pump and verify that no vacuum is held.
17. If vacuum is held, check the evaporation pipe for clogging.



86U04A-144

### No. 1 Purge Control Valve

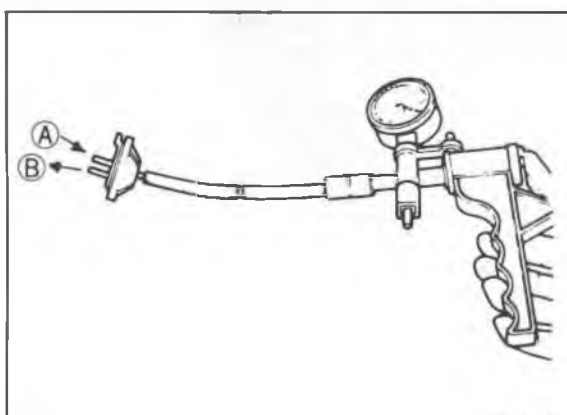
1. Blow through the purge control valve from port A and check that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.33 inHg)** vacuum, and blow through port A again; air should flow.



86U04A-145

### No. 2 Purge Control Valve

1. Disconnect vacuum hose B from the evaporation pipe.
2. Blow through the hose and verify that air flows freely.



86U04A-146

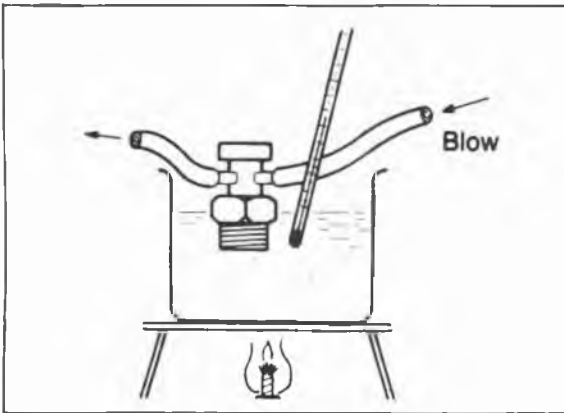
### Vacuum Switch Valve

1. Remove vacuum switch valve.
2. Connect a vacuum pump to the valve.
3. Blow through the valve from port A and verify that air comes out of port B when vacuum is applied.

### Specified vacuum:

**66—106 mmHg (2.6—4.2 inHg)**

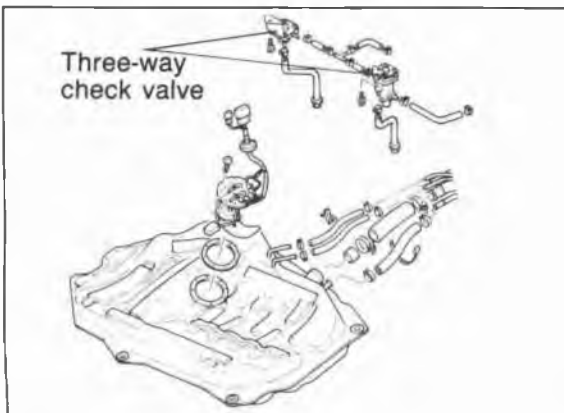
## 4B EEC SYSTEM



86U04A-147

### Water Thermo Valve

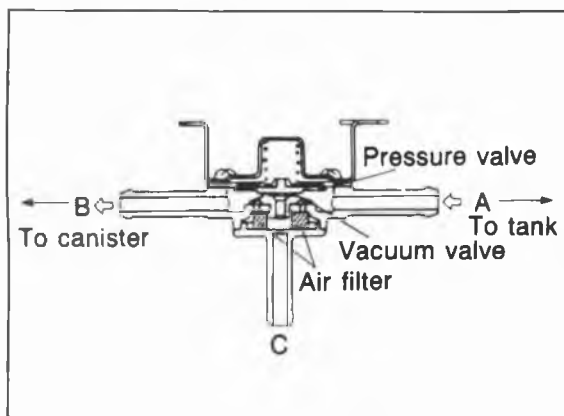
1. Remove the water thermo valve.
2. Immerse the valve in a water-filled container.
3. Heat the water gradually and observe the temperature.
4. Blow through the valve from one vacuum port and verify that air comes out of the other port at **46—54°C (115—129°F)**.



86U04A-148

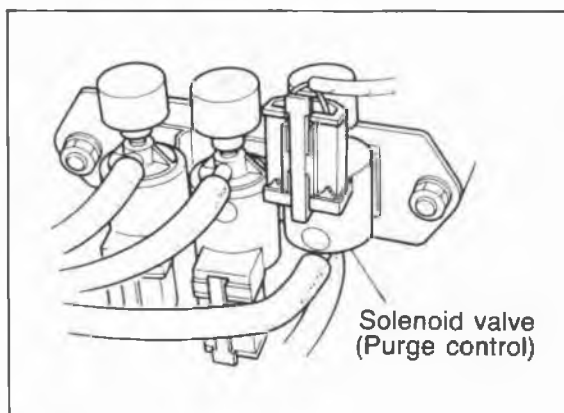
### Three-Way Check Valve

1. Remove the check valve.



86U04A-149

2. Blow through the valve from port A, and check that air comes out of port B. Next, block port B and check that air comes out of port C.
3. Block port B.
4. Connect a vacuum pump to port A and verify that no vacuum is held.

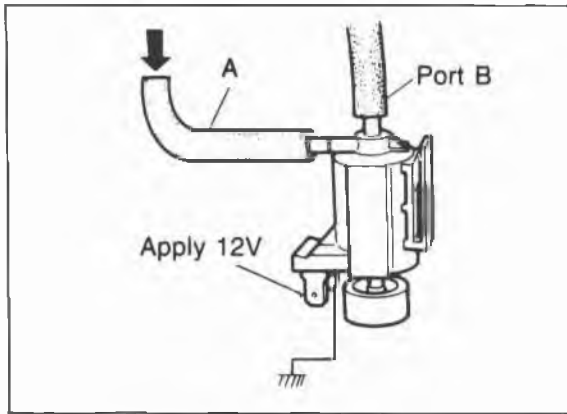


76G04B-128

### Solenoid Valve (Purge control)

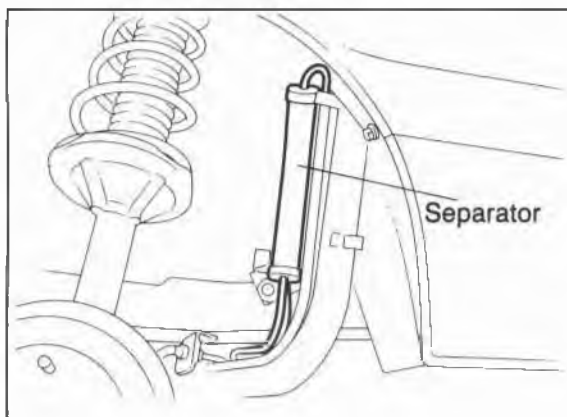
1. Remove the solenoid valve.





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2. Connect vacuum hoses to the valve as shown in the figure.
3. Blow air through the valve from hose A and check that air comes out of the valve air filter.
4. Apply 12V and ground the solenoid valve with jumper wires.
5. Blow air through the valve from hose A and check that the air comes out of port B.
6. Replace, if necessary.



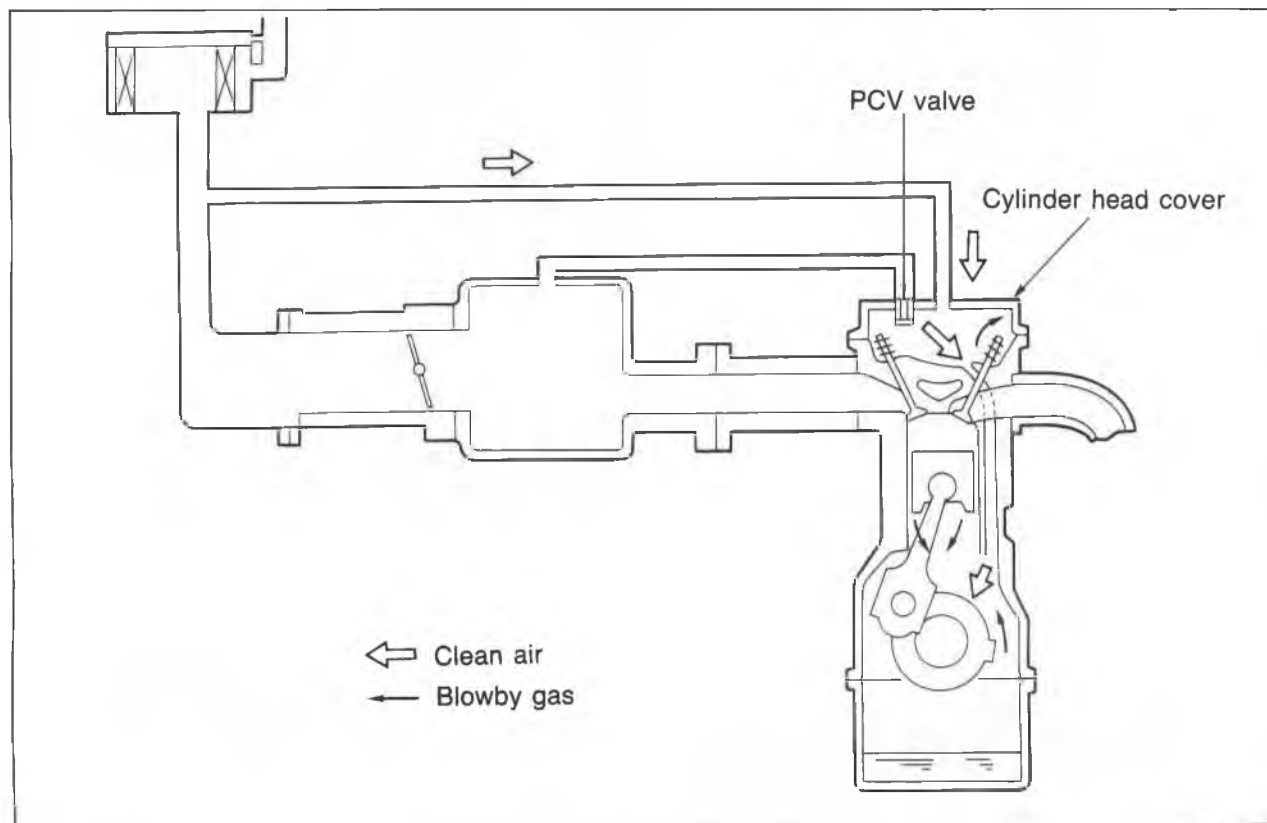
86U04A-154

### Separator

1. Remove the separator.
2. Visually check the separator for damage.
3. Replace, if necessary.

## 4B PCV SYSTEM

### POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

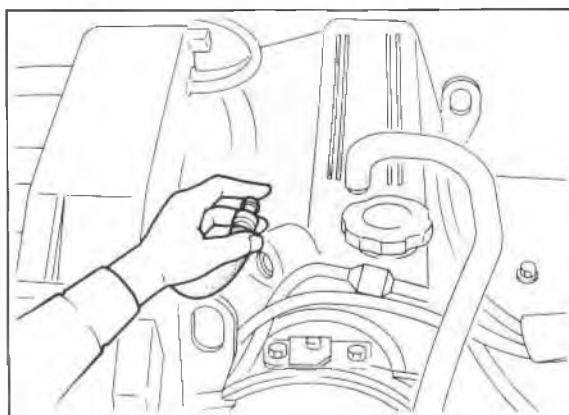


76G04B-106

The PCV valve is operated by the intake manifold vacuum. When the engine is running at idle, the PCV valve is opened slightly and a small amount of blowby gas is drawn into the dynamic chamber. At high engine speeds, the PCV valve is further opened and a larger amount of blowby gas is drawn into the dynamic chamber.

#### COMPONENT DESCRIPTION

Component	Function
PCV valve	Controls blowby gas amount pulled into engine

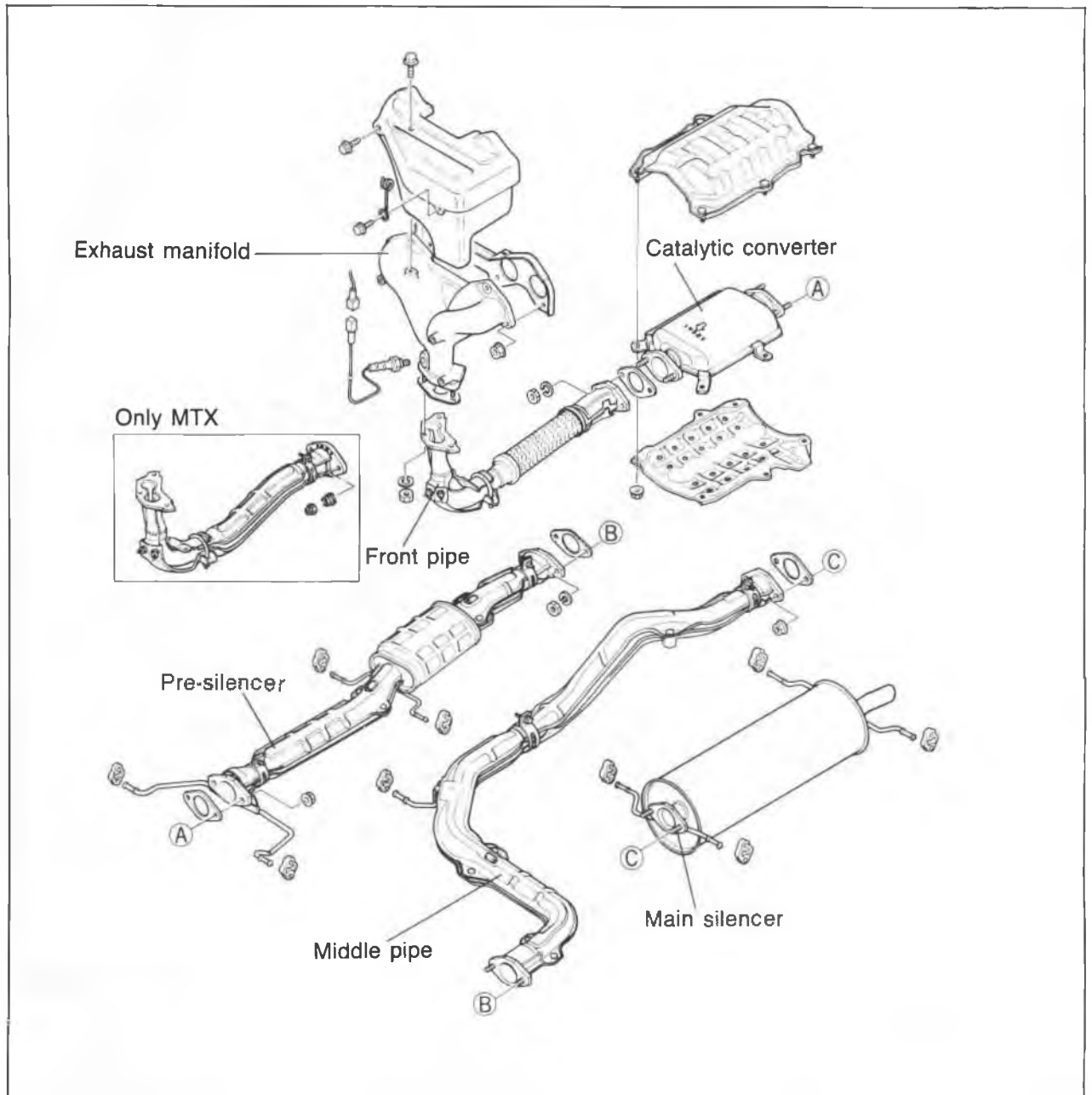


86U04A-157

#### PCV VALVE

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve and the ventilation hose from the cylinder head cover.
3. Close the PCV valve opening.
4. Check that vacuum is felt.

## EXHAUST SYSTEM



76G04B-107

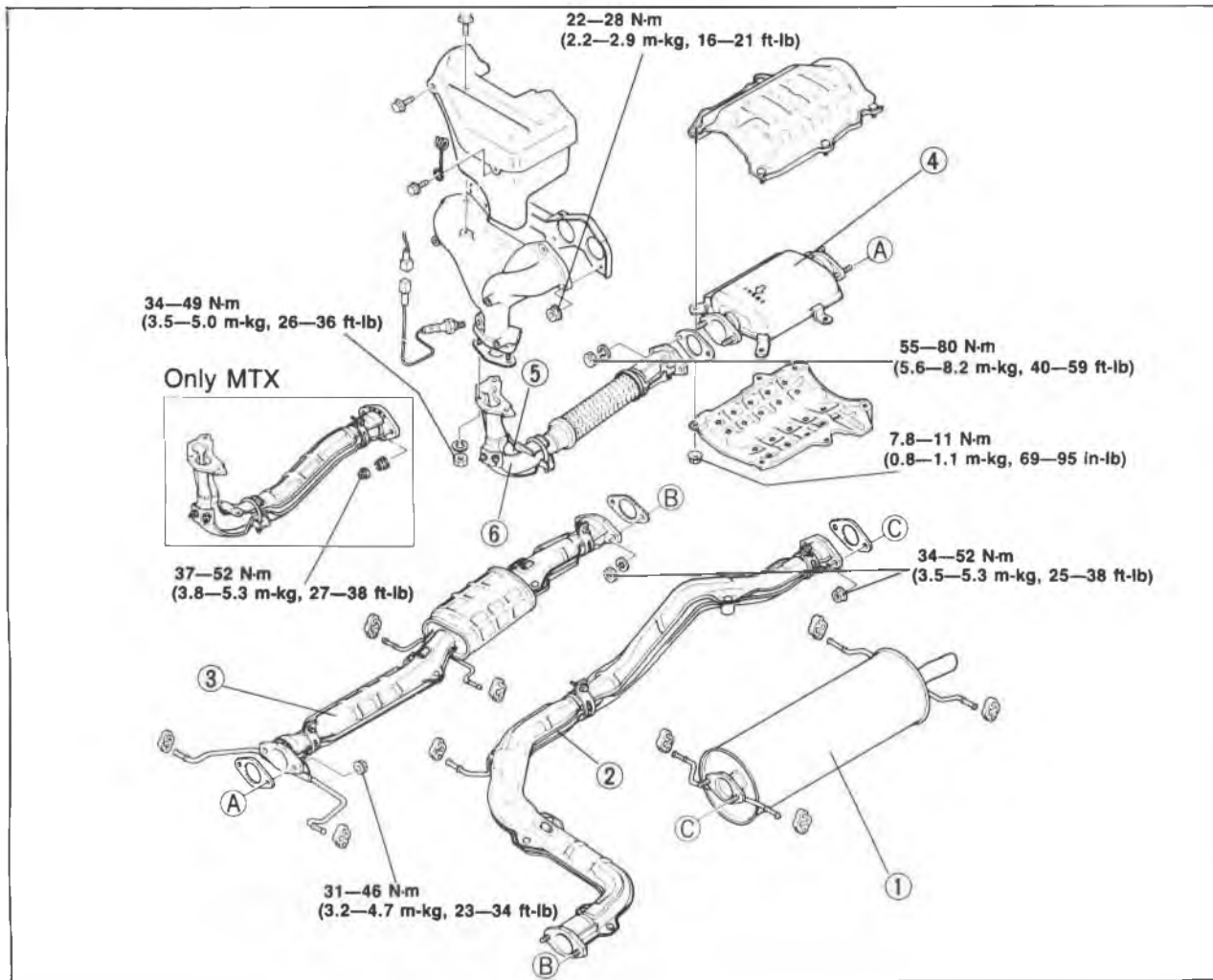
The catalytic converter is used to reduce CO, HC and NOx. The converter contains a compound of platinum and rhodium. It is a three-way catalyst type with a volume of **1,600 cc (98 cu in)**.

# 4B EXHAUST SYSTEM

## REMOVAL AND INSTALLATION

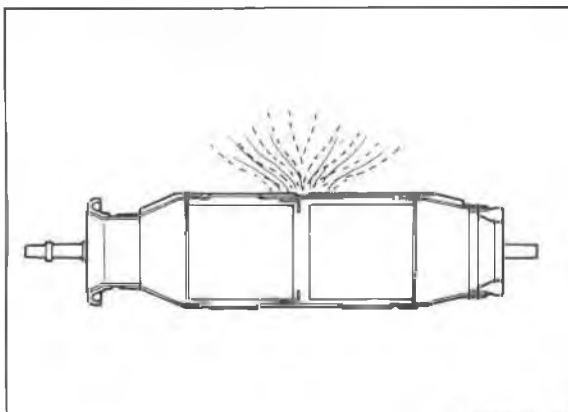
1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

## Torque Specifications



1. Main silencer
2. Middle pipe
3. Pre-silencer

4. Catalytic converter
5. Bracket
6. Front pipe



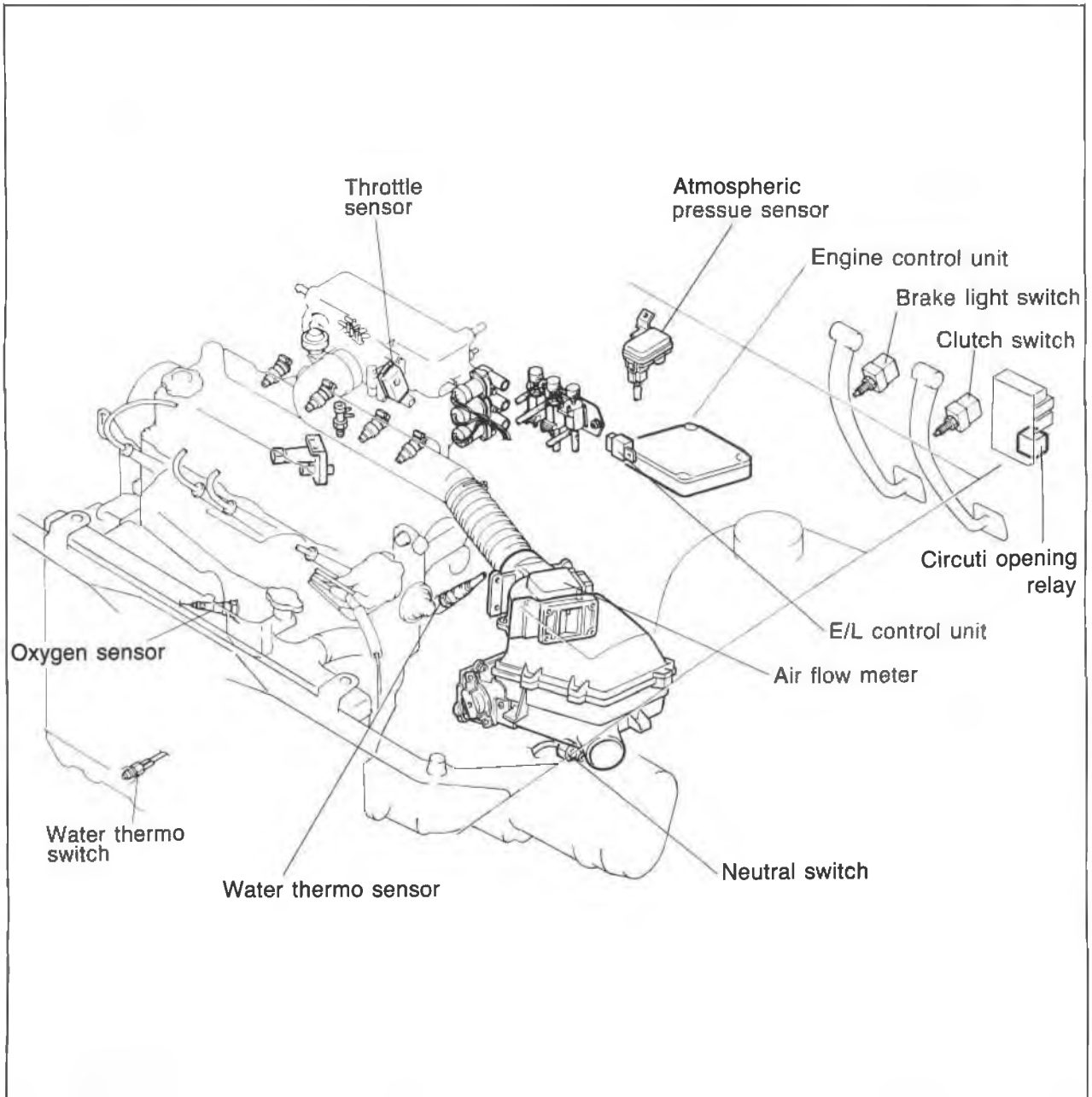
## INSPECTION

1. Check the catalytic converter and exhaust pipe for deterioration or restriction.
2. Check the insulation covers welded onto the catalytic converter for damage.

## Note

If the insulation cover is touching the catalytic converter housing, excessive heat at the floor will occur.

## CONTROL SYSTEM



76G04B-129

The control system consists of the input devices and the engine control unit. The engine control unit controls the fuel injection amount (EGI), fuel injection pressure, bypass air amount, switch monitor function, and fail-safe function.

# 4B CONTROL SYSTEM

## RELATIONSHIP CHART Input Devices and Output Devices

BRAKE LIGHT SWITCH	○	×	×	×	×	×	×	×	×	×	×	
ELECTRICAL LOAD CONTROL UNIT	×	×	×	×	×	×	×	×	×	○	×	
P/S PRESSURE SWITCH*	×	×	×	×	×	×	×	×	×	○	×	
A/C SWITCH	○	×	×	×	×	○	○	×	×	×	○	
IGNITION SWITCH (STA POSITION)	○	○	×	○	×	×	×	×	×	○	○	
INHIBITOR SWITCH	○	×	×	×	○	×	×	×	×	×	○	
NEUTRAL AND CLUTCH SWITCH	○	×	×	×	×	×	×	×	×	×	○	
OXYGEN SENSOR	○	×	×	×	×	×	×	×	×	×	×	
WATER THERMO SWITCH (RADIATOR)	○	×	×	×	○	×	×	×	×	×	×	
ATMOSPHERIC PRESSURE SENSOR	○	×	×	×	×	○	×	○	○	○	×	
INTAKE AIR THERMO SENSOR	○	×	×	○	×	×	×	○	○	○	×	
WATER THERMO SENSOR	○	×	×	○	○	○	×	×	×	○	×	
IDLE SWITCH	○	○	×	○	×	×	×	×	×	○	×	
THROTTLE SENSOR	○	○	×	×	○	×	×	×	×	×	○	
AIR FLOW METER	○	×	×	×	×	○	×	×	×	×	×	
IGNITION COIL	○	○	×	○	○	○	×	×	×	○	○	
INPUT DEVICES	INJECTOR	FUEL INJECTION AMOUNT	AIR VALVE	PRESSURE REGULATOR	SOLENOID VALVE	PURGE	IDLE-UP (A)*	AIR BYPASS SOLENOID VALVE	IDLE-UP (B)	IDLE-UP (C)	AIR CONDITIONER	
		FUEL INJECTION TIMING										

X : Not related ○ : Related

\* It does not have a relationship with the engine control unit

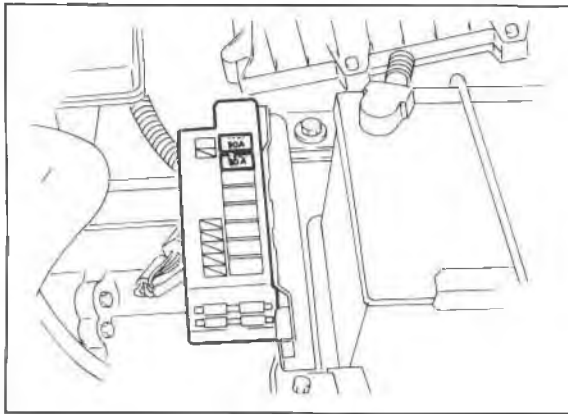
76G04B-108

Output Devices and Engine Conditions

CONTROL SYSTEM 4B

ENGINE CONDITIONS		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCEL- ERATION	HEAVY LOAD	DECEL- ERATION	IDLE (THROT- TLE VALVE FULLY CLOSED)	IGN: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
OUTPUT DEVICES											
INJEC- TOR	FUEL INJECTION AMOUNT	Rich		Rich and lean		Rich		Fuel cut	Rich and lean	No injection	
	FUEL INJECTION TIMING	1 group (once per revolution)							1 group (once per revolution)		
AIR VALVE		Open		Closed*						*After warming up	
SOLE- NOID VALVE	PRESSURE REGULATOR	OFF (Vacuum to pressure regulator)							After start ON* (Vacuum cut)	OFF	*Hot start only
	EGR	ON (EGR cut)		OFF (EGR)	ON (EGR cut)	OFF (EGR)	ON (EGR cut)		ON		
	PURGE	OFF (2nd stage not operated)		ON (2nd stage operates)			OFF (2nd stage not operated)		OFF	1st stage: controlled by water thermo valve	
AIR BYPASS SOLE- NOID VALVE	IDLE-UP (A)	Open*									*With A/C ON
	IDLE-UP (B)	Open (When intake air temp. above 55°C (131°F) or vehicle at above 1,000 m (3,280 ft)							No bypass		
	IDLE-UP (C)	Open (When E/L applied, P/S operated, intake air temp. above 55°C (131°F), solenoid valve (pressure regulator) ON or vehicle at above 1,900 m (6,232 ft)							After start open*		*Hot start only
AIR CONDITIONER		Operates				Not operate*		Operates	Does not operate	*Full throttle	

# 4B CONTROL SYSTEM

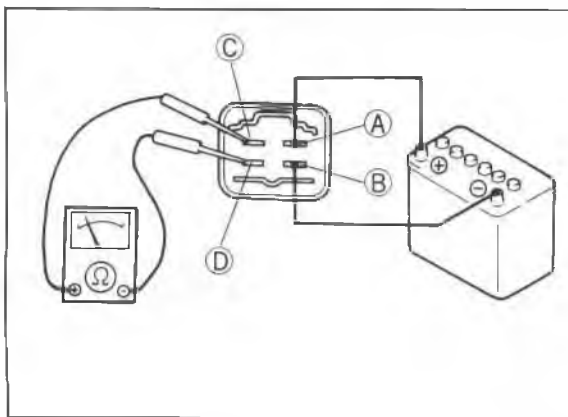


69G04A-161

## EGI MAIN FUSE

### Inspection

Check the continuity of EGI main fuse.

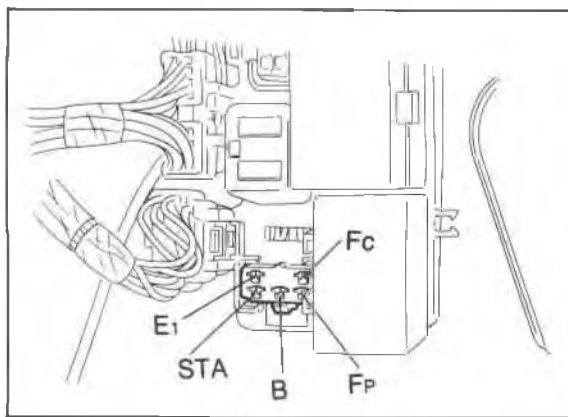


86U04A-169

## MAIN RELAY

1. Check that a "clicking" sound is heard at the main relay when turning the ignition switch ON and OFF.
2. Apply 12V and a ground to (A) and (B) terminals of the main relay.
3. Check continuity at terminals using an ohmmeter.

Operation Terminals	12V Not applied	12V Applied
Ⓒ - Ⓓ	No continuity	Continuity



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## CIRCUIT OPENING RELAY

### Relay Circuit

1. Remove the circuit opening relay.
2. Check the circuit as described.

Terminal	Checking item	Correct result
Fp	Resistance	0.2-30Ω
Fc	Continuity (cranking)	∞
B	Voltage (Ign: ON)	Battery voltage
STA	Voltage (Cranking)	Approx. 9V
E1	Continuity	∞

### Circuit Opening Relay

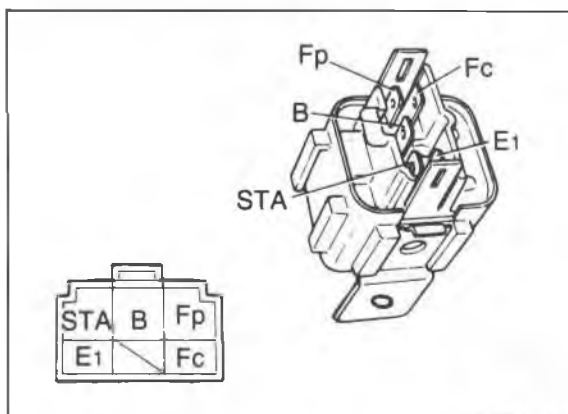
Apply 12V and a ground to the terminals below and check the circuit opening relay as described.

12V	Grounded	Correct result
STA	E1	B ↔ FP: Continuity
B	Fc	Fp: Battery voltage

### Resistance

Check the resistance between the terminals using an ohmmeter.

Between terminals	Resistance (Ω)
STA ↔ E1	15 ~ 30
B ↔ Fc	80 ~ 150
B ↔ Fp	∞

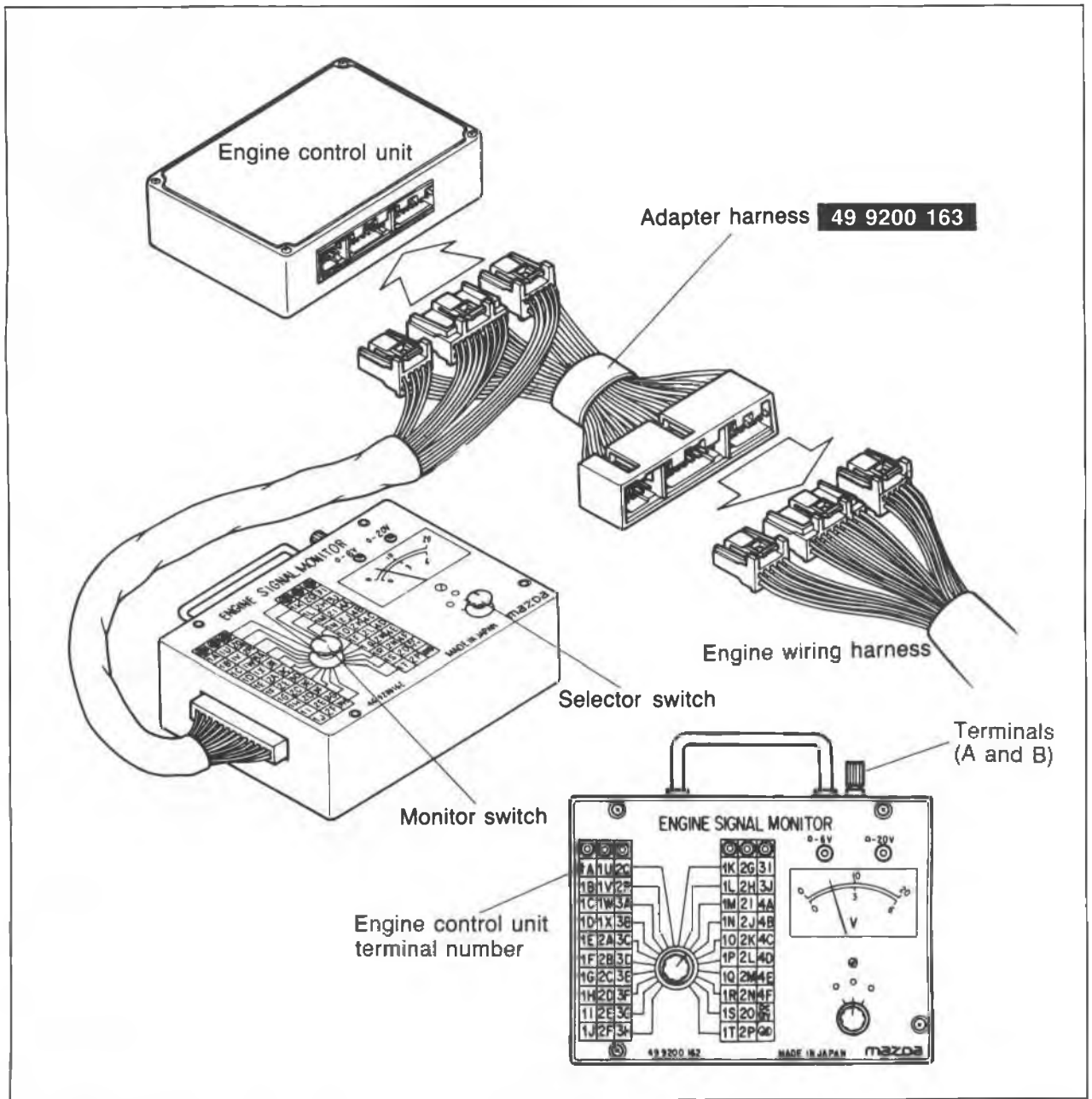


69G04A-164



## ENGINE CONTROL UNIT

Engine Signal Monitor (49 9200 162) and Adapter (49 9200 163).



86U04A-171

The **Engine Signal Monitor** (49 9200 162) was developed to check the control unit terminal voltages. This monitor easily inspects the individual terminal voltages through selection of the monitor switch.

### How to Use the Engine Signal Monitor

1. Connect the **Engine Signal Monitor** (49 9200 162) between the engine control unit and the engine harness using the **adapter** (49 9200 163).
2. Turn the selector switch and monitor switch to select the terminal number.
3. Check the terminal voltage.

### Caution

**Never apply voltage to terminals A and B.**

# 4B CONTROL SYSTEM

## Terminal Voltage

If the input and output devices and related wiring are normal, but the engine control unit terminal voltage is incorrect, replace the engine control unit.

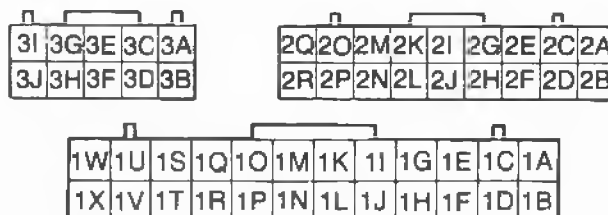
Terminal	Input	Output	Connection to	Voltage (After warming-up)		Remarks
				IGN: ON	Idle	
1A	—	—	—	—		—
1B		○	Self-Diagnosis Checker (Code number)	For 3sec. after ignition switch OFF → ON: below 6.2V (Buzzer sounds) After 3sec.: Battery voltage (Buzzer does not sound)		<ul style="list-style-type: none"> <li>Using Self-Diagnosis Checker and test connector grounded</li> <li>Buzzer sounds: below 6.2V</li> <li>Buzzer does not sound: Battery voltage</li> </ul>
1C	—	—	—	—		—
1D		○	Self-Diagnosis Checker (Monitor lamp)	Test connector grounded For 3sec. after ignition switch OFF → ON: below 6.2V (light illuminates) After 3sec.: Battery voltage (light does not illuminate)	(Test connector grounded) approx. 10V (Test connector not grounded) Monitor lamp ON: below 6.2V Monitor lamp OFF: Battery voltage	With Self-Diagnosis Checker
1E	○		Idle switch	Accelerator pedal released: below 1.5V Accelerator pedal depressed: Battery voltage		
1F		○	A/C relay	A/C switch ON: below 2.5V A/C switch OFF: Battery voltage		Blower motor ON
1G	—	—	—	—		—
1H	○		Water thermo switch	Below 1.5V		Radiator temp.: above 17°C (63°F)
1I	○		Electrical load control unit	Electrical load ON: below 1.5V Electrical load OFF: Battery voltage		Electrical load: Rear defroster Headlight Blower motor (3rd & 4th position) Electrical fan
1J	○		Brake light switch	Brake pedal released: below 1.5V Brake pedal depressed: battery voltage		
1K	—	—	—	—		—
1L	○		A/C switch	A/C switch ON: below 1.5V A/C switch OFF: battery voltage		Blower motor: ON
1M	○		Ignition coil ⊖ terminal	Battery voltage	*1 Battery voltage	*1 Engine Signal Monitor: green and red lights flash
1N	—	—	—	—		—
1O	—	—	—	—		—

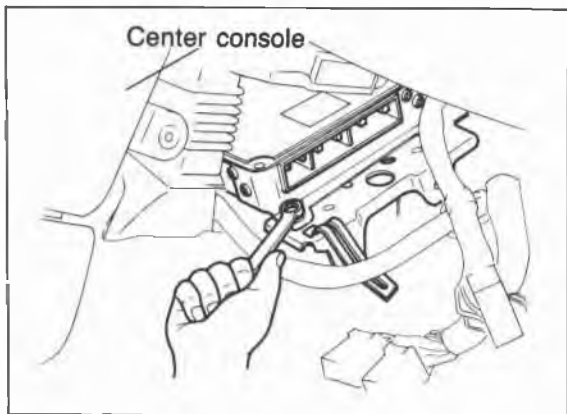
Terminal	Input	Output	Connection to	Voltage (After warming-up)		Remarks
				IGN: ON	Idle	
1P	—	—	—	—		—
1Q	—	—	—	—		—
1R	—	—	—	—		—
1S		○	Air bypass solenoid valve (Idle-up C) and P/S pressure switch	Battery voltage		While solenoid ON (Refer to page 4B—35): below 1.5V
1T	—	—	—	—		—
1U	—	—	—	—		—
1V	○		MTX Neutral and clutch switch	In-gear condition Clutch pedal depressed: battery voltage Clutch pedal released: below 1.5V		Neutral: constant battery voltage
1W	○		Test connector	Test connector grounded: below 1.5V Test connector not grounded: battery voltage		Green connector, 1-pin
1X	—	—	—	—		—
2A		○	V ref	4.5—5.5V		
2B	○		Air flow meter (Vc)	6—10V		
2C	—	—	Ground (E2)	Approx. 0V		
2D	○		Oxygen sensor	0V	0—1.0V	<ul style="list-style-type: none"> <li>• Cold engine: 0V at idle</li> <li>• After warming-up: Increase engine speed: 0.5—1.0V Deceleration: 0—0.4V</li> </ul>
2E	○		Air flow meter (Vs)	Approx. 1.7V	Approx. 3—5V	Increase engine speed: voltage increases
2F	—	—	—	—		—
2G	○		Throttle sensor	Accelerator pedal released: 0.4—0.6 V		
2H	○		Atmospheric pressure sensor	At sea level: approx. 4.0V		
2I	○		Water thermo sensor	0.3—0.6 V		Engine coolant temp. 20°C (68°F): approx. 2.5V
2J	○		Air flow meter (Intake air thermo sensor)	Approx. 2.3V at 20°C (68°F)		
2K		○	Solenoid valve (Pressure regulator control)	For 120 sec. after ignition switch OFF → ON: below 1.5V	For 120 sec. after starting: below 1.5V	Hot condition: Coolant temp. above 70°C (158°F) Intake air temp. above 10°C (50°F)
				Battery voltage		
2L	—	—	—	—		—
2M	—	—	—	—		—

# 4B CONTROL SYSTEM

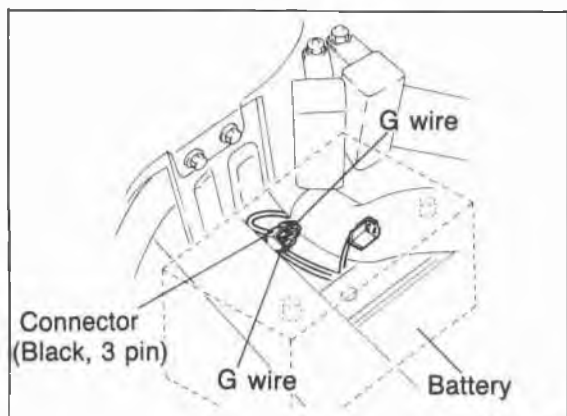
Terminal	Input	Output	Connection to	Voltage (After warming-up)		Remarks
				IGN: ON	Idle	
2N		○	Solenoid valve (EGR)	Below 1.5V		<ul style="list-style-type: none"> <li>Cold engine: below 1.5V Radiator coolant temp.—below 17°C (63°F) or Engine coolant temp.—below 70°C (158°F)</li> <li>Engine above approx. 1,500 rpm: Battery voltage</li> </ul>
2O		○	Air bypass solenoid valve (Idle-up B)	Battery voltage		While solenoid ON (Refer to page 4B—35): below 1.5 V
2P		○	Solenoid valve (Purge control valve)	Battery voltage		<ul style="list-style-type: none"> <li>Medium and high load: below 1.5V</li> </ul>
2Q	—	—	—	—		
2R	—	—	Ground (E02)	Below 1.5V		
3A	—	—	Ground (E01)	Below 1.5V		
3B	○	—	Ignition switch (Start position)	Below 1.5V		While cranking: battery voltage
3C		○	Injector (No. 4 and No. 2)	Battery voltage	*1 Battery voltage	*1 Engine Signal Monitor green and red lights flash
3D	○	—	Inhibitor switch	"N" or "P" range: below 2.0V Other ranges: battery voltage		ATX
3E		○	Injector (No. 1 and No. 3)	Battery voltage	*1 Battery voltage	*1 Engine Signal Monitor: green and red lights flash
3F	—	—	—	—		—
3G	—	—	Ground (E1)	Below 1.5V		
3H	—	—	—	—		—
3I	○	—	Main relay	Battery voltage		
3J	—	—	Battery	Battery voltage		For back-up

76G04B-110

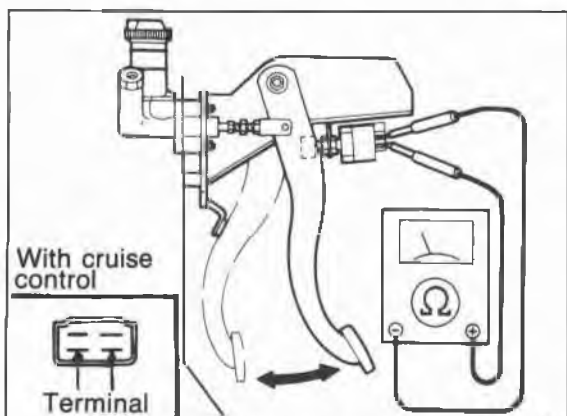




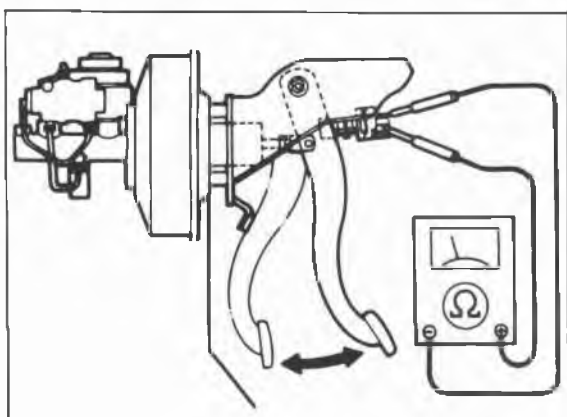
86U04A-174



69G04A-171



69G04A-172



86U04A-175

## Replacement

1. Disconnect the negative battery cable.
2. Remove the front console covers (right and left).
3. Disconnect the connectors from the control unit.
4. Replace the control unit.

## NEUTRAL SWITCH

### Inspection

1. Disconnect the neutral switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Transmission	Continuity
In neutral	No
In other ranges	Yes

4. After checking, connect the switch connector.

### Note

Refer to section 7A for replacement of the neutral switch.

## CLUTCH SWITCH

### Inspection

1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Pedal	Continuity
Depressed	No
Released	Yes

4. After checking, connect the switch connector.

### Note

Refer to section 6 for replacement of the clutch switch.

## BRAKE LIGHT SWITCH

### Inspection

1. Disconnect the brake light switch connector.
2. Connect an ohmmeter to the switch.
3. Check the continuity of the switch.

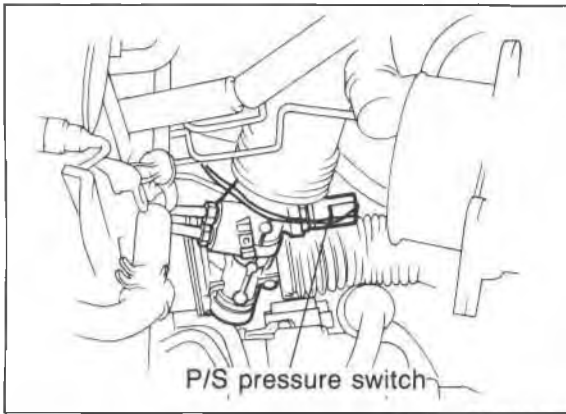
Pedal	Continuity
Depressed	Yes
Released	No

4. After checking, connect the switch connector.

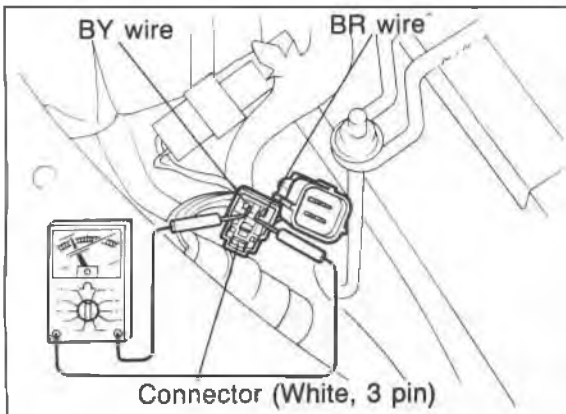
### Note

Refer to section 11 for replacement of the brake switch.

# 4B CONTROL SYSTEM



86U04A-176



86U04A-177

## P/S PRESSURE SWITCH

### Inspection

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the switch.
3. Start the engine. Check continuity of the switch while turning the steering wheel at idle.

P/S	Continuity
Turning	Yes
Not turning	No

4. Connect the switch connector after checking.

### Note

Refer to section 10 for replacement of the P/S pressure switch.

## INHIBITOR SWITCH

### Inspection

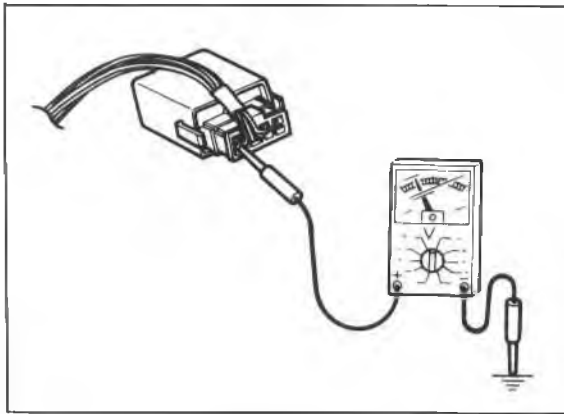
1. Disconnect the inhibitor switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Position	Continuity
P and N ranges	Yes
Other ranges	No

4. Connect the switch connector after checking.

### Note

Refer to Section 7B for replacement of the inhibitor switch.



69G04A-174

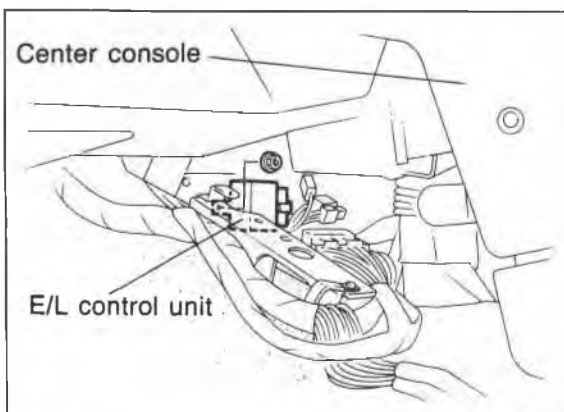
## E/L CONTROL UNIT

### Inspection

1. Connect a voltmeter between the E/L control unit and ground.
2. Start the engine and check the terminal voltages as described below.

Terminal	Input	Output	Connection to	Voltage (after warm-up)		Remarks
				Ignition switch: ON	Idle	
A (BW)	—	—	Ignition switch	Battery voltage		
B	—	—	—	—	—	—
C (B)	—	—	Ground	0V		
D (LY)	○		Electrical fan relay	Battery voltage		Coolant temp.: below 97°C (207°F)
				Below 1.5V		Coolant temp.: above 97°C (207°F)
E (GY)		○	Engine control unit (1l)	0V		E/L: ON
				Battery voltage		E/L: OFF
F (RB)	○		Headlight switch	Battery voltage		Headlight switch: ON
				Below 1.5V		Headlight switch: OFF
G (LB)	○		Blower motor switch	Below 1.5V		Blower motor switch: ON (3rd or 4th position)
				Approx. 5V		Others
H (BL)	○		Rear defroster switch	Below 1.5V		Rear defroster switch: ON
				Battery voltage		Rear defroster switch: OFF

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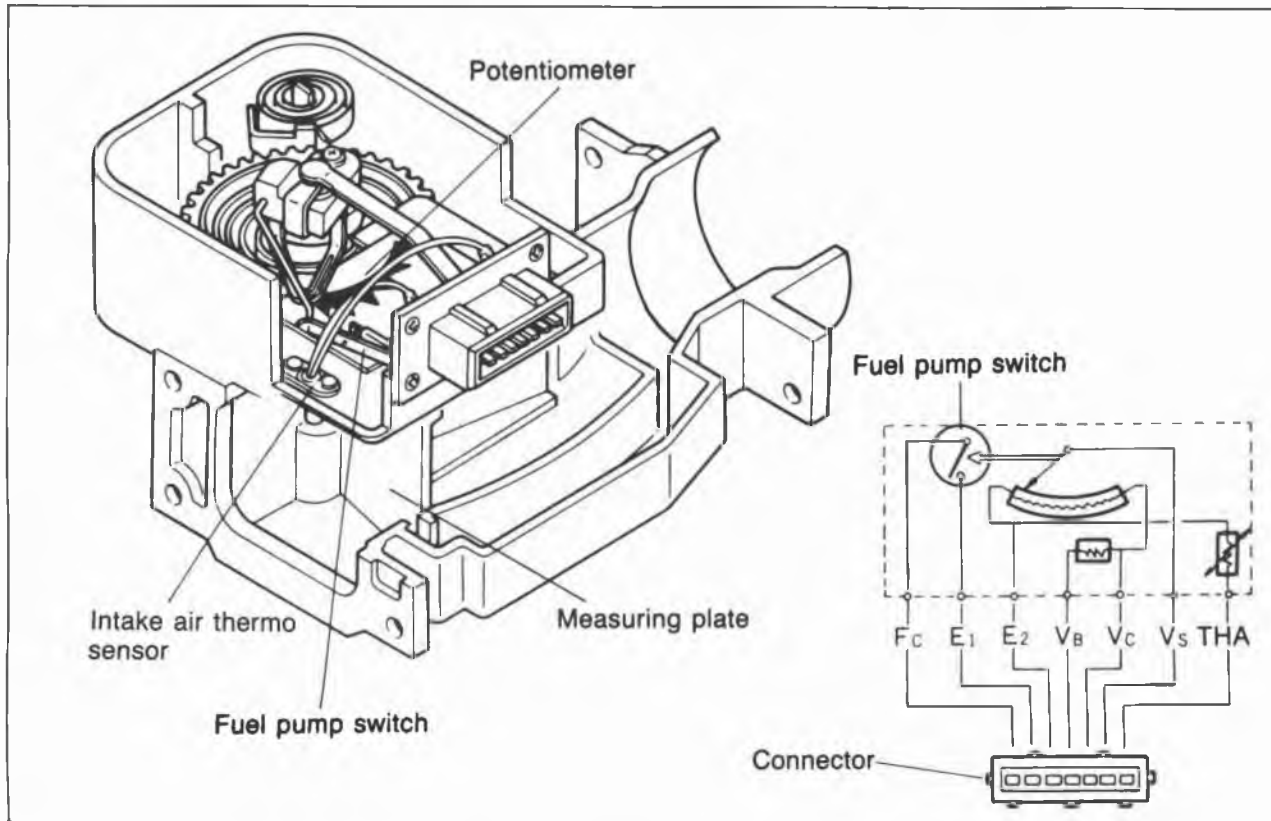
76G04B-111

### Replacement

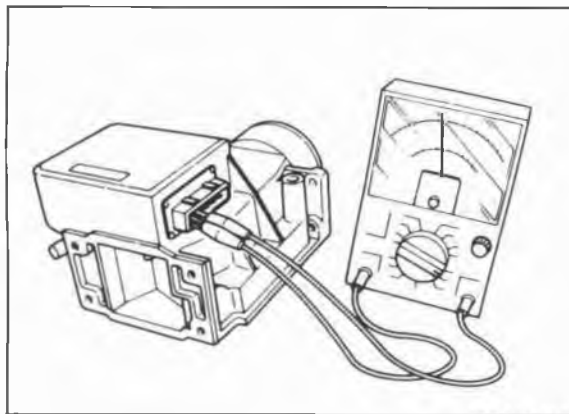
1. Remove the engine control unit. (Refer to page 4B—91)
2. Replace the E/L control unit.
3. Install in the reverse order of removal.

# 4B CONTROL SYSTEM

## AIR FLOW METER



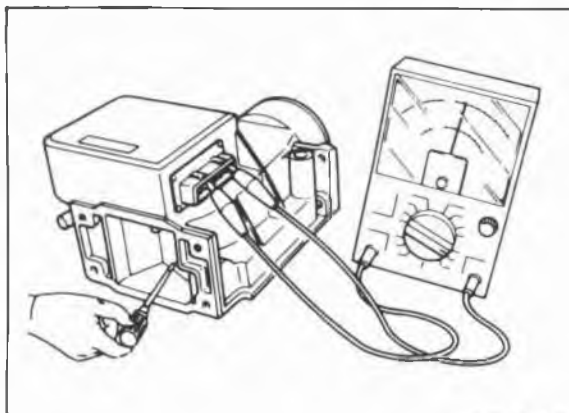
69G04C-100



76G04B-112

### Inspection

1. Remove the air flow meter. (Refer to page 4B—31)
2. Check the air flow meter body for cracks.
3. Verify that the measuring plate moves smoothly.
4. Disconnect the connector from the air flow meter.
5. Using an ohmmeter, check resistance between the terminals with the measuring plate fully closed and fully open.
6. Connect the connector to the air flow meter after inspecting.



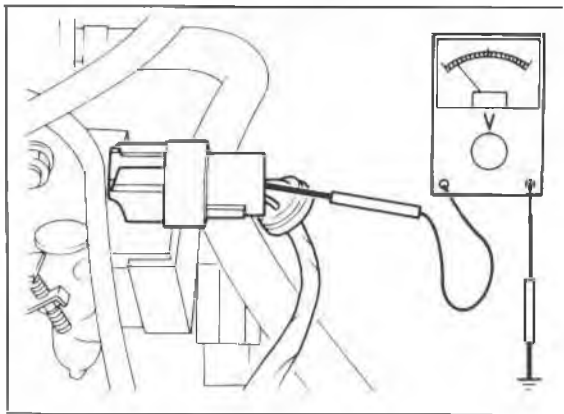
76G04B-113

Terminal	Resistance ( $\Omega$ )	
	Fully closed	Fully open
E2↔Vs	More than 20	
E2↔Vc	100—300	
E2↔Vb	200—400	
E2↔THA (Intake air thermo sensor)	-20°C (-4°F)	13.6—18.4 k $\Omega$
	20°C (68°F)	2.21—2.69 k $\Omega$
	60°C (140°F)	493—667 $\Omega$
E1↔Fc	$\infty$	0

### Note

Refer to page 4B—31 for replacement of the air flow meter.





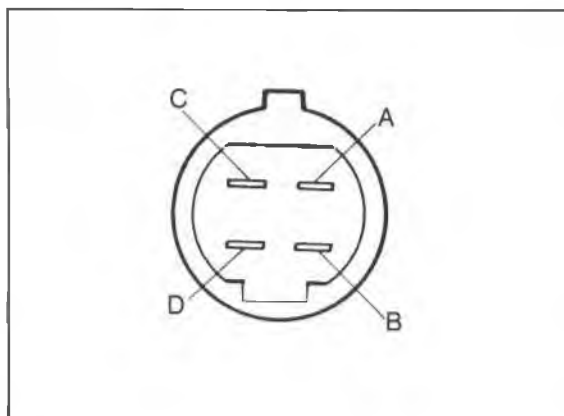
76G04B-114

## THROTTLE SENSOR

### Inspection of Terminal Voltage

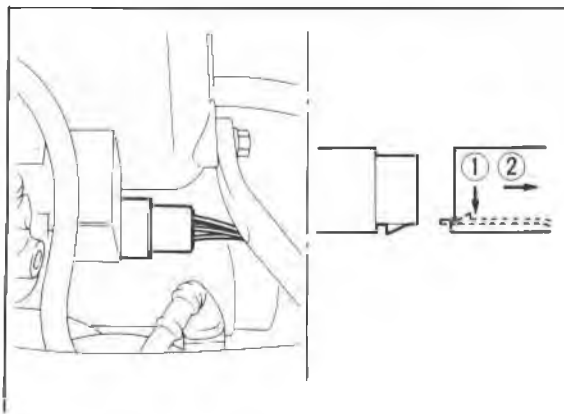
1. Remove the rubber boot from the connector.
2. Turn the ignition switch ON.
3. Check voltage between each terminal and a ground.
4. Open the throttle valve and again check voltage between each terminal and a ground.

Terminal	Condition	
	Closed	Fully open
A (V <sub>T</sub> )	0.4—0.6V	Approx. 4.0V
B (GND)	Below 1.5 V	
C (V ref)	4.5—5.5 V	
D (IDL)	Below 1.5 V	Approx. 12 V



76G04B-115

5. If not correct at the D terminal only, check the throttle sensor setting.
6. If not correct on other terminals, check resistance at the throttle sensor (Refer to page 4B—97) and terminals (2A, 2C, 1E and 2G) (Refer to page 4B—88 and 89) of the engine control unit and wiring harness.
7. Install the rubber boot on the connector.

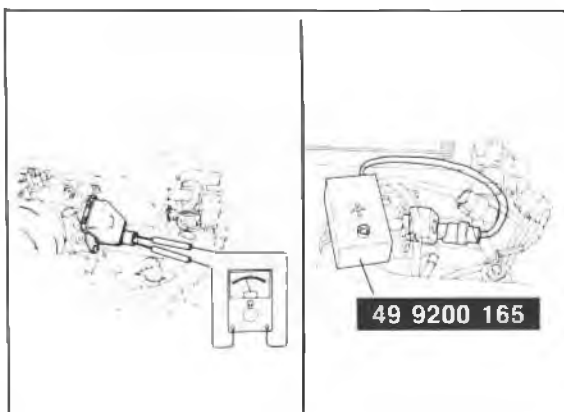


76U04A-018

## Throttle Sensor Setting

### Inspection

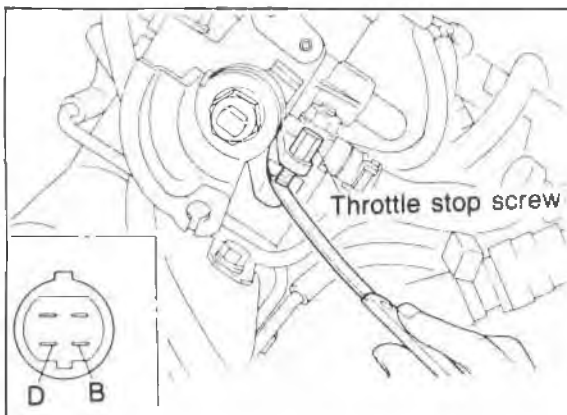
1. Disconnect the connector from the throttle sensor.
2. Connect the **SST** to the throttle sensor or connect an ohmmeter between terminals B and D.



76G04B-116

49 9200 165

## 4B CONTROL SYSTEM

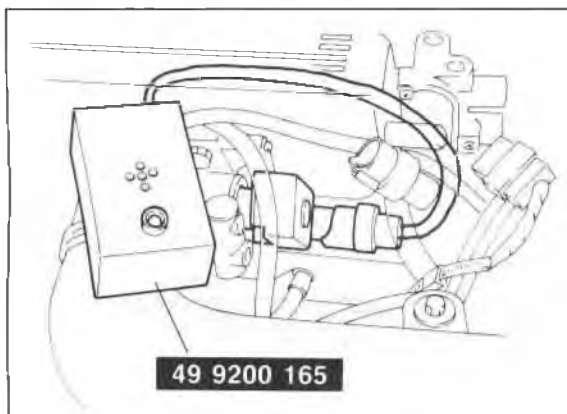


76G04B-117

- Place a feeler gauge between the lever and the throttle stop screw and check that the **SST** buzzer sounds or that there is continuity between terminals B and D.

Feeler gauge	0 mm (0 in)	0.7 mm (0.028 in)
Buzzer	Sounds	Does not sound
Lamp	ON	OFF
Continuity	YES	NO

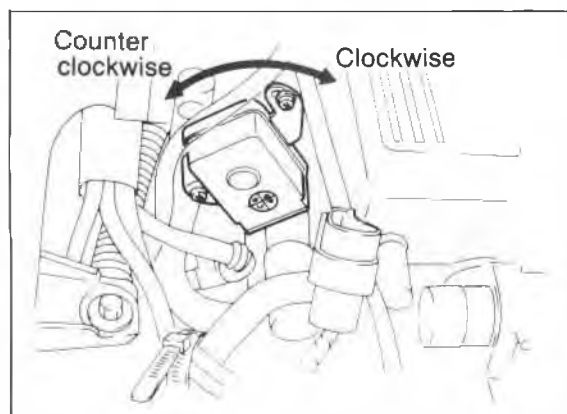
- If not correct, adjust the throttle sensor as outlined below.



76G04B-118

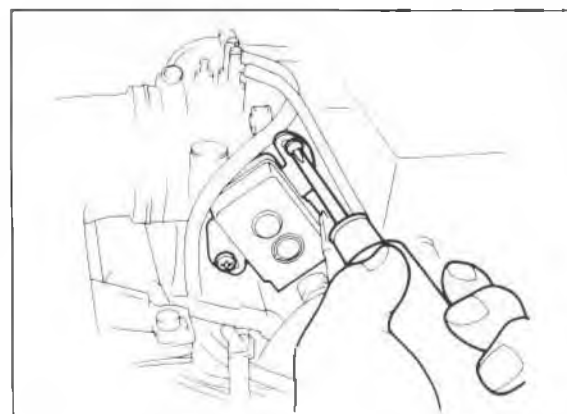
### Adjustment

- Disconnect the connector and connect the **SST** to the throttle sensor.
- Place a **0.40 mm (0.016 in)** feeler gauge between the lever and the throttle stop screw.



76G04B-119

- Loosen the two attaching screws.
- Rotate the throttle sensor clockwise about 30°, then rotate it counterclockwise until the buzzer sounds.
- If it does not buzz, replace the throttle sensor.
- If it does buzz, substitute the feeler gauge with a **0.55 mm (0.022 in)** gauge.
- Check that the buzzer does not sound.
- If it buzzes, repeat steps 3 to 7.
- If it still buzzes, replace the throttle sensor.



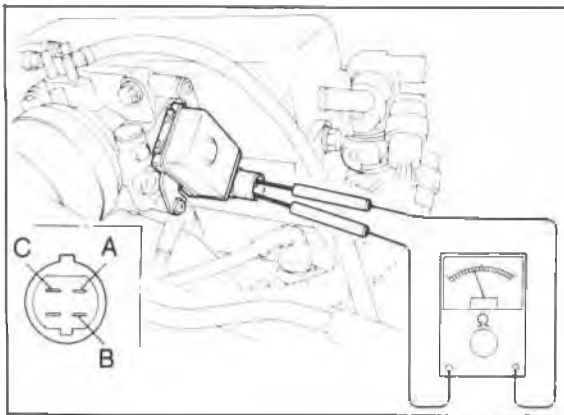
76G04B-120

- Tighten the two attaching screws.

### Note

**Be careful not to disturb the throttle sensor position when tightening the screws.**

- Open the throttle valve fully a few times; then recheck the adjustment of the throttle sensor.
- Disconnect the **SST** from the throttle sensor and reconnect the connector.



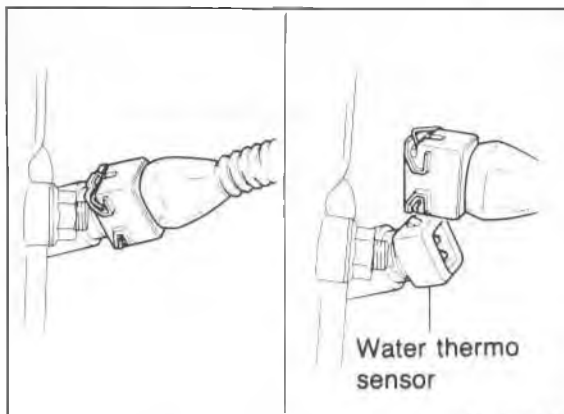
56G04B-038

### Inspection of Resistance

1. Disconnect the connector from the sensor.
2. Check resistance between the terminals as shown in the table.
3. Open the throttle valve fully and check resistances between terminals.

Terminal \ Condition	Closed	Fully open
A ↔ B	Approx. 500 Ω	Approx. 4.5 kΩ
B ↔ C	4—6 kΩ	

4. If not correct, replace the throttle sensor.

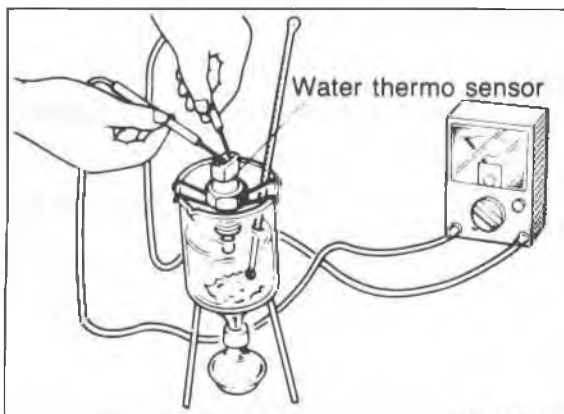


86U04A-202

### WATER THERMO SENSOR

#### Inspection

1. Remove the water thermo sensor from the cylinder head.

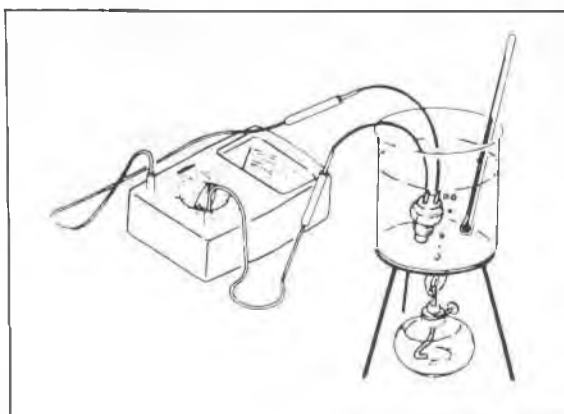


86U04A-203

2. Place the sensor in water with a thermometer and heat the water gradually.
3. Check resistance of the sensor with an ohmmeter.

Coolant	Resistance
-20°C ( -4°F)	14.5—17.8 kΩ
20°C ( 68°F)	2.2—2.7 kΩ
40°C (104°F)	1.0—1.3 kΩ
60°C (140°F)	500—640 Ω
80°C (176°F)	280—350 Ω

4. If not correct, replace the water thermo sensor.



76G04B-132

### WATER THERMO SWITCH

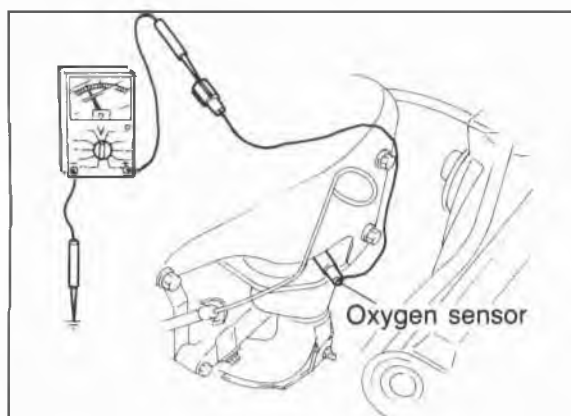
#### Inspection

1. Remove the switch from the radiator.
2. Place the switch in water with a thermometer, and heat the water gradually.
3. Check for continuity of the switch with an ohmmeter.

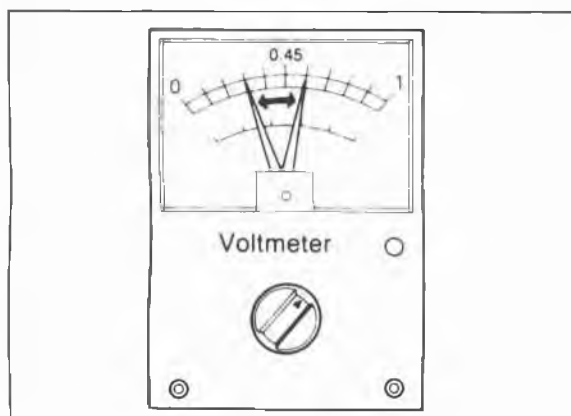
Coolant temp.	Continuity
More than approx. 17°C (63°F)	Yes
Less than approx. 17°C (63°F)	No

4. If not correct, replace the water thermo switch.

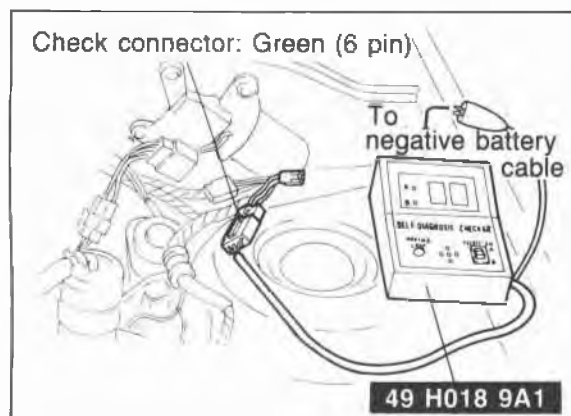
## 4B CONTROL SYSTEM



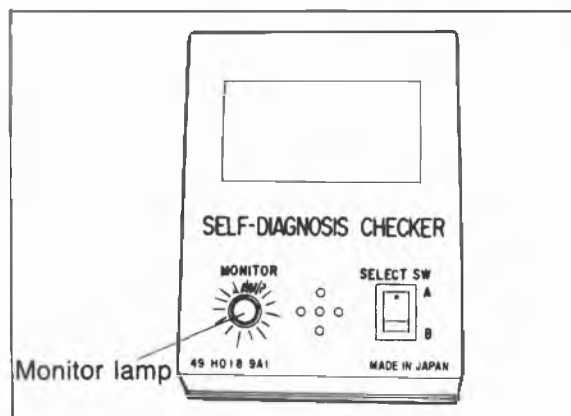
76G04B-121



86U04A-206



76G04B-133



86U04A-208

### OXYGEN SENSOR

#### Inspection of Output Voltage

1. Warm up the engine and run it at idle.
2. Disconnect the oxygen sensor connector.
3. Connect a voltmeter between the oxygen sensor and ground.
4. Run the engine at **4,000 rpm** until the voltmeter indicates **approx. 0.55V**.

5. Increase and decrease the engine speed suddenly several times. Check to see that when the speed is increased the meter reads between **0.5V—1.0V**, and when the speed is decreased it reads between **0V—0.4V**.
6. If the voltmeter doesn't indicate as specified, replace the oxygen sensor.

#### Inspection of Sensitivity

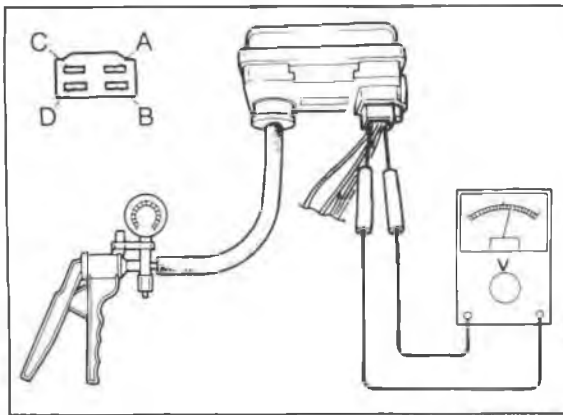
##### Caution

**Do not ground the test connector (Green, 1-pin).**

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect the **SST** to the check connector.

3. Increase the engine speed to between **2,000 and 3,000 rpm**, and check that the monitor lamp flashes for 10 seconds.

**Monitor lamp: Flashes ON and OFF more than 8 times/10 sec**



## ATMOSPHERIC PRESSURE SENSOR Inspection

1. Connect a voltmeter to the atmospheric pressure sensor (D) terminal.
2. Turn the ignition switch on and take a voltage reading.

**Voltage: 3.5—4.5V at sea level**  
**2.5—3.5V at high altitude**  
**[2,000m (6,500 ft)]**

3. Replace the sensor if necessary.

67U04X-154

# FUEL AND EMISSION CONTROL SYSTEMS (FUEL INJECTION FE DOHC)

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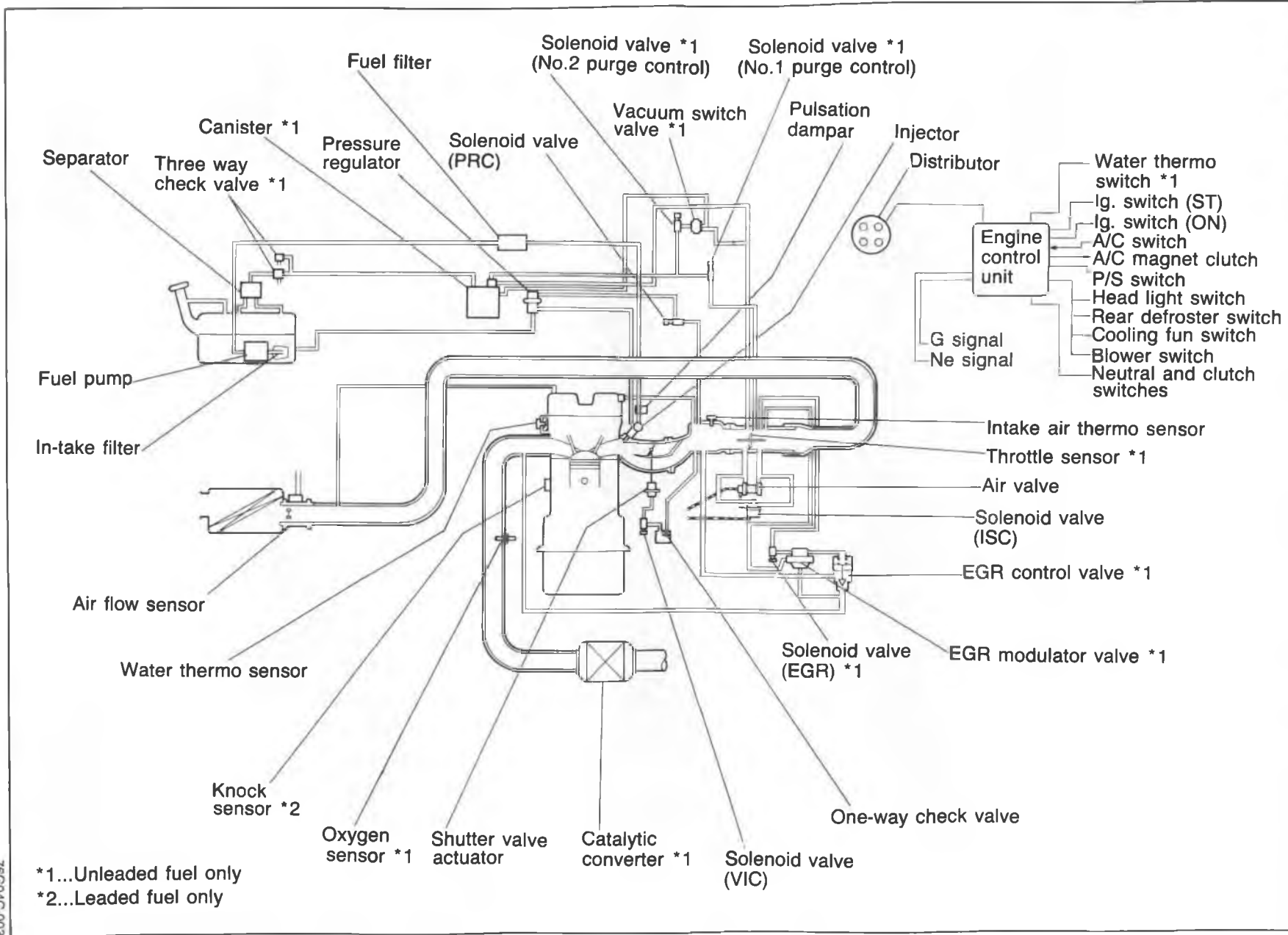
# 4C OUTLINE

## OUTLINE

### COMPONENT APPLICATION

Item		Unleaded fuel	Leaded fuel
<b>INTAKE AIR SYSTEM</b>	Air flow sensor (Hot wire type)	○	○
	Dynamic chamber with vacuum chamber	○	○
	Throttle body (Two bore)	○	○
	Throttle sensor	○	X
	Idle switch	○	○
	Resonance chamber	○	○
<b>VARIABLE INERTIA CONTROL SYSTEM</b>		○	○
<b>IDLE SPEED CONTROL SYSTEM</b>		○	○
<b>FUEL SYSTEM</b>	Injector	○	○
	Pressure regulator	○	○
	Pulsation damper	○	○
	Intank filter	○	○
	Transfer pump	○ (4WS)	○ (4WS)
	Transfer pump switch	○ (4WS)	○ (4WS)
	Fuel pump control unit	○ (4WS)	○ (4WS)
<b>PRESSURE REGULATOR CONTROL SYSTEM</b>		○	○
<b>EVAPORATIVE EMISSION CONTROL SYSTEM</b>	Canister	○	X
	Three-way check valve	○	X
	Two-way check valve	X	○
	Separator	○	○
	Solenoid valves	○	X
<b>EGR SYSTEM</b>	EGR control valve	○	X
	EGR modulator valve	○	X
	Solenoid valve	○	X
<b>ELECTRONIC SPARK ADVANCE CONTROL SYSTEM</b>	Igniter	○	○
	Knock control function	X	○
<b>CONTROL SYSTEM</b>	Water thermo sensor	○	○
	Water thermo switch	○	X
	Intake air thermo sensor	○	○
	Oxygen sensor	○	X
	Distributor	○	○
	Ne signal	○	○
	G signal	○	○
	Clutch switch	○	○
	Neutral switch	○	○
Knock sensor	X	○	
<b>FAIL-SAFE CONTROL SYSTEM</b>		○	○
<b>MONITOR FUNCTION</b>		○	○

76G04C-002

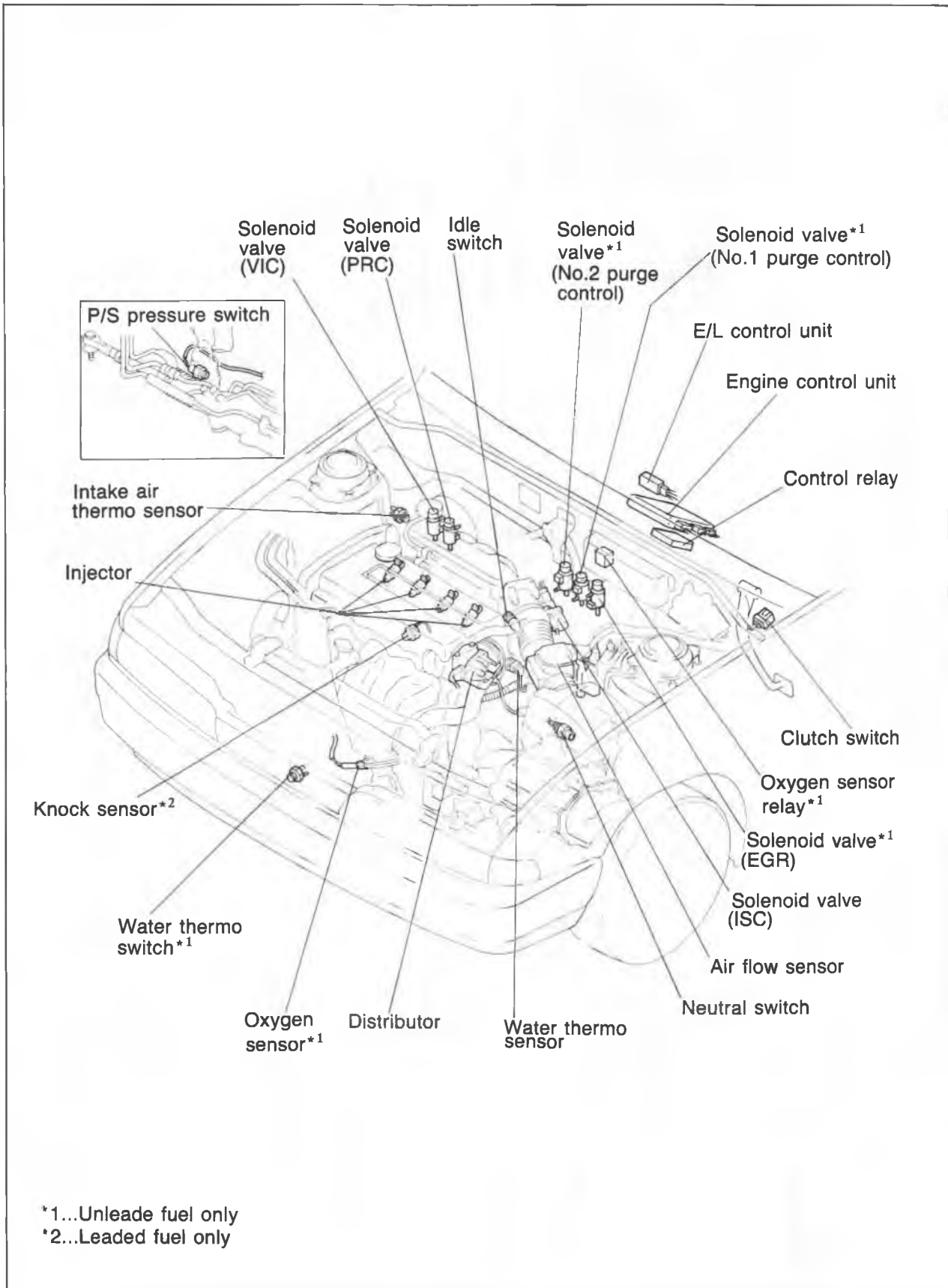


\*1...Unleaded fuel only  
 \*2...Leaded fuel only



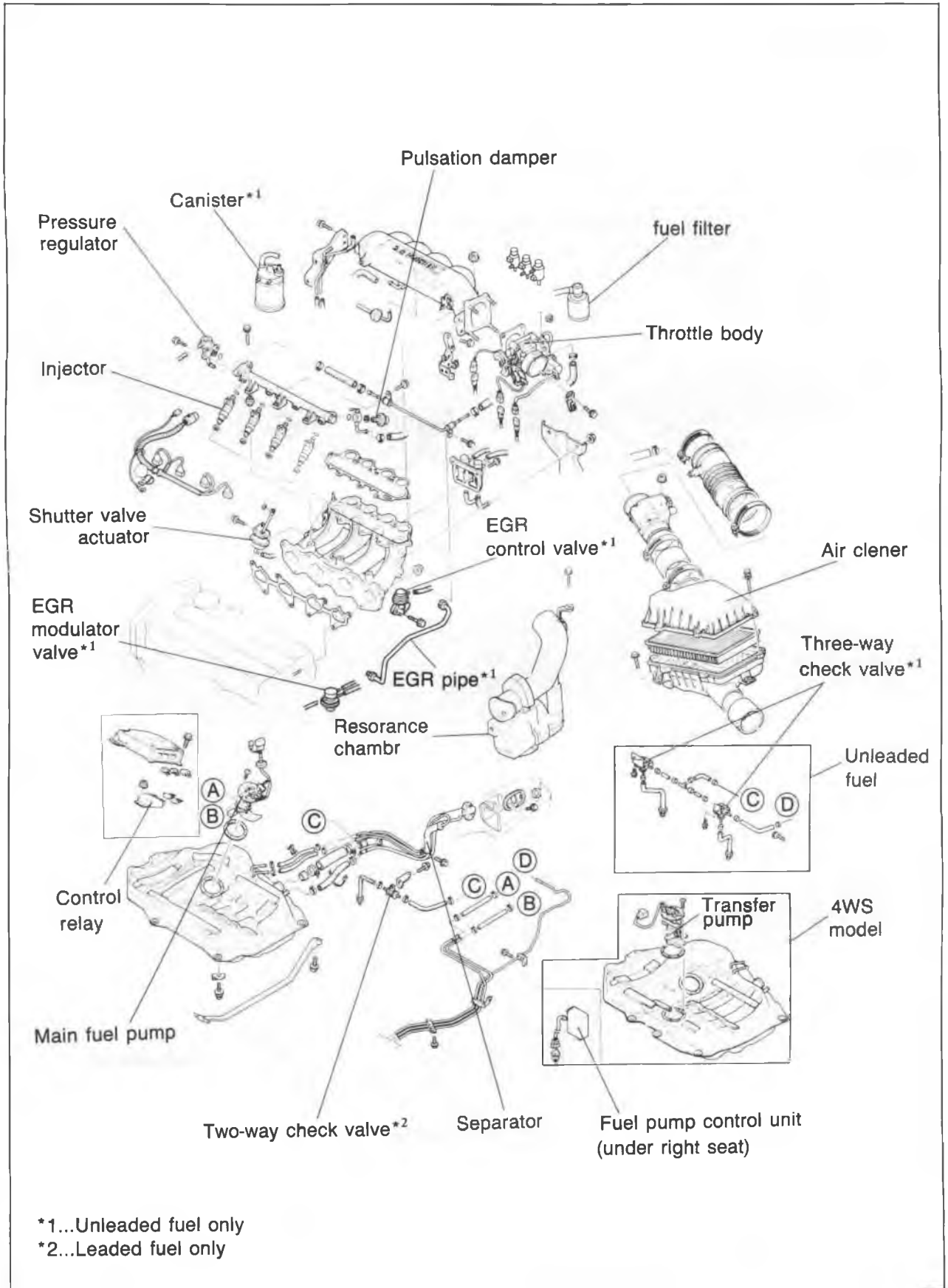
# 4C OUTLINE

## COMPONENT LOCATION Input and Output Devices



76G04C-004

Fuel System



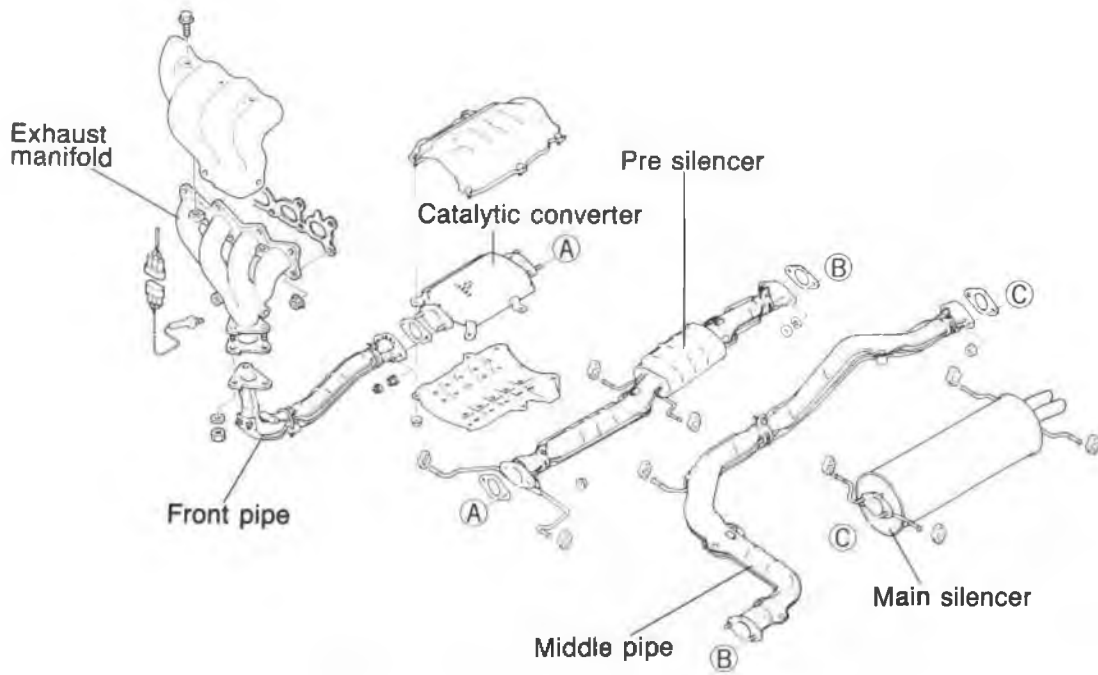
\*1...Unleaded fuel only

\*2...Leaded fuel only

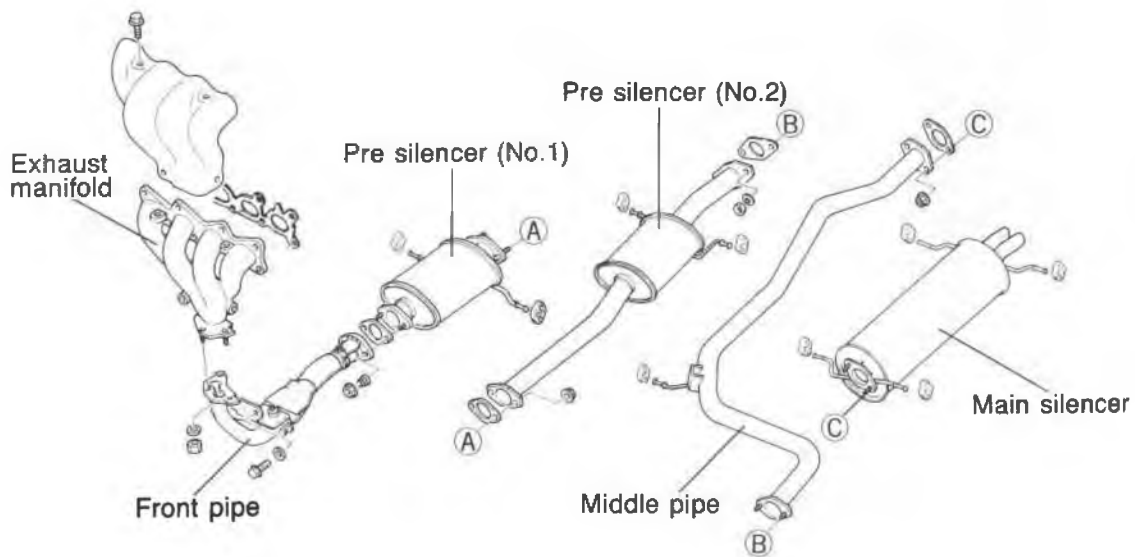
# 4C OUTLINE

## Exhaust System

### Unleaded Fuel



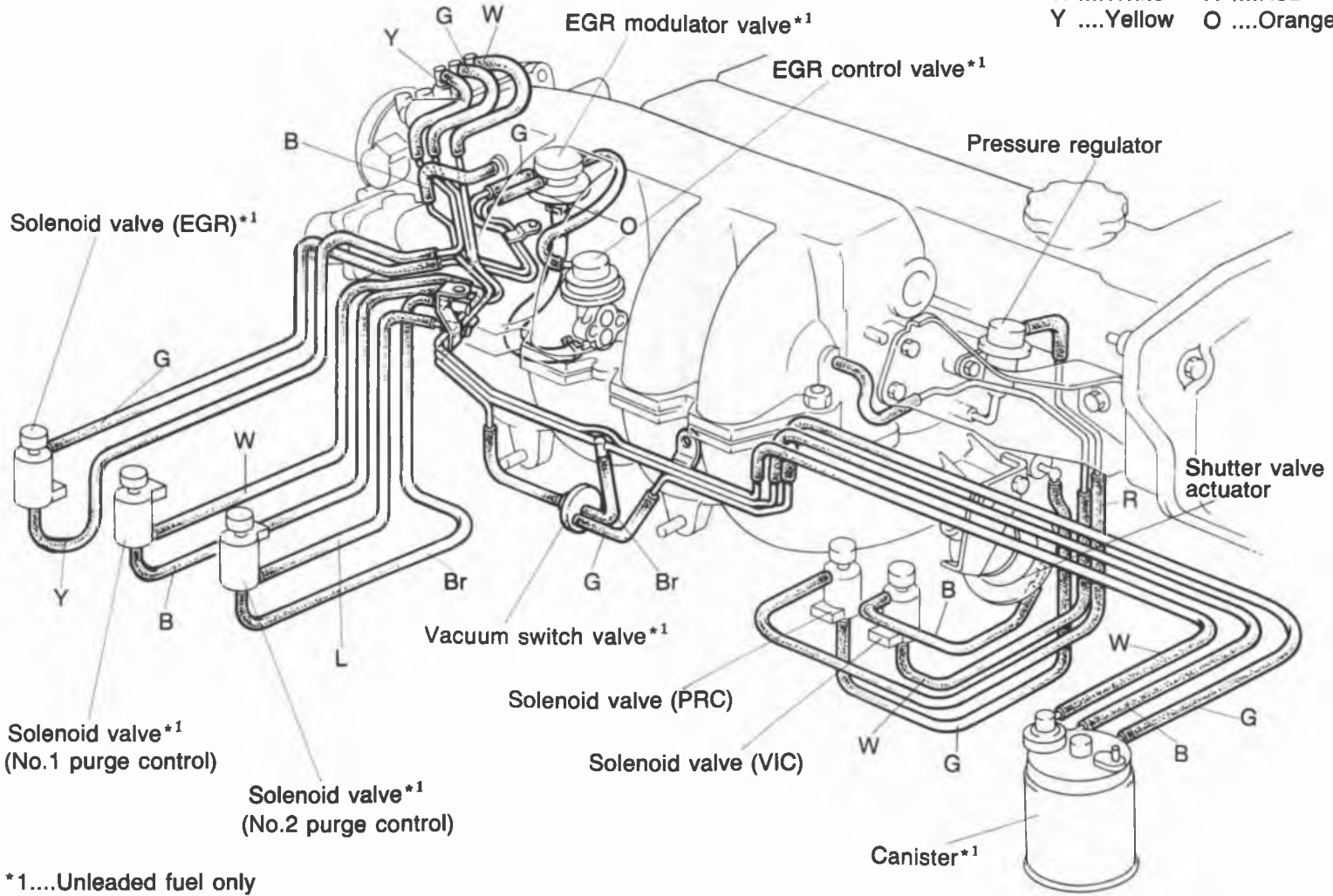
### Leaded Fuel



76G04C-006

VACUUM HOSE ROUTING DIAGRAM

Hose color:  
 G ....Green      Br ....Brown  
 B ....Black      L ....Blue  
 W ....White      R ....Red  
 Y ....Yellow      O ....Orange



\*1....Unleaded fuel only

# 4C OUTLINE

## SPECIFICATIONS

Item	Engine type		Unleaded Fuel	Leaded Fuel
	Idle speed	rpm		750 ± 50
<b>Throttle body</b>				
Type			Horizontal draft (2-barrel)	
Throat diameter	mm (in)	No. 1	46 (1.8)	
		No. 2	40 (1.6)	
<b>Fuel pump</b>				
Type			Impeller (in tank)	
Output pressure	kPa (kg/cm <sup>2</sup> , psi)		Main pump: 441—588 (4.5—6.0, 64—85) Transfer pump: 20—25 (0.20—0.25, 2.8—3.6)	
Feeding capacity	cc (cu in)/10 sec.		Main pump: More than 220 (13.4) Transfer pump: More than 190 (11.6)	
<b>Fuel filter</b>				
Type	Low pressure side		Nylon element	
	High pressure side		Paper element	
<b>Pressure regulator</b>				
Type			Diaphragm	
Regulating pressure	kPa (kg/cm <sup>2</sup> , psi)		235—275 (2.4—2.8, 34—40)	
<b>Injector</b>				
Type			High-ohmic	
Type of drive			Voltage	
Resistance	Ω		12—16	
Injection amount	cc (cu in)/15 sec.		66—91 (4.03—5.55)	
<b>Idle speed control valve</b>				
Solenoid resistance	Ω		6.3—9.9	
<b>Fuel tank</b>				
Capacity	liters (US gal, Imp gal)		60 (15.9, 13.2), 57 (15.0, 12.5): 4-wheel steering vehicle	
<b>Air cleaner</b>				
Element type			Dry	
<b>Fuel</b>				
Specification			Unleaded (95 RON or more)	Leaded or unleaded fuel (95 RON or more)

76G04C-008

## TROUBLESHOOTING GUIDE

This troubleshooting guide shows the malfunction numbers and the symptoms of various failures. Perform troubleshooting as described below.

Possible cause		Input sensors and switches										Output solenoid valve					
		No signal	G signal	Knock sensor	Air flow sensor	Water thermo sensor	Intake air thermo sensor (Dynamic chamber)	Throttle sensor	Oxygen sensor	Feedback system	Solenoid valve (Pressure regulator control)	Solenoid valve (No. 1 purge control)	Solenoid valve (No. 2 purge control)	Solenoid valve (EGR)	Solenoid valve (Idle speed control)	Oxygen sensor relay	Solenoid valve (Variable inertia charging system)
Symptom and No.		4C—16	4C—16	4C—17	4C—17	4C—18	4C—19	4C—19	4C—20	4C—21	4C—21	4C—22	4C—22	4C—23	4C—23	4C—24	4C—24
<b>1</b>	<b>Fault Indicated by SST Code No.</b>	02	03	05 *1	08	09	11	12 *2	15 *2	17 *2	25	26 *2	27 *2	28 *2	34	36 *2	41
<b>2</b>		<b>TROUBLESHOOTING PROCEDURE</b>															
<b>3</b>		<b>Note</b>															
<b>Engine stalls</b>		Code No. is to quickly determine which system or unit may be at fault by use of the SST. (Self-Diagnosis Checker 49 H018 9A1 or Digital Code Checker 49 G018 9A0 with Adaptor harness 49 9200 180)															
<b>During warm up</b>		<b>1st:</b> Check input sensors and output solenoid valves with the SST. (Refer to page 4C—11.)															
<b>After warm up</b>		<b>2nd:</b> Check other switches with the SST. (Refer to page 4C—25.)															
<b>4</b>		<b>3rd:</b> Check the following items:															
<b>During warm up</b>		<b>Electrical system</b>								<b>Ignition system</b>							
<b>After warm up</b>		1) Battery condition 2) Fuses								1) Ignition spark 2) Ignition timing (with test connector grounded)							
<b>5</b>		<b>Fuel system</b>								<b>Intake air system</b>							
<b>High Idle speed after warm up</b>		1) Fuel level 2) Fuel leakage 3) Fuel filter 4) Idle speed (with test connector grounded)								1) Air cleaner element 2) Vacuum or air leakage 3) Vacuum hose routing 4) Accelerator cable							
<b>6</b>		<b>Engine</b>								<b>Others</b>							
<b>Poor acceleration, hesitation or lack of power</b>		1) Compression 2) Overheating								1) Clutch slippage 2) Brake dragging							
<b>7</b>		<b>4th:</b> Check Fuel and Emission Control Systems. (Refer to page 4C—10.)															
<b>Runs rough on deceleration</b>																	
<b>8</b>																	
<b>Afterburn in exhaust system</b>																	
<b>9</b>																	
<b>Poor fuel consumption</b>																	
<b>10</b>																	
<b>Engine stalls or runs rough after hot starting</b>																	
<b>11</b>																	
<b>Knocking</b>																	
<b>12</b>																	
<b>Falls emission test</b>																	

\*1.....Leaded fuel

\*2.....Unleaded fuel

76G04C-009

# 4C TROUBLESHOOTING GUIDE

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding which system(s) to check, refer to the pages shown for detailed guides.

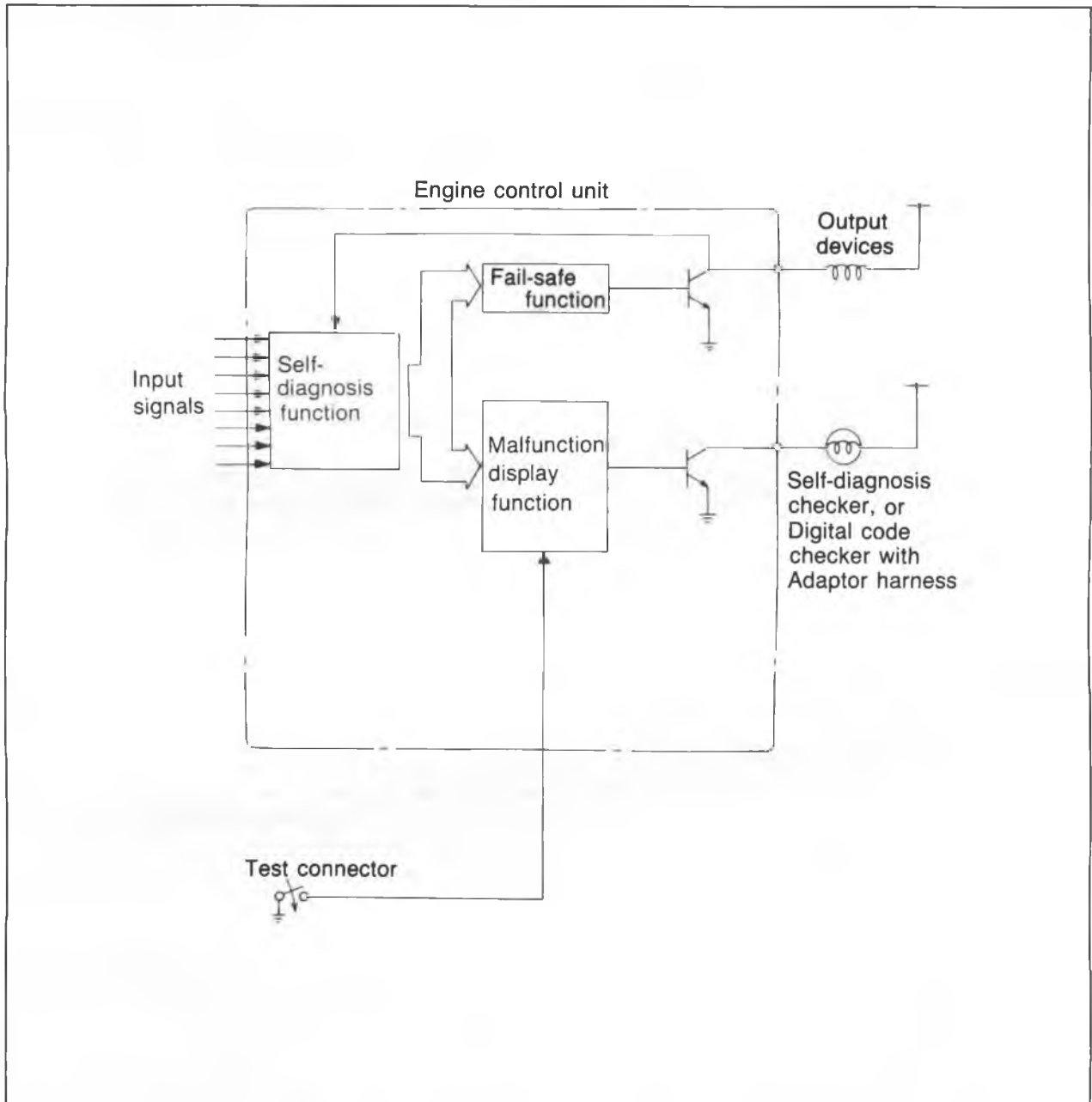
System		INTAKE AIR SYSTEM	FUEL SYSTEM	PRESSURE REGULATOR CONTROL (PRC) SYSTEM	IDLE SPEED CONTROL (ISC) SYSTEM	ELECTRONIC SPARK ADVANCE (ESA) CONTROL SYSTEM	EXHAUST GAS RECIRCULATION (EGR) SYSTEM	EVAPORATIVE EMISSION CONTROL (EEC) SYSTEM	POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM	DECELERATION CONTROL SYSTEM	EXHAUST SYSTEM	VARIABLE INERTIA CONTROL (VIC) SYSTEM
Page		4C-31	4C-49	4C-68	4C-44	4C-75	4C-77	4C-80	4C-86	4C-72	4C-87 & 89	4C-39
Symptom No.	2	3	2	—	—	1	—	—	—	—	—	—
	3	4	3	—	1	—	2	—	—	—	—	—
		5	4	—	2	—	3	—	1	—	—	—
	4	5	4	—	1	—	3	—	2	—	—	—
		6	5	—	2	—	3	4	1	—	—	—
	5	2	3	—	1	—	—	—	—	—	—	—
	6	3	4	—	—	—	1	2	—	—	6	5
	7	4	3	—	2	—	—	—	—	1	—	—
	8	3	4	—	1	—	—	—	—	2	—	—
	9	—	2	—	—	—	3	—	—	1	5	4
	10	—	2	1	—	—	—	—	—	—	—	—
	11	—	—	—	—	1	—	—	—	—	—	—
12	6	7	—	4	—	2	5	—	3	1	—	

76G04C-010

The numbers of the list show the priorities of inspections, from the most possible system to that with the lowest possibility.

These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

**TROUBLESHOOTING WITH SST**

76G04C-011

When troubles occur in the main input devices or output devices, check for the cause with the **SST (Self-Diagnosis checker 49 H018 9A1 or Digital code checker 49 G018 9A0 with Adaptor harness 49 9200 180)**.

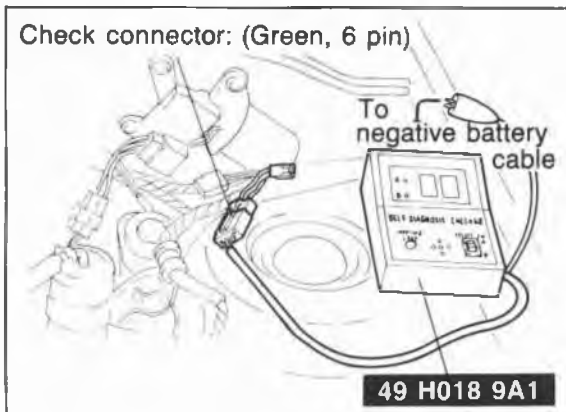
Failure of individual input and output devices is indicated and retrieved from the control unit as malfunction code numbers.

**Note**

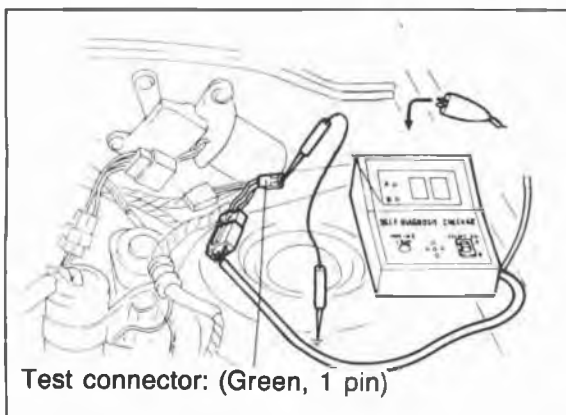
**The control unit constantly checks for malfunction of the input devices. But, the control unit checks for malfunction of output devices only in a 3 second period after the ignition switch is turned ON and the test connector is grounded.**



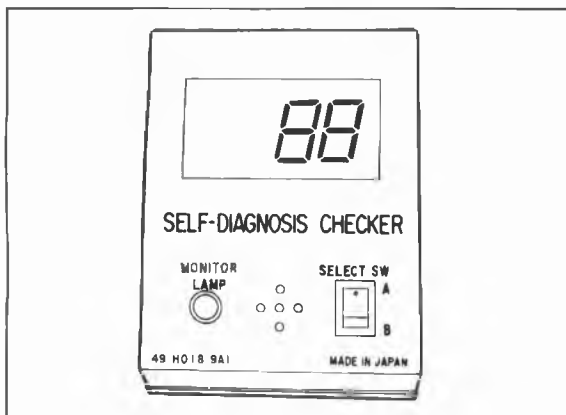
## 4C TROUBLESHOOTING WITH SST



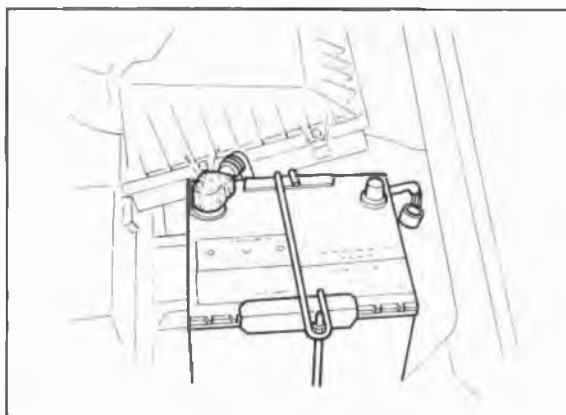
86U04A-011



86U04A-012



76G04C-012



76G04C-013

### INSPECTION PROCEDURE

1. Connect the **SST** to the check connector. (Green, 6-pin) and the negative battery terminal.
2. Set the select switch to position A.

#### Note

**The check connector is located at the rear of the left side wheel housing.**

3. Ground the test connector (Green, 1-pin) with a jumper wire.

#### Note

**The test connector is located near the Self-Diagnosis Checker check connector.**

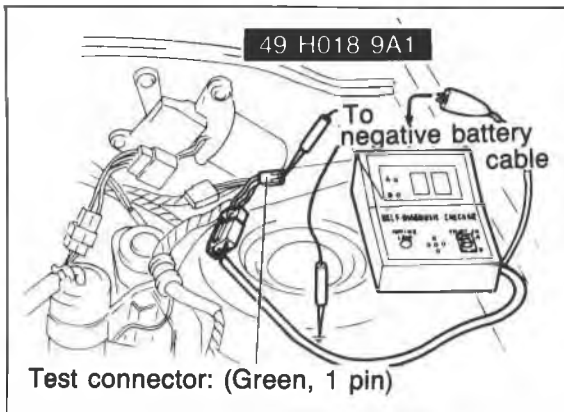
4. Turn the ignition switch ON.
5. Verify that **88** flashes on the digital display and that the buzzer sounds for **three seconds** after turning the ignition switch ON.
6. If **88** does not flash, check the control relay (refer to page 4C—96), power supply circuit, and check connector wiring.
7. If **88** flashes and the buzzer sounds continuously for more than **20 seconds** check the check connector wiring, then replace the engine control unit and perform steps 3 and 4 again.
8. Note the code numbers and check for the causes by referring to the check sequences shown on pages **4C—16 to 4C—24**. Repair as necessary.

#### Note

**Cancel the code numbers by performing the after-repair procedure after repairing.**

### AFTER-REPAIR PROCEDURE

1. Cancel the memory of malfunctions by disconnecting the negative battery cable and depress the brake pedal for at least **five** seconds.



86U04A-015

**Ignition switch: ON  
for six seconds**

76G04C-014

2. Connect the **SST** to the check connector.
3. Ground the test connector (Green, 1-pin) with a jumper wire.

4. Turn the ignition switch ON for **six seconds** (do not start the engine).
5. Start and warm up the engine, then run it at **2,000 rpm** for **two** minutes.
6. Verify that no code numbers are displayed.

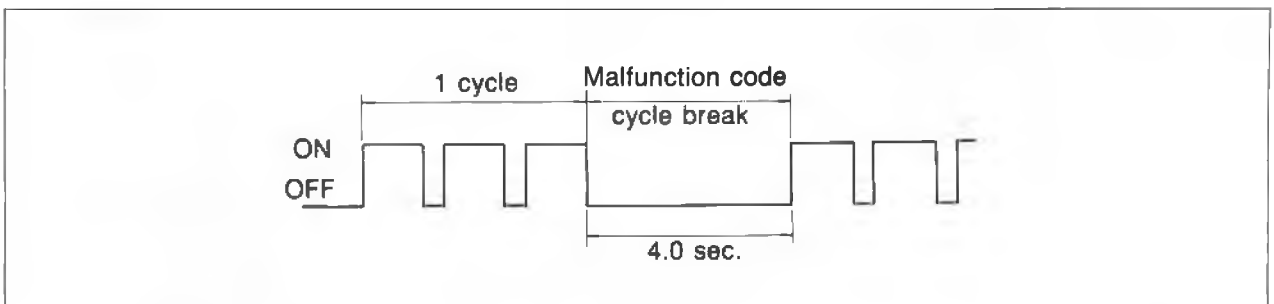
## PRINCIPLE OF CODE CYCLE

Malfunction codes are determined as shown below

86U04A-017

### 1. Code cycle break

The time between warning code cycles is 4.0 sec (the time the light is off).

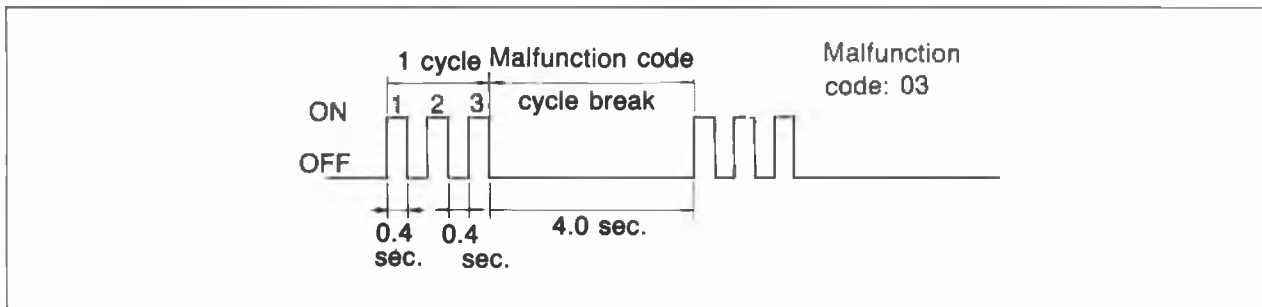


86U04A-018

# 4C TROUBLESHOOTING WITH SST

## 2. Second digit of malfunction code (ones position)

The digit in the ones position of the malfunction code represents the number of times the buzzer is on 0.4 sec during one cycle.

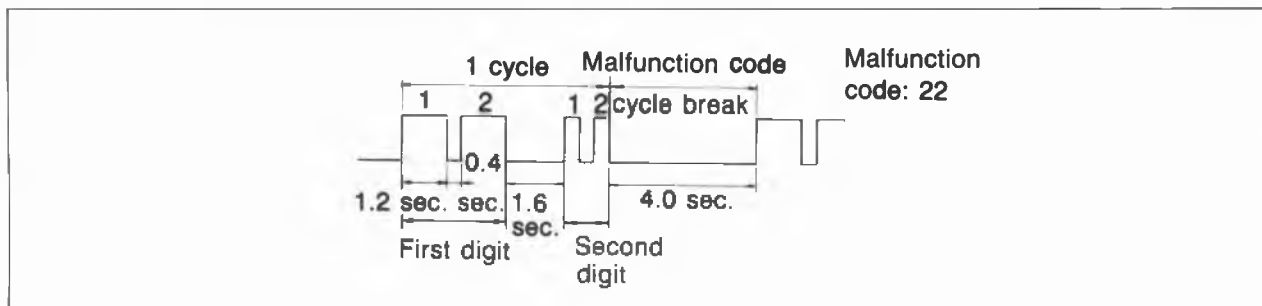


76G04C-015

## 3. First digit of malfunction code (tens position)

The digit in the tens position of the malfunction code represents the number of times the buzzer is on 1.2 sec during one cycle.

It should also be noted that the light goes off for 1.6 sec. between the long and short pulses of the buzzer.





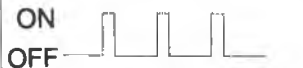























76G04C-016

## CODE NUMBER

Malfunction display		Sensor or subsystem	Self-diagnosis	Fail-safe
Malfunction code no.	Malfunction code output signal pattern			
02	ON  OFF	Ne signal	No Ne signal from crank angle sensor during craking	—
03	ON  OFF	G signal	No G signal	Cancels sequential injection
05	ON  OFF	Knock sensor (only leaded fuel)	Open or short circuit	<ul style="list-style-type: none"> <li>Retards ignition timing 4°</li> </ul>

76G04C-017

Malfunction display		Sensor or subsystem	Self-diagnosis	Fail-safe
Malfunction code no.	Malfunction code output signal pattern			
08	ON  OFF 	Air flow sensor	Open or short circuit	Maintains basic signal at preset value
09	ON  OFF 	Water thermo sensor	Open or short circuit	Maintains constant 35°C (95°F) command
11	ON  OFF 	Intake air thermo sensor (dynamic chamber)	Short circuit	Maintains constant 20°C (68°F) command
12	ON  OFF 	Throttle sensor	Open or short circuit	Maintains constant command of throttle valve fully open
15	ON  OFF 	Oxygen sensor	Sensor output continues less than 0.55V 120 sec. after engine starts (1,500 rpm or over)	Cancels EGI feedback operation
17	ON  OFF 	Feedback system	Sensor output not changed 20 sec. after engine starts (1,500 rpm or over)	Cancels EGI feedback operation
25	ON  OFF 	Solenoid valve (pressure regulator control)	Open or short circuit	—
26	ON  OFF 	Solenoid valve (No.1 purge control)		—
27	ON  OFF 	Solenoid valve (No.2 purge control)		—
28	ON  OFF 	Solenoid valve (EGR)		—
34	ON  OFF 	Solenoid valve (Idle speed control)		—
36	ON  OFF 	Oxygen sensor relay		—
41	ON  OFF 	Solenoid valve (Variable inertia control)		—

76G04C-018

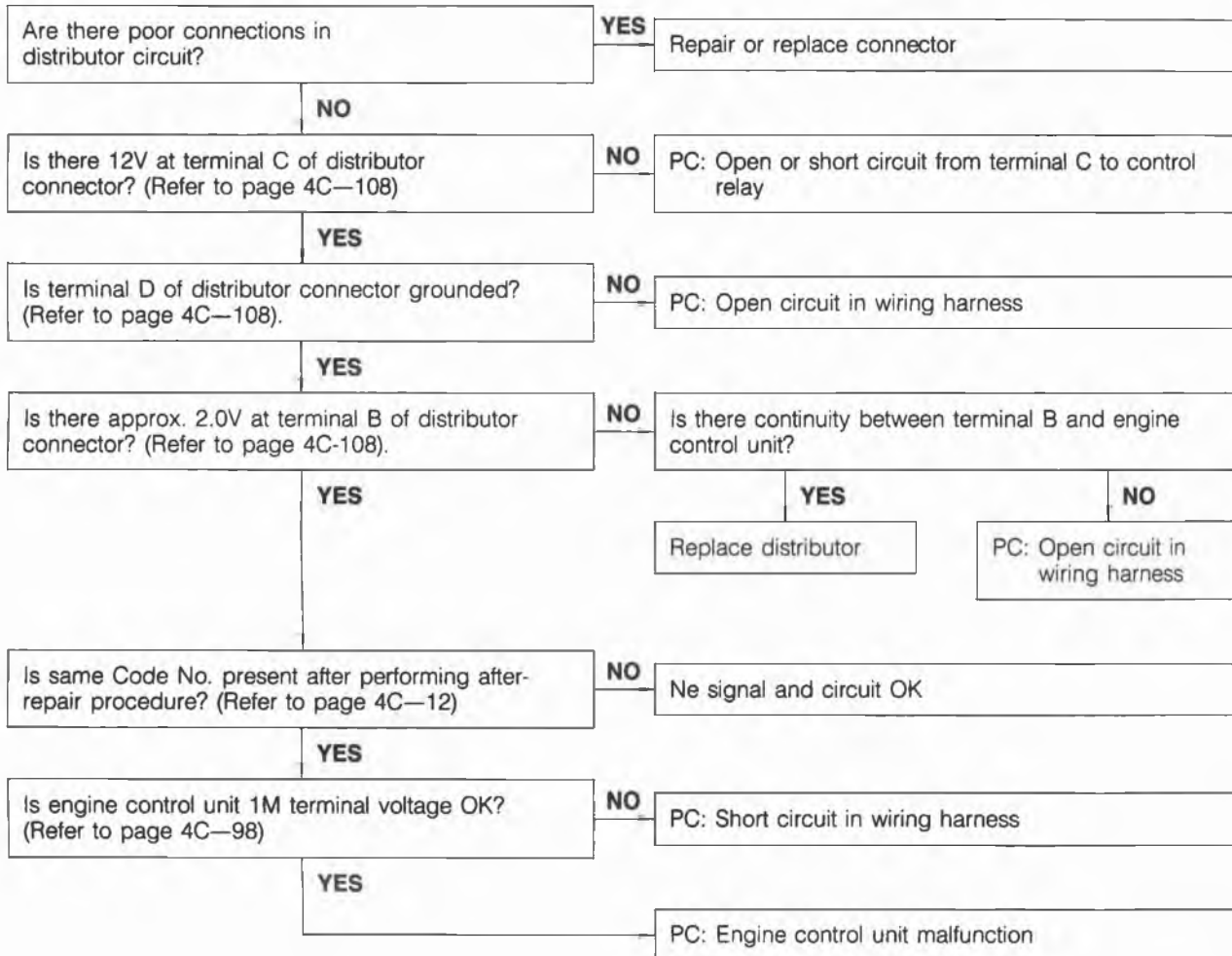
**Caution**

- a) If there is more than one failure present, the lowest number malfunction code is displayed first, the remaining codes are displayed sequentially.
- b) After repairing a failure, turn off the ignition switch and disconnect the negative battery cable and depress the brake pedal for at least 5 seconds to erase the memory of a malfunction code.

# 4C TROUBLESHOOTING WITH SST

## Code No.2 (Ne signal)

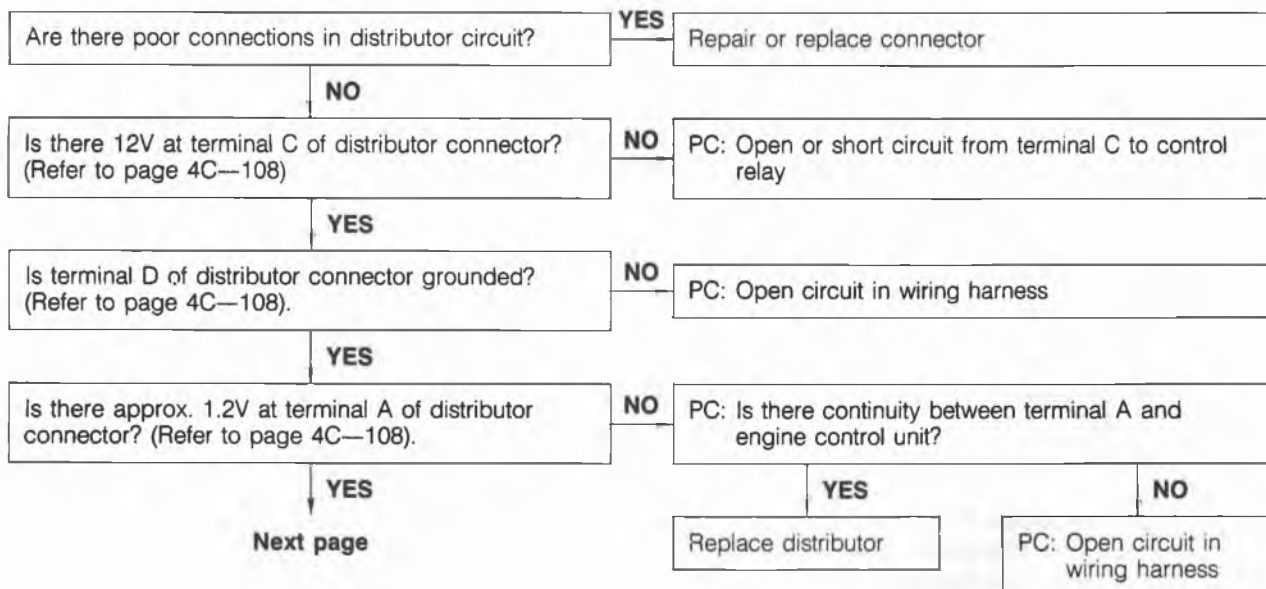
PC: Possible Cause

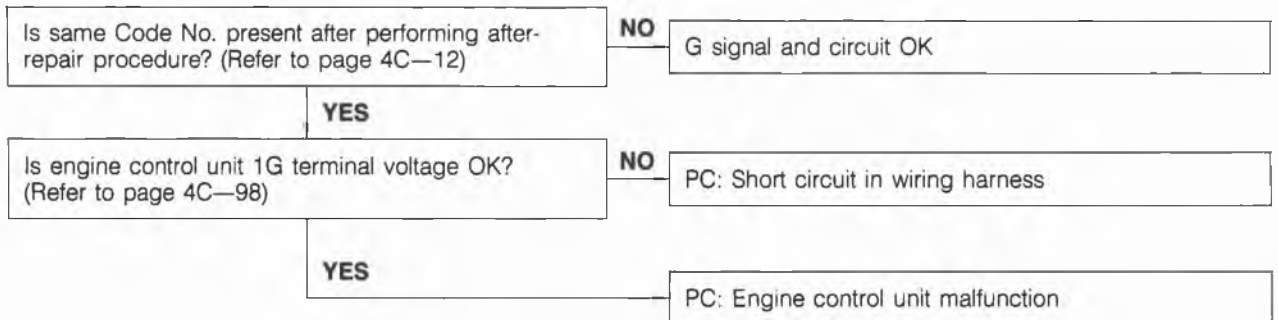


76G04C-019

## Code No.3 (G signal)

PC: Possible Cause

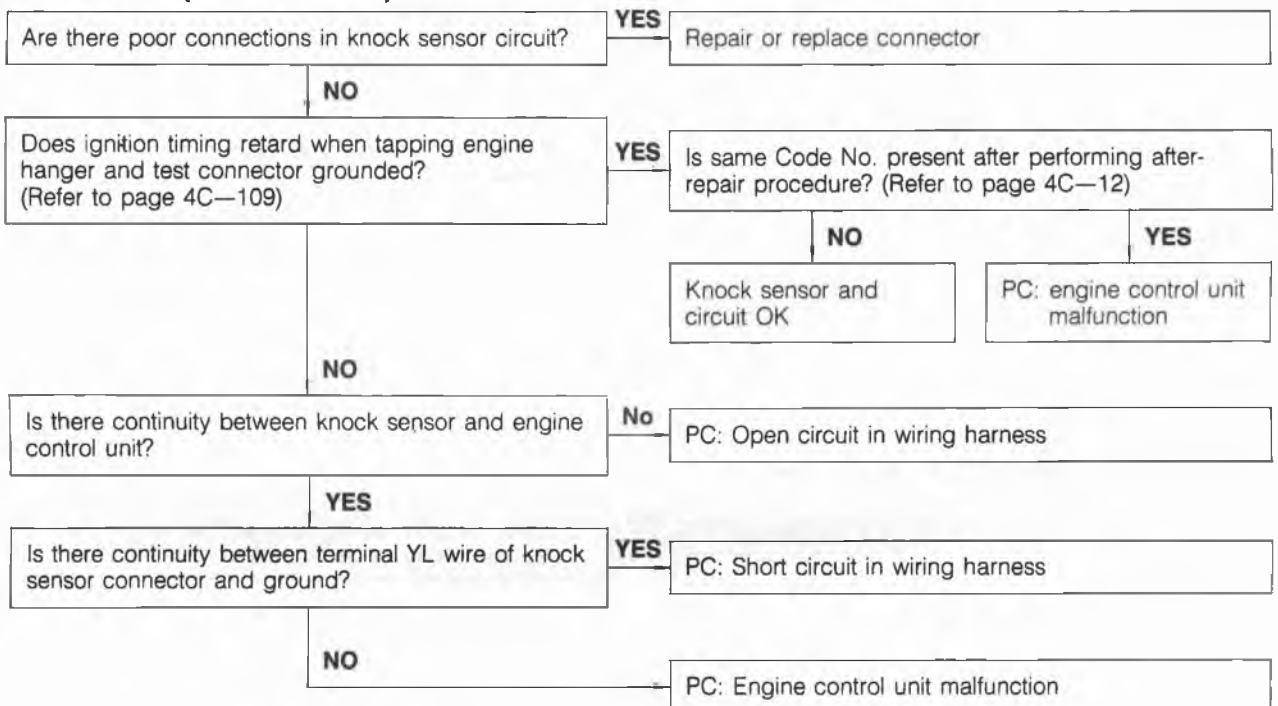




76G04C-020

### Code No.05 (Knock sensor)

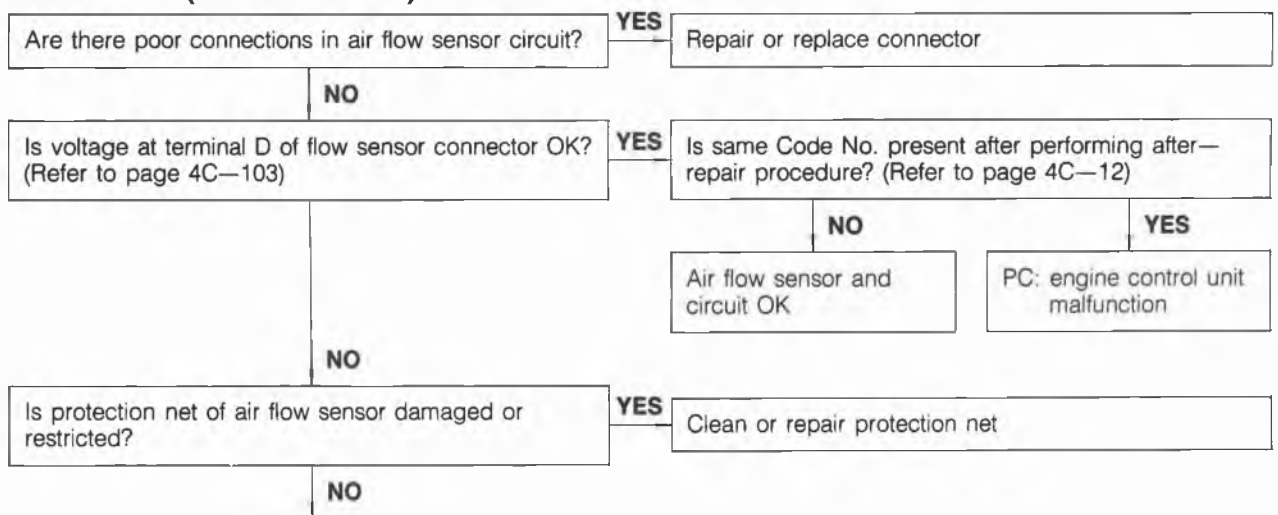
### PC: Possible Cause



76G04C-021

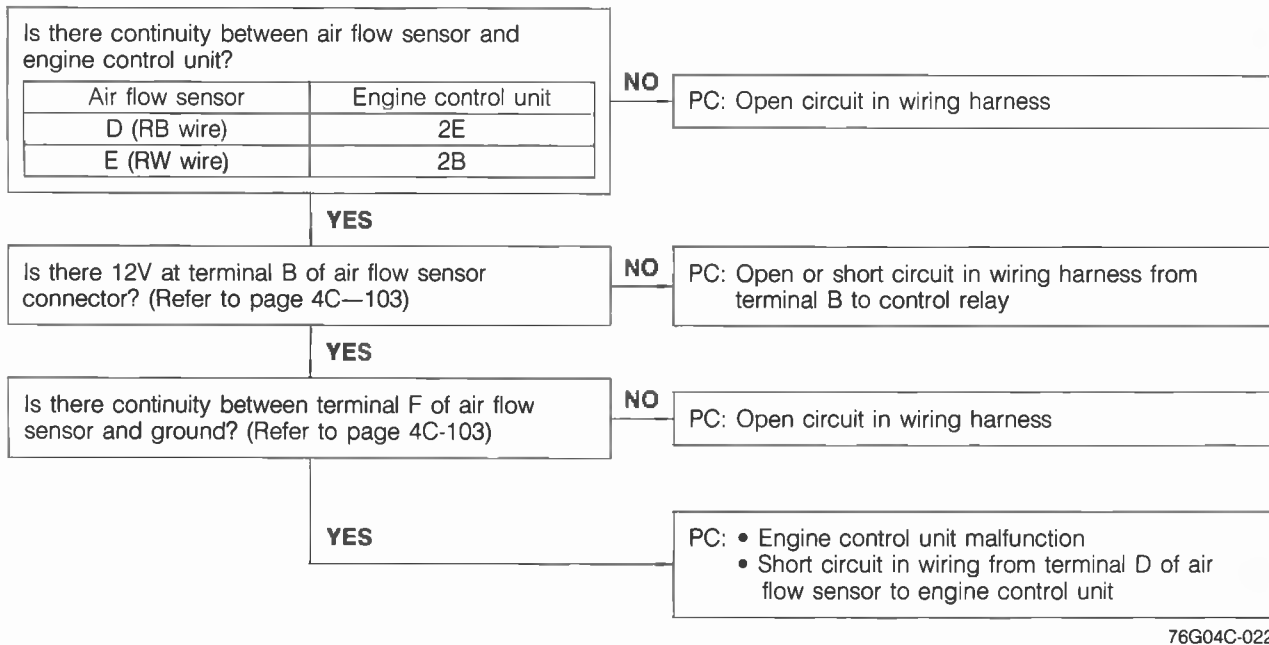
### Code No.08 (Air flow sensor)

### PC: Possible Cause



Next page

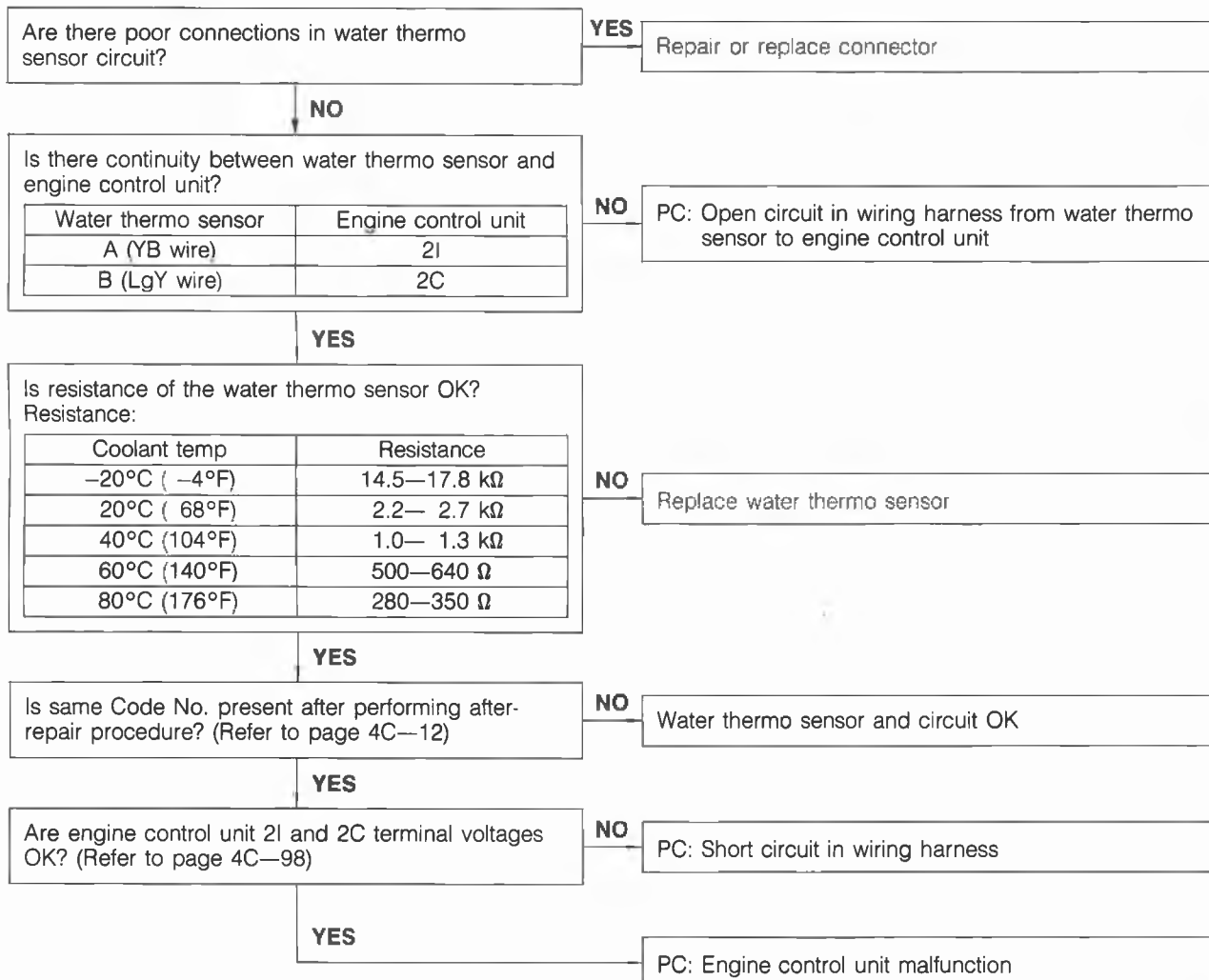
# 4C TROUBLESHOOTING WITH SST



76G04C-022

## Code No. 09 (Water thermo sensor)

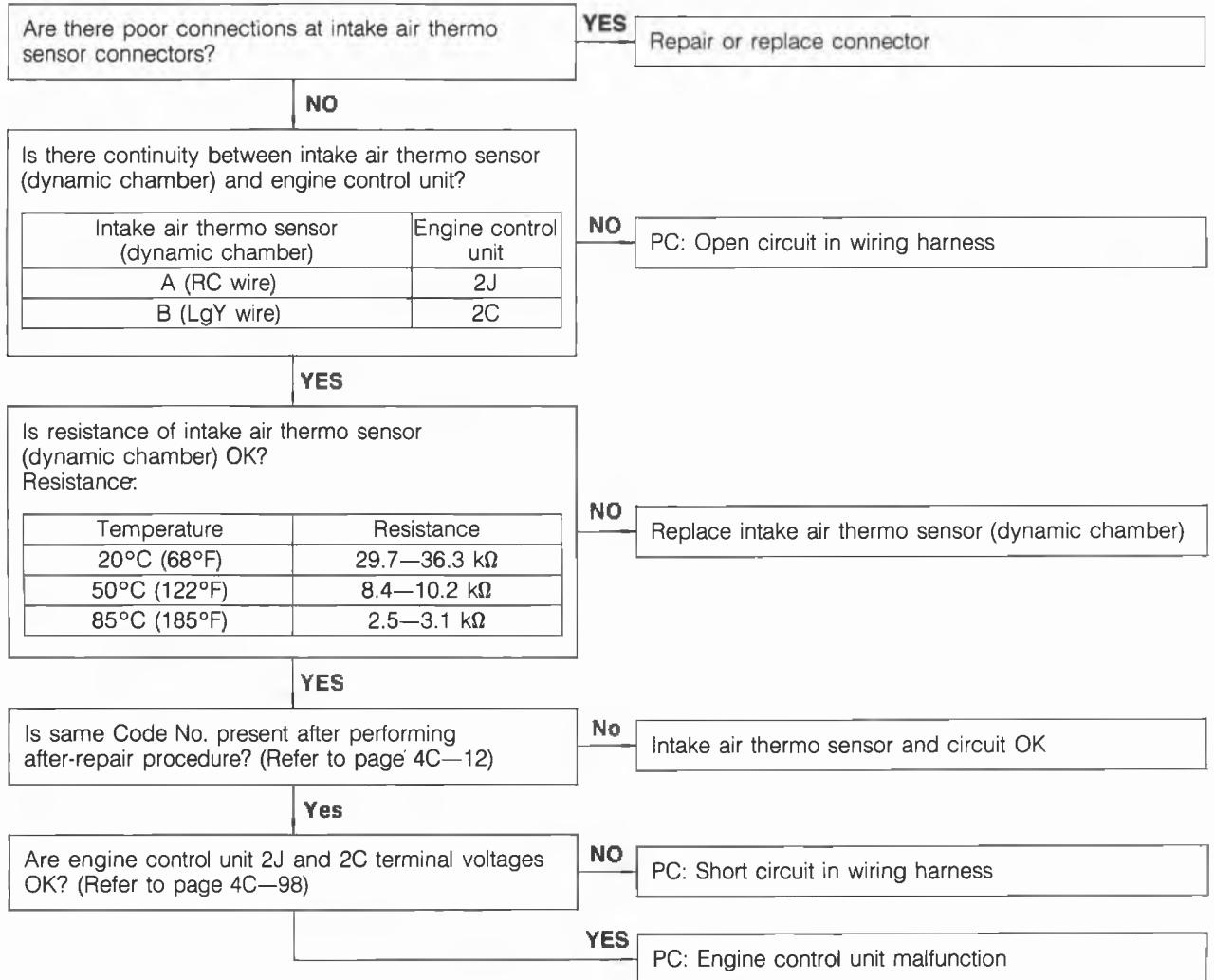
PC: Possible Cause



76G04C-023

## No. 11 Code (Intake air thermo sensor)

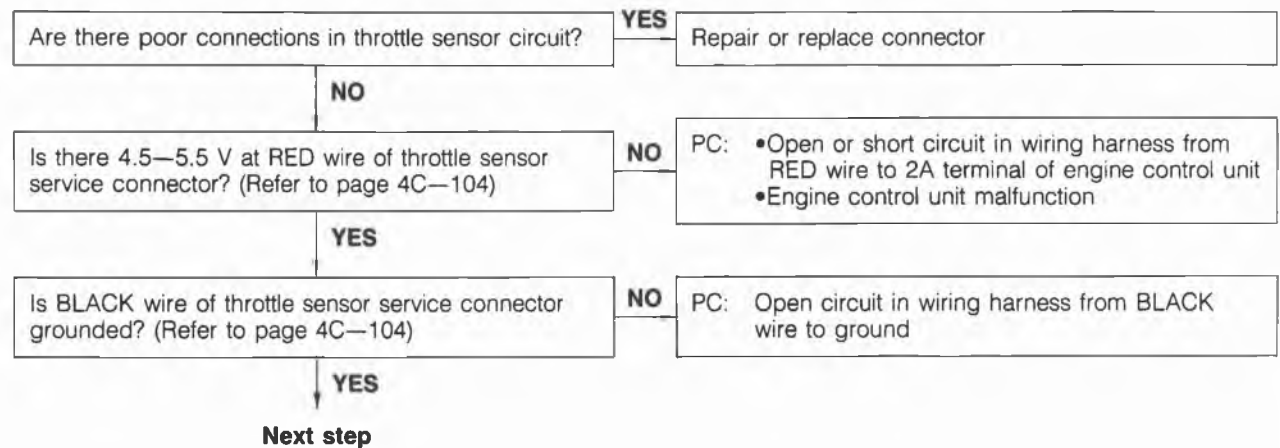
**PC: Possible Cause**



76G04C-024

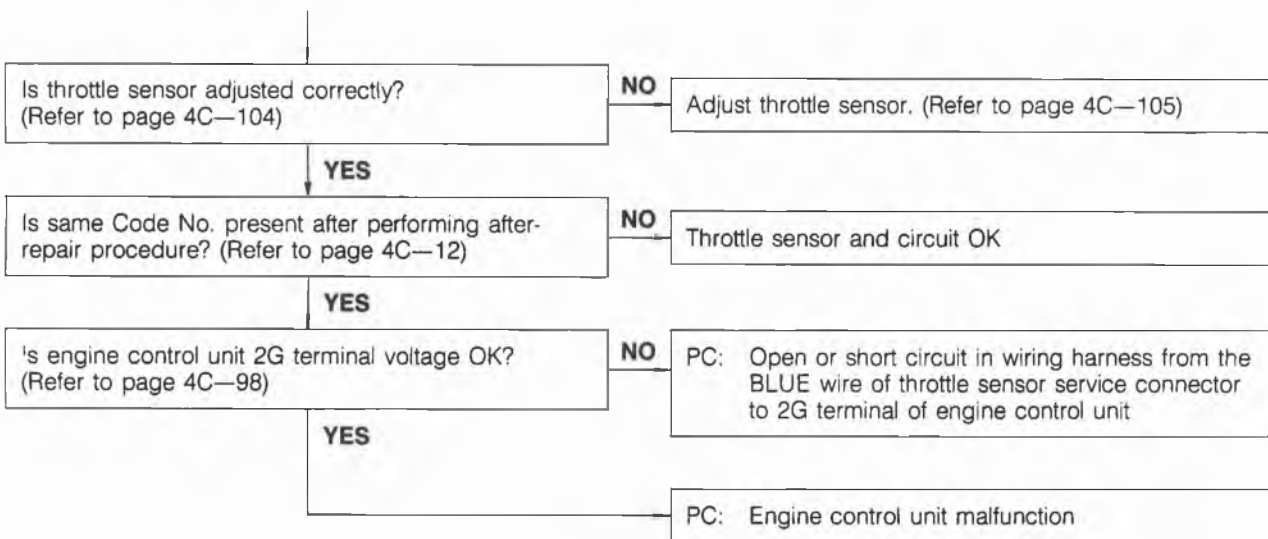
## Code No. 12 (Throttle sensor)

**PC: Possible cause**





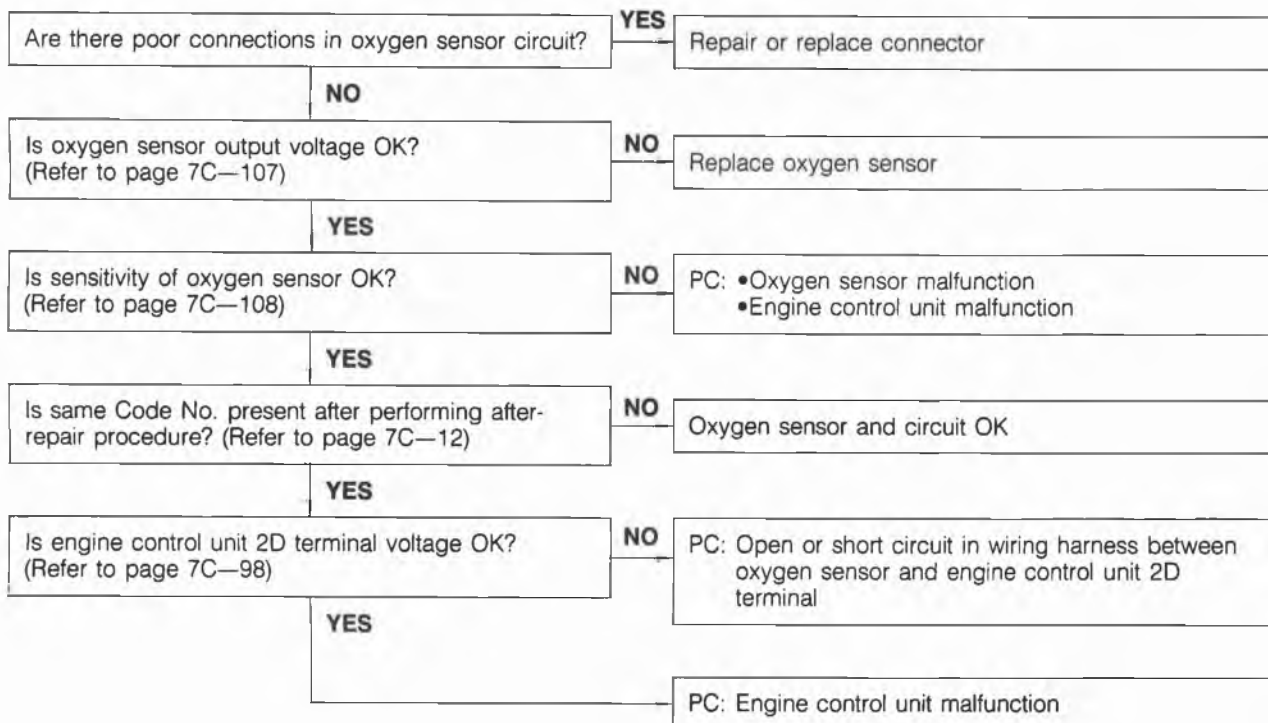
# 4C TROUBLESHOOTING WITH SST



76G04C-025

## Code No. 15 (Oxygen sensor)

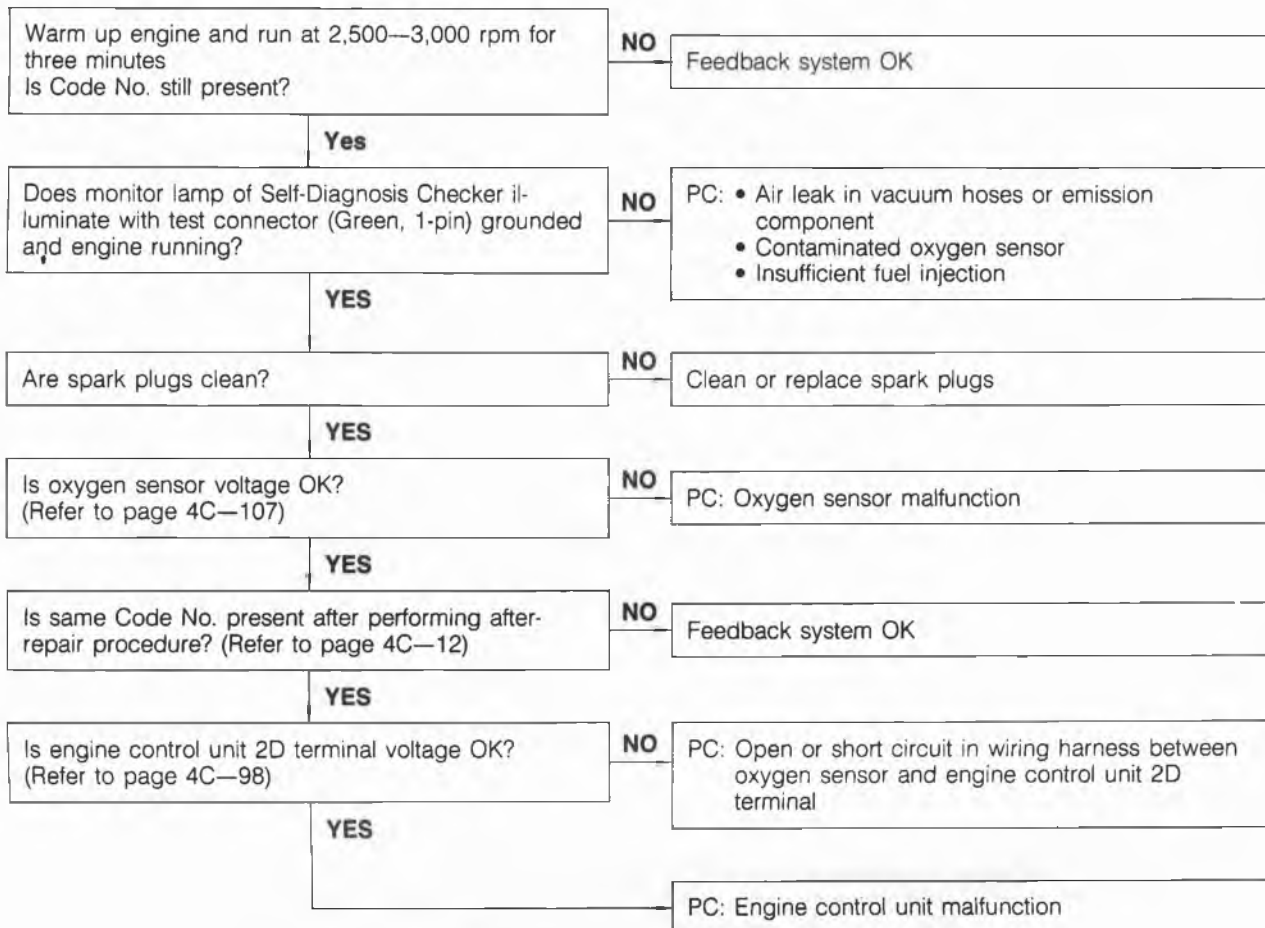
### PC: Possible Cause



76G04C-026

## Code No. 17 (Feedback system)

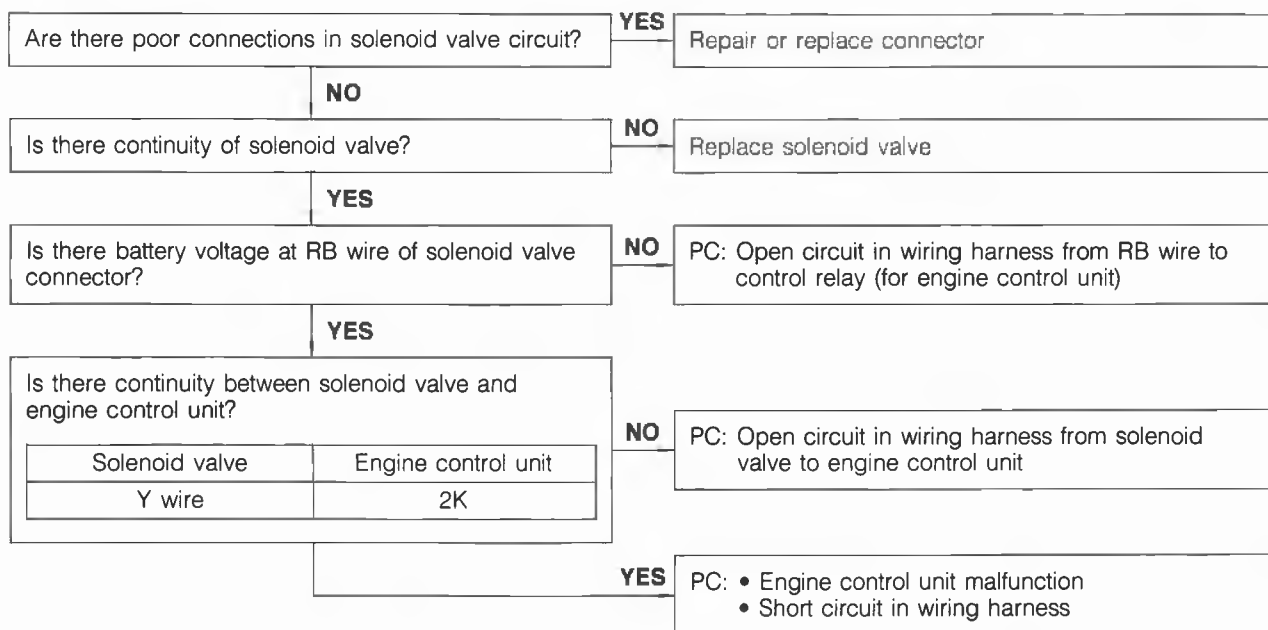
**PC: Possible Cause**



76G04C-027

## Code No. 25 (Solenoid valve-Pressure regulator control (PRC))

**PC: Possible Cause**

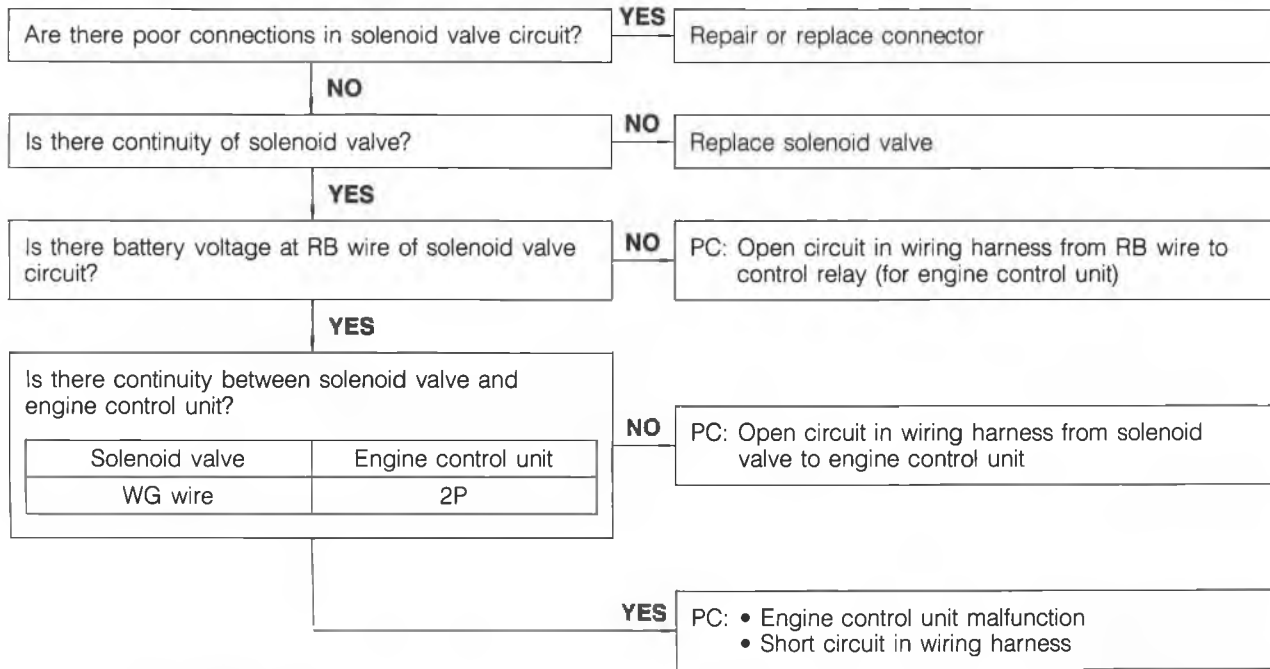


76G04C-028

# 4C TROUBLESHOOTING WITH SST

## Code No. 26 (Solenoid valve—No. 1 purge control)

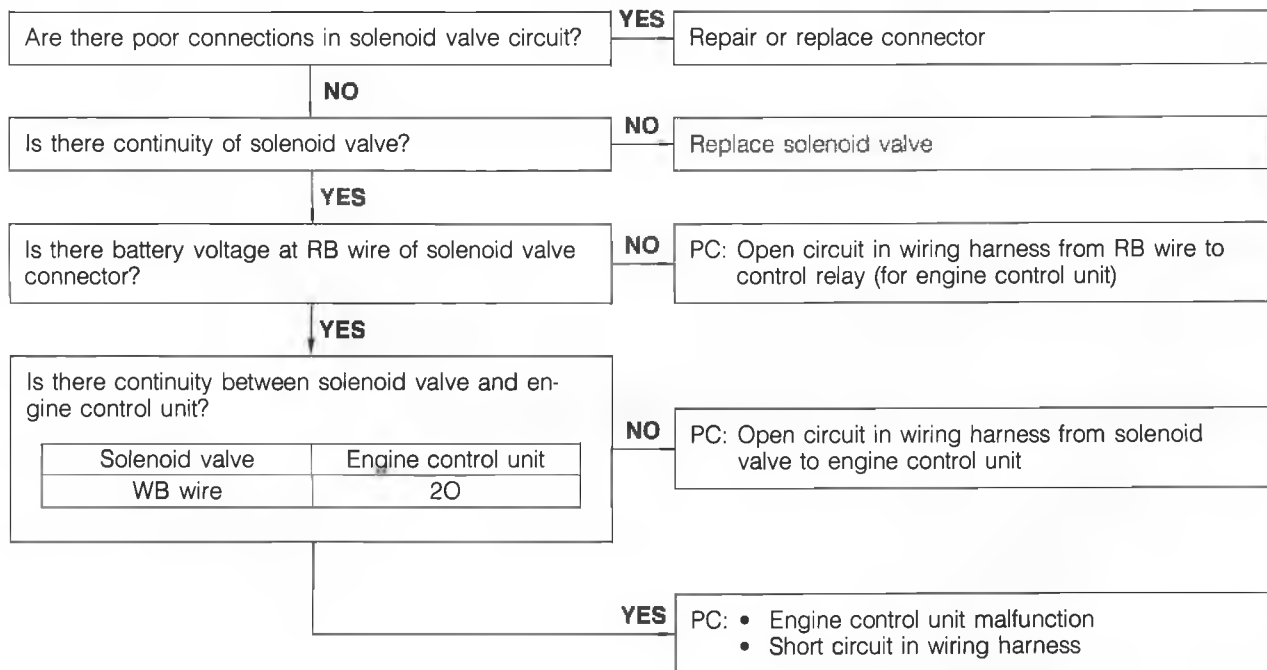
PC: Possible Cause



76G04C-029

## Code No. 27 (Solenoid valve—No. 2 purge control)

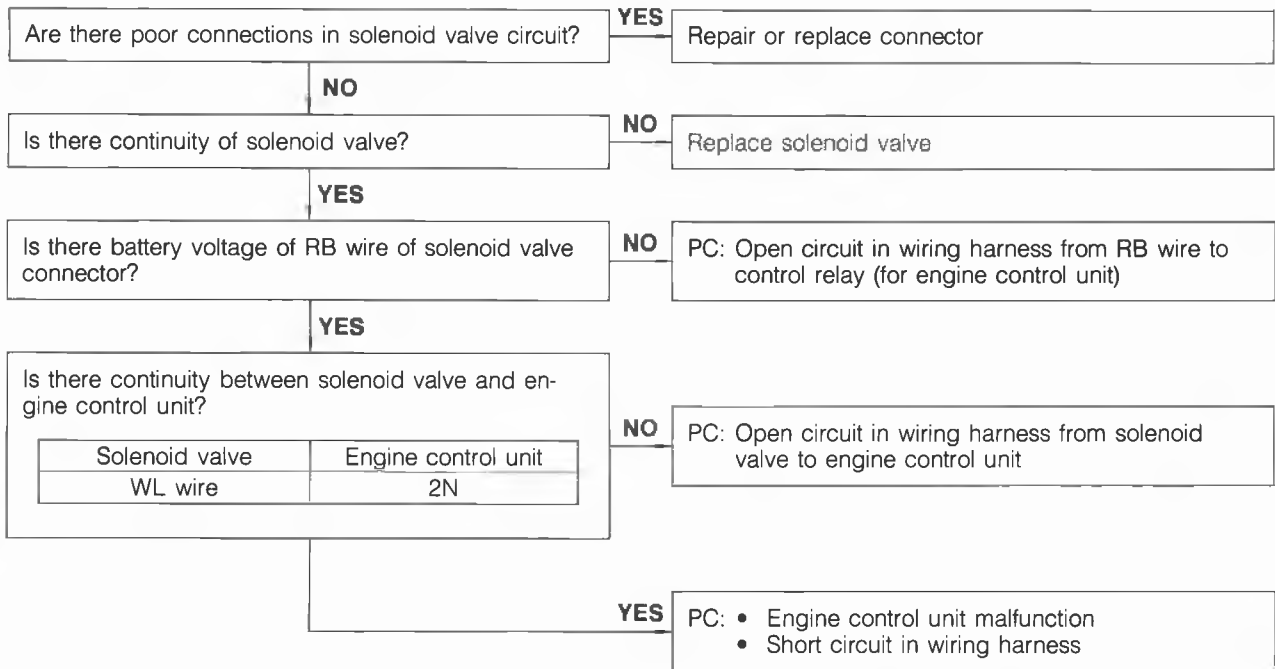
PC: Possible Cause



76G04C-030

## Code No. 28 (Solenoid valve—EGR)

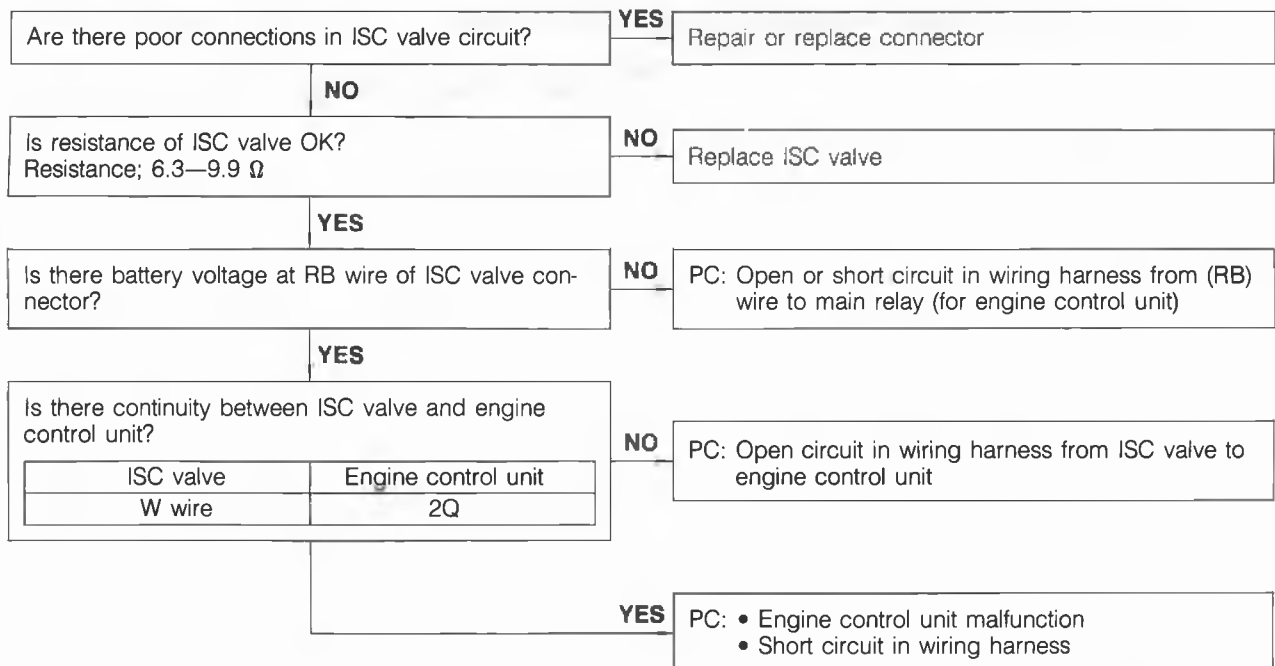
**PC: Possible Cause**



76G04C-031

## Code No. 34 (Solenoid valve—Idle speed control (ISC))

**PC: Possible Cause**

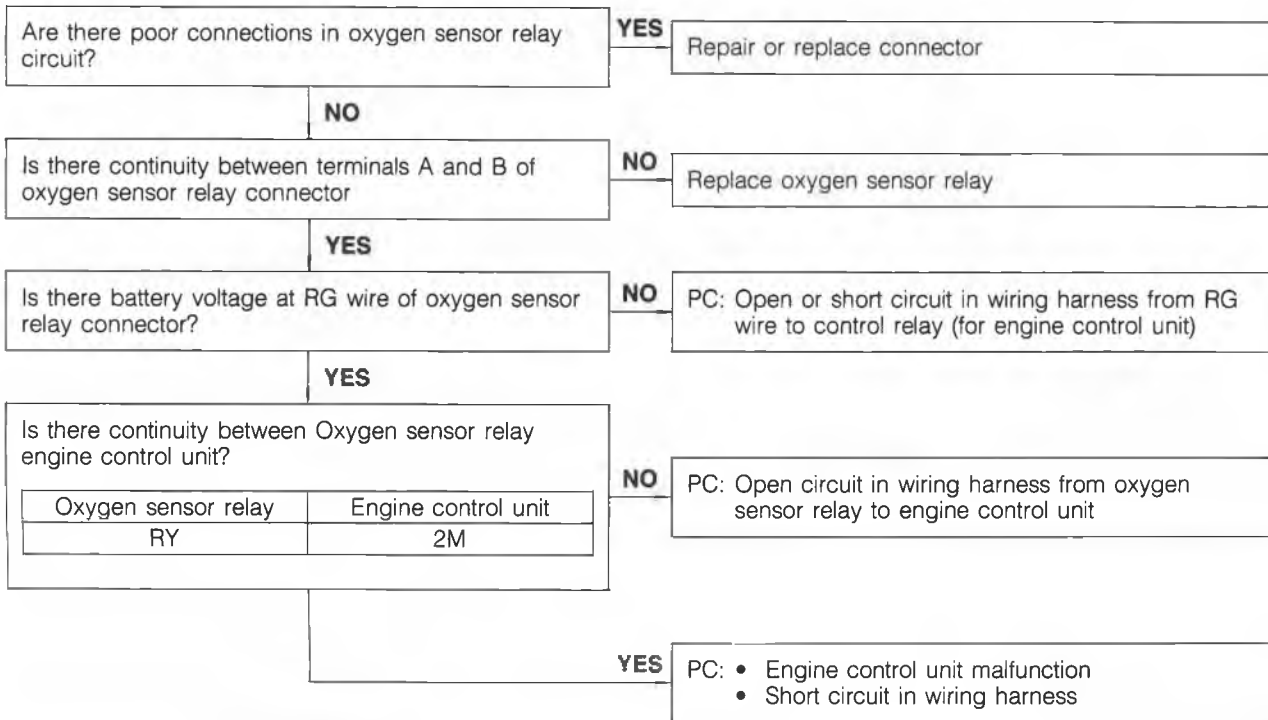


76G04C-032

# 4C TROUBLESHOOTING WITH SST

## No.36 Code (Oxygen sensor relay)

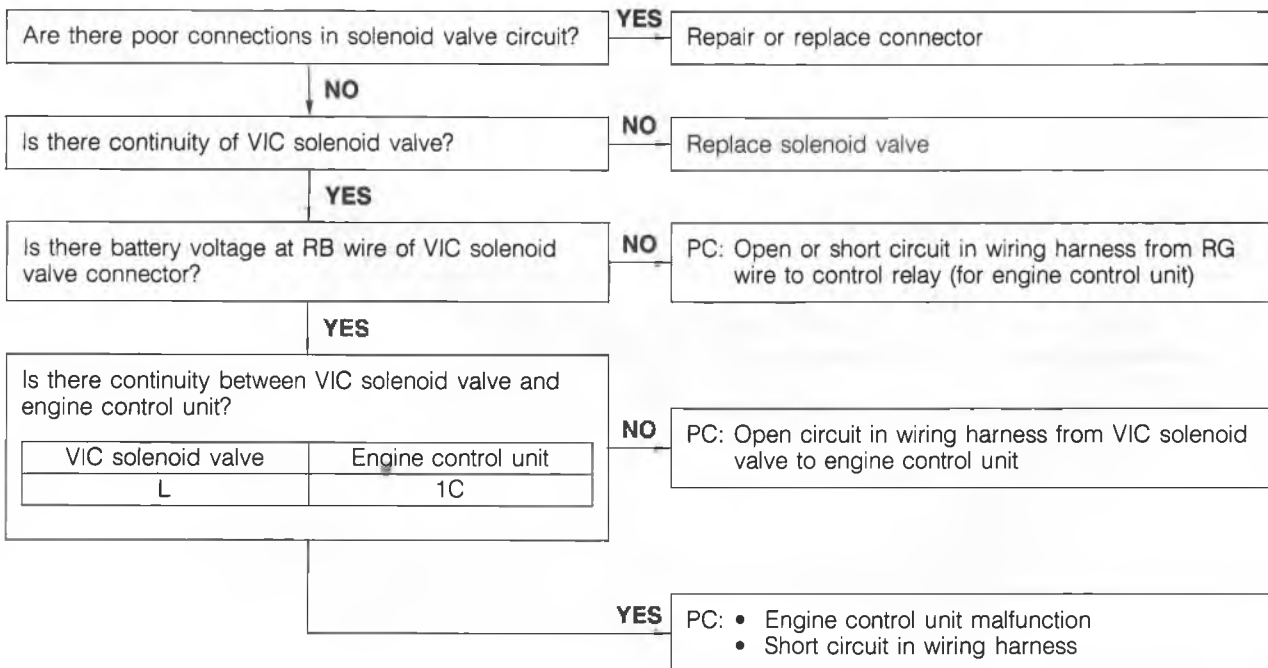
PC: Possible Cause



76G04C-033

## No.41 Code (Solenoid valve—Variable inertia control (VIC))

PC: Possible Cause



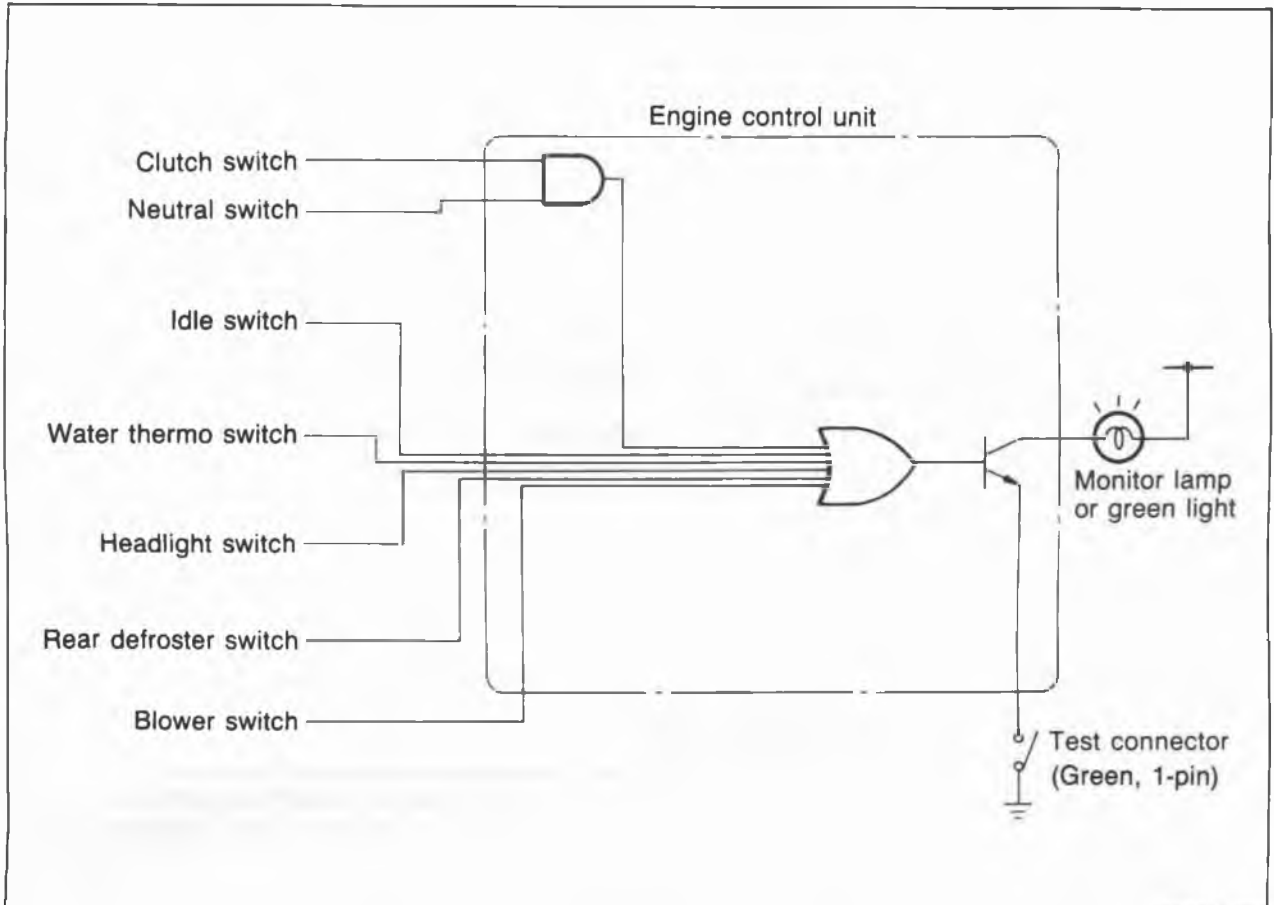
76G04C-034

## SWITCH MONITOR FUNCTION

Individual switches can be monitored by the **SST (Self-Diagnosis checker 49 G018 9A0 or Digital code checker 49 9200 180)**.

**Note**

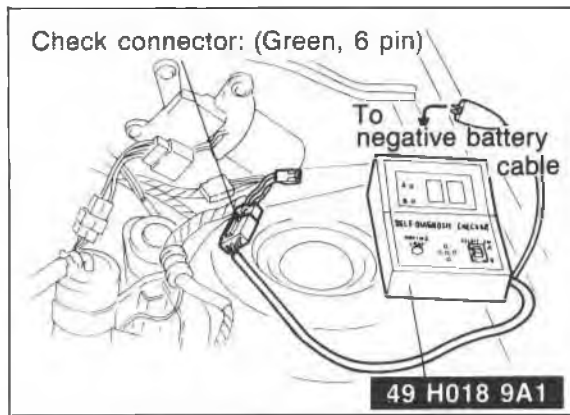
The test connector must be grounded and the ignition switch ON (engine stopped).



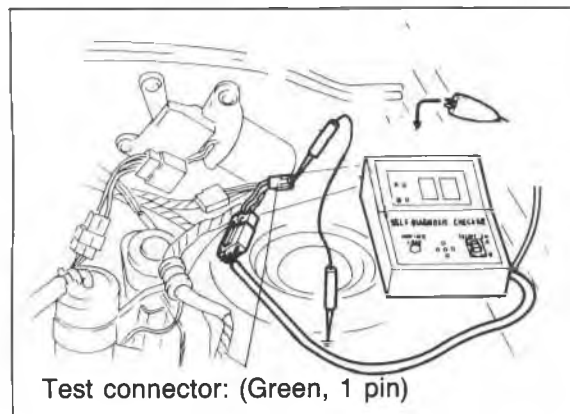
76G04C-035

Switch	Self-Diagnosis Checker (Monitor lamp)		Remark
	Light ON	Light OFF	
Clutch switch	Pedal released	Pedal depressed	In gear
Neutral switch	In gear	Neutral	Clutch pedal released
Idle switch	Pedal depressed	Pedal released	—
Headlight switch	ON	OFF	—
Rear defroster switch	ON	OFF	—
Blower switch	ON	OFF	Blower motor position: "3" or "4"
Water thermo switch (Electrical fan)	Terminal disconnected	Terminal connected	While fan not operating

# 4C SWITCH MONITOR FUNCTION



86U04A-034



76G04C-036

## INSPECTION PROCEDURE

1. Warm up the engine to normal operating temperature and stop it.
2. Connect the **SST** to the check connector (Green, 6-pin) and the negative battery terminal.

3. Connect a jumper wire between the test connector (Green, 1-pin) and a ground.
4. Turn the ignition switch ON. Check if monitor lamp illuminates as each switch is made to function as described below.

### Caution

- a) If any one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

## Procedure

Set conditions to deactivate each switch

- Transmission in neutral
- All pedals released

Verify that monitor lamp does not illuminate

YES

NO

Check each switch and related wiring harness

- Clutch and Neutral switch :Refer to page 4C—97
- Idle switch :Refer to page 4C—106
- Headlight switch :Refer to section 15
- Rear defroster switch :Refer to section 15
- Blower switch :Refer to section 15
- Water thermo switch :Refer to section 3

Check each switch as described

76G04C-037

## Neutral and Clutch switch

Shift transmission into gear  
Check that monitor lamp illuminates with clutch pedal released

YES

NO

PC: • Neutral or clutch switch malfunction (Refer to 4C—97)

- Open circuit in related wiring harness
- Engine control unit 1G terminal malfunction (Refer to page 4C—98)

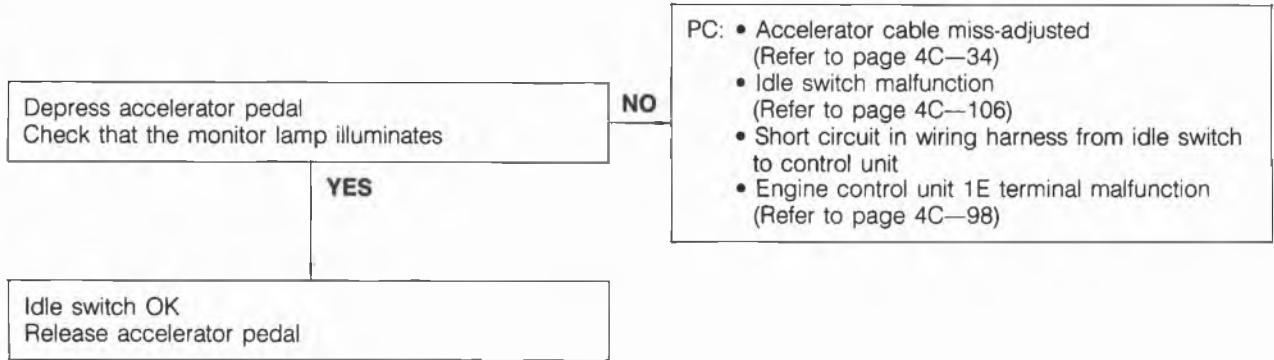
Depress clutch pedal  
Check that monitor lamp does not illuminate  
Return transmission to neutral

NO

PC: • Clutch switch malfunction (Refer to page 4C—97)

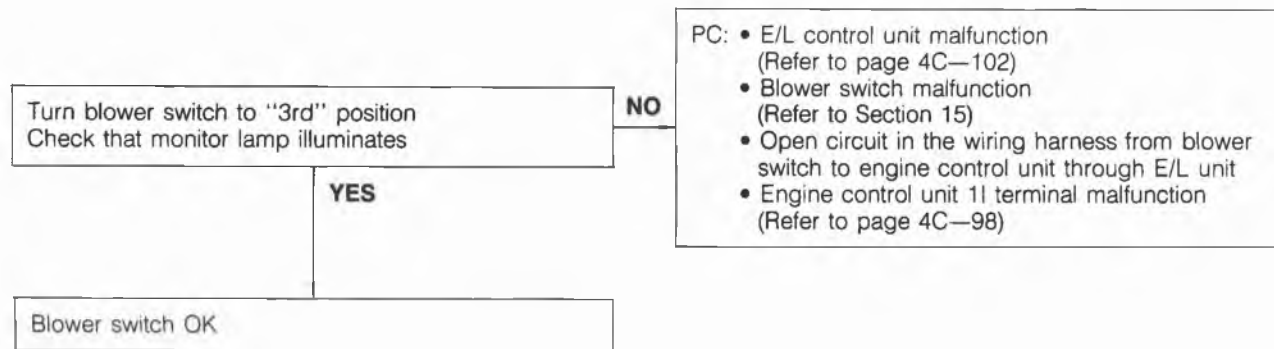
76G04C-038

## Idle switch



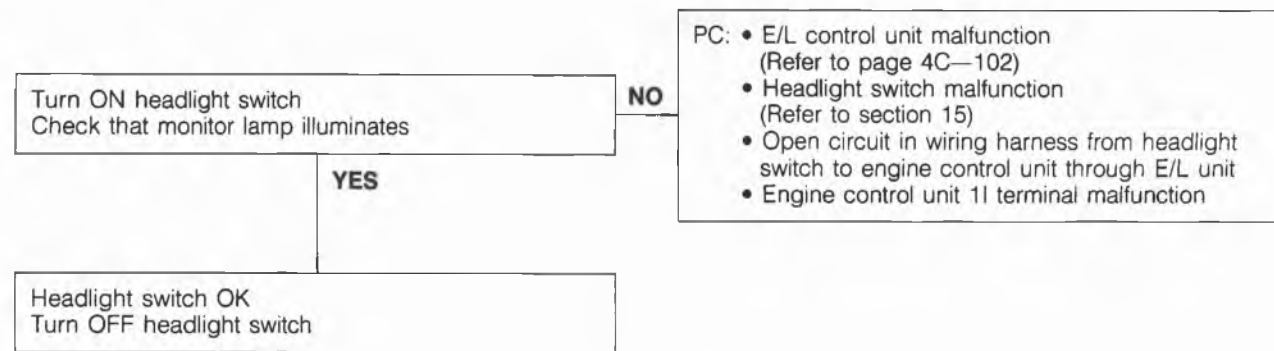
76G04C-039

## Blower switch



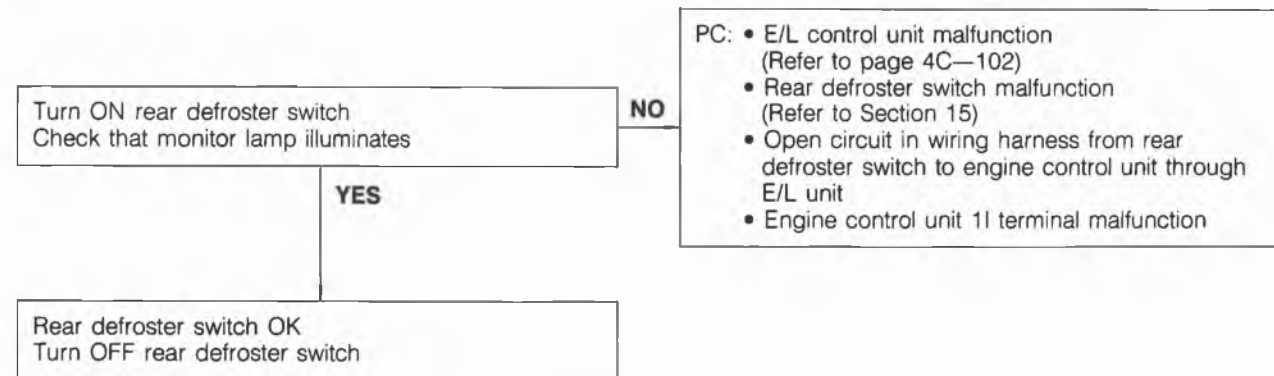
76G04C-040

## Headlight switch



76G04C-041

## Rear defroster switch



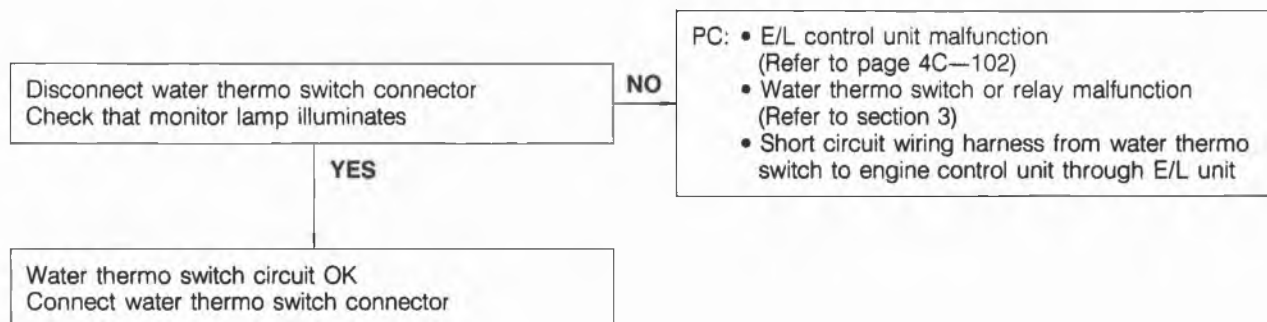
76G04C-042



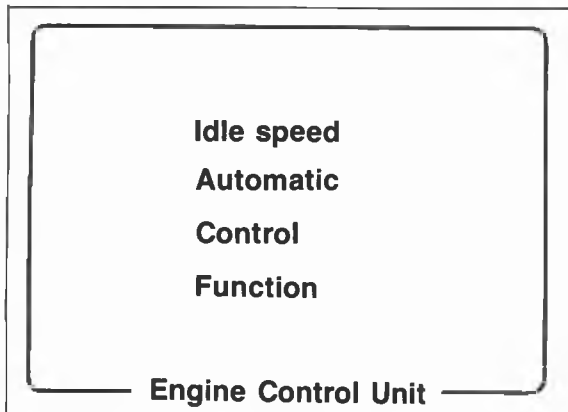
# 4C SWITCH MONITOR FUNCTION

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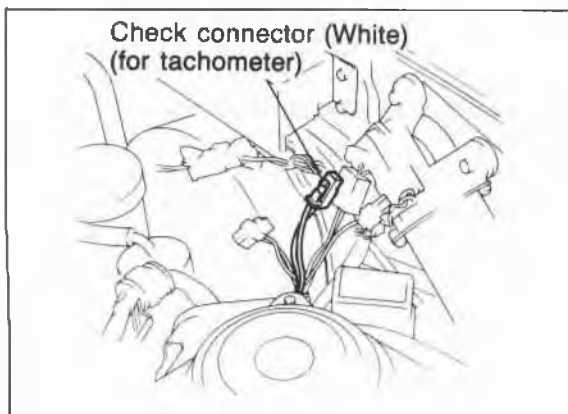
## Water thermo switch circuit



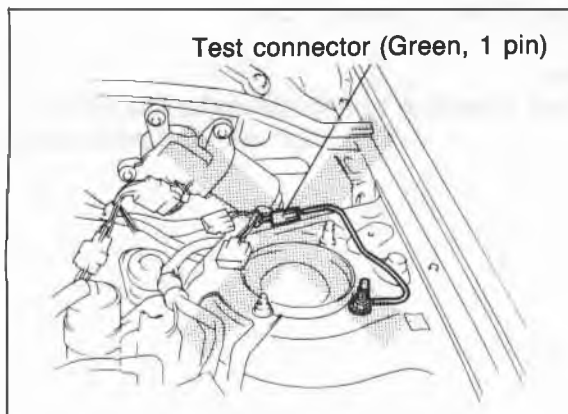
76G04C-043



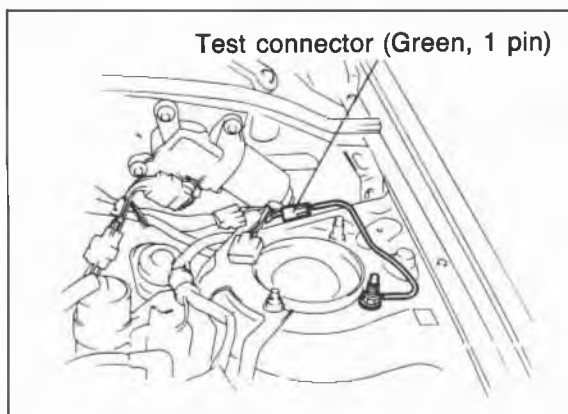
76G04C-044



76G04C-045



76G04C-046



76G04C-047

## IDLE ADJUSTMENT

### IDLE SPEED

The idle speed is controlled automatically by the engine control unit through the idle speed control (ISC) solenoid valve, it is not necessary to adjust the idle speed.

However, if the idle speed is not within specification, the idle speed must be adjusted.

### Preparation

- 1) Check the condition of the engine (plugs, leaks in hoses, etc.).
- 2) Make sure all accessories are OFF.
- 3) Warm up the engine and run it for **three minutes at 2,500—3,000 rpm** in neutral.
- 4) Check the initial ignition timing and adjust it if necessary.

### Inspection

1. Check that the idle speed is within specification without grounding the test connector (Green, 1-pin).

### Specification:

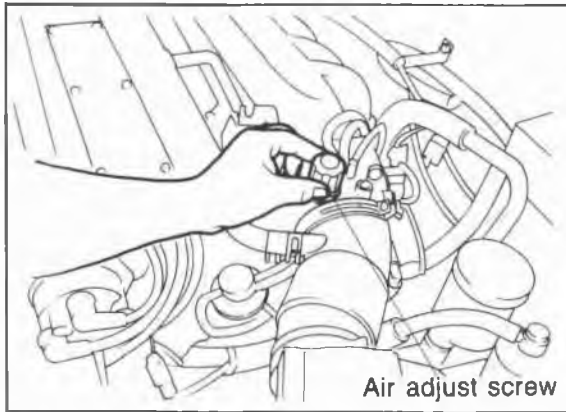
Applied load	Idle speed
No load	750 ± 50 rpm
P/S load	750 ± 50 rpm
A/C and/or E/L load	800 ± 50 rpm

2. If not correct, adjust the initial idle speed.

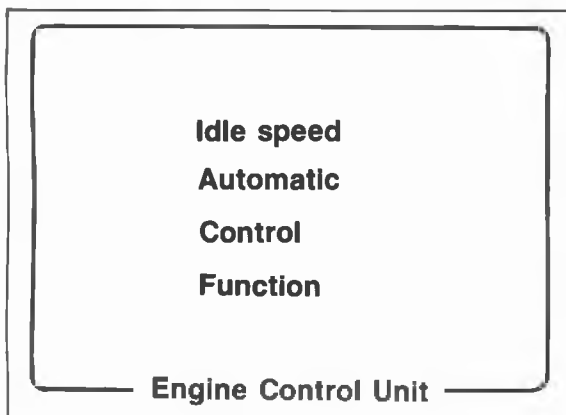
### Adjustment

1. Ground the test connector (Green, 1-pin) with a jumper wire.
2. Turn all accessories and loads OFF.

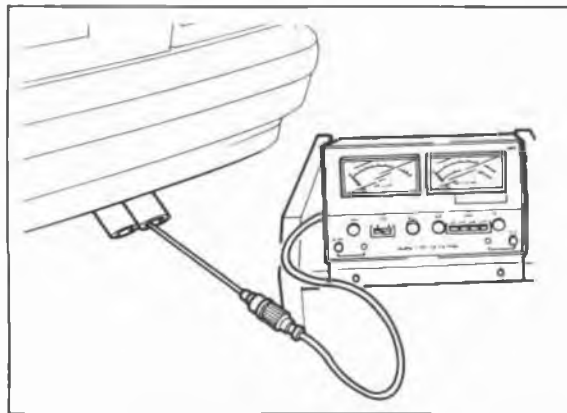
## 4C IDLE ADJUSTMENT



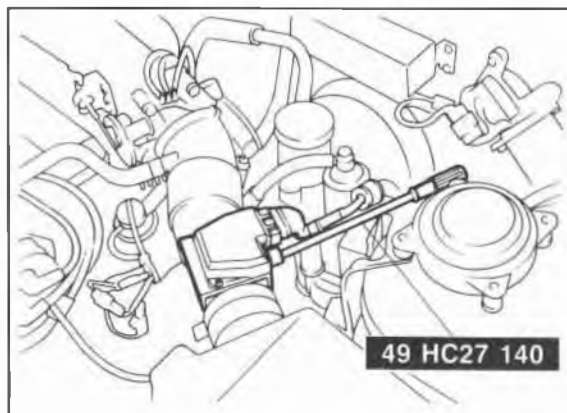
76G04C-048



76G04C-049



76G04C-050



76G04C-051

3. Remove the blind cap and adjust the initial idle speed to specification by turning the air adjust screw.

**Initial idle speed:  $750 \pm 50$  rpm**

4. After adjusting the idle speed, install the blind cap and disconnect the jumper wire from the test connector.
5. Recheck the idle speed.
6. If not within specification, check the idle speed control (ISC) system.

### IDLE MIXTURE (Unleaded Fuel)

**An automatic compensation function for air/fuel mixture is built into the engine control unit, it is not necessary to check and adjust the idle mixture.**

### IDLE MIXTURE (Leaded Fuel)

#### Note

**Before checking or adjusting the idle mixture, check and adjust the idle speed, if necessary.**

1. Insert a gas analyzer pick-up into the tail pipe.

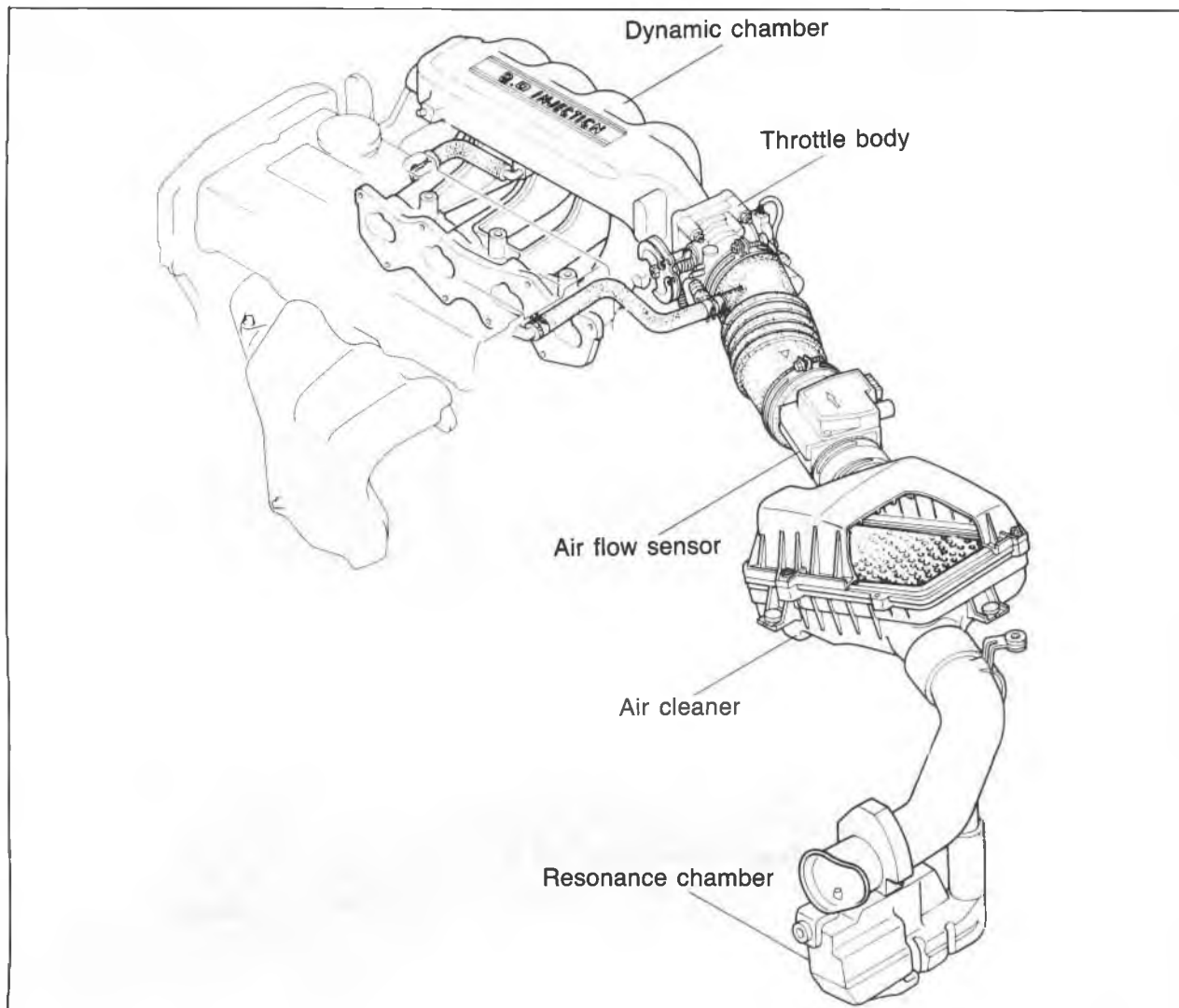
2. Check that the CO and HC concentrations are within specification.

**CO concentration:  $1.5 \pm 0.5\%$**

**HC concentration: Less than 1,000 PPM**

3. If the CO or HC concentration is not within specification, turn the adjust screw with the **SST** to adjust.

## INTAKE AIR SYSTEM



76G04C-052

This system controls the air required by the engine for operation. The system consists of the air duct, resonance chamber, air cleaner, air flow sensor, throttle body, dynamic chamber, and intake manifold.

### COMPONENT DESCRIPTION

Component	Function	Remark
<b>Air cleaner</b>	Filters air entering throttle body	Dry type
<b>Air flow sensor</b>	Detects amount of intake air; sends signal to engine control unit	Hot-wire type
<b>Resonance chamber</b>	Minimizes intake air noise	
<b>Throttle body</b>	Controls intake air quantity	Integrated throttle sensor and idle switch

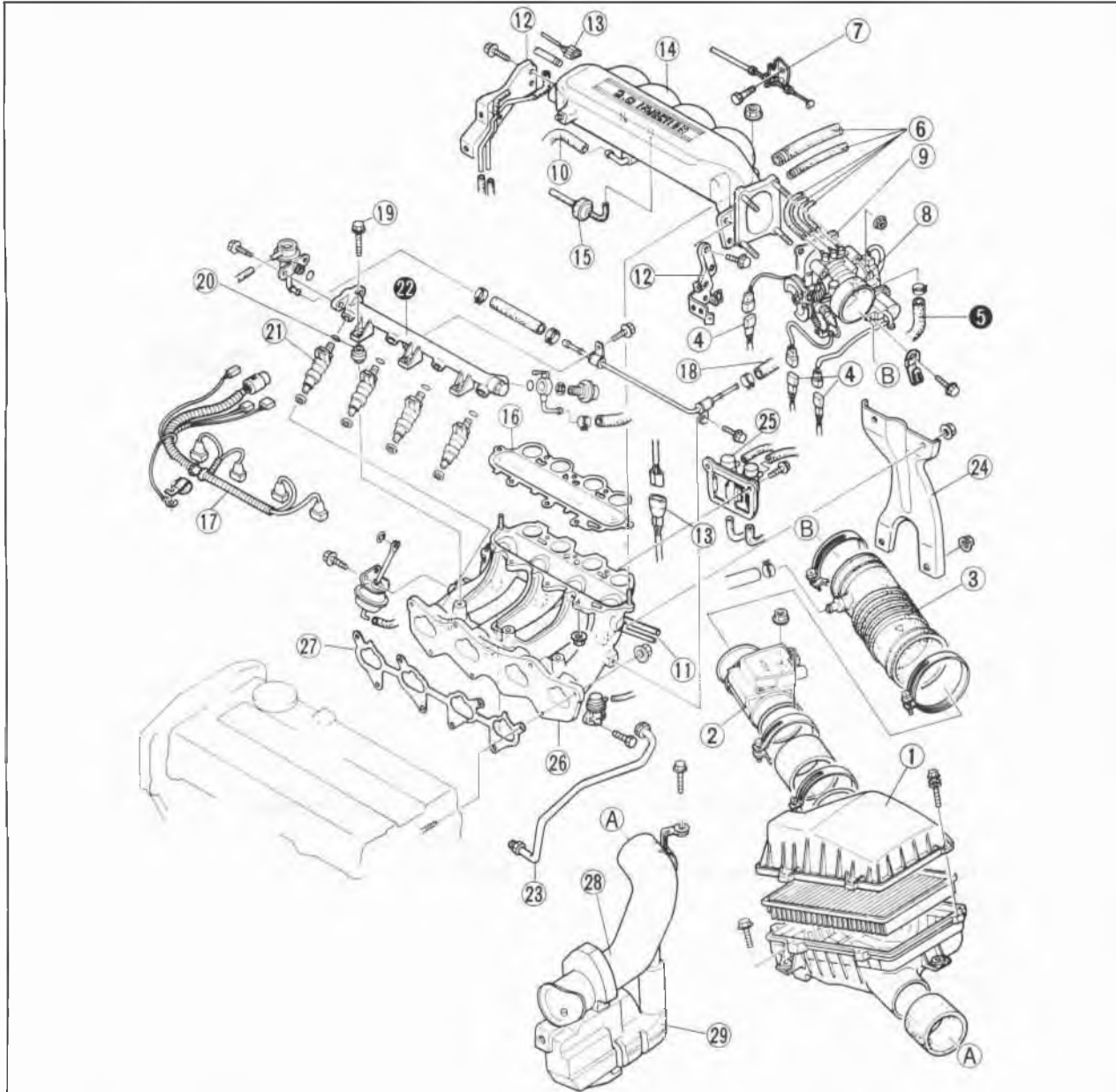
# 4C INTAKE AIR SYSTEM

## REMOVAL

### Caution

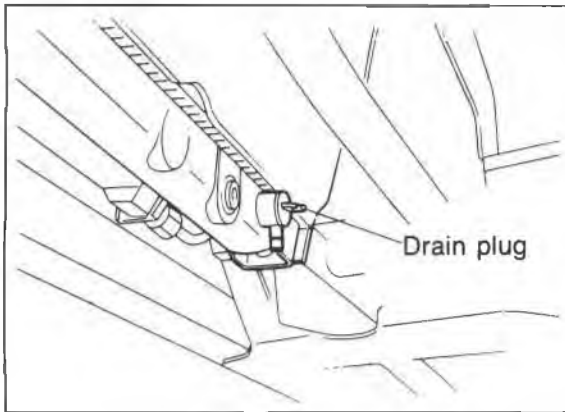
Before removing the following parts, release the fuel pressure from fuel system to reduce the possibility of injury or fire. (Refer to page 4C—52.)

Remove in the sequence shown in the figure, referring to the removal note.



76G04C-053

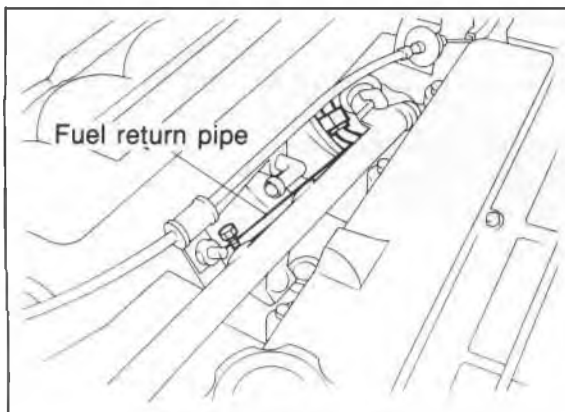
- |  |  |  |
|--|--|--|
| 1. Air cleaner                                       | 11. Vacuum pipe assembly<br>(Unleaded fuel)                | 19. Delivery pipe assembly<br>mounting bolt. |
| 2. Air flow sensor                                   | 12. Dynamic chamber brackets                               | 20. Heat insulator                           |
| 3. Air hoses   | 13. Connectors (Knock sensor,<br>Intake air thermo sensor) | 21. Injectors                                |
| 4. Connectors (Idle switch,<br>ISC, Throttle sensor) | 14. Dynamic chamber  | 22. Delivery pipe assembly                   |
| 5. Water hoses                                       | 15. One-way check valve                                    | 23. EGR pipe                                 |
| 6. Vacuum hoses                                      | 16. Gasket   | 24. Intake manifold bracket                  |
| 7. Accelerator cable                                 | 17. Wiring harness<br>(for injectors)                      | 25. Solenoid valve                           |
| 8. Throttle body                                     | 18. Fuel hoses   | 26. Intake manifold                          |
| 9. Gasket  |  | 27. Gasket                                   |
| 10. PCV hose   |  | 28. Air duct                                 |
|  |  | 29. Resonance chamber                        |



76G04C-054

## Removal Note Water hose

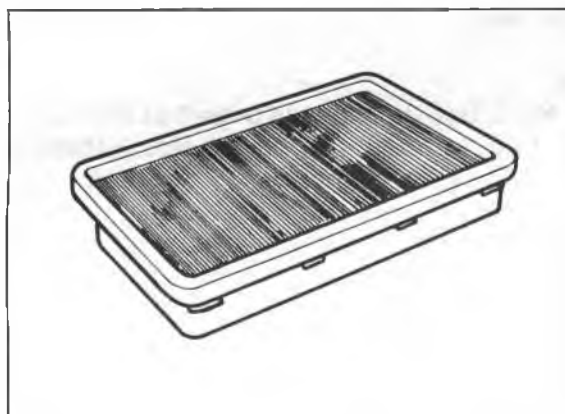
Before disconnecting the water hose, drain two liters of engine coolant.



76G04C-055

## Delivery pipe assembly.

1. Separate the fuel return pipe from the delivery pipe assembly.
2. Remove the delivery pipe assembly and the fuel return pipe.



76G04C-056

## PARTS INSPECTION

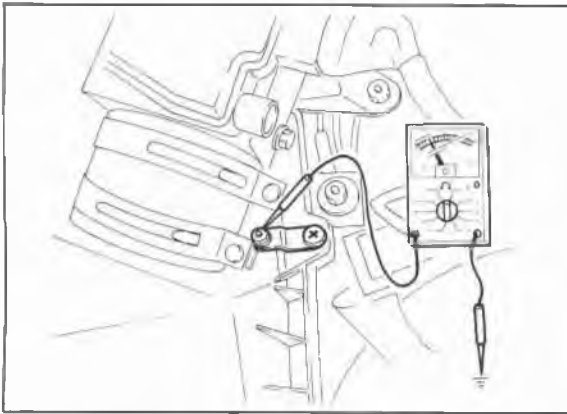
### Air Cleaner Element

1. Check the condition of the air cleaner element.
2. Blow out the dust with compressed air, if necessary.

### Caution

- a) The air cleaner must be replaced at the intervals outlined in the maintenance schedule.
- b) Never drive the vehicle without the air cleaner element, otherwise, damage to the air flow sensor (hot wire) will occur.
- c) Never use an oil permeated air cleaner element, otherwise, contamination of the hot wire will occur.

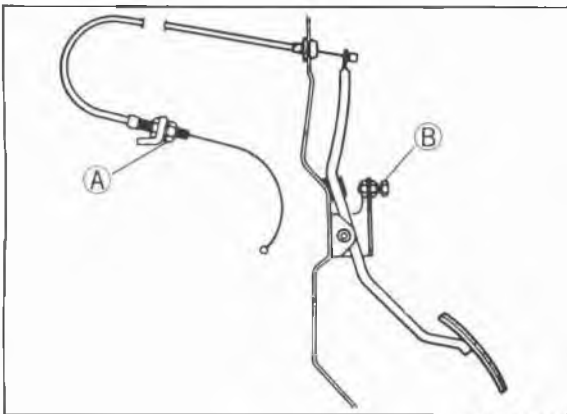
## 4C INTAKE AIR SYSTEM



76G04C-058

### Air Cleaner Case

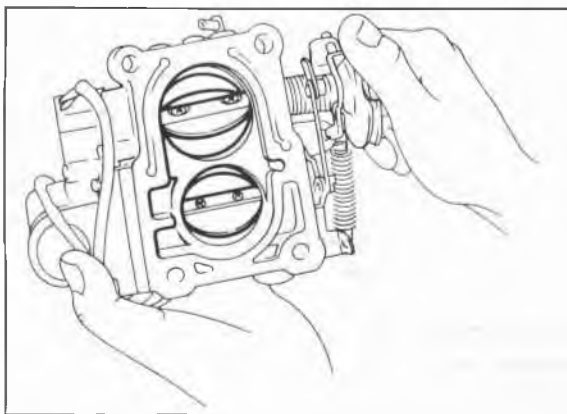
1. Check that the steel plate mounted on the upper case is grounded.
2. Replace, if necessary.



76G04C-059

### Accelerator Cable

1. Inspect the deflection of the cable. If it is not within **1—3 mm (0.04—0.12 in.)**, adjust by turning nuts A.
2. Depress the accelerator pedal to the floor and confirm that the throttle valve is fully opened. Adjust by turning bolt B if necessary.



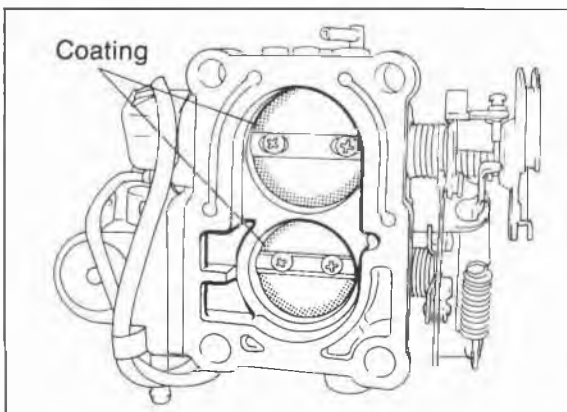
76G04C-060

### Throttle Body

#### Note

**The No. 2 throttle valve is preset at the factory to begin opening after the No. 1 throttle valve has opened approx. 25 degrees.**

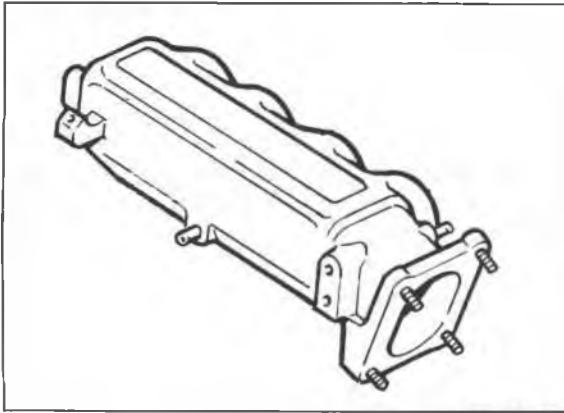
1. Check that the No. 1 and No. 2 throttle valves move smoothly when the throttle lever is moved from fully closed to fully open.
2. Replace, if necessary.



69G04C-050

#### Caution

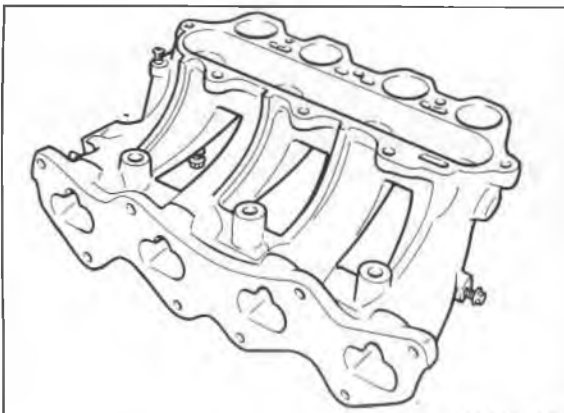
**Do not remove the thin sealing coating from the throttle valve or bore.**



69G04A-062

### Dynamic Chamber

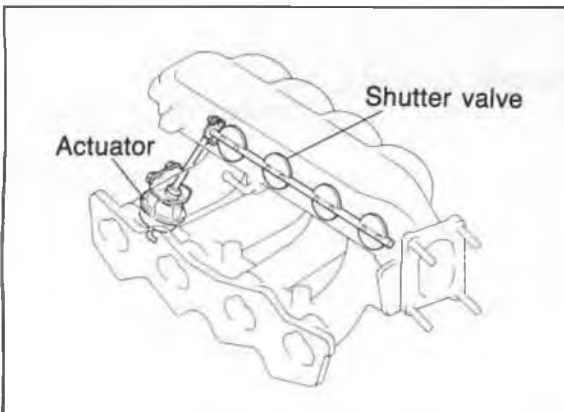
1. Visually check the dynamic chamber for damage.
2. Replace, if necessary.



69G04A-064

### Intake Manifold

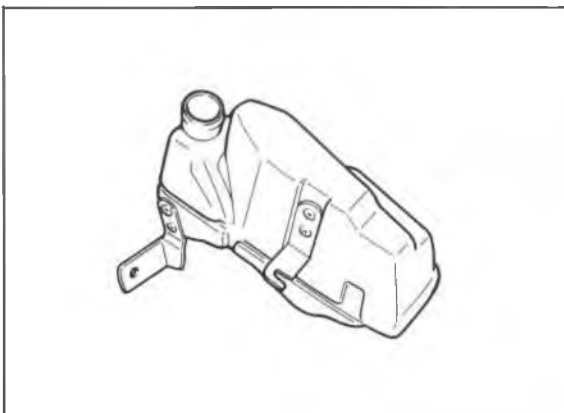
1. Visually check the intake manifold for damage.
2. Replace, if necessary.



69G04C-051

### Shutter Valves

1. Visually check the shutter valves for damage.
2. Check that the shutter valves close and open fully.
3. Adjust or replace them if necessary.



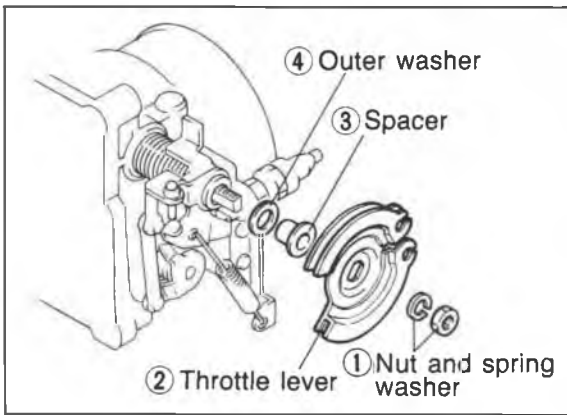
69G04C-054

### Resonance Chamber

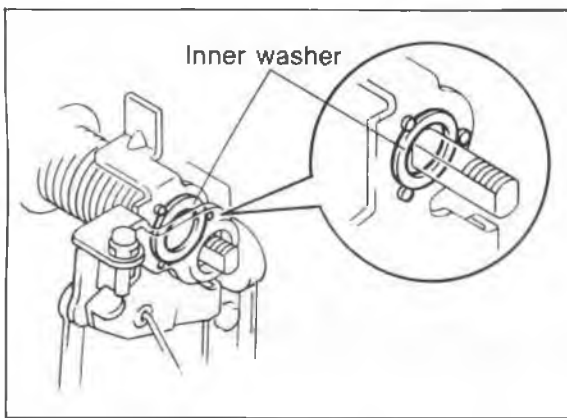
1. Visually check the resonance chamber for damage.
2. Replace if necessary.



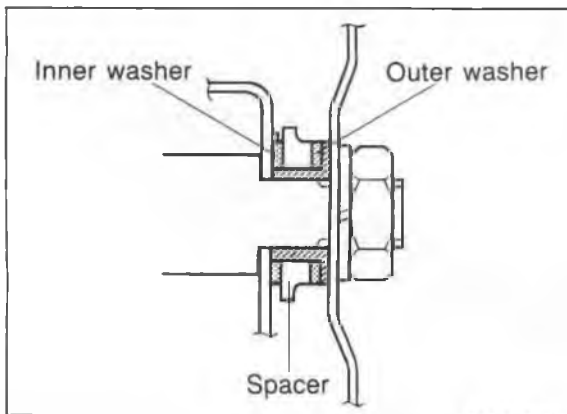
## 4C INTAKE AIR SYSTEM



69G04C-130



69G04C-131



76G04C-061

### REPLACEMENT Throttle Lever Removal

#### Caution

When loosening the throttle lever nut, hold the throttle valves fully open to prevent damaging the idle switch.

Remove the throttle lever in the sequence shown in the figure.

### Installation

1. Check that the inner washer is in the proper position as shown in the figure.
2. Assemble the spacer and outer washer and install them onto the throttle shaft.
3. Install the throttle lever onto the throttle shaft.

#### Caution

When tightening the throttle lever nut, hold the throttle valves fully closed to prevent bending the stopper lever.

4. Tighten the throttle lever nut.

#### Tightening torque:

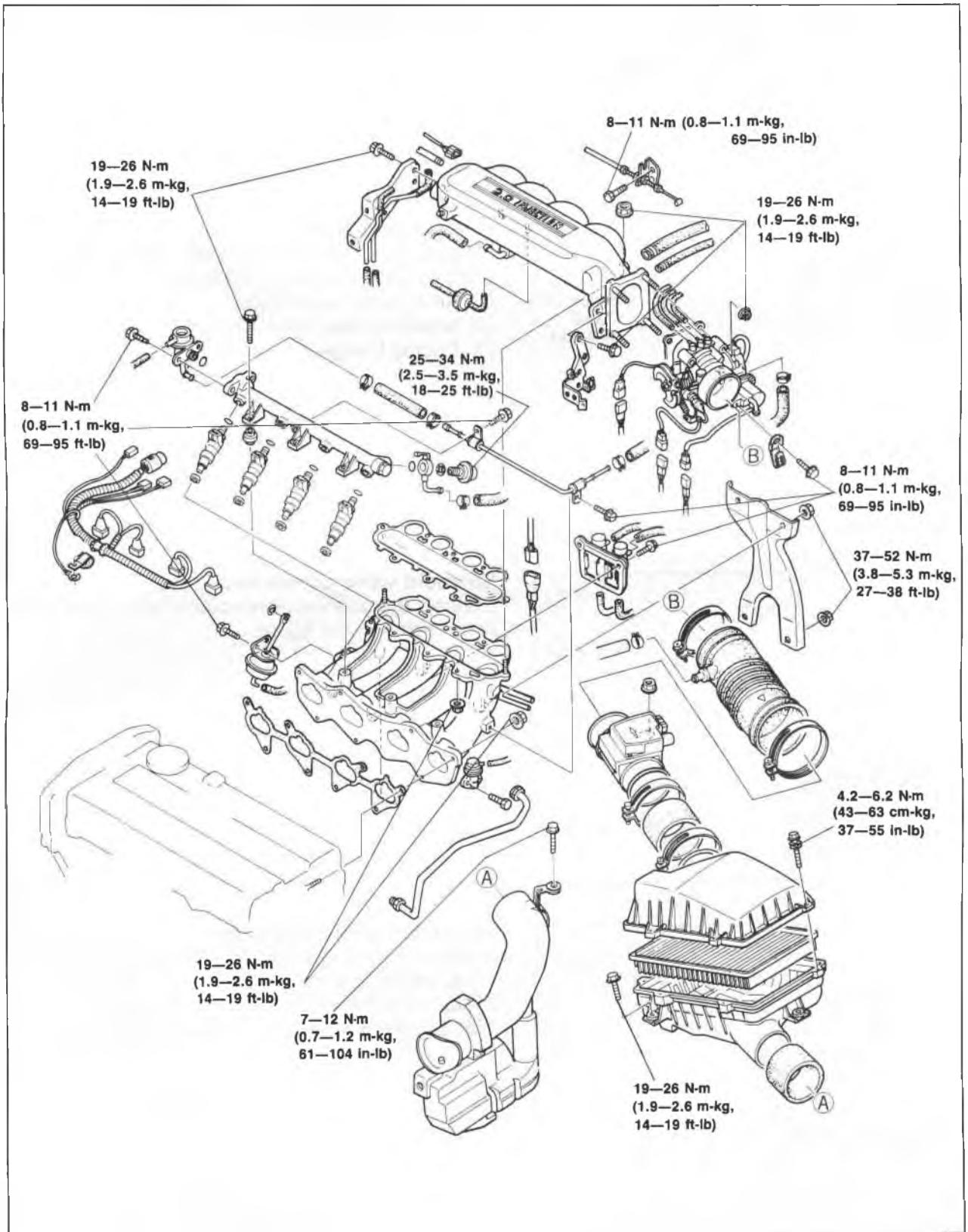
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

5. Check that the inner and outer washer and spacer are assembled correctly as shown.
6. Check that No.1 and No.2 throttle valves move smoothly and that No.2 throttle valve is closed completely when the No.1 throttle valve is closed.
7. Check the operation of the idle switch.  
(Refer to page 4C—106.)

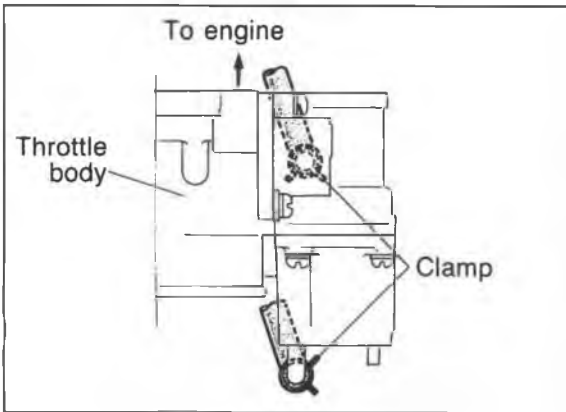
## INSTALLATION

Install in the reverse order of removal, referring to the installation note.

### Torque Specification



# 4C INTAKE AIR SYSTEM



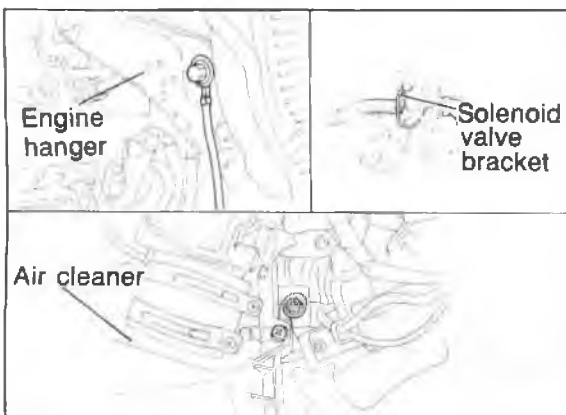
86U04A-056

## Installation Note Water hose spring clamps

Face the clamp end as shown in the figure.

## Gasket

Use new gaskets at the intake manifold, dynamic chamber, and throttle body.

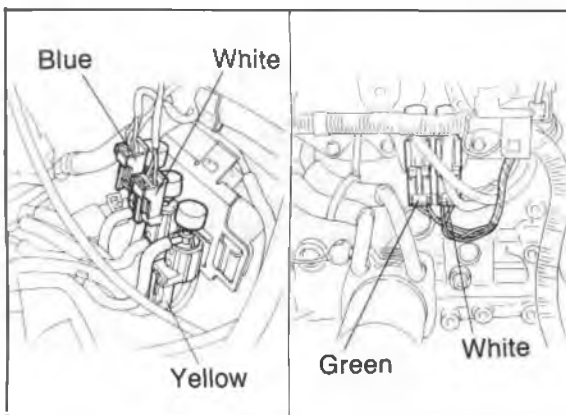


76G04C-062

## Ground harnesses

Make sure that the ground harnesses are tightened securely at the following positions.

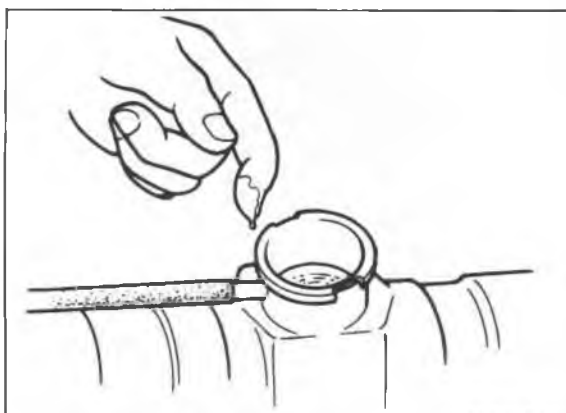
- (1) Air cleaner upper case
- (2) Solenoid valve bracket
- (3) Engine hanger



76G04C-063

## Solenoid valve connectors

Connect the solenoid valve connectors at the positions shown in the figure.



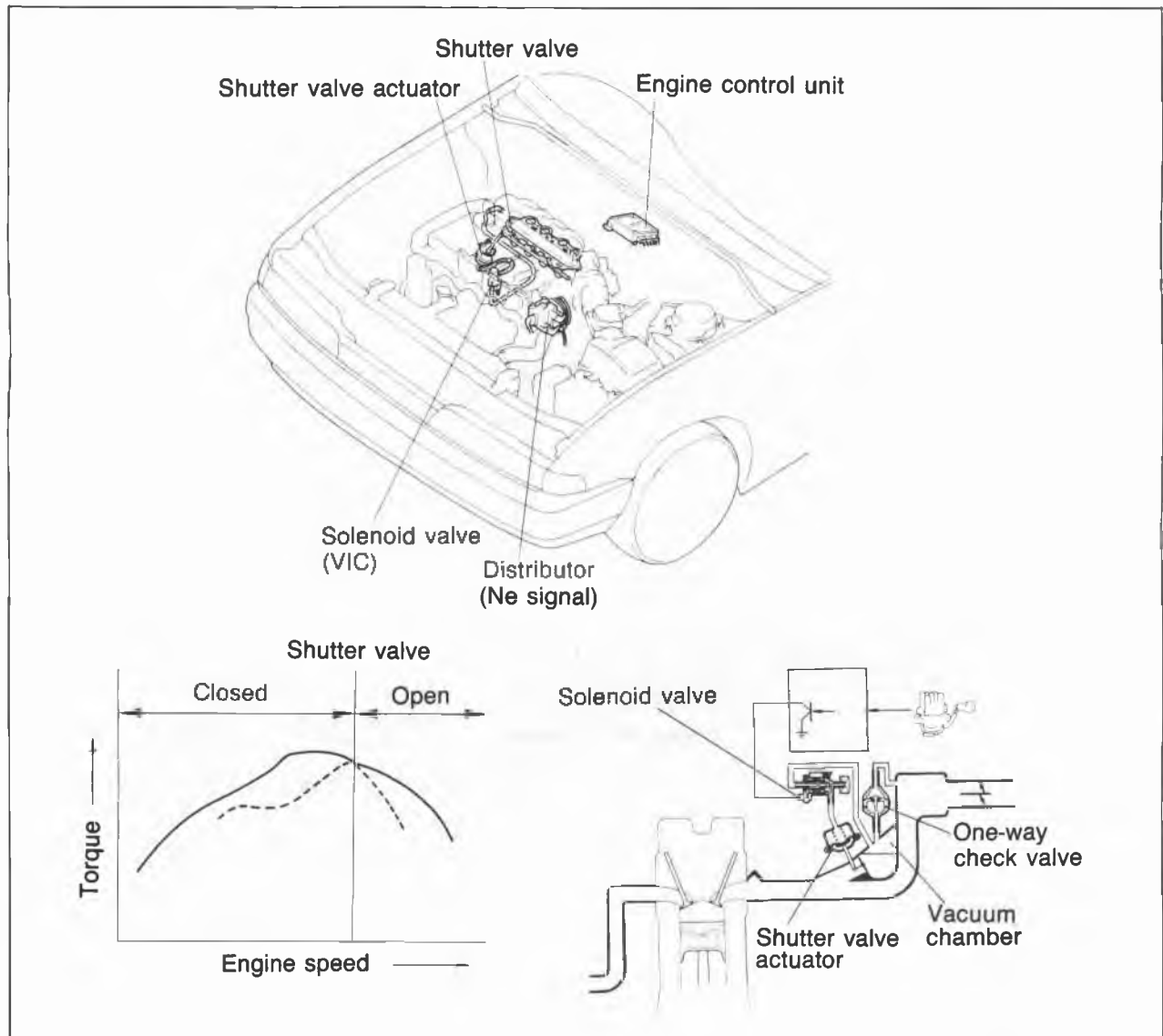
76G04C-064

## Inspection after installation

1. After completing installation, fill up the engine with the specified engine coolant.
2. Warm up the engine and run it at idle.
3. Check for any vacuum, coolant, or fuel leaks.

## VARIABLE INERTIA CONTROL (VIC) SYSTEM

The VIC system supplements the intake air's inertial effect to create a torque band that runs from low rpm through the high rpm range. The system consists of the intake manifold, shutter valves, dynamic chambers, actuator, one-way check valve, three-way solenoid valve, and engine control unit.



76G04C-065

### Intake Inertia Effect

The air within the dynamic chamber and intake manifold begins to flow during the first half of the air intake process. This air flow pushes air into the cylinder by its own inertial force during the second half of the air intake process. This improves the charging of the cylinder.

To most effectively put this inertia charging to use, the length of the manifold leading to the dynamic chamber needs to be changed in response to the engine rpm.

Length of intake manifold	Intake inertia effect
Long	Effective at low and middle speed
Short	Effective at high speed

The VIC system controls the length of the intake manifold travel by switching the shutter valve either open or closed at the specified engine rpm.

# 7C VIC SYSTEM

## COMPONENT DESCRIPTION

Component	Function	Remark
<b>Dynamic chamber</b>	Provides chamber for VIC system operation	Integrates one-way check valve
<b>Engine control unit</b>	Monitors engine rpm, controls solenoid valve	Unleaded fuel: ON at above 5200 rpm Leaded fuel: ON at above 5400 rpm
<b>Intake manifold</b>	Provides short and long length of intake travel	Integrates shutter valve
<b>One-way check valve</b>	Holds vacuum in vacuum chamber	Installed between dynamic chamber and vacuum chamber
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to control unit	Installed in distributor
<b>Solenoid valve (VIC)</b>	Controls vacuum to shutter valve actuator	
<b>Shutter valve</b>	Closes short intake port	
<b>Shutter valve actuator</b>	Actuates shutter valve according to vacuum from solenoid valve	

76G04C-066

## TROUBLESHOOTING

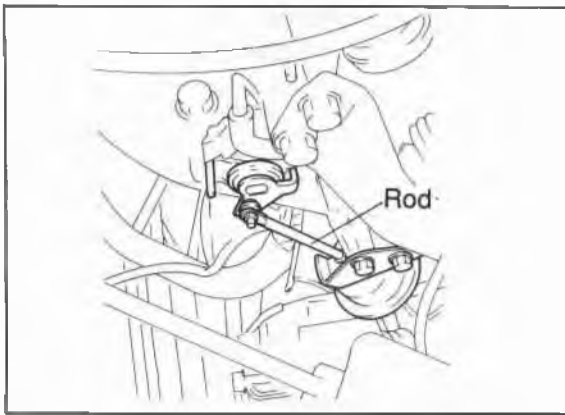
Check the condition of the wiring harness and connectors before checking the sensor or switches.

### Note

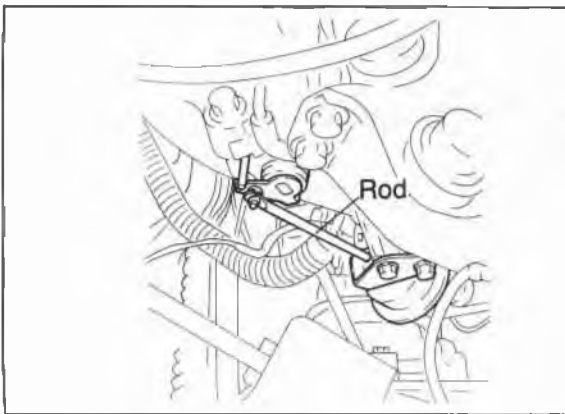
**Make the system inspection first. If no problem is found, continue with inspection of the next system of the Troubleshooting Guide. (Refer to pages 4C—10 and 11.)**

Possible cause		Vacuum chamber (Vacuum leak)	Shutter valve actuator	One-way check valve	Solenoid valve (VIC)		Engine control unit (1C)	System inspection
					Vacuum signal	Electric signal		
Page		4C—42	4C—41	4C—43	4C—42		4C—98	4C—41
Symptom								
Rough idle	During warm up	2	3	4	—	—	—	1
	After warming up	2	3	4	—	—	—	1
Poor acceleration, hesitation, or lack of power		6	5	7	2	3	4	1
Poor fuel consumption		6	5	7	2	3	4	1

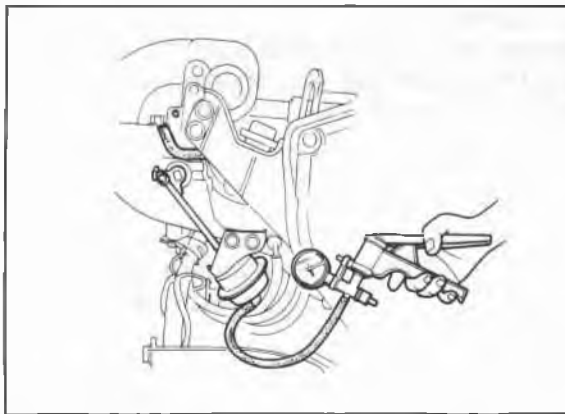
76G04C-067



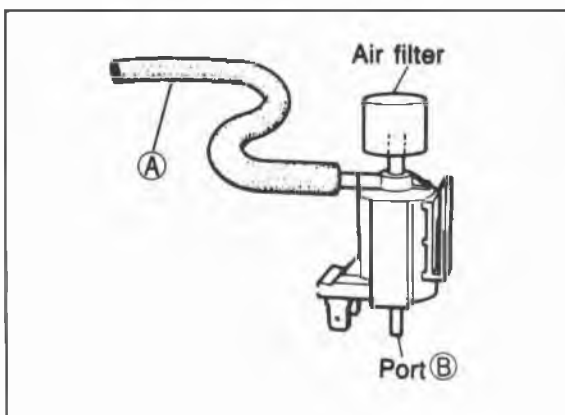
76G04C-068



76G04C-069



76G04C-070



76G04C-071

## System Inspection

1. Warm up the engine to normal operating temperature and run it at idle.
2. Check that the rod has been pulled into the actuator.

3. Increase the engine speed and check that the rod is released above specification.

## Specification:

**Approx. 5,200 rpm....Unleaded fuel**

**Approx. 5,400 rpm....Leaded fuel**

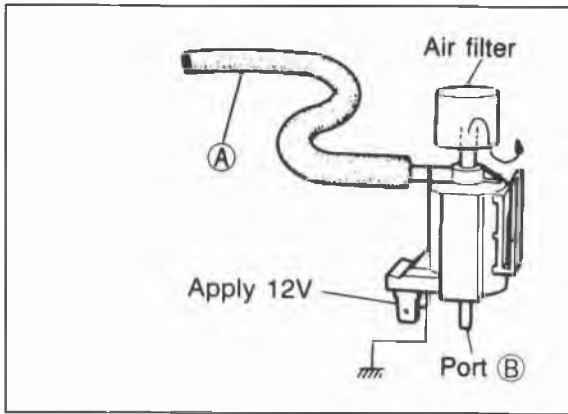
## Shutter Valve Actuator

1. Disconnect the vacuum hose from the actuator, and connect a vacuum pump to the actuator.
2. Apply **approx. 200 mmHg (7.9 inHg)** vacuum and check that the rod is pulled into the actuator.

## VIC Solenoid Valve

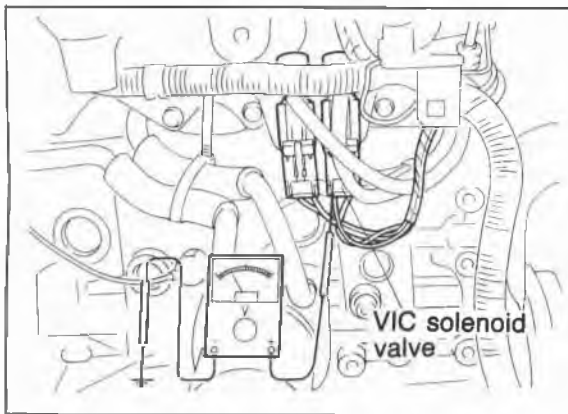
1. Disconnect the vacuum hoses from the solenoid valve.
2. Blow through the valve from port A and check that air flows from port B.

# 4C VIC SYSTEM



76G04C-072

3. Disconnect the solenoid valve connector and connect 12V and a ground to the terminals of the solenoid valve.
4. Blow through the valve from port A and check that air flows from the air filter.

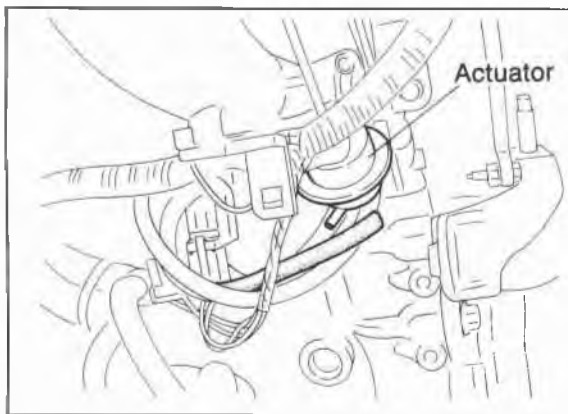


76G04C-073

### Electrical Signal

1. Connect a voltmeter to the VIC solenoid valve (O wire).
2. Increase the engine speed and note the voltmeter reading.

Voltmeter reading	Unleaded fuel	Leaded fuel
Approx. 12V	Below 5,200 rpm	Below 5,400 rpm
Below 2.0V	Approx. 5,100 rpm	Approx. 5,300 rpm



76G04C-074

### Vacuum Signal

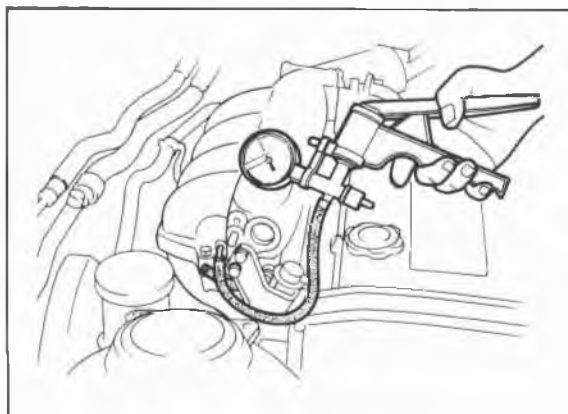
1. Disconnect the vacuum hose from the actuator.
2. Place a finger over the port opening and check that air is pulled in at idle.
3. Increase the engine speed above specification and check that air is not pulled in.

### Specification:

**Approx. 5,200 rpm.....Unleaded fuel**

**Approx. 5,400 rpm.....Leaded fuel**

4. Connect the vacuum hose.



76G04C-075

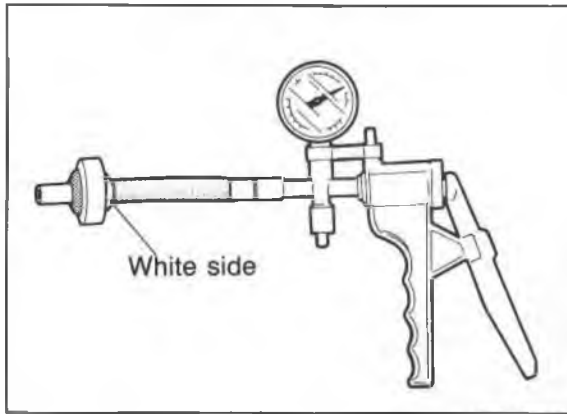
### Vacuum Chamber

1. Disconnect vacuum hose A from the dynamic chamber.
2. Connect the vacuum pump to the dynamic chamber.
3. Apply vacuum and check that it is held.
4. If not correct, check the one-way check valve for vacuum leakage. (Refer to page 4C—43.)

### Note

**10 mm Hg (0.39 inHg) drop per 30 seconds is allowable.**

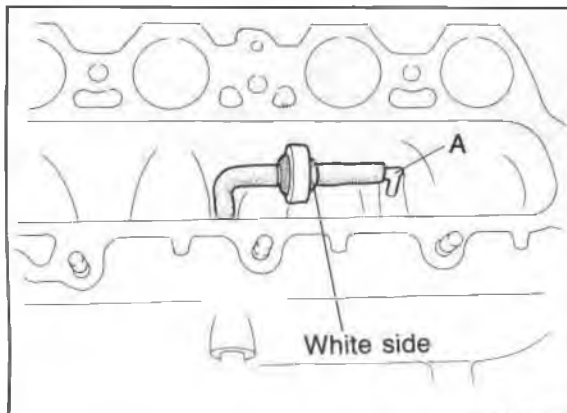
5. If the one-way check valve is good, check the dynamic chamber.



76G04C-076

## One-way Check Valve Inspection

1. Remove the dynamic chamber.
2. Remove the one-way check valve.
3. Connect a vacuum pump as shown in the illustration.
4. Apply vacuum and check that it is held.
5. Connect the vacuum pump to the opposite port.
6. Apply vacuum and check that it is not held.
7. If not correct, replace the valve.



76G04C-210

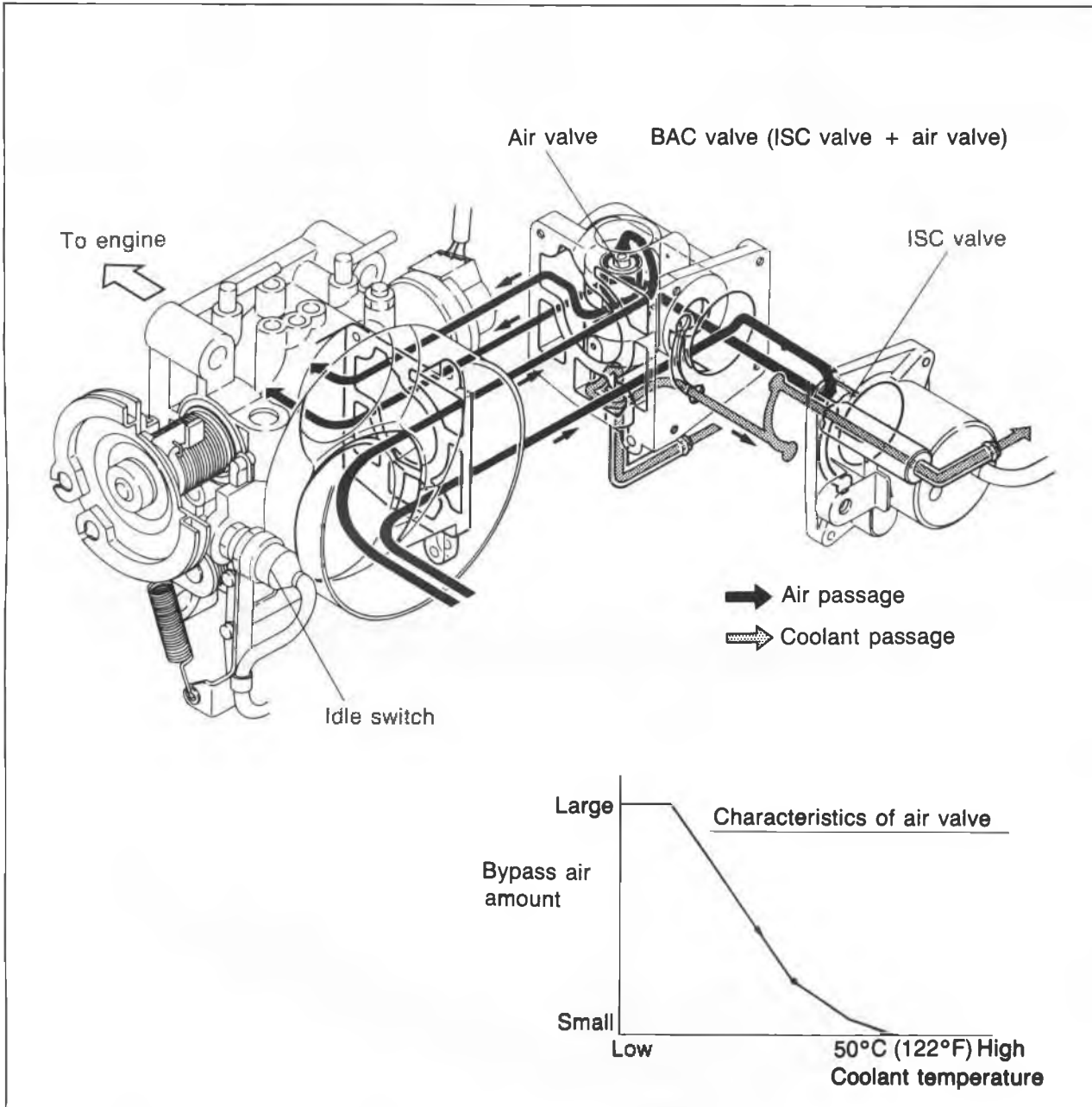
## Replacement

1. Remove the dynamic chamber. (Refer to page 4C—32)
2. Remove the one-way check valve.
3. Install a new valve so that the white side of the valve faces to the port A.



# 4C ISC SYSTEM

## IDLE SPEED CONTROL (ISC) SYSTEM



76G04C-077

To improve idle smoothness, the ISC system controls the intake air amount by regulating the bypass air amount that passes through the throttle body. This system consists of the BAC valve and the control system.

The BAC valve consists of the air valve which functions only when the engine is cold (**below 50°C (122°F)**) and the ISC valve which works throughout the entire engine speed range.

## COMPONENT DESCRIPTION

Component	Function	Remark
<b>A/C switch</b>	Detects air conditioner operation; sends signal to engine control unit	Switch ON when air conditioner operating
<b>Air valve</b>	When cold, supplies bypass air into dynamic chamber	<ul style="list-style-type: none"> <li>• Engine speed increased to shorten warm-up period</li> <li>• Thermo wax type</li> <li>• Installed in BAC valve</li> </ul>
<b>Clutch switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when clutch pedal released
<b>E/L control unit</b>	Detects that E/L is being applied; sends signal to engine control unit	
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valve (Idle speed control)	
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	Installed on throttle body
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to engine control unit	Installed in distributor
<b>Neutral switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when in gear
<b>P/S pressure switch</b>	Detects P/S operation; sends signal to engine control unit	Switch ON when steering wheel turned right or left
<b>Solenoid valve (Idle speed control)</b>	Controls bypass air amount	<ul style="list-style-type: none"> <li>• Controlled by duty signal from engine control unit</li> <li>• Installed in BAC valve</li> <li>• Operates idle-up</li> </ul>
<b>Test connector</b>	For initial idle speed adjustment	<ul style="list-style-type: none"> <li>• Gernr, 1-pin</li> <li>• Idle speed feedback control cancelled when connector grounded</li> </ul>
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	

76G04C-078

# 4C ISC SYSTEM

## TROUBLESHOOTING

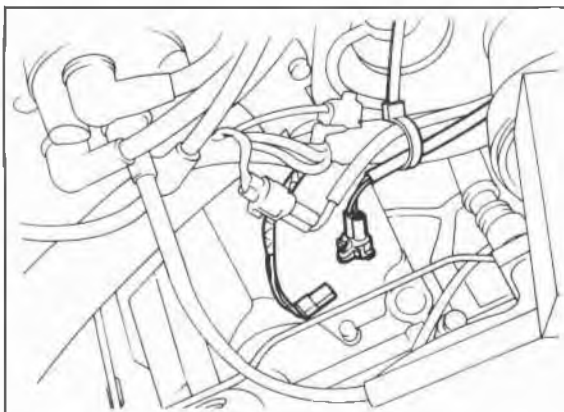
Check the condition of the wiring harness and connectors before checking the sensors or switches.

### Note

Make the system inspection first. If no problem is found, continue with inspection of the next system of the Troubleshooting Guide. (Refer to pages 4C—10 and 11.)

Symptom		Possible cause	Air valve	P/S pressure switch	Solenoid valve (Idle speed control)	Water thermo sensor	Engine control unit terminal			System inspection
							1L	1W	2Q	
Page		4C—47	4C—97	4C—48	4C—107	4C—98			4C—46	
Engine stalls	During warm up	2	—	3	4	—	5	6	1	
	After warm up	—	4	2	—	3	5	6	1	
Rough idle	During warm up	2	—	3	—	—	4	5	1	
	After warm up	—	4	2	—	3	5	6	1	
High idle speed after warm up		2	5	3	—	4	6	7	1	
Runs rough on deceleration		—	—	2	—	—	3	4	1	
Afterburn in exhaust system		2	—	3	—	—	4	5	1	
Falls emission test		2	—	3	—	—	4	5	1	

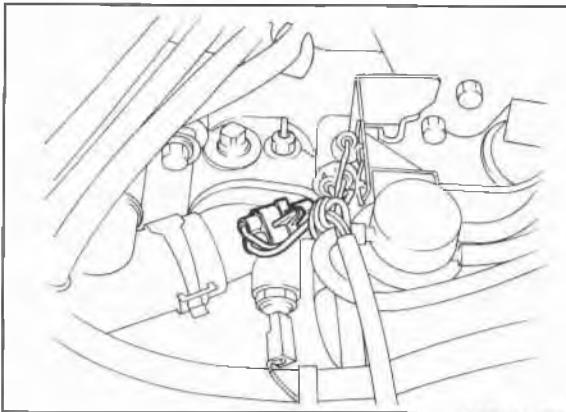
76G04C-079



76G04C-080

### System Inspection (Air valve)

1. Ground the test connector (Green, 1-pin) with a jumper wire.
2. Disconnect the ISC valve connector (Gray, 2-pin) at idle while the engine is cold.
3. Note the engine speed and reconnect the connector.
4. Warm up the engine to the normal operating temperature and disconnect the connector again.
5. Check that the engine speed is lower than that when cold.



76G04C-081

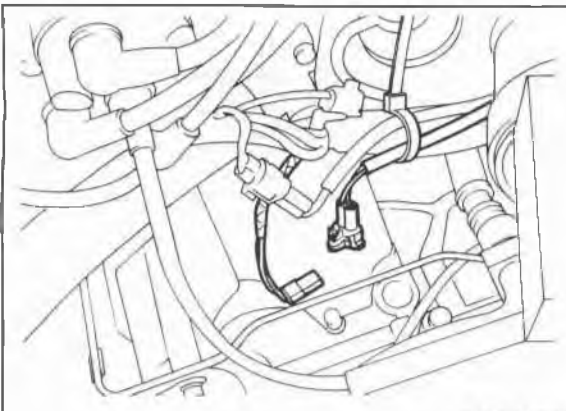
### (ISC valve)

6. Connect the ISC valve connector.

#### Note

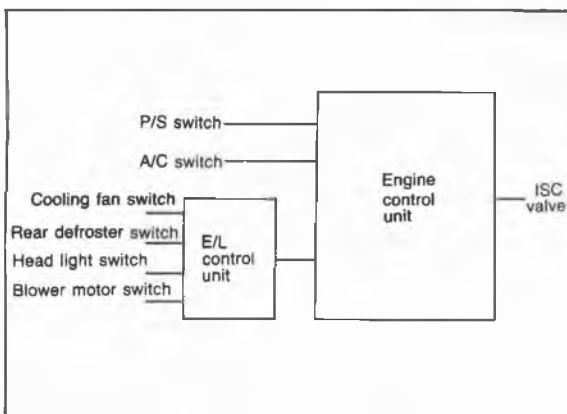
a) Make sure that the initial idle speed is set to specification.

b) All accessory must be OFF.



76G04C-082

7. Again disconnect the ISC valve connector (engine at normal operating temperature).
8. Check that the engine speed decreases.
9. Reconnect the ISC valve connector.
10. Remove the jumper wire from the test connector and make sure that the idle speed is within specifications.

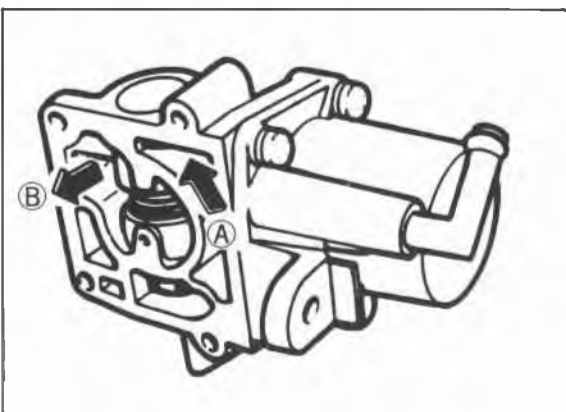


76G04C-083

### (Load Test)

11. Apply power steering, electrical, and air conditioner loads and check that the idle speed is controlled to within specifications.

Load	Idle speed
P/S	750 ± 50
E/L	800 ± 50
A/C	800 ± 50
E/L and A/C	800 ± 50



86U04A-063

### BAC Valve

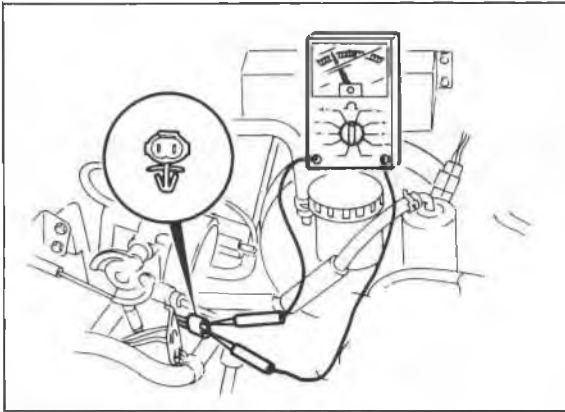
#### Air valve

1. Remove the BAC valve from the throttle body.
2. Blow air through the valve from port A and check that air comes out of port B when the BAC valve is cold..
3. If not correct, replace the BAC valve.

#### Note

Refer to "Installation" on this page for the BAC valve installation.

## 4C ISC SYSTEM



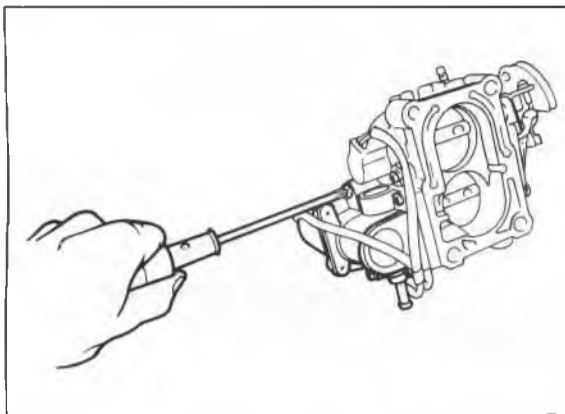
76UG4C-212

### ISC valve

1. Disconnect the ISC valve connector.
2. Connect an ohmmeter to the terminals of the ISC valve.
3. Check the resistance.

**Resistance (at 20°C (68°C)): 6.3—9.9  $\Omega$**

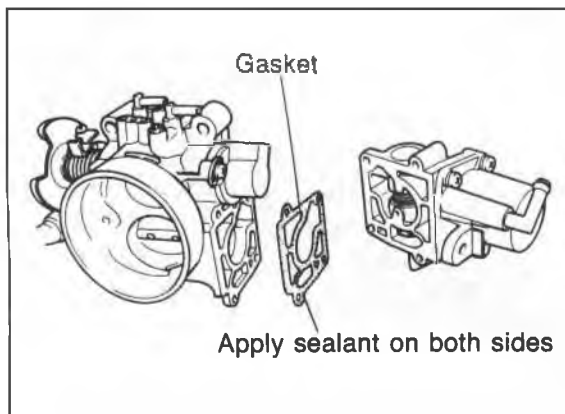
4. If not correct, replace the BAC valve.



76G04C-085

### REMOVAL

1. Remove the screws.
2. Remove the BAC valve from the throttle body.



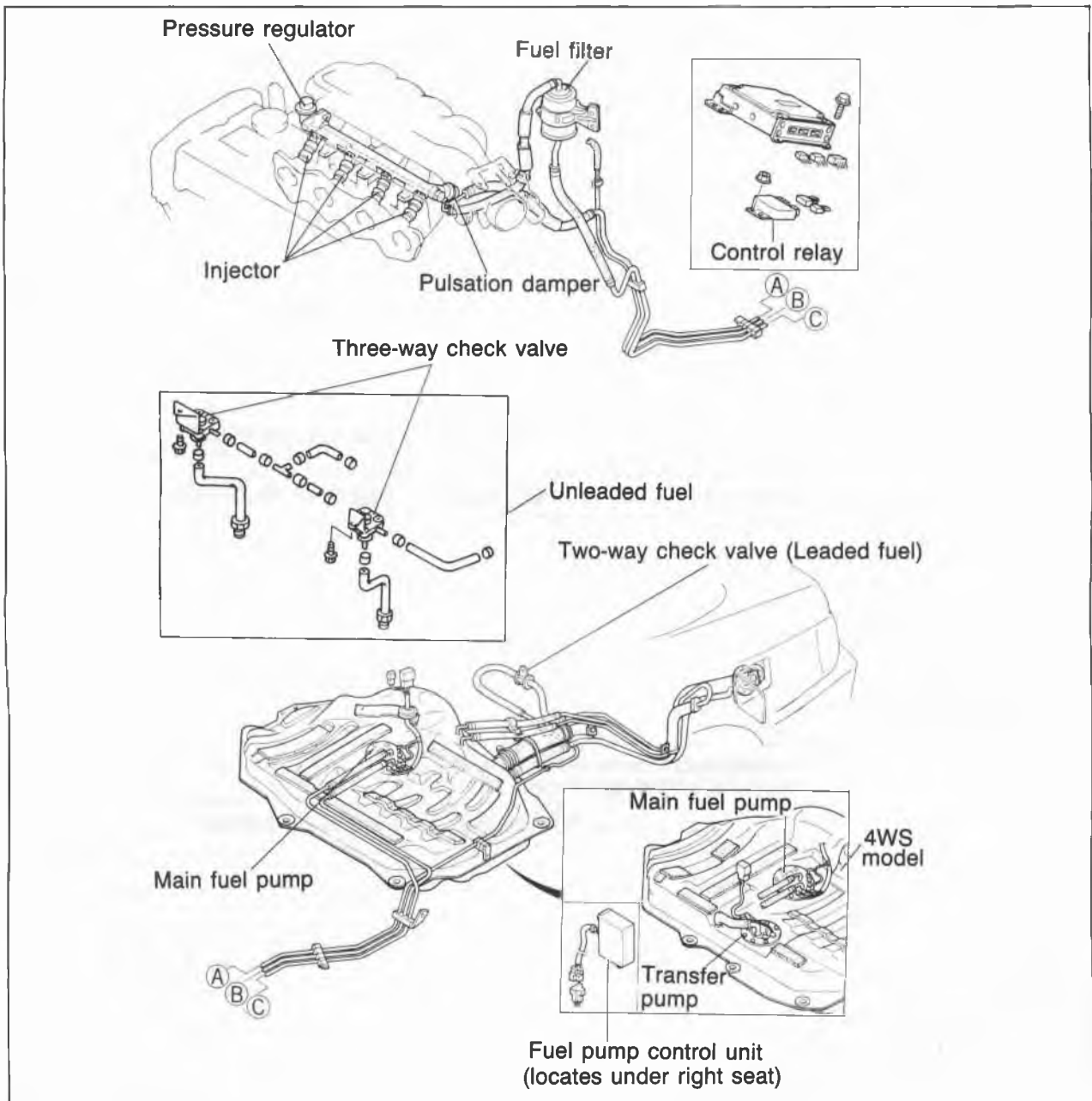
76G04C-086

### Installation

**Caution**  
**Install a new gasket.**

1. Remove any dirt or old sealant from the contact surfaces.
2. Apply sealant to both sides of the gasket.
3. Tighten the screws.

## FUEL SYSTEM



76G04C-087

This system supplies the necessary fuel for combustion at a constant pressure to the injectors. Fuel is metered and injected into the intake manifold according to the injection control signals from the engine control unit. It consists of the fuel pump, fuel filters, delivery pipe, pulsation damper, pressure regulator, injectors, fuel pump control unit, and the control relay.

The fuel pump is mounted in the fuel tank to minimize the operating noise of the fuel pump. The injectors directly supplied with battery voltage through the control relay. The connector of the injectors is white to distinguish the injectors for FE DOHC from those of other engines.

Due to the installation of the steering angle transfer shaft for the 4-wheel steering (4WS) the fuel tank of 4WS vehicles is designed with separate right and left sections. A transfer pump is used to pump fuel from the left side to the right side.

# 4C FUEL SYSTEM

## COMPONENT DESCRIPTION

Component	Function	Remark
<b>Air flow sensor</b>	Detects amount of intake air; sends signal to engine control unit	
<b>Clutch switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when clutch pedal released
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls injector and fuel pump operations	
<b>Fuel filter</b>	Filters fuel	
<b>Fuel pump</b>	Provides fuel to injectors	<ul style="list-style-type: none"> <li>Operates while engine running</li> <li>Installed in fuel tank</li> </ul>
<b>Fuel pump control unit (4WS)</b>	Monitors fuel level in left section; controls transfer pump operation	
<b>G signal pick-up</b>	Detects No.1 cylinder TDC; sends signal to engine control unit	Installed in distributor
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	Installed on throttle body
<b>Ignition switch (ST position)</b>	Sends engine cranking signal to engine control unit	
<b>Injector</b>	Injects fuel into intake port	<ul style="list-style-type: none"> <li>Controlled by signals from engine control unit</li> <li>High-ohmic injector</li> </ul>
<b>Intake air thermo sensor</b>	Detects intake air temperature; send signal to engine control unit	
<b>Control relay</b>	Supplies electric current to injectors fuel pump and engine control unit	
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to engine control unit	Installed in distributor
<b>Neutral switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when in gear
<b>Oxygen sensor (Unleaded fuel)</b>	Detects oxygen concentration; sends signal to engine control unit	<ul style="list-style-type: none"> <li>Zirconia ceramic and platinum coating</li> <li>Integrated heater coil</li> </ul>
<b>Pressure regulator</b>	Adjusts fuel pressure supplied to injectors	
<b>Pulsation damper</b>	Absorbs fuel pulsation	
<b>Throttle sensor</b>	Detects throttle valve opening angle; sends signal to engine control unit	Installed on throttle body
<b>Transfer pump (4WS)</b>	Pumps fuel from the left to the right side	Controlled by fuel pump control unit
<b>Transfer pump switch (4WS)</b>	Detects fuel level in left section; sends signal to control unit	
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Water thermo switch (Unleaded fuel)</b>	Detects radiator coolant temperature; sends signal to engine control unit	ON: above 17°C (63°F)

76G04C-088

## TROUBLESHOOTING

Checking the condition of the wiring harness and connectors before checking the sensors or switches.

### Note

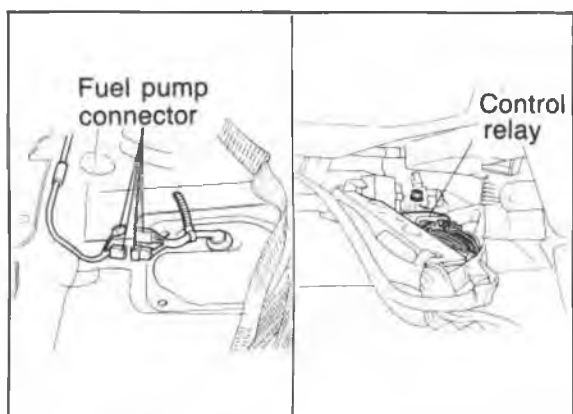
If no problem is found, continue with inspection of the next system of Troubleshooting Guide. (Refer to page 4C-10, and 11)

Possible cause		Page															
		Air flow sensor	Intake air thermo sensor	Oxygen sensor	Throttle sensor	Water thermo sensor	Water thermo switch	Fuel pump	Injector	Fuel pressure	Engine control unit terminal			Transfer pump (4WS)	Transfer pump switch (4WS)	Fuel pump control unit (4WS)	
		4C-103	4C-110	4C-107	4C-104	4C-107	4C-106	4C-56	4C-57	4C-54	1Q	3C,3E 3F,3H	3B	4C-98	4C-59		
Symptom																	
Unleaded fuel	Hard start or won't start (Crank OK)	—	—	—	—	9	—	1	7	—	2	8	6	3	4	5	
	Engine stalls	During warm up	4	—	—	—	3	—	—	2	1	—	5	—	—	—	—
		After warm up	1	—	—	—	—	—	—	3	2	—	4	—	—	—	—
	Rough idle	During warm up	5	—	—	—	3	—	—	2	1	—	4	—	—	—	—
		After warm up	1	6	—	—	4	—	—	3	2	—	5	—	—	—	—
	Poor acceleration, hesitation, or lack of power	1	—	—	3	5	—	—	4	2	—	6	—	—	—	—	
	Runs rough on deceleration	1	—	—	—	—	—	—	2	—	—	3	—	—	—	—	
	Afterburn on deceleration	1	—	—	—	—	—	—	2	—	—	3	—	—	—	—	
	Poor fuel consumption	6	—	5	—	4	—	—	2	1	—	3	—	—	—	—	
	Engine stalls or runs rough after hot starting	1	5	—	—	—	—	—	3	2	—	4	—	—	—	—	
Fails emission test	—	—	1	—	—	2	—	3	—	—	4	—	—	—	—		
Leaded fuel	Hard start or won't start (Crank OK)	—	—	—	—	9	—	1	7	—	2	8	6	3	4	5	
	Engine stalls	During warm up	4	—	—	—	3	—	—	2	1	—	5	—	—	—	—
		After warm up	1	—	—	—	—	—	—	3	2	—	4	—	—	—	—
	Rough idle	During warm up	5	—	—	—	3	—	—	2	1	—	4	—	—	—	—
		After warm up	1	6	—	—	4	—	—	3	2	—	5	—	—	—	—
	Poor acceleration, hesitation, or lack of power	1	—	—	—	4	—	—	3	2	—	5	—	—	—	—	
	Runs rough on deceleration	1	—	—	—	—	—	—	2	—	—	3	—	—	—	—	
	Afterburn on deceleration	1	—	—	—	—	—	—	2	—	—	3	—	—	—	—	
	Poor fuel consumption	5	—	—	—	4	—	—	2	1	—	3	—	—	—	—	
	Engine stalls or runs rough after hot starting	1	5	—	—	—	—	—	3	2	—	4	—	—	—	—	
Fails emission test	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—		

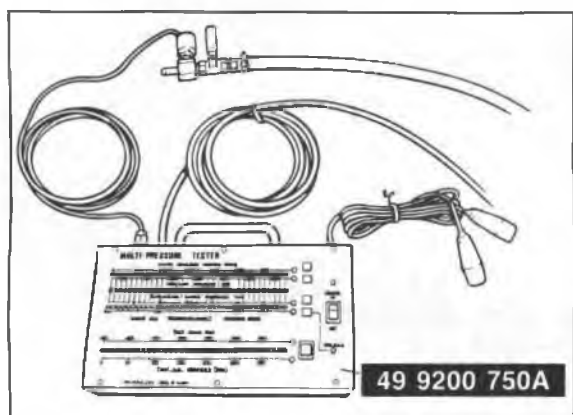
76G04C-089



## 4C FUEL SYSTEM



76G04C-090



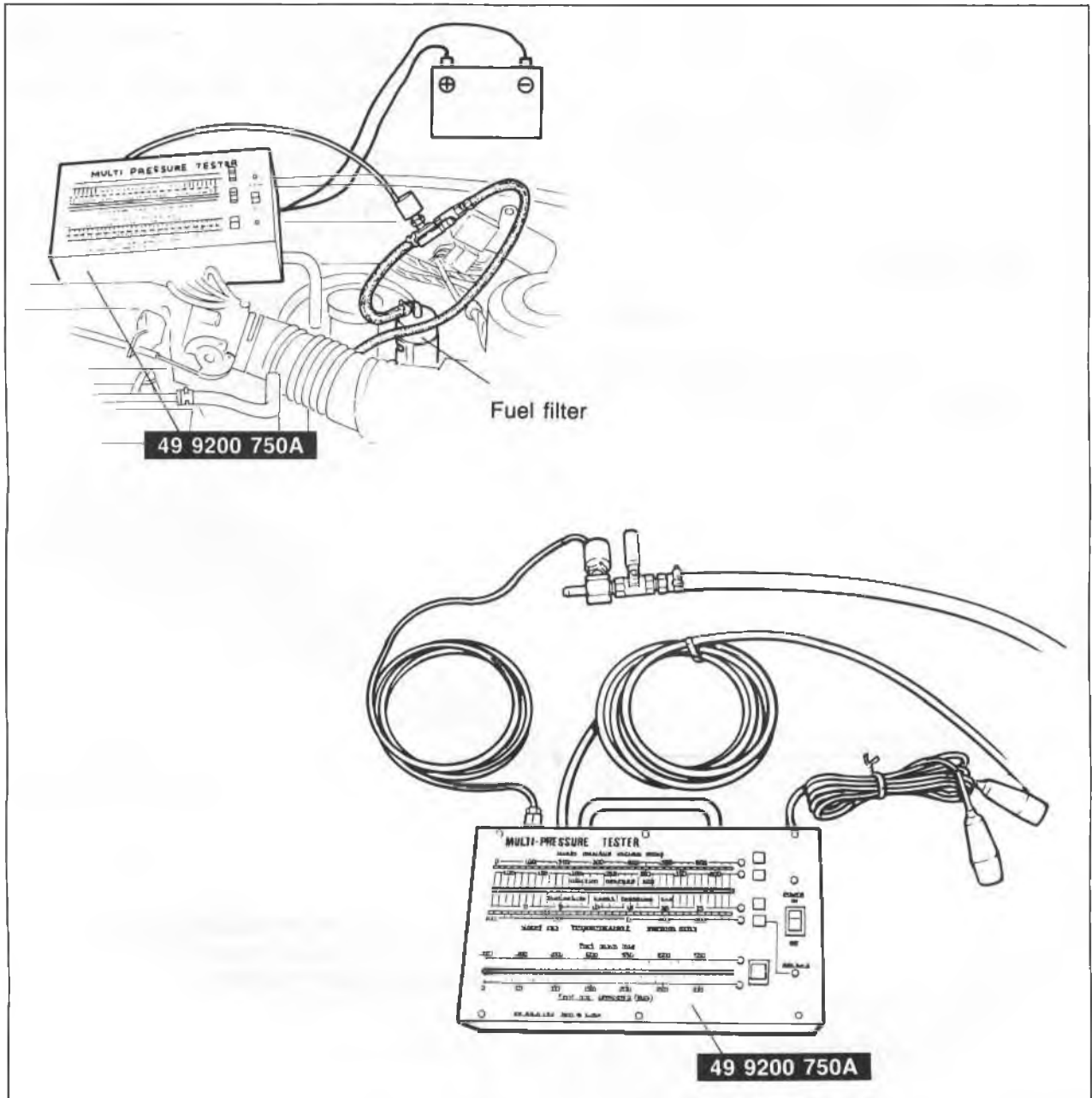
86U04A-069

### FUEL PRESSURE RELEASE AND SERVICING FUEL SYSTEM

Fuel in the fuel system remains under high pressure even when the engine is not running.

- a) Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.
  1. Start the engine.
  2. Disconnect the 4-pin connector from the control relay or the fuel pump connector (5-pin or 6-pin).
  3. After the engine stalls, turn OFF the ignition switch.
  4. Reconnect the relay or fuel pump connector.
- b) Use a rag as protection from fuel spray when disconnecting the hoses.  
Plug the hoses after removal.
- c) When inspecting the fuel system, use the **SST**.

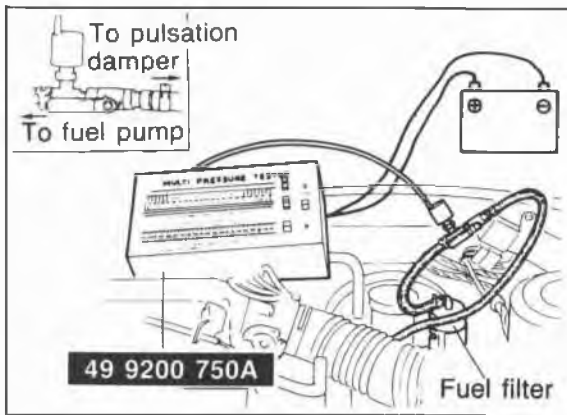
## MULTI-PRESSURE TESTER (49 9200 750A)



76G04C-091

The **MULTI-PRESSURE TESTER** (49 9200 750A) has been developed to check the fuel pressure and the intake manifold vacuum.

# 4C FUEL SYSTEM



76G04C-092

## How to Connect Multi-Pressure Tester

### Warning

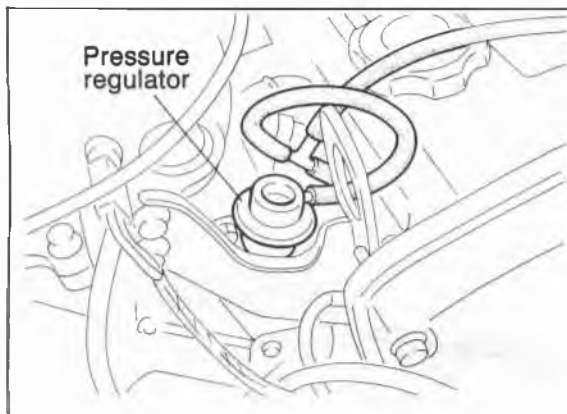
Before connecting the SST, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4C—52.)

1. Disconnect the negative battery terminal.
2. Disconnect the fuel main hose from the fuel filter.
3. Connect the **SST** and adapter between the fuel main hose and the fuel pump.

### Caution

Do not reverse the adapter connection.

4. Disconnect the vacuum hose from the pressure regulator. Connect the **SST** to the vacuum hose with a three-way joint.
5. Connect the negative battery terminal.
6. Connect the **SST** to the battery.

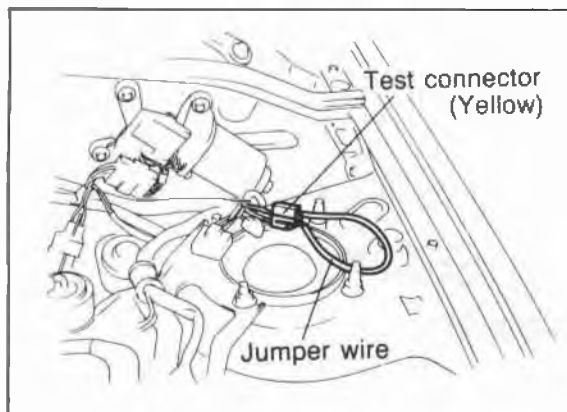


76G04C-093

7. Connect the terminals of the test connector (Yellow) with a jumper wire. Turn the ignition switch ON to operate the fuel pump.
8. Check for fuel leaks.

### Caution

After checking for fuel leakage, turn the ignition switch OFF and disconnect the jumper wire from the test connector.



86U04A-072

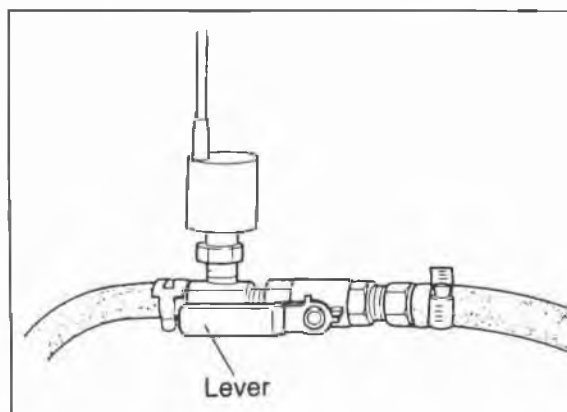
## FUEL PRESSURE

### Note

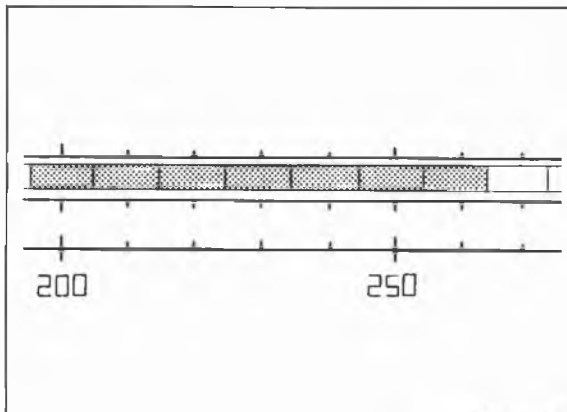
Warm up the engine to normal operating temperature.

### Injection Pressure

1. Set the lever on the adapter as shown in the figure.



76G04C-094

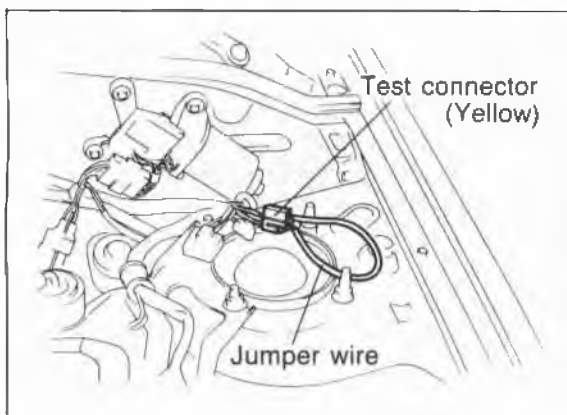


86U04A-074

- Run the engine and measure the injection pressure at various speeds.

**Injection pressure: Approx. 235—275 kPa  
(2.4—2.8 kg/cm<sup>2</sup>, 34—40 psi)**

- If not within specification, check the fuel pump pressure and fuel line pressure.



86U04A-075

### Fuel Pump Pressure

- Connect the terminals of the test connector (Yellow) with a jumper wire.
- Turn the ignition switch ON to operate the fuel pump.

- Set the lever on the adapter as shown in the figure.
- Check the fuel pump pressure.

**Fuel pump pressure: 441—588 kPa  
(4.5—6.0 kg/cm<sup>2</sup>, 64—85 psi)**

- If the fuel pump pressure is not within specification, check the following;

#### No pressure

- Fuel pump operation (Refer to page 4C—56.)

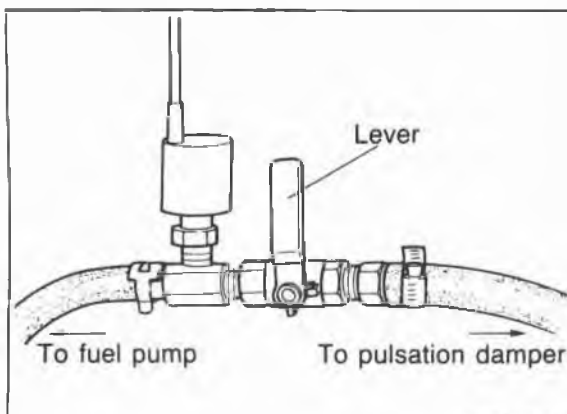
#### Low pressure

- Fuel pump feeding capacity (Refer to page 4C—56.)

#### High pressure

- Replace the fuel pump

- After checking the fuel pump pressure, disconnect the jumper wire from the test connector.



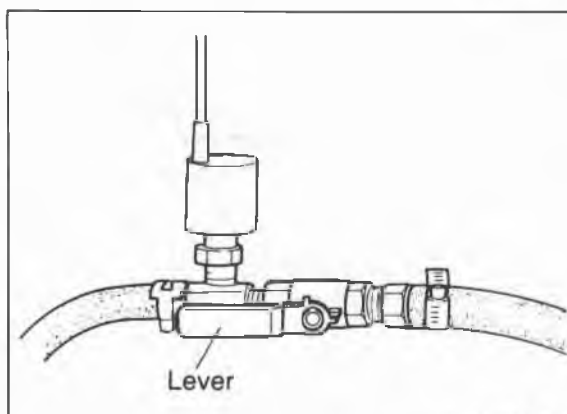
76G04C-095

### Fuel Line Pressure

- Start the engine and run it idle.
- Set the lever on the adapter as shown in the figure.
- Check the fuel line pressure.

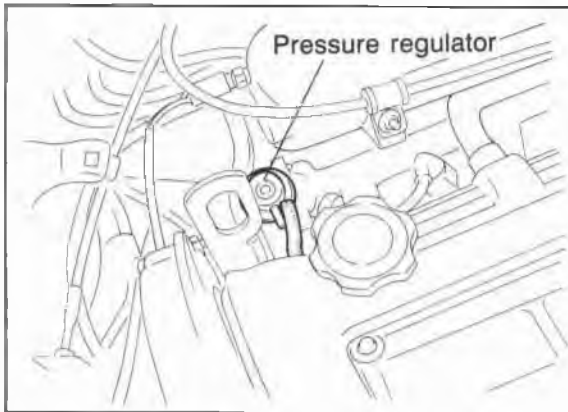
**Fuel line pressure: Approx. 186—226 kPa  
(1.9—2.3 kg/cm<sup>2</sup>, 27—33 psi)**

- If not within specification, check the pressure regulator vacuum hose.



76G04C-096

## 4C FUEL SYSTEM

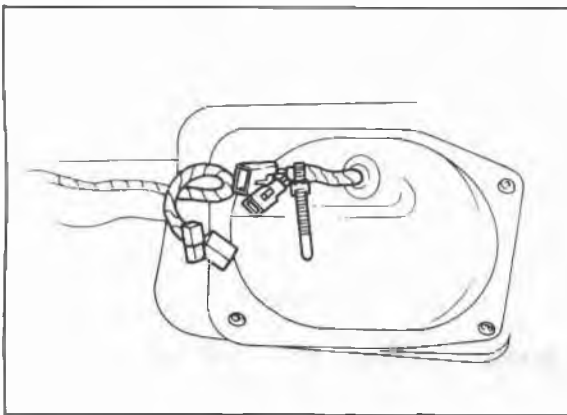


86U04A-078

5. Disconnect the vacuum hose from pressure regulator, and place a finger over the end of the hose.
6. Check the fuel line pressure.

**Fuel line pressure: 235—275 kPa  
(2.4—2.8 kg/cm<sup>2</sup>, 34—40 psi)**

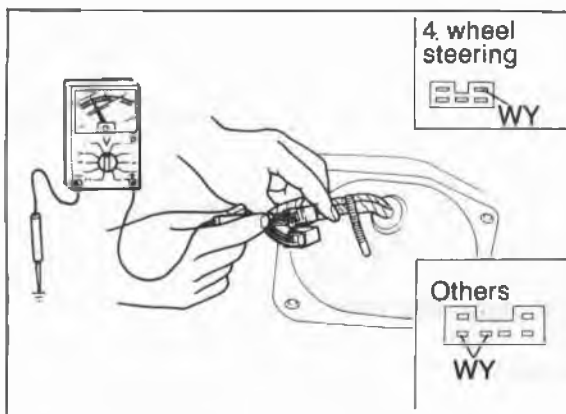
7. If not within specification, replace the pressure regulator.
8. Connect the vacuum hose to pressure regulator.



76G04C-097

### FUEL PUMP Operation Test

1. Connect a jumper wire to the test connector (Yellow).
2. Remove the fuel filler cap.
3. Disconnect transfer pump connector (8-pin).
4. Turn the ignition switch ON.
5. Listen for operational sound of the fuel pump at the filler inlet.
6. Install the fuel filler cap.

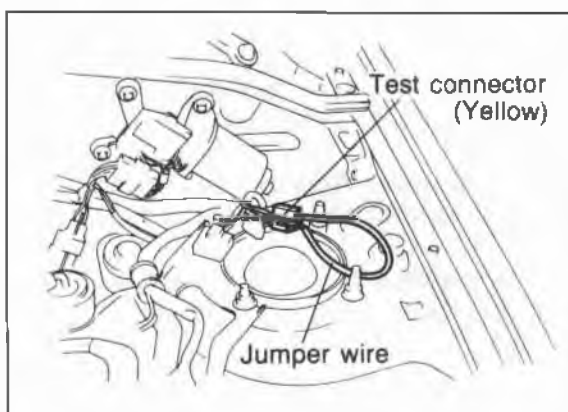


76G04C-098

7. If no sound was heard, check the voltage at the fuel pump connector (WY wire and a ground).

**Voltage: 12V**

8. If the voltage is normal, replace the fuel pump.
9. If not correct, check the control relay and circuit (Refer to page 4C—96.)
10. Disconnect the jumper wire.



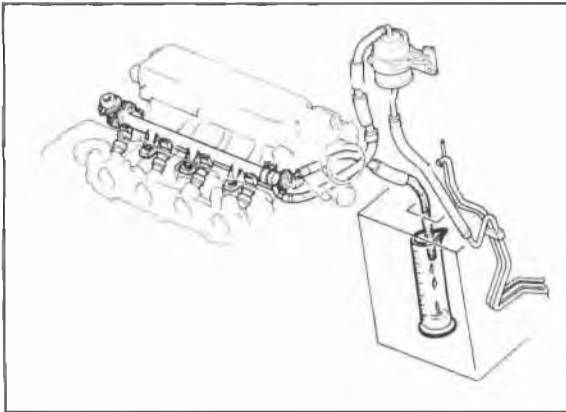
76G04C-099

### Volume Test

#### Warning

**Before performing the following procedures, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4C—52)**

1. Connect a jumper wire to test connector (Yellow).
2. Disconnect the fuel return hose from fuel return pipe.



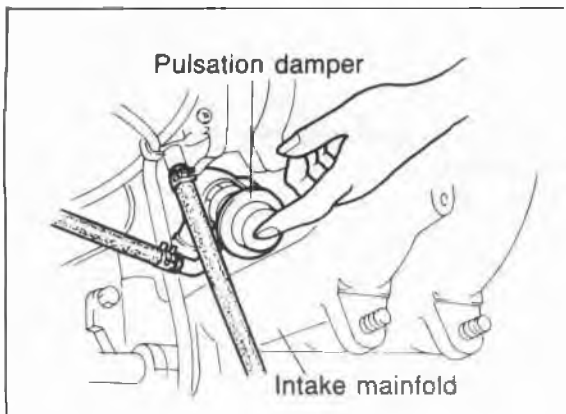
76G04C-100

3. Turn the ignition switch ON for 10 seconds, and check the feeding capacity with graduated cylinder.

**Feeding capacity:**

**Minimum 220 cc (13.4 cu in)/10 sec.**

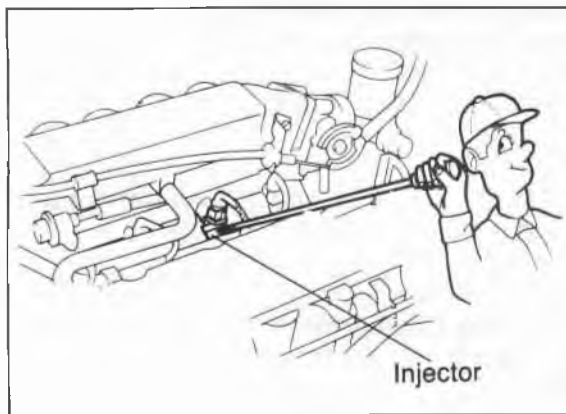
4. If not within specification, check the fuel filter, fuel lines and fuel pump.
5. Turn the ignition switch OFF and disconnect the jumper wire.



86U04A-083

**PULSATION DAMPER**

1. Run the engine at idle.
2. Place a finger on the screw of the pulsation damper head.
3. Check that pulsation is felt.

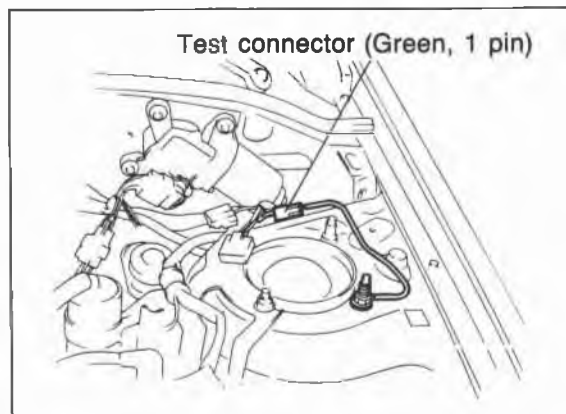


76G04C-101

**INJECTOR**

**On-vehicle Inspection**

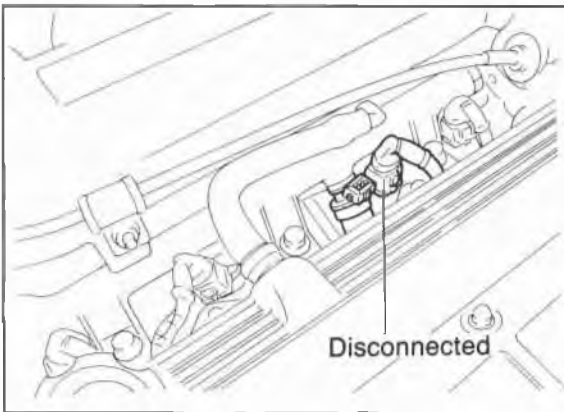
1. Warm up the engine and run it at idle.
2. Listen for operational sound of the injector with a screwdriver or a sound scope.



76G04C-102

3. Ground the test connector (Green, 1-pin).

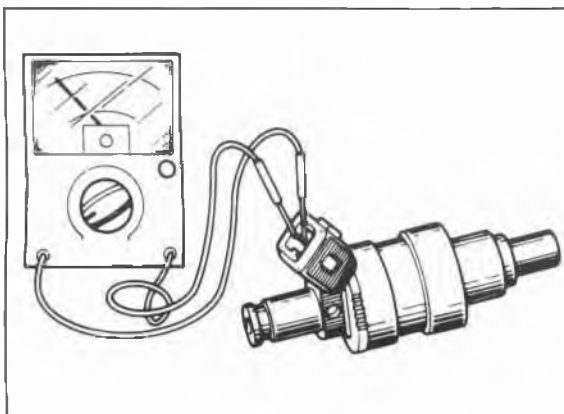
## 4C FUEL SYSTEM



76G04C-103

4. Disconnect the connector from each injector respectively.
5. Check that the engine speed decreases about **100—200 rpm** each time.
6. If not correct, check the following:

**No operating sound and no speed drop**  
**Check injector wiring harness**  
**No speed drop only**  
**Injector resistance**  
**Injection volume of injector**



76G04C-104

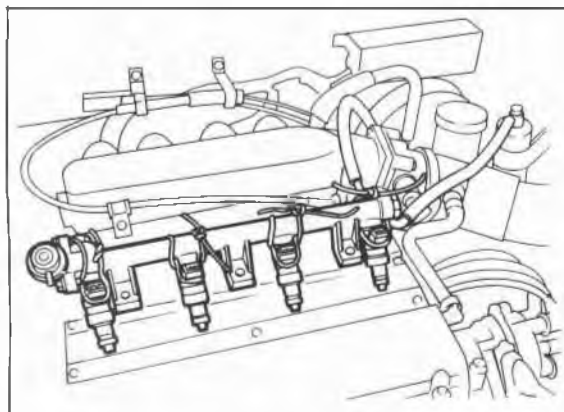
### Inspection

Perform the following inspections.

#### Resistance

1. Remove the injectors from the engine. (Refer to page 4C—61.)
2. Check the resistance of each injector with an ohmmeter.
3. If not correct, replace the injector.

**Resistance: 12—16  $\Omega$**



76G04C-105

#### Fuel leakage test and volume test

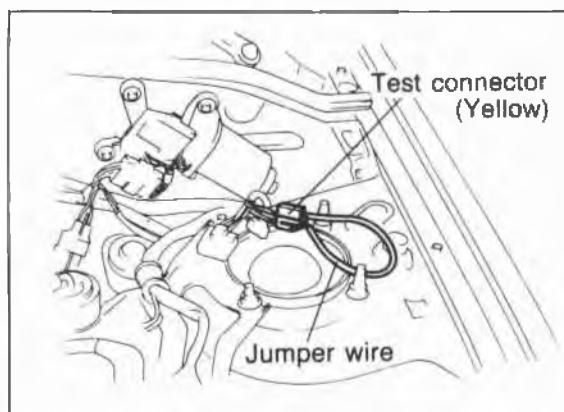
1. Remove the injectors and delivery pipe. (Refer to pages 4C—61 and 63.)
2. Affix the injectors to the delivery pipe with wire.

#### Caution

**Affix the injectors firmly so that no movement is possible.**

#### Warning

**Be extremely careful when working with fuel. Always work away from sparks or open flames.**

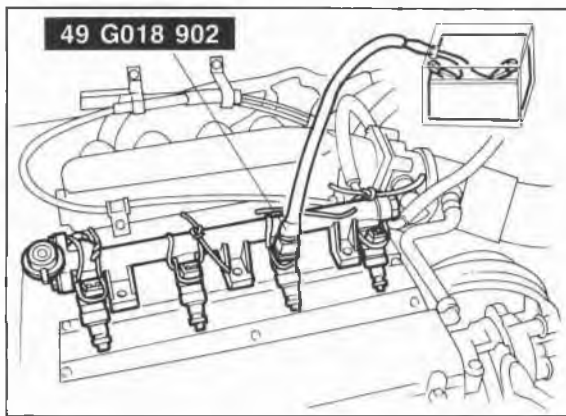


76G04C-106

3. Connect the terminals of the test connector (Yellow) with a jumper wire. Turn the ignition switch ON.
4. Check that no fuel leaks from the injector nozzles.

#### Note

**After 1 minute, a drop of fuel from the injector is acceptable.**



76G04C-107

5. Connect the **SST** to the battery and injector.
6. Check the injection volume with a graduated container.

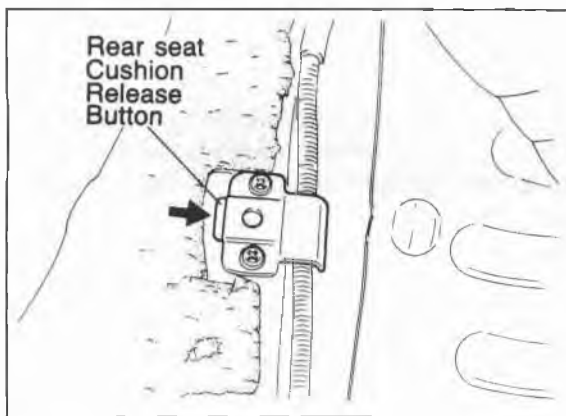
**Injection volume:**

**Approx. 66—91 cc (4.03—5.55 cu in) /15 sec.**

**Caution**

**When using the SST, make sure of the SST number and use correct one.**

7. If not correct, replace the injector.



76G04C-108

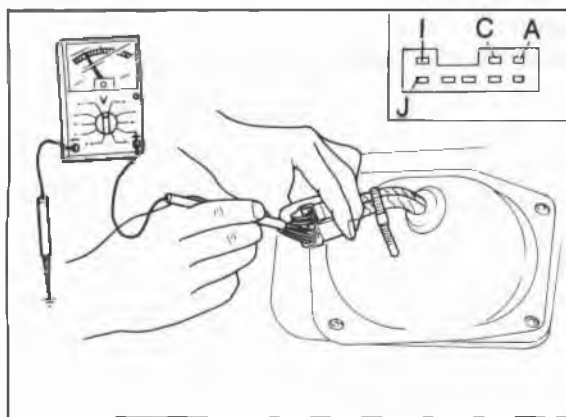
**TRANSFER PUMP CONTROL SYSTEM (4 WHEEL STEERING)**

1. Remove the rear seat. (Refer to 14 section.)
2. Remove the fuel filler cap.
3. Turn the ignition switch ON.

**Note**

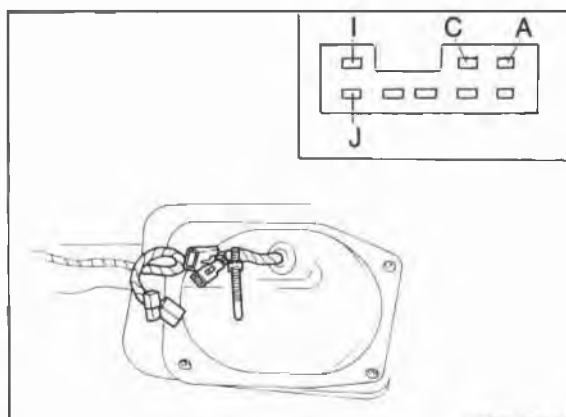
- a) The tank should be more than 1/3 full.
- b) Due to the delay timer, transfer pump operation begins approx. 10 sec. after the ignition switch is turned ON.

4. Listen for the operational sound of the transfer pump.
5. Install the fuel filler cap.
6. If no sound was heard, check the voltage at the transfer pump connector.



86U04B-075

Terminal (wire)	Voltage
A, C (WG)	Approx. 12V
I, J (B)	0V



76G04C-211

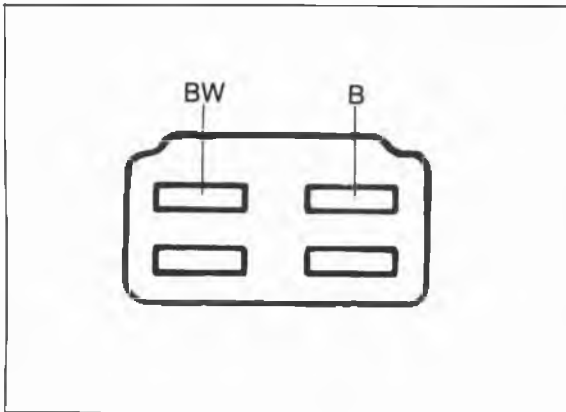
7. If the voltages are correct, replace the transfer pump.
8. If not correct, disconnect the transfer pump connector.
9. Check the voltage at the terminals below.

Terminal (wire)	Voltage
A, C (WG)	Approx. 12V
I, J (B)	0V

10. If the voltages are correct, replace the transfer pump.



# 4C FUEL SYSTEM

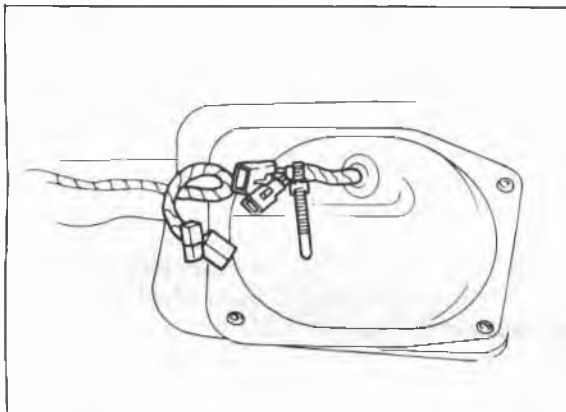


76G04C-109

11. If not correct, check the voltage at terminals of the fuel pump control unit.

Terminal (wire)	Voltage
A (B)	Approx. 12V
C (BW)	0V

12. If the voltages are correct, replace the fuel pump control unit.
13. If not correct, repair the power supply circuit or the ground circuit for the fuel pump control unit.



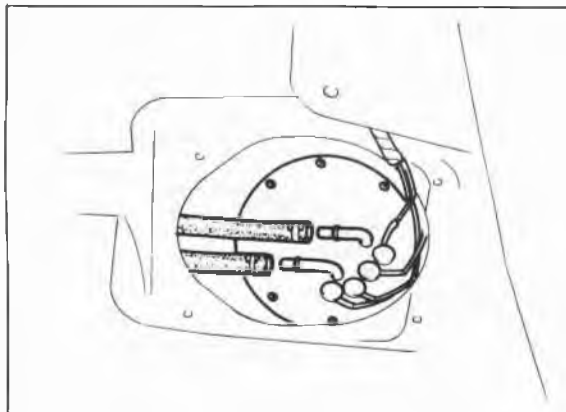
76G04C-110

## REPLACEMENT

### Caution

**A) Before performing the following procedure, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4C—52.)**

**b) When servicing the fuel system, keep sparks, cigarettes, and open flames away from the fuel.**



86U04A-101

### Fuel Pump

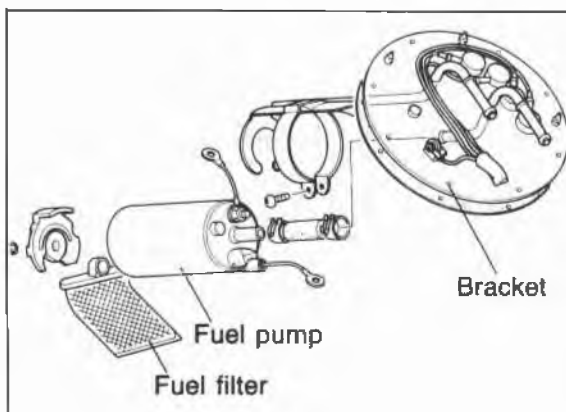
1. Remove the rear seat and disconnect the fuel pump connector.
2. Remove the service hole cover.
3. Disconnect the fuel hoses.
4. Remove the fuel pump and fuel tank gauge assembly.

5. Replace the fuel pump.

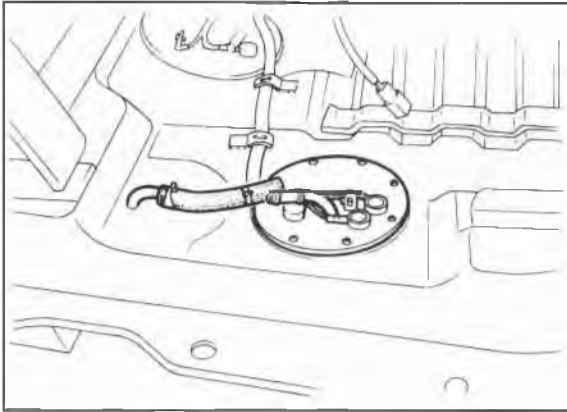
### Caution

**Secure the fuel pump terminals and fuel hoses tightly.**

6. Install in the reverse order of removal.



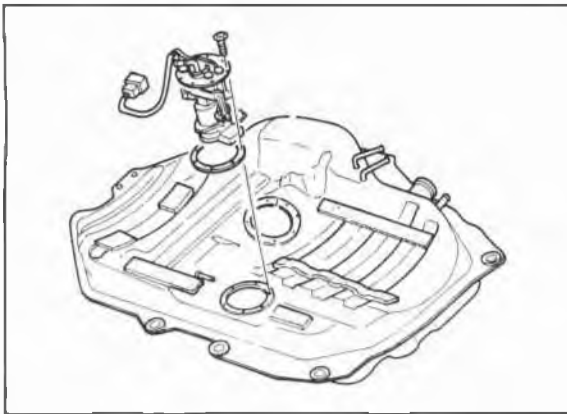
76G04C-111



76G04C-112

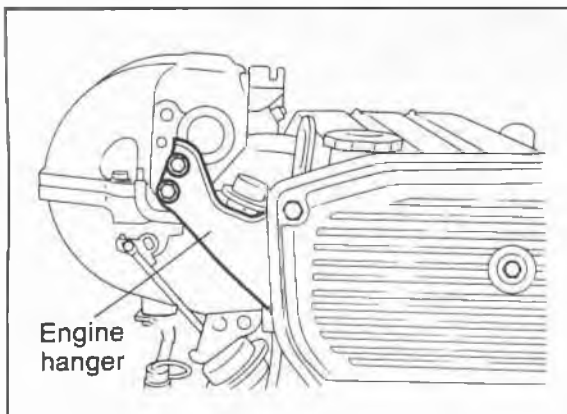
## Transfer Pump

1. Remove the fuel tank. (Refer to page 4C—65.)
2. Disconnect the fuel hoses from the transfer pump.



86U04B-083

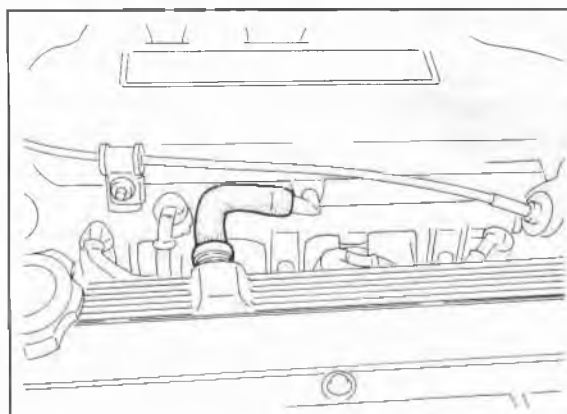
3. Remove the transfer pump.
4. Install in the reverse order of removal.



76G04C-113

## Injector

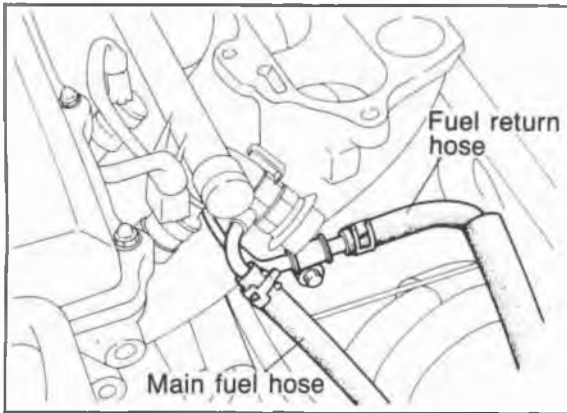
1. Remove the engine hanger.
2. Remove the wiring harness bracket.



76G04C-114

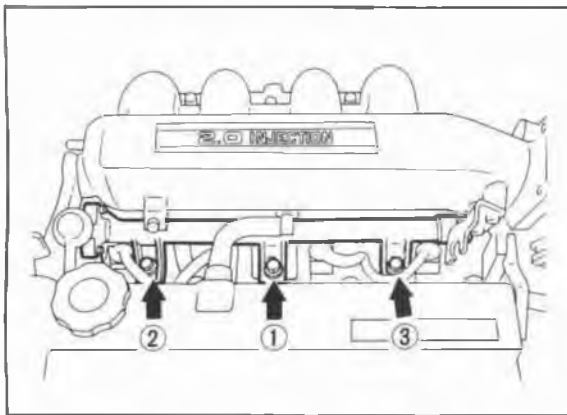
3. Disconnect the PCV valve and hose from the dynamic chamber.

# 4C FUEL SYSTEM



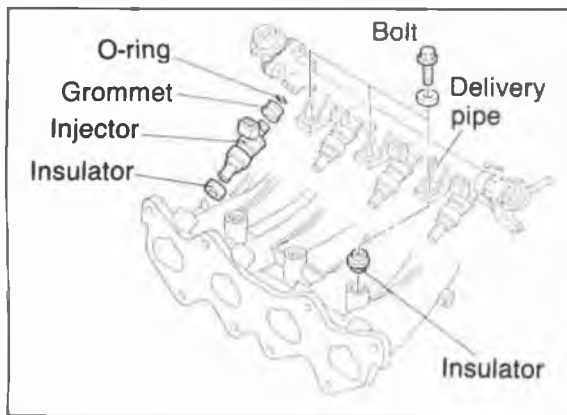
76G04C-115

4. Disconnect the main fuel hose from the delivery pipe assembly.
5. Disconnect the fuel return hose from the fuel return pipe.
6. Remove fuel return pipe mounting bolt.



76G04C-116

7. Remove the delivery pipe assembly mounting bolts and insulators.

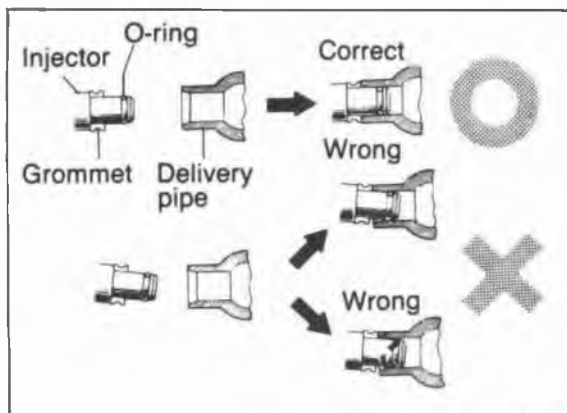


76G04C-117

8. Remove the grommets, injectors, and insulators.
9. Install in the reverse order of removal, referring to the installation note.

### Tightening torque:

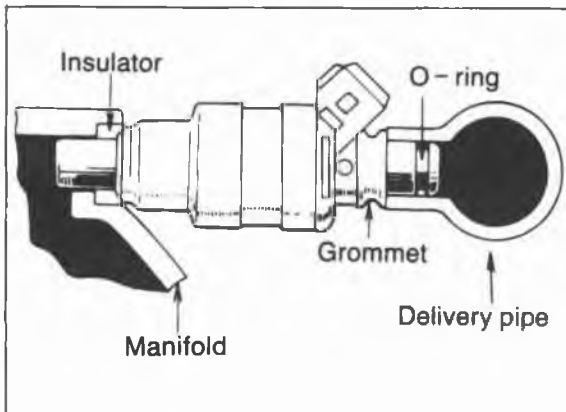
**Delivery pipe, dynamic chamber, and engine hanger**  
 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



86U04A-108

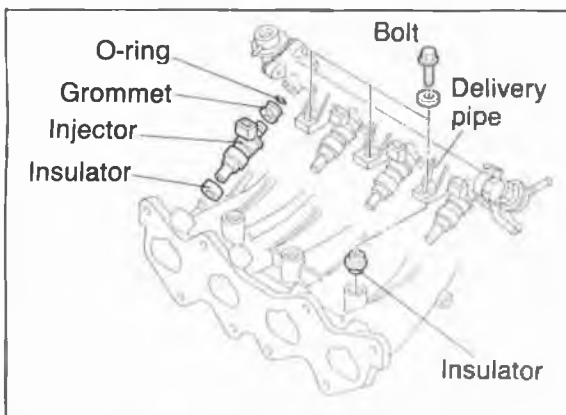
### Installation note Injector

1. Use new O-rings.
2. Apply a small amount of engine oil to the O-rings when installing.



86U04A-109

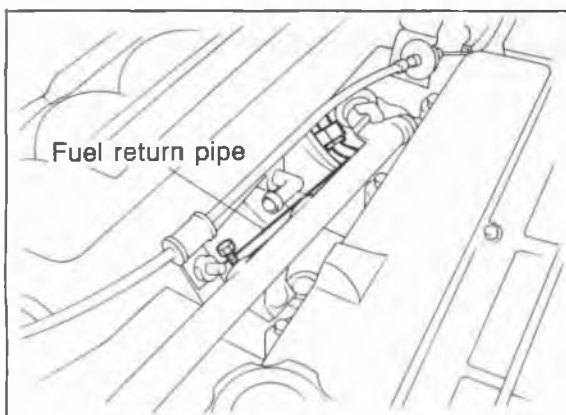
3. Install the injectors and the injector insulators.



76G04C-118

### Insulator

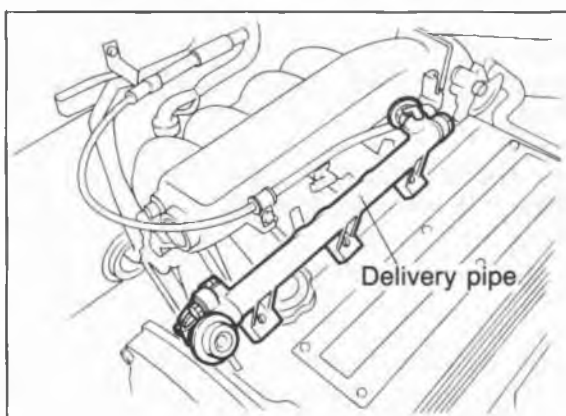
Install the insulators between the intake manifold and the delivery pipe.



76G04C-119

### Delivery Pipe

1. Remove the injectors. (Refer to page 4C-61.)
2. Separate the fuel return pipe from the delivery pipe assembly.



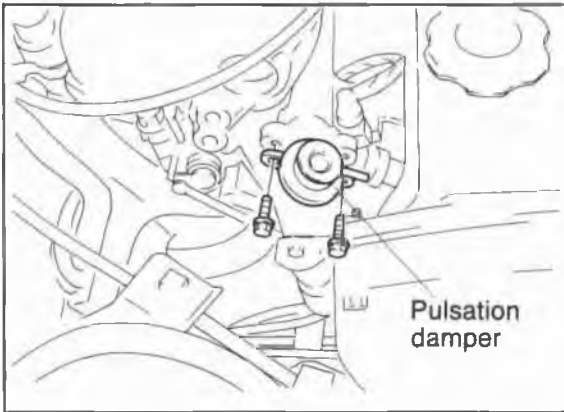
76G04C-120

3. Replace the delivery pipe.
4. Install in the reverse order of removal, referring to the installation note.

### Tightening torque:

**Fuel return pipe 8—11 Nm  
(0.8—1.1 m·kg, 69—95 in·lb)**

## 4C FUEL SYSTEM



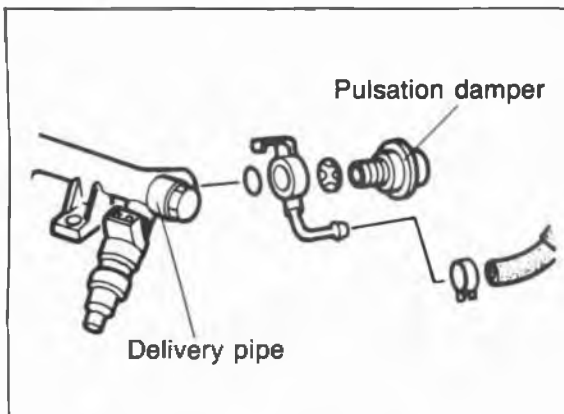
76G04C-121

### Pressure Regulator

1. Remove the engine hanger.
2. Disconnect the vacuum hose and fuel return hose.
3. Remove the pressure regulator.
4. Install in the reverse order of removal.

### Tightening torque:

**8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)**



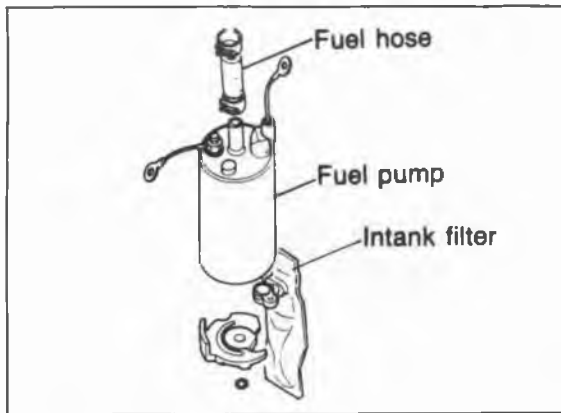
76G04C-122

### Pulsation Damper

1. Remove the delivery pipe assembly. (Refer to page 4C—63.)
2. Remove the pulsation damper.
3. Install in the reverse order of removal.

### Tightening torque:

**25—34 N·m (2.5—3.5 m·kg, 18—25 ft·lb)**



76G04C-123

### Fuel Filter

#### Low pressure side (In-tank filter)

Refer to page 4C—60.

#### High pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

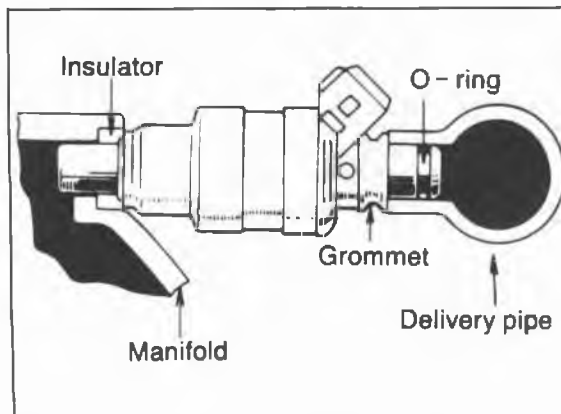
### Warning

**Always work away from sparks or open flames.**

1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and the bracket.
3. Install a new filter and the bracket.
4. Connect the fuel hoses.

### Note

**When installing the filter, push the fuel hoses fully onto the fuel filter and secure them with spring clamps.**



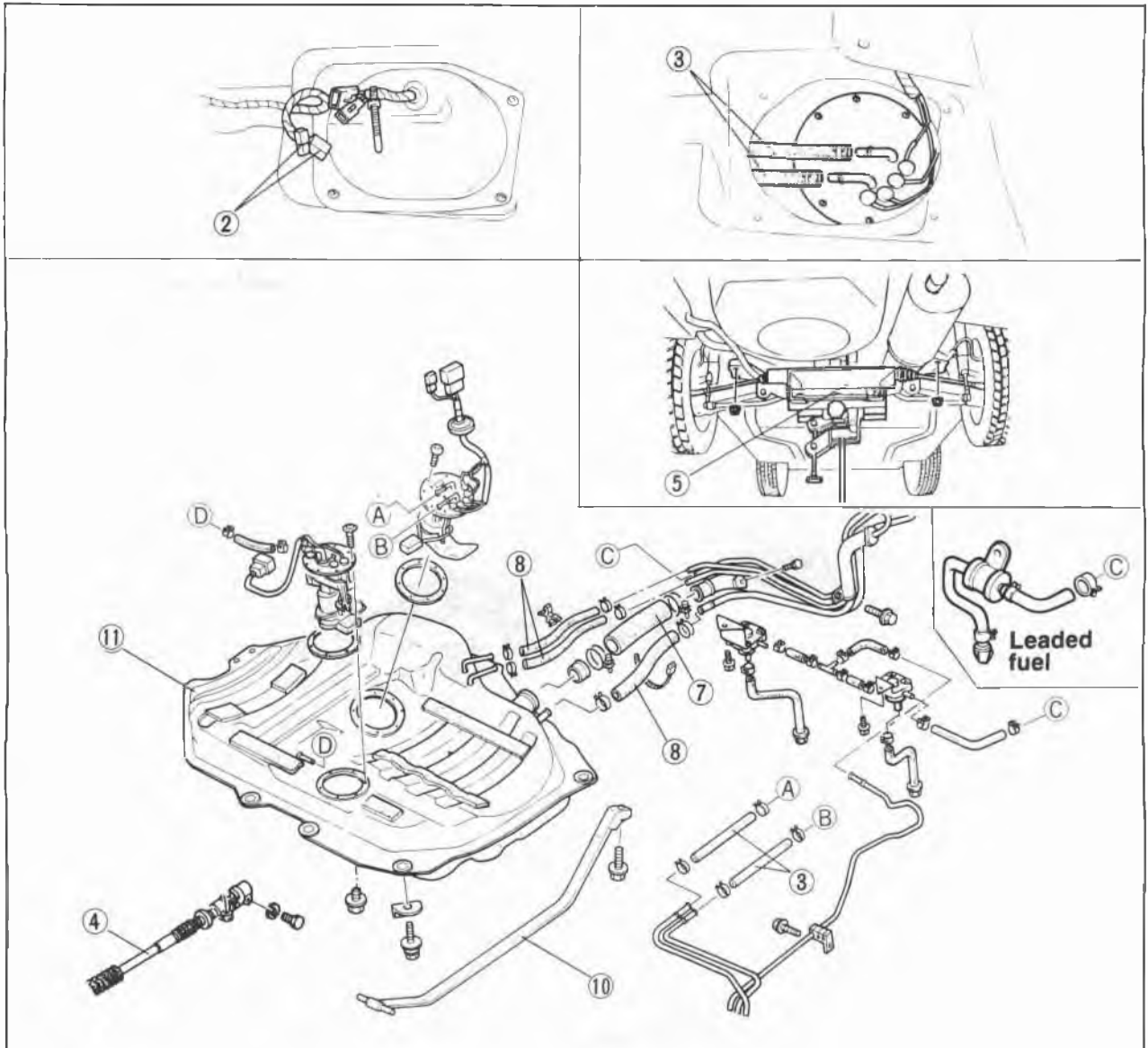
76G04C-124

## FUEL TANK Removal

### Caution

- a) Before performing the following procedure, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4C—52.)
- b) When removing the fuel tank, keep sparks, cigarettes, and open flames away from the fuel tank.

Remove in the sequence shown in the figure.



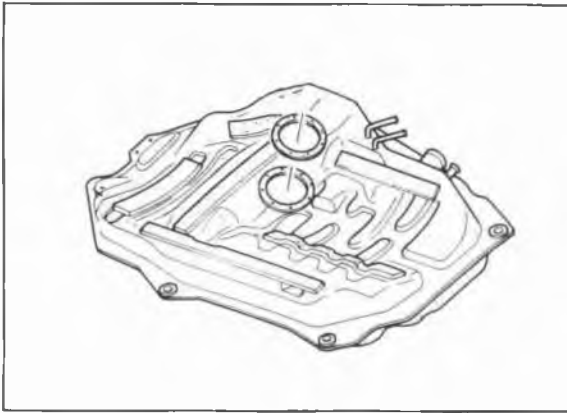
76G04C-125

### Note

**Drain the fuel from the fuel tank before removing the tank.**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Remove fuel filler cap.</li> <li>2. Fuel pump connectors</li> <li>3. Fuel hoses</li> <li>4. Steering angle transfer shaft (4-wheel steering)<br/>(Refer to section 10)</li> </ol> | <ol style="list-style-type: none"> <li>5. Cross member (4-wheel steering)</li> <li>6. Evaporative hoses</li> <li>7. Fuel filler hose</li> <li>8. Breather hose</li> <li>9. Parking cable bracket</li> <li>10. Fuel tank strap</li> <li>11. Fuel tank</li> </ol> |
|---|---|

# 4C FUEL SYSTEM



76G04C-126

## Inspection

1. Check the fuel tank for cracks and corrosion.
2. If any defect is found, repair or replace the tank.

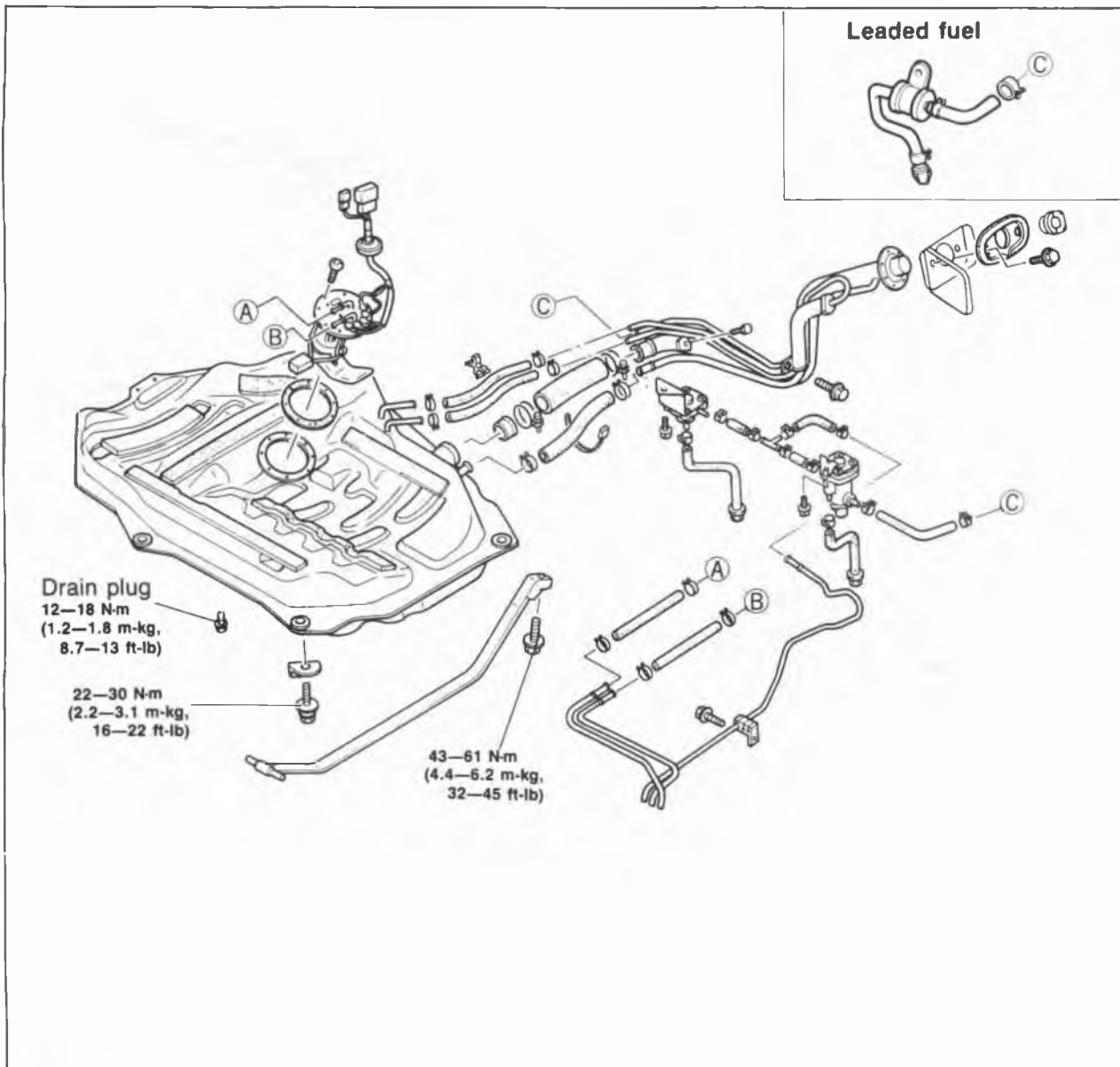
## Warning

**Before repairing, clean the fuel tank thoroughly with steam to remove all explosive fuel and fumes.**

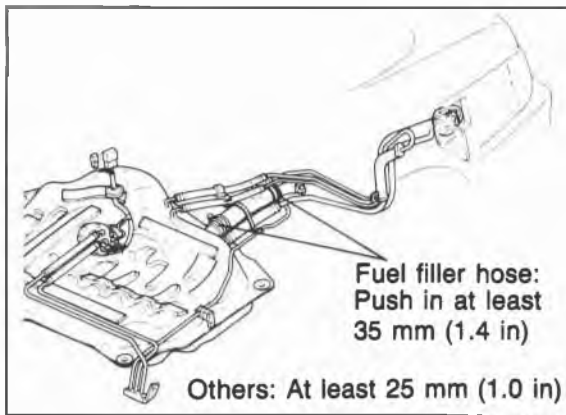
## Installation

Install in the reverse order of removal, referring to the installation note.

## Torque Specifications



86U04A-119



76G04C-127

## Installation note

### Hoses

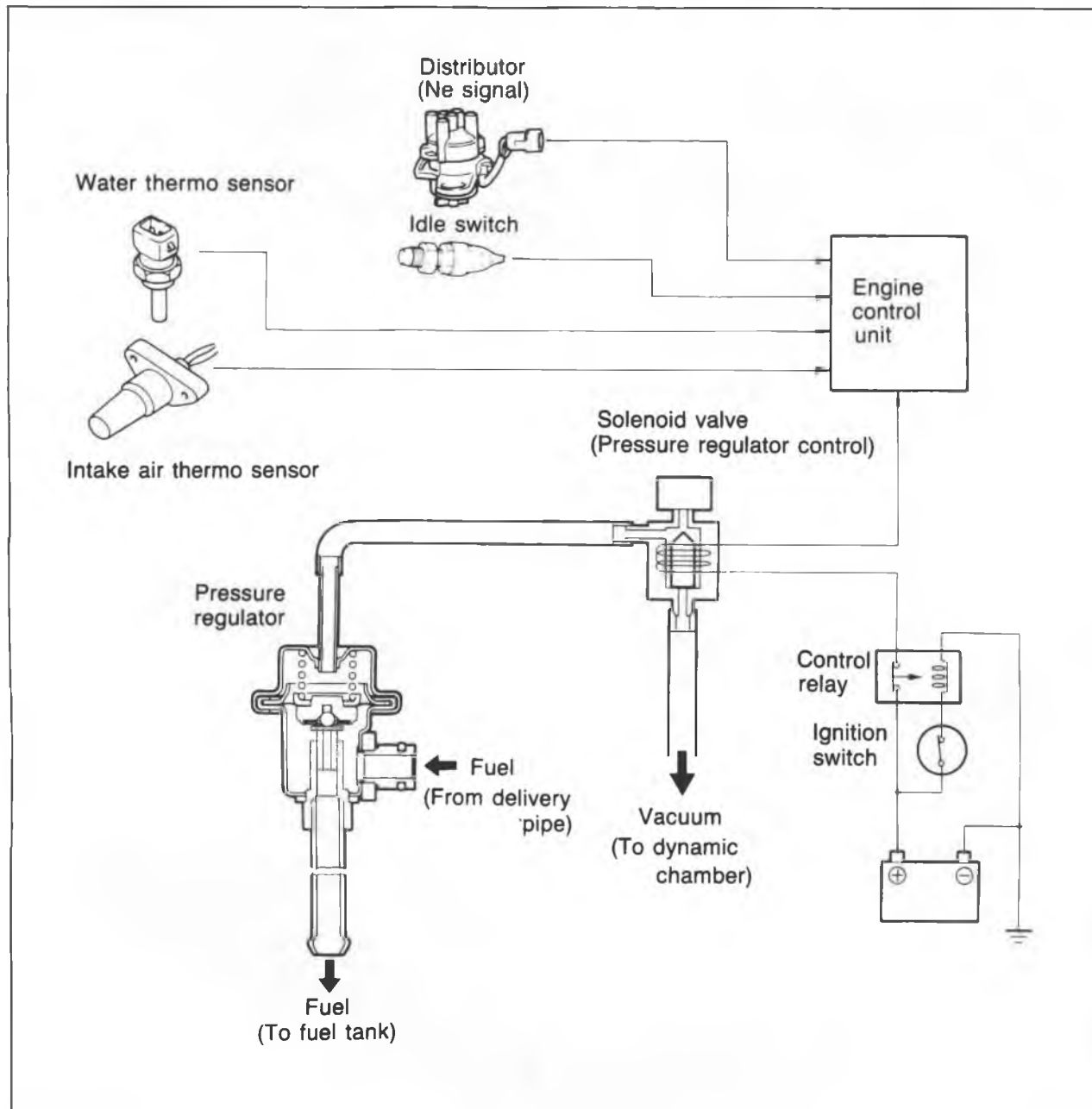
1. Push the ends of the main fuel hose, fuel return hose, and evaporation hoses onto the fuel tank fittings **at least 25 mm (1.0 in)**.
2. Push the fuel filler hose onto the fuel tank pipe and filler pipe **at least 35 mm (1.4 in)**.

### Steering angle transfer shaft (4-wheel steering)

Refer to section 10



## PRESSURE REGULATOR CONTROL (PRC) SYSTEM



76G04C-128

To prevent percolation of the fuel during idle after the engine is restarted, vacuum is cut to the pressure regulator, increasing the fuel pressure.

**Specified time: Approx. 120 sec.**

**Operating condition: Coolant temperature — above 70°C (158°F)**

**Intake air temperature — above 30°C (86°F)....Unleaded fuel  
above 50°C (122°F)....Leaded fuel**

**COMPONENT DESCRIPTION**

Component	Function	Remark
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valve (Pressure regulator control)	
<b>Ignition switch (ST position)</b>	Sends engine cranking signal to engine control unit	
<b>Intake air thermo sensor</b>	Detects intake air temperature; sends signal to engine control unit	
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to engine control unit	Installed in distributor
<b>Pressure regulator</b>	Adjusts fuel pressure supplied to injectors	
<b>Solenoid valve (Pressure regulator control)</b>	Controls vacuum to pressure regulator	Cuts vacuum when hot
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Idle switch</b>	Detects when throttle valve closed; sends signal to engine control unit	ON at idle

76G04C-129

**TROUBLESHOOTING**

Check the condition of the wiring harness and connections before checking the sensors or switches.

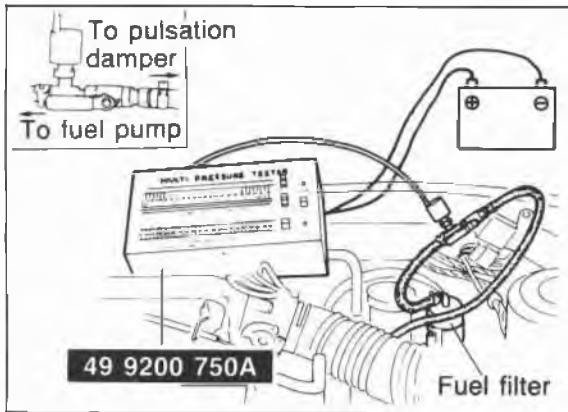
**Note**

**Make the system inspection first. If no problem is found, continue with inspection of the next system of the Troubleshooting Guide. (Refer to pages 4C—10 and 11.)**

Possible cause Page	Solenoid valve (Pressure regulator control)	Water thermo sensor	Intake air thermo sensor	Engine control unit terminal	System inspection
	4C—70	4C—107	4C—110	2K 4C—98	
Symptom	4C—70	4C—107	4C—110	4C—98	4C—70
<b>Engine stalls or runs rough after hot starting</b>	2	3	4	5	1

76G04C-130

# 4C PRC SYSTEM



76G04C-131

## System Inspection

1. Connect the **SST** to the engine. (Refer to page 4C-53.)
2. Start the engine.

3. Warm up the engine to normal operating temperature and stop the engine.

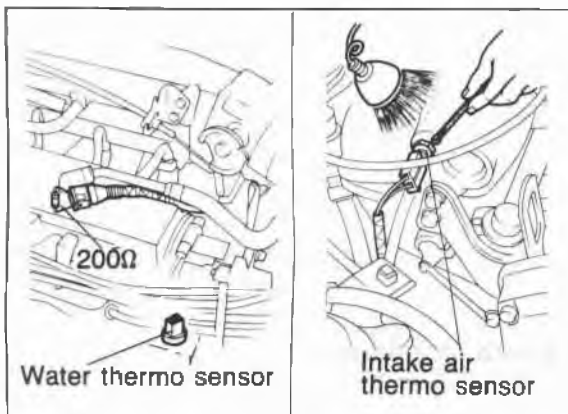
### Warning

**Be careful when disconnecting the water thermo sensor connector because the surrounding area is very hot.**

4. Disconnect the water thermo sensor connector. Connect a resistor (**200 Ω**) to the sensor connector.
5. Heat the intake air thermo sensor to above specification.

**Specification: 30°C (86°F)...unleaded fuel  
50°C (122°F)...leaded fuel**

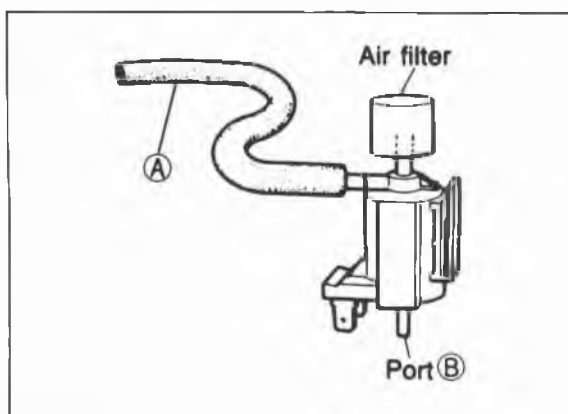
6. Restart the engine.
7. Check the fuel line pressure and operating times as shown in the chart.



76G04C-132

Operating time	Fuel line pressure kPa (kg/cm <sup>2</sup> , psi)
After starting: for 120 sec.	235—275 (2.4—2.8, 34—40)
After 120 sec.	186—226 (1.9—2.3, 27—33)

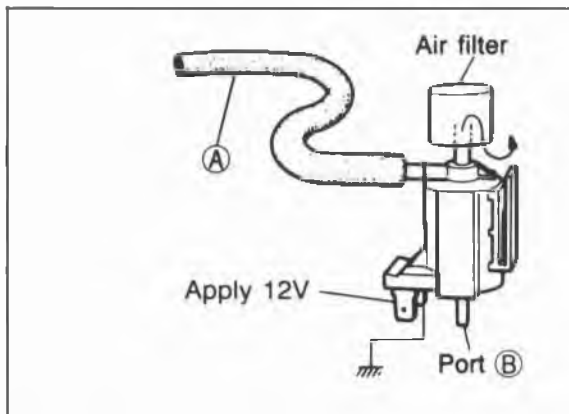
76G04C-133



76G04C-134

## Solenoid Valve (Pressure Regulator Control) Inspection

1. Disconnect the vacuum hose from the vacuum pipe.
2. Blow through the solenoid valve from vacuum hose A.
3. Check that air flows from port B.

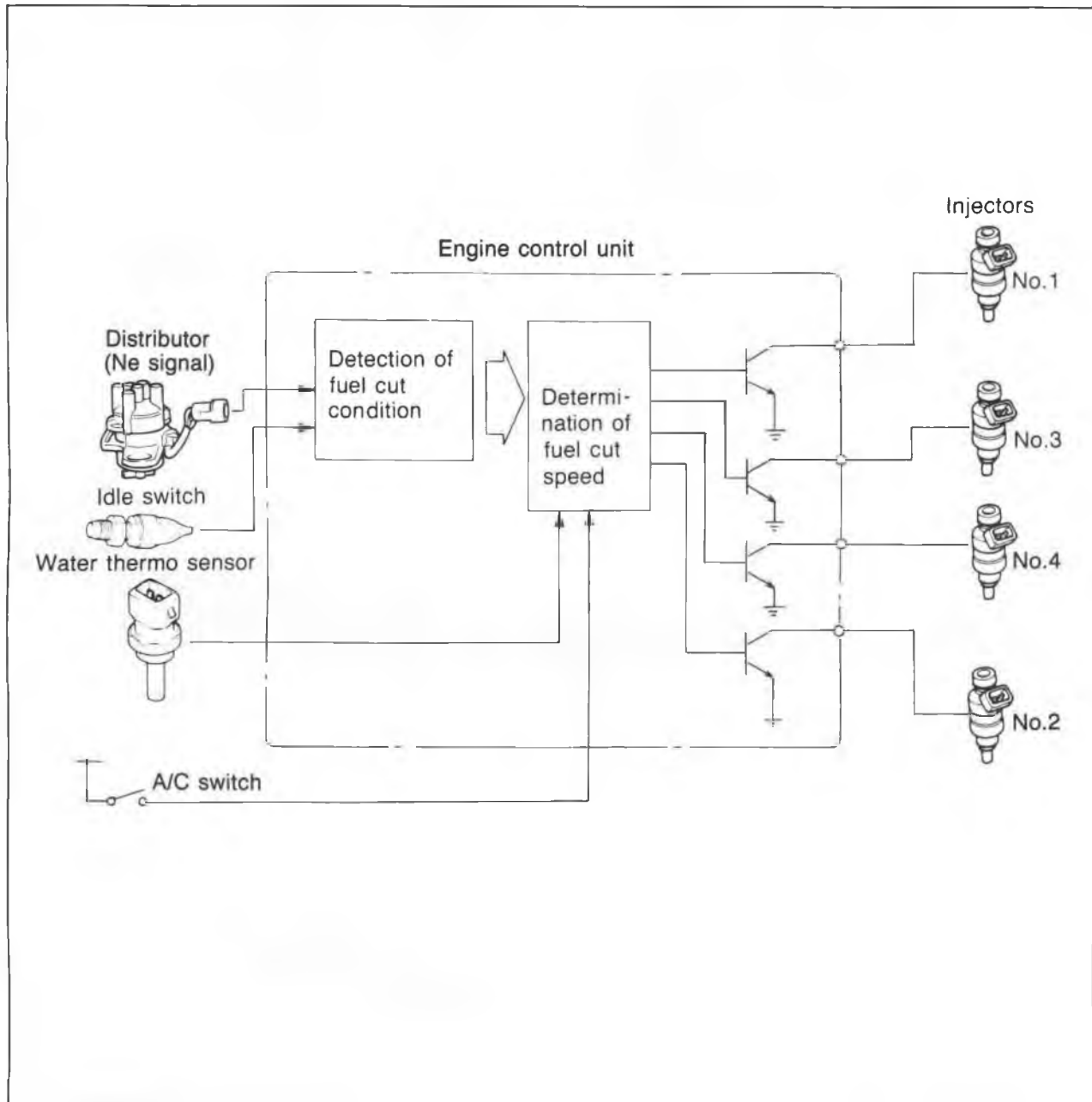


86U04A-099

4. Disconnect the solenoid valve connector.
5. Connect 12V and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from the vacuum hose A.
7. Check that air flows from the valve air filter.

# 4C DECELERATION CONTROL SYSTEM

## DECELERATION CONTROL SYSTEM



86U04A-121

The fuel cut system is provided as a deceleration control system. This system is to improve fuel consumption.

# DECELERATION CONTROL SYSTEM 4C

## COMPONENT DESCRIPTION

Component	Function	Remarks
<b>Engine control unit</b>	Detects signals from input sensors and switches; cuts fuel injection	
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	ON at idle
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to engine control unit	Installed in distributor
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	

76G04C-135

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensor or switches.

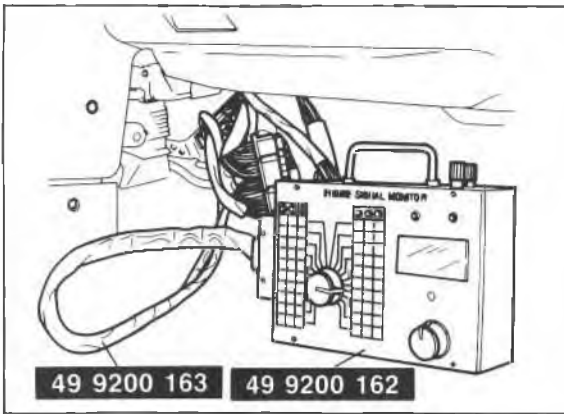
### Note

**Make the system inspection first. If no problem is found, continue with inspection of the next system of the Troubleshooting Guide. (Refer to page 4C—10 and 11.)**

<b>Possible cause</b>	<b>Water thermo sensor</b>	<b>System inspection</b>
<b>Page</b>	<b>4C—107</b>	<b>4C—74</b>
<b>Checking order</b>	2	1

76G04C-136

# 4C DECELERATION CONTROL SYSTEM



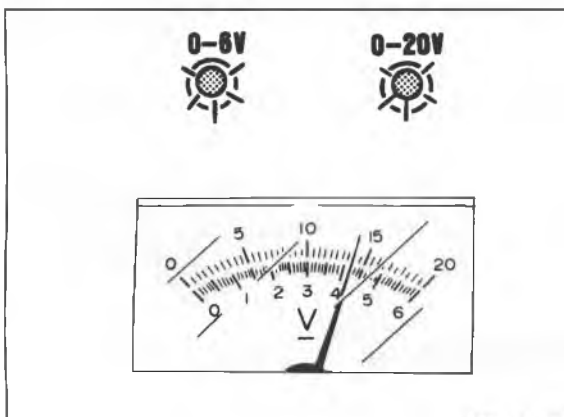
76G04C-137

## System Inspection (Electrical Signal)

1. Connect the **SST** between the wiring harness and control unit.
2. Set 3C, 3E 3F, or 3H position on the **SST**.

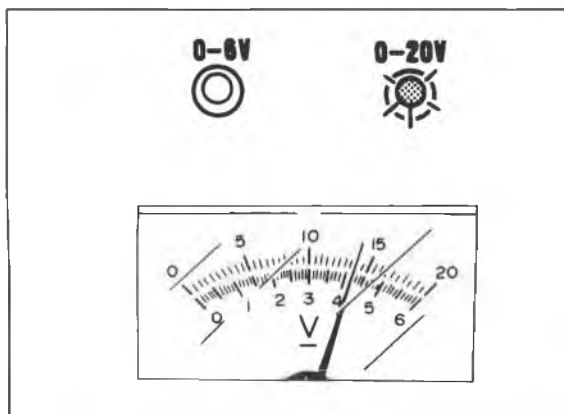
### Note

- 3C** — For No. 2 injector
- 3E** — For No. 1 injector
- 3F** — For No. 4 injector
- 3H** — For No. 3 injector



86U04A-125

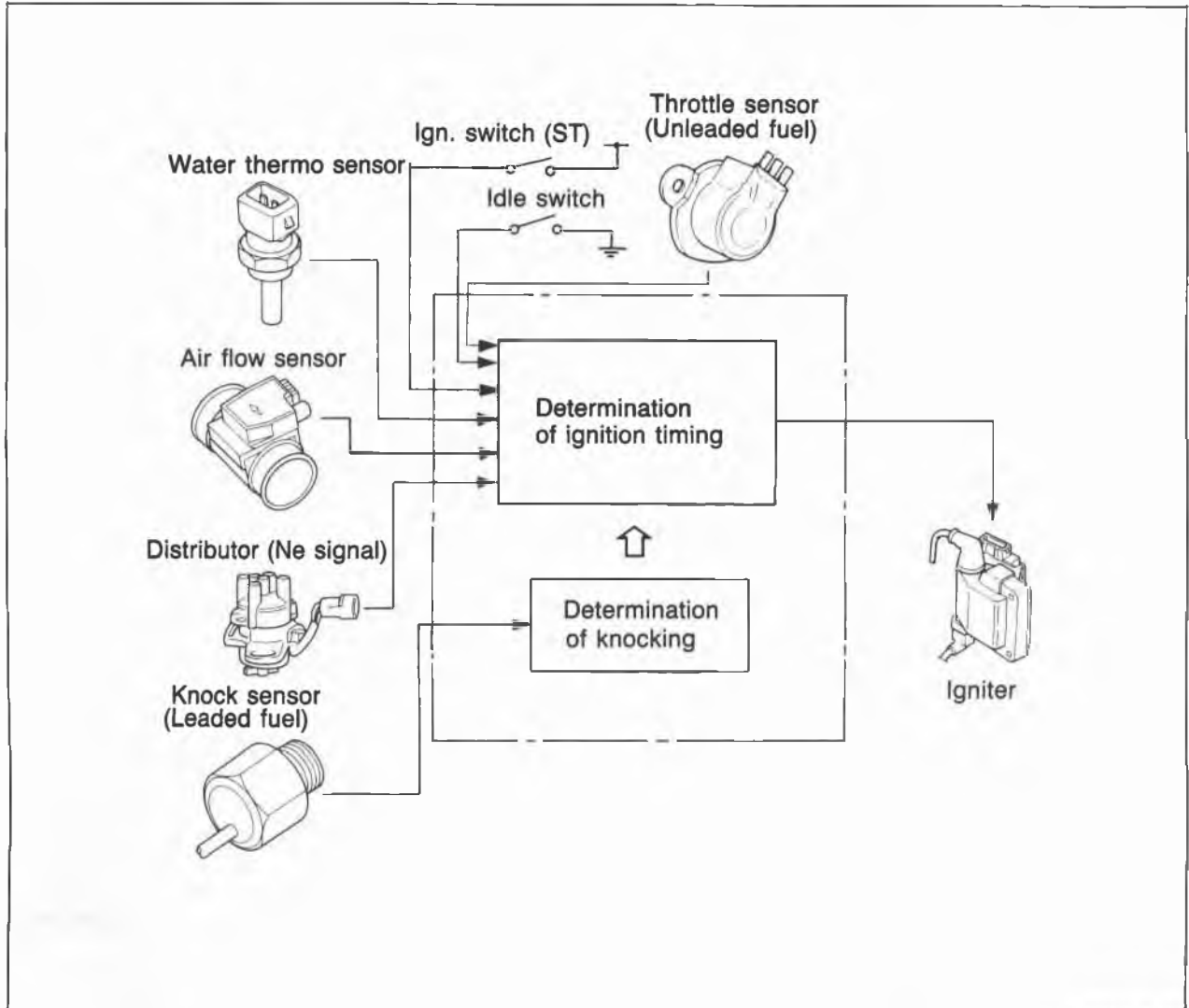
3. Check that the indicator lamps alternately flash at idle.



76G04C-138

4. Increase the engine speed to **4,000 rpm**, then suddenly decrease the engine speed.
5. Check that the green indicator lamp is OFF during deceleration.
6. Accelerate and check that the voltage decreases.

ELECTRONIC SPARK ADVANCE (ESA) CONTROL SYSTEM



76G04C-139

This system electronically controls the ignition timing to obtain better engine performance. The best ignition timing is determined and set within the engine control unit based on signals from the various sensors and switches. The knock control function is used only with leaded fuel engines.



# 4C ESA CONTROL SYSTEM

## COMPONENT DESCRIPTION

Component	Function	Remark
<b>Air flow sensor</b>	Detects amount of intake air; sends signal to engine control unit	
<b>Distributor</b>	Has Ne and G signal pick-up and distributes high voltage to spark plugs	
<b>Engine control unit</b>	Detects signals from input sensors and switches; decides best ignition timing	
<b>Idle switch</b>	Detects when throttle valve fully closed; sends signal to engine control unit	Installed on throttle body
<b>Igniter</b>	Receives spark signal from engine control unit and generates high voltage in ignition coil	
<b>Ignition switch (ST position)</b>	Sends engine cranking signal to engine control unit	
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to engine control unit	Installed in distributor
<b>Knock sensor (leaded fuel)</b>	Detects engine knocking; sends signal to knock control unit	
<b>Throttle sensor</b>	Detects throttle opening angle; sends signal to engine control unit	Installed on throttle body

76G04C-140

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensors or switches.

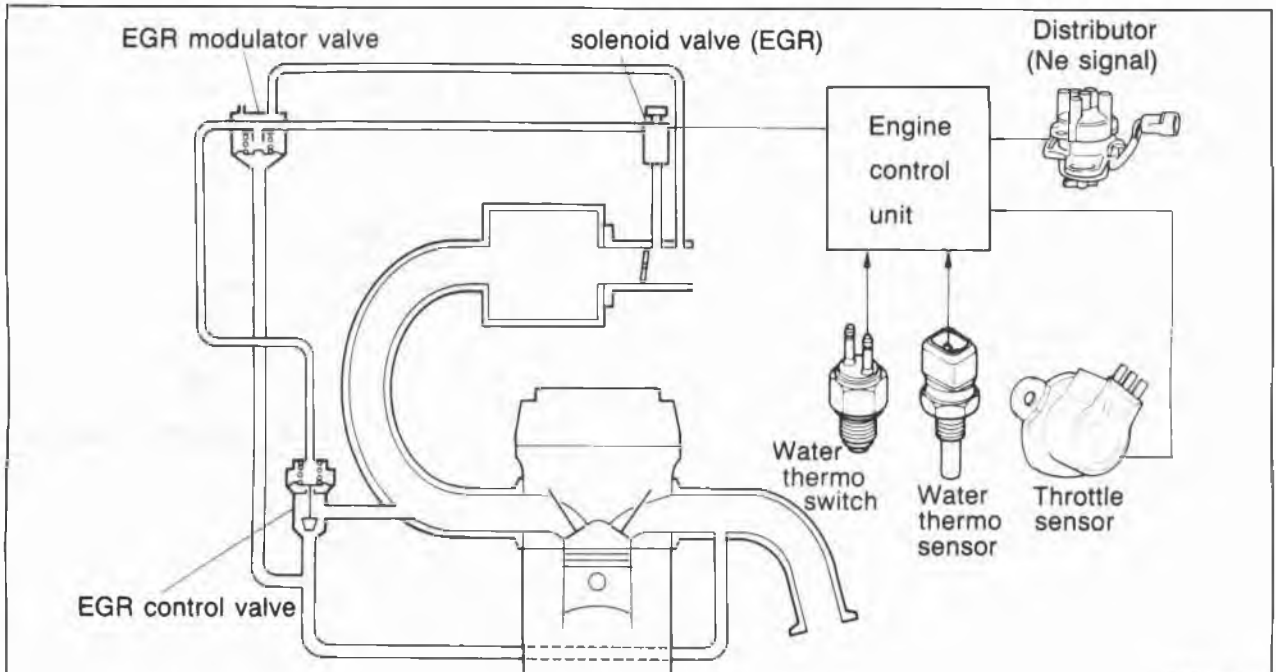
### Note

If no problem is found, continue with inspection of the next system of the troubleshooting Guide. (Refer to page 4C—10 and 11)

Symptom	Possible cause	Air flow sensor	Igniter	Engine control unit terminal	Knock sensor
				1X	
		4C—103	Refer to section 5	4C—98	4C—109
<b>Hard start or won't start (Crank OK)</b>		3	1	2	—
<b>Knocking</b>		—	—	—	1

76G04C-141

## EXHAUST GAS RECIRCULATION (EGR) SYSTEM (UNLEADED FUEL)



76G04C-142

This system introduces exhaust gas into the intake manifold to reduce NO<sub>x</sub> emissions. It operates depending on the engine load, engine speed (**1,500—3,500 rpm**), engine coolant temperature (**above 70°C, 158°F**), and radiator coolant temperature (**above 17°C, 63°F**).

### COMPONENT DESCRIPTION

Component	Function	Remark
<b>EGR control valve</b>	Recirculates portion of exhaust gas	
<b>EGR modulator valve</b>	Controls vacuum acting on EGR control valve	
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valve (EGR)	
<b>Ne signal pick-up</b>	Detects crank angle at 180° intervals; sends signal to engine control unit	
<b>Solenoid valve (EGR)</b>	Controls vacuum to EGR control valve	
<b>Throttle sensor</b>	Detects throttle valve opening angle; sends signal to engine control unit	Installed on throttle body
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit	
<b>Water thermo switch</b>	Detects radiator coolant temperature; sends signal to engine control unit	ON: above 17°C (63°F)

76G04C-143

# 4C EGR SYSTEM (UNLEADED FUEL)

## TROUBLESHOOTING

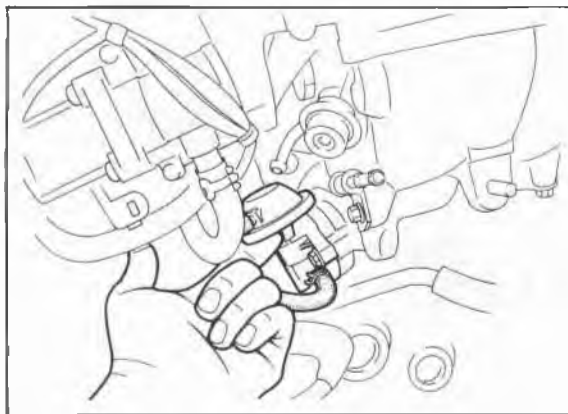
Check the condition of the wiring harness and connectors before checking the sensors or switches.

### Note

**Make the system inspection first. If no problem is found, continue with inspection of the next system of the Troubleshooting Guide. (Refer to pages 4C—10 and 11.)**

Possible cause	Throttle sensor	Solenoid valve (EGR)	EGR modulator valve	EGR control valve	Water thermo sensor	Water thermo switch	Engine control unit terminal	System inspection
							2N	
Page	4C—104	4C—78	4C—79	4C—79	4C—107	4C—106	4C—98	4C—78
Checking order	8	2	4	3	6	5	7	1

76G04C-144



76G04C-145

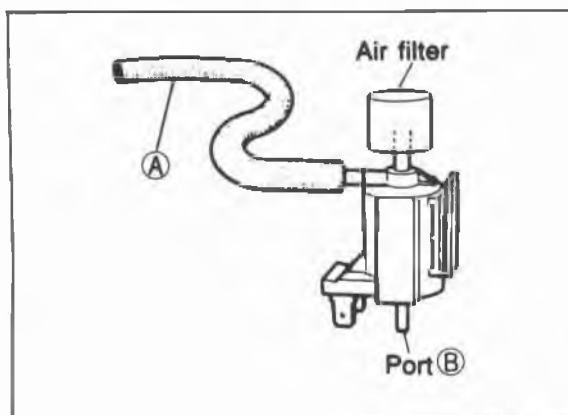
### System Inspection

1. Start the engine.
2. Accelerate the engine while still cold and verify that the diaphragm of the EGR control valve does not move.
3. Warm up the engine to normal operating temperature and run it at idle.

### Warning

**Be careful when checking the EGR control valve, the surrounding area is very hot.**

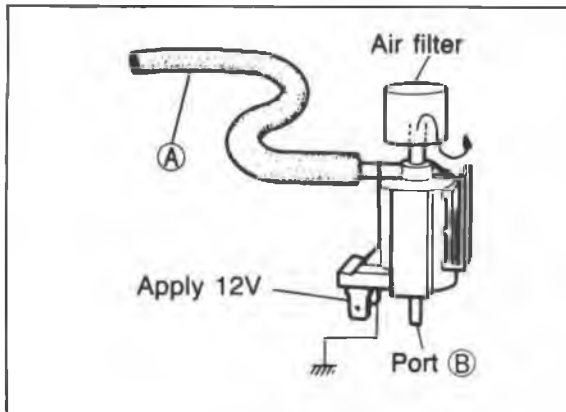
4. Accelerate the engine and check that the diaphragm of the EGR control valve moves.



76G04C-146

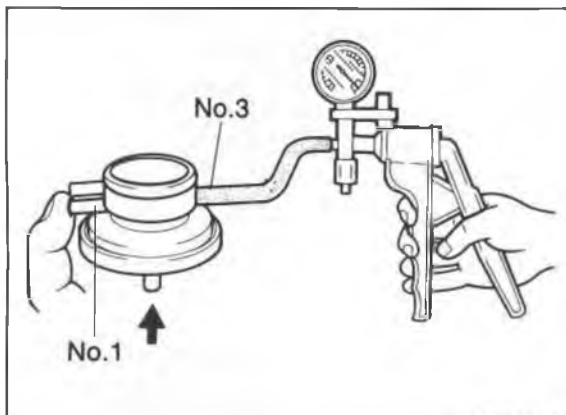
### Solenoid Valve (EGR)

1. Disconnect the vacuum hose from the vacuum pipe.
2. Blow through the solenoid valve from vacuum hose A.
3. Check that air flows from port B.



76G04C-147

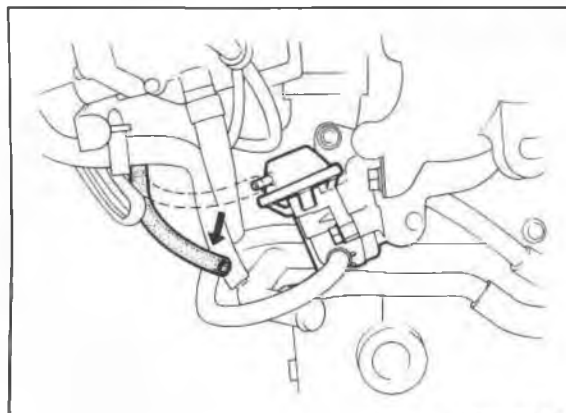
4. Disconnect the solenoid valve connector.
5. Connect 12V and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from vacuum hose A.
7. Check that air flows from the air filter.



86U04A-133

### EGR Modulator Valve

1. Remove the EGR modulator valve.
2. Plug the No. 1 port and connect a vacuum pump to the No. 3 port.
3. Blow into the exhaust gas port. Operate the vacuum pump and verify that vacuum is held.
4. Release the exhaust gas port and confirm that vacuum is released.



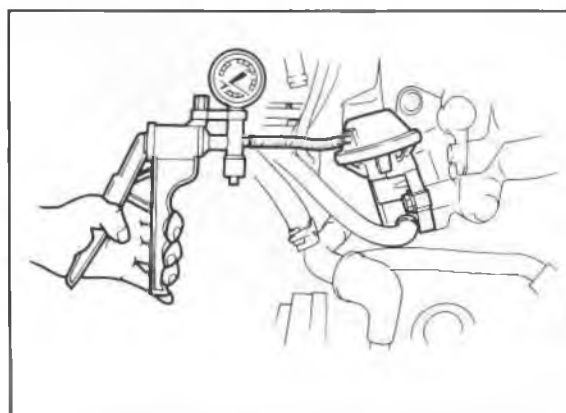
76G04C-148

### EGR Control Valve

1. Warm up the engine and run at idle.
2. Disconnect the vacuum hose from the EGR control valve and plug it.
3. Verify that the engine runs smoothly.
4. If not correct, clean the exhaust gas passage in the valve or replace the valve.

#### Note

**Before replacing the EGR control valve, check the intake air and control systems.**



76G04C-149

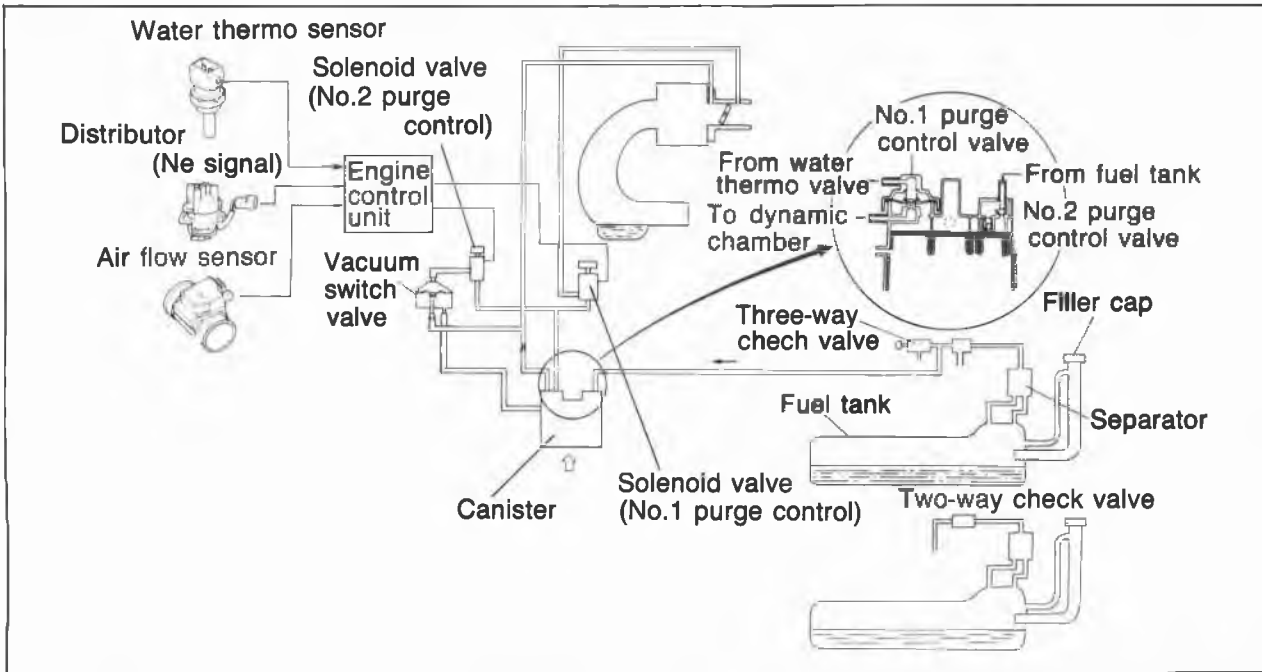
5. Connect a vacuum pump to the valve and apply vacuum.
6. Verify that the engine runs roughly or stalls at more than the specified vacuum.

#### Specification:

**40—60 mmHg (1.6—2.4 inHg)**

7. If not correct, replace the EGR control valve.

## EVAPORATIVE EMISSION CONTROL (EEC) SYSTEM



76G04C-150

### Unleaded fuel:

This system stores fuel vapor generated in the fuel tank in the canister when the engine is not running. The fuel vapor is stored in the canister until it is drawn into the dynamic chamber and burned when the engine is started.

### Leaded fuel:

Fuel vapor generated in the fuel tank flows out to the atmosphere.

### COMPONENT DESCRIPTION

Component	Function	Remark	Application	
			New model	Previous model
<b>Air flow sensor</b>	Detects amount of intake air; sends signal to engine control unit		○	X
<b>Charcoal canister</b>	Stores fuel tank fumes while engine stopped		○	X
<b>Engine control unit</b>	Detects signals from input sensors and switches; controls solenoid valves (Purge control)		○	X
<b>Ne signal pick-up</b>	Detect crank angle at 180° intervals; sends signal to engine control unit	Installed in distributor	○	X
<b>Separator</b>	Prevents fuel from flowing into charcoal canister		○	○
<b>Solenoid valve (No.1 purge control)</b>	Controls vacuum to solenoid valve (No.2 purge control) and vacuum switch valve		○	X
<b>Solenoid valve (No.2 Purge control)</b>	Controls vacuum to vacuum switch valve		○	X
<b>Three-way check valve</b>	Controls pressure in fuel tank		○	X
<b>Two-way check valve</b>	Controls pressure in fuel tank		X	○
<b>Vacuum switch valve</b>	Regulates evaporative fumes from canister to intake manifold		○	X
<b>Water thermo sensor</b>	Detects coolant temperature; sends signal to engine control unit		○	X

76G04C-151

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensors or switches.

### Note

**Make the system inspection first. If no problem is found, continue with inspection of the next system of the Troubleshooting Guide. (Refer to pages 4C—10 and 11.)**

Possible cause	Vacuum switch valve	Solenoid valve (No. 1 purge control)	Solenoid valve (No. 2 purge control)	Two-way check valve	Three-way check valve	Separator	No. 1 purge control valve	No. 2 purge control valve	Water thermo switch	Water thermo sensor	Engine control unit terminal	System inspection
											2P, 2O	
Page	4C-83	4C-84	4C-84	4C-84	4C-83	4C-85	4C-82	4C-83	4C-106	4C-107	4C-98	4C-81
Checking order (Unleaded fuel)	4	2	3	—	10	11	5	6	7	8	9	1
Checking order (Leaded fuel)	—	—	—	1	—	2	—	—	—	—	—	—

76G04C-152



76G04C-153

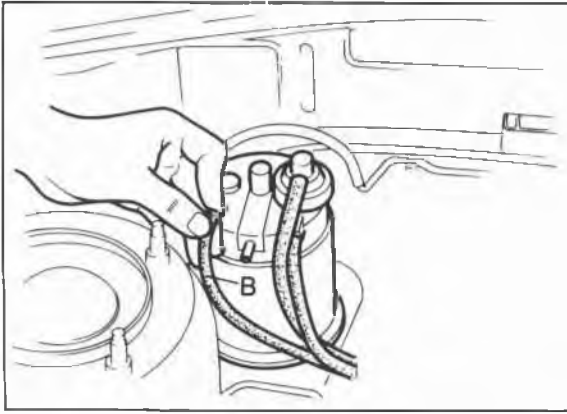
### System Inspection

1. Check the vacuum hose routing.
2. If there is a poor connection, clog, or leak, repair or replace as necessary.
3. Warm up the engine and run it at idle.
4. Disconnect vacuum hose A from No. 1 purge control valve and connect the **SST** to the hose.

86U04A-140

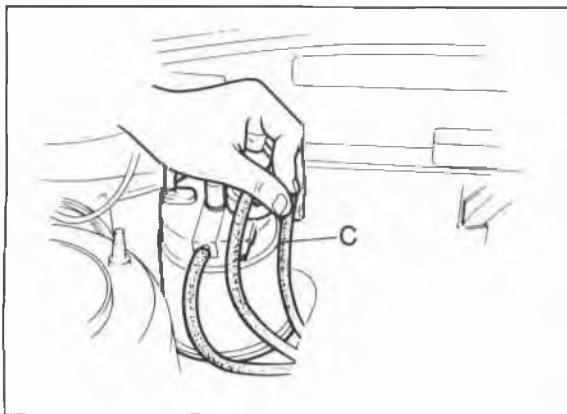
5. Increase the engine speed to above **2,500 rpm** and verify that the gauge shows more than **150 mmHg (5.9 inHg)**.
6. If not correct, check the solenoid valve (No. 1 purge control).
7. Reconnect hose A to No. 1 purge control valve.

## 4C EEC SYSTEM



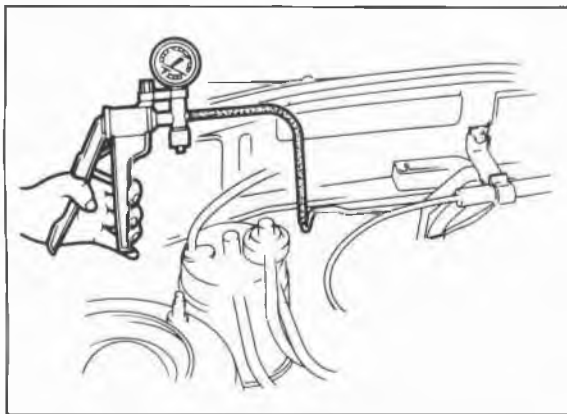
76G04C-154

8. Disconnect vacuum hose B from the canister and place a finger over the end of the hose.
9. Accelerate the engine rapidly and check that vacuum is felt at **above 1,700 rpm**.
10. Reconnect hose B to the canister.
11. If not correct, check the vacuum switch valve and the solenoid valve (No. 2 purge control).



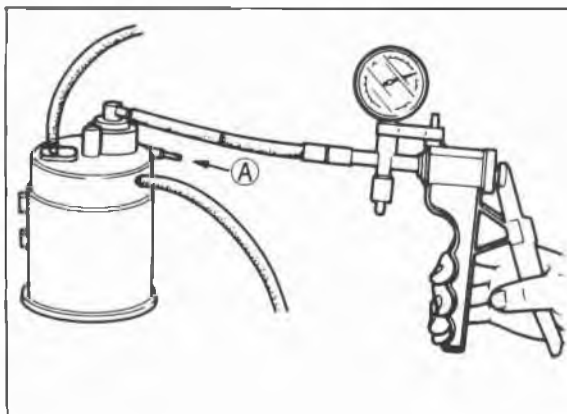
76G04C-155

12. Disconnect vacuum hose C from the canister and place a finger over the end of the hose.
13. Check that vacuum is felt.
14. If not correct, check the vacuum line between the canister and the dynamic chamber for clogging.



76G04C-156

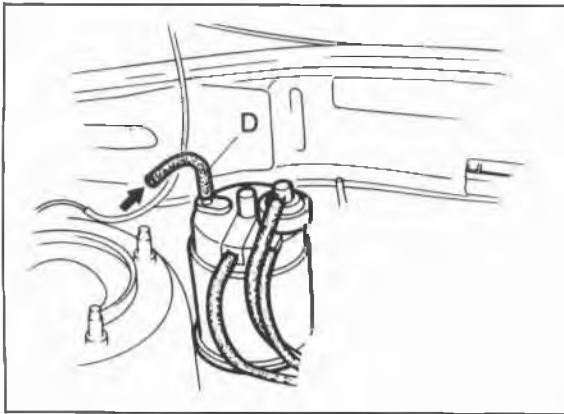
15. Disconnect the evaporation hose from the evaporation pipe.
16. Connect a vacuum pump to the evaporation pipe.
17. Operate the vacuum pump and verify that no vacuum is held.
18. If vacuum is held, check the evaporation pipe for clogging.



86U04A-144

### No. 1 Purge Control Valve

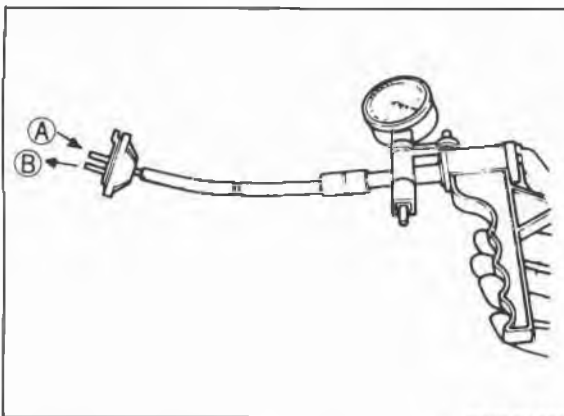
1. Blow through the purge control valve from port A and check that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.33 inHg)** vacuum, and blow through port A again; air should flow.



76G04C-157

**No. 2 Purge Control Valve**

1. Disconnect vacuum hose D from the evaporation pipe.
2. Blow through the hose and verify that air flows freely.

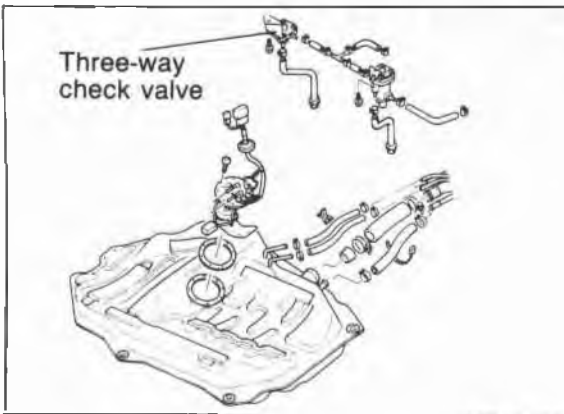


76G04C-158

**Vacuum Switch Valve**

1. Remove the vacuum switch valve.
2. Connect a vacuum pump to the valve.
3. Blow through the valve from port A and verify that air comes out of port B when vacuum is applied.

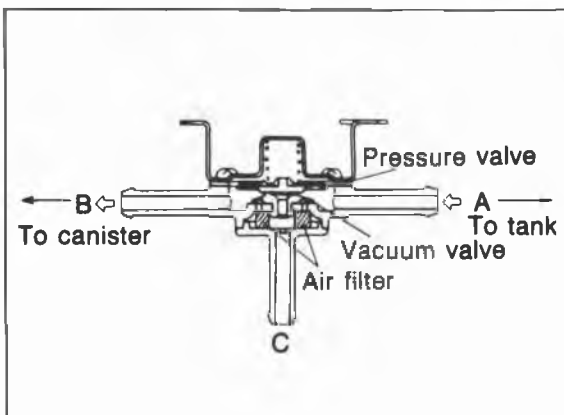
**Specified vacuum:**  
**66—106 mmHg (2.6—4.2 inHg)**



86U04A-148

**Three-Way Check Valve**

1. Remove the check valve.

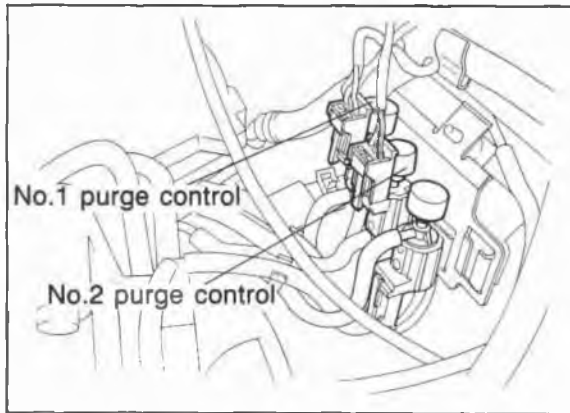


86U04A-149

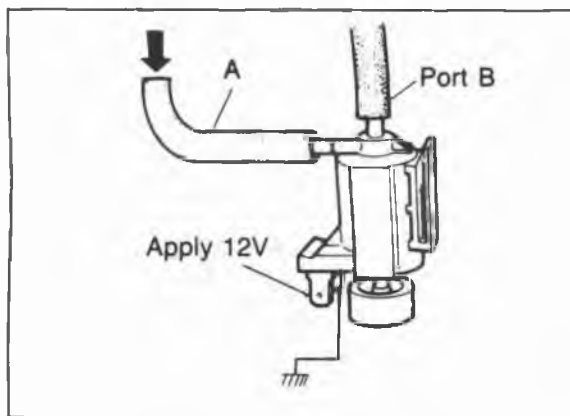
2. Blow through the valve from port A, and check that air comes out of port B.  
 Next, block port B and check that air comes out of port C.
3. Block port B.
4. Connect a vacuum pump to port A and verify that no vacuum is held.



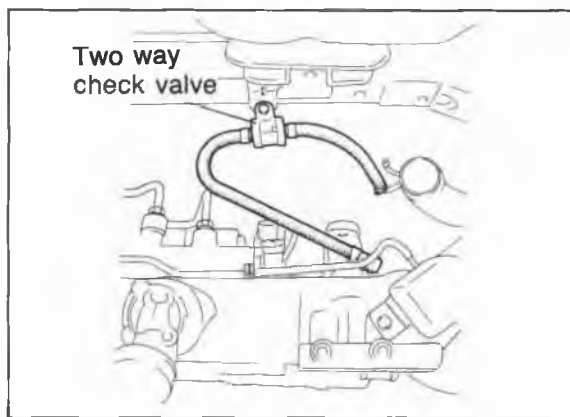
# 4C EEC SYSTEM



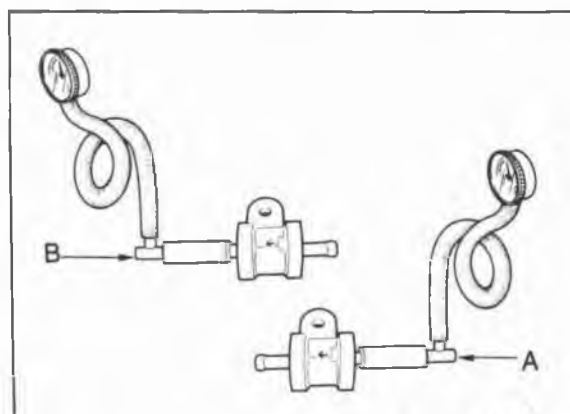
76G04C-159



86U04A-151



76G04C-160



76G04C-161

## Solenoid Valve

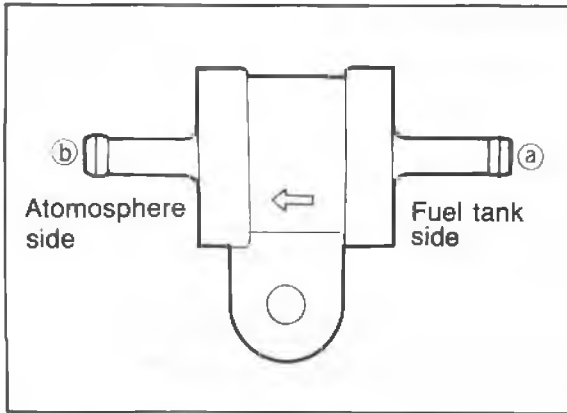
1. Remove the solenoid valve.

2. Connect vacuum hoses to the valve as shown in the figure.
3. Blow air through the valve from hose A and check that air comes out of the valve air filter.
4. Apply 12V and ground the solenoid valve with jumper wires.
5. Blow air through the valve from hose A and check that the air comes out of port B.
6. Replace, if necessary.

## Two-way check valve Inspection

1. Remove the two-way check valve.

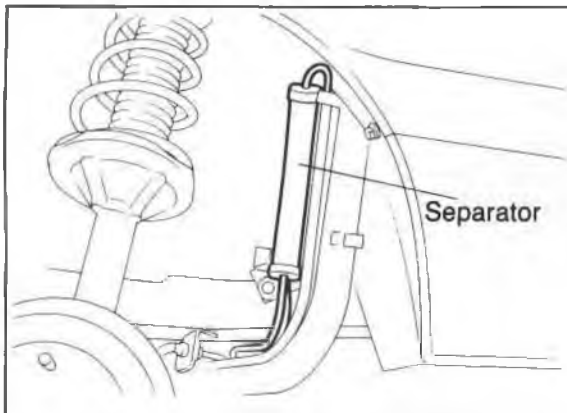
2. Connect a pressure gauge to the passage that normally is connected to the fuel tank.
3. Blow through the valve from port A. Verify that the valve opens at **2.94 kPa (0.03 kg/cm<sup>2</sup>, 0.43 psi)**.
4. Remove the pressure gauge and connect it to the passage to atmosphere.
5. Blow through the valve from port B. Verify that the valve opens at **0.98 kPa (0.01 kg/cm<sup>2</sup>, 0.14 psi)**.



76G04C-212

### Replacement

1. Remove the two-way check valve.
2. Install a new valve so that the arrow on the valve faces atmosphere side.



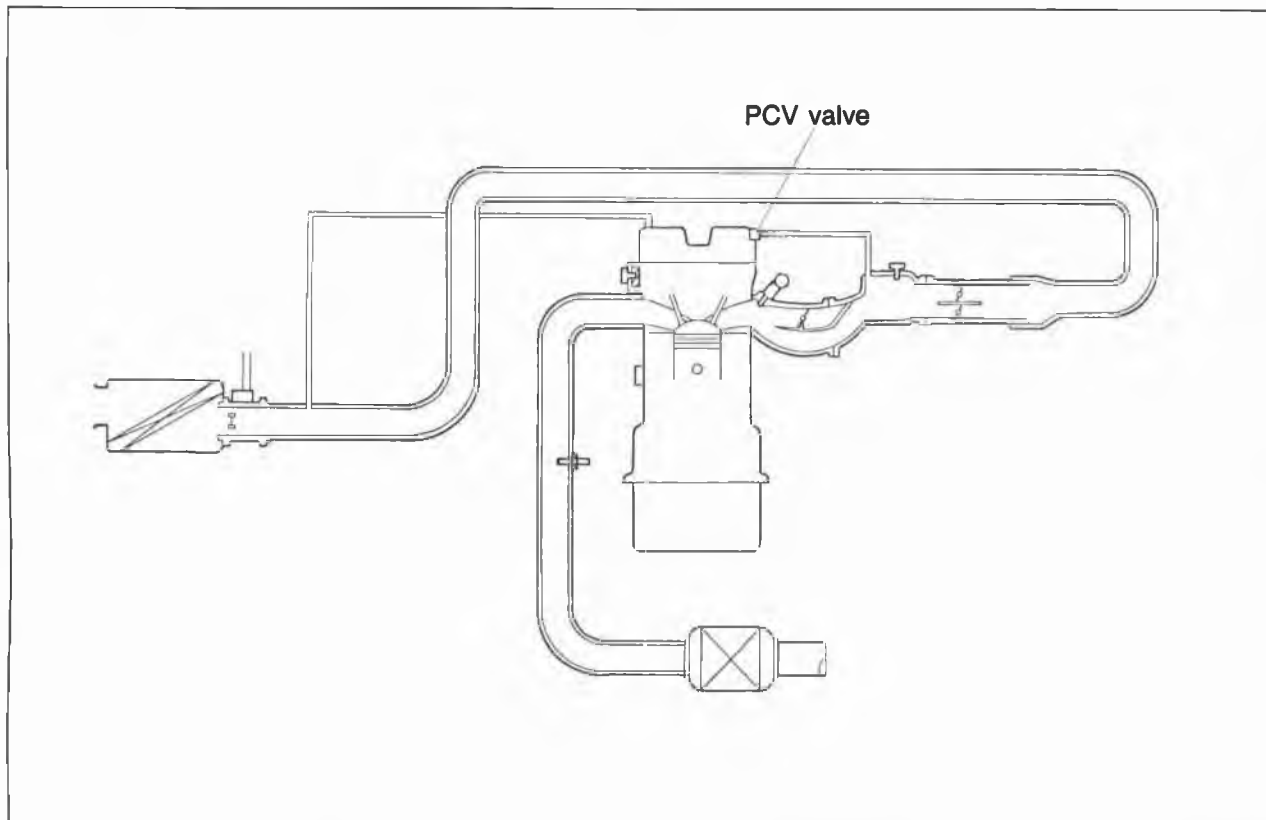
86U04A-154

### Separator

1. Remove the separator.
2. Visually check the separator for damage.
3. Replace, if necessary.

# 4C PCV SYSTEM

## POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



76G04C-162

The PCV valve is operated by the intake manifold vacuum.

When the engine is running at idle, the PCV valve is opened slightly and a small amount of blow-by gas is drawn into the dynamic chamber.

At high engine speeds, the PCV valve is further opened and a larger amount of blow-by gas is drawn into the dynamic chamber.

### COMPONENT DESCRIPTION

Component	Function	Remark
PCV valve	Controls blowby gas amount pulled into engine	

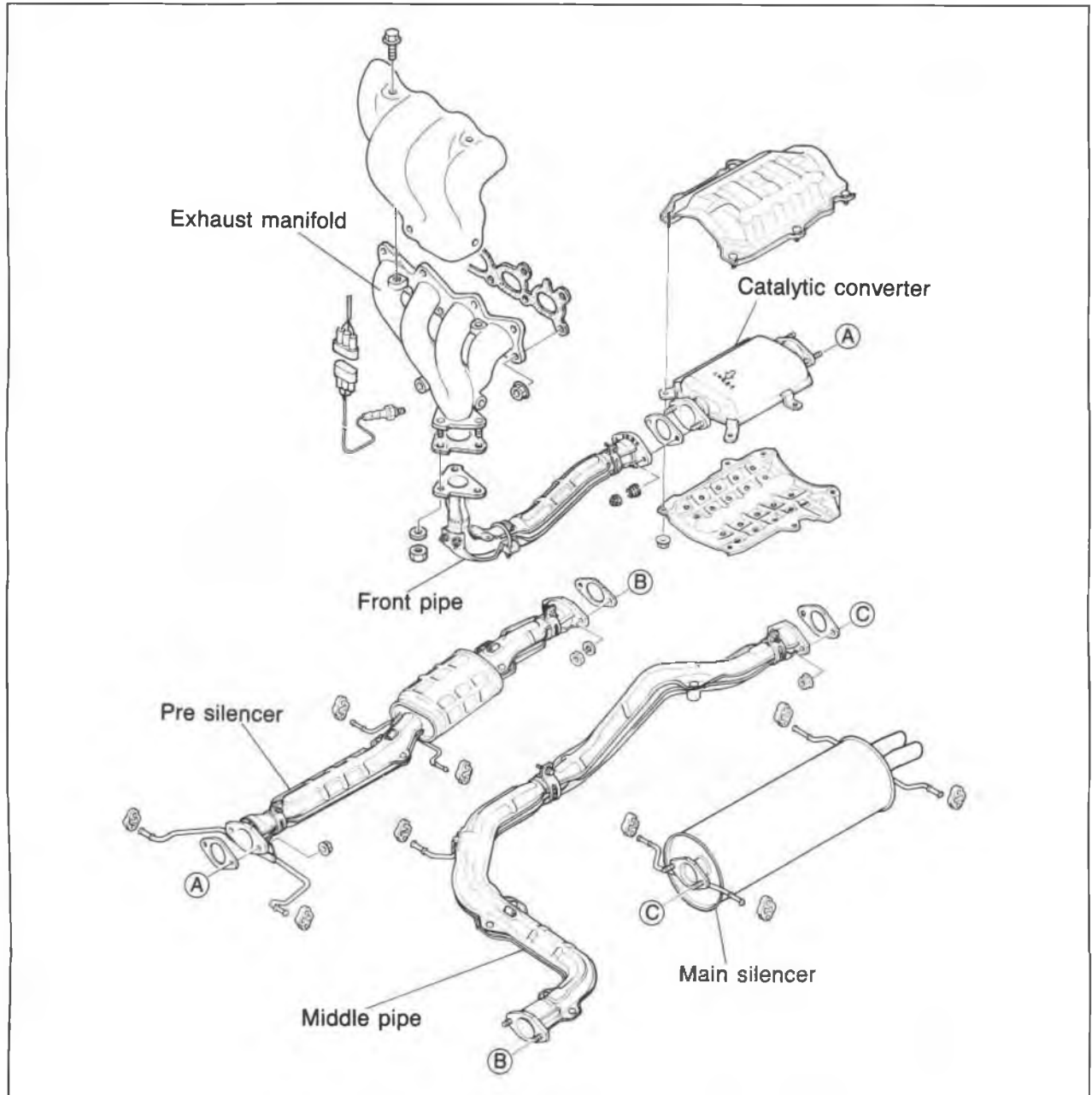


86U04A-157

### PCV VALVE

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve and the ventilation hose from the cylinder head cover.
3. Close the PCV valve opening.
4. Check that vacuum is felt.

## EXHAUST SYSTEM (UNLEADED FUEL)



76G04C-163

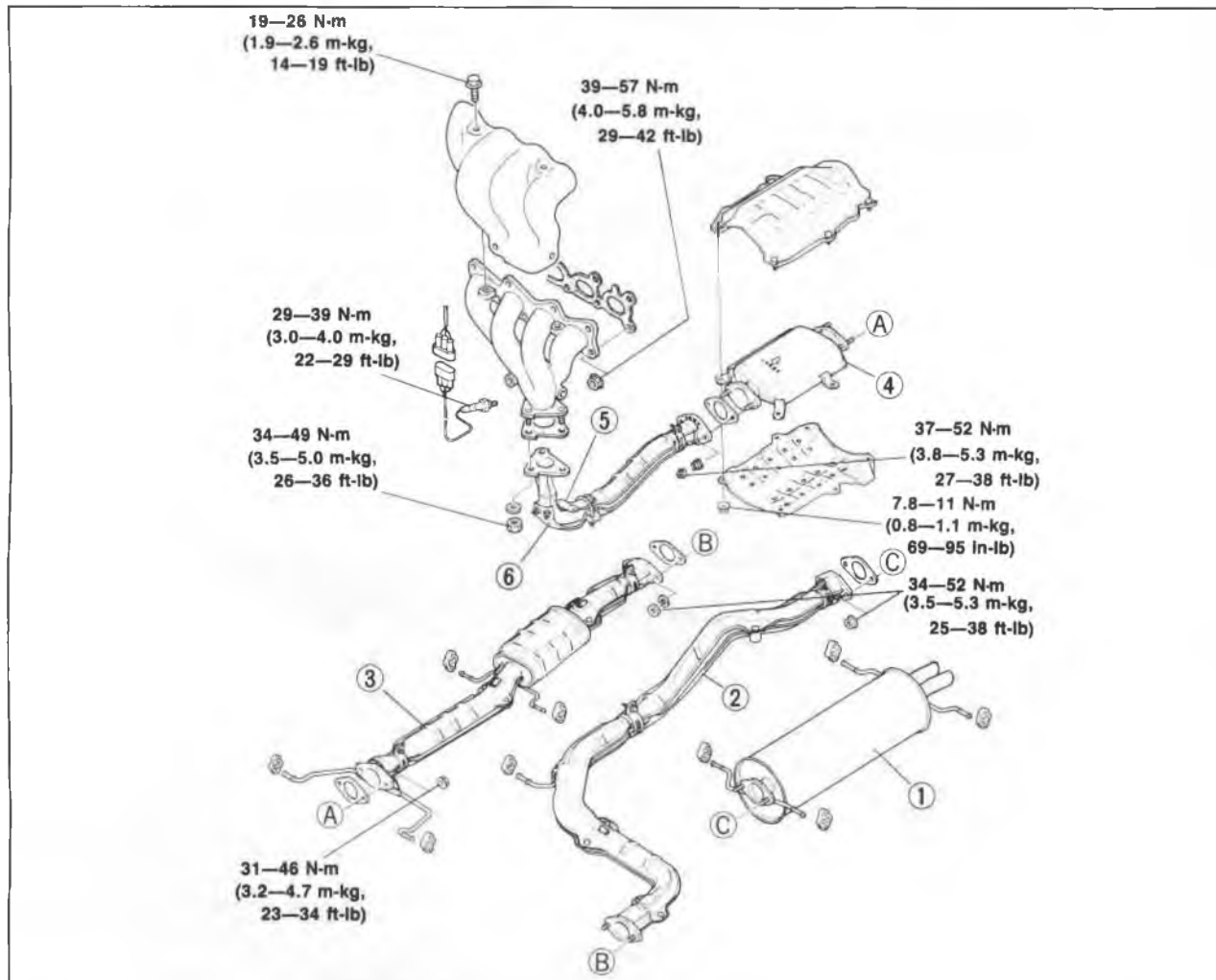
The catalytic converter is used to reduce CO and HC. The converter contains a compound of platinum and rhodium. It is a two-way catalyst type with a volume of **2,300 cc (140 cu in)**.

# 4C EXHAUST SYSTEM (UNLEADED FUEL)

## REMOVAL AND INSTALLATION

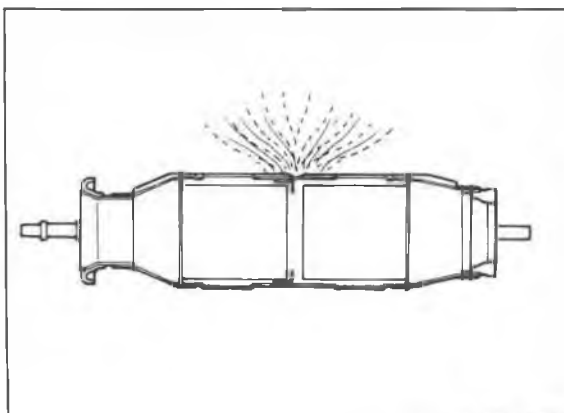
1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

## Torque Specifications



86U04A-159

- |                  |                        |
|------------------|------------------------|
| 1. Main silencer | 4. Catalytic converter |
| 2. Middle pipe   | 5. Bracket             |
| 3. Pre-silencer  | 6. Front pipe          |



86U04A-160

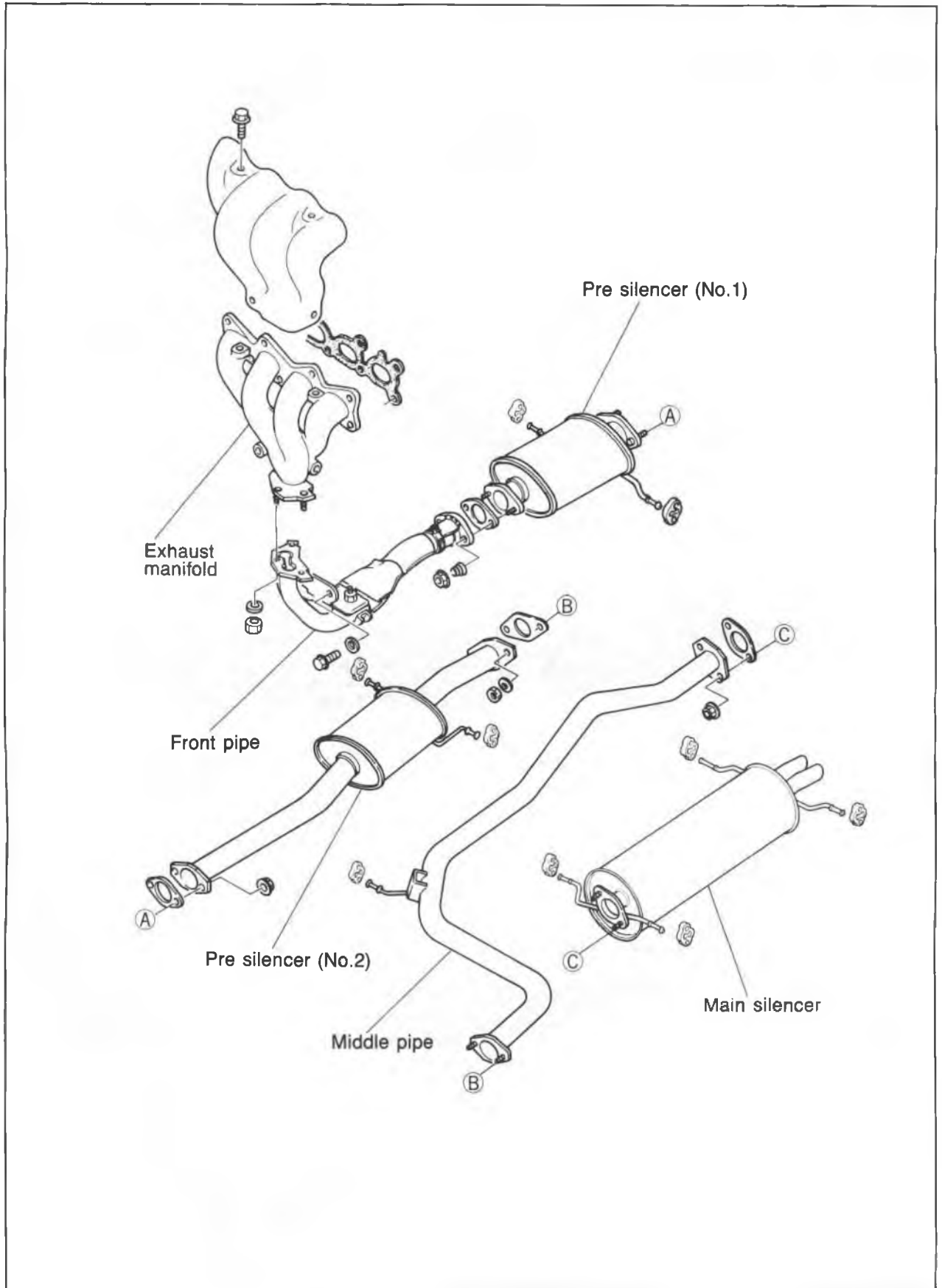
## INSPECTION

1. Check the catalytic converter and exhaust pipe for deterioration or restriction.
2. Check the insulation covers welded onto the catalytic converter for damage.

## Note

**If the insulation cover is touching the catalytic converter housing, excessive heat at the floor will occur.**

EXHAUST SYSTEM (LEADED FUEL)

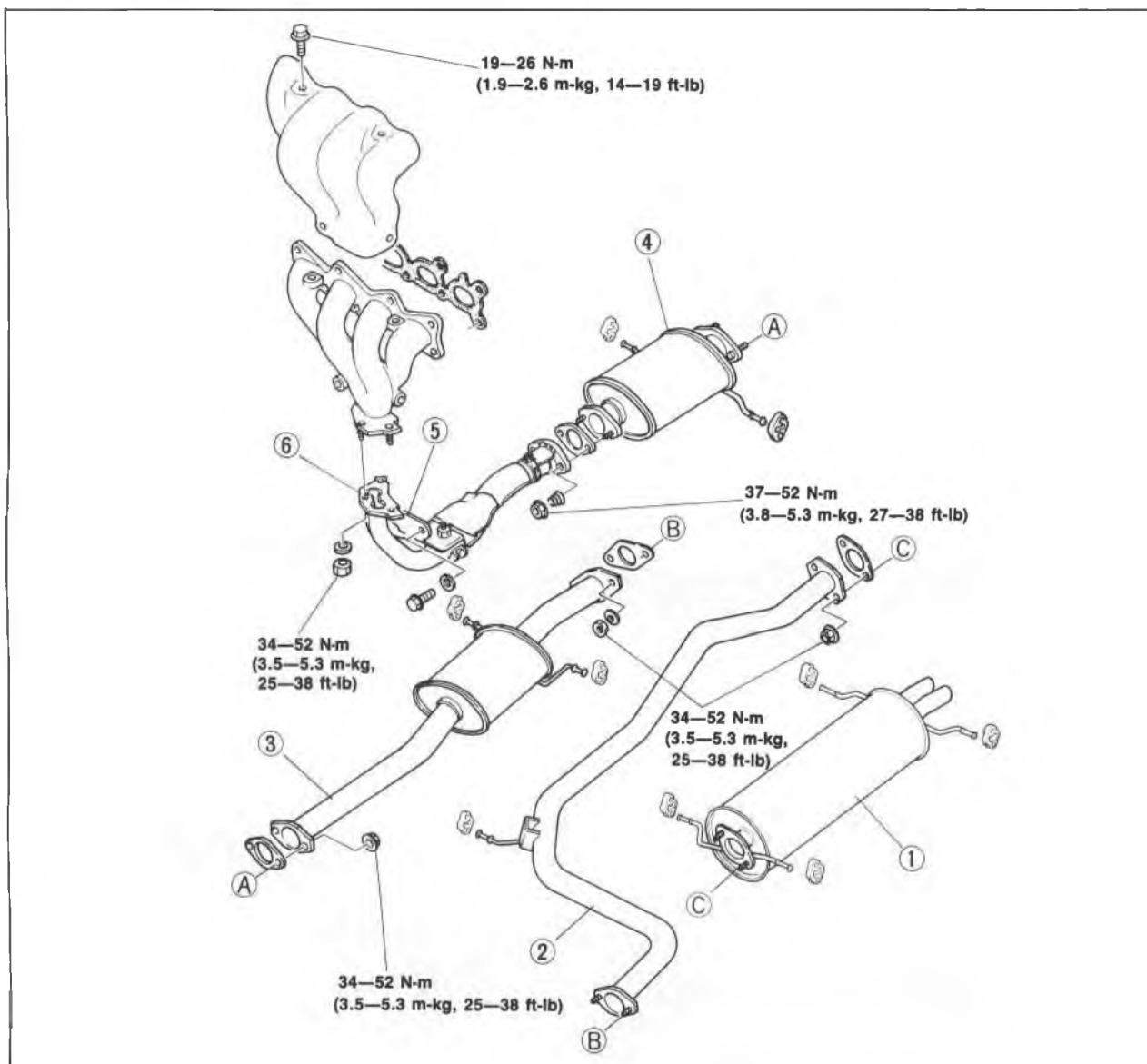


# 4C EXHAUST SYSTEM (LEADED FUEL)

## REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

## Torque Specifications

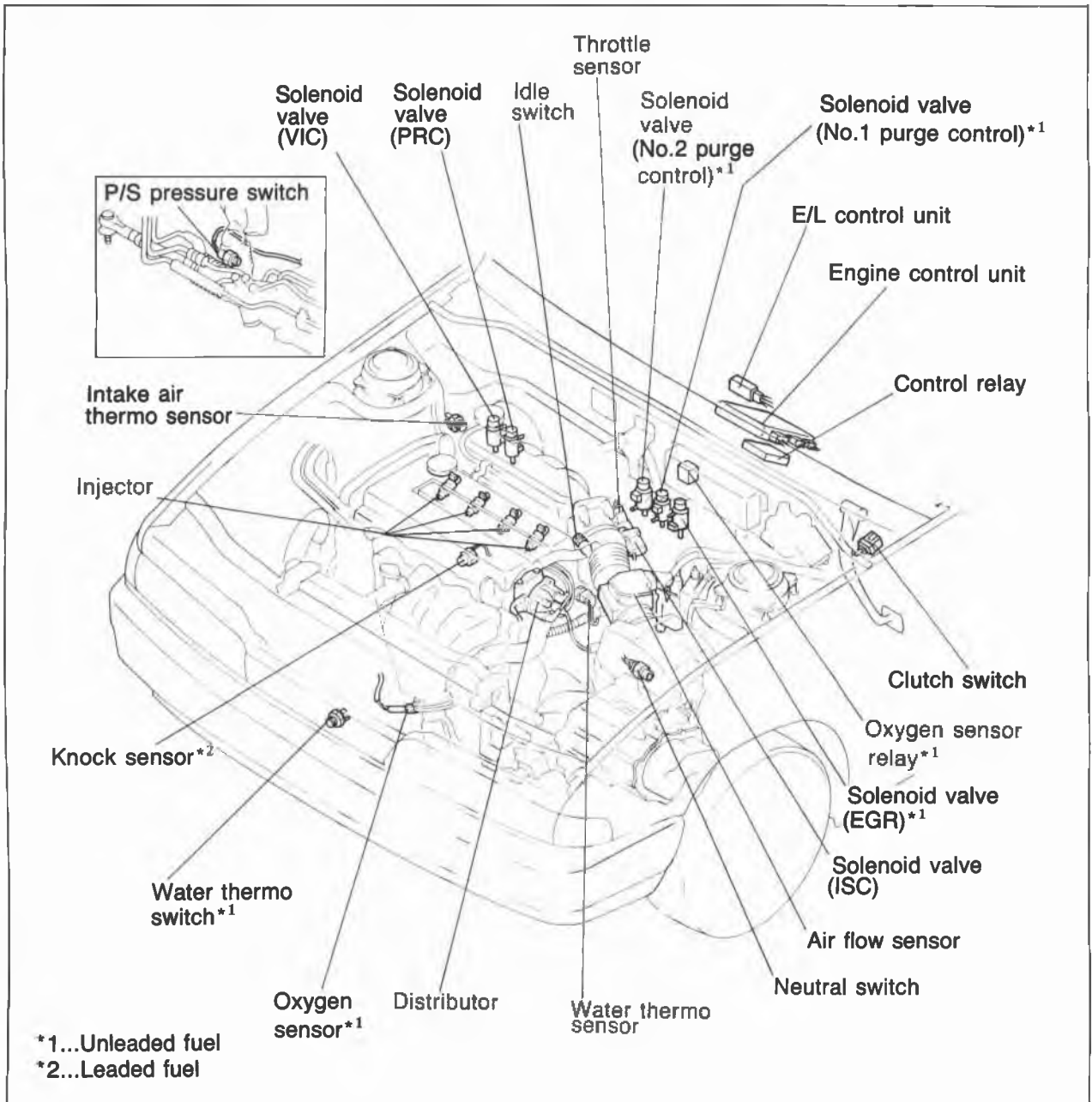


76G04C-165

1. Main silencer
2. Middle pipe
3. No. 2 pre-silencer

4. No. 1 pre-silencer
5. Bracket
6. Front pipe

## CONTROL SYSTEM



The control system consists of the input devices and the engine control unit. The control unit controls the fuel injection amount (EGI), fuel injection pressure, bypass air amount, ignition timing, switch monitor function, and fail-safe function.



# 4C CONTROL SYSTEM

**RELATIONSHIP CHART**  
Output Devices and Input Devices (Unleaded fuel)

INPUT DEVICE \ OUTPUT DEVICE		IGNITION SWITCH (ON POSITION)	TEST CONNECTOR	ELECTRICAL LOAD CONTROL UNIT	P/S PRESSURE SWITCH	A/C SWITCH	IGNITION SWITCH (STA POSITION)	NEUTRAL AND CLUTCH SWITCH	OXYGEN SENSOR	WATER THERMO SWITCH (RADIATOR)	INTAKE AIR THERMO SENSOR	WATER THERMO SENSOR	IDLE SWITCH	THROTTLE SENSOR	AIR FLOW SENSOR	Ne SIGNAL	G SIGNAL
INJECTOR	FUEL INJECTION AMOUNT	X	○	○	○	○	○	○	○	○	X	○	○	○	○	○	X
	FUEL INJECTION TIMING	○	○	X	X	X	○	X	X	X	X	X	X	X	X	○	○
BAC VALVE	AIR VALVE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	ISC VALVE	X	○	X	X	○	○	○	X	X	X	○	○	○	○	○	○
CONTROL RELAY	FUEL PUMP CONTROL	X	○	X	X	X	○	X	X	X	X	X	X	X	X	X	X
	MAIN POWER CONTROL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	○
SOLENOID VALVE (No.1 PURGE)		X	X	X	X	X	X	X	X	X	X	○	X	X	X	X	X
SOLENOID VALVE (No.2 PURGE)		X	○	○	X	X	○	○	X	X	X	○	X	X	X	X	X
SOLENOID VALVE (EGR)		X	○	X	○	X	○	○	X	X	X	○	X	X	X	X	X
SOLENOID VALVE (PRESSURE REGULATOR CONTROL)		X	○	X	X	○	○	○	X	X	X	○	X	X	X	X	X
SOLENOID VALVE (VARIABLE INERTIA CONTROL)		X	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OXYGEN SENSOR RELAY		X	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A/C RELAY		X	X	X	X	X	X	X	X	X	X	○	X	X	X	X	X
IGNITER		X	○	○	○	○	○	○	X	X	X	○	X	X	○	○	X
AIR FLOW SENSOR (BURN-OFF)		X	○	○	X	X	○	○	X	X	X	○	X	X	○	○	○

76G04C-167

## Output Devices and Input Devices (Leaded fuel)

INPUT DEVICE	OUTPUT DEVICE											
	INJECTOR	FUEL INJECTION AMOUNT	FUEL INJECTION TIMING	AIR VALVE	ISC VALVE	FUEL PUMP CONTROL	MAIN POWER CONTROL	SOLENOID VALVE (PRESSURE REGULATOR CONTROL)	SOLENOID VALVE (VARIABLE INERTIA CONTROL)	A/C RELAY	IGNITER	AIR FLOW SENSOR (BURN-OFF)
IGNITION SWITCH (ON POSITION)	X	X	X	X	X	X	O	X	X	X	X	O
TEST CONNECTOR	X	X	X	O	X	X	X	X	X	X	O	X
KNOCK SENSOR	X	X	X	X	X	X	X	X	X	X	O	X
ELECTRICAL LOAD CONTROL UNIT	X	X	X	O	X	X	X	X	X	X	X	X
P/S PRESSURE SWITCH	X	X	X	O	X	X	X	X	X	X	X	X
A/C SWITCH	X	X	X	O	X	X	X	X	X	O	X	X
IGNITION SWITCH (STA POSITION)	O	O	X	O	O	X	X	O	X	X	O	X
NEUTRAL AND CLUTCH SWITCH	O	X	X	O	X	X	X	X	X	X	X	X
INTAKE AIR THERMO SENSOR	X	X	X	X	X	X	X	O	X	X	X	X
WATER THERMO SENSOR	O	X	X	O	X	X	X	O	X	X	O	O
IDLE SWITCH	O	X	X	O	X	X	X	O	X	X	O	X
VARIABLE RESISTOR (IN AIR FLOW SENSOR)	O	X	X	X	X	X	X	X	X	X	X	X
AIR FLOW SENSOR	O	X	X	X	X	X	X	X	X	X	O	O
Ne SIGNAL	O	O	X	O	O	X	X	O	O	X	O	O
G SIGNAL	X	O	X	X	X	X	X	X	X	X	X	X

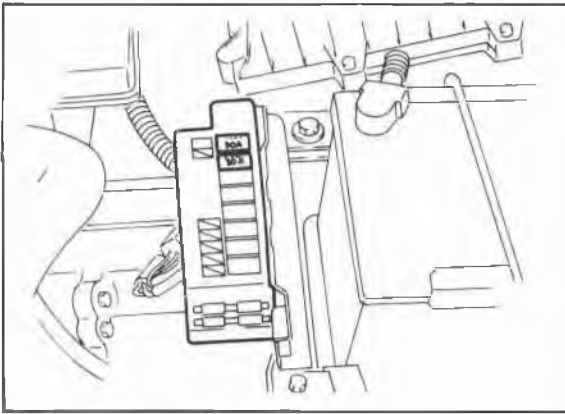
ENGINE CONDITION		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELE- RATION	HEAVY LOAD	DECELE- RATION	IDLE (THROTTLE VALVE FULLY CLOSED)	IGN: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
OUTPUT DEVICE											
INJECTOR	FUEL INJECTION AMOUNT	Rich		Rich and lean		Rich		*Fuel cut	Rich and lean	No injection	* Above 7,000 rpm: fuel cut
	FUEL INJECTION TIMING	1 group (twice per revolution)	Sequential (once per two revolutions)					*Fuel cut	Sequential (once per two revolutions)	No injection	
BAC VALVE	AIR VALVE	*Open			Closed						*Coolant temp.: below 50°C (122°F)
	ISC VALVE	Large amount of bypass air		Small amount of bypass air					No bypass		
CONTROL RELAY	FUEL PUMP CONTROL	ON (main fuel pump operates)								OFF (main fuel pump not operated)	
	MAIN POWER CONTROL	ON									
SOLENOID VALVE (No.1 PURGE)		*OFF (1st stage not operated)			ON (1st stage operates)						
SOLENOID VALVE (NO.2 PURGE)		*1 OFF (2nd stage not operated)			*2 ON (2nd stage operates)			OFF			*1 Coolant temp: below 70°C (158°F) *2 Engine speed above 1,700 rpm *3 Engine speed: 1,500—3,500 rpm
SOLENOID VALVE (EGR)		*1 ON (EGR cut)			*3 OFF (EGR)	ON (EGR cut)	*3 OFF (EGR)	ON (EGR cut)			
SOLENOID VALVE (PRESSURE REGU- LATOR CONTROL)		OFF (Vacuum to pressure regulator)							*After start- ing: ON (Vacuum cut)	OFF	* During hot start only
SOLENOID VALVE (VARIABLE INER- TIA CONTROL)		OFF		*ON (Vacuum to shutter valve actuator)				OFF		* Engine speed: above 5,200 rpm	
OXYGEN SENSOR RELAY		ON		*OFF(current to oxygen sensor relay)				ON		*Engine speed: above 3,000 rpm	
A/C RELAY		OFF		*ON						*Delays 0.5 second	
IGNITER		Fixed at BTDC 6°	Fixed at BTDC 12°	Advanced: depends on engine conditions					—		
AIR FLOW SENSOR (BURN-OFF)		OFF (Burn-off does not function)									

ENGINE CONDITION  OUTPUT DEVICE		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELE- RATION	HEAVY LOAD	DECELE- RATION	IDLE (THROTTLE VALVE FULLY CLOSED)	IGN: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
INJECTOR	FUEL INJECTION AMOUNT	Rich		Normal	Rich		*Fuel cut	Rich	No injection	Above 7,000 rpm: fuel cut	
	FUEL INJECTION TIMING	1 group (twice per revolution)	Sequential (once per two revolutions)					Sequential (once per two revolutions)			
BAC VALVE	AIR VALVE	*Open			Closed				*Coolant temp.: below 50° (122°F)		
	ISC VALVE	Large amount of bypass air		Small amount of bypass air				No bypass			
CONTROL RELAY	FUEL PUMP CONTROL	ON (main fuel pump operates)							OFF (main fuel pump not operated)		
	MAIN POWER CONTROL	ON									
SOLENOID VALVE (PRESSURE REGU- LATOR CONTROL)		OFF(Vacuum to pressure regulator)						*After start- ing: ON (vacuum cut)	OFF	* During hot starting only	
SOLENOID VALVE (VARIABLE INER- TIA CONTROL)		OFF	*ON (Vacuum to shutter valve actuator.)				OFF	* Engine speed: above 5,400 rpm			
A/C RELAY		OFF	*ON						*Delays 0.5 seconds		
IGNITER		Fixed at BTDC 6°	Fixed at BTDC 12°	Advanced: depends on engine conditions				—			
AIR FLOW SENSOR (BURN-OFF)		OFF (Burn-off does not function)									

Output Devices and Engine Conditions (Leaded fuel)

CONTROL SYSTEM 4C

# 4C CONTROL SYSTEM

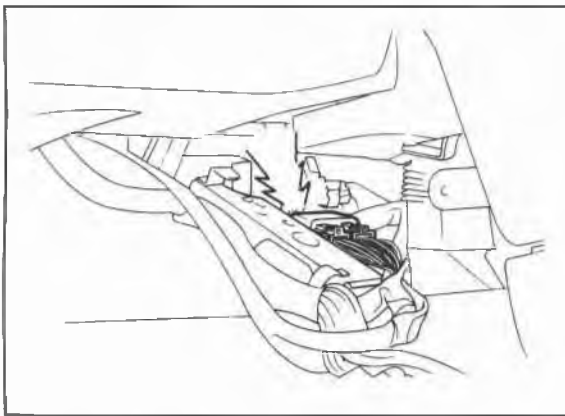


69G04A-161

## EGI MAIN FUSE

### Inspection

Check the continuity of EGI main fuse.



76G04C-171

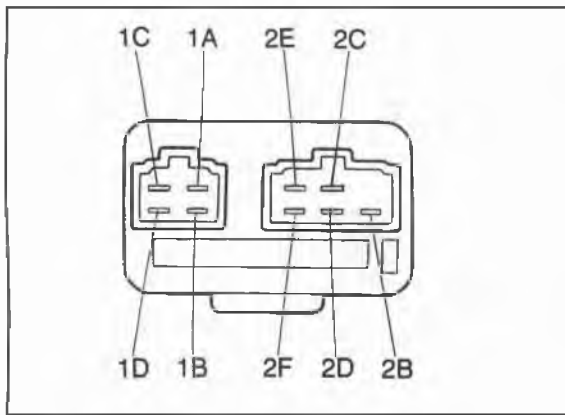
## CONTROL RELAY

### Power Supply Circuit

1. Check that a "clicking" sound is heard at the control relay when turning the ignition switch ON and OFF.

### Note

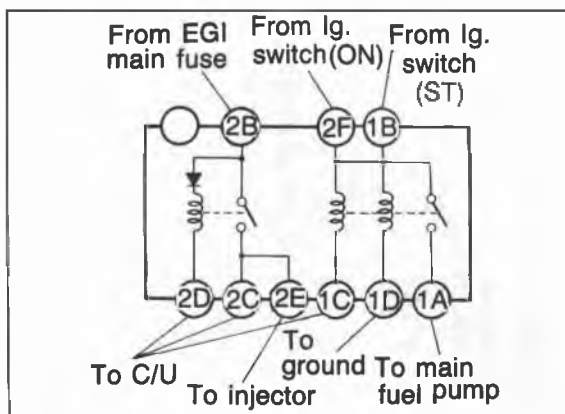
The control relay is located under the center console.



76G04C-172

2. Apply 12V to the 2B terminal and ground the 2D terminal of the control relay.  
3. Check voltage at the terminals with a voltmeter.

2D terminal \ Terminals	Grounded	Not grounded
2C	12V	0V
2E	12V	0V

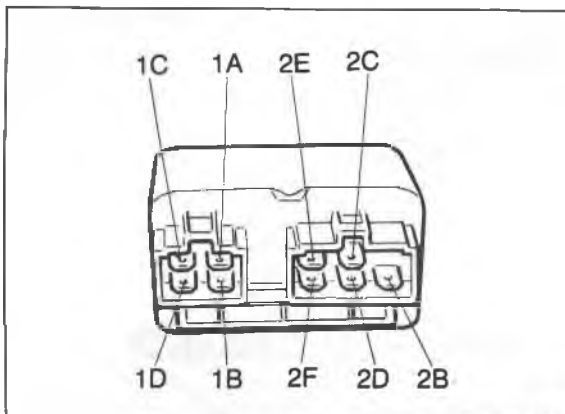


76G04C-173

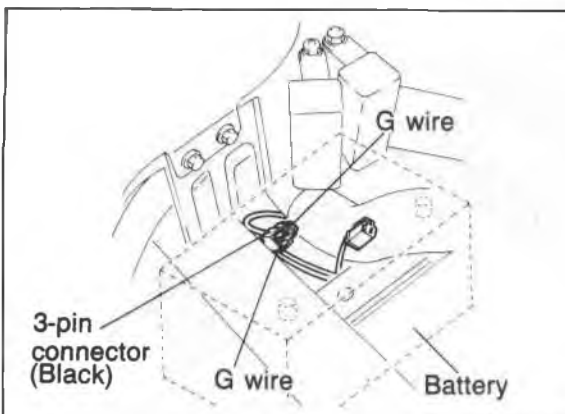
## Fuel Pump Circuit

1. Apply 12V and a ground to the terminals described below and check the terminals with an ohmmeter or voltmeter.

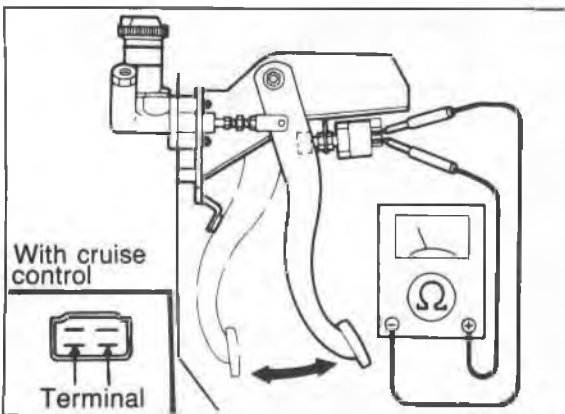
Terminal applied 12V	Terminal grounded	Terminal checked	Correct condition
1B	1D	2F-1A	Continuity
2F	1C	1A	Approx. 12V



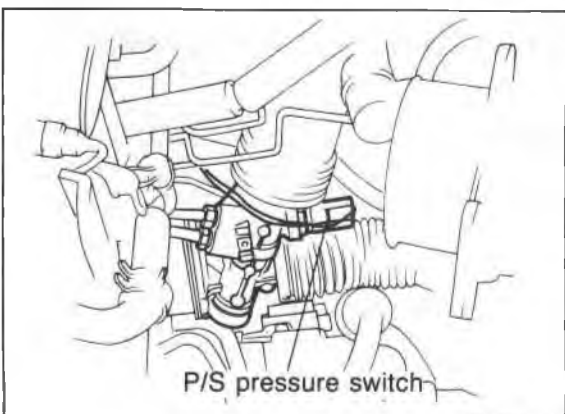
76G04C-174



76G04C-175



76G04C-176



76G04C-177

## Resistance

Check resistance between the terminals with an ohmmeter.

Between terminals	Resistance ( $\Omega$ )
1B $\leftrightarrow$ 1D	More than approx. 20
2F $\leftrightarrow$ 1C	More than approx. 60
2F $\leftrightarrow$ 1A	$\infty$
2B $\leftrightarrow$ 2D	More than approx. 60
2B $\leftrightarrow$ 2C	$\infty$

## NEUTRAL SWITCH

### Inspection

1. Disconnect the neutral switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Transmission	Continuity
In neutral	No
In other ranges	Yes

4. Reconnect the switch connector.

### Note

Refer to Section 7A for replacement of the neutral switch.

## CLUTCH SWITCH

### Inspection

1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Pedal	Continuity
Depressed	No
Released	Yes

4. Reconnect the switch connector.

### Note

Refer to Section 6 for replacement of the clutch switch.

## P/S PRESSURE SWITCH

### Inspection

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the switch.
3. Start the engine. Check continuity of the switch while turning the steering wheel at idle.

P/S	Continuity
Turning	Yes
Not turning	No

4. Reconnect the switch connector.

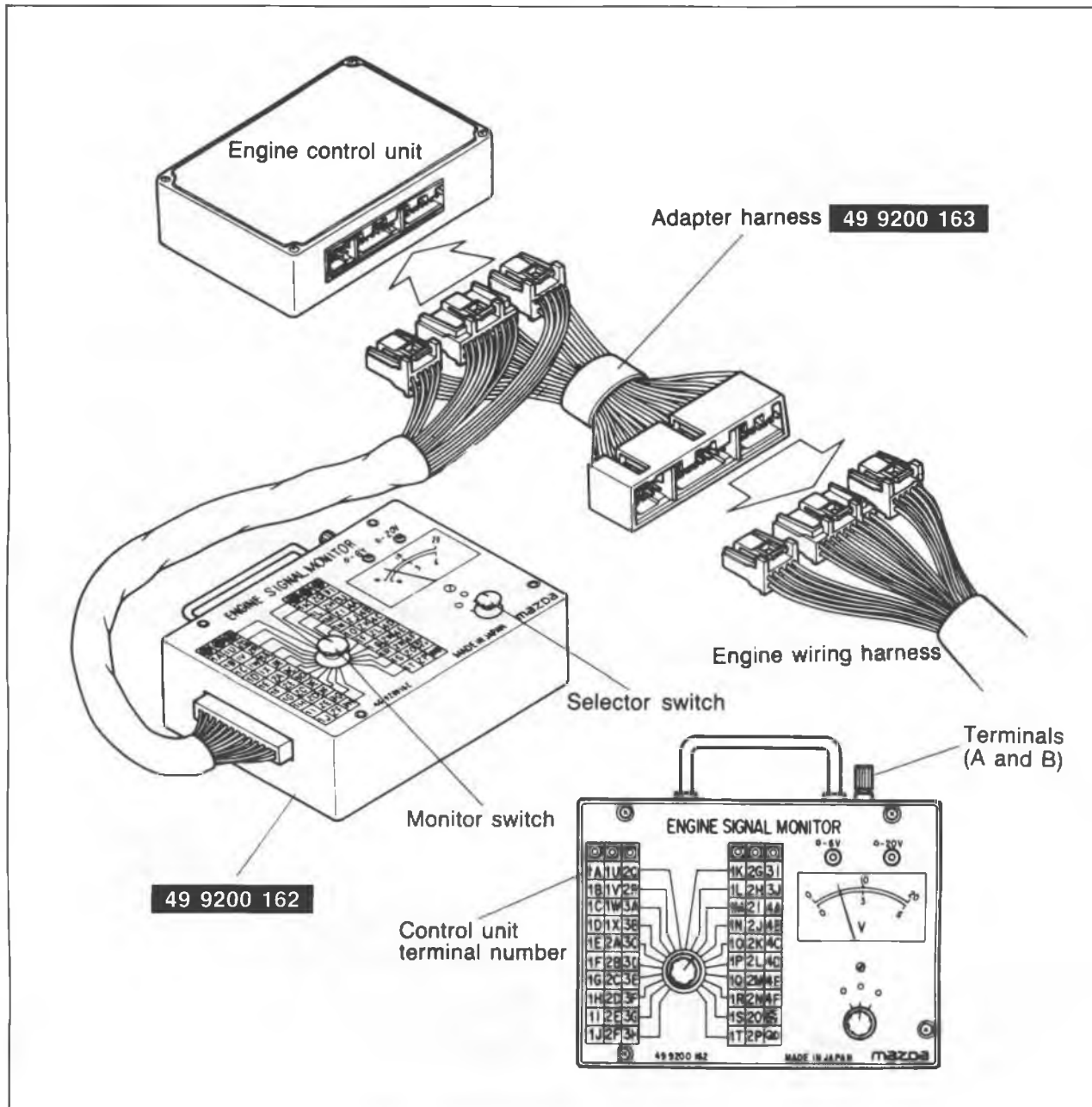
### Note

Refer to Section 10 for replacement of the P/S pressure switch.

# 4C CONTROL SYSTEM

## ENGINE CONTROL UNIT

Engine Signal Monitor (49 9200 162) and Adapter (49 9200 163).



76G04C-178

The **Engine Signal Monitor** (49 9200 162) is used to check the control unit terminal voltages.

### How to Use the Engine Signal Monitor

1. Connect the **Engine Signal Monitor** (49 9200 162) between the engine control unit and the engine harness using the **adapter** (49 9200 163).
2. Turn the selector switch and monitor switch to select the terminal number.
3. Check the terminal voltage.

### Caution

**Never apply voltage to terminals A and B.**

## Terminal Voltage

If the input and output devices wiring are normal, but the engine control unit terminal voltage is incorrect, replace the engine control unit.

Terminal	Input	Output	Connection to	Voltage (After warming-up)		Remark
				Ign: ON	Idle	
1A	—	—	—	—	—	—
1B		○	Self-Diagnosis Checker (Code No.)	For 3sec. after ignition switch OFF → ON: below 2.5V (Buzzer sounds) After 3sec.: approx. 12V (Buzzer does not sound)		<ul style="list-style-type: none"> <li>Using Self-Diagnosis Checker and test connector grounded</li> <li>Buzzer sounds: below 2.5V</li> <li>Buzzer does not sound: approx. 12V</li> </ul>
1C		○	Solenoid valve (Variable inertia control)	Approx. 12V		Above 5200 rpm (Unleaded fuel) or 5400 rpm (Leaded fuel): Below 2.5V
1D		○	Self-Diagnosis Checker (Monitor lamp)	For 3sec. after ignition switch OFF → ON: approx. 5V (light illuminates) After 3sec.: approx. 12V (light does not illuminate)	(Test connector grounded) approx. 5V (Test connector not grounded) Monitor lamp ON: approx. 5V Monitor lamp OFF: approx. 12V	With Self-Diagnosis Checker
1E	○		Idle switch	Accelerator pedal released: 0V Accelerator pedal depressed: approx. 12V		
1F		○	A/C relay	A/C switch ON: below 2.5V A/C switch OFF: approx. 12V		Blower motor ON
1G	○		Neutral or clutch switch	In-gear condition Clutch pedal depressed: approx. 12V Clutch pedal released: 0V		MTX (Neutral: constant approx. 12V)
1H (U/F)	○		Water thermo switch	Approx. 12V		Radiator temp.: below 17°C (63°F)
				0V		Radiator temp.: above 17°C (63°F)
1I	○		Electrical load control unit	E/L switch ON: below 2.5V E/L switch OFF: approx. 10—12V		Electrical load: Rear defroster switch Headlight switch Blower motor switch (3rd & 4th position) Electrical fan switch
1J	—	—	—	—	—	—
1K	○		P/S pressure switch	Constant approx. 12V	P/S ON: below 2.5V P/S OFF: approx. 12V	
1L	○		A/C switch	A/C switch ON: below 2.5V A/C switch OFF: approx. 12V		Blower motor: ON
1M	○		Distributor (Ne signal)	0V or 5V	Approx. 2.0V	
1N	○		Distributor (G signal)	0V or 5V	Approx. 1.2V	

### Note

Terminals labeled "U/F" are only for unleaded fuel.



# 4C CONTROL SYSTEM

Terminal	Input	Output	Connection to	Voltage (After warming-up)		Remark
				Ign: ON	Idle	
1O		○	Air flow sensor (Burn-off control)	Below 2.5V		White burning off: Approx. 8—12V
1P		○	Control relay (Power supply circuit)	Below 2.5V		Ignition switch OFF: Approx. 12V
1Q		○	Control relay (Fuel pump circuit)	Approx. 12V	Below 2.5V	
1R (L/F)	○		Knock sensor	0V or 2—7V		While knocking: Approx. 0.001
1S	—	—	—	—		—
1T	○		Ignition switch (ON position)	Approx. 12V		
1U	—	—	—	—		—
1V	—	—	—	—		—
1W	○		Test connector	Test connector grounded: 0V Test connector not grounded: approx. 12V		Green connector, 1-pin
1X		○	Igniter	Approx. 12V	*Approx. 1V	*Engine Signal Monitor: green and red lights flash
2A (U/F)		○	V ref	4.5—5.5V		
2B	○		Air flow sensor (Ground)	0V		
2C	—	—	Ground (E2)	0V		
2D (U/F)	○		Oxygen sensor	0V	0—1.0V	<ul style="list-style-type: none"> <li>• Cold engine: 0V at idle</li> <li>• After warming-up: Increase engine speed: 0.7—1.0V Deceleration: 0—0.2V</li> </ul>
2E	○		Air flow sensor (Intake air mass)	1.0—1.6V	1.7—2.3V	Increase engine speed: voltage increases
2F	—	—	—	—		—
2G (U/F)	○		Throttle sensor	Accelerator pedal released: approx. 0.5V		Max. voltage (Throttle valve fully opened): approx. .4.3V
2H (L/F)	○		Air flow sensor (Variable resistor)	0—5V		Depends on adjustment
2I	○		Water thermo sensor	Approx. 0.4V		Engine coolant temp. 20°C (68°F): approx. 2.5
2J	○		Intake air thermo sensor (Dynamic chamber)	Approx. 2.5V at 20°C (68°F)		
2K		○	Solenoid valve (Pressure regulator control)	For 120 sec. after ignition switch OFF → ON: below 2.5V	For 120. sec after starting: below 2.5V	During hot condition: Coolant temp. above 70°C (158°F) Intake air temp. above 30°C (86°F) ...Unleaded fuel above 50°C (122°F) ...Leaded fuel
				Approx. 12V		
2L	—	—	—	—		—

## Note

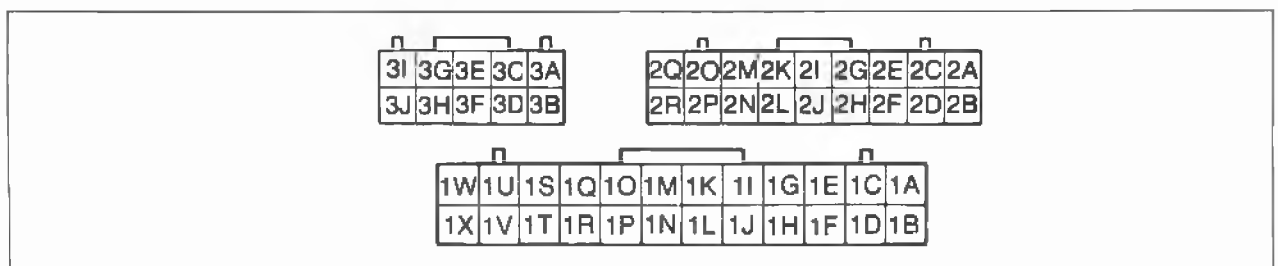
- a) Terminal labeled "U/F" are only for unleaded fuel.  
 b) Terminal labeled "L/F" are only for leaded fuel.

Terminal	Input	Output	Connection to	Voltage (After warming-up)		Remark
				Ign: ON	Idle	
2M (U/F)		○	Oxygen sensor heater	Below 2.5V		Above 3000 rpm: Approx. 12V
2N (U/F)		○	Solenoid valve (EGR)	Below 2.5V		<ul style="list-style-type: none"> <li>Radiator temp. below 17°C (62.6°F) or coolant temp. below 70°C (158°F): constant below 2.5V</li> <li>1,500—3,500 rpm: approx. 12V</li> </ul>
2O (U/F)		○	Solenoid valve (No.2 purge control)	Approx. 12V		<ul style="list-style-type: none"> <li>Coolant temp. below 75°C (167°F): constant approx. 12V</li> <li>During medium and high load of above 1,700 rpm: below 2.5V</li> </ul>
2P (U/F)		○	Solenoid valve (No.1 purge control)	Below 2.5V		Coolant temp. below 70°C (158°F): approx. 12V
2Q		○	Solenoid valve (Idle speed control)	Approx. 9—11V		
2R	—	—	Ground (E02)	0V		
3A	—	—	Ground (E01)	0V		
3B	○		Ignition switch (Start position)	Below 2.5V		While cranking: approx. 10V
3C		○	Injector (No.2)	Approx. 12V	*1 Approx. 12V	*1 Engine Signal Monitor green and red lights flash
3D	—	—	—	—		—
3E		○	Injector (No.1)	Approx. 12V	*1 Approx. 12V	*1 Engine Signal Monitor: gree and red lights flash
3F		○	Injector (No.4)	Approx. 12V	*1 Approx. 12V	*1 Engine Signal Monitor: gree and red lights flash
3G	—	—	Ground (E1)	0V		
3H		○	Injector (No.3)	Approx. 12V	*Approx. 12V	*1 Engine Signal Monitor: green and red lights flash
3I	○	—	Control relay	Approx. 12V		
3J	—	—	Battery	Approx. 12V		For back-up

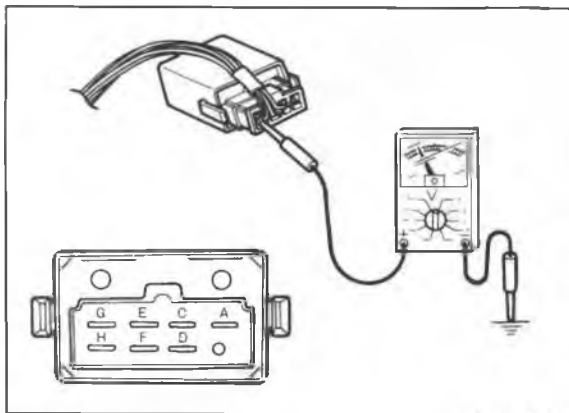
76G04C-179

**Note**  
Terminals labeled "U/F" are only for unleaded fuel.

### Terminal Location



# 4C CONTROL SYSTEM



76G04C-180

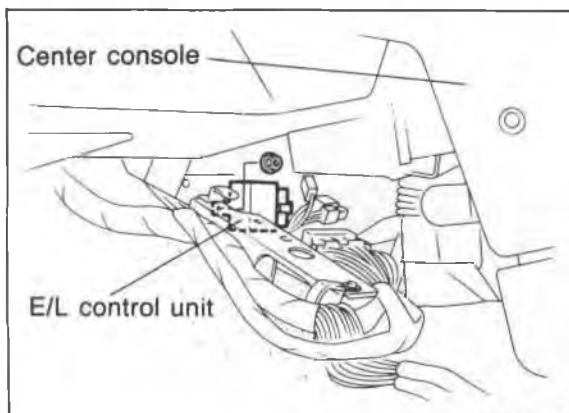
## E/L CONTROL UNIT

### Inspection

1. Connect a voltmeter between the E/L control unit and a ground.
2. Start the engine and check the terminal voltages as described below.

Terminal	Input	Output	Connection to	Voltage (after warm-up)		Remarks
				Ignition switch: ON	Idle	
A (BW)	—	—	Ignition switch	Approx. 12V		
B	—	—	—	—	—	—
C (B)	—	—	Ground	0V		
D (LY)	○		Electrical fan relay	Approx. 12V		Coolant temp.: below 97°C (207°F)
				Below 1.5V		Coolant temp.: above 97°C (207°F)
E (GY)	○		Control unit (1I)	0V		E/L: ON
				Approx. 12V		E/L: OFF
F (W)	○		Headlight switch	Approx. 12V		Headlight switch: ON
				Below 1.5V		Headlight switch: OFF
G (LB)	○		Blower motor switch	Below 1.5V		Blower motor switch: ON (3rd or 4th position)
				Approx. 5V		Others
H (BL)	○		Rear defroster switch	Below 1.5V		Rear defroster switch: ON
				Approx. 12V		Rear defroster switch: OFF

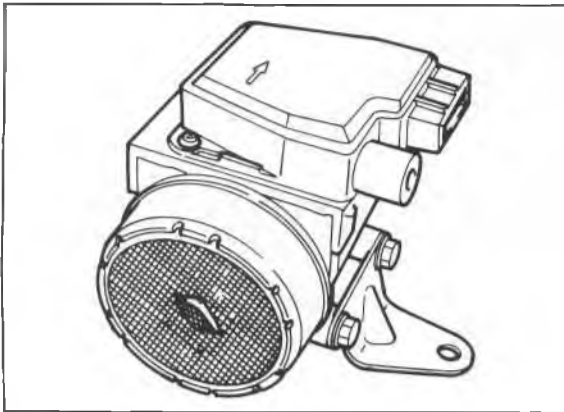
76G04C-181



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### Replacement

1. Replace the E/L control unit.
2. Install in the reverse order of removal.

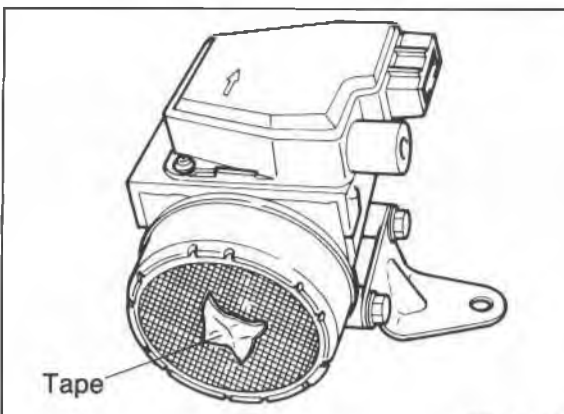


76G04C-183

## AIR FLOW SENSOR

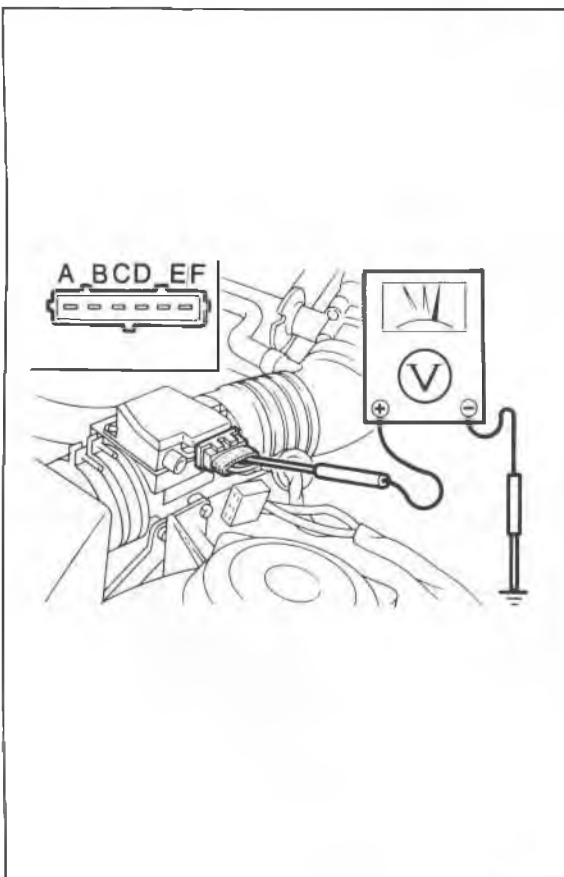
### Visual Inspection

1. Remove the air hose.
2. Check the air flow sensor visually for the following:
  - a) Torn protection net (air cleaner side)



76G04C-184

- b) Restricted protection net



76G04C-185

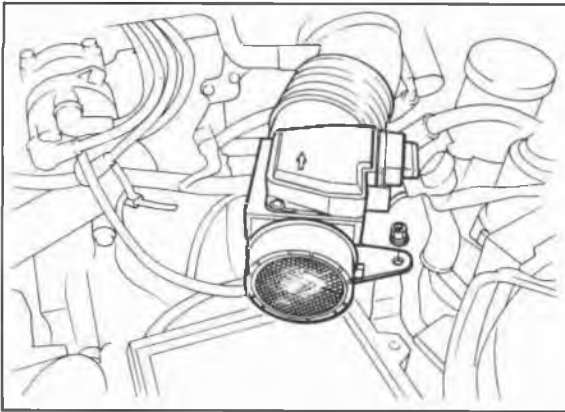
### Output Voltage Inspection

1. Remove the rubber boot from the air flow sensor connector.
2. Check terminal voltage with a voltmeter.

Terminal	Condition	
	Ign. switch:ON	Engine running
A (Idle mixture)	0—5V	
B (Power supply)	Approx. 12V	
C (Burn-off)	0V	
D (Air flow mass)	1.0—1.6V	1.7V—5V
E (Ground)	0V	
F (Ground)	0V	

6. If not correct, check the wiring harness for an open or short circuit
7. If the wiring harness is OK, replace the air flow sensor.

# 4C CONTROL SYSTEM



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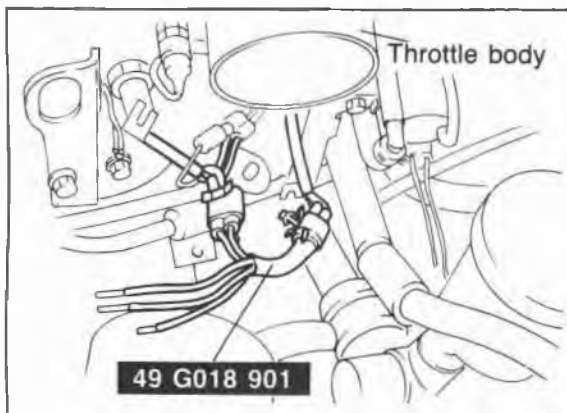
## Replacement

1. Disconnect the connector.
2. Loosen the air hose clamps.
3. Replace the air flow sensor.

## Caution

**Install the air flow sensor so that the arrow on the sensor aligns with air flow direction.**

4. Tighten the hose clamps.
5. Reconnect the connector to the sensor.



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## THROTTLE SENSOR

## Caution

**Use a precision voltmeter with a scale of 0.01V to inspect or adjust the throttle sensor. If it is not available, replace the throttle sensor and throttle body as an assembly.**

## Inspection

1. Disconnect the throttle sensor connector (3-pin).
2. Connect the **SST** between the throttle sensor and the wiring harness.
3. Turn the ignition switch ON.

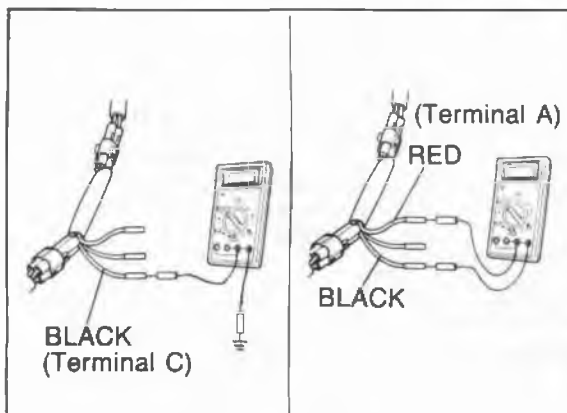
4. Measure **BLACK** and **RED** wire voltages.

## Specifications:

**BLACK—Approx. 0V**

**RED—4.5—5.5V**

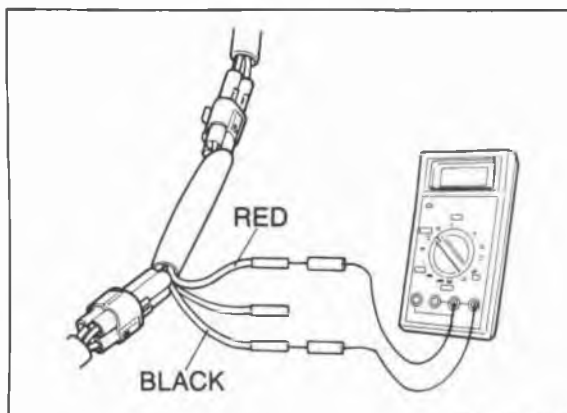
5. If not correct, check the battery voltage and wiring harness. If these are OK, replace the engine control unit.



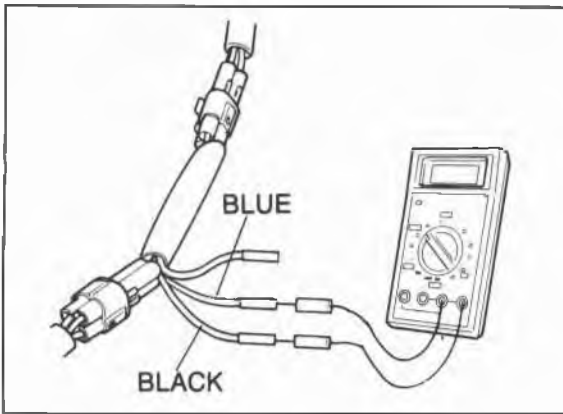
76G04C-189

6. Using the RED wire voltage as a guide, find the specified BLUE wire voltage ranges in the table.

RED wire voltage	Specified range (V)	
	Fully close	Fully open
4.90—4.99V	0.40—0.58	3.90—4.60
5.00—5.09V	0.41—0.60	3.97—4.70
5.10—5.19V	0.42—0.61	4.05—4.79

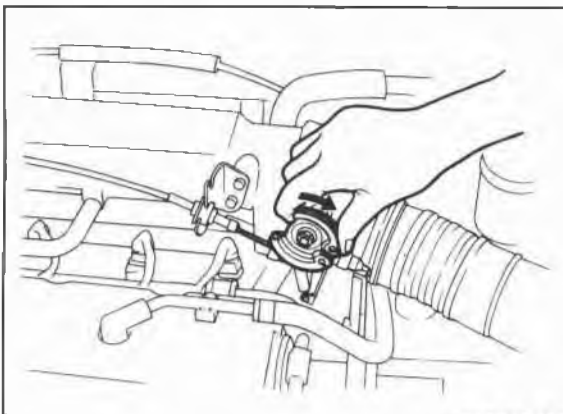


76G04C-109



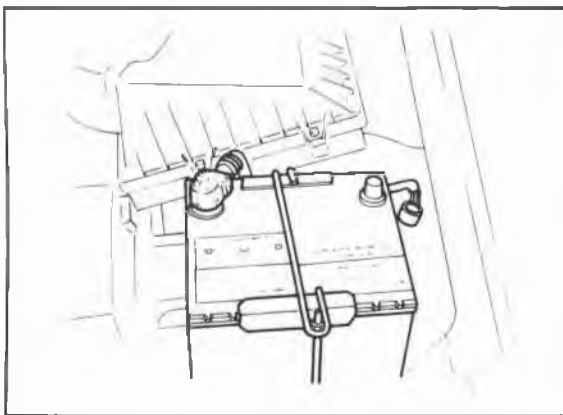
76G04C-191

7. Make sure that the throttle valve is fully closed.
8. Check that the **BLUE** wire voltage is within the specified range.
9. Adjust the throttle sensor if necessary



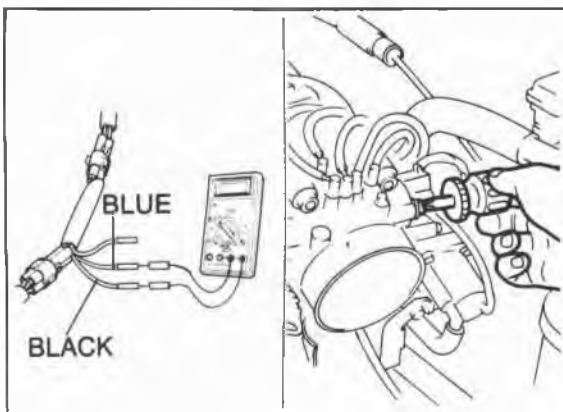
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10. Open the throttle valve fully.
11. Check that **BLUE** wire voltage is within the specified range.
12. If not correct, replace the throttle sensor.



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13. Turn the ignition switch OFF.
14. Disconnect the SST and reconnect the throttle sensor connector.
15. Disconnect the negative battery terminal and depress the brake pedal for **5 seconds** to eliminate the malfunction memory from the control unit.

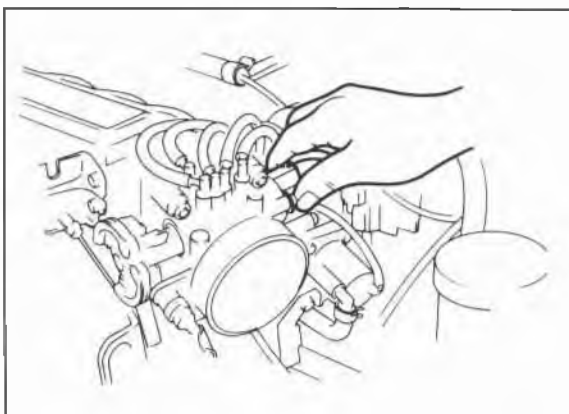


76G04C-194

### Adjustment

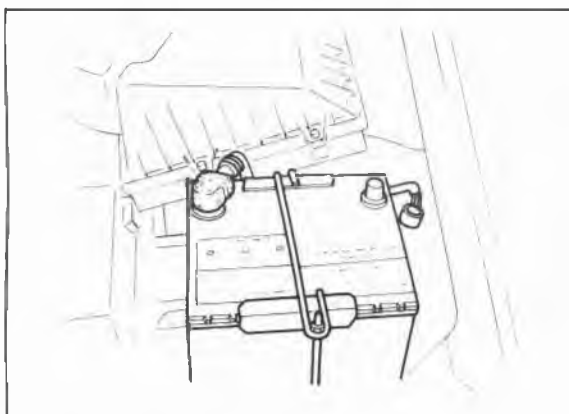
1. Perform steps 1 to 7 in the inspection procedure.
2. Connect the voltmeter to the **BLUE** wire.
3. Loosen the throttle sensor mounting screw.

# 4C CONTROL SYSTEM



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4. Make sure that the throttle valve is fully closed.
5. Turn the throttle sensor so that the **BLUE** wire voltage indicates within the specified closed range.
6. Tighten the throttle sensor mounting screw.
7. Recheck that the **BLUE** wire voltage is within the specified range.



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8. Turn the ignition switch OFF.
9. Disconnect the SST and reconnect the throttle sensor connector.
10. Disconnect the negative battery terminal and depress the brake pedal for **5 seconds** to eliminate the from the malfunction memory from the control unit.



76G04C-197

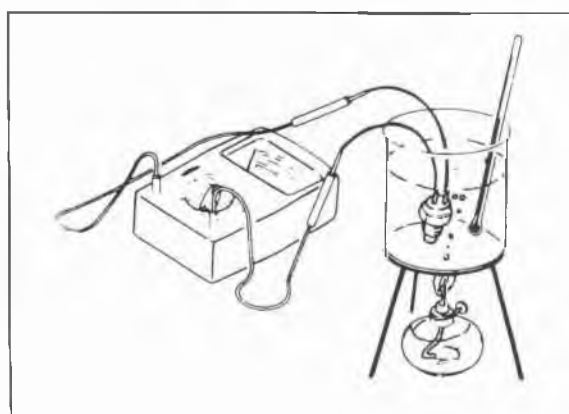
## IDLE SWITCH

### Inspection

1. Disconnect the idle switch connector.
2. Check continuity between the switch and a ground.

Throttle valve condition	Continuity
Fully closed	Yes
Open	No

3. If not correct, check condition of the wiring harness of the idle switch. Replace the idle switch and throttle body as an assembly, if necessary.



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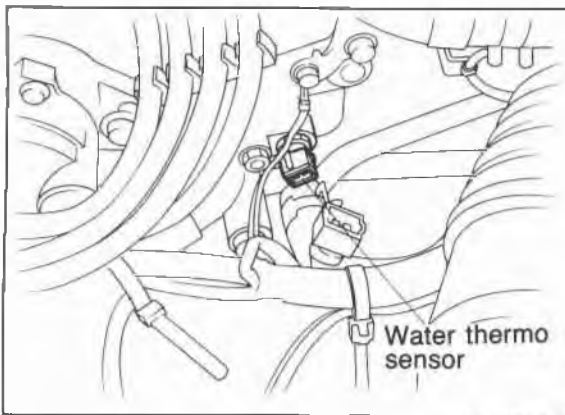
## WATER THERMO SWITCH

### Inspection

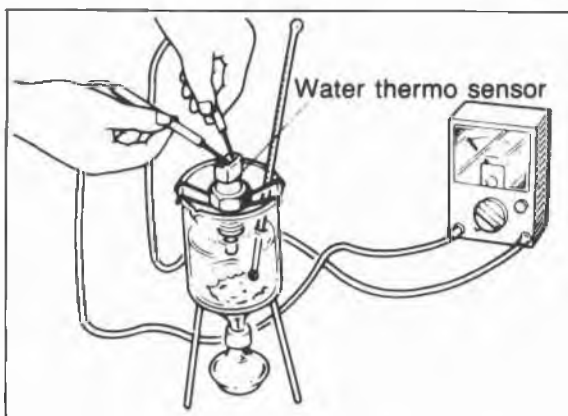
1. Remove the switch from the radiator.
2. Place the switch in water with a thermometer and heat the water gradually.
3. Check for continuity of the switch with an ohmmeter.

Coolant temp.	Continuity
More than approx. 17°C (63°F)	Yes
Less than approx. 10°C (63°F)	No

4. If not correct, replace the water thermo switch.



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86U04A-203

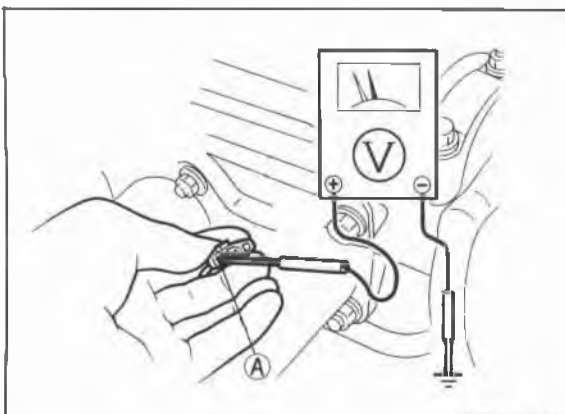
## WATER THERMO SENSOR

### Inspection

1. Remove the water thermo sensor.
2. Place the sensor in water with a thermometer and heat the water gradually.
3. Check resistance of the sensor with an ohmmeter.

Coolant	Resistance
-20°C ( -4°F)	14.5—17.8 kΩ
20°C ( 68°F)	2.2—2.7 kΩ
40°C (104°F)	1.0—1.3 kΩ
60°C (140°F)	500—640 Ω
80°C (176°F)	280—350 Ω

4. If not correct, replace the water thermo sensor.

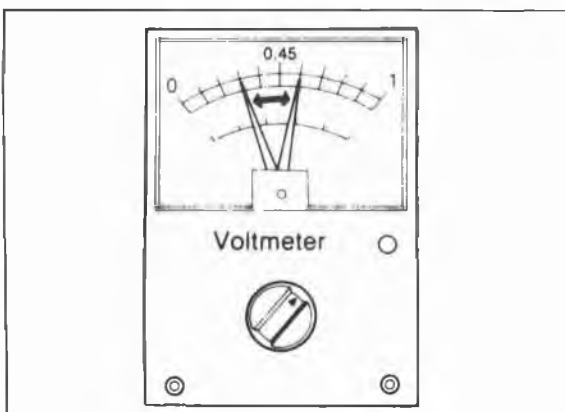


76G04C-200

## OXYGEN SENSOR

### Inspection of Output Voltage

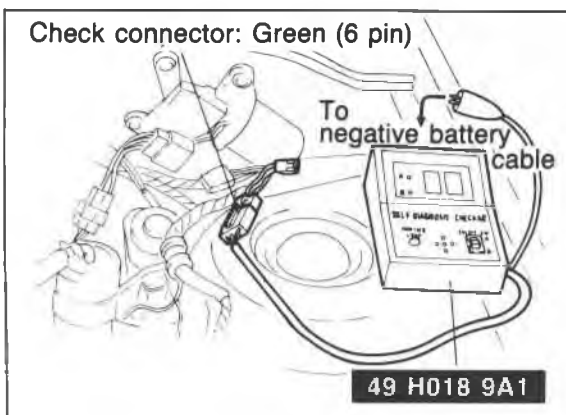
1. Warm up the engine and run it at idle.
2. Disconnect the oxygen sensor connector.
3. Connect a voltmeter between the oxygen sensor and a ground.
4. Run the engine at **4,500 rpm** until the voltmeter indicates **approx. 0.7V**.
5. Increase and decrease the engine speed suddenly several times. Check to see that when the speed is increased the meter reads between **0.5V—1.0V**, and when the speed is decreased it reads between **0V—0.4V**.
6. If the voltmeter doesn't indicate as specified, replace the oxygen sensor.



86U04A-206



## 4C CONTROL SYSTEM



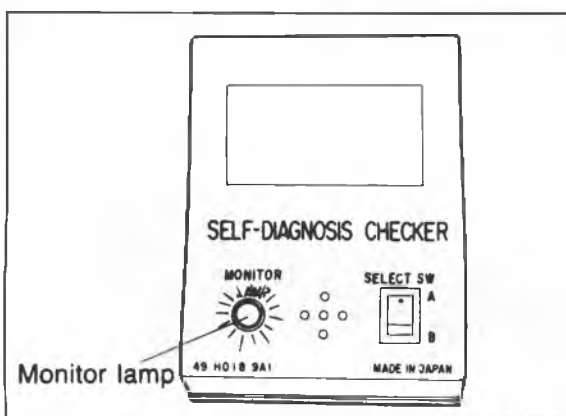
76G04C-213

### Inspection of Sensitivity

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect the **SST** to the check connector.

#### Note

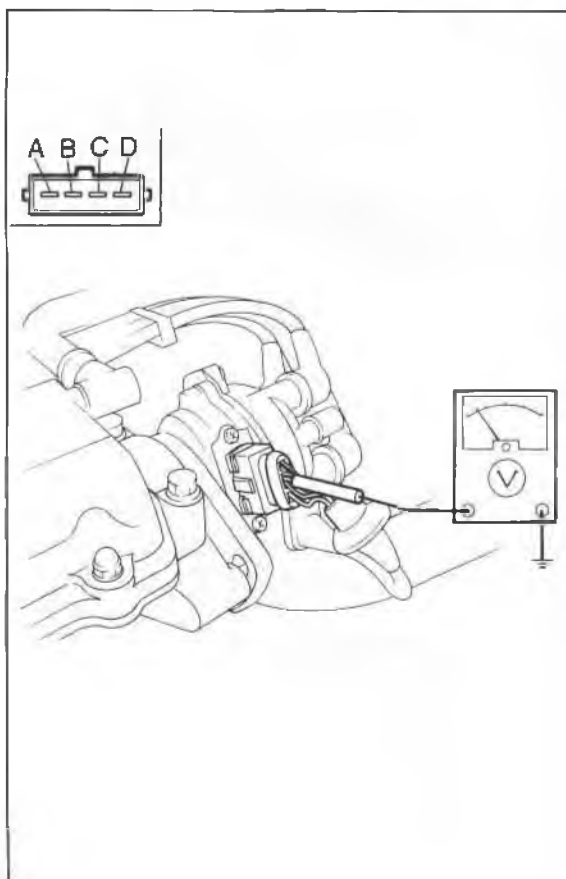
**Digital code checker (49 G018 9A0) can be used.**



86U04A-208

3. Increase the engine speed to between **2,000 and 3,000 rpm**, and check that the monitor lamp flashes for 10 seconds.

**Monitor lamp: Flashes ON and OFF more than 8 times/10 sec**



76G04C-201

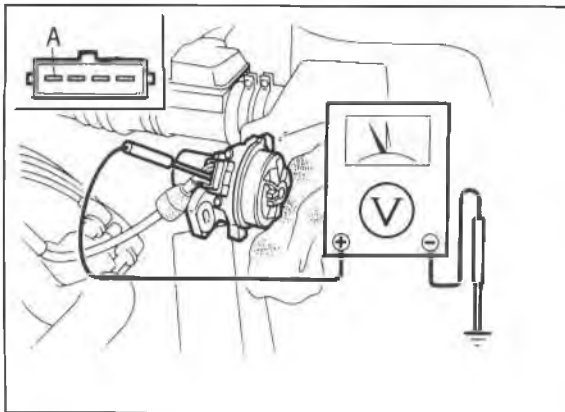
### DISTRIBUTOR

#### On-vehicle Inspection

1. Remove the rubber boot from the distributor connector.
2. Run the engine at idle.
3. Check terminal voltage with a voltmeter.

Terminal	Voltage
A (G signal)	1.0—2.4
B (Ne signal)	1.8—2.2
C (Power supply)	Approx. 12V
D (Ground)	0V

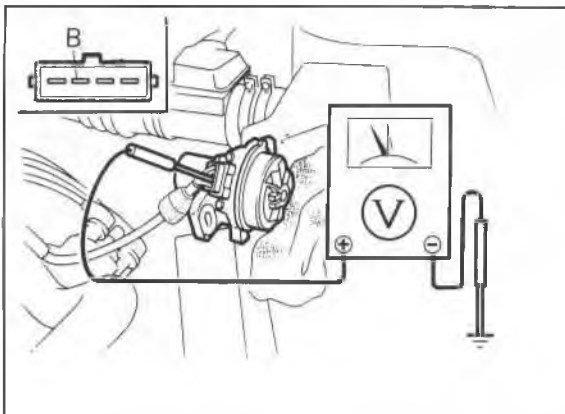
4. If not correct, check the wiring harness for an open or short circuit, then check the distributor for G signal or Ne signal.



76G04C-203

### G Signal Inspection

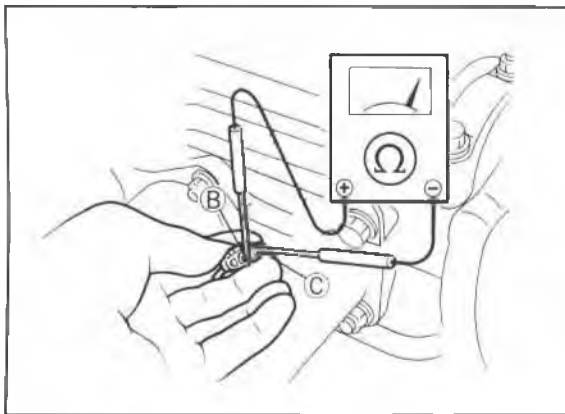
1. Remove the distributor. (Refer to section 5.)
2. Reconnect the distributor to the wiring harness.
3. Remove the rubber boot from the distributor connector.
4. Connect a volt meter between the A terminal and a ground.
5. Turn the shaft and check that the distributor generates one pulse signal I per one turn.



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### Ne signal Inspection

1. Remove the distributor. (Refer to Section 5.)
2. Reconnect the distributor to the wiring harness.
3. Remove the rubber boot from the distributor connector.
4. Connect a voltmeter between the B terminal and a ground.
5. Turn the shaft and check that the distributor generates four pulse signals per one turn.

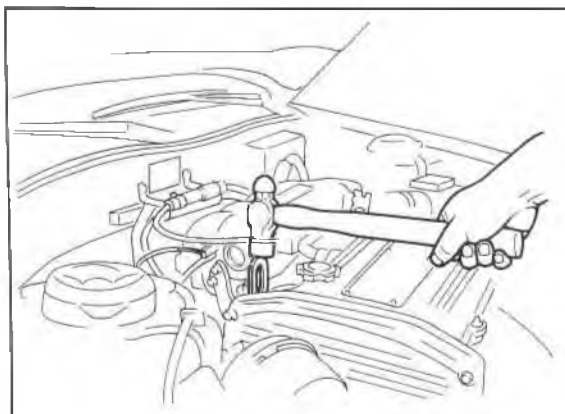


76G04C-205

### Oxygen Sensor Heater

1. Disconnect the oxygen sensor connector.
2. Check resistance between terminals B and C.

**Specification: approx. 6  $\Omega$**

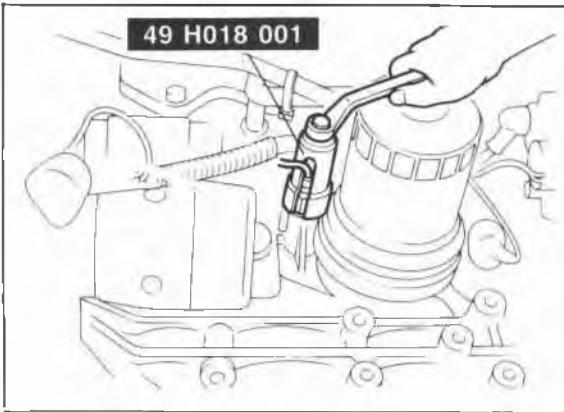


76G04C-206

### Knock Sensor (Leaded fuel)

1. Warm up the engine and run it at idle.
2. Ground the test connector (Green, 1-pin) with a jumper wire.
3. Tap the engine hanger with a hammer and verify that the ignition timing retards.
4. If not correct, check the knock sensor.

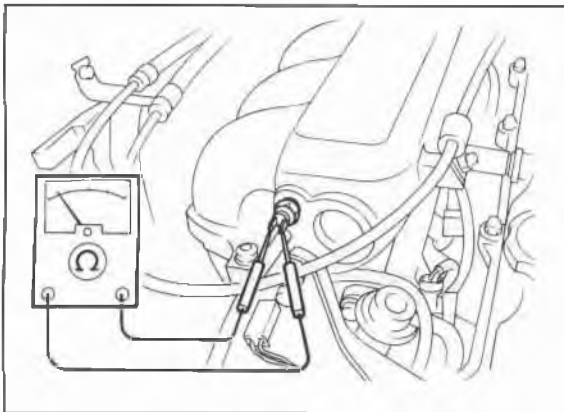
# 4C CONTROL SYSTEM



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## Replacement

1. Disconnect the knock sensor connector.
2. Lift the vehicle and remove the intake manifold bracket.
3. Remove the knock sensor with the **SST**.
4. Install the knock sensor in the reverse order of removal.



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## INTAKE AIR THERMO SENSOR (DYNAMIC CHAMBER)

### Inspection

1. Disconnect the intake air thermo sensor connector.
2. Connect an ohmmeter to the sensor terminals.
3. Check the resistance of the sensor.

Temperature	Resistance (k $\Omega$ )
20°C (68°F)	29.7—36.3
50°C (122°F)	8.4—10.2
85°C (185°F)	2.5—3.1

4. Reconnect the sensor connector.

### Replacement

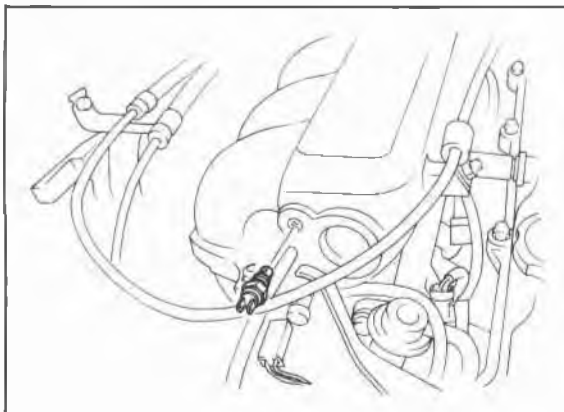
1. Disconnect the intake air thermo sensor connector.
2. Remove the sensor.
3. Install the sensor.

### Note

When installing the sensor, tighten to the specified torque.

### Specified torque:

6.9—8.8 N·m (0.7—0.9 m·kg, 72 in·lb)



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# FUEL AND EMISSION CONTROL SYSTEM (DIESEL)

<b>OUTLINE</b> .....	4D— 2
SPECIFICATIONS.....	4D— 2
<b>TROUBLESHOOTING GUIDE</b> .....	4D— 3
<b>ON-VEHICLE MAINTENANCE</b> .....	4D— 4
AIR CLEANER ELEMENT.....	4D— 4
WATER DRAINING .....	4D— 4
AIR BLEEDING .....	4D— 4
INJECTION TIMING .....	4D— 5
IDLE SPEED .....	4D— 6
EXHAUST SMOKE .....	4D— 6
<b>INTAKE AIR SYSTEM</b> .....	4D— 7
STRUCTURAL VIEW.....	4D— 7
AIR DUCT AND AIR CLEANER.....	4D— 8
INTAKE MANIFOLD .....	4D— 9
<b>SUPERCHARGING SYSTEM (RF-CX)</b> .....	4D—10
TROUBLESHOOTING GUIDE.....	4D—10
ON-VEHICLE INSPECTION.....	4D—11
COMPRES SUPERCHARGER .....	4D—13
STARTING VALVE .....	4D—15
INTERCOOLER .....	4D—16
BOOST AIR TEMPERATURE SENSOR.....	4D—17
<b>EXHAUST SYSTEM</b> .....	4D—18
STRUCTURAL VIEW.....	4D—18
EXHAUST MANIFOLD .....	4D—19
EXHAUST PIPE AND MAIN SILENCER ....	4D—20
<b>FUEL SYSTEM</b> .....	4D—21
STRUCTURAL VIEW.....	4D—21
FUEL FILTER.....	4D—22
SEDIMENTER (GENERAL).....	4D—22
WATER LEVEL SENSOR.....	4D—23
INJECTION PUMP .....	4D—24
INJECTION NOZZLE .....	4D—31
FUEL TANK.....	4D—34

# 4D OUTLINE

## OUTLINE

The Mazda 626 offers two diesel engines; a Comprex supercharged RF-CX engine, and a normally aspirated RF-N engine.

## SPECIFICATIONS

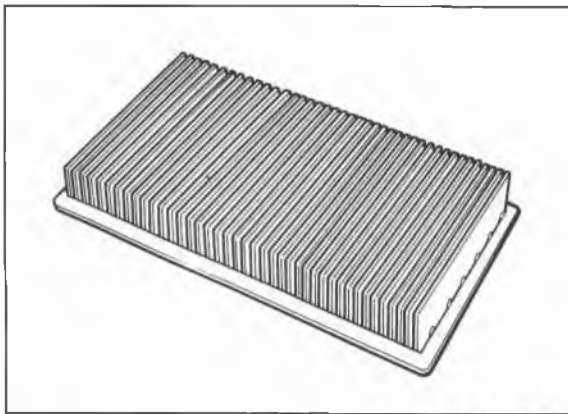
Item		Engine model	ECE		UK, GENERAL
			RF-CX	RF-N	
Fuel tank	Capacity	liters (US gal, Imp gal)	60 (15.9, 13.2)		
Fuel filter	Type		Cartridge, paper element		
Sedimenter	Type		With detector		
Injection pump	Type		Bosch VE distributor		
	Manufacturer		Diesel Kiki Co., Ltd.		
	Direction of rotation		Clockwise		
	Drive method		Timing belt		
	Plunger diameter	mm (in)	9.0 (0.35)	8.0 (0.31)	
	Cam lift	mm (in)	2.2 (0.087)		
Injection nozzle	Type		Throttle		
	Injection pressure	kPa (kg/cm <sup>2</sup> , psi)	13,240 (135 , 1,920)		
Injection timing			ATDC 1°	TDC 0°	
Idle speed		rpm	720 <sup>+30</sup> / <sub>-20</sub>		
Fast idle speed (A/C ON)		rpm	700—750		
Cold start device	Engine speed	rpm	1.100		
	Advance degree		6°		
Air cleaner	Type		Cartridge, paper element		
			Wet	Dry	
PCV system	Type		Open	Closed	

76G04D-002

**TROUBLESHOOTING GUIDE**

Condition	Condition Cause	Remedy
<b>Hard starting</b>	<b>Fuel filter</b> Clogged Water or air in filter <b>Fuel injection pump</b> Faulty fuel cut solenoid Incorrect injection timing Air in pump Faulty pump <b>Fuel injection nozzle</b> Seized needle valve Fuel dripping from nozzle Incorrect valve opening pressure <b>Faulty glow plug</b> <b>Faulty cold start device</b> <b>Faulty supercharging system</b>	Replace Repair  Replace Adjust Bleed Replace  Replace Replace Adjust Replace Adjust or replace Refer to page 4D—10
<b>Rough idle</b>	<b>Fuel filter</b> (Refer to "Hard starting") <b>Fuel injection pump</b> (Refer to "Hard starting") <b>Fuel injection nozzle</b> Seized needle valve Incorrect valve opening pressure Improper mounting to nozzle holder Leakage of nozzle holder copper washer <b>Fuel injection pipe</b> Cranks Leaking from joint <b>Improper idle speed adjustment</b>	 Replace Adjust Repair Replace  Replace Repair Adjust
<b>Engine knocking</b>	Incorrect injection timing Low quality fuel Incorrect injection nozzle opening pressure Seized injection nozzle needle valve Fuel dripping from injection nozzle <b>Faulty supercharging system</b>	Adjust Replace Adjust Replace Replace Refer to page 4D—10
<b>High fuel consumption</b>	<b>Fuel injection pump</b> Incorrect injection timing High idle speed <b>Fuel injection nozzle</b> Incorrect valve opening pressure Fuel dripping from nozzle Leakage of nozzle holder copper washer Fuel leaking from connection <b>Clogged fuel filter</b> <b>Clogged air cleaner</b>	Adjust Adjust, Inspect the dashpot  Repair Replace Replace Repair Replace Replace
<b>Poor acceleration</b>	<b>Fuel injection nozzle</b> (Refer to "Hard starting") <b>Fuel injection pump</b> (Refer to "Hard starting") <b>Fuel injection pipe</b> (Refer to "Rough idle") <b>Fuel filter</b> (Refer to "Hard starting") <b>Clogged air cleaner</b> <b>Faulty supercharging system</b>	   Clean or replace Refer to page 4D—10
<b>Excessive exhaust smoke</b>	Clogged air cleaner Improper injection timing Faulty nozzle or nozzle holder <b>Faulty supercharging system</b>	Clean or replace Adjust Adjust or replace Refer to page 4D—10

76G04D-003



76G04D-004

## ON-VEHICLE MAINTENANCE

### AIR CLEANER ELEMENT

Check the air cleaner element for excessive dirt, damage, or oil. Replace if necessary.

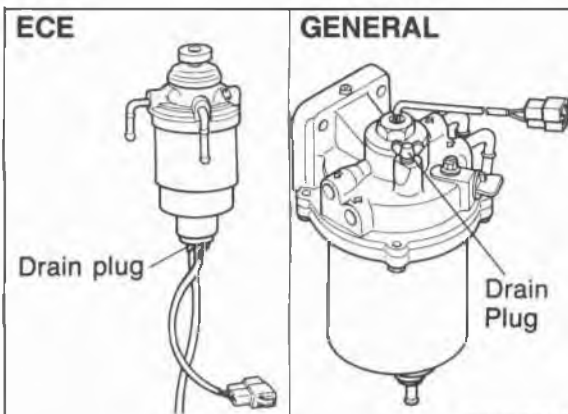
#### Caution

##### (Wet type)

**Do not clean the air cleaner element with compressed air, replace if necessary.**

##### (Dry type)

**When cleaning the air cleaner element, blow dust off from the inside first, then blow off the outside.**



76G04D-005

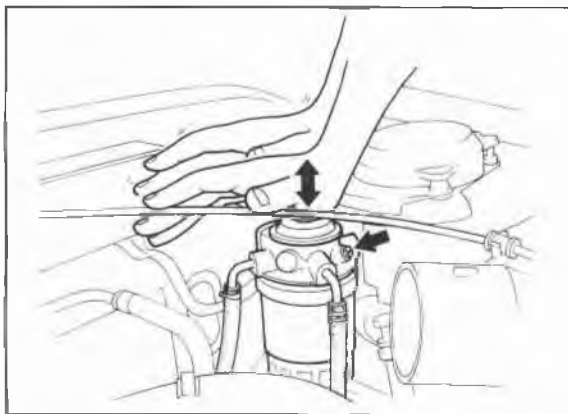
### WATER DRAINING

#### (ECE)

1. Loosen the drain plug of the fuel filter.
2. Pump the priming pump.
3. Bleed air from the fuel filter.

#### (General)

1. Loosen the drain plug of the sedimenter and let the water drain. If necessary loosen the air bleeding plug.
2. Bleed air from the sedimenter.



76G04D-006

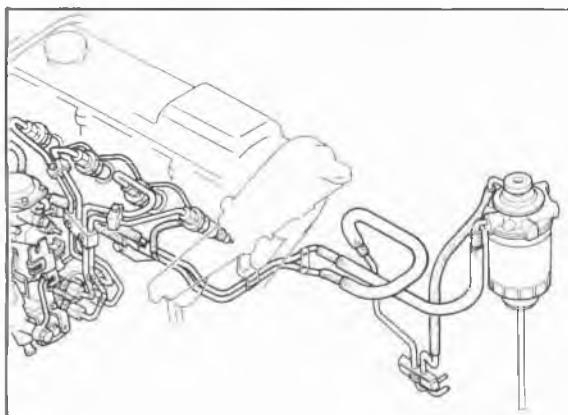
### AIR BLEEDING

#### From Fuel Tank to Fuel Filter

1. Loosen the air bleeding plug of the fuel filter.
2. Pump the priming pump until no air bubbles flow from the air bleeding plug hole.
3. Depress the priming pump and tighten the air bleeding plug.

#### Note

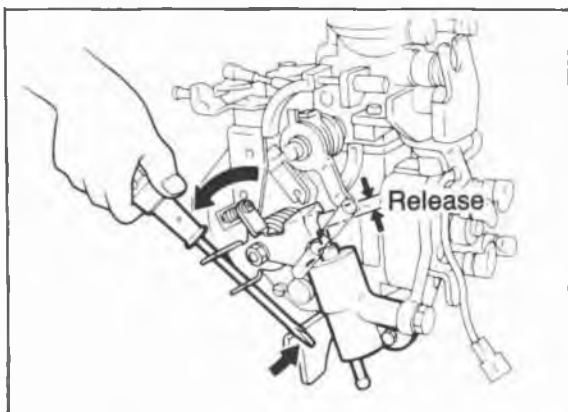
**Open only the air bleeding plug of the filter.**



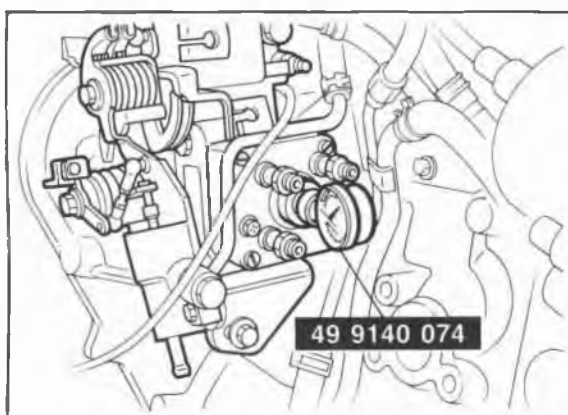
76G04D-007

#### From Fuel Filter to Injection Pump

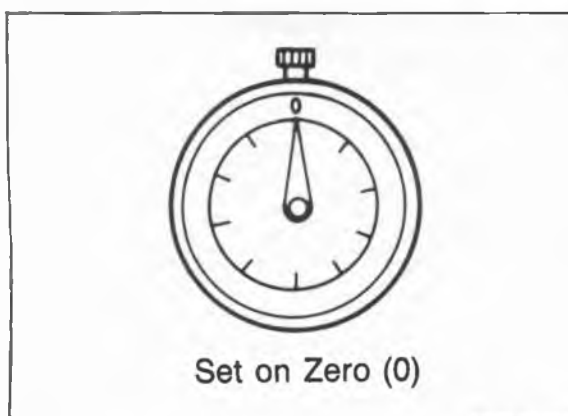
Pump the priming pump until it becomes hard to pump.



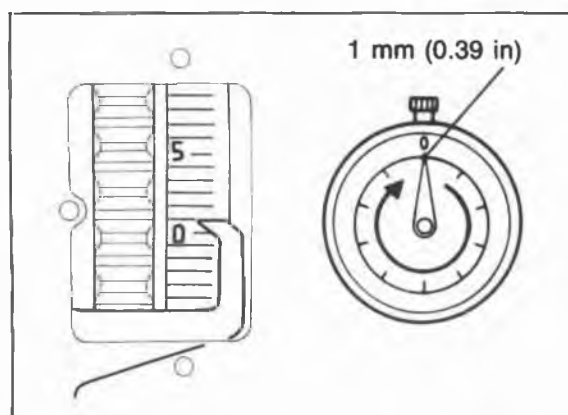
76G04D-008



76G04D-009



76G04D-010



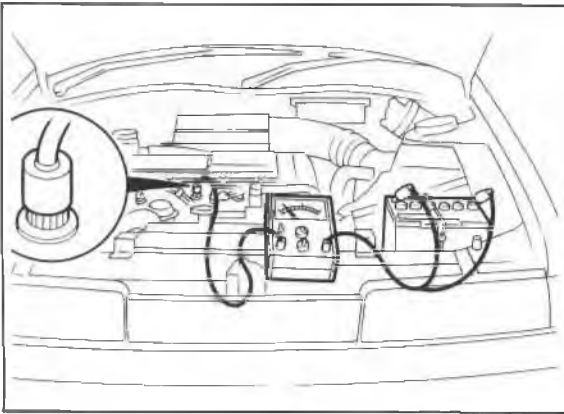
76G04D-011

## INJECTION TIMING

1. Disconnect the negative battery cable.
  2. Release the CSD using the screw driver.
  3. Remove the cover on the clutch housing.
  4. Turn the flywheel and set the indicator at **TDC**.
  5. Disconnect the injection pipes from the injection pump.
  6. Remove the hydraulic head plug from the injection pump.
  7. Mount the **SST** into the plug hole on the hydraulic head so the tip of the dial gauge pointer touches the plunger end of the pump and the dial gauge indicates **approx. 2.0 mm (0.08 in)**.
  8. Turn the crankshaft slowly counterclockwise to 30—50° BTDC.
  9. Make sure the dial indicator pointer no longer moves by slightly turning the crankshaft.
  10. Set the dial gauge scale to Zero at the pointer.
  11. Turn the crankshaft clockwise to align the indicator pin at **ATDC 1° (RF-CX), TDC 0° (RF-N)**.
  12. Read the dial gauge.
- Cam lift: 0.98—1.02 mm (0.038—0.040 in)**
13. If not within the specification, adjust the injection timing. (Refer to page 4D—24.)



## 4D ON-VEHICLE MAINTENANCE

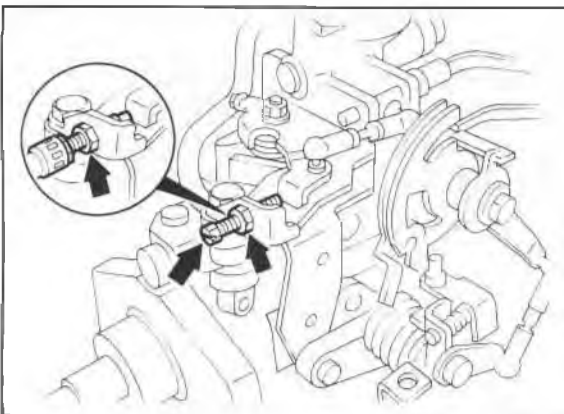


76G04D-012

### IDLE SPEED

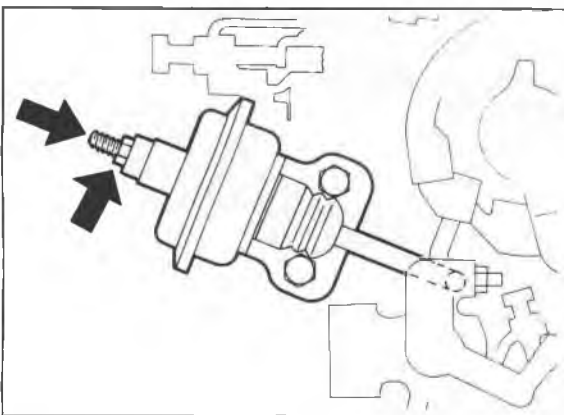
1. Warm up the engine to normal operating temperature.
2. Be sure the A/C switch is OFF.
3. Connect a tachometer and check the engine speed.

**Idle speed: 720  $\pm$  30 rpm**



76G04D-013

4. If necessary, adjust the idle by turning the idle adjusting screw.



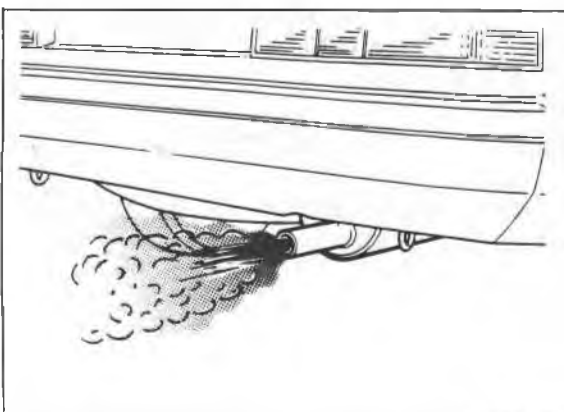
76G04D-014

### Fast Idle Speed (A/C equipped model)

1. Turn ON the A/C switch and blower motor switch.
2. Check the engine speed.

**Fast idle speed: 725  $\pm$  25 rpm**

3. If necessary, turn the adjusting screw on the idle-up actuator, and adjust the fast idle speed.



76G04D-015

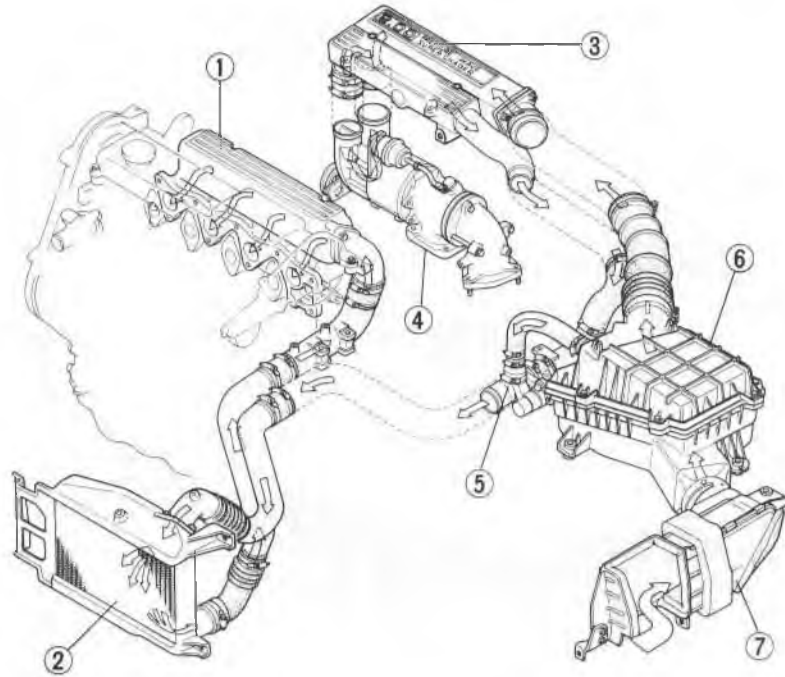
### EXHAUST SMOKE

Increase and decrease the engine speed several times and check that there is no black smoke. If there is, refer to the Troubleshooting Guide.

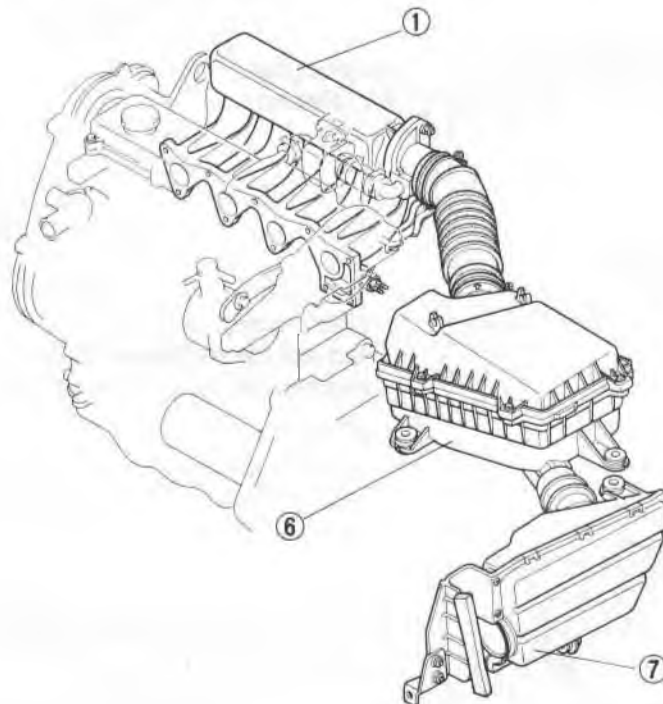
## INTAKE AIR SYSTEM

### STRUCTURAL VIEW

RF-CX



RF-N



76G04D-016

- 1. Intake manifold
- 2. Intercooler
- 3. Air funnel assembly
- 4. Complex supercharger

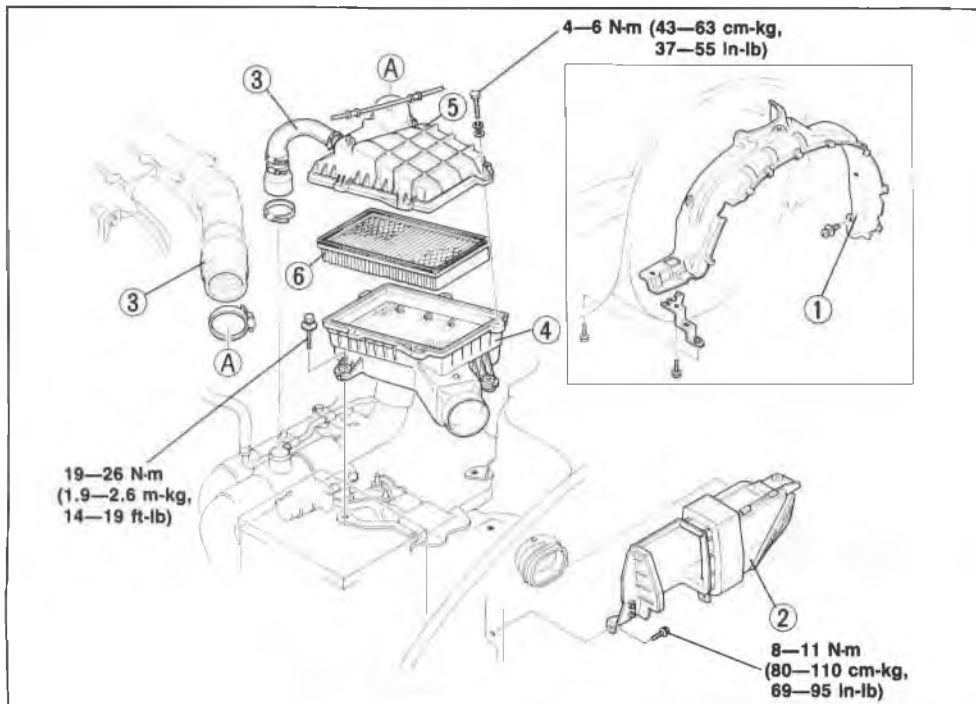
- 5. Starting valve
- 6. Air cleaner
- 7. Air duct

# 4D INTAKE AIR SYSTEM

## AIR DUCT AND AIR CLEANER

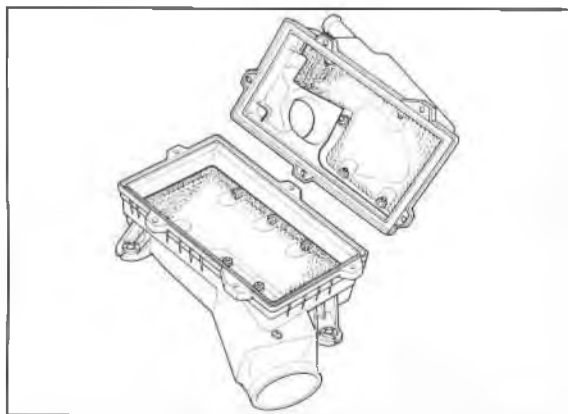
### Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for air leakage.



1. Tire house cover
2. Air duct
3. Air hose
4. Air cleaner case
5. Air cleaner cover
6. Air cleaner element

76G04D-017



76G04D-018

### Inspection Air cleaner

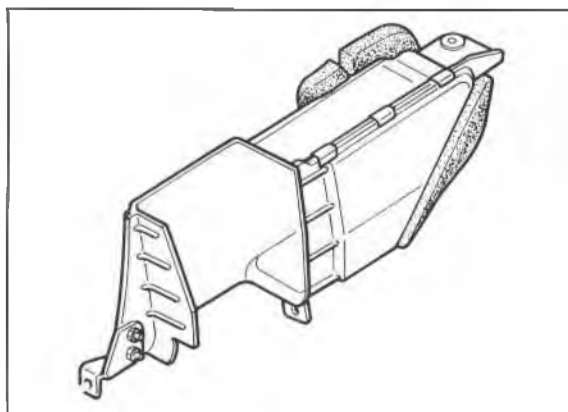
1. Inspect the silencer in the air cleaner cover for damage.
2. Inspect the air cleaner element for excessive dirt, damage, or oil. Replace if necessary.

### Caution (Wet type)

**Do not clean the air cleaner element with compressed air, replace it if necessary.**

### (Dry type)

**When cleaning the air cleaner element, blow dust off from the inside first, then blow off the outside.**



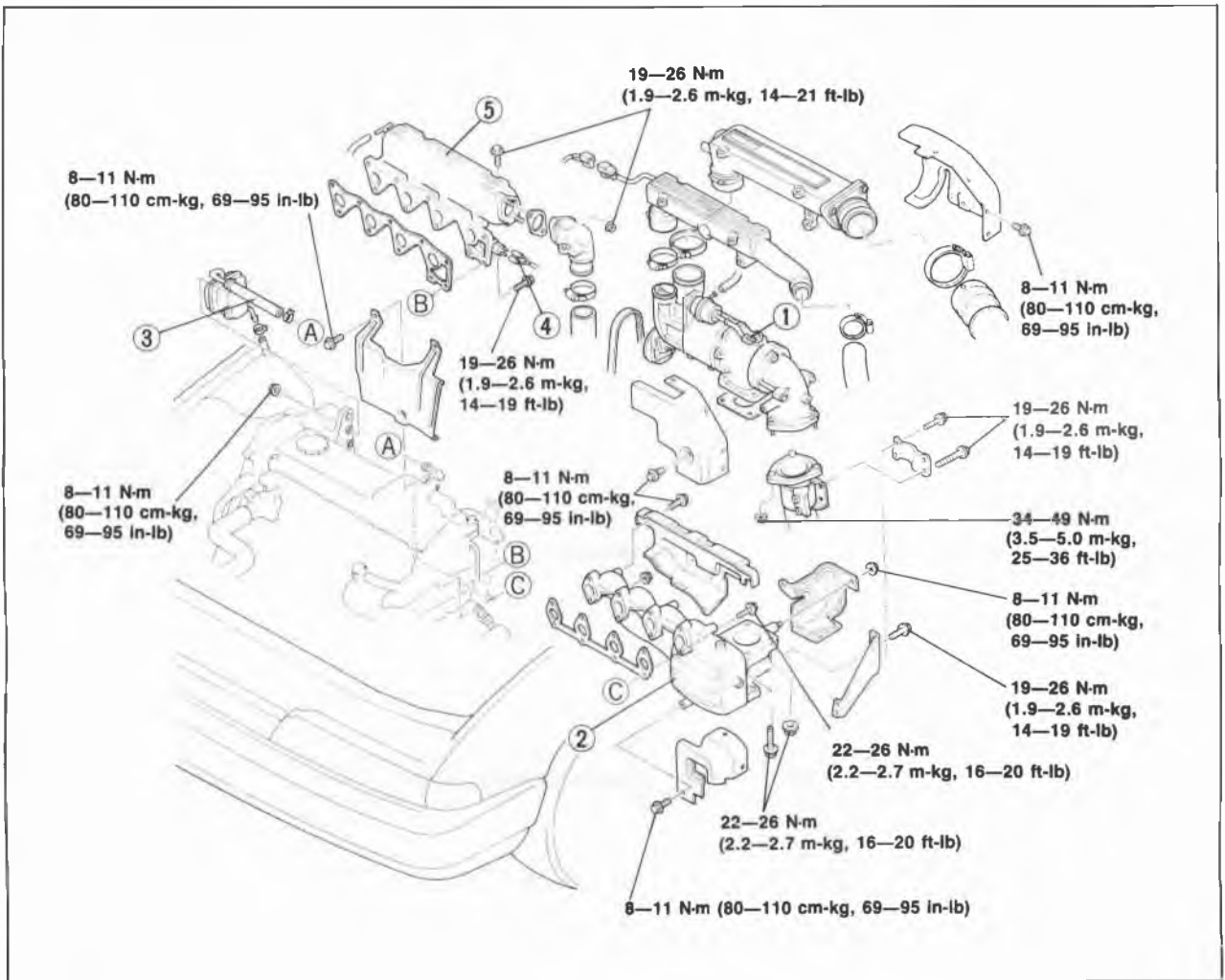
76G014-019

### Air duct

Inspect the silencer in the air duct for damage. Replace if necessary.

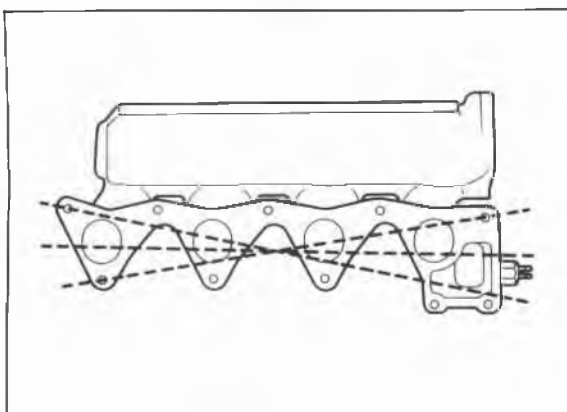
## INTAKE MANIFOLD Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for air/exhaust leakage.



76G04D-020

1. Compress supercharger  
(Refer to page 4D-13.: RF-CX)
2. Exhaust manifold  
(Refer to page 4D-19.: RF-CX)
3. Vacuum hose (RF-CX)
4. Water thermo switch connector
5. Intake manifold



76G04D-021

### Inspection

1. Check the intake manifold for cracks and damage.
2. Inspect the flatness of the mounting surface using a straight edge and a feeler gauge. Replace if necessary.

**Distortion: 0.05 mm (0.002 in) max.**

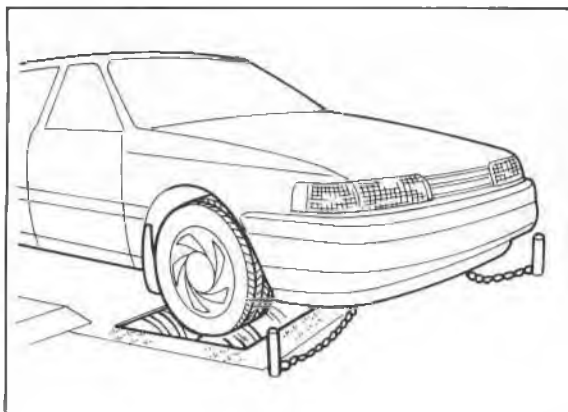
# 4D SUPERCHARGING SYSTEM (RF-CX)

## SUPERCHARGING SYSTEM (RF-CX)

### TROUBLESHOOTING GUIDE

Engine hard starting	Poor acceleration	Excessive blue smoke	Excessive black smoke	Excessive compressed air temperature (Buzzer sounds)	Excessive noise	Possible Cause	Remedy (reference page)
*	*					Comprex supercharger Rotor stuck Casing damaged Rotor bearing damaged	Replace (4D—14)
*	*		*			Drive system of Comprex supercharger Drive belt loose or worn	Repair or replace (4D—12)
*						Idler pulley damaged	
*						Pulley bolt loose or worn	
				*		Wastegate Valve not open	Clean or replace (4D—12)
	*		*			Valve not closed	
	*		*			Starting valve Valve not open	Repair or replace (4D—15)
*		*				Valve not closed	
*						Bypass valve not open	
	*		*			Bypass valve not closed	
	*					Intercooler dirty	Clean or replace (4D—16)
*	*	*	*			Intake air system Fresh air side clogged (Air cleaner element, etc.)	Repair or replace
				*		Compressed air side clogged (Intercooler, etc.)	
					*	Fresh air side leaks	
	*		*		*	Compressed air side leaks	
					*	Exhaust system Exhaust gas broken	Repair
*	*	*	*		*	Exhaust pipe clogged	
					*	Silencer damaged (in fender, in air cleaner, in air funnel, Comprex insulator)	Repair or replace
					*	Bolt and nut loosend	Repair

76G04D-022



76D04D-023

## ON-VEHICLE INSPECTION

### Boost Pressure

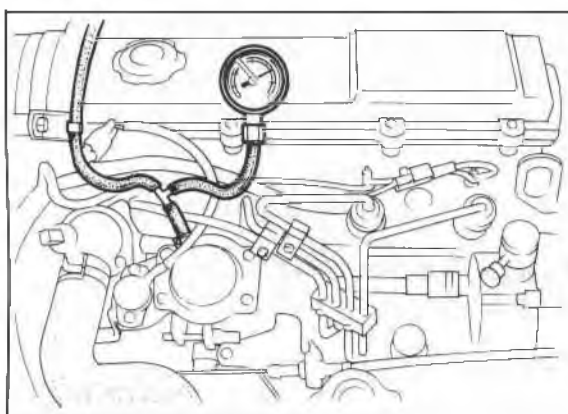
1. Connect a pressure gauge to the hose from the intake manifold.
2. (On chassis dynamometer, full load)
  - (1) Set the vehicle on a chassis dynamometer.
  - (2) Run the vehicle in gear at **3,000 rpm** with the acceleration pedal fully depressed.
  - (3) Measure the boost pressure.

### Boost pressure:

**82 kPa (0.87 kg/cm<sup>2</sup>, 8.1 psi)**

### Note

**The above inspection should be done on a chassis dynamometer. If a dynamometer is not available follow the below procedure.**



76G04D-024

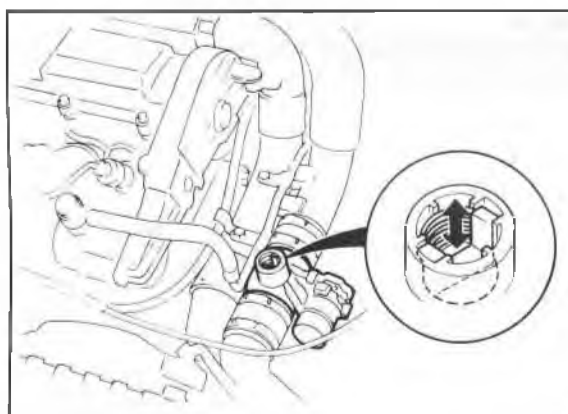
3. (Off chassis dynamometer, no load)
  - (1) Shift the transaxle out of gear.
  - (2) Run the engine in neutral at **3,000 rpm** of the engine no load. Measure the boost pressure.

### Boost pressure:

**5 kPa (0.05 kg/cm<sup>2</sup>, 0.7 psi)**

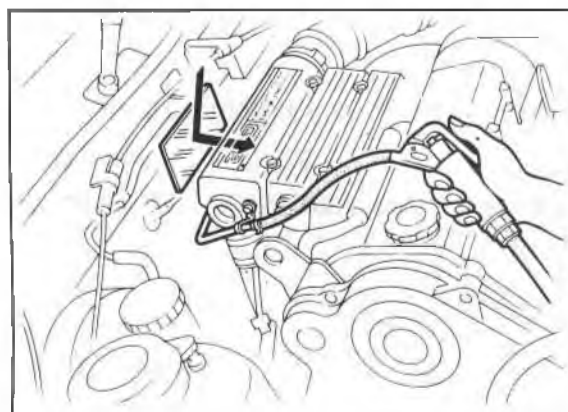
### Note

**The boost pressure is varied by engine speed and engine load.**



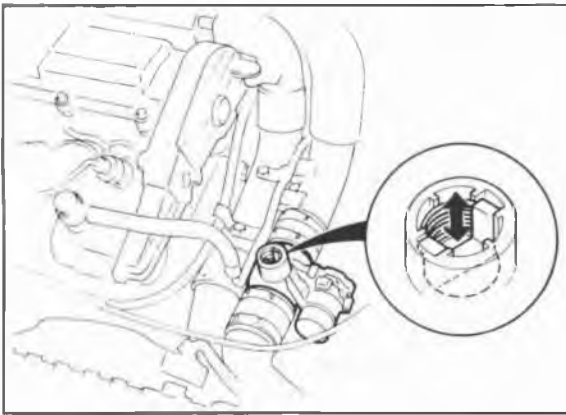
76G04D-025

- (3) Remove the starting valve bypass hose.
- (4) Check that the bypass valve is closed at 3,000 rpm.
4. If the pressure is below specification, check the following. Replace the Compex supercharger if necessary.
  - (1) Intake air and exhaust passages leakage
  - (2) Intake air and exhaust passages clogged
  - (3) Wastegate (Refer to 4D—12.)
  - (4) Starting valve (Refer to 4D—15.)
  - (5) Fuel system (Injection nozzle... refer to page 4D—31, injection pump...refer to page 4D—24, etc.)
5. If the pressure exceeds specification, check the wastegate operation. (Refer to page 4D—12.)



76G04D-086

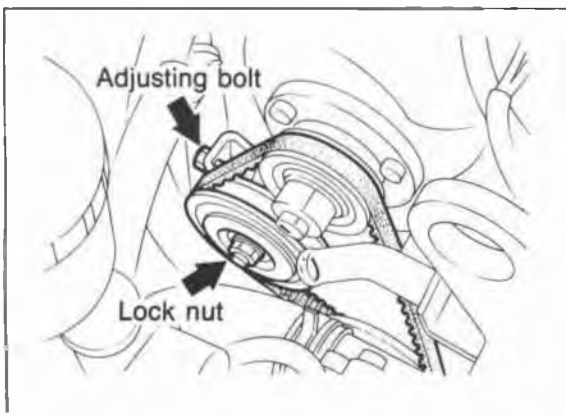
## 4D SUPERCHARGING SYSTEM (RF-CX)



76G04D-026

### Starting Valve

1. Remove the bypass hose from the starting valve.
2. Check that the bypass valve in the starting valve opens and closes repeatedly at idle.
3. Check that the bypass valve is closed when the accelerator pedal is fully depressed when the engine speed is more than 3,000 rpm.
4. If necessary replace the starting valve.



76G04D-027

### Compex Supercharger Drive Belt

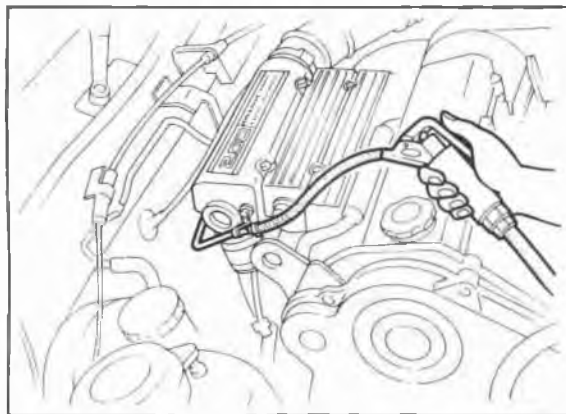
1. Check the drive belt for wear, cracks, or fraying.
2. Check the drive belt deflection by applying moderate pressure (**98 N, 10 kg, 22 lb**) midway between the pulleys.
3. If necessary, loosen the bolt and adjust the belt deflection by turning the adjusting bolt.

**New : 4.0—5.0 mm (0.16—0.20 in)**

**Used: 4.5—5.5 mm (0.18—0.22 in)**

### Tightening torque:

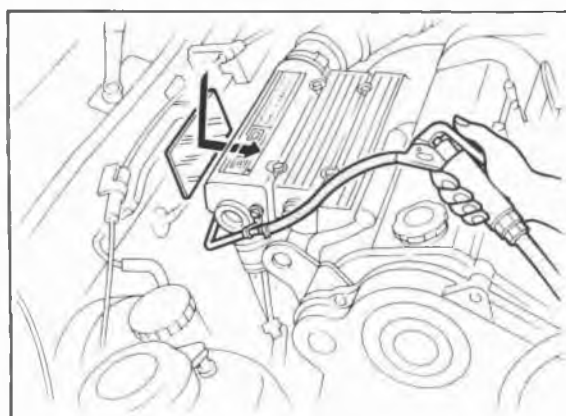
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



76G04D-028

### Wastegate

1. Disconnect the boost air hose from wastegate to the intake manifold, and apply compressed air.



76G04D-087

2. Check that the wastegate actuator pulls the rod at the specified pressure.

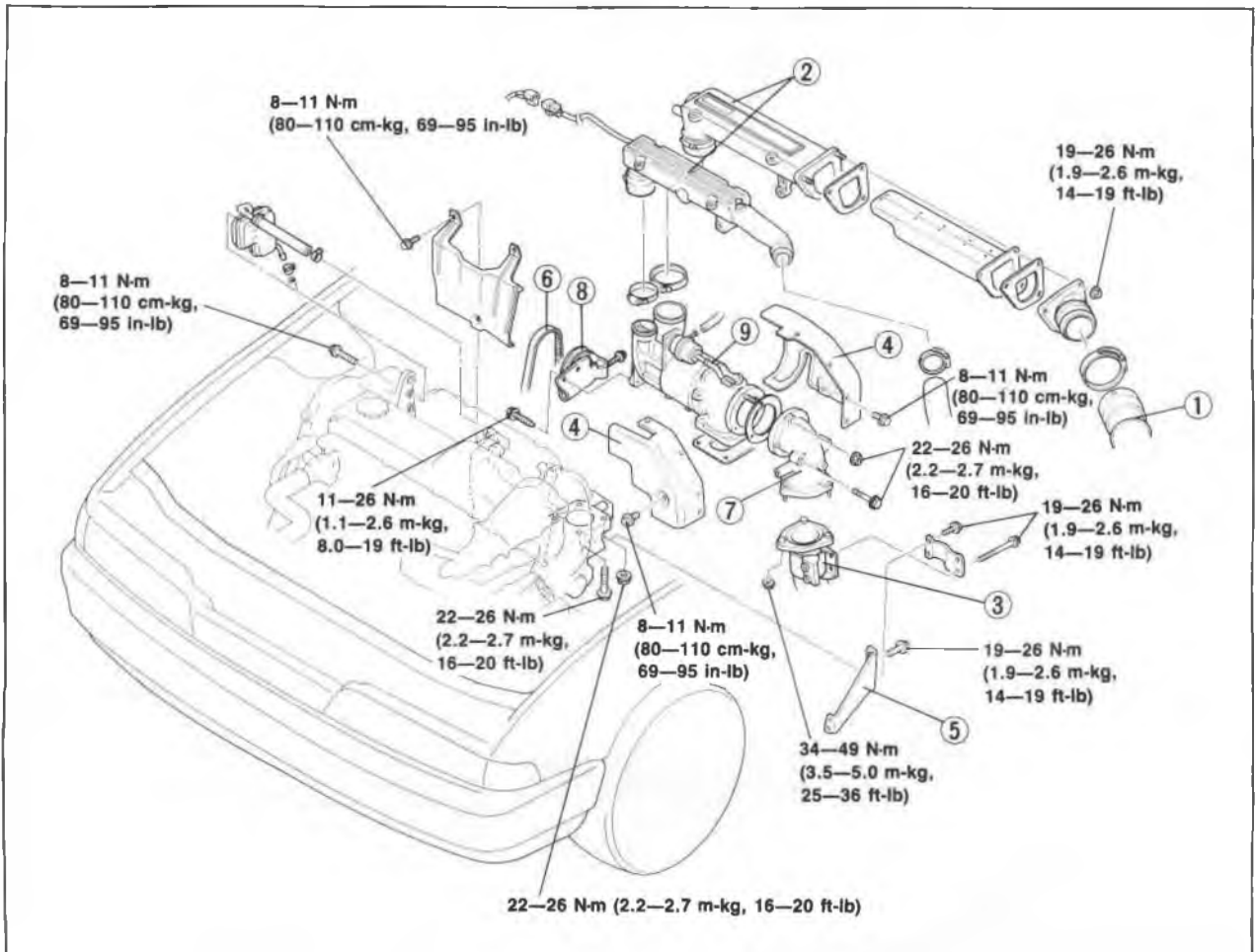
**Pressure: 137 kPa (1.4 kg/cm<sup>2</sup>, 20 psi)**

### Caution

**Do not apply more than 196 kPa (2.0 kg/cm<sup>2</sup>, 28 psi) pressure.**

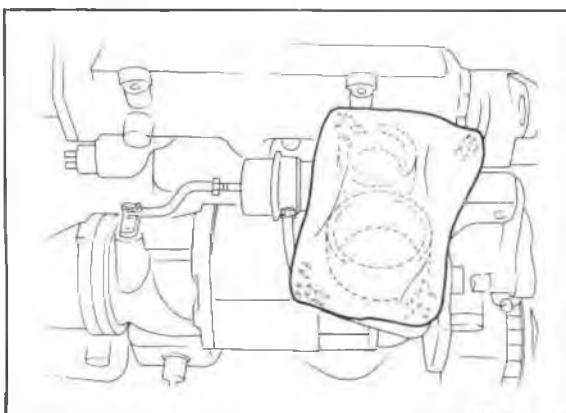
## COMPRES SUPERCHARGER Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for air/exhaust leakage.



76G04D-029

- |                           |                         |
|---------------------------|-------------------------|
| 1. Air hose               | 6. Drive belt           |
| 2. Air funnel assembly    | 7. Exhaust joint pipe   |
| 3. Exhaust pipe           | 8. Idle pulley          |
| 4. Supercharger insulator | 9. Compres supercharger |
| 5. Exhaust manifold stay  |                         |



76G04D-030

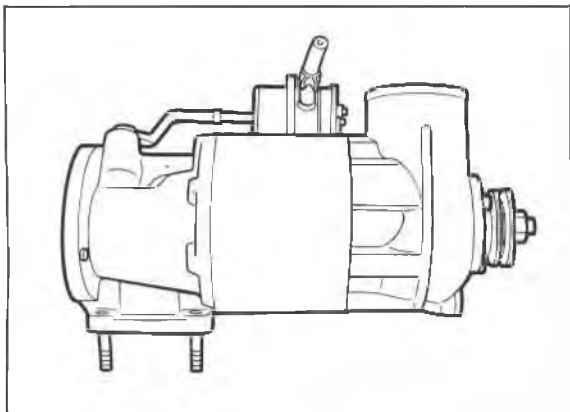
### Caution

- a) Be careful not to bend the rod or bracket of the wastegate.
- b) Cover the intake and exhaust ports to prevent dirt or other material from entering.



## 4D SUPERCHARGING SYSTEM (RF-CX)

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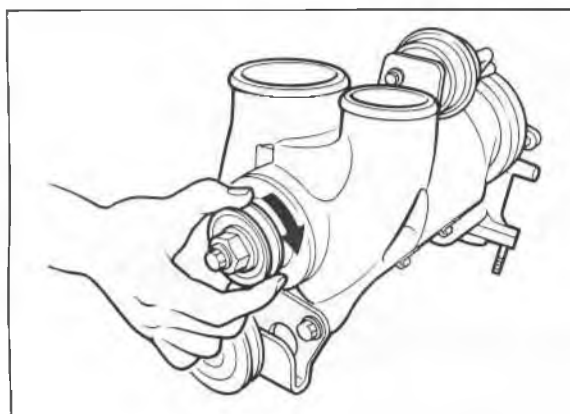


76G04D-031

### Inspection

#### **Air casing, exhaust casing, rotor housing**

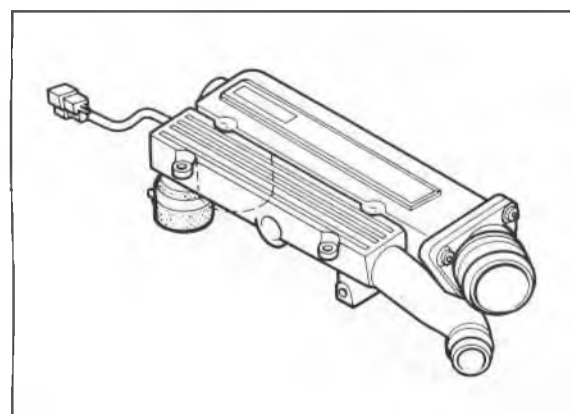
Check the air casing, exhaust casing, and rotor housing for cracks or damage. Replace the Comprex supercharger if necessary.



76G04D-032

#### **Rotor and rotor bearing**

Check that the rotor turns smoothly. Replace the Comprex supercharger if necessary.



76G04D-033

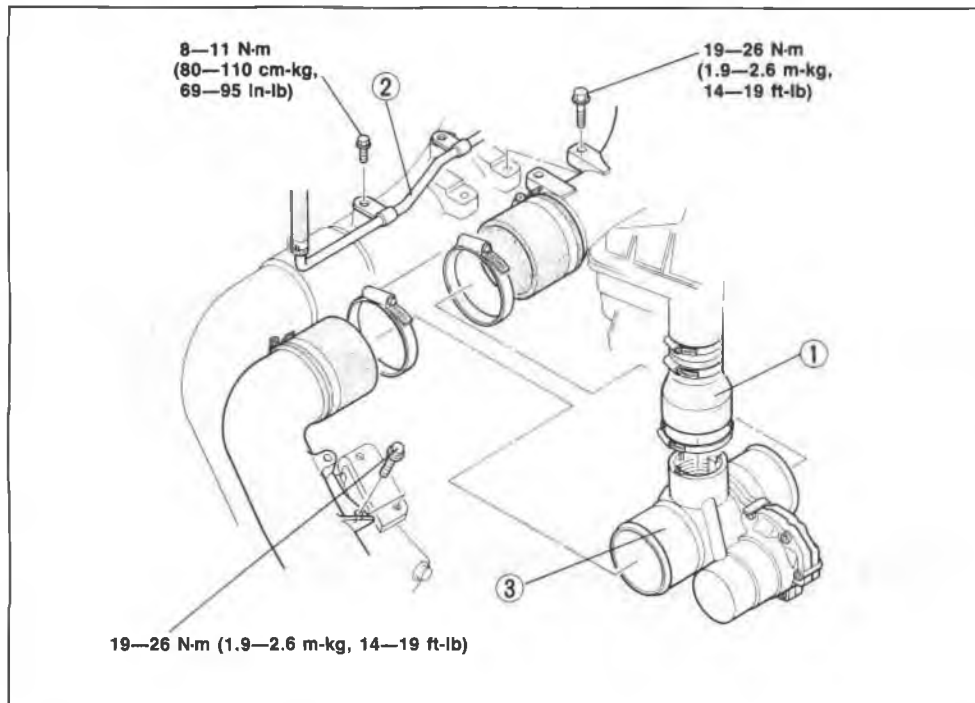
#### **Air funnel**

Check the air funnel and insulator for cracks or damaged. Replace if necessary.

## STARTING VALVE

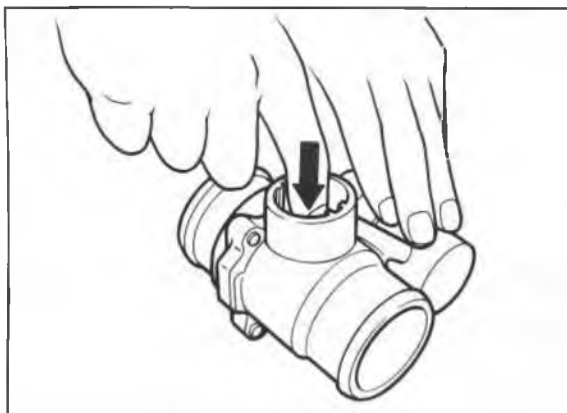
### Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for air leakage.



1. Air hose
2. Vacuum pipe
3. Starting valve

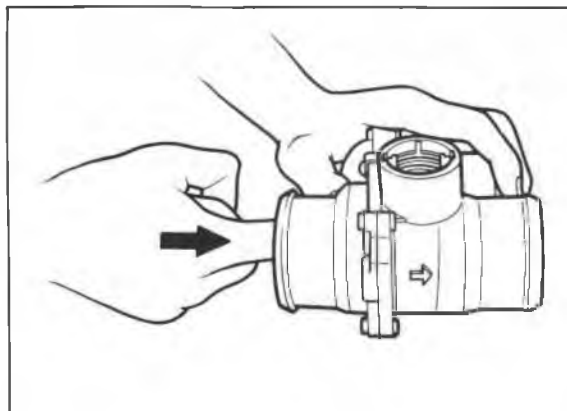
76G04D-034



76G04D-035

### Insipiton Bypass valve

Check that the bypass valve opens smoothly.  
Replace the starting valve if necessary.



76G04D-036

### Starting valve

Check that the starting valve opens smoothly.  
Replace the starting valve if necessary.

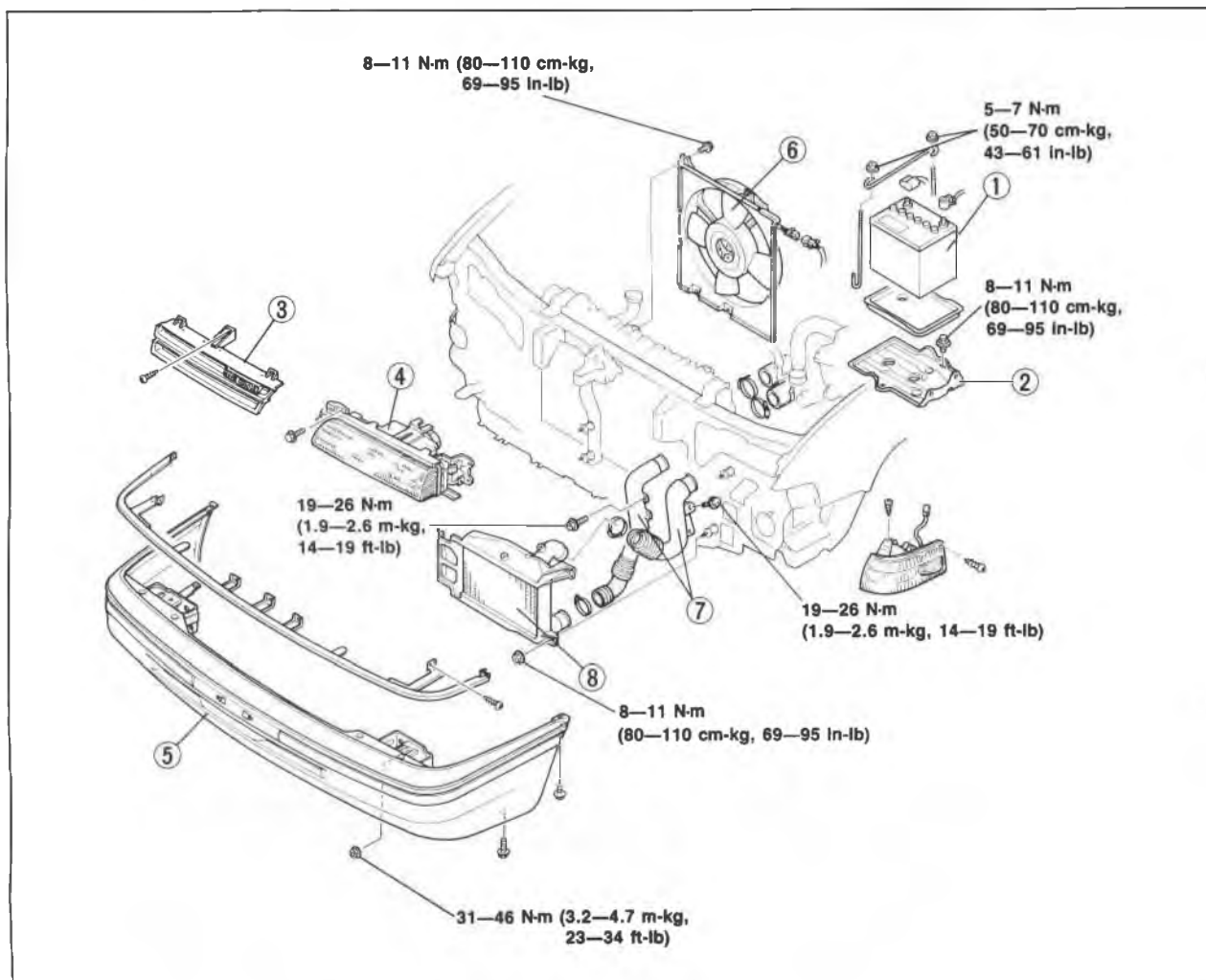
**Note**  
Resistance will be felt because of the magnet  
when opening the valve.

# 4D SUPERCHARGING SYSTEM (RF-CX)

## INTERCOOLER

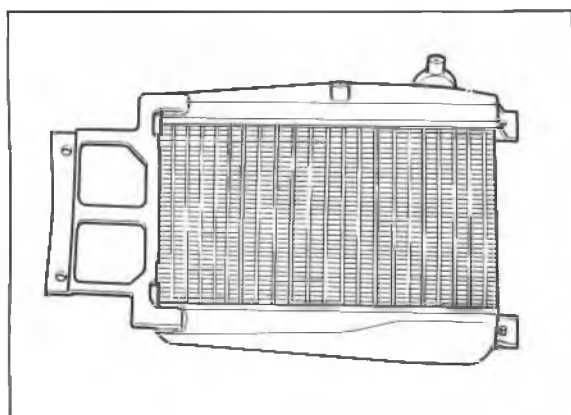
### Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for air leakage.



76G04D-037

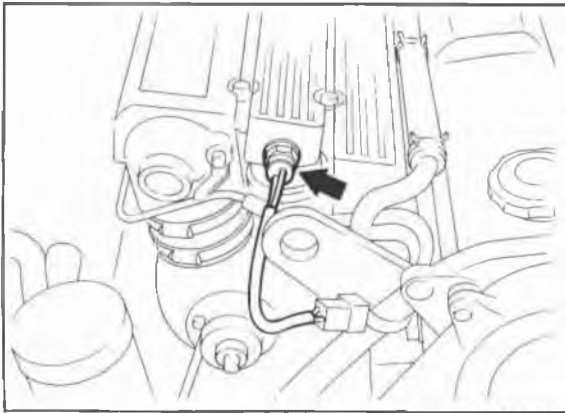
- |  |  |
|--|--|
| 1. Battery                             | 5. Front bumper (Refer to Section 14.) |
| 2. Battery carrier                     | 6. Cooling fan                         |
| 3. Front grille (Refer to Section 14.) | 7. Air pipe                            |
| 4. Headlight (Refer to Section 14.)    | 8. Intercooler                         |



76G04D-038

### Inspection

Check the intercooler for cracks or damage. Replace if necessary.

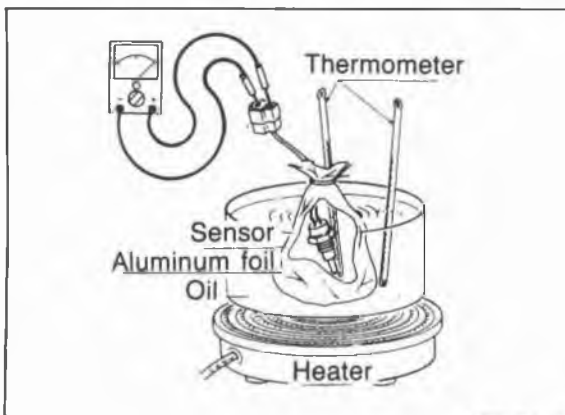


76G04D-039

## BOOST AIR TEMPERATURE SENSOR

### Removal

Remove the boost air temperature sensor from the compressed air funnel.

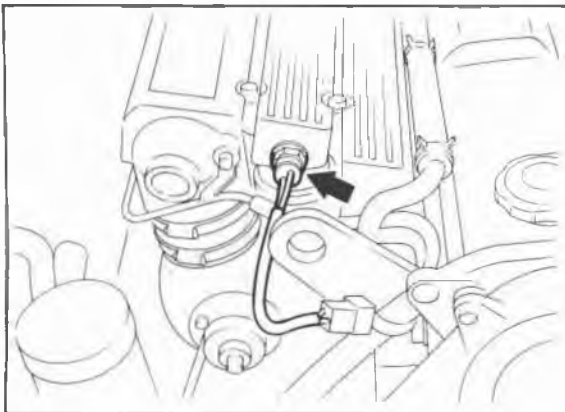


76G04D-040

### Inspection

1. Place the boost air temperature sensor in oil.
2. Heat the oil and check continuity of the sensor with an ohmmeter. Replace if necessary.

**Continuity : over 150°C (302°F)**  
**No continuity: below 143°C (289°F)**



76G04D-041

### Installation

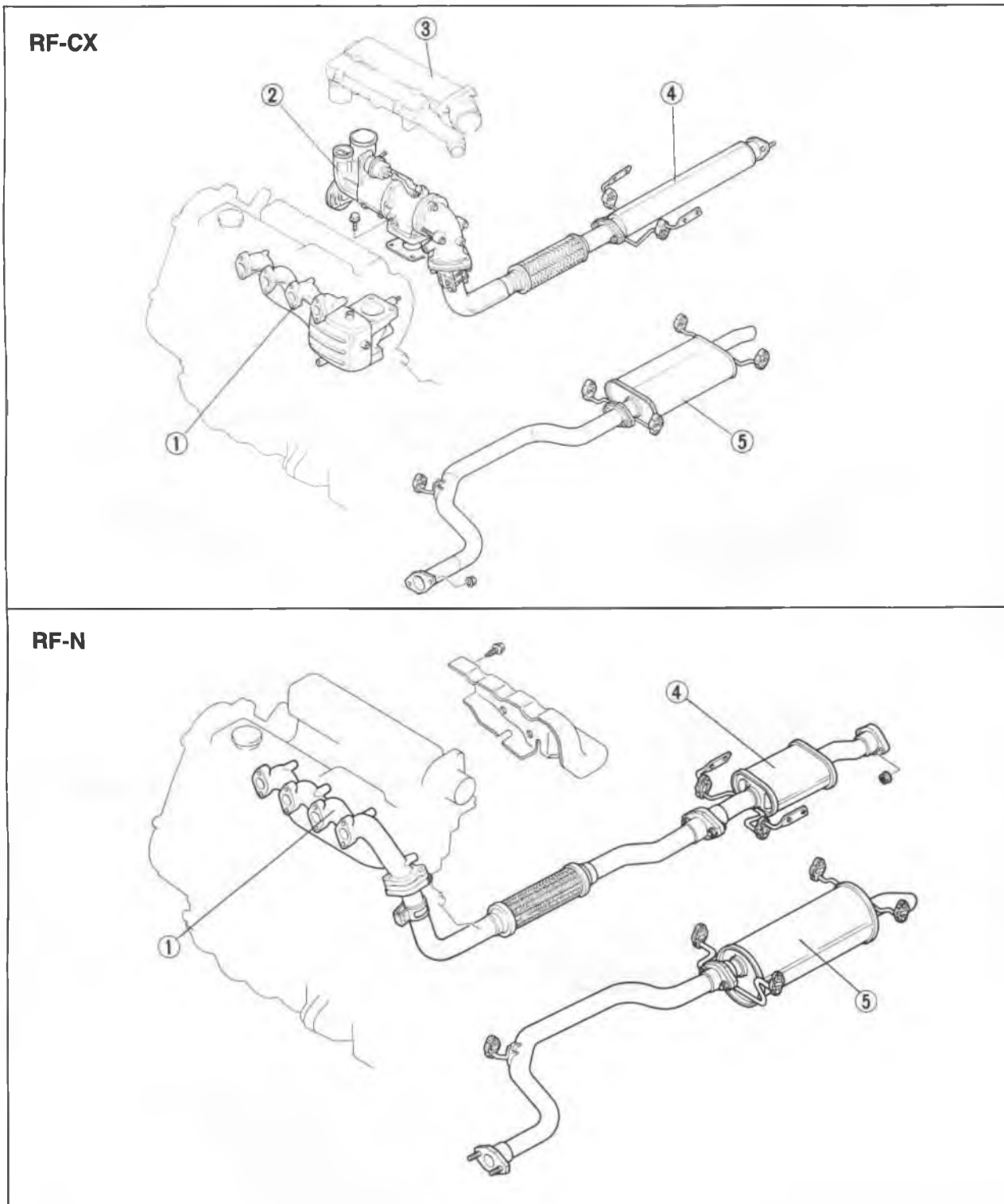
Install the boost air temperature sensor in the compressed air funnel.

**Tightening torque:**  
**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

# 4D EXHAUST SYSTEM

## EXHAUST SYSTEM

### STRUCTURAL VIEW



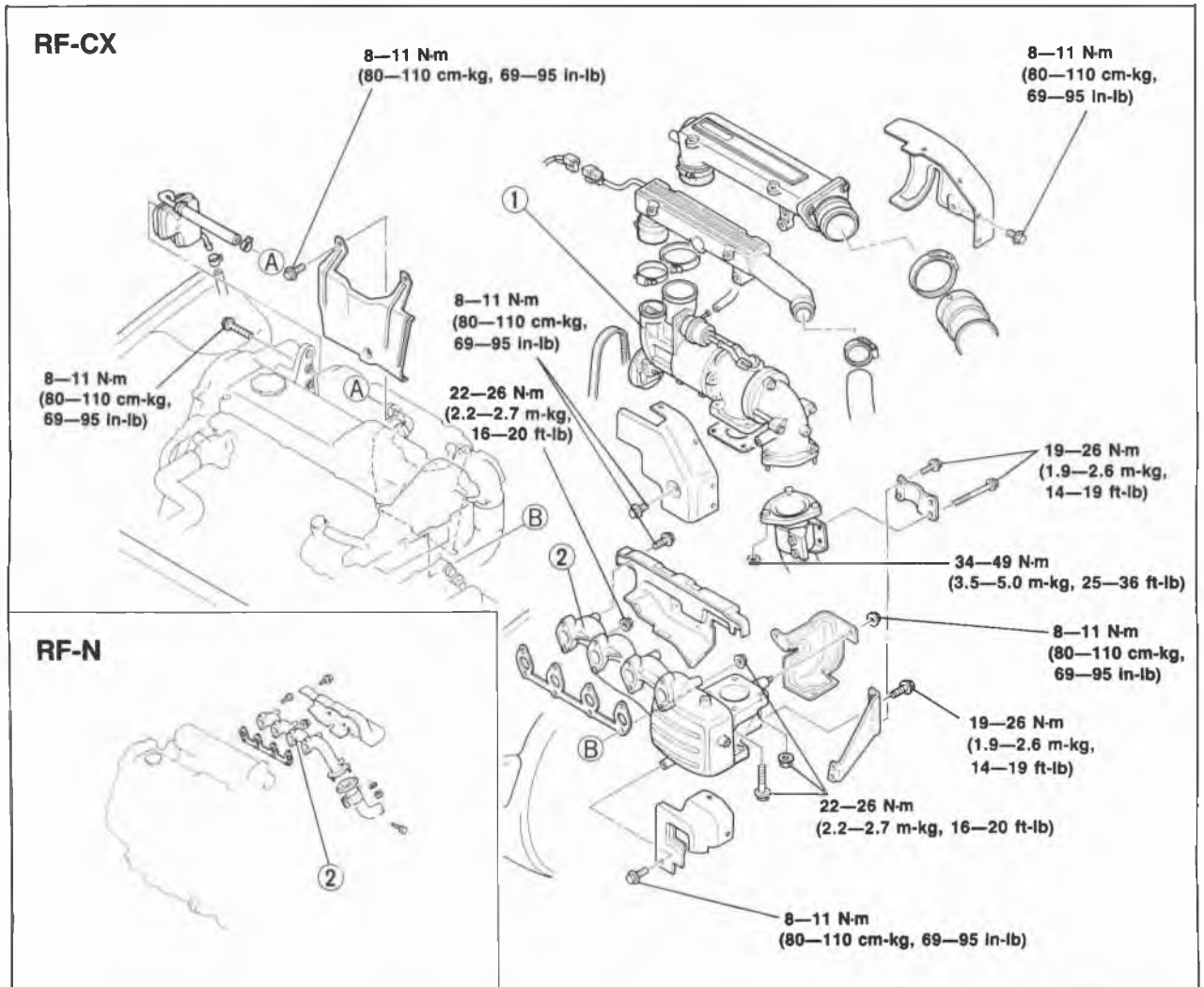
76G04D-042

- 1. Exhaust manifold
- 2. Complex supercharger (RF-CX)
- 3. Air funnel assembly

- 4. Pre-silencer
- 5. Main silencer

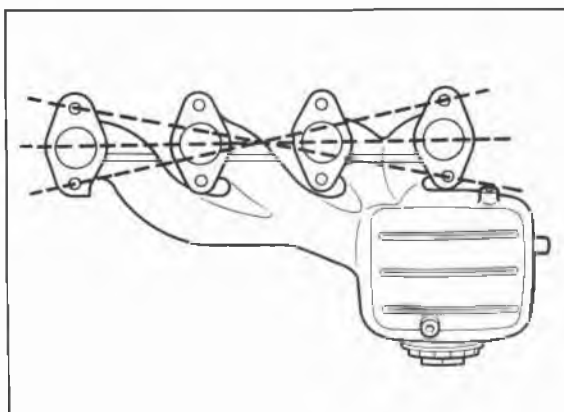
## EXHAUST MANIFOLD Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for exhaust leakage.



76G04D-043

1. Complex supercharger (Refer to page 4D-13.: only RF-CX)
2. Exhaust manifold



76G04D-044

### Inspection

1. Check the exhaust manifold for cracks and damage.
2. Inspect the flatness of the mounting surface using the straight edge and a feeler gauge. Replace if necessary.

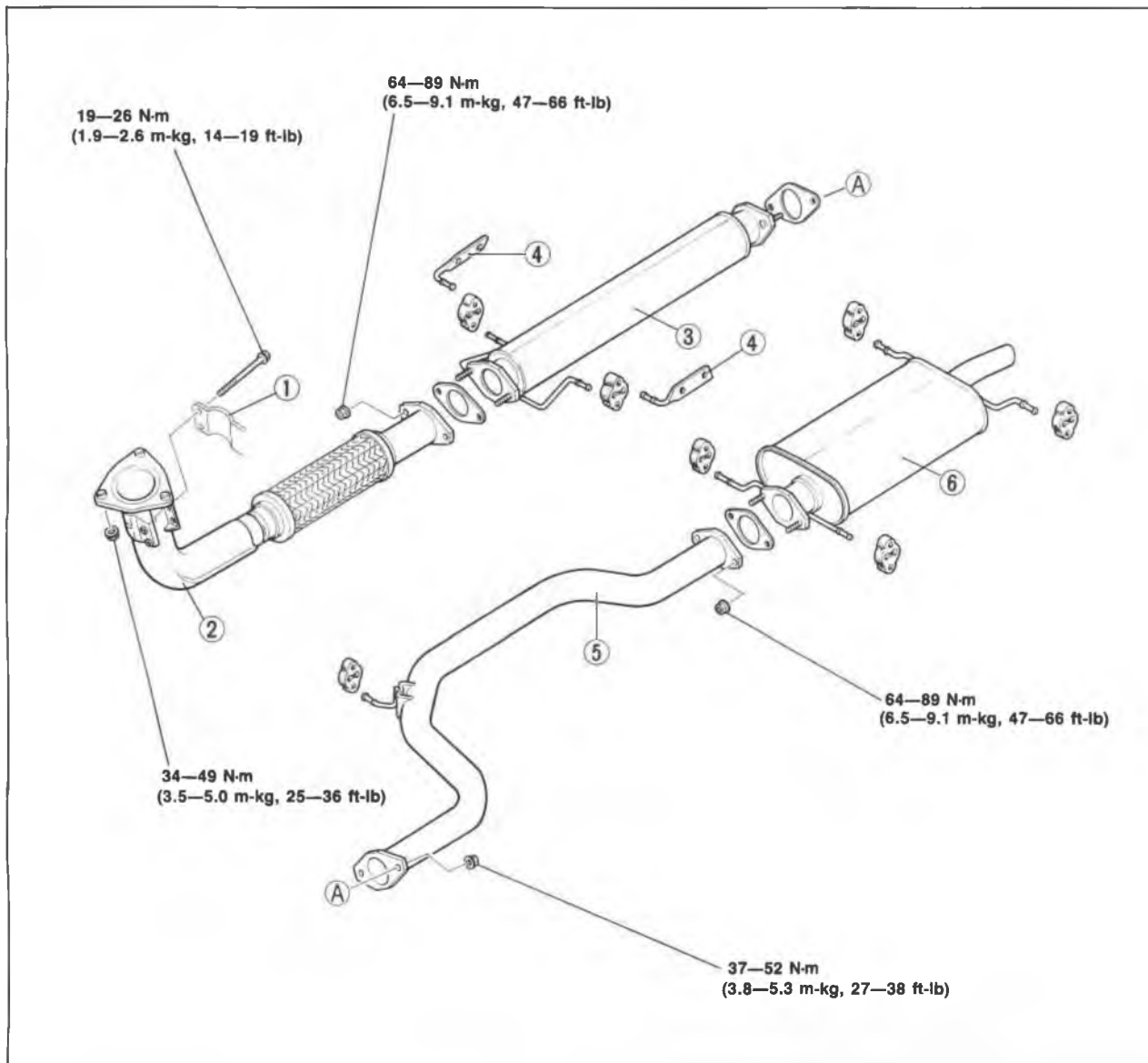
**Distortion: 0.05 mm (0.002 in) max.**

# 4D EXHAUST SYSTEM

## EXHAUST PIPE AND MAIN SILENCER

### Removal and Installation

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.
3. Check for exhaust leakage.

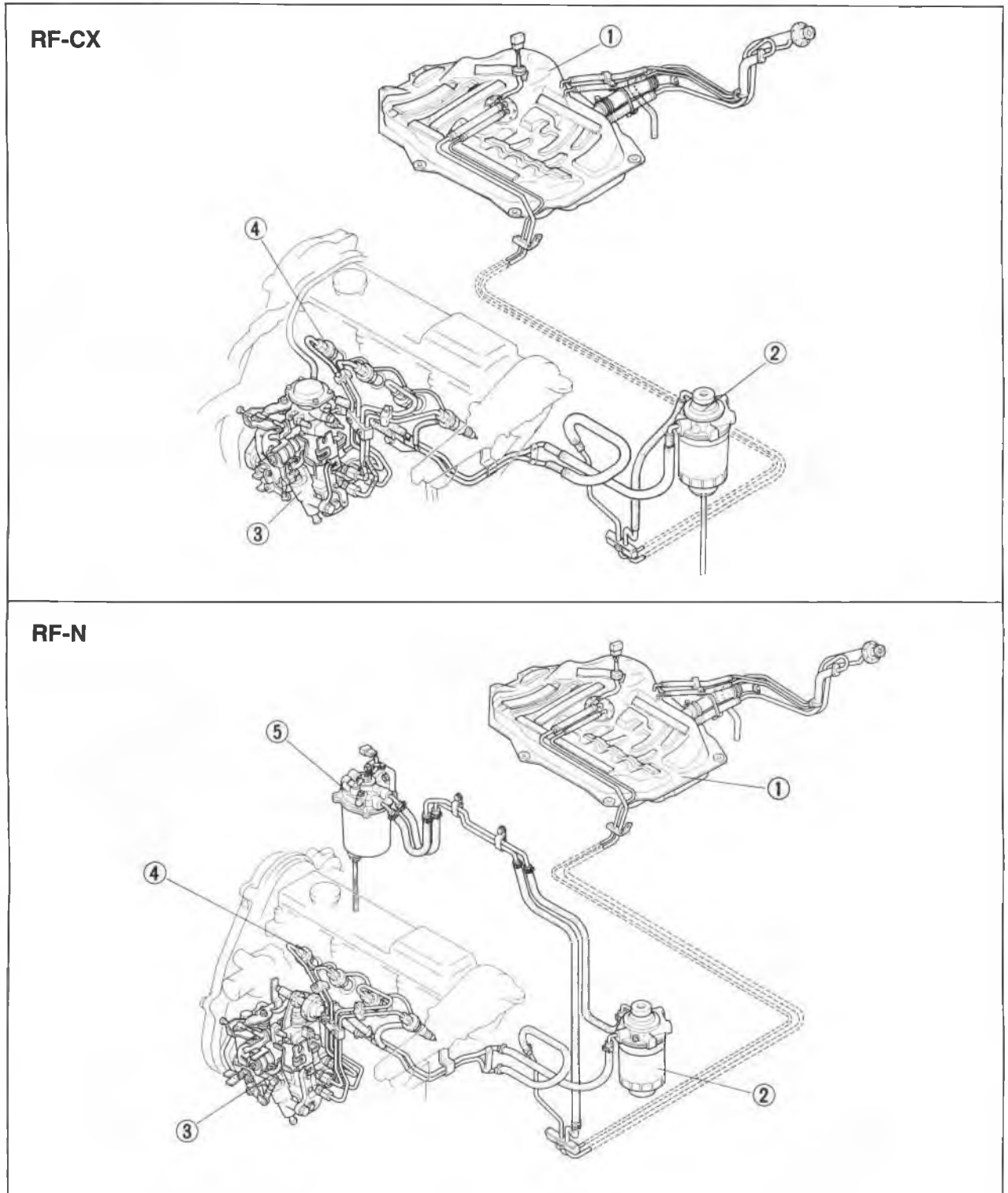


76G04D-045

1. Front exhaust pipe bracket
2. Front exhaust pipe
3. Pre-silencer

4. Silencer hanger
5. Middle pipe
6. Main silencer

FUEL SYSTEM  
STRUCTURAL VIEW



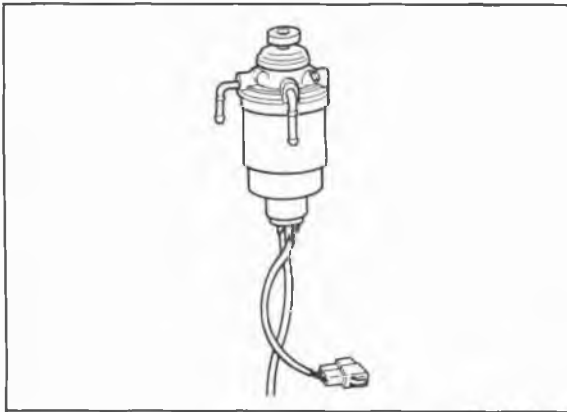
76G04D-046

- 1. Fuel tank
- 2. Fuel filter
- 3. Fuel injection pump

- 4. Fuel injection nozzle
- 5. Sedimenter



# 4D FUEL SYSTEM

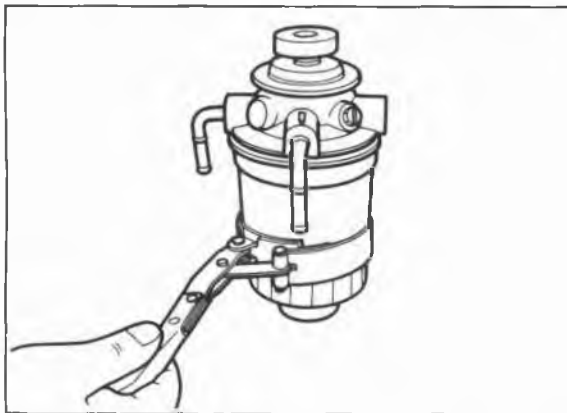


76G04D-047

## FUEL FILTER

### On-Vehicle Inspection

Check for water in the fuel filter. If present drain the water. (Refer to page 4D—4.)



76G04D-048

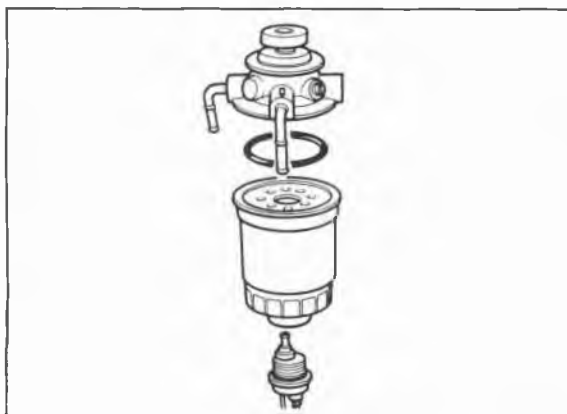
### Replacement

#### Removal

1. Disconnect the water level sensor connector (ECE).
2. Remove the water level sensor. (ECE).
3. Remove the fuel filter cartridge.

#### Warning

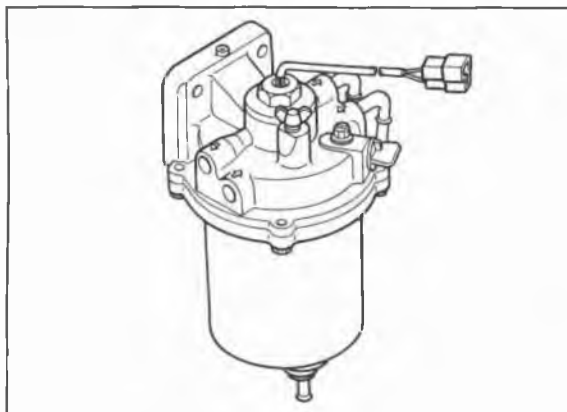
**Keep fire and open flame away from the fuel area.**



76G04D-049

### Installation

1. Apply fuel to the O-ring of the fuel filter cartridge and install it onto the filter body.
2. Install the water level sensor (ECE).
3. Connect the water level sensor connector (ECE).
4. Bleed air from fuel filter. (Refer to page 4D—4.)
5. Check for fuel leakage.

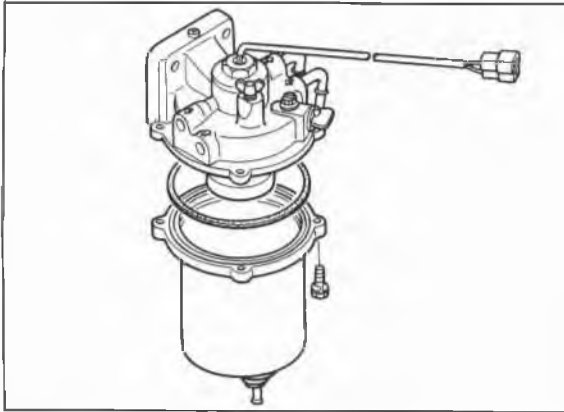


76G04D-050

## SEDIMENTER (GENERAL)

### On-Vehicle Inspection

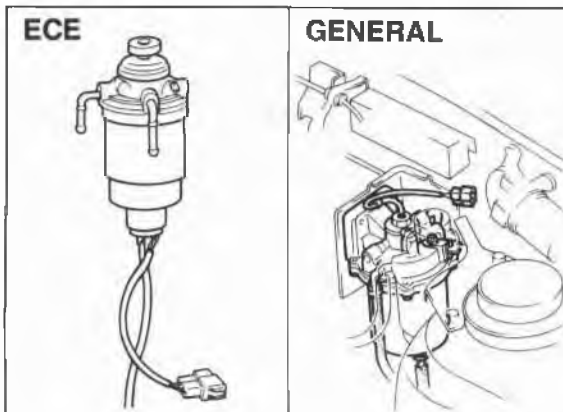
Check for water in the sedimenter. If present, drain the water. (Refer to page 4D—4.)



76G04D-051

## Replacement

1. Remove the sedimenter from the body.
2. Apply fuel to a new O-ring, and install it onto the sedimenter body with water level sensor.

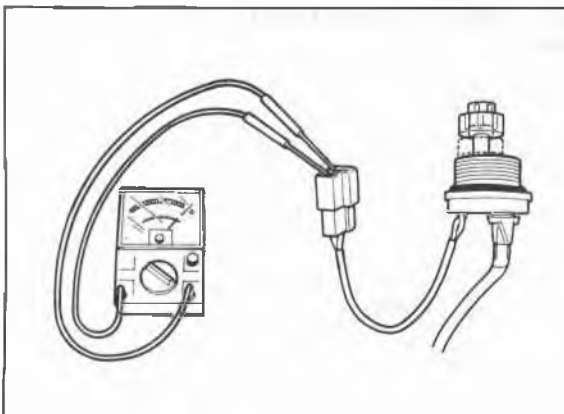


76G04D-052

## WATER LEVEL SENSOR

### Inspection

1. Remove the water level sensor.
  - (ECE)
  - Remove the water level sensor from the fuel filter. (GENERAL)
  - Remove the water level sensor from the sedimenter body.



76G04D-053

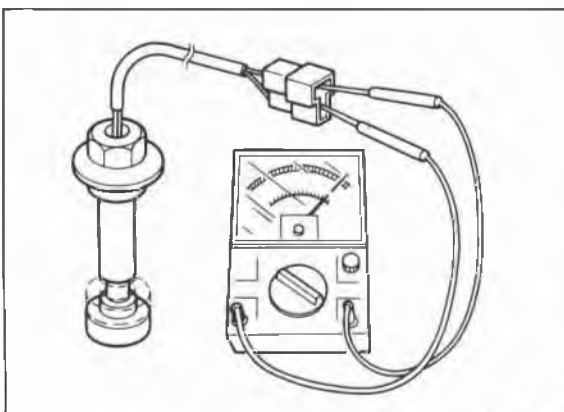
2. Check the water level sensor for continuity with an ohmmeter. Replace if necessary.

### ECE

**Continuity : Pulled condition**  
**No continuity: Pushed condition**

### GENERAL

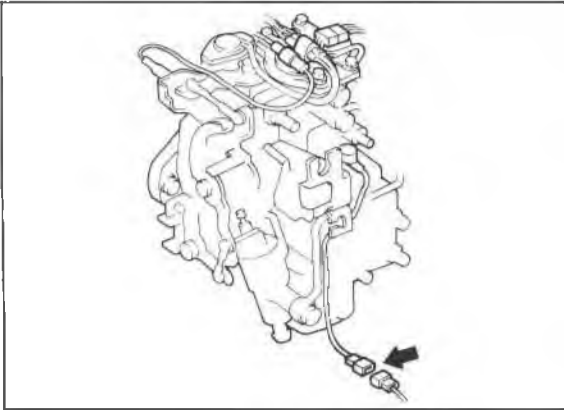
**Continuity : Pushed condition**  
**No continuity: Pulled condition**



76G04D-054

3. Apply fuel to a new O-ring and install it onto the sensor.
4. Install the water level sensor to the fuel filter (ECE) or the sedimenter (General).
5. Check for fuel leakage.

## 4D FUEL SYSTEM



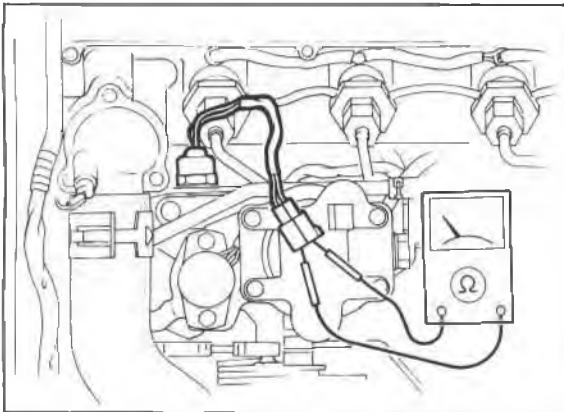
76G04D-055

### INJECTION PUMP

#### On-Vehicle Inspection

##### Fuel cut solenoid valve

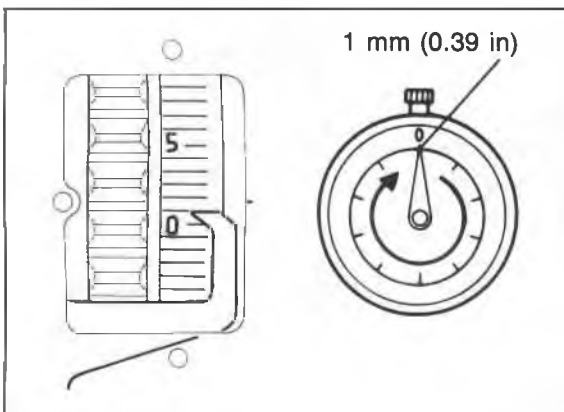
1. Run the engine at idle.
2. Disconnect the solenoid valve connector, and let the engine stop.
3. If the engine does not stop, replace the fuel cut solenoid valve.



76G04D-056

#### Pick up coil

1. Disconnect the pick up coil connector.
2. Check for continuity of the coil using an ohmmeter.
3. Replace it if there is not continuity.



76G04D-057

### Injection Timing Adjustment

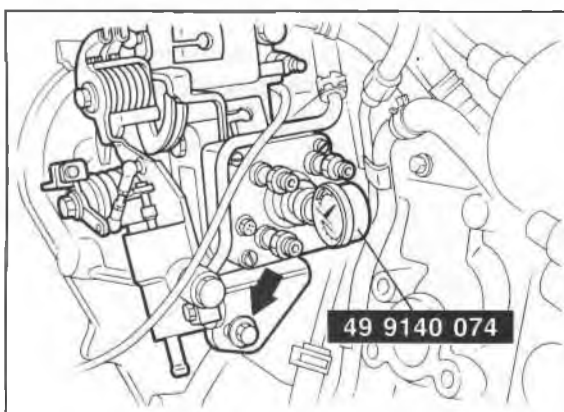
#### Inspection

Check the injection timing. (Refer to page 4D—5.)

#### Injection timing

RF-CX: ATDC 1°

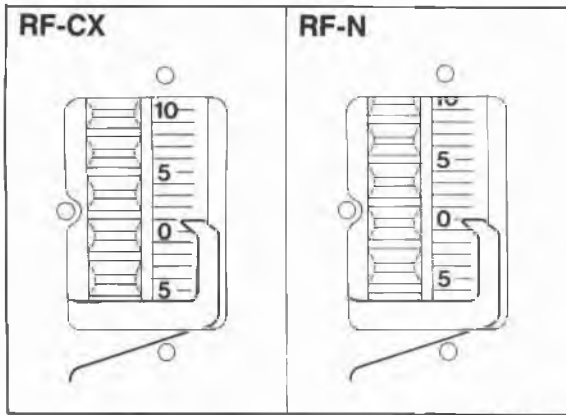
RF-N : TDC 0°



76G04D-058

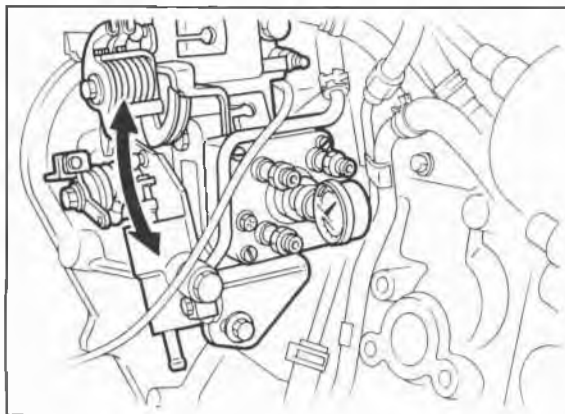
#### Adjustment

1. Loosen the injection pump mounting nut.
2. Loosen the injection pump bracket bolt.



76G04D-059

- Turn the crankshaft, and align the flywheel indicator pin at ATDC 1° (RF-CX), or TDC 0° (RF-N).

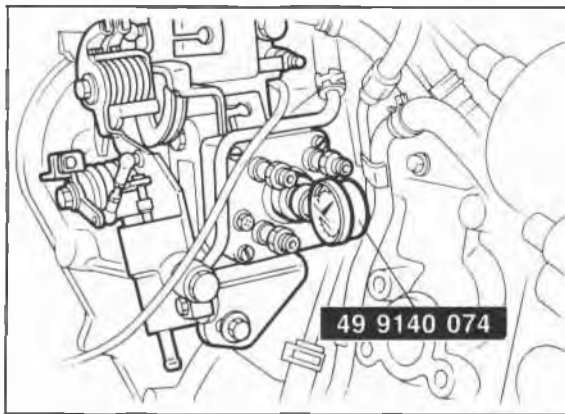


76G04D-060

- Turn the injection pump until the dial indicator indicates **1 mm (0.04 in)**.

**Note**

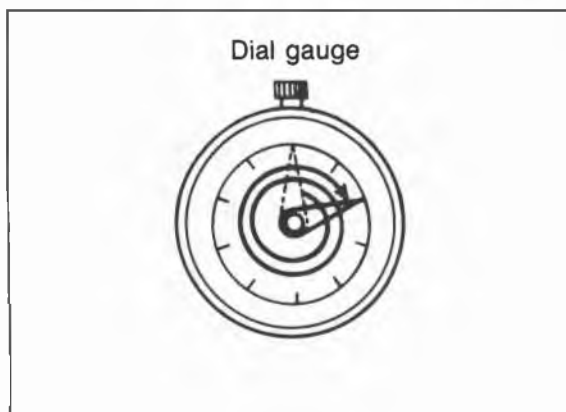
Refer to page 4D—4 for initial setting of the dial indicator.



76G04D-061

**Cam Height Inspection**

- Set the **SST** into the injection pump as for injection timing adjustment. (Refer to page 4D—4.)



76G04D-062

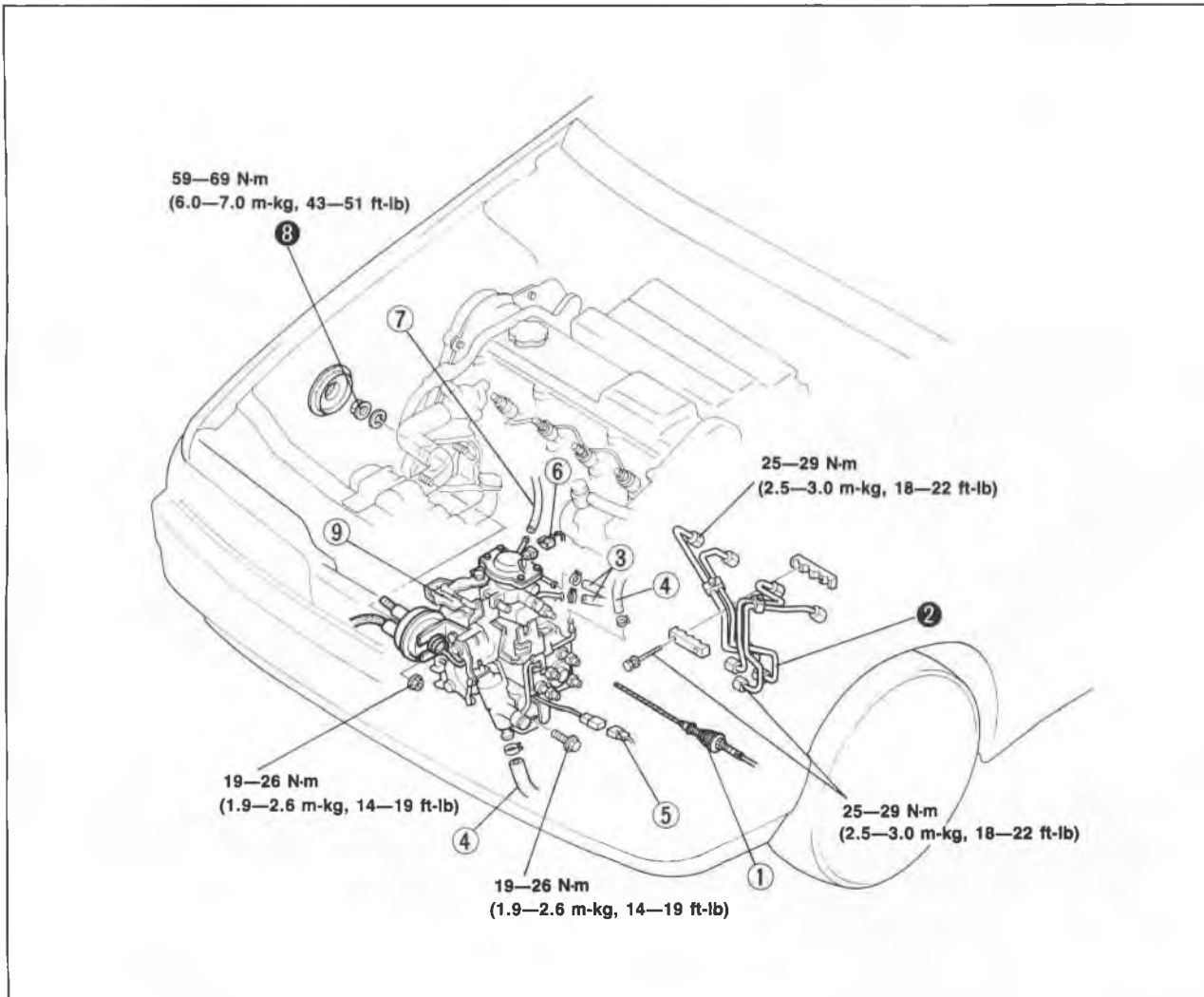
- Turn the crankshaft clockwise and read the maximum difference of the indicator value, which gives the cam height.

**Cam height: 2.2 mm (0.08 in)**

# 4D FUEL SYSTEM

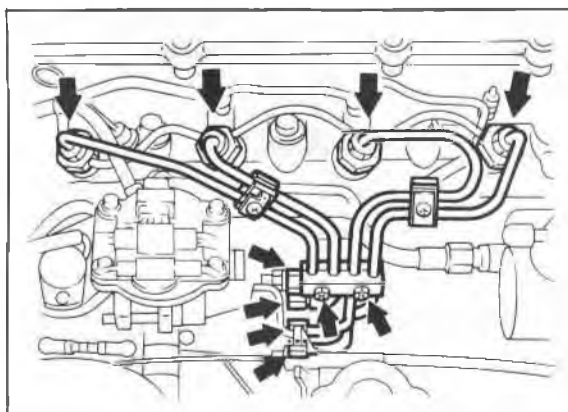
## Removal and Installation

1. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
2. Install in the reverse order of removal.



76G04D-063

- |                      |                                      |                                   |
|----------------------|--------------------------------------|-----------------------------------|
| 1. Accelerator cable | 5. Fuel cut solenoid valve connector | 8. Injection pump pulley lock nut |
| 2. Injection pipe    | 6. Pick-up coil connector            | 9. Injection pump                 |
| 3. Fuel hose         | 7. Boost air hose (RF-CX)            |                                   |
| 4. Water hose        |                                      |                                   |



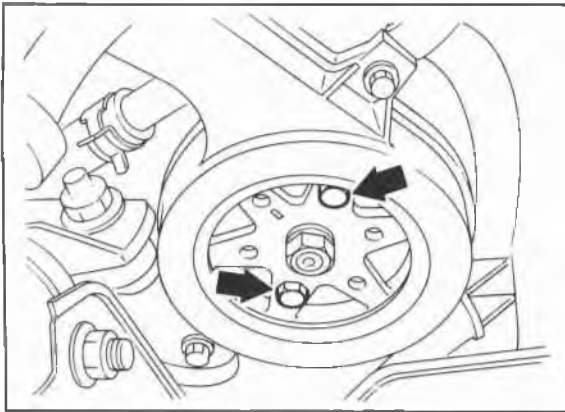
76G04D-064

### Removal note Injection pipe

#### Warning

1. Catch leaking fuel with a rag when removing the injection pipes.
2. Keep fire and open flame away from the fuel area.

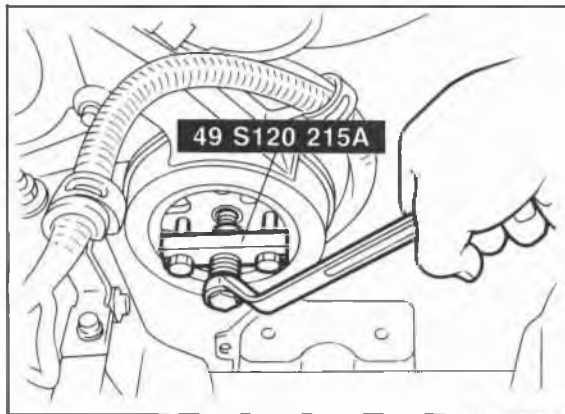
Remove the injection pipes.



76G04D-065

### Injection pump pulley

1. Put two 35—40 mm (1.3—1.6 in) long bolts through the injection pump pulley and affix them in the threaded holes of the injection pump bracket.
2. Loosen the injection pump pulley bolt.



76G04D-066

3. Separate the injection pump pulley from the injection pump shaft with the **SST**.

### Steps after installation

1. After installation adjust the injection timing. (Refer to page 4D—24.)
2. Bleed air from the fuel line.
3. Check for fuel leakage.

76G04D-067

# 4D FUEL SYSTEM

## Overhaul Service point

1. For overhauling the injection pump, see the "Repair Service and Maintenance" manual prepared by the manufacturer of the pump.
2. If the inside of the injection pump is disassembled for maintenance, be sure to properly use the checking device such as the pump tester.

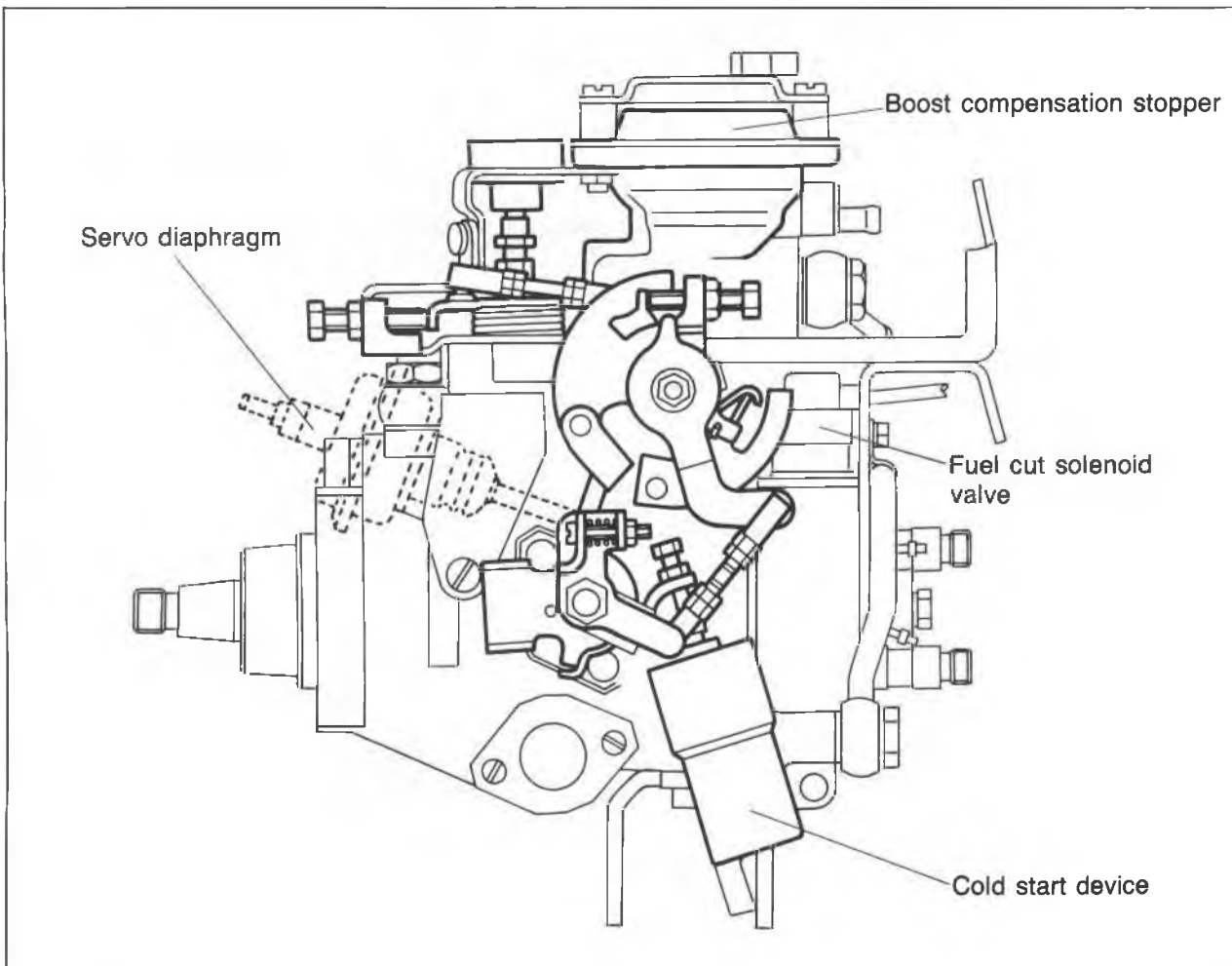
76G04D-068



63G04D-312

**Manufacturer of Injection Pump:  
Diesel Kiki Co., Ltd.**

## Construction of VE Injection Pump



63G04D-313

VE-TYPE RF71 13 800C: 104749-0343 For RF-CX

☆ TEST OIL SAE Standard test oil (SEA 967C)

Fuel injection amount

Item	Pump speed (RPM)	Fuel injection amount (cm <sup>3</sup> /stroke)
Start	100	More than 55/1,000
Full load	600	33.9—38.9/1,000
	1,000	48.9—50.9/1,000
	2,150	39.7—44.7/1,000
	2,250	32.7—37.7/1,000
	2,550	8.0—15.0/1,000
Idling	360	7.6—10.6/1,000

Chamber pressure and timer stroke

Pump speed (RPM)	Chamber pressure (kg/cm <sup>2</sup> )	Timer stroke (mm)
500	—	—
1,250	4.5—5.1	2.7—3.9
1,500	5.2—5.8	4.3—4.9
2,150	6.8—7.4	7.6—8.8

Load sensing timer and overflowing quantity

Item	Fuel injection amount (cm <sup>3</sup> /stroke)
Load sensing timer	Start 37.2—39.2/1,000
	End 32.2—34.2/1,000
Overflowing quantity	41.0—85.0/1,000

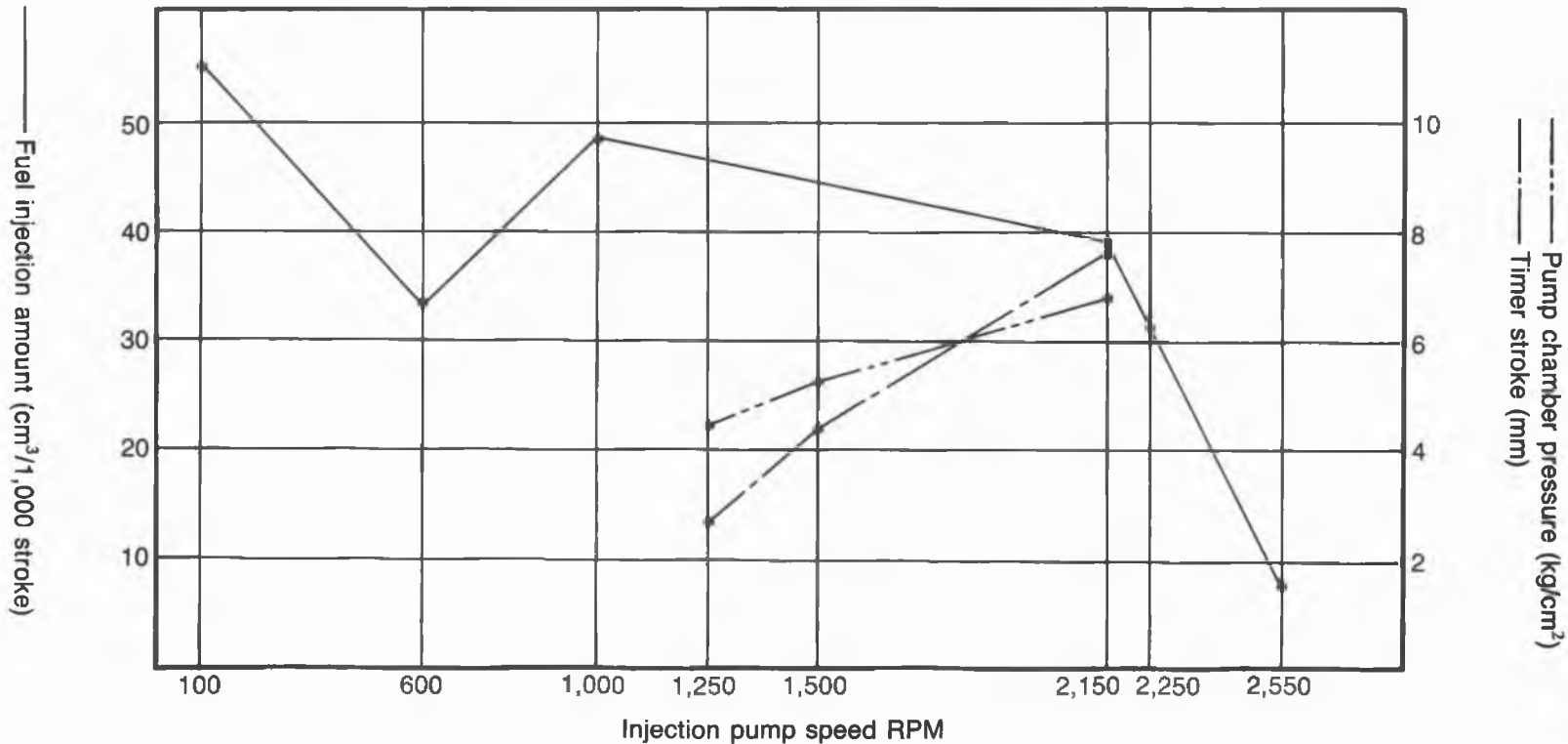
Measurement

Measuring place	Dimension (mm)
KF	5.7—5.9
K	3.2—3.4
MS	1.6—1.8

\*Checking condition

Pump speed: 1,500 rpm

Lever: Full load



Injection Pump Characteristic (RF-CX)

FUEL SYSTEM 4D



Injection Pump Characteristic (RF-N)

VE-TYPE RF79 13 800A: 104748-0343 For RF-N ENGINE

☆ TEST OIL SAE Standard test oil (SEA 967C)

Fuel injection amount

Item	Pump speed (RPM)	Fuel injection amount (cm <sup>3</sup> /stroke)
Start	100	More than 42/1,000
	600	29.0—33.0/1,000
Full load	1,375	34.9—36.9/1,000
	2,325	30.2—34.2/1,000
	2,600	9.8—15.8/1,000
	2,700	Max. 6.0/1,000
	Idling	360

Chamber pressure and timer stroke

Pump speed (RPM)	Chamber pressure (kg/cm <sup>2</sup> )	Timer stroke (mm)
600	2.2—2.8	—
1,375	4.4—5.0	3.9—4.5
1,800	5.6—6.2	6.1—7.3
2,325	6.9—7.5	7.2—8.4
—	—	—

Load sensing timer and overflowing quantity

Item	Fuel injection amount (cm <sup>3</sup> /stroke)
Load sensing timer	Start 26.7—29.7/1,000
	End 14.6—17.6/1,000
Overflowing quantity	46.3—90.3/1,000

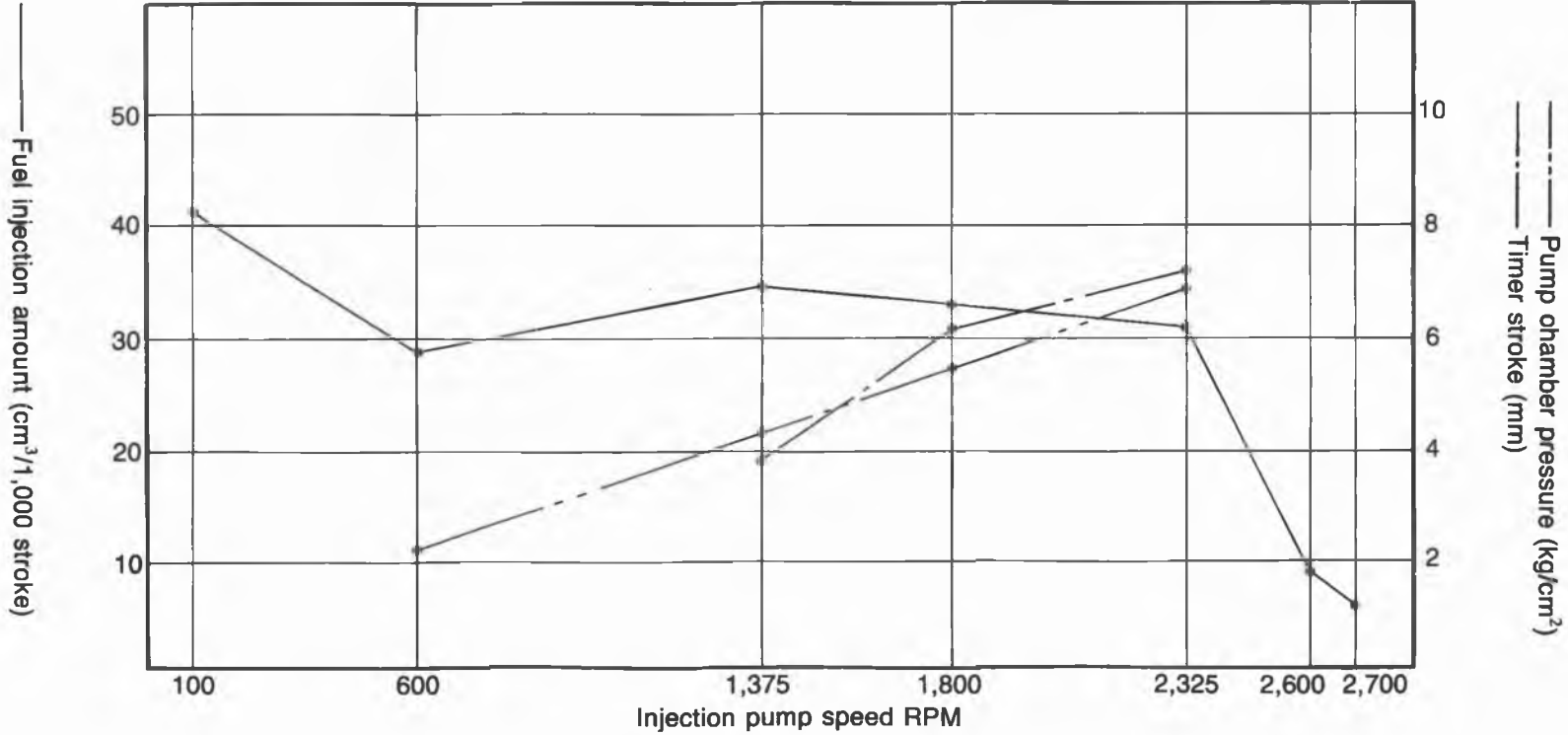
Measurement

Measuring place	Dimension (mm)
KF	5.8—5.9
K	3.2—3.4
MS	1.4—1.6

\*Checking condition

Pump speed: 1,375 rpm

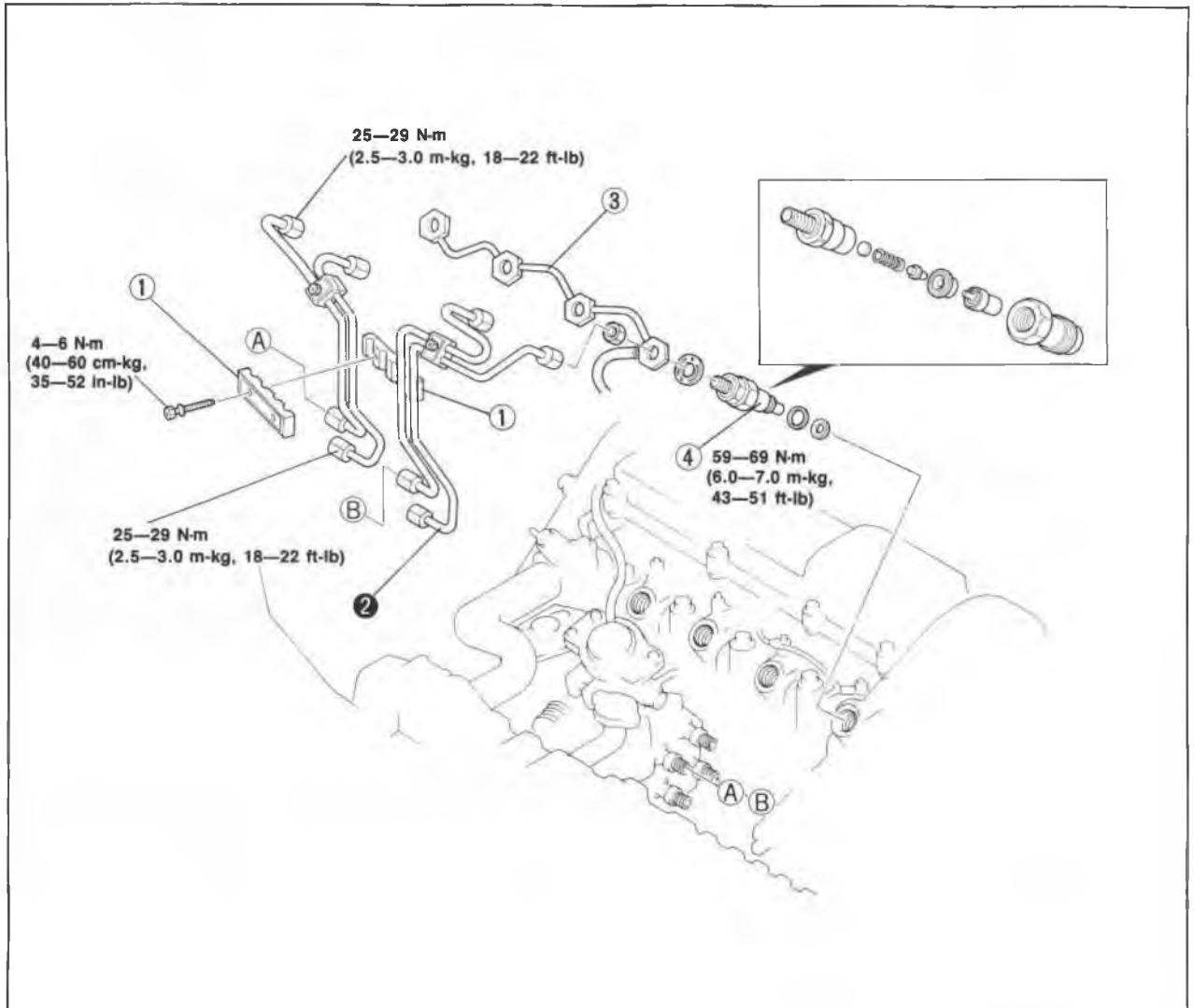
Lever: Full load



## INJECTION NOZZLE

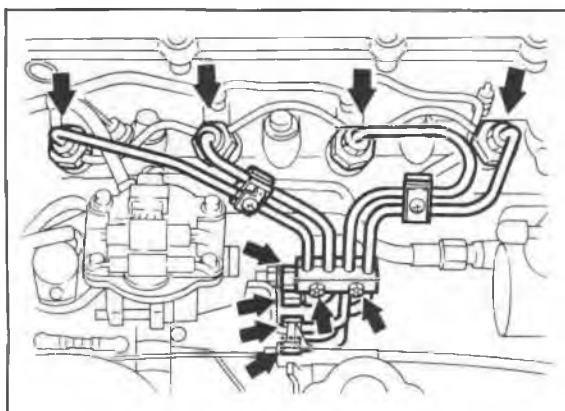
### Removal

Remove in the sequence shown in the figure, referring to the removal note for the specially marked parts.



76G04D-071

1. Injection pipe bracket
2. Injection pipe
3. Fuel leak pipe
4. Fuel injection nozzle



76G04D-072

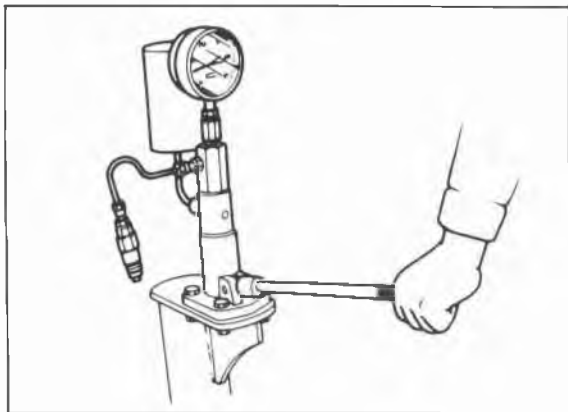
### Removal note Injection pipe

#### Warning

- a) Catch leaking fuel leakage with a rag when removing the injection pipes.
- b) Keep fire and open flame away from the fuel area.

Remove the injection pipes.

# 4D FUEL SYSTEM



76G04D-073

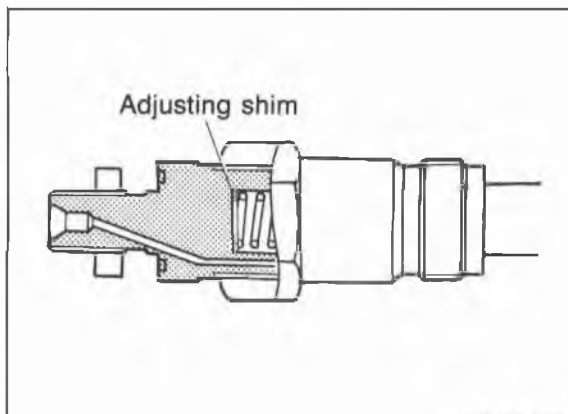
## Inspection

### Injection starting pressure

1. Set the nozzle on the nozzle tester.
2. Bleed the air by pumping the nozzle tester handle several times.
3. Slowly lower the nozzle tester handle and check the pressure when injection starts.

### Injection starting pressure:

**13,200 kPa (135 kg/cm<sup>2</sup>, 1,920 lb/in<sup>2</sup>) at 20°C (36°F) of fuel temperature**

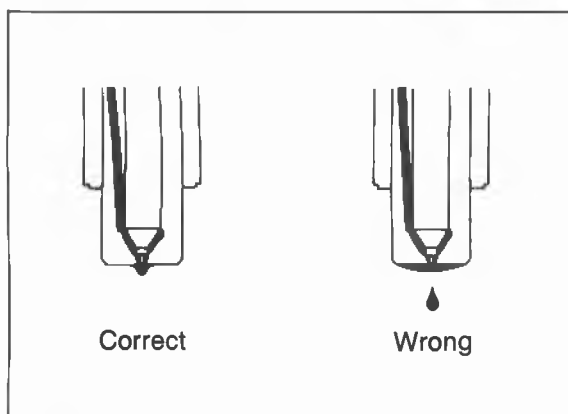


76G04D-074

4. If the injection starting pressure is higher than specification, increase the shim thickness. If the injection starting pressure is lower than specification, decrease the shim thickness.

## Note

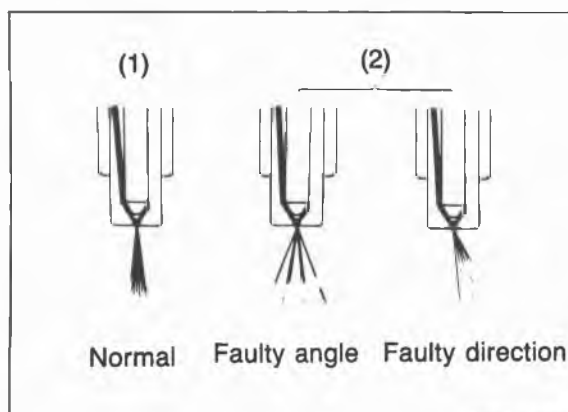
**Adjusting shims are available in 0.05 mm (0.0197 in) thicknesses, from 1.0 mm (0.039 in) to 1.95 mm (0.077 in). When 0.05 mm (0.0197 in) is added, injection pressure increases approx. 490 kPa (5.0 kg/cm<sup>2</sup>, 70 psi).**



76G04D-075

## Nozzle leakage

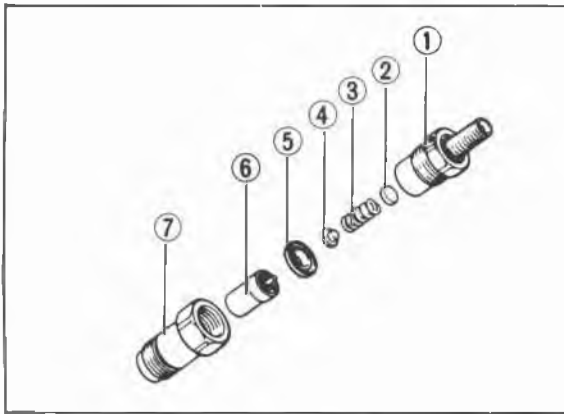
1. Apply **11,300 kPa (115 kg/cm<sup>2</sup>, 1,640 psi)** pressure to the injection nozzle, and check for fuel leaks from the injection hole.
2. If fuel leaks, overhaul or replace the injection nozzle.



76G04D-076

## Atomization (spray pattern)

1. Set the injection nozzle on the nozzle tester.
2. Bleed the air by operating the nozzle tester handle several times.
3. Lower the handle several times as quickly as possible so that a pulsating whistling sound is heard, and check the atomization.
  - (1) Uniform and proper atomization
  - (2) Incorrect injection angle and direction
4. If necessary, overhaul or replace the injection nozzle.

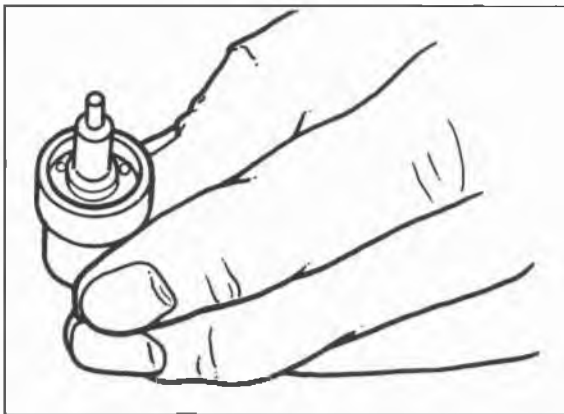


76G04D-077

### Injection Nozzle Disassembly

**Disassemble the injection nozzle.**

1. Nozzle holder
2. Adjusting shim
3. Pressure spring
4. Pressure pin
5. Distance piece
6. Nozzle
7. Retaining ring



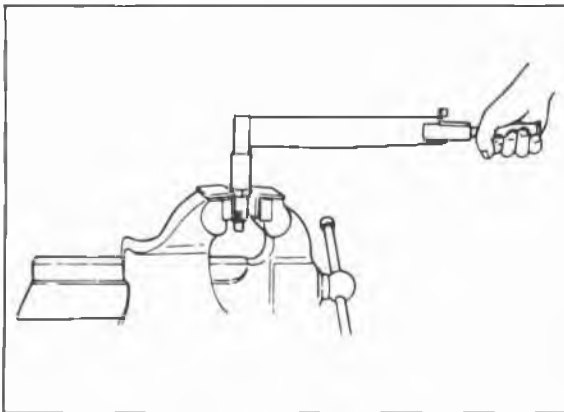
76G04D-078

### Cleaning

Clean the parts in clean test oil.

### Injection Nozzle Inspection

1. Check the needle valve, nozzle body, and other parts for damage.
2. Hold the nozzle body upright and insert approximately two thirds of the needle valve, and check that the needle valve drops to the valve seat by its own weight.



76G04D-079

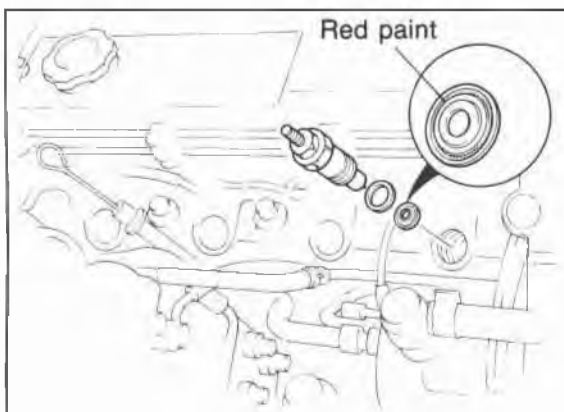
### Injection Nozzle Assembly

1. Assemble the injection nozzle.

#### Tightening torque of nozzle body:

**29—49 N·m (3.0—5.0 m·kg, 22—36 ft·lb)**

2. Check the injection starting pressure, and atomization. (Refer to page 4D—32.)



76G04D-080

### Injection Nozzle Installation

1. Install in the reverse order of removal, referring to the installation note.
2. Check for fuel leakage.

#### Installation note

##### Nozzle gasket

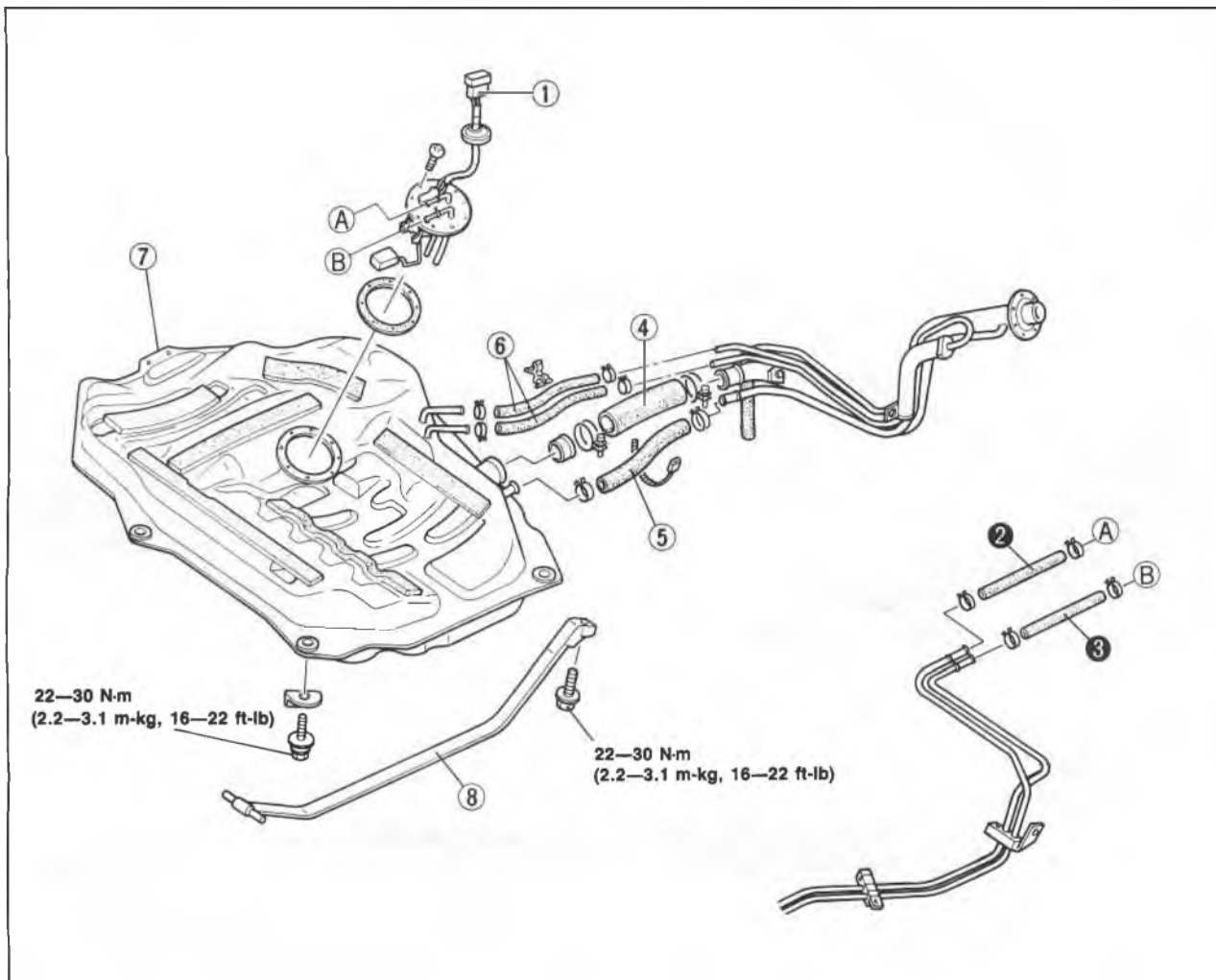
Install a new gasket with the red face toward the nozzle.

# 4D FUEL SYSTEM

## FUEL TANK

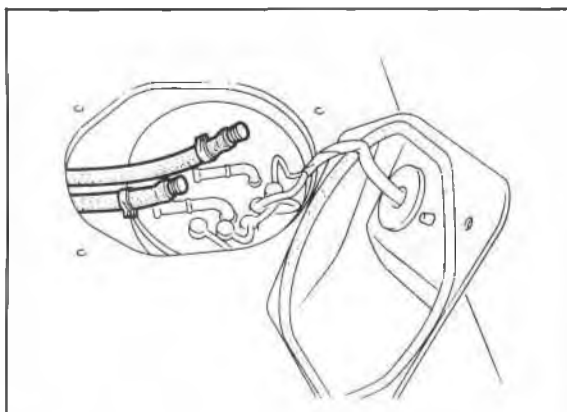
### Removal and Installation

1. Drain the fuel from the fuel tank.
2. Remove in the sequence shown in the figure, referring to the removal note for the specially marked parts.



76G04D-081

- |                               |                     |                  |
|-------------------------------|---------------------|------------------|
| 1. Fuel level gauge connector | 4. Joint hose       | 7. Fuel tank     |
| 2. Fuel main hose             | 5. Ventilation hose | 8. Fuel tank pad |
| 3. Fuel return hose           | 6. Breather hose    |                  |



76G04D-082

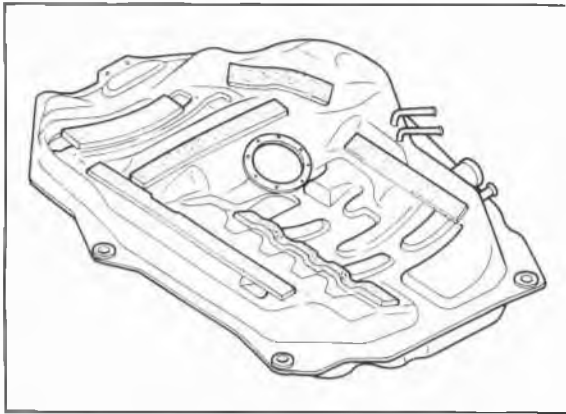
### Removal note

Fuel main and return hoses

1. Remove the service hole cover from the body.
2. Disconnect the fuel main and return hoses and plug them.

### Warning

**Keep fire and open flame away from the fuel area.**

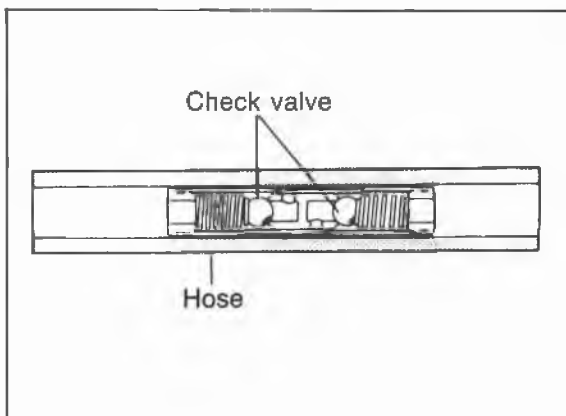


76G04D-083

## Inspection

### Fuel tank

Check the fuel tank for cracks or damage. Replace if necessary.



76G04D-084

## Two way check valve

1. Disconnect the hose from the fuel tank.
2. Check that the air flows in both directions through the valve.
3. Replace the fuel vent hose if necessary.

## Installation

1. Install in the reverse order of removal.
2. Bleed air from fuel line.
3. Check for fuel leakage.

76G04D-085

# ENGINE ELECTRICAL SYSTEM

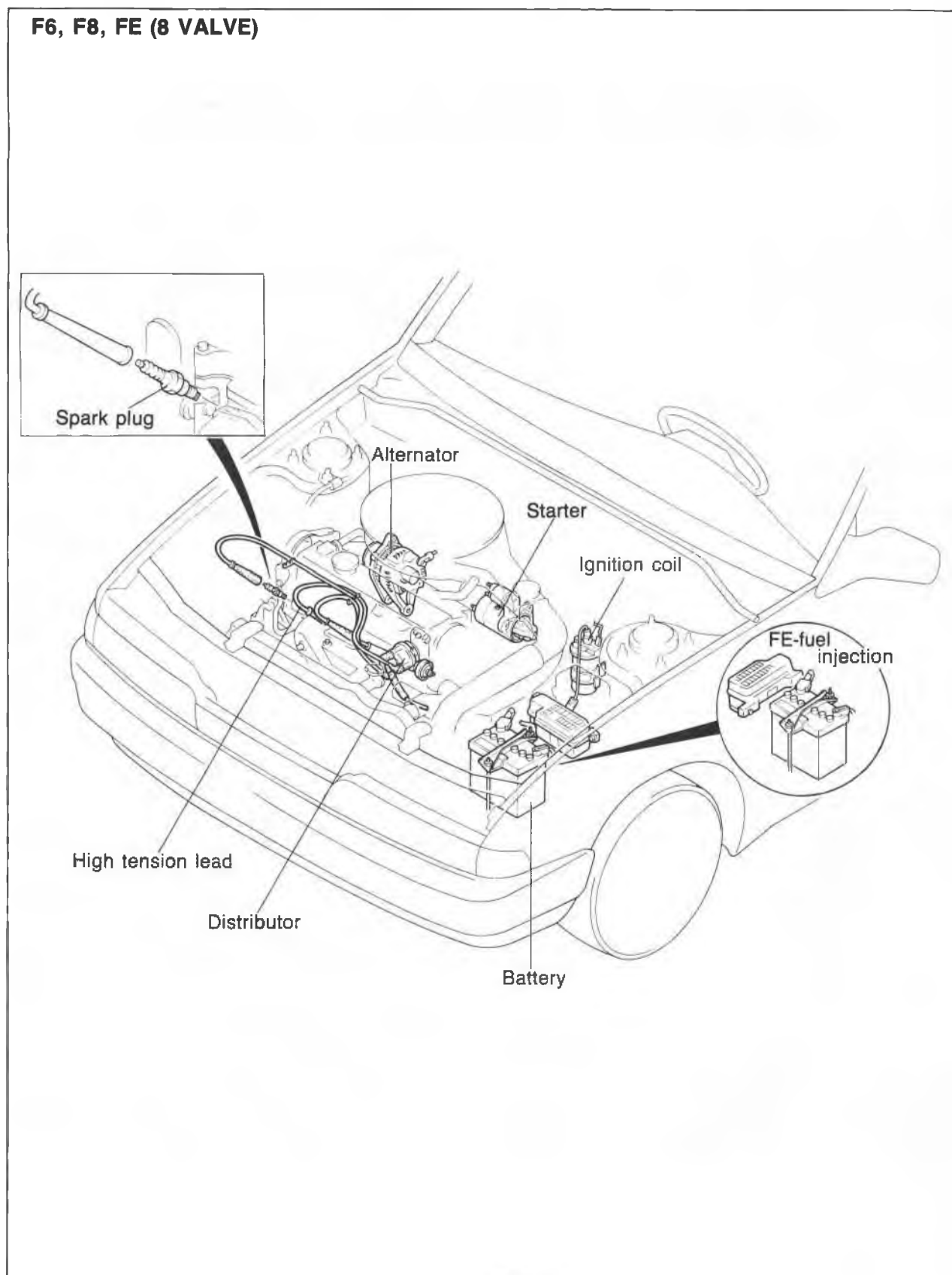
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# 5 OUTLINE

## OUTLINE

### STRUCTURAL VIEW

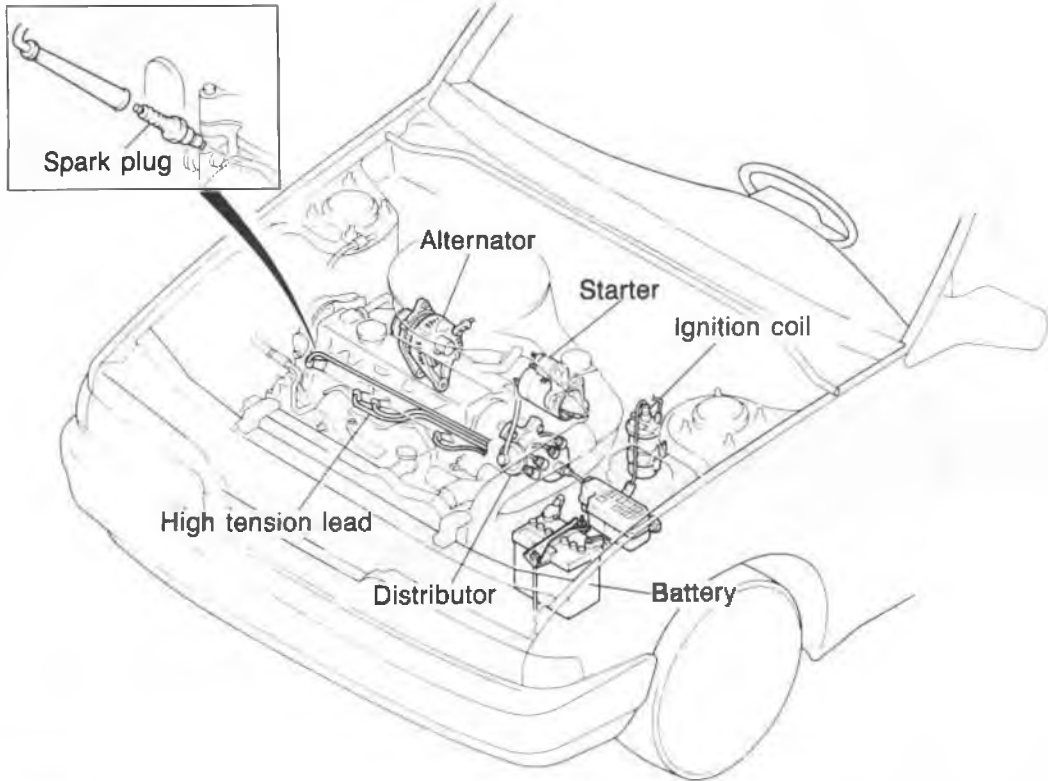
F6, F8, FE (8 VALVE)



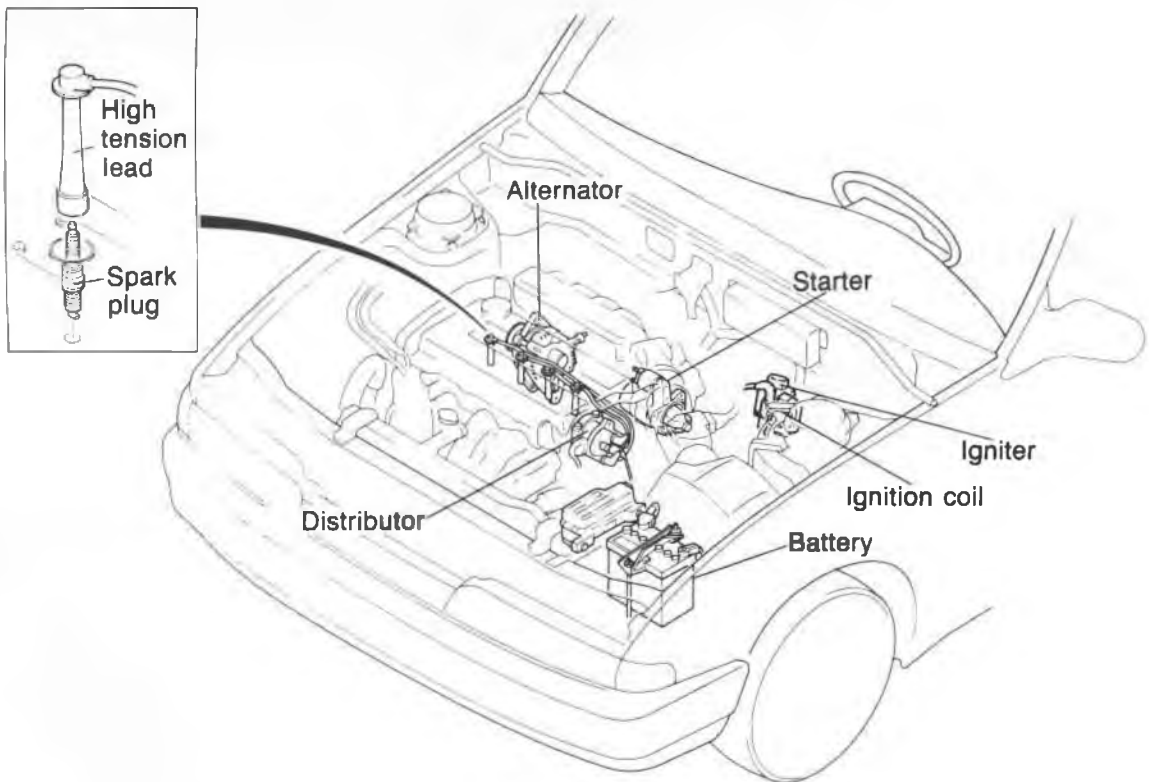
76G05X-002



FE (12 VALVE)

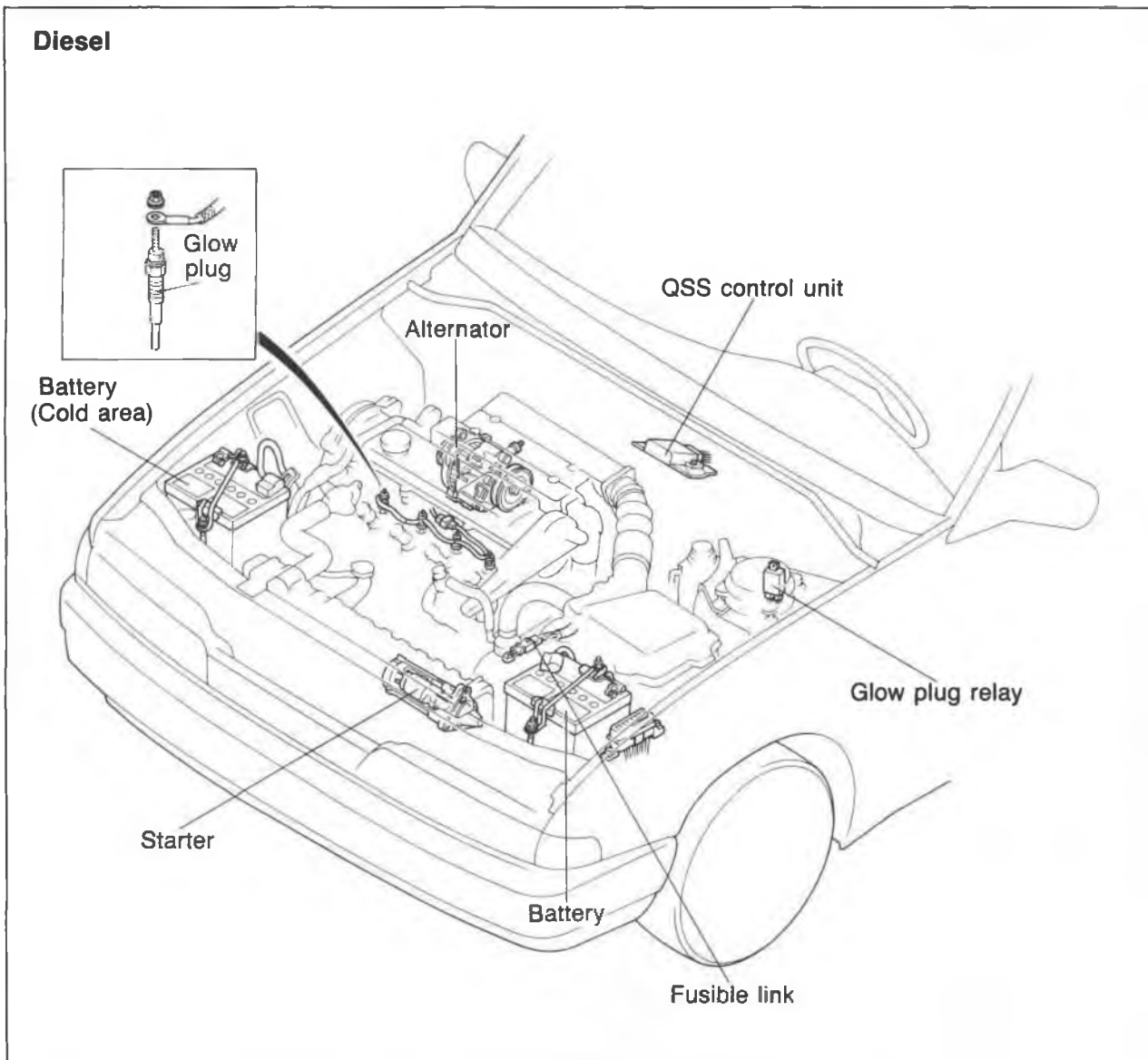


FE (DOHC)



# 5 OUTLINE

## Diesel



**SPECIFICATIONS  
Gasoline Engine**

		Engine		F6	F8	FE (8 VALVE)	FE (12 VALVE)	FE (DOHC)	
Battery	Voltage	V		12. Negative ground					
	Type and capacity (20 hour rate)	34B19L(S) (33 Ah): General 50D20L (50 Ah), 55D23L (60 Ah): ECE							
Alternator	Type	A.C.							
	Output	V—A		12—70					
	Regulator type	Transistorized (built-in IC regulator)							
	Regulated voltage	V		14.1—14.7					
	Brush length mm (in)	Standard	16.5 (0.650)						
		Minimum	8.0 (0.315)						
Drive belt tension mm (in)/98 N (10 kg, 22 lb)	New: 6—8 (0.24—0.32), Used: 7—9 (0.28—0.35)								
Starter	Type	Coaxial reduction: Middle East & General (FE · carburetor) Non-reduction: Others							
	Output	V—kW		12—0.85	12—0.95		12—1.4	12—0.95	
	Brush length mm (in)	Standard	17.0 (0.669)		Unleaded fuel 17.0 (0.669) Others 17.5 (0.689)		17.0 (0.669)		
		Minimum	11.5 (0.453)		Unleaded fuel 11.5 (0.453) Others 10.0 (0.394)		11.5 (0.453)		
Ignition timing	6 ± 1° BTDC (Vacuum hose disconnected)							12 ± 1° BTDC (Test connector grounded)	
Distributor	Type	Fully transistorized (HEI)							Electronic spark advance
	Centrifugal spark advance (crank angle/engine speed) degree/rpm	F6 -2—2/1,000 6—10/2,100 14—18/6,100  F8 -2—2/1,000 10—14/2,100 18—22/6,100  FE (8 VALVE)—Carburetor Unleaded fuel (MTX) -2—2/1,760 12—16/3,360 22—26/5,320 (ATX) -2—2/1,300 12—16/3,360 22—26/5,320  Others -2—2/1,460 10—14/2,540 22—26/5,540  FE (12 VALVE)—Carburetor -2—2/1,200 10—14/2,400 10—14/4,000 16—20/5,000  FE—Fuel injection (except FE DOHC) -2—2/1,000 10—14/2,600 10—14/4,600 16—20/5,800							

\* Unleaded fuel model

# 5 OUTLINE

Item		Engine		F6	F8	FE (8 VALVE)	FE (12 VALVE)	FE (DOHC)
		Distributor	Vacuum spark advance (Crank angle/Vacuum)  degree/mmHg (inHg)	F6 and F8 -2-2/100 6-10/300  FE (8 VALVE)—Carburetor Unleaded fuel -2-2/120 8-12/245  Others (MTX) -2-2/100 16-20/250 (ATX) -2-2/100 10-14/200  FE (12 VALVE)—Carburetor -2-2/120 11-15/300  FE—Fuel injection (except FE DOHC) [A chamber] -2-2/125 18-22/300  [B chamber] -2-2/125 -6-10/200				
Spark plug	Type	FE (8 VALVE)* <sup>1</sup> NGK: BPR5ES-11, BPR6ES-11 Nippon Denso: W16EXR-U11, W20EXR-U11  Others NGK: BPR5ES, BPR6ES Nippon Denso: W16EXR-U, W20EXR-U				NGK: BCPR5E, BCPR6E Nippon Denso: Q16PR-U, Q20PR-U	Unleaded fuel NGK: BCPR5E-11 BCPR6E-11 BCPR7E-11  Leaded fuel NGK: BCPR5E BCPR6E	
	Plug gap	mm (in)	0.75-0.85 (0.030-0.033), FE (8 VALVE)* <sup>1</sup> 1.0-1.1 (0.039-0.043)			0.7-0.8 (0.028-0.031)	1.0-1.1 * <sup>1</sup> (0.039-0.043) 0.7-0.8 * <sup>2</sup> (0.028-0.031)	
Firing order		1-3-4-2						

76G05X-504

## Diesel Engine

Item		Engine		RF-N		RF-CX			
		Battery	Voltage	V	12, Negative ground				
	Type and capacity (20 hour rate)	80D26L (65) 50D20L, 50D20R (50)—ECE		80D26L (65) 65D23L, 65D23R (55)					
Alternator	Type	A.C.							
	Output	V—A	12-70		12-75				
	Regulator type	Transistorized (built-in IC regulator)							
	Regulated voltage	V	14.1-14.7						
	Brush length	mm (in)	Standard	16.5 (0.650)		21.5 (0.846)			
			Minimum	8.0 (0.315)		8.0 (0.315)			
Drive belt tension	mm (in)/98 N (10 kg, 92 lb)	New: 9-11 (0.35-0.43), Used: 12-14 (0.47-0.55)							
Starter	Type	Reduction							
	Output	V—kW	12-2.0, 12-2.2 (Cold area)						
	Brush length	mm (in)	Standard	2.0 kW: 17.0 (0.669), 2.2 kW: 18.0 (0.709)					
Minimum			2.0 kW: 11.0 (0.453), 2.2 kW: 11.0 (0.453)						
Firing order		1-3-4-2							

\*<sup>1</sup> Unleaded fuel model

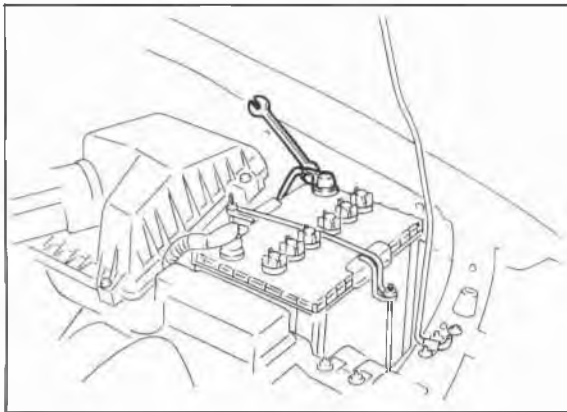
\*<sup>2</sup> Leaded fuel model

76G05X-505

TROUBLESHOOTING GUIDE

Problem	Possible cause	Remedy	Page
<b>Starter does not turn at all, or its turning speed is too slow to start the engine.</b>	Battery and related parts Poor contact of battery terminals Poor grounding of negative cable Voltage drop caused by discharged battery Insufficient voltage caused by battery malfunction	Clean and tighten Clean and repair Recharge Replace	5— 8 — 5— 8 5— 8
	Ignition switch and related parts Poor contact of ignition switch Loose ignition switch wiring or connector Broken wire between ignition switch and magnetic switch	Replace Repair Repair or replace	— — 5—38,45,56,66
	Magnetic switch and related parts Loose wiring and/or connectors Burnt magnetic switch contact plate or improper contact Broken wire in magnetic switch pull-in coil Broken wire magnetic switch holding coil	Repair Replace Replace Replace	5—38,45,56,66 5—43,54,64,74 5—43,54,64,74 5—43,54,64,74
	Starter Poor contact of brushes  Fatigued brush spring Poor grounding of field coil Poor soldering of field coil Commutator malfunction Grounded armature Worn parts	Adjust contact or replace Replace Replace Repair Repair or Replace Replace Replace	5—43,54,64,74      — —
<b>Starting problem</b>	Gasoline engine Insufficient battery capacity Malfunction of spark plug (s)  Loose positive terminal Damaged distributor cap or rotor Ignition coil malfunction Igniter malfunction	Recharge Clean, adjust or replace Tighten Replace Replace Replace	5— 8 5— 9  — 5—16 5—10 5—16,20
	Diesel engine Insufficient battery capacity QSS system malfunction	Recharge Replace	5— 8 5—76
<b>Starter turns but pinion gear does not mesh with ring gear</b>	Starter Tip of overrunning clutch pinion is worn Weakened overrunning clutch drive spring Worn overrunning clutch Improper sliding of spline  Worn bushing Worn ring gear	Replace Replace Replace Adjust contact and repair, or replace Replace Replace	— — — 5—40,54,70  — —
<b>Starter turns continuously (does not stop)</b>	Magnetic switch Sticking contact plate of magnetic switch Layer shorting coil of magnetic switch Ignition switch does not return	Replace Replace Replace	5—43,54,64,74 5—43,54,64,74 —
<b>Misfiring</b>	Dirty or damaged spark plug (s) Malfunction of wiring, or open circuit Damaged distributor cap	Clean or replace Repair or Replace Replace	5— 9 5—10 5—16
<b>Discharging of battery</b>	Alternator Loose drive belt Grounded or broken stator coil Broken rotor coil Poor contact of brush and slip ring  Malfunction of rectifier Malfunction of IC regulator	Adjust Replace Replace Replace Clean, repair or replace Replace Replace	5—37 5—32 5—32 5—32  5—34 —
	Battery and related parts Insufficient or unsuitable battery electrolyte Malfunction of battery electrode (internal short-circuit) Poor contact of battery terminal (s) Excessive electric load	Adjust Replace Clean and tighten Check power consumption and short circuit	5— 8 5— 8 5— 8 —
<b>Overcharging of battery</b>	IC regulator malfunction Operating in extremely high temperature	Replace Repair	— —
<b>Poor acceleration</b>	Mis-adjusted ignition timing Distributor malfunction	Adjust Repair or replace	5—11 5—11
	<b>Knocking</b>	Mis-adjusted ignition timing Distributor malfunction	Adjust Repair or replace

# 5 BATTERY



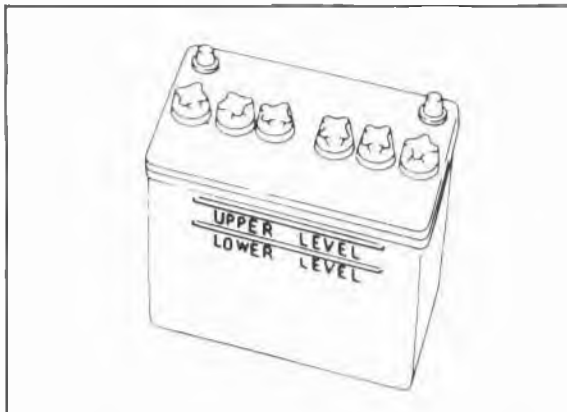
4BG05X-006

## BATTERY

### INSPECTION

#### Terminal and Cable

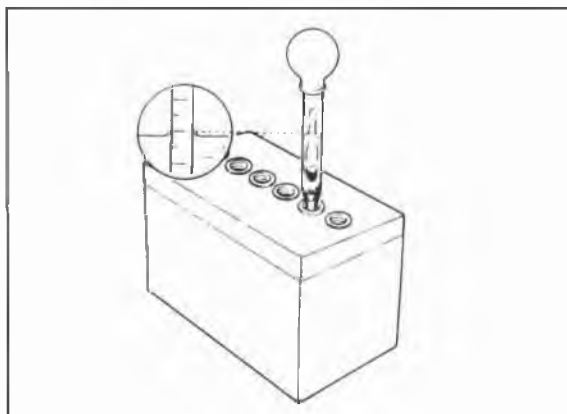
1. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat them with grease after tightening the terminal.
2. Inspect for corroded or frayed battery cables.
3. Check the rubber protector on the positive terminal for proper coverage.



4BG05X-007

#### Electrolyte Level

1. Check whether or not the electrolyte level lies between the "UPPER LEVEL" and the "LOWER LEVEL" lines.
2. If low, add distilled water by the "UPPER LEVEL". Do not overfill.



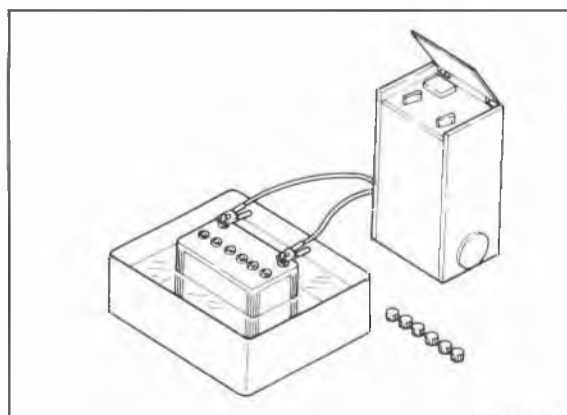
76G05X-004

#### Specific Gravity

1. Measure the specific gravity by using a hydrometer.
2. If the specific gravity reading is standard or less, recharge the battery.

**Standard gravity: 1.22**

**Fully charged gravity: 1.27—1.29**

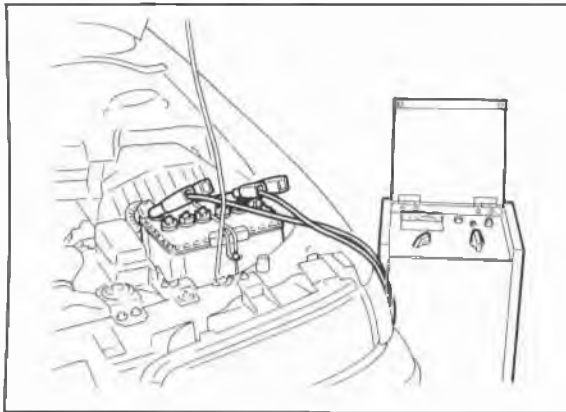


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## RECHARGE

### Quick Charge

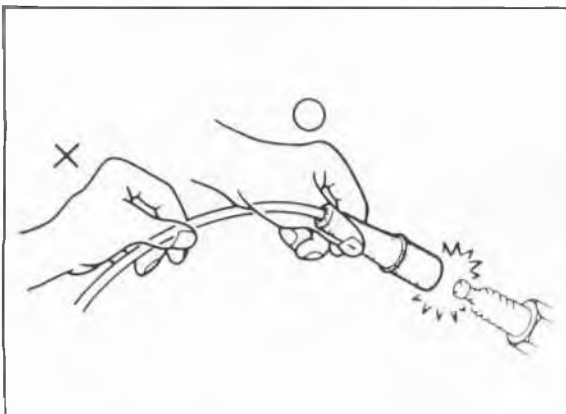
1. Remove the battery from the vehicle.
2. Remove all the vent caps.
3. Perform a quick charge (6A or above, but max. 20A).
4. Add distilled water if necessary while charging.
5. Cool the battery not to exceed the electrolyte temperature over 55°C (131°F) while charging.
6. Charge once more if the specific gravity is under fully charged gravity.



4BG05X-010

## Slow Charge

1. Stop the engine
2. Turn all the accessories off.
3. Remove the negative battery cable.
4. Perform a slow charge (3.5A to 4.5A).
5. Add distilled water if necessary while charging.
6. Charge once more if the specific gravity is under fully charged gravity.



76G05X-054

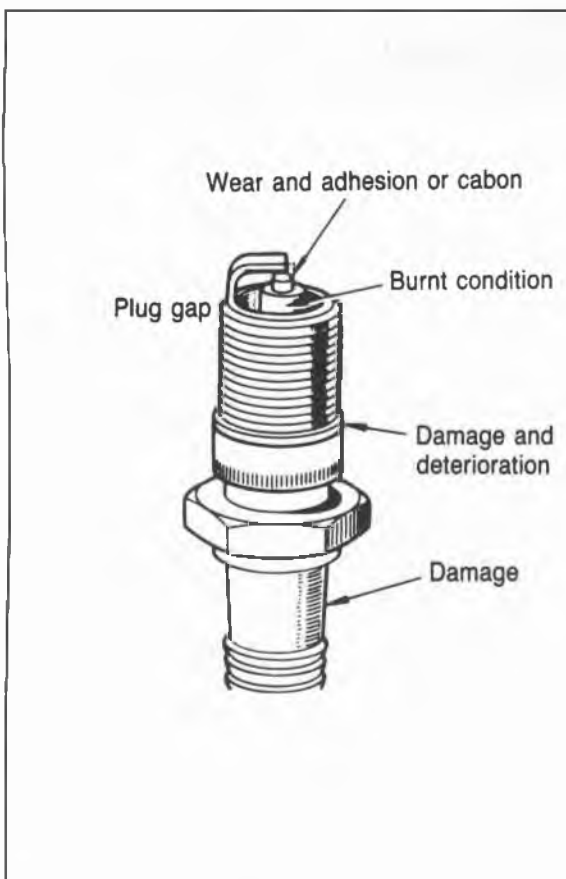
## SPARK PLUG

### REMOVAL AND INSTALLATION

Note the following points:

1. When the high-tension lead is to be pulled off, be sure to pull the boot itself, and not the wire.
2. Tighten the spark plugs to the specified torque.

**Tightening torque: 15—23 N·m  
(1.5—2.3 m·kg, 10.8—16.6 ft·lb)**



76G05X-005

### INSPECTION

Check the following points. If a problem is found, replace the spark plug.

1. Damaged insulation
2. Worn electrodes
3. Carbon deposits  
If cleaning is necessary, use a plug cleaner or a wire brush. Clean the upper insulator also.
4. Damaged gasket
5. Burnt condition of spark insulator
6. If it is black with carbon deposits, either misfiring due to improper proportions of gas and air or overheating of the plug may have occurred.

### Plug gap:

**FE (12VALVE) and FE DOHC Leaded fuel model:**

**0.70—0.80 mm (0.028—0.031 in)**

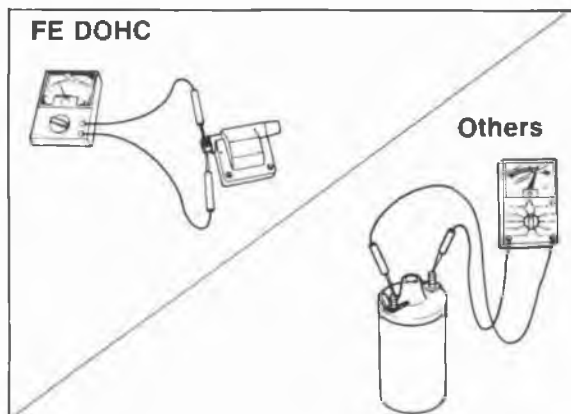
**FE (8VALVE) and FE DOHC Unleaded fuel model:**

**1.0—1.10 mm (0.039—0.043 in)**

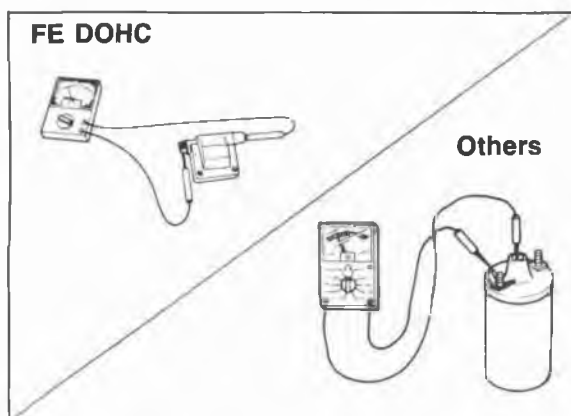
**Others:**

**0.75—0.85 mm (0.030—0.034 in)**

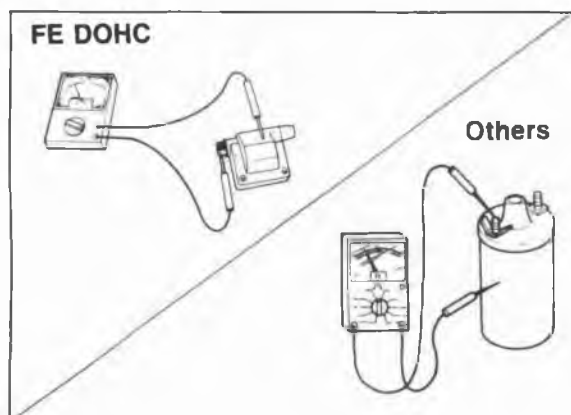
## 5 IGNITION COIL, HIGH-TENSION LEAD



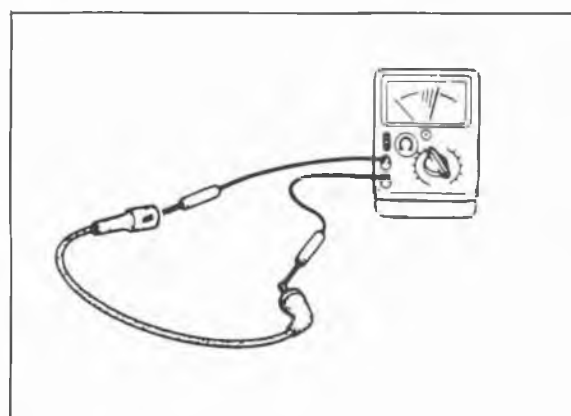
76G05X-006



76G05X-055



86U05X-046



86U05X-047

### IGNITION COIL

#### INSPECTION

##### Primary Coil

Use an ohmmeter and check for resistance in the primary coil. If it is not within the specification, replace the coil.

##### Primary coil resistance: (at 20°C 68°F)

FE DOHC...0.72—0.88  $\Omega$

Others.....1.04—1.27  $\Omega$

##### Secondary Coil

Use a ohmmeter to measure the resistance of the secondary coil. If it is not within specification, replace the coil.

##### Secondary coil resistance: (at 20°C 68°F)

FE DOHC.....10.3—13.9 k $\Omega$

Others..... 7.1— 9.7 k $\Omega$

#### Insulation of Case

Use a **500V megger** tester to measure the insulation resistance between the primary terminal and the case.

The standard reading is **10 M $\Omega$  or more**.

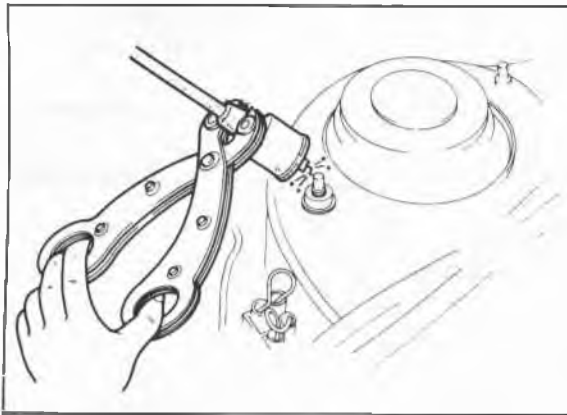
### HIGH-TENSION LEAD

#### INSPECTION

Measure the resistance using an ohmmeter.

**Resistance: 16 k $\Omega$  per 1m (3.28 ft)**



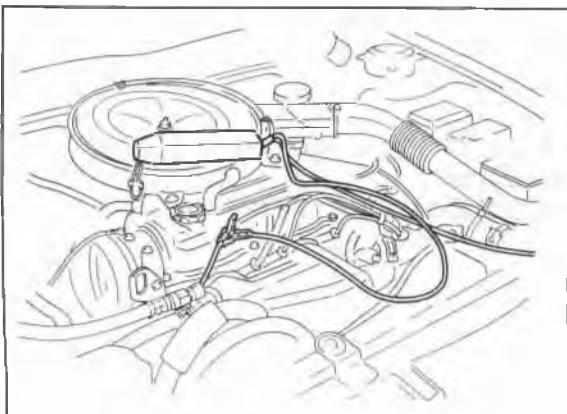


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## DISTRIBUTOR

### SPARK TEST

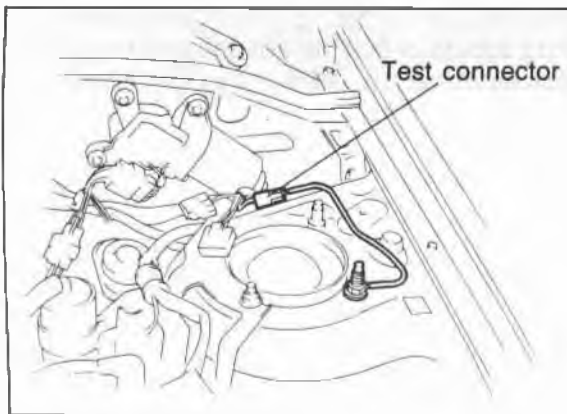
1. Disconnect the distributor lead from the distributor.
2. Hold it with insulated pliers approx. 5—10 mm (0.20—0.39 in) from a ground.
3. Crank the engine and check that a strong blue spark is visible.
4. If there is no spark, the ignition coil or pick-up coil may be bad.  
Check once again after replacing the ignition coil or pick-up coil.



86U05X-048

### IGNITION TIMING

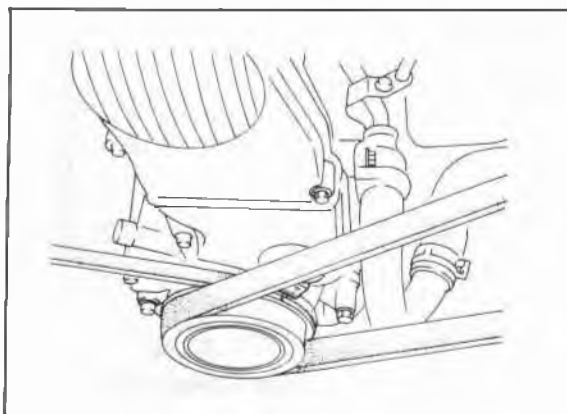
1. Warm up the engine to the normal operating temperature.
2. Turn all electric loads OFF.
3. Connect a tachometer and timing light to the engine.



76G05X-007

4. Connect a jumper wire between the test connector and ground. (Only for FE DOHC)
5. Check the idle speed. Set to the specified speed if necessary.

**Idle speed:** 750  $\pm$  50 rpm (FE DOHC)  
 800  $\pm$  5% rpm (F6, F8 FE—MTX)  
 900  $\pm$  5% rpm (F8, FE—ATX  
 in "P" range)  
 950  $\pm$  5% rpm (F6—ATX  
 in "P" range)

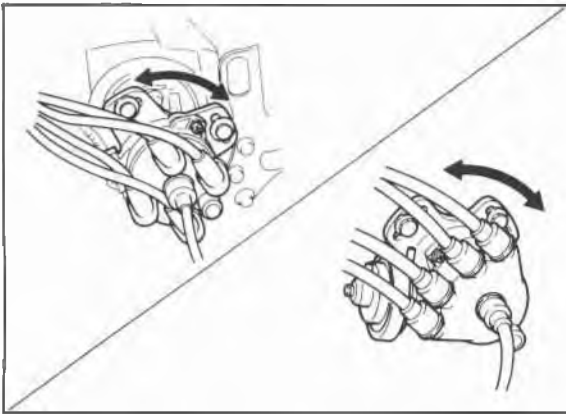


76G05X-008

6. Check that the timing mark (Yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

**Ignition timing:**  
**FE DOHC:** 12  $\pm$  1° BTDC  
 (Test connector grounded)  
**Others:** 6  $\pm$  1°  
 (Vacuum hoses disconnected and plugged)

# 5 DISTRIBUTOR



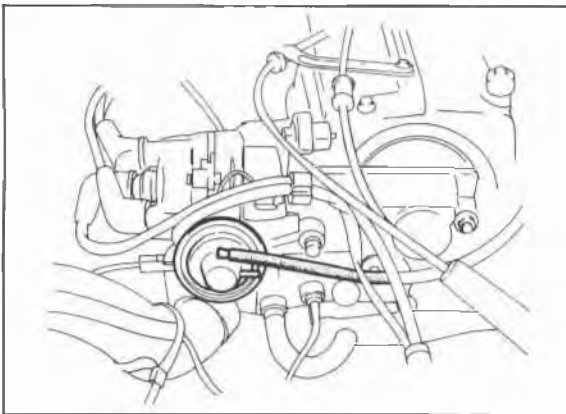
86U05X-051

8. If the mark is not aligned, loosen the distributor lock bolt, and turn the distributor housing to make the adjustment.
9. Reconnect the vacuum hoses, or disconnect the jumper wire from the test connector.
10. Tighten the distributor lock bolt to specified torque.

**Tightening torque:**

**18.6—25.5 N-m**

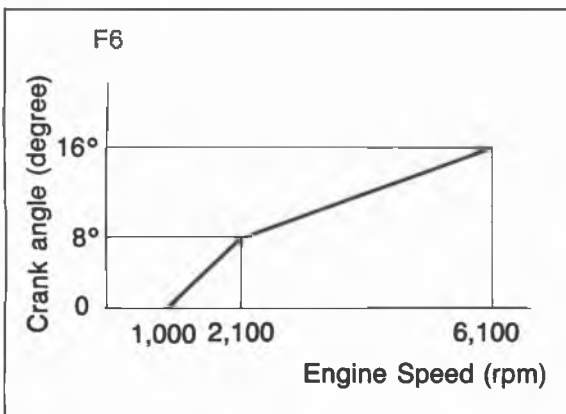
**(1.9—2.6 m-kg, 13.7—18.8 ft-lb)**



76G05X-009

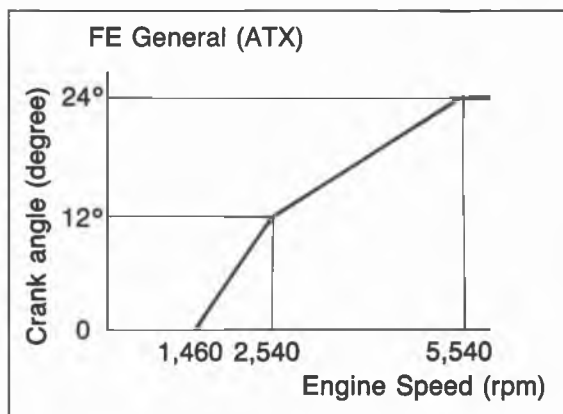
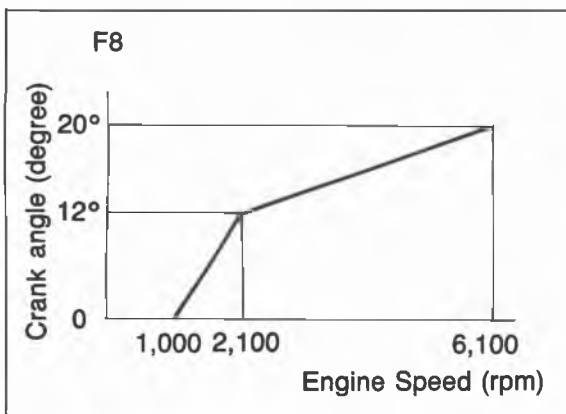
**SPARK CONTROL (Except FE DOHC)  
Centrifugal Advance**

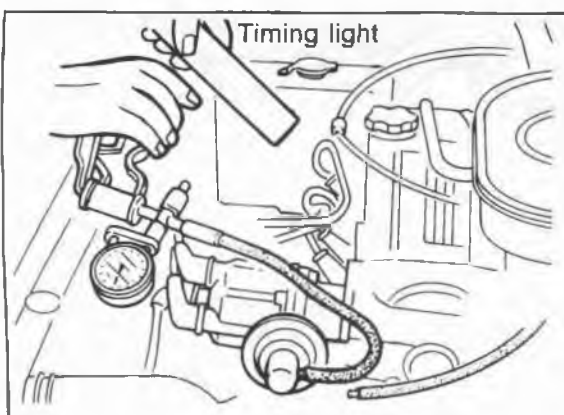
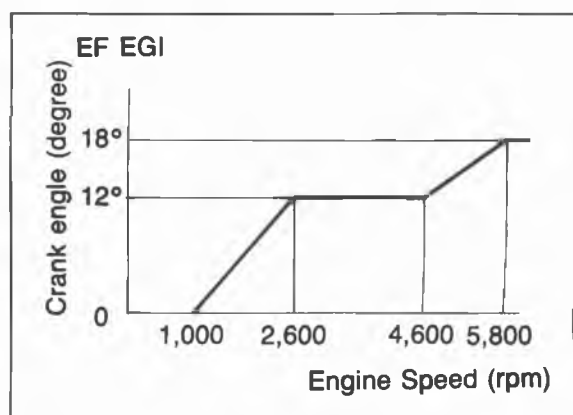
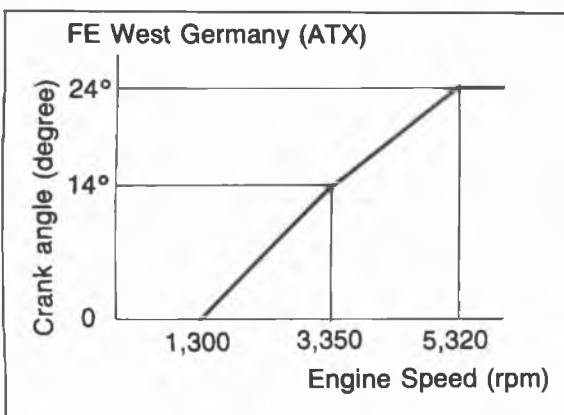
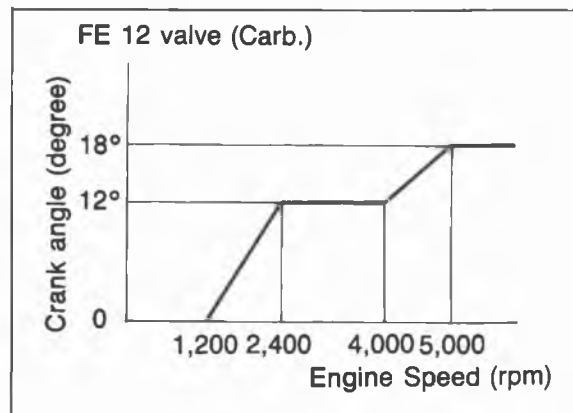
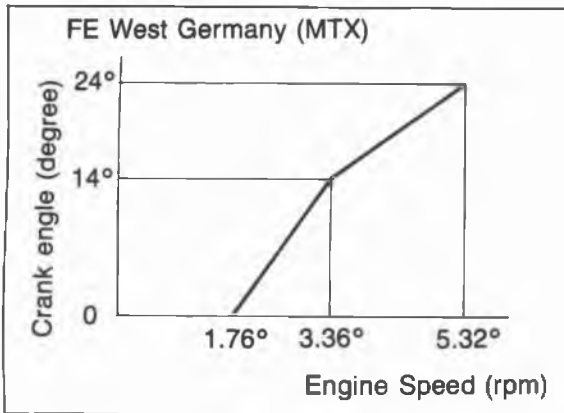
1. Warm up the engine to the normal operating temperature.
2. Check that the idle speed and initial ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control unit and plug them.



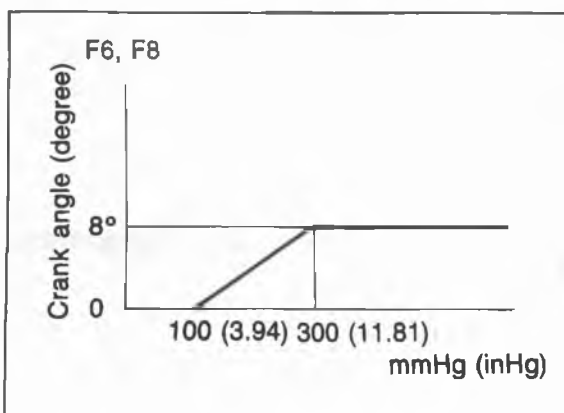
86U05X-053

4. While gradually increasing the engine speed, use a timing light to check the advance on the pulley.  
 Excess advance..... weak governor spring  
 (If the governor spring is broken, the advance will rise very high)  
 Insufficient advance...governor weight or cam malfunction





86U05X-054

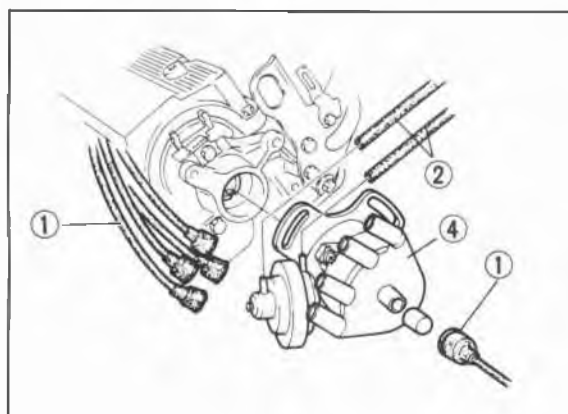
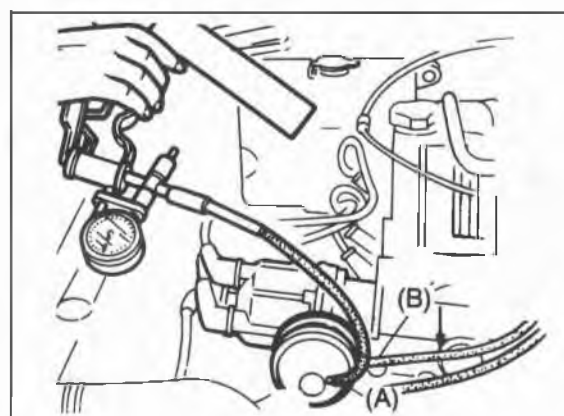
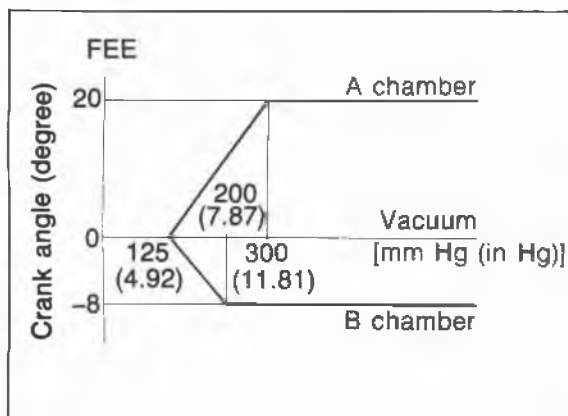
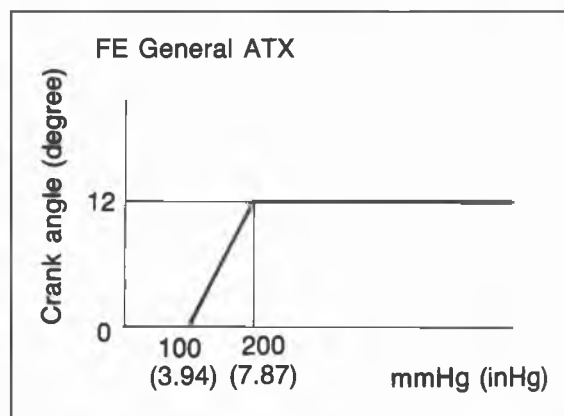
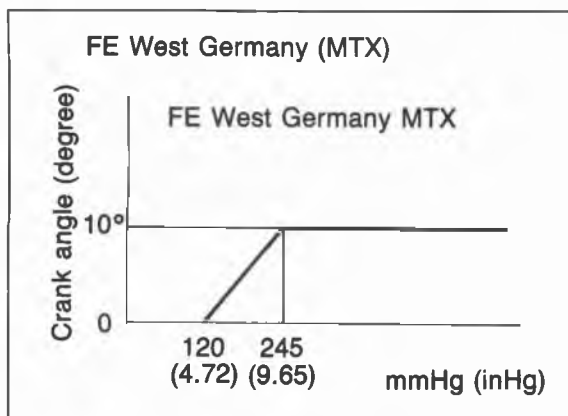
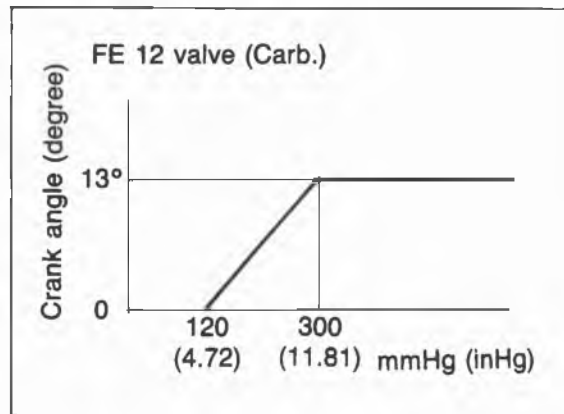
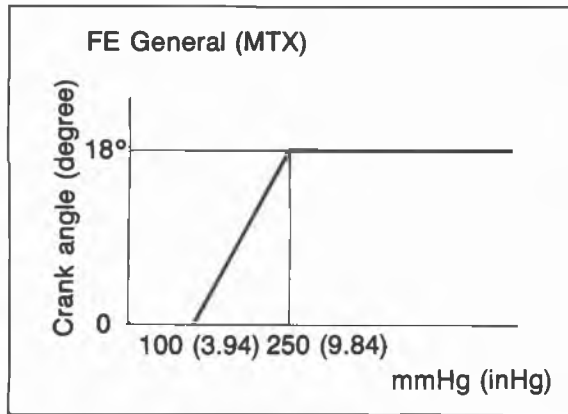


86U05X-055

### Vacuum Advance

1. Warm up the engine to the normal operating temperature.
2. Check that the idle speed and ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control unit, and plug them.
4. Connect a vacuum pump to the vacuum control unit.
5. Apply vacuum and check the advance with the timing light.

# 5 DISTRIBUTOR



## REMOVAL

1. Remove the high-tension leads.
2. Disconnect the vacuum hose(s) and wiring.
3. Loosen the distributor lock bolt(s).
4. Remove the distributor.

## Note

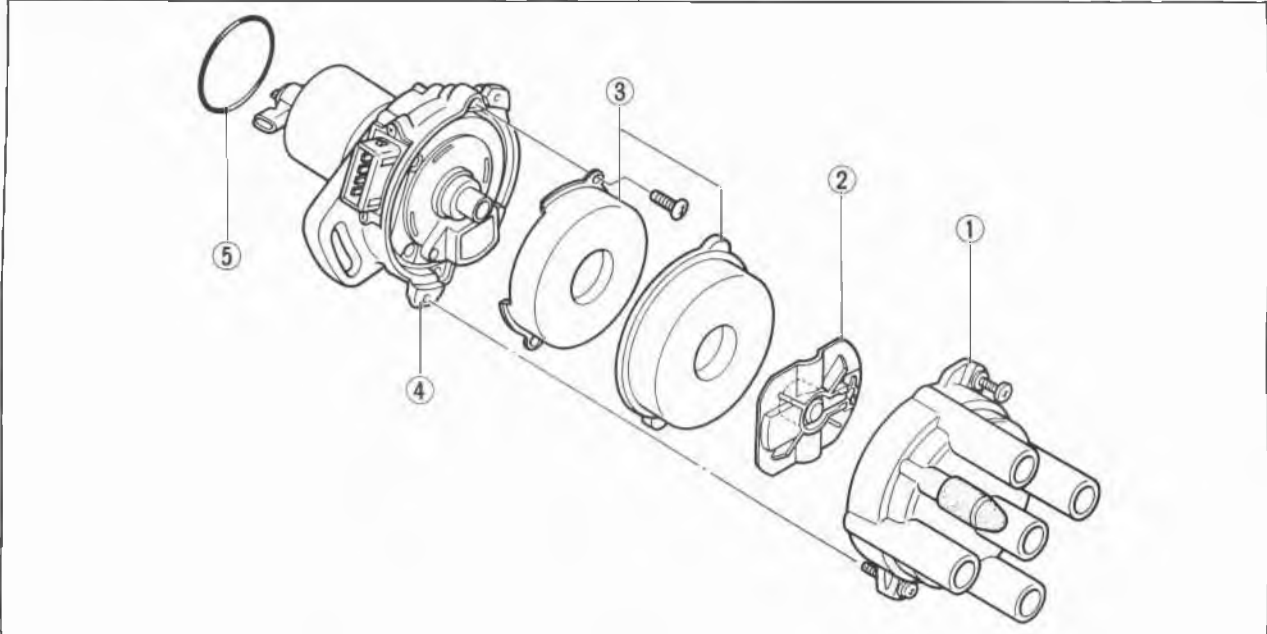
**Do not turn the crankshaft after the distributor has been removed.**

76G05X-010

**DISASSEMBLY**

Disassemble in the order shown in the figure.

**FE DOHC**

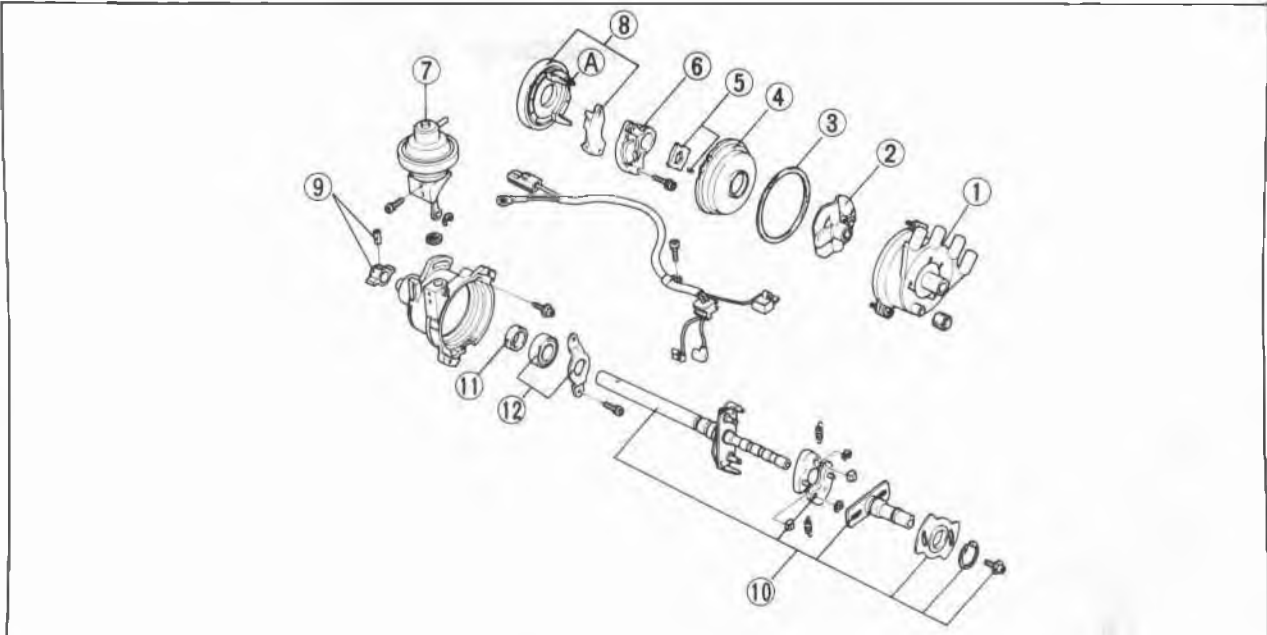


76G05X-011

- 1. Cap
- 2. Distributor rotor
- 3. Cover
- 4. Distributor set
- 5. O-ring

**Caution**  
Do not disassemble the distributor set.

**FE 12 Valve Caburetor Engine**

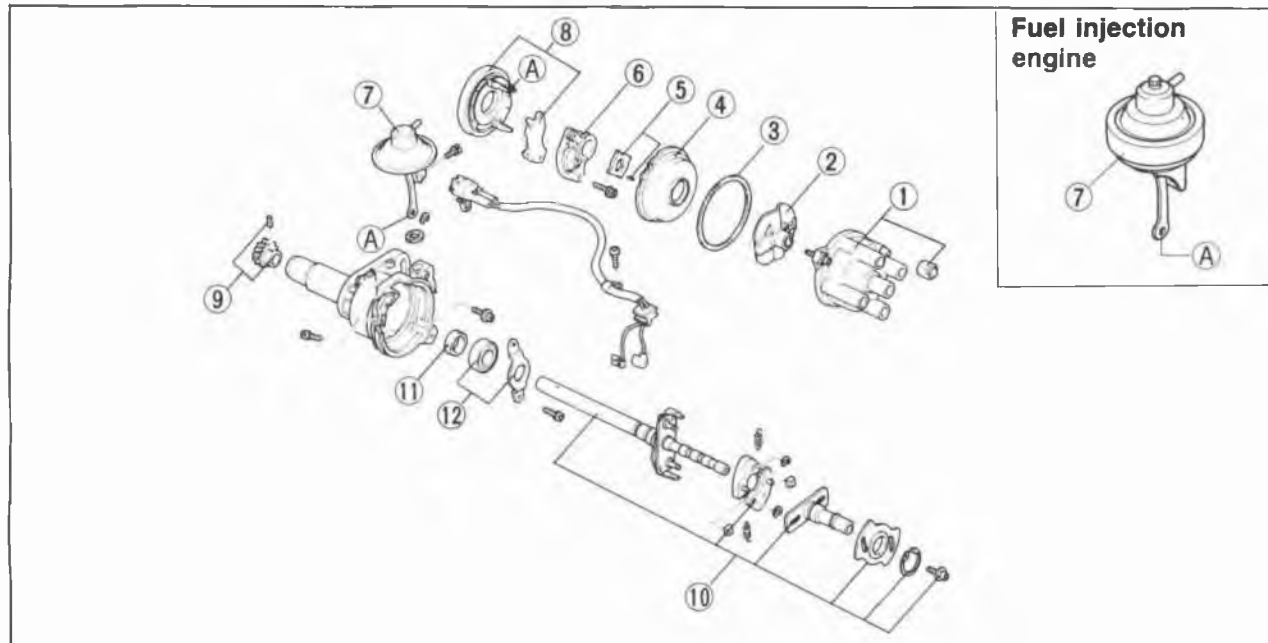


76G05X-012

- 1. Cap
- 2. Rotor
- 3. Gasket
- 4. Cover
- 5. Signal rotor and pin
- 6. Pick-up coil with igniter
- 7. Vacuum control unit
- 8. Breaker
- 9. Coupling set
- 10. Governor set
- 11. Oil seal
- 12. Bearing

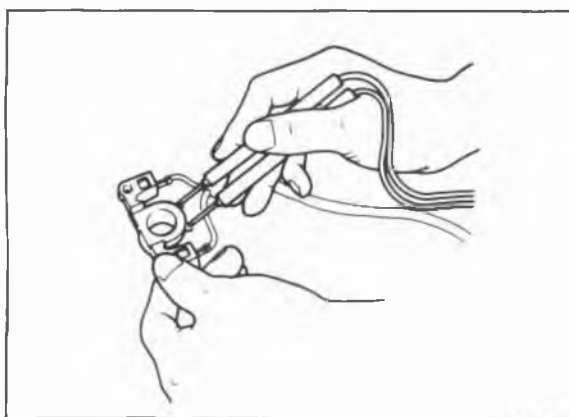
# 5 DISTRIBUTOR

## Others



76G05X-013

- |           |                              |                  |
|-----------|------------------------------|------------------|
| 1. Cap    | 5. Signal rotor              | 9. Coupling set  |
| 2. Rotor  | 6. Pick-up coil with ignitor | 10. Governor set |
| 3. Gasket | 7. Vacuum control unit       | 11. Oil seal     |
| 4. Cover  | 8. Breaker                   | 12. Bearing      |



76G05X-14

### INSPECTION

#### Pick-up Coil with Igniter (Except FE DOHC)

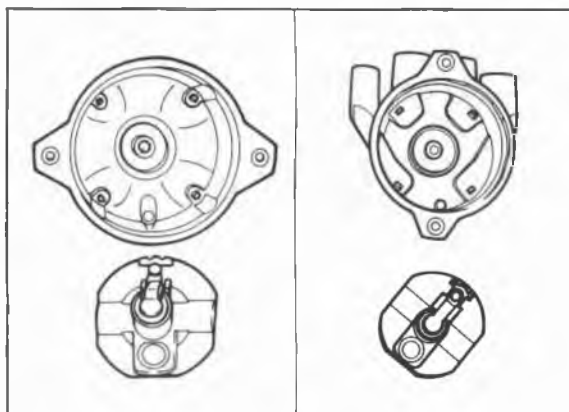
1. Connect an ohmmeter to the pick-up coil.
2. Measure the resistance.

**Resistance: 900—1,200  $\Omega$**

3. If it is not within specification, replace it.

#### Control Module (FE DOHC)

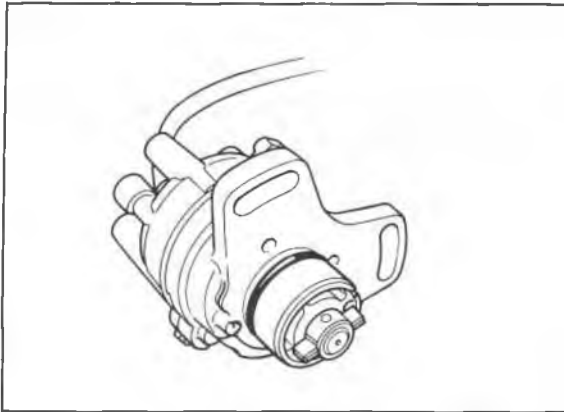
Refer to page 4C—108.



86U05X-060

#### Cap and Rotor

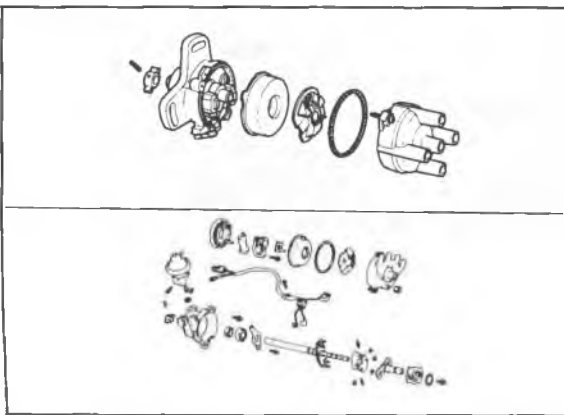
1. Check for corrosion, damage, and cracks.
2. Replace if necessary.



86U05X-061

### Distributor Shaft, O-Ring, and Oil Seal

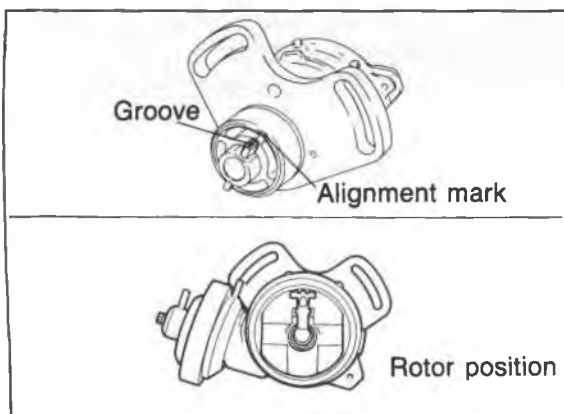
1. Check for damage to the distributor shaft, O-ring, and oil seal.



86U05X-062

### ASSEMBLY

Assemble in the reverse order of disassembly, referring to the assembly note.

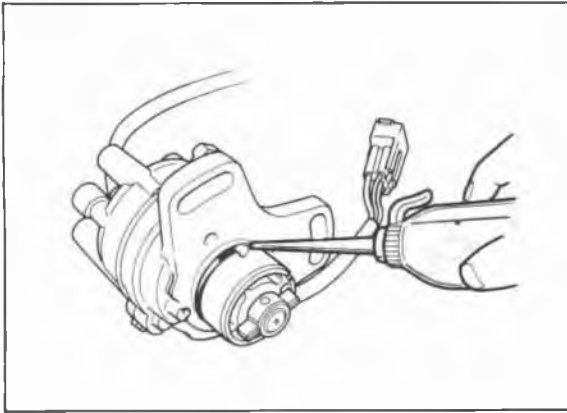


76G05X-015

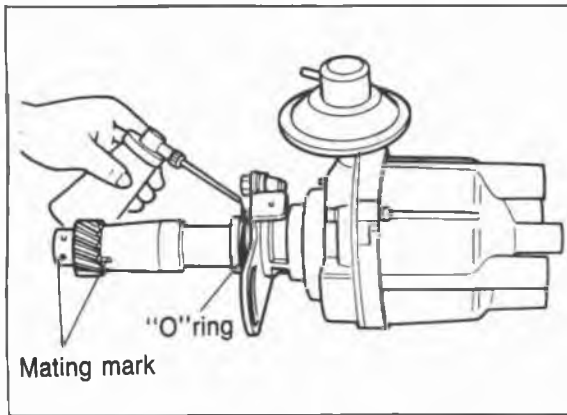
### Assembly Note (FE DOHC and FE 12 Valve Caburetor)

Align the coupling set blade with the alignment mark and check that the rotor is aligned as shown in the illustration.

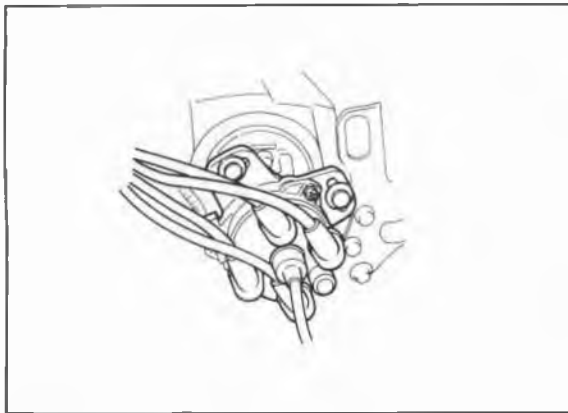
## 5 DISTRIBUTOR



76G05X-056



76G05X-016



86U05X-064

### INSTALLATION

#### Note

After installing the distributor, adjust the ignition timing (Refer to 5—11).

1. Apply engine oil to the O-ring and driven gear.

#### Note

Gear driven type, check that the No.1 cylinder is at top dead center and align the distributor matching marks.

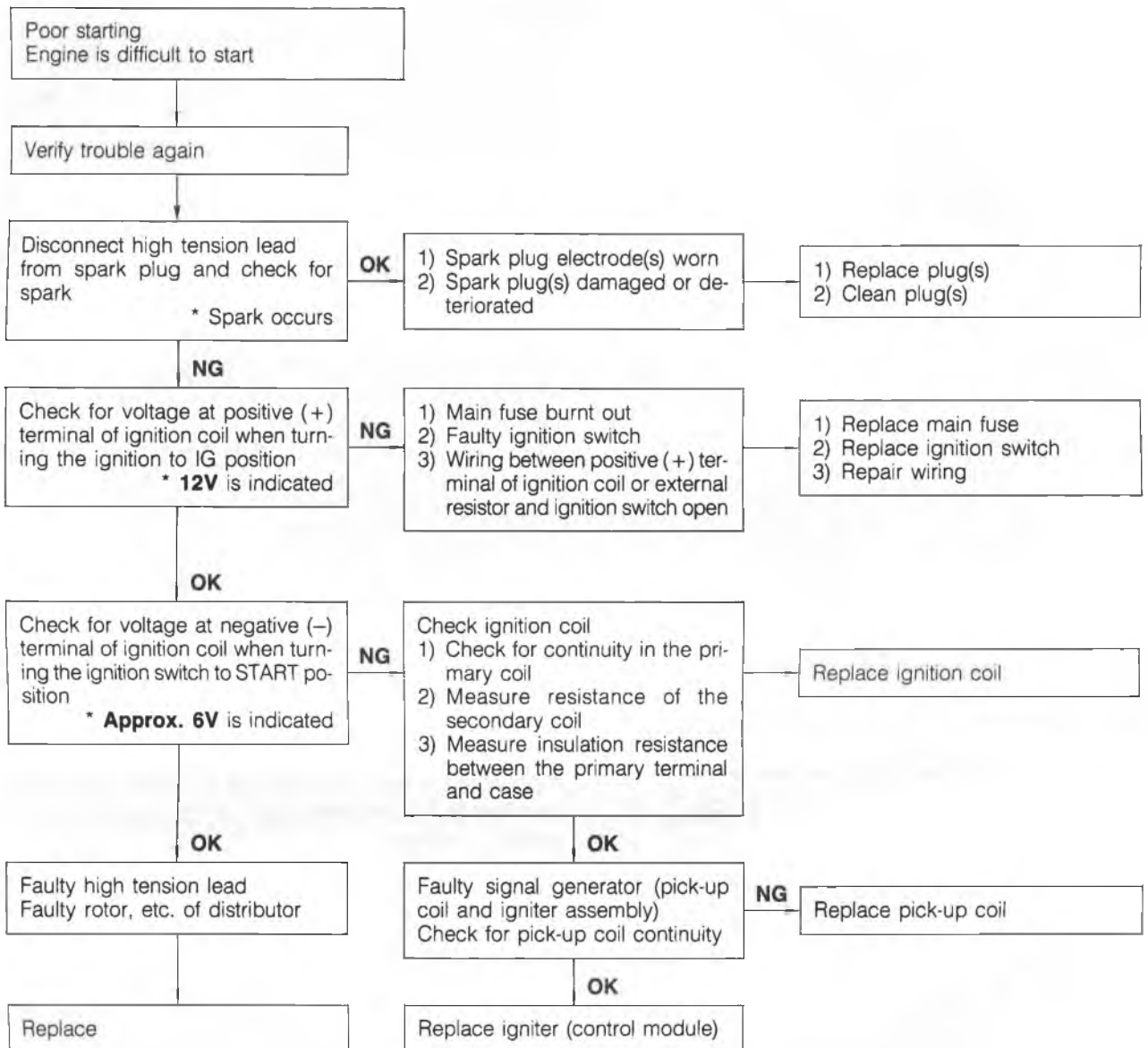
2. Install the distributor and connect the high-tension leads and distributor connector.
3. Tighten lock bolt to the specified torque.

#### Torque specification:

19—25 N·m (1.9—2.6 m·kg, 14—18 ft·lb)

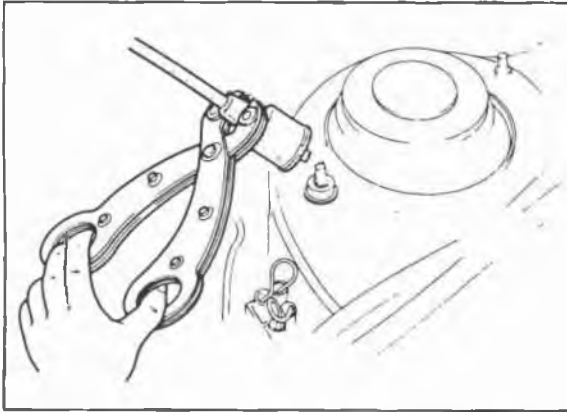


## H.E.I. TROUBLESHOOTING (Except FE DOHC)



76G05X-017

## 5 IGNITER (FE DOHC)

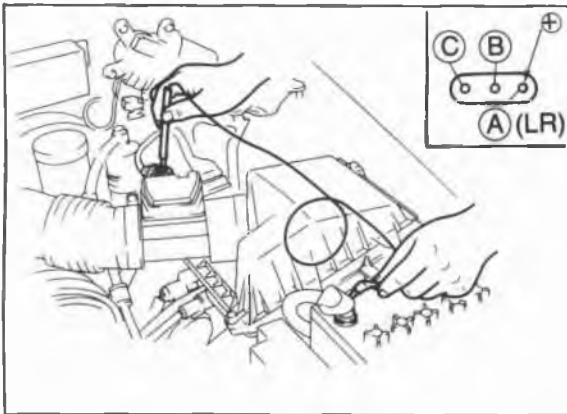


76G05X-018

### IGNITER

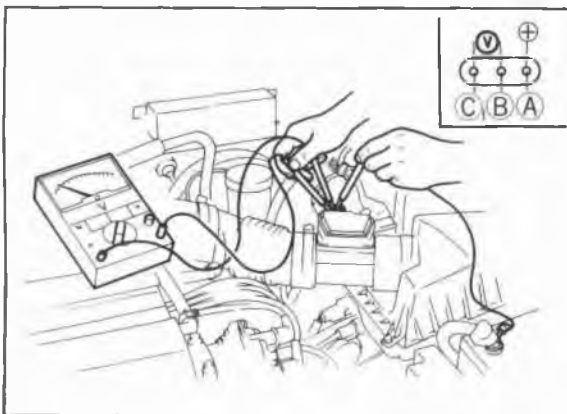
#### INSPECTION

1. Disconnect the center high tension lead from the distributor cap.
2. Hold it with insulated pliers **approx. 5—10 mm (0.20—0.39 in)** from a ground.
3. Turn the ignition switch ON.



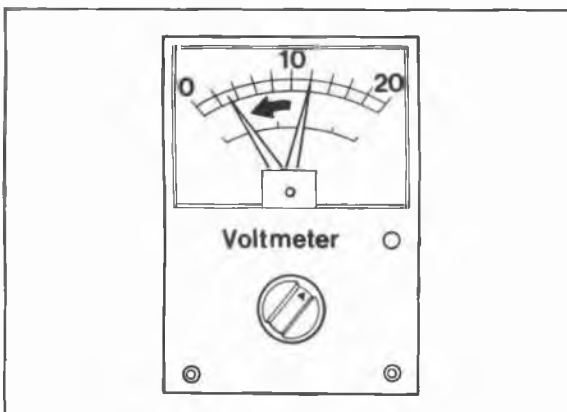
76G05X-019

4. Remove the rubber seal from the igniter connector.
5. Apply battery voltage to terminal A (LR) with a jumper wire.
6. Check that a strong blue spark is visible when the wire is disconnected.



76G-05X-020

7. If no spark is seen, connect a voltmeter between terminal B (B) and terminal C (YL), and check for battery voltage.



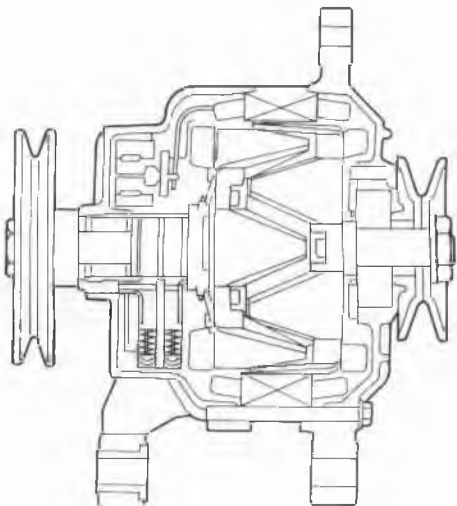
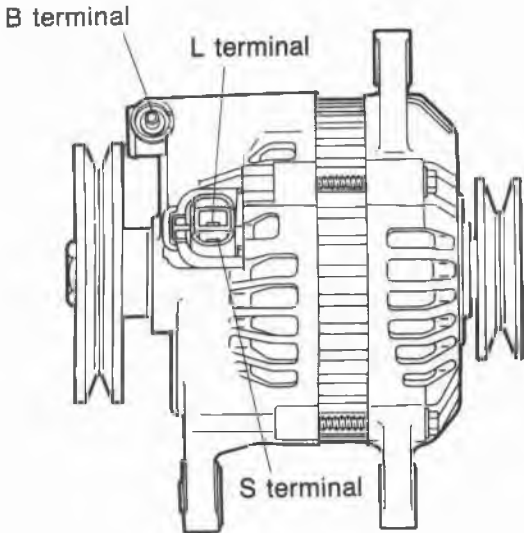
76G05X-021

8. Repeat steps 5 and check that the voltage changes to **2—3V**.
9. If the voltage is not as specified, replace the igniter.
10. If the voltage is as specified, check the ignition coil and high tension lead.

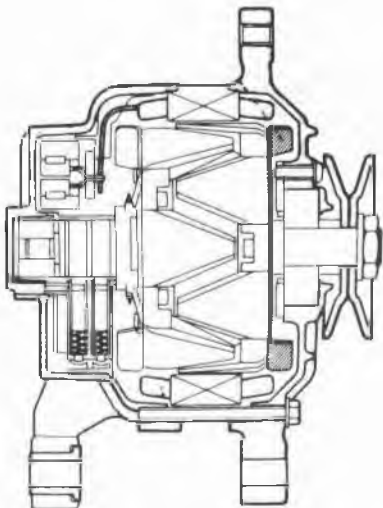
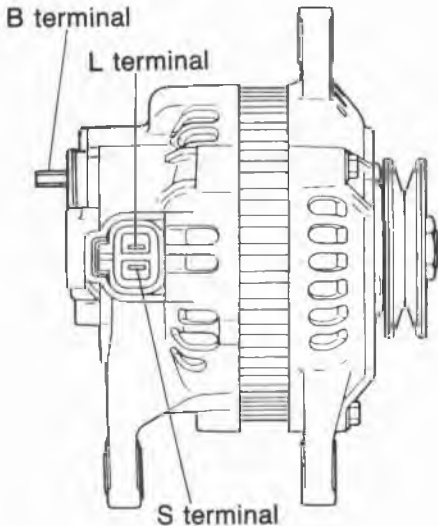
ALTERNATOR

CROSS-SECTIONAL VIEW

RF-CX Model

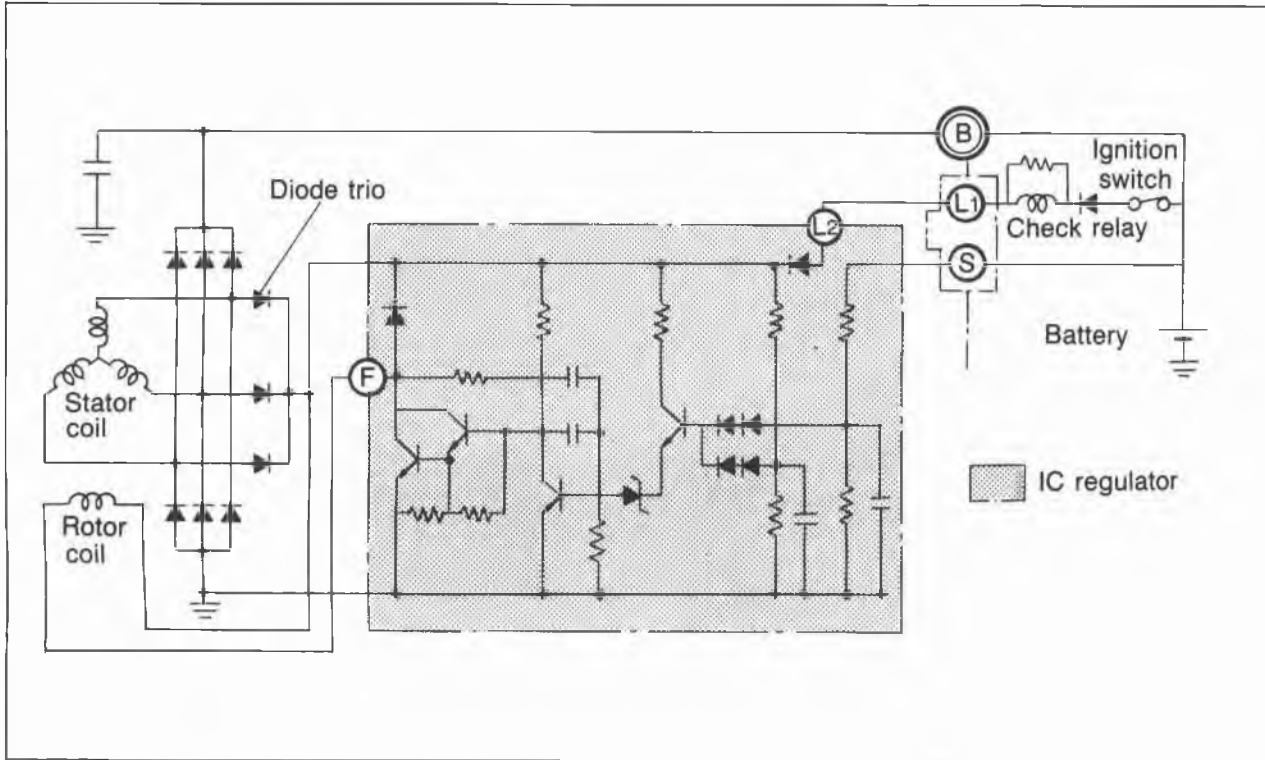


Except RF-CX Model

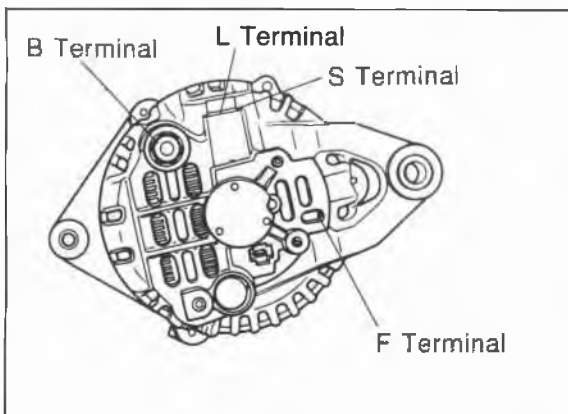


# 5 ALTERNATOR

## CHARGING SYSTEM



76G05X-023



86U05X-008

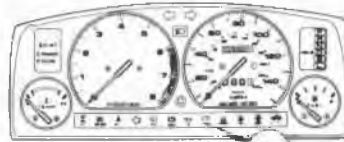
### Caution

- Be sure the battery connections are not reversed, because this will damage the rectifier.
- Do not use high-voltage testers such as a megger, because they will damage the rectifier.
- Remember that battery voltage is always applied to the alternator B terminal.
- Do not ground the L terminal while the engine is running.
- Do not start the engine while the connector is disconnected from the L and S terminals.

## TROUBLESHOOTING

### Preliminary Check

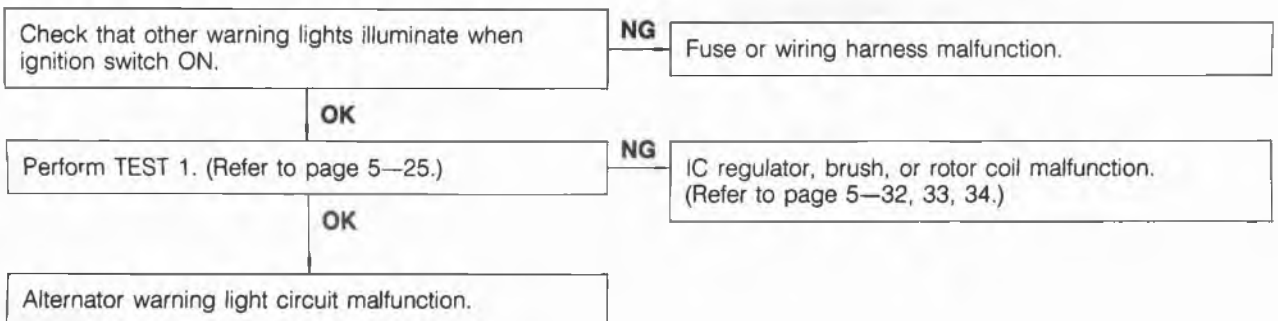
1. Turn the ignition switch ON, and check that the alternator warning light illuminates.
2. Start the engine, and check that the alternator warning light goes off.



Alternator warning light

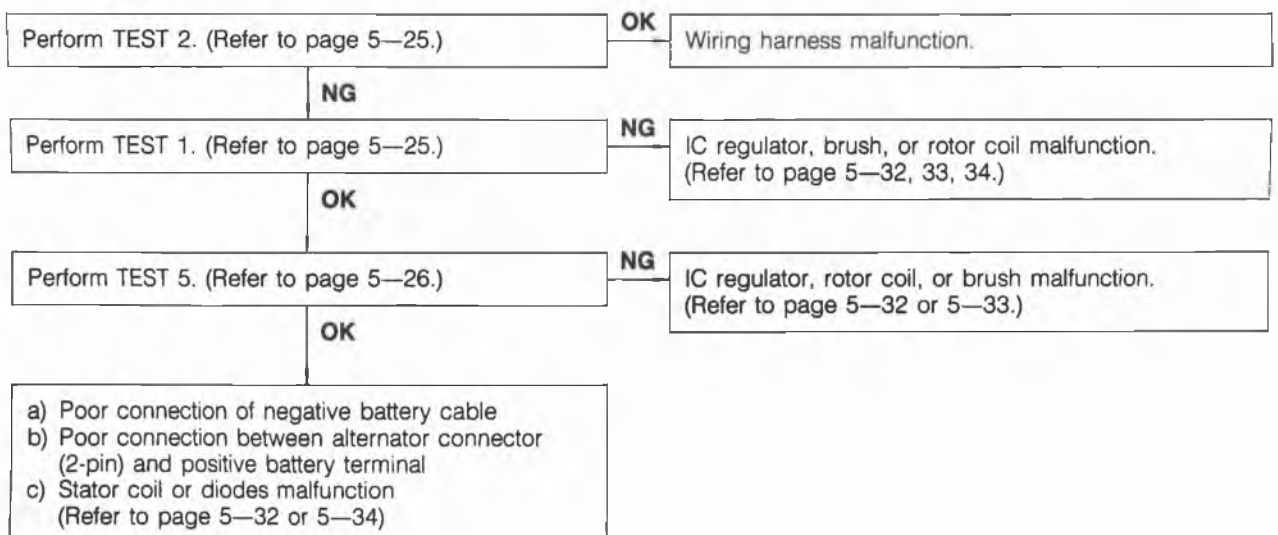
76G05X-024

### 1. Alternator warning light always not illuminate



76G05X-025

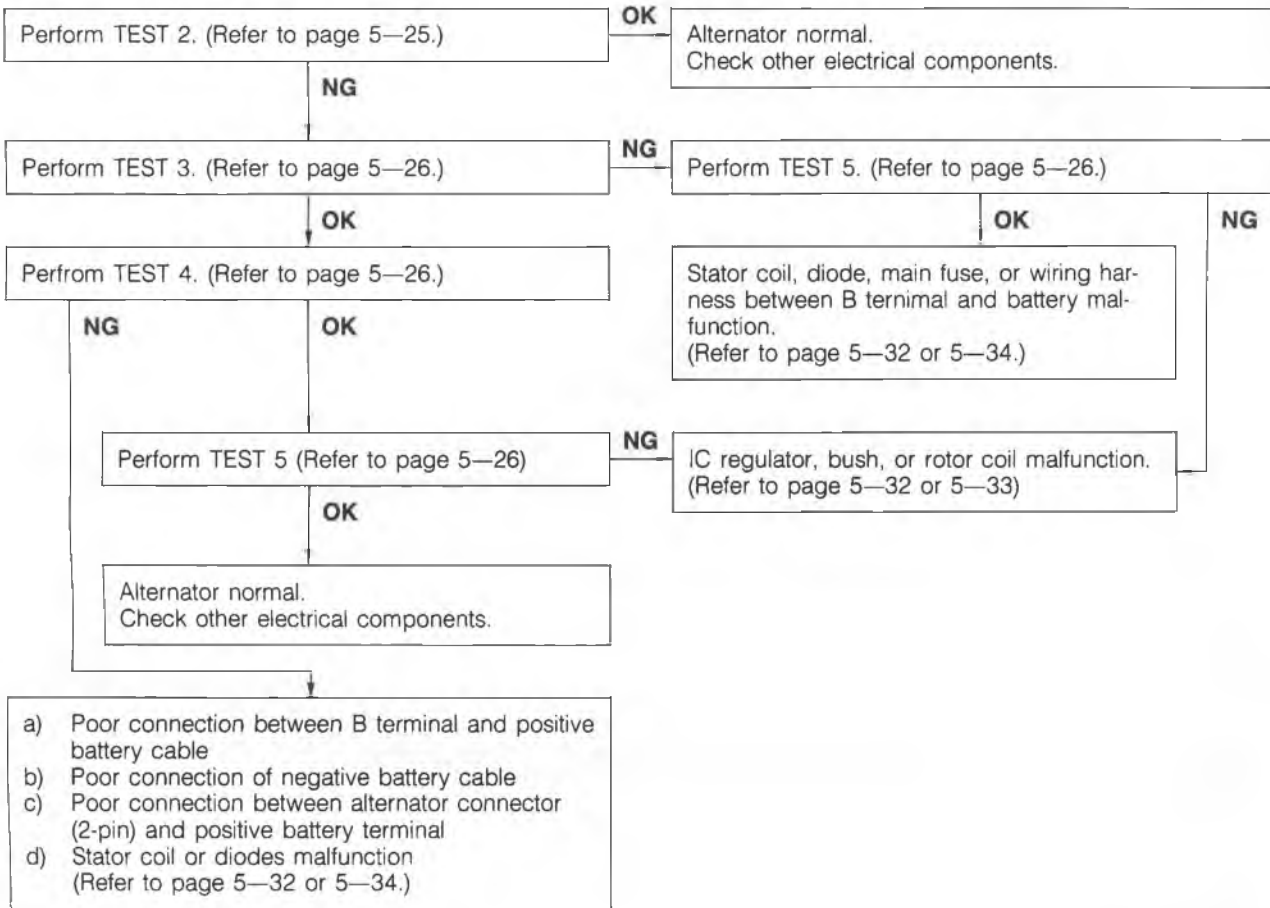
### 2. Alternator warning light illuminates when engine running



76G05X-026

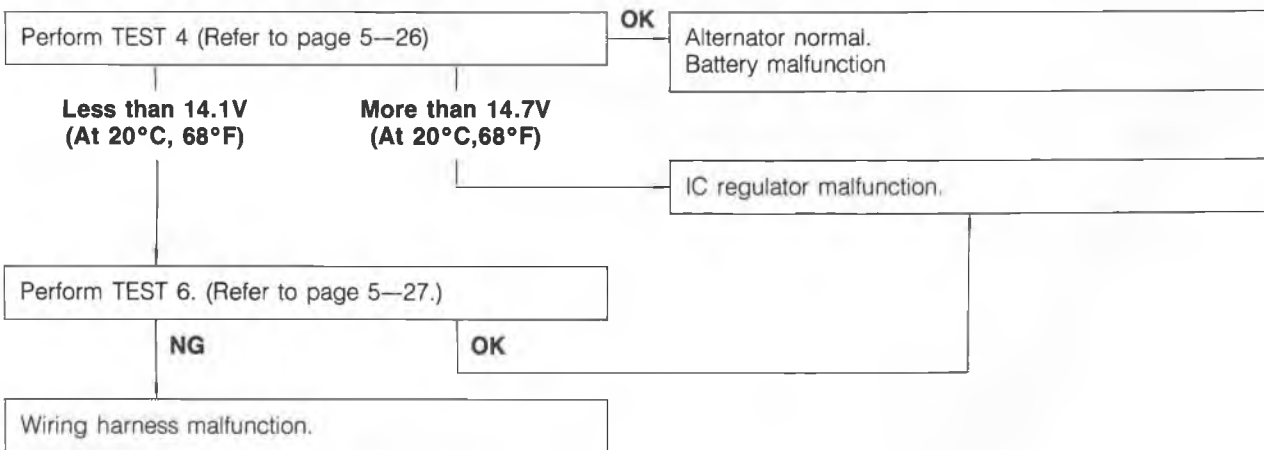
# 5 ALTERNATOR

## 3. Alternator warning light operates properly, but battery discharged



76G05X-027

## 4. Battery overcharged



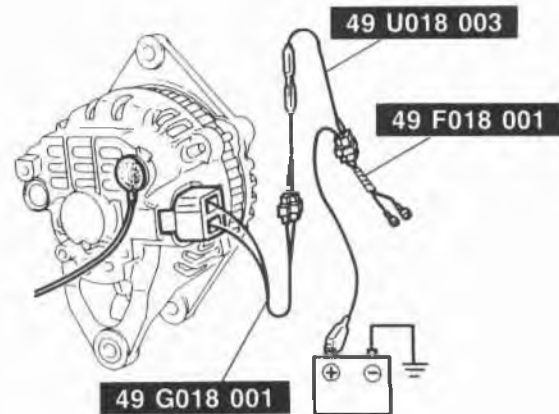
76G05X-028

## Warning

Disconnect the negative battery terminal when disconnect or reconnect B terminal.

### TEST 1

1. Disconnect the alternator connector (2-pin).
2. Connect the **SST**.



4. Connect the red clip of the adapter harness to the battery (+), and check that the red lamp and green lamp illuminate.
5. Start the engine and check that both lamps go off.

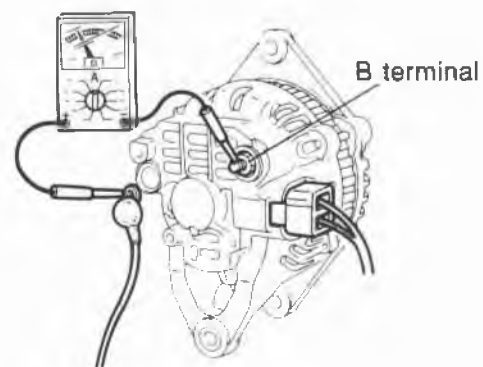
86U05X-010

### TEST 2

1. Connect an ammeter (**75A min.**) between the wire and the B terminal.
2. Turn all headlights and accessories on, and depress the brake pedal.
3. Start the engine and check that output current is **70A (RF-CX: 75A) or more** at **2,500—3,000 rpm** of the engine speed.

#### Caution

Do not ground the B terminal.

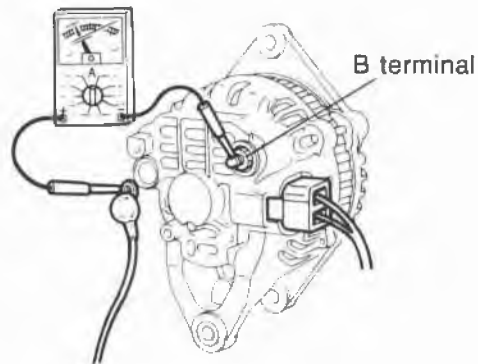


76G05X-029

## 5 ALTERNATOR

### TEST 3

1. Turn all electric loads off and release the brake pedal.
2. Check that output current is **5A or more** at **2,500—3,000 rpm** of the engine speed.

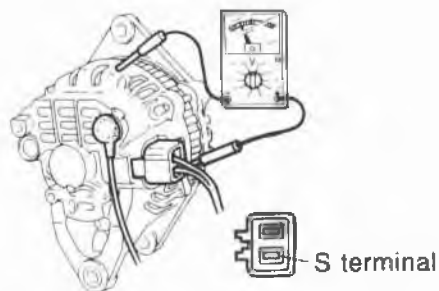


86U05X-013

### TEST 4

1. Turn all electric loads off and release the brake pedal.
2. Check that output voltage between S terminal and ground is within specification at **2,500—3,000 rpm** of the engine speed.

**Voltage: 14.1—14.7V**

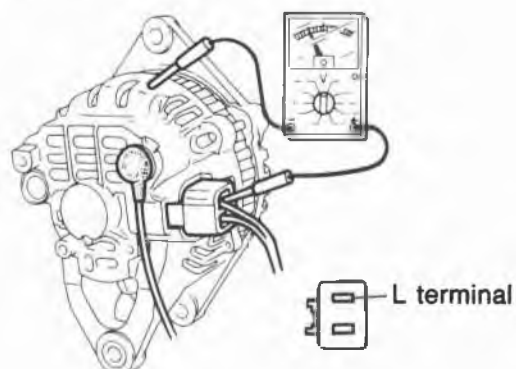


86U05X-072

### TEST 5

1. Turn the ignition switch ON.
2. Check that L terminal voltage is within specification.

**Voltage: 1—5V**

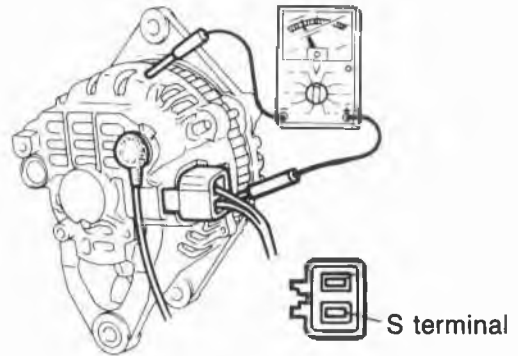


86U05X-073

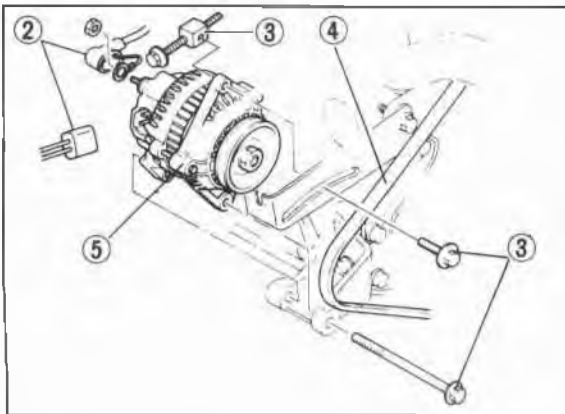


## TEST 6

1. Turn the ignition switch ON.
2. Turn all electric loads off and release the brake pedal.
3. Check that voltage between S terminal and ground is battery voltage.



86U05X-074

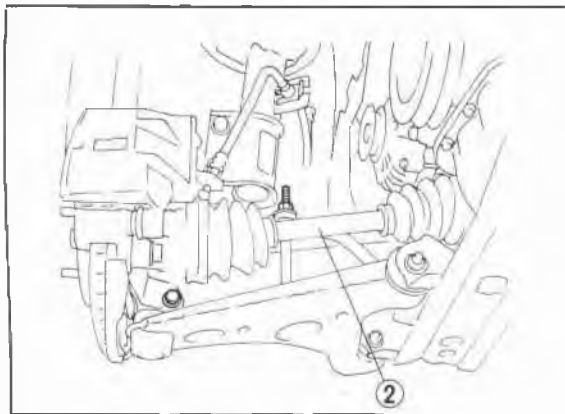


76G05X-057

## REMOVAL (GASOLINE)

Remove in the sequence shown in the figure.

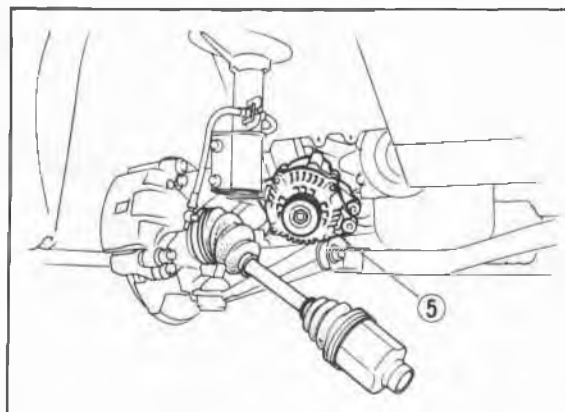
1. Disconnect the negative battery terminal.
2. Disconnect the wire and connector from the alternator.
3. Remove the bolts.
4. Remove the V-belt.
5. Remove the alternator to upper side (LHD) or lower side (RHD).



76G05X-030

## REMOVAL (DIESEL)

1. Disconnect the negative battery terminal.
2. Remove the right hand driveshaft (Refer to Section 9).



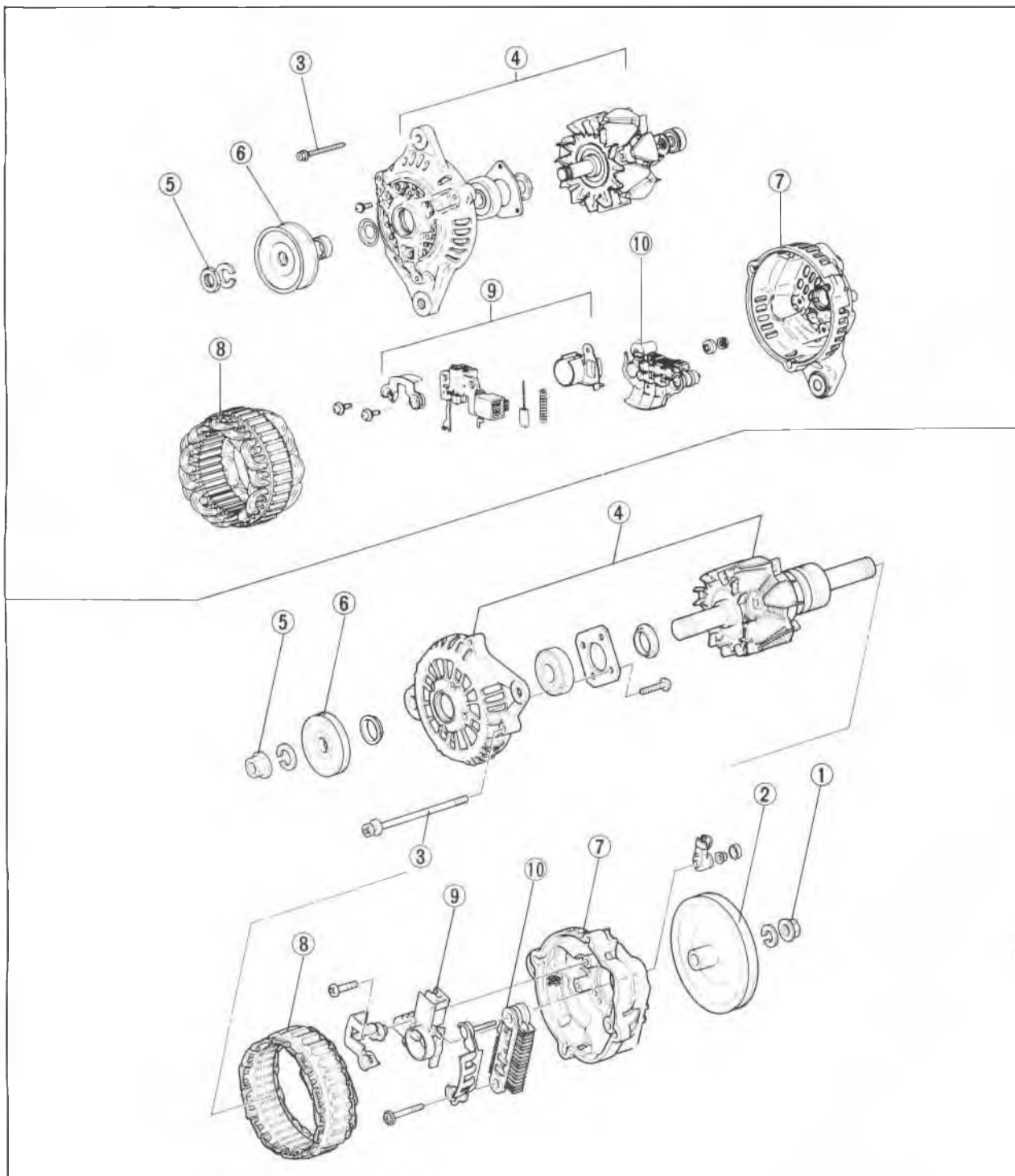
76G05X-031

3. Disconnect the wire and connector from the alternator.
4. Loosen the idle pulley nuts and remove the drive belts.
5. Remove the bolts and remove the alternator from under the vehicle.

# 5 ALTERNATOR

## DISASSEMBLY

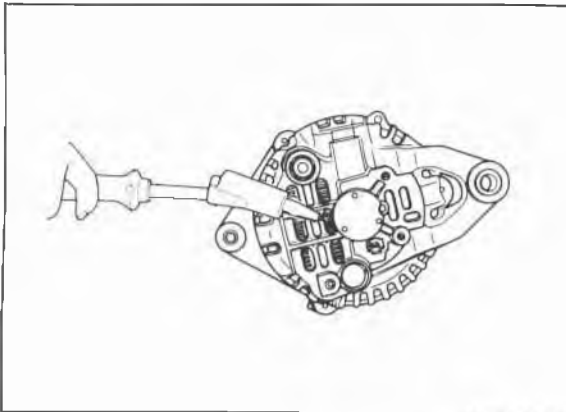
Disassemble in the sequence shown in the figure.



76G05X-033

- |                            |                          |
|----------------------------|--------------------------|
| 1. Lock nut (RF-CX)        | 6. Pulley                |
| 2. Pulley (RF-CX)          | 7. Rear bracket          |
| 3. Bolt                    | 8. Stator                |
| 4. Front bracket and rotor | 9. Brush holder assembly |
| 5. Lock nut                | 10. Rectifier            |

## ALTERNATOR 5



86U05X-020

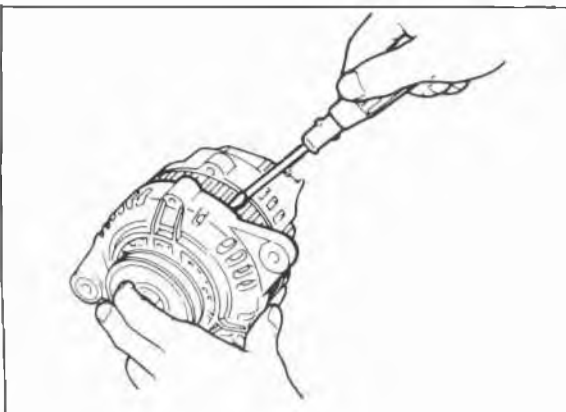
1. Place a soldering iron (200W) on the bearing box for **3 or 4 minutes** to heat it to about **50–60°C (122–140°F)**.

Pull out the three bolts, and then insert a screwdriver between the stator and front bracket and separate them.

### Note

a) If the bearing box is not heated, the bearing cannot be pulled out because the rear bearing and rear bracket fit together very tightly.

b) Be careful not to force the screwdriver in too far. The stator may become scratched.

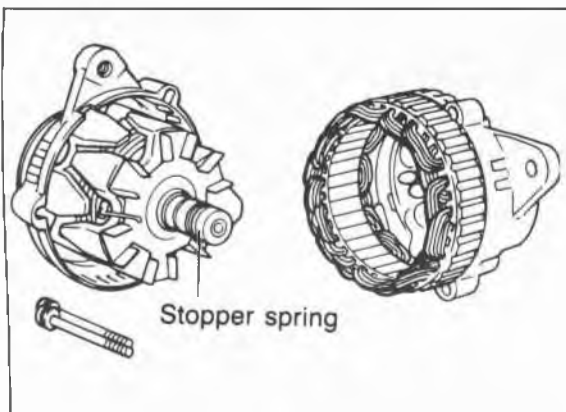


63U05X-999

2. Separate the rear and front sections.

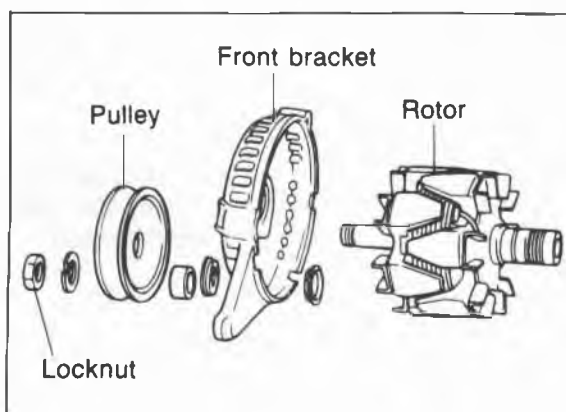
### Note

Be careful not to lose the stopper spring that fits around the circumference of the rear bearing.



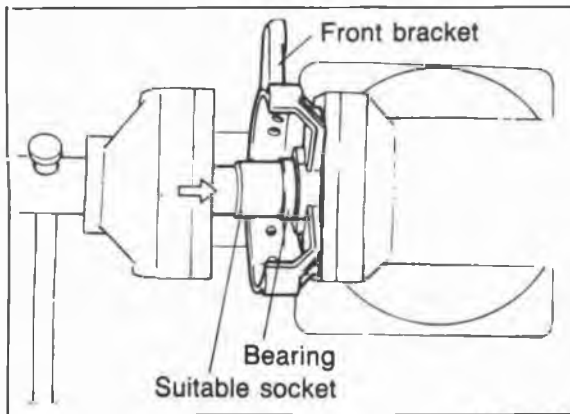
5BU05X-057

3. Place the rotor in a vise and loosen the pulley nut, then disassemble the pulley, rotor, and front bracket.



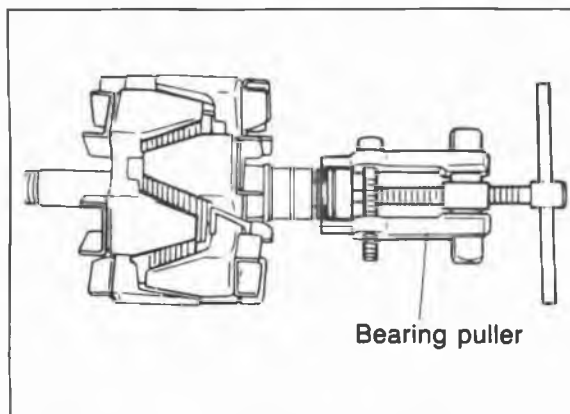
86U05X-021

## 5 ALTERNATOR



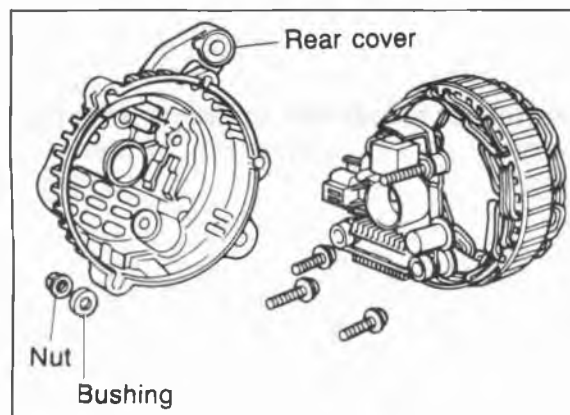
86U05X-076

4. Replace the front bearing  
Using a socket which exactly fits on the outer race of the bearing, carefully press in the bearing. Use a hand press or a vise.



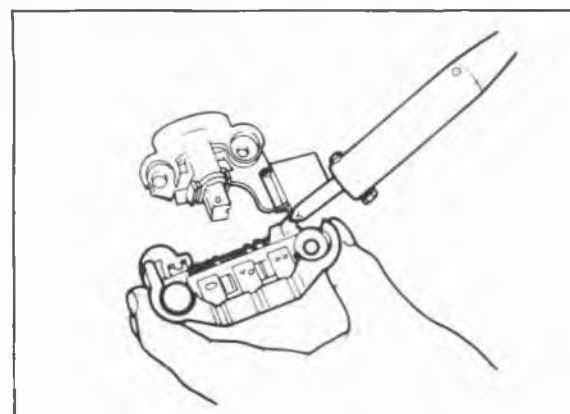
86U05X-086

5. Replace the rear bearing  
The bearing can be pulled off by using a bearing puller.  
When it is pressed on, press it on so that the groove at the bearing circumference is at the slip ring side.



86U05X-077

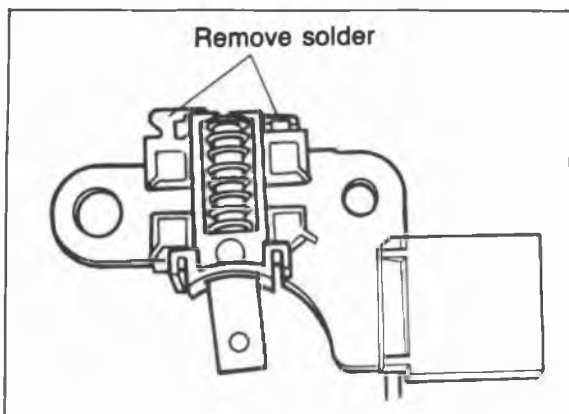
6. Remove the nut of the B terminal and the insulation bushing.
7. Remove the rectifier holding screws and the brush holder holding screw.
8. Separate the rear bracket and the stator.



86U05X-087

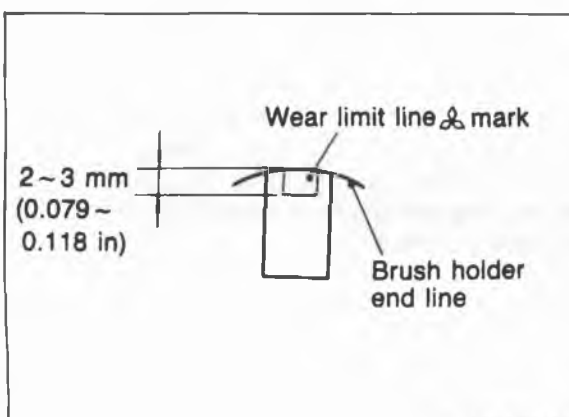
9. Use a soldering iron to remove the solder from the rectifier and the stator leads, and then remove the IC regulator.

**Caution**  
Disconnect quickly, use the soldering iron no more than about 5 seconds because the rectifier may be damaged if it is overheated.



86U05X-088

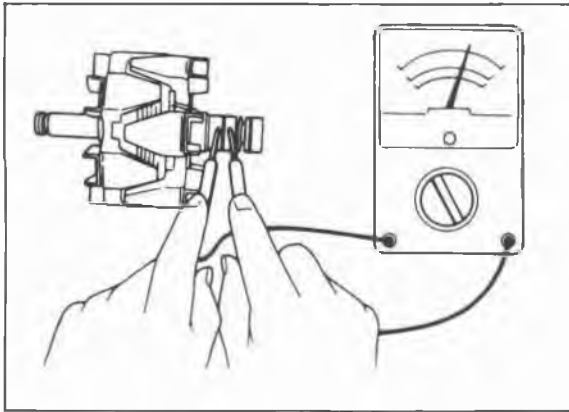
10. Replace the brushes  
Remove the solder from the pigtail, and then remove the brush.



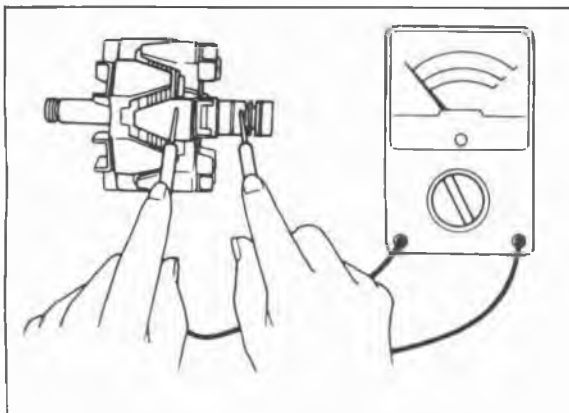
86U05X-089

11. When soldering the brush, solder the pigtail so that the wear limit line of the brush projects **2—3 mm (0.079—0.118 in)** out from the end of the brush holder.

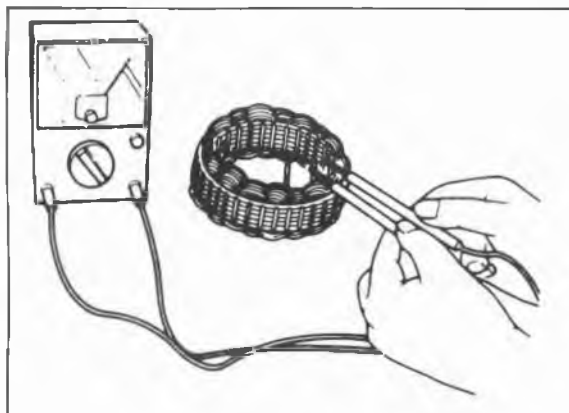
## 5 ALTERNATOR



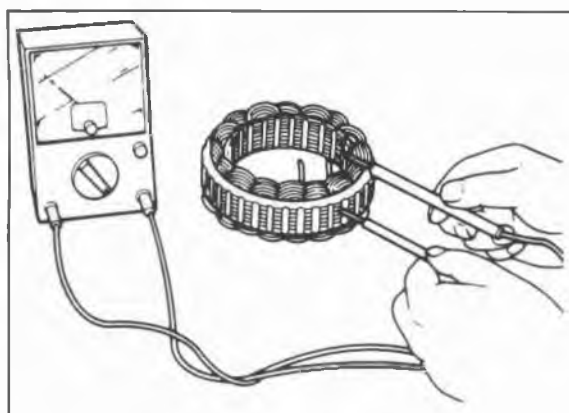
86U05X-078



86U05X-080



86U05X-081



86U05X-082

### INSPECTION

#### Rotor

1. Wiring damage
  - (1) Check the resistance between the slip rings using an ohmmeter.

**Specification: 2—6  $\Omega$**

- (2) If it is not within specification, replace the rotor

2. Ground of the field coil

- (1) Check for continuity between the slip ring and the core using an ohmmeter.
- (2) Replace the rotor if there is continuity.

3. Slip ring surface

If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.

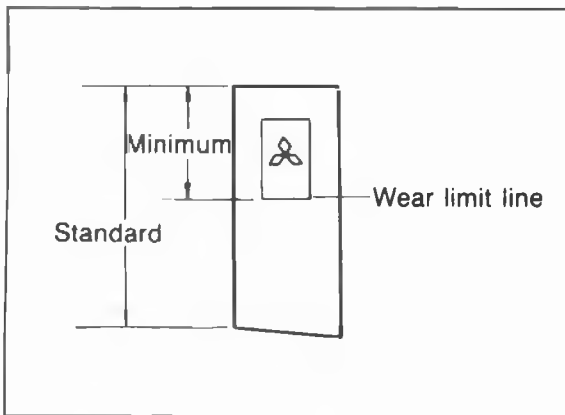
#### Stator

1. Wiring damage

- (1) Check for continuity between the stator coil leads using an ohmmeter.
- (2) Replace the stator if there is no continuity.

2. Ground of the stator coil

- (1) Check for continuity between the stator coil leads and the core using a circuit tester.
- (2) Replace the stator if there is continuity.

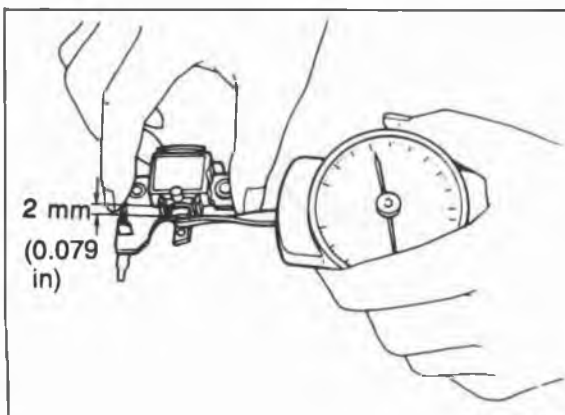


76G05X-034

### Brush

If the brushes are worn almost to or beyond the limit, replace them.

**Standard: 16.5 mm (0.650 in)**  
**21.5 mm (0.846 in)—RF-CX**  
**Minimum: 8 mm (0.315 in)**



86U05X-090

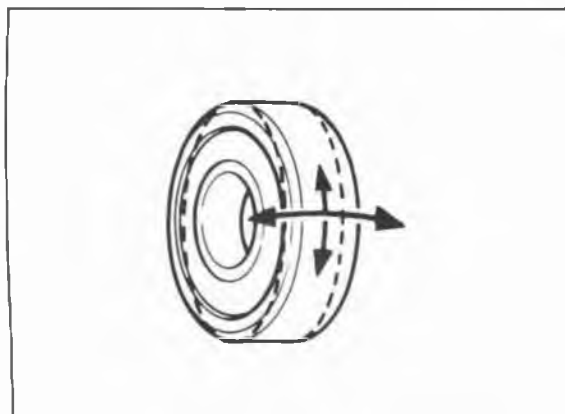
### Brush Spring

1. Measure the force of the brush spring using a spring pressure gauge.
2. Replace the spring if necessary.

**Standard force: 3.0—4.2 N**  
**(310—430 g, 10.9—15.2 oz)**  
**Minimum: 1.7—2.5 N**  
**(170—250 g, 6.0—8.8 oz)**

### Note

**Read the spring pressure gauge at the brush tip projection of 2 mm (0.079 in).**

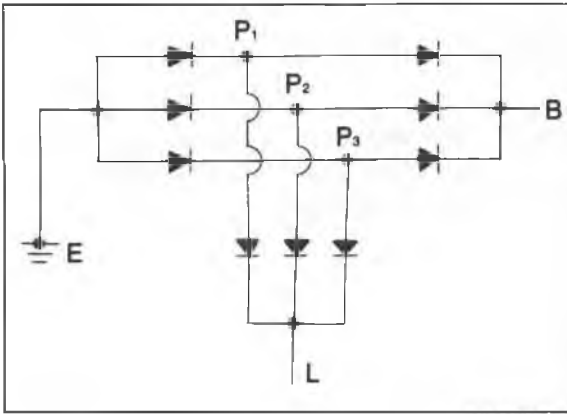


86U05X-023

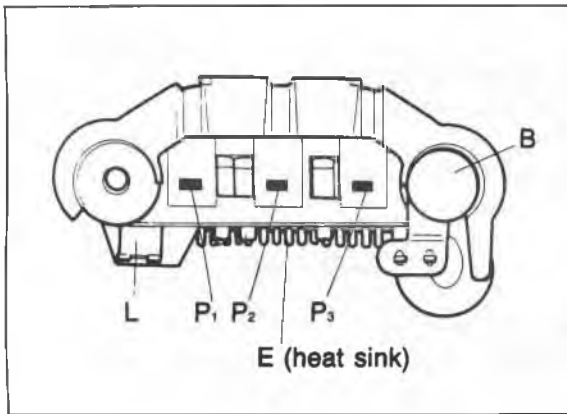
### Bearing

1. Check for abnormal noise, looseness, or insufficient lubrication.
2. Replace the bearing(s) if there is any abnormality.

# 5 ALTERNATOR



86U05X-024



86U05X-025

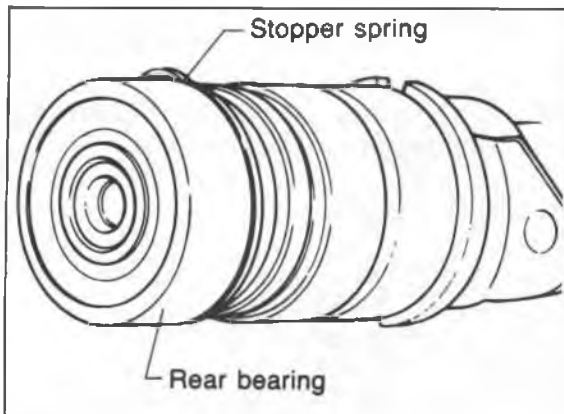
## Rectifier

1. Check for continuity of the diodes using an ohmmeter.

Negative (Black)	Positive (Red)	Continuity
E	P <sub>1</sub> , P <sub>2</sub> , P <sub>3</sub>	Yes
B		No
L		No
P <sub>1</sub> , P <sub>2</sub> , P <sub>3</sub>	E	No
	B	Yes
	L	Yes

2. Replace the rectifier.





86U05X-026

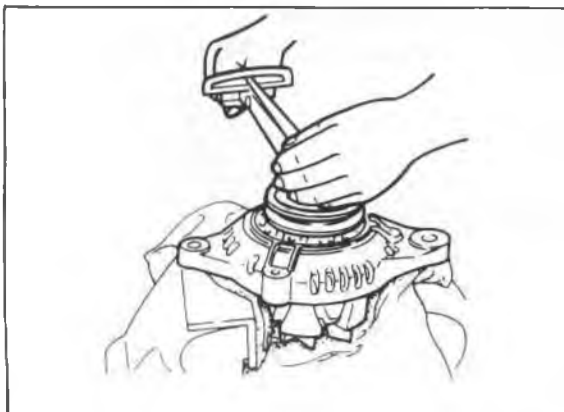
## ASSEMBLY

Assemble in the reverse order of disassembly, referring to assembly note.

### Assembly Note

#### Stopper spring installation

1. Fit the stopper spring into the eccentric groove of the rear bearing circumference.
2. Check that the protruding part of the spring is fitted into the deepest part of the groove.



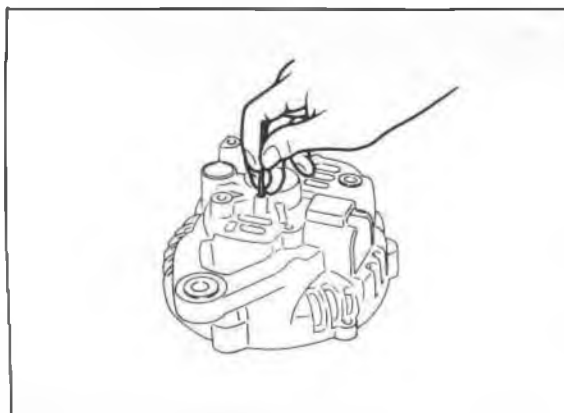
86U05X-027

### Front bracket and rotor

When assembling the front bracket and rotor, tighten the locknut to the specified torque.

#### Tightening torque:

**49—88 N·m (5—9 m·kg, 36—65 ft·lb)**



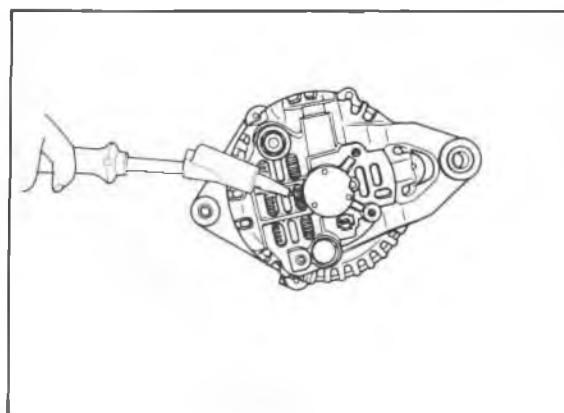
86U05X-028

### Brush lifting

1. Before assembly, use a finger to hold the brushes into the brush holder; then pass a wire ( $\phi 2$  mm, 40—50 mm,  $\phi 0.08$  in, 1.6—2.0 in) through the hole shown in the figure.
2. Secure the brushes in position.

#### Note

**Be sure to remove wire after assembly is completed.**

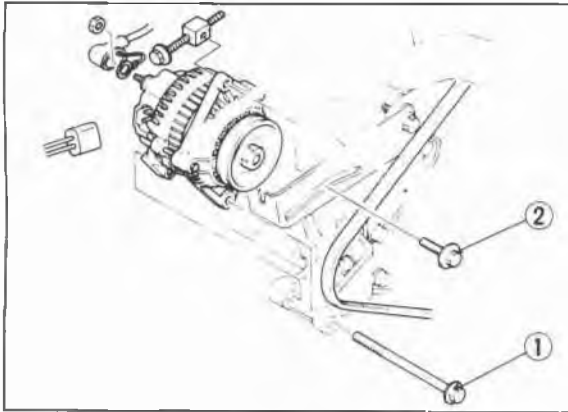


4BG05X-054

### Rear bearing installation

1. Heat the rear bracket.
2. Press the rear bearing into the rear bracket.
3. Check that the rotor turns easily.

# 5 ALTERNATOR



69G05X-018

## INSTALLATION

### Note

When installing the alternator, tighten the bolts to the specified torque.

Install in the reverse order of removal.

### Tightening torque:

**Bolt (1).....37.3—52 N·m**

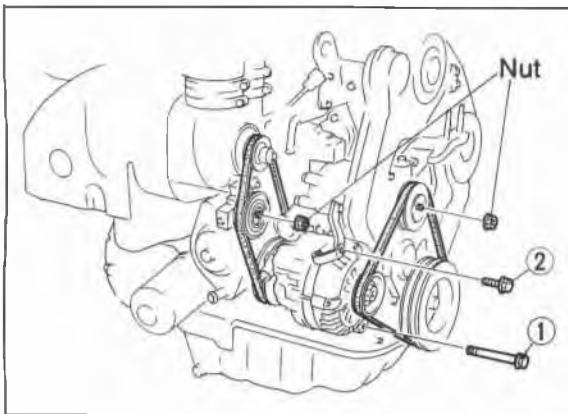
**(3.8—5.3 m·kg, 27.5—38.3 ft·lb)**

**Bolt (2).....18.6—25.5 N·m**

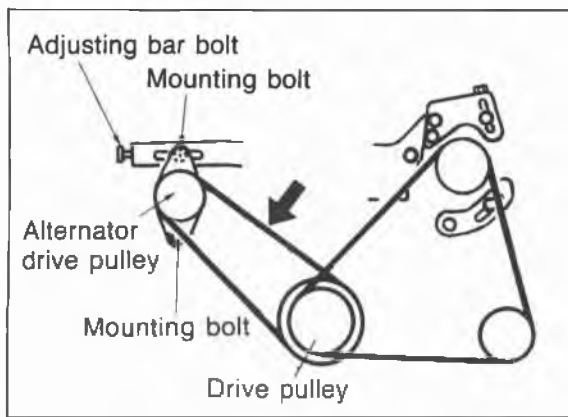
**(1.9—2.6 m·kg, 13.7—18.8 ft·lb)**

**Nut..... 37—52 N·m**

**(3.8—5.3 m·kg, 27.5—38.3 ft·lb)**



76G05X-036



76G05X-037

## V-BELT TENSION (GASOLINE)

### Adjustment

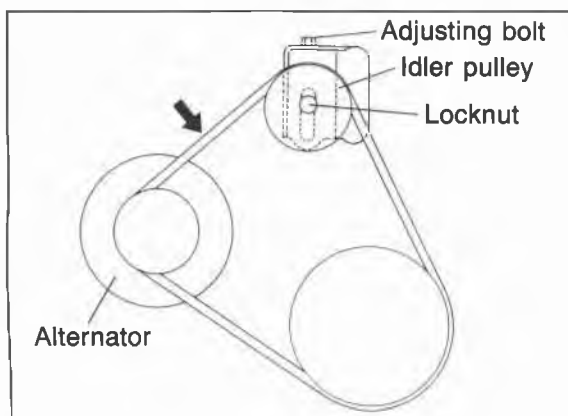
1. Loosen the alternator mounting bolt and adjusting bar bolt.
2. Adjust the alternator belt deflection while pushing the V-belt with a force of 98 N (10 kg, 22 ft-lb).

### Deflection:

**New: 6—8 mm (0.24—0.31 in)**

**Used: 7—9 mm (0.27—0.35 in)**

3. Tighten the bolts and recheck the tension.



76G05X-038

## V-BELT TENSION (DIESEL)

### Adjustment

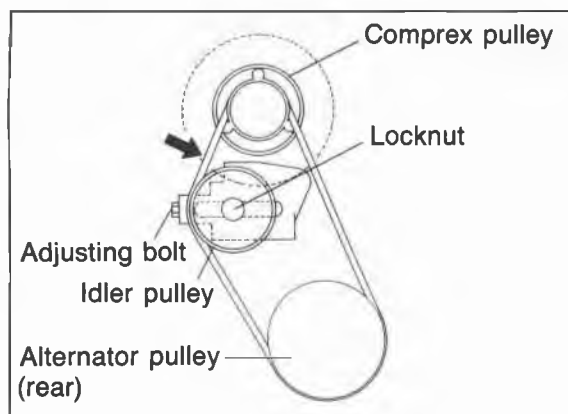
1. Loosen the alternator idler pulley locknut.
2. Adjust the alternator belt deflection while pushing the V-belt with a force of 98 N (10 kg, 22 ft-lb).

### Deflection:

#### Alternator

**New: 8—10 mm (0.31—0.39 in)**

**Used: 9—11 mm (0.35—0.43 in)**



76G05X-058

### Complex

**New: 4.0—5.0 mm (0.16—0.20 in)**

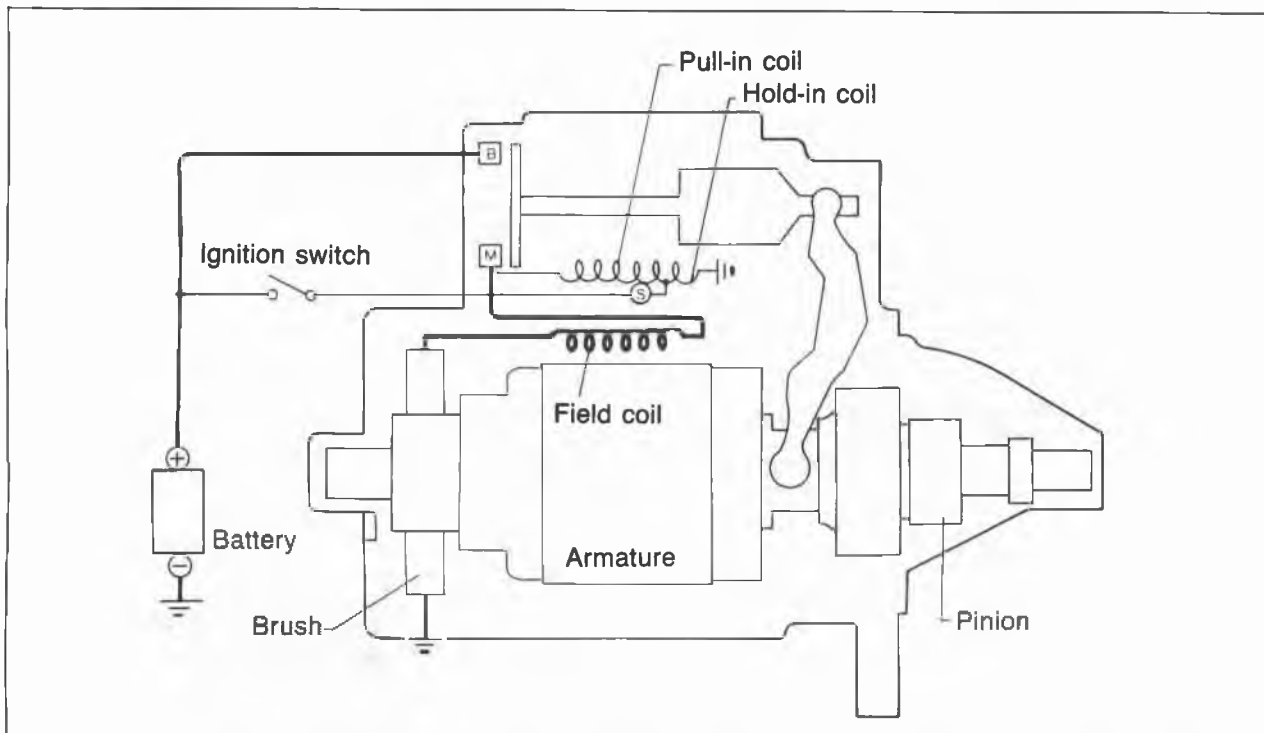
**Used: 4.5—5.5 mm (0.18—0.21 in)**

3. Tighten the bolts and nuts and recheck the tension.

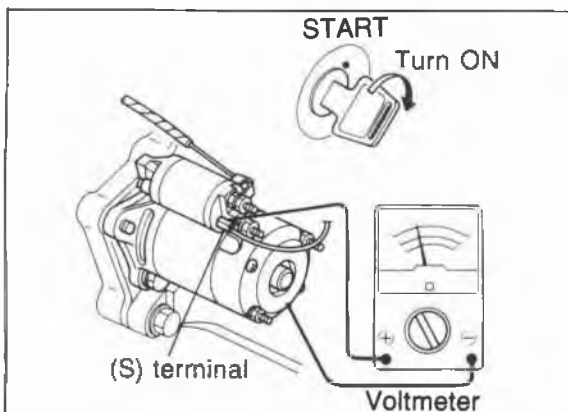
## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)

### STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)

#### STARTING SYSTEM CIRCUIT



76G05X-039



4BG05X-074

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspections.

##### A. If the magnetic switch dose not function during starting.

1. Turn the ignition switch to the start position.
2. Measure the voltage between the S terminal and ground.
3. If the measured value is standard voltage or more, there is starter malfunction.
4. If it is less than standard voltage, there is a malfunction in the wiring.

**Standard voltage: 8 V**

##### Caution

**If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.**

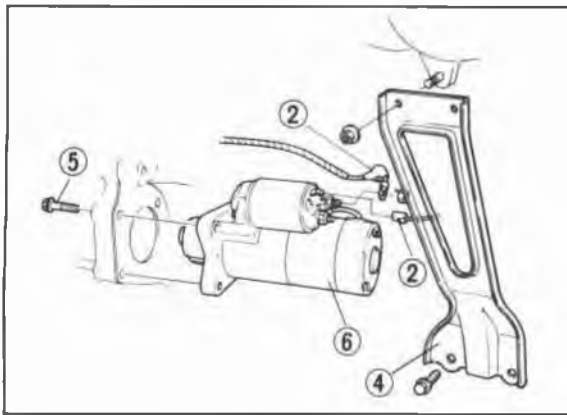
##### B. If the starter won't crank, or if the cranking speed is slow.

The problem may be a malfunction of the starter or in the wiring.

##### Note

**The cranking speed is greatly affected by the viscosity of the engine oil.**

# STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE) 5



76G05X-040

## REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Raise the front of the vehicle and support it with safety stands.
4. Remove the intake manifold bracket. (Fuel Injection Engine)
5. Remove the starter bolts.
6. Draw out the starter from lower side of the vehicle.

Installation in the reverse order of removal.

## Tightening torque

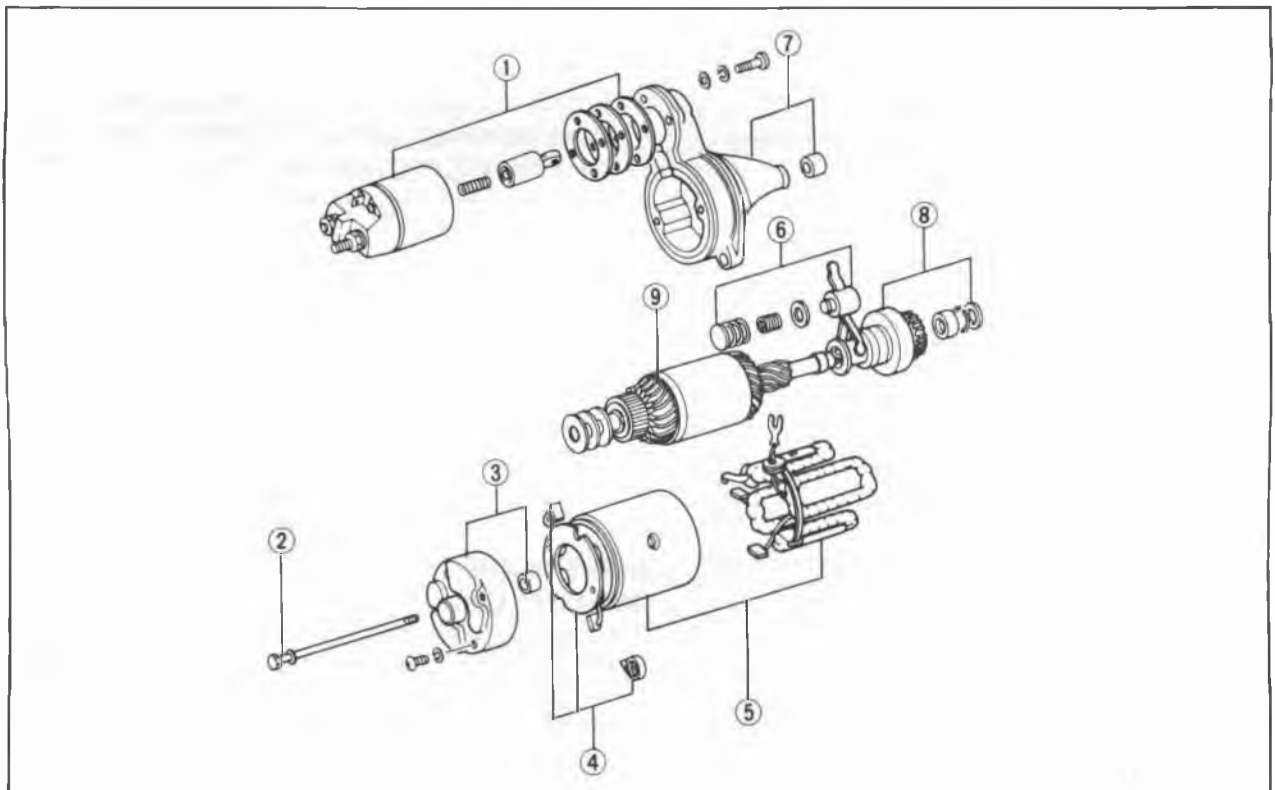
- Bolts.....37—52 N·m**  
(3.8—5.3 m·kg, 27—38 ft·lb)
- B terminal.....9.8—11.8 N·m**  
(1.0—1.2 m·kg, 87—104 in·lb)

- Intake manifold bracket bolt**  
37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)
- Nut.....**  
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the numbered order shown in the figure.
2. Assembly is the reverse order of disassembly.

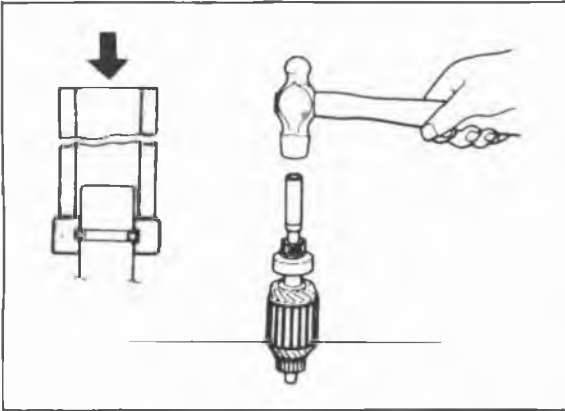
4BG05X-049



4BG05X-075

- |                          |                                   |                 |
|--------------------------|-----------------------------------|-----------------|
| 1. Magnetic switch       | 5. Yoke                           | 8. Drive pinion |
| 2. Bolt                  | 6. Lever                          | 9. Armature     |
| 3. Rear cover            | 7. Drive housing<br>(front cover) |                 |
| 4. Brush-holder assembly |                                   |                 |

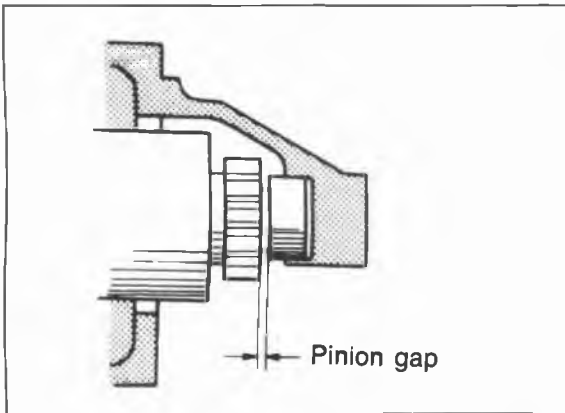
## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)



4BG05X-078

### Drive Pinion

Remove the stopper for the overrunning clutch by using a pipe as shown in the figure.



4BG05X-079

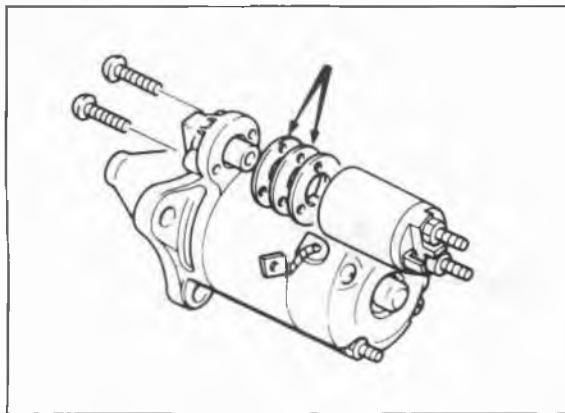
### Adjustment of Pinion Gap

1. Disconnect the wiring from terminal (M).
2. Apply battery power to the terminal (S) and ground the starter motor body, the pinion will eject outward and then stop.
3. Measure the clearance (pinion gap) between the pinion and the stopper.

**Pinion gap: 0.5—2.0 mm (0.020—0.079 in)**

### Caution

**Do not let electricity flow continuously for more than 10 seconds.**

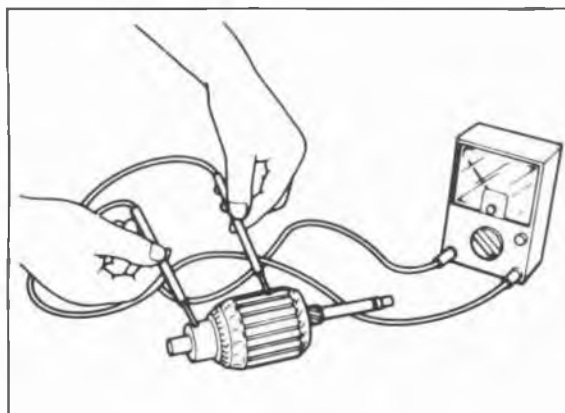


4BG05X-080

4. If the pinion gap is not within the specified range, make the adjustment by increasing or decreasing the number of washers used between the magnetic switch and the drive housing. The gap will become smaller if the number of washers is increased.

### Caution

**Do not use the washers more than 2 mm (0.079 in) in all.**



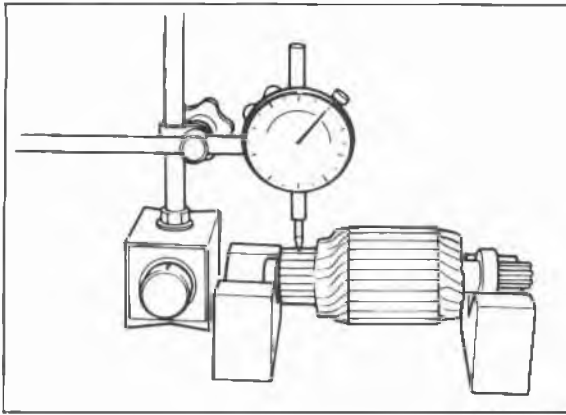
4BG05X-081

### INSPECTION

#### Armature Coil

1. Ground of the armature coil
  - (1) Check for continuity between the commutator and the core by using a circuit tester.
  - (2) Replace the armature if there is continuity.

## STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE) 5



4BG05X-082

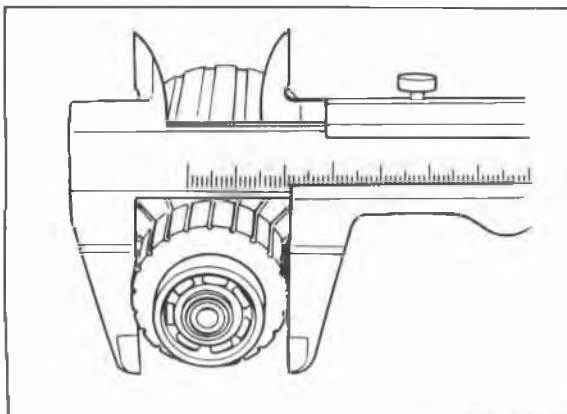
### 2. Vibration of the commutator

- (1) Place the armature on V blocks, and measure the vibration by using a dial gauge.
- (2) If the vibration is Limit or more, repair so that it becomes standard by using a lathe, or replace the armature.

**Standard vibration: 0.05 mm (0.002 in)**  
**Limit: 0.4 mm (0.018 in)**

### Note

**Before checking, be sure that there is no play in the bearings.**



4BG05X-083

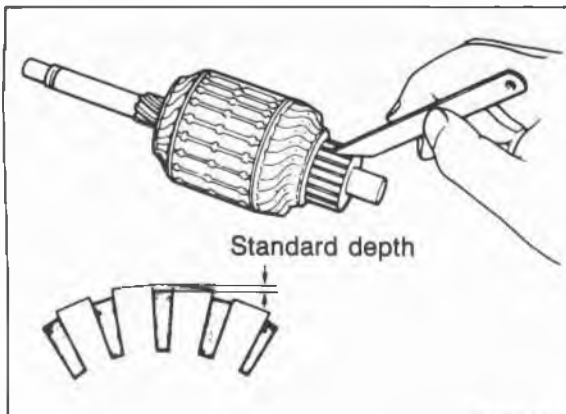
### 3. Outer diameter of the commutator

Replace the armature if the outer diameter of the commutator is grind limit or less.

### 4. Roughness of the commutator surface

- (1) If the commutator surface is dirty, wipe it with a cloth.
- (2) If it is rough, repair it by using a lathe or fine sandpaper.

**Grind limit: 31 mm (1.22 in)**

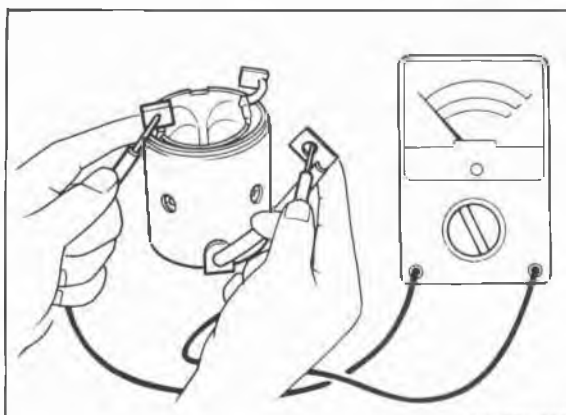


4BG05X-084

### 5. Segment groove depth

If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

**Standard depth:**  
**0.5—0.8 mm (0.020—0.031 in)**  
**Limit depth: 0.2 mm (0.008 in)**



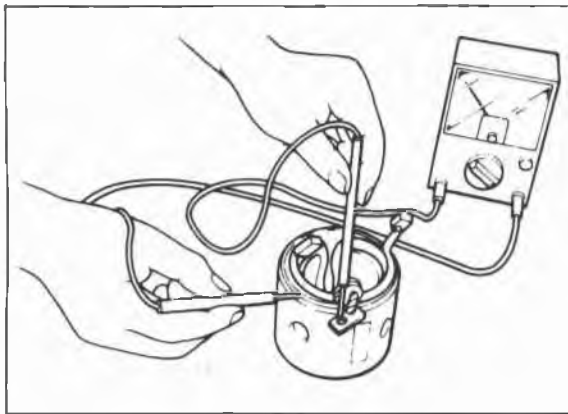
4BG05X-085

### Field Coil

#### 1. Wiring damage

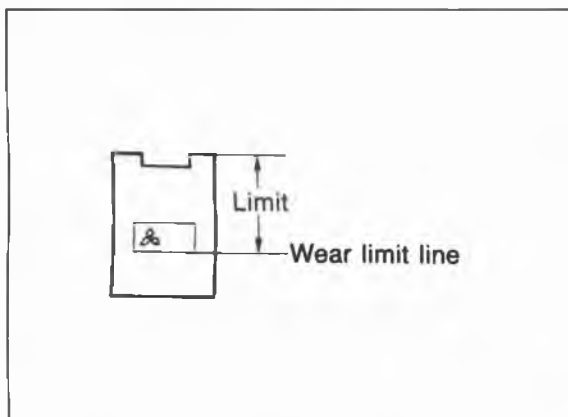
- (1) Check for continuity between the connector and brushes by using a circuit tester.
- (2) Replace the yoke assembly if there is no continuity.

## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)



4BG05X-086

2. Ground of the field coil
  - (1) Check for continuity between the connector and yoke by using a circuit tester.
  - (2) Repair, or replace the yoke assembly if there is continuity.
3. Installation of the field coil  
Replace the yoke assembly if the field coil is loose.



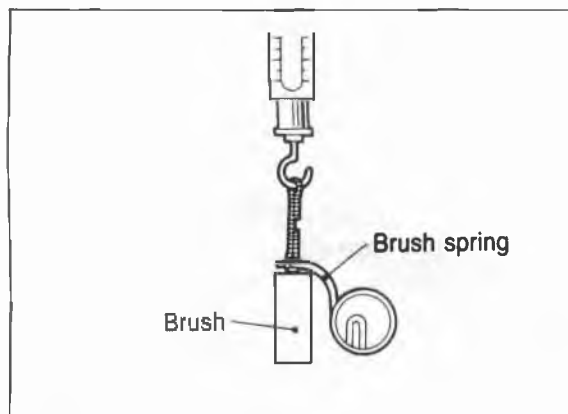
4BG05X-087

### Brush and Brush Holder

1. Brush  
If the brushes are worn beyond the wear limit, or if the wear is near the limit, replace the brushes.

**Standard: 17 mm (0.669 in)**

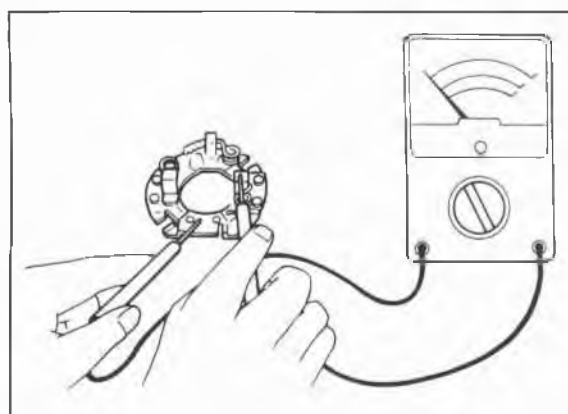
**Wear limit: 11 mm (0.433 in)**



4BG05X-088

2. Brush spring
  - (1) Measure the force of the brush spring by using a spring balance.
  - (2) Replace the brush spring if the force is Limit or less.

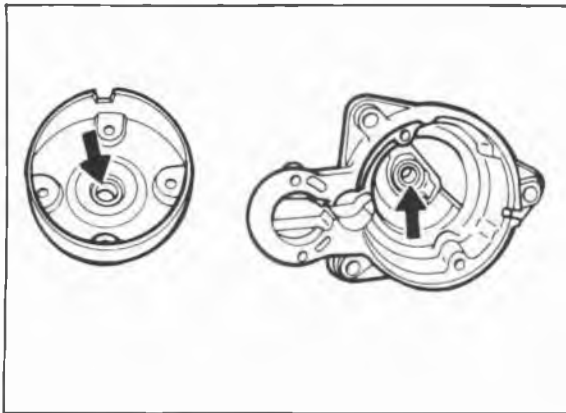
**Limit: 9 N (900 g, 31.75 oz)**



4BG05X-089

3. Brush holder
  - (1) Check for continuity between the insulated brush and the plate by using a circuit tester.
  - (2) Repair or replace if there is continuity.
  - (3) Also check to be sure that the brush slides smoothly inside the brush holder.





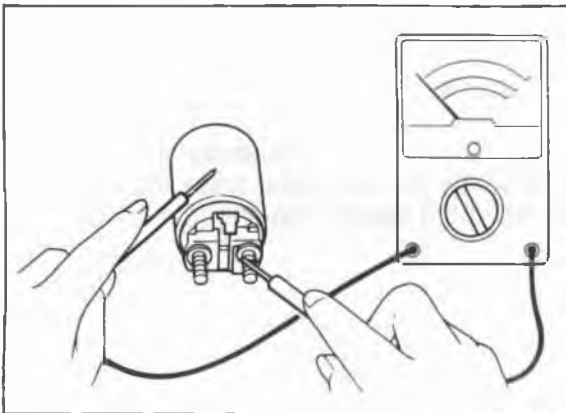
4BG05X-090

## Drive Pinion and Housing

1. Pinion gear
  - (1) Check for wear or damage of the pinion gear.
  - (2) Replace if necessary.
  - (3) If the pinion gear is seriously damaged, also check the flywheel ring gear.

2. Bushing

- (1) Check for wear or damage.
- (2) Replace if necessary.



4BG05X-091

3. Switch coil

- (1) Check for continuity between the M terminal and the body by using a circuit tester.
- (2) Replace the switch if there is no continuity.

## PERFORMANCE INSPECTION

### Magnetic Switch

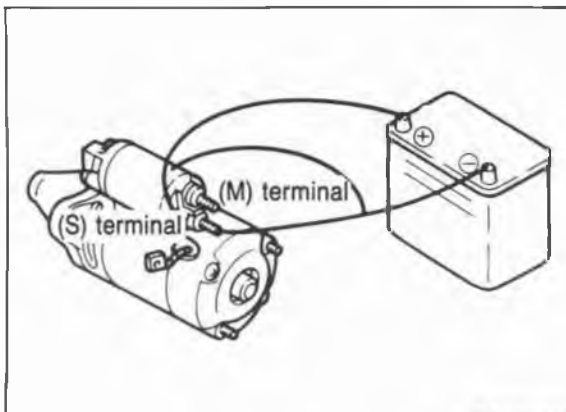
Disconnect the terminal **M wire**, and make the following tests.

#### Pull-in Test

The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

#### Caution

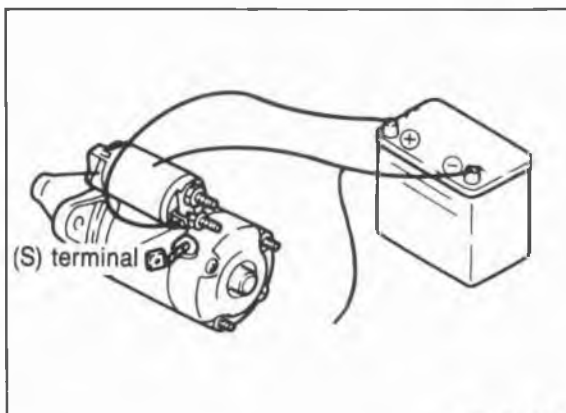
**Do not supply power continuously for more than 10 seconds.**



4BG05X-092

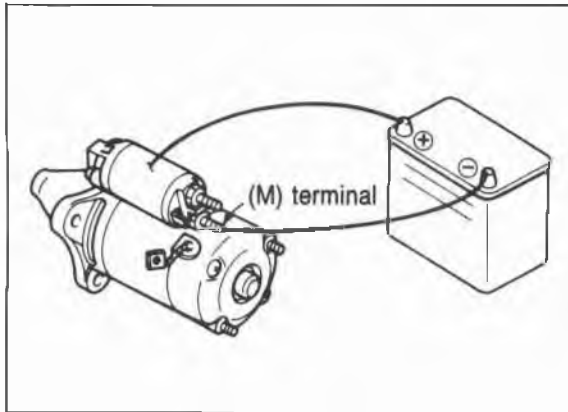
#### Hold-in Test

1. After completing the pull-in test, disconnect the wire from terminal M (with the pinion left ejected).
2. The hold-in coil is functioning properly if the pinion does not return.

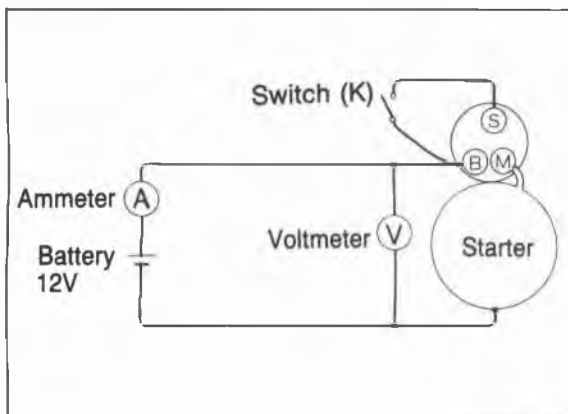


4BG05X-093

## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)



4BG05X-094



76G05X-059

### Return Test

1. Connect the battery between terminal M of the magnetic switch and the body, as shown in the figure.
2. Pull the pinion out manually to the pinion stopper position.
3. The pinion should immediately return to its original position when it is released.

### No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

### Note

**Use wires as thick as possible and tighten each terminal fully.**

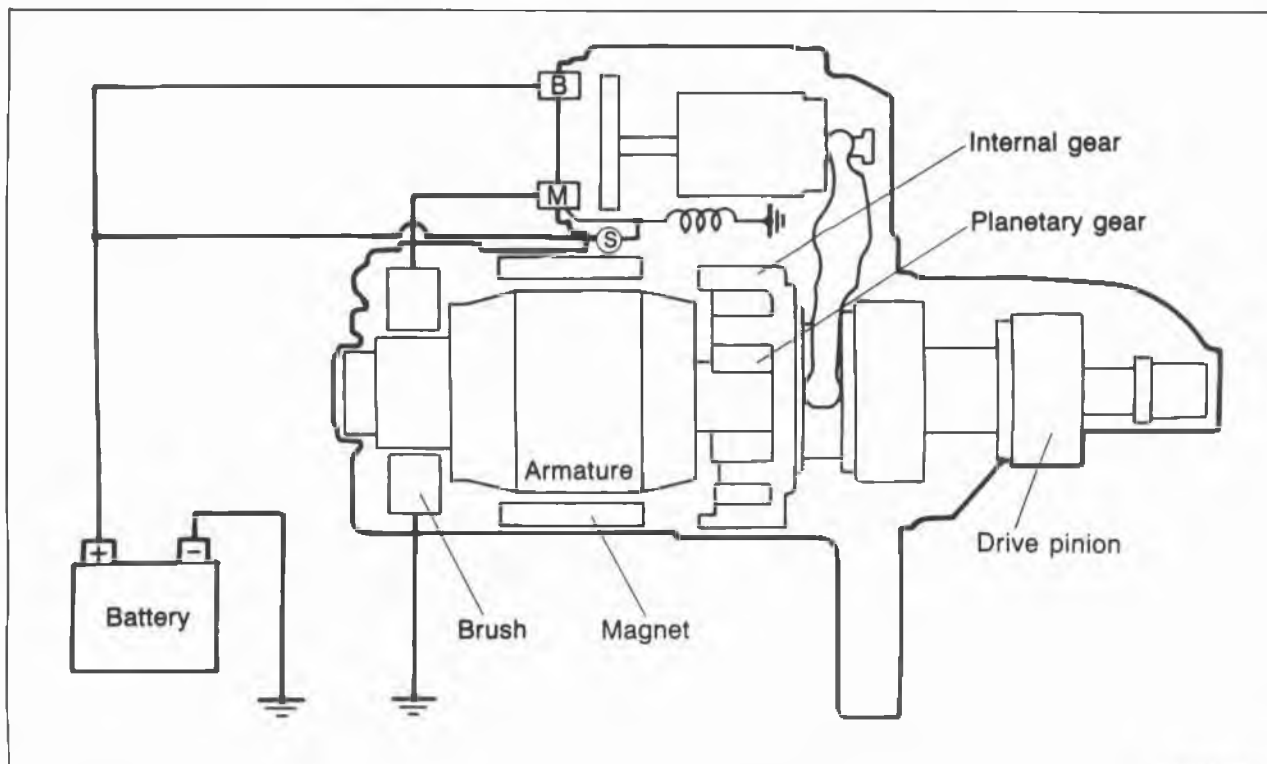
2. Close switch "K" to run the starter.
3. If the voltmeter and ammeter show the following values while the starter is running, it is normal.

	0.85 kW type	0.95 kW type
Battery voltage (volt)	11.5	
Current (ampere)	60 or less	
Gear shaft speed (rpm)	6,500 or more	6,600 or more

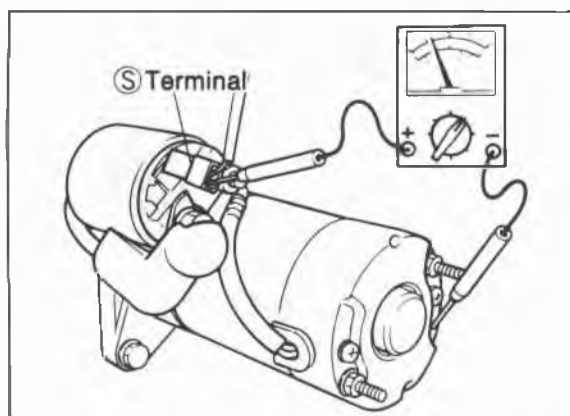
4. If any abnormality is noted, check it according to "INSPECTION"

## STARTER (GASOLINE ENGINE, 1.4 KW TYPE)

### STARTING SYSTEM



76G05X-041



86U05X-031

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspection.

1. Turn the ignition switch to the start position.
2. Check that the starter motor operates.
3. If the starter does not operate, check the voltage between S terminal and ground using a voltmeter.
4. If the voltage is 8V or more, the starter is malfunction.
5. If less than 8V, the wiring harness is malfunction.

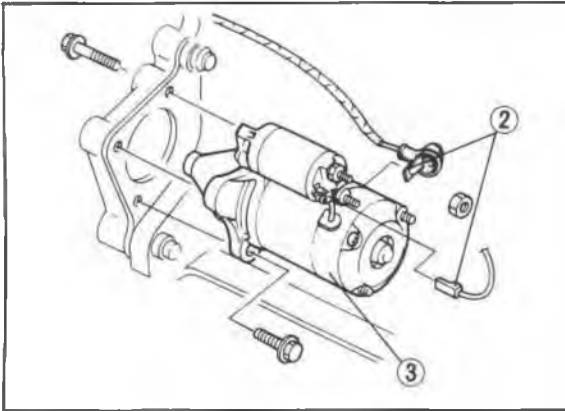
#### Caution

**If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.**

#### Note

**The cranking speed is greatly affected by the viscosity of the engine oil.**

## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



76G05X-042

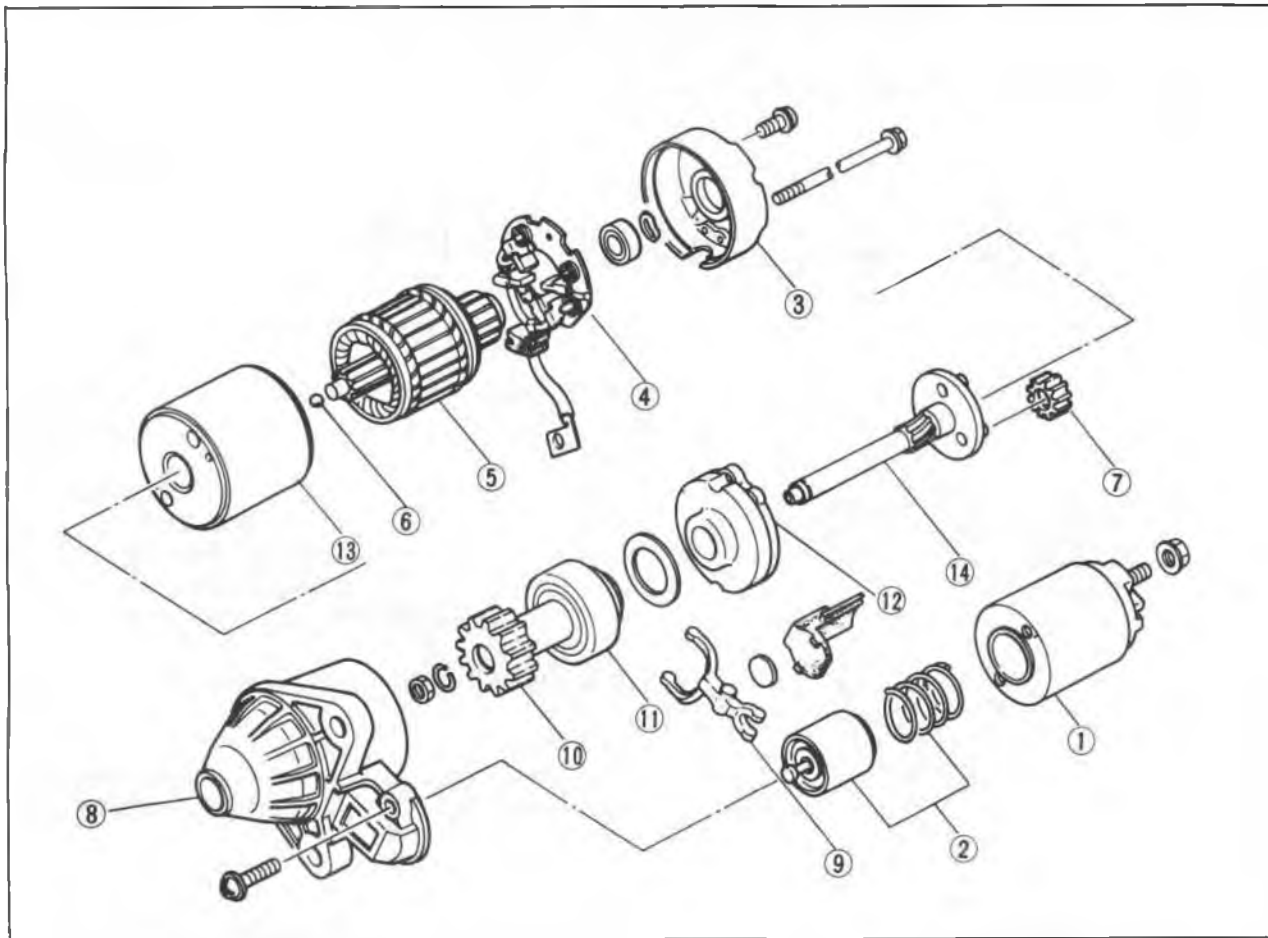
### REMOVAL

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Raise the front of the vehicle and support it with safety stands.
4. Remove the starter bolts.
5. Draw out the starter from lower side of the vehicle.

### Note

**Remove the lowest starter bolt last.**

### DISASSEMBLY



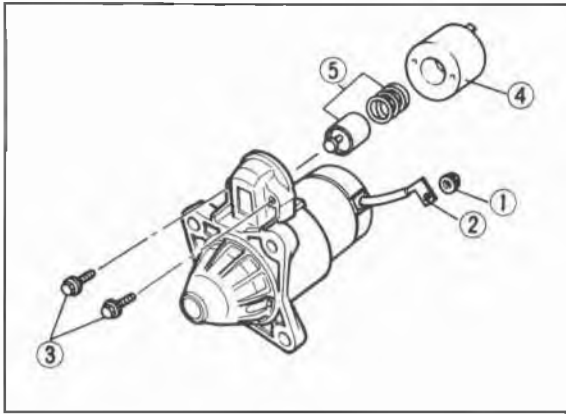
86U05X-083

- |                          |                              |                        |
|--------------------------|------------------------------|------------------------|
| 1. Magnetic switch       | 6. Ball                      | 11. Overrunning clutch |
| 2. Plunger and spring    | 7. Planetary gear            | 12. Internal gear      |
| 3. Rear housing          | 8. Drive housing front cover | 13. Yoke assembly      |
| 4. Brush holder assembly | 9. Lever                     | 14. Gear shaft         |
| 5. Armature              | 10. Drive pinion             |                        |

### Caution

**Do not strike the yoke with a hammer, drop it or put it in a vise when disassembling the starter.**

# STARTER (GASOLINE ENGINE, 1.4 KW TYPE) 5

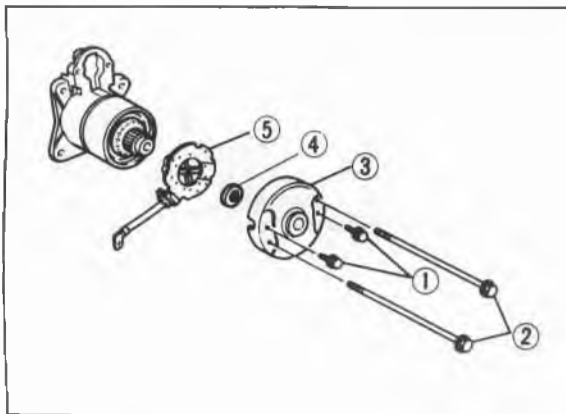


86U05X-33

## Magnetic Switch

Remove the following parts:

- (1) M terminal nut
- (2) Wire
- (3) Switch installation screws
- (4) Magnetic switch
- (5) Plunger and plunger spring



7BU05X-034

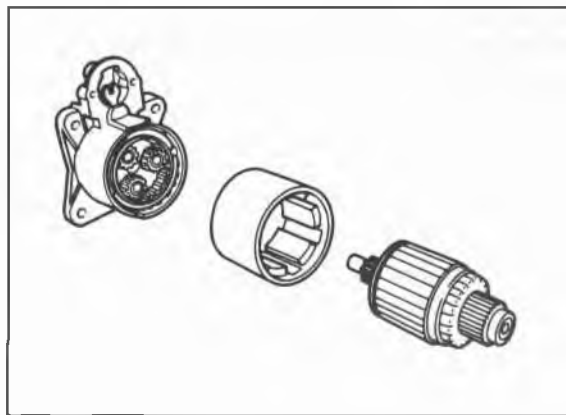
## Rear Bracket and Brush Holder

Remove the following parts:

- (1) Brush holder installation screws
- (2) Through bolts
- (3) Rear cover
- (4) Wave washer
- (5) Brush holder assembly

### Note

Put an aligning mark on the yoke and rear bracket for reassembly before removing the rear bracket.



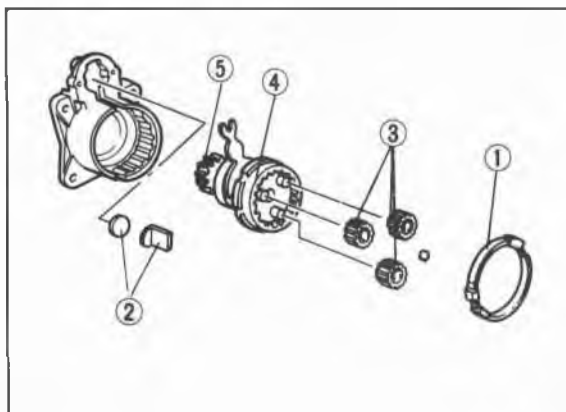
7BU05X-035

## Yoke and Armature

Remove the armature and yoke.

### Note

Put an aligning mark on the yoke and front bracket for reassembly before removing the front bracket.



7BU05X-110

## Overrunning Clutch, Planetary Gears, and Internal Gear.

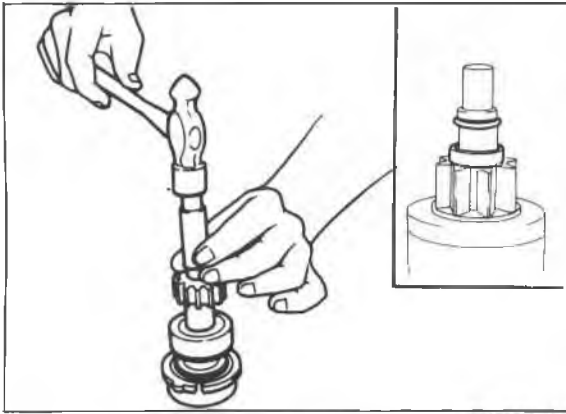
Remove the following parts:

- (1) Gasket
- (2) Plate
- (3) Planetary gears
- (4) Internal gear
- (5) Drive pinion

### Note

Do not lose the ball.

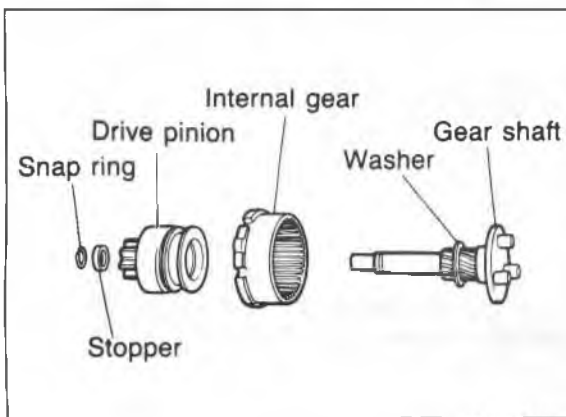
## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



86U05X-034

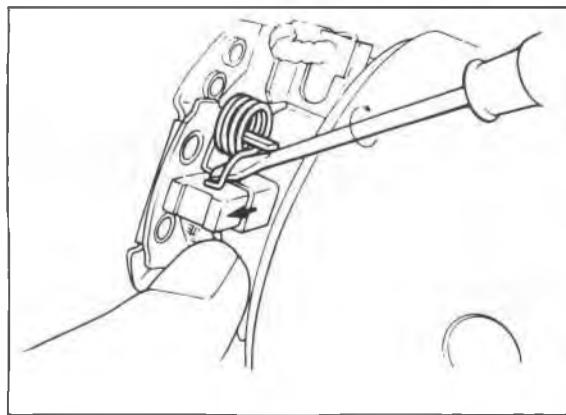
### Overrunning Clutch Stopper

1. Remove the overrunning clutch stopper using a pipe.



7BU05X-037

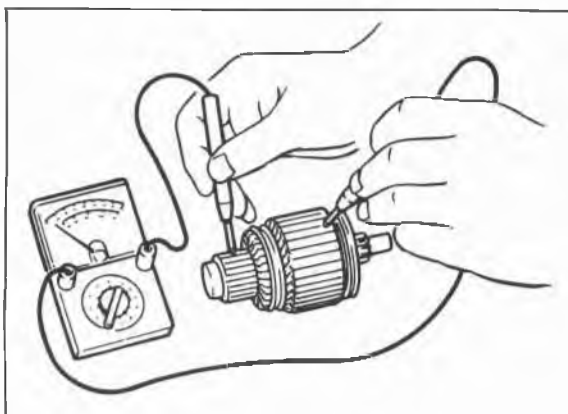
2. Disassemble the drive pinion, internal gear and washer from the gear shaft.



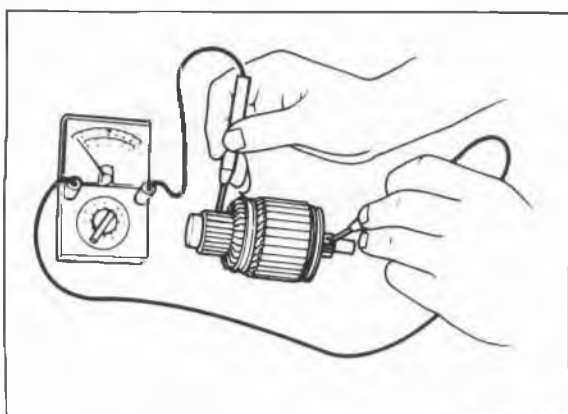
7BU05X-038

### Brush and Brush Holder

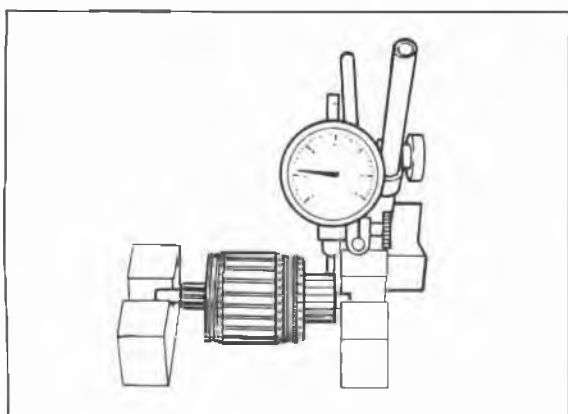
- Remove the brush from the brush holder using a flat-tip screwdriver.



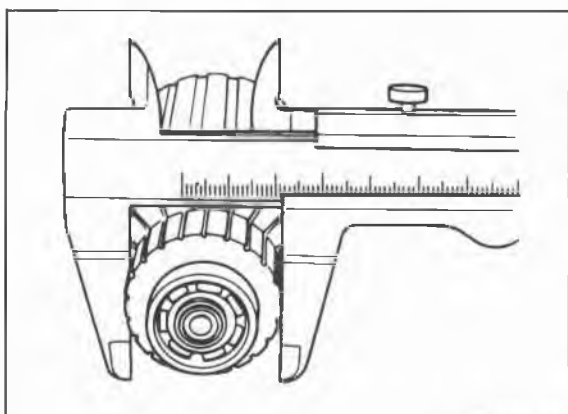
67U05X-048



67U05X-049



7BU05X-039



7BU05X-040

## INSPECTION

### Armature

1. Ground of armature coil  
Check for continuity between the commutator and the core using a circuit tester. Replace the armature if there is continuity.
2. Insulation of armature coil  
Check for continuity between the commutator and the shaft using a circuit tester. Replace the armature if there is continuity.

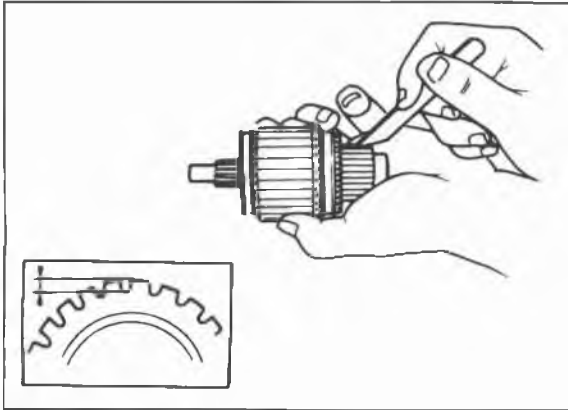
3. Runout of commutator
  - (1) Place the armature on V blocks, and measure the runout using a dial gauge.
  - (2) If the runout is excessive, replace the armature.

**Runout: 0.05 mm (0.002 in)**  
**Maximum: 0.1 mm (0.004 in)**

4. Outer diameter of commutator  
Replace the armature if the outer diameter of the commutator is less than the grind limit.
5. Roughness of commutator surface  
Repair using a lathe or fine sandpaper if it is rough; wipe it with a rag if it is dirty.

**Grind limit: 28.8 mm (1.13 in)**

## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



7BU05X-041

6. Segments groove depth  
If the depth of the groove is less than standard, undercut the grooves to the standard depth.

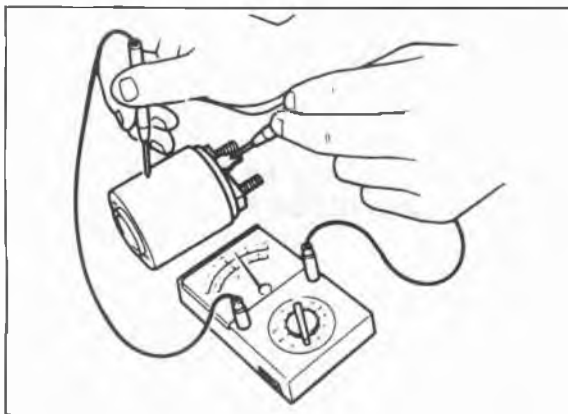
**Standard depth: 0.5—0.8 mm (0.02—0.03 in)**  
**Minimum depth: 0.2 mm (0.008 in).**



67U05X-053

### Magnetic Switch

1. Wiring damage (S terminal — M terminal).  
Check for continuity between the S terminal and the M terminal using a circuit tester. Replace the magnetic switch if there is no continuity.



67U05X-054

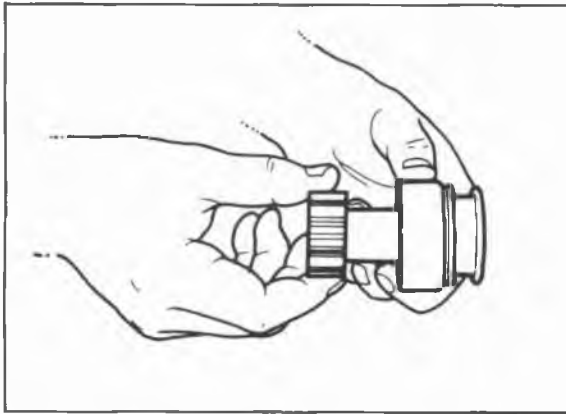
2. Wiring damage (S terminal — body)  
Check for continuity between S terminal and body using a circuit tester.  
Replace the magnetic switch if there is no continuity.



67U05X-055

3. Ground of magnetic switch  
Check for continuity between M and B terminals using a circuit tester. Replace the magnetic switch if there is continuity.





86U05X-035

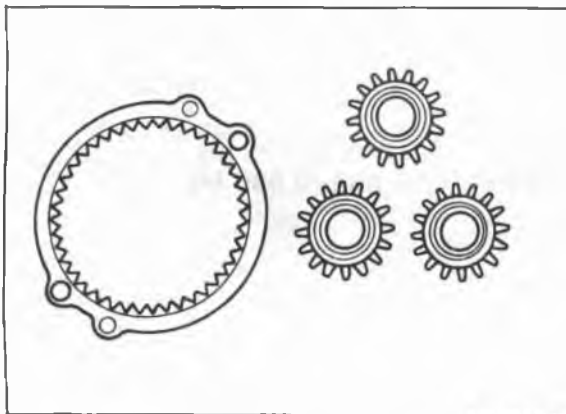
### Overrunning Clutch

Turn the pinion shaft by hand and hold the overrunning clutch.

Replace the overrunning clutch if the pinion turns in both directions or in neither direction.

### Note

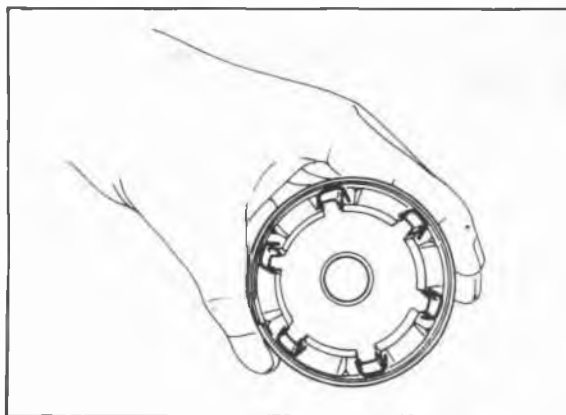
**Do not wash the overrunning clutch with solvent; it is packed with grease and sealed.**



67U05X-057

### Internal Gear and Planetary Gears

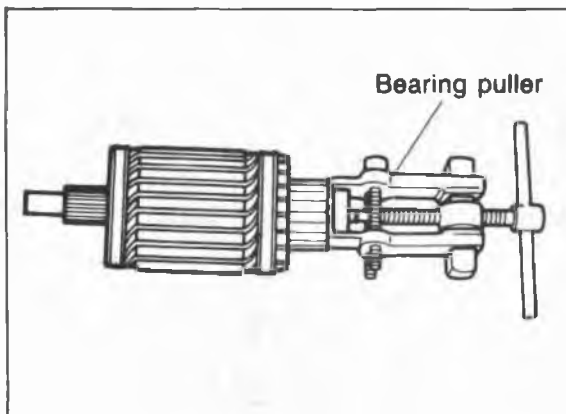
1. Internal gear  
Check for wear or damage. Replace if necessary.
2. Planetary gears  
Check for wear or damage. Replace if necessary.



67U05X-058

### Yoke

Check for damage. Replace if necessary.



67U05X-059

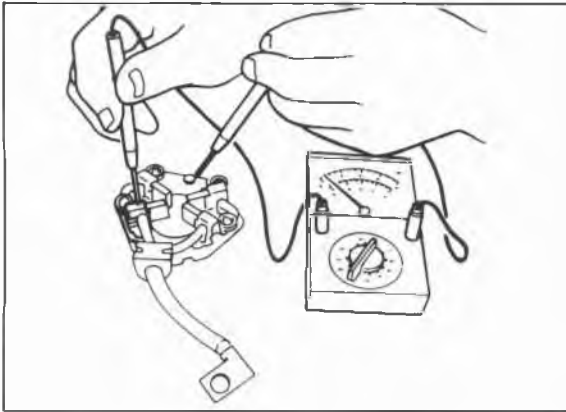
### Bearing

Check for abnormal noise, looseness, binding. Replace the bearing if there is any problem.

### Note

**Use a bearing puller to remove the bearings.**

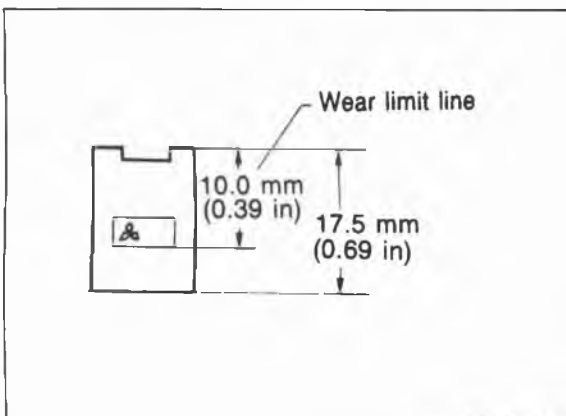
## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



67U05X-060

### Brush and Brush Holder

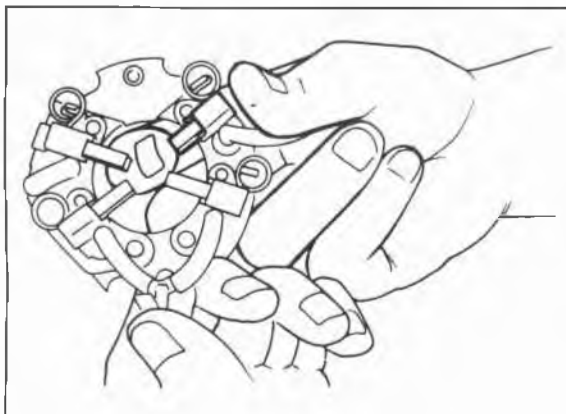
1. Insulation of brush holder  
Check for continuity between the insulated brush and the plate using a circuit tester. Replace the brush holder if there is continuity.



7BU05X-043

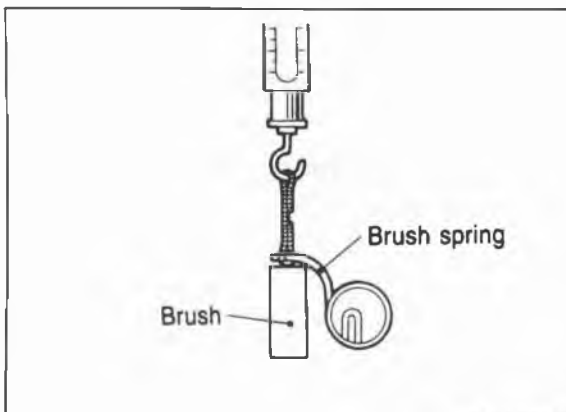
2. Brush  
Replace the brushes if they are worn beyond the wear limit, or if the wear is near the limit.

**Wear limit: 10.0 mm (0.394 in)**  
**New brush: 17.5 mm (0.689 in)**



67U05X-062

3. Brush holder  
Check that the brush slides smoothly inside the brush holder.



86U05X-036

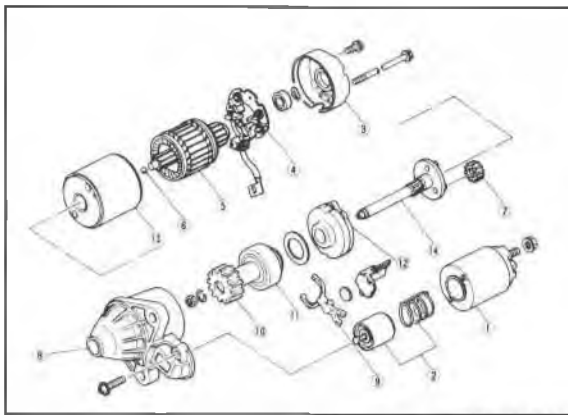
4. Brush spring
  - (1) Measure the force of the brush spring using a spring balance.
  - (2) Replace the brush spring if the force is below specification.

**Specification: 7 N (0.7 kg, 1.5 lb)**

### Note

- a) The force is measured at the moment the brush spring separates from the brush.
- b) The force must be 18–24 N (1.8–2.4 kg, 4.0–5.3 lb) for a new brush spring.

# STARTER (GASOLINE ENGINE, 1.4 KW TYPE) 5



86U05X-037

## ASSEMBLY

Assemble in the reverse order of disassembly, referring to the assembly note.

## Assembly Note

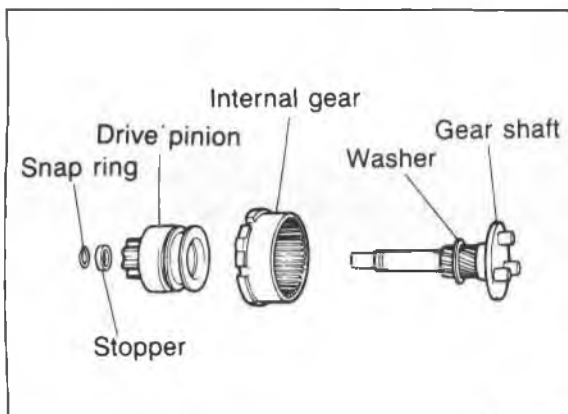
### Lubricate

During assembly lubricate the following points:

1. Gear of armature shaft
2. Internal gear and planetary gears
3. Plunger circumference
4. Lever
5. Ball
6. Gear shaft spline
7. Front bracket housing

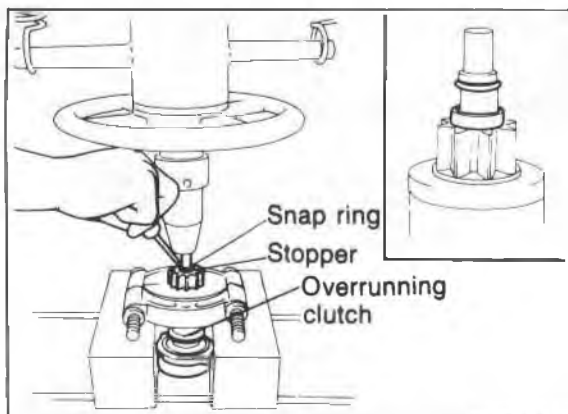
## Installation of Overrunning Clutch

1. Install the washer, internal gear, drive pinion stopper, and the snap ring on the gear shaft.



7BU05X-045

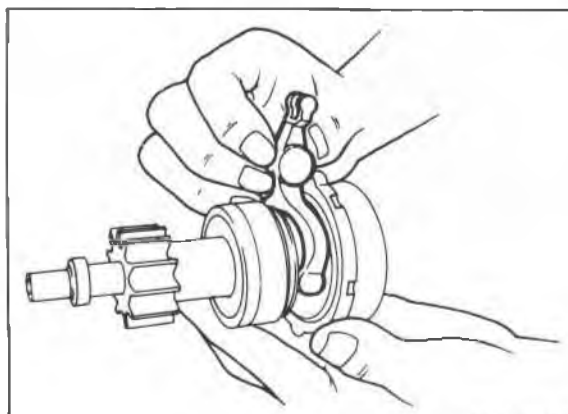
2. Press the stopper and the snap ring into position as shown in the figure.



7BU05X-046

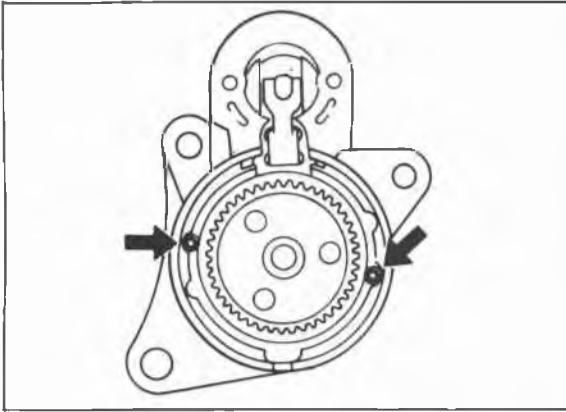
## Installation of lever

Check the lever faces in the correct direction.



7BU05X-047

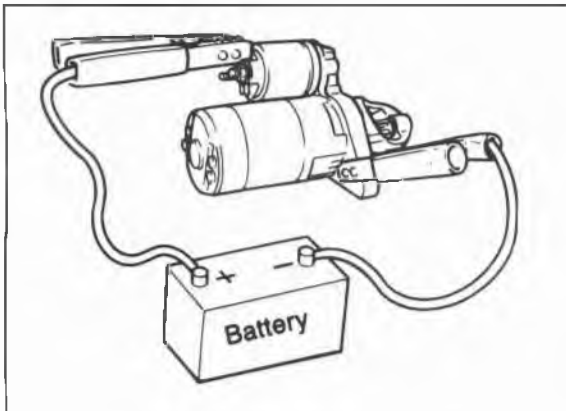
## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



7BU05X-048

### Installation of Brush Holder

Install the brush holder assembly and rear cover and align the through bolts.



86U05X-038

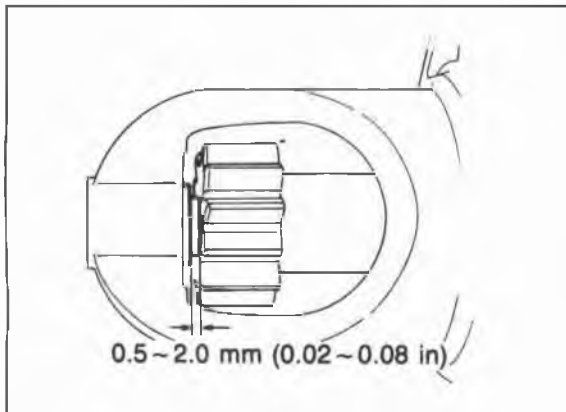
### CHECKING OPERATION

#### Magnetic Switch

Make the following tests:

#### Pull-out test

1. Check that the pinion is pulled out when 12V is connected to the S terminal and the body is grounded.

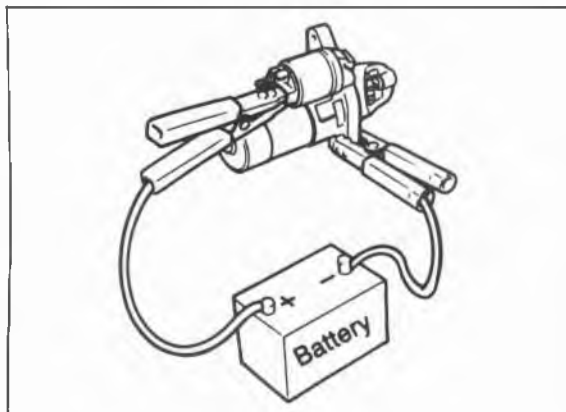


7BU05X-050

2. Measure the pinion gap while the pinion is pulled out.

**Specification: 0.5—2.0 mm (0.02—0.08 in)**

3. Adjust the pinion gap with an adjust washer (drive housing front cover—magnetic switch) if it is not within specification.

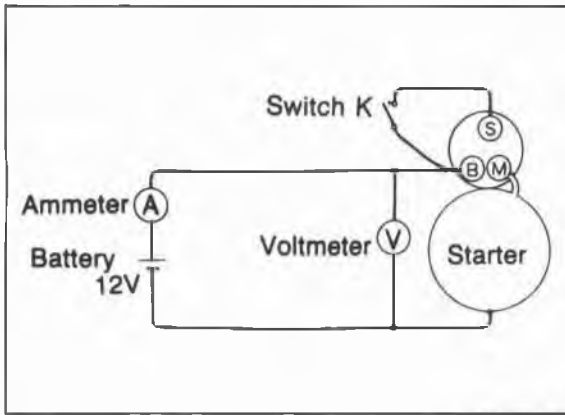


86U05X-039

#### Return test

1. Disconnect the motor wire from the M terminal, and then connect the battery power to the M terminal and ground the body.
2. Pull out the overrunning clutch with a flat-tip screwdriver. Check that the overrunning clutch returns to its original position when released.

# STARTER (GASOLINE ENGINE, 1.4 KW TYPE) 5



86U05X-040

## No-Load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

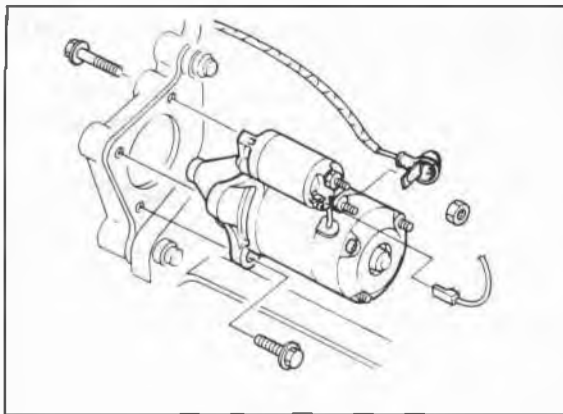
### Note

**Use heavy gauge wires and tighten each terminal fully.**

2. Close switch K to run the starter.
3. Check for the following:

Voltage	(V)	11.0
Current	(A)	90 max.
Gear shaft speed	(rpm)	3,000 min.

4. If any abnormality is noted, check for the cause according to "Inspection".



76G05X-043

## INSTALLATION

Install in the reverse order of removal.

### Note

**When installing the starter, tighten the bolts to the specified torque.**

### Tightening torque:

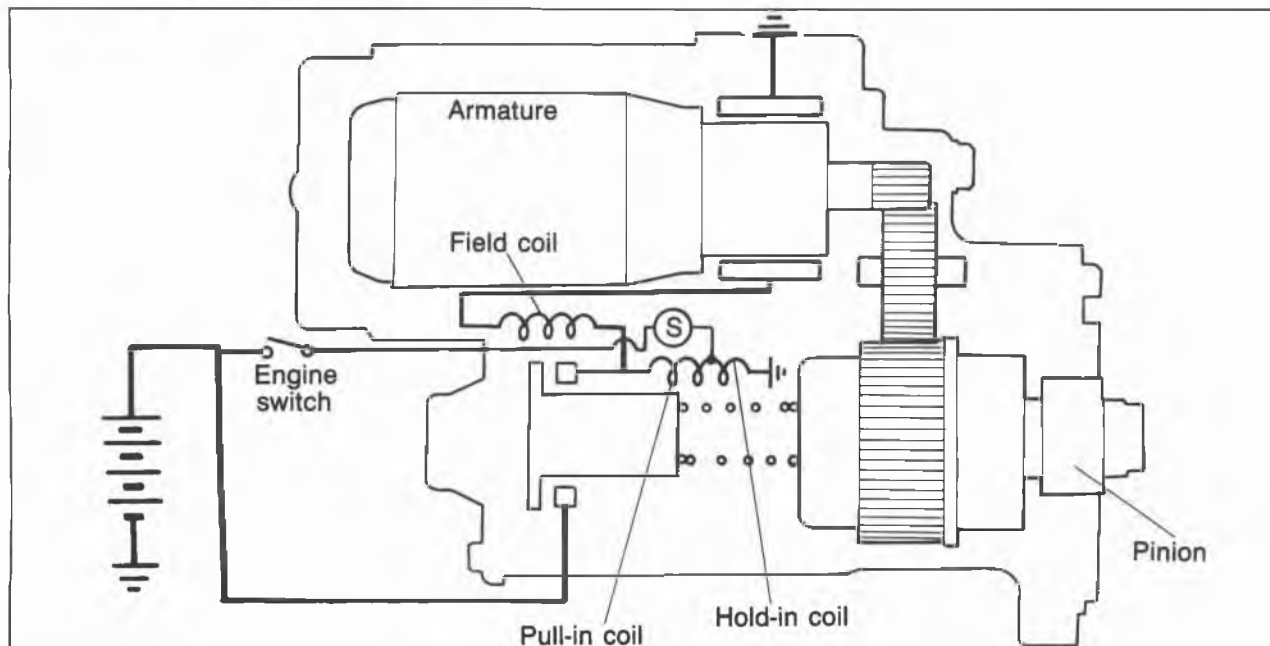
**Bolts..... 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)**

**B terminal..... 9.8—11.8 N·m  
(1.0—1.2 m·kg, 87—104 in·lb)**

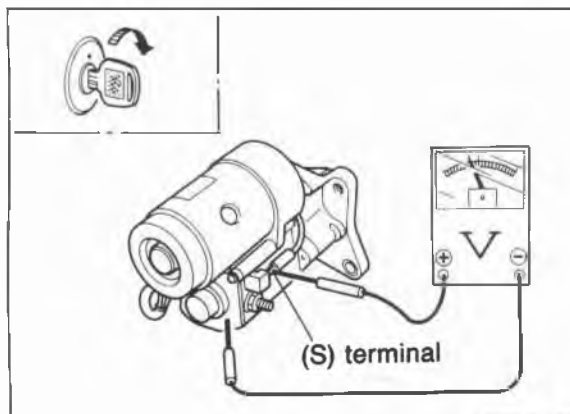
## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)

### STARTER (DIESEL ENGINE, 2.0 KW TYPE)

#### STARTING SYSTEM CIRCUIT



4BG05X-096



76G05X-060

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspections.

#### A. If the magnetic switch does not function during starting.

1. Turn the ignition switch to the start position.
2. Measure the voltage between the S terminal and ground.
3. If the measured value is standard voltage or more, there is starter malfunction.
4. If it is less than standard voltage, there is a malfunction in the wiring.

**Standard voltage: 8 V**

#### Caution

If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

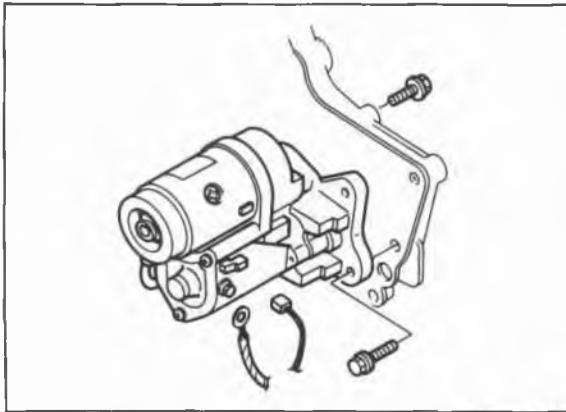
#### B. If the starter won't crank, or if the cranking speed is slow.

The problem may be a malfunction of the starter or in the wiring.

#### Note

The cranking speed is greatly affected by the viscosity of the engine oil.

## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5



76G05X-044

### REMOVAL AND INSTALLATION

Removal is as follows:

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Remove the starter.

Install in the reverse order of removal.

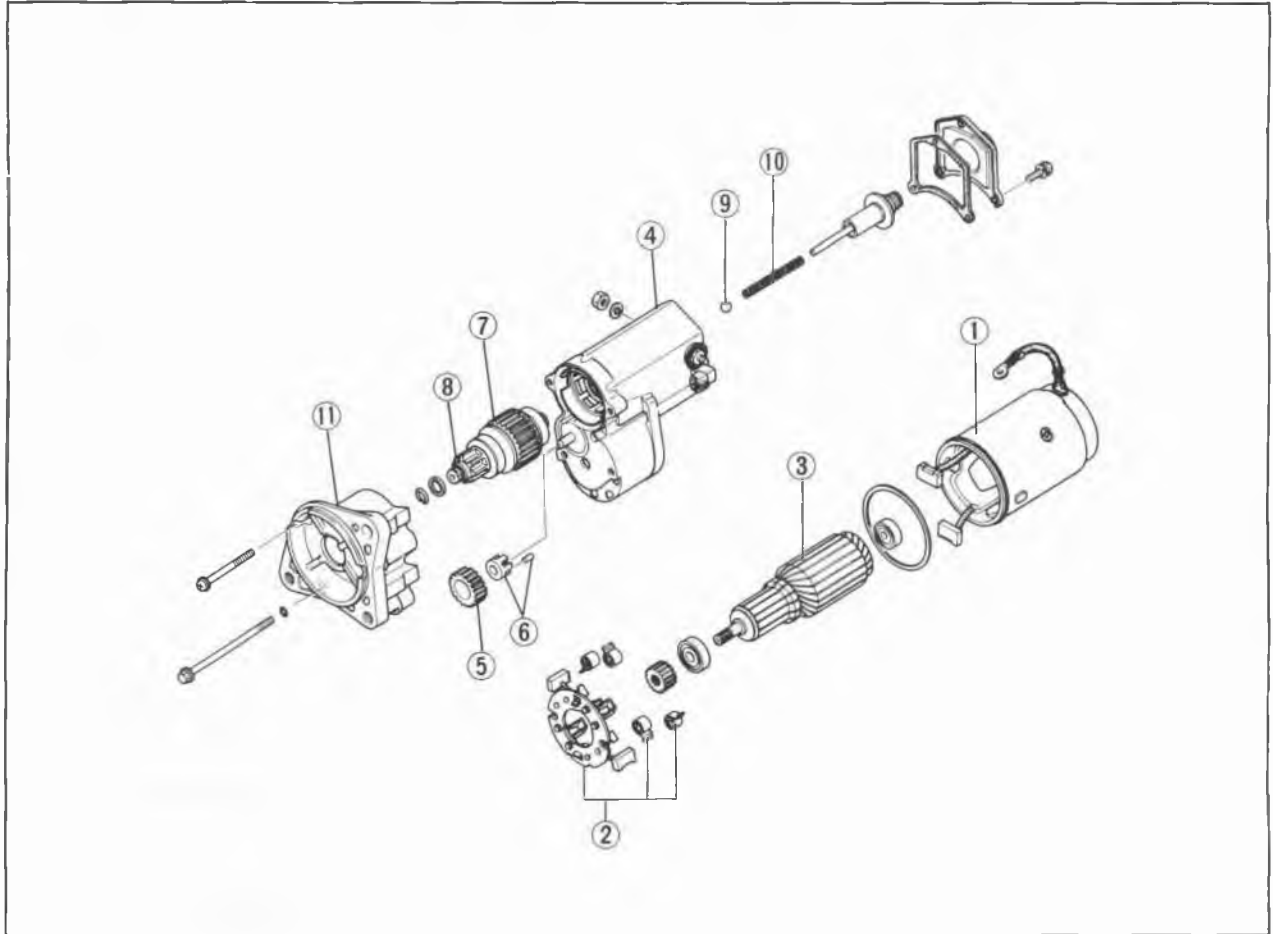
### Tightening torque:

- Bolts**..... 64—89 N·m  
(6.5—9.1 m·kg, 47—66 ft·lb)
- B terminal**..... 9.8—11.8 N·m  
(1.0—1.2 m·kg, 87—104 in·lb)

### DISASSEMBLY AND ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

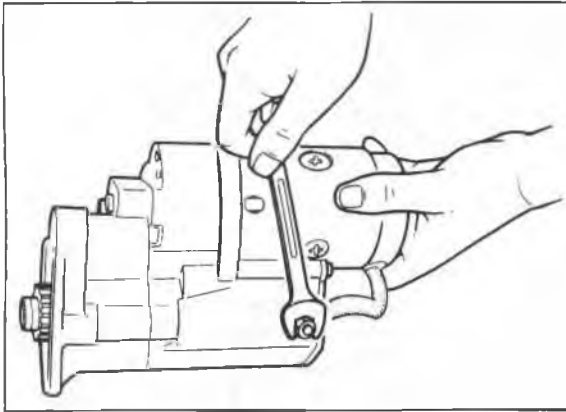
76G05X-045



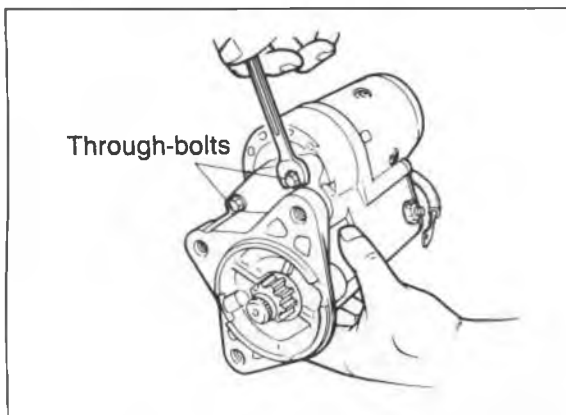
4BG05X-047

- |                             |                                 |
|-----------------------------|---------------------------------|
| 1. Yoke assembly            | 7. Over-running clutch assembly |
| 2. Brush holder             | 8. Pinion gear                  |
| 3. Armature                 | 9. Steel ball                   |
| 4. Magnetic switch assembly | 10. Coil spring                 |
| 5. Idler gear               | 11. Housing                     |
| 6. Retainer and rollers     |                                 |

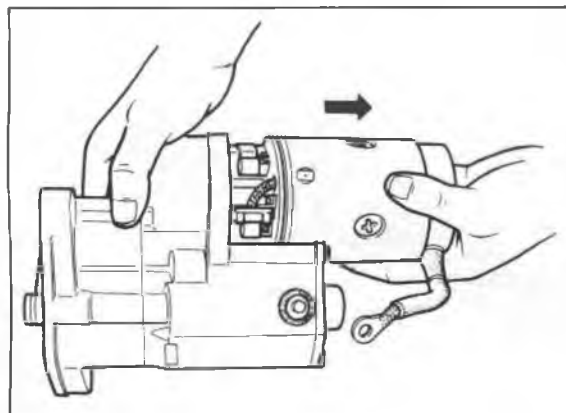
## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



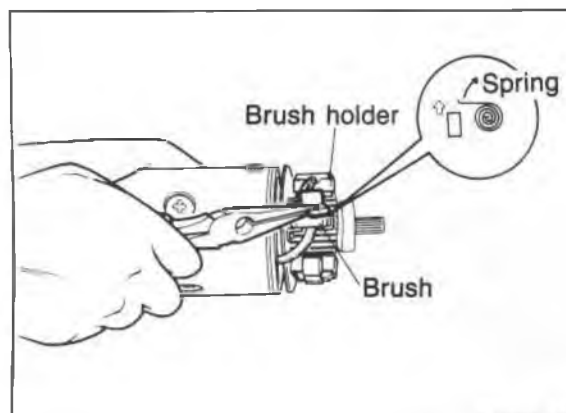
4BG05X-098



4EG05X-041



4EG05X-042



4EG05X-043

### Disassembly

1. Remove the lead wire connected to the magnetic switch.

2. Remove the two through-bolts.

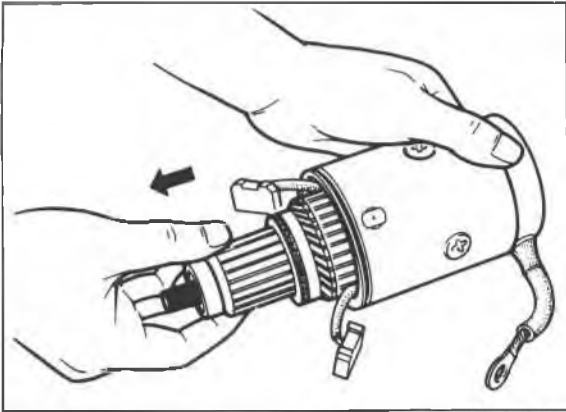
3. Remove the yoke from the magnetic switch.

4. Using radio pliers or a similar tool, raise the + side brush spring and remove the brush.

**Caution**  
Be careful not to scratch the brush or commutator.



## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5

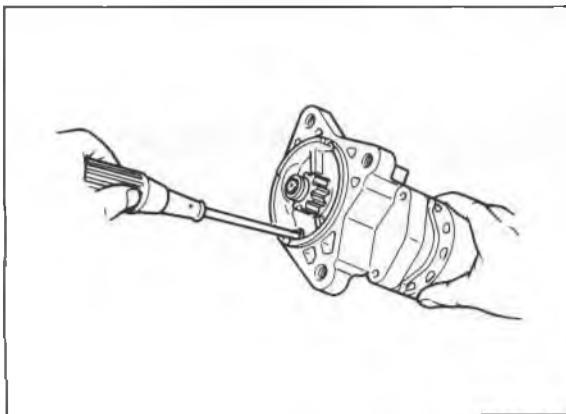


4EG05X-044

5. Remove the armature from the yoke.

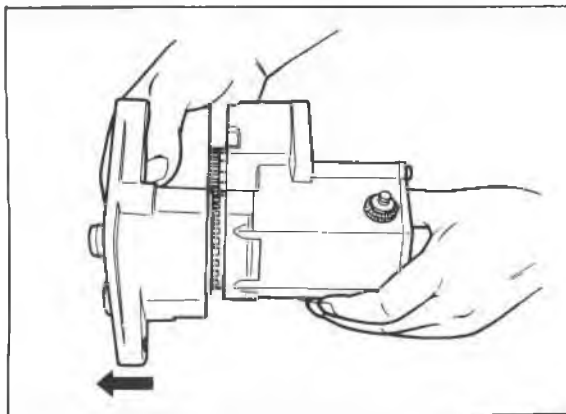
**Caution**

**Be careful not to drop the armature.**



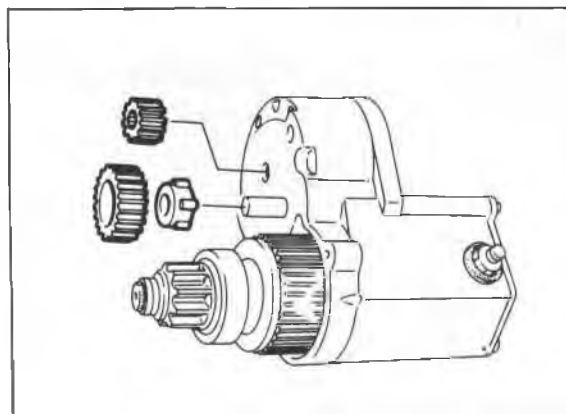
4EG05X-045

6. Remove the two screws which hold the housing and the magnetic switch.



4EG05X-046

7. Remove the housing from the magnetic switch.



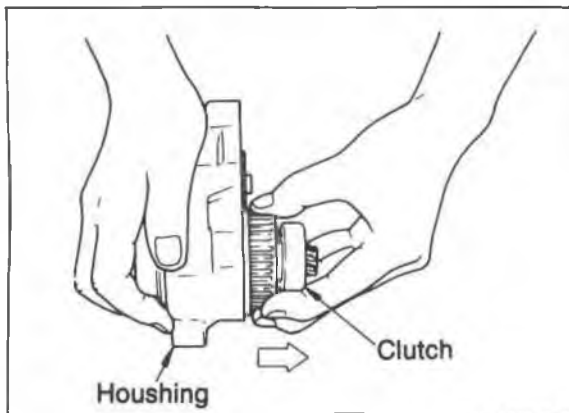
4EG05X-047

8. Remove the idle gear, retainer and roller.

**Caution**

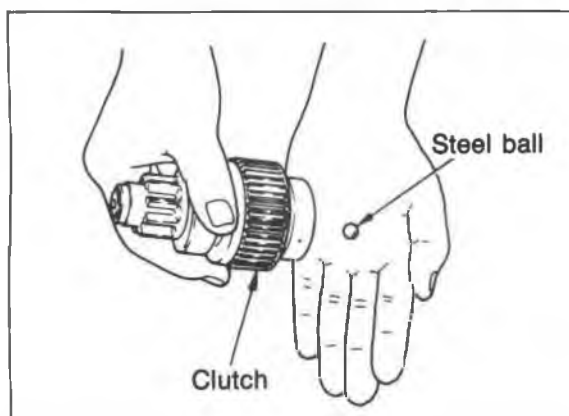
**Be careful not to lose the roller.**

## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



4EG05X-048

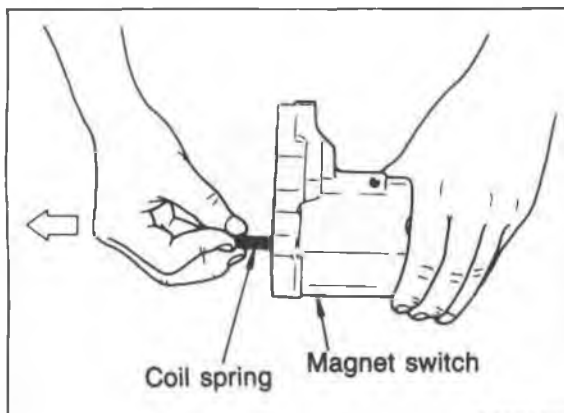
9. Remove the over-running clutch assembly from the housing.



4EG05X-049

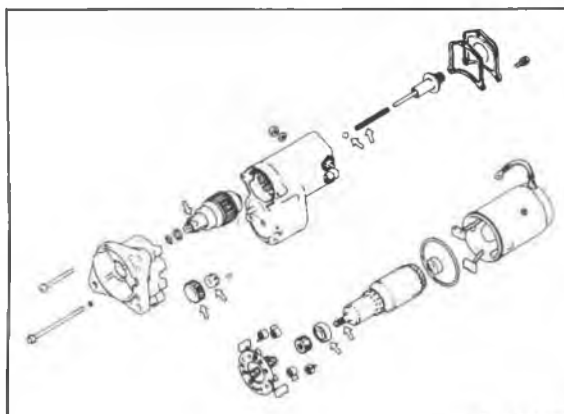
10. Remove the steel ball from the over-running clutch assembly.

**Caution**  
Be careful not to lose the steel ball.



4EG05X-050

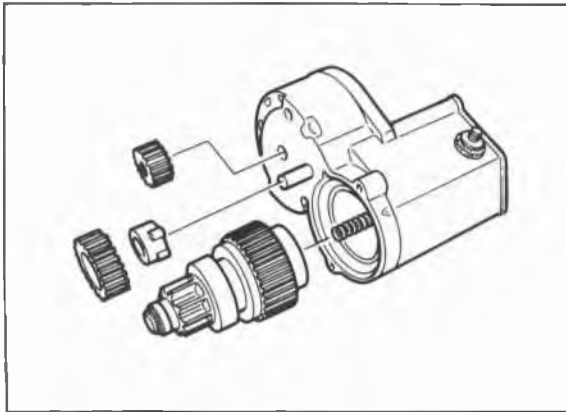
11. Remove the coil spring from the magnetic switch.



### Assembly (main point)

#### Greasing

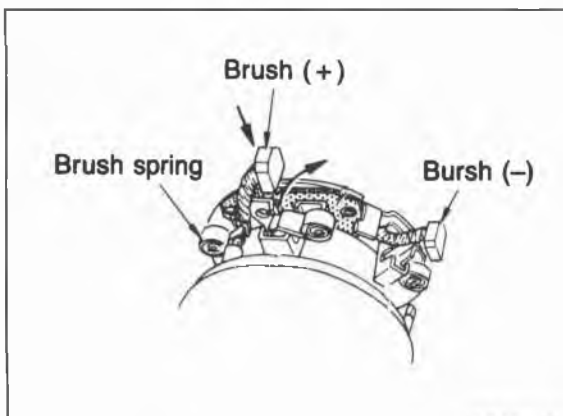
Apply grease (lithium base, NLGI No. 2) to the places shown in the figure.



4BG04X-100

### Coil spring and steel ball installation

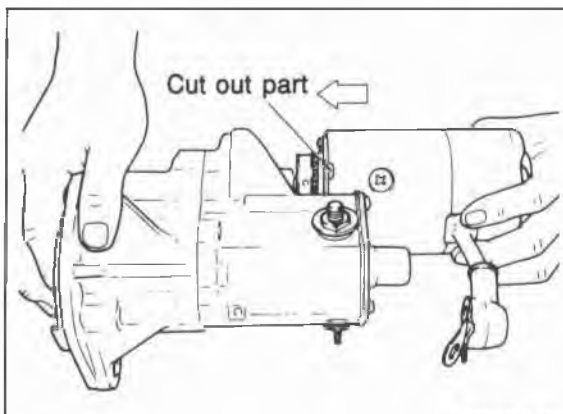
1. Install the coil spring and steel ball to the magnetic switch before installing the over-running clutch assembly.
2. Assemble the retainer and roller to the idler gear.



4BG05X-101

### Brush installation

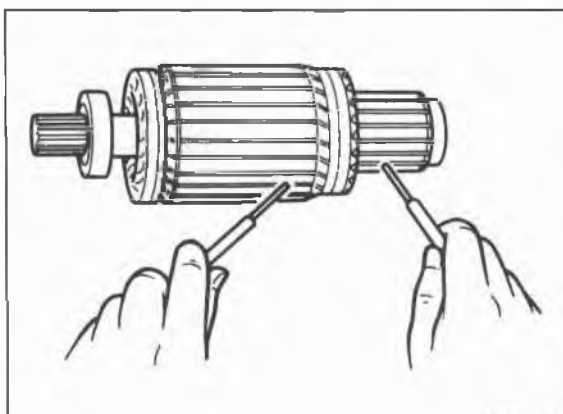
1. Assemble the brush holder to the yoke.
2. Assemble the two brushes on the yoke side to the brush holder.



4BG05X-102

### Magnetic switch installation

Align the cut out part with the projection of the magnetic switch.



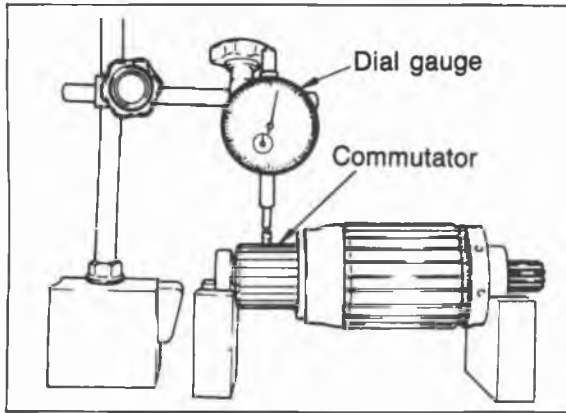
4BG05X-081

### INSPECTION

#### Armature Coil

1. Ground of the armature coil
  - (1) Check for continuity between the commutator and the core by using a circuit tester.
  - (2) Replace the armature if there is continuity.

## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



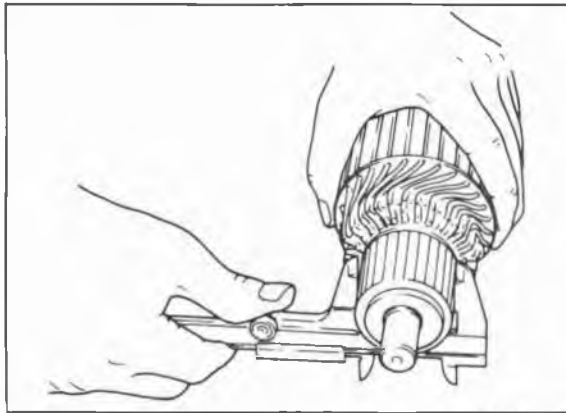
4BG05X-082

2. Vibration of the commutator
  - (1) Place the armature on V blocks, and measure the vibration by using a dial gauge.
  - (2) If the vibration is Limit or more, repair so that it becomes standard by using a lathe, or replace the armature.

**Standard vibration: 0.05 mm (0.002 in)**  
**Limit: 0.4 mm (0.018 in)**

### Note

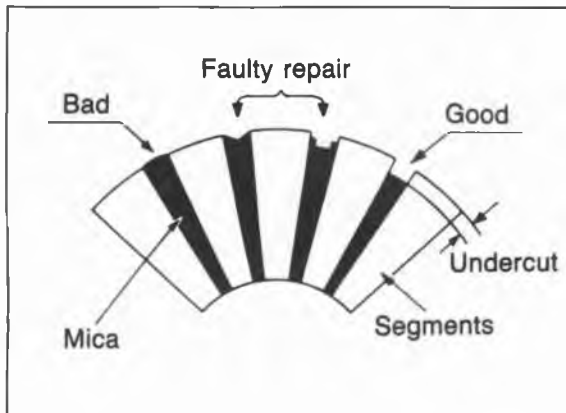
**Before checking, be sure that there is no play in the bearings.**



4BG05X-103

3. Outer diameter of the commutator  
Replace the armature if the outer diameter of the commutator is grind limit or less.
4. Roughness of the commutator surface
  - (1) If the commutator surface is dirty, wipe it with a cloth.
  - (2) If it is rough, repair it by using a lathe or fine sandpaper.

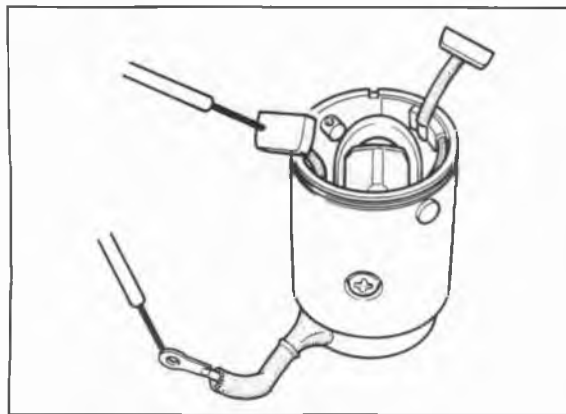
**Grind limit: 34 mm (1.34 in)**



4BG05X-084

5. Segment groove depth  
If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

**Standard depth:**  
**0.5—0.8 mm (0.020—0.031 in)**  
**Limit depth: 0.2 mm (0.008 in)**

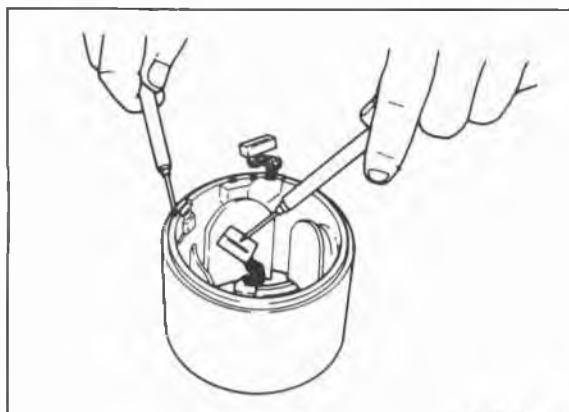


4BG05X-085

### Field Coil

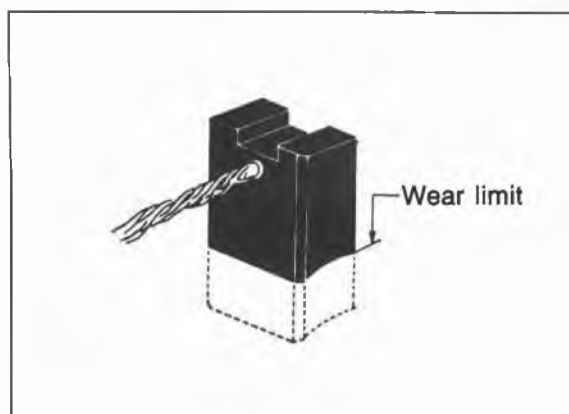
1. Wiring damage
  - (1) Check for continuity between the connector and brushes by using a circuit tester.
  - (2) Replace the yoke assembly if there is no continuity.

## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5



4BG05X-086

2. Ground of the field coil
  - (1) Check for continuity between the connector and yoke by using a circuit tester.
  - (2) Repair, or replace the yoke assembly if there is continuity.
3. Installation of the field coil  
Replace the yoke assembly if the field coil is loose.

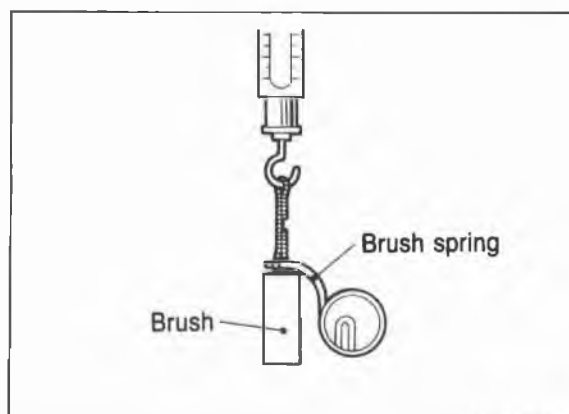


4BG05X-087

### Brush and Brush Holder

1. Brush  
If the brushes are worn beyond the wear limit, or if the wear is near the limit, replace the brushes.

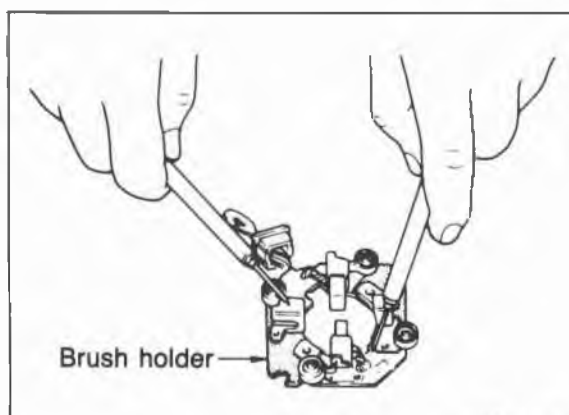
**Standard: 17 mm (0.669 in)**  
**Wear limit: 11 mm (0.433 in)**



4BG05X-088

2. Brush spring
  - (1) Measure the force of the brush spring by using a spring balance.
  - (2) Replace the brush spring if the force is limit or less.

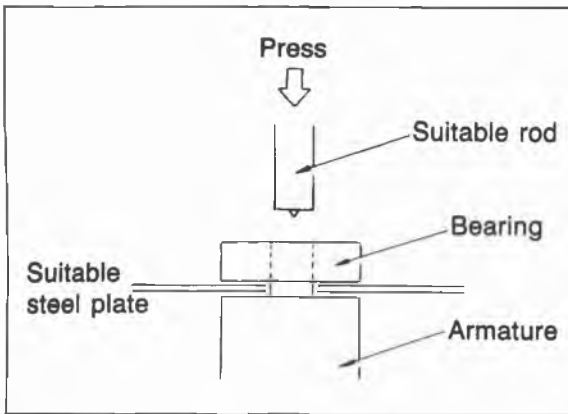
**Limit: 9 N (900 g, 31.75 oz)**



4BG05X-089

3. Brush holder
  - (1) Check for continuity between the insulated brush and the plate by using a circuit tester.
  - (2) Repair or replace if there is continuity.
  - (3) Also check to be sure that the brush slides smoothly inside the brush holder.

## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)

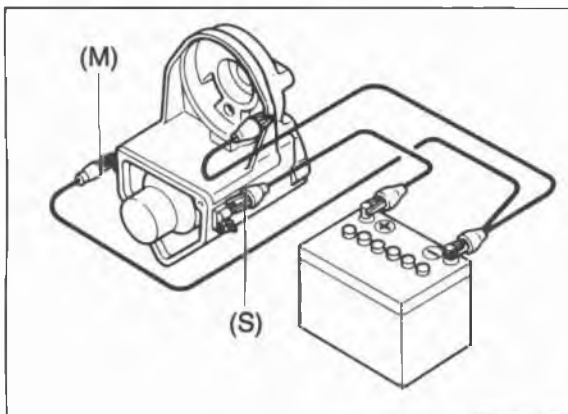


4BG05X-104

### Bearing

Check for abnormal noise, looseness, insufficient lubrication, etc. Replace the bearing if there is any abnormality.

Take out the bearing, as shown in the figure, by using the suitable tools.



4BG05X-092

### PERFORMANCE INSPECTION

#### Magnetic Switch

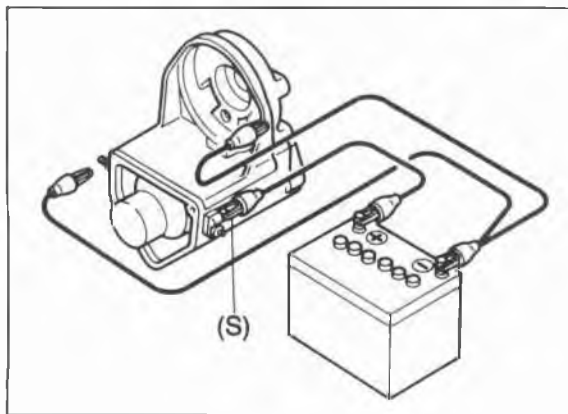
Disconnect the terminal **M wire**, and make the following tests.

#### Pull-in Test

The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

#### Caution

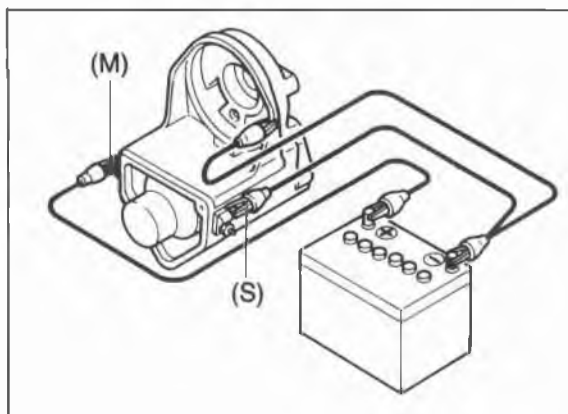
**Do not supply power continuously for more than 10 seconds.**



4BG05X-093

#### Hold-in Test

1. After completing the pull-in test, disconnect the wire from terminal **M** (with the pinion left ejected).
2. The hold-in coil is functioning properly if the pinion does not return.

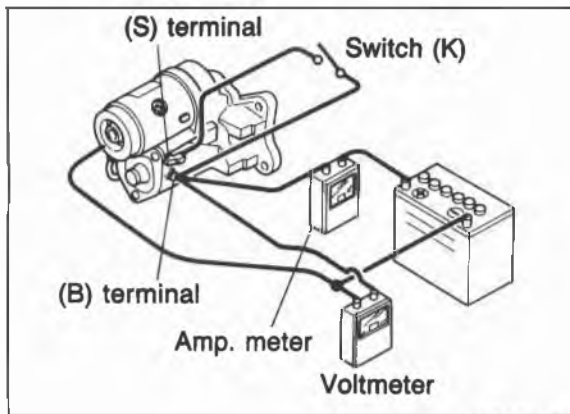


4BG05X-094

#### Return Test

1. Connect the battery between terminal **M** of the magnetic switch and the body, as shown in the figure.
2. Pull the pinion out manually to the pinion stopper position.
3. The pinion should immediately return to its original position when it is released.

## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5



4BG05X-105

### No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

### Note

**Use wires as thick as possible and tighten each terminal fully.**

2. Close switch "K" to run the starter. If the voltmeter and ammeter show the following values while the starter is running, it is normal.

**Battery voltage: 11.5 volts**

**Current: 120 amperes or less**

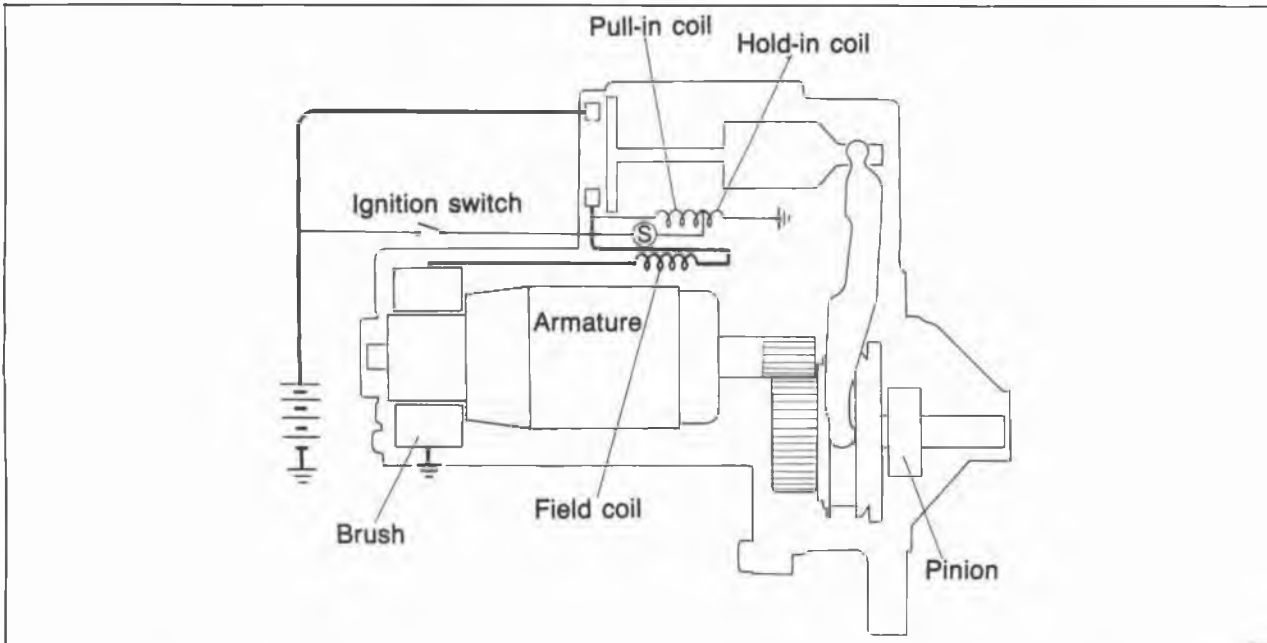
**Gear shaft speed: at 4,000 or more**

3. If any abnormality is noted, check it according to "INSPECTION"

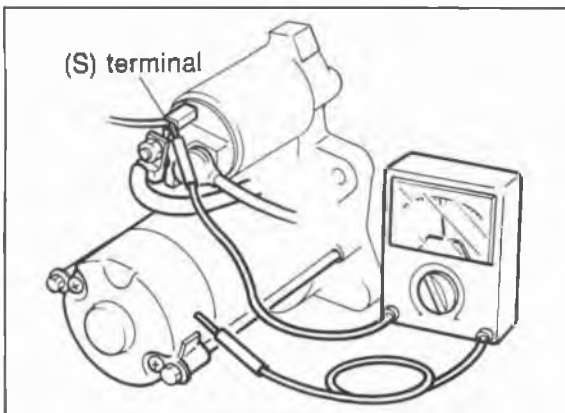
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)

### STARTER (DIESEL ENGINE, 2.2 KW TYPE)

#### STARTING SYSTEM CIRCUIT



4BG05X-106



76G05X-060

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspections.

#### A. If the magnetic switch dose not function during starting.

1. Turn the ignition switch to the start position.
2. Measure the voltage between the S terminal and ground.
3. If the measured value is standard voltage or more, there is starter malfunction.
4. If it is less than standard voltage, there is a malfunction in the wiring.

**Standard voltage: 8 V**

#### Caution

**If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.**

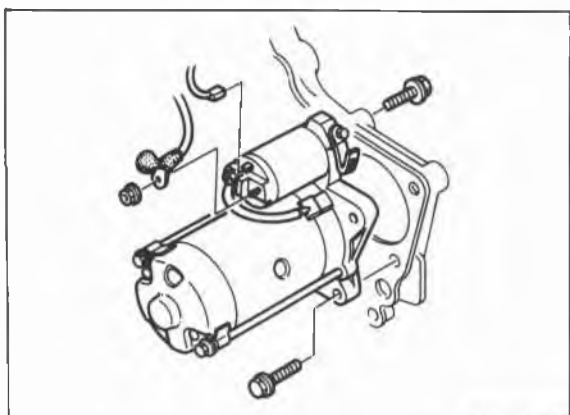
#### B. If the starter won't crank, or if the cranking speed is slow.

The problem may be a malfunction of the starter or in the wiring.

#### Note

**The cranking speed is greatly affected by the viscosity of the engine oil.**





76G05X-046

## REMOVAL AND INSTALLATION

Removal is as follows:

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Remove the starter.

Install in the reverse order of removal.

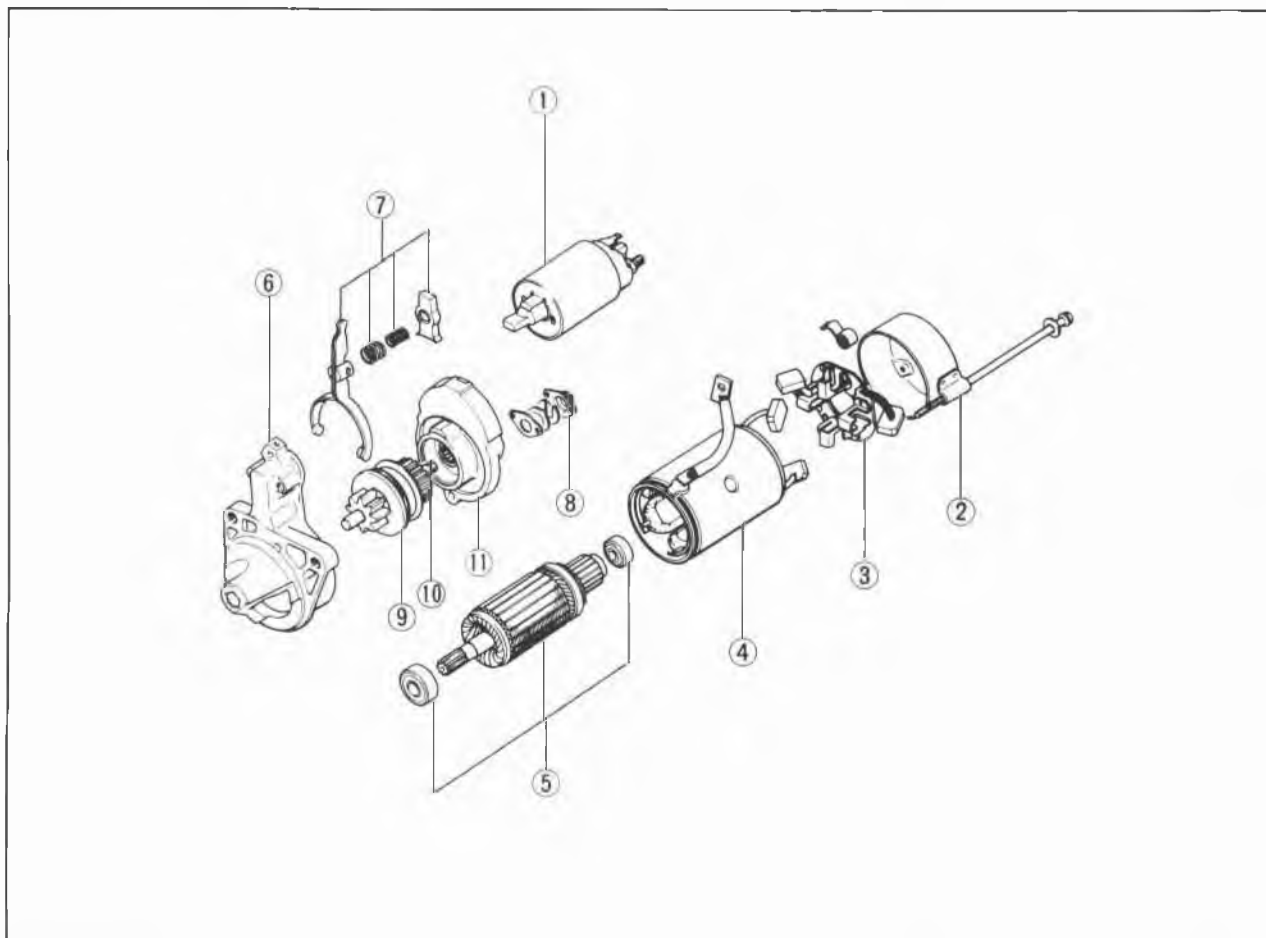
### Tightening torque:

- Bolts**..... 64—89 N·m  
(6.5—9.1 m·kg, 47—66 ft·lb)
- B terminal**..... 9.8—11.8 N·m  
(1.0—1.2 m·kg, 87—104 in·lb)

## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the numbered order shown in the figure.
2. Assembly in the reverse order of disassembly.

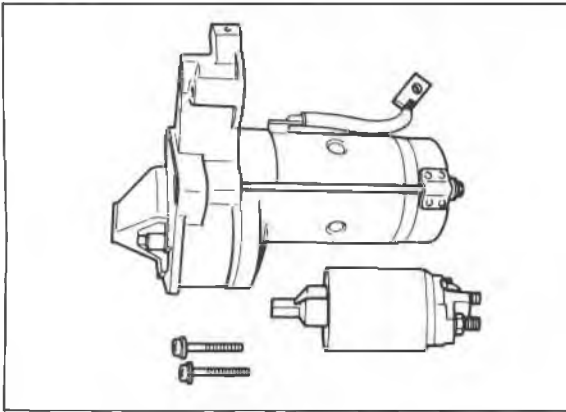
4BG05X-049



4BG05X-107

- |                          |  |
|--------------------------|--|
| 1. Magnetic switch       | 7. Lever   |
| 2. Rear cover            | 8. Cover   |
| 3. Brush-holder assembly | 9. Drive pinion and over-running clutch assembly |
| 4. Yoke                  | 10. Reduction gear                               |
| 5. Armature              | 11. Center bracket                               |
| 6. Front housing         |  |

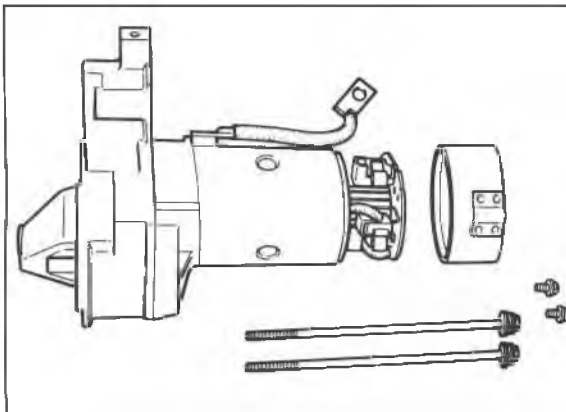
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-108

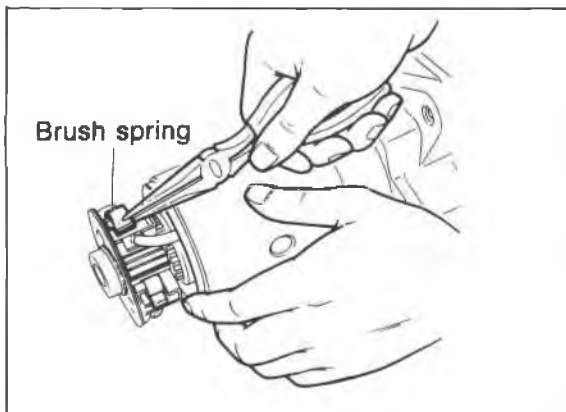
### Disassembly

1. Remove the magnetic switch.



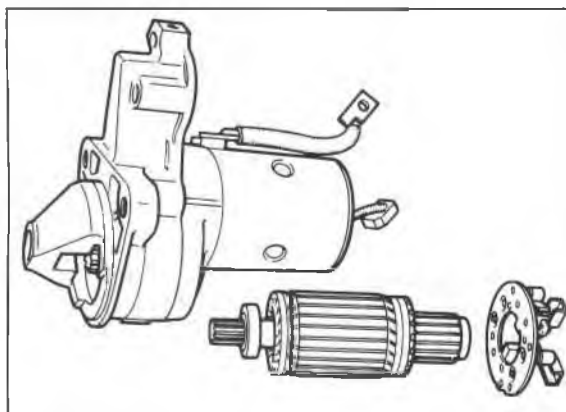
4EG05X-069

2. Remove the rear housing.



36G05X-032

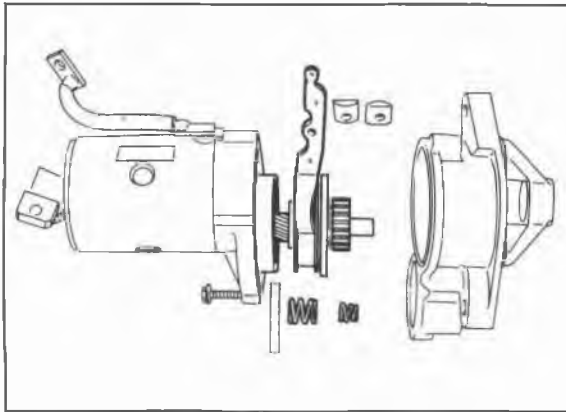
3. Using radio pliers or a similar tool, raise the positive (+) side brush spring, and remove the brush.



36G05X-033

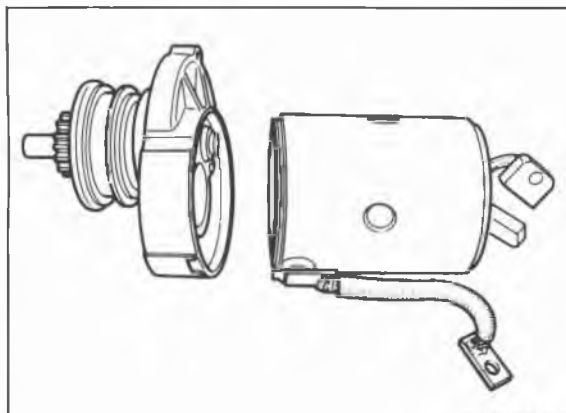
4. Remove the brush holder assembly and the armature.

## STARTER (DIESEL ENGINE, 2.2 KW TYPE) 5



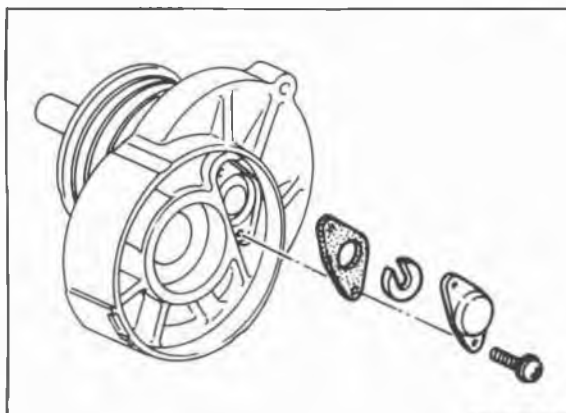
36G05X-034

5. Remove the front cover, and remove the lever and springs (two).



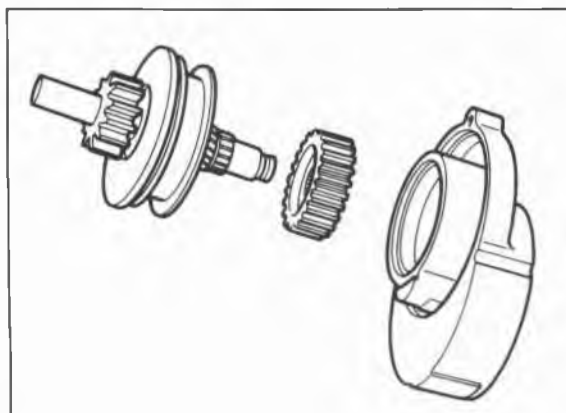
36G05X-035

6. Separate the yoke and center bracket.



36G05X-036

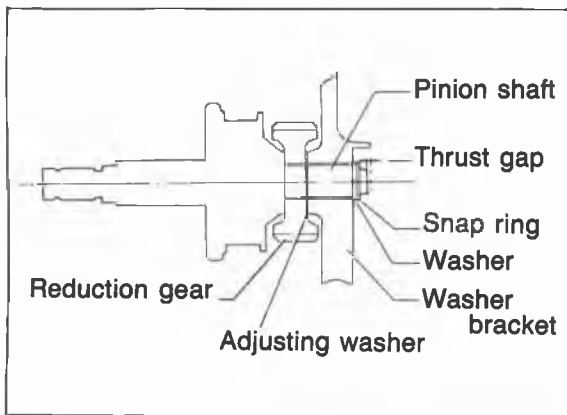
7. Remove the cover and pull out the snap ring and washer.



36G05X-037

8. Remove the pinion, over-running clutch assembly and reduction gear from the center bracket.

## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-109

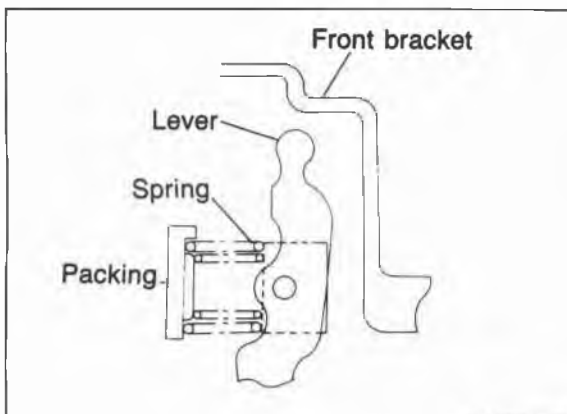
### Assembly (main point)

#### Pinion shaft play

1. Measure the thrust gap by moving the pinion shaft axial direction.

**Standard play: Less than 0.5 mm (0.02 in)**

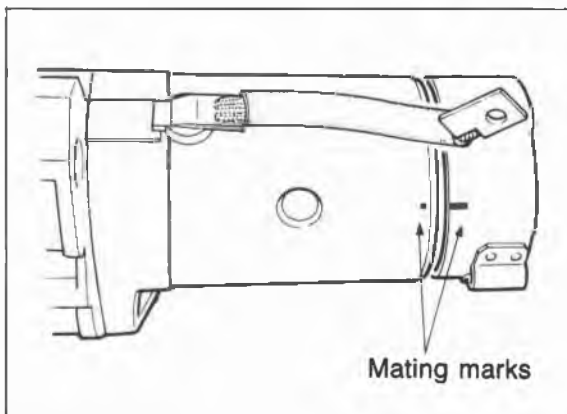
2. Adjust the play with the adjusting washer.



4BG05X-110

### Lever installation

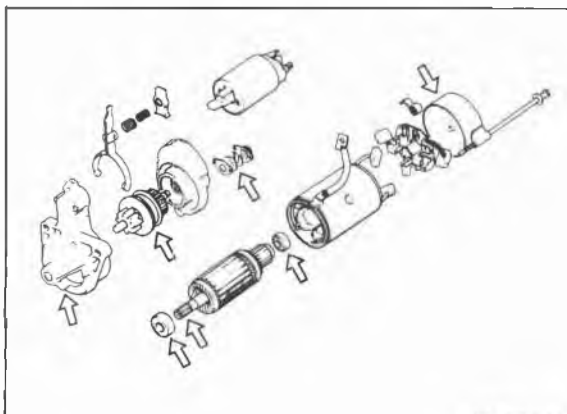
Install the lever as shown in figure.



4BG05X-111

### Rear bracket installation

Align the matching marks when assembling the rear bracket.

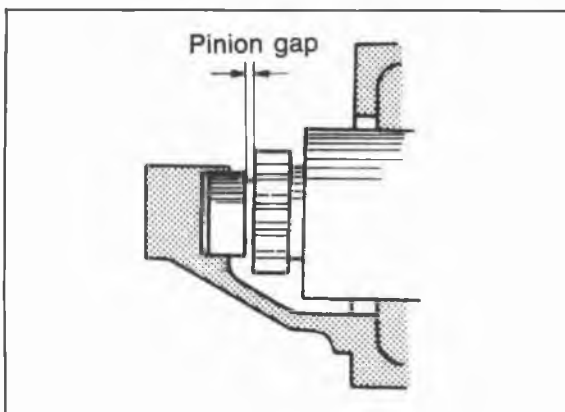


4BG05X-112

### Greasing

When disassembling or assembling the starter, grease each sliding part, gear and bearing.

- (1) Armature shaft gear
- (2) Reduction gear
- (3) Ball bearings (both ends of armature)
- (4) Bearing box of rear bracket
- (5) Snap ring of pinion shaft
- (6) Sleeve bearing, pinion lever sliding part, others



4BG05X-113

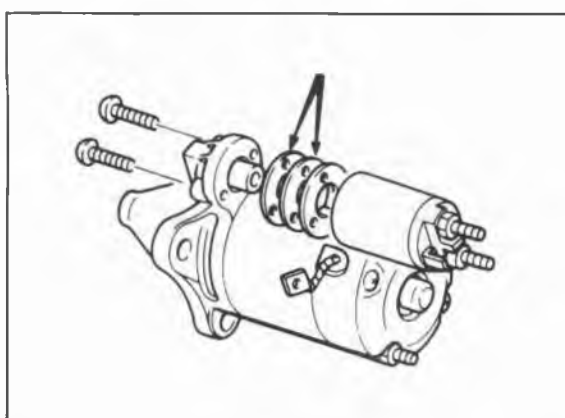
### Adjustment of pinion gap

1. Disconnect the wiring from terminal (M).
2. Apply battery power to the terminal (S) and ground the starter motor body, the pinion will eject outward and then stop.
3. Measure the clearance (pinion gap) between the pinion and the stopper.

### Note

**Be careful not to let electricity flow continuously for more than 10 seconds.**

**Pinion gap: 0.5—2.0 mm (0.020—0.079 in)**

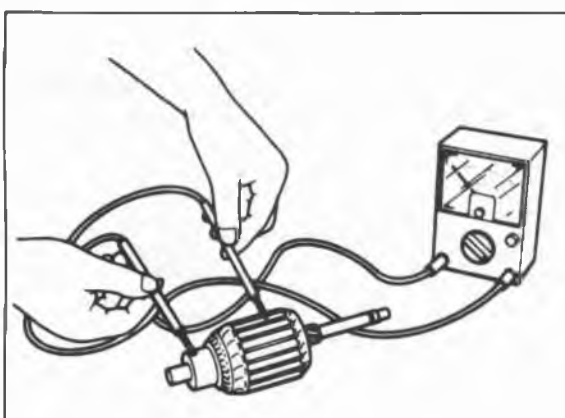


4BG05X-080

4. If the pinion gap is not within the specified range, make the adjustment by increasing or decreasing the number of washers used between the magnetic switch and the drive housing. The gap will become smaller if the number of washers is increased.

### Caution

**Do not use the washers more than plates.**

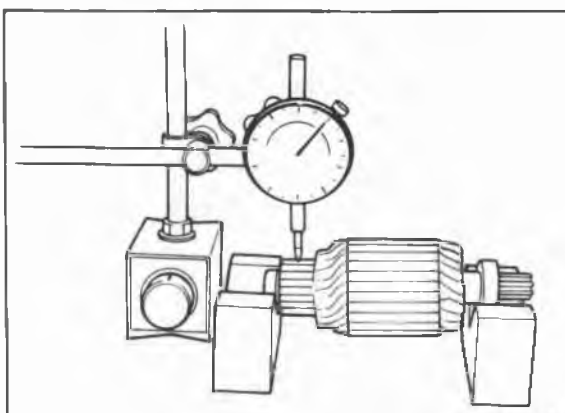


4BG05-081

### INSPECTION

#### Armature Coil

1. Ground of the armature coil  
Check for continuity between the commutator and the core by using a circuit tester. Replace the armature if there is continuity.



4BG05X-082

2. Vibration of the commutator  
Plate the armature on V blocks, and measure the vibration by using a dial gauge. If the vibration is Limit or more, repair so that is standard by using a lathe, or replace the armature.

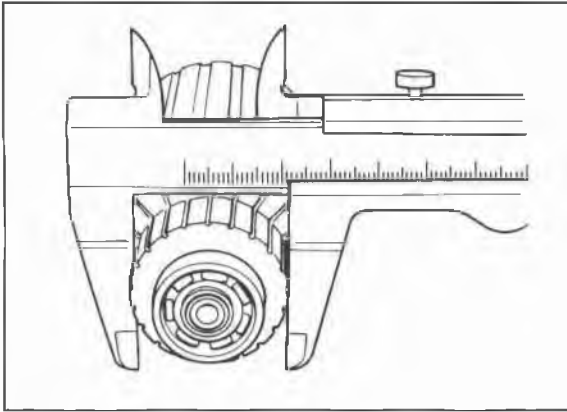
**Standard vibration: 0.05 mm (0.002 in)**

**Limit: 0.4 mm (0.018 in)**

### Note

**Before checking, be sure than there is no play in the bearings.**

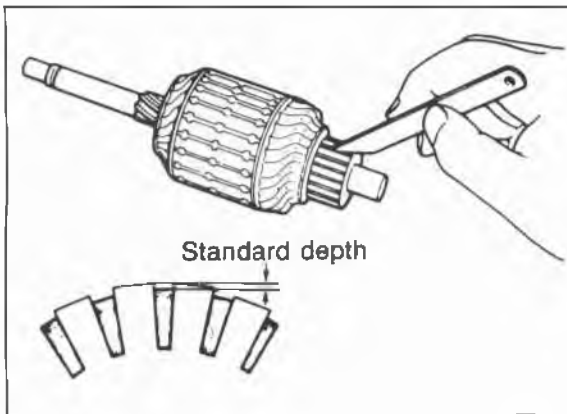
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-115

3. Outer diameter of the commutator  
Replace the armature if the outer diameter of the commutator is grind limit or less.
4. Roughness of the commutator surface  
If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair it by using a lathe or fine sandpaper.

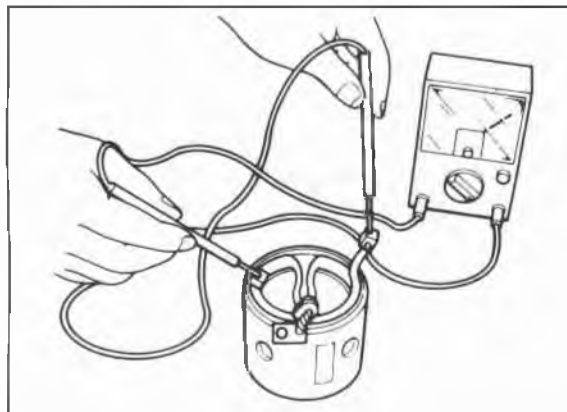
**Grind limit: 31 mm (1.22 in)**



4BG05X-084

5. Segments groove depth  
If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

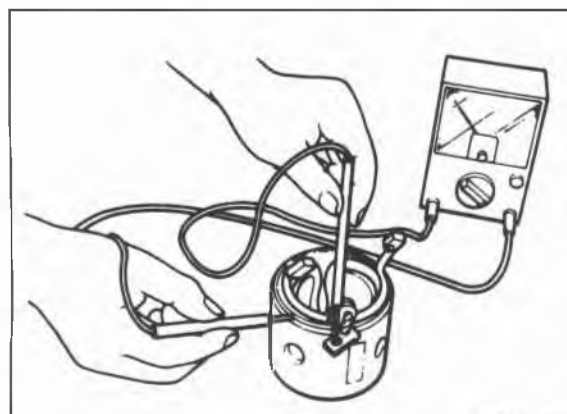
**Standard depth:**  
**0.5—0.8 mm (0.020—0.031 in)**  
**Limit depth: 0.2 mm (0.008 in)**



4BG05X-085

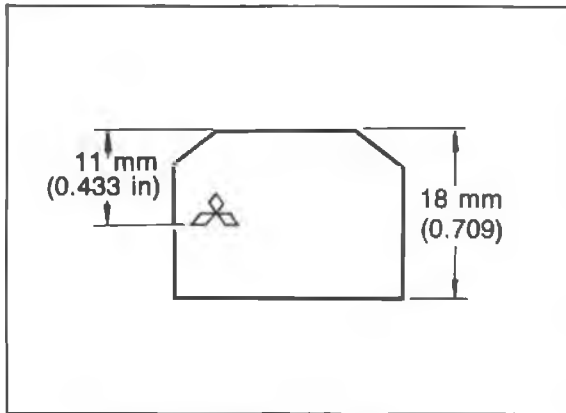
### Field Coil

1. Wiring damage  
Check for continuity between the connector and brushes by using a circuit tester. Replace the yoke assembly if there is no continuity.



4BG05X-086

2. Ground of the field coil  
Check for continuity between the connector and yoke by using a circuit tester. Repair, or replace the yoke assembly if there is continuity.
3. Installation of the field coil  
Replace the yoke assembly if the field coil is loose.



76G05X-047

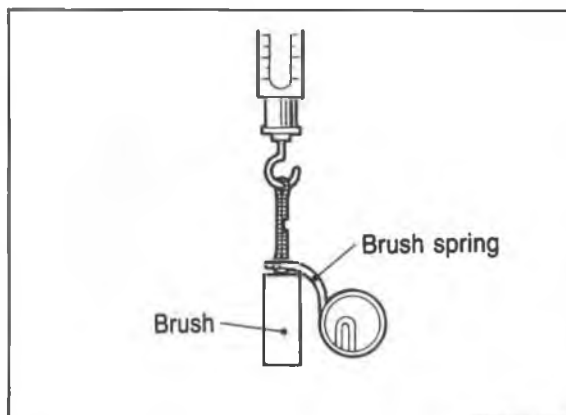
## Brush and Brush Holder

### 1. Brush

If the brushes are worn beyond the wear limit, or if the wear is near the limit, replace the brushes.

**Standard: 18 mm (0.709 in)**

**Wear limit: 11 mm (0.433 in)**

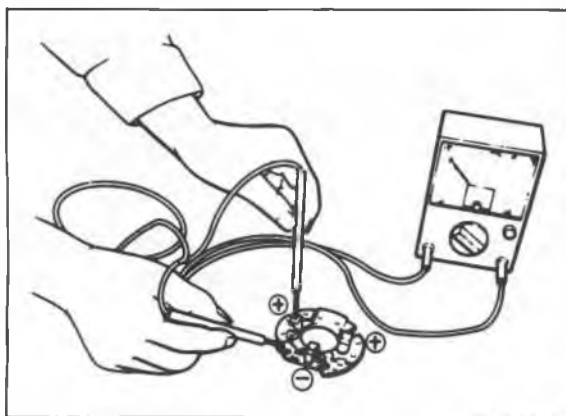


4BG05X-088

### 2. Brush spring

- (1) Measure the force of the brush spring by using a spring balance.
- (2) Replace the brush spring if the force is Limit or less.

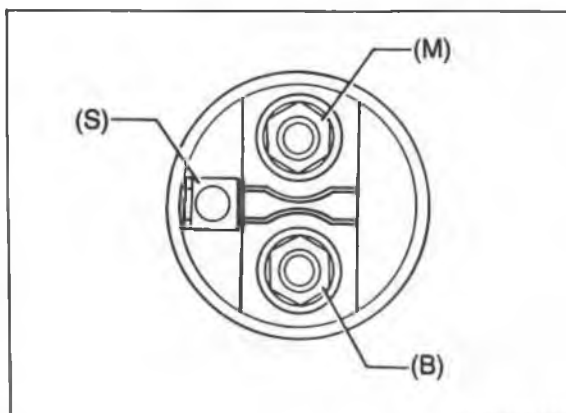
**Limit: 9 N (900 g, 31.75 oz)**



4BG05X-089

### 3. Brush holder

- (1) Check for continuity between the insulated brush and the plate by using a circuit tester.
- (2) Repair or replace if there is continuity.
- (3) Also check to be sure that the brush slides smoothly inside the brush holder.

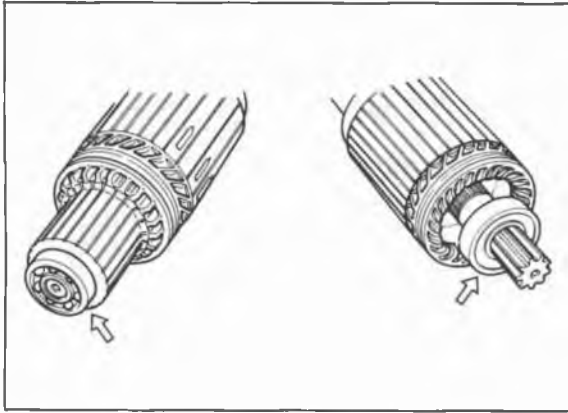


4BG05X-116

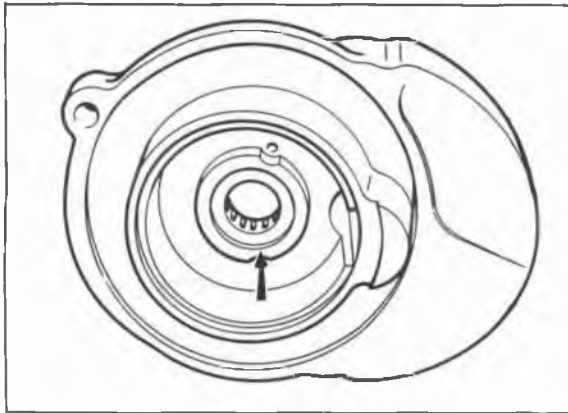
## Magnetic Switch

1. Check continuity between (S) terminal and (M) terminal, and between (S) terminal and ground (body).
2. If there is no continuity, the wire is broken so replace the magnetic switch.

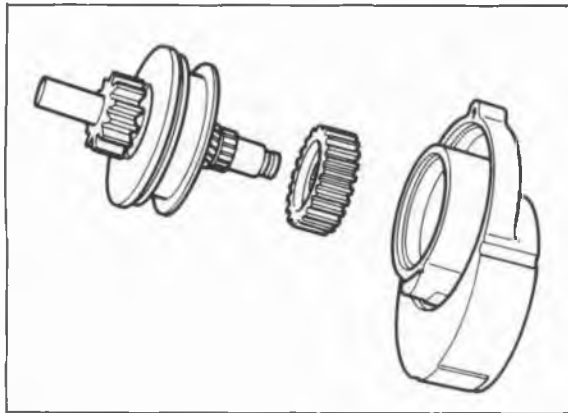
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



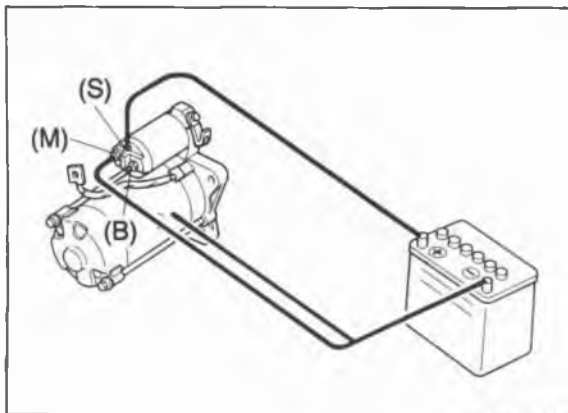
4BG05X-117



4BG05X-118



4BG05X-119



4BG05X-092

### Gear

Wear and damage

### Bearing

Replace the bearing when it is noisy or does not rotate smoothly.

### Over-running Clutch

1. Replace the pinion when a worn pinion or damaged pinion are found.
2. If the pinion does not rotate in both directions when rotating the pinion by hand, replace it.

### Note

**Do not wash the over-running clutch in gas or kerosene, this will destroy the grease packing.**

### PERFORMANCE INSPECTION

#### Magnetic Switch

Disconnect the terminal **M wire**, and make the following tests.

#### Pull-in Test

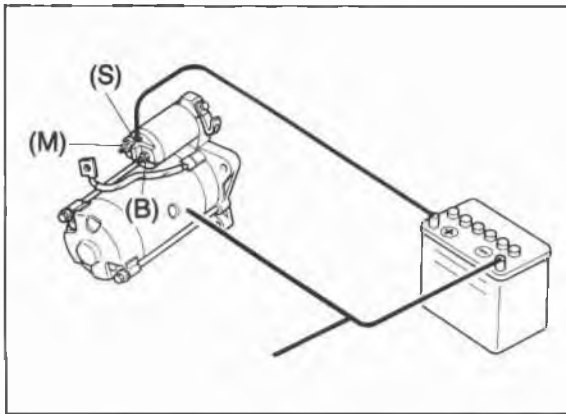
The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

### Caution

**Do not supply power continuously for more than 10 seconds.**



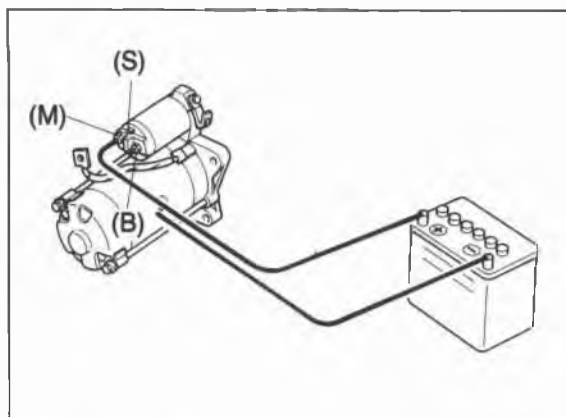
## STARTER (DIESEL ENGINE, 2.2 KW TYPE) 5



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### Hold-in Test

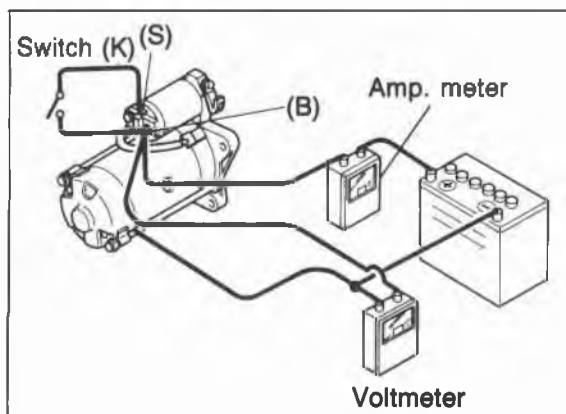
1. After completing the pull-in test, disconnect the wire from terminal M (with the pinion left ejected).
2. The hold-in coil is functioning properly if the pinion does not return.



4BG05X-094

### Return Test

1. Connect the battery between terminal M of the magnetic switch and the body, as shown in the figure.
2. Pull the pinion out manually to the pinion stopper position.
3. The pinion should immediately return to its original position when it is released.



4BG05X-120

### No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

#### Note

**Use wires as thick as possible and tighten each terminal fully.**

2. Close switch "K" to run the starter. If the voltmeter and ammeter show the following values while the starter is running, it is normal.

**Battery voltage: 11.0 volts**

**Current: 130 amperes or less**

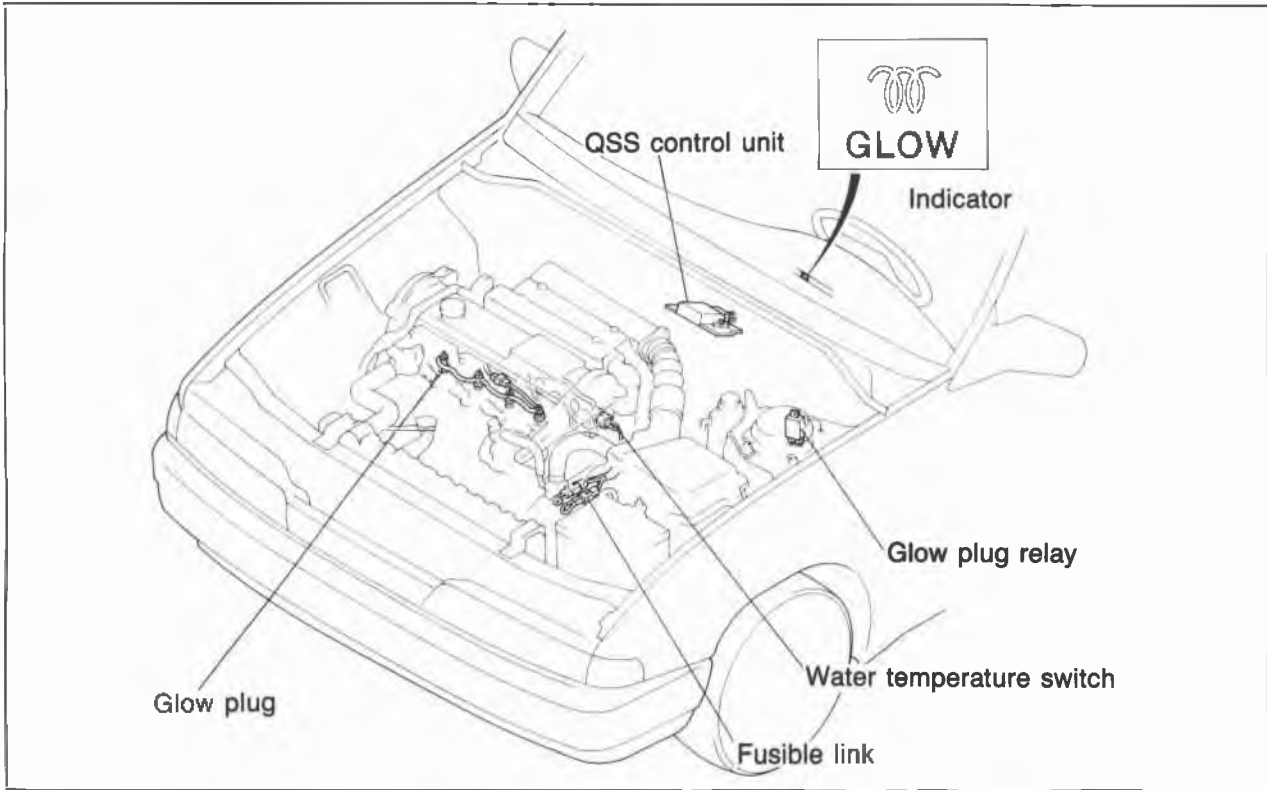
**Gear shaft speed: at 4,500 rpm or more**

3. If any abnormality is noted, check it according to "INSPECTION".

# 5 QUICK START SYSTEM (QSS)

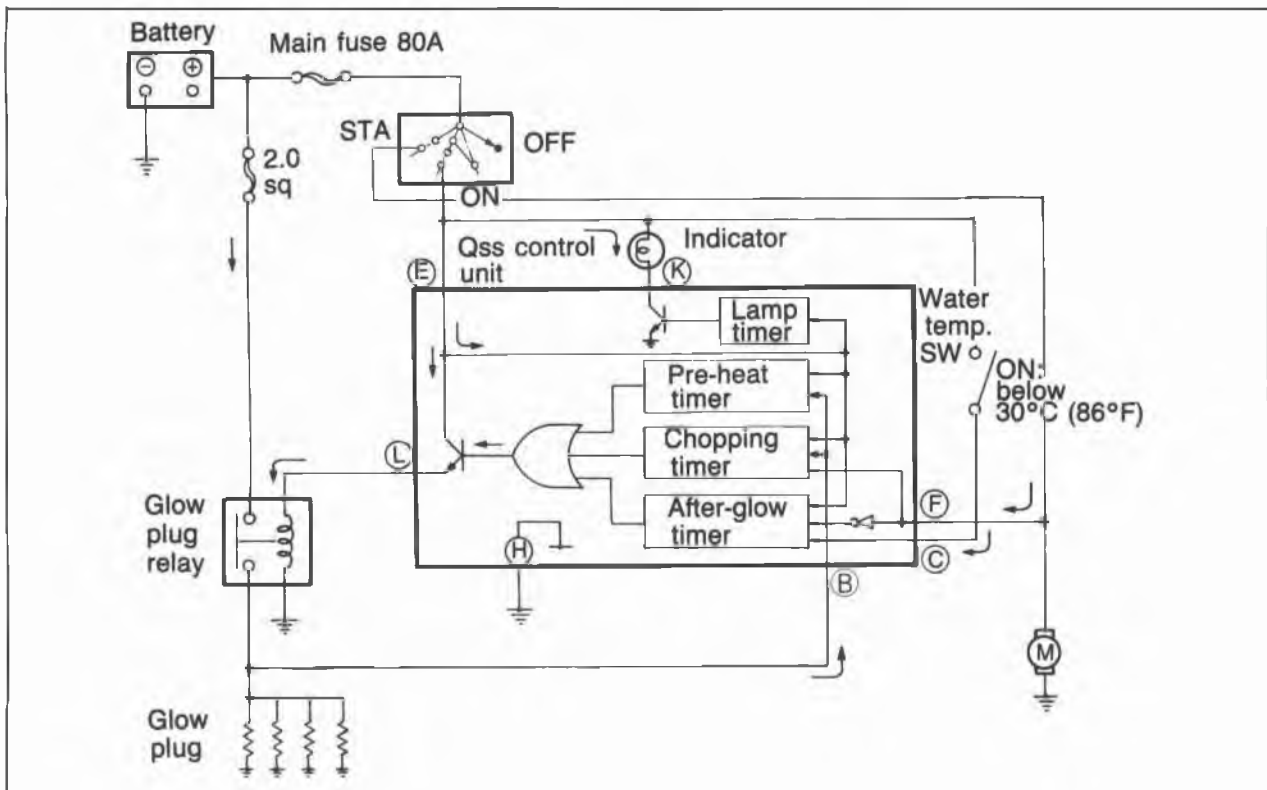
## QUICK START SYSTEM (QSS)

### COMPONENT LOCATION



76G05X-048

### CIRCUIT DIAGRAM



76G05X-049

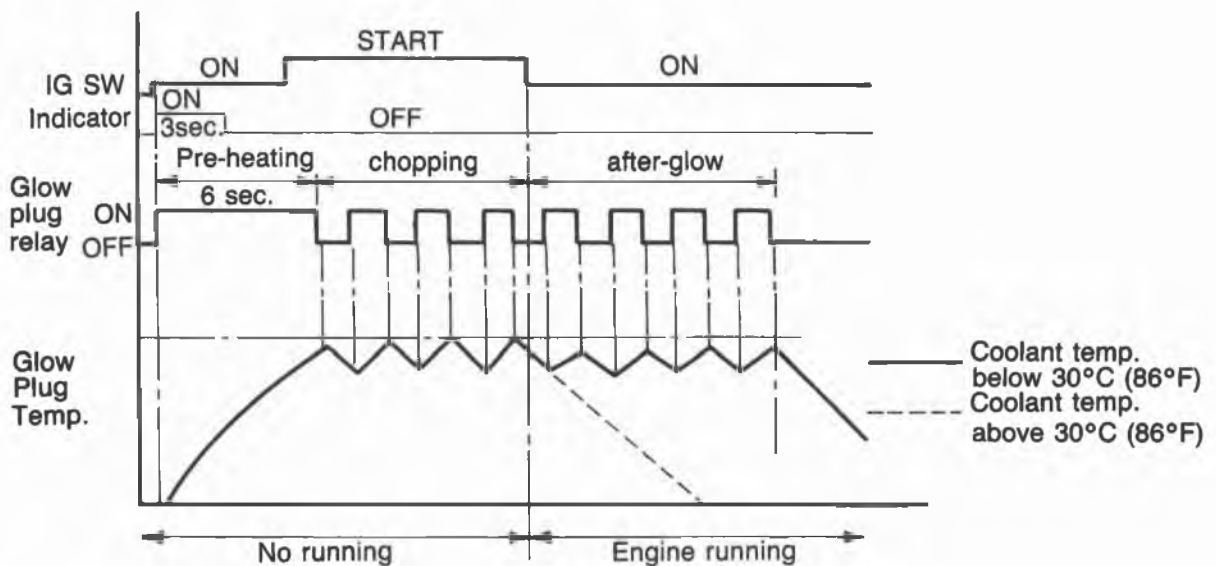
## SYSTEM OPERATION

The Quick Start System has three functions: **Pre-heating**, **Chopping**, and **After-glow**; as used in the previous model. Each function operates as follows:

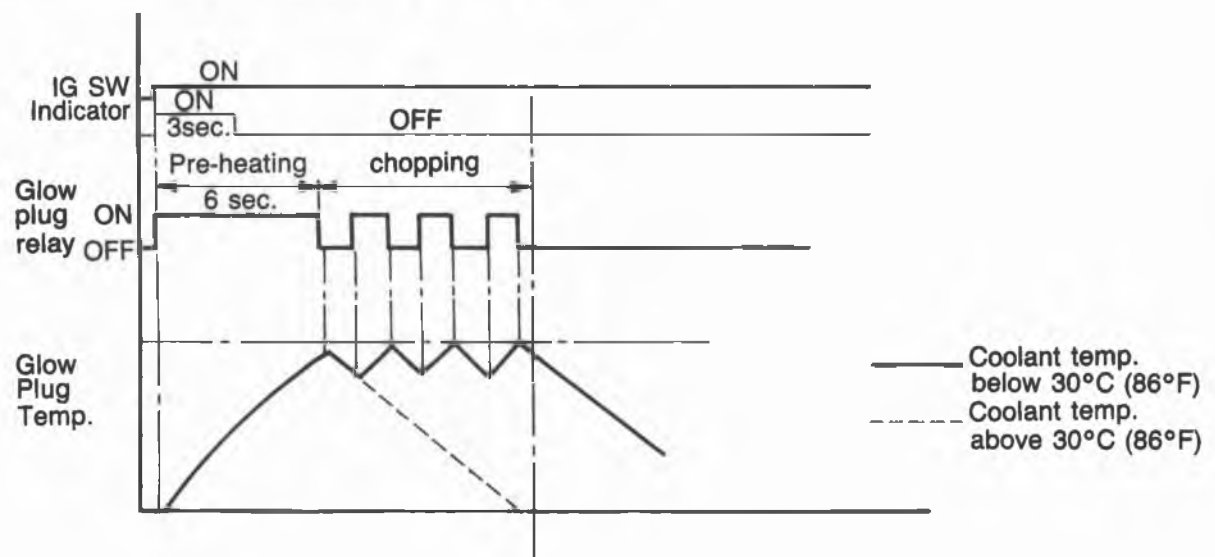
1. Pre-heating : After ignition switch is turned to ON position, current flows to glow plug for 6 sec.
2. Chopping : While engine switch is in START position, current flows to glow plug continuously.
3. After-glow (coolant temperature below 30°C (86°F):
  - a) When engine switch is kept in ON position after pre-heating, current flows to glow plug continuously for 15 sec.
  - b) After engine has started, current flows to glow plug continuously for 15 sec.

Indicator lamp: Indicator illuminates for 3 sec. after ignition is ON position.

### When ignition switch is ON-START-ON position



### When ignition switch is kept in ON position



## 5 QUICK START SYSTEM (QSS)

### TROUBLESHOOTING GUIDE

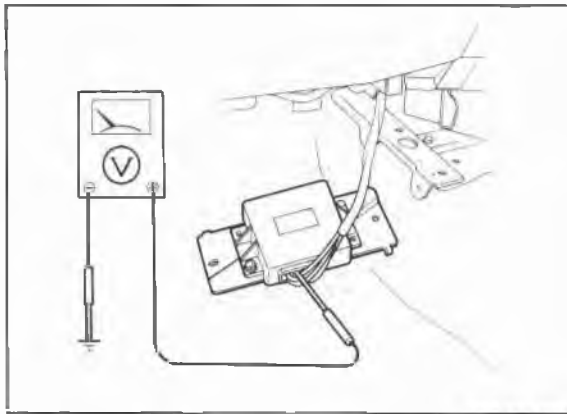
#### Preliminary Checks

When troubleshooting, check below first.

1. Main fuse
2. Fuses
3. Connectors
4. Ground circuit
5. Wiring harness

Condition	Cause
Glow plug relay does not close.	<ol style="list-style-type: none"><li>1. Faulty glow plug relay</li><li>2. Faulty control unit internal circuit</li><li>3. Poor contact or disconnection between control unit terminal ① and harness</li><li>4. Faulty START harness (open circuit at ② terminal in control unit)</li><li>5. Poor contact or disconnection between glow plug relay terminal and harness</li><li>6. Faulty glow plug</li></ol>
Glow plug relay does not open	<ol style="list-style-type: none"><li>1. Faulty glow plug relay</li><li>2. Faulty control unit internal circuit</li></ol>
Glow plug relay does not repeat ON and OFF.	<ol style="list-style-type: none"><li>1. Faulty poor contact of engine switch</li><li>2. Poor contact or disconnection of starter harness</li><li>3. Faulty control unit internal circuit</li></ol>
Glow plug relay does not repeat ON and OFF within 15 sec. after turning the engine switch ON.	<ol style="list-style-type: none"><li>1. Faulty water temperature switch</li><li>2. Faulty control unit internal circuit</li><li>3. Faulty glow plug relay</li><li>4. Poor contact or disconnection between control unit ③ and water temperature switch</li></ol>

76G05X-051



63G05X-337

### CONTROL UNIT Inspection

1. Connect a voltmeter to the control unit as shown in the figure.
2. Check the voltage of the terminal.
3. Replace the control unit if necessary.

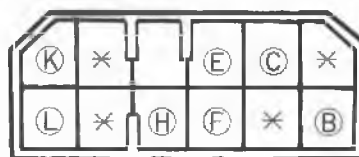
### Caution

**If the proper voltage is not indicated on the voltmeter, check all wiring connections and finally, check that component.**

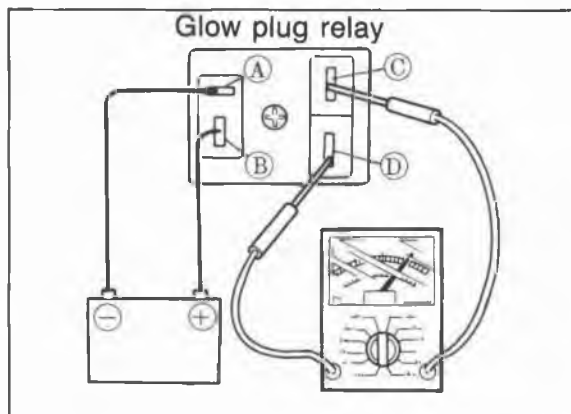
### Control Unit Connector

Terminal	Input	Output	Connection to	Operation condition	Voltage	Remark
L (GW)	○	Glow plug relay	Engine switch: ON (No cranking)	for 6 sec.	approx. 12V	
				after 6 sec.	0V ↔ 12V	Coolant temperature; below 30°C (86°F)
					0V	Coolant temperature; above 30°C (86°F)
H (B)	—	—	Ground	—	0V	
E (BW)	○		Engine switch (ON)	Engine switch: ON	approx. 12V	
F (BR)	○		Engine switch (START)	Engine switch: START	approx. 12V	
C (BrB)	○	Water temperature switch	Engine switch: ON (No cranking)		approx. 12V	Coolant temperature; below 30°C (86°F)
					approx. 0V	Coolant temperature; above 30°C (86°F)
B (Gr)	○	Glow plug		At cranking	0V ↔ 12V	
				For 15 sec. after engine has started	0V ↔ 12V	Coolant temperature; below 30°C (86°F)
				After 15 sec.	0V	
				After engine has started	0V	Coolant temperature; above 30°C (86°F)
K (WR)	○	Indicator	Engine switch: ON	For 3 sec.	0V	
				after 3 sec.	approx. 12V	

76G05X-052



## 5 QUICK START SYSTEM (QSS)

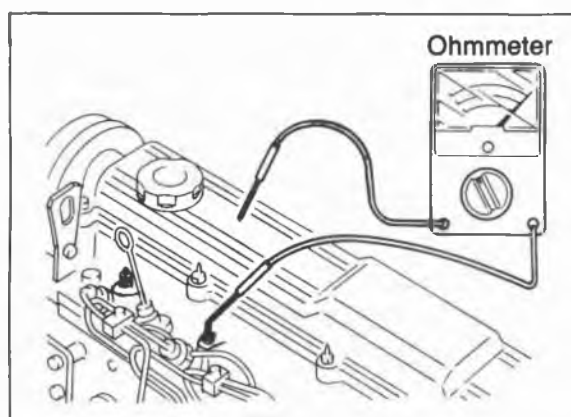


4BG05X-123

### GLOW PLUG RELAY

#### Inspection

1. As shown in the figure, connect the battery and an ohmmeter to the relay.
2. If the ohmmeter shows continuity when the battery is connected, and no continuity when the battery is disconnected, the relay is good.
3. Replace the relay if it fails this test.

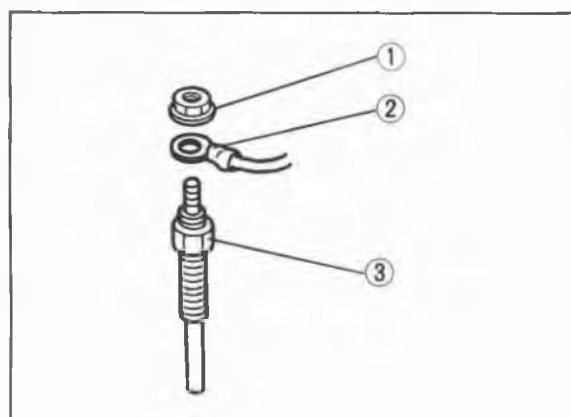


4BG05X-121

### GLOW PLUG

#### Inspection

1. Check the continuity between the positive terminal of the glow plug and cylinder head with a circuit tester.
2. If there is no continuity, replace the glow plug.



76G05X-053

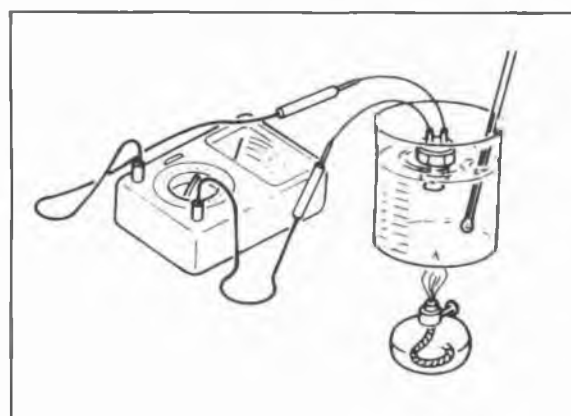
#### Removal

Remove in the following order:

1. Glow plug connector attaching nut.
2. Glow plug connector.
3. Glow plug

#### Installation

Install the glow plug, reverse order of removal.



63G05X-336

### WATER TEMPERATURE SWITCH

#### Removal

Remove the water temperature switch from the radiator.

#### Installation

Install in the reverse order of removal.

#### Inspection

1. Place the water temperature switch in water with a thermometer and heat the water gradually.
2. Check the temperature at which continuity exists between the terminals.
3. Replace the switch, if necessary.

**Specified temperature: above 28—32°C  
(82—90°F)**

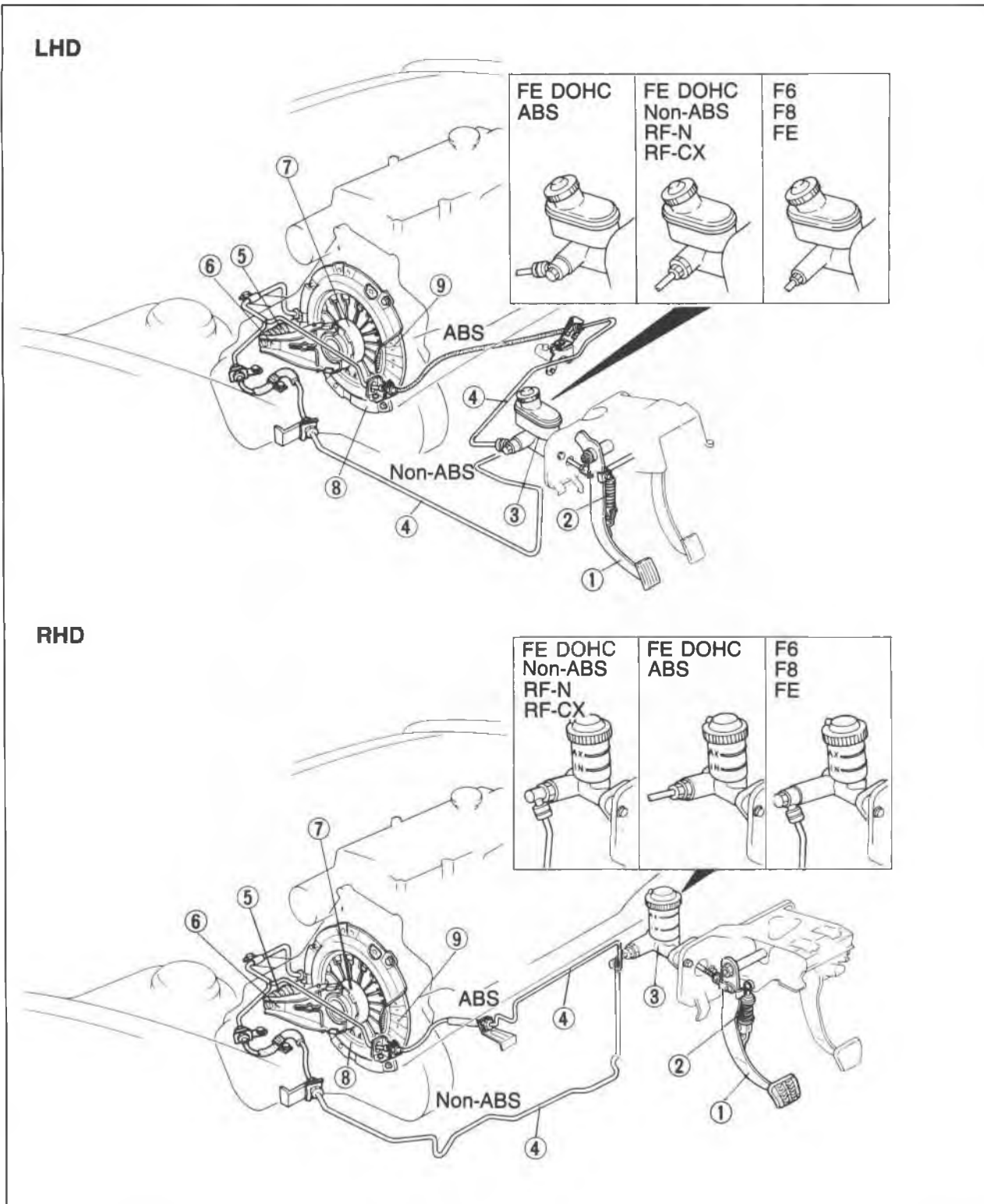
# CLUTCH

- OUTLINE** ..... 6— 2
  - STRUCTURAL VIEW ..... 6— 2
  - SPECIFICATIONS ..... 6— 3
- TROUBLESHOOTING GUIDE** ..... 6— 3
- ON-VEHICLE MAINTENANCE** ..... 6— 4
  - FLUID LEVEL ..... 6— 4
  - PEDAL HEIGHT ..... 6— 4
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- CLUTCH PEDAL** ..... 6— 5
  - REMOVAL ..... 6— 5
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  - INSTALLATION ..... 6— 6
  - ADJUSTMENT ..... 6— 6
- CLUTCH MASTER CYLINDER** ..... 6— 7
  - REMOVAL ..... 6— 7
  - DISASSEMBLY ..... 6— 8
  - INSPECTION ..... 6— 9
  - ASSEMBLY ..... 6— 9
  - INSTALLATION ..... 6—11
- CLUTCH RELEASE CYLINDER** ..... 6—11
  - REMOVAL ..... 6—12
  - DISASSEMBLY ..... 6—12
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  - INSTALLATION ..... 6—14
- AIR BLEEDING** ..... 6—14
- CLUTCH AND FLYWHEEL** ..... 6—15
  - REMOVAL ..... 6—15
  - INSPECTION ..... 6—16
  - INSTALLATION ..... 6—19

# 6 OUTLINE

## OUTLINE

### STRUCTURAL VIEW



86U06X-002

- |                           |                            |                           |
|---------------------------|----------------------------|---------------------------|
| 1. Clutch pedal           | 4. Clutch pipe             | 7. Clutch release bearing |
| 2. Assist spring          | 5. Clutch release cylinder | 8. Clutch cover           |
| 3. Clutch master cylinder | 6. Clutch release fork     | 9. Clutch disc            |



## SPECIFICATIONS

Item		Engine model	F6	F8	FE	FE DOHC	RF-N	RF-CX	
Clutch control type			Hydraulic						
Clutch cover type			Diaphragm spring						
Clutch disc	Set load N (kg, lb)	General	3,434 (350,770)	3,846 (392,862)	4,316 (440,968)		3,846 (392,862)	—	
		ECE (Except UK)	—	4,022 (410,902)	4,611 (470, 1,034)		4,022 (410, 902)		
		UK	—	3,846 (392,862)	4,611 (470,1,034)	4,316 (440,968)	3,846 (392,862)	4,022 (410,902)	
	Outer diameter	mm (in)	200 (7.874)	215 (8.465)	225 (8.858)				
	Inner diameter	mm (in)	130 (5.118)	150 (5.906)					
	Thickness mm(in)	Pressure plate side	General	4.1 (0.16)				—	
			ECE (Except UK)	—	3.8 (0.15)				
Flywheel side		—	4.1 (0.16)	3.8 (0.15)	4.1 (0.16)		3.8 (0.15)		
Clutch pedal	Type		Suspended						
	Pedal ratio	LHD	6.00						
		RHD	5.96						
	Full stroke	mm (in)	135 (5.31)						
Height	mm (in)	216.5—221.5 (8.524—8.720)							
Master cylinder inner diameter		mm (in)	15.87 (0.625)						
Release cylinder inner diameter		mm (in)	19.05 (0.750)						
Clutch fluid type			DOT-3 or DOT-4, FMVSS 116, or SAE J1703						

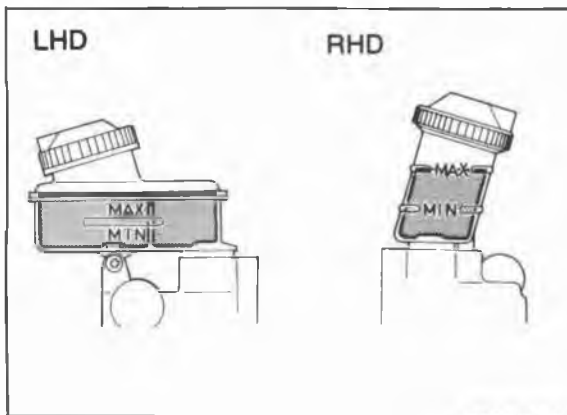
76G06X-002

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Slipping</b>	Clutch disc facing worn excessively	Replace	6—17
	Clutch disc facing surface hardened or oil on surface	Repair or replace	6—17
	Pressure plate deformed	Repair or replace	6—16
	Diaphragm spring damaged or weakened	Replace	6—16
	Insufficient clutch pedal play	Adjust	6—4
	Clutch pedal does not function smoothly	Repair or replace	6—4, 5
	Flywheel deformed	Repair or replace	6—18
<b>Faulty disengagement</b>	Excessive runout or deformity of clutch disc	Replace	6—17
	Clutch disc splines rusted or worn	Remove rust or replace	6—17
	Oil on clutch cover facing surface	Repair or replace	6—16
	Diaphragm spring weakened	Replace	6—16
	Excessive clutch pedal play	Adjust	6—4, 5
	Insufficient clutch fluid	Add fluid	6—4
	Leakage of clutch fluid	Repair or replace	—
<b>Clutch vibrates when starting</b>	Oil on clutch disc facing surface	Repair or replace	6—17
	Torsion spring weakened	Replace	6—17
	Clutch disc facing surface hardened or deformed	Repair or replace	6—17
	Clutch disc facing rivets loose	Replace	6—17
	Pressure plate deformed	Replace	6—16
	Flywheel surface hardened or deformed	Repair or replace	6—18
	Loose or worn engine mount	Tighten or replace	—
<b>Clutch pedal does not function smoothly</b>	Pedal shaft not properly lubricated	lubricate or replace	6—5
<b>Abnormal noise</b>	Clutch release bearing damaged	Replace	6—17
	Poor lubrication of clutch release bearing sleeve	Lubricate or replace	6—17
	Torsion spring weakened	Replace	6—17
	Excessive crankshaft end play	Repair	Refer to Section 1
	Pilot bearing worn or damaged by heat	Replace	6—16
	Worn pivot points of release fork	Repair or replace	6—18

76G06X-003

## 6 ON-VEHICLE MAINTENANCE



76G06X-004

### ON-VEHICLE MAINTENANCE

#### FLUID LEVEL

1. Clean the area around the reservoir and the reservoir cap.
2. Check the fluid level. If the level is near or below the "MIN" mark, add clutch fluid to the "MAX" mark.

#### Fluid specification:

**DOT-3 or DOT-4**

**(FMVSS 116, or SAE J1703)**

#### PEDAL HEIGHT

##### Inspection

Measure the distance from the upper center of the pedal pad to the firewall and ensure that the distance is within specification.

##### Pedal height A:

**216.5—221.5 mm (8.524—8.720 in)**

##### Adjustment

To adjust the pedal height, loosen locknut and turn stopper bolt or clutch switch.

#### PEDAL FREEPLAY

##### Inspection

Depress the pedal lightly by hand and measure the freeplay to ensure that it is within specification.

**Pedal freeplay: 5—13 mm (0.20—0.51 in)**

##### Adjustment

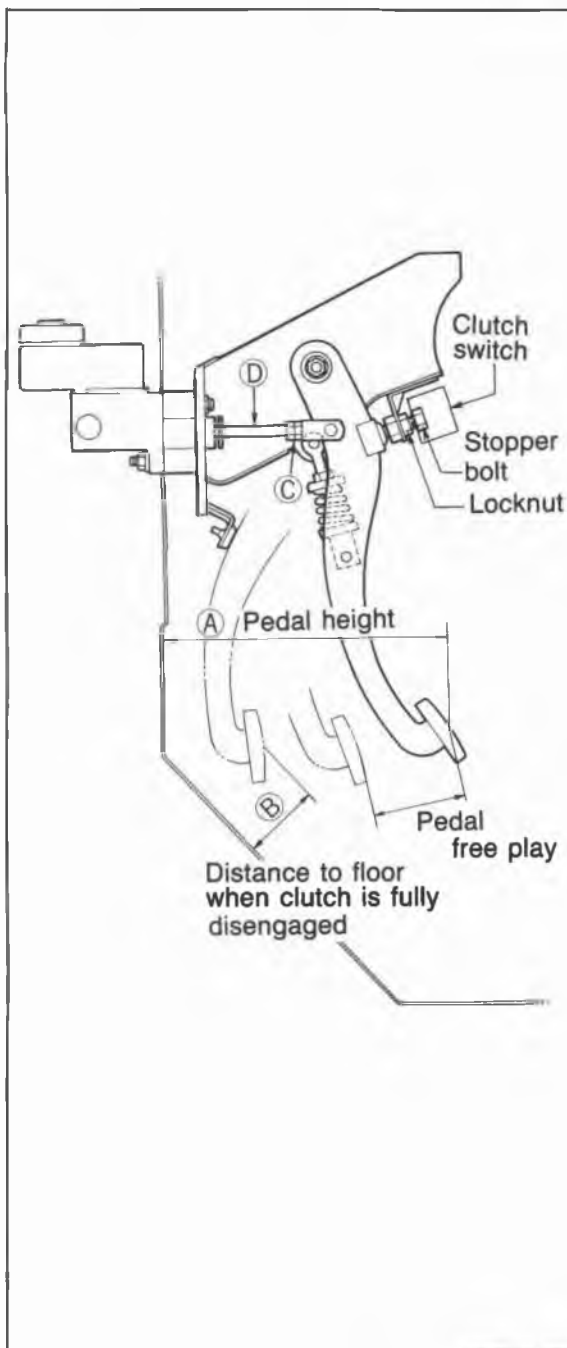
1. Adjust the free play by loosening locknut C and turning push rod D.
2. Check that the distance from the floor to the center of the upper surface of the pedal pad is as specified or more when the clutch is fully disengaged.

##### Disengagement height B:

**LHD 68 mm (2.7 in)**

**RHD 85 mm (3.3 in)**

3. Tighten locknut C after adjustment.

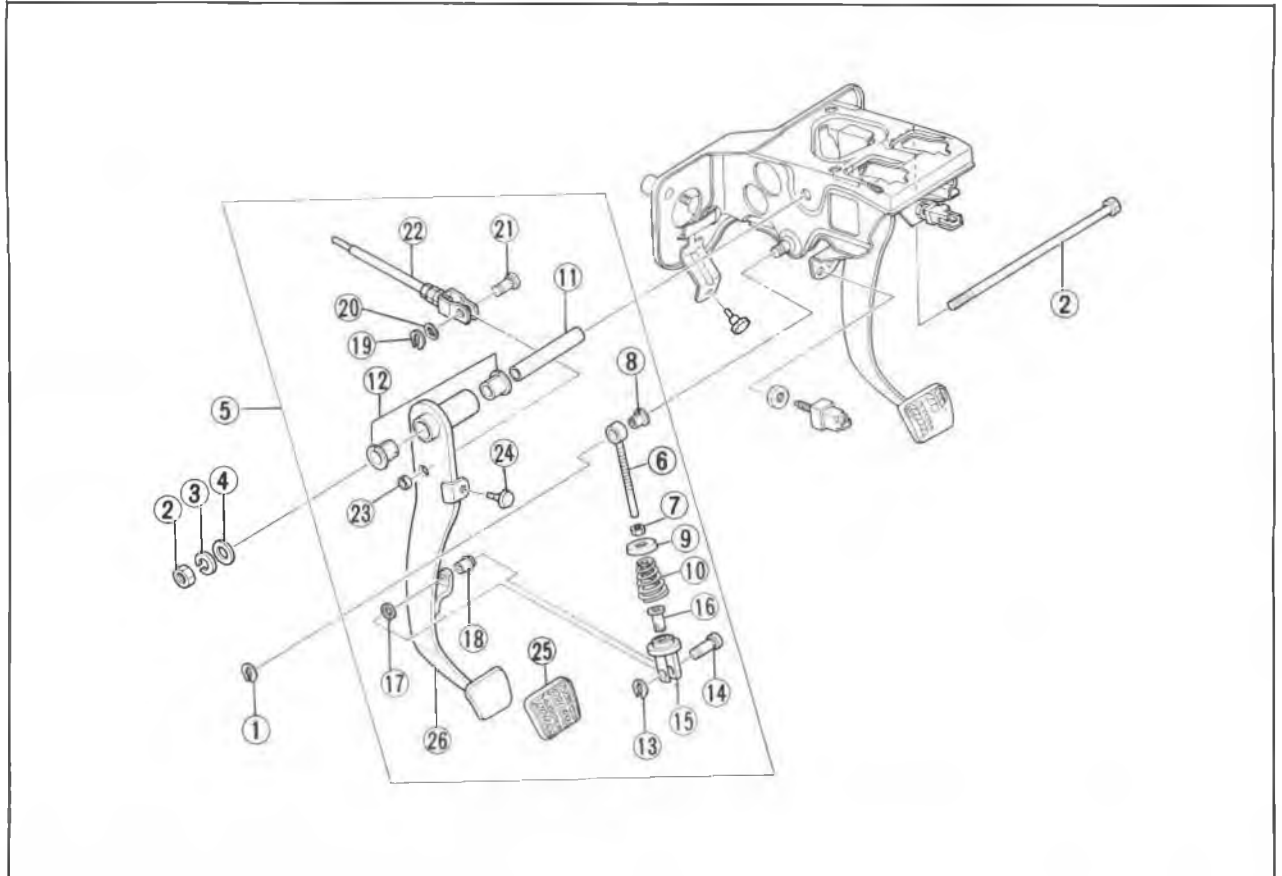


76G06X-005

## CLUTCH PEDAL

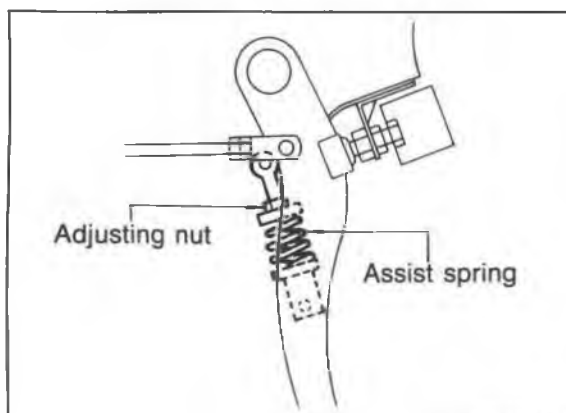
### REMOVAL

Remove in the sequence shown in the figure referring to the removal note.



76G06X-006

- |                          |                   |                    |
|--------------------------|-------------------|--------------------|
| 1. Clip                  | 10. Assist spring | 19. Clip           |
| 2. Bolt and nut          | 11. Spacer        | 20. Wave washer    |
| 3. Spring washer         | 12. Bushings      | 21. Pin            |
| 4. Flat washer           | 13. Clip          | 22. Push rod       |
| 5. Clutch pedal Assembly | 14. Pin           | 23. Bushing        |
| 6. Rod                   | 15. Spring seat   | 24. Stopper rubber |
| 7. Adjusting nut         | 16. Bushing       | 25. Pad            |
| 8. Bushing               | 17. Spacer        | 26. Clutch pedal   |
| 9. Spring seat           | 18. Bushing       |                    |

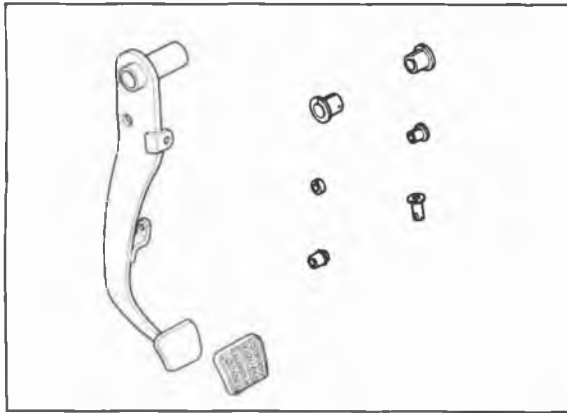


76G06X-007

### Removal Note

Before removing the clutch pedal, loosen adjusting nut of the assist spring to relieve the spring tension.

## 6 CLUTCH PEDAL

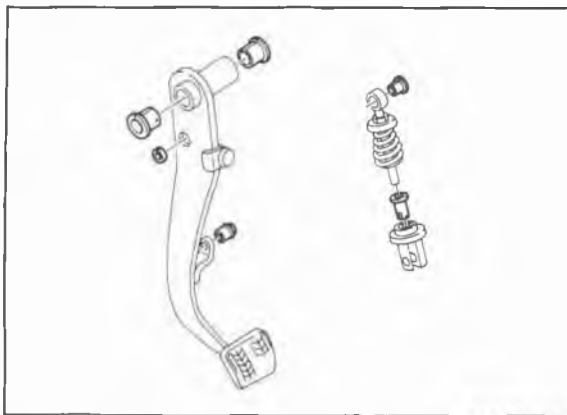


76G06X-008

### INSPECTION

Check the following, and repair or replace any faulty parts.

1. Worn or damaged pedal bushing
2. Twisted or bent pedal
3. Worn or damaged pedal pad



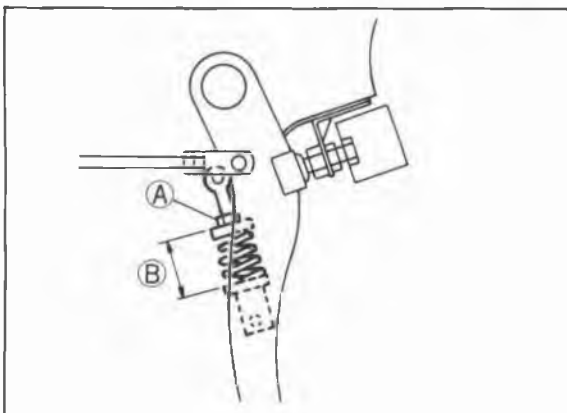
76G06X-009

### INSTALLATION

Install in the reverse order of removal referring to the installation note.

#### Installation Note

Apply grease (lithium base, NLGI No.2) to the bushings.



76G06X-010

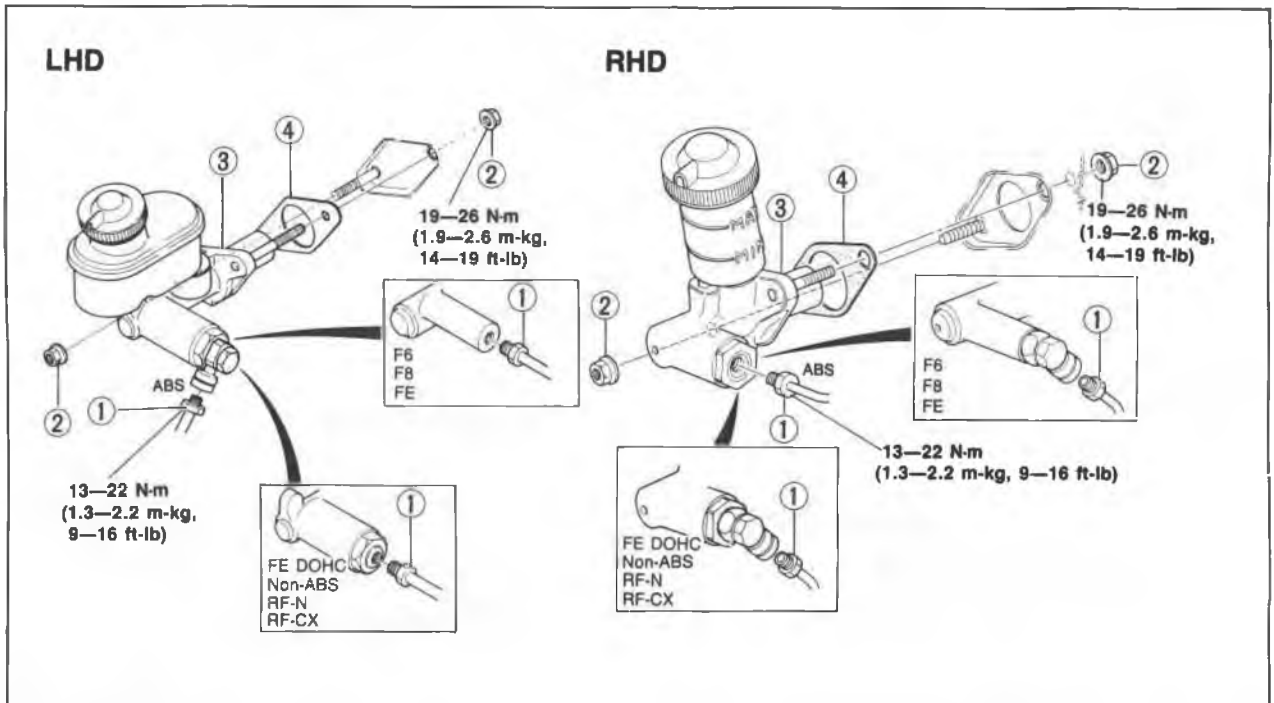
### ADJUSTMENT

1. Adjust the pedal height. (Refer to page 6—4.)
2. Check the pedal free play, and adjust if necessary. (Refer to page 6—4.)
3. Adjust the installation length of the assist spring. The installation length is adjusted by turning nut A show in the figure and adjusting dimension B.

#### Standard dimension:

**38.6—39.6 (1.520—1.559 in)**

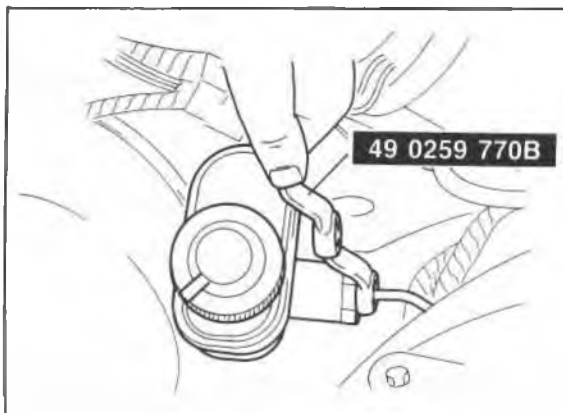
## CLUTCH MASTER CYLINDER



76G06X-011

- 1. Clutch pipe
- 2. Nuts

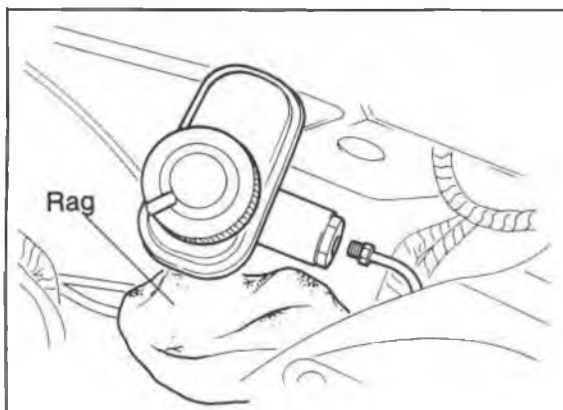
- 3. Clutch master cylinder
- 4. Gasket



76G06X-012

### REMOVAL

1. Remove the ABS relay box. (LHD)
2. Disconnect the clutch pipe with the **SST**.
3. Remove the mounting nuts.
4. Remove the clutch master cylinder.



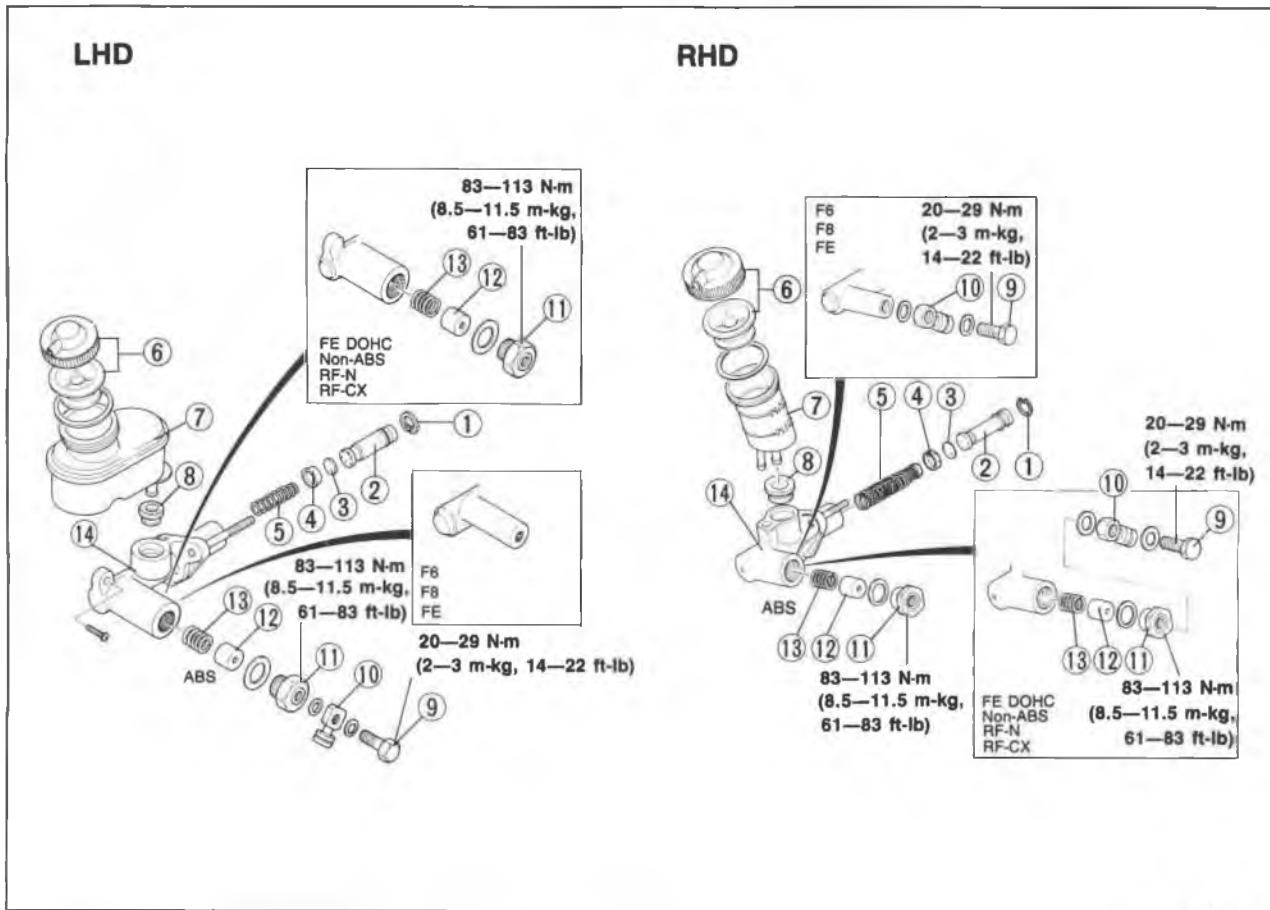
86U06X-010

### Caution

**Clutch fluid will damage painted surfaces. Be sure to use a container or rags to collect it. If fluid does get on a painted surface, wipe it off immediately with a rag.**

# 6 CLUTCH MASTER CYLINDER

## DISASSEMBLY Components

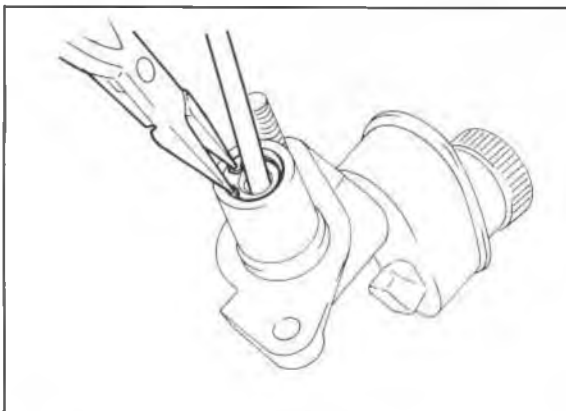


76G06X-013

- |                                      |                        |                          |
|--------------------------------------|------------------------|--------------------------|
| 1. Snap ring                         | 5. Return spring       | 10. Connector            |
| 2. Piston and secondary cup assembly | 6. Tank cap and baffle | 11. Joint bolt           |
| 3. Spacer                            | 7. Reserve tank        | 12. One-way valve piston |
| 4. Primary cup                       | 8. Bushing             | 13. Spring               |
|                                      | 9. Connector bolt      | 14. Cylinder body        |

### Caution

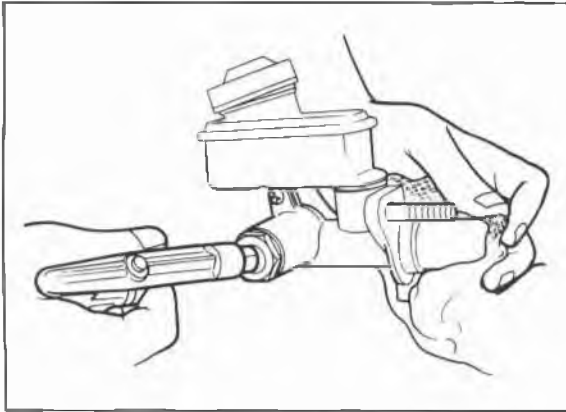
**When disassembling or assembling the clutch master cylinder, do so in a clean space free from dirt and dust.**



76G06X-014

1. Press down on the piston with a phillips screwdriver and remove the snap ring with snap ring pliers.

## CLUTCH MASTER CYLINDER 6



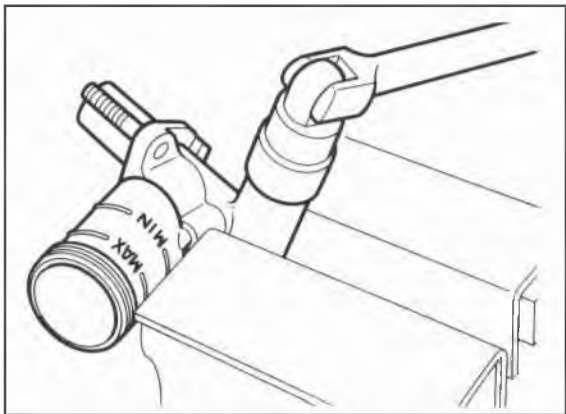
76G06X-015

2. Remove the piston and secondary cup assembly by blowing compressed air through the clutch pipe installation hole.

### Caution

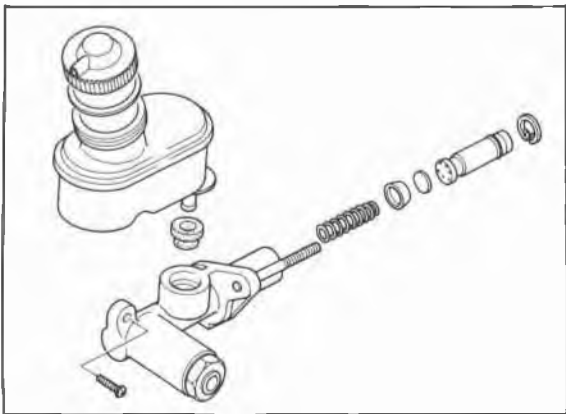
**When doing so, use a rag to prevent the piston and secondary cup assembly from projecting out.**

3. Remove the spacer, primary cup, and return spring.
4. Remove the tank cap and baffle.



76G06X-016

5. Remove the tank set screw. (LHD)
6. Remove the reserve tank.
7. Remove the bushing, if necessary.
8. Remove the connector. (LHD ABS, RHD without ABS)
9. Remove the joint bolt, then remove the one-way valve piston and spring. (FE DOHC, RF-N, RF-CX)

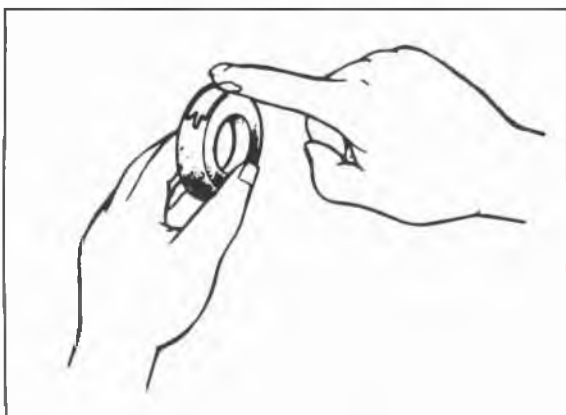


86U06X-014

### INSPECTION

After cleaning all parts, check the following points. Replace any parts with new parts, if necessary. Note that rubber parts should be cleaned with clutch fluid.

1. Wear or damage of cylinder wall and/or piston.
2. Weakness of return spring.
3. Wear or damage of piston cup.
4. Damaged or bent reserve tank and/or reserve tank installation part.



86U06X-015

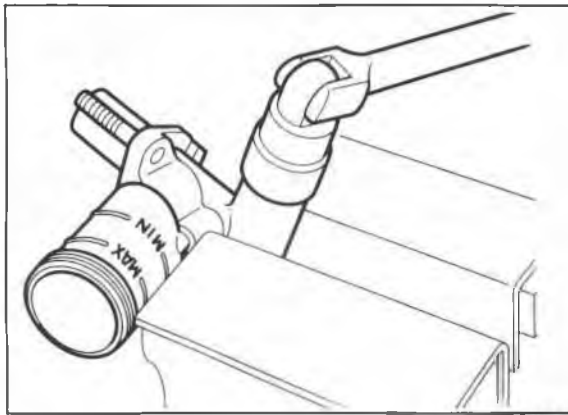
### ASSEMBLY

Apply clean clutch fluid to the piston cup and the cylinder bore before assembly.

### Caution

**After applying clutch fluid, check that no foreign material is on the cup.**

## 6 CLUTCH MASTER CYLINDER

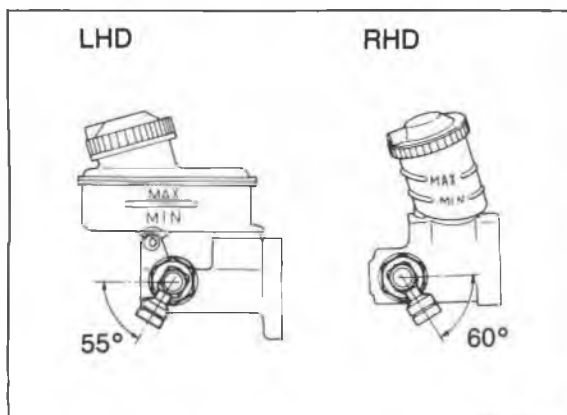


76G06X-017

1. Install the one-way valve spring and piston. (FE DOHC, RF-N, RF-CX)
2. Tighten the joint bolt with new gasket. (FE DOHC, RF-N, RF-CX)

### Tightening torque:

**83—113 Nm (8.5—11.5 m-kg, 61—83 ft-lb)**



76G06X-018

3. Install the connector and new gaskets. (LHD ABS, RHD without ABS)

### Caution

**Install the connector at the angle shown in the figure.**

### Tightening torque:

**20—29 Nm (2—3 m-kg, 14—22 ft-lb)**

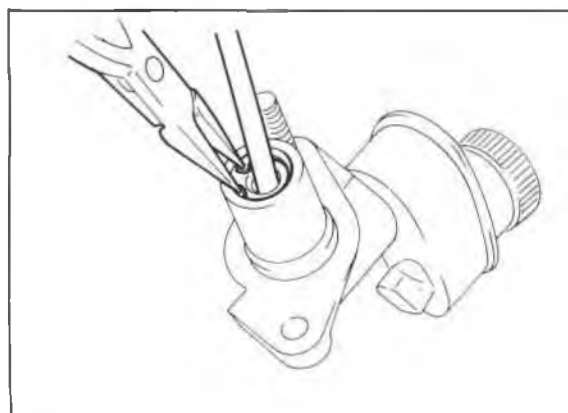


76G06X-019

4. Install the new bushing.
5. Install the reserve tank, baffle and tank cap.
6. Install the following parts:
  - (1) Return spring
  - (2) Primary cup
  - (3) Spacer
  - (4) New piston and secondary cup assembly

### Caution

**A new primary cup, piston, and secondary cup assembly must be used.**

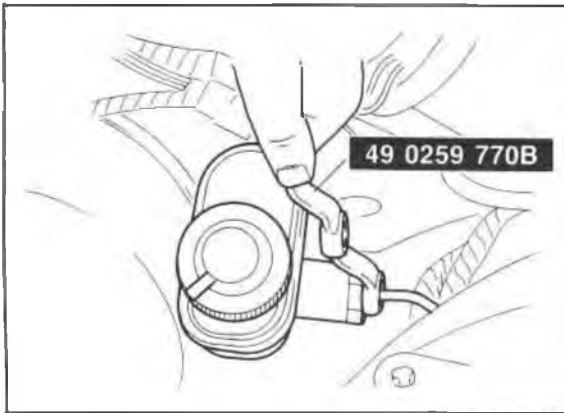


76G06X-020

7. While pressing the piston with a screwdriver, install the snap ring.



## CLUTCH RELEASE CYLINDER 6



76G06X-021

### INSTALLATION

1. Install the clutch master cylinder.
2. Tighten the mounting nuts.

#### Tightening torque:

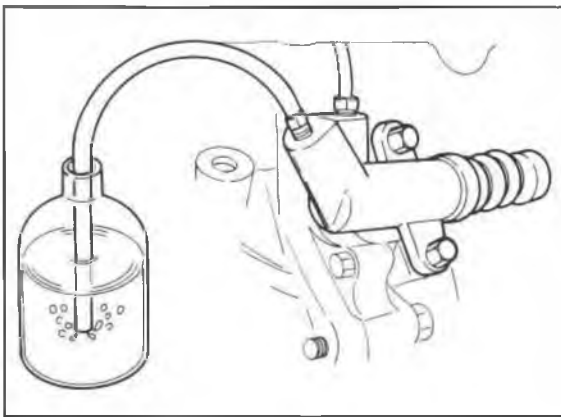
19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

3. Tighten the clutch pipe flare nut securely with the SST.

#### Tightening torque:

13—22 N·m (1.3—2.2 m·kg, 9—16 ft·lb)

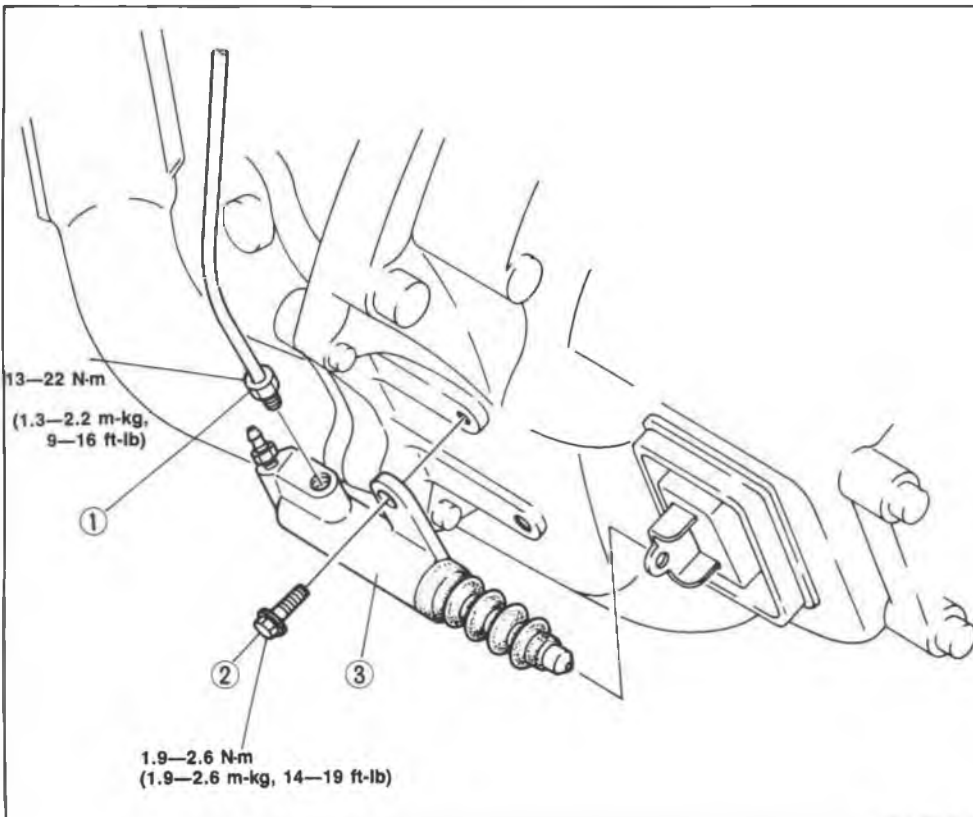
4. Install the ABS relay box. (LHD)



### After installation

1. Perform air bleeding. (Refer to page 6—14.)
2. Verify that there is no leakage.
3. Perform a road test.

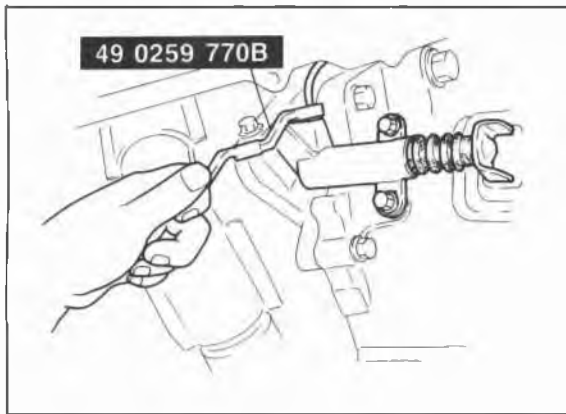
## CLUTCH RELEASE CYLINDER



86U06X-019

1. Clutch pipe flare nut
2. Installation bolts
3. Release cylinder

## 6 CLUTCH RELEASE CYLINDER



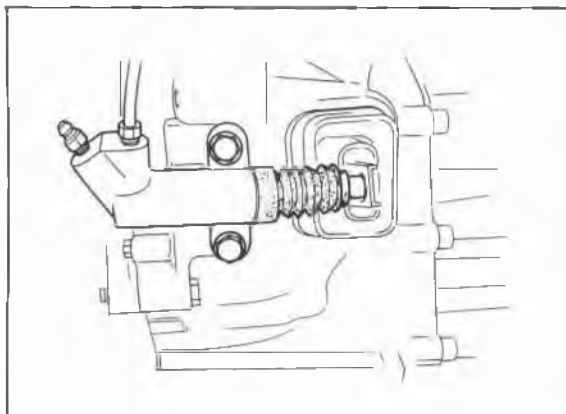
86U06X-020

### REMOVAL

1. Disconnect the clutch pipe, with the **SST**.

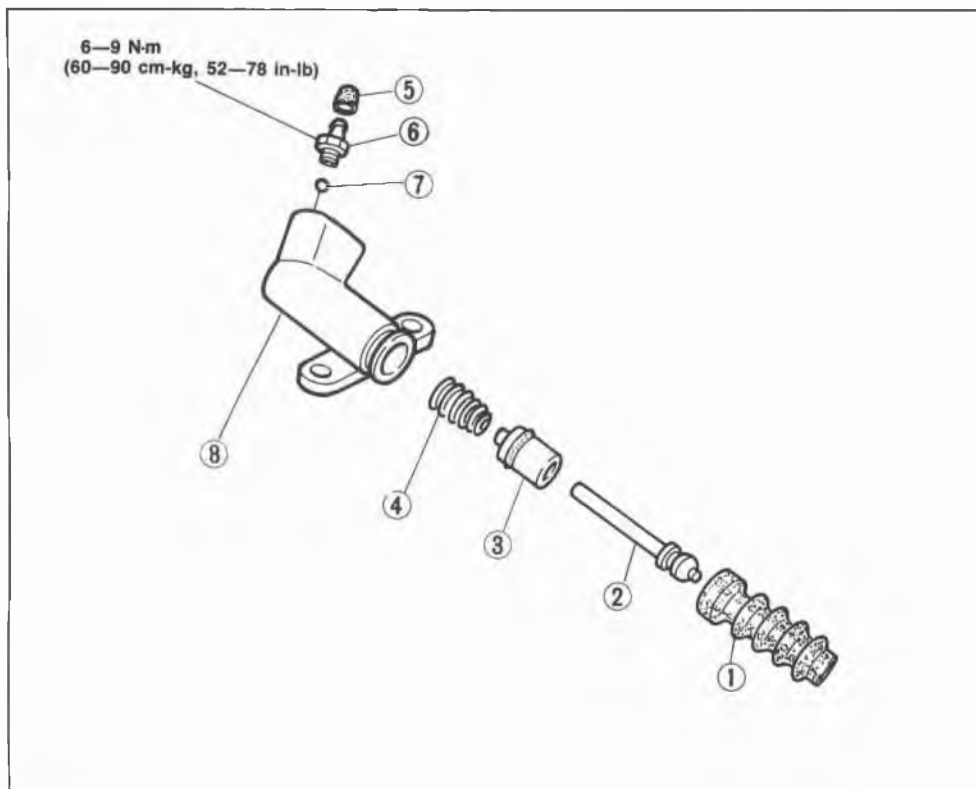
#### Note

**Plug the pipe in order to prevent fluid from leaking.**



2. Remove the installation bolts.
3. Remove the release cylinder.

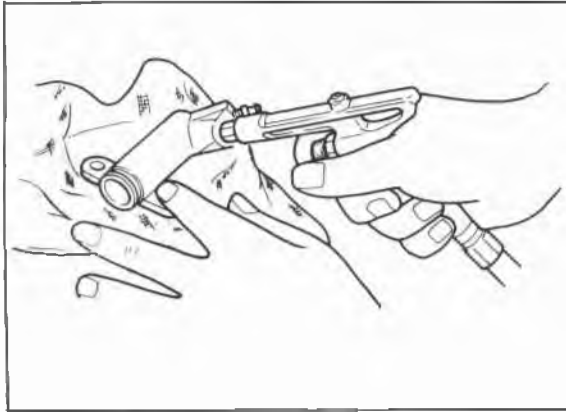
### DISASSEMBLY Components



1. Boot
2. Push rod
3. Piston and piston cup
4. Return spring
5. Bleeder cap
6. Bleeder screw
7. Steel ball
8. Cylinder body

76G06X-022

## CLUTCH RELEASE CYLINDER 6

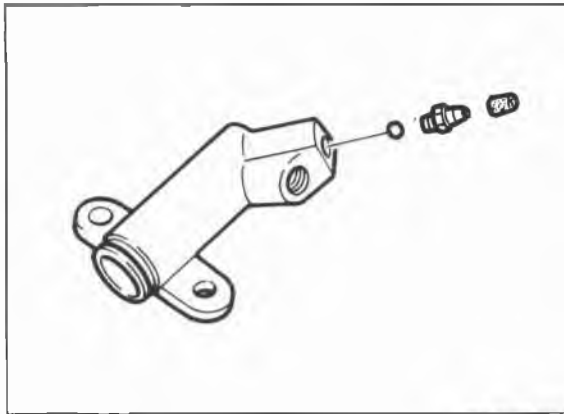


86U06X-023

1. Pull out the push rod and boot.
2. Remove the piston and piston cup by blowing compressed air through the clutch pipe installation hole.

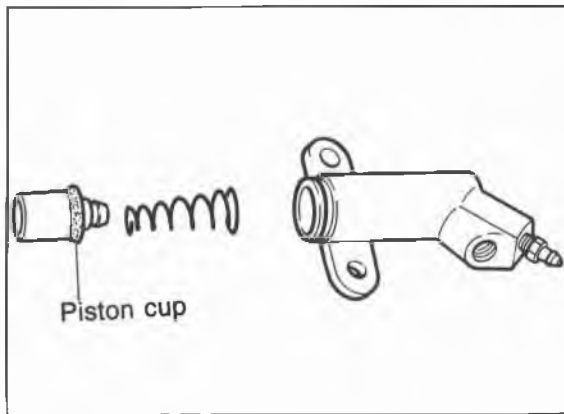
### Caution

**When doing so, use a rag to prevent the piston and piston cup assembly from projecting out.**



86U06X-024

3. Remove the return spring.
4. Remove the following parts if necessary:
  - (1) Bleeder cap
  - (2) Bleeder screw
  - (3) Steel ball

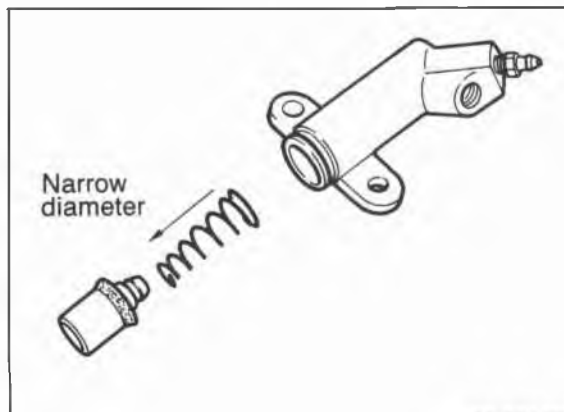


76U06X-029

### INSPECTION

After cleaning all parts, check the following points. Replace any parts with new parts if necessary. Note that rubber parts should be cleaned with clutch fluid.

1. Wear or damage of cylinder wall and piston.
2. Weakness of return spring.
3. Wear or damage of piston cup.



86U06X-025

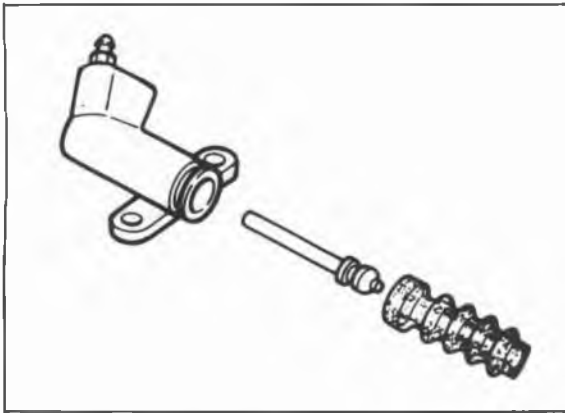
### ASSEMBLY

1. Install the following parts:
  - (1) Steel ball
  - (2) Bleeder screw
  - (3) Bleeder cap
2. Install the return spring.
3. Install the new piston and piston cup assembly.

### Caution

- a) A new piston and piston cup assembly must be used.
- b) Make sure the return spring and piston cup assembly are as illustrated.

## 6 AIR BLEEDING



76U06X-031

4. Install the following parts:
  - (1) Push rod
  - (2) Boot

### INSTALLATION

1. Install the release cylinder.
2. Tighten the installation bolts.

#### Tightening torque:

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

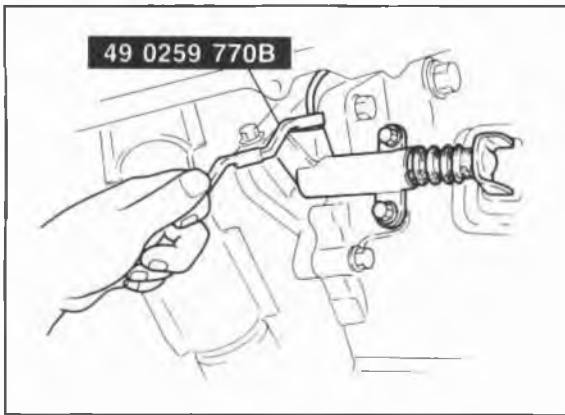
3. Tighten the clutch pipe flare nut securely with the **SST**.

#### Tightening torque:

**13—22 N·m (1.3—2.2 m·kg, 9—16 ft·lb)**

### After installation

1. Perform air bleeding.
2. Verify that there is no leakage from the hydraulic circuit.
3. Perform a road test.



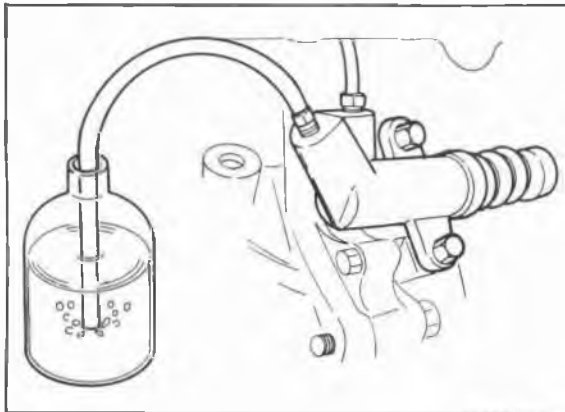
76G06X-023

## AIR BLEEDING

The clutch hydraulic system must be bled to remove air that entered when the pipes were disconnected. This bleeding is done as described below.

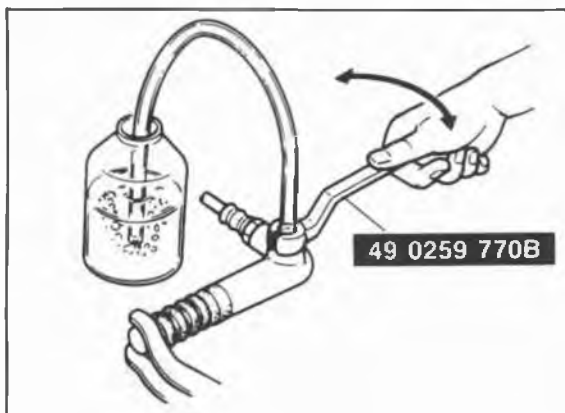
### Note

- a) The fluid in the reserve tank must be maintained at the 3/4 level or higher during air bleeding.
- b) Use only the specified fluid type. (Refer to page 6—3)
- c) Be careful not to spill clutch fluid onto a painted surface.



86U06X-027

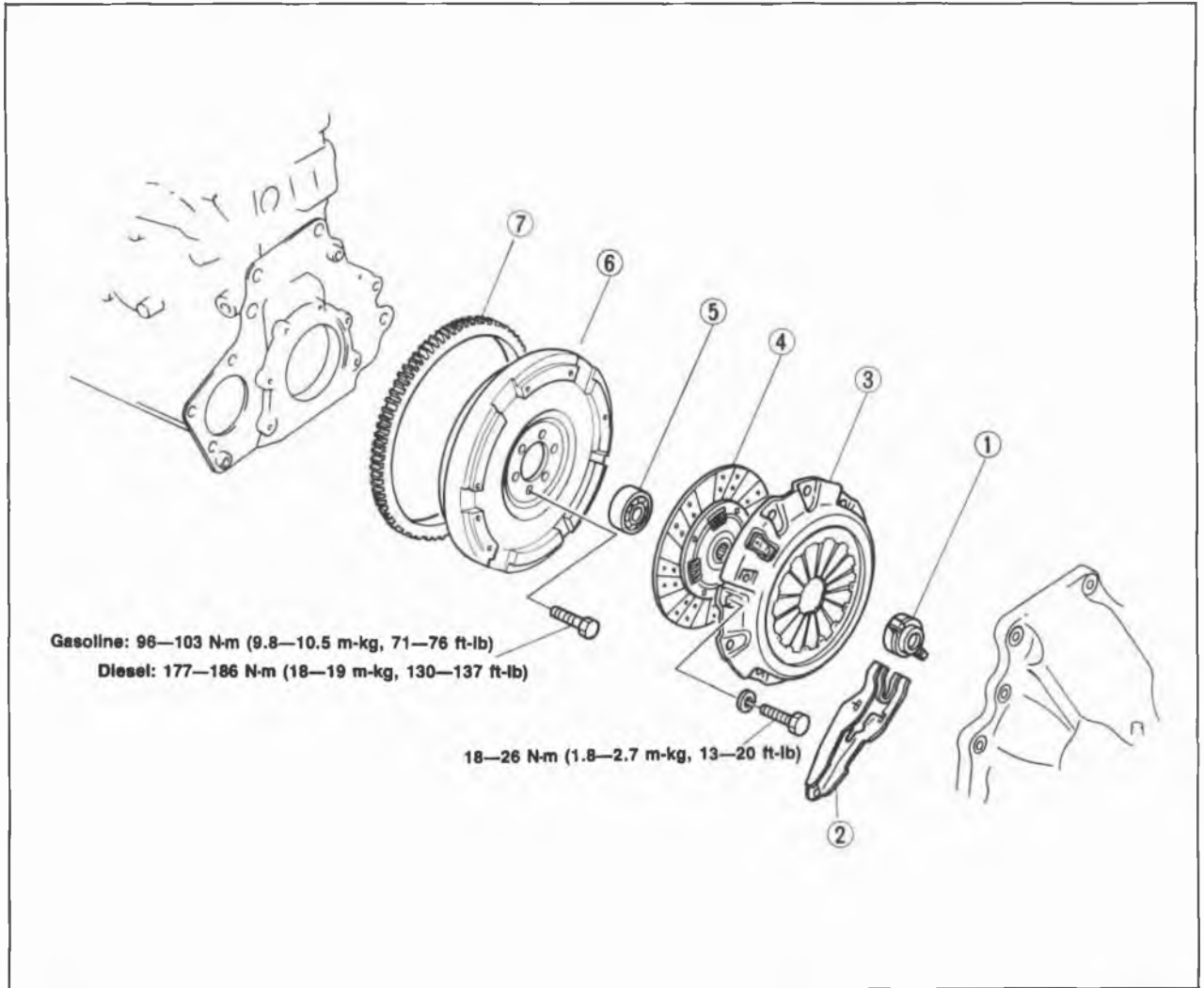
1. Remove the bleeder cap, and attach a vinyl hose to the bleeder screw.
2. Place the other end of the vinyl tube in a glass container of the appropriate capacity.
3. Slowly pump the clutch pedal several times by hand.
4. While the clutch pedal is depressed, loosen the bleeder screw to let fluid and air escape. Then close the bleeder screw.
5. Repeat step 3 and 4 until no more air bubbles are in the fluid.
6. Check for correct clutch operation.



86U06X-028

## CLUTCH AND FLYWHEEL

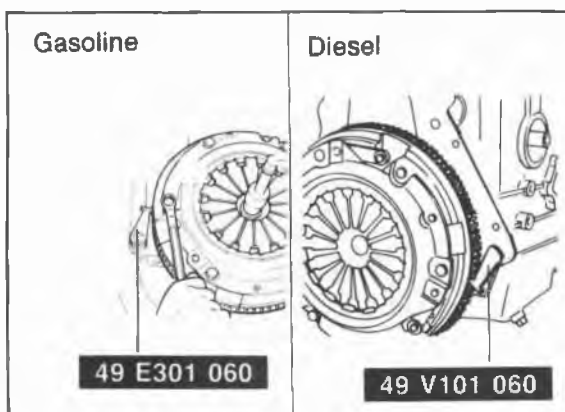
### REMOVAL Components



76G06X-024

1. Clutch release bearing
2. Clutch release fork
3. Clutch cover

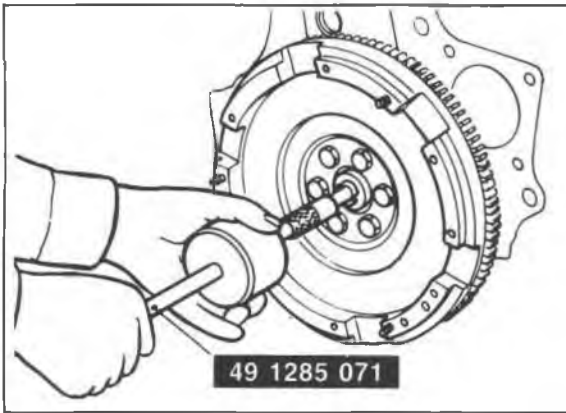
4. Clutch disc
5. Pilot bearing
6. Flywheel
7. Ring gear



86U06X-030

1. Remove the transaxle. (Refer to Section 7).
2. Attach the **SST** to the engine, and remove the clutch cover and clutch disc.

## 6 CLUTCH AND FLYWHEEL

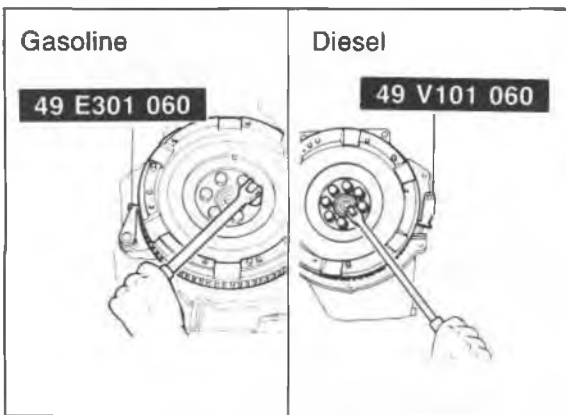


86U06X-031

3. Remove the pilot bearing from the crankshaft with the **SST**.

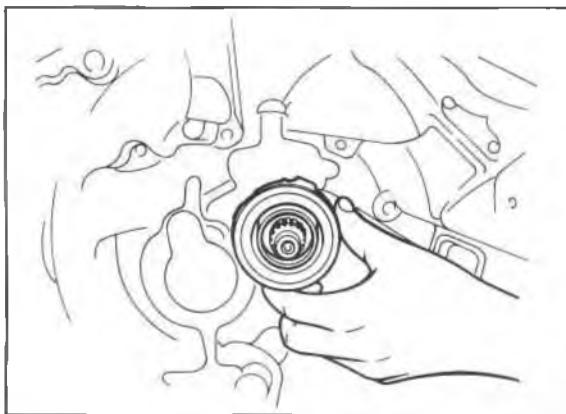
### Note

**Do not remove the bearing if it is not necessary.**



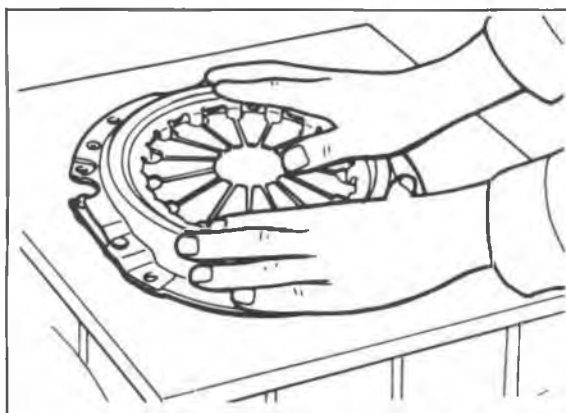
86U06X-032

4. Remove the flywheel.



86U06X-033

5. Remove the release bearing.
6. Remove the release fork.



86U06X-034

### INSPECTION

Check the following and repair or replace any faulty parts.

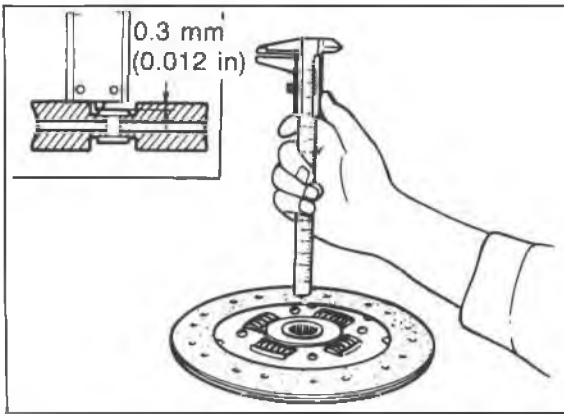
### Clutch Cover

1. Clutch disc for scoring, cracks, or discoloration.

### Note

**Minor scratches or discoloration should be removed with sandpaper.**

2. Diaphragm spring and cover for damage.



86U06X-035

### Clutch Disc

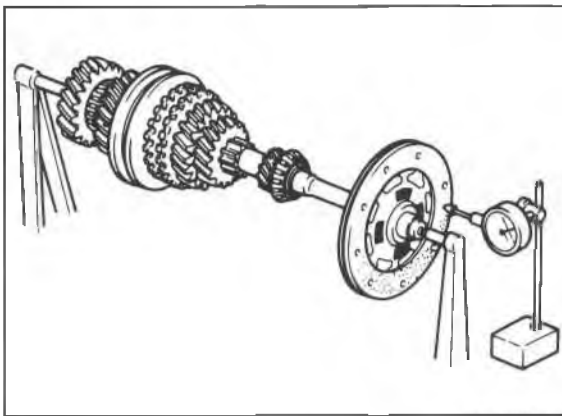
1. Facing surface for hardening or presence of oil.

#### Note

**Use sandpaper if the trouble is minor.**

2. Loose facing rivets.
3. Worn clutch disc.  
Measure the depth to the rivet heads with a slide caliper.

**Depth: 0.3 mm (0.012 in) min.**

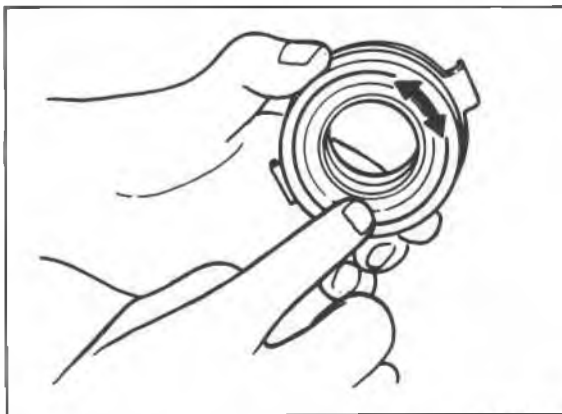


86U06X-036

4. Runout of clutch disc.

**Runout: 1.0 mm (0.039 in) max.**

5. Wear or rust on the splines.  
Remove any minor rust.



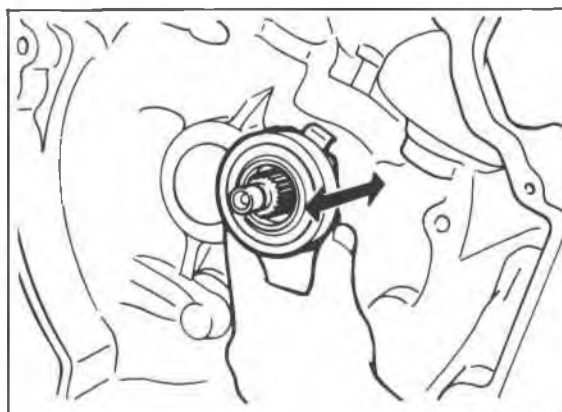
76G06X-025

### Clutch Release Bearing

1. Turn the bearing both directions and check for any binding or abnormal noise.
2. Worn or damaged diaphragm spring or release fork contact surface.

#### Caution

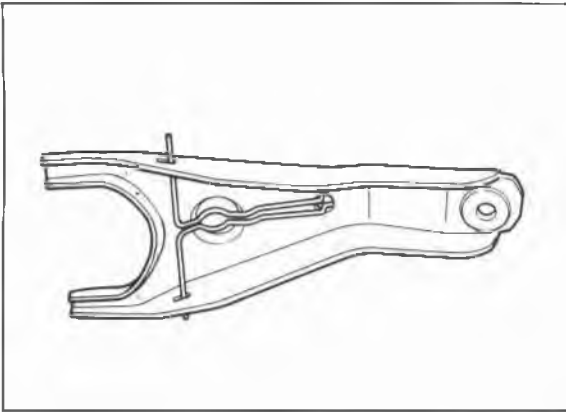
**The clutch release bearing is a sealed bearing and must not be washed.**



63U06X-025

3. Sliding condition of bearing.  
Install the bearing on the clutch housing extension and check for smooth movement.

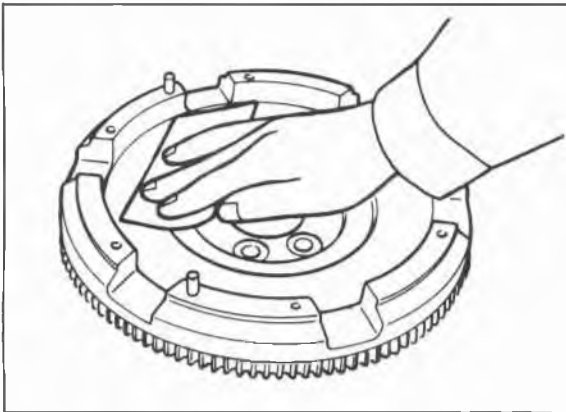
## 6 CLUTCH AND FLYWHEEL



67U06X-035

### Clutch Release Fork

Cracked or bent clutch release fork.



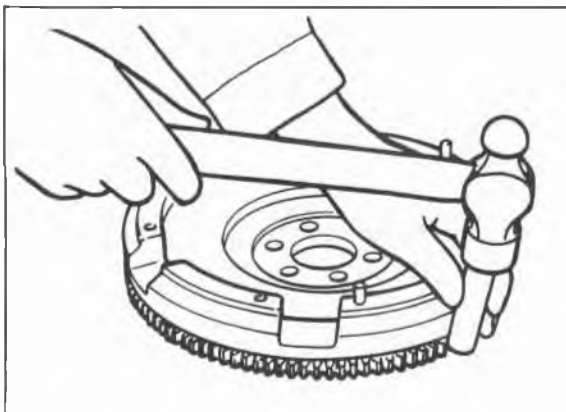
4BG06X-028

### Flywheel

1. Surface marks, scoring or discoloration of clutch contact surface.

#### Note

**If the problem is minor, repairs can be made by cleaning with sandpaper.**



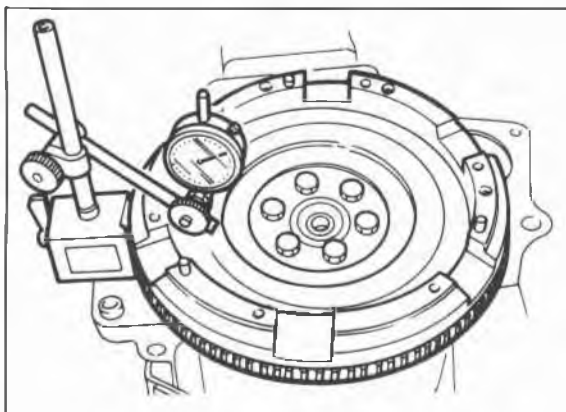
4BG06X-029

2. Damaged or worn ring gear teeth.  
If necessary, replace the ring gear as follows:

- (1) Heat the ring gear with a blowtorch, then tap around the gear to remove it from the flywheel.
- (2) Heat the new ring gear to 250—300°C (480—570°F), then fit it onto the flywheel.

#### Caution

**The bevelled side of the ring gear must face toward the engine side.**



86U06X-037

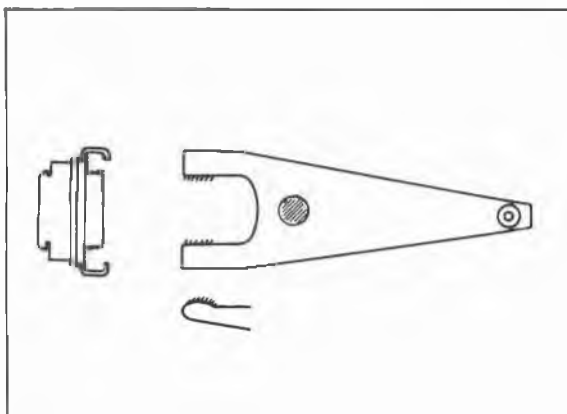
3. Runout of flywheel  
(1) To measure, set a dial indicator on the clutch disc contact surface, and turn the flywheel.

**Runout: 0.2 mm (0.008 in) max.**

- (2) If the runout exceeds specification repair by grinding.

**Grinding limit: 0.5 mm (0.020 in) max.**

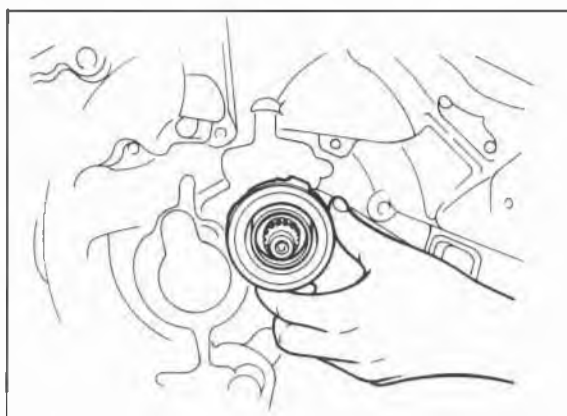




86U06X-038

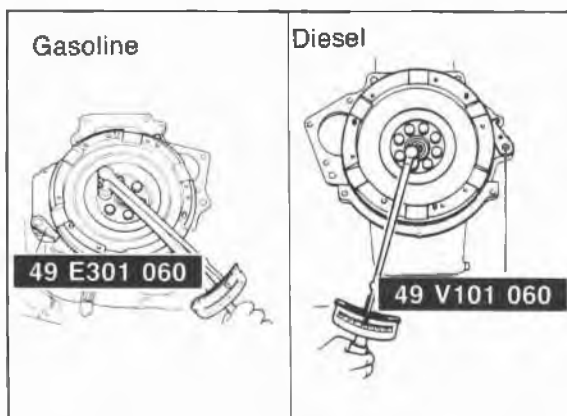
## INSTALLATION

1. Apply clutch grease (**Mori White TA No.2** or equivalent organic molybdenum grease) to the clutch release bearing and fork, indicated by the shaded lines in the figure.



86U06X-039

2. Install the clutch release fork and release bearing.



76G06X-026

3. Install the flywheel, then attach the **SST** and tighten the flywheel installation bolts.

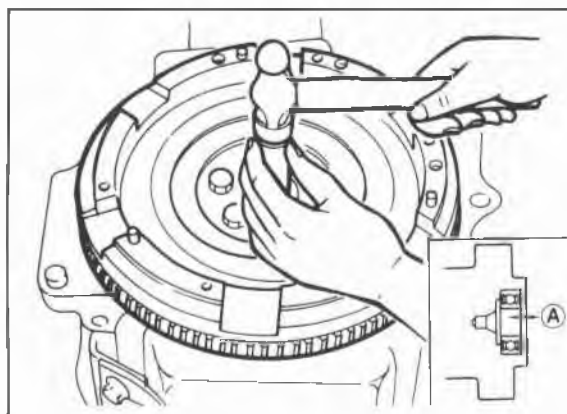
### Tightening torque:

**Gasoline 96—103 N·m**  
(9.8—10.5 m·kg, 71—76 ft·lb)

**Diesel 177—186 N·m**  
(18—19 m·kg, 130—137 ft·lb)

### Caution

If reusing the flywheel bolts, clean the threads to remove old sealant, and apply new sealant. If old sealant cannot be removed, replace the bolts.



86U06X-041

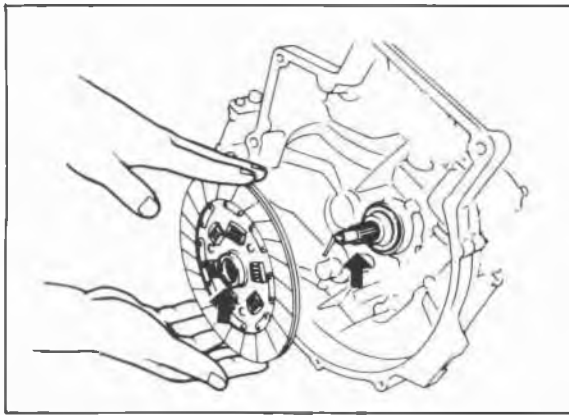
4. Install the pilot bearing in the flywheel using a suitable bar and a hammer.

### Caution

a) Tap it in until distance **A** in the figure is 3.8—4.2 mm (0.150—0.165 in).

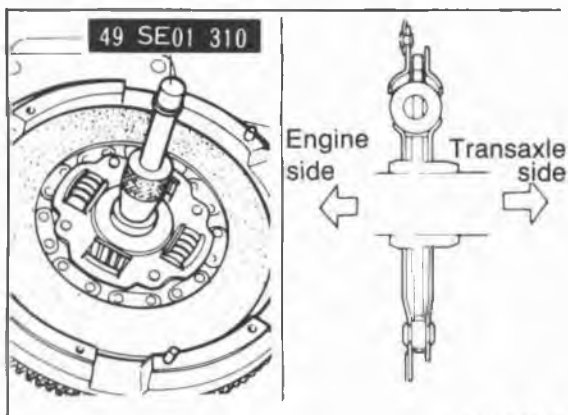
b) Put a small amount of clutch grease (**Mori White TA No.2** or equivalent organic molybdenum grease).

## 6 CLUTCH AND FLYWHEEL



86U06X-042

5. Clean the clutch disc splines and primary shaft splines, then apply clutch grease (**Mori White TA No. 2** or equivalent organic molybdenum grease).

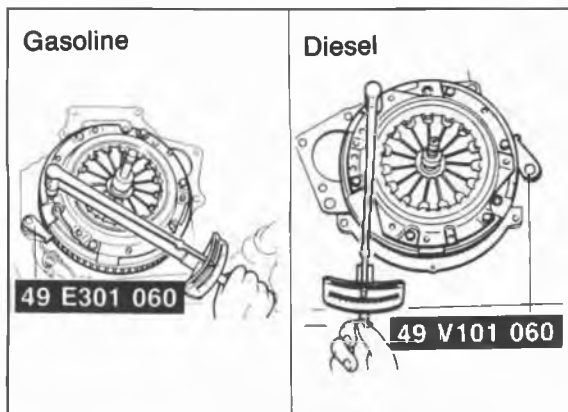


86U06X-043

6. Install the clutch disc with the **SST**.

### Note

**Install the clutch so that it faces in the direction shown in the figure.**



76G06X-027

7. Install the **SST**, and tighten the clutch cover diagonally and evenly.

**Tightening torque: 18—26 Nm  
(1.8—2.7 m·kg, 13—20 ft·lb)**

8. Install the transaxle. (Refer to Section 7A.)

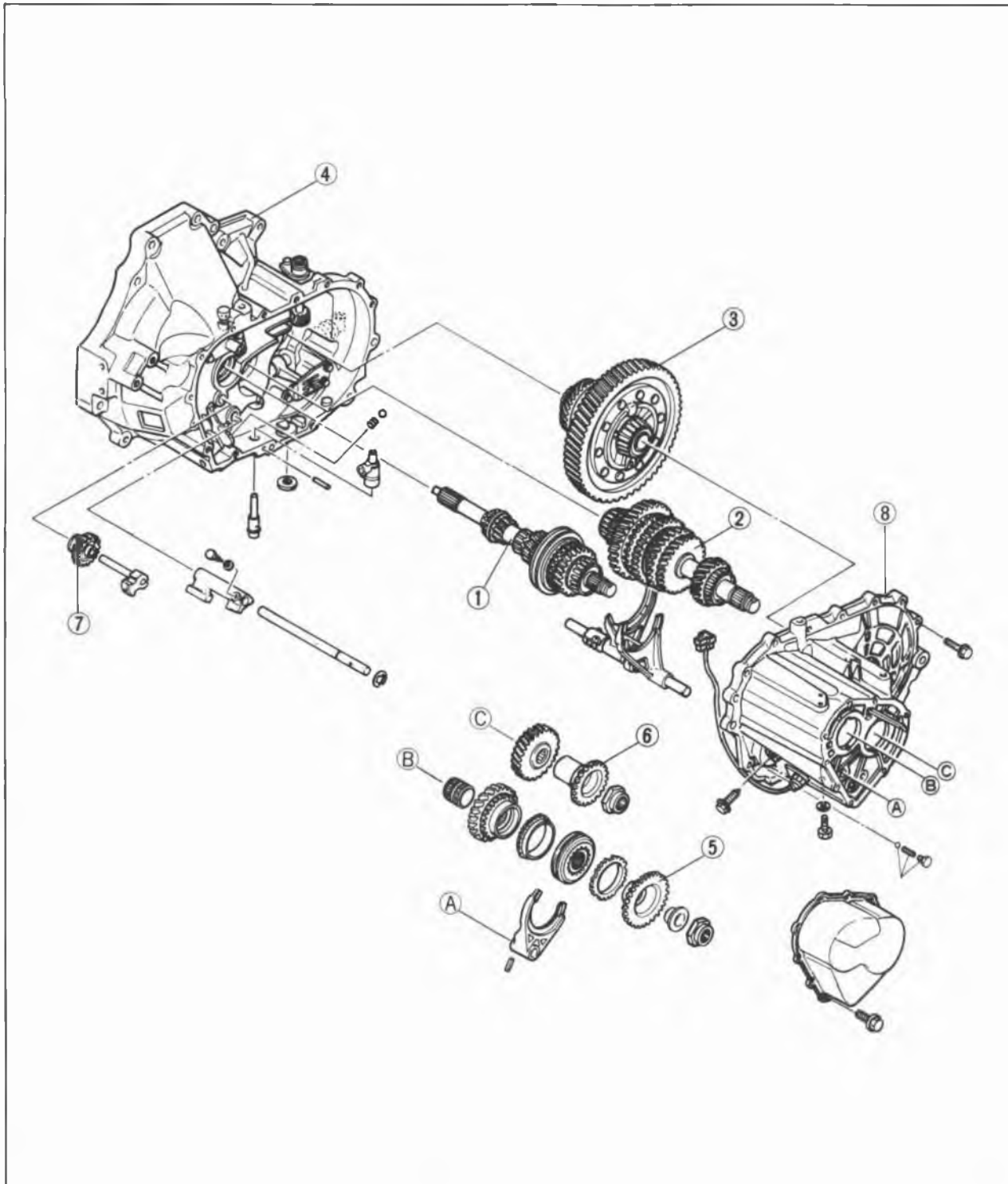
# MANUAL TRANSAXLE

<b>OUTLINE</b> .....	7A— 2
STRUCTURAL VIEW.....	7A— 2
CROSS-SECTIONAL VIEW.....	7A— 3
SPECIFICATIONS.....	7A— 4
<b>TROUBLESHOOTING GUIDE</b> .....	7A— 5
<b>ON-VEHICLE MAINTENANCE</b> .....	7A— 6
TRANSAXLE OIL.....	7A— 6
DRIVESHAFT OIL SEALS.....	7A— 7
<b>REMOVAL</b> .....	7A—10
<b>DISASSEMBLY</b> .....	7A—18
STEP 1.....	7A—18
STEP 2.....	7A—20
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STEP 4.....	7A—25
<b>INSPECTION</b> .....	7A—26
<b>ASSEMBLY</b> .....	7A—29
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# 7A OUTLINE

## OUTLINE

### STRUCTURAL VIEW

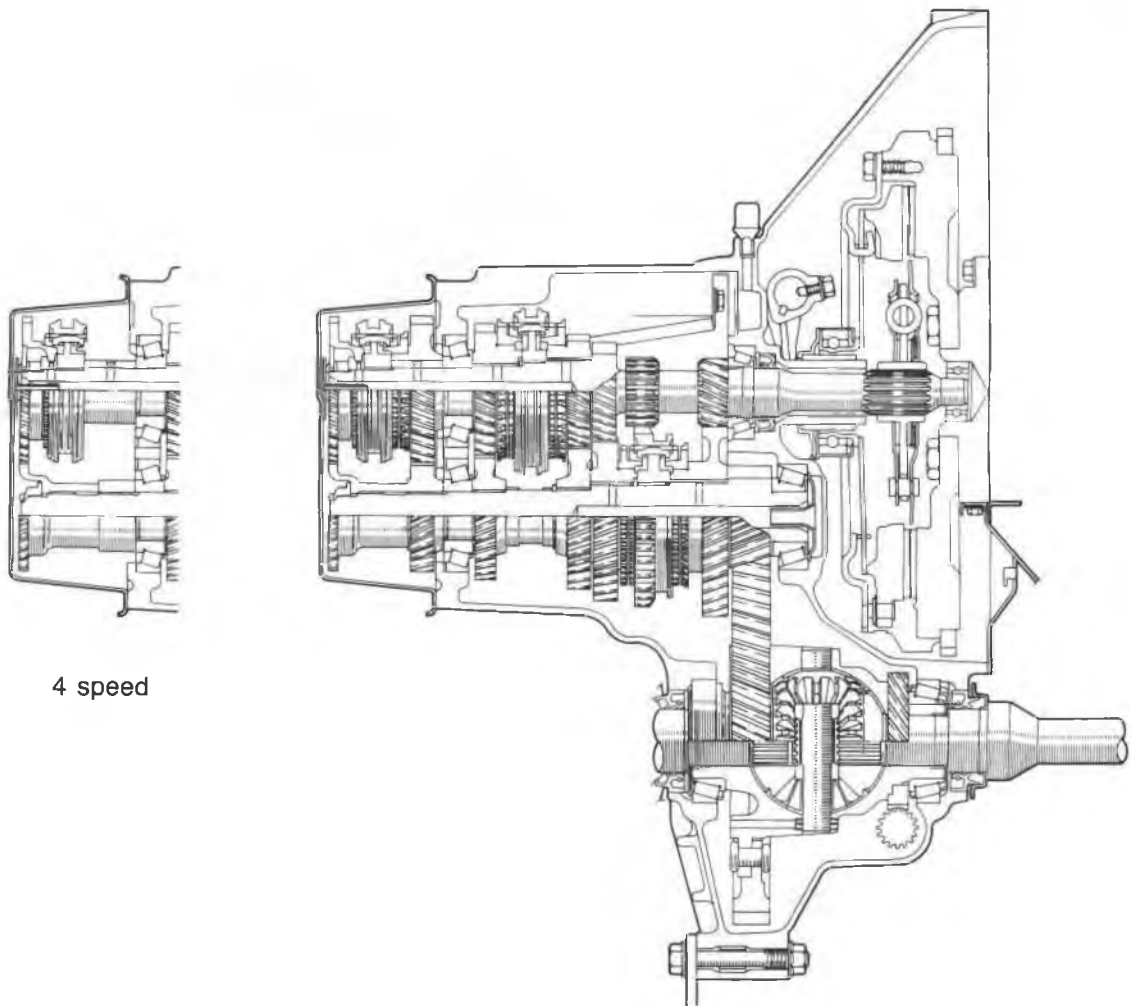


76G07A-002

1. Primary shaft gear assembly
2. Secondary shaft gear assembly
3. Differential assembly
4. Clutch housing

5. Primary reverse synchronizer gear
6. Secondary reverse synchronizer gear
7. Reverse idle gear
8. Transaxle case

CROSS-SECTIONAL VIEW



4 speed

# 7A OUTLINE

## SPECIFICATIONS

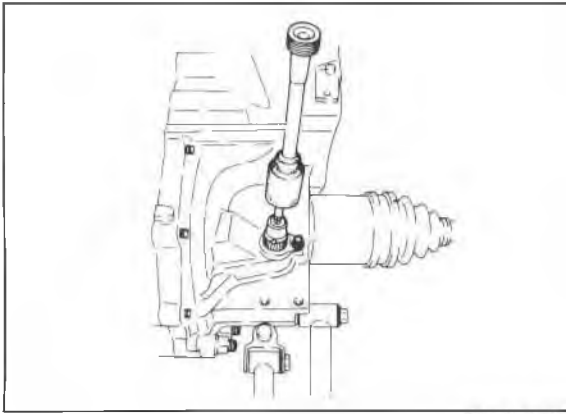
Item	Engine model	FE DOHC		F6	FE 12-valve	FE 8-valve		F8	RF-N	RF-CX
		Leaded	Unleaded			Carb.	FI			
Transaxle control		Floor shift								
Synchromesh system		Forward.....synchromesh, Reverse.....selective sliding and synchromesh								
Gear ratio	1st	3.307								
	2nd	1.833								
	3rd	1.310			1.233			1.161		
	4th	1.030			0.970			0.914	0.861	
	5th	0.837			0.795			0.755	0.680	
	Reverse	3.166								
Final gear ratio		4.105		3.850			4.105	3.850	4.105	
Oil	Type	ATF: DEXRON-II Above -18°C (0°F): API: GL-4 or GL-5 SAE 80W-90 or SAE 90								
	Capacity	3.35 liters (3.6 US qt, 3.9 Imp qt)								

76G07A-004

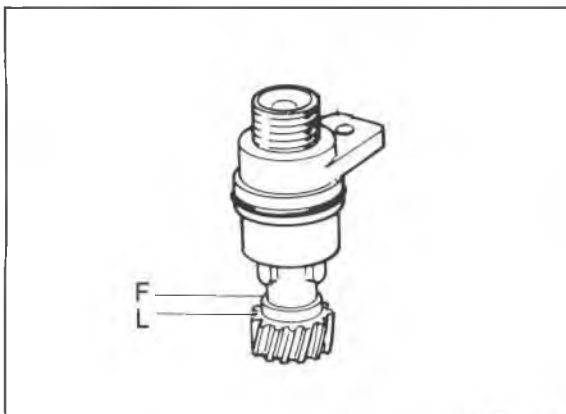
**TROUBLESHOOTING GUIDE**

<b>Problem</b>	<b>Possible cause</b>	<b>Remedy</b>	<b>Page</b>
<b>Change lever won't shift smoothly, or is hard to shift</b>	Seized change lever ball	Replace	7A—58
	Seized change control rod joint	Replace	7A—58
	Bent change control rod	Replace	7A—58
<b>Too much play in change lever</b>	Worn change control rod bushing	Replace	7A—58
	Weak spring of ball or change lever	Replace	7A—58
	Worn bushing of ball or change lever	Replace	7A—58
<b>Difficult to shift</b>	Bent change rod	Replace	7A—58
	No grease in transmission control	Lubricate with grease	7A—58
	Insufficient oil	Add oil	7A—6
	Deterioration of oil quality	Replace with oil of specified quality	7A—6
	Wear or play of shift fork or shift rod	Replace	7A—18
	Wear of synchronizer ring	Replace	7A—27
	Wear of synchronizer cone of gear	Replace	7A—27
	Bed contact of synchronizer ring and cone of gear	Replace	7A—27
	Excessive longitudinal play of gears	Replace	7A—22
	Wear of bearing	Adjust or replace	7A—22
	Wear of synchronizer key spring	Replace	7A—27
	Excessive shaft gear bearing preload	Adjust	7A—37
Improperly adjusted change guide plate	Adjust	7A—20	
<b>Won't stay in gear</b>	Bent change control rod	Replace	7A—58
	Worn change control rod bushing	Replace	7A—58
	Weak change lever ball spring	Replace	7A—58
	Improperly installed extension bar	Tighten	7A—58
	Wear of shift fork	Replace	7A—22
	Wear of clutch hub	Replace	7A—27
	Worn clutch hub sleeve	Replace	7A—27
	Worn gear sliding part of both shaft gears	Replace	7A—26
	Worn gear sliding part of each gear	Replace	7A—26
	Worn steel sliding groove of control end	Replace	7A—18
	Weak spring pressing against steel ball	Replace	7A—18
	Excessive thrust clearance	Replace	7A—33,35
	Worn bearing	Replace	7A—22
Improperly installed engine mount	Tighten	7A—49	
<b>Abnormal noise</b>	Insufficient oil	Add oil	7A—6
	Deterioration of oil quality	Replace	7A—6
	Worn bearing	Adjust or replace	7A—22
	Worn gear sliding surface of both shaft gears	Replace	7A—26
	Wear of sliding surfaces of gears	Replace	7A—26
	Excessive thrust clearance	Replace	7A—33,35
	Damaged gear teeth	Replace with oil of specified quality	7A—26
	Foreign material in gears	Replace	7A—22
	Damaged differential gear, or excessive backlash	Adjust or replace	7A—30

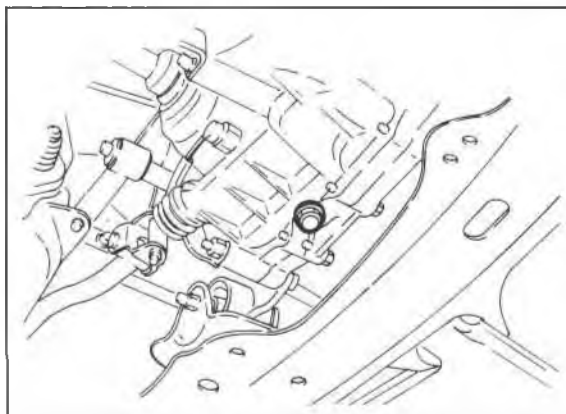
76G07A-005



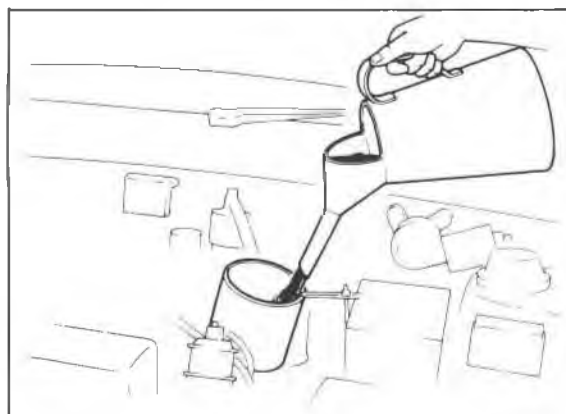
61G07X-189



61G07X-190



61G07X-191



76G07A-006

## ON-VEHICLE MAINTENANCE

### TRANSAXLE OIL

#### Inspection

1. Park the vehicle on level ground.
2. Remove the speedometer cable dust cover, and disconnect the cable from the speedometer driven gear.
3. After removing the bolt, pull the gear case to remove it from the housing. (Insert a flat-tipped screwdriver between the speedometer gear case and the clutch housing, and use it to pry the gear case loose if necessary.)
4. Check that the oil level is between the "F" and "L".
5. If not, add the necessary amount of the specified oil through the gear case hole.

#### Replacement

1. Park the vehicle on level ground.
2. Remove the speedometer driven gear. (See "Inspection" section above.)
3. Remove the drain plug, and drain the oil.
4. Replace the drain plug, and add the necessary amount of the specified oil through the speedometer gear case hole.

#### Specified oil

##### Type

ATF: DEXRON II

Above  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ):

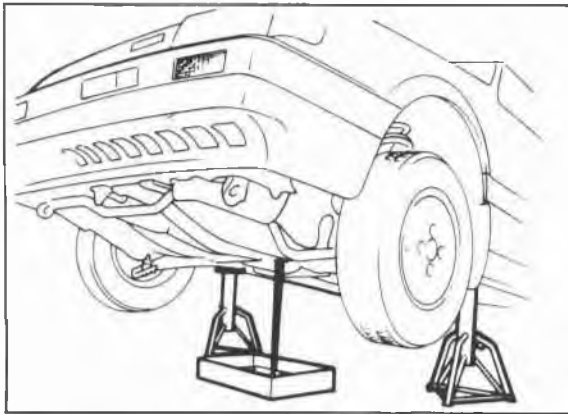
API: GL-4 or GL-5

SAE 80W-90 or SAE 90

##### Capacity:

3.35 liters (3.6 US qt, 3.0 Imp qt)





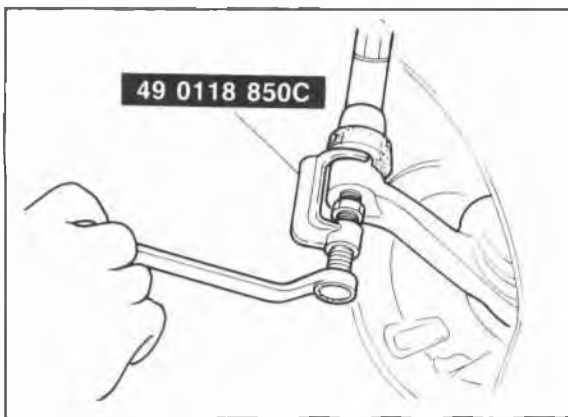
61G07X-170

## DRIVESHAFT OIL SEALS

### Replacement

Jack up the vehicle, support it on safety stands, and then drain the transaxle oil. Next, use the following procedure to replace the driveshaft oil seals:

1. Remove the front wheel(s).
2. Remove the splash shield(s).
3. Separate the front stabilizer from the lower arm.



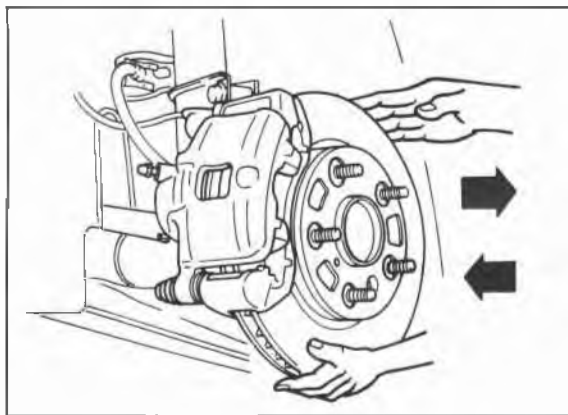
86U07A-009

4. Remove the bolt and pull the lower arm downward. Separate the knuckle from the lower arm ball-joint.

### Note

**Be careful not to damage the ball-joint dust boot.**

5. Remove the cotter pin then disconnect the tie-rod end with the **SST**.



86U07A-010

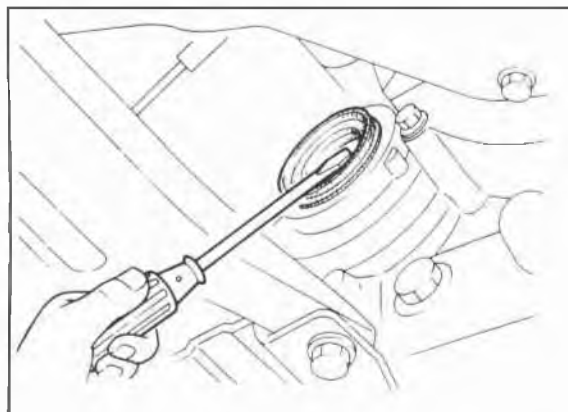
6. Separate the driveshaft by pulling the front hub outward. Do not use too much force at once, increase the force gradually.

### Note

**a) Do not to allow the driveshaft ball-joint to be bent to its maximum extent.**

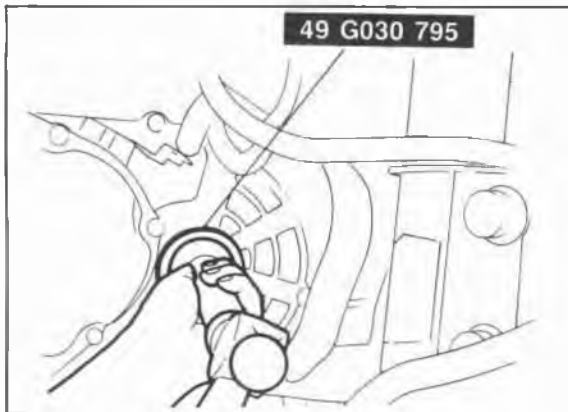
**b) Support the driveshaft using string, wire, etc.**

7. Remove the oil seal with a flat-tipped screwdriver.



86U07A-011

## 7A ON-VEHICLE MAINTENANCE

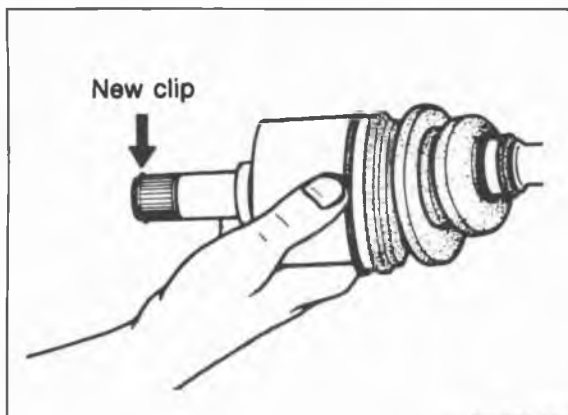


86U07A-012

8. Tap the new oil seal into the transaxle case with the **SST**.

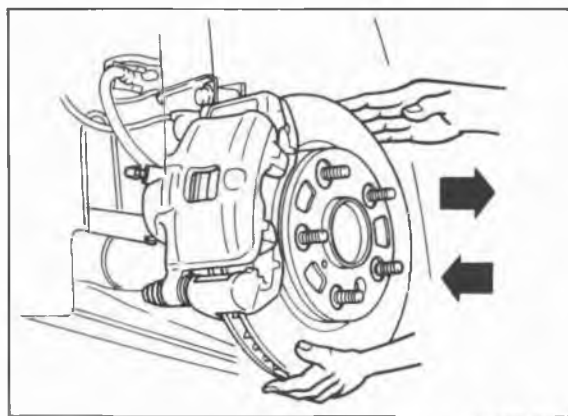
**Note**

- a) Tap in until the oil seal installer contacts the case.  
b) Coat the oil seal lip with transaxle oil.



86U07A-013

9. Replace the driveshaft end clip with a new one. Insert the clip with the gap at the top of the groove.

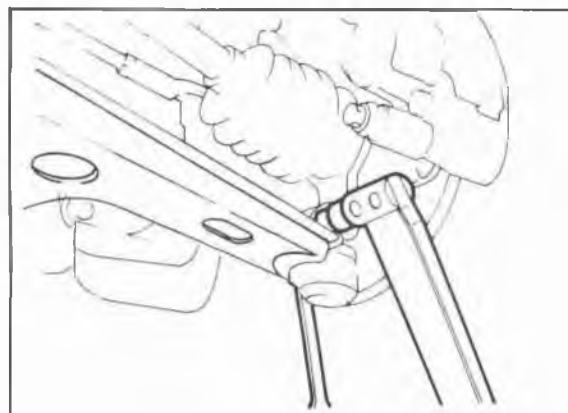


86U07A-014

10. Install the driveshaft as follows:  
(1) Pull the front hub outward, then fit the driveshaft into the transaxle.  
(2) Insert the driveshaft into the transaxle by pushing on the wheel hub assembly.

**Note**

- a) Be careful not to damage the oil seal.  
b) After installation is finished, pull the front hub slowly outward to check that the driveshaft is held securely by the clip.



86U07A-015

11. Install the lower arm ball-joint to the knuckle, and tighten the clinch bolt.

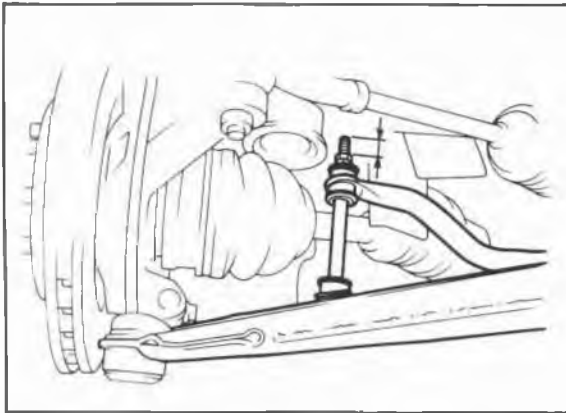
**Tightening torque:**

**43—54 N·m (4.4—5.5 m·kg, 32—40 ft·lb)**

12. Install the tie-rod end and new cotter pin.

**Tightening torque:**

**29—44 N·m (3.0—4.5 m·kg, 22—33 ft·lb)**



86U07A-016

13. Adjust and tighten the stabilizer.

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

**Dimension: 20.1 mm (0.79 in)**



76G07A-007

14. Install the drain plug.

**Tightening torque:**

**39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)**

15. Install the wheel.

**Tightening torque:**

**88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**

16. Add the correct quantity of the specified oil.

**Type: A.T.F.: DEXRON II**

**Above -18°C (0°F):**

**API: GL-4 or GL-5**

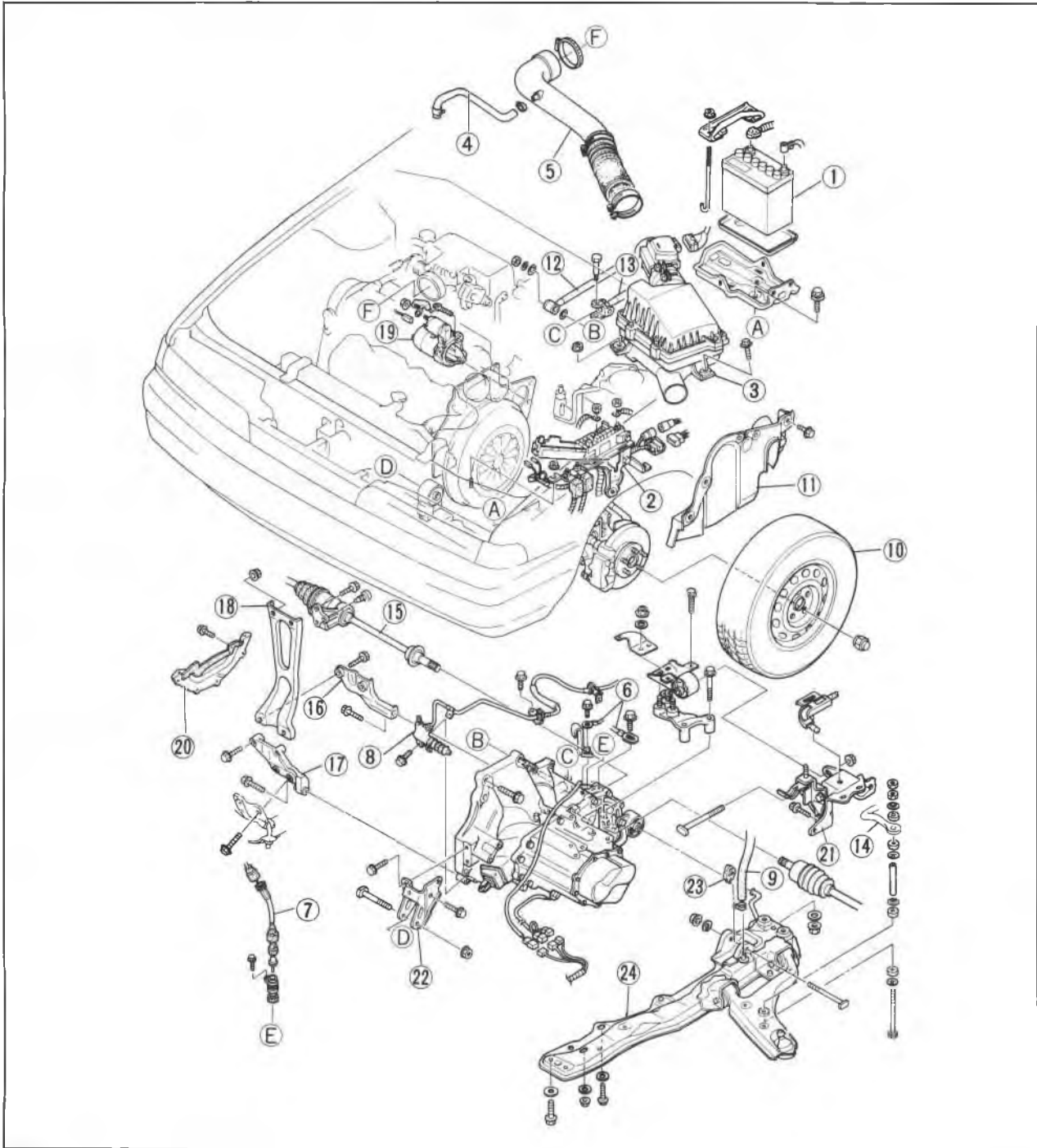
**SAE 80W-90 or SAE 90**

**Capacity: 3.35 liters (3.6 US qt, 3.0 Imp qt)**

# 7A REMOVAL

## REMOVAL

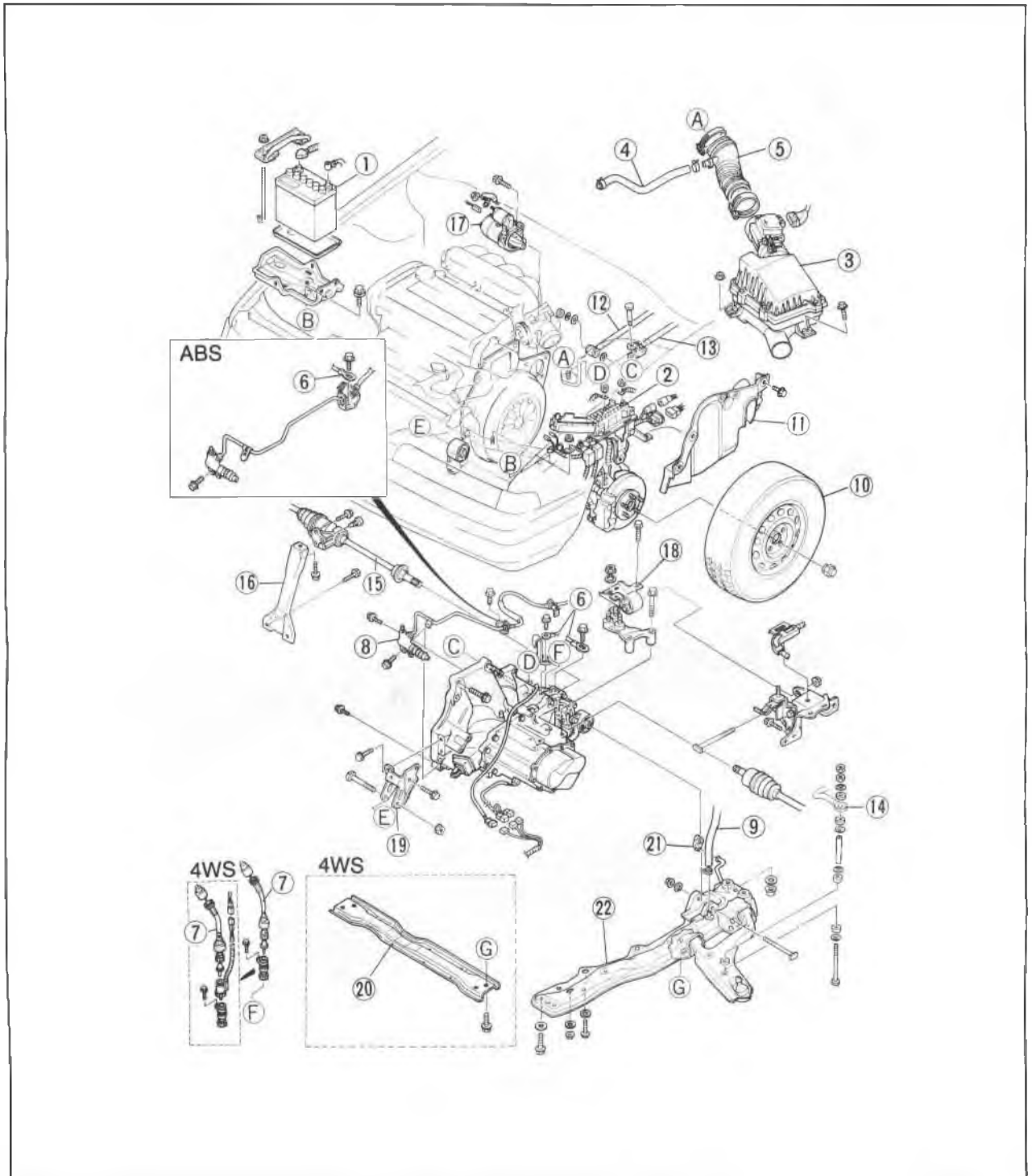
FI except DOHC



76G07A-008

- |                            |                         |                          |
|----------------------------|-------------------------|--------------------------|
| 1. Battery                 | 9. Canister hose        | 17. Gusset plate (front) |
| 2. Main fuse block         | 10. Wheel               | 18. Surge tank bracket   |
| 3. Air cleaner assembly    | 11. Splash shield       | 19. Starter              |
| 4. Ventilation hose        | 12. Extension bar       | 20. Under cover          |
| 5. Air hose                | 13. Control rod         | 21. Engine mount No.4    |
| 6. Ground(s)               | 14. Stabilizer          | 22. Engine mount No.2    |
| 7. Speedometer cable       | 15. Joint shaft         | 23. Hunger rubber        |
| 8. Clutch release cylinder | 16. Gusset plate (rear) | 24. Crossmember          |

## DOHC

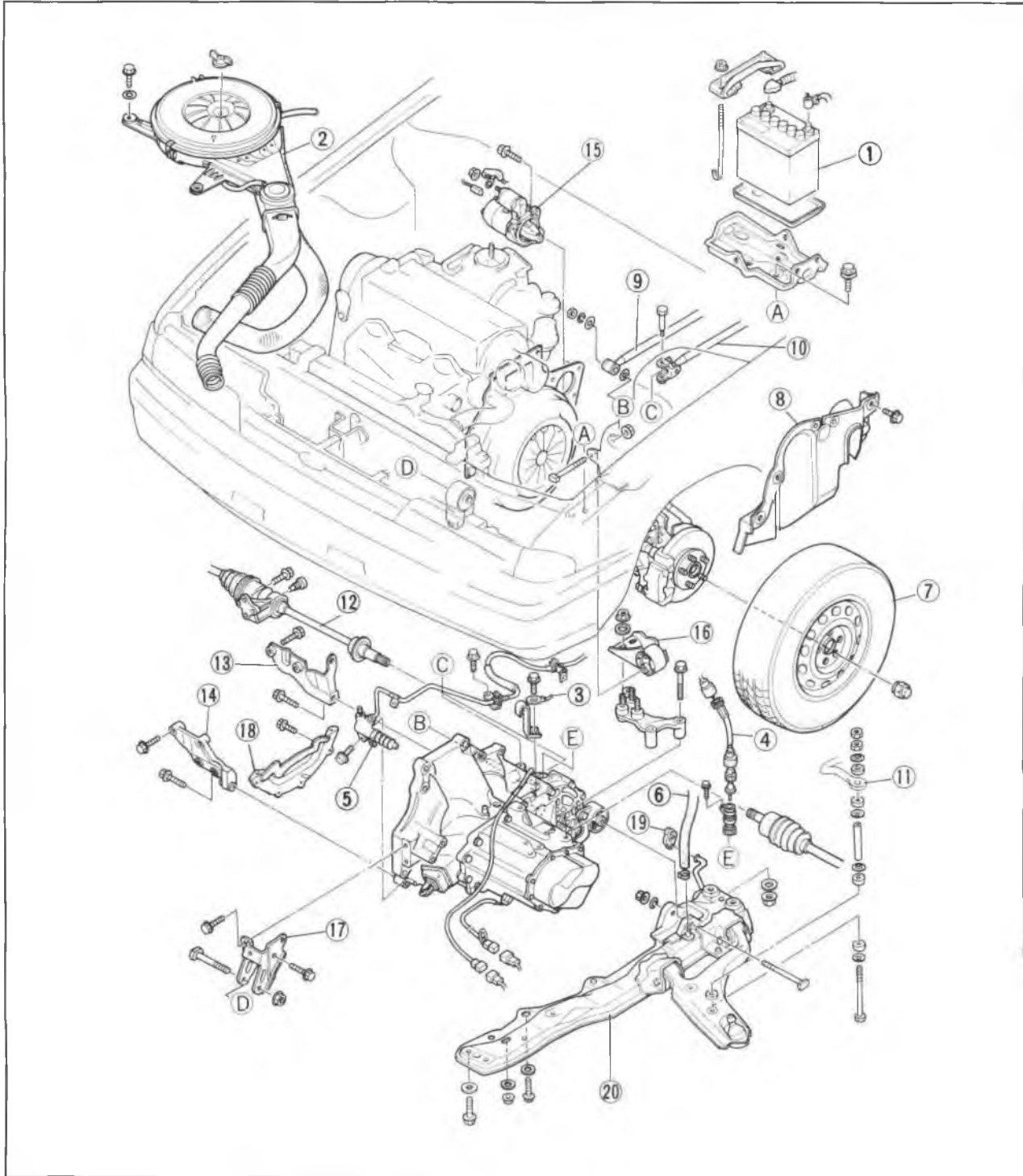


76G07A-009

- |                            |                   |                        |
|----------------------------|-------------------|------------------------|
| 1. Battery                 | 9. Canister hose  | 16. Surge tank bracket |
| 2. Main fuse block         | 10. Wheel         | 17. Starter            |
| 3. Air cleaner assembly    | 11. Splash shield | 18. Engine mount No.4  |
| 4. Ventilation hose        | 12. Extension bar | 19. Engine mount No.2  |
| 5. Air hose                | 13. Control rod   | 20. Rear member (4WS)  |
| 6. Ground(s)               | 14. Stabilizer    | 21. Hunger rubber      |
| 7. Speedometer cable       | 15. Joint shaft   | 22. Crossmember        |
| 8. Clutch release cylinder |                   |                        |

# 7A REMOVAL

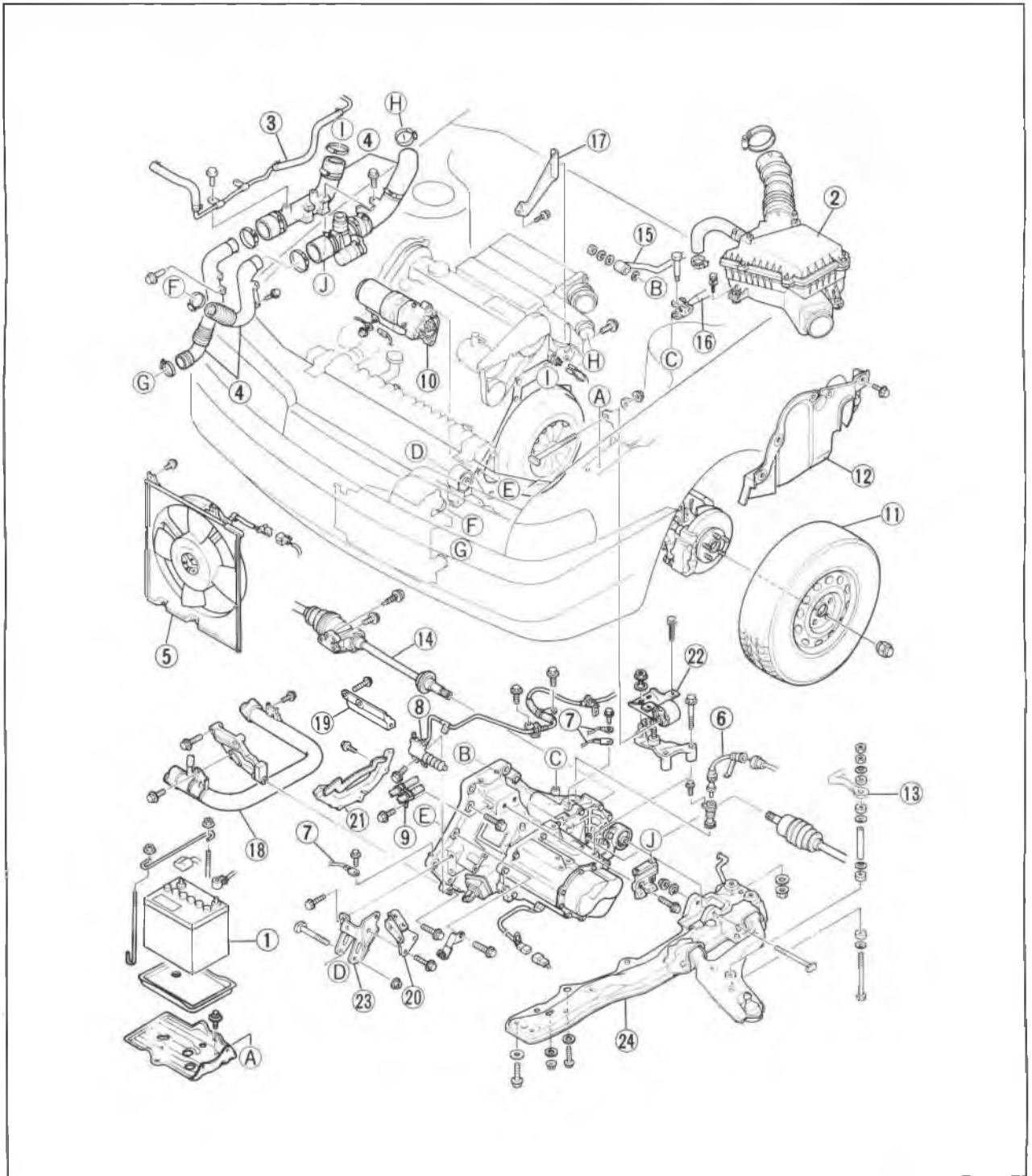
## Carburator



76G07A-010

- |                            |                          |                       |
|----------------------------|--------------------------|-----------------------|
| 1. Battery                 | 8. Splash shield         | 15. Starter           |
| 2. Air cleaner assembly    | 9. Extension bar         | 16. Engine mount No.4 |
| 3. Ground                  | 10. Control rod          | 17. Engine mount No.2 |
| 4. Speedometer cable       | 11. Stabilizer           | 18. Under cover       |
| 5. Clutch release cylinder | 12. Joint shaft          | 19. Hunger rubber     |
| 6. Canister hose           | 13. Gusset plate (rear)  | 20. Crossmember       |
| 7. Wheel                   | 14. Gusset plate (front) |                       |

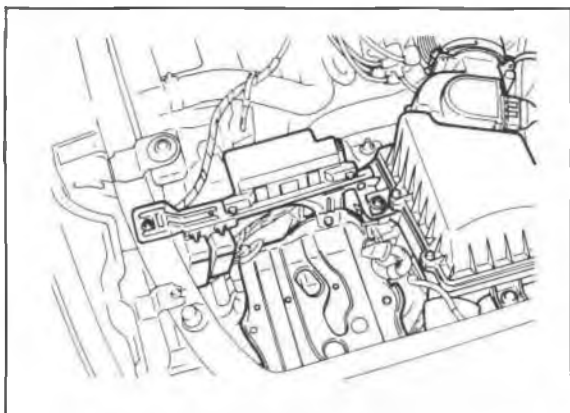
## RF-N and RF-CX



76G07A-011

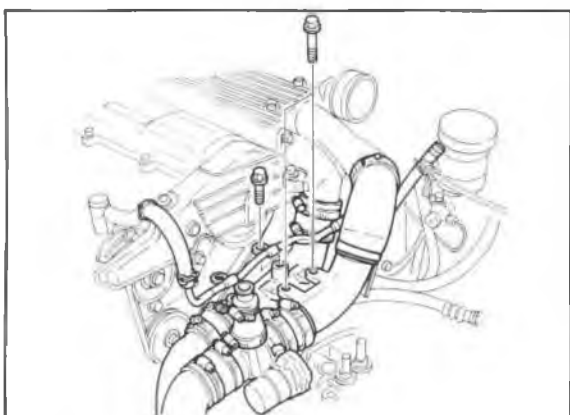
- |   |  |                          |
|---|--|--------------------------|
| 1. Battery                              | 9. Pressure and return hoses<br>(power steering) | 17. Exhaust pipe bracket |
| 2. Air cleaner assembly                 | 10. Starter                                      | 18. Water pipe           |
| 3. Vacuum hose                          | 11. Wheel  | 19. Gusset plate (rear)  |
| 4. Intercooler pipe and hose<br>(RF-CX) | 12. Splash shield                                | 20. Gusset plate (front) |
| 5. Electric fan                         | 13. Stabilizer                                   | 21. Under cover          |
| 6. Speedometer cable                    | 14. Joint shaft                                  | 22. Engine mount No.4    |
| 7. Ground(s)                            | 15. Extension bar                                | 23. Engine mount No.2    |
| 8. Clutch release cylinder              | 16. Control rod                                  | 24. Crossmember          |

## 7A REMOVAL



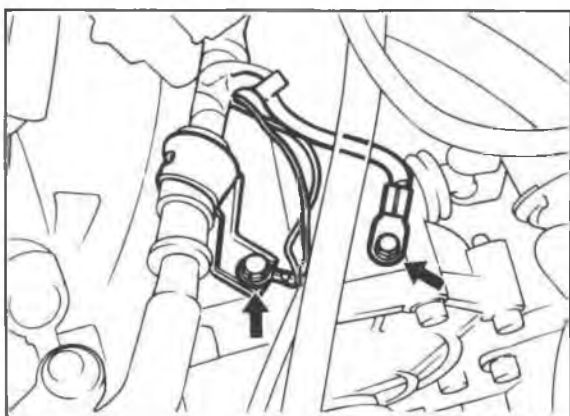
76G07A-012

1. Remove the battery and battery carrier.
2. Disconnect the main fuse block. (FI)
3. Disconnect the distributor lead.
4. Remove the air cleaner assembly.



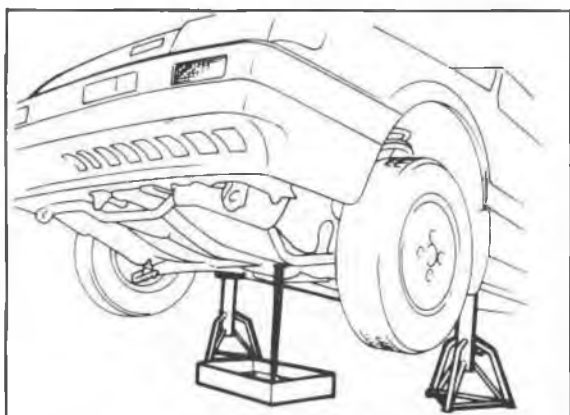
76G07A-013

5. Remove the vacuum hose, the intercooler hose (RF-CX) and the electric fan. (RF-N and RF-CX)



86U07A-021

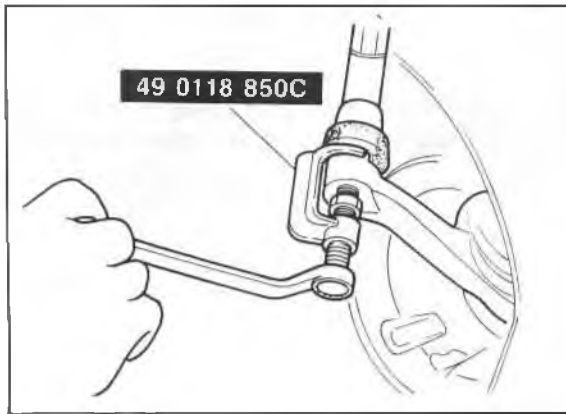
6. Disconnect the speedometer cable.
7. Disconnect the grounds from the transaxle case.



86U07A-022

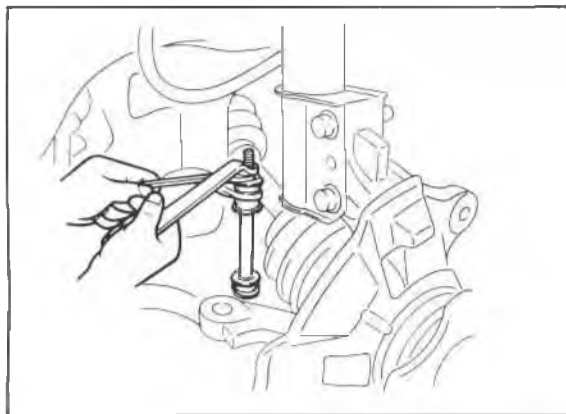
8. Remove the front wheels.
9. Remove the splash shields.
10. Drain the transaxle oil.





86U07A-023

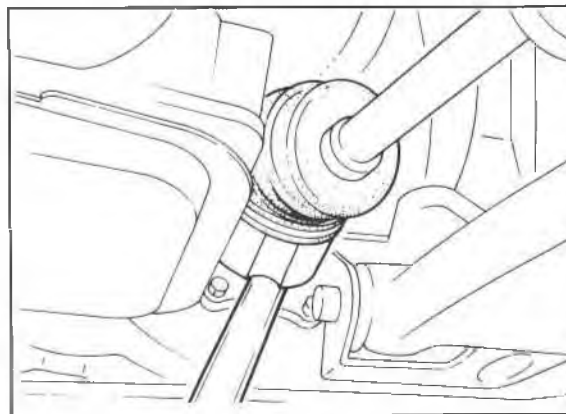
11. Disconnect the clutch release cylinder.
12. Disconnect the tie-rod ends using **SST**.



86U07A-024

13. Remove the stabilizer bar control links.
14. Remove the bolts and nuts at the left and right lower arm bolt joints.
15. Pull the lower arms downward to separate them from the knuckles.

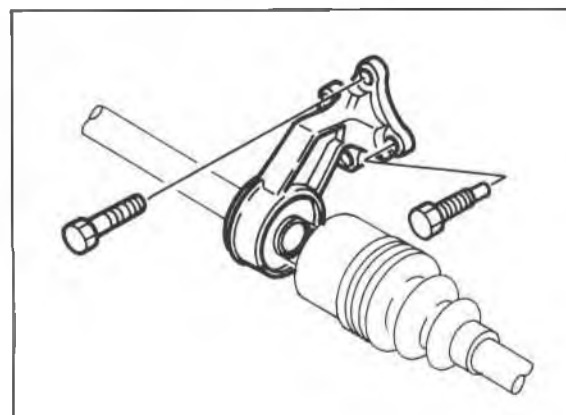
**Note**  
**Do not damage the ball-joint dust boots.**



86U07A-025

16. Separate the left driveshaft from the transaxle by prying with a bar inserted between the shaft and the case.

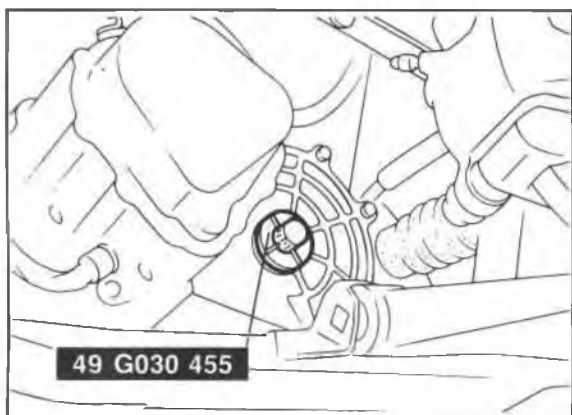
**Note**  
**Do not damage the oil seal.**



86U07A-026

17. Remove the joint shaft bracket.
18. Separate the right driveshaft together with the joint shaft in the same manner.

# 7A REMOVAL

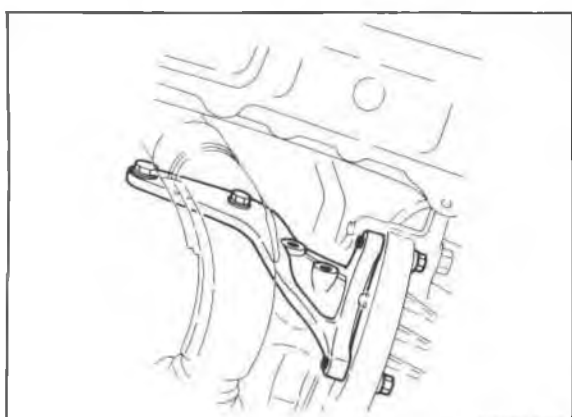


86U07A-027

19. Install the **SST** to the differential side gear.

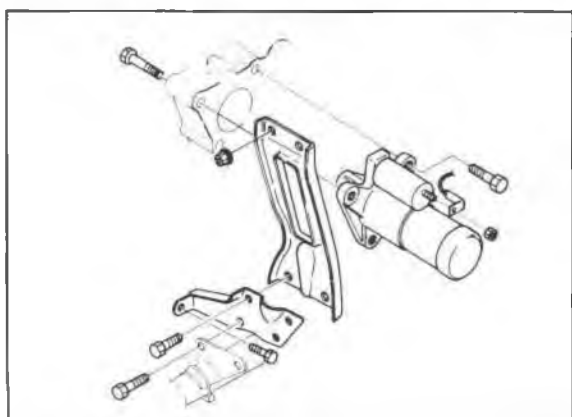
### Note

**Failure to install the SST may cause the differential side gears to become mispositioned.**



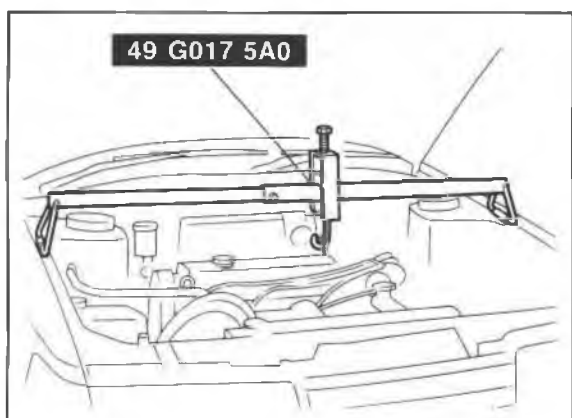
76G07A-014

20. Remove the gusset plates. (except DOHC)  
21. Remove the under cover. (except DOHC)  
22. Remove the extension bar and the control rod.



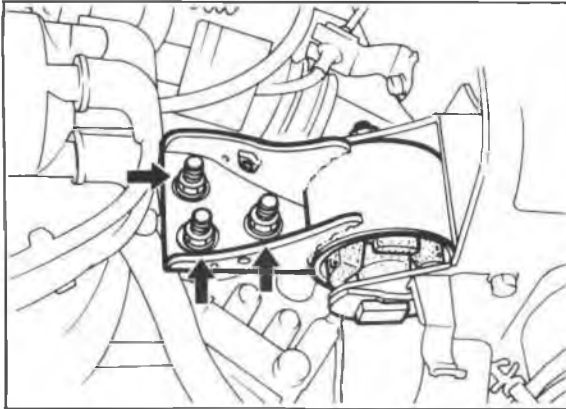
76G07A-015

23. Remove the surge tank bracket. (FI)  
24. Remove the starter.

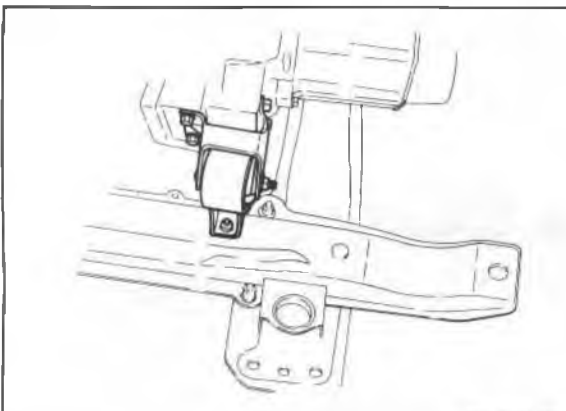


86U07A-030

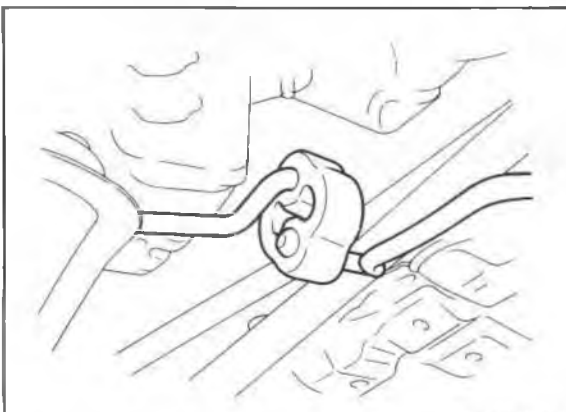
25. Suspend the engine with the **SST**.



26. Remove the engine mount No. 4 and bracket.



27. Remove the engine mount No. 2.



28. Disconnect the hanger rubber then remove the crossmember and the left side lower arm as an assembly.



29. Lean the engine toward the transaxle.  
30. Support the transaxle with a jack.  
31. Remove the remaining transaxle mounting bolts.  
32. Remove the transaxle.

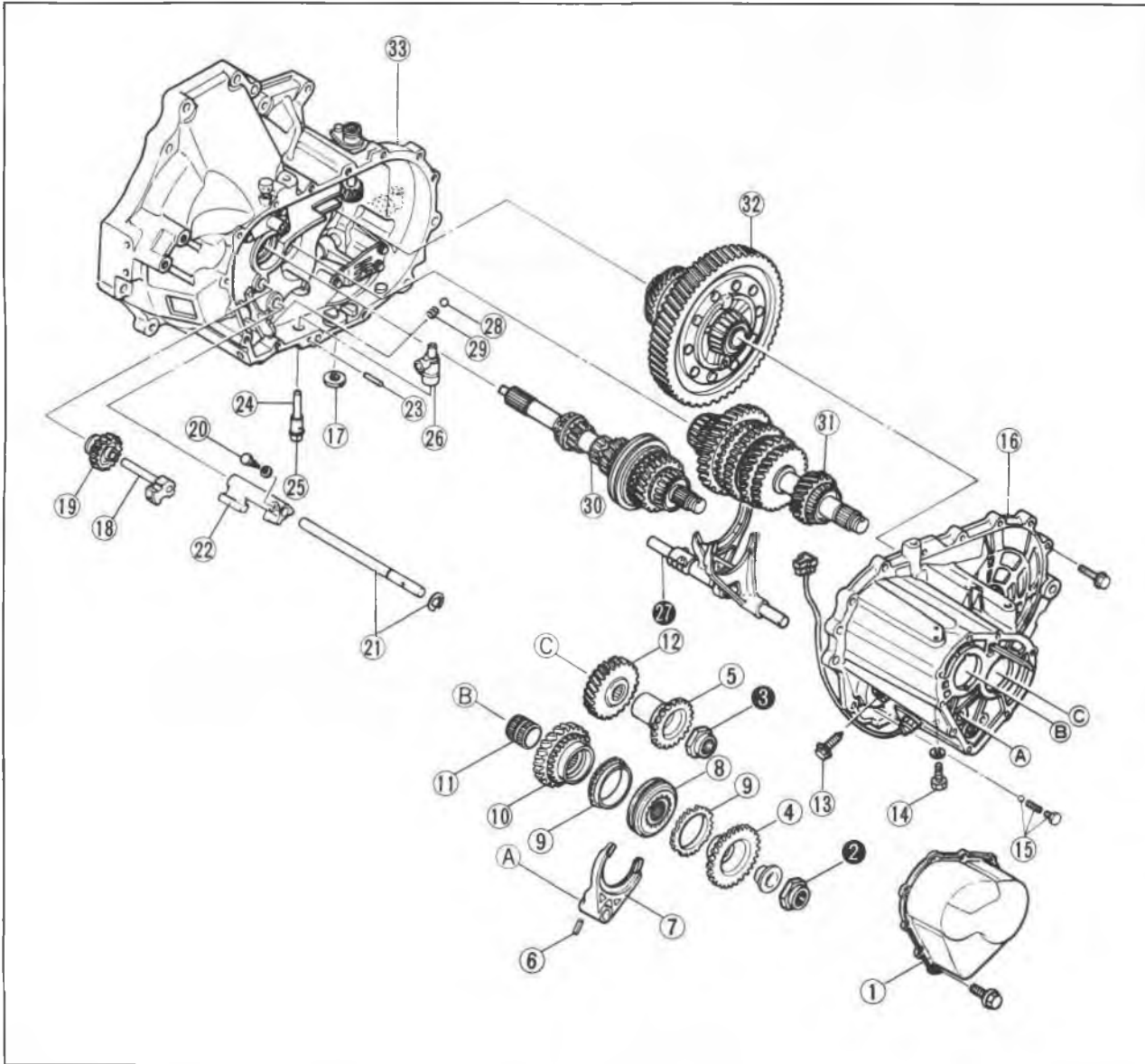
# 7A DISASSEMBLY

## DISASSEMBLY

### STEP 1

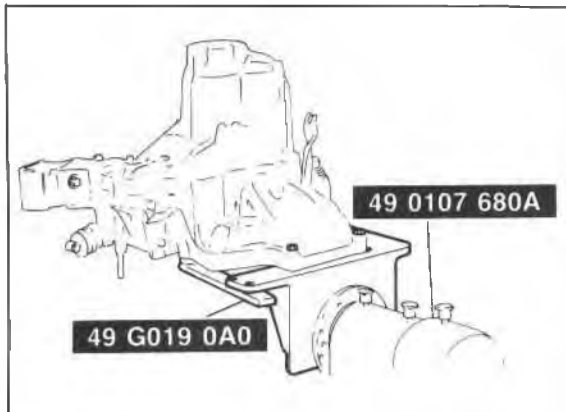
Disassemble in the sequence shown in the figure referring to disassembly note for the specially marked parts.

76G07A-016



76G07A-017

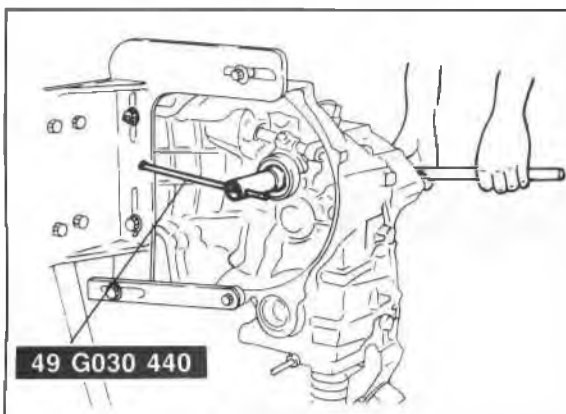
- |  |  |                                       |
|--|--|---------------------------------------|
| 1. Rear cover                          | 12. Secondary 5th gear                   | 24. Crank lever shaft                 |
| 2. Lock nut                            | 13. Lock bolt                            | 25. O-ring                            |
| 3. Lock nut                            | 14. Guide bolt                           | 26. Crank lever assembly              |
| 4. Primary reverse synchronizer gear   | 15. Lock bolt, ball and spring           | 27. Shift fork and shift rod assembly |
| 5. Secondary reverse synchronizer gear | 16. Transaxle case                       | 28. Steel ball                        |
| 6. Roll pin                            | 17. Magnet                               | 29. Spring                            |
| 7. Shift fork                          | 18. Reverse idle shaft                   | 30. Primary shaft gear assembly       |
| 8. Clutch hub assembly                 | 19. Reverse idle gear                    | 31. Secondary shaft gear assembly     |
| 9. Synchronizer ring                   | 20. Lock bolt                            | 32. Differential assembly             |
| 10. 5th gear                           | 21. Shift rod (5th and reverse) and clip | 33. Clutch housing                    |
| 11. Gear sleeve                        | 22. Gate                                 |                                       |
|  | 23. Pin                                  |                                       |



86U07A-037

## Disassembly Note Transaxle

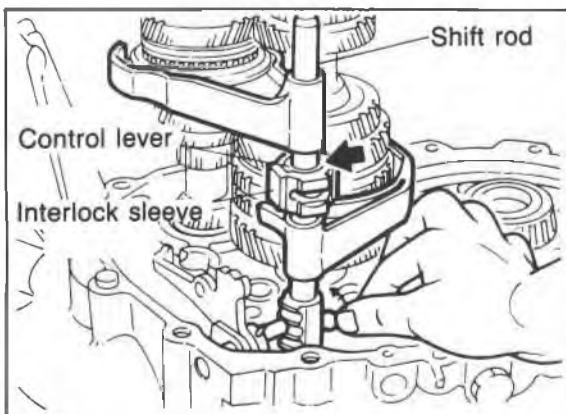
Mount the transaxle on the **SST**.



86U07A-038

## Lock nut

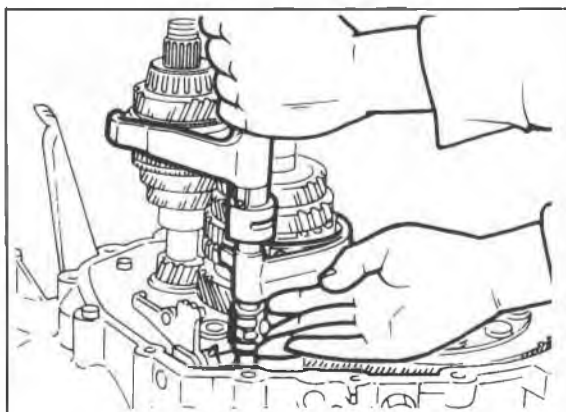
1. Lock the primary shaft with the **SST**.
2. Shift to 1st or 2nd gear.
3. Remove the lock nut.



86U07A-039

## Shift fork and shift rod assembly

1. Align the ends of the interlock sleeve and of the control lever, then turn the shift rod counter-clockwise.
2. While holding the 1st-2nd shift fork with one hand and the 3rd-4th shift fork with the other, raise them both at the same time and shift each of the clutch hub sleeves.



76U07A-227

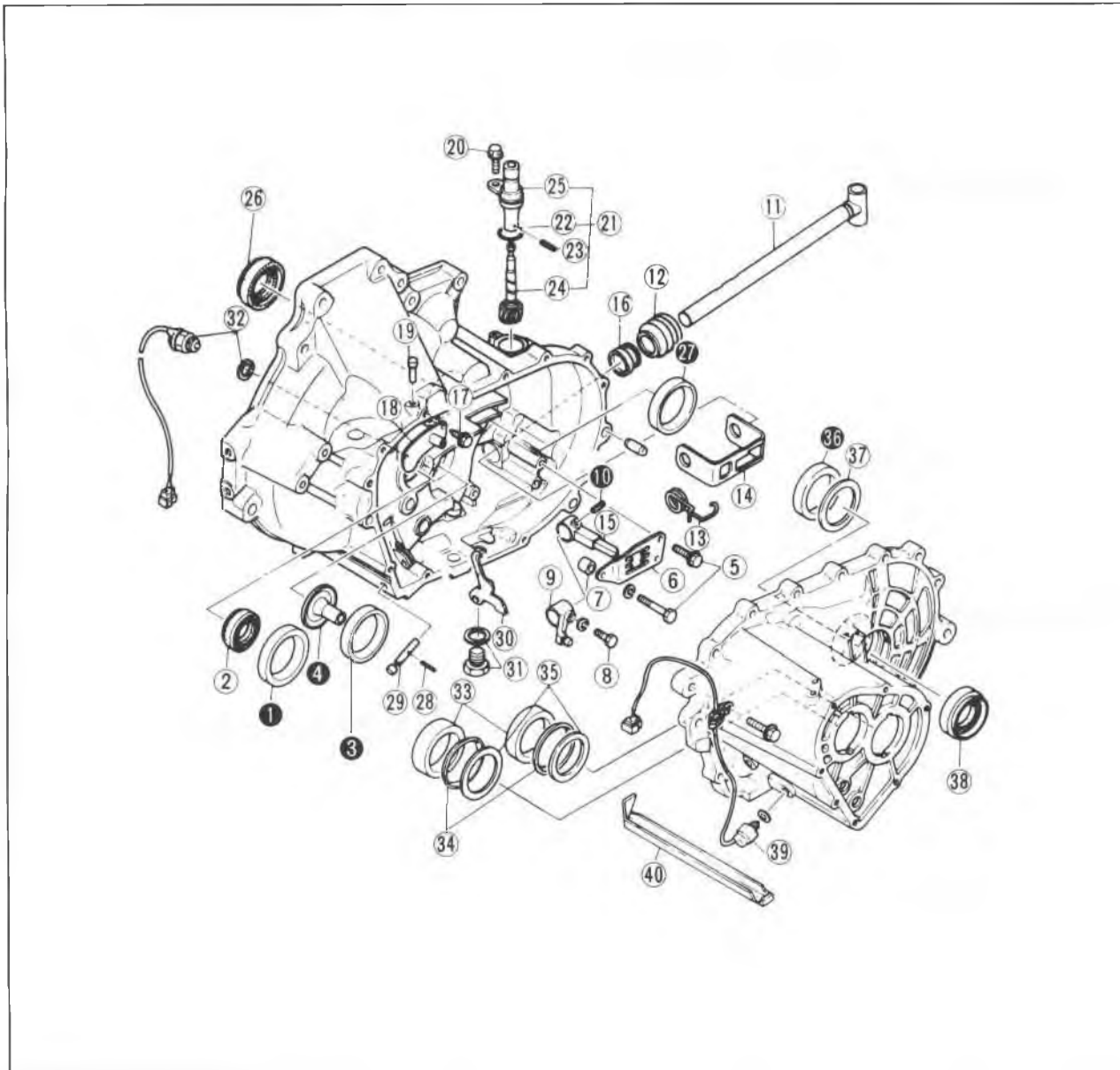
3. Lift the control end and remove the steel ball, and, at the same time, remove the shift rod from the clutch housing.
4. Separate the shift rod and shift fork assembly from each of the clutch hub sleeves.

# 7A DISASSEMBLY

## STEP 2

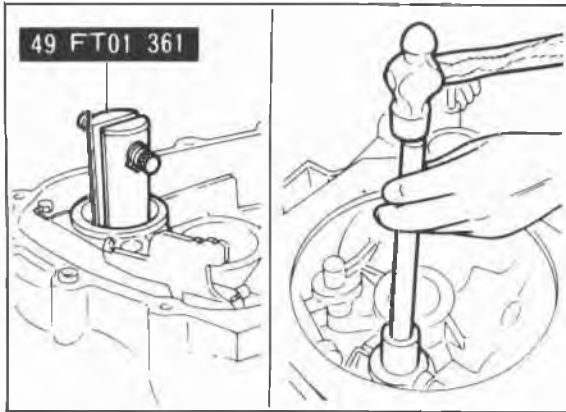
Disassemble in the sequence shown in the figure referring to disassembly note for the specially marked parts.

76G07A-018



76G07A-019

- |                       |                                      |                               |
|-----------------------|--------------------------------------|-------------------------------|
| 1. Bearing outer race | 15. Selector                         | 28. Roll pin                  |
| 2. Oil seal           | 16. Oil seal                         | 29. Reverse lever shaft       |
| 3. Bearing outer race | 17. Bolt                             | 30. Reverse lever             |
| 4. Funnel             | 18. Bleeder cover                    | 31. Drain plug and washer     |
| 5. Bolts              | 19. Bleeder                          | 32. Neutral switch and gasket |
| 6. Guide plate        | 20. Bolt                             | 33. Bearing outer race        |
| 7. Pipe               | 21. Speedometer driven gear assembly | 34. Diaphragm spring          |
| 8. Bolt               | 22. O-ring                           | 35. Adjust shim               |
| 9. Change arm         | 23. Roll pin                         | 36. Bearing outer race        |
| 10. Roll pin          | 24. Driven gear                      | 37. Adjust shim               |
| 11. Change rod        | 25. Gear case                        | 38. Oil seal                  |
| 12. Boot              | 26. Oil seal                         | 39. Back-up light switch      |
| 13. Spring            | 27. Bearing outer race               | 40. Oil passage               |
| 14. Reverse gate      |                                      |                               |

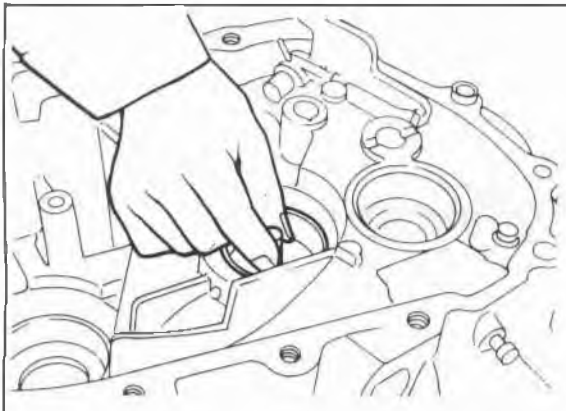


86U07A-041

### Disassembly Note

#### Bearing outer race (primary shaft)

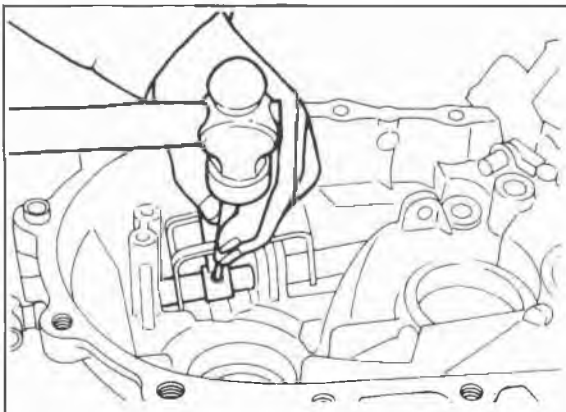
Remove the bearing outer race with the **SST**.



86U07A-042

#### Bearing outer race (secondary shaft)

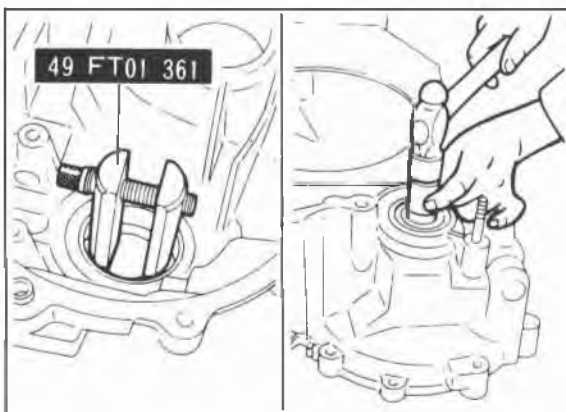
Remove the bearing outer race by lifting out the funnel and race together.



76G07A-020

#### Roll pin

Align the groove for removal of the clutch housing pin with the position of the roll pin, then tap the pin out using a pin punch.



86U07A-044

#### Bearing outer race (differential)

Remove the bearing outer race with the **SST**.

# 7A DISASSEMBLY

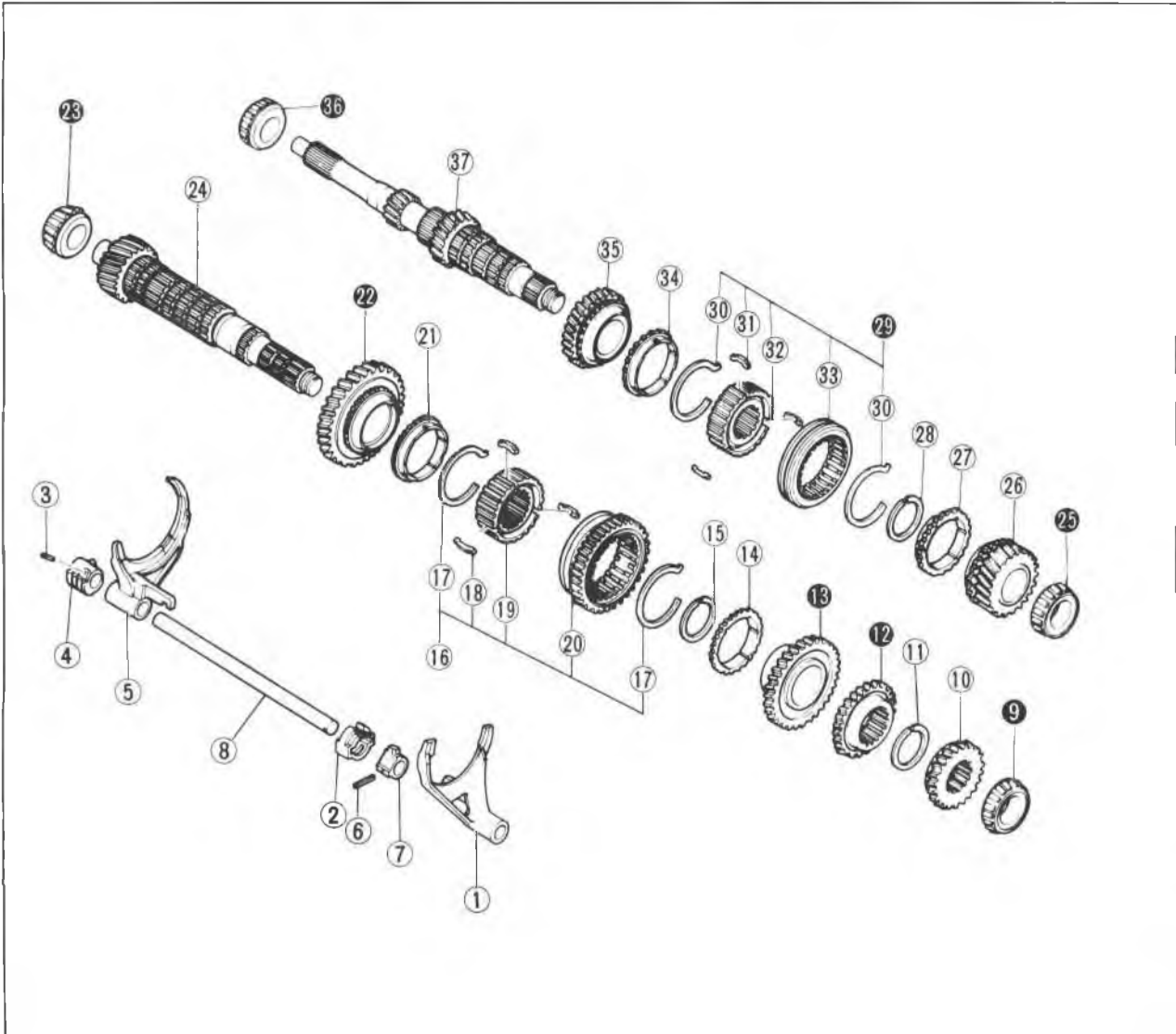
## STEP 3

Disassemble in the sequence shown in the figure referring to disassembly note for the specially marked parts.

### Note

a) Replace the bearings with new ones whenever they are disassembled.

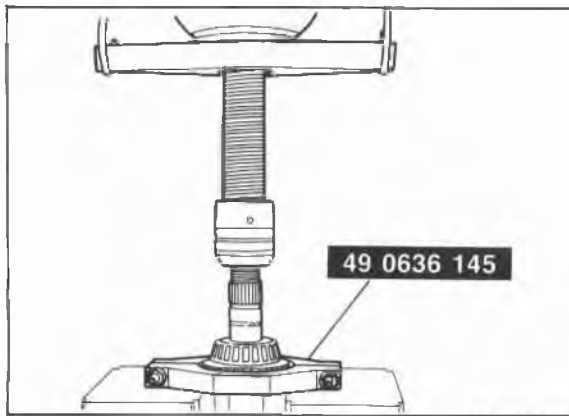
b) Before disassembly, check the thrust clearance of all gears. (Refer to page 7A—33, 35.)



76G07A-021

- |                                   |                                      |   |
|-----------------------------------|--------------------------------------|---|
| 1. Shift fork (3rd and 4th gears) | 13. 2nd gear                         | 26. 4th gear                                |
| 2. Interlock sleeve               | 14. Synchronizer ring                | 27. Synchronizer ring                       |
| 3. Roll pin                       | 15. Retaining ring                   | 28. Retaining ring                          |
| 4. Control end                    | 16. Clutch hub assembly              | 29. Clutch hub assembly (3rd and 4th gears) |
| 5. Shift fork (1st and 2nd gears) | 17. Synchronizer spring              | 30. Synchronizer spring                     |
| 6. Roll pin                       | 18. Synchronizer key                 | 31. Synchronizer key                        |
| 7. Control lever                  | 19. Clutch hub                       | 32. Clutch hub                              |
| 8. Control rod                    | 20. Clutch hub sleeve (reverse gear) | 33. Clutch hub sleeve                       |
| 9. Bearing outer race             | 21. Synchronizer ring                | 34. Synchronizer ring                       |
| 10. Secondary 4th gear            | 22. 1st gear                         | 35. 3rd gear                                |
| 11. Retaining ring                | 23. Bearing inner race               | 36. Bearing inner race                      |
| 12. Secondary 3rd gear            | 24. Secondary shaft                  | 37. Primary shaft                           |
|                                   | 25. Bearing inner race               |   |





76G07A-022

### Disassembly Note

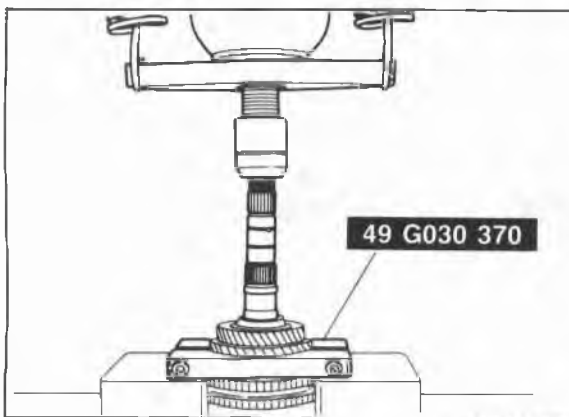
#### Secondary Shaft

#### Bearing inner race (secondary 4th gear end)

Remove the bearing inner race and secondary 2nd gear with the **SST**.

#### Caution

Hold the shaft with one hand so that it does not fall.



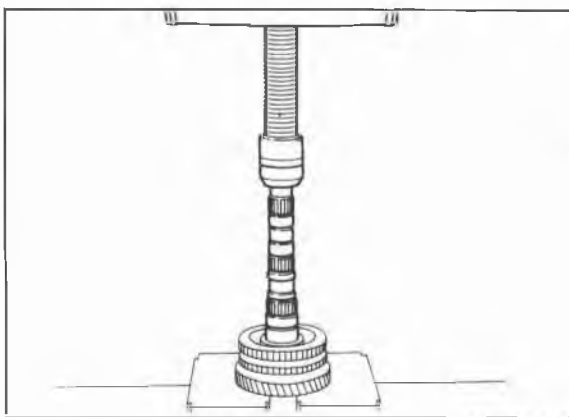
86U07A-047

#### Secondary 3rd gear and 2nd gear

1. Remove the retaining ring.
2. Shift the gears to 1st gear.
3. Remove the secondary 3rd gear and 2nd gear with the **SST**.

#### Caution

Hold the shaft with one hand so that it does not fall.



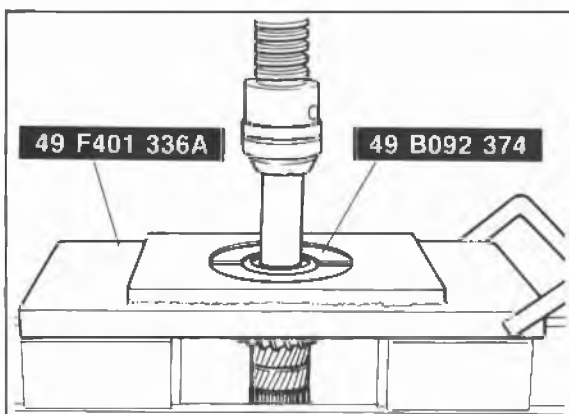
86U07A-048

#### 1st gear

1. Remove the retaining ring.
2. Remove the clutch hub assembly (reverse gear) and 1st gear as shown in the figure.

#### Caution

Hold the shaft with one hand so that it does not fall.



76G07A-023

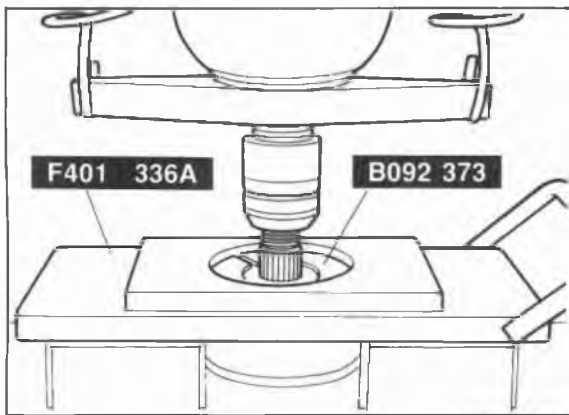
#### Bearing inner race

Remove the bearing inner race with the **SST**.

#### Caution

Hold the shaft with one hand so that it does not fall.

# 7A DISASSEMBLY



76G07A-024

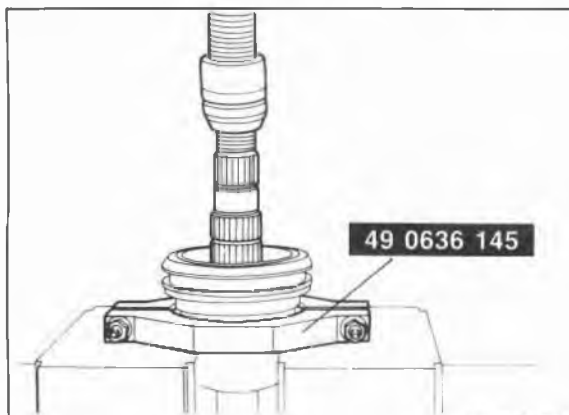
## Primary Shaft

### Bearing inner race (4th gear end)

1. Remove the retaining ring.
2. Remove the bearing inner race with the **SST**.

#### Caution

Hold the shaft with one hand so that it does not fall.



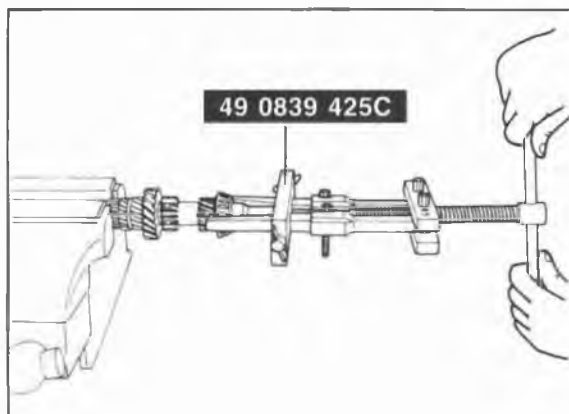
86U07A-051

## Clutch hub assembly (3rd/4th)

1. Remove the retaining ring.
2. Remove the clutch hub assembly with the **SST**.

#### Caution

Hold the shaft with one hand so that it does not fall.



76G07A-025

## Bearing inner race

Remove the bearing inner race with the **SST**.

#### Caution

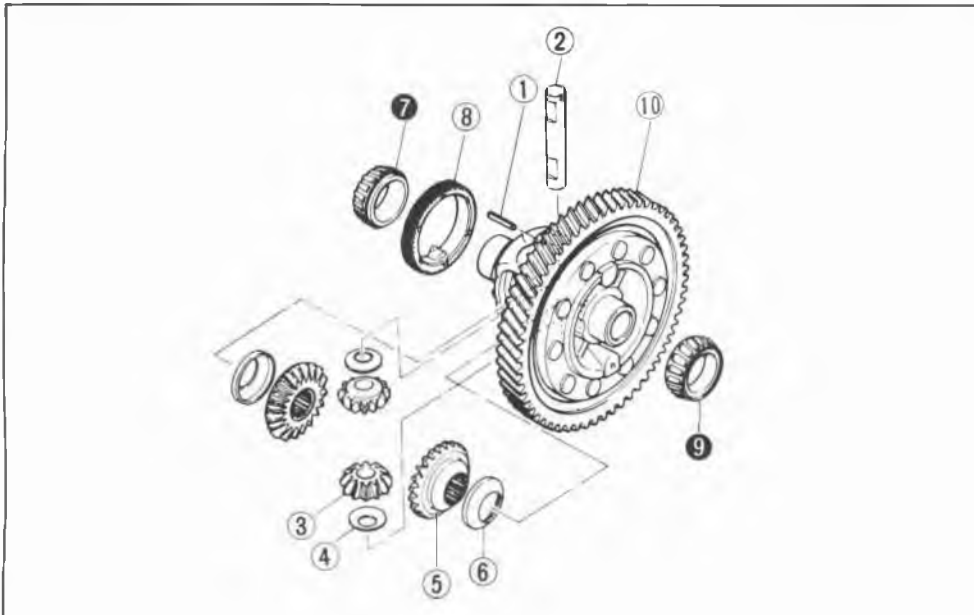
Hold the shaft with one hand so that it does not fall.

## STEP 4 (DIFFERENTIAL)

Disassemble in the sequence shown in the figure referring to disassembly note for the specially marked parts.

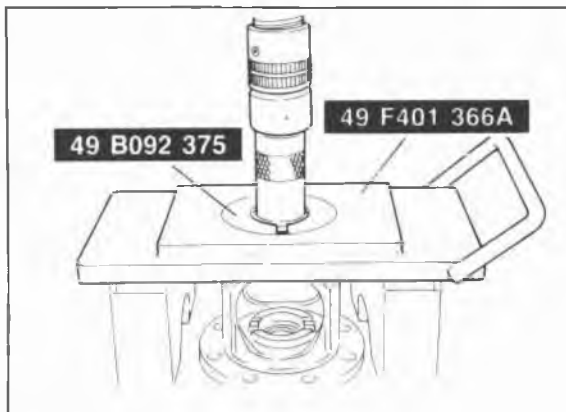
### Note

- a) If the bearing inner races are removed replace them with new ones.
- b) Before disassembly, check the backlash of the side gears and pinion gears.  
(Refer to page 7A—30)



76G07A-026

- 1. Knock pin
- 2. Pinion shaft
- 3. Pinion gear
- 4. Thrust washer
- 5. Side gear
- 6. Thrust washer
- 7. Side bearing inner race
- 8. Speedometer drive gear
- 9. Side bearing inner race
- 10. Gear case



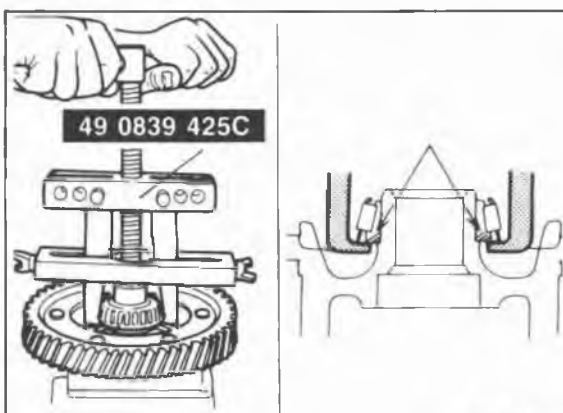
76G07A-027

### Disassemble Note

**Side bearing inner race (side opposite ring gear)**  
Remove the race from the gear case with the SST.

### Caution

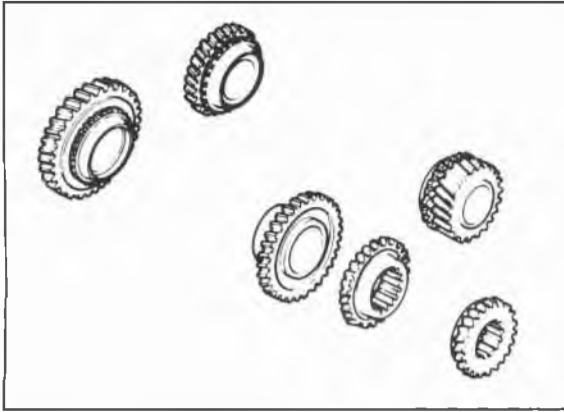
**Hold the gear case with one hand so that it does not fall.**



86U07A-055

### Side bearing inner race (ring gear side)

Remove the race with a combination of parts from the SST.



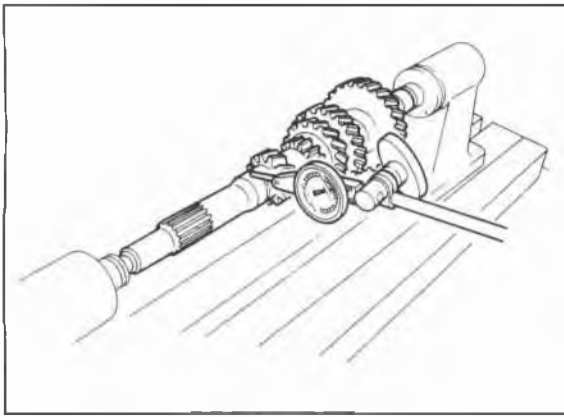
63U07A-064

## INSPECTION

Check the following parts, and replace if necessary.

### 1st, 2nd, 3rd, 4th, and 5th gears

1. Worn or damaged synchronizer cone.
2. Worn or damaged hub sleeve coupling.
3. Worn or damaged teeth.
4. Worn or damaged inner surface or end surface of gears.



76G07A-028

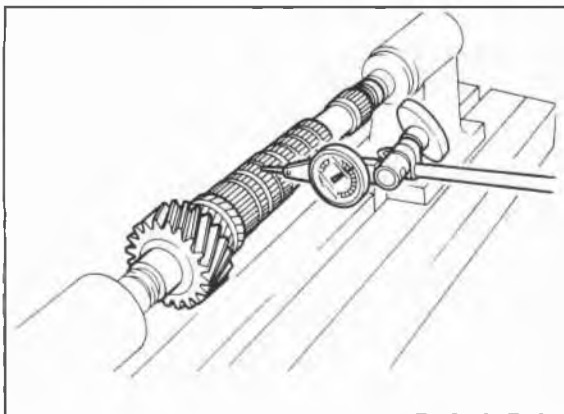
### Primary Shaft Gear and Primary Gear

1. Worn teeth
2. Primary shaft gear run-out

**Run-out: 0.05 mm (0.002 in) max.**

#### Note

**If the shaft gear is replaced, adjust the bearing preload. (Refer to page 7A—37)**

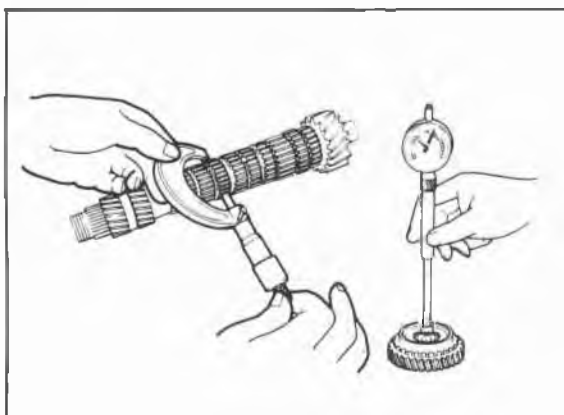


63U07A-068

### Secondary Shaft Gear

1. Worn or damaged gear contact surface.
2. Worn or damaged splines.
3. Worn teeth.
4. Clogged oil passage.
5. Secondary shaft gear run-out.

**Standard run-out: 0.015 mm (0.0006 in)**



63U07A-069

6. Oil clearance between secondary gear shaft and gears.

**Standard: 0.03—0.08 mm (0.001—0.003 in)**

#### Caution

**If the shaft gear is replaced, adjust the bearing preload.**



86U07A-057

### Synchronizer Ring

1. Engagement with gear
2. Worn or damaged teeth
3. Worn or damaged tapered surface
4. Clearance from side of gear

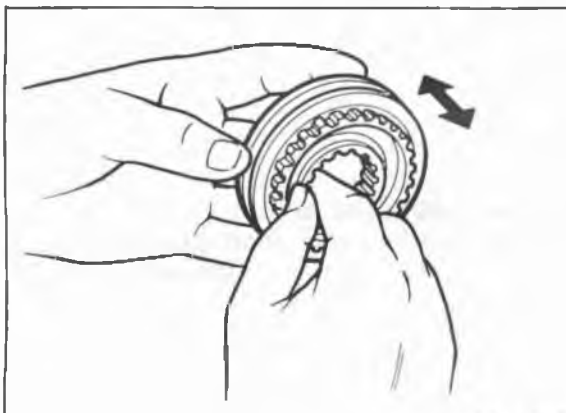
**Clearance: 1.5 mm (0.059 in)**

**Minimum: 0.8 mm (0.031 in)**

#### Note

a) Press the synchronizer ring uniformly against the gear and measure around the circumference.

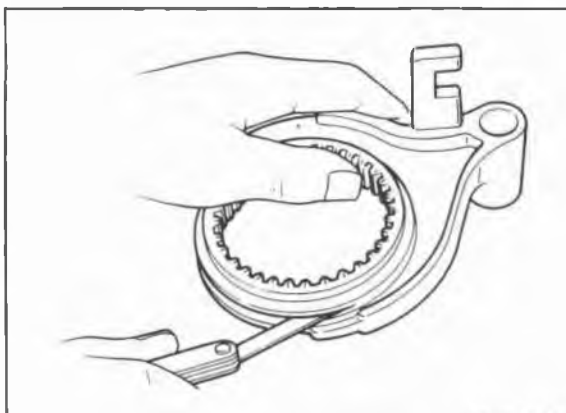
b) If the clearance is less than specified, replace the synchronizer ring or gear.



63U07A-070

### Clutch Hub

1. Worn or damaged splines.
2. Worn or damaged synchronizer key groove.
3. Worn end surface.
4. Operation of the hub sleeve when it is installed.



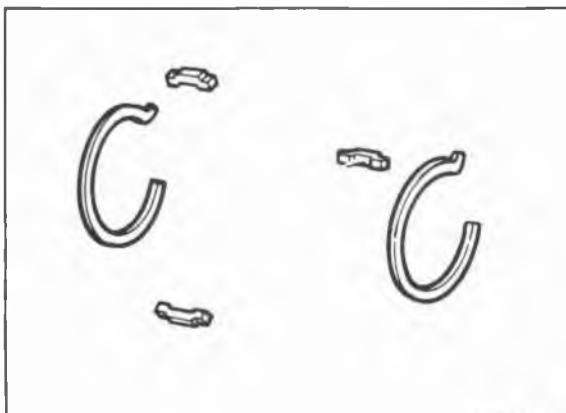
63U07A-071

### Clutch Hub Sleeve

1. Worn or damaged hub splines.
2. Worn or damaged sleeve fork groove.
3. Clearance between sleeve and shift fork.

**Standard: 0.2—0.458 mm (0.008—0.018 in)**

**Limit: 0.5 mm (0.020 in)**

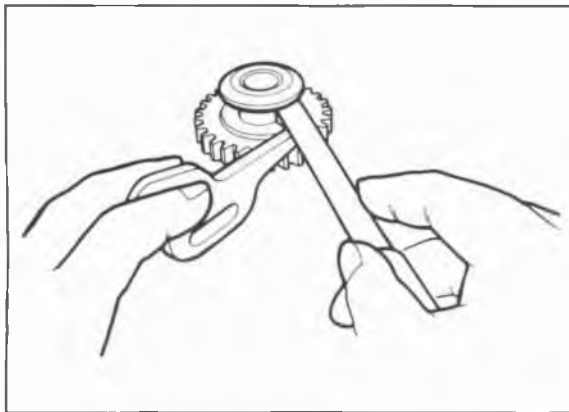


63U07A-072

### Synchronizer Key and Spring

1. Worn key.
2. Bent spring.

# 7A INSPECTION



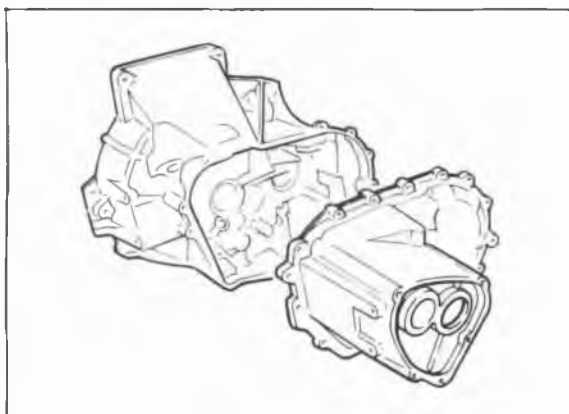
86U07A-058

## Reverse Idle Gear

1. Worn or damaged bushing.
2. Worn or damaged teeth.
3. Worn or damaged release lever coupling groove.
4. Clearance between sleeve and reverse lever.

**Standard: 0.095—0.318 mm (0.004—0.013 in)**

**Maximum: 0.5 mm (0.020 in)**



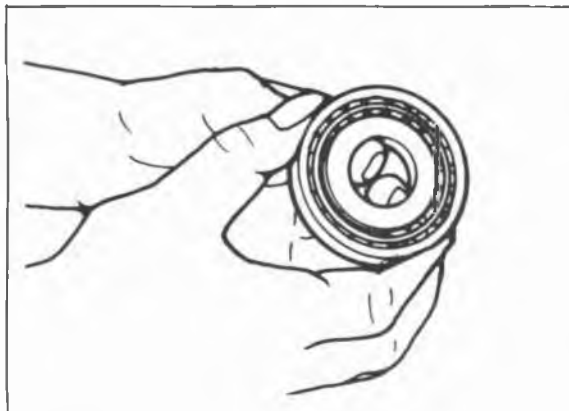
63U07A-074

## Clutch Housing, Transaxle Case, Rear Cover, and Differential Gear Case

Cracks or damage.

### Caution

If the clutch housing, transaxle case, or differential gear case is replaced, adjust the bearing preload of the shaft gears and the preload of the differential side bearings.



63U07A-075

## Bearing

1. Roughness or noise while turning
2. Worn or damaged outer race or rollers

### Caution

a) Replace the bearing, the outer race, and the inner race as a unit.

b) If the bearing is replaced, adjust the preload.



63U07A-076

## Speedometer Driven Gear Assembly

1. Worn or damaged teeth.
2. Worn or damaged O-ring.

## Ring Gear Speedometer Drive Gear

Worn or damaged teeth.

## Oil Seal

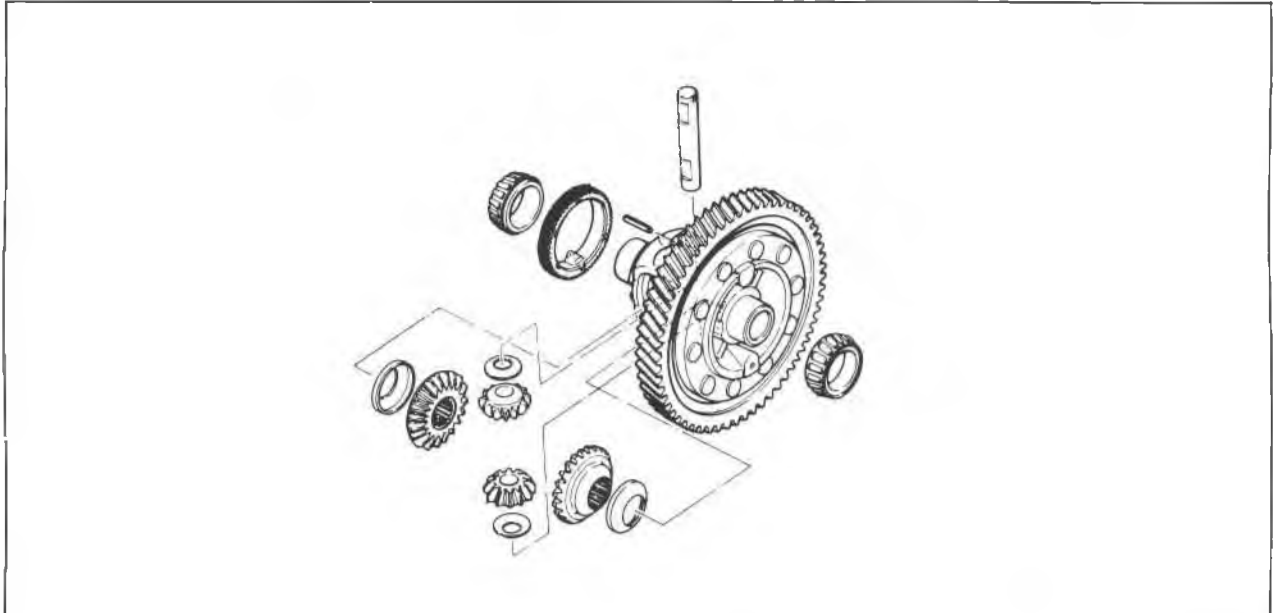
Damaged or worn lip.

## ASSEMBLY

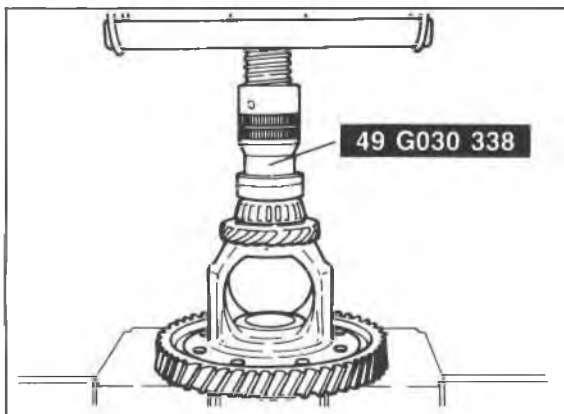
### Note

- a) Wash all parts.
- b) Apply oil to all friction surfaces.
- c) Use new roll pins and retaining rings.

### STEP 1 (DIFFERENTIAL)



86U07A-059



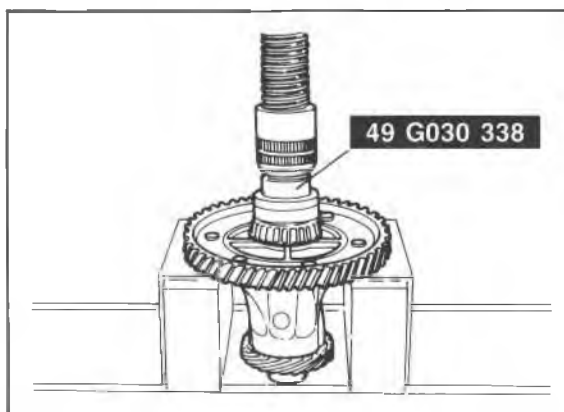
86U07A-060

### Assembly

1. Install the speedometer drive gear and the new bearing inner race with the **SST**.

### Note

**Press to 19,620 N (2,000 kg, 4,400 lb).**



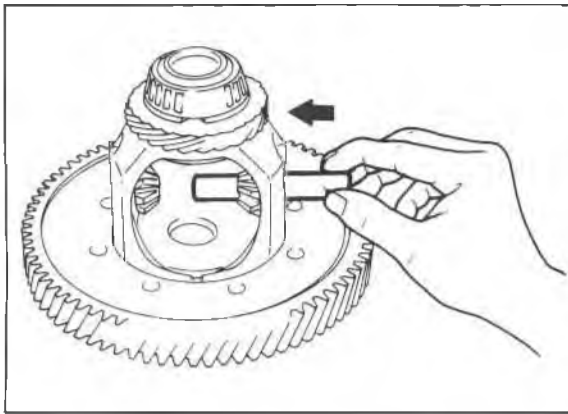
86U07A-061

2. Install the new bearing inner race with the **SST**.

### Note

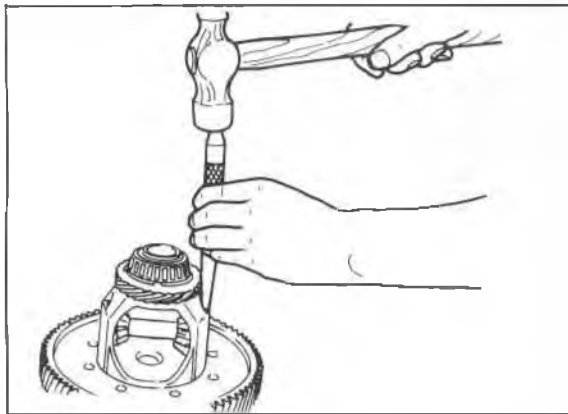
**Press to 19,620 N (2,000 kg, 4,400 lb).**

# 7A ASSEMBLY



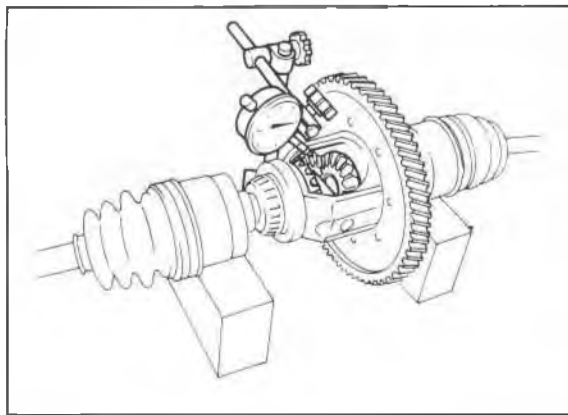
86U07A-062

3. Install the thrust washers and pinion gears.
4. Install the pinion shaft.



86U07A-063

5. Install the knock pin, then crimp it so that it cannot come out of the gear case.
6. Install the thrust washers and the side gears.



86U07A-064

- Check and adjust using the following procedure.
7. Install the left and right driveshafts in the differential assembly.
  8. Support the driveshafts on V-blocks as shown in the figure.
  9. Measure the backlash of both pinion gears.

**Backlash: 0—0.1 mm (0—0.004 in)**

Identification mark	Thickness
0	2.0 mm (0.079 in)
1	2.1 mm (0.083 in)
2	2.2 mm (0.087 in)

86U07A-065

10. If the backlash is more than specified, adjust by selecting thrust washers from the table and install them between the case and side gears.

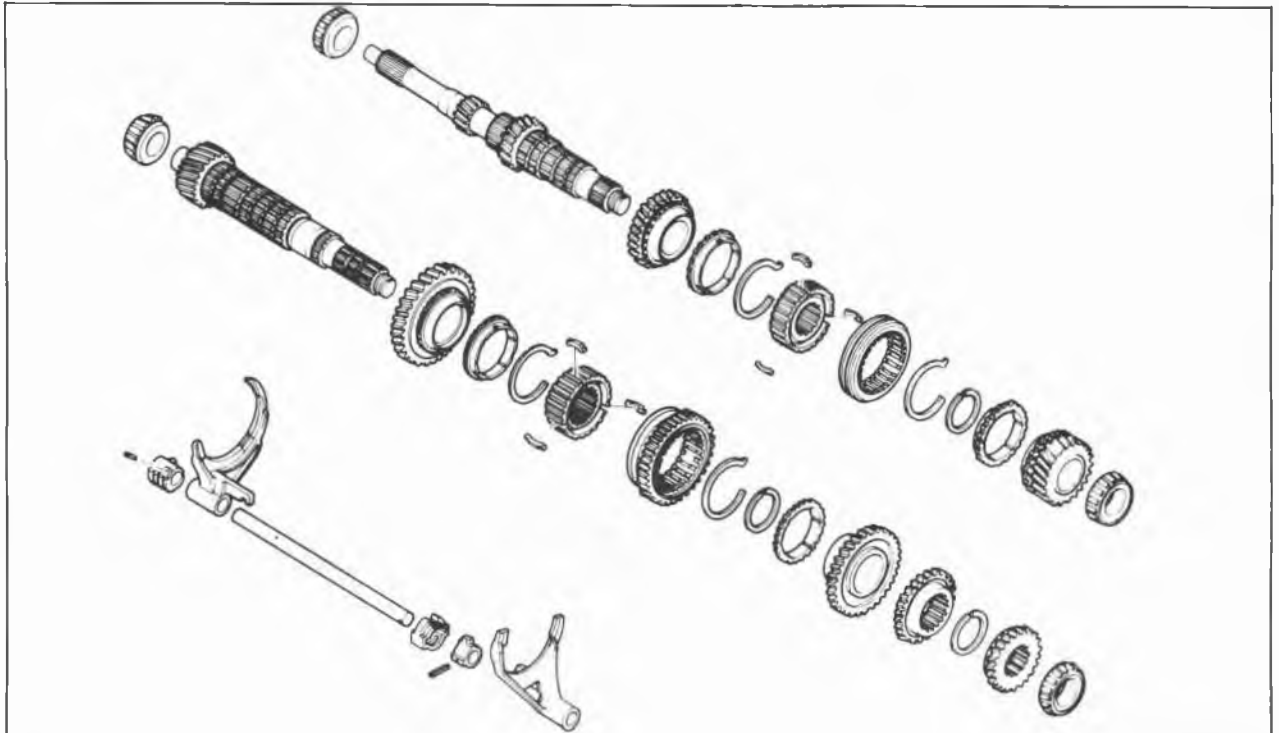
**Note**  
Use the same thickness thrust washer on each side.



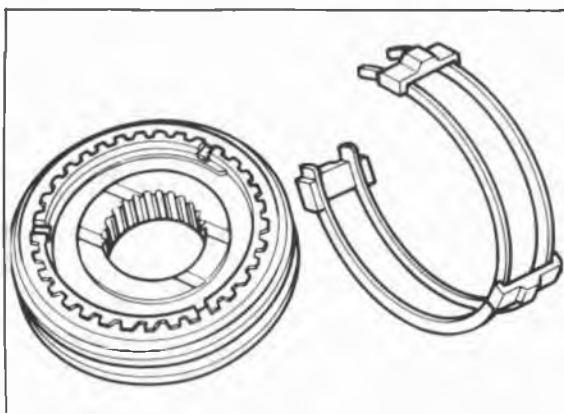
## STEP 2

### Note

During assembly, check the thrust clearance of each gear. (Refer to page 7A—33, 35)



76G07A-029



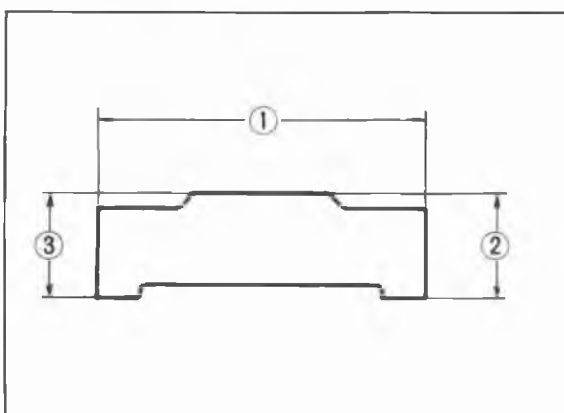
86U07A-067

### Assembly

Install the synchronizer key spring in the clutch hub with the hook in the groove. This holds the three synchronizer keys in place.

### Note

a) The sizes of the synchronizer keys are different.



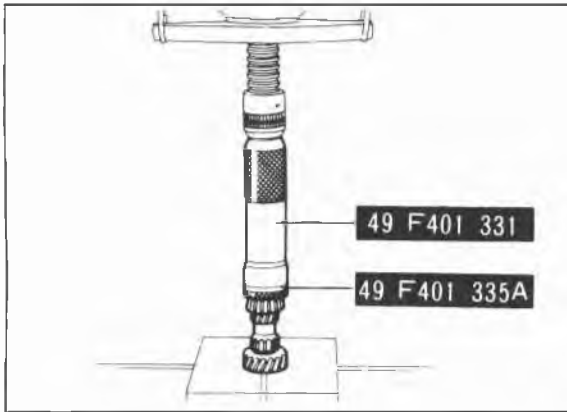
86U07A-068

### Specification:

mm (in)

	①	②	③
1st/2nd	19 (0.7480)	4.25 (0.1673)	4.25 (0.1673)
3rd/4th 5th/Rev.	17 (0.6693)	4.25 (0.1673)	4.25 (0.1673)

# 7A ASSEMBLY



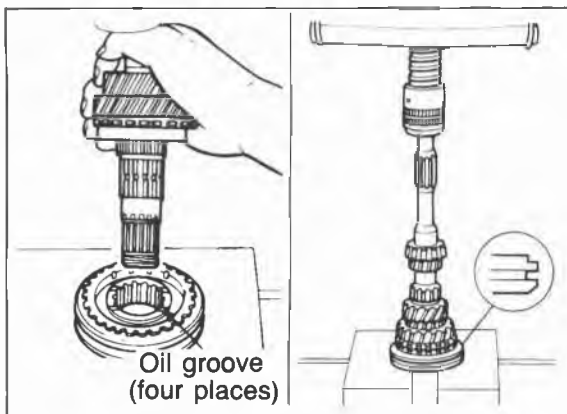
86U07A-069

## Primary Shaft

1. Install the new bearing inner race with the **SST**.

### Note

**Press to 19,620 N (2,000 kg, 4,400 lb).**

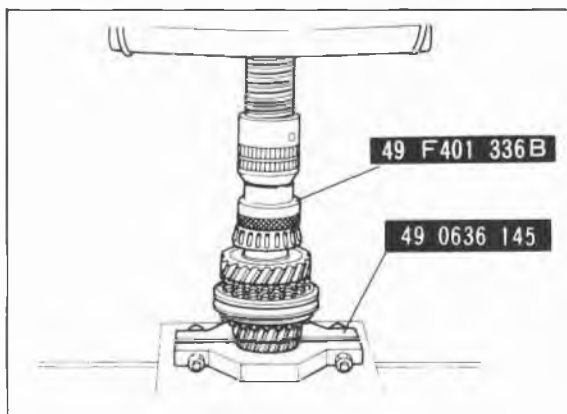


76G07A-030

2. Install the 3rd gear, synchronizer ring, and clutch hub assembly with the **SST**. (Refer to page 7A-33)

### Note

- a) Press to 19,620 N (2,000 kg, 4,400 lb).
- b) Align the synchronizer ring groove and clutch housing hub key when installing.

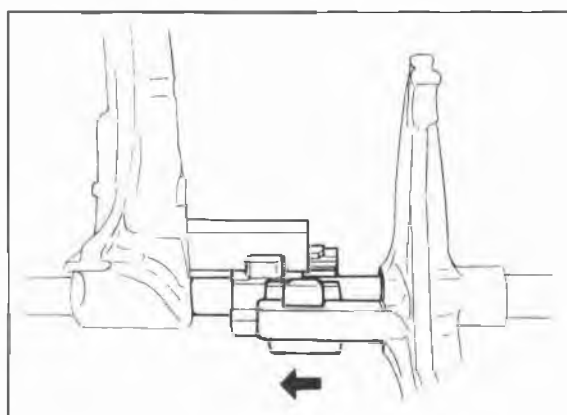


86U07A-071

3. Install the retaining ring.
4. Install the synchronizer ring, 4th gear, and bearing inner race with the **SST**.

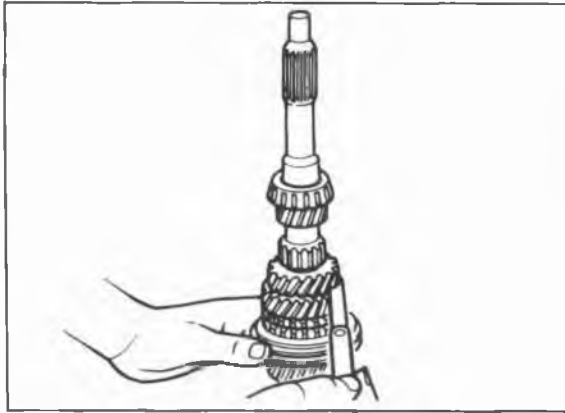
### Note

**Press to 19,620 N (2,000 kg, 4,400 lb).**



86U07A-072

5. Install both shift forks and the interlock sleeve, as in the figure.



86U07A-073

6. Measure the clearance between the 3rd gear and 2nd gear.

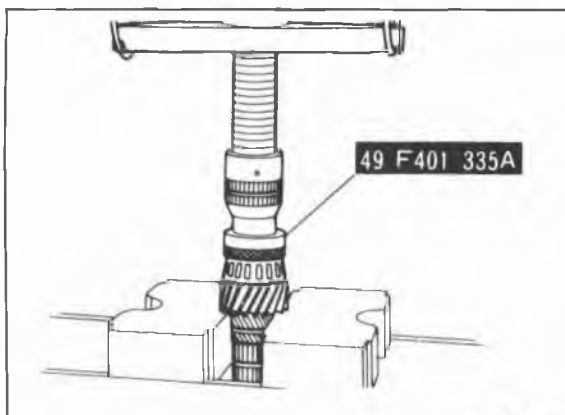
**Clearance: 0.05—0.20 mm (0.0020—0.0079 in)**  
**Maximum: 0.25 mm (0.0098 in)**



86U07A-074

7. Measure the clearance between the 4th gear and bearing inner race.

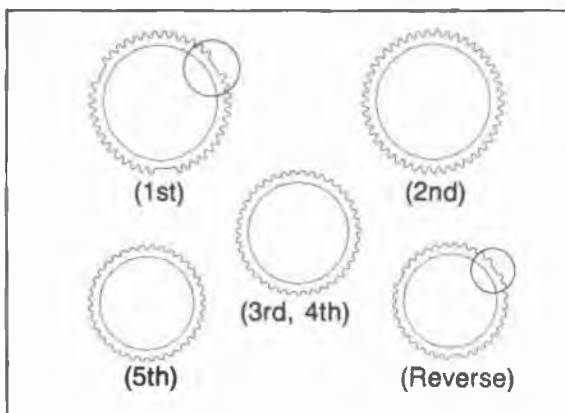
**Clearance: 0.165—0.365 mm**  
**(0.0064—0.0144 in)**  
**Maximum: 0.415 mm (0.0163 in)**



86U07A-075

8. Install the new bearing, inner race with the **SST**.

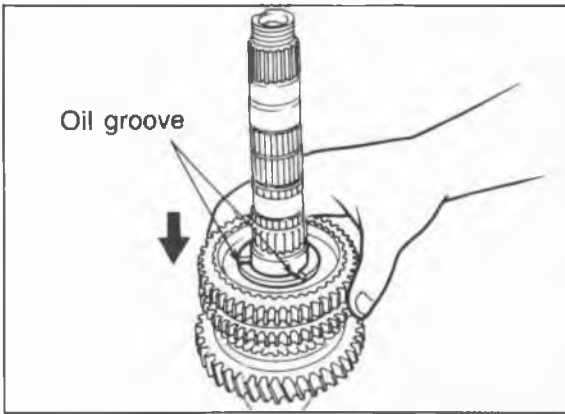
**Note**  
**Press to 19,620 N (2,000 kg, 4,400 lb).**



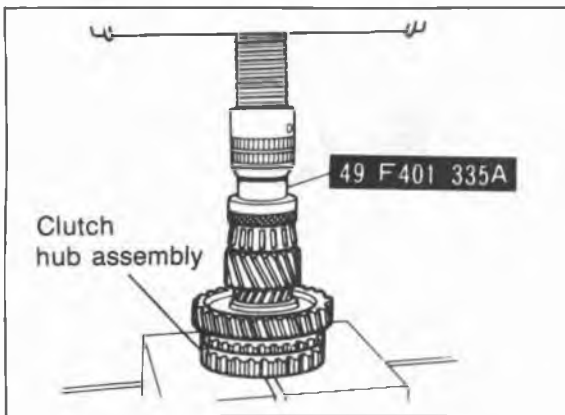
86U07A-076

**Note**  
**The styles and sizes of synchronizer rings are different as shown in the illustration.**

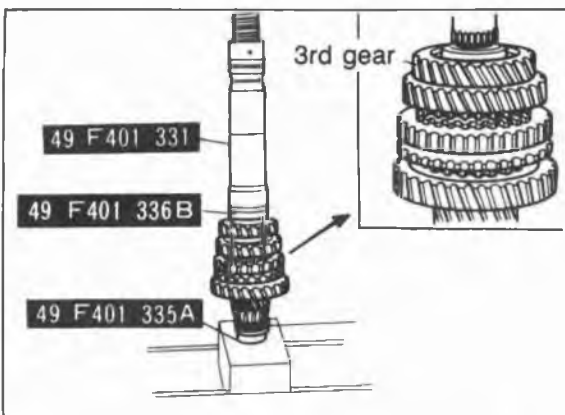
# 7A ASSEMBLY



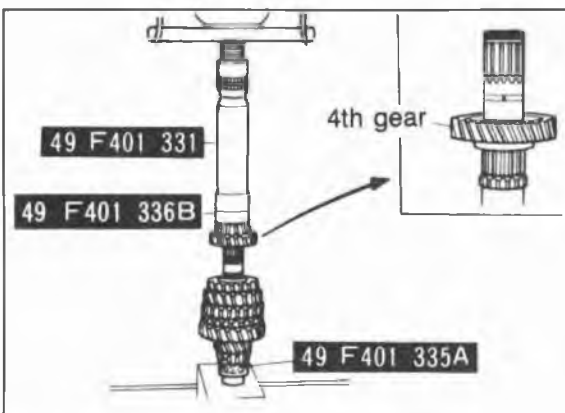
86U07A-077



86U07A-078



86U07A-079



86U07A-080

## Secondary Shaft

1. Assemble the 1st gear, synchronizer ring, and clutch hub assembly (reverse gear), as shown in the figure.

### Note

Align the synchronizer ring, groove and clutch housing hub key when installing.

2. Press on the clutch hub assembly (reverse gear) with the **SST**.

### Note

Press to 19,620 N (2,000 kg, 4,400 lb).

3. Install the retaining ring.

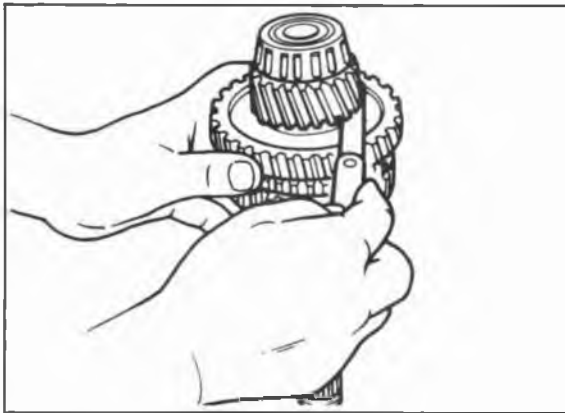
4. Install the synchronizer ring and 2nd gear.
5. Install the secondary 3rd gear with the **SST**.

### Note

Press to 19,620 N (2,000 kg, 4,400 lb).

6. Install the retaining ring.
7. Install the secondary 4th gear and new bearing inner race.

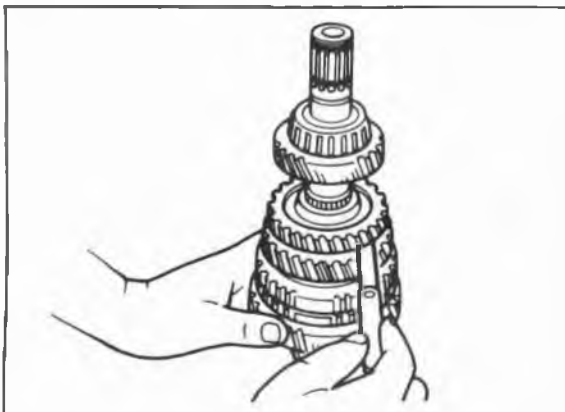
## ASSEMBLY 7A



86U07A-081

8. Measure the clearance between the 1st gear and differential drive gear.

**Clearance: 0.05—0.28 mm (0.0020—0.0110 in)**  
**Maximum: 0.33 mm (0.0199 in)**



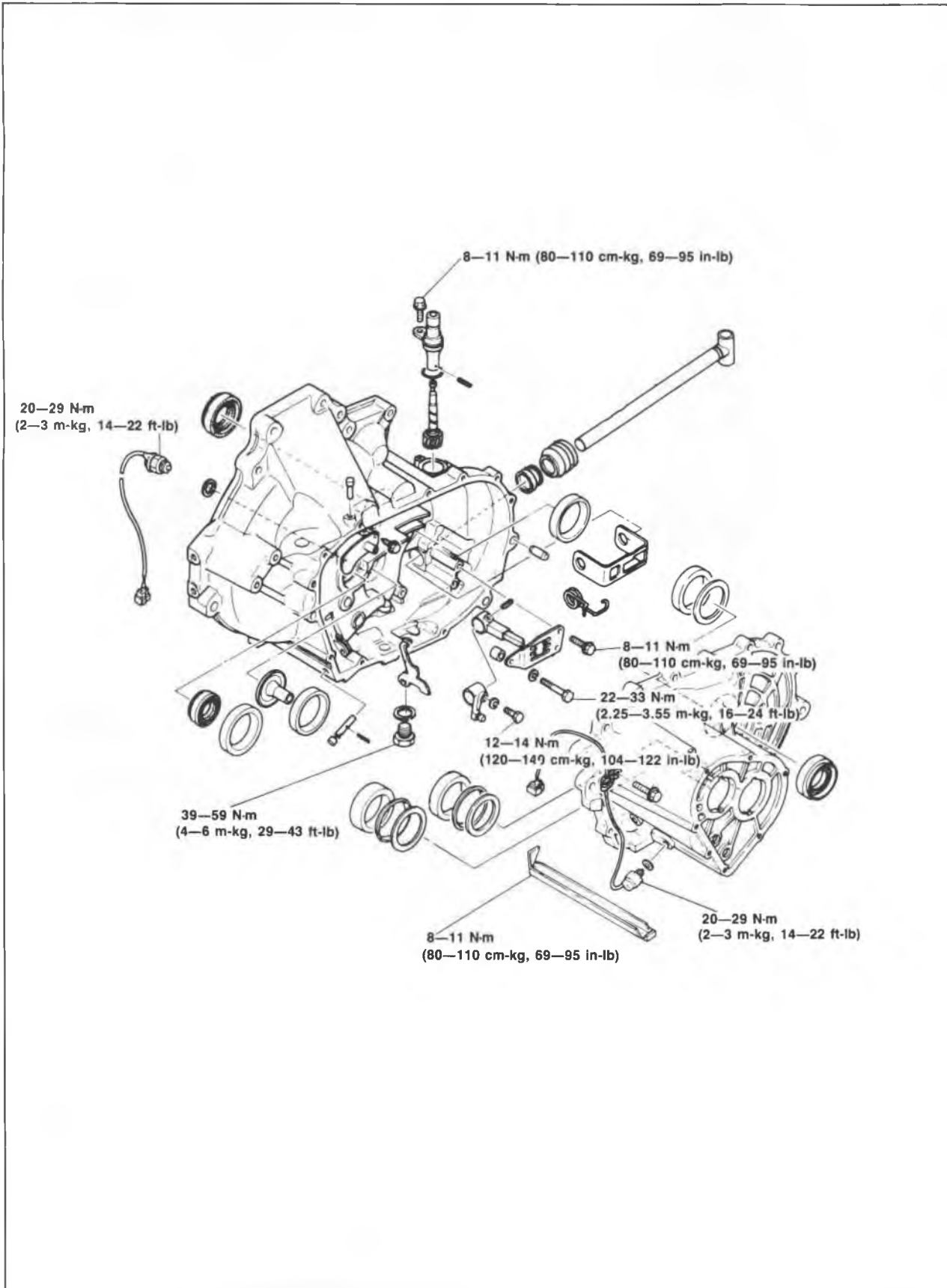
86U07A-082

9. Measure the clearance between the 2nd gear and secondary 3rd gear.

**Clearance:**  
**0.175—0.455 mm (0.0069—0.0179 in)**  
**Maximum: 0.505 mm (0.0199 in)**

# 7A ASSEMBLY

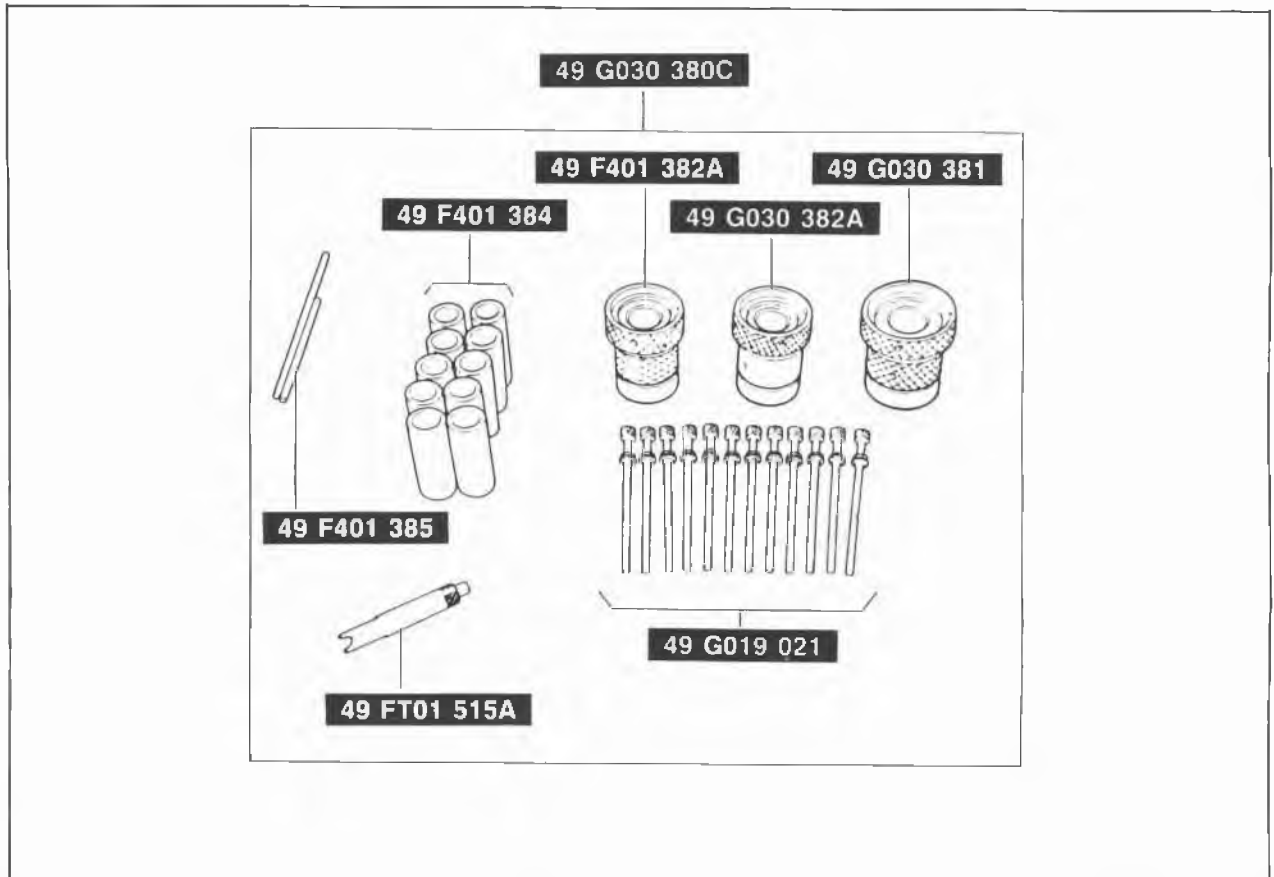
## STEP 3 Torque specifications



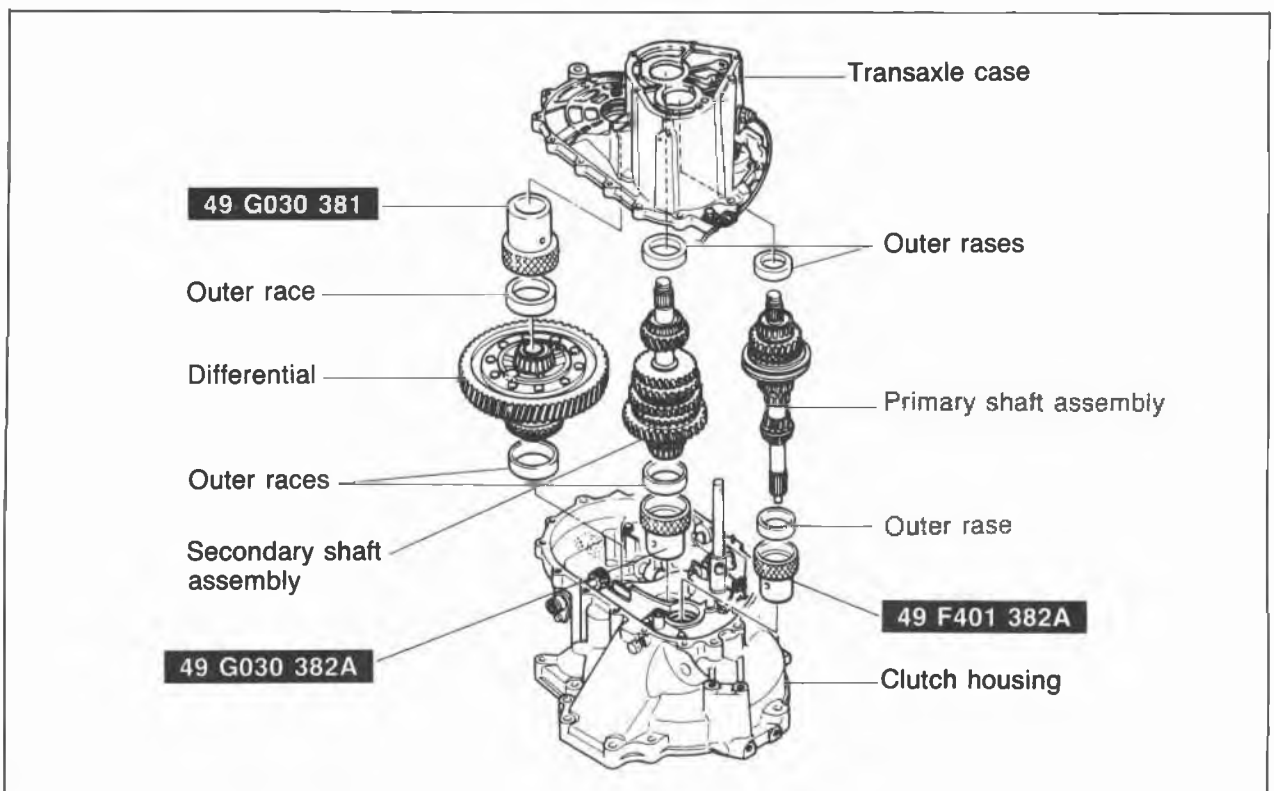
76G07A-031

## Bearing Preload

Adjust the bearing preload through the use of adjust shim(s).

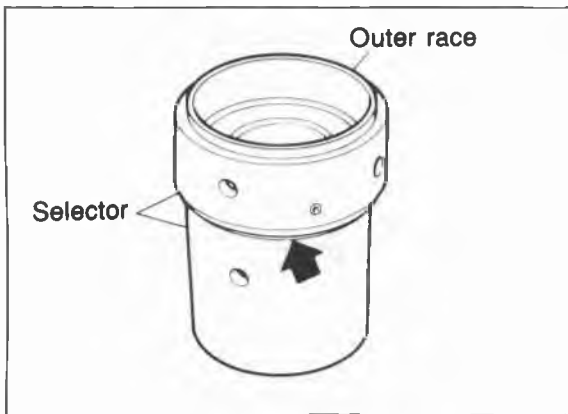


83U07A-099



83U07A-033

# 7A ASSEMBLY

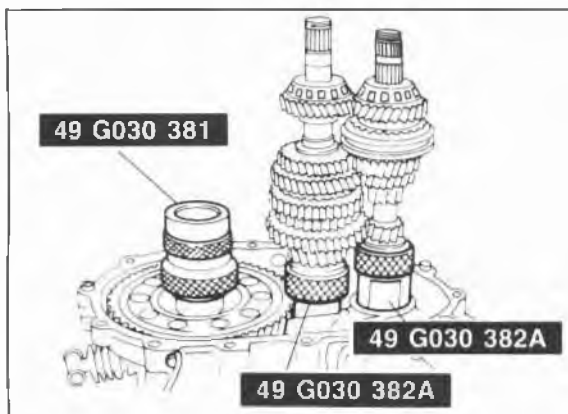


76G07A-032

1. Install the primary and secondary shaft bearing outer races into the transaxle case (diaphragm springs and shims removed).
2. After mounting the clutch housing onto the transaxle hanger, and set the differential bearing outer race into the clutch housing, and tap in with a hammer until it contacts the clutch housing, and tap in with a hammer until it contacts the clutch housing.
3. Assemble the outer races into the **SST** (selector) as shown in the figure.

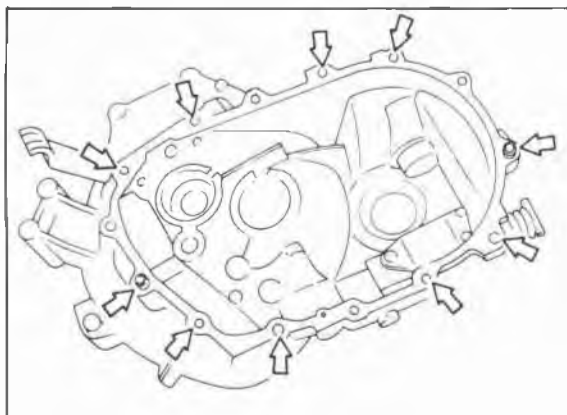
### Note

**Turn the selector to eliminate the gap indicated by the arrow in the figure.**



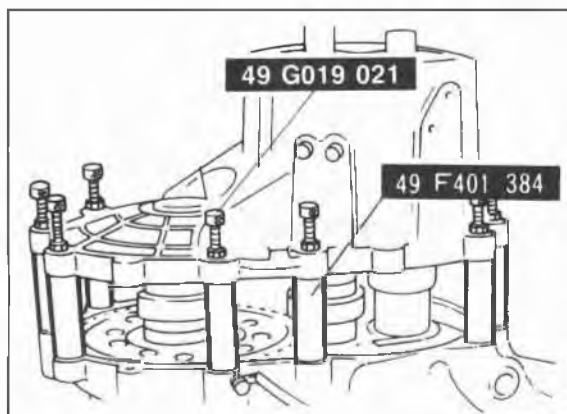
76G07A-033

4. Set the differential assembly onto the clutch housing, then mount the bearing outer race and the selector on the differential.  
Set the assembled selectors for the primary and secondary shaft in the clutch housing.  
Mount the shaft gear assemblies as shown in the figure.



76G07A-034

5. Set the **SST** (collars) in the positions shown in the figure.



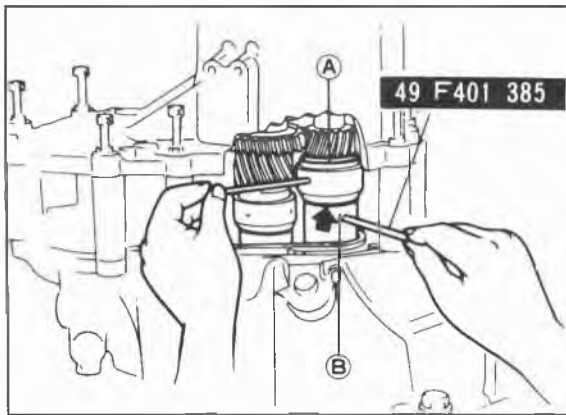
76G7A-035

6. Install the transaxle case then tighten the **SST**(bolts) to the specified torque.

### Tightening torque:

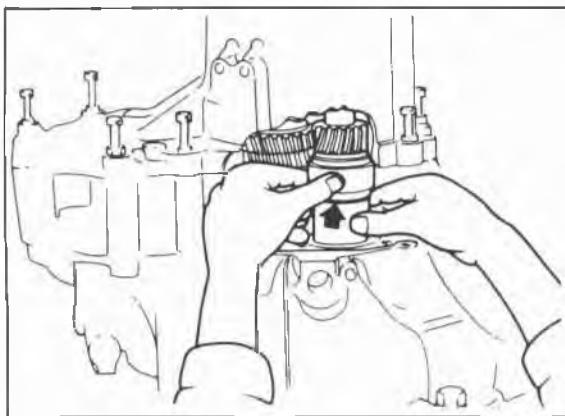
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft—lb)**





76G07A-036

7. To seat the bearings, mount the **SST** (bars) on parts (A) and (B) of the selector, and then turn the selector so the gap is widened. Then turn it in the reverse direction until the gap is eliminated.



76G07A-037

8. Manually expand the selector until the selector no longer turns by hand.

**Note**

**Check that each shaft turns smoothly.**

9. Use a feeler gauge and measure the gap in the selector.

**Note**

**Measure the gap around the entire circumference of the selector.**



76G07A-038

10. Take the maximum reading and determine the shim to be used as follows:

**< Primary shaft adjust shim >**

- Subtract the diaphragm spring thickness (0.70 mm, 0.0276 in) from the gap determined in the step 9.
- Select the closest thinner shim from the table.

**Example**

$$1.22 \text{ mm (0.0480 in)} - 0.70 \text{ mm (0.0276 in)} = 0.52 \text{ mm (0.0204 in)}$$

**Shim: 0.50 mm (0.020 in)**

**< Secondary shaft adjust shim >**

- Subtract the diaphragm spring thickness (0.70 mm, 0.0276 in) from the gap determined in the step 9.
- Select the closest thicker shim from the table.

**Example**

$$1.22 \text{ mm (0.0480 in)} - 0.70 \text{ mm (0.0276 in)} = 0.52 \text{ mm (0.0204 in)}$$

**Shim: 0.55 mm (0.022 in)**

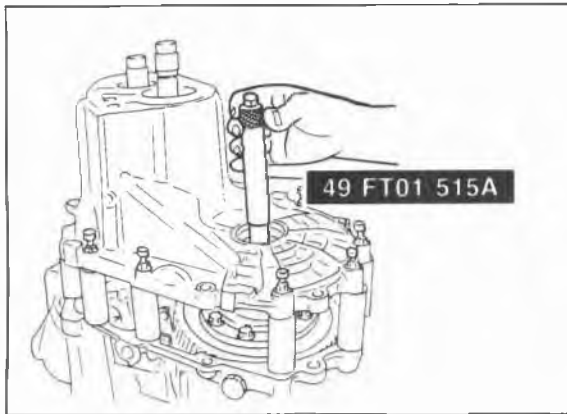
**Note**

**Use a maximum of two shims.**

Thickness (Shaft gears)	mm (in)
0.20 (0.008)	0.50 (0.020)
0.25 (0.010)	0.55 (0.022)
0.30 (0.012)	0.60 (0.024)
0.35 (0.014)	0.65 (0.026)
0.40 (0.016)	0.70 (0.028)
0.45 (0.018)	

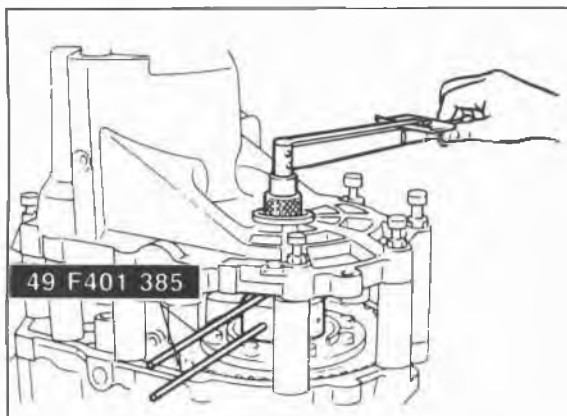
76G07A-072

# 7A ASSEMBLY



76G07A-039

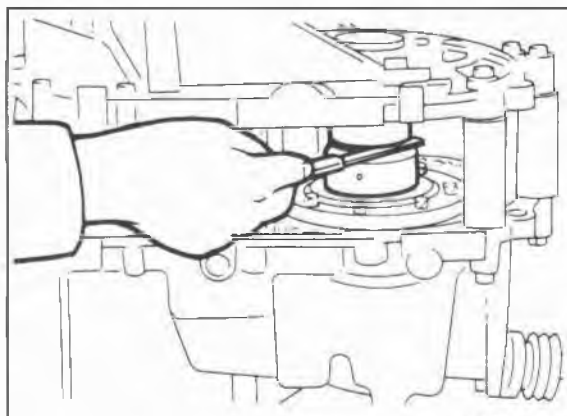
11. Install the **SST**.



76G07A-040

12. Adjust the selector with the **SST** until the specified preload is obtained.

**Preload:**  
**0.5 N·m (5 cm·kg, 4.3 in·lb)**



76G07A-041

13. Use a feeler gauge to measure the gap in the selector for the differential.

**Note**  
**Measure the gap around the entire circumference of the selector**

14. Add **0.15 mm (0.0059 in)** to the measured clearance and select the combination of shims whose thickness added is nearest higher than that valve. See the table for available shim sizes.

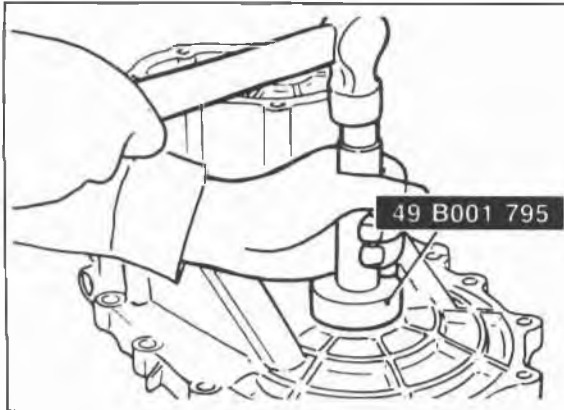
**Example: 0.32 mm (0.013 in)**  
**0.32 mm (0.013 in) + 0.15 mm (0.006 in) = 0.47 mm (0.019 in).**  
**So the nearest shim (on the thick side) to 0.47 mm (0.019 in) is 0.50 mm (0.020 in).**

**Note**  
**Use a maximum of two shims.**

15. Remove the **SST** and transaxle case.  
 16. Remove the primary shaft assembly and the differential.  
 17. Remove the bearing outer races.

Thickness (Differential)	mm (in)
0.10 (0.004)	0.70 (0.026)
0.15 (0.006)	0.75 (0.028)
0.20 (0.008)	0.80 (0.030)
0.25 (0.010)	0.85 (0.032)
0.30 (0.012)	0.90 (0.034)
0.35 (0.014)	0.95 (0.036)
0.40 (0.016)	1.00 (0.038)
0.45 (0.018)	1.05 (0.040)
0.50 (0.020)	1.10 (0.042)
0.60 (0.022)	1.15 (0.044)
0.65 (0.024)	1.20 (0.046)

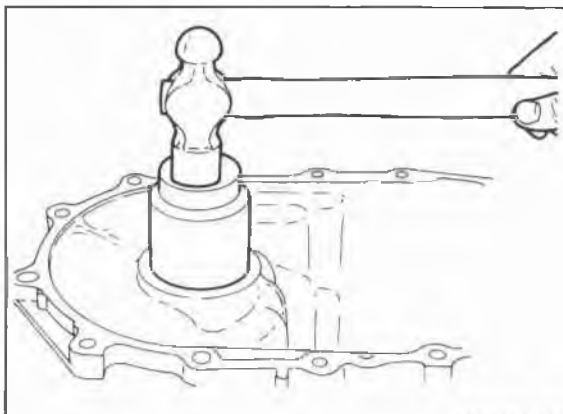
76G07A-042



86U07A-102

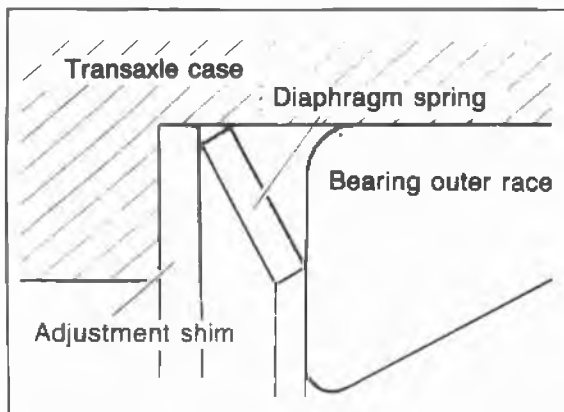
## Assembly

1. Install the neutral switch.
2. Install the drain plug.
3. Install the back-up lamp switch.
4. Install the new oil seals with the **SST**.



86U07A-103

5. Install the differential adjust shim(s) and the bearing outer race with a suitable pipe.

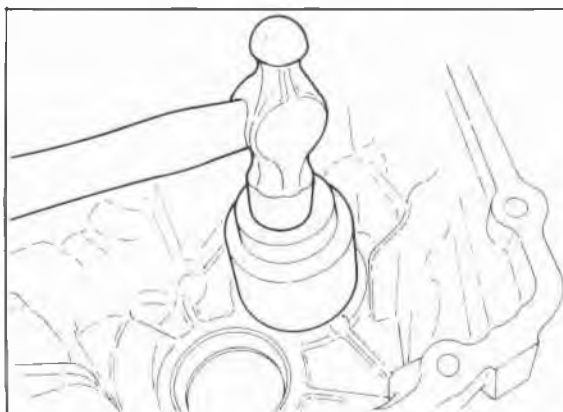


76G07A-043

6. Install the adjust shims, diaphragm springs, funnel, and bearing outer races.

### Note

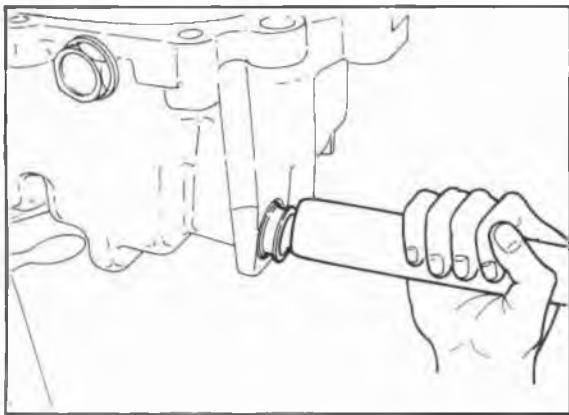
**Install the diaphragm spring as shown in the figure.**



86U07A-105

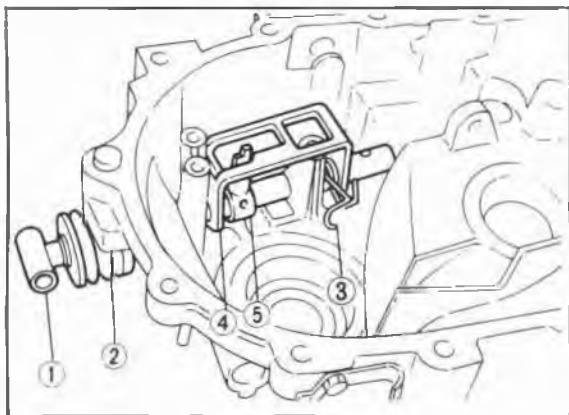
7. Install the bearing outer races with a suitable pipe.

# 7A ASSEMBLY



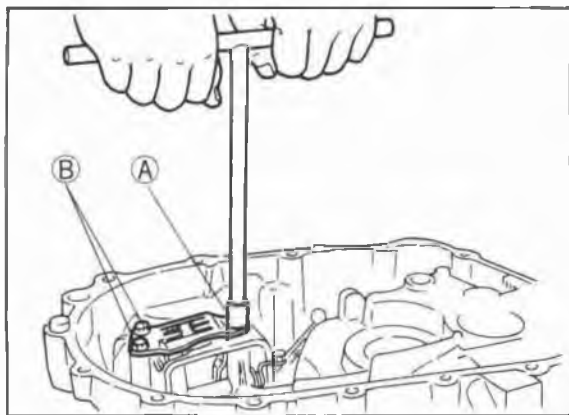
86U07A-106

8. Install the new breather.
9. Install the new change rod oil seal.



86U07A-107

10. Install the change rod ①, the boot ②, the spring ③, the reverse gate ④, and selector ⑤, as shown.
11. Install the new roll pin.



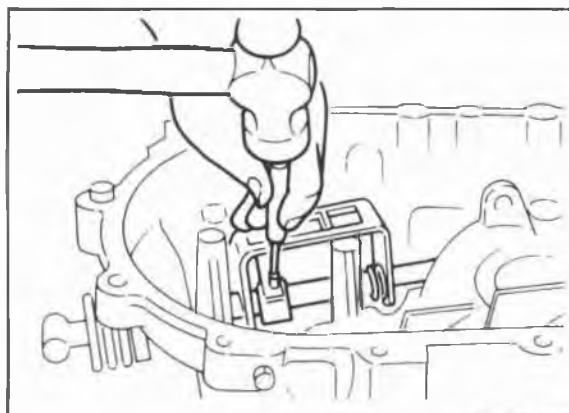
86U07A-108

12. Install the change arm.

**Tightening torque: 12—14 N·m**  
(120—140 cm·kg, 104—122 in·lb)

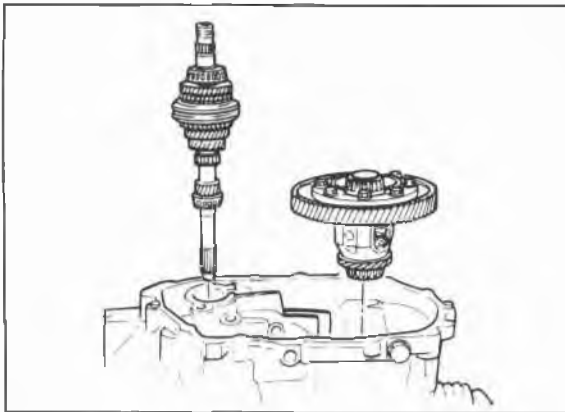
13. Install the guide plate.

**Tightening torque:**  
Ⓐ 8—11 N·m  
(80—115 cm·kg, 69—100 in·lb)  
Ⓑ 22—33 N·m  
(2.25—3.35 m·kg, 16—25 ft·lb)



86U07A-109

14. Install reverse lever, and reverse lever shaft.
15. Install the new roll pin.
16. Install the speedometer driven gear assembly.



76G07A-044

## Bearing Preload

Check the shaft gears and the differential bearing preload.

### Note

- a) Check that the correct adjust shims were selected.
- b) If the bearing preload is not within specification, adjust again.

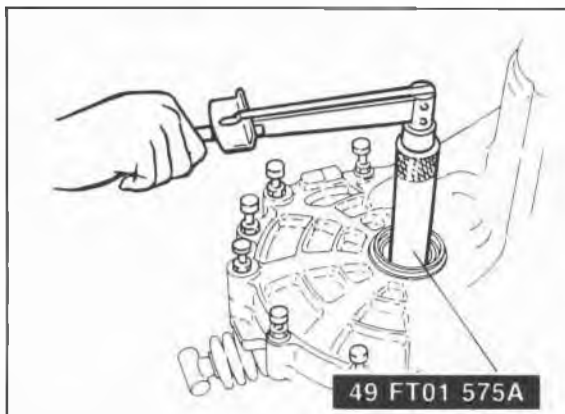
1. Set the primary shaft gear and the differential into the clutch housing.
2. Install the transaxle case, and tighten to the specified torque.

**Tightening torque: 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)**

3. Connect the **SST** and install it through the driveshaft hole.
4. Measure the preload.

**Preload: 1.4—2.0 N·m  
(14—20 cm·kg, 12.1—17.3 in·lb)**

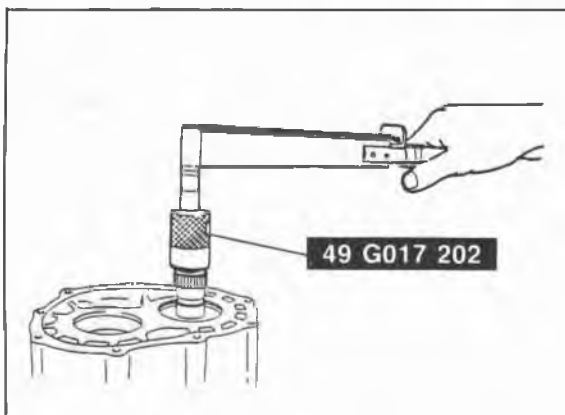
5. Remove the **SST**.



76G07A-045

6. Install the **SST** to the primary shaft gear.
7. Measure the preload.

**Preload: 0.1—0.25 N·m  
(1.0—2.5 cm·kg, 0.87—2.18 in·lb)**



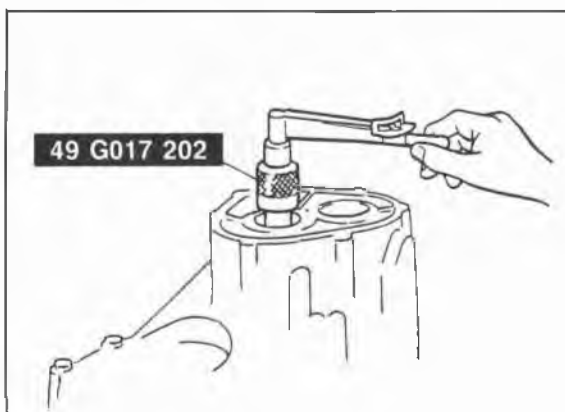
76G07A-046

8. Remove the **SST**, transaxle case, primary shaft gear and differential.
9. Install the secondary shaft gear and transaxle case then tighten to the specified torque.

**Tightening torque: 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)**

10. Check the secondary shaft preload with the **SST**.

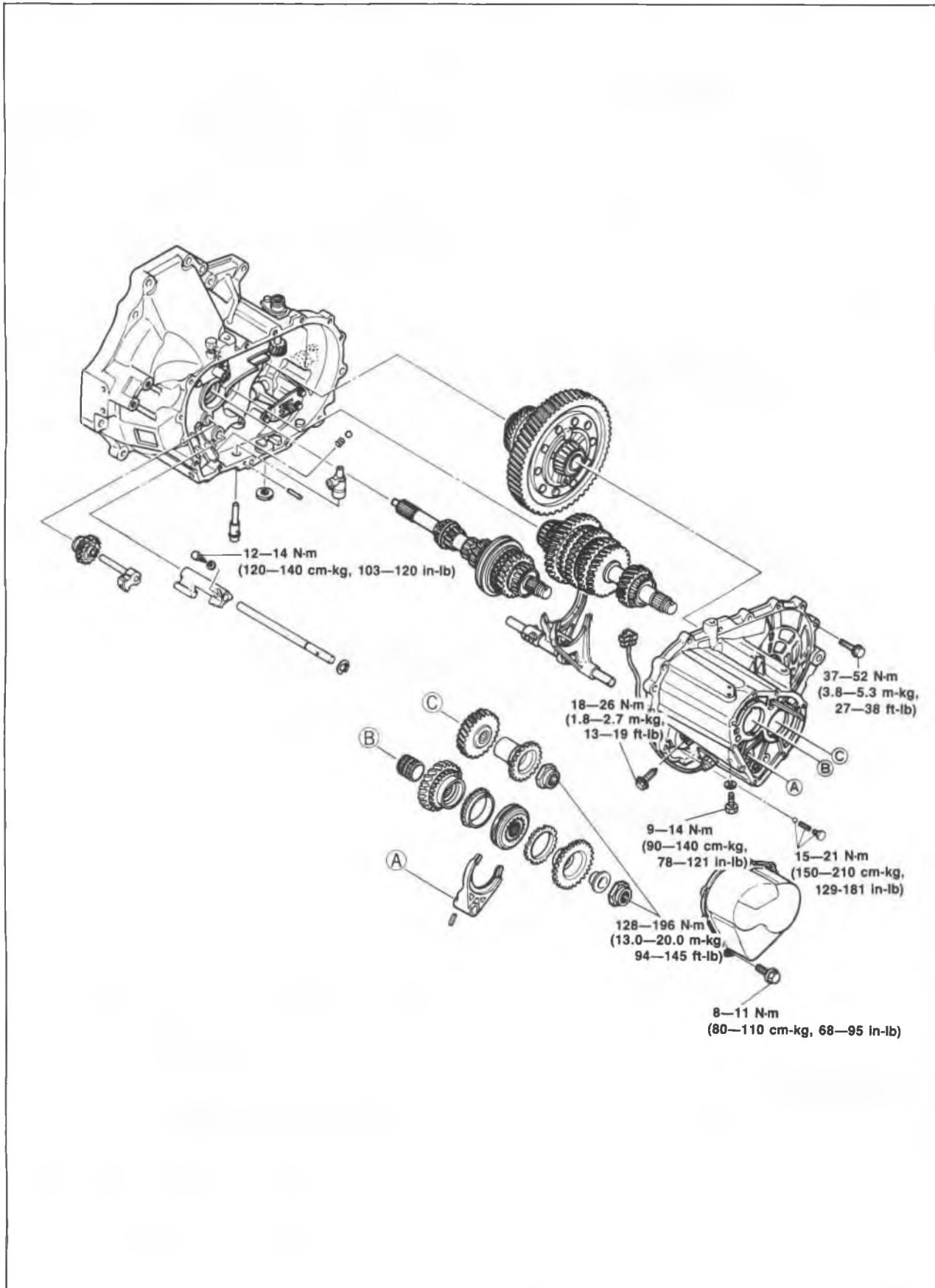
**Preload: 0.2—0.4 N·m  
(2.0—4.0 m·kg, 1.7—3.4 in·lb)**



76G07A-047

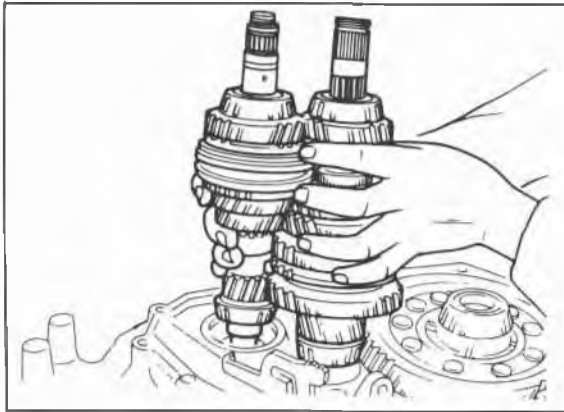
# 7A ASSEMBLY

## STEP 4 Torque Specifications



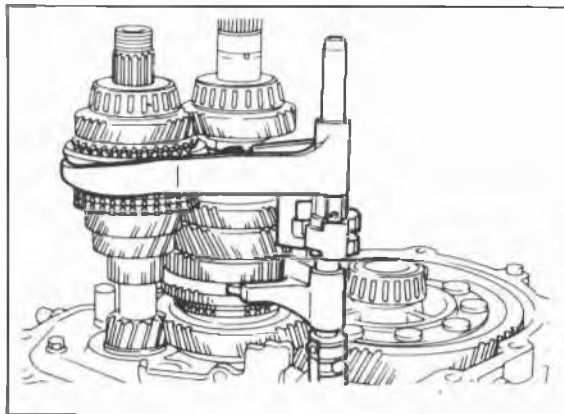
86U07A-110

## ASSEMBLY 7A



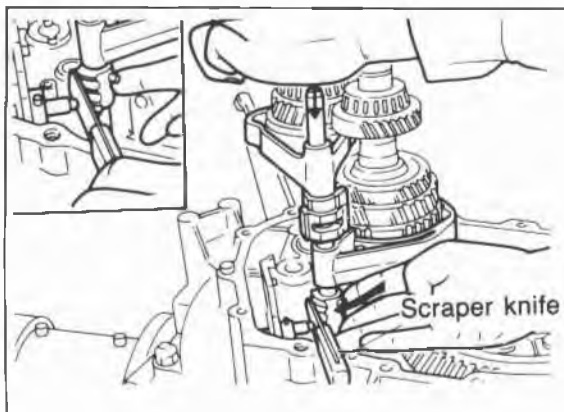
86U07A-111

1. Install the magnet and the differential assembly.
2. Install the primary shaft gear assembly and the secondary shaft gear assembly together.



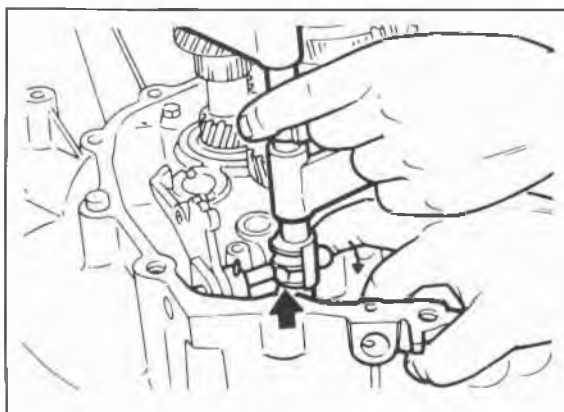
86U07A-112

3. Shift to 2nd gear and position the shift fork and shift rod assembly as shown.



76U07A-284

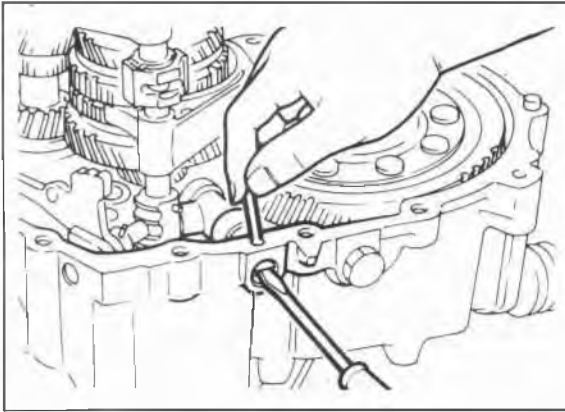
4. Insert the spring seat and spring into the reverse lever shaft, install the steel ball, and place a scraper knife so that it contacts the steel ball.
5. With the edge of the control end against the knife, when the control end is pushed in the direction of the arrow in the figure so that the ball goes into the shaft, the rod will at the same time line up with the shift rod coupling hole in the clutch housing.



76U07A-119

6. Set each clutch hub sleeve to the neutral position, and tap the shift rod from above so that the steel ball goes into the center groove (of the 3 grooves in the control end).
7. Pull the ball part of the control end forward so that the steel ball goes into the detent in the groove.

# 7A ASSEMBLY

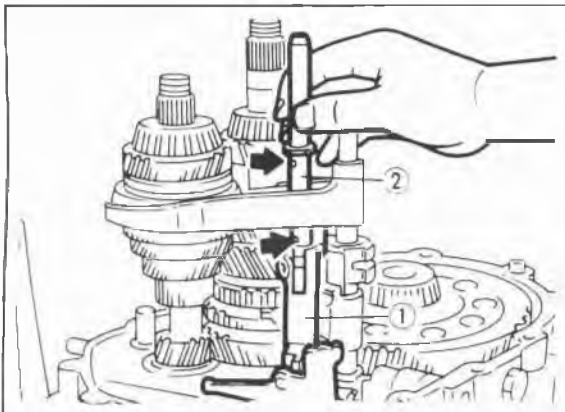


86U07A-113

- Fit the crank lever in between the change arm and the control end, and connect the crank lever shaft to the crank lever.
- Align the pin holes of the crank lever shaft and the clutch housing, and insert the pin.

**Note**

**Use a new O-ring for the crank lever shaft.**

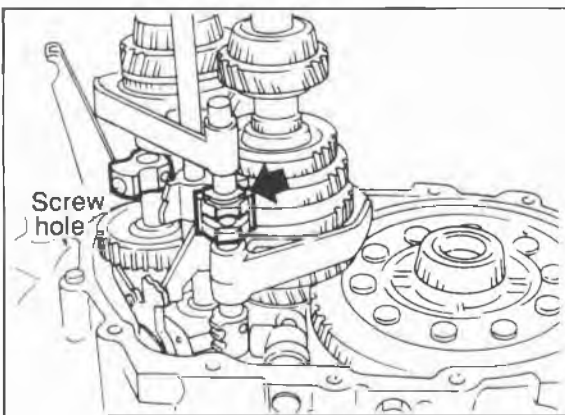


76U07A-121

- Install the gate (1) and the shift rod (2), and tighten the gate mounting bolt.

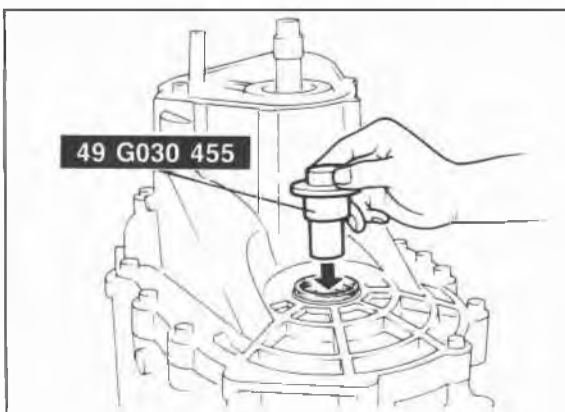
**Note**

**The mark (indicated by the arrow in the figure) and the gate mounting bolt hole must be in the same direction.**



76U07A-122

- Install the reverse idle gear and the reverse idle shaft.
- Connect the magnet to the clutch housing.
- Align the end of the interlock sleeve with the control lever indicated by the arrow, and, at the same time, face the reverse idle shaft screw hole in the direction shown in the figure.



86U07A-114

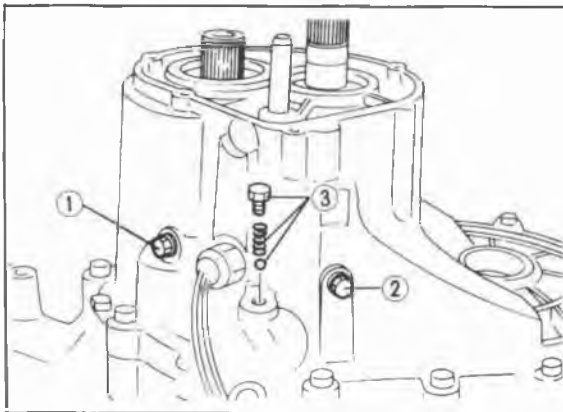
- Apply a thin coat of sealant to the contact surfaces of the clutch housing and transmission case, tighten the transaxle case installation bolts to the specified torque.

**Tightening torque:**

**18—26 N·m (1.8—2.7 m·kg, 13—18.8 ft·lb)**

- Insert the **SST** to driveshaft coupling hole.





76G07A-048

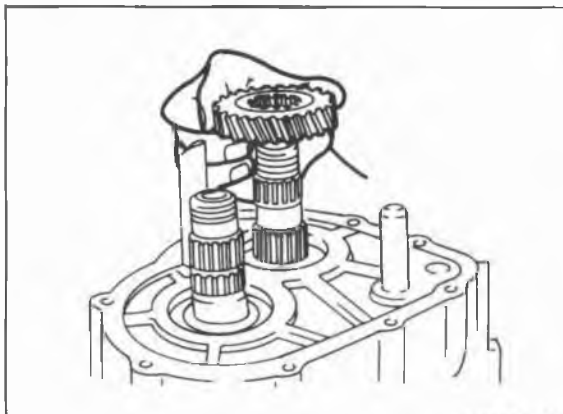
16. Install the lock bolt ①, the guide bolt ②.
17. Install the ball, spring and lock bolt ③.

**Tightening torque:**

- (1) 18—26 N·m  
(1.8—2.7 m·kg, 13—19 ft·lb)
- (2) 9—14 N·m  
(90—140 cm·kg, 78—121 in·lb)
- (3) 15—21 N·m  
(150—210 cm·kg, 129—181 in·lb)

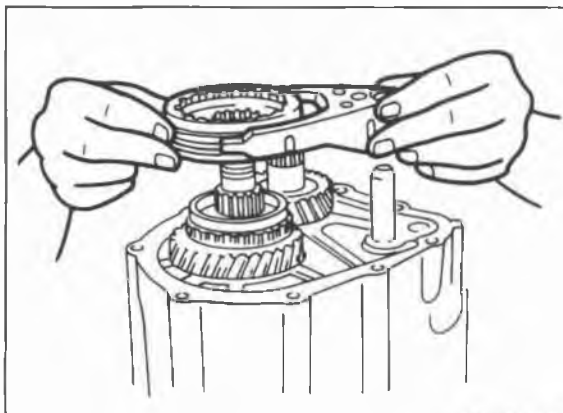
**Note**

Check that gear change operation is smooth.



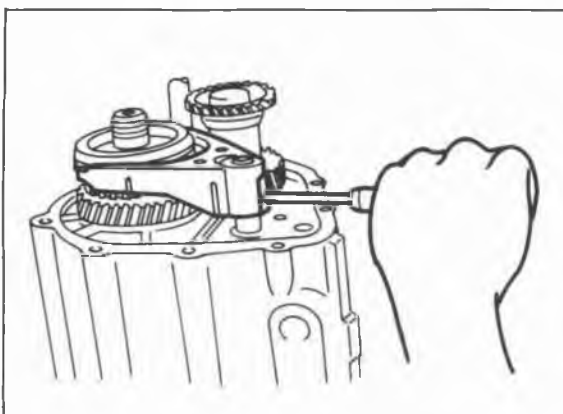
86U07A-116

18. Install the secondary 5th gear as shown.



86U07A-117

19. Install the gear sleeve, the 5th gear and synchronizer ring to primary shaft.

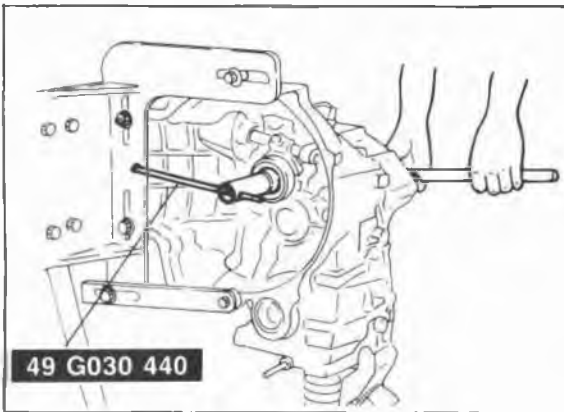


86U07A-118

20. Tap in the roll pin.
21. Install the synchronizer ring and the reverse synchronizer gears.

## 7A ASSEMBLY

---

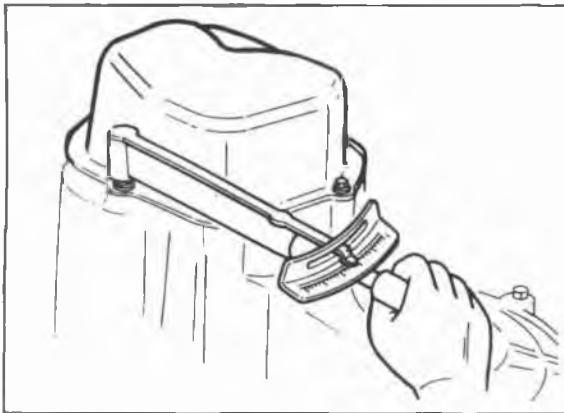


86U07A-119

22. Shift to 1st gear.
23. Lock the primary shaft with the **SST**.
24. Tighten new lock nuts.

**Tightening torque: 128—196 N·m  
(13.0—20.0 m·kg, 94—145 ft·lb)**

25. Stake the lock nuts.



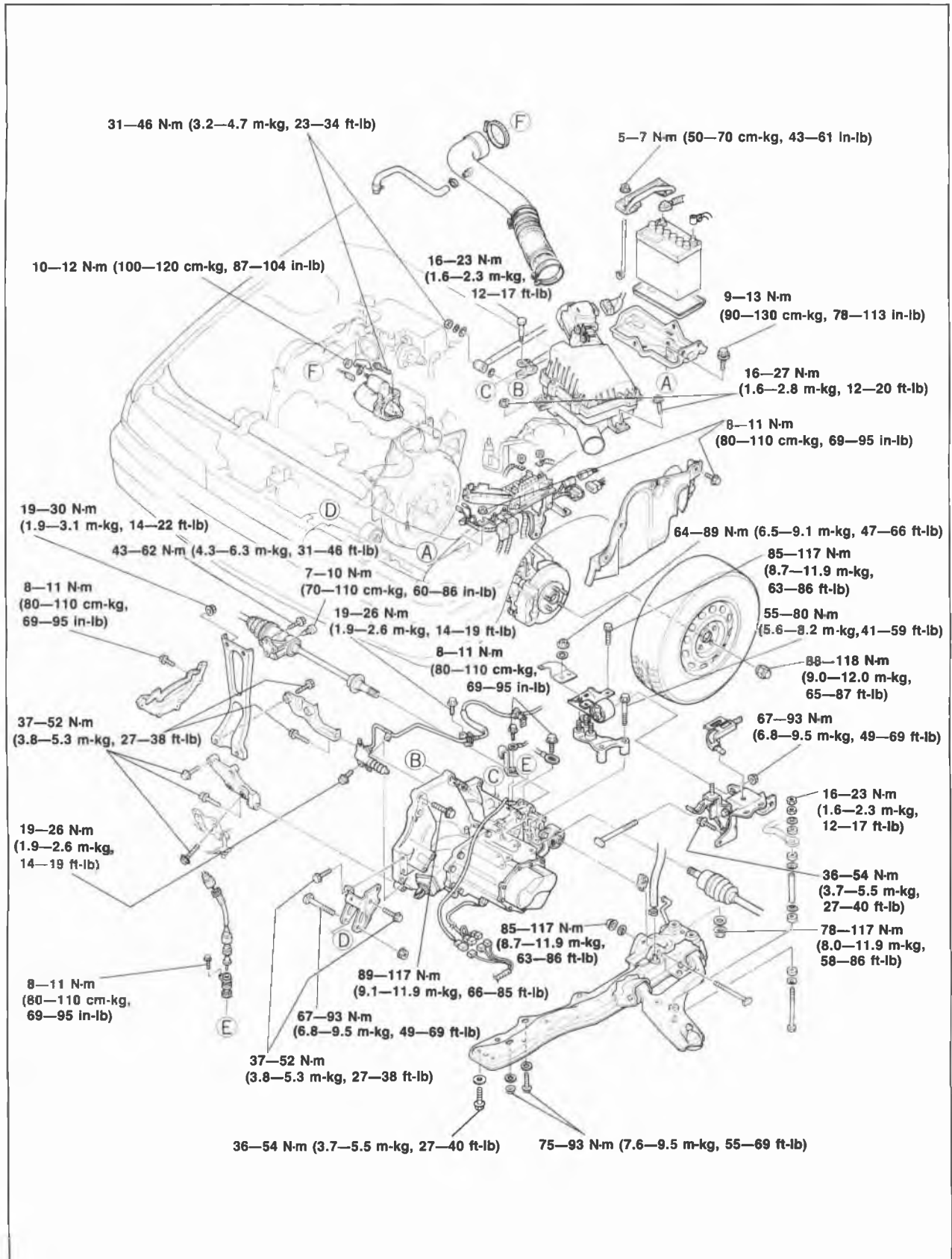
76G07A-049

26. Clean and coat the both surfaces and install the rear cover.

**Tightening torque: 8—11 N·m  
(80—110 cm·kg, 69—95 in·lb)**

## INSTALLATION (FI except DOHC)

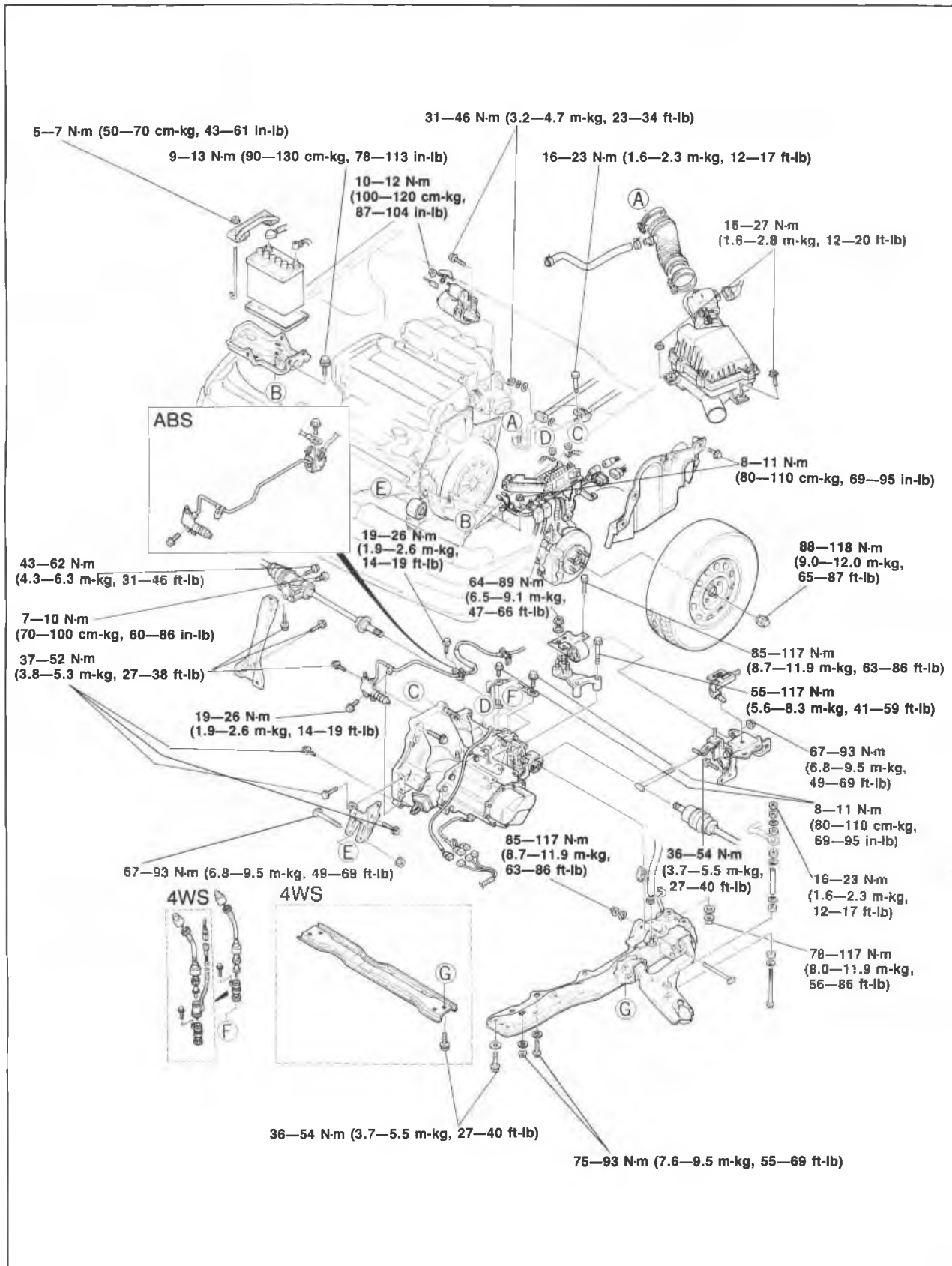
### Torque Specifications



# 7A INSTALLATION

## INSTALLATION (DOHC)

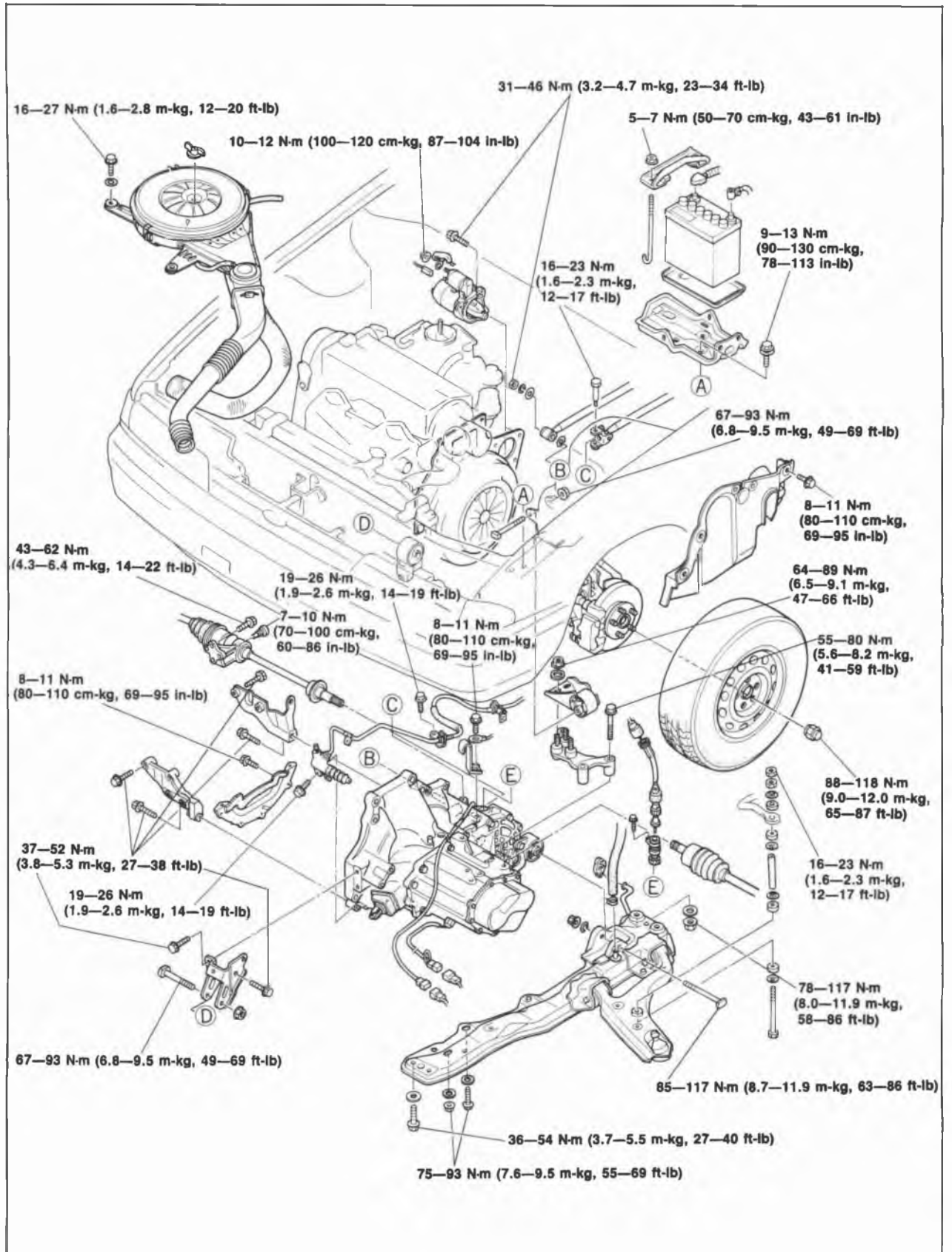
### Torque Specifications



76G07A-051

## INSTALLATION (Carburator)

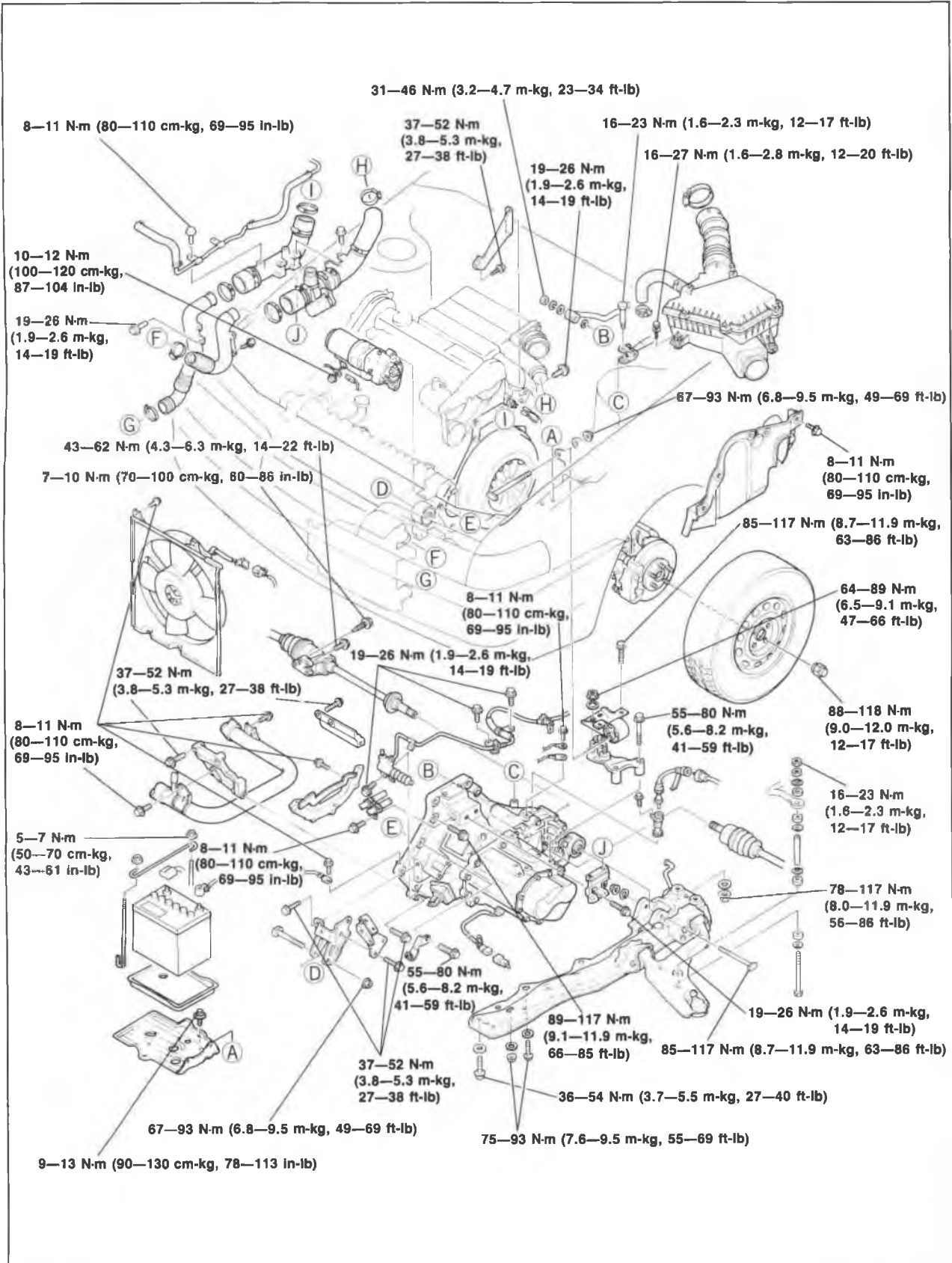
### Torque Specifications



# 7A INSTALLATION

## INSTALLATION (RF-N and RF-CX)

### Torque Specifications



76G07A-053



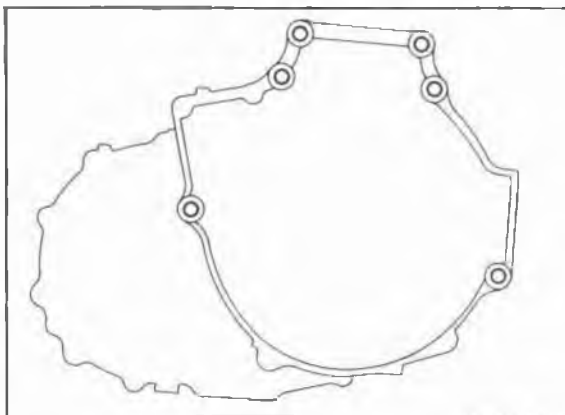
86U07A-210

1. Attach rope at 2 places on the transaxle and place a board on the jack and position the transaxle on it.

**Caution**

**The transaxle is not well balanced; be careful when positioning on the jack.**

2. Move the transaxle into the place and attach the rope (attached to the transaxle in step 1) to the SST.



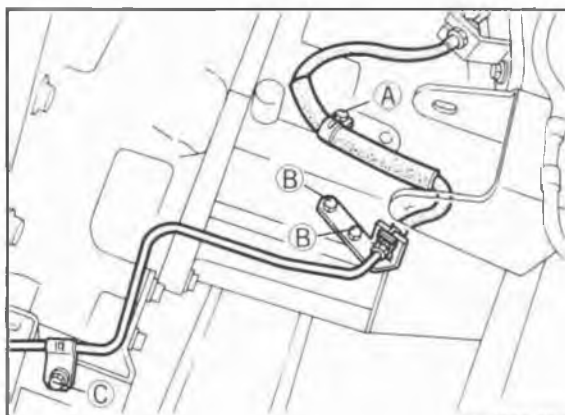
86U07A-211

3. Install the transaxle onto the engine.

**Note**

**Lift the transaxle using the jack pulling the rope.**

**Tightening torque: 89—117 N·m  
(9.1—11.9 m·kg, 66—85 ft·lb)**



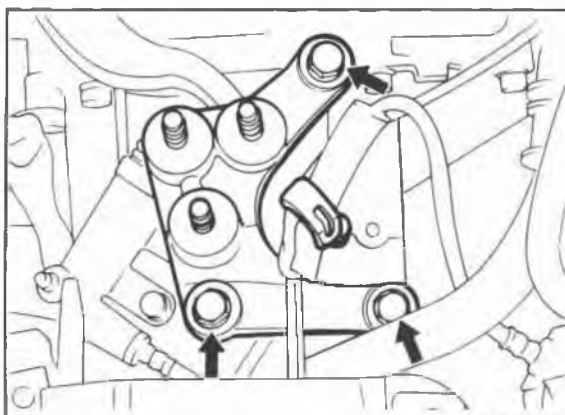
76G07A-054

4. Install the clutch pipe.

**Tightening torque:**

**Ⓐ, Ⓑ: 19—26 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)**

**Ⓒ: 8—11 N·m  
(80—110 cm·kg, 69—95 in·lb)**



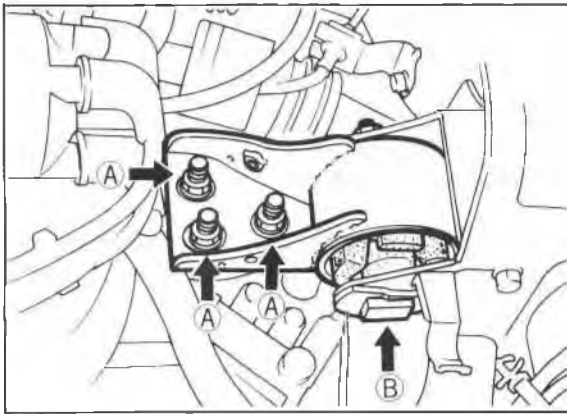
76G07A-055

5. Install the engine mount bracket.

**Tightening torque:**

**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**

# 7A INSTALLATION

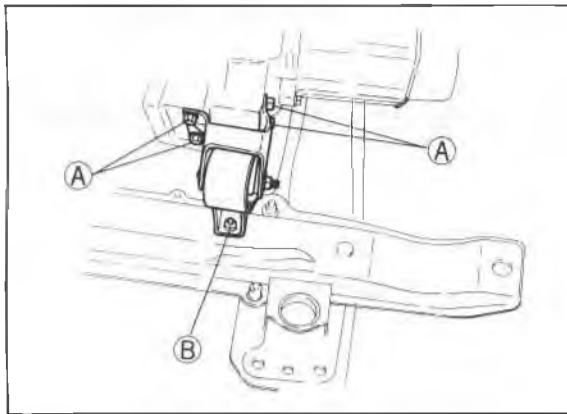


76G07A-056

6. Install the engine mount rubber No.4.

**Tightening torque:**

- (A) 64—89 N·m  
(6.5—9.1 m·kg, 47—66 ft·lb)
- (B) 67—93 N·m  
(6.8—9.5 m·kg, 49—69 ft·lb)

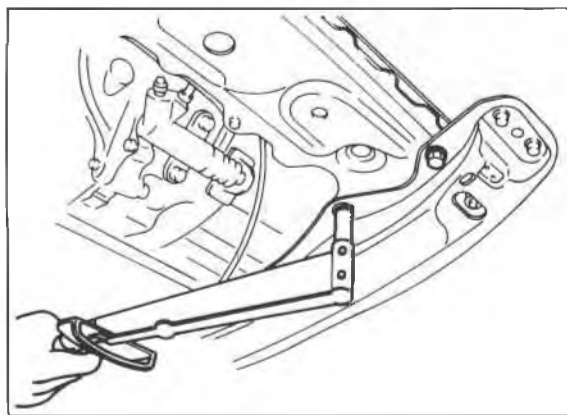


76G07A-057

7. Install the engine mount No. 2.

**Tightening torque:**

- (A) 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)
- (B) 67—93 N·m  
(6.8—9.5 m·kg, 49—69 ft·lb)



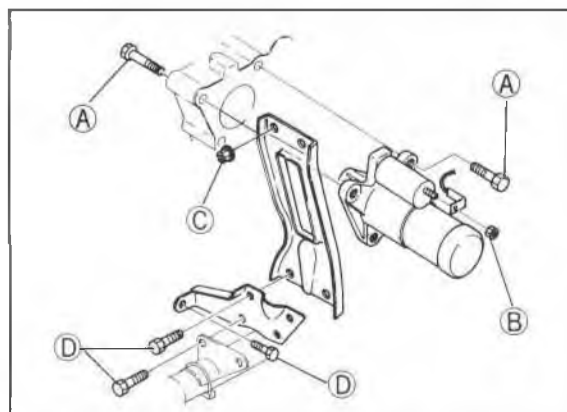
76G07A-058

8. Install the crossmember and the left side lower arm as an assembly.

- Tightening torque: Bolts, 36—54 N·m**  
(3.7—5.5 m·kg, 27—40 ft·lb)  
**Nut, 75—93 N·m**  
(7.6—9.5 kg, 55—69 ft·lb)

9. Remove the jack and take off the rope.  
10. Remove the **SST**.  
11. Install the end plate.

- Tightening torque: 8—11 N·m**  
(80—110 cm·kg, 69—95 in·lb)



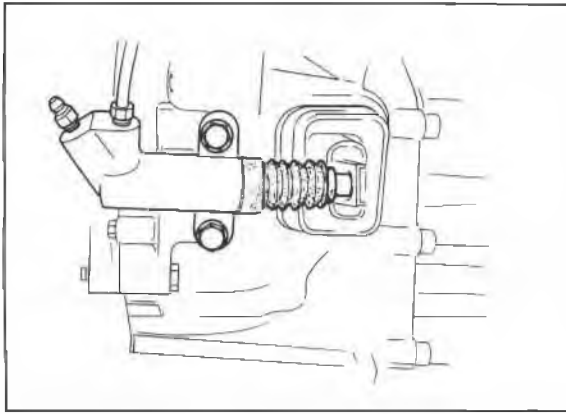
76G07A-059

12. Install the starter and harnesses.  
13. Install the surge tank bracket and the gusset plate.

**Tightening torque:**

- (A) 31—46 N·m  
(3.2—4.7 m·kg, 23—34 ft·lb)
- (B) 10—12 N·m  
(100—120 cm·kg, 87—104 in·lb)
- (C) 19—30 N·m  
(1.9—3.1 m·kg, 14—22 ft·lb)
- (D) 43—61 N·m  
(4.4—6.2 m·kg, 32—45 ft·lb)

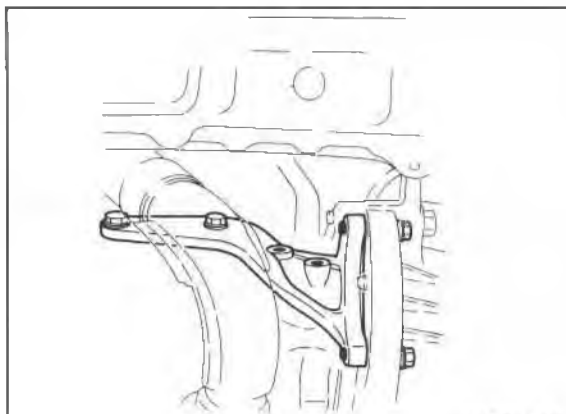




76G07A-060

14. Install the clutch release cylinder.

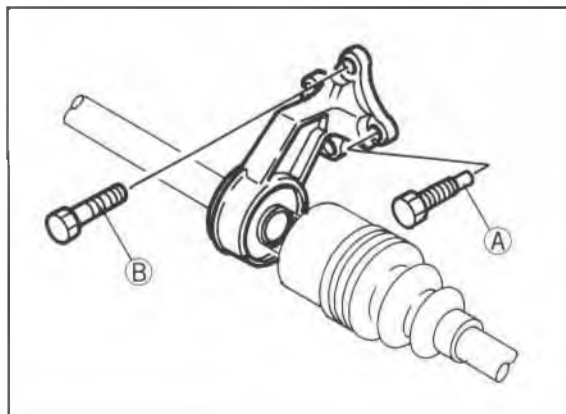
**Tightening torque: 19—26 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)**



76G07A-061

15. Install the gusset plates.

**Tightening torque: 37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)**



76G07A-062

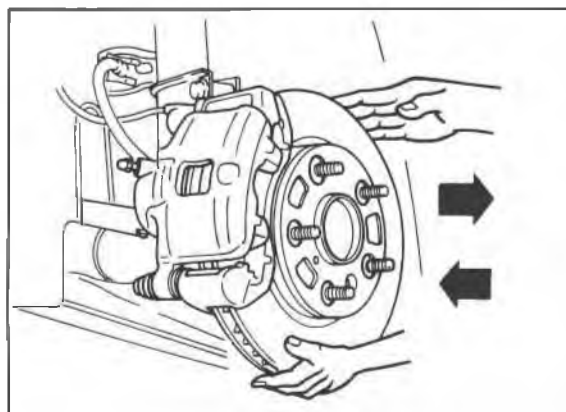
16. Replace the clips at the end of the driveshafts and joint shaft with new ones.

17. Install the joint shaft and right driveshaft as follows:  
(1) Install and tighten the reamer bolts (A); then install and tighten the standard bolts (B).

**Tightening torque:**

**(A) :7—10 N·m  
(70—100 cm·kg, 43—61 in·lb)**

**(B) :42—62 N·m  
(4.3—6.3 m·kg, 31—46 ft·lb)**



86U07A-219

(2) Remove the **SST** and insert the shaft into the transaxle.

(3) Pull the front hub outward and connect the driveshaft to the joint shaft.

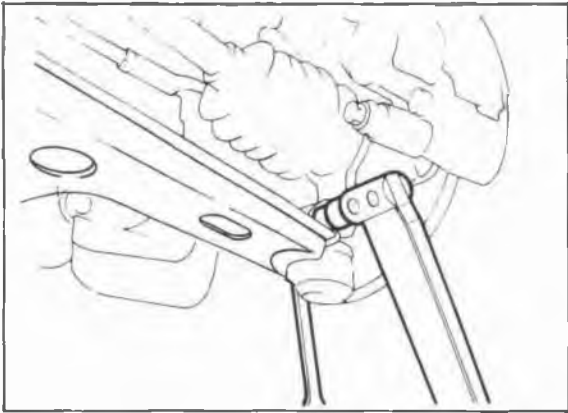
(4) Push the joint at the differential side to securely connect the driveshaft to the joint shaft.

**Note**

**a) After installation, pull the front hub outward to confirm that the driveshaft doesn't come out.**

**b) Do not damage the oil seal.**

# 7A INSTALLATION



76G07A-063

18. Install the left driveshaft as follows:
  - (1) Pull the front hub outward and insert the driveshaft into the transaxle.
  - (2) Push the joint at the differential side to connect the driveshaft to the differential side gear.

**Note**

- a) Do not damage the oil seal.
- b) After installation, pull the front hub outward to confirm that the driveshaft doesn't come out.

19. Install the lower arm ball joints to the knuckles and tighten the bolts and nuts.

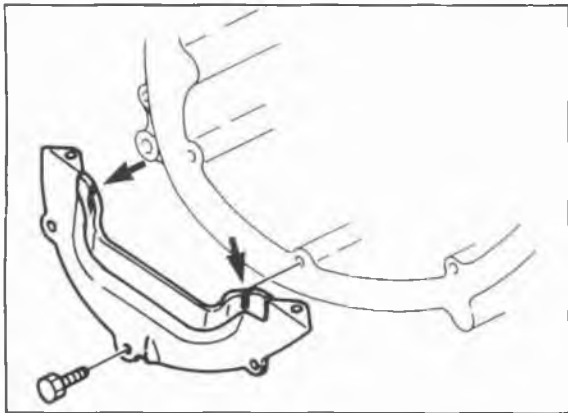
**Tightening torque: 43—54 N·m**  
(4.4—5.5 m·kg, 32—40 ft·lb)

20. Install the under cover. (except DOHC)

**Note**

Before installation, fill the notches with silicon as shown in the figure.

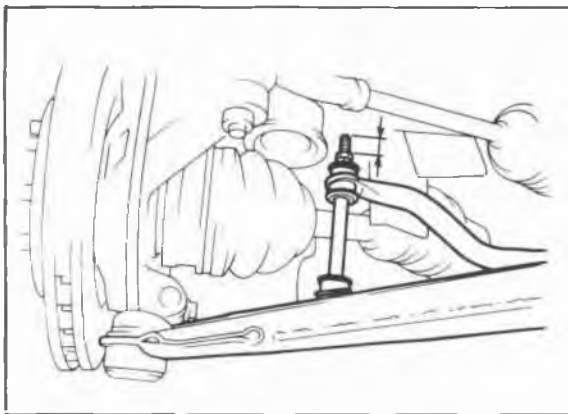
**Tightening torque: 8—11 N·m**  
(80—110 cm·kg, 69—95 in·lb)



76G07A-064

21. Install the stabilizer bar control links as follows.
  - (1) Install the stabilizer bar control link.
  - (2) Adjust protrusion to 20.1 mm (0.79 in)
  - (3) Tighten bolt to specified torque.

**Tightening torque: 16—23 N·m**  
(1.6—2.3 m·kg, 12—17 ft·lb)



76G07A-065

22. Install the tie-rod ends and new cotter pine.

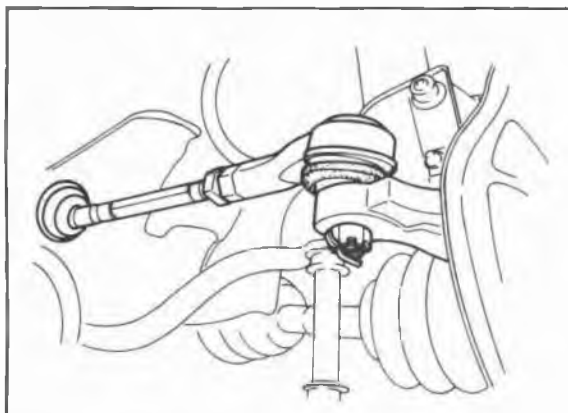
**Tightening torque: 29—44 N·m**  
(3.0—4.5 m·kg, 22—33 ft·lb)

23. Install the splash shields.

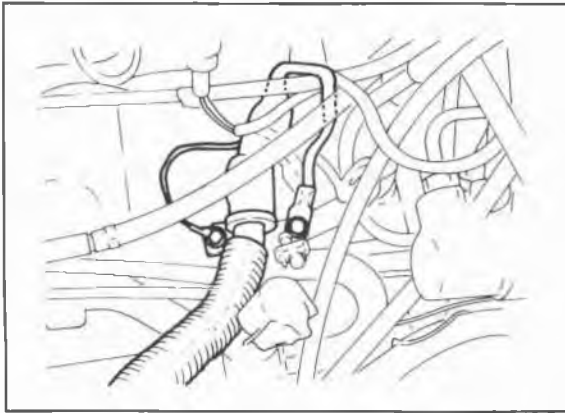
**Tightening torque: 8—11 N·m**  
(80—110 cm·kg, 69—95 in·lb)

24. Install the front wheels.

**Tightening torque: 88—118 N·m**  
(9.0—12.0 m·kg, 65—87 ft·lb)



76G07A-066



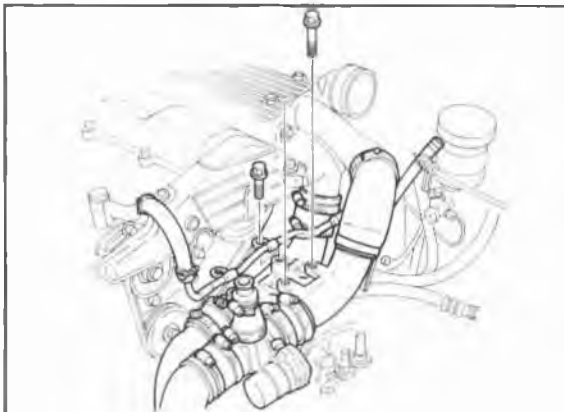
76G07A-067

25. Install the grounds to the transaxle case.

**Tightening torque:**

**8—11 N·m (80—115 cm·kg, 69—100 in·lb)**

26. Connect the speedometer cable.



76G07A-068

27. Install the intercooler pipe and hose. (RF-CX)

**Tightening torque:**

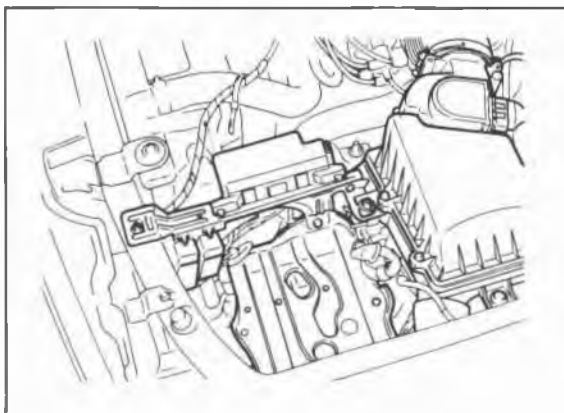
**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

28. Install the brake vacuum pipe. (RF-CX)

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

29. Connect the brake vacuum hose. (RF-CX)



76G07A-069

30. Install the air cleaner assembly and connect the air flow meter connector.

**Tightening torque:**

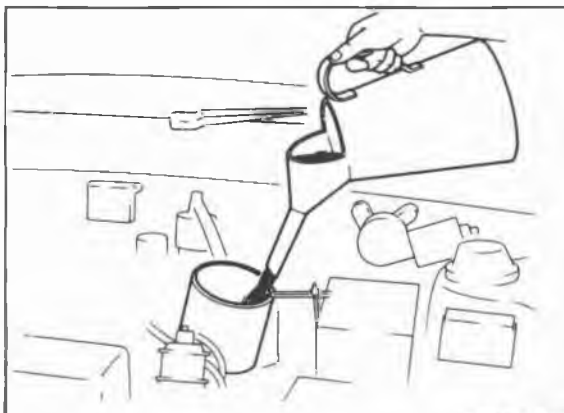
**16—27 N·m (1.6—2.8 m·kg, 12—20 ft·lb)**

31. Connect the distributor lead.

32. Connect the main fuse block.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



76G07A-070

33. Install the battery carrier and battery.

34. Add the correct quantity of the specified transaxle oil.

**Specified**

**Type**

**A.T.F.: DEXRON II**

**Above 0°F:**

**API: GL-4 or GL-5**

**SAE 80W-90 or SAE 90**

**Capacity:**

**3.35 liters (3.6 US qt, 3.0 Imp qt)**

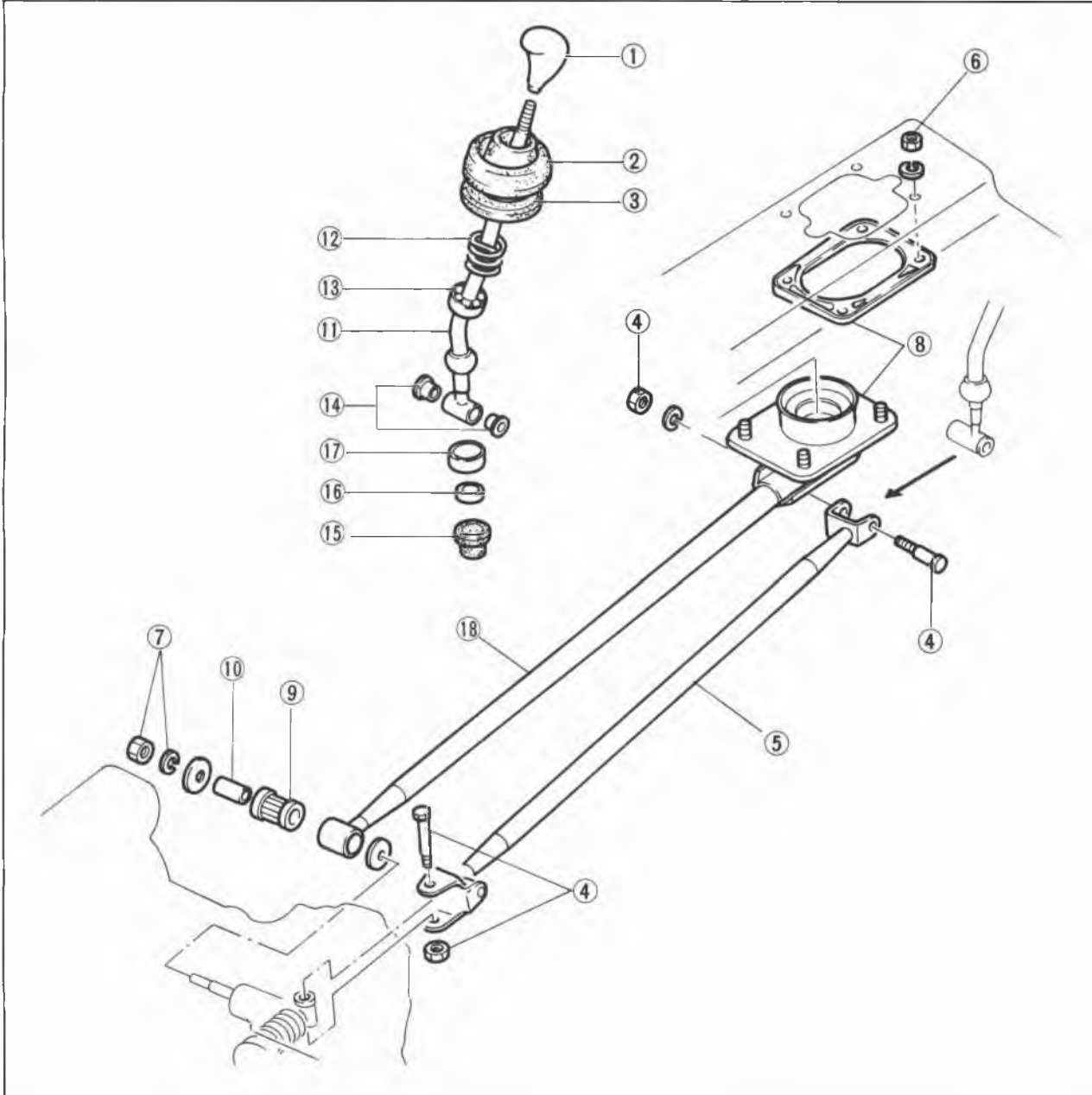
# 7A TRANSAXLE CONTROL

## TRANSAXLE CONTROL

### REMOVAL AND INSTALLATION

1. Jack up the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.

61G07X-165

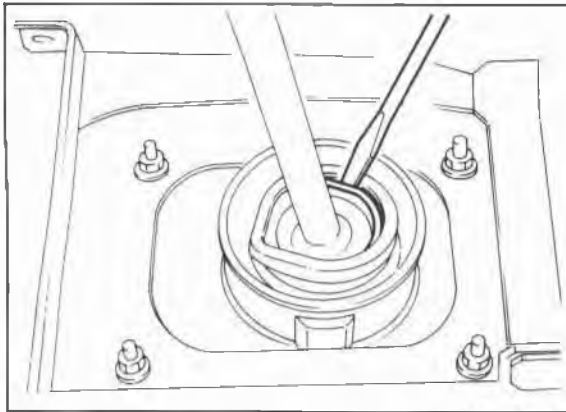


86U07A-230

- |                              |  |                       |
|------------------------------|--|-----------------------|
| 1. Change lever knob         | 7. Nut and washer                            | 12. Spring            |
| 2. Assist boot               | 8. Extension bar bracket assembly and gasket | 13. Ball seat (upper) |
| 3. Mounting rubber boot      | 9. Bushing                                   | 14. Bushings          |
| 4. Bolts and nuts            | 10. Pipe                                     | 15. Boot              |
| 5. Change control rod        | 11. Change lever                             | 16. Holder            |
| 6. Bracket installation nuts |  | 17. Ball seat (lower) |
|                              |  | 18. Extension bar     |

#### Note

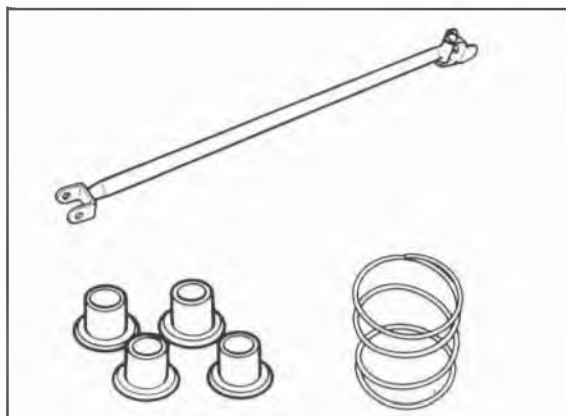
Apply a coat of grease (lithium base, NLGI No. 2) to the change lever ball, the ball seats, and each joint.



63U07A-151

## Spring

Remove the spring by prying on the hooked part of the spring with a screwdriver.

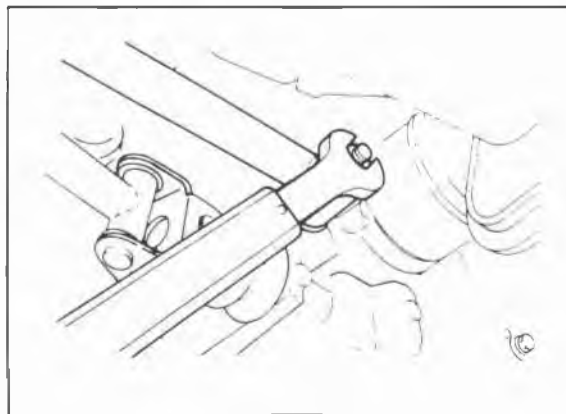


61G07X-192

## INSPECTION

Check the following, and replace if necessary:

1. Bent control rod.
2. Wear, damage, or malfunction of any joint.
3. Damaged gear shift lever ball.
4. Weak spring.
5. Wear or damage of bushing.



63U07A-153

## INSTALLATION

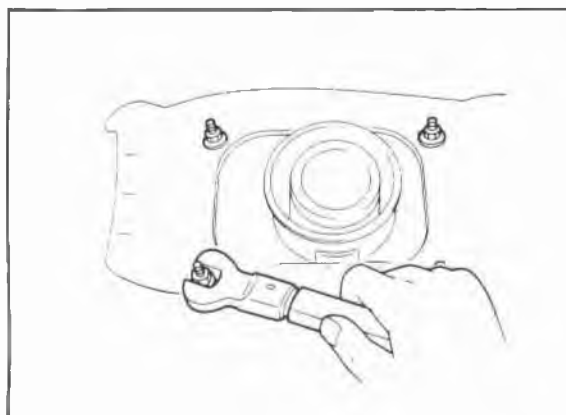
Install in the reverse order of removal and note the following:

### Extension Bar

First, install the extension bar to the floor, and then install it onto the transaxle.

### Tightening torque:

**31–46 N·m (3.2–4.7 m·kg, 23–34 ft·lb)**



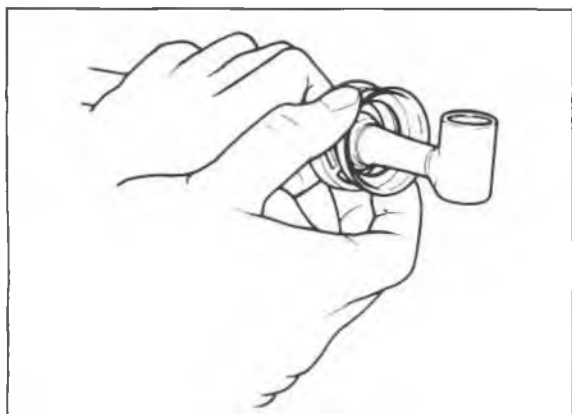
76G07A-071

### Bracket Installation

Tighten the bracket installation nuts to the specified torque.

**Tightening torque: 7–10 N·m  
(70–100 cm·kg, 61–87 in·lb)**

## 7A TRANSAXLE CONTROL



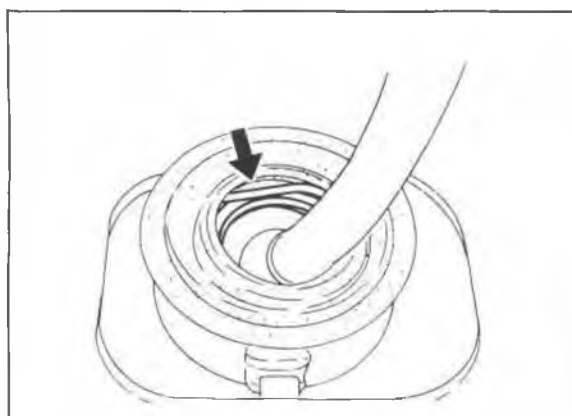
61G07X-193

### Gear Shift Lever Ball

Apply grease to the ball seat surface, and install the upper and lower ball seat, holder, and boot.

#### Note

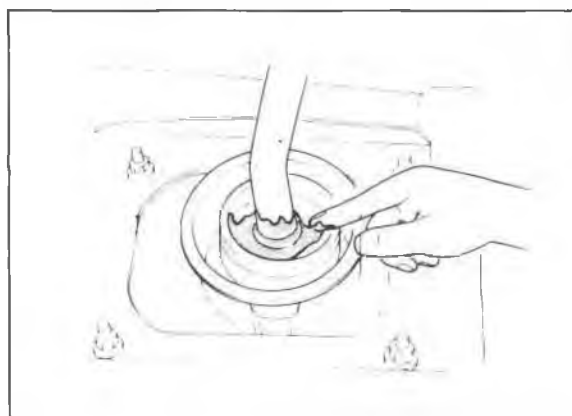
Apply grease to all joints.



63U07A-156

### Spring

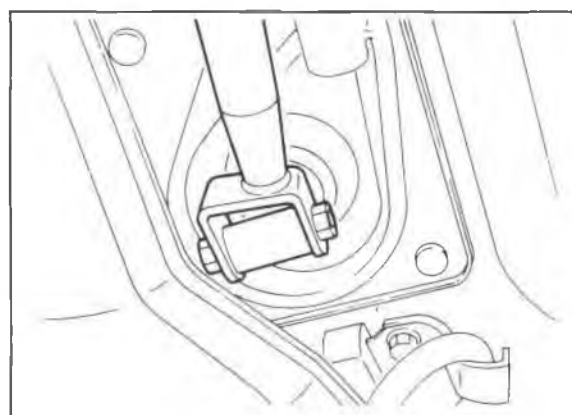
Make sure that the hooked part of the spring is properly seated in the bracket groove, as shown in the figure.



63U07A-157

### Bracket Cavity

Put grease in the bracket cavity.



61G07X-195

### Change Control Rod

Install the change control rod so that its relationship with the shift lever is as shown in the figure.

#### Tightening torque:

16—22 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

# AUTOMATIC TRANSAXLE

## (Electronically Controlled and 4-Speed)

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# 7B OUTLINE

## OUTLINE

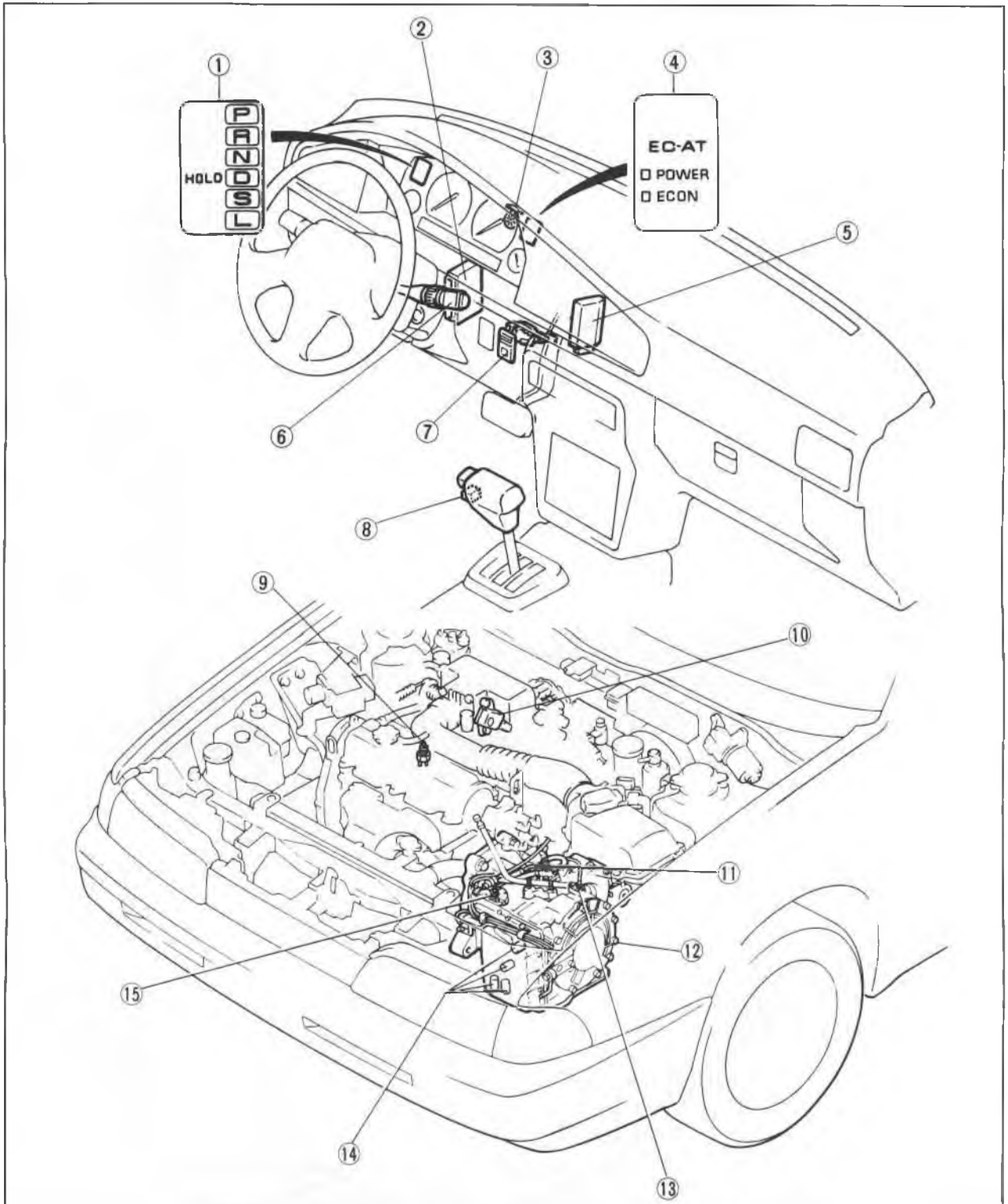
### SPECIFICATIONS

Model		G4A-EL (EC-AT)	G4A-HL (4-speed)	
			FE engine	F8 engine
Torque converter stall torque ratio		1.710—1.900 : 1	1.900—2.100 : 1	
Gear ratio	First	2.800		
	Second	1.540		
	Third	1.000		
	Fourth (OD)	0.700		
	Reverse	2.333		
Final gear ratio		3.700		
Number of drive plates/ driven plates	Forward clutch	3/3		
	Coasting clutch	2/2		
	3-4 clutch	5/5	4/4	
	Reverse clutch	2/2		
	Low and reverse brake	3/3	4/4	
Servo diameter (Piston outer dia./retainer inner dia.) mm (in)		78/53 (3.07/2.09)	78/49 (3.07/1.93)	78/56 (3.07/2.20)
Speedometer gear ratio (Driven/Drive gear)		20 : 25 or 21 : 25		
Automatic transmission fluid	Type	Dexron II or MIII		
	Capacity liters (US qt, Imp qt)	6.8 (7.2, 6.0)		

76G07B-002



## COMPONENT LOCATION G4A-EL

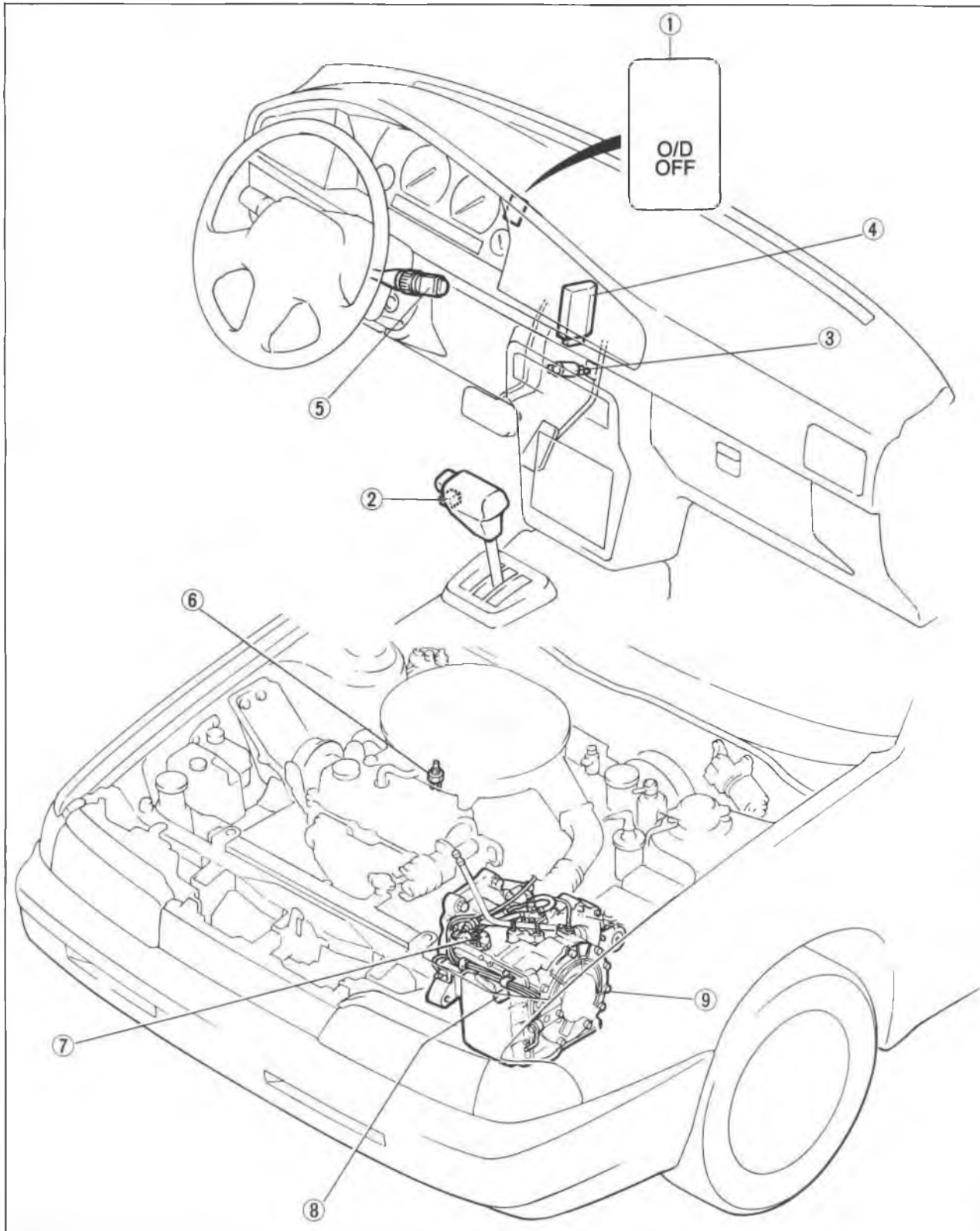


76G07B-003

- |                          |                                     |                      |
|--------------------------|-------------------------------------|----------------------|
| 1. Hold indicator light  | 7. Mode switch                      | 12. EC-AT            |
| 2. EC-AT control unit    | 8. Hold switch                      | 13. Pulse genelator  |
| 3. Vehicle speed sensor  | 9. Water temperature switch         | 14. Solenoid valves  |
| 4. Mode indicator light  | 10. Throttle sensor and idle switch | 15. Inhibitor switch |
| 5. Cruise control unit   | 11. Fluid temperature switch        |                      |
| 6. Cruise control switch |                                     |                      |

# 7B OUTLINE

G4A-HL

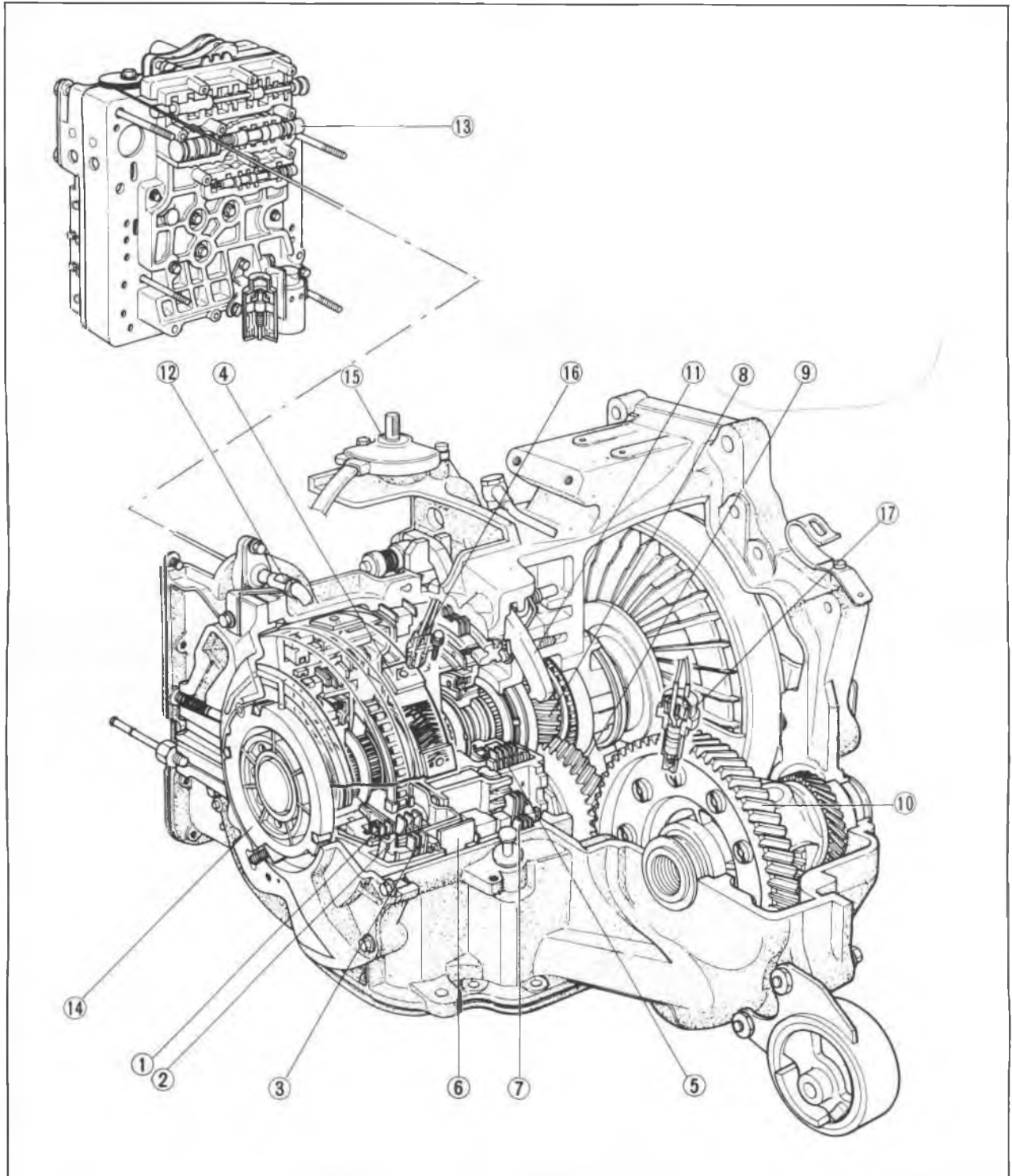


76G07B-004

- 1. OD OFF indicator light
- 2. OD OFF switch
- 3. Kick-down switch
- 4. Cruise control unit
- 5. Cruise control switch

- 6. Water temperature switch
- 7. Inhibitor switch
- 8. OD release solenoid valve
- 9. Automatic transaxle

## STRUCTURAL VIEW

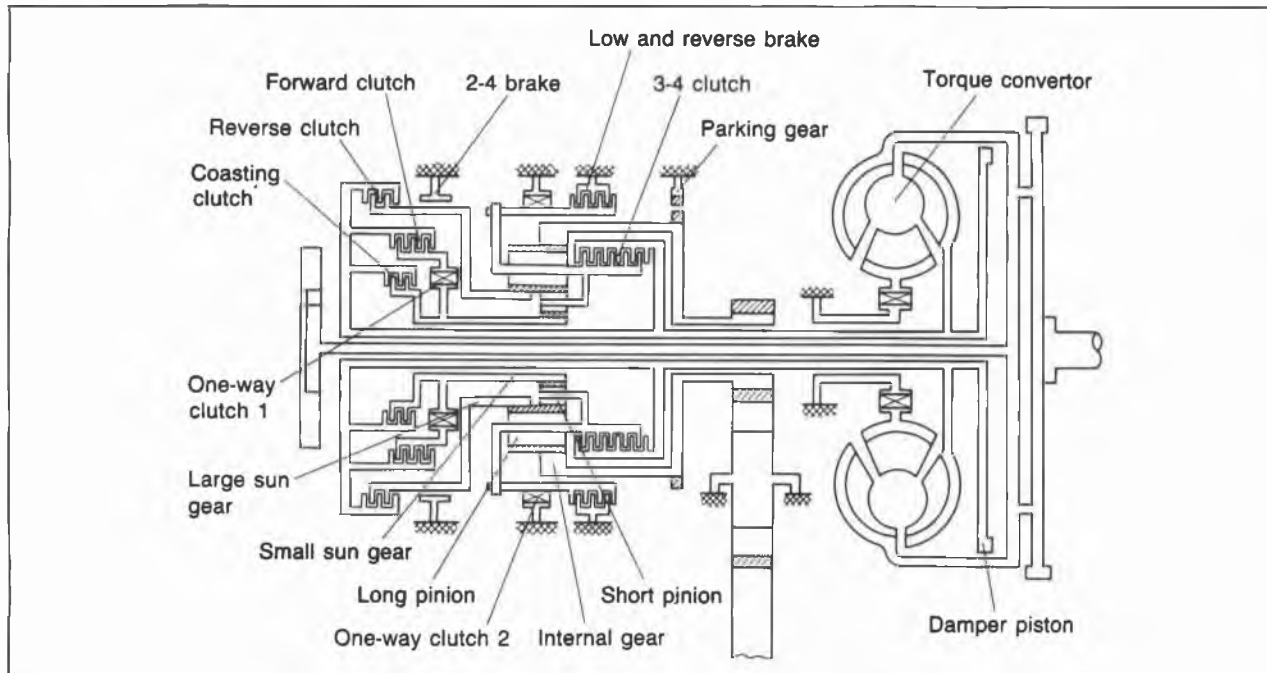


76G07B-005

- |                             |                          |                              |
|-----------------------------|--------------------------|------------------------------|
| 1. Coasting clutch          | 7. Low and reverse brake | 13. Control body             |
| 2. Forward clutch           | 8. Output gear           | 14. Oil pump                 |
| 3. Reverse clutch           | 9. Idle gear             | 15. Inhibitor switch         |
| 4. Reverse and forward drum | 10. Differential         | 16. Pulse generator          |
| 5. 3-4 clutch               | 11. Parking pawl         | 17. Fluid temperature switch |
| 6. 2-4 brake band           | 12. Throttle cable       |                              |

# 7B OUTLINE

## OPERATION OF COMPONENTS



76U07B-508

Operation Table (G4A-EL)

Range	Gear	Engine braking effect	Operation elements									
			Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake Applied	2-4 brake Released	Low & reverse brake	One-way clutch 1	One-way clutch 2	
P	—	—										
R	Reverse	Yes				○			○			
N	—	—										
D	1st	No	○							○	○	
	2nd	No	○					○		○		
	3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○		○	
		Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○	
	OD	Yes	⊙		○		○					
S	1st	No	○							○	○	
	2nd	No	○					○		○		
	3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○		○	
		Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○	
L	1st	No	○						○	○	○	
	2nd	Yes	○	○				○		○		
HOLD	D	2nd	No	○				○		○		
		3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○	○	
	Above approx. 40 km/h (25 mph)		Yes	○	○	○		⊗	○		○	
	S	2nd	Yes	○	○				○		○	
		3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○	○	
			Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○
		L	1st	Yes	○	○					○	○
	2nd		Yes	○	○				○		○	

⊗ : Indicates fluid pressure to servo but band not applied due to pressure difference in servo.

⊙ : Indicates that it does not function to transmission power.

76G07B-006

## Operation Table (G4A-HL)

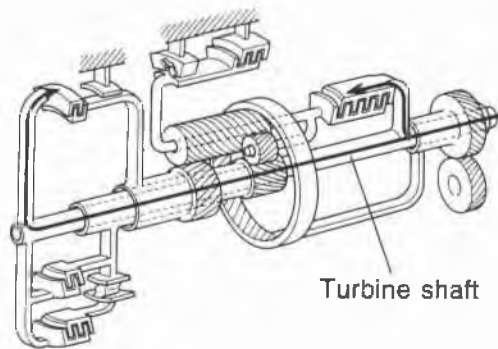
Range	Gear	Operation elements									
		Engine braking effect	Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake		Low & reverse brake	One-way clutch 1	One-way clutch 2
							Applied	Released			
P	—	—									
R	—	Yes				○			○		
N	—	—									
D	1st	No	○							○	○
	2nd	No	○				○			○	
	3rd	Yes	○	○	○		⊗	○		○	
	OD	Yes	⊙		○		○				
2	2nd	Yes	○	○			○			○	
1	1st	Yes	○	○				○	○	○	
	2nd	Yes	○	○			○			○	

76G07B-007

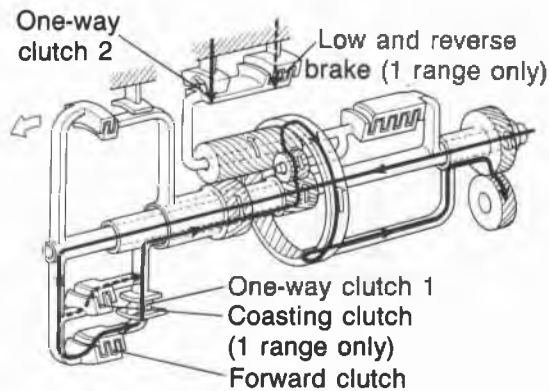
⊗ : Indicates fluid pressure to servo but band not applied due to pressure difference in servo.  
 ⊙ : Indicates that it does not function to transmit power.

## POWER FLOW DIAGRAM

### Neutral

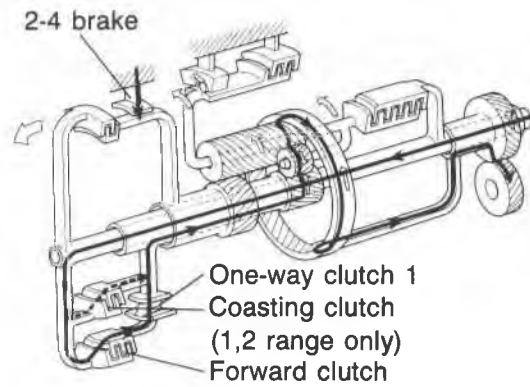


### 1st gear

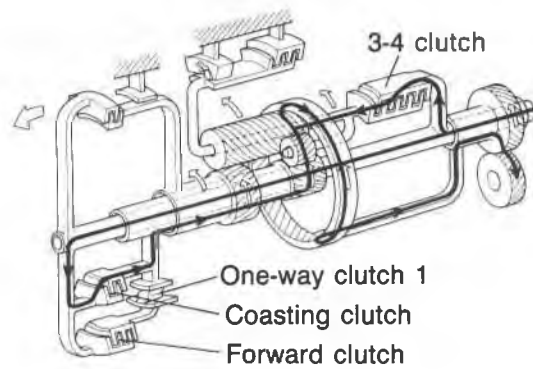


# 7B OUTLINE

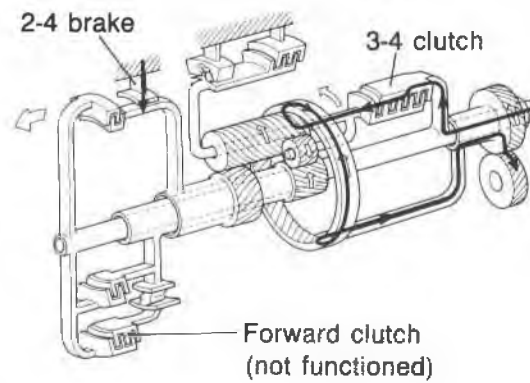
## 2nd gear



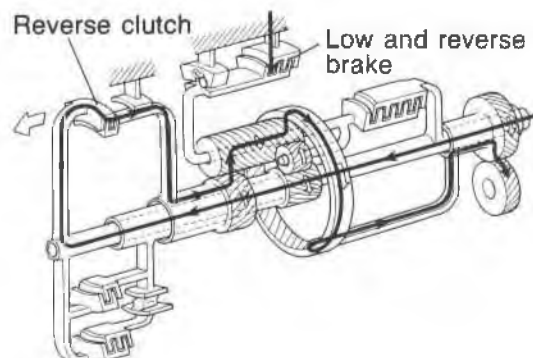
## 3rd gear



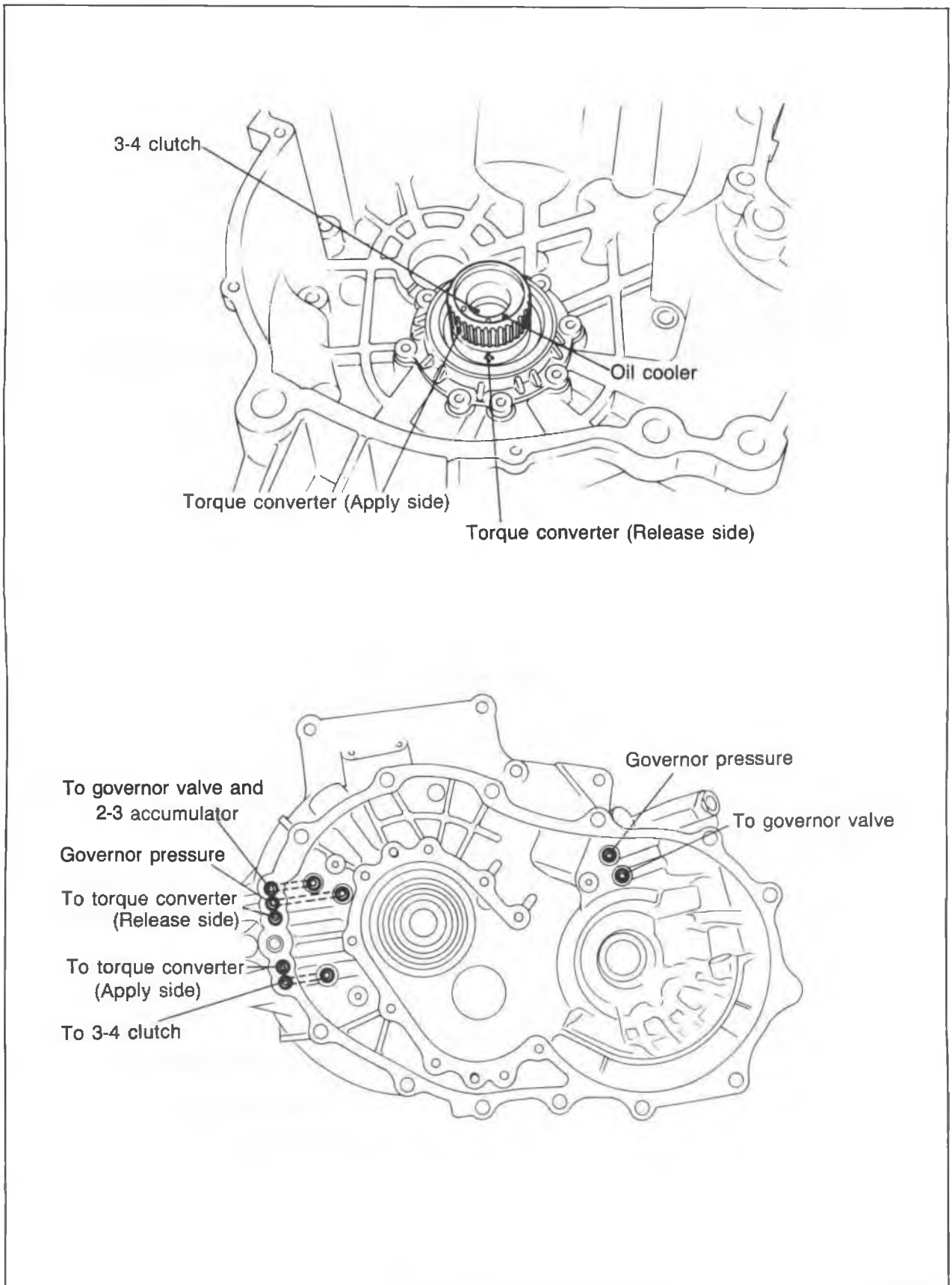
## Overdrive gear



## Reverse gear

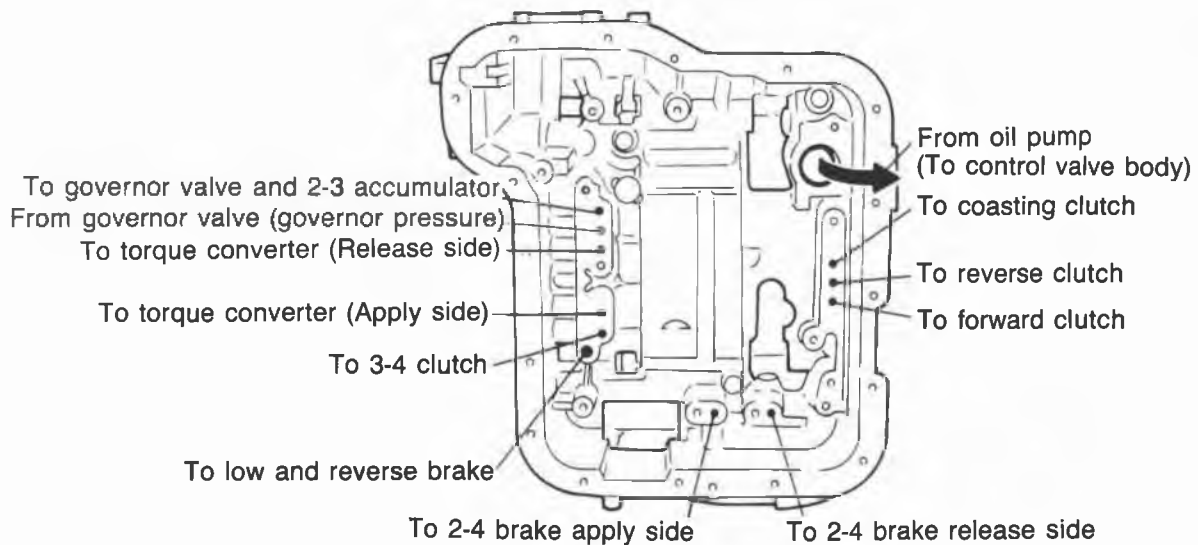
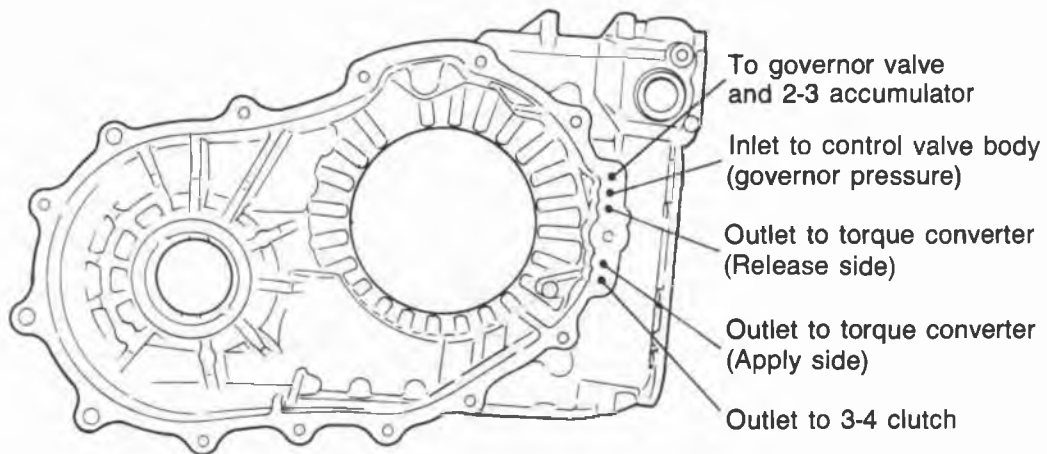


**FLUID PASSAGE LOCATION**  
**Converter Housing**



# 7B OUTLINE

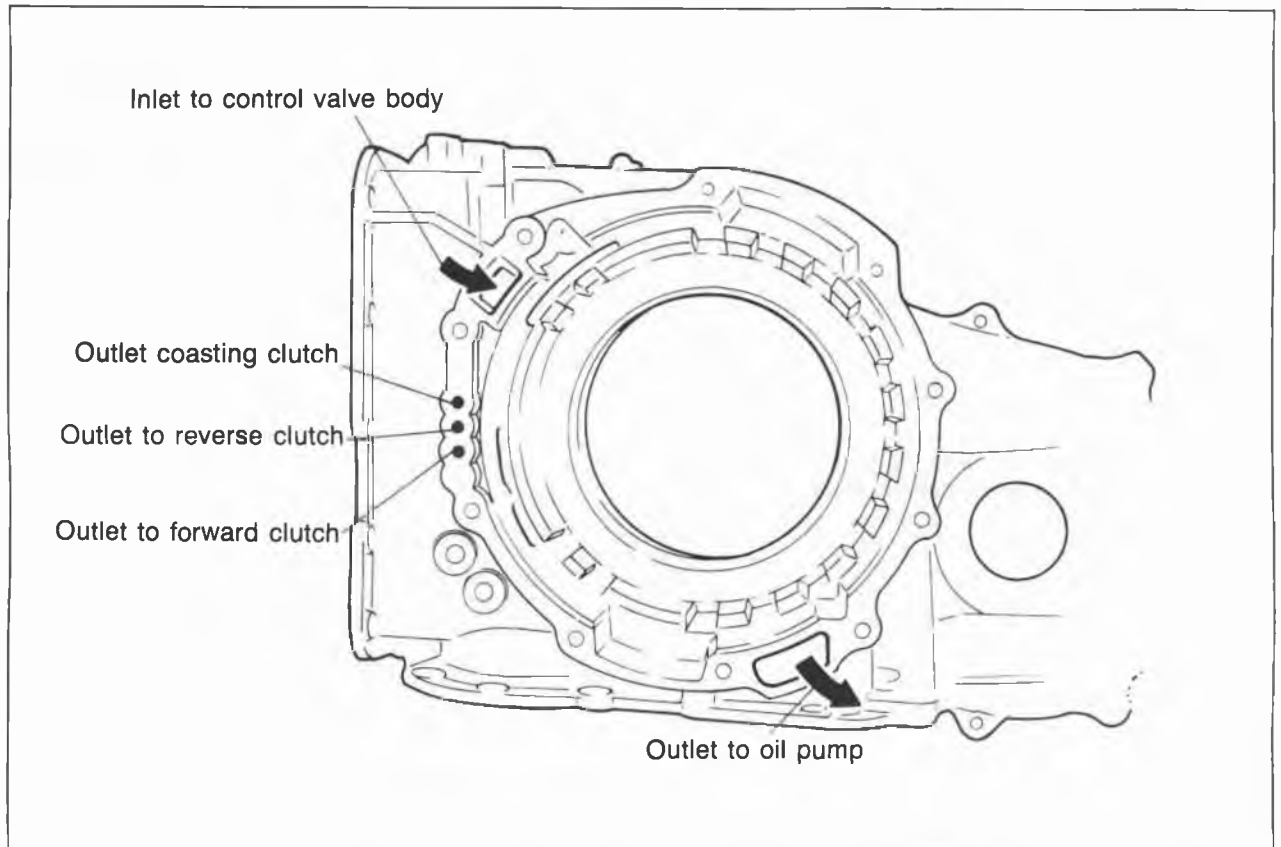
## Transaxle Case



76G07B-009

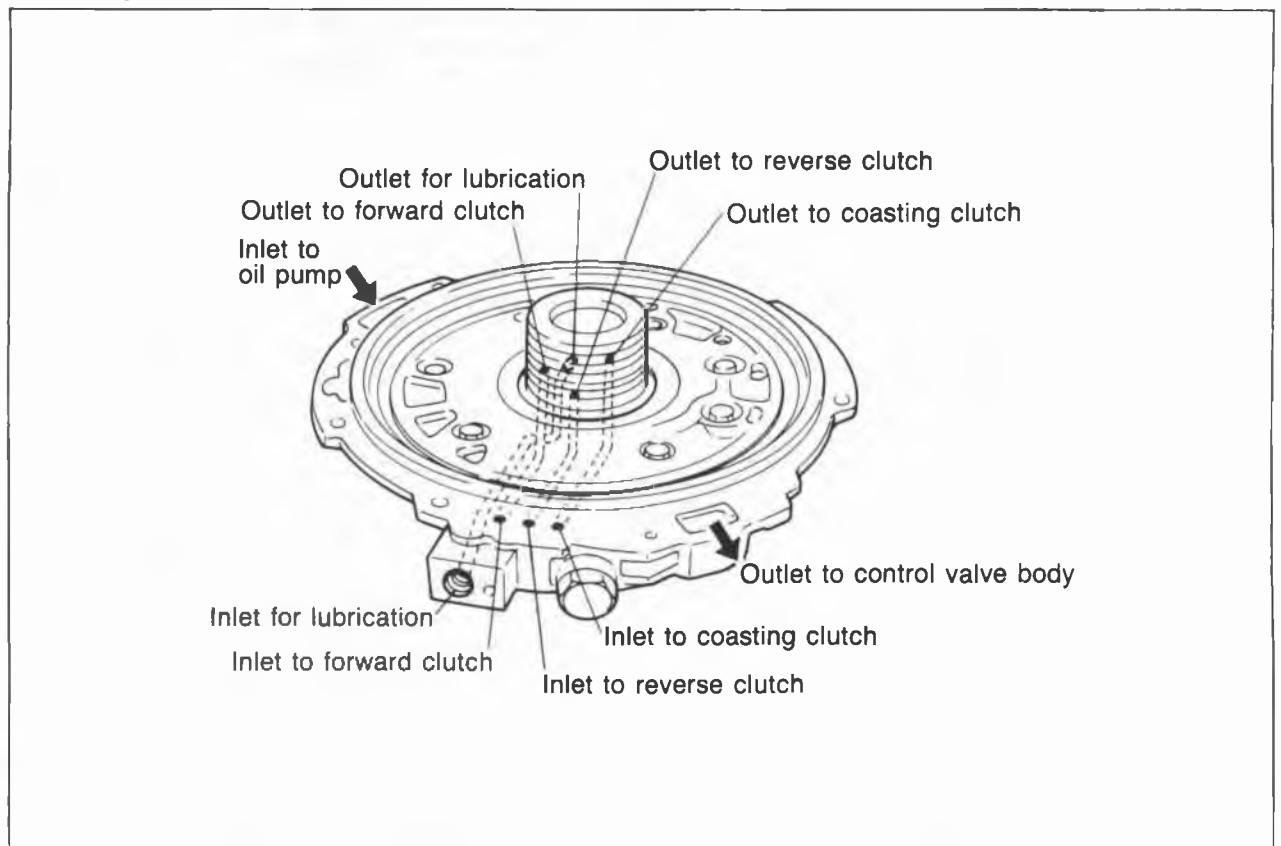


Transaxle Case



76G07B-010

Oil Pump



76G07B-011

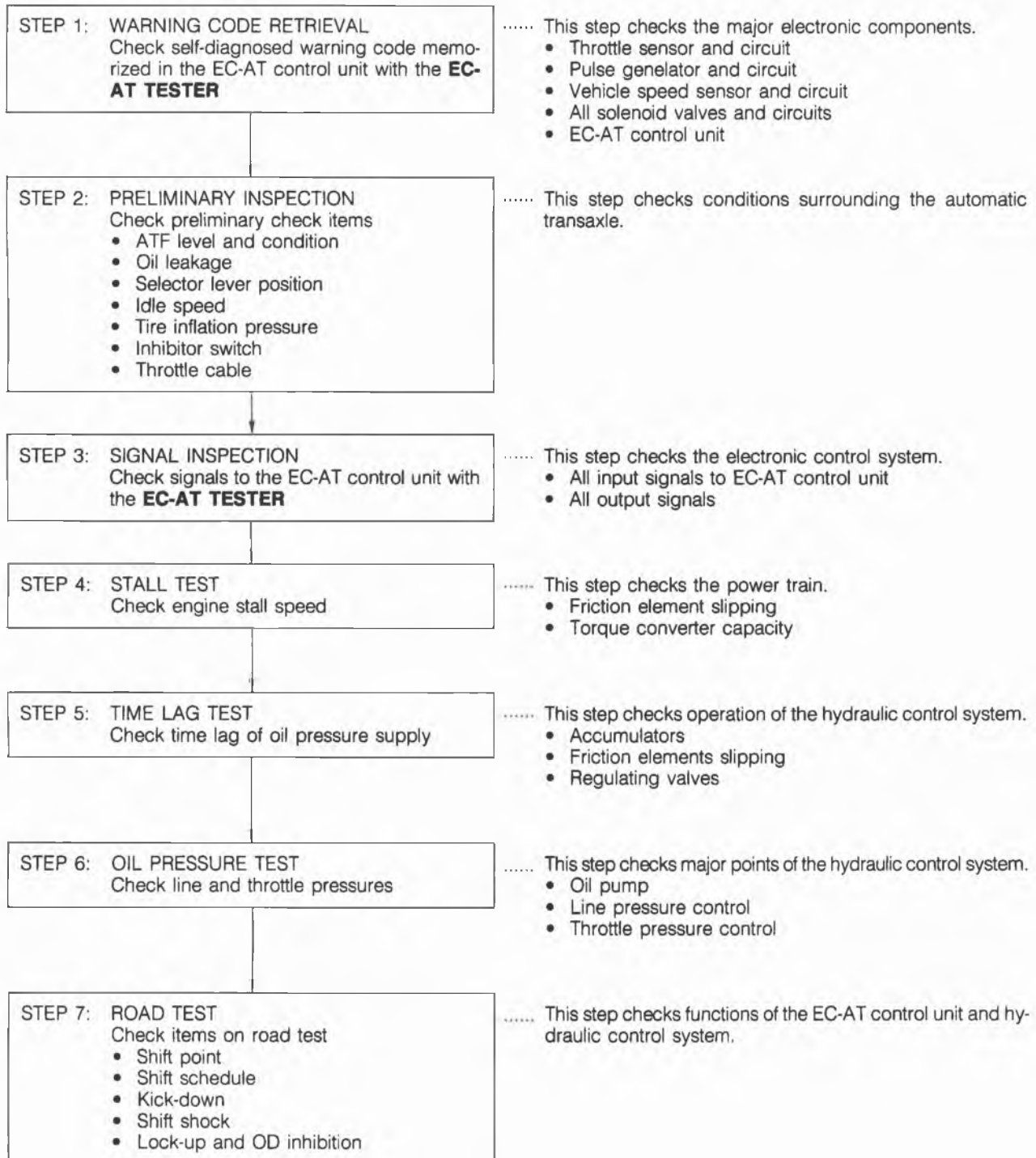
# 7B TROUBLESHOOTING (G4A-EL)

## TROUBLESHOOTING (G4A-EL)

### GENERAL NOTE

In the event of a problem with the EC-AT, the cause may be in the engine, EC-AT power train, hydraulic control system, or electronic control system.

When troubleshooting, therefore, it is recommended to begin from those points that can be judged quickly and easily. The recommended troubleshooting sequence is described below.



76G07B-012

By following the above seven steps, the cause of the problem should be located. As another guide to faster location of the causes of problems, the Quick Diagnosis Chart is included at pages 7B—13, 14.

In this chart, a circle is used to indicate the components that might be the cause of trouble for 23 types of problems. It is only necessary to check those components indicated by circles, at each step of the troubleshooting process, in order to quickly locate the cause of the problem.

### Quick Diagnosis Chart

The Quick Diagnosis Chart shows various problems and the relationship of various components that might be the cause of the problem.

1. Components indicated in the "Self-Diag." column are diagnosed by the EC-AT control unit self-diagnosis function.  
The **EC-AT Tester** can be used for easy retrieval of these signals.
2. Components indicated in the "Adjustment" column indicate that there is a possibility that the problem may be the result of an incorrect adjustment.  
Check the adjustment of each component, and readjust if necessary.
3. Input and output signals of the EC-AT control unit for the components indicated in the "EC-AT TESTER" column can be easily checked by using of the **EC-AT Tester**.
4. Components indicated in the "Stall Test" column can be checked for malfunction by the results of the stall test.
5. Components indicated in the "Time Lag Test" column can be checked for malfunction by the results of the time lag test.
6. Components indicated in the "Oil Pressure Test" column can be checked for malfunction by the results of the oil pressure test.
7. Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
8. The checking, adjusting, repair or replacement procedures for each component is described in the page(s) noted in the "Reference Page" column.

Inspection point  Item	Electronic control system														Preliminary	Hydraulic control system				Power train													
	Brake light switch	Inhibitor switch	Mode switch	Hold switch	Idle switch	Throttle sensor	Water temp. switch	Vehicle speed sensor	Pulse generator	1-2 solenoid	2-3 solenoid	3-4 solenoid	Lock-up solenoid	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake band and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly
Self-diag.																																	
Adjustment																																	
EC-AT TESTER																																	
Stall Test																																	
Time Lag Test																																	
Oil Pressure Test																																	
Road Test																																	

76G07B-013

# 7B TROUBLESHOOTING (G4A-EL)

Inspection point and reference page	ON VEHICLE										OFF VEHICLE																							
	Electronic control system						Preliminary	Hydraulic control system				Power train																						
	7B-66	7B-65	7B-63	7B-63	Section 4B	Section 4B	7B-66	7B-68	7B-68	7B-69	7B-69	7B-69	7B-69	7B-71	7B-72	7B-73	Section 4B	7B-77, 137	7B-132, 141	7B-108	7B-231	7B-107	7B-113	7B-113	7B-113	7B-113	7B-128	7B-135	7B-134	7B-122	7B-126	7B-135	7B-126	7B-177
<b>Condition</b>	Brake light switch	Inhibitor switch	Mode switch	Hold switch	Idle switch	Throttle sensor	Water temp. switch	Vehicle speed sensor	Pulse generator	1-2 solenoid	2-3 solenoid	3-4 solenoid	Lock-up solenoid	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake band and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly	
	<b>Condition</b>																																	
Accelerating	Vehicle does not move in D, S, L, or R range																																	
	Vehicle moves in N range																																	
Shifting	Excessive creep																																	
	No creep at all																																	
	No shift																																	
	Abnormal shift sequence																																	
	Frequent shifting																																	
	Excessively high or low shift point																																	
	No lock-up																																	
No kick-down																																		
Slipping	Engine run away or slip when starting vehicle																																	
	Engine run away or slip when up- or down-shifting																																	
Shift shock	Excessive N to D or N to R shift shock																																	
	Excessive shift shock when up-shifting or downshifting																																	
	Excessive shift shock when changing range																																	
Noise	Transaxle noisy in N or P range																																	
	Transaxle noisy in D, S, L, or R range																																	
Others	No engine braking																																	
	No mode change																																	
	Transaxle overheats																																	
	Vehicle moves in "P", or parking gear not disengaged when "P" is disengaged																																	
	Hold indicator flashes																																	
Engine will not start																																		

76G07B-014

## STEP 1 (WARNING CODE RETRIEVAL)








### Self-diagnosis Function

The self-diagnosis system, which is integrated in the EC-AT control unit, diagnoses malfunction of the main sensors (input) and solenoid valves (output), and the EC-AT control unit.

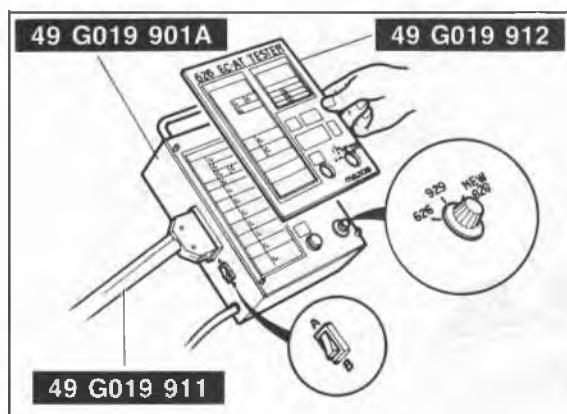
Malfunctions which have happened or are continuing are memorized in the EC-AT control unit as specific codes.

The **EC-AT Tester** is used to retrieve these warning codes. Each malfunction is indicated by a code number and buzzer as shown the table below.

### Code Number

Code number	Location of malfunction	Buzzer
06	Vehicle speed sensor or circuit	
12	Throttle sensor or circuit	
55	Pulse genelator or circuit	
60	1-2 shift solenoid valve or circuit	
61	2-3 shift solenoid valve or circuit	
62	3-4 shift solenoid valve or circuit	
63	Lock-up solenoid valve or circuit	

76G07B-213



76G07B-603

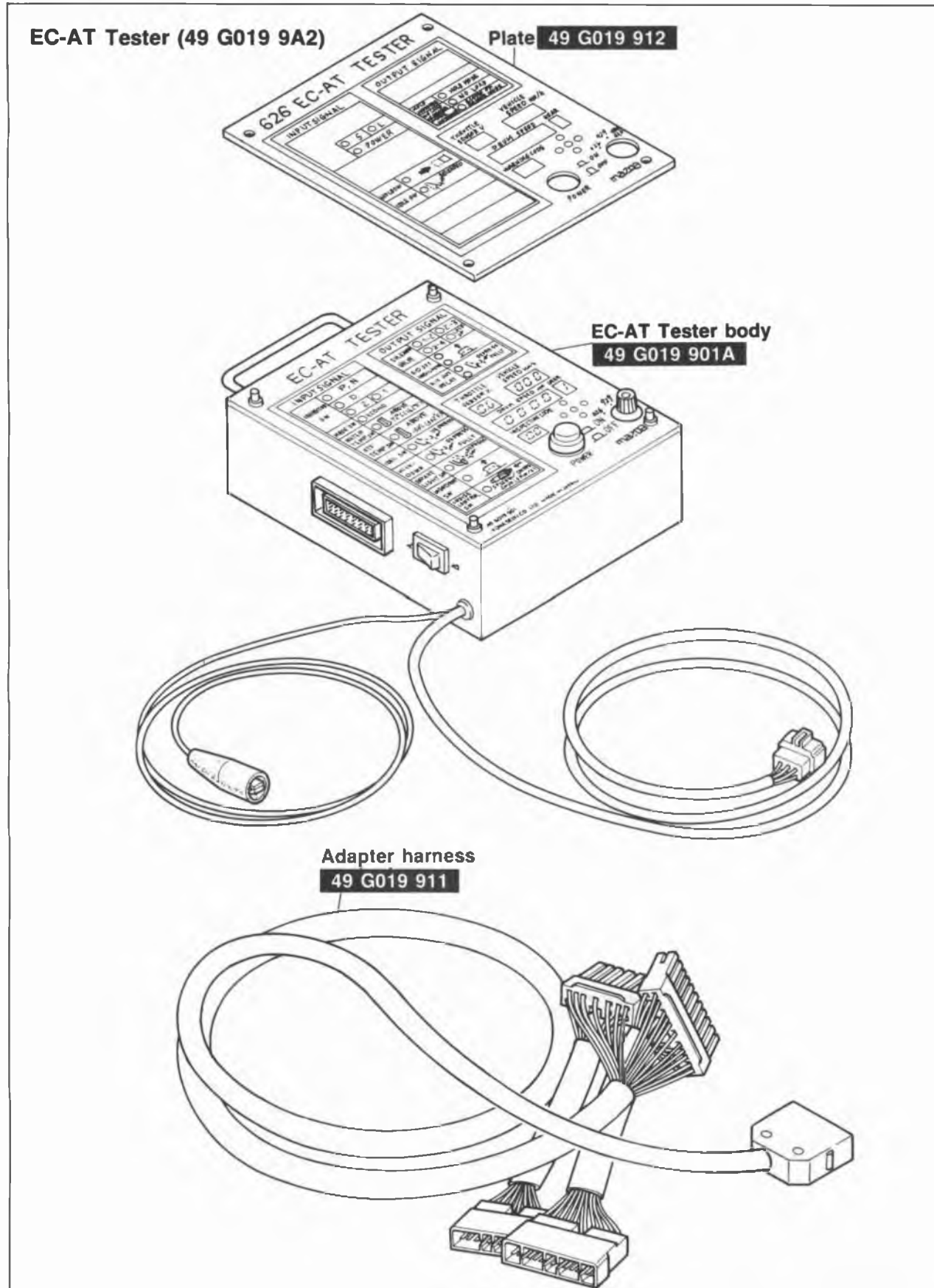
### EC-AT Tester

#### Assembly of EC-AT tester

1. Set the **plate** (49 G019 912) onto the **EC-AT tester body** (49 G019 901A).
2. Connect the **adapter harness** (49 G019 911) to the **EC-AT tester body**.
3. Select the code select switch to A position.
4. Select the select switch to NEW 626 position.

# 7B TROUBLESHOOTING (G4A-EL)

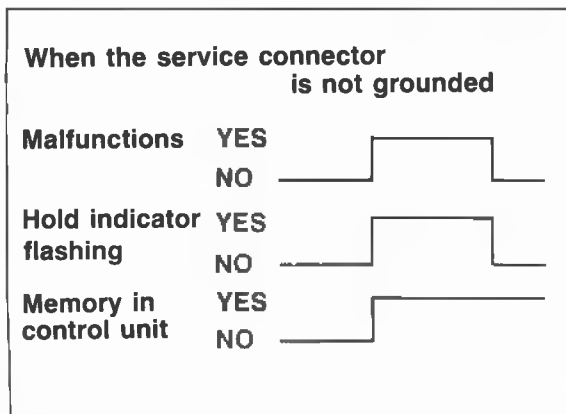
## Components



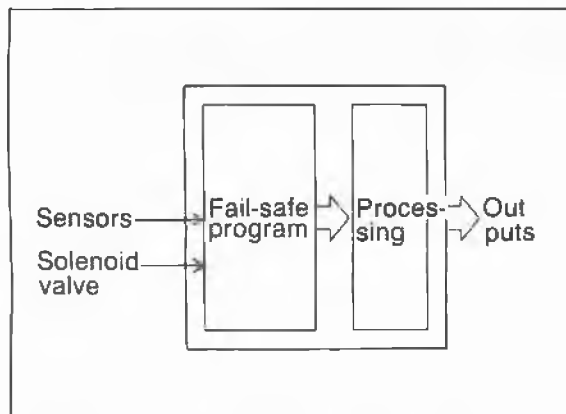
86U07B-013

**06 → 4 second period →**  
**55 → 4 second period →**  
**63 → 4 second period →**  
**Repeats above**

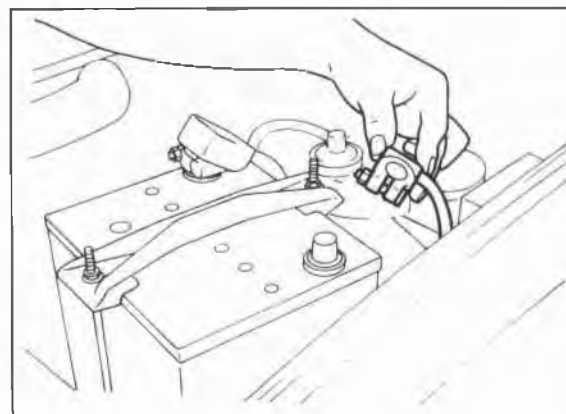
86U07B-018



76G07B-015



79G07C-062



79G07C-063

### General Note

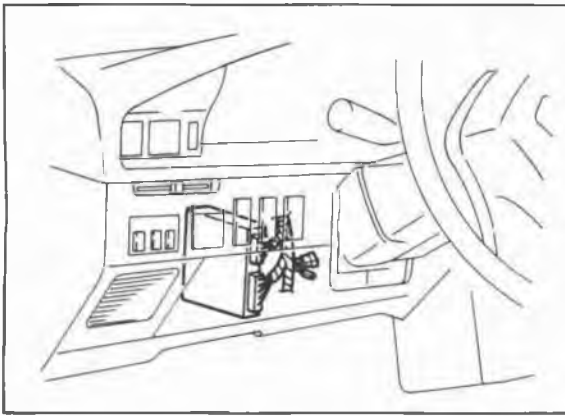
1. If there is more than one malfunction, the code numbers will be displayed on the tester one by one in a numerical order. In the case of malfunctions, 55, 06, and 63, the code numbers are displayed in an order of 06, 55, then 63. The display is as shown.

2. The hold indicator flashes to indicate the same pattern as the buzzer of the EC-AT Tester when the EC-AT service connector is grounded. When the EC-AT service connector is not grounded, the indicator flashes in a constant frequency while a malfunction is occurring and goes out if the malfunction recovers. However, the warning code is memorized in the EC-AT control unit.

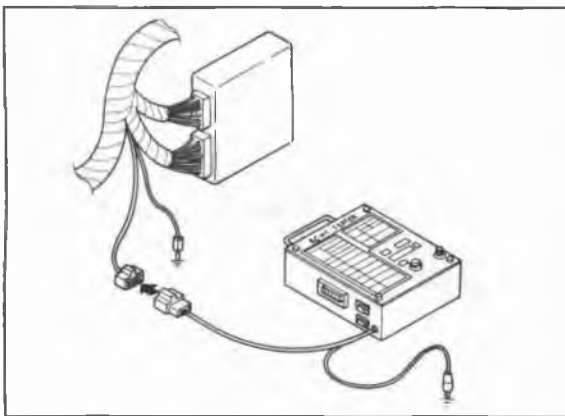
3. The EC-AT control unit has a built-in fail-safe function for the throttle sensor, the pulse generator, and the 1-2, 2-3, and 3-4 shift solenoid valves. If a malfunction occurs, the EC-AT control unit will control operation of the remaining components according to a preset fail-safe program. The vehicle may still be driven, although the driving performance will be slightly affected.

4. The memory of warning codes is canceled by disconnecting the negative battery terminal for approx. five seconds.

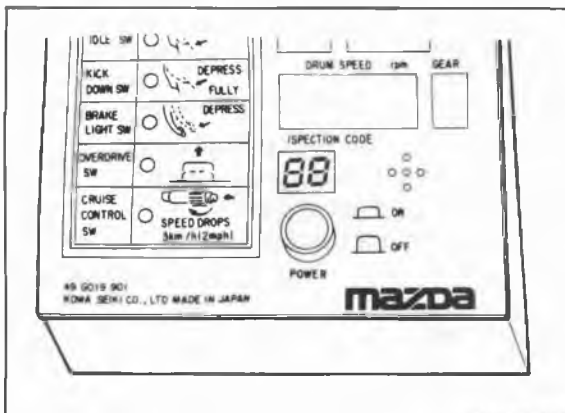
## 7B TROUBLESHOOTING (G4A-EL)



86U07B-019



76G07B-214



76G07B-016

### Retrieval Procedure

1. Locate the service connector.

2. Ground the ground connector of the **EC-AT Tester**.
3. Connect the 6-pin connector of the **EC-AT Tester** to the service connector.

### Note

**The service connector is blue-colored connector.**

4. Ground the 1 pin service connector.

### Note

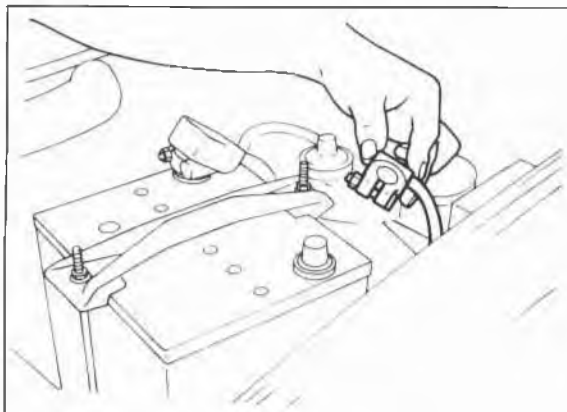
**The service connector is blue-colored connector.**

5. Turn the ignition switch ON.
6. Check that "88" flashes on the digital display and the buzzer sounds for three seconds after turning the ignition switch ON.
7. If "88" does not flash, check the service connector wiring.
8. If "88" flashes and the buzzer sounds continuously for more than **20 seconds**, check wiring to 2M terminal of the EC-AT control unit for short-circuit then replace the EC-AT control unit and repeat steps 3 and 4.
9. Note the code numbers and check for the causes by referring to the Inspection Procedure shown on pages 7B—19 to 7B—21, repair as necessary.

### Note

**After repairs are made, recheck for code numbers by performing the "After-repair procedure."**





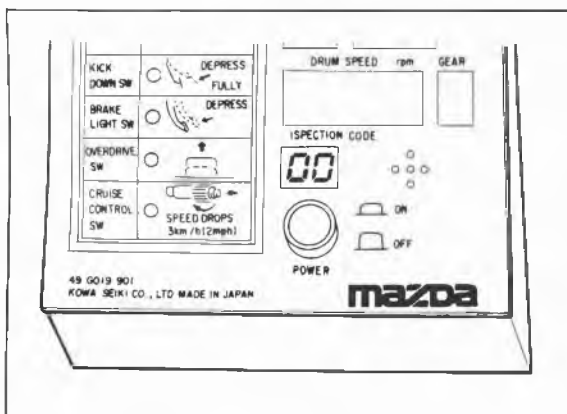
79G07C-068

**Drive at 50 km/h (31 mph)**

**Kick-down**

**Stop the vehicle**

79G07C-069



79G07C-070

### After-repair Procedure

1. Cancel the memory of malfunctions by disconnecting the negative battery terminal for at least five seconds, then reconnect it.
2. Remove the EC-AT tester if it is connected.

3. Drive the vehicle at 50 km/h (31 mph), then depress the accelerator pedal fully to activate kick-down. Stop the vehicle gradually.

4. Reconnect the **EC-AT tester** to the 6-pin service connector.
5. Ground the 1-pin service connector with a jumper wire.
6. Turn the ignition switch ON.
7. Check that no code numbers are displayed.

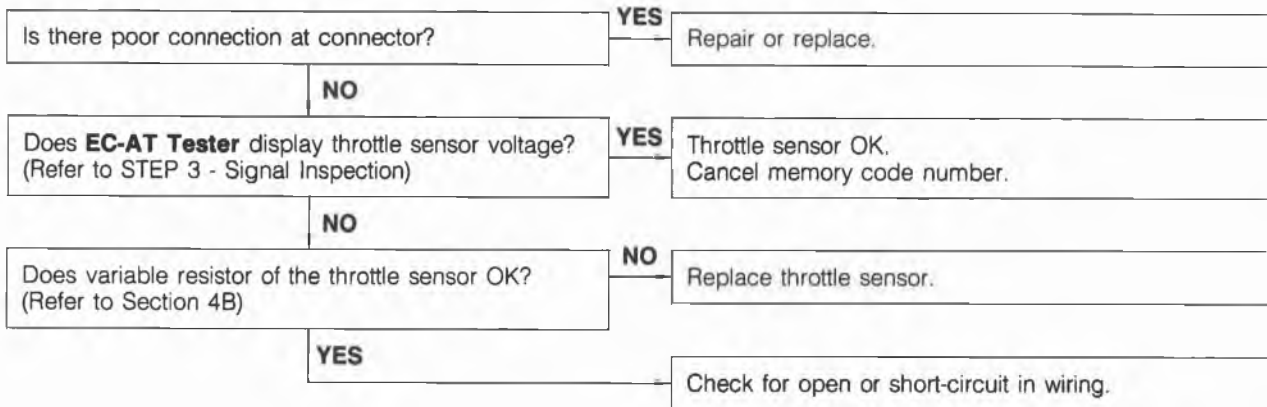
### Inspection Procedure No. 06 code display (Vehicle speed sensor)

Is there poor connection at connector?	YES	Repair or replace.
	NO	
Does <b>EC-AT Tester</b> display vehicle speed? (Refer to STEP 3-Signal Inspection)	YES	Vehicle speed sensor OK. Cancel memory of code number.
	NO	
Does vehicle speed sensor operate correctly? (Refer to page 7B-68)	NO	Check speedometer.
	YES	Check for open or short-circuit in wiring.

76G07B-017

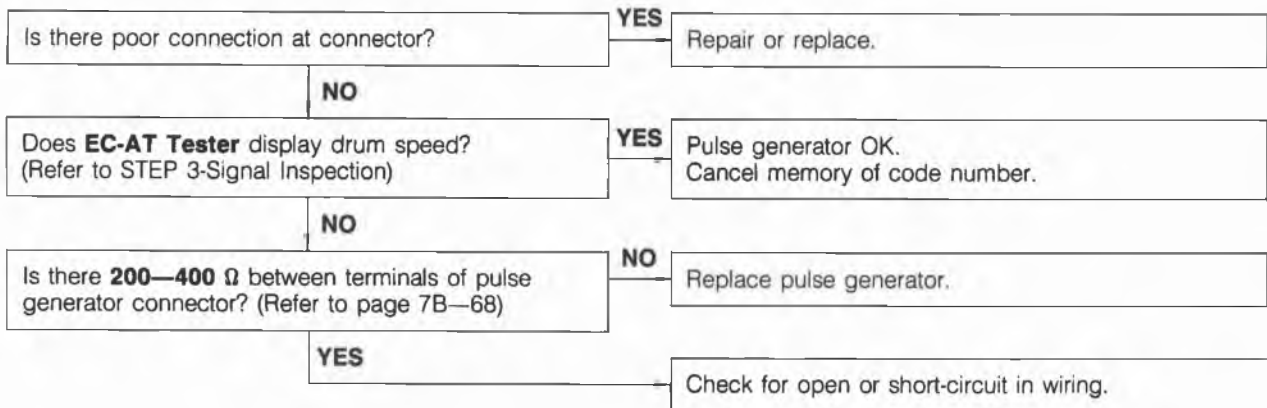
# 7B TROUBLESHOOTING (G4A-EL)

## No. 12 code display (Throttle sensor)



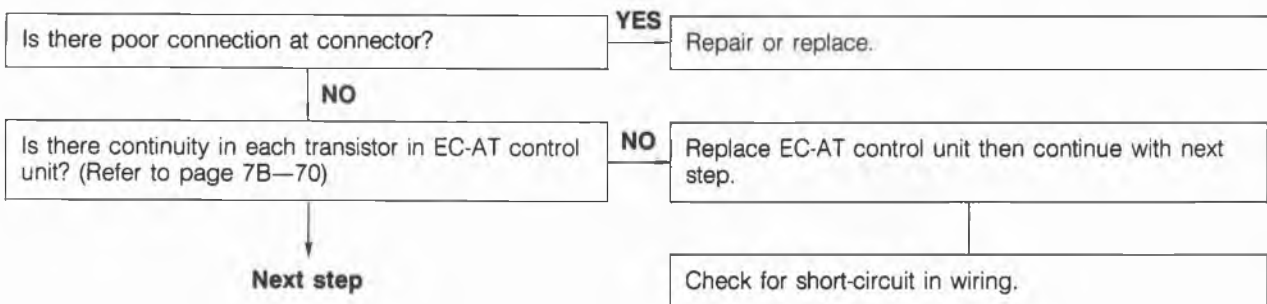
76G07B-018

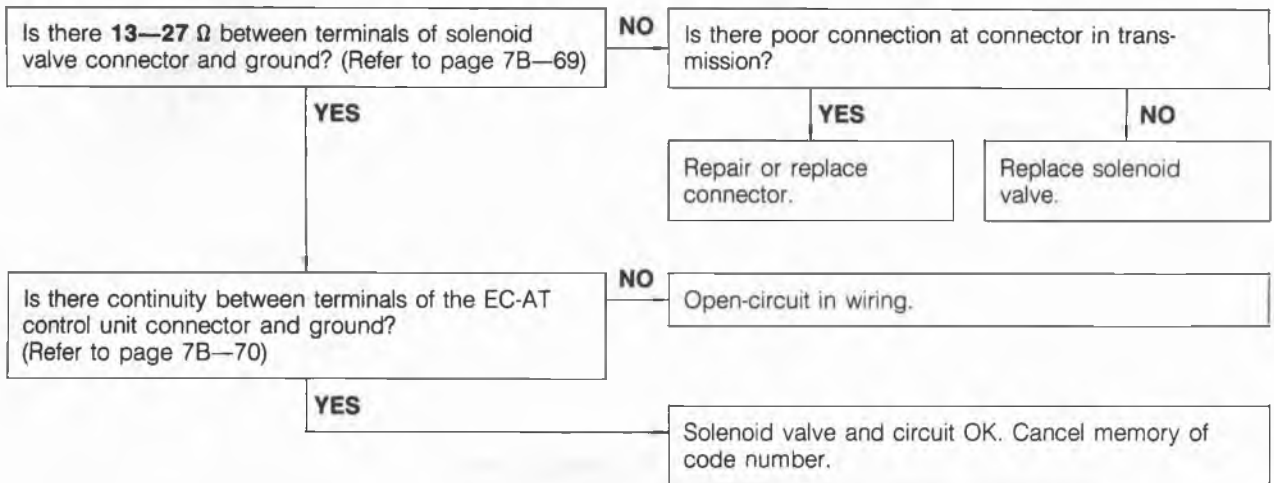
## No. 55 code display (Pulse generator)



76G07B-019

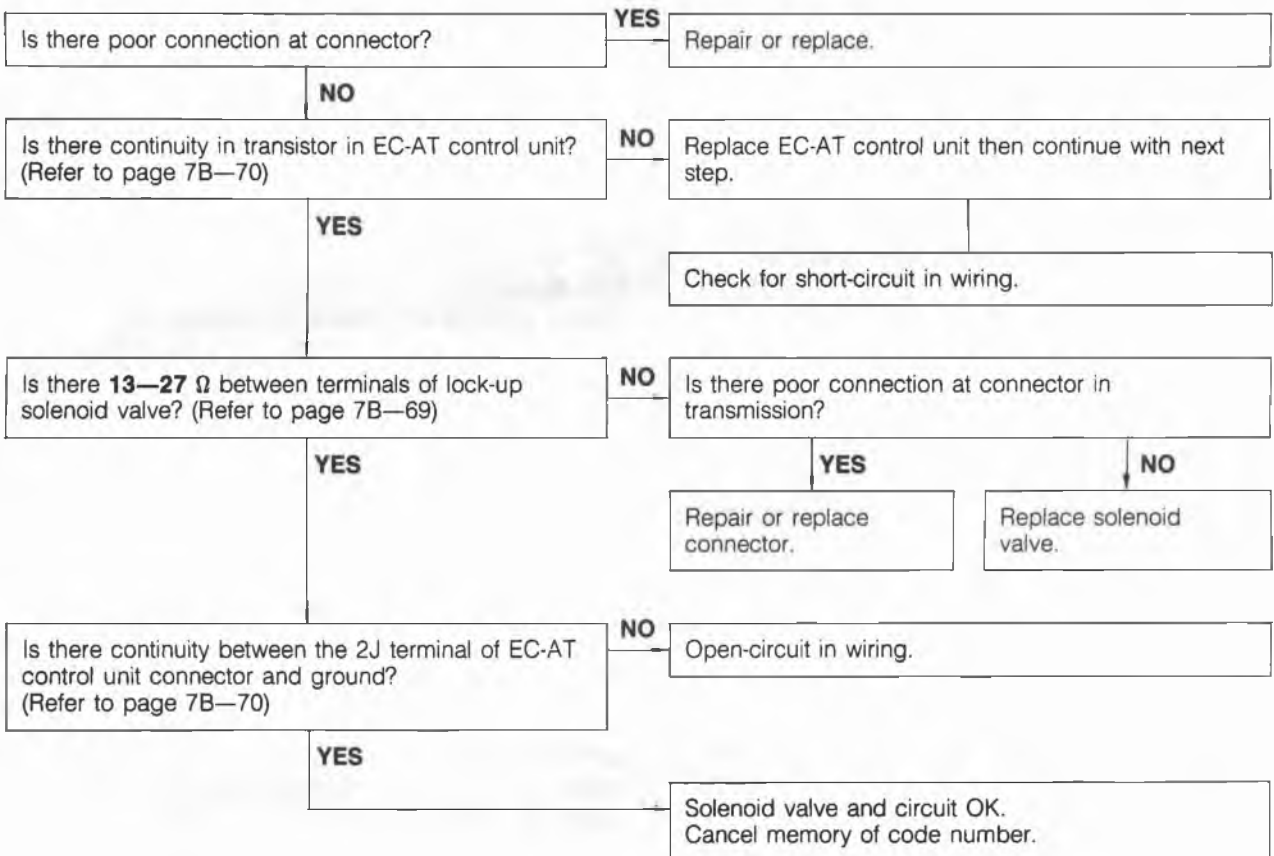
## No. 60, 61, 62, or 64 code display (1-2 shift, 2-3 shift, or 3-4 shift solenoid valve)





76G07B-020

## No. 63 code display (Lock-up solenoid valve)



76G07B-021

# 7B TROUBLESHOOTING (G4A-EL)

## STEP 2 (PRELIMINARY INSPECTION)

In this step, the fundamental points related to the automatic transaxle are checked. These points must be kept in the correct condition at all times in order to assure proper operation of the automatic transaxle.

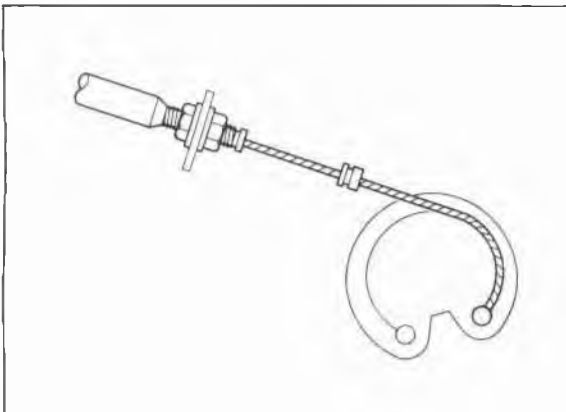
### 1. Automatic Transmission Fluid (ATF)

Check ATF level and condition. (Refer to page 7B—71)

### 2. Selector Lever

Check selector lever position and adjust if necessary. (Refer to page 7B—72)

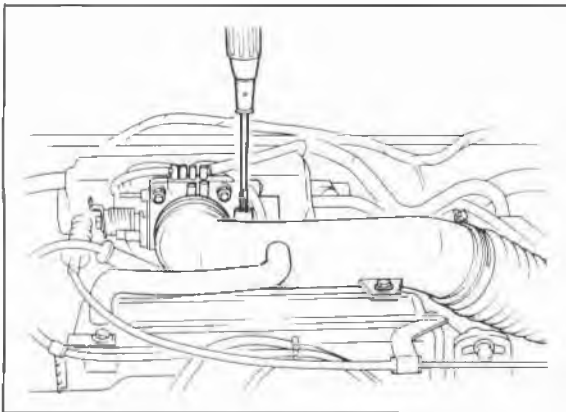
76G07B-022



76G07B-023

### 3. Throttle cable

- (1) Check the inner and outer cable for damage.
- (2) Make sure that the accelerator operates smoothly.



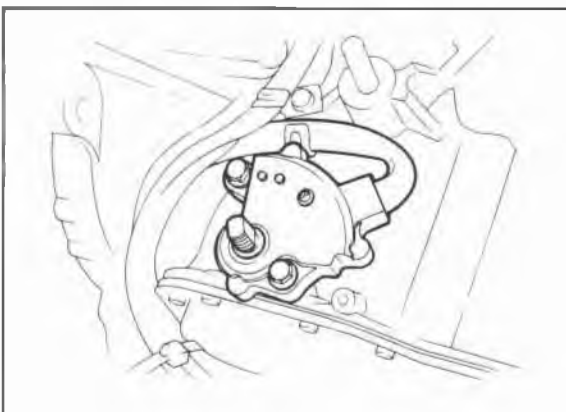
76G07B-024

### 4. Idle Speed

Check idle speed. (Refer to Section 4B)

### 5. Tire Inflation Pressure

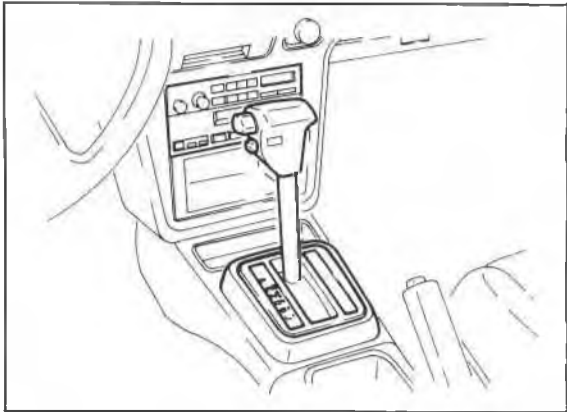
Check tire inflation pressure. (Refer to Section 12)



76G07B-025

### 6. Inhibitor Switch

Check the inhibitor switch for operation. (Refer to page 7B—65)



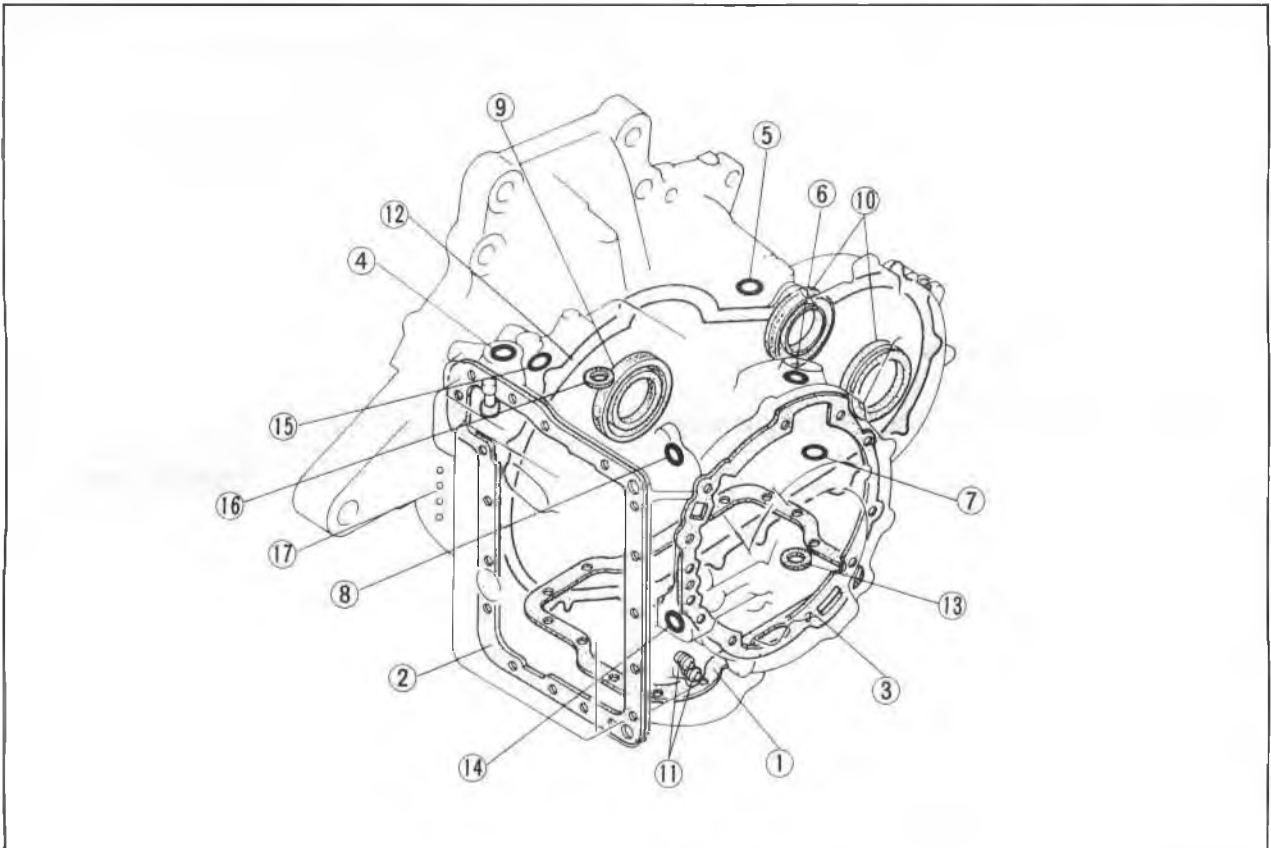
76G07B-026

## 7. Oil Leakage

Check for oil leakage.

- (1) Warm up the ATF.
- (2) Apply the parking brake and block the wheels to prevent the vehicle from rolling.
- (3) Shift the selector lever to R range.
- (4) Check if oil leaks from the following oil seals or gaskets.
- (5) If oil leaks, replace the oil seal or gasket.

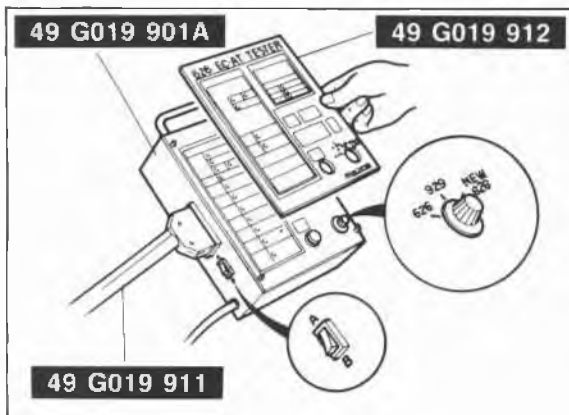
Check for fluid leaks; the following figure shows the locations where fluid leakage may possibly occur.



76G07B-027

- |                             |                              |
|-----------------------------|------------------------------|
| 1. Oil pan                  | 10. Driveshaft               |
| 2. Control valve body cover | 11. Square head plug         |
| 3. Oil pump                 | 12. Transaxle case           |
| 4. Inhibitor switch         | 13. Drain plug               |
| 5. Speedometer driven gear  | 14. Oil cooler return pipe   |
| 6. Pulse generator          | 15. Oil cooler outlet pipe   |
| 7. Oil filler tube          | 16. Fluid temperature switch |
| 8. Throttle cable           | 17. Blind plugs              |
| 9. Bearing cover            |                              |

# 7B TROUBLESHOOTING (G4A-EL)

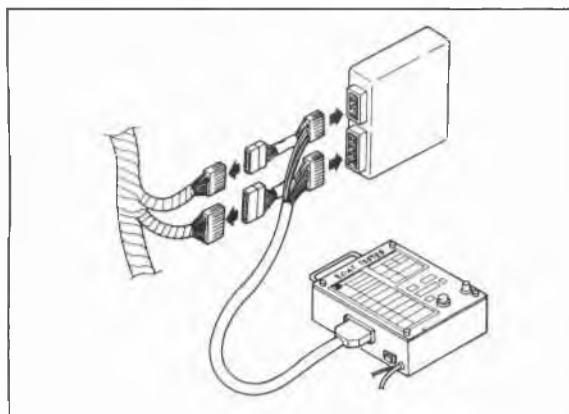


86U07B-030

## STEP 3 (SIGNAL INSPECTION)

In this step, the input and output signals are checked with the **EC-AT Tester**.

The Tester checks for proper operation of the various switches and sensors in the EC-AT system. It also checks the control unit for output of the various control signals. Powertrain slippage is also checked.



86U07B-031

## Inspection Procedure

1. Disconnect the connectors from the EC-AT control unit.
2. Connect the adaptor harness between the control unit and the connectors.
3. Turn the ignition switch and main switch ON.
4. Check indication of the respective light or digital display in each condition, referring to the indication table below.

## Indication table of light and digital display

Item	Indication	Condition	Possible cause	
<b>Input (Light)</b>				
INHIBITOR SW	L	ON	L range	Inhibitor switch or wiring
		OFF	Other ranges	
	S	ON	S range	
		OFF	Other ranges	
	D	ON	D range	
		OFF	Other ranges	
P,N	ON	P or N range		
	OFF	Other ranges		
HOLD SW	ON	Hold switch pushed	Hold switch or wiring	
	OFF	Hold switch released		
MODE SW	ON	Power mode	Mode switch or wiring	
	OFF	Economy mode		
IDLE SW	ON	Throttle valve fully closed	Idle switch or wiring	
	OFF	Throttle valve open		

## TROUBLESHOOTING (G4A-EL) 7B

Item	Indication	Condition	Possible cause
BRAKE LIGHT SW	ON	Brake pedal depressed	Brake light switch or wiring
	OFF	Brake pedal released	
WATER TEMP SW	ON	Coolant temperature 72°C (162°F) or above	Water temp switch or wiring
	OFF	Coolant temperature lower than 65°C (149°F)	
ATF TEMP SW	ON	ATF temperature 150°C (302°F) or above	Fluid temperature switch or wiring
	OFF	ATF temperature lower than 143°C (289°F)	
CRUISE CONTROL SW	Not used	—	—
<b>Input (Digital display)</b>			
THROTTLE SENSOR	EC-AT control unit terminal voltage	All the time	Throttle sensor, idle switch or wirings
VEHICLE SPEED*	Vehicle speed calculated from speed sensor signal	All the time	Vehicle speed sensor, speedometer cable, or wiring
DRUM SPEED*	Drum speed	All the time	Pulse generator or wirings
<b>Output (Light)</b>			
1-2 SOLENOID VALVE*	ON	Refer to page 7B—26 solenoid valve operation table	Control unit, 1-2 shift sol., or wiring
	OFF		
2-3 SOLENOID VALVE*	ON		Control unit, 2-3 shift sol., or wiring
	OFF		
3-4 SOLENOID VALVE*	ON		Control unit, 3-4 shift sol., or wiring
	OFF		
LOCK-UP SOLENOID VALVE*	ON	Lock-up condition	Control unit, lock-up sol., or wiring
	OFF	Non-lock-up condition	
HOLD INDICATOR	ON	Hold mode	Control unit, Hold switch, or wiring
	OFF	Other modes	
MODE INDICATOR	ON	Power or economy mode	Control unit, hold switch, mode switch, or wiring
	OFF	Hold mode	
NO LOAD SIGNAL	Not used	—	—

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# 7B TROUBLESHOOTING (G4A-EL)

Item	Indication	Condition
<b>OUTPUT (Digital display)</b>		
GEAR*	1	1st gear position
	2	2nd gear position
	3	3rd gear position
	4	Overdrive (OD) gear position

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### Note

a) The back-up condition is as following condition

**S range, hold mode, and the accelerator pedal depressed fully.**

b) The \* marked items should be checked during the engine running or driving.

### Comprehensive Usage

The **EC-AT Tester** can be used to inspect slippage of friction elements, shift points, and shift sequence during the road test.

The inspection procedure is shown in STEP 7 (ROAD TEST).

### Solenoid valve operation table

RANGE	GEAR		SOLENOID VALVES			
			1-2	2-3	3-4	Lock-up
P	Non				ON	
R	Reverse		ON			
N	—	Below approx. 18 km/h (11 mph)			ON	
		Above approx. 18 km/h (11 mph)	ON			
D		1st		ON	ON	
		2nd	ON	ON	ON	
	3rd	Below approx. 40 km/h (25 mph)				
		Above approx. 40 km/h (25 mph)	Lock-up OFF	ON		
			Lock-up ON	ON		ON
	OD		Lock-up OFF	ON		ON
		Lock-up ON	ON		ON	ON
S		1st		ON	ON	
		2nd	ON	ON	ON	
	3rd	Below approx. 40 km/h (25 mph)				
		Above approx. 40 km/h (25 mph)	ON			
L	2nd	1st		ON	ON	
		Below approx. 110 km/h (68 mph)	ON	ON		
		Above approx. 110 km/h (68 mph)	ON			
HOLD	D	2nd	ON	ON	ON	
		3rd	Below approx. 40 km/h (25 mph)			
	Above approx. 40 km/h (25 mph)		ON			
	S	2nd	ON	ON		
		3rd	Below approx. 40 km/h (25 mph)			
	Above approx. 40 km/h (25 mph)		ON			
	L	1st		ON		
		2nd	Below approx. 110 km/h (68 mph)	ON	ON	
			Above approx. 110 km/h (68 mph)	ON		



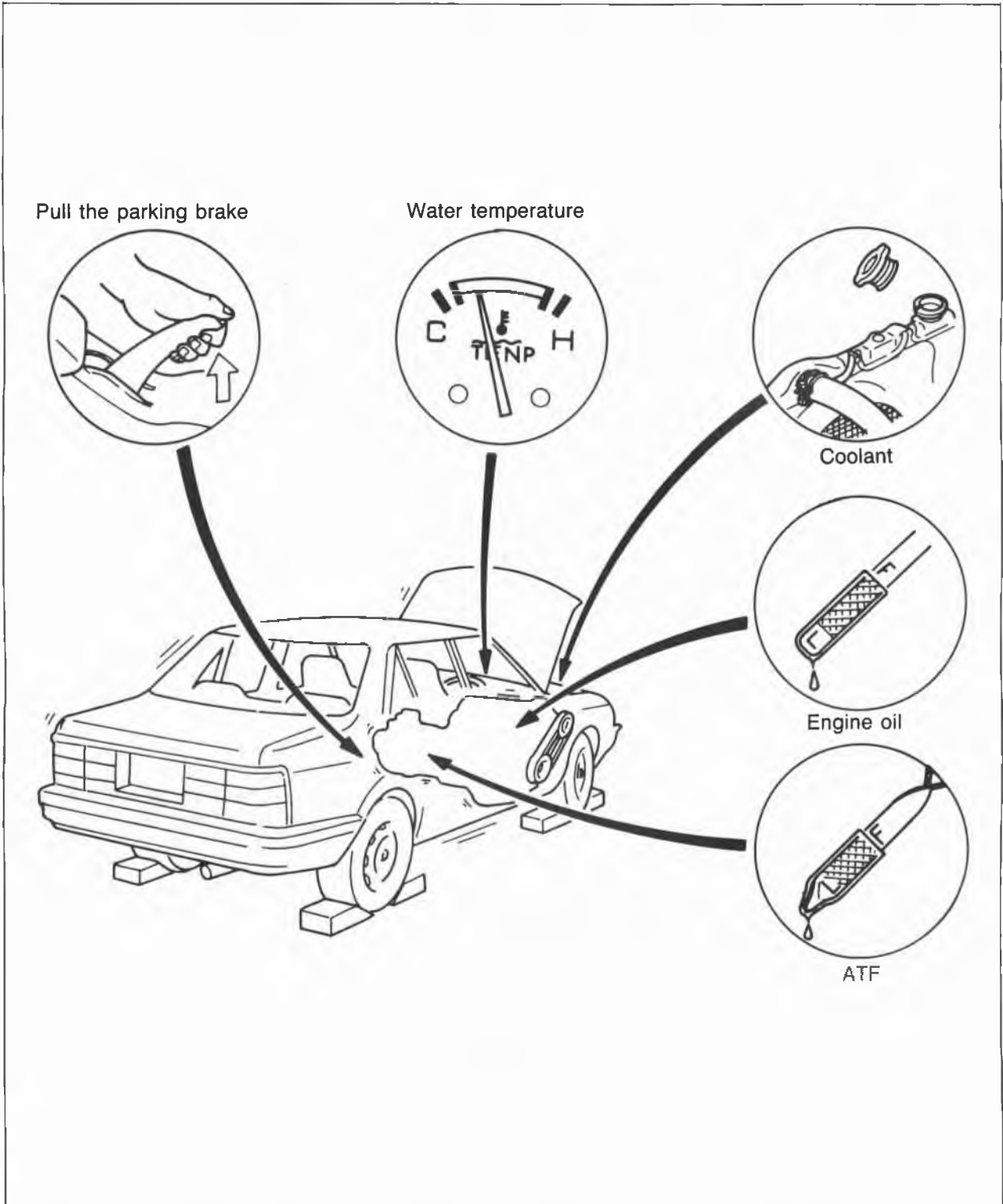
## STEP 4 (STALL TEST)

This step is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

### Preparation

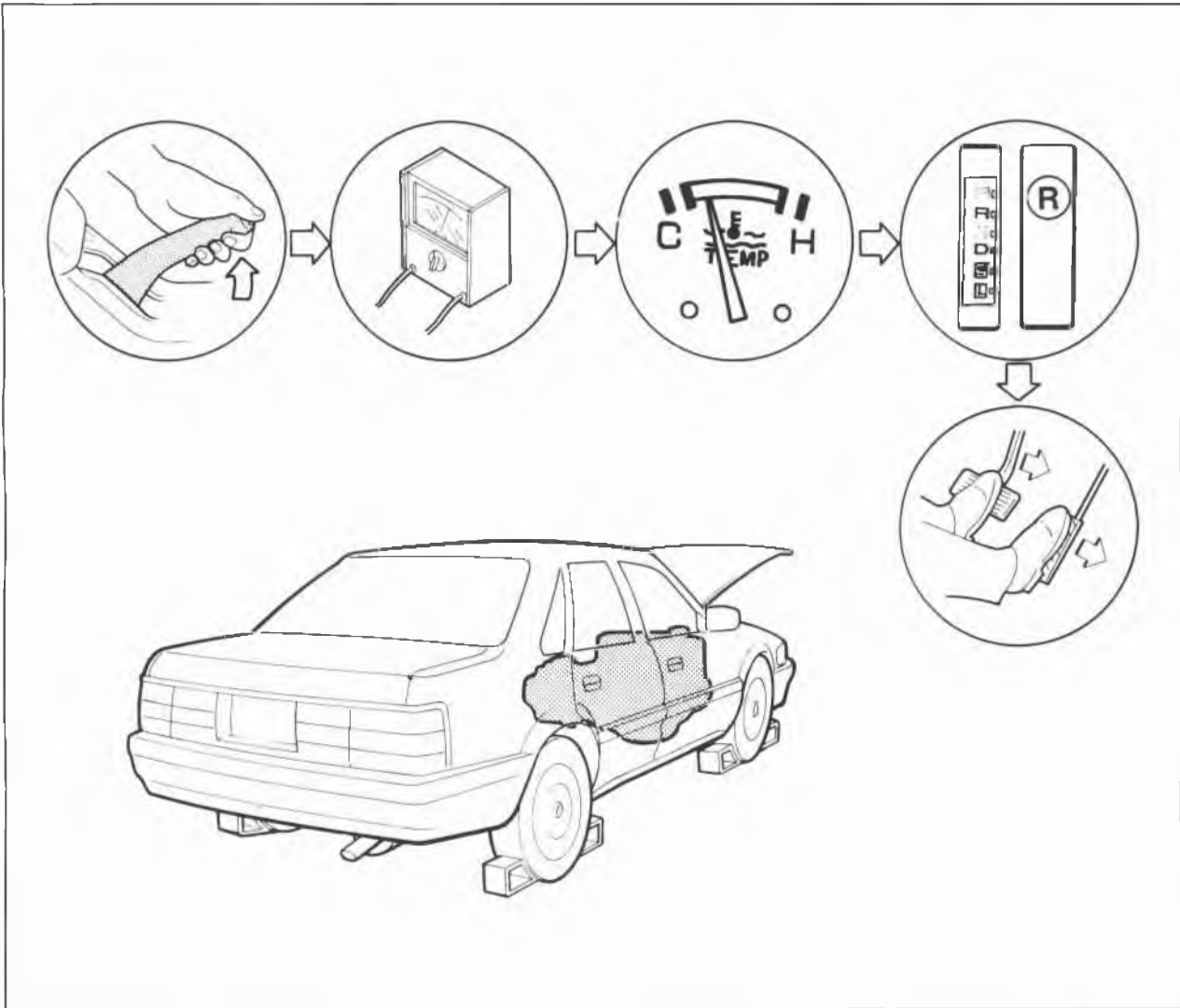
Check the following items prior to testing:

1. Engine coolant, engine oil and ATF levels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (50—80°C, 122—176°F).
3. Engage the parking brake and use wheel chocks at the front and rear wheels.



## 7B TROUBLESHOOTING (G4A-EL)

### Procedure



86U07B-034

1. Block the wheels and apply the parking brake.
2. Connect a tachometer to the engine.
3. Shift the selector lever to R.
4. Firmly depress the foot brake with the left foot, and gently depress the accelerator pedal with the right.
5. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.

#### Caution

**Steps 4 → 5 must be done within 5 seconds.**

6. Move the selector lever to N and let the engine idle for at least one minute.

#### Caution

**The reason for idling for at least one minute is to cool the ATF and to prevent deterioration of the fluid.**

7. Perform the stall test for the following ranges in the same manner.
- |                    |                    |
|--------------------|--------------------|
| (1) D range        | (4) L range        |
| (2) D range (Hold) | (5) L range (Hold) |
| (3) S range (Hold) |                    |

**Caution**

**Be sure to allow sufficient cooling time between each stall test.**

**Engine stall speed: D.S.L range 2170—2270 rpm**  
**R range 2130—2230 rpm**

**Note**

**The stall test can be performed with the EC-AT Tester in place of a tachometer.**

**Drum stall speed indication: 0 rpm**

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**Evaluation**

Condition		Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transmission case
			Stuck pressure regulator valve
	In forward ranges	Forward clutch slipping One-way clutch 1 slipping	
	In D range	One-way clutch 2 slipping	
	In S (Hold) and L (Hold) ranges	Coasting clutch slipping	
	In D (Hold) and S (Hold) ranges	2-4 brake band slipping	
	In R, L and L (Hold) ranges	Low and reverse brake slipping	
	In R range	Low and reverse brake slipping Reverse clutch slipping Perform road test to determine whether problem is low and reverse brake or reverse clutch a) Engine brake applied in 1st ...Reverse clutch b) Engine brake not applied in 1st ...Low and reverse brake	
Within specification		All shift control elements within transmission are functioning normally.	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

86U07B-036

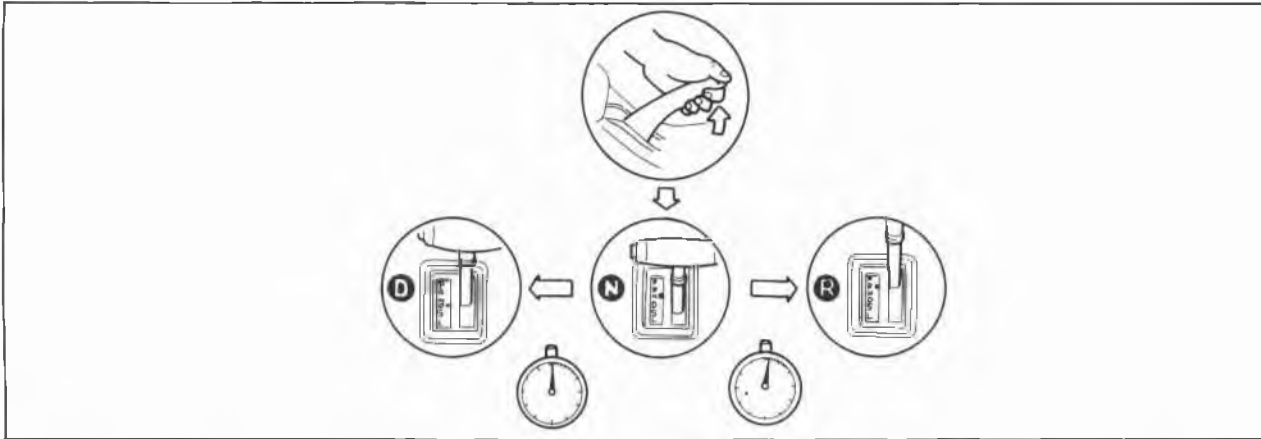
# 7B TROUBLESHOOTING (G4A-EL)

## STEP 5 (TIME LAG TEST)

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step checks this time lag for checking condition of the 1-2, N-R, and N-D accumulators, forward, and one-way clutches, 2-4 brake band, and low and reverse brake.

### Preparation

Perform the preparation procedure shown in the STEP 4 (STALL TEST).



76G07B-030

### Procedure

1. Start the engine and check the idle speed in P range.

**Idle speed: 900  $\pm$  5% rpm**

2. Shift from N range to D range
3. Measure the time it takes from shifting until shock is felt, with a stop watch.
4. Shift the selector to N range and run the engine at idle speed for at least one minute.
5. Perform the test for the following shifts in the same manner.
  - (1) N  $\rightarrow$  D range (Hold mode)
  - (2) N  $\rightarrow$  R range

### Note

**Make three measurements for each test and take the average value.**

**Specified time lag:** N  $\rightarrow$  D range ..... 0.5—1.0 second  
 N  $\rightarrow$  R range ..... 0.5—1.0 second

### Evaluation

Condition		Possible Cause
N $\rightarrow$ D (Economy) shifting	More than specification	Insufficient line pressure Forward clutch slipping One-way clutch 1 slipping One-way clutch 2 slipping
	Less than specification	N-D accumulator not operating properly Excessive line pressure
N $\rightarrow$ D (Hold) shifting	More than specification	Insufficient line pressure Forward clutch slipping 2-4 brake band slipping One-way clutch 1 slipping
	Less than specification	1-2 accumulator not operating properly Excessive line pressure
N $\rightarrow$ R shifting	More than specification	Insufficient line pressure Low and reverse brake slipping Reverse clutch slipping
	Less than specification	N-R accumulator not operating properly Excessive line pressure

86U07B-038

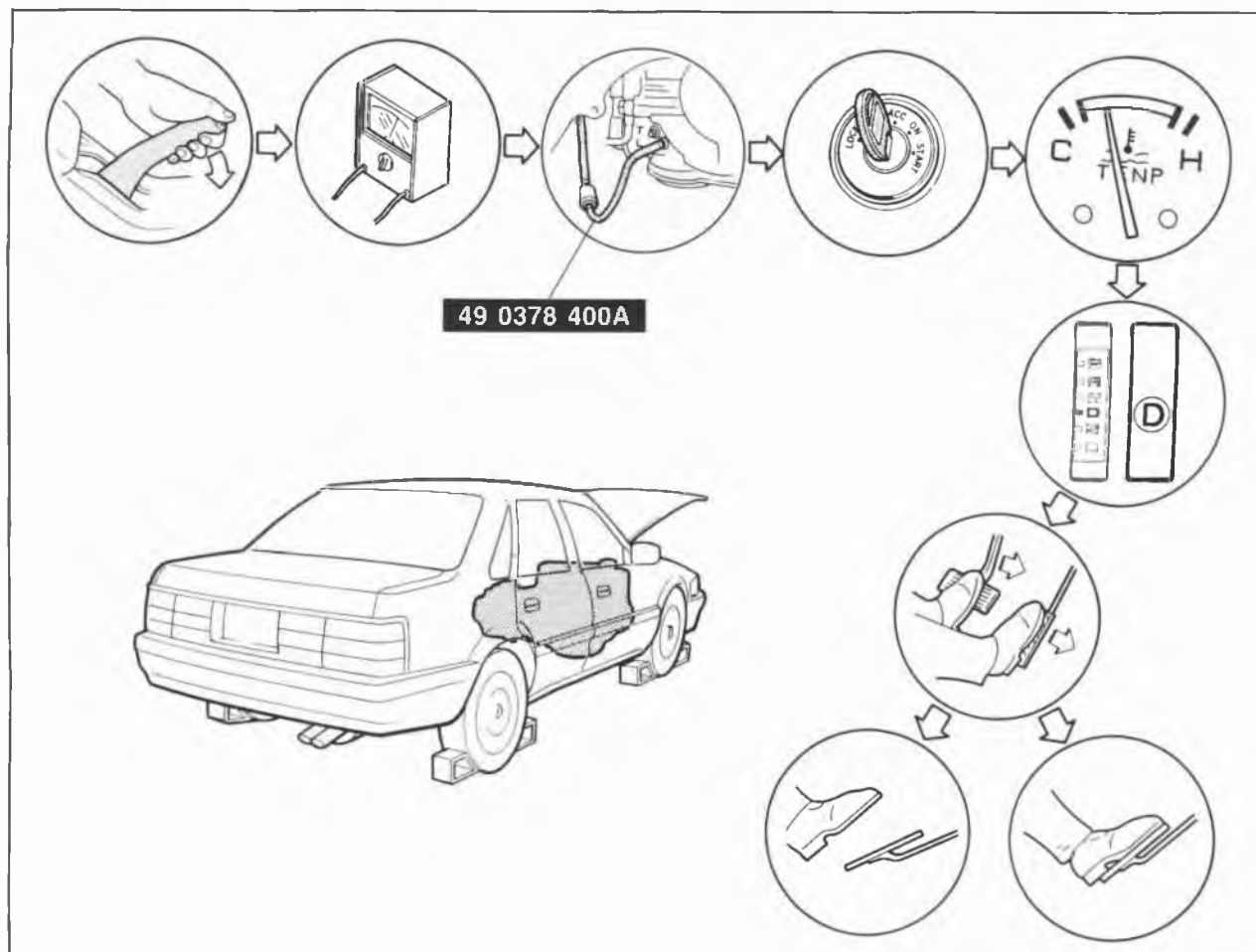
## STEP 6 (OIL PRESSURE TEST)

This step checks line pressures for checking the hydraulic components and for oil leakage.

### Line Pressure Test Preparation

1. Perform the preparation procedure shown in STEP 4 (STALL TEST).
2. Connect a tachometer to the engine.
3. Connect the **SST** to the line pressure inspection hole (square head plug L)

### Procedure



76G07B-031

1. Start the engine and check the idle speed in P range

**Idle speed: 900  $\pm$  5% rpm**

2. Shift the selector lever to D range and read the line pressure at idle.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

### Caution

**Steps 3 to 4 must be performed within 5 seconds.**

5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and engine stall speeds for each range in the same manner.

## 7B TROUBLESHOOTING (G4A-EL)

### Specified line pressure:

Range	Line pressure kPa, (kg/cm <sup>2</sup> , psi)	
	D S L	R
When idling	353—432 (3.6—4.4, 51—63)	598—942 (6.1—9.6, 87—137)
At stall speed	873—1040 (8.9—10.6, 127—151)	1668—2011 (17.0—20.5, 242—292)

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### Evaluation

Line pressure	Possible location of problem
Low pressure in every position	Worn oil pump Fluid leaking from oil pump, control valve body, or transaxle case Pressure regulator valve sticking
Low pressure in D and S only	Fluid leaking from hydraulic circuit of forward clutch
Low pressure in R only	Fluid leaking from hydraulic circuit of low and reverse brake
Higher than specification	Throttle valve sticking Throttle modulator valve sticking Pressure regulator valve sticking

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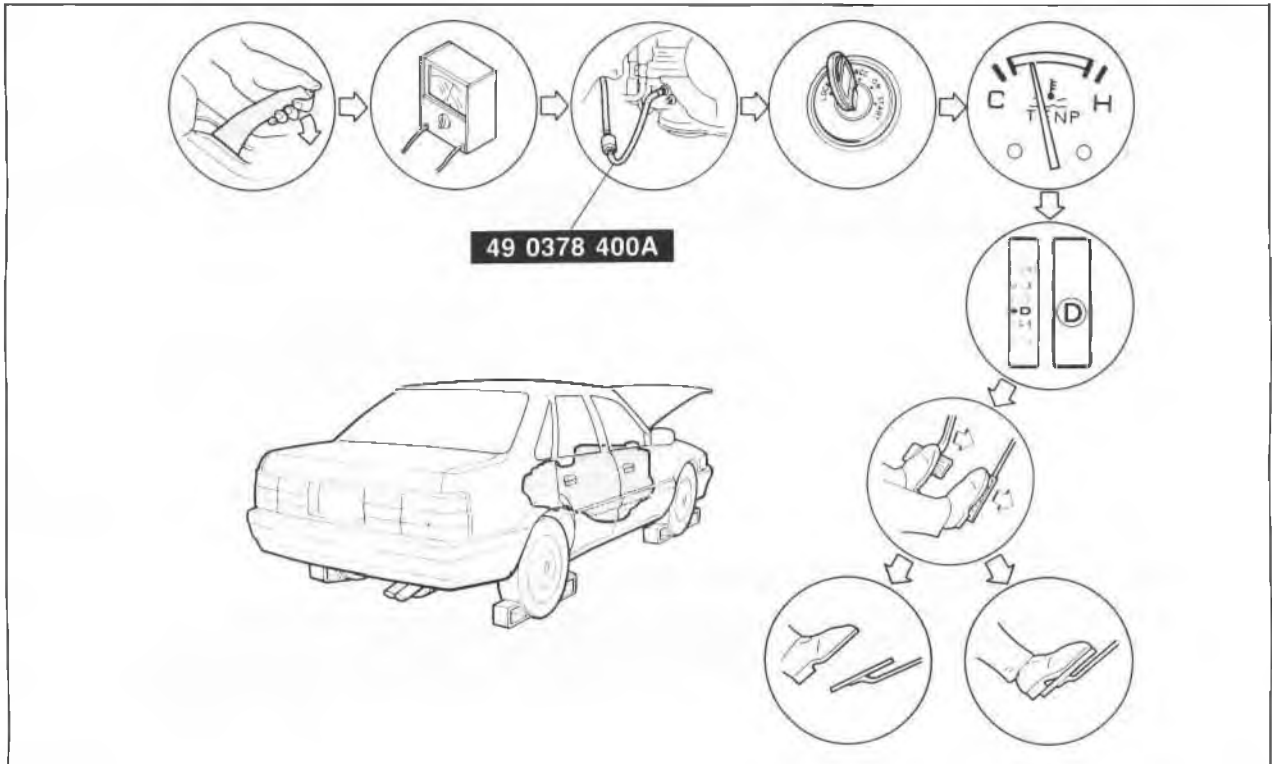
## Throttle Pressure Test

This step checks line pressure for checking the hydraulic components and for improper adjustment of throttle cable.

### Preparation

1. Perform the preparation procedure shown in STEP 4 (STALL TEST).
2. Connect a tachometer to the engine.
3. Connect the **SST** to the throttle pressure inspection hole (square head plug T).

### Procedure



76G07B-034

1. Start the engine and check the idle speed in P range.

**Idle speed: 900 ±50 rpm**

2. Shift the selector lever to D range and read the throttle pressure at idle.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read the throttle pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

### Caution

**Steps 3 to 4 must be performed within 5 seconds.**

### Specified throttle pressure:

	Throttle pressure kPa (kg/cm <sup>2</sup> , psi)
When idling	39—88 (0.4—0.9, 6—13)
At stall speed	471—589 (4.8—6.0, 68—85)

### Evaluation

Throttle pressure	Possible location of problem
Not within specification	Throttle valve sticking Pressure regulator valve sticking Improper adjustment of throttle cable

## 7B TROUBLESHOOTING (G4A-EL)

### STEP 7 (ROAD TEST)

This step is performed to inspect for problems at the various ranges. If these tests show any problems, adjust or replace by referring to the electronic system component or mechanical sections.

#### Caution

Perform the test at normal ATF operating temperature (50—80°C, 122—176°F).

#### D Range Test

Shift point, shift pattern, and shift shock

1. Shift the selector lever to D range and select the Power mode.
2. Accelerate the vehicle with half and full throttle valve opening.

#### Note

Throttle sensor voltage of the EC-AT Tester represents the throttle valve opening.

3. Check that 1-2, 2-3 and 3-OD up-shifts and downshifts and lock-up are obtained. The shift points must be as shown in the D range (Power) shift diagram.

#### Note

a) Drum speed (rpm) of the EC-AT Tester represents the shift point.

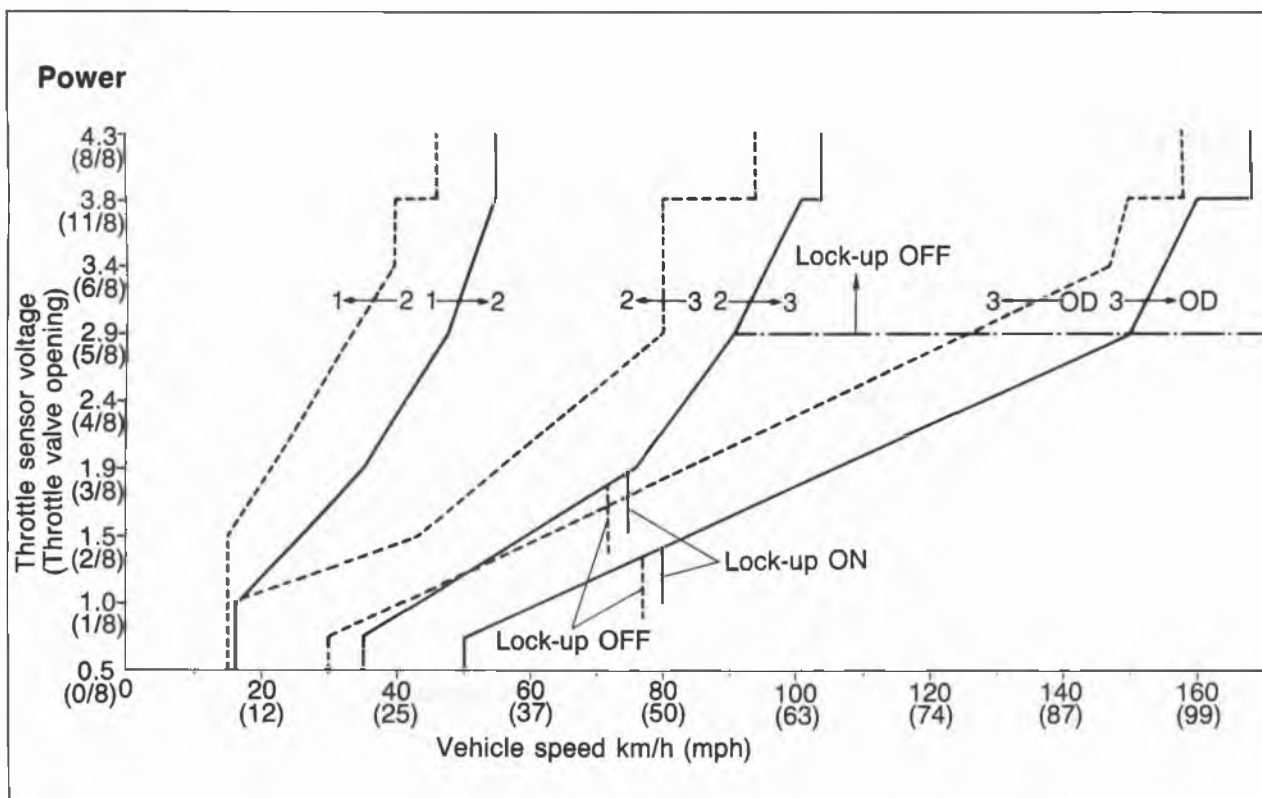
b) Vehicle speed of the EC-AT Tester and speedometer and vehicle speed on a chassis roller may not meet the specified shift pattern because of tire size. Therefore, check the shift points with the Drum speed.

c) There is no lock-up when the coolant temperature is below 72°C (162°F).

d) There is no overdrive when the cruise control is operating and there is a 3 km/h (1.9 mph) difference between the pre-set cruise speed and vehicle speed, or set or resume switch is ON.

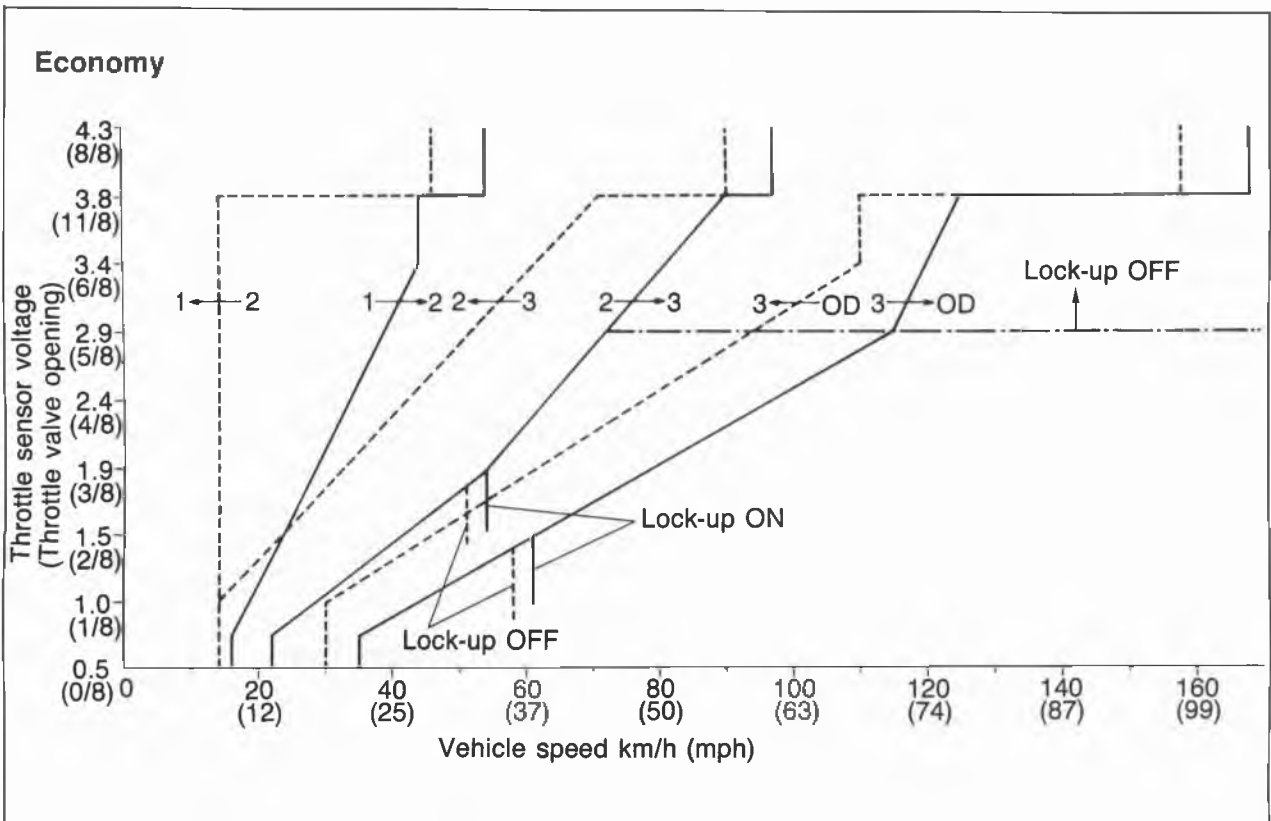
e) There is no lock-up when the brake pedal is depressed.

4. Check the up-shifts for shift shock or slippage in the same manner.
5. While driving in OD, shift the selector lever to S range and check that 4-3 downshift immediately occurs, then decelerate and check that engine braking effect is felt in only 3rd gear.

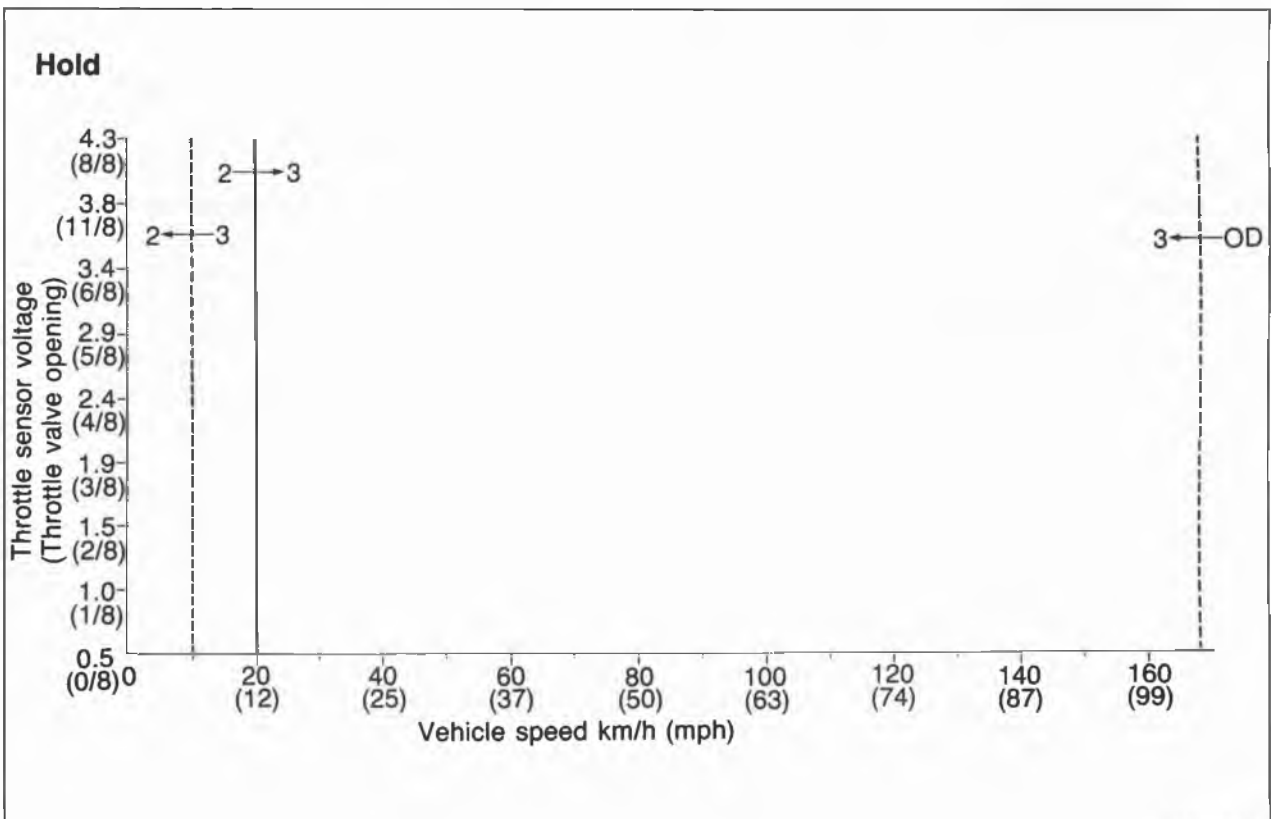


79G07C-093





6. Select D range (Hold mode).
7. Accelerate the vehicle and check 2-3 up- and down-shifts, no 1st, and no OD is obtained and that the 2-3 shift points are as shown in the D range (Hold) shift diagram.



# 7B TROUBLESHOOTING (G4A-EL)

## Evaluation

Condition	Possible Cause
No 1-2 up- or down-shift	Stuck 1-2 shift solenoid valve Stuck 1-2 shift valve
No 2-3 up- or down-shift	Stuck 2-3 shift solenoid valve Stuck 2-3 shift valve
No 3-OD up- or down-shift	Stuck 3-4 shift solenoid valve Stuck 3-4 shift valve
No lock-up shift	Stuck lock-up control solenoid valve Stuck lock-up control valve
Incorrect shift point	Mis-adjusted throttle sensor Sticking shift valves
Excessive shift shock or slippage	Excessive shift shock Stuck accumulators Stuck or no one-way check orifice Worn clutches, brakes, or one-way clutch
No engine braking effect	Worn clutches or brakes

76G07B-035

## Noise and vibration

Drive the vehicle in OD (lock-up), OD (no lock-up), 3rd (Hold) and check for abnormal noise or vibration.

### Note

**Abnormal noise and vibration can also be caused by the torque converter, drive shaft, or differential. Therefore, checking of cause must be made with extreme care.**

## Kick-down

Drive the vehicle in OD, 3rd and 2nd gears and check that kick-down occurs for OD→3, OD→2, OD→1, 3→2, 3→1, 2→1, and the shift points are as shown in the shift diagram.

## S Range Test

### Shift pattern

1. Shift the selector lever to S range and select the Economy mode.
2. Accelerate the vehicle and check that 1-2 and 2-3 up-shifts and down-shifts are obtained, and that no overdrive and no lock-up are obtained.

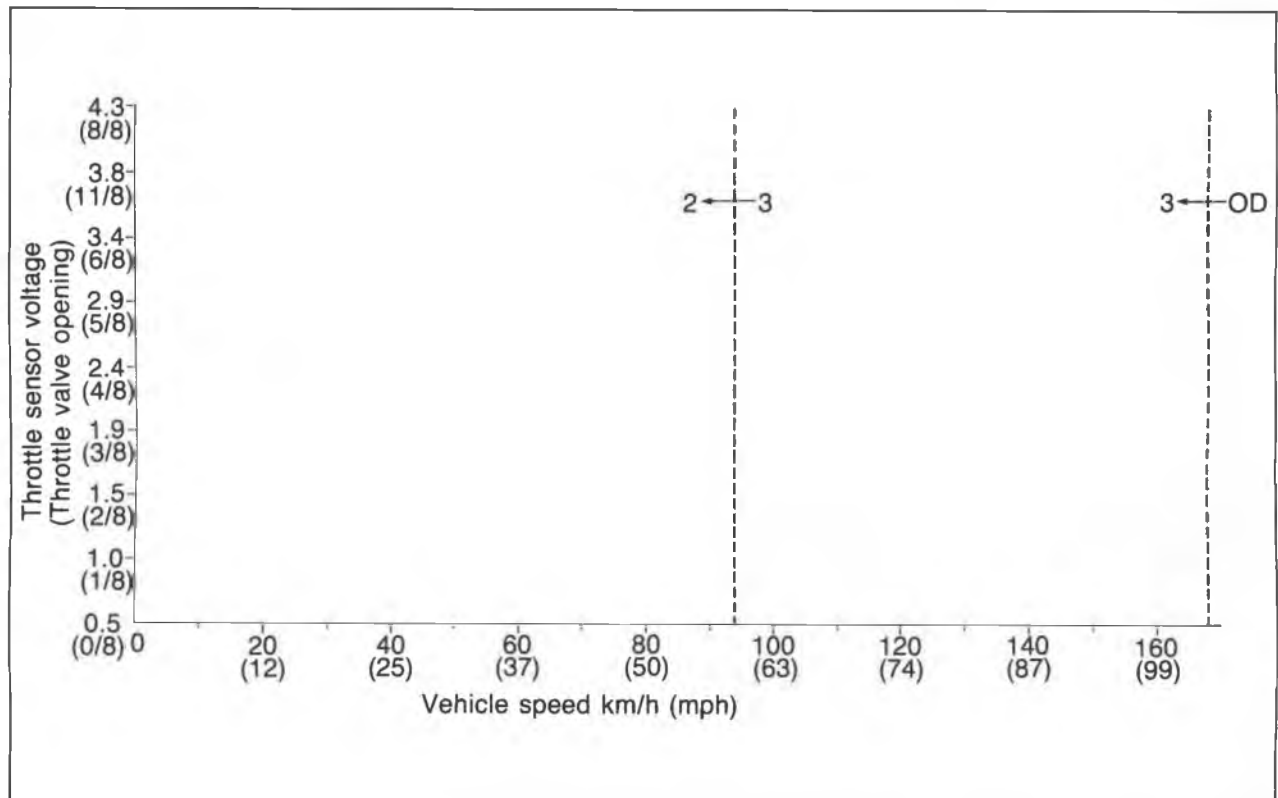
### Note

**a) Inspections of shift shock and shift point are not necessary because these are the same as those of the D Range Test.**

**b) In S range, the shift patterns for Economy and Power modes are the same.**

**c) Shift points are the same as those of the D range (Power) shift diagram.**

3. While driving in S range (Economy mode) and 3rd gear, select the Hold mode and check that 3rd gear is held until the 3-2 down-shift point as shown in the S range (Hold) shift diagram is achieved.
4. Accelerate the vehicle with S range (Hold mode) and check that 2nd gear is held.



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**Noise and vibration**

Drive the vehicle in 2nd gear (Hold mode) and check for abnormal noise or vibration.

**Note**

**Abnormal noise and vibration can also be caused by the torque converter, drive shaft or differential. Therefore, checking of cause must be made with extreme care.**

**L Range Test****Shift pattern**

1. Shift the selector lever to L range and select the mode.
2. Accelerate the vehicle and check that the 1-2 up- and down-shiftings are obtained and that no 3rd gear, no OD, and no lock-up are obtained.

**Note**

**Inspection of shift shock and shift point are not necessary because these are the same as those of the D Range Test.**

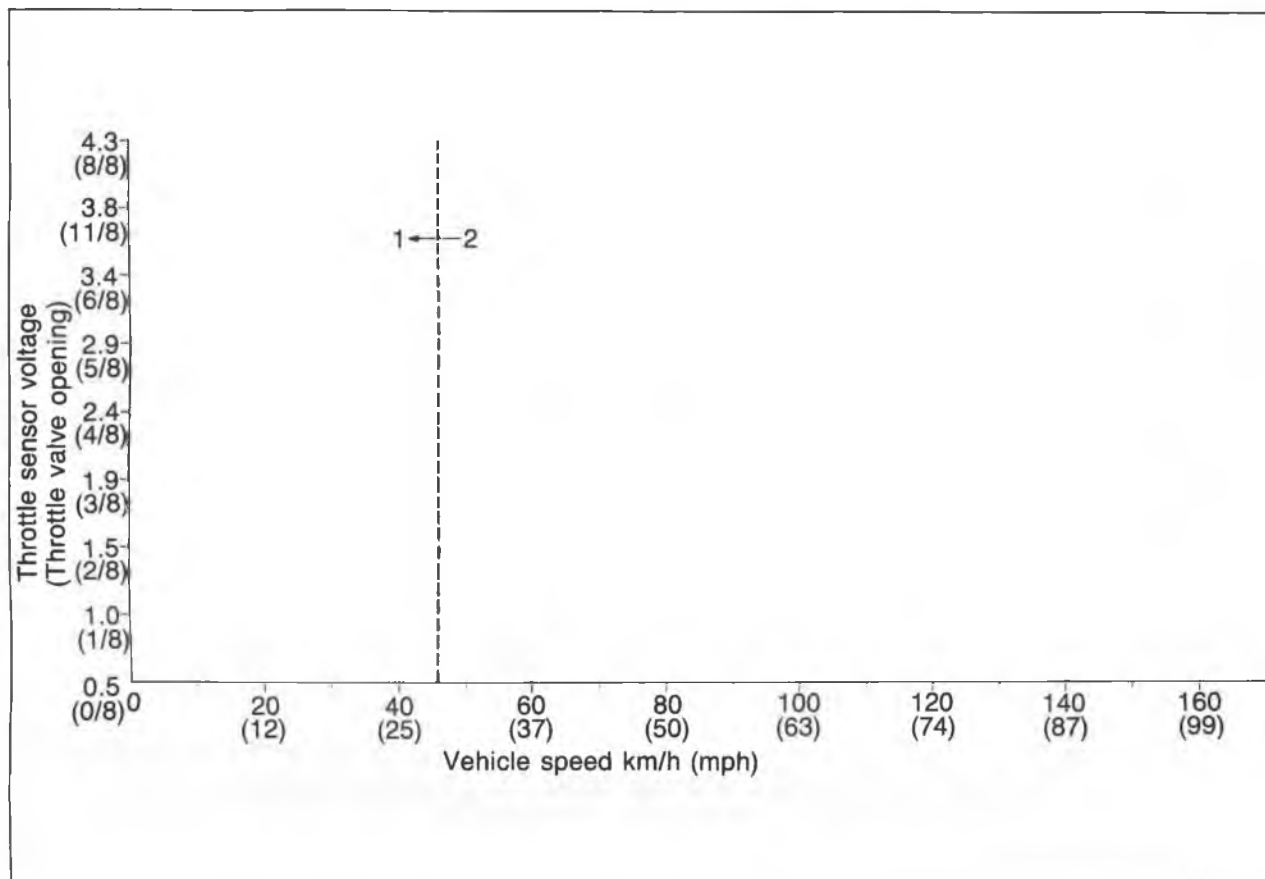
3. Drive in 1st gear then decelerate and check that engine braking effect is felt.

**Note**

**a) In L range, the shift patterns for Economy and Power modes are the same.  
b) Shift points are the same as those of the D range (Power) shift diagram.**

4. While driving in S range (Hold mode) and 2nd gear, shift the selector lever to L range and check that 2nd gear is held until the 2-1 down-shift point as shown in the L range (Hold) shift diagram is achieved.
5. Accelerate the vehicle in L range (Hold mode) and check that 1st gear is held.

## 7B TROUBLESHOOTING (G4A-EL)



86U07B-044

### Noise and vibration

Drive the vehicle in 1st gear (Hold mode) and check for abnormal noise or vibration.

#### Note

**Abnormal noise and vibration can also be caused by the torque converter, drive shaft or differential. Therefore, checking of cause must be made with extreme care.**

### P Range Test

1. Shift into P range on a gentle slope, release the brake and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at maximum of 4 km/h (2.5 mph) on a level surface, and check that the vehicle stops.

## Vehicle Speed at Gearshift Table

Mode Range		Throttle condition (Throttle sensor voltage)	Shifting	Drum speed rpm	Vehicle speed km/h (mph)			
Power	D	Fully opened (4.3 volt)	D1 → D2	4930—5480	54—60 (33—37)			
			D2 → D3	5120—5520	102—110 (63—68)			
			D3 → OD	5380—5710	165—175 (102—109)			
		Half throttle (1.6—2.2 volt)	D1 → D2	3470—4180	38—45 (24—28)			
			D2 → D3	4020—4420	80—88 (50—55)			
			D3 → OD	3820—4530	117—139 (73—86)			
			Lock-up ON (OD)	2670—3170	117—139 (73—86)			
			Lock-up OFF (OD)	2510—2970	110—130 (68—81)			
			OD → D3	2150—2630	94—115 (58—71)			
		Kick-down	D3 → D2	2020—2410	62—74 (38—46)			
			OD → D3	3490—3720	153—163 (95—101)			
			OD → D2	2050—2240	90—98 (56—61)			
			OD → D1	980—1120	43—49 (27—30)			
			D3 → D2	2940—3200	90—98 (56—61)			
			D3 → D1	1400—1500	43—46 (27—29)			
			D2 → D1	2160—2300	43—46 (27—29)			
		Economy	D	Fully opened (4.3 volt)	D1 → D2	4470—5020	49—55 (30—34)	
					D2 → D3	4770—5170	95—103 (59—64)	
D3 → OD	5380—5710				165—175 (102—109)			
Half throttle (1.6—2.2 volt)	D1 → D2			2830—3380	31—37 (19—23)			
	D2 → D3			2960—3120	59—68 (37—42)			
	D3 → OD			2870—3460	88—106 (55—66)			
	Lock-up ON (OD)			2010—2420	88—106 (55—66)			
	Lock-up OFF (OD)			1940—2310	85—101 (53—63)			
	OD → D3			1600—1960	70—86 (43—53)			
Kick-down	D3 → D2			1240—1570	38—48 (24—30)			
	OD → D3			3490—3720	153—163 (95—101)			
	OD → D2			1960—2150	86—94 (53—58)			
	OD → D1			980—1120	43—49 (27—30)			
	D3 → D2			2800—3070	86—94 (53—58)			
	D3 → D1			1400—1600	43—49 (27—30)			
	D2 → D1			2160—2460	43—46 (27—30)			
S	S			Fully opened (4.3 volt)	S1 → S2	4930—5480	54—60 (33—37)	
					S2 → S3	5120—5520	102—110 (63—68)	
		S4 → S3	3720—3950		163—173 (101—107)			
		S3 → S2	2940—3200		90—98 (56—61)			
		S2 → S1	2160—2310		43—46 (27—29)			
		Half throttle (1.6—2.2 volt)	S1 → S2	3470—4180	38—45 (24—28)			
			S2 → S3	4020—4420	80—88 (50—55)			
			S4 → S3	3720—3950	163—173 (101—107)			
			S3 → S2	2020—2410	62—74 (38—46)			
			L	L	Fully opened (4.3 volt)	L1 → L2	4930—5480	54—60 (33—37)
						L2 → L1	2160—2310	43—46 (27—29)
					Half throttle (1.6—2.2 volt)	L1 → L2	3470—4180	38—45 (24—28)
HOLD	D	—				D2 → D3	850—1160	17—23 (11—14)
		D3 → D2				230—420	7—13 (4—8)	
S	S	Fully closed (0.5 volt)	OD → D3	3720—3950	163—173 (101—107)			
			S3 → S2	2940—3200	90—98 (56—61)			
			L	L2 → L1	2160—2310	43—49 (27—30)		

## 7B TROUBLESHOOTING (G4A-EL)

### Slippage Test

This step is performed to inspect slippage of the friction elements.

### Preparation

1. Perform the preparation procedure shown in STEP 4 (STALL TEST).
2. Connect a tachometer to the engine and set it in the cabin.
3. Connect the **EC-AT Tester** and the **adaptor harness** between the EC-AT control unit and wiring harness.

### Procedure

Drive the vehicle in each of the gears indicated below and check whether the vehicle speed or engine speed is above or below specification excessively as shown by the drum speed.

Driving condition			Speed	Drum speed (rpm)			
No.	Gears	Other condition		1,000	2,000	3,000	4,000
1	1st	L range, Hold mode	Vehicle speed km/h (mph)	11 (7)	22 (14)	33 (20)	44 (27)
2	1st	D range, Economy mode		11 (7)	22 (14)	33 (20)	44 (27)
3	2nd	S range, Hold mode		20 (12)	40 (25)	60 (37)	80 (50)
4	3rd	D range, Hold mode		31 (19)	61 (38)	92 (57)	123 (76)
5	OD	D range, Economy mode		44 (27)	88 (55)	131 (81)	173 (107)
6	OD	D range, Economy mode, Lock-up	Engine speed (rpm)	1,000	2,000	3,000	4,000

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### Evaluation

When there is no malfunction in the electrical system or hydraulic system, but vehicle speed or engine speed is below specification, the problem can be attributed to slippage of the friction elements.

Driving conditions below specification	Possible Cause
No.1 condition only	Low and reverse brake
No.2 condition only	One-way clutch
No.3 condition only	2-4 brake band
No.4 condition only	Coasting clutch
No.5 condition only	3-4 clutch
No.1-No.5 conditions	Forward clutch
No.6 condition only	Lock-up piston (in torque converter)

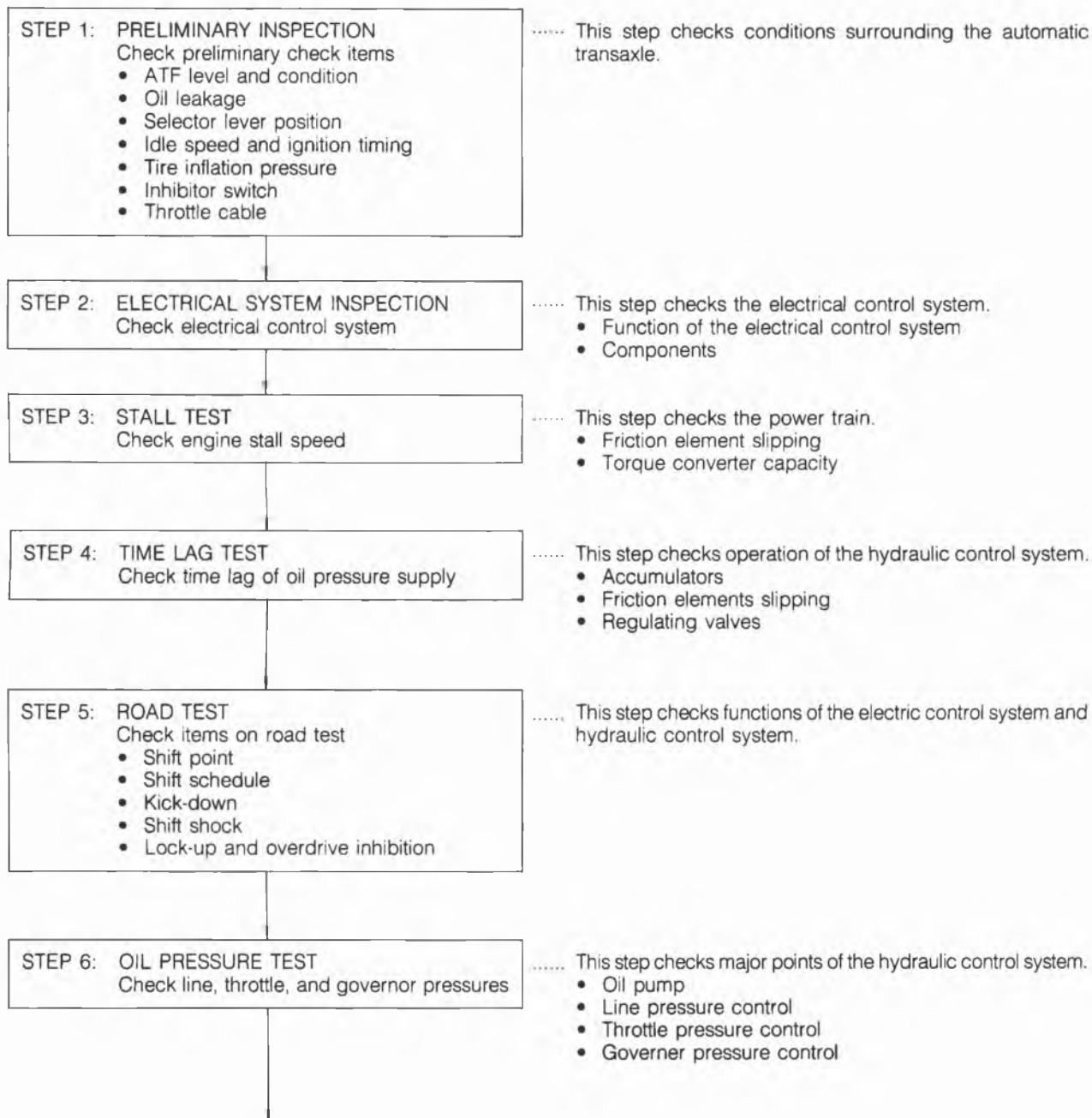
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## TROUBLESHOOTING (G4A-HL)

### GENERAL NOTE

In the event of a problem with the automatic transaxle, the cause may be in the engine, power train, hydraulic control system, or electrical control system.

When troubleshooting, therefore, it is recommended to begin from those points that can be judged quickly and easily. The recommended troubleshooting sequence is described below.



By following the above 6 steps, the cause of the problem should be located.

As another guide to faster location of the causes of problems, the Quick Diagnosis Chart is included at pages 7B—42, 43.

In this chart, a circle is used to indicate the components that might be the cause of trouble for 20 types of problems. It is only necessary to check those components indicated by circles, at each step of the troubleshooting process, in order to quickly locate the cause of the problem.

# 7B TROUBLESHOOTING (G4A-HL)

## Quick Diagnosis Chart

The Quick Diagnosis Chart shows various problems and the relationship of various components that might be the cause of the problem.

The following is an explanation of the symbols used in this chart.

1. Components indicated in the "Adjustment" column indicate that there is a possibility that the problem may be the result of an incorrect adjustment.  
Check the adjustment of each component, and readjust if necessary.
2. The components indicated in the "Electrical System Inspection" column can be checked for malfunction by the results of the checking procedure.
3. Components indicated in the "Stall Test" column can be checked for malfunction by the results of the stall test.
4. Components indicated in the "Time Lag Test" column can be checked for malfunction by the results of the time lag test.
5. Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
6. Components indicated in the "Oil Pressure Test" column can be checked for malfunction by the results of the oil pressure test.
7. The checking, adjusting, repair or replacement procedures for each component is described in the page(s) noted in the "Reference Page" column.

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Inspection point  Item	Electrical control system				Preliminary				Hydraulic control system				Power train														
	Inhibitor switch	OD OFF switch	Water temperature switch	Kick-down switch	OD release solenoid valve	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Governor valve	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly	
Adjustment	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																			
Electrical System Inspection		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>																						
Stall Test										<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Time Lag Test										<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Oil Pressure Test							<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						
Road Test					<input type="checkbox"/>				<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>														



# TROUBLESHOOTING (G4A-HL) 7B

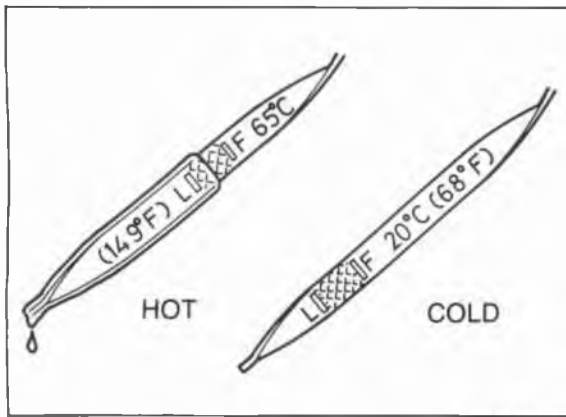
Inspection point and reference page		ON VEHICLE										OFF VEHICLE														
		Electrical control system					Preliminary					Hydraulic control system					Power train									
		Inhibitor switch	OD OFF switch	Water temperature switch	Kick-down switch	OD release solenoid valve	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Governor valve	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear
7B-65	7B-64	7B-66	7B-67	7B-68	7B-71	7B-72	7B-73	SECTION 4A	7B-77, 155	7B-132, 155	7B-108	7B-82, 133	7B-249	7B-107	7B-108	7B-108	7B-108	7B-128	7B-134	7B-134	7B-122	7B-126	7B-135	7B-126	7B-177	
Accelerating	Vehicle does not move in D, 2, 1, or R range					○	○			○		○		○	○			○			○	○	○	○		
	Vehicle moves in N range						○			○			○													
	Excessive creep								○	○					○											
	No creep at all						○	○	○	○			○		○	○		○			○	○	○			
Shifting	No shift					○				○		○	○													
	Abnormal shift sequence	○	○		○		○	○		○			○	○		○	○		○			○	○			
	Frequent shifting	○	○	○	○					○			○													
	Excessive high or low shift point				○	○	○	○		○		○	○	○												
	No lock-up	○	○	○	○		○			○			○	○	○											
	No kick-down				○		○			○			○	○												
Slipping	Engine run away or slip when starting vehicle					○	○		○		○	○	○		○	○		○			○	○	○			
	Engine run away or slip when up- or down-shifting					○	○		○		○	○	○		○	○		○			○	○	○			
Shift shock	Excessive N to D or N to R shift shock					○			○	○																
	Excessive shift shock when upshifting or downshifting					○	○		○	○						○	○		○	○		○				
	Excessive shift shock when changing range					○	○	○		○	○					○	○		○	○	○	○				
Noise	Transaxle noisy in N or P range					○				○		○	○		○											
	Transaxle noisy in D, 2, 1, or R range					○				○		○	○		○										○	○
Others	No engine braking					○				○			○	○		○					○	○				
	Transaxle overheats					○				○		○	○		○											
	Engine will not start	○							○																	

# 7B TROUBLESHOOTING (G4A-HL)

## STEP 1 (PRELIMINARY INSPECTION)

In this step, the fundamental points related to the automatic transaxle are checked. These points must be kept in the correct condition at all times in order to assure proper operation of the automatic transaxle.

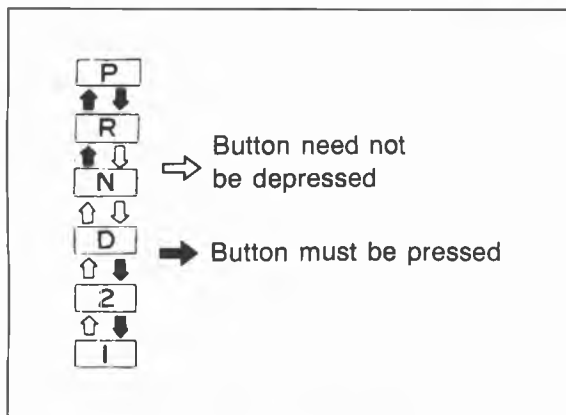
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76G07B-043

### 1. Automatic Transaxle Fluid (ATF)

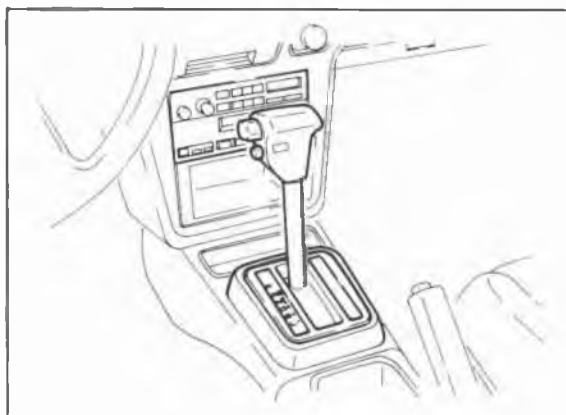
Check ATF level and condition. (Refer to page 7B—71)



76G07B-044

### 2. Selector Lever

Check selector lever position and adjust if necessary. (Refer to page 7B—72)



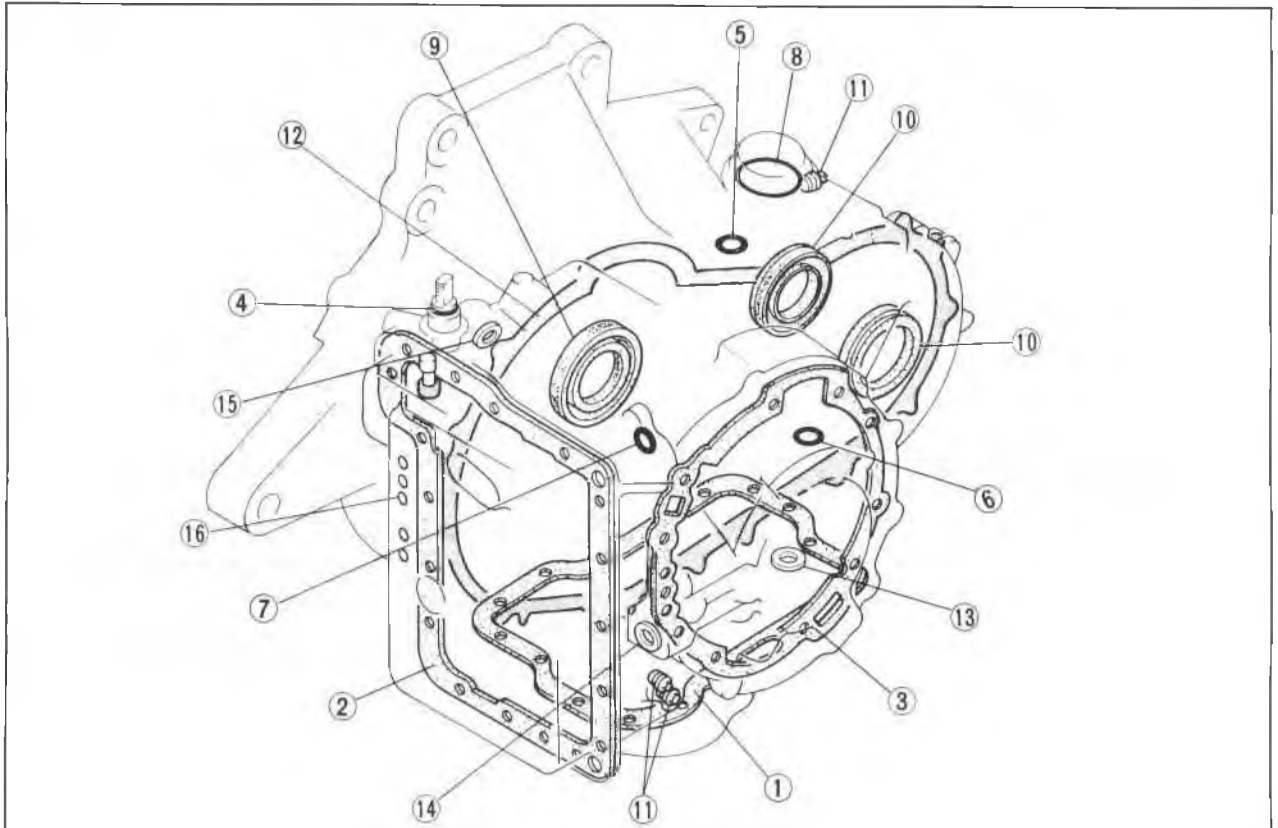
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### 3. Oil Leakage

Check for oil leakage.

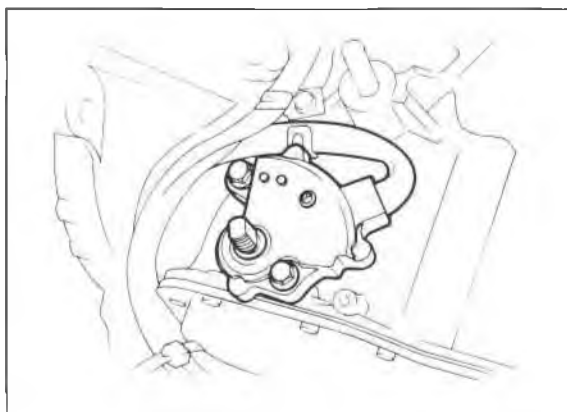
- (1) Warm up the ATF.
- (2) Apply the parking brake and block the wheels to prevent the vehicle from rolling.
- (3) Shift the selector lever to R range.
- (4) Check if oil leaks from the following oil seals or gaskets.
- (5) If oil leaks, replace the oil seal or gasket.

The following figure shows the locations where fluid leakage may possibly occur.



83U07B-028

- |                             |                            |
|-----------------------------|----------------------------|
| 1. Oil pan                  | 10. Driveshaft             |
| 2. Control valve body cover | 11. Square head plug       |
| 3. Oil pump                 | 12. Transaxle case         |
| 4. Inhibitor switch         | 13. Drain plug             |
| 5. Speedometer driven gear  | 14. Oil cooler return pipe |
| 6. Oil filler tube          | 15. Oil cooler outlet pipe |
| 7. Throttle cable           | 16. Blind plugs            |
| 8. Governor cover           |                            |
| 9. Bearing cover            |                            |



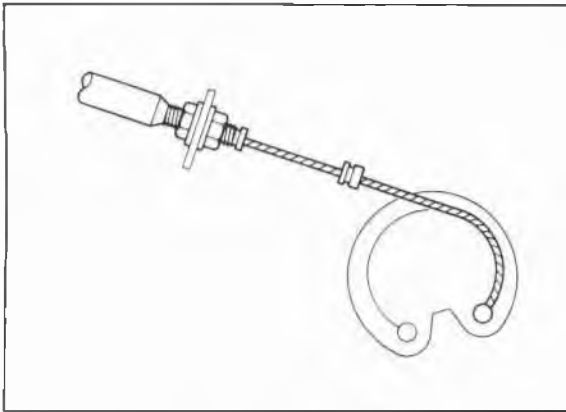
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#### 4. Inhibitor Switch

Check the inhibitor switch for operation. (Refer to page 7B—65)

## 7B TROUBLESHOOTING (G4A-HL)

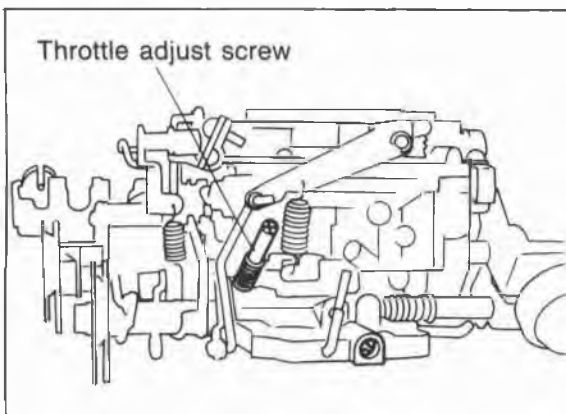
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76G07B-046

### 5. Throttle Cable

- (1) Check the inner and outer cable for damage.
- (2) Make sure that the accelerator operates smoothly.



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### 6. Idle Speed

Check idle speed. (Refer to Section 4A)

### 7. Tire Inflation Pressure

Check tire inflation pressure. (Refer to Section 12)

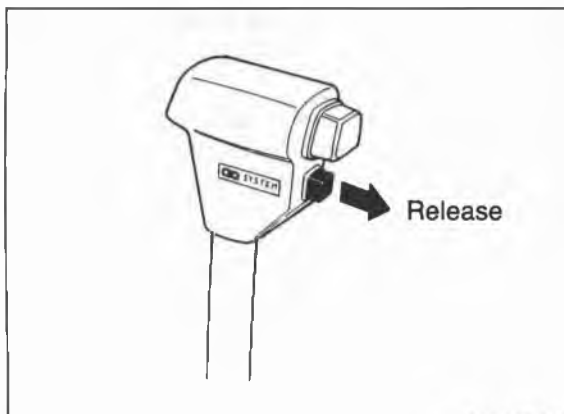
### 8. Ignition Timing

Check ignition timing. (Refer to Section 5)

## STEP 2 (ELECTRICAL SYSTEM INSPECTION)

In this step, the function of the electrical control system (Inhibition of OD and lock-up) is checked. The electrical control system components should be checked to determine if it functions correctly.

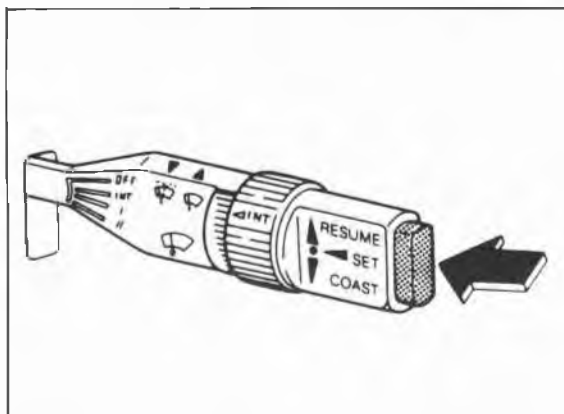
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### O/D OFF Switch Inhibition Function

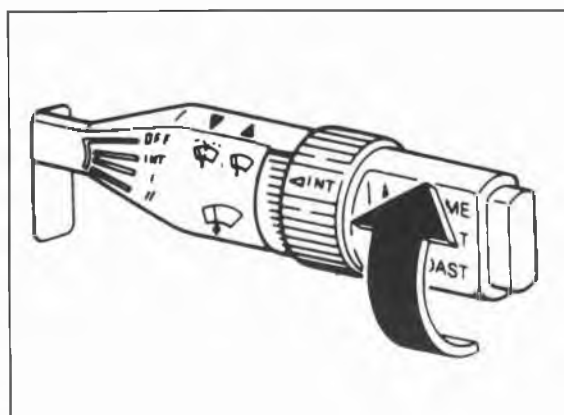
1. Warm up the engine and ATF.
2. Check that the D range, OD, and lock-up is provided.
3. When driving the vehicle with D range, OD, and lock-up selected, depress the O/D OFF switch and check that OD and lock-up is cancelled.
4. If not cancelled, check the O/D OFF switch.
5. Release the O/D OFF switch after completion.



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### Cruise Control Switch Inhibition Function

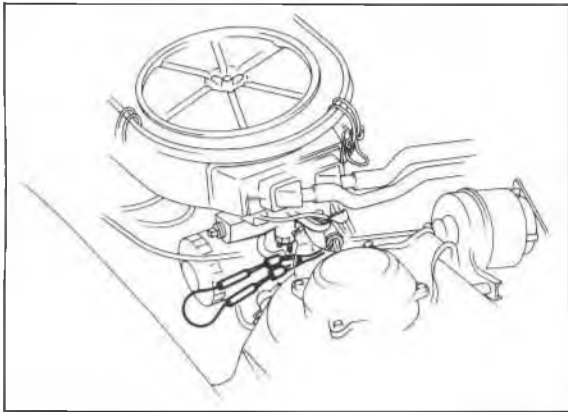
1. Drive the vehicle in D range, OD, and lock-up selected again.
2. Depress the Set switch of the cruise control and check that OD and lock-up is cancelled.
3. If not cancelled, check the cruise control system.



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4. Again drive the vehicle in D range, OD, and lock-up.
5. Turn the Resume switch of the cruise control and check that OD and lock-up is cancelled.
6. If not cancelled, check the cruise control system.

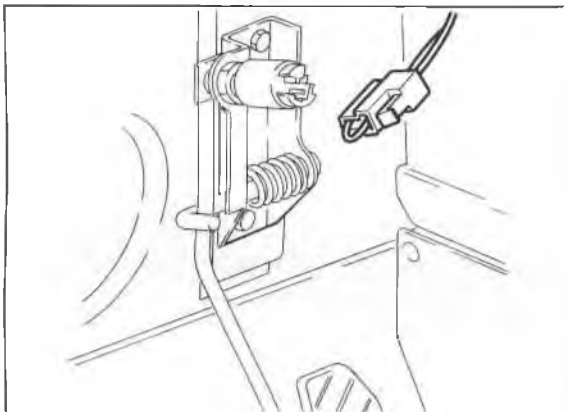
## 7B TROUBLESHOOTING (G4A-HL)



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### Water Temperature Switch Inhibition Function

1. Stop the vehicle.
2. Disconnect the water temperature switch connector.
3. Drive the vehicle in D range selected.
4. Check that OD and lock-up does not operate.
5. If not cancelled, check the wiring harness of the water temperature switch.
6. Stop the vehicle and reconnect the water temperature switch connector.



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### Kick-down Switch Inhibition Function

1. Connect the terminals of the kick-down switch connector with a jumper wire.
2. Drive the vehicle in D range selected.
3. Check that the OD and lock-up do not achieve.
4. If not correct, check wiring harness of kick-down switch.
5. Stop the vehicle and reconnect the connector to the switch.

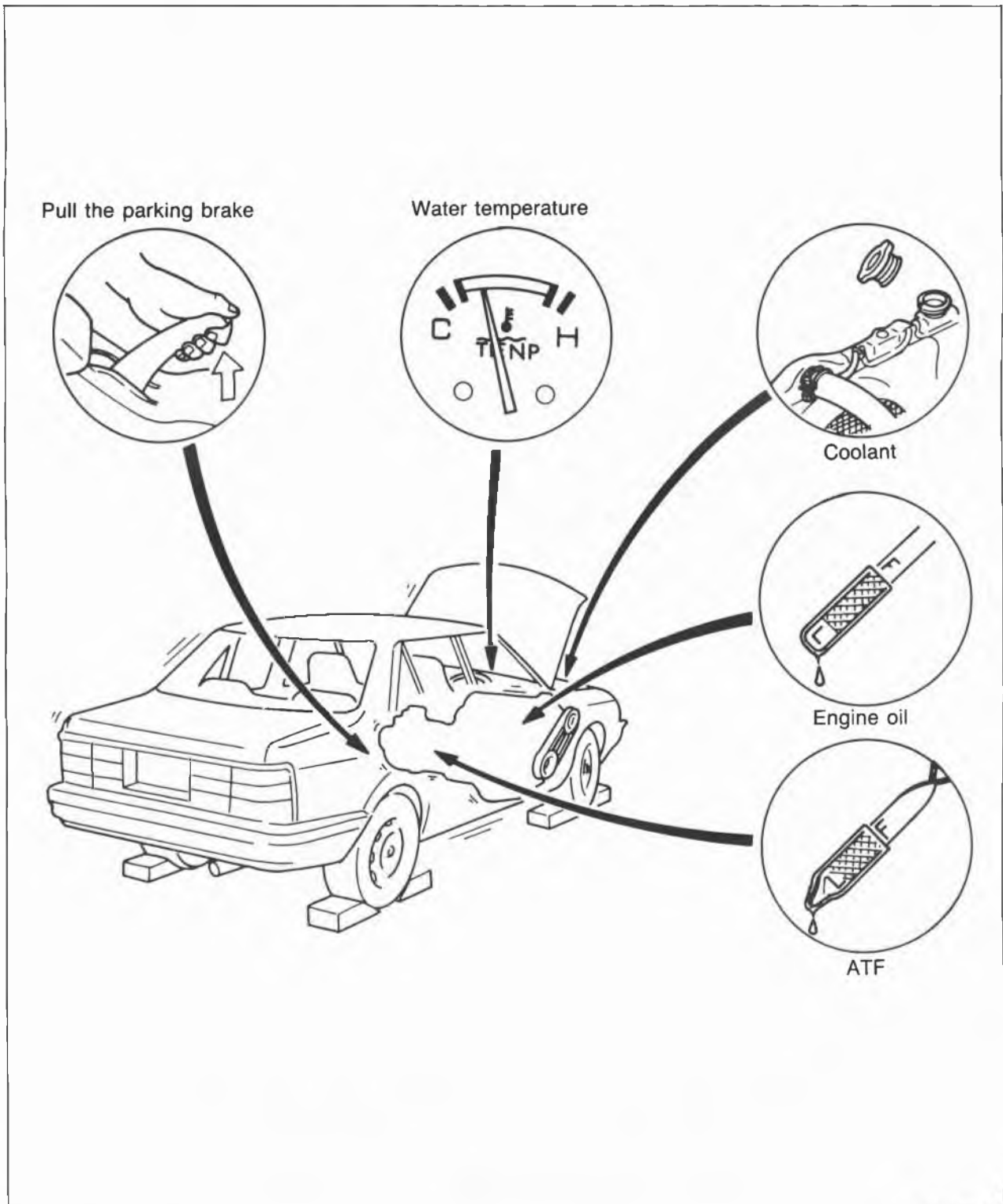
## STEP 3 (STALL TEST)

This step is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

### Preparation

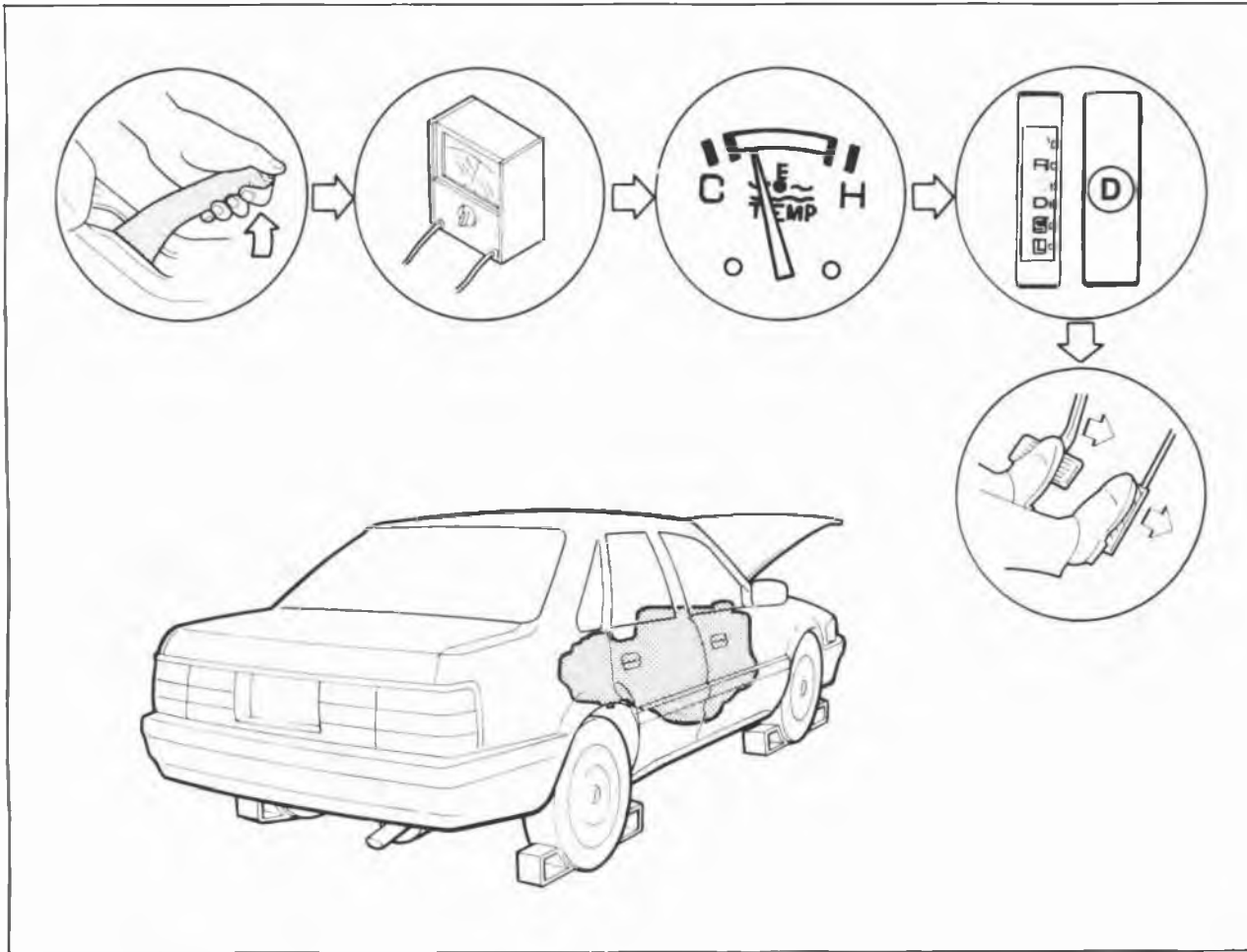
Check the following items prior to testing:

1. Engine coolant, engine oil and ATF levels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (50—80°C, 122—176°F).
3. Engage the parking brake and use wheel chocks at the front and rear wheels.



## 7B TROUBLESHOOTING (G4A-HL)

### Procedure



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1. Connect a tachometer to the engine.
2. Shift the selector lever to D range.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read and note the engine speed as soon as it becomes constant, then release the accelerator pedal.

#### Caution

**Steps 3 to 4 must be performed within 5 seconds.**

5. Shift the selector to N range and run the engine at idle speed for at least one minutes.

#### Note

**This one minute idle period is performed to cool the ATF and prevent oil degradation.**

6. Perform stall tests for the following ranges in the same manner.
  - (1) 2 range
  - (2) 1 range
  - (3) R range

#### Standard stall speed:

##### FE engine

D.S.L range 2430—2530 rpm  
R range 2390—2490 rpm

##### F8 engine

D.S.L range 2180—2280 rpm  
R range 2140—2240 rpm

#### Caution

**Always provide adequate cooling time between individual range stall tests.**



## Evaluation

Condition		Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transaxle case
			Stuck pressure regulator valve
	In D 2, and 1	One-way clutch 1 slipping	
	In D range only	One-way clutch 2 slipping	
	In 2 range only	2-4 brake slipping	
In R range only	Low and reverse brake slipping		
	Reverse clutch slipping		
	Perform a road test, to determine if this is caused by the low and reverse brake or the reverse clutch, as follows: a) Effective engine braking in 1 range.....Front clutch b) No engine braking in 1 range.....Low and reverse brake		
Within specification		All shift control elements within transaxle are functioning normally.	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

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# 7B TROUBLESHOOTING (G4A-HL)

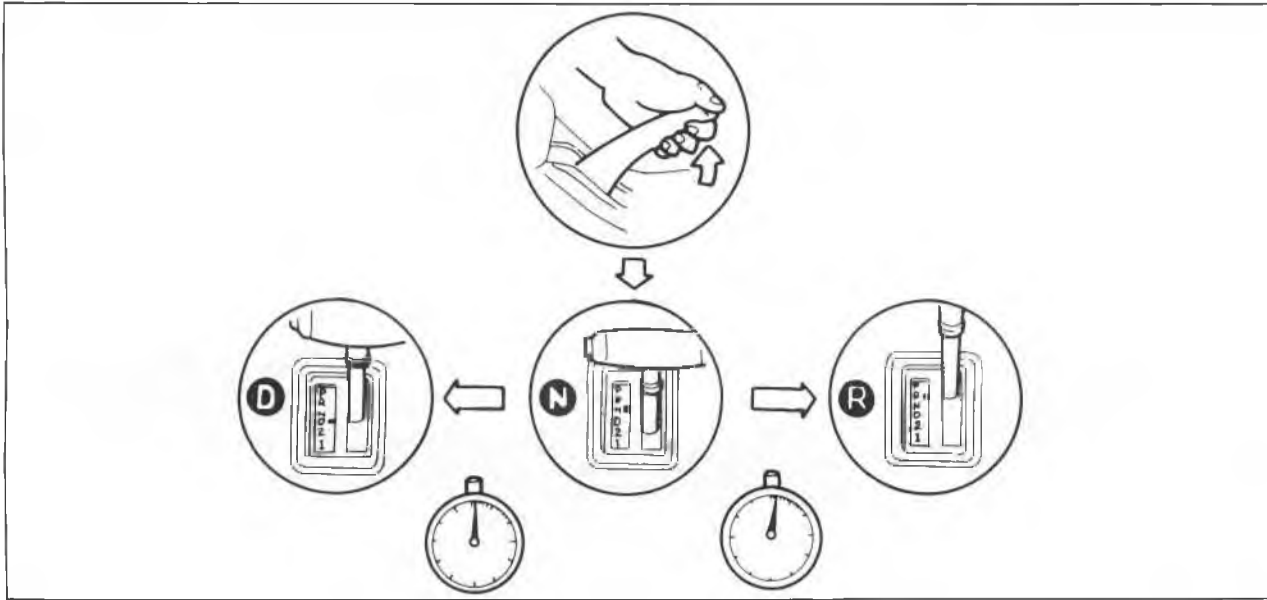
## STEP 4 (TIME LAG TEST)

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step checks this time lag for checking the condition of the N-D and N-R accumulators, forward, reverse and one-way clutches, and low and reverse brake.

### Preparation

Perform the preparation procedure shown in the STEP 3 (STALL TEST).

### Procedure



1. Start the engine and check that the idle speed is  $900 \pm 5\%$  rpm.
2. Shift from N range to D range
3. Measure the time it takes from shifting until shock is felt using a stop watch.
4. Shift the selector to N range and run the engine at idle speed for at least one minute.
5. Perform the test for the shift from N range to R range in the same manner.

### Note

**Make three measurements for each test and take the average value.**

**Specified time lag:** N → D range ..... 0.4—1.2 second  
 N → R range ..... 0.4—1.5 second

### Evaluation

Condition		Possible Cause
N → D shift	More than specification	Insufficient line pressure
		Forward clutch slipping
		One-way clutch 1 slipping
		One-way clutch 2 slipping
Less than specification	N-D accumulator not operating properly	
	Excessive line pressure	
N → R shift	More than specification	Insufficient line pressure
		Low & reverse brake slipping
		Reverse clutch slipping
	Less than specification	N-R accumulator not operating properly
		Excessive line pressure

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**STEP 5 (ROAD TEST)**

This step is performed to inspect for problems at the various ranges. If these tests show any problems, adjust or replace by referring to the mechanical sections.

**Caution**

Perform the test at normal ATF operating temperature (50—80°C, 122—176°F).

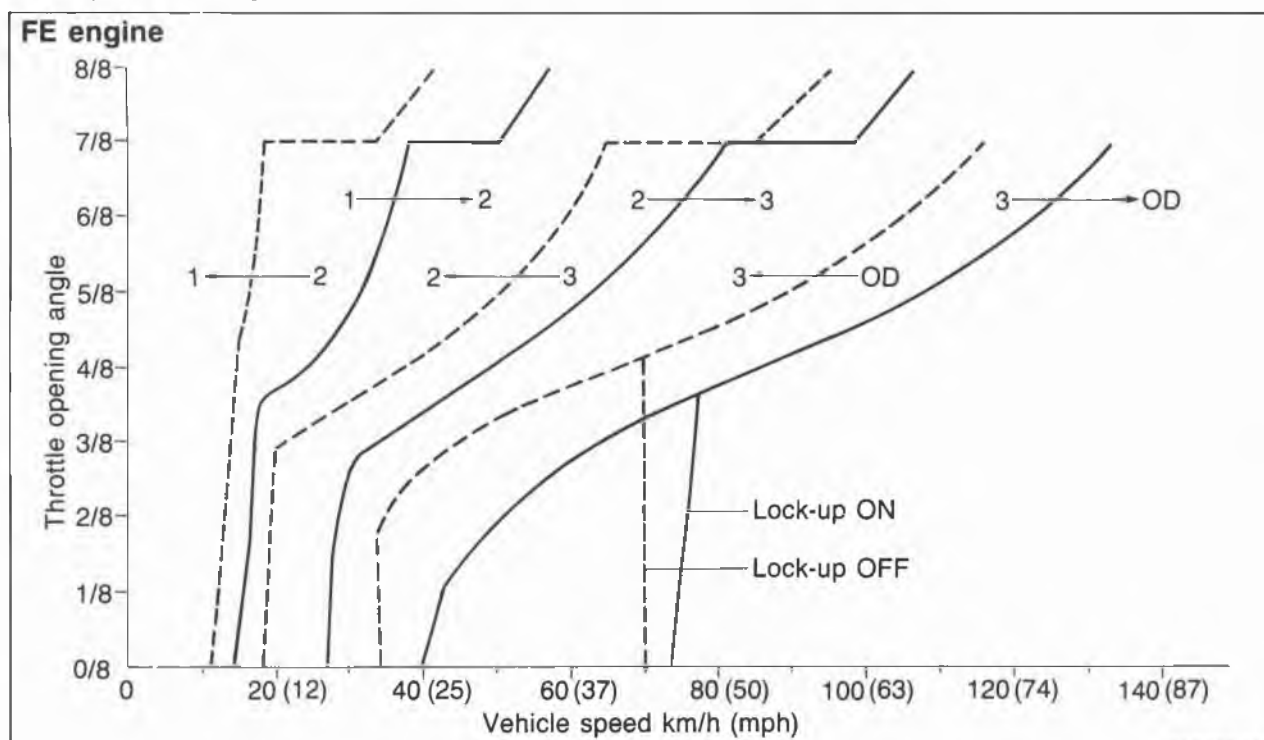
**D Range Test****Shift point, shift pattern, and shift shock**

1. Shift the selector lever to D range and depress the OD OFF switch.
2. Accelerate the vehicle with half (4/8) and full (8/8) throttle valve opening.
3. Check that 1-2, 2-3 and 3-OD up-shifts and downshifts and lock-up are obtained. The shift points must be as shown in the D range shift diagram.

**Note**

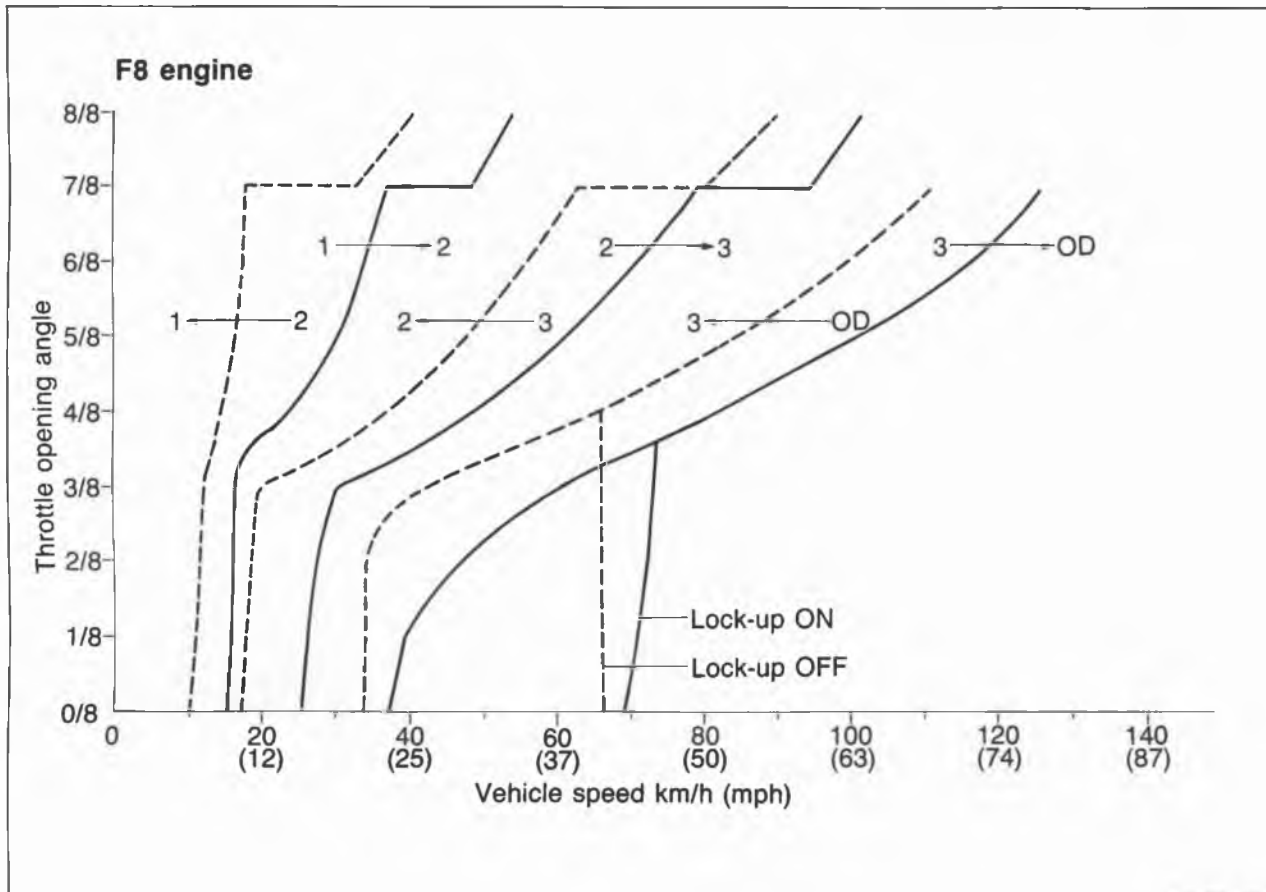
- a) Vehicle speed on a chassis roller may not meet the specified shift diagram because of tire size.
- b) There is no lock-up or OD when the coolant temperature is below 72°C (162°F), and when the OD OFF switch is depressed.

4. Check the up and down shifts for shift shock or slippage.
5. While driving in 3rd (50—60 km/h, 31—37 mph) shift the selector lever to 2 range and check that 3-2 downshift immediately occurs, then decelerate and check that engine braking effect is felt in 2nd gear.

**D range shift diagram**

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## 7B TROUBLESHOOTING (G4A-HL)



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### Noise and vibration

Drive the vehicle in OD (lock-up), OD (no lock-up), 3rd and check for abnormal noise or vibration.

#### Note

**Abnormal noise and vibration can also be caused by the torque converter, drive shaft, or differential. Therefore, checking of cause must be made with extreme care.**

### Kick-down

Drive the vehicle in OD, 3rd and 2nd gears and check that kick-down occurs for OD→3, OD→2, 3→2, 3→1, 2→1, and the shift points are as shown in the shift diagram.

### 2 Range Test

#### Shift pattern

1. Shift the selector lever to 2 range.
2. Accelerate the vehicle in 2 range and check that 2nd gear is held.

### Noise and vibration

Drive the vehicle in 2nd gear and check for abnormal noise or vibration.

#### Note

**Abnormal noise and vibration can also be caused by the torque converter, drive shaft or differential. Therefore, checking of cause must be made with extreme care.**

## 1 Range Test

### Shift pattern

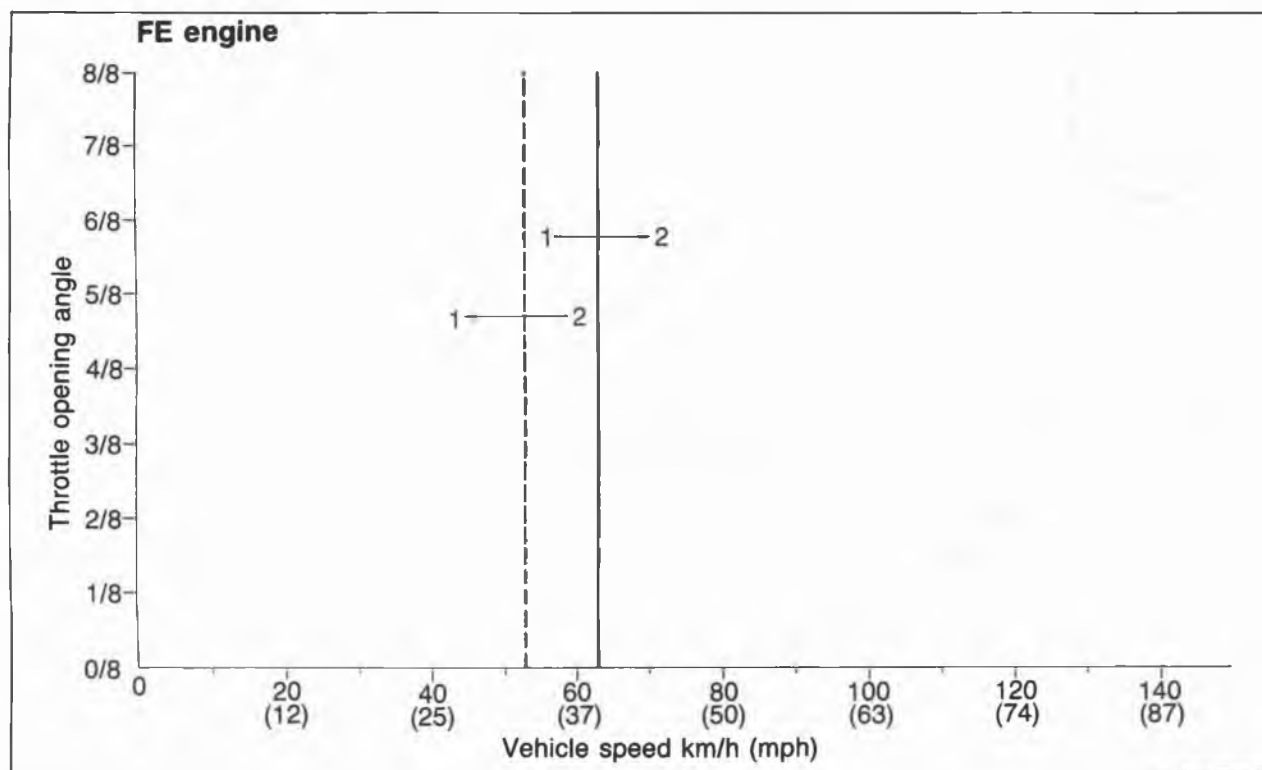
1. Shift the selector lever to 1 range.
2. Accelerate the vehicle with half (4/8) and full (8/8) throttle valve opening.
3. Check that the 1-2 up- and down-shifts are obtained and that no 3rd gear, no OD, and no lock-up are obtained. The shift points must be as shown in the 1 range shift diagram.

### Note

**Vehicle speed on a chassis roller may not meet the specified shift diagram because of tire size.**

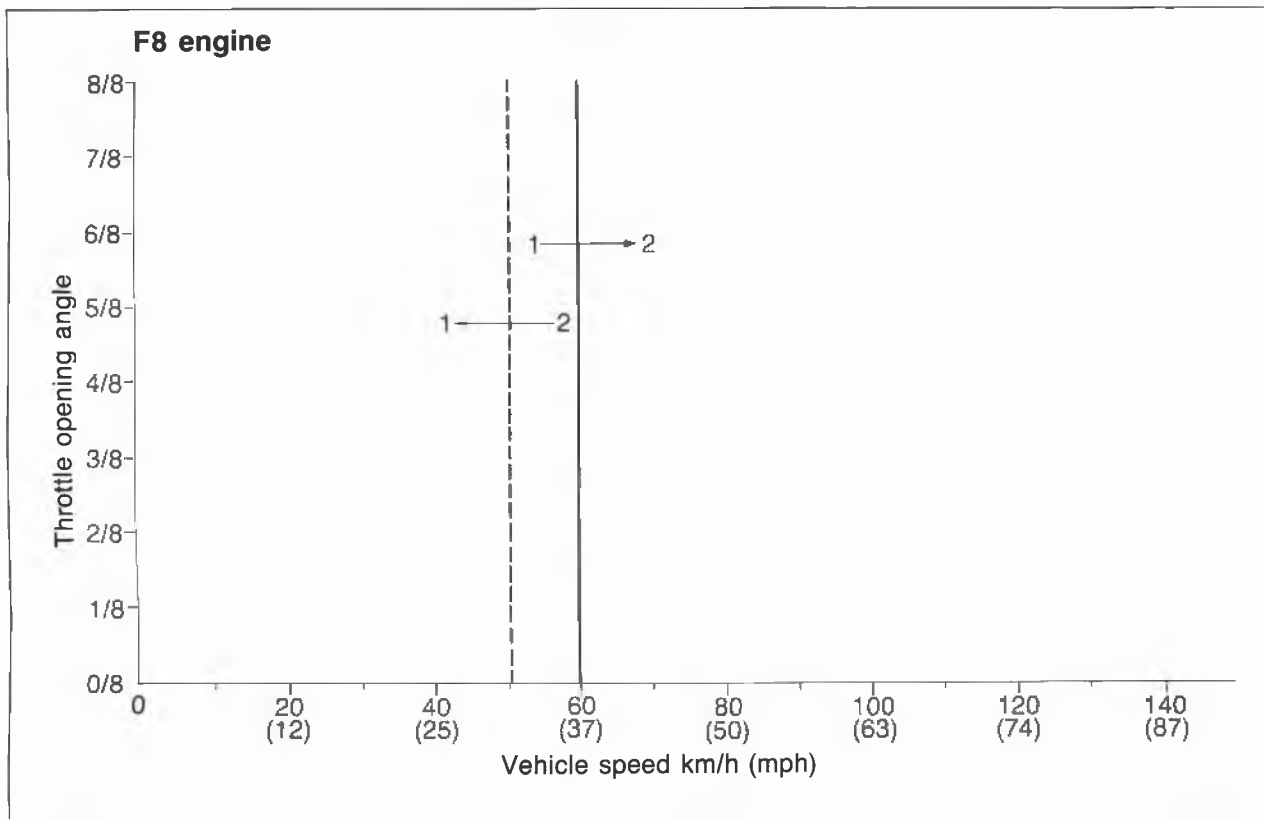
4. Check the up and down-shifts for shift shock or slippage.
5. Drive in 1st gear then decelerate and check that engine braking effect is felt.

### 1 range shift diagram



76G07B-059

# 7B TROUBLESHOOTING (G4A-HL)



76G07B-060

## Noise and vibration

Drive the vehicle in 1st gear and check for abnormal noise or vibration.

### Note

**Abnormal noise and vibration can also be caused by the torque converter, drive shaft or differential. Therefore, checking of cause must be made with extreme care.**

## P Range Test

1. Shift into P range on a gentle slope, release the brake and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at maximum of **4 km/h (2.5 mph)** on a level surface, and check that the vehicle stops.

## Vehicle Speed at Gearshift Table

Range	Throttle condition	Shifting	Vehicle speed km/h (mph)	
			FE engine	F8 engine
D	Fully opened	1st → 2nd	50—65 (31—40)	47—62 (29—38)
		2nd → 3rd	100—115 (62—71)	94—109 (58—68)
	Half throttle (1/2)	1st → 2nd	17—32 (11—20)	16—31 (10—19)
		2nd → 3rd	42—57 (26—35)	
		3rd → OD	79—94 (49—58)	74—89 (46—55)
		Lock-up	74—89 (46—55)	
	Kick-down	OD → 3rd	More than 88 (55)	More than 82 (51)
		OD → 2nd	34—103 (21—64)	33—97 (20—60)
		OD → 1st	27—49 (17—30)	26—48 (16—30)
		3rd → 2nd	34—103 (21—64)	33—97 (20—60)
3rd → 1st		11—49 (7—30)	10—48 (6—30)	
1	Fully opened	2nd → 1st	4—49 (2—30)	3—48 (2—30)
		1st → 2nd	56—71 (35—44)	52—67 (32—42)
	Half throttle (1/2)	1st → 2nd	56—71 (35—44)	52—67 (32—42)
	Kick-down	2nd → 1st	46—61 (29—38)	43—58 (27—36)
D	Fully opened	3rd lock-up	106—121 (66—75)	100—115 (62—71)

## Evaluation

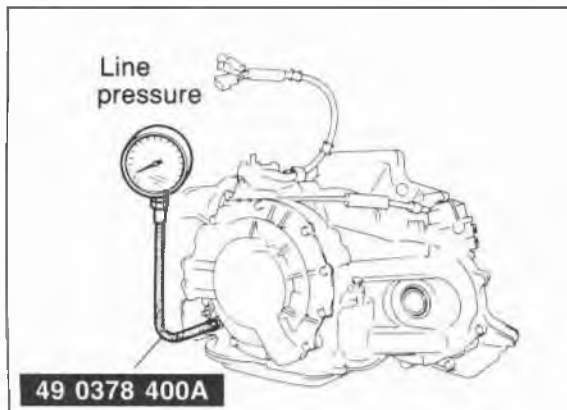
Condition		Possible Cause
No 1-2 shift		Insufficient governor pressure
		Stuck 1 range control valve
		Stuck 1-2 shift control valve
		Stuck 1-2 shift valve
		No check ball (rubber ball)
No 2-3 shift		Insufficient governor pressure
		Stuck 2 range control valve
		Stuck servo control valve
		Stuck 2-3 shift valve
		No check ball (rubber ball)
No 3-OD shift		Insufficient governor pressure
		Excessive throttle pressure
		Stuck OD release valve
		Stuck needle valve of the OD release solenoid valve
		Stuck 3-4 shift valve
		No check ball (rubber ball)
No. Lock-up (Electric circuit is OK)		Insufficient governor pressure
		Stuck OD release valve
		Stuck needle valve of the OD release solenoid valve
		Stuck OD lock-up valve
		Stuck lock-up control valve
Shift occurred in 2 range		Stuck 1-2 control valve
		Stuck 2 range control valve
No kick-down		Stuck throttle valve
		Stuck kick-down valve
Incorrect shift point	In D and 1 range	Excessive or insufficient governor pressure
		Excessive or insufficient throttle pressure
		Excessive or insufficient line pressure
	In 1 range	Stuck 1 range control valve
No engine braking effect		Stuck coasting bypass valve
		Fluid leakage from 2-3 accumulator seal rings
		No check ball (rubber ball)
Shift shock or slippage	In 1-2 and/or 3-OD shift	Fluid leakage from 1-2 accumulator seal rings
		No check ball (rubber ball) or leakage
		No one-way check orifice or leakage
	In 2-3 shift	Fluid leakage from 2-3 accumulator seal ring
		Stuck bypass valve
		Stuck 2-3 timing valve
		Stuck coast bypass valve
		Stuck servo control valve
		No one-way check orifice or leakage
		No check ball (rubber ball) or leakage
	In 3-2 shift	Fluid leakage from 1-2 accumulator seal ring
		No check ball (rubber ball) or leakage
		Stuck 3-2 timing valve
		Stuck 3-2 capacity valve

## 7B TROUBLESHOOTING (G4A-HL)

### STEP 6 (OIL PRESSURE TEST)

This step checks line, throttle, and governor pressures to check the operation of hydraulic components and for oil leakage.

83U07B-047

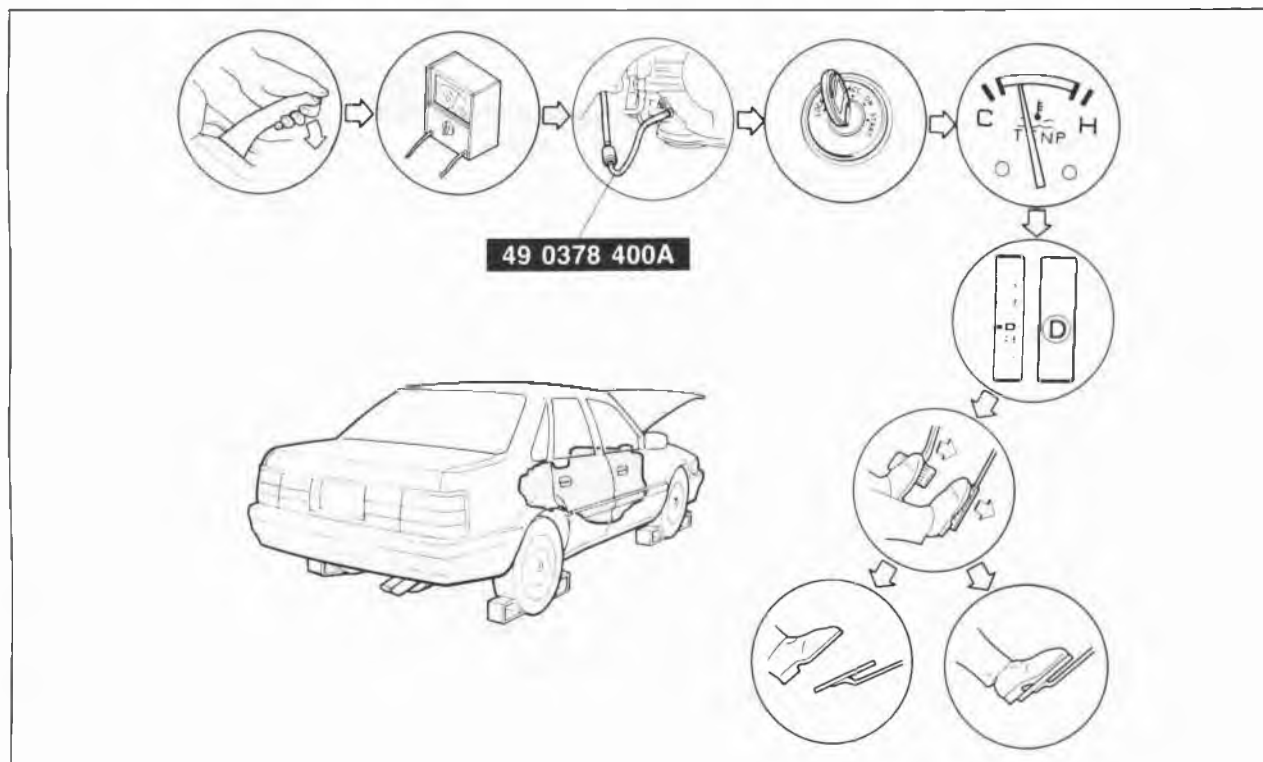


76G07B-061

### Line Pressure Test Preparation

1. Connect the **SST** to the line pressure output point (square head plug L).
2. Connect a tachometer to the engine.
3. Perform the preparation procedure shown in STEP 3 (STALL TEST).

### Procedure



76G07B-062

1. Start the engine and check that the idle speed is  $900 \pm 50$  rpm.
2. Shift the selector lever to D range.
3. Read the line pressure at idle.
4. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
5. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

### Caution

**Steps 4 to 5 must be performed within 5 seconds.**

5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and engine stall speeds for each range in the same manner.



## Specified Line pressure:

Condition	Line pressure kPa (kg/cm <sup>2</sup> , psi)	
	D S L	R
When idling	350—490 (3.6—5.0, 51—71)	600—830 (6.1—8.5, 87—121)
At stall speed	980—1230 (10.0—12.5, 142—178)	1470—1960 (15.0—20.0, 213—284)

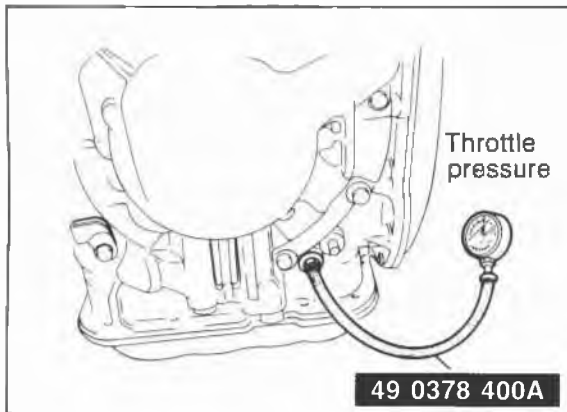
76G07B-063

## Evaluation

Condition		Possible Cause
Below specification	In all ranges	Worn oil pump
		Fluid leakage from the oil pump, control valve body and/or transaxle case
		Stuck pressure regulator valve
		Stuck throttle valve
	In D, 2 and 1 range	Fluid leakage from the forward clutch hydraulic circuit
		Fluid leakage from the governor valve hydraulic circuit
		Fluid leakage from the N-R accumulator seal rings
	In D and 1 range	Fluid leakage from the 2-3 accumulator seal rings
		Fluid leakage from the 1-2 accumulator seal rings
	In D and R range	Fluid leakage from the N-D accumulator seal rings
	In 2 and 1 range	Fluid leakage from the coasting clutch hydraulic circuit
		Stuck throttle backup valve
	In R and 1 range	Fluid leakage from the low and reverse brake hydraulic circuit
In 2 range only	Fluid leakage from 2-4 brake servo hydraulic circuit	
In 1 range only	Stuck low reducing valve	
In R range only	Fluid leakage from reverse clutch hydraulic circuit	
Excessive line pressure	Stuck throttle valve	
	Stuck throttle modulator valve	
	Stuck pressure regulator valve	
	Stuck throttle backup valve	

76G07B-216

## 7B TROUBLESHOOTING (G4A-HL)



83U07B-052

### Throttle Pressure Test

#### Preparation

1. Connect the **SST** to the throttle pressure output point (Square head plug T).
2. Connect a tachometer to the engine.
3. Perform the preparation procedure shown in STEP 3 (STALL TEST).

#### Procedure



76G07B-064

1. Start the engine and check that the idle speed is  $900 \pm 5\%$  rpm.
2. Shift the selector to D range.
3. Read the throttle pressure at idle.
4. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
5. Read the throttle pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

#### Caution

**Steps 4 to 5 must be performed within 5 seconds.**

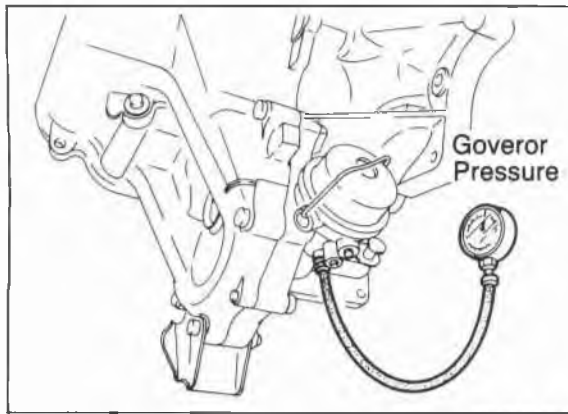
**Specified throttle pressure:**

Condition	Throttle pressure kPa (kg/cm <sup>2</sup> , psi)
When idling	83—113 (0.85—1.15, 12—16)
At stall speed	540—610 (5.5—6.2, 78—88)

**Evaluation**

Condition	Possible Cause
Not within specification	Stuck throttle valve
	Stuck pressure regulator valve
	Improper adjustment of throttle cable

## 7B TROUBLESHOOTING (G4A-HL)



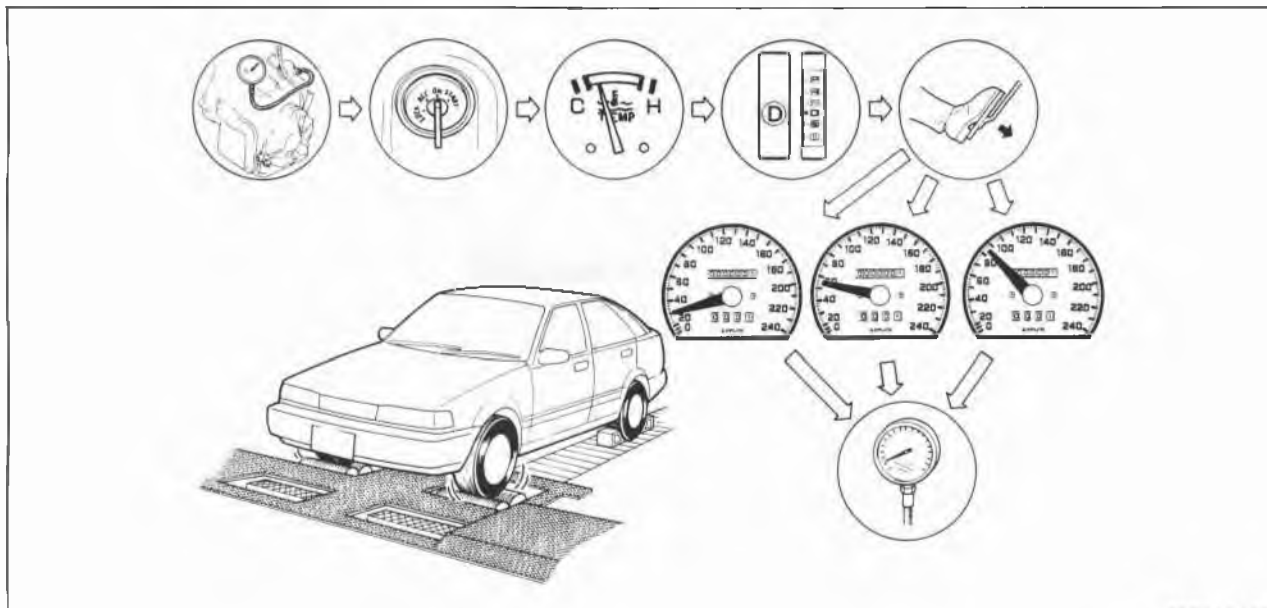
83U07B-054

### Governor Pressure Test

#### Preparation

1. Connect the **SST** to the governor pressure output point.
2. Place the pressure gauge inside the vehicle.
3. Warm up ATF and check ATF level.

#### Procedure



76G07B-065

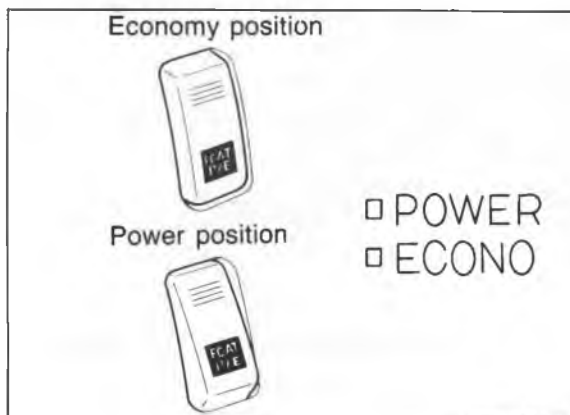
1. Drive the vehicle in D range.
2. Read the governor pressure at the speeds listed in the table below.

#### Specified governor pressure:

Vehicle Speed km/h (mph)	Governor Pressure kPa (kg/cm <sup>2</sup> , psi)	
	FE engine	F8 engine
30 (19)	79—114 (0.81—1.16, 12—16)	82—117 (0.84—1.19, 12—17)
55 (34)	146—190 (1.49—1.94, 21—28)	157—201 (1.60—2.05, 23—29)
85 (53)	276—339 (2.81—3.46, 40—49)	302—366 (3.08—3.73, 44—53)

#### Evaluation

Condition	Possible Cause
Not within specification	Fluid leakage from the line pressure hydraulic circuit
	Fluid leakage from the governor pressure hydraulic circuit
	Defective or stuck governor valve



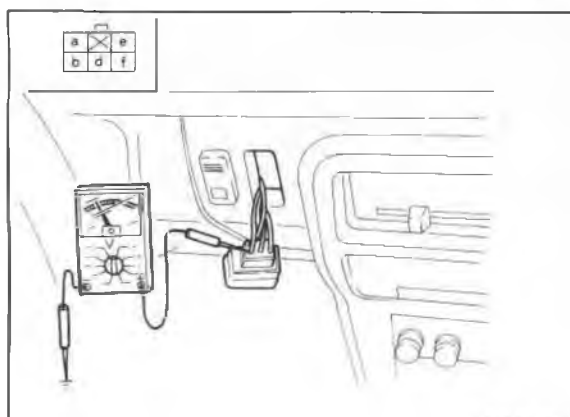
76G07B-066

## ELECTRICAL SYSTEM COMPONENTS

### MODE SWITCH (G4A-EL)

#### Inspection of Operation

1. Turn the ignition switch ON.
2. Check that the mode indicator illuminates at each mode.
3. If it is not working properly, check terminal voltage of mode switch.



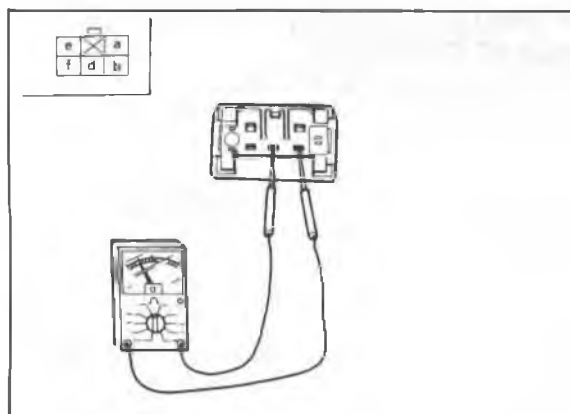
86U07B-049

#### Inspection of Continuity

1. Disconnect the mode switch.
2. Turn the ignition switch ON and light switch OFF.
3. Check the voltage between each terminal and ground.

Mode	Voltage				
	a	b	d	e	f
Power	Approx. 12V	Below 1.5 V	Below 1.5 V	Below 1.5 V	Below 1.5 V
Economy	Below 1.5 V	Below 1.5 V	Below 1.5 V	Below 1.5 V	Approx. 12V

4. If correct, check for continuity between the terminal.



86U07B-050

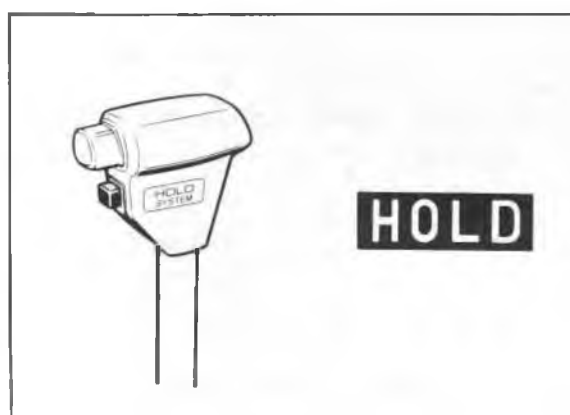
#### Inspection of Terminal Voltage

1. Disconnect the mode switch connector.
2. Check continuity of the terminals.

Mode	Connector terminal				
	a	f	d	e	b
Economy	○—○	○—○	○—○	○—○	
Power	○—○	○—○	○—○		○—○

○—○: Indicates continuity

3. If not correct, replace the mode switch.



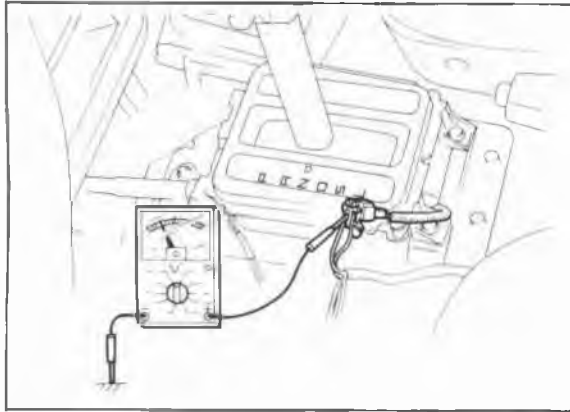
76G07B-067

### HOLD SWITCH (G4A-EL)

#### Inspection of Operation

1. Turn the ignition switch ON.
2. Check that the hold indicator illuminates while switch depressed. Release the switch and mode indicator lights are out.
3. If it is not working properly, check terminal voltage of hold switch.

# 7B ELECTRICAL SYSTEM COMPONENTS



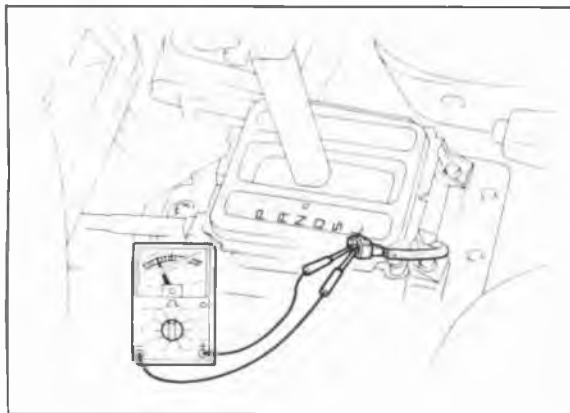
86U07B-052

### Inspection of Terminal Voltage

1. Remove the consol box.
2. Turn the ignition switch ON.
3. Check the voltage between the terminal (B) and ground while depressing the switch.

Terminal voltage	Switch
Approx. 12V	Depressed
Below 1.5V	Released

4. If correct, check continuity between the terminal.



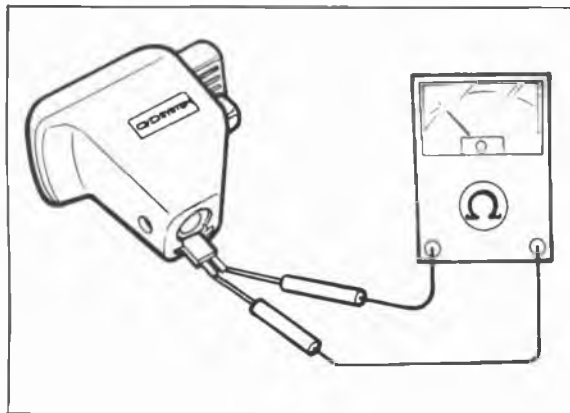
86U07B-053

### Inspection of Continuity

1. Disconnect the hold switch connector.
2. Check for continuity between the terminals while depressing the switch.

Continuity	Switch
YES	Released
NO	Depressed

3. If not correct, replace the hold switch.



76G07B-068

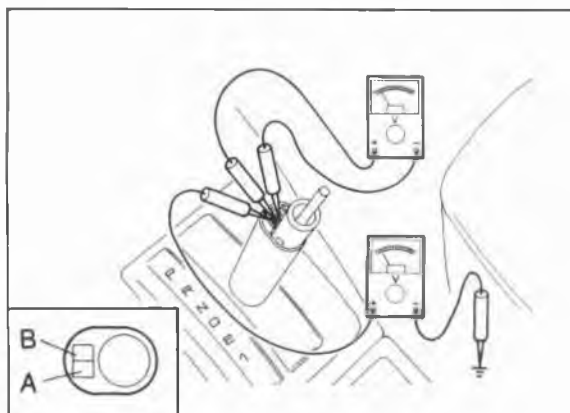
### OD OFF SWITCH (G4A-HL)

#### Inspection of Continuity

1. Remove the selector lever knob.
2. Check the continuity of the terminals.

Switch	Continuity
Depressed	No
Released	Yes

3. If not correct, replace the selector lever knob.



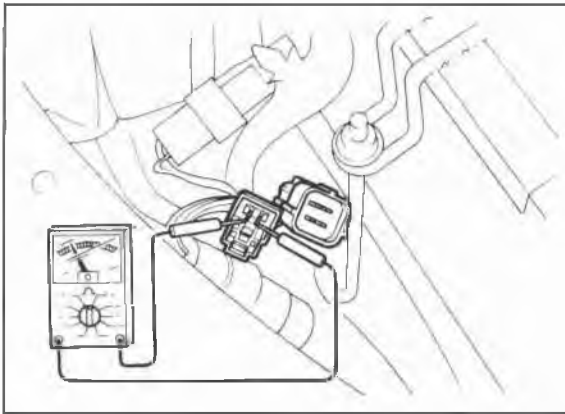
83U07B-063

### Inspection of Terminal Voltage

1. Check that continuity of the switch is OK.
2. Turn the ignition switch ON.
3. Check the voltage between terminal A and B, and between terminal A and ground.

Terminal	Voltage
A and B	Approx. 12V
A and ground	Approx. 12V

4. If not correct, check the wiring harness.

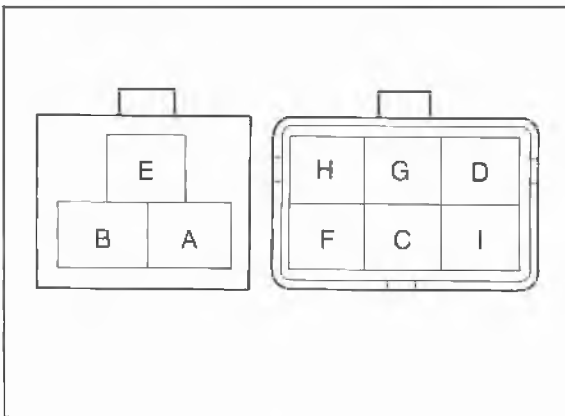


76G07B-069

## INHIBITOR SWITCH

### Inspection

1. Check that the starter turns with the ignition switch at START position and the selector in the P and N ranges, and does not operate in other positions.
2. Check that the back-up (reverse) light illuminates when shifted to the R range with the ignition switch in the ON position.
3. Check the inhibitor switch if it is not working properly.



76G07B-070

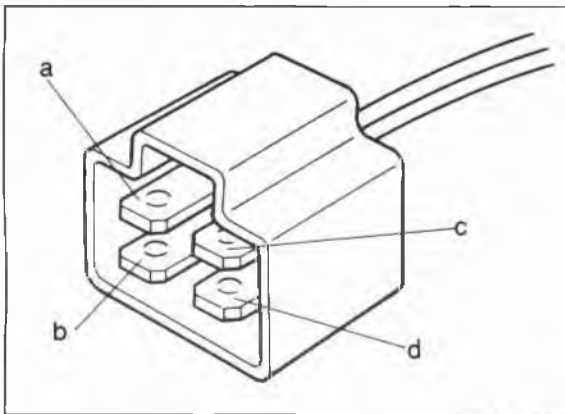
### Inspection of continuity

1. Disconnect the inhibitor switch connector.
2. Check continuity of the terminals.

### G4A-EL

Position	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○—○		○—○						
R			○—○		○—○				
N	○—○		○—○			○—○			
D			○—○				○—○		
S			○—○					○—○	
L			○—○						○—○

○—○: Indicates continuity



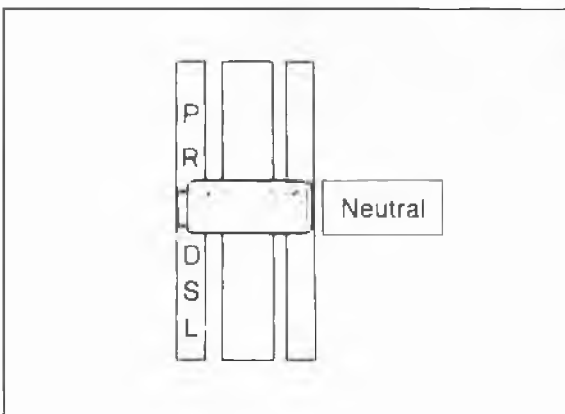
76G07B-071

### G4A-HL

Position	Connector terminal			
	a	b	c	d
P			○—○	○—○
R	○—○	○—○		
N			○—○	○—○
D, 1, 2				

○—○: indicates continuity

3. If not correct, replace switch and perform adjustment of inhibitor switch.

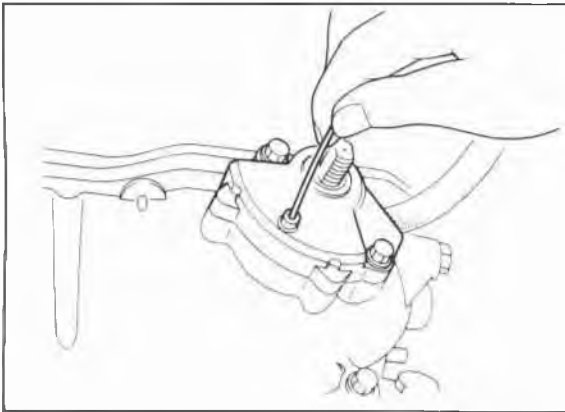


76G07B-072

### Adjustment

1. Shift the selector lever to N range.
2. Loosen the inhibitor switch mounting bolts.

## 7B ELECTRICAL SYSTEM COMPONENTS



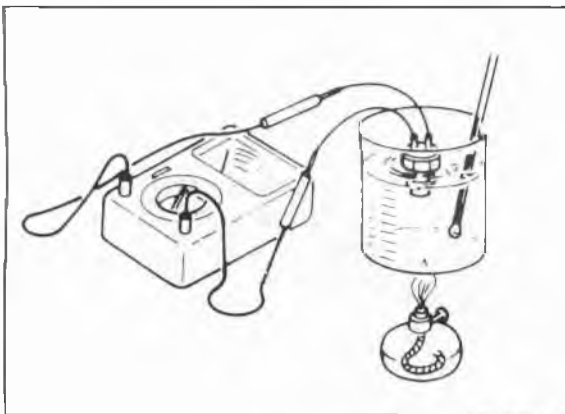
76G07B-073

3. Remove the screw and move the inhibitor switch so that the small hole is aligned with the screw hole.
4. Set the alignment by inserting a **2.0 mm (0.079 in)** diameter pin through the holes.
5. Loosely tighten the switch mounting bolts, remove the pin, and reinstall the screw.
6. Tighten the switch mounting bolts to specification.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

7. Recheck the continuity of the individual terminals.



86U07B-481

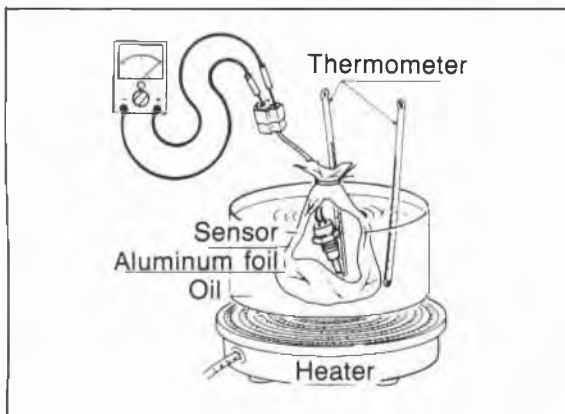
### WATER TEMPERATURE SWITCH

#### Inspection

1. Remove the water temperature switch.
2. Place the switch in water with a thermometer and heat up the water gradually.
3. Check the continuity of the terminals. If necessary replace the switch.

#### Connection guide

Water temperature	Continuity
Below 65°C (149°F)	Yes
Above 72°C (162°F)	No



76G07B-074

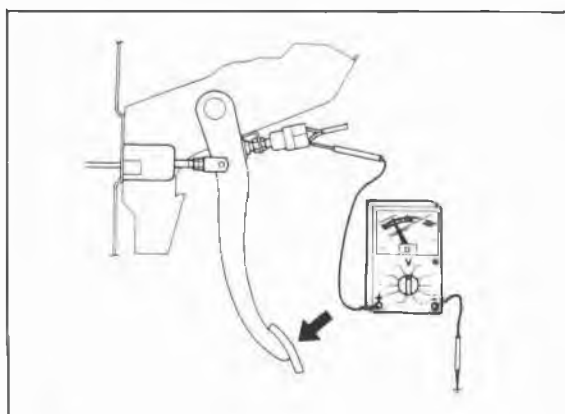
### FLUID TEMPERATURE SWITCH (G4A-EL)

#### Inspection

1. Remove the fluid temperature switch.
2. Place the switch in oil with a thermometer as shown and heat it up gradually.
3. Check the continuity of the terminals. If necessary replace the switch.

#### Connection guide

Fluid temperature	Continuity
Above 150°C (302°F)	Yes
Below 143°C (289°F)	No



76G07B-075

### BRAKE LIGHT SWITCH (G4A-EL)

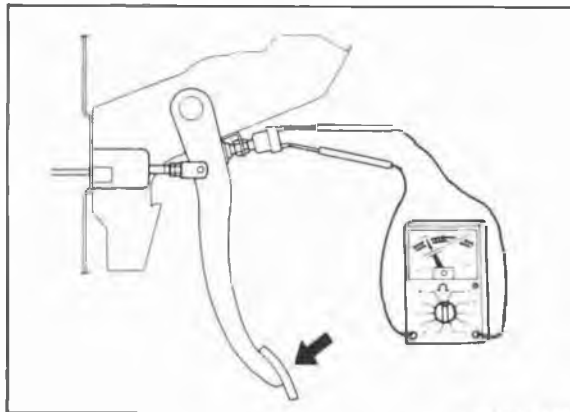
#### Inspection of Terminal Voltage

1. Turn the ignition switch ON.
2. Check the voltage between terminal (WG) and ground while depressing the brake pedal.

Terminal voltage	Brake pedal
Approx. 12V	Depressed
Below 1.5V	Released

3. If not correct, check continuity of the switch.

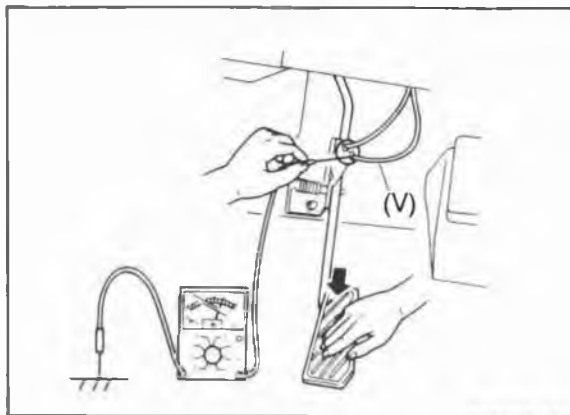




79G07C-114

### Inspection of Continuity

1. Disconnect the brake light switch connector.
2. Check for continuity between the terminals while depressing the brake pedal.



76G07B-076

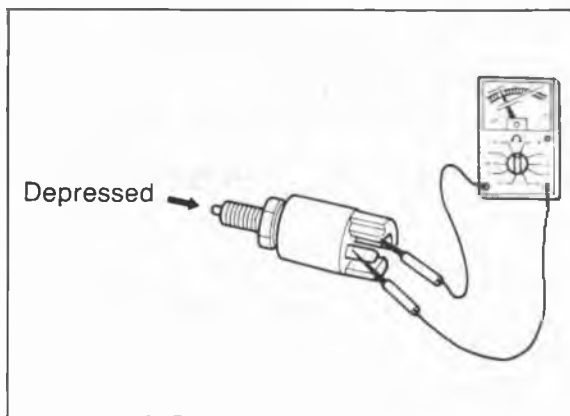
### KICK-DOWN SWITCH (G4A-HL)

#### Inspection of Terminal Voltage

1. Turn the ignition switch ON.
2. Check the voltage at terminal (V) with a voltmeter.

Depressing stroke	Terminal voltage
7/8—8/8 (Full)	Approx. 12V
0—7/8	Below 1.5V

3. If not correct, check the wiring harness, switch, or adjust the switch position.



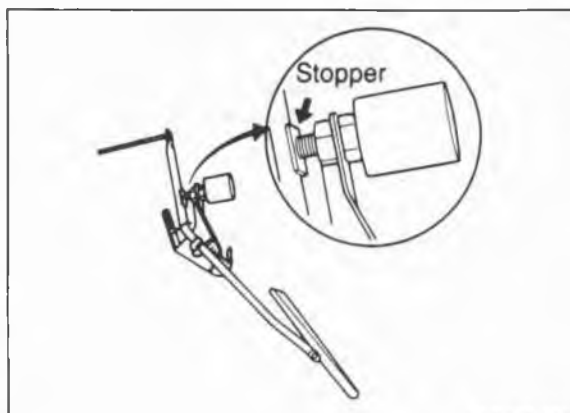
76G07B-077

### Inspection of Continuity

1. Disconnect the kick-down switch connector.
2. Check for continuity of the switch with an ohmmeter.

Switch	Continuity
Pushed	Yes
Released	No

3. If not correct, replace the kick-down switch.

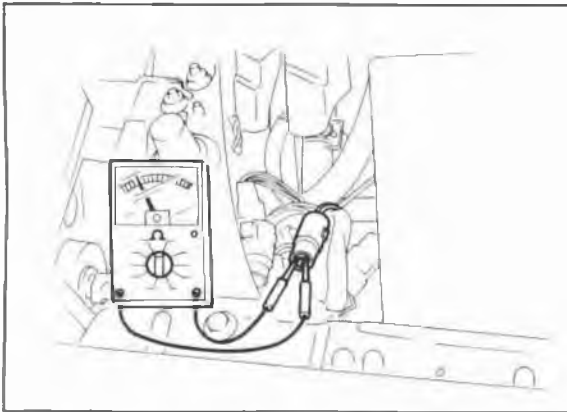


76G07B-078

### Adjustment

1. Loosen the kick-down switch locknuts.
2. Depress the accelerator pedal fully.
3. Turn the switch until the threaded case touches the stopper.
4. Turn the switch counterclockwise by one half revolution.
5. Secure the switch with the locknut.

## 7B ELECTRICAL SYSTEM COMPONENTS



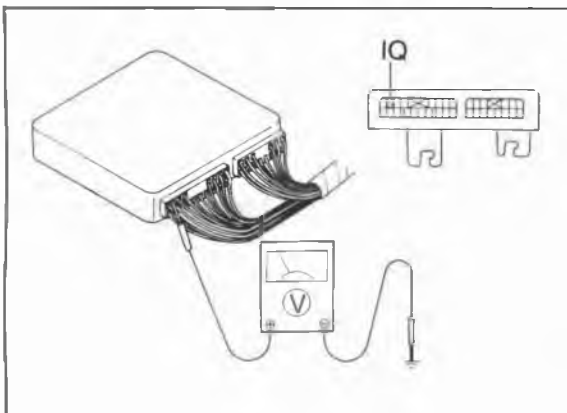
76G07B-079

### PULSE GENERATOR (G4A-EL)

#### Inspection

1. Disconnect the pulse generator connector.
2. Check for continuity between the terminals, if necessary replace the pulse generator.

**Resistance: 200—400 $\Omega$**

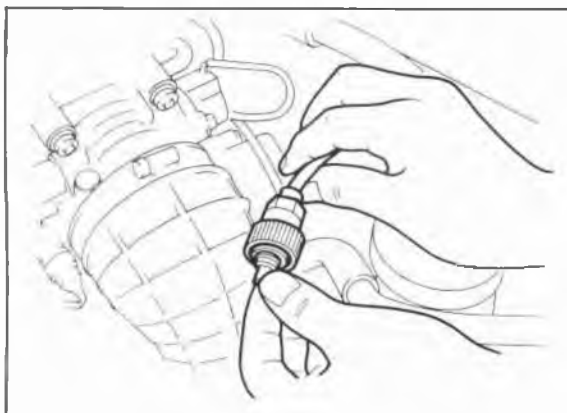


76G07B-080

### VEHICLE SPEED SENSOR (G4A-EL)

#### Inspection of voltage

1. Connect a voltmeter between the 1Q terminal of the EC-AT control unit and ground as shown.
2. Turn the ignition switch ON.



76G07B-081

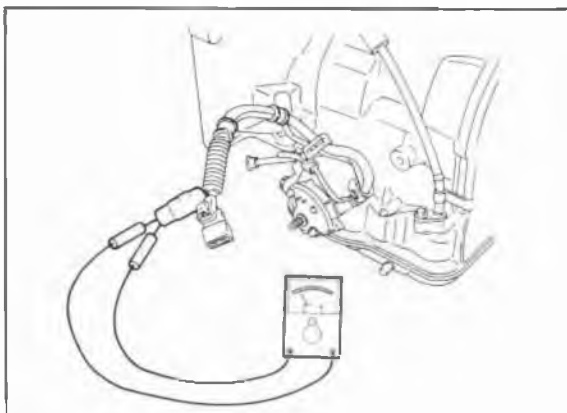
3. Remove the speedometer cable from the transaxle.
4. Slowly turn the speedometer cable one turn.
5. Check that approx. 4.5V is shown 4 times.
6. If not correct, check the combination meter.

### CRUISE CONTROL SWITCH (CRUISE CONTROL UNIT)

Refer to Section 15.

### IDLE SWITCH AND THROTTLE SENSOR (G4A-EL)

Refer to Section 4A.



76G07B-082

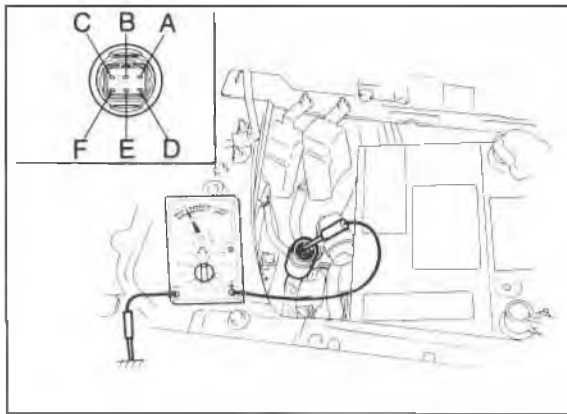
### OD RELEASE SOLENOID VALVE (G4A-HL)

#### Inspection of Resistance

1. Disconnect the solenoid valve connector.
2. Check resistance between the terminals.

**Resistance: 13—27  $\Omega$**

3. If not correct, replace the solenoid valve.



76G07B-083

## SOLENOID VALVES (G4A-EL)

### Inspection of Resistance

1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Measure the resistance of the terminals except (A) terminal, if necessary replace the solenoid valve.

**Resistance: 13—27Ω**

### Note

**1-2 solenoid valve : F**

**2-3 solenoid valve : C,E**

**3-4 solenoid valve : B**

**Lock-up solenoid valve : D**

## NO LOAD SIGNAL (G4A-EL)

Refer to STEP 3 in Troubleshooting.

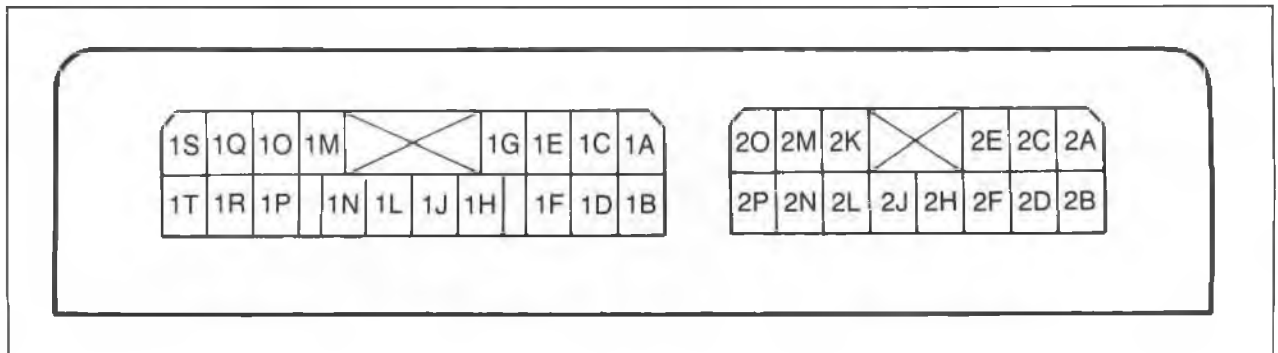
## MODE, AND HOLD INDICATOR LIGHT (G4A-EL)

Refer to Section 15.

## OD OFF INDICATOR LIGHT (G4A-HL)

Refer to Section 15.

## EC-AT CONTROL UNIT (G4A-EL)



## Terminal Voltage Chart

Terminal	Connected to	Voltage	Condition	
1A (Input)	Hold switch	Approx. 12V	Switch depressed	
		Below 1.5V	Switch released	
1B (Input)	Mode switch (Power side)	Below 1.5V	POWER mode	
		Approx. 12V	ECONOMY mode	
1C (Input)	Inhibitor switch	Approx. 12V	L range	
		Below 1.5V	Other ranges	
1D (Input)		S range	Approx. 12V	S range
			Below 1.5V	Other ranges
1E (Input)		D range	Approx. 12V	D range
			Below 1.5V	Other ranges
1F (Input)	N and P range	Below 1.5V	N or P range	
		Approx. 12V	Other ranges	
1G (Input)	Water temperature switch	Approx. 12V	Above 72°C (162°F)	
		Below 1.5V	Below 65°C (149°F)	
1H	—	—	—	
1I	—	—	—	

# 7B ELECTRICAL SYSTEM COMPONENTS

Terminal	Connected to	Voltage	Condition
1J	—	—	—
1K	—	—	—
1L (Input)	Idle switch	Below 1.5V	At idle
		Approx. 12V	Other speeds
1M	—	—	—
1N (Input)	Brake light switch	Approx. 12V	Brake pedal depressed
		Below 1.5V	Brake pedal released
1O (Input)	Throttle sensor	Approx. 5V	Ignition switch ON
		Below 1.5V	Ignition switch OFF
1P (Input)		Approx. 0.5—4.3V	Throttle valve fully closed to fully open
1Q (Input)	Vehicle speed sensor	Approx. 4.5V	During driving
		Approx. 4.5V or below 1.5V	Vehicle stopped
1R (Ground)	Throttle sensor	Below 1.5V	—
1S (Input)	Pulse generator	Approx. 12V	Engine running
		Below 1.5V	Engine stopped
1S (Ground)	Pulse generator	Below 1.5V	—
2A (Battery power)	Battery	Approx. 12V	Ignition switch ON
		Below 1.5V	Ignition switch OFF
2B (Ground)	Body ground	Below 1.5V	—
2C (Memory power)	Battery	Approx. 12V	—
2D (Ground)	Body ground	Below 1.5V	—
2E (Output)	1-2 shift solenoid valve	Approx. 12V	Refer to page 7B—26 of solenoid valve operation table
		Below 1.5V	
2F (Output)	2-3 shift solenoid valve	Approx. 12V	
		Below 1.5V	
2G	—	—	—
2H (Output)	3-4 shift solenoid valve	Approx. 12V	Refer to page 7B—26 of solenoid valve operation table
		Below 1.5V	
2I	—	—	—
2J (Output)	Lock-up solenoid valve	Approx. 12V	Lock-up
		Below 1.5V	Other
2K (Output)	Hold indicator	Below 1.5V	Hold mode
		Approx. 12V	Other modes
2L (Output)	Mode indicator	Approx. 12V	Hold mode
		Below 1.5V	Power or economy mode
2M (Output)	EC-AT Tester (malfunction code)	Approx. 12V	Normal
		Below 1.5V	If malfunction present
		Code signal	Self-diagnosis check connector grounded
2N	—	—	—
2O (Input)	Fluid temperature switch	Below 1.5V	Above 150°C (302°F)
		Approx. 10—12V	Below 143°C (289°F)
2P (Input)	EC-AT check connect	Approx. 12V	—

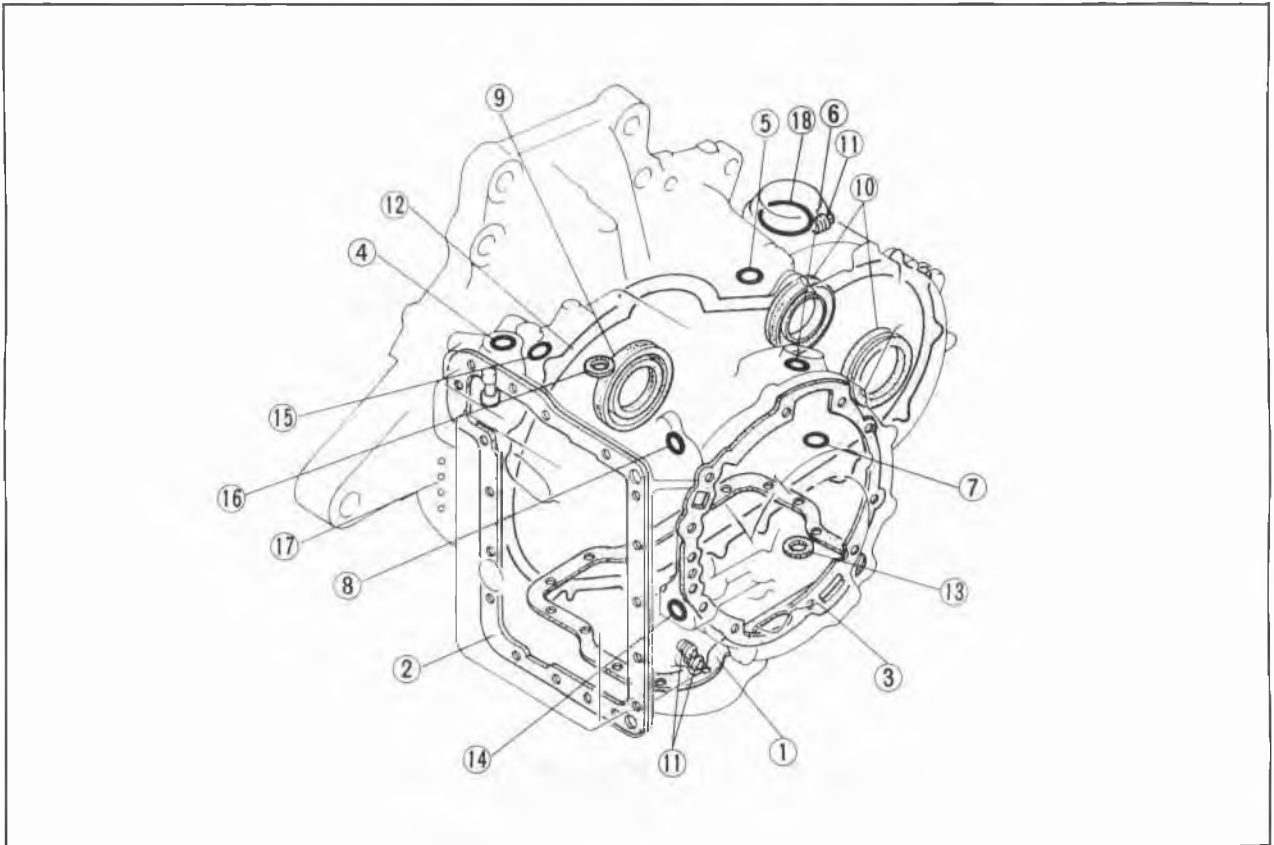
76G07B-084

## ON-VEHICLE MAINTENANCE

### AUTOMATIC TRANSAXLE FLUID (ATF)

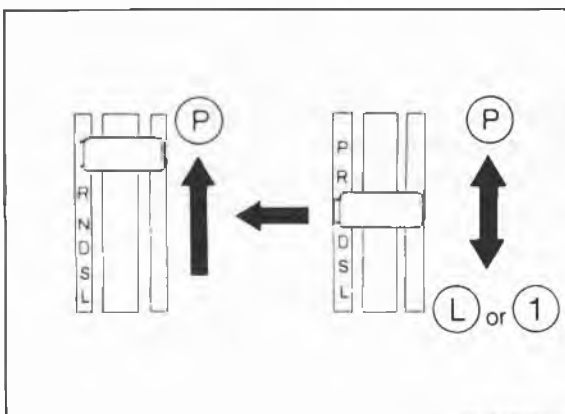
#### Inspection for Fluid Leaks

Check for fluid leaks; the following figure shows the locations where fluid leakage may possibly occur.



76G07B-085

- |                             |                                       |
|-----------------------------|---------------------------------------|
| 1. Oil pan                  | 10. Driveshaft                        |
| 2. Control valve body cover | 11. Square head plug                  |
| 3. Oil pump                 | 12. Transaxle case                    |
| 4. Inhibitor switch         | 13. Drain plug                        |
| 5. Speedometer driven gear  | 14. Oil cooler return pipe            |
| 6. Pulse generator (G4A-EL) | 15. Oil cooler outlet pipe            |
| 7. Oil filler tube          | 16. Fluid temperature switch (G4A-EL) |
| 8. Throttle cable           | 17. Blind plugs                       |
| 9. Bearing cover            | 18. Governor cover (G4A-HL)           |



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#### Inspection of Level

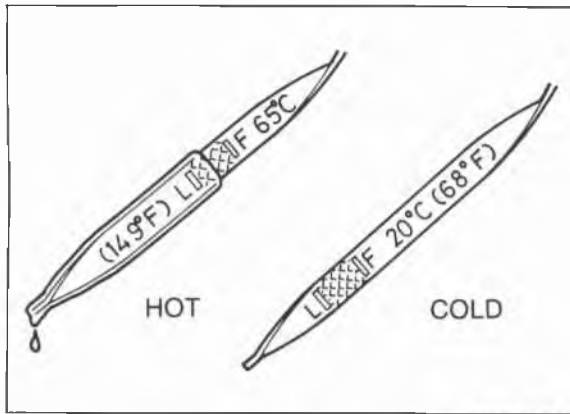
1. Apply the parking brake and position wheel chocks to prevent the car from rolling forward.

#### Note

**Place the car on a flat, level surface.**

2. Run the engine so that the automatic transaxle fluid reaches specified temperature.
3. While the engine is idling, shift the select lever from P to L or P to 1 and back again.
4. Let the engine idle.
5. Shift the select lever to P.

## 7B ON-VEHICLE MAINTENANCE



86U07B-064

- Ensure that the ATF level is between the F and L marks. Add ATF to specification, if necessary.

**Low temperature scale:**  
20°C (68°F)

**High temperature scale:**  
65°C (149°F)

**ATF type:**  
Dexron II or M III



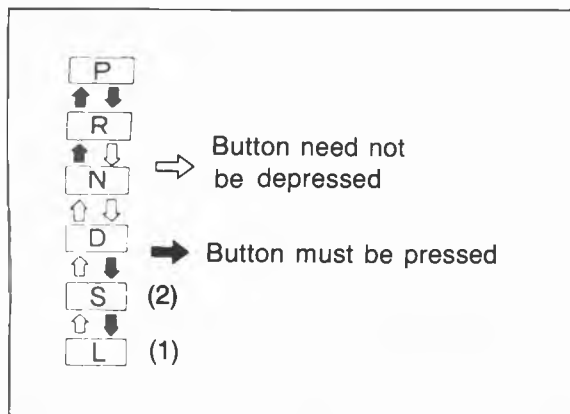
86U07B-065

### Inspection of Condition

- Check the ATF for discoloration.
- Check the ATF for any unusual smell.

### Note

**Determine whether or not the automatic transmission should be disassembled by observing the condition of fluid carefully. If the fluid is muddy and varnished, it indicates burned drive plates.**



76F07B-022

### SELECTOR LEVER

#### Inspection

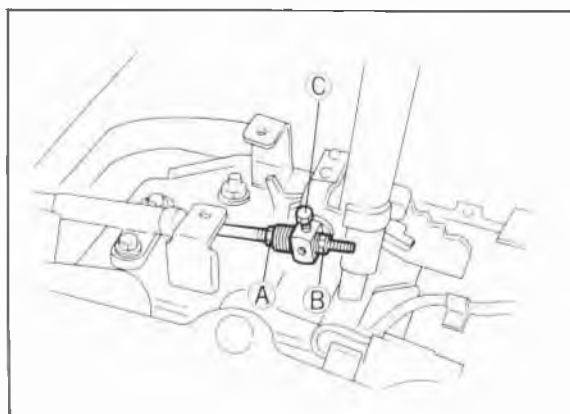
- Check that the selector lever can only be shifted as shown in the figure.
- Make sure there is a click at each range when shifted from P ↔ L or P ↔ 1 range.
- Check that the position of the selector lever and the indicator are exact.
- Check that the button returns smoothly when used to shift the selector.

#### Adjustment

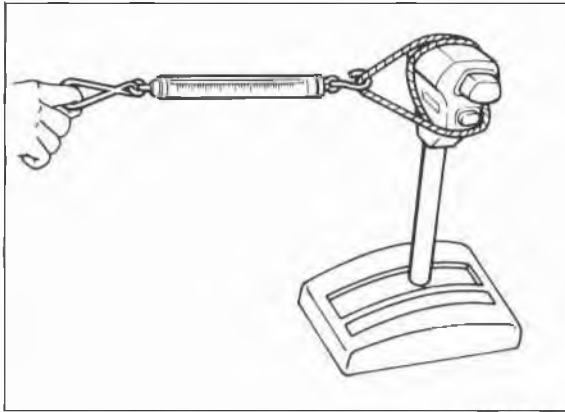
- Loosen locknuts A, B, and lockbolt C.
- Shift the selector lever to P range.
- Shift the transaxle to P range by moving the manual shaft of the transaxle.
- While holding the selector lever forward in P range, tighten lockbolt C to the specified torque.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 67—95 in·lb)**



76F07B-023



76F07B-024

5. Turn locknut A by hand until it just touches the spacer.
6. Tighten locknut B to the specified torque.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 67—96 in·lb)**

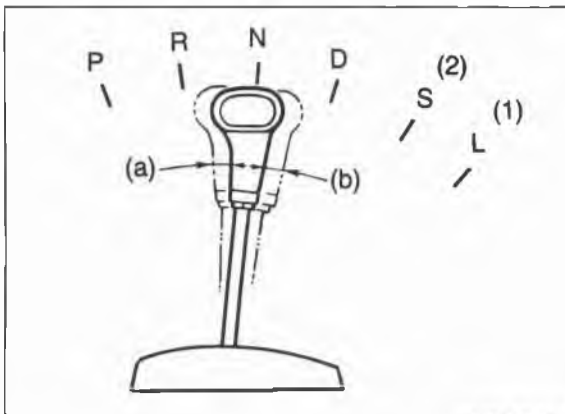
7. Shift the selector lever to N range.
8. With the button on the selector lever knob pressed, push the selector toward R range with a force of **20 N (2 kg, 4.4 lb)** and check the amount of movement (a) at the selector lever knob.
9. Pull the selector lever toward D range in the same manner and check the amount of movement (b).
10. Verify the stroke difference of (a) and (b) is as specified.

**Stroke difference: 8 mm (0.315 in) max.**

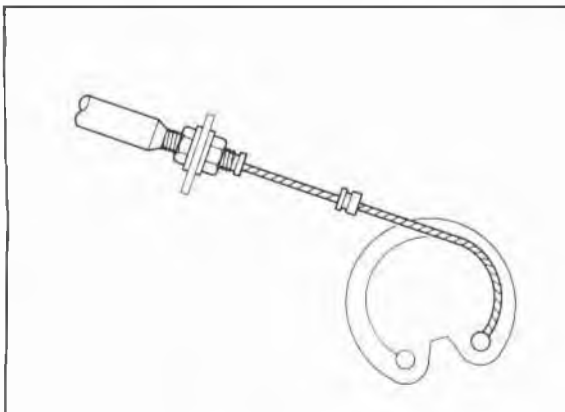
**Note**

**If not within specification, readjust locknuts A and B.**

11. Check the selector lever operation. (Refer to Inspection section.)



76F07B-025



86U07B-066

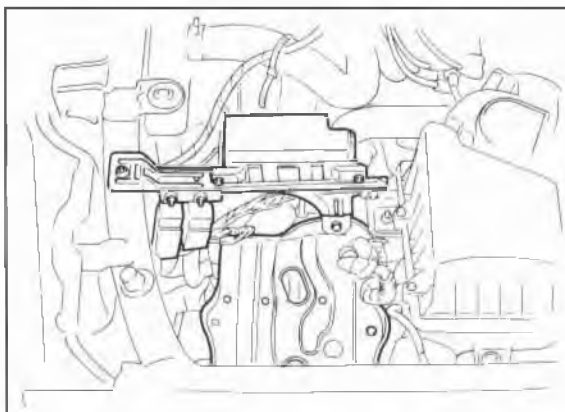
**THROTTLE CABLE**

**Inspection**

1. Check the inner and outer cable for damage.
2. Make sure that the accelerator operates smoothly.

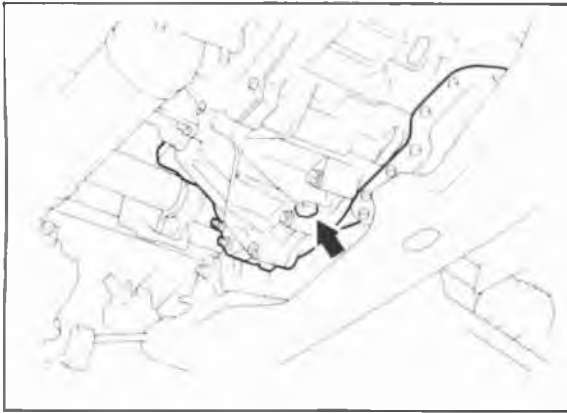
**Removal**

1. Remove the battery and battery carrier.
2. Disconnect the main fuse block. (G4A-EL)

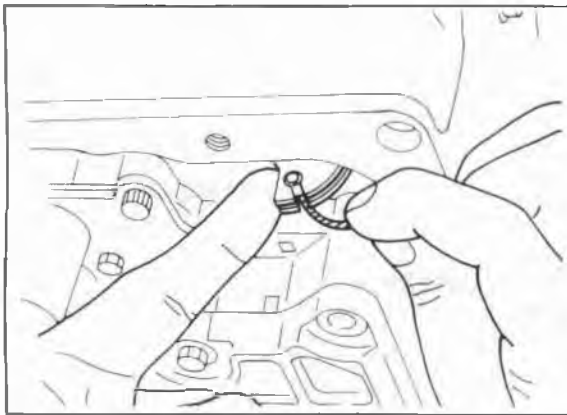


76G07B-090

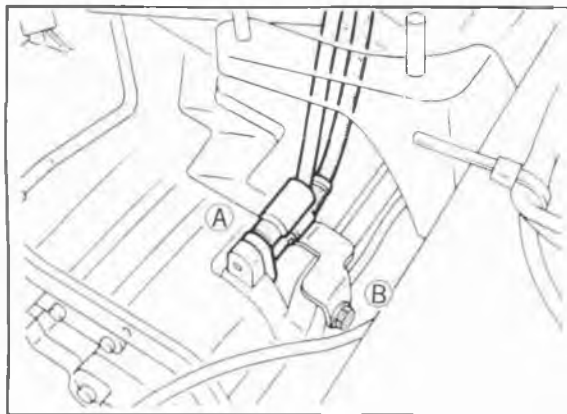
## 7B ON-VEHICLE MAINTENANCE



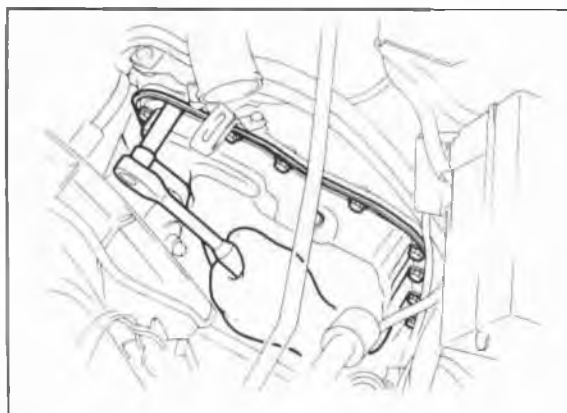
76G07B-091



76G07B-092



86U07B-075



86U07B-076

3. Separate the harness from the clip.
4. Jack up the vehicle and support it with safety stands, then drain the ATF.

5. Remove the throttle cable from the throttle cam (throttle chamber).
6. Remove the control valve body cover and gasket.
7. Remove the throttle cable from the throttle cam (control valve body).
8. Remove the mounting bolt and throttle cable from the transaxle.
9. Remove the O-ring.

### Installation

Install in the reverse order of removal referring to installation note.

### Installation note

#### Throttle cable

Install the throttle cable and a new O-ring into the transaxle case.

#### Tightening torque:

- Ⓐ 8—11 N·m  
(80—110 cm·kg, 69—95 in·lb)
- Ⓑ 19—26 N·m  
(1.9—2.6 m·kg, 14—19 ft·lb)

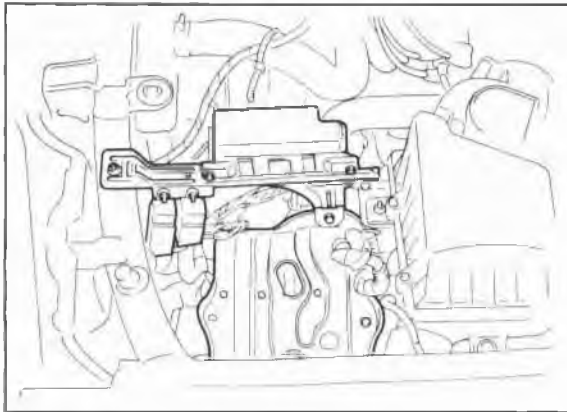
### Control valve body cover

Install the control valve body cover and a new gasket.

#### Tightening torque:

- 8—11 N·m (85—110 cm·kg, 74—95 in·lb)





76G07B-093

### Main fuse block (G4A-EL)

Install the main fuse block.

#### Tightening torque:

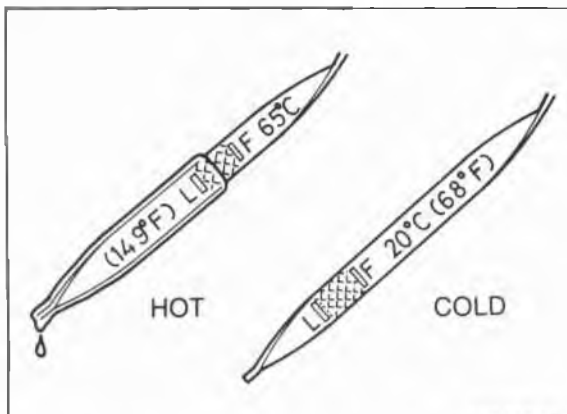
8—11 N·m (80—110 cm·kg, 69—95 in·lb)

### Battery carrier

Install the battery carrier.

#### Tightening torque:

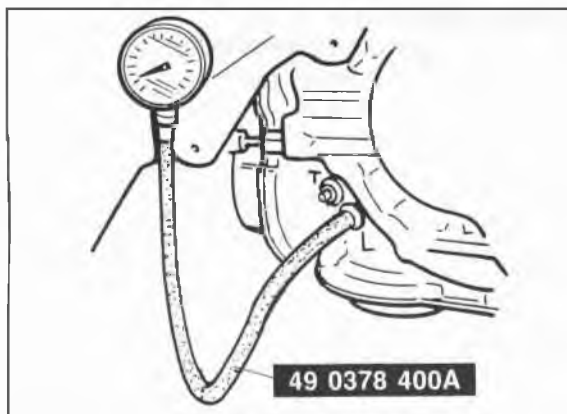
31—40 N·m (3.2—4.1 m·kg, 23—30 ft·lb)



76G07B-094

### ATF level

After installation, add ATF, and with the engine idling, check the fluid level and for leaks. (Refer to page 7B—71)

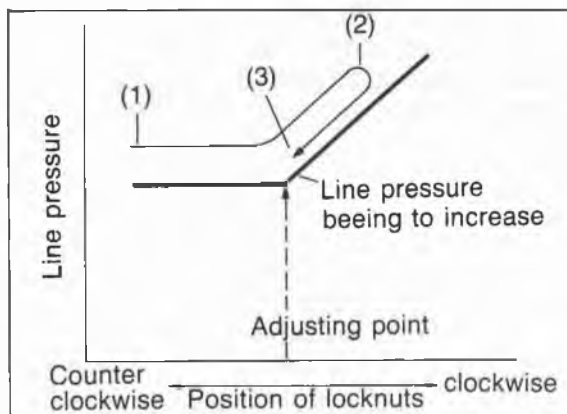


76G07B-095

### Adjustment (G4A-EL)

1. Remove the splash shield next to the left front tire.
2. Remove the square head plug L and install the SST.
3. Shift into P range and start the engine. Warm up the engine to normal operating temperature, and adjust the idle speed.

**Idle speed: 950  $\pm$  50 rpm**



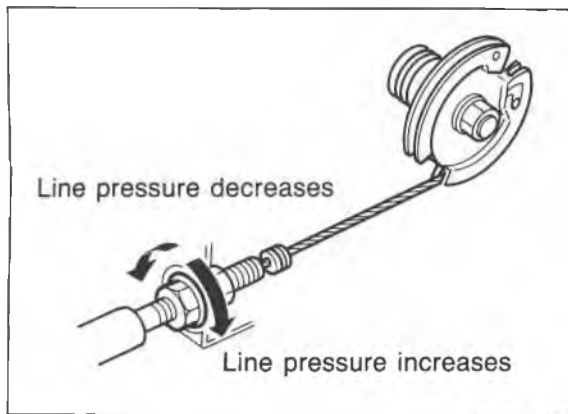
86U07B-482

4. Adjust locknuts as follows:

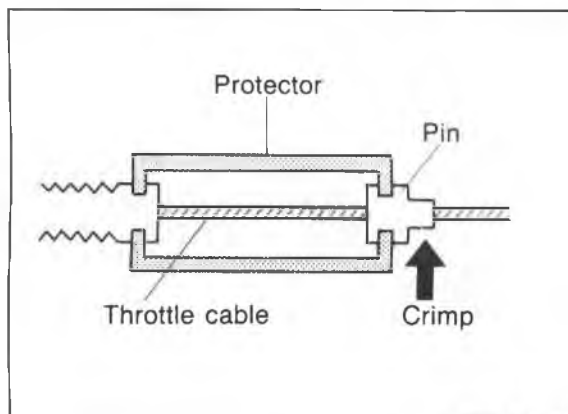
When the locknuts are moved, line pressure is increased or decreased as shown. Adjust the locknuts to the correct position using the following procedure.

- (1) Initially install the locknuts fully away from the throttle cam. (Loosen the cable all the way)
- (2) Adjust the locknuts in a clockwise direction as viewed from the front of the vehicle until the line pressure begins to increase above the specification shown below.

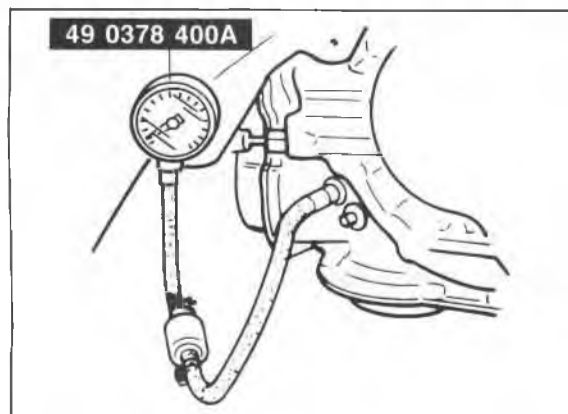
## 7B ON-VEHICLE MAINTENANCE



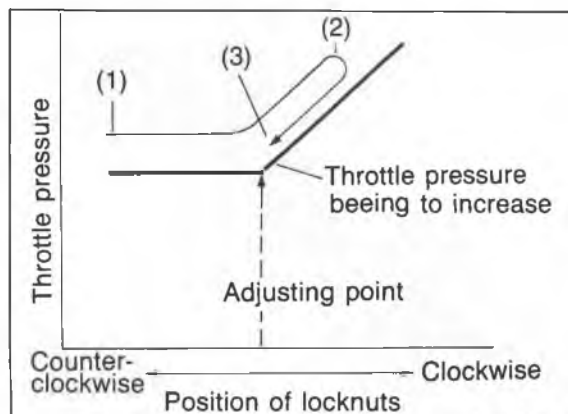
86U07B-483



86U07B-080



76G07B-096



76G07B-097

- (3) Adjust the locknuts in a counterclockwise direction until the line pressure decreases to the specification. Tighten the locknuts.

**Specified pressure: 432—450 kPa  
(4.4—4.6 kg/cm<sup>2</sup>, 63—66 psi)**

### Note

#### Transmission in P range

5. Turn off the engine.

6. Reinstall the square head plug.

### Tightening torque:

**5—10 N·m (50—100 cm·kg, 43—87 in·lb)**

7. Fully open the throttle valve; then crimp the pin with the protector installed as shown.
8. Remove the protector.

### Adjustment (G4A-HL)

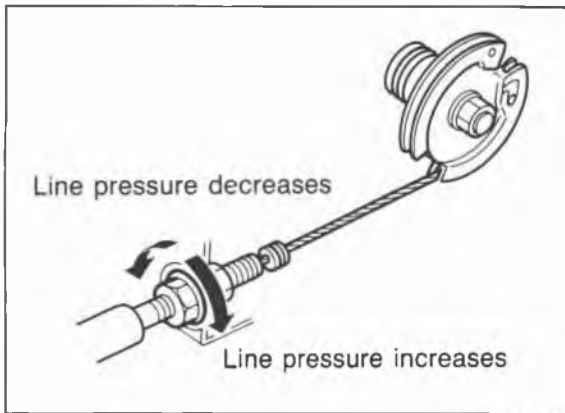
1. Remove the splash shield next to the left front tire.
2. Remove the square head plug T and install the SST.
3. Shift into P range and start the engine. Warm up the engine to normal operating temperature, and adjust the idle speed.

**Idle speed: 900 ±<sup>50</sup> rpm**

4. Adjust locknuts as follows:

When the locknuts are moved, throttle pressure is increased or decreased as shown. Adjust the locknuts to the correct position using the following procedure.

- (1) Initially install the locknuts fully away from the throttle cam. (Loosen the cable all the way)
- (2) Adjust the locknuts in a clockwise direction as viewed from the front of the vehicle until the throttle pressure begins to increase above the specification shown below.



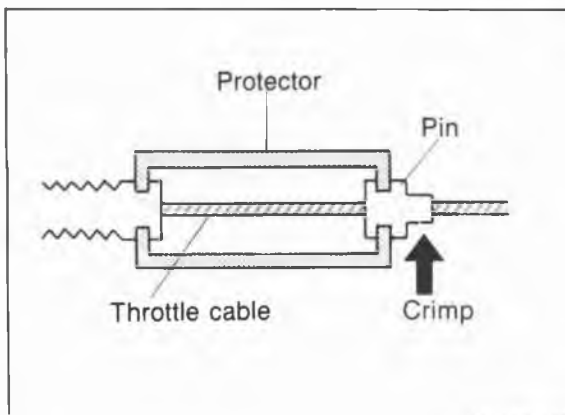
76G07B-098

- (3) Adjust the locknuts in a counterclockwise direction until the throttle pressure decreases to the specification. Tighten the locknuts.

**Specified pressure: 88—108 kPa  
(0.9—1.1 kg/cm<sup>2</sup>, 13—16 psi)**

**Note**  
**Transmission in P range**

5. Turn off the engine.

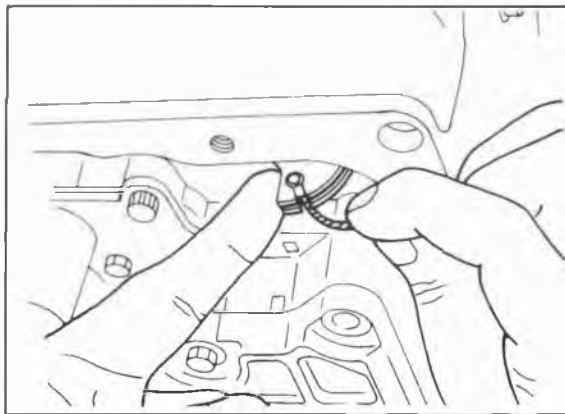


86U07B-080

6. Reinstall the square head plug.

**Tightening torque:**  
**5—10 N·m (50—100 cm·kg, 43—87 in·lb)**

7. Fully open the throttle valve; then crimp the pin with the protector installed as shown.  
8. Remove the protector.



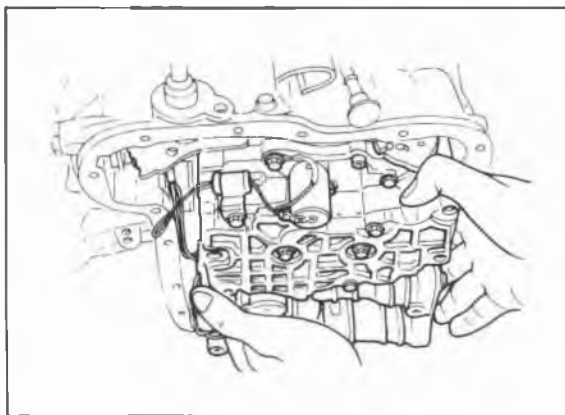
76G07B-099

## CONTROL VALVE BODY

**Note**  
**Remove the control valve body only if troubleshooting indicates a probable failure.**

### Removal

1. Remove the throttle cable. (Refer to 7B—73)
2. Disconnect the solenoid connector.



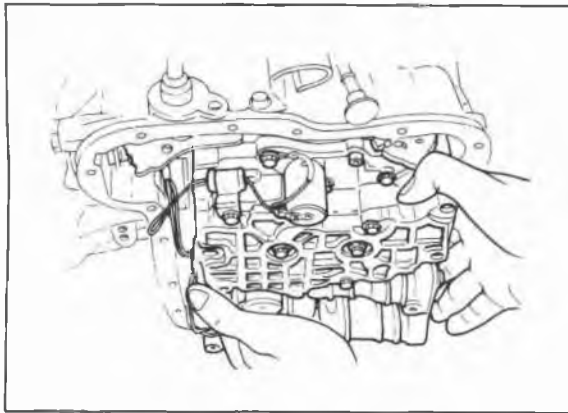
86U07B-082

3. Remove the control valve body.

### Disassembly, Inspection and Assembly

Refer to control valve body section of INSPECTION AND REPAIR.

## 7B ON-VEHICLE MAINTENANCE



86U07B-083

### Installation

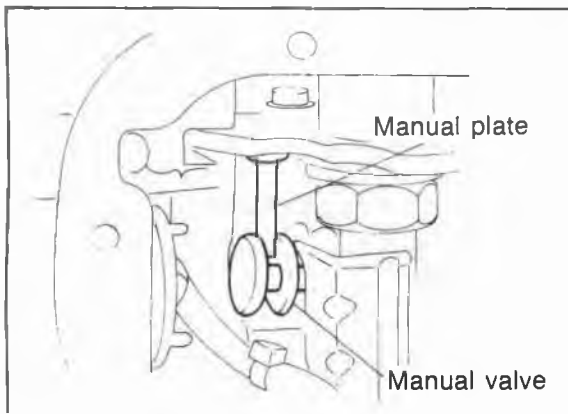
Install in the reverse order of removal referring to installation note.

### Installation note

#### Control valve body

Install the control valve body.

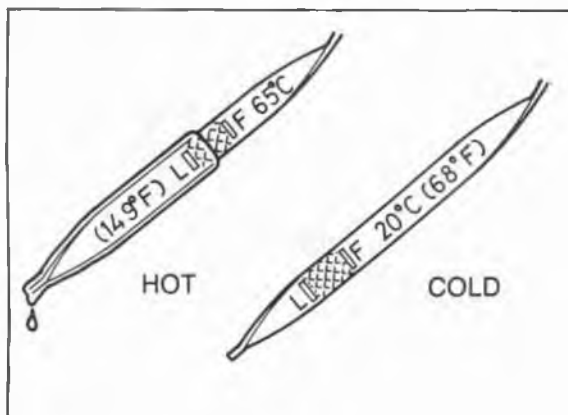
**Tightening torque: 11—15 N·m  
(110—150 cm·kg, 95—130 in·lb)**



86U07B-084

### Note

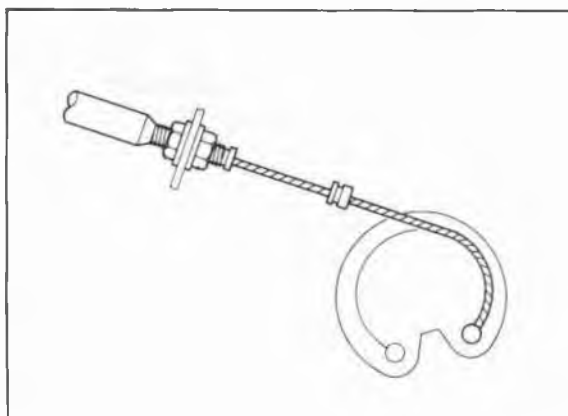
- To place the manual plate in the correct position of the manual valve, shift into "R" before installation.
- Verify that the manual plate and manual valve are assembled correctly by using a mirror, then tighten the mounting bolts.



76G07B-100

### ATF level

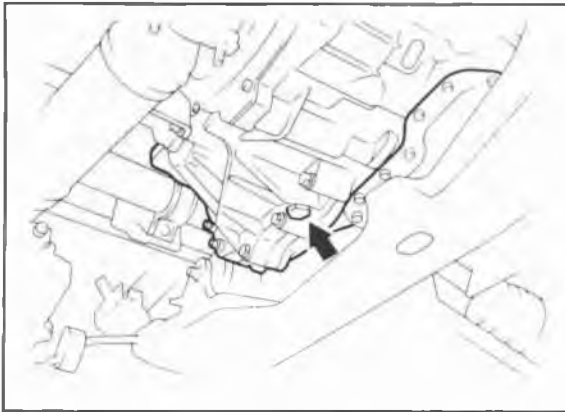
After installation, add ATF, and with the engine idling, check the fluid level and for leaks.  
(Refer to page 7B—71)



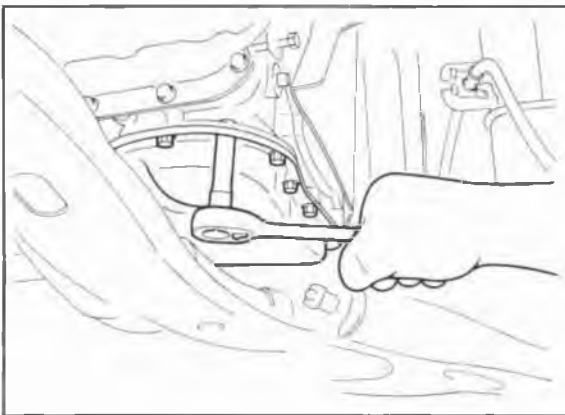
86U07B-086

### Throttle cable

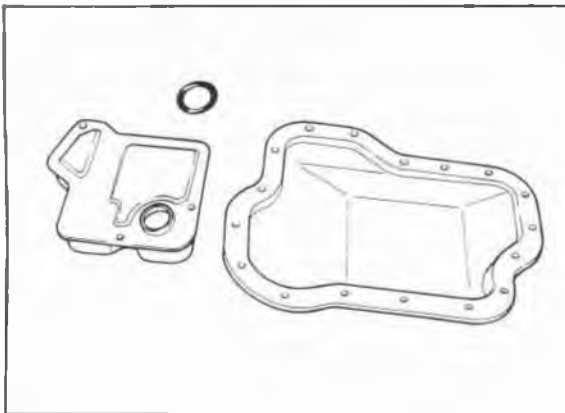
Adjust the throttle cable with the oil pressure test.



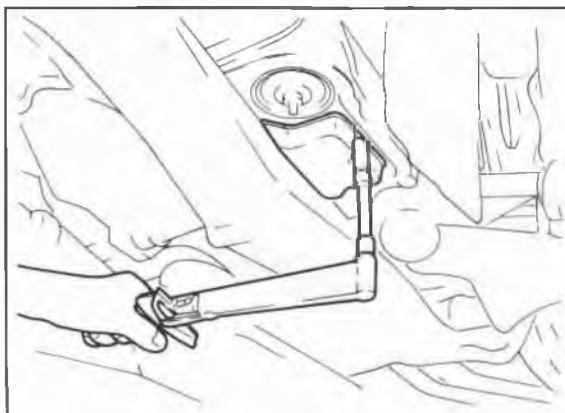
86U07B-087



86U07B-088



86U07B-089



86U07B-090

## OIL STRAINER

### Removal

1. Jack up the vehicle and support it with safety stands.
2. Drain the ATF.
3. Remove the left side splash shield.

4. Remove the oil pan and gasket.
5. Remove the oil strainer.
6. Remove the O-ring from the oil strainer.

### Inspection

Check the following and repair or replace any faulty parts.

1. Deformed or cracked oil pan
2. Deformed or clogged oil strainer

### Installation

1. Apply ATF to the O-ring and install it onto the oil strainer.
2. Install the oil strainer.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

## 7B ON-VEHICLE MAINTENANCE

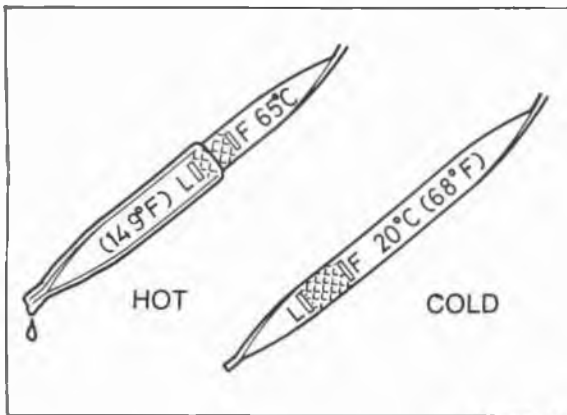


86U07B-091

3. Install the magnets on the oil pan as shown and install the oil pan along with a new gasket.

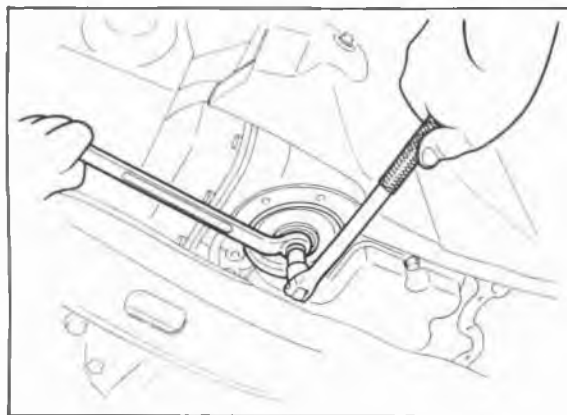
### Tightening torque:

**8—11 N-m (80—110 cm-kg, 69—95 in-lb)**



76G07B-101

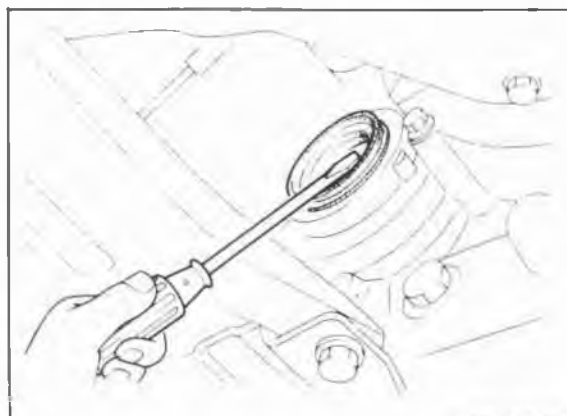
4. Add ATF, and with the engine idling, check the fluid level and for leaks. (Refer to page 7B—71)



76G07B-102

### ADJUSTMENT OF 2-4 BRAKE BAND

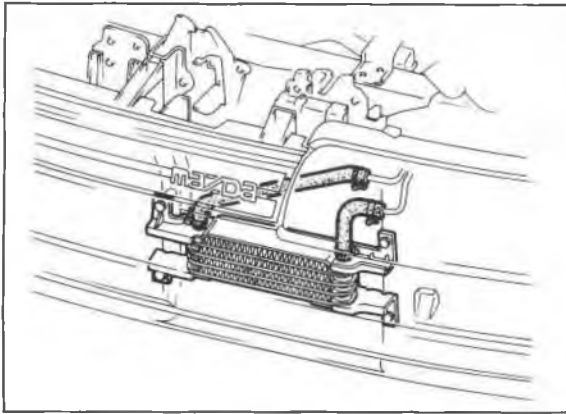
1. Remove the oil pan. (Refer to page 7B—79)
2. Adjust the 2-4 brake band. (Refer to page 7B—211)



86U07B-094

### REPLACEMENT OF DRIVESHAFT OIL SEAL

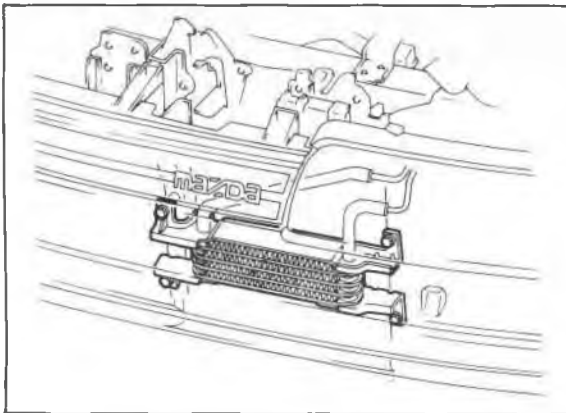
Replace the oil seal in the same manner as for the manual transaxle. (Refer to page 7A—9)



86U07B-095

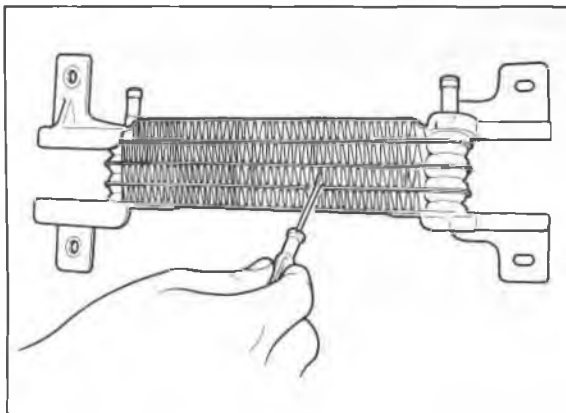
## OIL COOLER Removal

1. Remove the front grille.
2. Disconnect the oil cooler hoses.



86U07B-096

3. Remove the oil cooler.

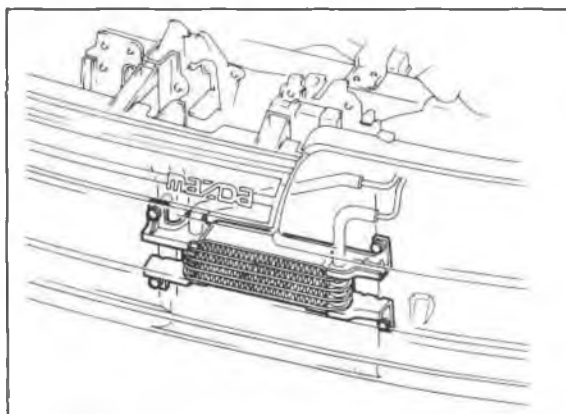


86U07B-097

## Inspection

Check the following and repair or replace any faulty parts.

1. Cracks, damage, or oil leakage
2. Bent fins (repair with a screwdriver)



86U07B-098

## Installation

Install the oil cooler referring to installation note.

## Installation note

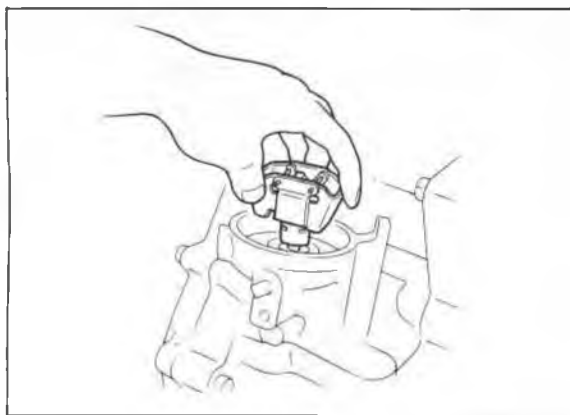
### Oil cooler

Install the oil cooler.

### Tightening torque:

8—11 N·m (80—110 cm·kg, 69—95 in·lb)

## 7B ON-VEHICLE MAINTENANCE

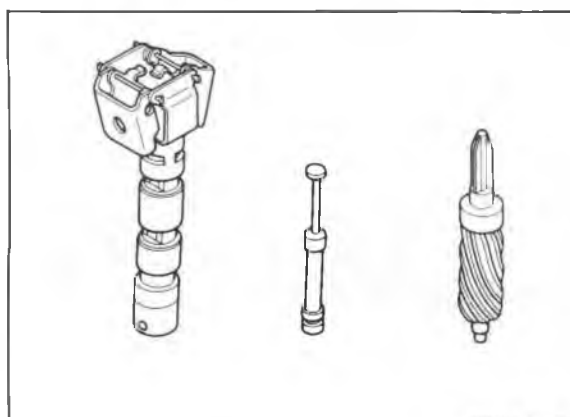


76G07B-103

### GOVERNOR (G4A-HL)

#### Removal

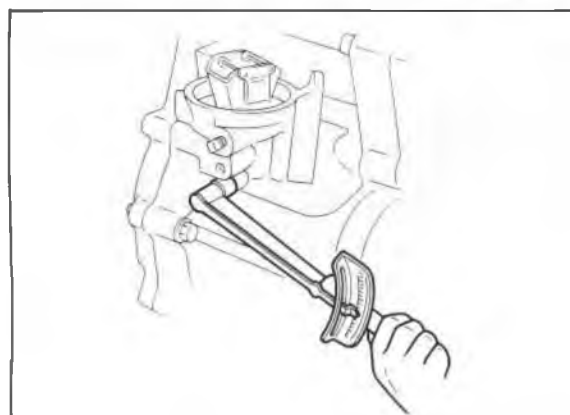
1. Remove the clip from the governor cover.
2. Remove the stopper bolt; then remove the governor assembly.



76G07B-104

#### Disassembly, Inspection and Assembly

Refer to Governor section of INSPECTION AND REPAIR.



76G07B-105

#### Installation

Install in the reverse order of removal referring to installation note.

#### Installation note

##### Stopper bolt

Tighten the stopper bolt.

#### Tightening torque:

**6—9 N·m (60—90 cm·kg, 52—78 in·lb)**

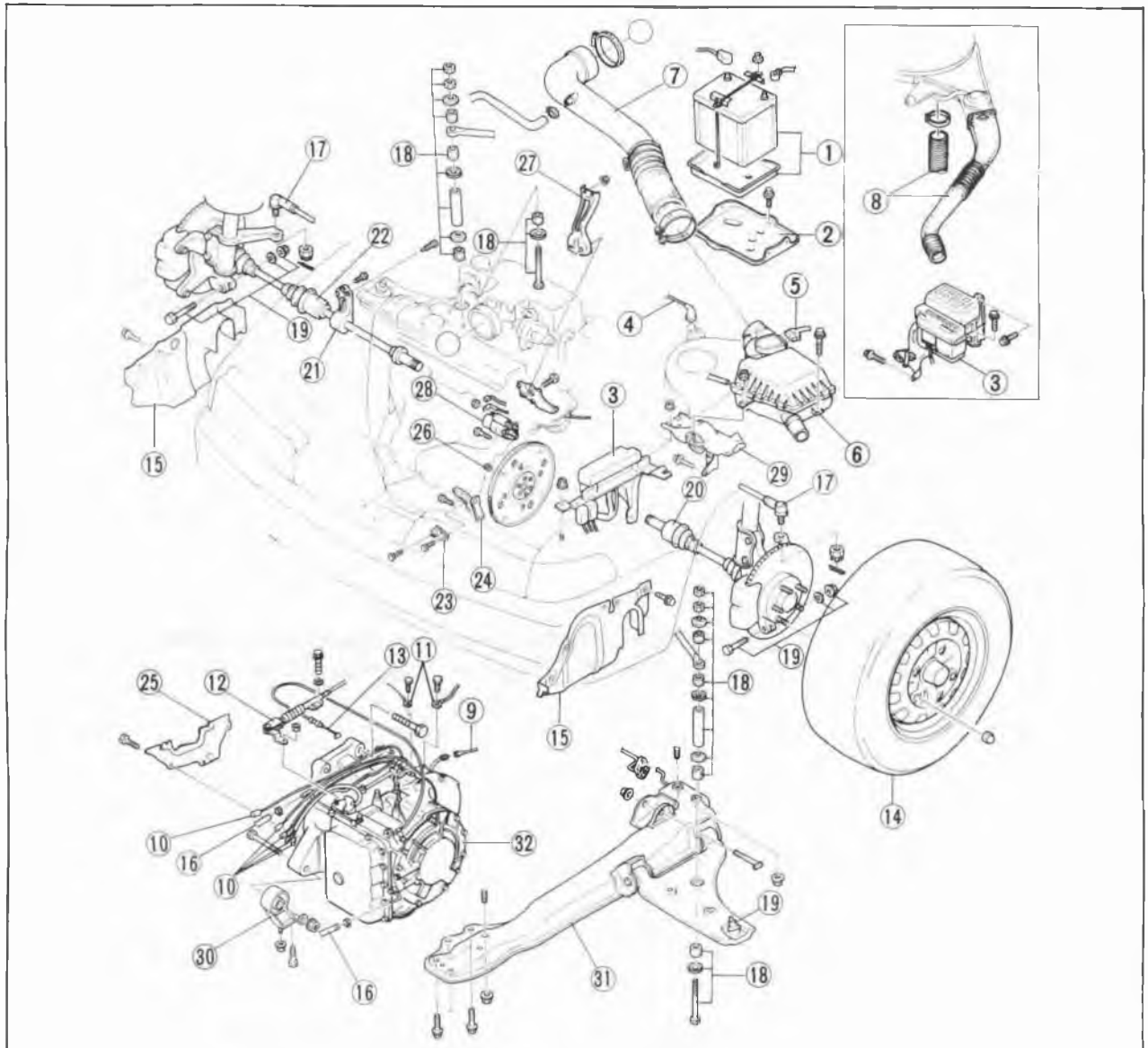


## REMOVAL

### PRECAUTION

- (1) Drain the ATF before removal.
- (2) Jack up the vehicle and support it with safety stands after attaching the engine support.

### Components

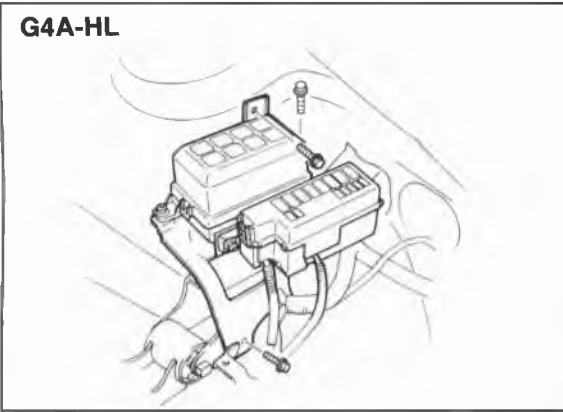


76G07B-106

- |                                      |                                       |   |
|--------------------------------------|---------------------------------------|---|
| 1. Battery                           | 11. Grounds                           | 22. Joint shaft and driveshaft          |
| 2. Battery carrier                   | 12. Selector cable                    | 23. Exhaust pipe bracket                |
| 3. Main fuse block                   | 13. Throttle cable                    | 24. Gusset plates                       |
| 4. Distributor lead                  | 14. Front wheels                      | 25. Under cover                         |
| 5. Air flow meter connector (G4A-EL) | 15. Splash shields                    | 26. Torque converter nuts               |
| 6. Air cleaner assembly (G4A-EL)     | 16. Oil cooler outlet and inlet hoses | 27. Manifold bracket (G4A-EL)           |
| 7. Air cleaner hose (G4A-EL)         | 17. Tie-rod ends                      | 28. Starter                             |
| 8. Fresh air duct (G4A-HL)           | 18. Stabilizer bar control links      | 29. Engine mount No.4                   |
| 9. Speedometer cable                 | 19. Lower arm ball joints             | 30. Engine mount No.2                   |
| 10. Connectors                       | 20. Driveshaft                        | 31. Crossmember and left side lower arm |
|                                      | 21. Joint shaft bracket               | 32. Transaxle                           |

## 7B REMOVAL

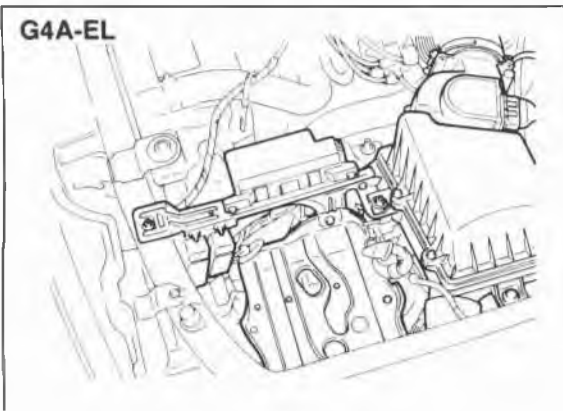
G4A-HL



76G07B-107

1. Remove the battery and battery carrier.
2. Disconnect the main fuse block.

G4A-EL



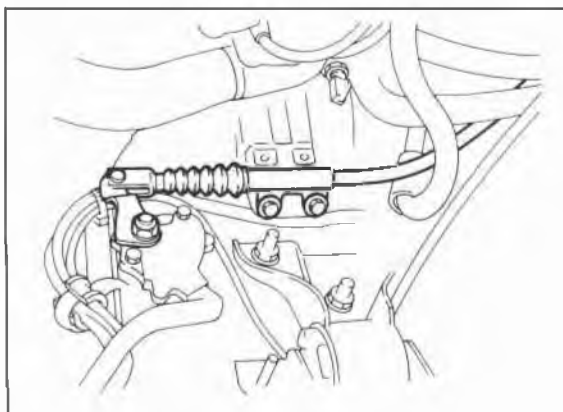
76G07B-108

3. Disconnect the distributor lead.
4. Disconnect the air flow meter connector and remove the air cleaner assembly. (G4A-EL)
5. Remove the air cleaner hose. (G4A-EL)
6. Remove the fresh air duct. (G4A-HL)



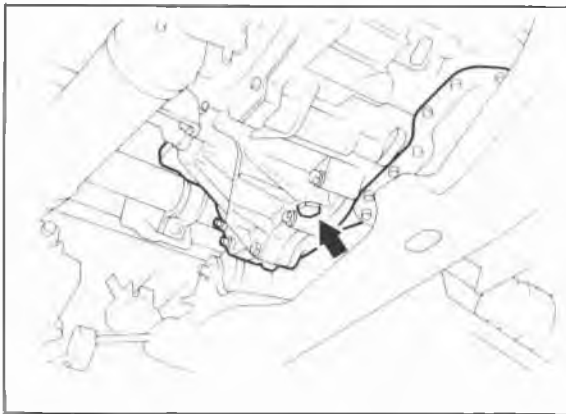
76G07B-109

7. Disconnect the speedometer cable.
8. Disconnect the connectors.
  - (1) Inhibitor switch
  - (2) Solenoid valve
  - (3) Pulse generator (G4A-EL)
  - (4) Fluid temperature switch (G4A-EL)
9. Disconnect the grounds from the transaxle case.



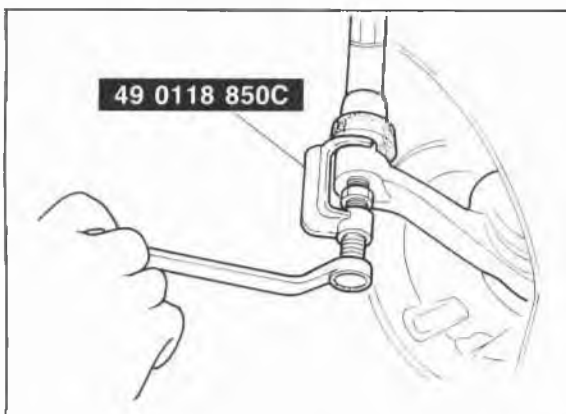
76G07B-110

10. Disconnect the selector cable.
11. Disconnect the throttle cable.



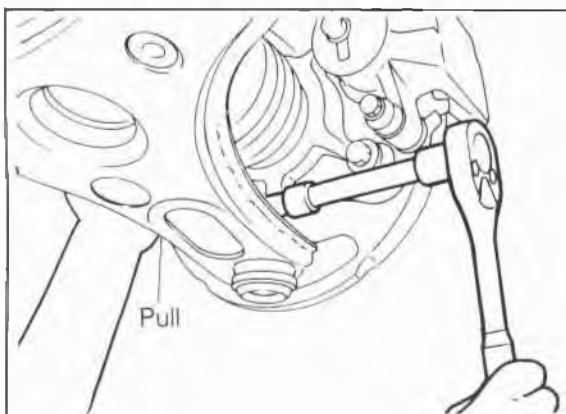
76G07B-111

12. Remove the front wheels.
13. Remove the splash shields.
14. Drain the ATF.
15. Disconnect the oil cooler outlet and inlet hoses.



76G07B-112

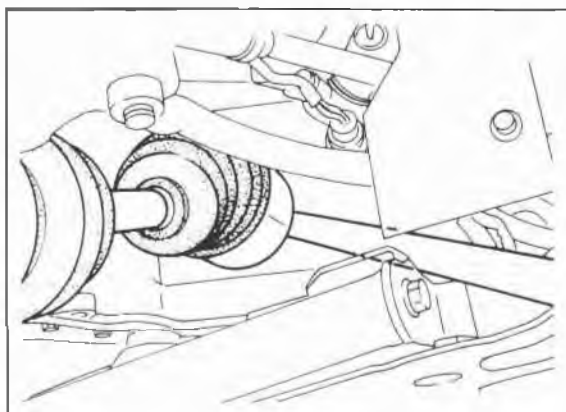
16. Disconnect the tie-rod ends with the **SST**.



76G07B-113

17. Remove the stabilizer bar control links.
18. Remove the bolts and nuts at the left and right lower arm ball joints.
19. Pull the lower arms downward to separate them from the knuckles.

**Caution**  
**Do not damage the ball joint dust boots.**



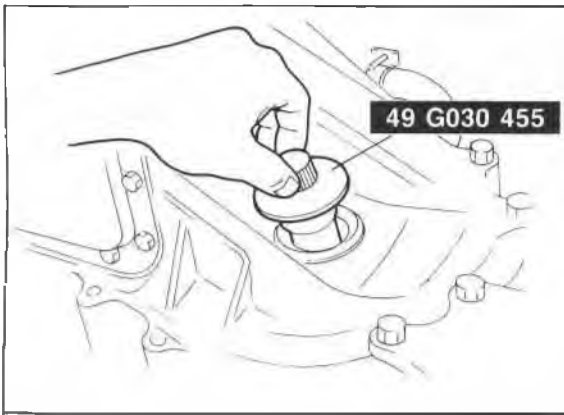
76G07B-114

20. Separate the left driveshaft from the transaxle by prying with a bar inserted between the shaft and the case.

**Caution**  
**Do not damage the oil seal.**

21. Remove the joint shaft bracket.
22. Separate the right driveshaft together with the joint shaft in the same manner.

## 7B REMOVAL

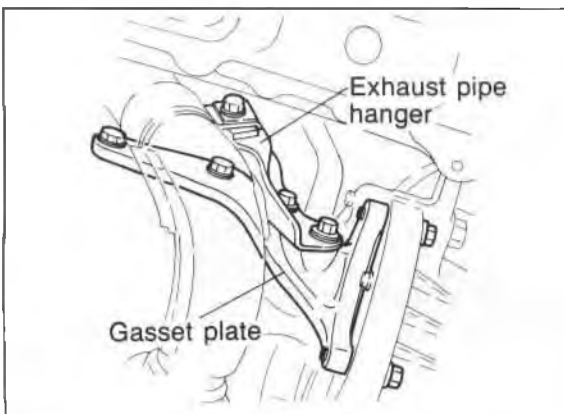


76G07B-115

23. Install the **SST** into the differential side gears.

### Caution

Failure to install the **SST** may allow the differential side gears to become misaligned.

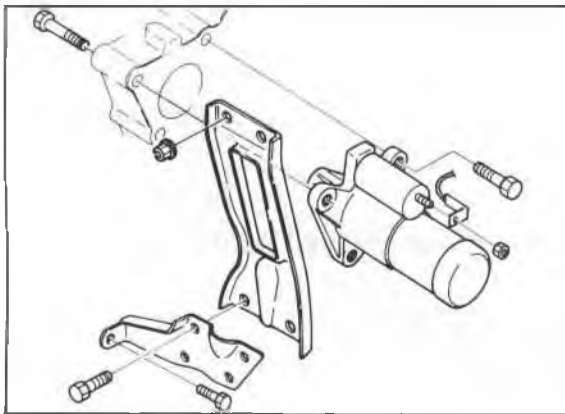


76G07B-116

24. Remove the exhaust pipe hanger and gasket plates.

25. Remove the under cover.

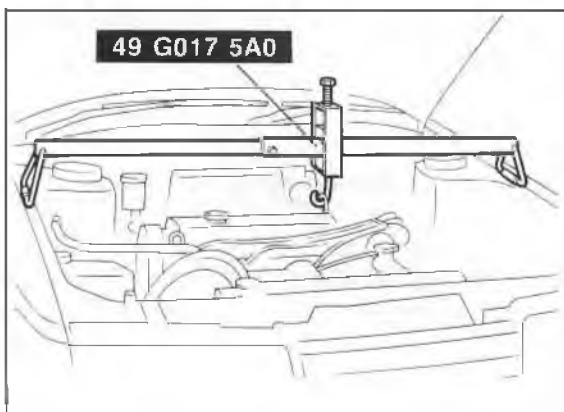
26. Remove the torque converter nuts.



76G07B-117

27. Remove the manifold bracket. (G4A-EL)

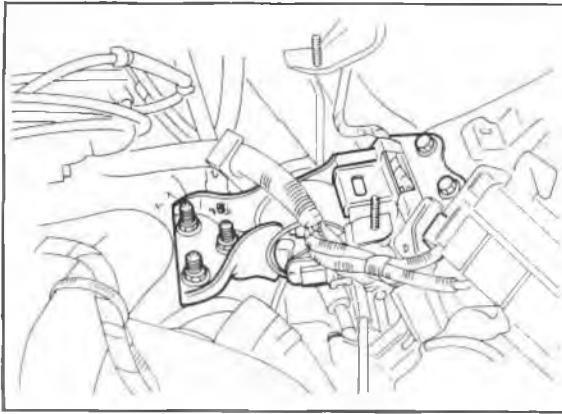
28. Remove the starter.



76G07B-118

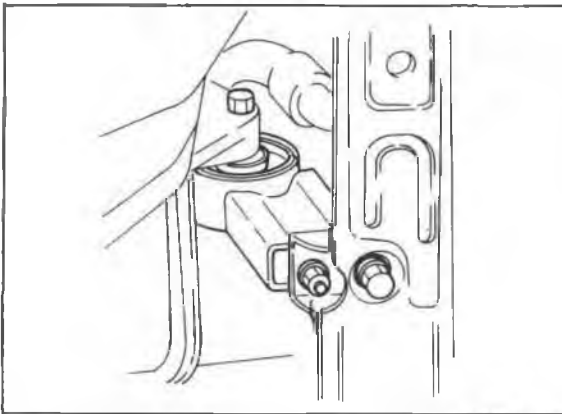
29. Suspend the engine with the **SST**.

## REMOVAL 7B



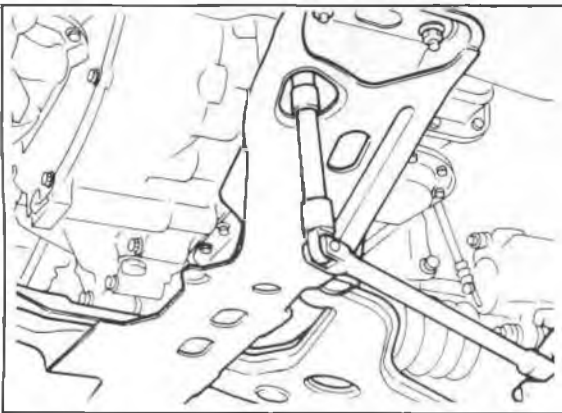
76G07B-119

30. Remove engine mount No. 4 and bracket.



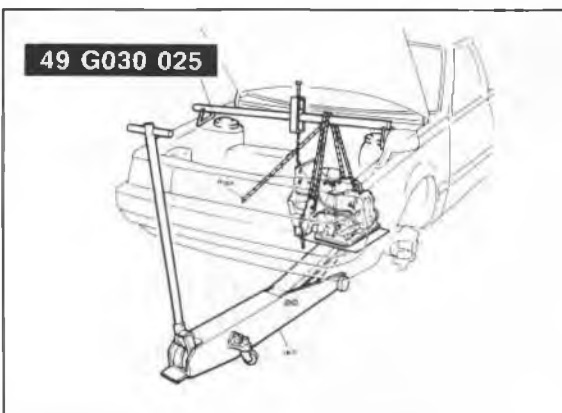
76G07B-120

31. Remove engine mount No. 2.



76G07B-121

32. Remove the crossmember and the left side lower arm as an assembly.



76G07B-122

33. Lean the engine toward the transaxle by loosening the engine support hook bolt.

34. Support the transaxle with a jack.

35. Remove the transaxle mounting bolts.

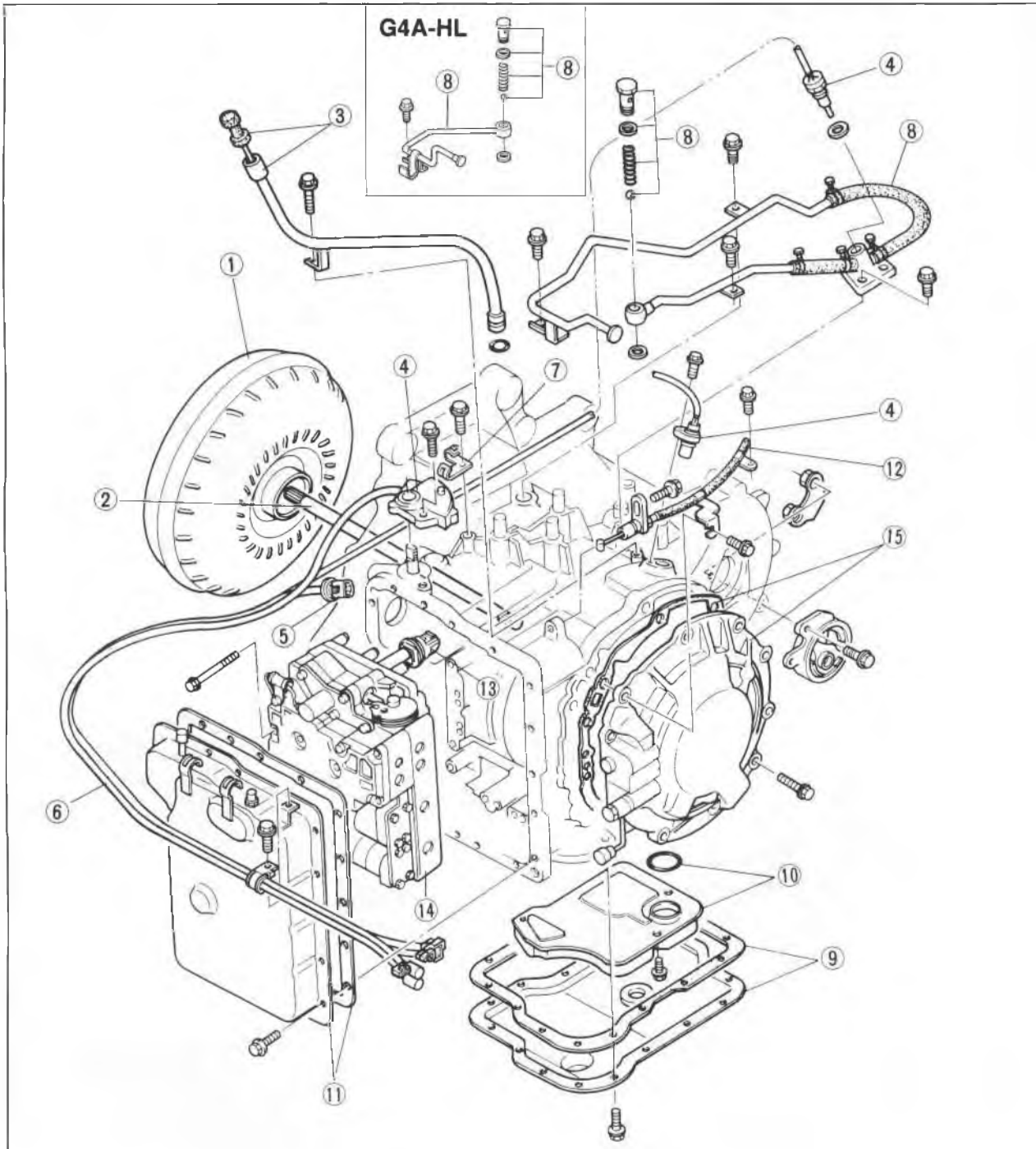
36. Remove the transaxle.

# 7B DISASSEMBLY

## DISASSEMBLY

### DISASSEMBLY-STEP 1

#### Components



86U07B-116

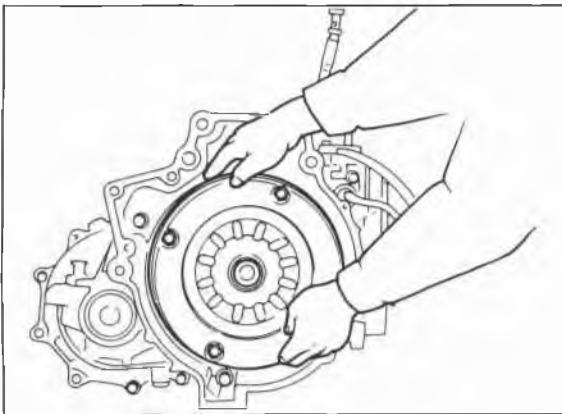
- |  |  |
|--|--|
| 1. Torque converter  | 8. Oil pipes, oil hoses, and switch box  |
| 2. Oil pump shaft  | 9. Oil pan and gasket                    |
| 3. Oil level gauge and oil filler tube                             | 10. Oil strainer and O-ring              |
| 4. Pulse generator, fluid temperature switch, and inhibitor switch | 11. Control valve body cover and gasket  |
| 5. Solenoid connector  | 12. Throttle cable                       |
| 6. Wire harnesses  | 13. Solenoid connector (Valve body side) |
| 7. Harness clip  | 14. Control valve body                   |
|  | 15. Oil pump and gasket                  |

## Procedure

### Precaution

- (1) Drain the ATF before removing the transaxle from the vehicle.
- (2) Disassemble the transaxle in a clean area (dustproof workspace) to prevent dust entry into the mechanisms.
- (3) Clean the transaxle exterior thoroughly with steam and/or cleaning solvents prior to disassembly.
- (4) Inspect the individual transaxle components in accordance with the Troubleshooting during disassembly.
- (5) Use plastic hammers when applying force to separate the light alloy case joints.
- (6) Do not use rags during disassembly.
- (7) Neatly arrange the removed parts in order during disassembly.

86U07B-117

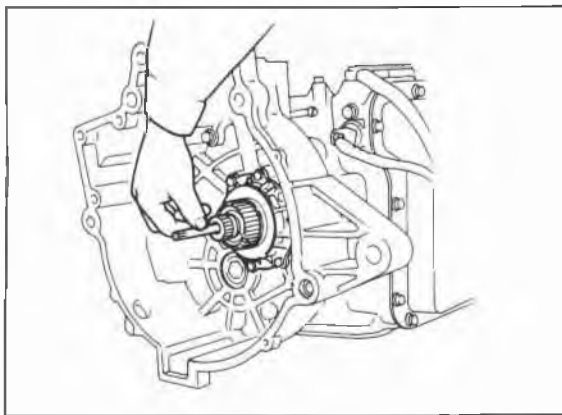


86U07B-118

1. Remove the torque converter from the converter housing.

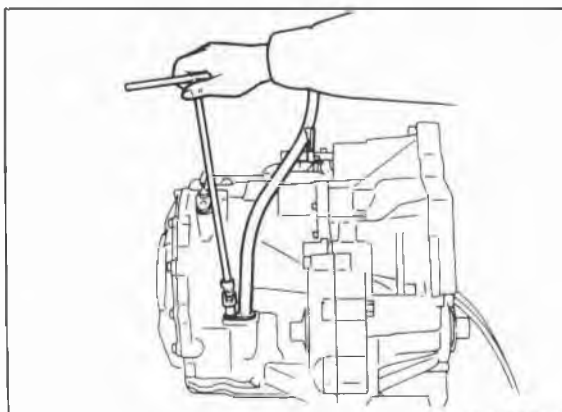
### Note

**Do not allow the ATF to spill when removing the torque converter.**



86U07B-119

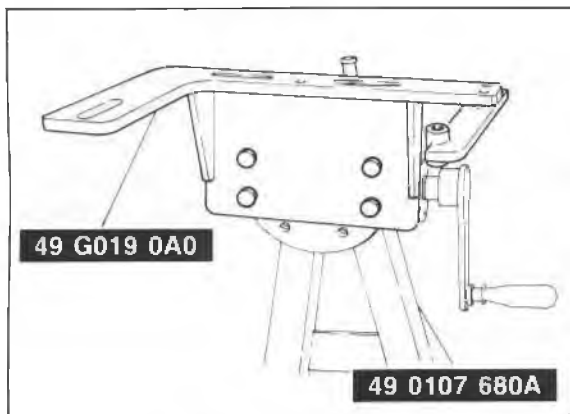
2. Pull out the oil pump shaft by hand.



86U07B-120

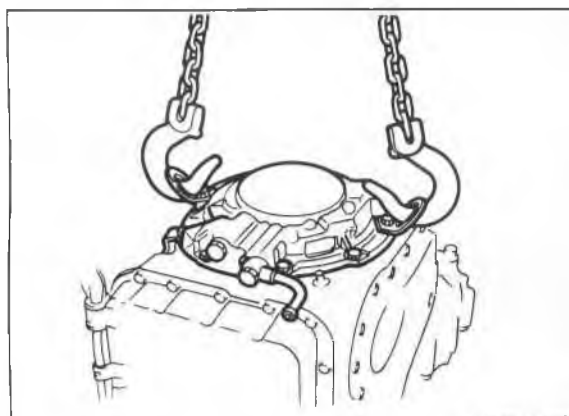
3. Remove the oil level gauge and oil filler tube.

## 7B DISASSEMBLY



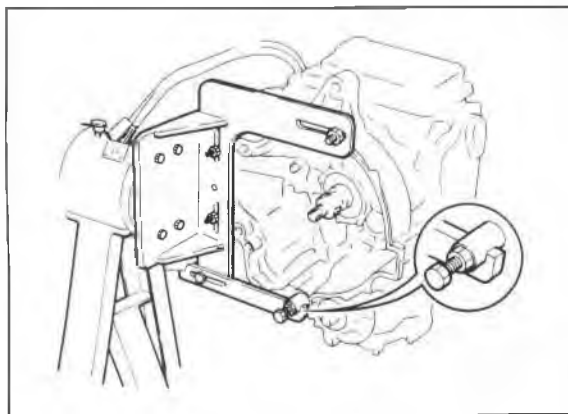
86U07B-121

4. Assemble the **SST**.



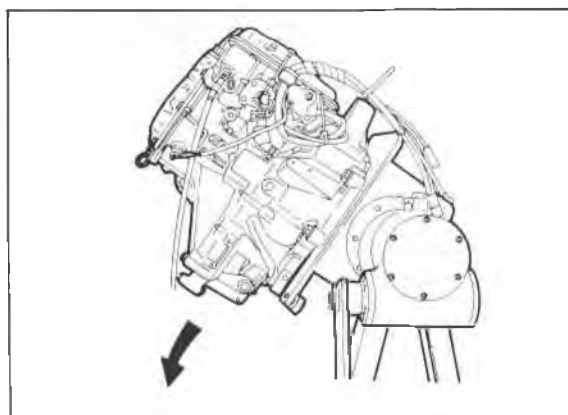
86U07B-122

5. Lift the transaxle and mount it on the **SST**.



86U07B-123

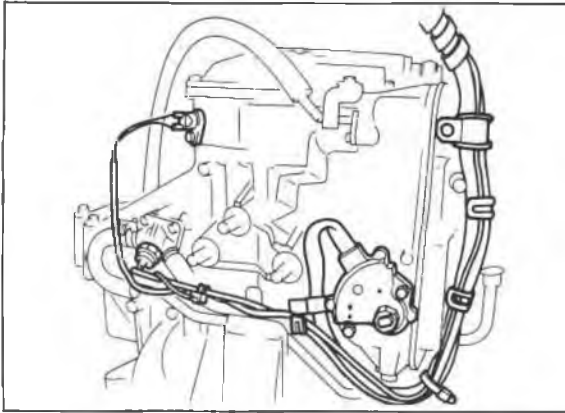
**Note**  
Attach the suitable hanger to the oil pump as shown.



76U07B-453

**Warning**  
Avoid leaning the transaxle to one side during disassembly, it may turn quickly and cause injury.

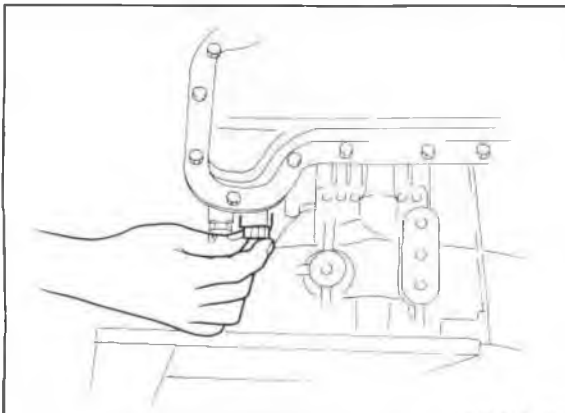




76G07B-123

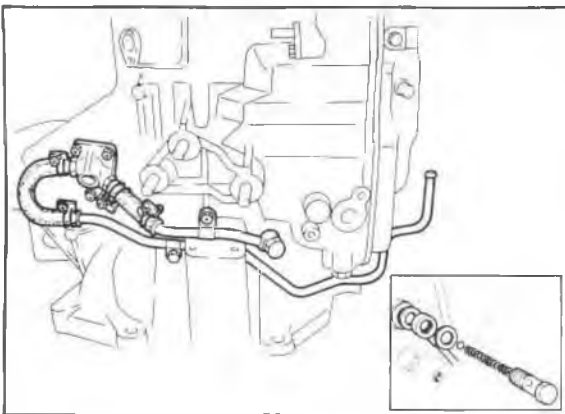
6. **G4A-EL**  
Remove the pulse generator, fluid temperature switch, and inhibitor switch.

**G4A-HL**  
Remove the inhibitor switch.



76G07B-124

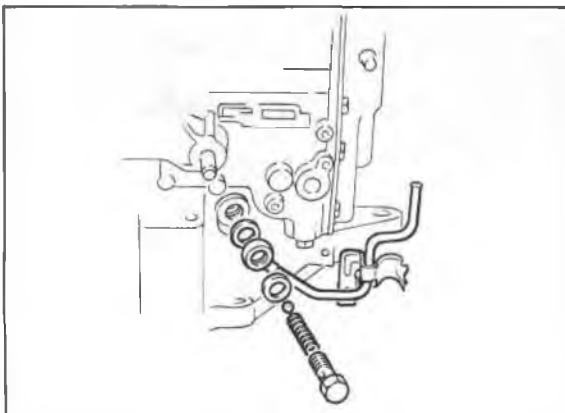
7. Disconnect the solenoid connector.  
8. Remove the harnesses.



76G07B-125

9. **G4A-EL**  
Remove the harness clip, then remove the oil pipes, oil hoses and switch box as an assembly.

**Note**  
Remove the ball from the case.



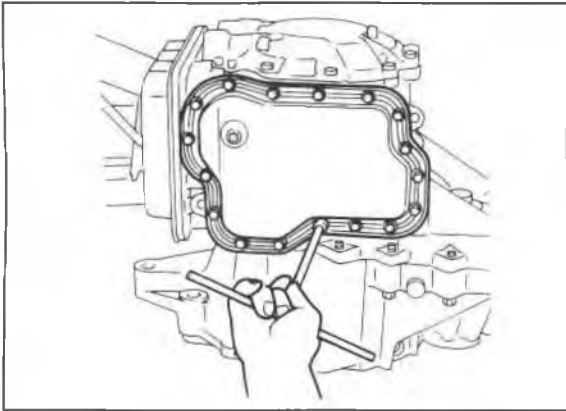
76G07B-126

**G4A-HL**  
Remove the oil pipe.

**Note**  
Remove the ball from the case.

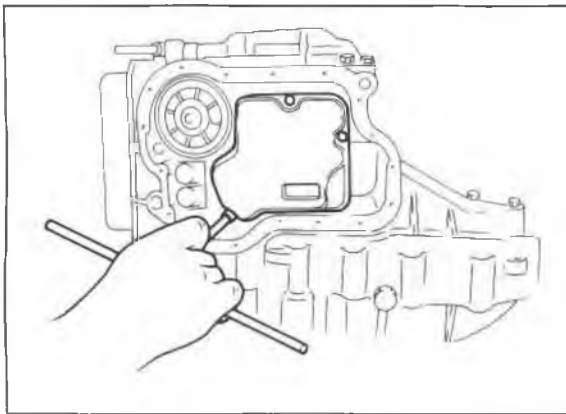
## 7B DISASSEMBLY

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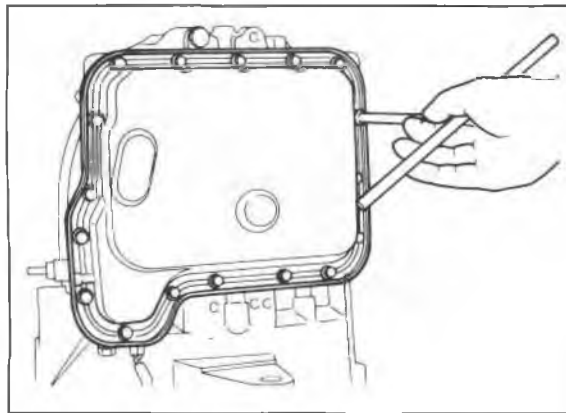
86U07B-128

10. Remove the oil pan and gasket.



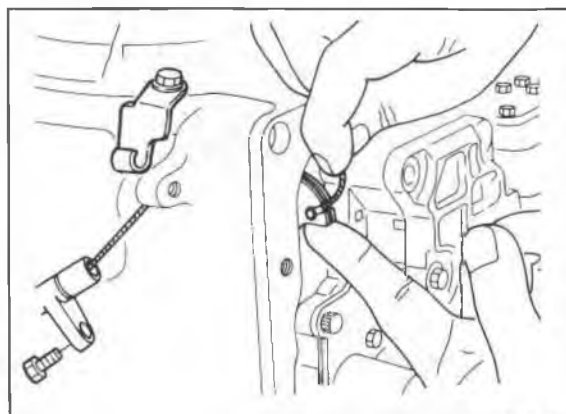
86U07B-129

11. Remove the oil strainer and O-ring.



86U07B-130

12. Remove the control valve body cover and gasket.

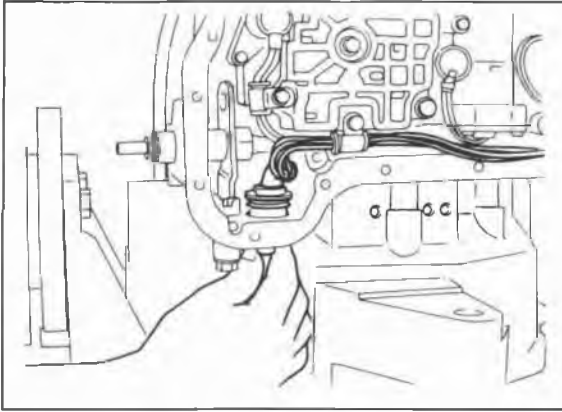


86U07B-131

13. Remove the throttle cable.

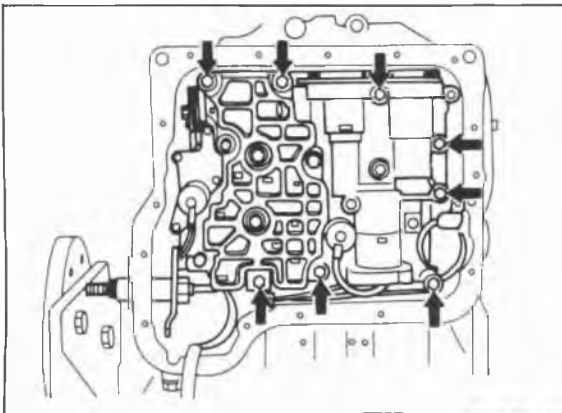
- (1) Remove the throttle cable attaching bolt and bracket.
- (2) Remove the cable from the throttle cam of the valve body.

## DISASSEMBLY 7B



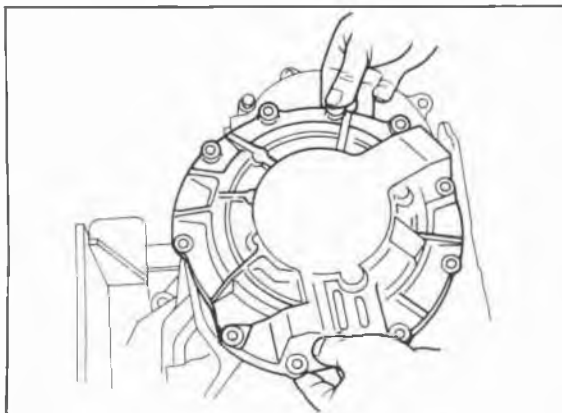
86U07B-132

14. Pinch the teeth of the solenoid connector and remove it by pushing inward.



86U07B-133

15. Remove the control valve body as an assembly.

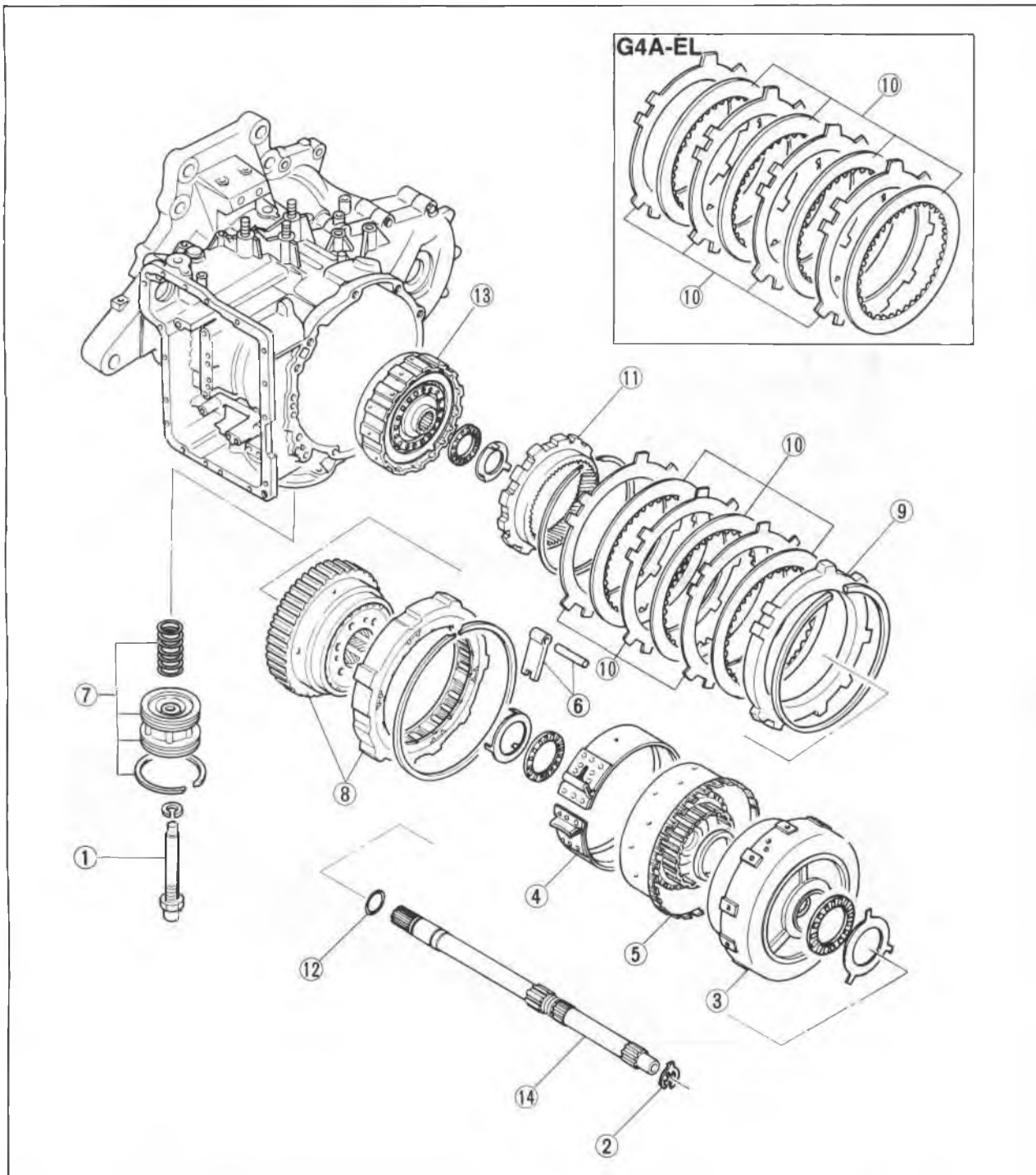


86U07B-134

16. Remove the oil pump as an assembly.

# 7B DISASSEMBLY

## DISASSEMBLY-STEP 2 Components

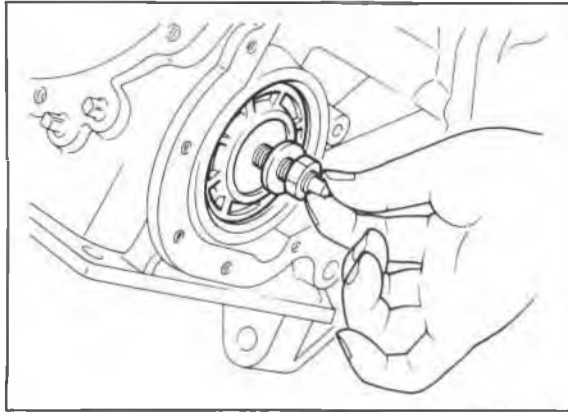


86U07B-135

1. Piston stem
2. Snap ring
3. Clutch assembly
4. 2-4 brake band
5. Small sun gear and one-way clutch
6. Anchor strut and shaft
7. Servo
8. One-way clutch and carrier hub assembly

### —Low and reverse brake—

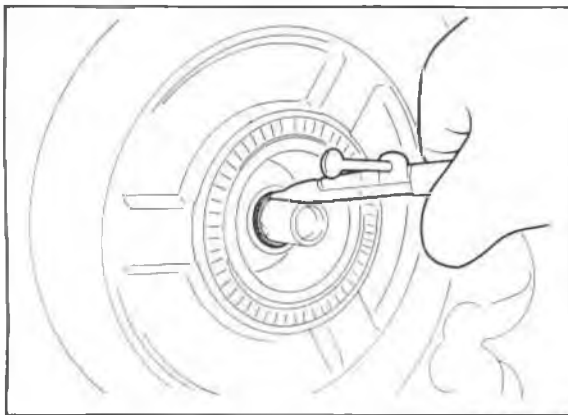
9. Retaining plate
10. Drive and driven plates
11. Internal gear
12. O-ring
13. 3-4 clutch assembly
14. Turbine shaft



86U07B-136

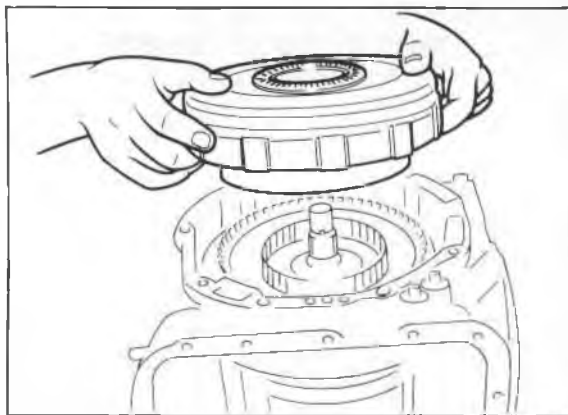
## Procedure

1. Remove the piston stem from the servo.



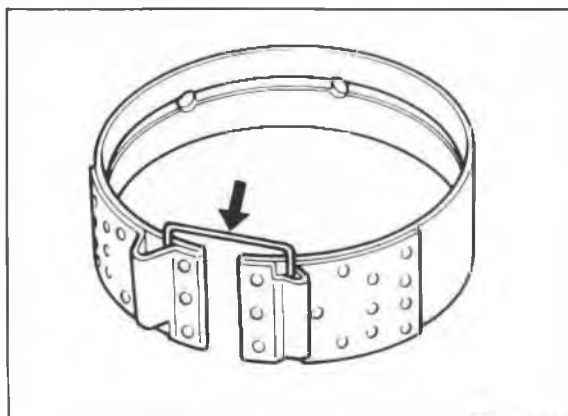
86U07B-137

2. Remove the clutch assembly.
  - (1) Remove the turbine shaft snap ring.



86U07B-138

- (2) Pull the reverse and forward drum and remove the clutch assembly.



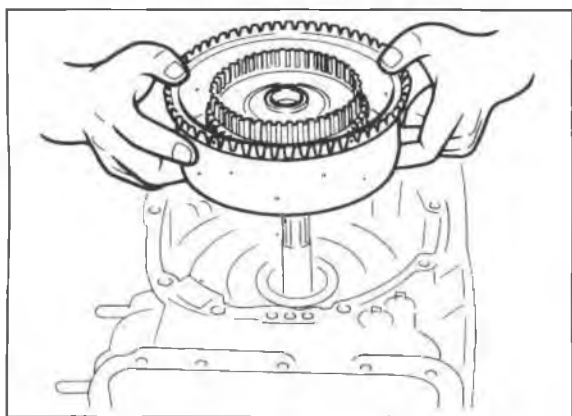
86U07B-139

3. Remove the 2-4 brake band.

## Note

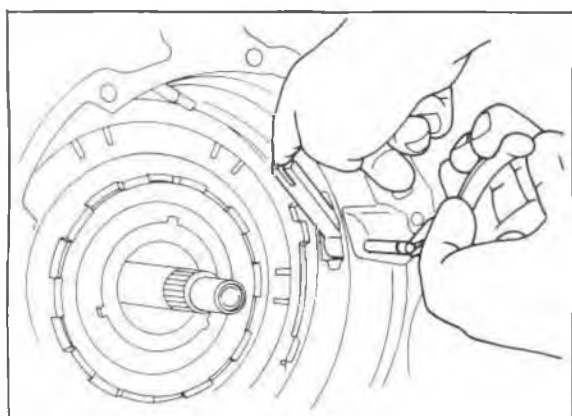
Use a piece of wire to secure the brake band so that it is not damaged by being stretched.

## 7B DISASSEMBLY



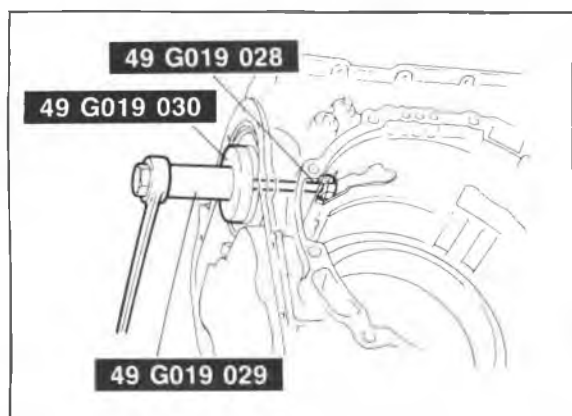
86U07B-140

4. Remove the small sun gear and one-way clutch.



86U07B-141

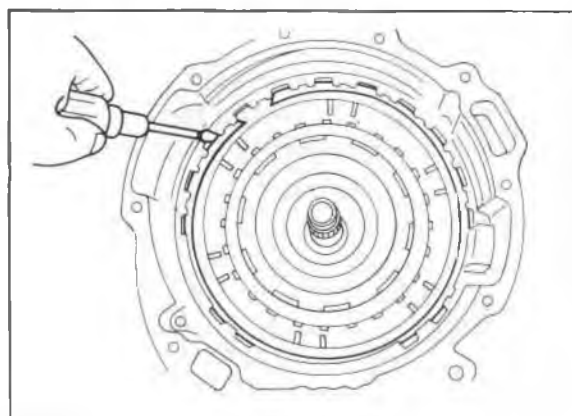
5. Pull the anchor shaft while holding the strut, then remove the strut.



86U07B-142

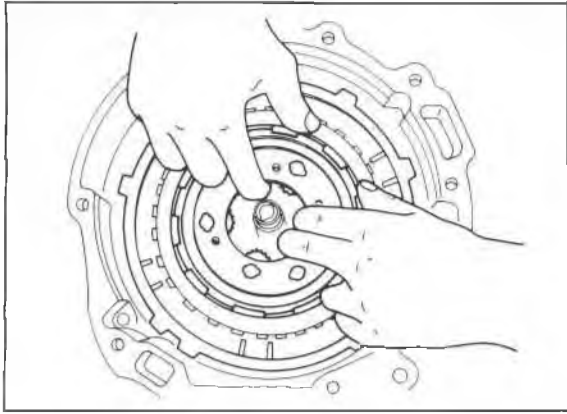
6. Remove the servo.

- (1) Remove the snap ring with the **SST**.
- (2) Remove the servo and spring.



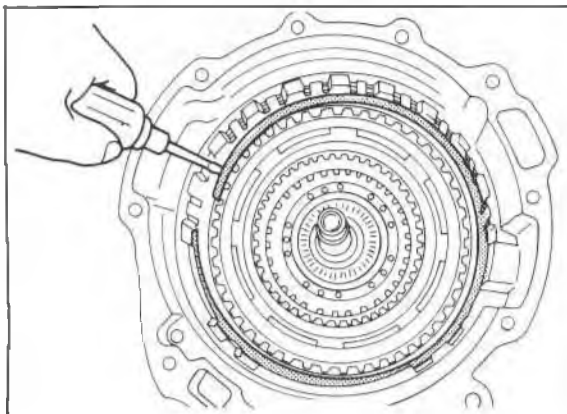
86U07B-143

7. Remove the one-way clutch and carrier hub assembly.  
(1) Remove the snap ring.



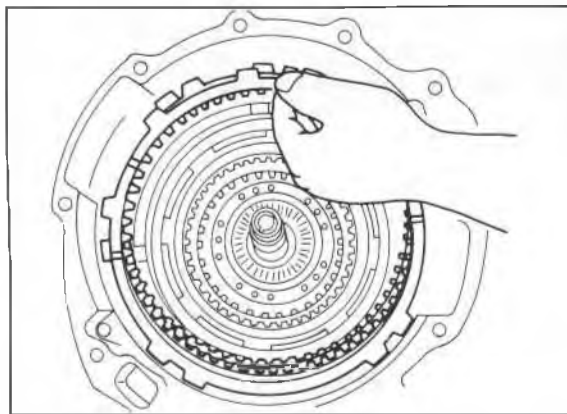
86U07B-144

- (2) Remove the one-way clutch together with the carrier hub assembly.



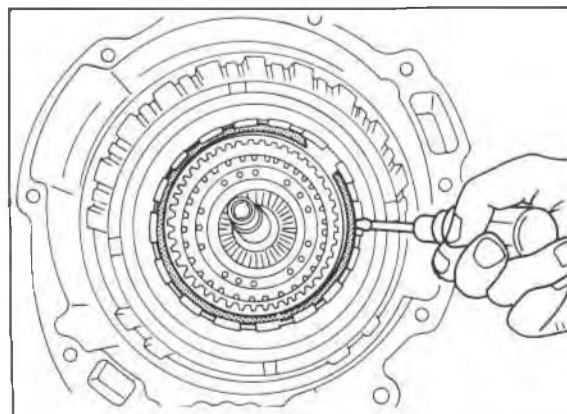
86U07B-145

8. Remove the low and reverse brake assembly.  
(1) Remove the snap ring.



86U07B-146

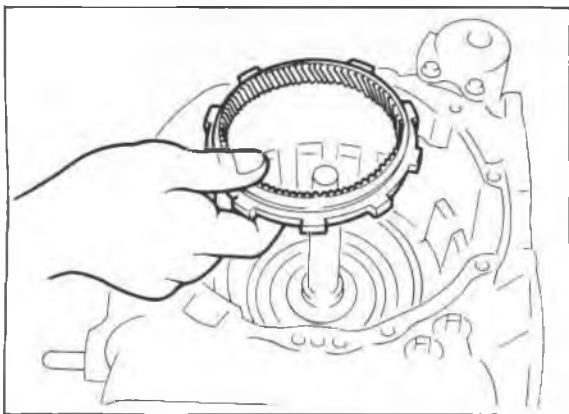
- (2) Remove the retaining plate and the drive and driven plates.



86U07B-147

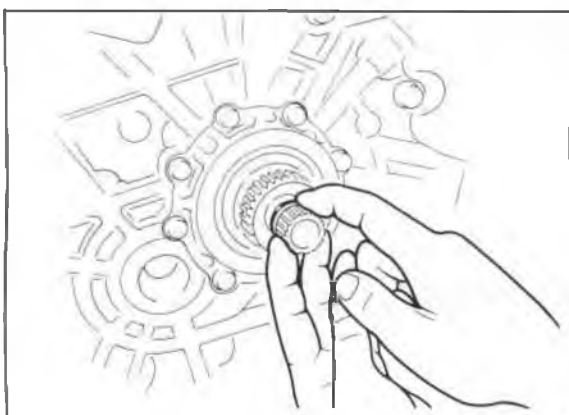
9. Remove the internal gear.  
(1) Remove the snap ring.

## 7B DISASSEMBLY



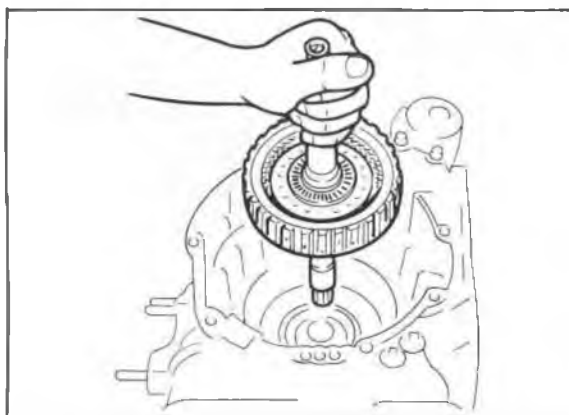
86U07B-148

- (2) Remove the internal gear from the 3-4 clutch drum.



86U07B-149

10. Remove the 3-4 clutch assembly.
  - (1) Remove the O-ring from the turbine shaft at the converter housing side.

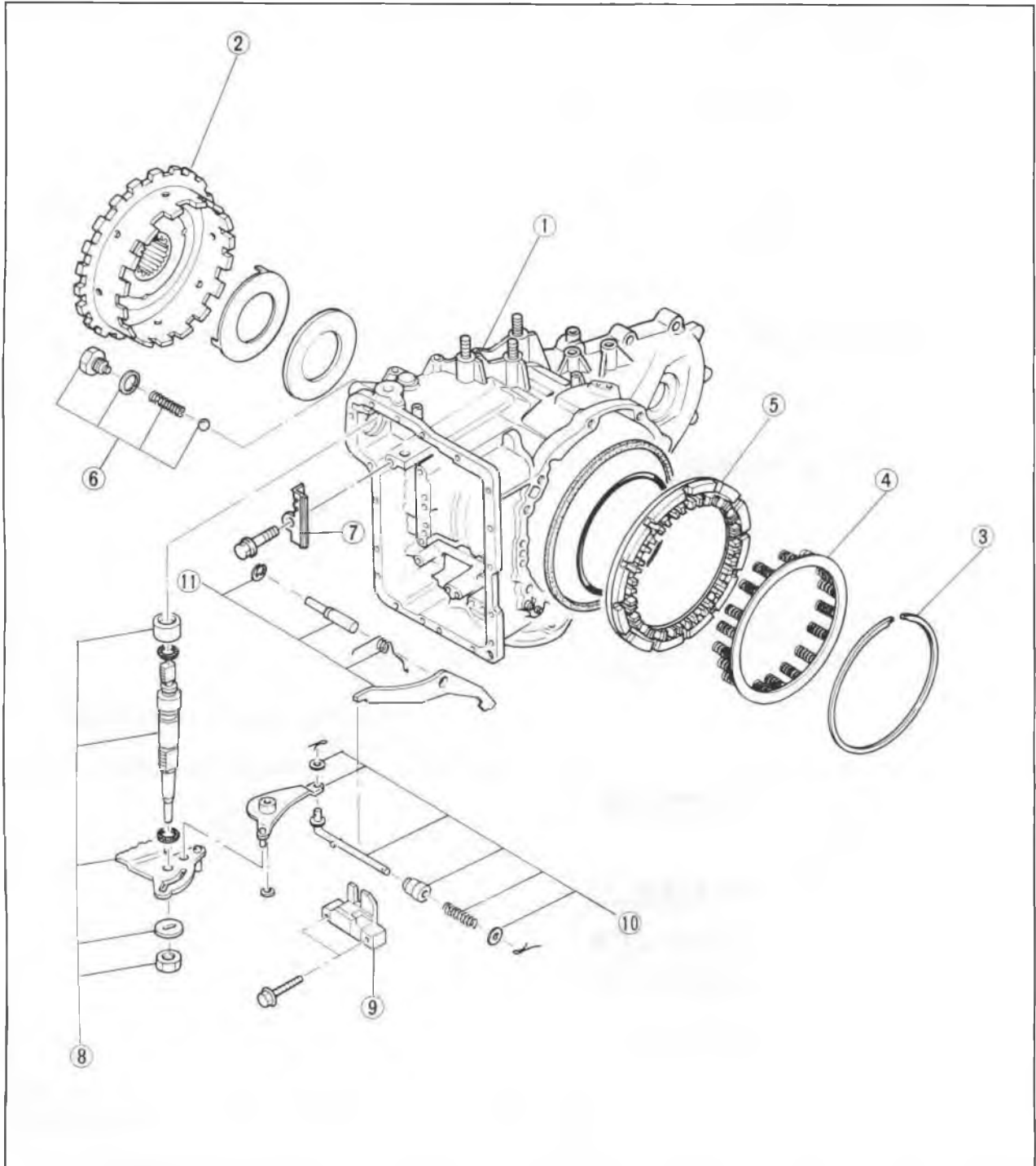


86U07B-150

- (2) Pull out the turbine shaft to remove the 3-4 clutch assembly.
  - (3) Remove the 3-4 clutch assembly.



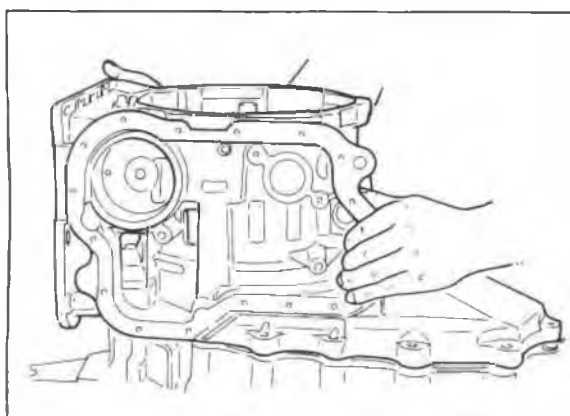
## DISASSEMBLY-STEP 3 Component



86U07B-151

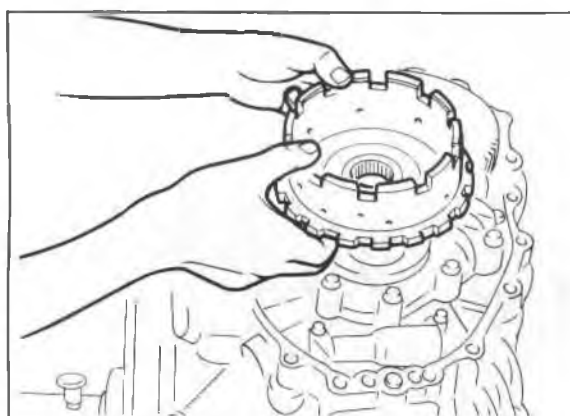
- |  |                                  |
|--|----------------------------------|
| 1. Transaxle case                        | 7. Bracket                       |
| 2. Output shell                          | 8. Manual shaft and manual plate |
| 3. Snap ring                             | 9. Actuator support              |
| 4. Spring and retainer assembly          | 10. Parking assist lever         |
| 5. Low and reverse brake piston          | 11. Parking pawl                 |
| 6. Plug, washer, spring, and detent ball |                                  |

## 7B DISASSEMBLY



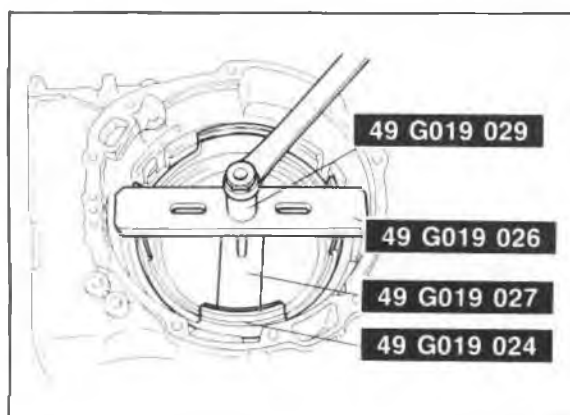
76G07B-127

1. Remove the bolts; then remove the transaxle case by tapping lightly with a plastic hammer.



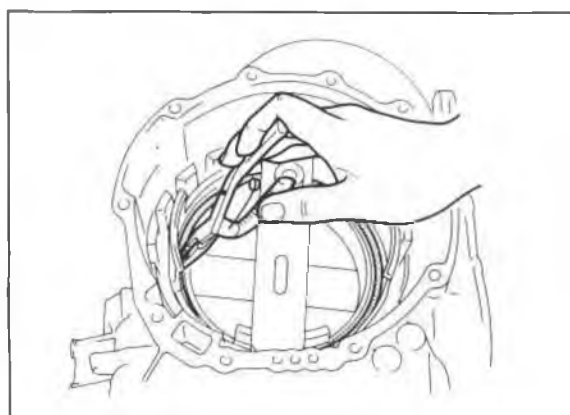
86U07B-153

2. Remove the output shell from the output gear.



86U07B-154

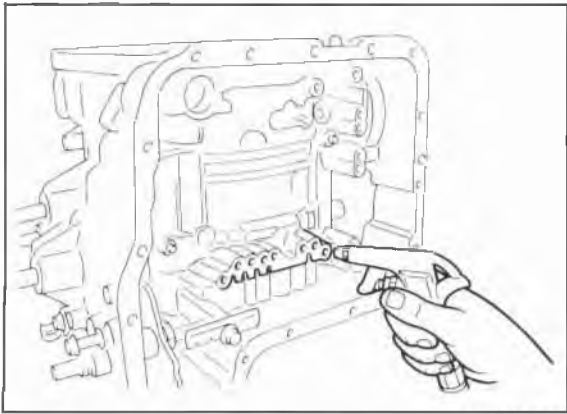
3. Remove the low and reverse brake piston
  - (1) Install the **SST**.
  - (2) Compress the spring and retainer assembly.



86U07B-155

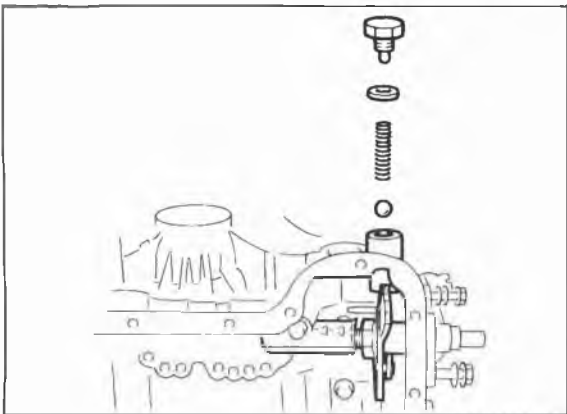
- (3) Remove the snap ring with snap ring pliers; then remove the spring and retainer assembly.

## DISASSEMBLY 7B



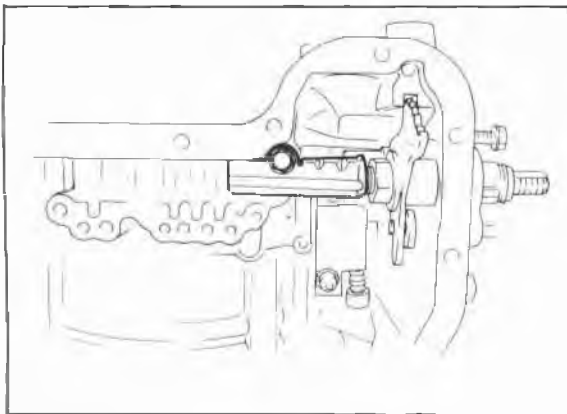
86U07B-156

- (4) Remove the low and reverse brake piston by applying compressed air through the fluid passage.



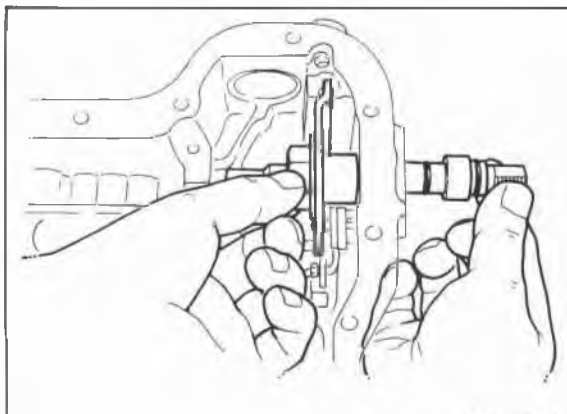
86U07B-157

4. Remove the manual shaft and manual plate.  
(1) Remove the plug, washer, spring, and detent ball.



86U07B-158

- (2) Remove the bracket.

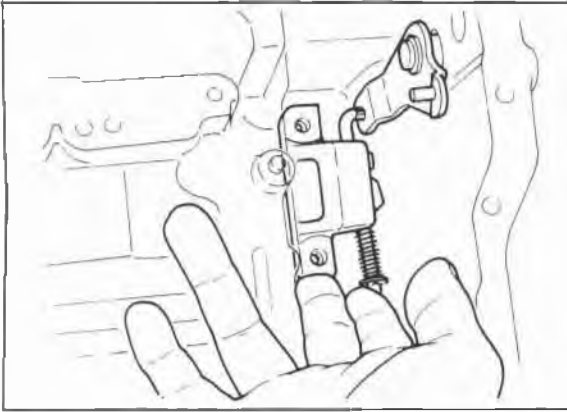


86U07B-159

- (3) Loosen the nut and pull the manual shaft out.  
(4) Remove the nut, washer, spacer, and manual plate.

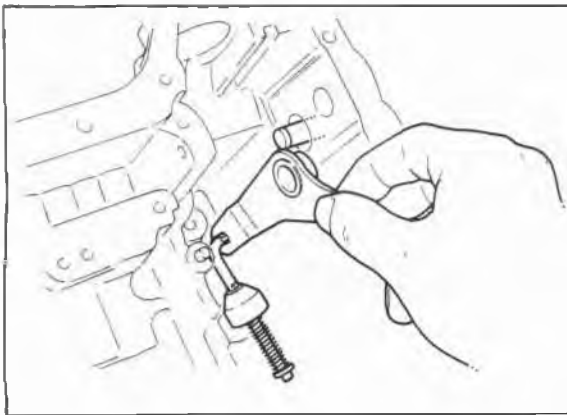
## 7B DISASSEMBLY

---



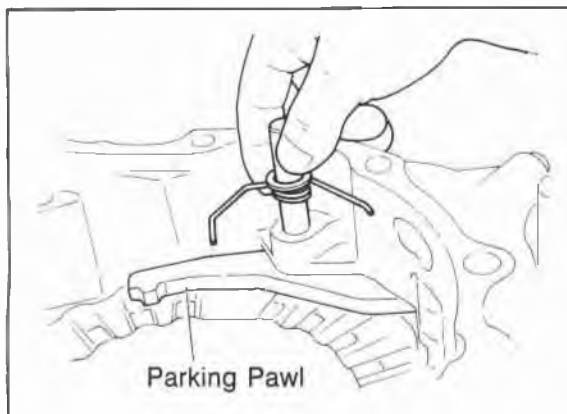
86U07B-160

5. Remove the actuator support.



86U07B-161

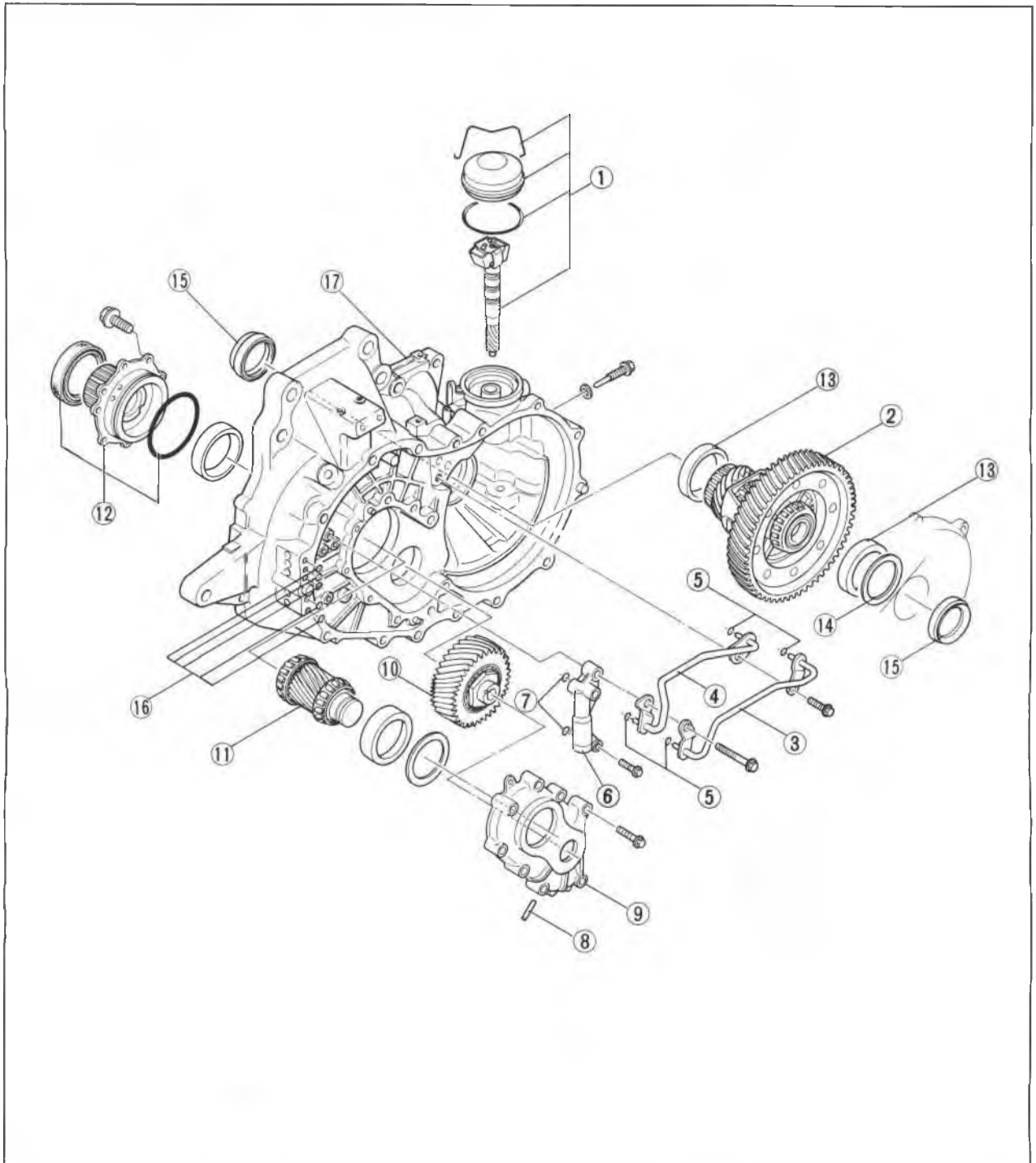
6. Remove the snap ring, then remove the parking assist lever.



86U07B-162

7. Remove the parking pawl.  
(1) Remove the snap ring.  
(2) Pull the parking shaft, then remove the spring and parking pawl.

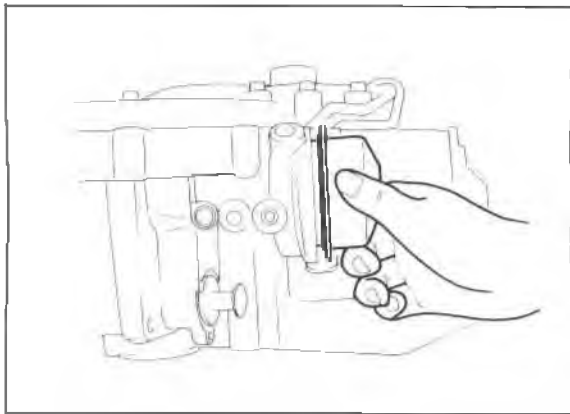
## DISASSEMBLY—STEP 4 Component



76G07B-128

- |                                    |                            |
|------------------------------------|----------------------------|
| 1. Governor assembly (G4A-HL)      | 9. Bearing housing         |
| 2. Differential assembly           | 10. Idle gear assembly     |
| 3. Governor outlet pipe (G4A-HL)   | 11. Output gear assembly   |
| 4. Governor inlet pipe (G4A-HL)    | 12. Bearing cover assembly |
| 5. O-rings (G4A-HL)                | 13. Bearing outer races    |
| 6. 2-3 accumulator piston assembly | 14. Adjust shim            |
| 7. O-rings                         | 15. Oil seals              |
| 8. Roll pin                        | 16. O-rings                |
|                                    | 17. Converter housing      |

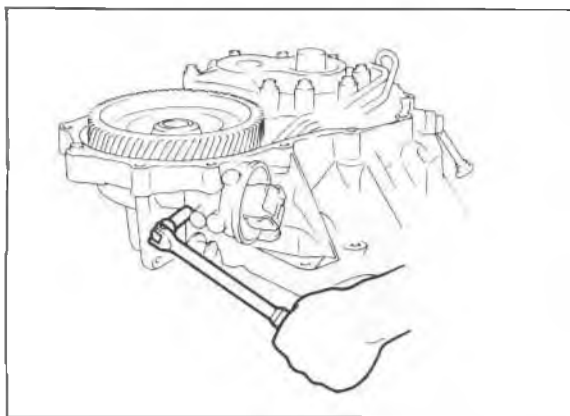
## 7B DISASSEMBLY



76G07B-129

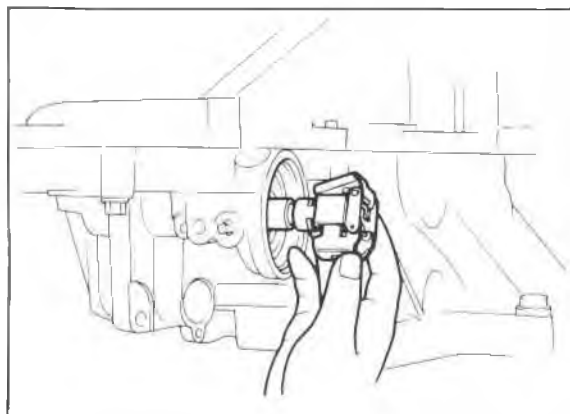
### Procedure

1. Remove the governor assembly.
  - (1) Remove the clip, governor cover and O-ring.



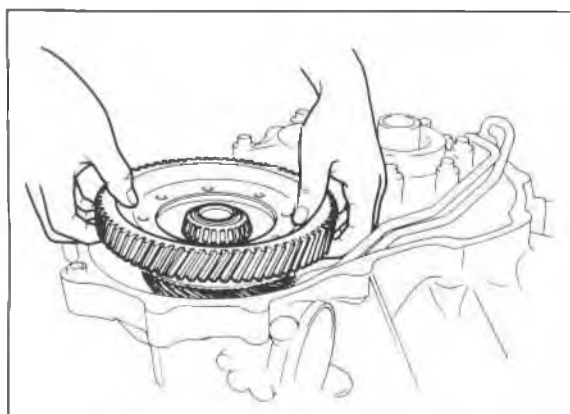
83U07B-165

- (2) Remove the stopper bolt.



83U07B-166

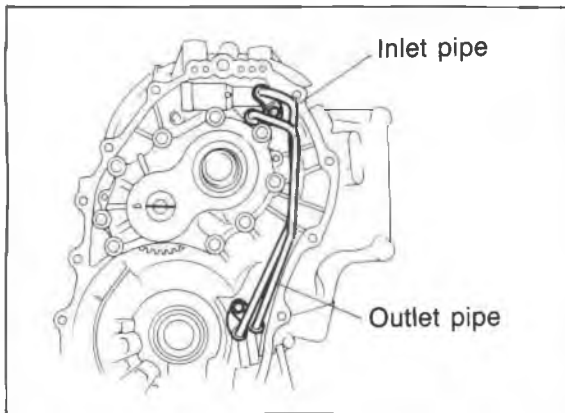
- (3) Remove the governor assembly.



83U07B-167

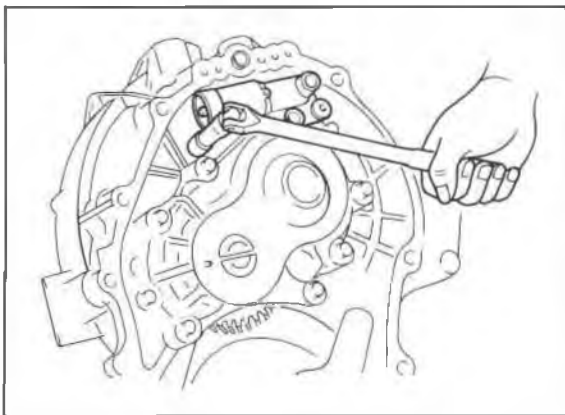
2. Remove the differential assembly.

## DISASSEMBLY 7B



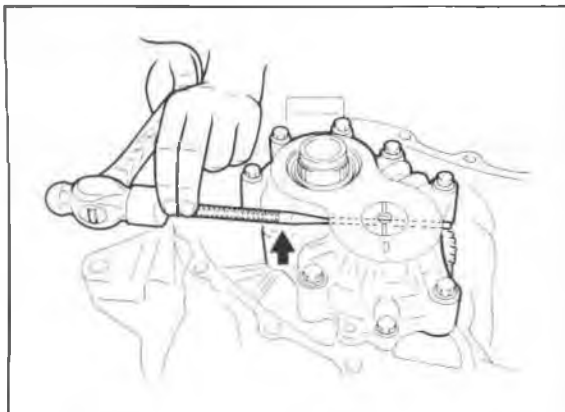
83U07B-168

3. Remove the governor outlet pipe, governor inlet pipe, and O-rings.



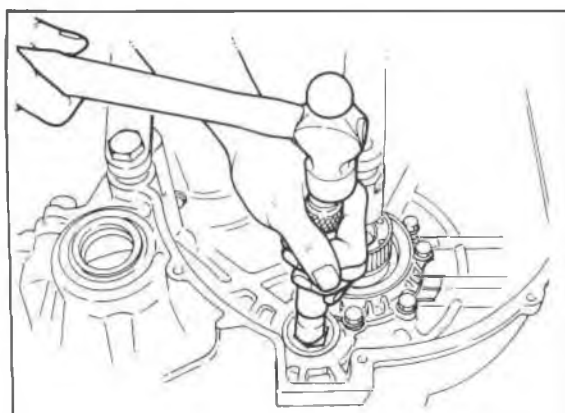
83U07B-169

4. Remove the 2-3 accumulator piston assembly and O-rings.



83U07B-170

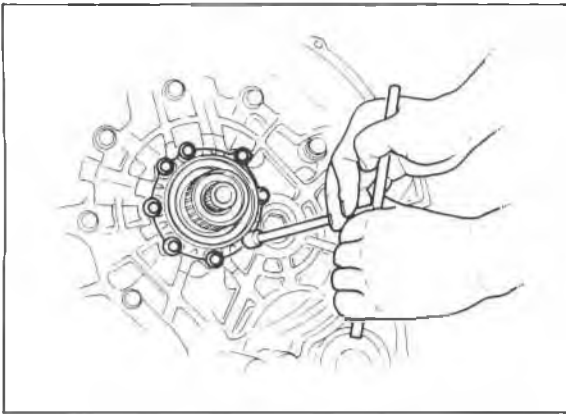
5. Remove the bearing housing.
  - (1) Remove the bolt indicated in the figure.
  - (2) Remove the roll pin with a pin punch.
  - (3) Remove the bearing housing by tapping lightly with a plastic hammer.



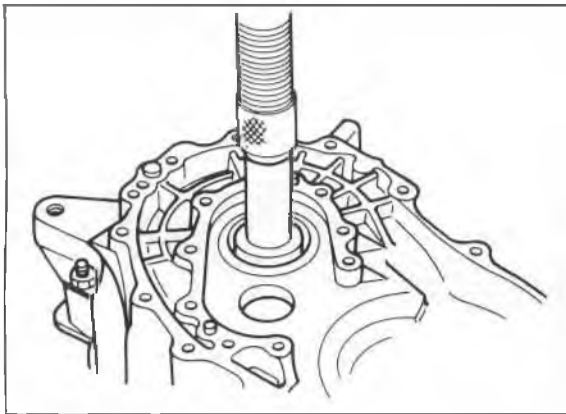
83U07B-171

6. Remove the idle gear assembly and output gear assembly by tapping out from the torque converter side.

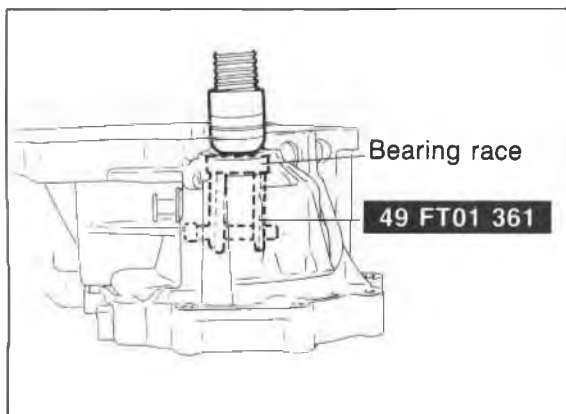
## 7B DISASSEMBLY



83U07B-172



83U07B-173



83U07B-174

7. Remove the bearing cover.
  - (1) Remove the converter housing from the trans-axle hanger.
  - (2) Remove the bearing cover bolts.

- (3) Press the bearing cover assembly out of the converter housing.

8. Remove the bearing outer races.
  - (1) Press out the bearing outer races with the **SST**.

**Note**  
**Install the bearing outer race during reassembly to adjust the preload.**

9. Check the oil seals for damage, replace if necessary.
10. Check the O-rings for damage, replace if necessary.

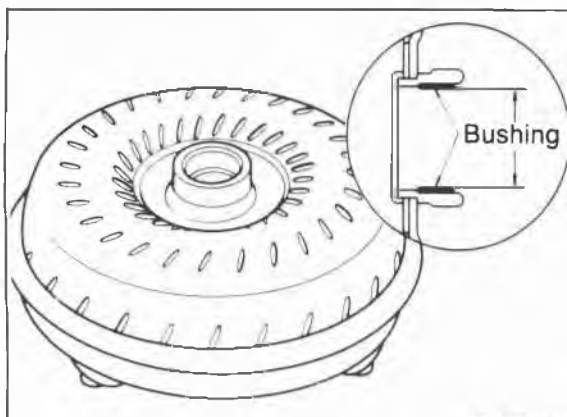


## INSPECTION AND REPAIR

### PRECAUTION

- (1) Several of the parts resemble each other; organize them so that they do not get mixed up.
- (2) Clean each part with cleaning oil, clean out the oil holes and oil passages with compressed air, and check that there are no obstructions.
- (3) When using cleaning oil and compressed air, wear protective eyewear.
- (4) If a clutch plate or brake band is replaced with a new one, soak it in ATF for 2 hours or more before installing.
- (5) Before assembly, apply ATF to all seal rings, rotating parts, and sliding parts.
- (6) All seals, gaskets and roll pins must be replaced with new ones during assembly.
- (7) Use petroleum jelly, not grease where required.
- (8) When it is necessary to replace a bushing, replace the assembly which includes that bushing.

76G07B-217



86U07B-172

### TORQUE CONVERTER

The torque converter is welded together and cannot be disassembled.

#### Inspection

1. Check the outer part of the converter for damage or cracks, and replace it if necessary.
2. Check whether there is any rust on the pilot hub of the converter or on the boss. If there is any, remove it completely.
3. Measure the bushing of the converter boss. Replace the converter assembly if the bushing is worn.

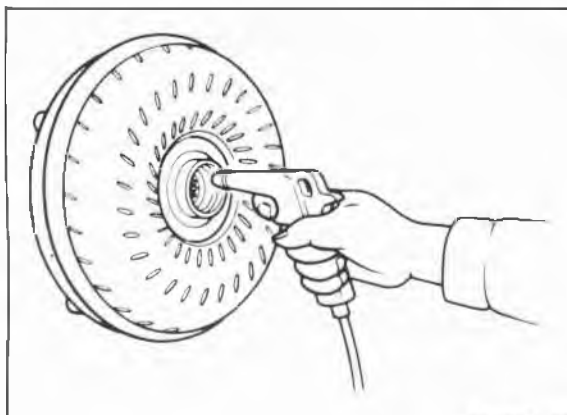
#### Bushing inner diameter

**Standard: 53.030 mm (2.088 in)**

**Maximum: 53.076 mm (2.090 in)**

#### Washing Inside of Converter

1. Drain any ATF remaining in the converter.
2. Pour in solvent [approximately **0.5 liter (0.53 US qt, 0.44 Imp qt)** ].
3. Shake the converter to clean the inside. Pour out the solvent.
4. Clean the inside of the converter with compressed air so that the inside is perfectly empty.
5. Pour in ATF.
6. Shake the converter to clean the inside. Pour out the ATF.



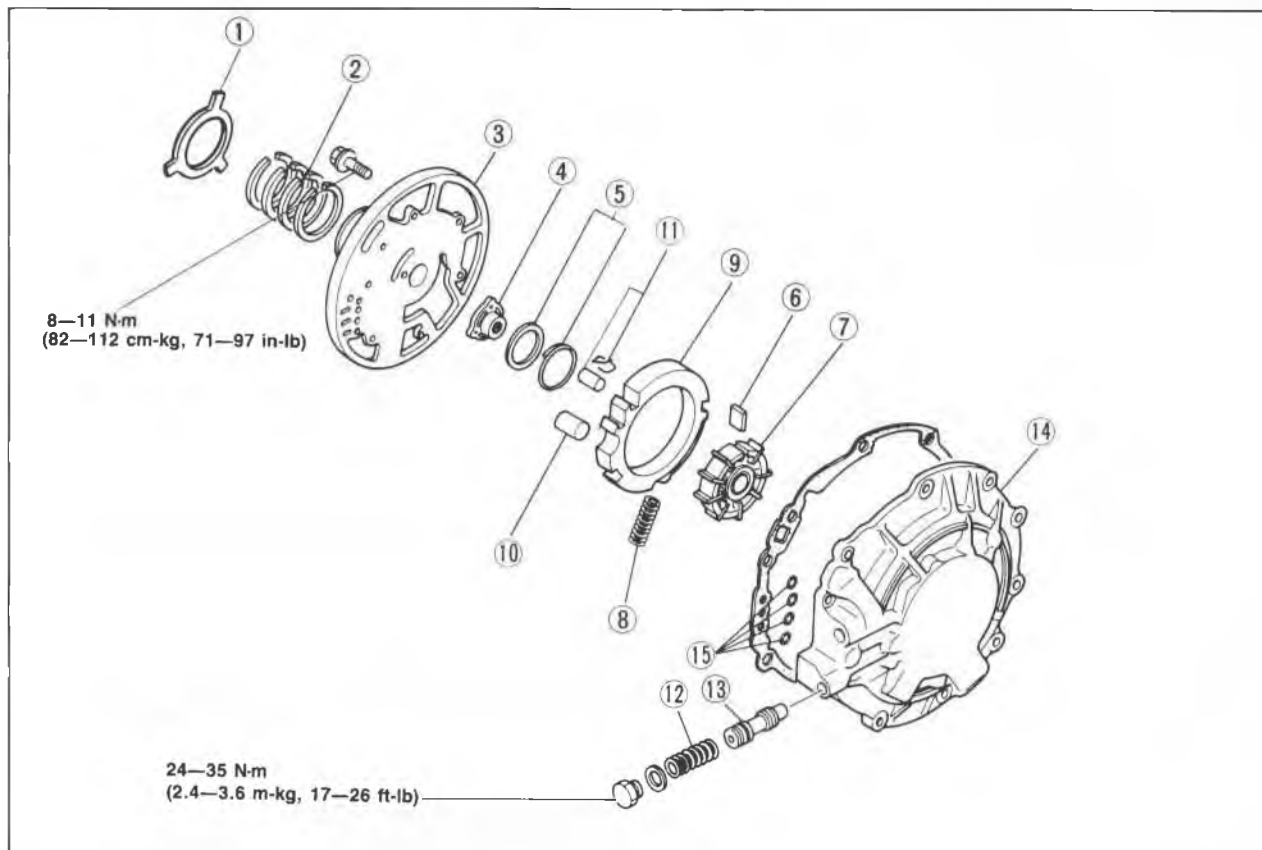
86U07B-173

# 7B INSPECTION AND REPAIR

## OIL PUMP

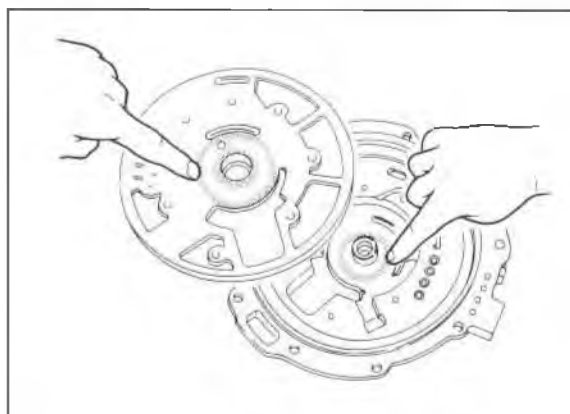
### Disassembly

Disassemble in the sequence shown in the figure.



86U07B-174

- |                                |                         |
|--------------------------------|-------------------------|
| 1. Bearing race                | 9. Cam ring             |
| 2. Seal rings                  | 10. Pivot roller        |
| 3. Oil pump cover              | 11. Seal pin and spring |
| 4. Pump flange                 | 12. Spring              |
| 5. Guide ring and guide spring | 13. Valve               |
| 6. Vane                        | 14. Oil pump body       |
| 7. Rotor                       | 15. O-ring              |
| 8. Spring                      |                         |



86U07B-175

### Inspection

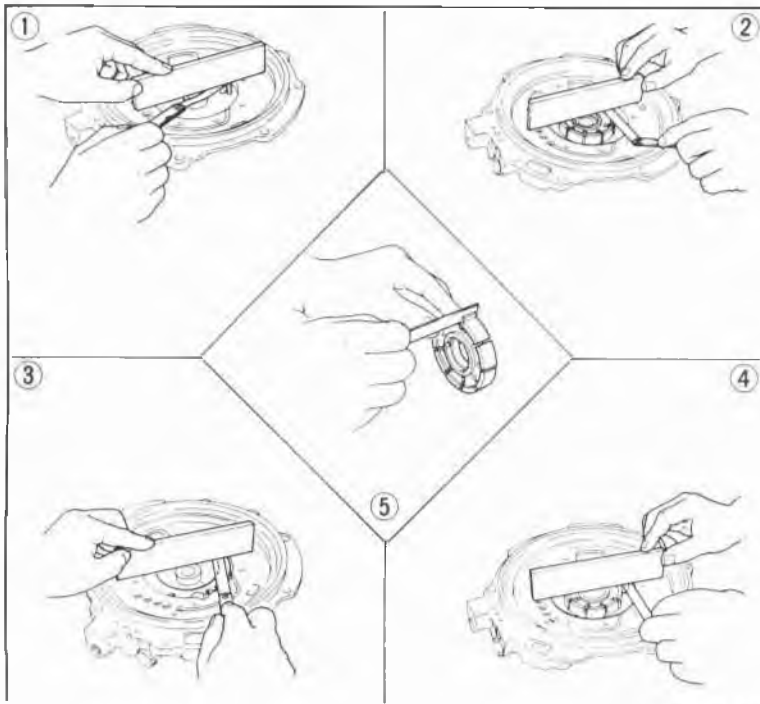
- Check the following and replace any faulty parts.
1. Sliding surfaces of the oil pump cover and oil pump body for damage or wear
  2. Broken or worn seal ring
  3. Weakened spring

### Free length of springs:

- (1) For the cam ring (No. 8)  
41.6 mm (1.64 in)
- (2) For the valve (No. 12)  
35.0 mm (1.38 in)

## 4. Clearance

Measure the clearances below; if not within specification, replace the oil pump.



86U07B-176

**1. Seal pin—Oil pump cover**

**Standard:**  
0.005—0.020 mm  
(0.0002—0.0008 in)  
**Maximum:** 0.060 mm (0.002 in)

**2. Rotor—Oil pump cover**

**Standard:**  
0.005—0.020 mm  
(0.0002—0.0008 in)  
**Maximum:** 0.030 mm (0.0012 in)

**3. Cam ring—Oil pump cover**

**Standard:**  
0.005—0.020 mm  
(0.0002—0.0008 in)  
**Maximum:** 0.080 mm (0.003 in)

**4. Vane—Oil pump cover**

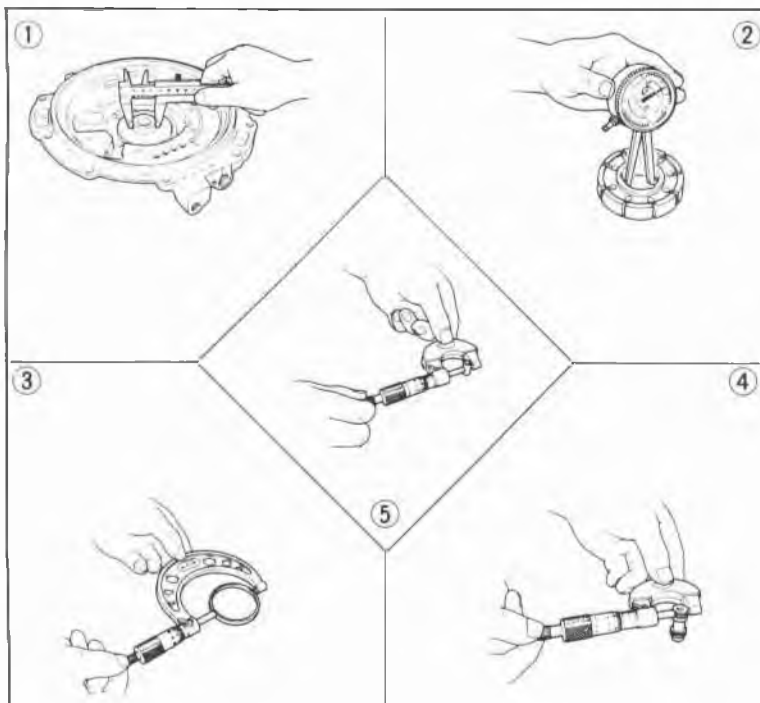
**Standard:**  
0.015—0.050 mm  
(0.0006—0.0020 in)  
**Maximum:** 0.080 mm (0.003 in)

**5. Vane—Rotor groove**

**Standard:**  
0.010—0.045 mm  
(0.0004—0.0018 in)  
**Maximum:** 0.065 mm (0.0026 in)

## 5. Wear limit

Check each part for wear; if not within specification, replace the oil pump.



76G07B-218

**1. Oil pump body sleeve.. outer diameter**

**Standard:** 28.00 mm (1.102 in)

**2. Rotor bushing .... inner diameter**

**Standard:** 28.00 mm (1.102 in)  
**Maximum:** 28.05 mm (1.104 in)

**3. Guide ring ..... outer diameter**

**Standard:** 57.85 mm (2.278 in)  
**Minimum:** 57.70 mm (2.272 in)

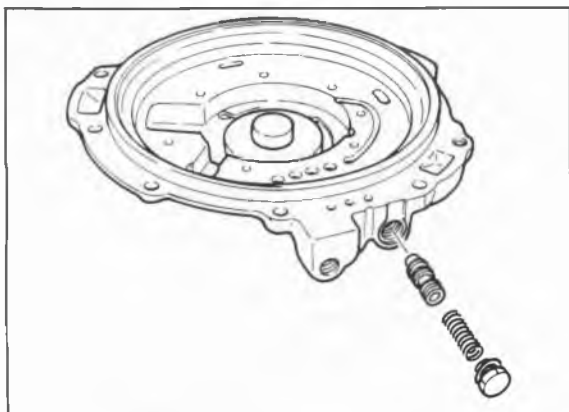
**4. Valve..... outer diameter**

**Standard:** 12.00 mm (0.472 in)  
**Minimum:** 11.86 mm (0.467 in)

**5. Seal pin..... outer diameter**

**Standard:** 5.00 mm (0.197 in)  
**Minimum:** 4.90 mm (0.193 in)

## 7B INSPECTION AND REPAIR



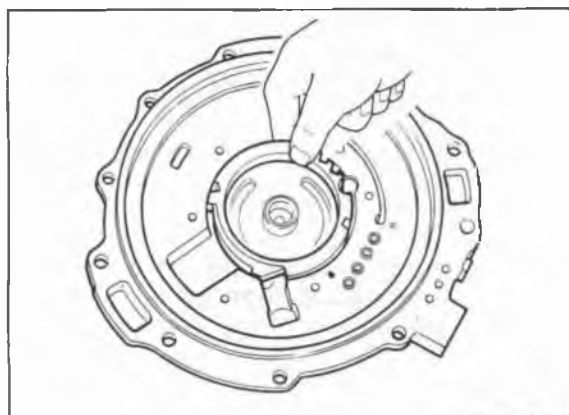
86U07B-178

### Assembly

1. Install the valve and spring into the oil pump body, and check that the valve moves smoothly.
2. Install the plug.

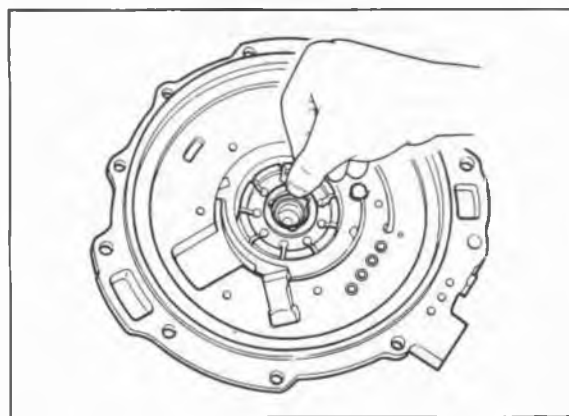
### Tightening torque:

**24—35 N·m (2.4—3.6 m·kg, 17—26 ft·lb)**



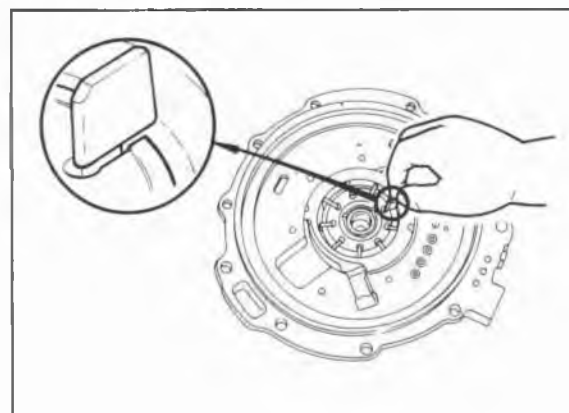
86U07B-179

3. Install the cam ring and pivot roller onto the oil pump body.



86U07B-180

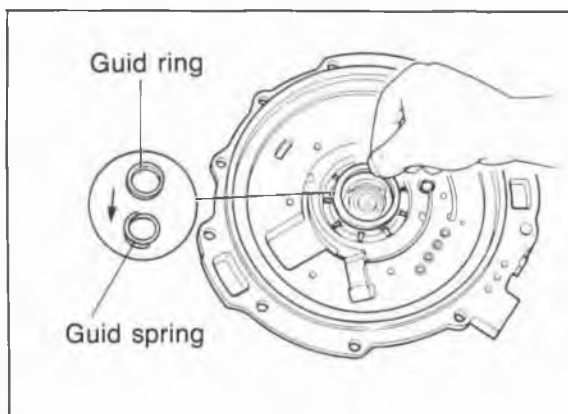
4. Install the rotor onto the oil pump body.



86U07B-181

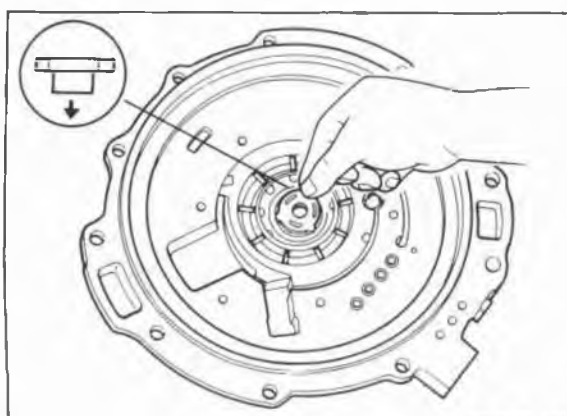
5. Install the vanes into the rotor as shown.

## INSPECTION AND REPAIR 7B



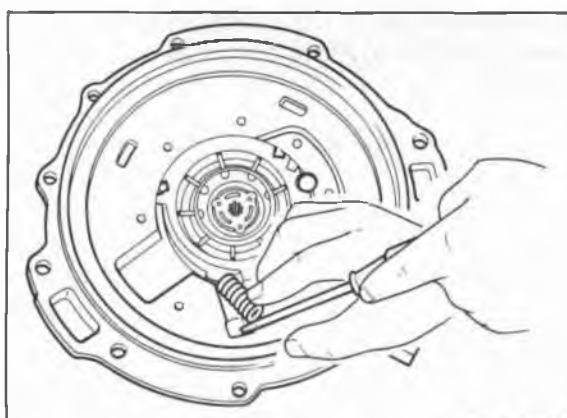
86U07B-182

6. Install the guide spring and guide ring while expanding the vanes toward the cam ring.



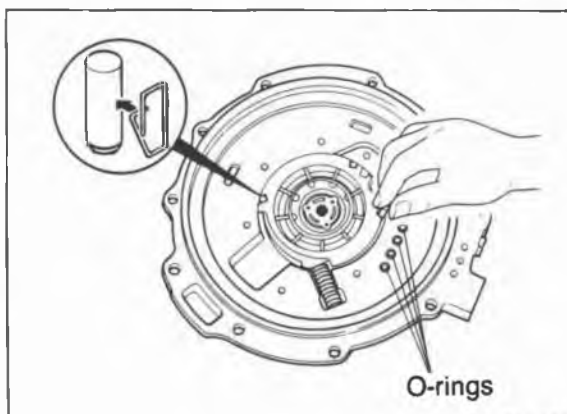
86U07B-183

7. Install the pump flange onto the rotor.



86U07B-184

8. Install the spring between the cam ring and oil pump body.



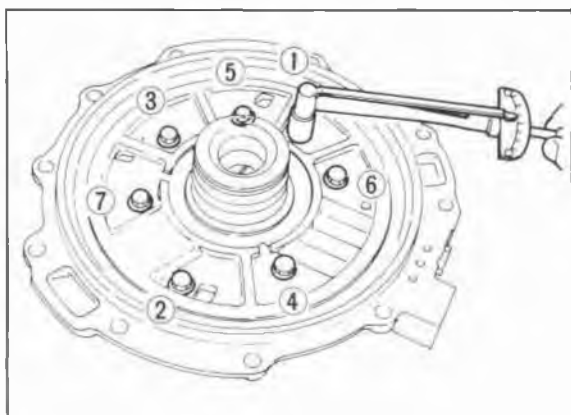
86U07B-185

9. Install the seal pins and springs with the pins facing toward the oil pump body.

**Note**  
**Install the seal pins round end first.**

10. Install the O-rings.

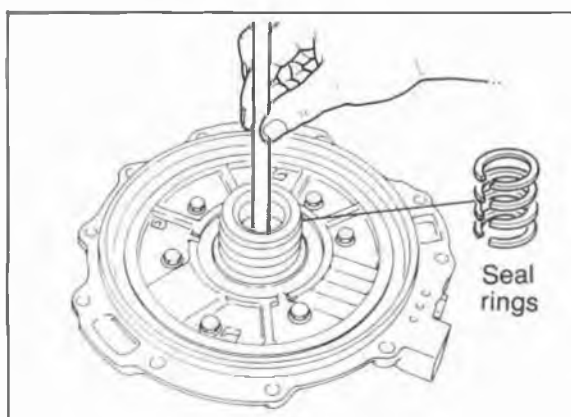
## 7B INSPECTION AND REPAIR



86U07B-186

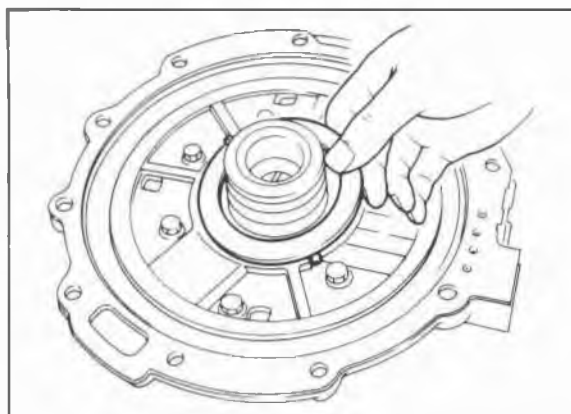
11. Install the oil pump cover to the oil pump body. Tighten the bolts in sequence.

**Tightening torque:**  
**8—11 Nm (82—112 cm-kg, 71—97 in-lb)**



86U07B-187

12. Install the oil pump shaft and check for smooth oil pump operation.
13. Install the seal rings.



86U07B-188

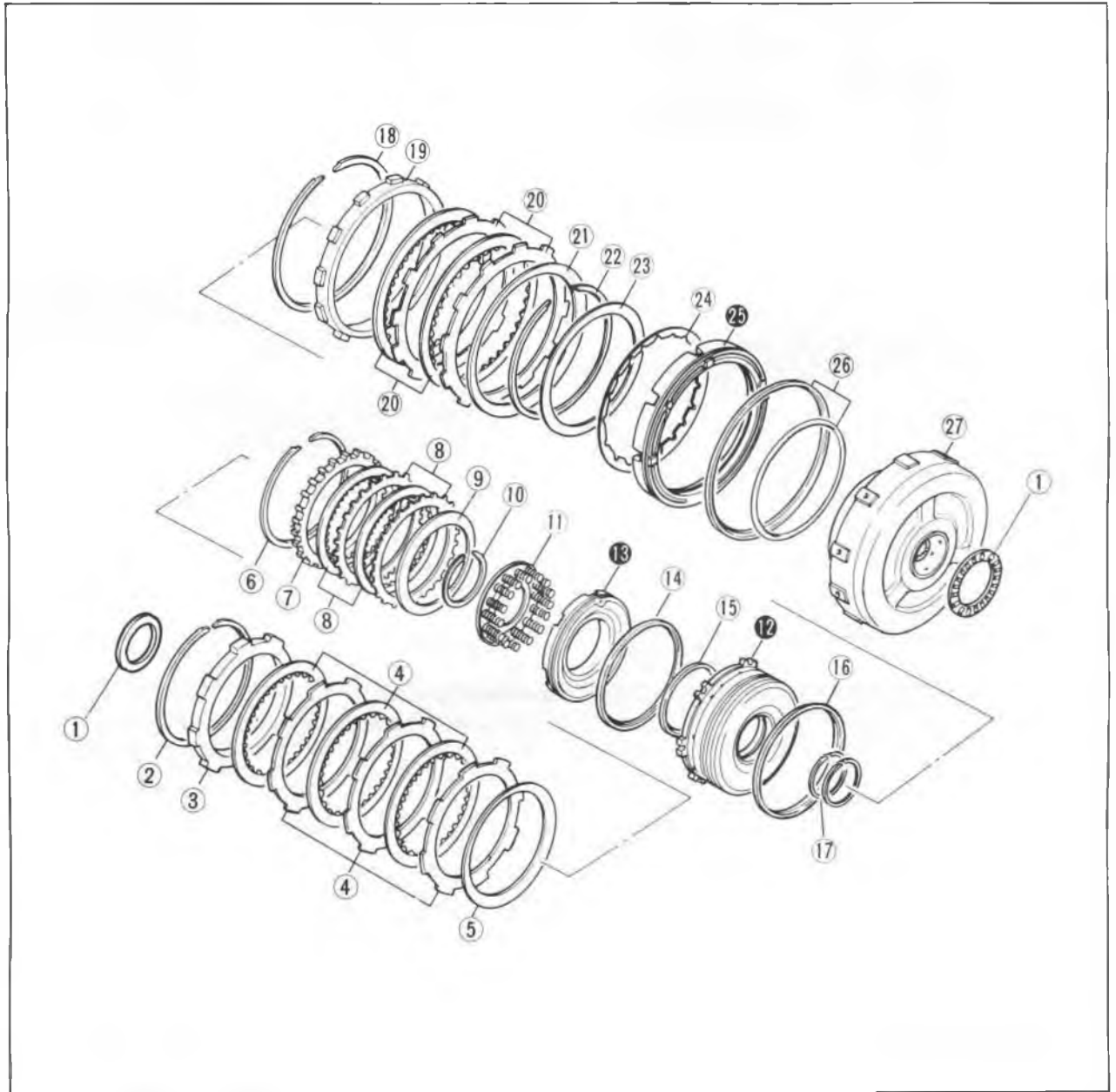
14. Apply petroleum jelly to the bearing race to secure it to the oil pump cover; then install it on the oil pump cover.

**Bearing race outer diameter:**  
**88.0 mm (3.46 in)**

## CLUTCH ASSEMBLY

### Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



86U07B-189

#### —Forward clutch—

1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate

#### —Coasting clutch—

6. Snap ring
7. Retaining plate
8. Drive and driven plates
9. Dished plate

10. Snap ring

11. Spring and retainer assembly

12. Coasting clutch drum

13. Coasting piston

14. Outer seal

15. Inner seal

16. Outer seal

17. Seal rings

#### —Reverse clutch—

18. Snap ring

19. Retaining plate

20. Drive and driven plates

21. Dished plate

22. Snap ring

23. Return spring stopper

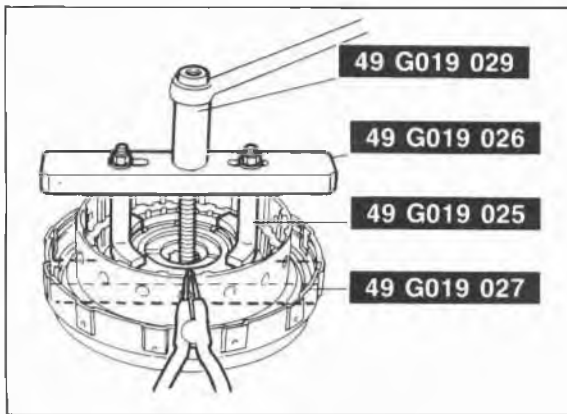
24. Piston return spring

25. Reverse piston

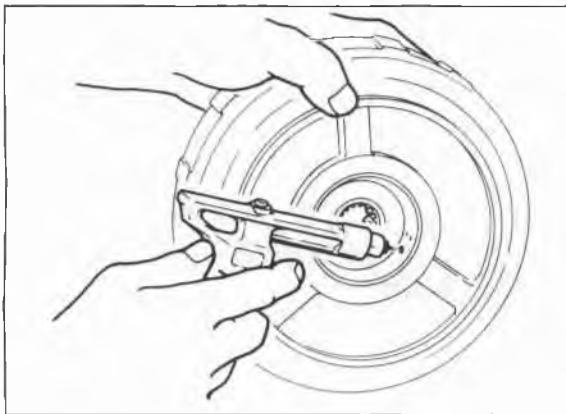
26. Seal rings (inner and outer)

27. Reverse and forward drum

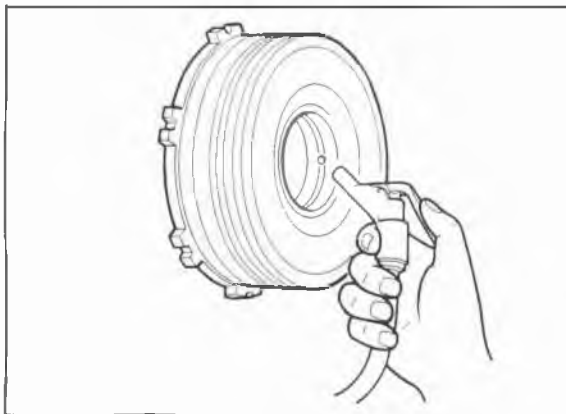
## 7B INSPECTION AND REPAIR



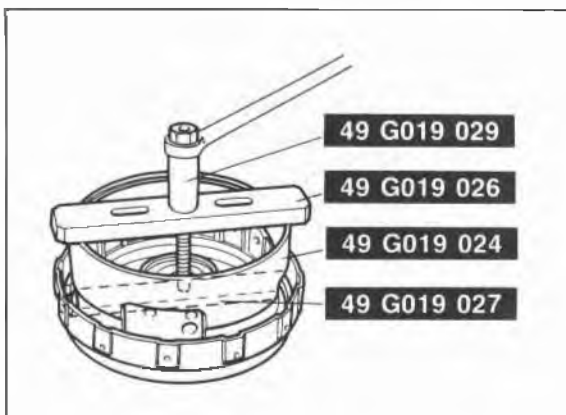
86U07B-190



86U07B-191



76G07B-130



86U07B-193

### Disassembly note

#### Coasting clutch drum

1. Install the **SST** in the coasting clutch drum as shown.
2. Compress the spring and retainer assembly.
3. Remove the snap ring.
4. Remove the **SST**, then remove the spring and retainer assembly.

5. Remove the coasting clutch drum from the reverse and forward drum by applying compressed air through the fluid passage.

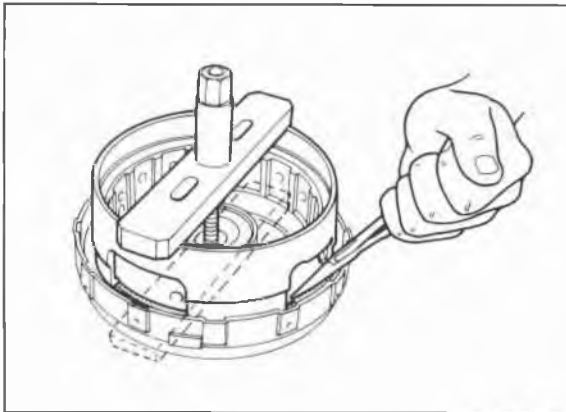
#### Coasting piston

1. Remove the coasting clutch piston from the coasting clutch drum by applying compressed air through the fluid passage.

#### Reverse piston

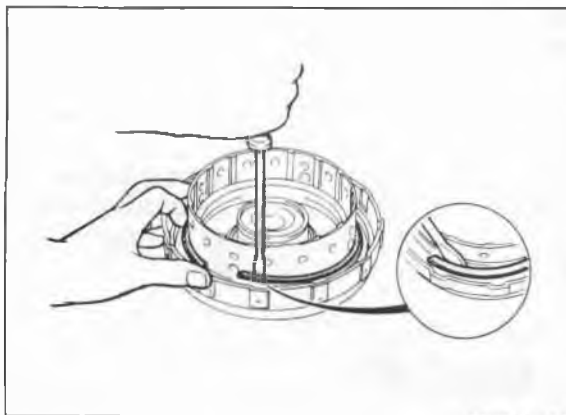
1. Install the **SST** in the reverse and forward drum as shown.
2. Compress the piston return spring.





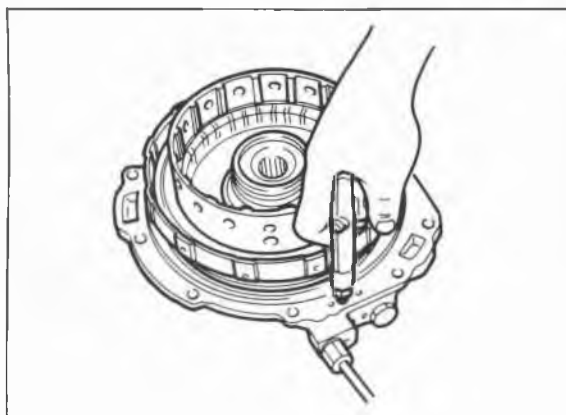
86U07B-194

3. Remove one end of the snap ring from the groove with snap ring pliers.



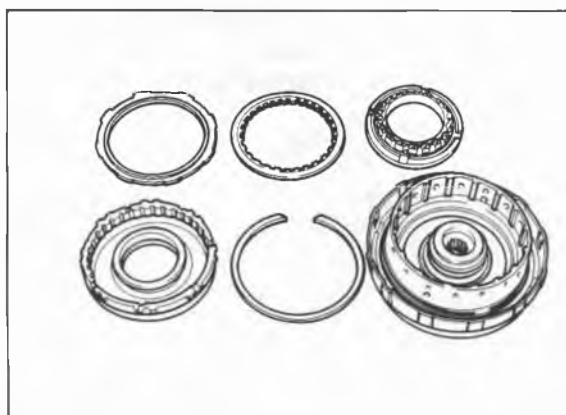
86U07B-195

4. Remove the **SST** from the reverse and forward drum.
5. Remove the snap ring with a screw driver.



86U07B-196

6. Place the reverse and forward drum on the oil pump.
7. Remove the reverse piston by applying compressed air through the fluid passage.



86U07B-197

### Inspection

Check the following and repair or replace any faulty parts.

1. Drive and driven plates for damage or wear

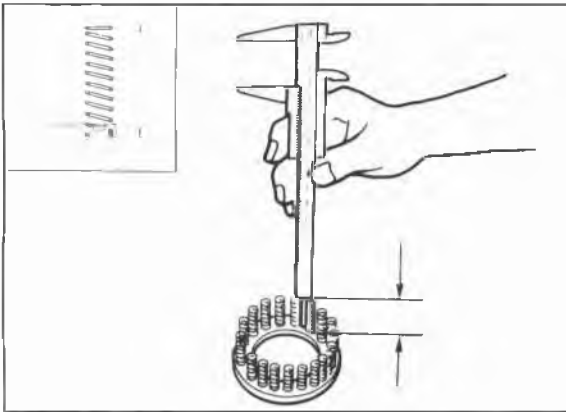
#### Drive plate thickness

**Standard: 1.6 mm (0.063 in)**

**Minimum: 1.4 mm (0.055 in)**

2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact area for damage
5. Check ball for leaking sticking
6. Broken or worn snap ring
7. Broken or weakened spring

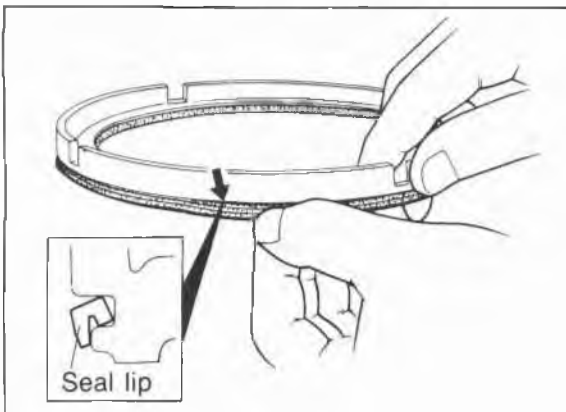
## 7B INSPECTION AND REPAIR



86U07B-198

6. Spring and retainer assembly for separation or deformation

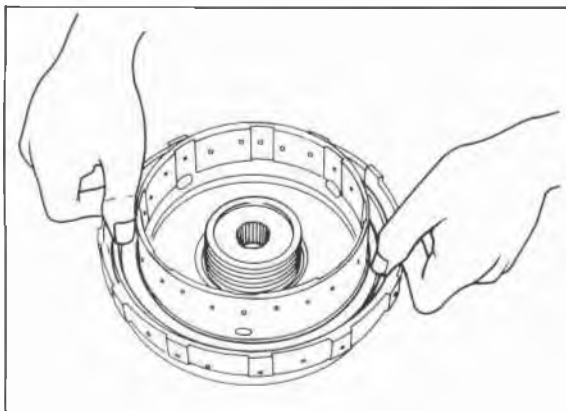
**Free length of spring:  
29.8 mm (1.173 in)**



86U07B-199

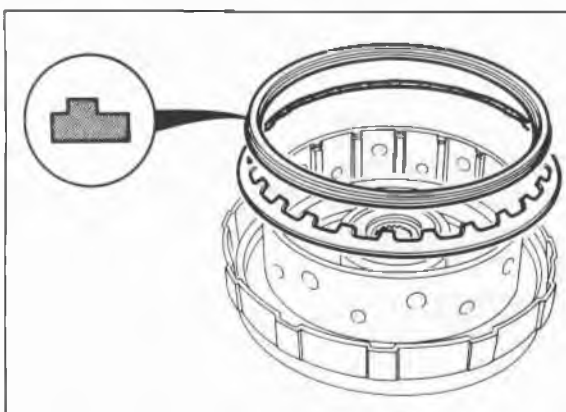
### Assembly Reverse clutch

1. Install the reverse piston.
  - (1) Apply ATF to inner and outer faces of the seals, and install them to the reverse piston.
  - (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse clutch drum.



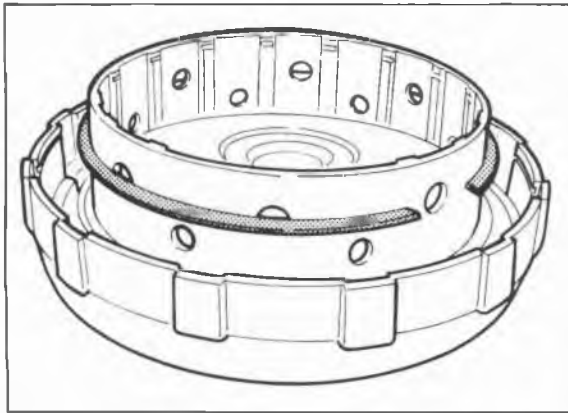
86U07B-200

- (3) Install the reverse piston by pushing evenly around the circumference, being careful not to damage the seal rings.



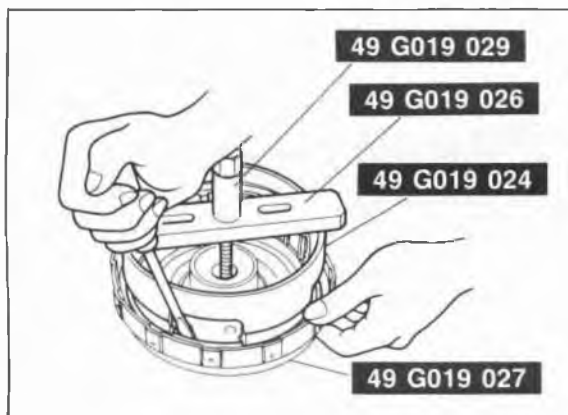
86U07B-201

2. Install the piston return spring with the tabs facing away from the reverse piston.
3. Install the return spring stopper with the step facing upwards.



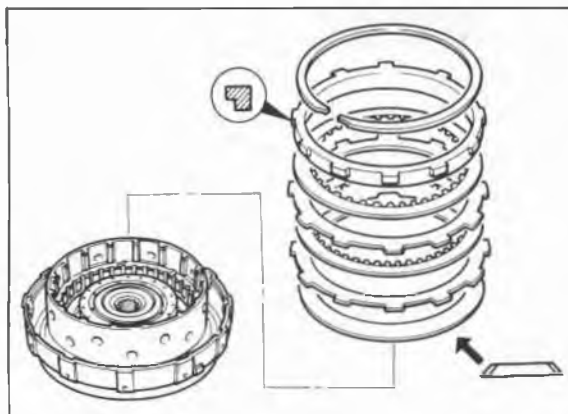
86U07B-202

4. Install the snap ring half-way down the reverse forward drum as shown.



86U07B-203

5. Install the **SST** on the reverse and forward drum.  
 6. Compress the spring and retainer assembly.  
 7. Install the snap ring with a screwdriver.  
 8. Remove the **SST**.

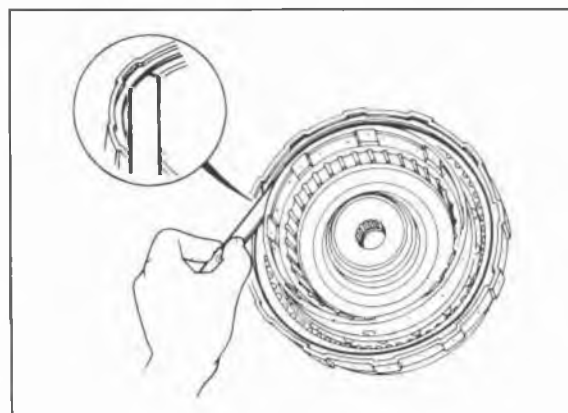


86U07B-204

9. Install the dished plate with the dished side facing the piston as shown.  
 10. Install the drive and driven plates.

**Note**  
**Installation order:**  
**Driven-Drive-Driven-Drive**

11. Install the retaining plate with the step facing downward.  
 12. Install the snap ring.



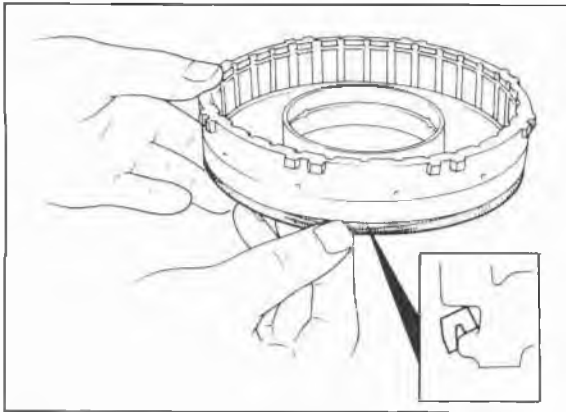
86U07B-205

13. Check the reverse clutch clearance.  
 (1) Measure the clearance between the snap ring and the retaining plate of the reverse clutch.  
 (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Reverse clutch clearance:**  
**2.1—2.4 mm (0.083—0.094 in)**

Retaining plate sizes		mm (in)
6.6 (0.260)	6.8 (0.268)	7.0 (0.276)
7.2 (0.283)	7.4 (0.291)	7.6 (0.299)

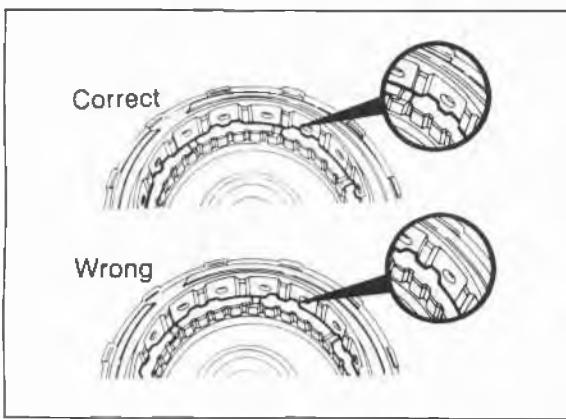
## 7B INSPECTION AND REPAIR



86U07B-206

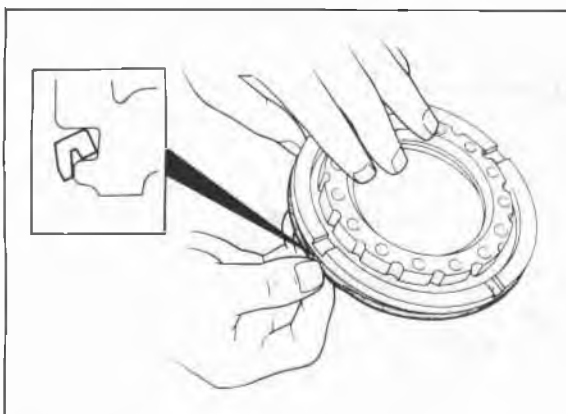
### Coasting clutch

1. Install the coasting clutch drum.
  - (1) Apply ATF to inner and outer faces of the seal, and install it onto the coasting clutch drum.
  - (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the drum.



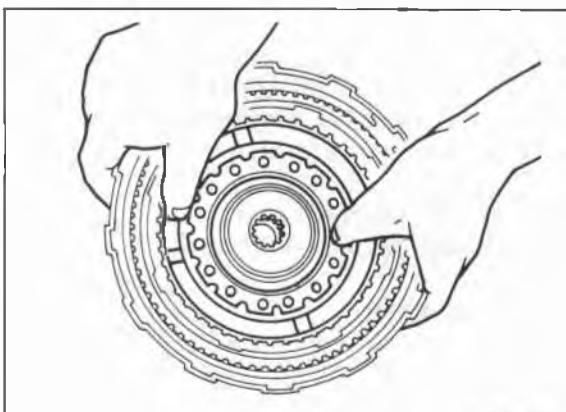
86U07B-207

- (3) Install the coasting clutch drum the correct position in the reverse and forward drum.
- (4) Push evenly around the circumference, being careful not to damage the outer seal.



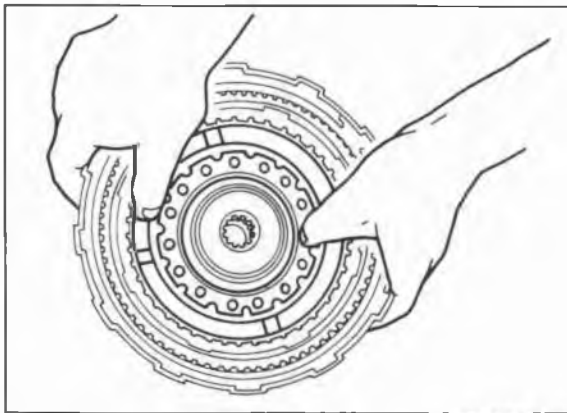
86U07B-208

2. Install the coasting piston
  - (1) Apply ATF to inner and outer faces of the seals and install them onto the coasting piston.
  - (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the drum.



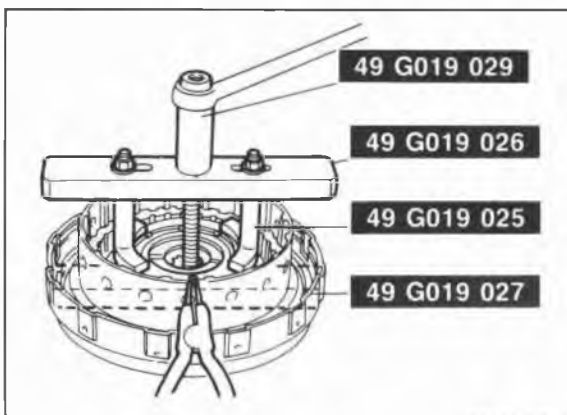
86U07B-209

- (3) Install the coasting piston by pushing evenly around the circumference, being careful not to damage the outer seal.



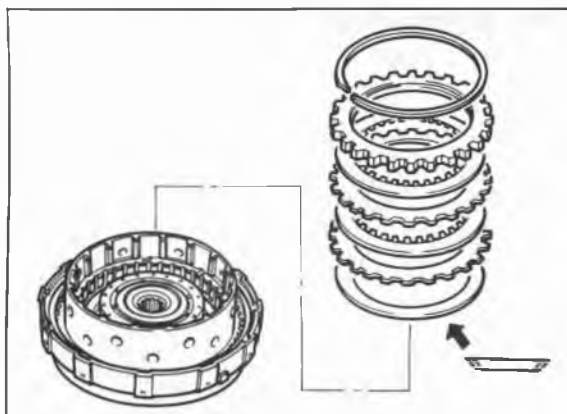
86U07B-210

3. Install the spring and retainer assembly.



86U07B-211

4. Install the **SST** in the coasting clutch as shown.
5. Compress the spring and retainer assembly.
6. Install the snap ring.
7. Remove the **SST**.



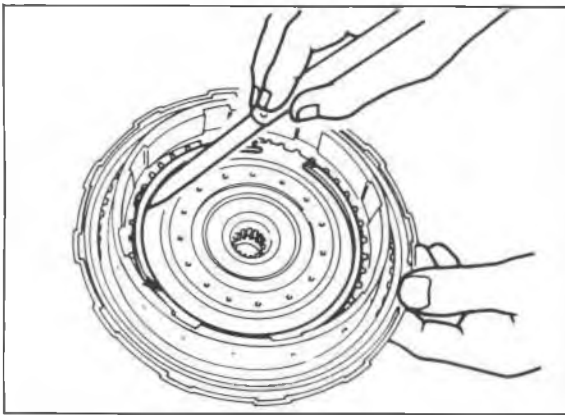
86U07B-212

8. Install the dished plate with the dished side upward.
9. Install the drive and driven plates.

**Note**  
**Installation order:**  
**Driven-Drive-Driven-Drive**

10. Install the retaining plate.
11. Install the snap ring.

# 7B INSPECTION AND REPAIR



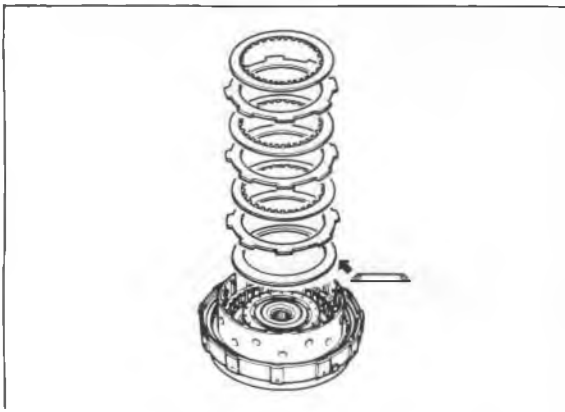
76G07B-131

12. Check the coasting clutch clearance.
  - (1) Measure the clearance between the snap ring and the retaining plate of the coasting clutch.
  - (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Coasting clutch clearance:**  
**1.0—1.2 mm (0.040—0.047 in)**

**Retaining plate sizes** mm (in)

4.6 (0.181)	4.8 (0.189)	5.0 (0.197)
5.2 (0.205)	5.4 (0.213)	5.6 (0.220)



76G07B-132

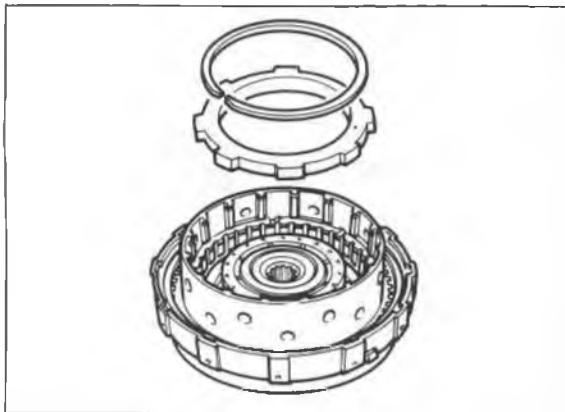
### Forward clutch

1. Install the dished plate with the dished side downward.
2. Install the drive and driven plates.

### Note

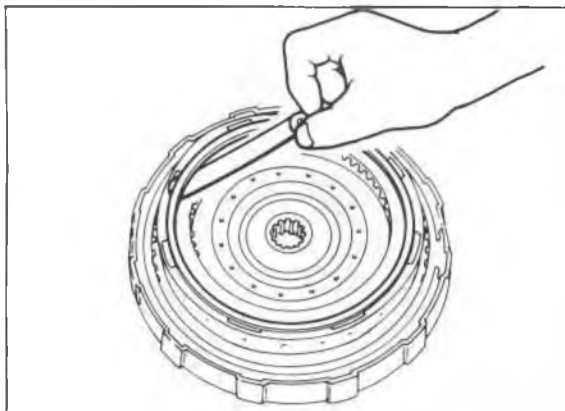
#### Installation order:

**Driven-Drive-Driven-Drive-Driven-Drive**



86U07B-215

3. Install the retaining plate.
4. Install the snap ring.



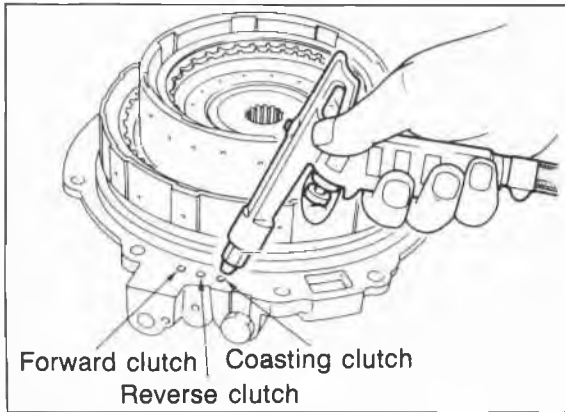
86U07B-216

5. Check the forward clutch clearance.
  - (1) Measure the clearance between the snap ring and the retaining plate of the forward clutch.
  - (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Forward clutch clearance:**  
**1.0—1.2 mm (0.040—0.047 in)**

**Retaining plate sizes** mm (in)

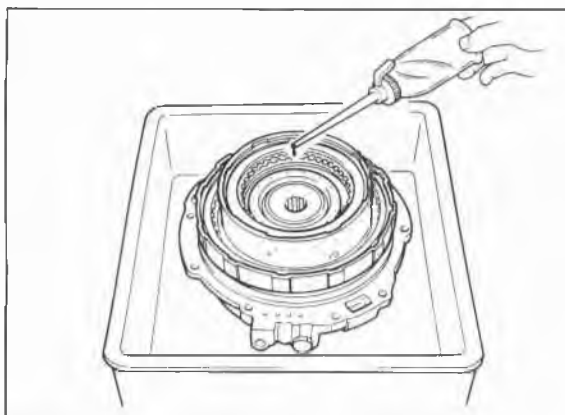
5.9 (0.232)	6.1 (0.240)	6.3 (0.248)
6.5 (0.256)	6.7 (0.264)	8.9 (0.350)



86U07B-217

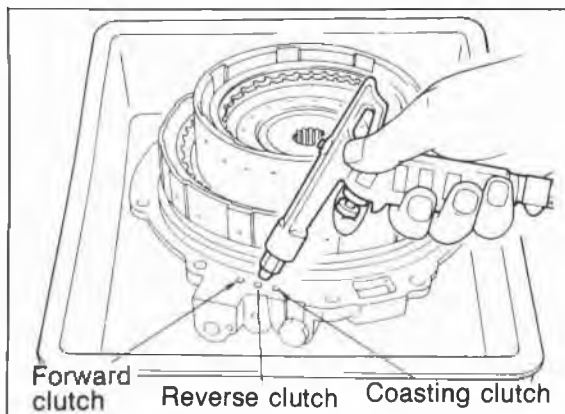
6. Check for the clutch operation as follows.
  - (1) Set the clutch assembly onto the oil pump.
  - (2) Check the clutch operation by applying compressed air through the fluid passages as shown.

**Applied air pressure:**  
392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi)



86U07B-218

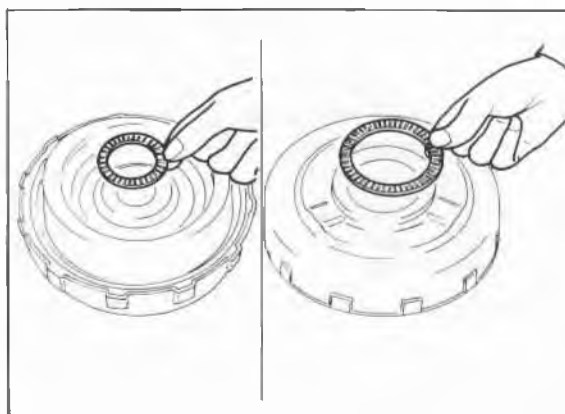
- (3) Pour in ATF so that the reverse piston, coasting clutch drum, and coasting clutch piston are fully submerged.



86U07B-219

- (4) Check that no bubbles come from between the piston and drum seal when applying compressed air through the fluid passages as shown.

**Caution**  
The compressed air must be under 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi), and should not applied for over 3 seconds.



86U07B-220

7. Apply petroleum jelly to the thrust bearings to secure them; then install them on both sides of the reverse and forward drum.

**Thrust bearing outer diameter**  
Oil pump side: 86.0 mm (3.39 in)

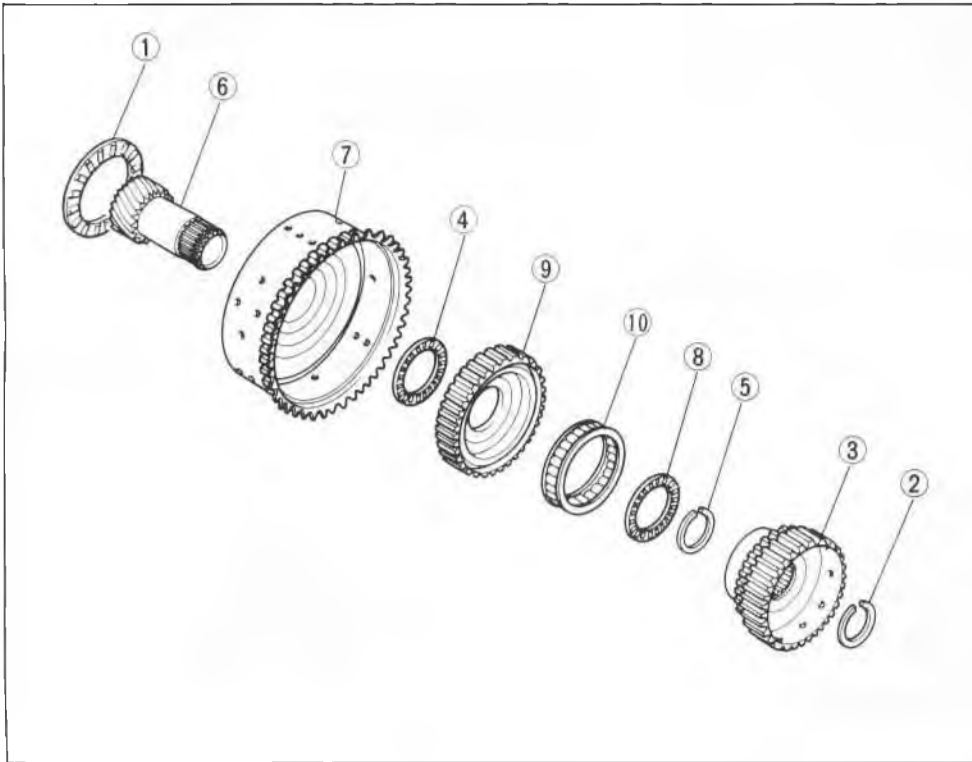
**Small sun gear and one-way clutch side:**  
56.1 mm (2.21 in)

# 7B INSPECTION AND REPAIR

## SMALL SUN GEAR AND ONE-WAY CLUTCH

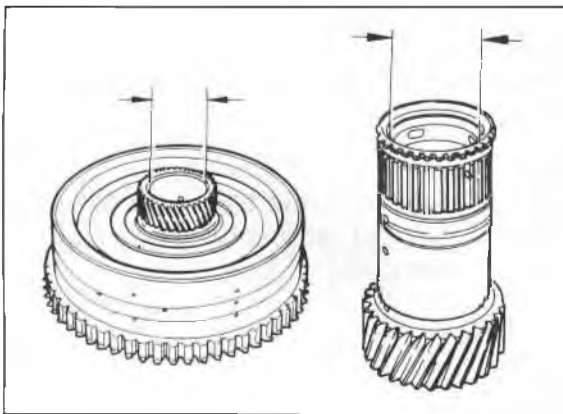
### Disassembly

Disassemble in the sequence shown in the figure.



1. Thrust bearing
2. Snap ring
3. One-way clutch inner race
4. Thrust bearing
5. Snap ring
6. Small sun gear
7. Sun gear drum
8. Thrust bearing
9. One-way clutch outer race
10. One-way clutch

86U07B-221



86U07B-222

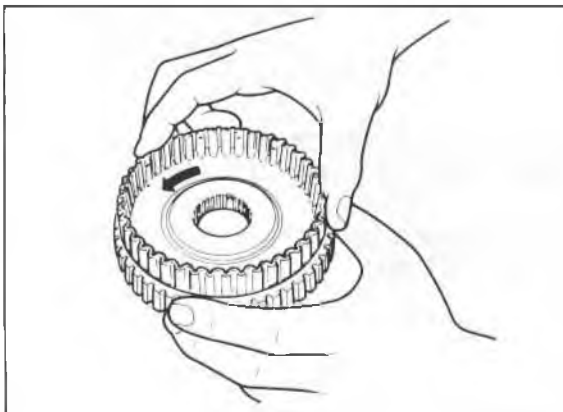
### Inspection

Check the following and replace any faulty parts.

1. Sun gear drum and small sun gear for damage or wear
2. Bushing for damage or wear

### Specification:

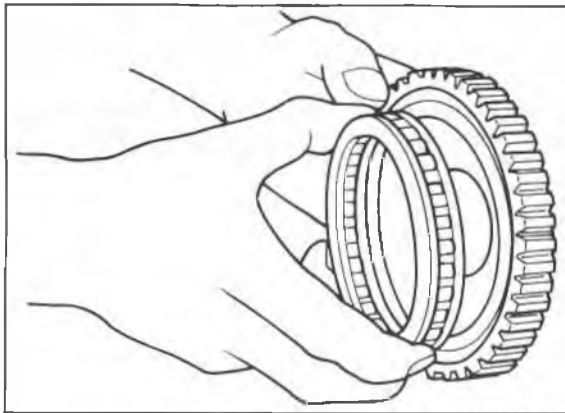
**Sun gear drum: 33.425 mm (1.316 in) max.**  
**Small sun gear: 24.021 mm (0.946 in) max.**



86U07B-223

3. Inner and outer race for damage or wear
4. Damaged or worn clutch hub
5. Damaged or worn gear
6. Damaged or worn thrust bearing
7. Broken or worn snap ring
8. One-way clutch operation  
Hold the one-way clutch outer race. Check that the inner race turns only counterclockwise.

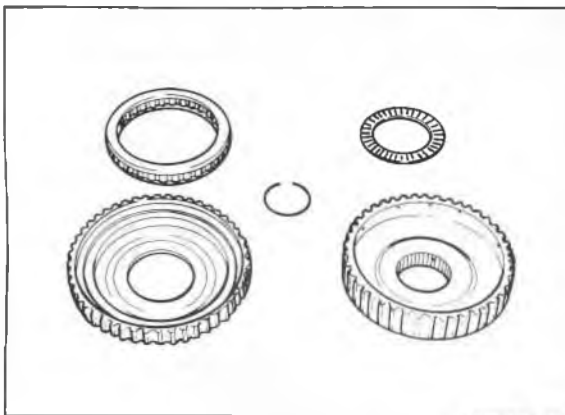




86U07B-224

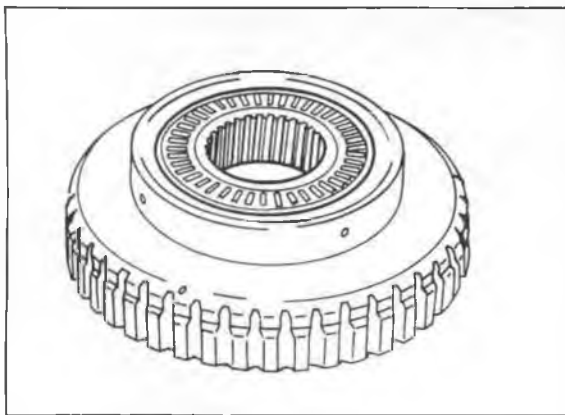
## Replacement of one-way clutch

1. Remove the one-way clutch inner race.
2. Remove the one-way clutch.
3. Remove the thrust bearing.



86U07B-225

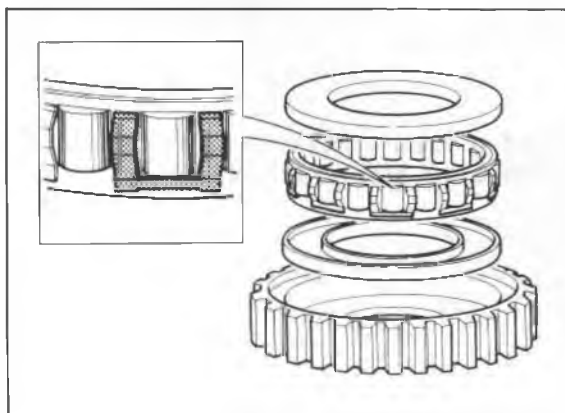
4. Inspect the one-way clutch inner and outer race, and replace if necessary.



86U07B-226

5. Apply petroleum jelly to the thrust bearing to secure it; then install it to the one-way clutch inner race.

**Thrust bearing outer diameter:  
62.1 mm (2.44 in)**



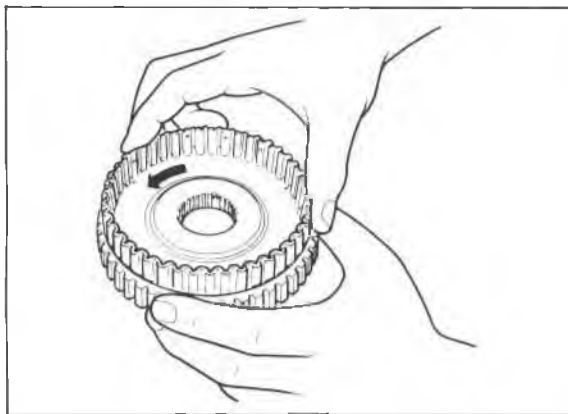
86U07B-227

6. Install the one-way clutch into the one-way clutch outer race.

### Caution

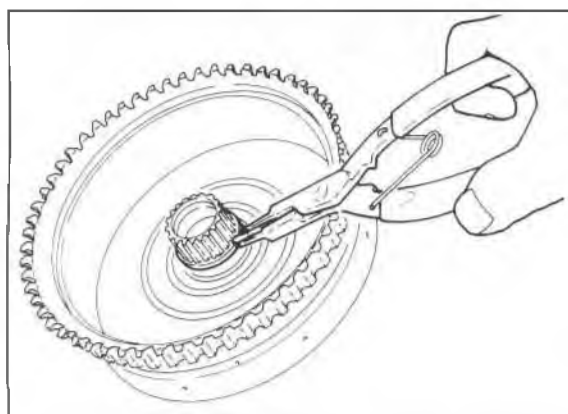
**Check that the spring cage of the one-way clutch faces toward the outer race.**

## 7B INSPECTION AND REPAIR



86U07B-228

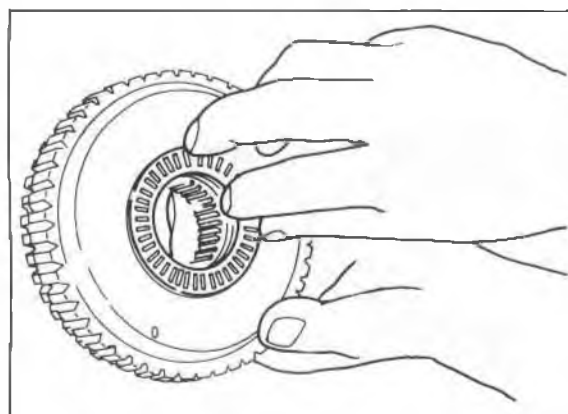
7. Install the one-way clutch inner race into the one-way clutch outer race by turning inner race counterclockwise.
8. Hold the one-way clutch outer race. Check that the inner race turns only counterclockwise.



86U07B-229

### Assembly

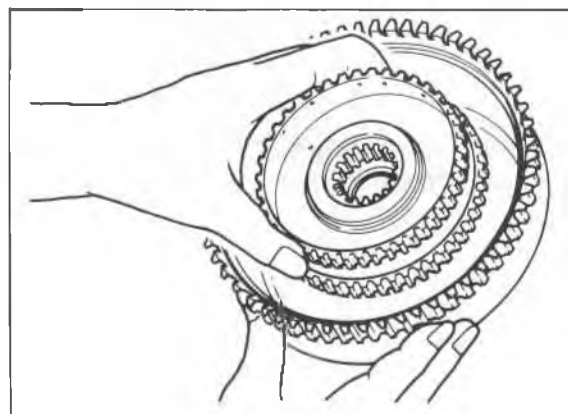
1. Install the small sun gear into the sun gear drum.
2. Install the snap ring.



86U07B-230

3. Apply petroleum jelly to the thrust bearing to secure it; then install it to the one-way clutch inner race.

**Thrust bearing outer diameter:  
62.1 mm (2.44 in)**

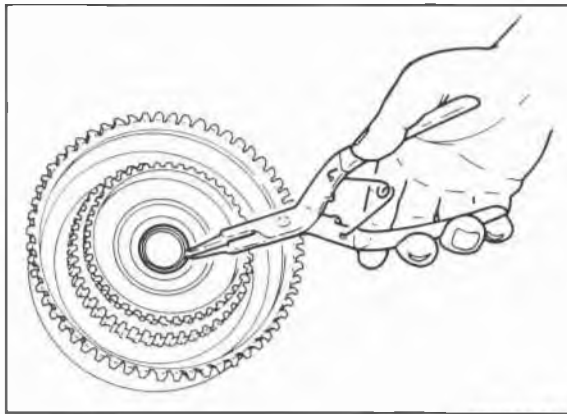


86U07B-231

4. Install the one-way clutch inner and outer race to the sun gear drum.

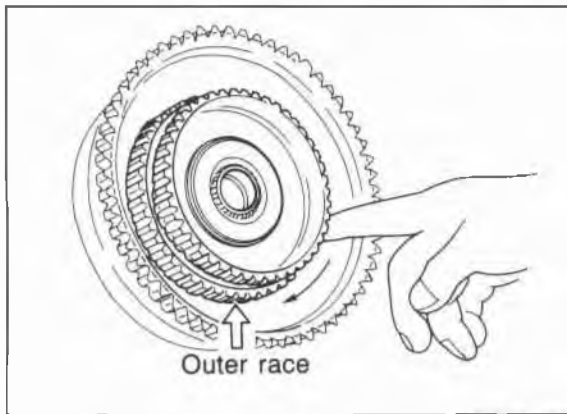
### Note

**Align the splines of the one-way clutch inner race and small sun gear clutch hub.**



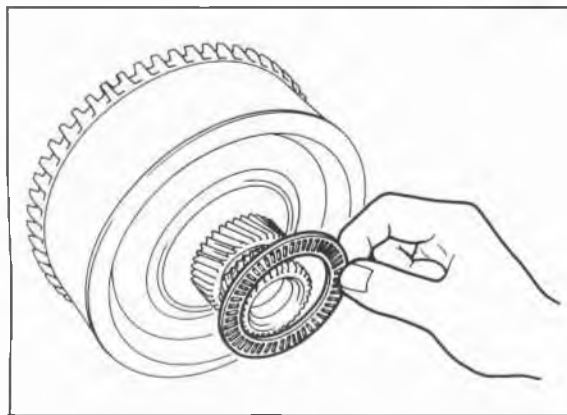
86U07B-232

5. Install the snap ring.



86U07B-233

6. Check that when the small sun gear is held, the one-way clutch outer race turns smoothly and only clockwise.



86U07B-234

7. Apply petroleum jelly to the thrust bearing to secure it; then install it to the sun gear drum.

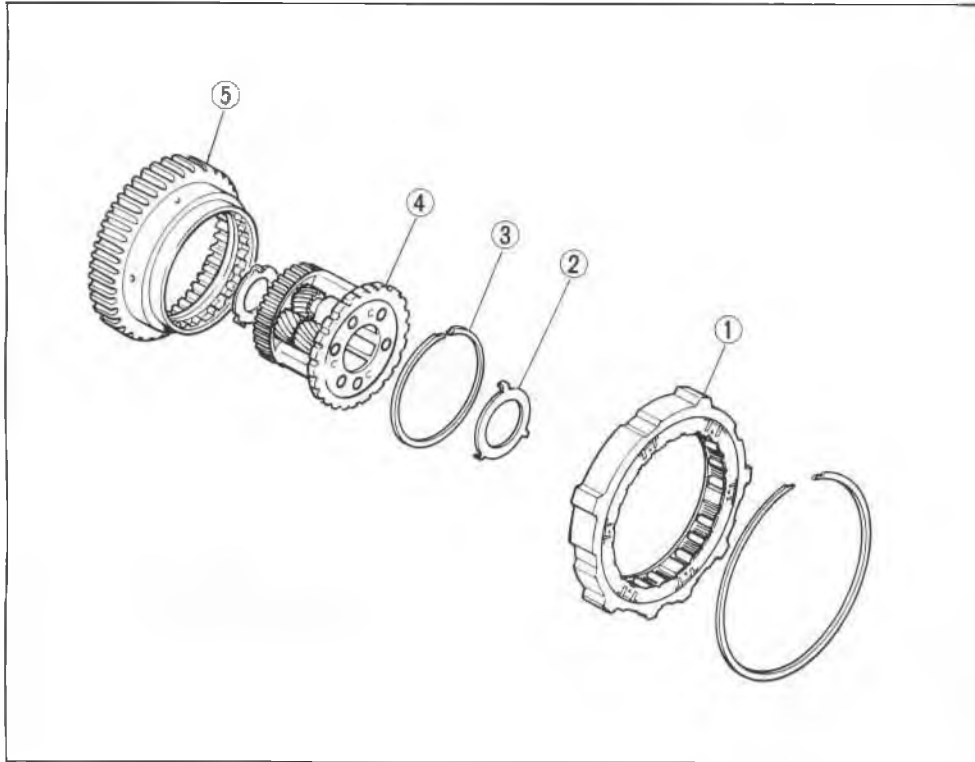
**Thrust bearing outer diameter:  
72.0 mm (2.83 in)**

# 7B INSPECTION AND REPAIR

## ONE-WAY CLUTCH AND CARRIER HUB ASSEMBLY

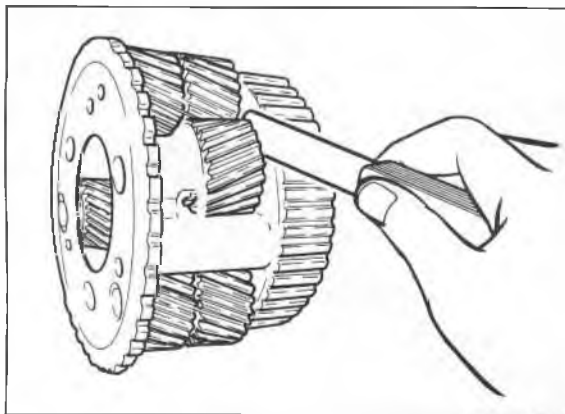
### Disassembly

Disassemble in the sequence shown in the figure.



86U07B-235

1. One-way clutch
2. Bearing races
3. Snap ring
4. Carrier hub assembly
5. Inner race (Low and reverse hub)



86U07B-236

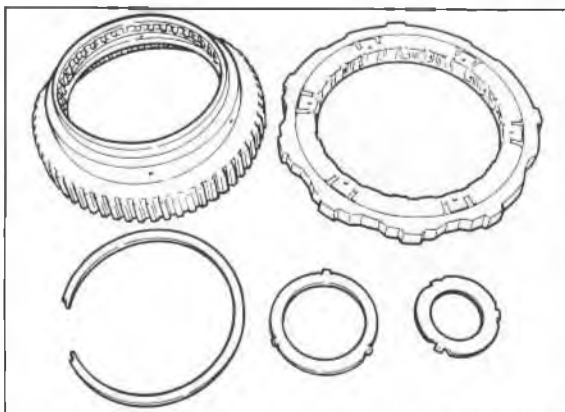
### Inspection

Check the following and replace any faulty parts.

1. Damaged or worn gear and operation
2. Clearance between pinion washer and planetary carrier

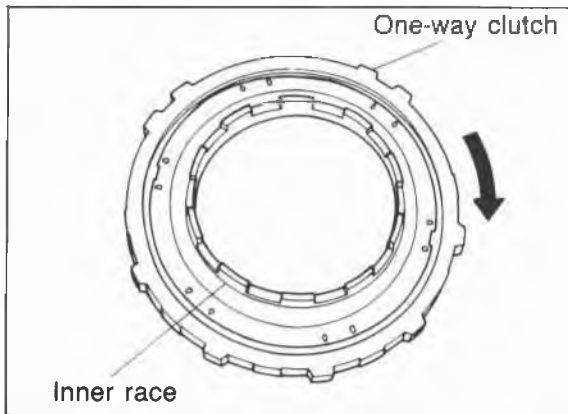
### Clearance:

**0.2—0.7 mm (0.008—0.028 in)**



86U07B-237

3. Damaged or worn inner race
4. Broken or worn snap ring
5. Damaged or worn bearing race

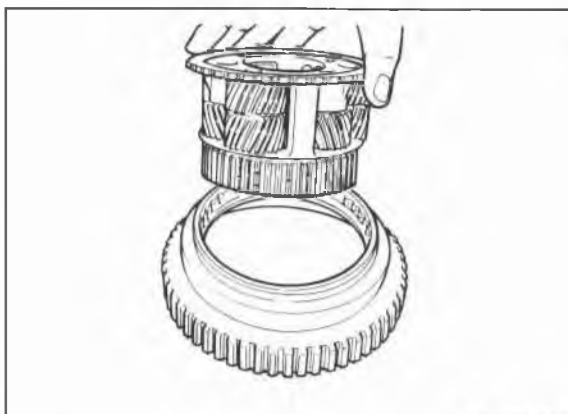


86U07B-238

6. Damaged or worn one-way clutch and operation
7. Detached roller

**Note**

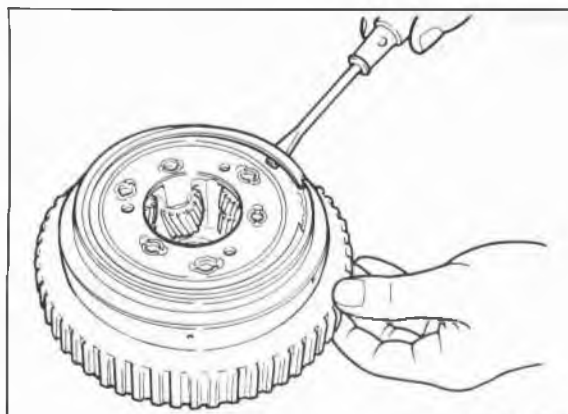
Assemble the one-way clutch and the inner race, then confirm that the one-way clutch rotates only clockwise and smoothly.



86U07B-239

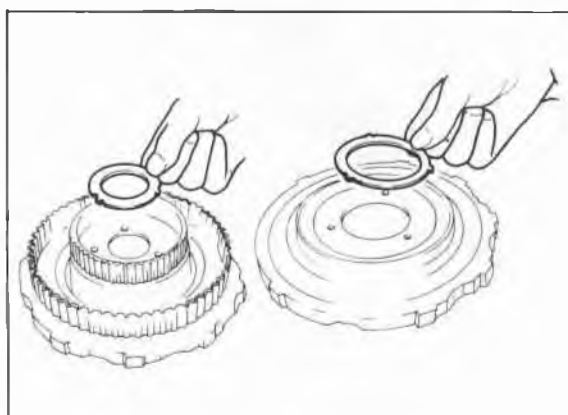
**Assembly**

1. Assemble the carrier hub assembly to the inner race.



86U07B-240

2. Install the snap ring.



86U07B-241

3. Apply petroleum jelly to the bearing races to secure them; then install them to both sides of the one-way clutch and carrier hub assembly.

**Bearing race outer diameter**

Sun gear drum side: 72.0 mm (2.83 in)

3-4 clutch side: 57.0 mm (2.21 in)

**Note**

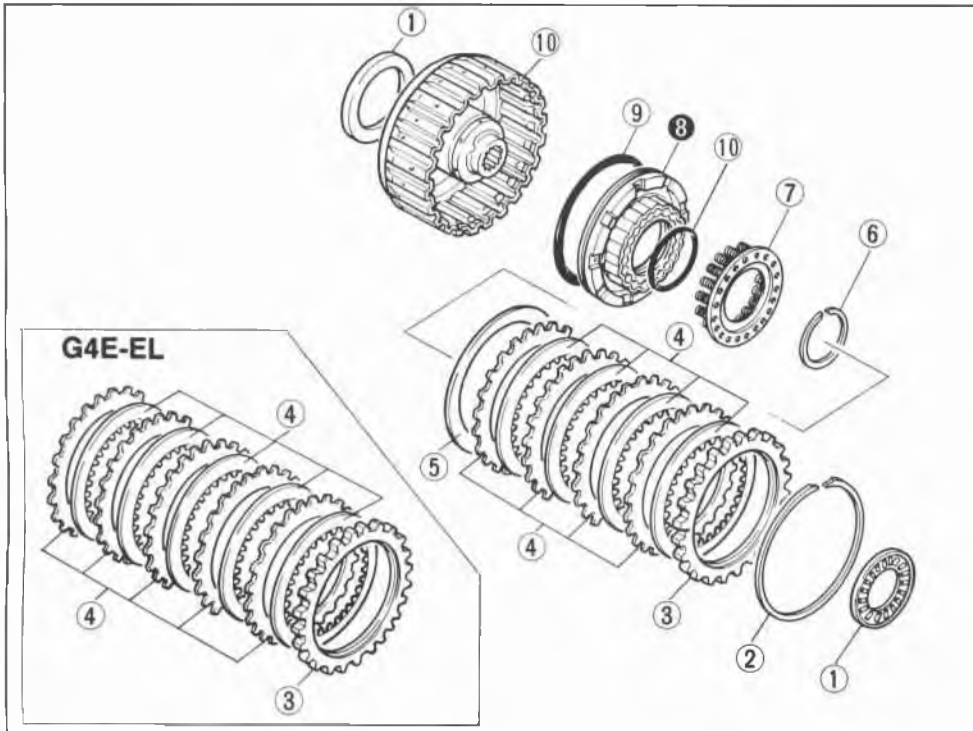
Install the tabs of the bearing race into the alignment holes.

# 7B INSPECTION AND REPAIR

## 3-4 CLUTCH

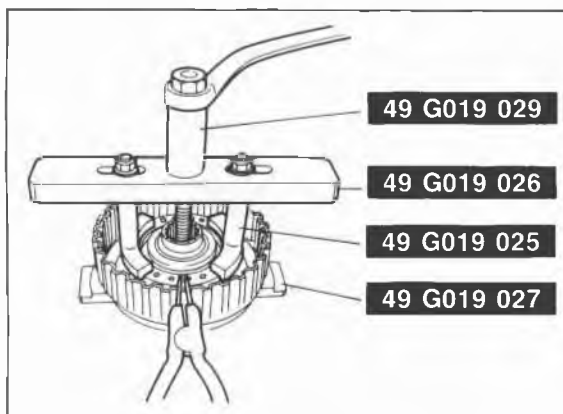
### Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked part.



1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate (G4A-HL)
6. Snap ring
7. Spring and retainer assembly
8. 3-4 clutch piston
9. Outer seal
10. Inner seal
11. 3-4 clutch drum

76G07B-133

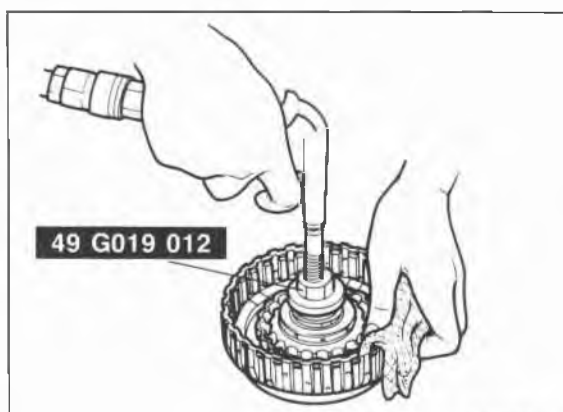


86U07B-243

### Disassembly note

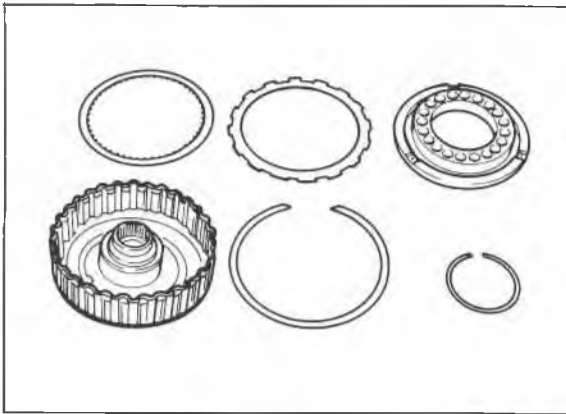
#### 3-4 clutch piston

1. Install the **SST** to the 3-4 clutch as shown.
2. Compress the spring and retainer assembly.
3. Remove the snap ring.
4. Remove the **SST** then remove the spring and retainer assembly.



86U07B-244

5. Remove the 3-4 clutch piston with the **SST** and compressed air.



86U07B-245

## Inspection

Check the following and repair or replace any faulty parts.

1. Drive and driven plates for damage or wear

### Drive plate thickness

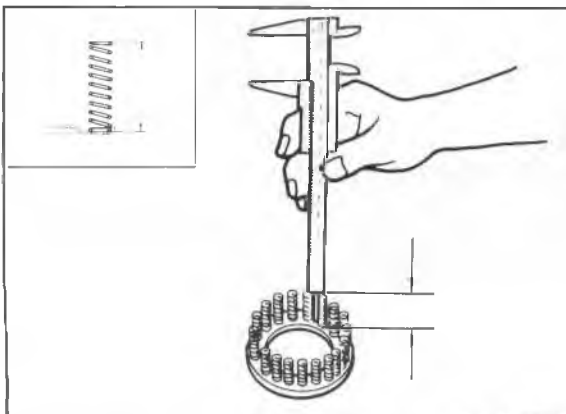
**Standard: 1.6 mm (0.063 in)**

**Minimum: 1.4 mm (0.055 in)**

2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact areas for damage
5. Check ball for leaking or sticking
6. Spring and retainer assembly for separation or deformation
7. Broken or worn snap ring
8. Broken or weakened spring

### Free length of spring:

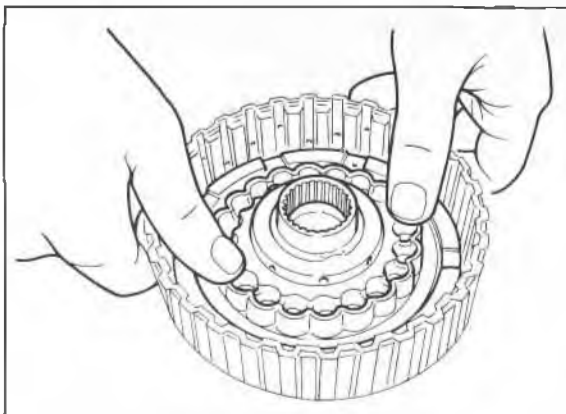
**33.2 mm (1.307 in)**



86U07B-246

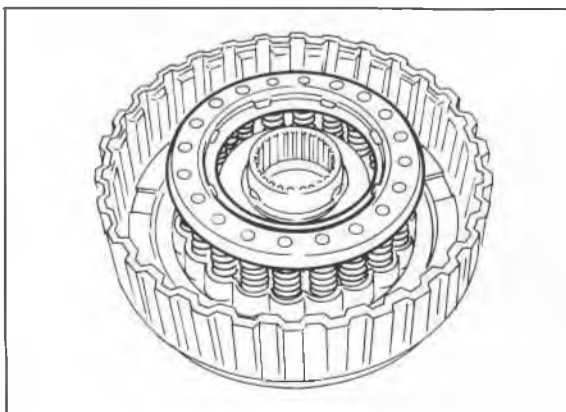
## Assembly

1. Install the 3-4 clutch piston.
  - (1) Apply ATF to the inner and outer seals, and install them onto the 3-4 clutch piston.
  - (2) Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.



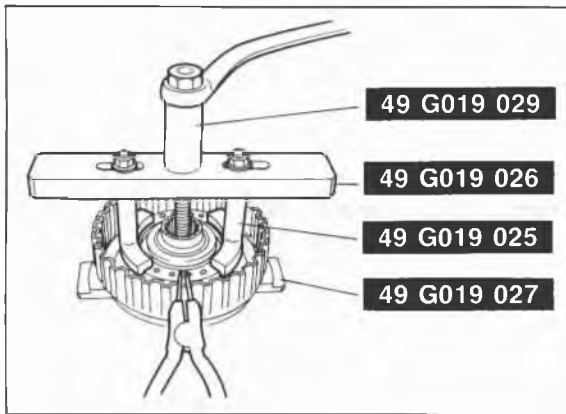
86U07B-247

2. Install the spring and retainer assembly.



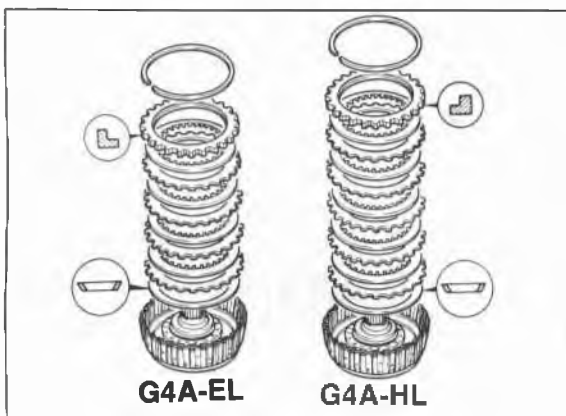
86U07B-248

# 7B INSPECTION AND REPAIR



86U07B-249

3. Install the **SST** to the 3-4 clutch as shown.
4. Compress the spring and retainer assembly.
5. Install the snap ring.
6. Remove the **SST**.



76G07B-134

7. Install the dished plate the dished side up ward (G4A-HL).
8. Install the drive and driven plates.

### Note

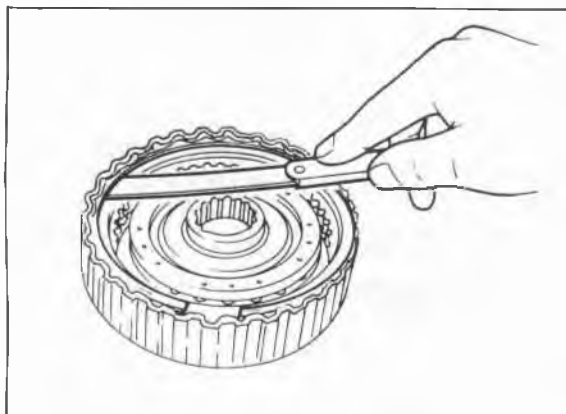
#### Installation order:

#### G4A-EL

**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**

#### G4A-HL

**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**



76G07B-135

9. Install the retaining plate with the step facing upward.
10. Install the snap ring.
11. Check the 3-4 clutch clearance.
  - (1) Measure the clearance between the snap ring and the retaining plate of the 3-4 clutch.
  - (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

#### 3-4 clutch clearance:

**1.3—1.5 mm (0.051—0.059 in)**

#### Retaining plate sizes

mm (in)

#### G4A-EL

3.8 (0.150)	4.0 (0.157)	4.2 (0.165)
4.4 (0.173)	4.6 (0.181)	4.8 (0.189)

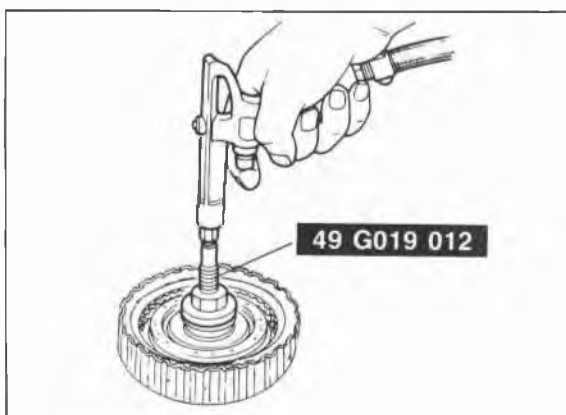
#### G4A-HL

4.8 (0.189)	5.0 (0.197)	5.2 (0.205)
5.4 (0.213)	5.6 (0.220)	

12. Check clutch operation as follows:
  - (1) Install the **SST** as shown, and check clutch operation by applying compressed air.

#### Air pressure:

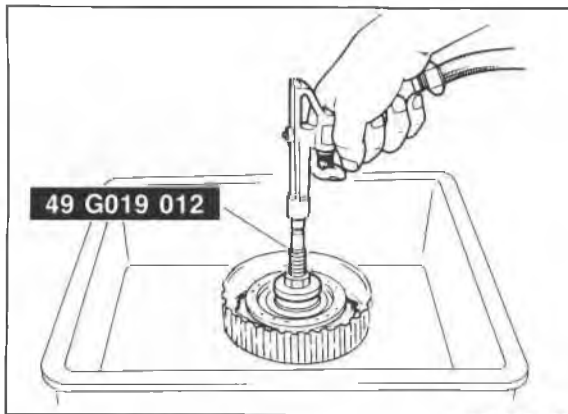
**392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi)**



76G07B-136



## INSPECTION AND REPAIR 7B

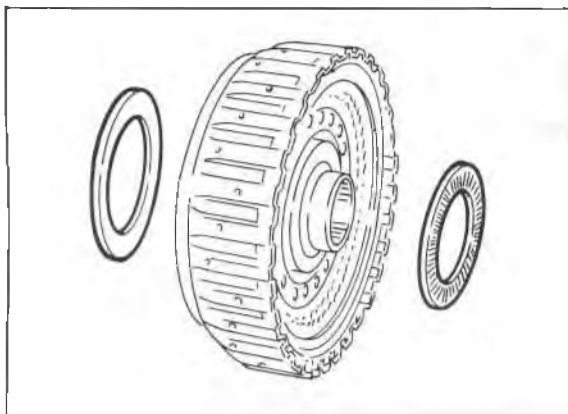


86U07B-253

- (2) Pour ATF into the clutch drum so that the 3-4 clutch piston is fully submerged.
- (3) Check that no bubbles come from the 3-4 clutch piston seal while applying compressed air.

### Caution

The compressed air must be under 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) and not applied for over 3 seconds.



76G07B-137

13. Apply petroleum jelly to the thrust bearings and secure them to both sides of the 3-4 clutch drum.

### Thrust bearing outer diameter

Carrier hub side: 56.1 mm (2.21 in)

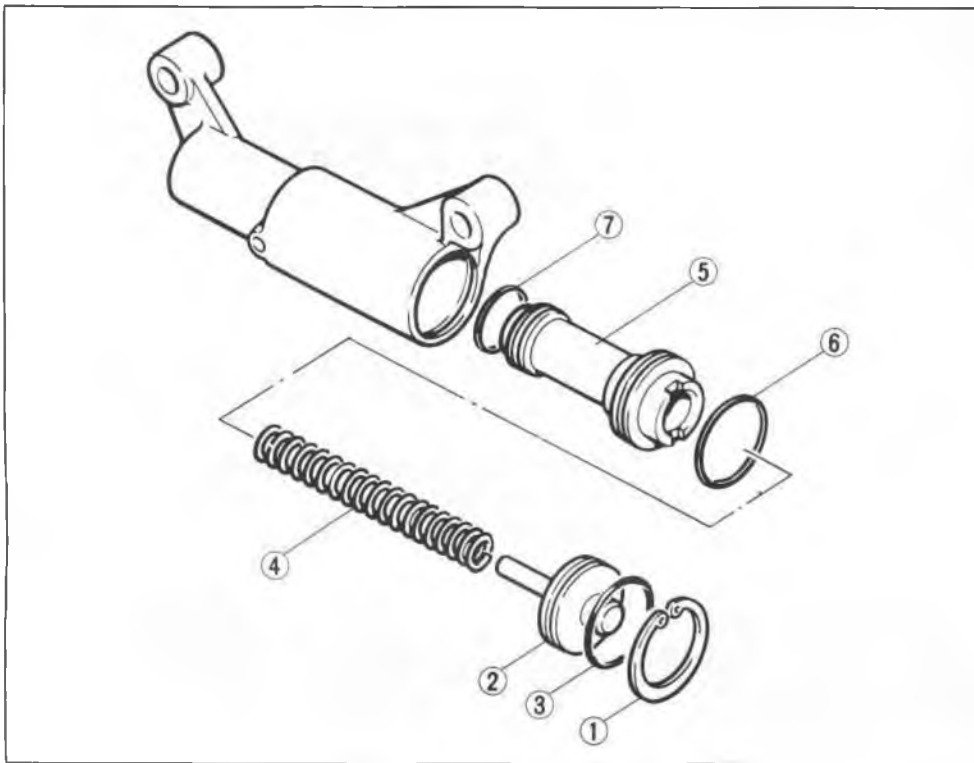
Output shell side: 72.1 mm (2.84 in)

# 7B INSPECTION AND REPAIR

## 2-3 ACCUMULATOR

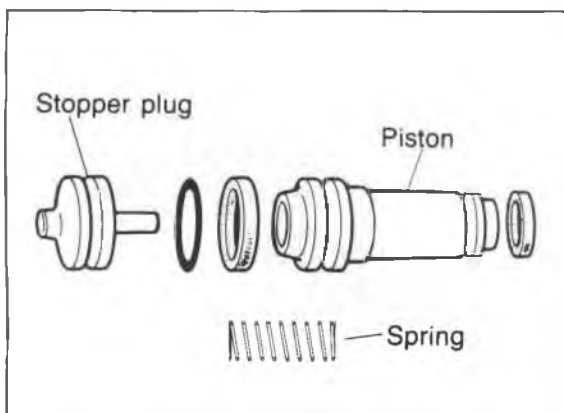
### Disassembly

Disassemble in the sequence shown in the figure.



1. Snap ring
2. Stopper plug
3. O-ring
4. 2-3 accumulator spring
5. 2-3 accumulator piston
6. Large seal ring
7. Small sea ring

86U07B-255



76G07B-138

### Inspection

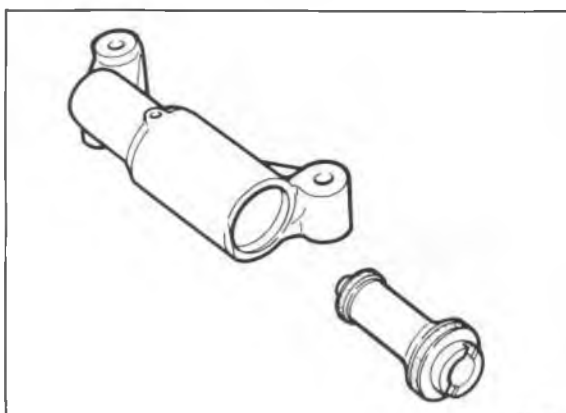
Check the following and replace any faulty parts.

1. Damaged or worn piston
2. Damaged or worn stopper plug
3. Broken or weakened spring

### Free length of spring:

**G4A-EL 83.3 mm (3.280 in)**

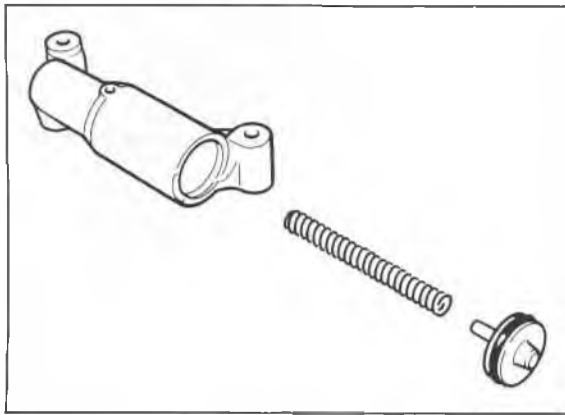
**G4A-HL 76.0 mm (2.992 in)**



86U07B-257

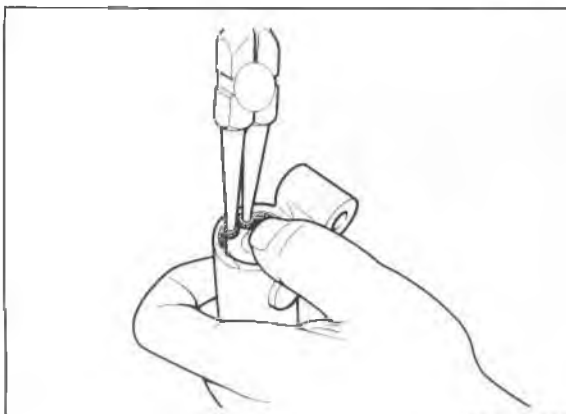
### Assembly

1. Install the 2-3 accumulator.
  - (1) Apply ATF to large and small seal rings; then install them to the accumulator piston.
  - (2) Insert the 2-3 accumulator.



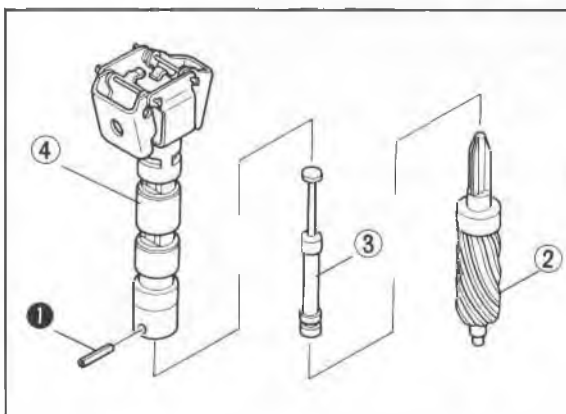
86U07B-258

2. Install the spring to the piston.
3. Install the stopper plug.
  - (1) Apply ATF to O-ring, and install it onto the stopper plug.
  - (2) Install the stopper plug.



86U07B-259

4. Install the snap ring while holding in the stopper plug.



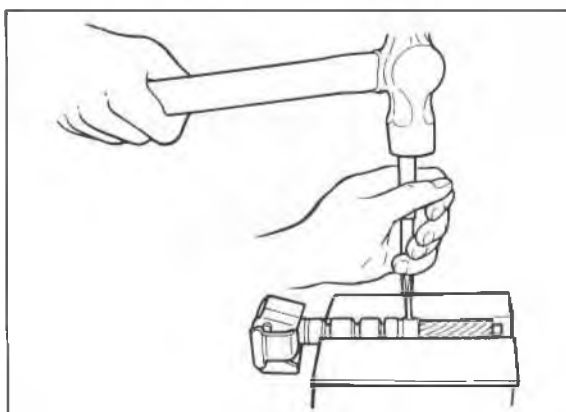
76G07B-139

## GOVERNOR ASSEMBLY (G4A-HL)

### Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked part.

1. Roll pin
2. Governor driven gear
3. Governor valve
4. Governor carrier and sleeve



83U07B-266

### Disassembly note

#### Roll pin

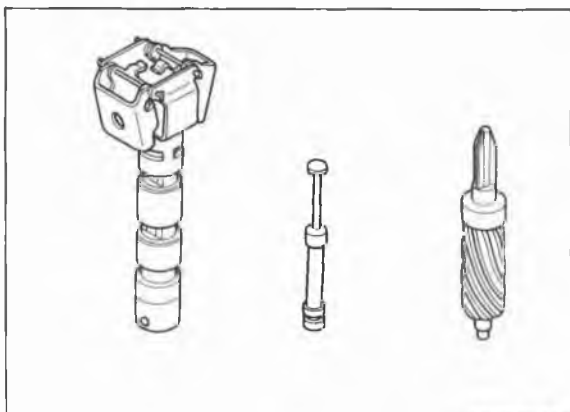
1. Secure the governor assembly in a vise.

#### Note

**Use the protective plates to prevent damage to the governor assembly.**

2. Remove the roll pin from the governor assembly.

## 7B INSPECTION AND REPAIR

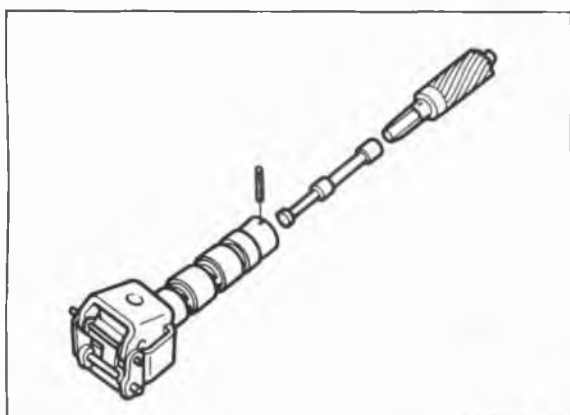


83U07B-267

### Inspection

Check the following and replace any faulty parts.

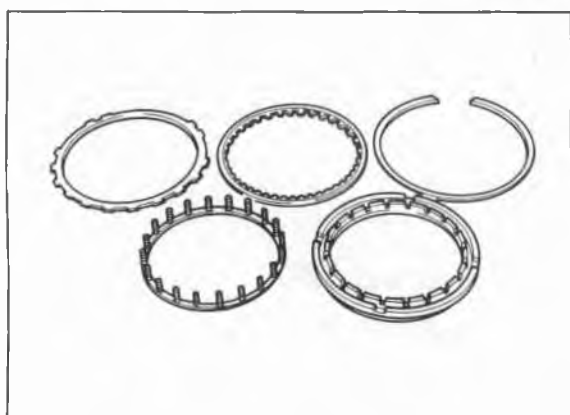
1. Damaged or worn governor gear
2. Damaged or worn governor valve
3. Cracked or damaged governor carrier and sleeve



83U07B-268

### Assembly

1. Insert the governor valve to the governor carrier and sleeve.
2. Install the governor driven gear.
3. Install the roll pin.



86U07B-260

### LOW AND REVERSE BRAKE

#### Inspection

Check the following and replace any faulty parts.

1. Damaged or worn drive and driven plates

#### Drive plate thickness

**Standard: 1.6 mm (0.063 in)**

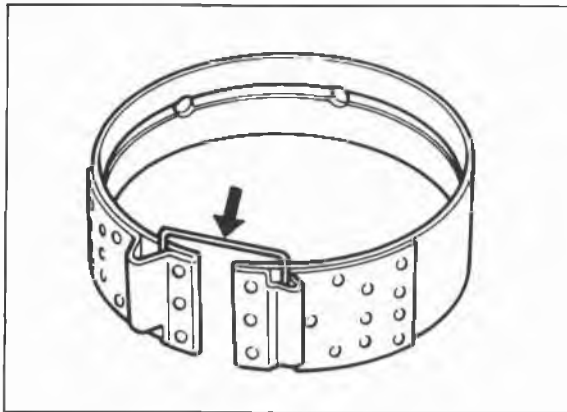
**Minimum: 1.4 mm (0.055 in)**

2. Broken or worn snap ring
3. Deformed or detached spring and retainer assembly
4. Broken or weakened spring

#### Free length of spring:

**20.5 mm (0.807 in)**

5. Damaged or worn piston
6. Damaged seal contact area of transaxle case



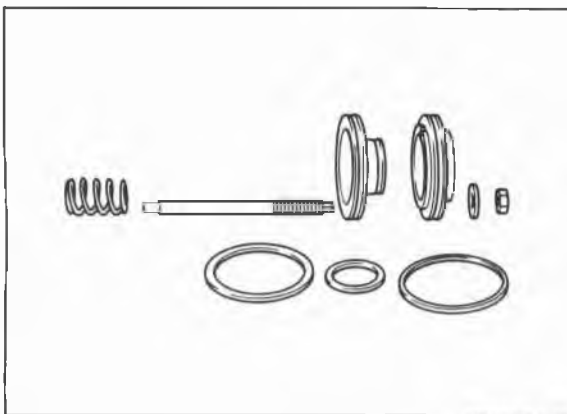
86U07B-261

## 2-4 BRAKE BAND

### Inspection

Check the following and replace if necessary.

1. Damaged or worn 2-4 brake band



76G07B-140

## BAND SERVO

### Inspection

Check the following and replace any faulty parts.

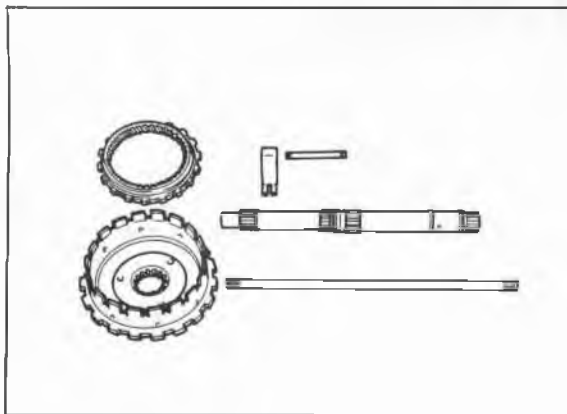
1. Damaged or worn piston
2. Weakened return spring

### Free length of spring:

**G4A-EL: 43.25 mm (1.703 in)**

**G4A-HL: FE engine 42.0 mm (1.654 in)**

**F8 engine 43.25 mm (1.703 in)**

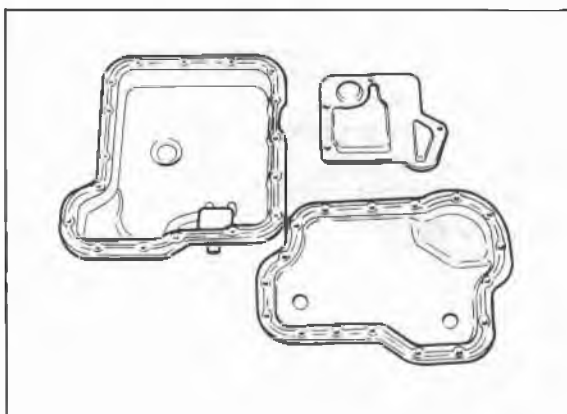


86U07B-263

## OTHER INSPECTION

Check the following and replace any faulty parts.

1. Damaged or worn output shell
2. Damaged or worn internal gear
3. Damaged or worn turbine shaft
4. Damaged or worn oil pump shaft
5. Damaged or worn anchor strut and shaft



86U07B-264

6. Damaged or cracked valve body cover
7. Damaged or cracked oil pan
8. Damaged or clogged oil strainer

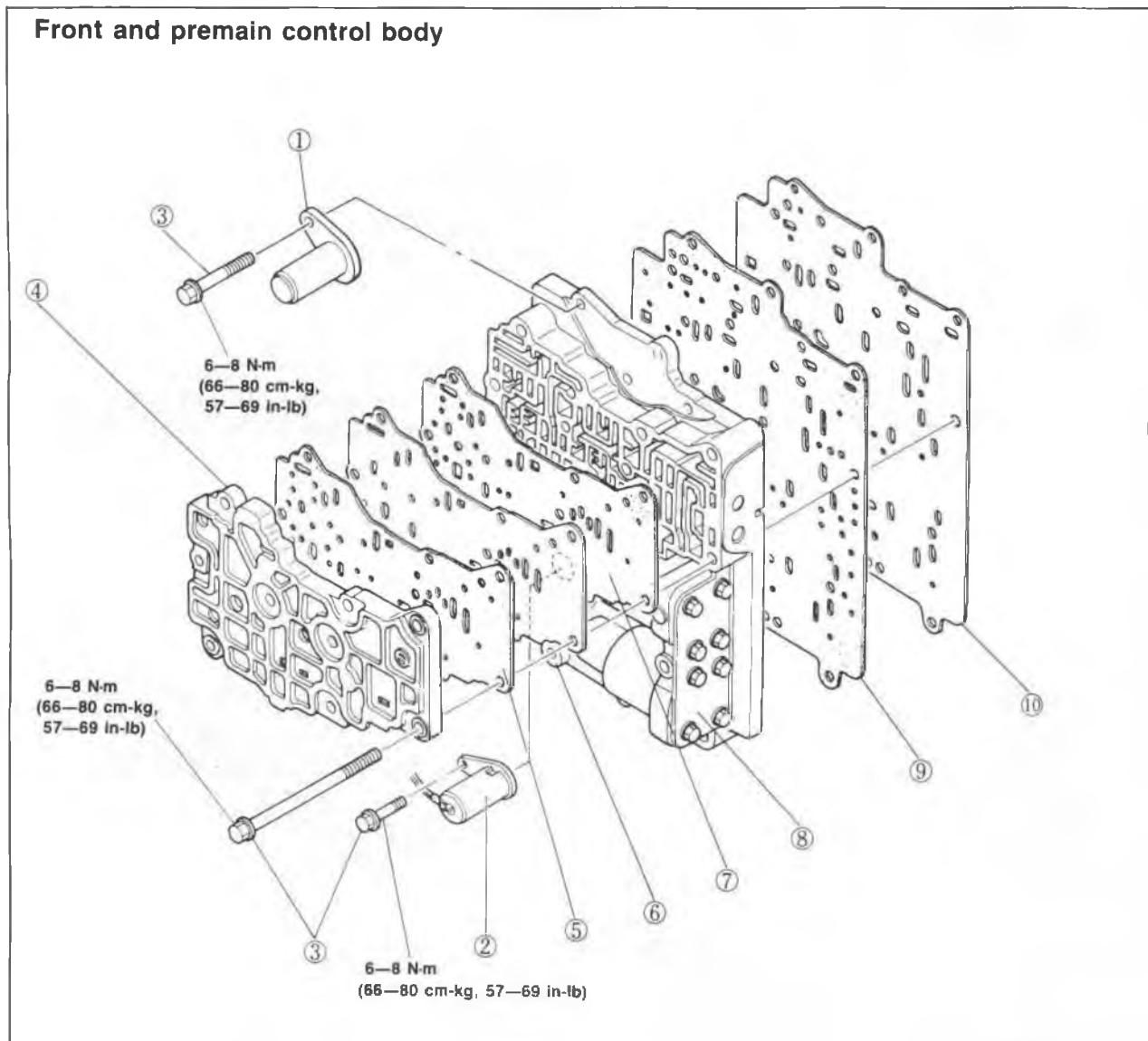
## 7B INSPECTION AND REPAIR

### CONTROL VALVE BODY (G4A-EL)

#### Precaution

- (1) Pay close attention when handling the control valve because it consists of the most precise and delicate parts of the transaxle.
- (2) Neatly arrange the removed parts in order to avoid mixing up similar parts.
- (3) Disassemble the control valve assembly and thoroughly clean it when the clutch and/or brake bands are burned, and/or when the automatic transaxle fluid is degenerated.

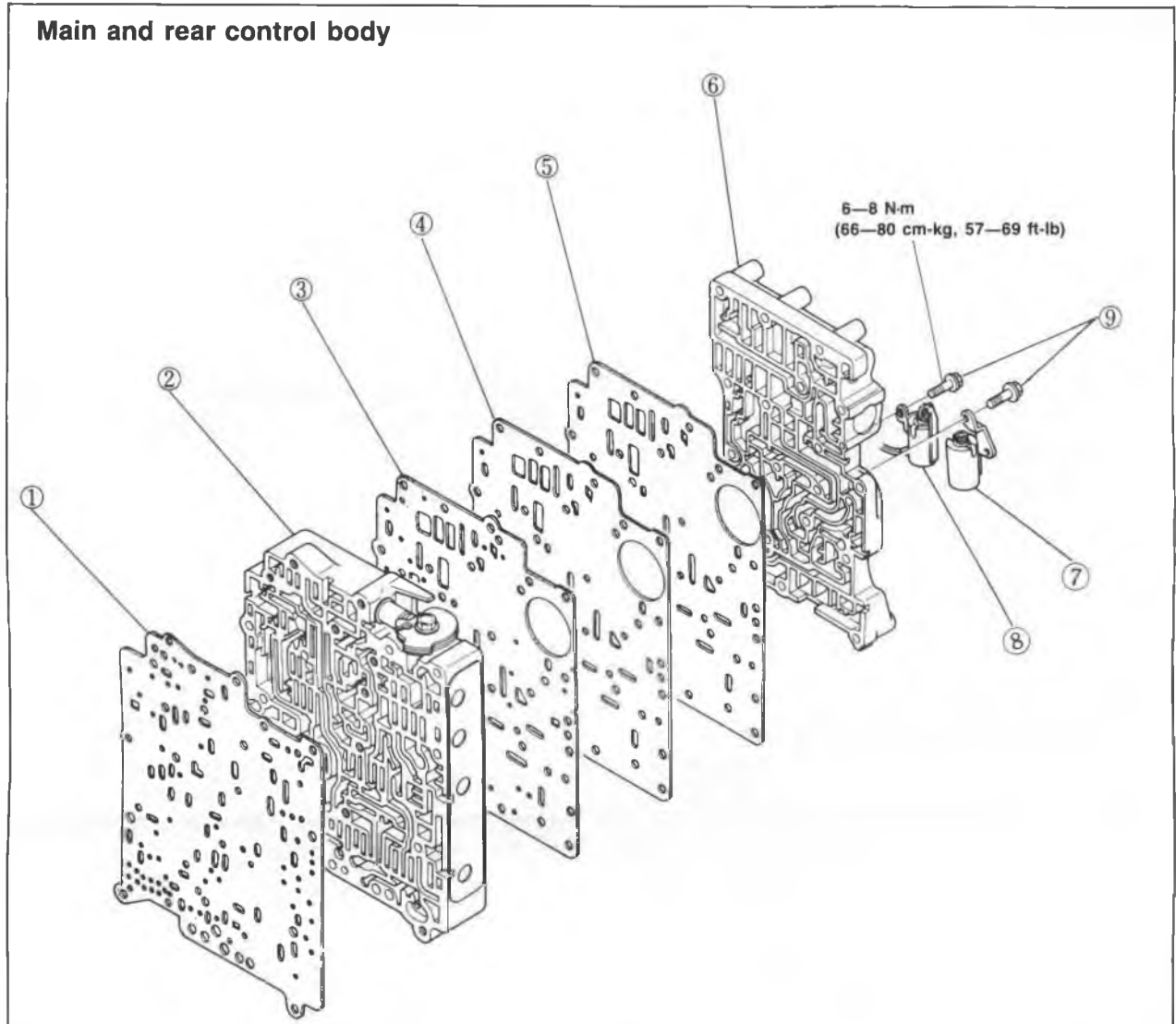
#### Components I



76G07B-141

- |                               |                              |
|-------------------------------|------------------------------|
| 1. 1-2 Solenoid valve         | 6. Premain separator         |
| 2. 2-3 Solenoid valve         | 7. Front/premain rear gasket |
| 3. Bolts                      | 8. Premain control body      |
| 4. Front control body         | 9. Premain/main front gasket |
| 5. Front/premain front gasket | 10. Main separator           |

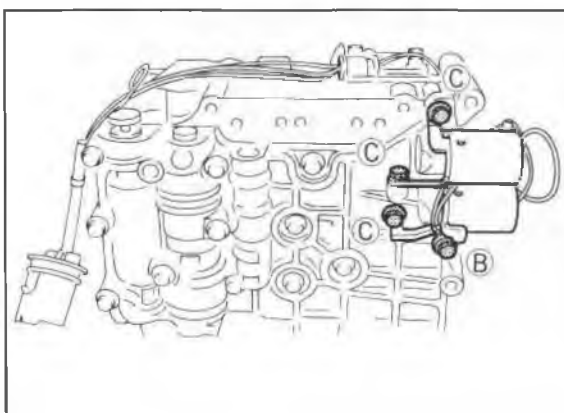
## Components II



86U07B-266

1. Premain/main rear gasket
2. Main control body
3. Main/rear front gasket
4. Rear separator
5. Main/rear rear gasket

6. Rear control body
7. 3-4 solenoid valve
8. Lock-up solenoid valve
9. Bolts

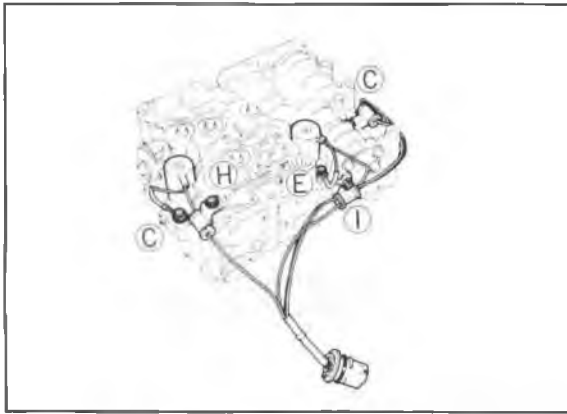


86U07B-267

### Disassembly of Control Valve Body

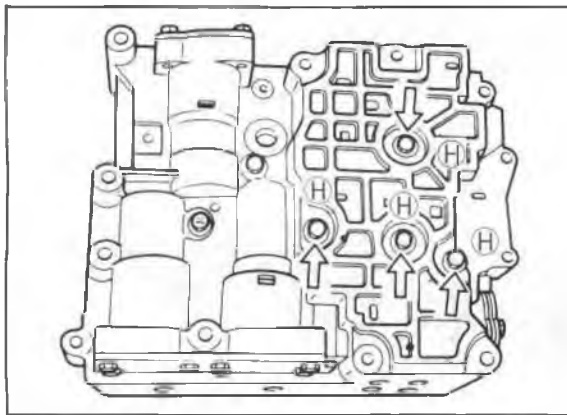
1. Remove the 3-4 solenoid valve and lock-up solenoid valve.
2. Remove the O-rings and oil strainers.

## 7B INSPECTION AND REPAIR



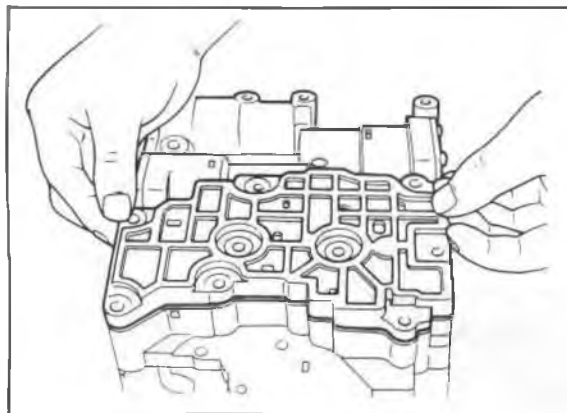
86U07B-268

3. Remove the 1-2 solenoid valve and 2-3 solenoid valve and wire harness.
4. Remove the O-rings and oil strainers.



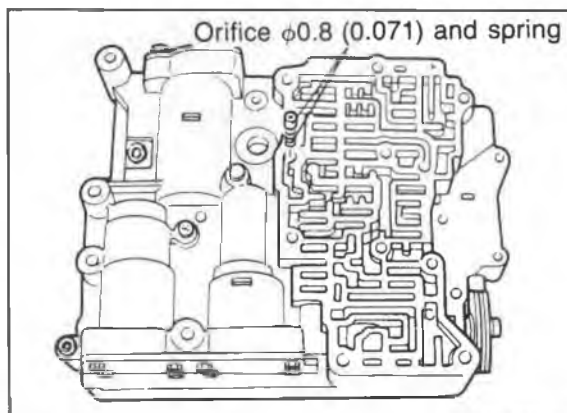
86U07B-269

5. Remove the front indicated bolts and pull out the front control body with premain separator as a unit.



86U07B-270

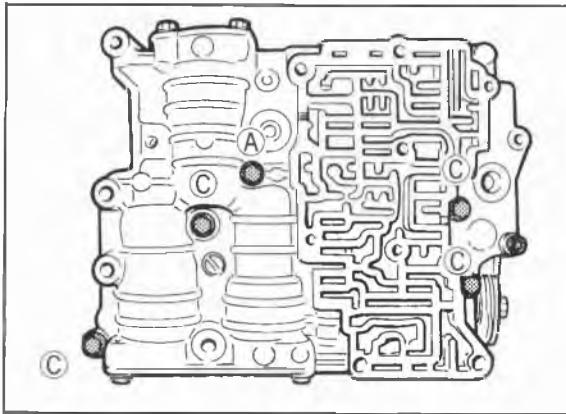
6. Remove the front/premain gaskets and separator from the front control body.



76G07B-142

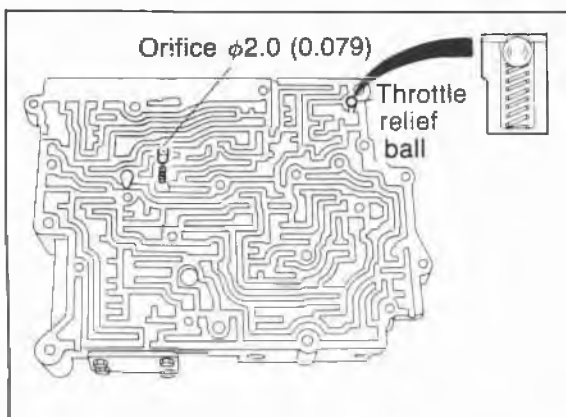
7. Remove the orifice check valve ( $\phi 0.8$  mm, 0.071 in) and spring from the premain control body.





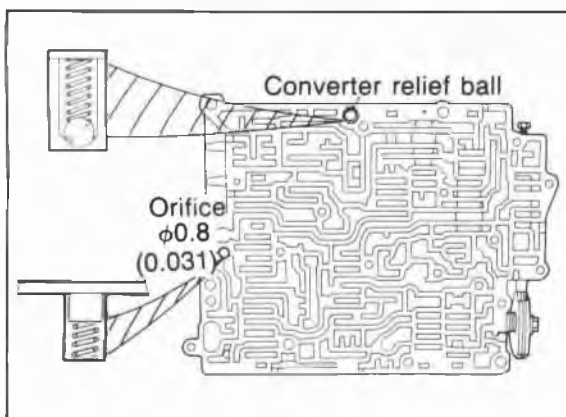
76G07B-144

8. Remove the bolts and hexagonal head bolt and remove the premain control body and the main separator as a unit.



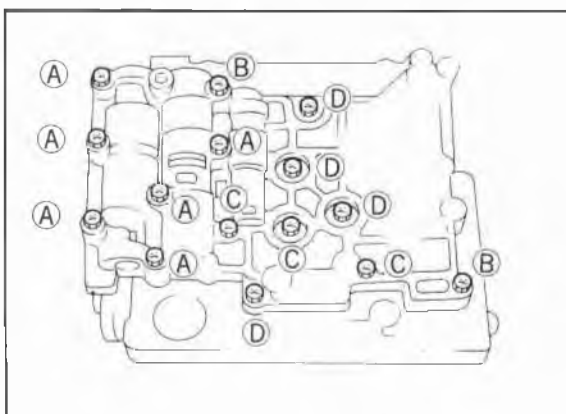
76G07B-145

9. Remove the premain/main gaskets and separator from the premain control body.
10. Remove the orifice check valve ( $\phi 2.0$  mm, 0.079 in) and spring, and the throttle relief ball and spring from the premain control body.



76G07B-146

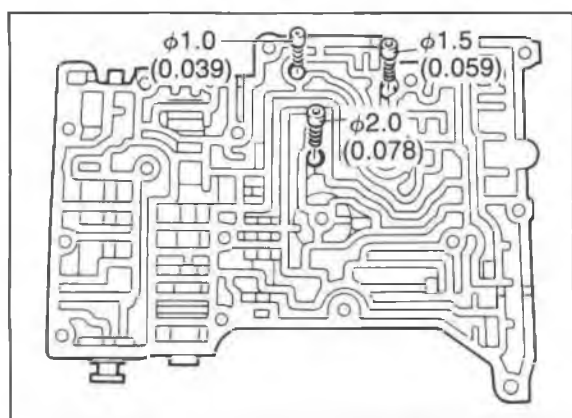
11. Remove the converter relief ball and spring, and the orifice check valve ( $\phi 0.8$  mm, 0.031 in) and spring from the main control body.



76G07B-147

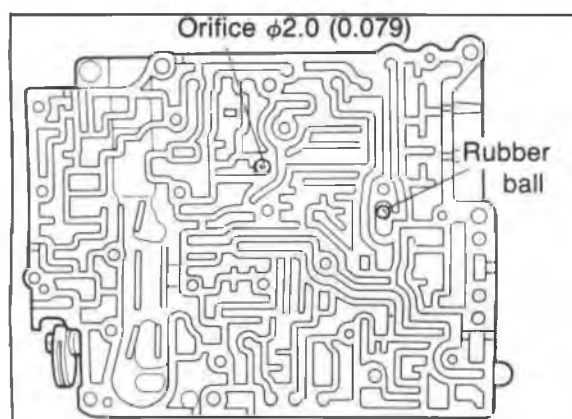
12. Turn the assembly over and remove the bolts shown in the figure. Remove the rear separator as a unit.

## 7B INSPECTION AND REPAIR



76G07B-148

13. Remove the main/rear gaskets and separator from the rear control body.
14. Remove the orifice check valves ( $\phi 1.5$  mm, 0.059 in;  $\phi 1.0$  mm, 0.039 in;  $\phi 2.0$  mm, 0.079 in) and spring from the rear control body.

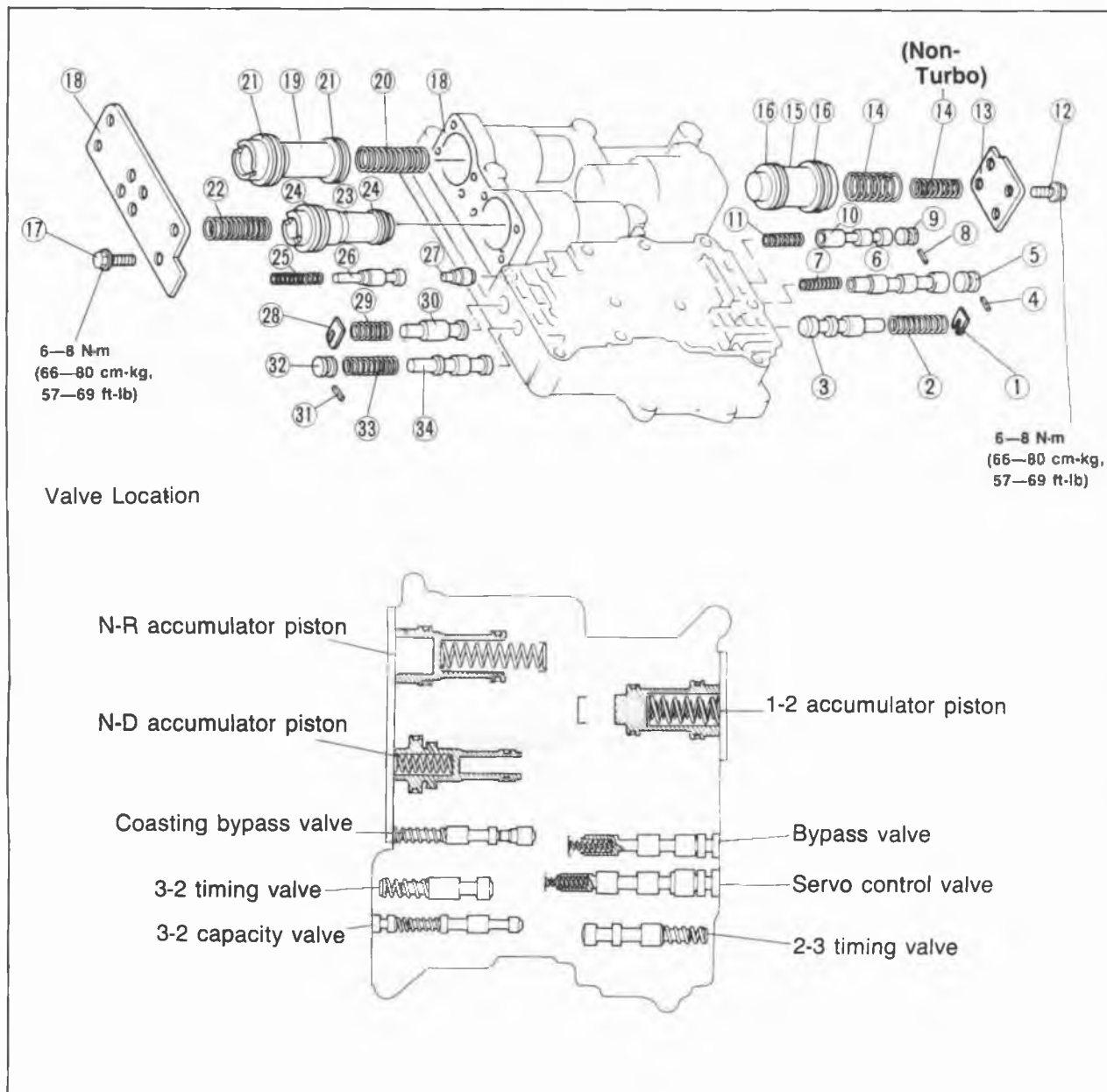


76G07B-149

15. Remove the orifice check valve ( $\phi 2.0$  mm, 0.079 in) and spring and the rubber ball from the main control body.

## Premain Control Body Disassembly

Disassemble in the sequence shown in the figure.



76G07B-150

- |                                      |                                      |                                |
|--------------------------------------|--------------------------------------|--------------------------------|
| 1. Retainer                          | 14. 1-2 accumulator spring           | 23. N-D accumulator piston     |
| 2. 2-3 timing spring                 | 15. 1-2 accumulator piston           | 24. N-D accumulator seal rings |
| 3. 2-3 timing valve                  | 16. 1-2 accumulator seal rings       | 25. Coasting bypass spring     |
| 4. Stopper pin                       | 17. Bolt                             | 26. Coasting bypass valve      |
| 5. Stopper plug                      | 18. N-R accumulator plate and gasket | 27. Coasting bypass plug       |
| 6. Servo control valve               | 19. N-R accumulator piston           | 28. Retainer                   |
| 7. Servo control spring              | 20. N-R accumulator rear spring      | 29. 3-2 timing spring          |
| 8. Stopper pin                       | 21. N-R accumulator seal rings       | 30. 3-2 timing valve           |
| 9. Stopper plug                      | 22. N-D accumulator front spring     | 31. Stopper pin                |
| 10. Bypass valve                     |                                      | 32. Stopper plug               |
| 11. Bypass spring                    |                                      | 33. 3-2 capacity spring        |
| 12. Bolt                             |                                      | 34. 3-2 capacity valve         |
| 13. 1-2 accumulator plate and gasket |                                      |                                |

# 7B INSPECTION AND REPAIR

## Inspection

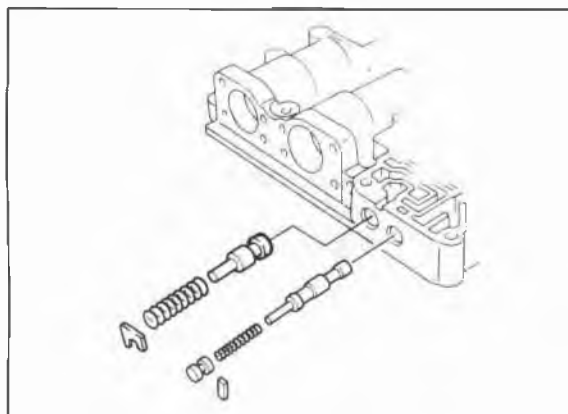
Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

## Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 accumulator small spring	11.0 (0.433)	88.1 (3.348)	1.4 (0.055)	Gray
1-2 accumulator large spring	16.0 (0.630)	78.0 (3.071)	2.0 (0.079)	Blue
Bypass, Servo control spring	5.0 (0.197)	33.4 (1.315)	0.55 (0.022)	Maroon
2-3 timing spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
N-R accumulator rear spring	11.1 (0.437)	62.0 (2.441)	1.2 (0.047)	Light green
N-D accumulator front spring	9.8 (0.386)	52.9 (2.083)	1.0 (0.039)	Brown
Coasting bypass spring	5.8 (0.228)	37.7 (1.484)	0.6 (0.024)	Dark blue
3-2 timing spring	8.2 (0.323)	28.6 (1.126)	0.8 (0.031)	Red
3-2 capacity spring	5.4 (0.213)	30.6 (1.205)	0.5 (0.020)	White
Throttle relief ball spring	6.6 (0.260)	21.6 (0.850)	0.8 (0.031)	—

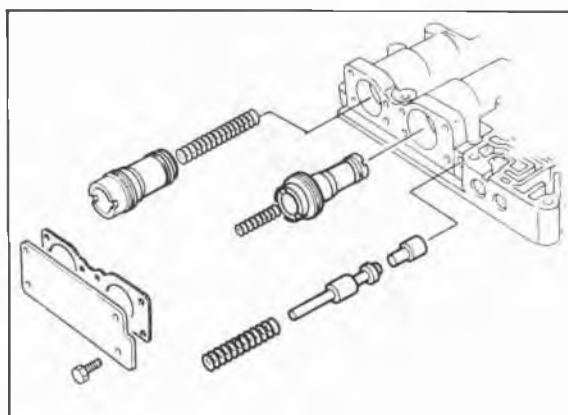
76G07B-151



86U07B-280

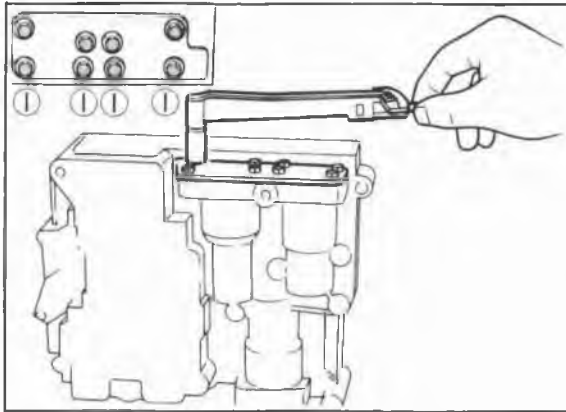
## Assembly

1. Install the 3-2 capacity valve, 3-2 capacity spring, and stopper plug; then install the stopper pin.
2. Install the 3-2 timing valve, the 3-2 timing spring, and retainer.



76G07B-152

3. Install the coasting bypass plug, coasting bypass valve and coasting bypass spring.
4. Apply ATF to the O-rings, and install them to the piston; then insert the N-R accumulator rear spring and N-R accumulator piston.
5. Apply ATF to the O-rings, and install them to the piston; then insert the N-D accumulator piston and N-D accumulator front spring.

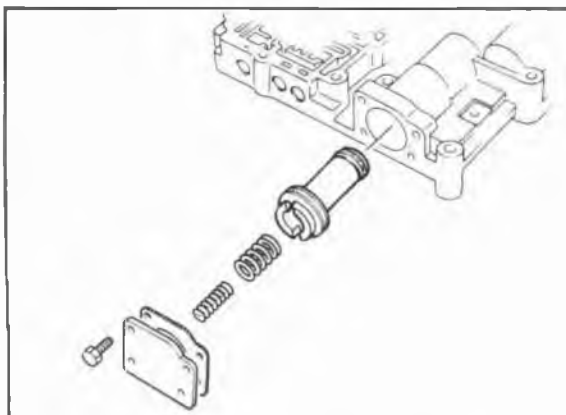


86U07B-282

6. Install the N-R accumulator gasket and plate; then tighten the plate.

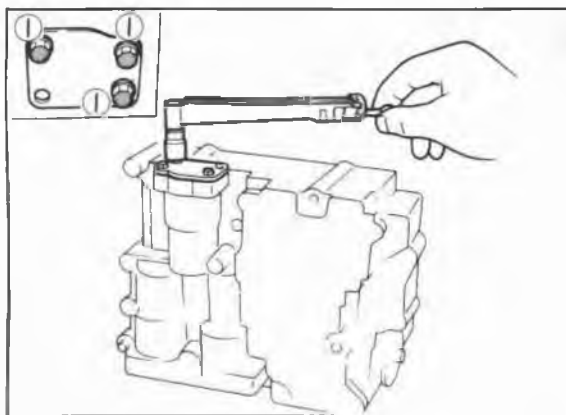
**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**



86U07B-283

7. Apply ATF to the O-rings, and install them onto the piston; then install the 1-2 accumulator piston and 1-2 accumulator springs.

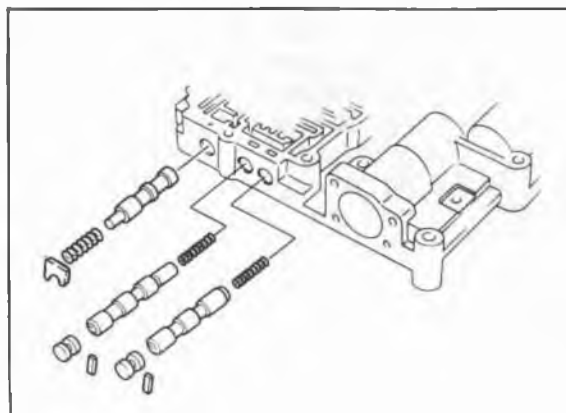


86U07B-284

8. Install the 1-2 accumulator gasket and plate; then tighten the plate.

**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**



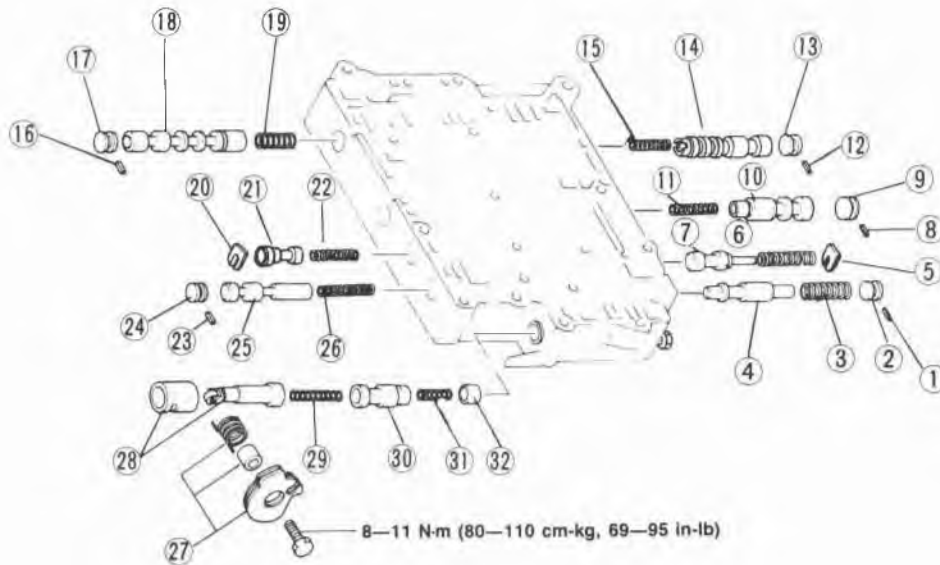
86U07B-285

9. Install the bypass spring, bypass valve, stopper plug, and stopper pin.  
 10. Install the servo control spring, servo control valve, stopper plug, and stopper pin.  
 11. Install the 2-3 timing valve, 2-3 timing spring, and retainer.

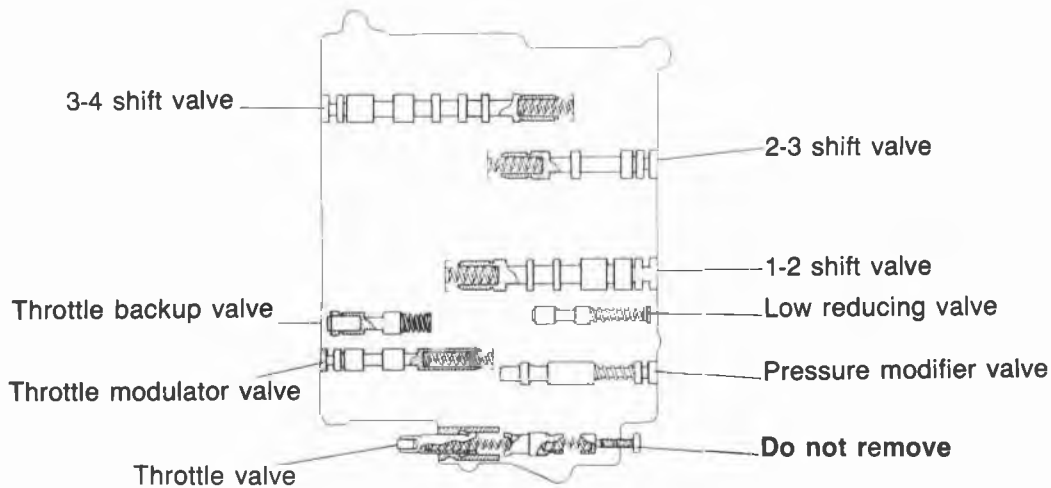
# 7B INSPECTION AND REPAIR

## Main Control Body Disassembly

Disassemble in the sequence shown in the figure.



### Valve Location



86U07B-286

- |                             |                            |                               |
|-----------------------------|----------------------------|-------------------------------|
| 1. Stopper pin              | 12. Stopper pin            | 23. Stopper pin               |
| 2. Stopper plug             | 13. Stopper plug           | 24. Stopper plug              |
| 3. Pressure modifier spring | 14. 2-3 shift valve        | 25. Throttle modulator valve  |
| 4. Pressure modifier valve  | 15. 2-3 shift spring       | 26. Throttle modulator spring |
| 5. Retainer                 | 16. Stopper pin            | 27. Throttle cam assembly     |
| 6. Low reducing spring      | 17. Stopper plug           | 28. Throttle plug assembly    |
| 7. Low reducing valve       | 18. 3-4 shift valve        | 29. Throttle spring           |
| 8. Stopper pin              | 19. 3-4 shift spring       | 30. Throttle valve            |
| 9. Stopper plug             | 20. Retainer               | 31. Throttle assist spring    |
| 10. 1-2 shift valve         | 21. Throttle backup valve  | 32. Throttle adjust plug      |
| 11. 1-2 shift spring        | 22. Throttle backup spring |                               |

## Inspection

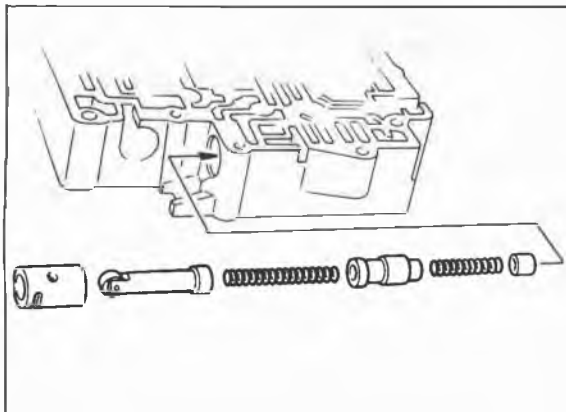
Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

## Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure modifier spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
Low reducing spring	8.7 (0.343)	38.3 (1.508)	0.9 (0.035)	Black
1-2 shift spring	8.7 (0.343)	41.3 (1.626)	1.0 (0.039)	Yellow
2-3, 3-4 shift spring	7.4 (0.291)	36.6 (1.441)	0.8 (0.031)	Gray
Throttle backup spring	9.65 (0.380)	26.9 (1.059)	0.55 (0.022)	Red
Throttle modulator spring	6.3 (0.248)	47.9 (1.886)	0.8 (0.031)	—
Throttle assist spring	5.15 (0.203)	32.3 (1.272)	0.55 (0.022)	Dark green
Throttle spring	5.4 (0.213)	47.2 (1.858)	0.8 (0.031)	Pink
Converter relief ball spring	6.9 (0.272)	24.1 (0.949)	0.9 (0.035)	Maroon
Orifice check valve spring	5.0 (0.197)	12.5 (0.492)	0.23 (0.009)	—

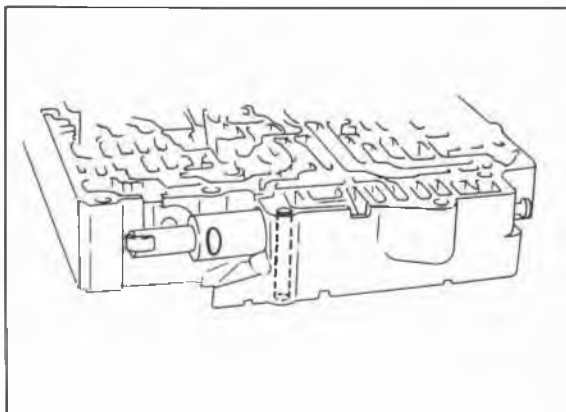
76G07B-219



86U07B-288

## Assembly

1. Install the throttle adjust plug, throttle assist spring, throttle valve, and throttle plug assembly.

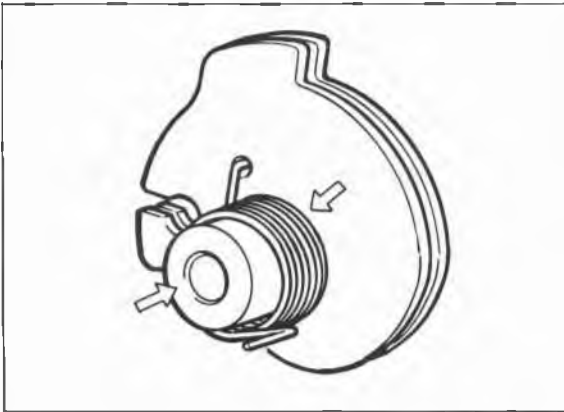


86U07B-289

## Caution

**Install the throttle plug assembly with the groove aligned with the bolt hole.**

## 7B INSPECTION AND REPAIR

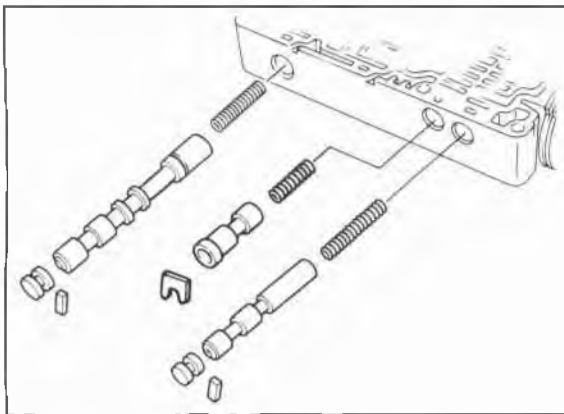


86U07B-290

2. Install the throttle return spring as shown.
3. Install the throttle cam assembly to the main control body.

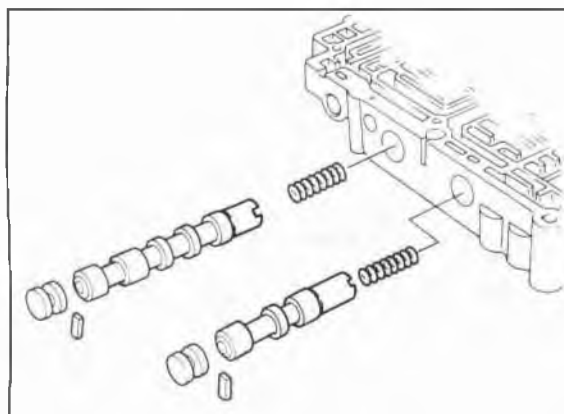
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



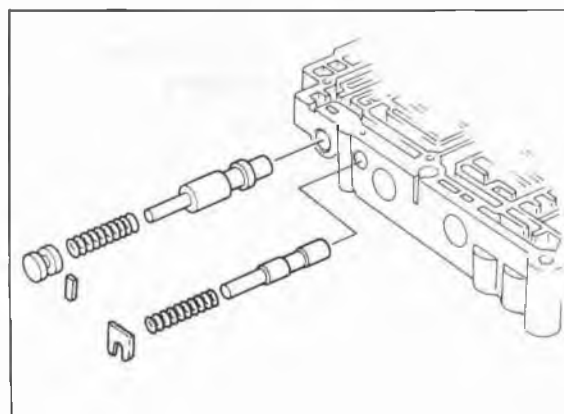
386U07B-291

4. Install the throttle modulator spring, throttle modulator valve, stopper plug, and stopper pin.
5. Install the throttle backup spring, throttle back valve, and retainer.
6. Install the 3-4 shift spring, 3-4 shift valve, stopper plug, and stopper pin.



86U07B-292

7. Install the 2-3 shift spring, 2-3 shift valve, stopper plug, and stopper pin.
8. Install the 1-2 shift spring, 1-2 shift valve, stopper plug, and stopper pin.



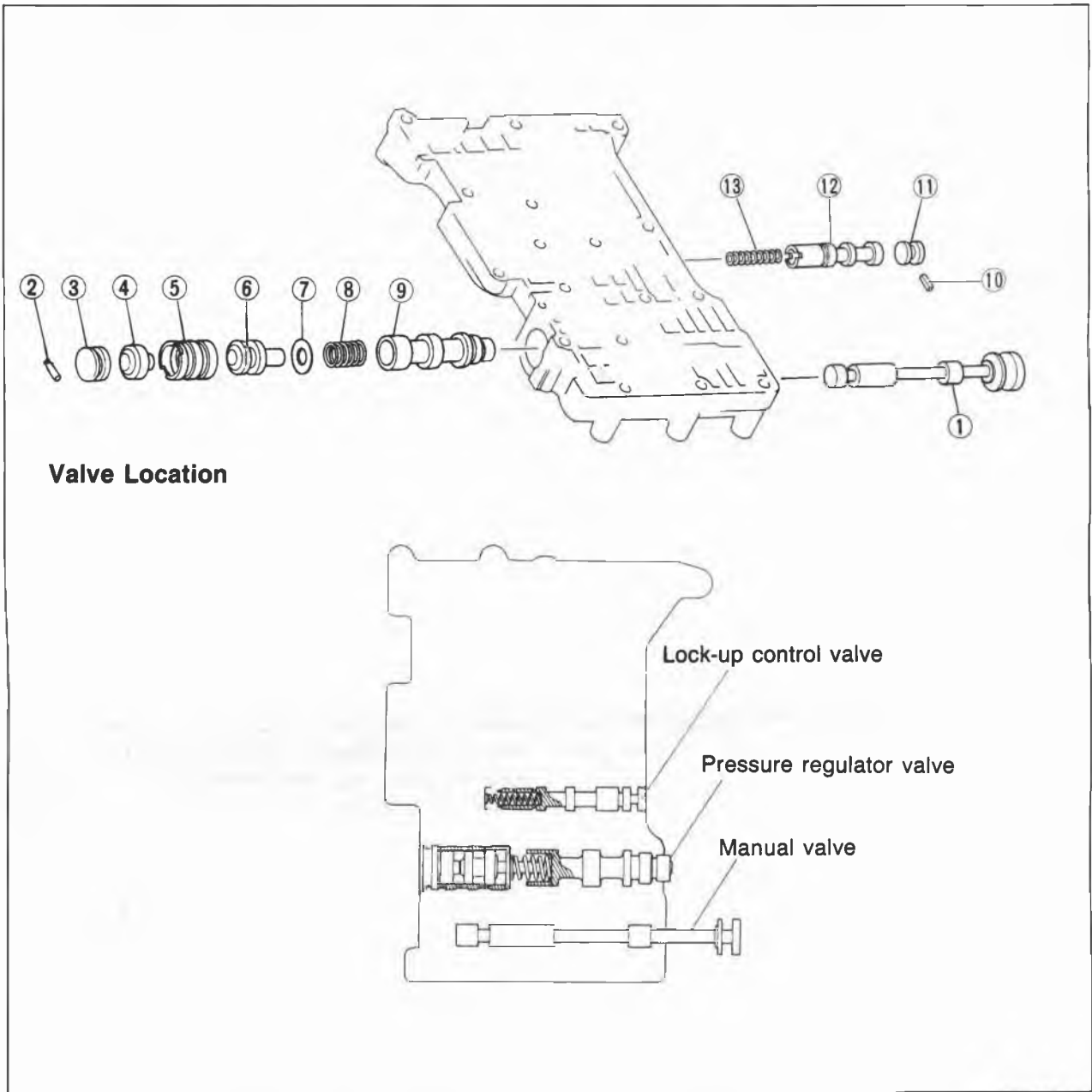
86U07B-293

9. Install the low reducing valve, low reducing spring, and retainer.
10. Install the pressure modifier valve, pressure modifier spring, stopper plug, and stopper pin.



## Rear Control Body Disassembly

Disassemble in the sequence shown in the figure.



### Valve Location

- |                                   |                              |
|-----------------------------------|------------------------------|
| 1. Manual valve                   | 8. Pressure regulator spring |
| 2. Stopper pin                    | 9. Pressure regulator valve  |
| 3. Stopper plug                   | 10. Stopper pin              |
| 4. Pressure regulator backup plug | 11. Stopper plug             |
| 5. Pressure regulator plug sleeve | 12. Lock-up control valve    |
| 6. Pressure regulator plug        | 13. Lock-up control spring   |
| 7. Pressure regulator spring seat |                              |

86U07B-294

# 7B INSPECTION AND REPAIR

## Inspection

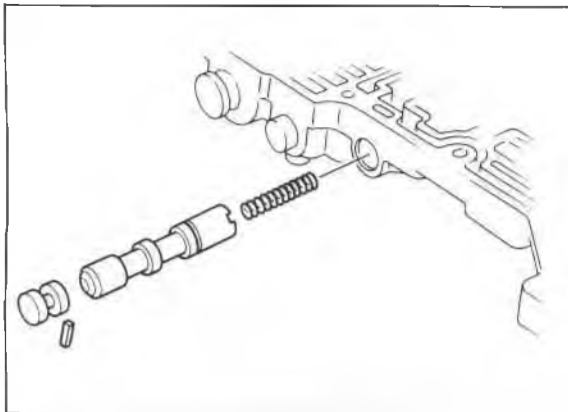
Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

## Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure regulator spring	11.5 (0.453)	26.5 (1.043)	1.0 (0.039)	Maroon
Lock-up control spring	5.0 (0.197)	35.2 (1.386)	0.6 (0.024)	Purple

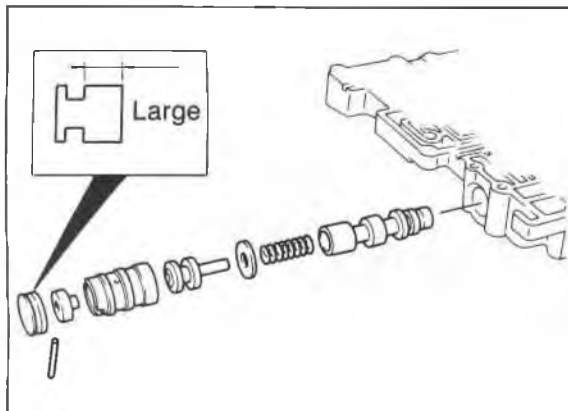
86U07B-295



86U07B-296

## Assembly

1. Install the lock-up control spring, lock-up control valve, stopper plug, and stopper pin.

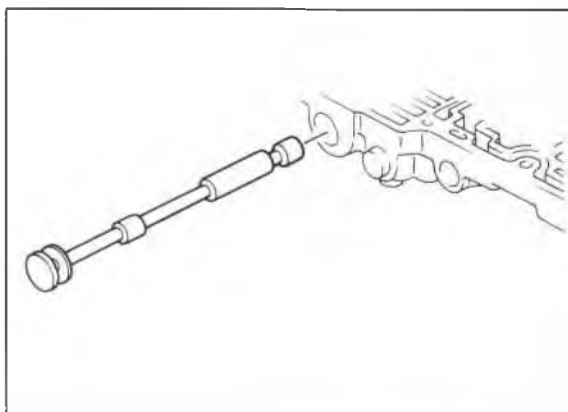


86U07B-297

2. Install the pressure regulator valve, pressure regulator spring, pressure regulator spring seat, pressure regulator plug, pressure regulator plug sleeve, pressure regulator backup plug, stopper plug, and stopper pin.

## Note

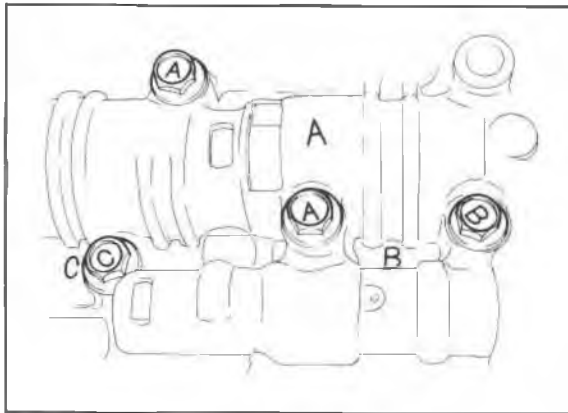
**Install the stopper plug larger end first.**



86U07B-298

3. Install the manual valve.

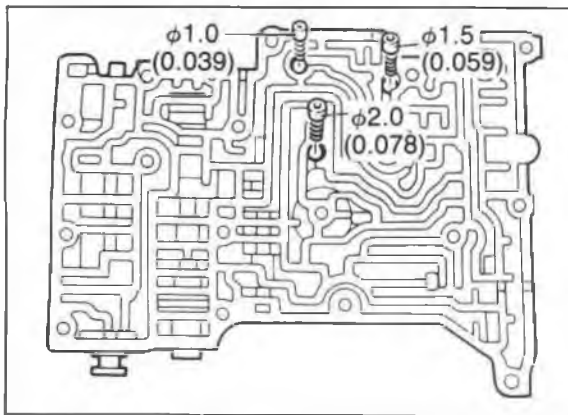
## Assembly of Control Valve Body



86U07B-299

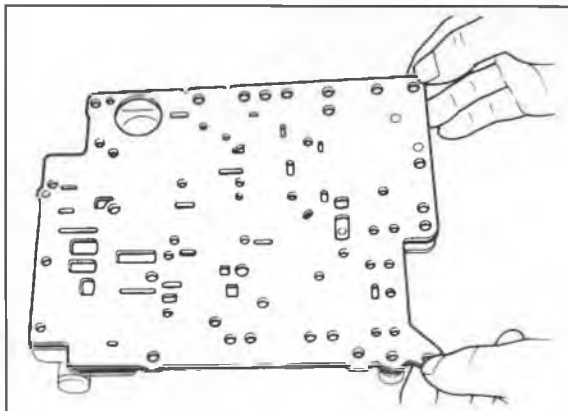
**Note**

- a) Do not mix-up the front and rear gaskets during assembly.
- b) Match the bolt head letter and the control valve body letter.



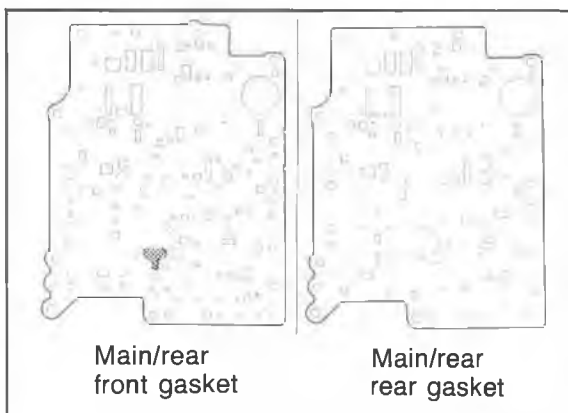
86U07B-300

1. Install the orifice check valves ( $\phi 1.5$  mm, 0.059 in;  $\phi 1.0$  mm, 0.039 in;  $\phi 2.0$  mm, 0.079 in) and springs in the rear control body as shown.



86U07B-301

2. Install the gaskets on both sides of the rear separator; then install it onto the rear control body.

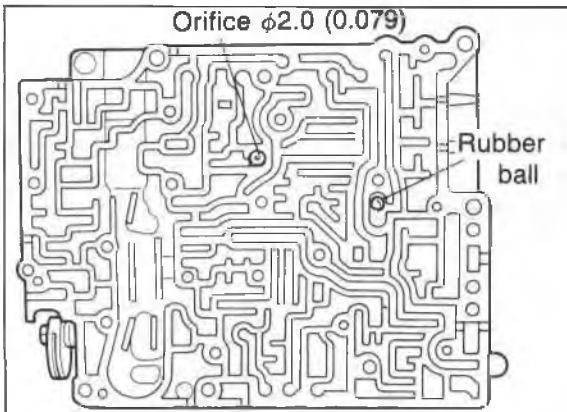


86U07B-302

**Note**

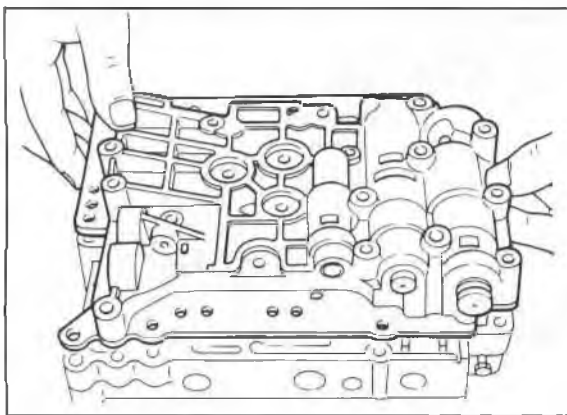
The main/rear rear gasket and main/rear front gasket are not interchangeable.

## 7B INSPECTION AND REPAIR



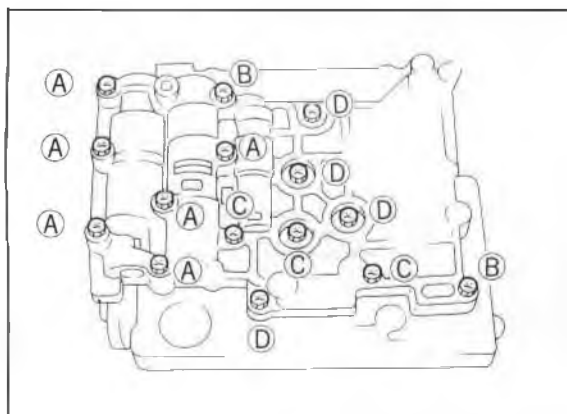
76G07B-153

3. Install the orifice check valve ( $\phi 2.0$  mm, 0.079 in) and spring, and the rubber ball in the main control body as shown.



86U07B-304

4. Install the rear control body to the main control body.

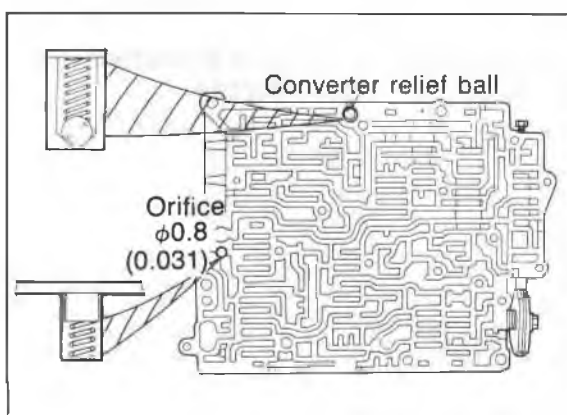


86U07B-305

5. Loosely tighten the bolts.

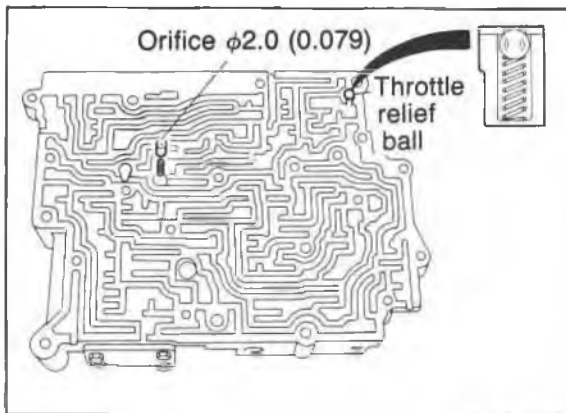
### Note

Match the bolt head letter as shown.



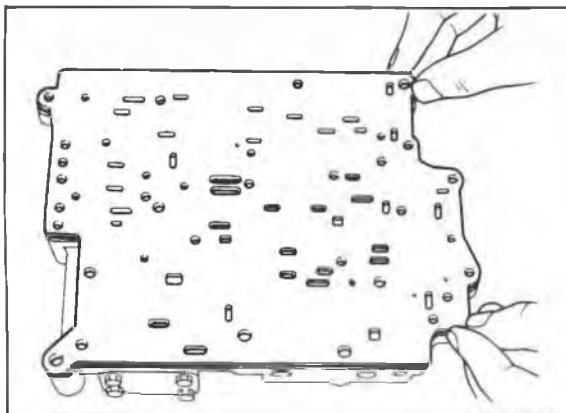
86U07B-306

6. Turn the assembly over and install the orifice check valve ( $\phi 0.8$  mm, 0.031 in) and spring, and the converter relief ball and spring in the main control body as shown.



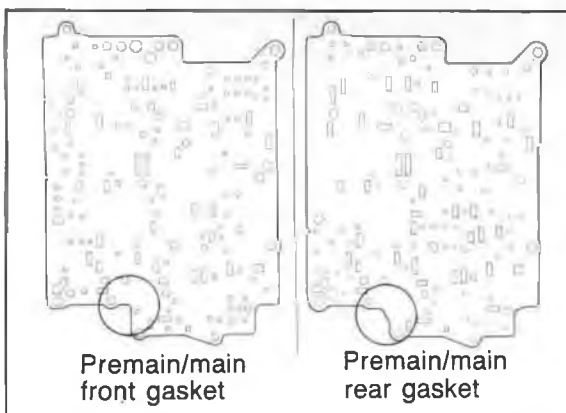
76G07B-154

7. Install the orifice check valve ( $\phi 2.0$  mm, 0.079 in) and spring, and the throttle relief ball and spring in the premain control body as shown.



86U07B-308

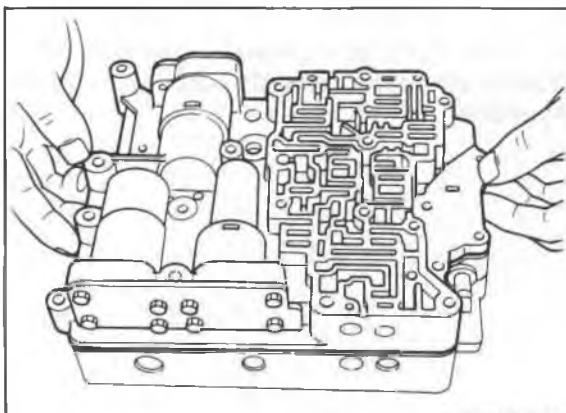
8. Install the gaskets on both sides of the main separator; then install it onto the premain control body.



86U07B-309

**Note**

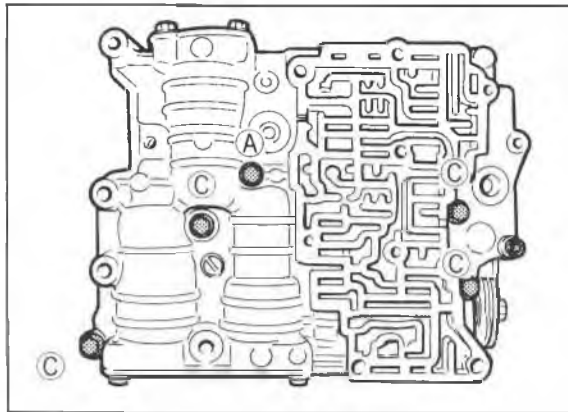
The premain/main rear gasket and premain/main front gasket are not interchangeable.



86U07B-310

9. Set the premain control body onto the main control body.

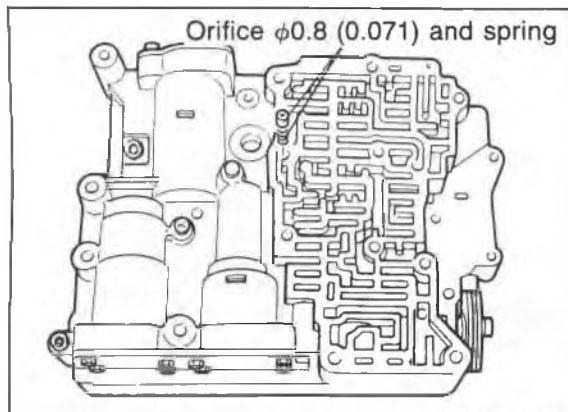
## 7B INSPECTION AND REPAIR



86U07B-311

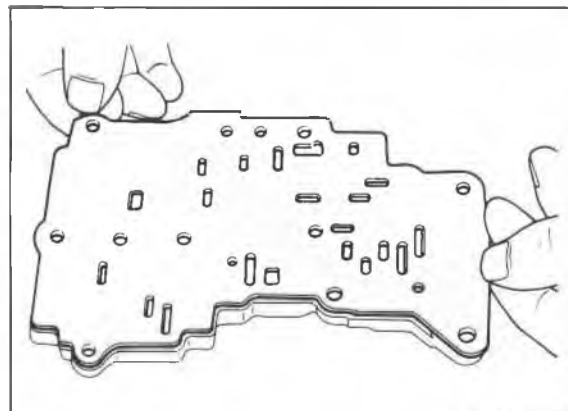
10. Loosely tighten the bolts.

**Note**  
Match the bolt head letter as shown.



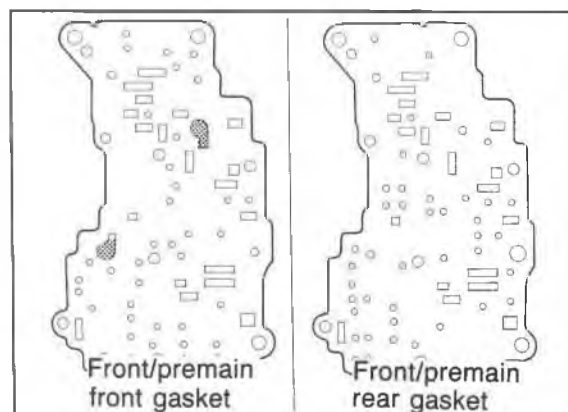
86U07B-312

11. Install the orifice check valve ( $\phi 0.8$  mm, 0.071 in) and spring in the premain control body as shown.



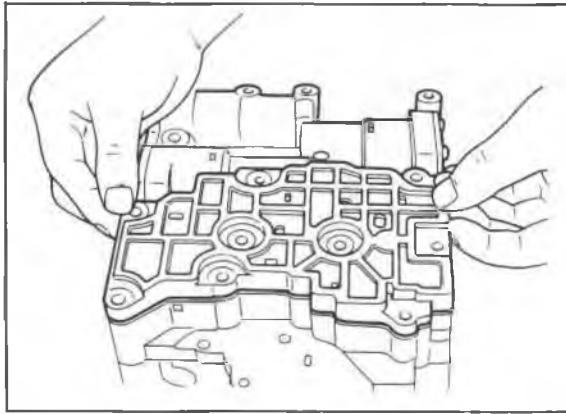
76G07B-156

12. Install the gaskets on both sides of the premain separator; then install it onto the front control body.



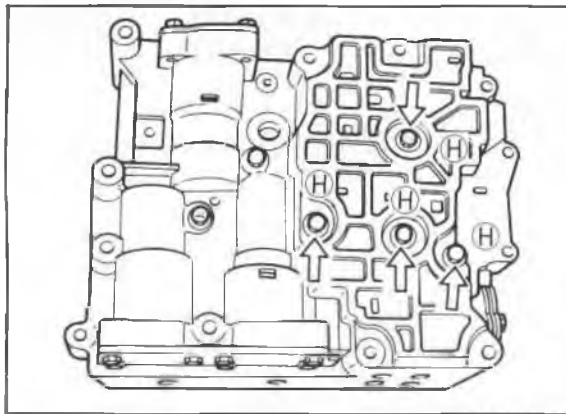
86U07B-314

**Note**  
The front/premain front gasket and front/premain rear gasket are not interchangeable.



76G07B-157

13. Install the front control body on the premain control body.

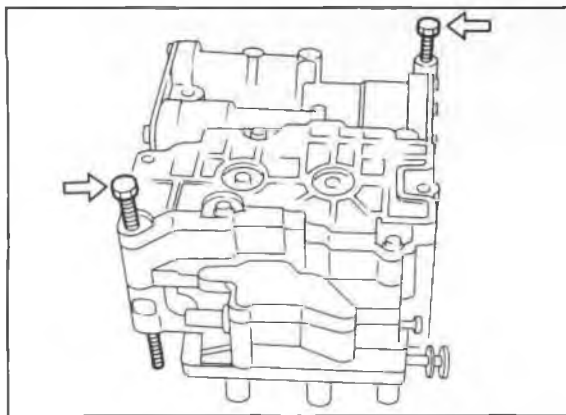


76G07B-158

14. Loosely tighten the bolts.

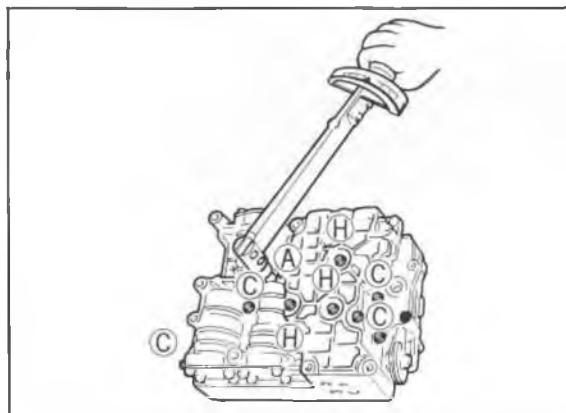
**Note**

**Match the bolt head letter as shown.**



76G07B-159

15. Install the control valve body mounting bolts as shown for alignment.



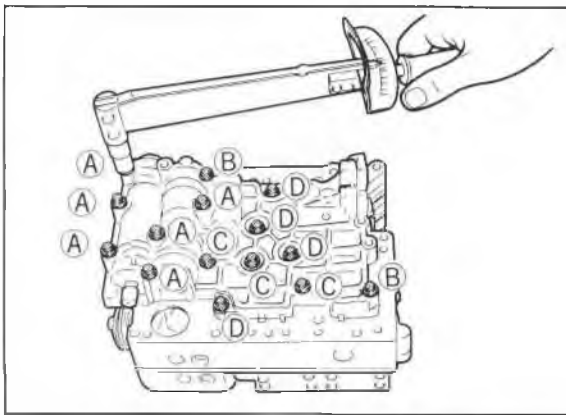
76G07B-160

16. Tighten the mounting bolts.  
(1) Tighten the front control body.

**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**

## 7B INSPECTION AND REPAIR

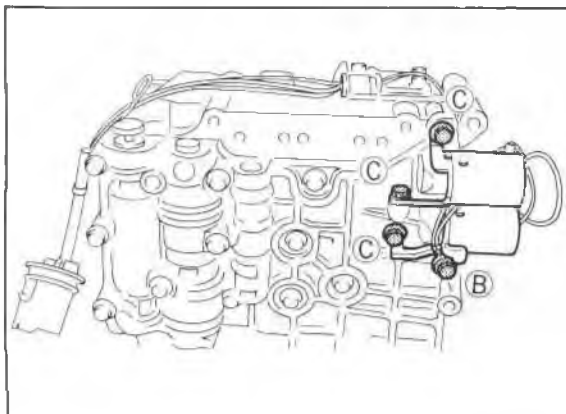


86U07B-319

(2) Tighten the rear control body.

**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**

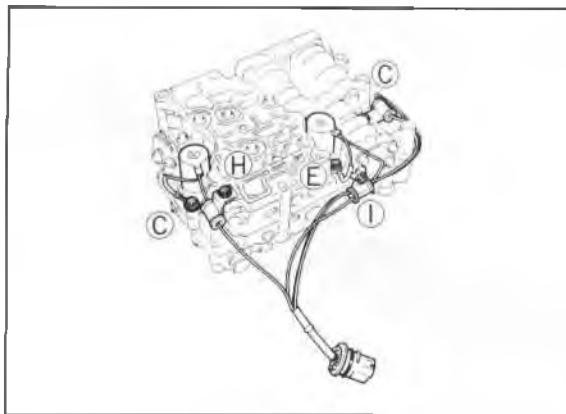


76G07B-161

17. Install the 3-4 solenoid valve and lock-up solenoid valve along with new O-rings and oil strainers.

**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**



76G07B-162

18. Install the 1-2 solenoid valve and 2-3 solenoid valve along with new O-rings and oil strainers.

**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**

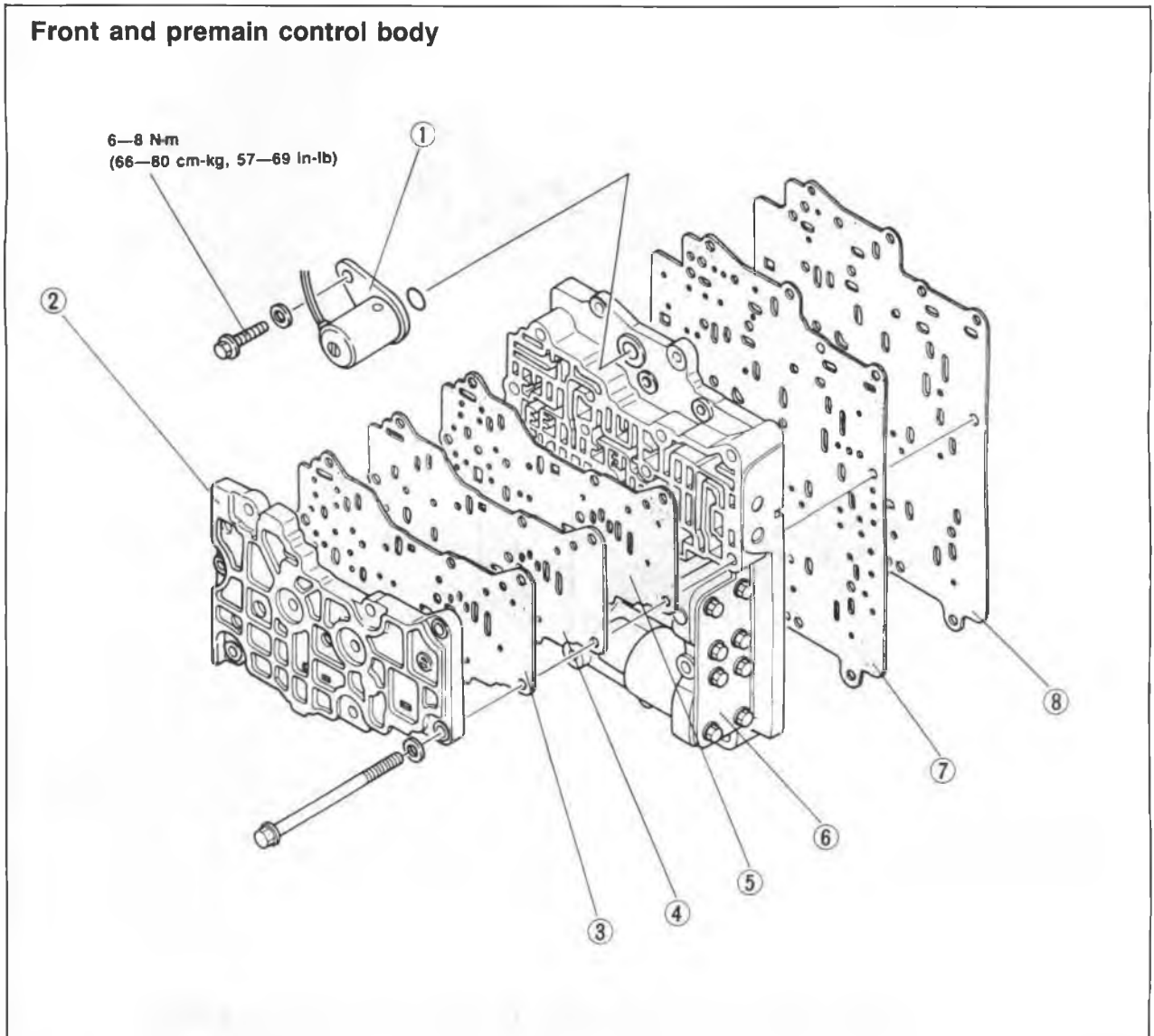


## CONTROL VALVE BODY (G4A-HL)

### Precaution

- (1) Pay close attention when handling the control valve because it consists of the most precise and delicate parts of the transaxle.
- (2) Neatly arrange the removed parts in order to avoid mixing up similar parts.
- (3) Disassemble the control valve assembly and thoroughly clean it when the clutch and/or brake bands are burned, and/or when the automatic transaxle fluid is degenerated.

### Components I



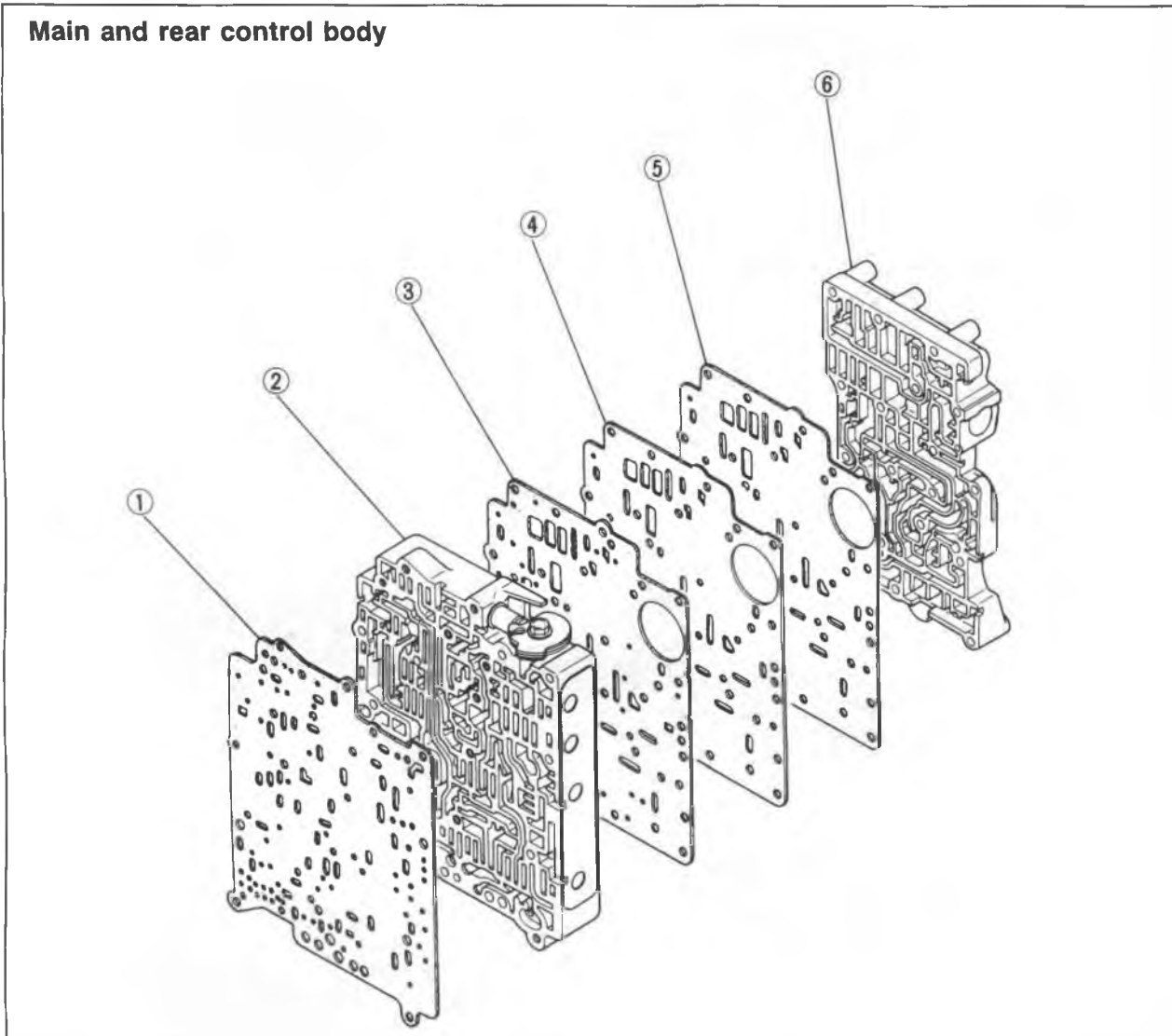
76G07B-163

- |                               |                              |
|-------------------------------|------------------------------|
| 1. Lock-up solenoid valve     | 5. Front/premain rear gasket |
| 2. Front control body         | 6. Premain control body      |
| 3. Front/premain front gasket | 7. Premain/main front gasket |
| 4. Premain separator          | 8. Main separator            |

# 7B INSPECTION AND REPAIR

## Components II

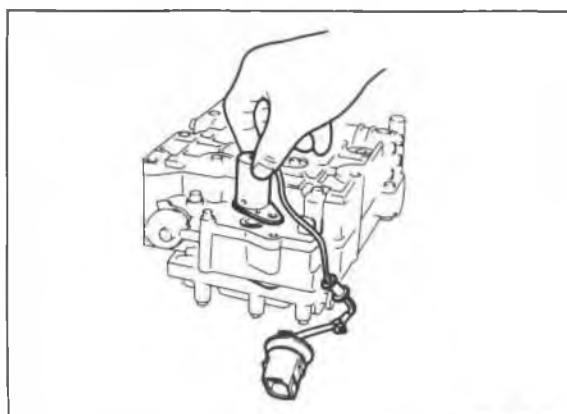
### Main and rear control body



83U07B-274

1. Pre-main/main rear gasket
2. Main control body
3. Main/rear front gasket

4. Rear separator
5. Main/rear rear gasket
6. Rear control body

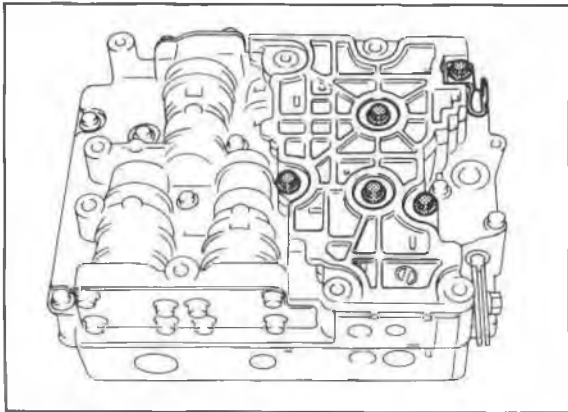


83U07B-275

### Disassembly of Control Valve Body

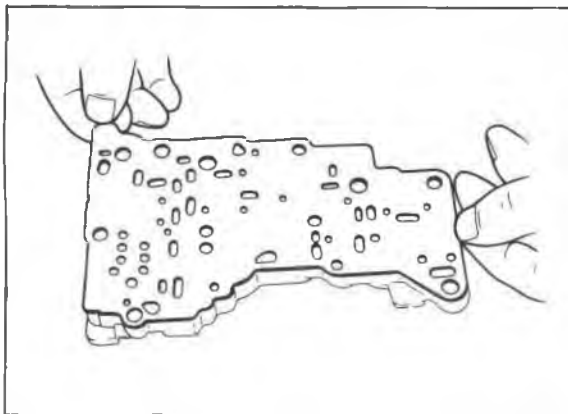
1. Remove the lock-up solenoid valve.
2. Remove the O-ring and oil strainer.

## INSPECTION AND REPAIR 7B



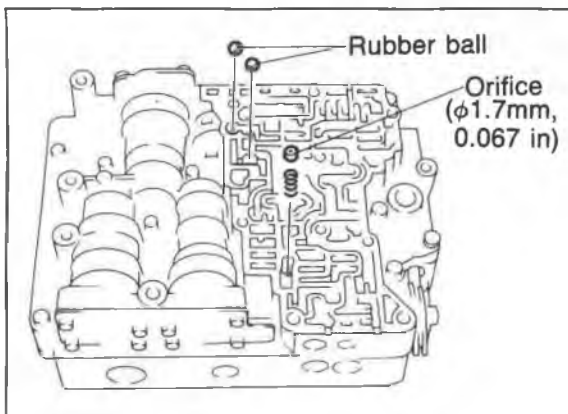
83U07B-276

3. Remove the indicated bolts and bracket, and pull out the front control body with the premain separator as a unit.



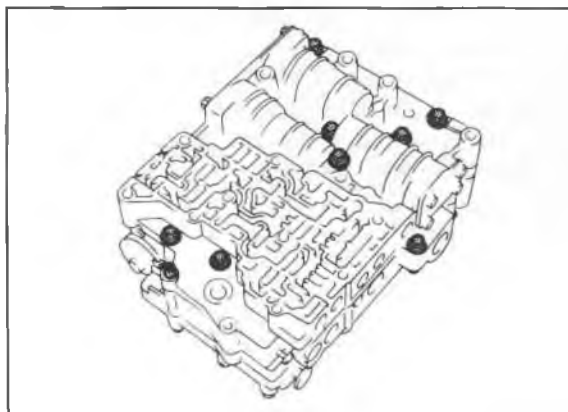
83U07B-277

4. Remove the front/premain gaskets and separator from the front control body.



83U07B-278

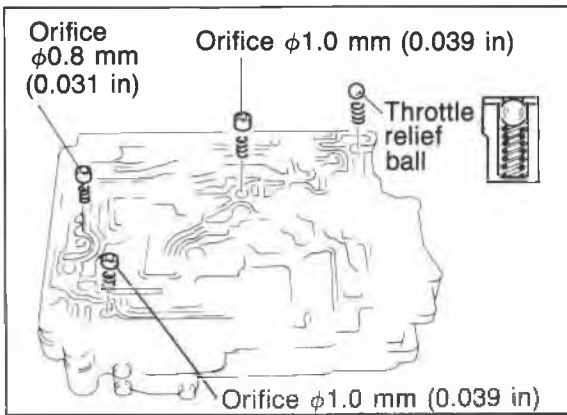
5. Remove the rubber balls, orifice check valve ( $\phi 1.7$  mm, 0.067 in) and spring from the premain control body.



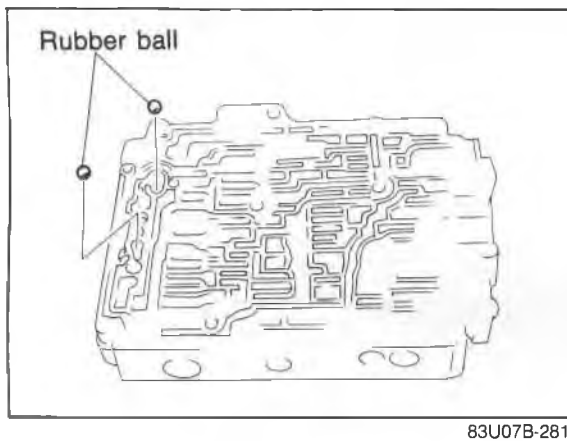
83U07B-279

6. Remove the bolts and hexagonal head bolt and remove the premain control body and the main separator as a unit.

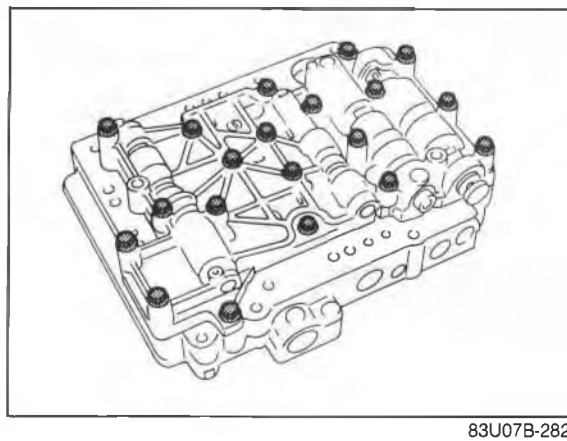
## 7B INSPECTION AND REPAIR



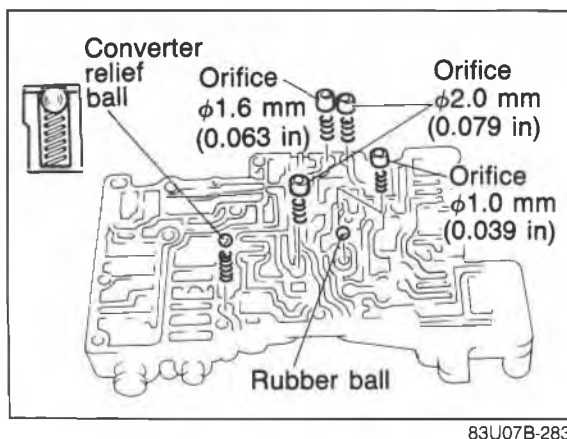
7. Remove the premain/main gaskets and separator from the premain control body.
8. Remove the orifice check valves ( $\phi 1.0$  mm, 0.039 in;  $\phi 0.8$  mm, 0.031 in) and springs, and the throttle relief ball and spring from the premain control body.



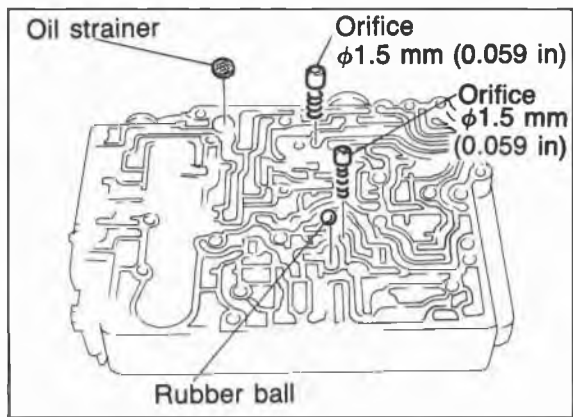
9. Remove the rubber balls from the main control body.



10. Turn the assembly over and remove the bolts shown in the figure. Remove the rear separator as a unit.



11. Remove the main/rear gaskets and separator from the rear control body.
12. Remove the orifice check valves ( $\phi 2.0$  mm, 0.079 in;  $\phi 1.6$  mm, 0.063 in;  $\phi 1.0$  mm, 0.039 in) and springs, converter relief ball and spring, and the rubber ball from the rear control body.



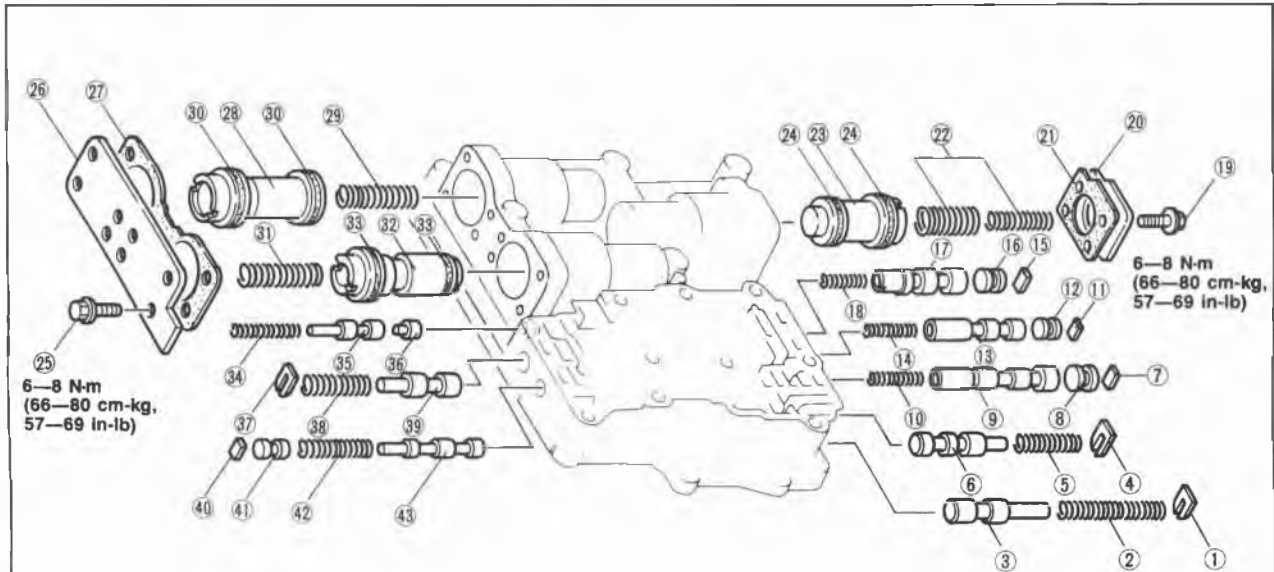
76G07B-164

13. Remove the orifice check valves ( $\phi 1.5 \text{ mm}$ , 0.059 in) and springs, oil strainer, and rubber ball from the main control body.

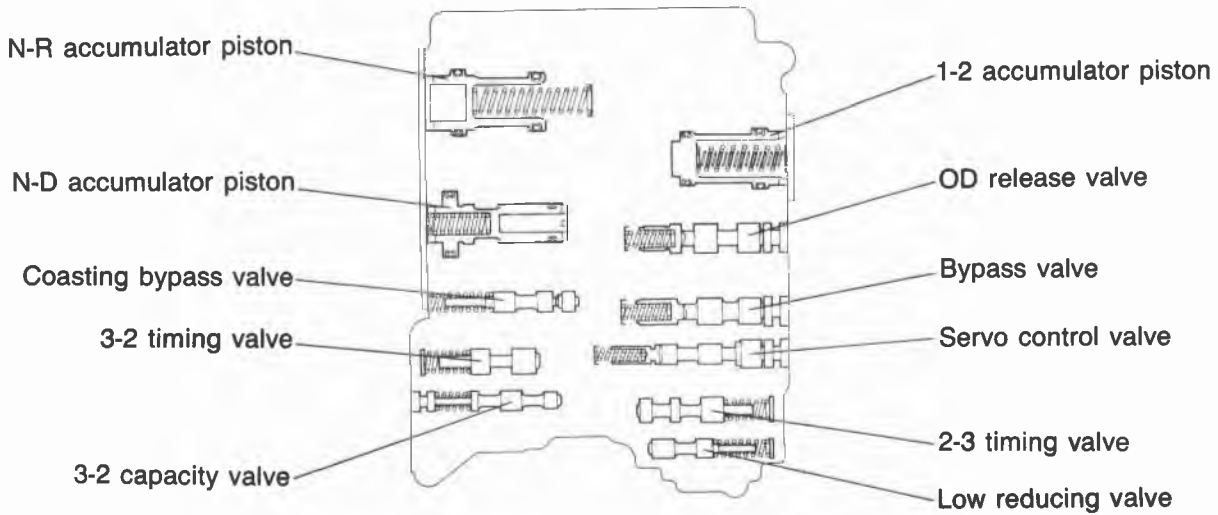
# 7B INSPECTION AND REPAIR

## Premain Control Body Disassembly

Disassemble in the sequence shown in the figure.



### Valve Location



83U07B-285

- |                          |                                 |                                  |
|--------------------------|---------------------------------|----------------------------------|
| 1. Retainer              | 16. Stopper plug                | 30. N-R accumulator seal rings   |
| 2. Low reducing spring   | 17. OD release valve            | 31. N-D accumulator front spring |
| 3. Low reducing valve    | 18. OD release spring           | 32. N-D accumulator piston       |
| 4. Retainer              | 19. Bolt                        | 33. N-D accumulator seal rings   |
| 5. 2-3 timing spring     | 20. 1-2 accumulator plate       | 34. Coasting bypass spring       |
| 6. 2-3 timing valve      | 21. 1-2 accumulator gasket      | 35. Coasting bypass valve        |
| 7. Stopper pin           | 22. 1-2 accumulator springs     | 36. Coasting bypass plug         |
| 8. Stopper plug          | 23. 1-2 accumulator piston      | 37. Retainer                     |
| 9. Servo control valve   | 24. 1-2 accumulator seal rings  | 38. 3-2 timing spring            |
| 10. Servo control spring | 25. Bolt                        | 39. 3-2 timing valve             |
| 11. Stopper pin          | 26. N-R accumulator plate       | 40. Stopper pin                  |
| 12. Stopper plug         | 27. N-R accumulator gasket      | 41. Stopper plug                 |
| 13. Bypass valve         | 28. N-R accumulator piston      | 42. 3-2 capacity spring          |
| 14. Bypass spring        | 29. N-R accumulator rear spring | 43. 3-2 capacity valve           |
| 15. Stopper pin          |                                 |                                  |

## Inspection

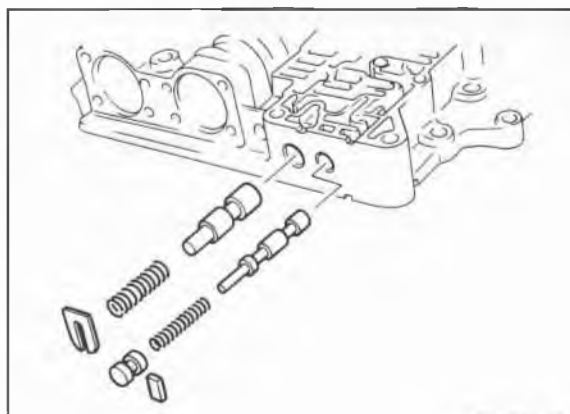
Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

## Spring

Spring name		Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 accumulator small spring	F8 engine	9.9 (0.400)	84.7 (3.335)	1.2 (0.047)	Red
1-2 accumulator large spring	FE engine	13.0 (0.512)	73.2 (2.881)	1.8 (0.071)	Pink
	F8 engine	16.0 (0.630)	84.7 (3.335)	2.0 (0.079)	White
Bypass spring		5.0 (0.197)	25.1 (0.988)	0.7 (0.028)	Yellow
Servo control spring		4.9 (0.193)	27.1 (1.067)	0.5 (0.020)	Light blue
2-3 timing spring		8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
N-R accumulator rear spring		11.1 (0.437)	68.2 (2.685)	1.0 (0.039)	Blue
N-D accumulator front spring		9.8 (0.386)	60.9 (2.398)	1.1 (0.043)	Yellow
Low reducing spring		8.7 (0.343)	38.3 (1.508)	0.9 (0.035)	Black
OD release spring		6.0 (0.236)	32.6 (1.283)	0.6 (0.024)	Orange
Coasting bypass spring		5.8 (0.228)	31.3 (1.232)	0.6 (0.024)	Yellow
3-2 timing spring		8.2 (0.323)	28.55 (1.124)	0.8 (0.031)	Maroon
3-2 capacity spring		5.55 (0.219)	30.5 (1.201)	0.55 (0.022)	Light green
Throttle relief ball spring		6.6 (0.260)	20.3 (0.799)	0.8 (0.031)	Light green

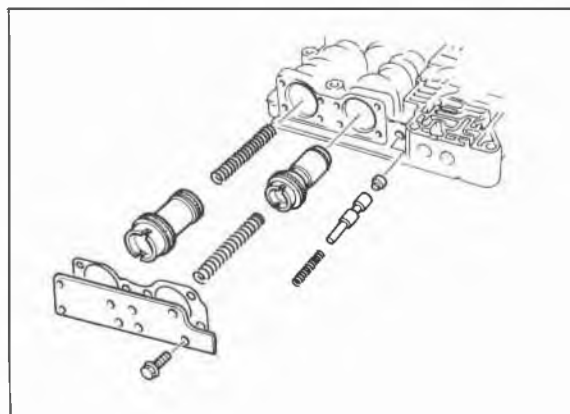
76G07B-165



83U07B-287

## Assembly

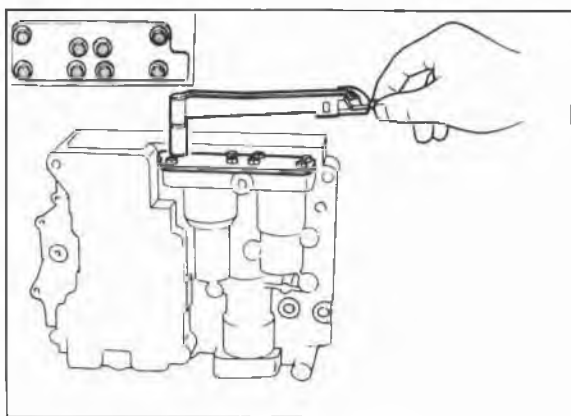
1. Install the 3-2 capacity valve, 3-2 capacity spring, stopper plug, and stopper pin.
2. Install the 3-2 timing valve, 3-2 timing spring, and retainer.



83U07B-288

3. Install the coasting bypass plug, coasting bypass valve, and coasting bypass spring.
4. Apply ATF to the O-rings, and install them onto the piston; then insert the N-R accumulator rear spring, and N-R accumulator piston.
5. Apply ATF to the O-rings, and install them onto the piston; then insert the N-D accumulator piston, and N-D accumulator front spring.

## 7B INSPECTION AND PREAIR

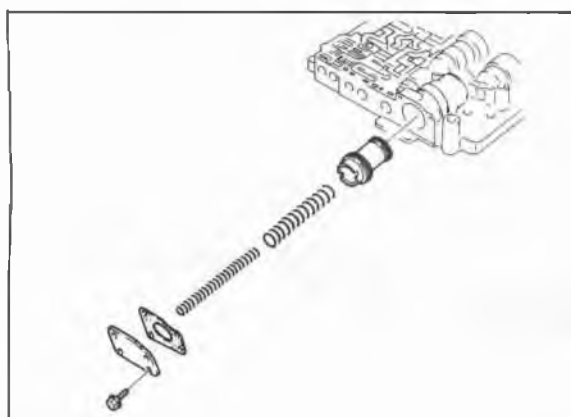


83U07B-289

6. Install the N-R accumulator gasket and plate; then tighten the plate.

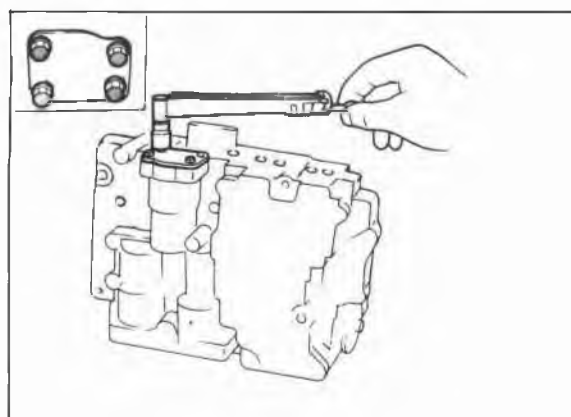
**Tightening torque:**

**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**



83U07B-290

7. Apply ATF to the O-rings, and install them onto the piston; then install the 1-2 accumulator piston and 1-2 accumulator springs.

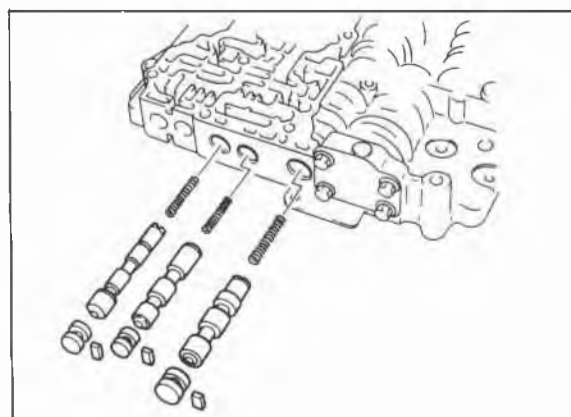


83U07B-291

8. Install the 1-2 accumulator gasket and plate; then tighten the plate.

**Tightening torque:**

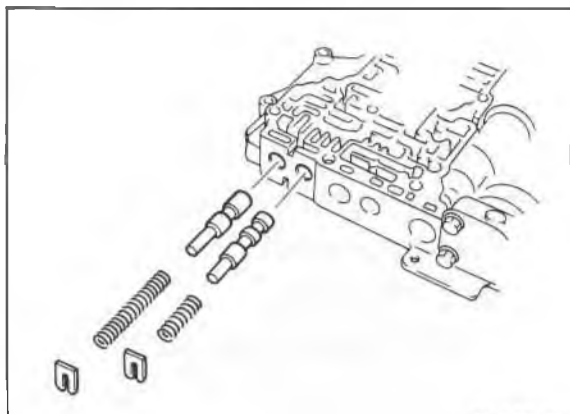
**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**



83U07B-292

9. Install the OD release spring, OD release valve, stopper plug, and stopper pin.
10. Install the bypass spring, bypass valve, stopper plug, and stopper pin.
11. Install the servo control spring, servo control valve, stopper plug, and stopper pin.





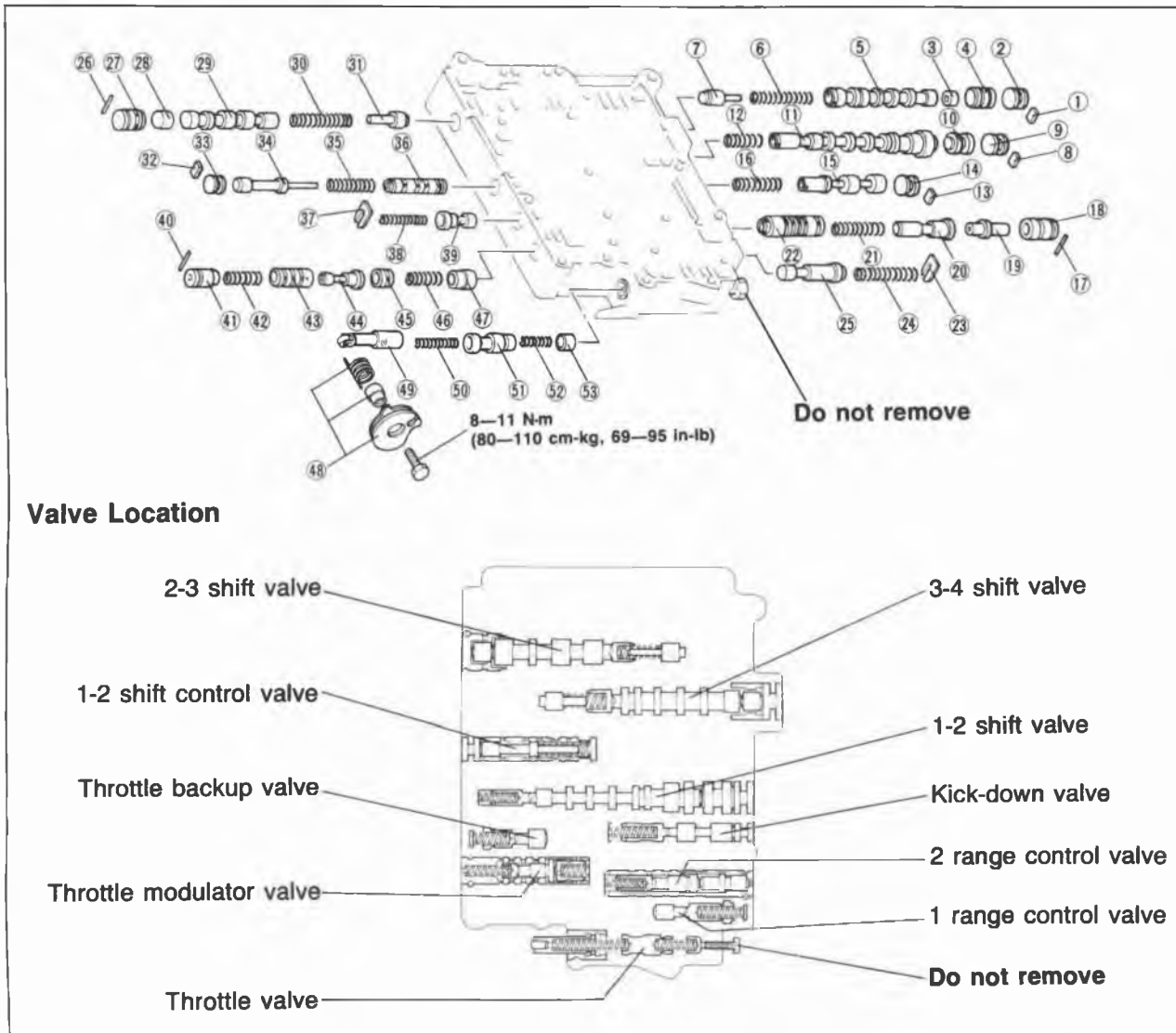
83U07B-293

12. Install the 2-3 timing valve, 2-3 timing spring, and retainer.
13. Install the low reducing valve, low reducing spring, and retainer.

# 7B INSPECTION AND REPAIR

## Main Control Body Disassembly

Disassemble in the sequence shown in the figure.



83U07B-294

- |                                  |                                 |                                     |
|----------------------------------|---------------------------------|-------------------------------------|
| 1. Stopper pin                   | 19. 2 range control plug        | 37. Retainer                        |
| 2. Stopper plug                  | 20. 2 range control valve       | 38. Throttle backup spring          |
| 3. 3-4 shift front plug          | 21. 2 range control spring      | 39. Throttle backup valve           |
| 4. 3-4 shift sleeve              | 22. 2 range control rear sleeve | 40. Stopper pin                     |
| 5. 3-4 shift valve               | 23. Retainer                    | 41. Throttle modulator sleeve A     |
| 6. 3-4 shift spring              | 24. 1 range control spring      | 42. Throttle modulator front spring |
| 7. 3-4 shift rear plug           | 25. 1 range control valve       | 43. Throttle modulator sleeve B     |
| 8. Stopper pin                   | 26. Stopper pin                 | 44. Throttle modulator valve        |
| 9. Stopper plug                  | 27. 2-3 shift sleeve            | 45. Throttle modulator sleeve C     |
| 10. 1-2 shift plug               | 28. 2-3 shift front plug        | 46. Throttle modulator rear spring  |
| 11. 1-2 shift valve              | 29. 2-3 shift valve             | 47. Throttle modulator plug         |
| 12. 1-2 shift spring             | 30. 2-3 shift spring            | 48. Throttle cam assembly           |
| 13. Stopper pin                  | 31. 2-3 shift rear plug         | 49. Throttle plug assembly          |
| 14. Stopper plug                 | 32. Stopper pin                 | 50. Throttle spring                 |
| 15. Kick-down valve              | 33. Stopper plug                | 51. Throttle valve                  |
| 16. Kick-down spring             | 34. 1-2 shift control valve     | 52. Throttle assist spring          |
| 17. Stopper pin                  | 35. 1-2 shift control spring    | 53. Throttle adjust plug            |
| 18. 2 range control front sleeve | 36. 1-2 shift control sleeve    |                                     |

## Inspection

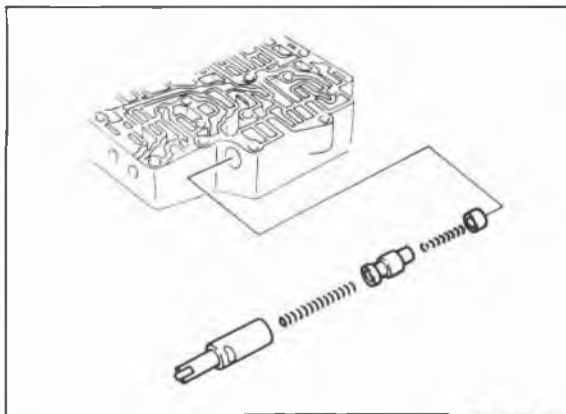
Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

## Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 shift control spring	5.5 (0.217)	46.0 (1.811)	0.5 (0.020)	Light green
1-2 shift spring	5.0 (0.197)	24.9 (0.980)	0.5 (0.020)	Gray
2-3 shift spring	6.1 (0.240)	39.7 (1.563)	0.65 (0.026)	Pink
3-4 shift spring	6.4 (0.252)	37.0 (1.457)	0.6 (0.024)	—
Throttle backup spring	6.4 (0.252)	33.5 (1.319)	0.6 (0.024)	Pink
Throttle modulator front spring	5.0 (0.197)	27.8 (1.094)	0.6 (0.024)	Red
Throttle modulator rear spring	7.15 (0.281)	30.8 (1.213)	0.85 (0.033)	Red
1 rang control spring	6.15 (0.242)	39.2 (1.543)	0.65 (0.026)	White
2 rang control spring	3.95 (0.156)	32.1 (1.264)	0.45 (0.018)	—
Kick-down spring	5.4 (0.213)	38.1 (1.500)	0.8 (0.031)	—
Throttle assist spring	5.15 (0.203)	32.3 (1.272)	0.55 (0.022)	Dark green
Throttle spring	5.4 (0.213)	48.3 (1.902)	0.8 (0.031)	—
Converter relief ball spring	6.9 (0.272)	24.1 (0.949)	0.9 (0.035)	Maroon
Orifice check valve spring	5.0 (0.197)	12.5 (0.492)	0.23 (0.009)	—

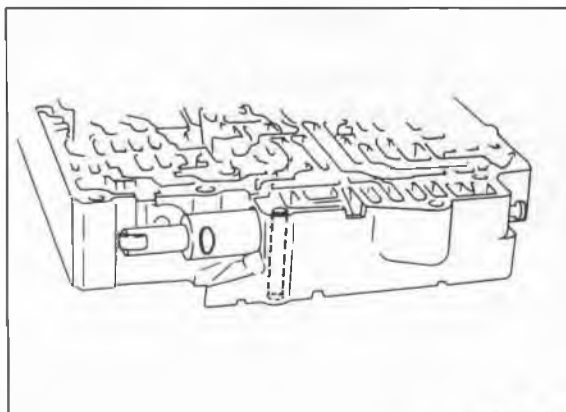
76G07B-220



83U07B-296

## Assembly

1. Install the throttle adjust plug, throttle assist spring, throttle valve, throttle spring, and throttle plug assembly.

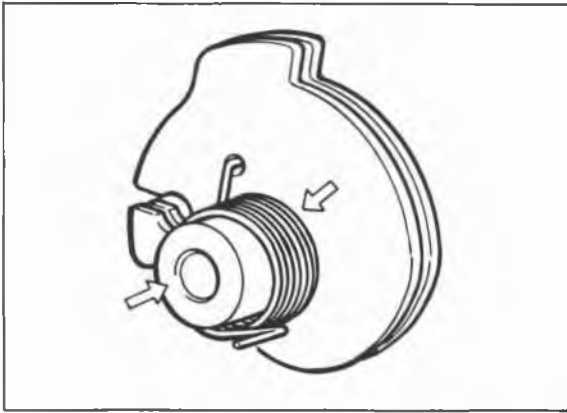


83U07B-297

## Caution

**Install the throttle plug assembly with the groove aligned with the bolt hole.**

## 7B INSPECTION AND REPAIR

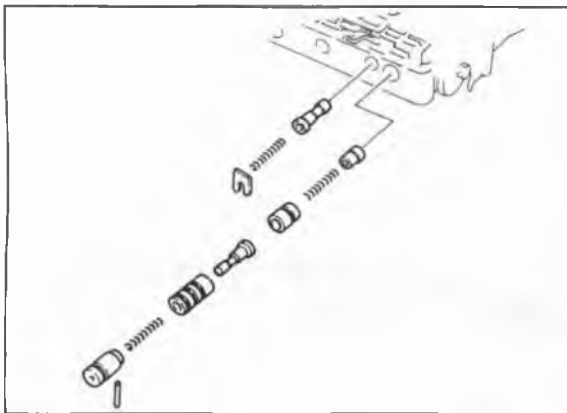


83U07B-298

2. Install the throttle return spring as shown.
3. Install the throttle cam assembly to the main control body.

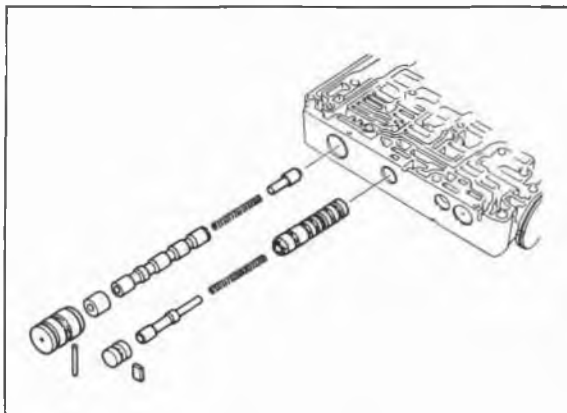
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



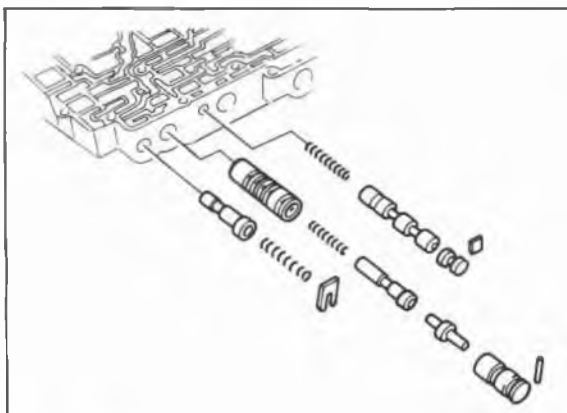
83U07B-299

4. Install the throttle modulator plug, throttle modulator rear spring, throttle modulator sleeve C, throttle modulator valve, throttle modulator sleeve B, throttle modulator front spring, throttle modulator sleeve A, and stopper pin.
5. Install the throttle backup valve, throttle backup spring, and retainer.



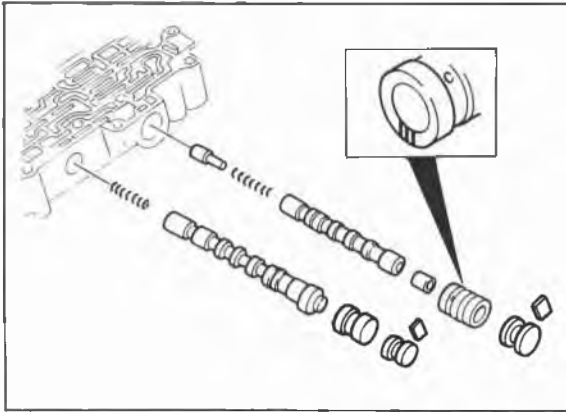
83U07B-300

6. Install the 1-2 shift control sleeve, 1-2 shift control spring, 1-2 shift control valve, stopper plug, and stopper pin.
7. Install the 2-3 shift rear plug, 2-3 shift spring, 2-3 shift valve, 2-3 shift front plug, 2-3 shift sleeve, and stopper pin.



83U07B-301

8. Install the 1 range control valve, 1 range control spring, and retainer.
9. Install the 2 range control rear sleeve, 2 range control spring, 2 range control valve, 2 range control plug, 2 range control front sleeve, and stopper pin.
10. Install the kick-down spring, kick-down valve, stopper plug, and stopper pin.



83U07B-302

11. Install the 1-2 shift spring, 1-2 shift valve, 1-2 shift plug, stopper plug, and stopper pin.
12. Install the 3-4 shift rear plug, 3-4 shift spring, 3-4 shift valve, 3-4 shift sleeve, 3-4 shift front plug, stopper plug, and stopper pin.

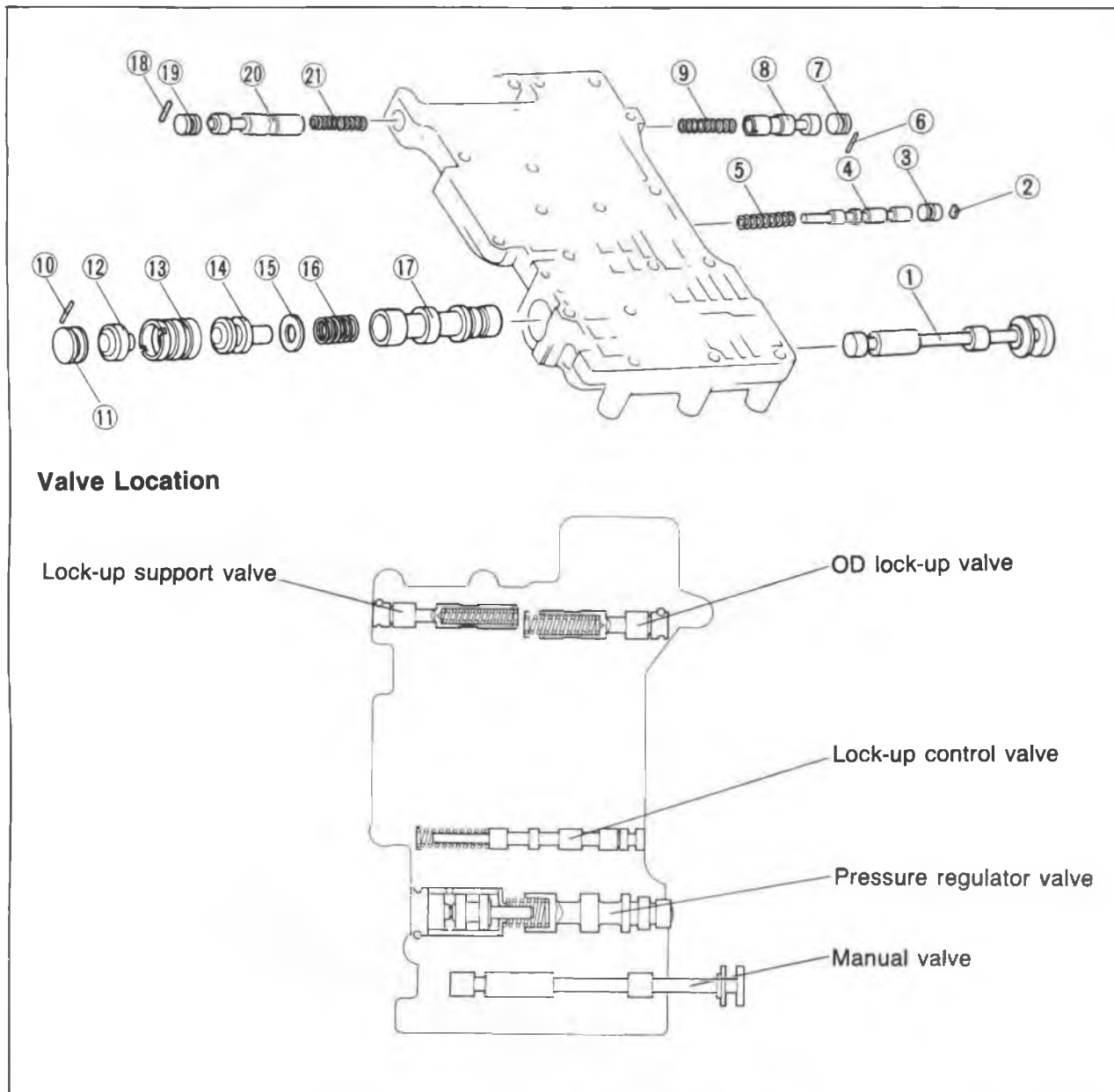
**Note**

**Install the 3-4 shift sleeve with the identification notches facing inward.**

# 7B INSPECTION AND REPAIR

## Rear Control Body Disassembly

Disassemble in the sequence shown in the figure.



83U07B-303

- |                           |                                    |
|---------------------------|------------------------------------|
| 1. Manual valve           | 11. Stopper plug                   |
| 2. Stopper pin            | 12. Pressure regulator backup plug |
| 3. Stopper plug           | 13. Pressure regulator plug sleeve |
| 4. Lock-up control valve  | 14. Pressure regulator plug        |
| 5. Lock-up control spring | 15. Pressure regulator spring seat |
| 6. Stopper pin            | 16. Pressure regulator spring      |
| 7. Stopper plug           | 17. Pressure regulator valve       |
| 8. OD lock-up valve       | 18. Stopper pin                    |
| 9. OD lock-up spring      | 19. Stopper plug                   |
| 10. Stopper pin           | 20. Lock-up support valve          |
|                           | 21. Lock-up support spring         |

## Inspection

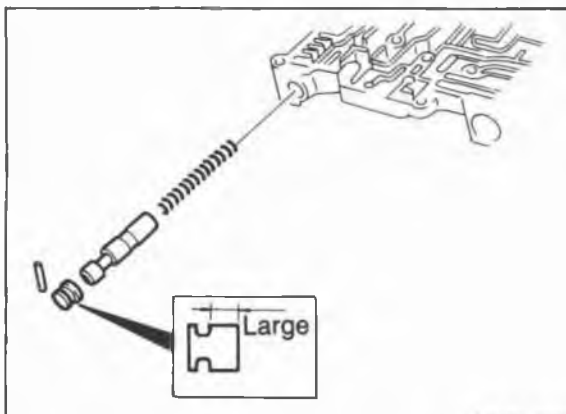
Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

## Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure regulator spring	9.5 (0.374)	30.7 (1.209)	0.7 (0.028)	—
Lock-up control spring	7.3 (0.287)	46.2 (1.819)	0.8 (0.031)	Blue
Lock-up support spring	7.0 (0.276)	52.3 (2.059)	1.0 (0.039)	Yellow
OD lock-up spring	7.1 (0.280)	66.5 (2.618)	0.8 (0.031)	Red

76G07B-166



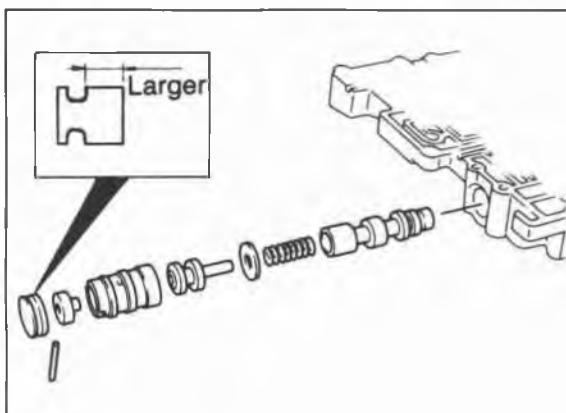
83U07B-305

## Assembly

1. Install the lock-up support spring, lock-up support valve, stopper plug, and stopper pin.

### Note

**Install the stopper plug large end first.**



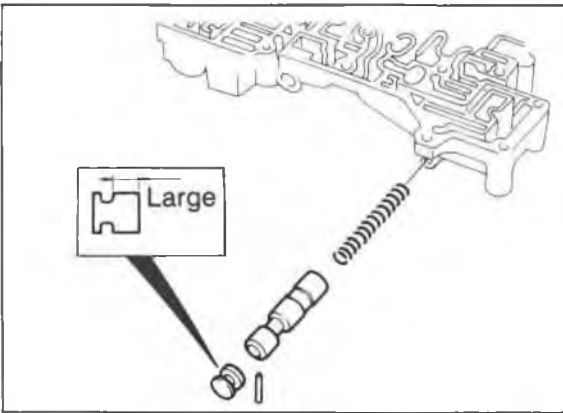
83U07B-306

2. Install the pressure regulator valve, pressure regulator spring, pressure regulator spring seat, pressure regulator plug, pressure regulator plug sleeve, pressure regulator backup plug, stopper plug, and stopper pin.

### Note

**Install the stopper plug large end first.**

## 7B INSPECTION AND REPAIR

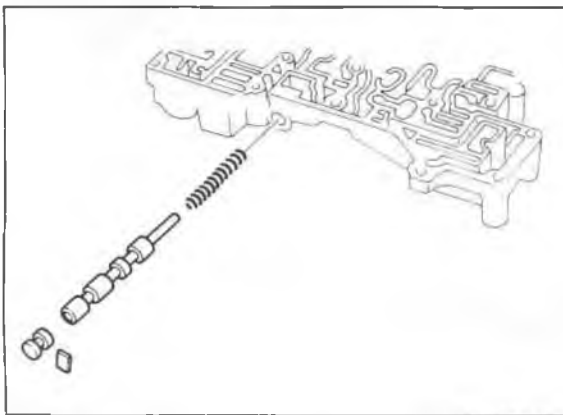


83U07B-307

3. Install the OD lock-up spring, OD lock-up valve, stopper plug, and stopper pin.

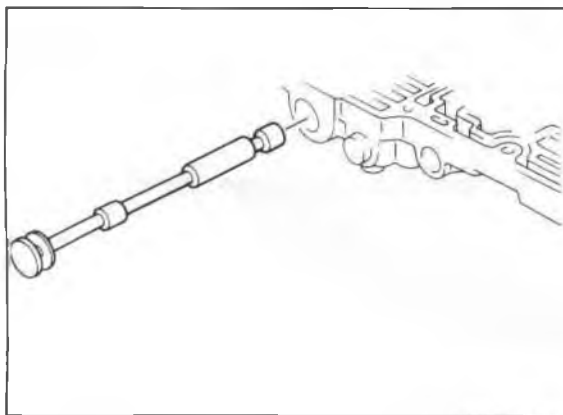
**Note**

**Install the stopper plug large end first.**



83U07B-308

4. Install the lock-up control spring, lock-up control valve, stopper plug, and stopper pin.

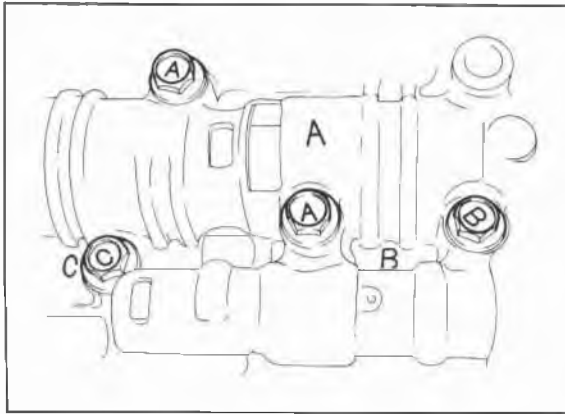


83U07B-309

3. Install the manual valve.



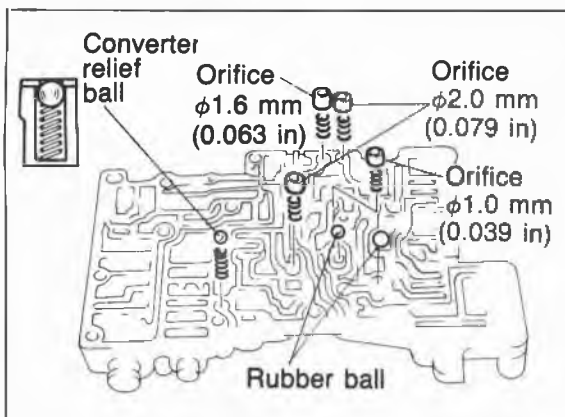
## Assembly of Control Valve Body



83U07B-310

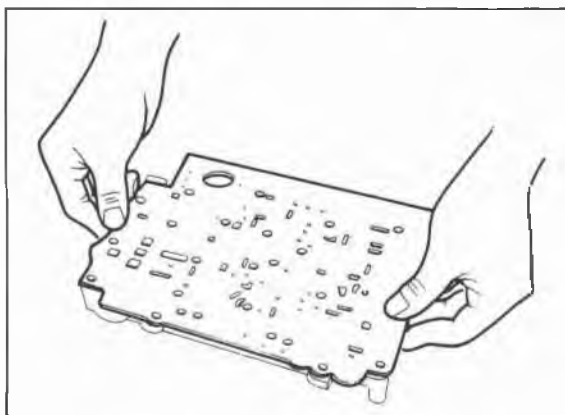
### Note

- a) Do not mix-up the front and rear gaskets during assembly.
- b) Match the bolt head letter and the control valve body letter.



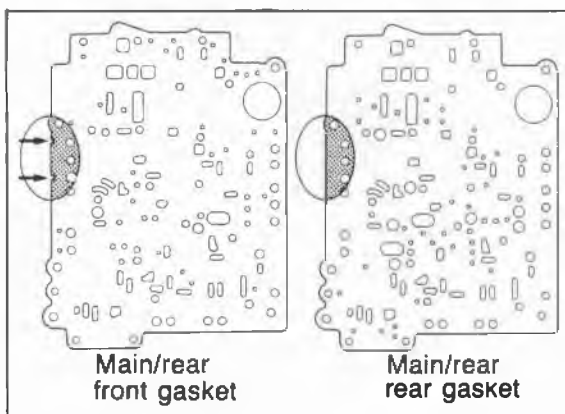
83U07B-311

1. Install the orifice check valves ( $\phi 2.0\text{ mm}$ , 0.079 in;  $\phi 1.6\text{ mm}$ , 0.063 in;  $\phi 1.0\text{ mm}$ , 0.039 in) and springs, converter relief ball and spring, and rubber balls in the rear control body as shown.



83U07B-312

2. Install the gaskets on both sides of the rear separator; then install it onto the rear control body.

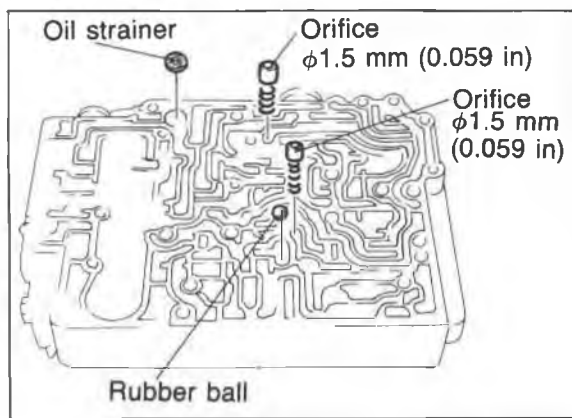


83U07B-313

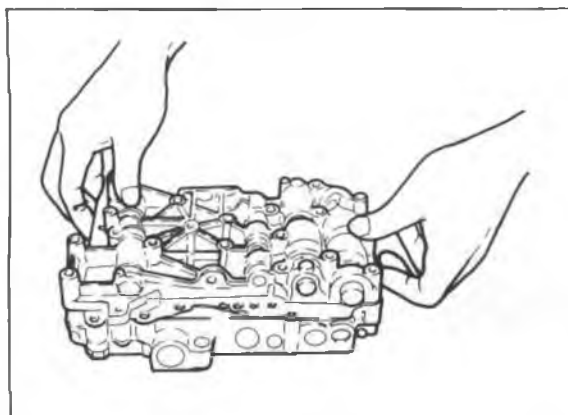
### Note

The main/rear rear gasket and main/rear front gasket are not interchangeable.

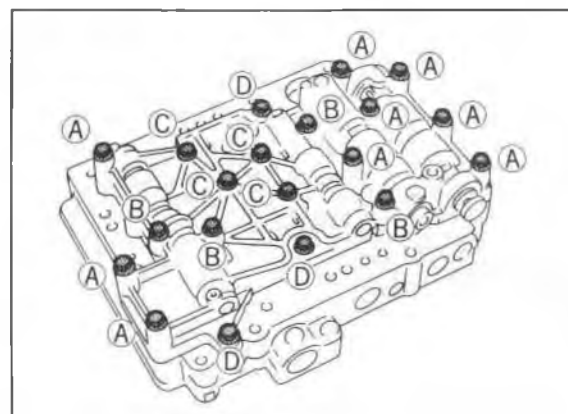
## 7B INSPECTION AND REPAIR



3. Install the orifice check valves ( $\phi 1.5$  mm, 0.059 in) and springs, oil strainer, and rubber ball in the main control body as shown.

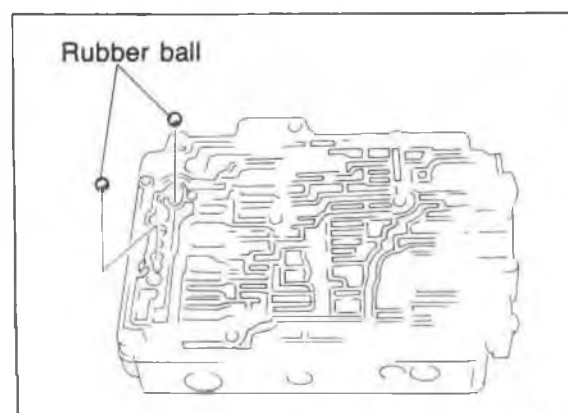


4. Install the rear control body to the main control body.

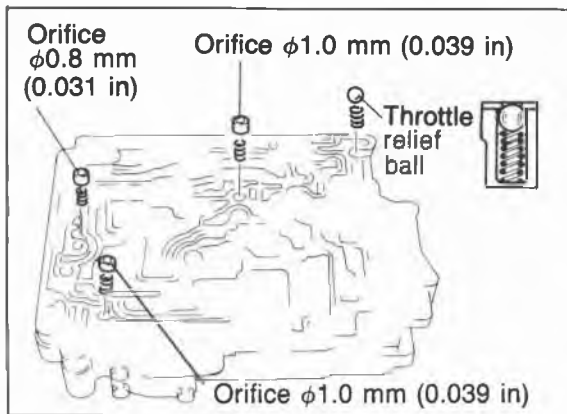


5. Loosely tighten the bolts.

**Note**  
Match the bolt head letter as shown.

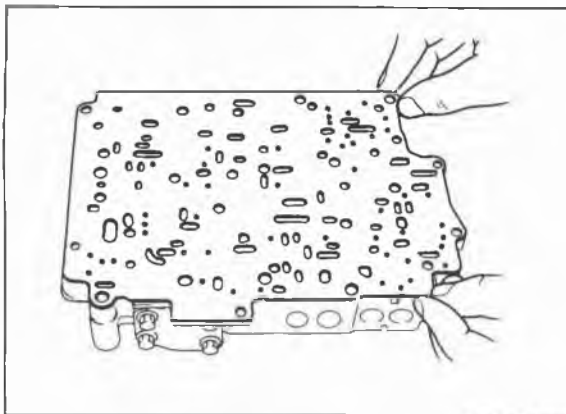


6. Turn the assembly over and install the rubber balls in the main control body as shown.



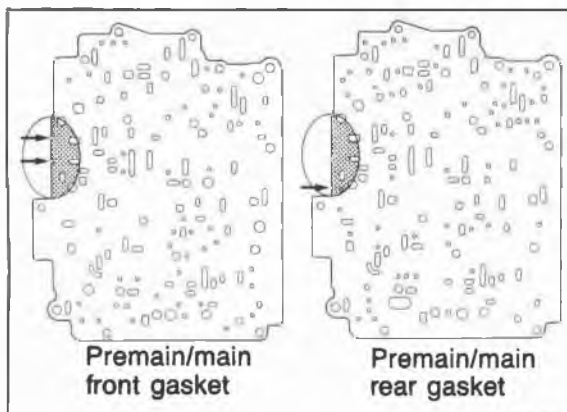
83U07B-318

7. Install the orifice check valves ( $\phi 1.0$  mm, 0.039 in;  $\phi 0.8$  mm; 0.031 in) and springs, and the throttle relief ball and spring in the premain control body as shown.



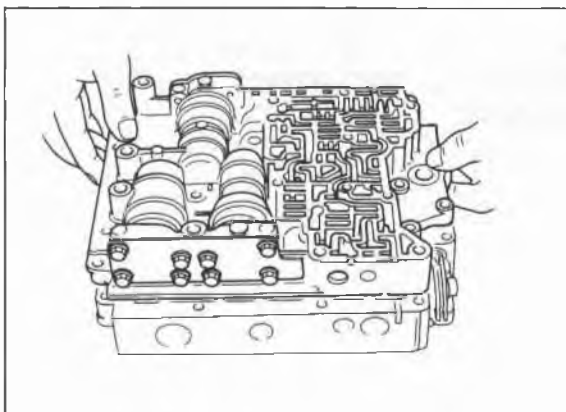
83U07B-319

8. Install the gaskets on both sides of the main separator; then install it onto the premain control body.



83U07B-320

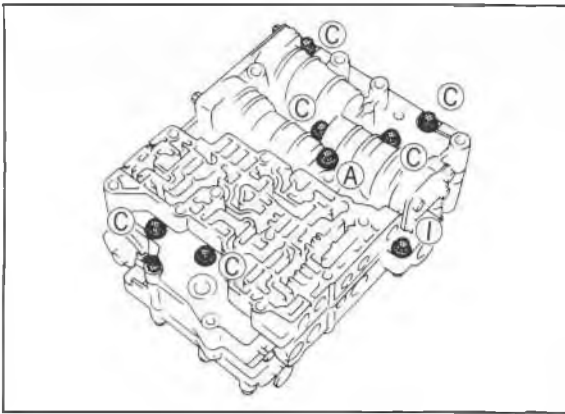
**Note**  
The premain/main rear gasket and premain/main front gasket are not interchangeable.



83U07B-321

9. Set the premain control body onto the main control body.

## 7B INSPECTION AND REPAIR

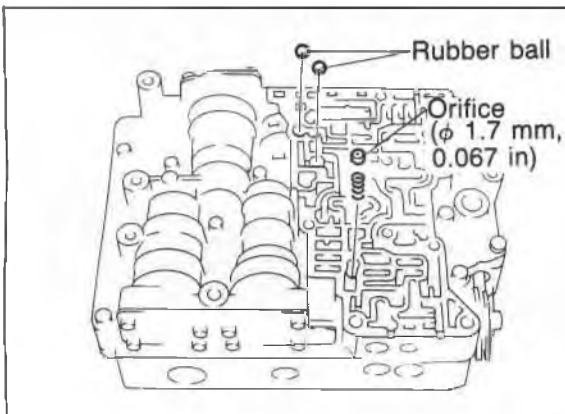


83U07B-322

10. Loosely tighten the bolts.

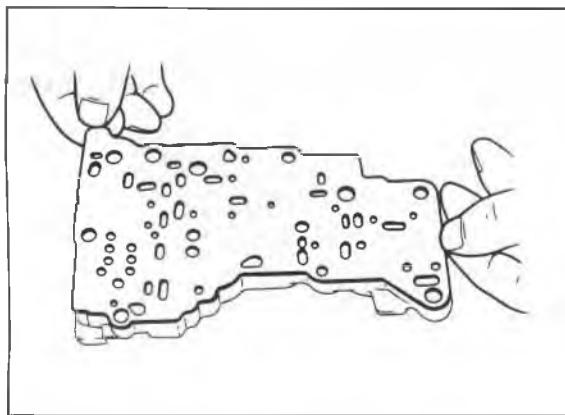
**Note**

**Match the bolt head letter as shown.**



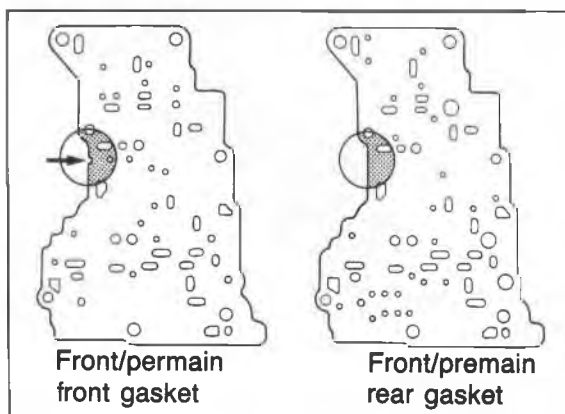
83U07B-323

11. Install the rubber balls, orifice check valve ( $\phi 1.7$  mm, 0.067 in) in and spring in the premain control body as shown.



83U07B-324

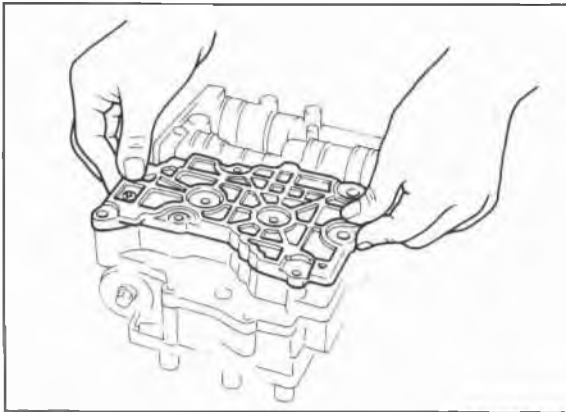
12. Install the gaskets on both sides of the premain separator; then install it onto the front control body.



83U07B-325

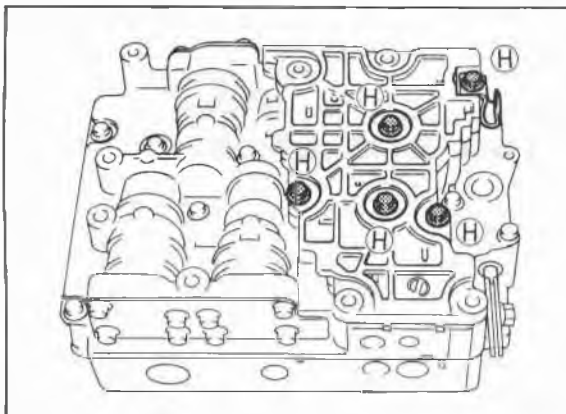
**Note**

**The front/premain front gasket and front/premain rear gasket are not interchangeable.**



83U07B-326

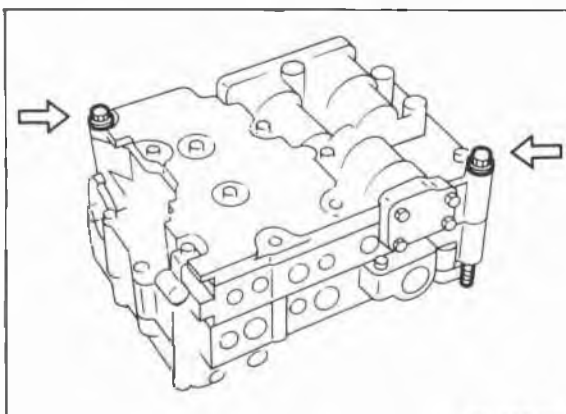
13. Install the front control body on the premain control body.



83U07B-327

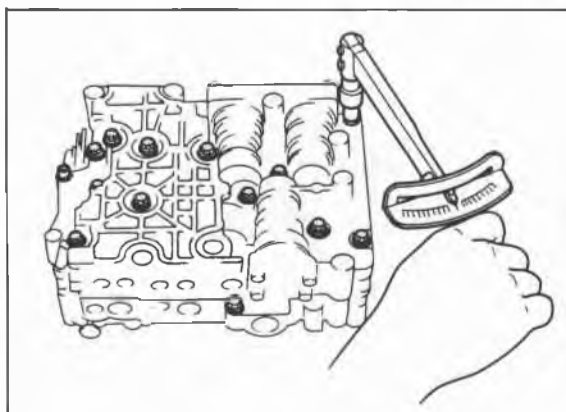
14. Loosely tighten the bolts and bracket.

**Note**  
Match the bolt head letter as shown.



83U07B-328

15. Install the control valve body mounting bolts as shown for alignment.



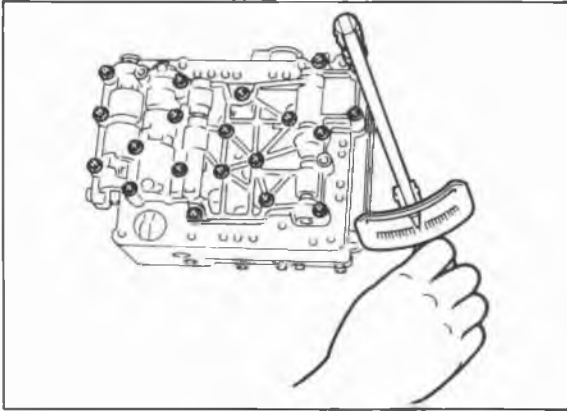
83U07B-329

16. Tighten the mounting bolts.  
(1) Tighten the front control body.

**Tightening torque:**  
6—8 N·m (66—80 cm·kg, 57—69 in·lb)

## 7B INSPECTION AND REPAIR

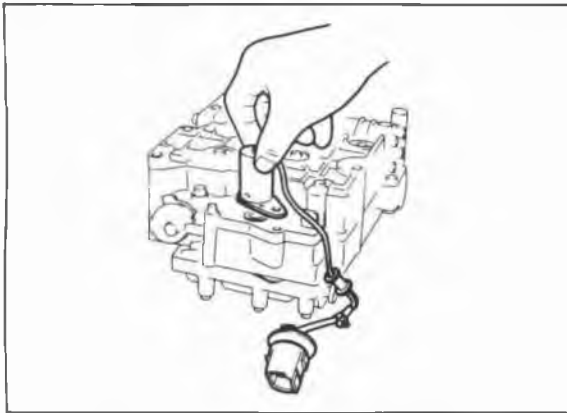
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83U07B-330

(2) Tighten the rear control body.

**Tightening torque:**  
**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**



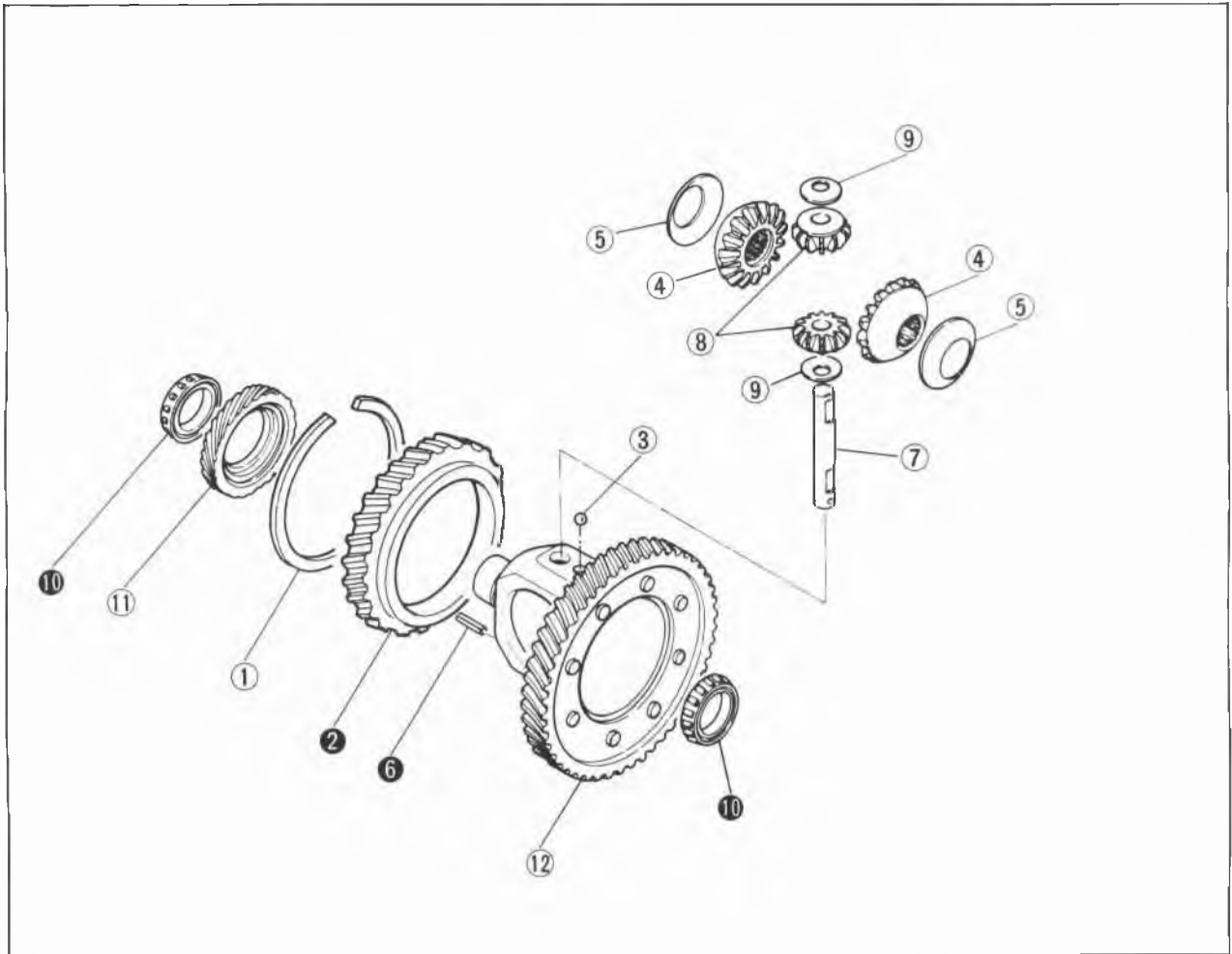
83U07B-331

17. Install the lock-up solenoid valve along with new O-ring and oil strainer.

**Tightening torque:**  
**6—8 N·m (66—80 cm·kg, 57—69 in·lb)**

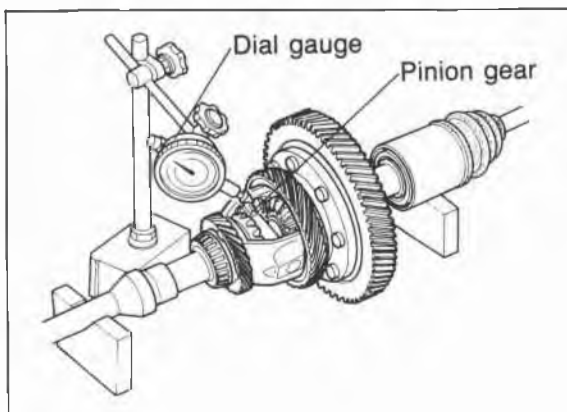
## DIFFERENTIAL Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



76G07B-221

- |                                 |                                      |
|---------------------------------|--------------------------------------|
| 1. Snap ring (G4A-HL)           | 7. Pinion shaft                      |
| 2. Governor drive gear (G4A-HL) | 8. Pinion gear                       |
| 3. Steel ball (G4A-HL)          | 9. Pinion gear thrust washer         |
| 4. Side gear                    | 10. Side bearing inner race          |
| 5. Side gear thrust washer      | 11. Speedometer drive gear           |
| 6. Roll pin                     | 12. Ring gear and gear case assembly |



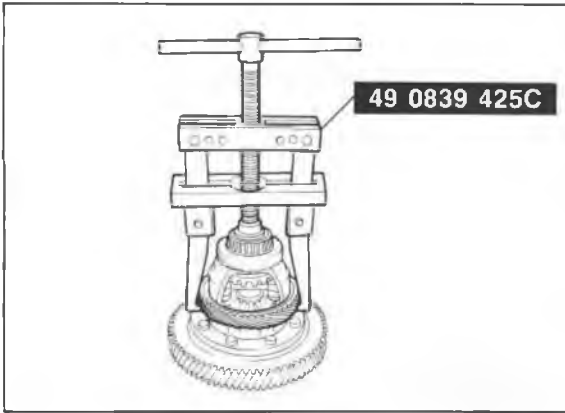
83U07B-333

### Disassembly note Checking backlash

Before disassembly, measure the backlash of the side gears and pinion gears. If it is not within specification, replace the differential assembly.

**Backlash:**  
**Standard 0.025—0.1 mm (0.001—0.004 in)**  
**Maximum 0.5 mm (0.020 in)**

## 7B INSPECTION AND REPAIR



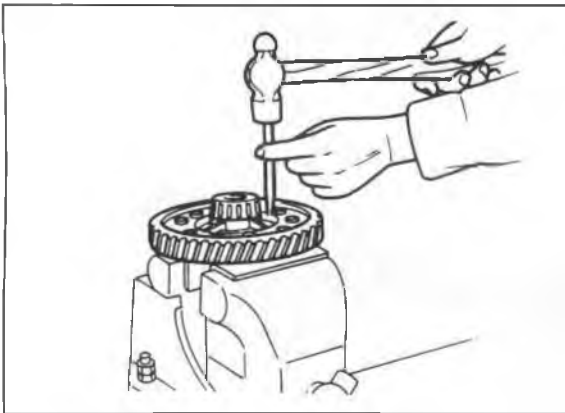
76G07B-168

### Governor drive gear (G4A-HL)

Remove the governor drive gear with the **SST**.

#### Note

Be careful not to lose the steel ball.



86U07B-324

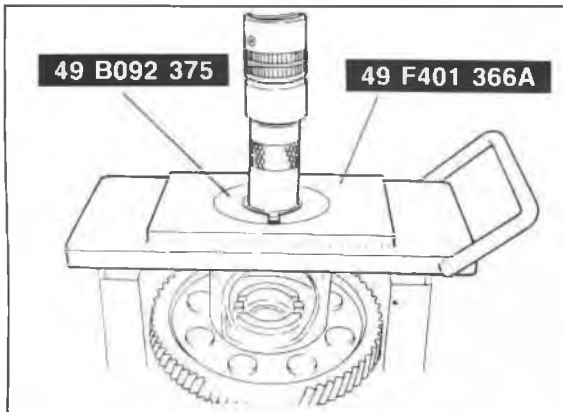
### Roll pin

For removing the roll pin from the pinion shaft, place the gear case on a vise and knock the pin out with a suitable pin punch ( $\phi 2.0$  mm (0.079 in) ) and hammer.

#### Note

a) Use the protective plates to prevent damage to the differential.

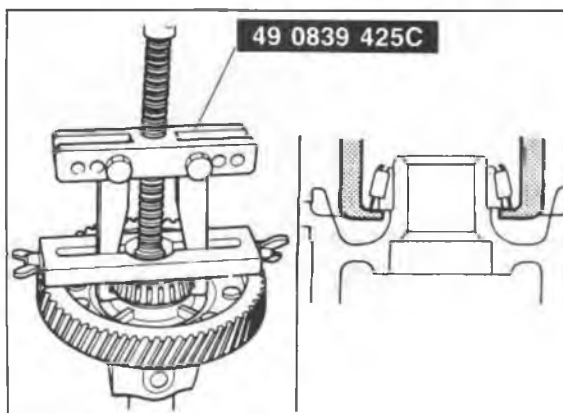
b) Insert the punch into the spring pin hole from the ring gear side.



86U07B-325

### Side bearing inner race

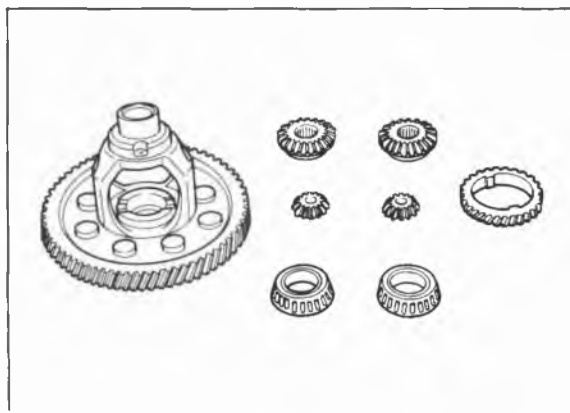
1. Remove the side bearing inner race (side opposite the ring gear) from the gear case with the **SST**.



86U07B-326

2. Remove the side bearing inner race (ring gear side) with a combination of parts from the **SST**.



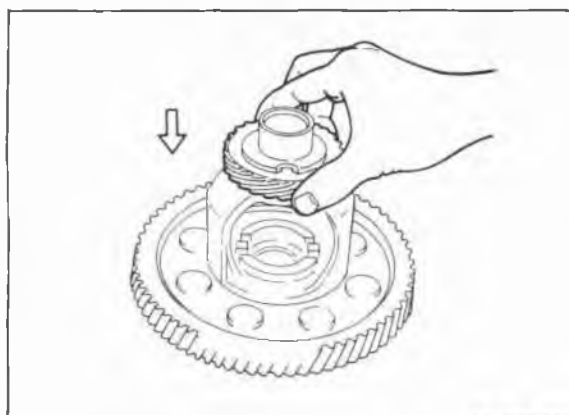


86U07B-327

## Inspection

Check the following and replace any faulty parts.

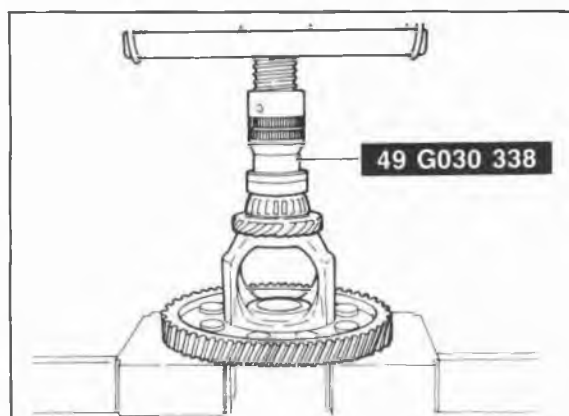
1. Damaged or worn gears
2. Cracked or damaged gear case
3. Damaged bearings



86U07B-328

## Assembly

1. Set the speedometer drive gear onto the ring gear and case assembly.

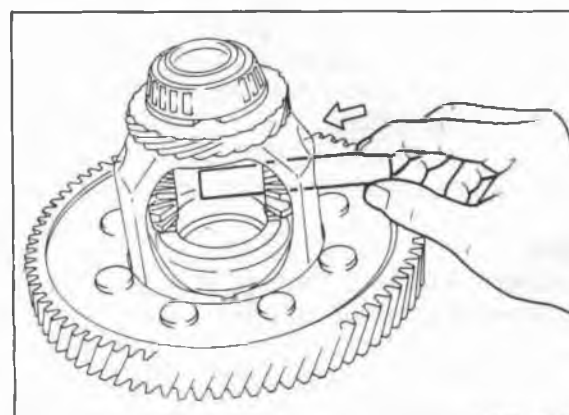


86U07B-329

2. Install the side bearing inner races.
  - (1) Press the side bearing inner race (side opposite the ring gear) onto the ring gear and case assembly with the **SST**.
  - (2) Press on the other side bearing inner race (ring gear side) in the same manner.

## Caution

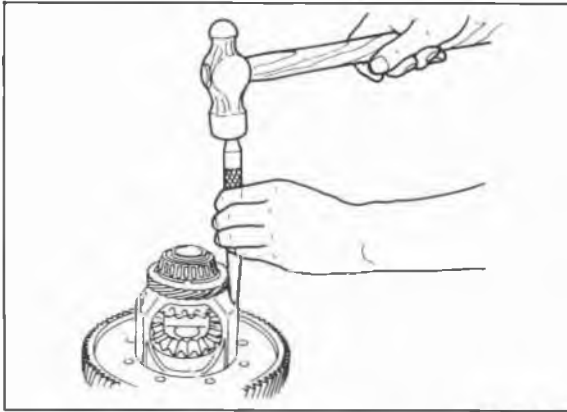
**Do not reuse the bearings if they were removed.**



86U07B-330

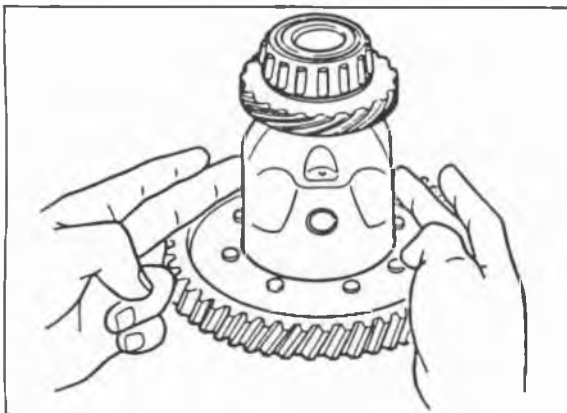
3. Install the pinion gears and thrust washers into the case.
4. Install the pinion shaft.

## 7B INSPECTION AND REPAIR



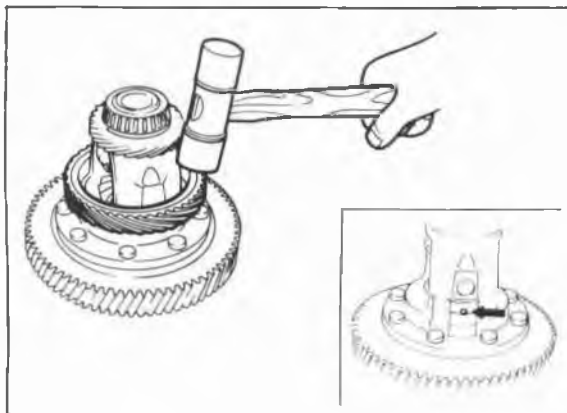
76G07B-222

5. Install the roll pin.



86U07B-332

6. Install the thrust washers and side gears into the gear case at the same time, then turn them back on the pinion gear and align them with the pinion shaft hole.



76G07B-169

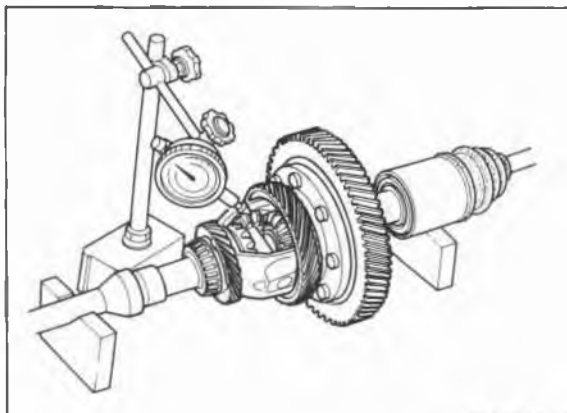
7. Set the steel ball in the hole in the gear case.

### Note

**Affix the ball with petroleum jelly.**

8. Install the governor drive gear onto the gear case with a plastic hammer.

9. Install the snap ring.



76G07B-170

10. Check and adjust the backlash of the side gears and pinion gears as follows:

- (1) Install the left and right driveshafts in the differential assembly.
- (2) Support the driveshafts on V-blocks.
- (3) Measure the backlash of both pinion gears.

### Backlash:

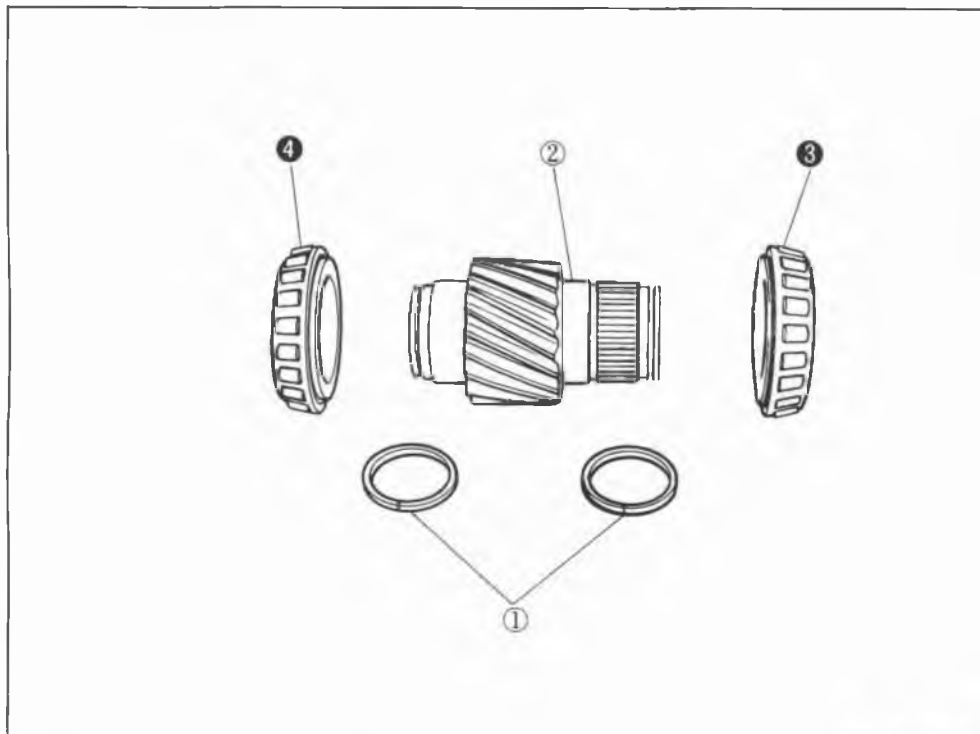
**Standard 0.025—0.1 mm (0.001—0.004 in)**  
**Maximum 0.5 mm (0.020 in)**

11. If the backlash is not within specification, replace the differential assembly.

## OUTPUT GEAR

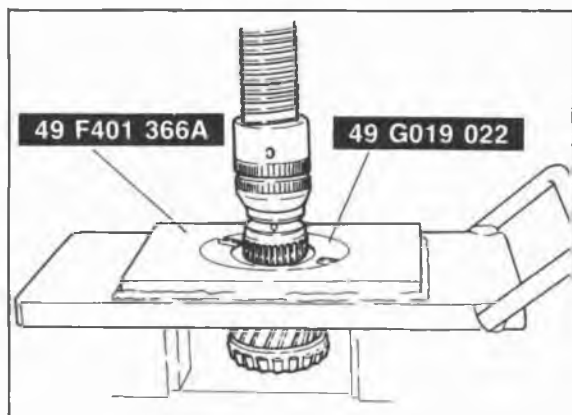
### Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Seal ring
2. Output gear
3. Output gear bearing
4. Output gear bearing

86U07B-334



86U07B-335

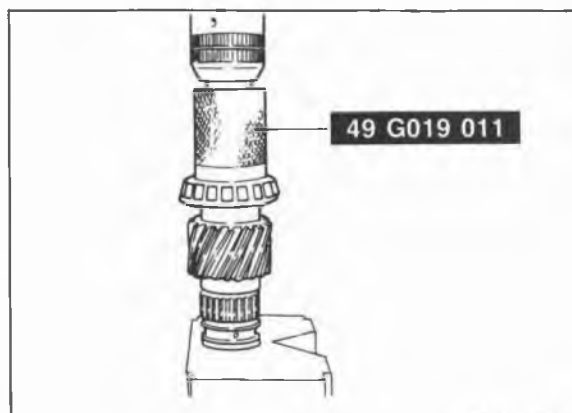
### Disassembly note Output gear bearings

Remove the output gear bearings from the output gear with the **SST**.

### Inspection

Check the following and replace any faulty parts.

1. Damaged or worn output gear
2. Damaged bearing



86U07B-336

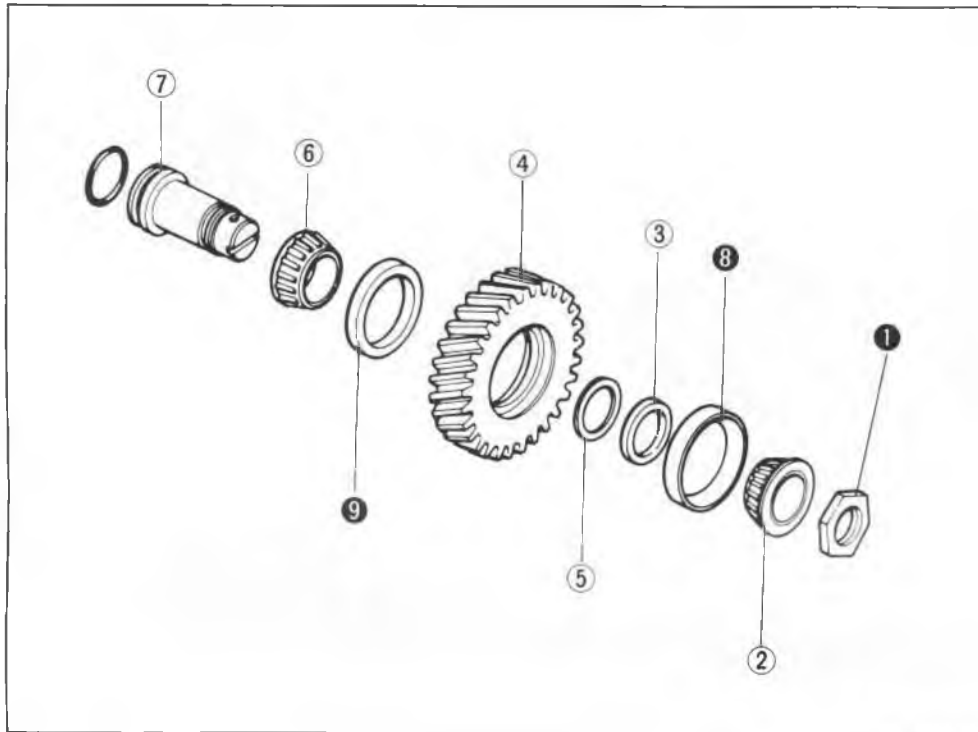
### Assembly

1. Press the output gear bearings onto the output gear with the **SST**.

# 7B INSPECTION AND REPAIR

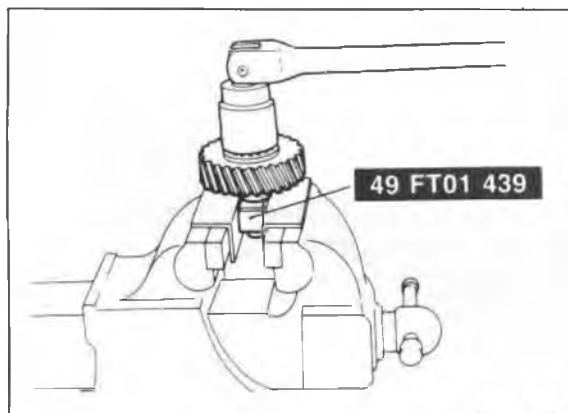
## IDLE GEAR Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Locknut
2. Idle gear bearing
3. Spacer
4. Idle gear
5. Adjust shim
6. Idle gear bearing
7. Idle shaft
8. Bearing outer race
9. Bearing outer race

86U07B-337

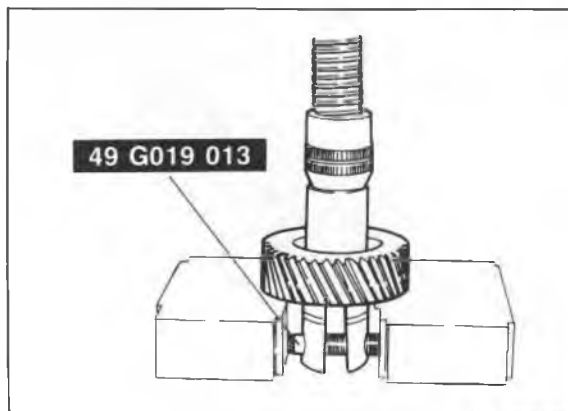


86U07B-338

### Disassembly note Locknut

Secure the idle shaft in a vise with the **SST**; then remove the locknut.

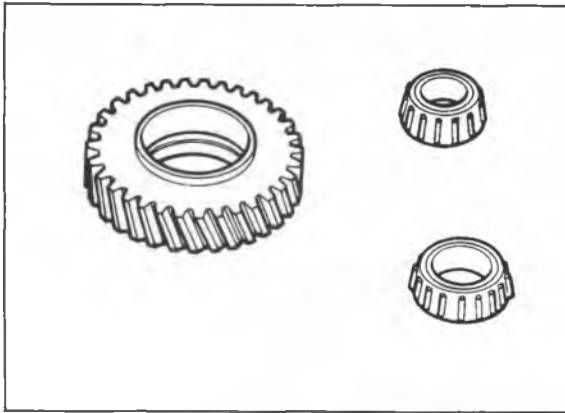
**Note**  
Use the protective plates to prevent damage to the **SST**.



86U07B-339

### Bearing outer race

Remove the bearing outer race from the idle gear with the **SST**.

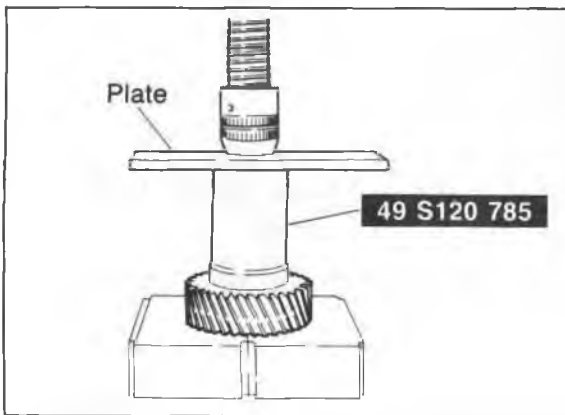


86U07B-340

### Inspection

Check the following and replace any faulty parts.

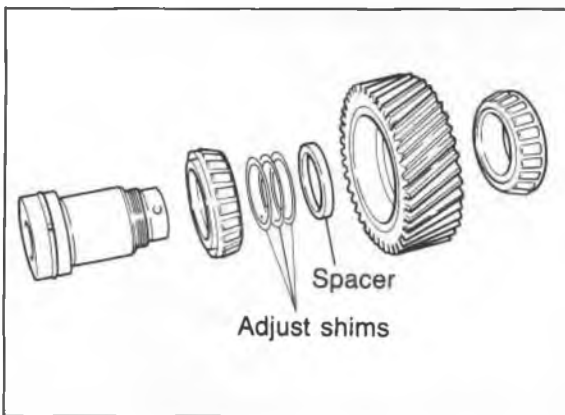
1. Damaged or worn idle gear
2. Damaged or worn bearing



86U07B-341

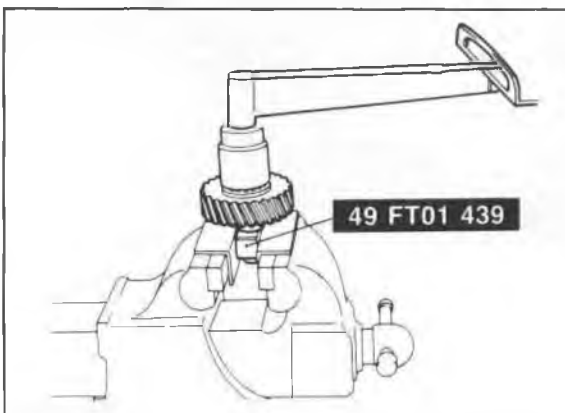
### Assembly

1. Press the bearing outer races in with the **SST**.



86U07B-342

2. Install the idle gear bearing onto the idle shaft, then install the idle gear, adjust shim, spacer, and bearing.



86U07B-343

3. Secure the idle shaft in a vise with the **SST**; then tighten the locknut to the lower limit of the tightening torque.

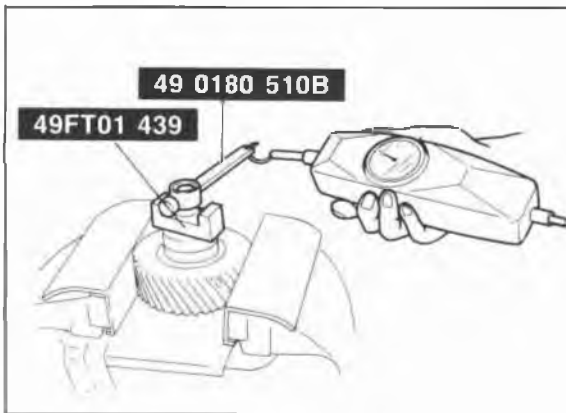
### Tightening torque:

**128 N·m (13 m·kg, 94 ft·lb)**

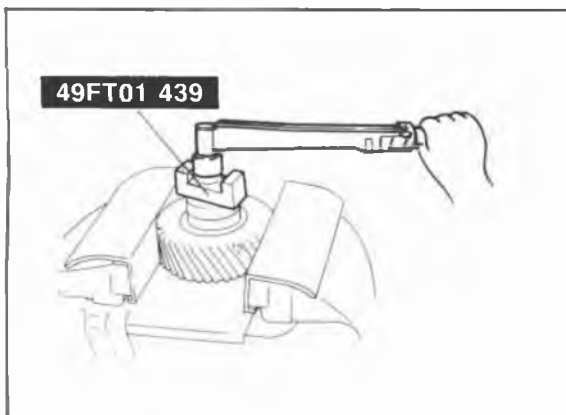
### Note

**Use the protective plates to prevent damage to the SST.**

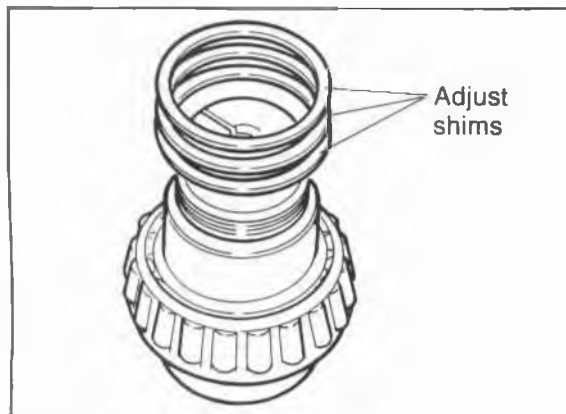
## 7B INSPECTION AND REPAIR



86U07B-344



86U07B-345



86U07B-346

4. Check and adjust the idle gear bearing preload.
  - (1) Turn the idle gear assembly and **SST** over, and secure the gear in the vice.

### Note

Use protective plates to prevent damage to the idle gear.

- (2) Attach the **SST** and spring scale or torque wrench, and measure the preload while tightening the locknut.

### Tightening torque:

**128—177 N·m (13—18 m·kg, 94—130 ft·lb)**

### Preload:

**0.03—0.9 N·m**

**(0.3—9.0 cm·kg, 0.26—7.8 in·lb)**

### Value indicated on pull scale:

**0.3—9 N (0.03—0.9 kg, 0.066—1.98 lb)**

### Note

Read the preload when the idle shaft starts to turn.

5. If the specified preload cannot be obtained within the specified tightening torque, adjust by selecting the proper adjust shims.

Thickness of shim
0.10 mm (0.004 in)
0.12 mm (0.005 in)
0.14 mm (0.006 in)
0.16 mm (0.0063 in)
0.18 mm (0.007 in)
0.20 mm (0.008 in)

### Note

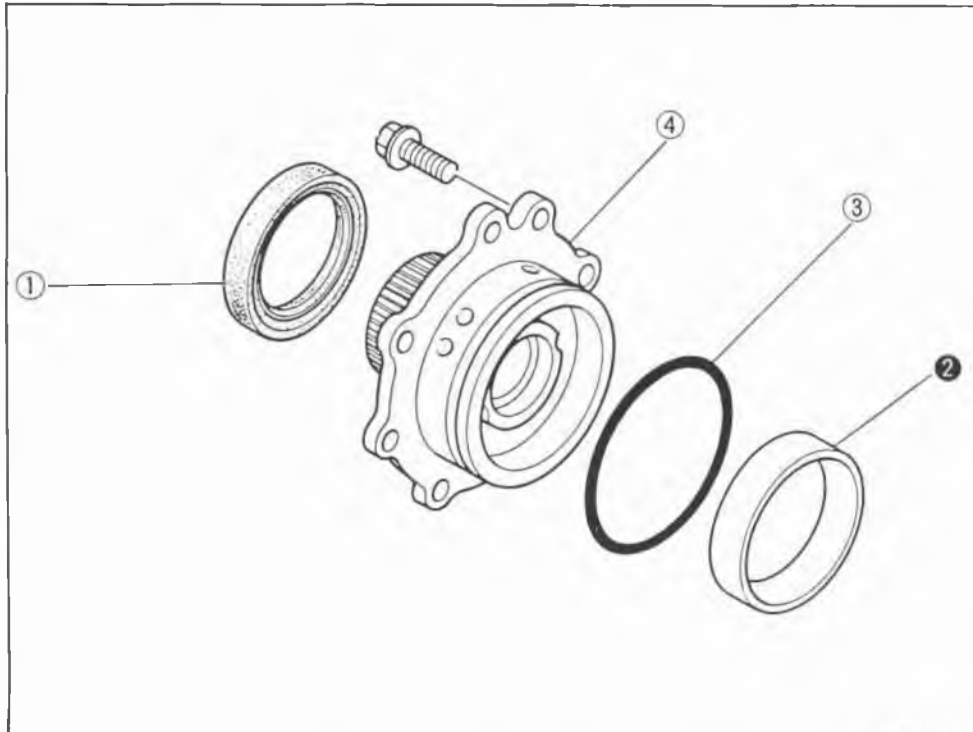
a) The maximum allowable number of shims is 7.

b) Preload is reduced by increasing the thickness of the shims, or increased by reducing the thickness of the shims.

## BEARING COVER ASSEMBLY

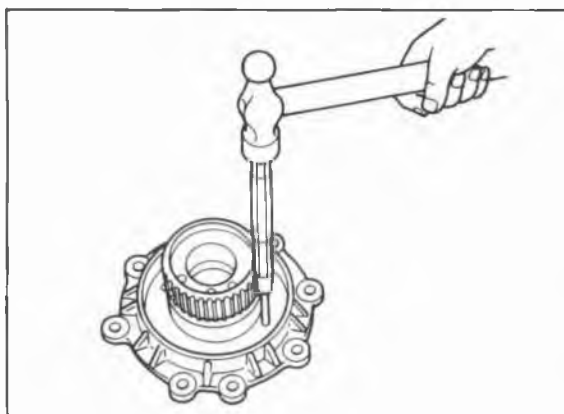
### Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Oil seal
2. Bearing outer race
3. O-ring
4. Bearing cover

86U07B-347



86U07B-348

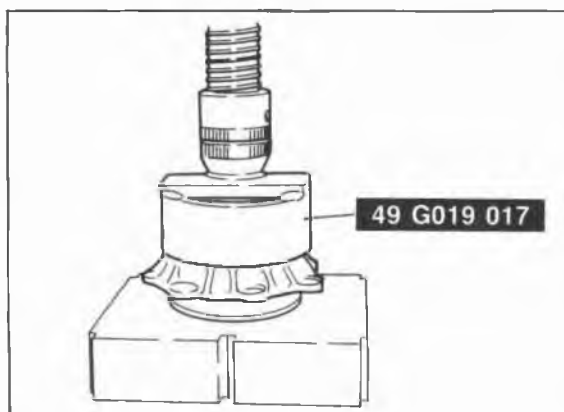
### Disassembly note Bearing outer race

Remove the bearing outer race with a pin punch and hammer as shown.

### Inspection

Check the following and replace any faulty parts.

1. Damaged bearing cover
2. Damaged or worn bushing

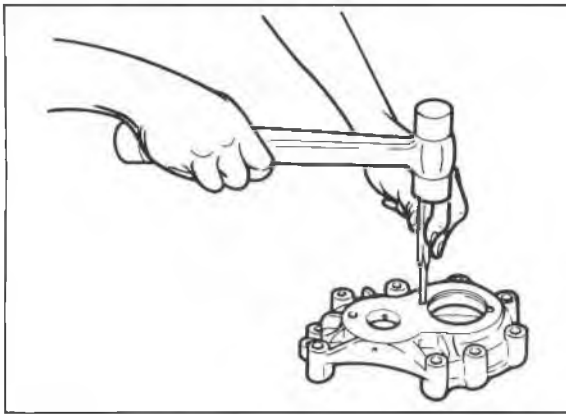


86U07B-349

### Assembly

1. Press the bearing outer race into the cover.
2. Press the oil seal into the cover with the **SST**.

## 7B INSPECTION AND REPAIR



86U07B-350

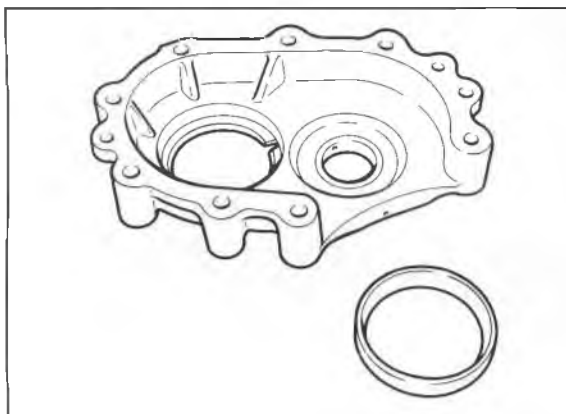
### BEARING HOUSING

#### Disassembly

Remove the bearing outer race with a pin punch and hammer.

#### Note

Install the bearing outer race during reassembly of transaxle to adjust the preload.



86U07B-351

#### Inspection

Check the following and replace any faulty parts.

1. Damaged bearing housing
2. Damaged bearing outer race



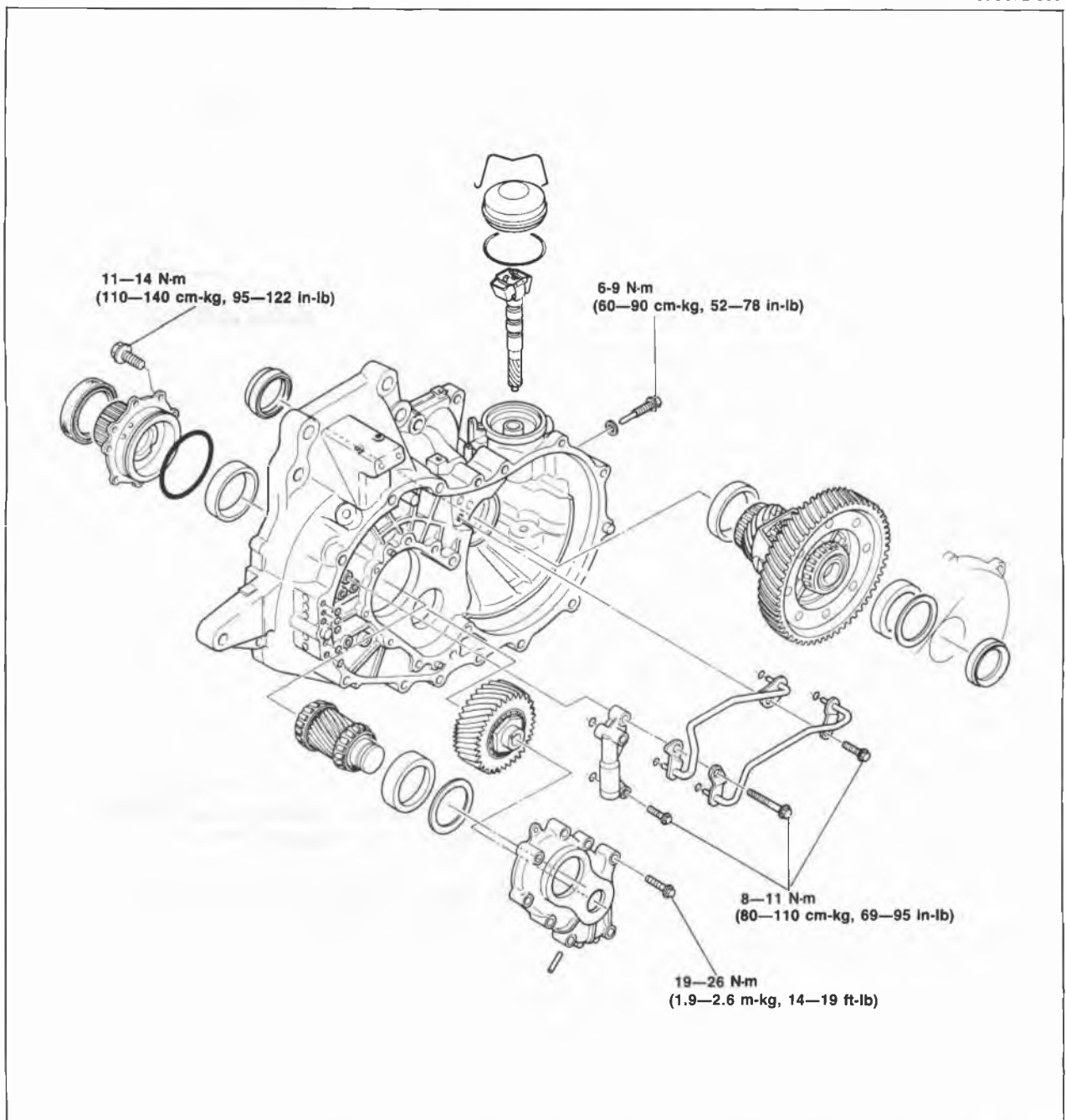
## ASSEMBLY

### PRECAUTION

- (1) The automatic transaxle consists of high-precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
- (2) Clean out oil holes and oil passages with compressed air, and check that there are no obstructions.
- (3) Before assembly, apply ATF to each O-ring, seal ring, rotating part, and friction part.
- (4) If the brake band or drive plates are replaced with new ones, first soak them in ATF for at least 2 hours before installing.
- (5) Each seal gasket and O-ring must be replaced with a new one.
- (6) Be sure to install all thrust bearings and races in the correct direction and position.

### ASSEMBLY—STEP 1 Torque Specifications

83U07B-365



83U07B-366

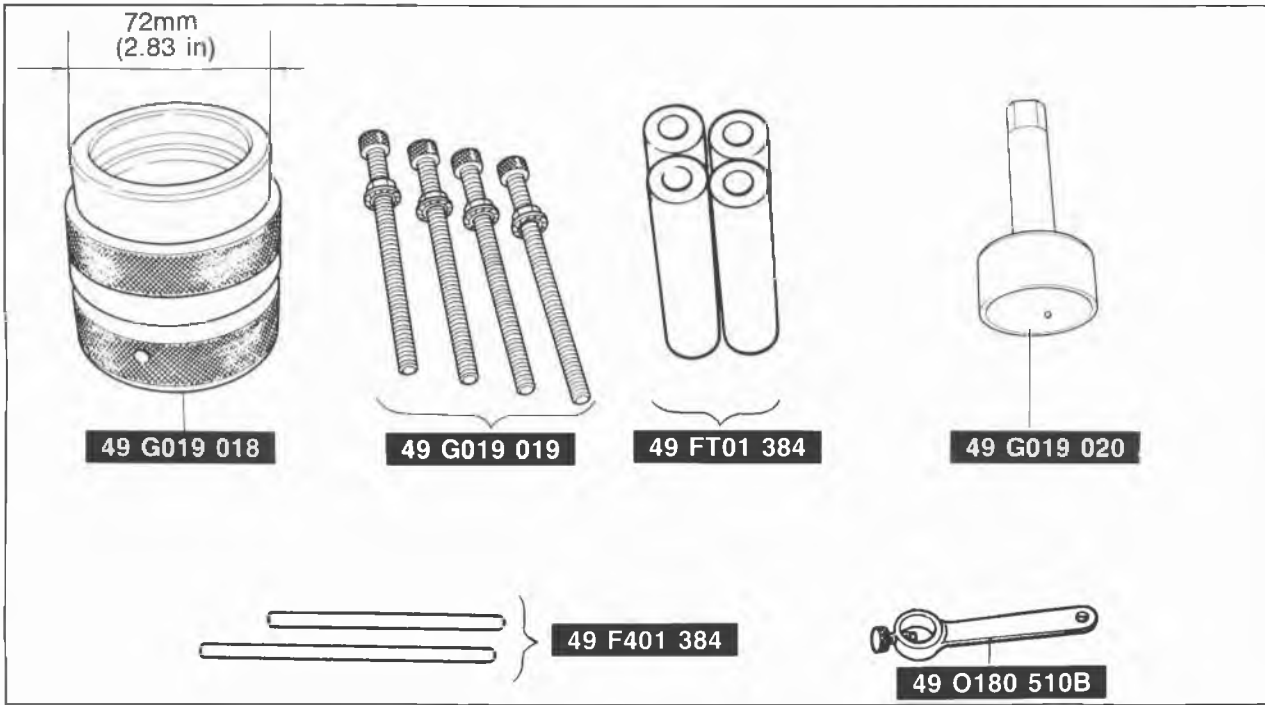
# 7B ASSEMBLY

## Procedure

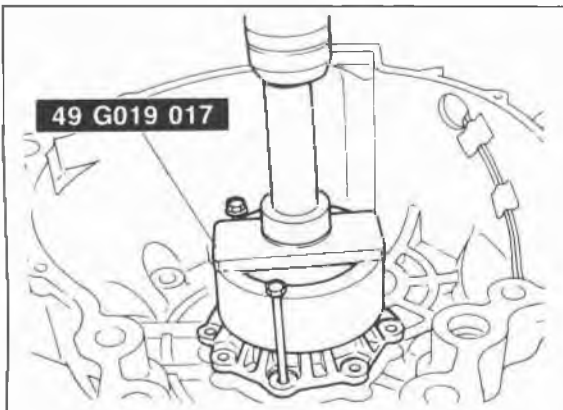
1. Adjust the preload of the output gear bearing and select the adjust shim(s) as described below.

## Note

To adjust the preload, use the SST shown below.



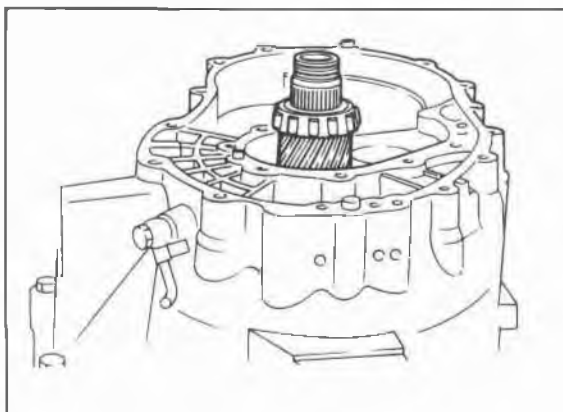
83U07B-367



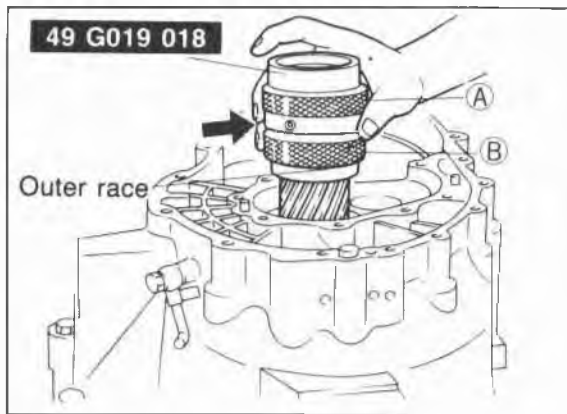
83U07B-368

(1) Press the bearing cover in after aligning it with guide bolts as shown.

**Tightening torque: 11—14 N·m  
(110—140 cm·kg, 95—122 in·lb)**



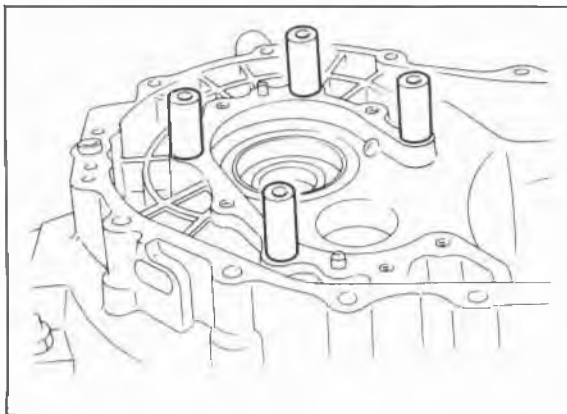
(2) Install the converter housing onto the **SST**.  
(3) Remove the bearing outer race and adjust shims from the bearing housing. (Refer to page 7B—185)  
(4) Mount the output gear assembly onto the converter housing.



76G07B-172

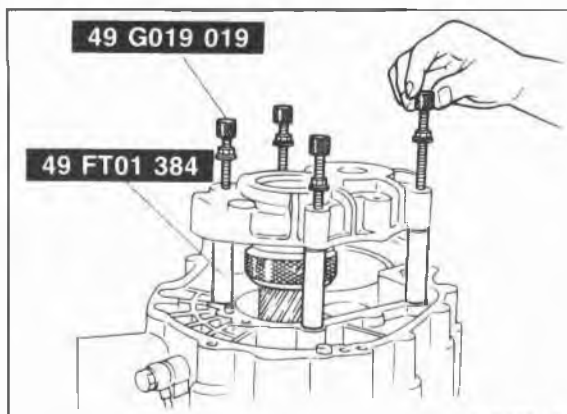
- (5) Install the outer race removed in step (2) to the **SST**; then mount them on the output gear assembly.

**Caution**  
Eliminate the gap (arrow) by turning A or B of the selector.



76G07B-173

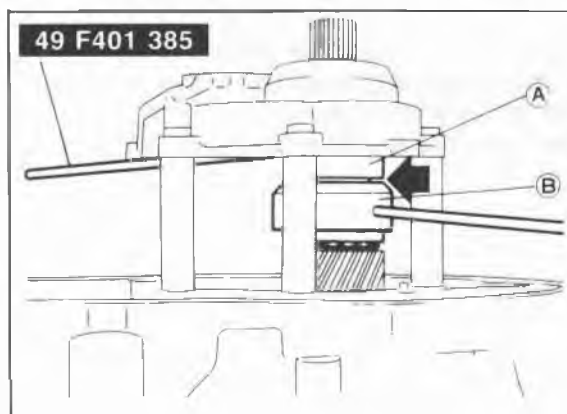
- (6) Set the four **SST** on the converter housing in the positions shown.



76G07B-174

- (7) Set the bearing housing on the **SST** (selector) and install the four **SST** (bolts); then tighten them to the specified torque.

**Tightening torque:**  
19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



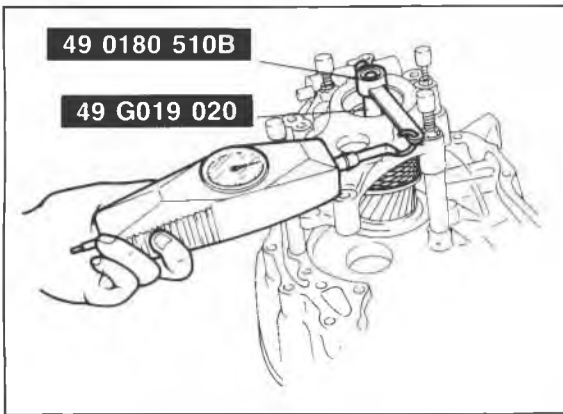
76G07B-175

- (8) Turn the **SST** (selector) to increase the clearance indicated by the arrow with the **SST** (bars) until it no longer turns.

**Note**  
This is to seat the bearing.

- (9) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

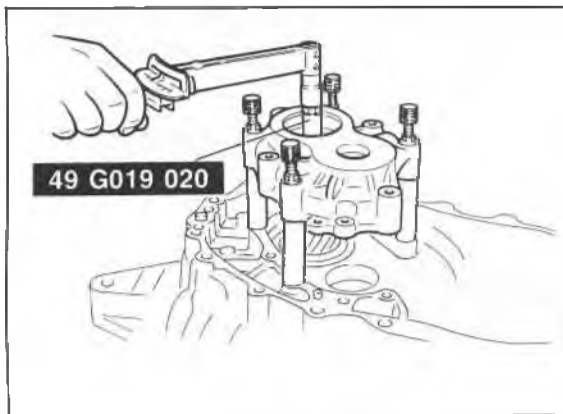
# 7B ASSEMBLY



76G07B-176

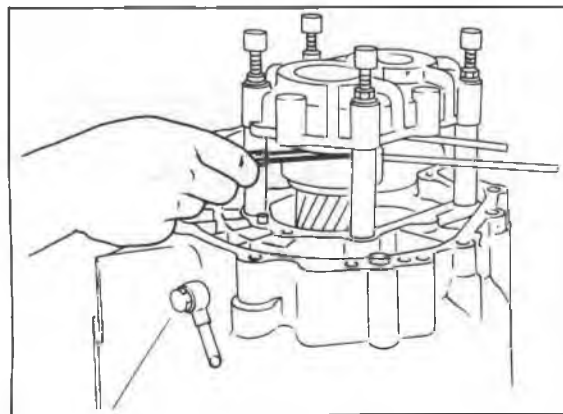
- (10) Mount the **SST** and pull scale or torque wrench on the output gear.
- (11) Increase the clearance between A and B to obtain the specified preload/pull scale reading.

**Preload: 0.5—0.9 N·m**  
**(5.0—9.0 cm·kg, 4.34—7.81 in·lb)**  
**Reading on pull scale: 5—9 N**  
**(0.5—0.9 kg, 1.1—1.98 lb)**



83U07B-375

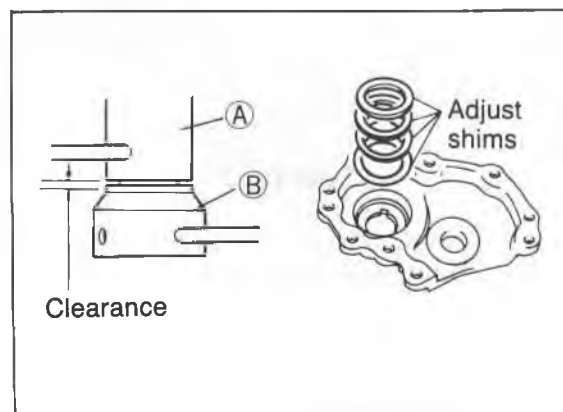
**Note**  
**Read the preload when the output gear starts to turn.**



76G07B-177

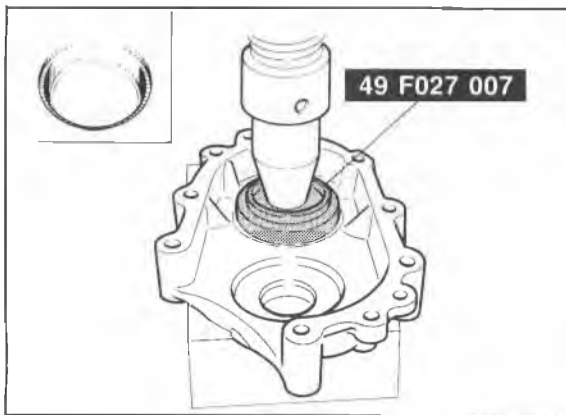
- (12) Measure the clearance. Select adjust shim(s) equivalent to the measured clearance.

Thickness of shim	
0.10 mm (0.004 in)	0.18 mm (0.007 in)
0.12 mm (0.005 in)	0.20 mm (0.008 in)
0.14 mm (0.006 in)	0.50 mm (0.020 in)
0.16 mm (0.0063 in)	



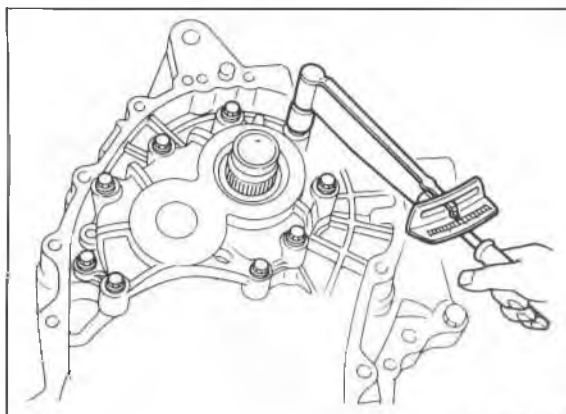
83U07B-377

**Caution**  
**a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.**  
**b) The maximum allowable number of shims is 7.**



76G07B-178

- (13) Remove the bearing housing and **SST**.
- (14) Install the required shim(s) and press the bearing race into the bearing housing with the **SST**.



76G07B-179

- (15) Install the bearing housing.

**Tightening torque:**  
**19—26 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**

- (16) Check that the preload/pull scale reading is within specification. If not within specification return to step (2).

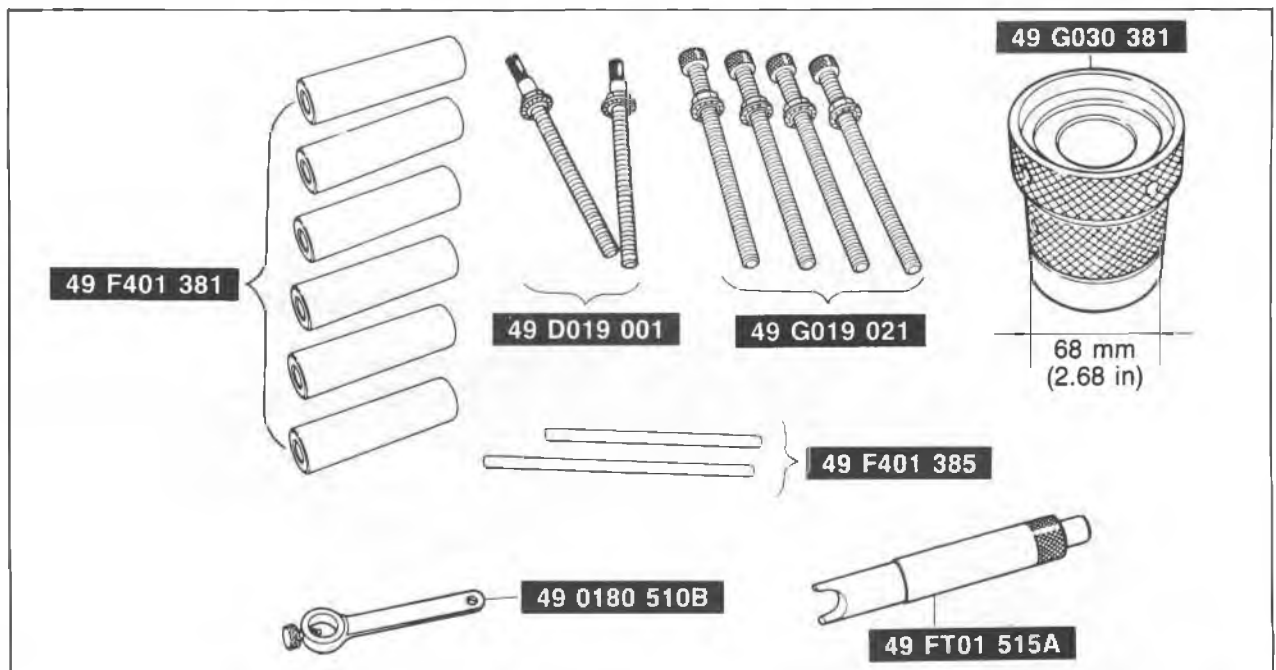
**Preload: 0.03—0.9 Nm**  
**(0.3—9.0 cm-kg, 0.26—7.81 in-lb)**  
**Reading on pull scale:**  
**0.3—9 N (0.03—0.9 kg, 0.066—1.98 lb)**

- (17) Remove the bearing housing.

2. Adjust the differential side bearing preload and select the adjust shim(s) as described below.

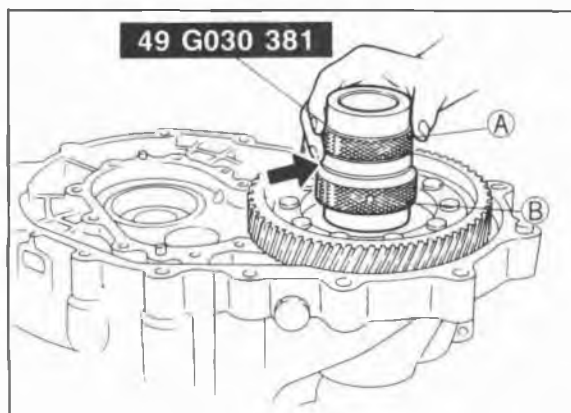
**Note**

To inspect and adjust the preload, use the SST shown below.



83U07B-380

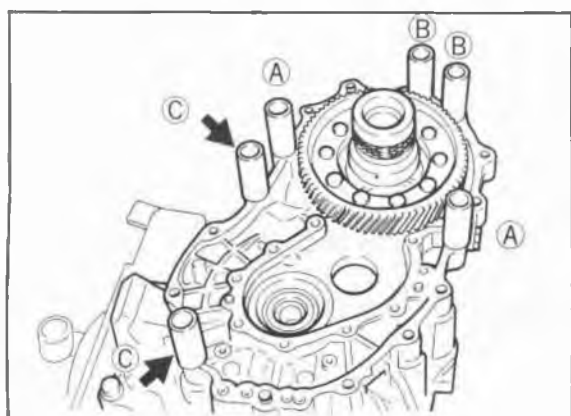
## 7B ASSEMBLY



76G07B-180

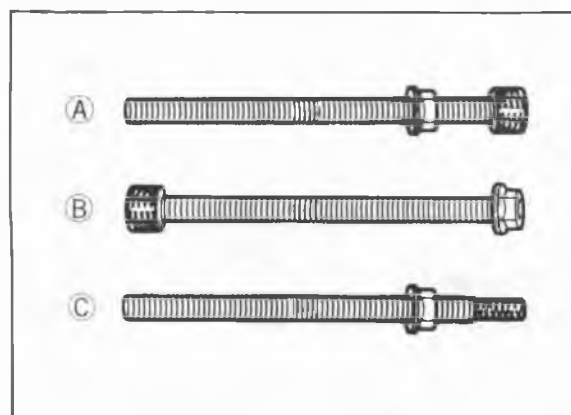
- (1) Remove the bearing outer race and adjust shims from the transaxle case. (Refer to page 7B—106)
- (2) Set the differential assembly into the converter housing.
- (3) Install the outer race removed in step (1) into the **SST**; then set them on the differential assembly.

**Caution**  
Eliminate the gap by turning either A or B of the selector.



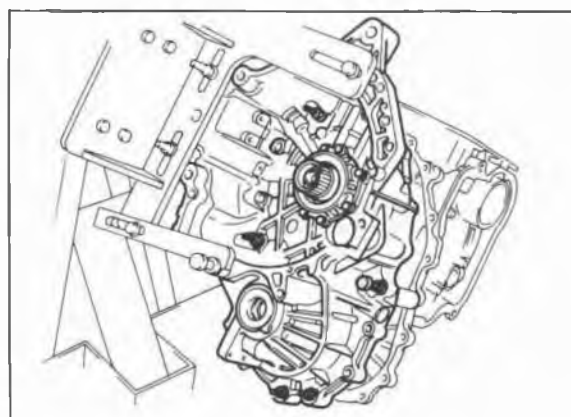
83U07B-382

- (4) Set the six **SST** in the positions shown.



83U07B-383

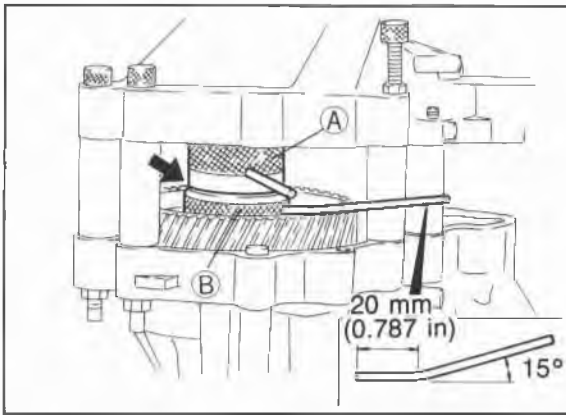
**Note**  
Install the bolts in the positions shown in the illustration above.



83U07B-384

- (5) Set the transaxle case on the selectors.
- (6) Tighten the **SST** (bolts) to the specified torque.

**Tightening torque:**  
37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)



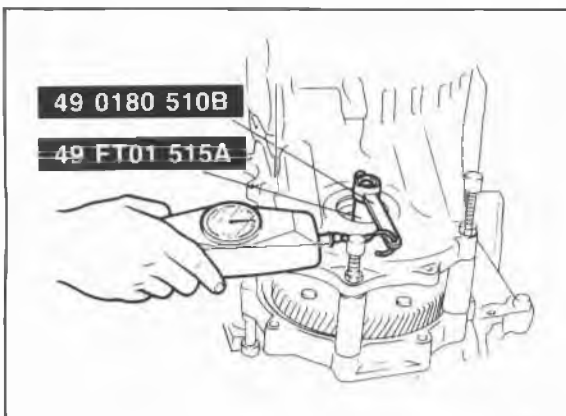
86U07B-371

- (7) Turn the **SST** (selector) to increase the clearance indicated by the arrow with the **SST** (bars), until it no longer turns.

**Note**

- a) This is to seat the bearings.  
b) To turn the **SST** (B), bend the bar as shown.

- (8) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).



86U07B-372

- (9) Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft.  
(10) Mount the **SST** and pull scale or torque wrench.  
(11) Widen the clearance between A and B to obtain the specified preload/pull scale reading.

**Preload:**

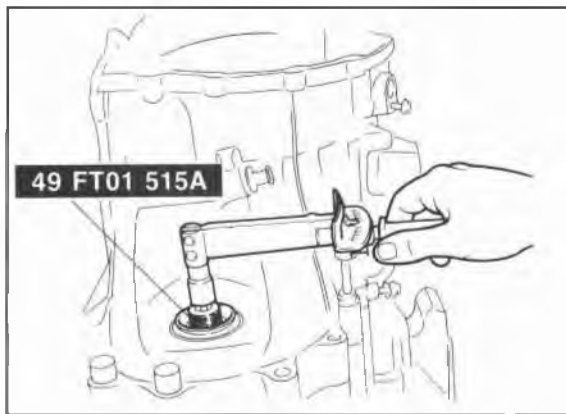
**0.5 N·m (5 cm·kg, 4.3 in·lb)**

**Reading on pull scale:**

**5 N (0.5 kg, 1.1 lb)**

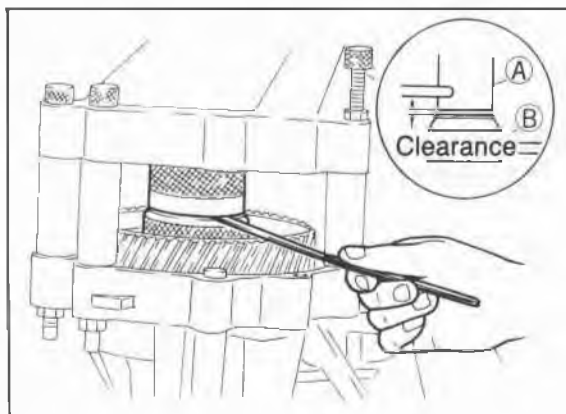
**Note**

**Read the preload when the differential starts to turn.**



76G07B-224

- (12) Measure the clearance between A and B.  
(13) Add **0.3 mm (0.0118 in)** to the measured clearance, and select the shim(s) closest in value to that measurement.



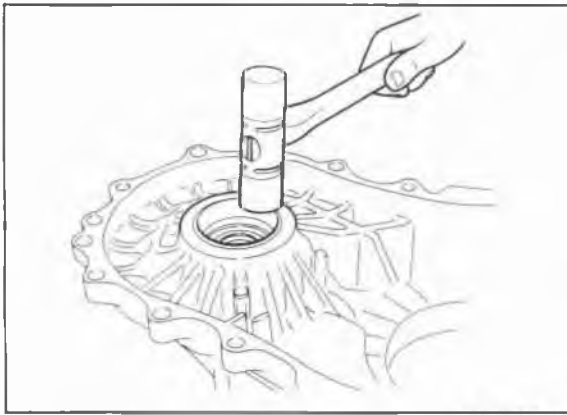
86U07B-374

Thickness of shim	
0.10 mm (0.004 in)	0.20 mm (0.008 in)
0.12 mm (0.005 in)	0.50 mm (0.020 in)
0.14 mm (0.006 in)	0.70 mm (0.028 in)
0.16 mm (0.0063 in)	1.00 mm (0.039 in)
0.18 mm (0.007 in)	

**Caution**

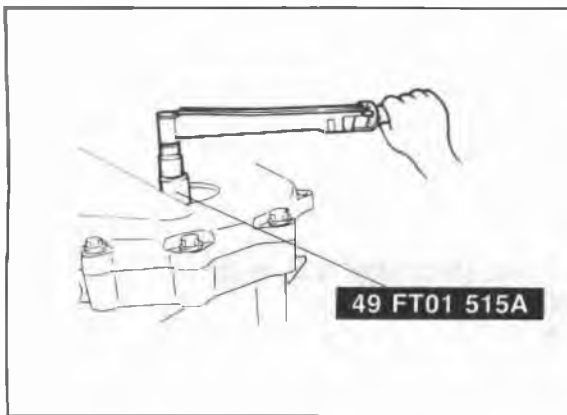
- a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.  
b) The maximum allowable number of shims is 3.

## 7B ASSEMBLY



83U07B-389

- (14) Remove the transaxle case and selector.
- (15) Install the required shim(s) and tap the bearing race into the transaxle case.



83U07B-390

- (16) Install the transaxle case.

**Tightening torque:**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

- (17) Check that the preload is within specification. If not within specification, return to step (2).

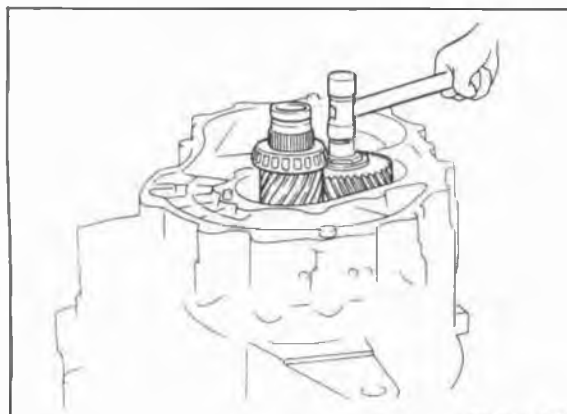
**Preload: 2.9—3.9 N·m**

**(30—40 cm·kg, 26—35 in·lb)**

**Reading on pull scale: 29—39 N**

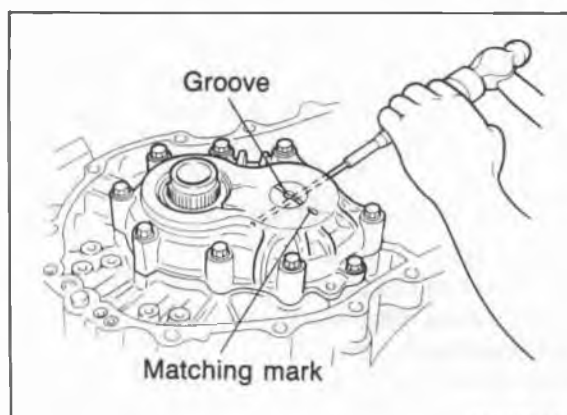
**(3.0—4.0 kg, 6.6—8.8 lb)**

- (18) Remove the transaxle case and differential assembly.



83U07B-391

3. Install the idle gear and output gear as an assembly by tapping in with a plastic hammer.



83U07B-392

4. Install the bearing housing.

- (1) Install the bearing housing on the converter housing.

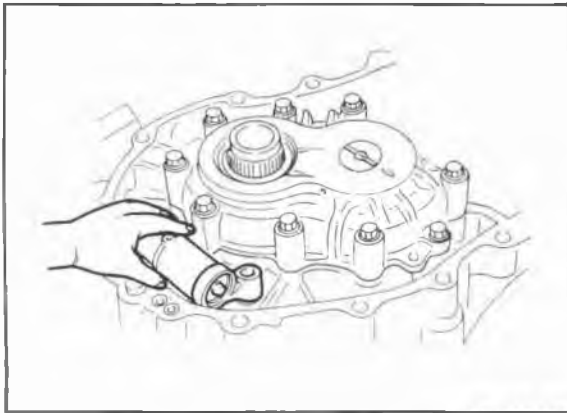
**Tightening torque:**

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

- (2) Align the groove on the idle shaft with the matching mark on the bearing housing.
- (3) Tap the roll pin in with a pin punch and hammer.

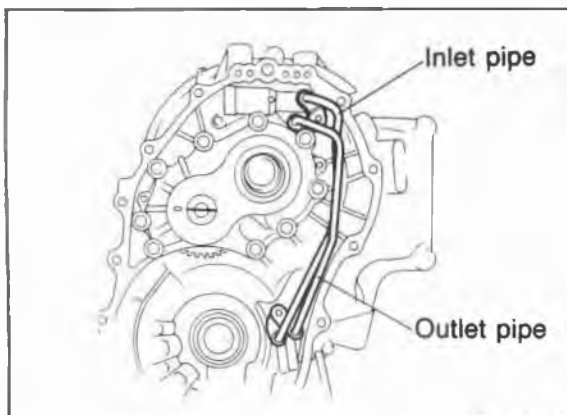


## ASSEMBLY 7B



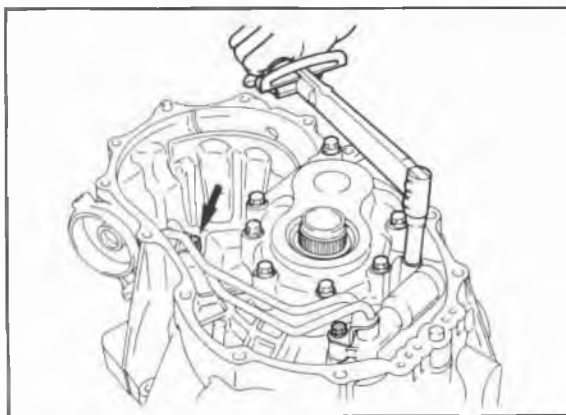
83U07B-393

5. Apply ATF to the O-rings and install them into the 2-3 accumulator; then temporarily install the 2-3 accumulator piston assembly in the converter housing.



83U07B-394

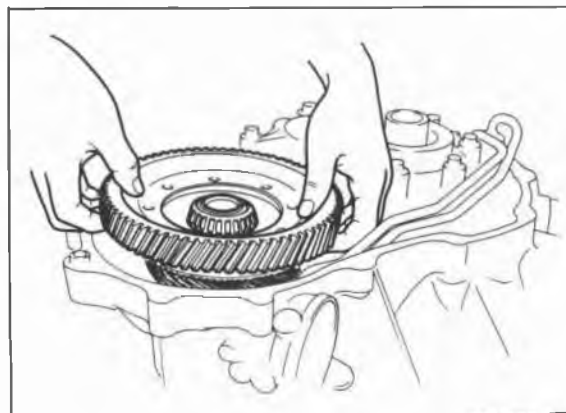
6. Apply ATF to the O-rings and install them onto the governor inlet pipe and governor outlet pipe; then temporarily install the inlet and outlet pipes.



83U07B-395

7. Tighten the bolts.

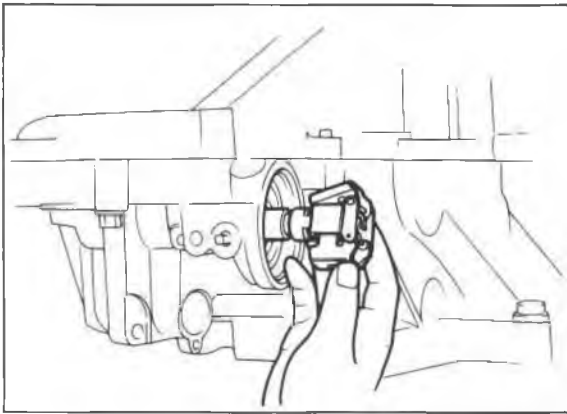
**Tightening torque: 8—11 Nm  
(80—110 cm-kg, 69—95 in-lb)**



83U07B-396

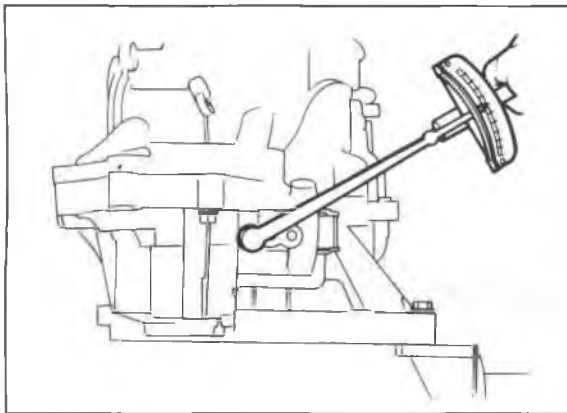
8. Set the differential assembly into the converter housing.

## 7B ASSEMBLY



83U07B-397

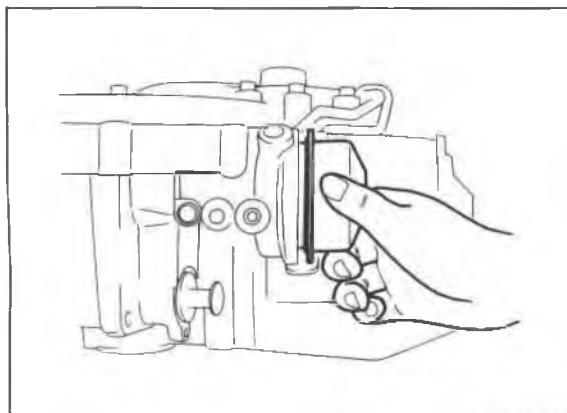
9. Install the governor assembly.
  - (1) Install the governor assembly.



83U07B-398

- (2) Install the stopper bolt.

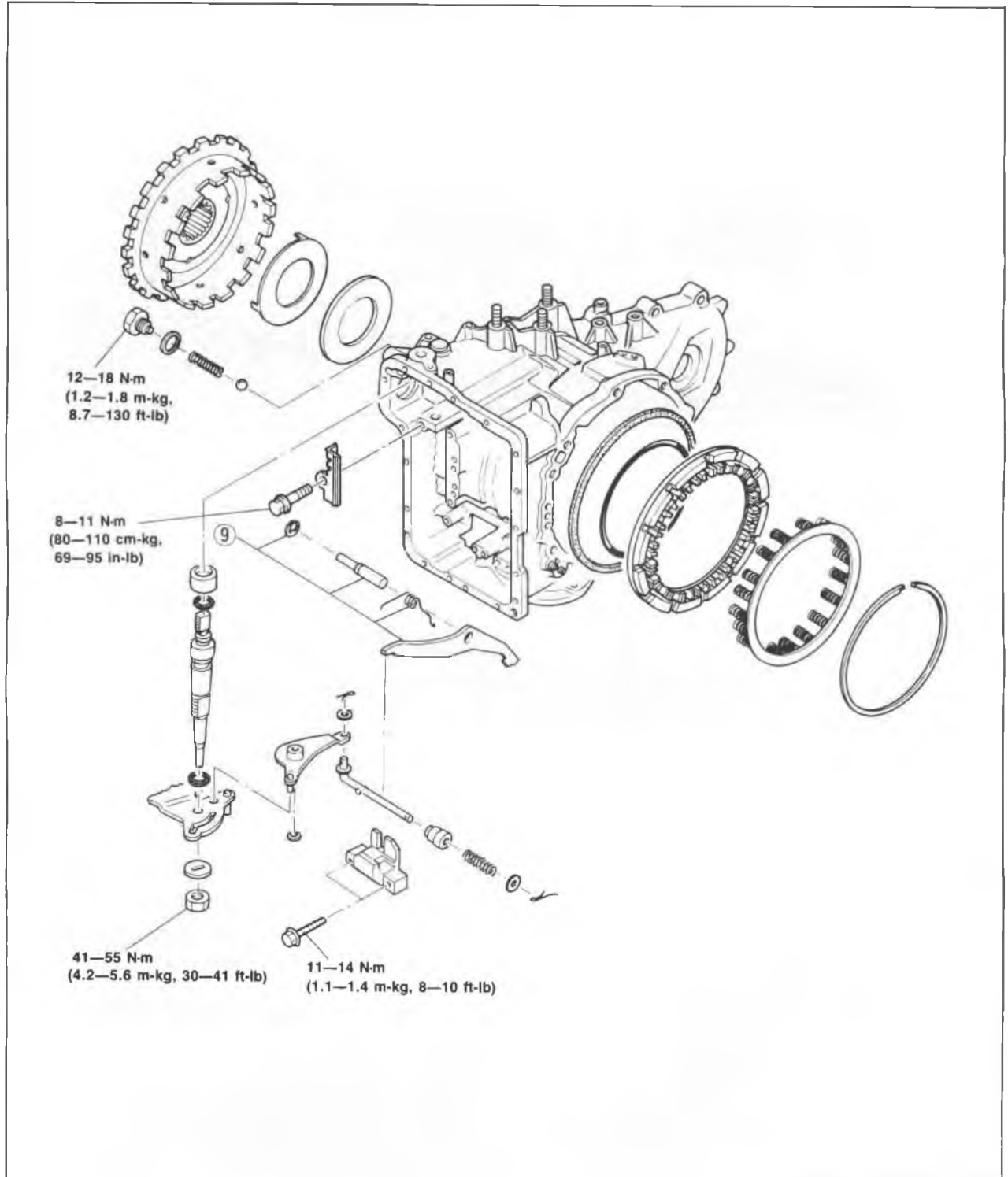
**Tightening torque: 6—9 N·m  
(60—90 cm·kg, 52—78 in·lb)**



83U07B-399

- (3) Install the O-ring on the governor cover.
  - (4) Install the governor cover and clip.

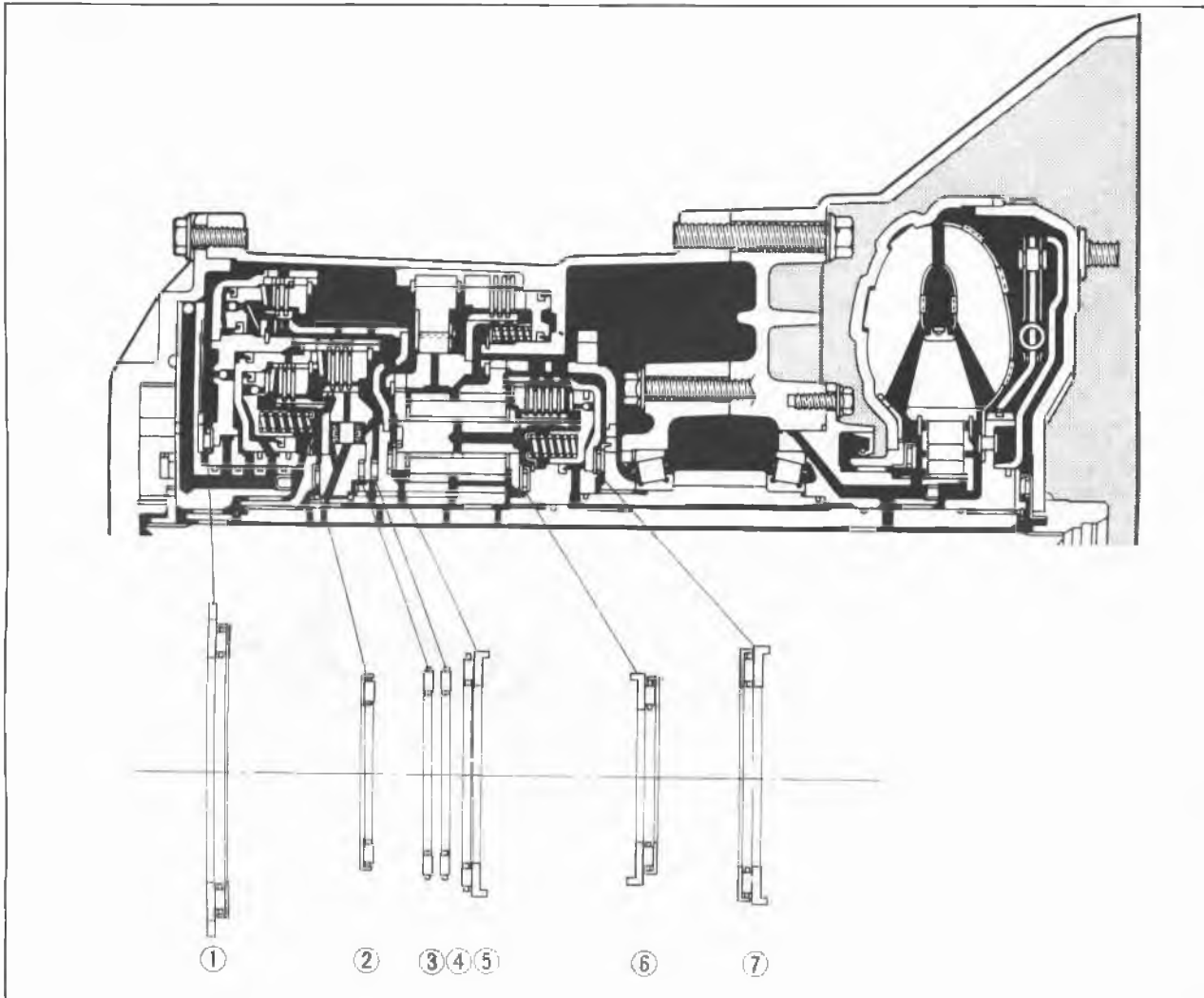
## ASSEMBLY-STEP 2 Torque Specifications



86U07B-379

# 7B ASSEMBLY

## Thrust Washer, Bearing, and Race Locations



86U07B-380

### Outer diameter of bearing and race

mm (in)

	1	2	3	4	5	6	7
Bearing	86.0 (3.39)	56.1 (2.21)	62.1 (2.44)	62.1 (2.44)	72.0 (2.83)	56.1 (2.21)	72.1 (2.84)
Race	88.0 (3.46)	—	—	—	72.0 (2.83)	57.0 (2.21)	72.0 (2.83)

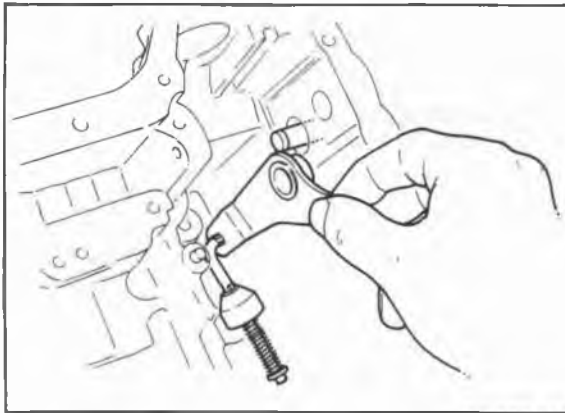
**Note:** Install with petroleum jelly to prevent the thrust bearing or bearing race from falling out.



86U07B-381

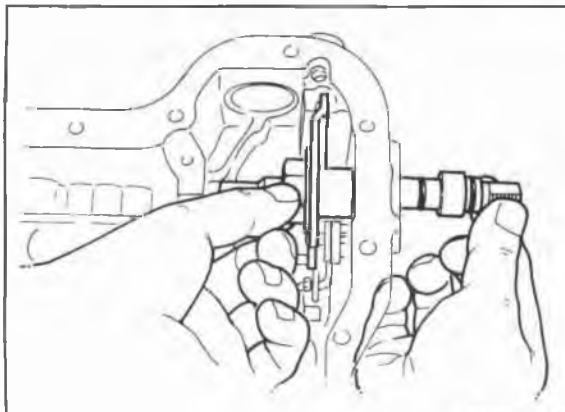
### Procedure

1. Install the parking pawl.
  - (1) Install the parking pawl and shaft.
  - (2) Install the spring and snap ring.
  - (3) Move the manual shaft and check that the parking pawl operates.



86U07B-382

2. Install the parking assist lever and snap ring.

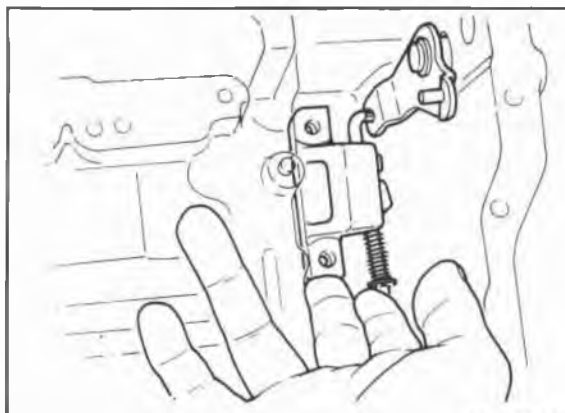


86U07B-383

3. Install the actuator support.

**Tightening torque:**

**11—14 N·m (1.1—1.4 m·kg, 8.0—10 ft·lb)**



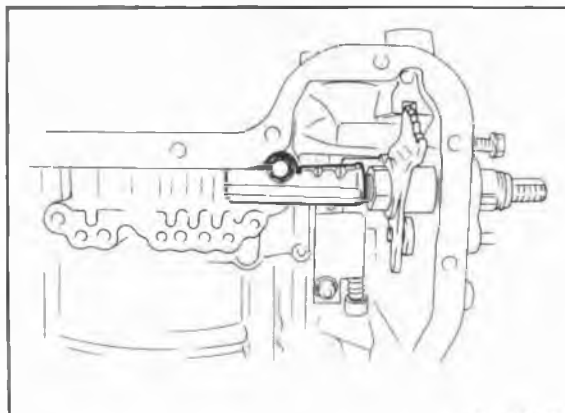
86U07B-384

4. Install the manual shaft and manual plate.

- (1) Install the manual plate, spacer, washer, and nut.  
(2) Tighten the nut to specified torque.

**Tightening torque:**

**41—55 N·m (4.2—5.6 m·kg, 30—41 ft·lb)**



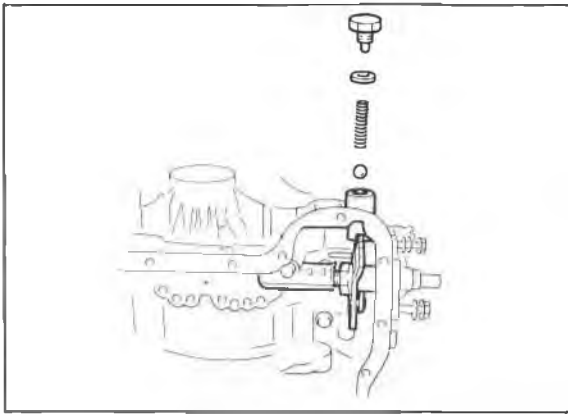
86U07B-385

- (3) Install the bracket.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

## 7B ASSEMBLY

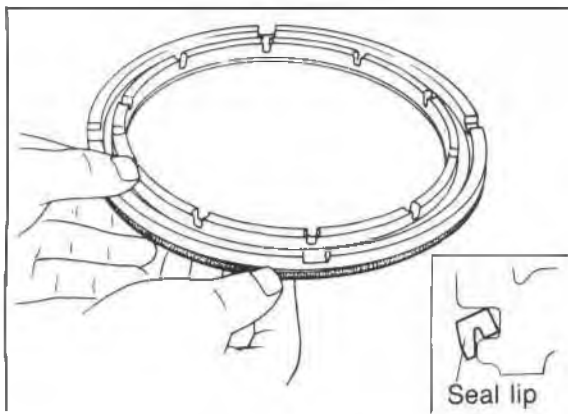


86U07B-386

- (4) Install the detent ball, spring, washer and plug; then tighten the plug.

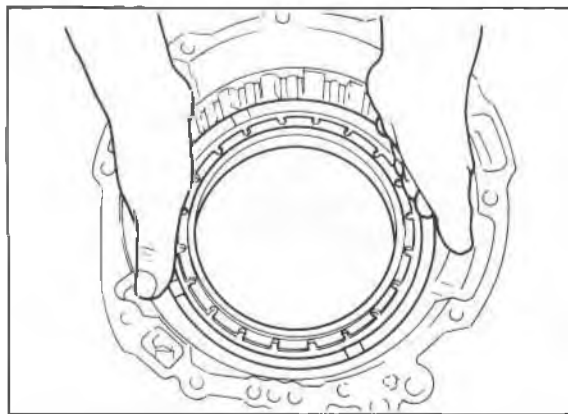
**Tightening torque:**

**12—18 N·m (1.2—1.8 m·kg, 8.7—13 ft·lb)**



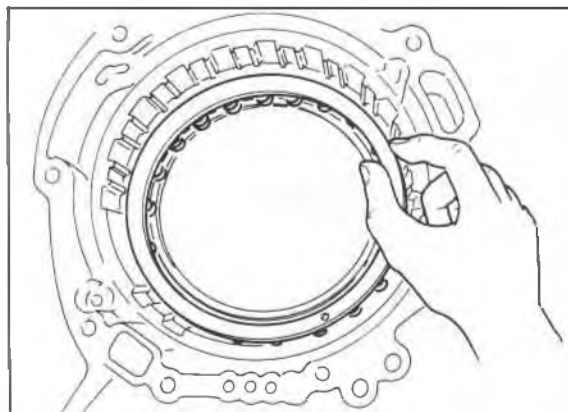
76G07B-181

5. Install the low and reverse brake piston.
  - (1) Apply ATF to the inner and outer seals, and install them to the low and reverse brake piston.
  - (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the case.



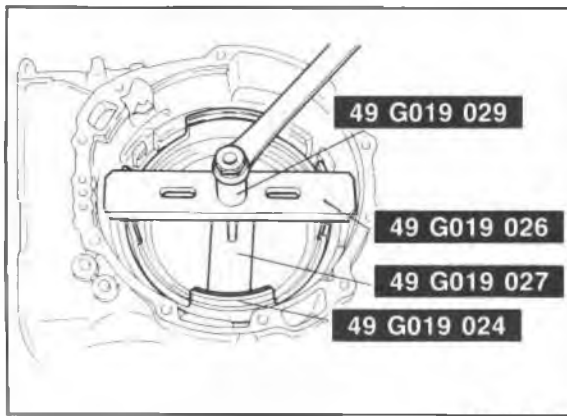
86U07B-388

- (3) Install the low and reverse brake piston by pushing evenly around the circumference, being careful not to damage the outer seal.



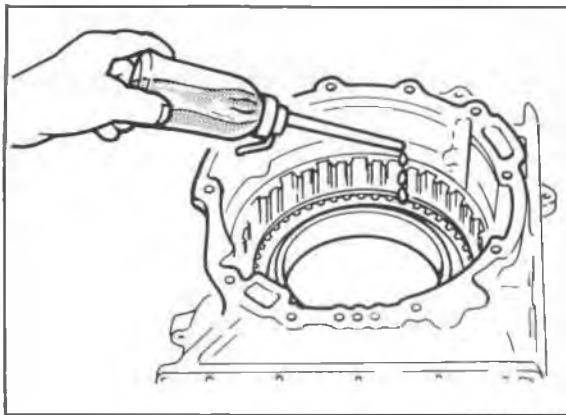
86U07B-389

- (4) Install the spring and retainer assembly.



86U07B-390

- (5) Install the **SST** in the case.
- (6) Compress the spring and retainer assembly.
- (7) Install the snap ring with snap ring pliers.
- (8) Remove the **SST**.

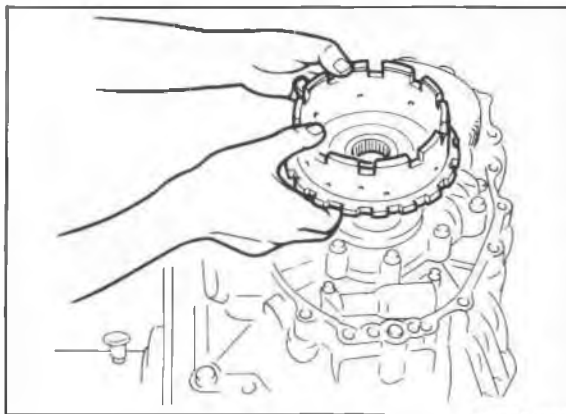


76G07B-182

6. Check the low and reverse brake piston operation.
  - (1) Pour in ATF so that the low and reverse brake piston is fully submerged.
  - (2) Check that no bubbles come from between the piston and seals when applying compressed air through the fluid passage. (Refer to page 7B—204)

**Caution**

The compressed air must be under 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) and not applied for over 3 seconds.

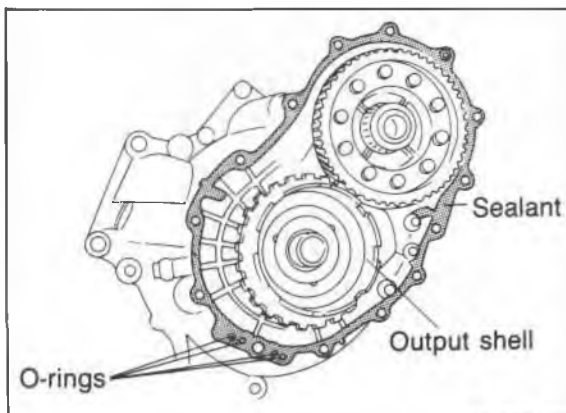


86U07B-392

7. Install the output shell to the output gear, and install the bearing race onto the output shell.

**Bearing race outer diameter.**

**72.0 mm (2.83 in)**



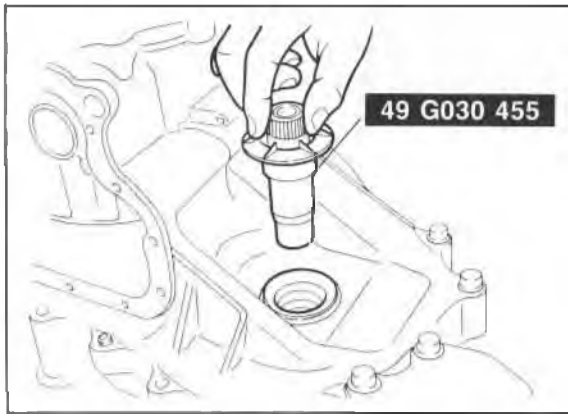
86U07B-393

8. Apply a thin coat of silicon sealant to the contact surfaces of the converter housing and transaxle case.
9. Install the O-rings.
10. Install the transaxle case to the converter housing.

**Tightening torque:**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

# 7B ASSEMBLY

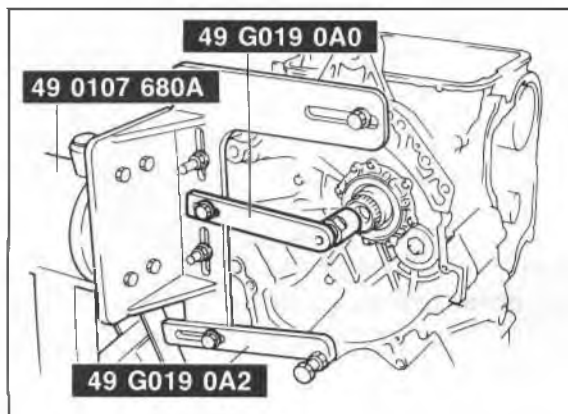


86U07B-394

11. Install the **SST** to the differential side gear.

### Caution

Failure to install the **SST** may allow the differential side gears to become mispositioned.



86U07B-395

### ASSEMBLY-STEP 3

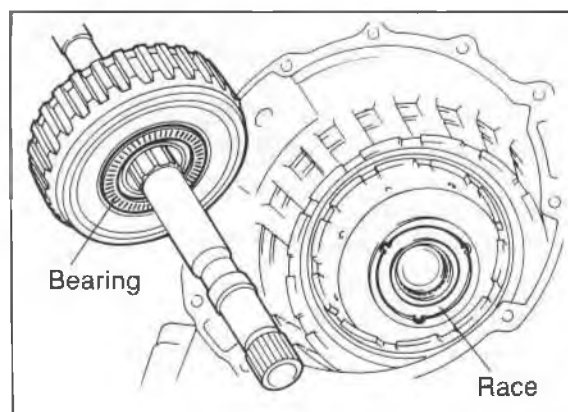
#### Procedure

1. Temporarily install the **SST** to hold the turbine shaft.



86U07B-396

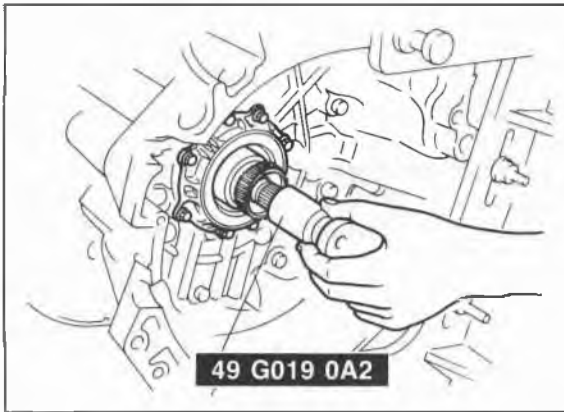
2. Install the turbine shaft and 3-4 clutch assembly.
  - (1) Assemble the turbine shaft and 3-4 clutch assembly.



86U07B-397

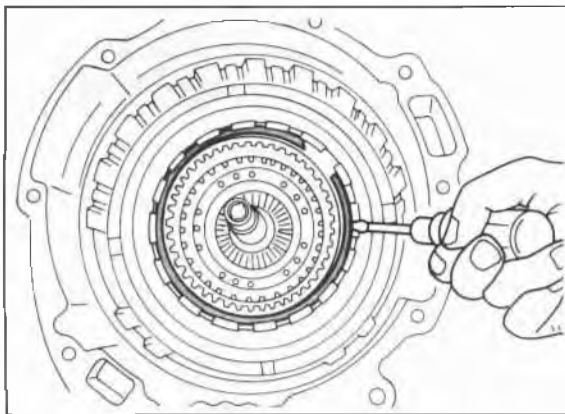
- (2) Check that the thrust bearing and bearing race are installed in the correct position.
  - (3) Install the turbine shaft and 3-4 clutch assembly into the transaxle case.





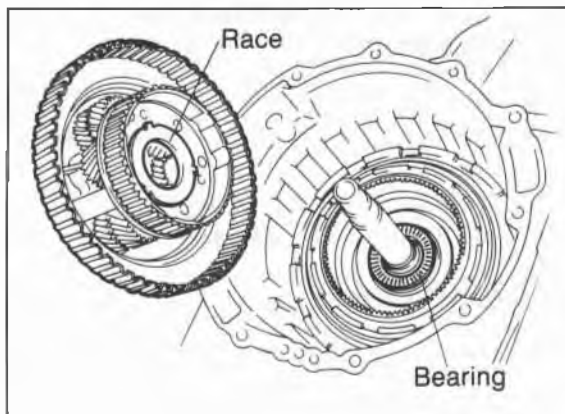
86U07B-398

3. Adjust the **SST** position so that it contacts and holds the turbine shaft.



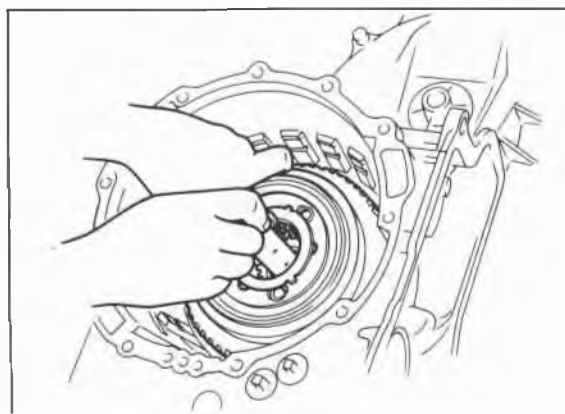
86U07B-399

4. Install the internal gear.
  - (1) Install the internal gear to the 3-4 clutch drum.
  - (2) Install the snap ring.



86U07B-400

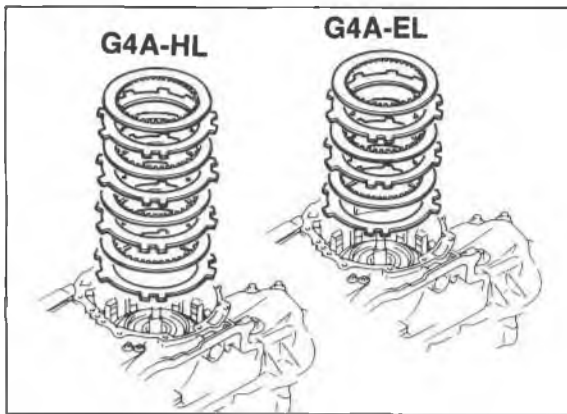
5. Install the carrier hub assembly.
  - (1) Check that the thrust bearing and bearing race are installed in the correct position.



36U07B-401

- (2) Hold the turbine shaft with one hand to prevent it from rotating.
  - (3) Install the carrier hub assembly into the 3-4 clutch drum by rotating it.

# 7B ASSEMBLY



76G07B-183

6. Install the drive and driven plates.

**Note**

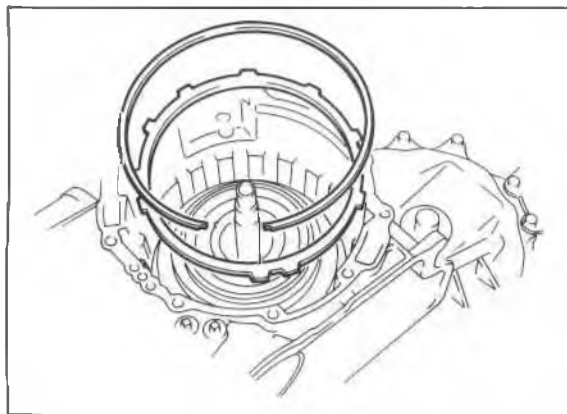
**Installation order:**

**G4A-EL**

**Driven-Drive-Driven-Drive-Driven-Drive**

**G4A-HL**

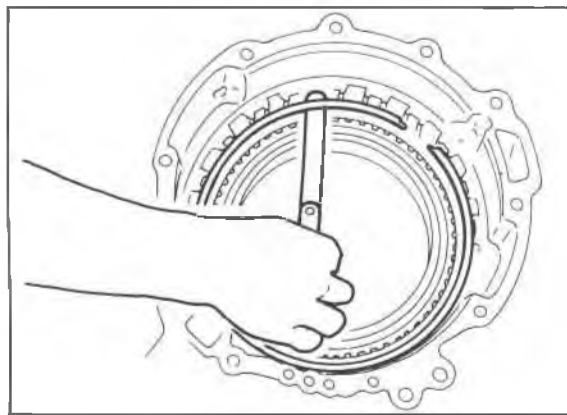
**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**



86U07B-403

7. Install the retaining plate.

8. Install the snap ring.



76G07B-184

9. Check the low and reverse brake clearance.

(1) Measure the clearance between the snap ring and the low and reverse brake retaining plate.

(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Low and reverse brake clearance:**

**2.1—2.4 mm (0.083—0.094 in)**

**Retaining plate sizes**

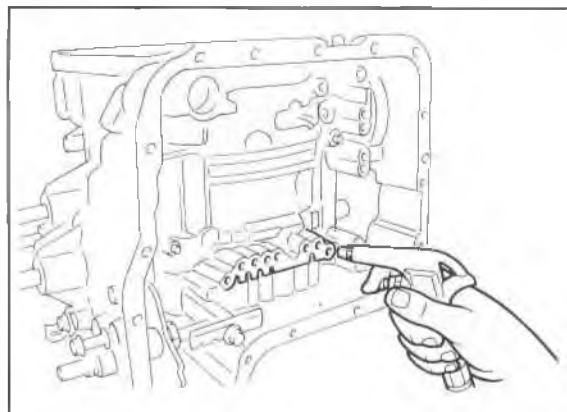
mm (in)

**G4A-EL**

10.0 (0.394)	10.2 (0.402)	10.4 (0.410)
10.6 (0.417)	10.8 (0.425)	

**G4A-HL**

6.8 (0.268)	7.0 (0.276)	7.2 (0.283)
7.4 (0.291)	7.6 (0.299)	7.8 (0.307)

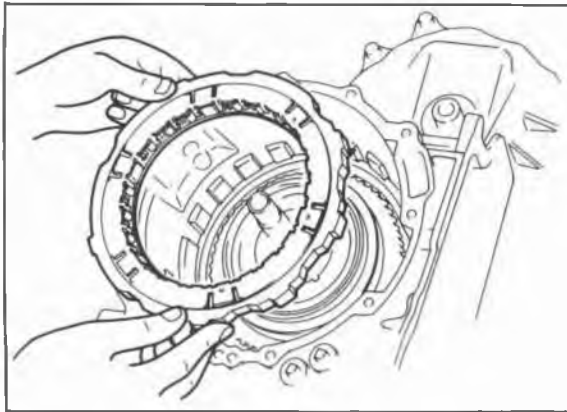


86U07B-405

10. Check the low and reverse brake operation by applying compressed air through the fluid passage as shown in the figure.

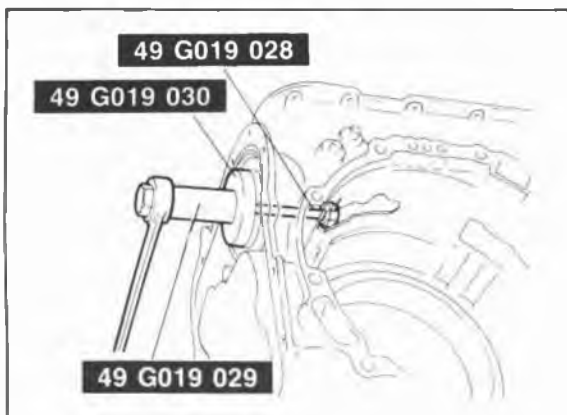
**Air pressure:**

**392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi)**



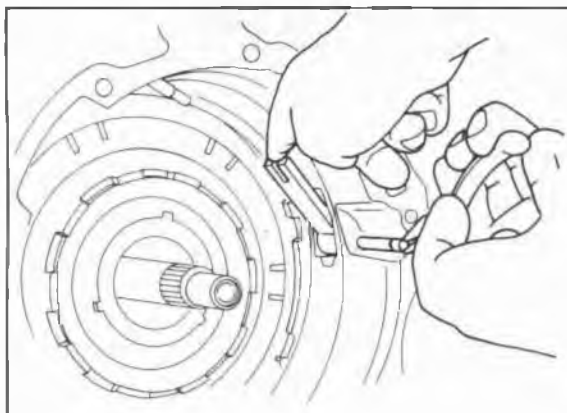
86U07B-406

11. Install the one-way clutch.
  - (1) Hold the one-way clutch horizontally.
  - (2) Install it by turning the carrier hub assembly counterclockwise.
  - (3) Install the snap ring.



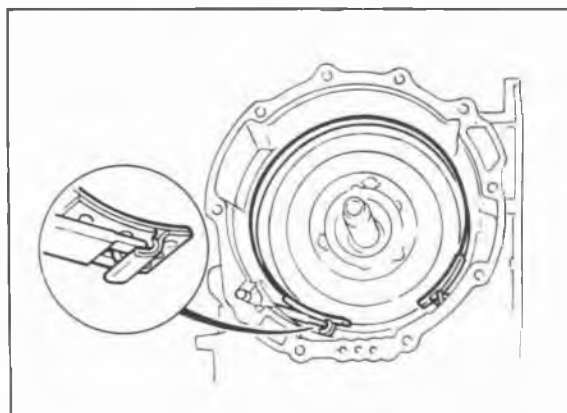
86U07B-407

12. Install the servo to the transaxle case.
  - (1) Install the servo spring and servo.
  - (2) Compress the servo with the **SST**.
  - (3) Install the snap ring.
  - (4) Remove the **SST**.
  - (5) Install the piston stem.



86U07B-408

13. Install the anchor strut.

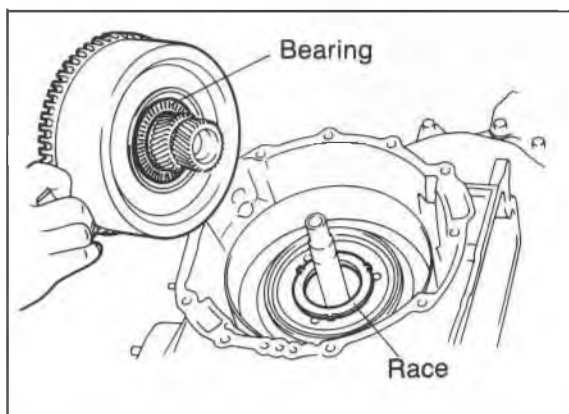


86U07B-409

14. Install the 2-4 brake band in the transaxle case so that it is expanded fully.

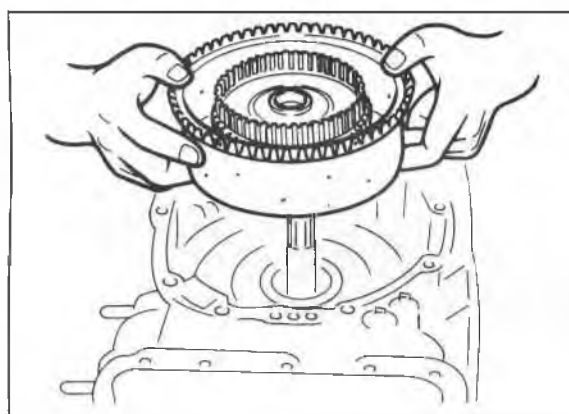
**Note**  
**Interlock the 2-4 brake band and anchor strut as shown.**

## 7B ASSEMBLY



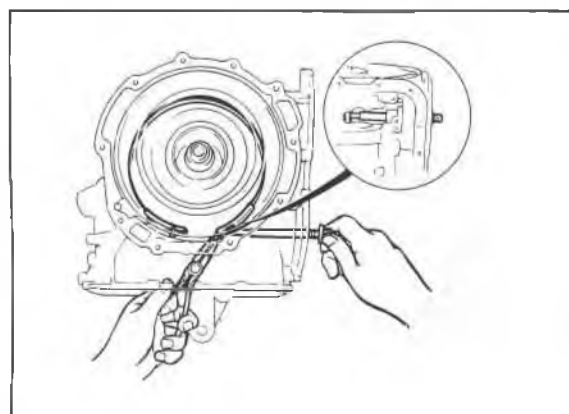
86U07B-410

15. Install the small sun gear and one-way clutch.  
(1) Check that the thrust bearing and bearing race are installed in the correct position.



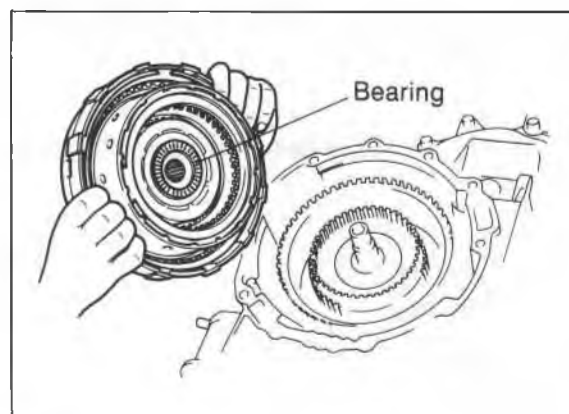
86U07B-411

- (2) Install the small sun gear and one-way clutch by rotating it.



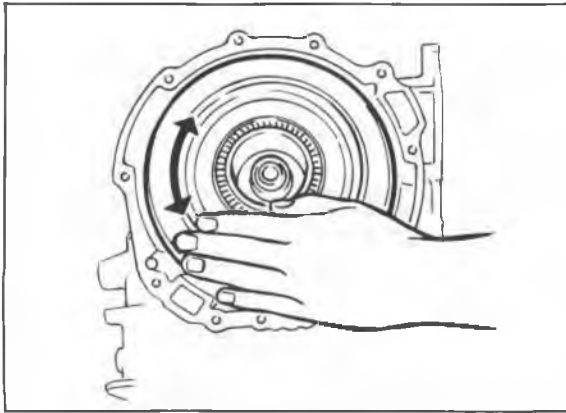
86U07B-412

16. Install the piston stem in the position while pulling out the 2-4 brake band with a pliers; then loosely tighten the piston stem by hand.



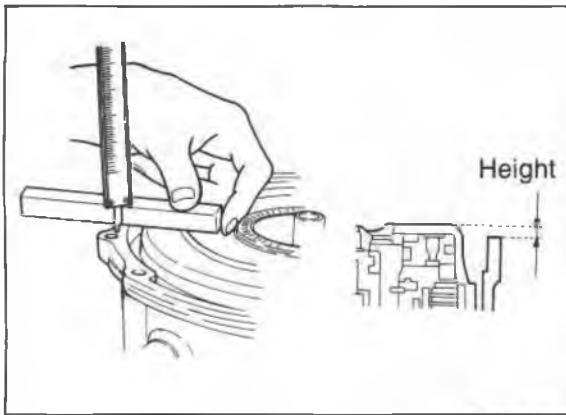
86U07B-413

17. Install the clutch assembly.  
(1) Check that the thrust bearing is installed in the correct position.



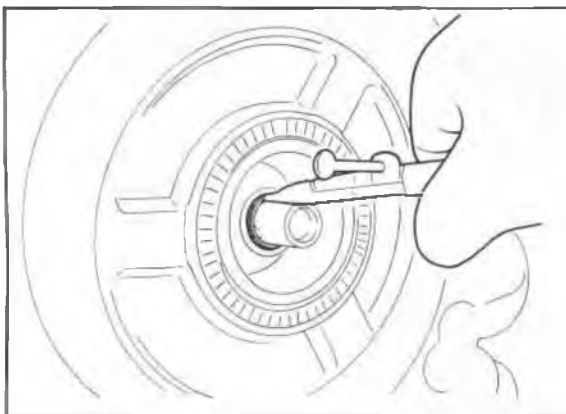
86U07B-414

(2) Install the clutch assembly by rotating it.



76G07B-185

**Note**  
Measure the height difference between the reverse and forward drum and transaxle case.  
Standard height: 0.8 mm (0.032 in)

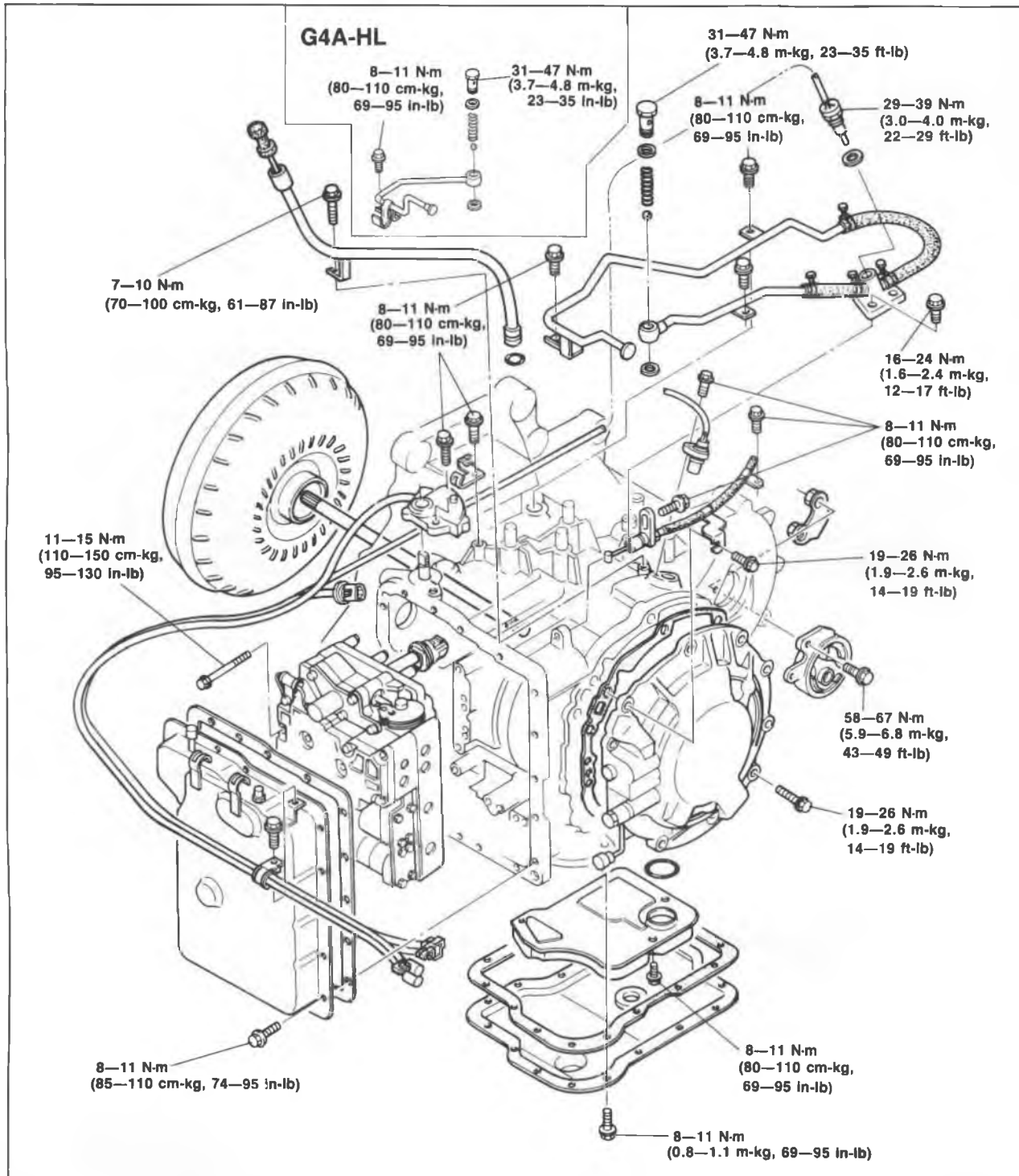


86U07B-416

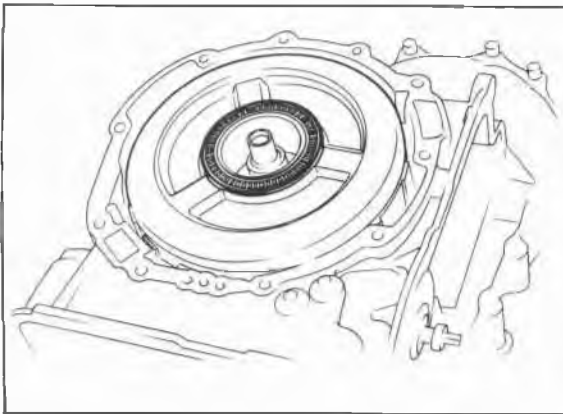
17. Install the snap ring into the bottom ring groove of the turbine shaft.

# 7B ASSEMBLY

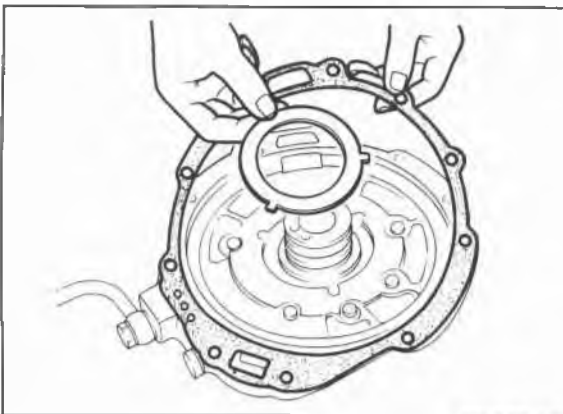
## ASSEMBLY-STEP 4 Torque Specifications



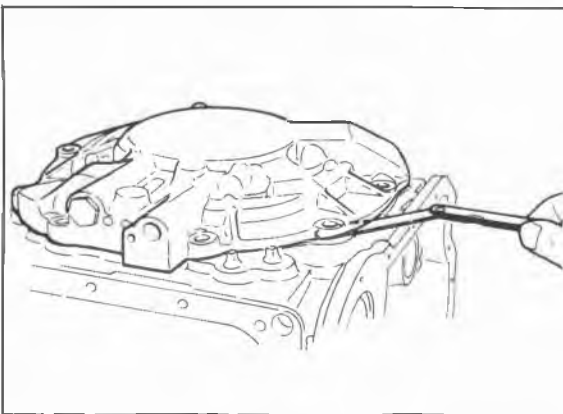
86U07B-417



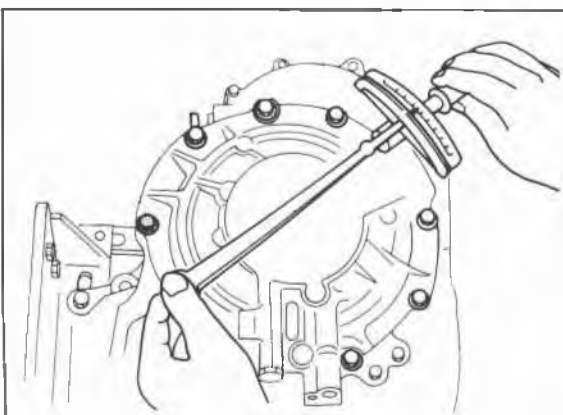
86U07B-418



86U07B-419



76G07B-223



86U07B-421

## Procedure

1. Use the following procedure to adjust the total end play and select a suitable bearing race.
  - (1) Set the thrust bearing onto the clutch assembly.

- (2) Remove the previous race and gasket.
- (3) Set the thickest bearing race **2.2 mm (0.087 in)** onto the oil pump.
- (4) Set the oil pump onto the clutch assembly.

- (5) Measure clearance between the transaxle case and oil pump.
- (6) Select a suitable bearing race from the chart below.

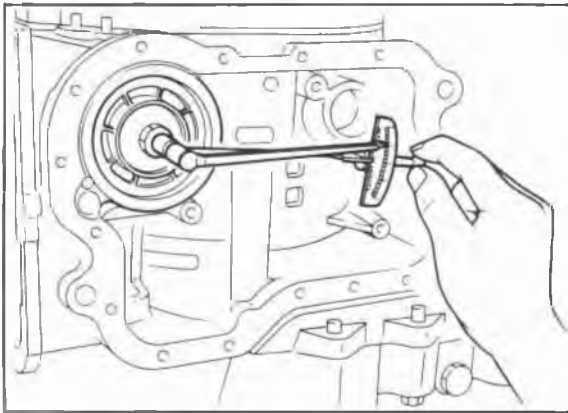
Clearance	mm (in)	Select this bearing race	mm (in)
0.91—1.10	(0.036—0.043)	1.2	(0.047)
0.71—0.90	(0.028—0.035)	1.4	(0.055)
0.51—0.70	(0.020—0.027)	1.6	(0.063)
0.31—0.50	(0.012—0.019)	1.8	(0.071)
0.11—0.30	(0.004—0.011)	2.0	(0.078)
0—0.10	(0—0.003)	2.2	(0.087)

- (7) Remove the oil pump.
- (8) Place the selected bearing race and a new gasket onto the oil pump.
- (9) Install the oil pump onto the clutch assembly.

## Tightening torque:

**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

## 7B ASSEMBLY

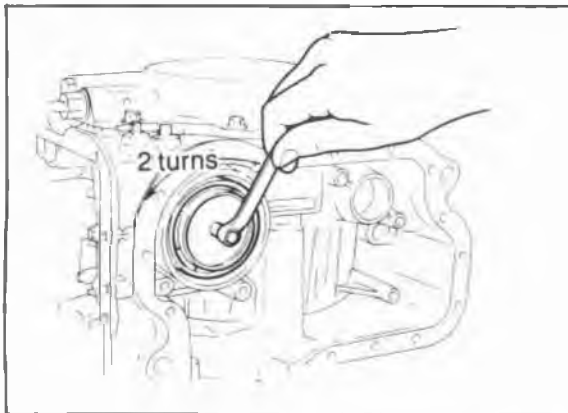


86U07B-422

2. Adjust the 2-4 brake band.
  - (1) Loosen the locknut and tighten the piston stem to the specified torque.

**Tightening torque:**

**9—11 N·m (90—110 cm·kg, 78—95 in·lb)**

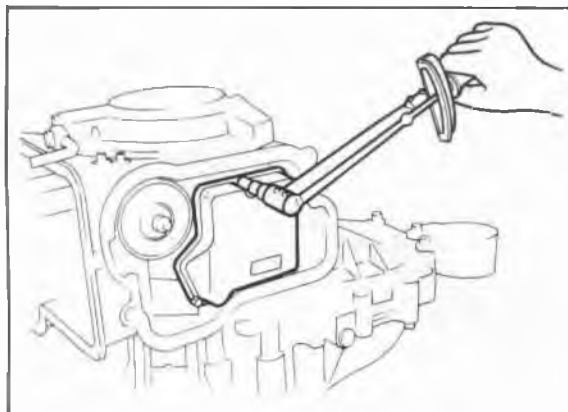


86U07B-423

- (2) Loosen the piston stem 2 turns.
  - (3) Tighten the locknut to the specified torque.

**Tightening torque:**

**25—39 N·m (2.5—4.0 m·kg, 18—29 ft·lb)**

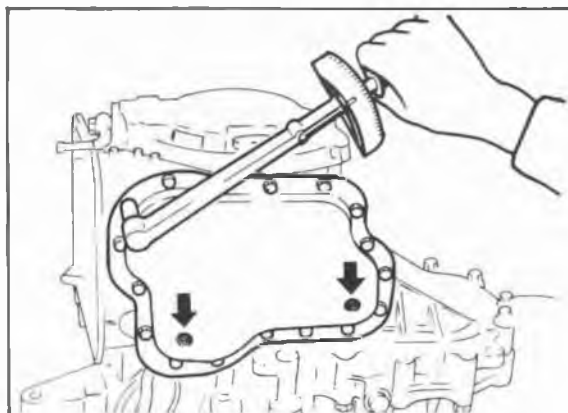


86U07B-424

3. Install the oil strainer along with a new O-ring to the transaxle.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



86U07B-425

4. Install the oil pan along with a new gasket.

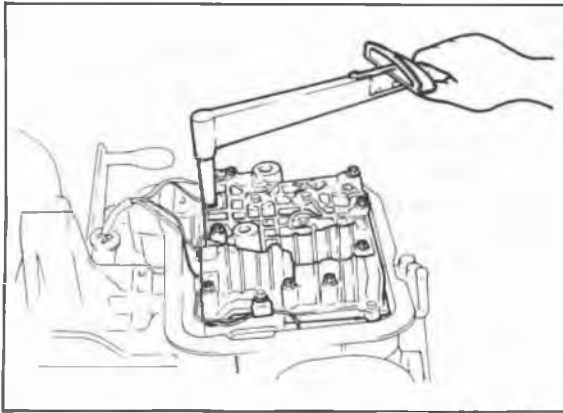
**Tightening torque:**

**8—11 N·m (85—110 cm·kg, 74—95 in·lb)**

**Note**

**Install the magnets in the positions shown in the illustration.**

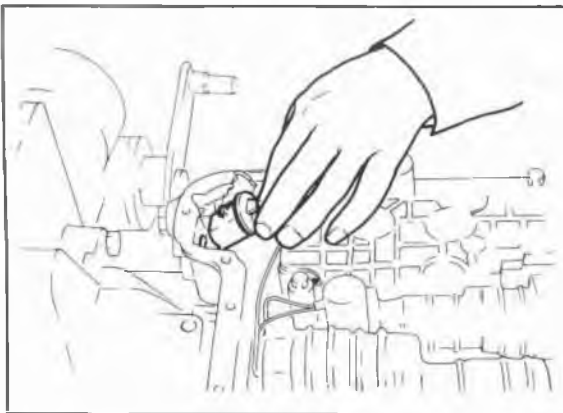




86U07B-426

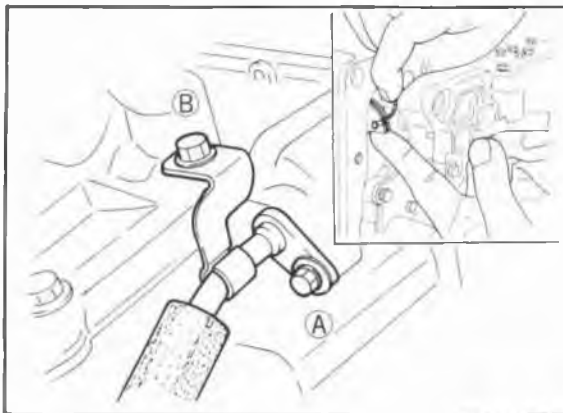
5. Align the manual valve with the pin on the manual plate, and install the control valve body into the transaxle case.

**Tightening torque:**  
**11–15 Nm**  
**(110–150 cm-kg, 95–130 in-lb)**



86U07B-427

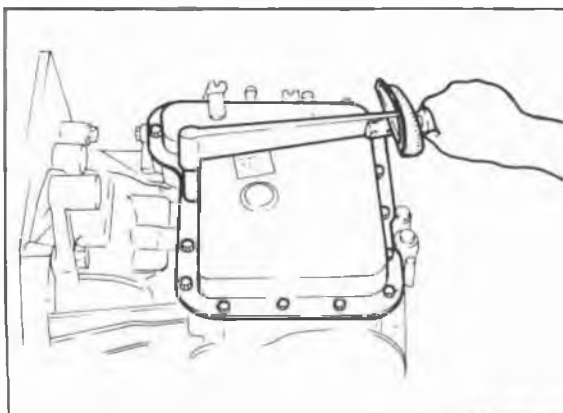
6. Install the solenoid connector and a new O-ring in the transaxle case.



86U07B-428

7. Install a new O-ring on the bracket; then feed the throttle cable through the transaxle case and connect it to the throttle cam.  
 8. Install the throttle cable attaching bolts and bracket.

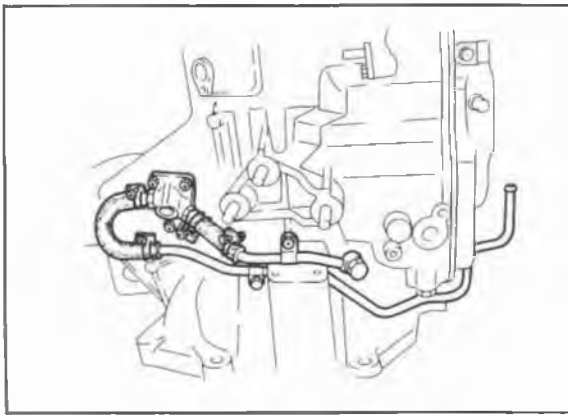
**Tightening torque:**  
**A 8–11 Nm**  
**(80–110 cm-kg, 69–95 in-lb)**  
**B 19–26 Nm**  
**(1.9–2.6 m-kg, 14–19 ft-lb)**



86U07B-429

9. Install the control valve body cover along with a new gasket.

**Tightening torque:**  
**8–11 Nm (85–110 cm-kg, 74–95 in-lb)**



76G07B-186

## 10. G4A-EL

- (1) Install the oil pipes, oil hoses, and switch box as an assembly; then install the harness clip.

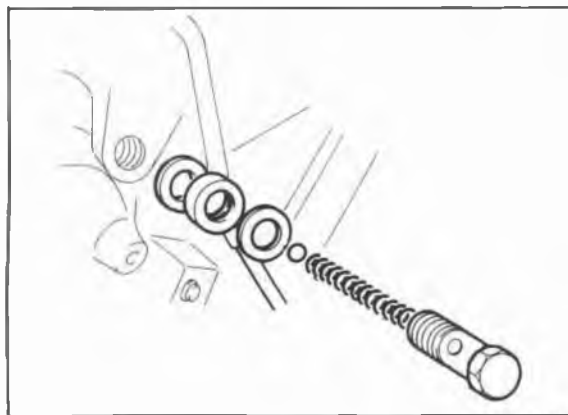
### Tightening torque:

#### Switch box

16—24 N·m (1.6—2.4 m·kg, 12—17 ft·lb)

#### Harness clip

8—11 N·m (80—110 cm·kg, 69—95 in·lb)

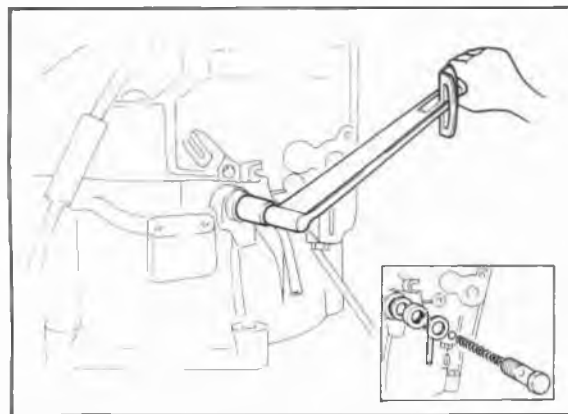


76G07B-187

- (2) Install the ball, spring, gasket, and a plug.

### Tightening torque:

31—47 N·m (3.2—4.8 m·kg, 23—35 ft·lb)

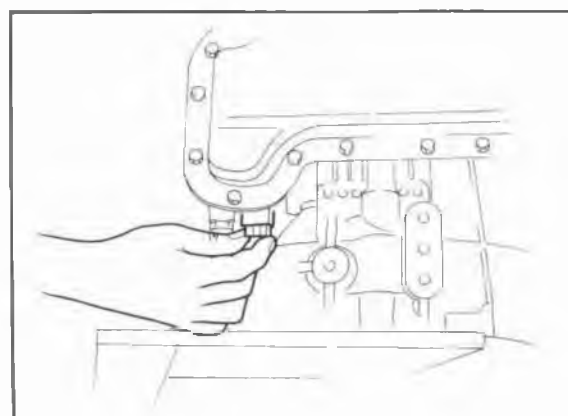


76G07B-188

## G4A-HL

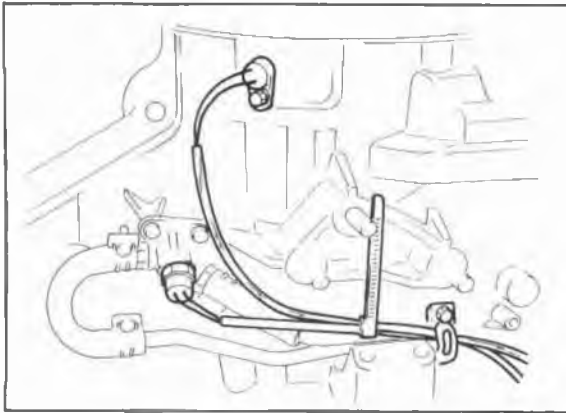
Install the oil pipe, ball, spring, oil pipe, gasket, and plug.

**Tightening torque: 31—47 N·m  
(3.2—4.8 m·kg, 23—35 ft·lb)**



76G07B-189

11. Install the solenoid connector.



76G07B-190

12. Install the pulse generator and fluid temperature switch.

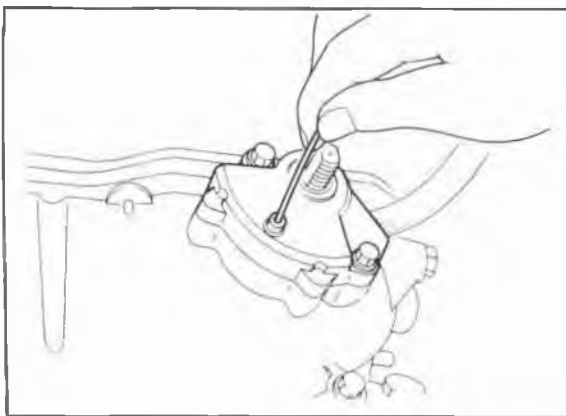
**Tightening torque:**

**Pulse generator**

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

**Fluid temperature switch**

**29—39 Nm (3.0—4.0 m-kg, 22—29 in-lb)**



76G07B-191

13. Install the inhibitor switch.

(1) Turn the manual shaft to the "N" position.

(2) Install the inhibitor switch and loosely tighten the bolts.

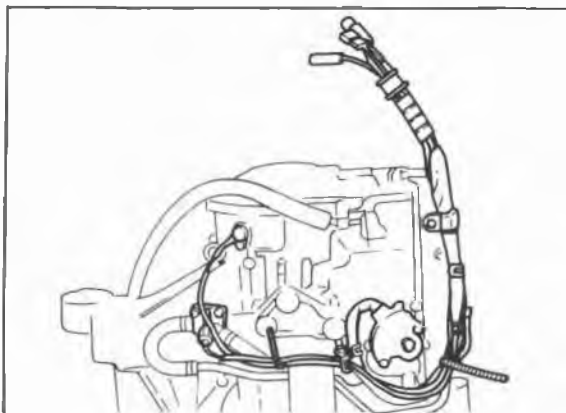
(3) Remove the screw and move the inhibitor switch so that the alignment hole is aligned with the screw hole.

(4) Insert a **2.0 mm (0.079 in)** diameter pin through the holes.

(5) Install the screw; then tighten the bolts to the specified torque.

**Tightening torque:**

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



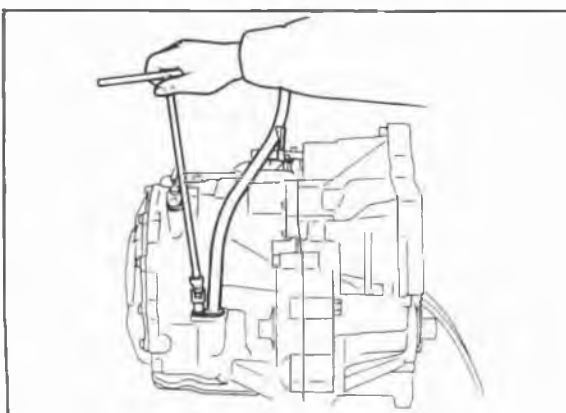
76G07B-192

14. Install the harness with the remaining clip.

**Tightening torque:**

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

15. Remove the transaxle from the **SST**.



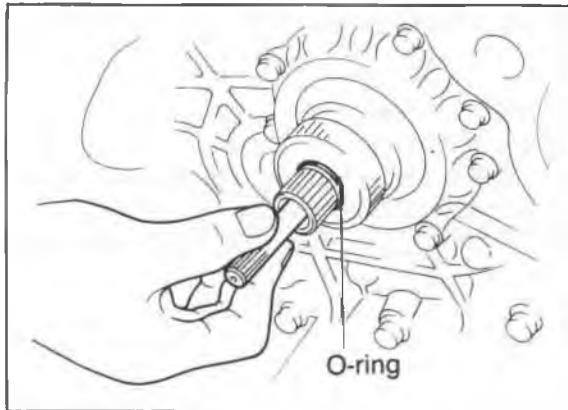
76G07B-193

16. Install the oil level gauge and tube along with a new O-ring to the transaxle case.

**Tightening torque:**

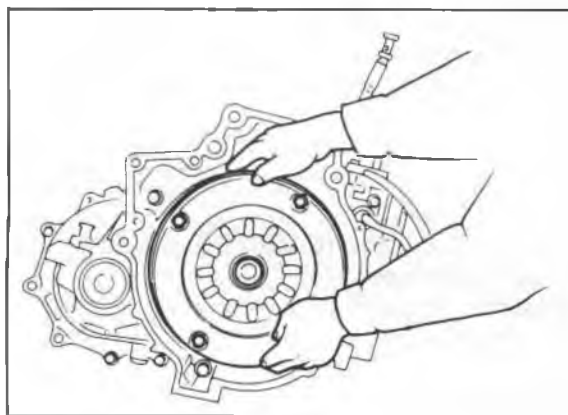
**7—10 Nm (70—100 cm-kg, 61—87 in-lb)**

## 7B ASSEMBLY



76G07B-194

17. Install the oil pump shaft.
18. Install a new O-ring onto the turbine shaft.



76G07B-195

19. Fill the torque converter with ATF if it has been drained and washed.

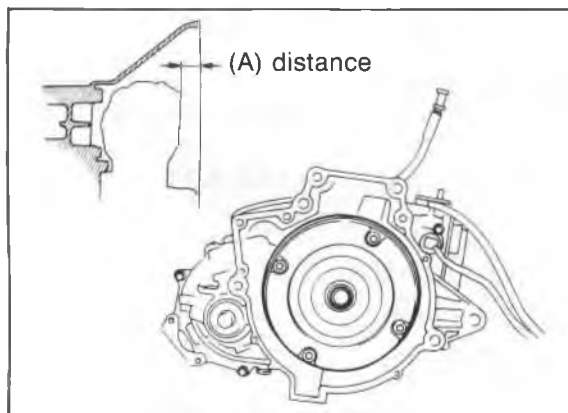
**ATF type: Dexron II or M III**

20. Install the torque converter in the converter housing while rotating it to align the splines.

**Caution**

a) Hold the torque converter in an erect position when filling it with ATF, do not allow the fluid to overflow.

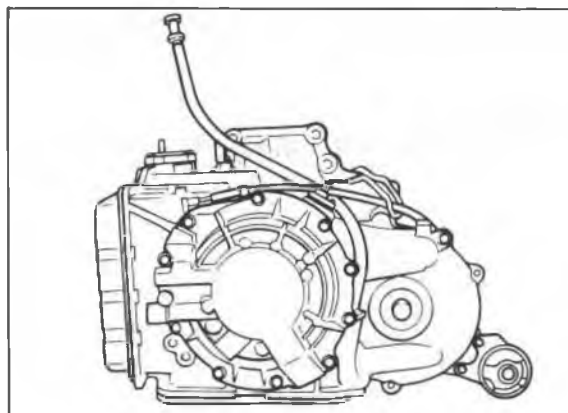
b) If the converter does not fit in easily, do not try to force it; install carefully.



76G07B-196

21. To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the end of the converter housing.

**(A): approx. 25 mm (0.98 in)**



76G07B-197

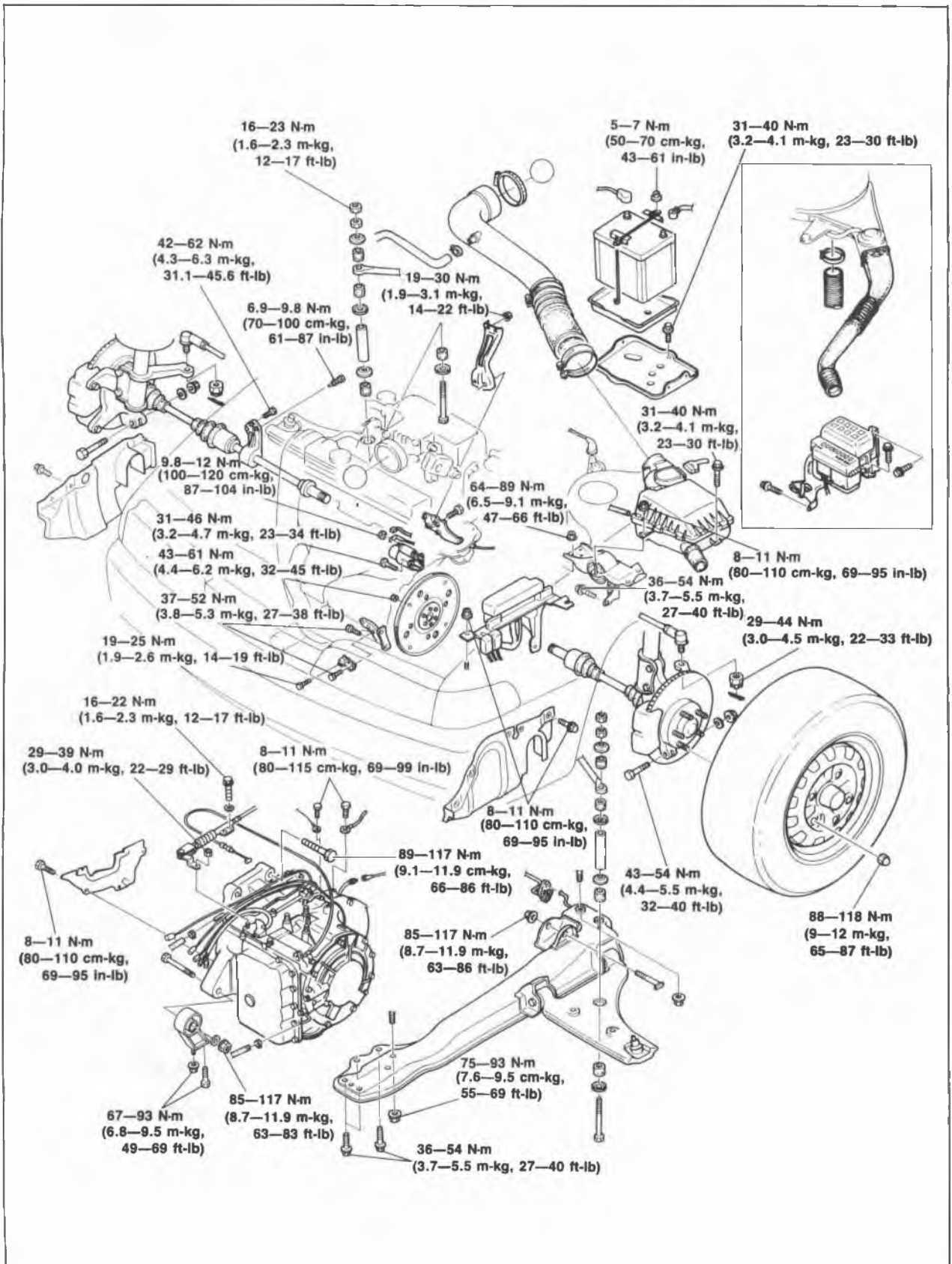
22. Install the engine mount No. 1

**Tightening torque:**

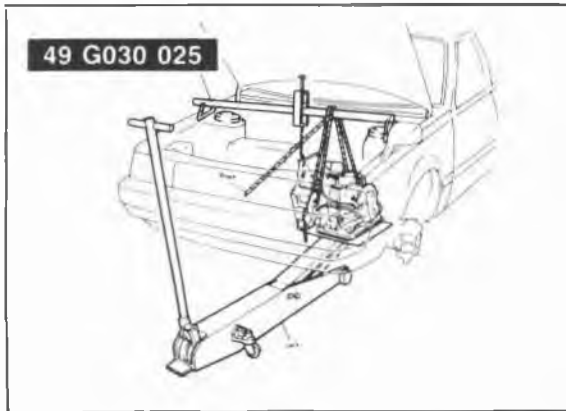
**58—67 N·m (5.9—6.8 m·kg, 43—49 ft·lb)**

## INSTALLATION

### TORQUE SPECIFICATIONS



## 7B INSTALLATION



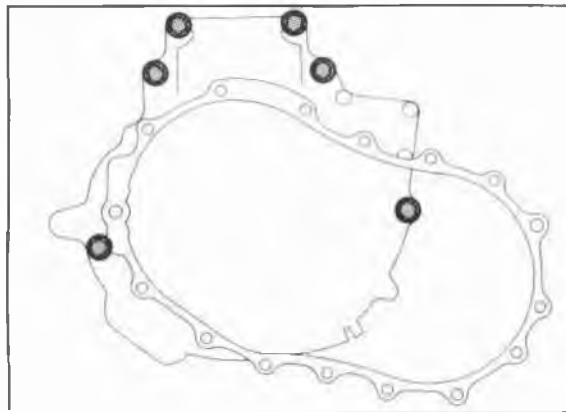
86U07B-441

1. Attach rope at 2 places on the transaxle. Place a flat board on a jack and set the transaxle on it.

### Caution

**The transaxle is not well balanced; be careful when positioning it on the jack.**

2. Move the transaxle into place and attach the rope to the **SST**.



3. Mount the transaxle to the engine.

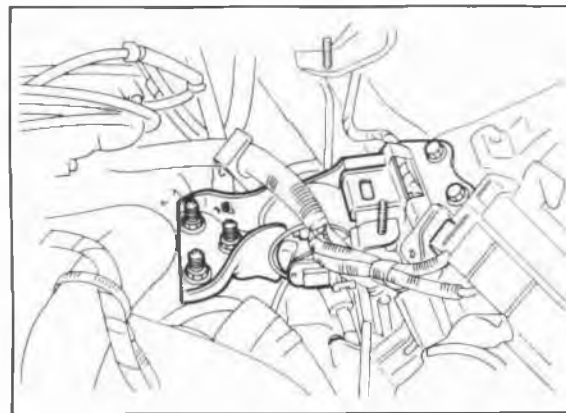
### Tightening torque:

**89—117 N·m (9.1—11.9 m·kg, 66—86 ft·lb)**

### Note

a) Lift the transaxle with the jack while pulling the rope.

b) Align the torque converter bolts and drive plate holes.



4. Install engine mount No. 4 and bracket.

### Tightening torque:

#### Bolt

**36—54 N·m (3.7—5.5 m·kg, 27—40 ft·lb)**

#### Nut

**64—89 N·m (6.5—9.1 m·kg, 47—66 ft·lb)**

5. Install engine mount No. 2.

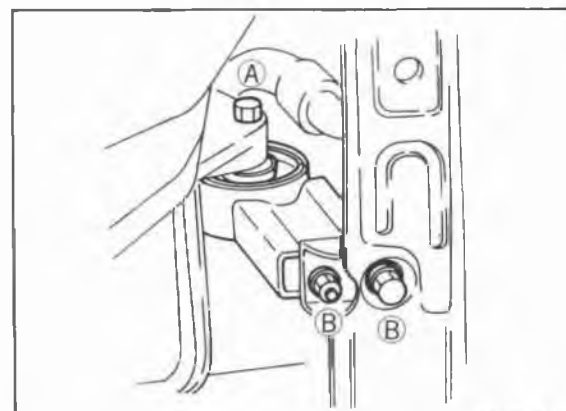
### Tightening torque:

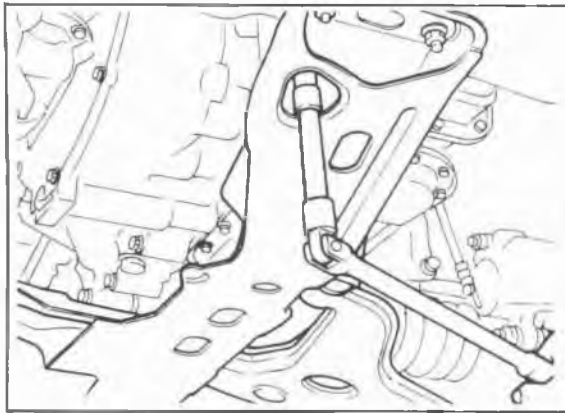
**A 85—117 N·m**

**(8.7—11.9 m·kg, 63—86 ft·lb)**

**B 67—93 N·m**

**(6.8—9.5 m·kg, 49—69 ft·lb)**





86U07B-445

6. Install the crossmember and the left side lower arm as an assembly.

**Tightening torque:**

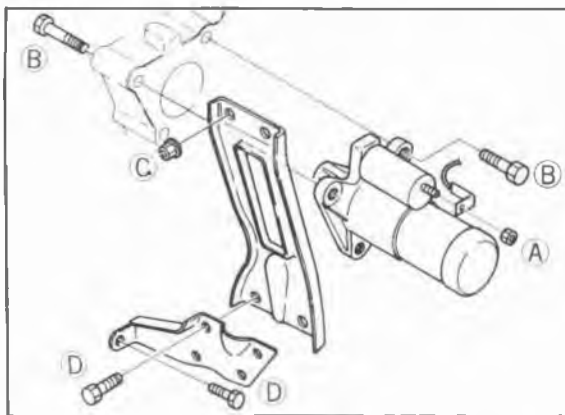
**Bolt**

**36—54 N·m (3.7—5.5 m·kg, 27—40 ft·lb)**

**Nut**

**75—93 N·m (7.6—9.5 m·kg, 55—69 ft·lb)**

7. Install the jack and the rope.  
8. Remove the SST.



86U07B-446

9. Install the starter and harnesses.

**Tightening torque:**

**A 9.8—12 N·m**

**(100—120 cm·kg, 87—104 in·lb)**

**B 31—46 N·m**

**(3.2—4.7 m·kg, 23—34 ft·lb)**

10. Install the manifold bracket.

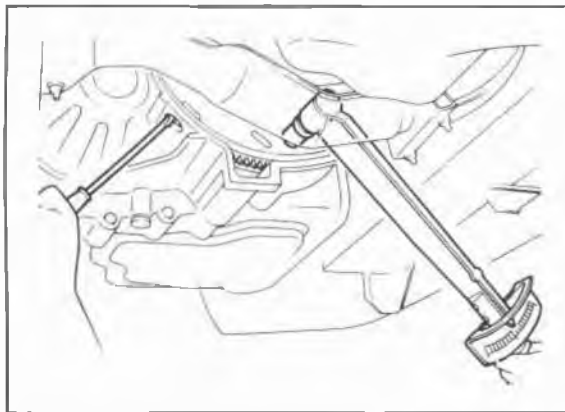
**Tightening torque:**

**C 19—30 N·m**

**(1.9—3.1 m·kg, 14—22 ft·lb)**

**D 37—52 N·m**

**(3.8—5.3 m·kg, 27—38 ft·lb)**



86U07B-447

11. Install the torque converter nuts.

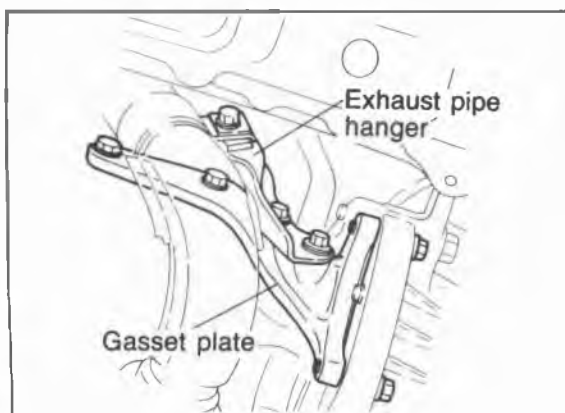
**Tightening torque:**

**43—61 N·m (4.4—6.2 m·kg, 32—45 ft·lb)**

12. Install the end plate.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



86U07B-448

13. Install the gusset plates and exhaust pipe hanger.

**Tightening torque:**

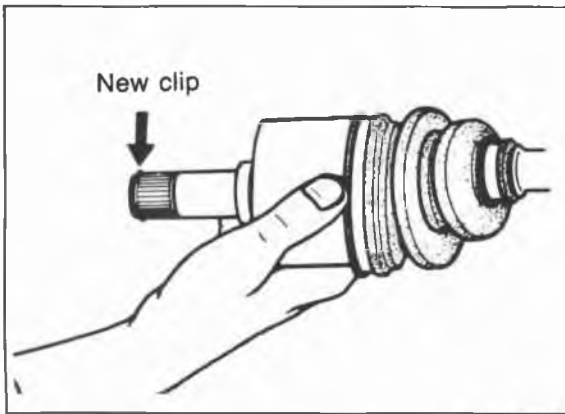
**Gasket plate**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

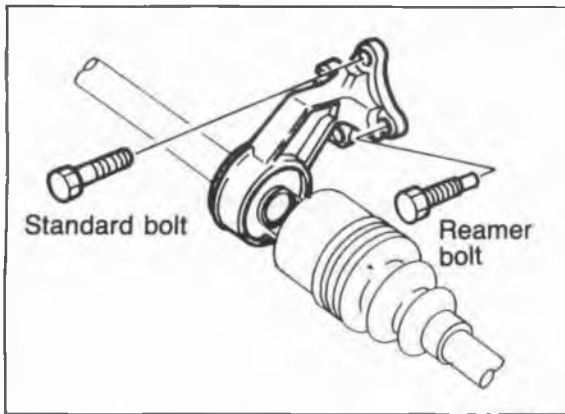
**Exhaust pipe hanger**

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

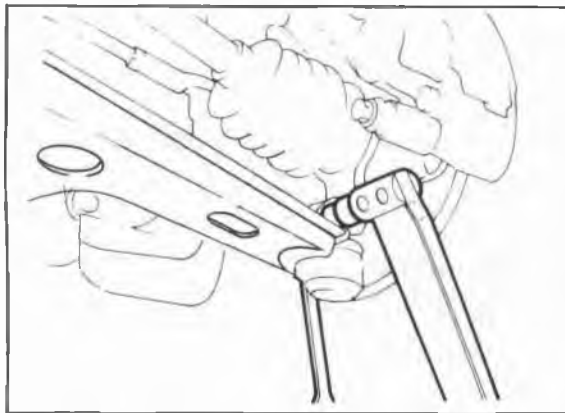
## 7B INSTALLATION



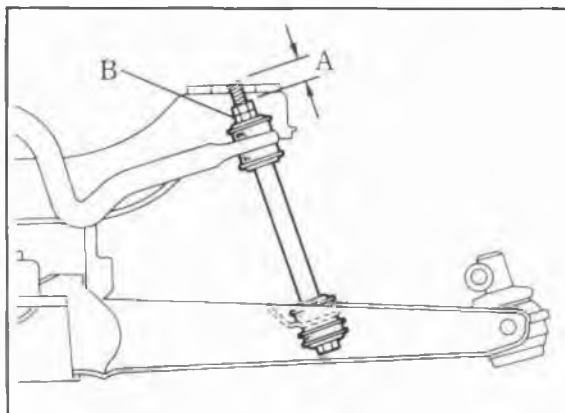
86U07B-449



86U07B-450



86U07B-451



86U07B-452

14. Replace the clips at the end of the driveshaft and joint shaft with new ones.
15. Install the joint shaft and right driveshaft as follows:
  - (1) Remove the **SST** and insert the joint shaft into the transaxle.
  - (2) Mount the joint shaft bracket onto the engine.

- (3) Install and tighten the reamer bolts; then install and tighten the standard bolts.

### Tightening torque:

**Reamer bolts 6.9—9.8 N-m  
(70—100 cm-kg, 61—87 in-lb)**

**Standard bolts 42—62 N-m  
(4.3—6.3 m-kg, 31.1—45.6 ft-lb)**

- (4) Pull the front hub outward to connect the driveshaft to the joint shaft.
- (5) Push the joint from the differential side to securely connect the driveshaft to the joint shaft.

### Caution

- a) Do not damage the oil seal.
- b) After installation, pull the front hub outward to verify that the driveshaft does not come.

16. Install the left driveshaft as follows:
  - (1) Pull the front hub outward to insert the driveshaft into the transaxle.
  - (2) Push the joint from the differential side to connect the driveshaft to the differential side gear.

### Caution

- a) Do not damage the oil seal.
- b) After installation, pull the front hub outward to verify that the driveshaft does not come out.

17. Install the lower arm ball joints to the knuckles and tighten the bolts and nuts.

### Tightening torque:

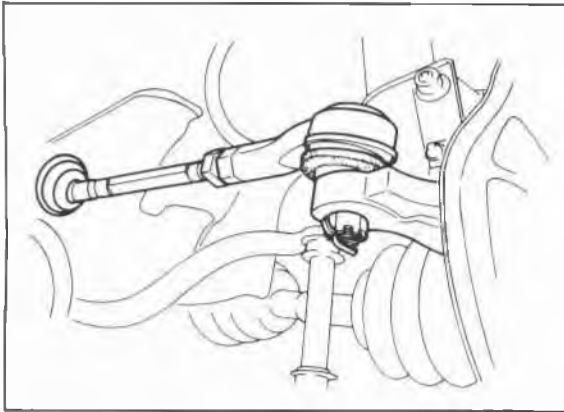
**43—54 N-m (4.4—5.5 m-kg, 32—40 ft-lb)**

18. Install the undercover.
19. Install the stabilizer bar control link as follows:
  - (1) Install the stabilizer bar control link.
  - (2) Adjust protrusion A to **20.1 mm (0.79 in)**.
  - (3) Tighten bolt B to the specified torque.

### Tightening torque:

**16—23 N-m (1.6—2.3 m-kg, 12—17 ft-lb)**



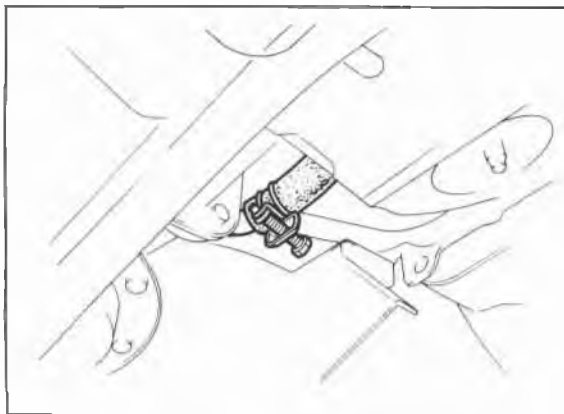


86U07B-453

20. Install the tie-rod ends and cotter pins.

**Tightening torque:**

**29—44 N·m (3.0—4.5 m·kg, 22—33 ft·lb)**



86U07B-454

21. Install the oil cooler outlet and inlet hoses.  
22. Install the splash shields.

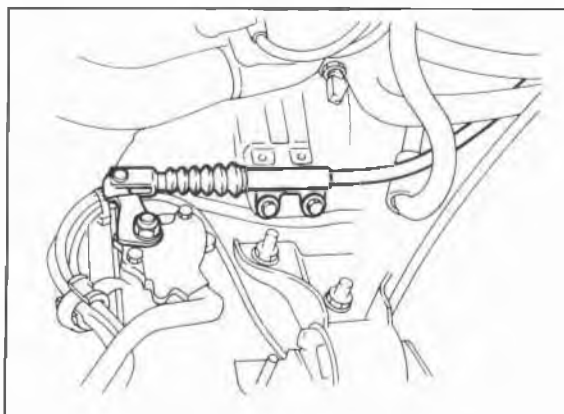
**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

23. Install the front wheels.

**Tightening torque:**

**88—118 N·m (9—12 m·kg, 65—87 ft·lb)**



76G07B-198

24. Connect the throttle cable.

**Note**

**Adjust the throttle cable with the oil pressure test. (Refer to page 7B—75, 76)**

25. Connect the selector cable.

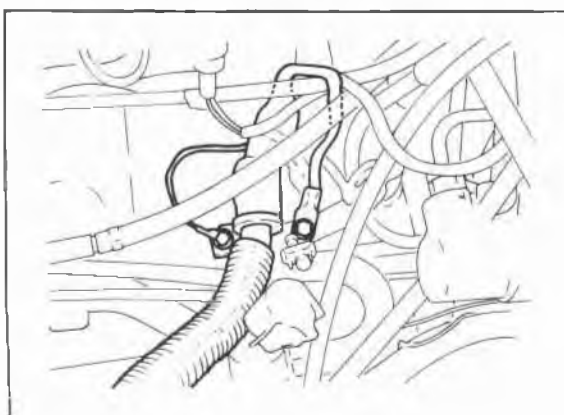
**Tightening torque:**

**Nut**

**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

**Bolts**

**16—22 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



86U07B-456

26. Connect the ground wires to the transaxle case.

**Tightening torque:**

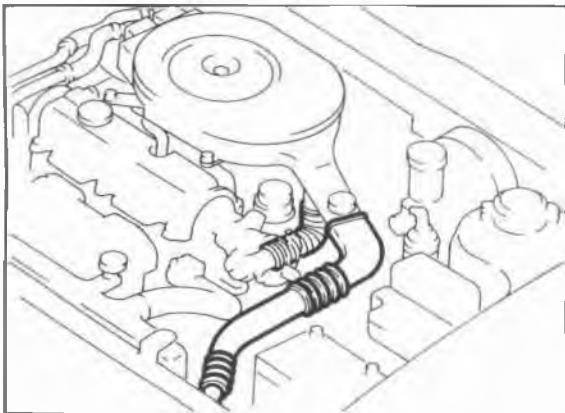
**8—11 N·m (80—115 cm·kg, 69—99 in·lb)**

## 7B INSTALLATION



76G07B-199

27. Connect the connectors as follows:
  - (1) Inhibitor switch
  - (2) Solenoid valve
  - (3) Pulse generator (G4A-EL)
  - (4) Fluid temperature switch (G4A-EL)
28. Connect the speedometer cable.



76G07B-200

29. Install the fresh air duct. (G4A-HL)
30. Install the air cleaner hose. (G4A-EL)
31. Install the air cleaner assembly; then connect the air flow meter connector and inlet hose. (G4A-EL)

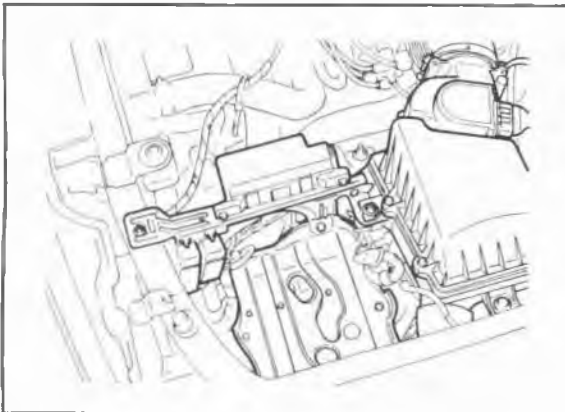
### Tightening torque:

#### Bolt

31—40 N·m (3.2—4.1 m·kg, 23—30 in·lb)

#### Nut

8—11 N·m (80—110 cm·kg, 69—95 in·lb)



76G07B-201

32. Connect the distributor lead.
33. Install the main fuse block.

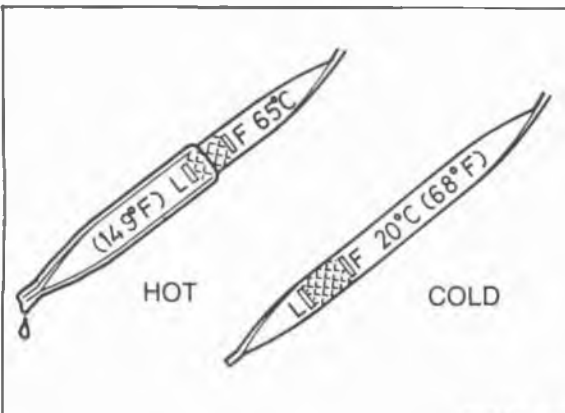
### Tightening torque:

8—11 N·m (80—110 cm·kg, 69—95 in·lb)

34. Install the battery carrier and battery.

### Tightening torque:

31—40 N·m (3.2—4.1 m·kg, 23—30 in·lb)

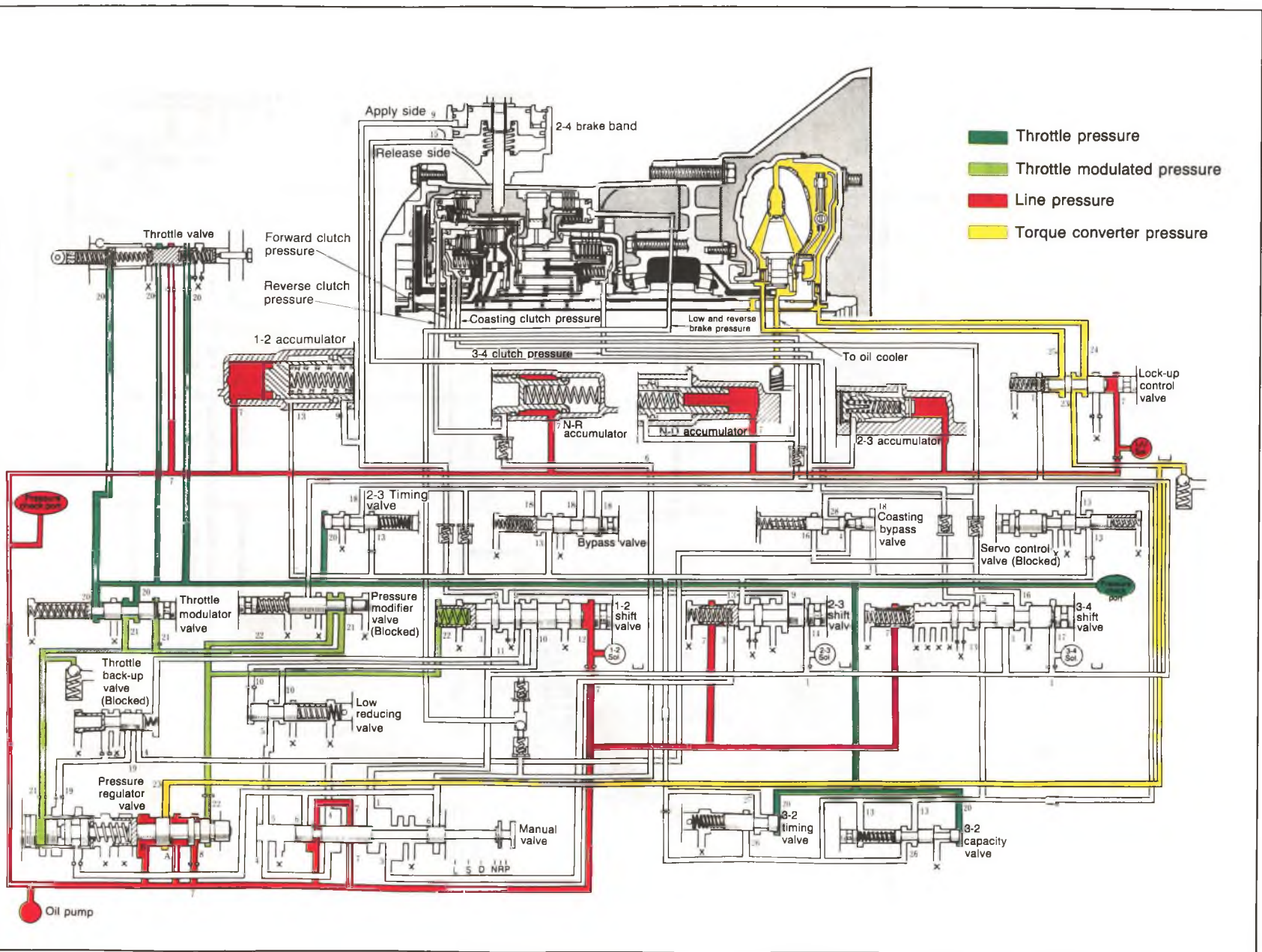


76G07B-202

35. Pour in ATF and check the following:
  - (1) With the engine idling, check that the fluid level is between the F and L marks on the dipstick. (Refer to page 7B—71)
  - (2) Check the manual linkage, and adjust if necessary. (Refer to page 7B—72)
  - (3) Check the inhibitor switch operation. (Refer to page 7B—65)
  - (4) Conduct a road test. (Refer to page 7B—34, 35)
  - (5) Check that there is no fluid leakage from the transaxle. (Refer to page 7B—71)

HYDRAULIC CIRCUIT (G4A-EL)

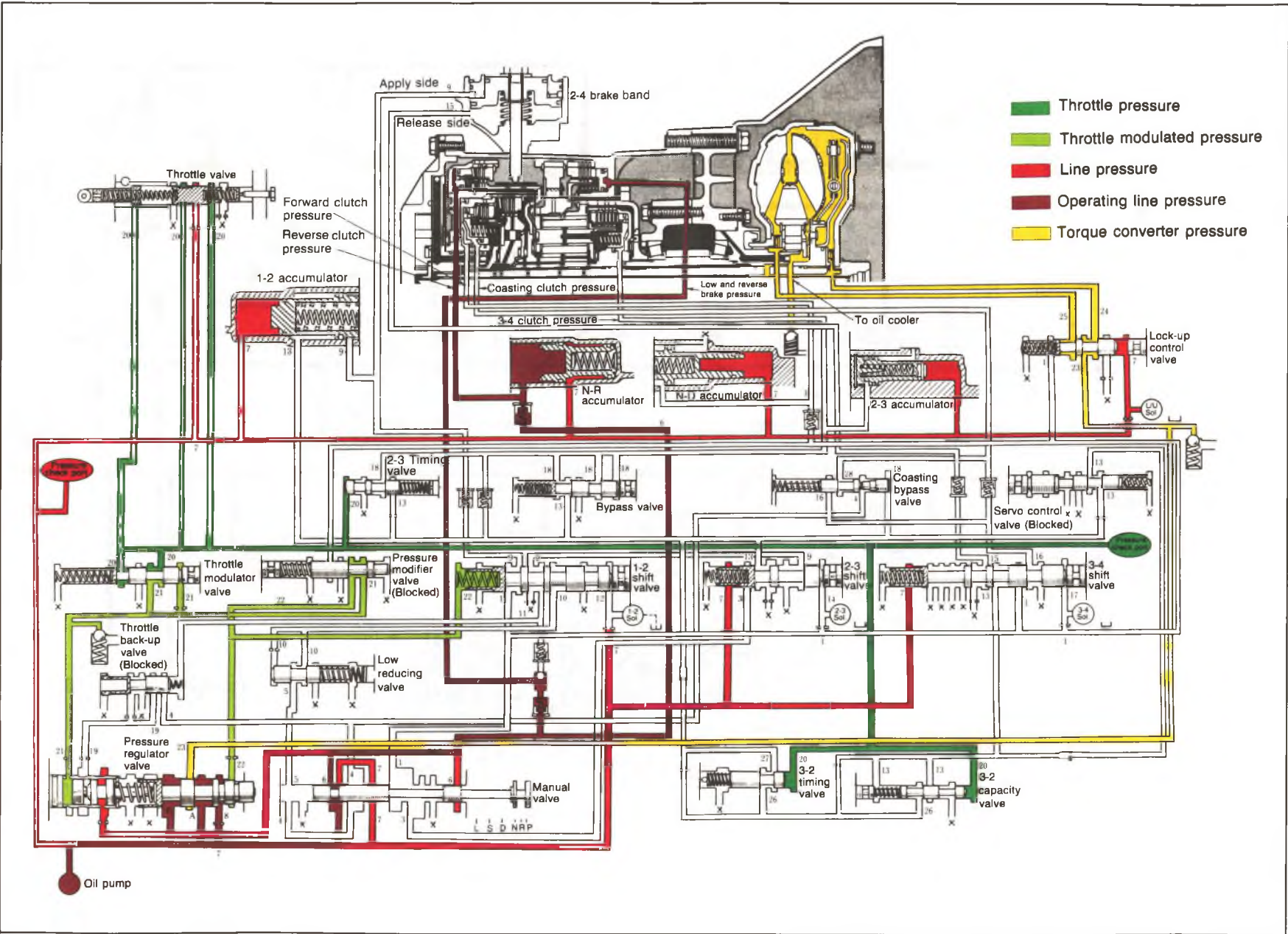
P RANGE



- Throttle pressure
- Throttle modulated pressure
- Line pressure
- Torque converter pressure

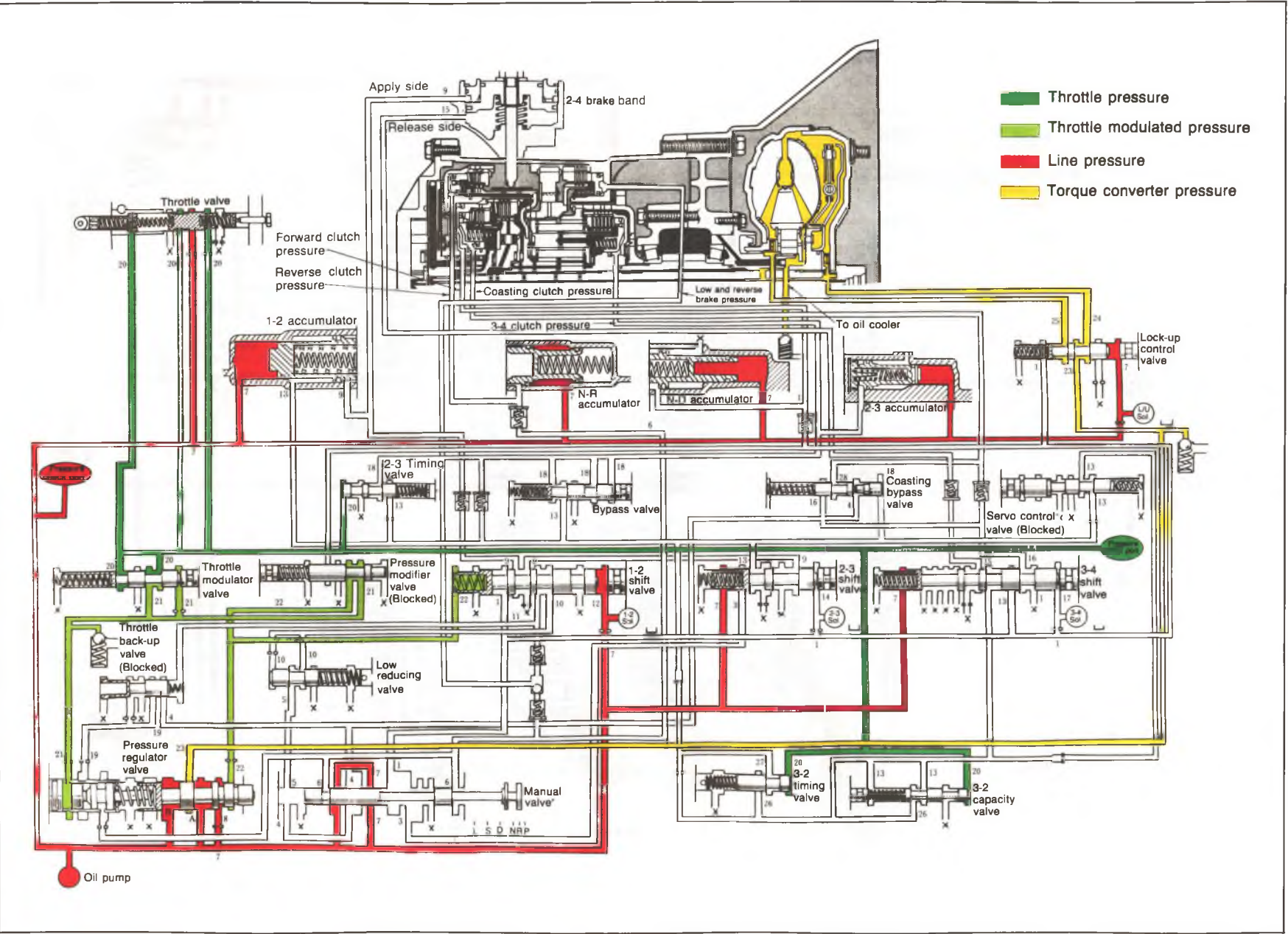
# 7B HYDRAULIC CIRCUIT (G4A-EL)

R RANGE



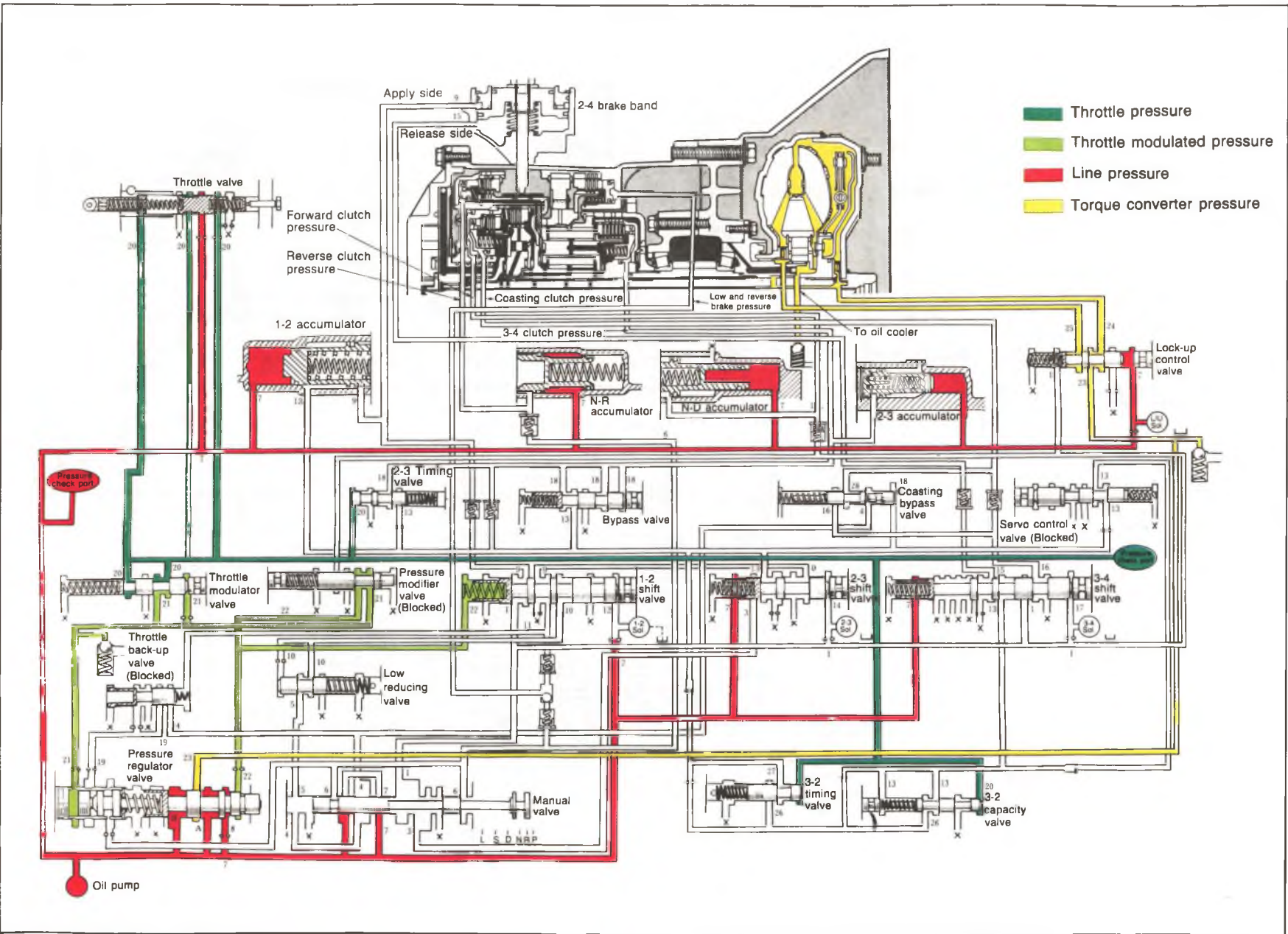
N RANGE: BELOW APPROX. 18 km/h (11 mph)

HYDRAULIC CIRCUIT (G4A-EL) **7B**



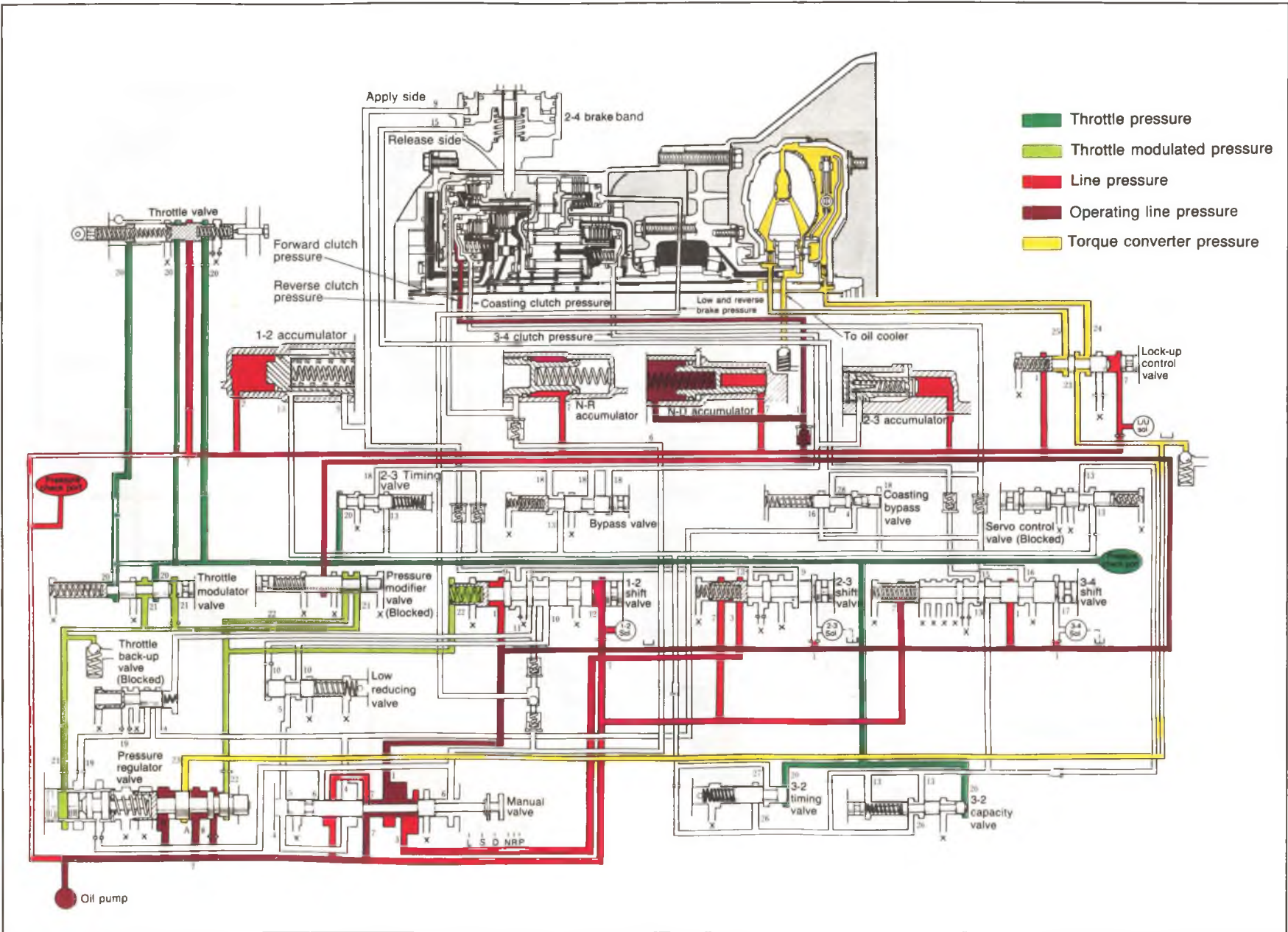
# 7B HYDRAULIC CIRCUIT (G4A-EL)

N RANGE: ABOVE APPROX. 18 km/h (11 mph)



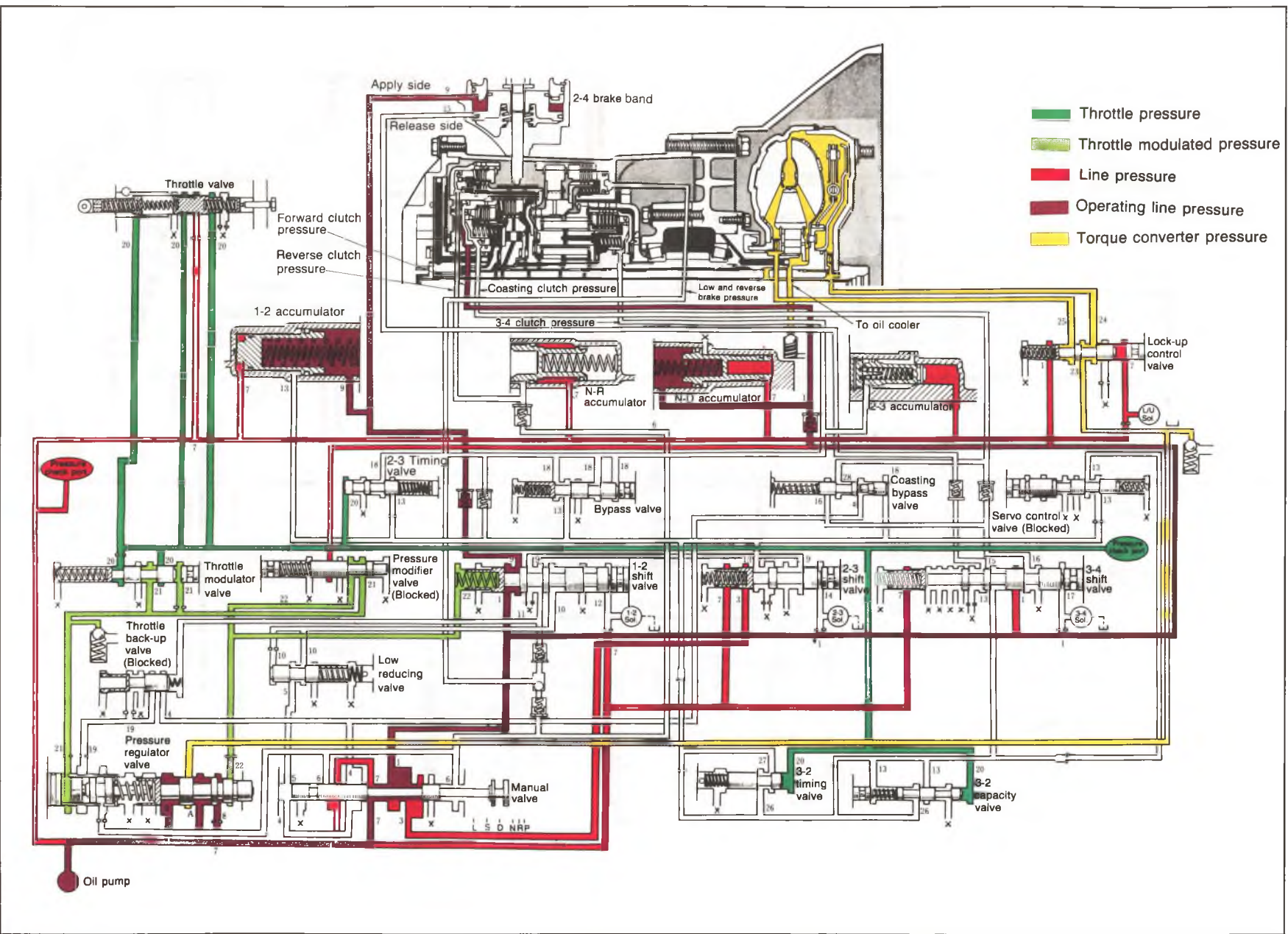
D RANGE: 1ST GEAR

HYDRAULIC CIRCUIT (G4A-EL) **7B**



# 7B HYDRAULIC CIRCUIT (G4A-EL)

D RANGE; 2ND GEAR

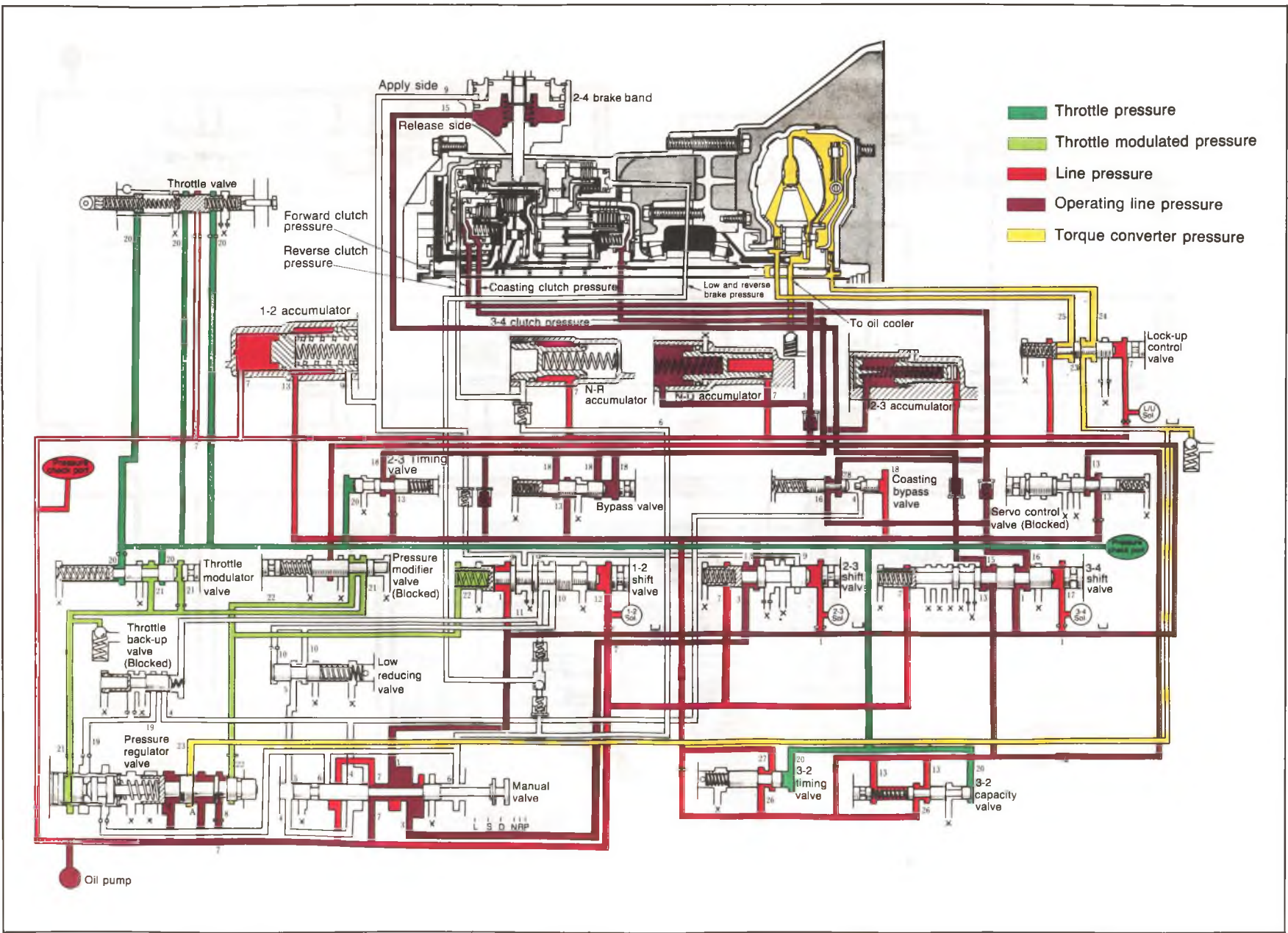


86U07B-466



D RANGE; 3RD GEAR, BELOW APPROX. 40 km/h (25 mph)

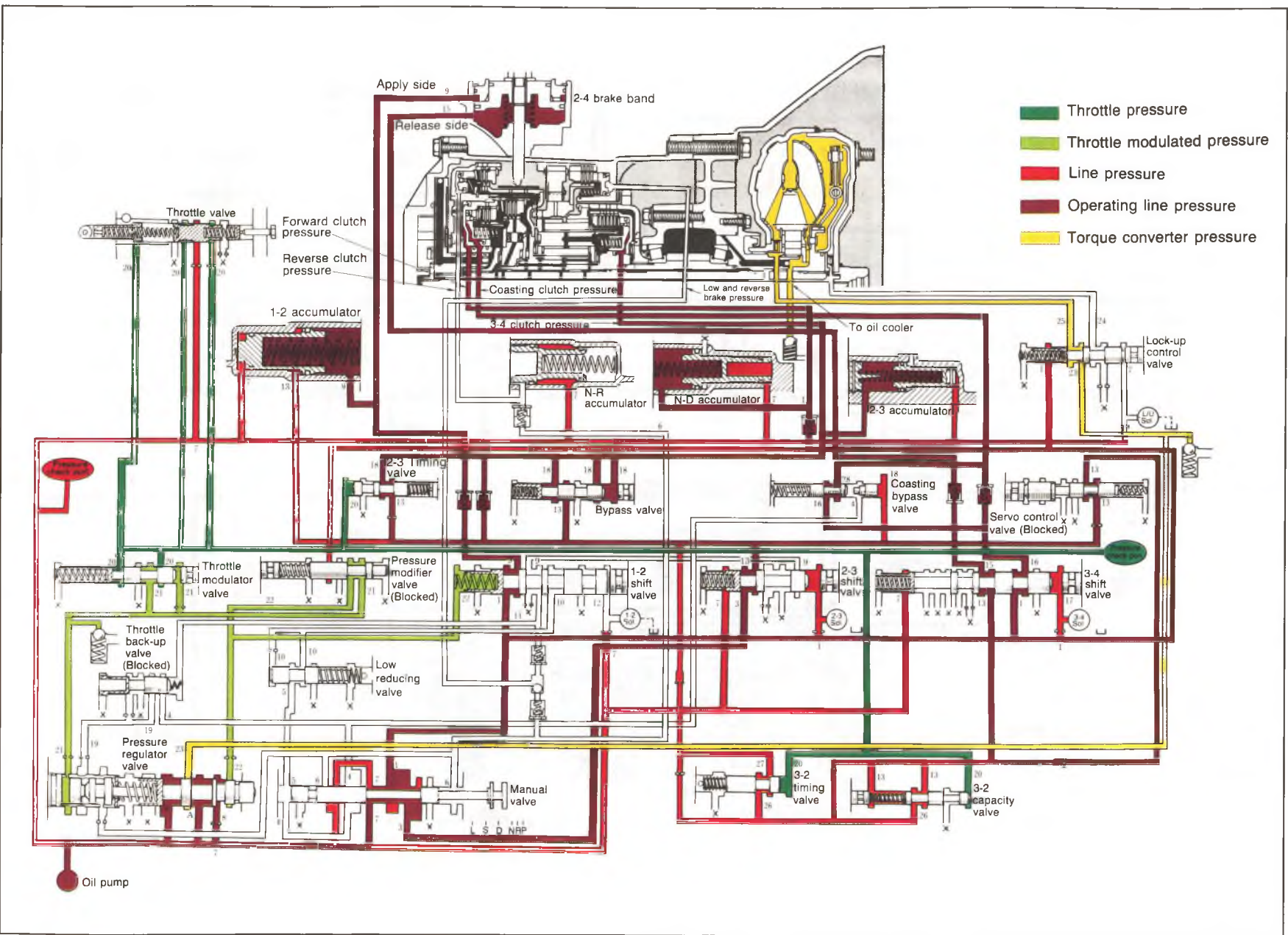
HYDRAULIC CIRCUIT (G4A-EL) **7B**



- █ Throttle pressure
- █ Throttle modulated pressure
- █ Line pressure
- █ Operating line pressure
- █ Torque converter pressure

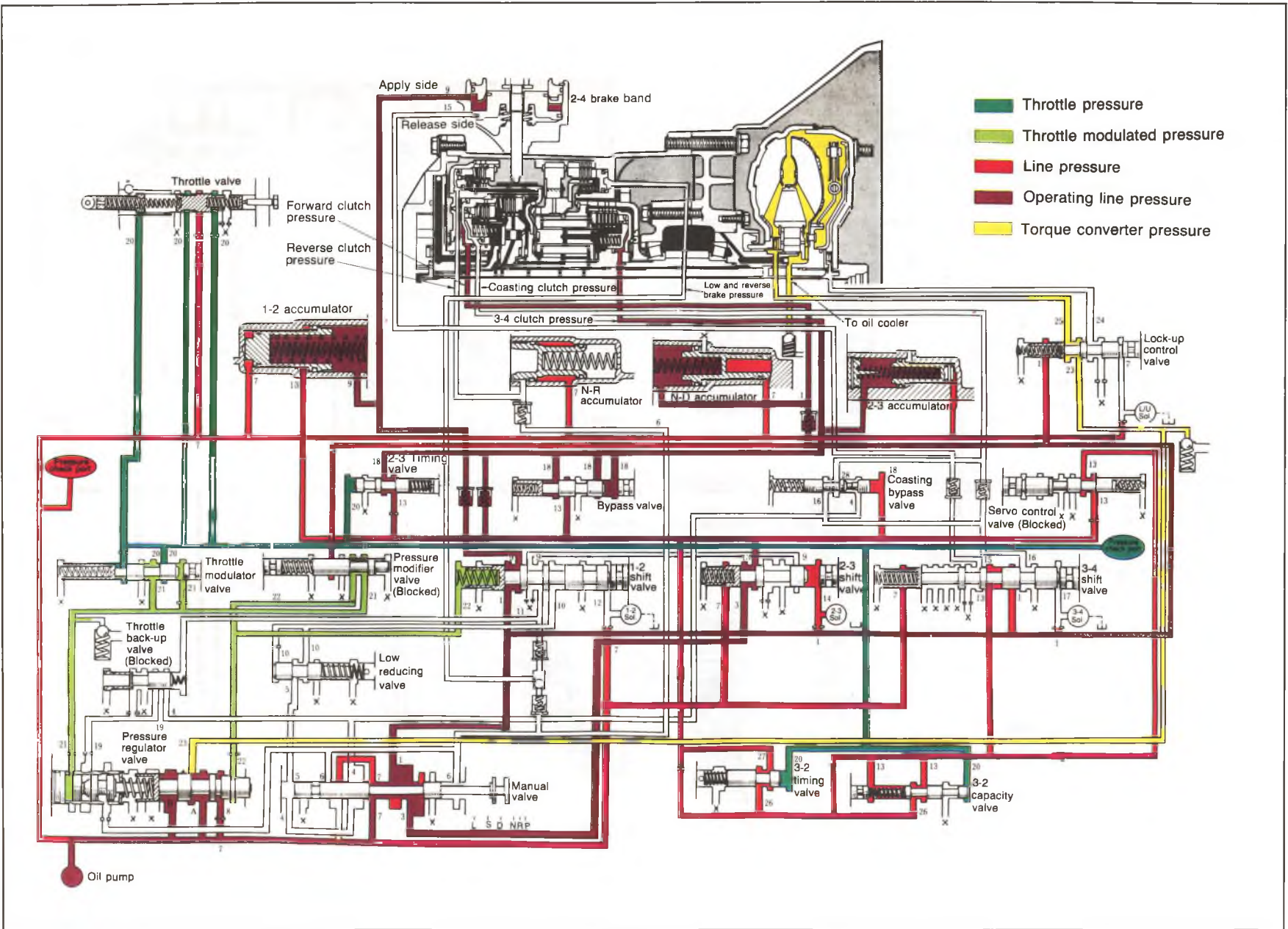
# 7B HYDRAULIC CIRCUIT (G4A-EL)

D RANGE: 3RD GEAR, ABOVE APPROX. 40 km/h (25 mph) LOCK-UP ON



D RANGE; OD, LOCK-UP ON

HYDRAULIC CIRCUIT (G4A-EL) **7B**

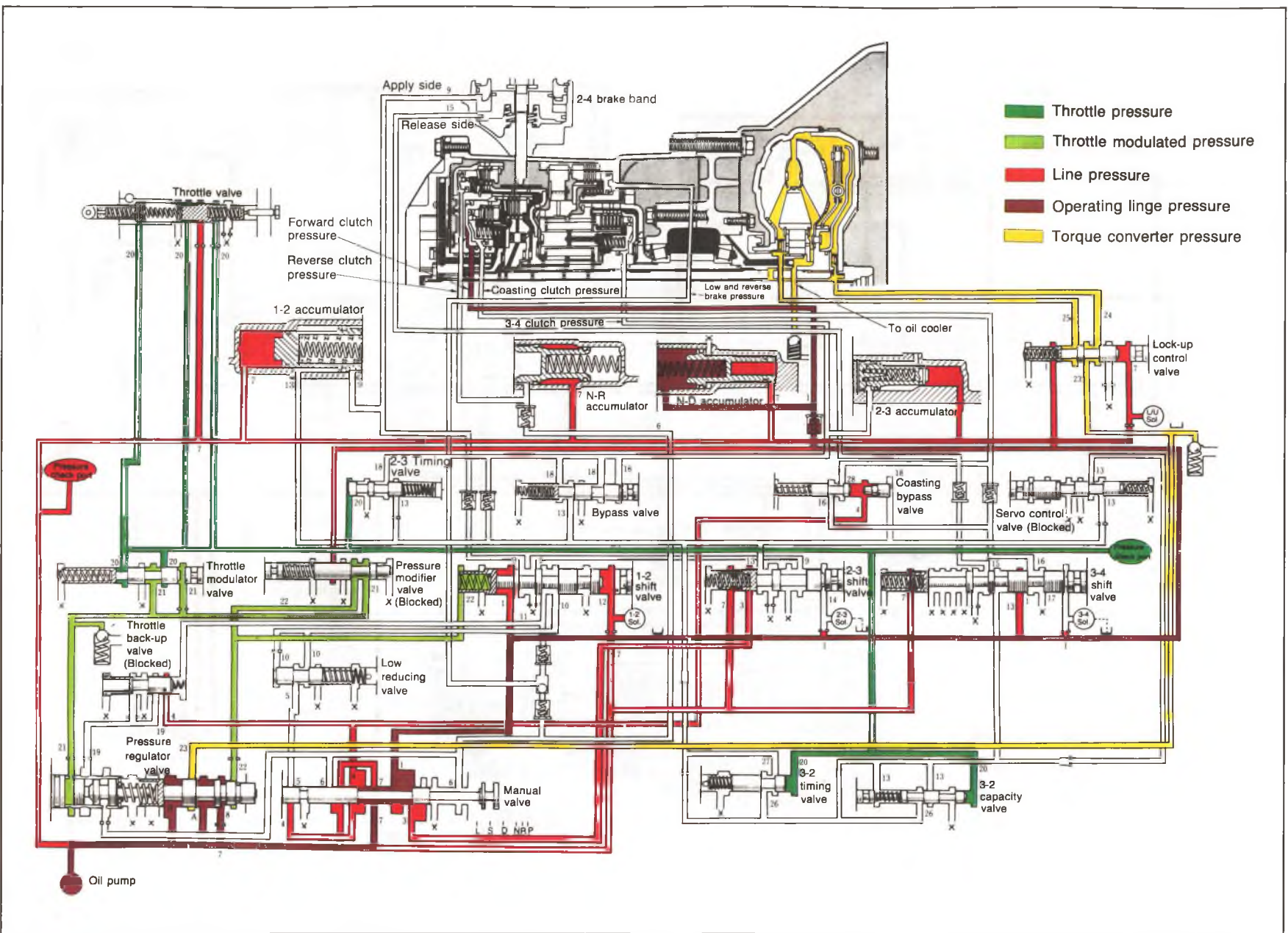


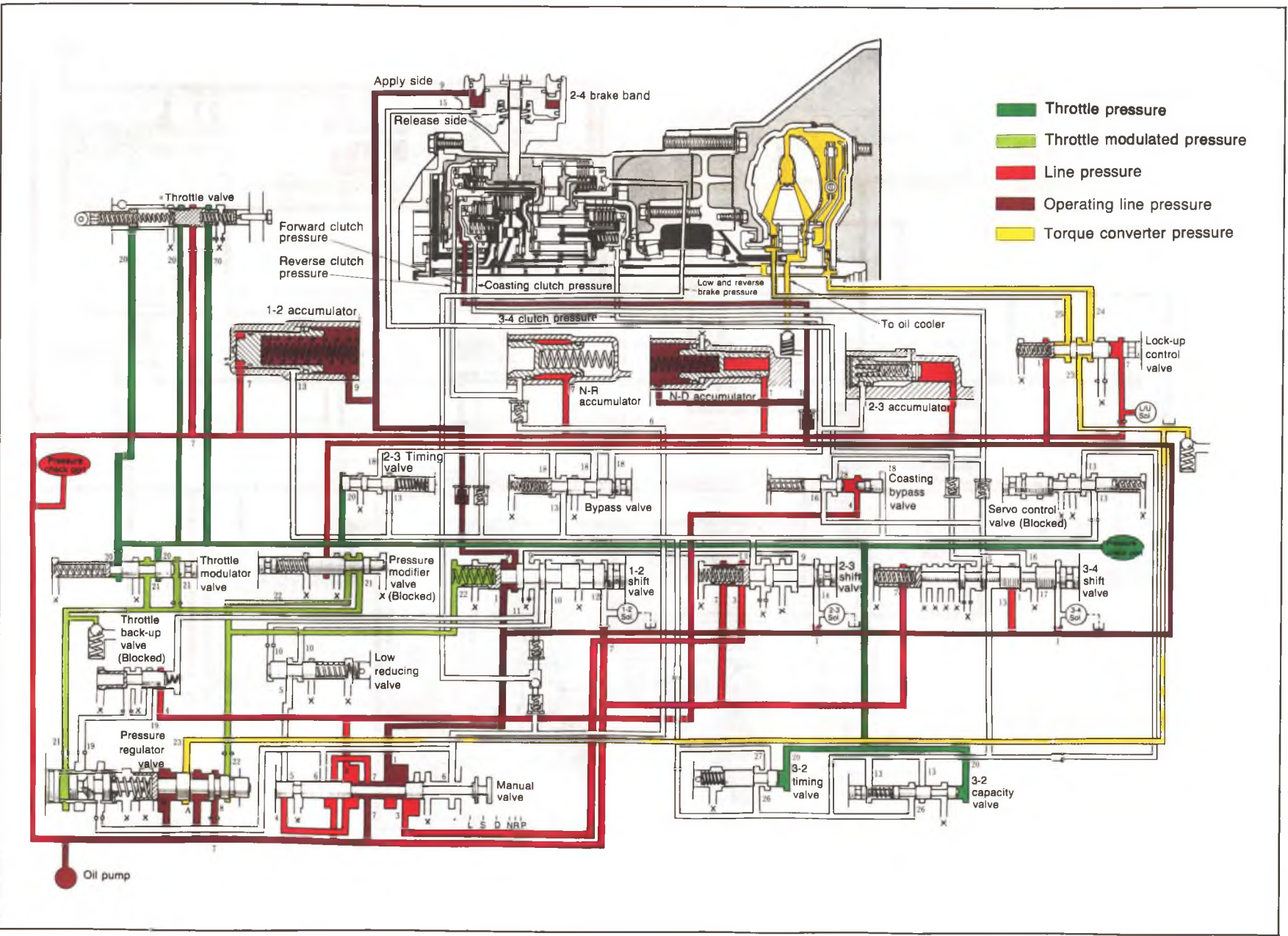
86U07B-469

7B-229

# 7B HYDRAULIC CIRCUIT (G4A-EL)

S RANGE: 1ST GEAR



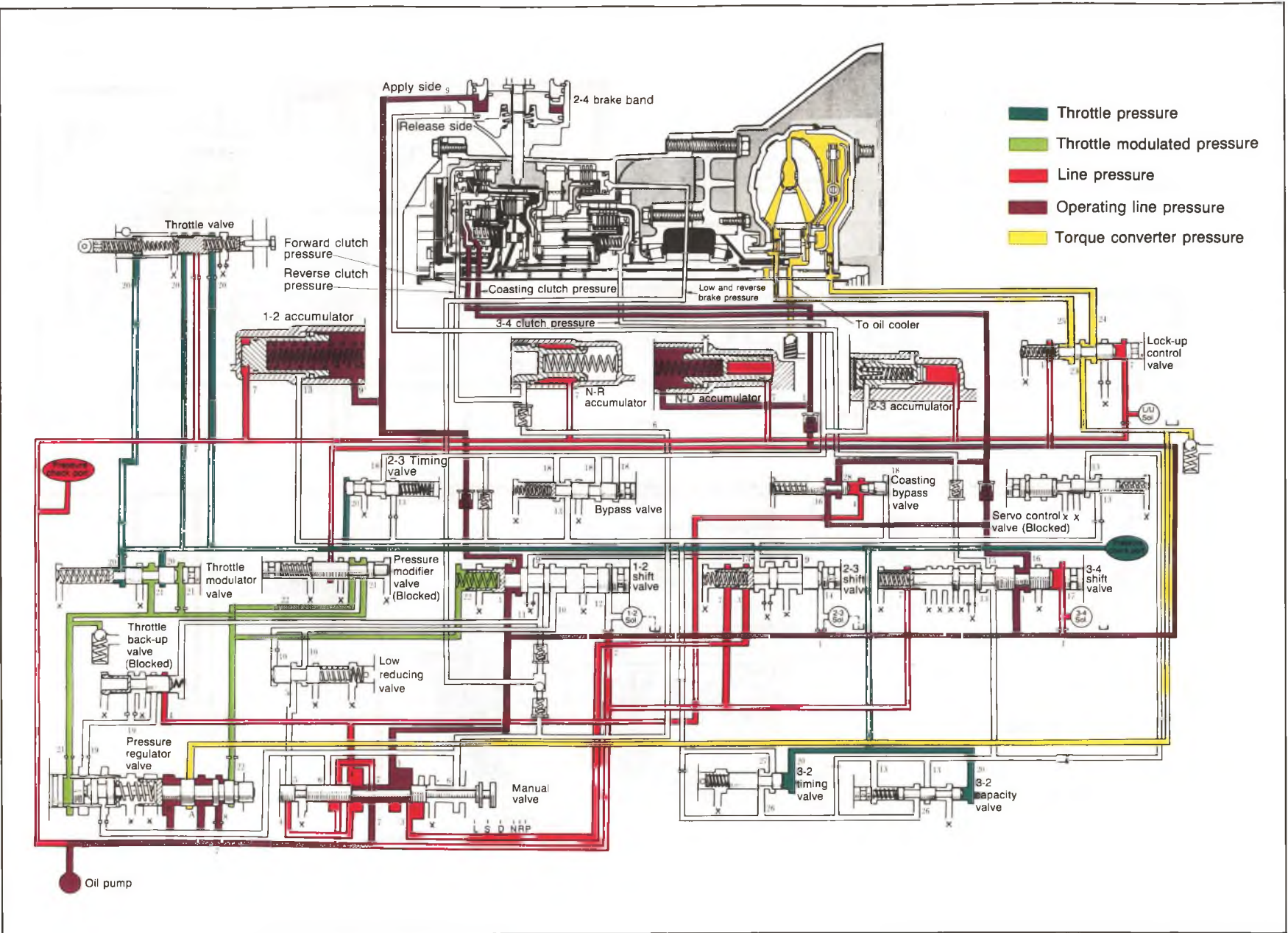


86U07B-471

7B-231

# 7B HYDRAULIC CIRCUIT (G4A-EL)

S RANGE; 2ND GEAR, HOLD

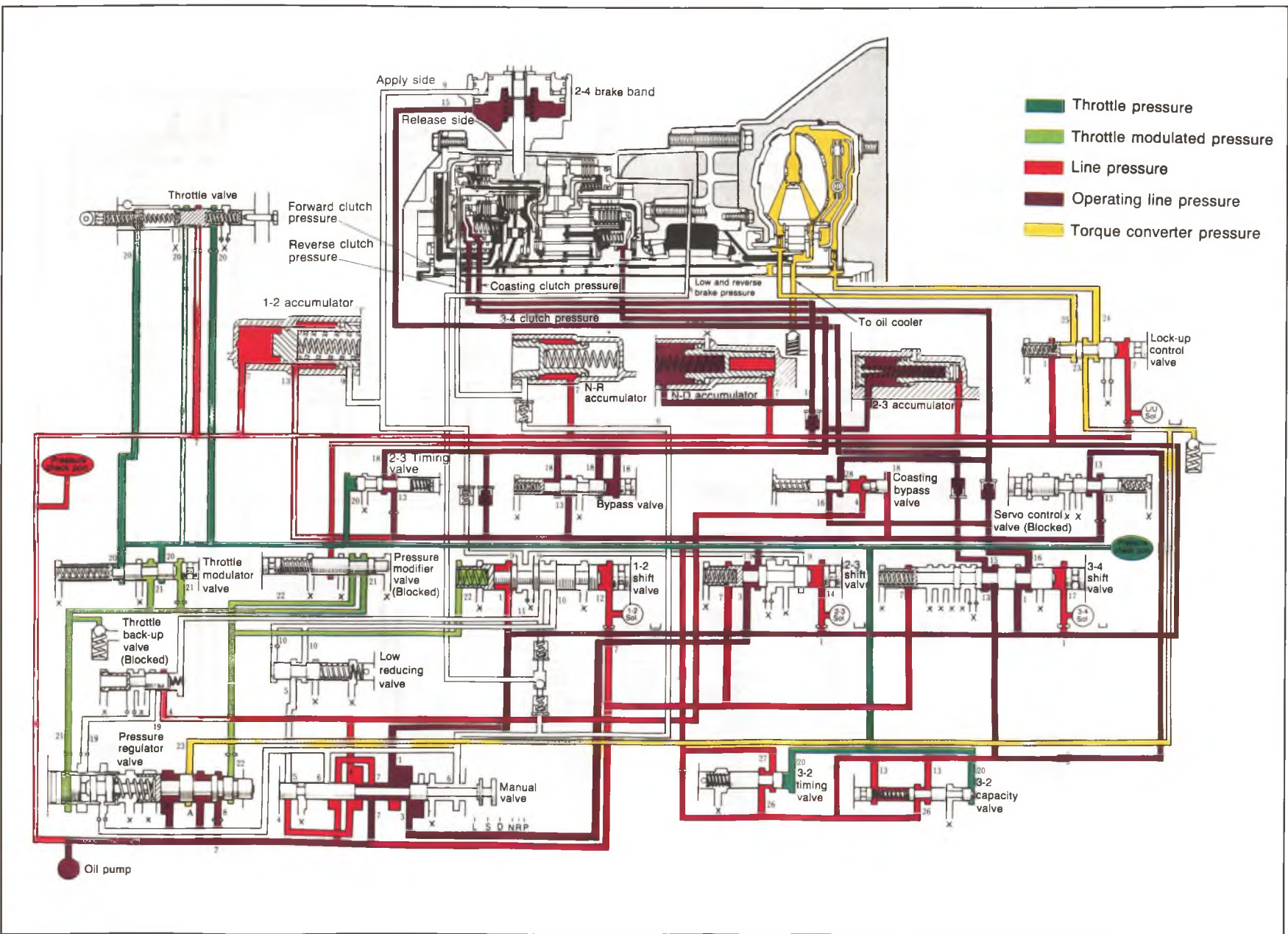


7B-232

86U07B-472

S RANGE: 3RD GEAR, BELOW APPROX. 40 km/h (25 mph)

# HYDRAULIC CIRCUIT (G4A-EL) 7B

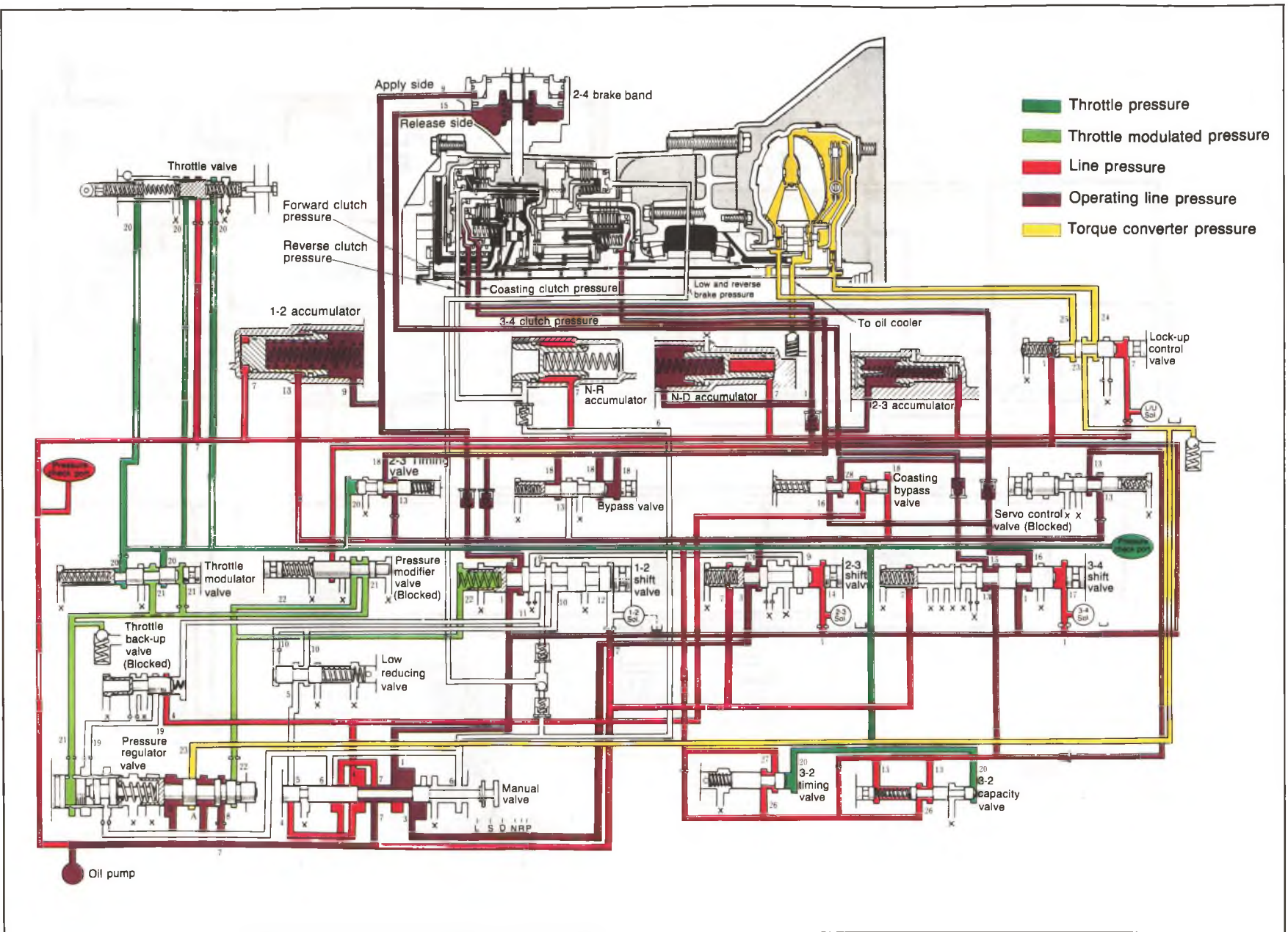


86U07B-473

7B-233

# 7B HYDRAULIC CIRCUIT (G4A-EL)

S RANGE; 3RD GEAR, ABOVE APPROX. 40 km/h (25 mph)



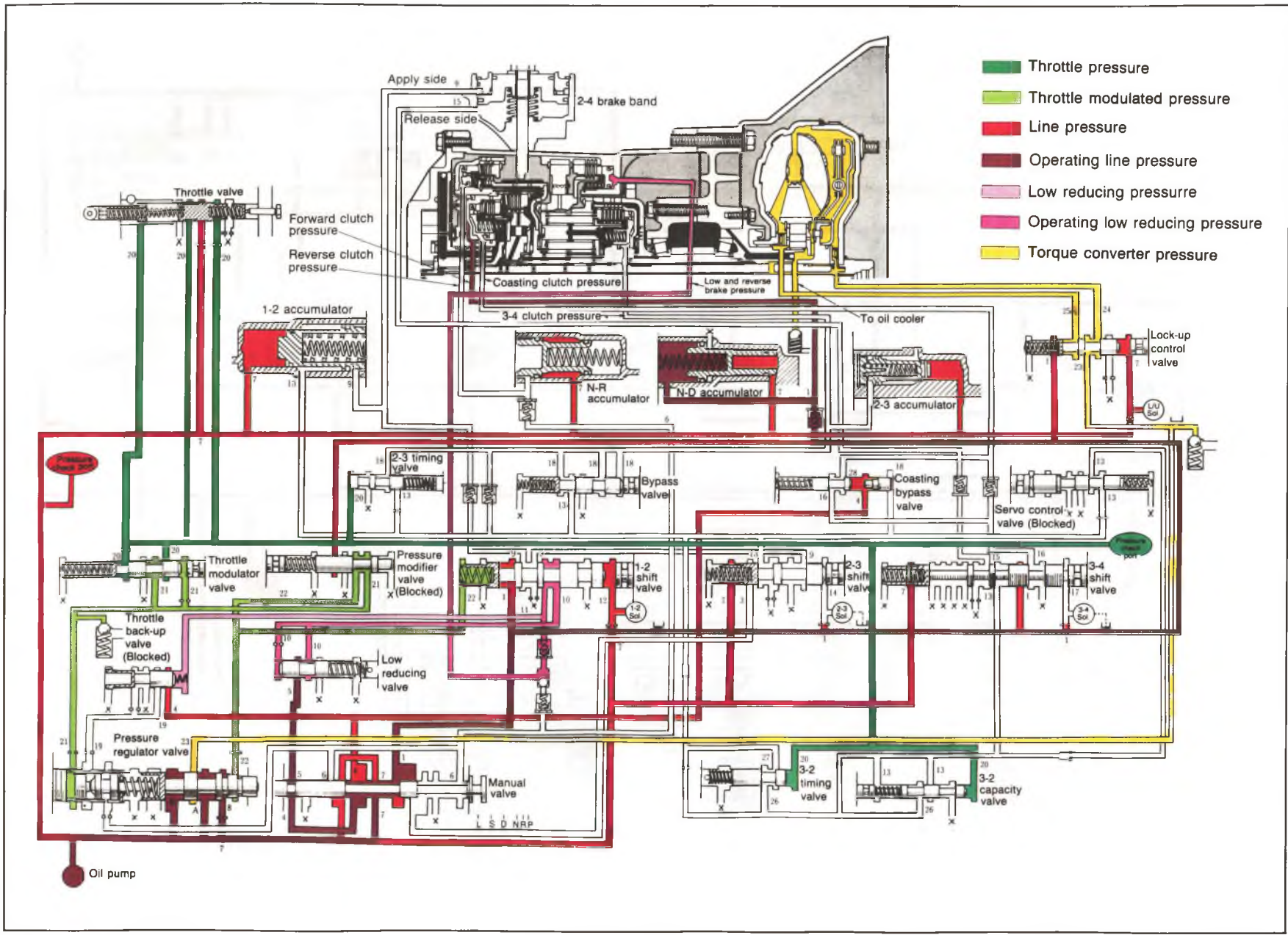
7B-234

86U07B-474



# HYDRAULIC CIRCUIT (G4A-EL) 7B

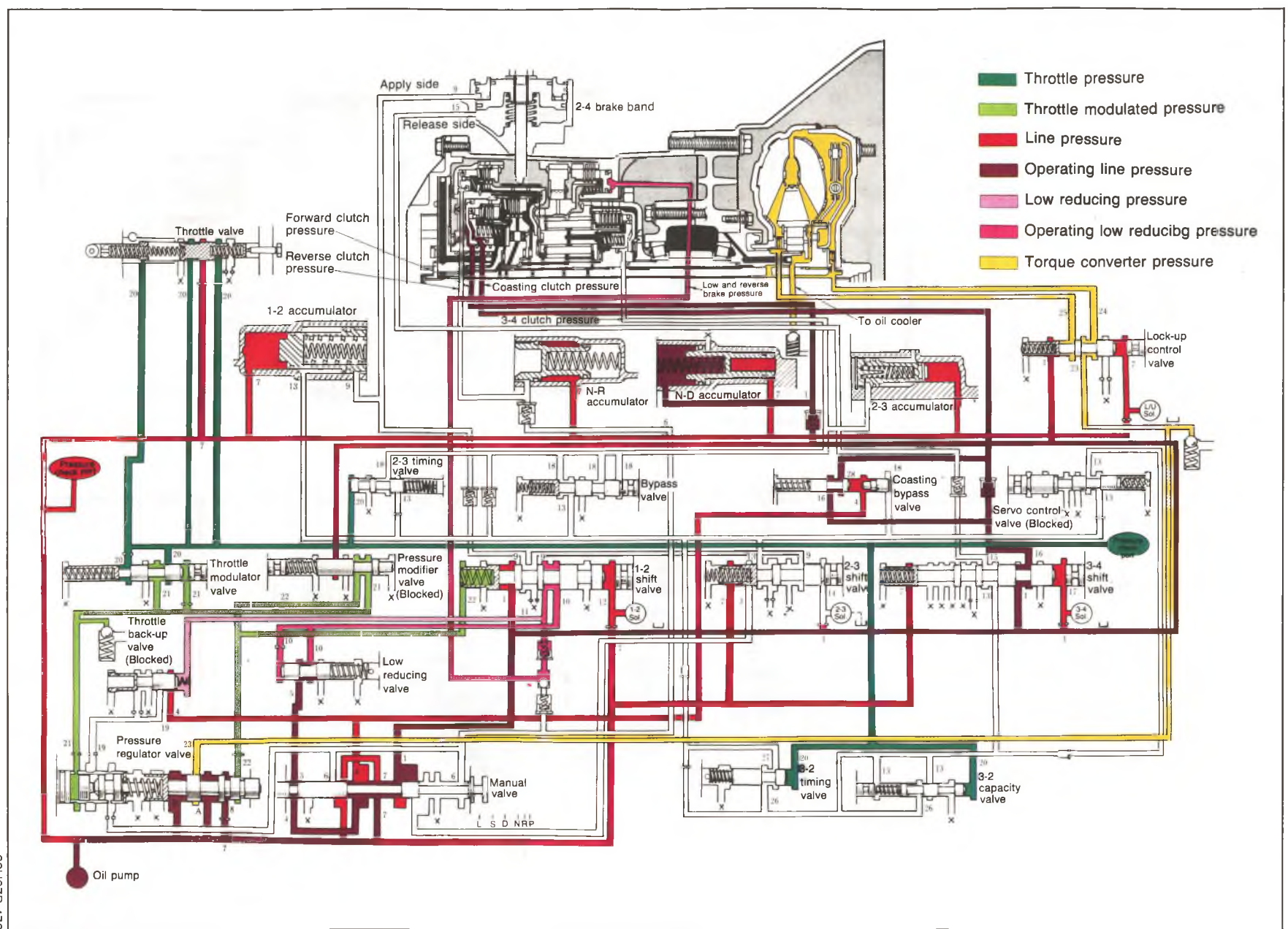
L RANGE: 1ST GEAR



- Throttle pressure
- Throttle modulated pressure
- Line pressure
- Operating line pressure
- Low reducing pressure
- Operating low reducing pressure
- Torque converter pressure

# 7B HYDRAULIC CIRCUIT (G4A-EL)

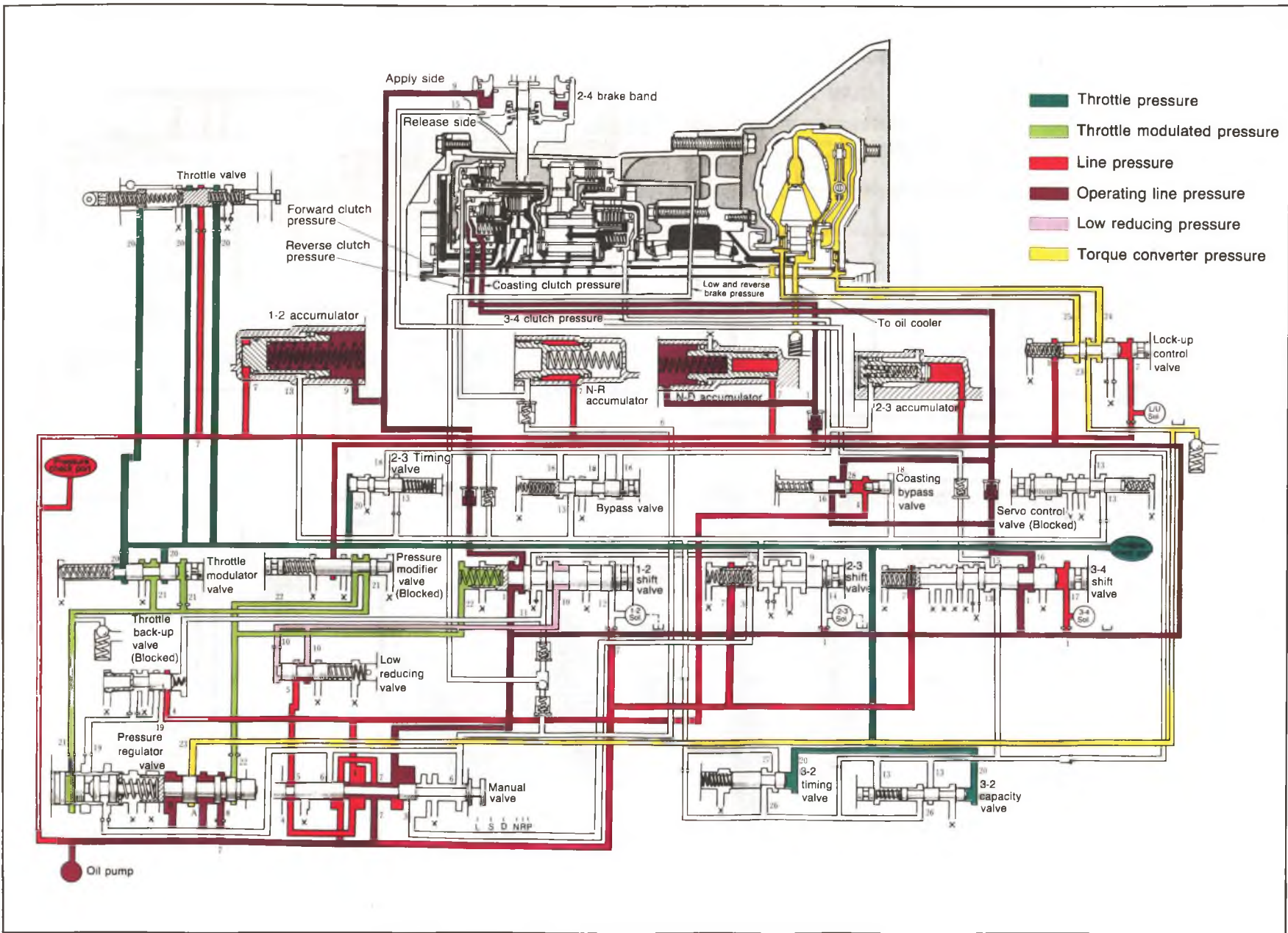
L RANGE; 1ST GEAR, HOLD



- █ Throttle pressure
- █ Throttle modulated pressure
- █ Line pressure
- █ Operating line pressure
- █ Low reducing pressure
- █ Operating low reducing pressure
- █ Torque converter pressure

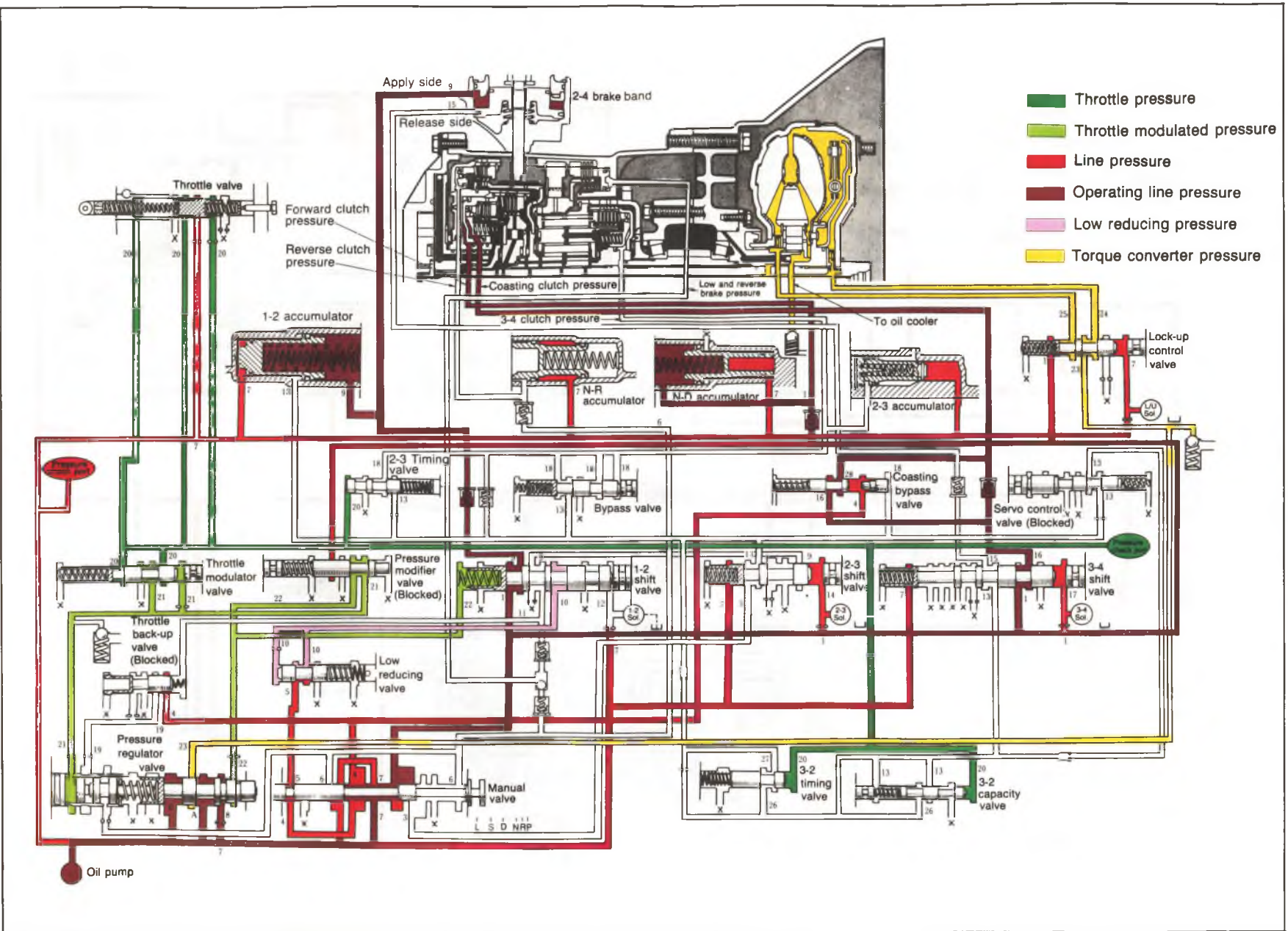
# HYDRAULIC CIRCUIT (G4A-EL) 7B

L RANGE: 2ND GEAR, BELOW APPROX. 110 km/h (68 mph)

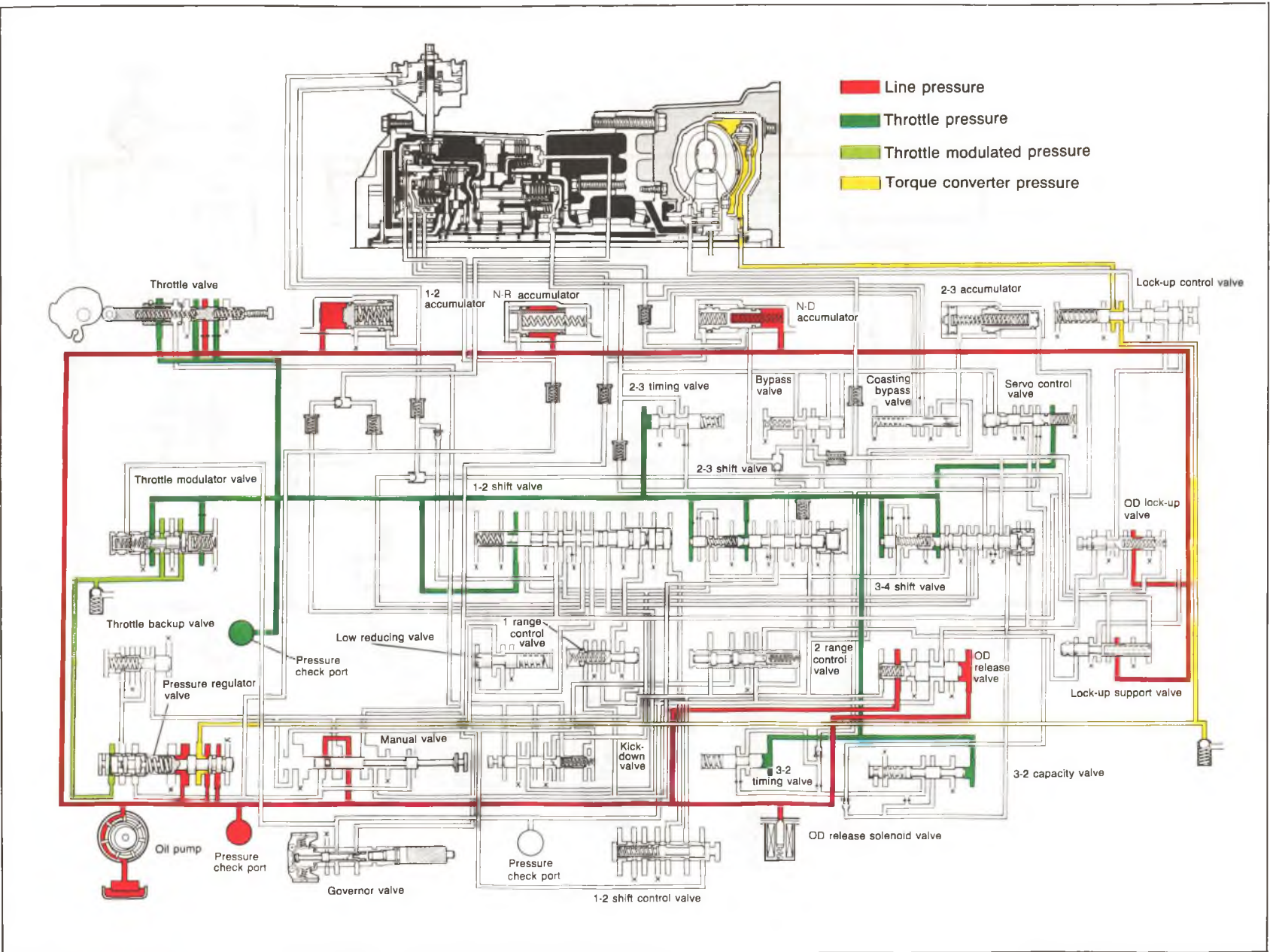


# 7B HYDRAULIC CIRCUIT (G4A-EL)

L RANGE: 2ND GEAR, ABOVE APPROX. 110 km/h (68 mph)

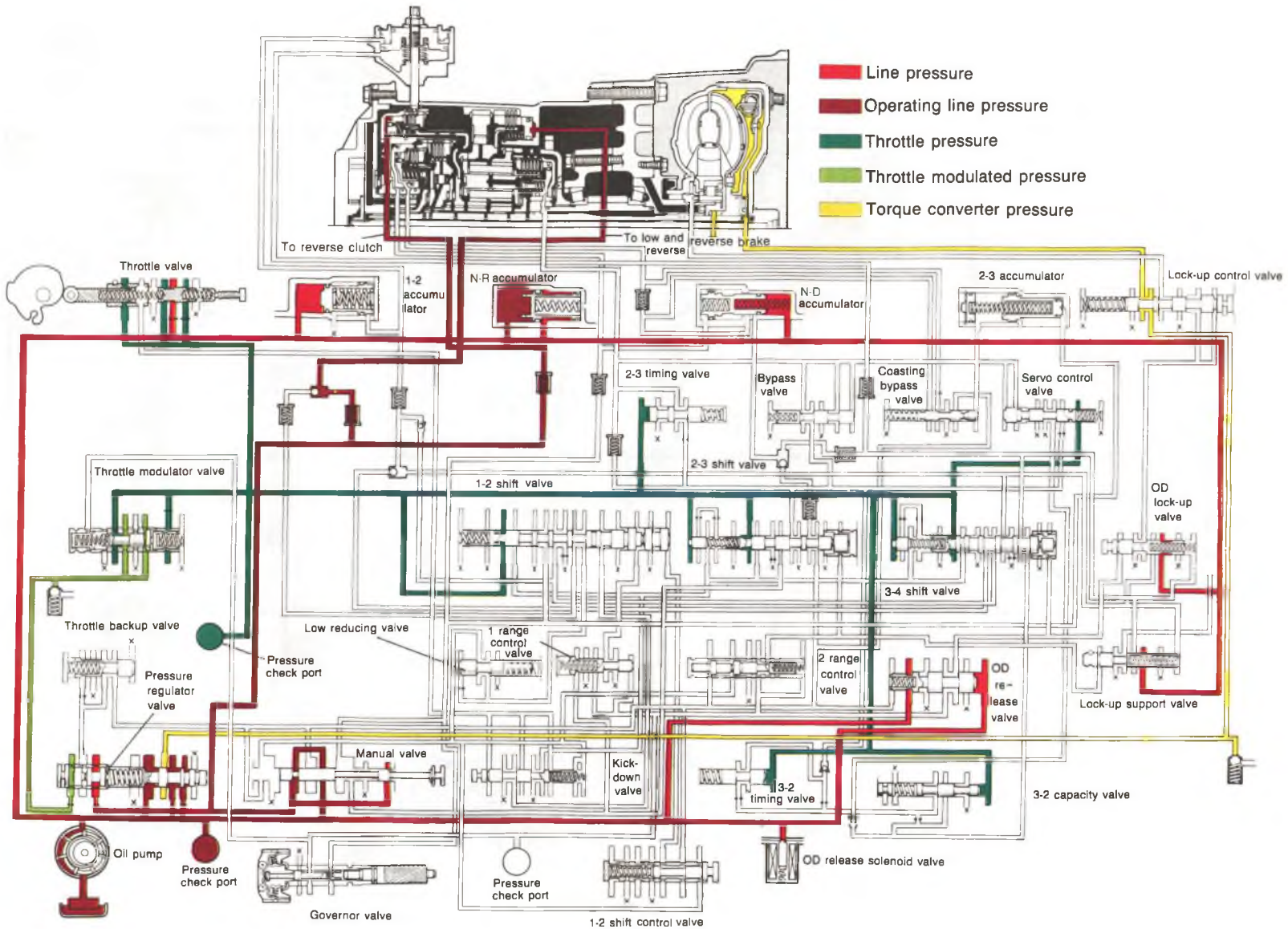


HYDRAULIC CIRCUIT (G4A-HL)  
N AND P RANGES



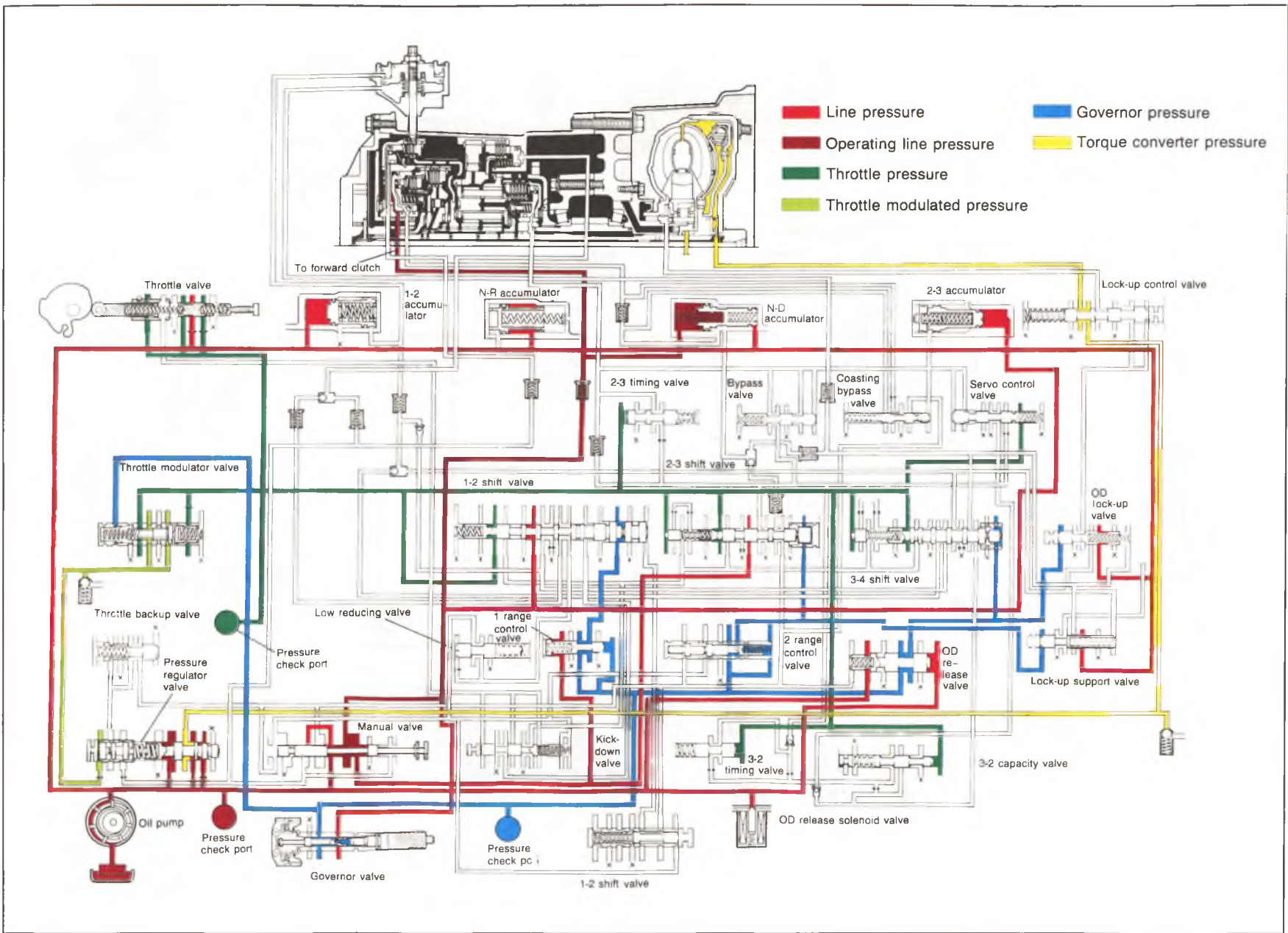
# 7B HYDRAULIC CIRCUIT (G4A-HL)

R RANGE



# HYDRAULIC CIRCUIT (G4A-HL) 7B

## D RANGE; 1ST GEAR

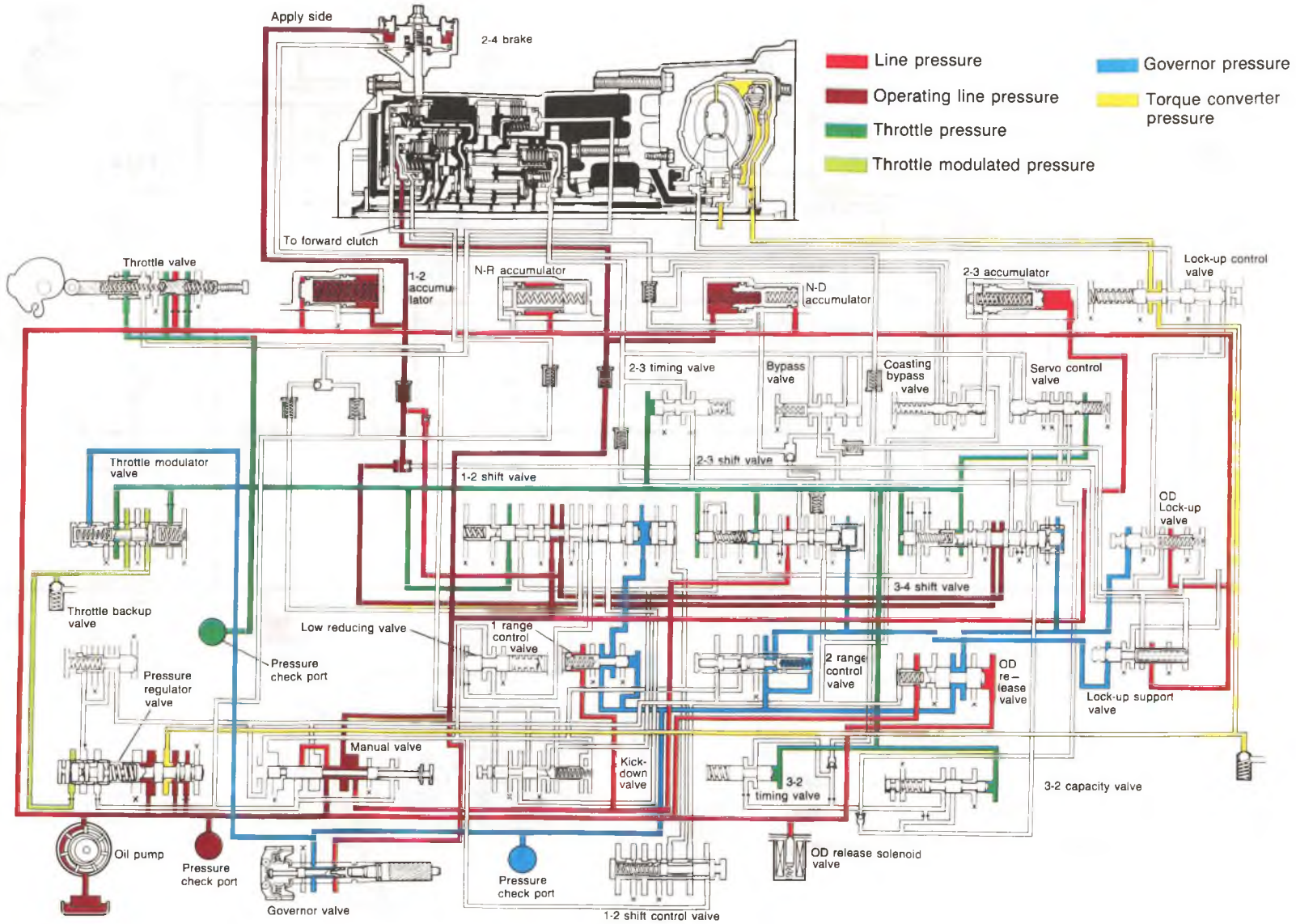


76G07B-205

7B-241

# 7B HYDRAULIC CIRCUIT (G4A-HL)

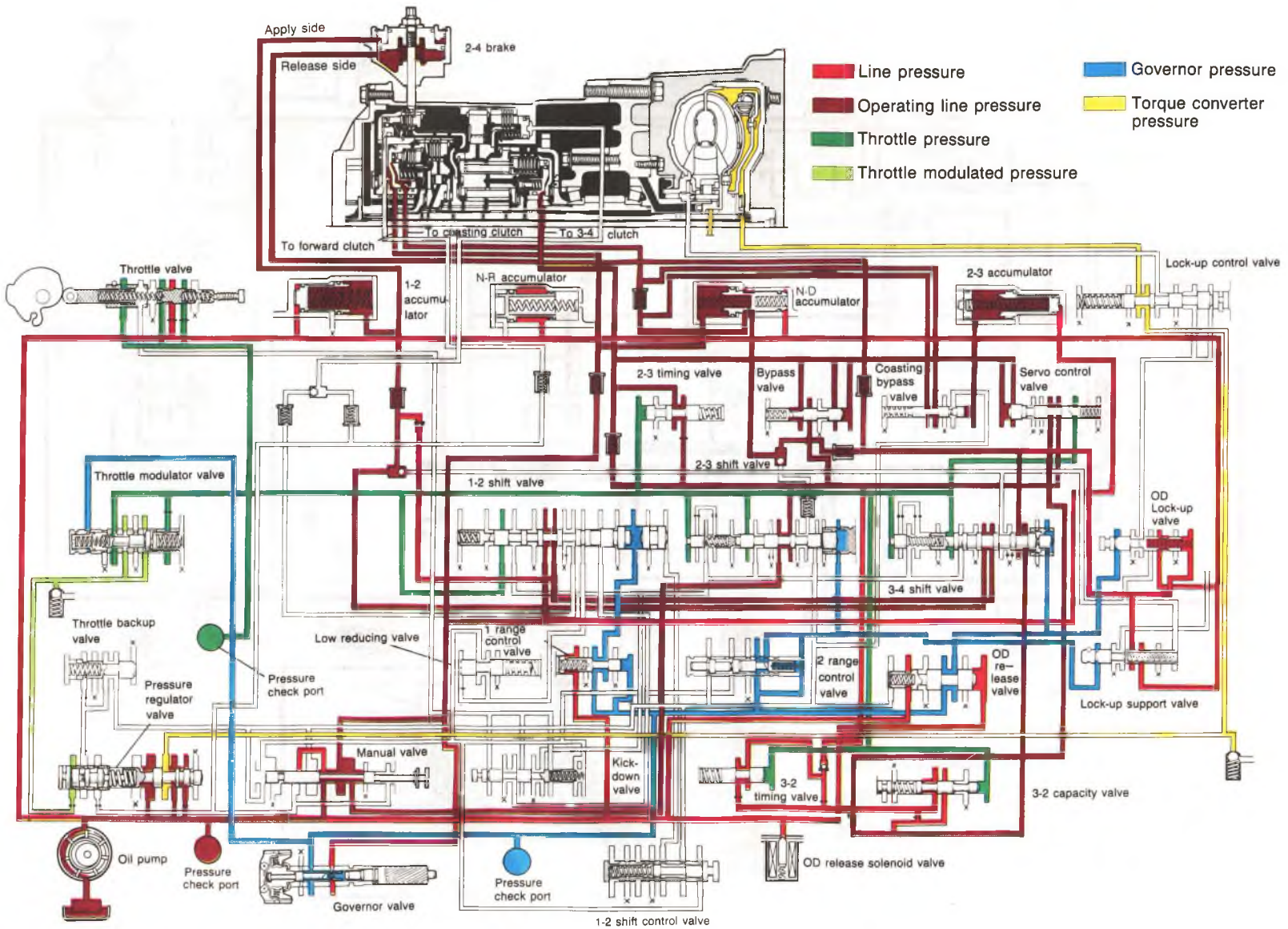
D RANGE; 2ND GEAR





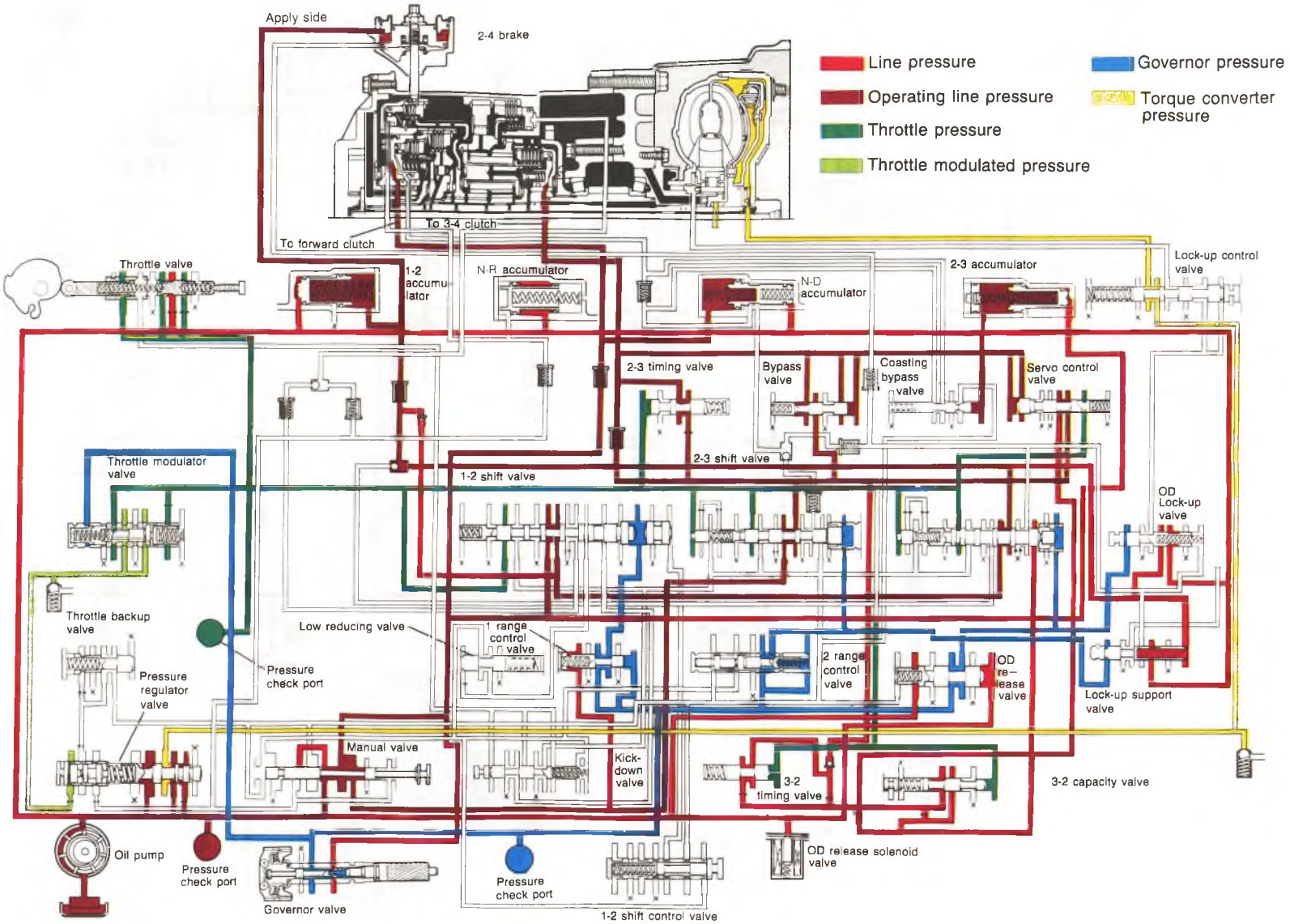
**D RANGE: 3RD GEAR**

**HYDRAULIC CIRCUIT (G4A-HL) 7B**



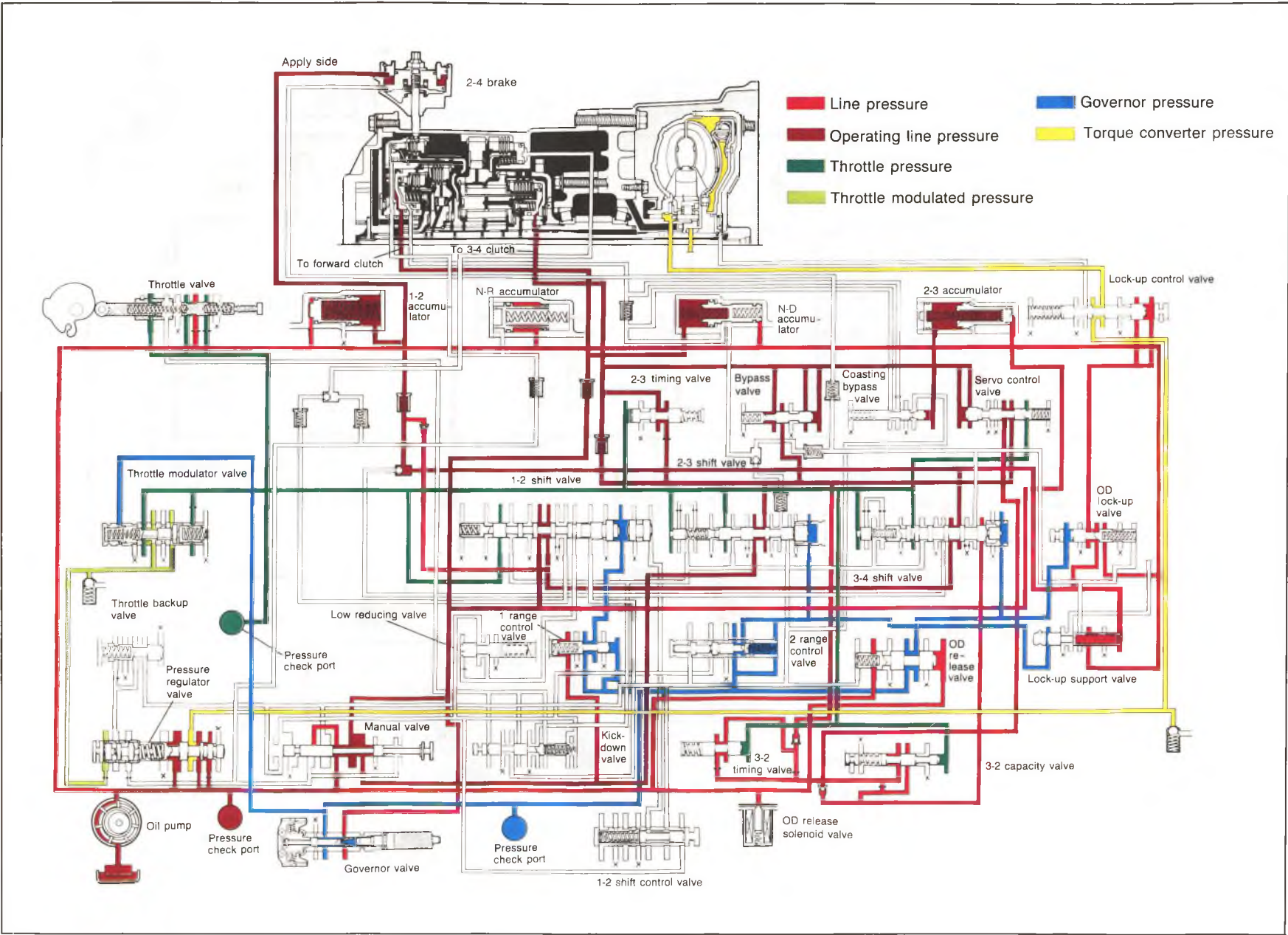
# 7B HYDRAULIC CIRCUIT (G4A-HL)

D RANGE: OD



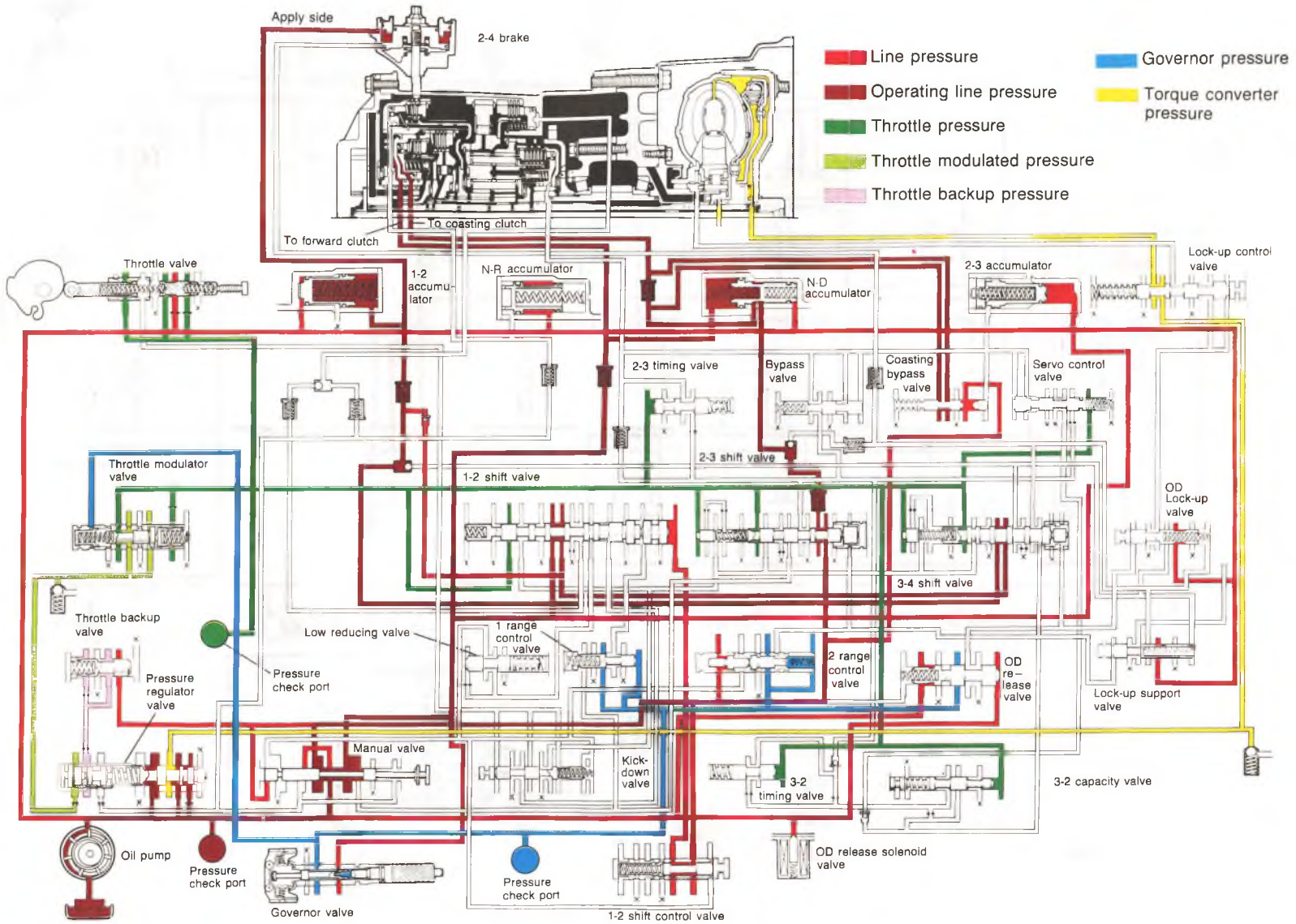
D RANGE; OD, LOCK-UP ON

HYDRAULIC CIRCUIT (G4A-HL) 7B



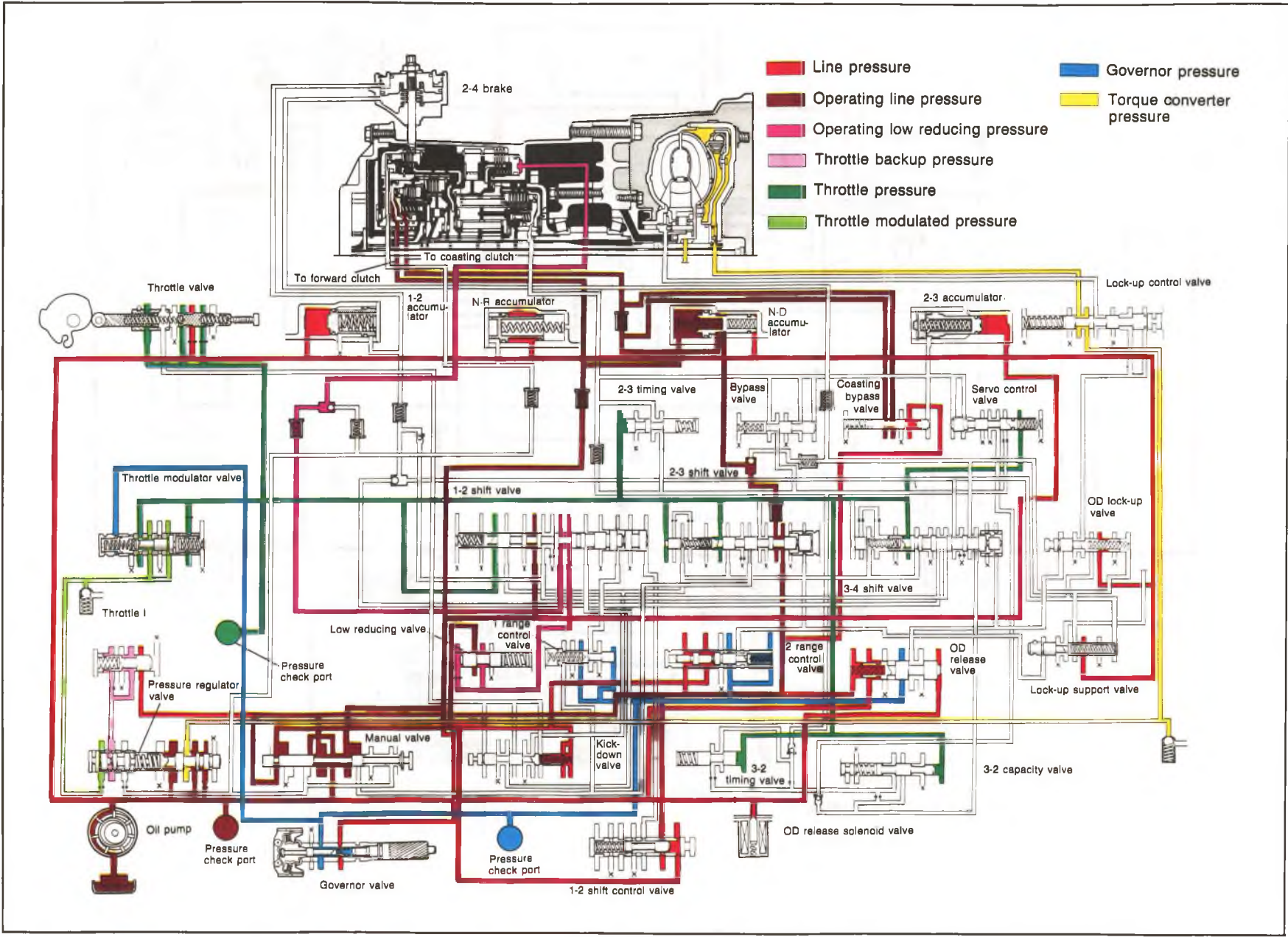
# 7B HYDRAULIC CIRCUIT (G4A-HL)

## 2 RANGE; 2ND GEAR



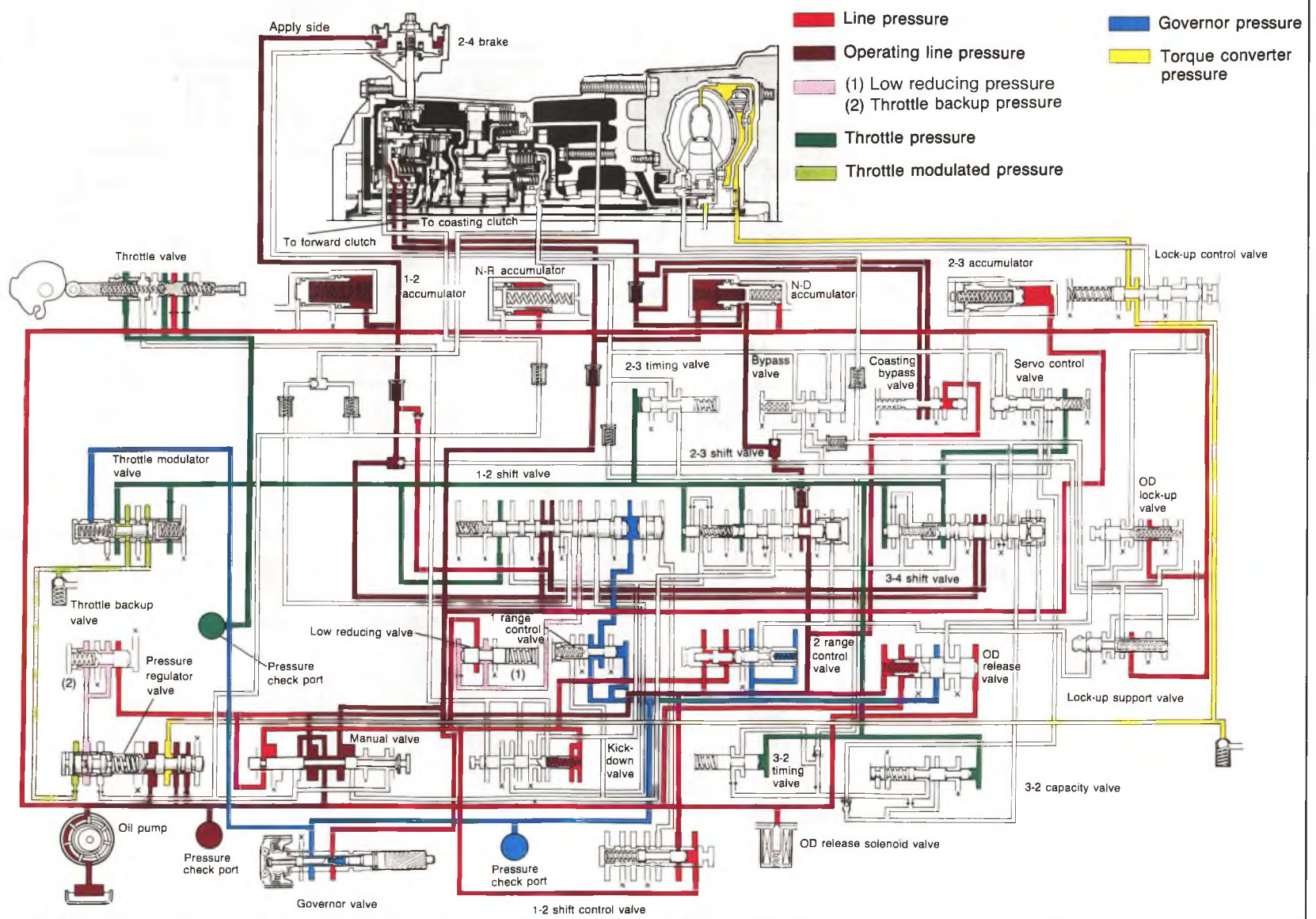
1 RANGE: 1ST GEAR

HYDRAULIC CIRCUIT (G4A-HL) 7B



# 7B HYDRAULIC CIRCUIT (G4A-HL)

1 RANGE: 2ND GEAR



# AUTOMATIC TRANSAXLE (3-Speed)

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FRONT CLUTCH .....	7C— 58		

# 7C OUTLINE

## OUTLINE

### SPECIFICATIONS

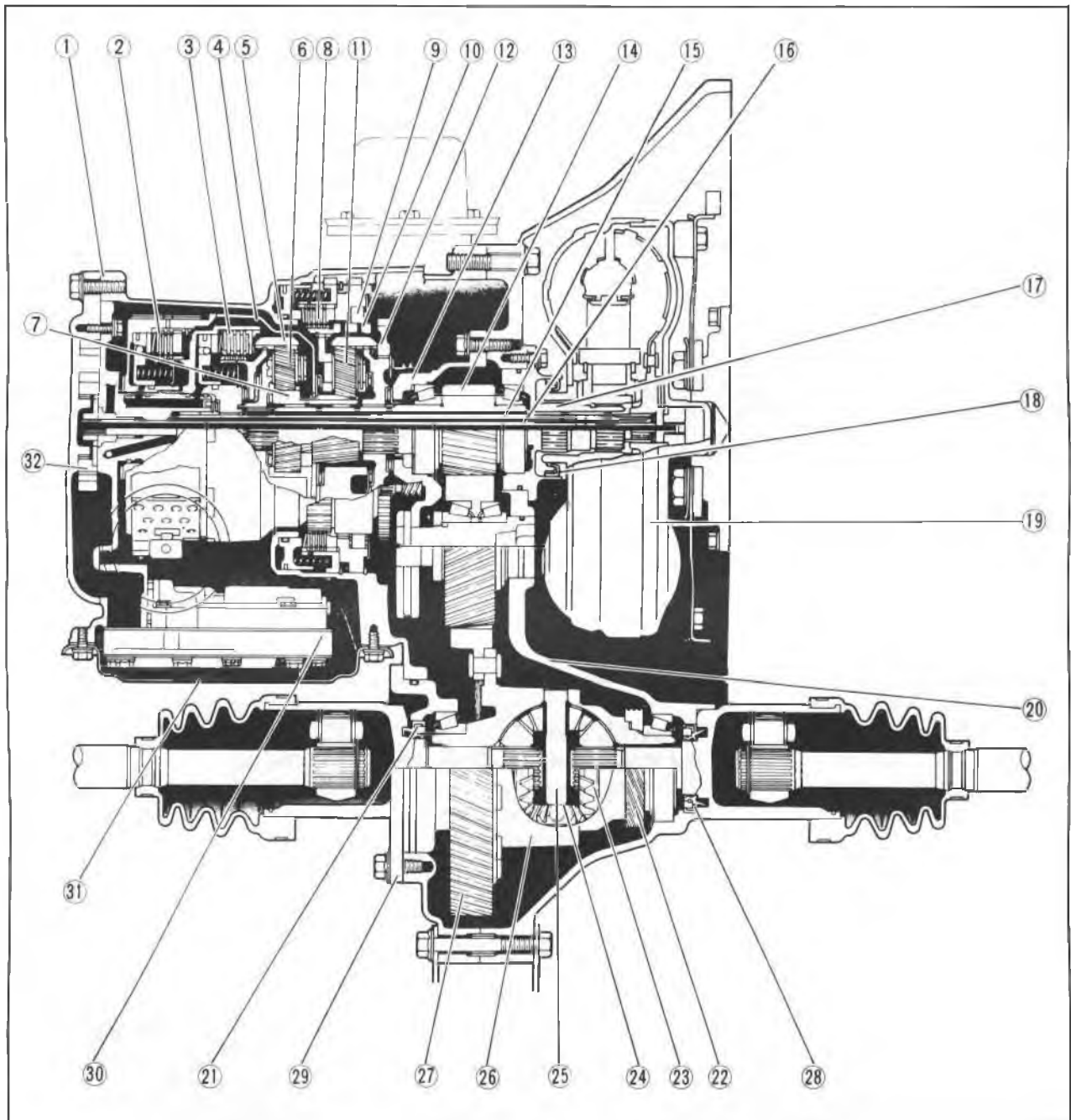
Model		F3A	
		FE engine	F6 engine
Torque converter stall torque ratio		1.800—2.100 : 1	
Gear ratio	First	2.841	
	Second	1.541	
	Third	1.000	
	Reverse	2.400	
Final gear ratio		3.450 : 1	3.631 : 1
Number of drive plates/ driven plates	Front clutch	3/3	
	Rear clutch	4/4	
	Low and reverse brake	4/4	
Servo diameter (Piston outer dia./retainer inner dia.) mm (in)		64/36 (2.52/1.42)	64/44 (2.52/1.73)
Speedometer gear ratio (Driven/Drive gear)		0.80 (20/25)	0.84 (21/25)
Automatic transaxle fluid	Type	Dexron-II or M-III	
	Capacity liters (US qt, Imp qt)	6.2 (6.6, 5.5)	

76G07C-002



## CROSS-SECTIONAL VIEW

76G07C-003

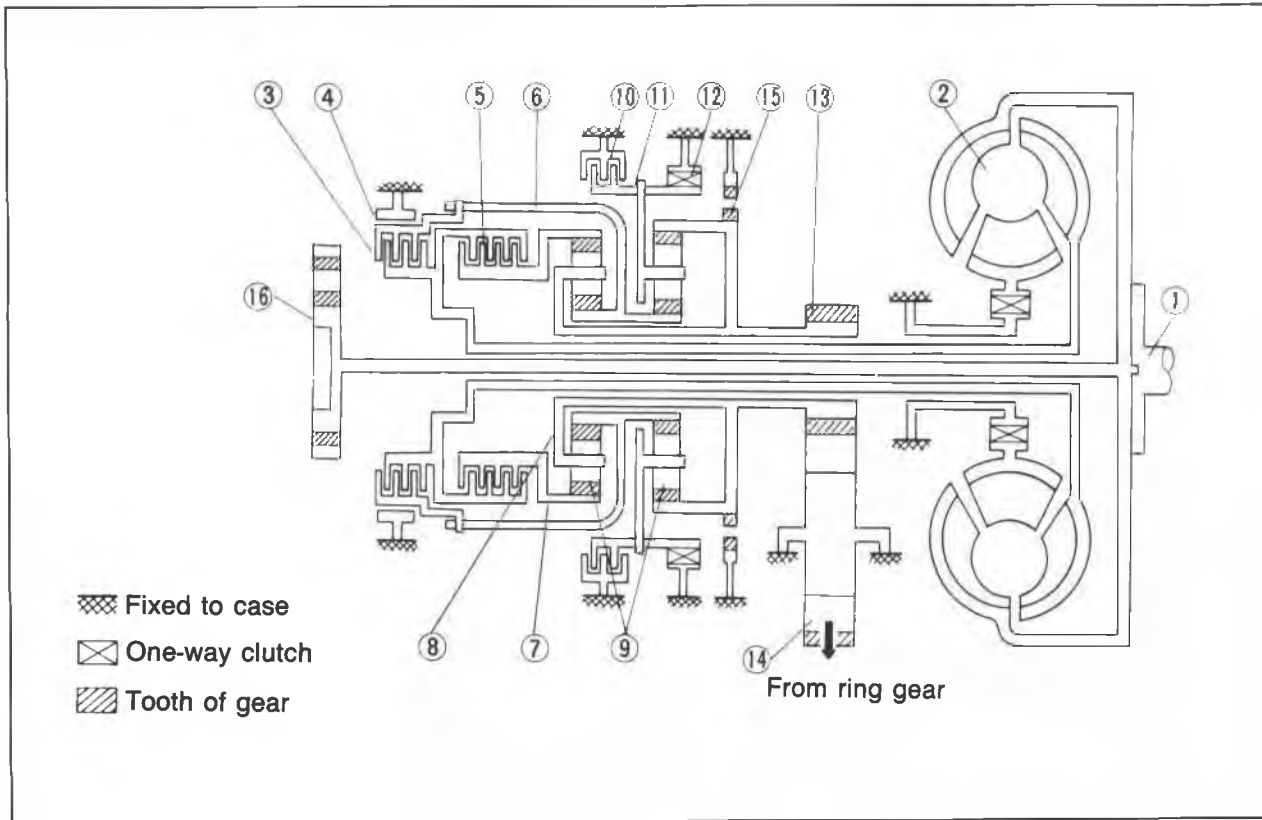


63U07B-003

- |                               |                            |                            |
|-------------------------------|----------------------------|----------------------------|
| 1. Transaxle case             | 12. Drum hub assembly      | 23. Side gear              |
| 2. Front clutch               | 13. Bearing housing        | 24. Pinion gear            |
| 3. Rear clutch                | 14. Output gear            | 25. Pinion shaft           |
| 4. Connecting shell           | 15. Turbine shaft          | 26. Differential gear case |
| 5. Rear clutch hub            | 16. Oil pump shaft         | 27. Ring gear              |
| 6. Planetary carrier (front)  | 17. Bearing cover          | 28. Oil seal               |
| 7. Sun gear                   | 18. Oil seal               | 29. Side bearing housing   |
| 8. Low and reverse brake      | 19. Torque converter       | 30. Control valve body     |
| 9. One-way clutch             | 20. Converter housing      | 31. Oil pan                |
| 10. One-way clutch inner race | 21. Oil seal               | 32. Oil pump               |
| 11. Planetary carrier (rear)  | 22. Speedometer drive gear |                            |

# 7C OUTLINE

## OPERATION OF COMPONENTS



76G07C-004

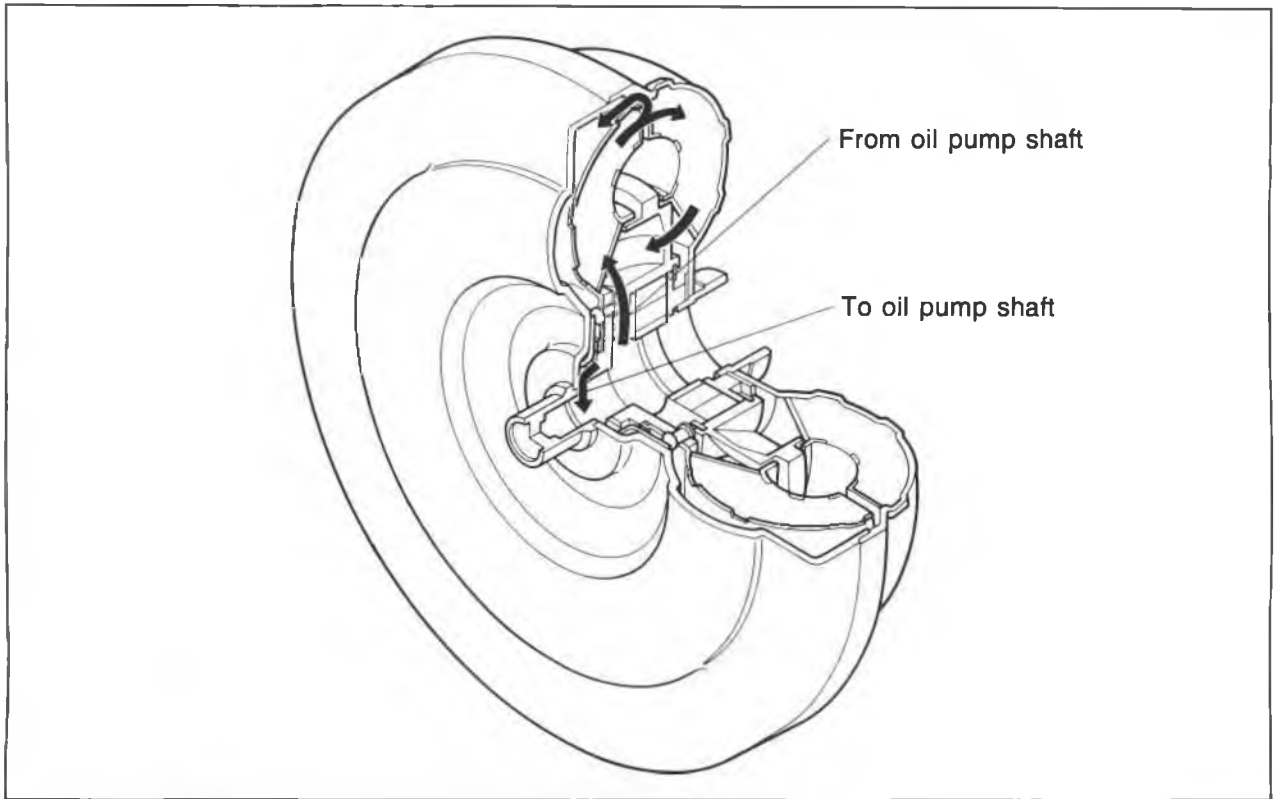
- |                     |                              |                  |
|---------------------|------------------------------|------------------|
| 1. Crankshaft       | 7. Internal gear             | 13. Output gear  |
| 2. Torque converter | 8. Planetary carrier (front) | 14. Idle gear    |
| 3. Front clutch     | 9. Pinion gear               | 15. Parking gear |
| 4. Brake band       | 10. Low and reverse brake    | 16. Oil pump     |
| 5. Rear clutch      | 11. Planetary carrier (rear) |                  |
| 6. Connecting shell | 12. One-way clutch           |                  |

Shift position	Gear ratio	Clutch		Low and reverse brake	Band servo		One-way clutch
		Front	Rear		Operation	Release	
P	—			○			
R	2.400	○		○		○	
N	—						
D	1		○				○
	2		○		○		
	3	○	○		⊗	○	
2	1.541		○		○		
1	2		○		○		
	1	2.841		○			

⊗ : Indicates fluid pressure to servo but not applied due to pressure difference in servo.

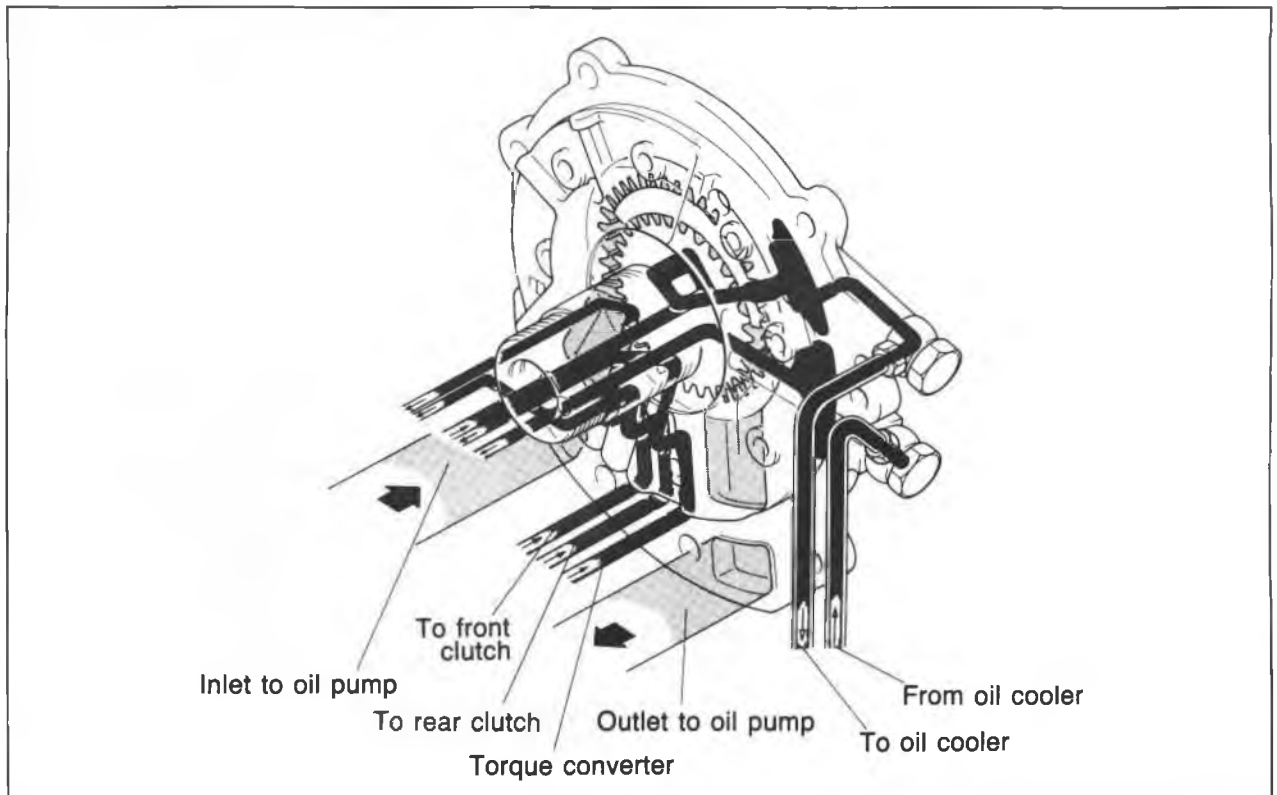
76G07C-005

**FLUID PASSAGE LOCATION**  
**Torque Converter**



76G07C-006

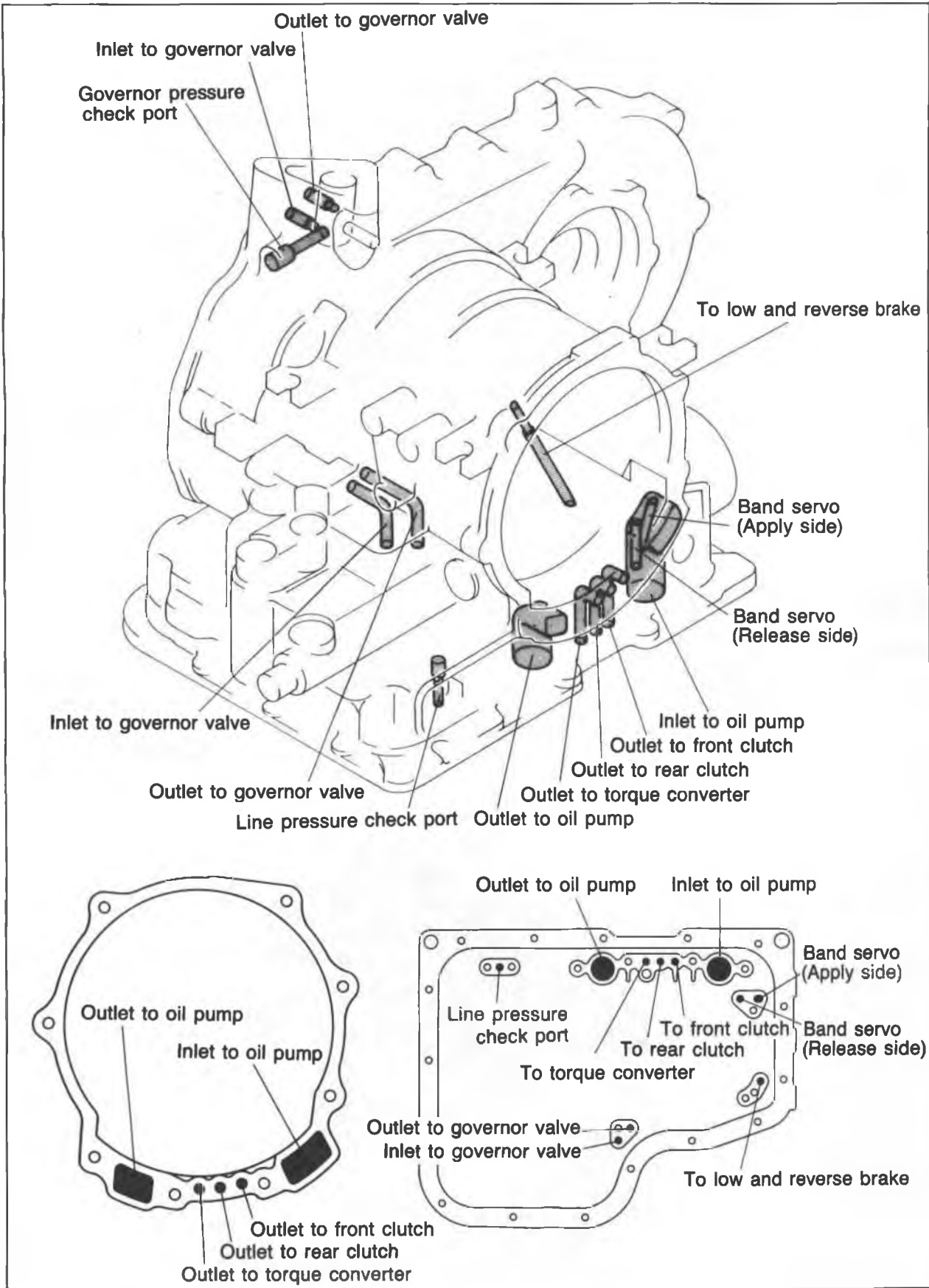
**Oil Pump**



76G07C-007

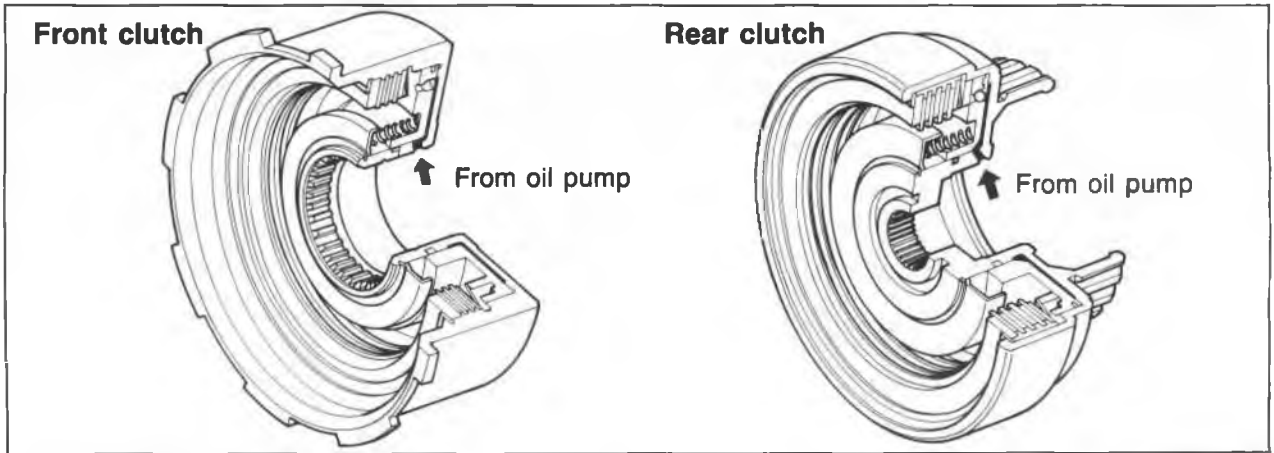
# 7C OUTLINE

## Transaxle Case



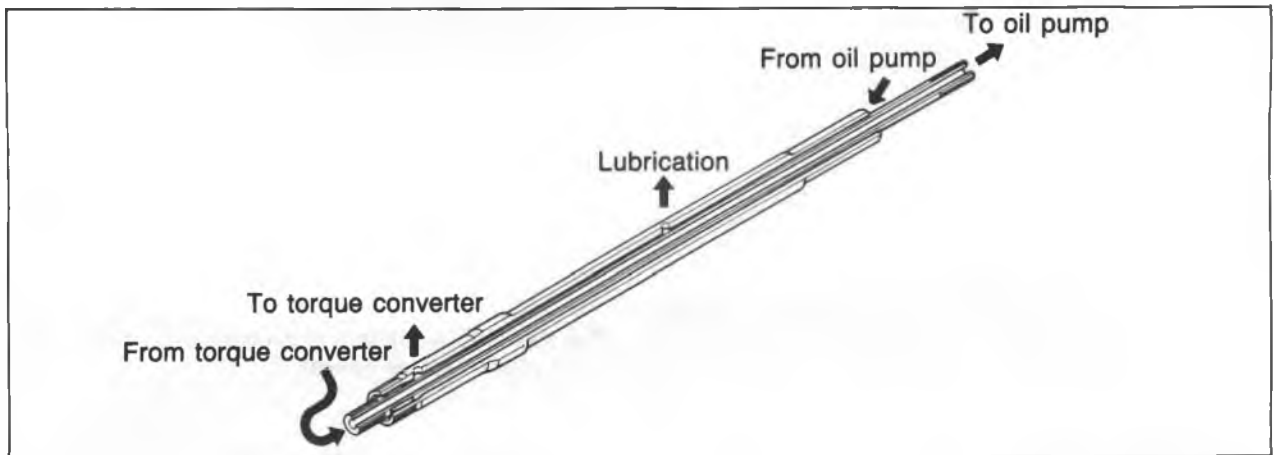
76G07C-008

Clutches



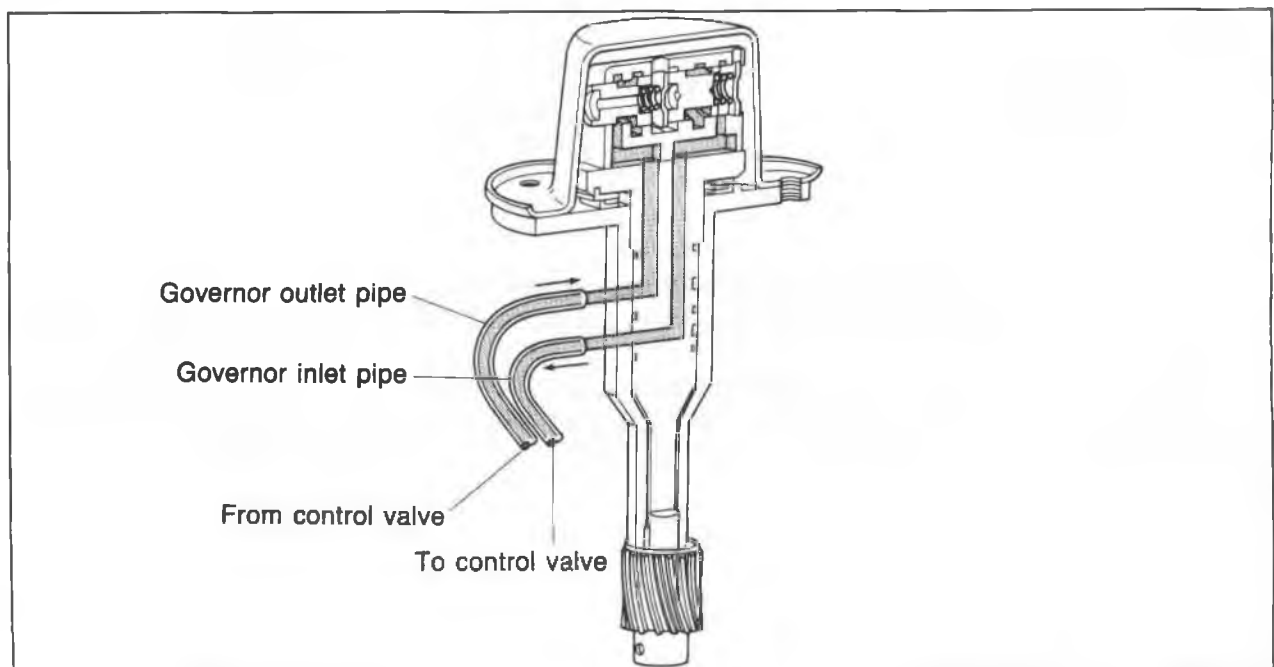
76G07C-009

Oil Pump, and Turbine Shaft



76G07C-010

Governor

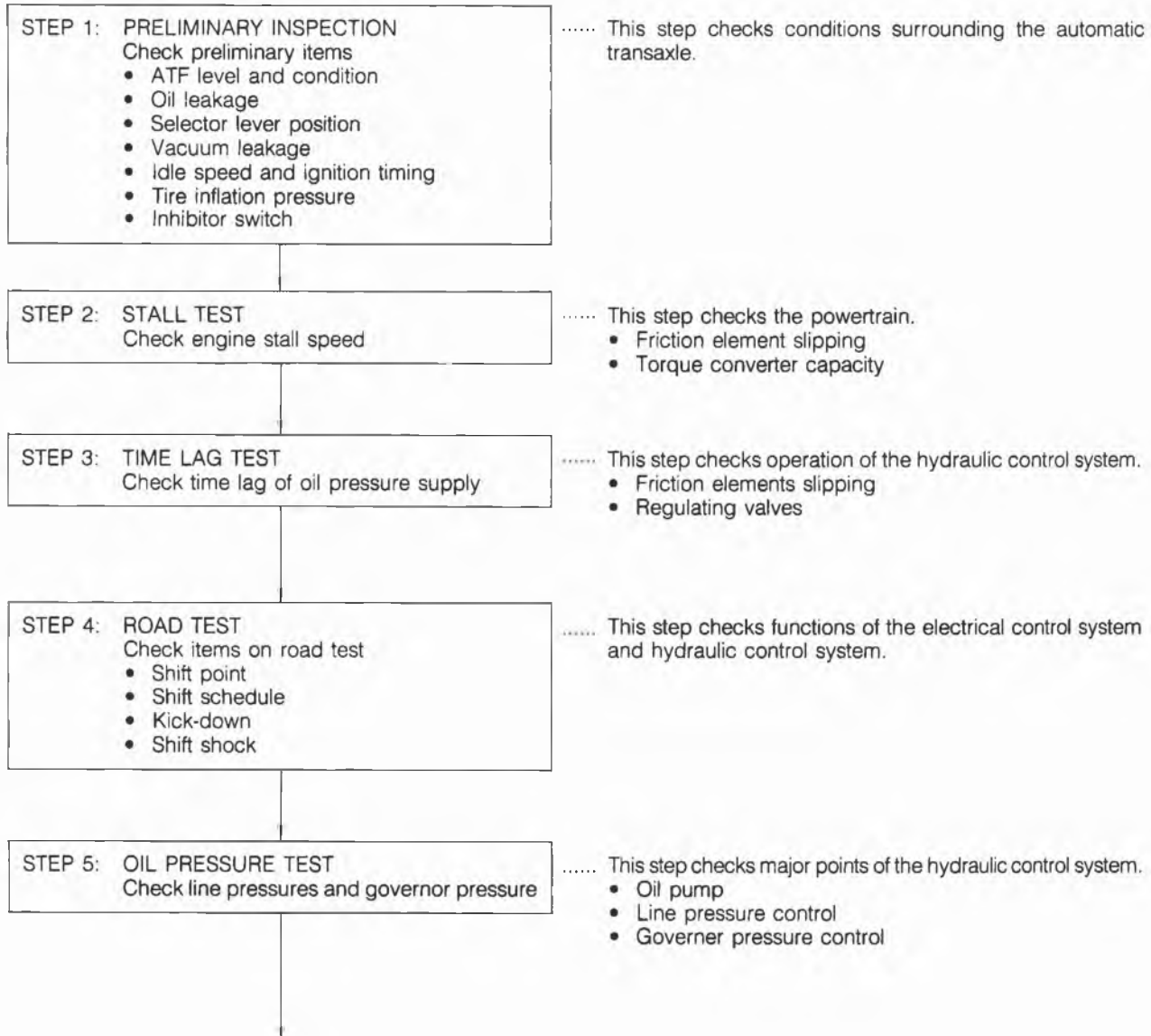


76G07C-011

## TROUBLESHOOTING

### GENERAL NOTE

In the event of a problem with the automatic transaxle, the cause may be in the engine, powertrain, hydraulic control system, or electrical control system. When troubleshooting, it is recommended to begin from those points that can be judged quickly and easily. The recommended troubleshooting sequence is described below.



By following the above five steps, the cause of the problem should be located.

As another guide to faster location of the causes of problems, the Quick Diagnosis Chart is included at pages 7C—9 to 7C—11.

In this chart, a circle is used to indicate the components that might be the cause of trouble for 54 types of problems. It is only necessary to check those components indicated by circles, at each step of the troubleshooting process, in order to quickly locate the cause of the problem.

76G07C-012

## QUICK DIAGNOSIS CHART

### How to use Quick Diagnosis Chart

1. The numbers indicate the order of inspection for troubleshooting.
2. Circled numbers indicate that the transaxle must be removed from the vehicle.

76G07C-013

### Transaxle

<div style="display: flex; justify-content: space-between;"> <div style="width: 30%; text-align: center;"> <b>Inspection point and reference page</b>   <b>Condition</b> </div> <div style="width: 35%; text-align: center;"> <b>ON VEHICLE</b> </div> <div style="width: 35%; text-align: center;"> <b>OFF VEHICLE</b> </div> </div>		7C-25	7C-26	7C-23	7C-27	7C-23,24	Section 4A	7C-14	7C-20,22	7C-75	7C-72	7C-69	7C-5	Section 5	7C-58	7C-62	7C-70	7C-71	7C-55	7C-125	7C-54	7C-71	7C-66, 98	7C-68, 71
		ATF level and condition	Selector lever	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kick-down solenoid, kick-down switch and wiring	Engine idle speed and condition	Engine stall speed	Fluid pressure (Line and governor)	Control valves	Governor valve	Band servo	Transaxle air check	Ignition switch and starter	Front clutch	Rear clutch	Brake band	Low and reverse brake	Oil pump	Hydraulic circuit	Torque converter	One-way clutch	Parking linkage	Planetary gear
Engine starting	Engine does not start in N or P range	• 2 3	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	1	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	•		
	Engine starts in ranges other than N and P ranges	• 1 2	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	•	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	•		
Accelerating	Vehicle does not move in D range (moves in 1, 2 & R ranges)	• 1 •	• • •	• • •	• • •	• • •	• 2 3	• • •	• • •	• • •	• • •	• • •	•	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• ④ •	•		
	Vehicle does not move in forward ranges (moves in R range) Extremely poor acceleration	1 2 •	• • •	• • •	• • •	• • •	• 3 4	• • •	• • •	• • •	• • •	• • •	•	• • •	• ⑤ •	• • •	• • •	• ⑦	• • •	• • •	• • •	•		
	Vehicle does not move in R range (moves in forward range) Extremely poor acceleration	1 2 •	• • •	• • •	• • •	• • •	• 3 4	• • •	• • •	• • •	• • •	• • •	•	•	⑦ ⑧ •	• • •	• • •	⑥ • •	⑨	• • •	• • •	•		
	Vehicle does not move in any range	1 2 •	• • •	• • •	• • •	• • •	• 3 4	• • •	• • •	• • •	• • •	• • •	•	•	• • •	• • •	• • •	• ⑥ ⑦	• • •	• • •	• • •	⑧ •		
	Slippage felt when accelerating	1 2 •	• • •	• • •	• • •	• • •	• 3 4	• • •	• • •	• • •	• • •	• • •	•	•	• • •	• • •	• • •	• ⑦ ⑧	• • •	• • •	• • •	•		
	Vehicle moves in N range	2 1 •	• • •	• • •	• • •	• • •	• • •	• 3	• • •	• • •	• • •	• • •	•	•	• • •	• ④ •	• • •	• • •	• • •	• • •	• • •	• • •	•	
	Excessive creep	• • •	• • •	• • •	• • •	• • •	• 1	• • •	• • •	• • •	• • •	• • •	•	•	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	•	
	No creep at all	1 2 •	• • •	• • •	• • •	• • •	• 3	• • •	• 4	• • •	• • •	• • •	•	•	• • •	⑧ ⑦ •	• • •	• • •	• ⑤ ⑥	• • •	• • •	• • •	•	
	Low maximum speed and poor acceleration	1 2 •	• • •	• • •	• • •	• • •	• 7	• 3 4 6	• • •	• • •	• • •	• • •	• • •	•	•	• • •	⑩ ⑪ ⑧	• • •	• ⑨ ⑫ •	• • •	• • •	• • •	•	
No shifting	Does not shift from 1st to 2nd	• 1 •	• 2 3 •	• • •	• • •	• • •	• 4	• 5 6 7	• • •	• • •	• • •	• • •	•	•	• • •	• ⑧ ⑨	• • •	• • •	• ⑩	• • •	• • •	•		
	Does not shift from 2nd to 3rd	• 1 •	• 2 3 •	• • •	• • •	• • •	• 4	• 5 6 7	• • •	• • •	• • •	• • •	•	•	• • •	• ⑧ • •	• • •	• • •	• ⑨	• • •	• • •	•		
	Does not shift from 3rd to 2nd	1 • •	• 2 • •	• • •	• • •	• • •	• 3	• 4 5 6	• • •	• • •	• • •	• • •	•	•	• • •	• ⑦ • ⑧	• • •	• • •	• ⑨	• • •	• • •	•		

76G07C-014

# 7C TROUBLESHOOTING

Inspection point and reference page		ON VEHICLE							OFF VEHICLE						
		7C-25 7C-26 7C-23	7C-27 7C-23,24 Section 4A	7C-14 7C-20,22 7C-75	7C-72 7C-69 7C-5	Section 5	7C-58 7C-62 7C-70	7C-71 7C-55 7C-125	7C-54 7C-71 7C-66, 98	7C-68, 71					
Condition		ATF level and condition Selector lever Inhibitor switch and wiring	Vacuum diaphragm and piping Kick-down solenoid, kick-down switch and wiring Engine idle speed and condition	Engine stall speed Fluid pressure (Line and governor) Control valves	Governor valve Band servo Transaxle air check	Ignition switch and starter	Front clutch Rear clutch Brake band	Low and reverse brake Oil pump Hydraulic circuit	Torque converter One-way clutch Parking linkage	Planetary gear					
No shifting	Does not shift from 2nd to 1st or from 3rd to 1st	1 • • •	2 • • •	• • • 3	4 5 6	•	• • • ⑦	• • • •	• ⑥ • •	•					
	Does not kick-down when accelerator is depressed in 3rd within the kick-down range	1 • • •	3 2 •	• • • 4	5 • • •	•	• • • ⑥	• • • ⑦	• • • •	•					
	Excessive engine speed when accelerated in 3rd due to delayed kick-down	1 2 •	• • • •	• 3 4	5 • 6	•	⑦ • • •	• • • ⑧	• • • •	•					
	Does not shift from 3rd to 2nd on D to 2 range shift	1 2 •	• • • •	• 3 4	5 6 •	•	⑦ • ⑧	• • • ⑨	• • • •	•					
	Does not shift from 3rd to 2nd on D to 1 range shift	1 2 •	• • • •	• 3 4	5 7 6	•	⑧ • ⑨	• • • ⑩	• • • •	•					
Shift shock	Excessive N to D range shift shock	• • • •	2 • 1	• 3 4	• • • •	•	• ⑤ •	• • • •	• • • •	•					
	Excessive 1st to 2nd shift shock	1 • • •	2 • • •	3 • 4	• 5 6	•	• • • ⑦	• • • •	• • • •	•					
	Excessive 2nd to 3rd shift shock	• • • •	1 • • •	• 2 3	• 4 5	•	⑦ • ⑥	• • • •	• • • •	•					
	Vehicle braked when shifted from 1st to 2nd	1 • • •	• • • •	• • 2	• • • •	•	④ • • •	③ • • •	• ⑤ • •	•					
	Vehicle braked when shifted from 2nd to 3rd	1 • • •	• • • •	• • 3	• 2 • •	•	• • • ④	• • • •	• • • •	•					
	Vehicle braked when shifted to R range	1 • • •	• • • •	• • • •	• 3 2	•	• ④ ⑤	• • • •	• • • ⑥	•					
	Shift shock felt when accelerator is released and deceleration occurs	• 1 •	2 3 •	• 4 5	6 • • •	•	• • • •	• • • ⑦	• • • •	•					
	Excessively large 2nd to 1st shift shock in 1 range	1 • • •	2 • • •	3 4 5	• • • •	•	• • • •	⑥ • • •	• • • •	•					
Shift point	Excessively high 1st to 2nd and 2nd to 3rd shift	1 • • •	2 3 •	• 4 5	6 • • •	•	• • • •	• • • ⑦	• • • •	•					
	Excessively high 3rd to 2nd and 2nd to 1st shift point	• 1 •	2 3 •	• 4 5	6 • • •	•	• • • •	• • • ⑦	• • • •	•					
	Kick-down operates or engine overruns when depressing pedal in 3rd beyond kick-down speed limit	1 2 •	3 • • •	• 4 5	6 • 7	•	⑧ • • •	• • • ⑨	• • • •	•					
Shift sequence	Shifts directly from 1st to 3rd	1 • • •	• • • •	• • 2	3 • 4	•	• • • ⑤	• • • ⑥	• • • •	•					
	Shifts from 2nd to 1st or 2nd to 3rd in 2 range	• 1 •	• • • •	• 2 3	• • • •	•	• • • •	• • • •	• • • •	•					



<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"><b>Inspection point and reference page</b></div> <div style="width: 35%; text-align: center;">ON VEHICLE</div> <div style="width: 35%; text-align: center;">OFF VEHICLE</div> </div>		7C-25 7C-26 7C-23			7C-27 7C-23,24 Section 4A			7C-14 7C-20,22 7C-75			7C-72 7C-69 7C-5			Section 5			7C-58 7C-62 7C-70			7C-71 7C-55 7C-125			7C-54 7C-71 7C-66, 98			7C-68, 71
		ATF level and condition Selector lever Inhibitor switch and wiring			Vacuum diaphragm and piping Kick-down solenoid, kick-down switch and wiring Engine idle speed and condition			Engine stall speed Fluid pressure (Line and governor) Control valves			Governor valve Band servo Transaxle air check			Ignition switch and starter			Front clutch Rear clutch Brake band			Low and reverse brake Oil pump Hydraulic circuit			Torque converter One-way clutch Parking linkage			Planetary gear
Shift sequence	Shifts from 1st to 2nd or 2nd to 3rd in 1 range	•	1	•	•	•	•	•	•	2	•	•	•	•	•	•	•	•	•	3	•	•	•	•		
	Slipping	Practically no shift shock, or slippage while 1st to 2nd shifting	1	2	•	3	•	•	•	4	5	•	7	6	•	•	•	8	•	•	9	•	•	•	•	
		Practically no shift shock or slippage while 2nd to 3rd shifting	1	2	•	3	•	•	•	4	5	•	7	6	•	8	•	•	•	•	9	•	•	•	•	
		No shift shock or engine runaway in 1 to 2 range shift	1	2	•	3	•	4	5	•	6	•	•	7	•	•	•	8	•	9	•	•	•	•	•	
		Engine runaway or slip when shifting 3rd to 2nd	1	•	•	2	•	•	•	3	4	•	5	6	•	7	•	8	•	•	9	•	•	•	•	
		Slippage evident when vehicle starts moving	1	2	•	5	•	•	•	3	4	•	•	6	•	•	•	•	•	7	8	•	•	•	•	
Noise	Transaxle noisy in P and N range	1	•	•	•	•	•	•	2	•	•	•	•	•	•	•	•	•	3	•	•	•	•	•		
	Transaxle noisy in D, 2, 1 and R ranges	1	•	•	•	•	•	•	2	•	•	•	•	•	•	3	•	•	4	•	•	5	•	6		
Others	No engine brake in 1 range	•	1	•	•	•	•	•	2	3	•	•	4	•	•	•	•	6	•	6	•	•	•	•		
	Vehicle moves in P range or parking gear not disengaged when P range disengaged	•	1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2	•		
	Transaxle overheats	1	•	•	•	•	•	3	4	5	•	2	6	•	7	8	9	10	11	12	13	•	•	14		
	White smoke from exhaust while running	1	•	•	2	•	•	3	4	5	•	•	6	•	7	8	9	10	11	12	13	•	•	14		
	Abnormal odor from oil level gauge pipe	1	•	•	•	•	•	•	•	•	•	•	•	•	2	3	4	5	6	7	8	•	•	9		

76G07C-016

## Differential

Problem	Probable Cause	Remedy	Page
<b>Noise</b>	Insufficient fluid	Add	7C-25
	Low fluid quality	Replace with specified ATF	7C-25
	Worn bearing	Adjust or replace	7C-79
	Contact surface of gears worn	Replace	7C-79
	Tooth surface of gears damaged	Replace	7C-79
	Contaminated ATF	Repair or replace	7C-25
	Differential gear damaged, excessive backlash	Replace	7C-79
	Excessive bearing preload	Adjust	7C-94

76G07C-017

# 7C TROUBLESHOOTING

## STEP 1 (PRELIMINARY INSPECTION)

In this step, the main points related to the automatic transaxle are checked. These items must be kept in the correct condition at all times in order to assure proper operation of the automatic transaxle.

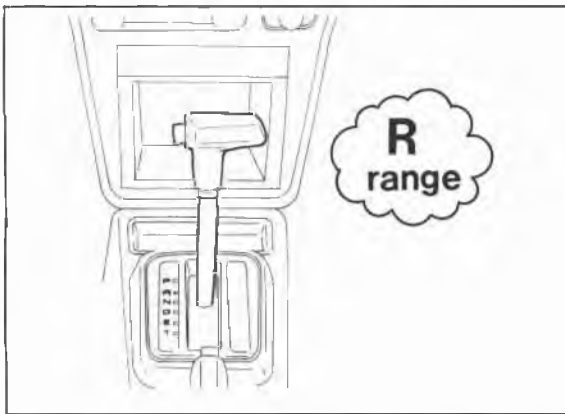
### 1. Automatic Transaxle Fluid (ATF)

Check ATF level and condition. (Refer to page 7C—25.)

### 2. Selector Lever

Check selector lever position and adjust it if necessary. (Refer to page 7C—26.)

76G07C-018

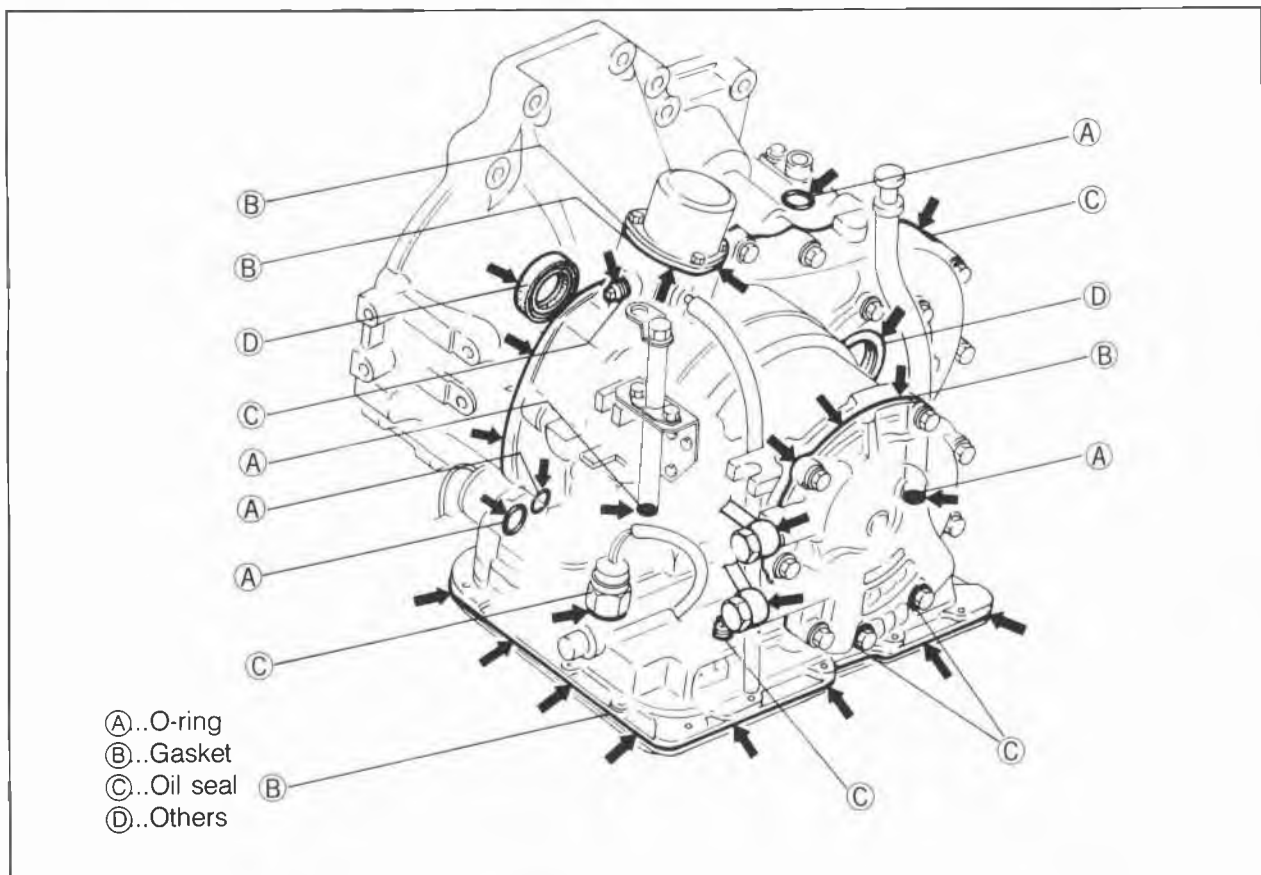


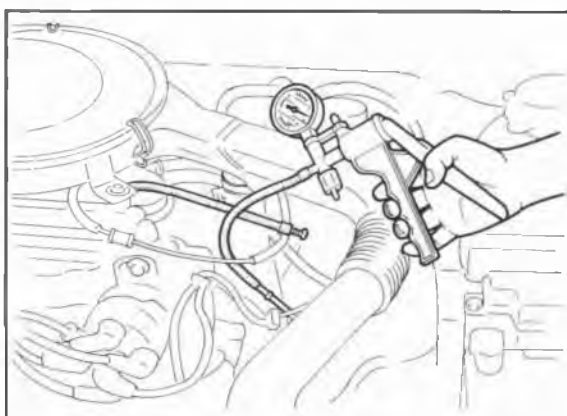
76G07C-019

### 3. Oil Leakage

Check for oil leakage.

- (1) Warm up the ATF.
- (2) Apply the parking brake and block the wheels to prevent the vehicle from rolling.
- (3) Shift the selector lever to R range.
- (4) Check if oil leaks from the noted oil seals or gaskets.
- (5) If oil leaks, replace the seal or gasket.



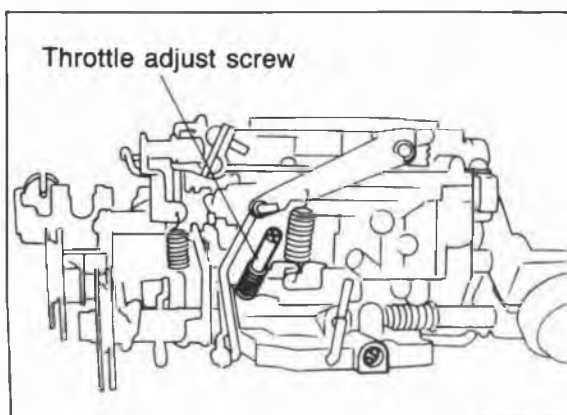


76G07C-020

#### 4. Vacuum Leakage

Check for vacuum leakage.

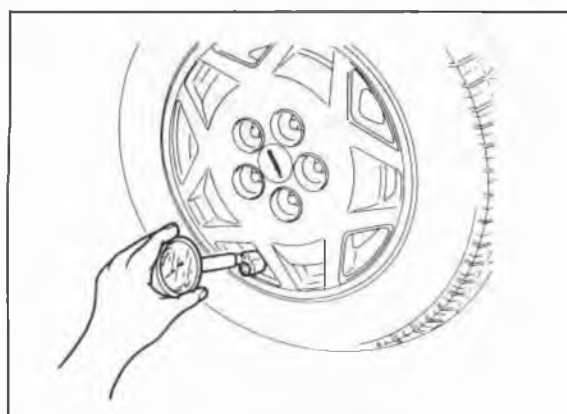
- (1) Disconnect the vacuum hose to the vacuum diaphragm.
- (2) Connect a vacuum pump to the hose.
- (3) Apply vacuum and check if vacuum leaks.
- (4) If vacuum leaks, check the vacuum hose and vacuum diaphragm. Replace if necessary.



76G07C-021

#### 5. Idle Speed and Ignition Timing

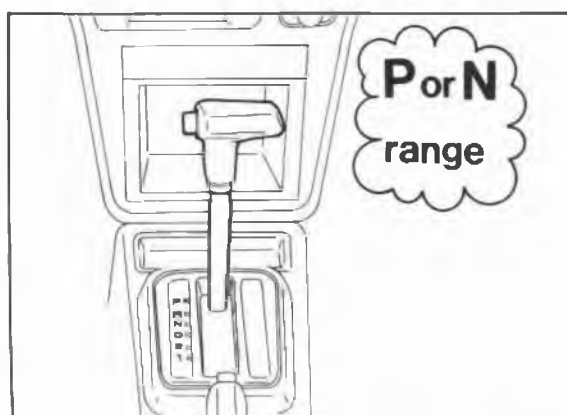
Check idle speed and ignition timing. (Refer to Section 4A.)



76G07C-022

#### 6. Tire Inflation Pressure

Check tire inflation pressure. (Refer to page 12—2.)



76G07C-023

#### 7. Inhibitor Switch

Check the inhibitor switch for operation. (Refer to page 7C—23.)

## 7C TROUBLESHOOTING

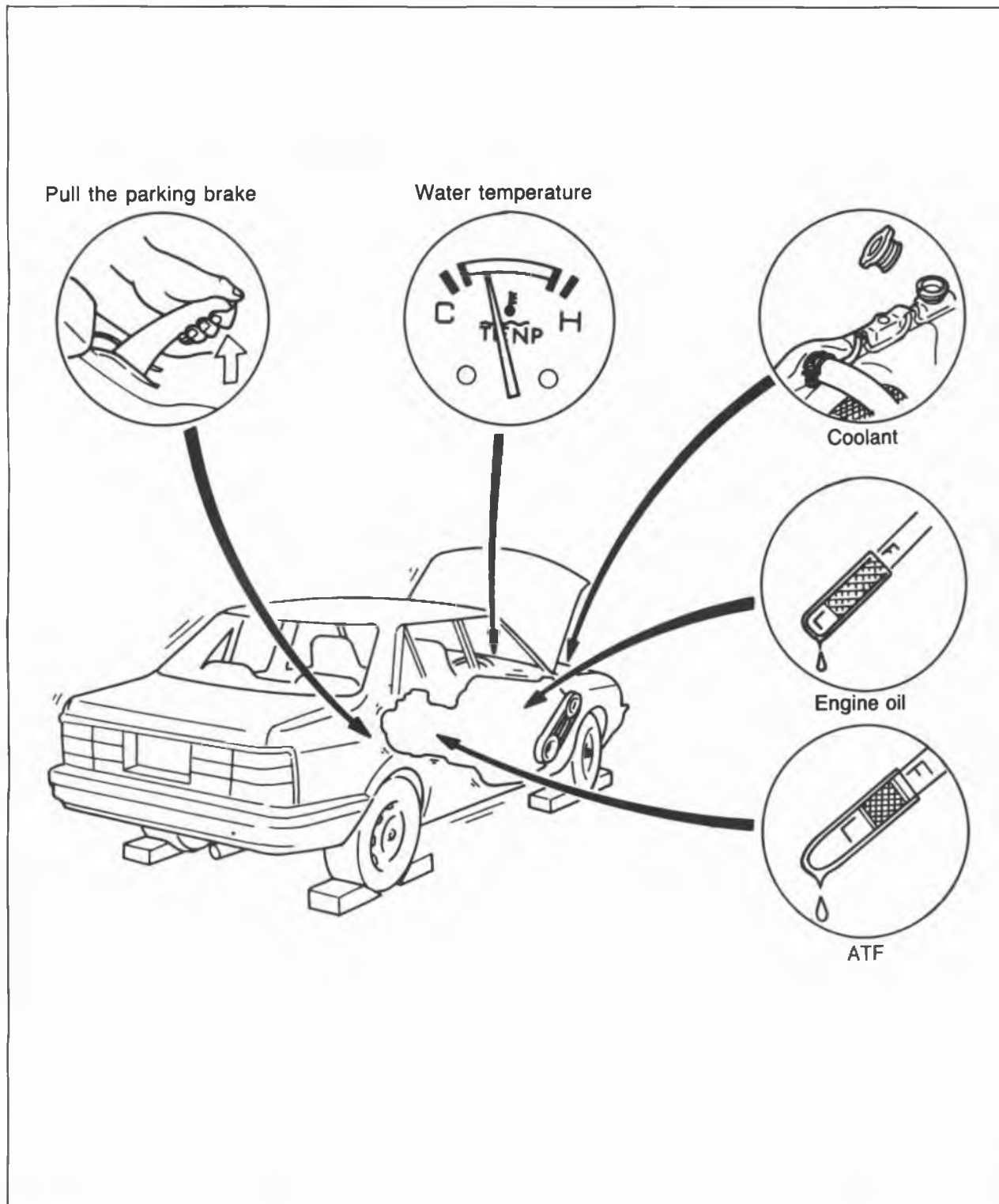
### STEP 2 (STALL TEST)

This step is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

#### Preparation

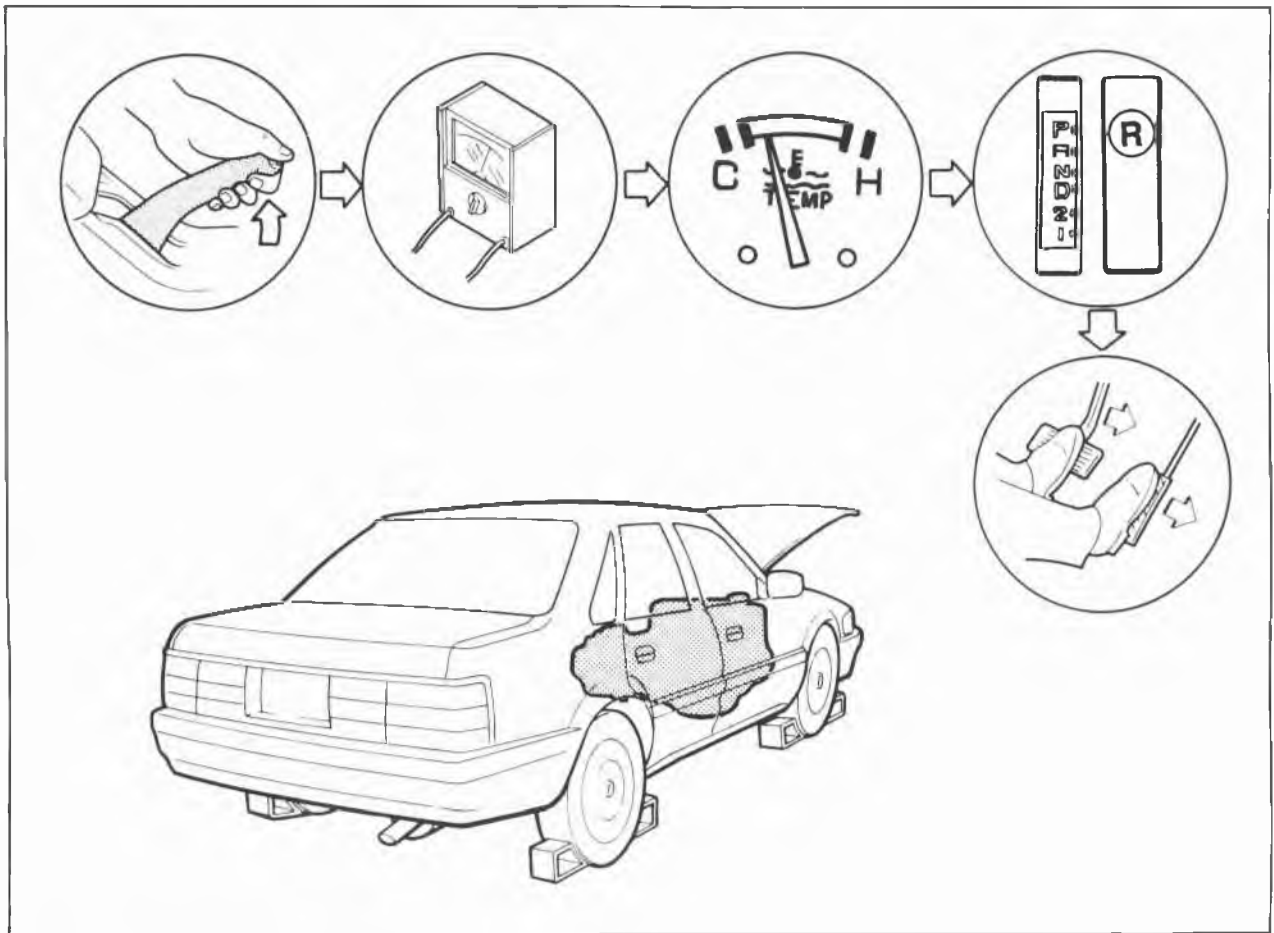
Check the following items prior to testing:

1. Engine coolant, engine oil and ATF levels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (50—80°C, 122—176°F).
3. Set the parking brake and block the front and rear of the wheels.



76G07C-024

## Procedure



76G07C-025

1. Connect a tachometer to the engine.
2. Shift the selector lever to D range.
3. Depress the brake pedal firmly with the left foot, and gradually depress the accelerator pedal with the right foot.
4. Read and note the engine speed as soon as it becomes constant; then release the accelerator pedal.

### Caution

**Steps 3 to 4 must be done within 5 seconds.**

5. Shift the selector to N range and let the engine idle for one minute or more.

### Note

**The idling cools the ATF and prevents oil degeneration.**

6. Perform stall tests for the following ranges in the same manner.
  - (1) 2 range
  - (2) 1 range
  - (3) R range

### Standard stall speed:

**FE engine 2050—2150 rpm**  
**F6 engine 1800—2050 rpm**

### Caution

**Always provide adequate cooling time between individual range stall tests.**

# 7C TROUBLESHOOTING

## Evaluation

Condition		Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transaxle case
			Stuck pressure regulator valve
	In D, 2, and 1	Rear clutch slipping	
	In D range only	One-way clutch slipping	
	In 2 range only	Brake band slipping	
In R range only	Low and reverse brake slipping		
	Brake band slipping		
	Road test to determine if cause is low and reverse brake or reverse clutch: a) Engine braking in 1 range..... Front clutch b) No engine braking in 1 range .... Low and reverse brake		
Within specification		All shift control elements within transaxle functioning normally	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

76G07C-026

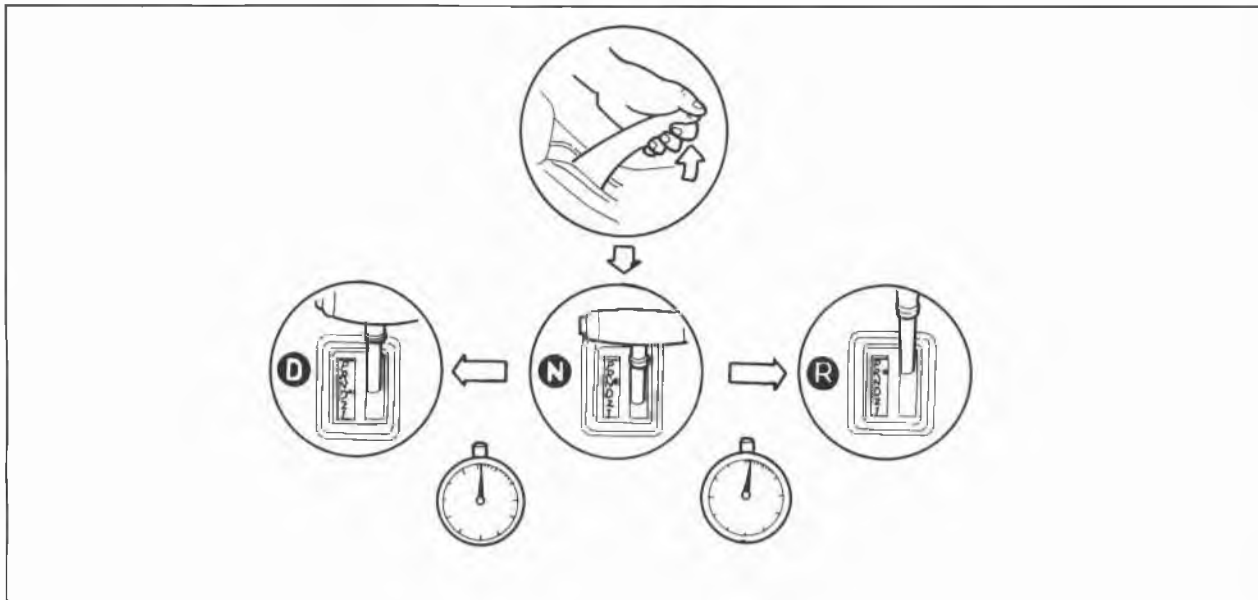
## STEP 3 (TIME LAG TEST)

When the selector lever is shifted while the engine is idling, there is a certain time lapse, or time lag, before shock is felt. This time lag test checks the condition of the front, rear, and one-way clutch, low and reverse brake, and orifice check valve.

### Preparation

Follow the test preparation procedure shown in STEP 2 (STALL TEST).

### Procedure



1. Start the engine and verify that the idle speed is  $950 \pm 50$  rpm.
2. Shift from N range to D range
3. Measure the time it takes from shifting until shock is felt with a stop watch.
4. Shift the selector to N range and run the engine at idle for one minute or more.
5. Perform the test for N range to R range in the same manner.

### Note

**Make three measurements for each test and take the average value.**

**Specified time lag:** N → D range ..... 0.5—1.0 second  
 N → R range ..... 0.5—1.0 second

### Evaluation

Condition		Possible Cause
N → D shift	More than specification	Insufficient line pressure
		Rear clutch slipping
		One-way clutch slipping
Less than specification	N-D accumulator not operating properly	
N → R shift	More than specification	Insufficient line pressure
		Low and reverse brake slipping
		Front clutch slipping
	Less than specification	Stuck orifice check valve
		Excessive line pressure

76G07C-027

# 7C TROUBLESHOOTING

## STEP 4 (ROAD TEST)

This step is performed to check for problems in the various ranges. If these tests show any problems, adjust or replace by referring to the **QUICK DIAGNOSIS CHART** and mechanical sections.

### Caution

**Perform the test at normal ATF operating temperature (50—80°C, 122—176°F).**

### Gearshift Function Check Items

1. Shift shock must be minimal, and shifting must be smooth.
2. Engine speed must not run away, and the shifting must not be delayed.
3. Transaxle must shift through D<sub>1</sub> → D<sub>2</sub> → D<sub>3</sub> in D range.
4. Transaxle must shift from 3rd in D range to 2nd gear when 2 range is selected.
5. Transaxle must shift from 2nd to 1st when 1 range is selected from 3rd gear in D range.
6. Transaxle must not upshift in 1 range.
7. Transaxle must remain in 2nd gear in 2 range.
8. Transaxle must positively lock in P range.

The transaxle must positively lock when P range is selected while moving at a speed below 4 km/h (2.5 mph) on level ground. The transaxle must positively lock when set in P range with the vehicle on a gentle slope and the brakes disengaged.

### Shift Speed

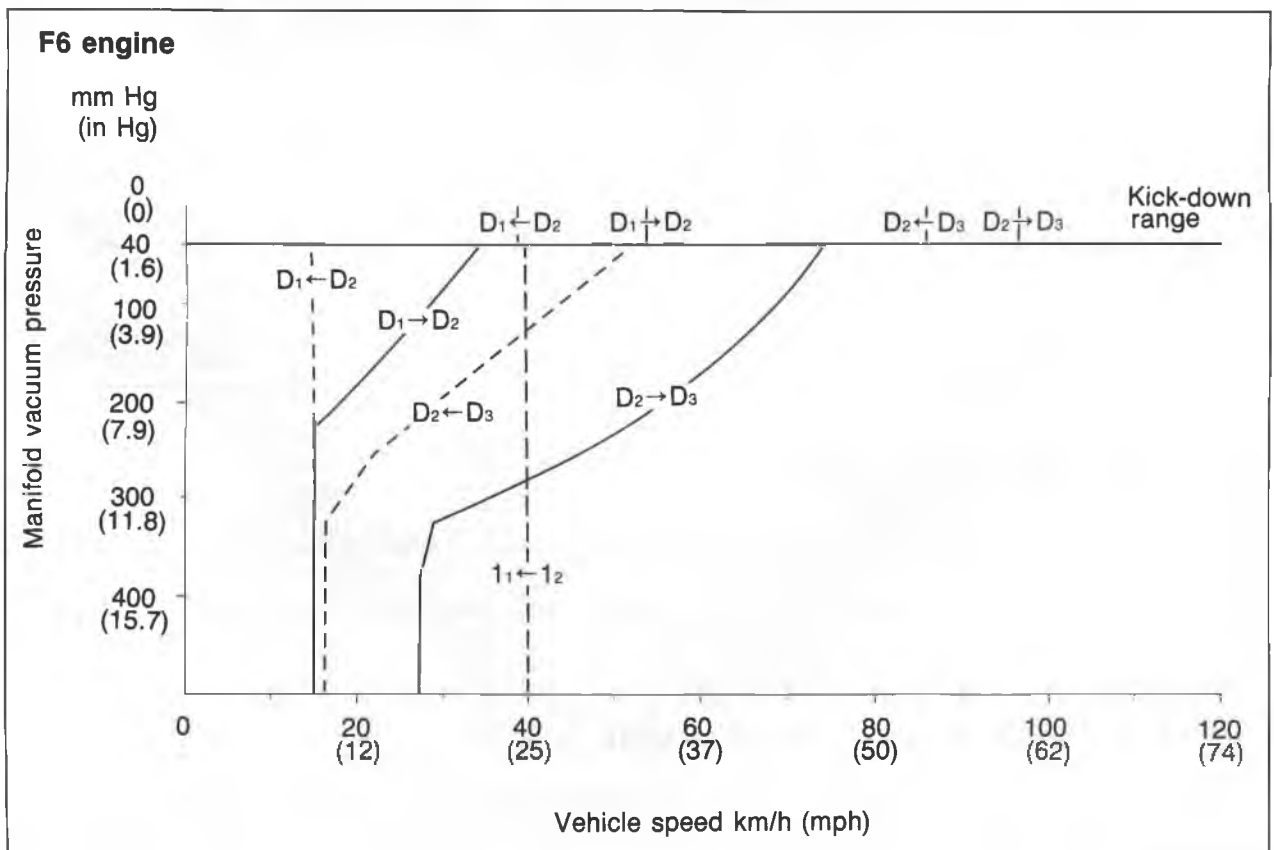
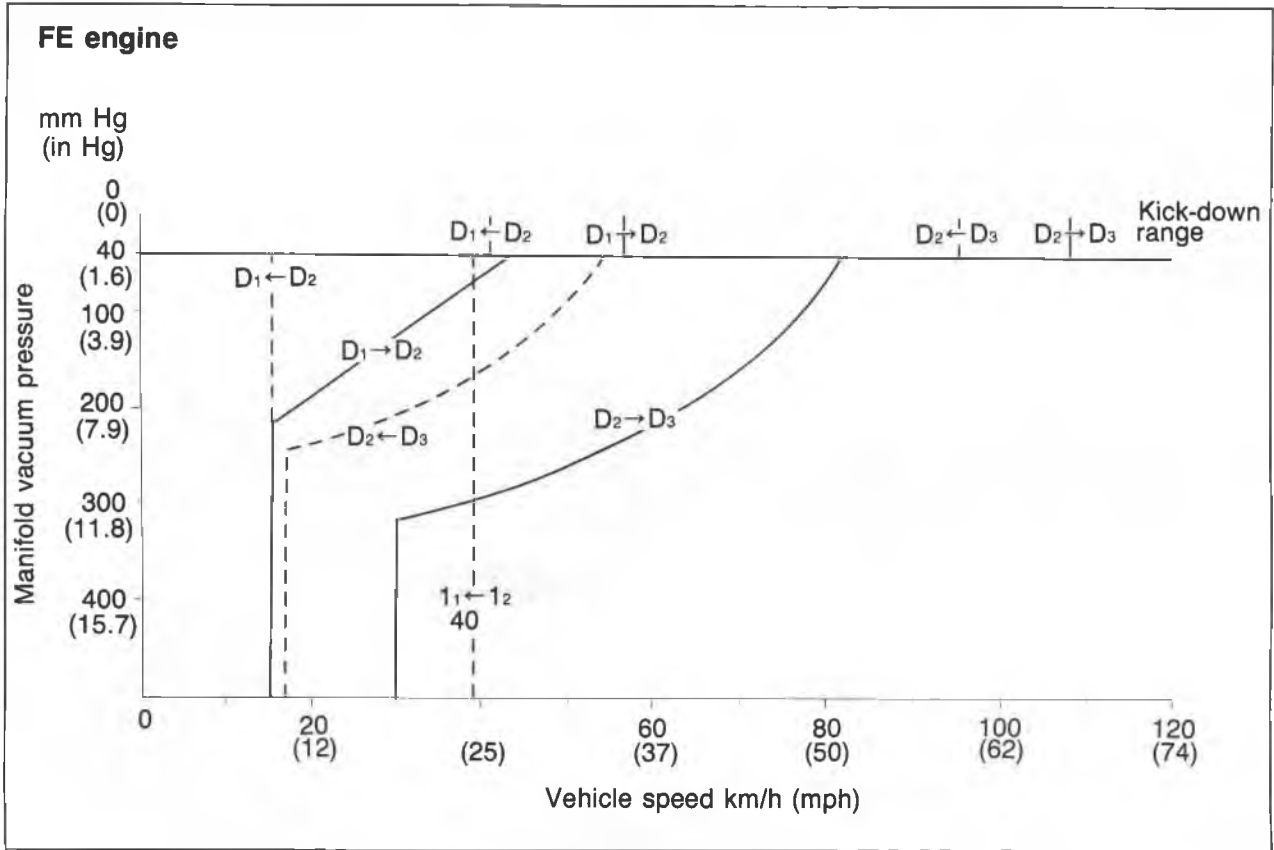
Throttle condition (manifold vacuum)	Range	Shift	Vehicle speed km/h (mph)	
			FE engine	F6 engine
Fully opened 0—100 mmHg (0—3.94 inHg)	D	1st → 2nd	47—57 (29—35)	44—54 (27—33)
		2nd → 3rd	106—119 (66—74)	95—108 (59—67)
		3rd → 2nd	95—103 (59—64)	86—94 (53—58)
		2nd → 1st	35—39 (22—24)	34—38 (21—24)
Half-throttle 130 mmHg (5.12 inHg)	D	1st → 2nd	18—31 (11—19)	18—31 (11—19)
		2nd → 3rd	39—68 (24—42)	44—73 (27—45)
Fully closed	D	2nd → 1st	10—15 (6—9)	10—15 (6—9)
	1	2nd → 1st	32—39 (20—24)	33—40 (20—25)

1. Full-throttle: The throttle opening during kick-down when the manifold vacuum is between **0—100 mmHg (0—3.94 inHg)**
2. Half-throttle: The throttle opening at manifold vacuum of **130 mmHg (5.12 inHg)**

76G07C-028



Basic Gearshift Pattern



## 7C TROUBLESHOOTING

### STEP 5 (OIL PRESSURE TEST)

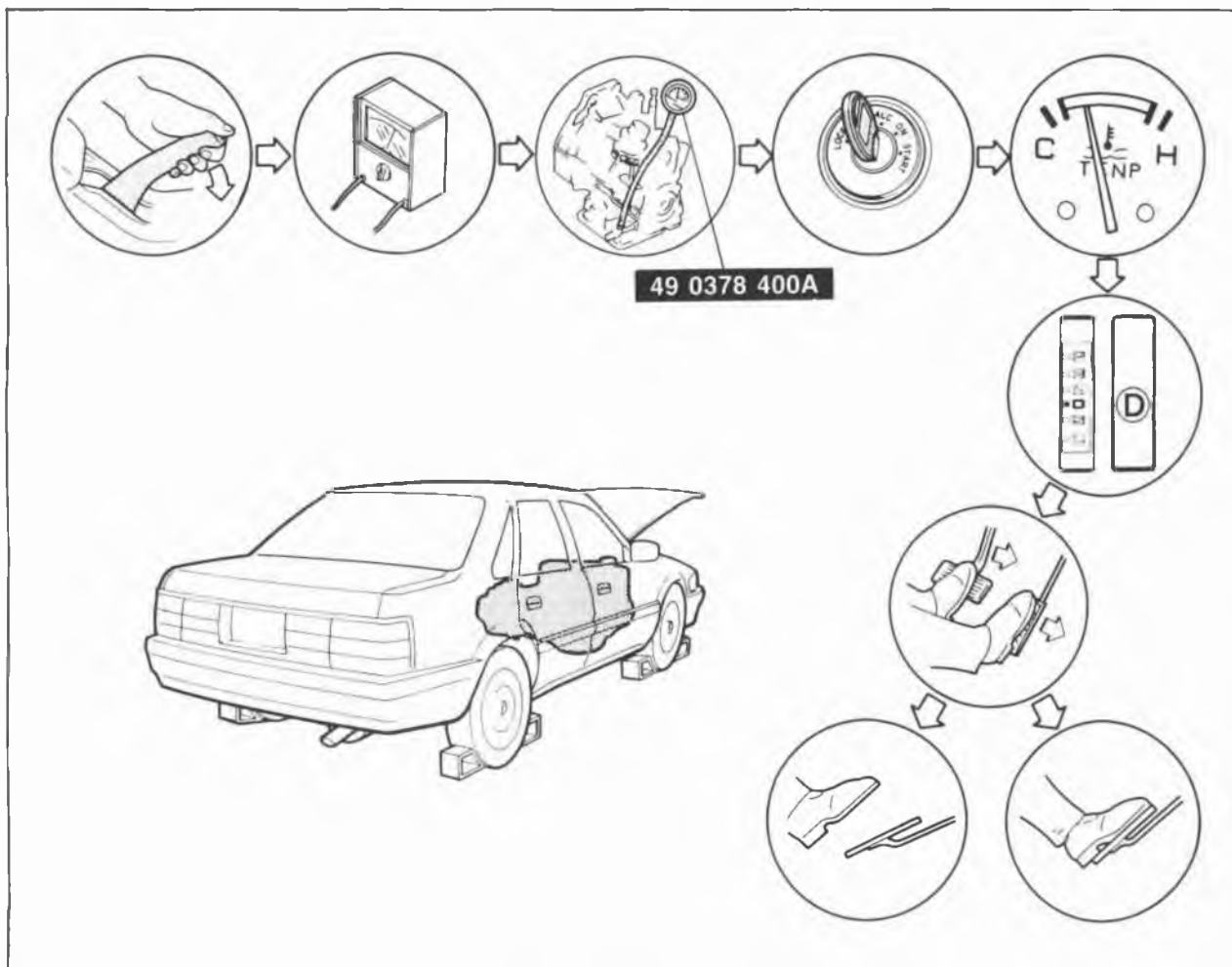
This step determines line pressure, and governor pressure to check the hydraulic components and for oil leakage.

#### Line Pressure Test

##### Preparation

1. Connect the **SST** to the line pressure output point.
2. Connect a tachometer to the engine.
3. Follow the test preparation procedure show in STEP 2 (STALL TEST).

##### Procedure



76G07C-030

1. Start the engine and verify that the idle speed is  $950 \pm 50$  rpm.
2. Shift the selector lever to D range.
3. Read the line pressure at idle.
4. Depress the brake pedal firmly with the left foot, and gradually depress the accelerator pedal with the right foot.
5. Read the line pressure as soon as the engine speed becomes constant; then release the accelerator pedal.

##### Caution

**Steps 4 to 5 must be done within 5 seconds.**

5. Shift the selector lever to N range and let the engine idle for one minute or more.
6. Read the line pressure at idle and engine stall speeds for each range in the same manner.

## Specified line pressure:

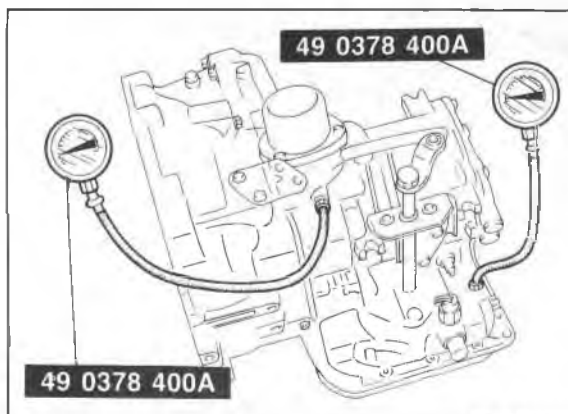
Range	Pressure kPa (kg/cm <sup>2</sup> , psi)	
	Idle	Stall
D	294—392 (3—4, 43—57)	883—1079 (9—11, 128—156)
2	785—1177 (8—12, 114—171)	785—1177 (8—12, 114—171)
1	294—392 (3—4, 43—57)	883—1079 (9—11, 128—156)
R	392—687 (4—7, 57—100)	1570—1864 (16—19, 228—270)

76G07C-031

## Evaluation

Condition		Possible cause
Below standard	In all ranges	Worn oil pump
		Fluid leakage from the oil pump, control valve, or transaxle case
		Stuck pressure regulator valve
	In D, 1, 2 ranges	Fluid leakage from the rear clutch or governor hydraulic circuit, or both
	In R range only	Fluid leakage from the low and reverse brake hydraulic circuit
Excessive line pressure at idle		Leaking or disconnected vacuum hose
		Leaking vacuum diaphragm

76G07C-032



76G07C-033

### Line Pressure Cutback Point

1. Connect the **SST** to the line pressure output point and the governor pressure output point in the transaxle case, and place the gauges inside the vehicle.
2. Disconnect the hose to the vacuum diaphragm, and plug it.
3. Connect a vacuum pump to the vacuum diaphragm, and place the pump inside the vehicle.
4. Gradually accelerate the vehicle in D range.
5. Read the governor pressure at the point where the line pressure suddenly drops.
6. Apply **200 mmHg (7.87 inHg)** vacuum, and repeat steps 4 and 5.

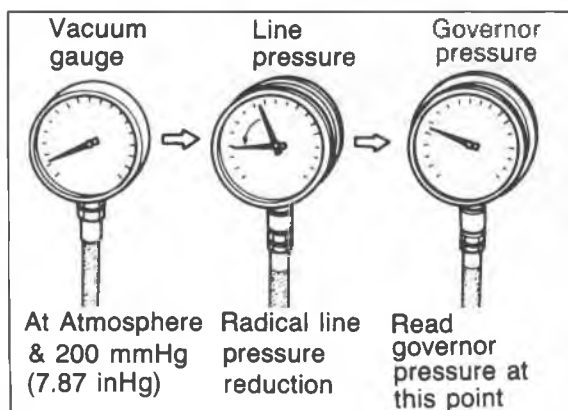
### Standard

Vacuum mmHg (inHg)	Governor pressure kPa (kg/cm <sup>2</sup> , psi)
Atmospheric pressure	98—157 (1.0—1.6, 14—23)
200 (7.87)	39—98 (0.4—1.0, 6—14)

### Evaluation

Incorrect pressures

1. Missing diaphragm rod or rod length incorrect, or both.
2. Stuck valve in control valve.



76G07C-034

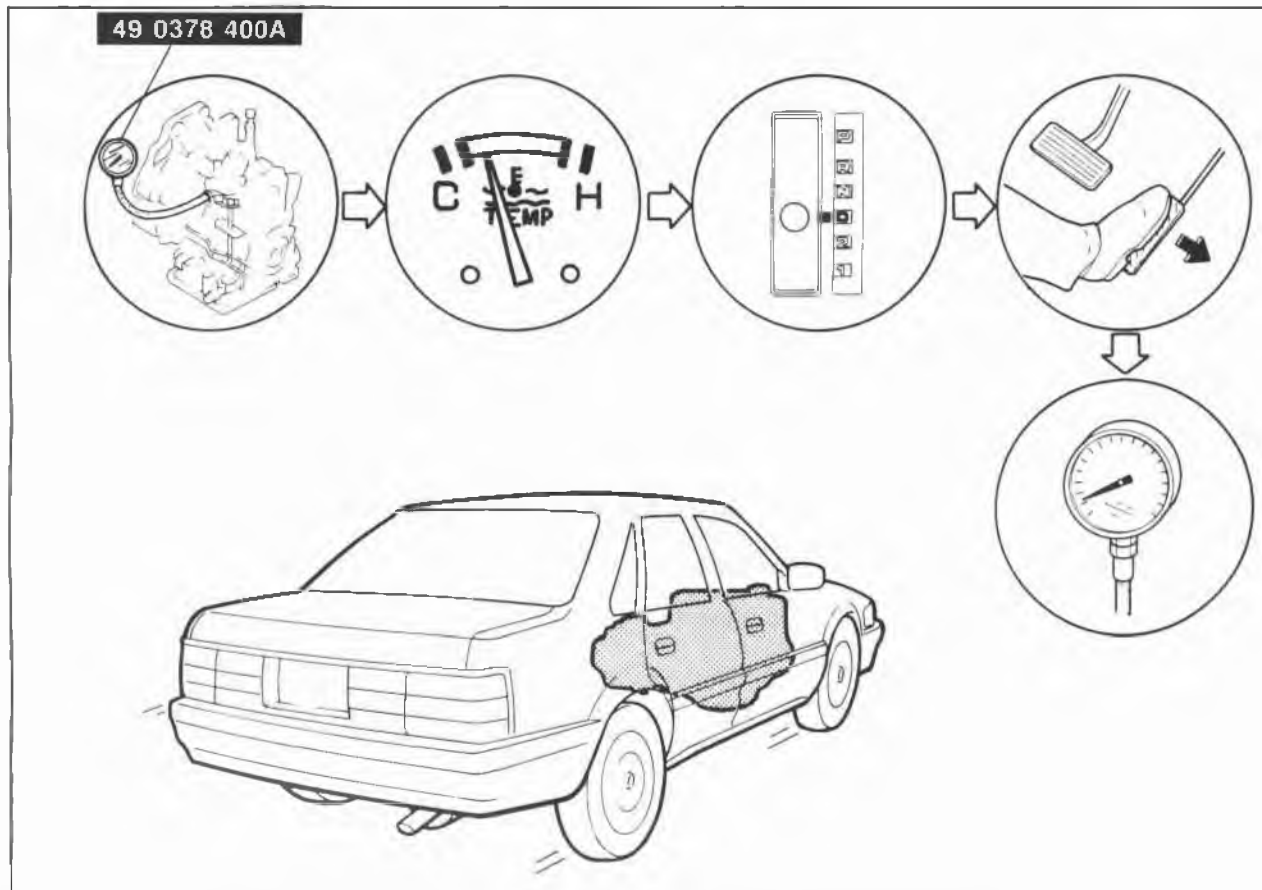
# 7C TROUBLESHOOTING

## Governor Pressure Test

### Preparation

1. Connect the **SST** to the governor pressure output point.
2. Place the **SST** inside the vehicle.
3. Warm up the ATF and check the ATF level.

### Procedure



76G07C-035

1. Drive the vehicle in D range.
2. Read the governor pressure at the speeds listed in the table below.

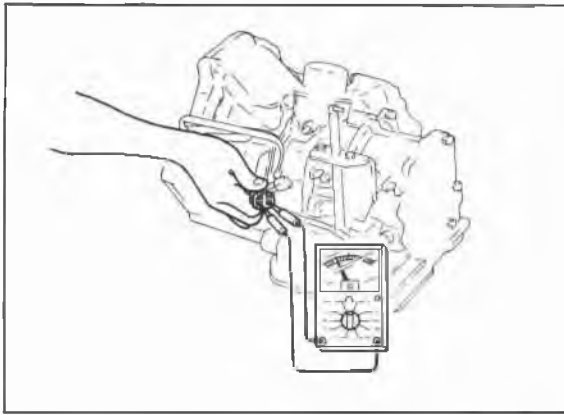
### Specified governor pressure:

Vehicle Speed km/h (mph)	Governor Pressure kPa (kg/cm <sup>2</sup> , psi)
30 (19)	78—137 (0.8—1.4, 11—20)
55 (34)	157—226 (1.6—2.3, 23—33)
85 (53)	314—402 (3.2—4.1, 46—58)

### Evaluation

Condition	Possible Cause
Not within specification	Fluid leakage from the line pressure hydraulic circuit
	Fluid leakage from the governor pressure hydraulic circuit
	Defective or stuck governor valve

## ELECTRIC COMPONENTS

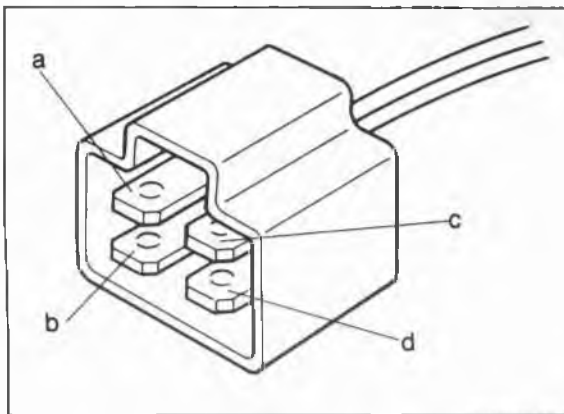


76G07C-036

### INHIBITOR SWITCH

#### Inspection

1. Check that engine starts only at P and N range.
2. Check that the backup lights illuminate in R range with the ignition switch ON.
3. If the inhibitor switch is not operating properly, disconnect it and check the continuity between the terminals.



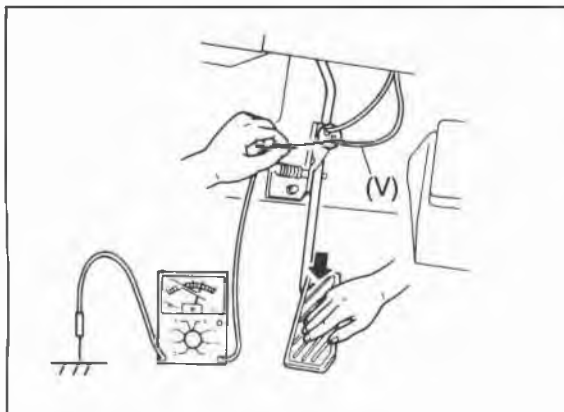
76G07C-037

#### Connection guide

Position	Connector terminal			
	a	b	c	d
P			○	○
R	○	○		
N			○	○
D, 1, 2				

○—○: Indicates continuity

4. If not correct, replace the inhibitor switch.



76G07C-038

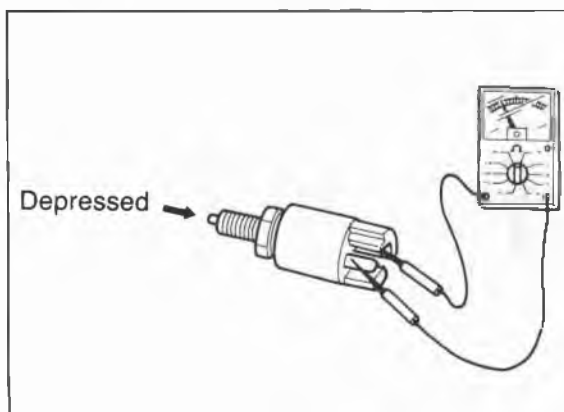
### KICK-DOWN SWITCH

#### Inspection of Terminal Voltage

1. Turn the ignition switch ON.
2. Check the voltage at terminal (V) with a voltmeter.

Depressing stroke	Terminal voltage
7/8—8/8 (Full)	Approx. 12V
0—7/8	Below 1.5V

3. If not correct, check the wiring harness or switch, or adjust the switch position.



83U07B-060

#### Inspection of Switch

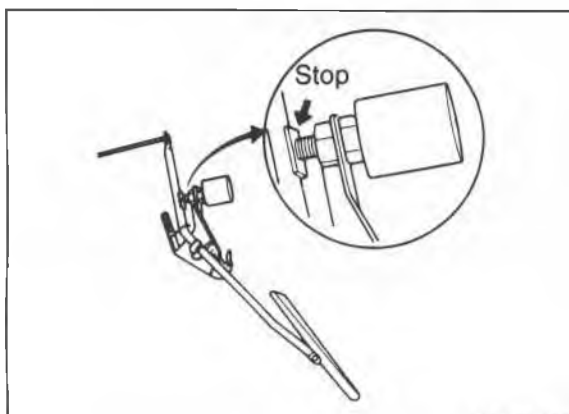
1. Disconnect the kick-down switch connector.
2. Check for continuity of the switch with an ohmmeter.

Switch	Continuity
Pushed	Yes
Released	No

3. If not correct, replace the kick-down switch.

## 7C ELECTRIC COMPONENTS

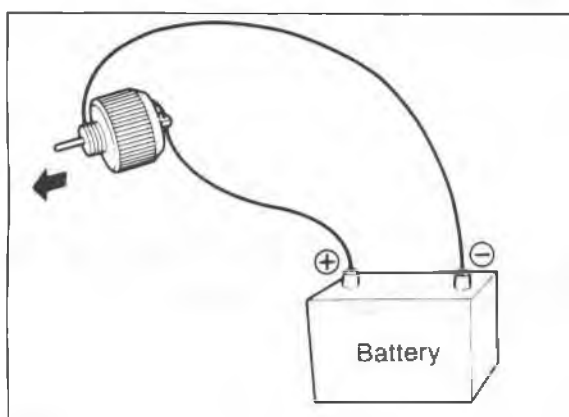
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76G07C-039

### Adjustment

1. Loosen the kick-down switch locknuts.
2. Depress the accelerator pedal fully.
3. Turn the switch until the threaded case touches the stop.
4. Turn the switch counterclockwise one-half turn.
5. Secure the switch with the locknut.



76G07C-040

### KICK-DOWN SOLENOID

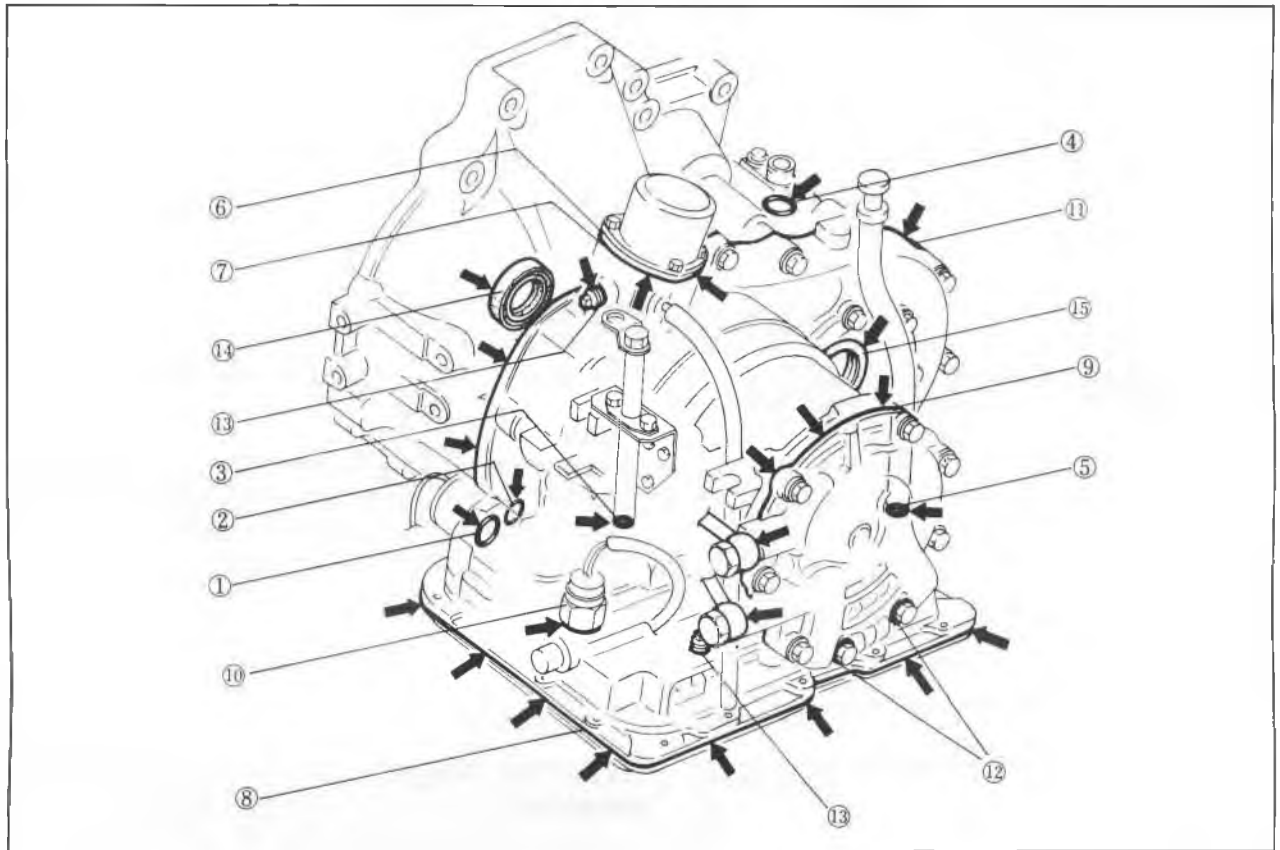
Check that the rod extends when 12 V is applied.

**ON-VEHICLE MAINTENANCE**

**AUTOMATIC TRANSAXLE FLUID (ATF)**

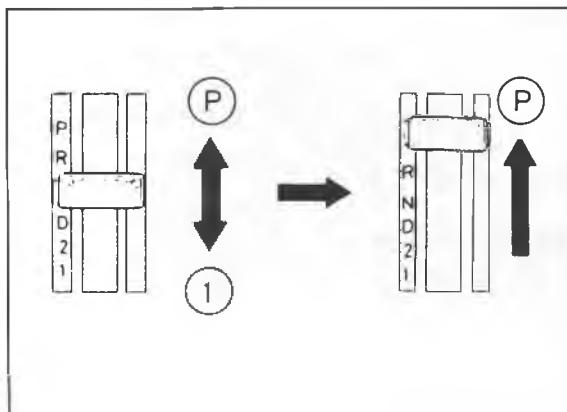
**Inspection for Fluid Leaks**

Check for fluid leaks; the following figure shows the locations where fluid leakage may possibly occur.



76G07C-041

- |                            |                       |
|----------------------------|-----------------------|
| 1. Kick-down solenoid      | 9. Oil pump           |
| 2. Vacuum diaphragm        | 10. Inhibitor switch  |
| 3. Manual shaft            | 11. Transaxle case    |
| 4. Speedometer driven gear | 12. Oil pump          |
| 5. Oil level tube          | 13. Square head plugs |
| 6. Governor cover          | 14. Bearing cover     |
| 7. Governor                | 15. Drive shaft       |
| 8. Oil pan                 |                       |



76G07C-042

**Inspection of Level**

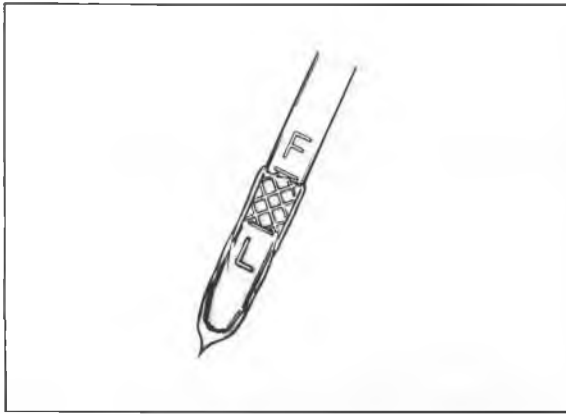
1. Apply the parking brake and block the wheels to prevent the vehicle from rolling.

**Note**

**Place the car on a flat, level surface.**

2. Run the engine so that the automatic transaxle fluid reaches operating temperature.
3. While the engine is idling, shift the select lever from P to 1 and back again.
4. Let the engine idle.
5. Shift the select lever to P.

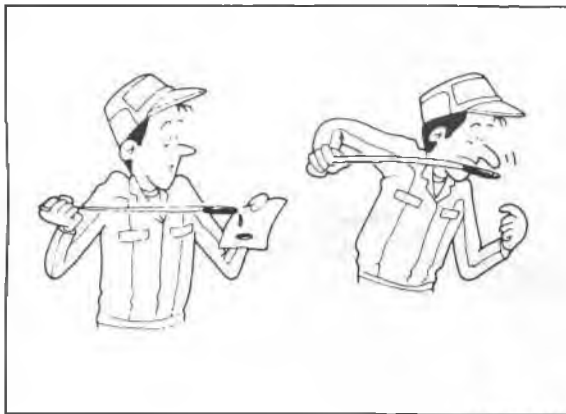
## 7C ON-VEHICLE MAINTENANCE



76G07C-349

6. Ensure that the ATF level is between the F and L marks. Add ATF to specification, if necessary.

**ATF type: Dexron II or M III**



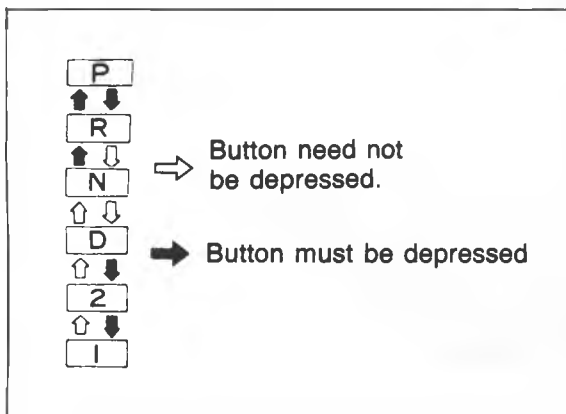
86U07B-065

### Inspection of Condition

1. Check the ATF for discoloration.
2. Check the ATF for any unusual smell.

### Note

**Determine whether or not the automatic transmission should be disassembled by observing the condition of fluid carefully. If the fluid is muddy and varnished, it indicates burned drive plates.**

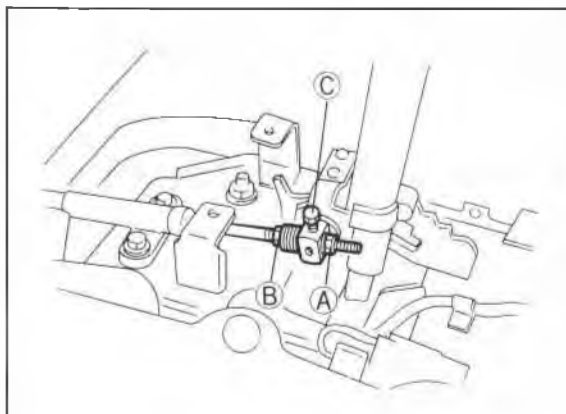


76G07C-043

### SELECTOR LEVER

#### Inspection

1. Check that the selector lever can be shifted as shown in the figure.
2. Make sure there is a click at each range when shifted from P ↔ 1 range.
3. Check that the positions of the selector lever and the indicator are exact.
4. Check that the button returns smoothly when used to shift the selector.



76G07C-044

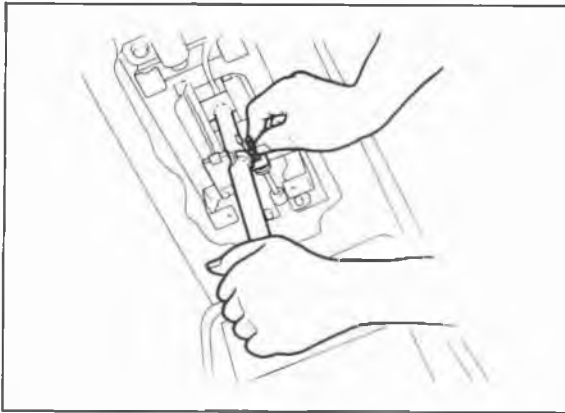
#### Adjustment

1. Shift the selector lever to the P range.
2. Loosen locknuts A, B, and C.
3. Shift the transaxle to P range by moving the manual shaft of the transaxle.
4. Tighten locknut C to the specified torque.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**





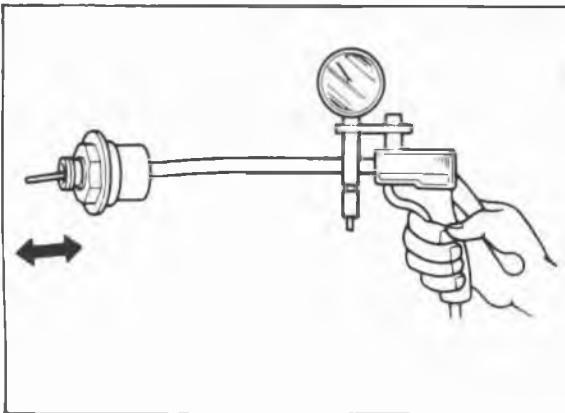
76G07C-045

5. Turn locknut A by hand until it just touches the spacer.
6. Tighten locknut B to the specified torque.

### Tightening torque:

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

7. Verify that there is a click at each range when shifted from P ↔ 1 range.
8. Check that the positions of the selector lever and the indicator are exact.
9. Check that the button returns smoothly when used to shift the selector.
10. If necessary, check the spring.



76G07C-046

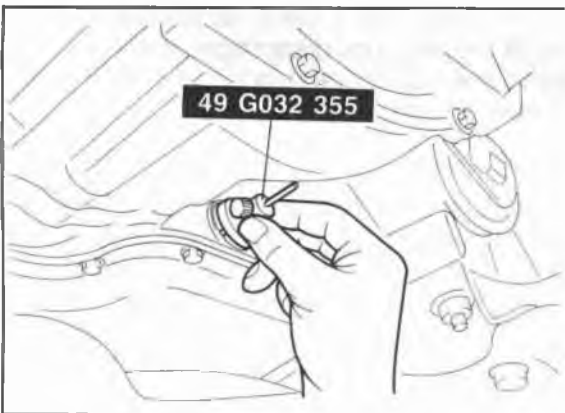
### VACUUM DIAPHRAGM

#### Inspection

1. Remove the vacuum hose from the vacuum diaphragm. Check for ATF leakage. Replace if any is found.
2. Remove the vacuum diaphragm.
3. Verify that the diaphragm rod moves when vacuum is applied.

#### Caution

**When removing the diaphragm, do not drop the rod into the oil pan.**



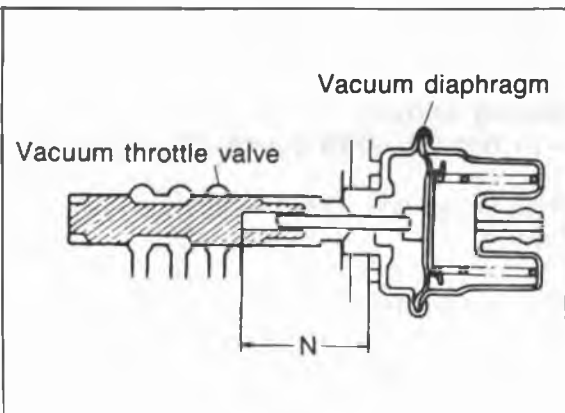
76G07C-047

#### Adjustment

#### Note

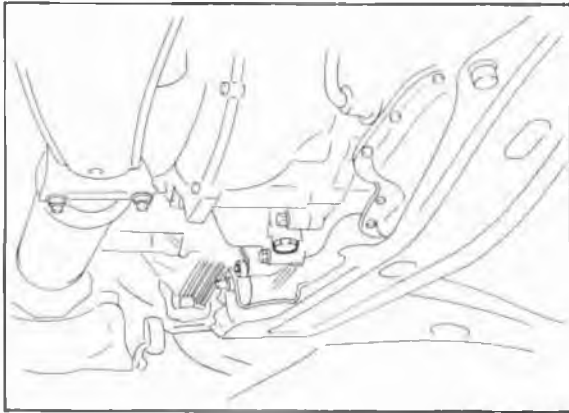
- a) **Excessive shift shocks and improper shifting often indicate a vacuum diaphragm malfunction.**
- b) **Remove approximately 1.0 liter (1.1 US qt, 0.9 Imp qt) of ATF before removing the vacuum diaphragm.**

1. Remove the vacuum diaphragm, rod, and O-ring from the transaxle case.
2. Measure the N dimension indicated in the figure with the **SST** and a scale.
3. Select the diaphragm rod in accordance with the table.



76G07C-048

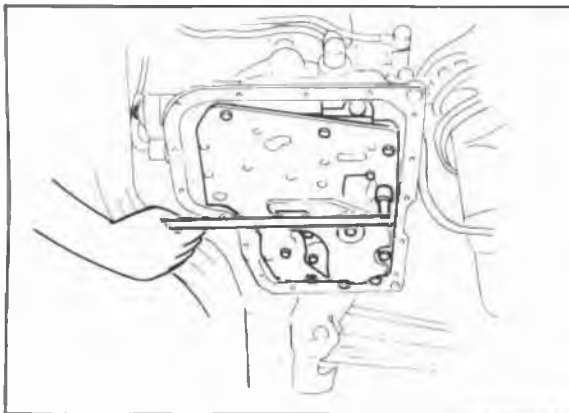
N dimension	Applicable diaphragm rod length
Below 25.4 mm (1.000 in)	29.5 mm (1.161 in)
25.4—25.9 mm (1.000—1.020 in)	30.0 mm (1.181 in)
25.9—26.4 mm (1.020—1.039 in)	30.5 mm (1.200 in)
26.4—26.9 mm (1.039—1.059 in)	31.0 mm (1.220 in)
26.9 mm (1.059 in) or over	31.5 mm (1.240 in)



76G07C-049

## REPLACEMENT OF CONTROL VALVE

1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the ATF.
4. Remove the under cover and side cover.



63U07B-024

5. Remove the oil pan from the transaxle case.

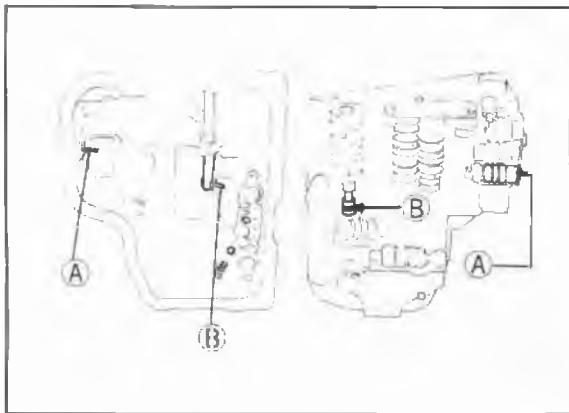
### Caution

**Be careful because some ATF will be in the oil pan.**

6. Remove the control valve body.

### Caution

**Be careful not to lose the ball and spring for the torque converter relief valve or the vacuum diaphragm rod.**



76G07C-050

7. Install the control valve body as follows:
  - (1) Install the vacuum diaphragm rod.
  - (2) Insert the ball and spring into the hole in the transaxle case.

### Note

**a) The ball is inserted first, then the spring.**  
**b) Use petroleum jelly to prevent them from falling out.**

- (3) Install the control valve, mating the groove of the manual valve with the driving pin of the control rod.

- (4) Tighten the control valve mounting bolts to the specified torque.

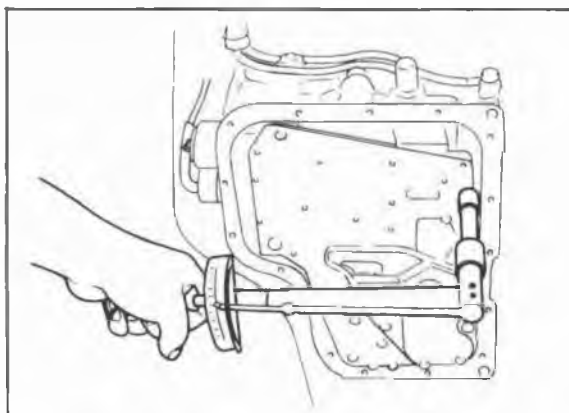
### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

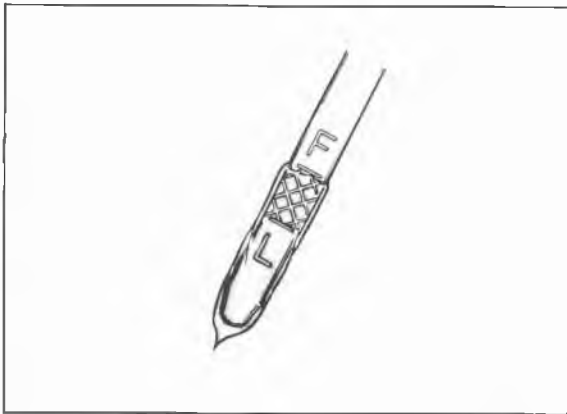
8. Install the oil pan and tighten the bolts to the specified torque.

### Tightening torque:

**5—8 N·m (50—80 cm·kg, 43—69 in·lb)**

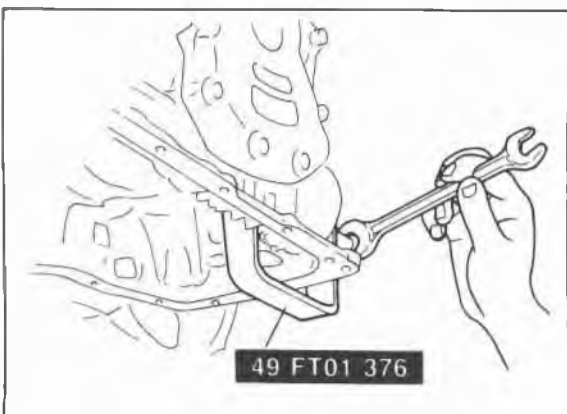


76G07C-051



76G07C-052

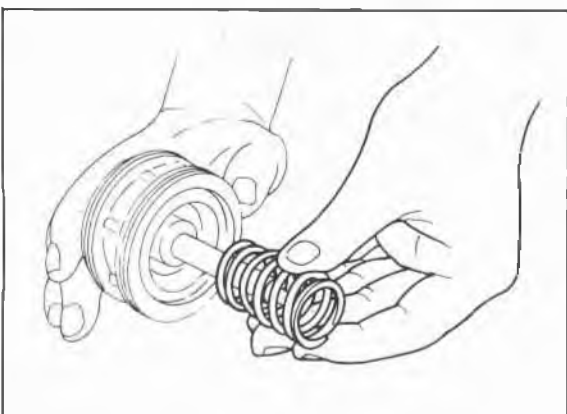
9. Install the under cover and side cover.
10. Lower the vehicle.
11. Add ATF, and with the engine idling, check the fluid level.
12. Verify that there is no fluid leakage from the trans-axle. (Refer to page 7C—25.)



76G07C-053

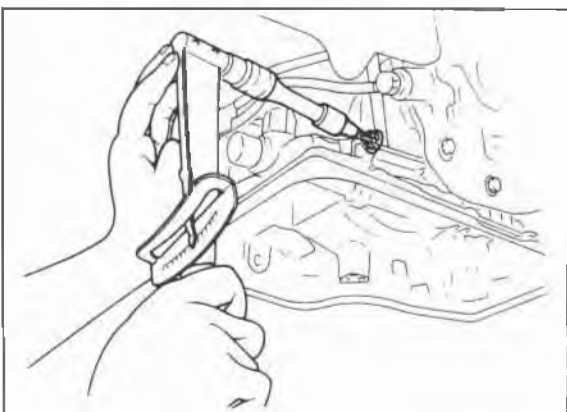
## REPLACEMENT OF SERVO PISTON RETURN SPRING

1. Remove the control valve body. (Refer to replacement of control valve.)
2. Loosen the anchor end-bolt and locknut.
3. Remove the band strut.
4. Compress the servo piston retainer with the **SST**.
5. Remove the snap ring with a screwdriver.



76G07C-054

6. Remove the servo retainer, piston and spring by gradually loosening the **SST**.
7. Replace the return spring. If the O-ring or the piston seal is damaged, replace them.
8. Assemble the servo retainer, piston, and spring, insert them into the case with the **SST**. Fit the snap ring into the ring groove.
9. Install the band strut.
10. Tighten the anchor-end bolt to **12—15 N·m (120—150 cm·kg, 104—130 in·lb)**, then back it off two full turns. Tighten the locknut to **55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**.



76G07C-055

11. Install the control valve body, oil pan, etc. in the reverse order of removal.
12. Adjust the fluid level, and check for fluid leaks. (Refer to page 7C—25.)

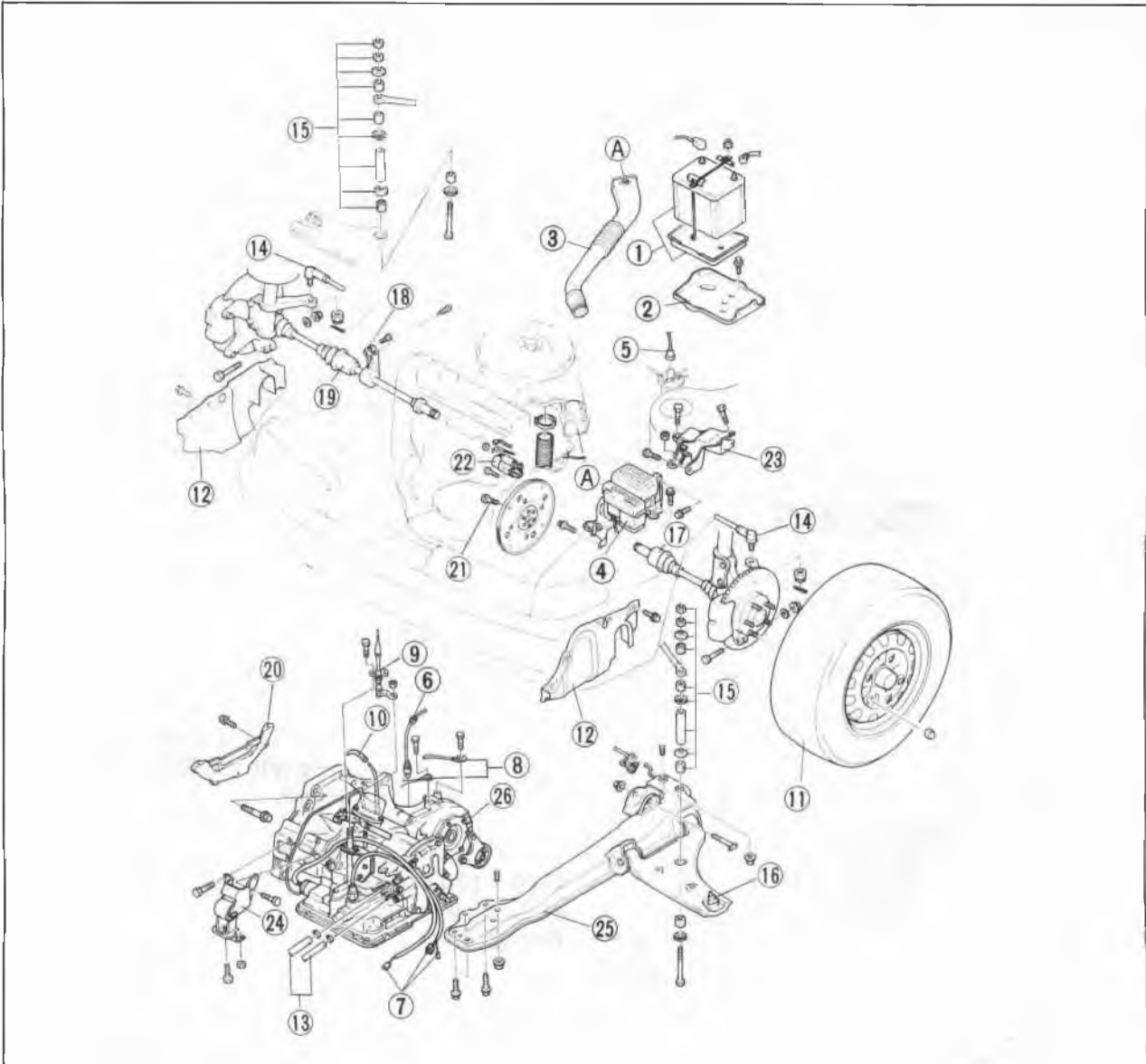
# 7C REMOVAL

## REMOVAL

### PREPARATION

- (1) Drain the ATF before removal.
- (2) Attach the engine support.
- (3) Jack up the vehicle and support it with safety stands.

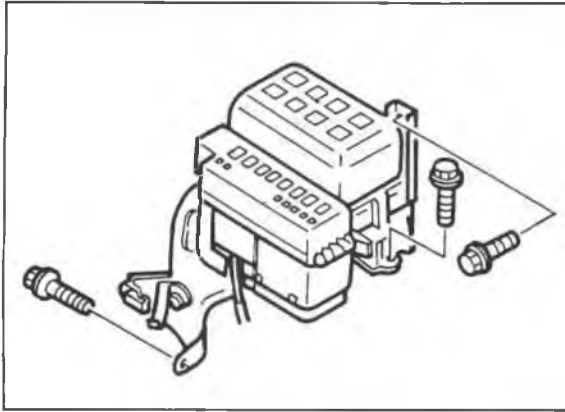
### Components



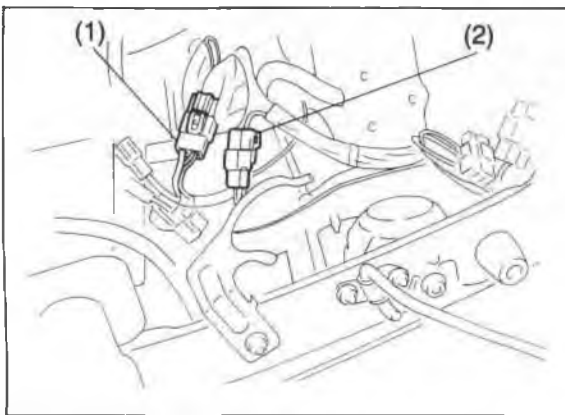
76G07C-056

- |                      |                                       |   |
|----------------------|---------------------------------------|---|
| 1. Battery           | 10. Vacuum hose                       | 19. Joint shaft and driveshaft          |
| 2. Battery carrier   | 11. Front wheels                      | 20. Under cover                         |
| 3. Fresh air duct    | 12. Splash shields                    | 21. Torque converter bolts              |
| 4. Main fuse block   | 13. Oil cooler outlet and inlet hoses | 22. Starter                             |
| 5. Distributor leads | 14. Tie-rod ends                      | 23. Engine mount No.4                   |
| 6. Speedometer cable | 15. Stabilizer bar control links      | 24. Engine mount No.2                   |
| 7. Cnnectors         | 16. Lower arm ball joints             | 25. Crossmember and left side lower arm |
| 8. Ground wires      | 17. Driveshaft                        | 26. Transaxle                           |
| 9. Selector cable    | 18. Joint shaft bracket               |   |

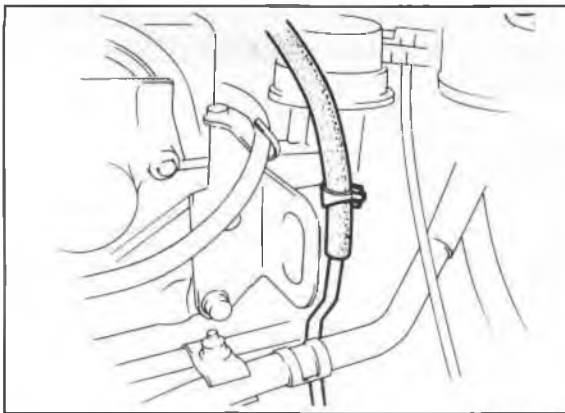
## REMOVAL 7C



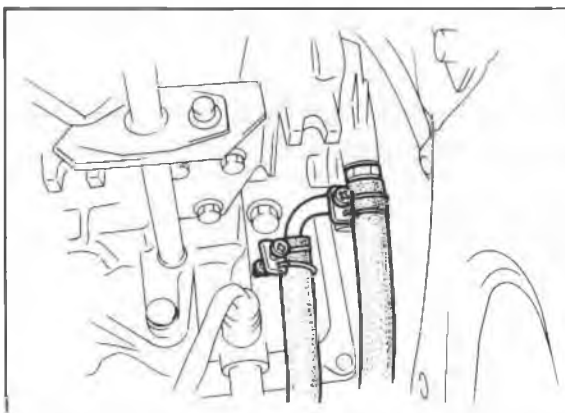
76G07C-057



76G07C-058



76G07C-059



76G07C-060

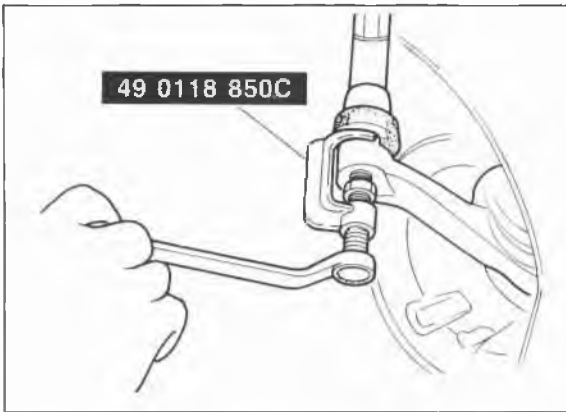
1. Remove the battery and battery carrier.
2. Remove the fresh air duct.
3. Disconnect the main fuse block.
4. Disconnect the distributor leads.

5. Disconnect the speedometer cable.
6. Disconnect the connectors.
  - (1) Inhibitor switch
  - (2) Kick-down solenoid
7. Disconnect the grounds from the transaxle case and oil pump.

8. Disconnect the selector cable.
9. Disconnect the vacuum hose.

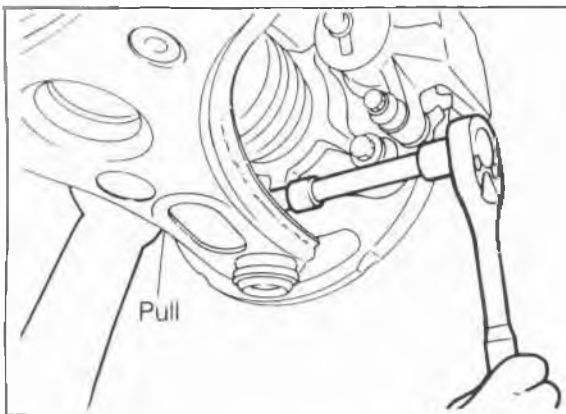
10. Remove the front wheels.
11. Remove the splash shields.
12. Drain the ATF.
13. Disconnect the oil cooler outlet and inlet hoses.

## 7C REMOVAL



76G07C-061

14. Disconnect the tie-rod ends with the **SST**.

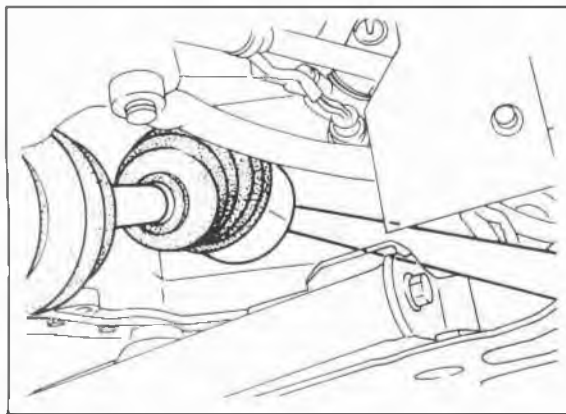


76G07C-062

15. Remove the stabilizer bar control links.
16. Remove the bolts and nuts at the left and right lower arm ball joints.
17. Pull the lower arms downward to separate them from the knuckles.

**Caution**

**Do not damage the ball joint dust boots.**



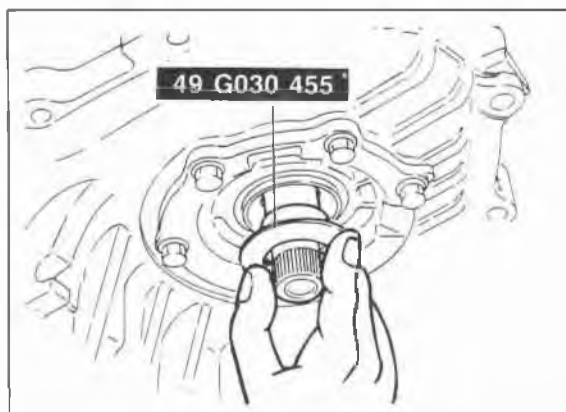
76G07C-063

18. Separate the left driveshaft from the transaxle by prying with a bar inserted between the shaft and the case.

**Caution**

**Do not damage the oil seal.**

19. Remove the joint shaft bracket.
20. Separate the right driveshaft together with the joint shaft in the same manner.



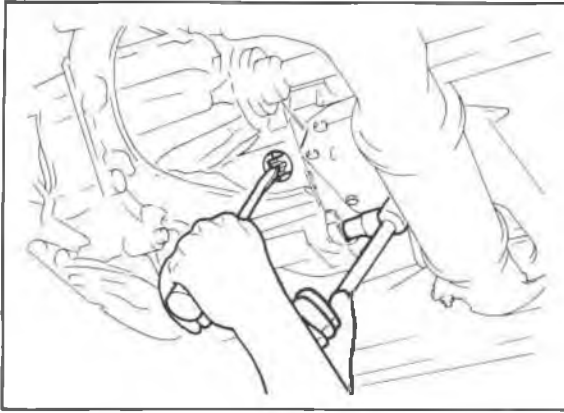
76G07C-064

21. Install the **SST** into the differential side gears.

**Caution**

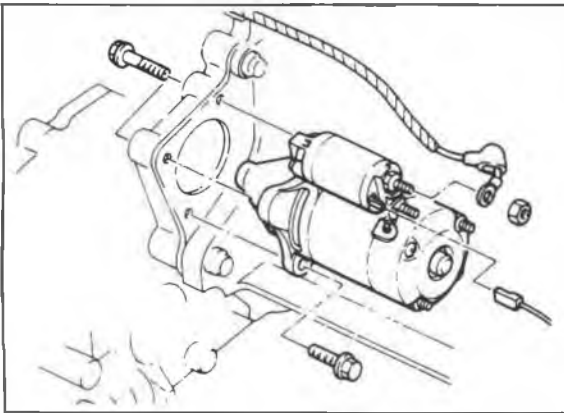
**Failure to install the SST may allow the differential side gears to become misaligned.**

# REMOVAL 7C



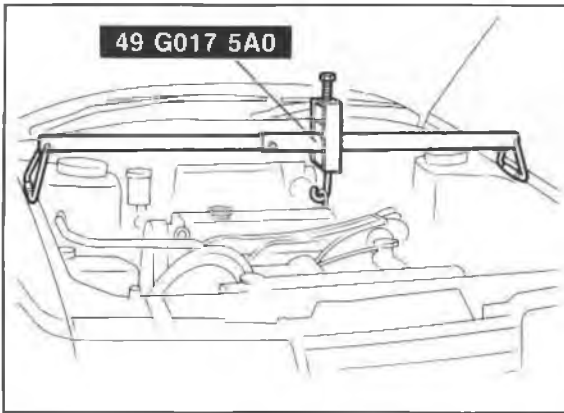
76G07C-065

22. Remove the under cover.
23. Remove the torque converter bolts.



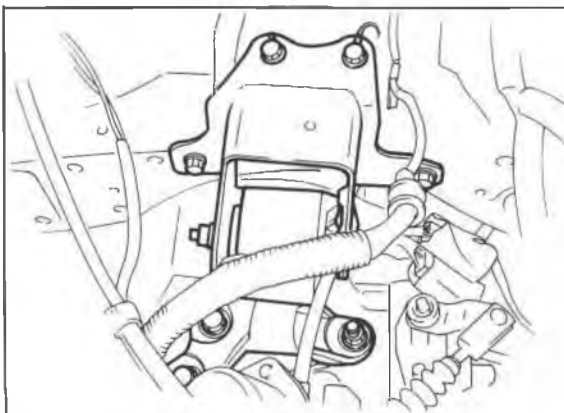
76G07C-066

24. Remove the starter.



76G07C-067

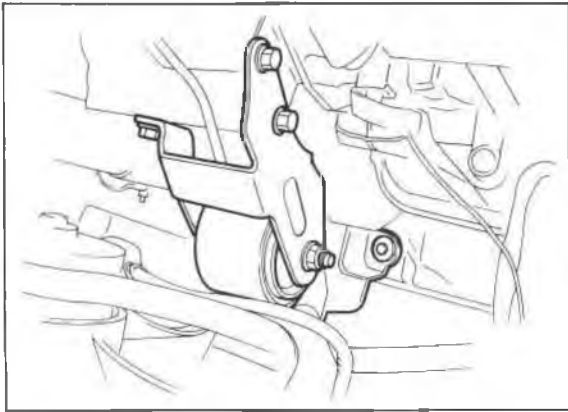
25. Suspend the engine with the **SST**.



76G07C-068

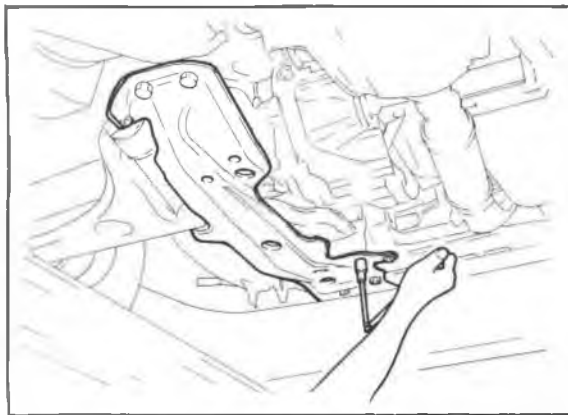
26. Remove engine mount No.4 and bracket.

## 7C REMOVAL



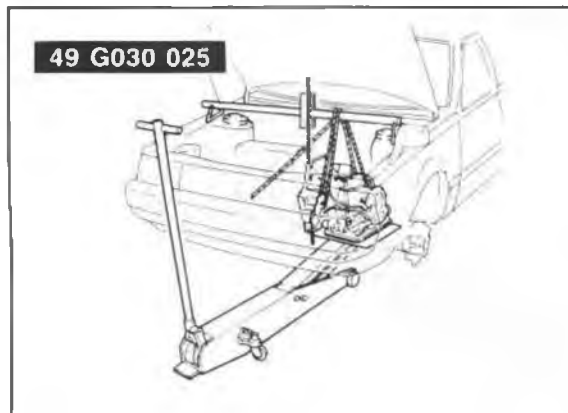
76G07C-069

27. Remove engine mount No. 2.



76G07C-070

28. Remove the crossmember and the left side lower arm as an assembly.



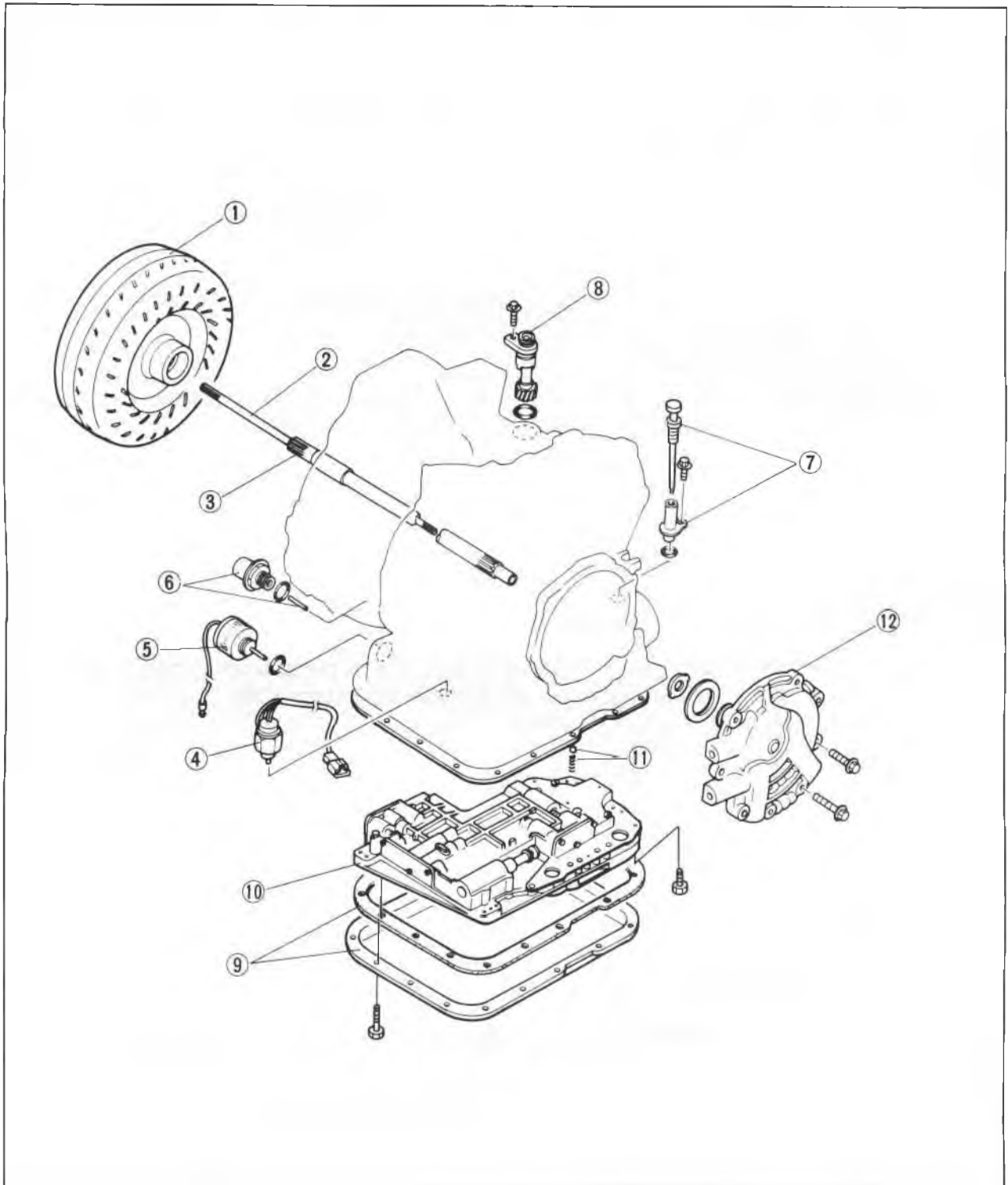
76G07C-071

29. Lean the engine toward the transaxle by loosening the engine support hook bolt.  
30. Support the transaxle with a jack.  
31. Remove the transaxle mounting bolts.  
32. Remove the transaxle.



## DISASSEMBLY

### DISASSEMBLY - STEP 1



76G07C-072

- 1. Torque converter
- 2. Oil pump shaft
- 3. Turbine shaft
- 4. Inhibitor switch

- 5. Kick-down solenoid
- 6. Vacuum diaphragm and rod
- 7. Oil level gauge and tube
- 8. Speedometer driven gear

- 9. Oil pan and gasket
- 10. Control valve body
- 11. Steel ball and spring
- 12. Oil pump

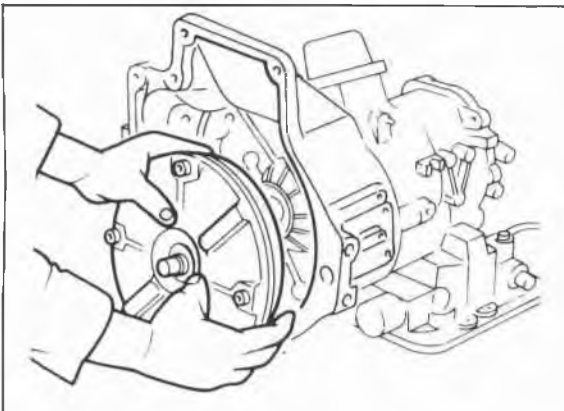
# 7C DISASSEMBLY

## Procedure

### Precaution

- (1) Clean the transaxle exterior thoroughly with steam and/or cleaning solvents prior to disassembly.
- (2) Disassemble the transaxle in a clean area (dustproof workspace) to prevent dust entry into the mechanisms.
- (3) Inspect the individual transaxle components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
- (4) Use plastic hammers when applying force to separate the light alloy case joints.
- (5) Do not use rags during disassembly to prevent contamination.
- (6) Neatly arrange the removed parts in order during disassembly.

76G07C-073

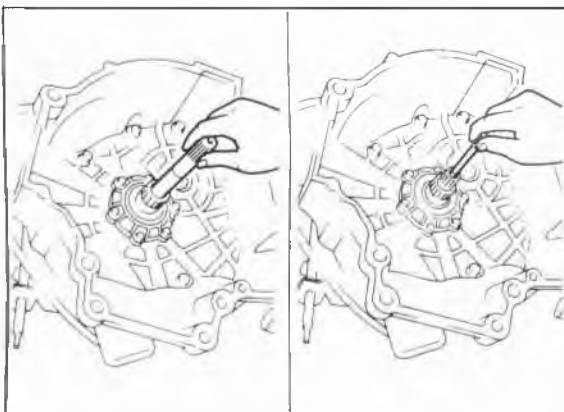


83U07B-119

1. Remove the torque converter from the converter housing.

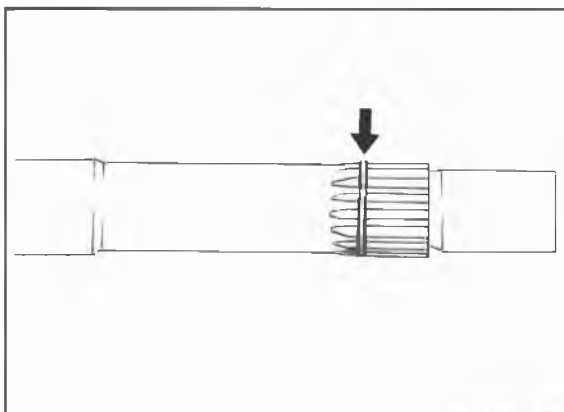
### Note

**Do not allow the ATF to spill when removing the torque converter.**



76G07C-074

2. Pull out the oil pump shaft by hand.
3. Remove the turbine shaft.

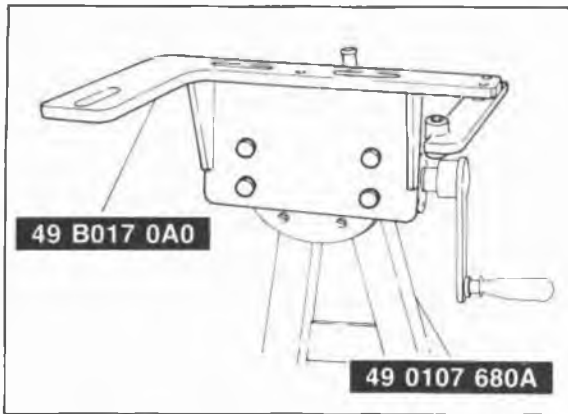


76G07C-075

4. Remove the clip from the turbine shaft.

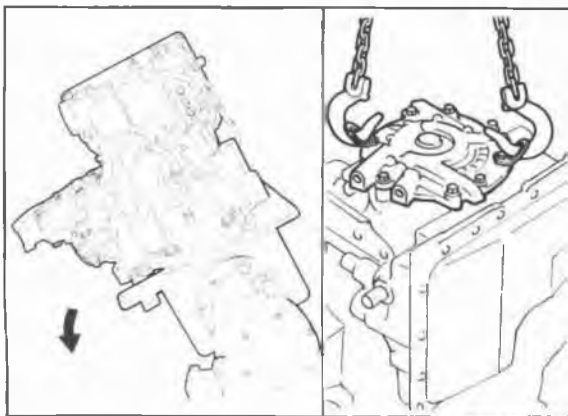
### Note

**Do not reuse the clip.**



76G07C-076

5. Assemble the **SST**.



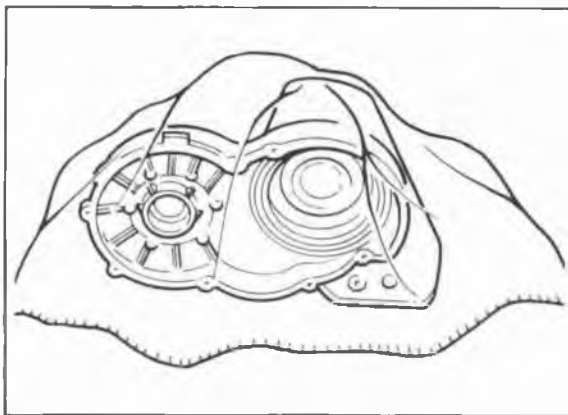
76G07C-350

6. Attach the hanger to the oil pump as shown.

7. Lift the transaxle and mount it on the **SST**.

**Warning**

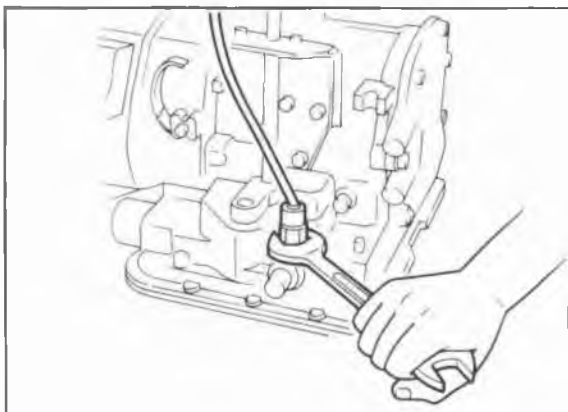
**Avoid leaning the transaxle to one side during disassembly, it may turn quickly and cause injury.**



63U07B-064

**Note**

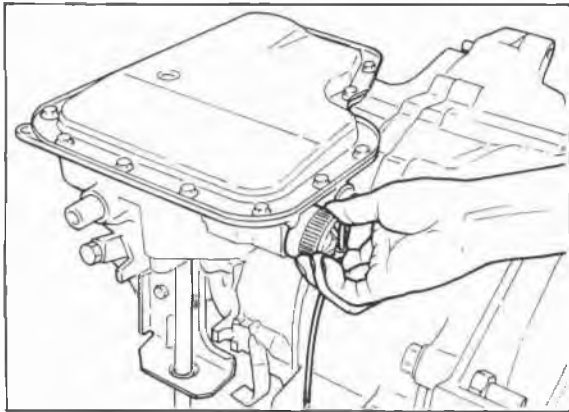
**If troubleshooting indicates that there is a problem on the differential side, separate the transaxle case assembly from the converter housing and cover it.**



76G07C-077

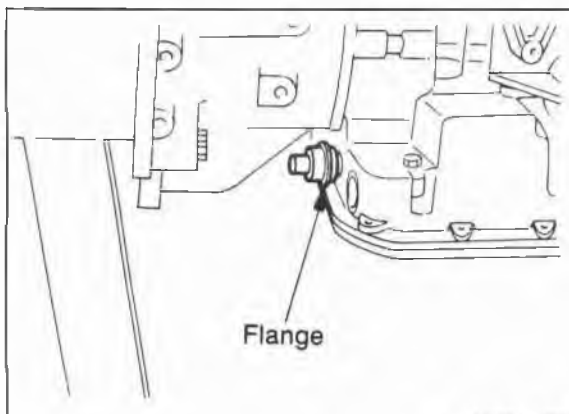
8. Remove the inhibitor switch.

## 7C DISASSEMBLY



76G07C-078

9. Remove the kick-down solenoid and O-ring.

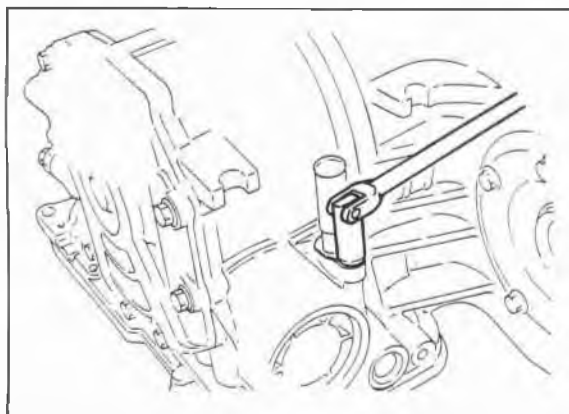


76G07C-079

10. Remove the vacuum diaphragm. If the vacuum diaphragm is difficult to remove, use pliers to grasp the flange.

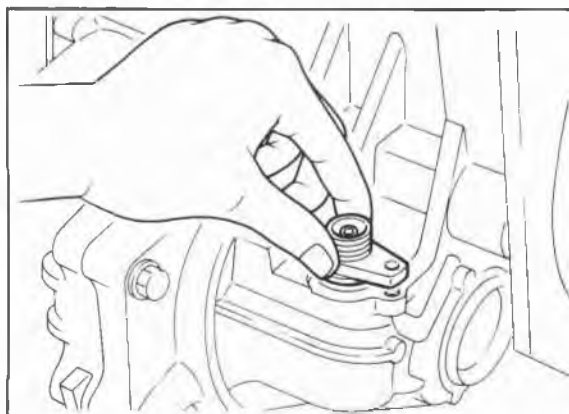
**Note**

**When the vacuum diaphragm is removed, take care not to lose the diaphragm rod.**



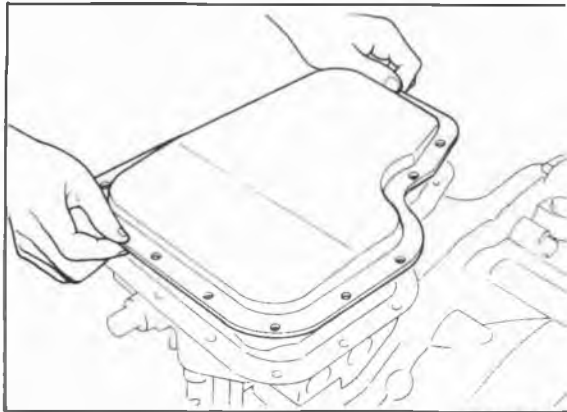
76G07C-080

11. Remove the oil level gauge and filter tube.



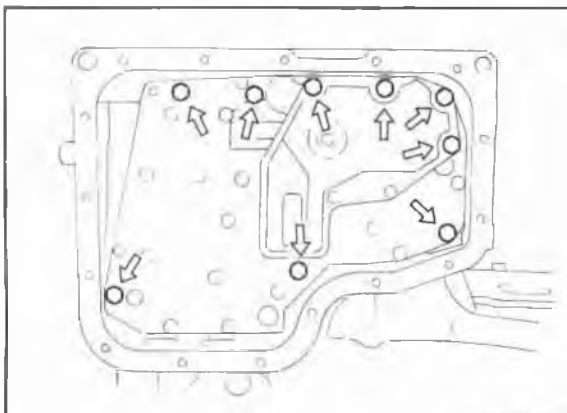
76G07C-081

12. Remove the speedometer driven gear.



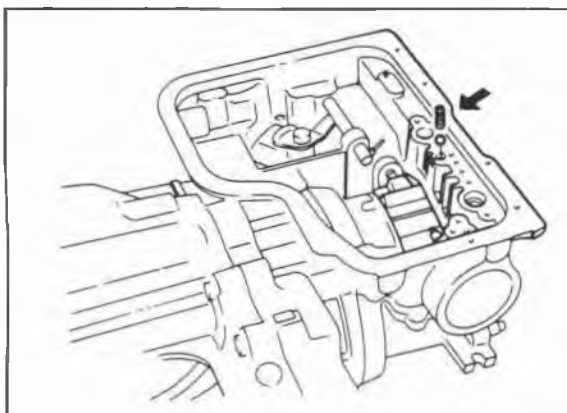
76G07C-351

13. Remove the oil pan and gasket.



76G07C-352

14. Remove the control valve body as an assembly.

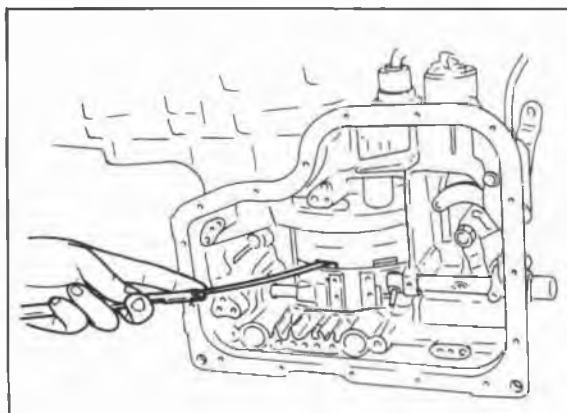


76G07C-082

15. Remove the steel ball and spring.

**Note**

**Be careful not to lose the steel ball and spring.**



76G07C-083

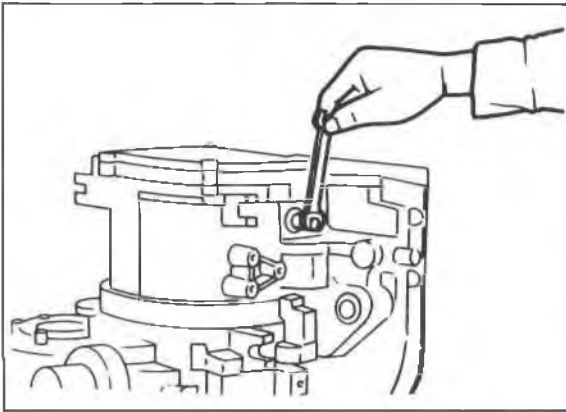
16. Measure the front clutch drum end play.

**End play: 0.5—0.8 mm (0.020—0.031 in)**

**Note**

**If it is not within specification, make the necessary adjustment by using an adjustment shim during assembly. (Refer to page 7C—113.)**

## 7C DISASSEMBLY

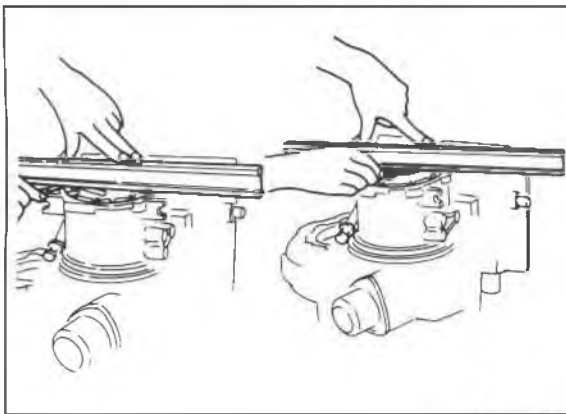


76G07C-084

17. Remove the oil pump.

**Note**

If the oil pump is difficult to remove, remove it after tightening the anchor-end bolt to secure the front clutch with the brake band.



76G07C-085

18. Measure the total end play.

**Standard clearance:**

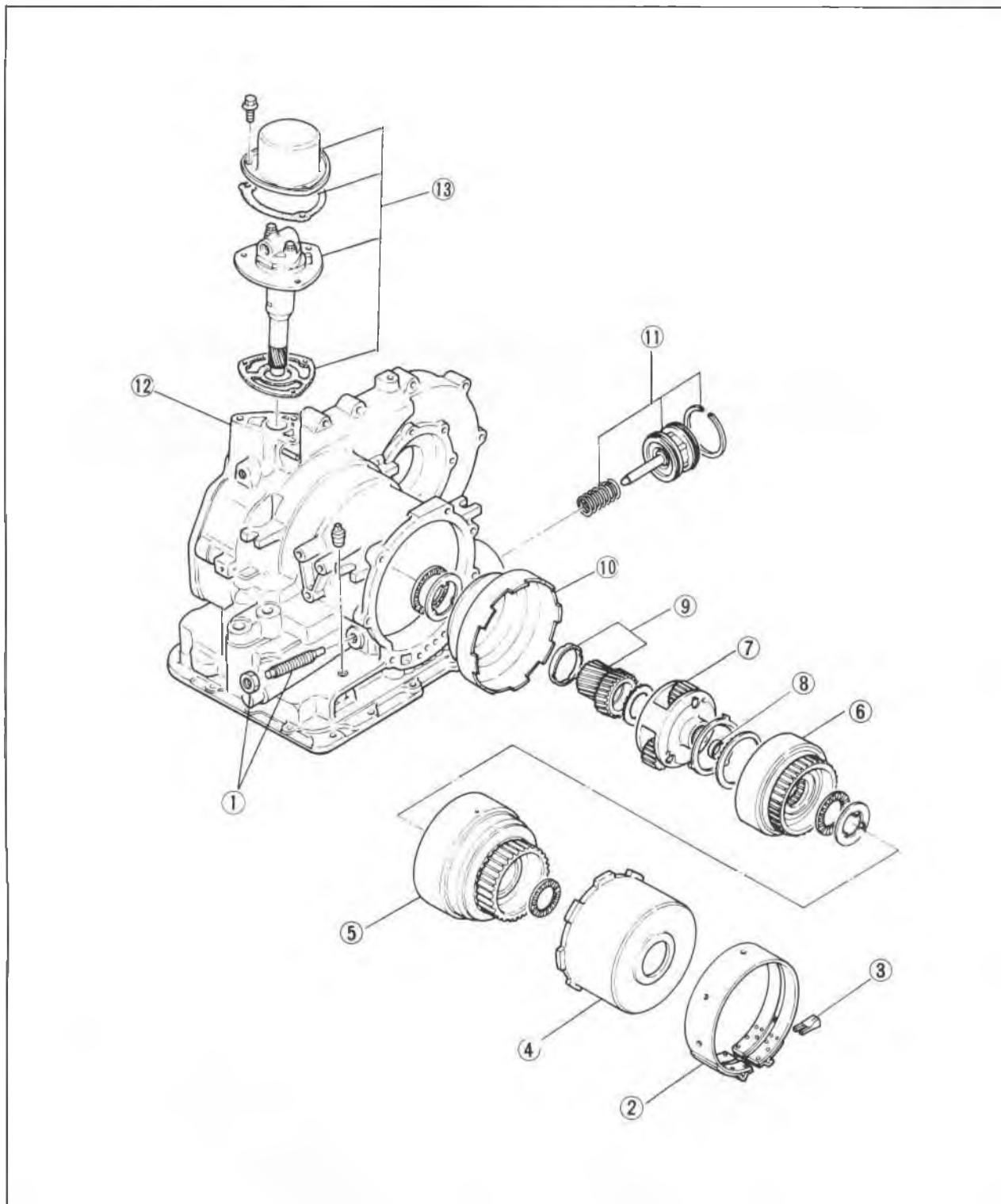
- a) Straight edge—Pump cover  
Maximum 0.10 mm (0.004 in)
- b) Straight edge—Transaxle case  
Maximum 0.15 mm (0.006 in)

**Note**

If it is not within specification, use the bearing outer race to make the adjustment at the time of installation. (Refer to page 7C—112.)

## DISASSEMBLY - STEP 2

76G07C-086



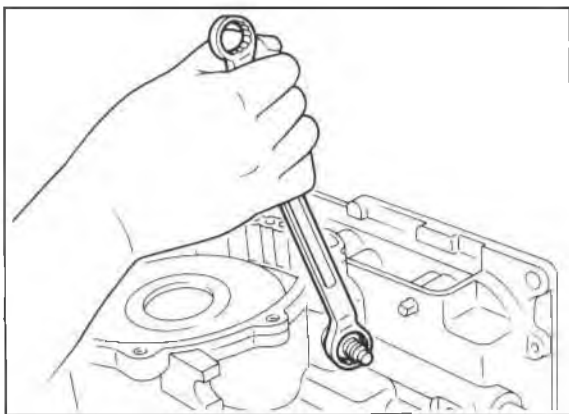
76G07C-087

1. Anchor-end bolt and locknut
2. Brake band
3. Strut
4. Front clutch

5. Rear clutch
6. Rear clutch hub assembly
7. Planetary carrier (front)
8. Seal sleeve
9. Sun gear and spacer

10. Connecting shell
11. Servo
12. Transaxle case
13. Governor

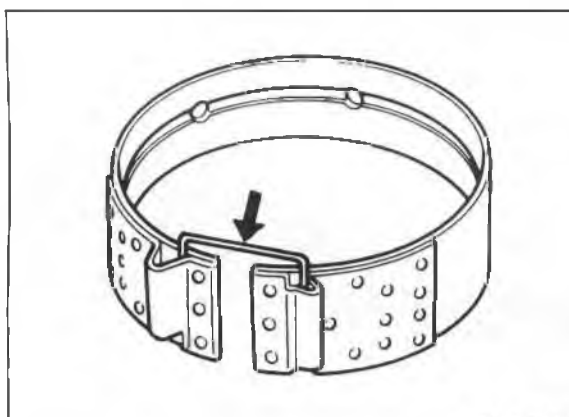
## 7C DISASSEMBLY



76G07C-088

### Procedure

1. Remove the anchor-end bolt and locknut.

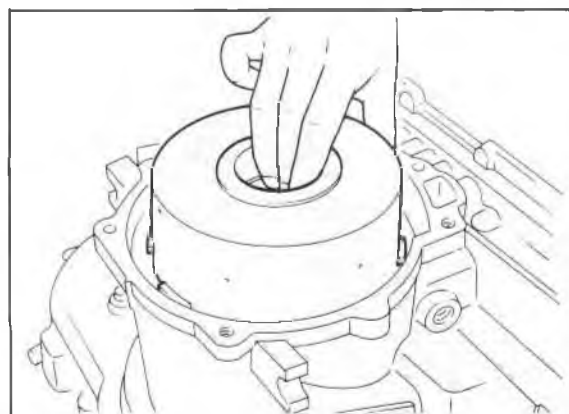


76G07C-089

2. Remove the brake band and strut.

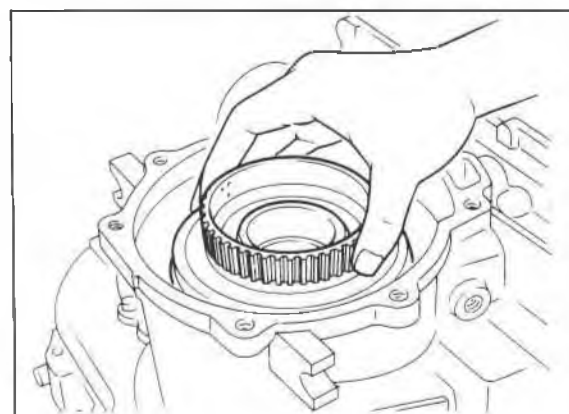
### Note

**Use a piece of wire to secure the brake band so that it is not damaged by being stretched.**



76G07C-090

3. Remove the front clutch.

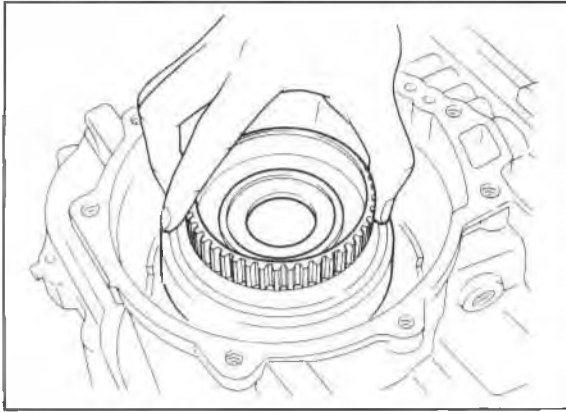


76G07C-091

4. Remove the rear clutch.

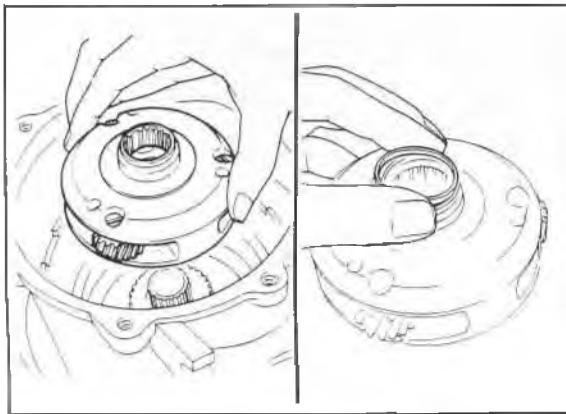


5. Remove the rear clutch hub assembly.



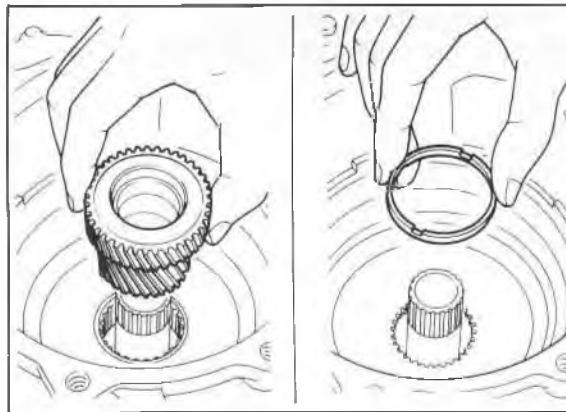
76G07C-092

6. Remove the front planetary carrier.  
7. Remove the seal sleeve.



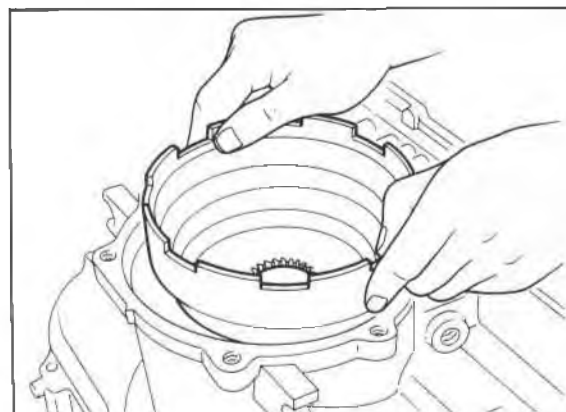
76G07C-093

8. Remove the sun gear and spacer.



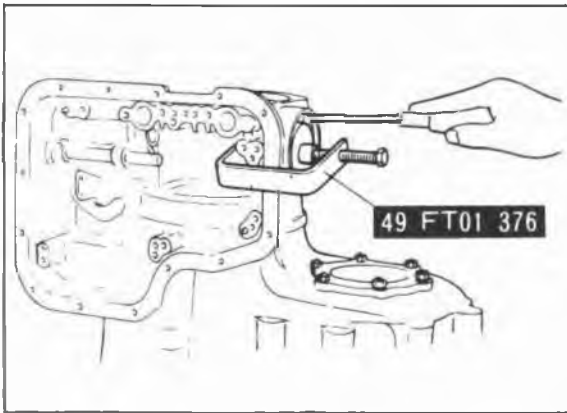
76G07C-094

9. Remove the connecting shell.



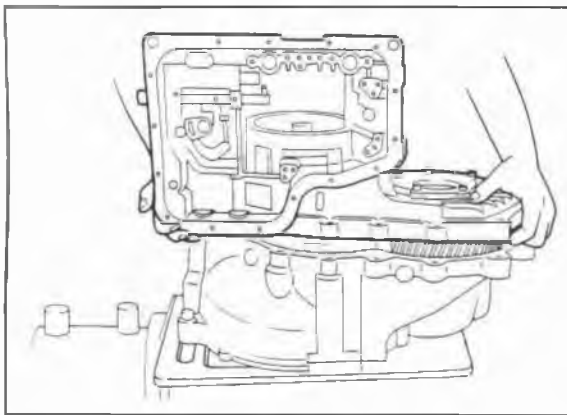
76G07C-095

## 7C DISASSEMBLY



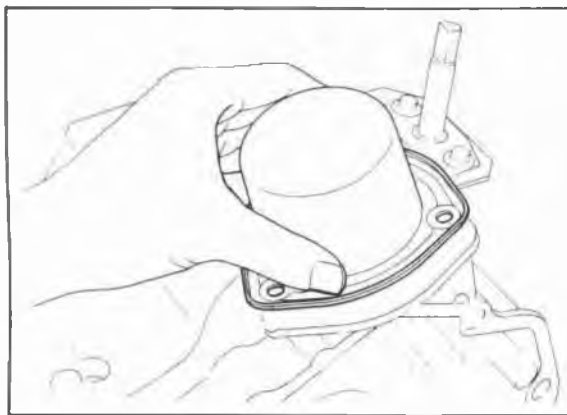
76G07C-096

10. Remove the servo.
  - (1) Compress the servo retainer with the **SST**.
  - (2) Remove the snap ring.
  - (3) Remove the servo retainer and return spring from the transaxle case while losing the **SST**.



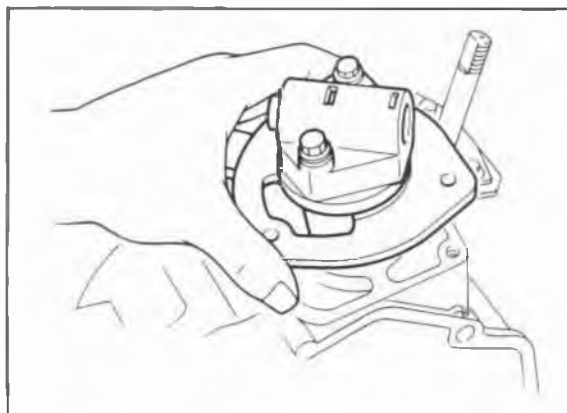
76G07C-097

11. Remove the bolts, and remove the transaxle case by tapping lightly with a plastic hammer.



76G07C-098

12. Remove the governor assembly.
  - (1) Remove the governor cover and gasket.

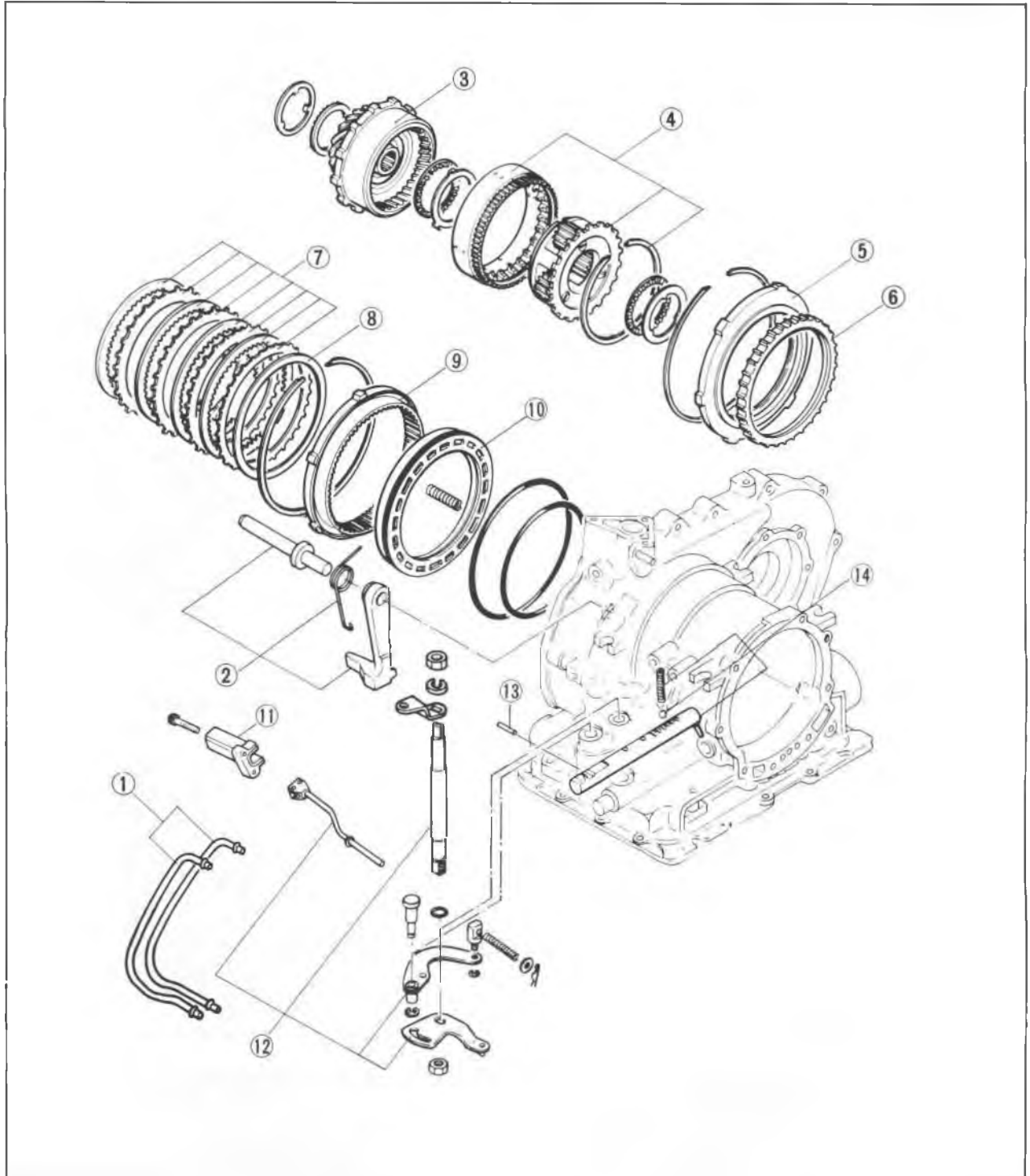


76G07C-099

- (2) Remove the governor assembly and gasket.

## DISASSEMBLY - STEP 3

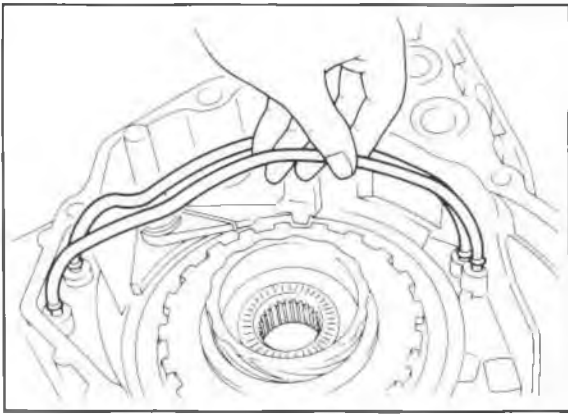
76G07C-100



76G07C-101

- |                                       |                                  |  |
|---------------------------------------|----------------------------------|--|
| 1. Oil pipe                           | 6. Retaining plate               | 11. Actuator support                     |
| 2. Parking pawl assembly              | 7. Drive and driven plate        | 12. Manual shaft assembly                |
| 3. Drum hub assembly                  | 8. Dished plate                  | 13. Knock pin                            |
| 4. One-way clutch inner race assembly | 9. Low and reverse brake hub     | 14. Control rod, detent ball, and spring |
| 5. One-way clutch                     | 10. Low and reverse brake piston |  |

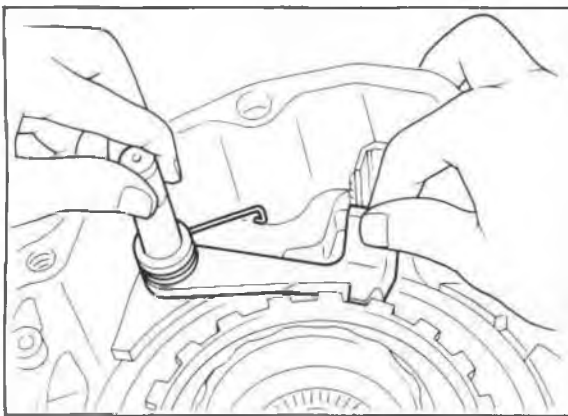
# 7C DISASSEMBLY



76G07C-102

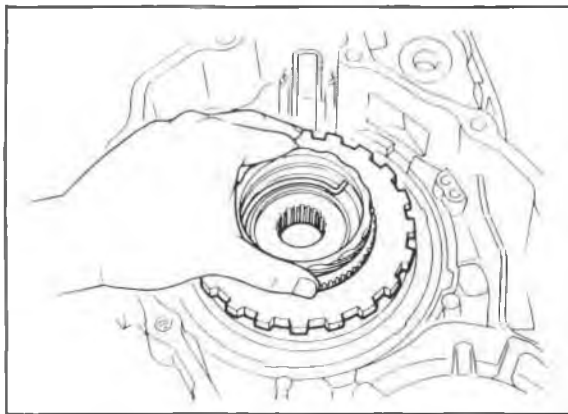
## Procedure

1. Remove the governor outlet and inlet pipes.



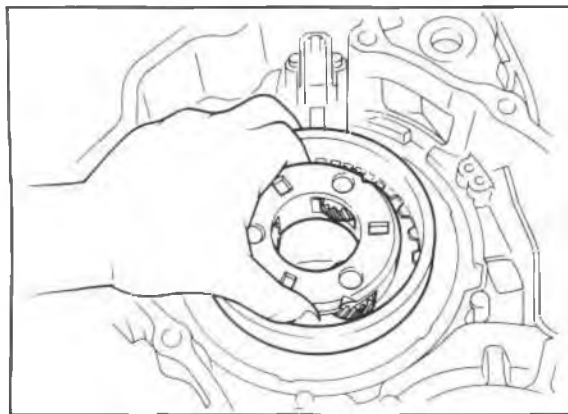
76G07C-103

2. Remove the parking pawl assembly.



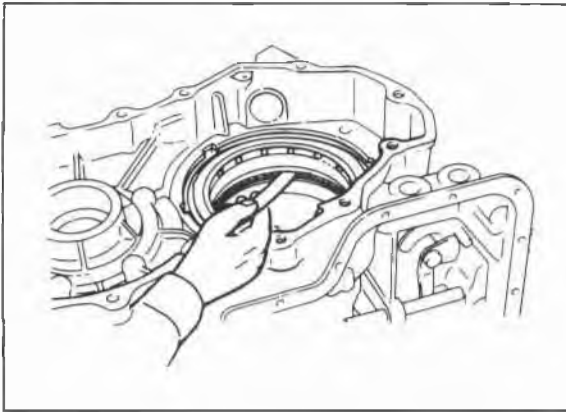
76G07C-104

3. Remove the drum hub assembly.



76G07C-105

4. Remove the one-way clutch inner race assembly.



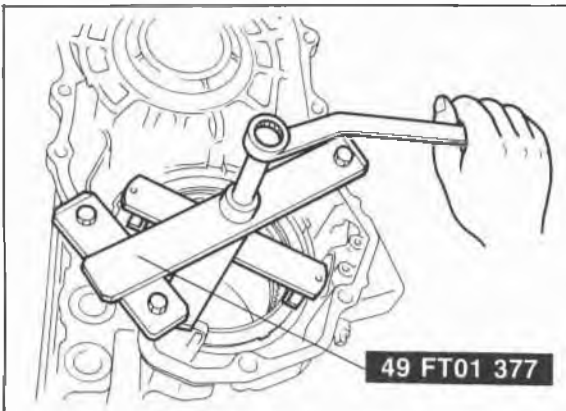
76G07C-106

5. Check the low and reverse brake clearance.

**Standard clearance:**  
0.8—1.05 mm (0.032—0.041 in)

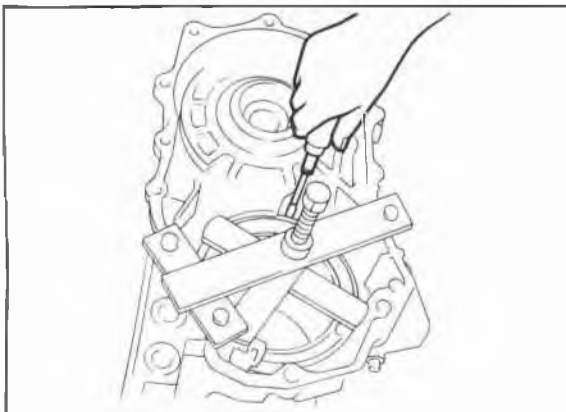
**Note**

If it is not within specification, use the retaining plate to make the adjustment at the time of installation. (Refer to page 7C—104.)



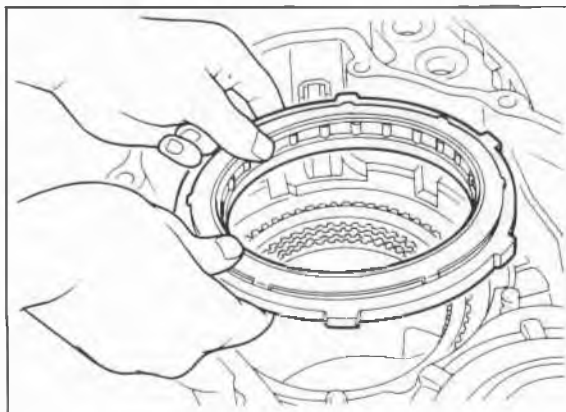
76G07C-107

6. Remove the one-way clutch.  
(1) Install the **SST** to the one-way clutch as shown.  
(2) Compress the one-way clutch.



76G07C-108

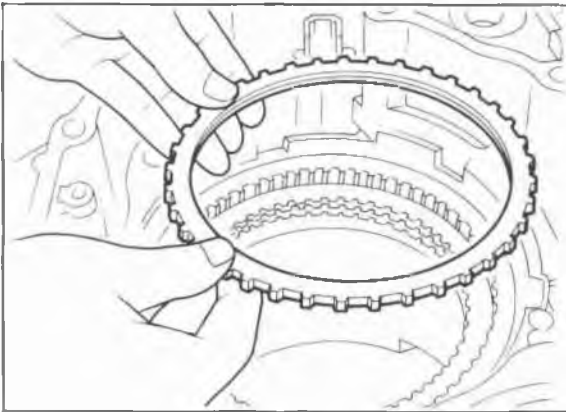
- (3) Remove the snap ring.  
(4) Remove the **SST**.



76G07C-109

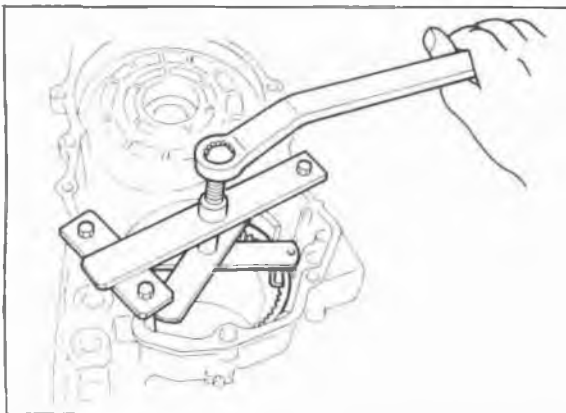
- (5) Remove the one-way clutch.

## 7C DISASSEMBLY



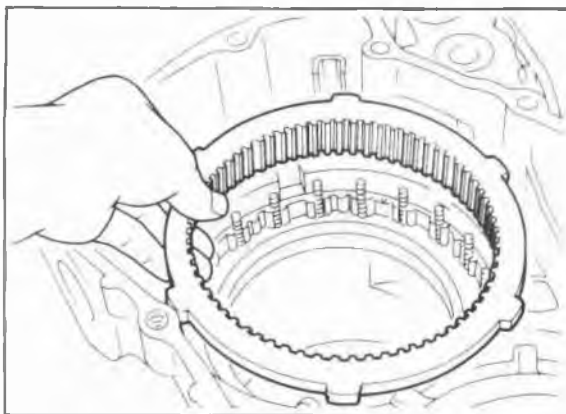
76G07C-110

7. Remove the retaining plate, drive plate, driven plate, and dished plate.



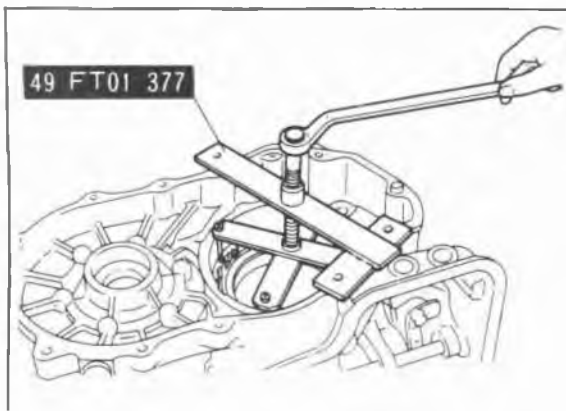
76G07C-111

8. Remove the low and reverse brake hub.
  - (1) Install the **SST** to the low and reverse brake hub as shown.
  - (2) Compress the brake hub.
  - (3) Remove the snap ring.
  - (4) Remove the **SST**.



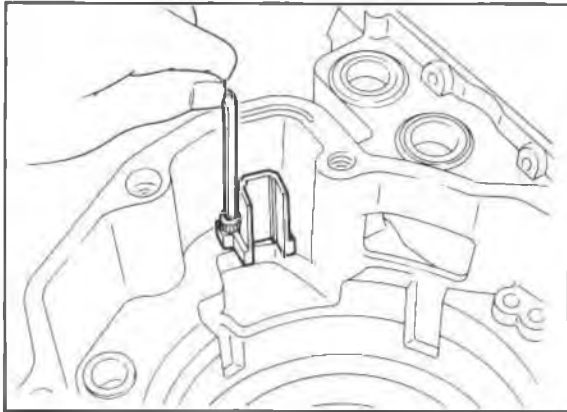
76G07C-112

- (5) Remove the low and reverse brake hub and springs.



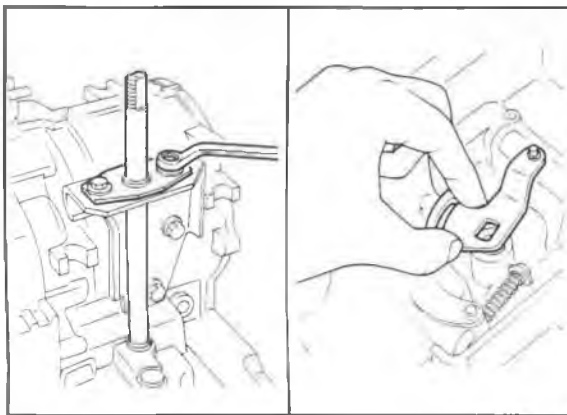
76G07C-113

9. Remove the low and reverse brake piston.
  - (1) Install the **SST** to the low and reverse brake piston as shown.
  - (2) Remove the brake piston by turning the **SST** counterclockwise.



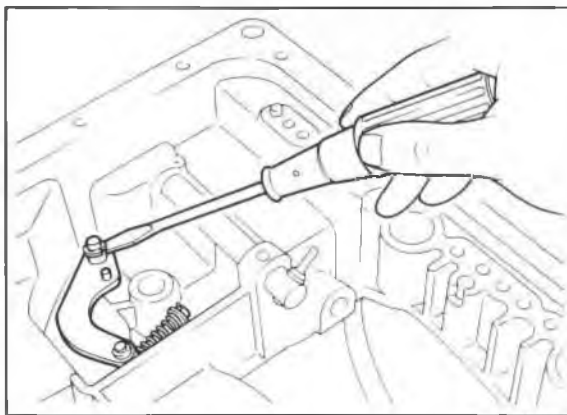
76G07C-114

10. Remove the actuator support.



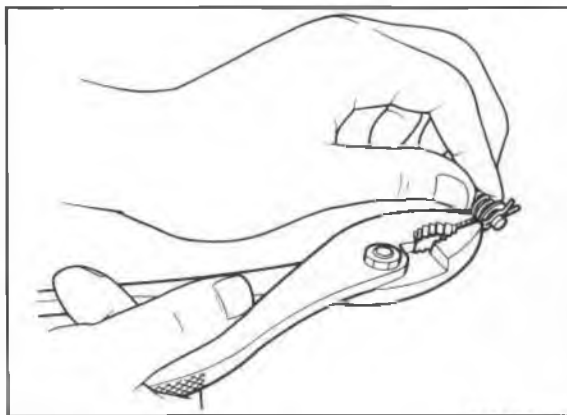
76G07C-115

11. Remove the manual shaft assembly.  
(1) Remove the plate and bushing.  
(2) Remove the nut, and remove the manual shaft and O-ring.  
(3) Remove the manual plate.



76G07C-116

(4) Remove the snap ring and parking lever.

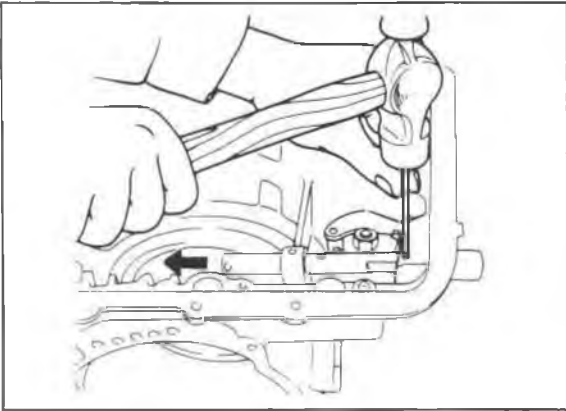


76G07C-117

(5) Remove the snap pin, washer, spring, and parking joint.

## 7C DISASSEMBLY

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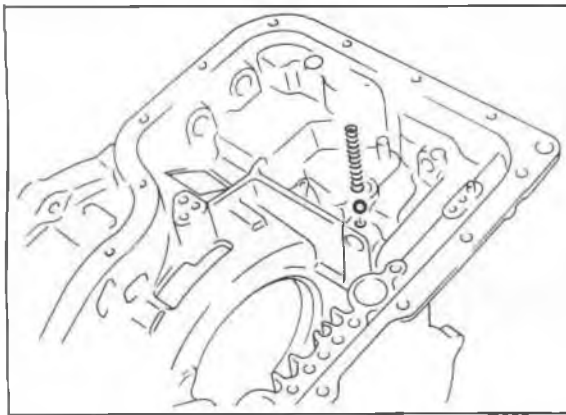


76G07C-118

12. Remove the control rod.
  - (1) Remove the pin, and remove the control rod from the transaxle.

**Warning**

**Be careful when removing the control rod, the detent ball will be pushed out by spring force.**



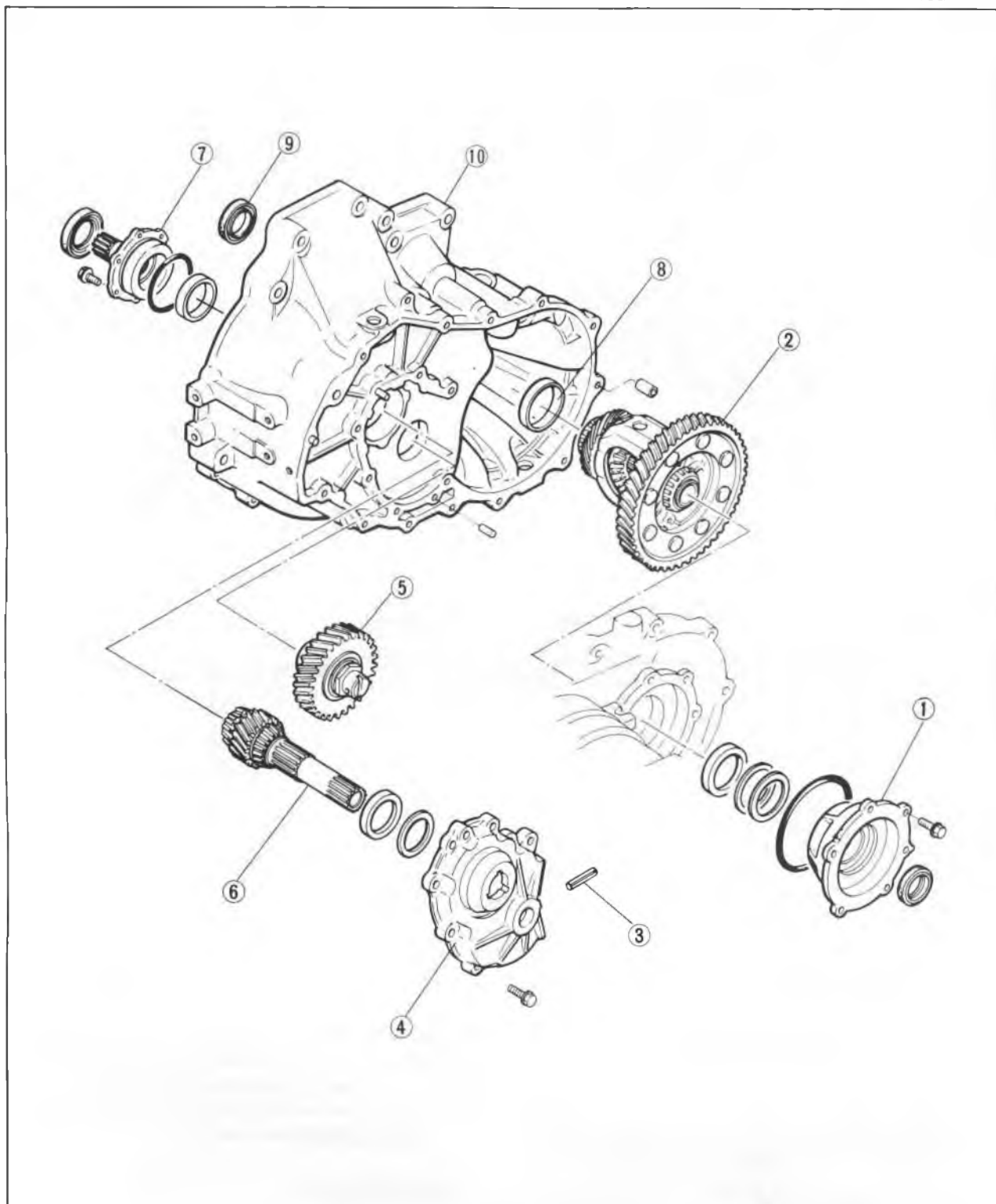
76G07C-119

- (2) Remove the detent ball and spring.



## DISASSEMBLY-STEP 4 Component

76G07C-120



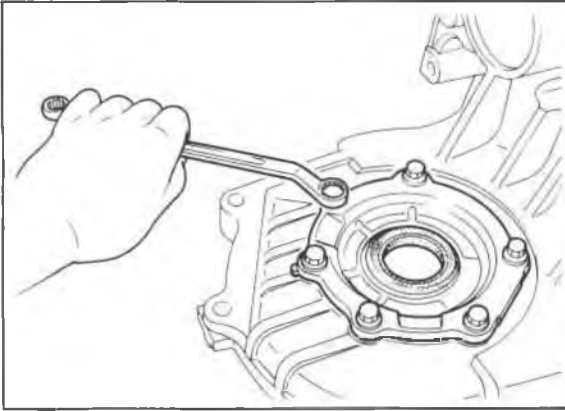
76G07C-121

1. Side bearing housing  
2. Differential assembly

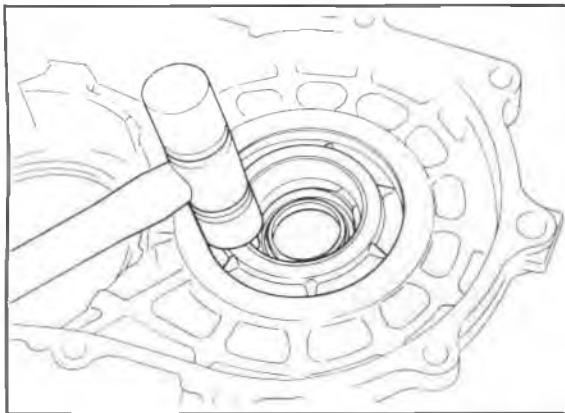
3. Roll pin  
4. Bearing housing  
5. Idle gear assembly  
6. Output gear assembly

7. Bearing cover  
8. Bearing outer race  
9. Oil seal  
10. Converter housing

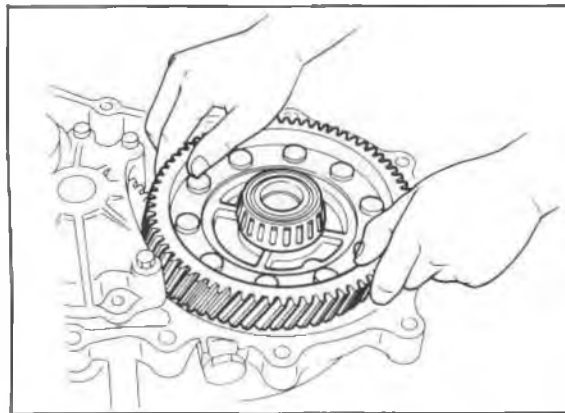
## 7C DISASSEMBLY



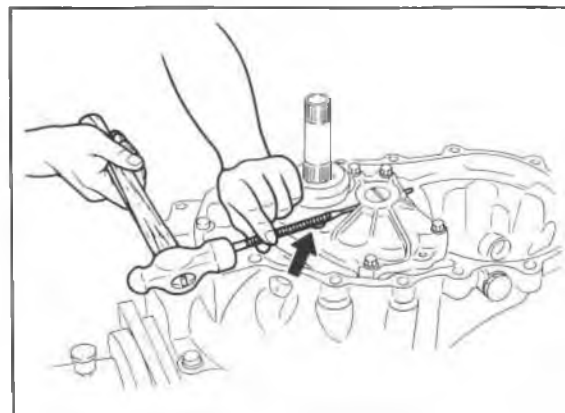
76G07C-122



76G07C-123



76G07C-124



76G07C-125

### Procedure

1. Remove the side bearing housing installation bolts from the transaxle case.

2. Remove the side bearing housing from the transaxle case by tapping lightly with a plastic hammer.

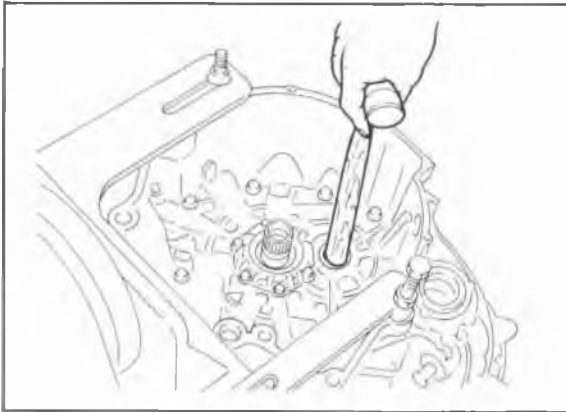
3. Remove the differential assembly.

4. Remove the bearing housing.

(1) Remove the bolt indicated in the figure (arrow).

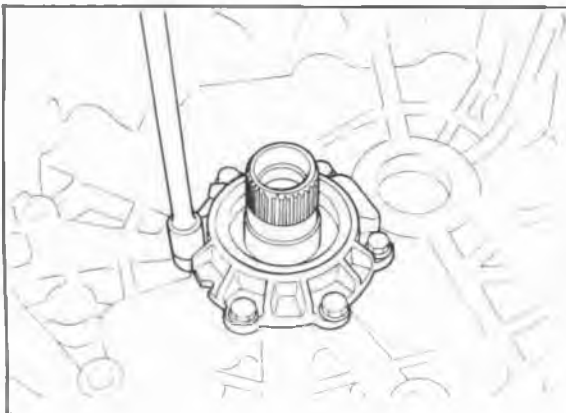
(2) Remove the roll pin with a pin punch.

(3) Remove the bearing housing by tapping lightly with a plastic hammer.



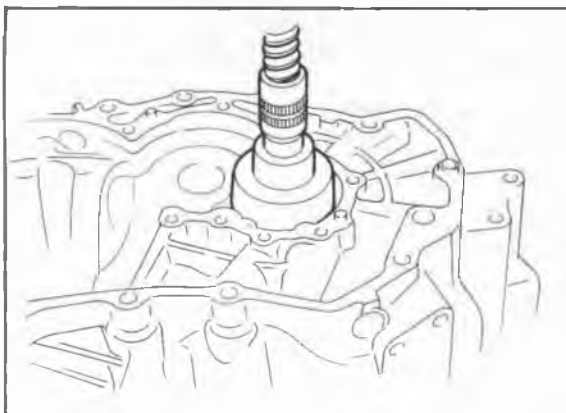
76G07C-126

5. Remove the idle gear assembly and output gear assembly by tapping out from the torque converter side.



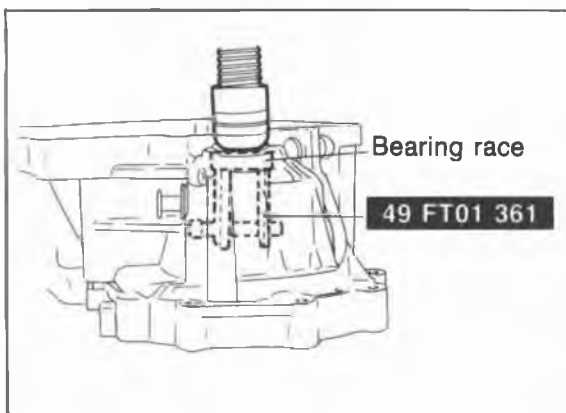
76G07C-127

6. Remove the bearing cover.
  - (1) Remove the converter housing from the trans-axle hanger.
  - (2) Remove the bearing cover bolts.



86U07B-169

- (3) Press the bearing cover assembly out of the converter housing.



76G07C-128

7. Press the bearing outer race out of the converter housing with the **SST**.

**Note**  
**Install the bearing outer race during reassembly to adjust the preload.**

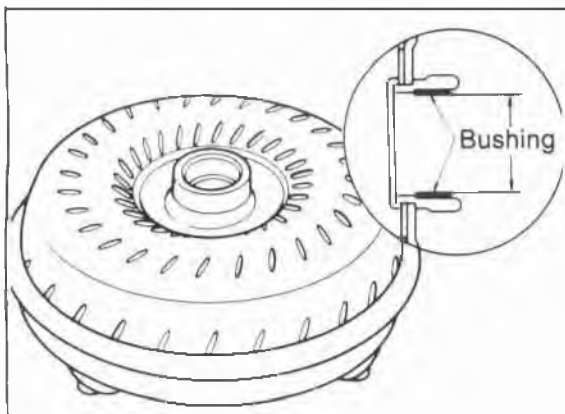
8. Check the oil seals for damage. Replace if necessary.

## INSPECTION AND REPAIR

### PRECAUTION

- (1) Several of the parts resemble each other; organize them so that they do not get mixed up.
- (2) Clean each part with cleaning oil, clean out the oil holes and oil passages with compressed air, and check that there are no obstructions.
- (3) When using cleaning oil and compressed air, wear protective eyewear.
- (4) If a clutch plate or brake band is replaced with a new one, soak it in ATF for 2 hours or more before installing.
- (5) Before assembly, apply ATF to all seal rings, rotating parts, and sliding parts.
- (6) All seals, gaskets and roll pins must be replaced with new ones during assembly.
- (7) Use petroleum jelly, not grease where required.
- (8) When it is necessary to replace a bushing, replace the assembly which includes that bushing.

76G07C-353



76G07C-129

### TORQUE CONVERTER

The torque converter is welded together and cannot be disassembled.

#### Inspection

1. Check the outer part of the converter for damage or cracks, and replace it if necessary.
2. Check for rust on the pilot hub of the converter or on the boss. If there is any, remove it completely.
3. Measure the bushing of the converter boss. Replace the converter assembly if the bushing is worn.

#### Bushing inner diameter

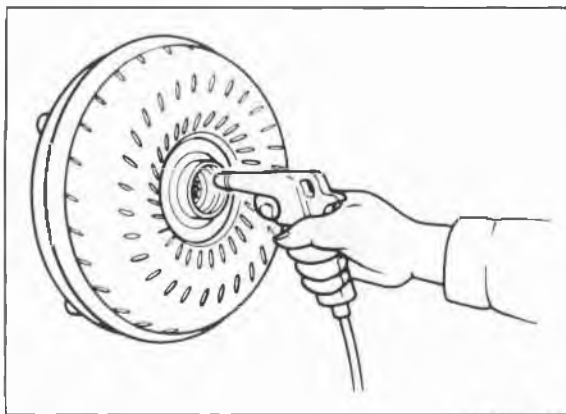
**Standard: 33.000—33.025 mm**

**(1.299—1.300 in)**

**Maximum: 33.075 mm (1.302 in)**

#### Washing Inside of Converter

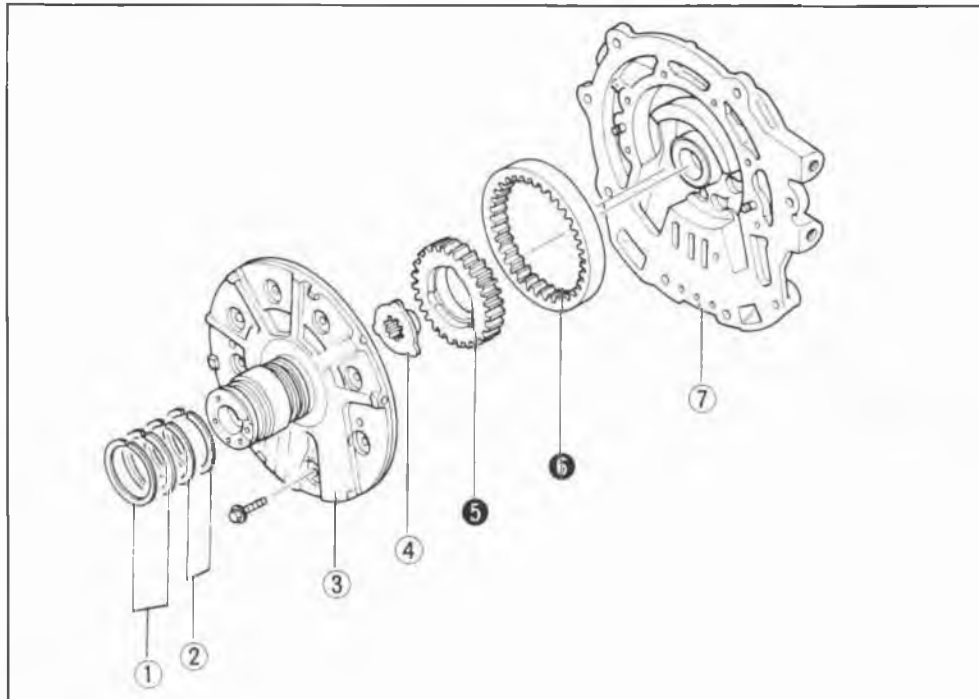
1. Drain any ATF remaining in the converter.
2. Pour in solvent [approximately **0.5 liter (0.53 US qt, 0.44 Imp qt)** ].
3. Shake the converter to clean the inside. Pour out the solvent.
4. Clean the inside of the converter with compressed air so that the inside is perfectly empty.
5. Pour in ATF.
6. Shake the converter to clean the inside. Pour out the ATF.



86U07B-173

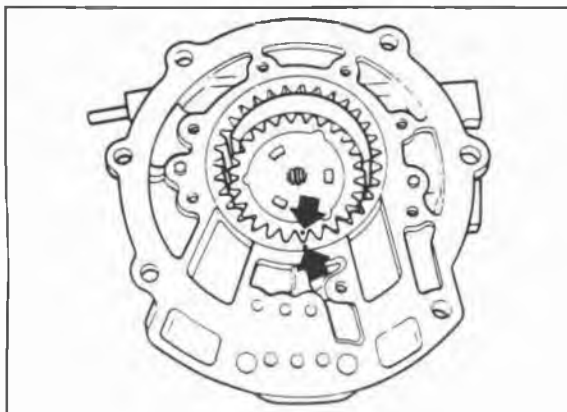
## OIL PUMP Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.



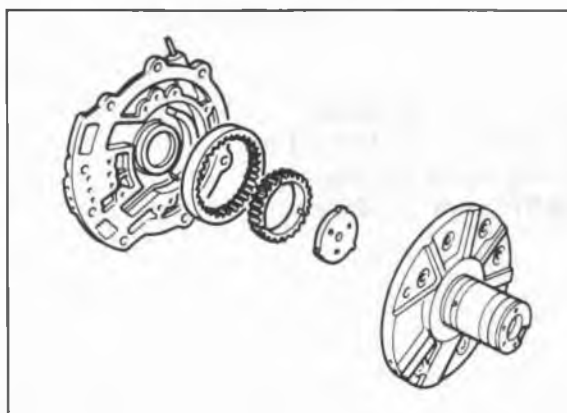
1. Seal ring
2. Seal ring
3. Pump cover
4. Pump flange
5. Inner gear
6. Outer gear
7. Pump housing

63U07B-089



### Disassembly note Inner gear and outer gear

Mark the inner and outer gears with paint before removing them.



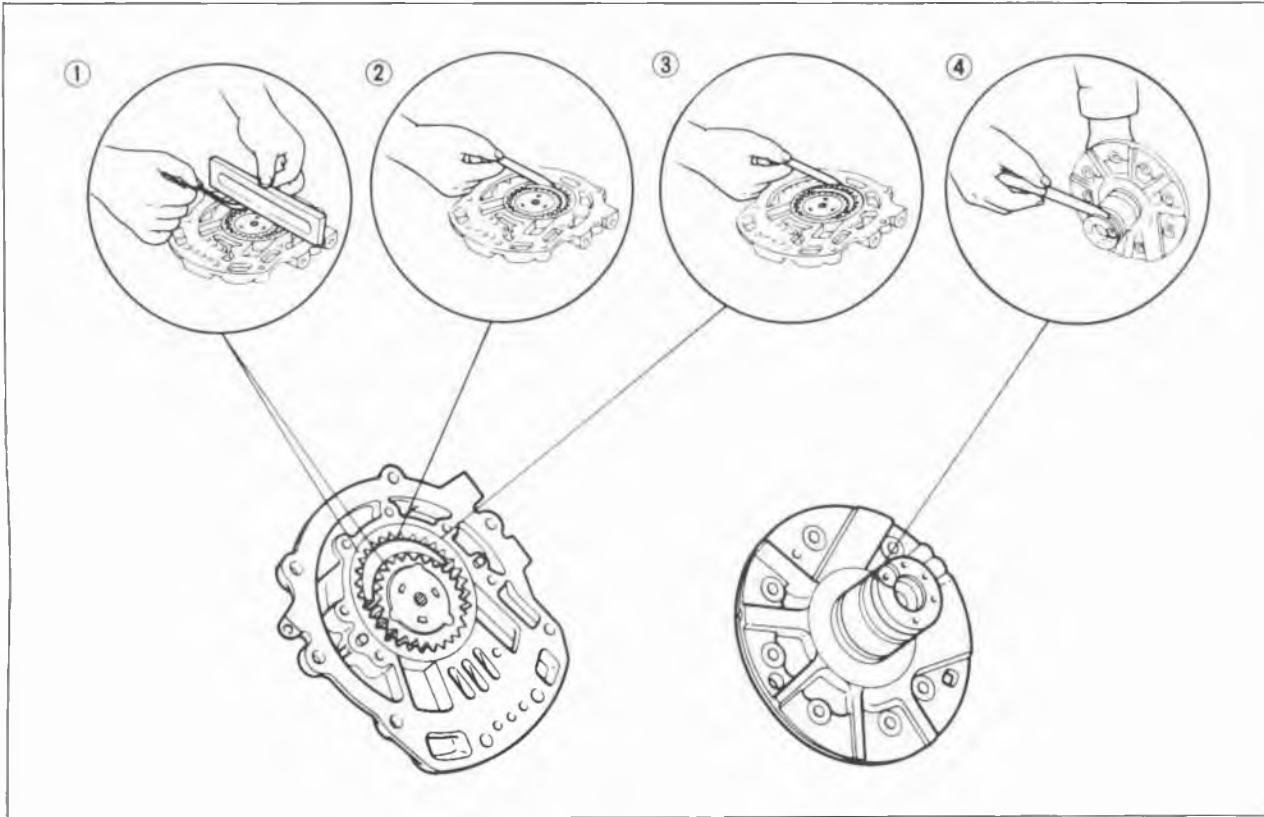
### Inspection

Check for the following and replace any faulty parts:

1. Damaged or worn inner or outer gear tooth surfaces.
2. Broken or worn seal ring.

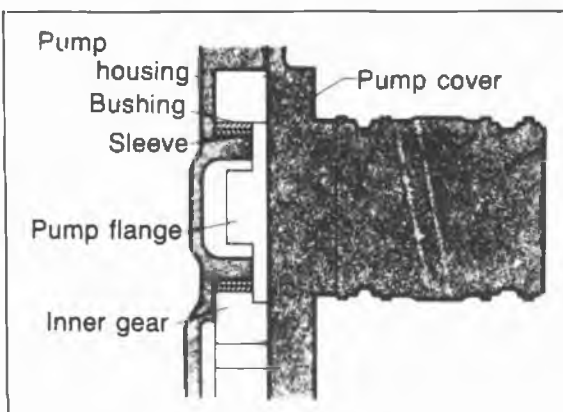
# 7C INSPECTION AND REPAIR

## 3. Clearance



	Measured location	Standard	Maximum
1	Gear to pump cover	0.02—0.04 mm (0.001—0.002 in)	0.08 mm (0.003 in)
2	Outer gear to crescent	0.14—0.21 mm (0.006—0.008 in)	0.25 mm (0.010 in)
3	Outer gear to housing	0.05—0.20 mm (0.002—0.008 in)	0.25 mm (0.010 in)
4	Oil seal ring to ring groove	0.04—0.16 mm (0.002—0.006 in)	0.40 mm (0.016 in)

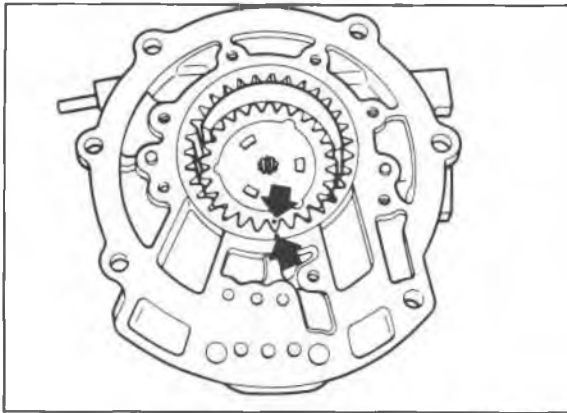
76G07C-133



76G07C-134

4. Damaged or worn inner gear bushing of pump housing sleeve.

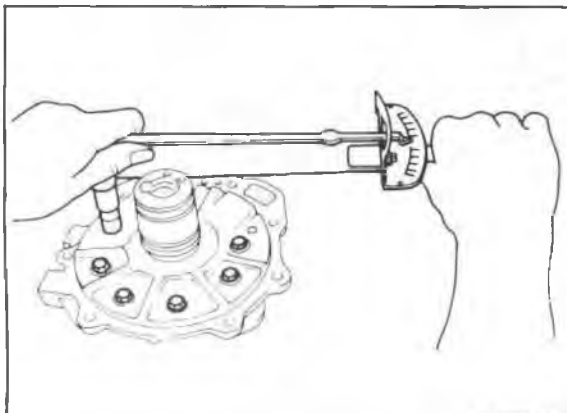
**Sleeve outer diameter:**  
**37.900 mm (1.492 in) max.**  
**Bushing inner diameter:**  
**38.075 mm (1.499 in) max.**



76G07C-135

### Assembly

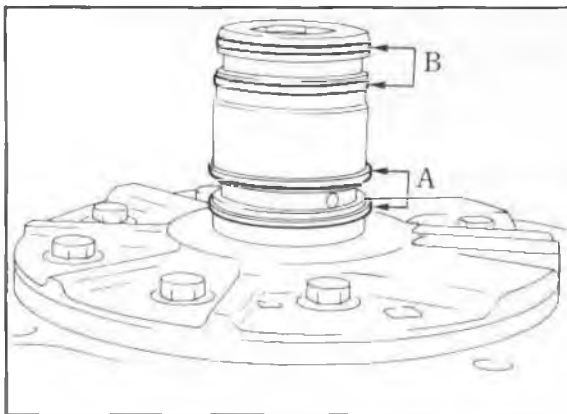
1. Assemble so that the marks on the inner and outer gears are at the pump cover side.
2. Install the pump flange.



76G07C-136

3. Install the oil pump cover.

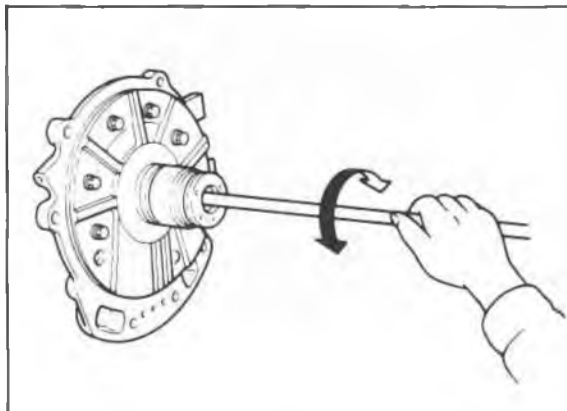
**Tightening torque: 11—14 N·m  
(110—140 cm·kg, 95—122 in·lb)**



76G07C-137

4. Install the seal rings.

**Seal ring outer diameter**  
**A: 44 mm (1.732 in)**  
**B: 43 mm (1.693 in)**



76G07C-138

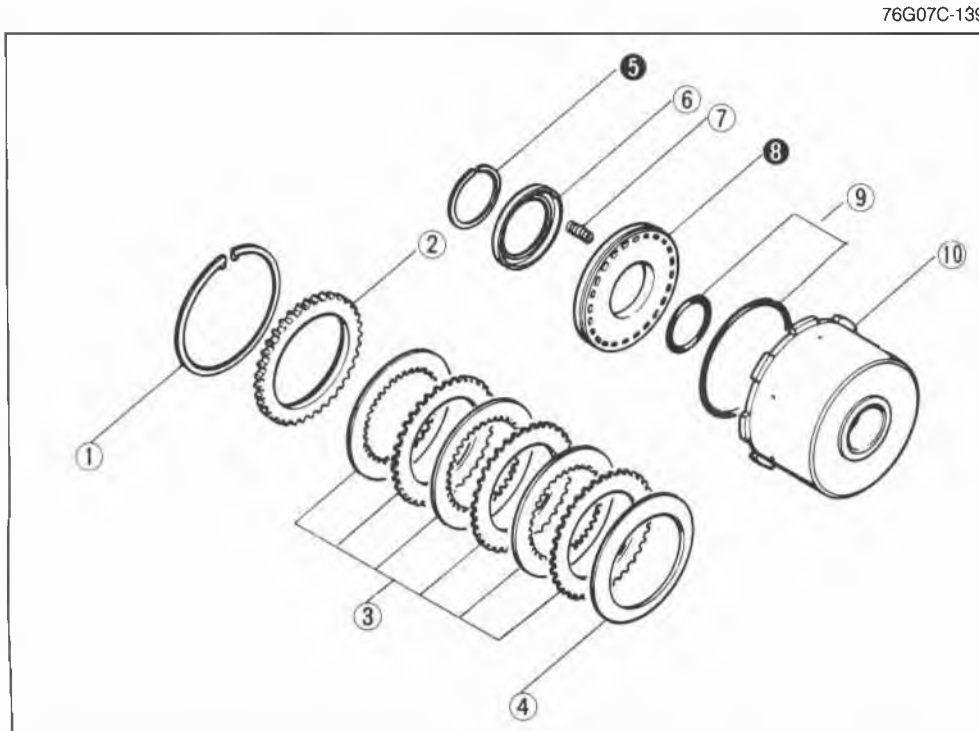
5. When the assembly is completed, install the oil pump shaft and make sure the gears turn easily.

# 7C INSPECTION AND REPAIR

## FRONT CLUTCH

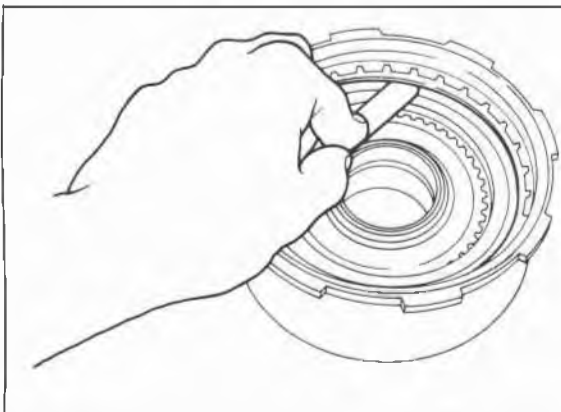
### Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.



1. Snap ring
2. Retaining plate
3. Drive and driven plates
4. Dished plate
5. Snap ring
6. Spring retainer
7. Return spring
8. Piston
9. Seal rings
10. Rear clutch drum

63U07B-097



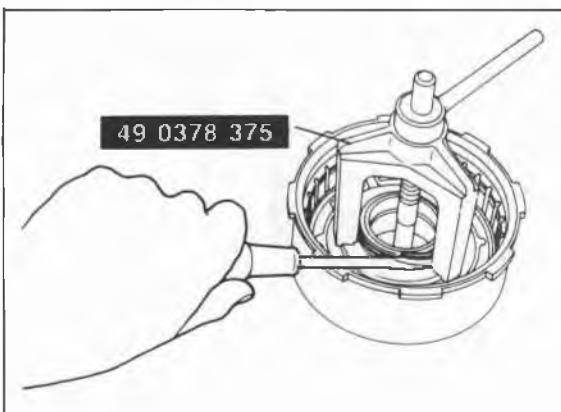
### Disassembly note Front clutch clearance

Before disassembling the front clutch, measure the front clutch clearance.

**Front clutch clearance:**  
1.6—1.8 mm (0.063—0.071 in)

### Note

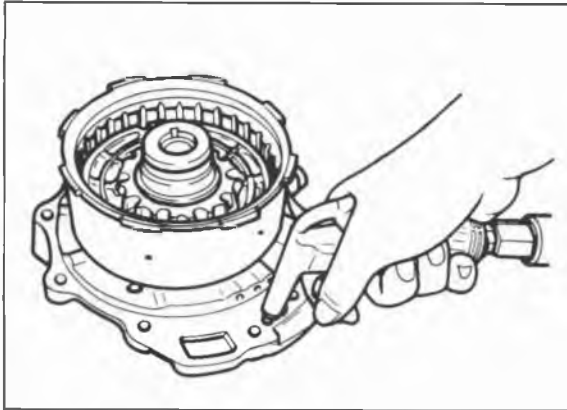
If the clearance is not within specification, adjust by using the retaining plate at the time of assembly. (Refer to page 7C—60.)



### Snap ring

Compress the clutch spring with the **SST**, and remove the snap ring with a screwdriver.

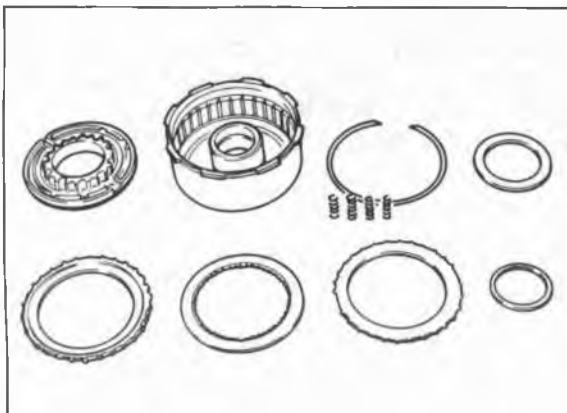




76G07C-142

### Piston

Remove the piston by blowing compressed air into the hole indicated.



76G07C-143

### Inspection

Check the following and repair or replace any faulty parts.

1. Drive and driven plates for damage or wear

#### Drive plate thickness

**Standard: 1.6 mm (0.063 in)**

**Minimum: 1.4 mm (0.055 in)**

2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact areas for damage
5. Check ball for leaking or sticking
6. Spring retainer for deformation
7. Broken or worn snap ring
8. Broken or weakened spring

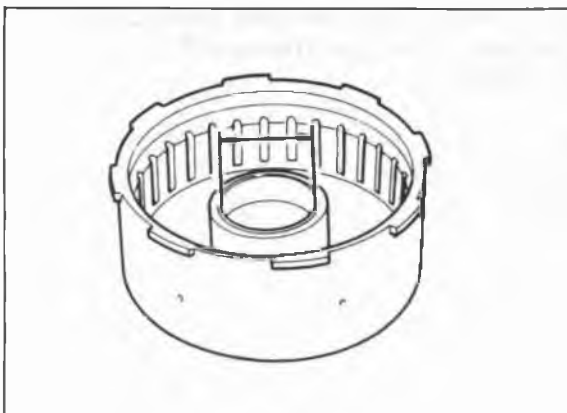
#### Free length of spring:

**26.2 mm (1.031 in)**

9. Worn drum bushing

#### Drum bushing inner diameter:

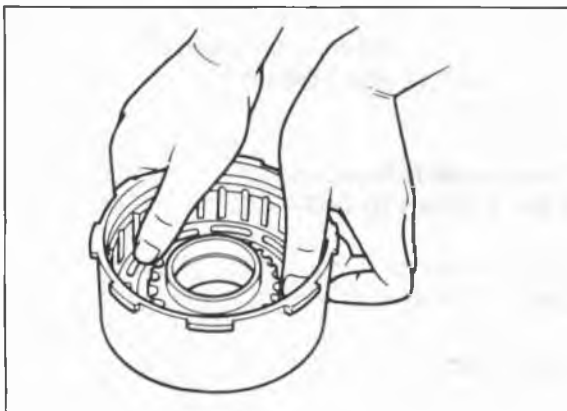
**44.075 mm (1.735 in) max.**



76G07C-144

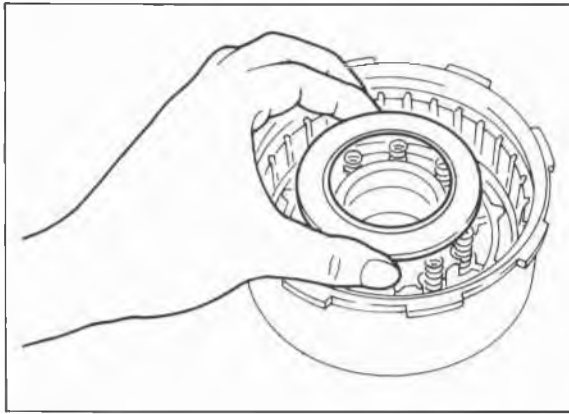
### Assembly

1. Apply ATF to the inner seal ring, and install it into the rear clutch drum.
2. Apply ATF to the outer seal ring, and install it onto the piston.
3. Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.



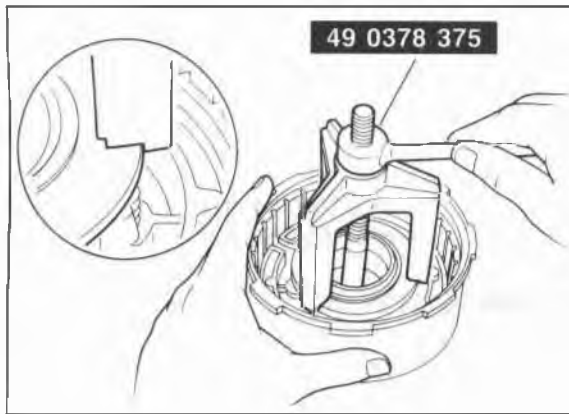
76G07C-145

# 7C INSPECTION AND REPAIR



76G07C-146

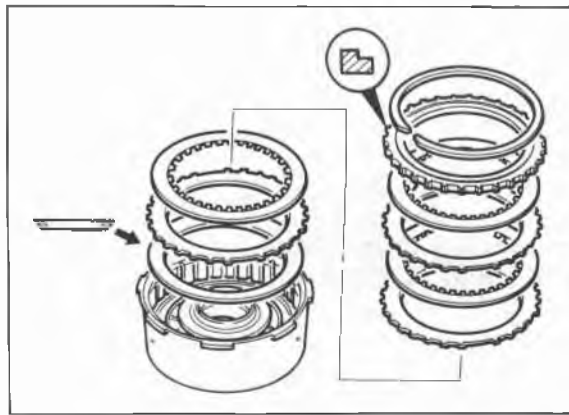
4. Install the return springs and the spring retainer.



76G07C-147

5. Install the snap ring.

- (1) Place the **SST** onto the spring retainer and compress only enough to install the snap ring.
- (2) Install the snap ring into the groove.
- (3) Remove the **SST**.



76G07C-148

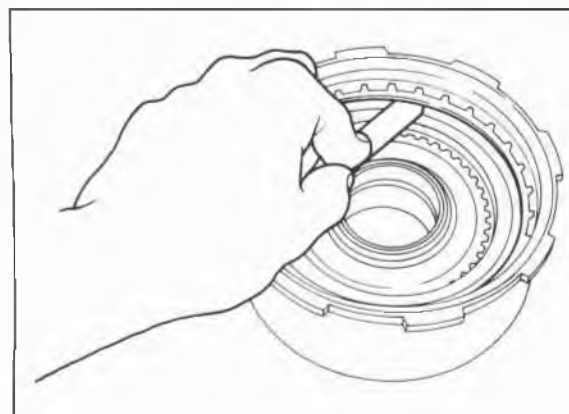
6. Install the dished plate with the beveled side facing the piston as shown. Then install the drive and driven plates.

**Note**

**Installation order:**

**Driven-Drive-Driven-Drive-Driven-Drive**

7. Install the retaining plate with the step facing upward; then install the snap ring.



76G07C-149

8. Check the front clutch clearance.

- (1) Measure the clearance between the snap ring and retaining plate of the front clutch with a feeler gauge.

**Front clutch clearance:**

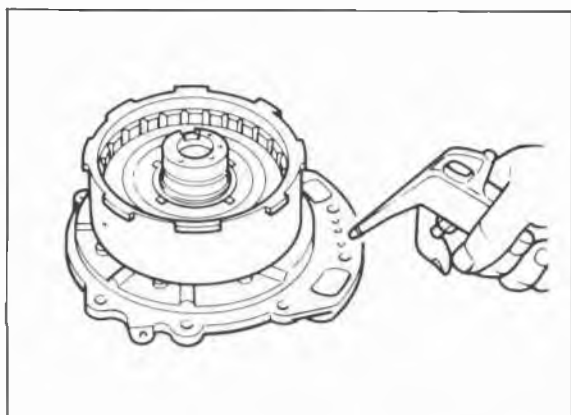
**1.6—1.8 mm (0.063—0.071 in)**

- (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Retaining plate sizes**

**mm (in)**

5.2 (0.205)	5.4 (0.213)	5.6 (0.220)
5.8 (0.228)	6.0 (0.236)	6.2 (0.244)

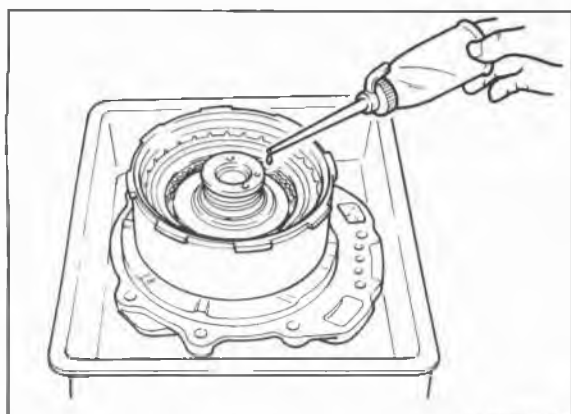


76G07C-150

9. Check the front clutch operation.
  - (1) Set the clutch assembly onto the oil pump.
  - (2) Check the front clutch operation by applying compressed air through the fluid passage shown.

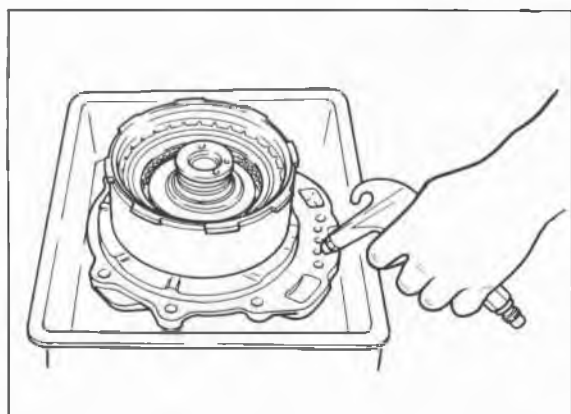
**Air pressure:**  
**392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**Caution**  
**Apply air for no more than 3 seconds.**



76G07C-151

- (3) Pour ATF into the front clutch until the clutch piston is fully submerged.



76G07C-152

- (4) Check that no bubbles come from between the piston and drum seal while applying compressed air through the fluid passage shown.

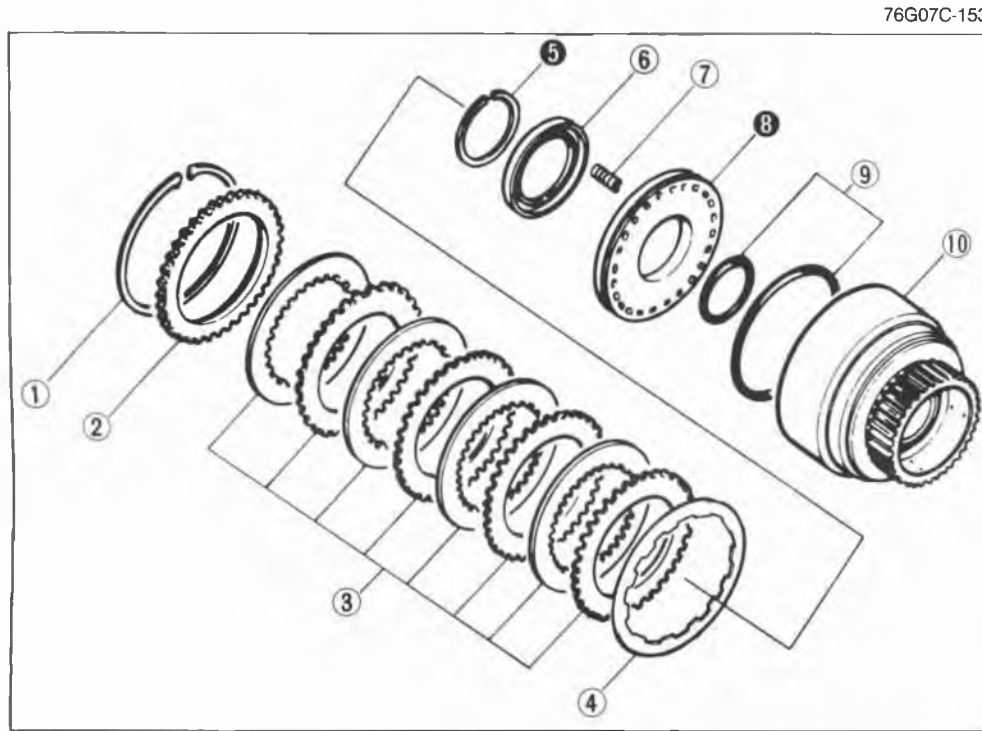
**Air pressure:**  
**392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**Caution**  
**Apply air for no more than 3 seconds.**

# 7C INSPECTION AND REPAIR

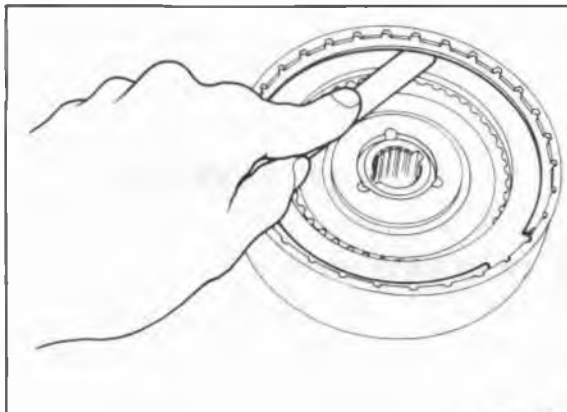
## REAR CLUTCH Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.



1. Snap ring
2. Retaining plate
3. Drive and driven plates
4. Dished plate
5. Snap ring
6. Spring retainer
7. Return spring
8. Piston
9. Seal rings
10. Rear clutch drum

63U07B-109

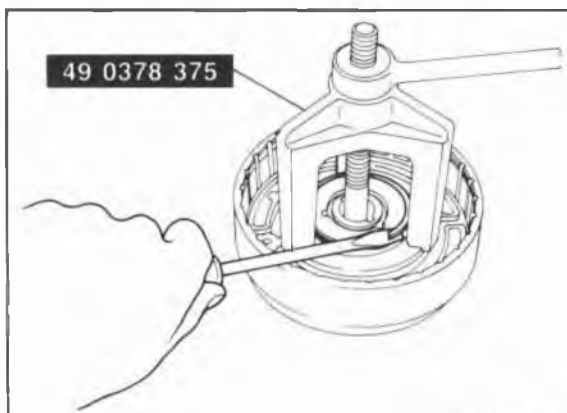


### Disassembly note Rear clutch clearance

Before disassembling the rear clutch, measure the rear clutch clearance.

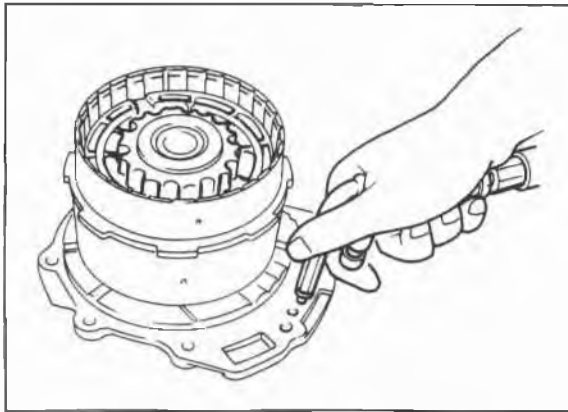
**Rear clutch clearance:**  
0.8—1.0 mm (0.031—0.039 in)

**Note**  
If the clearance is not within specification, adjust it by selecting a proper retaining plate. (Refer to page 7C—64.)



### Snap ring

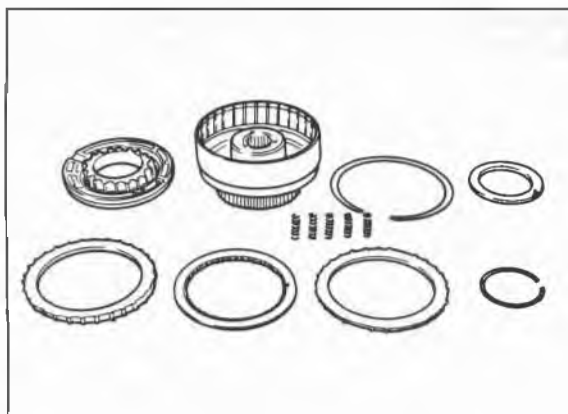
Compress the clutch spring, with the **SST** ; then remove the snap ring with a screwdriver.



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### Piston

Remove the piston by blowing compressed air into the fluid hole as shown.



76G07C-157

### Inspection

Check the following and repair or replace any faulty parts.

1. Drive and driven plates for damage or wear

#### Drive plate thickness

**Standard: 1.6 mm (0.063 in)**

**Minimum: 1.4 mm (0.055 in)**

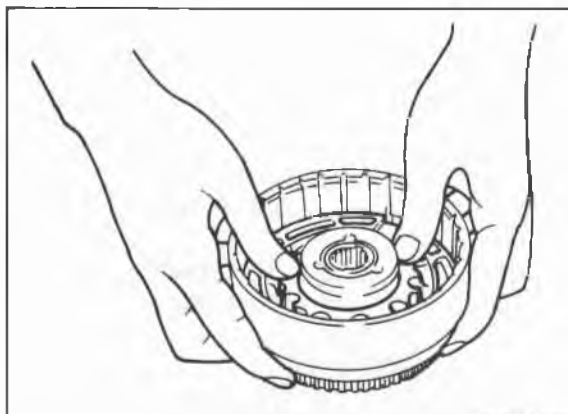
2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact areas for damage
5. Check ball for leaking or sticking
6. Spring retainer for deformation
7. Broken or worn snap ring
8. Broken or weakened spring

#### Free length of spring:

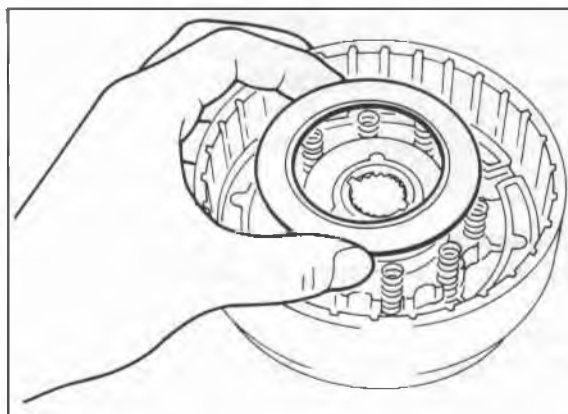
**26.2 mm (1.031 in)**

### Assembly

1. Apply ATF to the inner seal ring and install it into the rear clutch drum.
2. Apply ATF to the outer seal ring, and install it onto the piston.
3. Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.
4. Install the return springs and spring retainer into the piston.

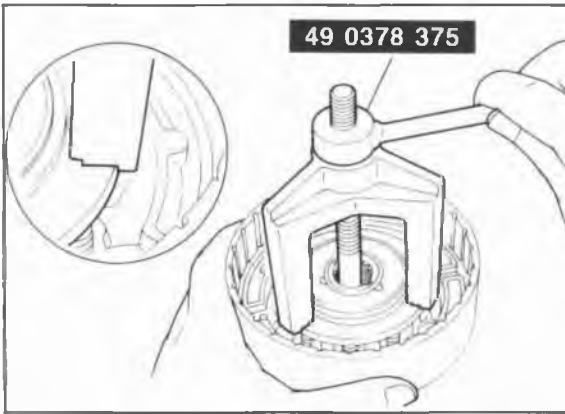


76G07C-158



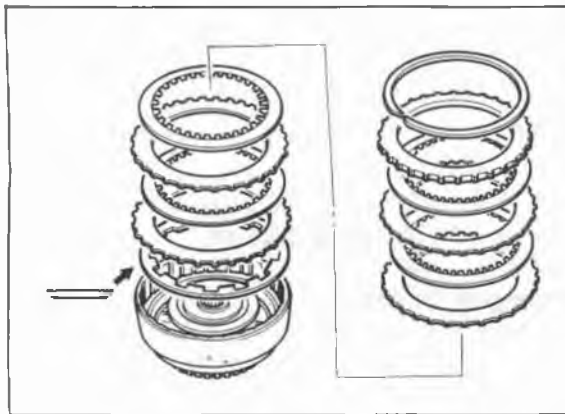
76G07C-159

# 7C INSPECTION AND REPAIR



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5. Install the snap ring.
  - (1) Place the **SST** on the spring retainer and compress only enough to install the snap ring.
  - (2) Install the snap ring in the groove.
  - (3) Remove the **SST**.



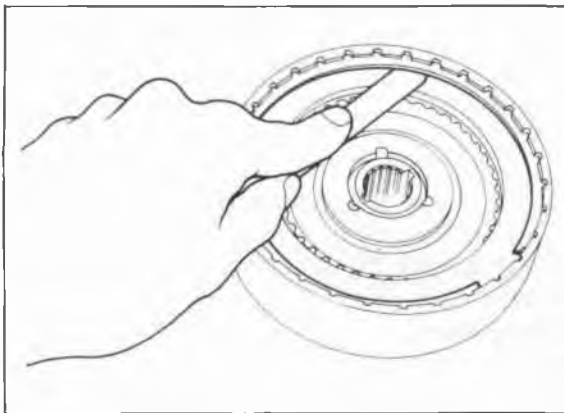
76G07C-161

6. Install the dished plate with the beveled side facing the piston as shown; then install the drive and driven plates.

**Note**

**Installation order:  
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**

7. Install the retaining plate with the step facing upward; then install the snap ring.



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8. Check the rear clutch clearance.
  - (1) Measure the clearance between the snap ring and retaining plate of the rear clutch with a feeler gauge.

**Rear clutch clearance:**

**0.8—1.0 mm (0.031—0.039 in)**

- (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Retaining plate sizes** **mm (in)**

4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	5.4 (0.213)
5.6 (0.220)	5.8 (0.228)	6.0 (0.236)	6.2 (0.244)

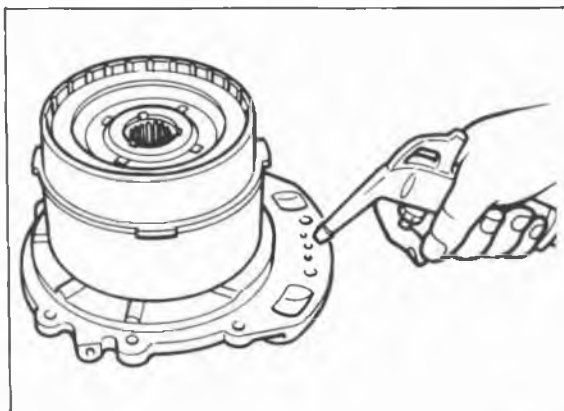
9. Check the rear clutch operation.
  - (1) Assemble the front clutch, and rear clutch; then set the clutch assembly onto the oil pump.
  - (2) Check the rear clutch operation by applying compressed air through the fluid passage as shown.

**Air pressure:**

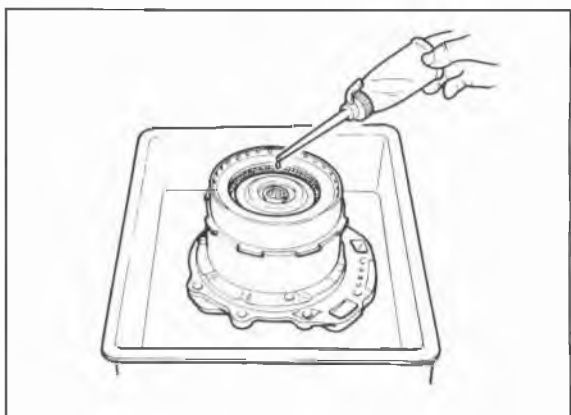
**392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**Caution**

**Apply air for no more than 3 seconds.**

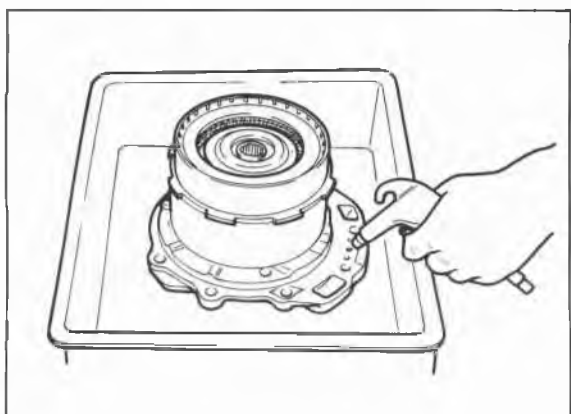


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- (3) Pour ATF into the rear clutch until the clutch piston is fully submerged.



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- (4) Check that no bubbles come from between the piston and drum seal while applying compressed air through the fluid passage shown.

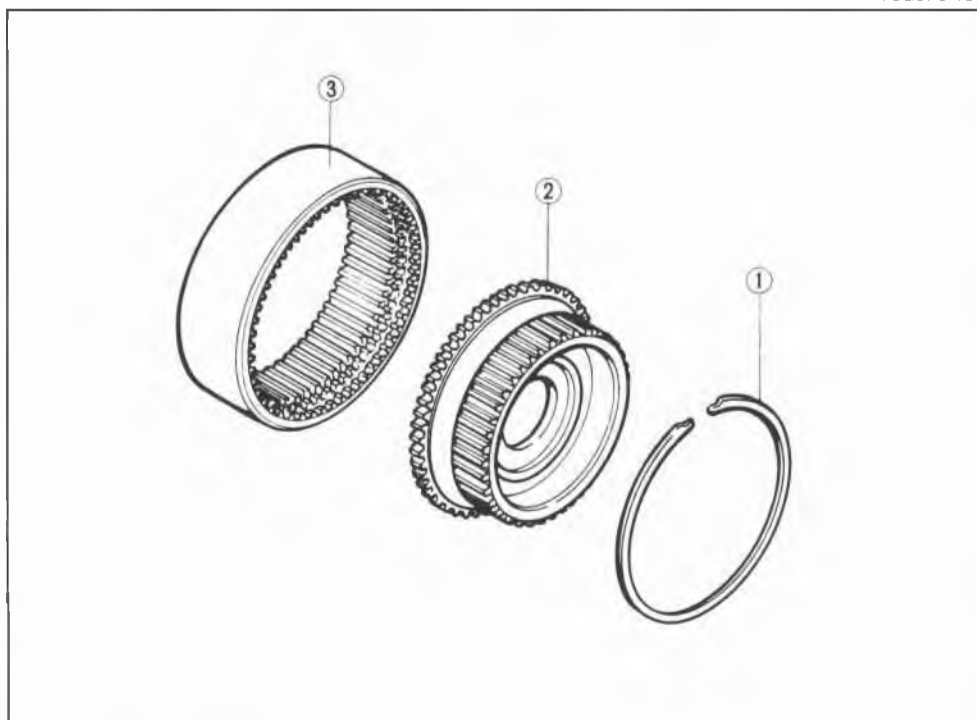
**Air pressure:**  
**392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**Caution**  
**Apply air for no more than 3 Seconds**

## REAR CLUTCH HUB Disassembly

Disassemble in the sequence shown in the figure.

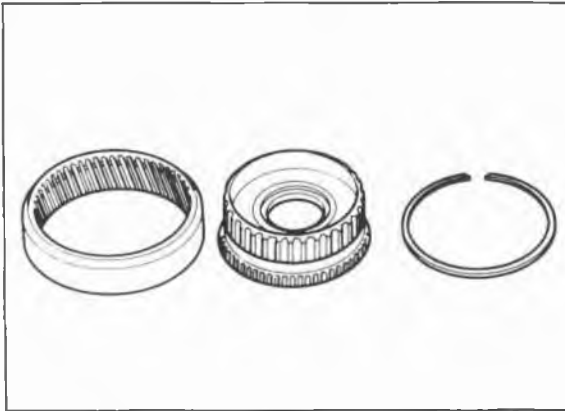
76G07C-166



1. Snap ring
2. Rear clutch hub
3. Internal gear

63U07B-124

# 7C INSPECTION AND REPAIR

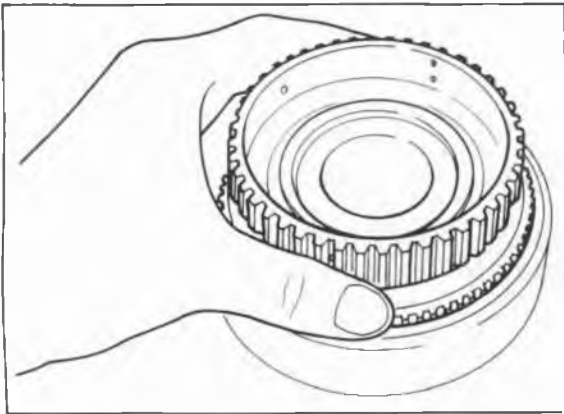


76G07C-167

## Inspection

Check the following and replace any faulty parts.

1. Broken or worn snap ring
2. Damaged or worn internal gear



76G07C-168

## Assembly

1. Set the rear clutch hub into the internal gear.

### Note

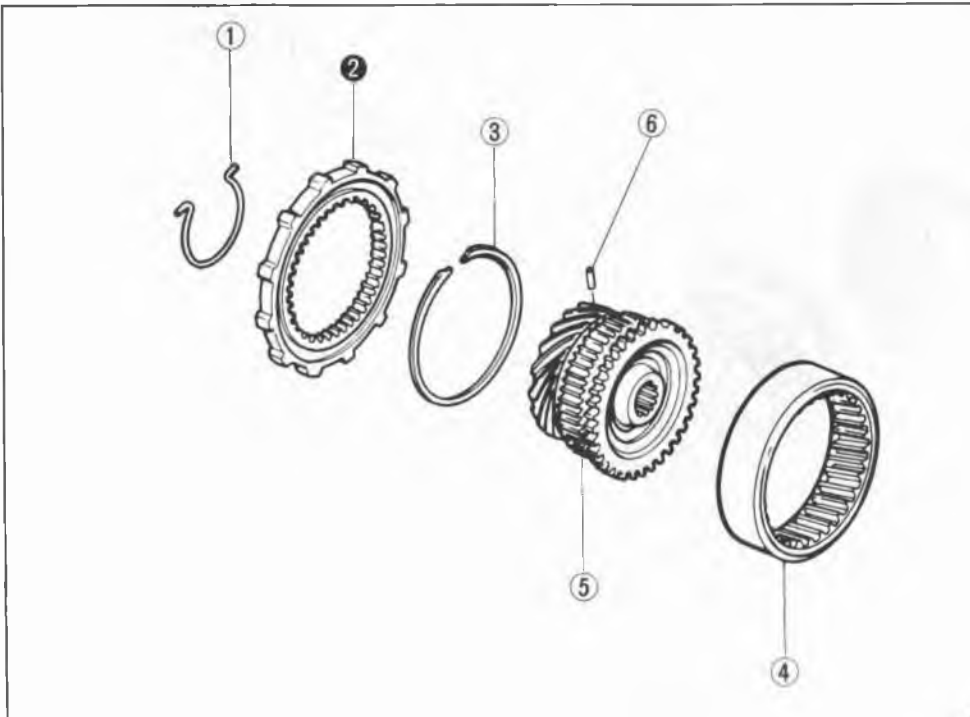
**Align the splines of the rear clutch hub and internal gear**

2. Install the snap ring.

## DRUM HUB Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked part.

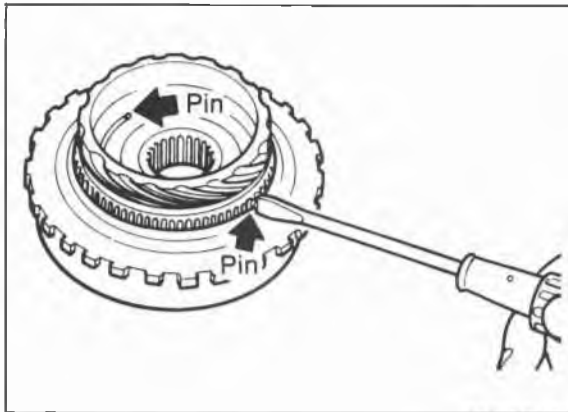
76G07C-169



1. Parking gear spring
2. Parking gear
3. Snap ring
4. Internal gear
5. Drive hub
6. Pin

76G07C-170



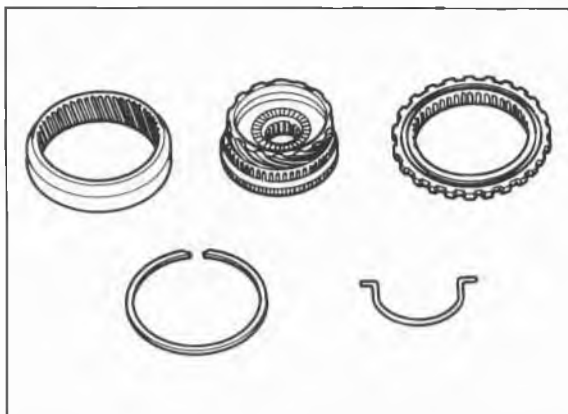


76G07C-171

### Disassembly note

#### Parking gear

Remove the parking gear from the drive hub by first removing the parking gear spring by pushing in the two pins which project from the internal gear.

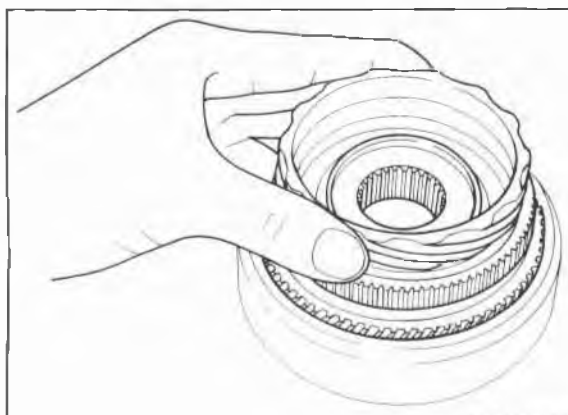


76G07C-172

### Inspection

Check the following and replace any faulty parts.

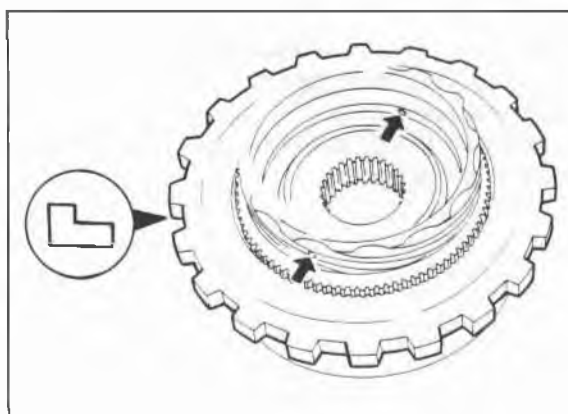
1. Broken or worn snap ring
2. Damaged or worn gear



76G07C-173

### Assembly

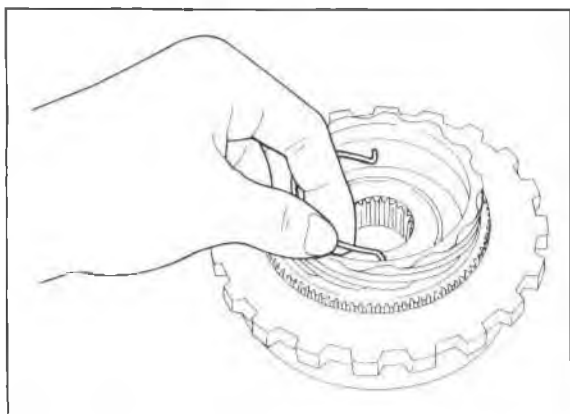
1. Install the drive hub to the internal gear; then install the snap ring.



76G07C-174

2. Install the parking gear onto the drive hub with the step facing upward.
3. Apply petroleum jelly to the pins to secure them; then install them into the drive hub.

# 7C INSPECTION AND REPAIR



76G07C-175

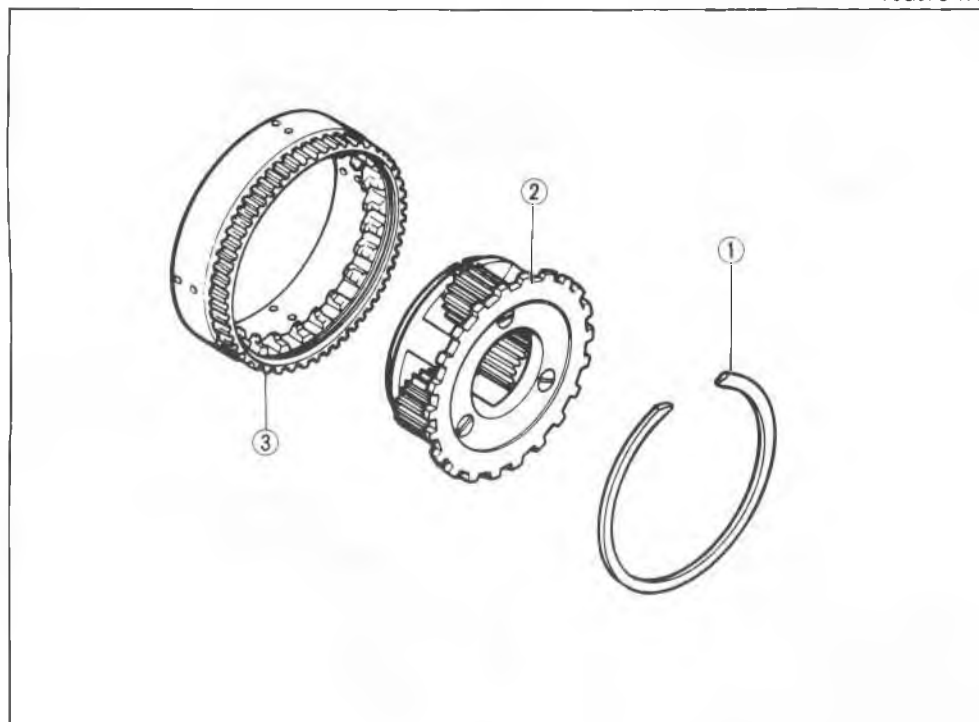
4. Install the parking gear spring.

## ONE-WAY CLUTCH INNER RACE

### Disassembly

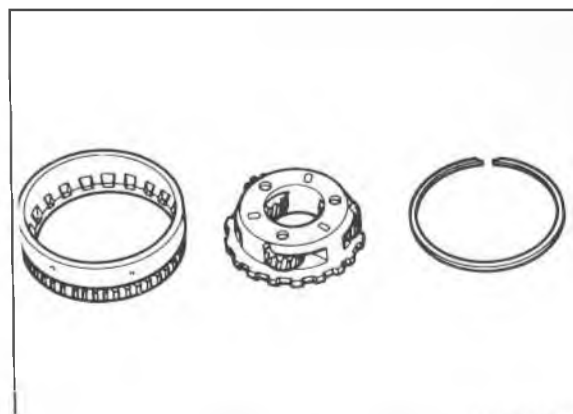
Disassemble in the sequence shown in the figure.

76G07C-176



1. Snap ring
2. Planetary carrier (Rear)
3. One-way clutch inner race

63U07B-127

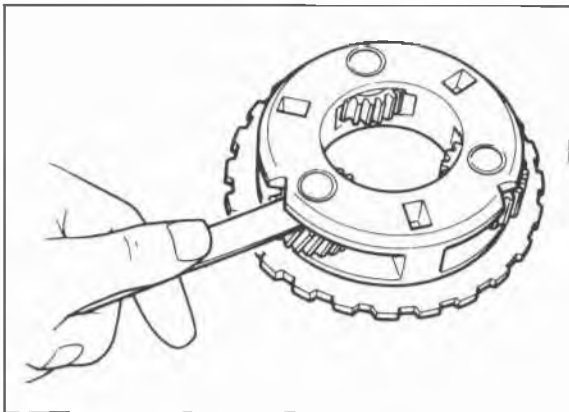


76G07C-177

### Inspection

Check the following and replace any faulty parts.

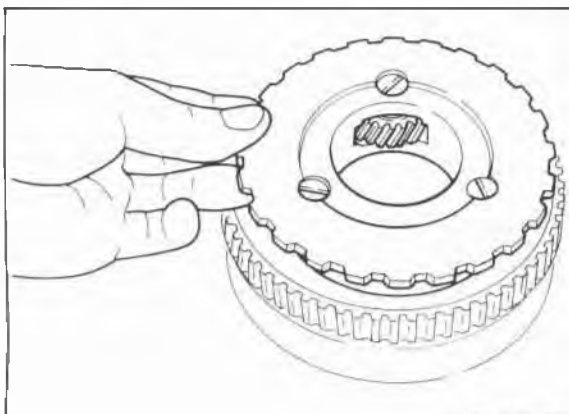
1. Broken or worn snap ring
2. Damaged or worn gear
3. Worn one-way clutch inner race
4. Rotation of pinion gear



76G07C-178

5. Clearance between the pinion washer and planetary carrier

**Clearance: 0.8 mm (0.031 in) max.**



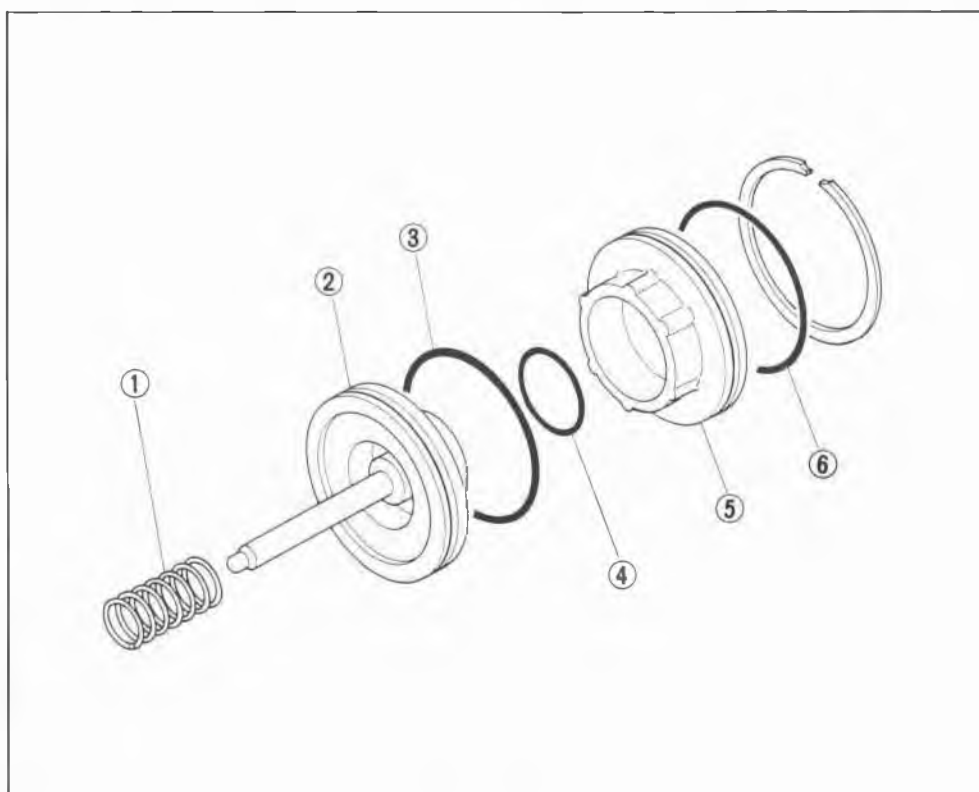
76G07C-179

### Assembly

Install the rear planetary carrier into the one-way clutch inner race; then install the snap ring.

### BAND SERVO

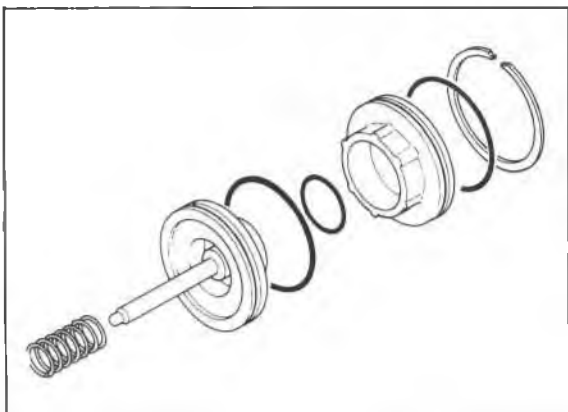
Disassemble in the sequence shown in the figure.



76G07C-180

1. Return spring
2. Servo piston
3. Outer seal ring
4. Inner seal ring
5. Servo retainer
6. Seal ring

## 7C INSPECTION AND REPAIR



76G07C-181

### Inspection

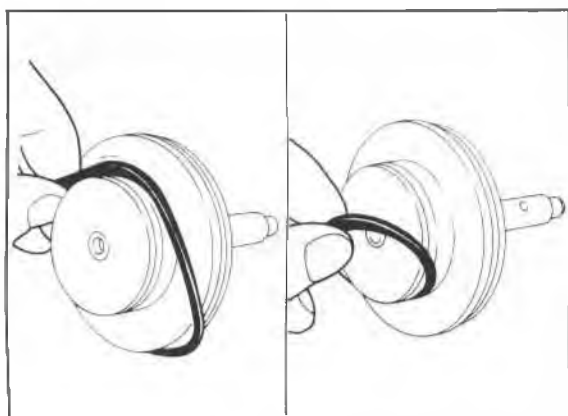
Check the following and replace any faulty parts.

1. Damaged or worn piston
2. Weakened return spring

### Free length of spring:

**FE engine: 48.0 mm (1.89 in)**

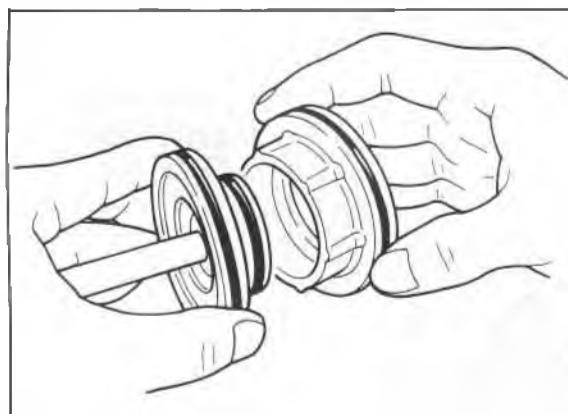
**F6 engine: 45.5 mm (1.79 in)**



76G07C-182

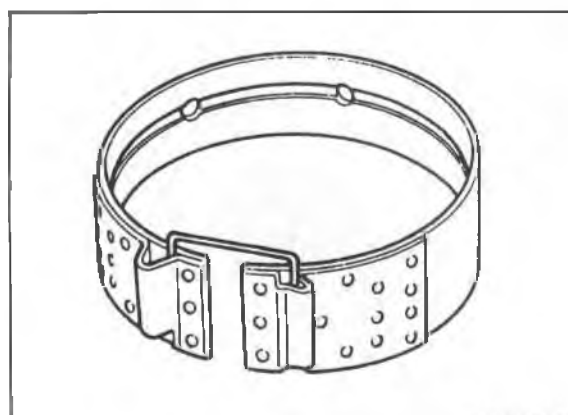
### Assembly

1. Apply ATF to the inner and outer seal rings, and install them onto the servo piston.



76G07C-183

2. Apply ATF to the seal ring, and install it onto the servo retainer.
3. Assemble the servo retainer and servo piston.



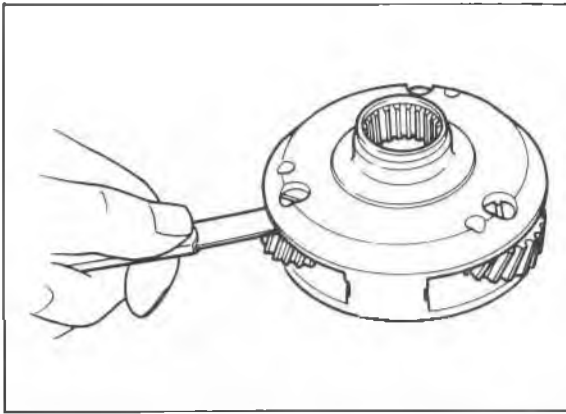
76G07C-184

### BRAKE BAND

#### Inspection

Check the following and replace any faulty part.

1. Damaged or worn brake band



76G07C-185

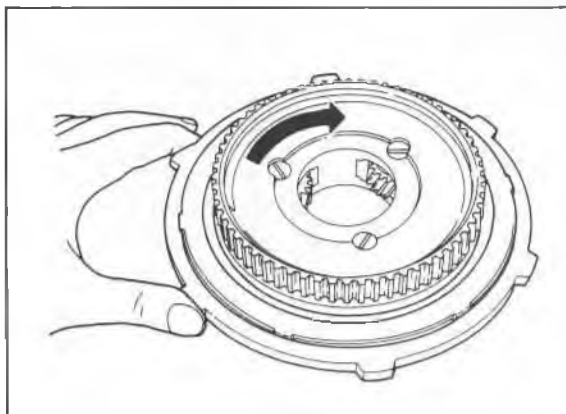
## PLANETARY CARRIER (FRONT)

### Inspection

Check the following and replace any faulty parts.

1. Rotation of pinion gear
2. Clearance between pinion washer and planetary carrier

**Clearance: 0.8 mm (0.031 in) max.**



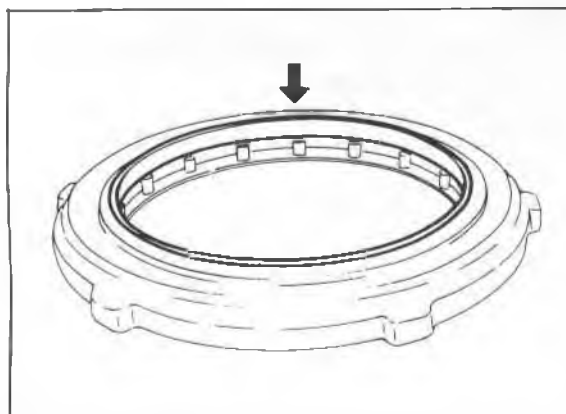
76G07C-186

## ONE-WAY CLUTCH

### Inspection

Check the following and replace any faulty parts.

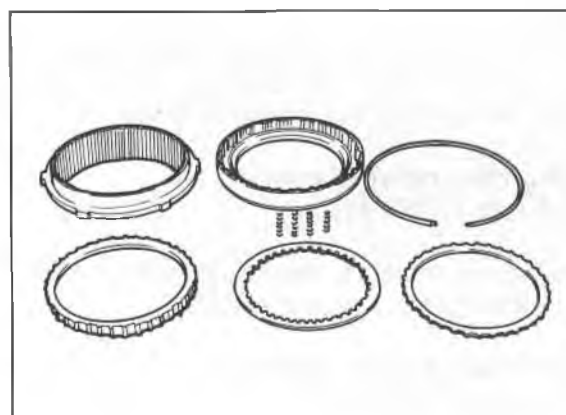
1. One-way clutch operation
  - (1) Install the one-way clutch into the one-way clutch inner race.
  - (2) Make sure that when the one-way clutch is held and the inner race is turned, the clutch turns smoothly in one direction only.



76G07C-187

2. Worn bushing

**Bushing inner diameter:  
130.063 mm (5.121 in) max.**



76G07C-188

## LOW AND REVERSE BRAKE

### Inspection

Check the following and replace any faulty parts.

1. Damaged or worn drive and driven plates

**Drive plate thickness**  
**Standard: 1.6 mm (0.063 in)**  
**Minimum: 1.4 mm (0.055 in)**

2. Broken or worn snap ring
3. Deformed low and reverse brake hub
4. Broken or weakened spring

**Free length of spring:**  
**27.7 mm (1.091 in)**

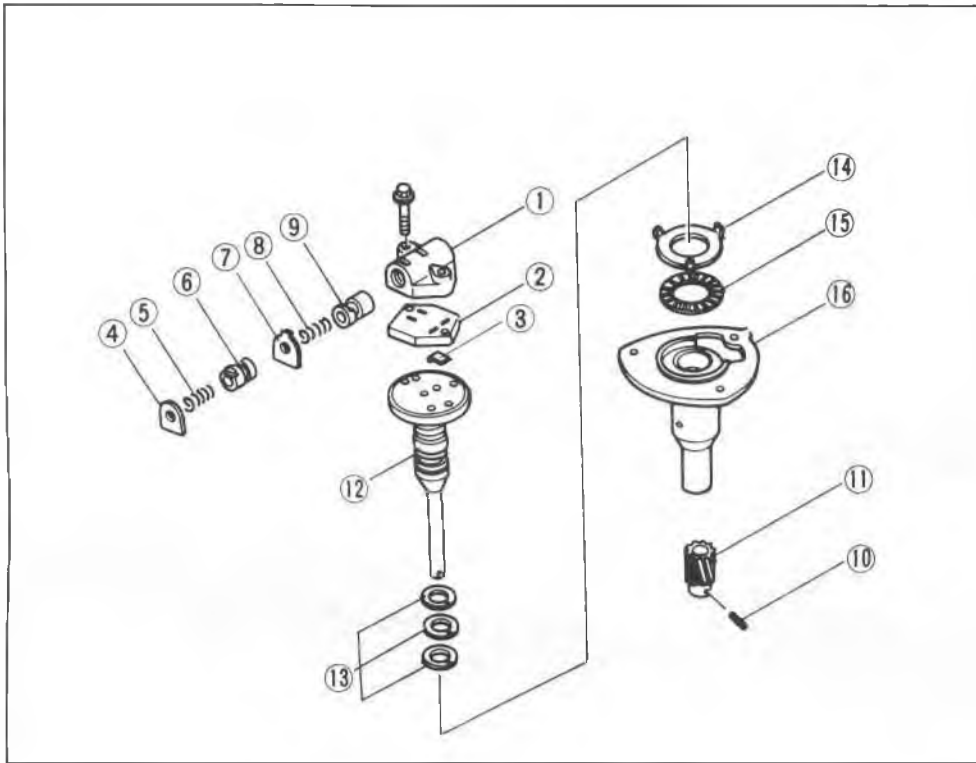
5. Damaged or worn piston
6. Damaged seal contact area of transaxle case

# 7C INSPECTION AND REPAIR

## GOVERNOR Disassembly

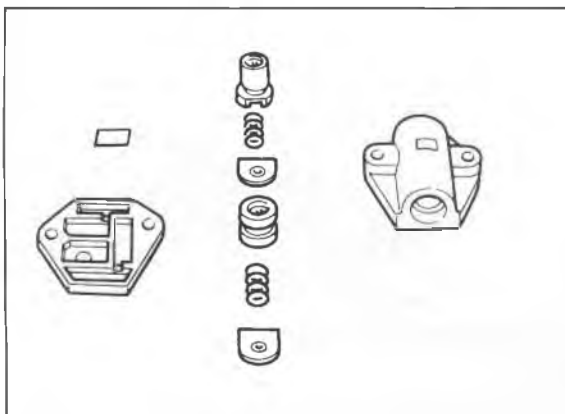
Disassemble in the sequence shown in the figure.

76G07C-189



1. Governor body
2. Separate plate
3. Filter
4. Retainer plate
5. Return spring
6. Primary governor
7. Retainer plate
8. Return spring
9. Secondary governor
10. Roll pin
11. Governor driven gear
12. Governor shaft
13. Seal ring
14. Bearing race
15. Thrust bearing
16. Sleeve

76G07C-190



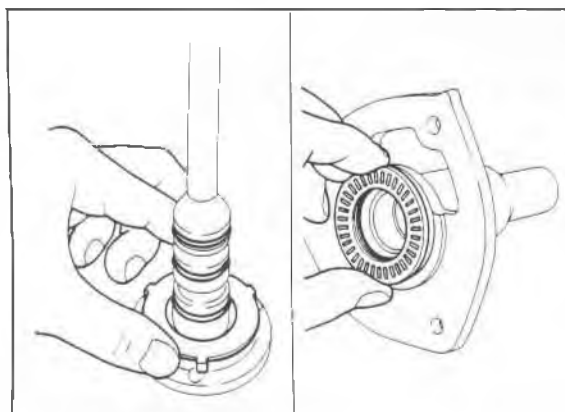
76G07C-191

### Inspection

Check the following and replace any faulty parts.

1. Damaged or worn valve
2. Clogged filter
3. Weakened return spring

	Outer diameter	Free length
Primary spring	9.0 mm (0.354 in)	17.2 mm (0.667 in)
Secondary spring	9.25 mm (0.364 in)	13.2 mm (0.520 in)



76G07C-192

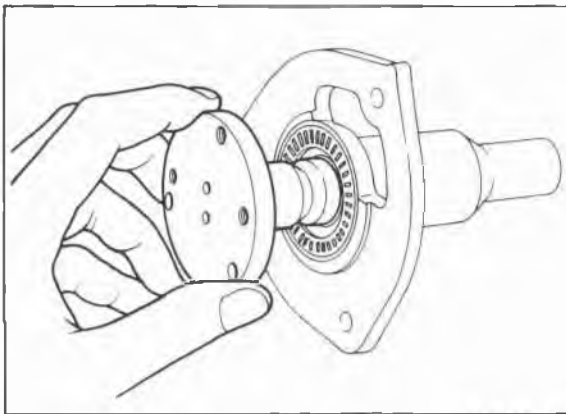
### Assembly

1. Install the seal rings onto the governor shaft.
2. Apply petroleum jelly to the bearing race to secure it; then install it onto the governor shaft.

**Bearing race outer diameter:  
47.0 mm (1.850 in)**

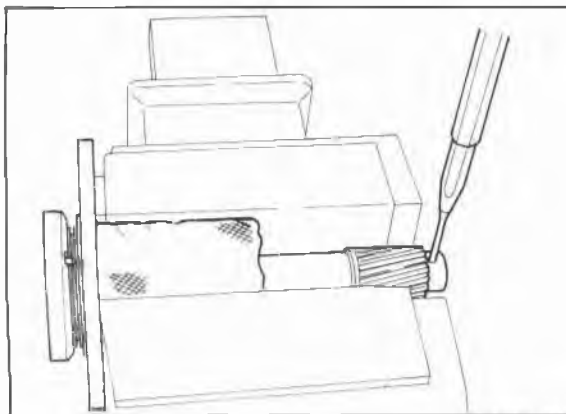
3. Apply petroleum jelly to the thrust bearing to secure it; then install it onto the sleeve.

**Thrust bearing outer diameter:  
46.9 mm (1.846 in)**



76G07C-193

4. Install the governor shaft into the sleeve.

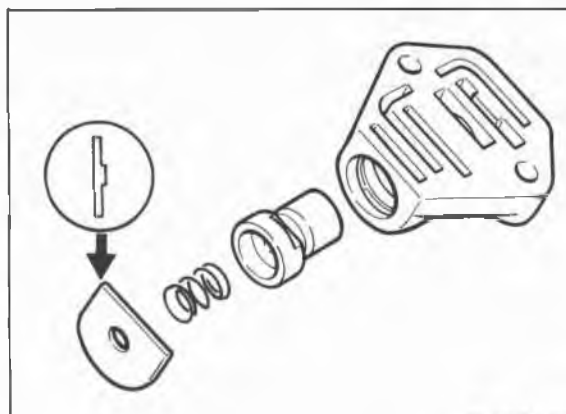


76G07C-194

5. Secure the governor in a vise; then install the governor driven gear with the roll pin.

**Note**

**Use protective plates in the vise to prevent damage to the governor.**

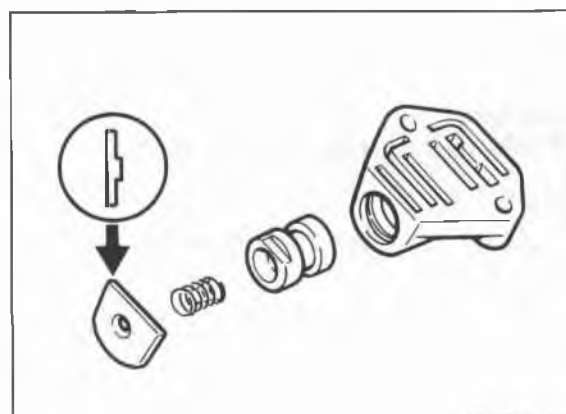


76G07C-195

6. Install the secondary governor valve and return spring; then install the retainer plate.

**Note**

**Install the retainer plate with the spring fit over the pin.**



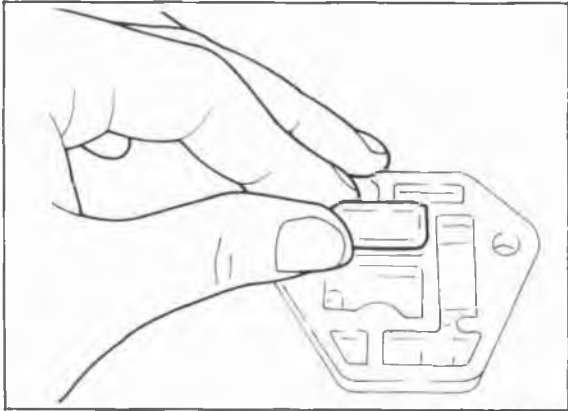
76G07C-196

7. Install the primary governor and return spring; then install the retainer plate.

**Note**

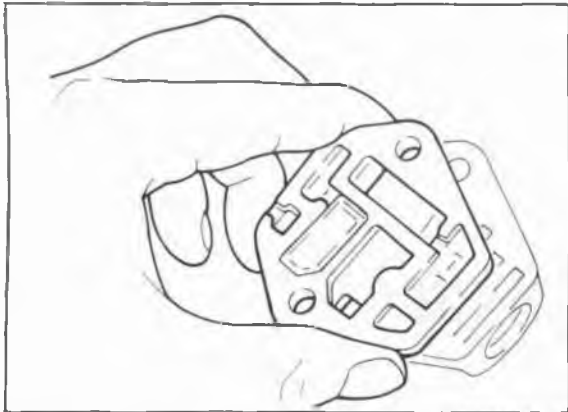
**Install the retainer plate with the spring fit over the pin.**

## 7C INSPECTION AND REPAIR



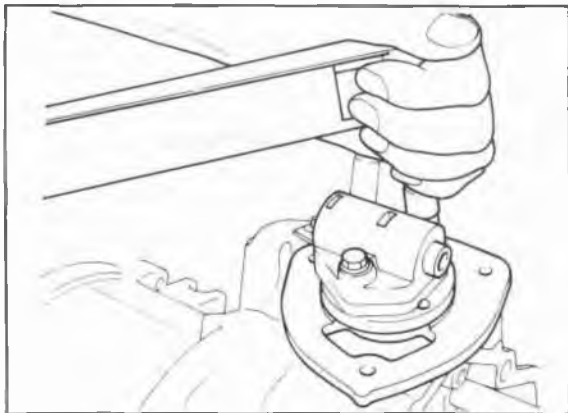
76G07C-197

8. Install the filter into the separate plate.



76G07C-198

9. Set the separate plate onto the governor body.



76G07C-199

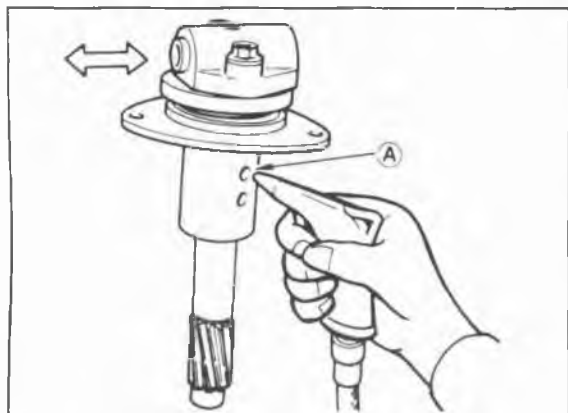
10. Secure the governor in the vise; tighten the governor body mounting bolts to the specified torque.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

**Note**

**Use protective plates in the vice to prevent damage to the governor.**



76G07C-200

11. Check that when compressed air is blown through port A, the valve functions (rattles).

**Air Pressure:**

**491 kPa (5.0 kg/cm<sup>2</sup>, 71 psi) max.**

**Caution**

**Apply air for no more than 5 seconds.**



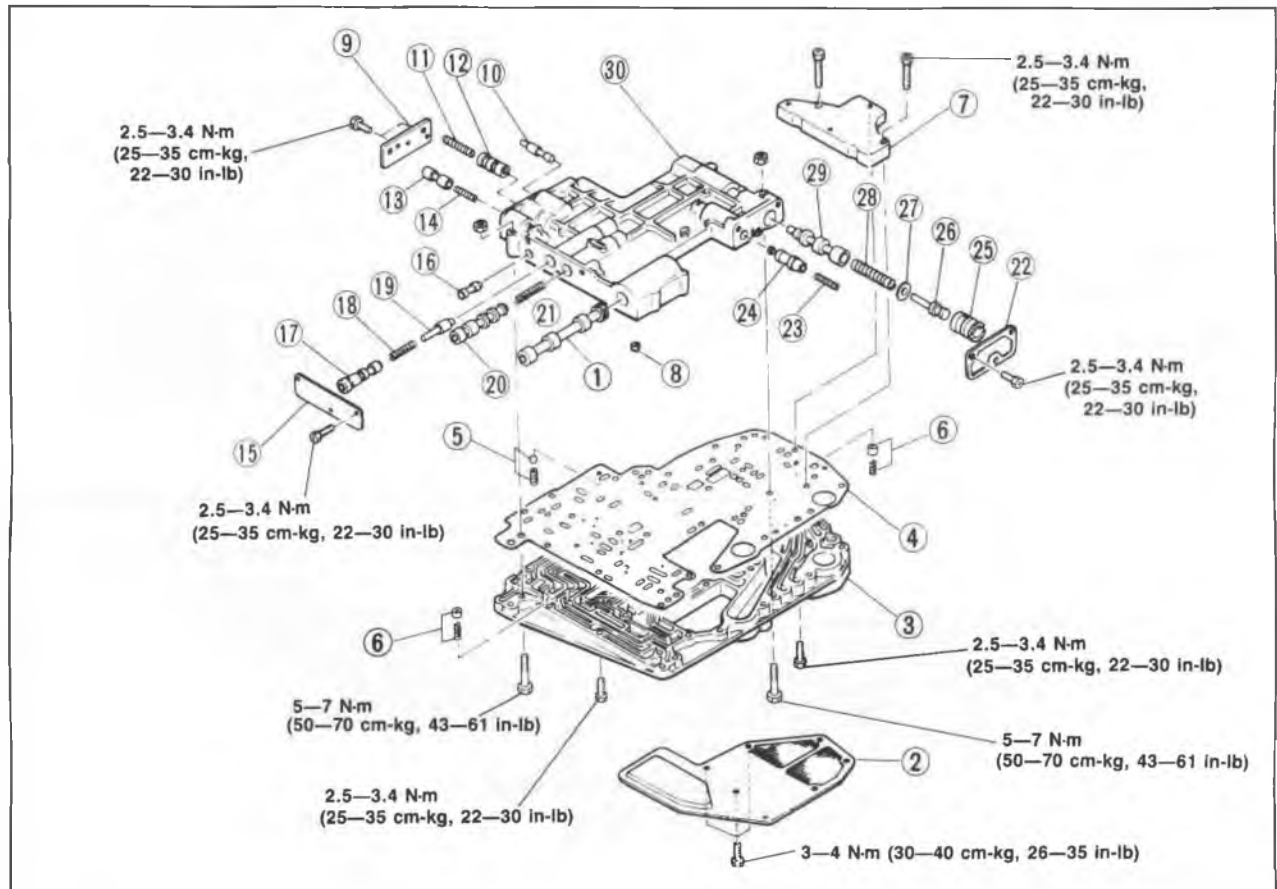
## CONTROL VALVE BODY

### Precaution

- (1) Pay close attention when handling the control valve because it consists of the most precise and delicate parts of the transaxle.
- (2) Neatly arrange the removed parts in order to avoid mixing up similar parts.
- (3) Disassemble the control valve assembly and thoroughly clean it when the clutch and/or brake bands are burned, and/or when the automatic transaxle fluid is degenerated.

### Disassembly

Disassemble in the sequence shown in the figure.



76G07C-201

- |                                    |                           |                               |
|------------------------------------|---------------------------|-------------------------------|
| 1. Manual valve                    | 10. Vacuum throttle valve | 21. Spring                    |
| 2. Oil strainer                    | 11. Spring                | 22. Side plate                |
| 3. Lower body                      | 12. Throttle backup valve | 23. Spring                    |
| 4. Separator plate                 | 13. Downshift valve       | 24. Second lock valve         |
| 5. Throttle relief ball and spring | 14. Spring                | 25. Pressure regulator sleeve |
| 6. Orifice check valve and spring  | 15. Side plate            | 26. Pressure regulator plug   |
| 7. Sub-body                        | 16. Modifier valve        | 27. Spring seat               |
| 8. Orifice check valve             | 17. 2-3 shift valve       | 28. Spring                    |
| 9. Side plate                      | 18. Spring                | 29. Pressure regulator valve  |
|                                    | 19. 2-3 shift plug        | 30. Upper body                |
|                                    | 20. 1-2 shift valve       |                               |

# 7C INSPECTION AND REPAIR

## Inspection

Check the following and replace any faulty parts.

1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

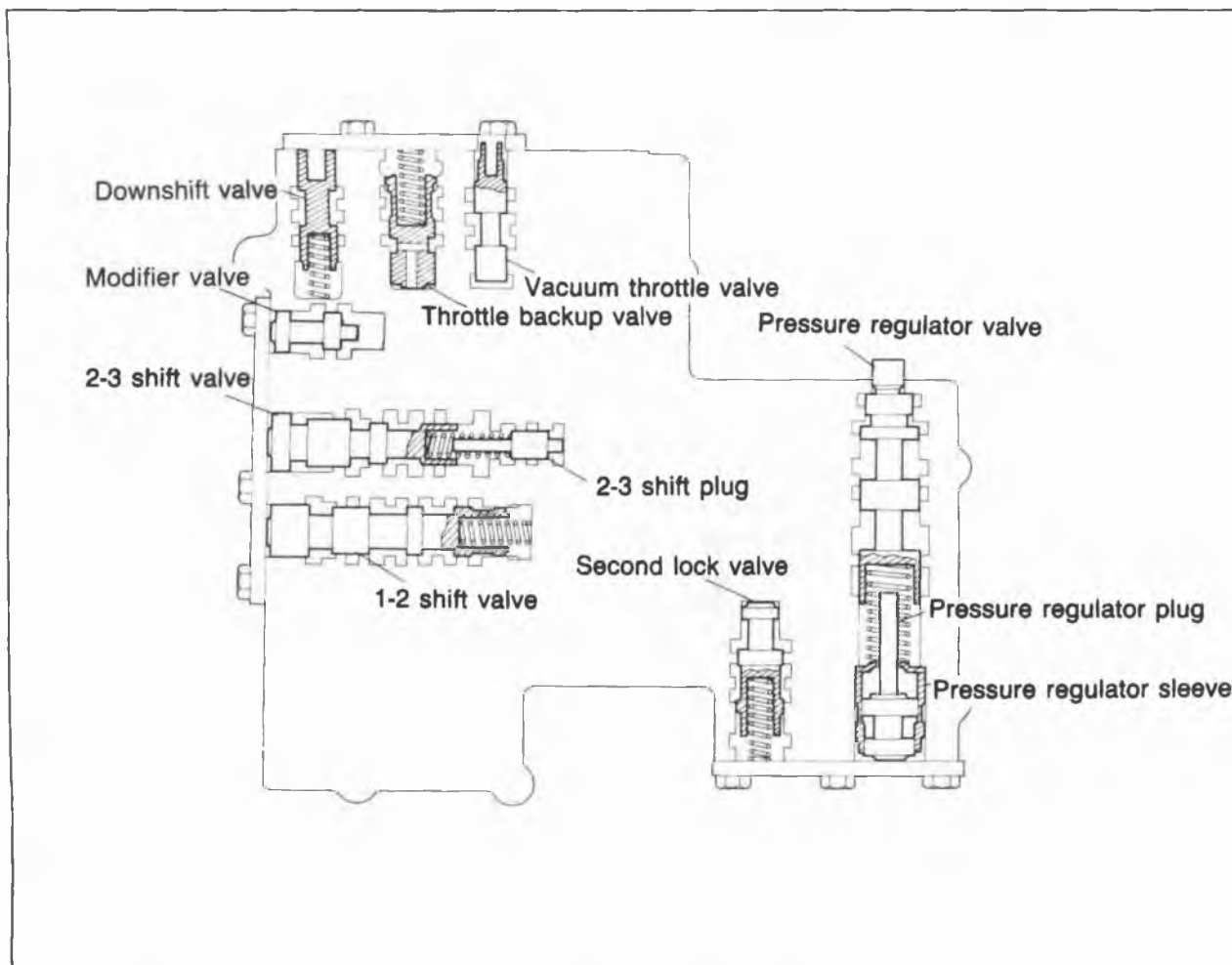
76G07C-202

## Spring

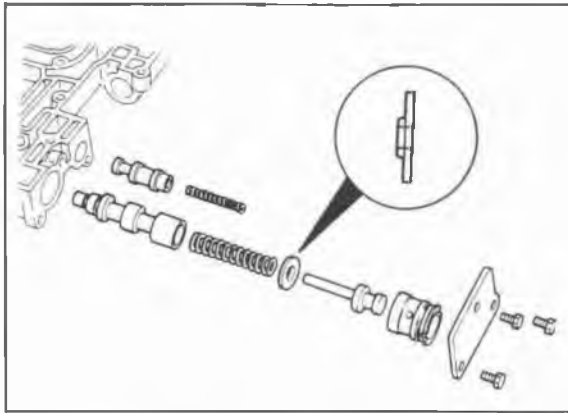
Name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)
Throttle backup	7.3 (0.287)	36.0 (1.417)	0.8 (0.031)
Downshift	5.55 (0.219)	21.9 (0.862)	0.55 (0.022)
2-3 shift	6.9 (0.272)	41.0 (1.614)	0.7 (0.028)
1-2 shift	6.4 (0.252)	31.63 (1.245)	0.4 (0.016)
Second lock	5.55 (0.219)	33.5 (1.319)	0.55 (0.022)
Pressure regulator	11.7 (0.461)	43.0 (1.693)	1.2 (0.047)
Throttle relief	7.0 (0.276)	11.2 (0.441)	0.9 (0.035)
Orifice check	5.0 (0.197)	15.5 (0.610)	0.23 (0.009)

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## Valve Location



63U07B-500



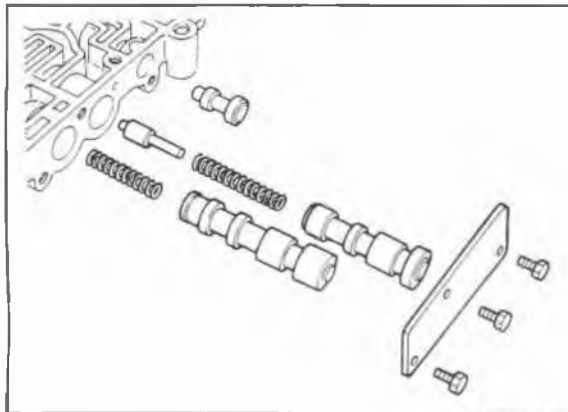
76G07C-204

### Assembly

1. Install the pressure regulator valve, spring, spring seat, pressure regulator plug, and pressure regulator sleeve.
2. Install the second lock valve and spring.
3. Install the side plate.

### Tightening torque:

**2.5—3.4 Nm (25—35 cm-kg, 22—30 in-lb)**

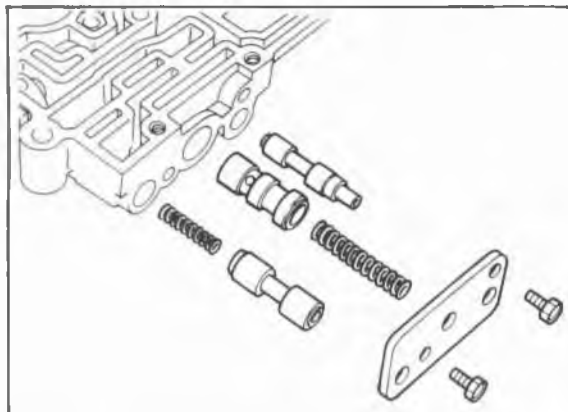


76G07C-205

4. Install the 1-2 shift spring, and valve.
5. Install the 2-3 shift plug, spring, and 2-3 shift valve.
6. Install the modifier valve.
7. Install the side plate.

### Tightening torque:

**2.5—3.4 Nm (25—35 cm-kg, 22—30 in-lb)**

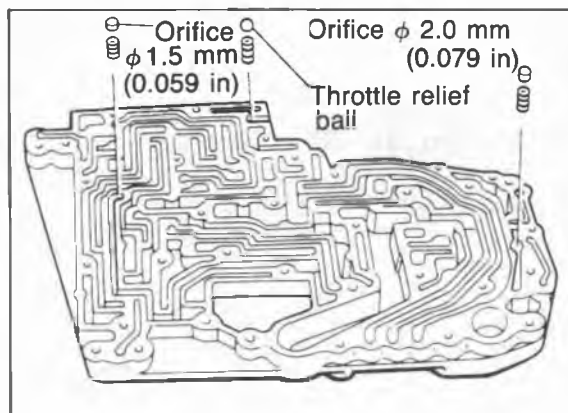


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8. Install the downshift spring, and valve.
9. Install the throttle backup valve and spring.
10. Install the vacuum throttle valve.
11. Install the side plate.

### Tightening torque:

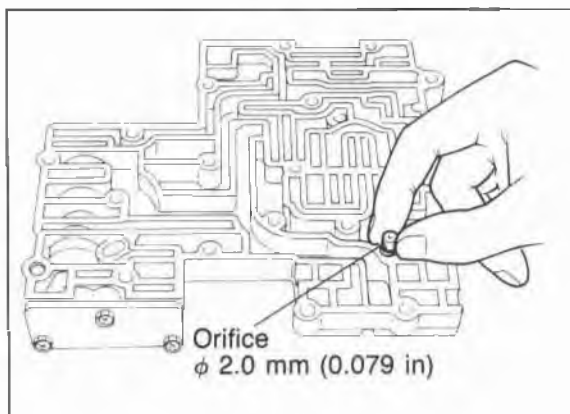
**2.5—3.4 Nm (25—35 cm-kg, 22—30 in-lb)**



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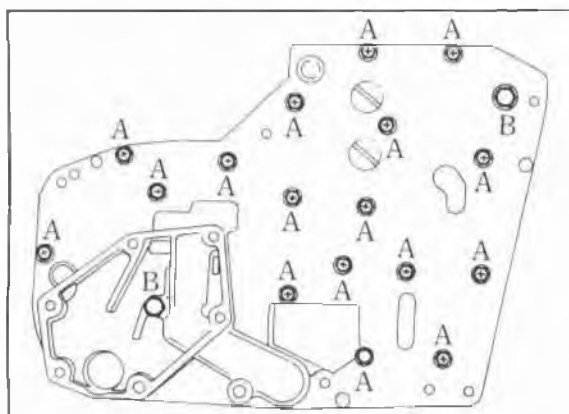
12. Install the orifice check valves ( $\phi$ 2.0 mm, (0.079 in), 1.5 mm (0.059 in) ) and springs, and throttle relief ball and spring in the lower body as shown.

## 7C INSPECTION AND REPAIR



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13. Install the orifice check valve ( $\phi 2.0$  mm (0.079 in)) in the upper body as shown.

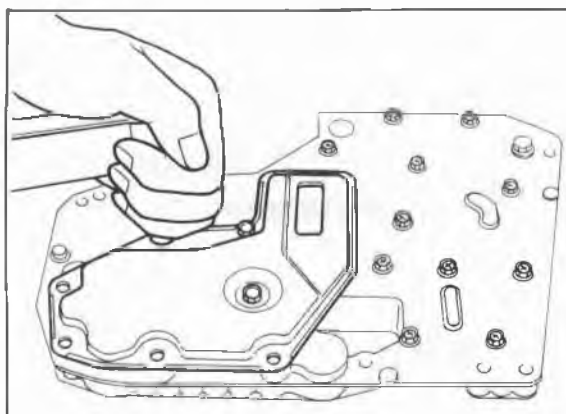


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14. Install the separator plate on the lower body, and hold it with clips; then install them onto the upper body.
15. Tighten the mounting bolts to the specified torque.

**Tightening torque:**

**A: 2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**  
**B: 5—7 N·m (50—70 cm·kg, 43—61 in·lb)**

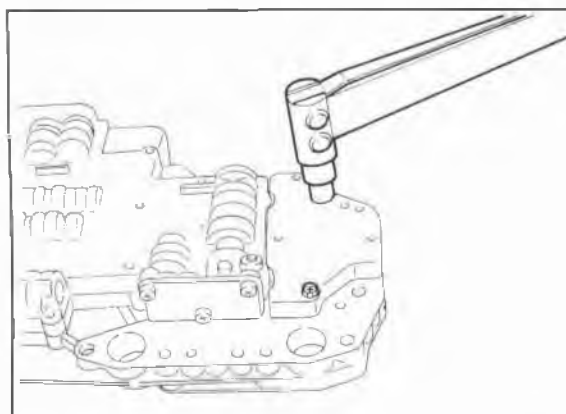


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16. Install the oil strainer.

**Tightening torque:**

**3—4 N·m (30—40 cm·kg, 26—35 in·lb)**



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17. Turn the valve body assembly over, and install the sub-body.

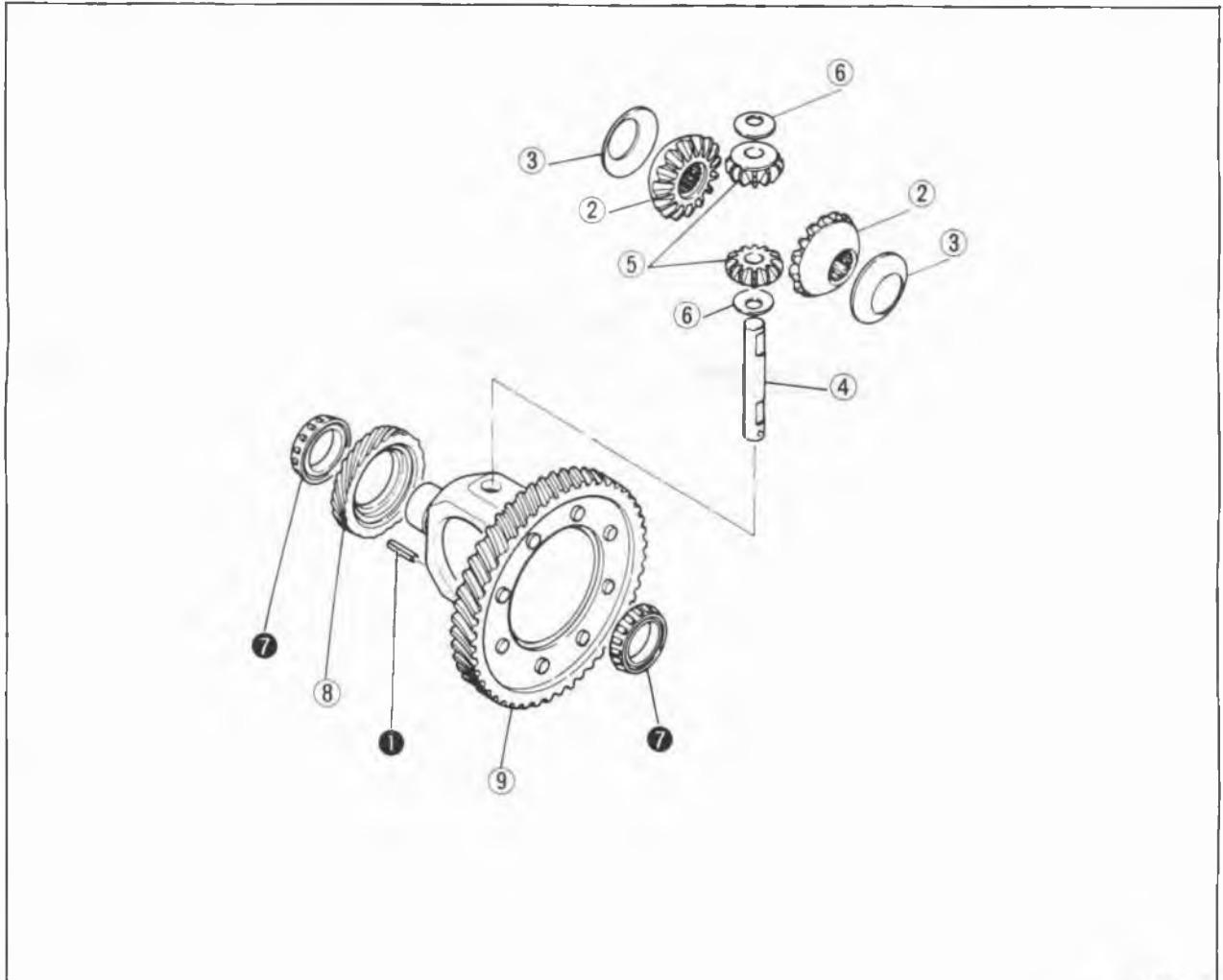
**Tightening torque:**

**2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**

18. Install the manual valve.

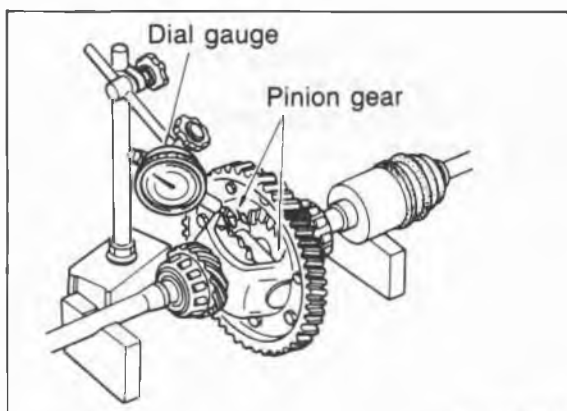
## DIFFERENTIAL Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.



76G07C-212

- |                            |                                     |
|----------------------------|-------------------------------------|
| 1. Roll pin                | 6. Pinion gear thrust washer        |
| 2. Side gear               | 7. Side bearing inner race          |
| 3. Side gear thrust washer | 8. Speedometer drive gear           |
| 4. Pinion shaft            | 9. Ring gear and gear case assembly |
| 5. Pinion gear             |                                     |



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### Disassembly note Checking backlash

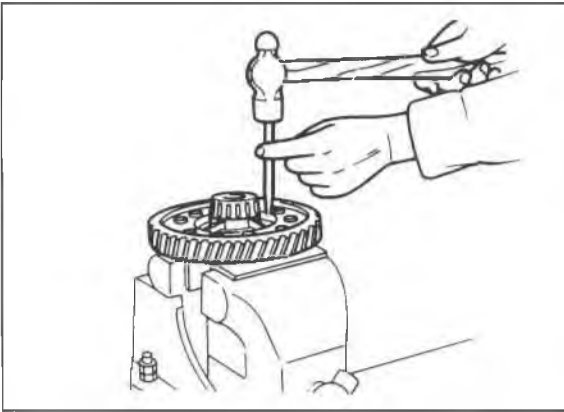
Before disassembly, measure the backlash of the side gears and pinion gears. If not within specification, replace the differential assembly.

#### Backlash:

**Standard 0.025—0.1 mm (0.001—0.004 in)**

**Maximum 0.5 mm (0.020 in)**

## 7C INSPECTION AND REPAIR



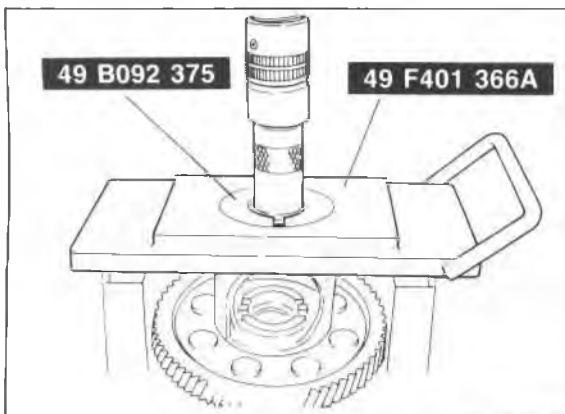
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### Roll pin

To remove the roll pin from the pinion shaft, place the gear case on a vise and knock the pin out with a suitable pin punch ( $\phi 4.0$  mm (0.157 in) ) and hammer.

### Note

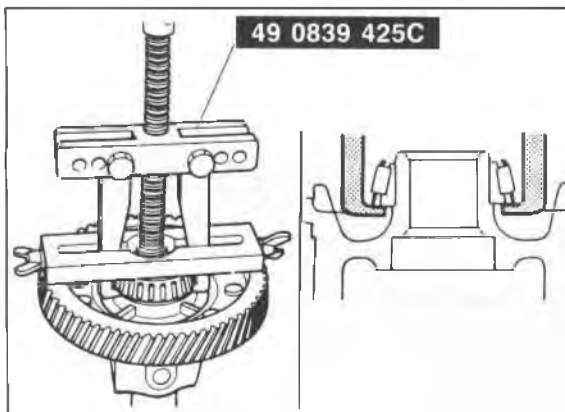
- a) Use the protective plates in the vise to prevent damage to the differential.
- b) Insert the punch into the roll pin hole from the ring gear side.



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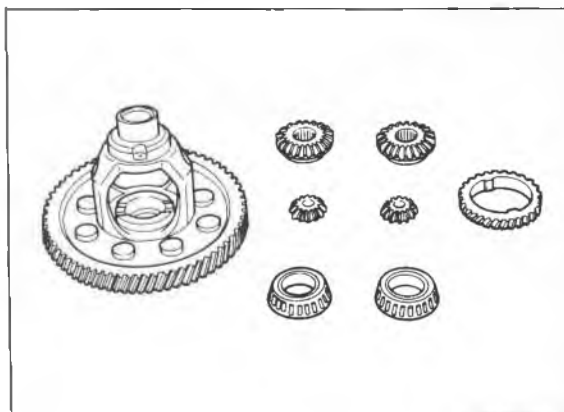
### Side bearing inner race

1. Remove the side bearing inner race (side opposite the ring gear) from the gear case with the **SST**.



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2. Remove the side bearing inner race (ring gear side) with a combination of parts from the **SST**.

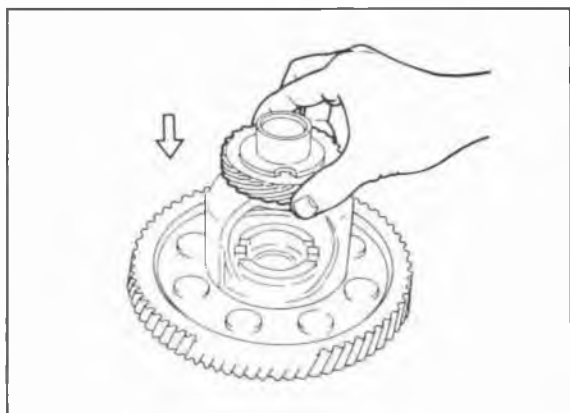


86U07B-327

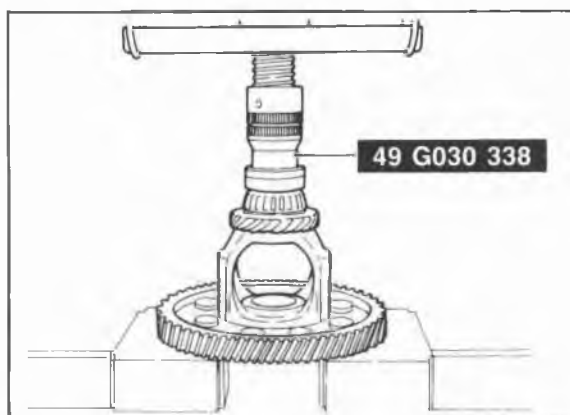
### Inspection

Check the following and replace any faulty parts.

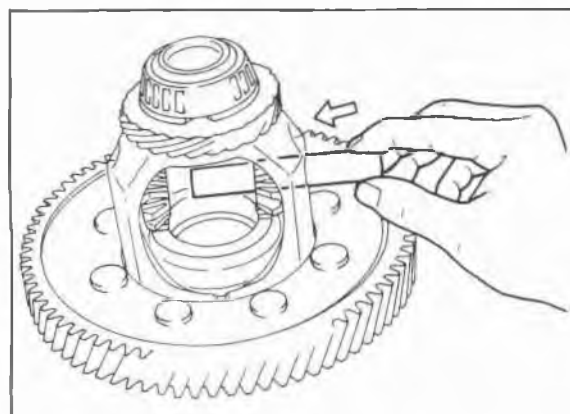
1. Damaged or worn gears
2. Cracked or damaged gear case
3. Damaged bearings



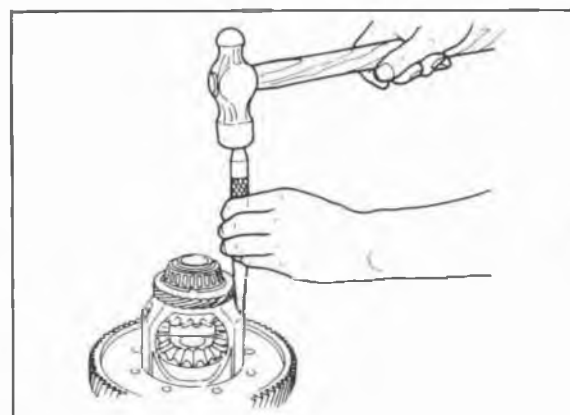
86U07B-328



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## Assembly

1. Set the speedometer drive gear onto the ring gear and case assembly.

2. Install the side bearing inner races.

(1) Press the side bearing inner race (side opposite the ring gear) onto the ring gear and case assembly with the **SST**.

(2) Press on the other side bearing inner race (ring gear side) in the same manner.

### Caution

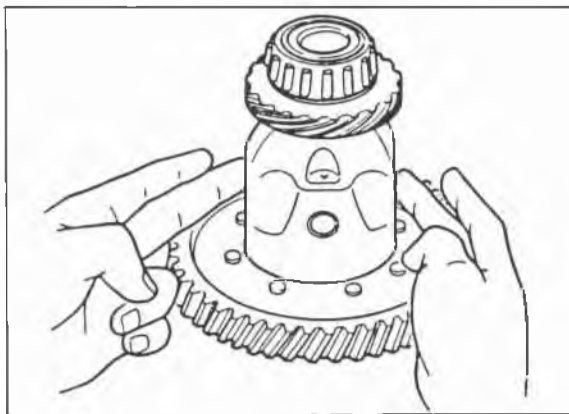
**Do not reuse the bearings if they were removed.**

3. Install the pinion gears and thrust washers into the case.

4. Install the pinion shaft.

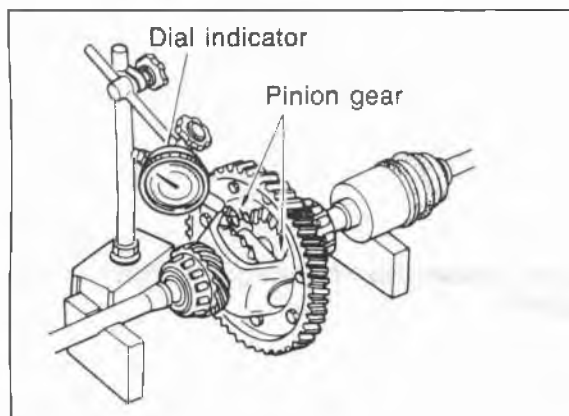
5. Install the roll pin, and make a crimp so that it will not come out of the gear case.

## 7C INSPECTION AND REPAIR



86U07B-332

6. Install the thrust washers and side gears into the gear case at the same time, then turn them back on the pinion gear and align them with the pinion shaft hole.



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7. Check and adjust the backlash of the side gears and pinion gears as follows:
  - (1) Install the left and right driveshafts in the differential assembly.
  - (2) Support the driveshafts on V-blocks.
  - (3) Measure the backlash of both pinion gears.

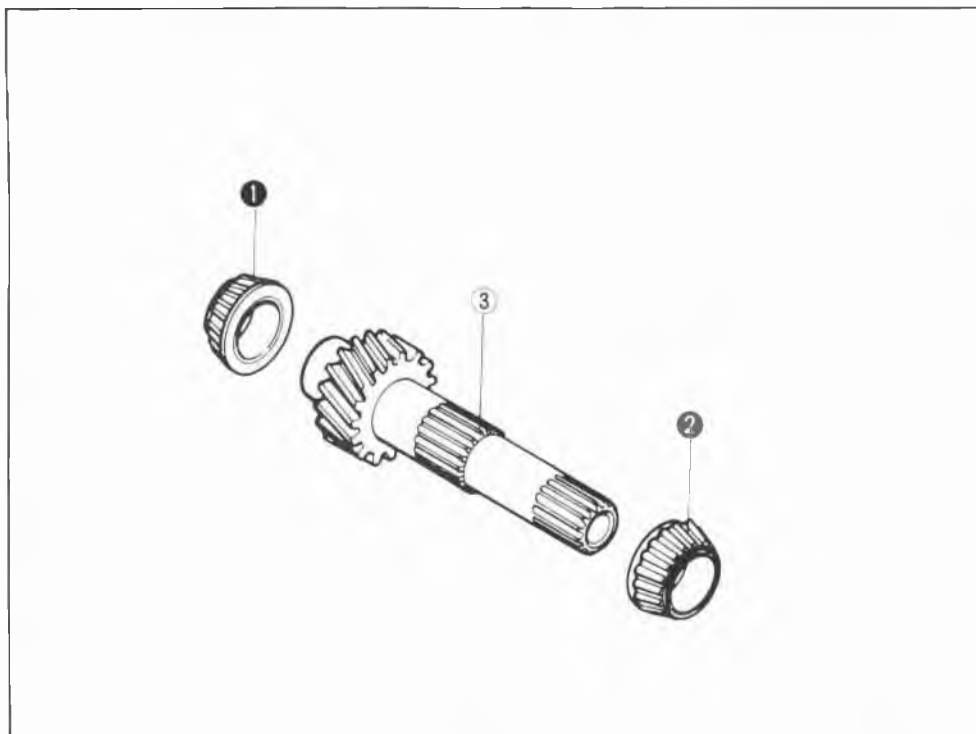
### Backlash:

**Standard 0.025—0.1 mm (0.001—0.004 in)**  
**Maximum 0.5 mm (0.020 in)**

8. If the backlash is not within specification, place the differential assembly.

### OUTPUT GEAR Disassembly

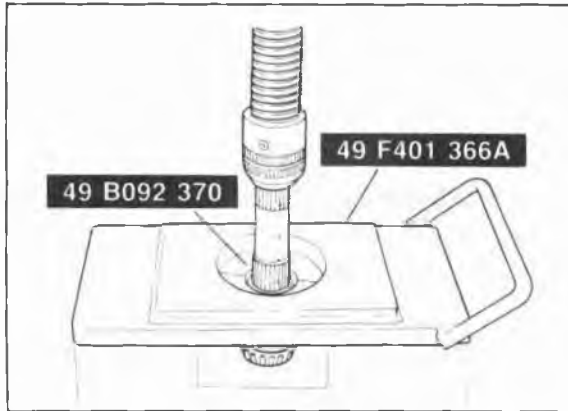
Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.



76G07C-214

1. Output gear bearing
2. Output gear bearing
3. Output gear





76G07C-215

### Disassembly note

#### Output gear bearings

Remove the output gear bearings from the output gear with the **SST**.

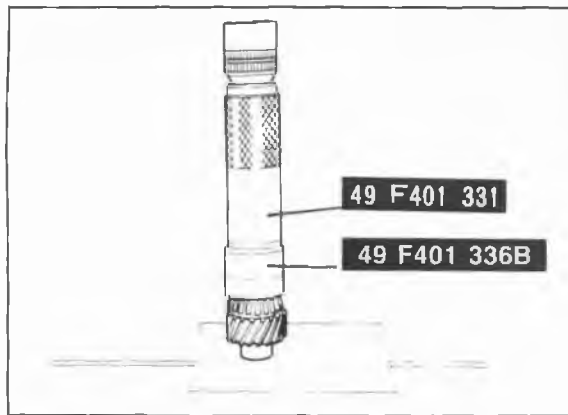
#### Caution

**Hold the output gear with one hand so that it does not fall.**

#### Inspection

Check the following and replace any faulty parts.

1. Damaged or worn output gear
2. Damaged bearing



86U07B-336

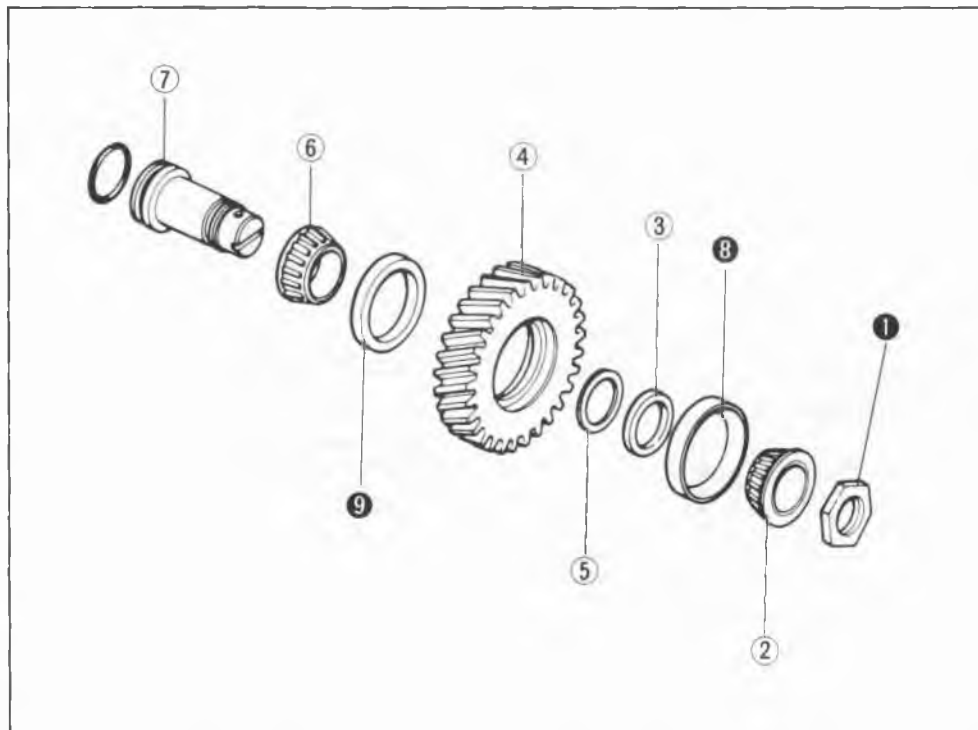
#### Assembly

1. Press the output gear bearings onto the output gear with the **SST**.

## IDLE GEAR

### Disassembly

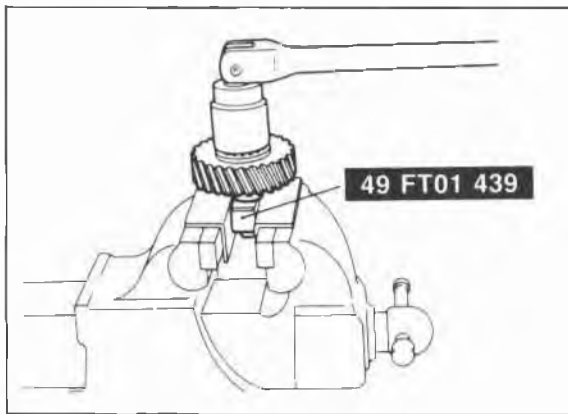
Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.



76G07C-216

1. Locknut
2. Idle gear bearing
3. Spacer
4. Idle gear
5. Adjust shim
6. Idle gear bearing
7. Idle shaft
8. Bearing outer race
9. Bearing outer race

## 7C INSPECTION AND REPAIR



76G07C-217

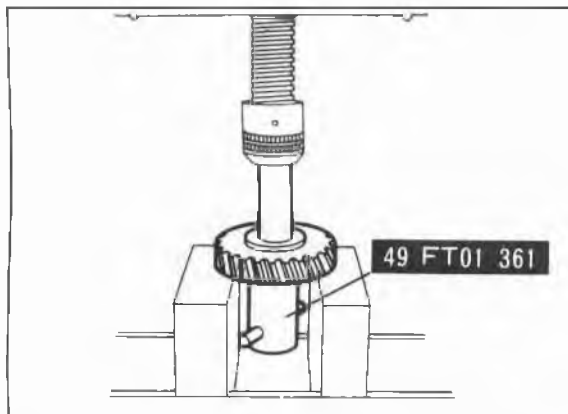
### Disassembly note

#### Locknut

Secure the idle shaft in a vise with the **SST**; then remove the locknut.

#### Note

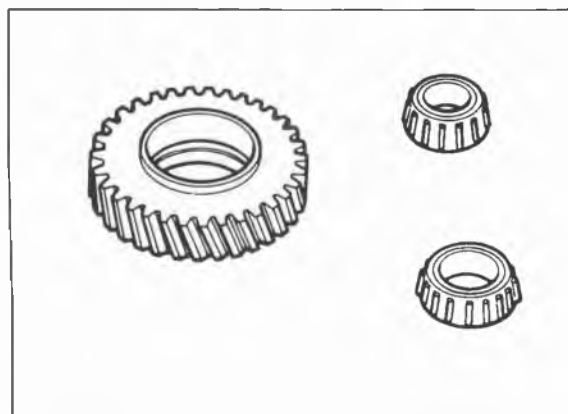
Use the protective plates in the vise to prevent damage to the **SST**.



86U07B-339

### Bearing outer race

Remove the bearing outer race from the idle gear with the **SST**.

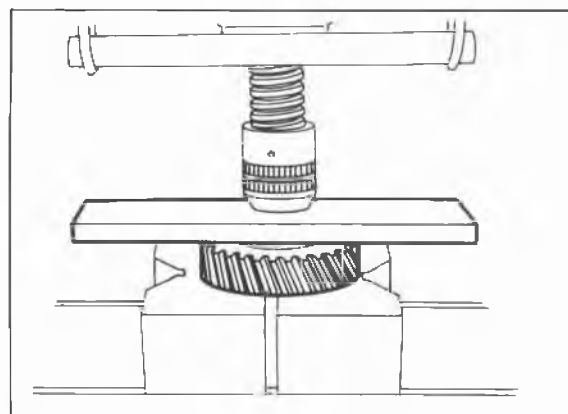


86U07B-340

### Inspection

Check the following and replace any faulty parts.

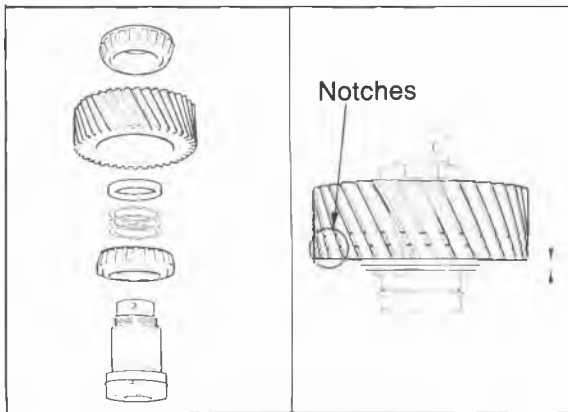
1. Damaged or worn idle gear
2. Damaged or worn bearing



86U07B-341

### Assembly

1. Press the bearing outer races in with the **SST**.



76G07C-218

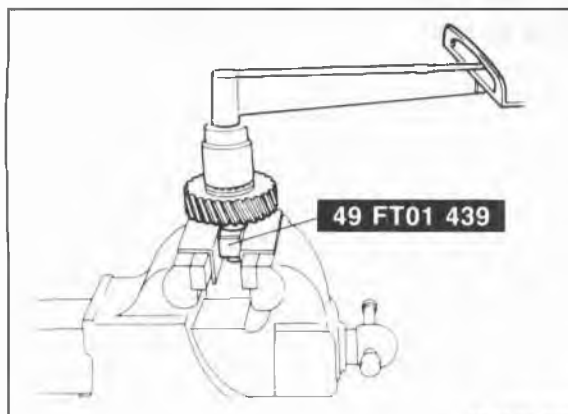
2. Install the idle gear bearing onto the idle shaft, then install the idle gear, adjust shim, spacer, and bearing.

**Note**

Install the idle gear with the notches in the teeth facing as shown.

FE engine: 2 notches

F6 engine: 3 notches



76G07C-219

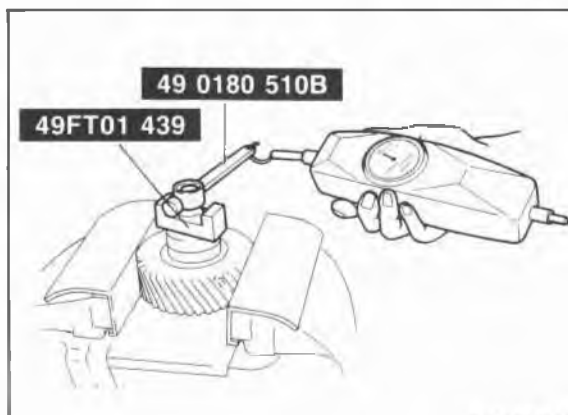
3. Secure the idle shaft in a vise with the **SST**; then tighten the locknut to the lower limit of the tightening torque.

**Tightening torque:**

128 N·m (13 m·kg, 94 ft·lb)

**Note**

Use the protective plates in the vise to prevent damage to the **SST**.



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4. Check and adjust the idle gear bearing preload.
  - (1) Turn the idle gear assembly and **SST** over, and secure the gear in the vise.

**Note**

Use protective plates in the vise to prevent damage to the idle gear.

- (2) Attach the **SST** and spring scale or a torque wrench, and measure the preload while tightening the locknut.

**Tightening torque:**

128—177 N·m (13—18 m·kg, 94—130 ft·lb)

**Preload:**

0.03—0.9 N·m

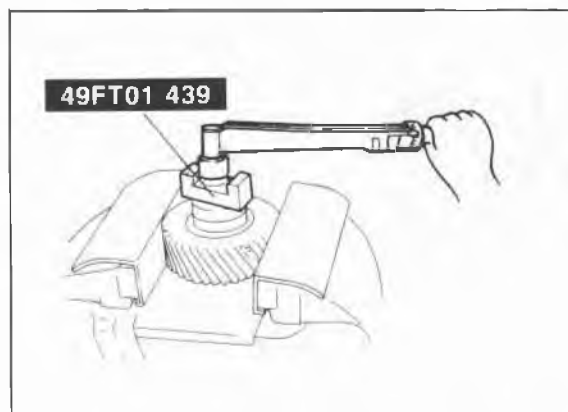
(0.3—9.0 cm·kg, 0.26—7.8 in·lb)

**Value indicated on pull scale:**

0.3—9 N (0.03—0.9 kg, 0.066—1.98 lb)

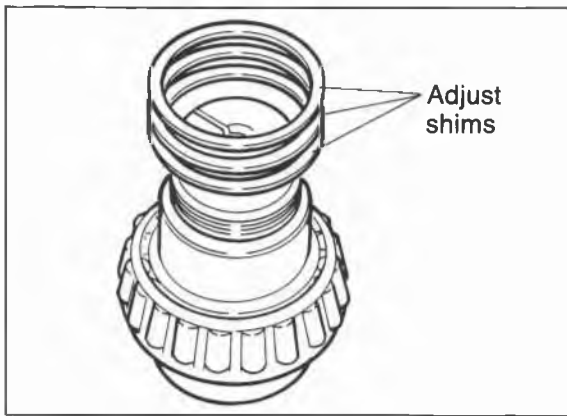
**Note**

Read the preload when the idle shaft starts to turn.



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## 7C INSPECTION AND REPAIR



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5. If the specified preload can not be obtained within the specified tightening torque, adjust it by selecting the proper adjust shims.

Thickness of shim
0.10 mm (0.004 in)
0.12 mm (0.005 in)
0.14 mm (0.006 in)
0.16 mm (0.0063 in)
0.20 mm (0.008 in)
0.50 mm (0.020 in)

### Note

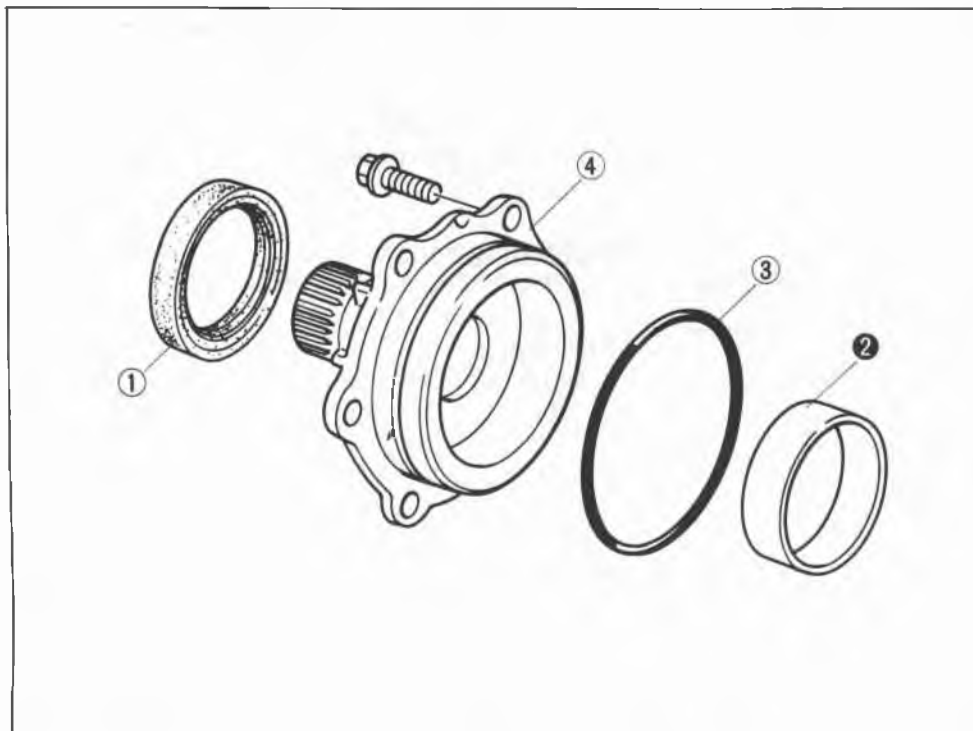
a) The maximum allowable number of shims is 7.

b) Preload is reduced by increasing the thickness of the shims, or increased by reducing the thickness of the shims.

## BEARING COVER ASSEMBLY

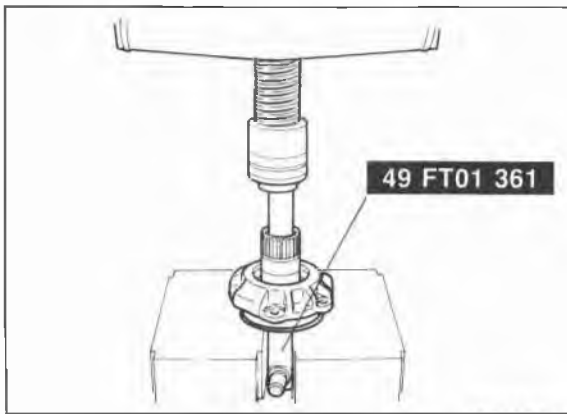
### Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked part.



1. Oil seal
2. Bearing outer race
3. O-ring
4. Bearing cover

76G07C-222



76G07C-223

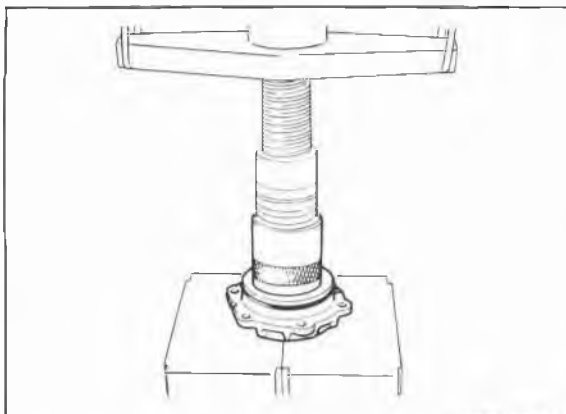
**Disassembly note**  
**Bearing outer race**

Remove the bearing outer race with the **SST**.

**Inspection**

Check the following and replace any faulty parts.

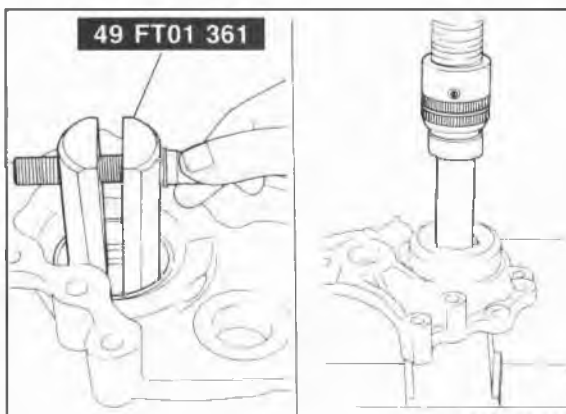
1. Damaged bearing cover
2. Damaged or worn bushing



76G07C-224

**Assembly**

1. Press the bearing outer race into the cover.
2. Press the oil seal into the cover.



76G07C-225

**BEARING HOUSING**

**Disassembly**

Remove the bearing outer race with the **SST**.

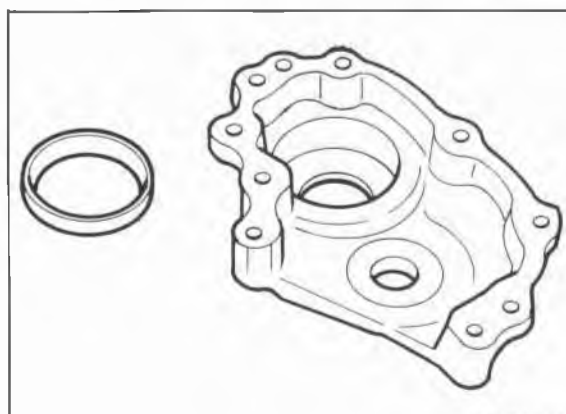
**Note**

**Install the bearing outer race during reassembly of the transaxle to adjust the preload.**

**Inspection**

Check the following and replace any faulty parts.

1. Damaged bearing housing
2. Damaged bearing outer race



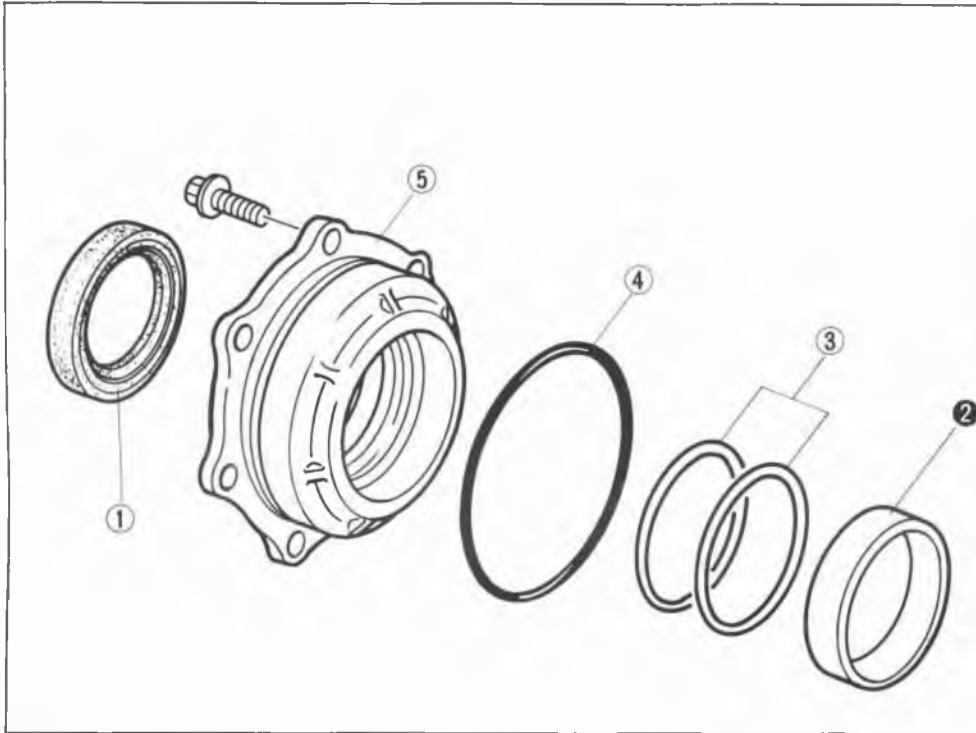
86U07B-351

# 7C INSPECTION AND REPAIR

## SIDE BEARING HOUSING

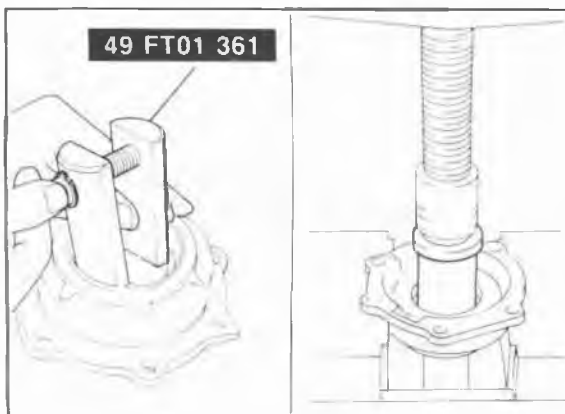
### Disassembly

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked part.



76G07C-226

1. Oil seal
2. Bearing outer race
3. Adjust shim
4. O-ring
5. Side bearing housing cover



76G07C-227

### Disassembly note Bearing outer race

Remove the bearing outer race with the **SST**.

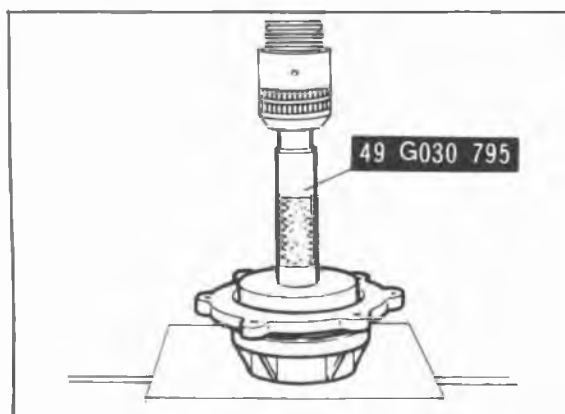
### Note

**Install the bearing outer race during reassembly of the transaxle to adjust the preload.**

### Inspection

Check the following and replace any faulty parts.

1. Damaged side bearing housing cover
2. Damaged or worn bushing



76G07C-228

### Assembly

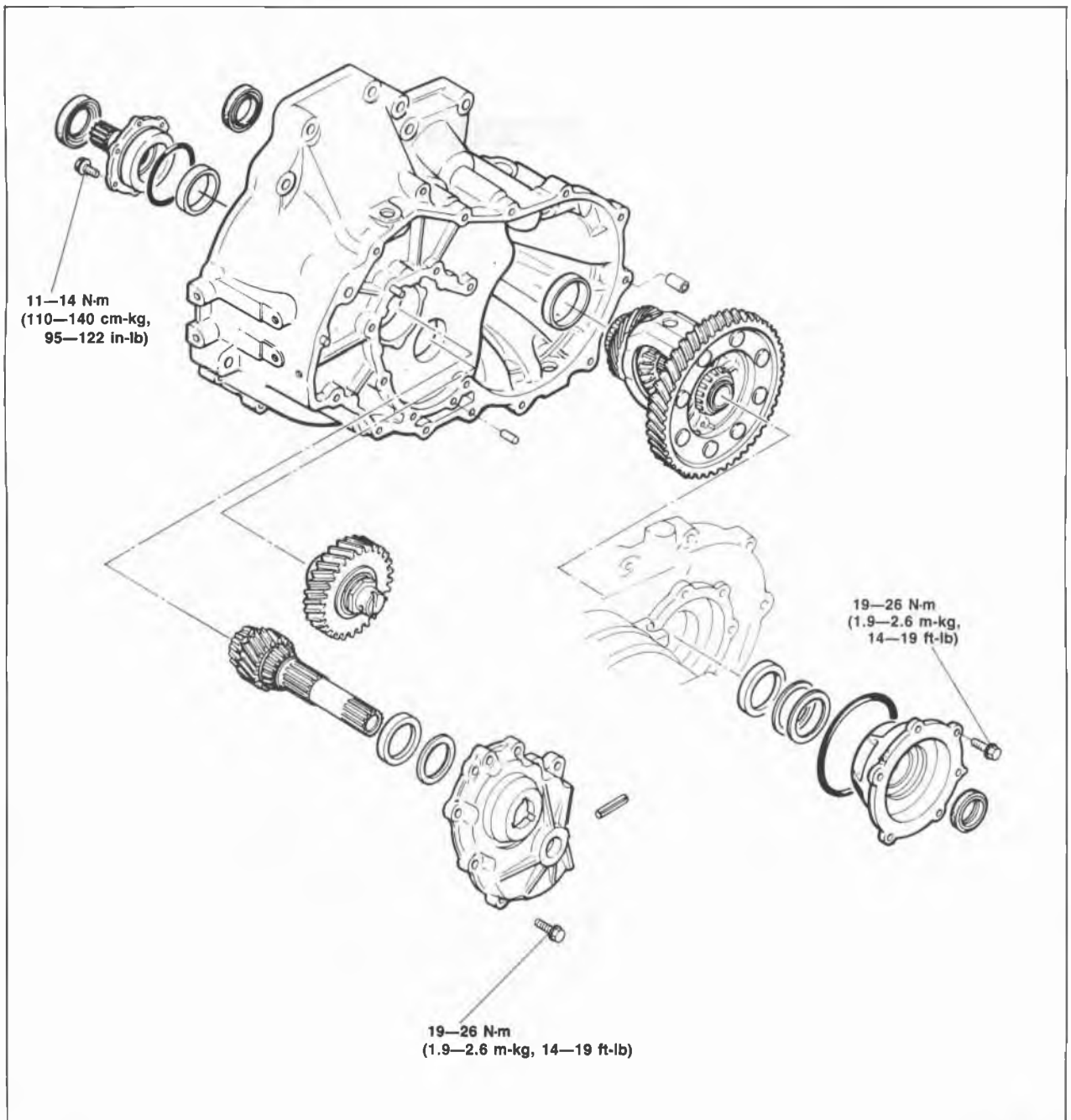
1. Press the oil seal into the cover with the **SST**.

## ASSEMBLY

### PRECAUTION

- (1) The automatic transaxle consists of high-precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
- (2) Clean out oil holes and oil passages with compressed air, and check that there are no obstructions.
- (3) Before assembly, apply ATF to each O-ring, seal ring, rotating part, and friction part.
- (4) If the brake band or drive plates are replaced with new ones, soak them in ATF for at least 2 hours before installing.
- (5) Each seal gasket and O-ring must be replaced with a new one.
- (6) Be sure to install all thrust bearings and races in the correct direction and position.

### ASSEMBLY—STEP 1 Torque Specifications



76G07C-229

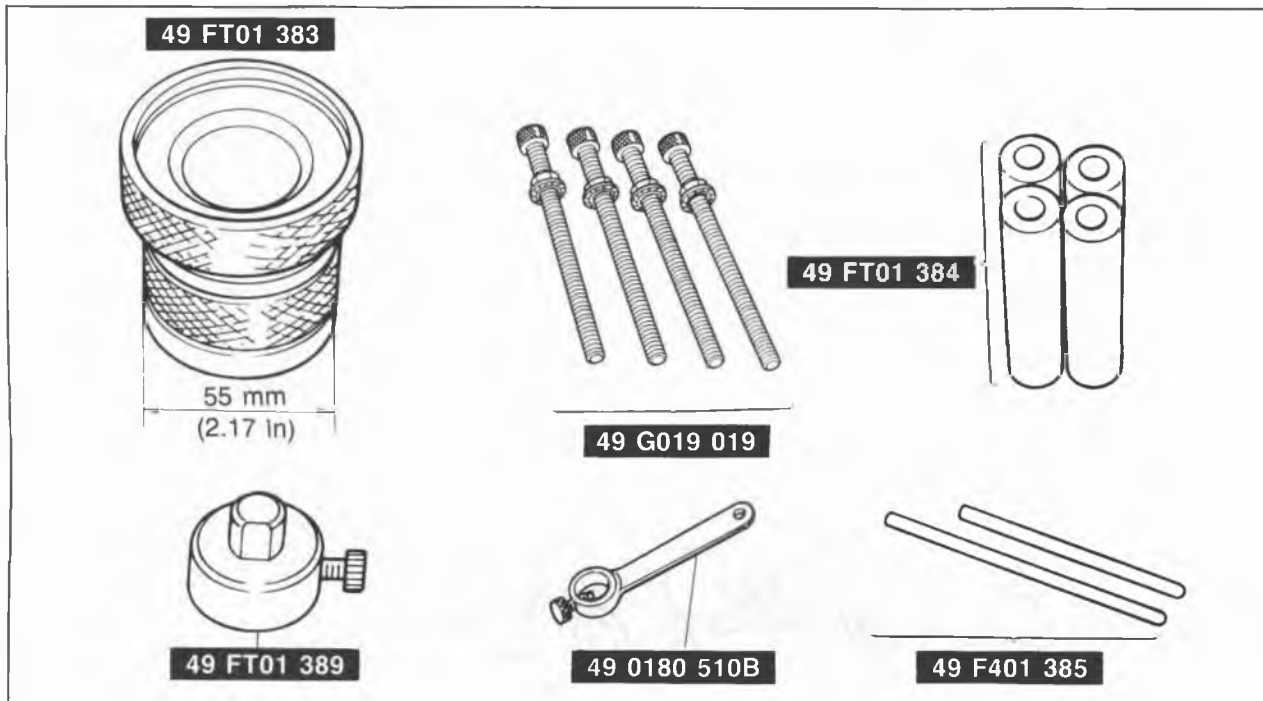
# 7C ASSEMBLY

## Procedure

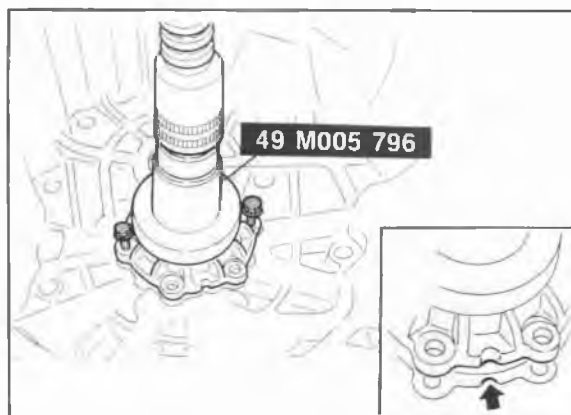
1. Adjust the preload of the output gear bearing and select the adjust shim(s) as described below.

## Note

To adjust the preload, use the SST shown below.



83U07B-367

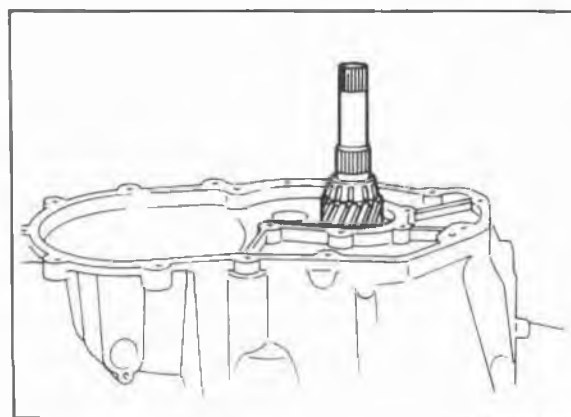


76G07C-230

- (1) Align the matching mark as shown; then press the bearing cover in with the **SST** after aligning it with guide bolts as shown.

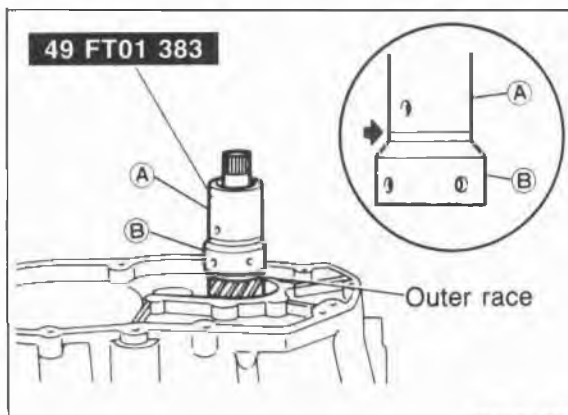
**Tightening torque: 11—14 N·m  
(110—140 cm·kg, 95—122 in·lb)**

- (2) Mount the converter housing onto the trans-axle hanger.



- (3) Remove the bearing outer race and adjust shims from the bearing housing. (Refer to page 7C—87.)
- (4) Set the output gear assembly into the converter housing.

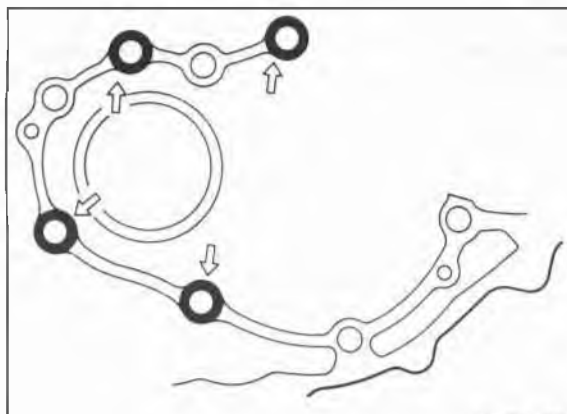




76G07C-232

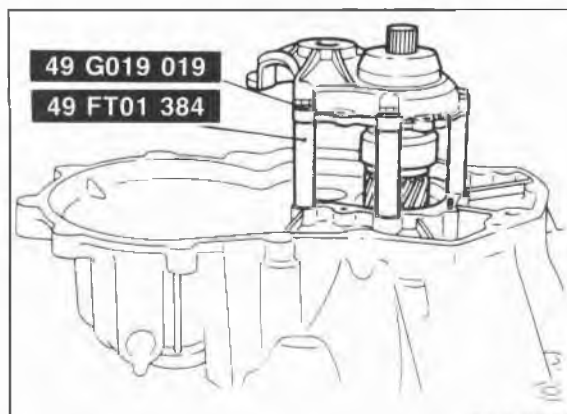
- (5) Install the outer race removed in step (3) to the **SST**; then mount them on the output gear assembly.

**Caution**  
Eliminate the gap (arrow) by turning A or B of the selector.



76G07C-233

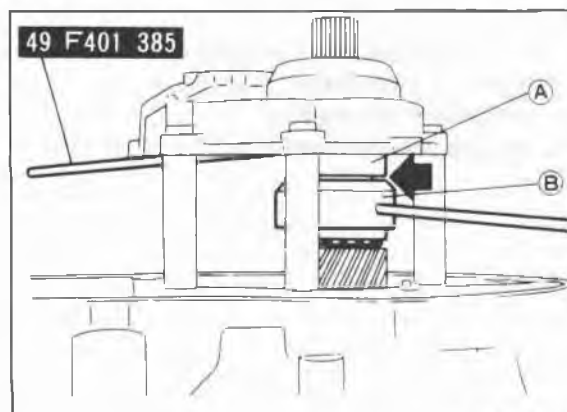
- (6) Set the four **SST** on the converter housing in the positions shown.



76G07C-234

- (7) Set the bearing housing on the **SST** (selector) and install the four **SST** (bolts); then tighten them to the specified torque.

**Tightening torque:**  
19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

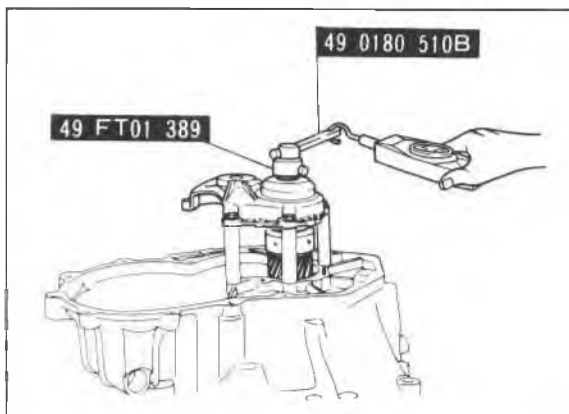


76G07C-235

- (8) Turn the **SST** (selector) to increase the clearance (indicated by the arrow) with the **SST** (bars) until it no longer turns.

**Note**  
This is to seat the bearing.

- (9) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

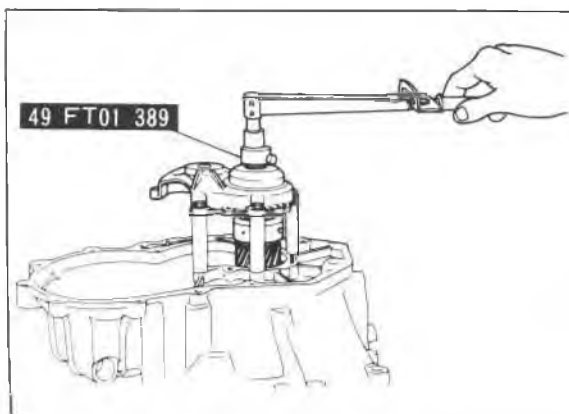


76G07C-236

- (10) Mount the **SST** and pull scale or torque wrench on the output gear.
- (11) Increase the clearance between A and B to obtain the specified preload/pull scale reading.

**Preload: 0.5—0.9 N·m**  
**(5.0—9.0 cm·kg, 4.34—7.81 in·lb)**  
**Reading on pull scale: 5—9 N**  
**(0.5—0.9 kg, 1.1—1.98 lb)**

**Note**  
**Read the preload when the output gear starts to turn.**



83U07B-375

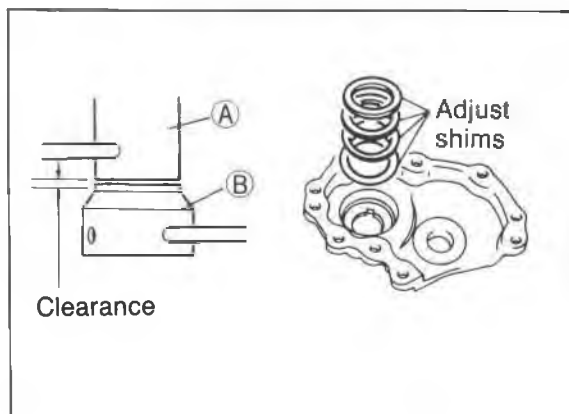
- (12) Measure the clearance. Select adjust shim(s) equivalent to the measured clearance.

Thickness of shim	
0.10 mm (0.004 in)	0.16 mm (0.0063 in)
0.12 mm (0.005 in)	0.20 mm (0.008 in)
0.14 mm (0.006 in)	0.50 mm (0.020 in)

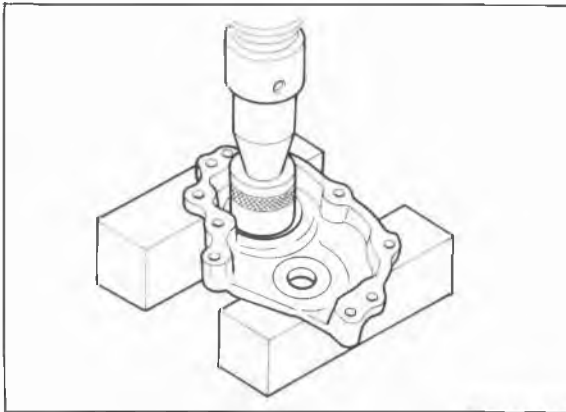


76G07C-237

- Caution**
- a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
  - b) The maximum allowable number of shims is 7.

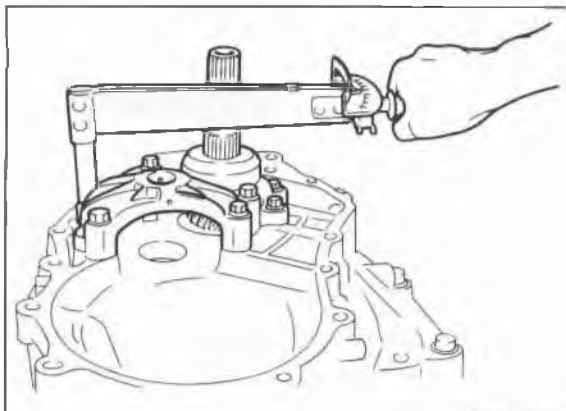


83U07B-377



76G07C-238

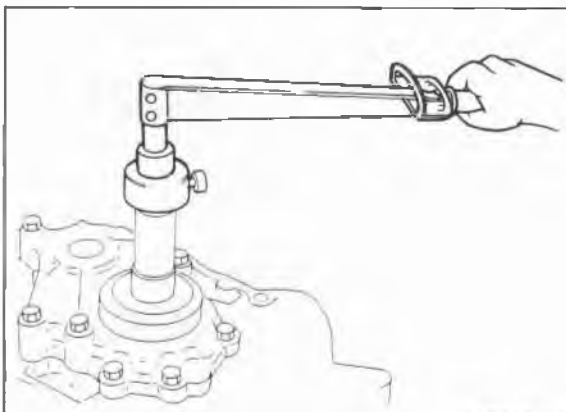
- (13) Remove the bearing housing and **SST**.
- (14) Install the required shim(s) and press the bearing race into the bearing housing with a suitable pipe.



76G07C-239

- (15) Install the bearing housing.

**Tightening torque:**  
**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

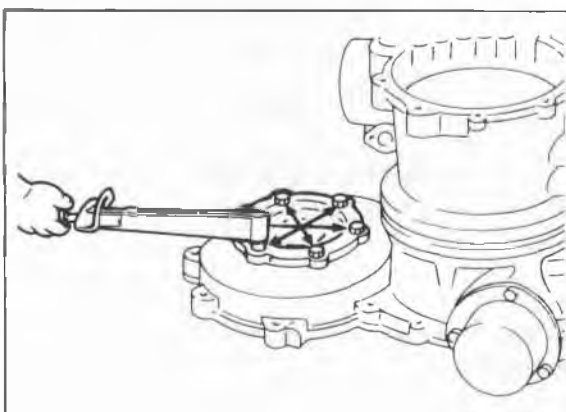


76G07C-240

- (16) Check that the preload/pull scale reading is within specification. If not within specification return to step (3).

**Preload: 0.03—0.9 N·m**  
**(0.3—9.0 cm·kg, 0.26—7.81 in·lb)**  
**Reading on pull scale:**  
**0.3—9 N (0.03—0.9 kg, 0.066—1.98 lb)**

- (17) Remove the bearing housing and output gear assembly.



76G07C-241

- 2. Mount the side bearing housing to transaxle case by gradually tightening the mounting bolts in a diagonal pattern.

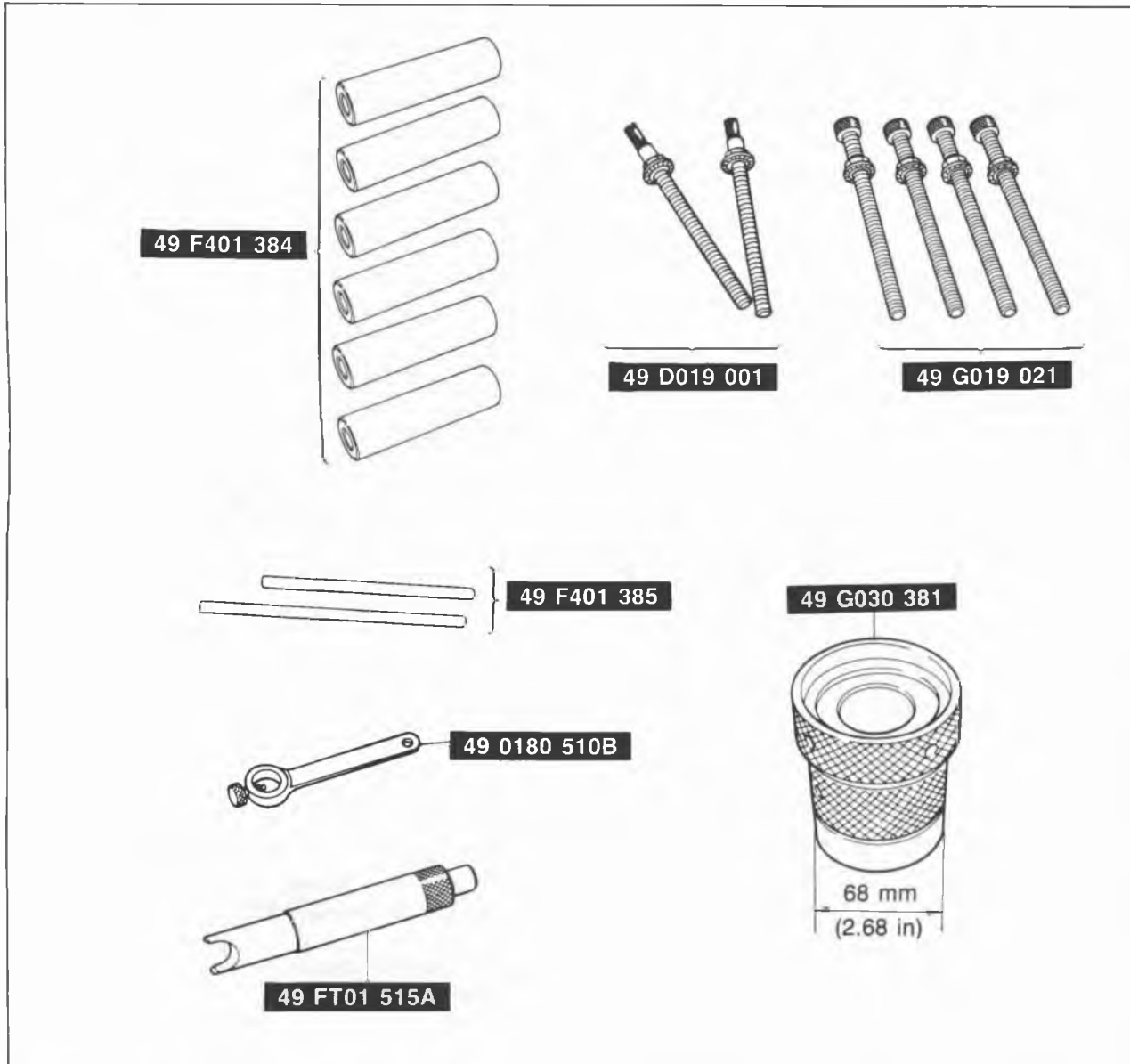
**Tightening torque:**  
**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

# 7C ASSEMBLY

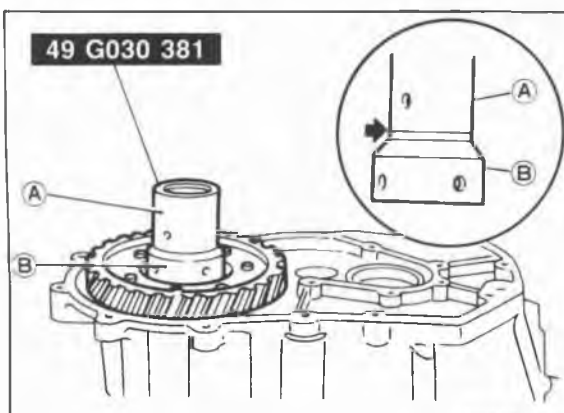
3. Adjust the differential side bearing preload and select the adjust shim(s) as described below.

### Note

To inspect and adjust the preload, use the SST shown below.



76G07C-242

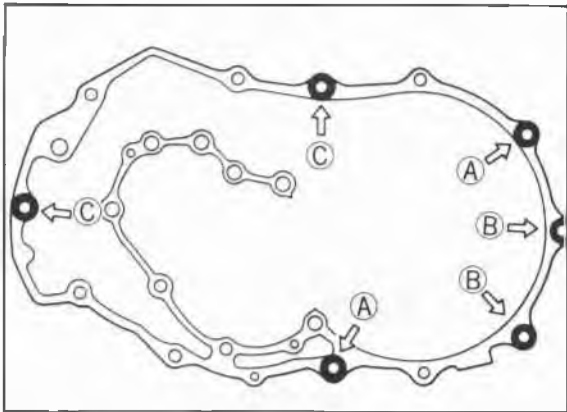


76G07C-243

- (1) Remove the side bearing housing race and adjust shims from the transaxle case. (Refer to page 7C—88.)
- (2) Set the differential assembly into the converter housing.
- (3) Install the outer race removed in step (1) into the **SST**; then set them on the differential assembly.

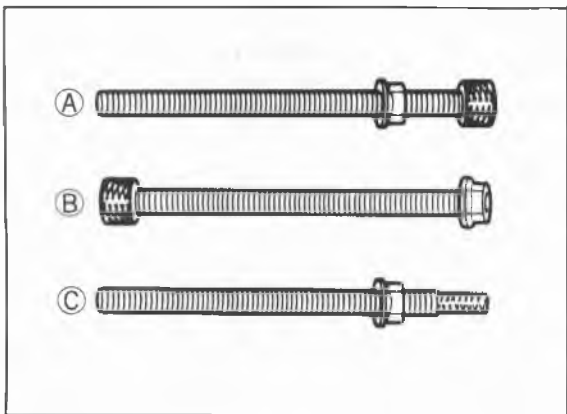
### Caution

Eliminate the gap by turning either **A** or **B** of the selector.



83U07B-382

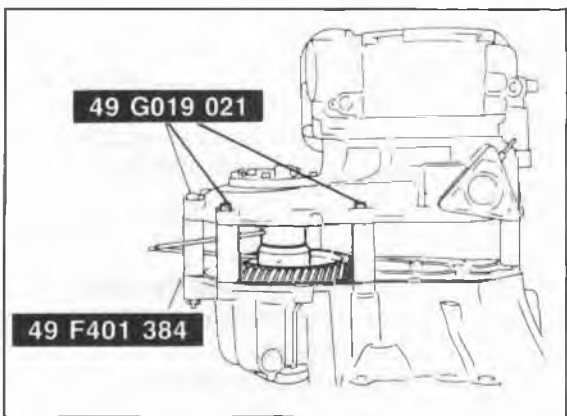
(4) Set the six **SST** in the positions shown.



76G07C-244

**Note**

Install the bolts in the positions shown in the illustration above.



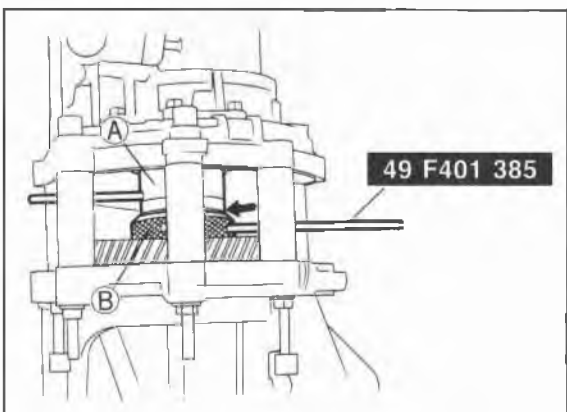
76G07C-245

(5) Set the transaxle case on the selectors.

(6) Tighten the **SST** (bolts) to the specified torque.

**Tightening torque:**

**29—46 N·m (3.0—4.7 m·kg, 22—34 ft·lb)**



83U07B-385

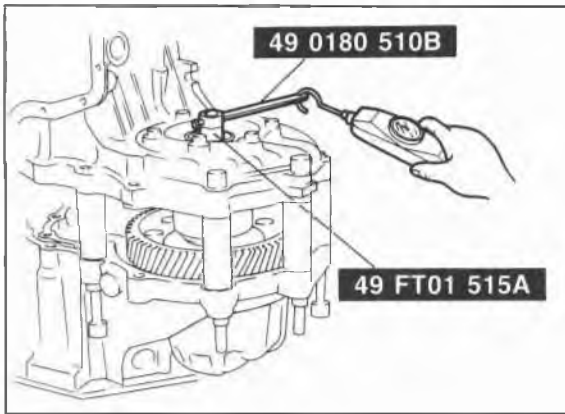
(7) Turn the **SST** (selector) to increase the clearance (indicated by the arrow) with the **SST** (bars), until it no longer turns.

**Note**

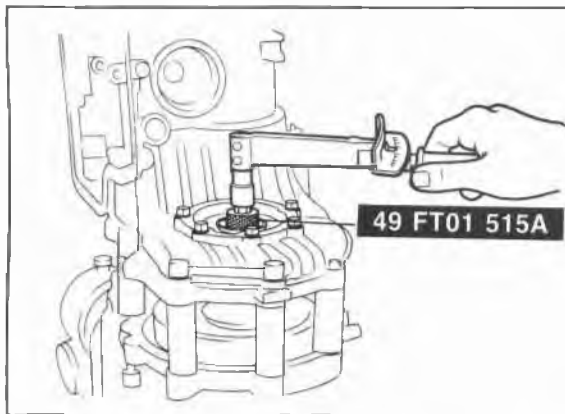
a) This is to seat the bearings.  
b) To turn the **SST** (B), bend the bar as shown.

(8) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

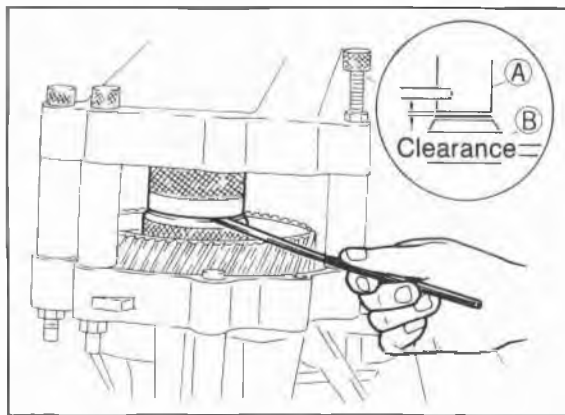
# 7C ASSEMBLY



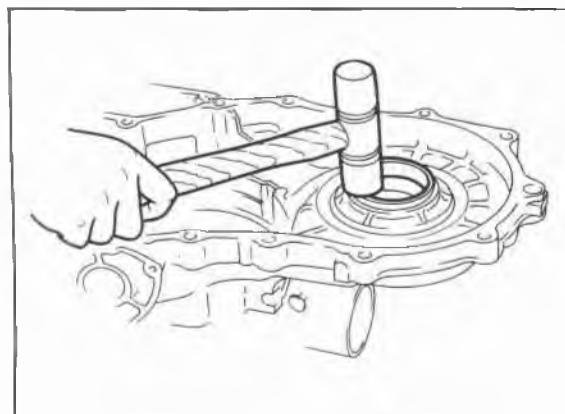
83U07B-386



76G07C-246



76G07C-247



76G07C-248

- (9) Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft.
- (10) Mount the **SST** and pull scale or torque wrench.
- (11) Widen the clearance between A and B to obtain the specified preload/pull scale reading.

### Preload:

**0.5 N·m (5 cm·kg, 4.3 in·lb)**

**Reading on pull scale: 5 N (0.5 kg, 1.1 lb)**

### Note

**Read the preload when the differential starts to turn.**

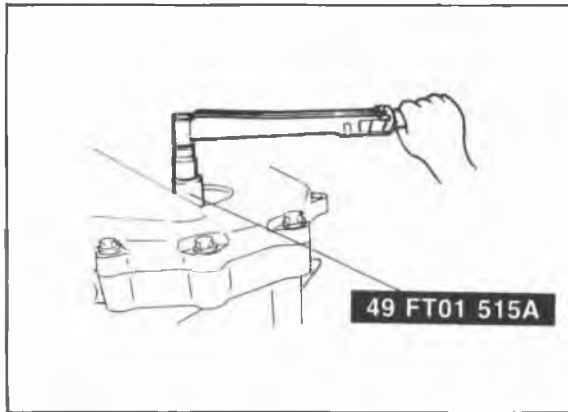
- (12) Measure the clearance between A and B.
- (13) Add **0.15 mm (0.0059 in)** to the measured clearance, and select the shim(s) closest in valve to that measurement.

Thickness of shim	
0.10 mm (0.004 in)	0.20 mm (0.008 in)
0.12 mm (0.005 in)	0.50 mm (0.020 in)
0.14 mm (0.006 in)	0.70 mm (0.028 in)
0.16 mm (0.0063 in)	1.00 mm (0.039 in)
0.18 mm (0.007 in)	

### Caution

- a) **Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.**
- b) **The maximum allowable number of shims is 3.**

- (14) Remove the transaxle case and selector.
- (15) Install the required shim(s) and tap the bearing race into the side bearing housing.



76G07C-249

(16) Install the transaxle case.

**Tightening torque:**

**29—46 N·m (3.0—4.7 m·kg, 22—34 ft·lb)**

(17) Check that the preload is within specification.  
If not within specification, return to step (2).

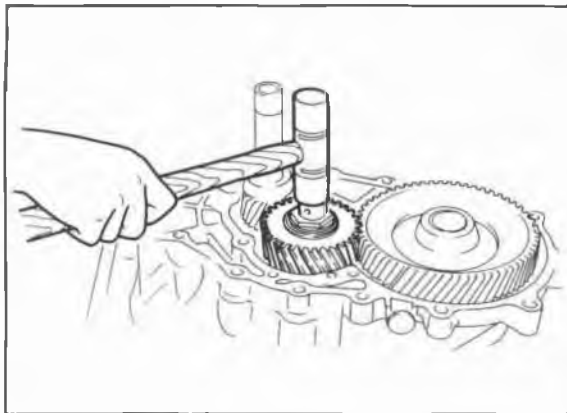
**Preload: 2.1—3.0 N·m**

**(21—31 cm·kg, 18—27 in·lb)**

**Reading on pull scale: 20—30 N**

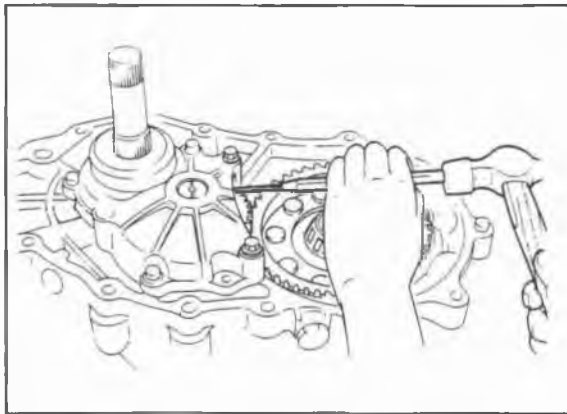
**(2.1—3.1 kg, 4.6—6.8 lb)**

(18) Remove the transaxle case.



83U07B-391

3. Install the idle gear and output gear as an assembly by tapping in with a plastic hammer.



76G07C-250

4. Install the bearing housing.

(1) Mount the bearing housing onto the converter housing.

**Tightening torque:**

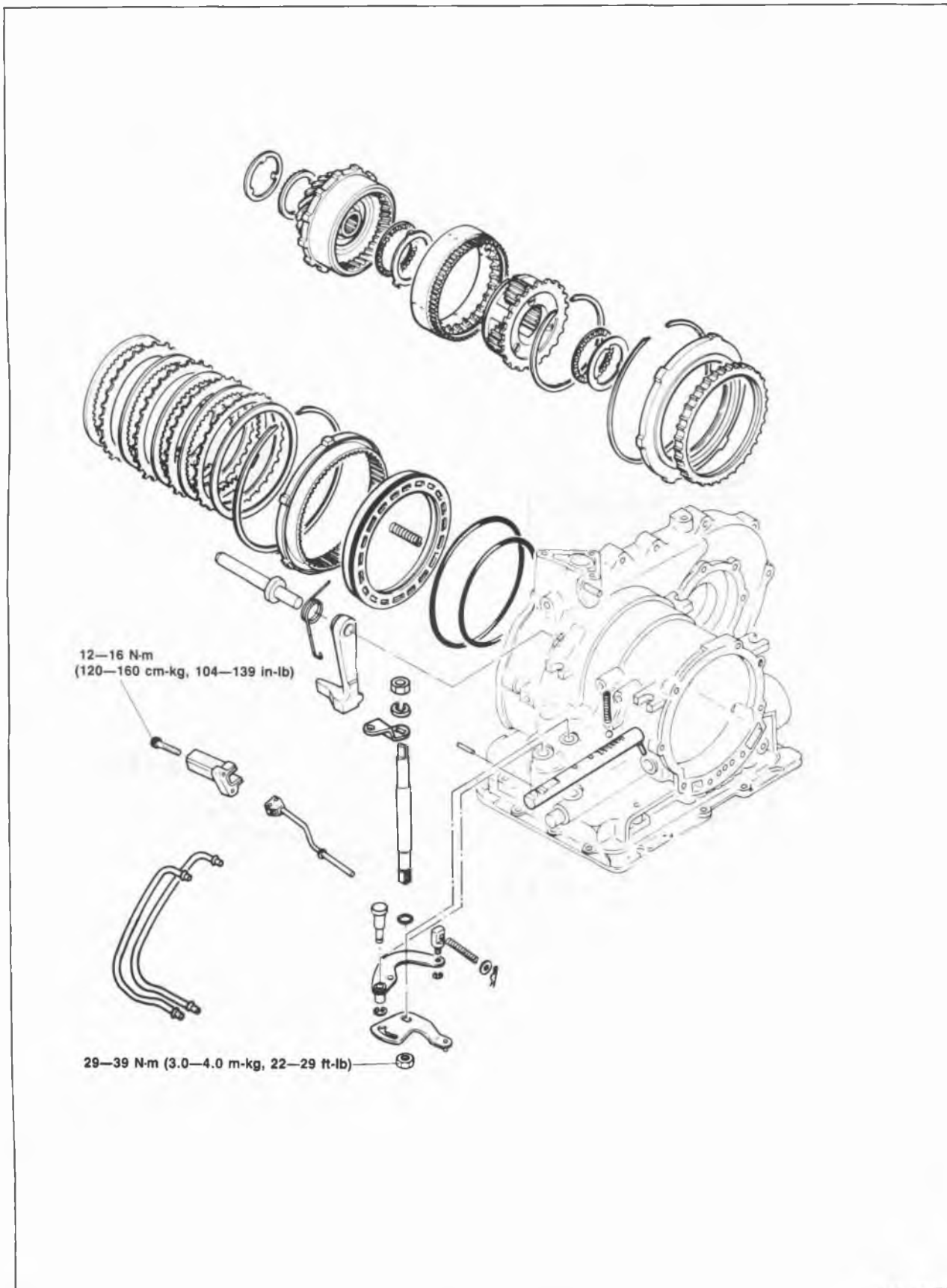
**19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

(2) Align the groove on the idle shaft as shown.

(3) Tap the roll pin in with a pin punch and hammer.

# 7C ASSEMBLY

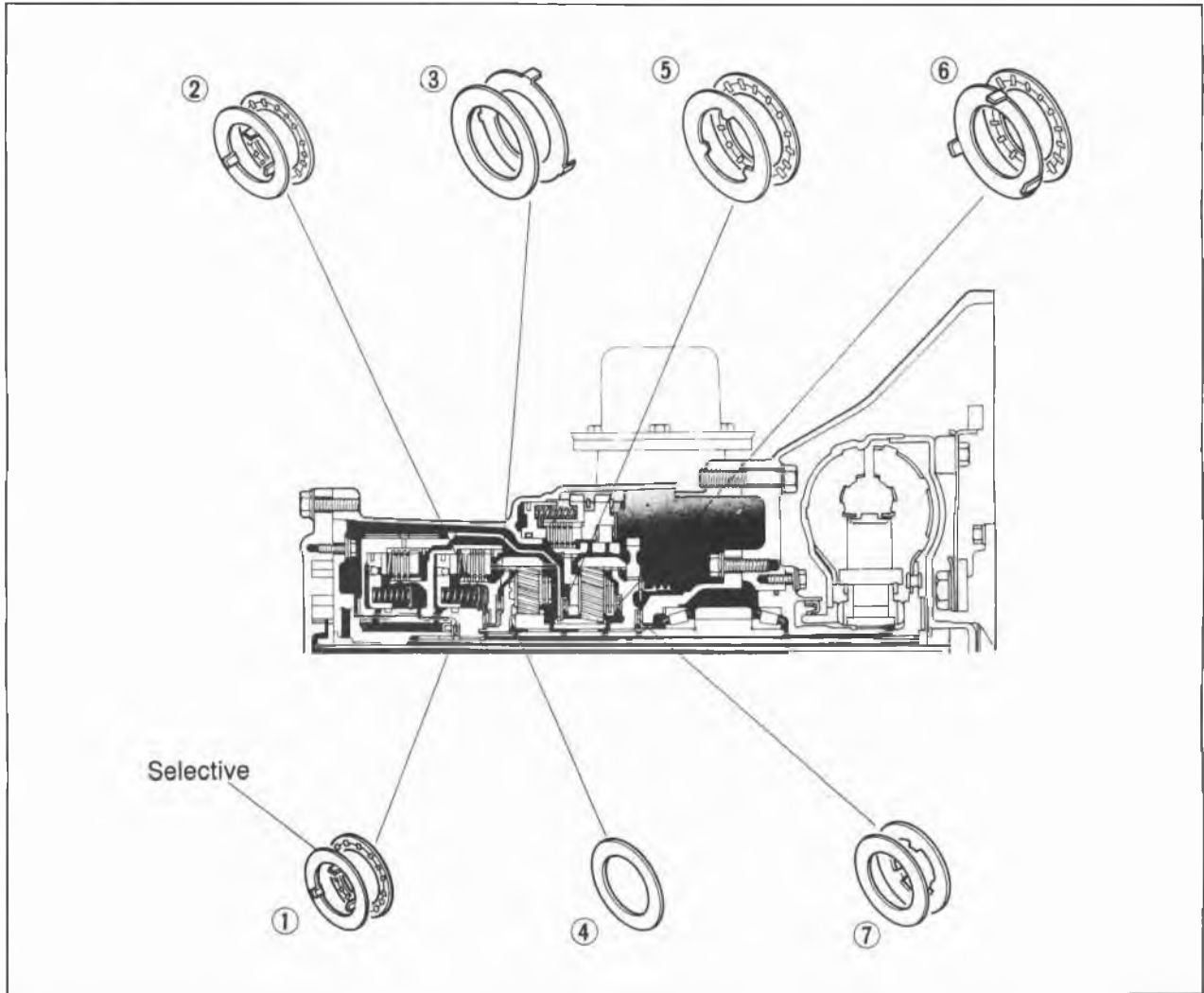
## ASSEMBLY-STEP 2 Torque Specifications



76G07C-251



## Thrust Washer, Bearing, and Race Locations



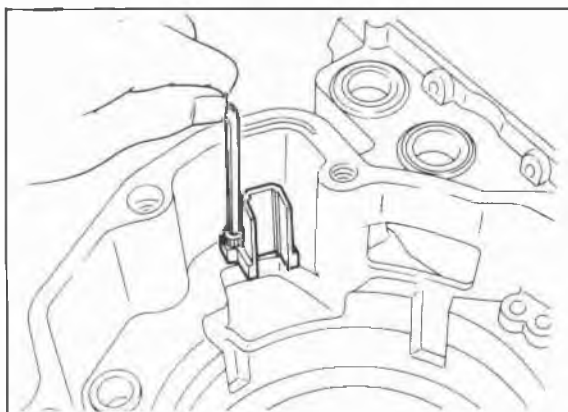
76G07C-252

### Outer diameter of bearing and race

mm (in)

	1	2	3	4	5	6	7
Bearing	41.9 (1.65)	52.9 (2.08)	69.9 (2.75)	46.9 (1.85)	69.9 (2.75)	69.9 (2.75)	52.9 (2.08)
Race	41.0 (1.61)	51.5 (2.03)	70.0 (2.76)	—	70.0 (2.76)	70.0 (2.76)	51.5 (2.03)

**Note:** Install with petroleum jelly to prevent the thrust bearing or bearing race from falling out.



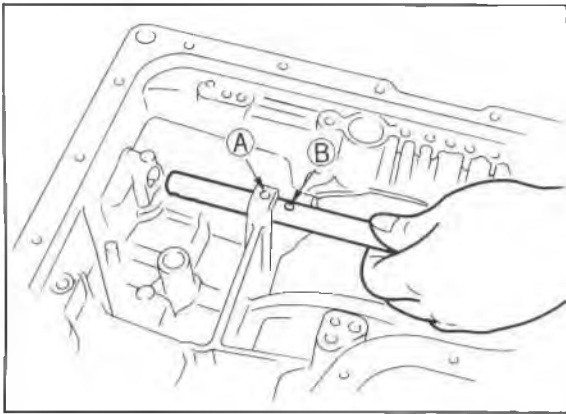
76G07C-253

### Procedure

1. Install the actuator support.

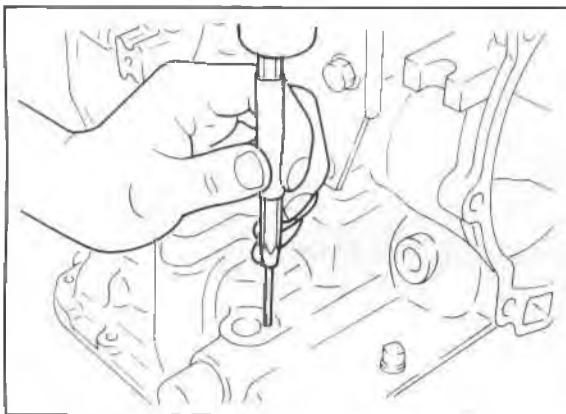
**Tightening torque: 12–16 Nm  
(120–160 cm·kg, 104–139 in·lb)**

## 7C ASSEMBLY



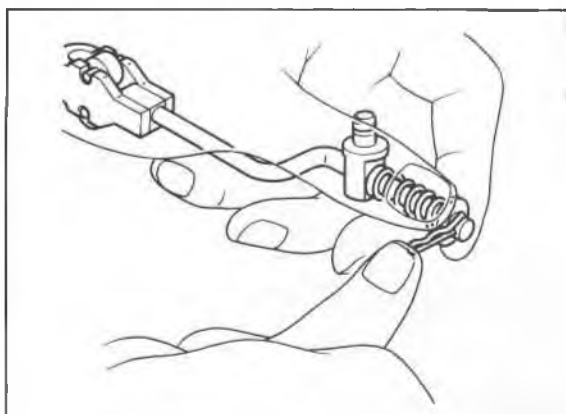
76G07C-254

2. Install the control rod.
  - (1) Insert the control rod and align holes A and B.
  - (2) Install the spring and ball.



76G07C-255

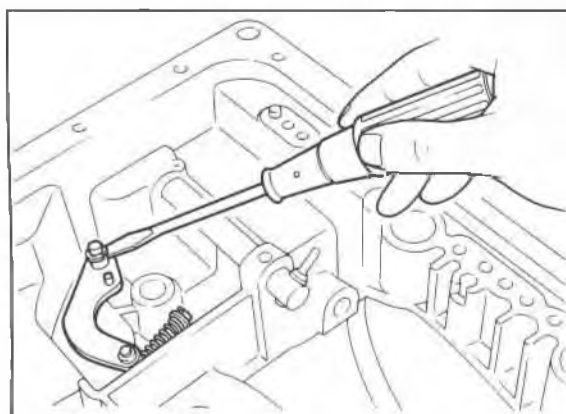
- (3) Install the knock pin.



76G07C-256

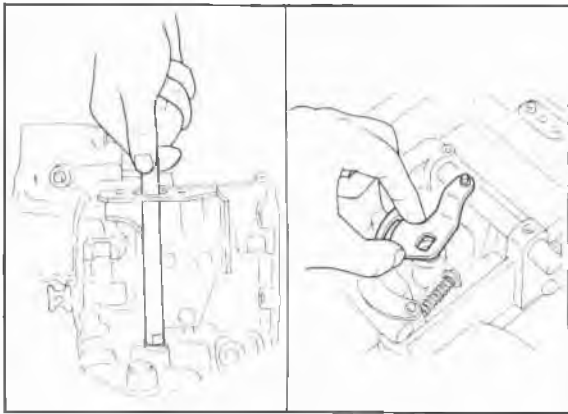
3. Install the manual shaft assembly.
  - (1) Install the parking joint, spring, and washer to the parking rod.
  - (2) Install the snap pin.

**Note**  
Face the snap pin in the direction shown.



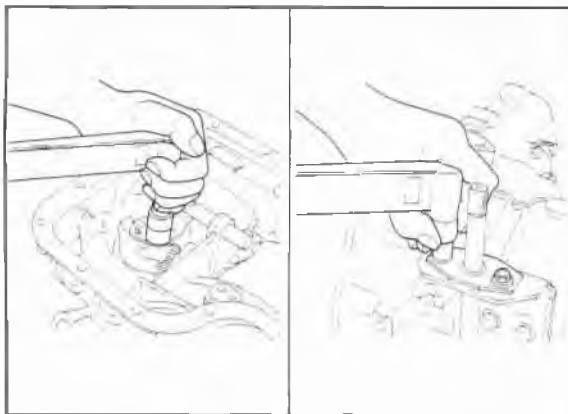
76G07C-257

- (3) Install the parking lever; then install the snap ring.



76G07C-258

- (4) Apply ATF to the O-ring, and install it onto the manual shaft.
- (5) Insert the manual shaft and manual plate.



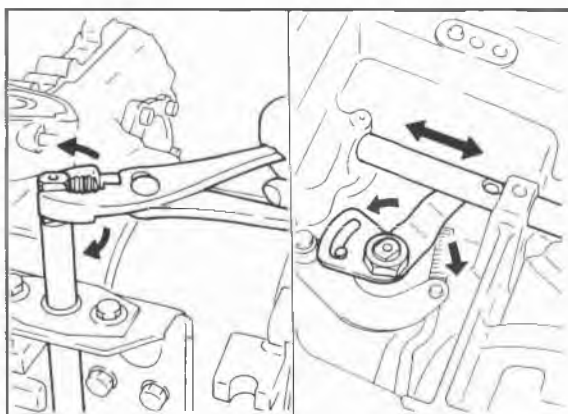
76G07C-259

- (6) Install the locknut.

**Tightening torque:**  
**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

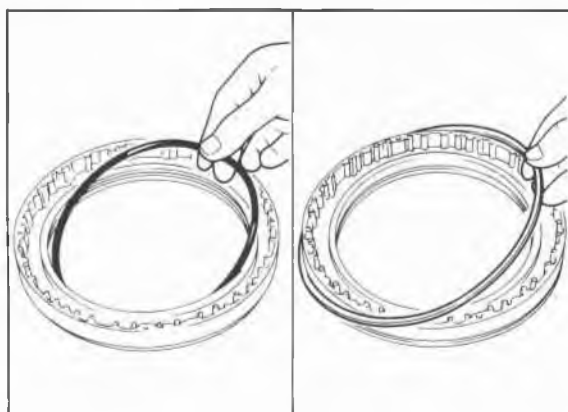
- (7) Install the bushing into the plate; then install the plate.

**Tightening torque:**  
**5—8 N·m (50—80 cm·kg, 43—69 in·lb)**



76G07C-260

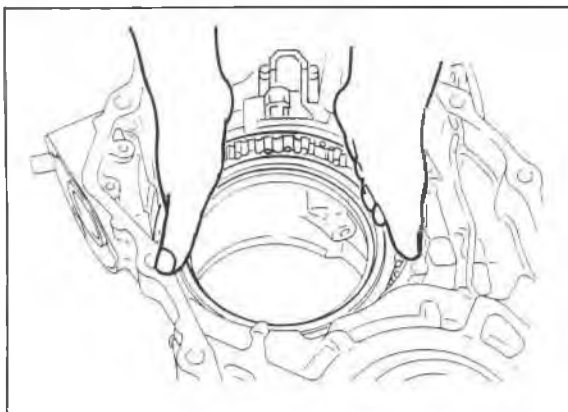
- (8) Move the manual shaft and check the manual shaft mechanism operation.



76G07C-261

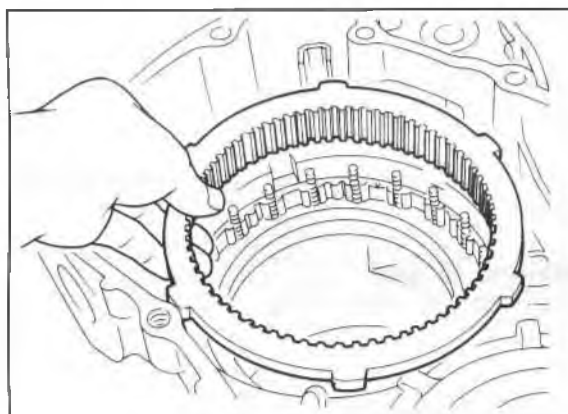
4. Install the low and reverse brake piston.
  - (1) Apply ATF to the inner and outer seals and install them onto the low and reverse brake piston.

## 7C ASSEMBLY



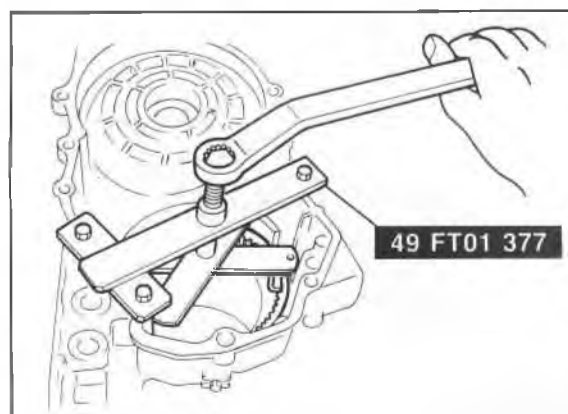
76G07C-262

- (2) Install the low and reverse brake piston by pushing evenly around the circumference.



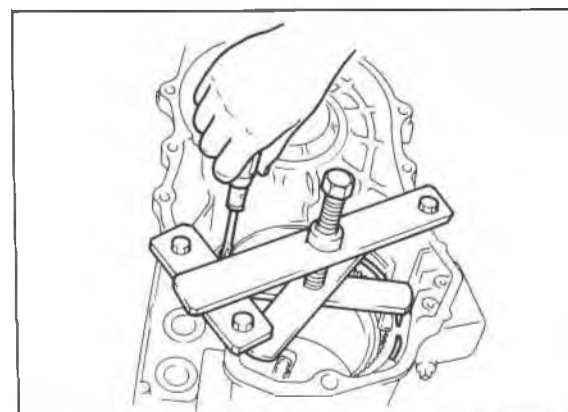
76G07C-263

5. Install the low and reverse brake hub.
  - (1) Install the springs and low and reverse brake hub.
  - (2) Set the snap ring onto the low and reverse brake hub.



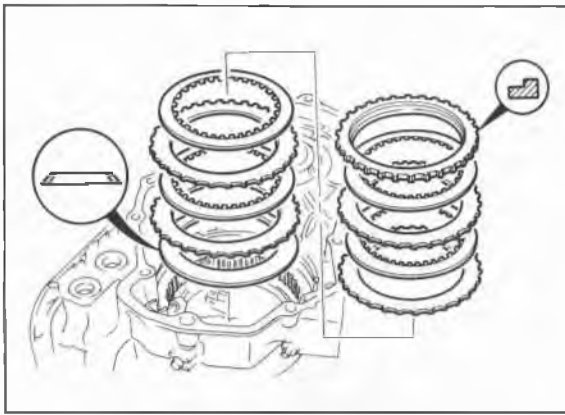
76G07C-264

- (3) Install the **SST**.
- (4) Compress the low and reverse brake hub.



76G07C-265

- (5) Install the snap ring.
- (6) Remove the **SST**.



76G07C-266

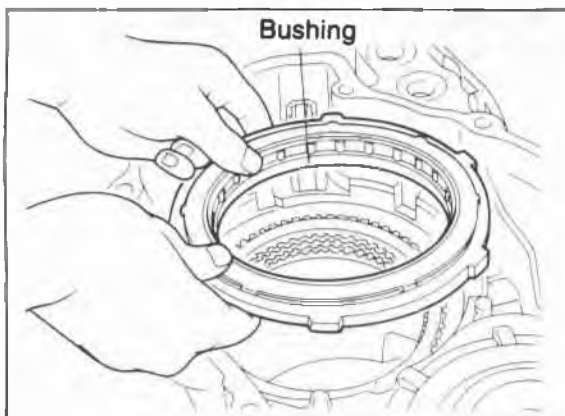
6. Install the dished plate with the dished side downward as shown.
7. Install the drive and driven plates.

**Note**

**Installation order:**

**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**

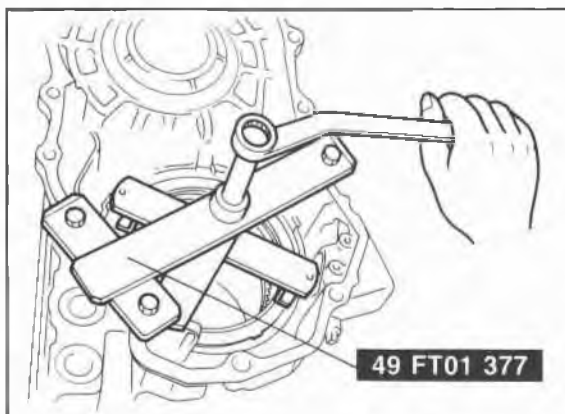
8. Install the retaining plate with the step facing upward.



76G07C-267

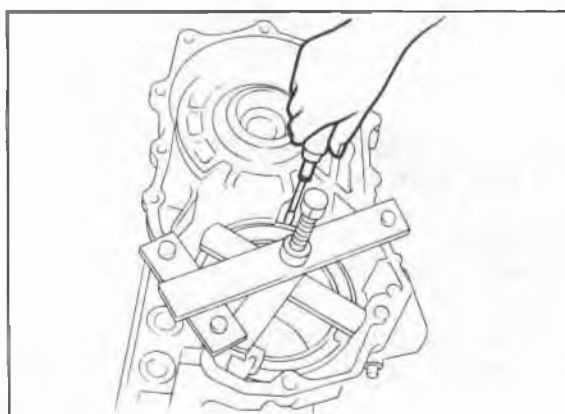
9. Install the one-way clutch.

- (1) Install the one-way clutch so that the side with the bushing faces the retaining plate.



76G07C-268

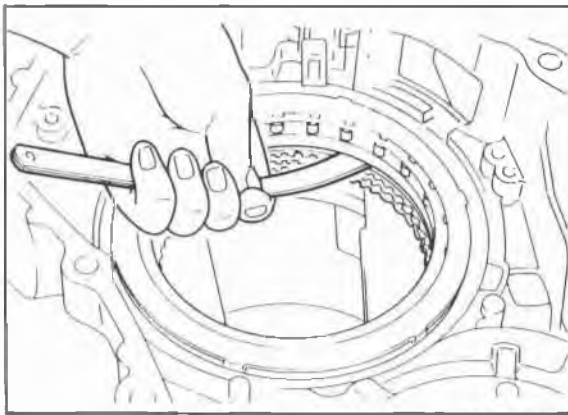
- (2) Set the snap ring on the one-way clutch.
- (3) Install the **SST**.
- (4) Compress the one-way clutch.



76G07C-269

- (5) Install the snap ring.
- (6) Remove the **SST**.

# 7C ASSEMBLY



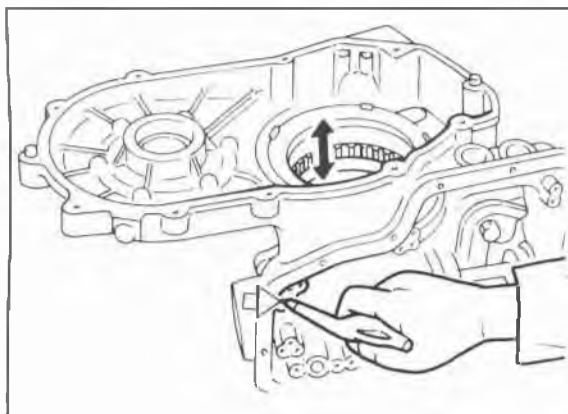
76G07C-270

10. Check the low and reverse brake clearance.
  - (1) Measure the clearance between the one-way clutch and the low and reverse brake retaining plate.
  - (2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

**Low and reverse brake clearance:  
0.8—1.05 mm (0.032—0.041 in)**

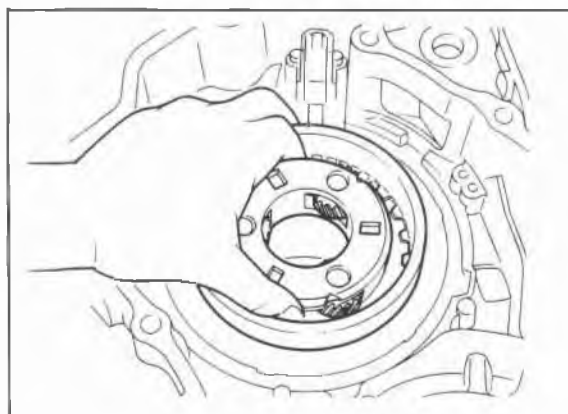
**Retaining plate sizes** **mm (in)**

4.6 (0.181)	4.8 (0.189)	5.0 (0.197)
5.2 (0.205)	5.4 (0.213)	5.6 (0.220)



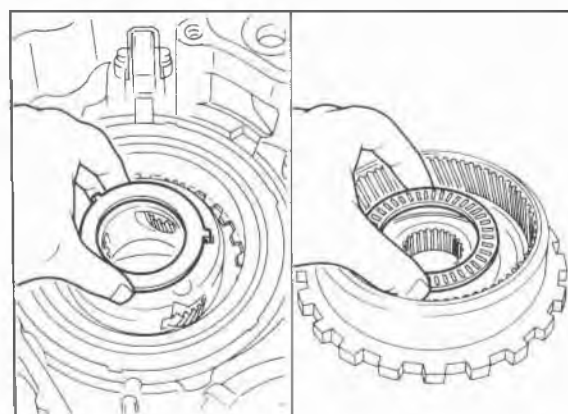
76G07C-271

11. Blow compressed air into the fluid hole of the trans-axle case to check the operation of the low and reverse brake.



76G07C-272

12. Install the one-way clutch inner race assembly.



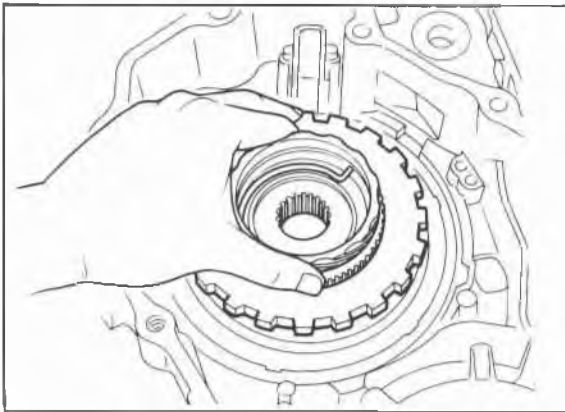
76G07C-273

13. Apply petroleum jelly to the bearing race to secure it; then install it onto the one-way clutch inner race assembly.

**Bearing race outer diameter:  
70.0 mm (2.76 in)**

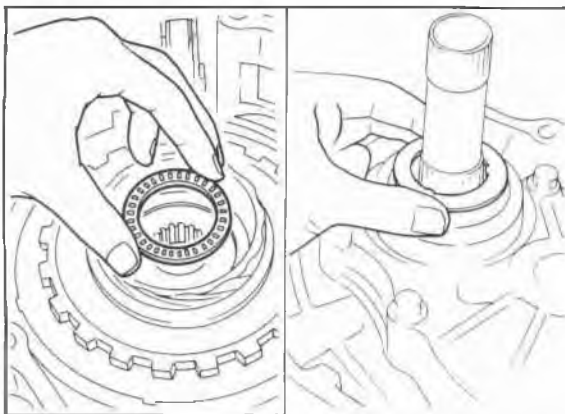
14. Apply petroleum jelly to the thrust bearing to secure it; then install it into the drum hub assembly.

**Thrust bearing outer diameter:  
69.9 mm (2.75 in)**



76G07C-274

15. Install the drum hub assembly.



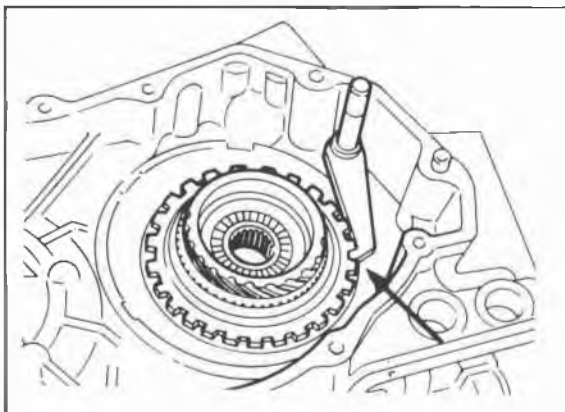
76G07C-275

16. Apply petroleum jelly to the thrust bearing to secure it; then install it into the drum hub assembly.

**Thrust bearing outer diameter:  
52.9 mm (2.08 in)**

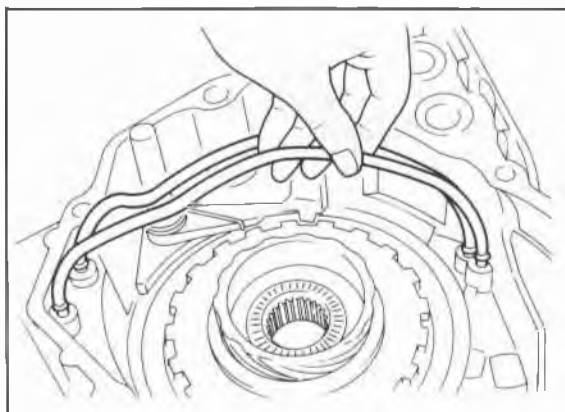
17. Apply petroleum jelly to the bearing race to secure it; then install it into the transaxle case.

**Bearing race outer diameter:  
51.5 mm (2.03 in)**



76G07C-276

18. Install the parking pawl assembly.  
19. Move the manual shaft and check that the parking pawl meshes properly with the parking gear when the manual shaft is at P.

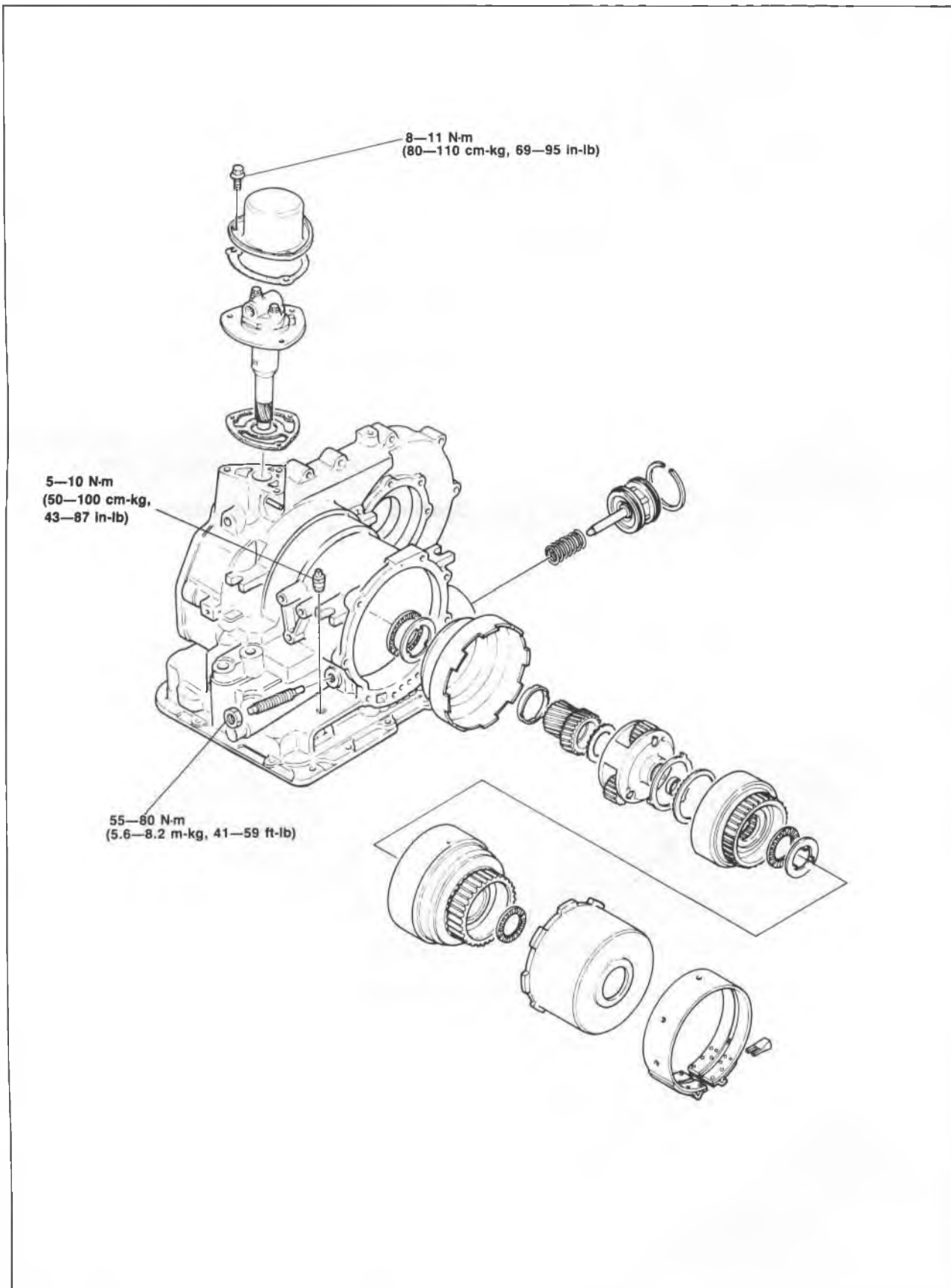


76G07C-277

20. Install the governor inlet and outlet pipe.

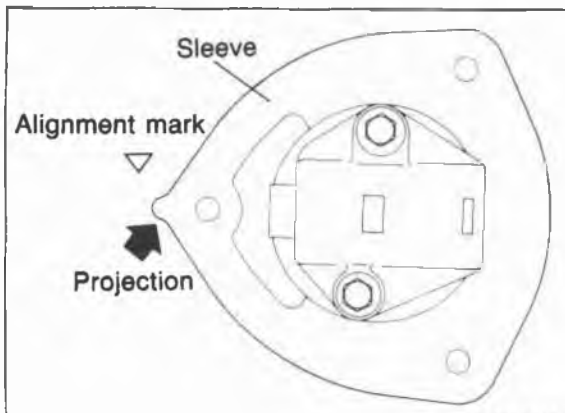
# 7C ASSEMBLY

## ASSEMBLY-STEP 3 Torque Specifications

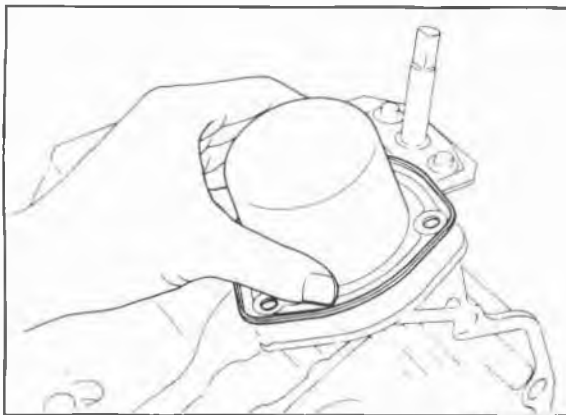


76G07C-278

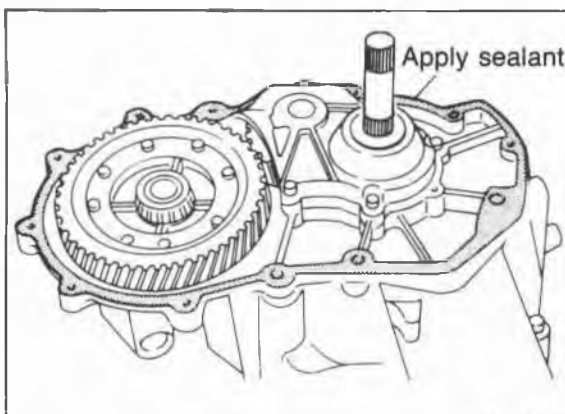




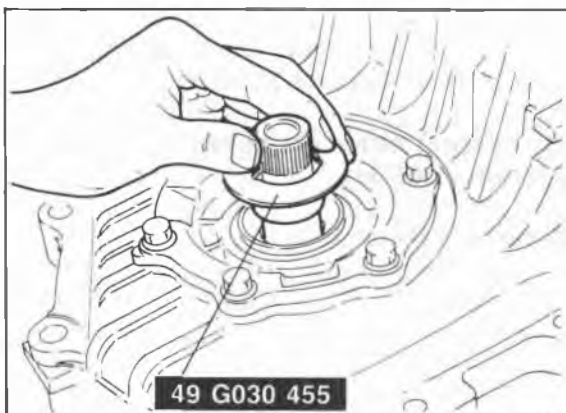
76G07C-279



76G07C-280



76G07C-281



76G07C-282

## Procedure

1. Install the governor assembly.
  - (1) Mount the governor along with a new gasket onto the transaxle case so that the sleeve projection is aligned with the alignment mark on the transaxle case.

- (2) Install the governor cover along with a new gasket.

## Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Apply a thin coat of silicone sealant to the contact surfaces of the converter housing and transaxle case.
3. Install the transaxle case onto the converter housing.

## Tightening torque:

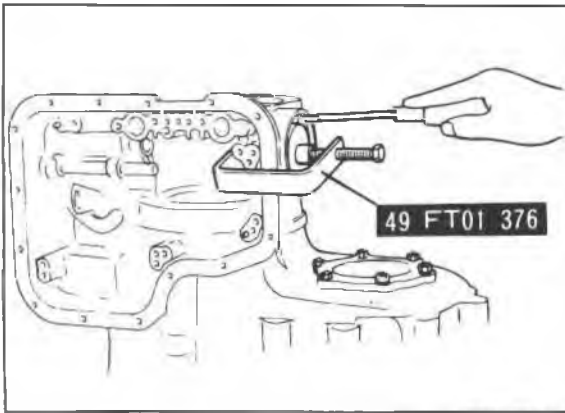
**29—46 N·m (3.0—4.7 m·kg, 22—34 ft·lb)**

4. Install the **SST** into the differential side gear.

## Caution

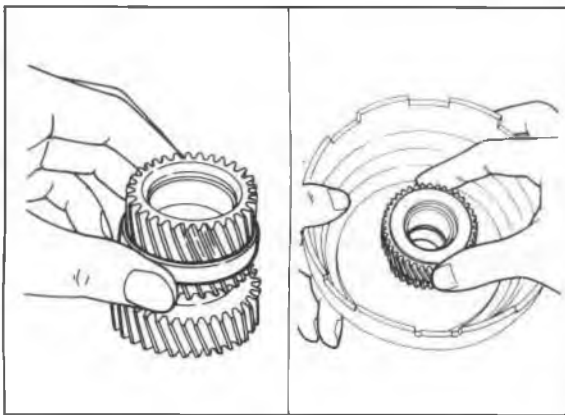
**Failure to install the SST may allow the differential side gears to become misaligned.**

## 7C ASSEMBLY



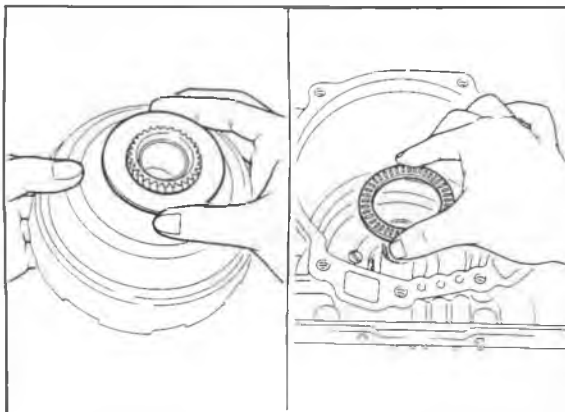
76G07C-283

5. Install the servo into the transaxle case.
  - (1) Install the return spring and servo retainer.
  - (2) Compress the servo retainer with the **SST**.
  - (3) Install the snap ring.
  - (4) Remove the **SST**.



76G07C-284

6. Install the spacer onto the sun gear.
7. Install the sun gear into the connecting shell.



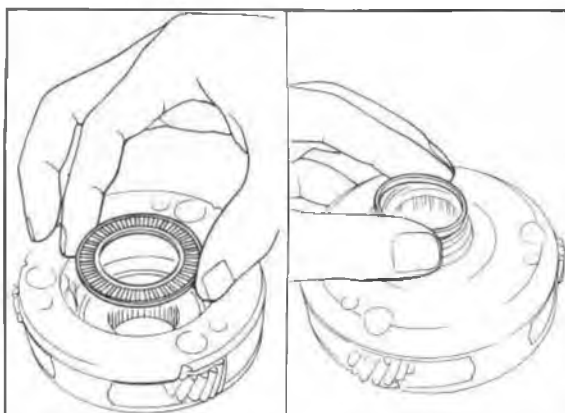
76G07C-285

8. Apply petroleum jelly to the bearing race to secure it; then install it onto the connecting shell.

**Bearing race outer diameter:  
70.0 mm (2.76 in)**

9. Apply petroleum jelly to the thrust bearing to secure it; then install it onto the one-way clutch inner race.

**Thrust bearing outer diameter:  
69.9 mm (2.75 in)**



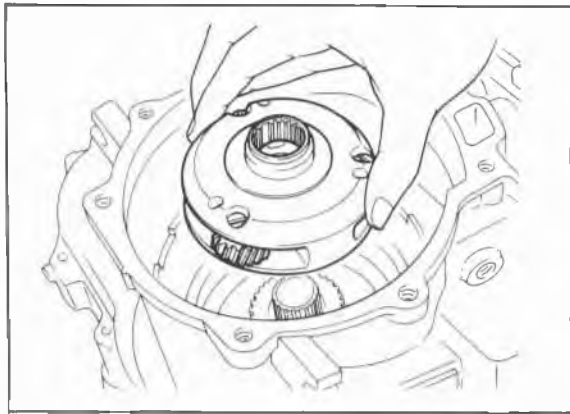
76G07C-286

10. Install the sun gear and connecting shell into the drum hub assembly.

11. Apply petroleum jelly to the thrust bearing to secure it; then install it into the front planetary carrier.

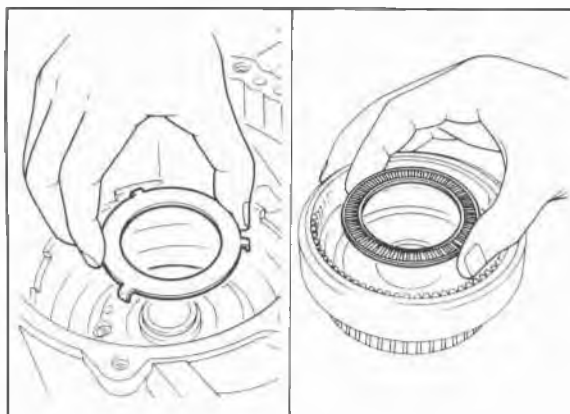
**Thrust bearing outer diameter:  
46.9 mm (1.85 in)**

12. Install the seal sleeve.



76G07C-287

13. Install the front planetary carrier.



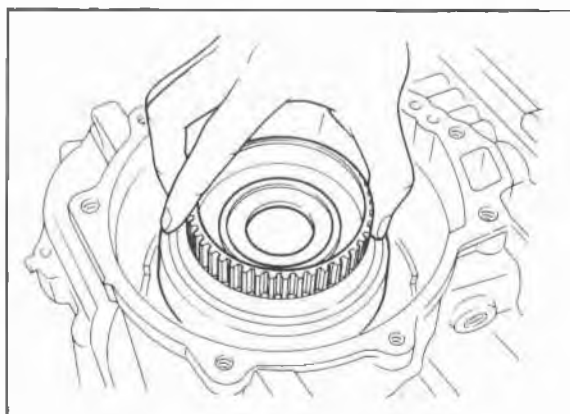
76G07C-288

14. Apply petroleum jelly to the bearing race to secure it; then install it into the front planetary carrier.

**Bearing race outer diameter:  
70.0 mm (2.76 in)**

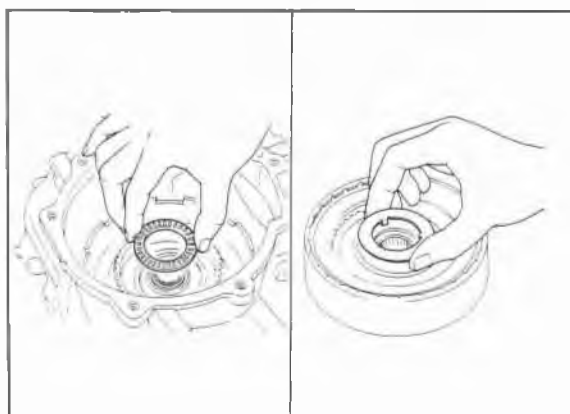
15. Apply petroleum jelly to the thrust bearing to secure it; then install it into the rear clutch hub assembly.

**Thrust bearing outer diameter:  
69.9 mm (2.75 in)**



76G07C-289

16. Install the rear clutch hub assembly.



76G07C-290

17. Apply petroleum jelly to the thrust bearing to secure it; then install it into the rear clutch hub assembly.

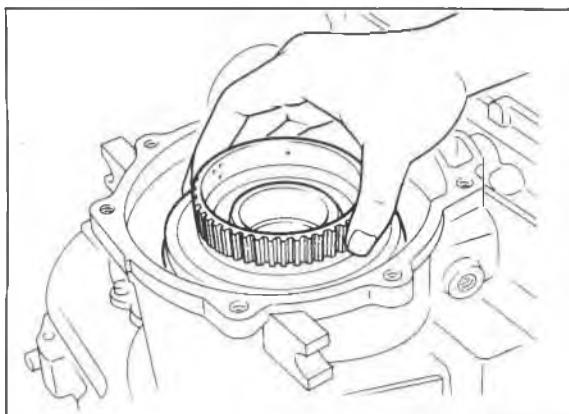
**Thrust bearing outer diameter:  
52.9 mm (2.08 in)**

18. Apply petroleum jelly to the bearing race to secure it; then install it into the rear clutch.

**Bearing race outer diameter:  
51.5 mm (2.03 in)**

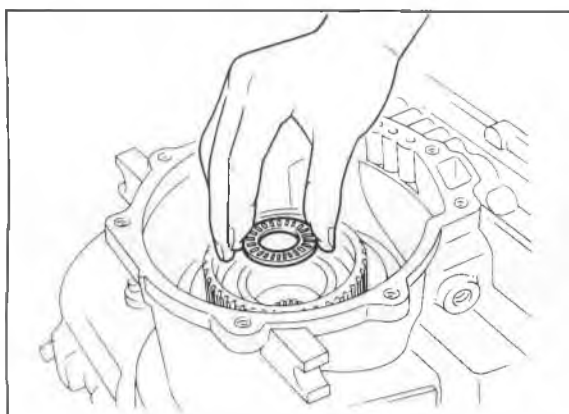
## 7C ASSEMBLY

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76G07C-291

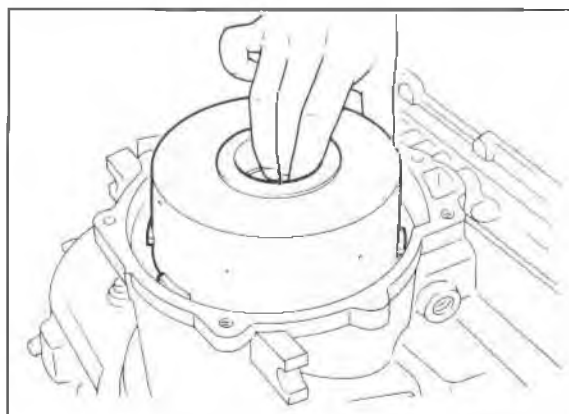
19. Install the rear clutch.



76G07C-292

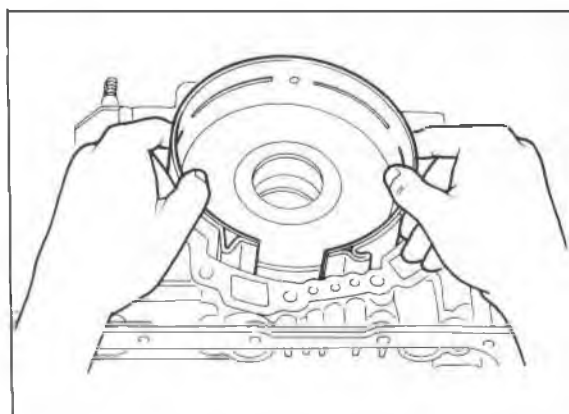
20. Apply petroleum jelly to the thrust bearing to secure it; then install it into the rear clutch.

**Thrust bearing outer diameter:  
41.9 mm (1.65 in)**



76G07C-293

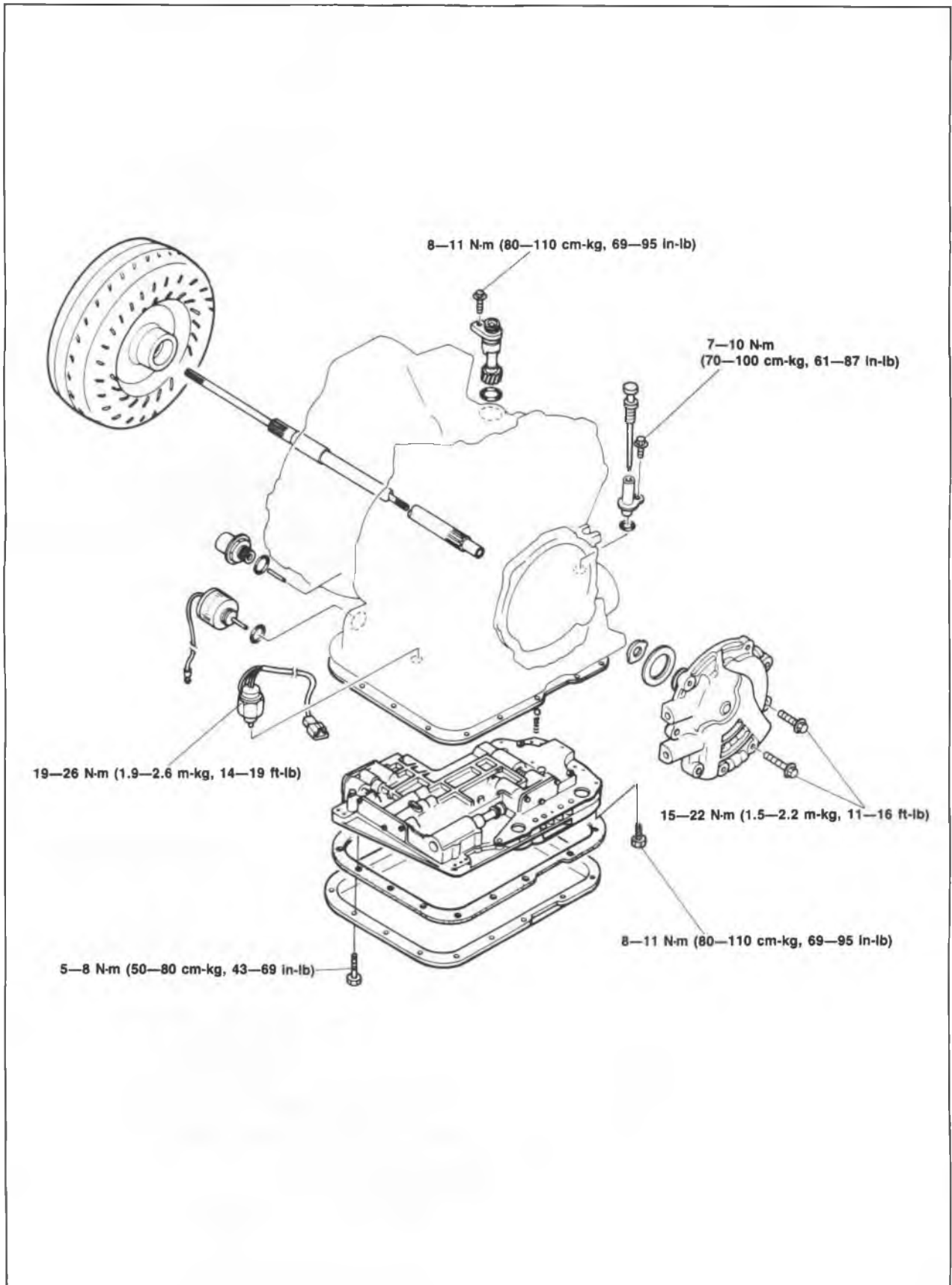
21. Install the front clutch.

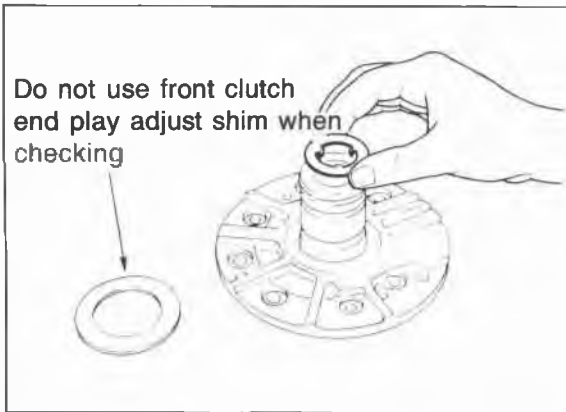


76G07C-294

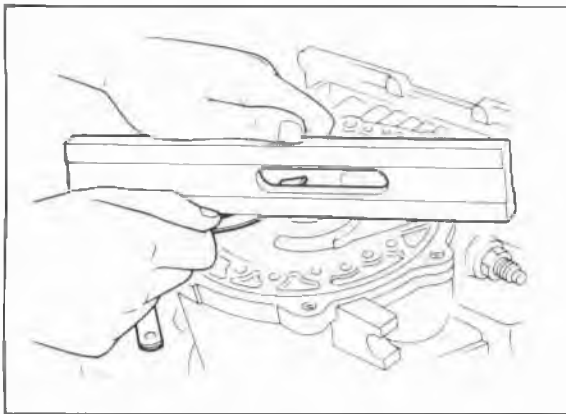
22. Install the brake band and strut.  
23. Install the anchor-end bolt and locknut; then loosely tighten the anchor-end bolt.

## ASSEMBLY-STEP 4 Torque Specifications

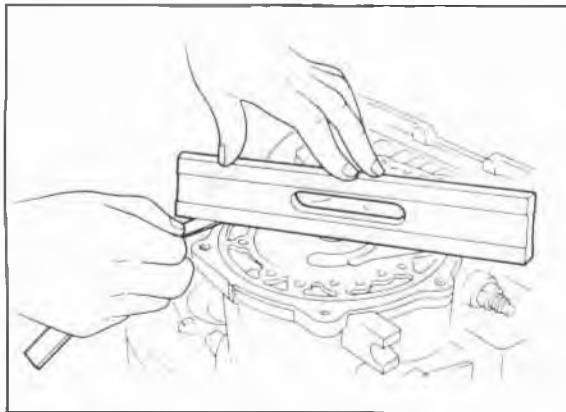




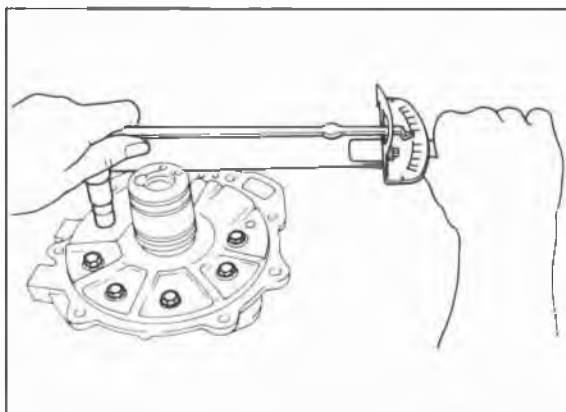
76G07C-296



76G07C-297



76G07C-298



76G07C-299

## Procedure

- Use the following procedure to adjust the total end play and select a suitable bearing race.
  - Remove the pump cover from the oil pump.
  - Install the bearing into the rear clutch drum.
  - Mount the bearing race to the pump cover; and then install it into the front clutch drum.

## Note

**A front clutch drum end play adjust shim must not be used between the pump cover and the front clutch drum when checking total end play.**

- Position a straight edge on the transaxle case, and measure the clearance between the straight edge and either the pump cover or the transaxle case.
  - If the pump cover surface is lower than the transaxle case, measure the clearance between the straight edge and the pump cover.

## Specification:

**0.10 mm (0.004 in) max.**

## Note

- Make the measurement without the oil pump gasket installed.**
- Measured clearance plus thickness of oil pump gasket equals total end play.**

- If the pump cover surface is higher than the transaxle case, measure the clearance between the straight edge and the transaxle case.

## Specification:

**0.15 mm (0.006 in) max.**

## Caution

**Do not position the straight edge on the bolt holes for mounting the oil pump to the transaxle case.**

## Note

**Thickness of oil pump gasket minus measured clearance equals total end play.**

- If the end play is not within specification, adjust it by selecting the proper bearing race.

## Caution

**Use only one bearing race.**

**Bearing race outer diameter: 41.0 mm (1.61 in)**

## Bearing race sizes

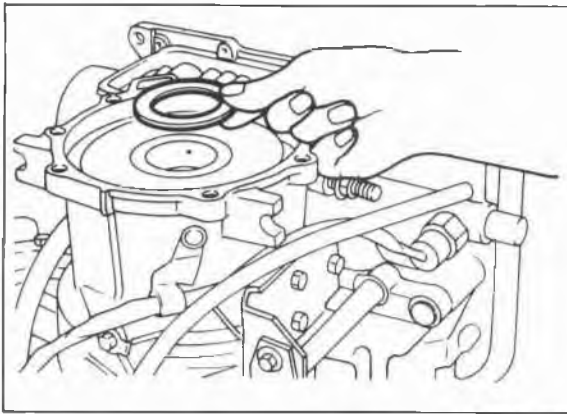
**mm (in)**

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)

- Reinstall the oil pump cover.

**Tightening torque: 11–14 Nm**

**(110–140 cm-kg, 95–122 in-lb)**

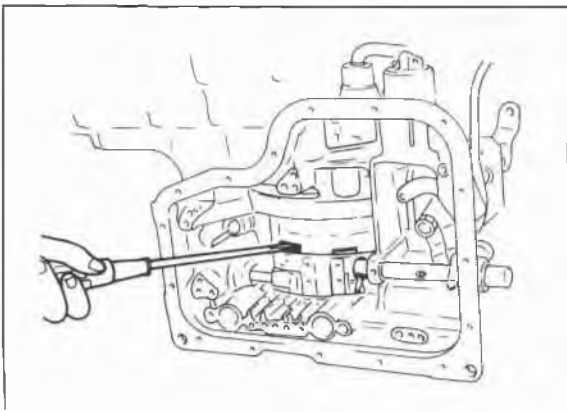


76G07C-300

4. Use the following procedure to adjust the front clutch drum end play and select the adjust shim.
  - (1) Set the oil pump gasket onto the transaxle case.
  - (2) Place the adjust shim onto the front clutch drum.
  - (3) Install the oil pump and bearing race into the transaxle; then tighten the oil pump mounting bolts to the specified torque.

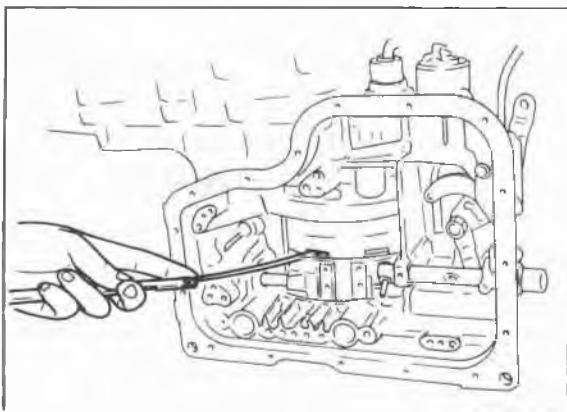
**Tightening torque:**

**15–22 N·m (1.5–2.2 m·kg, 11–16 ft·lb)**



76G07C-301

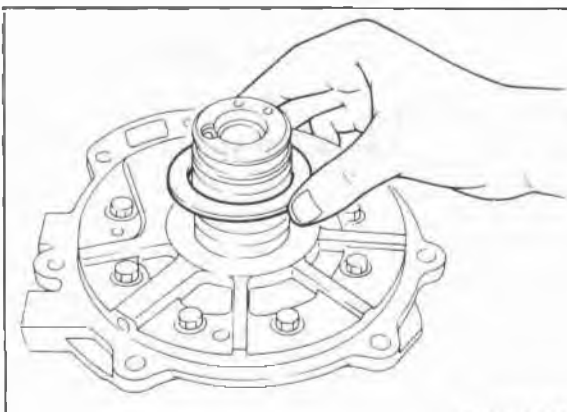
- (4) Position the transaxle with the oil pump facing down ward position.
- (5) While turning the connecting shell 2 complete turns, push the front clutch drum toward the oil pump with a screwdriver to seat the front clutch drum.



63U07B-220

- (6) Measure the clearance between the front clutch drum and the connecting shell. This clearance is the front clutch drum end play.

**End play: 0.5–0.8 mm (0.020–0.031 in)**



76G07C-302

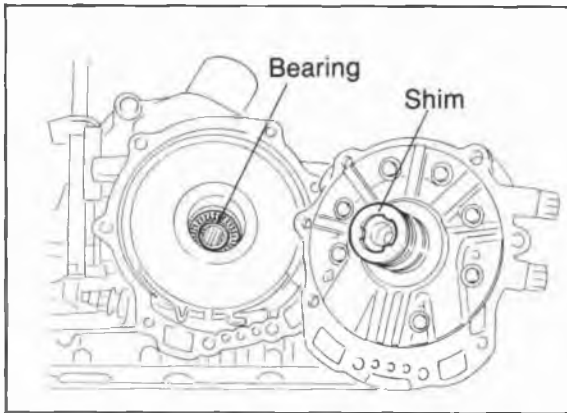
- (7) If the end play is not within specification, adjust it by selecting the proper adjust shim.

**Shim sizes**

**mm (in)**

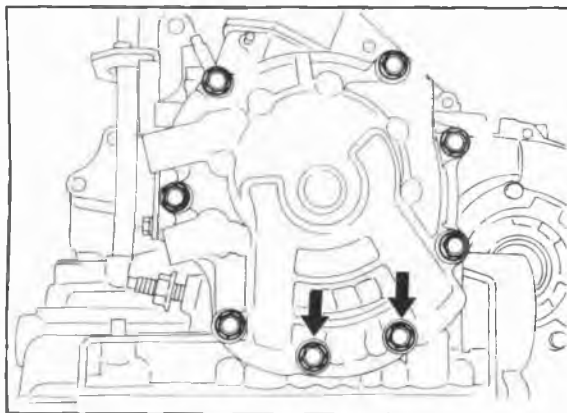
1.3 (0.051)	1.5 (0.059)	1.7 (0.067)
1.9 (0.075)	2.1 (0.083)	2.3 (0.091)
2.5 (0.098)	2.7 (0.106)	

# 7C ASSEMBLY



76G07C-303

5. Check that bearing race and shim are installed correctly.

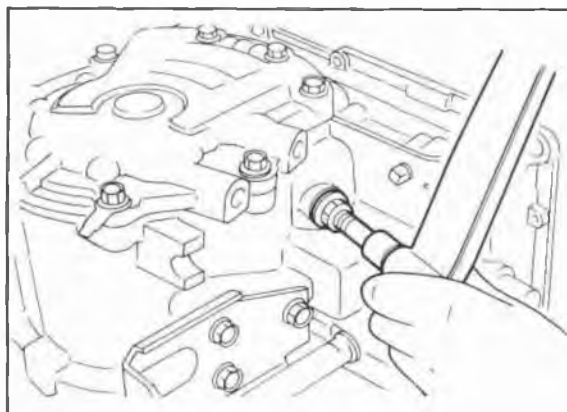


76G07C-304

6. Apply sealant to the seat face of the arrow marked bolts install the oil pump.

**Tightening torque:**

**15—22 N·m (1.5—2.2 m·kg, 11—16 ft·lb)**



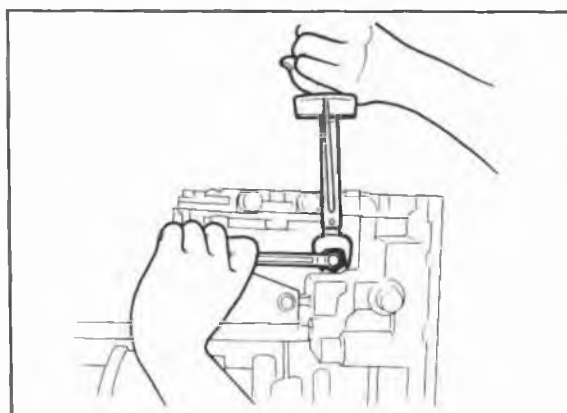
76G07C-305

7. Adjust the band brake.

- (1) Apply sealant to threads; and tighten the anchor-end bolt.

**Tightening torque: 12—15 N·m**

**(120—150 cm·kg, 104—130 in·lb)**



76G07C-306

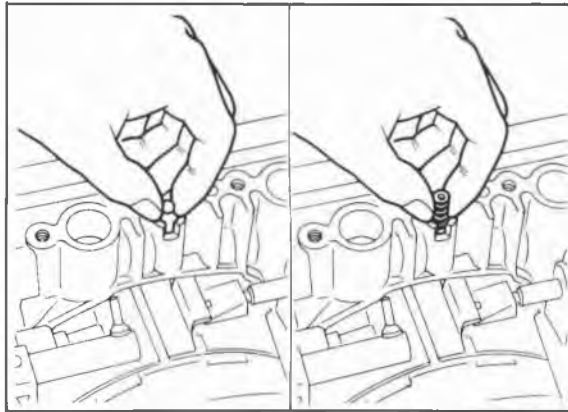
- (2) Loosen the anchor-end bolt 2 turns.

- (3) Tighten the locknut to the specified torque.

**Tightening torque:**

**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**



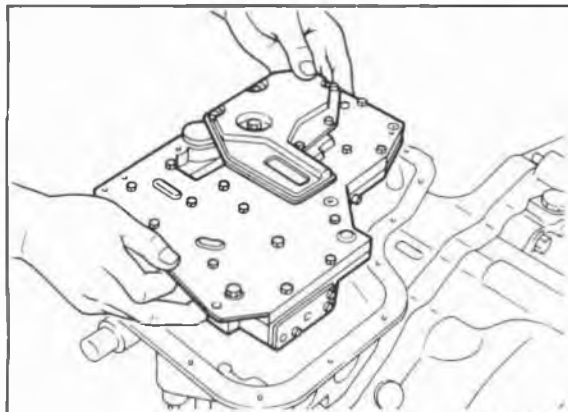


76G07C-307

8. Install the steel ball and spring.

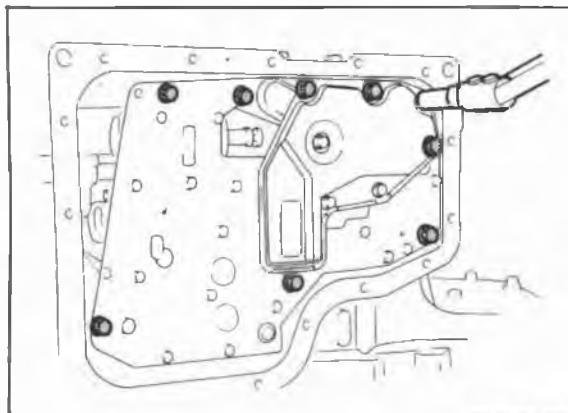
**Note**

**Install the ball first, then the spring.**



76G07C-308

9. Install the control valve, mating the groove of the manual valve with the driving pin of the control rod.

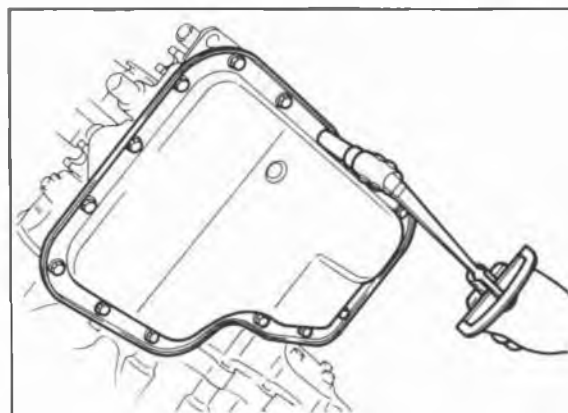


76G07C-309

10. Tighten the control valve mounting bolts to the specified torque.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



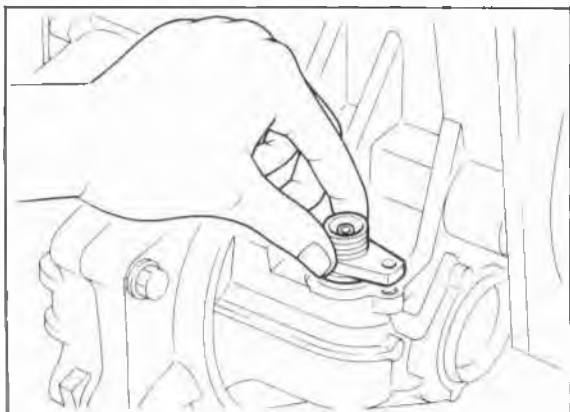
76G07C-310

11. Install the gasket and oil pan.

**Tightening torque:**

**5—8 N·m (50—80 cm·kg, 43—69 in·lb)**

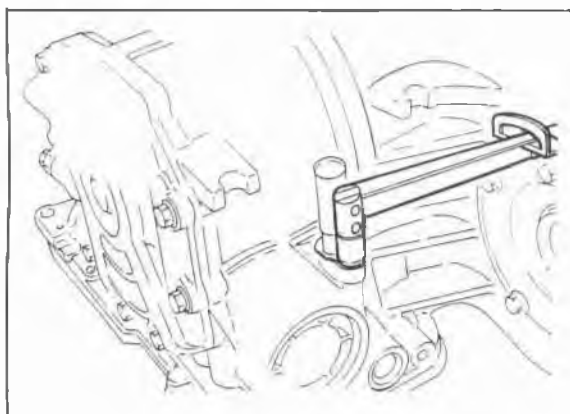
# 7C ASSEMBLY



76G07C-311

12. Install the speedometer driven gear.

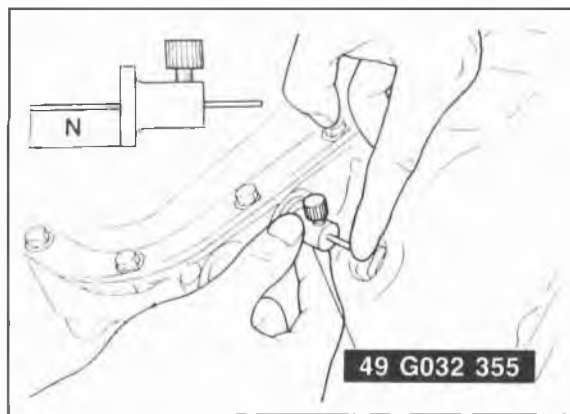
**Tightening torque:**  
**8—11 N·m (80—110 cm·kg, 69—95 In·lb)**



76G07C-312

13. Install the oil level gauge and tube along with a new O-ring to the transaxle case.

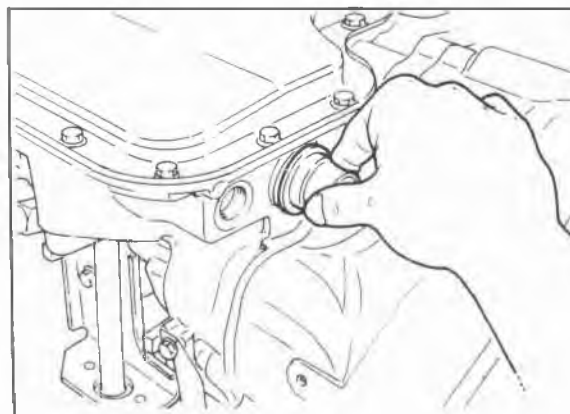
**Tightening torque:**  
**7—10 N·m (70—100 cm·kg, 61-87 in·lb)**



76G07C-313

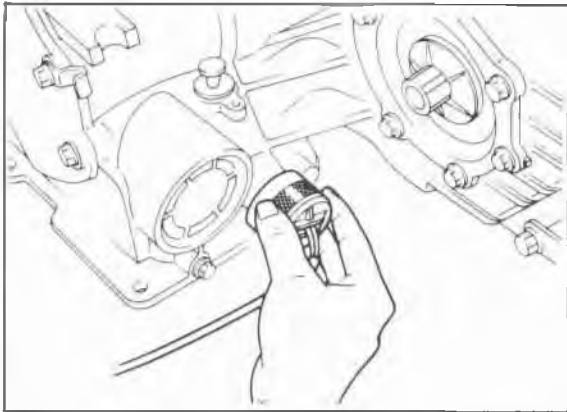
14. Install a new O-ring on the vacuum diaphragm.  
 15. Select the proper diaphragm rod.  
 (1) Measure the N dimension with the **SST** and a scale.  
 (2) Select the diaphragm rod in accordance with the table below.

N dimension	Applicable diaphragm rod length
Below 25.4 mm (1.000 in)	29.5 mm (1.161 in)
25.4—25.9 mm (1.000—1.020 in)	30.0 mm (1.181 in)
25.9—26.4 mm (1.020—1.039 in)	30.5 mm (1.200 in)
26.4—26.9 mm (1.039—1.059 in)	31.0 mm (1.220 in)
26.9 mm (1.059 in) or over	31.5 mm (1.240 in)



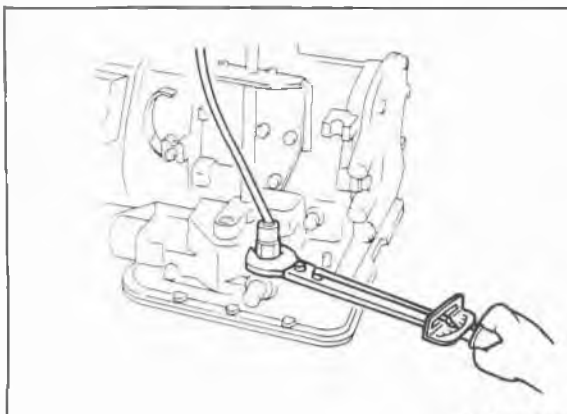
76G07C-314

16. Install the vacuum diaphragm.



76G07C-315

17. Install a new O-ring on the kick-down solenoid.
18. Install the kick-down solenoid.

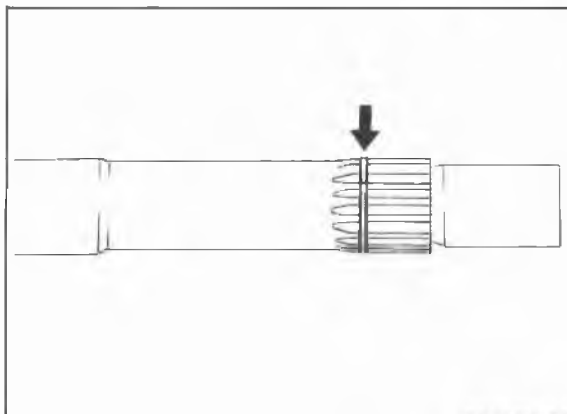


76G07C-316

19. Apply sealant to the threads and seat face of the switch; and install the inhibitor switch.

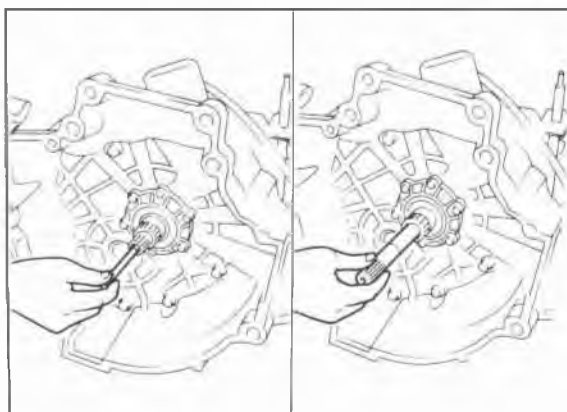
**Tightening torque:**

**19—26 Nm (1.9—2.6 m-kg, 14—19 ft-lb)**



76G07C-317

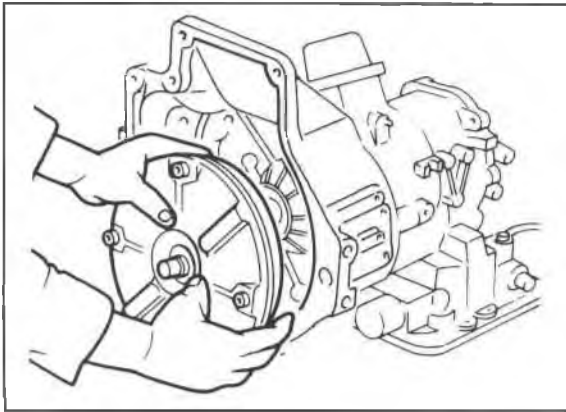
20. Remove the transaxle from the transaxle hanger.
21. Install a new clip on the turbine shaft.



76G07C-318

22. Install the turbine shaft.
23. Install the oil pump shaft.

## 7C ASSEMBLY



76G07C-319

24. Fill the torque converter with ATF if it has been drained and washed.

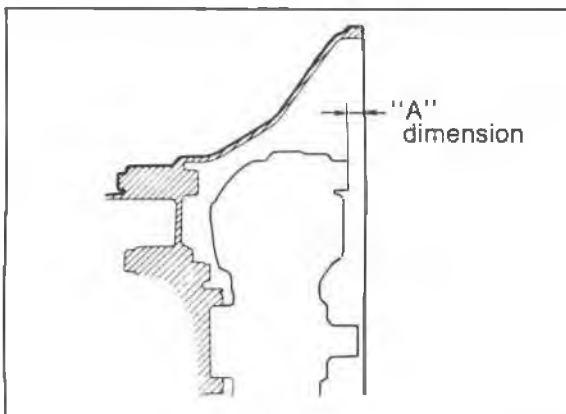
**ATF type: Dexron II or M III**

25. Install the torque converter in the converter housing while rotating it to align the splines.

**Caution**

a) **Hold the torque converter in an erect position when filling it with ATF, do not allow the fluid to overflow.**

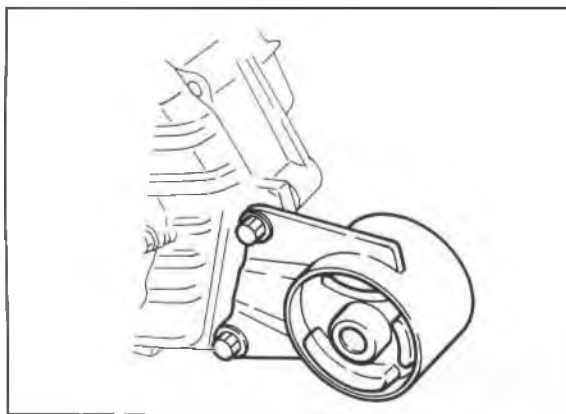
b) **If the converter does not fit in easily, do not try to force it; install carefully.**



76G07C-320

26. To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the end of the converter housing.

**(A): approx. 20 mm (0.79 in)**



76G07C-321

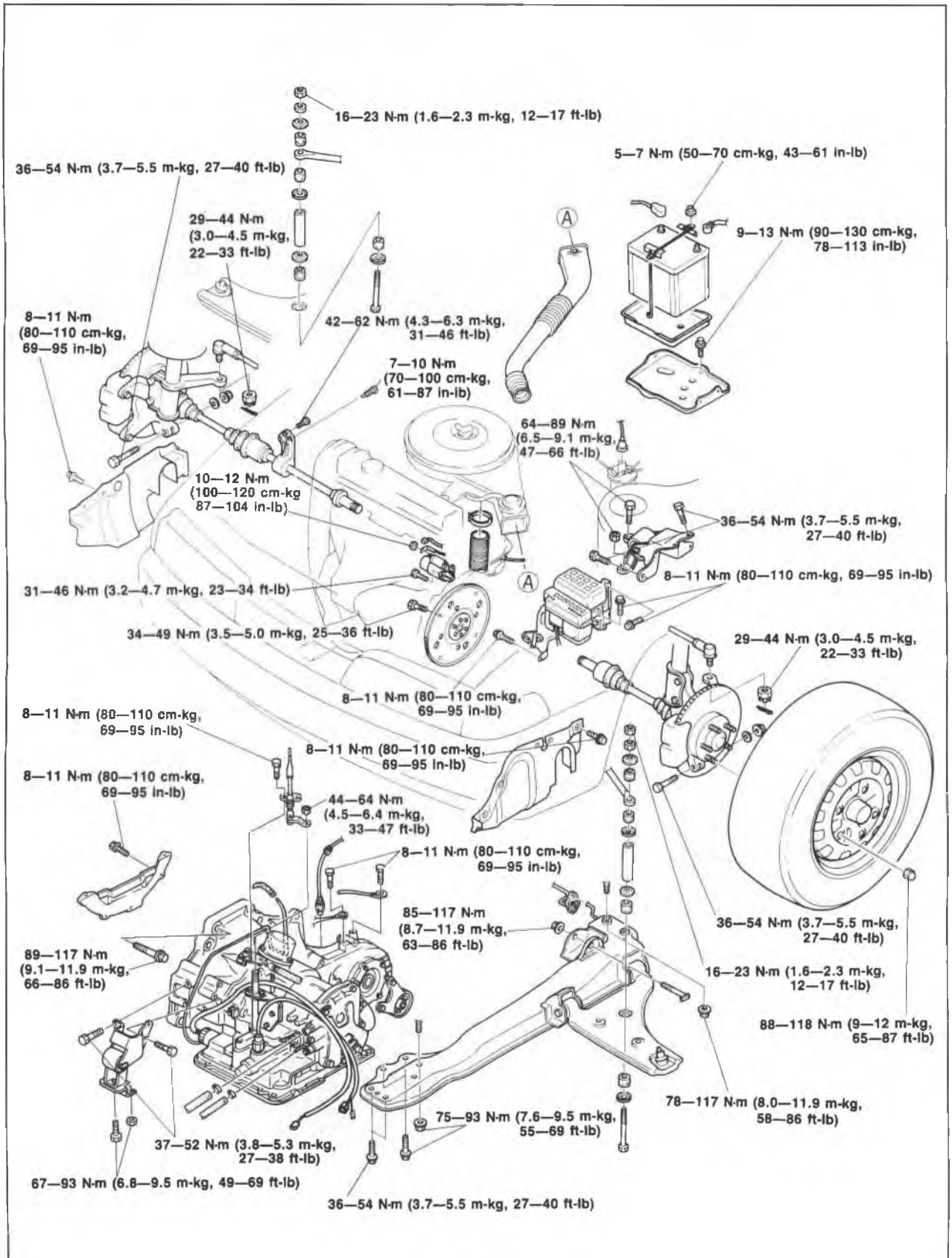
27. Install engine mount No.1.

**Tightening torque:**

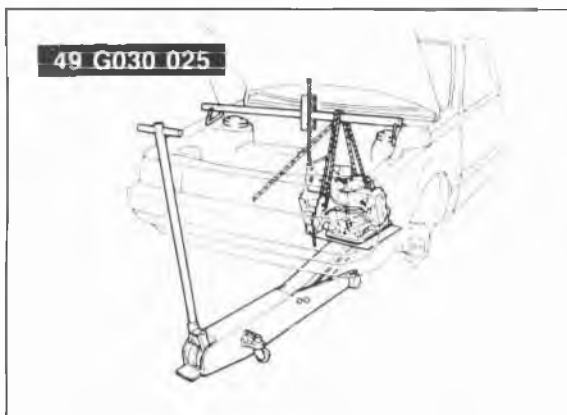
**29—46 N·m (3.0—4.7 m·kg, 22—34 ft·lb)**

## INSTALLATION

### TORQUE SPECIFICATIONS



# 7C INSTALLATION



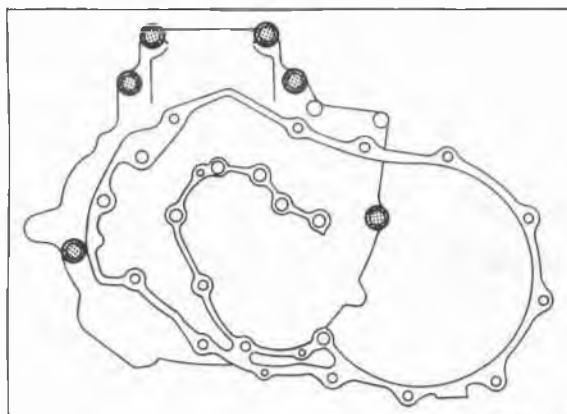
86U07B-441

1. Attach rope at 2 places on the transaxle. Place a flat board on a jack and set the transaxle on it.

### Caution

**The transaxle is not well balanced; be careful when positioning it on the jack.**

2. Move the transaxle into place and attach the rope to the **SST**.



86U07B-442

3. Mount the transaxle to the engine.

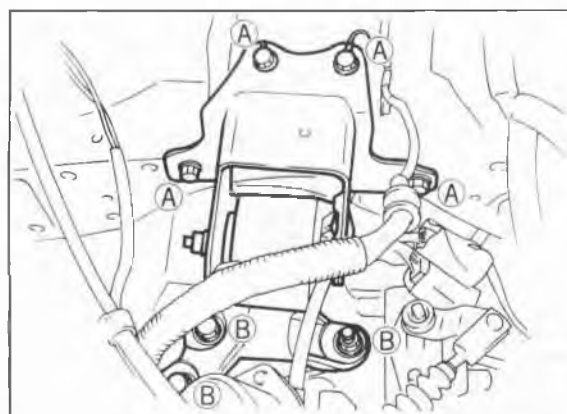
### Tightening torque:

**89—117 Nm (9.1—11.9 m-kG, 66—86 ft-lb)**

### Note

a) Lift the transaxle with the jack while pulling the rope.

b) Align the torque converter bolts and drive plate holes.



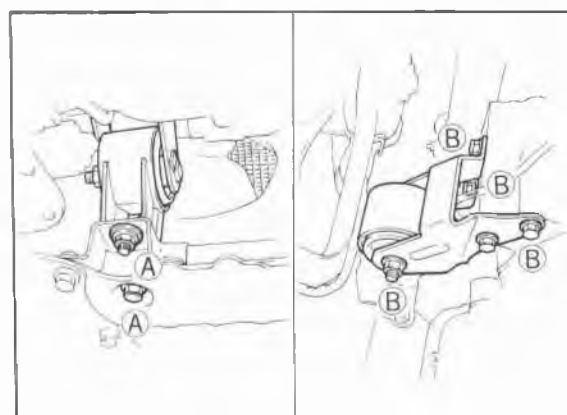
76G07C-322

4. Install engine mount No. 4 and bracket.

### Tightening torque:

**(A) 36—54 Nm  
(3.7—5.5 m-kG, 27—40 ft-lb)**

**(B) 64—89 Nm  
(6.5—9.1 m-kG, 47—66 ft-lb)**



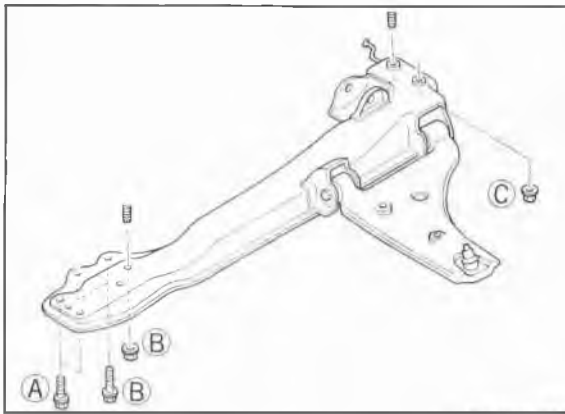
76G07C-323

5. Install engine mount No. 2.

### Tightening torque:

**(A) 67—93 Nm  
(6.8—9.5 m-kG, 49—69 ft-lb)**

**(B) 37—52 Nm  
(3.8—5.3 m-kG, 27—38 ft-lb)**



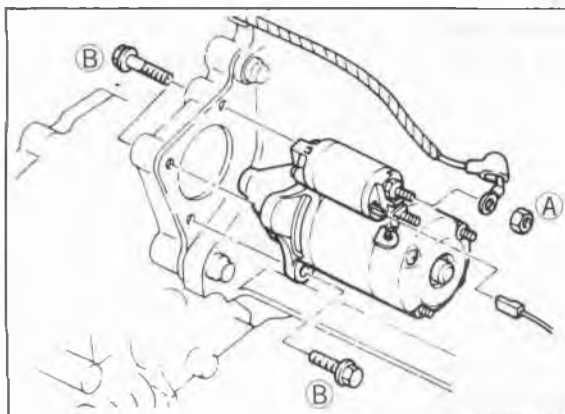
76G07C-324

6. Install the crossmember and the left side lower arm as an assembly.

**Tightening torque:**

- A** 36—54 Nm  
(3.7—5.5 m-kg, 27—40 ft-lb)
- B** 75—93 Nm  
(7.6—9.5 m-kg, 55—69 ft-lb)
- C** 78—117 Nm  
(18.0—11.9 m-kg, 58—86 ft-lb)

7. Remove the jack and the rope.
8. Remove the **SST**.



76G07C-325

9. Install the starter and harnesses.

**Tightening torque:**

- A** 10—12 Nm  
(100—120 cm-kg, 87—104 in-lb)
- B** 31—46 Nm  
(3.2—4.7 m-kg, 23—34 ft-lb)



76G07C-326

10. Install the torque converter bolts.

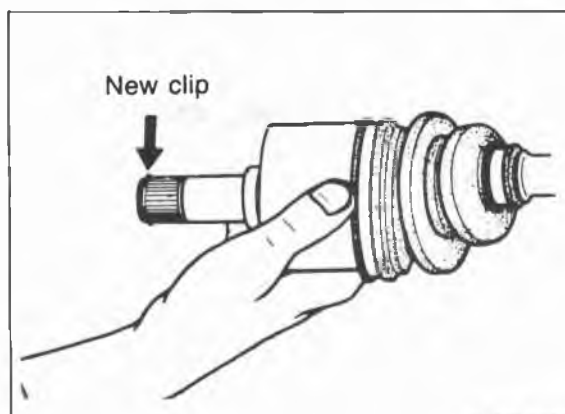
**Tightening torque:**

- 34—49 Nm (3.5—5.0 m-kg, 25—36 ft-lb)**

11. Install the end plate.

**Tightening torque:**

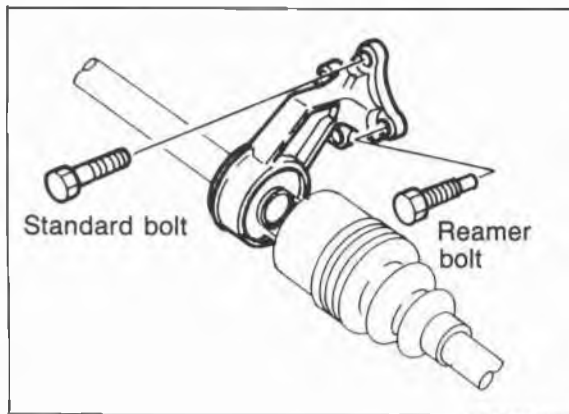
- 8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



76G07C-327

12. Replace the clip at the ends of the driveshafts and joint shaft with new ones.
13. Install the joint shaft and right driveshaft as follows:
  - (1) Remove the **SST** and insert the joint shaft into the transaxle.
  - (2) Mount the joint shaft bracket onto the engine.

## 7C INSTALLATION



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- (3) Install and tighten the reamer bolts, then install and tighten the standard bolts.

### Tightening torque:

**Reamer bolts 7—10 N·m  
(70—100 cm·kg, 61—87 in·lb)**  
**Standard bolts 42—62 N·m  
(4.3—6.3 m·kg, 31—46 ft·lb)**

- (4) Pull the front hub outward to connect the driveshaft to the joint shaft.
- (5) Push the joint from the differential side to securely connect the driveshaft to the joint shaft.

### Caution

- a) Do not damage the oil seal.
- b) After installation, pull the front hub outward to verify that the driveshaft is secured.

14. Install the left driveshaft as follows:

- (1) Pull the front hub outward to insert the driveshaft into the transaxle.
- (2) Push the joint from the differential side to connect the driveshaft to the differential side gear.

### Caution

- a) Do not damage the oil seal.
- b) After installation, pull the front hub outward to verify that the driveshaft is secured.

15. Install the lower arm ball joints to the knuckles and tighten the bolts and nuts.

### Tightening torque:

**36—54 N·m (3.7—5.5 m·kg, 27—40 ft·lb)**

16. Install the under cover.
17. Install the stabilizer bar control link as follows:
  - (1) Install the stabilizer bar control link.
  - (2) Adjust length A to **20.1 mm (0.79 in)**.
  - (3) Tighten bolt B to the specified torque.

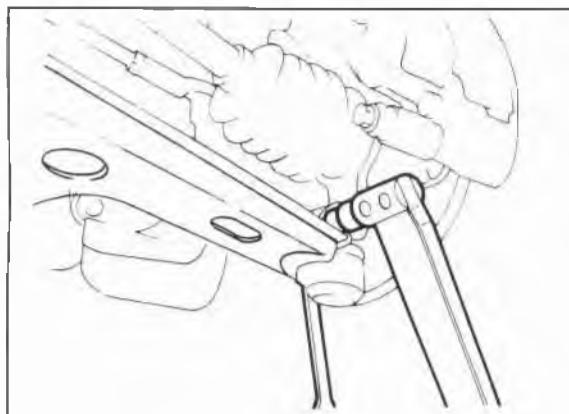
### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

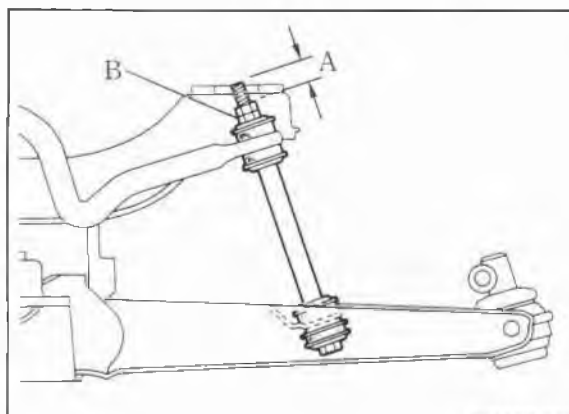
18. Install the tie-rod ends and cotter pins.

### Tightening torque:

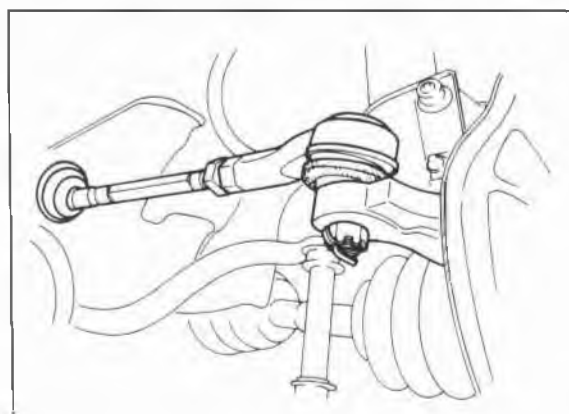
**29—44 N·m (3.0—4.5 m·kg, 22—33 ft·lb)**



76G07C-329

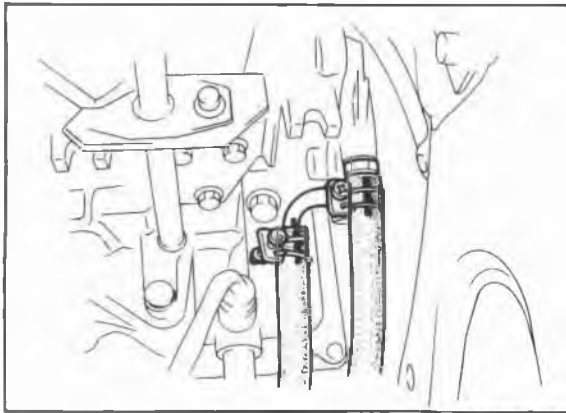


76G07C-330



76G07C-331





76G07C-332

19. Install the oil cooler outlet and inlet hoses.

**Note**

**Align the mating mark as shown.**

20. Install the splash shields.

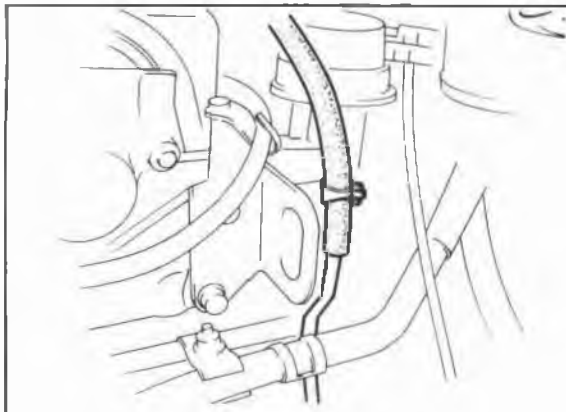
**Tightening torque:**

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

21. Install the front wheels.

**Tightening torque:**

**88—118 Nm (9—12 m-kg, 65—87 ft-lb)**



76G07C-333

22. Connect the vacuum hose.  
23. Connect the selector cable.

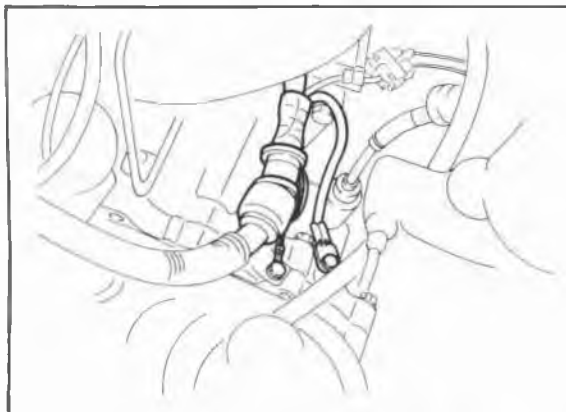
**Tightening torque:**

**Nut**

**44—64 Nm (4.5—6.5 m-kg, 33—47 ft-lb)**

**Bolts**

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**

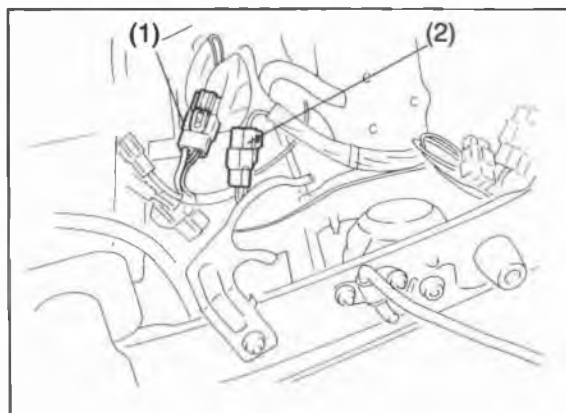


76G07C-334

24. Connect the ground wires to the transaxle case and oil pump.

**Tightening torque:**

**8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



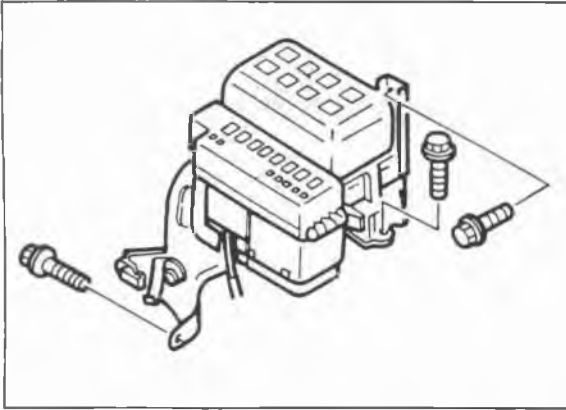
76G07C-335

25. Connect the connectors.

- (1) Inhibitor switch  
(2) Kick-down switch

26. Connect the speedometer cable.

## 7C INSTALLATION



76G07C-336

27. Connect the distributor lead.
28. Connect the main fuse block.

### Tightening torque:

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

29. Install the fresh air duct.
30. Install the battery carrier and battery.

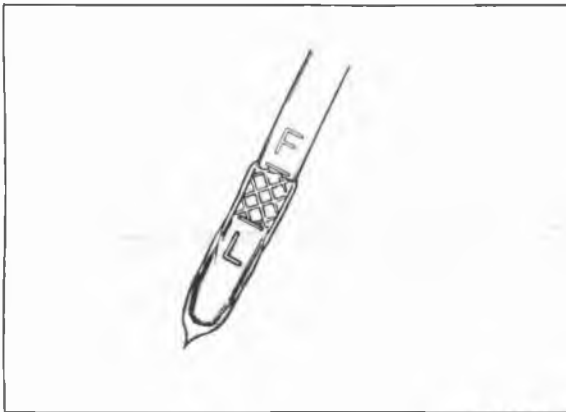
### Tghtening torque:

#### Bolts

**9—13 N·m (90—130 cm·kg, 78—113 in·lb)**

#### Nut

**5—7 N·m (50—70 cm·kg, 43—61 in·lb)**



76G07C-337

31. Pour in ATF and check the following:
  - (1) With the engine idling, check that the fluid level is between the F and L marks on the dipstick. (Refer to page 7C—25.)
  - (2) Check the manual linkage, and adjust if necessary. (Refer to page 7C—26.)
  - (3) Check the inhibitor switch operation. (Refer to page 7C—23.)
  - (4) Conduct a road test. (Refer to page 7C—18.)
  - (5) Check that there is no fluid leakage from the transaxle. (Refer to page 7C—25.)

## HYDRAULIC CIRCUIT

### OUTLINE

The flow of the individual hydraulic circuits are identified as listed below.

(Numbers indicate individual circuits)

Line pressure source .....	7
Control element operation system line pressure....	1,2,3,4,5,6,7,8,9,10,11,12
Auxiliary line pressure .....	13
Throttle system pressure .....	16,17,18,19
Governor system pressure.....	15
Torque converter system pressure .....	14

#### 1. Line pressure

The line pressure is the hydraulic pressure of the oil emitted from the oil pump after adjustment by the pressure regulator valve.

#### 2. Throttle pressure

Derived from the line pressure, the throttle pressure is the hydraulic pressure generated by the throttle valve which operates in conjunction with the intake manifold vacuum.

#### 3. Governor pressure

Also derived from the line pressure, the governor pressure is the hydraulic pressure which varies in conjunction with the vehicle's speed. It is controlled by the governor rotating together with the output shaft.

#### Note

#### Schematic symbols

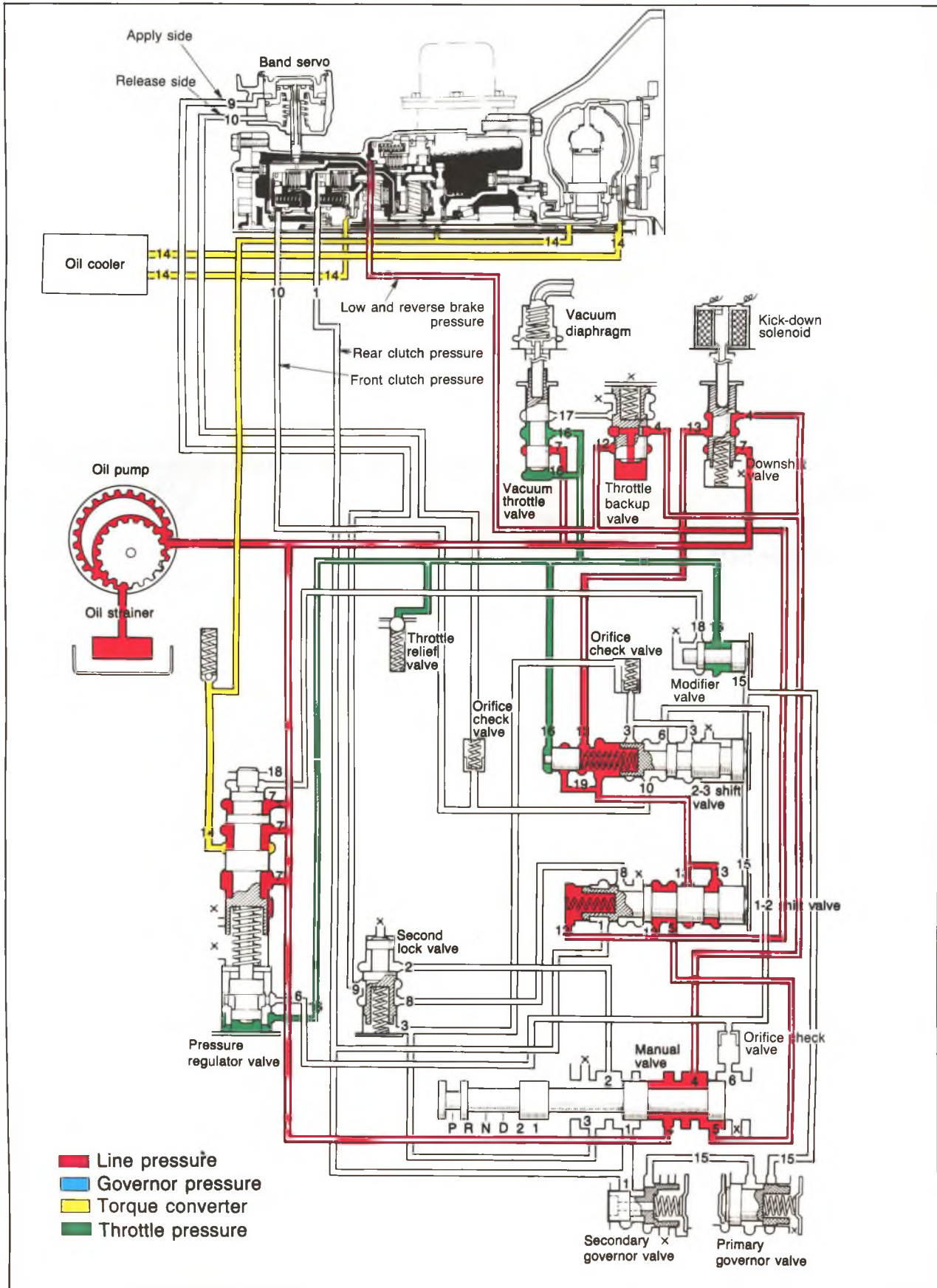
**X** : Drain

 : Orifice

76G07C-338

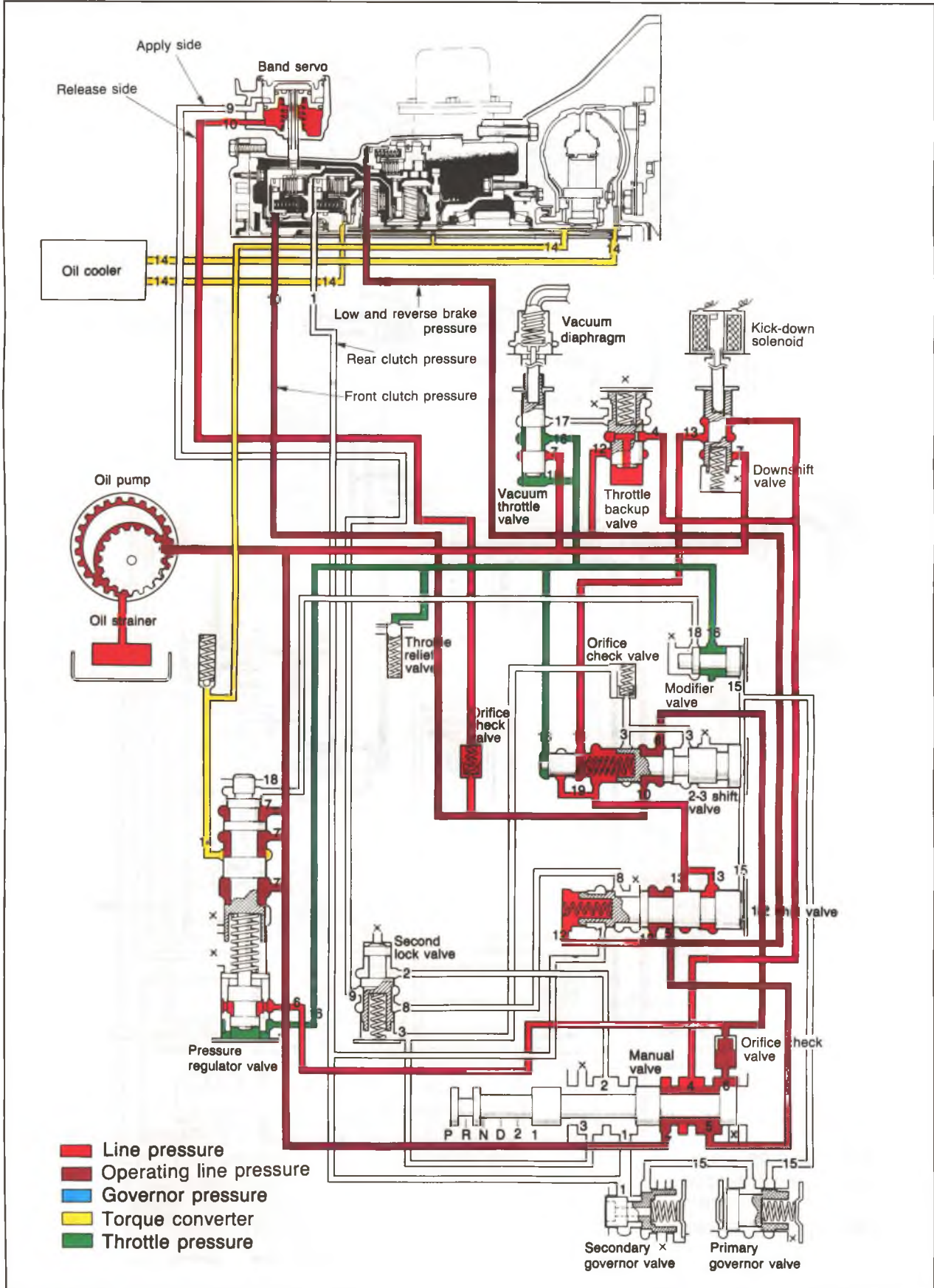
# 7C HYDRAULIC CIRCUIT

## P RANGE



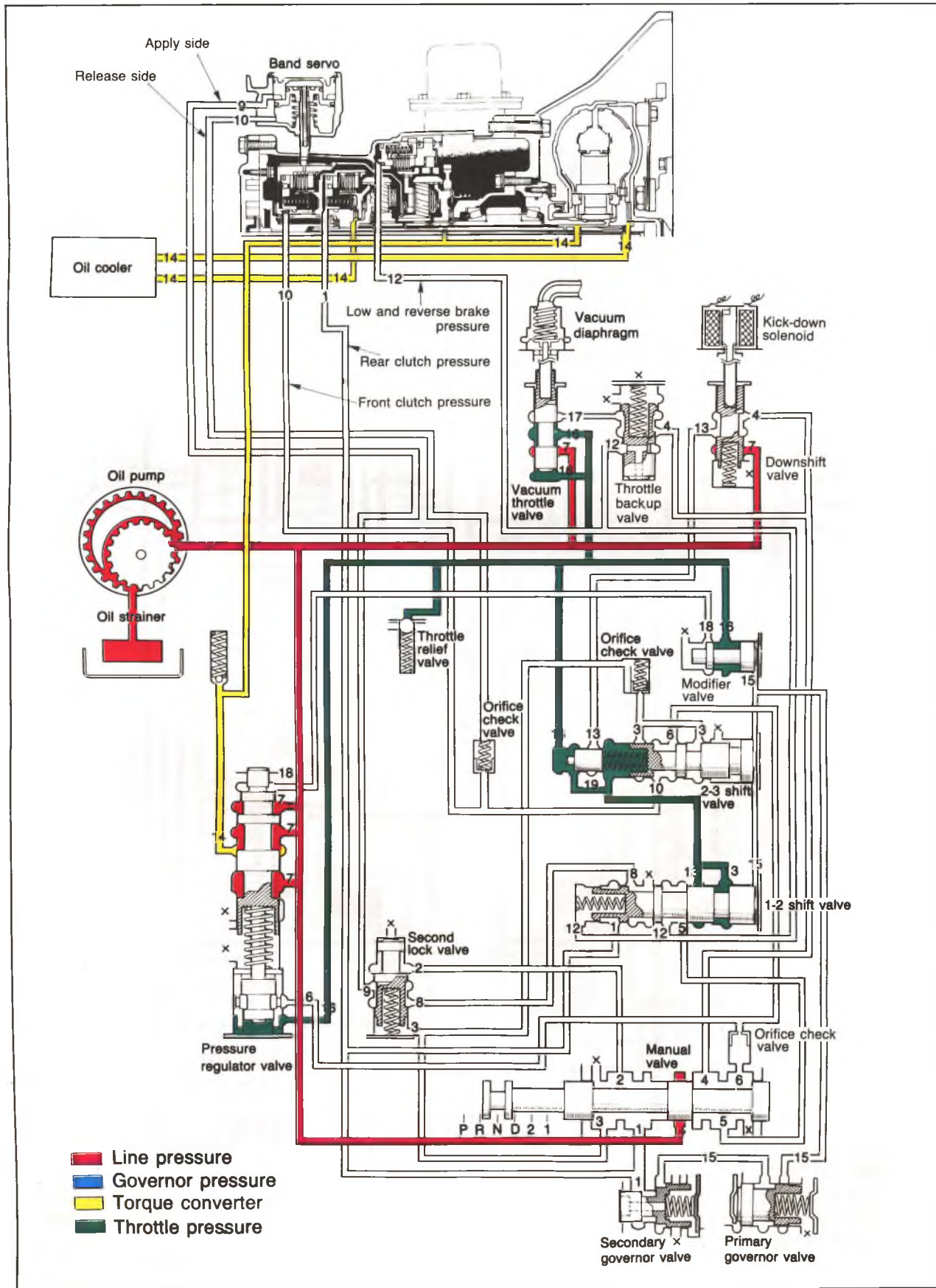
76G07C-339

## R RANGE



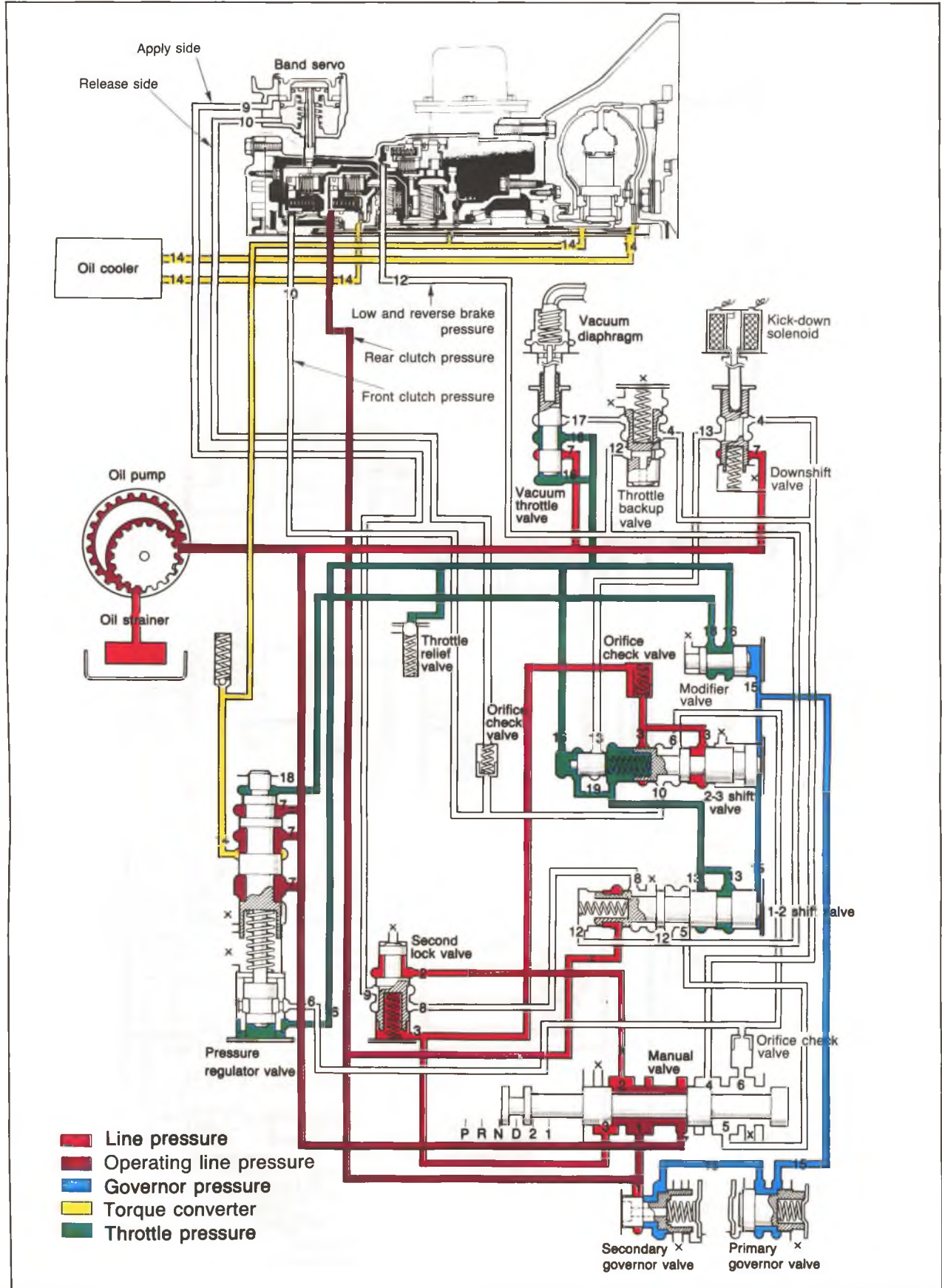
# 7C HYDRAULIC CIRCUIT

## N RANGE



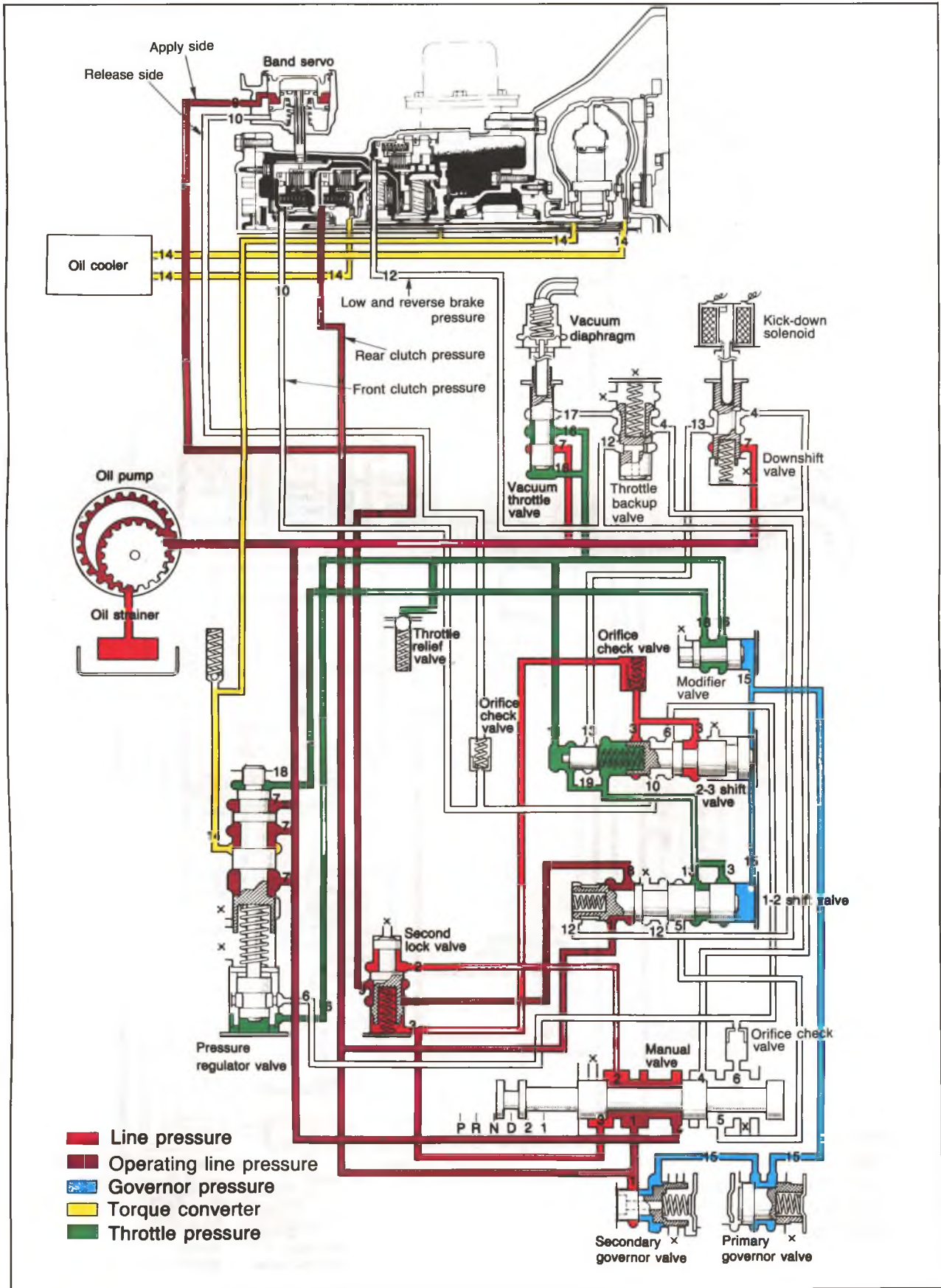
76G07C-341

## D RANGE (1ST GEAR)



# 7C HYDRAULIC CIRCUIT

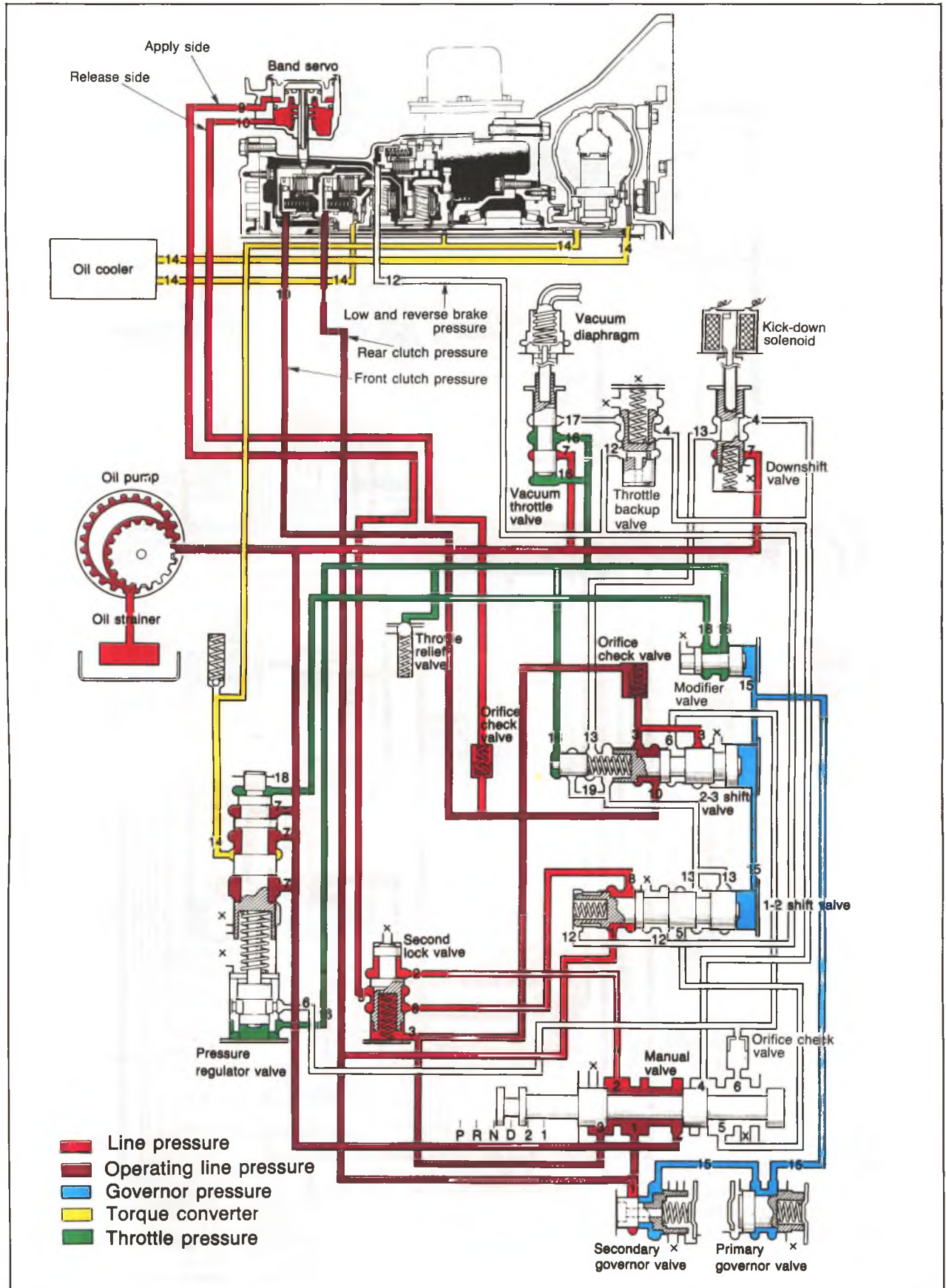
## D RANGE (2ND GEAR)



76G07C-343

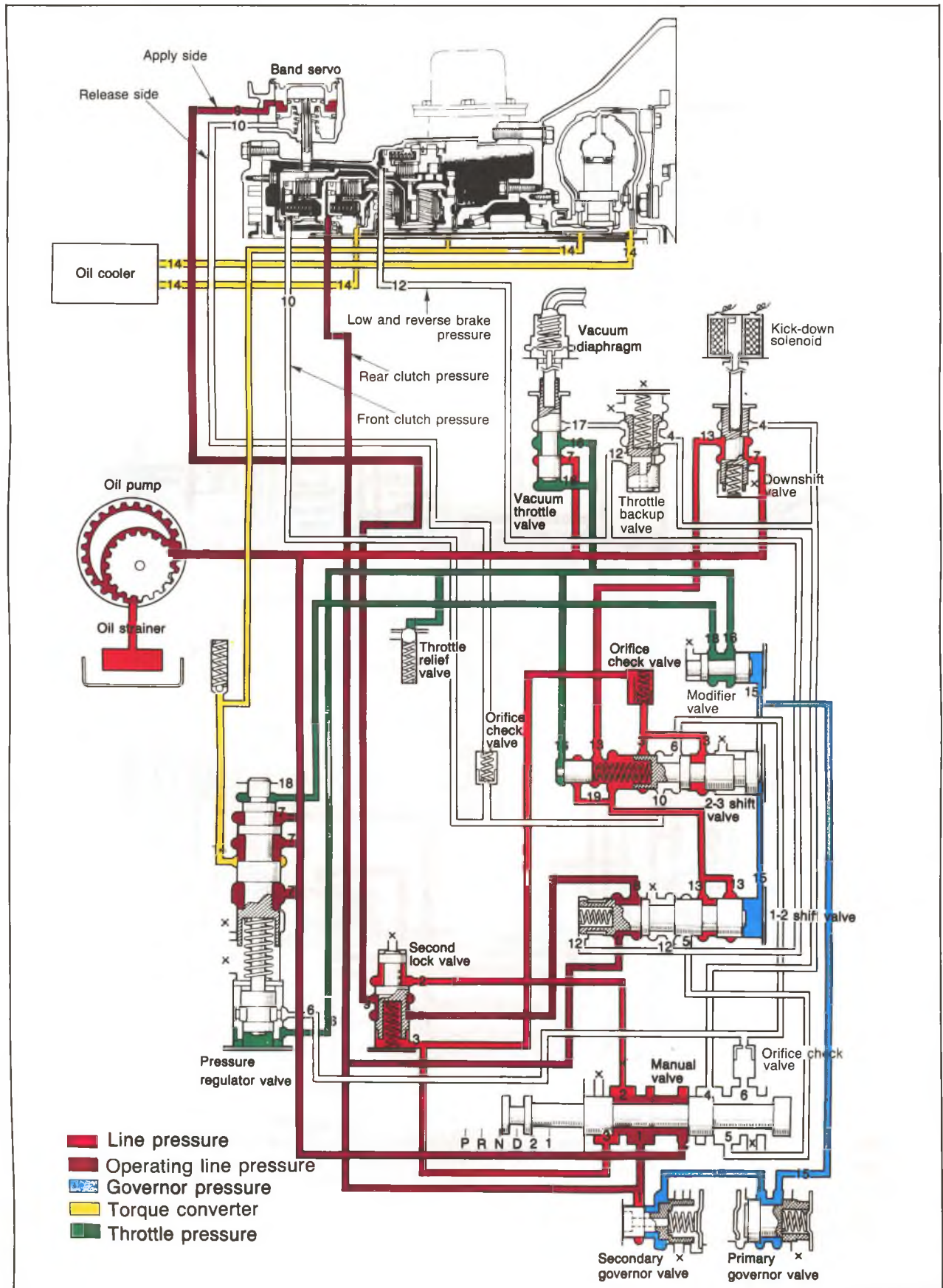


## D RANGE (3RD GEAR)



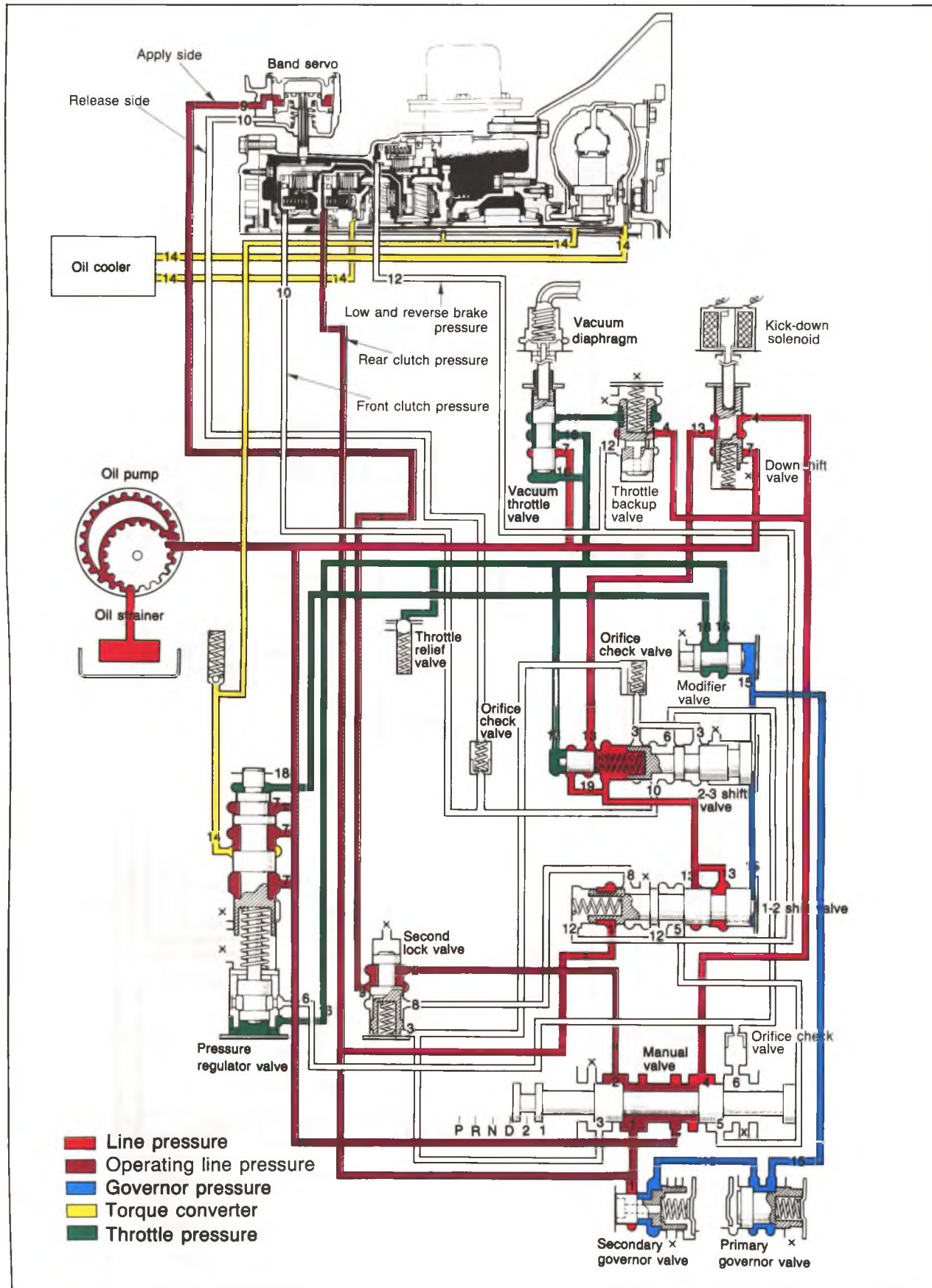
# 7C HYDRAULIC CIRCUIT

## D RANGE (KICK-DOWN; SHIFT VALVES IN 2ND POSITION)



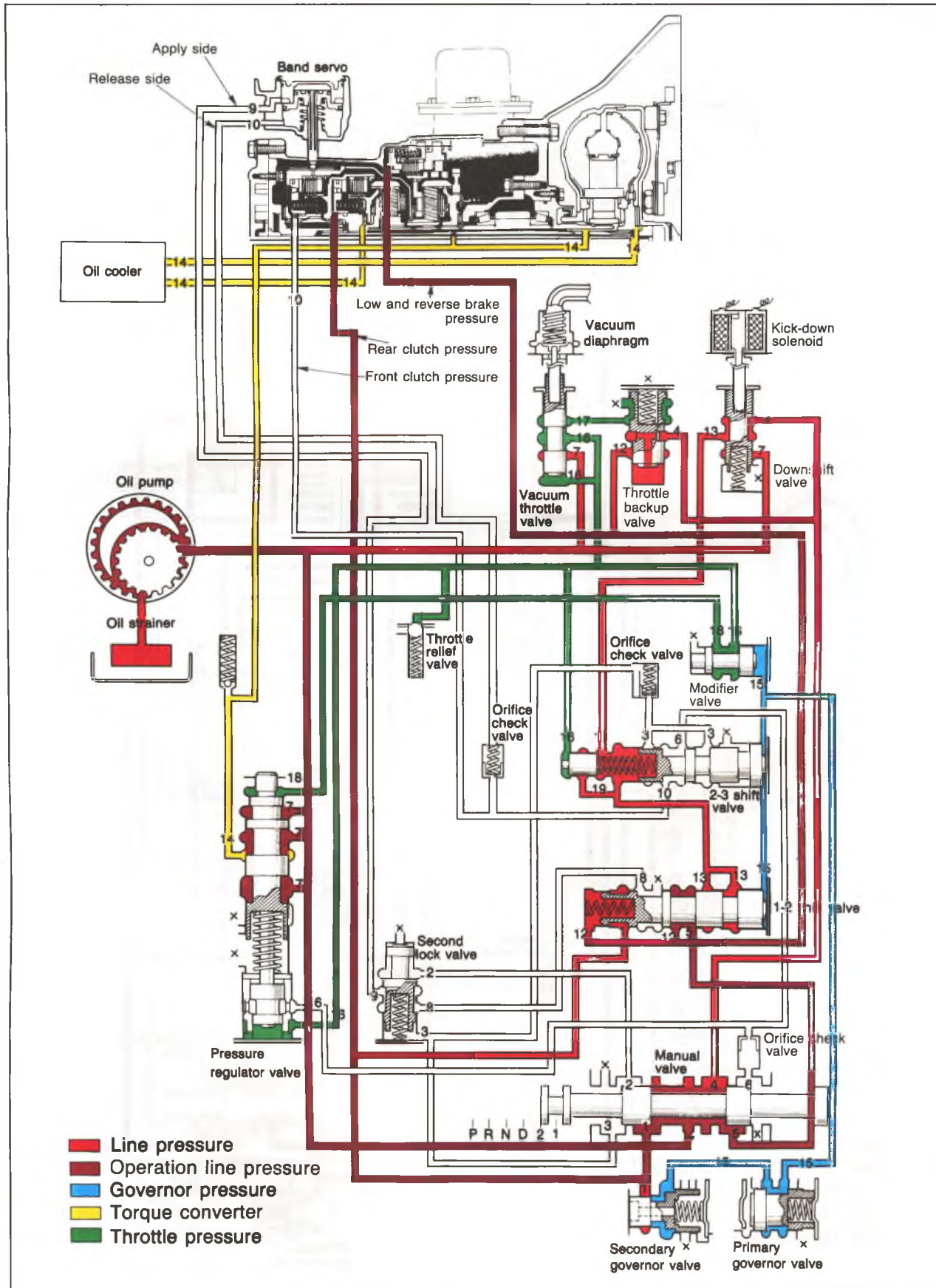
76G07C-345

## 2 RANGE (2ND GEAR)



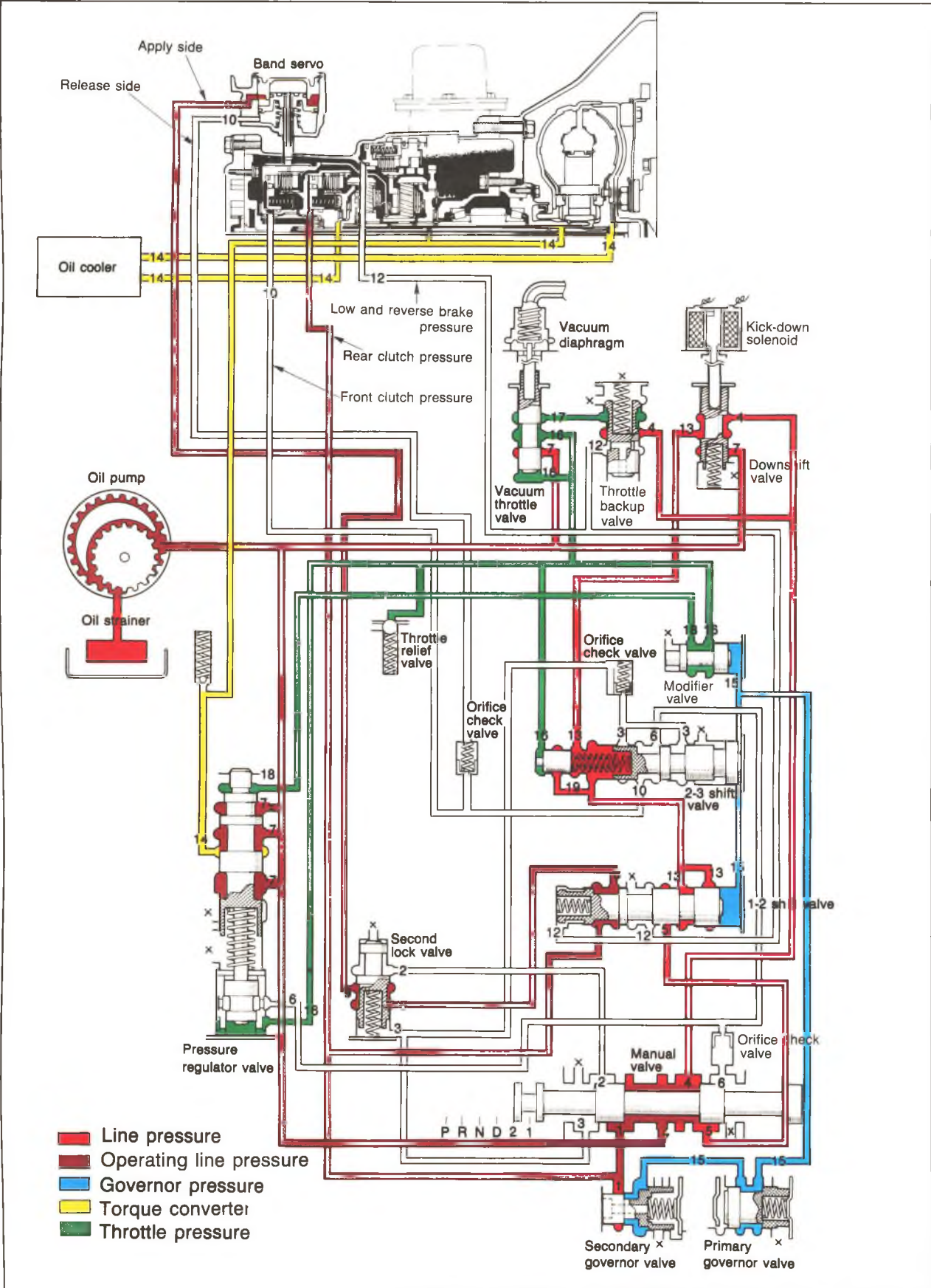
# 7C HYDRAULIC CIRCUIT

## 1 RANGE (1ST GEAR)



76G07C-347

1 RANGE (2ND GEAR)



- Line pressure
- Operating line pressure
- Governor pressure
- Torque converter
- Throttle pressure

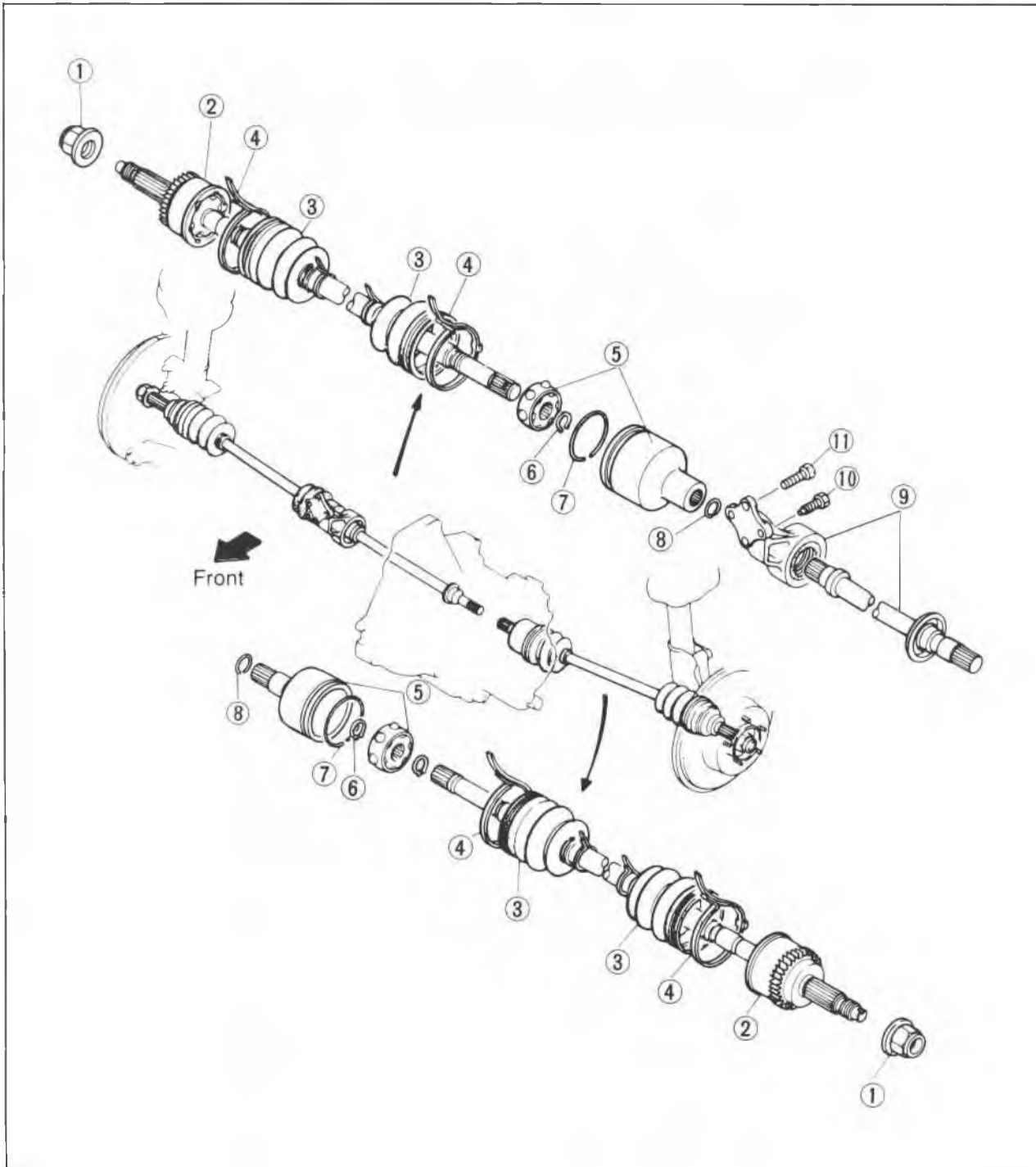
# FRONT AND REAR AXLES

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# 9 OUTLINE

## OUTLINE

### STRUCTURAL VIEW Driveshaft (MTX)



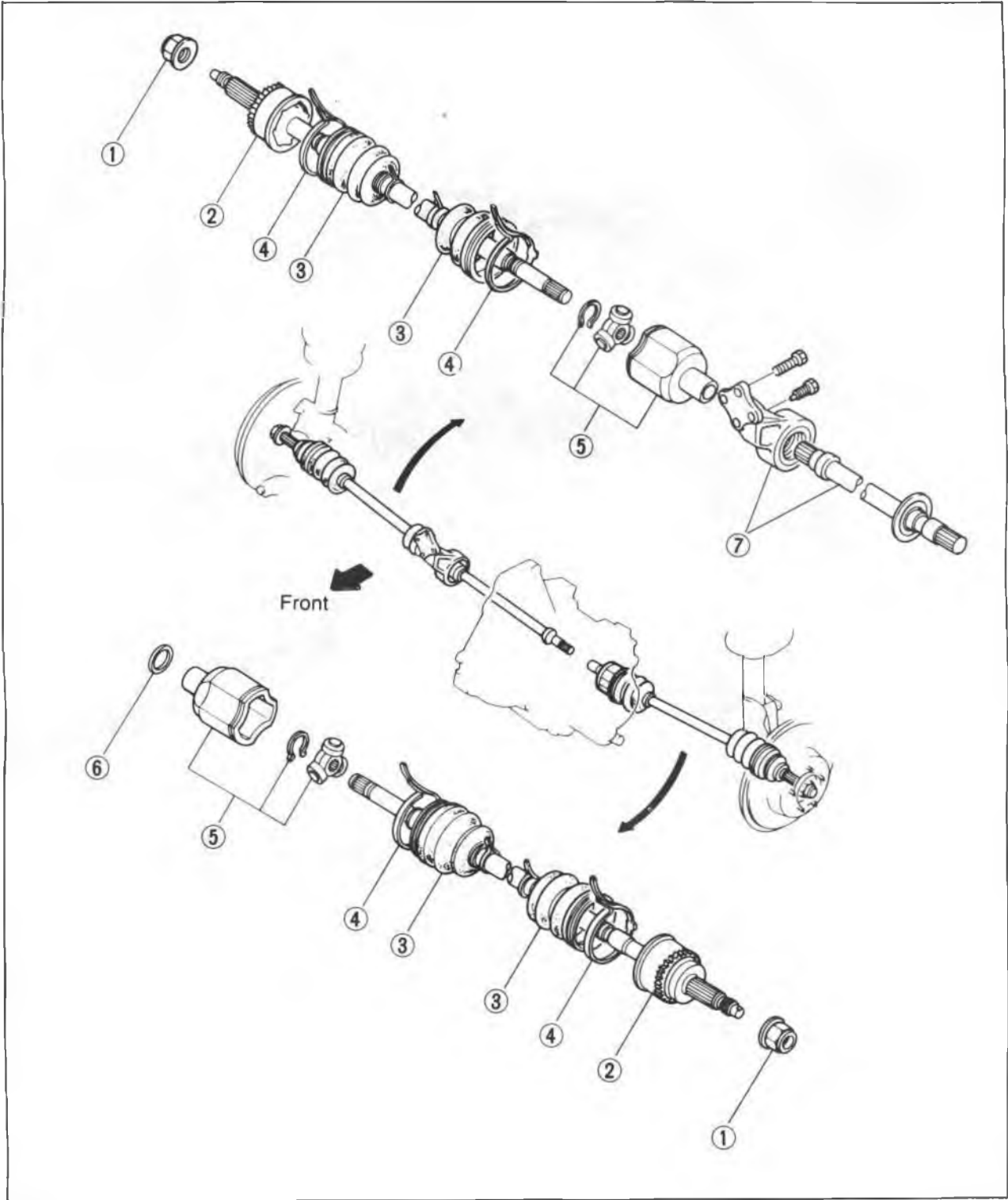
86U09X-080

- 1. Lock nut
- 2. Shaft and ball joint assembly
- 3. Boot
- 4. Boot band

- 5. Ball joint assembly (differential side)
- 6. Snap ring
- 7. Clip

- 8. Clip
- 9. Joint shaft assembly
- 10. Reamer bolt
- 11. Bracket mounting bolt

Driveshaft (ATX)



1. Lock nut  
2. Shaft and ball joint assembly

3. Boot  
4. Boot band  
5. Tripod joint assembly

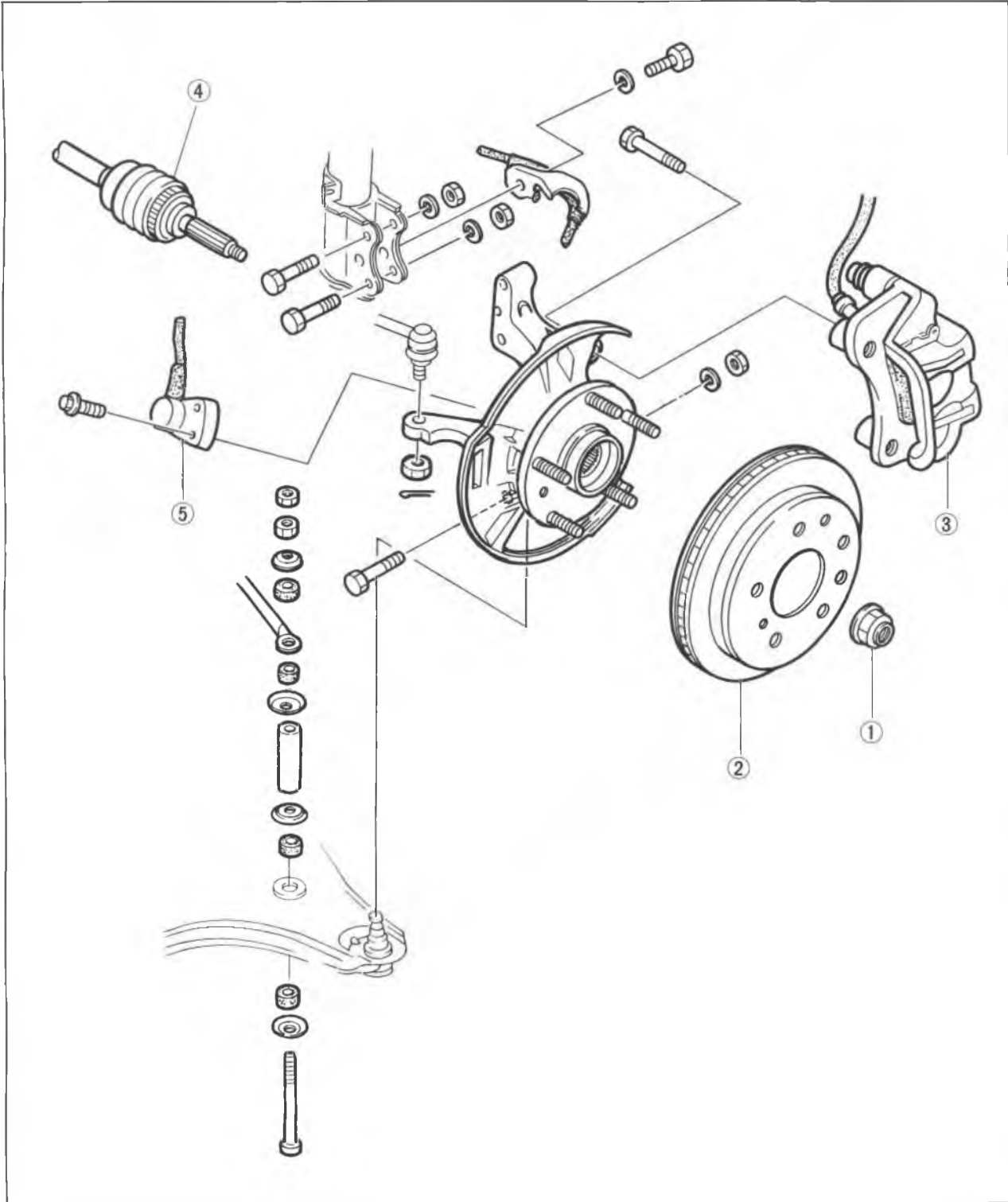
6. Clip  
7. Joint shaft assembly

86U09X-081



# 9 OUTLINE

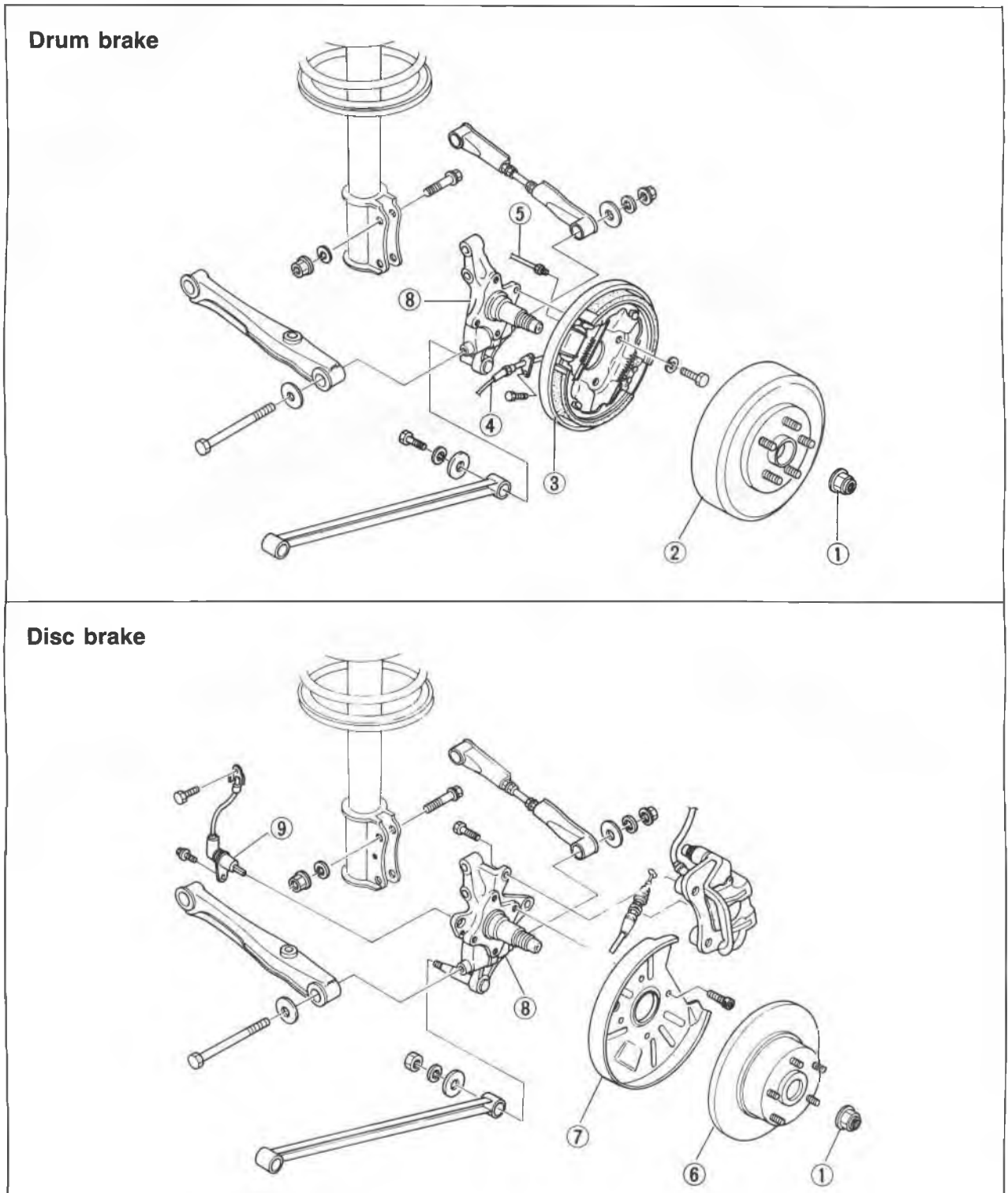
## Front Axle



86U09X-002

- 1. Lock nut
- 2. Disc plate
- 3. Caliper assembly
- 4. Driveshaft
- 5. Wheel speed sensor (ABS)

Rear Axle



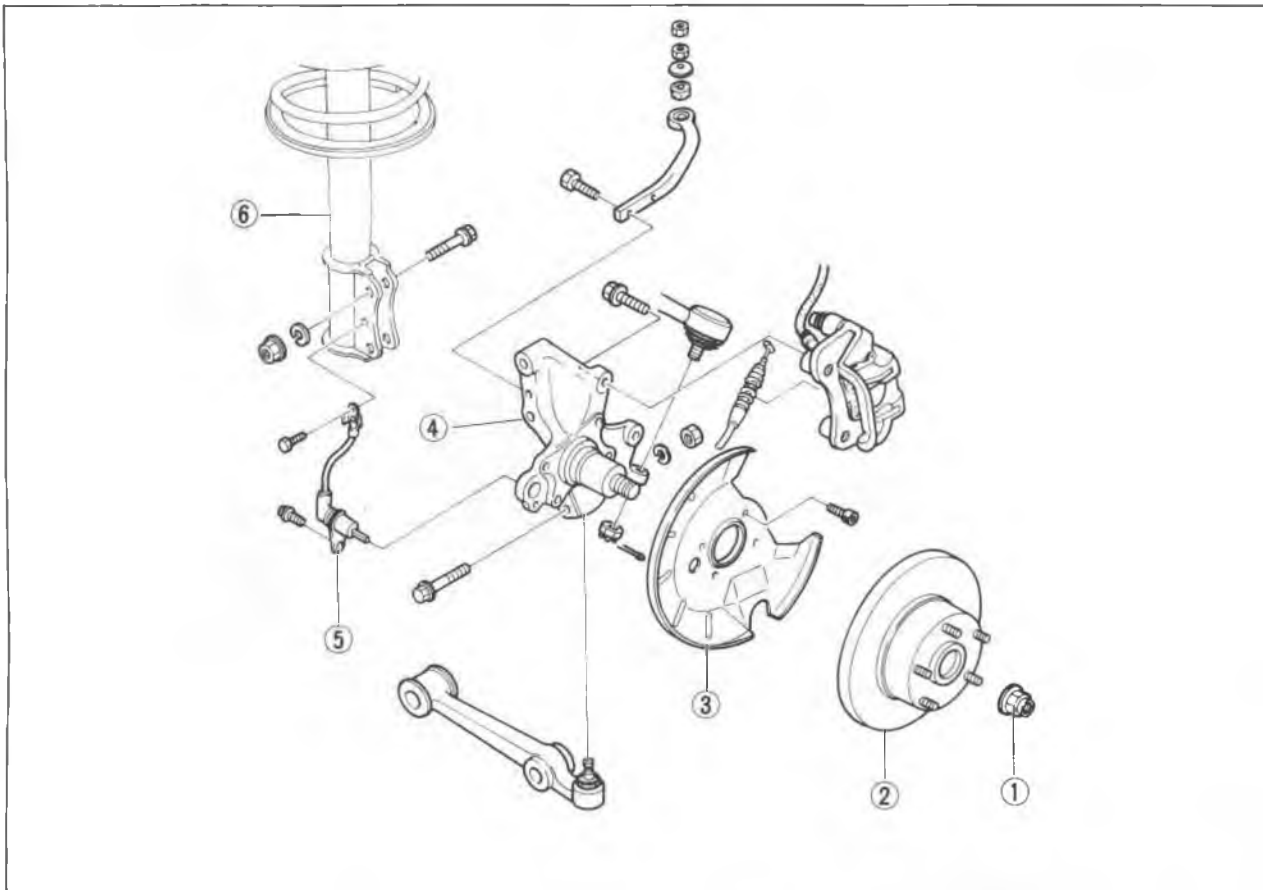
86U09X-003

- 1. Lock nut
- 2. Brake drum
- 3. Back plate
- 4. Parking cable
- 5. Brake pipe

- 6. Disc plate
- 7. Dust cover
- 8. Knuckle spindle
- 9. Wheel speed sensor (ABS)

# 9 OUTLINE

## Rear Axle (4WS)



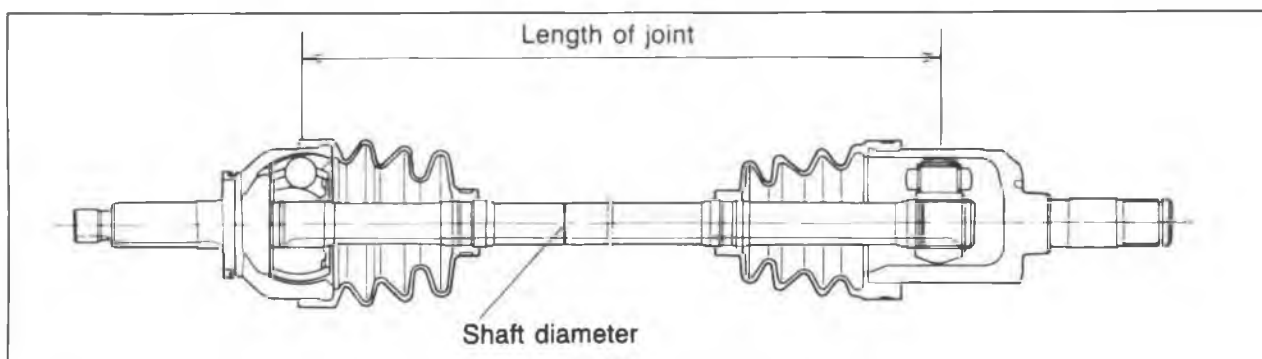
86U09X-004

- 1. Lock nut
- 2. Disc plate
- 3. Dust cover
- 4. Knuckle spindle
- 5. Wheel speed sensor (ABS)
- 6. Shock absorber

### SPECIFICATIONS

Item		Engine model	F6, F8, RF-N		FE, RF-CX	
			Right	Left	Right	Left
Length of joint (between centers of joints)	mm (in)	MTX	368.5 (14.51)	368.5 (14.51)	360.0 (14.17)	360.0 (14.17)
		ATX	359.5 (14.15)	359.5 (14.15)	355.5 (14.00)	355.5 (14.00)
Shaft diameter	mm (in)	MTX	23.0 (0.91)		24.0 (0.94)	
		ATX	23.0 (0.91)		24.0 (0.94)	

76G09X-001



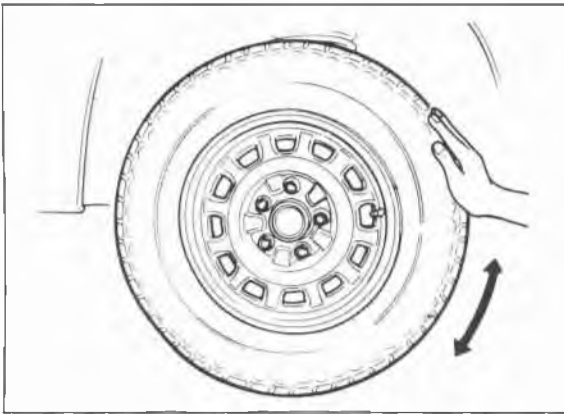
86U09X-082

**TROUBLESHOOTING GUIDE**

<b>Problem</b>	<b>Possible Cause</b>	<b>Remedy</b>	<b>Page</b>
<b>Faulty operation of driveshaft</b>	Broken ball joint Broken tri-pod joint Worn or seized joint	Replace Replace Replace	9—31 9—35 9—31, 35
<b>Abnormal noise from driveshaft</b>	Insufficient grease in joint or spline Excessive backlash on spline Worn joint	Add or replace Replace Replace	9—33, 36 9—31, 35 9—31, 35
<b>Steering wheel pulls. (Steering wheel pulls toward either right or left side)</b>	Bent steering linkage Fatigued coil spring Lower arm bushing worn or damaged Bent knuckle Bent lower arm or loose mounting Incorrect toe-in adjustment Improper tire air pressure Unevenly worn tires (left and right tires) Brake dragging	Refer to Section 10 Refer to Section 13 Refer to Section 13 Replace Refer to Section 13 Refer to Section 13 Refer to Section 12 Refer to Section 12 Refer to Section 11	— — — 9—11 — — — — —
<b>Unstable handling</b>	Bent steering linkage Joint in steering system worn or damaged Incorrect steering pinion preload adjustment Fatigued coil spring Faulty shock absorber(s) Lower arm bushing worn or damaged Incorrect toe-in adjustment (front or rear) Improper tire air pressure Wheel(s) bent or unbalanced	Refer to Section 10 Refer to Section 10 Refer to Section 10 Refer to Section 13 Refer to Section 13 Refer to Section 13 Refer to Section 13 Refer to Section 12 Refer to Section 12	— — — — — — — — —
<b>Excessive steering wheel play</b>	Faulty front wheel bearing Incorrect steering pinion preload adjustment Rack and pinion worn Joint in steering system worn or damaged Lower arm bushing worn or damaged	Adjust Refer to Section 10 Refer to Section 10 Refer to Section 10 Refer to Section 13	9—11 — — — —
<b>Tires excessively worn or worn unevenly</b>	Incorrect toe-in adjustment Improper tire air pressure Unbalanced wheel(s)	Refer to Section 13 Refer to Section 12 Refer to Section 12	— — —
<b>Abnormal noise from axle</b>	Faulty wheel bearing	Replace	9—11,18,23

86U09X-006

## 9 FRONT AXLE



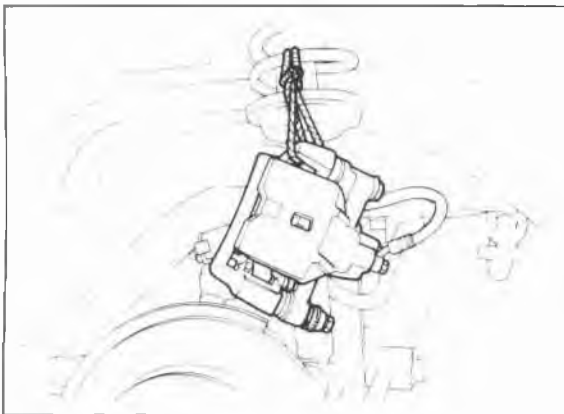
69G09X-011

### FRONT AXLE

#### ON-VEHICLE MAINTENANCE

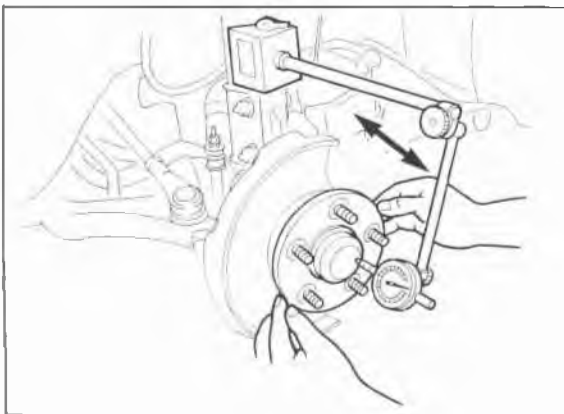
##### Wheel Bearing Play

1. Jack up the vehicle and support it with safety stands.
2. Check that there is no abnormal noise and that the tire rotates smoothly when rotated by hand.



69G09X-012

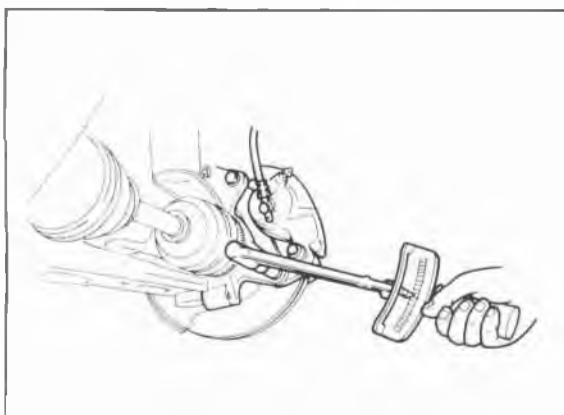
3. Remove the wheel.
4. Remove the caliper assembly and suspend it using a rope.



76G09X-002

5. Position a dial indicator against the hub cap, then push and pull the front wheel hub by hand in the axial direction and measure the end play of the wheel bearing.  
If the end play exceeds specification, replace the wheel bearing.

**End play: 0.2 mm (0.0079 in) max**



86U09X-008

6. Install the caliper assembly.

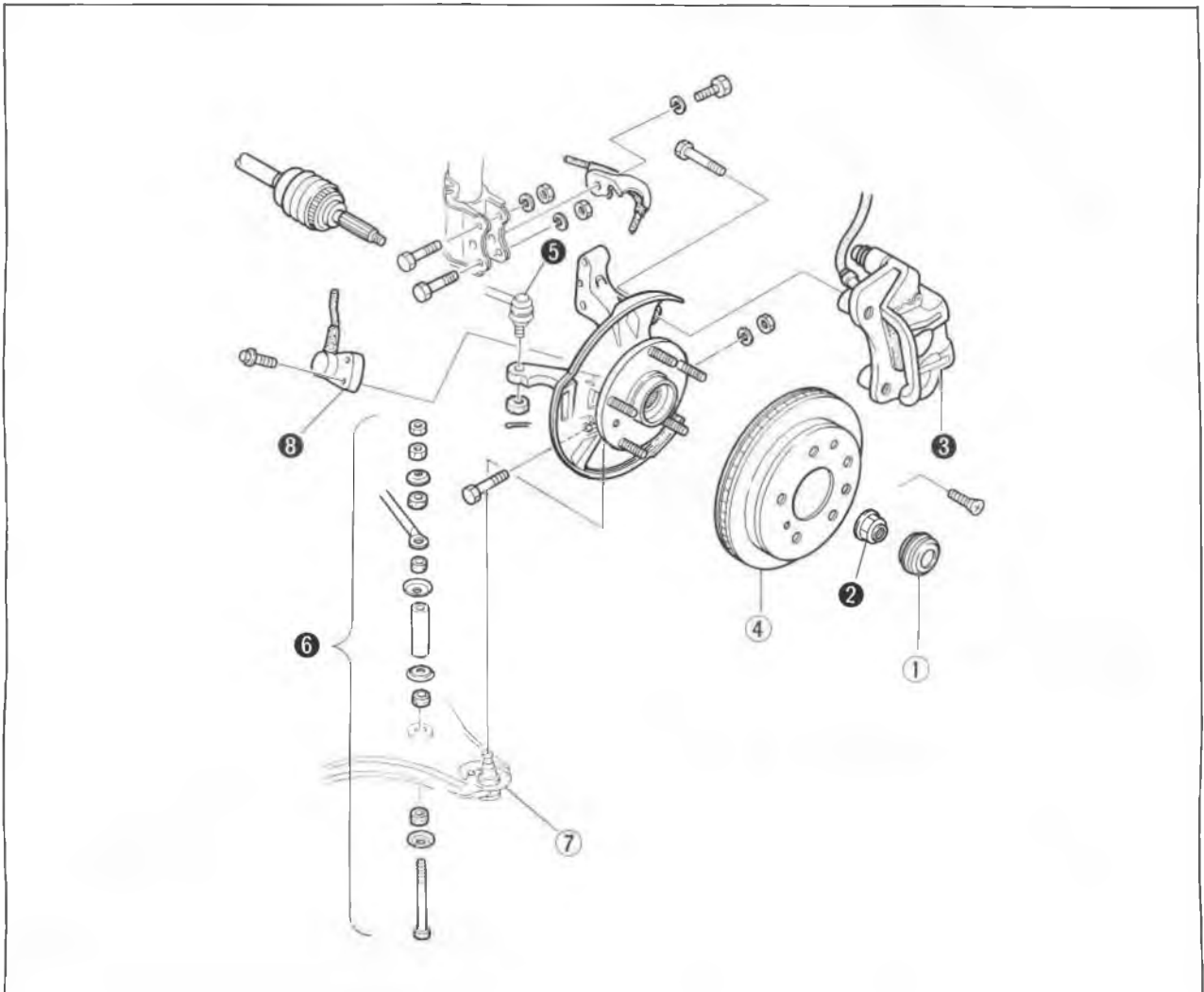
**Tightening torque: 78—98 N·m  
(8.0—10.0 m·kg, 58—72 ft·lb)**

7. Install the wheel.

**Tightening torque: 88—118 N·m  
(9.0—12.0 m·kg, 65—87 ft·lb)**

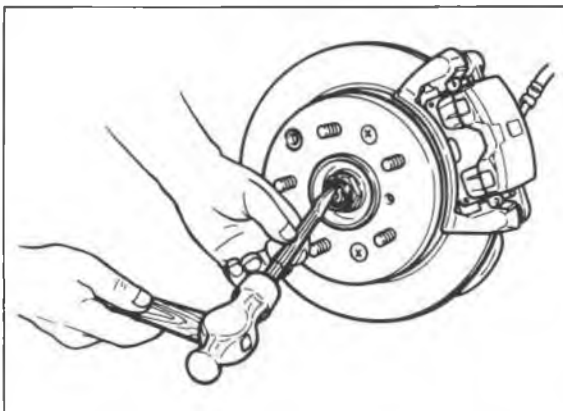
## REMOVAL

Removal in the sequence shown in the figure referring to the removal note for the specially marked parts.



86U09X-009

- |                     |                             |
|---------------------|-----------------------------|
| 1. Hub cap          | 6. Stabilizer               |
| 2. Lock nut         | 7. Lower arm                |
| 3. Caliper assembly | 8. Wheel speed sensor (ABS) |
| 4. Disc plate       | 9. Knuckle                  |
| 5. Tie-rod end      |                             |



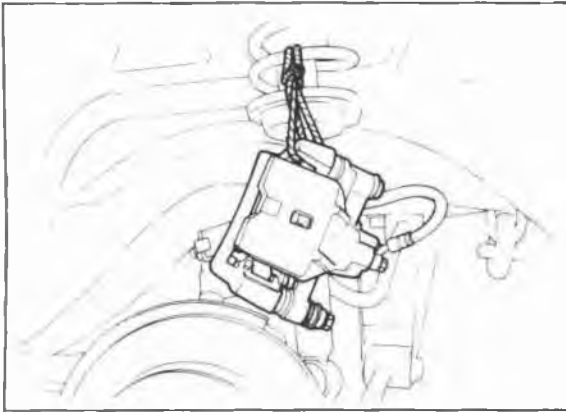
86U09X-010

### Removal Note

#### Lock nut

1. Uncrimp the tab of the lock nut.

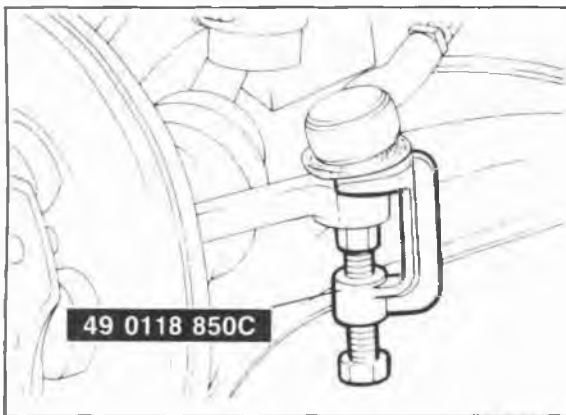
## 9 FRONT AXLE



86U09X-011

### Caliper assembly

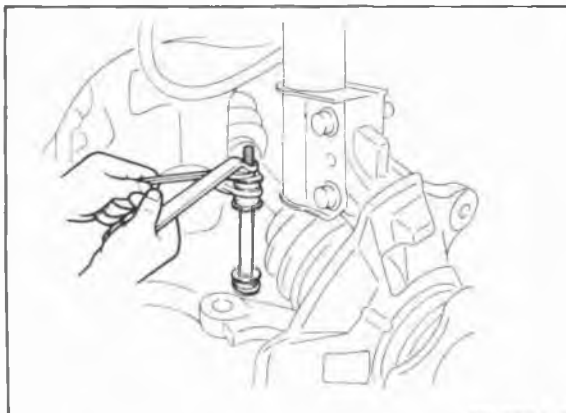
Remove the caliper assembly and suspend it.



86U09X-012

### Tie-rod end

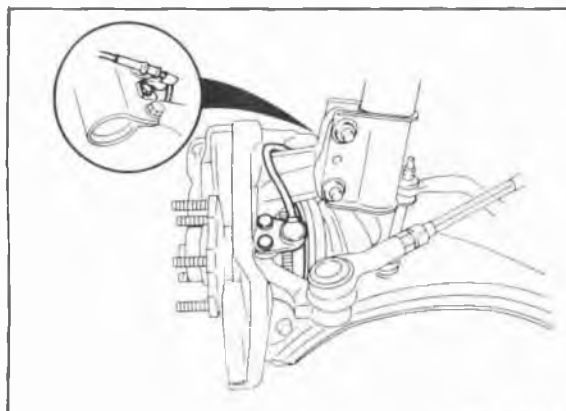
Disconnect the tie-rod end with the **SST**.



86U09X-013

### Stabilizer

Remove the stabilizer bolt.



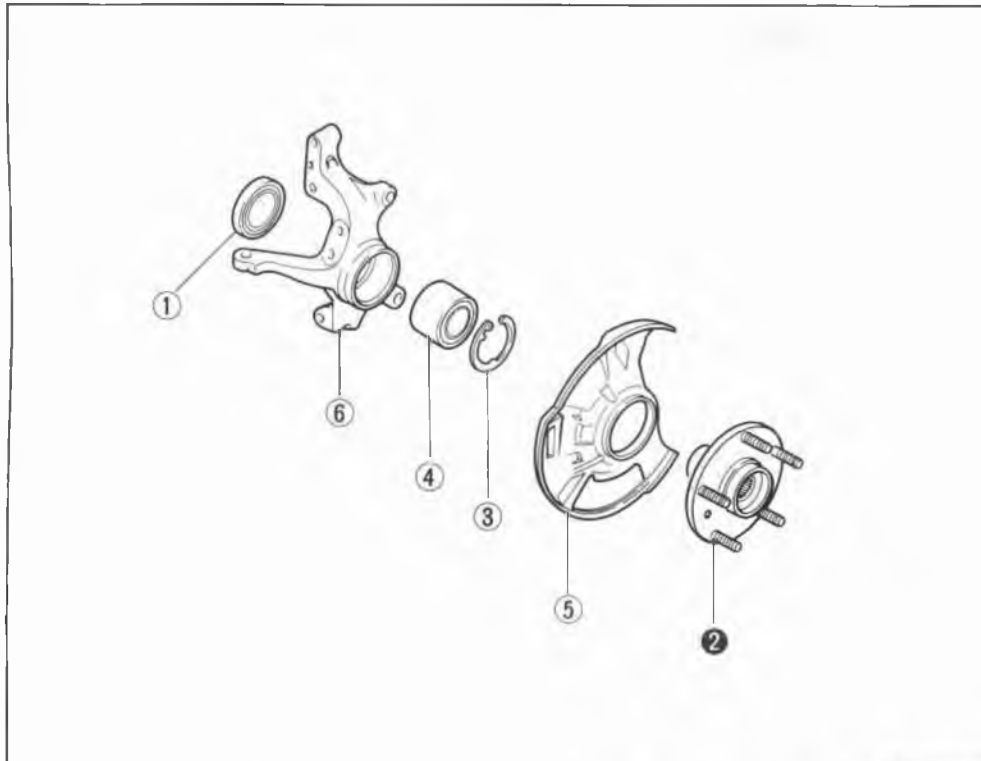
86U09X-014

### Wheel speed sensor (ABS)

Remove the speed sensor.

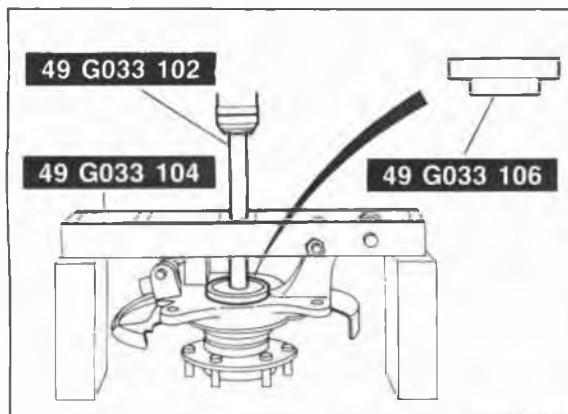
## DISASSEMBLY

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Oil seal
2. Front wheel hub
3. Retaining ring
4. Front wheel bearing
5. Dust cover
6. Knuckle

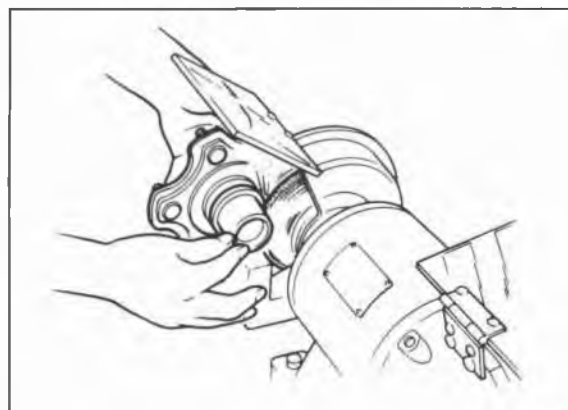
86U09X-015



86U09X-083

### Disassembly Note Front wheel hub

Remove the front wheel hub with the **SST**.



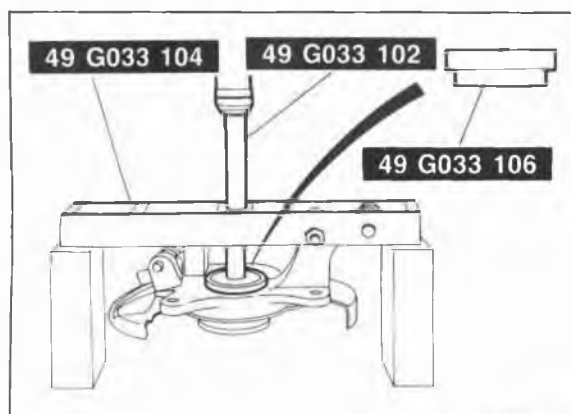
86U09X-086

### Note

If the bearing inner race remains on the front wheel hub, grind a section of the bearing inner race to approx. 0.5 mm (0.0197 in). Then remove it with a chisel.



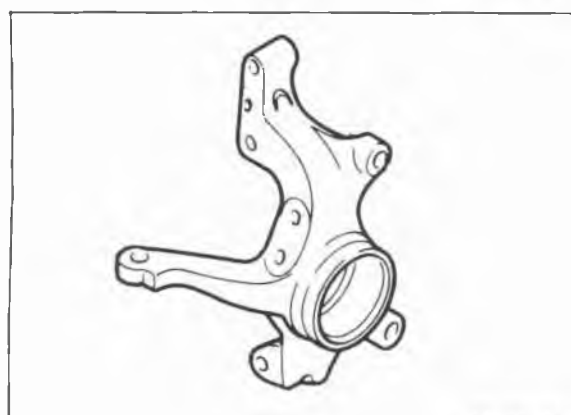
## 9 FRONT AXLE



86U09X-016

### Front wheel bearing

Remove the front wheel bearing with the **STT**.

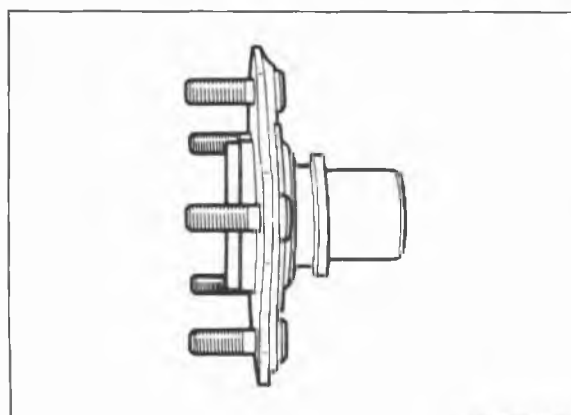


86U09X-084

### INSPECTION

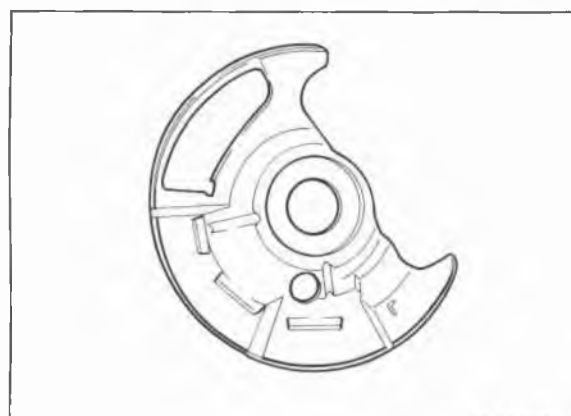
Check as described below, replace parts if necessary.

1. Check the knuckle for cracks or damage.



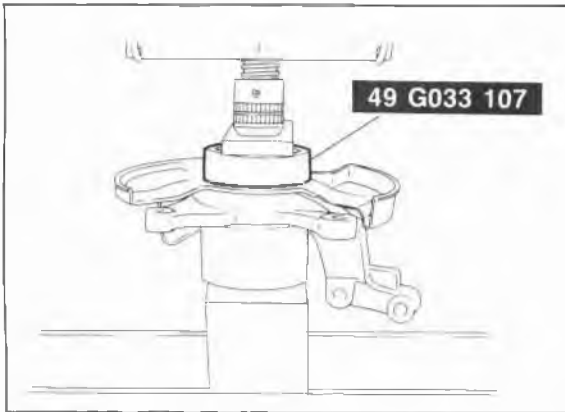
86U09X-098

2. Check the front wheel hub for seizure, cracks or damage.

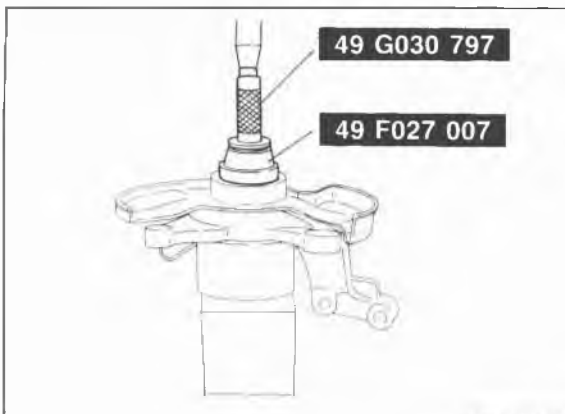


69G09X-084

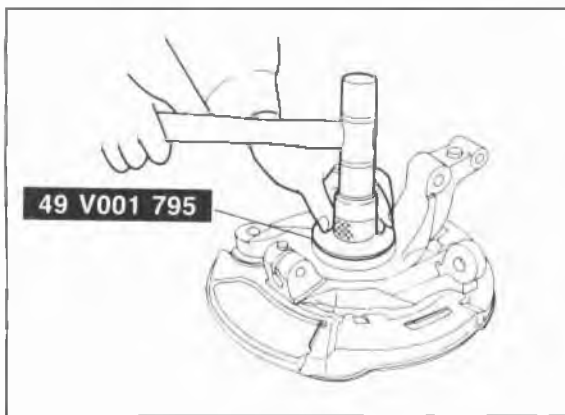
3. Check the dust cover for cracks or damage.



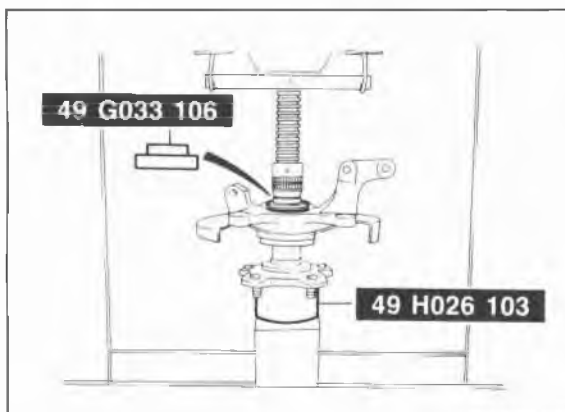
86U09X-017



86U09X-018



86U09X-019



86U09X-020

## ASSEMBLY

1. Install new hub bolts. (If applicable)
2. Install a new dust cover with the **SST**.

3. Install a new front wheel bearing with the **SST**.

4. Install the retaining ring.
5. Install a new oil seal with the **SST**.

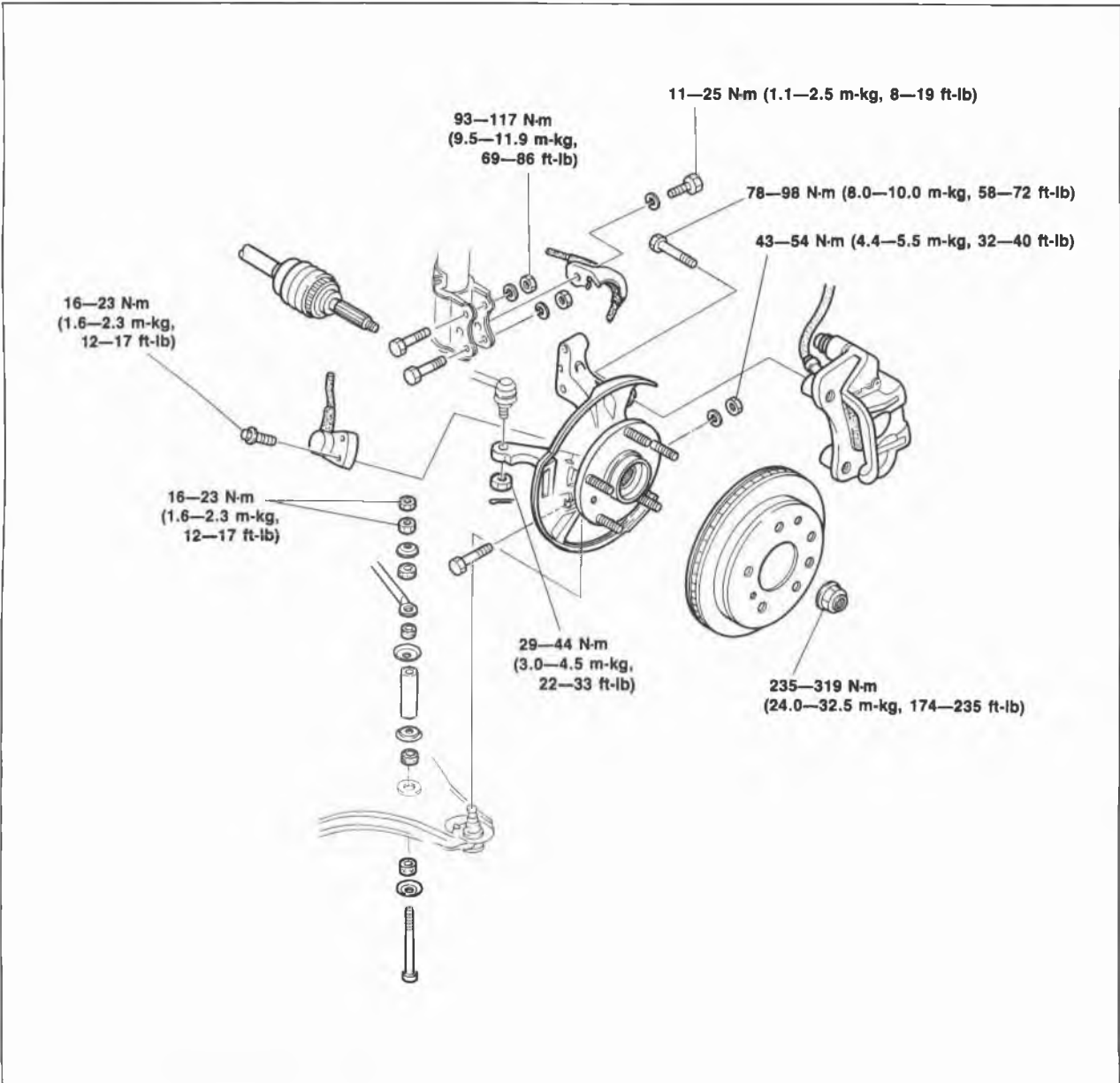
### Note

**Apply grease to the oil seal lip.**

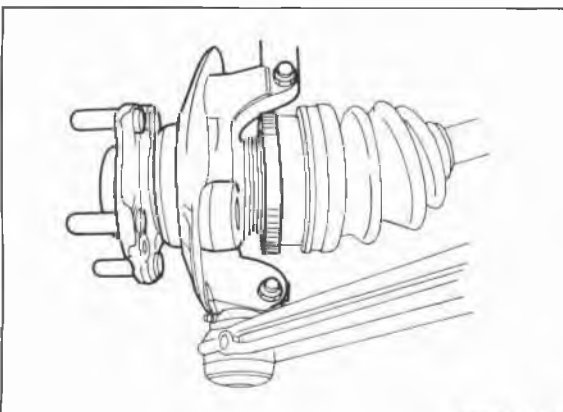
6. Install the front wheel hub with the **SST**.

# 9 FRONT AXLE

## INSTALLATION Torque Specifications



86U09X-021



86U09X-022

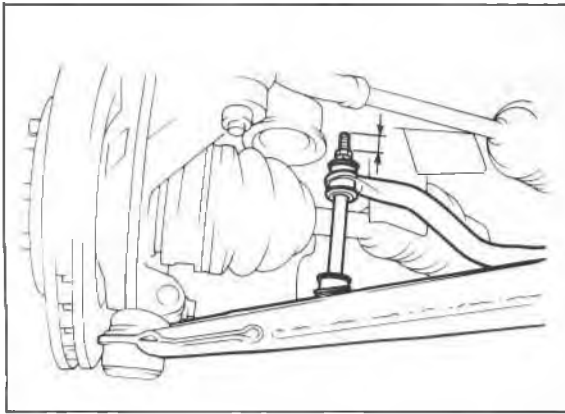
1. Install the knuckle to the shock absorber.

**Tightening torque: 93—117 N-m  
(9.5—11.9 m-kg, 69—86 ft-lb)**

2. Install the lower arm ball-joint.

**Tightening torque: 43—54 N-m  
(4.4—5.5 m-kg, 32—40 ft-lb)**

3. Install the driveshaft.

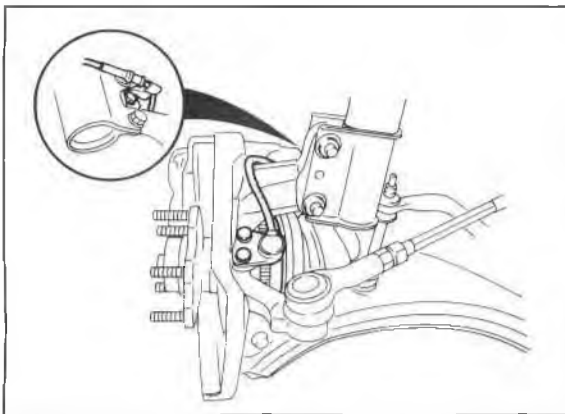


86U09X-023

4. Install the stabilizer.

**Dimension: 20.1 mm (0.79 in)**

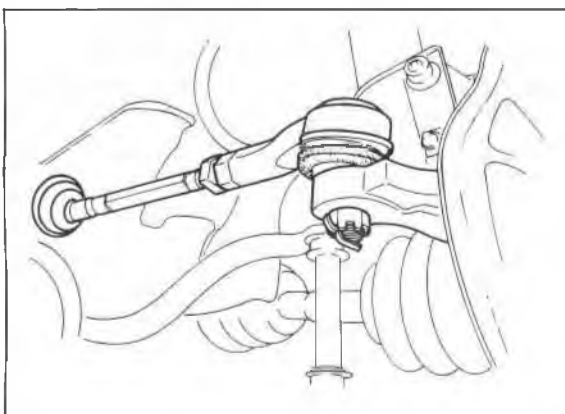
**Tightening torque: 16—23 N·m  
(1.6—2.3 m·kg, 12—17 ft·lb)**



86U09X-024

5. Install the wheel speed sensor. (ABS)

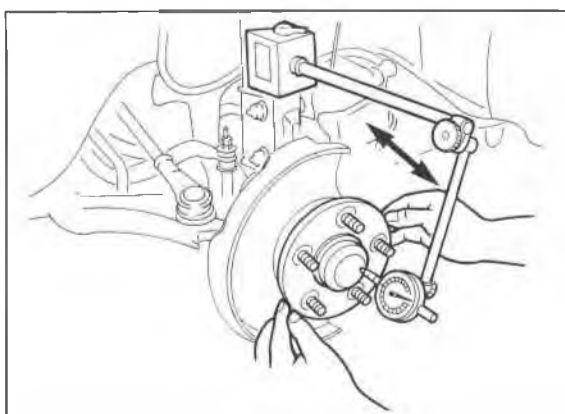
**Tightening torque: 16—23 N·m  
(1.6—2.3 m·kg, 12—17 ft·lb)**



86U09X-025

6. Install the tie-rod end.

**Tightening torque: 29—44 N·m  
(3.0—4.5 m·kg, 22—33 ft·lb)**



86U09X-026

7. Check the end play. (Refer to page 9—8)

**End play: 0.2 mm (0.0079 in) max.**

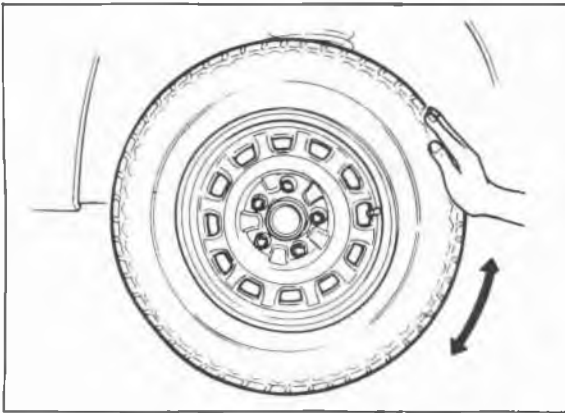
8. Stake the lock nut to groove.  
9. Install the caliper assembly.

**Tightening torque: 78—98 N·m  
(8.0—10.0 m·kg, 58—72 ft·lb)**

10. Install the wheel.

**Tightening torque: 88—118 N·m  
(9.0—12.0 m·kg, 65—87 ft·lb)**

## 9 REAR AXLE



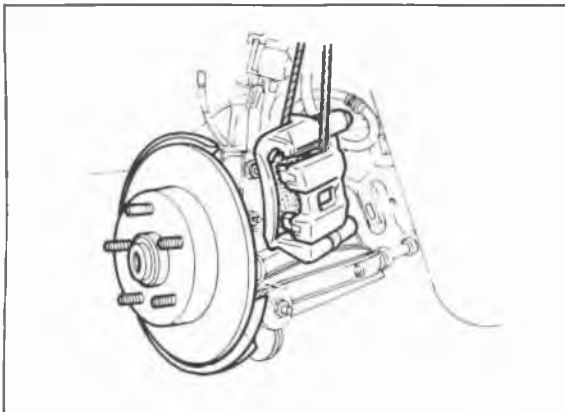
86U09X-027

### REAR AXLE

#### ON-VEHICLE MAINTENANCE

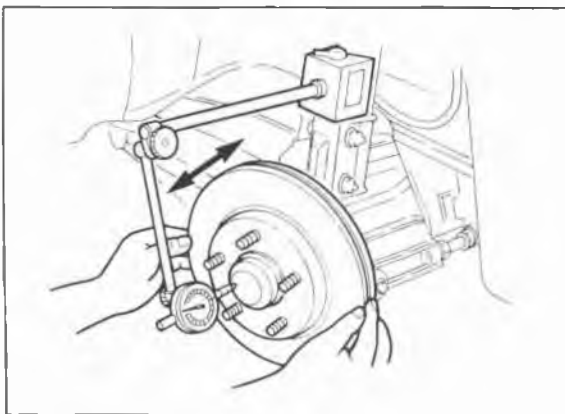
##### Wheel Bearing Play

1. Jack up the vehicle and support it with safety stands.
2. Check that there is no abnormal noise and that the tire rotates smoothly when rotated by hand.



69G09X-012

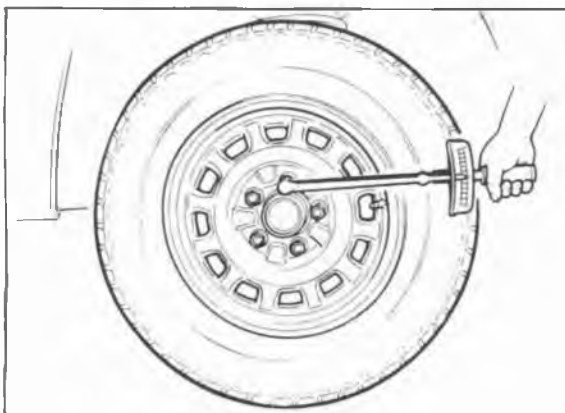
3. Remove the wheel.
4. Remove the caliper assembly and suspend it using a rope.



76G09X-003

5. Position a dial indicator against the hub cap, then push and pull the front wheel hub or brake drum by hand in the axial direction and measure the end play of the wheel bearing.  
If the end play exceeds specification, replace the wheel bearing.

**End play: 0.2 mm (0.0079 in) max.**



86U09X-029

6. Install the caliper assembly. (Disc)

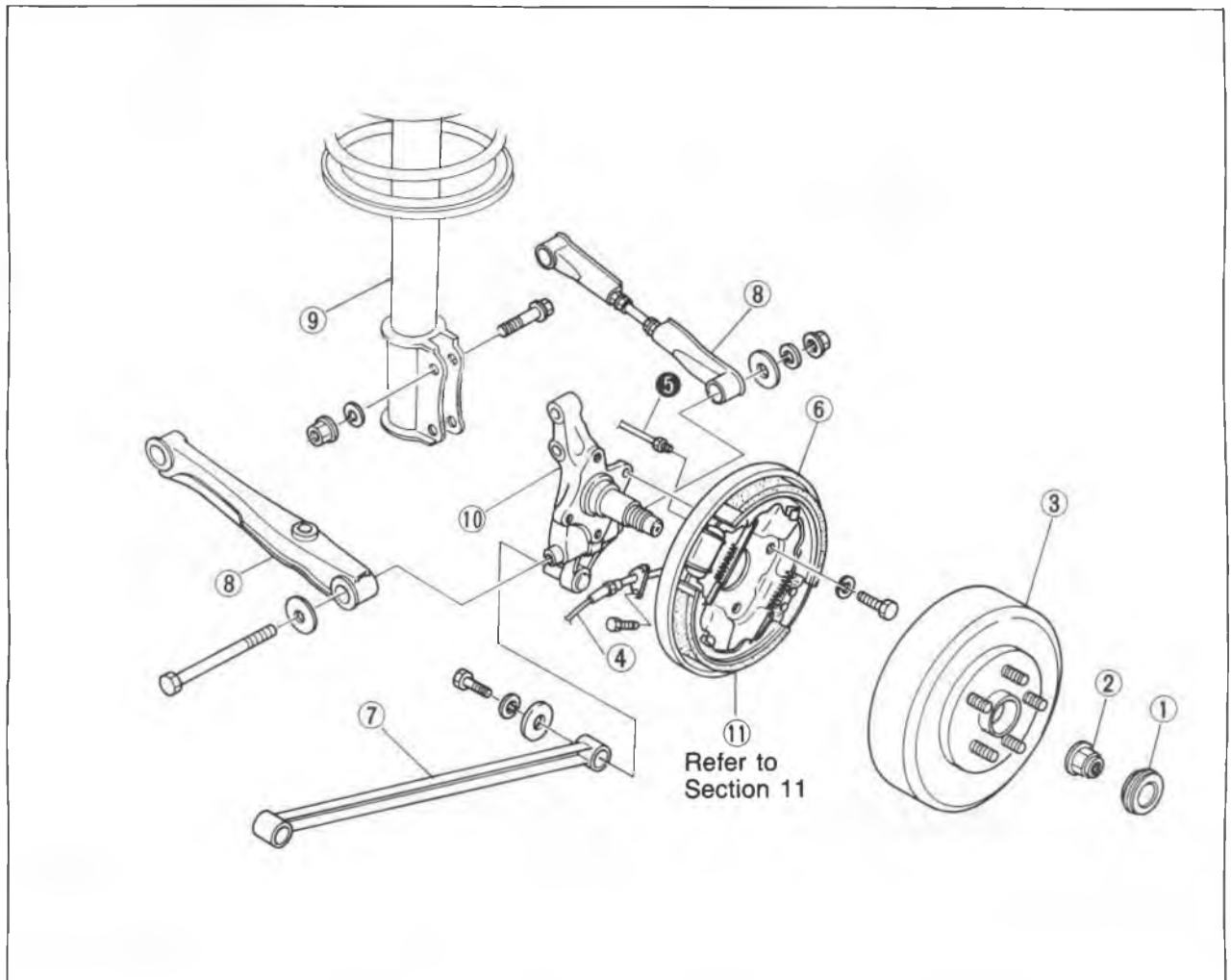
**Tightening torque: 45—67 N·m  
(4.6—6.8 m·kg, 33—49 ft·lb)**

7. Install the wheel.

**Tightening torque: 88—118 N·m  
(9.0—12.0 m·kg, 65—87 ft·lb)**

## [Drum Brake] REMOVAL

Remove in the sequence shown in the figure referring to the removal note for the specially marked parts.



86U09X-030

- |                        |                  |                         |
|------------------------|------------------|-------------------------|
| 1. Hub cap             | 5. Brake pipe    | 9. Shock absorber       |
| 2. Lock nut            | 6. Back plate    | 10. Knuckle spindle     |
| 3. Brake drum          | 7. Trailing link | 11. Brake shoe assembly |
| 4. Parking brake cable | 8. Lateral link  |                         |



86U09X-031

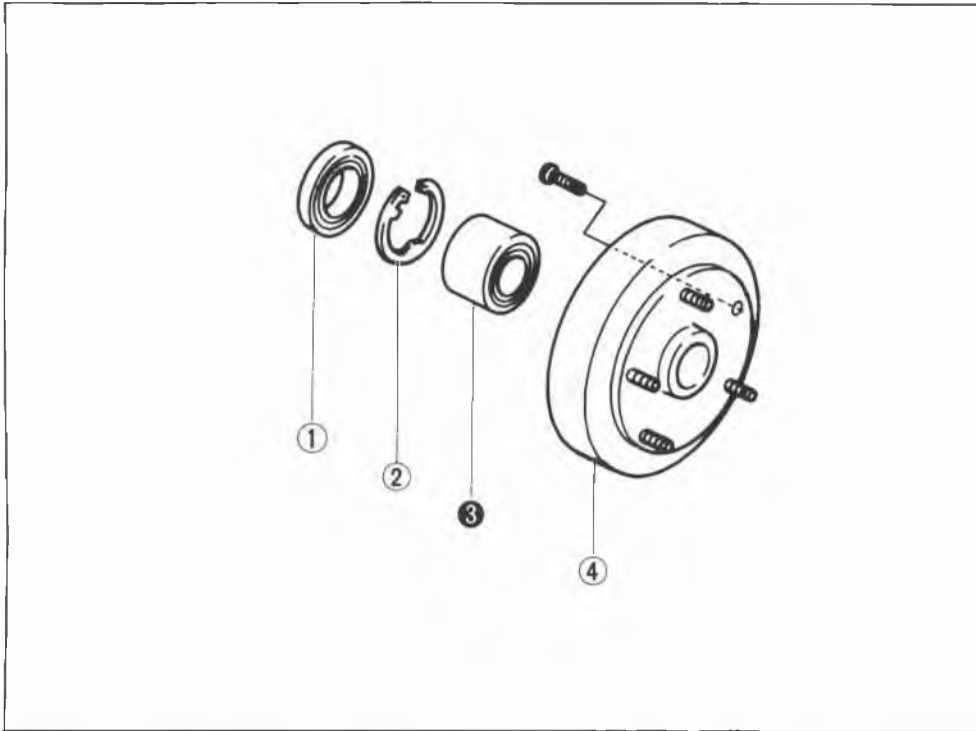
### Removal Note

Disconnect the brake pipe with the **SST**.

## 9 REAR AXLE

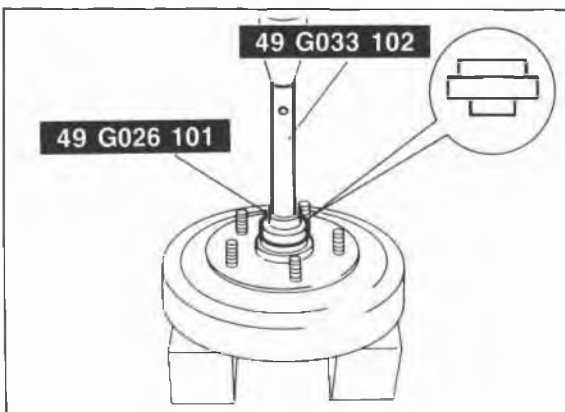
### DISASSEMBLY

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Oil seal
2. Retaining ring
3. Rear wheel bearing
4. Brake drum

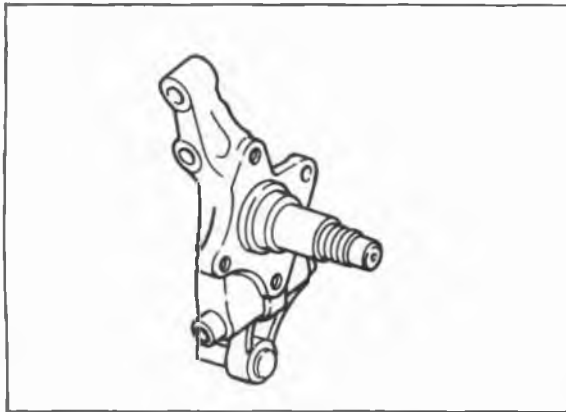
86U09X-032



86U09X-033

### Disassembly Note Bearing

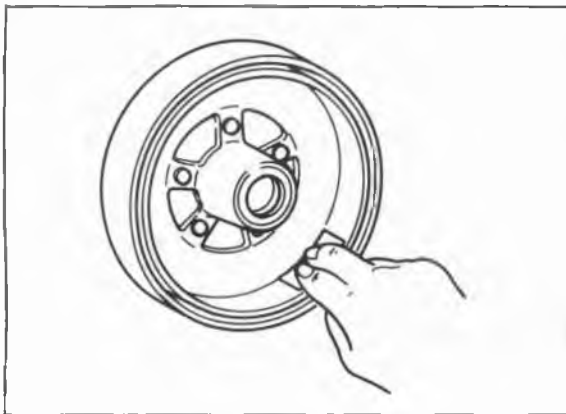
Remove the rear wheel bearing with the **SST**.



86U09X-034

### INSPECTION Knuckle Spindle

1. Cracks or damage.
2. Wear or rust on the oil seal contact surface.



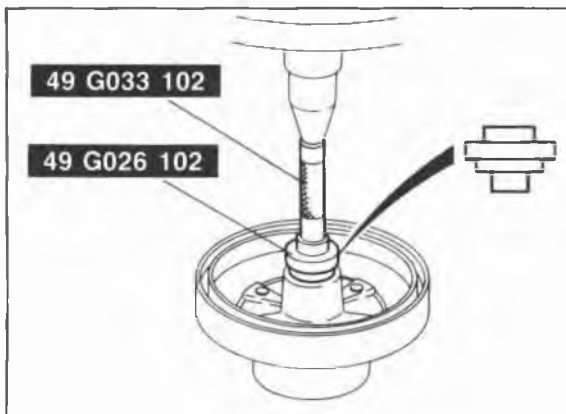
61G09X-036

### Brake Drum

Wear or damage to brake drum.

#### Note

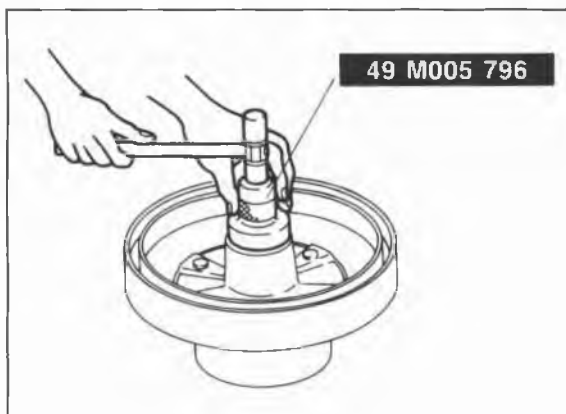
Remove minor rust with sandpaper



86U09X-035

### ASSEMBLY

1. Install a new rear wheel bearing with the **SST**.



86U09X-036

2. Install the retaining ring.
3. Install a new oil seal with the **SST**.

#### Note

Apply grease to the oil seal lip.

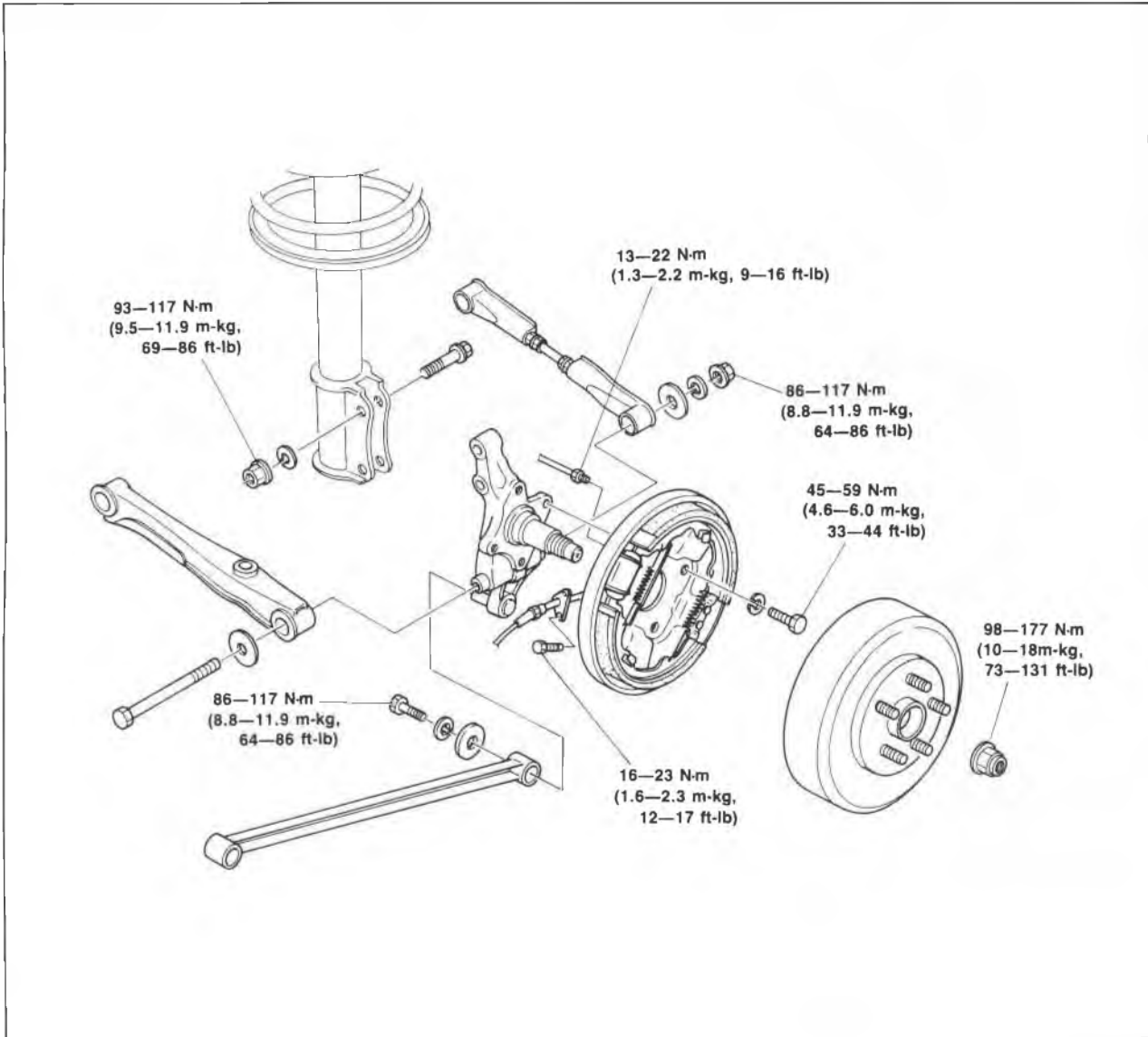


## 9 REAR AXLE

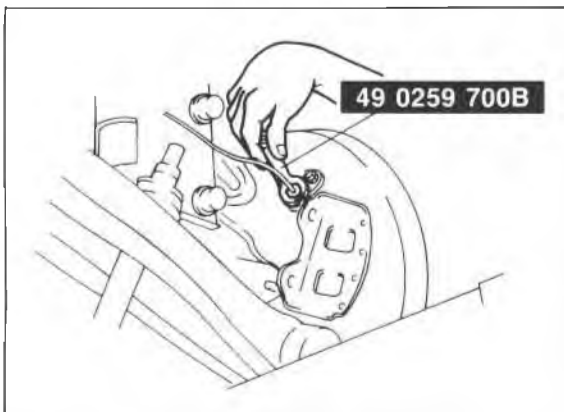
### INSTALLATION

Install in the reverse order of removal referring to the installation note.

### Torque specifications



86U09X-037



86U09X-038

### Installation Note

#### Brake pipe

1. Connect the brake pipe with the SST.

**Tightening torque: 13—22 N-m  
(1.3—2.2 m-kg, 9—16 ft-lb)**

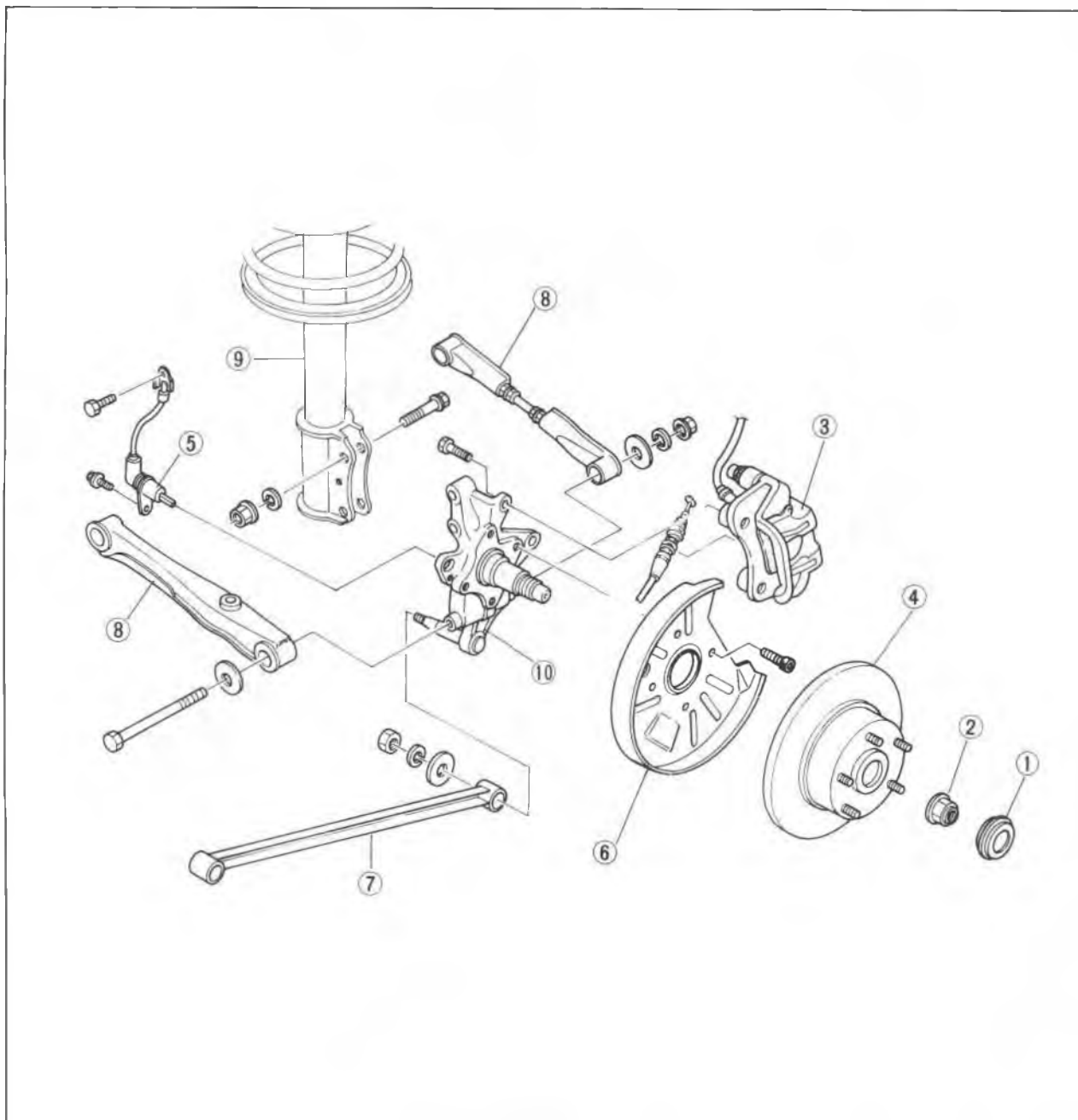
2. Bleed the air. (Refer to Section 11)

#### End play

Measure the end play. (Refer to page 9—16)

## [Disc Brake] REMOVAL (2WS)

Remove in the sequence shown in the figure.



86U09X 039

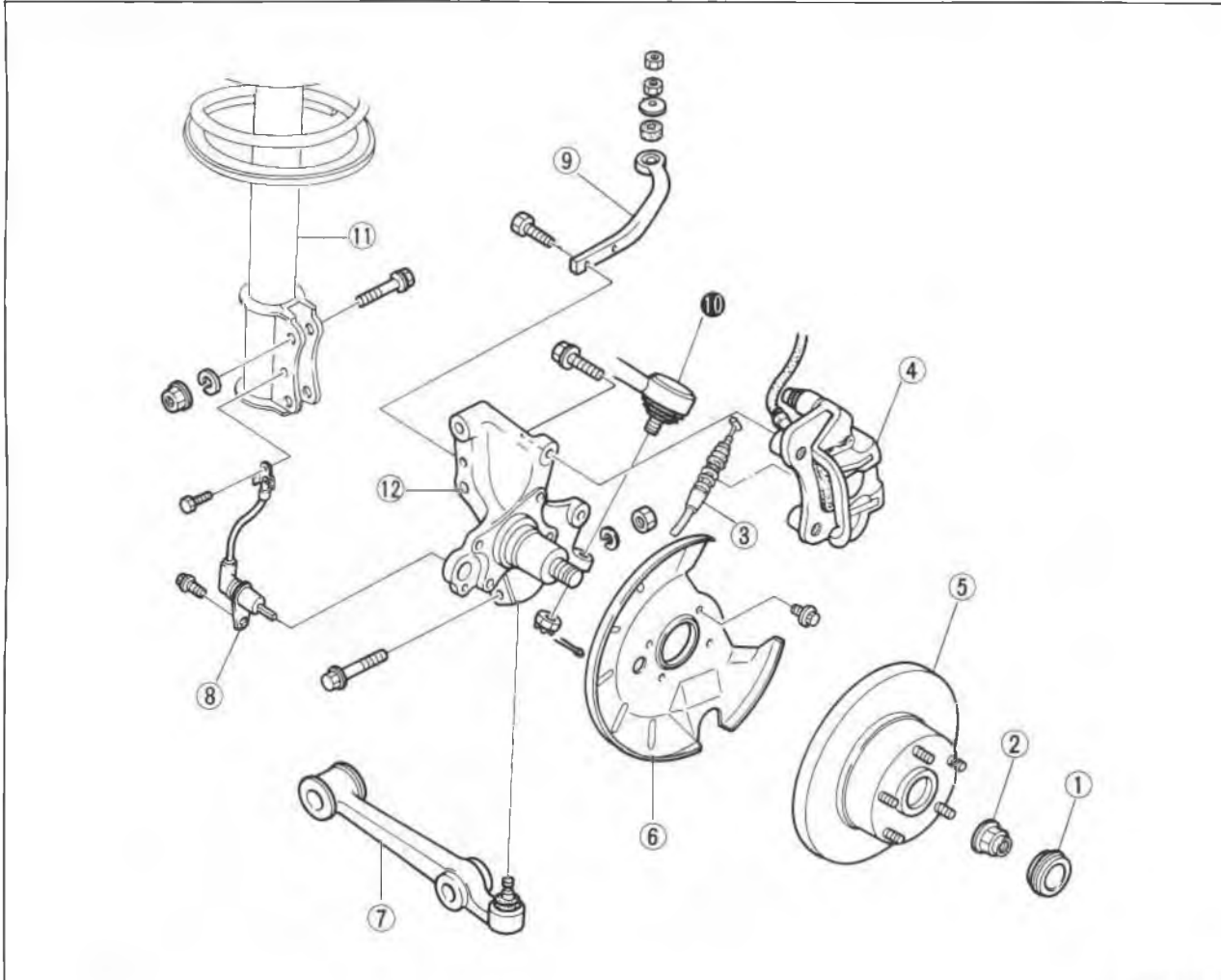
1. Hub cap
2. Lock nut
3. Caliper assembly
4. Disc plate
5. Wheel speed sensor (ABS)

6. Dust cover
7. Trailing link
8. Lateral link
9. Shock absorber
10. Knuckle spindle

# 9 REAR AXLE

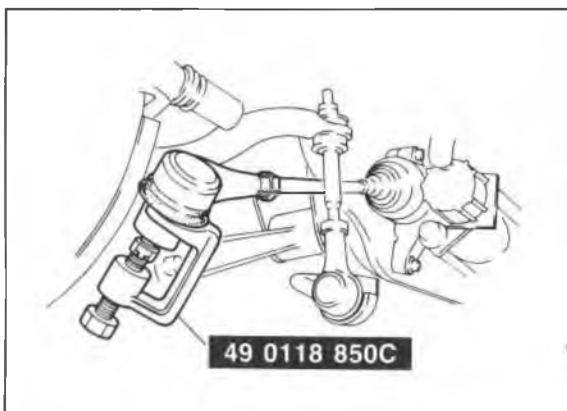
## REMOVAL (4WS)

Remove in the sequence shown in the figure referring to the removal note for the specially marked parts.



86U09X-040

- 1. Hub cap
- 2. Lock nut
- 3. Parking brake cable
- 4. Caliper assembly
- 5. Disc plate
- 6. Dust cover
- 7. Control link
- 8. Wheel speed sensor (ABS)
- 9. Stabilizer bracket
- 10. Tie-rod end
- 11. Shock absorber
- 12. Knuckle spindle



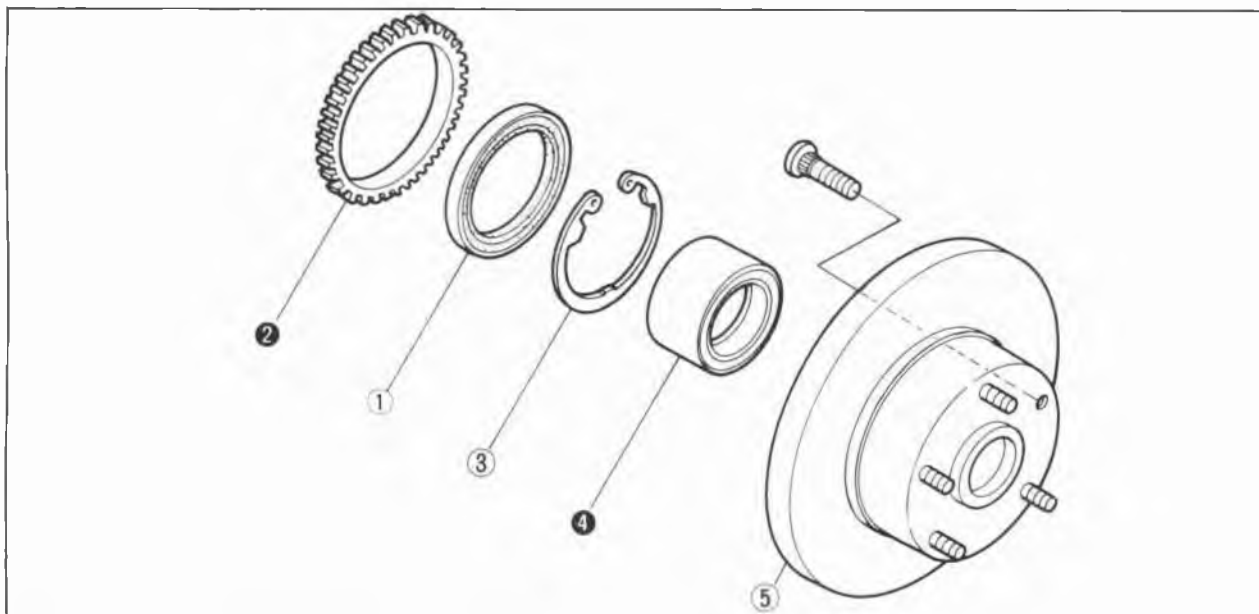
86U09X-041

### Removal Note Tie-rod end

Remove the tie-rod end from the knuckle spindle with the **SST**.

## DISASSEMBLY

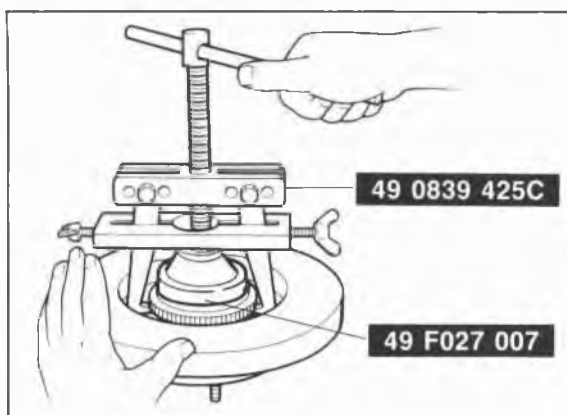
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



86U09X-042

1. Oil seal
2. Sensor rotor (ABS)
3. Retaining ring

4. Rear wheel bearing
5. Disc plate



86U09X-087

### Disassembly Note

#### Note

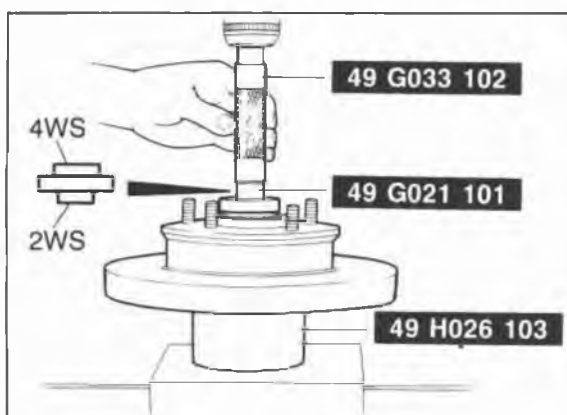
- a) Do not remove the hub bolts unless necessary.
- b) Do not reuse the hub bolts if removed.

### Sensor rotor (ABS)

Remove the sensor rotor with the SST.

#### Note

- a) Do not remove the sensor rotor unless necessary.
- b) Do not reuse the sensor rotor if removed.



86U09X-085

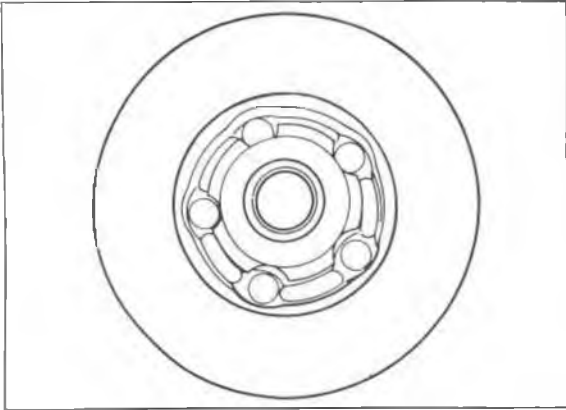
### Rear wheel bearing

Remove the rear wheel bearing with the SST.

#### Note

- Do not reuse the rear wheel bearing if removed.

## 9 REAR AXLE

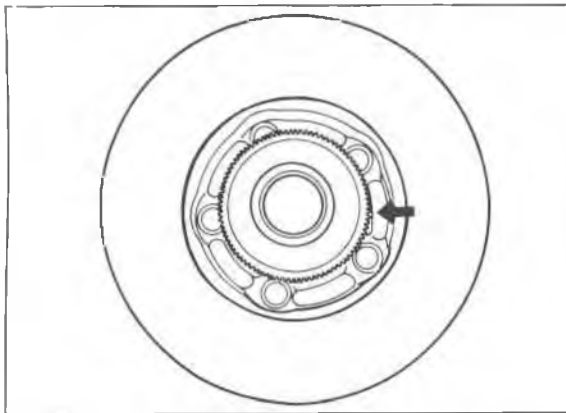


69G09X-028

### INSPECTION

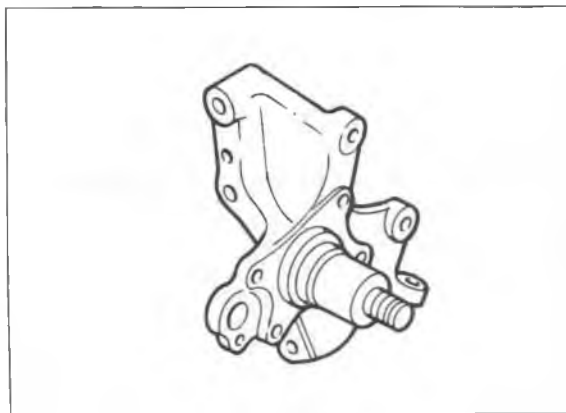
Check as described below, replace parts if necessary.

1. Check the hub for cracks or damage.



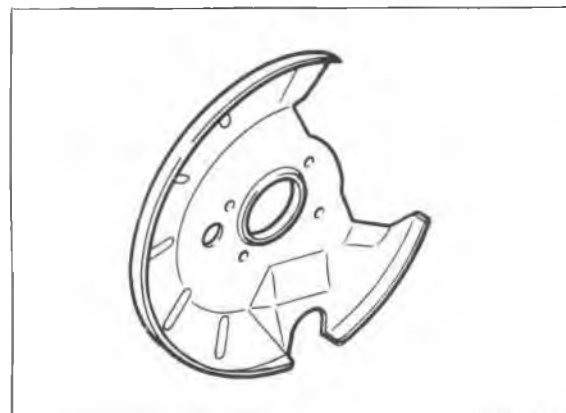
69G09X-029

2. Check the sensor rotor for cracks or damage.



86U09X-043

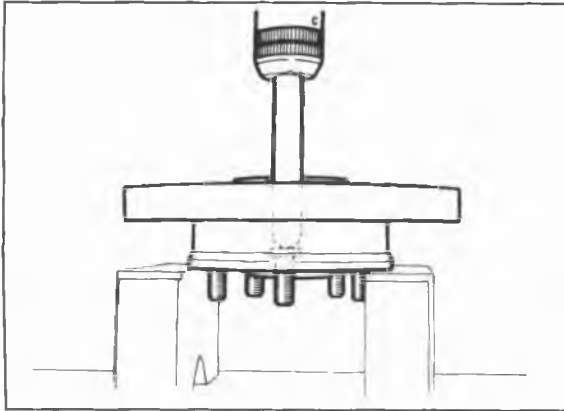
3. Check the knuckle spindle for cracks or damage, and the oil seal friction surface for wear or rust.



69G09X-031

4. Check the dust cover for damage.

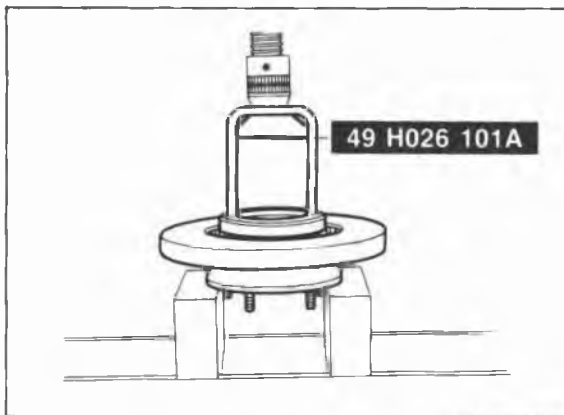
5. Check the hub cap for damage.



86U09X-045

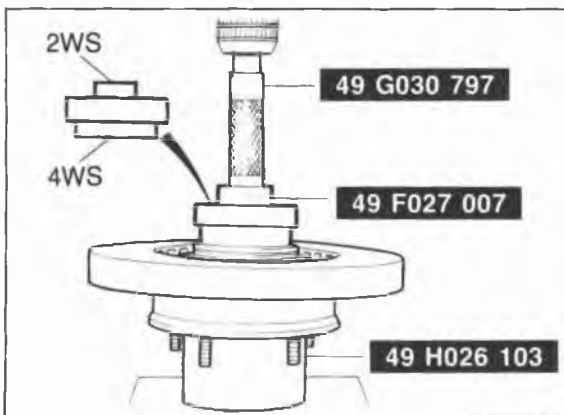
## ASSEMBLY

1. Install new hub bolts.



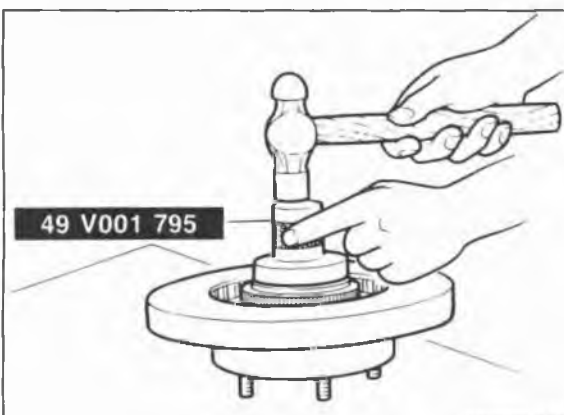
86U09X-046

2. Install a new sensor rotor with the **SST**. (ABS)



86U09X-047

3. Install a new rear wheel bearing with the **SST**.  
4. Install the retaining ring.



86U09X-048

5. Install a new oil seal with the **SST**.

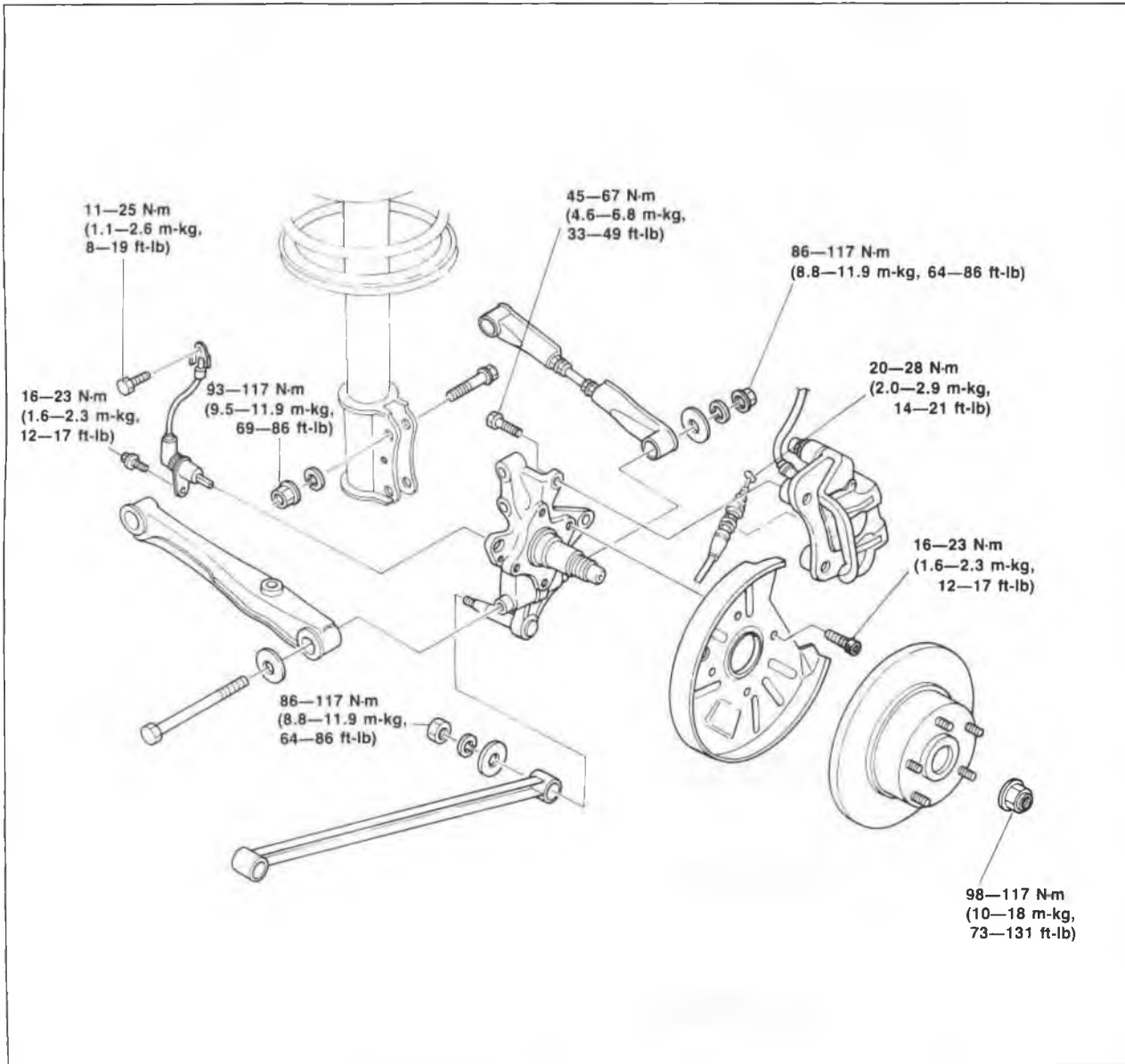
**Note**  
Apply grease to the oil seal lip.

# 9 REAR AXLE

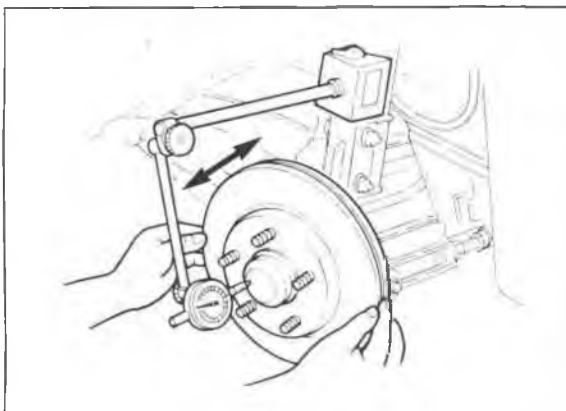
## INSTALLATION (2WS)

Install in the reverse order of removal.

### Torque Specifications



86U09X-049



86U09X-050

### Installation Note

#### End play

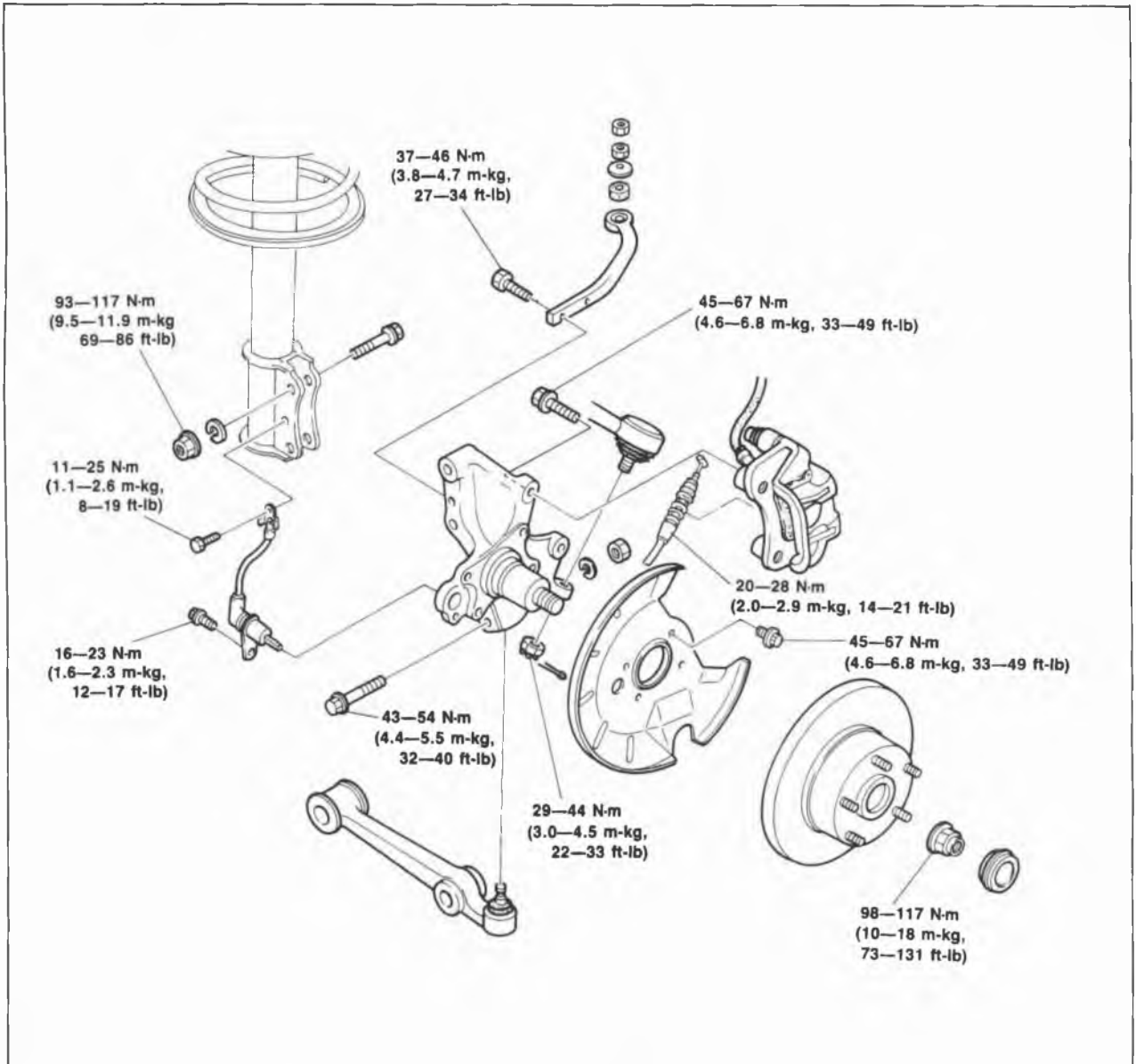
Measure the end play. (Refer to page 9—16)

**End play: 0.2 mm (0.0079 in) max.**

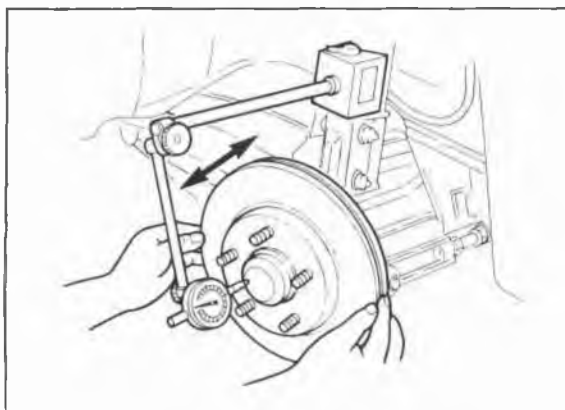
**INSTALLATION (4WS)**

Install in the reverse order of removal.

**Torque Specifications**



86U09X-051



86U09X-052

**Installation Note**

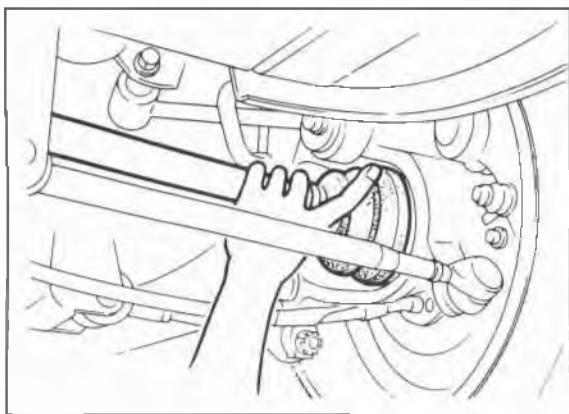
**End play**

Measure the end play. (Refer to page 9—16)

**End play: 0.2 mm (0.0079 in) max.**



## 9 DRIVESHAFT



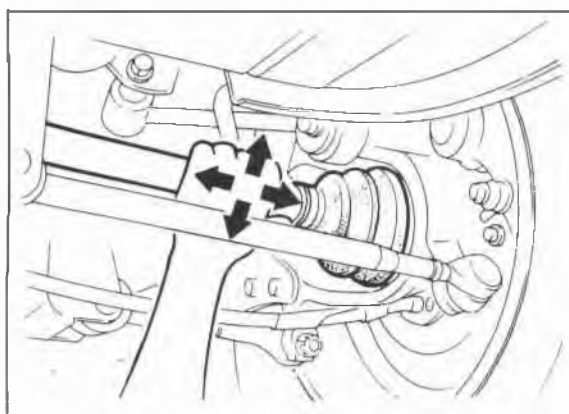
86U09X-088

### DRIVESHAFT

#### ON-VEHICLE MAINTENANCE

##### Boot

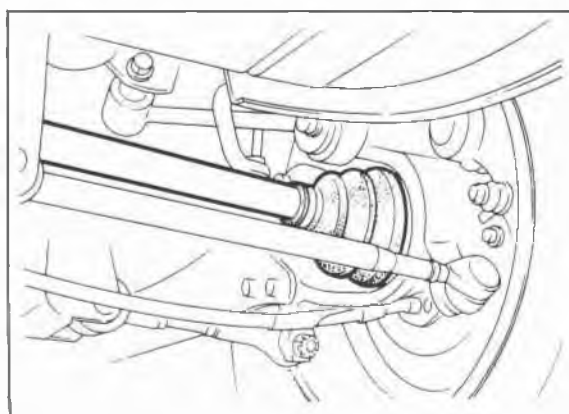
Check the boots on the driveshaft for cracks, damage, grease leakage or loose boot bands. Replace if necessary.



86U09X-089

##### Spline Looseness

Turn the driveshaft by hand and check that the spline and joint are not excessively loose. Replace if necessary.



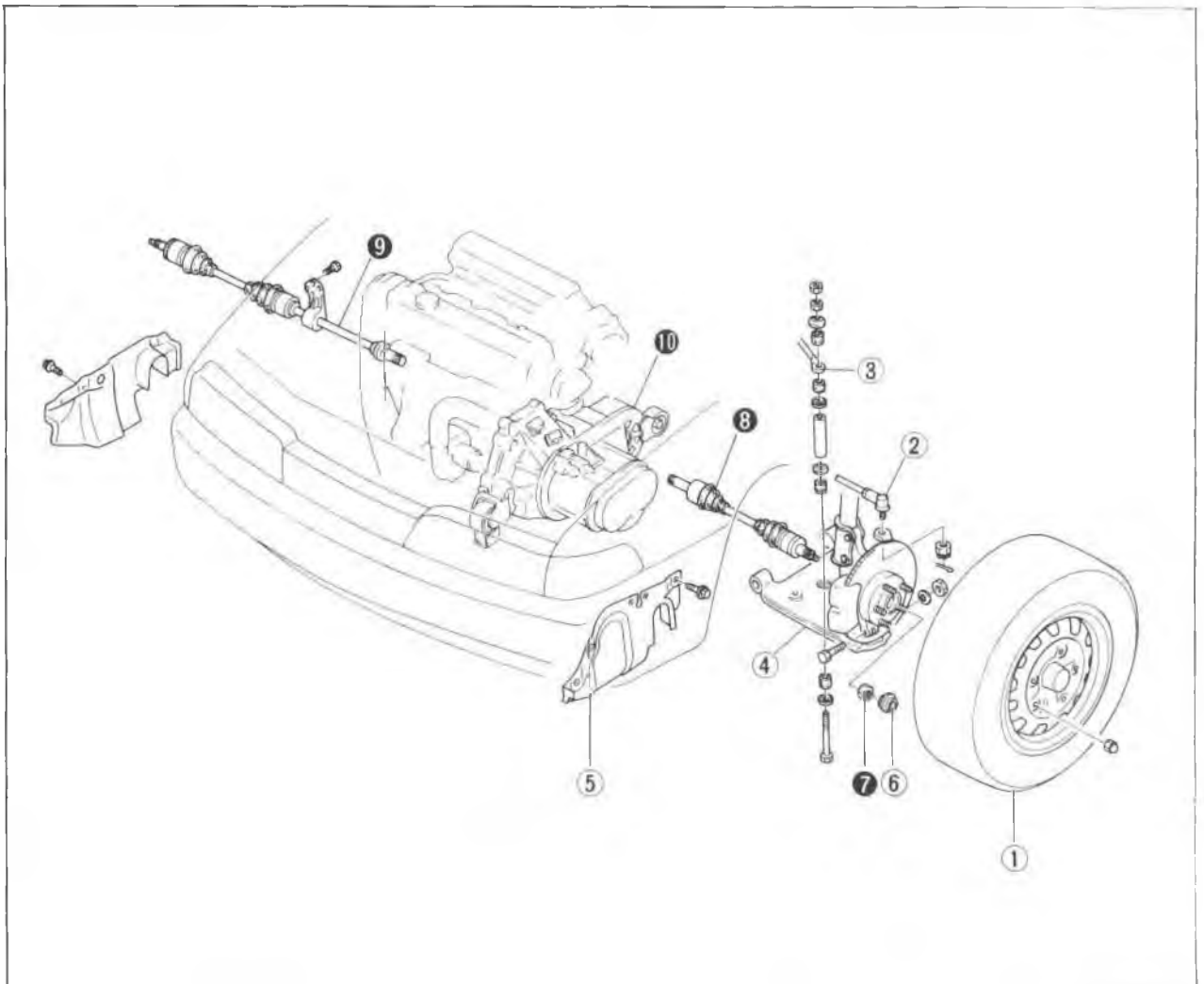
86U09X-090

##### Twisted or Cracked

Check that the driveshaft is not twisted or cracked. Replace if necessary.

## REMOVAL

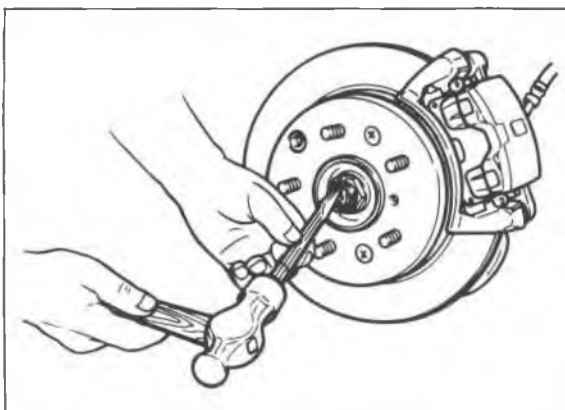
Remove in the sequence shown in the figure referring to the removal note for the specially marked parts.



86U09X-053

1. Wheel
2. Tie-rod end
3. Stabilizer
4. Lower arm
5. Splash shield

6. Hub cap
7. Lock nut
8. Driveshaft
9. Joint shaft
10. Transaxle

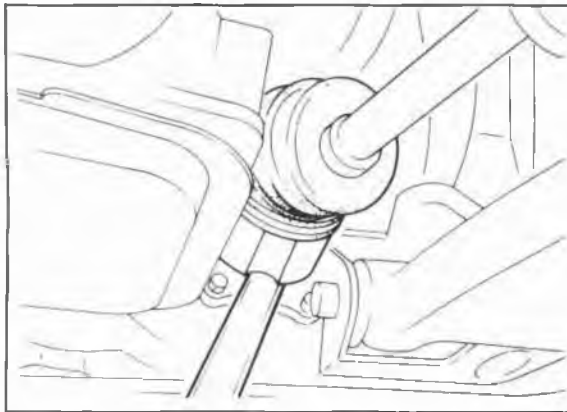


86U09X-054

### Removal Note Lock nut

Applying the brakes. Raise the lock nut tab and loosen it. Do not remove it.

## 9 DRIVESHAFT



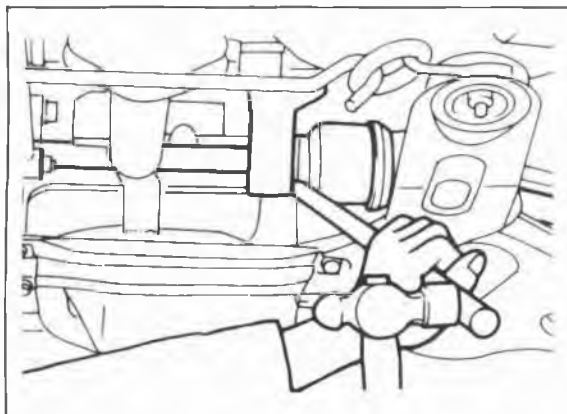
86U09X-055

### Driveshaft

Disconnect the driveshaft from the transaxle with a prybar.

### Note

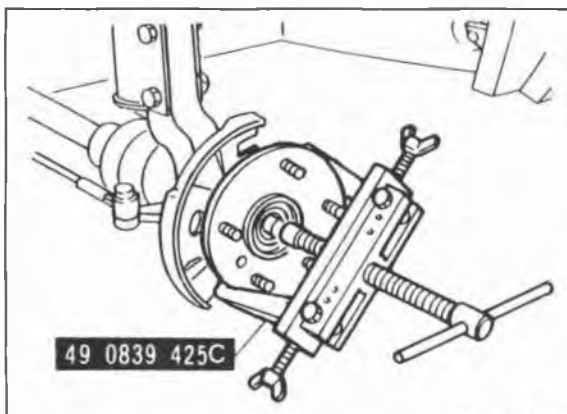
Do not damage the boot or the oil seal.



86U09X-056

### Joint shaft

As shown in the figure, insert a pry bar between the driveshaft and the joint shaft and tap on the bar to uncouple them.

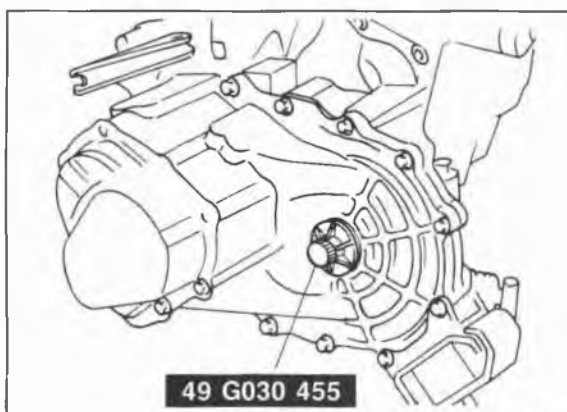


49 0839 425C

86U09X-057

### Front wheel hub

Use the **SST** to push the shaft out if it is stuck in the front wheel hub.



49 G030 455

86U09X-058

### Differential

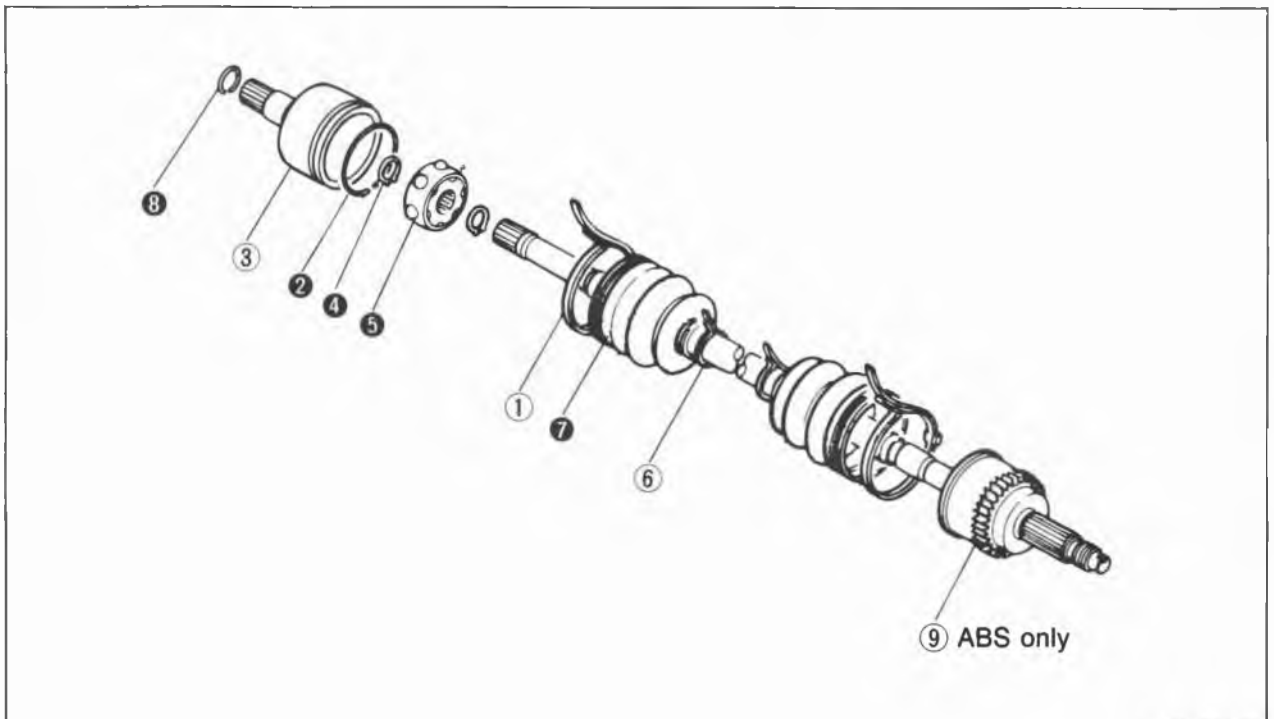
Install the **SST** to hold the side gear after removing the driveshaft.

## [MTX] DISASSEMBLY

Disassemble in the sequence shown in the figure referring to the disassembly note for specially marked parts.

### Note

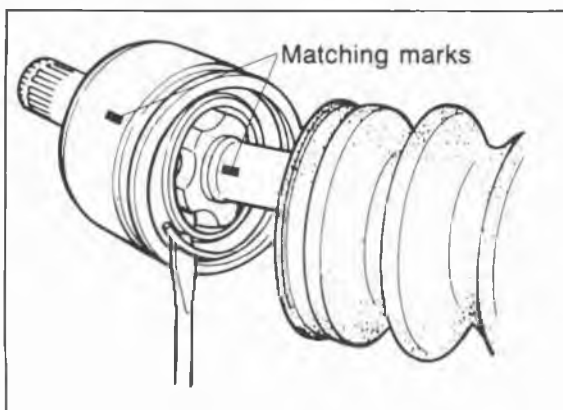
- a) Clamp the shaft in a vice. Use protectors in the vice to avoid damage.
- b) Do not allow dirt or foreign matter in the joint during disassembly or assembly.
- c) Do not disassemble the ball-joint at the wheel side. Do not wipe the grease off if there is no problem.
- d) Do not remove the clip used to secure the outer ring to the ball-joint at the differential side if there is no problem.  
If the clip is removed, replace it with a new one.



86U09X-059

- 1. Boot band
- 2. Clip
- 3. Outer ring
- 4. Snap ring

- 5. Ball joint
- 6. Boot band
- 7. Boot
- 8. Clip
- 9. Sensor rotor (Refer to Section 11)



86U09X-091

### Clip

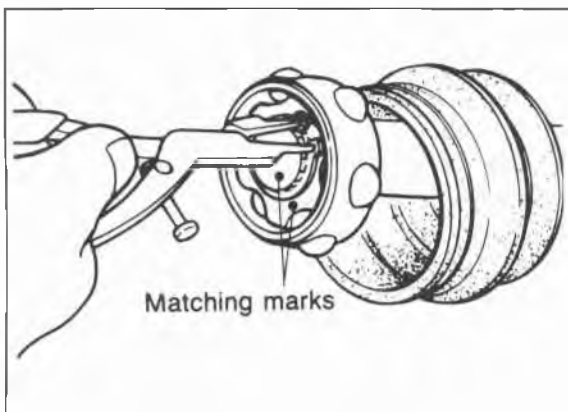
- 1. Make matching marks on the driveshaft and outer ring for proper reassembly.

### Note

**Mark with paint, do not use a punch.**

- 2. Remove the clip.

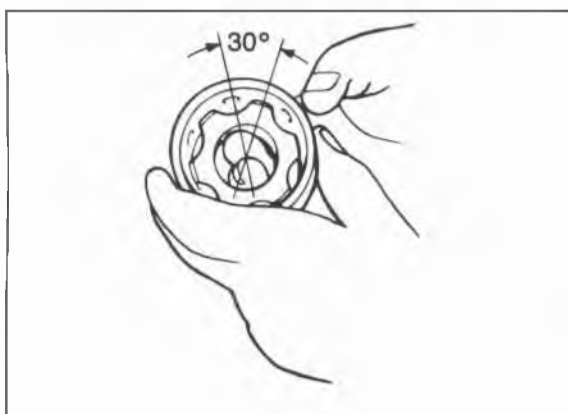
## 9 DRIVESHAFT



86U09X-092

### Snap ring

1. Make matching marks on the driveshaft end and inner ring.
2. Remove the snap ring using snap ring pliers.



86U09X-060

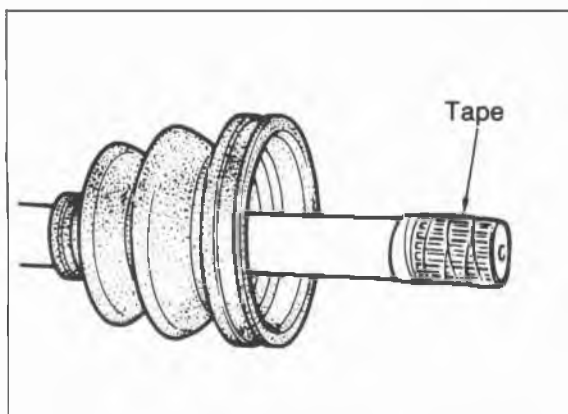
### Balls, inner ring and cage

1. Make matching marks on the inner ring and cage.

#### Note

**Mark with paint, do not use a punch.**

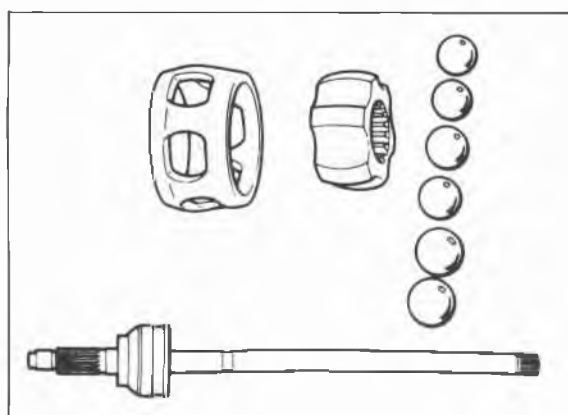
2. Turn the cage approximately 30°, then pull it away from the inner ring.



69G09X-120

### Boot

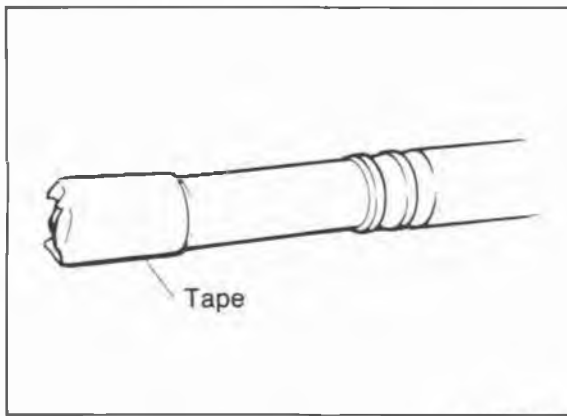
1. Wrap the shaft splines with tape.
2. Remove the boot.



### INSPECTION

Wash the parts. Check and replace all damaged parts.

1. Twisted, bent, or damaged shaft.
2. Worn or scored splines.
3. Worn, rusted, or damaged outer ring.

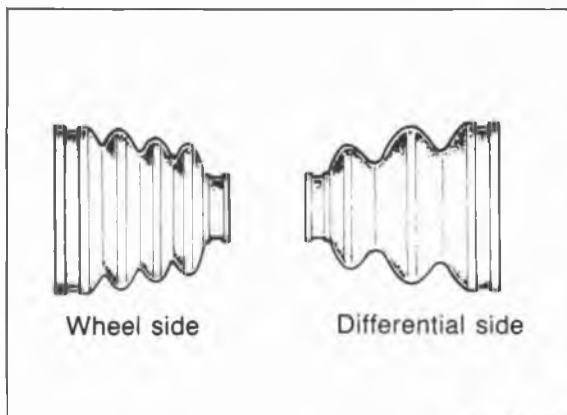


86U09X-093

## ASSEMBLY

### Boot

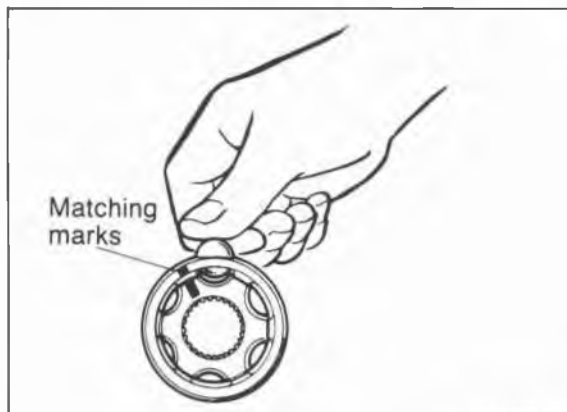
Wrap the shaft splines with tape before installing the boot.



86U09X-062

### Note

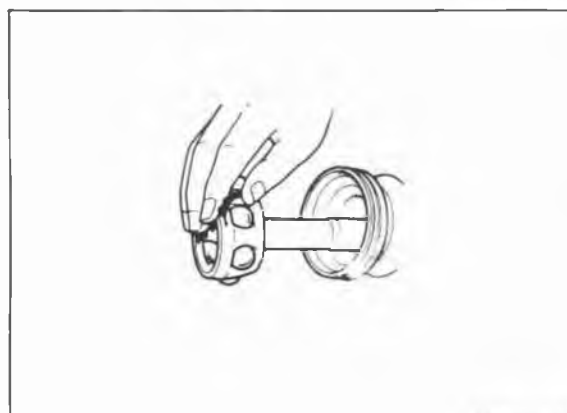
- a) The wheel side and differential side boots are different as shown in the figure.
- b) Fill the inside of the ball joint with the specified grease included in the kit.
- c) Securely fit the boot to the shaft and the outer race boot grooves.



86U09X-094

### Balls, inner ring and cage

1. Align the matching marks and install the balls.



86U09X-095

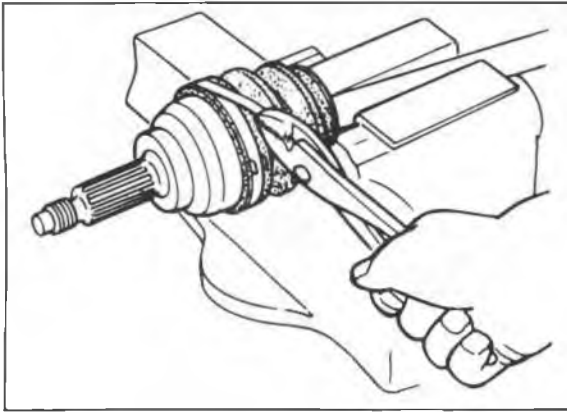
2. Apply molybdenum disulfide grease to the joint.

### Note

**Do not use other than specified grease.**

## 9 DRIVESHAFT

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86U09X-096

### Boot Band

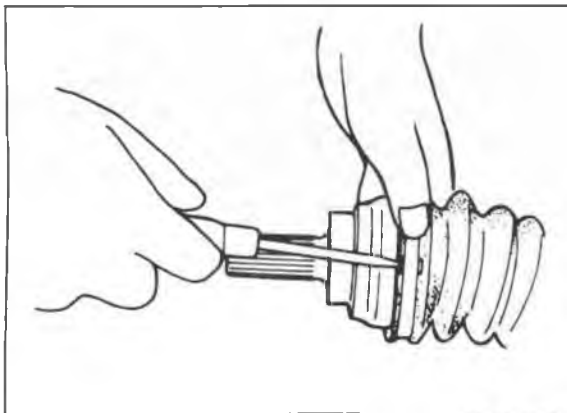
Tighten the boot band.

#### Note

a) Use a new band.

b) Fold the band in the direction opposite the forward rotation of the driveshaft.

1. Fold the band back by pulling on the end of the band.

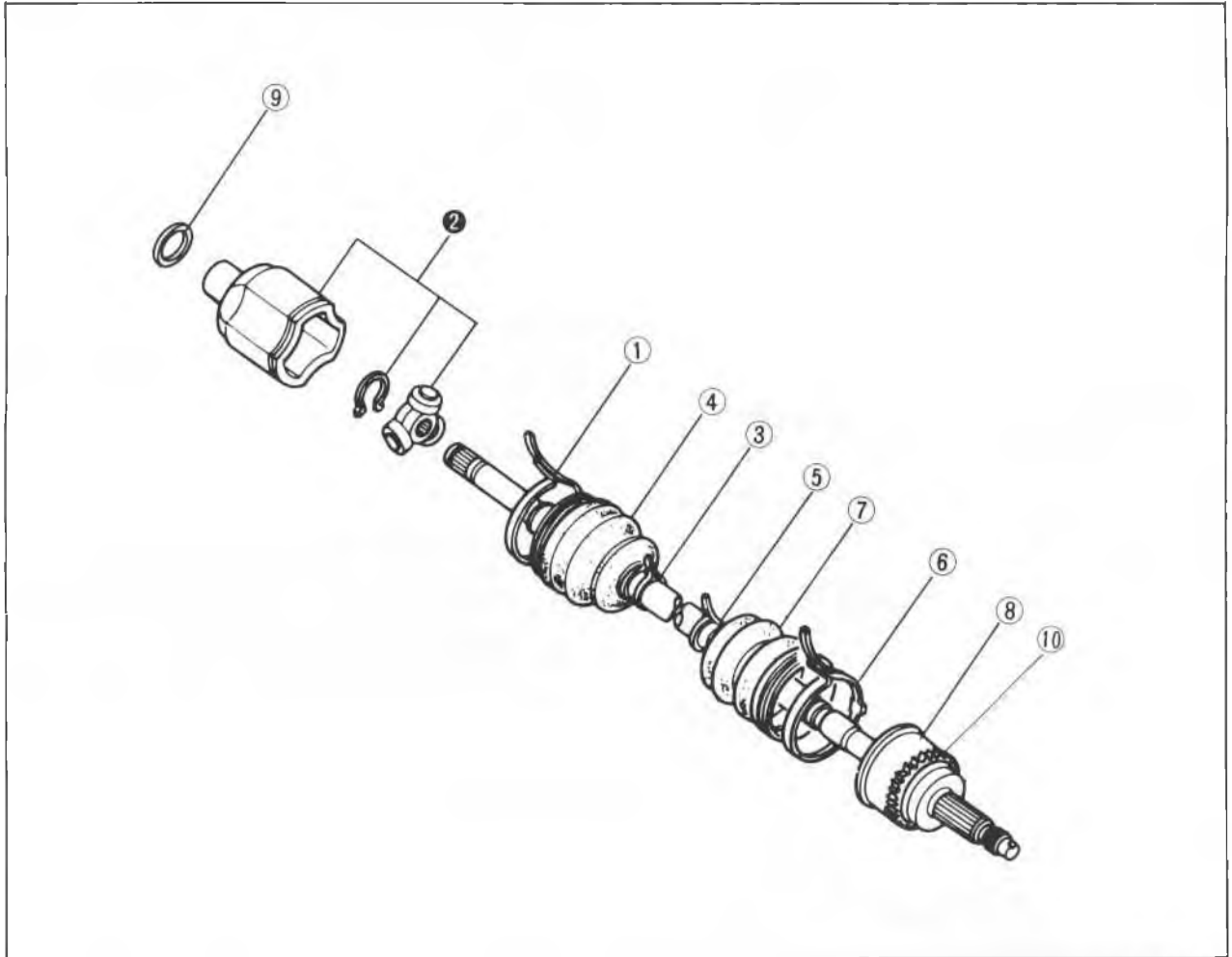


86U09X-097

2. Bend the locking clip to lock the end of the band.

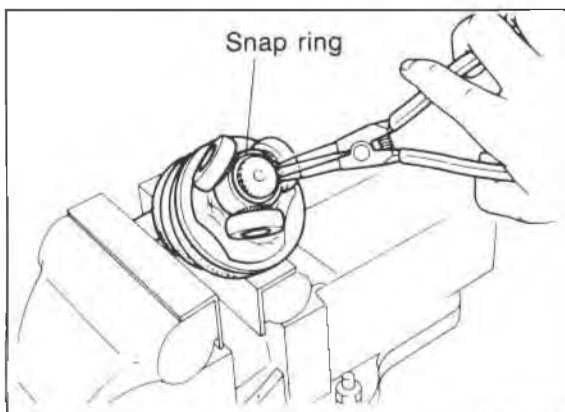
## [ATX] DISASSEMBLY

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



86U09X-064

- |                          |                                  |  |
|--------------------------|----------------------------------|--|
| 1. Boot band             | 6. Boot band                     | 9. Clip                                |
| 2. Tripod joint assembly | 7. Boot                          | 10. Sensor rotor (Refer to Section 11) |
| 3. Boot band             | 8. Shaft and ball-joint assembly |  |
| 4. Boot                  |                                  |  |
| 5. Boot band             |                                  |  |



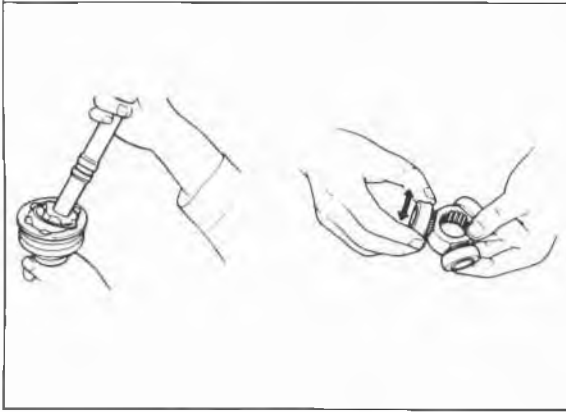
86U09X-065

### Disassembly Note Tripod joint assembly

1. Remove the snap ring using snap ring pliers, then remove the tripod joint bearing.
2. Disassemble the joint shaft assembly.



## 9 DRIVESHAFT

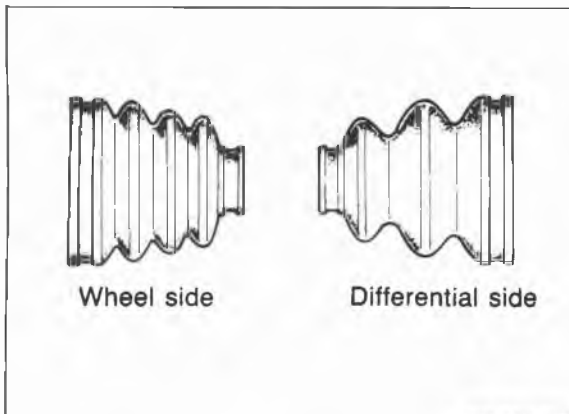


86U09X-066

### INSPECTION

Check and replace any faulty parts.

1. Twisted, bent, or damaged shaft.
2. Wear or scoring of splines.
3. Wear, excessive looseness, seizure, rust, or damage of bearing.
4. Checking, damage, or deterioration of boots.
5. Excessive play or heat damage of joint shaft bearing.



Wheel side

Differential side

86U09X-067

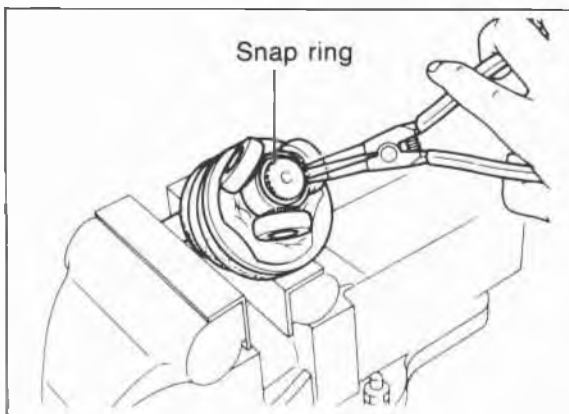
### ASSEMBLY

Assemble in the reverse order of disassembly, referring to assembly note.

#### Assembly Note

##### Note

- a) The wheel side and differential side boots are different as shown in the figure.
- b) Fill the inside of the ball joint with the specified grease included in the kit.
- c) Securely fit the boot to the shaft and the outer race boot grooves.

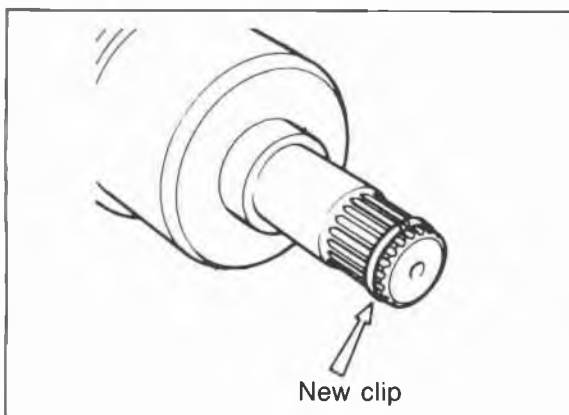


Snap ring

86U09X-068

### Tripod joint

Install the snap ring to the joint.



New clip

86U09X-069

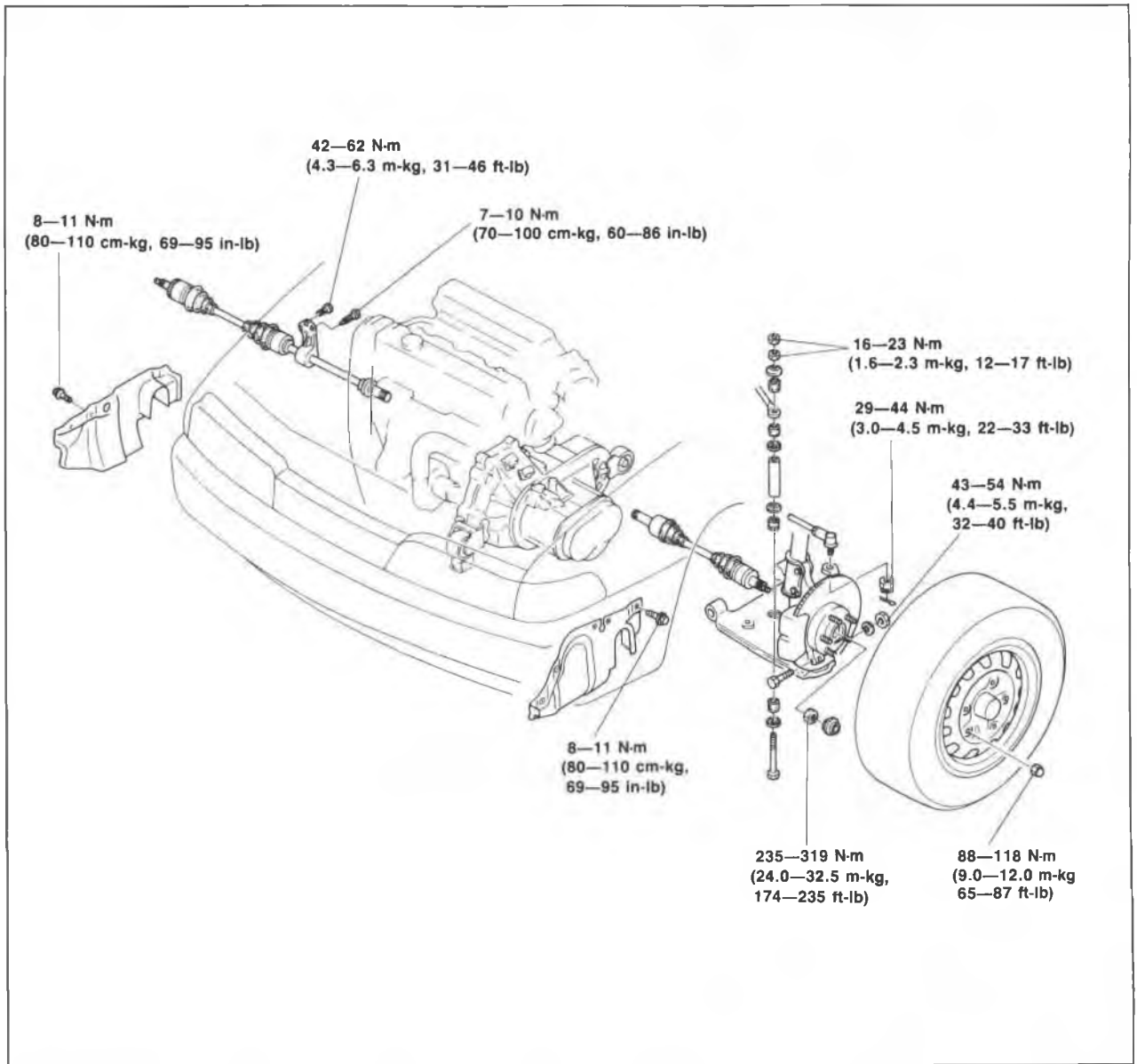
### Clip

Install a new clip.

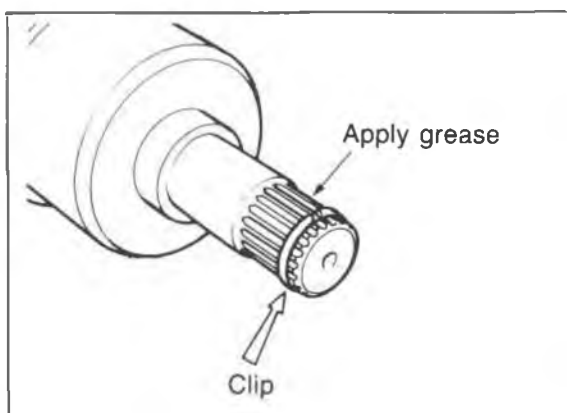
## INSTALLATION

Install in the reverse order of removal referring to the installation note.

### Torque specifications



86U09X-070



86U09X-071

### Installation Note

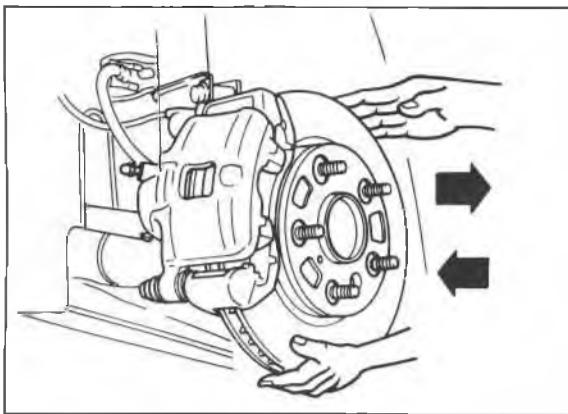
#### Clip

Install a new clip.

#### Note

- Before installing the shaft, check the transaxle oil seal for damage.
- Apply transaxle oil to the oil seal lip.

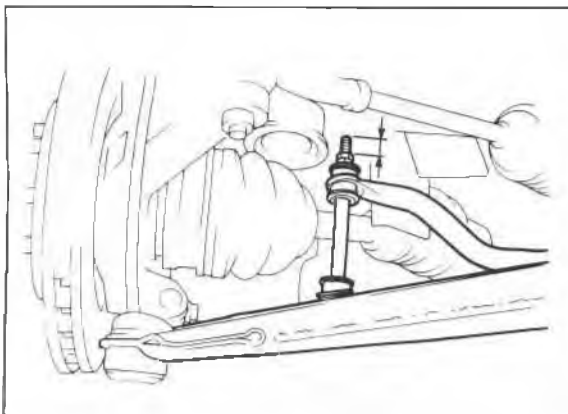
## 9 DRIVESHAFT



86U09X-072

### Front wheel hub

After installation, pull the front wheel hub outward and check that the driveshaft does not come out.

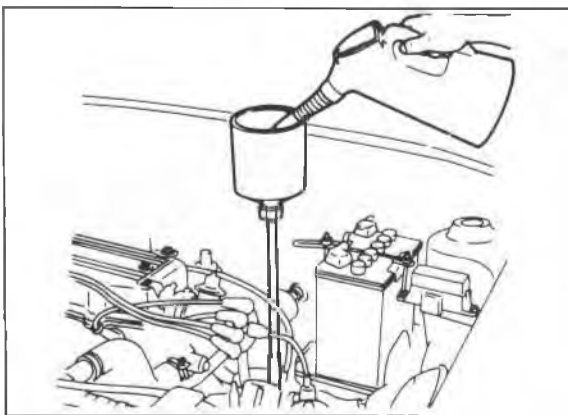


86U09X-073

### Stabilizer

Lock the nut with **20.1 mm (0.79 in)** of the threads exposed.

**Tightening torque: 16—23 N·m  
(1.6—2.3 m·kg, 12—17 ft·lb)**



76G09X-004

### Oil

Add the specified grade and quantity of transaxle oil. (Refer to Section 7A, 7B, 7C)

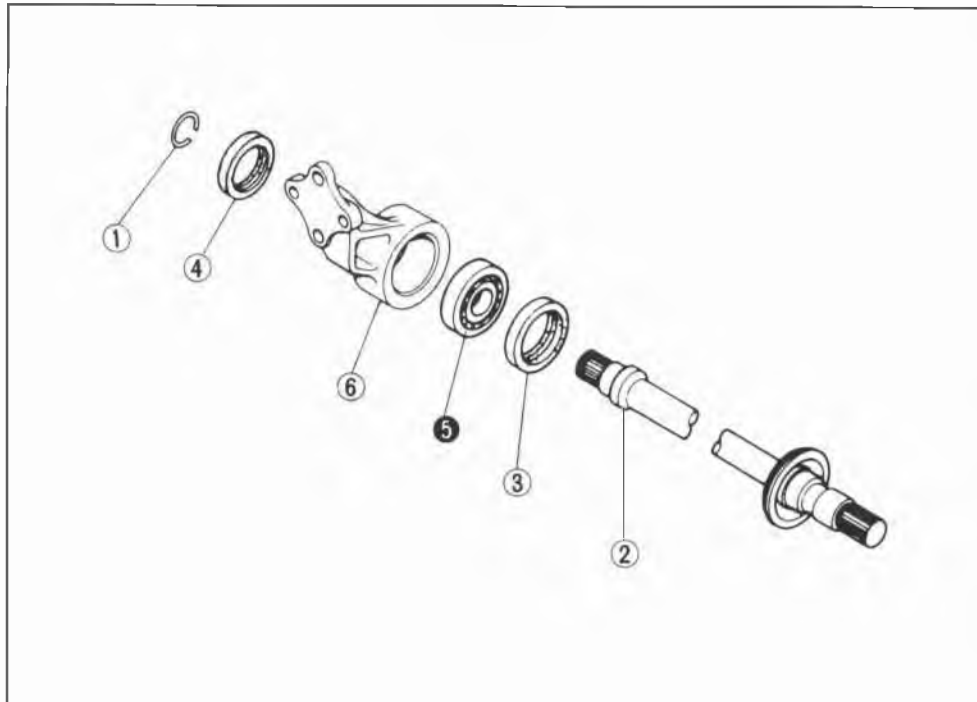
## JOINT SHAFT

### Disassembly and Assembly

Disassemble in the sequence shown in the figure.

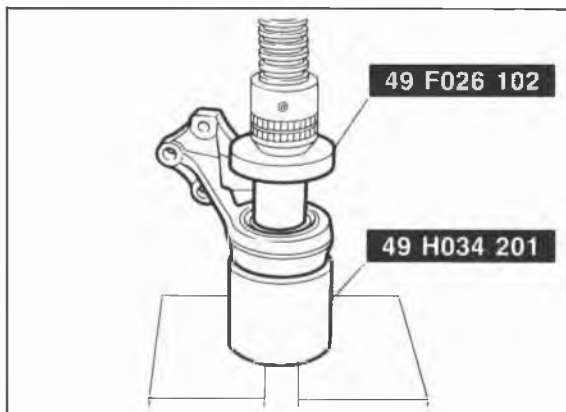
Assembly in the reverse order of disassembly.

Referring to the notes for the specially marked parts.



1. Clip
2. Joint shaft
3. Oil seal
4. Oil seal
5. Bearing
6. Bracket

76G09X-005



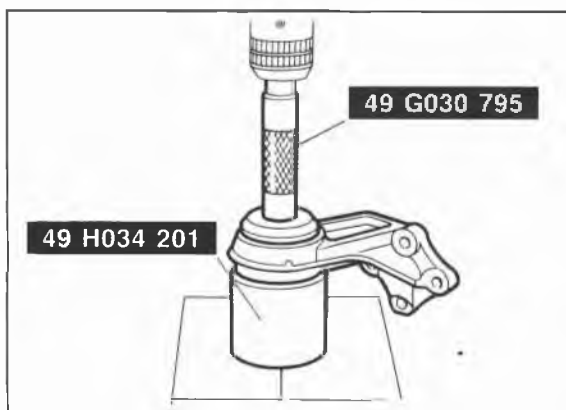
86U09X-076

### Disassembly Note Bearing

Remove the shaft and bearing with the **SST** and press.

### Caution

**Hold the shaft and the bearing by hand does not drop.**



86U09X-077

### Assembly Note Bearing

1. Install the shaft and a new bearing with the **SST** and press.
2. Install new oil seals.
3. Install a new clip.

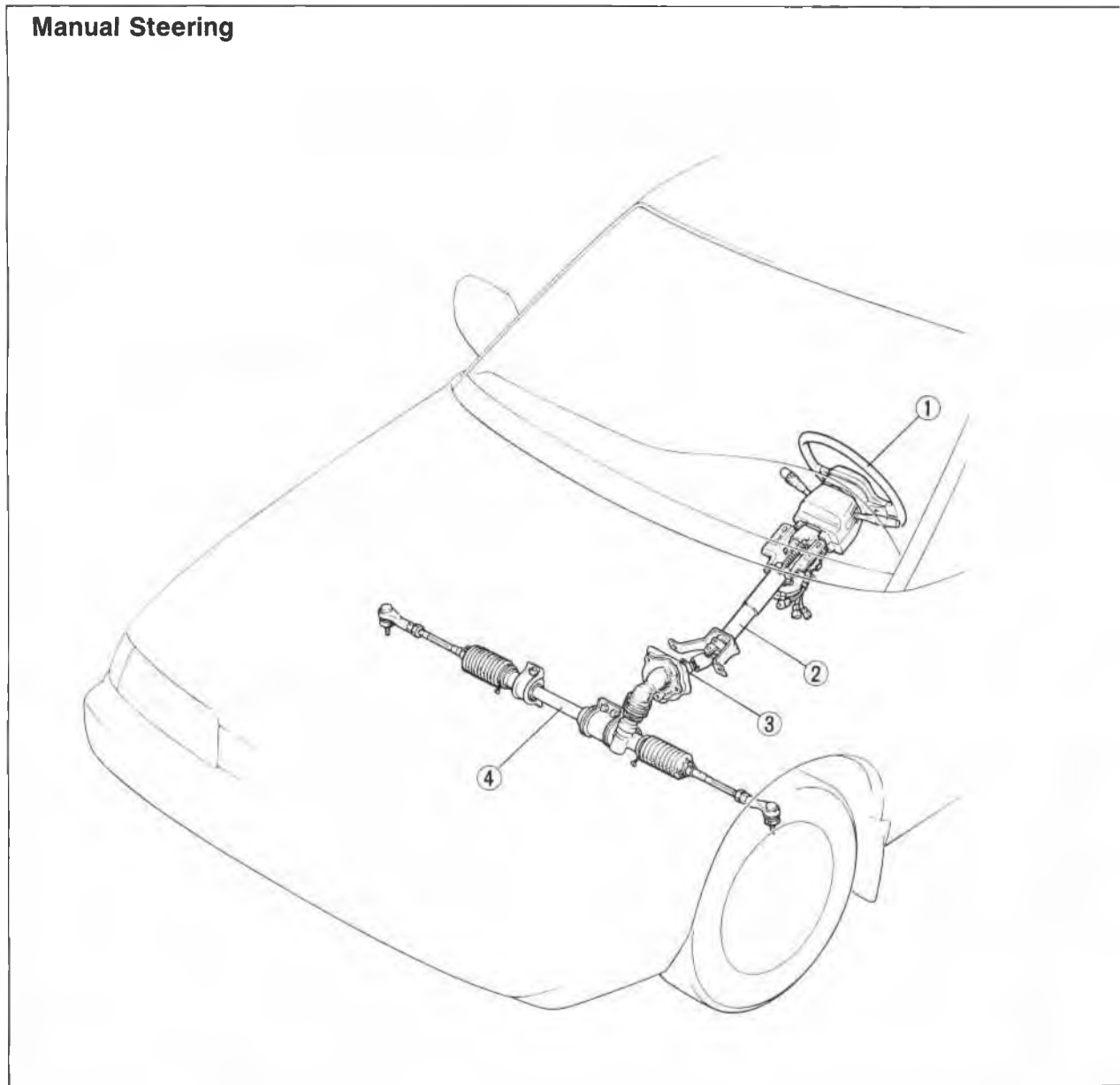
# STEERING SYSTEM

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# 10 OUTLINE

## OUTLINE

### STRUCTURAL VIEW

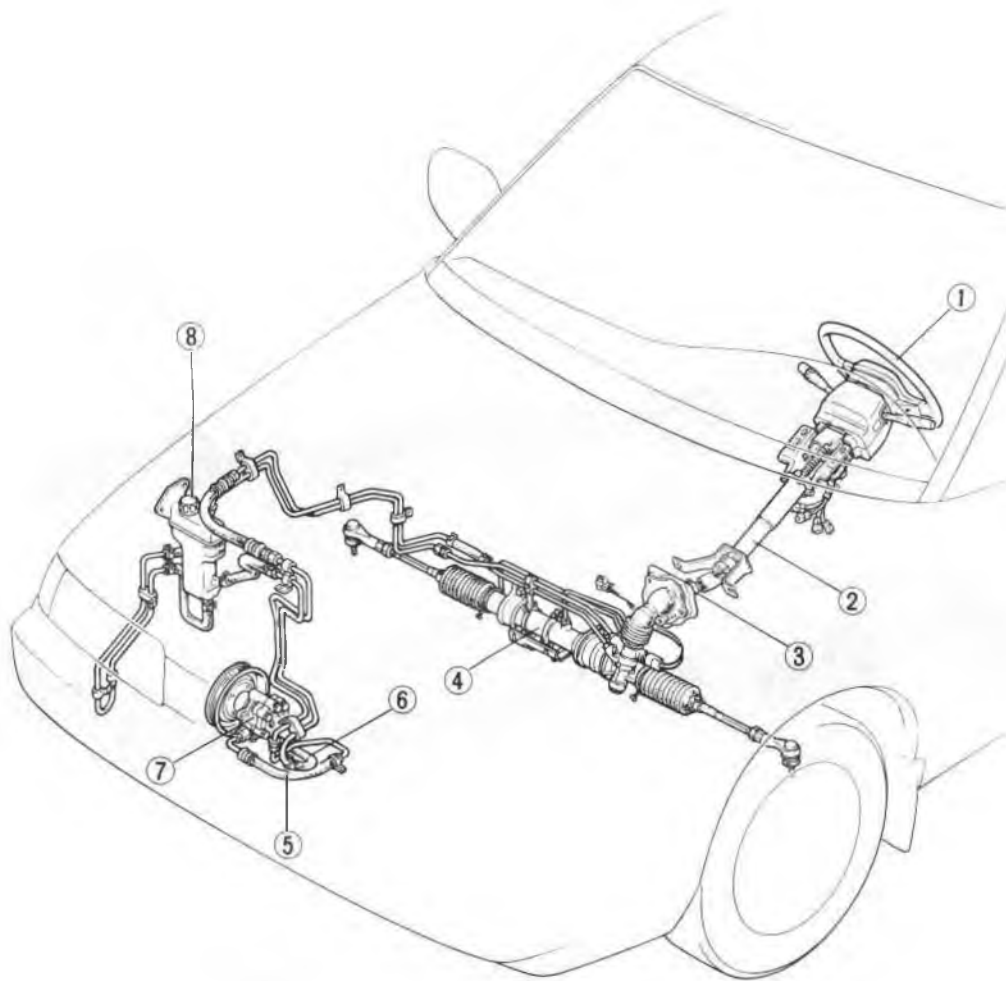


86U10X-002

- 1. Steering wheel
- 2. Steering shaft

- 3. Intermediate shaft
- 4. Steering gear assembly

## Power Steering (ESPS)



86U10X-003

1. Steering wheel

2. Steering shaft

3. Intermediate shaft

4. Steering gear assembly

5. Pressure hose

6. Return hose

7. Oil pump

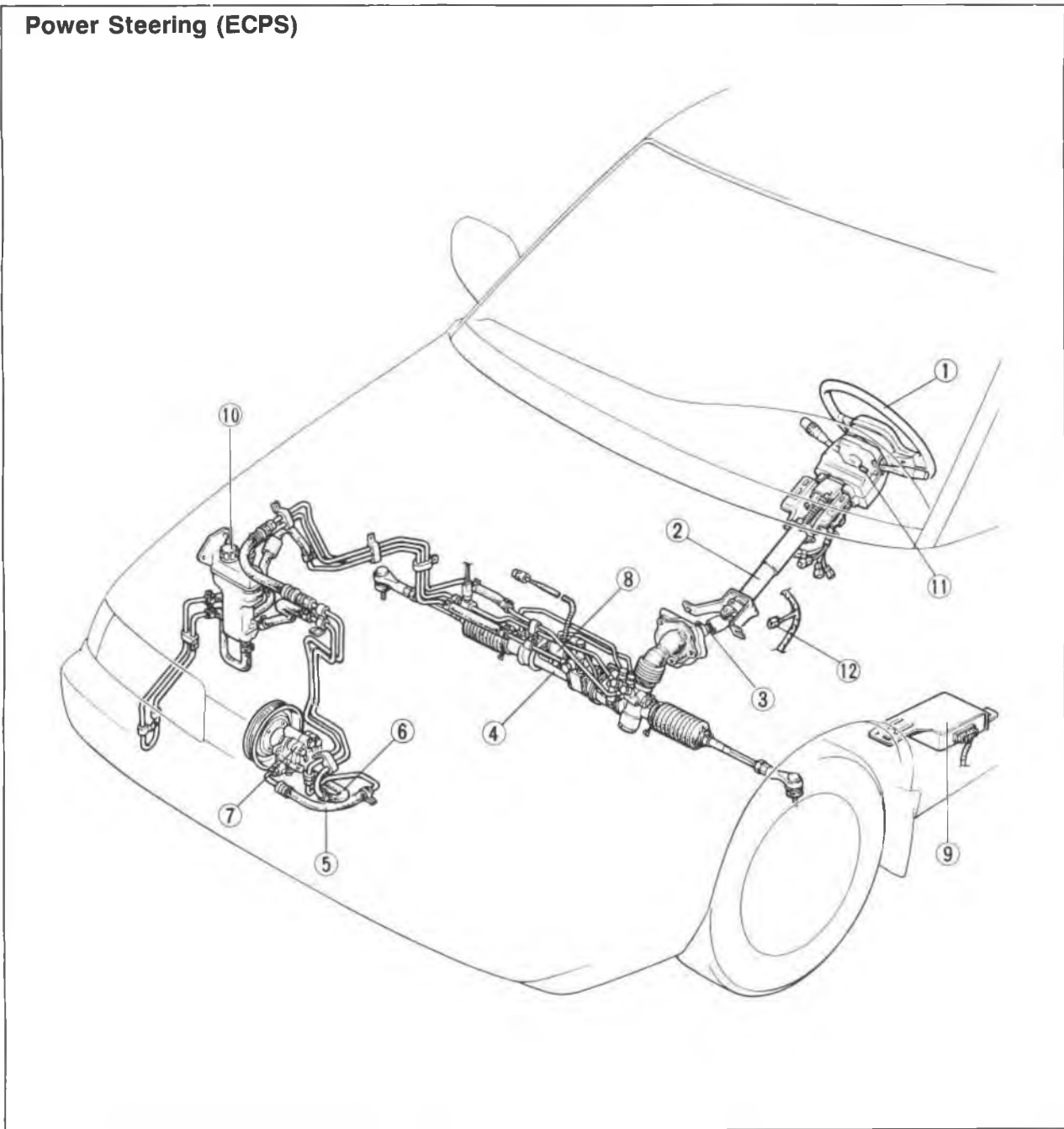
8. Reserve tank

### Note

Engine speed sensing power steering is abbreviated ESPS.

# 10 OUTLINE

## Power Steering (ECPS)



86U10X-004

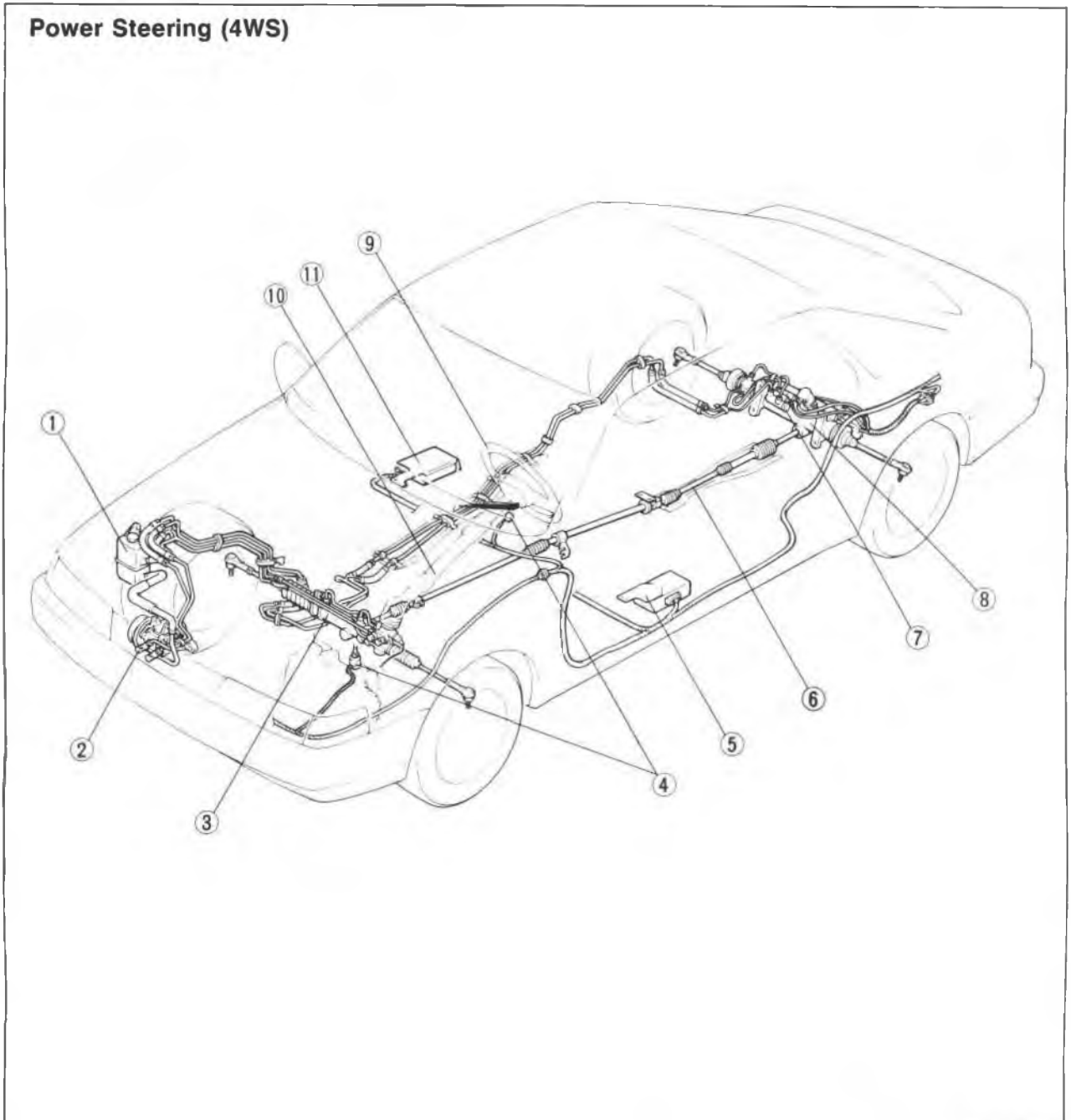
- |                           |                   |                           |
|---------------------------|-------------------|---------------------------|
| 1. Steering wheel         | 5. Pressure hose  | 9. Control unit           |
| 2. Steering shaft         | 6. Return hose    | 10. Reserve tank          |
| 3. Intermediate shaft     | 7. Oil pump       | 11. Steering angle sensor |
| 4. Steering gear assembly | 8. Solenoid valve | 12. Check connector       |

### Note

**Electronically - controlled power steering is abbreviated ECPS.**



**Power Steering (4WS)**



86U10X-005

- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1. Reserve tank                 | 6. Steering angle transfer shaft |
| 2. Oil pump                     | 7. Solenoid valves               |
| 3. Front steering gear assembly | 8. Rear steering gear assembly   |
| 4. Speed sensor                 | 9. Steering wheel                |
| 5. Control unit                 | 10. Steering shaft               |
|                                 | 11. Relay and timer              |

**Note**  
**4-wheel steering is abbreviated 4WS.**

# 10 OUTLINE

## SPECIFICATIONS

Item		Type	Manual steering	Power steering
Steering wheel	Outer diameter	mm (in)	380 (15.0)	
	Turns lock to lock		4.32	2.93
Steering shaft and joints	Shaft type		Collapsible	
	Joint type		Cross joints (2)	
	Tilt stroke	mm (in)	40 (1.6)	
Front steering gear	Type		Rack and pinion	
	Gear ratio		∞ (infinite)	
Power steering fluid	Capacity liter (US qt, Imp)	2WS	—	0.9 (0.95, 0.79)
		4WS	—	1.0 (1.06, 0.88)
	Type	2WS 4WS	—	Dexron II or M III

86U10X-006

### Note

**2-Wheel steering is abbreviated 2WS.**

**TROUBLESHOOTING GUIDE**

**MANUAL STEERING**

<b>Problem</b>	<b>Probable Cause</b>	<b>Remedy</b>	<b>Page</b>
<b>Steering "heavy" (vehicle jacked up, both wheels off ground)</b>	Poor lubrication, foreign material, or abnormal wear of steering ball-joints	Refer to Section 13	—
	Stuck or damaged ball-joints	Replace	10—18
	Improperly adjusted steering pinion preload	Adjust	10—56
	Damaged steering gear	Replace	10—28
	Worn or damaged steering bushing	Replace	10—53
	Stuck lower-arm ball-joint	Refer to Section 13	—
<b>Steering wheel pulls to one side</b>	Malfuction of steering-shaft joint	Replace	10—21
	Incorrect tire pressure	Refer to Section 12	—
	Unevenly worn tires	Refer to Section 12	—
	Weakened front spring	Refer to Section 13	—
	Worn or damaged stabilizer and/or lower arm bushing	Refer to Section 13	—
	Dragging brake	Refer to Section 11	—
<b>General instability while driving</b>	Loose lower arm	Refer to Section 13	—
	Improperly adjusted wheel alignment	Refer to Section 13	—
	Incorrect tire pressure	Refer to Section 12	—
	Damaged or unbalanced wheel	Refer to Section 13	—
	Worn or damaged steering joints	Replace	10—21
	Improperly adjusted steering pinion preload	Adjust	10—56
<b>Steering wheel vibrates</b>	Weakened front spring	Refer to Section 13	—
	Worn or damaged stabilizer and/or lower arm bushing	Refer to Section 13	—
	Malfuctioning shock absorber	Refer to Section 13	—
	Improperly adjusted wheel alignment	Refer to Section 13	—
	Incorrect tire pressure	Refer to Section 12	—
	Unevenly worn tires	Refer to Section 12	—
<b>Excessive steering wheel play</b>	Worn wheel bearing, or incorrect adjustment	Refer to Section 13	—
	Worn or damaged steering joints	Replace	10—21
	Improperly adjusted steering pinion preload	Adjust	10—56
	Loose gear housing mounting bolts	Tighten	10—30
	Worn steering gear bearing	Replace	—
	Worn or damaged stabilizer and/or lower arm bushing	Refer to Section 13	—
<b>Poor steering wheel return</b>	Improperly adjusted wheel alignment	Refer to Section 13	—
	Worn lower-arm ball-joint	Refer to Section 13	—
	Damaged unbalanced wheel	Refer to Section 13	—
	Malfuctioning or loose shock absorber	Refer to Section 13	—
<b>Abnormal noise from steering system</b>	Improperly adjusted steering gear backlash	Adjust	10—56
	Worn rack and pinion gear	Replace	10—51
	Worn or damaged steering joints	Replace	10—21
	Worn or damaged lower-arm bushing	Refer to Section 13	—
<b>Abnormal noise from steering system</b>	Incorrect tire pressure	Refer to Section 12	—
	Stuck or damaged steering joints	Replace	10—21
	Improperly adjusted front wheel alignment	Refer to Section 13	—
	Improperly adjusted steering pinion preload	Adjust	10—56
<b>Abnormal noise from steering system</b>	Loose steering linkage	Tighten	10—28
	Worn steering joints	Replace	10—21
	Improperly adjusted steering gear backlash	Adjust	10—56

86U10X-007

# 10 TROUBLESHOOTING GUIDE

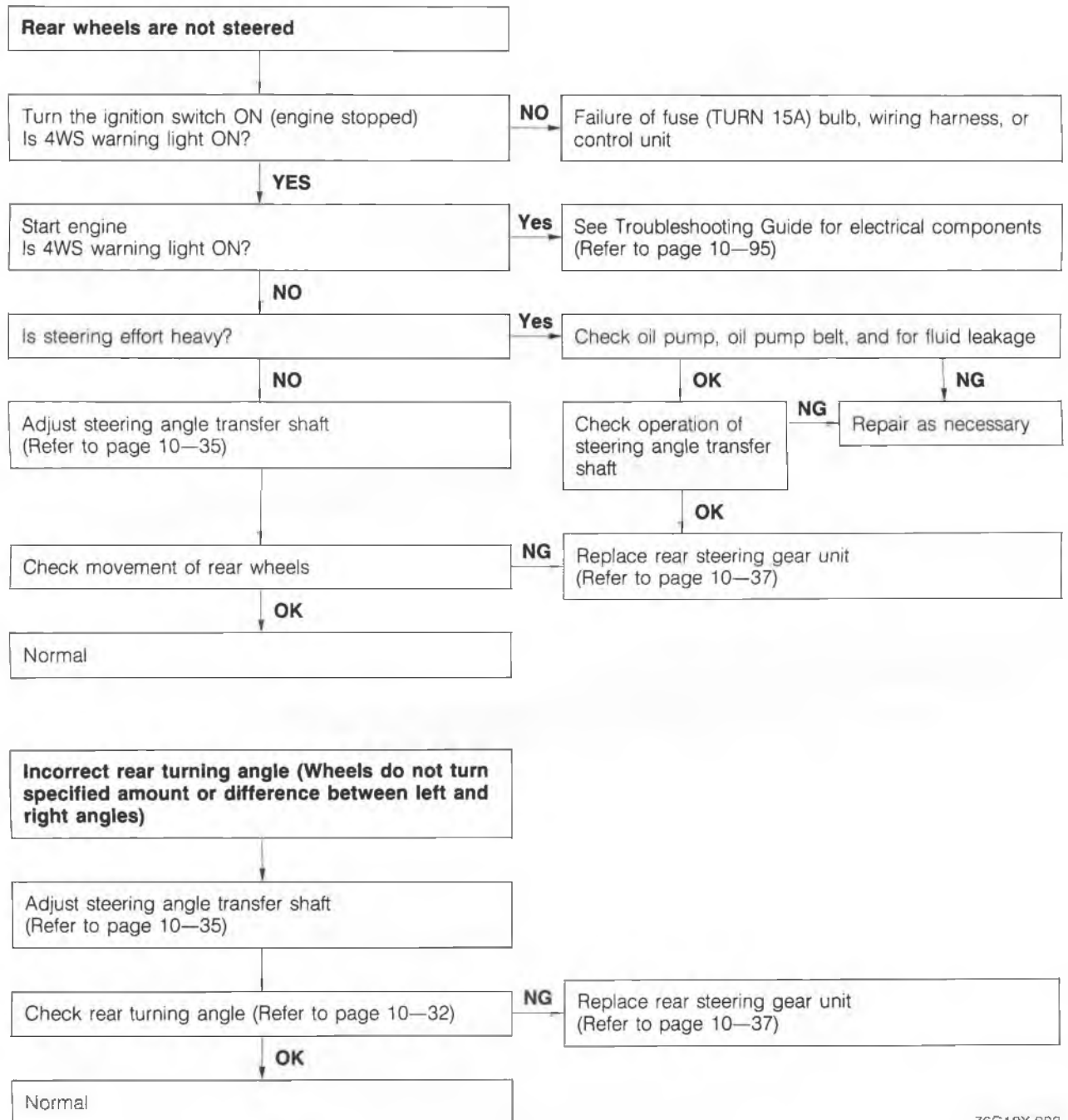
## POWER STEERING

Problem	Possible cause	Remedy	Page
<b>Hard steering</b>	Loose or damaged belt	Adjust or replace	10—12
	Low fluid level, or air in fluid	Add fluid or bleed air	10—11
	Leakage of fluid	Repair or replace	10—13
	Malfunctioning electrical system*	Repair or replace	10—87
	Insufficient oil pump pressure	Repair or replace	10—16
	Improperly adjusted wheel alignment	Refer to Section 13	—
	Malfunctioning steering gear	Repair or replace	10—28, 37
	Linkage ball joint not operating smoothly	Replace	10—18
<b>Poor return</b>	Insufficient tire pressure	Refer to Section 12	—
	Improperly adjusted wheel alignment	Refer to Section 13	—
	Ball-joint not operating smoothly	Replace	10—20
	Steering shaft contacting something	Repair	10—21
<b>Excessive play</b>	Loose gear box housing mounting bolts	Tighten	10—30
	Worn linkage or tie-rod ball joint	Replace	10—18
	Worn lower ball joint	Refer to Section 13	—
	Worn or damaged steering joint	Replace	10—21
	Worn rack and pinion gear	Replace	10—58, 75
<b>Steering wheel vibrates</b>	Insufficient tire pressure	Refer to Section 12	—
	Damaged or unbalanced wheel	Refer to Section 13	—
	Improperly adjusted wheel alignment	Refer to Section 13	—
	Loose gear box housing mounting bolts	Tighten	10—30
	Incorrect pinion preload adjustment	Adjust	10—72, 81
	Worn ball joints	Replace	10—18
	Loose shock absorber mounting	Refer to Section 13	—
Malfunctioning shock absorber	Refer to Section 13	—	
<b>Steering wheel pulls</b>	Unevenly worn tires	Refer to Section 12	—
	Incorrect tire pressure	Refer to Section 12	—
	Dragging brake	Refer to Section 11	—
	Improperly adjusted wheel alignment	Refer to Section 13	—
<b>Excessively light steering at high speed*</b>	Malfunctioning electrical system	Repair or replace	10—87

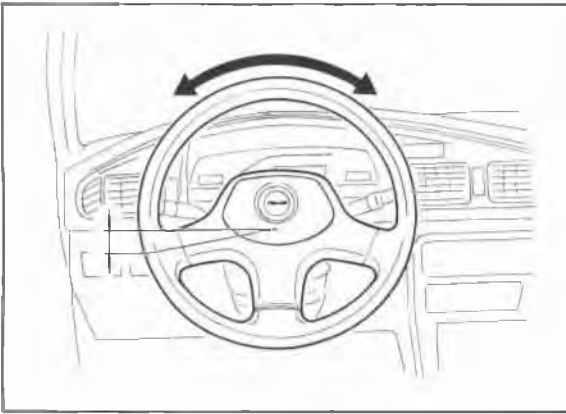
\*... Only for electronically - controlled type

76G10X-002

## 4WS Rear Steering Gear



76G10X-003



86U10X-010

## ON-VEHICLE MAINTENANCE

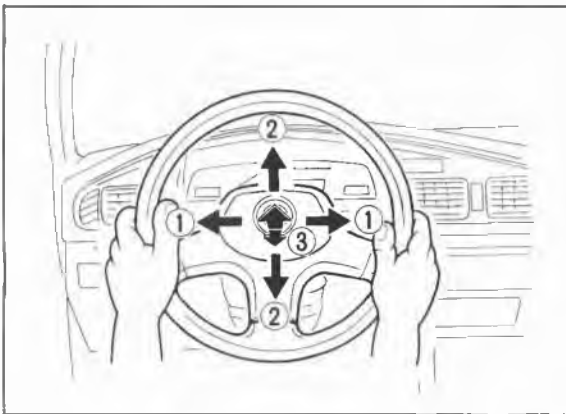
### STEERING WHEEL PLAY

With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right and check that the play is within specification.

**Play: 0—30 mm (0—1.18 in)**

#### Note

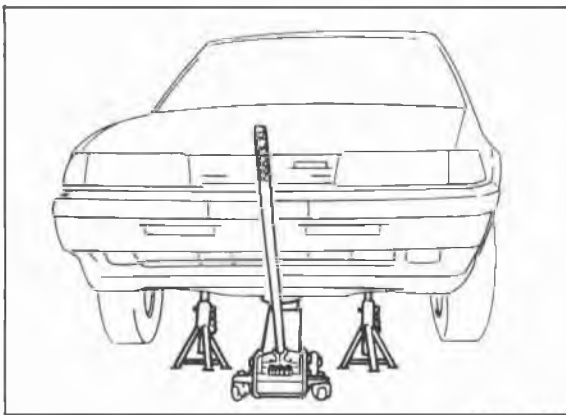
**If play exceeds specification, either the steering joints are worn or backlash of the steering gear is excessive.**



86U10X-011

### LOOSENESS OR PLAY OF STEERING WHEEL

Move the steering wheel in the directions ①, ②, and ③ to check for column bearing wear, steering-shaft joint play, steering wheel looseness, and column looseness.



86U10X-012

### STEERING WHEEL EFFORT

#### Manual Steering

1. Jack up the vehicle. Move the steering wheel to put the wheels in the straight-ahead position.
2. Measure the steering wheel effort by connecting a pull scale to the outer circumference of the steering wheel.

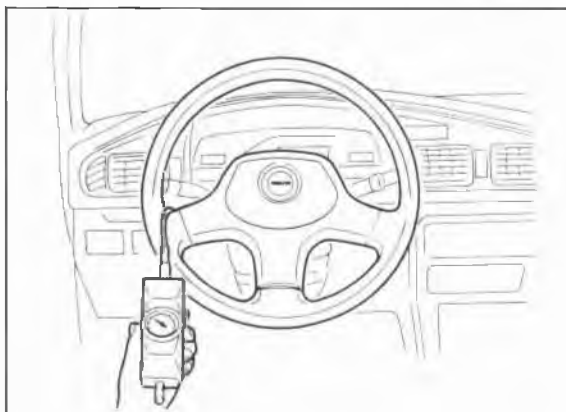
#### Steering wheel effort:

**5—25 N (0.5—2.5 kg, 1—5.5 lb)  
[during one turn of the steering wheel]**

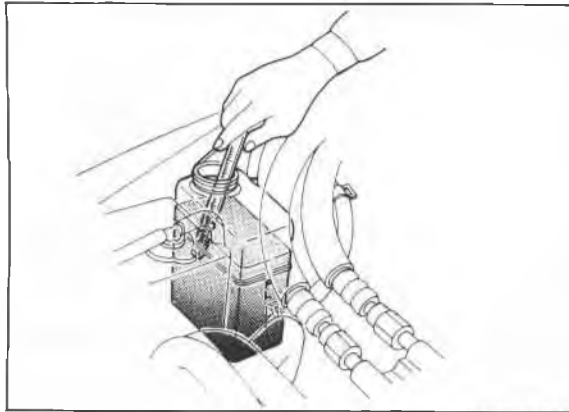
#### Note

**Measure after turning the steering wheel to the left and right at least 5 times.**

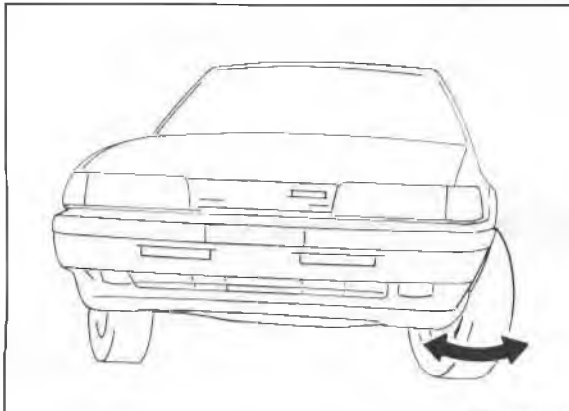
3. If the measured value exceeds specification, check the following: rotation-starting torque of pinion, rotation torque of each ball-joint, and joints.



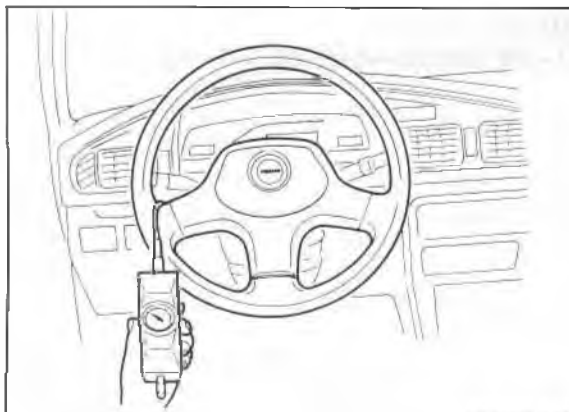
86U10X-013



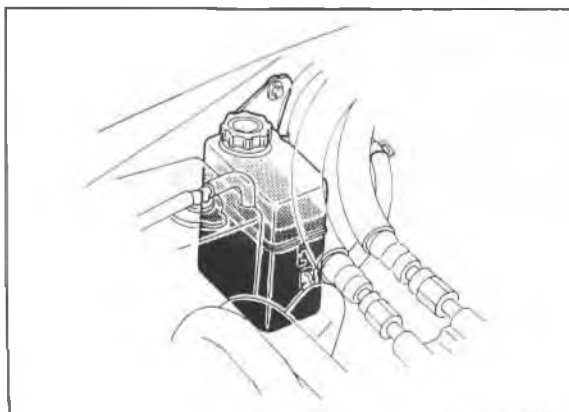
86U10X-014



86U10X-015



86U10X-016



86U10X-017

## Power Steering

1. With the vehicle on a hard level surface, move the steering wheel to put the wheels in the straight ahead position.
2. Start the engine and warm the power steering fluid to **50—60°C (122—140°F)**, pull scale.
3. Attach a pull scale to the outer circumference of the steering wheel. Then, starting with the wheels in the straight-ahead position, check the steering effort required to turn the steering wheel to the left and to the right.
4. If the measured value exceeds specification, check the following: fluid level, air in system, fluid leakage at hose or connections, function of oil pump and gear box, and tire pressure.

## Steering wheel effort:

### ESPS Type

25—31N (2.6—3.2 kg, 6—7 lb)

### ECPS Type

15—23 N (1.7—2.3 kg, 3—5 lb)

### 4WS Type

25—35N (2.5—3.5 kg, 6—8 lb)

[during one turn of the steering wheel]

## Note (4WS)

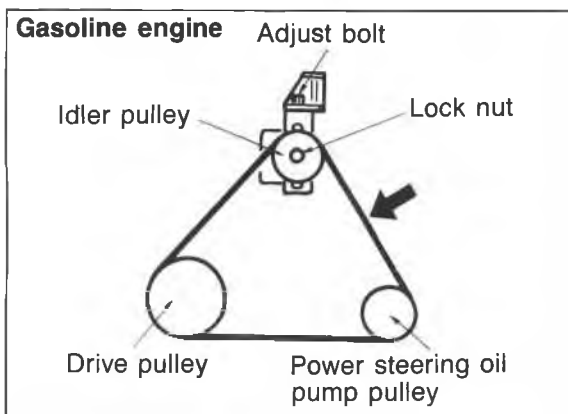
- 1) If not within specification, separate the transfer shaft from the front steering gear and check again.
- 2) If still not within specification, there is a malfunction of the front steering gear.
- 3) If the measured value is now within specification, check the transfer shaft and rear steering gear. (Refer to Page 10—45.)

## POWER STEERING FLUID LEVEL

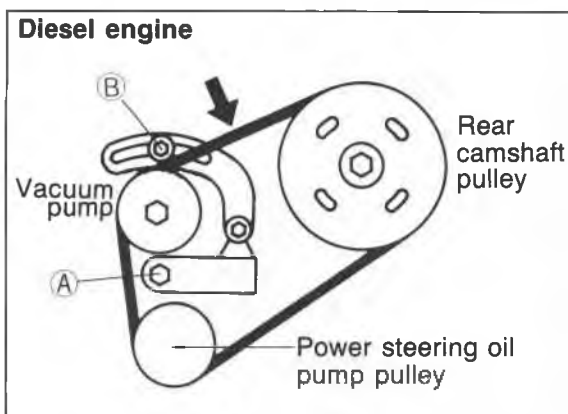
Check the power steering fluid level, and add fluid to the specified level if necessary.

## Caution

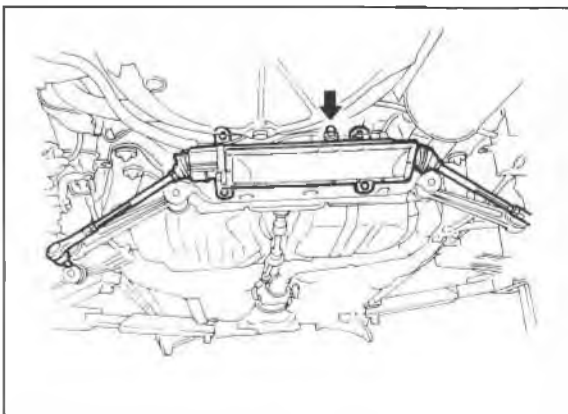
**Use only the specified power steering fluid.**



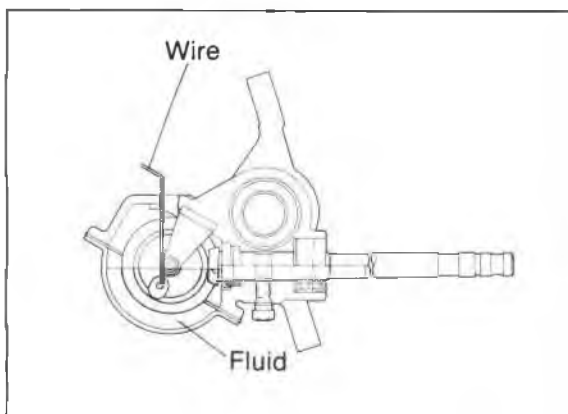
76G10X-004



76G10X-005



86U10X-019



86U10X-250

## LOOSE OR DAMAGED OIL PUMP BELT

### Inspection

Inspect the oil pump belt for looseness or damage.

Power steering oil pump drive belt	Deflection	
	New	Used
Gasoline engine	8—10 mm (0.31—0.39 in)	9—11 mm (0.35—0.43 in)
Diesel engine	6.5—7.5 mm (0.26—0.30 in)	7—8 mm (0.28—0.31 in)

**[When depressed with a force of 98 N (10 kg, 22 lb)]**

### Adjustment

#### Gasoline engine

1. Loosen the lock nut on the idler pulley.
2. Turn the adjust bolt on the idler pulley until the correct tension is obtained.
3. Tighten the lock nut and recheck the tension.

#### Tightening torque:

**49—59 N·m (5—6 m·kg, 36—43 ft·lb)**

#### Diesel engine

1. Loosen the vacuum pump bolt (A) and (B).
2. Lever the vacuum pump outward and apply tension to the belt.
3. Tighten the adjust bolt (B).

#### Tightening torque:

**49—59 N·m (5—6 m·kg, 36—43 ft·lb)**

4. Tighten the mounting bolt (A).

#### Tightening torque:

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

## REAR STEERING GEAR OIL

### Fluid Level (4WS)

Remove the bleeder valve, and check the fluid level with a wire.

### Caution

**Be careful not to let dirt in.**

### Fluid level

**44 ± 3 mm (1.7 ± 0.1 in)**

**0.9 ± 0.1 liters (1.0 ± 0.1 US qt,**

**0.8 ± 0.1 Imp qt)**



## LEAKAGE OF POWER STEERING FLUID

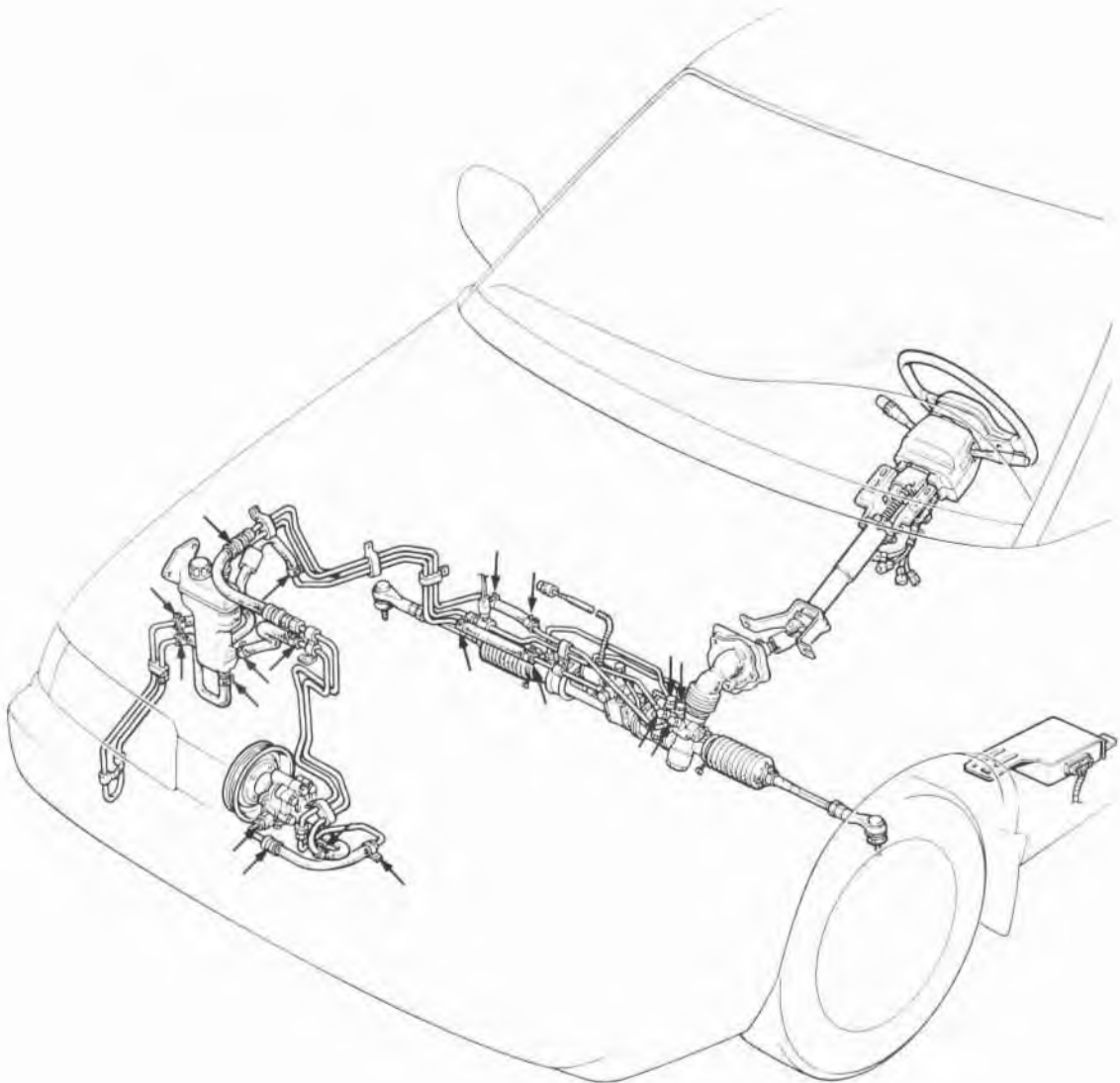
Check the following points for fluid leakage:

1. Gear
2. Oil pump
3. All fluid pipes and connections
4. Solenoid valve (ECPS Type, 4WS Type)

### Note

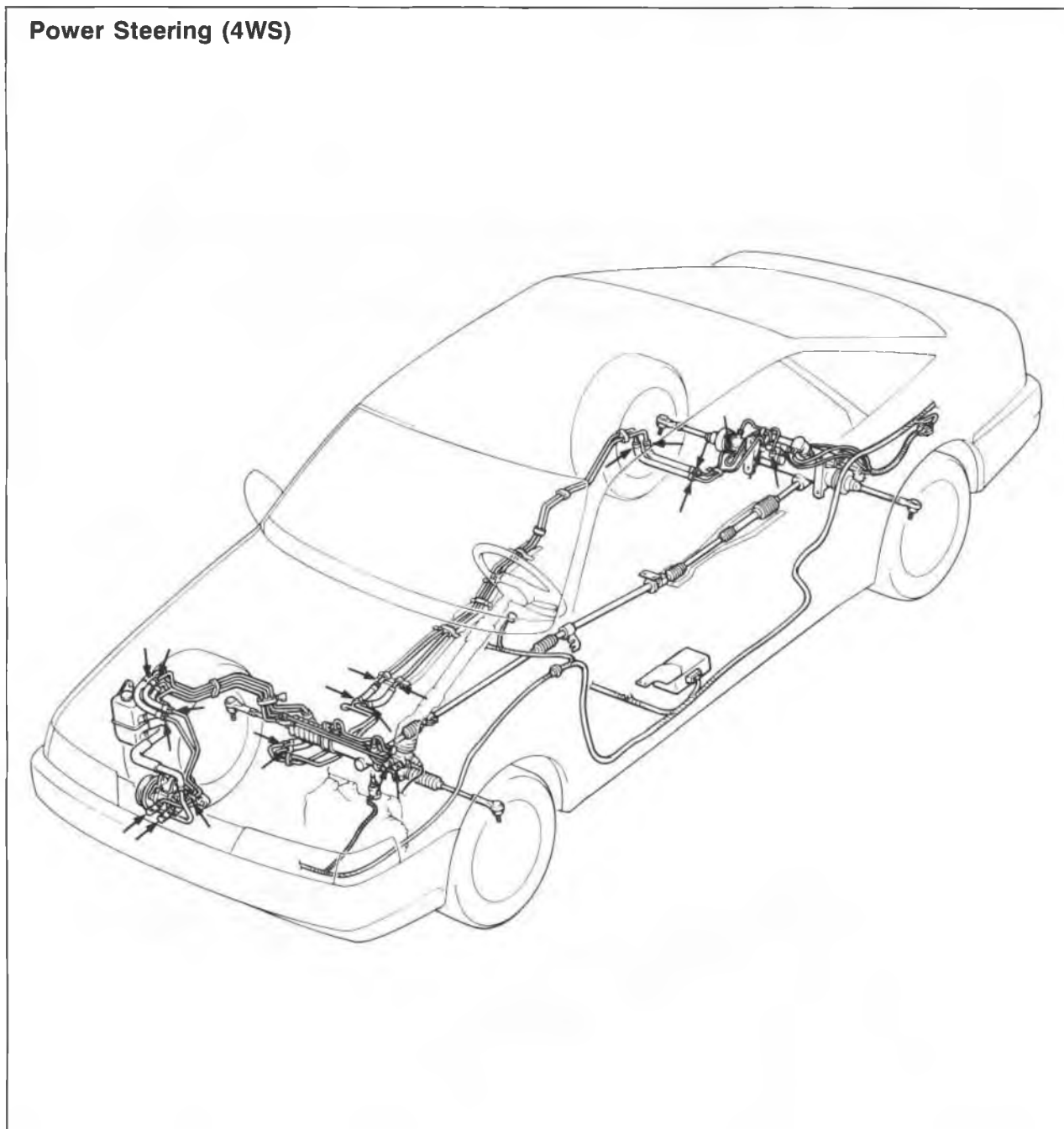
- a) Start the engine, and check for fluid leakage after turning the steering wheel completely to the left and right to apply fluid pressure. Do not, however, keep the steering wheel in the fully turned position for more than 15 seconds.
- b) The points where fluid leakage may occur are indicated by the arrows in the figure.

Power Steering (2WS)



# 10 ON-VEHICLE MAINTENANCE

## Power Steering (4WS)

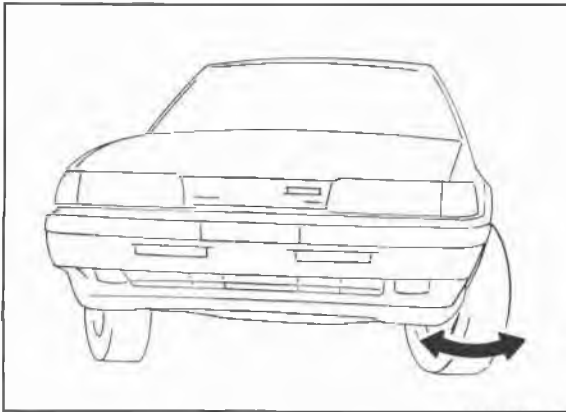


86U10X-235

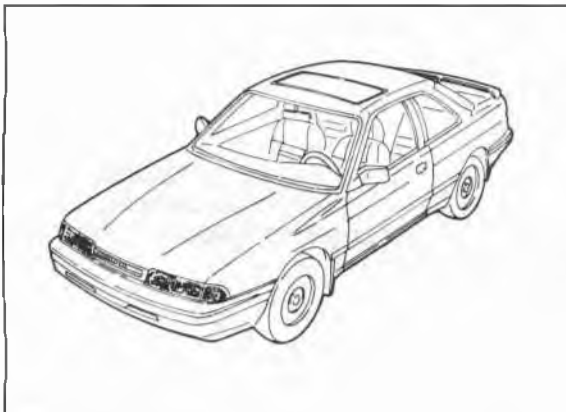
## INSPECTION AND ADJUSTMENT

### BLEEDING OF POWER STEERING SYSTEM

1. Check the fluid level, and add fluid if necessary.
2. Turn the steering wheel fully in both directions 5 times (engine not running).
3. Recheck the fluid level. If the level has lowered, add fluid, and repeat from step 1.



86U10X-021



86U10X-022

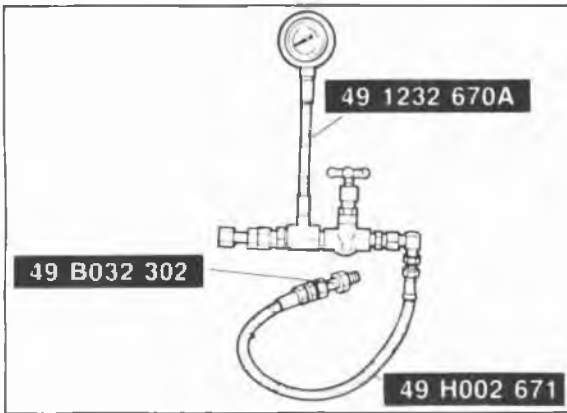
4. Start the engine, and run it at idle.
5. Turn the steering wheel fully in both directions 5 times to bleed air from the system.
6. Check that the fluid is not foamy and the fluid level has not lowered.  
If a problem is found, add fluid as necessary and repeat from step 5.

#### Note

**If bleeding is not done completely, the following problems may appear:**

- Foamy fluid on level gauge.
- Noise from power steering oil pump.

# 10 INSPECTION AND ADJUSTMENT



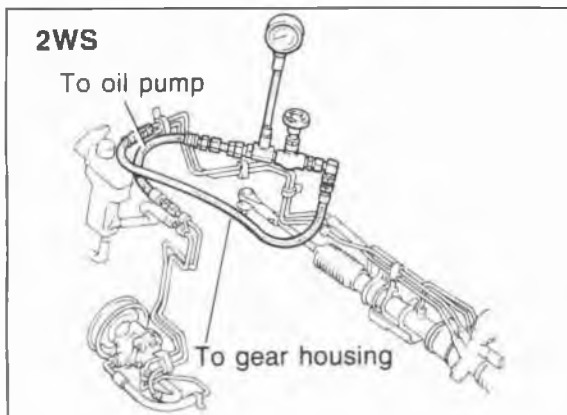
86U10X-023

## POWER STEERING PRESSURE

1. Disconnect the high-pressure hose of the gear housing side, and attach the **SST**.

### Tightening torque:

**39—49 N·m (4.0—5.0 m·kg, 29—36 ft·lb)**

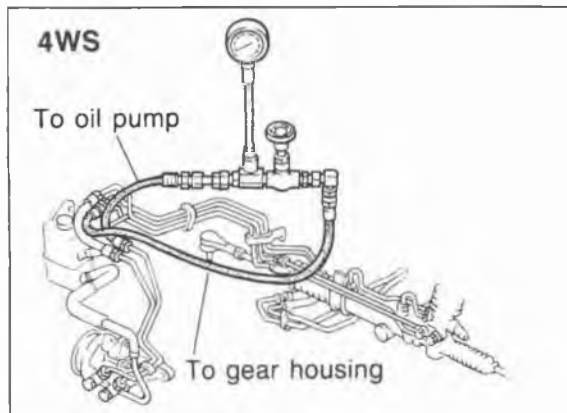


86U10X-024

2. Bleed air from the system.
3. Open the gauge valve fully, then start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50—60°C (122—140°F)**.
4. To measure the fluid pressure generated by the oil pump, close the gauge valve completely and increase the engine speed to **1,000—1,500 rpm**. If the fluid pressure is low, replace the oil pump assembly.

### Warning

**If the valve is left closed for more than 15 seconds, the fluid temperature will increase excessively and adversely affect the oil pump.**



86U10X-025

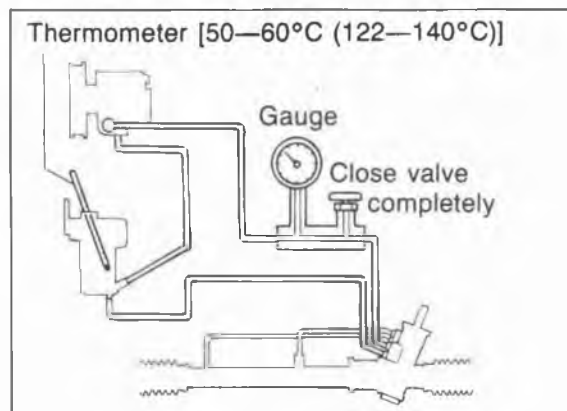
### Oil pump fluid pressure

#### 2WS

**7,355—7,846 kPa  
(75—80 kg/cm<sup>2</sup>, 1,066—1,138 psi)**

#### 4WS

**Front 8,093—8,829 kPa  
(82.5—90.0 kg/cm<sup>2</sup>, 1,173—1,280 psi)  
Rear 7,112—7,848 kPa  
(72.5—80.0 kg/cm<sup>2</sup>, 1,031—1,138 psi)**

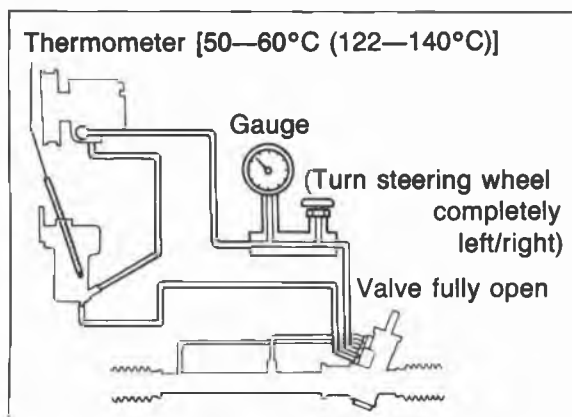


86U10X-026

5. To measure the fluid pressure generated at the gear housing, first open the gauge valve completely, increase the engine speed to **1,000—1,500 rpm**, and then turn the steering wheel fully to the left and right.

### Warning

**If the steering wheel is kept in the fully turned position for more than 15 seconds, the fluid temperature will rise excessively.**



76G10X-032

## Gear housing fluid pressure

### 2WS

7,355—7,846 kPa

(75—80 kg/cm<sup>2</sup>, 1,066—1,138 psi)

### 4WS

Front 8,093—8,829 kPa

(82.5—90.0 kg/cm<sup>2</sup>, 1,173—1,280 psi)

Rear More than 2,943 kPa

(More than 30 kg/cm<sup>2</sup>, more than 427 psi)

If the fluid pressure is low, repair or replace the gear box.

6. Remove the gauge set, then tighten the high-pressure hose to the specified torque.

## Tightening torque:

**31—36 N·m (3.2—3.7 m·kg, 23—27 ft·lb)**

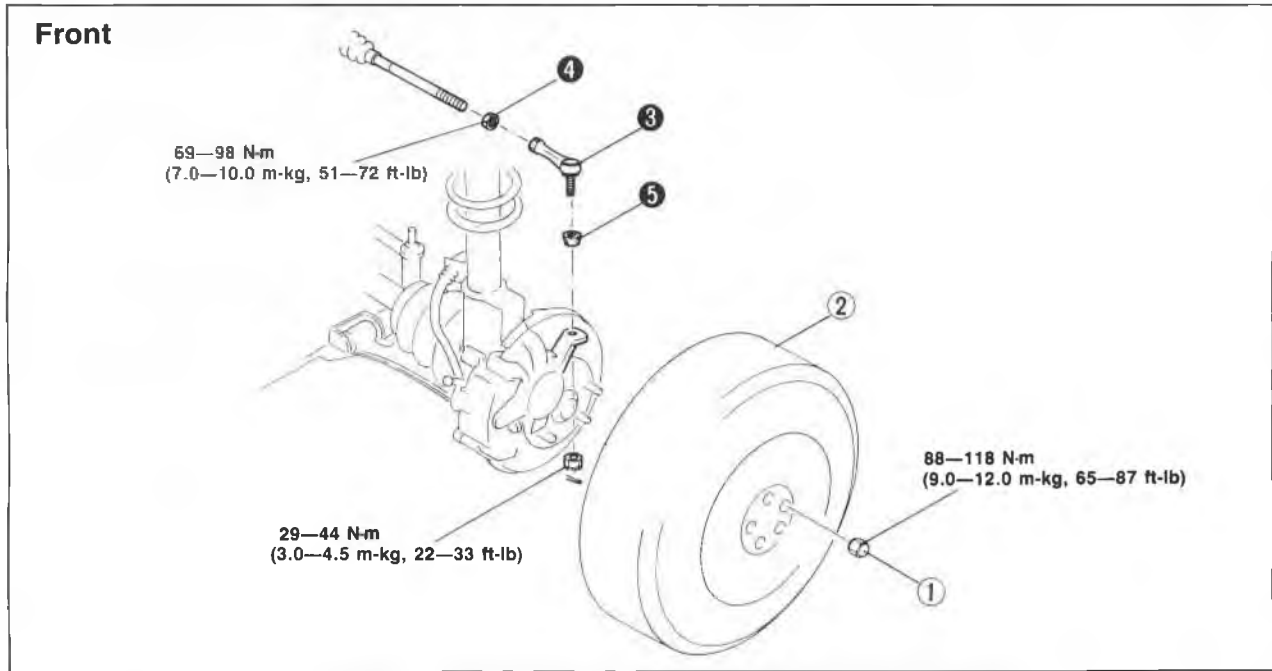
7. Bleed the air from the system. (Refer to page 10—15.)

# 10 TIE-ROD END BOOT

## TIE-ROD END BOOT

### REMOVAL AND INSTALLATION

1. Jack up the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Install in the reverse order of removal, referring to the installation note for specially marked parts.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.

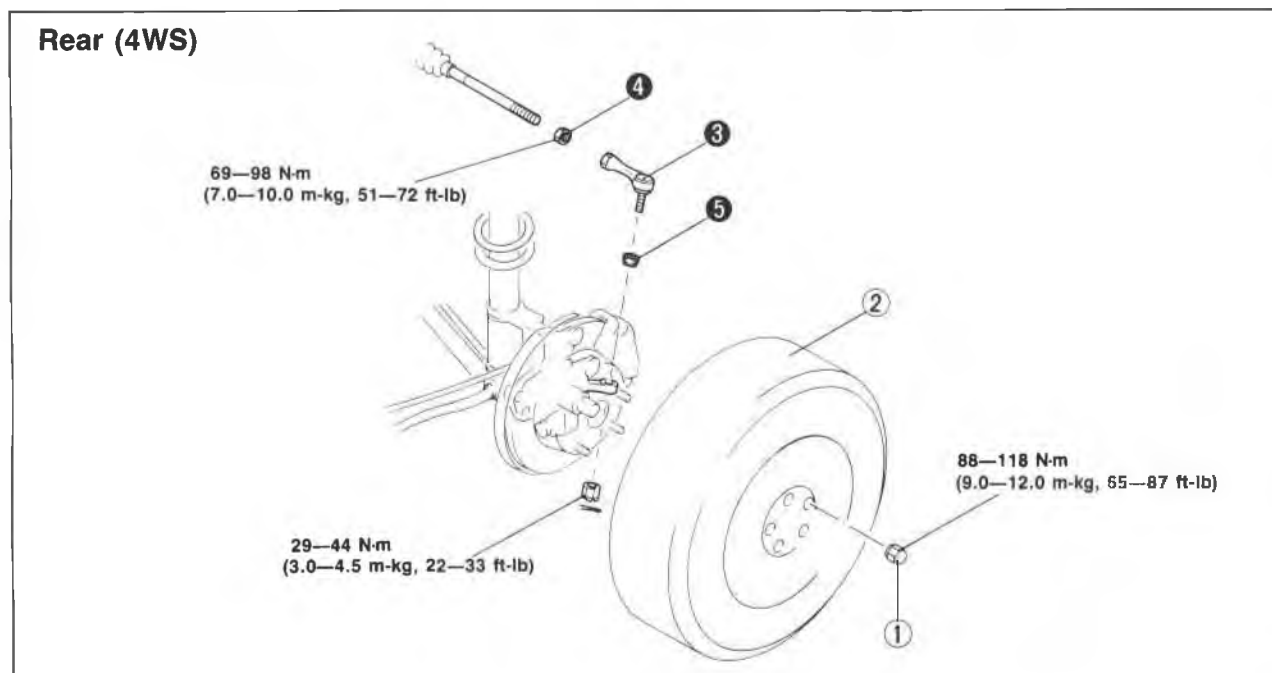


86U10X-028

1. Lug nuts
2. Wheel

3. Tie-rod end
4. Nut

5. Boot



86U10X-029

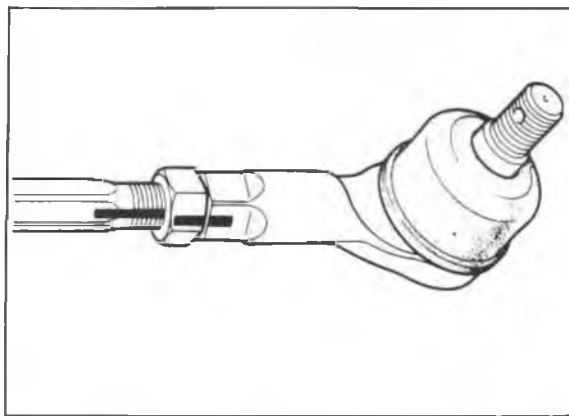
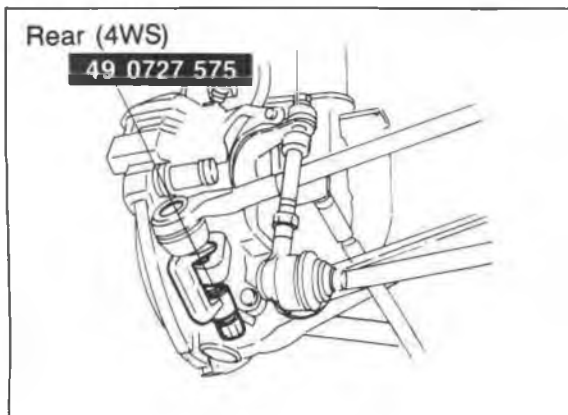
1. Lug nuts
2. Wheel

3. Tie-rod end
4. Nut

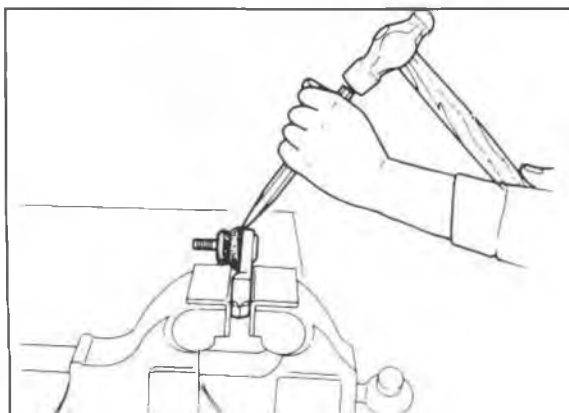
5. Boot



86U10X-030



69G10X-039



86U10X-031

## Removal Note

### Tie-rod end

Separate the tie-rod end from the knuckle using the SST.

## Nut

Before removing the nut from the tie-rod end, make a mark for reference during installation.

## Boot

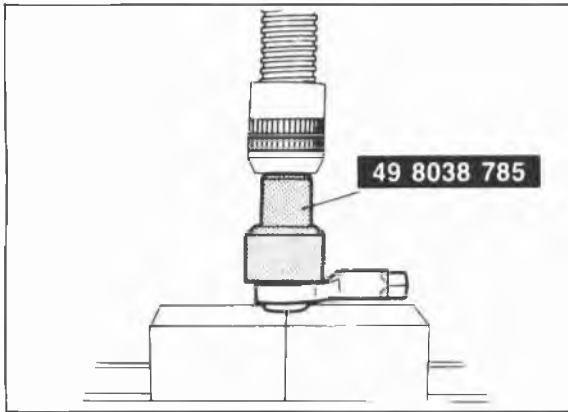
Secure the tie-rod end in a vise. Place a chisel against the boot and hold it at the angle shown. Remove the boot by tapping with a hammer.

## Caution

**Be careful not to scar the part where the boot is attached to the tie-rod end.**

# 10 TIE-ROD END BOOT

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86U10X-032

## Installation Note

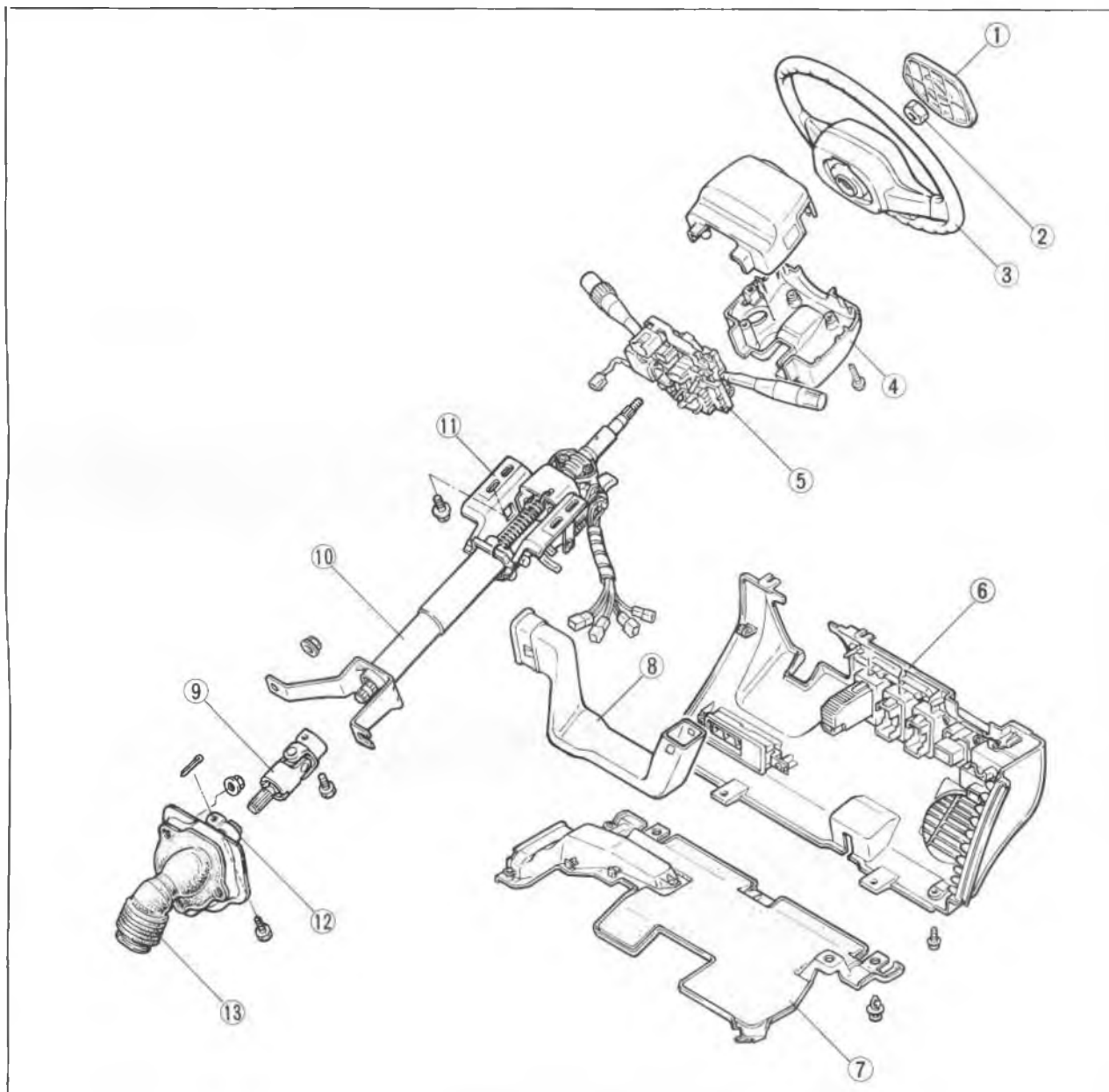
### Boot

Put a small amount of grease (lithium base, NLGI No. 2) into the new boot and set it onto the **SST**. Install the boot to the tie-rod end with a press.



## STEERING WHEEL AND COLUMN

### STRUCTURAL VIEW



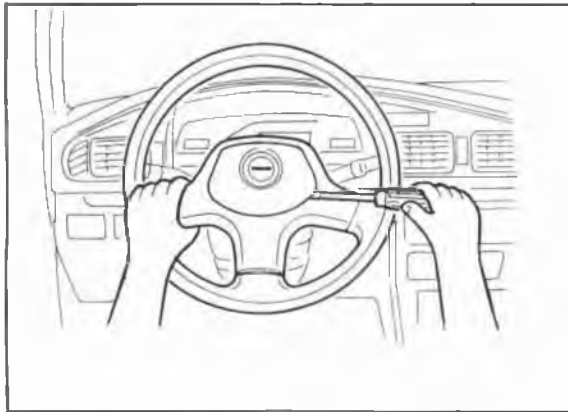
76G10X 006

- 1. Horn cap
- 2. Lock nut
- 3. Steering wheel
- 4. Column cover
- 5. Combination switch

- 6. Switch panel
- 7. Lower panel
- 8. Duct
- 9. Universal joint
- 10. Steering shaft

- 11. Steering shaft assembly
- 12. Intermediate shaft
- 13. Dust boot

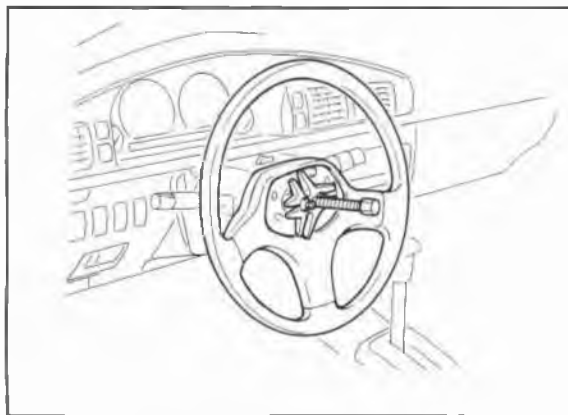
# 10 STEERING WHEEL AND COLUMN



76G10X-007

## REMOVAL

1. Remove the horn cap.
2. Remove the locknut.



76G10X-008

3. The steering wheel must be removed with a suitable puller.

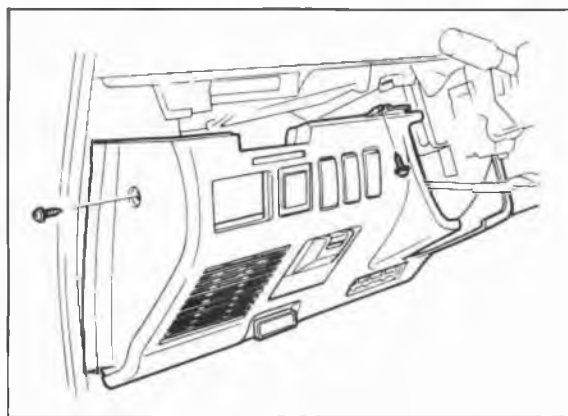
## Caution

**Be careful not to subject the steering shaft to severe impact in the axial direction when removing or installing the steering wheel.**



76G10X-009

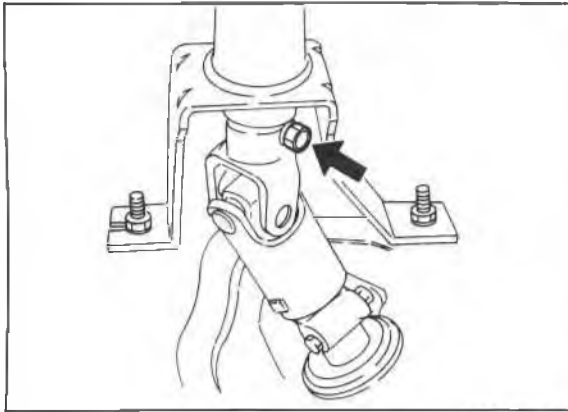
4. Remove the column cover.
5. Disconnect the ignition switch connector.
6. Remove the combination switch.



76G10X-010

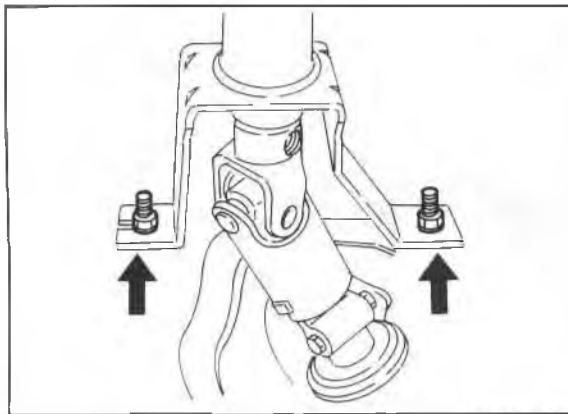
7. Remove the lower panel and switch panel.
8. Remove the duct.

## STEERING WHEEL AND COLUMN 10



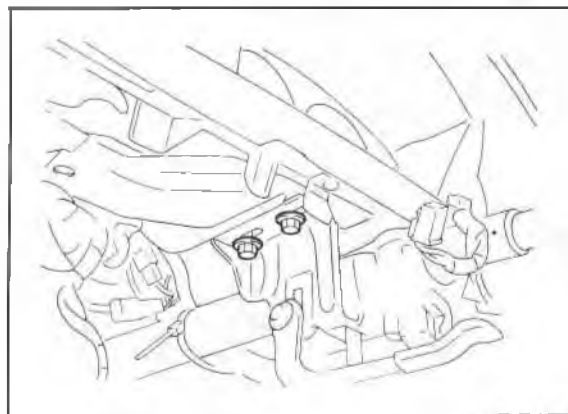
76G10X-011

9. Remove the bolt connecting the universal joint and steering shaft.



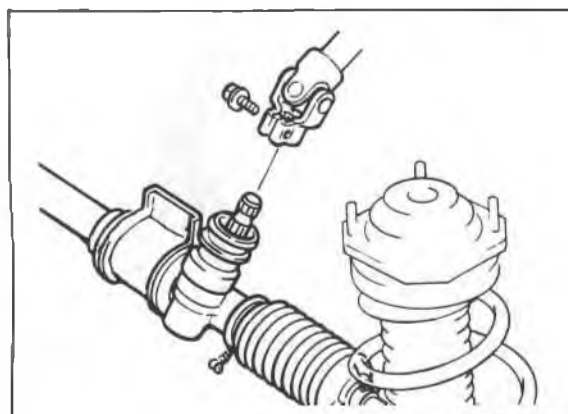
76G10X-012

10. Remove the nuts from the lower bracket of the steering shaft.



76G10X-013

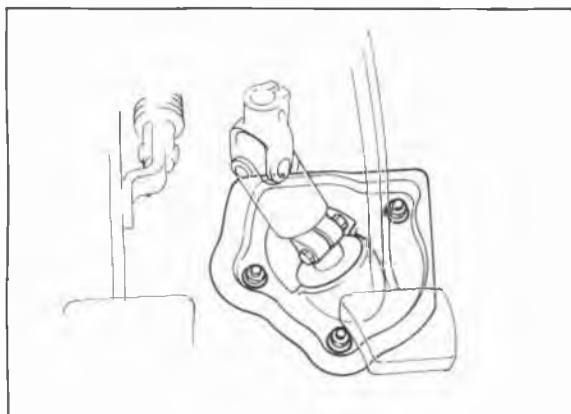
11. Remove the bolts from the upper bracket of the steering shaft.  
12. Remove the steering shaft assembly.



76G10X-014

13. Remove the bolts from the intermediate shaft.

# 10 STEERING WHEEL AND COLUMN

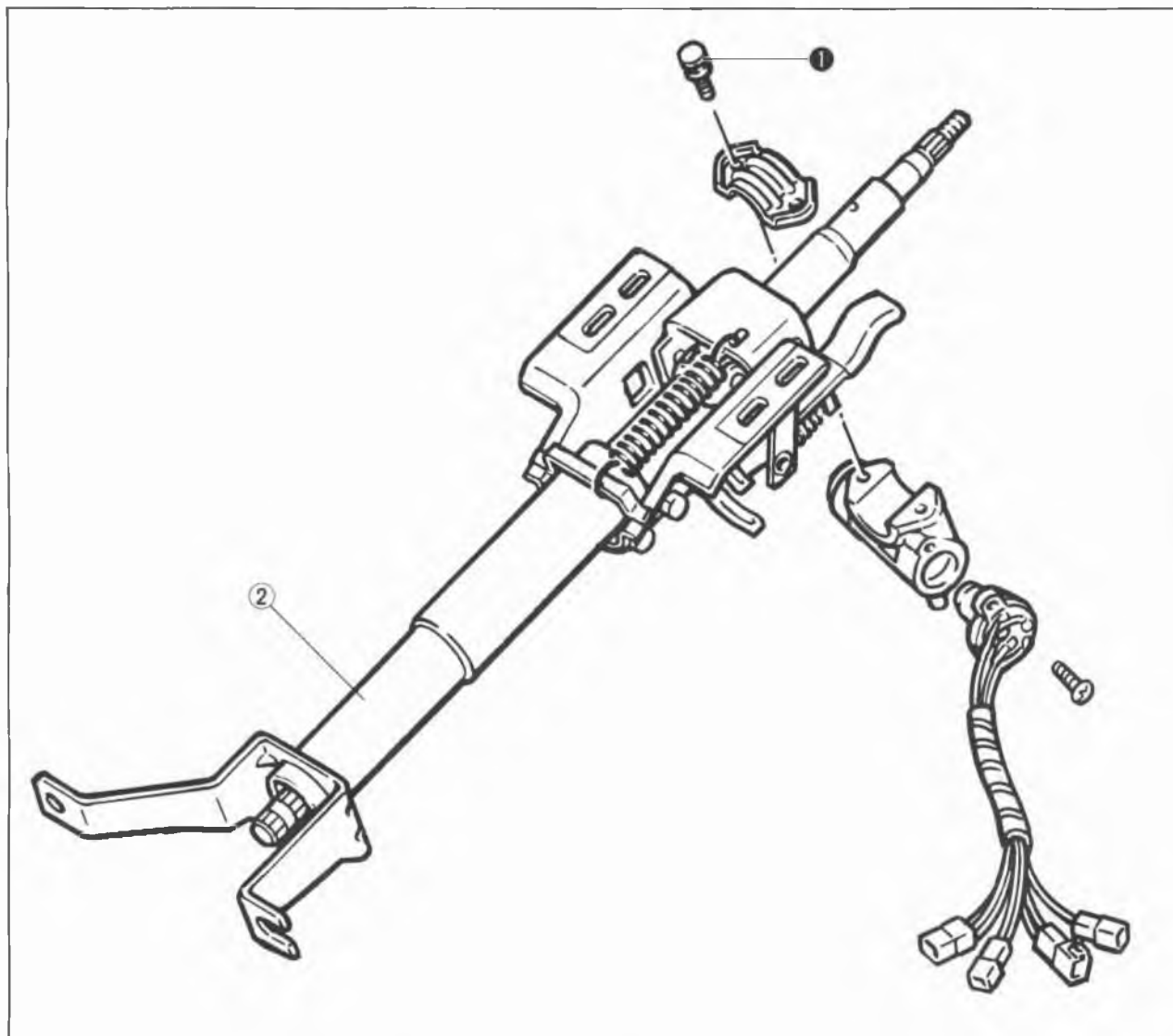


76G10X-015

14. Remove the dust cover assembly.
15. Remove the intermediate shaft.

## DISASSEMBLY AND ASSEMBLY

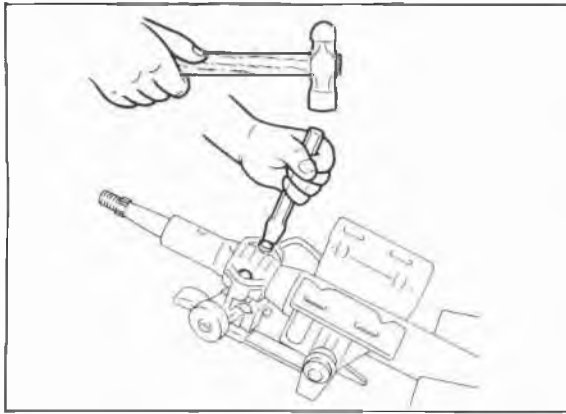
1. Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.
2. Assemble in the reverse order of removal, referring to the assembly note.



86U10X-043

1. Steering lock bolt

2. Steering shaft

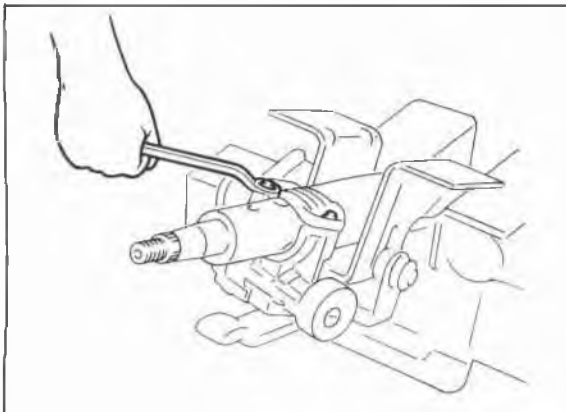


86U10X-44

## Disassembly Note

### Steering lock

Use a chisel to make a groove in the head of the steering lock installation screws. Remove the screws with a screwdriver; then remove the steering lock.



86U10X-045

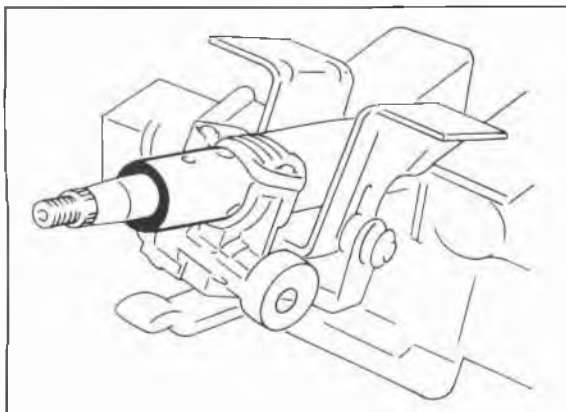
## Assembly Note

### Steering lock

Install the steering lock on the jacket; then use new steering lock mounting screws, and tighten them until the heads break off.

### Caution

**Check the operation of the lock while tightening the steering lock mounting screws.**



86U10X-046

## INSPECTION

Check the following and replace any faulty parts.

### Shaft

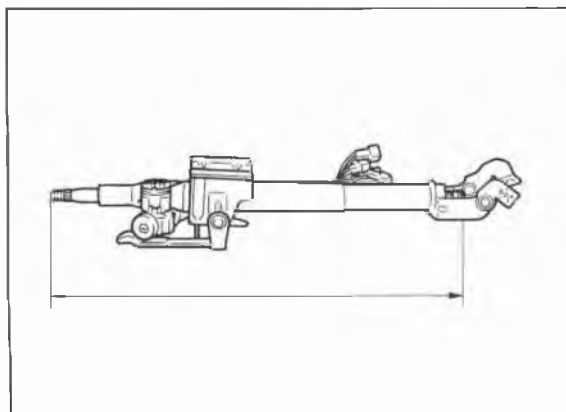
1. Wear of column bushing

2. Length of steering column

### Length:

**614—616 mm (24.2—24.3 in)**

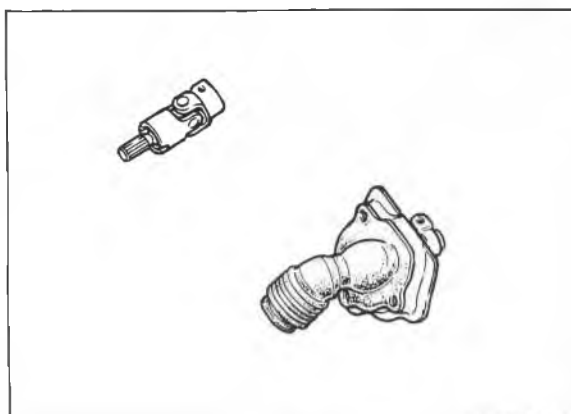
3. Damage of column



86U10X-047

# 10 STEERING WHEEL AND COLUMN

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86U10X-04B

## **Intermediate Shaft and Universal Joint**

Looseness, abnormal noise, or sticking while rotating

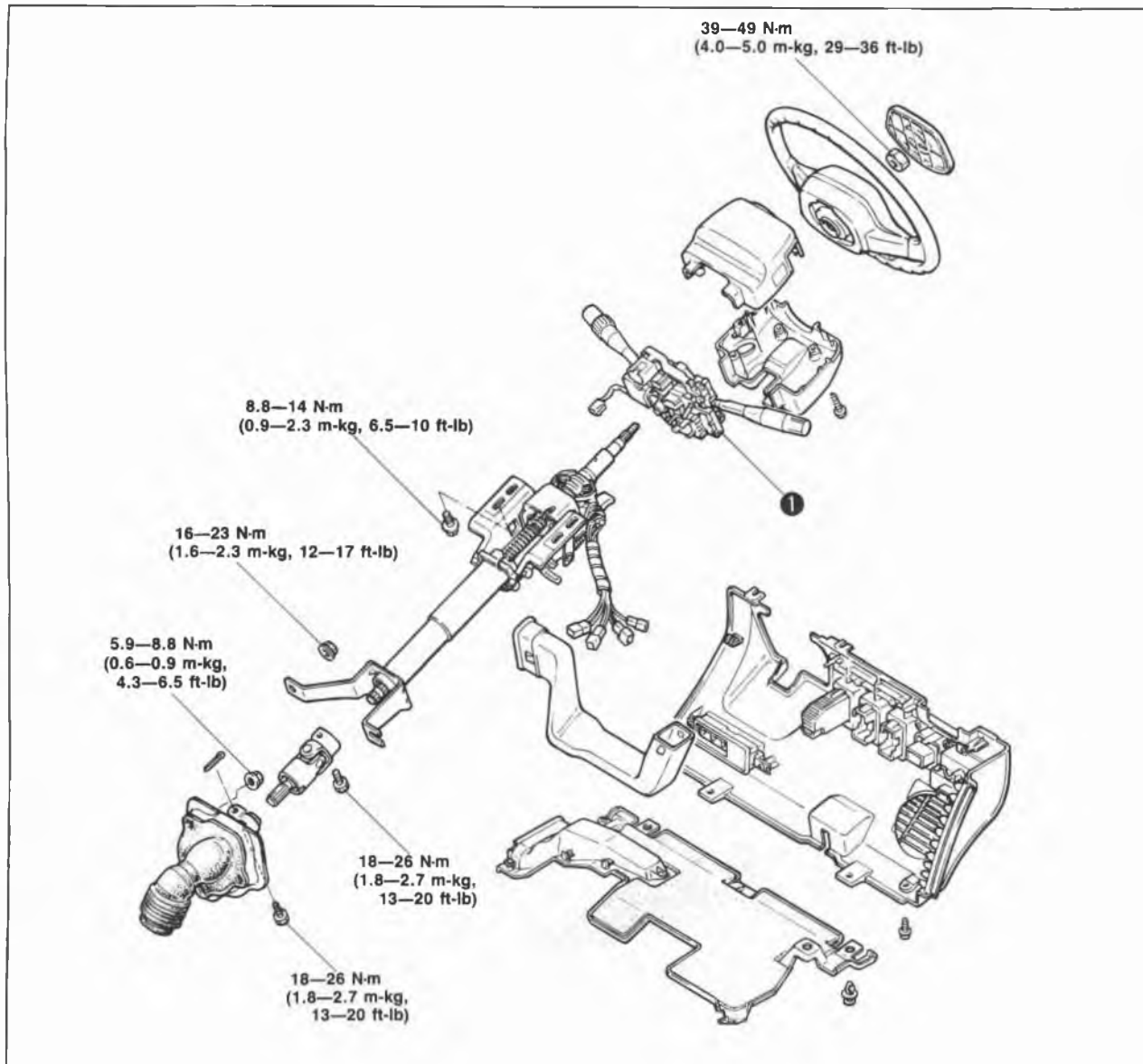
## **Dust Boot**

Damage or deterioration

## INSTALLATION

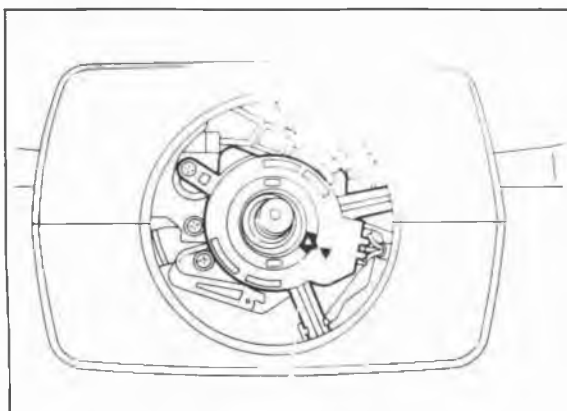
Install in the reverse order of removal, referring to the installation note for specially marked parts.

### Torque specifications



86U10X-049

1. Combination switch



86U10X-050

### Installation Note

#### Combination switch (angle sensor)

Position the angle sensor in the following order:

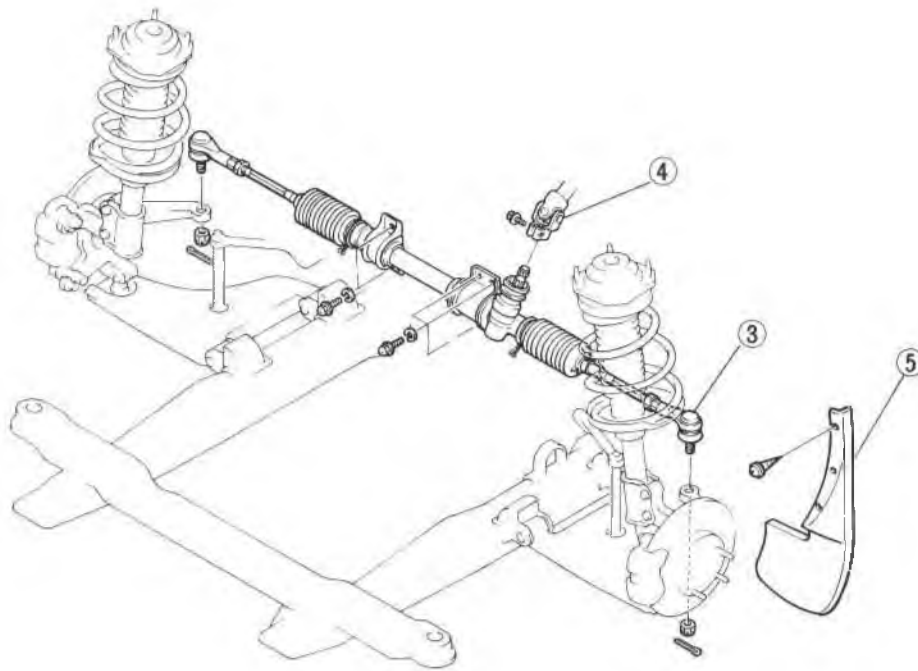
1. Set the wheels in the straight-ahead position.
2. Align the alignment marks (arrows).

# 10 STEERING GEAR AND LINKAGE

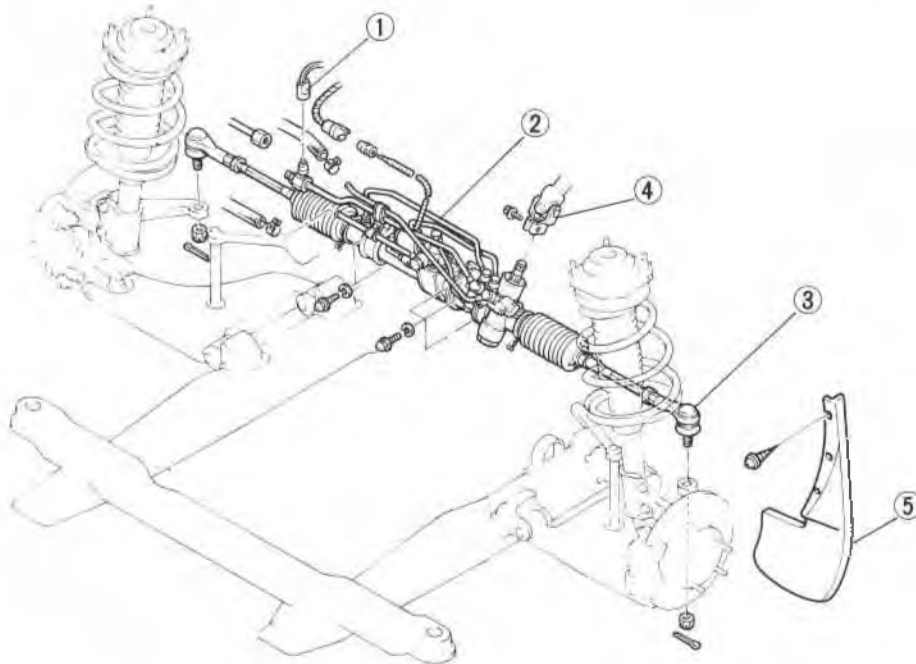
## STEERING GEAR AND LINKAGE

### STRUCTURAL VIEW

#### Manual steering



#### Power steering



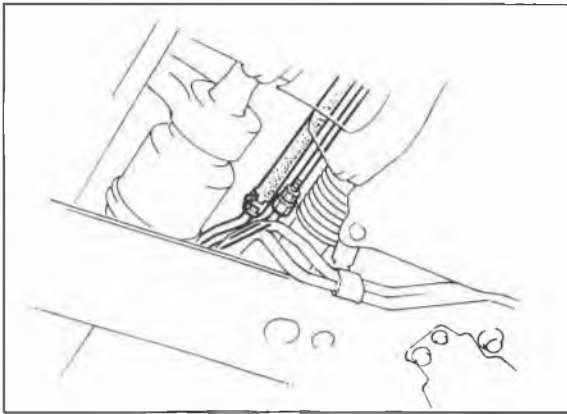
86U10X-051

- 1. Oil pressure switch connector
- 2. Pipes
- 3. Tie-rod end

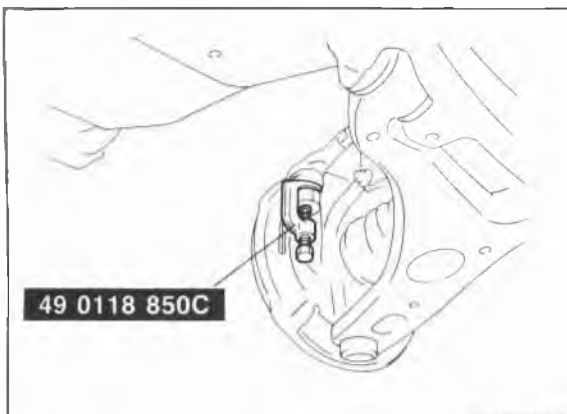
- 4. Steering shaft universal joint
- 5. Mud flap



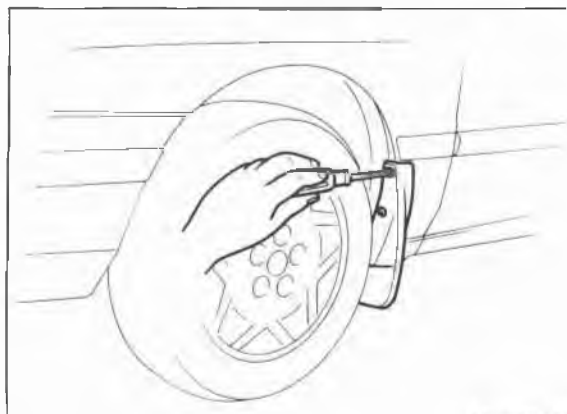
# STEERING GEAR AND LINKAGE 10



86U10X-052



86U10X-053



86U10X-054

## REMOVAL

### Note

The power steering fluid will leak out when the return hose or the pressure hose is disconnected. Prepare a suitable container for it to drain into.

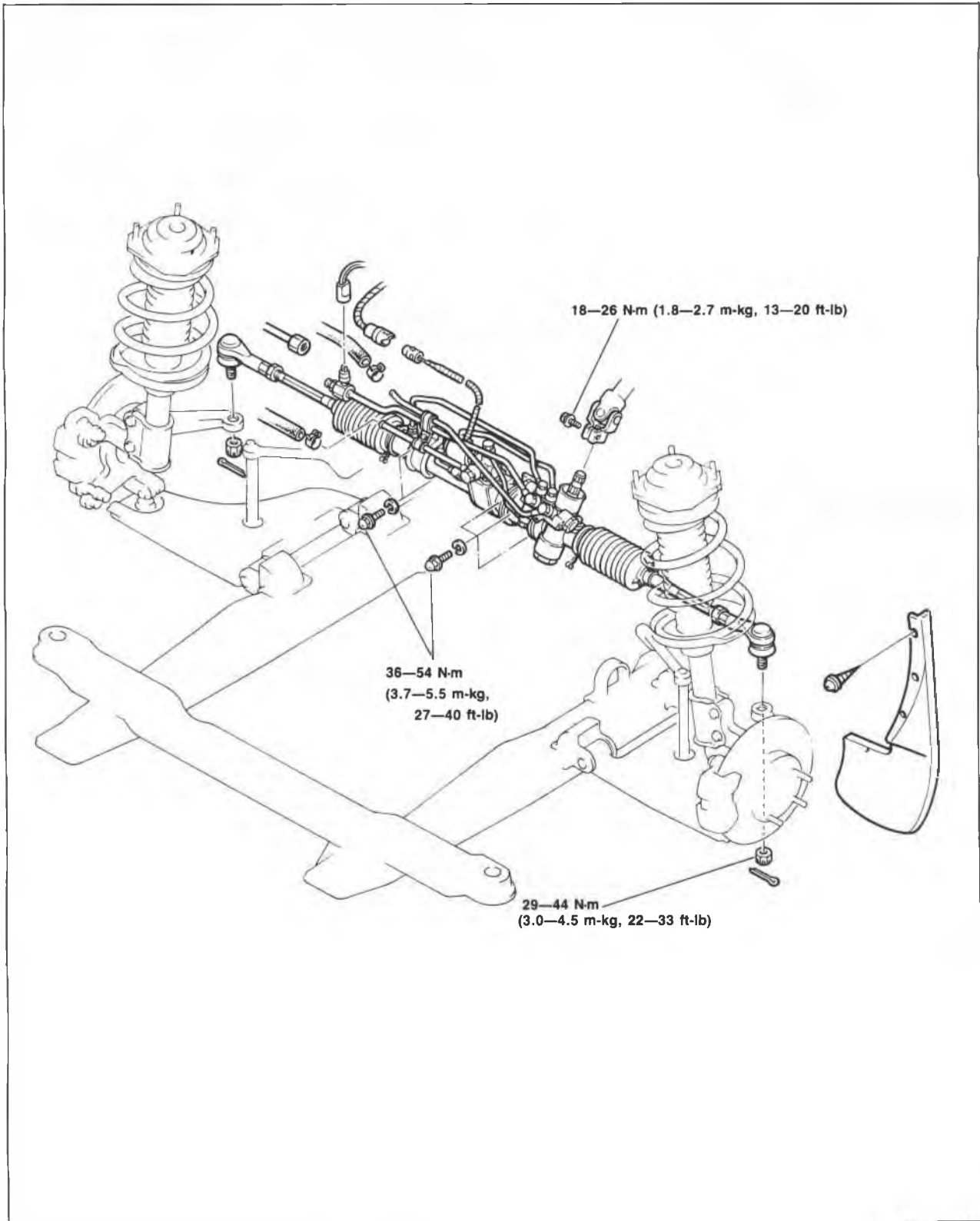
1. Disconnect the negative battery cable.
2. Disconnect the pressure switch connector.
3. Raise the vehicle on a lift or safety stands, and remove the front wheels.
4. Disconnect the power steering hose and pipe.
5. Disconnect the tie-rod ends from the knuckles with the **SST**.
6. Remove the steering shaft universal joint.
7. Remove the mud flap.
8. Remove the mounting bolts and the steering gear.

# 10 STEERING GEAR AND LINKAGE

## INSTALLATION

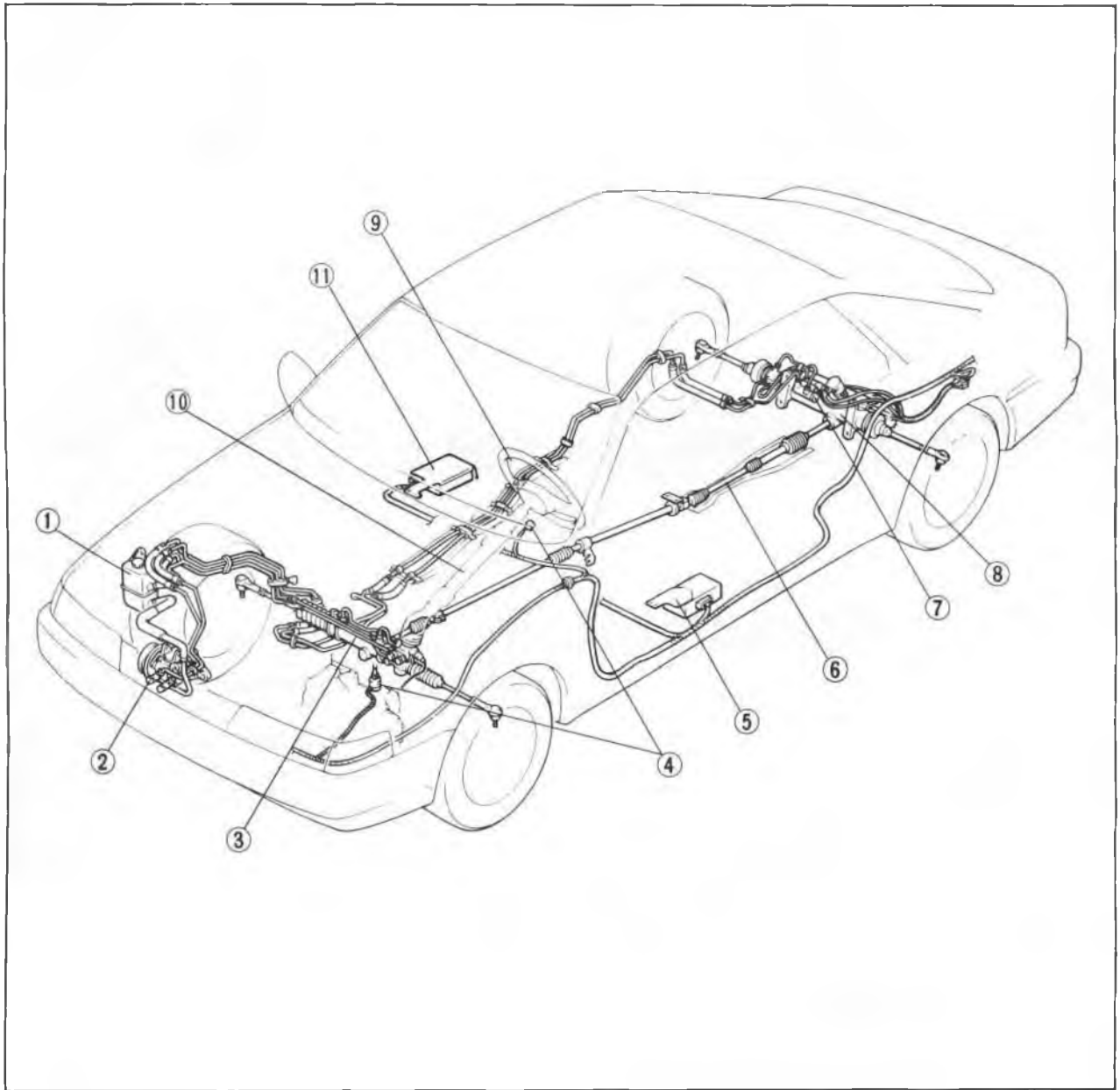
Install in the reverse order of removal.

### Torque Specifications



## 4-WHEEL STEERING GEAR AND LINKAGE

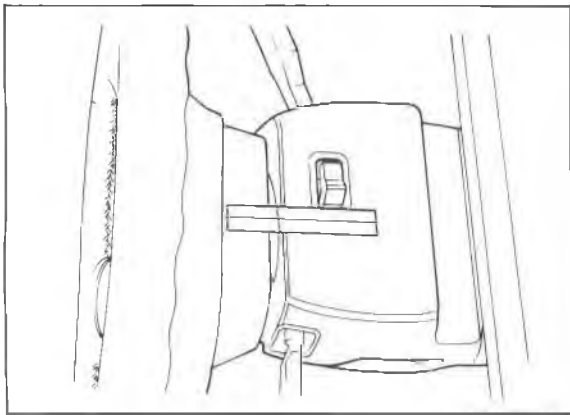
### STRUCTURAL VIEW



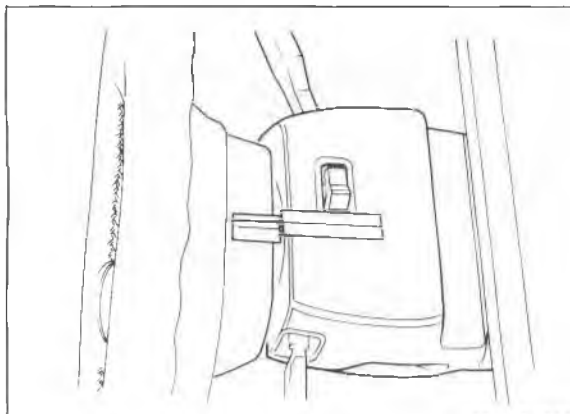
86U10X-056

- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1. Reserve tank                 | 6. Steering angle transfer shaft |
| 2. Oil pump                     | 7. Solenoid valve                |
| 3. Front steering gear assembly | 8. Rear steering gear assembly   |
| 4. Speed sensor                 | 9. Steering wheel                |
| 5. Control unit                 | 10. Steering shaft               |
|                                 | 11. Relay and timer              |

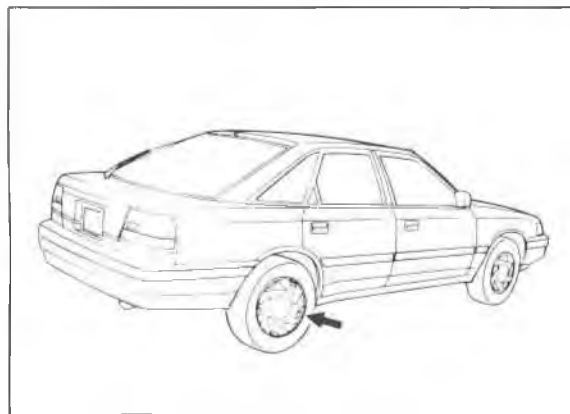
# 10 4-WHEEL STEERING GEAR AND LINKAGE



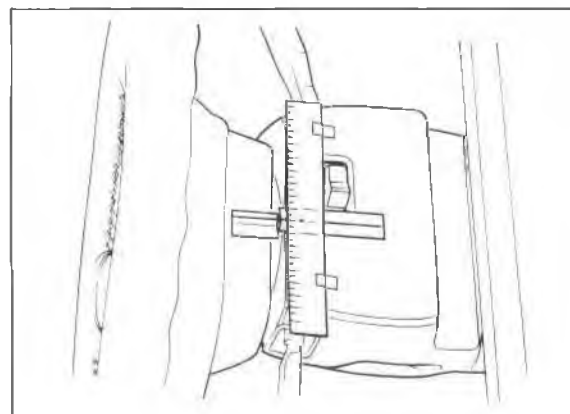
86U10X-301



86U10X-302



86U10X-303



86U10X-304

## 4WS PERFORMANCE INSPECTION

### 1. Steering Angle Transfer Shaft Alignment (Simple inspection)

- (1) Put masking tape on the steering wheel and column cover.

- (2) Drive the vehicle on a straight, flat road for at least 30 m (18.6 ft) and note the steering wheel position. Stop and mark the straight-ahead position on the steering wheel and column cover tape. Drive the vehicle again and check the marks.

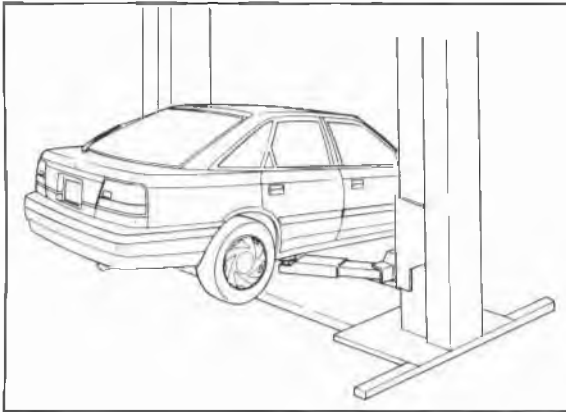
- (3) With the marks between the steering wheel and column cover aligned, check that the rear wheels do not turn off center when the engine is started.

- (4) If the rear wheels move, adjust the steering angle transfer shaft.

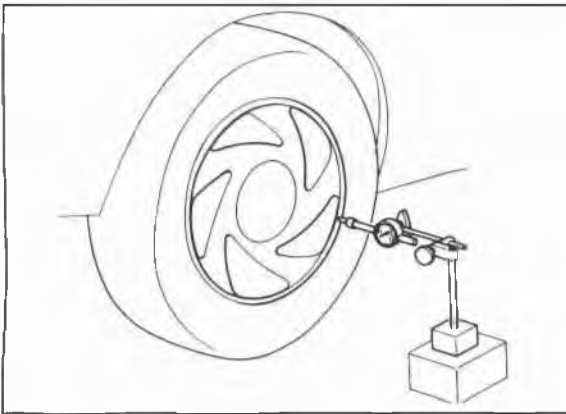
### (Inspection by dial indicator)

- (1) Mark between the steering wheel and column cover as shown above.
- (2) Attach a scale on the column cover as shown in the illustration.

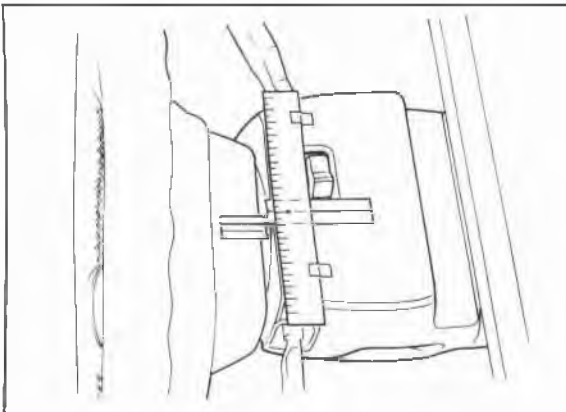
## 4-WHEEL STEERING GEAR AND LINKAGE 10



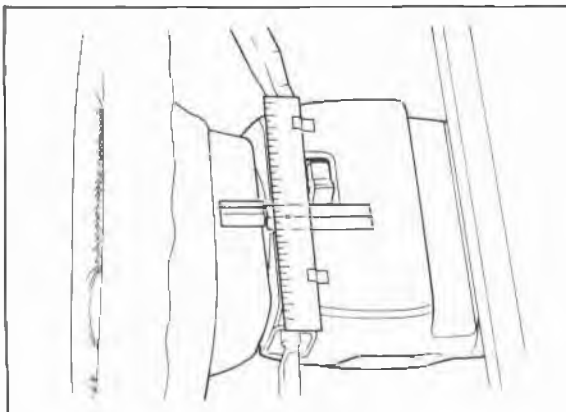
86U10X-305



86U10X-306



86U10X-307



86U10X-308

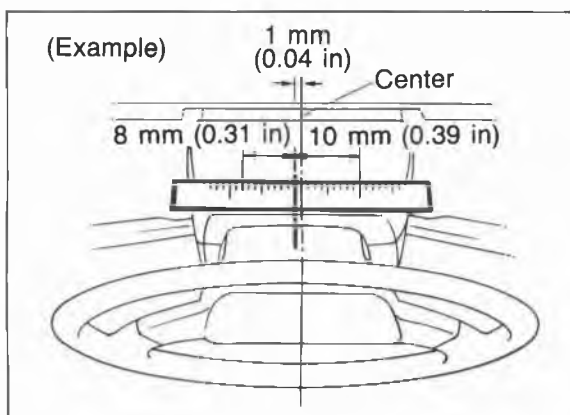
- (3) Raise the vehicle on a lift or safety stands.
- (4) Set a dial indicator against one rear tire. Set the pointer to 0.

- (5) With the marks on the steering wheel and column cover aligned, start the engine and turn the steering wheel slowly to the right. Using the scale on the column cover, note the rotation of the steering wheel at the point where the rear wheels begin to turn (dial indicator begins to move).

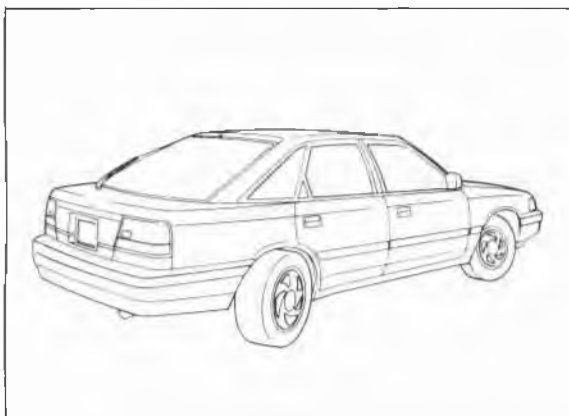
- (6) Turn the steering wheel left and right a few times to equalize the hydraulic pressure. Realign the marks between the steering wheel and column cover.

- (7) Reset the dial indicator to 0 and turn the steering wheel slowly to the left. Using the scale on column cover, again note the rotation of the steering wheel at the point where the rear wheels begin to turn (dial indicator begins to move).

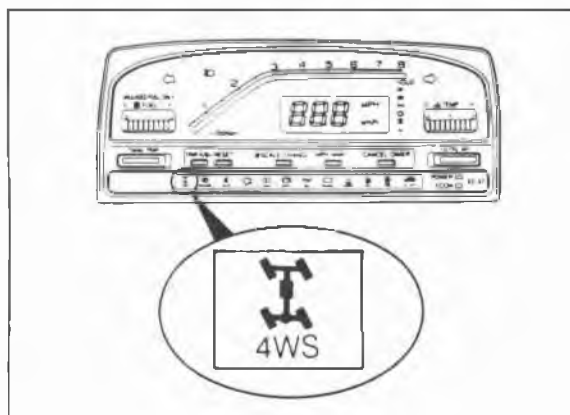
# 10 4-WHEEL STEERING GEAR AND LINKAGE



86U10X-309



86U10X-310



86U10X-311

- (8) The center position can be determined from the left/right measurements in (5) and (7) above.

### Example:

**Right rotation....10 mm (0.39 in)**

**Left rotation....8 mm (0.31 in)**

**Center = Right 1 mm (0.04 in)**

- (9) Check that the center is within specification.

### Specification

**= R 5 mm (0.4 in ) to L 5 mm (0.4 in)**

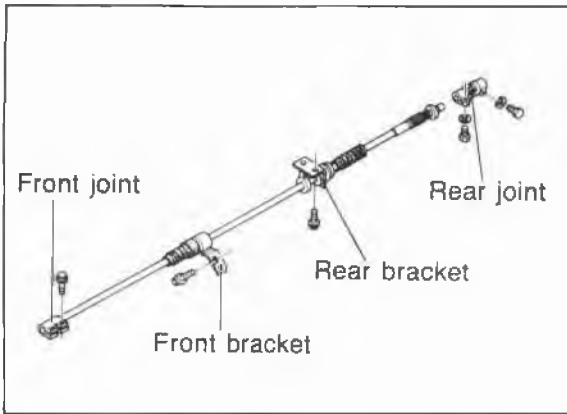
- (10) If not correct, adjust the steering angle transfer shaft.

## 2. Steering Inspection

With the vehicle stopped and the engine running, check that the rear wheels turn in the opposite direction when the steering wheel is turned and that there is no abnormal noise.

## 3. 4WS Electric System Inspection

Drive the vehicle and check that the 4WS warning light does not come on at over 40 km/h (25mph).



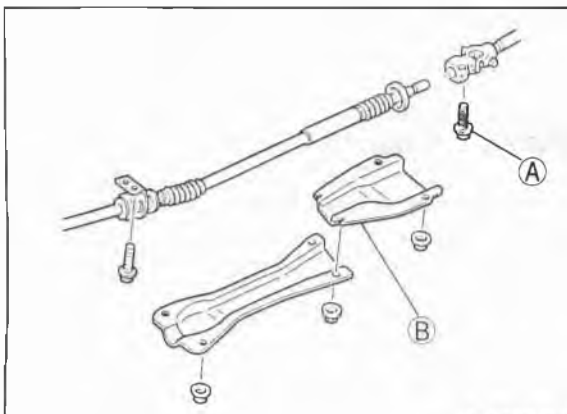
76G10X-033

## ADJUSTMENT OF STEERING ANGLE TRANSFER SHAFT

If the steering angle transfer shaft is disconnected from the front or rear steering gear or after adjusting the wheel alignment, or if the rear steering angle is not correct, adjust the rear turning angle as described below.

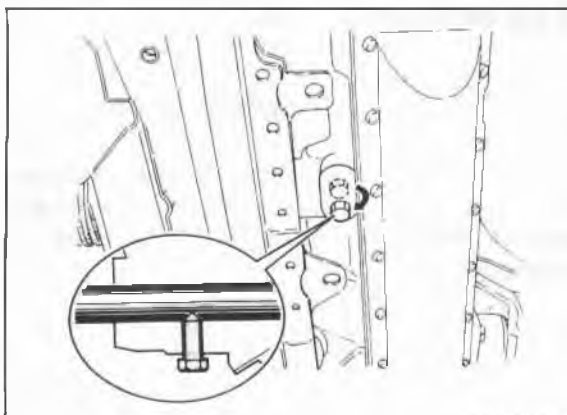
### Warning

**Improper installation of the 4WS steering transfer shaft may affect control of the vehicle and result in the risk of an accident or personal injury.**



86U10X-313

1. Raise the vehicle on a lift or safety stands.
2. Remove cover B and joint bolt A.
3. Slide the shaft out of the joint.

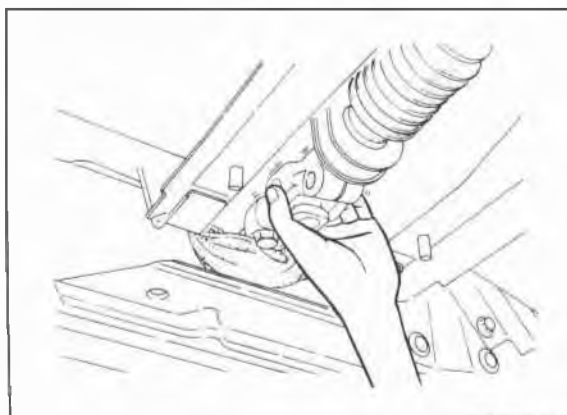


86U10X-314

4. Remove the plug from the rear steering gear. Sight through the hole and turn the steering angle input shaft to align the notch in the input shaft with the center of hole.
5. Remove the set bolt attached to the rear steering gear, and install it in the steering gear to set the input shaft.

### Tightening torque:

**4.9—7.8 N·m (50—80 cm·kg, 43—69 in·lb)**

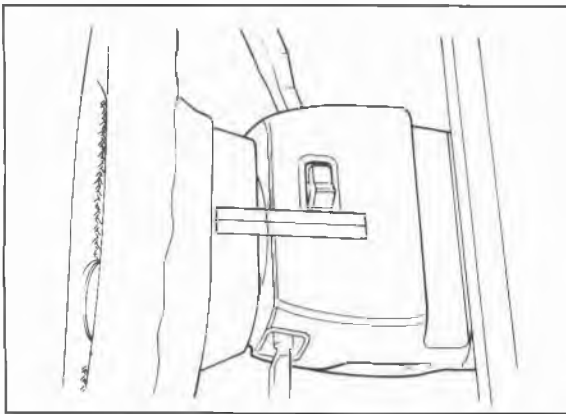


86U10X-315

### Note

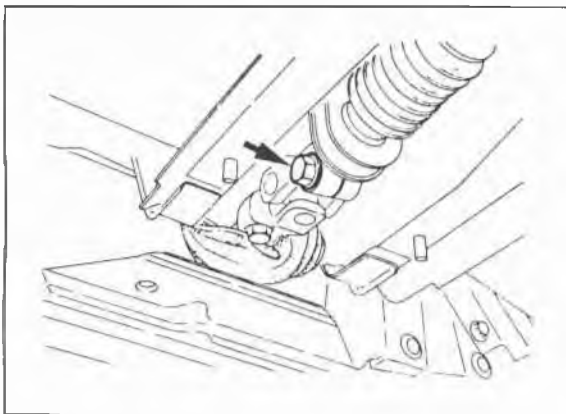
**After the input shaft is set, manually turn the rear joint and check that the shaft does not move.**

# 10 4-WHEEL STEERING GEAR AND LINKAGE



86U10B-316

6. Lower the vehicle.
7. Check and adjust the front and rear wheel alignment if necessary. (Refer to Section 13.)
8. Drive the vehicle and mark the steering straight-ahead position. (Refer to page 10—32.)

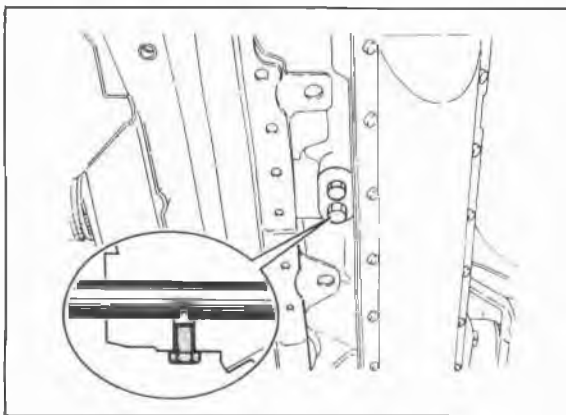


86U10X-317

9. Install the shaft and rear joint removed at step 2, and tighten the bolt to the specified torque.

**Tightening torque: 22—30 N·m  
(2.2—3.1 m·kg, 191—269 in·lb)**

10. Install and tighten a new wire on the joint boot.



86U10X-318

11. Install the set bolt in the rear steering gear.

**Tightening torque:  
20—28 N·m (2.0—2.9 m·kg, 14—21 ft·lb)**

**After installing the steering angle transfer shaft, check the steering angle transfer shaft alignment. [Refer to page 10—32 (Simple inspection).]**



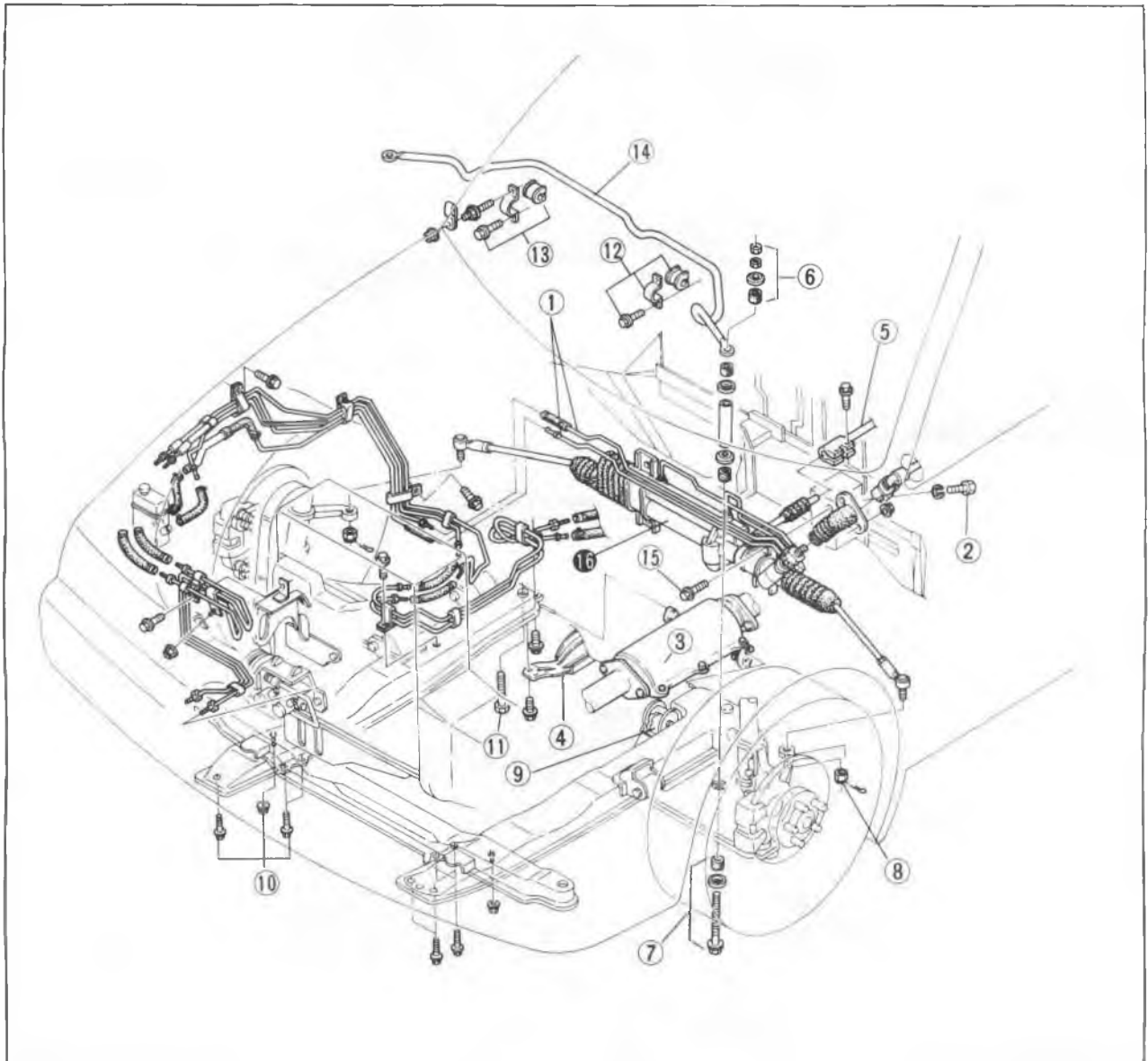
## REMOVAL AND INSTALLATION

1. Jack up the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Install in the reverse order of removal, referring to installation note for specially marked parts.
4. Tighten all nuts and bolts to the specified torque, referring to page 10—39.

### Note

The power steering fluid will leak out when the return hose or the pressure hose is disconnected. Prepare a suitable container for it to drain into.

### Front Steering Gear

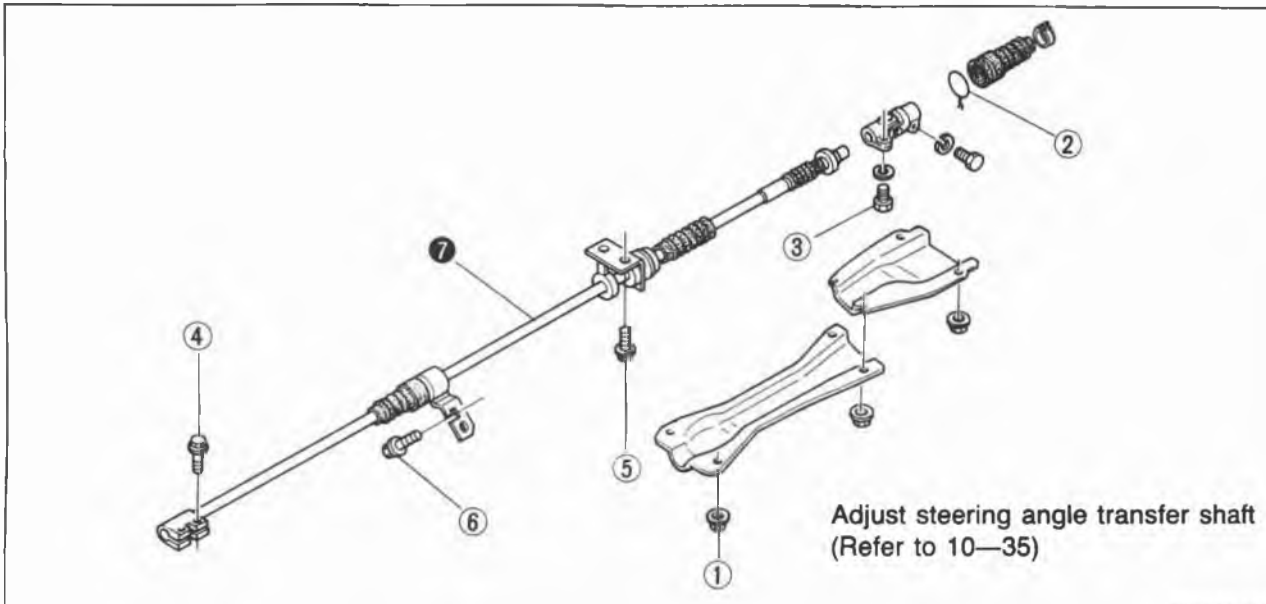


76G10X-034

- |                               |                                  |
|-------------------------------|----------------------------------|
| 1. Pipes                      | 9. Engine mount                  |
| 2. Bolt                       | 10. Bolts and nut                |
| 3. Exhaust pipe               | 11. Bolt                         |
| 4. Under cover                | 12. Bolt and mounting            |
| 5. Shaft (Refer to next page) | 13. Bolts and mounting           |
| 6. Nuts retainer and bushing  | 14. Stabilizer                   |
| 7. Bolt, retainer and bushing | 15. Bolt                         |
| 8. Nuts                       | 16. Front steering gear assembly |

# 10 4-WHEEL STEERING GEAR AND LINKAGE

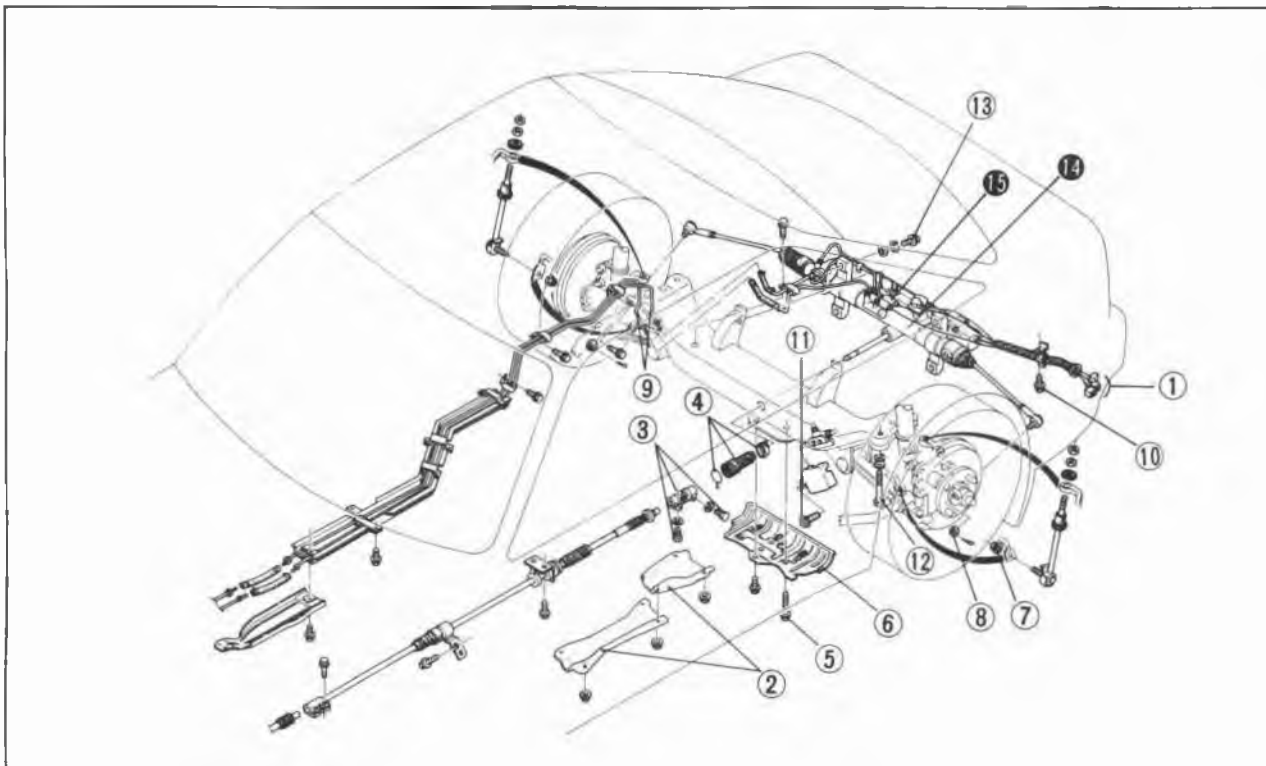
## Steering Angle Transfer Shaft



86U10X-064

- |              |                                  |
|--------------|----------------------------------|
| 1. Nut       | 5. Bolt                          |
| 2. Boot band | 6. Bolt                          |
| 3. Bolt      | 7. Steering angle transfer shaft |
| 4. Bolt      |                                  |

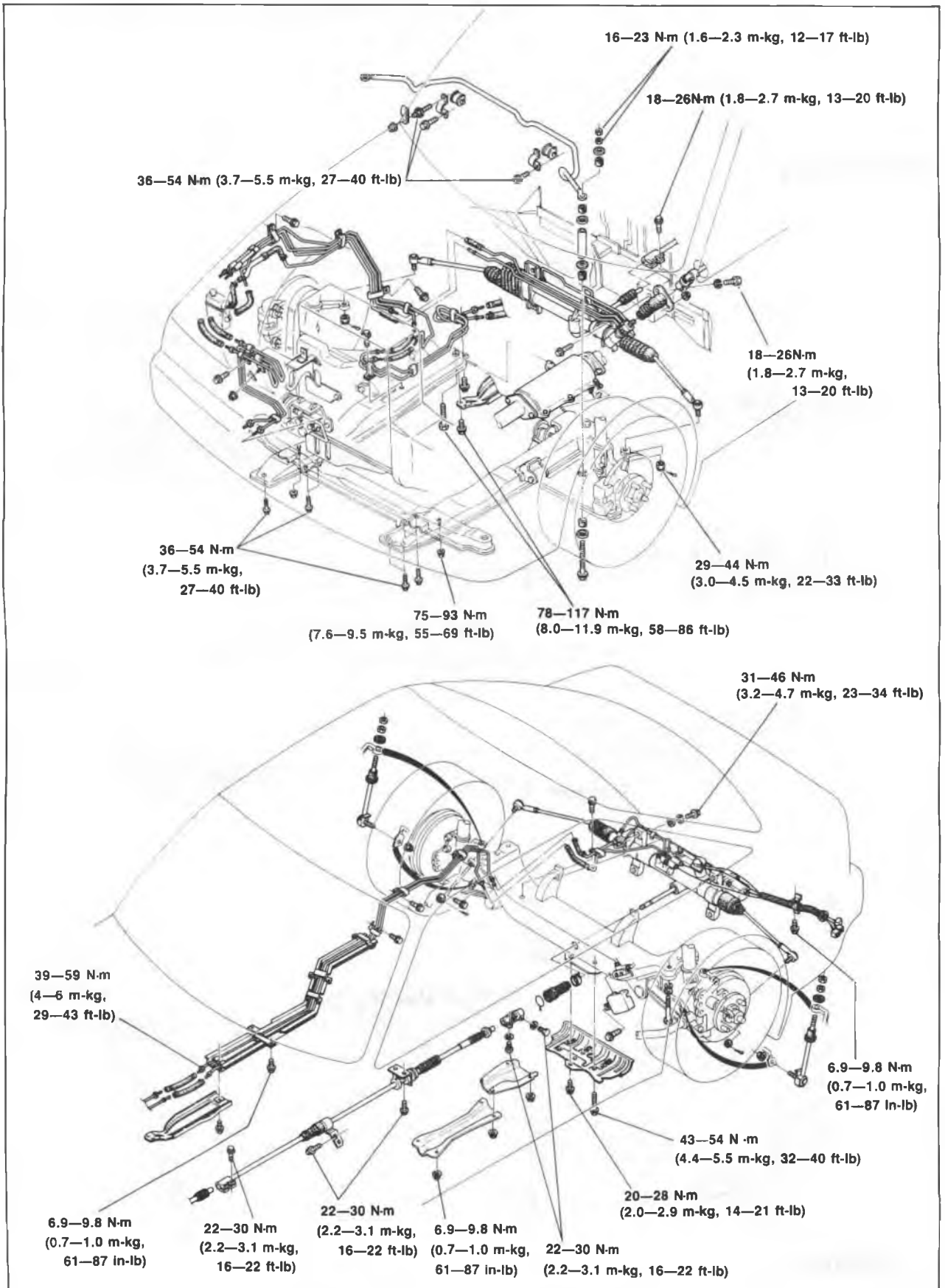
## Rear Steering Gear



86U10X-065

- |                              |          |                                 |
|------------------------------|----------|---------------------------------|
| 1. Connector                 | 6. Cover | 11. Bolt                        |
| 2. Cover                     | 7. Nuts  | 12. Bolt                        |
| 3. Universal joint and bolts | 8. Nuts  | 13. Bolt                        |
| 4. Boot and boot band        | 9. Pipes | 14. Rear steering gear assembly |
| 5. Bolts                     | 10. Bolt | 15. Solenoid valve              |

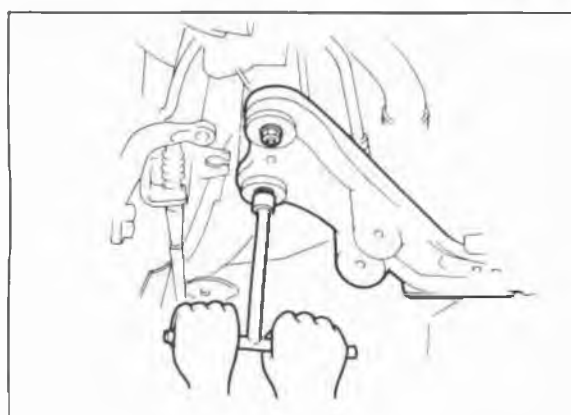
## Torque Specifications



# 10 4-WHEEL STEERING GEAR AND LINKAGE



86U10X-067

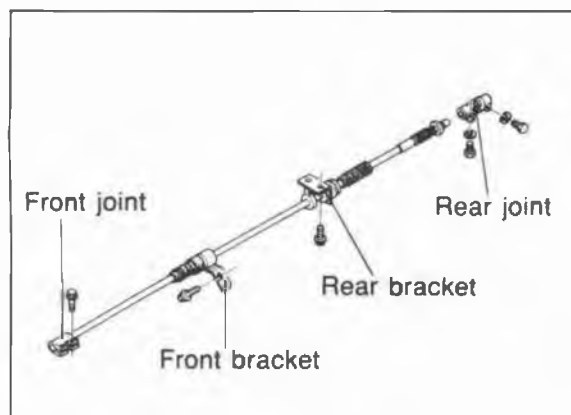


## Removal Note

### Front steering gear

1. Disconnect the tie-rod ends from the knuckles with the **SST**.

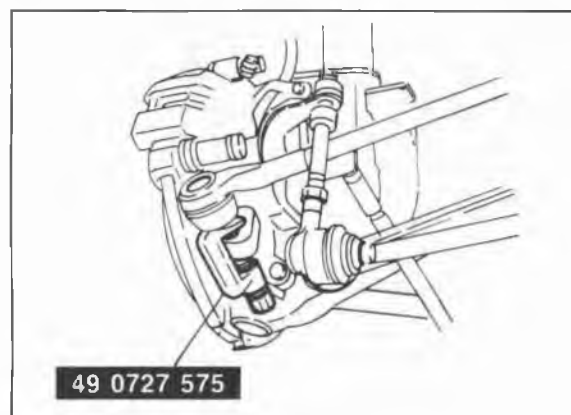
2. Remove the mounting bolts and nuts from the body and crossmember. Let the lower members hang down.



86U10X-069

### Steering angle transfer shaft

Be careful not to bend the joints to extreme angles.

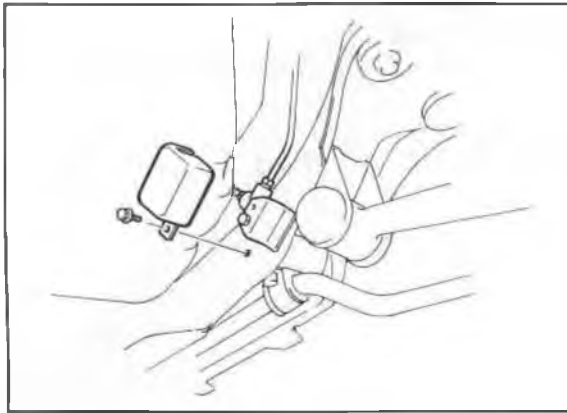


86U10X-070

### Rear steering gear

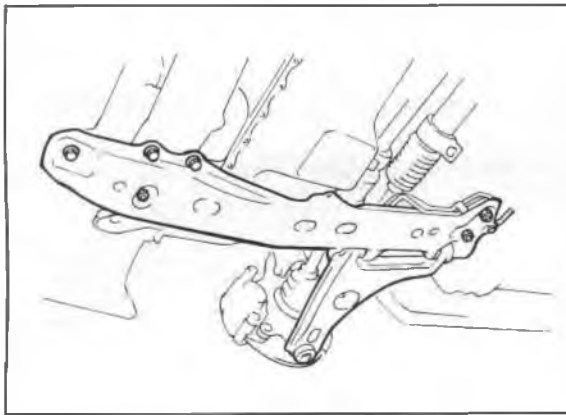
1. Disconnect the tie-rod ends from the knuckles with the **SST**.

## 4-WHEEL STEERING GEAR AND LINKAGE 10



86U10X-071

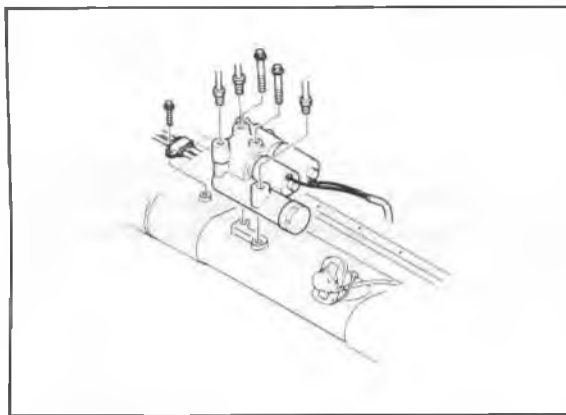
2. Remove the cover and the brake pipe joint block.



86U10X-072

3. Remove the mounting bolts and nuts from the left and right subframes.

4. Let the subframes hang down.



86U10X-073

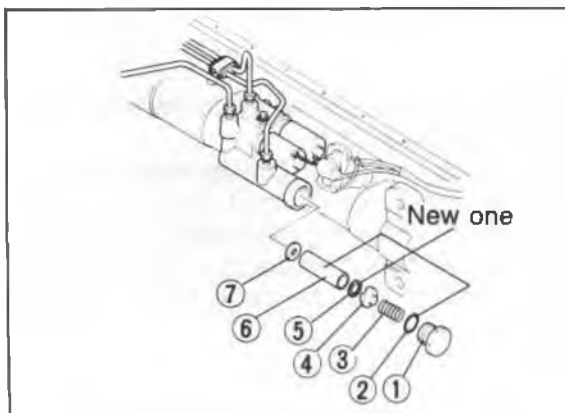
### Solenoid valves

1. Remove the oil pipes.

2. Remove the bolts.

3. Disconnect the solenoid valve connectors.

4. Remove the solenoid valve assembly.



86U10X-074

### Oil filter

Replace the oil filter in the sequence shown in the figure.

1. Filter cap

2. O-ring

3. Spring

4. Set plate

5. Rubber

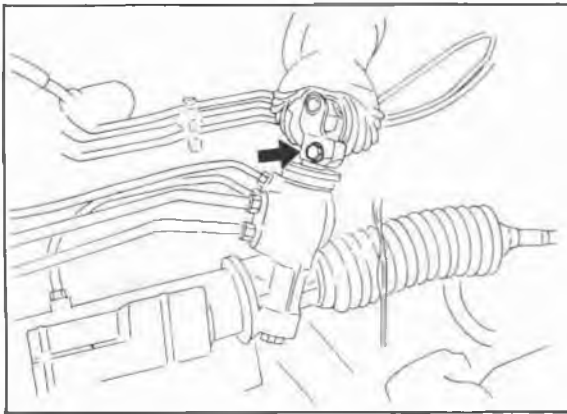
6. Oil filter

7. Magnet

### Note

**Clean up and install the magnet and set plate.**

# 10 4-WHEEL STEERING GEAR AND LINKAGE



86U10X-075

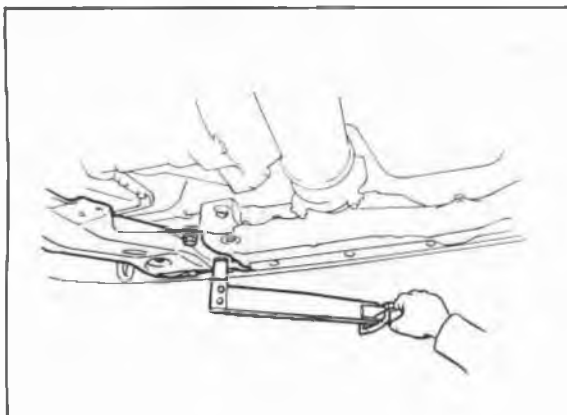
## Installation Note

### Front steering gear

Tighten the universal joint to the pinion shaft.

### Tightening torque:

18—26 N (1.8—2.7 m-kg, 13—20 ft-lb)



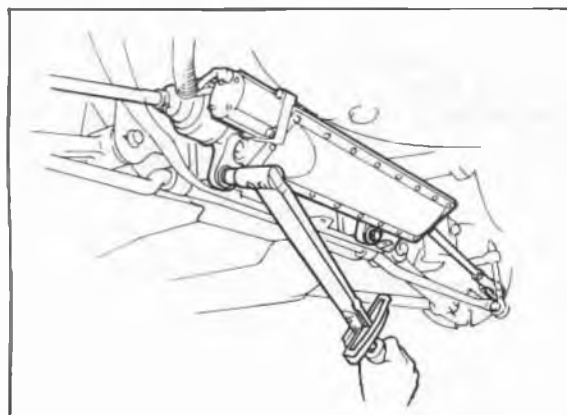
86U10X-076

Install the subframe.

### Tightening torque:

36—54 Nm (3.7—5.5 m-kg, 27—40 ft-lb)

Adjust the rear turning angle. (Refer to page 10—35.)



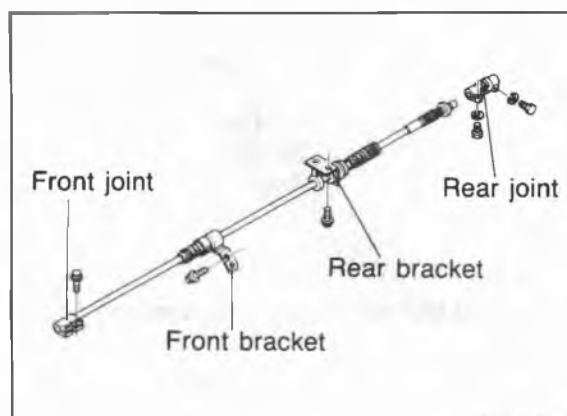
86U10X-077

## Rear steering gear

Adjust the rear steering angle after installation of the rear steering gear. (Refer to page 10—35.)

## Note

When the replacement of rear steering gear or the oil pan gasket owing to the oil leakage, add fluid to the specified level. (Refer to page 10—12)



86U10X-078

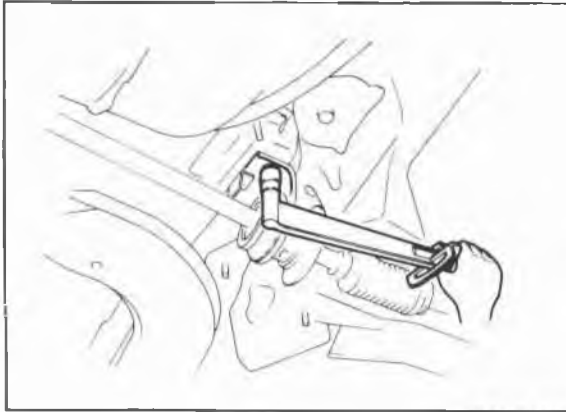
## Steering angle transfer shaft

### Caution

Installation of the steering angle transfer shaft must be done correctly.

Work carefully, referring to the adjustment of steering angle transfer shaft (page 10—35). If not installed correctly, the rear steering angle may be incorrect, causing steering problems or damage to the rear steering gear assembly.

## 4-WHEEL STEERING GEAR AND LINKAGE 10



76G10X-035

1. Temporarily install the front bracket.
2. Install the rear bracket, and then tighten at the specified torque.

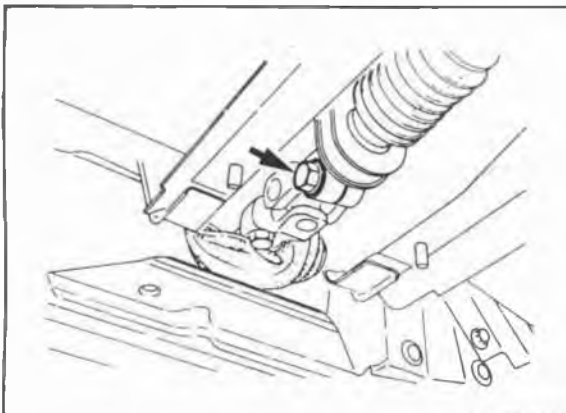
**Tightening torque:**

**22—30 N·m (2.2—3.1 m·kg, 5.1—7.2 ft·lb)**

3. Tighten the front bracket bolt.

**Tightening torque:**

**22—30 N·m (2.2—3.1 m·kg, 5.1—7.2 ft·lb)**

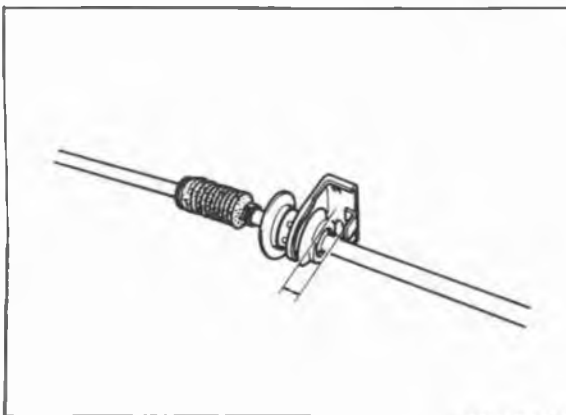


86U10X-320

**Caution**

**The shaft should be installed by two or more persons, taking care not to bend the joint part.**

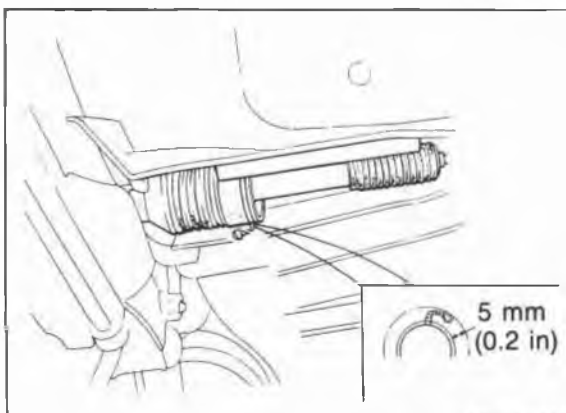
4. Connect the joint of the front steering gear side, and then tighten the bolt.
5. Connect the joint of the rear steering gear side, and then tighten the bolt.



86U10X-321

**Caution**

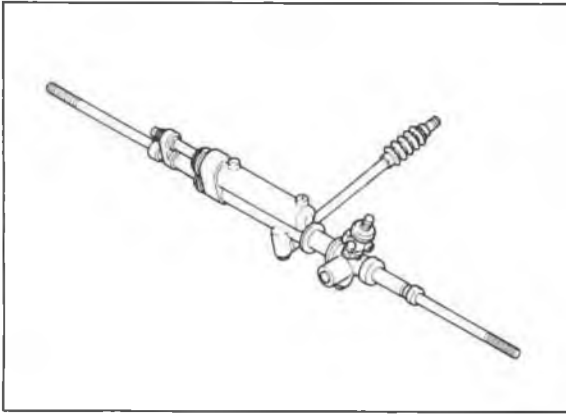
**Check to be sure that the front and rear brackets do not contact the oil seal.**



86U10X-322

6. Attach a new wire and clamp, and as shown in the illustration be sure that protrusion is within 5mm (0.2 in).
7. Install the cover.

# 10 4-WHEEL STEERING GEAR AND LINKAGE



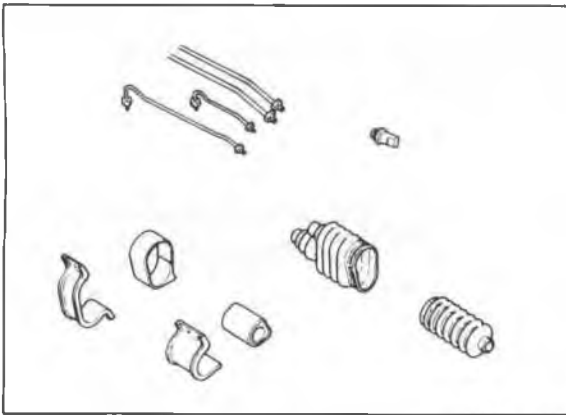
86U10X-079

## INSPECTION

### Front Steering Gear and Linkage

1. Check the following and replace the front steering gear assembly if necessary.

- (a) Damaged or cracked case
- (b) Bent linkage

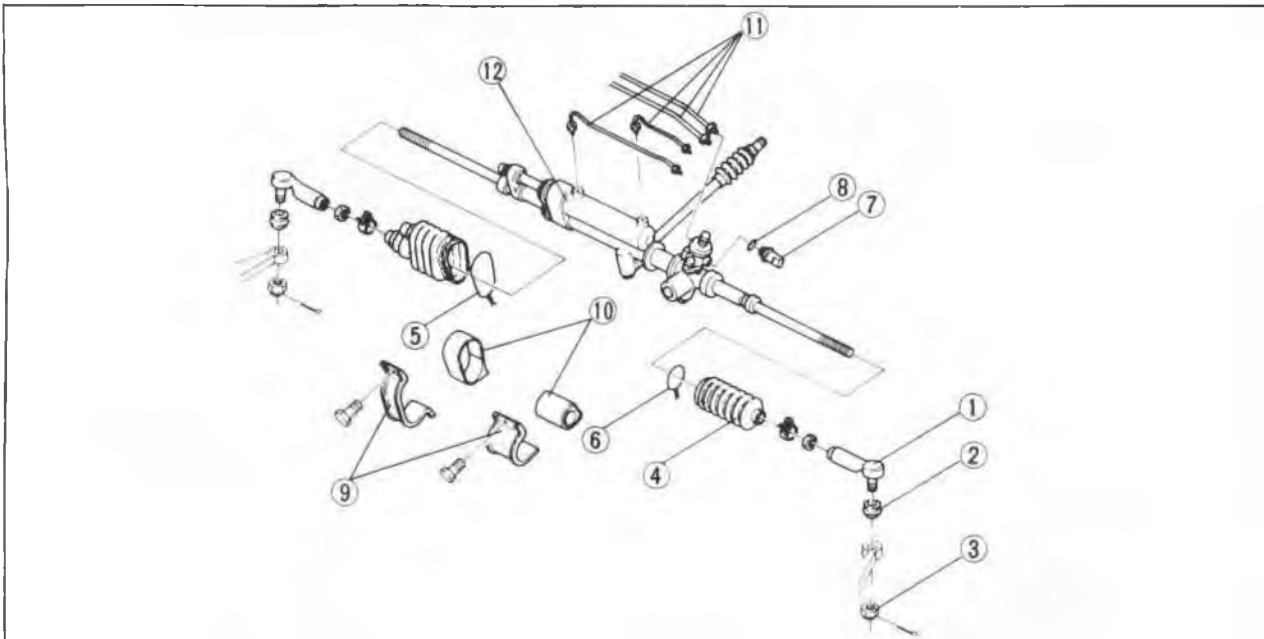


86U10X-080

2. Check the following and replace any faulty parts.

- (a) Clogged, bent, or pinched pipes
- (b) Faulty oil pressure switch
- (c) Damaged mounting bracket and mounting rubber
- (d) Cracked, damaged, or deteriorated boots

## Available spare parts

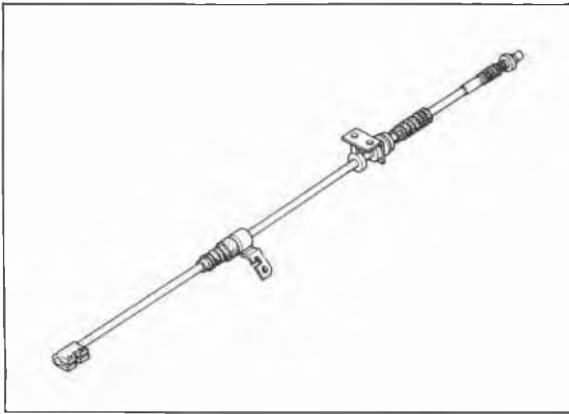


86U10X-081

- 1. Tie-rod end
- 2. Tie-rod end boot
- 3. Nut
- 4. Boot
- 5. Boot band (large)
- 6. Boot band (small)
- 7. Oil pressure switch
- 8. O-ring
- 9. Mounting bracket
- 10. Mounting rubber
- 11. Oil pipe
- 12. Steering gear assembly



# 4-WHEEL STEERING GEAR AND LINKAGE 10

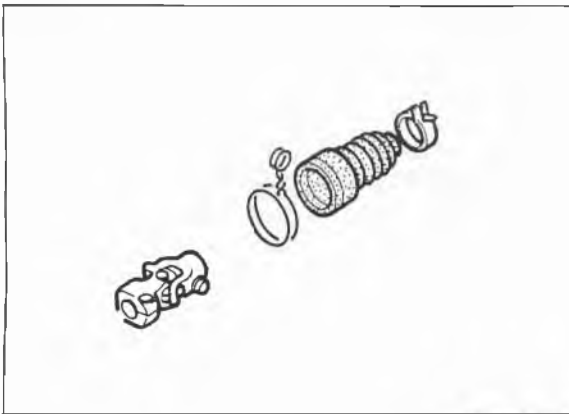


86U10X-082

## Steering Angle Transfer Shaft

Check the following and replace the shaft assembly if necessary

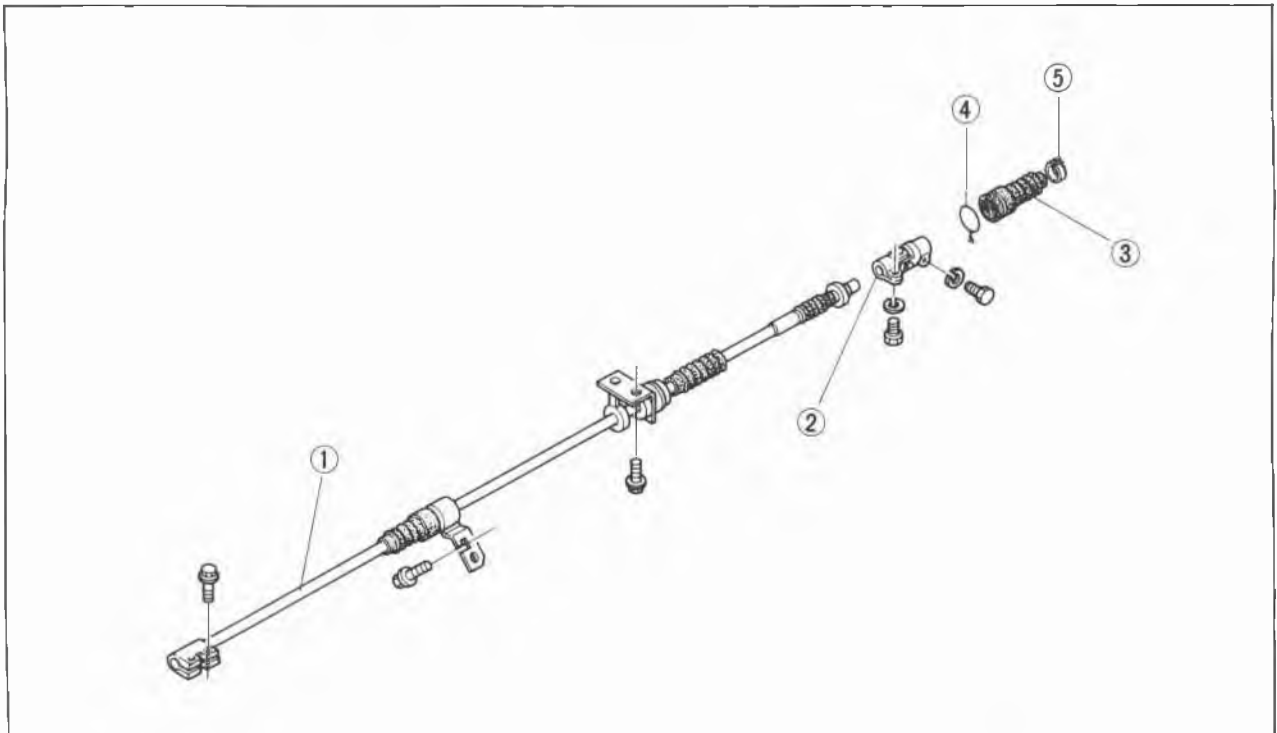
1. Shaft
  - (a) Cracked, damaged, or deteriorated boots
  - (b) Stuck carrier bearing
  - (c) Bending
  - (d) Damaged mounting brackets



86U10X-083

2. Universal joint
  - Looseness or damage
3. Rear boot
  - Crackes, damage, or deterioration

## Available spare parts



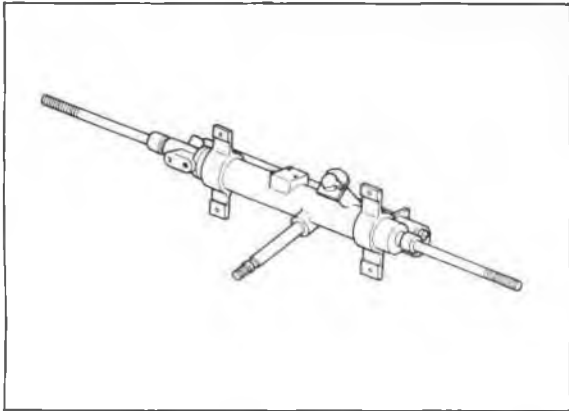
86U10X-084

1. Shaft
2. Universal joint

3. Rear boot
4. Wire

5. Clip

# 10 4-WHEEL STEERING GEAR AND LINKAGE



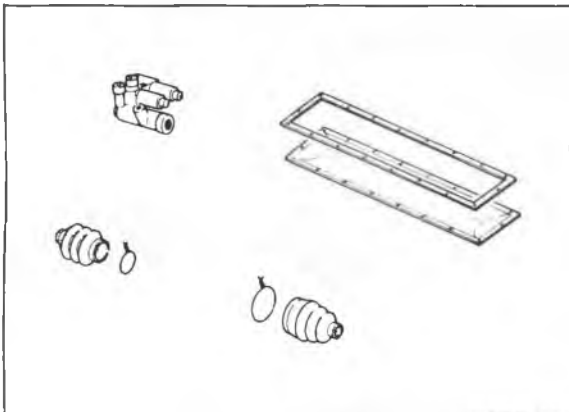
86U10X-085

## Rear Steering Gear and Linkage

1. Check the following and replace the rear steering gear assembly if necessary.
  - (a) Damaged or cracked case
  - (b) Faulty stepper motor or rear-to-front steering ratio sensor
  - (c) Sticking bearings
  - (d) Oil leakage

### Note

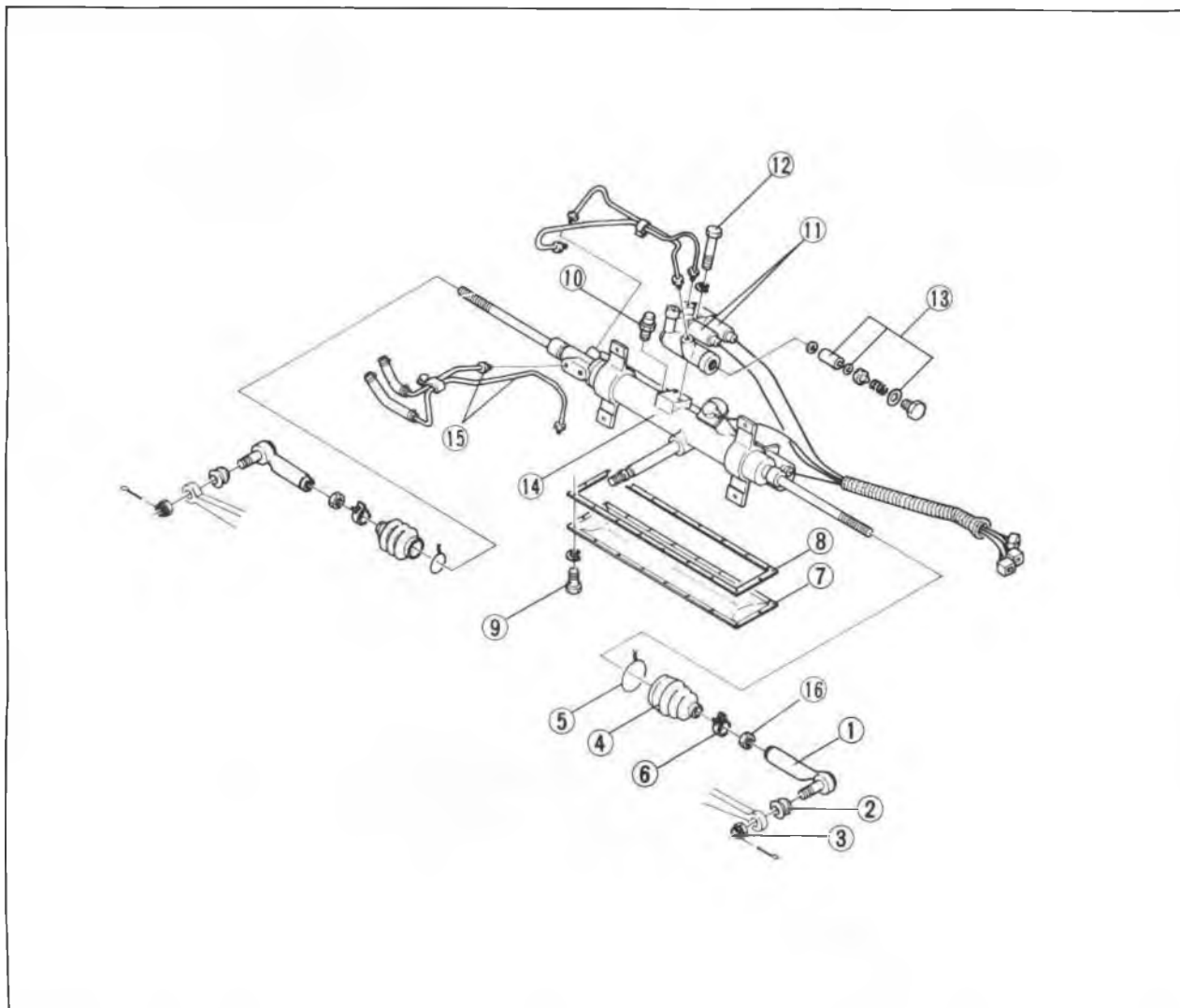
**There is no fluid in a new replacement rear steering gear assembly, add fluid to the specified level. (Refer to 10—12.)**



86U10X-086

2. Check and tighten bolts and nuts, if necessary.
3. Check the following and replace any faulty parts.
  - (a) Cracked, damaged, or deteriorated rear steering gear boots and bands
  - (b) Cracked or damaged oil pan
  - (c) Malfunctioning solenoid valve

## Available spare parts



86U10X-087

- |                     |                                     |
|---------------------|-------------------------------------|
| 1. Tie-rod end      | 9. Bolt                             |
| 2. Tie-rod end boot | 10. Oil filler bolt                 |
| 3. Nut              | 11. Solenoid valve (Refer to 10—41) |
| 4. Boot             | 12. Bolt                            |
| 5. Boot band (wire) | 13. Oil filter set (Refer to 10—41) |
| 6. Boot band (clip) | 14. Steering gear assembly          |
| 7. Oil pan          | 15. Pipe                            |
| 8. Oil pan gasket   | 16. Nut                             |

# 10 MANUAL STEERING

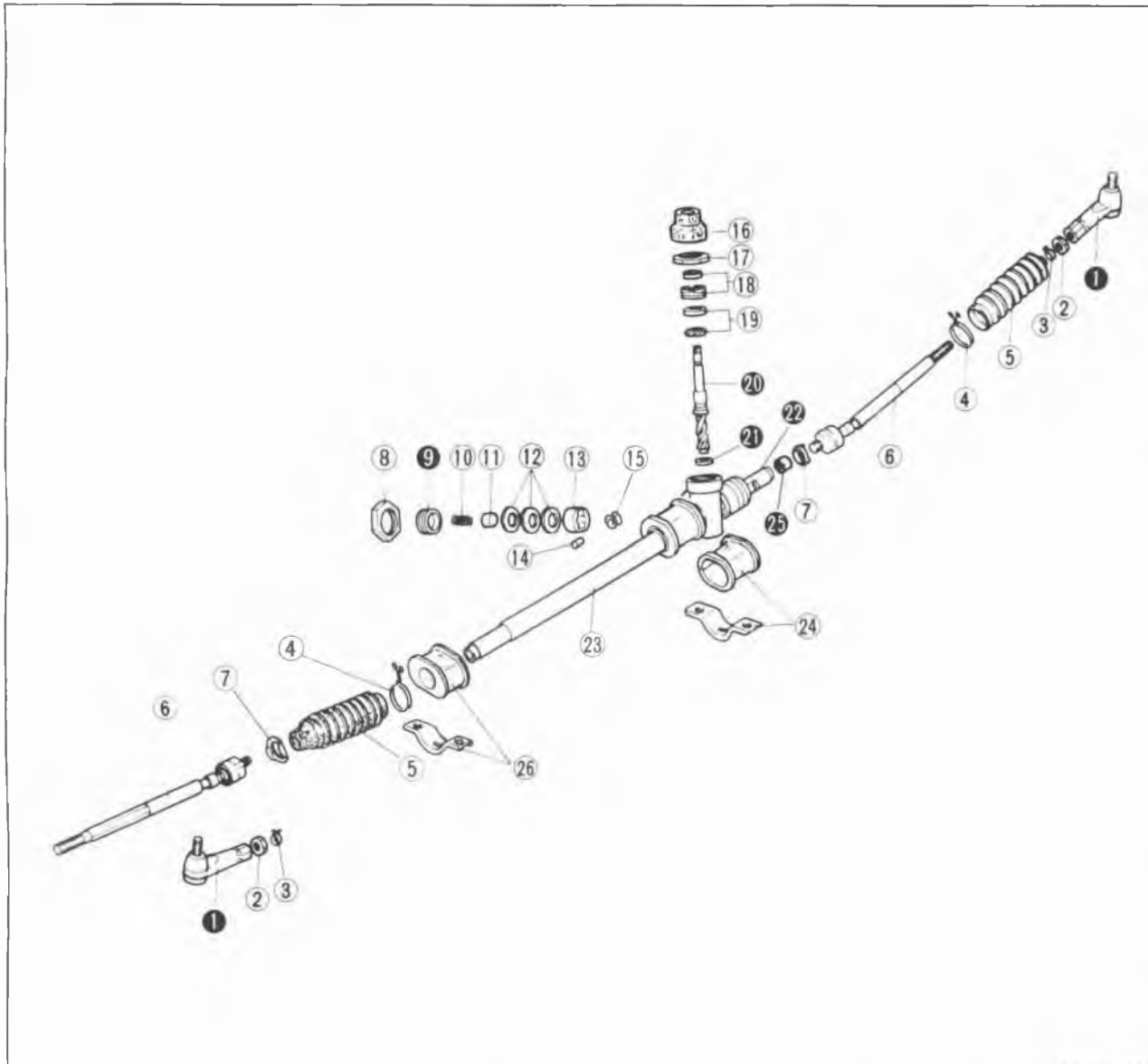
## MANUAL STEERING

### DISASSEMBLY

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.

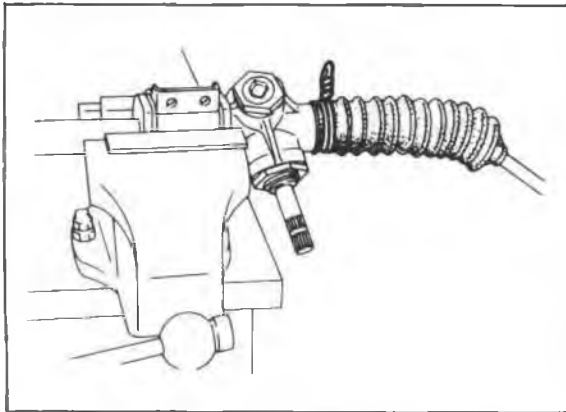
#### Note

**Before disassembling, drain the gear oil and remove all external grease and dirt.**



86U10X-088

- |                         |                             |                                 |
|-------------------------|-----------------------------|---------------------------------|
| 1. Tie-rod end          | 10. Spring                  | 19. Bearing                     |
| 2. Nut                  | 11. Friction block          | 20. Pinion                      |
| 3. Clip                 | 12. Dish spring             | 21. Bearing                     |
| 4. Boot wire            | 13. Holder                  | 22. Rack                        |
| 5. Boot                 | 14. Needle roller           | 23. Gear housing                |
| 6. Tie-rod              | 15. Roller assembly         | 24. Mounting rubber and bracket |
| 7. Washer               | 16. Boot support            | 25. Bushing                     |
| 8. Adjust cover locknut | 17. Rear cover locknut      |                                 |
| 9. Adjust cover         | 18. Rear cover and oil seal |                                 |



86U10X-089

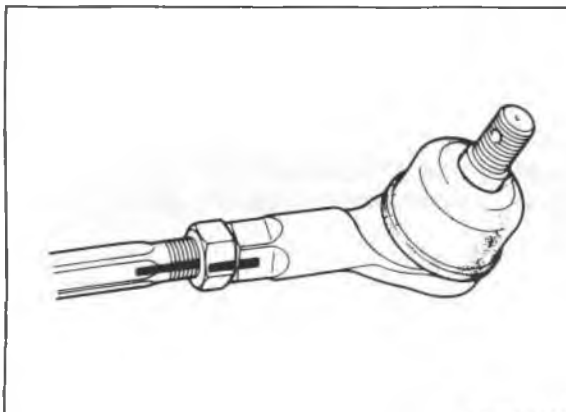
### Disassembly Note

#### Steering gear and linkage

Secure the gear and linkage in a vise.

#### Caution

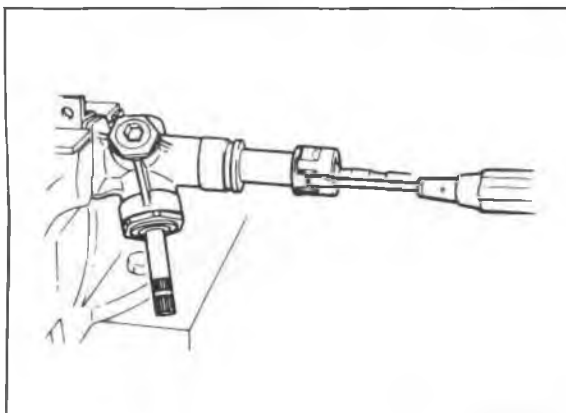
Insert protective material (such as copper plates) in the jaws of the vise.



86U10X-090

### Tie-rod ends

Before removing the tie-rod ends, make a mark for proper installation.

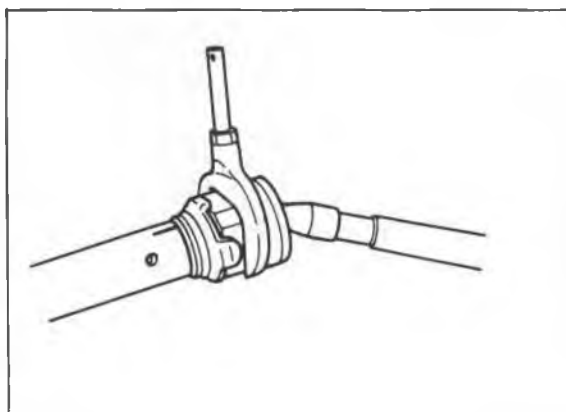


86U10X-091

### Tie-rods

Remove the tie-rods.

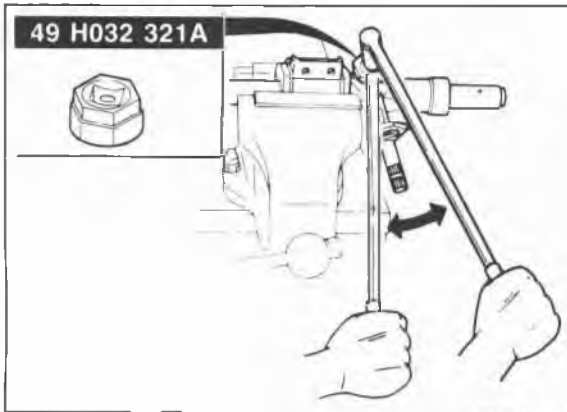
1. Uncrimp the washer as shown in the figure.



86U10X-092

2. Secure the rack in a vise and remove the tie-rod.

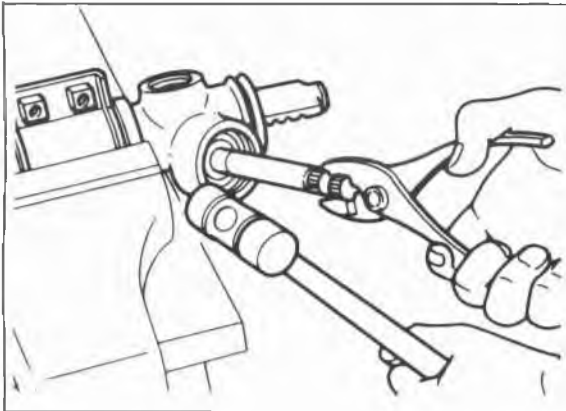
# 10 MANUAL STEERING



86U10X-093

## Adjust cover

1. Loosen the locknut, and remove the adjust cover with the **SST**.
2. Remove the spring, friction block, dish springs holder, and needle roller assembly.



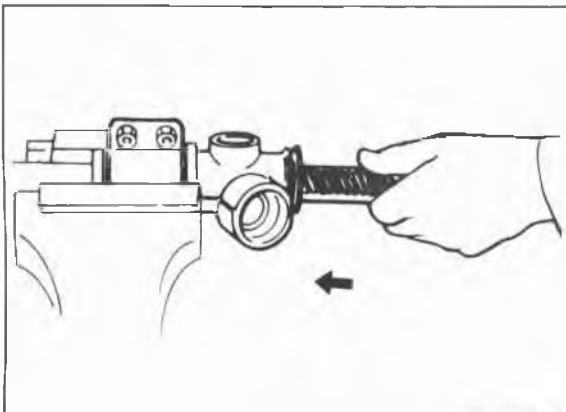
86U10X-094

## Pinion

Gently grasp the serrated part of the pinion and pull it out of the gear housing.

### Caution

**If the pinion is difficult to remove, gently tap the gear housing with a plastic hammer while pulling.**



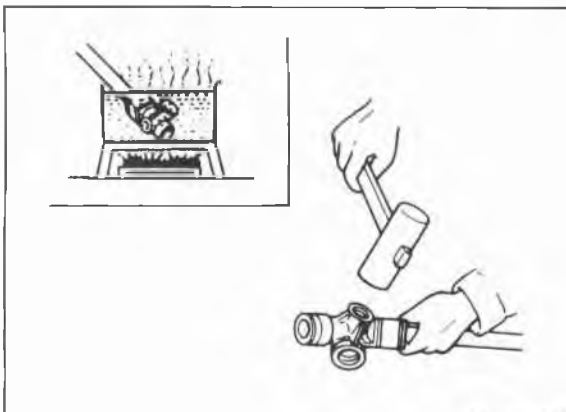
86U10X-095

## Rack

Remove the rack by taking it out in the direction indicated by the arrow.

### Caution

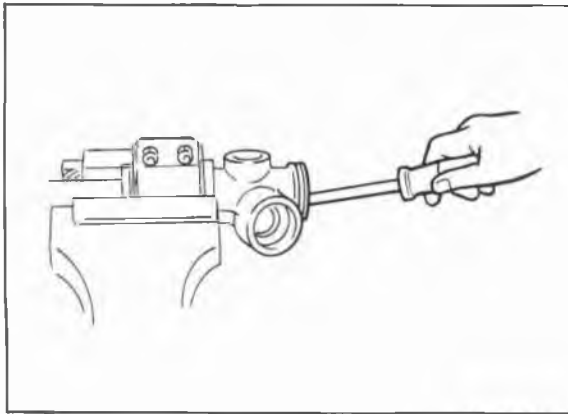
**Do not damage the rack bushing with the edge of the rack gear.**



86U10X-096

## Bearing (lower)

Heat the housing in water to about 80°C (176°F); then tap the end of the housing with a wooden hammer to remove the bearing.



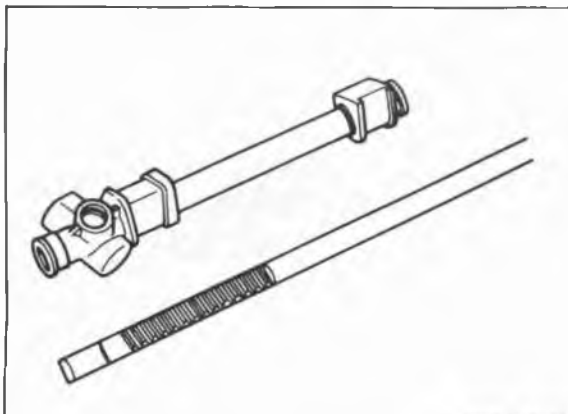
86U10X-097

## Bushing

Break the bushing and remove it.

### Caution

**Be careful not to damage the gear housing.**

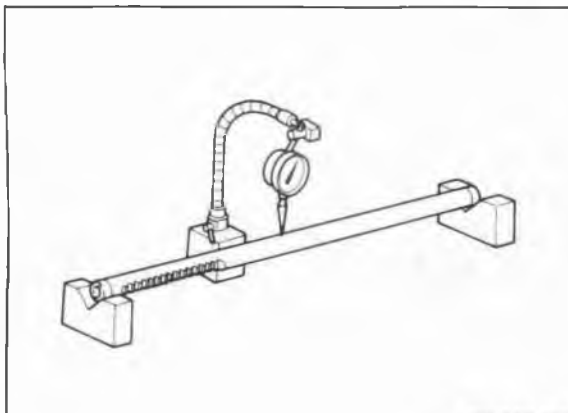


86U10X-098

## INSPECTION

Check the following and replace any faulty parts.

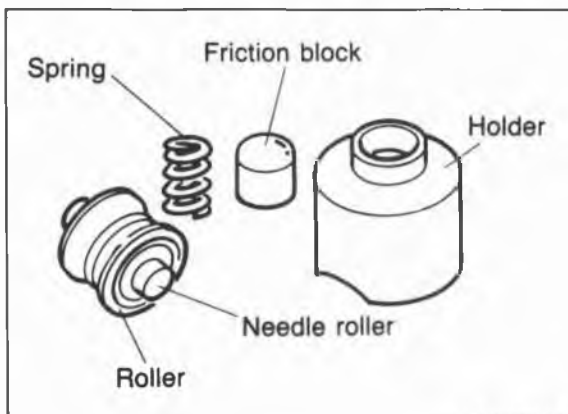
1. Damaged mounting rubber or bracket
2. Cracked, worn teeth, or damaged pinion
3. Loose, noisy, or sticking bearing in gear housing
4. Cracked or damaged gear housing
5. Worn rack and housing bushing
6. Tie-rod ball-joint operation and looseness
7. Bent tie-rods or tie-rod ends



86U10X-099

8. Cracked, worn teeth, or damaged rack
9. Runout of rack

**Runout: 0.30 mm (0.012 in) max.**



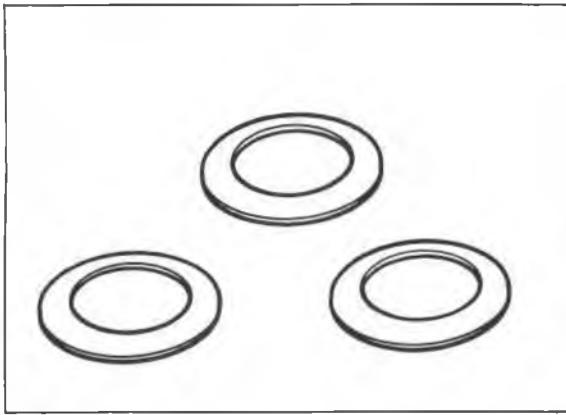
76G10X-036

10. Worn or damaged roller and friction block
11. Bearing operation
12. Cracked or damaged holder
13. Weak or damaged spring

### Note

**If the needle bearing must be replaced, replace the roller assembly.**

# 10 MANUAL STEERING

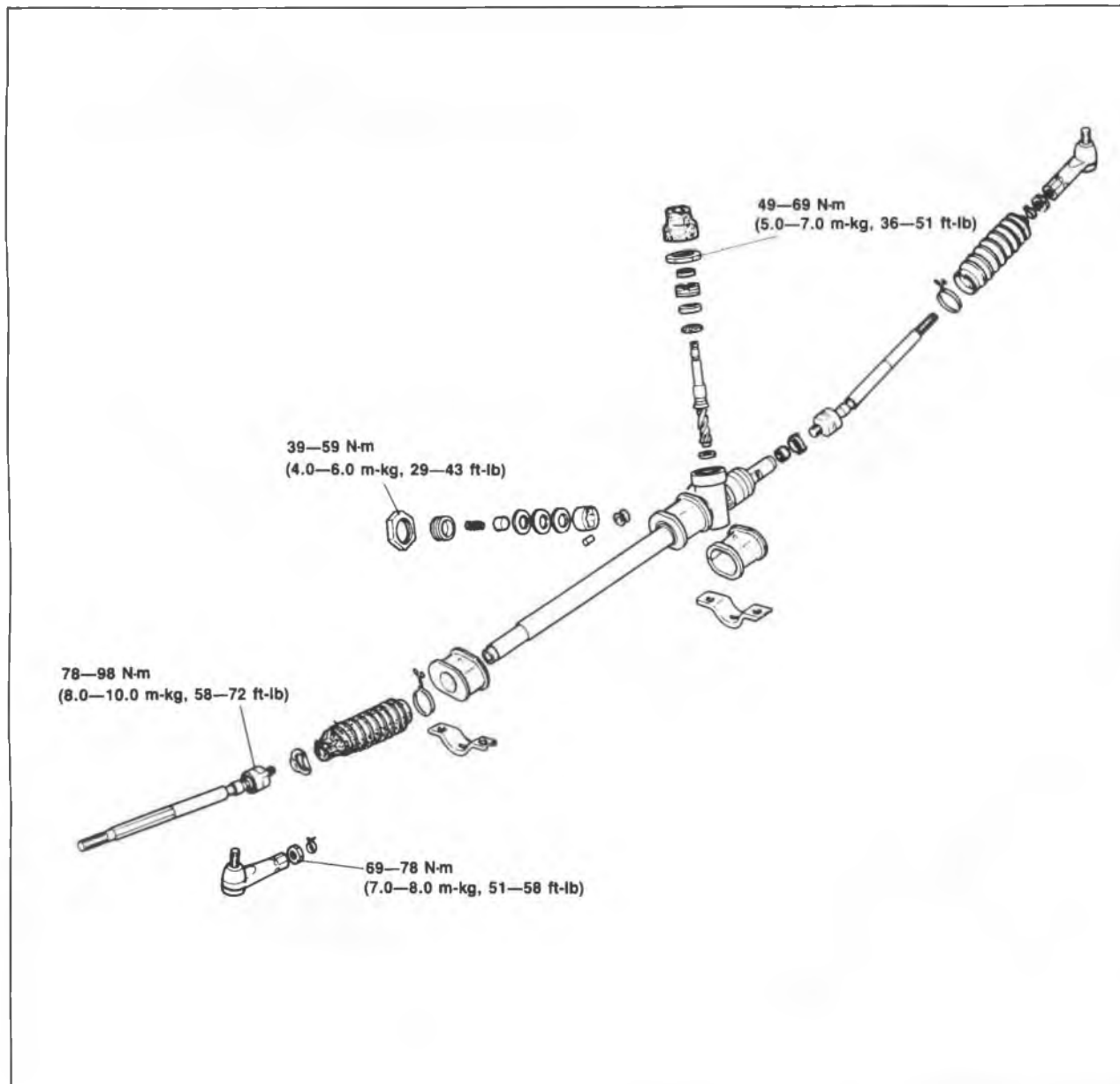


86U10X-101

14. Damaged dish springs

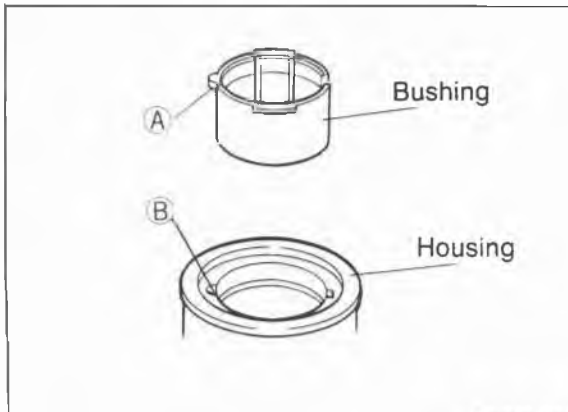
## ASSEMBLY

### Torque Specifications



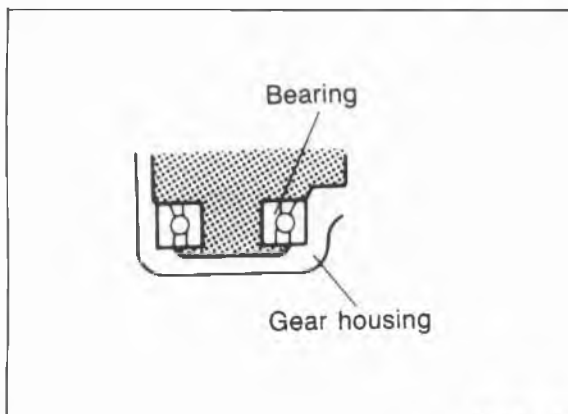
86U10X-102





86U10X-103

1. Install the mounting rubber and bracket.
2. Install the bushing.  
Align A with B and press the bushing into the gear housing until it is fully seated.

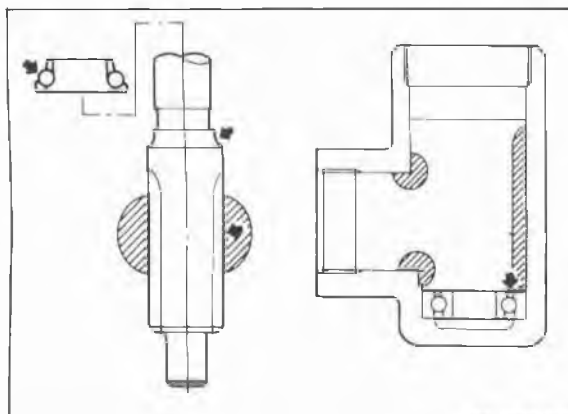


86U10X-104

3. Press in the lower bearing.

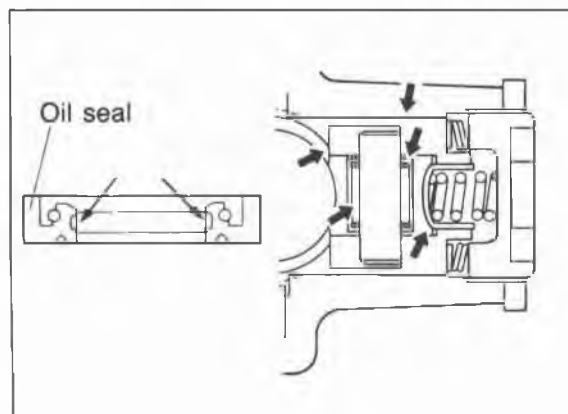
**Caution**

- a) Before pressing in, put grease (lithium base, NLGI No. 2) in the bearing and bearing bore.
- b) Install the bearing in the proper direction.
- c) Use the pinion to press the bearing in.



86U10X-105

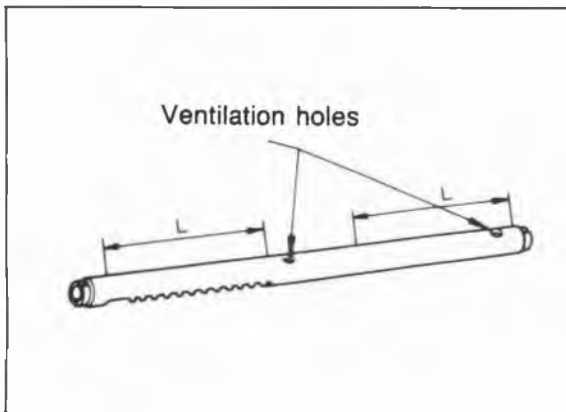
4. Fill or coat the following points with grease (lithium base, NLGI No. 2) before assembly.
  - a) Pinion bearing and teeth
  - b) Inside gear housing



69G10X-106

- c) Oil seal lip
- d) Roller surface
- e) Holder
- f) Friction block surface

# 10 MANUAL STEERING

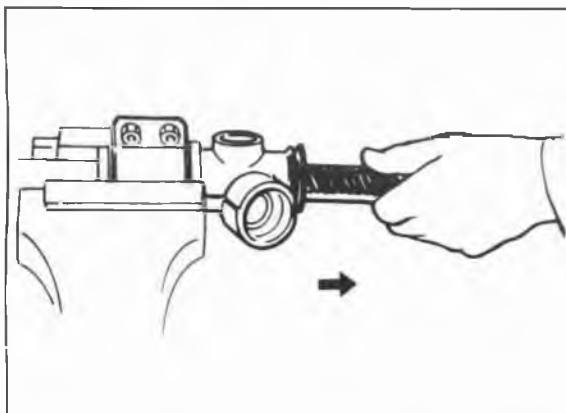


86U10X-107

- g) Inner surface of housing rack bushing
- h) Rack gear and outer circumference of rack shaft  
L = 180 mm (7.09 in)
- i) Tie-rod ball-joint
- j) Inside left and right boots

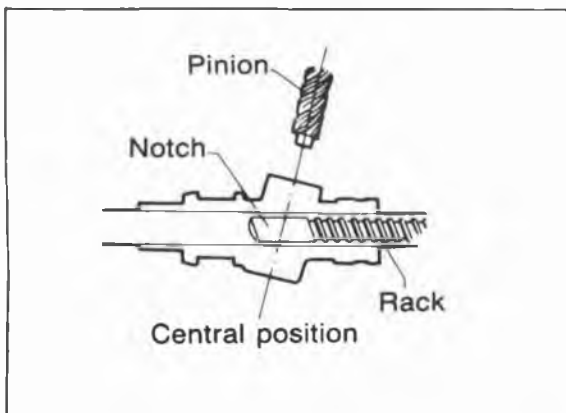
### Caution

**Be careful not to fill the ventilation holes in the rack shaft with grease.**



86U10X-108

5. Carefully install the rack in the direction of the arrow.

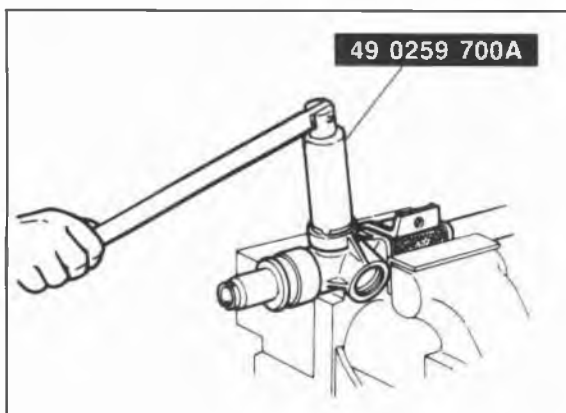


86U10X-109

6. Set the notch of the teeth of the rack at the pinion position, then insert the pinion.

### Caution

**This notch is used for adjustment of the pinion bearing preload without the pinion engaged with the rack.**



86U10X-110

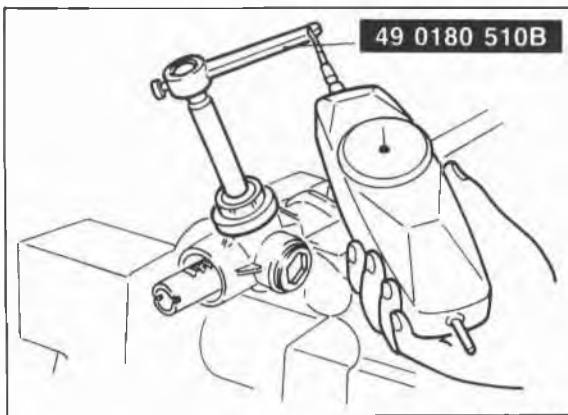
7. Install the upper bearing, and then screw on the rear cover.

### Caution

**a) Apply sealant to the threads of the rear cover.**

**b) Do not install the oil seal.**

**c) Screw on the rear cover with the SST.**

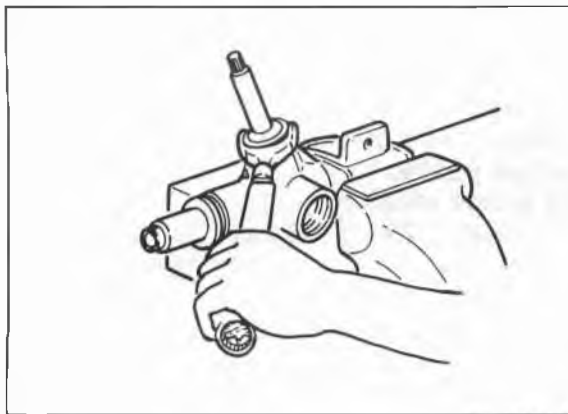


86U10X-111

8. Tighten the rear cover so that the torque of the pinion is approx **400 g (14.1 oz)**. Check with the **SST** and a pull gauge.

**Caution**

**Before measuring the torque, rotate the pinion to the left and right a few times to seat the bearing.**



86U10X-112

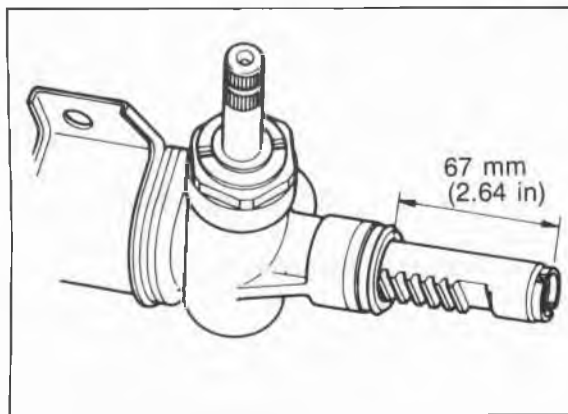
9. Loosen the rear cover and readjust the pinion torque to **300 g (10.6 oz)**. Tighten the locknut.

**Tightening torque:**

**49—69 N·m (5,0—7,0 m·kg, 36—51 ft·lb)**

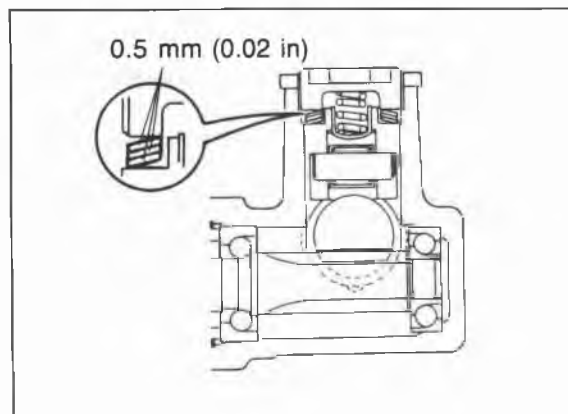
**Caution**

**Recheck the pinion torque after tightening the locknut. If it is not within 200—350 g (7—12.3 oz), loosen the locknut and adjust once again.**



86U10X-113

10. Carefully move the rack so that the pinion is set to the center (neutral position) of the rack gear.



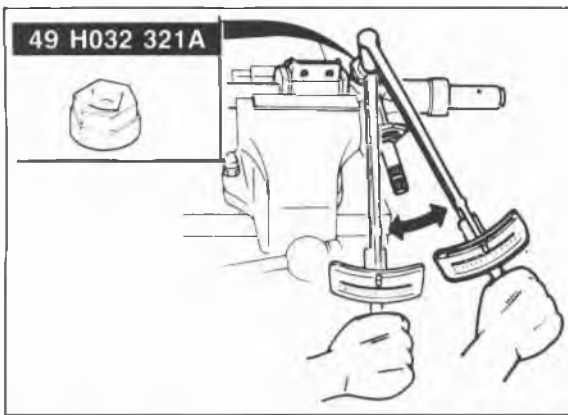
86U10X-114

11. Install the roller assembly, needle roller, holder, dish springs, friction block, and spring.

**Caution**

**Install the roller bearing so that it correctly contacts the rack.**

# 10 MANUAL STEERING

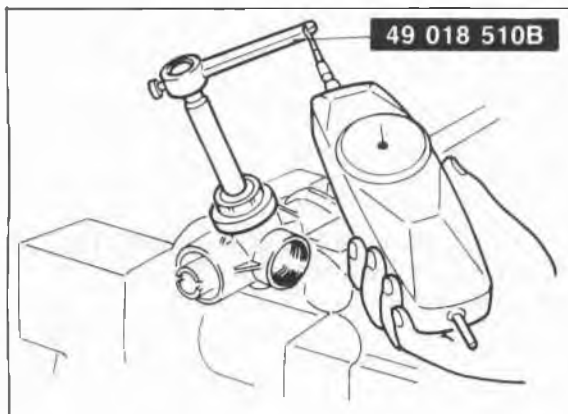


86U10X-115

12. Torque the adjust cover to **9.8 N-m (1 m-kg, 7.2 ft-lb)**, then loosen it 25°—45°. Secure the adjust cover with the locknut and the **SST**.

**Locknut tightening torque:**  
**39—59 N-m (4.0—6.0 m-kg, 29—43 ft-lb)**

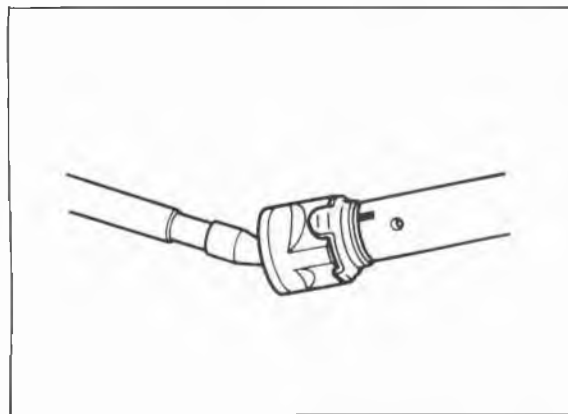
**Note**  
**Apply sealant to the threads of the adjust cover before installing.**



86U10X-116

13. Measure the pinion torque with the **SST**.

**Center position ± 90°**  
**Pull gauge reading:**  
**1,000—1,400 g (35—50 oz)**  
**Any other position**  
**Pull gauge reading:**  
**less than 1,700 g (60 oz)**

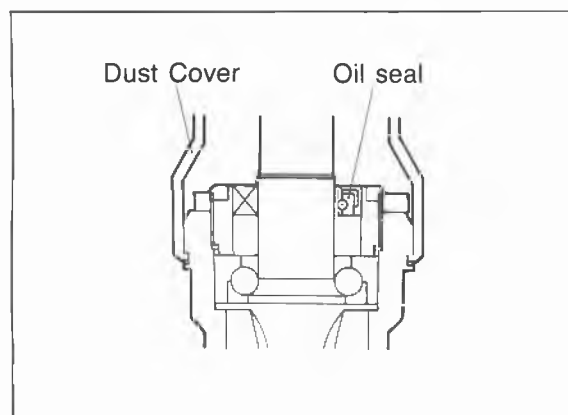


86U10X-117

14. Mark the positions of the rack grooves of the left tie-rod for staking.  
 15. Install the new washer on the left tie-rod, and install the tie-rod.

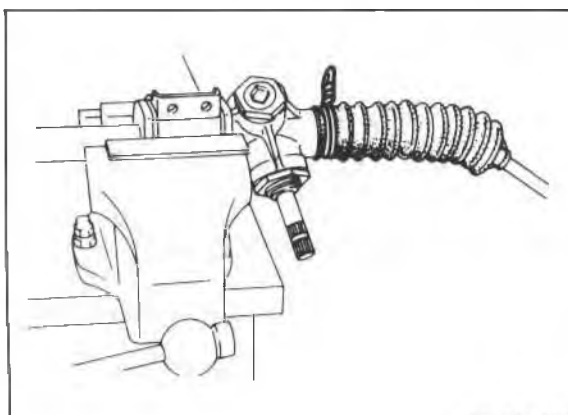
**Tightening torque:**  
**78—98 N-m (8.0—10.0 m-kg, 58—72 ft-lb)**

16. Stake the washer in two places.



86U10X-118

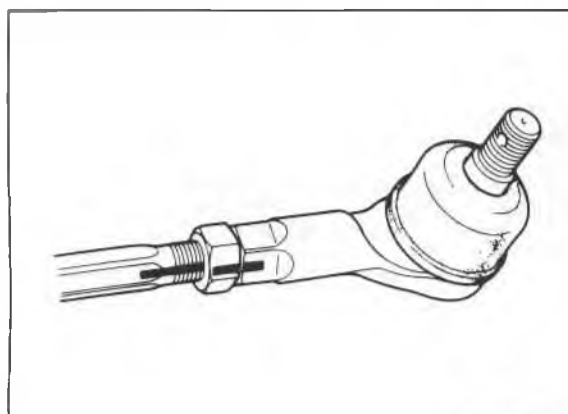
17. Use a pipe to press in the oil seal until it is flush with the end of the rear cover.  
 18. Slide on the dust cover so that it fits into the pinion groove.  
 19. Press in the boot support. Be sure that it fits tightly.



86U10X-119

20. Install the boot, then wrap a new wire around it two times and twist 4 to 4.5 times.  
Install the clip.

**Caution**  
**Check that the boot is not twisted or dented.**



86U10X-120

21. Install the tie-rod ends, aligning them with the marks made before disassembly.

# 10 ENGINE SPEED SENSING POWER STEERING

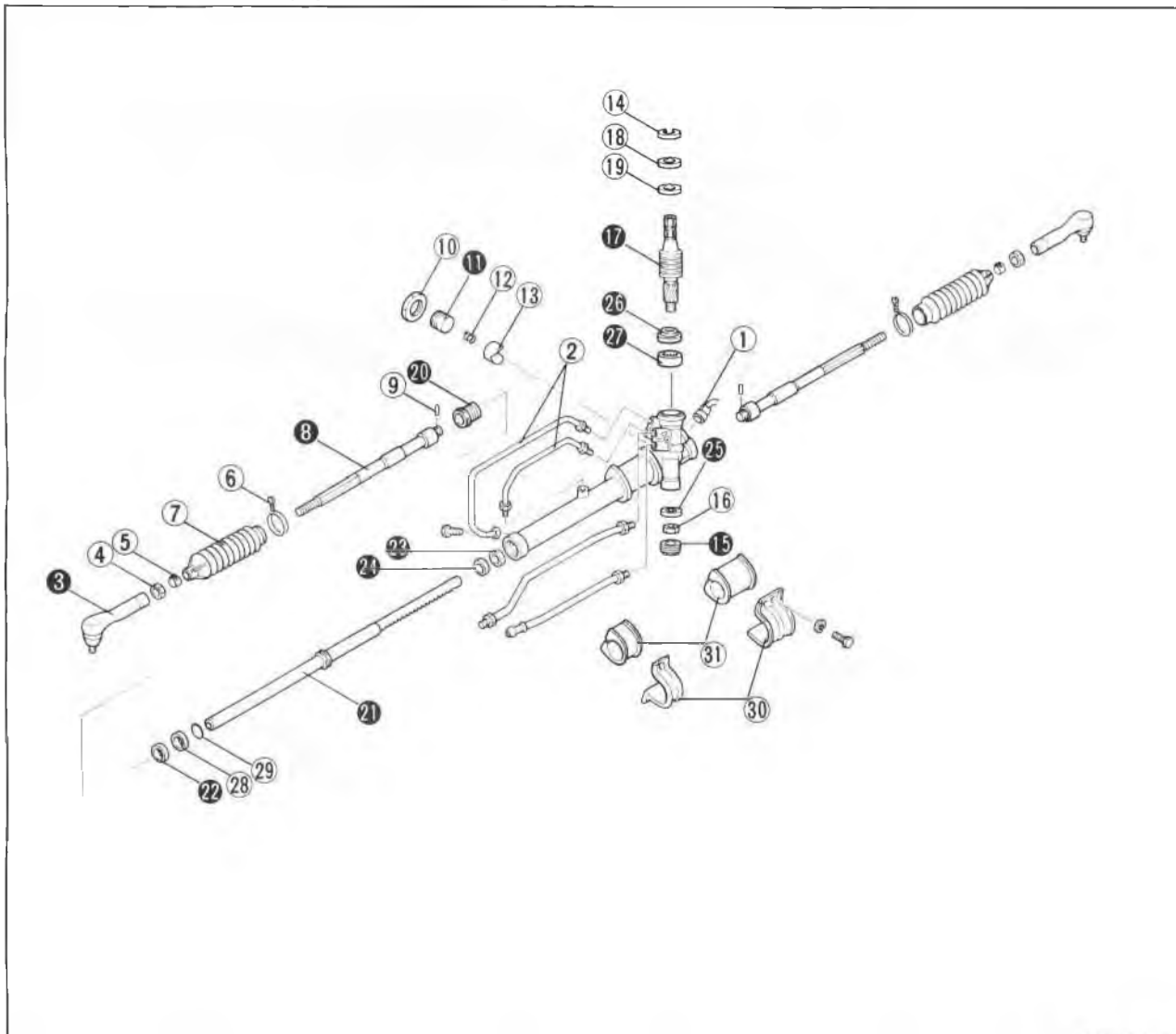
## ENGINE SPEED SENSING POWER STEERING

### DISASSEMBLY

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.

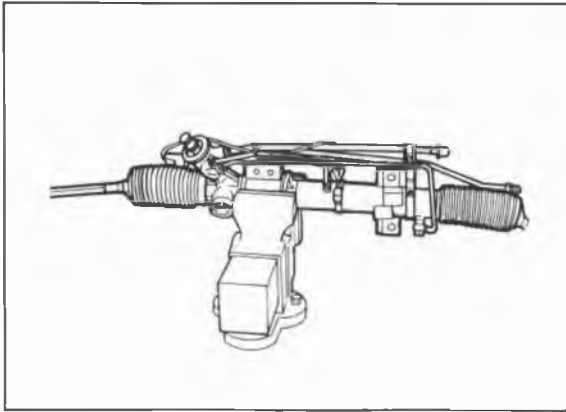
#### Caution

- a) In order to prevent the entrance of dirt, all disassembly and assembly should be done in a clean area.
- b) Before disassembly, plug the openings of all pipe installation fittings, then thoroughly clean the steering gear and linkage.



86U10X-121

- |                          |   |                           |
|--------------------------|---|---------------------------|
| 1. Oil pressure switch   | 11. Adjust cover                            | 21. Rack                  |
| 2. Oil pipe              | 12. Spring                                  | 22. Oil seal              |
| 3. Tie-rod end           | 13. Pressure pad                            | 23. Spacer                |
| 4. Tie-rod end locknut   | 14. Snap ring                               | 24. Oil seal              |
| 5. Spring clip           | 15. Housing cover                           | 25. Lower bearing         |
| 6. Boot wire             | 16. Lower bearing locknut                   | 26. Oil seal              |
| 7. Boot                  | 17. Pinion shaft and control valve assembly | 27. Needle bearing        |
| 8. Tie-rod               | 18. Oil seal                                | 28. Seal ring             |
| 9. Lock pin              | 19. Upper bearing                           | 29. O-ring                |
| 10. Adjust cover locknut | 20. Rack bushing assembly                   | 30. Mounting bracket      |
|                          |   | 31. Mounting rubber mount |



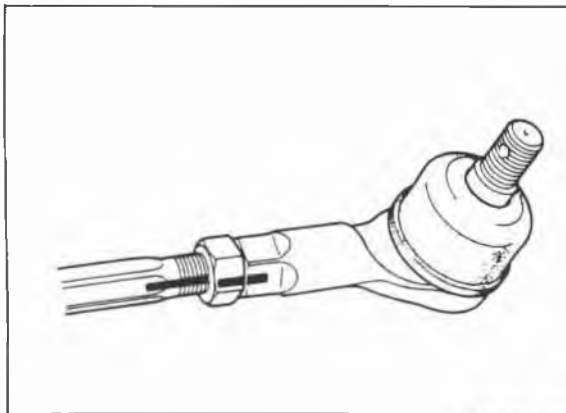
86U10X-122

### Disassembly Note Steering gear and linkage

Secure the gear and linkage in a vise.

### Caution

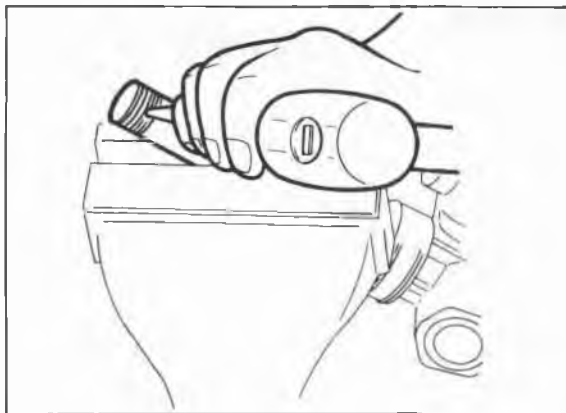
Insert protective material (such as copper plates) in the jaws of the vise.



86U10X-123

### Tie-rod ends

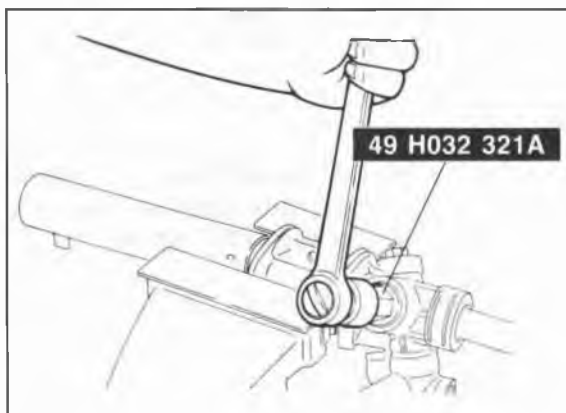
Before removing the tie-rod ends, make a mark for proper installation.



86U10X-124

### Tie-rod

1. Remove the tie-rod from rack.
2. Remove the roll pin with a pin-punch and hammer.

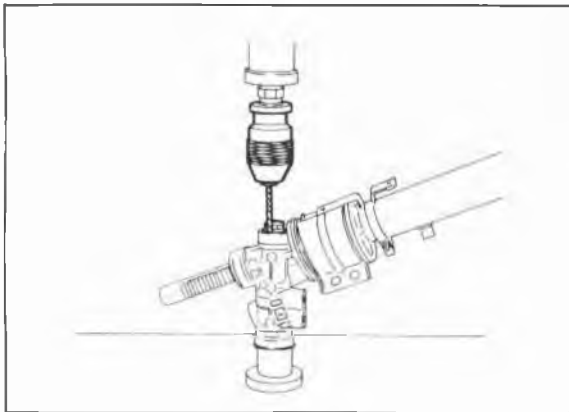


86U10X-125

### Adjust cover

1. Remove the locknut from the adjust cover.
2. Remove the adjust cover with the **SST**.
3. Remove the spring and pressure pad.

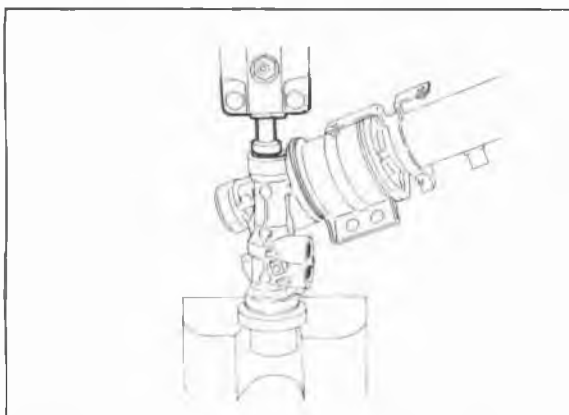
# 10 ENGINE SPEED SENSING POWER STEERING



86U10X-126

## Housing cover

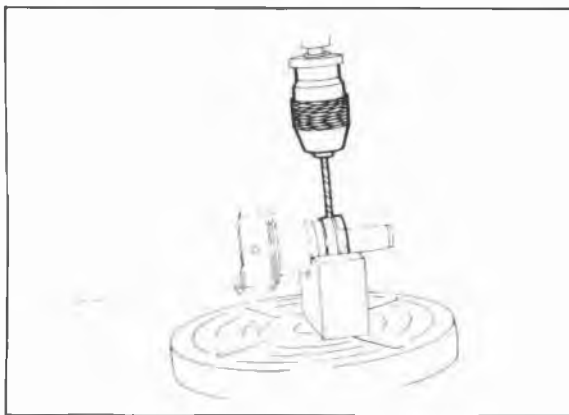
1. Cut away the staked areas with a drill.
2. Remove the housing cover.



86U10X-127

## Pinion shaft

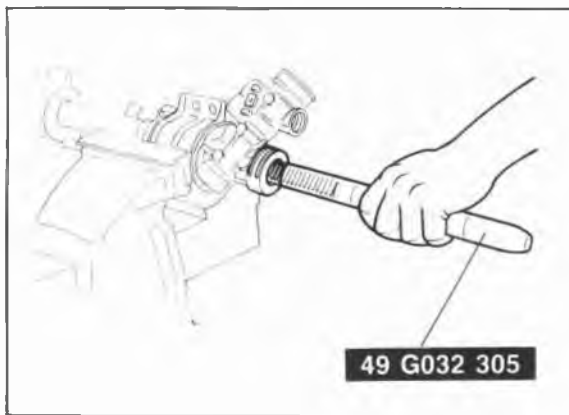
1. Remove the locknut.
2. Set the gear housing assembly on a press and remove the pinion shaft assembly as shown in the figure.



86U10X-128

## Rack bushing

1. Cut away the staked areas with a drill.
2. Remove the rack bushing.



86U10X-129

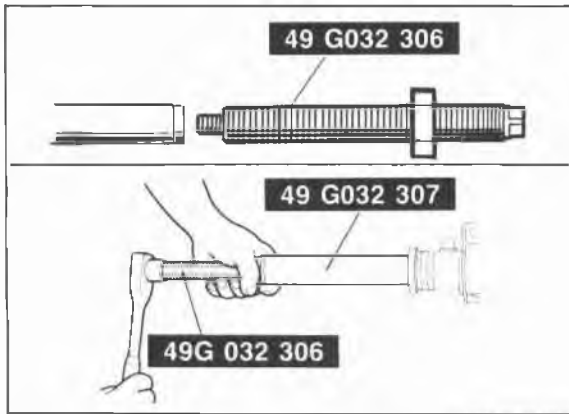
## Rack and oil seal at tube side

1. Slide the **SST** over the rack from the gear housing side.

### Note

**If the rack is removed without using the SST, there is the possibility that the rack housing may be damaged by the rack teeth.**





86U10X-130

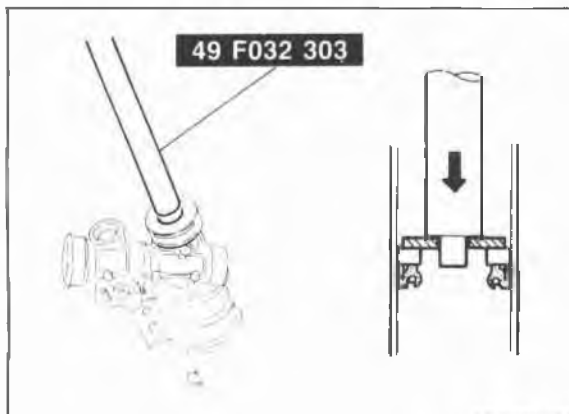
2. Install the **SST** to the threaded part of the rack at the tube side.
3. Remove the oil seal at the tube side which pulling out the rack.



86U10X-131

### Spacer and oil seal at housing side

1. Insert the **SST** from the pinion housing side so that it contacts the spacer.



86U10X-132

2. Set the **SST** against the **SST** inserted in step 1.
3. Secure the gear housing in a vise.
4. Drive the spacer and oil seal out of the housing.

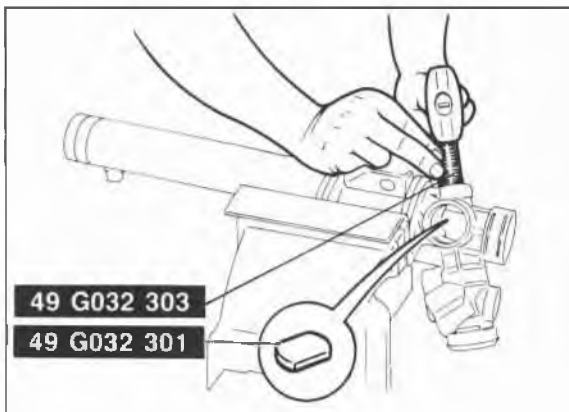


86U10X-133

### Lower bearing

Drive the lower bearing out of the housing with the **SST**.

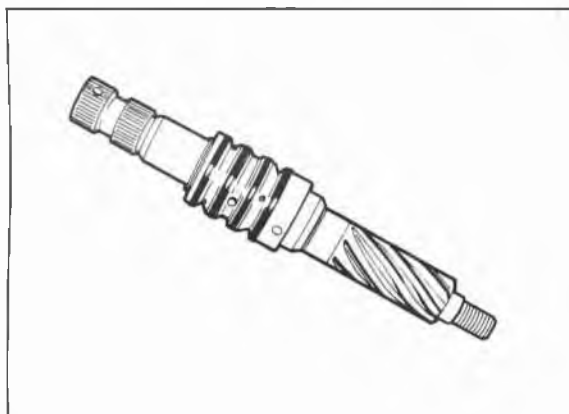
# 10 ENGINE SPEED SENSING POWER STEERING



86U10X-134

## Oil seal and needle bearing

1. Insert the **SST** so that it contacts the needle bearing.
2. Drive the oil seal and needle bearing out with the **SST** bar.



86U10X-135

## INSPECTION

Check the following and replace any faulty parts.

### Pinion shaft assembly

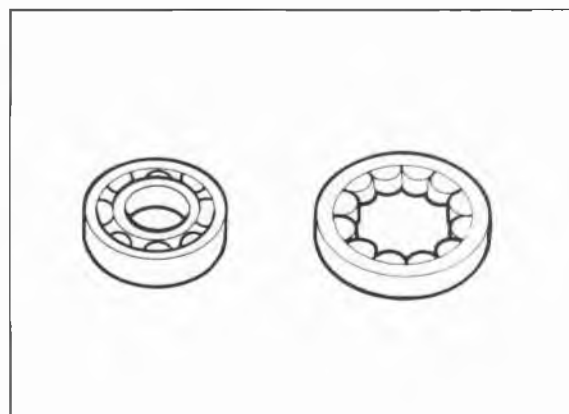
1. Pinion shaft teeth wear or damage
2. Control valve damage, clogging, and wear



86U10X-136

### Rack bushing

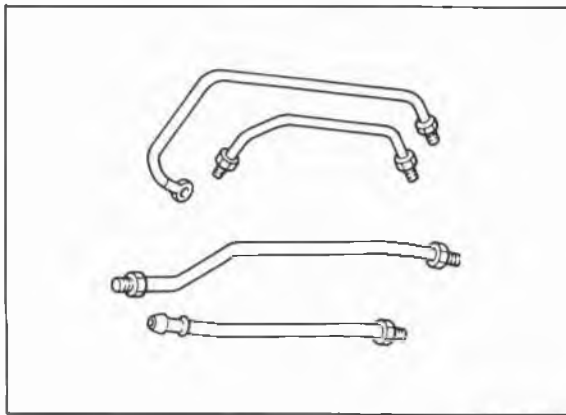
Wear or damage



86U10X-137

### Bearing

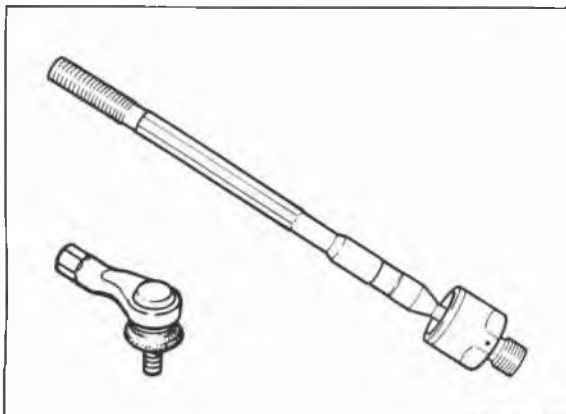
Wear, damage, and operation



86U10X-138

### Oil pipe

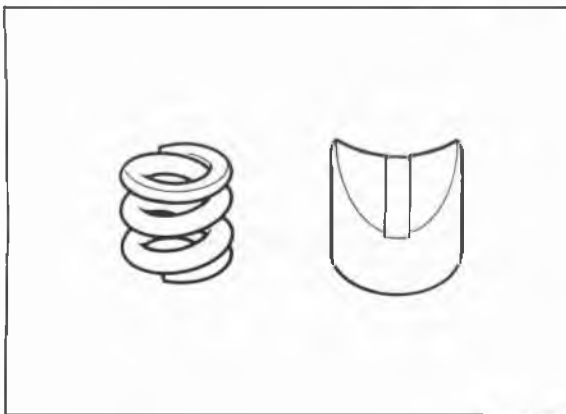
Clogging or damage



86U10X-139

### Tie-rod and tie-rod end

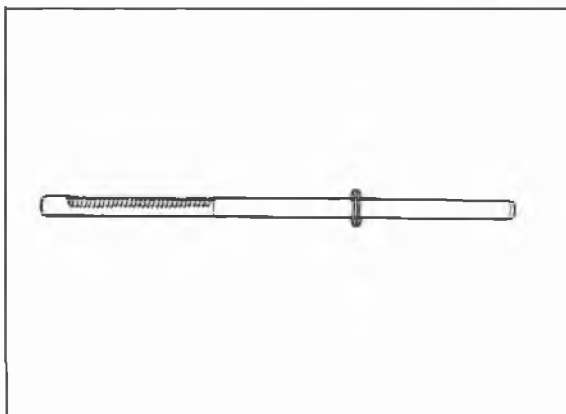
1. Tie-rod damage
2. Tie-rod ball joint damage and operation
3. Tie-rod end damage and operation



86U10X-140

### Pressure pad and spring

1. Pressure pad damage
2. Spring damage

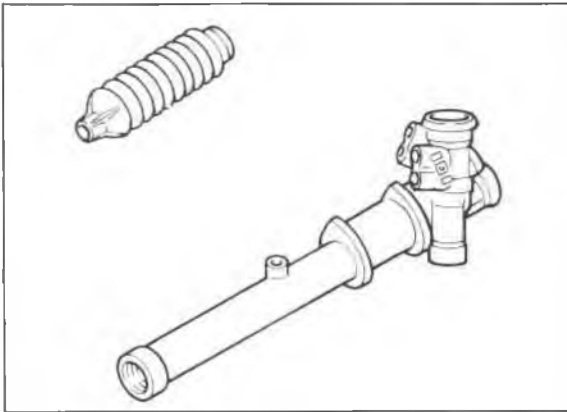


86U10X-141

### Rack

1. Rack cracking, damage, or wear of teeth
2. Seal ring holder wear or damage
3. Rack piston side corrosion

# 10 ENGINE SPEED SENSING POWER STEERING

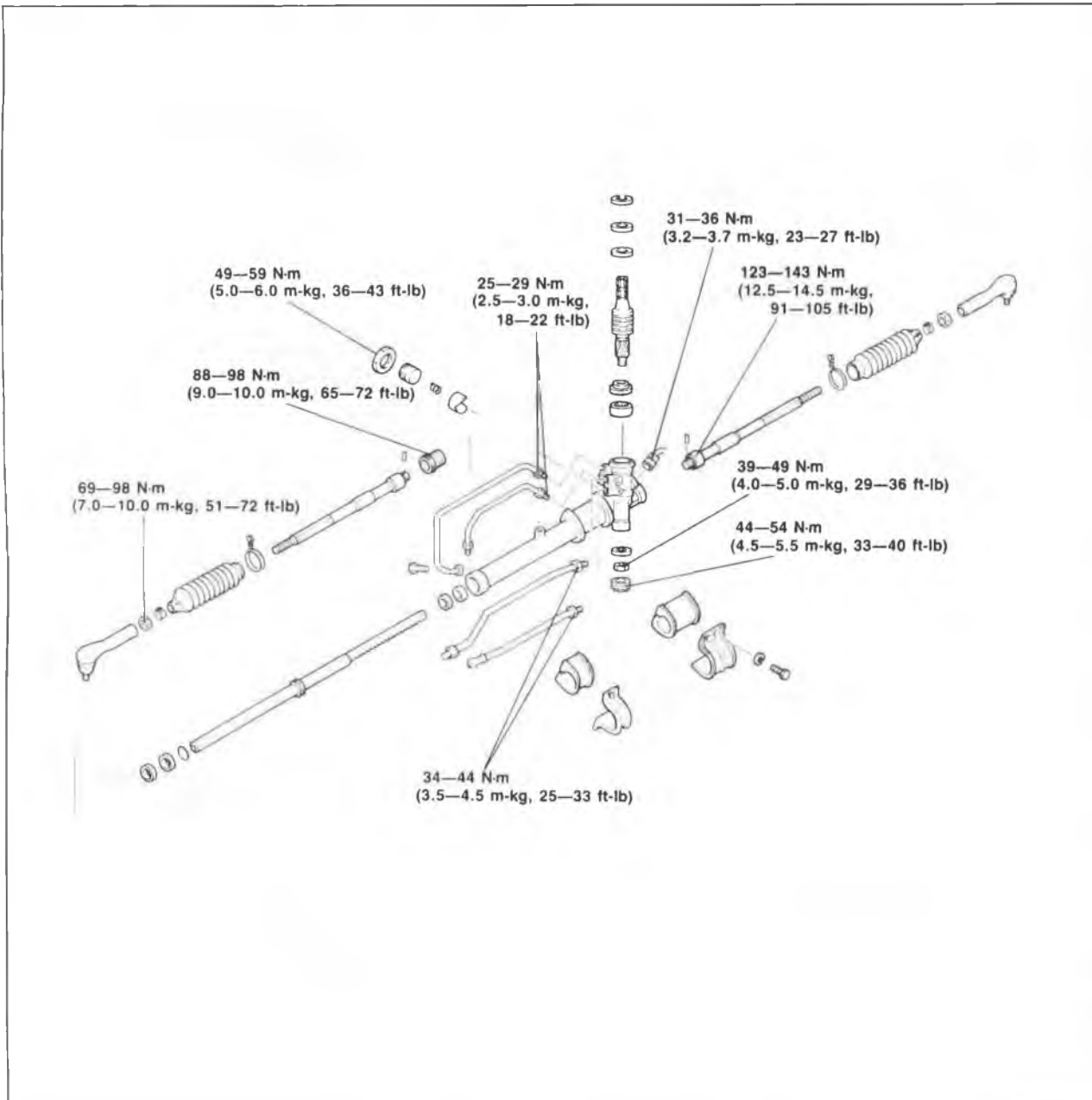


86U10X-142

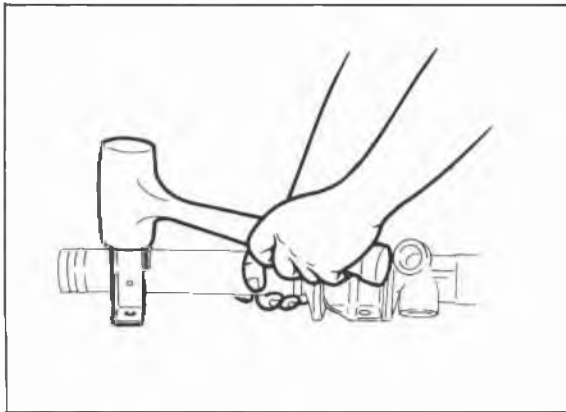
## Gear housing and boots

1. Gear housing cracking or damage
2. Boot cracking or tearing

## ASSEMBLY Torque Specifications



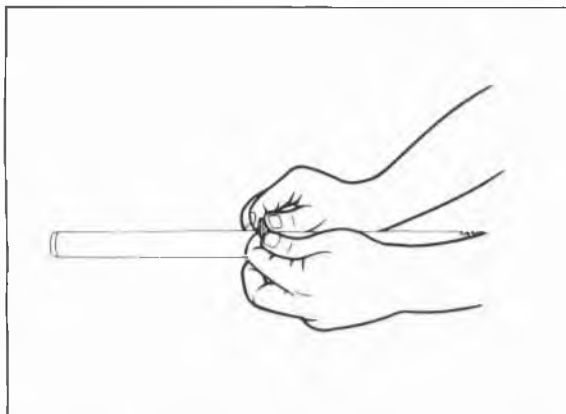
86U10X-251



86U10X-143

### Mounting bracket and rubber

1. Install the mounting rubber.
2. Tap the mounting bracket on with a plastic hammer.



86U10X-144

### O-ring and seal ring

1. Apply AFT to the O-ring and seal ring.
2. Install the O-ring in the ring groove of the rack.
3. Install the seal ring in the groove of the rack.

### Note

**Be careful not to cut or otherwise damage the edge of the seal ring.**

4. Compress the seal ring by hand to fit it to the groove.



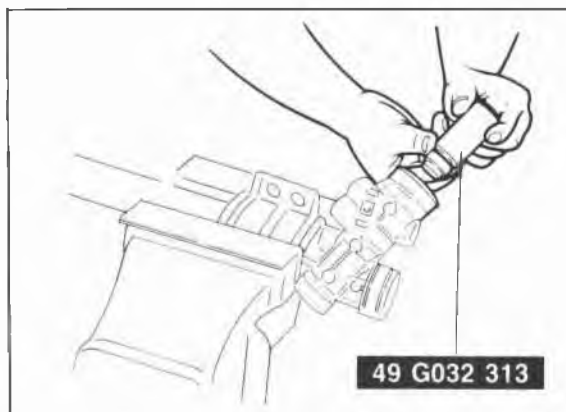
86U10X-145

### Needle bearing

1. Apply grease to the end of the **SST**.
2. Apply ATF to the needle bearing.
3. Set the needle bearing on the **SST**.

### Note

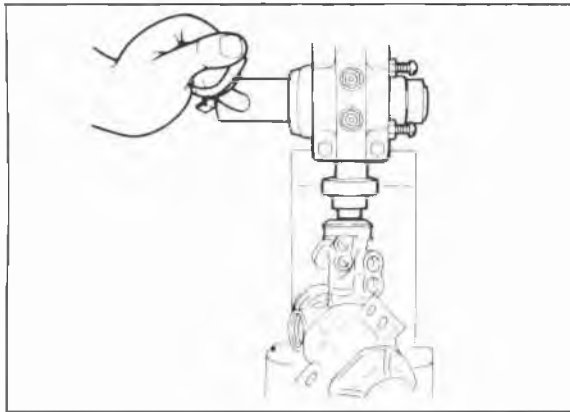
**When installing the needle bearing to the SST, install the embossed side first.**



86U10X-146

4. Insert the needle bearing and the **SST** into the housing.

# 10 ENGINE SPEED SENSING POWER STEERING



86U10X-147

5. Set the housing on a press and press in the bearing.



86U10X-148

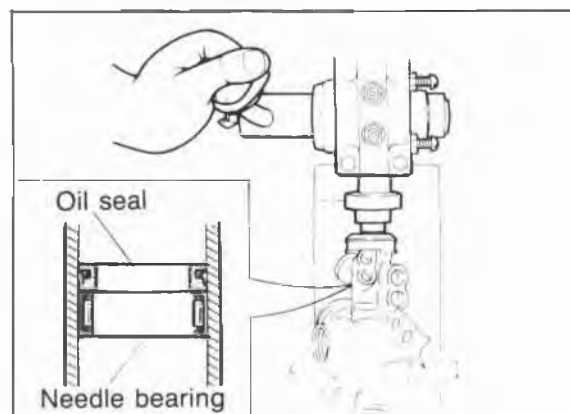
### Oil seal

1. Apply grease to the end of the **SST**.
2. Apply ATF to the oil seal.
3. Set the oil seal on the **SST**.



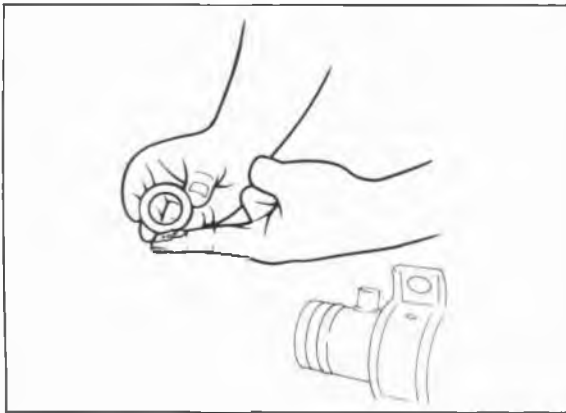
86U10X-149

4. Insert the oil seal and the **SST** into the housing.

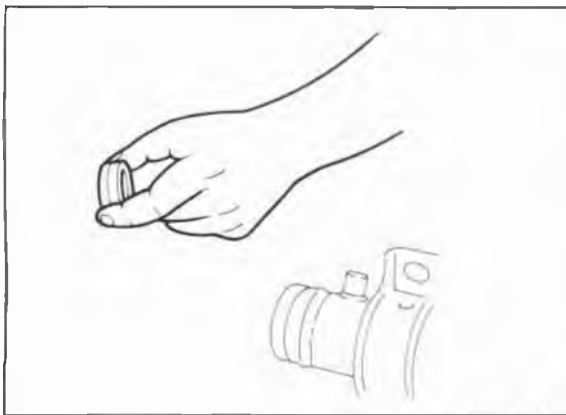


86U10X-150

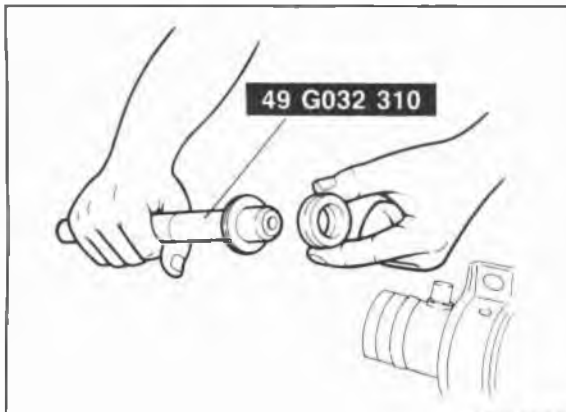
5. Set the housing on a press and press in the seal.



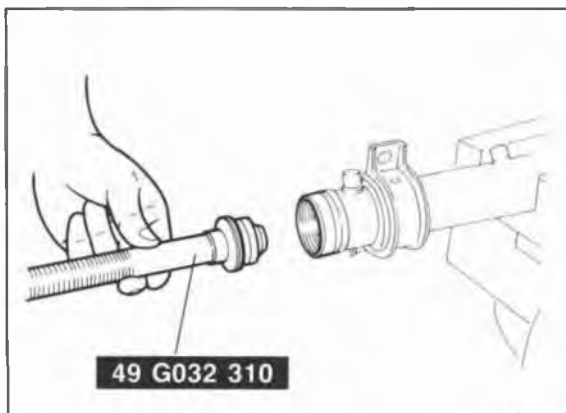
86U10X-151



86U10X-152



86U10X-153



86U10X-154

## Spacer and pinion housing side oil seal

1. Apply grease to flat surface of the spacer.

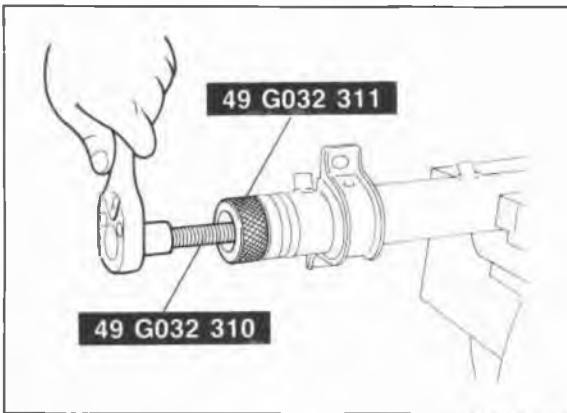
2. Connect the oil seal to the grease coated surface of the spacer.

3. Apply ATF to the inside and outside of the spacer and oil seal.

4. Set the spacer and oil seal on the **SST**.

5. Insert the **SST** from the tube side.

# 10 ENGINE SPEED SENSING POWER STEERING



86U10X-155

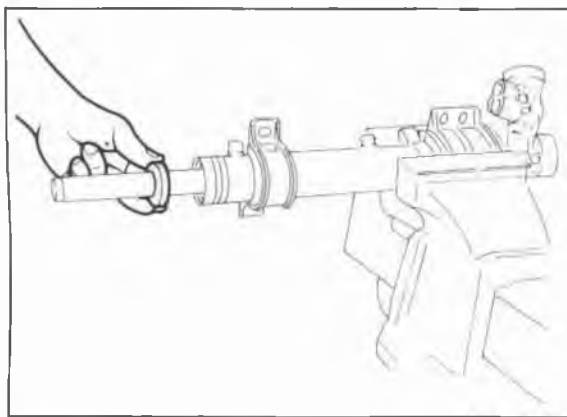
6. Install and tighten the **SST** nut against the tube.
7. Turn the **SST** shaft in as far as it will go to push in the seal and spacer.
8. Remove the **SST**.



86U10X-156

## Rack

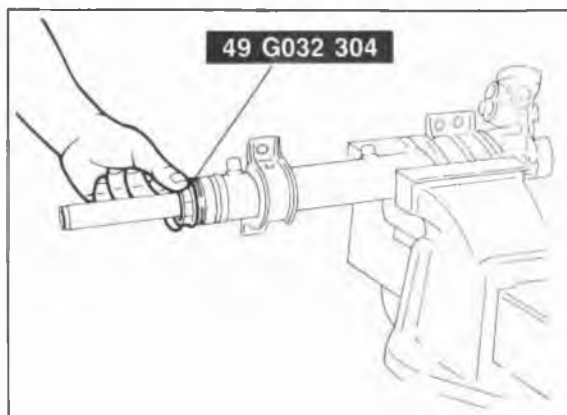
1. Apply grease (lithium base, NLGI No.2) to the friction surface and teeth of the rack.
2. Slide the **SST** over the rack and slide it in from the tube side.
3. Remove the **SST**.



76G10X-037

## Oil seal (Rack)

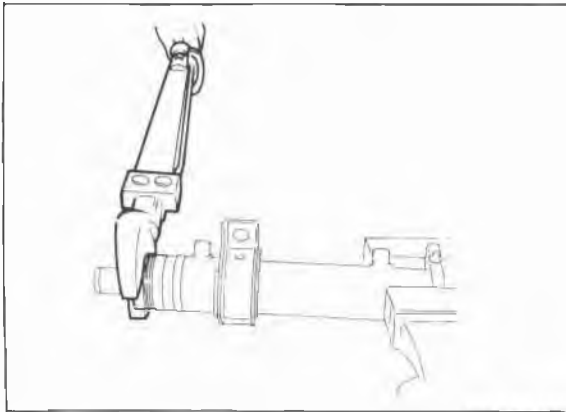
1. Apply ATF to the oil seal and slide it onto the rack.



86U10X-158

2. Set the **SST** on the rack.
3. Turn the **SST** as far as it will go, and push the oil seal into the tube.
4. Remove the **SST**.





86U10X-159

### Rack bushing

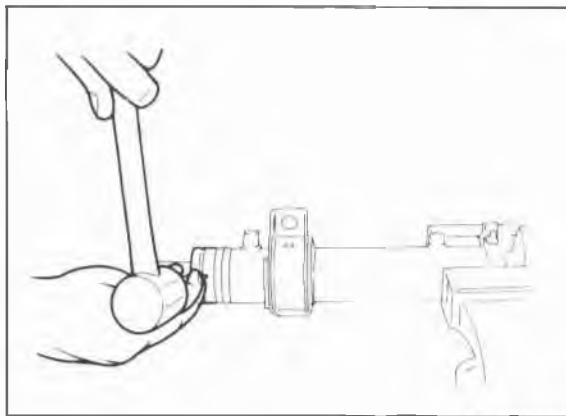
1. Install the rack bushing assembly in the rack housing.

### Tightening torque:

**88—98 N·m (9—10 m·kg, 65—72 ft·lb)**

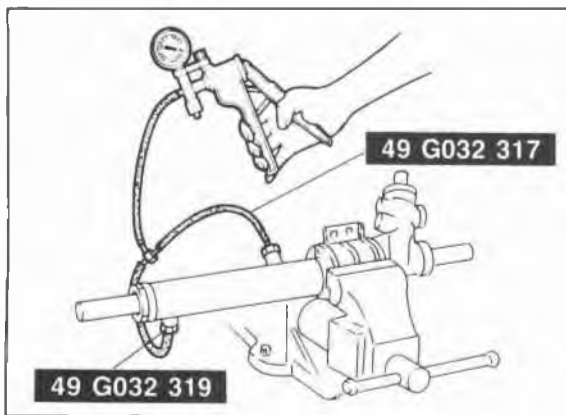
### Note

**The oil seal is pushed to the correct position in the rack housing by the tightening of the rack bushing.**



86U10X-160

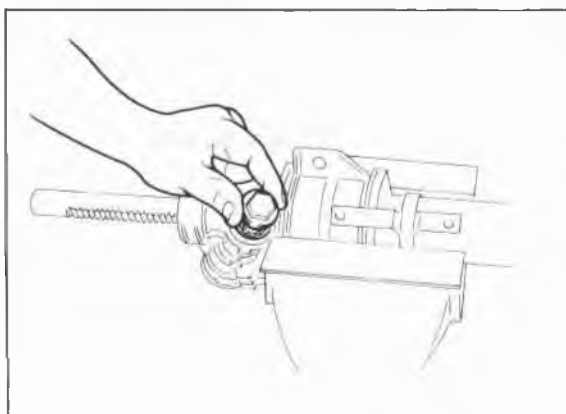
2. Stake the rack housing at two points **approx 1.5 mm (0.06 in)** from the end with a hammer and center punch.



86U10X-161

### Hermetic inspection

1. Connect the **SST** to the cylinder housing.
2. Connect a vacuum pump to the **SST**.
3. Apply **400 mmHg (15.7 inHg)** vacuum.
4. Verify that vacuum is held for at least **30 sec.** If not, check the seal and assembly.

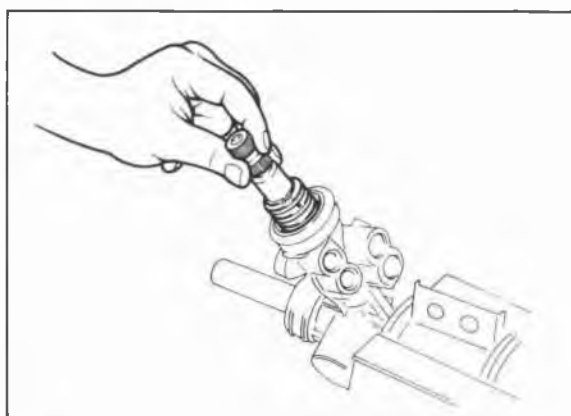


86U10X-162

### Lower bearing

1. Secure the gear housing in a vise so that the lower bearing bore faces upward.
2. Apply ATF to the lower bearing, then install it in the housing.
3. Press the bearing into the gear housing with the housing cover. Tighten the cover until the tightening force suddenly increases.

# 10 ENGINE SPEED SENSING POWER STEERING



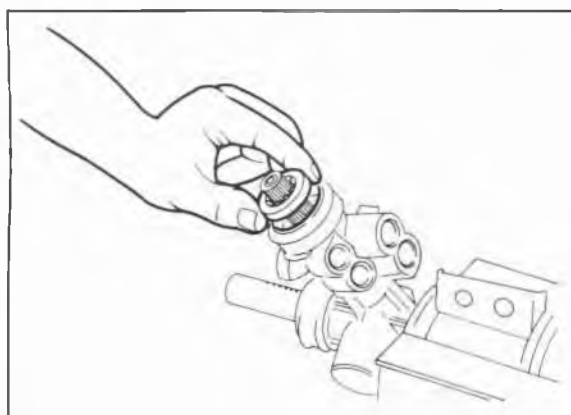
76G10X-038

## Pinion shaft assembly

1. Apply grease (lithium base, NLGI No. 2) to the teeth of the pinion shaft.
2. Apply ATF to the seal ring and the friction surface of the control valve.
3. Install the pinion shaft in the housing.

### Note

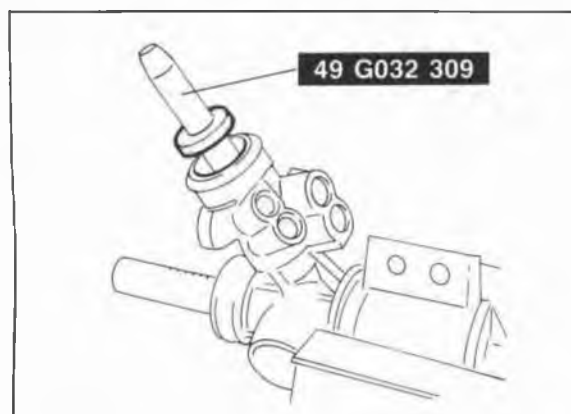
- a) Be careful not to damage the oil seal by the teeth of the pinion.
- b) Be careful not to damage the edge of the seal ring and control valve.



76G10X-039

## Upper bearing

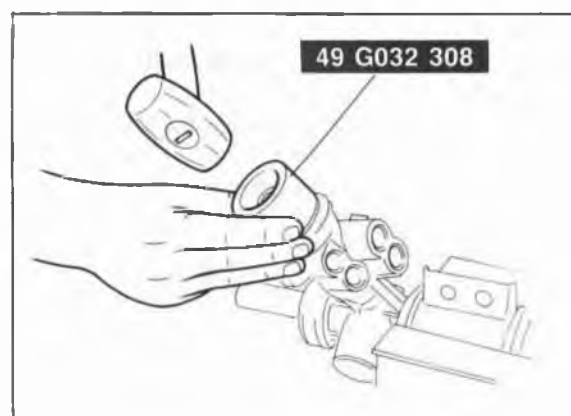
Apply ATF to the upper bearing, and then install it.



86U10X-165

## Oil seal

1. Apply ATF to the oil seal, and fill inside the lip with grease (lithium base, NLGI No. 2).
2. Slide the **SST** over the serrations of the pinion shaft assembly.
3. Slide the oil seal over the **SST** and position it in the housing.

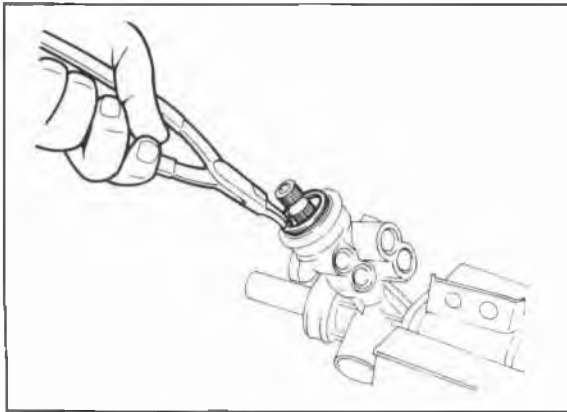


86U10X-166

4. Tap the oil seal in with the **SST** until the snap ring installation groove in the housing is just visible.

### Note

Apply uniform force to the oil seal when installing.



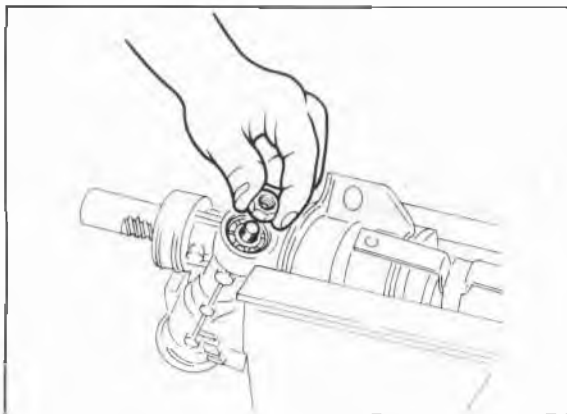
86U10X-167

### Snap ring

Install the snap ring.

### Note

Verify that the snap ring is correctly seated in the ring groove of the housing.



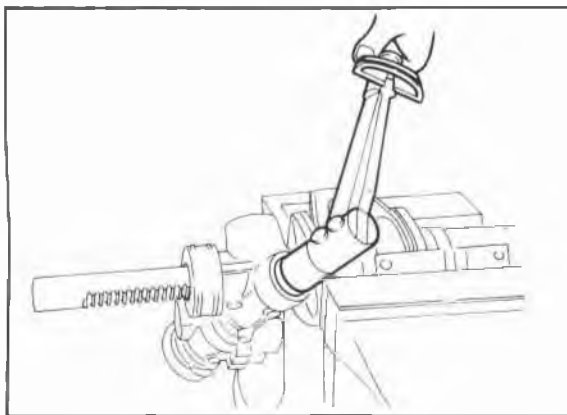
86U10X-168

### Locknut

1. Temporarily install the tie-rod on the tube side of the rack.
2. Install the locknut and turn it until the tie-rod contacts the tube.
3. Tighten the locknut.

### Tightening torque:

39—49 N·m (4.0—5.0 m·kg, 29—36 ft·lb)



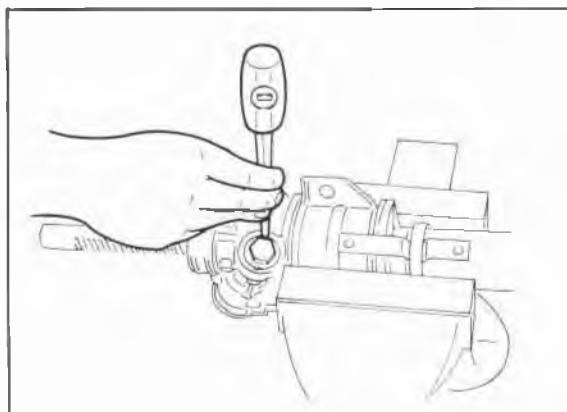
86U10X-169

### Housing cover

1. Apply thread sealant to the housing cover threads.
2. Install the housing cover.

### Tightening torque:

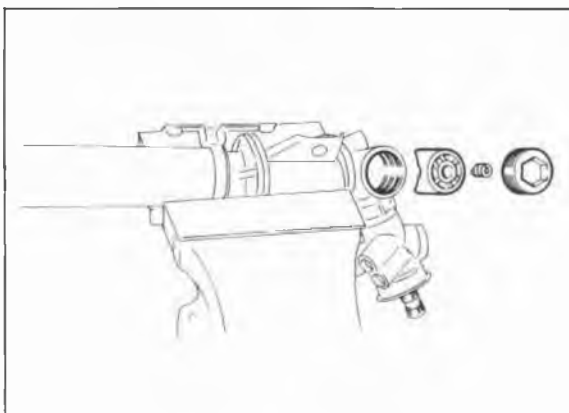
44—54 N·m (4.5—5.5 m·kg, 33—40 ft·lb)



86U10X-170

3. Stake between the rack housing and housing cover at two points with a center punch.

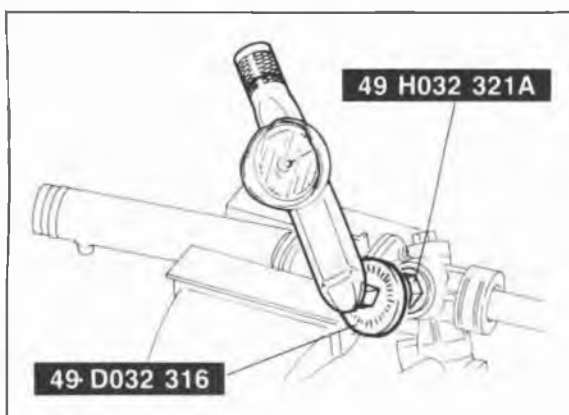
# 10 ENGINE SPEED SENSING POWER STEERING



86U10X-171

## Pressure pad

1. Secure the gear housing in a vise so that the pressure pad position faces upward.
2. Apply grease (lithium base NLGI No. 2) to the rack sliding surface of the pressure pad; then install it in the housing.
3. Install the pressure pad.



86U10X-172

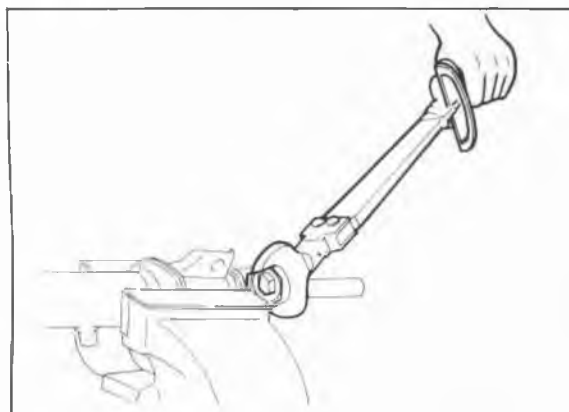
## Adjust cover

1. Set the rack in the center position.
2. Tighten the adjust cover to **9.8 N·m (100 cm·kg, 7.2 ft·lb)** then loosen it.
3. Tighten again to **4.9 ± 0.5 N·m (50 ± 5 cm·kg, 3.6 ± 0.4 ft·lb)**, and then return it 45°.
4. Apply thread sealant to the exposed threads of adjust cover.

5. Install and tighten the locknut.

## Tightening torque:

**49—59 N·m (5.0—6.0 m·kg, 36—43 ft·lb)**



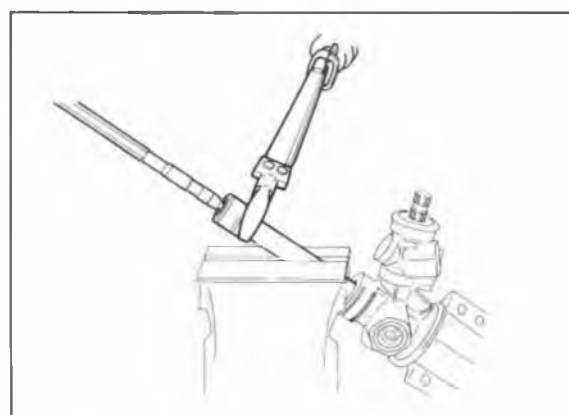
86U10X-173

## Tie-rod

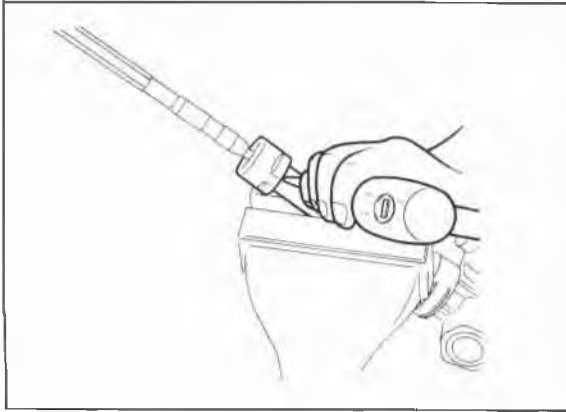
1. Secure the rack in a vise.
2. Install the tie rod on the rack.

## Tightening torque:

**123—143 N·m  
(12.5—14.5 m·kg, 90.6—105 ft·lb)**

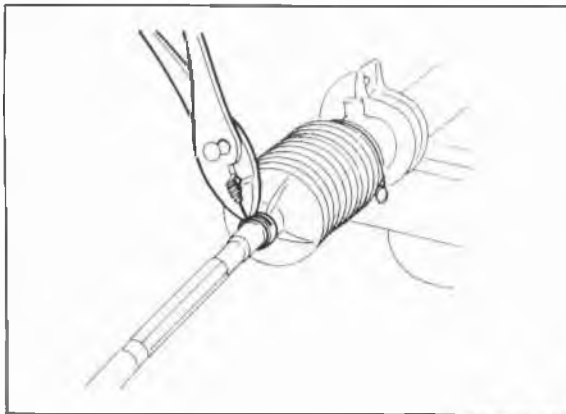


86U10X-174



86U10X-175

3. Tap in a new roll pin.



86U10X-176

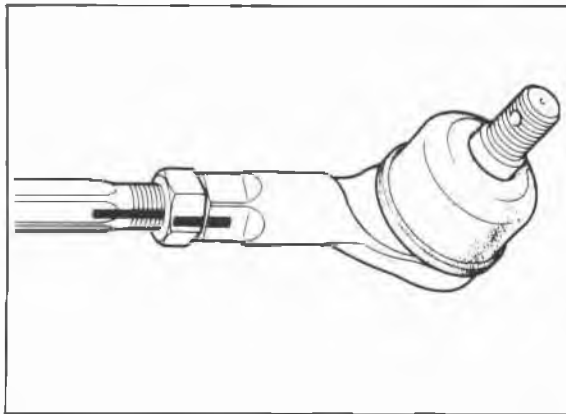
### Boot

1. Apply grease to the inner surface of the small end of the boot.
2. Install the boot. Wrap a new wire around the large end of the boot two times and then twist it 4 to 4.5 times. Bend the twisted part toward the mounting bracket.

### Note

**Be careful not to break the boot wire.**

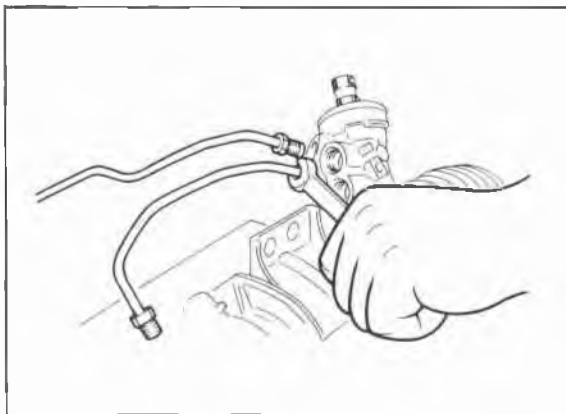
3. Install the spring clip on the small end of the boot.



86U10X-177

### Tie-rod end

Align with the mark made before disassembly, and then tighten the nut.



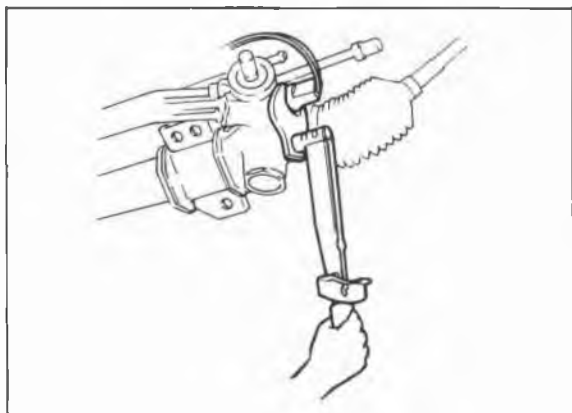
86U10X-178

### Oil pipe

Secure the mounting bracket in a vise so that the oil pipe connections face upward.

## 10 ENGINE SPEED SENSING POWER STEERING

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86U10X-179

### **Oil pressure switch**

1. Install the pressure switch O-ring in the gear housing.
2. Install the oil pressure switch.

### **Tightening torque:**

**31—36 N·m (3.2—3.7 m·kg, 23—27 ft·lb)**

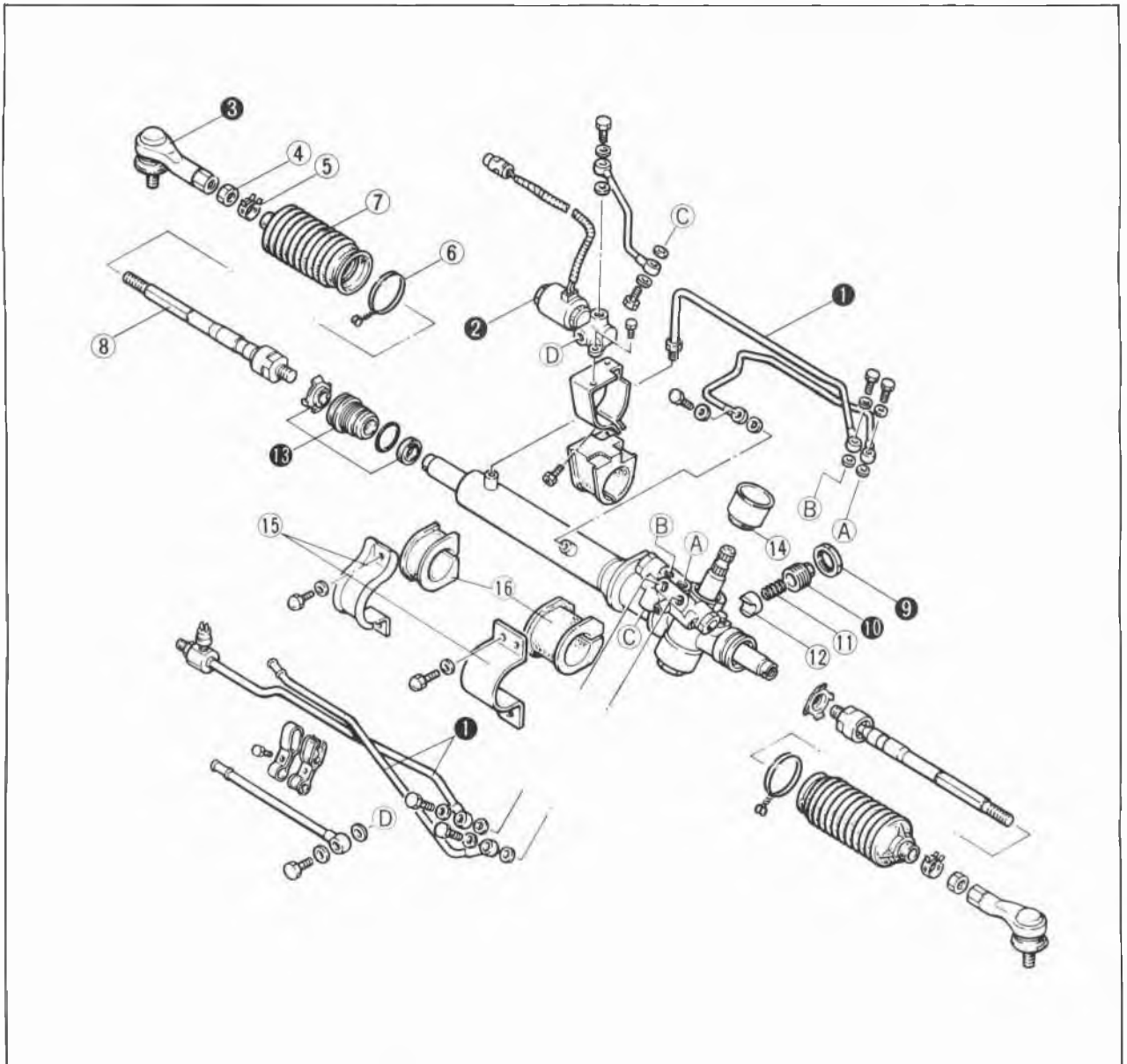
## ELECTRONICALLY-CONTROLLED POWER STEERING

### DISASSEMBLY

Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.

#### Caution

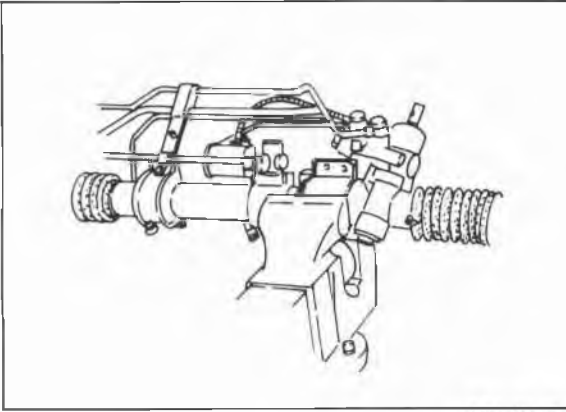
- a) Because adjustment of the spool valve is not possible, do not disassemble the gear box for spool valve repairs. If repairs are necessary, replace the gear box assembly.
- b) In order to prevent the entrance of dirt, all disassembly and assembly should be done in a clean area.
- c) Before disassembly, plug the openings of all pipe installation fittings; then thoroughly clean the steering gear and linkage.



86U10X-180

- |                        |                         |                        |
|------------------------|-------------------------|------------------------|
| 1. Pipe                | 6. Boot wire            | 11. Spring             |
| 2. Solenoid valve      | 7. Boot                 | 12. Pressure pad       |
| 3. Tie-rod end         | 8. Tie-rod              | 13. Outer box assembly |
| 4. Tie-rod end locknut | 9. Adjust cover locknut | 14. Oil seal           |
| 5. Spring clip         | 10. Adjust cover        | 15. Mounting bracket   |
|                        |                         | 16. Mounting rubber    |

# 10 ELECTRONICALLY-CONTROLLED POWER STEERING



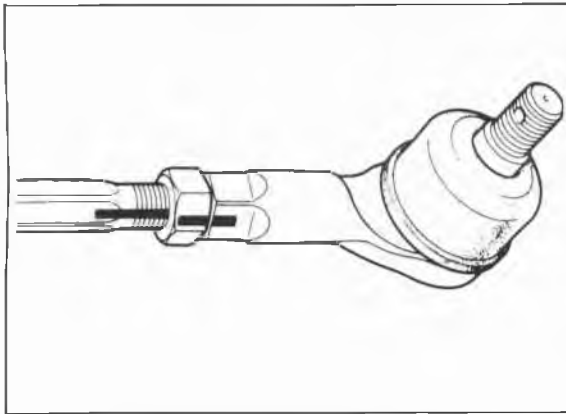
86U10X-181

## Disassembly Note Steering gear and linkage

Secure the mount part of the removed gear and linkage in a vise.

### Caution

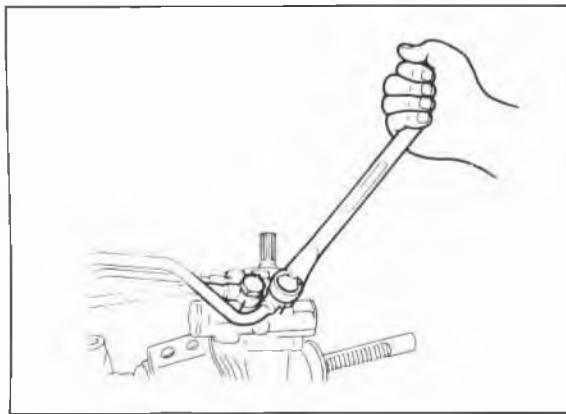
Insert protective material (such as copper plates) in the jaws of the vise.



86U10X-182

## Tie-rod ends

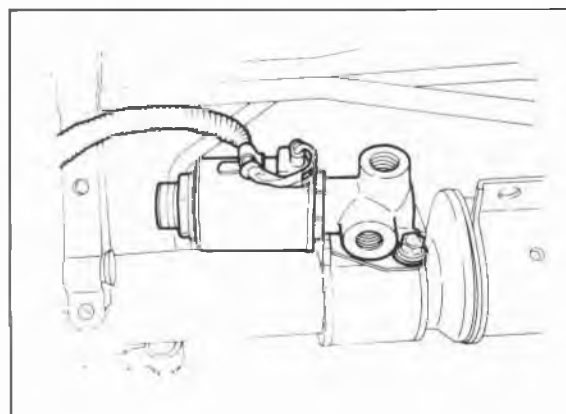
Before removing the tie-rod ends, make a mark for proper installation.



86U10X-183

## Oil pipe

Mark the pressure and return pipes and the valve case for proper installation. Remove the pipes.

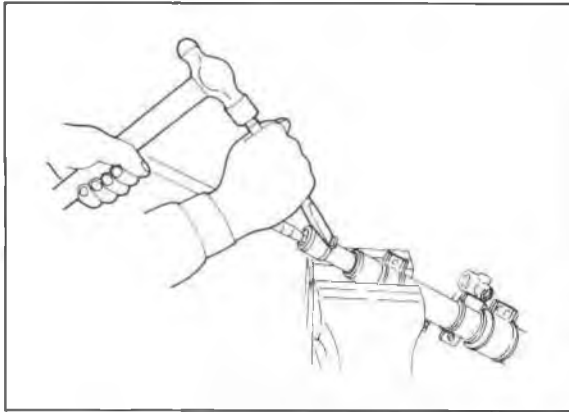


86U10X-184

## Solenoid valve

Remove the solenoid valve.

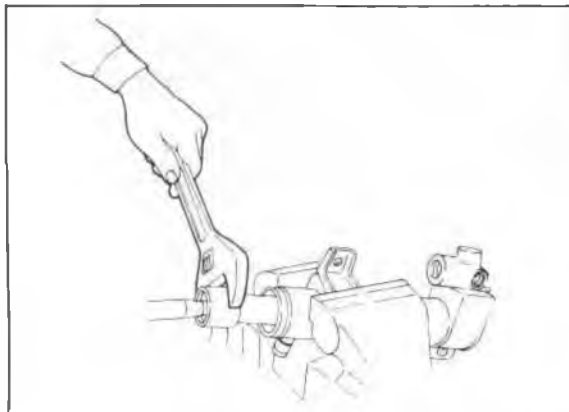




86U10X-185

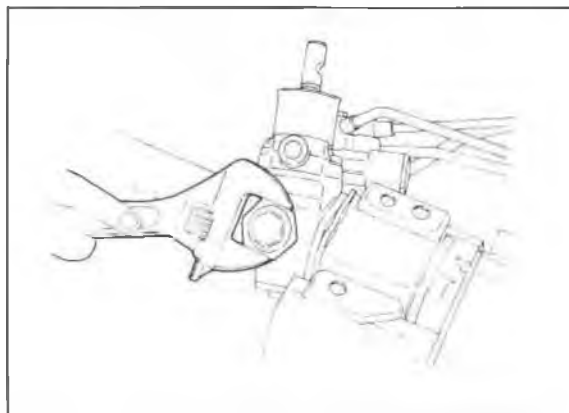
## Tie-rods

1. Uncrimp the washer as shown in the figure.



63U10X-127

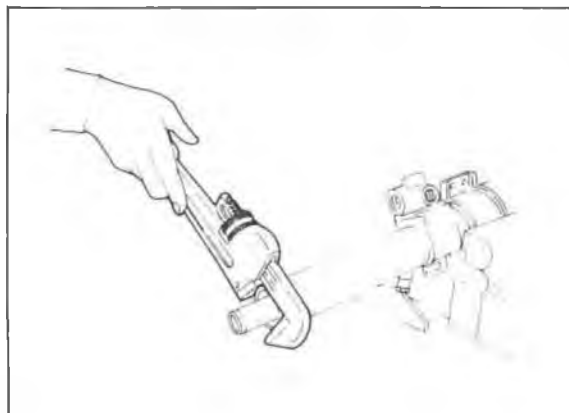
2. Remove the tie-rod from the rack.



86U10X-186

## Locknut and adjust cover

Loosen the locknut and remove the adjust cover, spring, and pressure pad.

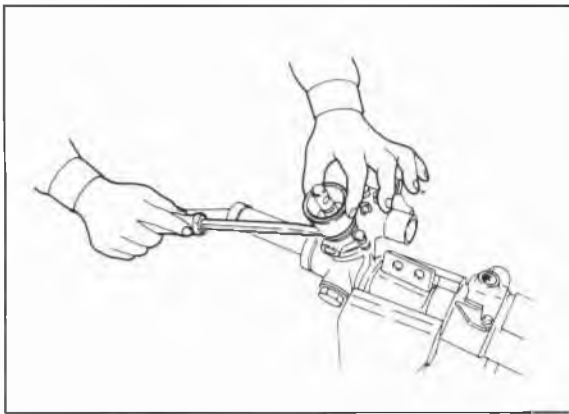


86U10X-187

## Outer box

Protect the outer box with cloth and remove it with a pipe wrench.

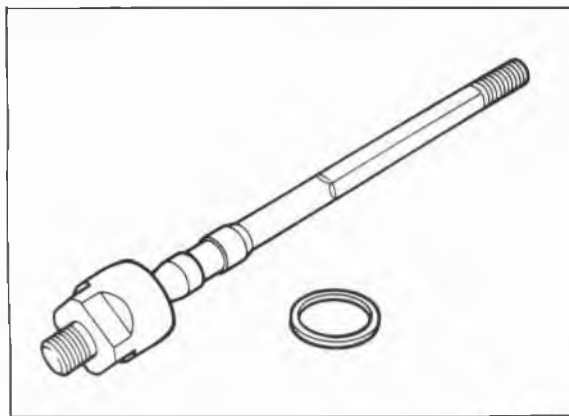
# 10 ELECTRONICALLY-CONTROLLED POWER STEERING



86U10X-188

## Oil seal

Remove the oil seal with a screwdriver.

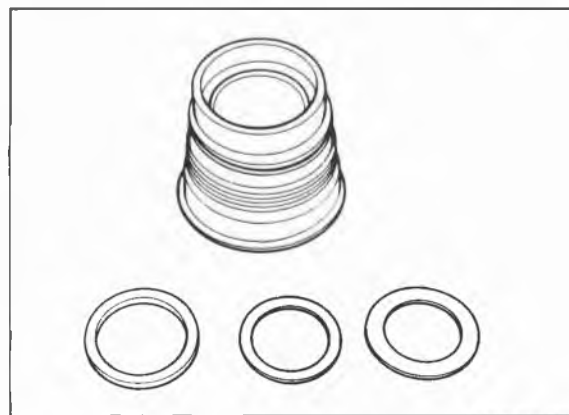


86U10X-189

## INSPECTION

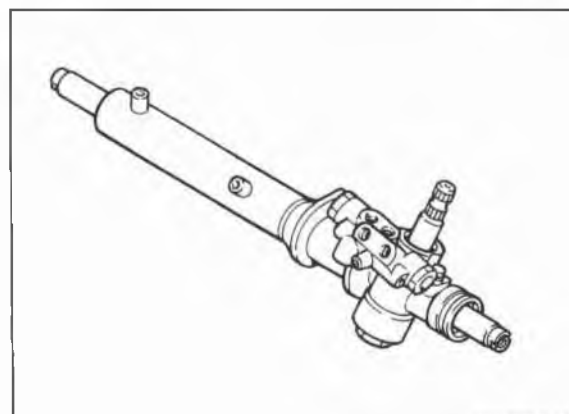
Check the following and replace any faulty parts.

1. Cracked, damaged, or deteriorated boots
2. Worn pressure pad friction surface
3. Loose or sticking tie-rod ball joint
4. Bent or damaged tie-rod or tie-rod end



86U10X-190

5. Worn outer box bushing

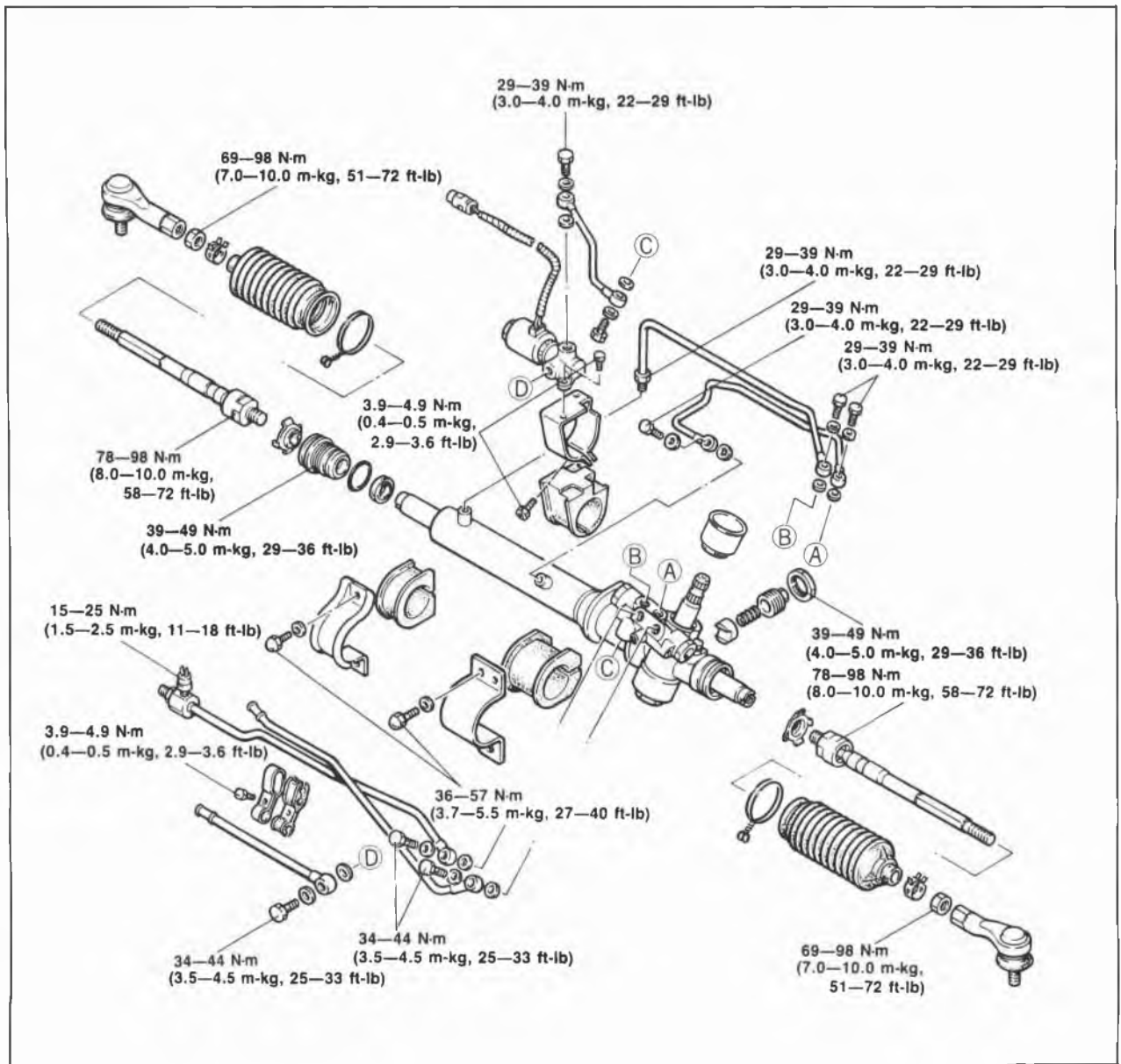


86I10X-191

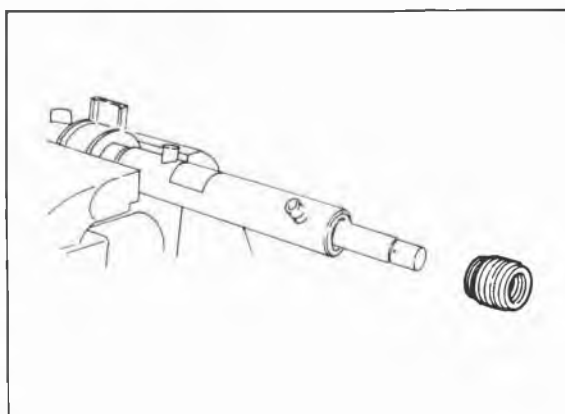
6. Cracked or damaged gear housing
7. Steering gear oil leakage

## ASSEMBLY

### Torque Specifications



86U10X-252



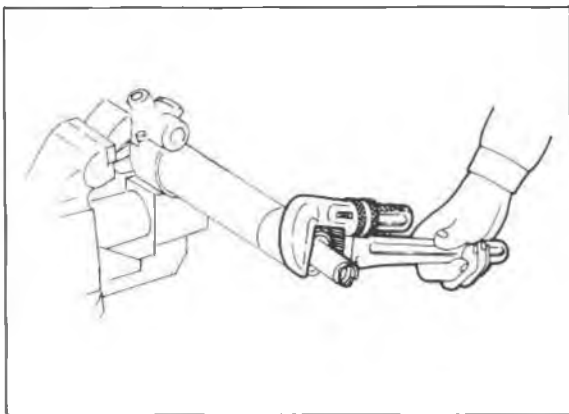
86U10X-192

1. Install the outer box in the rack housing.

#### Note

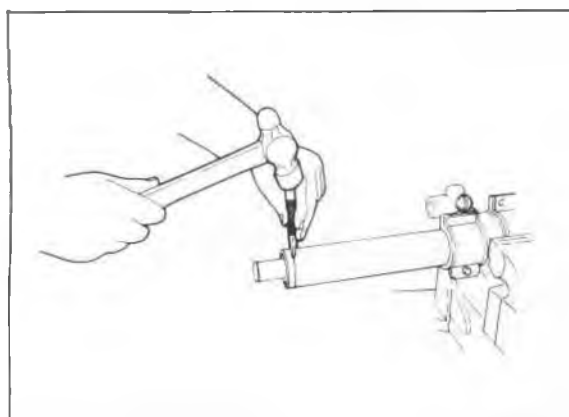
Coat the seals and O-rings with ATF.

## 10 ELECTRONICALLY-CONTROLLED POWER STEERING



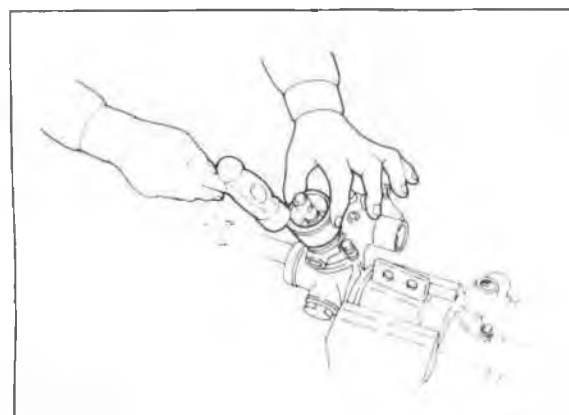
86U10X-193

2. Protect the outer box with cloth and tighten it with a pipe wrench.



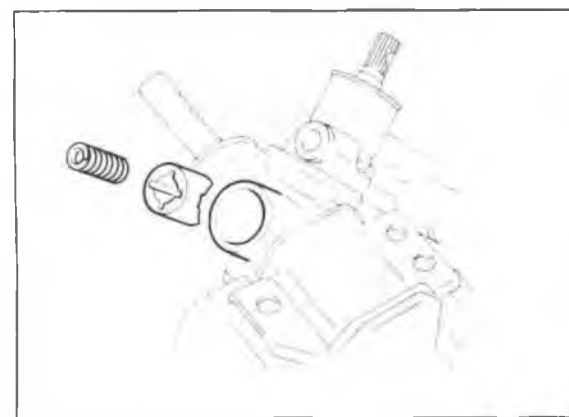
86U10X-194

3. Stake between the outer box and the rack housing with a center punch.



86U10X-195

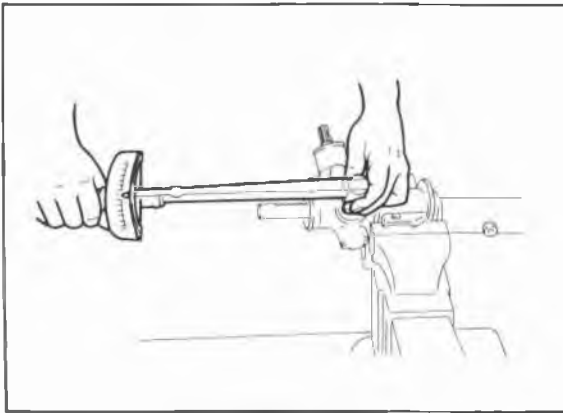
4. Install the oil seal with a suitable pipe.



86U10X-196

5. Install the pressure pad and spring in the gear housing.

## ELECTRONICALLY-CONTROLLED POWER STEERING 10



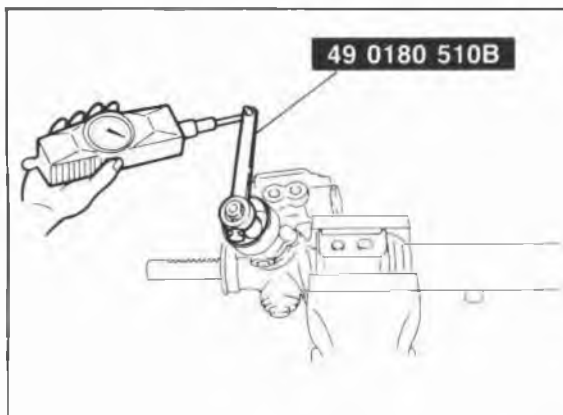
86U10X-197

6. Apply thread sealant to the threads of the adjust cover.
7. Install the adjust cover to the gear housing and tighten it as specified; then loosen it 35°.

**Tightening torque:**

**4.5—5.5 N·m**

**(45—55 cm·kg, 39—48 in·lb)**

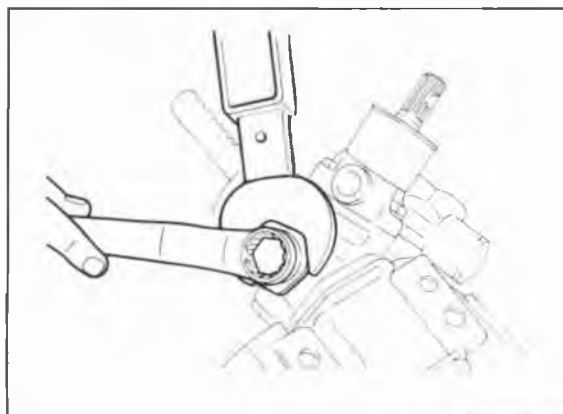


86U10X-198

8. Measure the pinion torque with the **SST**.

**Pull scale: 1,000—1,400 g (35.3—49.4 oz)**

9. If the pinion torque is not within specification, readjust the adjust cover.



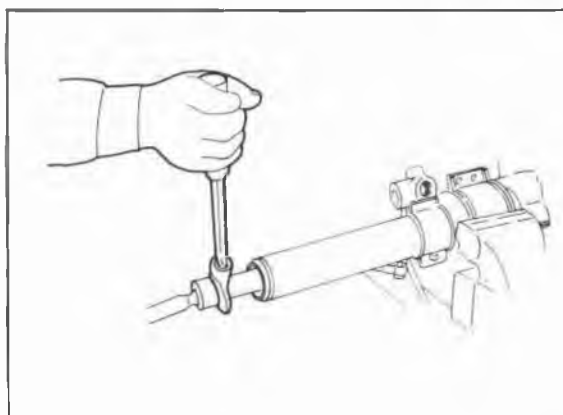
86U10X-199

10. Lock the adjust cover with the locknut.

**Tightening torque:**

**40—50 N·m**

**(4—5 m·kg, 29—36 ft·lb)**



76G10X-040

11. Set the rack in a vise and install the washer. Tighten the tie-rod.

**Tightening torque:**

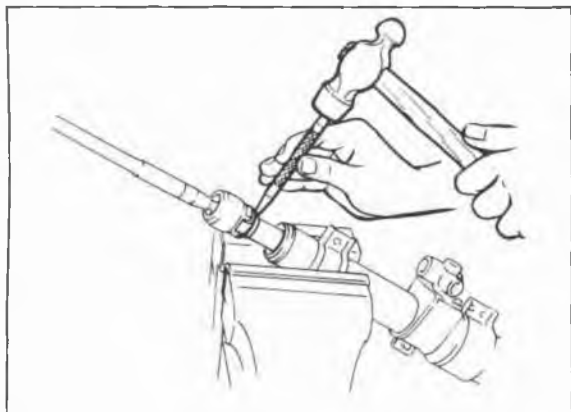
**60—80 N·m**

**(6—8 m·kg, 43—58 ft·lb)**

**Caution**

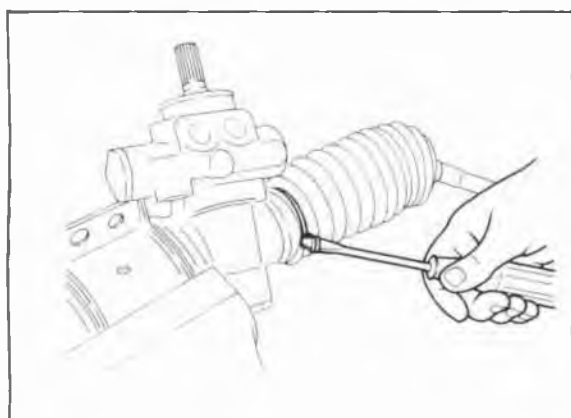
**Insert protective material (such as copper plates) in the jaws of the vise.**

## 10 ELECTRONICALLY-CONTROLLED POWER STEERING



86U10X-201

12. Stake the washer in two places with a punch.

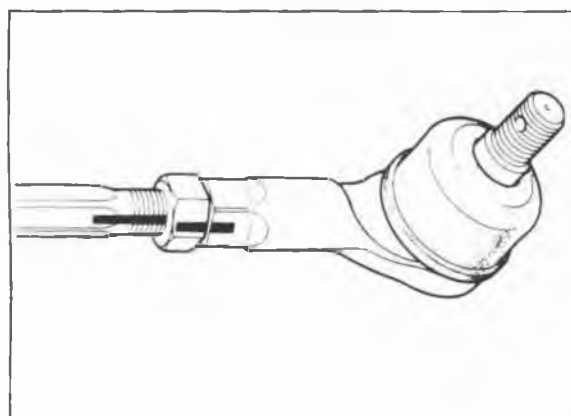


86U10X-202

13. Install the boot. Wrap a new wire around it two times and twist it 4 to 4.5 times.

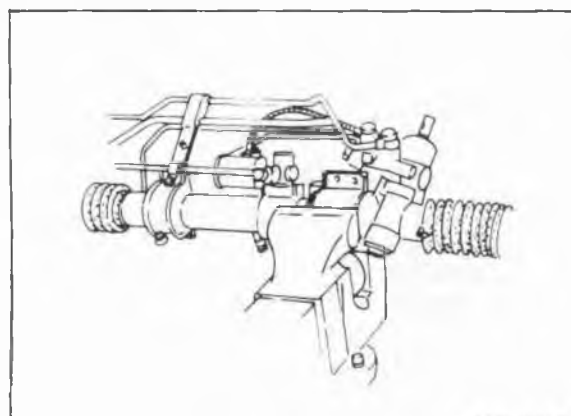
**Caution**

**Be sure that the boot is not twisted or dented.**



86U10X-203

14. Install the tie-rod ends, aligning them with the marks made before disassembly.



86U10X-204

15. Install the solenoid valve and pressure switch.  
16. Align the oil pipes with the marks made before disassembly, then tighten them.

## OIL PUMP

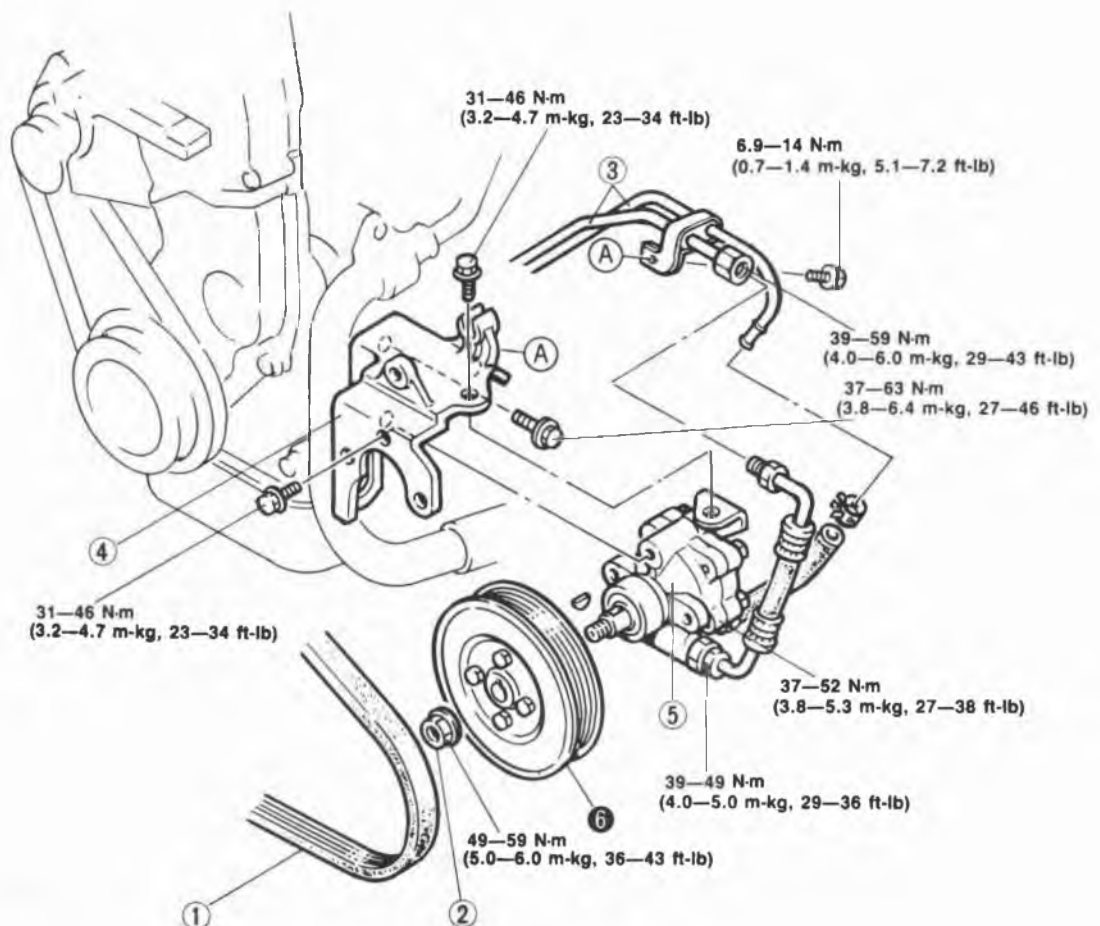
## REMOVAL AND INSTALLATION

1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove in the order shown in the figure, referring to the removal note for specially marked parts.
3. Install in the reverse order of removal.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.

## Note

- a) The power steering fluid will leak out when the return hose or the pressure hose is disconnected. Prepare a suitable container for it to drain into.
- b) After installation, inspect the deflection of the oil pump belt and bleed the air from the system, then check for fluid leakage.

## 2WS (Gasoline engine)

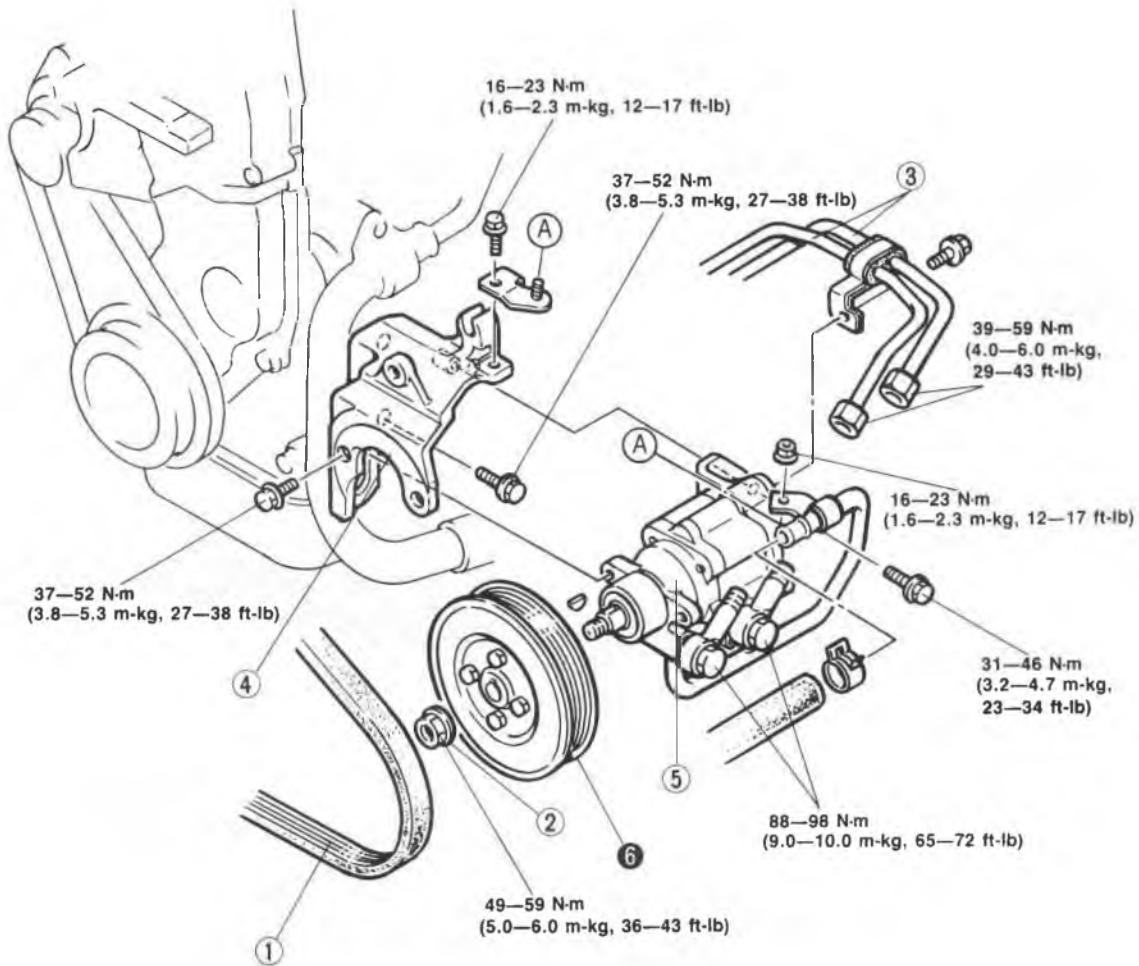


76G10X-041

- |          |                    |
|----------|--------------------|
| 1. Belt  | 4. Bracket         |
| 2. Nut   | 5. Oil pump        |
| 3. Pipes | 6. Oil pump pulley |

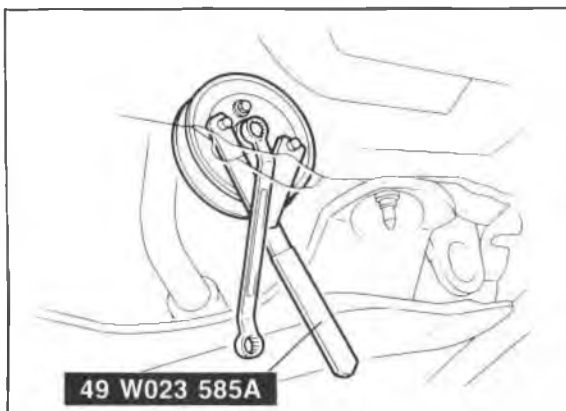
# 10 OIL PUMP

4WS



86U10X-206

- |          |                    |
|----------|--------------------|
| 1. Belt  | 4. Bracket         |
| 2. Nut   | 5. Oil pump        |
| 3. Pipes | 6. Oil pump pulley |



76G10X-016

## Removal Note

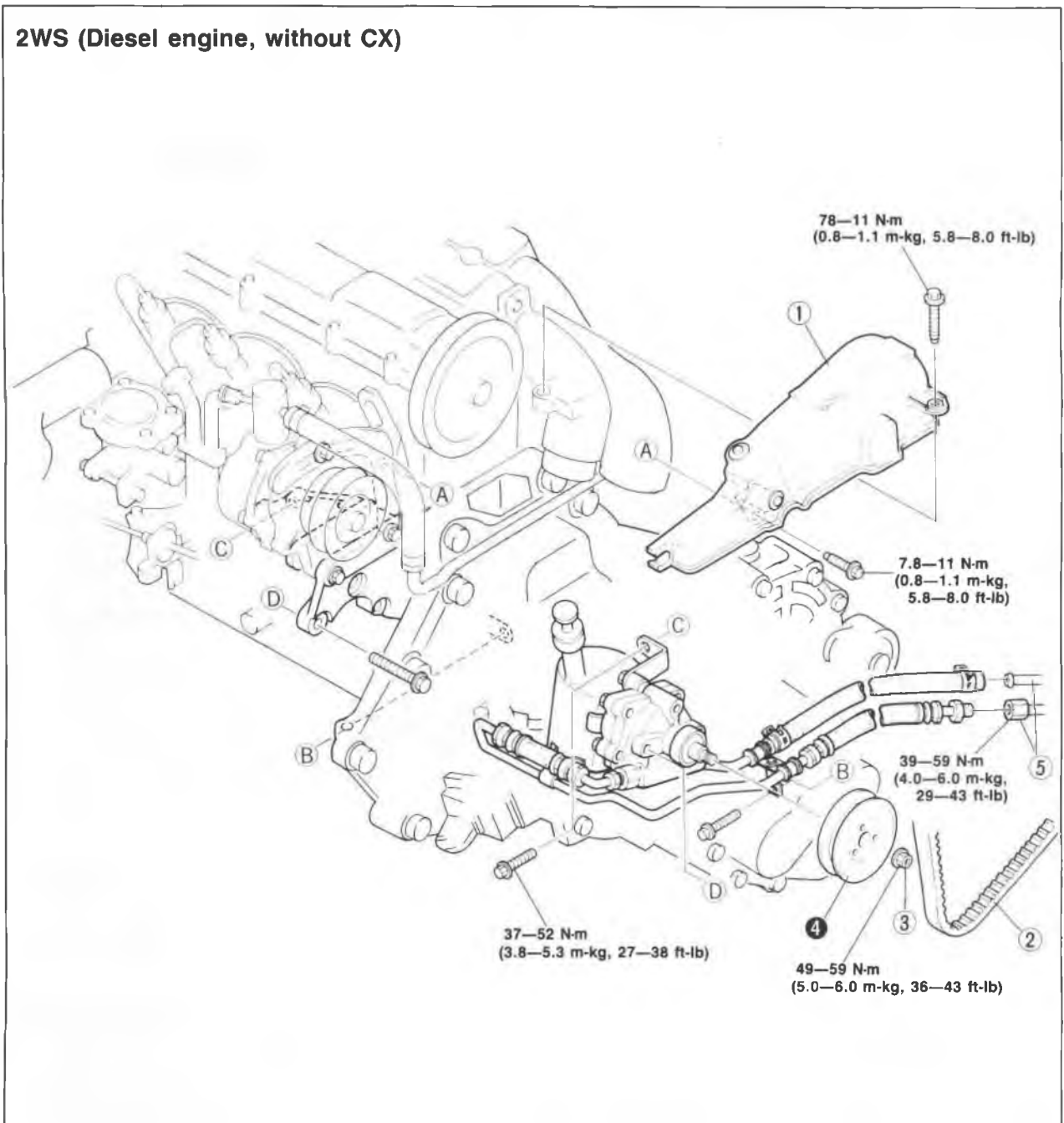
### Oil pump (2WS Gasoline engine, 4WS)

1. Hold the oil pump pulley with the SST, and remove the pulley nut.
2. Slide the pulley forward. Remove the hose, pipes, and the pump.
3. Remove the pulley.



# 10 OIL PUMP

## 2WS (Diesel engine, without CX)



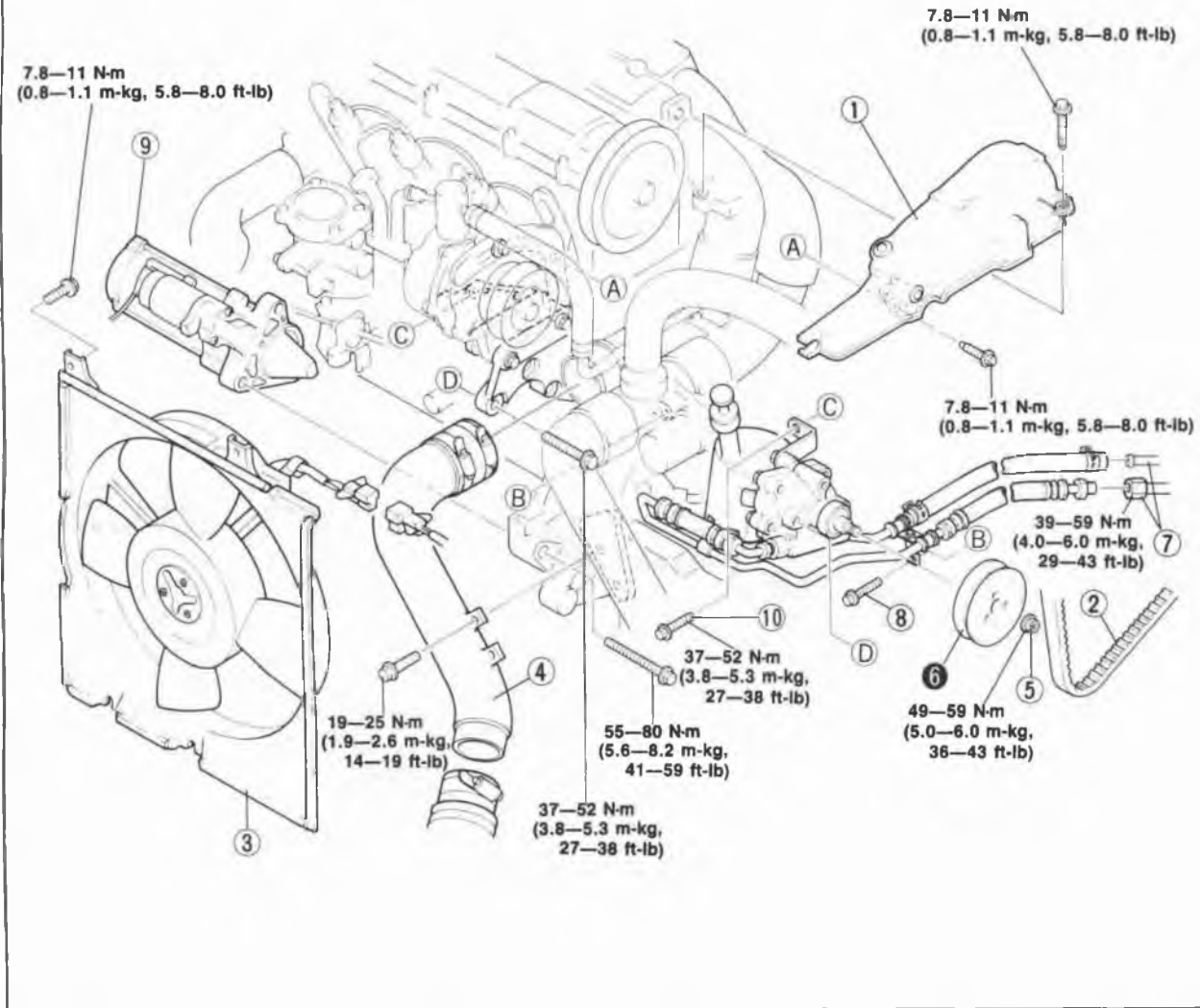
76G10X-042

- 1. Drive belt cover
- 2. Belt
- 3. Nut
- 4. Oil pump pulley

- 5. Pipes
- 6. Bolt
- 7. Bolt

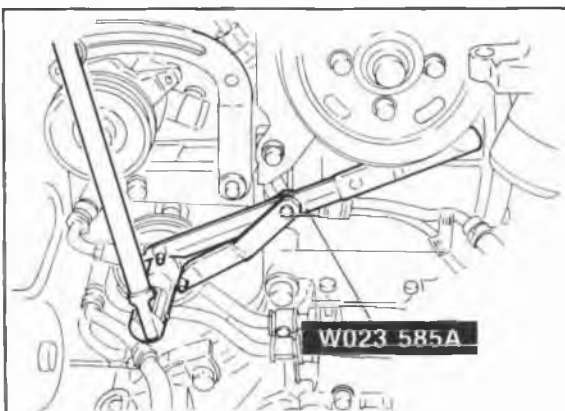
# 10 OIL PUMP

## 2WS (Diesel engine, with CX)



76G10X-017

- |                     |                    |            |
|---------------------|--------------------|------------|
| 1. Drive belt cover | 5. Nut             | 9. Starter |
| 2. Belt             | 6. Oil pump pulley | 10. Bolt   |
| 3. Cooling fan      | 7. Pipes           |            |
| 4. Intake air pipe  | 8. Bolt            |            |



76G10X-018

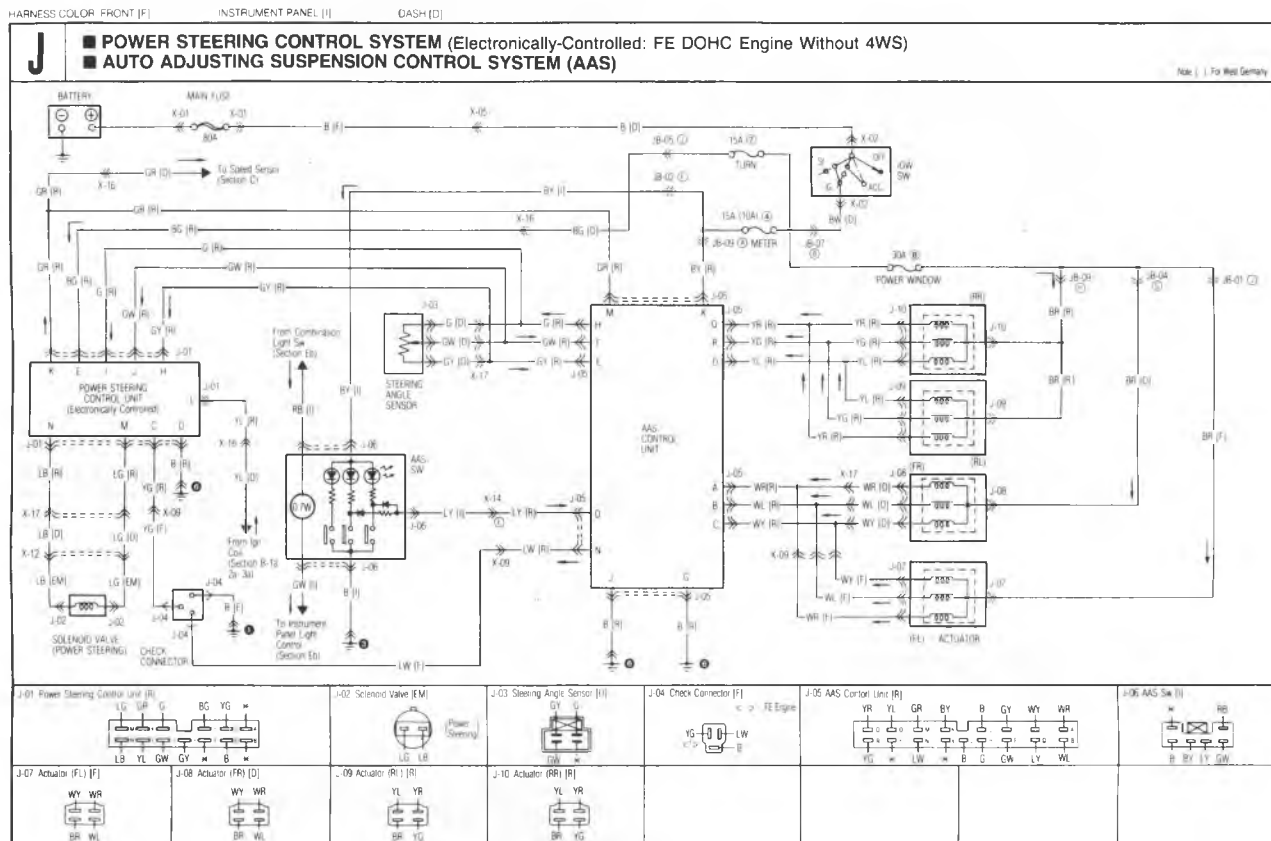
### Removal Note

#### Oil pump (2WS Diesel engine)

1. Hold the oil pump pulley with the **SST**, and remove the pulley nut.
2. Slide the pulley forward. Remove the hose, pipes, and the pump.
3. Remove the pulley.

# ELECTRICAL COMPONENTS OF ELECTRONICALLY-CONTROLLED POWER STEERING (ECPS)

## CIRCUIT DIAGRAM



86U10X-208

**Note**  
**Refer to page 10—4 for the component location.**

## TROUBLESHOOTING GUIDE

The power steering control unit contains a self-diagnosis function to detect malfunctions within itself, the ECPS electrical components and circuits. If a malfunction is detected, the control unit indicates where the problem is located by outputting specific voltage pulsations at terminal wire (YB) of the check connector. Troubleshooting of the ECPS system, then, is easily performed by comparing the output pattern with those of the Diagnosis Table on pages 10—89 and 90.

76G10X-019



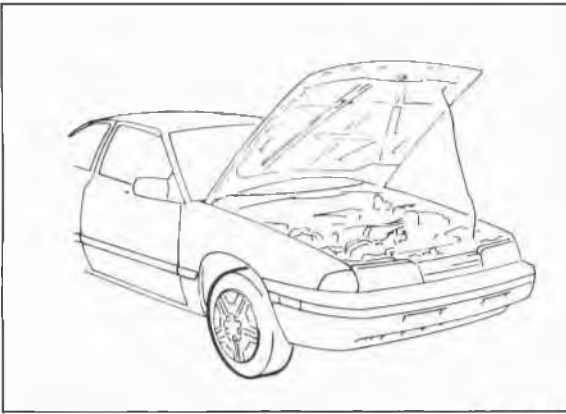
86U10X-209

## TROUBLESHOOTING How To Use Self-Diagnosis System

By using the control unit's self-diagnosis function and a voltmeter, malfunctions of the system are easily determined. When diagnosing malfunctions, follow the steps below.

1. Connect a voltmeter to terminal wire (YB) of the check connector in the engine compartment.
2. Check the output patterns as described on the following page.

# 10 ELECTRICAL COMPONENTS OF ELECTRONICALLY-CONTROLLED POWER STEERING (ECPS)

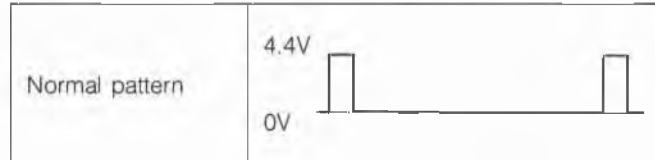


76G10X-020

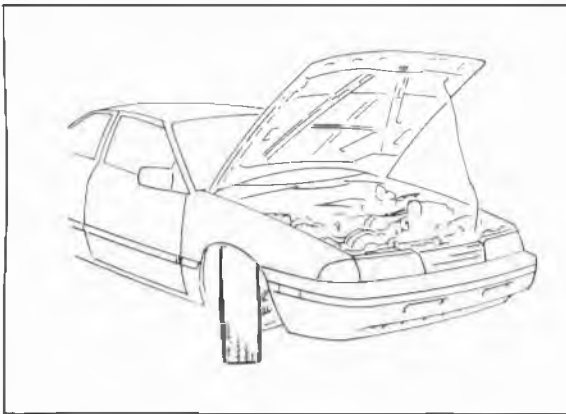
## Checking Condition

### Condition A

1. Turn the ignition switch OFF.
2. Start the engine and let it idle.
3. Turn the steering wheel to the straight-ahead position, and check the output pattern.



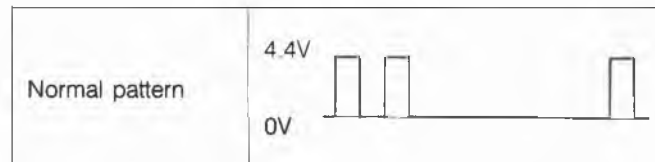
Refer to page 10—89 for other patterns and indicated failure points.



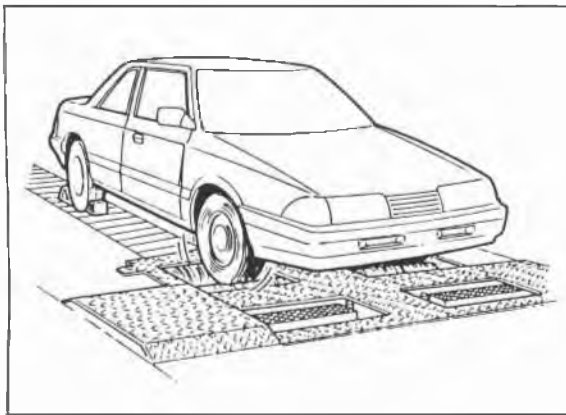
76G10X-021

### Condition B

1. Turn the ignition switch OFF.
2. Start the engine and let it idle.
3. Turn the steering wheel 45° left and right from the center, and check the output pattern.



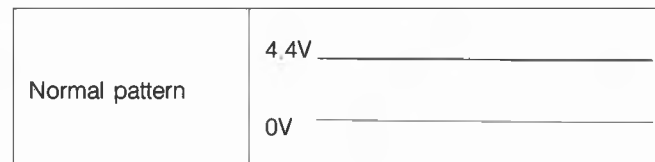
Refer to page 10—89 for other patterns and indicated failure points.



76G10X-022

### Condition C

1. Turn the ignition switch OFF.
2. Place the vehicle on a chassis roller tester. Block the rear wheels, and secure it with chains.
3. Start the engine. Put the transmission in gear and operate the vehicle at more than 10 km/h (6.2 mph).
4. Check the output pattern.



Refer to page 10—90 for other patterns and indicated failure points.

## Note


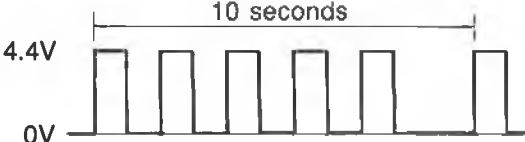
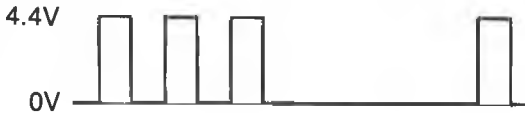




**For vehicles equipped with ABS, the ABS warning light may come on. This is not a failure. The light will go off when turning the ignition switch OFF and back ON.**

86U10X-213

**Diagnosis Table**

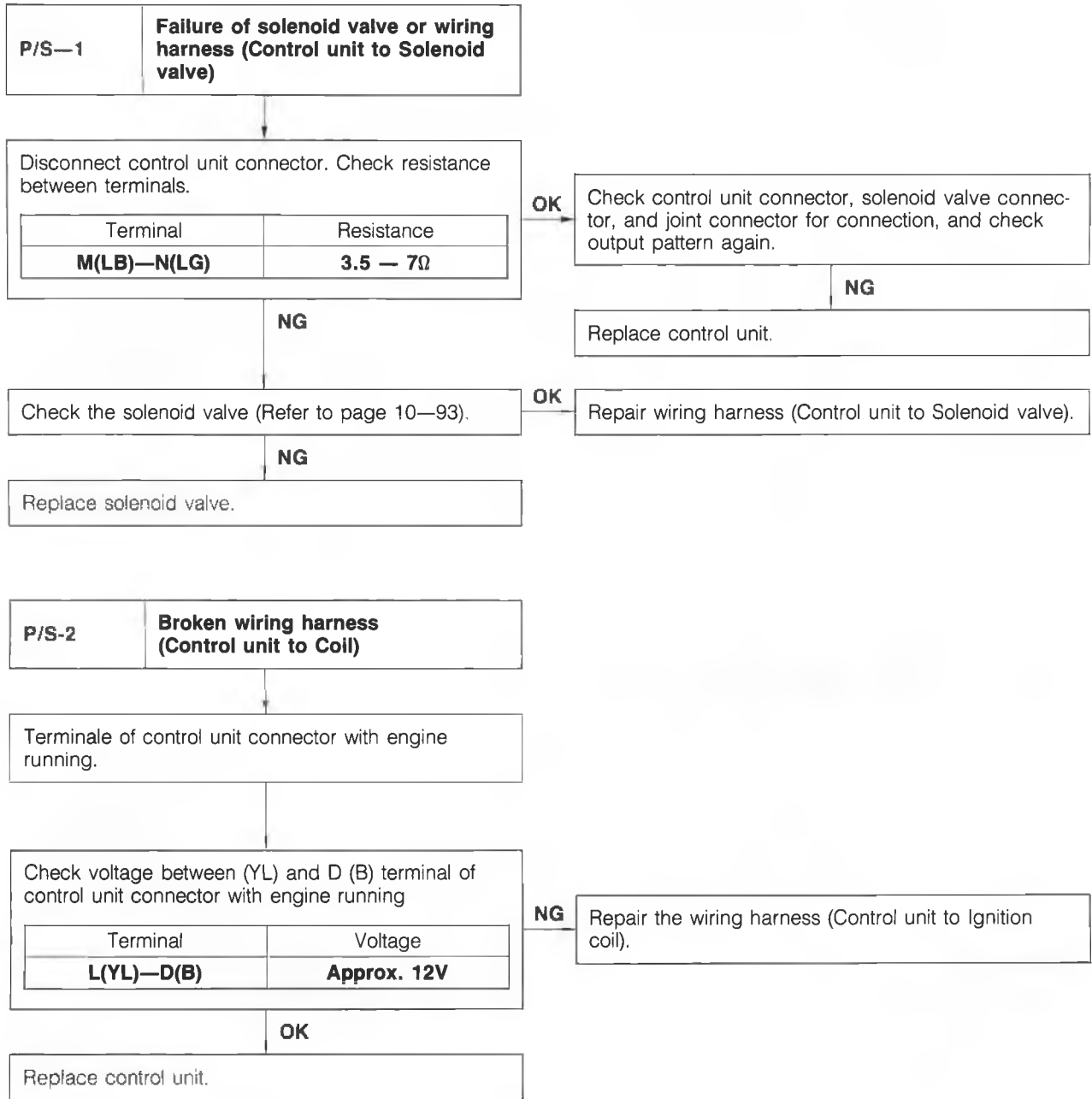
Condition	Output pattern	Malfunction	Flow chart No.
<p><b>A</b> Steering wheel in straight-ahead position with engine idling.</p>		<p><b>Power steering solenoid valve or wiring harness</b> (Control unit to Solenoid valve)</p>	<p><b>P/S—1</b> Refer to page 10—91</p>
		<p><b>Wiring harness</b> (Control unit to Ignition coil)</p>	<p><b>P/S—2</b> Refer to page 10—91</p>
		<p><b>Steering wheel angle sensor or wiring harness</b> (Control unit to Angle sensor)</p>	<p><b>P/S—3</b> Refer to page 10—92</p>
		<p><b>Normal operation</b></p>	<p>—</p>
		<p><b>Wiring harness</b> (Fuse box to Control unit or Control unit to Body ground)</p>	<p><b>P/S—5</b> Refer to page 10—93</p>
<p><b>B</b> Steering wheel turned 45° left and right from center with engine idling</p>		<p><b>Power steering solenoid valve or wiring harness</b> (Control unit to Solenoid valve)</p>	<p><b>P/S—1</b> Refer to page 10—91</p>
		<p><b>Wiring harness</b> (Control unit to Ignition coil)</p>	<p><b>P/S—2</b> Refer to page 10—91</p>
		<p><b>Normal operation</b></p>	<p>—</p>
		<p><b>Steering wheel angle sensor or wiring harness</b> (Control unit to Angle sensor)</p>	<p><b>P/S—3</b> Refer to page 10—92</p>

# 10 ELECTRICAL COMPONENTS OF ELECTRONICALLY-CONTROLLED POWER STEERING (ECPS)

Condition	Output pattern	Malfunction	Flow chart No.
<b>B Cont'd</b>		<b>Wiring harness</b> (Fuse box to Control unit or Control unit to Body ground)	<b>P/S—5</b> Refer to page 10—93
<b>C</b> Front wheels driven at more than 10 km/h (6.2 mph)		<b>Power steering solenoid valve or wiring harness</b> (Control unit to Solenoid valve)	<b>P/S—1</b> Refer to page 10—91
		<b>Wiring harness</b> (Control unit to Ignition coil)	<b>P/S—2</b> Refer to page 10—91
		<b>Steering wheel angle sensor or wiring harness</b> (Control unit to Angle sensor)	<b>P/S—3</b> Refer to page 10—92
		<b>Vehicle speed sensor or wiring harness</b> (Control unit to Meter)	<b>P/S—4</b> Refer to page 10—92
		<b>Normal operation</b>	
		<b>Wiring harness</b> (Fuse box to Control unit or Control unit to Body ground)	<b>P/S—5</b> Refer to page 10—93

76G10X-024

## Flow Chart



76G10X-025

# 10 ELECTRICAL COMPONENTS OF ELECTRONICALLY-CONTROLLED POWER STEERING (ECPS)

**P/S—3**      **Failure of angle sensor or wiring harness (Control unit to Angle sensor)**

Check steering angle sensor (Refer to page 15—16).

**OK**

**NG**      Replace angle sensor.

Check for continuity between each terminals of steering angle sensor and control unit harness side connector.

Terminal		Continuity
Angle sensor	Control unit	
(G)	I(G)	Yes
(GY)	H(GY)	Yes
(GW)	J(GW)	Yes

**NG**      Repair wiring harness (Control unit to angle sensor).

**OK**

Replace control unit.

**P/S—4**      **Failure of speed sensor or wiring harness (Control unit to Meter)**

Check speed sensor (Refer to page 15—88).

**OK**

**NG**      Replace speed sensor.

Check for continuity between 1U(GR) terminal of meter connector and K(GR) terminal of control unit connector.

**NG**      Repair wiring harness (Control unit to Meter).

**OK**

Replace control unit.

76G10X-043



P/S—5	<b>Broken wiring harness (Fuse box to Control unit, Control unit or to Body ground)</b>
-------	---

Measure voltage between terminal of control unit connector and body ground with ignition ON.

Terminal	Voltage
<b>E(BG)</b>	<b>Approx. 12V</b>
<b>D(B)</b>	<b>Approx. 0V</b>

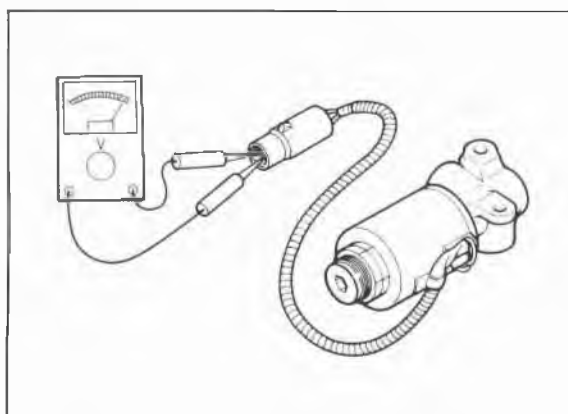
OK

Replace the control unit.

NG

Replace METER 10A fuse or repair wiring harnesses (Fuse box to Control unit or Control unit to Body ground).

86U10X-218



86U10X-219

### Power Steering Solenoid Valve Inspection

1. Listen for actuation sound of the solenoid valve when applying 12V between A and B terminals.
2. If no sound is heard, check the resistance of the solenoid valve with an ohmmeter.

Terminals	Resistance
<b>A — B</b>	<b>3.4—6.9 Ω</b>

3. If there is no continuity, replace the solenoid valve.

### Steering Angle Sensor Inspection

Refer to page 15—16.

### Vehicle Speed Sensor Inspection

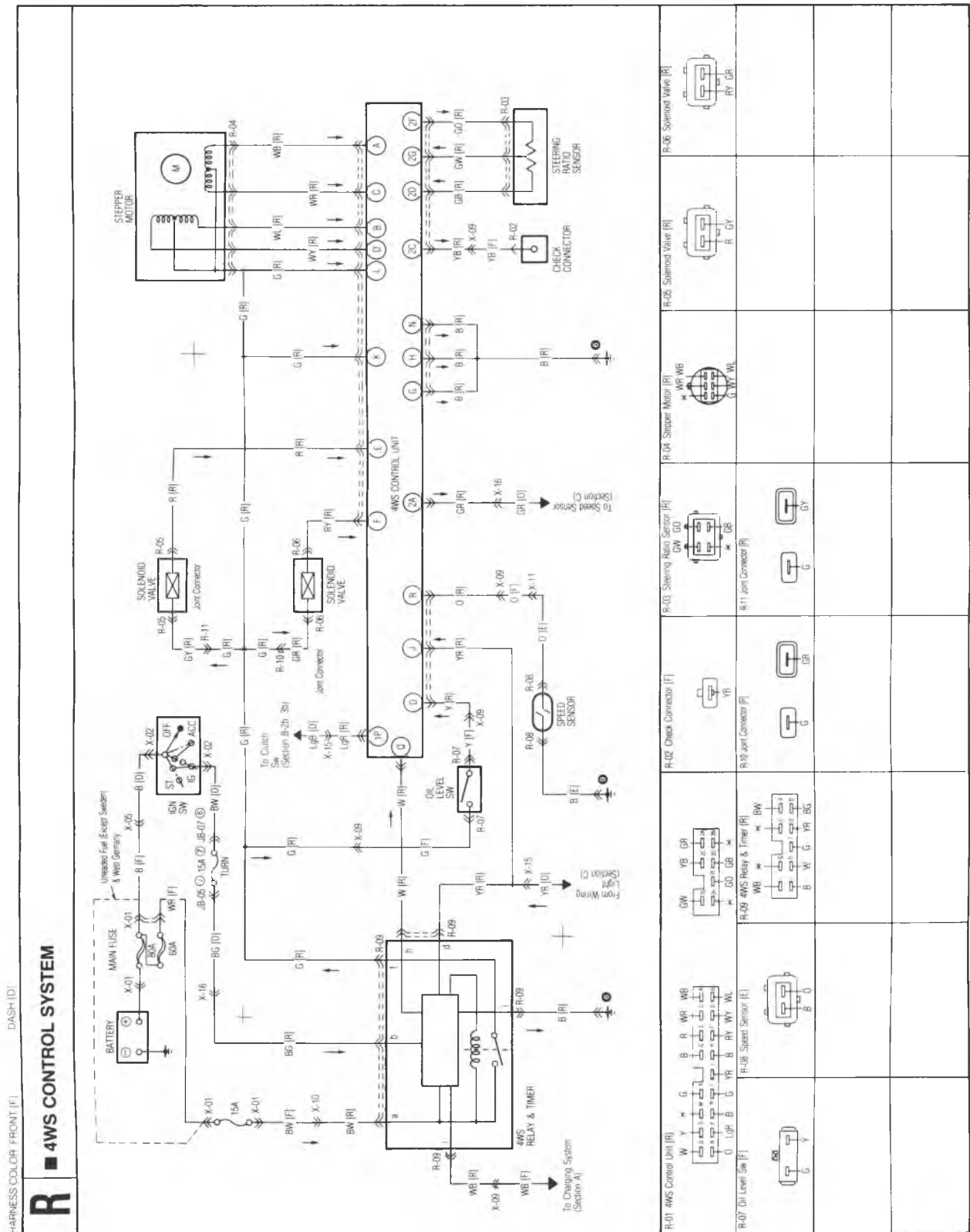
Refer to page 15—88.

76G10X-044

# 10 ELECTRICAL COMPONENTS OF 4-WHEEL STEERING

## ELECTRICAL COMPONENTS OF 4-WHEEL STEERING (4WS)

### CIRCUIT DIAGRAM



86U10X-221

**Note**  
Refer to page 10—31 for component location.

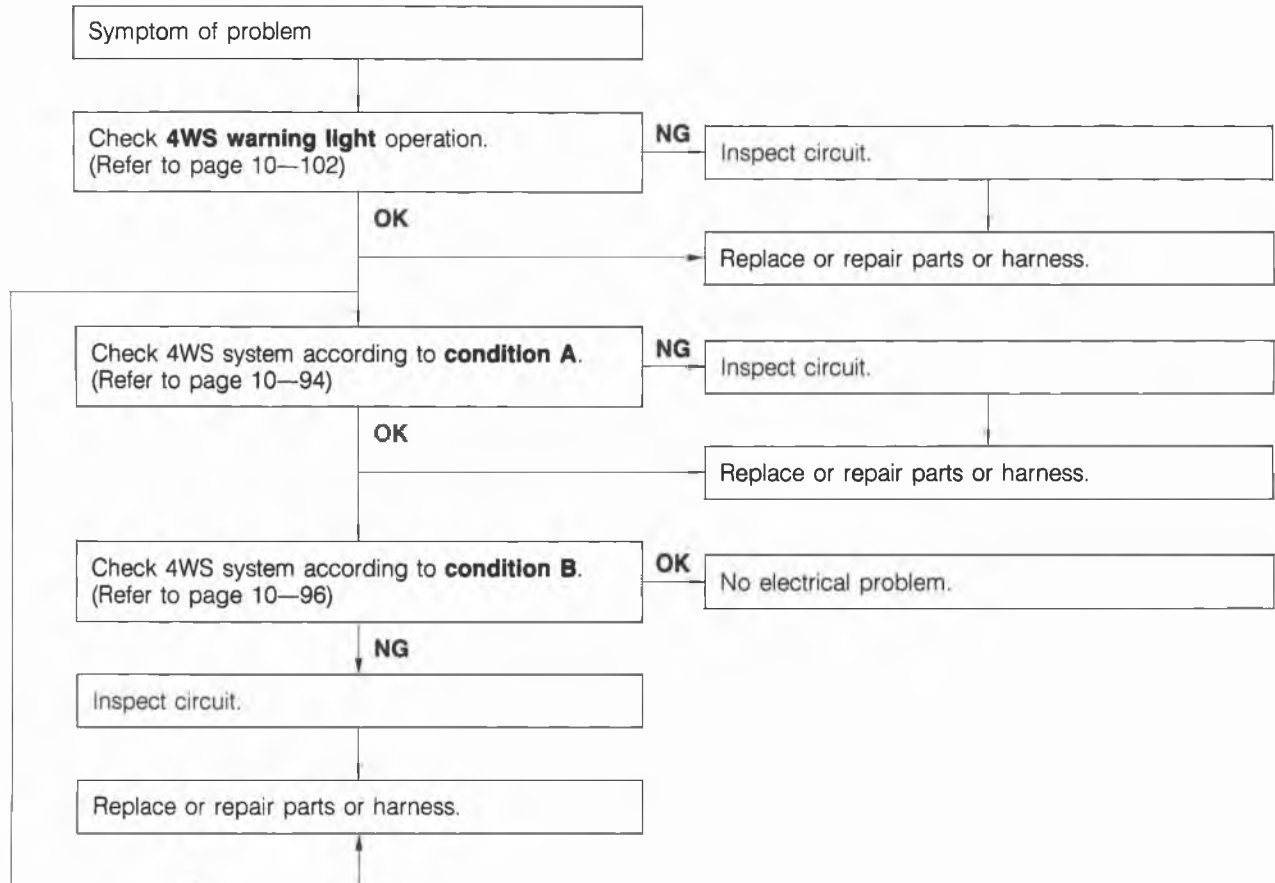
## TROUBLESHOOTING GUIDE

### Self-Diagnosis Function

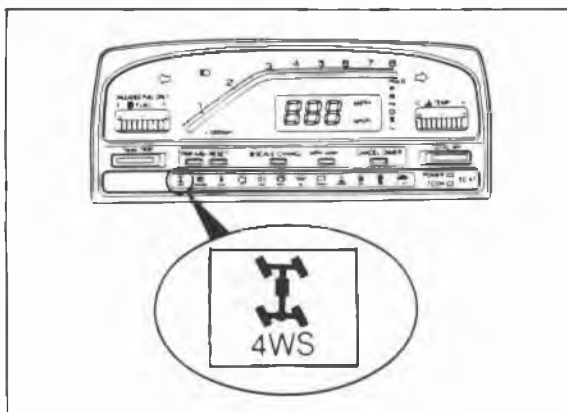
The four-wheel steering (4WS) control unit contains a self-diagnosis function to detect malfunctions within itself, the 4WS electrical components and circuits.

If a malfunction is detected, the control unit indicates where the problem is located and the 4WS warning light in the instrument cluster will flash for one minute with a specific pattern.

Troubleshoot the 4WS system according to the following flow chart.



76G10X-026



76G10X-027

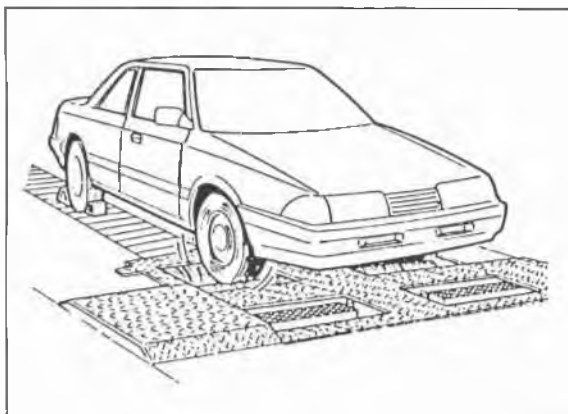
## TROUBLESHOOTING

### Checking Condition

#### Condition A

1. Turn the ignition switch OFF.
2. Start the engine after the ignition switch has been OFF for at least 10 seconds, and check if the 4WS warning light flashes or illuminates within 60 seconds.
3. If flashing or illumination occurs, inspect the circuit. (Refer to page 10-95.)

# 10 ELECTRICAL COMPONENTS OF 4-WHEEL STEERING



76G10X-045

## Condition B

1. Place the vehicle on a chassis roller tester. Block the rear wheels, and secure it with chains.
2. Turn the ignition switch OFF.
3. Start the engine after the ignition switch has been OFF for at least 10 seconds. Put the transmission in gear and operate the vehicle at more than 40 km/h (25 mph).
4. Check if the 4WS warning light flashes or illuminates within 60 seconds.
5. If flashing or illumination occurs, inspect the circuit by referring to the table below.

## Diagnosis Output Pattern

Warning light output pattern	Malfunction	Flow chart No.
	Normal operation, control unit or wiring harness	4WS-0
	Speed sensors or wiring harness	4WS-1
	Rear steering gear assembly	4WS-2
	Solenoid valve or wiring harness	4WS-3
	Stepper motor or wiring harness	4WS-4
	Rear-to-front steering ratio sensor or wiring harness	4WS-5

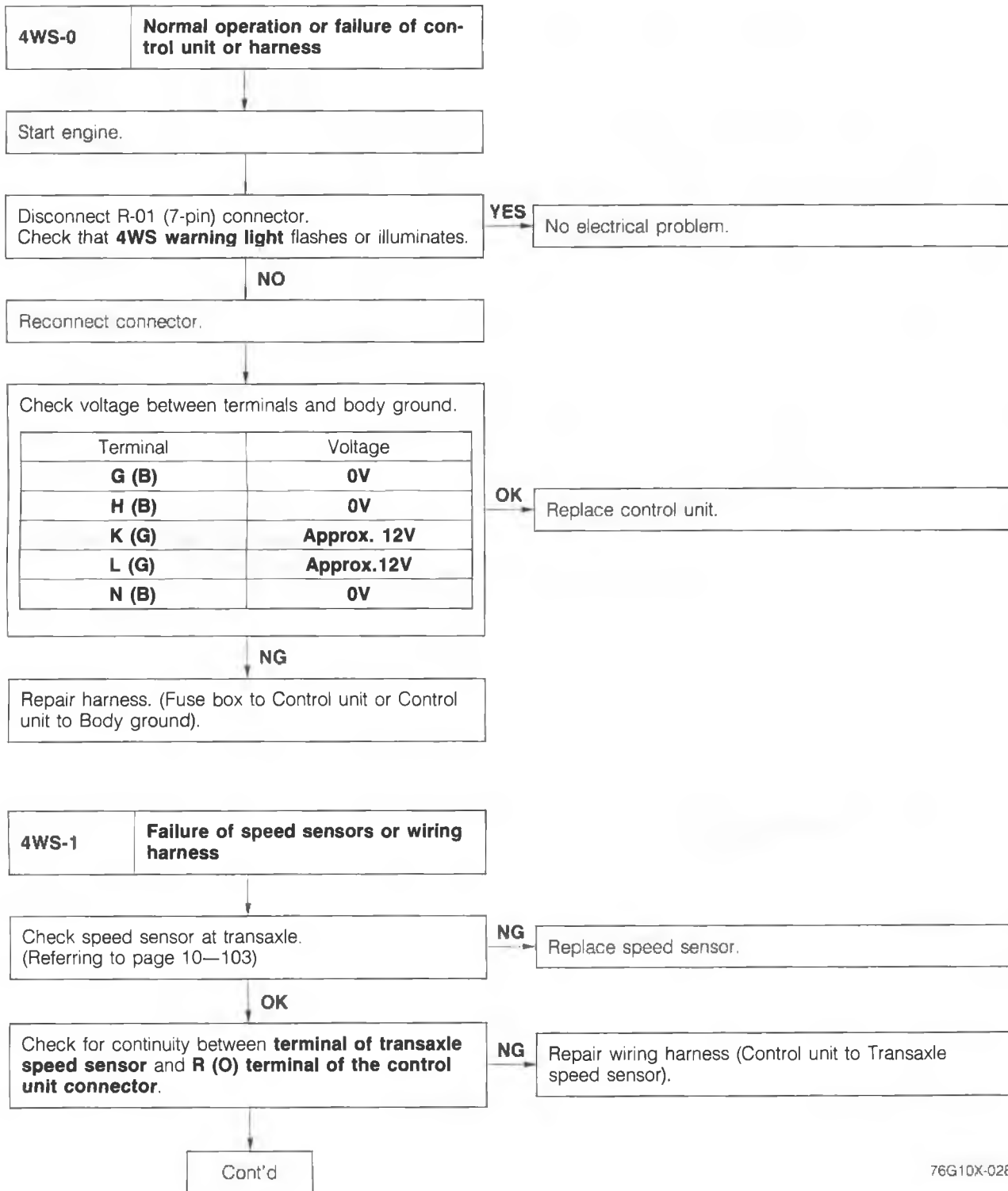
86U10X-225

# ELECTRICAL COMPONENTS OF 4-WHEEL STEERING 10

Warning light output pattern	Malfunction	Flow chart No.
<p>ON</p> <p>OFF</p>	Stepper motor or wiring harness	4WS-6
<p>ON</p> <p>OFF</p>	Oil leakage or oil level switch	4WS-7
<p>ON</p> <p>OFF</p>	Control unit	4WS-8
<p>ON</p> <p>OFF</p>	Control unit, alternator, or wiring harness	4WS-9

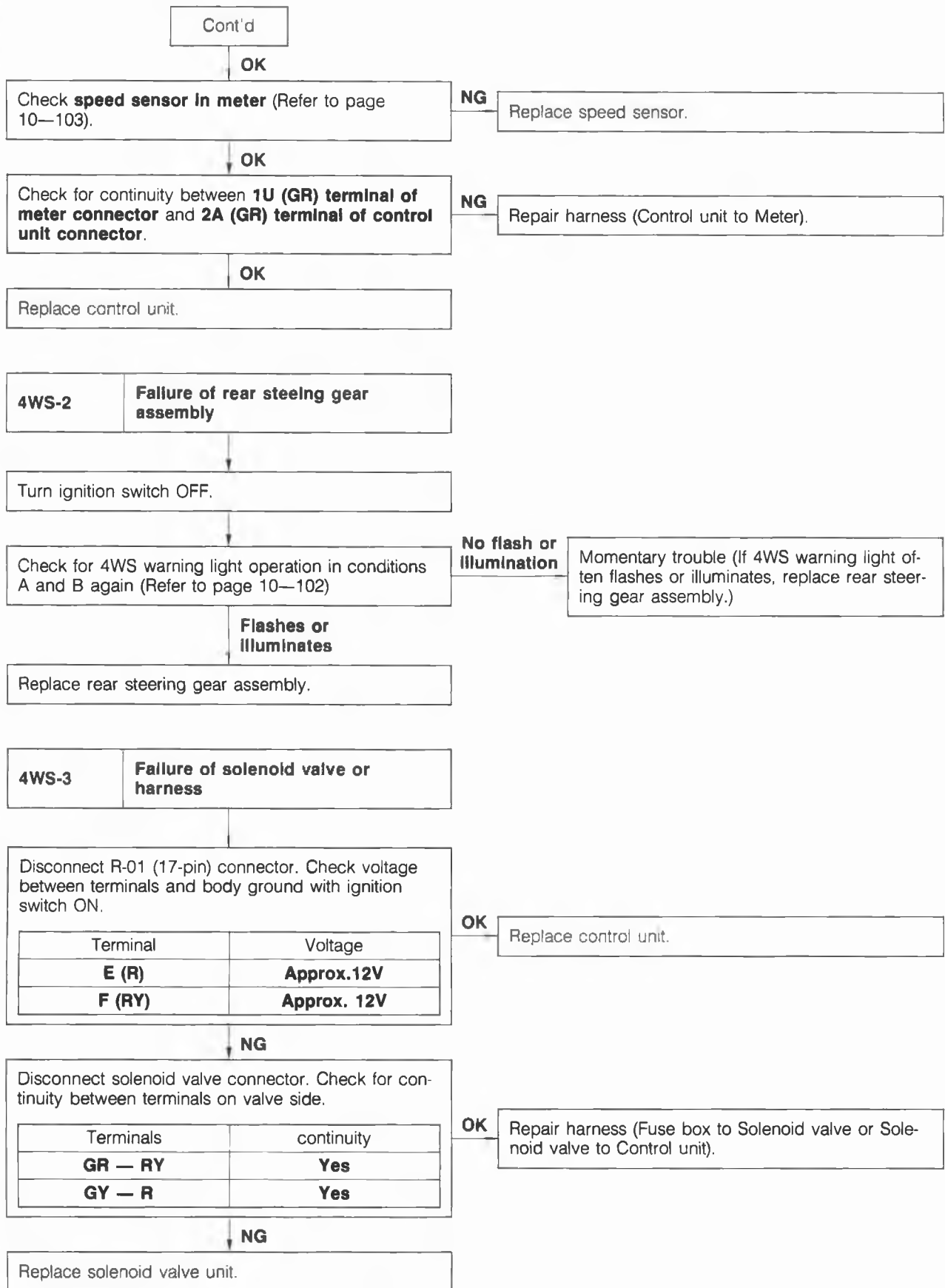
86U10X-226

# 10 ELECTRICAL COMPONENTS OF 4-WHEEL STEERING



76G10X-028

# ELECTRICAL COMPONENTS OF 4-WHEEL STEERING 10



76G10X-029

# 10 ELECTRICAL COMPONENTS OF 4-WHEEL STEERING

**4WS-4**      **Failure of stepper motor or harness**

Disconnect R-01 (17-pin) connector. Check for no continuity between each terminal of harness side connector and body ground.

Terminal	Continuity
<b>A (WB)</b>	<b>No</b>
<b>B (WL)</b>	<b>No</b>
<b>C (WR)</b>	<b>No</b>
<b>D (WY)</b>	<b>No</b>
<b>L (G)</b>	<b>No</b>

NG

Disconnect stepper motor connector. Check for no continuity between each terminal and body ground.

Terminal	Continuity
<b>WB</b>	<b>No</b>
<b>WL</b>	<b>No</b>
<b>WR</b>	<b>No</b>
<b>WY</b>	<b>No</b>
<b>G</b>	<b>No</b>

OK

OK

NG

Repair harness (Stepper motor to Control unit).

Replace rear steering gear assembly.

Check for continuity between terminals of R-01 (17-pin) harness side connector.

Terminal	Continuity
<b>A (WB) — L (G)</b>	<b>Yes</b>
<b>B (WL) — L (G)</b>	<b>Yes</b>
<b>C (WR) — L (G)</b>	<b>Yes</b>
<b>D (WY) — L (G)</b>	<b>Yes</b>

NG

Disconnect stepper motor connector. Check for continuity between terminals of motor side connector.

Terminals	Continuity
<b>WB — G</b>	<b>Yes</b>
<b>WL — G</b>	<b>Yes</b>
<b>WR — G</b>	<b>Yes</b>
<b>WY — G</b>	<b>Yes</b>

OK

OK

NG

Replace control unit.

Repair wiring harness (Stepper motor to Control unit).

Replace rear steering gear assembly.

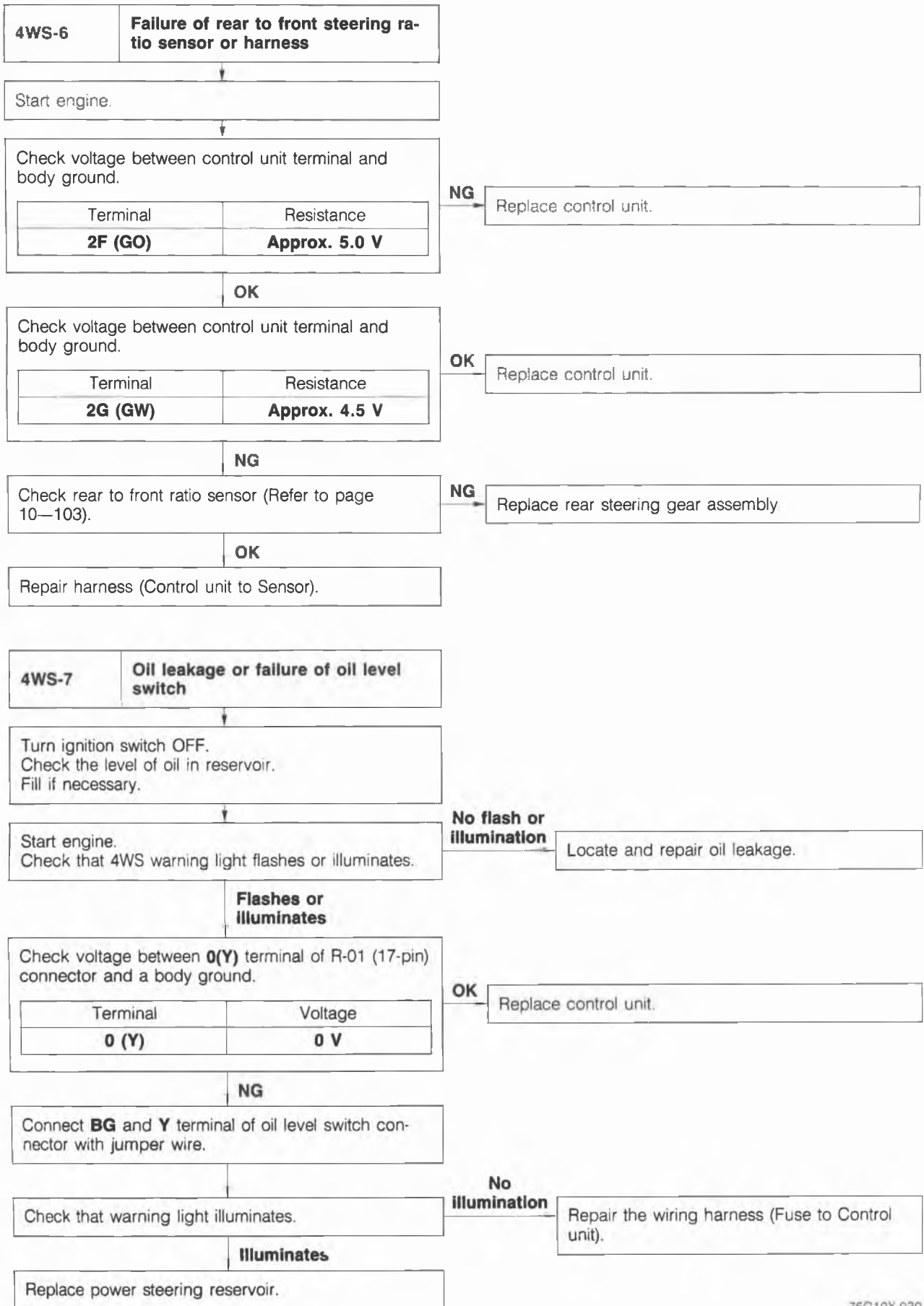
**4WS-5**      **Failure of rear to front steering ratio sensor**

Go to 4WS-2

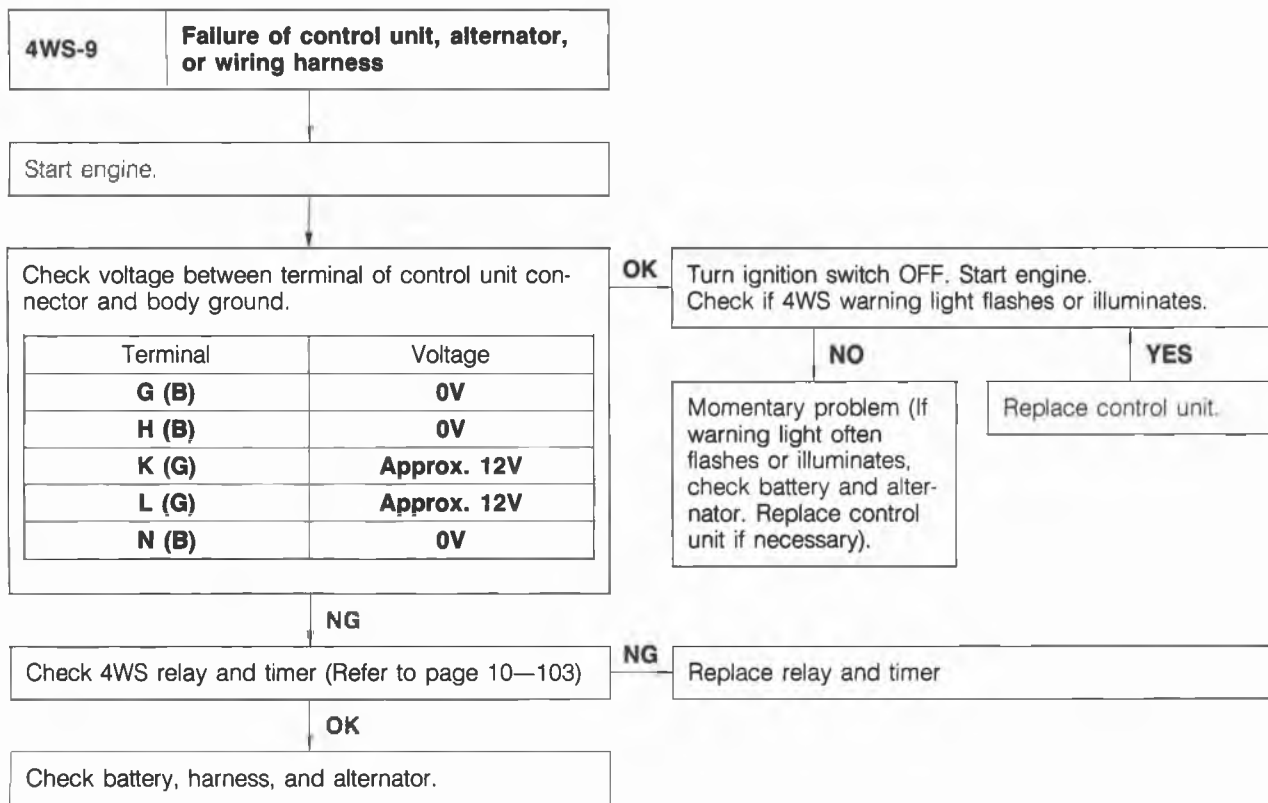
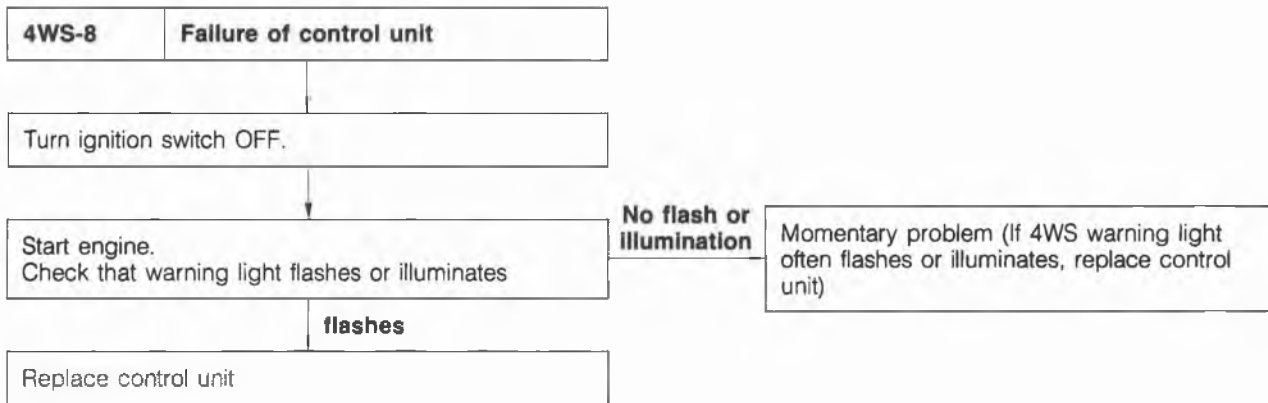
76G10X-046



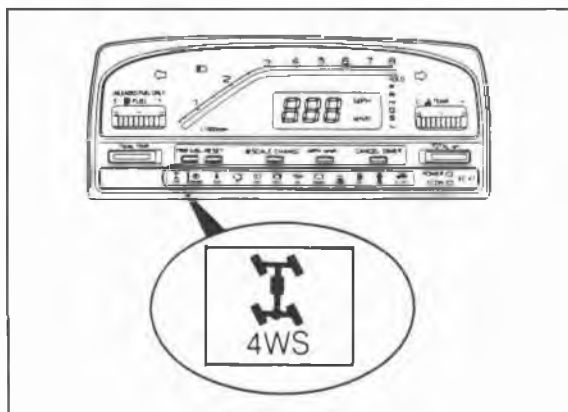
# ELECTRICAL COMPONENTS OF 4-WHEEL STEERING 10



# 10 ELECTRICAL COMPONENTS OF 4-WHEEL STEERING



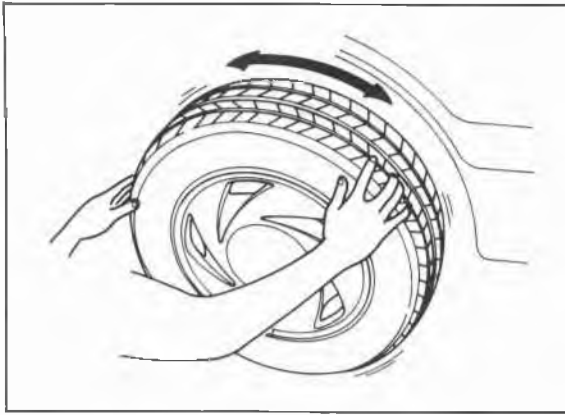
76G10X-031



86U10X-232

## 4WS WARNING LIGHT

1. Turn the ignition switch OFF.
2. Turn the ignition switch ON, and check that the 4WS warning light illuminates.
3. If there is no illumination, check the warning light bulb and wiring harness. Replace the control unit if necessary.



86U10X-233

### SPEED SENSOR (IN METER)

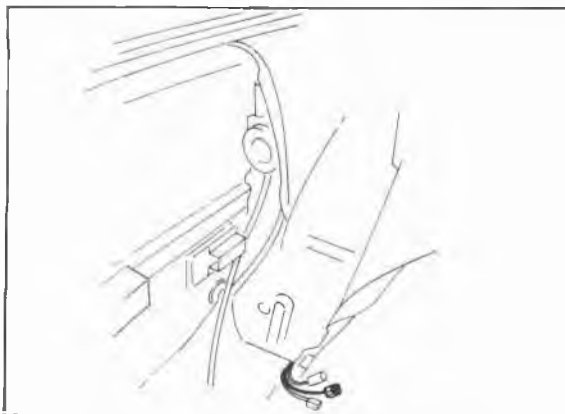
1. Jack up the front of the vehicle.
2. Connect a voltmeter between **2A (GR)** terminal of the control unit connector and a body ground.
3. Start the engine. Check that periodic voltage is detected when turning the front wheels slowly.
4. If periodic voltage is not detected, check the wiring harness. Replace the speed sensor if necessary.



86U10X-234

### SPEED SENSOR (AT TRANSAXLE)

1. Jack up the front of the vehicle.
2. Connect a voltmeter between **R (O)** terminal of the control unit connector and a body ground.
3. Start the engine. Check that periodic voltage is detected when turning the front wheels slowly.
4. If periodic voltage is not detected, check the wiring harness. Replace the speed sensor if necessary.



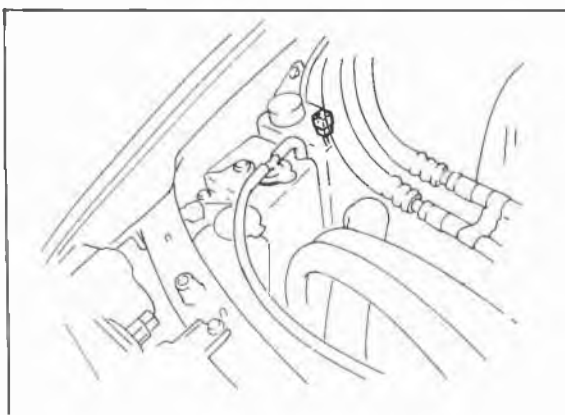
86U10X-235

### REAR-TO-FRONT STEERING RATIO SENSOR

Check the resistance between the terminals with an ohmmeter.

Terminal	Resistance
<b>GB—GO</b>	<b>3.5—6.5 kΩ</b>
<b>GB—GW</b>	<b>3.2—5.9 kΩ</b>

If the resistance is not within specification, replace the rear steering gear assembly.



86U10X-236

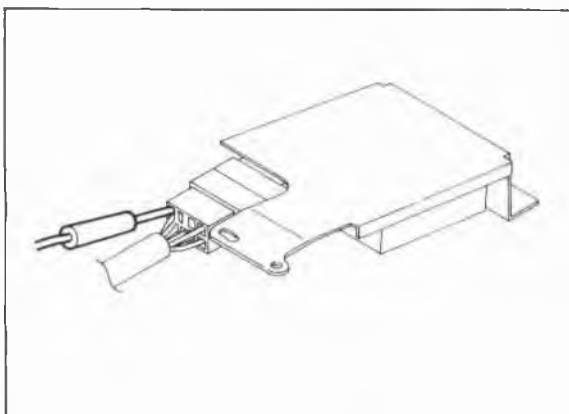
### OIL LEVEL SWITCH (IN P/S RESERVOIR)

Check for continuity of the switch with an ohmmeter.

Fluid level	Continuity
<b>More than L</b>	<b>No</b>
<b>Less than L</b>	<b>Yes</b>

If the continuity is not within specification, replace the P/S reservoir.

# 10 ELECTRICAL COMPONENTS OF 4-WHEEL STEERING



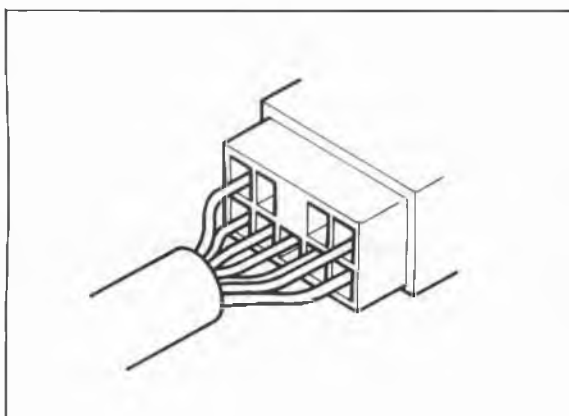
86U10X-237

## RELAY AND TIMER

1. Start the engine.
2. Check voltage between each terminal of the relay and timer connector and a body ground.

Terminal	Voltage
<b>a</b>	<b>12V</b>
<b>b</b>	<b>12V</b>
<b>d</b>	<b>12V</b>
<b>i</b>	<b>12V</b>
<b>j</b>	<b>0V</b>

If the voltage is not as specified, replace the fuse or repair the harness.



76G10X-047

3. Check voltage between each terminal and a body ground with the engine running.

Terminal	Voltage
<b>f</b>	<b>12V</b>
<b>h</b>	<b>12V</b>

4. Check that the voltage of f and h terminal is 12V for approximately 7 to 10 seconds after the ignition switch is turned OFF.  
If not, replace the relay and timer.

## BRAKING SYSTEM

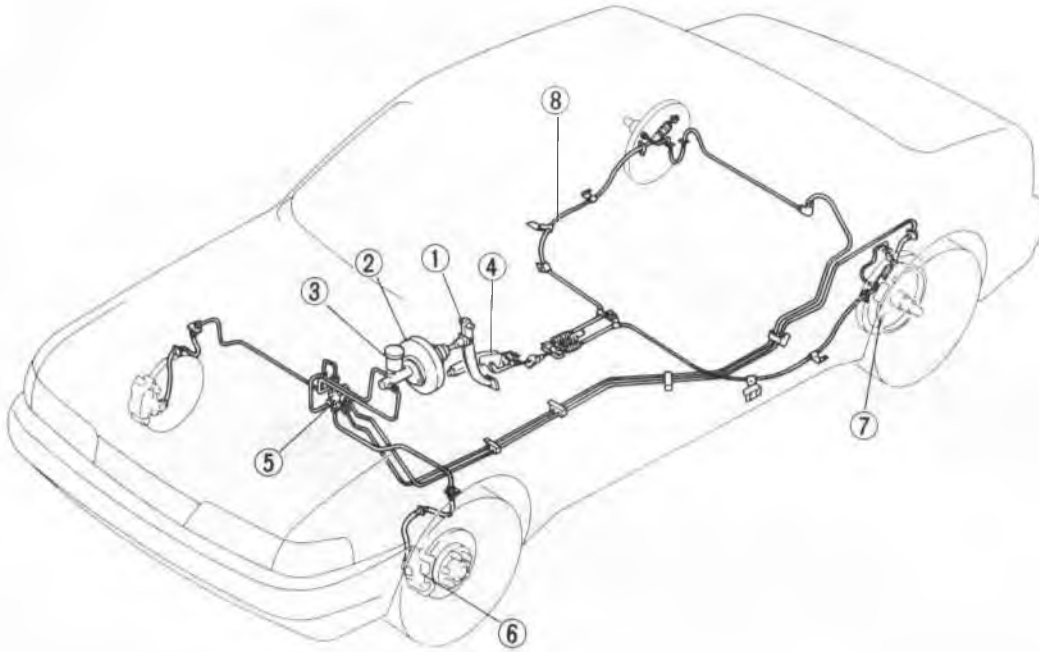
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# 11 OUTLINE

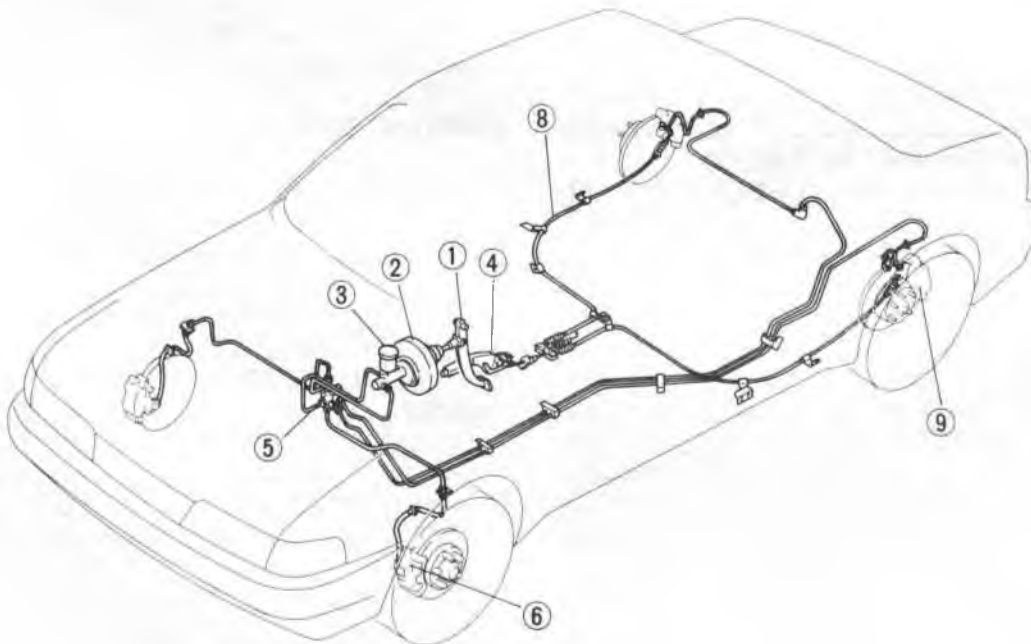
## OUTLINE

### STRUCTURAL VIEW

Front disc/rear drum brake



4-wheel disc brake



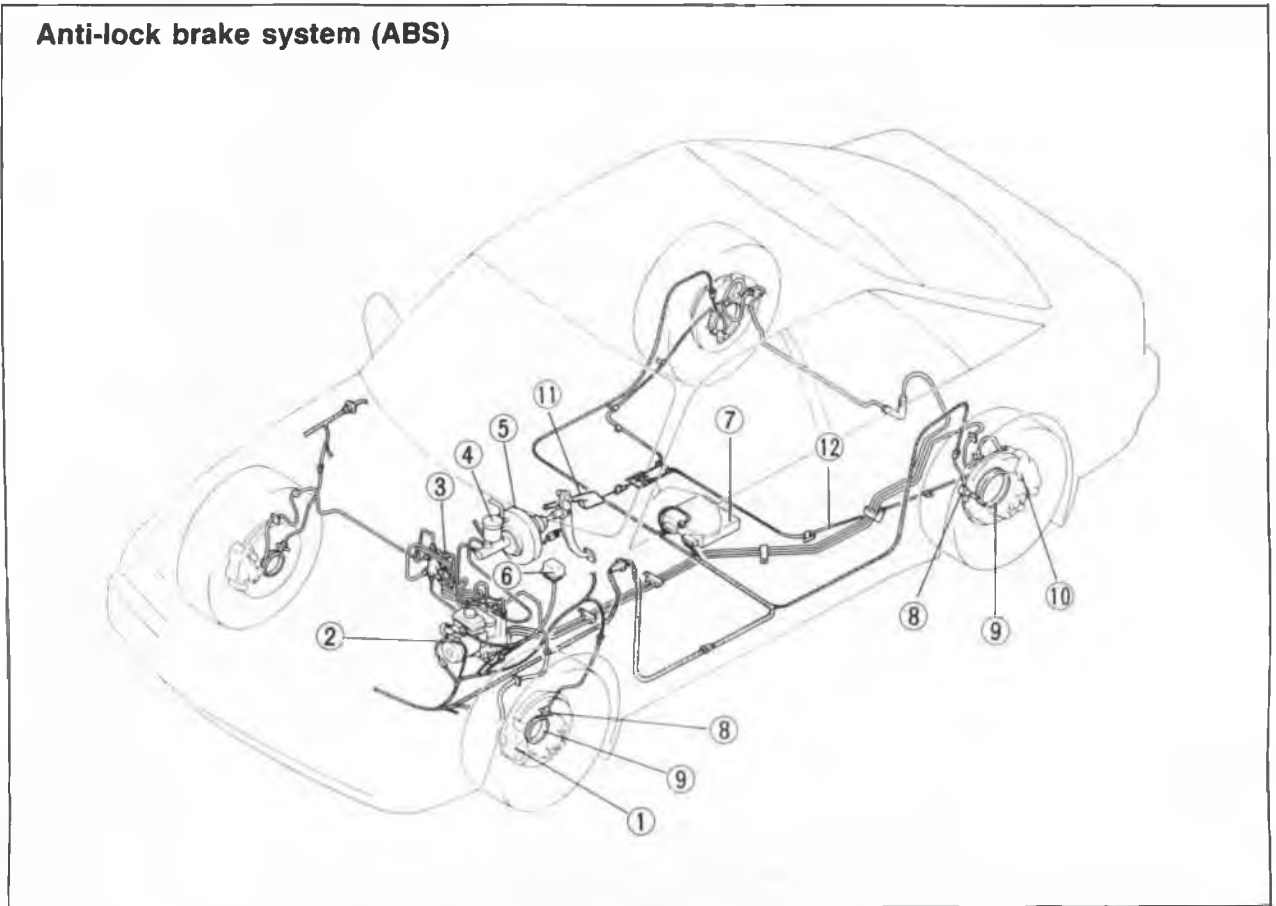
86U11X-002

- 1. Brake pedal
- 2. Power brake unit
- 3. Brake master cylinder

- 4. Parking brake lever
- 5. Dual proportioning valve
- 6. Front disc brake

- 7. Rear drum brake
- 8. Parking brake cable
- 9. Rear disc brake

## Anti-lock brake system (ABS)

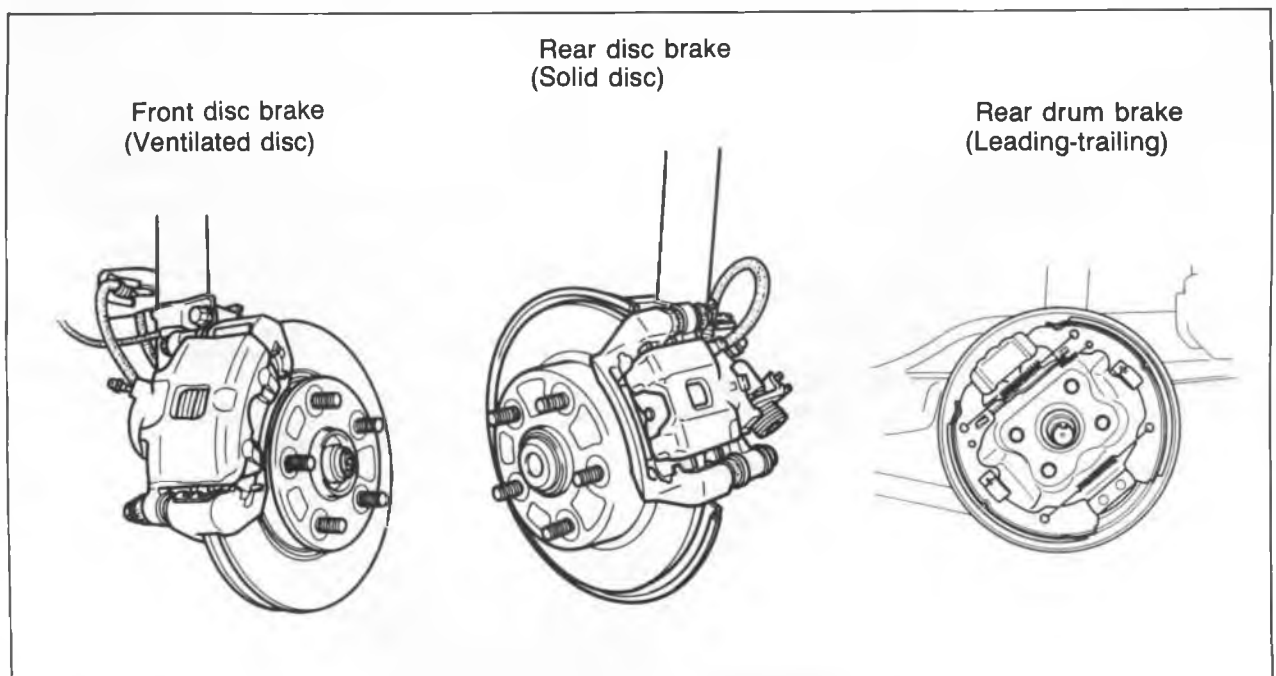


86U11X-003

- 1. Front disc brake
- 2. Hydraulic unit
- 3. Pipe joint
- 4. Master cylinder

- 5. Power brake unit
- 6. Relay box
- 7. Control unit
- 8. Wheel speed sensor

- 9. Sensor rotor
- 10. Rear disc brake
- 11. Parking brake lever
- 12. Parking brake cable



Front disc brake  
(Ventilated disc)

Rear disc brake  
(Solid disc)

Rear drum brake  
(Leading-trailing)

# 11 OUTLINE

## SPECIFICATIONS

Item		Specification
Brake pedal	Type	Suspended
	Pedal lever ratio	4.2
	Max. stroke	mm (in) LHD: 136.5 (5.37) RHD: 135 (5.31)
Master cylinder	Type	Tandem (with level sensor)
	Cylinder inner diameter	mm (in) 22.22 (0.87)
Front disc brake	Type	Mounting support, Ventilated disc
	Cylinder bore	mm (in) 53.97 (2.12)
	Pad dimensions (area x thickness) mm <sup>2</sup> x mm (in <sup>2</sup> x in)	4,800 x 10 (7.44 x 0.39)
	Disc plate dimensions (outer diameter x thickness)	mm (in) 13 inch-wheel: 242 x 20 (9.53 x 0.79) 14 or 15 inch-wheel: 264 x 24 (10.39 x 0.94)
Rear disc brake (Turbo model)	Type	Mounting support, Solid disc
	Cylinder bore	mm (in) 30.2 (1.19)
	Pad dimensions (area x thickness) mm <sup>2</sup> x mm (in <sup>2</sup> x in)	2,900 x 8 (4.5 x 0.31)
	Disc plate dimensions (outer diameter x thickness)	mm (in) 259 x 10 (10.2 x 0.39)
Rear drum brake (Non-Turbo model)	Type	Leading-trailing
	Wheel cylinder inner diameter	mm (in) 17.46 (0.69)
	Lining dimensions (width x length x thickness)	mm (in) (a): 25 x 191.9 x 5 (0.98 x 7.56 x 0.20) (b): 30 x 219.3 x 5 (1.18 x 8.63 x 0.20)
	Drum inner diameter	mm (in) (a): 200.0 (7.87) (b): 228.6 (9.0)
	Shoe clearance adjustment	Automatic adjuster
Power brake unit	Type	Vacuum multiplier
	Diameter	mm (in) 238 (9.37)
Braking force control device	Type	Dual proportioning valve or ABS (if equipped)
Brake fluid		DOT-3 or DOT-4, or SAE J1703
Parking brake	Type	Center lever (Mechanical two rear brakes)

(a)...13-inch wheel in General LHD and RHD models  
 (b)...Except 13-inch wheel in General LHD and RHD models

76G11X-002



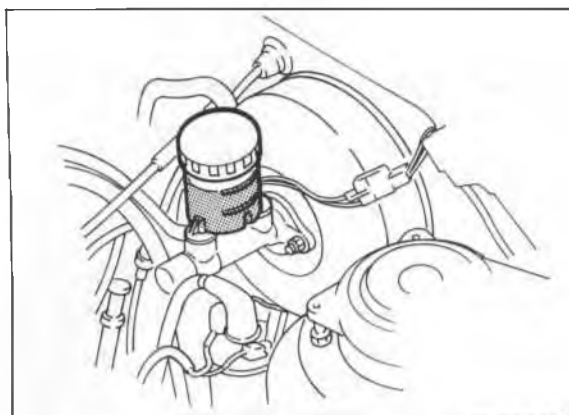
## TROUBLESHOOTING GUIDE

The table below covers the normal braking system. Refer to page 11—73 for ABS system.

Problem	Possible cause	Remedy	Page
<b>Poor braking</b>	Leakage of brake fluid	Repair	—
	Air in system	Air bleed	11—9
	Worn pad or lining	Replace	11—40,47,56
	Brake fluid, grease, oil, or water on pad or lining	Clean or replace	11—40,47,56
	Hardening of pad or lining surface or poor contact	Grind or replace	11—40,47,56
	Malfunction of disc brake piston	Replace	11—43,50
	Malfunction of master cylinder or wheel cylinder	Repair or replace	11—14,57
	Malfunction of power brake unit	Repair or replace	11—29
	Malfunction of check valve (vacuum hose)	Repair or replace	11—29
	Damaged vacuum hose	Replace	11—29
	Deterioration of flexible hose	Replace	—
Malfunction of dual proportioning valve	Replace	11—39	
<b>Brakes pull to one side</b>	Worn pad or lining	Replace	11—40,47,56
	Brake fluid, grease, oil, or water on pad or lining	Clean or replace	11—40,47,56
	Hardening of pad or lining surface or poor contact	Grind or replace	11—40,47,56
	Abnormal wear or distortion of disc, drum, pad, or lining	Repair or replace	11—40,47,56
	Malfunction of automatic adjuster	Repair or replace	11—56
	Looseness of backing plate mounting bolts	Tighten	11—61
	Malfunction of wheel cylinder	Repair or replace	11—57
	Improper adjustment of wheel bearing preload, or wear	Refer to Section 9	—
	Improper adjustment of wheel alignment	Refer to Section 10	—
Unequal tire air pressures	Refer to Section 12	—	
<b>Brakes do not release</b>	No brake pedal play	Adjust	11—11
	Improper adjustment of push rod clearance	Adjust	11—23,24
	Clogged master cylinder return port	Clean	—
	Shoe does not return properly	Adjust	—
	Wheel cylinder does not return properly	Clean or replace	11—57
	Improper return due to malfunction of piston seal of disc brake	Replace	11—43,50
	Excessive runout of disc plate	Replace	—
	Improper return of parking brake cable or improper adjustment	Repair or adjust	11—65
Improper adjustment of wheel bearing preload	Refer to Section 9	—	
<b>Pedal goes too far (too much pedal stroke)</b>	Air in system due to insufficient brake fluid	Add fluid and bleed air	11—9
	Improper adjustment of pedal play	Adjust	11—11
	Worn pad or lining	Replace	11—40,47,56
	Air in system	Air bleed	11—9
<b>Abnormal noise or vibration during braking</b>	Worn pad or lining	Replace	11—40,47,56
	Deterioration of pad or lining	Grind or replace	11—40,47,56
	Brakes do not release	Repair	—
	Foreign material or scratches on disc plate or drum contact surface	Clean	—
	Looseness of backing plate or caliper mounting bolts	Tighten	11—61
	Damage or deviation of disc or drum contact surface	Replace	11—56
	Poor contact of pad or lining	Repair or replace	11—40,47,56
	Insufficient grease on sliding parts	Apply grease	—
<b>Parking brake does not hold well</b>	Excessive lever stroke	Adjust	11—65
	Brake cable stuck or damaged	Repair or replace	11—68
	Brake fluid or oil on pad or lining	Clean or replace	11—40,47,56
	Hardening of pad or lining surface or poor contact	Grind or replace	11—40,47,56

76G11X-003

# 11 ON-VEHICLE MAINTENANCE, BRAKE HYDRAULIC LINE



76G11X-004

## ON-VEHICLE MAINTENANCE

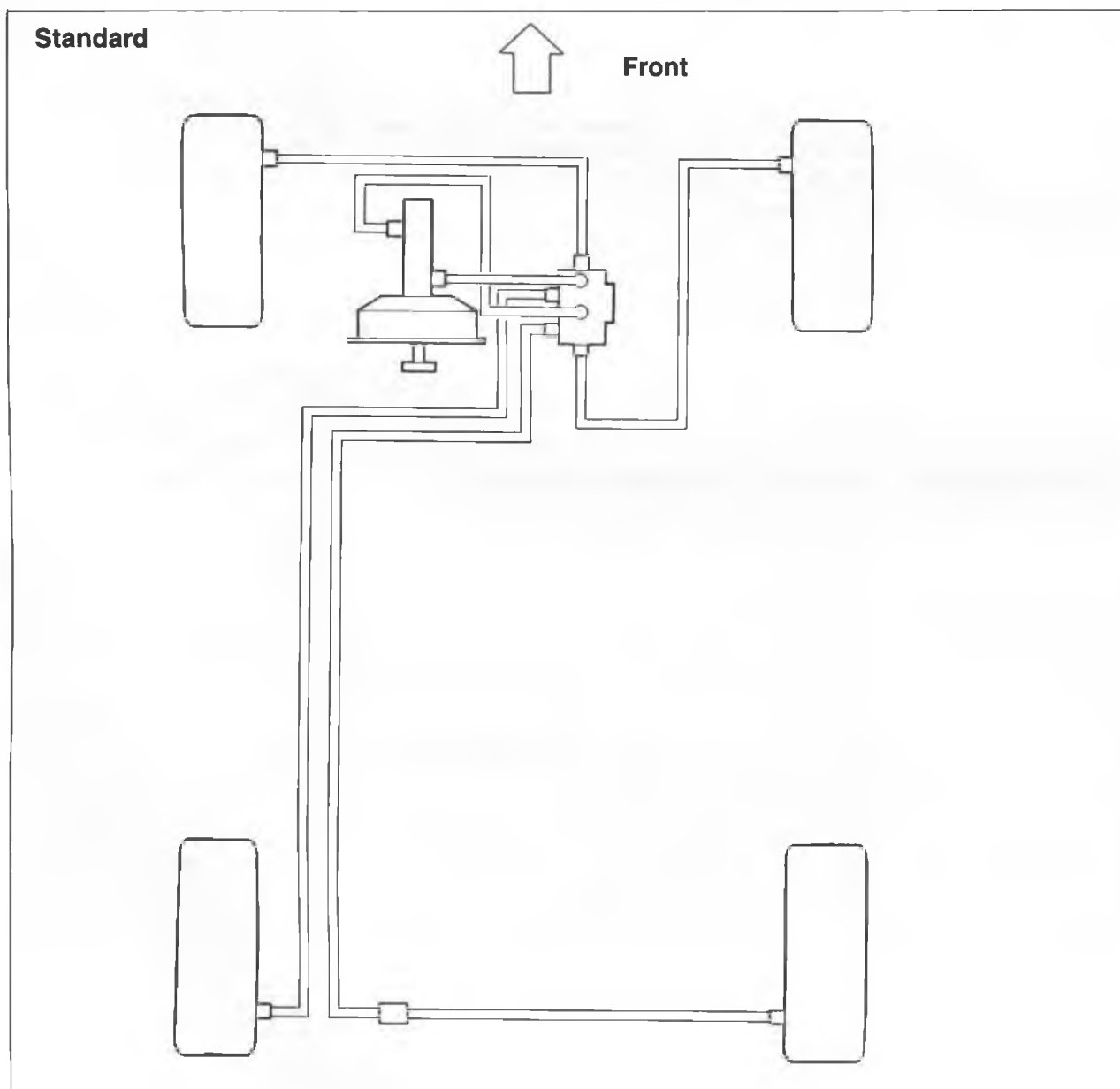
### BRAKE FLUID LEVEL IN MASTER CYLINDER RESERVOIR

Check the fluid level in the reservoir. It should be between the Max and Min lines on the reservoir. If the fluid level is extremely low, check the brake system for leaks.

**Fluid specification:  
DOT-3 or DOT-4 or SAE J1703**

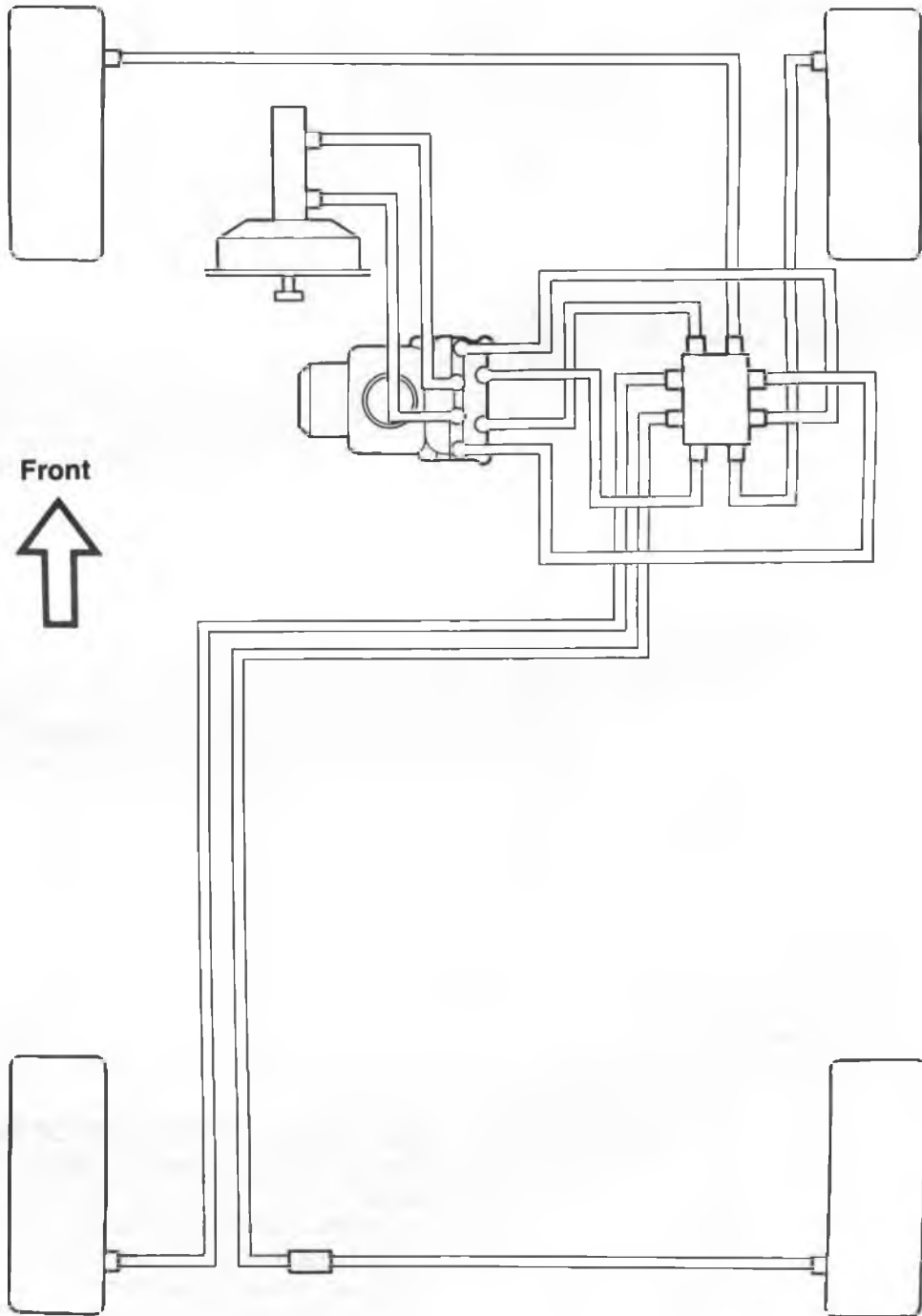
## BRAKE HYDRAULIC LINE

### STRUCTURAL VIEW

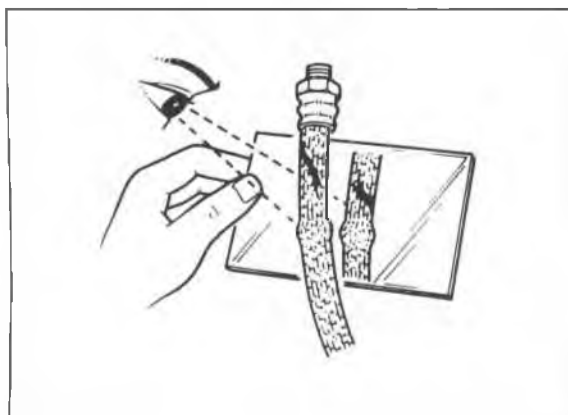
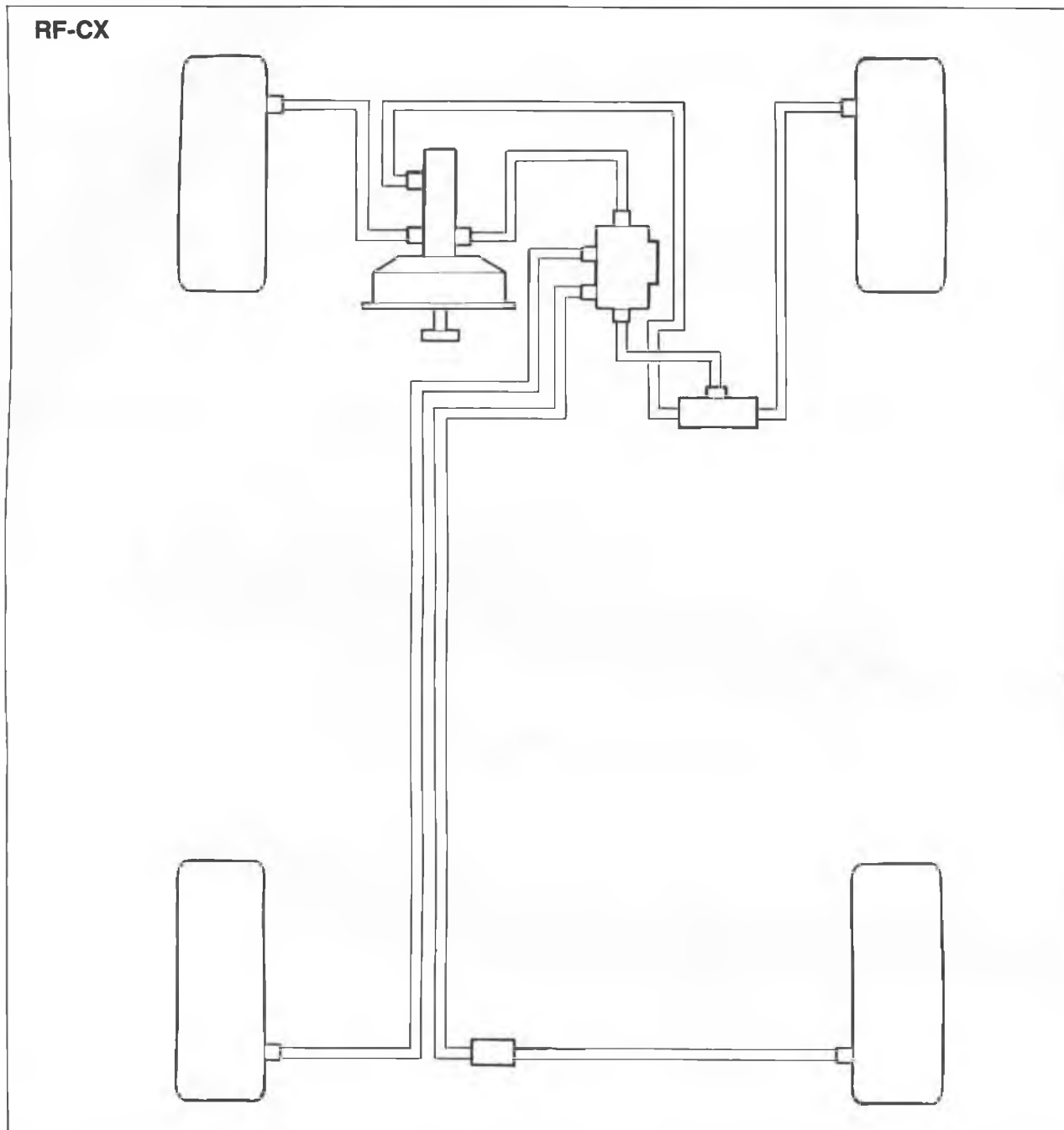


86U11X-007

ABS



# 11 BRAKE HYDRAULIC LINE



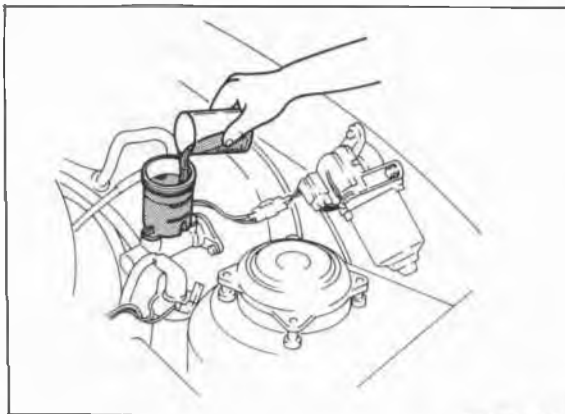
## ON-VEHICLE INSPECTION OF BRAKE LINES

Check the following and replace or repair any faulty parts.

1. Cracks, damage, corrosion of brake hose
2. Damage to brake hose threads
3. Scars, cracks, and swelling of flexible hose
4. Fluid leakage of all lines



76G11X-006



76G11X-007

## REMOVAL AND INSTALLATION OF BRAKE LINES

1. Loosen or tighten the flare nut with the SST.

**Flare nut tightening torque: 13—22 Nm  
(1.3—2.2 m-kg, 9—16 ft-lb)**

2. When connecting the flexible hose, do not over-tighten or twist it.

3. After installation:

(1) Check that the hose does not contact other parts when the vehicle bounces or when the steering wheel is turned all the way to the right or left.

(2) Bleed the air from the brake system. (Refer to page 11—9.)

## REPLACEMENT OF BRAKE FLUID

1. Remove the brake fluid from the reservoir with a suction pump.

2. Fill the reservoir with new, specified brake fluid.

3. Pump out the old brake fluid by loosening the bleeder screws (one by one) and pumping the brake pedal. (Refer to page 11—10 for details.)

## AIR BLEEDING

### Air Bleeding Locations

After the following parts are removed, air bleeding is necessary after installation.

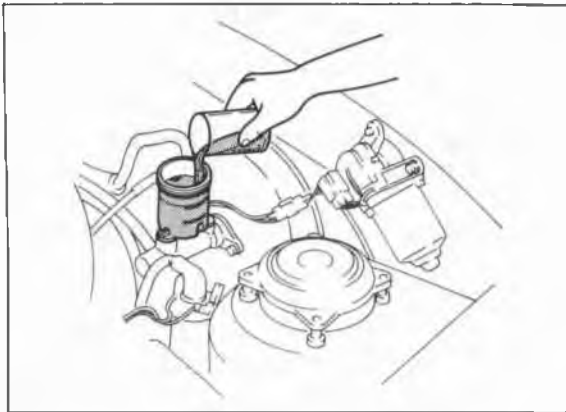
Removed part			Air bleeding location			
			Front		Rear	
			Right side	Left side	Right side	Left side
Master cylinder			*	*	*	*
Wheel cylinder or caliper	Front	Right side	*	—	—	—
		Left side	—	*	—	—
	Rear disc	Right side	—	—	*	—
		Left side	—	—	—	*
	Rear drum	Right side	—	—	*	—
		Left side	—	—	—	*
Dual proportioning valve			*	*	*	*
Hydraulic unit (ABS)			*	*	*	*

ABS: Anti-lock Brake System

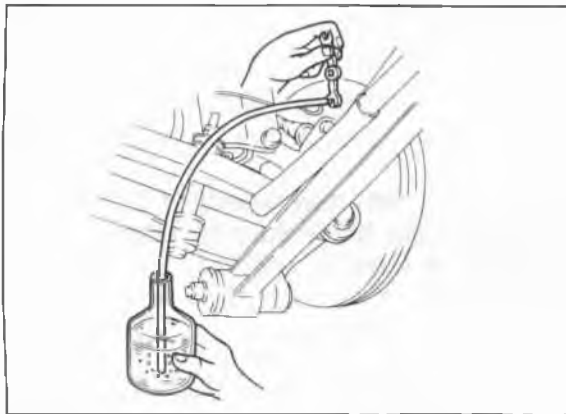
76G11X-064

\*: Indicates where air bleeding is necessary

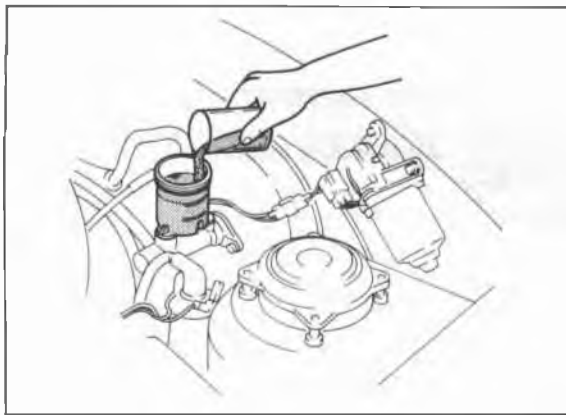
# 11 BRAKE HYDRAULIC LINE



86U11X-013



86U11X-014



86U11X-015

## Procedure

1. Jack up the vehicle and support it with safety stands.
2. Fill the reservoir with brake fluid. Be sure that it is at least half full at all times during the air bleeding process.

## Caution

- a) Be careful not to spill brake fluid onto a painted surface.
- b) Use only the specified brake fluid. Do not mix it with any other type.

3. Remove the bleeder cap; then connect one end of a transparent vinyl tube to the bleeder screw and place the other end in a receptacle.
4. Have an assistant depress the brake pedal a few times, and then hold it in the depressed position.
5. Loosen the bleeder screw, drain out the fluid, and retighten the bleeder.

## Note

- a) The two people should stay in voice contact with each other.
- b) Be sure the pedal remains depressed until the bleeder is tightened.

6. Repeat steps 4 and 5 until no more air is discharged.
7. Tighten the bleeder screw, and check that there is no fluid leakage.

## Bleeder screw tightening torque:

6—9 N·m (60—90 cm·kg, 52—78 in·lb)

## Caution

Be sure to clean away any spilled fluid with rags.

8. Add brake fluid to the reservoir up to the specified level.

## BRAKE PEDAL

### ON-VEHICLE INSPECTION

#### Pedal Height Inspection

Check that the distance from the center of the upper surface of the pedal pad to the firewall is as specified.

#### LHD and RHD

**Pedal height:  $222 \pm 5$  mm ( $8.74 \pm 0.20$  in)**

#### Adjustment

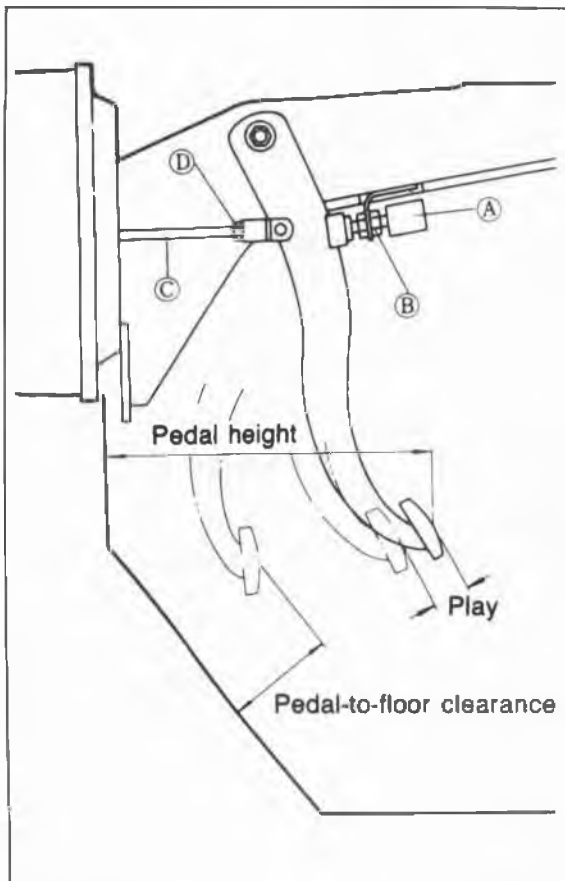
1. Disconnect the stop light switch connector.
2. Loosen locknut B and turn switch A until it does not contact the pedal.
3. Loosen locknut D and turn rod C to adjust the height.
4. Adjust the pedal free play and tighten locknut D.
5. Turn the stop light switch until it contacts the pedal; then turn an additional 1/2 turn. Tighten locknut B.

#### Locknut B tightening torque:

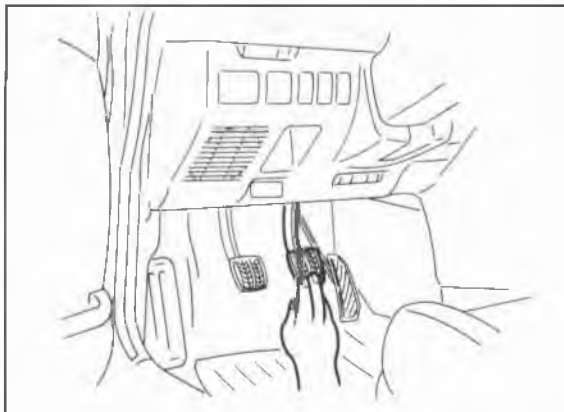
**14—18 Nm (1.4—1.8 m·kg, 10—13 ft·lb)**

#### Locknut D tightening torque:

**24—34 Nm (2.4—3.5 m·kg, 17—25 ft·lb)**



76G11X-008



76G11X-099

#### Pedal Play Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Gently depress the pedal again by hand, and check the free play. (Until the valve plunger contacts the stopper plate = until the power piston begins to move.)

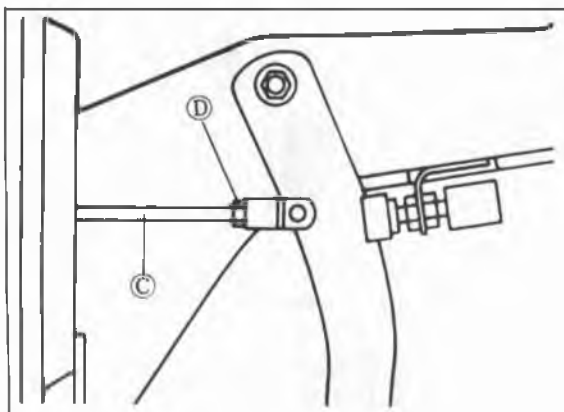
**Pedal play: 4—7 mm (0.16—0.28 in)**

#### Adjustment

Loosen the locknut D of the operating rod C; then turn the rod to adjust the free play.

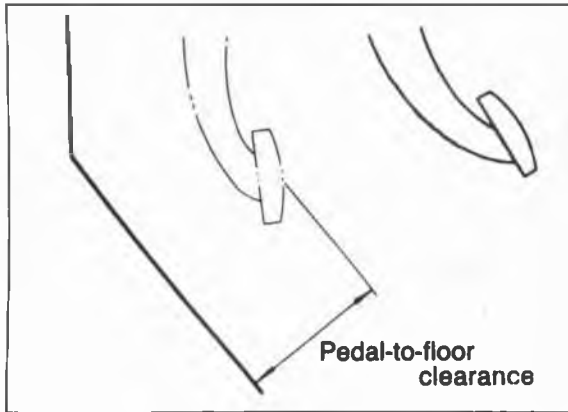
#### Locknut D tightening torque:

**24—34 Nm (2.4—3.5 m·kg, 17—25 ft·lb)**



86U11X-018

# 11 BRAKE PEDAL



76G11X-009

## Pedal-to-Floor Clearance Inspection

Check that the distance from the floor panel to the center of the upper surface of the pedal pad is as specified when the pedal is depressed with a force of 589 N (60 kg, 132.3 lb).

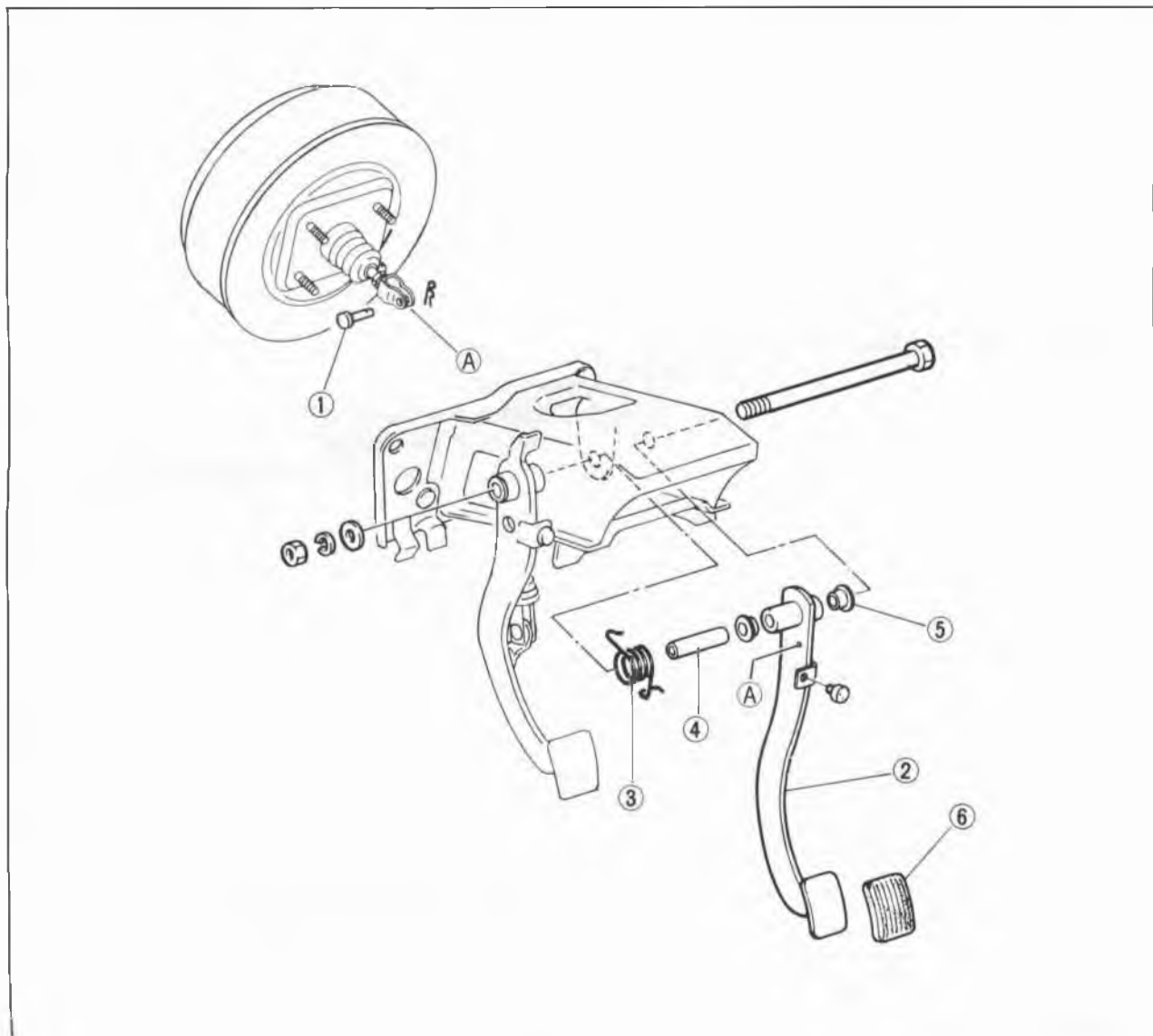
**Pedal-to-floor clearance:**  
**LHD and RHD**  
**95 mm (3.7 in) min.**

If the distance is less than specified, check for the following problems.

1. Air in brake system
2. Malfunction of automatic adjuster (rear drum brakes)
3. Worn shoes or pads

## REMOVAL

Remove in the sequence shown in the figure.



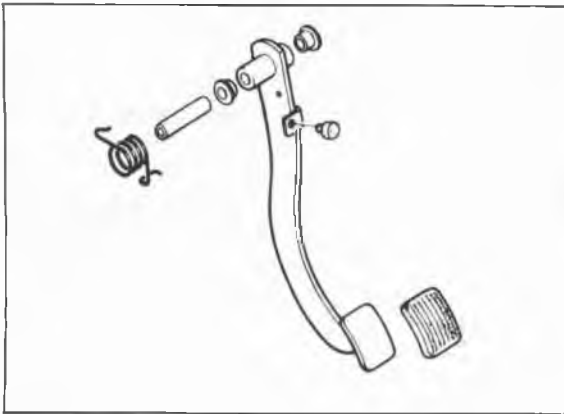
86U11X-020

1. Clevis pin  
2. Brake pedal

3. Return spring  
4. Guide pipe

5. Bushing  
6. Brake pad





86U11X-021

## INSPECTION

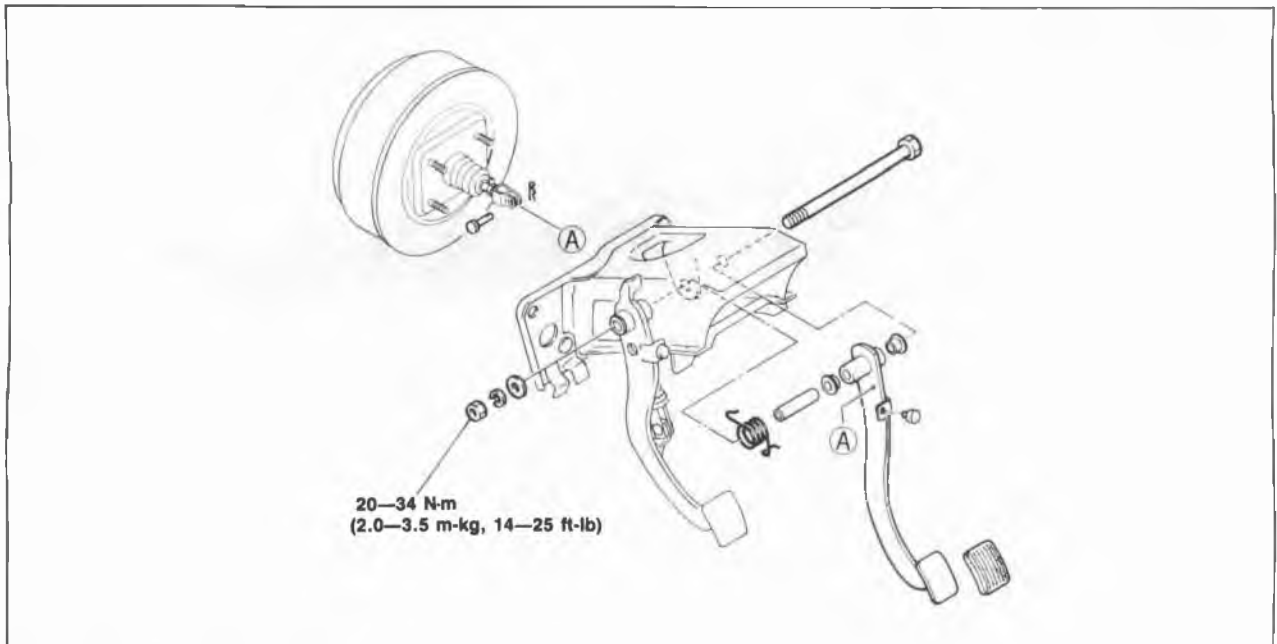
Check the following and replace or repair any faulty parts.

1. Pedal pad for wear or damage
2. Bushing for wear
3. Bolt for bending
4. Pedal for bending
5. Return spring for weakness or damage

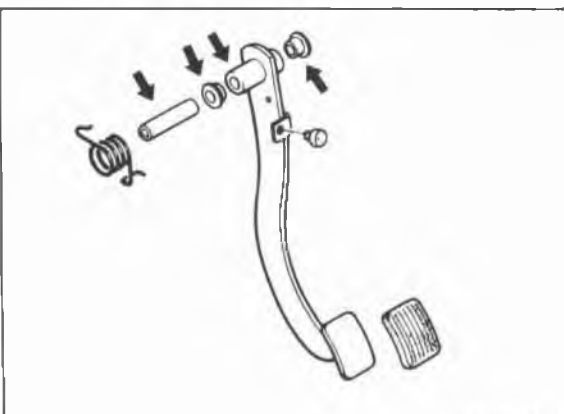
## INSTALLATION

1. Install in the reverse order of removal.
2. Tighten all nuts and bolts, referring to torque specifications.
3. After installation:  
Check and adjust the pedal height and play. (Refer to page 11—11.)

## Torque specifications



76G11X-010



86U11X-023

## Installation Note

### Application of grease

Apply grease to the following parts:

- (1) Inner and outer surfaces of bushing
- (2) Outer surface of guide pin
- (3) Contact surface of clevis pin and spring

# 11 MASTER CYLINDER

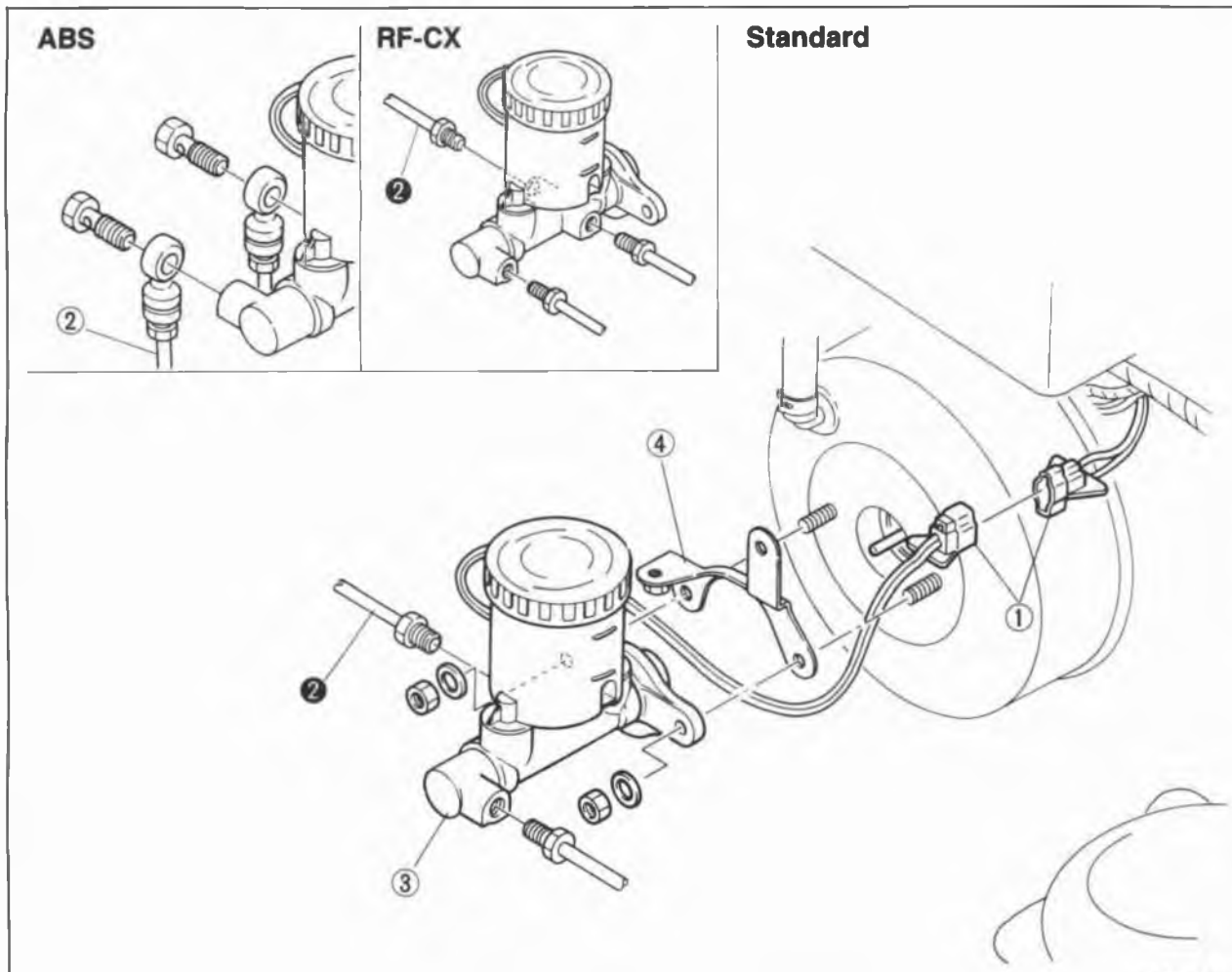
## MASTER CYLINDER

### REMOVAL

Remove in the sequence shown in the figure, referring to removal note for specially marked parts.

#### Caution

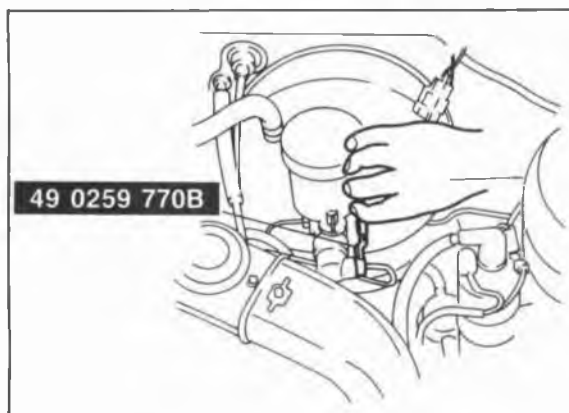
**Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



76G11X-011

1. Fluid level sensor connector
2. Brake pipe

3. Master cylinder
4. Clutch pipe holder (LHD MTX ABS)



76G11X-012

#### Removal Note

##### Brake pipe (Flare nut type)

1. Place rags under the master cylinder to prevent brake fluid from dripping on painted surfaces.
2. Disconnect the brake pipe from the master cylinder with the **SST**.

## DISASSEMBLY AND ASSEMBLY (EXCEPT RHD DOHC TURBO)

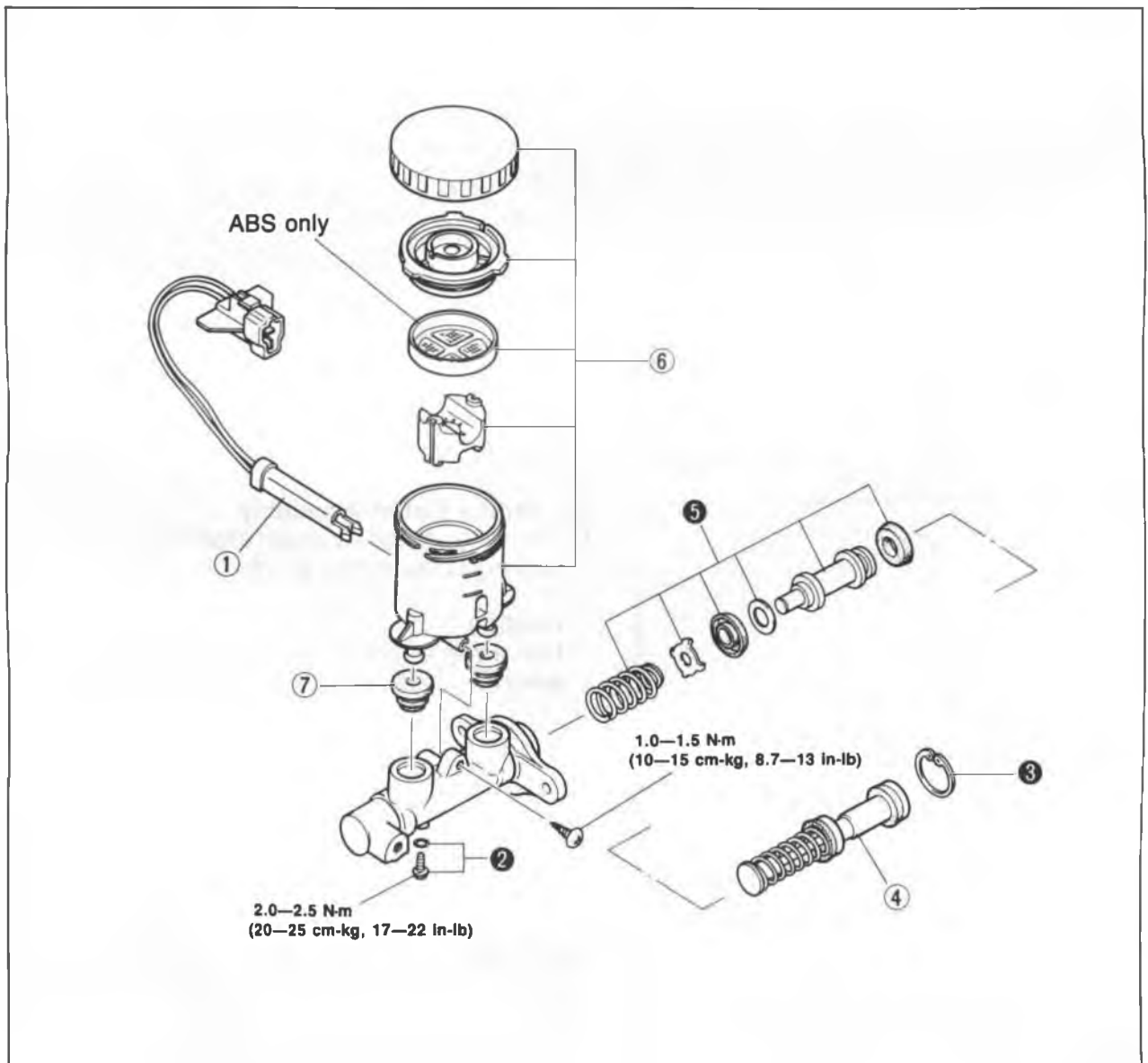
1. Pour out the brake fluid.
2. Disassemble in the sequence shown in the figure, referring to disassembly note for specially marked parts.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.

### Caution

- a) Do not to allow any foreign material into the master cylinder during repairs.
- b) Do not scratch the inside of the cylinder or the outer surface of the piston.

### Note

The primary piston assembly is not repairable. Replace it as an assembly.

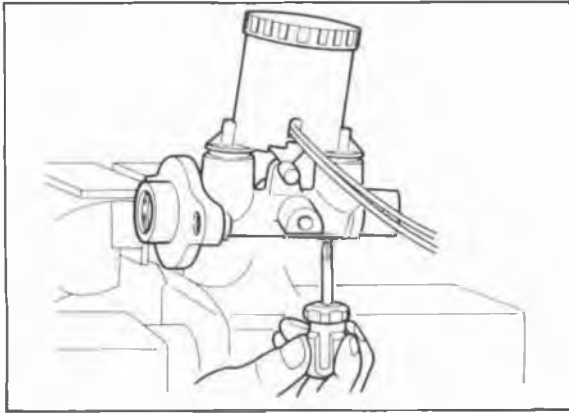


76G11X-013

1. Fluid level sensor
2. Stopper screw and O-ring
3. Snap ring
4. Primary piston assembly

5. Secondary piston assembly
6. Reservoir assembly
7. Bushing

# 11 MASTER CYLINDER



86U11X-027

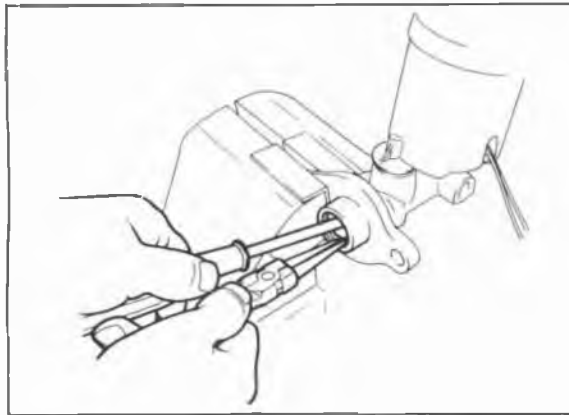
## Disassembly Note

### Stopper screw

Remove the stopper screw with a Phillips screwdriver.

### Note

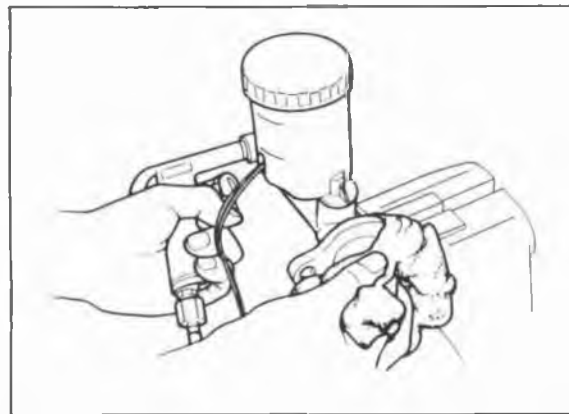
**Prepare a suitable container for the brake fluid to drain into.**



86U11X-028

## Snap ring

Push the primary piston with a Phillips screwdriver and remove or install the snap ring with snap-ring pliers.



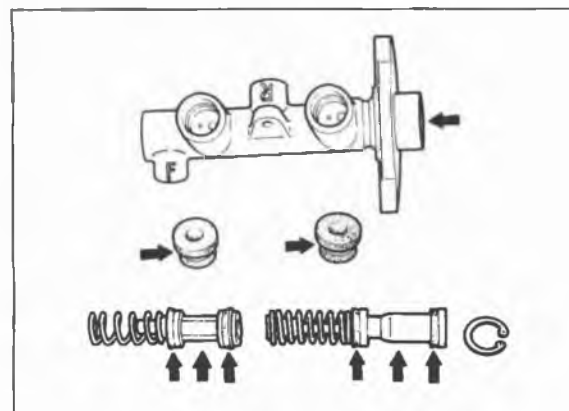
86U11X-029

## Secondary Piston Assembly

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

### Caution

**Use a rag to catch the secondary piston assembly when applying compressed air.**



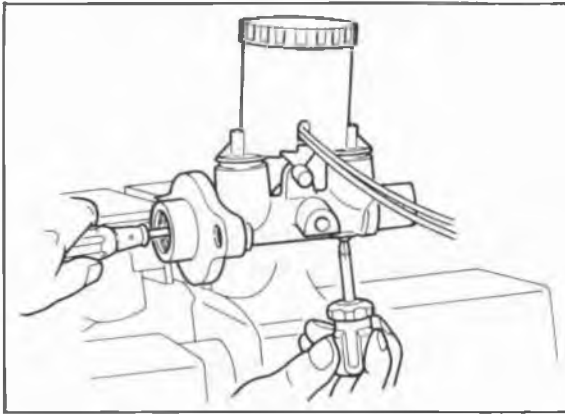
86U11X-030

## Assembly Note

### Application of brake fluid

Before assembly, apply brake fluid to the following parts:

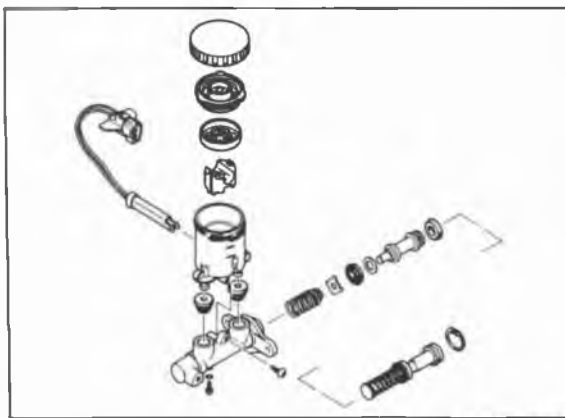
1. Cylinder inner surface
2. Piston
3. Piston cups
4. Bushings



86U11X-031

### Stopper screw

1. Push the primary piston assembly all the way in with a Phillips screwdriver.
2. Tighten the stopper screw.
3. Push and release the screwdriver to verify that the position of the stopper screw is correct.



86U11X-032

### INSPECTION

Check the following and replace any faulty parts.

1. Piston and cylinder bore for abnormal wear, rust, and damage
2. Springs for weakness and damage
3. Reservoir for damage and deformation

# 11 MASTER CYLINDER

## DISASSEMBLY AND ASSEMBLY (RHD DOHC TURBO)

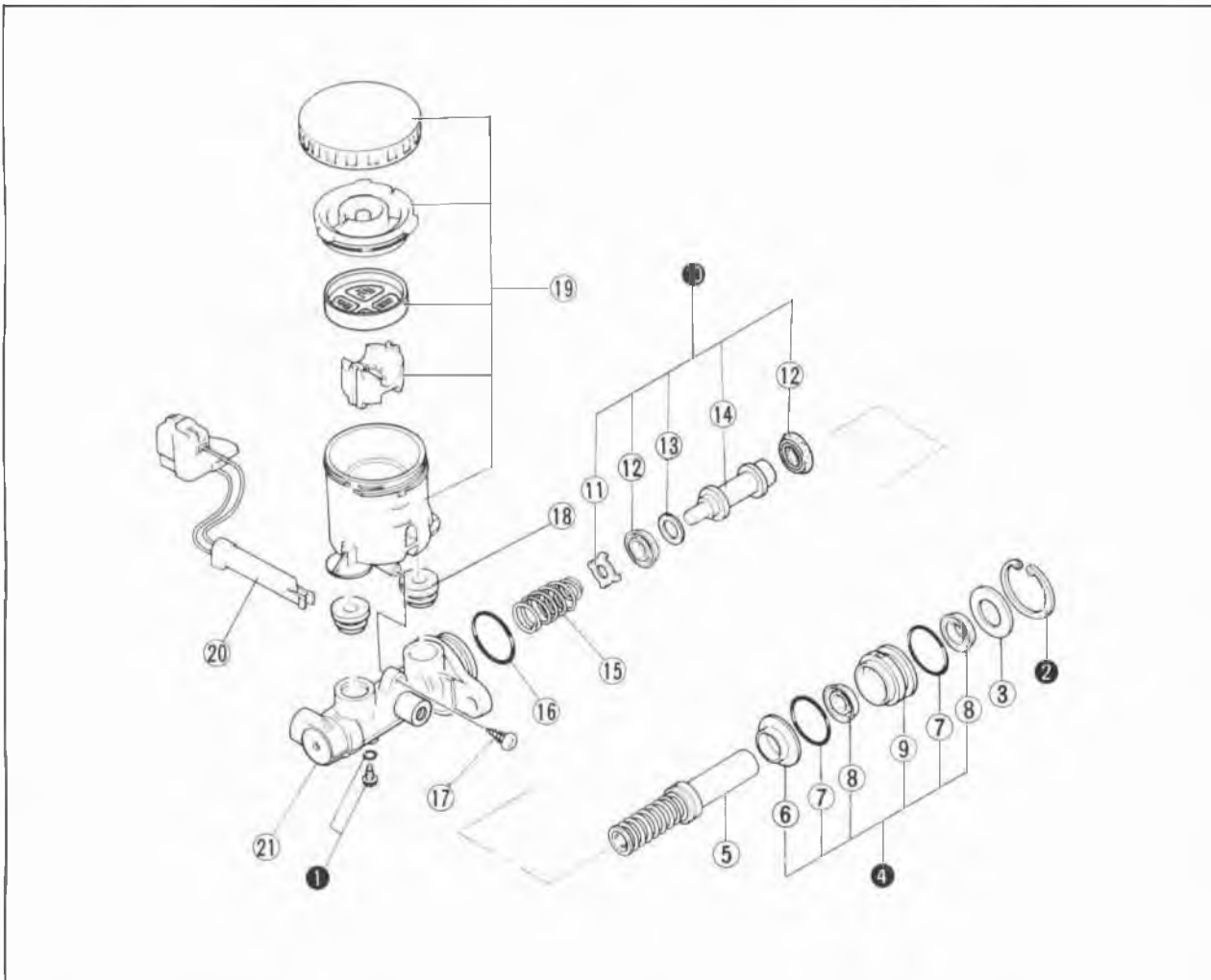
1. Pour out the brake fluid.
2. Disassemble in the sequence shown in the figure, referring to disassembly note for specially marked parts.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.

### Caution

- a) Do not allow any foreign material into the master cylinder during repairs.
- b) Do not scratch the inside of the cylinder or the outer surface of the piston.

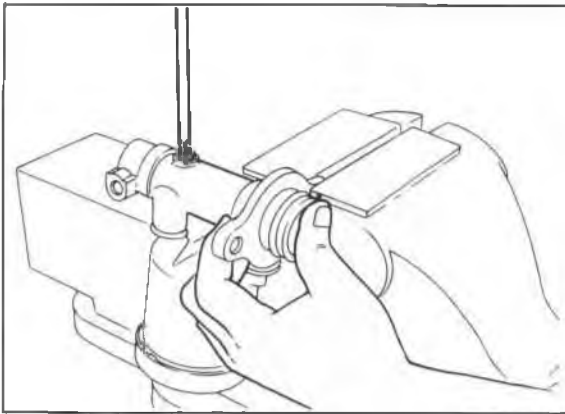
### Note

The primary piston assembly is not repairable. Replace it as an assembly.



76G11X-014

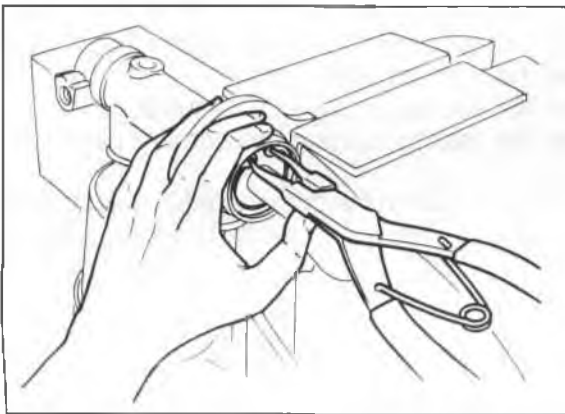
- |                               |                          |
|-------------------------------|--------------------------|
| 1. Stopper screw and O-ring   | 12. Piston cup           |
| 2. Snap ring                  | 13. Washer               |
| 3. Spacer                     | 14. Secondary piston     |
| 4. Piston guide assembly      | 15. Spring               |
| 5. Primary piston assembly    | 16. O-ring               |
| 6. Stopper                    | 17. Screw                |
| 7. O-ring                     | 18. Bushing              |
| 8. Piston guide cup           | 19. Reservoir assembly   |
| 9. Piston guide               | 20. Fluid level sensor   |
| 10. Secondary piston assembly | 21. Master cylinder body |
| 11. Stopper                   |                          |



76G11X-015

### Disassembly Note Stopper screw

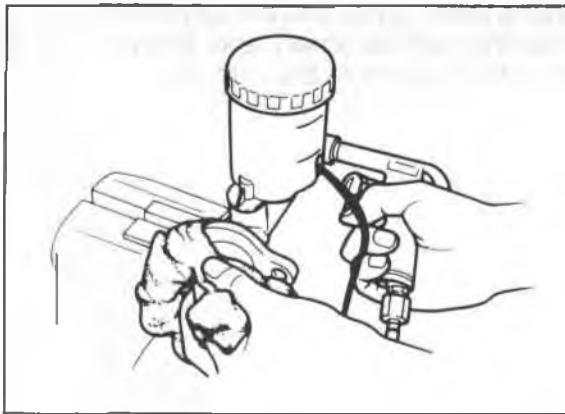
Push the piston in by hand and remove the stopper screw.



76G11X-016

### Snap ring

Push the piston in fully with a rod and remove the snap ring using snap ring pliers.



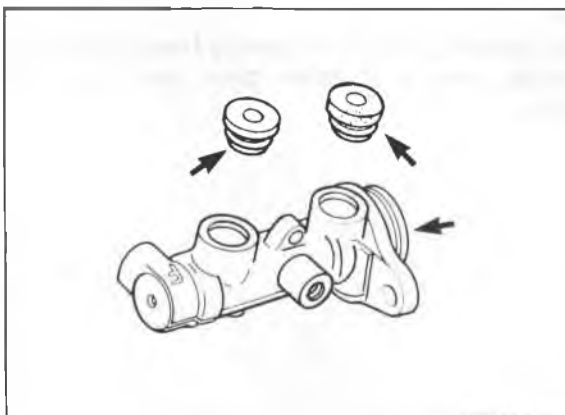
76G11X-017

### Secondary piston assembly

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

### Caution

Use a rag to catch the secondary piston assembly when applying compressed air.



76G11X-018

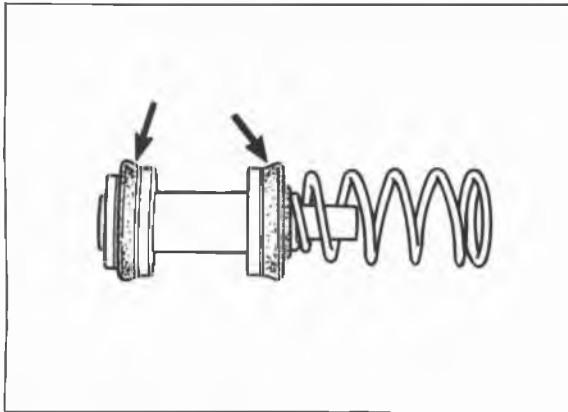
### Assembly Note

#### Application of brake fluid

Before assembly, apply brake fluid to the following parts:

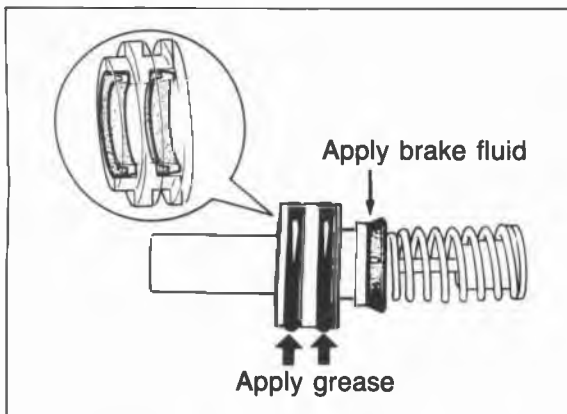
1. Bushing
2. Cylinder inner wall

# 11 MASTER CYLINDER



76G11X-019

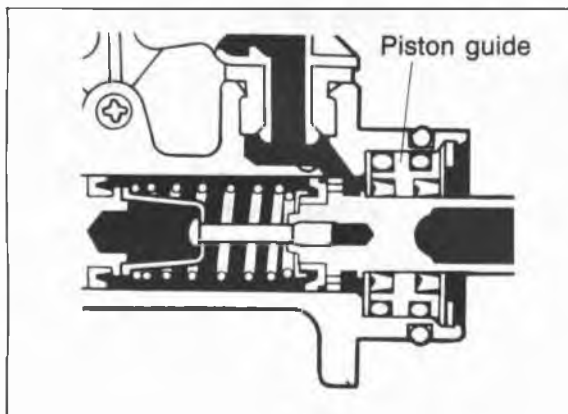
## 3. Secondary piston cup



76G11X-020

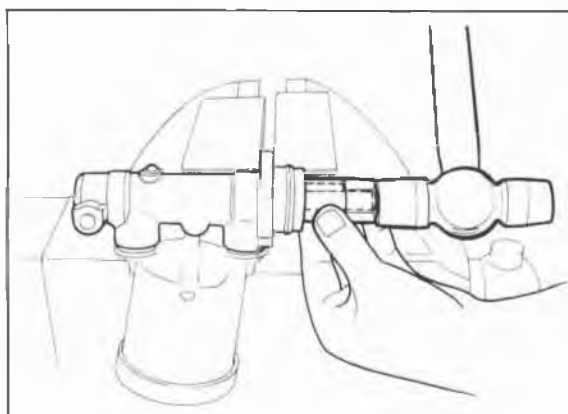
## Piston guide assembly

1. Apply brake fluid to the piston guide cups; then install them to the piston guide.
2. Install the O-rings to the piston guide.
3. Install the piston guide to the primary piston assembly.
4. Apply brake fluid to the primary piston cup and apply grease to the piston guide O-rings.



76G11X-021

5. Insert the piston guide and primary piston assembly into the cylinder slowly and straight; then fit them in the position in the cylinder.

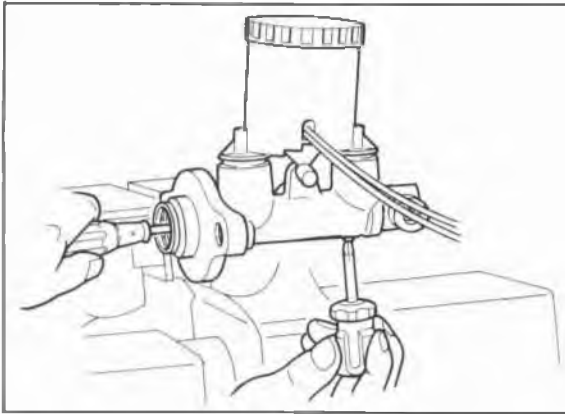


76G11X-022

## Note

If the piston guide is not easily installed in the cylinder, use a suitable pipe and tap it to install.

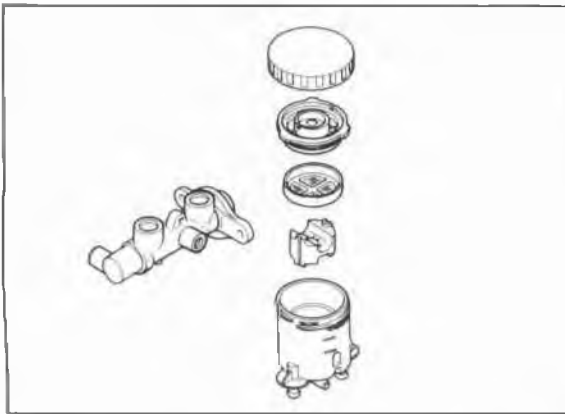




86U11X-031

### Stopper screw

1. Push the primary piston assembly all the way in with a Phillips screwdriver.
2. Tighten the stopper screw.
3. Push and release the screwdriver to verify that the position of the stopper screw is correct.



86U11X-032

### INSPECTION

Check the following and replace any faulty parts.

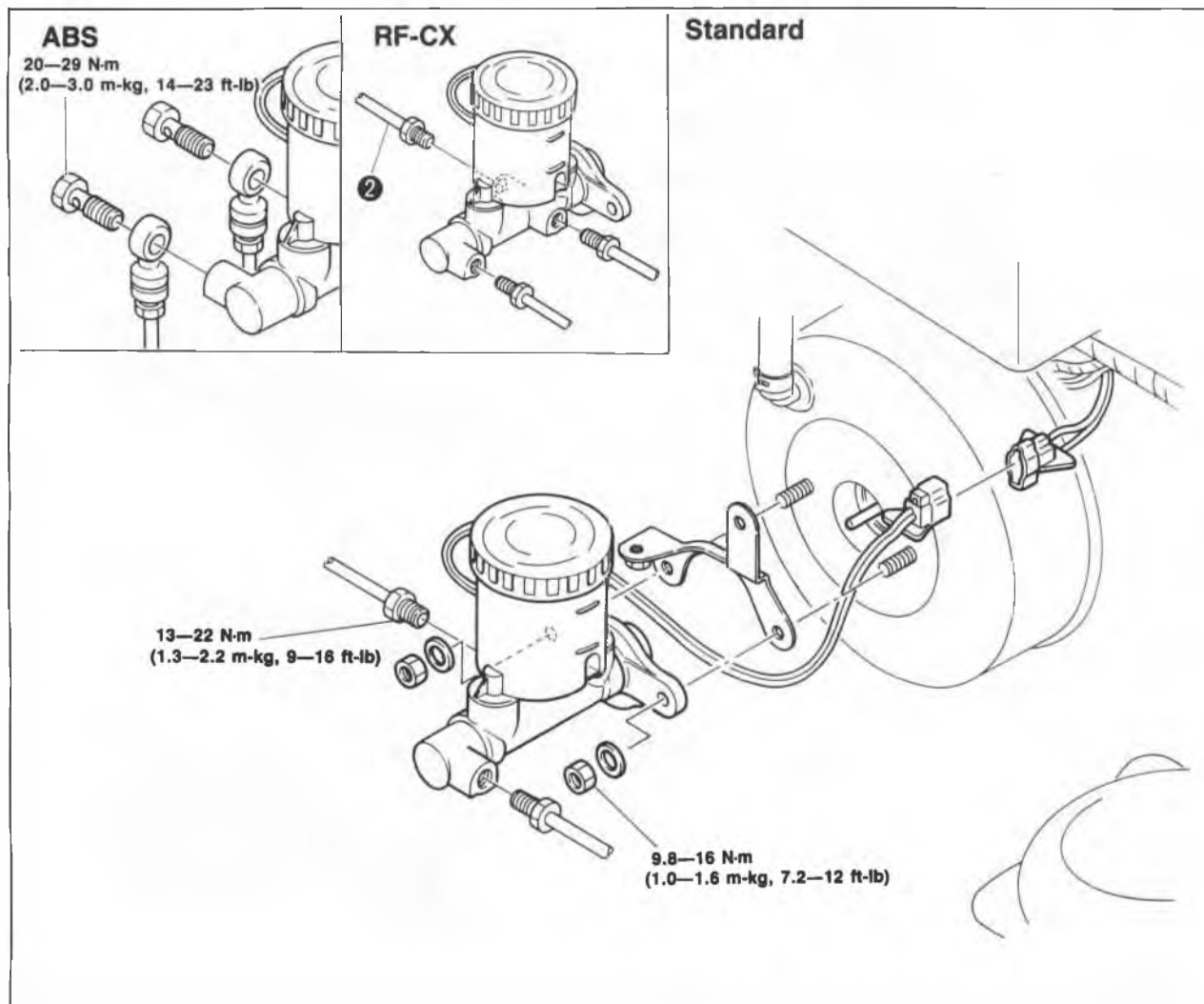
1. Piston and cylinder bore for abnormal wear, rust, and damage
2. Springs for weakness and damage
3. Reservoir for damage and deformation

# 11 MASTER CYLINDER

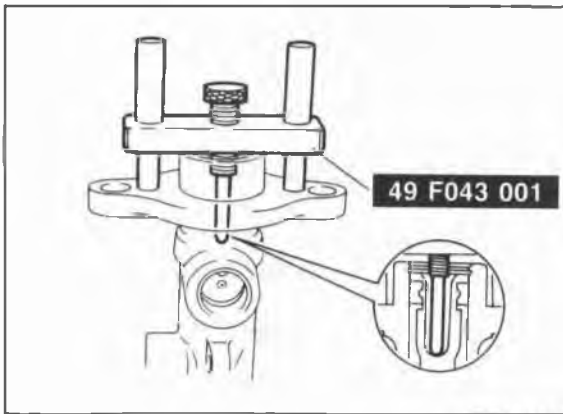
## INSTALLATION

1. Install in the reverse order of removal.
2. Tighten all nuts and bolts to the specified torque, referring to torque specifications.
3. After installation:
  - (1) Fill the reservoir with the specified fluid.
  - (2) Bleed air from the system. (Refer to page 11—9.)
  - (3) Check each part for fluid leakage.

## Torque specifications



76G11X-023



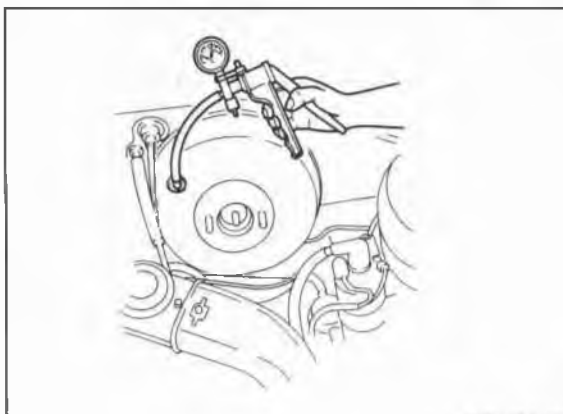
76G11X-024

## Installation Note

### Piston to push rod clearance adjustment (Except RHD DOHC TURBO)

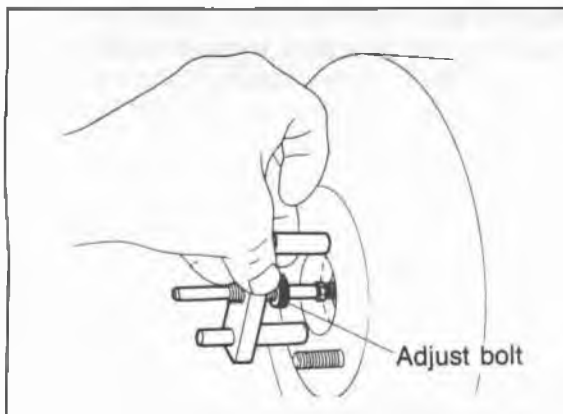
Before installing the master cylinder, check the clearance between the piston of the master cylinder and the push rod of the power brake unit as follows.

1. Place the **SST** on the top of the master cylinder; then turn the adjust bolt until it contacts the bottom of the push rod hole in the piston.



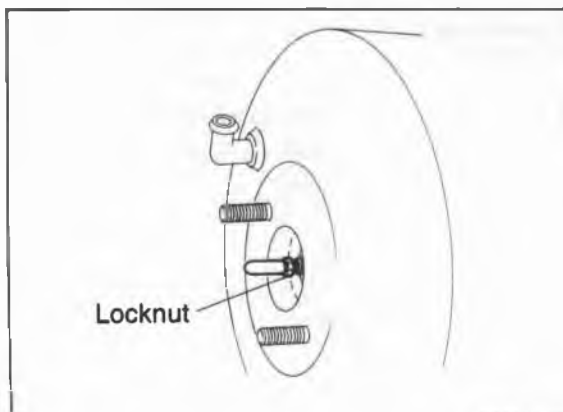
76G11X-100

2. Apply **500 mmHg (19.7 inHg)** vacuum to the power brake unit with a vacuum pump.



86U11X-036

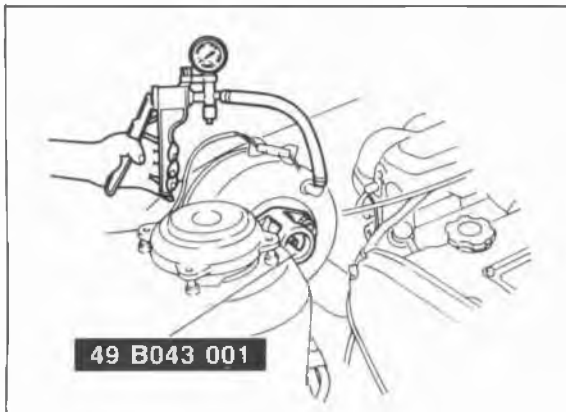
3. Invert the **SST** used in step 1, and place it on the power brake unit.



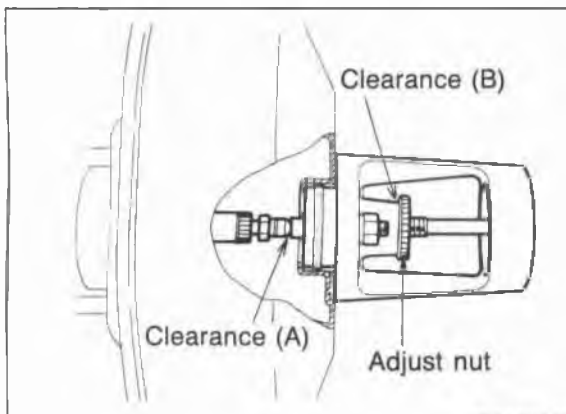
76G11X-101

4. Check the clearance between the adjust bolt and the push rod of the power brake unit. If it is not **0 mm**, loosen the push rod locknut and turn the push rod to adjust.

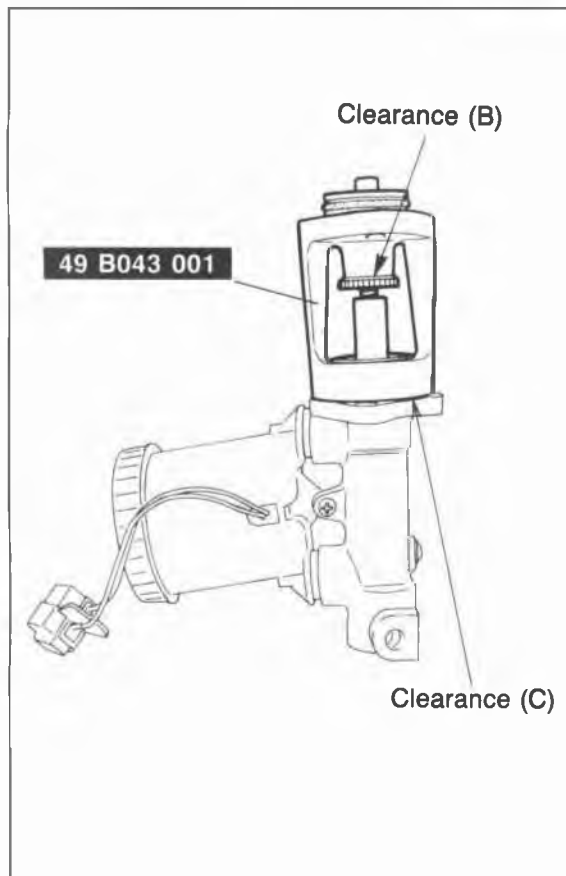
# 11 MASTER CYLINDER



76G11X-025



76G11X-026



76G11X-027

## Piston to push rod clearance adjustment (RHD DOHC TURBO)

### Inspection

Inspect the piston to push rod clearance in the following order.

1. Attach the **SST** to the power brake unit.

### Tightening torque:

**10—16 N·m (1.0—1.6 m·kg, 84—144 in·lb)**

2. Apply a vacuum of **500 mmHg (19.7 inHg)** using a vacuum pump.

3. Set clearance (A) between the push rod of the power brake unit and the push rod of the **SST**, and clearance (B) between the adjust nut and the **SST** body to 0 mm (0in) by turning the adjust nut.

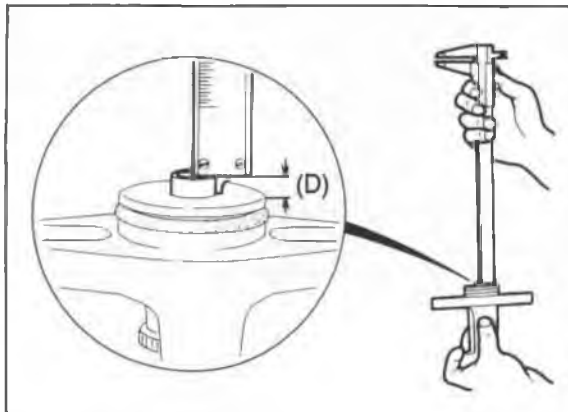
4. Remove the **SST** from the power brake unit keeping the clearance as above. Install the **SST** to the master cylinder body as shown in the figure.
5. Measure clearance (C) between the **SST** and the master cylinder, and then measure clearance (B) between the adjust nut and the **SST** body.

### Judgement Table

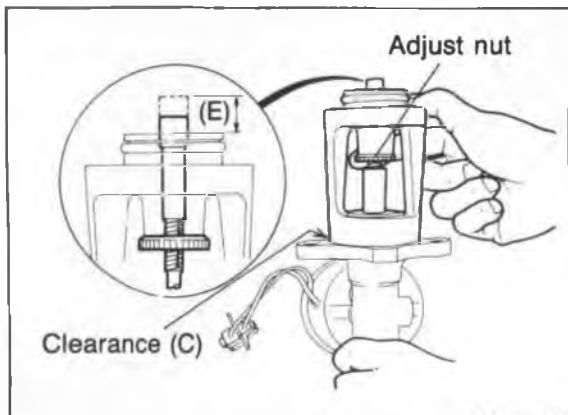
	Measurement	Necessity of adjustment
(a)	Clearance at (C)	Yes
(b)	Clearance at (B)	Yes
	Both clearances of (C) and (B) are 0 mm (0in)	No

(a) is when the push rod of the power brake unit extends.

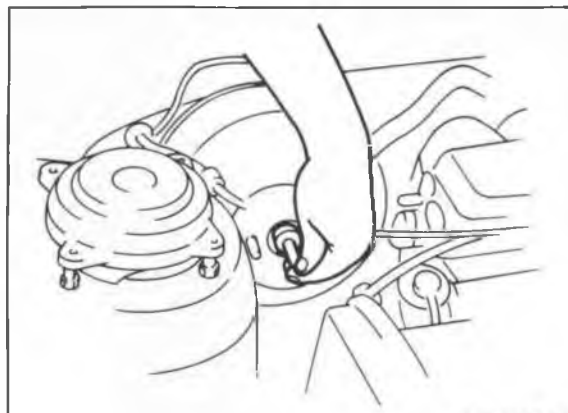
(b) is when the push rod of the power brake unit is recessed.



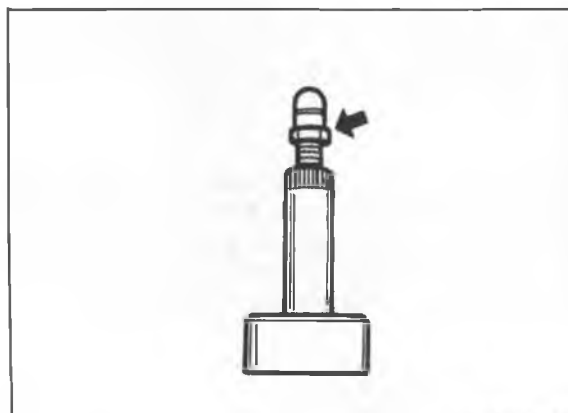
76G11X-028



76G11X-029



63G11X-349



76G11X-030

## Adjustment

Adjust the piston to push rod clearance in the following order.

1. For (a) of judgement table
  - (1) Measure the height of (D) and record after removing the **SST** from the master cylinder.
  - (2) Install the **SST** again to the master cylinder, and turn the adjust nut so that clearance (C) between the **SST** and the master cylinder is 0 mm (0in).
  - (3) Measure the height of (E) when clearance (C) is 0 mm (0in).

(E) — (D) = Projecting amount of the power brake unit push rod

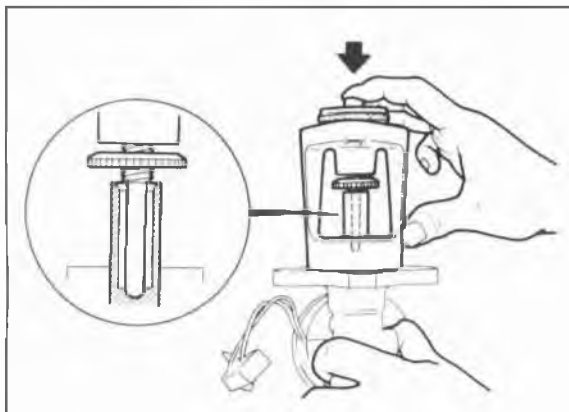
- (4) Remove the push rod from the power brake unit.

- (5) Make the piston to push rod clearance 0 mm (0in) by turning the push rod and shortening the push rod length by the amount of (E) — (D).

## Note

The threads of the push rod are specially designed so that the push rod bolt becomes harder to turn past a certain point to prevent loosening of the bolt. Turn the push rod bolt only within this range when adjusting.

# 11 MASTER CYLINDER

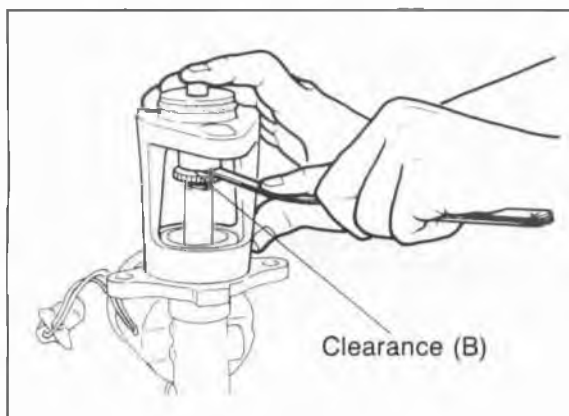


76G11X-031

2. For **(b)** of the judgement table
- (1) Push the push rod of **SST** lightly by hand until the push rod end touches the bottom of the primary piston in the master cylinder.

### Note

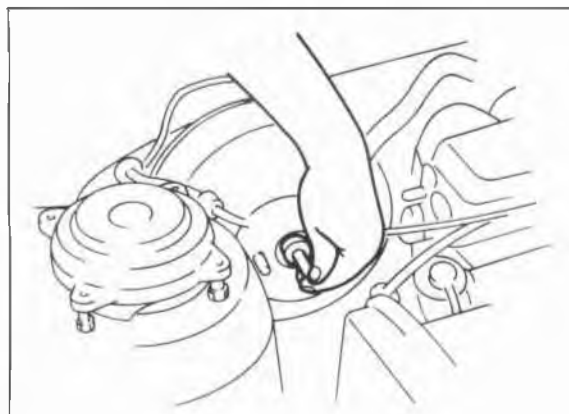
**When pushing only use enough pressure to bottom the rod in the piston. If too much pressure is applied a false reading will occur.**



76G11X-032

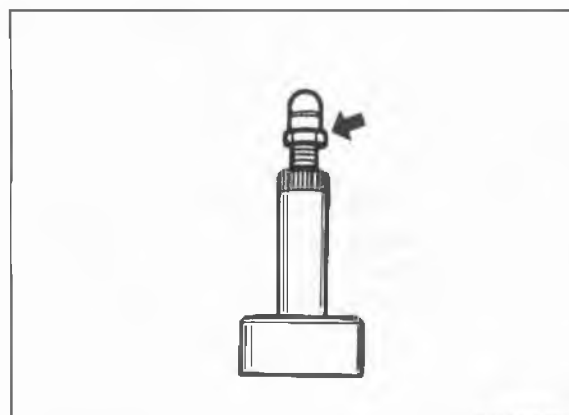
- (2) Measure clearance (B) between the adjust nut and the **SST** body with the rod held down.

(B) = Recessed amount of the power brake unit push rod



63G11X-353

- (3) Remove the push rod from the power brake unit.

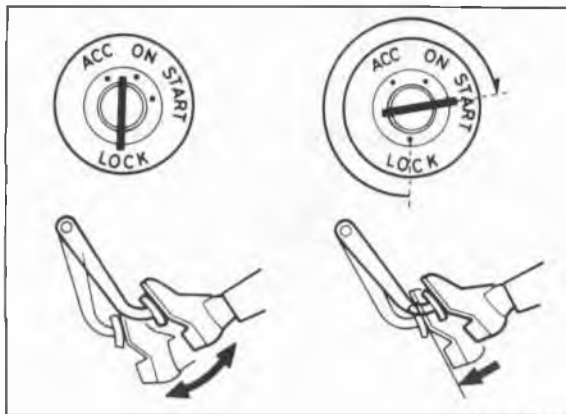


76G11X-033

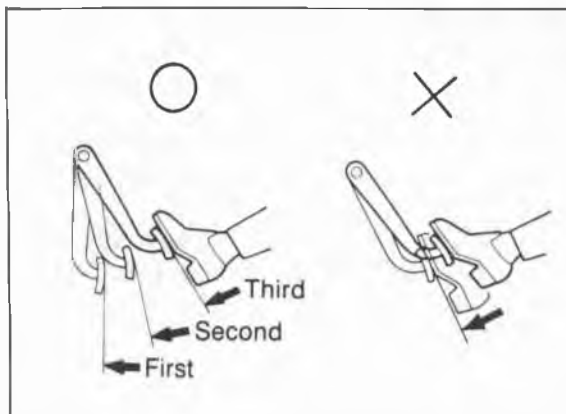
- (4) Make the push rod clearance 0 mm (0in) by turning the push rod and lengthening the push rod length by the amount of (B).

### Note

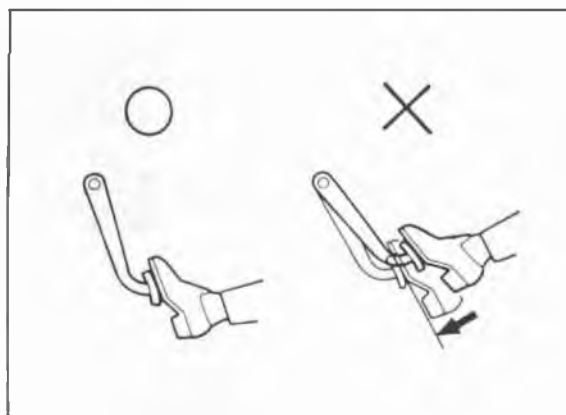
**The threads of the push rod are specially designed so that the push rod bolt becomes harder to turn past a certain point to prevent loosening of the bolt. Turn the push rod bolt only within this range when adjusting.**



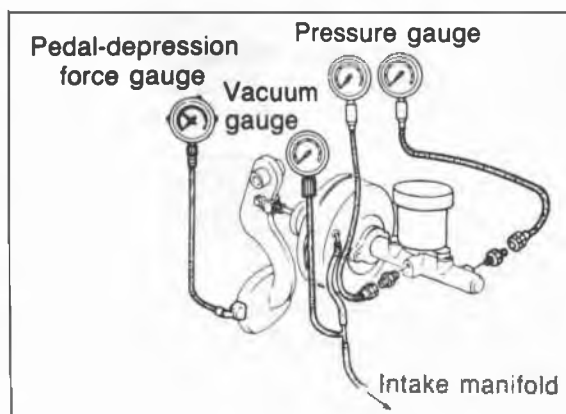
86U11X-038



86U11X-039



86U11X-040



86U11X-041

## POWER BRAKE UNIT

### FUNCTION CHECK

#### Simple Method

##### First step

1. With the engine stopped, depress the pedal a few times.
2. With the pedal depressed, start the engine
3. If immediately after the engine starts the pedal moves down slightly, the unit is operating.

##### Second step

1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes**.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect for damage of the check valve or vacuum hose, and examine the installation condition. Repair if necessary, and inspect it once again.

##### Third step

1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal still depressed.
4. Hold the pedal down for **about 30 seconds**.
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, check for damage to the check valve or vacuum hose, and check the connection. Repair if necessary, and check once again.

If the nature of the problem is still not clear after following the 3 steps above, follow the more detailed check described in "Method using tester".

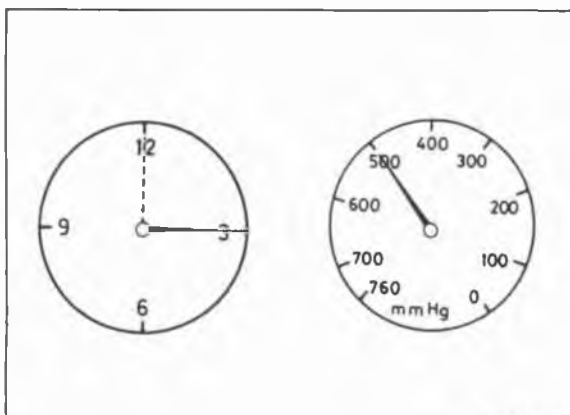
#### Method Using Tester

Connect a pressure gauge, vacuum gauge, and pedal depression force gauge as shown in the figure. After bleeding the air from the pressure gauge, conduct the test as described in the 3 steps below.

#### Note

**Use commercially available gauges and pedal depression force gauge.**

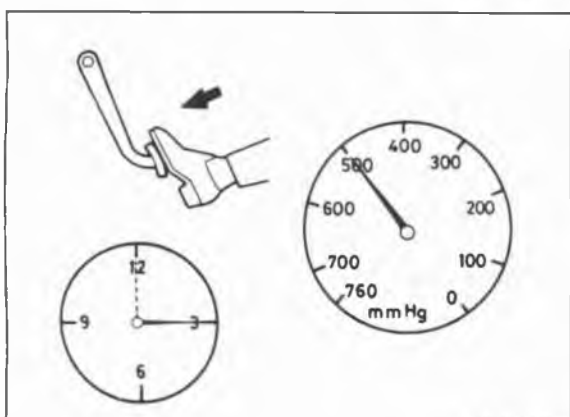
# 11 POWER BRAKE UNIT



76G11X-065

## a) Checking for vacuum loss Unloaded condition

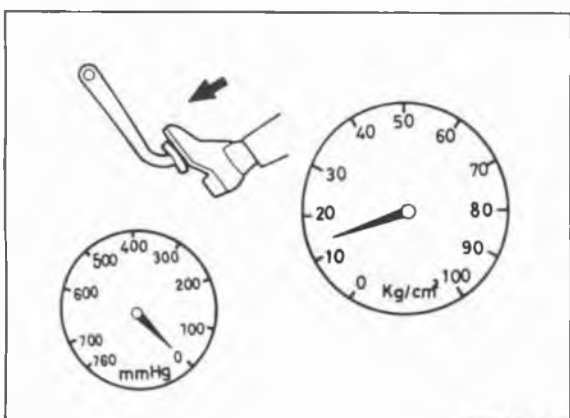
1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.



76G11X-066

## Loaded condition

1. Start the engine.
2. Depress the brake pedal with a force of **196 N (20 kg, 44 lb)**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.

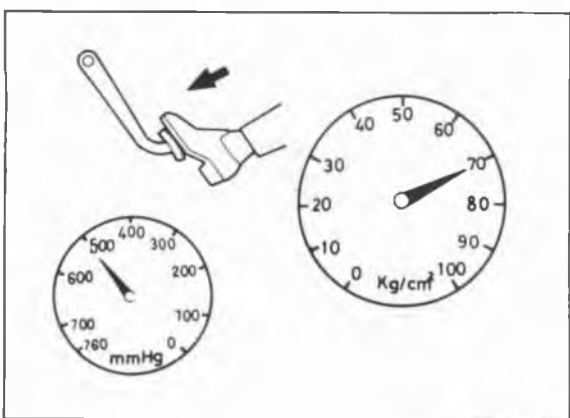


76G11X-067

## b) Checking for hydraulic pressure

1. If with the engine stopped (when vacuum is 0 mmHg) the relation between pedal force and fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
196 N (20 kg, 44 lb)	1,177 kPa (12 kg/cm <sup>2</sup> , 171 psi) min.

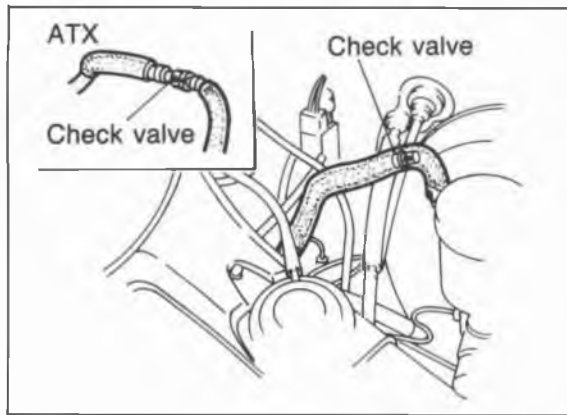


76G11X-068

2. Start the engine. Depress the brake pedal when the vacuum reaches **500 mmHg (19.7 inHg)**. If the relation between pedal force and fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
196 N (20 kg, 44 lb)	7,063 kPa (72 kg/cm <sup>2</sup> , 1,024 psi) min.





76G11X-034

## INSPECTION OF CHECK VALVE

### Note (MTX)

The check valve is pressed into the vacuum hose. There is an arrow on the hose surface to indicate direction of installation.

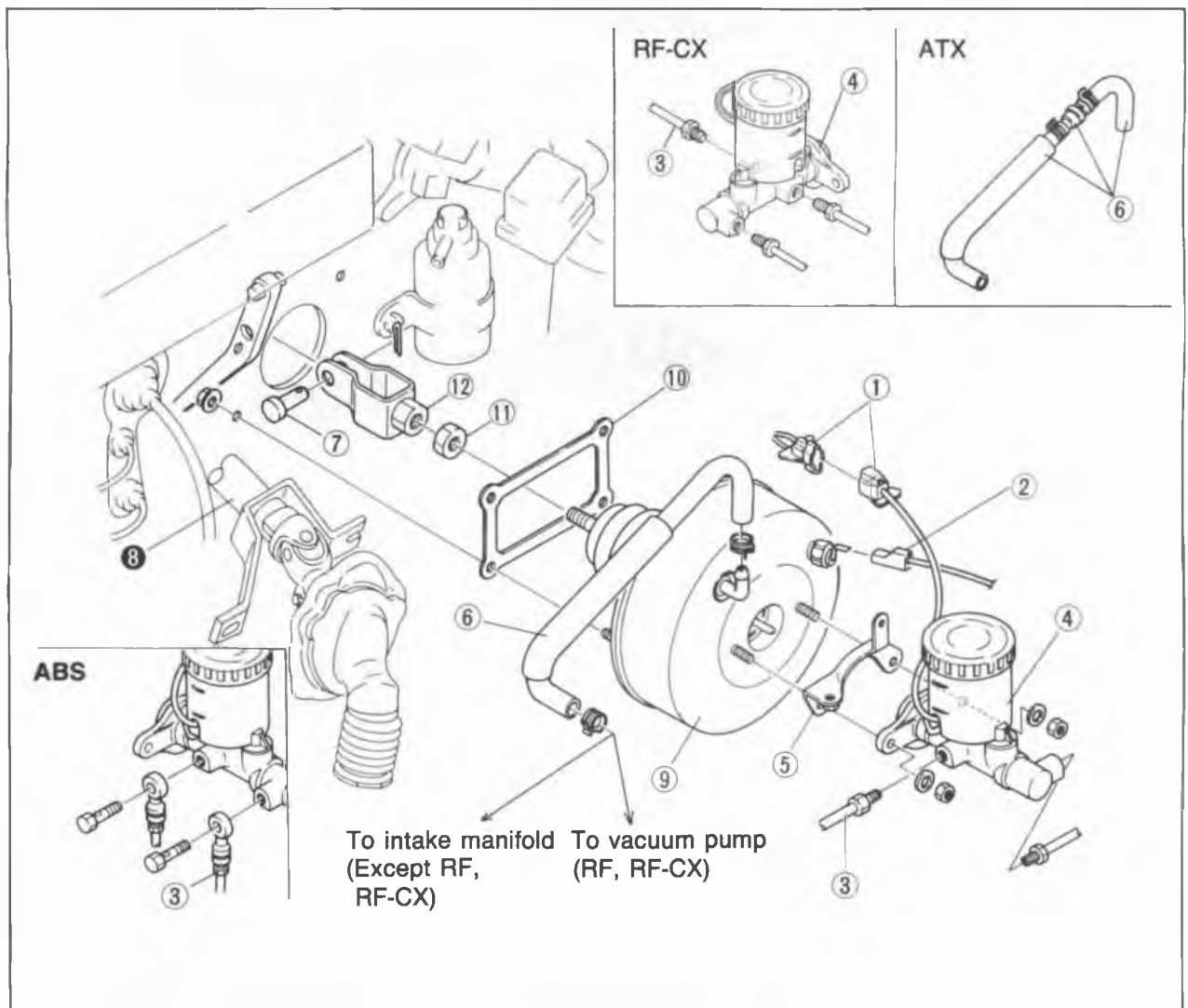
### Inspection

1. Disconnect the vacuum hose from the engine.
2. Apply suction and pressure to the hose from the engine side. Check that air flows only toward the engine.

If the air passes in both directions or not at all, replace the check valve (along with the hose).

## REMOVAL

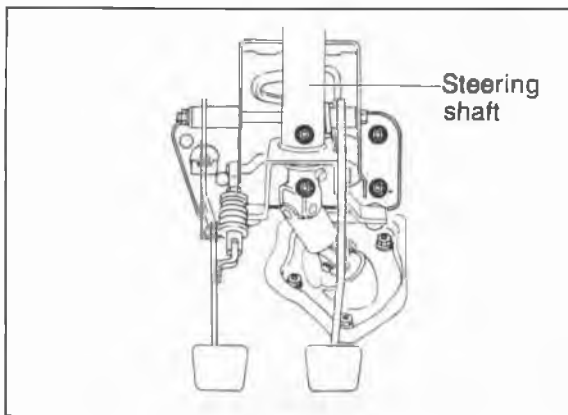
Remove in the sequence shown in the figure, referring to removal note for specially marked parts.



76G11X-069

- |                                      |                                |                     |
|--------------------------------------|--------------------------------|---------------------|
| 1. Fluid level sensor connector      | 5. Clutch pipe holder          | 9. Power brake unit |
| 2. Vacuum switch coupler (RF, RF-CX) | 6. Vacuum hose and check valve | 10. Gasket          |
| 3. Brake pipe                        | 7. Clevis pin                  | 11. Locknut         |
| 4. Master cylinder                   | 8. Steering shaft              | 12. Operating lever |

# 11 POWER BRAKE UNIT



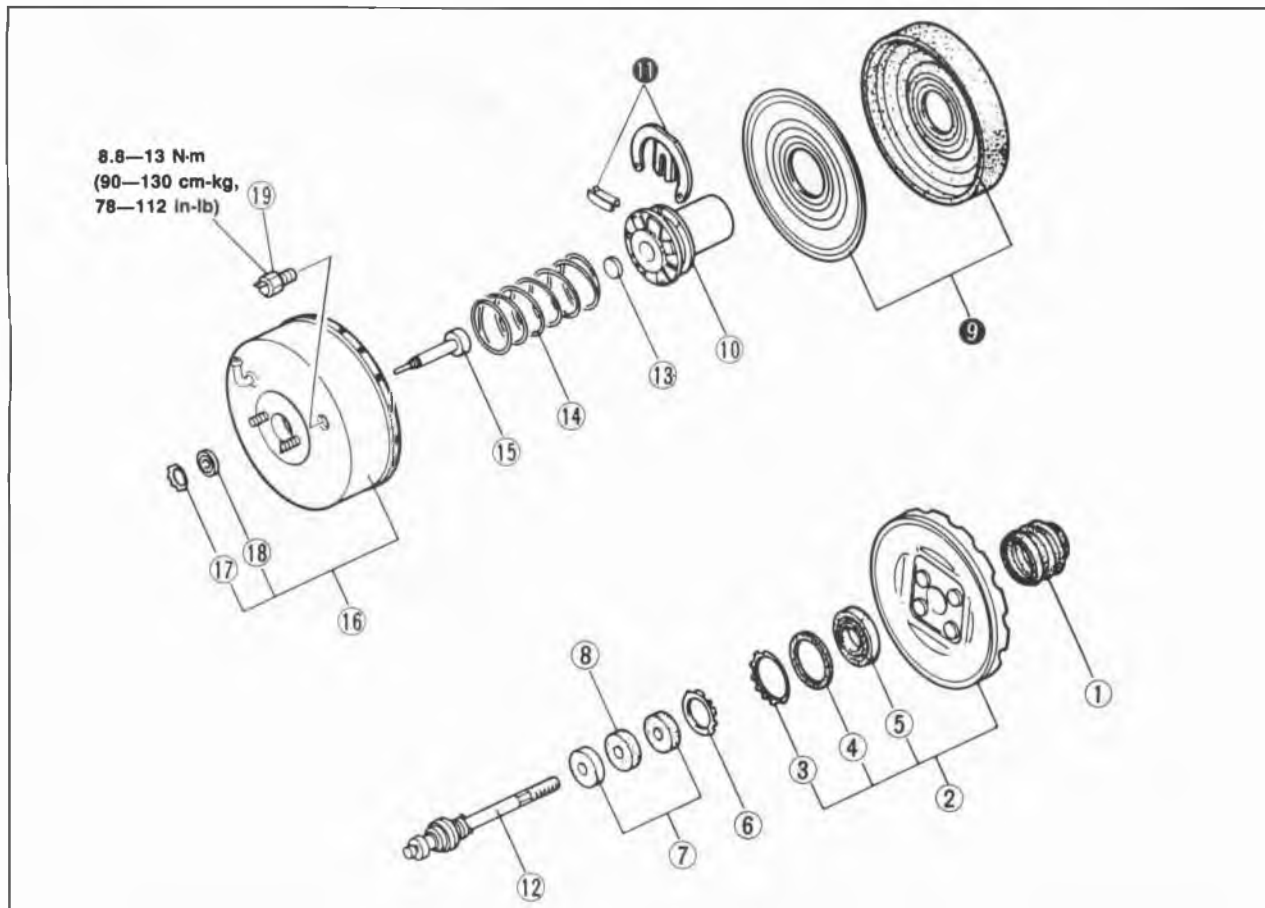
76G11X-102

## Removal Note Steering Shaft

To remove the mounting nuts of the power brake unit, the steering shaft must be removed. (Refer to page 10—22 for removal and installation procedures.)

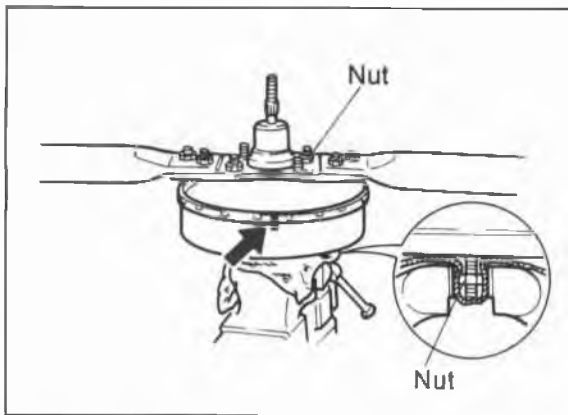
## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the sequence shown in the figure, referring to disassembly note for specially marked parts.
2. Inspect each part, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.



76G11X-070

- |                        |                                    |                               |
|------------------------|------------------------------------|-------------------------------|
| 1. Dust boot           | 8. Air silencer                    | 14. Spring                    |
| 2. Rear shell assembly | 9. Diaphragm and plate             | 15. Push rod                  |
| 3. Retainer            | 10. Power piston assembly          | 16. Front shell assembly      |
| 4. Bearing             | 11. Retainer key                   | 17. Retainer                  |
| 5. Dust seal           | 12. Valve rod and plunger assembly | 18. Seal                      |
| 6. Retainer            | 13. Reaction disc                  | 19. Vacuum switch (RF, RF-CX) |
| 7. Air filters         |                                    |                               |



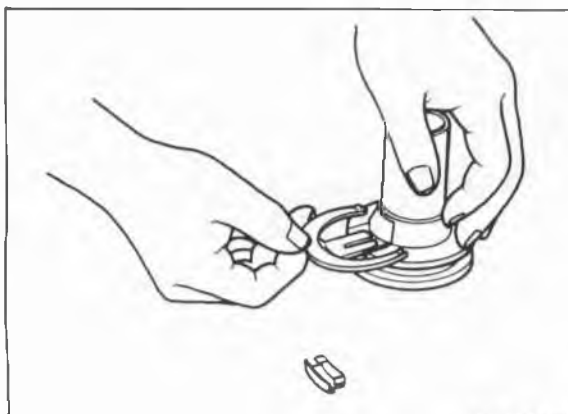
76G11X-071

### Disassembly Note Front and rear shells

1. Secure the front shell studs in a vise after attaching suitable nuts to them to prevent damage to the studs.
2. Before separating the front and rear shell assemblies, make matching marks to be used in reassembly.
3. Fit a wrench onto the rear shell studs; then fasten two of them with suitable nuts.
4. Rotate the rear shell counterclockwise to unlock.

### Caution

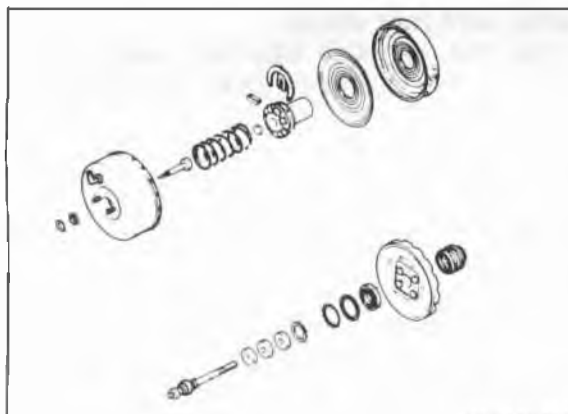
**The rear shell is spring loaded; loosen it carefully.**



86U11X-049

### Retainer key

Depress the plunger rod fully; then remove the retainer key.

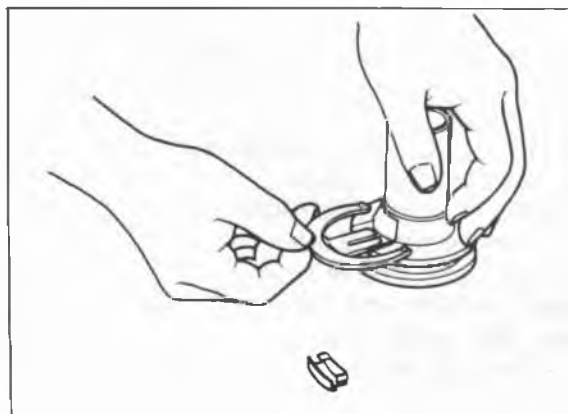


86U11X-050

### Assembly Note Application of Grease

Before assembly, coat the parts shown in the figure with silicon grease.

- (1) Entire surface of reaction disc
- (2) Dust seal lip
- (3) Push rod
- (4) Diaphragm-to-shell contacting surfaces
- (5) Power piston
- (6) Valve plunger oil seal



86U11X-051

### Retainer key

1. Push down the plunger rod.
2. Align the groove of the valve plunger with the slot of the power piston.
3. Insert the retainer key.

# 11 POWER BRAKE UNIT



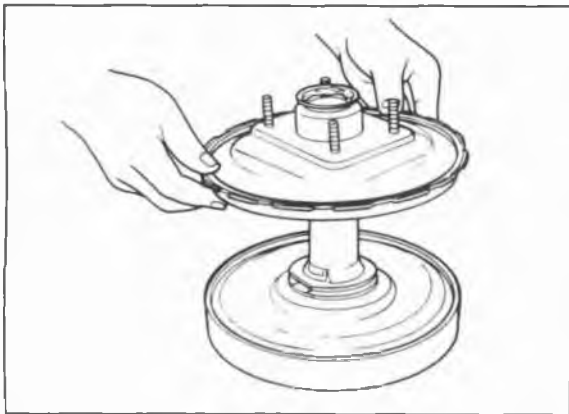
86U11X-052

## Diaphragm

Install the diaphragm to the power piston and plate.

### Caution

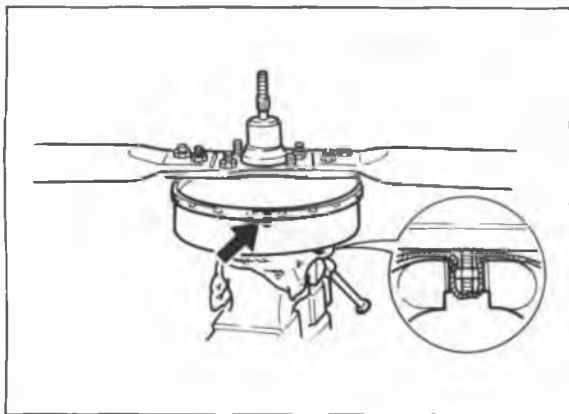
**Check that the diaphragm is well seated in the groove.**



86U11X-053

## Rear shell assembly

Assemble the rear shell assembly; carefully guiding the tube end of the power piston through the dust seal of the rear shell.



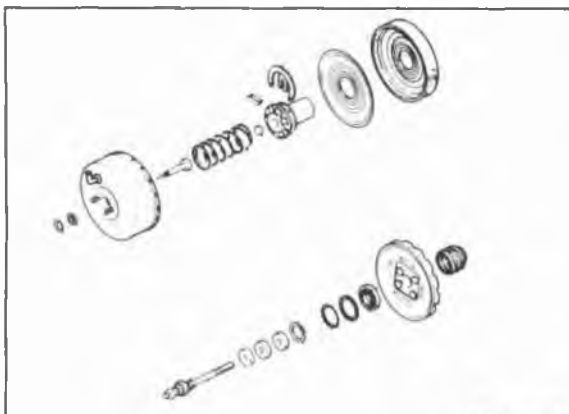
76G11X-072

## Front shell and rear shells

Press down the rear shell assembly, and rotate it clockwise until the matching marks are aligned.

### Caution

**Fit suitable nuts to two studs of the rear shell and tighten them to mount the wrench.**



86U11X-055

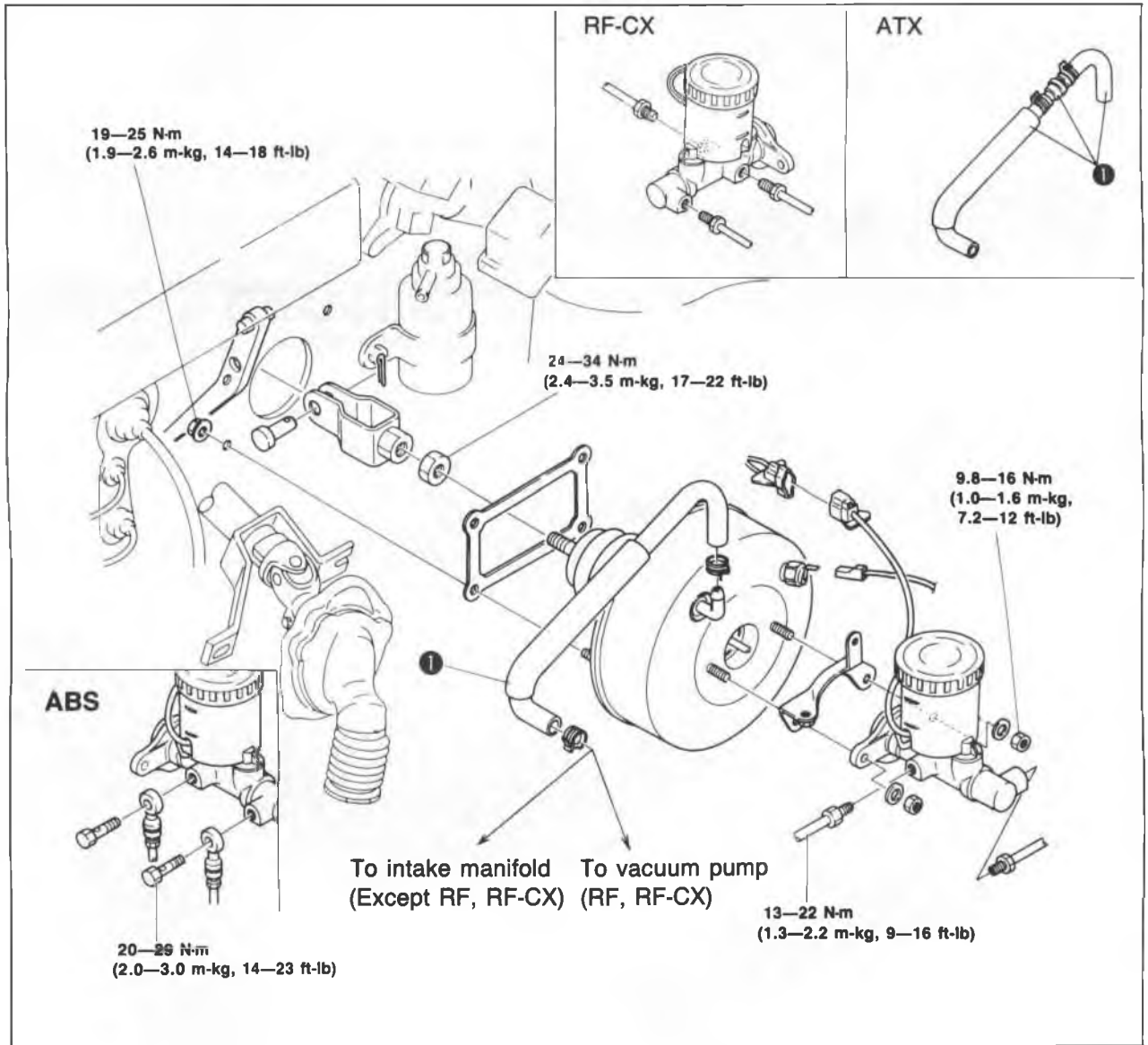
## INSPECTION

1. Inspect all rubber parts. Wipe free of fluid and carefully inspect all rubber parts for cuts, nicks, and other damage.
2. Check the power piston for cracks, distortion, chipping, and damaged seats.
3. Inspect the reaction disc rubber for deterioration.
4. Check that the seats of the valve rod and plunger are smooth and free of nicks and dents.
5. Inspect the front and rear shells for scratches, scores, pits, dents, and other damage.
6. Check the diaphragm for cuts and other damage.

## INSTALLATION

1. Install in the reverse order of removal, referring to installation note for specially marked parts.
2. Tighten all nuts and bolts to the specified torque, referring to torque specifications.
3. After installation:
  - (1) Add fluid and bleed the air. (Refer to page 11—9.)
  - (2) Check all parts for fluid leakage.
  - (3) Make an on-vehicle check of the unit (Refer to page 11—27.)
  - (4) Verify that the vacuum hose does not contact other parts.

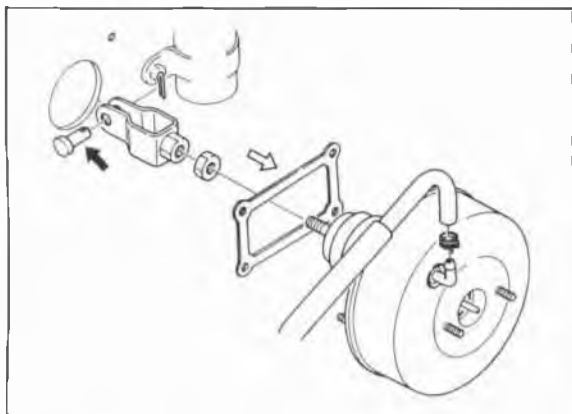
## Torque specifications



76G11X-035

1. Vacuum hose and check valve

# 11 POWER BRAKE UNIT

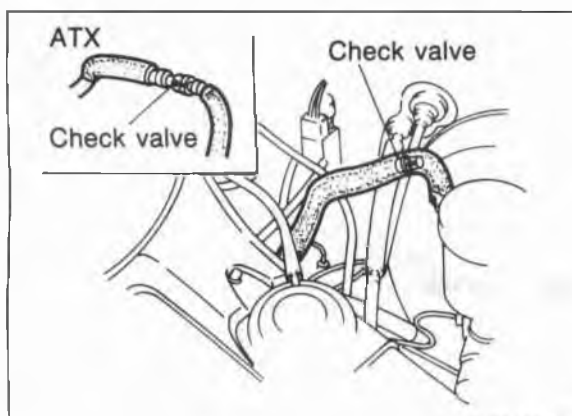


86U11X-057

## Installation Note

### Application of grease and sealant

1. Apply grease to the clevis pin contact surface.
2. Apply sealant to the gasket contact surface.



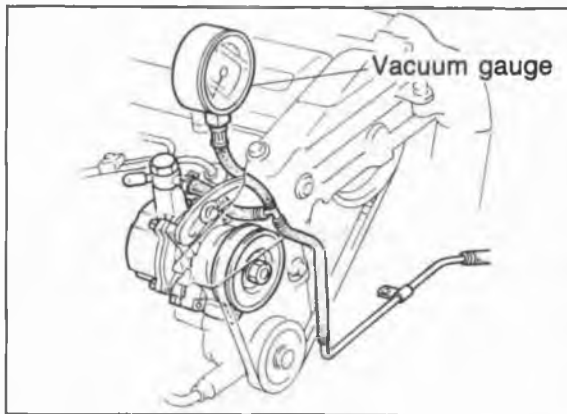
76G11X-036

## Vacuum hose and check valve

Install the vacuum hose and check valve, noting the installation direction.

### Note (MTX)

The check valve is pressed into the vacuum hose. There is an arrow on the hose surface to indicate direction of installation.



76G11X-037

## VACUUM PUMP

1. Disconnect the vacuum hose and release the remaining vacuum.
2. Connect a vacuum gauge as shown in the figure.
3. Run the engine at idle speed.

**Idle speed: 720  $\pm$ <sup>30</sup>/<sub>20</sub> rpm**

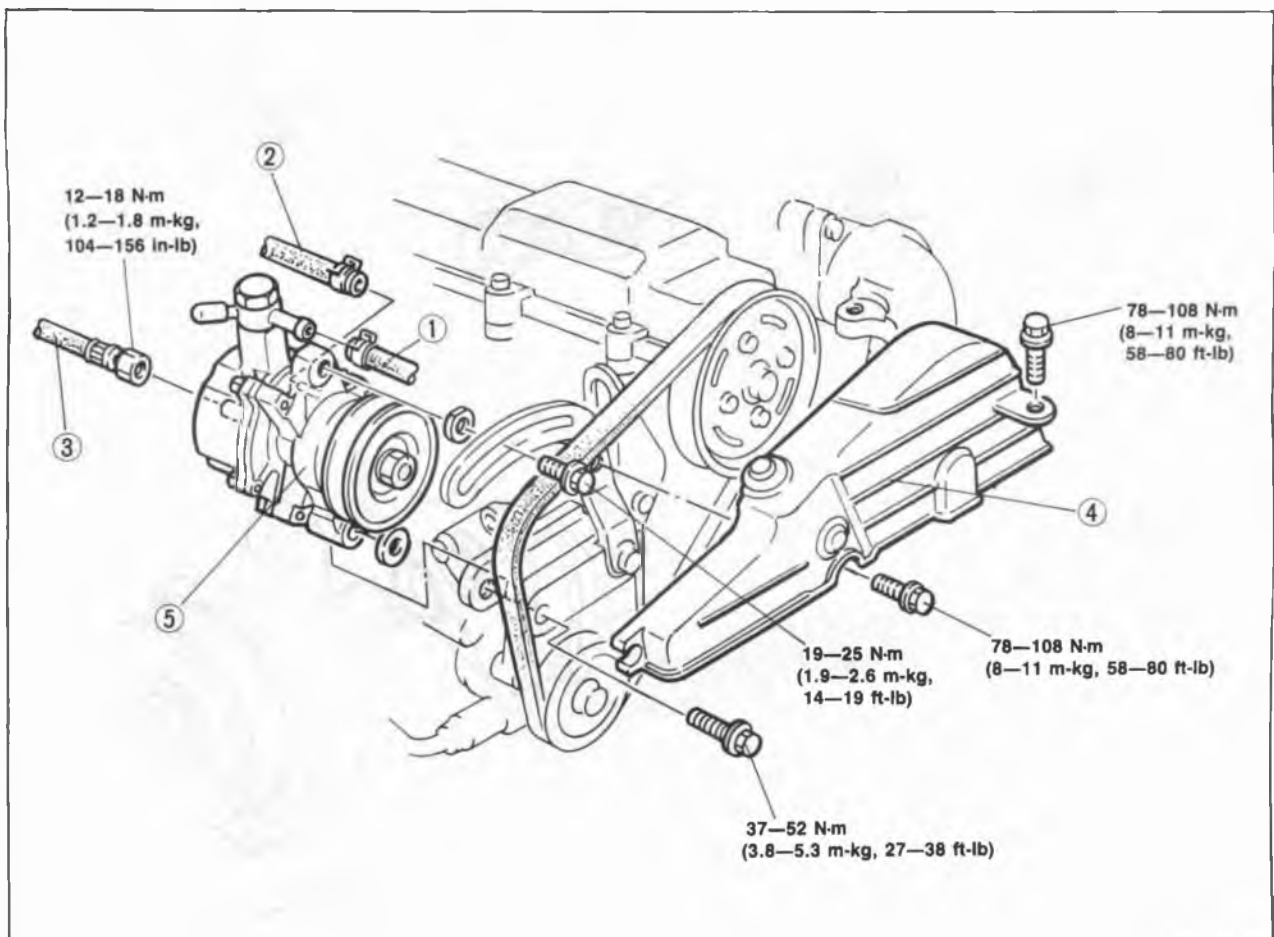
4. Check that the vacuum reaches **500 mmHg (19.7 inHg)** in 8 seconds or less.
5. Check that the maximum vacuum is within approx. **700—720 mmHg (27.6—28.3 inHg)** in 80 seconds or less.

## REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal, referring to installation note for specially marked parts.

### Note

**The engine oil will leak out when disconnecting the oil hose. Prepare a suitable container for it to drain into.**



76G11X-038

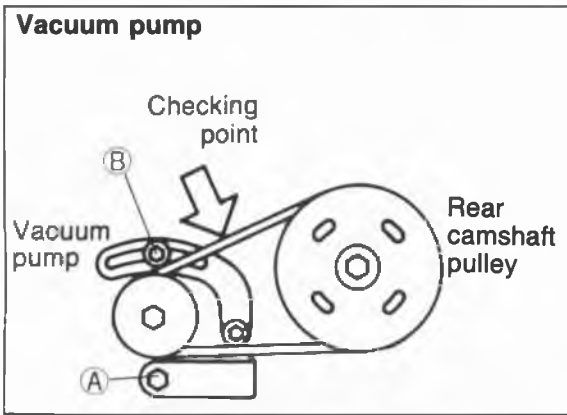
1. Vacuum hose
2. Oil return hose

3. Oil inlet hose
4. Drive velt cover

5. Vacuum pump

# 11 VACUUM PUMP

## Vacuum pump



76G11X-039

## Installation Note

### Belt deflection

### Inspection

Check the belt deflection within specification applying moderate pressure.

### Specification

**New belt: 7.5—8.5mm (0.30—0.33)**

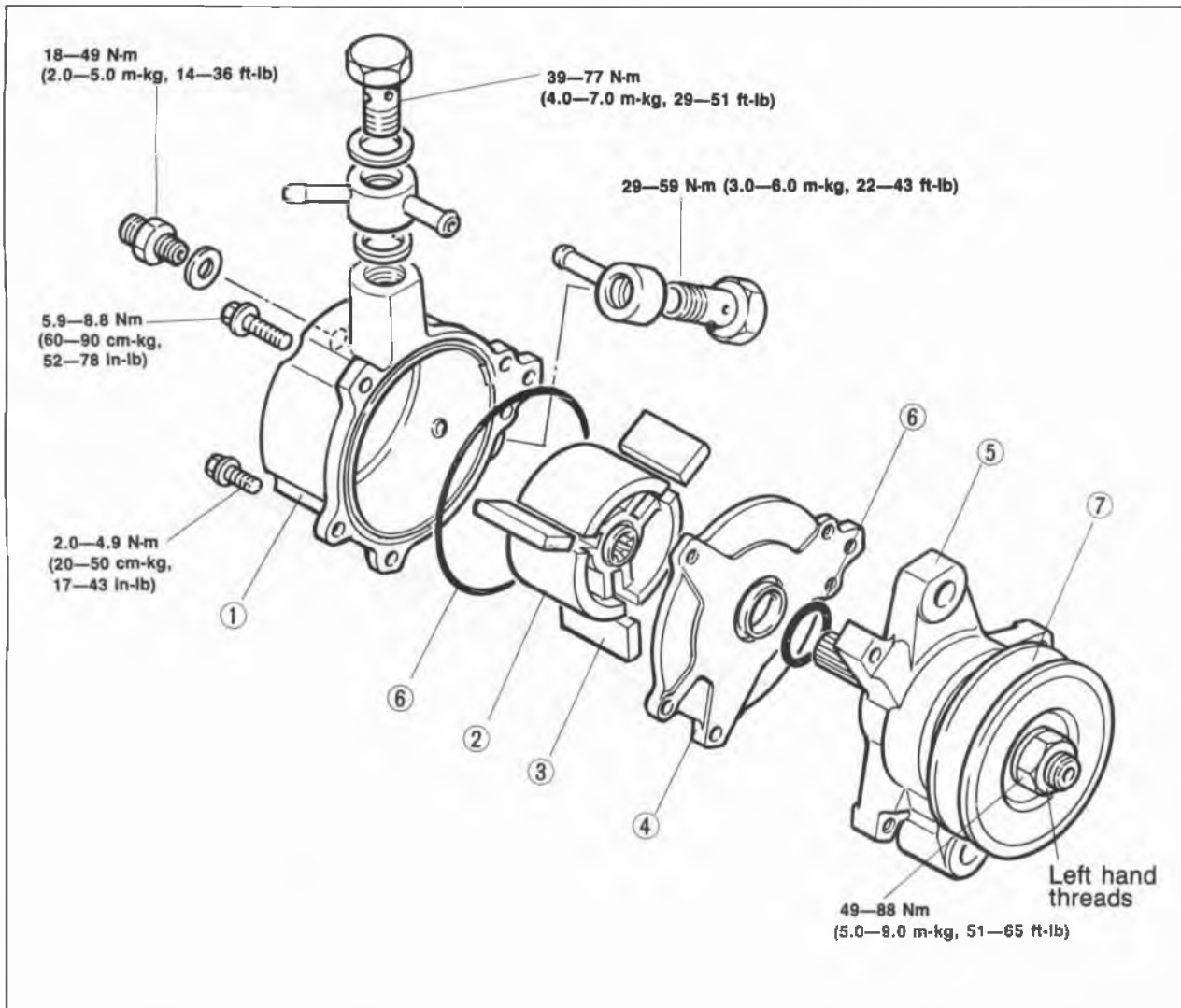
**Used belt: 8.5—9.5 mm (0.33—0.37)**

### Adjustment

1. Loosen the mounting bolt (A) and adjust bolt (B).
2. Lever the vacuum pump outward and apply tension to the belt.
3. Tighten the mounting bolt (A) and adjust bolt (B) to the specified torque. (See page 11—35.)

## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the sequence shown in the figure.
2. Assemble in the reverse order of disassembly.



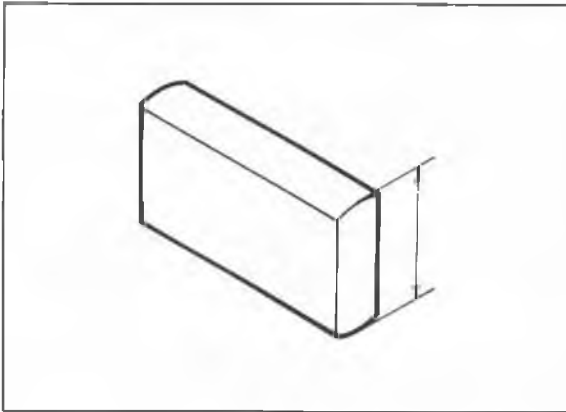
76G11X-040

1. Vacuum pump housing
2. Rotor
3. Vane

4. Center plate
5. Vacuum pump bracket assembly

6. O-ring
7. Pulley





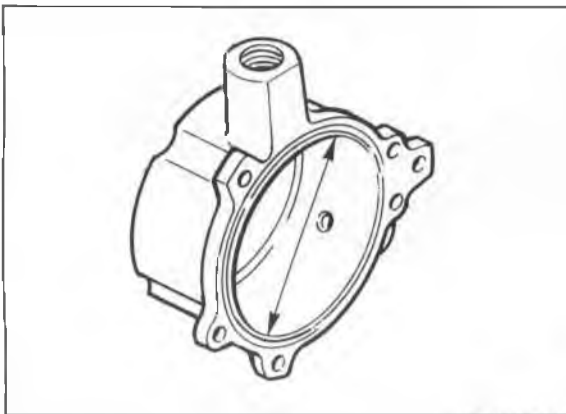
76G11X-041

## INSPECTION

1. Check the rotor, housing and cover for wear or damage.
2. Check the O-ring for deterioration or damage.
3. Check the vane for wear or damage. Replace if necessary.

### Height:

**13.0—13.5 mm (0.512—0.530 in)**



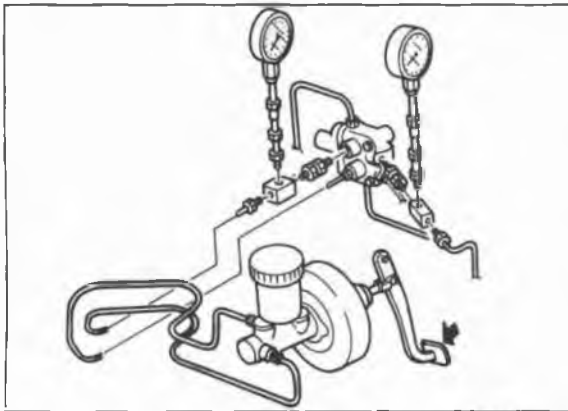
76G11X-042

4. Check the housing inner diameter.

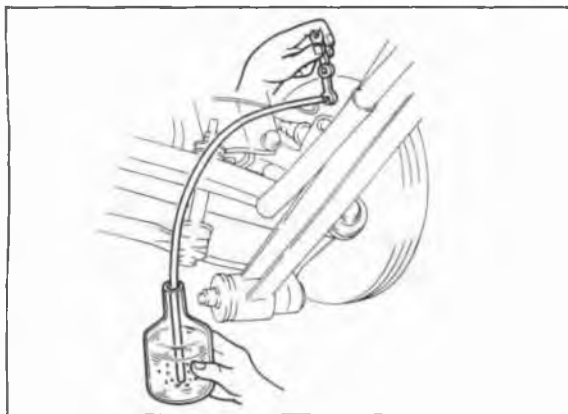
### Diameter:

**57.0—57.1 mm (2.244—2.248 in)**

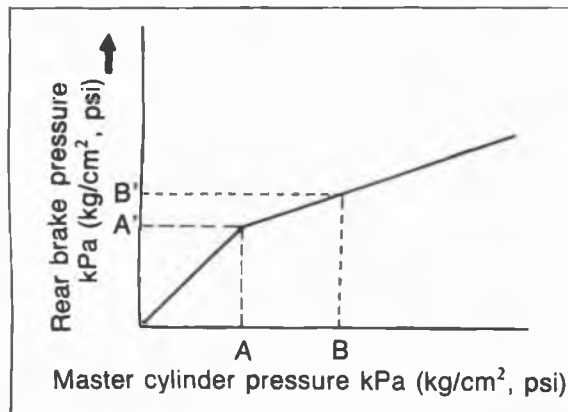
# 11 DUAL PROPORTIONING VALVE



86U11X-060



76G11X-043



76G11X-044

## DUAL PROPORTIONING VALVE

### FUNCTION CHECK

1. Connect two pressure gauges [9,810 kPa (100 kg/cm<sup>2</sup>, 1,422 psi) ] to the brake pipes and adaptors as shown in the figure.

**Adaptor and flare nut tightening torque:**  
 13—22 N·m (1.3—2.2 m·kg, 9—16 ft·lb)

**Note**  
**Disconnect and connect the brake pipes with the SST (49 0259 770B).**

2. Bleed air from the brake system.  
 (Refer to page 11—9.)

3. Depress the brake pedal until the master cylinder pressure equals A; then measure rear brake pressure A'.
4. Depress the brake pedal again; apply additional pressure until A equals B; then measure pressure B'.
5. If the measurements are not within specification, replace the valve assembly.
6. Install the brake pipes to the valve, and bleed air from the brake system.

### Specification

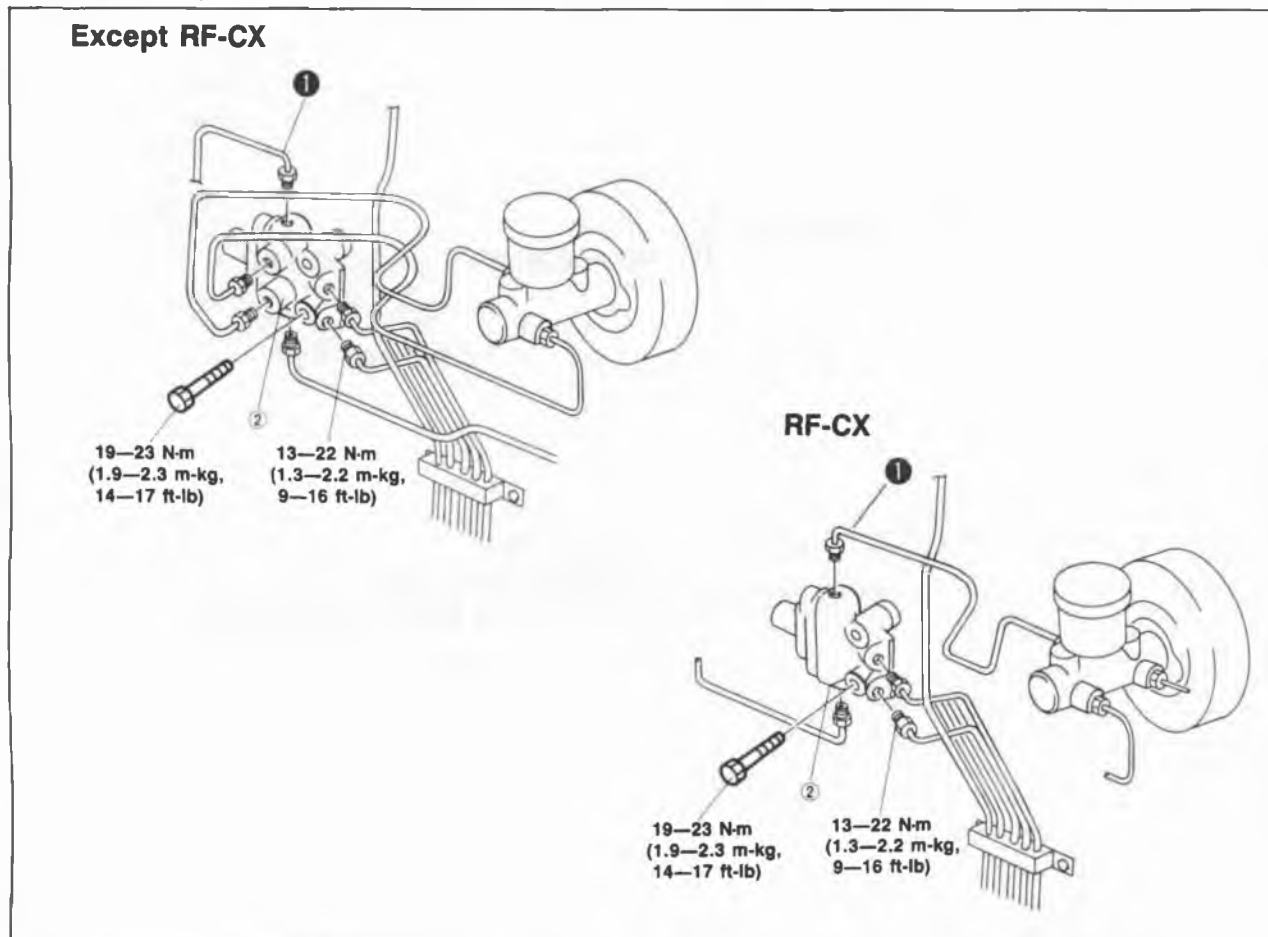
	Fluid pressure kPa (kg/cm <sup>2</sup> , psi)			
	A	A'	B	B'
Except General LHD and RHD	1,962 (20,284)	1,962 ± 196 (20 ± 2, 284 ± 28)	6,867 (70,995)	3,434 ± 196 (35 ± 2, 498 ± 28)
General LHD and RHD	2,943 (30,427)	2,943 ± 196 (30 ± 2, 427 ± 28)		4,120 ± 196 (42 ± 2, 597 ± 28)

## REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure, referring to removal and installation note for specially marked parts.
2. Install in the reverse order of removal.
3. After installation:
  - (1) Add brake fluid and bleed the air. (Refer to page 11—9.)
  - (2) Check the brake lines for fluid leakage.

### Caution

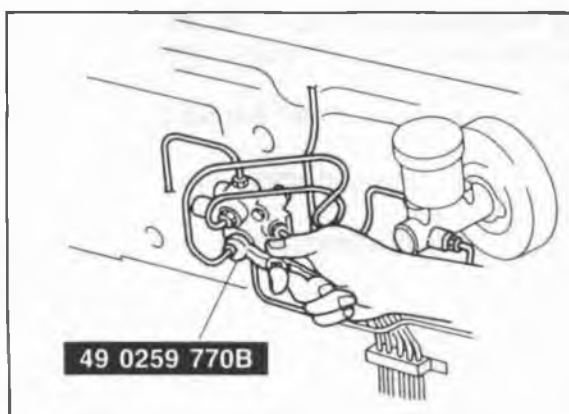
**Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



76G11X-045

1. Brake pipe

2. Dual proportioning valve



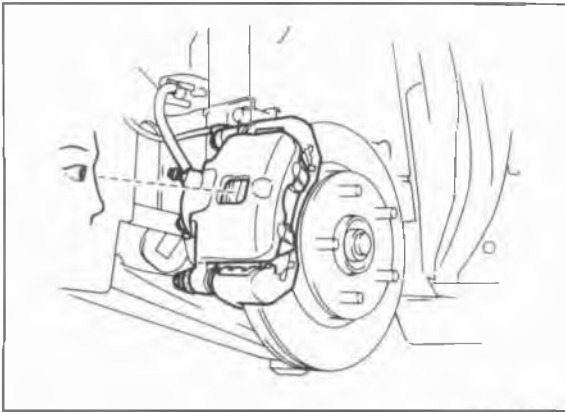
76G11X-103

### Removal and Installation Note

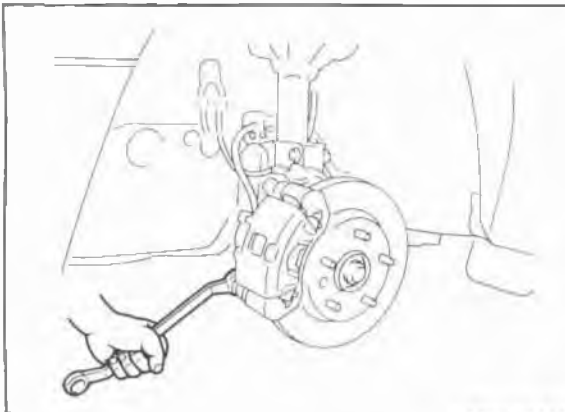
#### Brake pipe

Disconnect or connect the brake pipes with the **SST**.

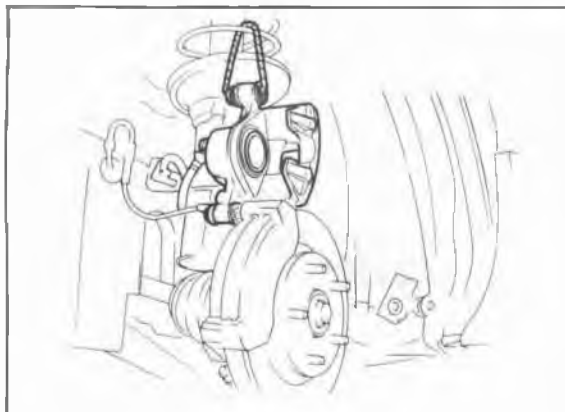
# 11 FRONT DISC BRAKE



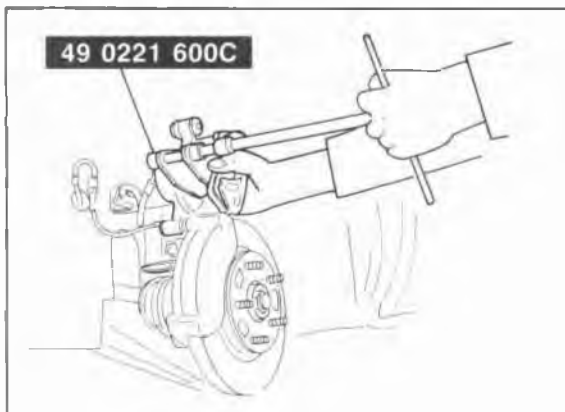
76G11X-073



86U11X-066



76G11X-074



76G11X-075

## FRONT DISC BRAKE

### SIMPLE INSPECTION OF DISC PAD WEAR

1. Loosen the front wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Look through the caliper inspection hole and check that the remaining thickness of the pad is **2 mm (0.08 in) min.**

#### Note

**When the remaining thickness becomes 2 mm (0.08 in), the wear indicator informs that the pad should be replaced by creating a squealing noise before any disc plate damage occurs.**

### REPLACEMENT OF DISC PAD

#### Caution

**Replace the left and right pads at the same time.**

1. Loosen the front wheel lug nuts.
2. Block the rear wheels firmly.
3. Jack up the front of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove the lower mounting bolt.
6. Pivot the caliper on the top bolt and support it.
7. Remove the V-springs.

#### Note

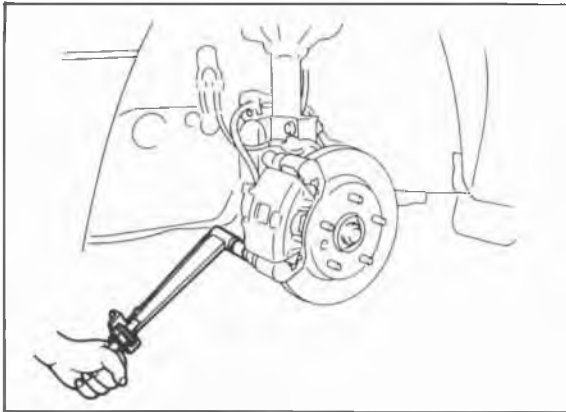
**V-springs are equipped for non-asbestos pad type.**

8. Remove the pads and shims.

#### Warning (Asbestos pad type)

**Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.**

9. Apply the grease supplied in the pad attachment set to the new shims, and attach them to the new pads.
10. Push the piston inward with the **SST** and the old pad.
11. Install the new pads and shims into the mounting support.
12. Install the V-springs (non-asbestos pad type).

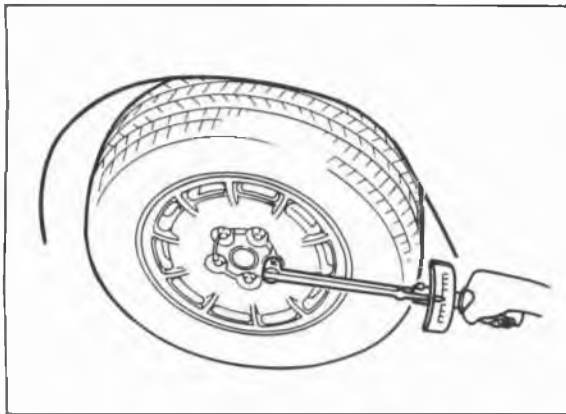


76G11X-076

13. Lower the caliper assembly onto the mounting support.
14. Tighten the mounting bolt to the specified torque.

**Tightening torque:**

**31—41 N·m (3.2—4.2 m·kg, 23—30 ft·lb)**



76G11X-077

15. Mount the wheels.
16. Apply the brakes a few times; then turn the wheels and check that the brakes do not drag excessively.
17. Lower the vehicle.
18. Tighten the wheel lug nuts.

**Tightening torque:**

**88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**

# 11 FRONT DISC BRAKE

## REMOVAL

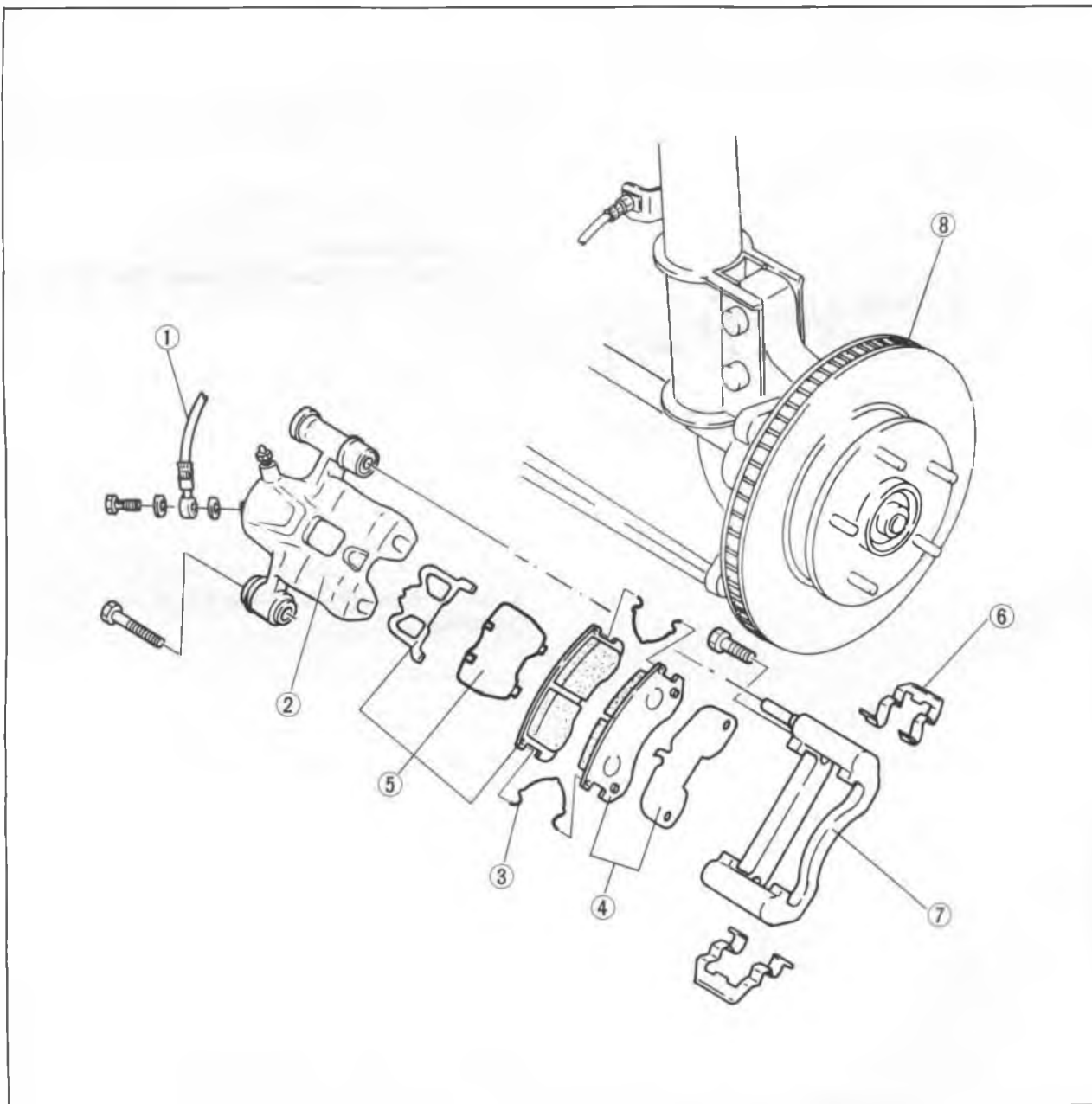
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the sequence shown in the figure.

### Warning

Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.

### Caution

Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.

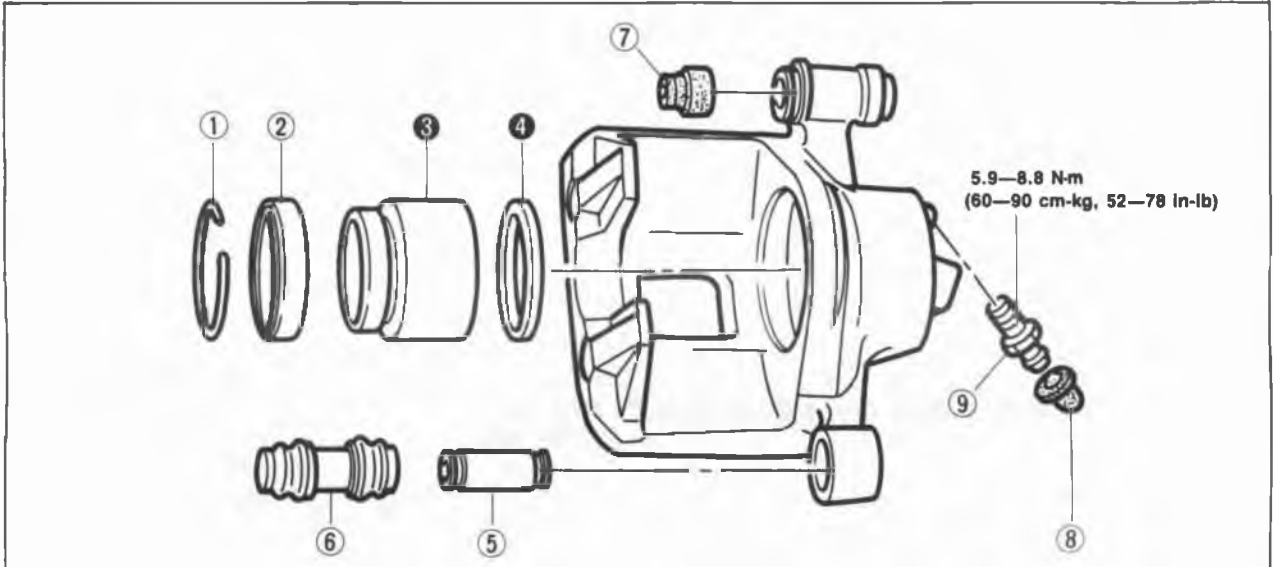


76G11X-078

- |                       |                                    |
|-----------------------|------------------------------------|
| 1. Flexible hose      | 5. Inner pad and shim              |
| 2. Caliper assembly   | 6. Guide plate                     |
| 3. V-spring           | 7. Mounting support                |
| 4. Outer pad and shim | 8. Disc plate (Refer to section 9) |

## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the sequence shown in the figure, referring to disassembly note for specially marked parts.
2. Inspect all parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.

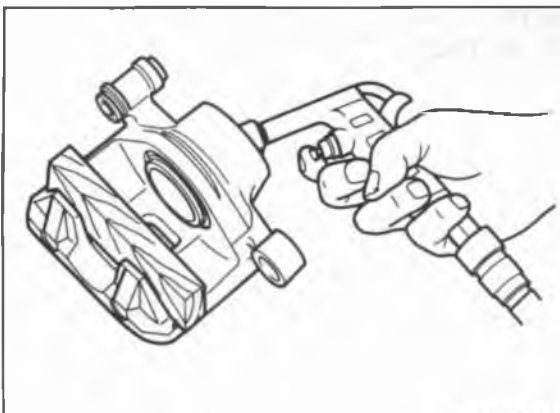


76G11X-079

1. Snap ring
2. Dust seal
3. Piston

4. Piston seal
5. Guide pin
6. Pin boot

7. Bushing
8. Cap
9. Bleeder screw



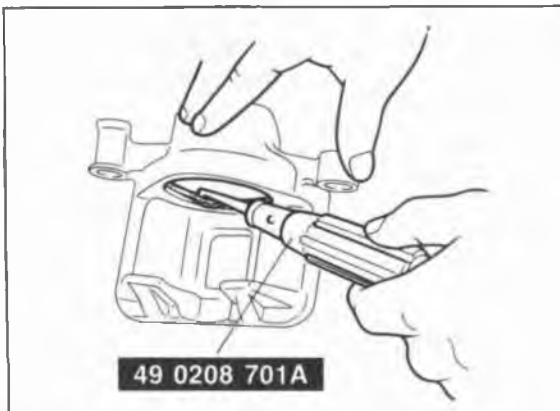
76G11X-080

### Disassembly Note Piston

Place a piece of wood in the caliper; then blow compressed air through the hose connection hole to force out the piston.

### Caution

**Blow the compressed air a little at a time to prevent the piston from popping out.**

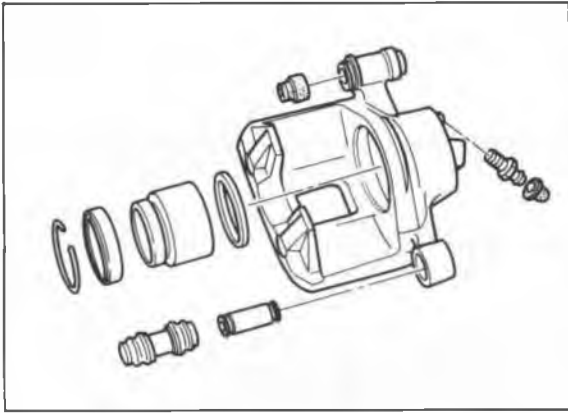


86U11X-074

### Piston seal

Remove the piston seal from the caliper with the **SST**.

# 11 FRONT DISC BRAKE

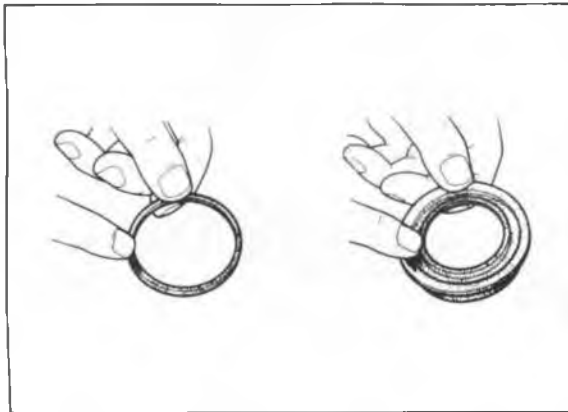


86U11X-075

## Inspection Note

Check the following and replace any faulty parts.

1. Cylinder and piston for wear or rust
2. Caliper body for damage or cracks
3. Boot for damage or poor sealing



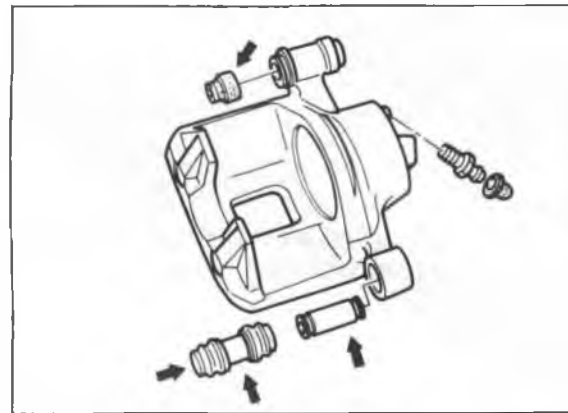
76G11X-081

## Assembly Note

### Application of grease

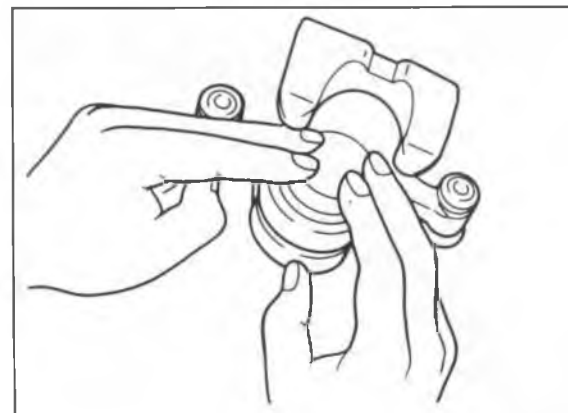
Coat the following parts with the grease supplied in the seal kit.

1. Piston seal
2. Dust seal



86U11X-077

3. Guide pin
4. Guide pin boot
5. Bushing

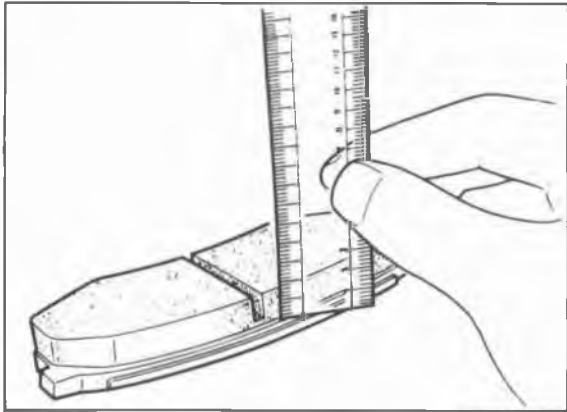


86U11X-078

## Piston

Coat the piston and the cylinder with brake fluid; then insert the piston straight into the cylinder.





86U11X-079

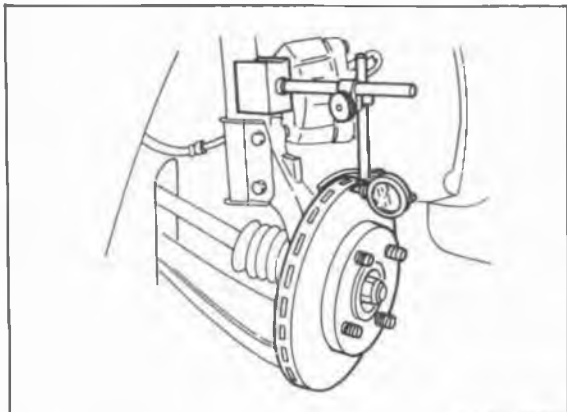
## INSPECTION

Check the following and replace any faulty parts.

### Disc Pad

1. Oil or grease on facing
2. Abnormal wear or cracks
3. Deterioration or heat damage
4. Remaining lining thickness

**Thickness: 2.0 mm (0.08 in) min.**



86U11X-080

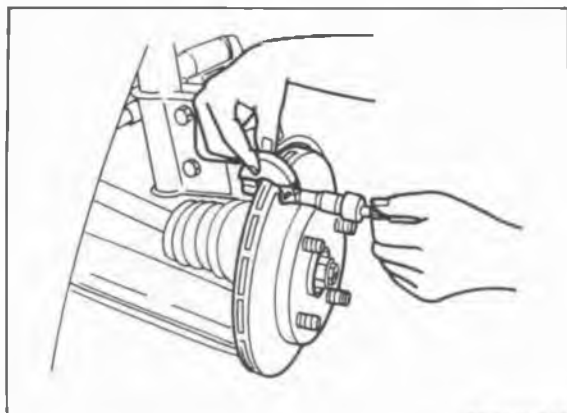
### Disc Plate

1. Runout

**Runout: 0.1 mm (0.004 in) max.**

### Caution

- a) There must be no wheel bearing looseness.
- b) Measure at the outer edge of the disc plate surface.



76G11X-046

2. Wear or damage

### Thickness specifications:

	mm (in)	
	Standard	Minimum
13 inch-wheel	20 (0.79)	18 (0.71)
14 or 15 inch-wheel	24 (0.94)	22 (0.86)

# 11 FRONT DISC BRAKE

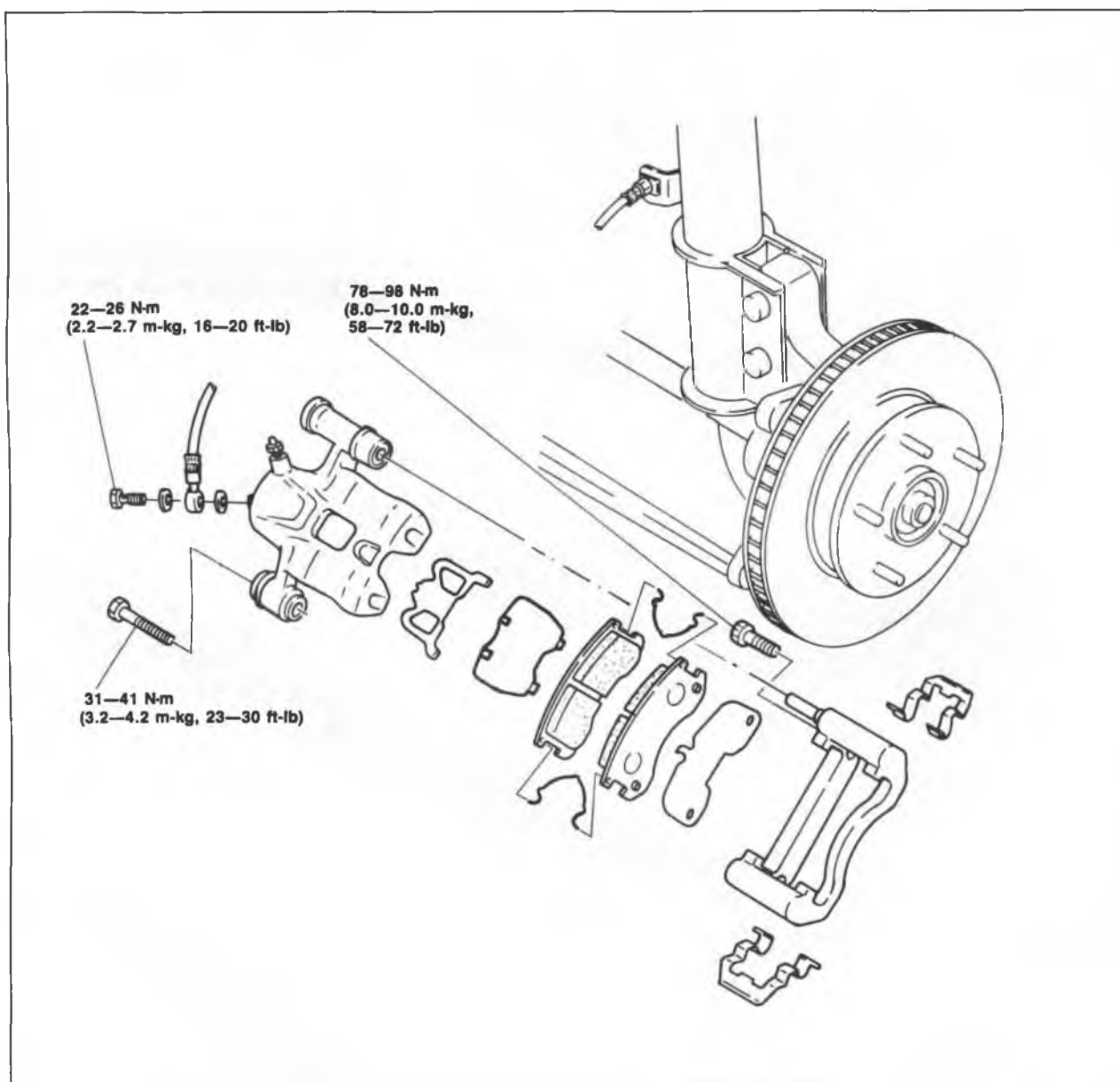
## INSTALLATION

1. Install in the reverse order of removal.
2. Tighten all nuts and bolts to the specified torque, referring to torque specifications.
3. After installation:
  - (1) Add brake fluid and bleed air. (Refer to page 11—9.)
  - (2) Depress the brake pedal a few times and check that the front brakes do not drag excessively while the wheels are being rotated.

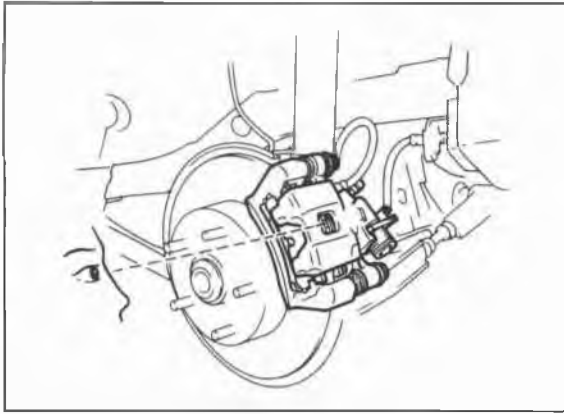
### Note

Refer to page 11—40 for pad installation.

## Torque specifications



76G11X-047

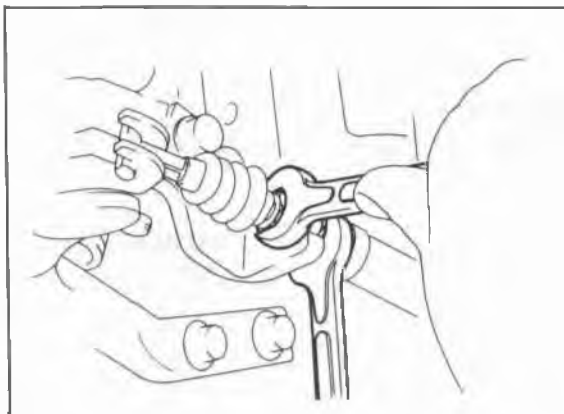


76G11X-082

## REAR DISC BRAKE

### SIMPLE INSPECTION OF DISC PAD WEAR

1. Loosen the rear wheel lug nuts.
2. Jack up the rear of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Look through the caliper inspection hole and check that the remaining thickness of the pad is **1 mm (0.04 in) min.**



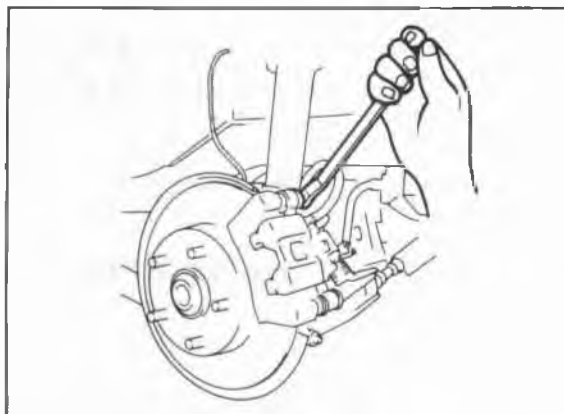
86U11X-084

### REPLACEMENT OF DISC PAD

#### Caution

**Replace the left and right pads at the same time.**

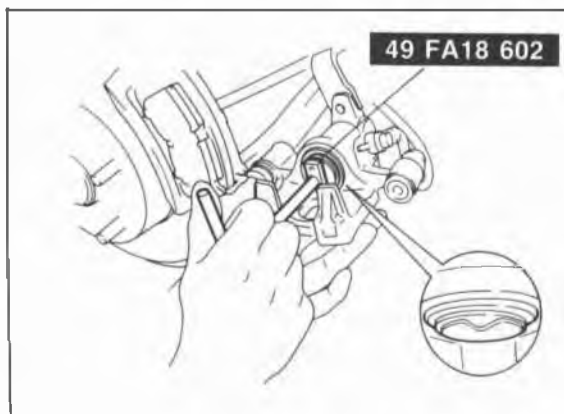
1. Loosen the wheel lug nuts.
2. Release the parking brakes.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove the parking brake cable from the cable bracket and the operating lever.
6. Remove the upper mounting bolt; then pivot the caliper.
7. Remove the V-springs.
8. Remove the pads and shims.



86U11X-085

#### Warning

**Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.**



86U11X-086

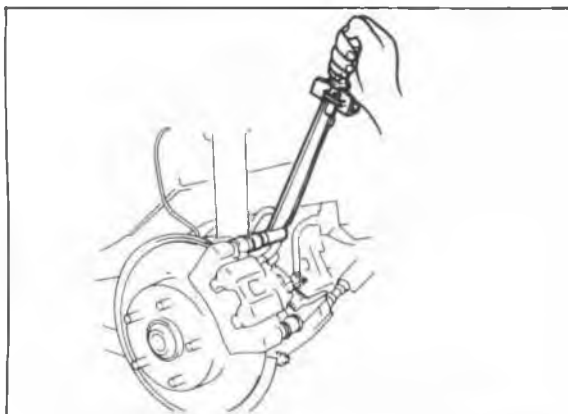
9. Apply the grease supplied in the pad attachment set to the new shims; then attach them to the new pads.
10. Turn the piston fully inward by rotating the **SST** clockwise. Align the piston groove as shown in the illustration.

#### Note

**The piston groove and inner pad alignment pin must be aligned when the inner pad is installed.**

11. Install the pads and shims to the mounting support.
12. Install the pad clip.

# 11 REAR DISC BRAKE

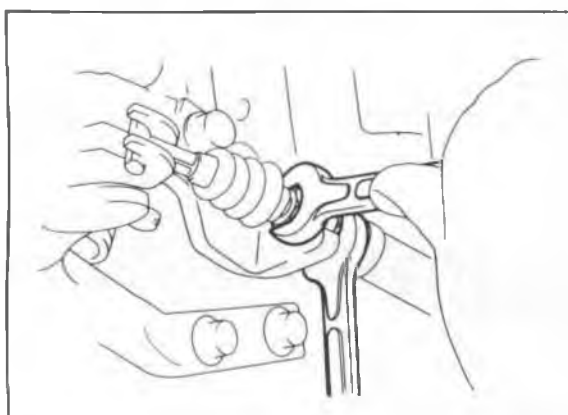


86U11X-087

13. Lift the caliper assembly onto the mounting support.
14. Tighten the mounting bolt to the specified torque.

**Tightening torque:**

**16—24 N·m (1.6—2.4 m·kg, 12—17 ft·lb)**



86U11X-088

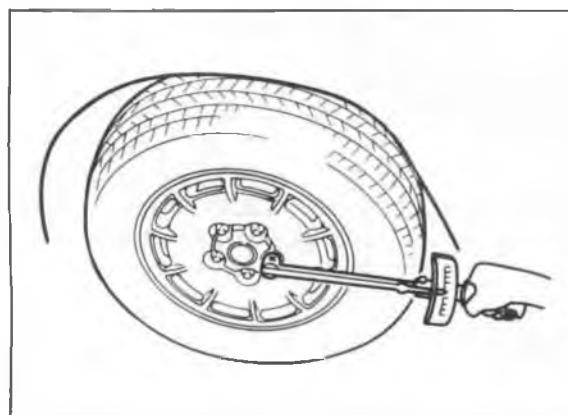
15. Connect the parking cable end to the operating lever; then tighten the locknut.

**Tightening torque:**

**20—28 N·m (2.0—2.9 m·kg, 14—21 ft·lb)**

**Caution**

**There must be no clearance between the cable end and the operating lever.**



76G11X-083

16. Mount the wheels.
17. Apply the brakes a few times; then check that the brakes do not drag excessively while the wheels are being rotated.
18. Lower the vehicles.
19. Tighten the wheel lug nuts.

**Tightening torque:**

**88—118 N·m (9—12 m·kg, 65—87 ft·lb)**

## REMOVAL

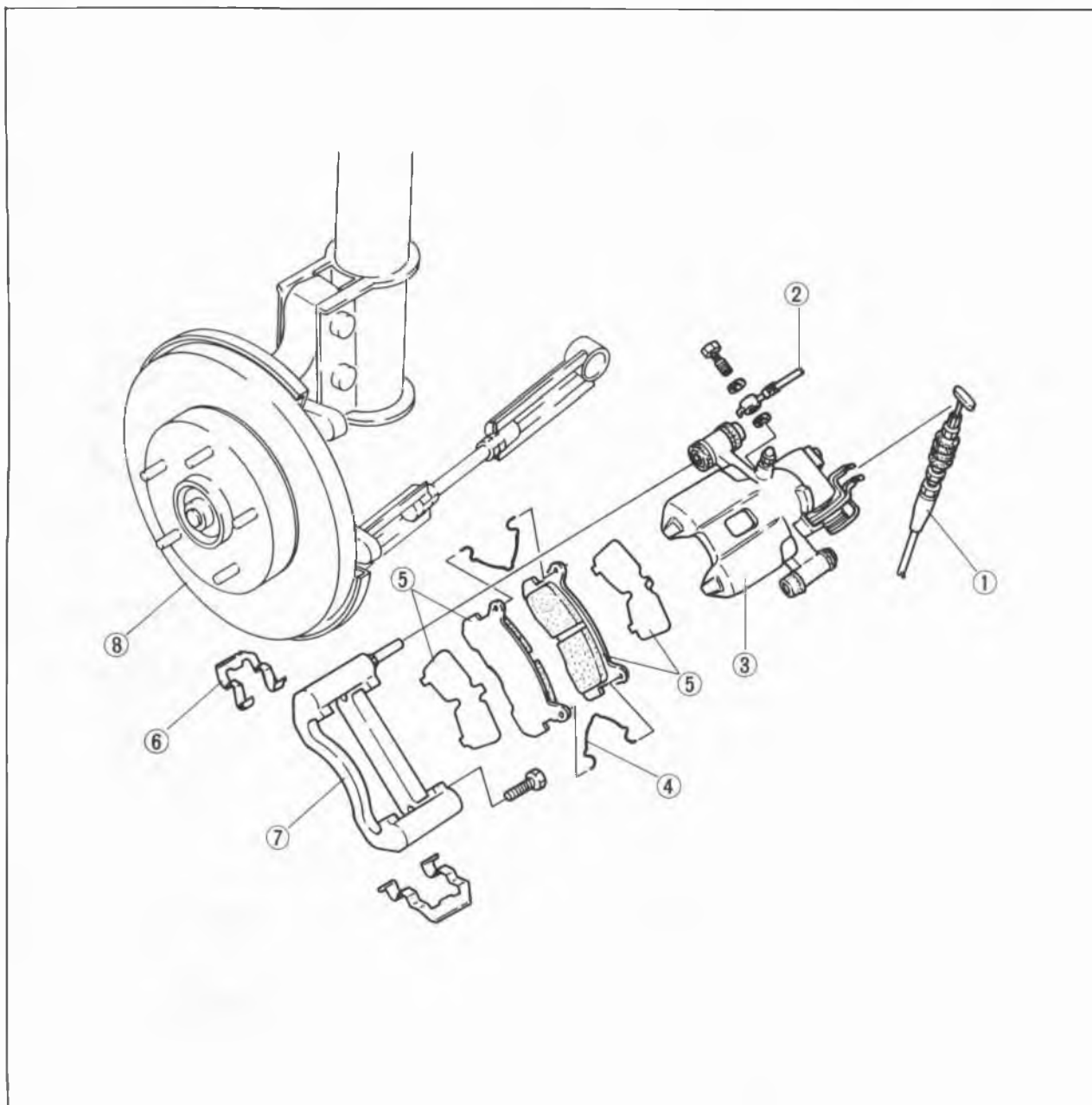
1. Loosen the wheel lug nuts.
2. Release the parking brakes.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure.

## Warning

**Asbestos dust is a health hazard. Do not blow away brake dust with compressed air.**

## Caution

**Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



76G11X-084

1. Parking brake cable
2. Flexible hose
3. Caliper assembly

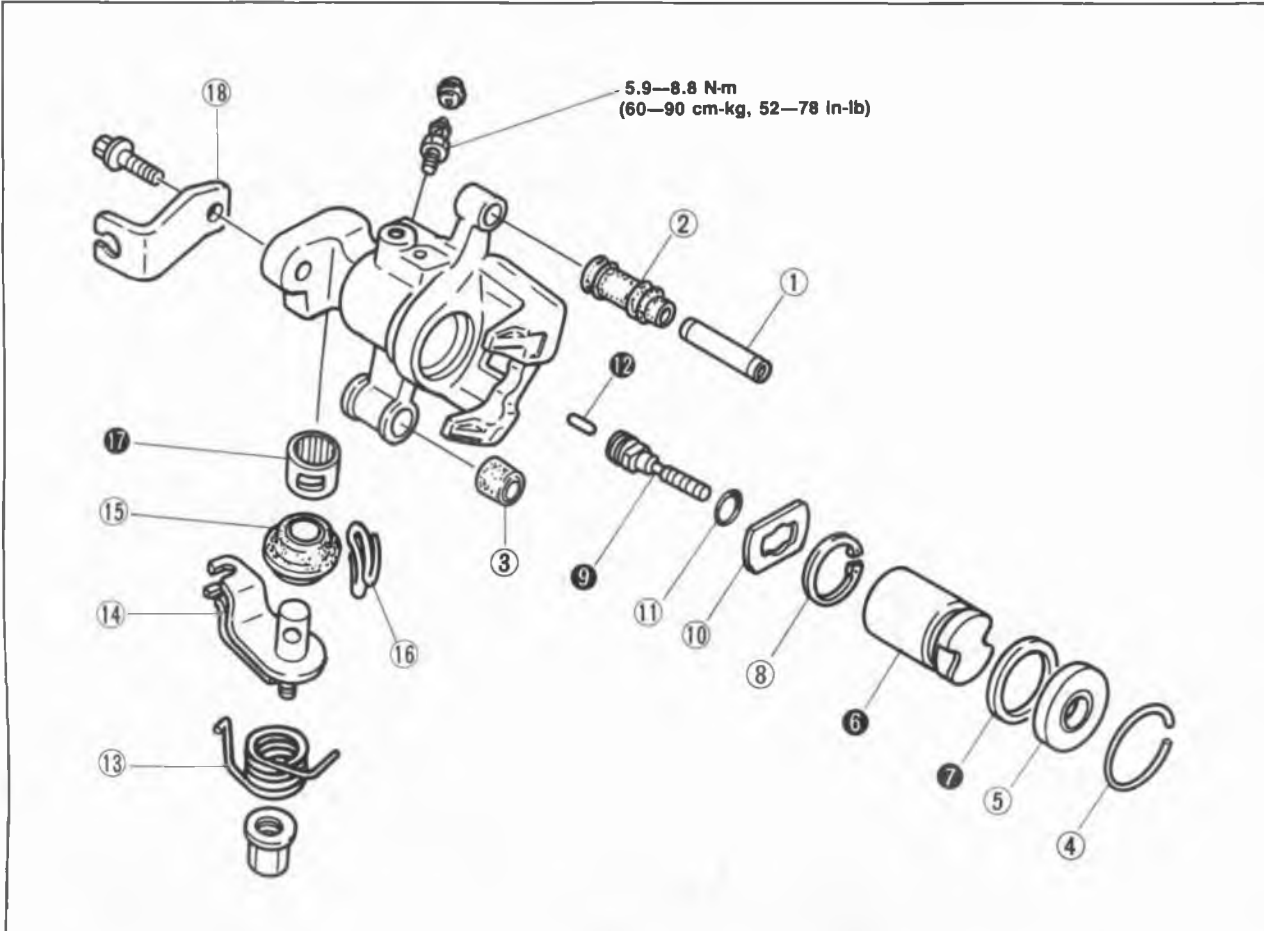
4. V-spring
5. Pad and shim
6. Guide plate

7. Mounting support
8. Disc plate  
(Refer to section 9)

# 11 REAR DISC BRAKE

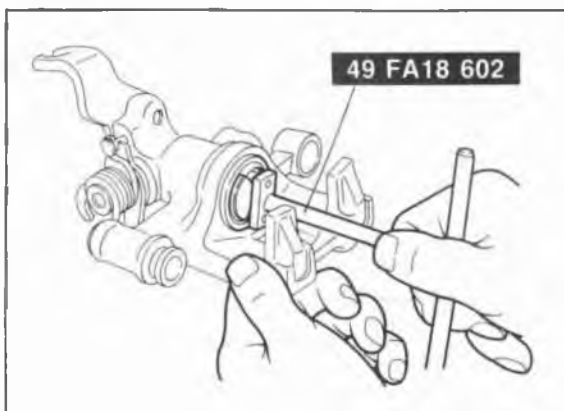
## DISASSEMBLY AND ASSEMBLY

1. Disassemble the caliper in the sequence shown in the figure, referring to disassembly note for specially marked parts.
2. Inspect all parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.



76G11X-085

- |                   |                     |                     |
|-------------------|---------------------|---------------------|
| 1. Guide pin      | 7. Piston seal      | 13. Return spring   |
| 2. Pin boot       | 8. Snap ring        | 14. Operating lever |
| 3. Bushing        | 9. Adjuster spindle | 15. Boot            |
| 4. Retaining ring | 10. Stopper         | 16. Boot clip       |
| 5. Dust seal      | 11. O-ring          | 17. Needle bearing  |
| 6. Piston         | 12. Connecting link | 18. Cable bracket   |



86U11X-092

### Disassembly Note

#### Piston

Remove the piston with the **SST**.

#### Note

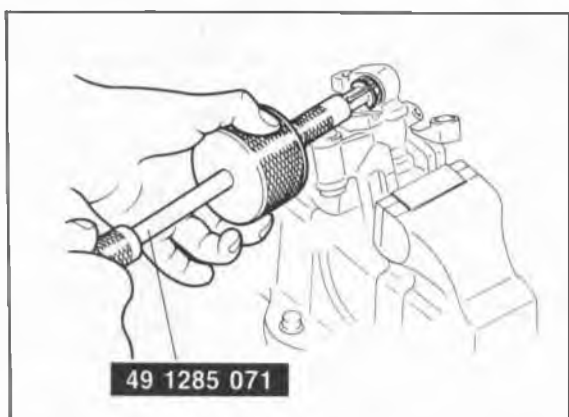
**The piston can be removed by turning the SST counterclockwise.**



86U11X-093

### Piston seal

Remove the piston seal with the **SST**.



86U11X-094

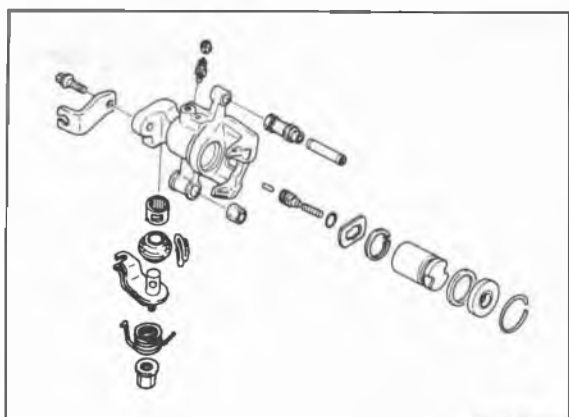
### Needle bearing

1. Secure the caliper in a vise.

#### Caution

**Insert a soft, protective material (such as copper plates) in the jaws of the vise.**

2. Remove the needle bearing from the caliper with the **SST**.

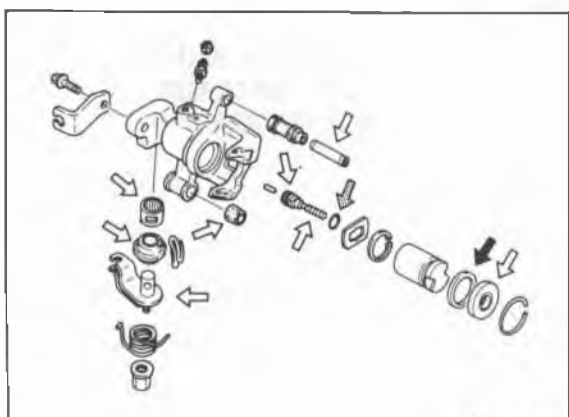


86U11X-095

### Inspection Note

Check the following and repair or replace any faulty parts.

1. Cylinder and piston for wear and rust
2. Caliper body for damage and cracks
3. Sleeve bolt and sleeve for damage and wear
4. Guide pin for damage and rust
5. Adjuster spindle threads for damage



86U11X-096

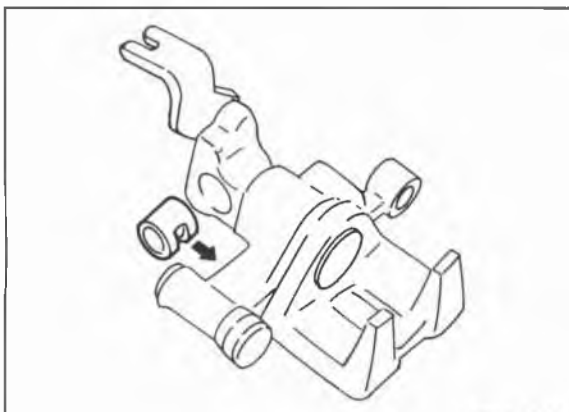
### Assembly Note

#### Application of grease

Before assembly, apply the grease supplied in the seal kit to the parts indicated by the arrows.

- ⇨ : Orange grease
- ⇨⇨ : White grease
- ⇨ : Red grease

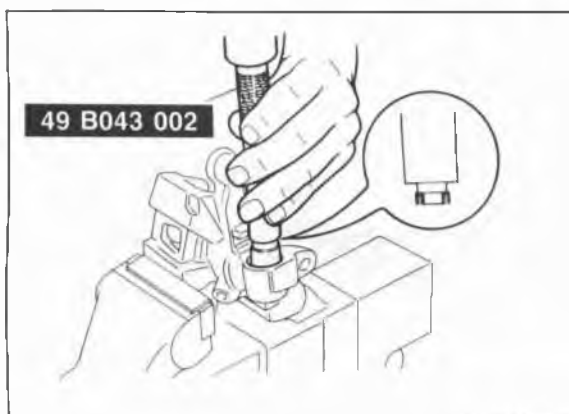
# 11 REAR DISC BRAKE



86U11X-097

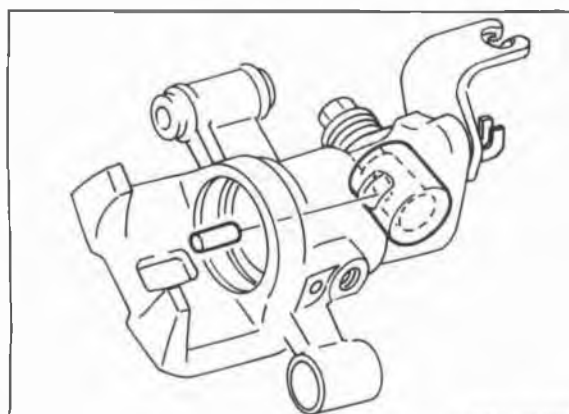
## Needle bearing

1. Align the needle bearing hole with the caliper hole, and set the needle bearing in the caliper.



86U11X-098

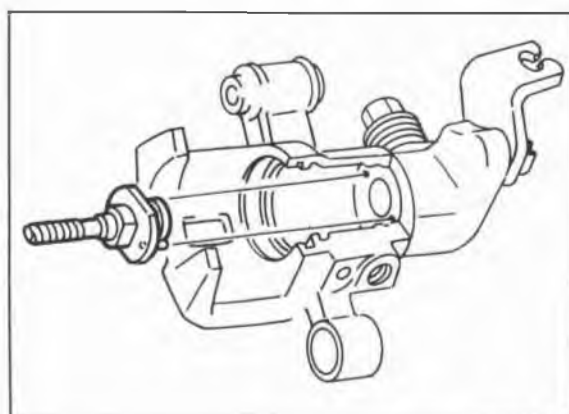
2. Press the needle bearing into the caliper with the **SST** until the **SST** bottoms against the caliper.



86U11X-099

## Connecting link

Install the connecting link into the operating lever.

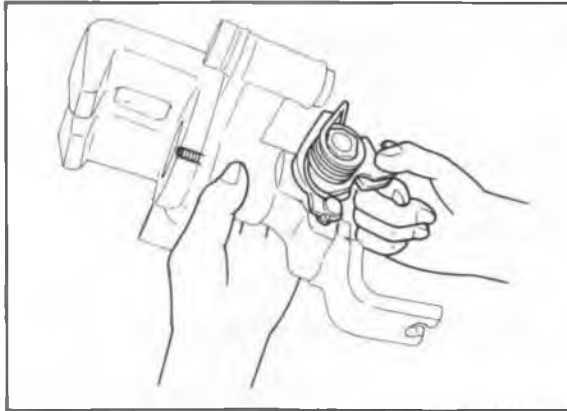


86U11X-100

## Adjuster spindle

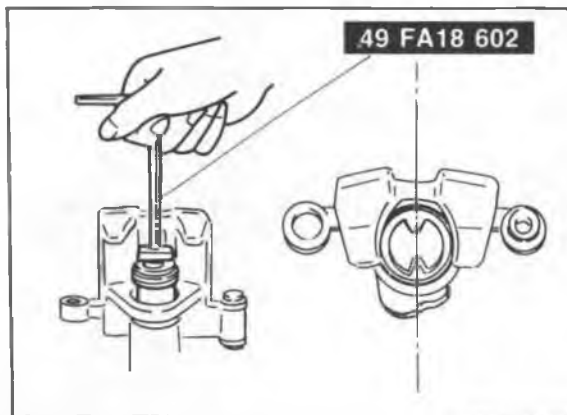
1. Assemble the adjuster spindle and the stopper.
2. Install the adjuster and stopper straight into the caliper cylinder with the two stopper pins fit into the caliper.
3. Install the snap ring.





86U11X-101

4. Move the operating lever and check that the adjuster spindle moves smoothly.



87U11X-102

### Piston

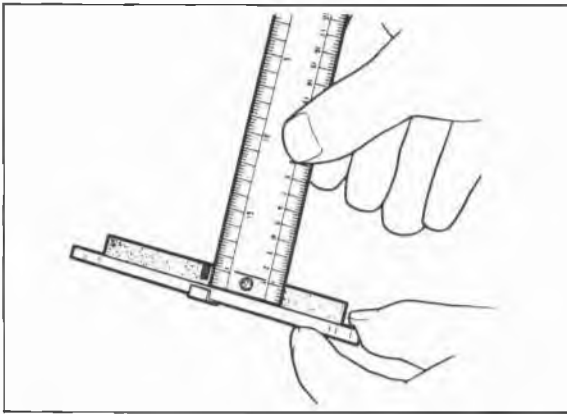
1. Clean the piston.
2. Install the dust seal in the piston groove.
3. Turn the piston into the caliper cylinder while rotating the **SST** clockwise.

### Note

**Turn the piston in fully, and align the piston grooves as shown in the illustration.**

4. Fit the dust seal into the caliper cylinder.

# 11 REAR DISC BRAKE



76G11X-086

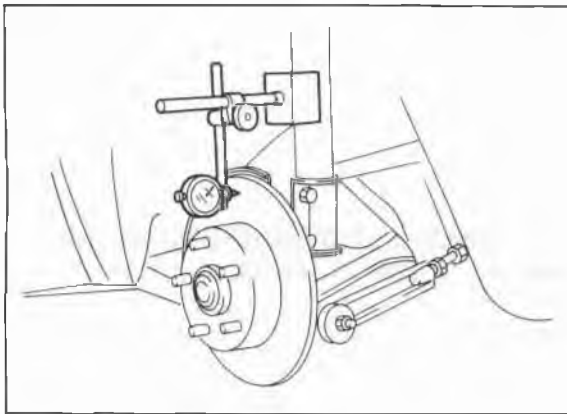
## INSPECTION

Check the following and replace or repair any faulty parts.

### Disc Pad

1. Oil or grease on facing
2. Abnormal wear or cracks
3. Deterioration or heat damage
4. Remaining lining thickness

**Thickness: 1 mm (0.04 in) min.**



86U11X-104

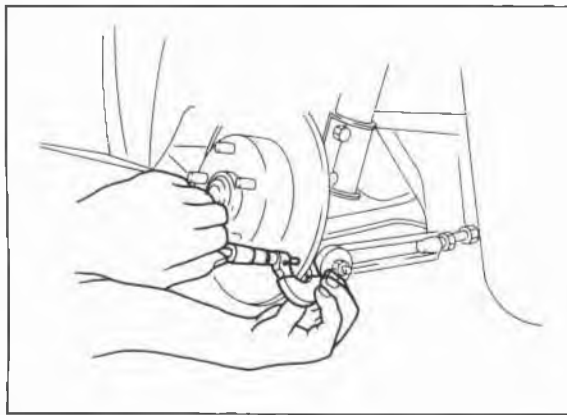
### Disc Plate

1. Runout

**Runout: 0.1 mm (0.004 in) max.**

### Caution

- a) There must be no wheel bearing looseness.
- b) Measure at the outer edge of the disc plate surface.



86U11X-105

2. Wear or damage

### Thickness

**Standard: 10 mm (0.39 in)**

**Minimum: 8 mm (0.31 in)**

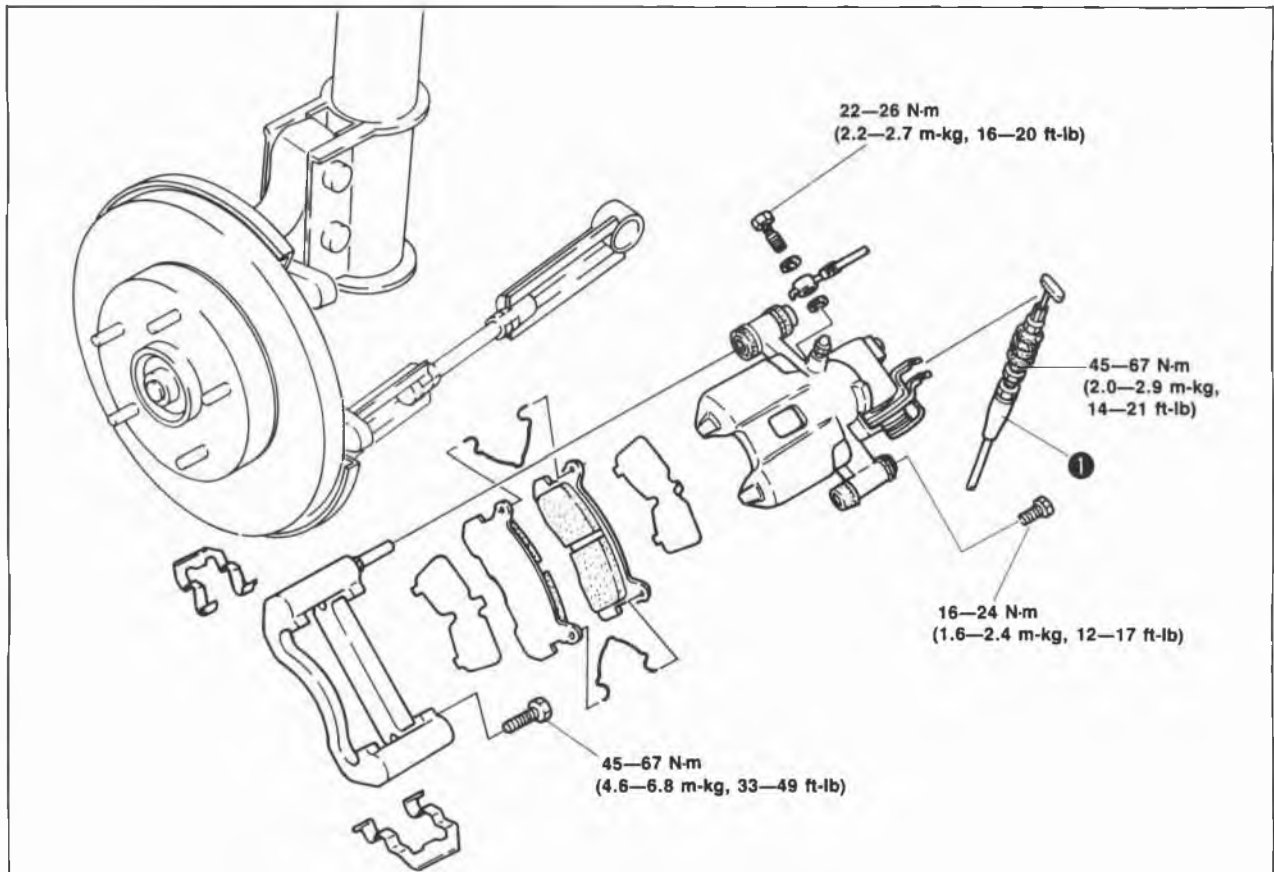
## INSTALLATION

1. Install in the reverse order of removal, referring to installation note for the specially marked parts.
2. Tighten all nuts and bolts to the specified torque, referring to torque specifications.
3. After installation:
  - (1) Add brake fluid and bleed air. (Refer to page 11—9.)
  - (2) Adjust the parking brake lever stroke. (Refer to page 11—65.)
  - (3) Depress the brake pedal a few times and check that the rear brakes do not drag excessively while the wheels are being rotated.

### Note

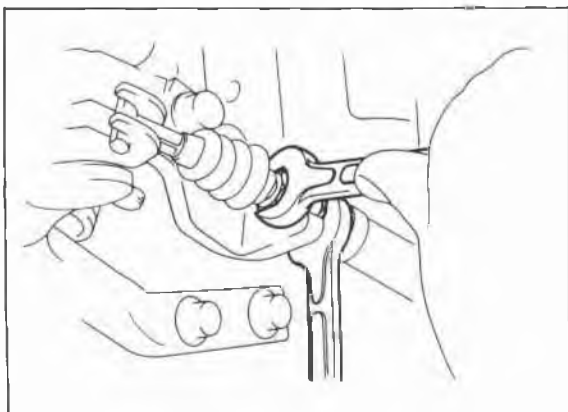
Refer to page 11—47 for pad installation.

## Torque specifications



76G11X-048

1. Parking brake cable



86U11X-107

### Installation Note Parking brake cable

Connect the parking brake cable end onto the operating lever; then fix it to the bracket by the locknut.

### Caution

**There must be no clearance between the cable end and the operating lever.**

# 11 REAR DRUM BRAKE

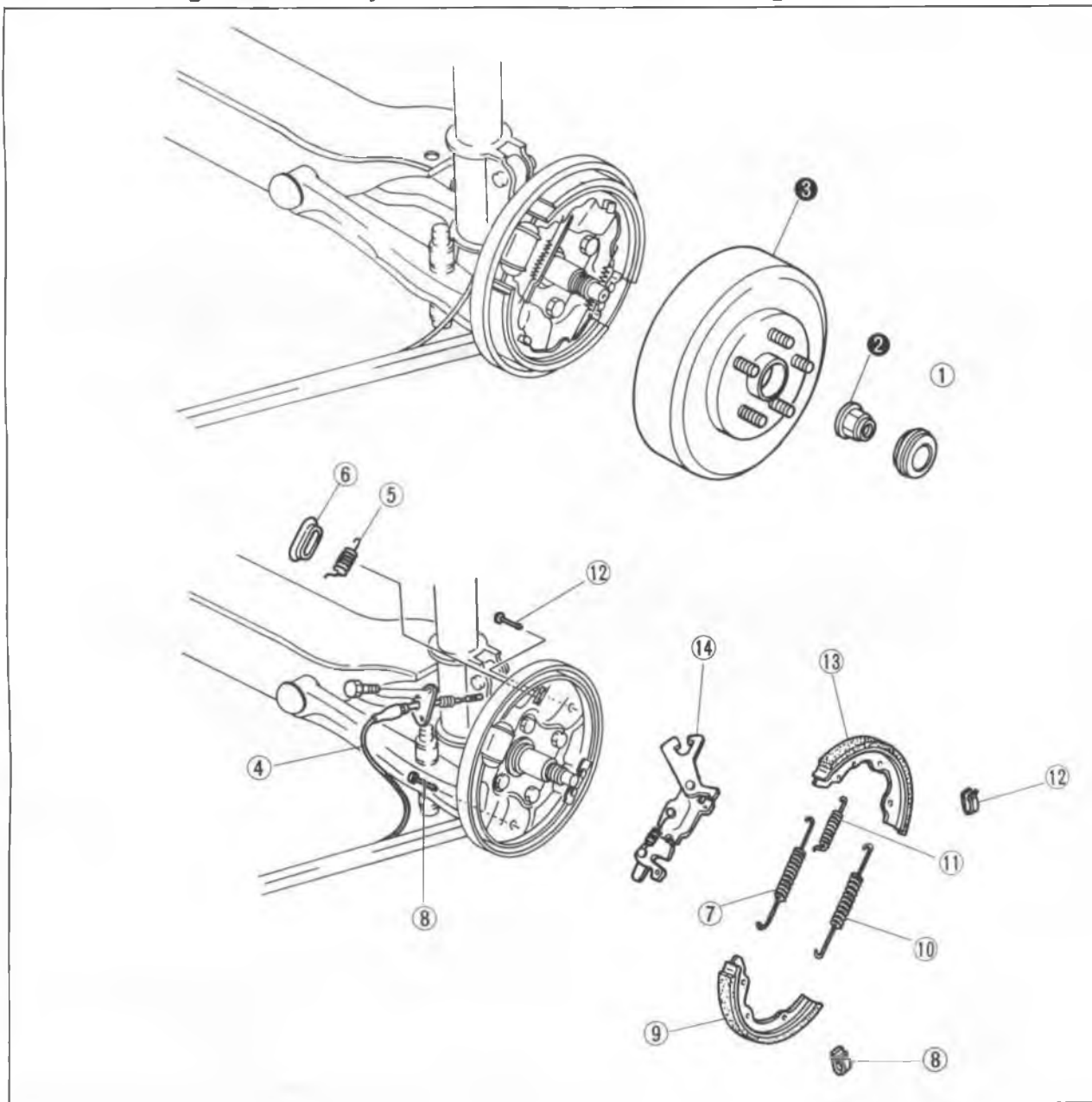
## REAR DRUM BRAKE

### REMOVAL

1. Loosen the wheel lug nuts.
2. Release the parking brakes.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure, referring to removal note for the specially marked parts.

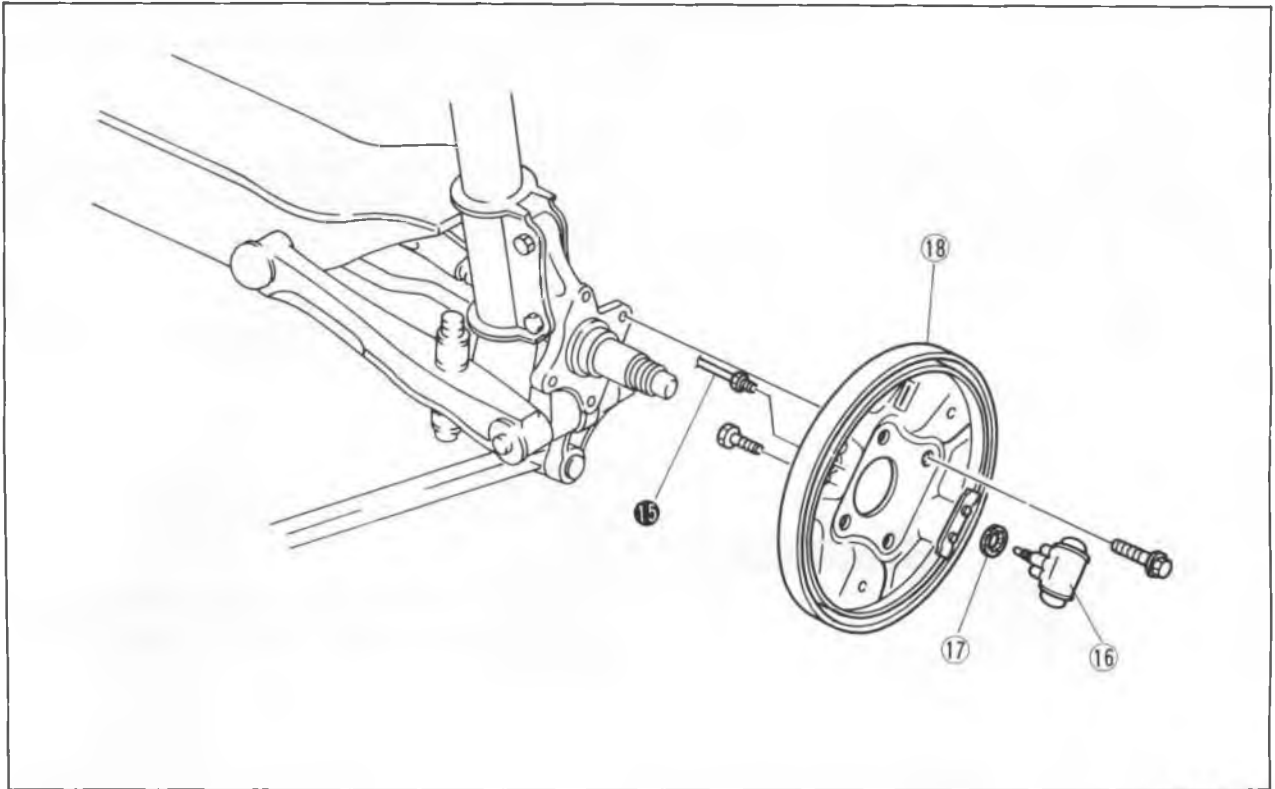
### Caution

Do not damage the wheel cylinder dust boots when removing the brake shoes.



86U11X-108

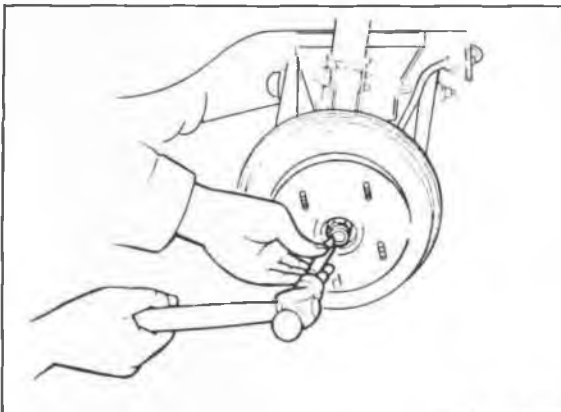
- |                        |                              |                                |
|------------------------|------------------------------|--------------------------------|
| 1. Hub cap             | 6. Dust cover                | 11. Anti-rattle spring         |
| 2. Locknut             | 7. Return spring (upper)     | 12. Hold pin and spring        |
| 3. Brake drum          | 8. Hold pin and spring       | 13. Brake shoe (trailing side) |
| 4. Parking brake cable | 9. Brake shoe (leading side) | 14. Operating lever assembly   |
| 5. Return spring       | 10. Return spring (lower)    |                                |



86U11X-109

- 15. Brake pipe
- 16. Wheel cylinder assembly

- 17. Gasket
- 18. Backing plate

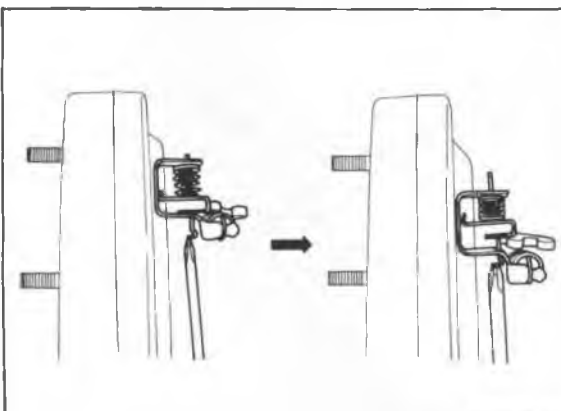


86U11X-110

### Removal Note Locknut

Uncrimp the locknut, and remove it.

**Caution**  
Do not reuse the locknut.

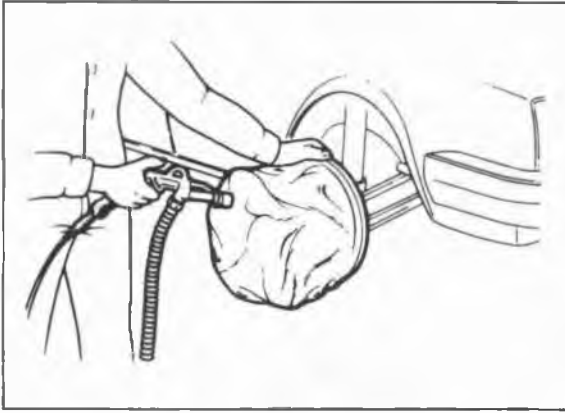


86U11X-111

### Brake drum

If the drum is difficult to remove, push the operating lever stopper (at backing plate) upward to release the operating lever and increase shoe clearance.

# 11 REAR DRUM BRAKE



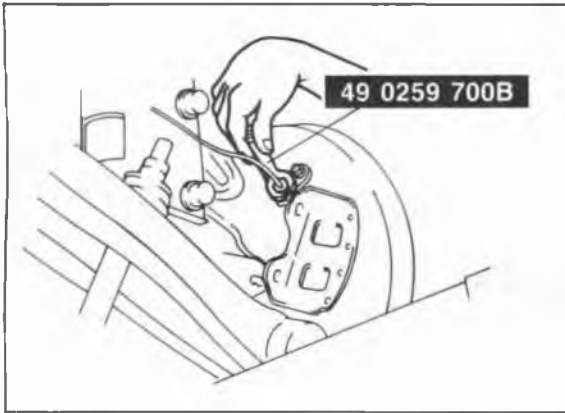
86U11X-112

## Cleaning of drum brake assembly

Use a vacuum cleaner or equivalent to clean the brake assembly

### Warning

**Asbestos dust is a health hazard. When cleaning the brake assembly, do not use compressed air or a brush.**



86U11X-113

## Brake pipe

Disconnect the brake pipe with the **SST**.

### Caution

**Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**

## DISASSEMBLY AND ASSEMBLY OF WHEEL CYLINDER

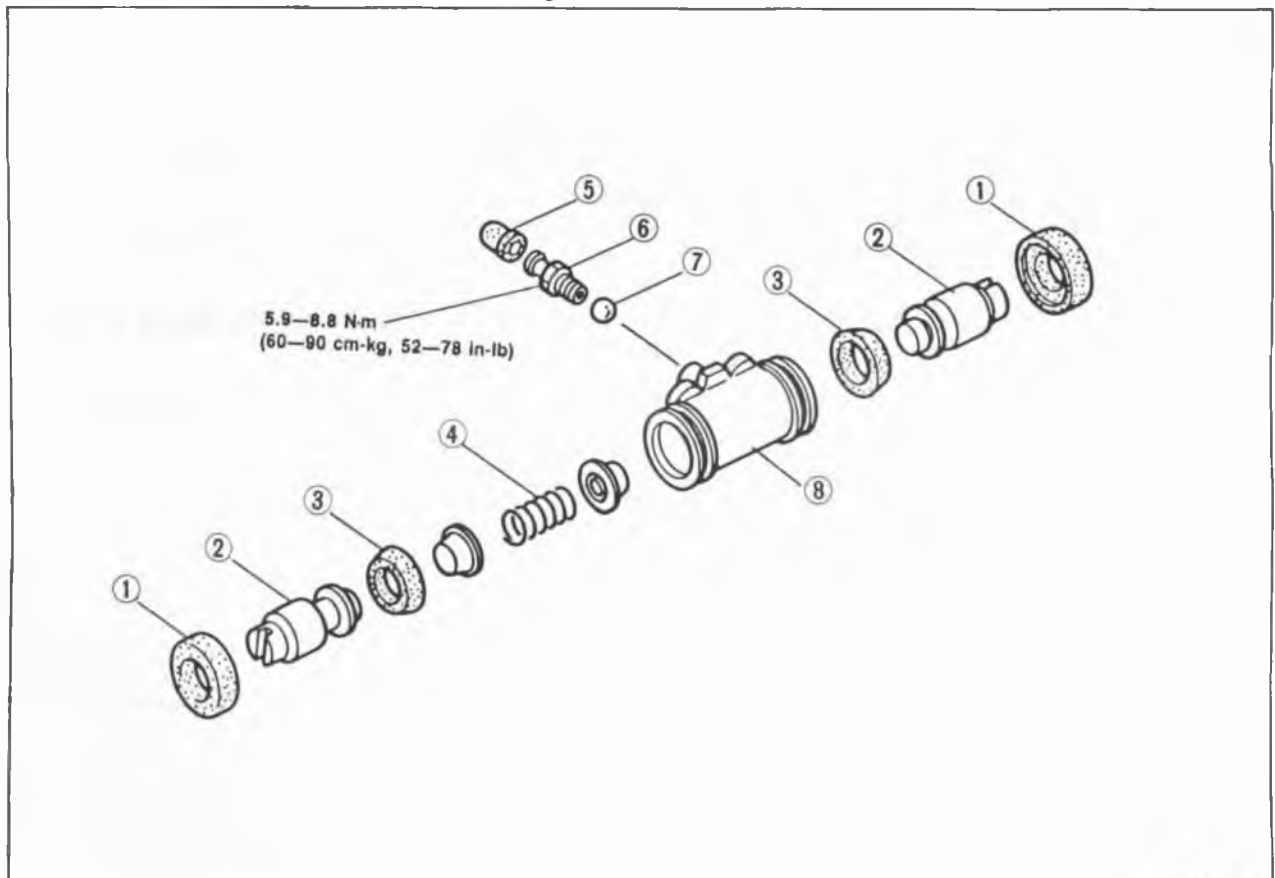
1. Disassemble in the sequence shown in the figure.
2. Inspect all parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to assembly note for the specially marked parts.

### Caution

Do not damage the piston or cylinder. Do not let foreign material into the cylinder.

### Note

Use new piston cups when installing.

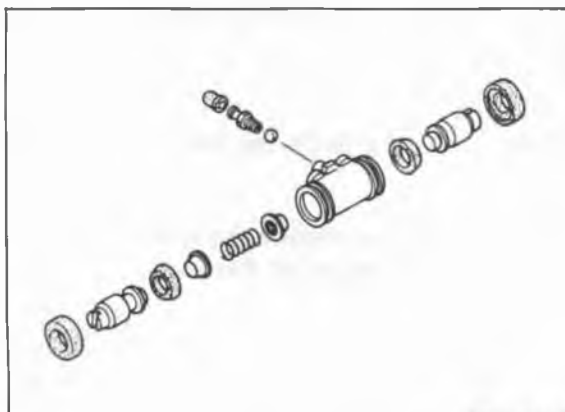


76G11X-087

1. Dust boot
2. Piston
3. Piston cup

4. Spring
5. Rubber cap
6. Bleeder screw

7. Steel ball
8. Wheel cylinder body



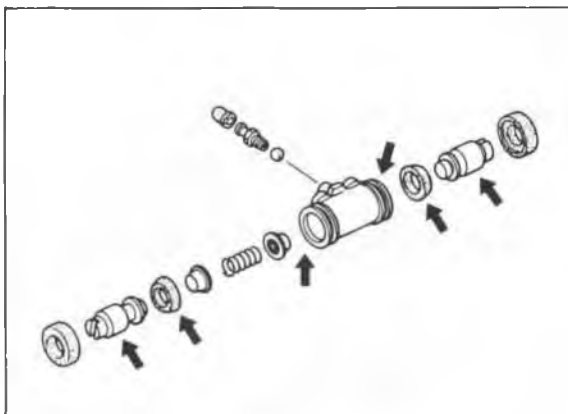
86U11X-115

### Inspection Note

Check the following and repair or replace any faulty parts.

1. Weak or broken spring
2. Worn, rusted, or damaged wheel cylinder

# 11 REAR DRUM BRAKE

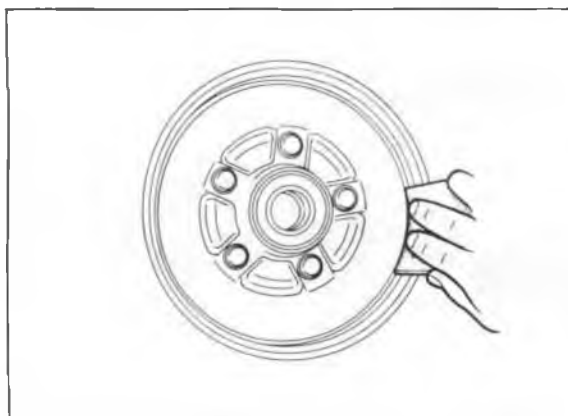


86U11X-116

## Assembly Note

Before assembly, apply brake fluid to the following parts:

1. Piston cup
2. Cylinder inner wall
3. Piston



86U11X-117

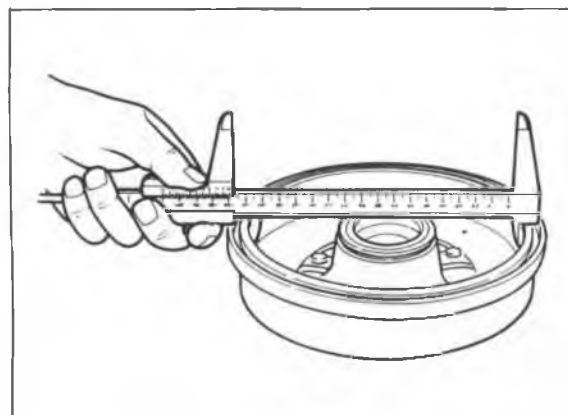
## INSPECTION

Check the following and repair or replace any faulty parts.

1. Scratches, uneven or abnormal wear inside drum

### Note

**Repair by sanding if the problem is minor.**



76G11X-049

2. Drum inner diameter

mm (in)

	Standard	Maximum
(a)	200.0 (7.87)	201.5 (7.93)
(b)	228.6 (9.00)	230.1 (9.06)

(a): 13-inch wheel in General LHD and RHD models

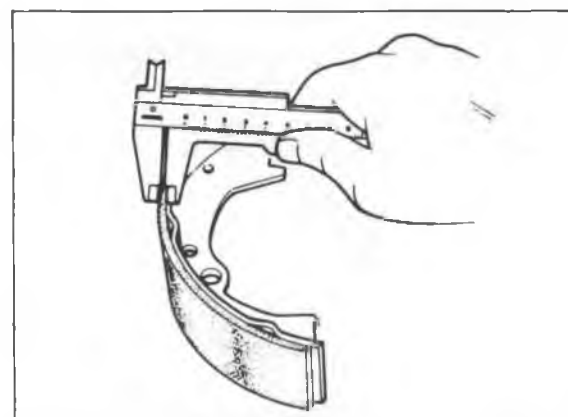
(b): Except 13-inch wheel in General LHD and RHD models

3. Peeling, cracking, or extremely uneven wear of lining
4. Lining wear

**Thickness: 1.0 mm (0.04 in) min.**

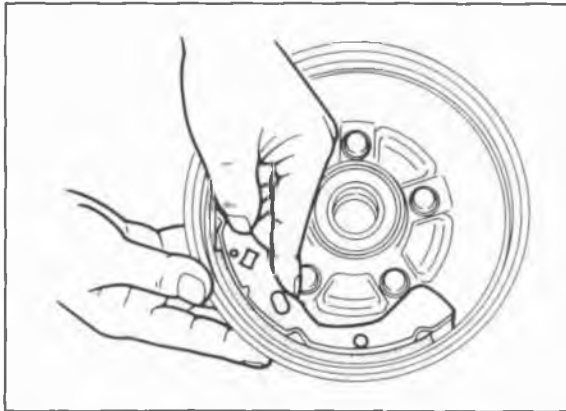
### Caution

**When replacing the shoe assembly, replace the left and right shoes at the same time as a set.**



86U11X-119





86U11X-120

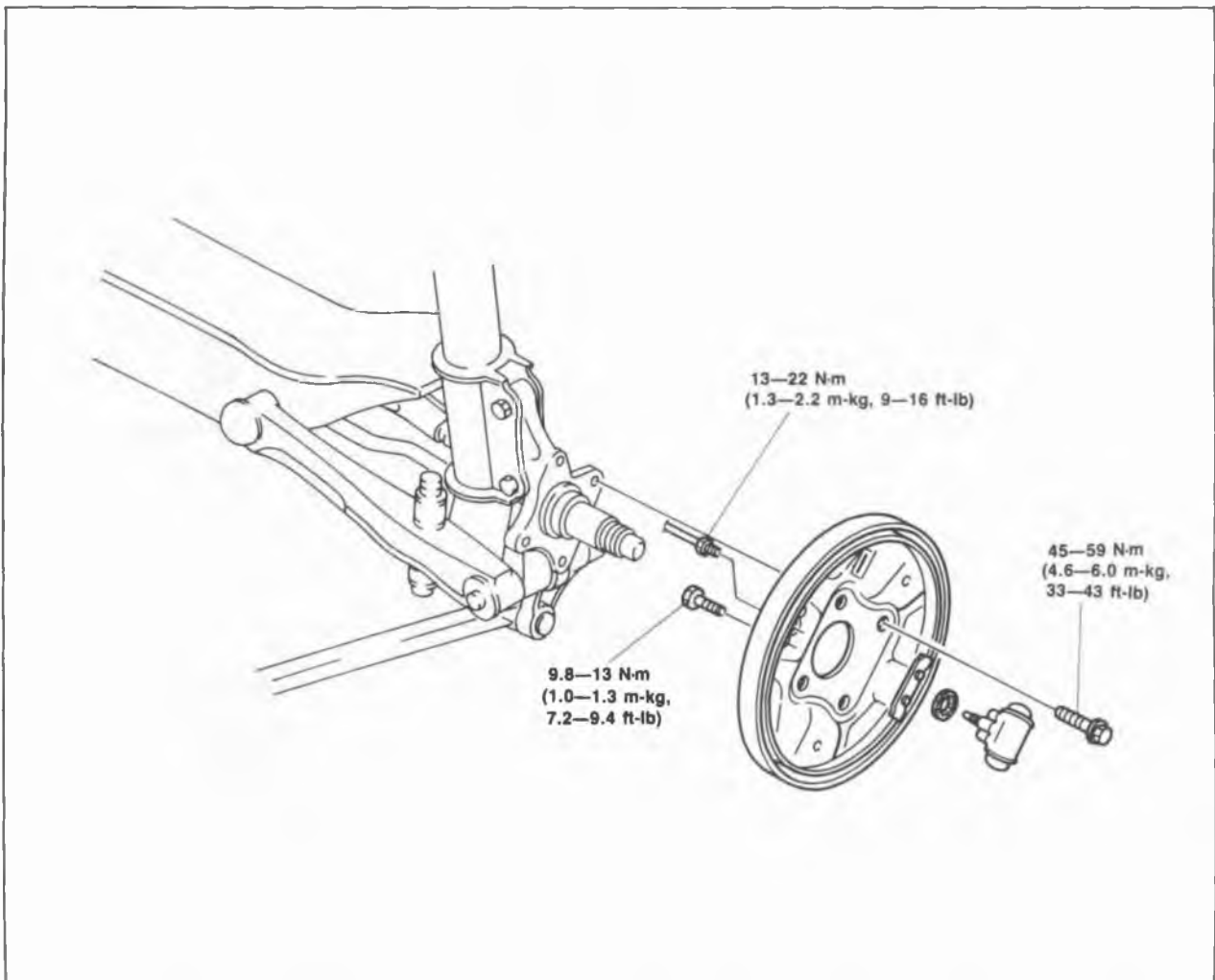
## 5. Fit of drum and lining

- (1) Apply chalk to the inside of the drum.
- (2) Rub the shoe against the drum.
- (3) Check lining to drum contact.
- (4) After checking, remove chalk.

## INSTALLATION

1. Install in the reverse order of removal.
2. Tighten all nuts and bolts to the specified torque, referring to torque specifications.
3. After installation:
  - (1) Add brake fluid and bleed air. (Refer to page 11—9.)
  - (2) Adjust the parking brake lever stroke. (Refer page to 11—65.)
  - (3) Depress the brake pedal a few times and check that the rear brakes do not drag while the wheels are being rotated.

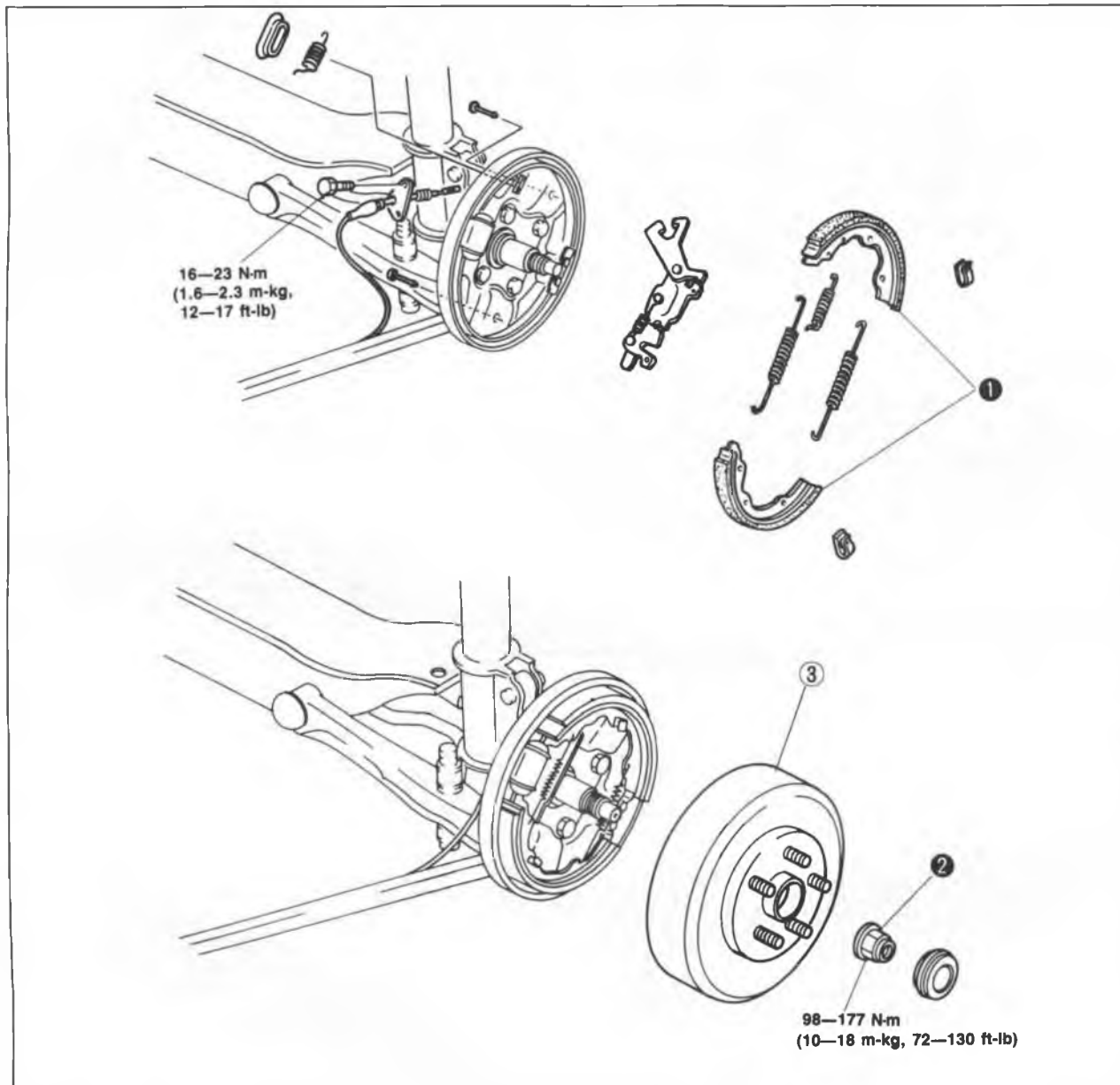
## Torque specification



76G11X-050

# 11 REAR DRUM BRAKE

## Torque specification

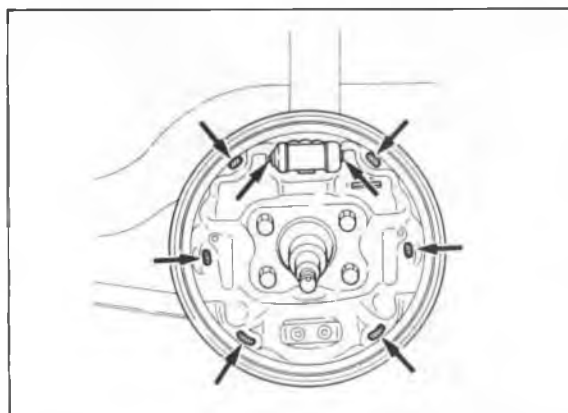


86U11X-122

1. Brake shoe

2. Brake drum

3. Locknut

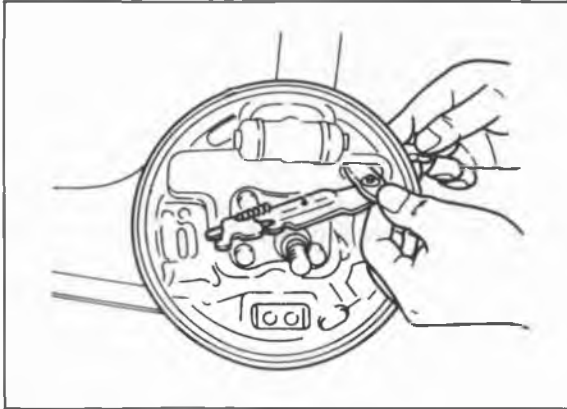


76G11X-088

### Installation Note Brake shoes

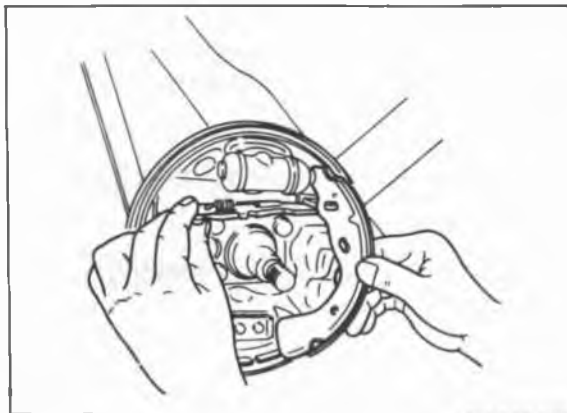
1. Apply grease to:
  - (1) Shoe and cylinder contact points
  - (2) Shoe anchor points
  - (3) Projections of backing plate

## REAR DRUM BRAKE 11



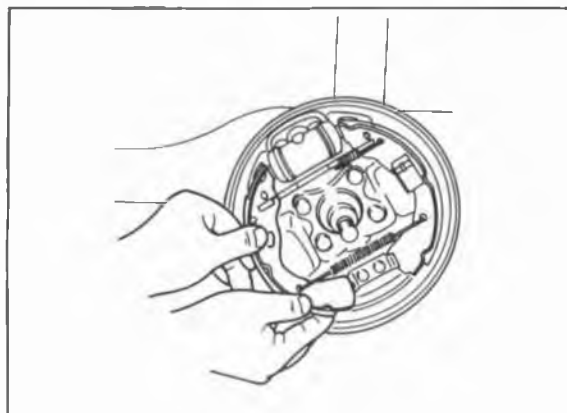
86U11X-124

2. Install the operating lever assembly through the backing plate.
3. Install the return spring to the backing plate (reverse side) and the operating lever.



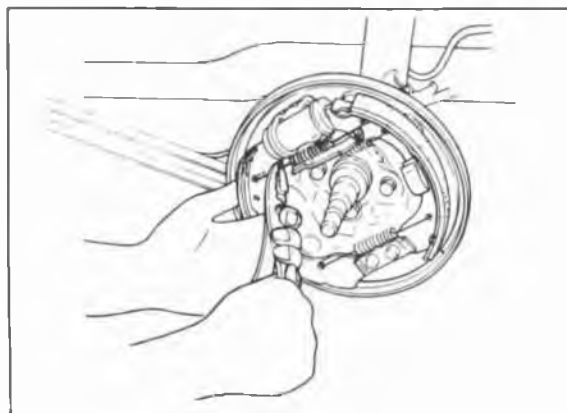
86U11X-125

4. Install the shoe (trailing side) to the operating lever, then to the wheel cylinder and anchor plate.
5. Fix the shoe with the hold spring and hold pin.
6. Install the anti-rattle spring.



86U11X-126

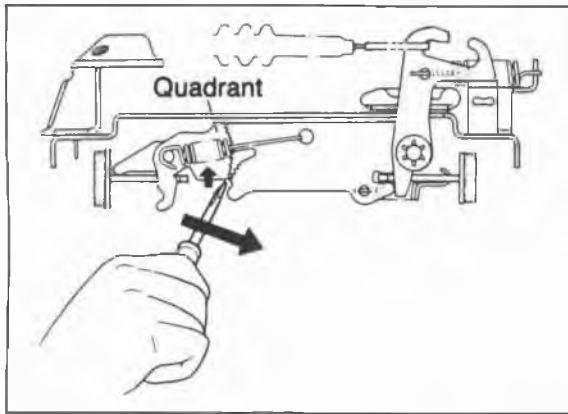
7. Install the return spring (lower) to the shoes (trailing side and leading side).
8. Install the shoe leading side to the operating lever, then to the wheel cylinder and anchor plate.
9. Fix the shoe with the hold spring and hold pin.



86U11X-127

10. Install the return spring (upper).

# 11 REAR DRUM BRAKE



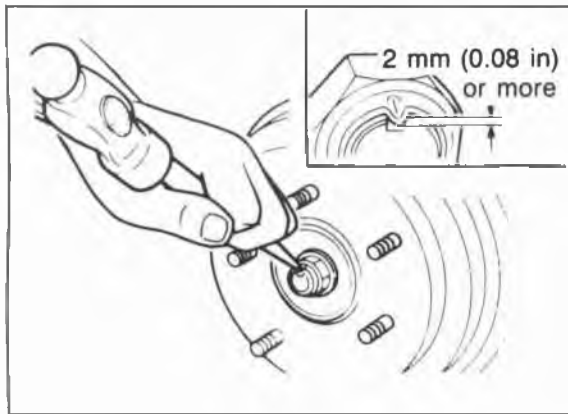
76G11X-089

## Brake drum

1. Move the quadrant against the backing plate with a screwdriver and increase the shoe clearance.
2. Install the brake drum.

## Note

The shoe clearance will be automatically adjusted by applying the parking brakes.



86U11X-129

## Locknut

Tighten the new locknut to the specified torque and securely stake it to the spindle groove.

## Tightening torque:

98—177 N·m (10—18 m·kg, 72—130 ft·lb)

## Caution

Do not use a pointed tool for staking.

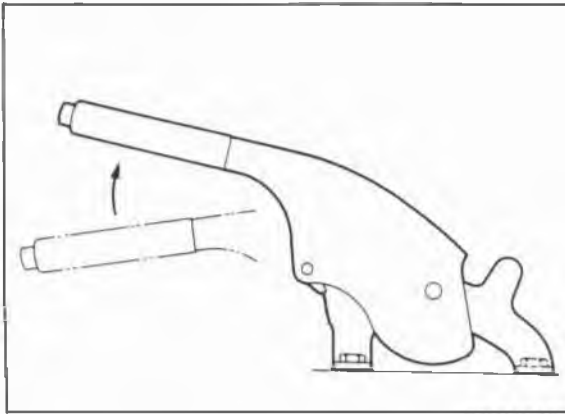
## PARKING BRAKE

### ON-VEHICLE MAINTENANCE

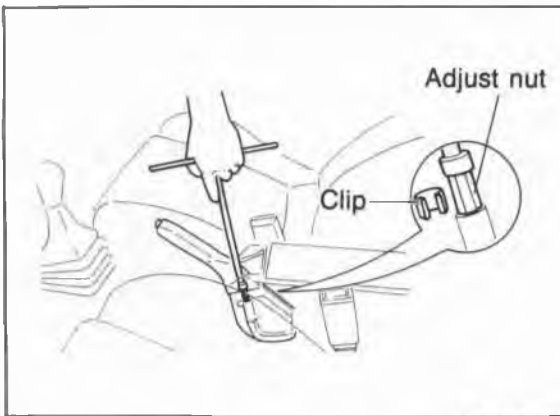
#### Parking Brake Lever Stroke Inspection

Check that the stroke is within specification when the parking brake lever is pulled with a force of 98N (10kg, 22lb).

**Stroke: 5—7 notches**



86U11X-130



86U11X-131

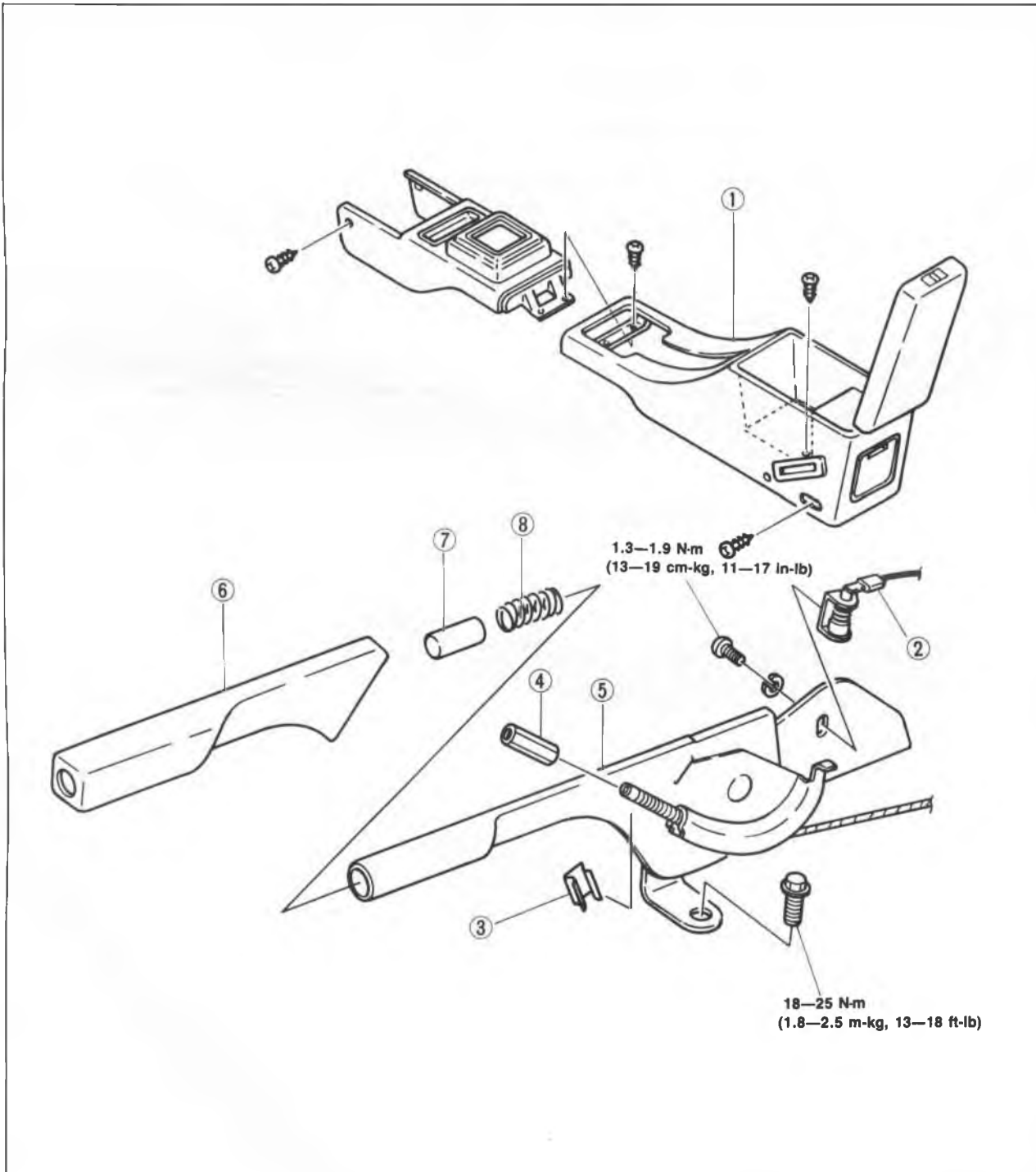
#### Adjustment

1. Before adjustment, start the engine and depress the brake pedal several times.
2. Stop the engine.
3. Remove the adjust nut clip and turn the adjust nut at the front of the parking cable.
4. After adjustment, check the following points:
  - (1) Turn the ignition switch ON, pull the parking brake lever one notch, and check that the parking brake warning lamp illuminates.
  - (2) Check that the rear brakes do not drag.

# 11 PARKING BRAKE

## REMOVAL AND INSTALLATION OF PARKING BRAKE LEVER

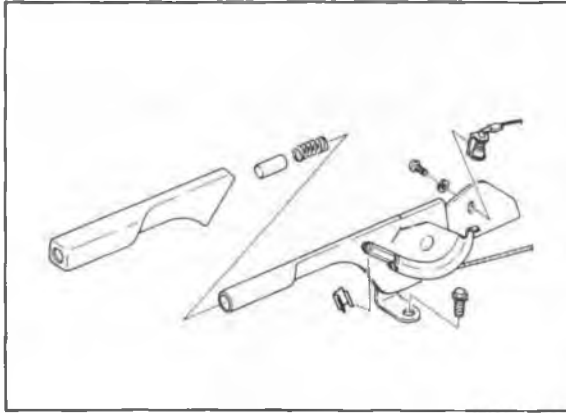
1. Block the wheels firmly.
2. Release the parking brakes.
3. Remove in the sequence shown in the figure.
4. Inspect all parts, referring to inspection note.
5. Install in the reverse order of removal, referring to installation note for specially marked parts.
6. After installation:  
Adjust the parking lever stroke. (Refer to page 11—65.)



76G11X-051

- |                         |                        |           |
|-------------------------|------------------------|-----------|
| 1. Rear console         | 4. Adjust nut          | 7. Button |
| 2. Parking brake switch | 5. Parking brake lever | 8. Spring |
| 3. Clip                 |                        |           |

## PARKING BRAKE 11

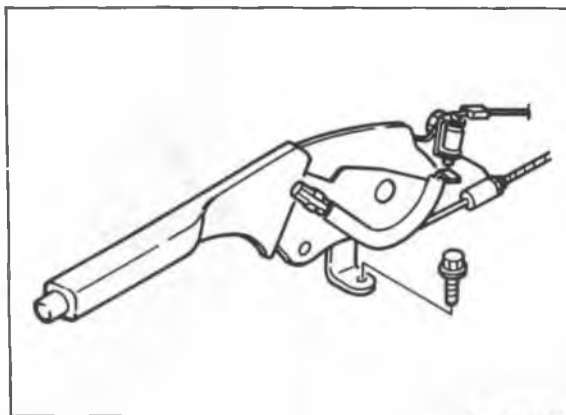


76G11X-090

### Inspection Note

Check the following and replace any faulty parts.

1. Sector and ratchet pawl for wear and damage
2. Spring for weakness and breakage



86U11X-135

### Installation Note

#### Parking switch

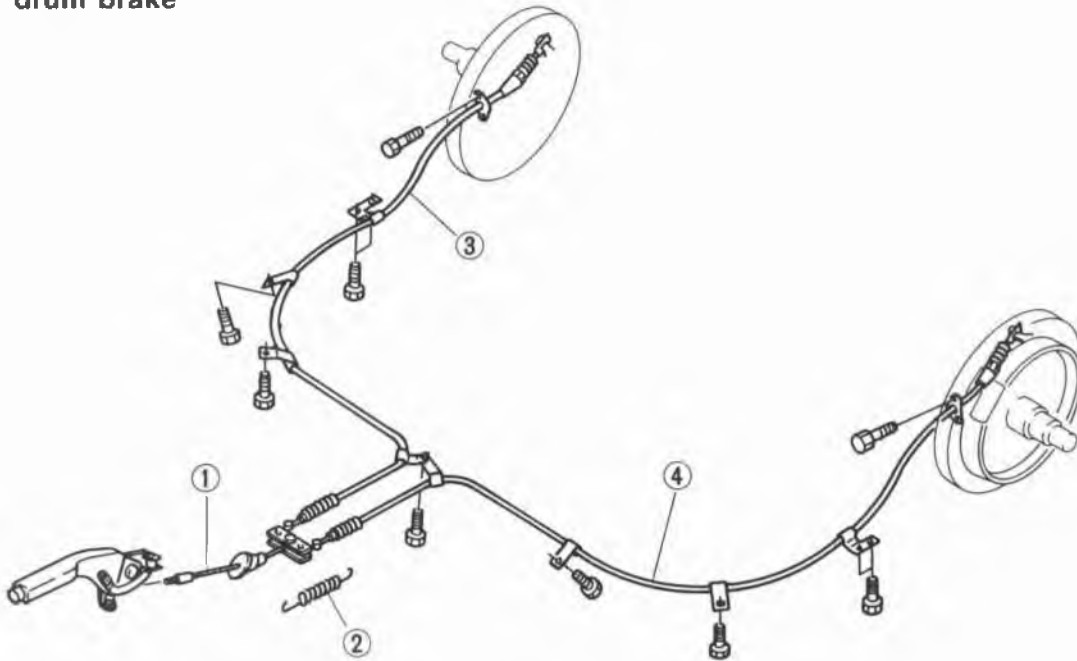
1. Install the parking switch so that it contacts the parking brake lever when the lever is released.
2. Turn the ignition switch ON, and check that the parking brake warning lamp illuminates with the lever pulled one notch.

# 11 PARKING BRAKE

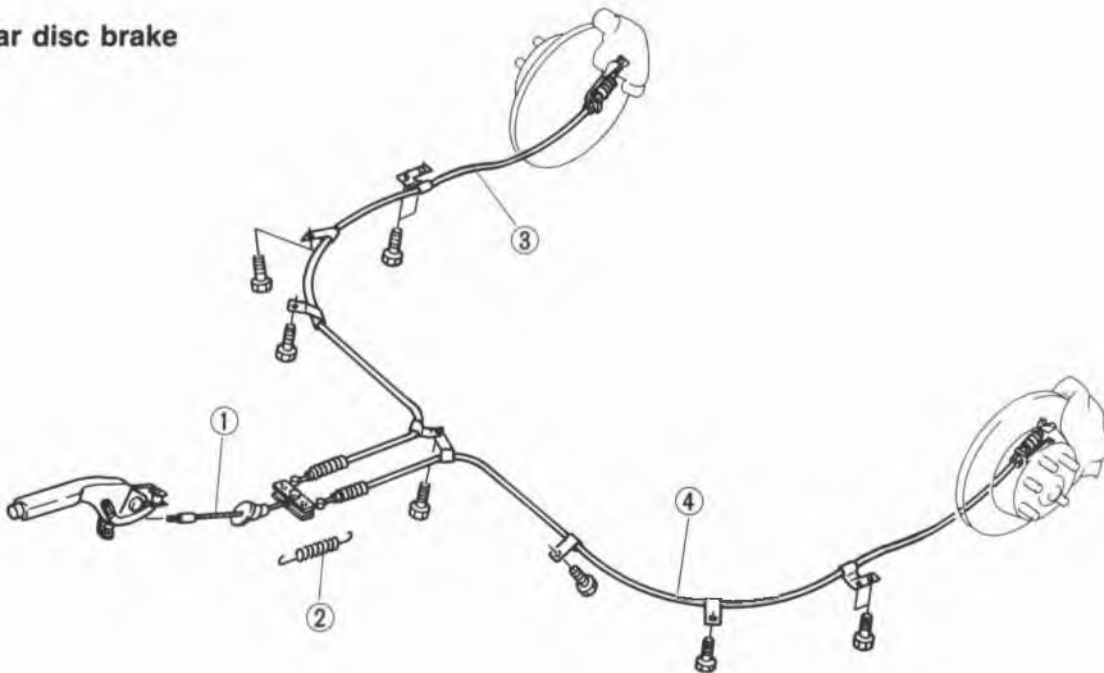
## REMOVAL OF PARKING BRAKE CABLE

1. Block the wheels firmly.
2. Remove the rear console. (Refer to page 11—66.)
3. Release the parking brake and remove the adjust nut of the parking brake lever. (Refer to page 11—66.)
4. Jack up the vehicle and support it with safety stands.
5. Remove the parking brake cable in the sequence shown in the figure.

### Rear drum brake



### Rear disc brake



76G11X-052

1. Front parking cable
2. Spring

3. Parking brake cable (left)
4. Parking brake cable (right)

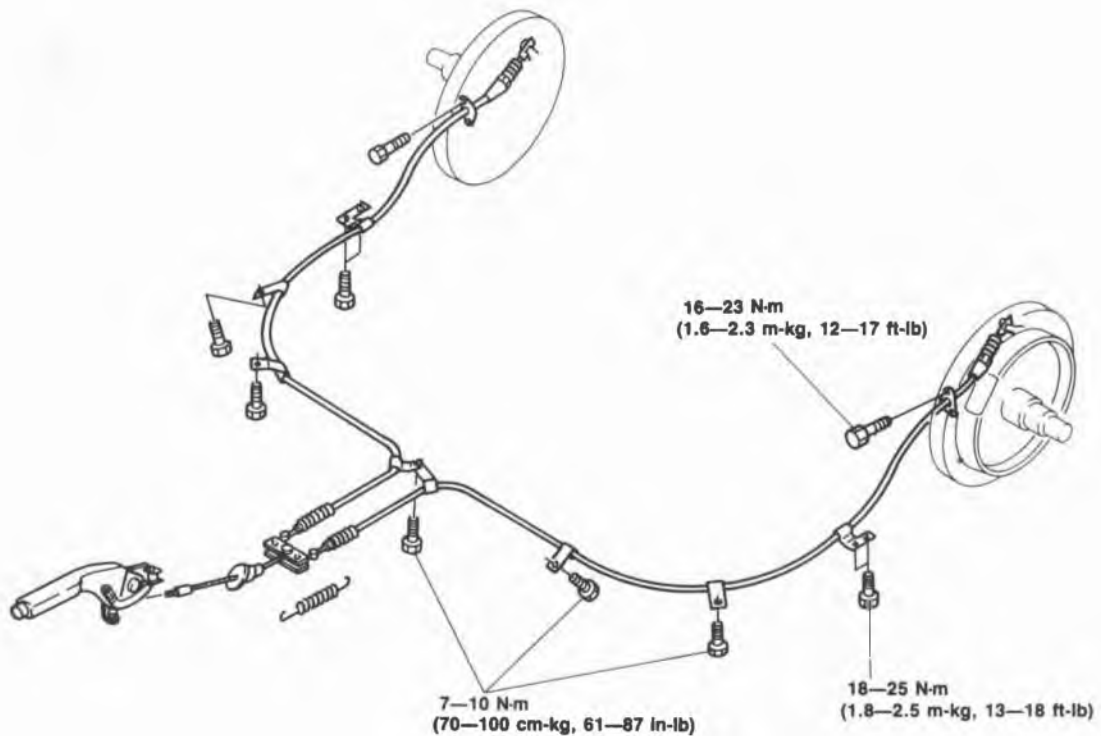


## INSTALLATION OF PARKING BRAKE CABLE

1. Install in the reverse order of removal, referring to installation note for specially marked parts.
2. Tighten all nuts and bolts to the specified torque, referring to torque specifications.
3. After installation:
  - (1) Adjust the parking brake lever stroke. (Refer to page 11—65.)
  - (2) Depress the brake pedal a few times and check that the rear brakes do not drag while the wheels are being rotated.

## Torque specifications

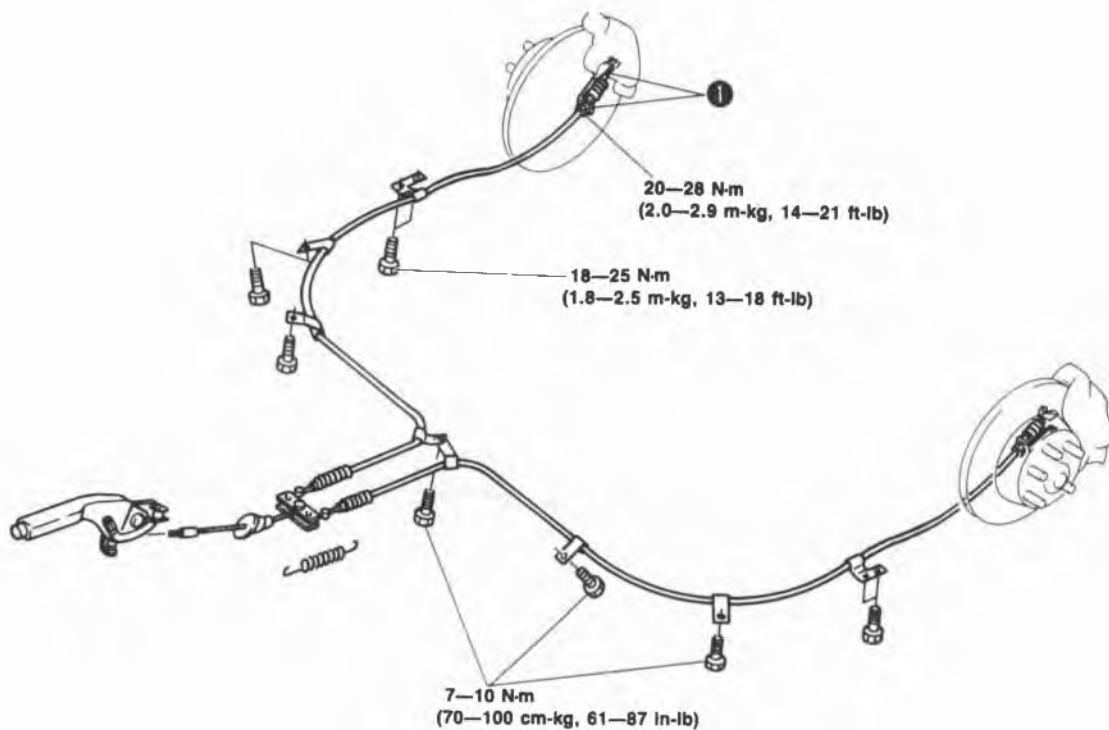
### Rear drum brake



76G11X-053

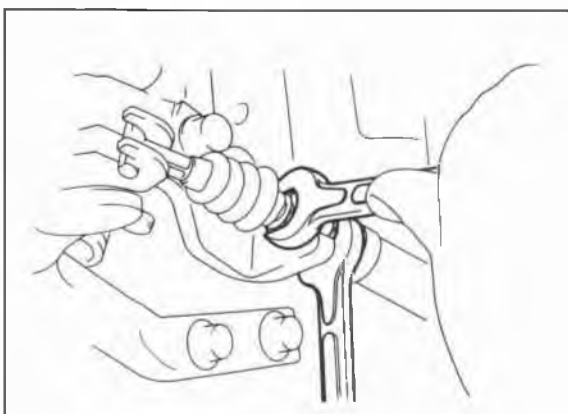
# 11 PARKING BRAKE

## Rear disc brake



86U11X-138

### 1. Parking brake cable (rear disc brake)



86U11X-139

#### Installation Note

##### Parking brake cable (Rear disc brake)

Connect the cable end to the operating lever; then tighten the locknut.

#### Tightening torque:

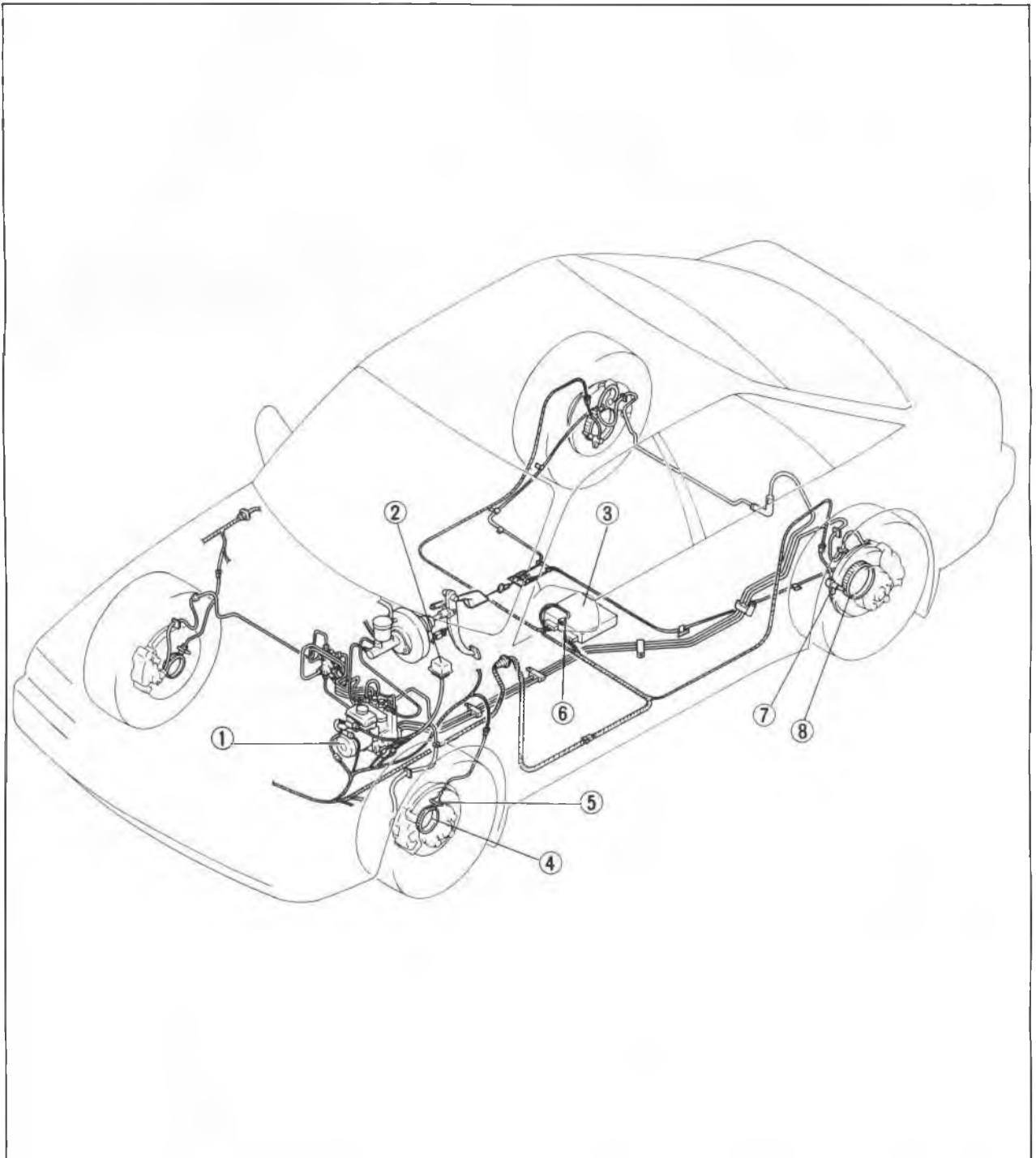
20—28 N·m (2.0—2.9 m·kg, 14—21 ft·lb)

#### Caution

There must be no clearance between the cable end and the operating lever.

## ANTI-LOCK BRAKE SYSTEM (ABS)

### STRUCTURAL VIEW



86U11X-140

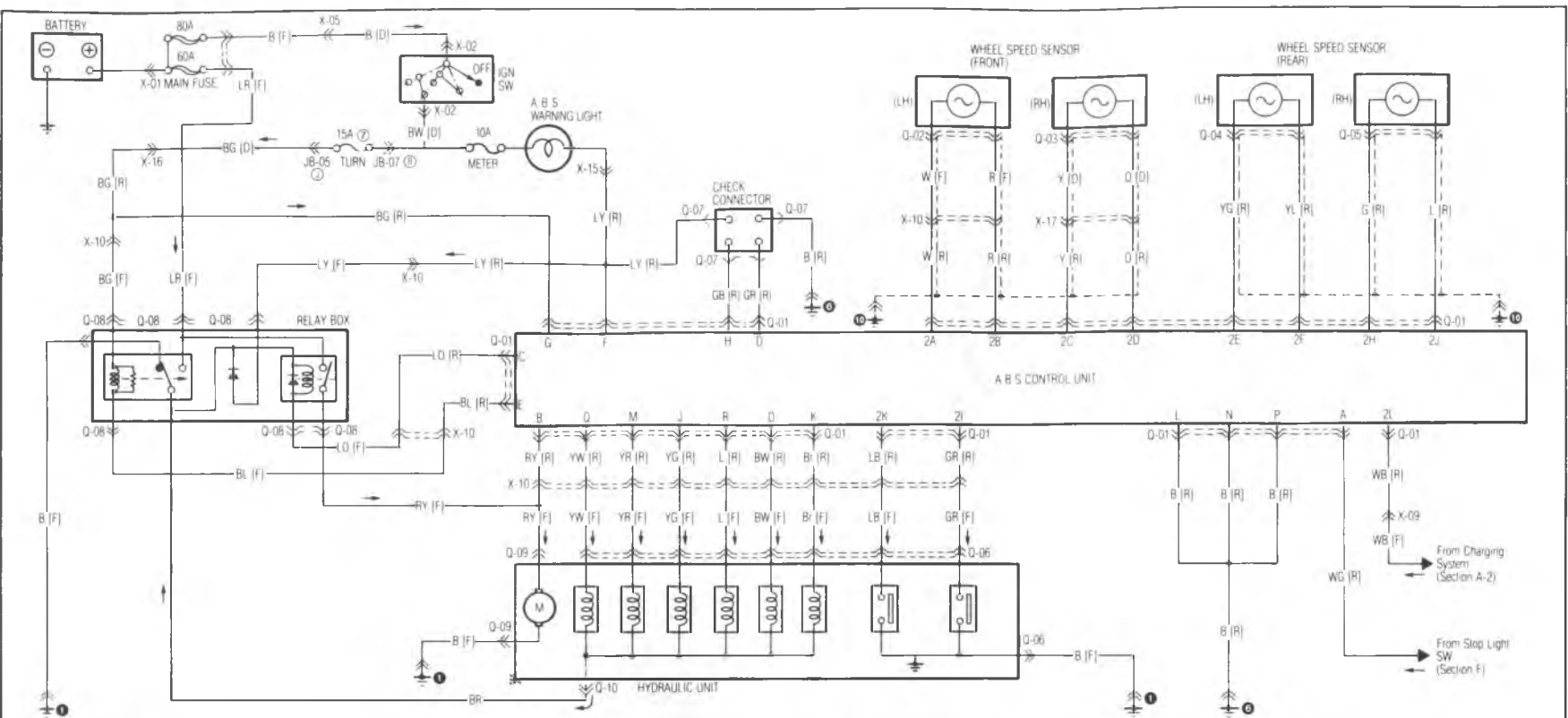
1. Hydraulic unit  
2. Relay box  
3. Control unit

4. Sensor rotor (front)  
5. Wheel speed sensor (front)  
6. Check connector

7. Wheel speed sensor (rear)  
8. Sensor rotor (rear)

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

## WIRING DIAGRAM



<p>Q-01 A B S Control Unit (R)</p>	<p>Q-02 Wheel Speed Sensor (FL) (F)</p>	<p>Q-03 Wheel Speed Sensor (FR) (D)</p>	<p>Q-04 Wheel Speed Sensor (RL) (R)</p>	<p>Q-05 Wheel Speed Sensor (RR) (R)</p>	<p>Q-06 Hydraulic Unit (F)</p>
<p>Q-07 Check Connector (R)</p>	<p>Q-08 Relay Box (F)</p>	<p>Q-09 A B S Hydraulic Motor (F)</p>	<p>Q-10 Connector Between Hydraulic Unit and A B S Relay</p>		

## TROUBLESHOOTING

### Precaution

#### Conditions that are not malfunctions

1. It may happen that vibration is felt in the steering wheel, body, and/or brake pedal when the ABS is functioning; such vibration is simply an indication that the system is functioning.
2. Sound of the pump motor operating, accumulator pressure being released, or the relay operating may be heard from the engine compartment when the engine is started as the system is being automatically checked.
3. The ABS pump motor may be automatically activated even though the ABS is not operating.
4. The ABS warning light may illuminate under any of the following conditions:
  - When the vehicle is traveling on snow or ice with the parking brake activated or a brake dragging at one wheel.
  - When different-sized tires are used.
  - When tires of different gripping performance are used.
  - When (while the vehicle is jacked up or stuck) only the front wheels are spun for 20 seconds or more.
  - When there is insufficient battery voltage.

### Note

**Under the above conditions, the warning light will not illuminate a second time when the ignition is switched OFF then back ON, and there will be no memory entry to the control unit of a problem.**

### Troubleshooting notes

The ABS is composed of electrical components, mechanical components (hydraulic unit), and the components of the standard brake system.

Fundamentally, malfunction of the ABS electrical or mechanical components is judged by the self-diagnosis function within the ABS control unit. And malfunctions are indicated by the warning light in the instrument panel.

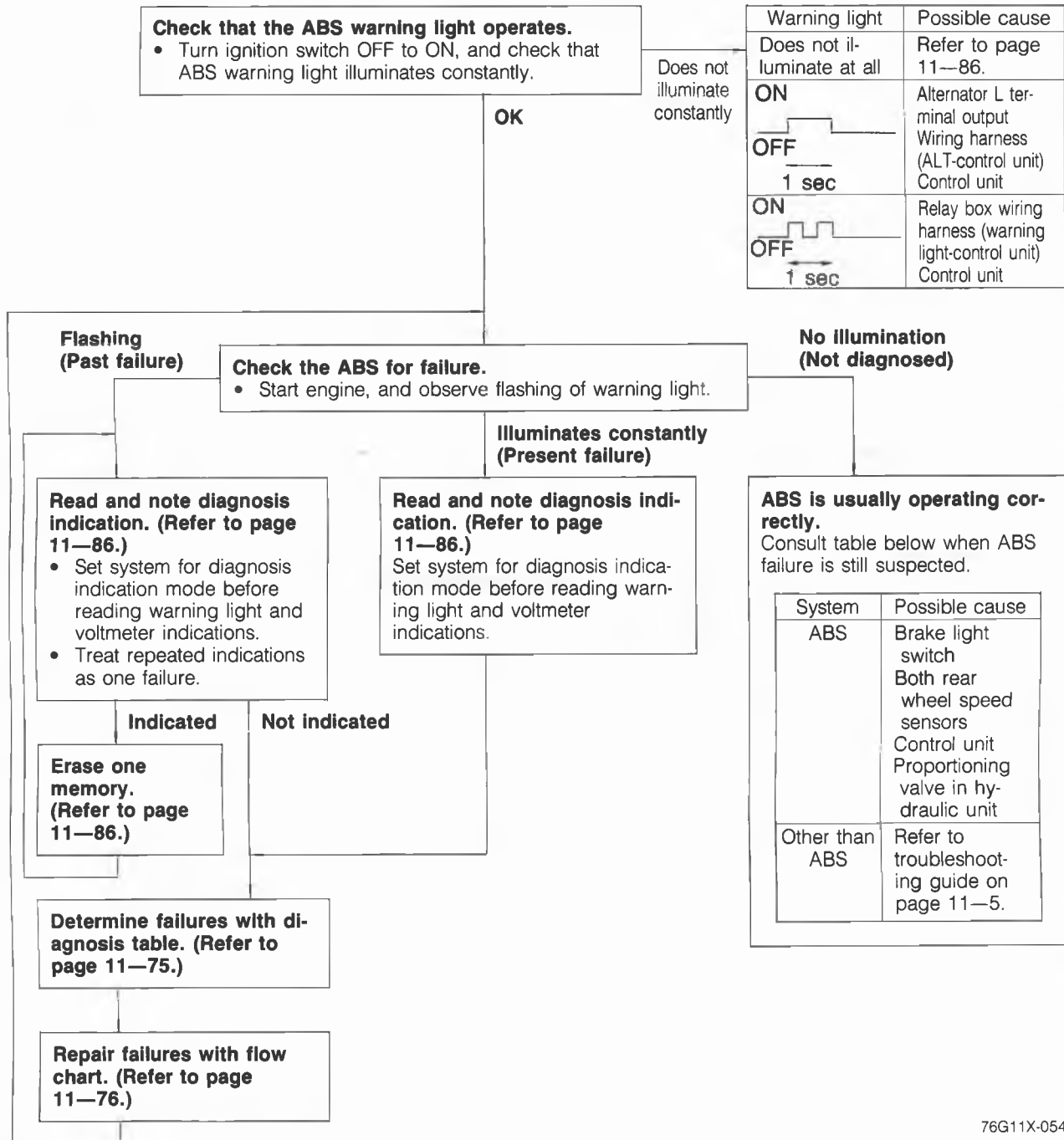
The location of a malfunction is indicated by the technician switching the system to the diagnosis-indication mode.

The self-diagnosis and indication functions must be used when malfunctions of the ABS are being diagnosed.

76G11X-091

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

## Troubleshooting Main Flow Chart




























76G11X-054

# ANTI-LOCK BRAKE SYSTEM (ABS) 11

## Diagnosis Table

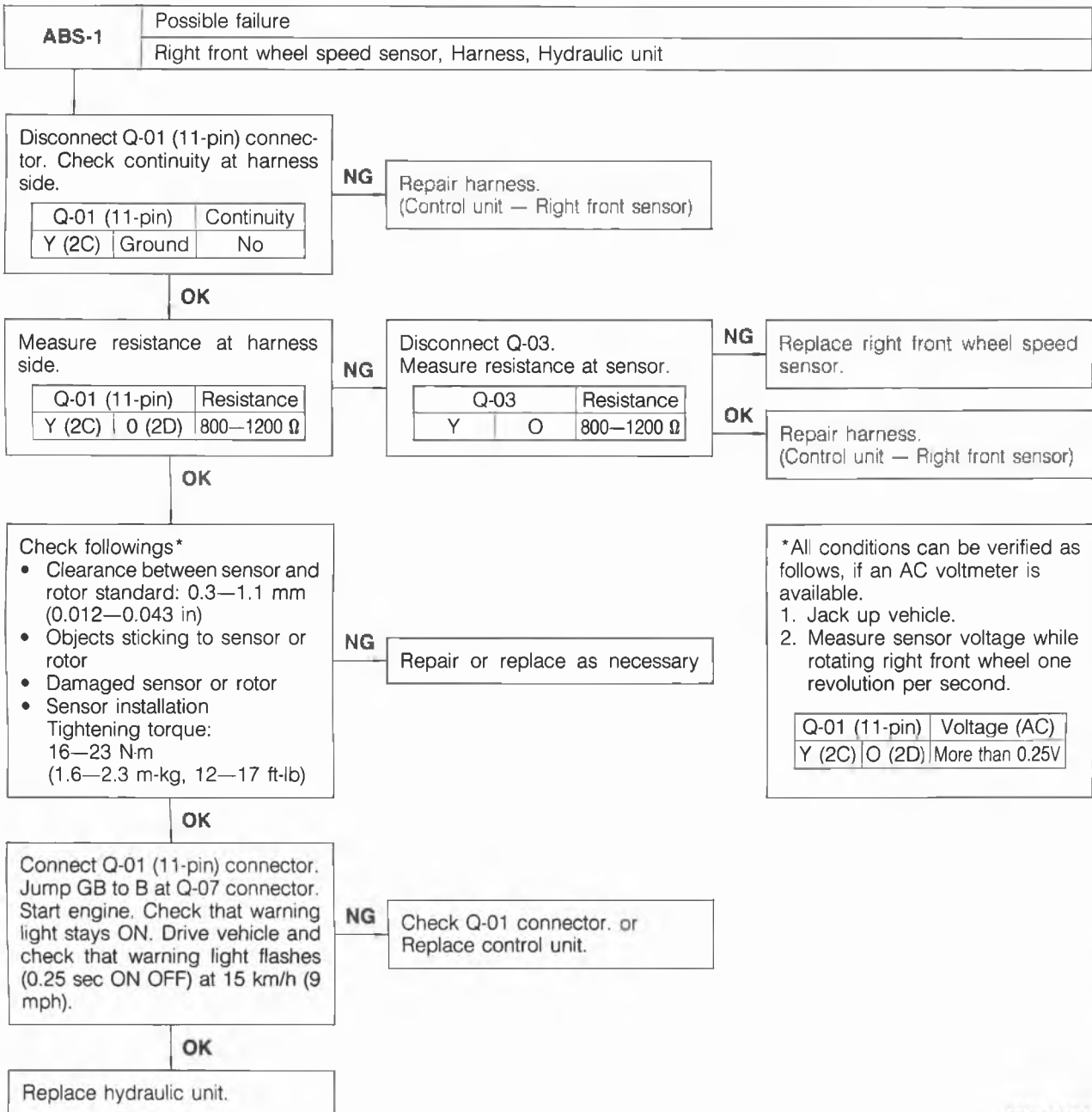
**Note**

Flashing of the warning light shows past failure, and its illumination shows present failure.

Diagnosis indication		Possible failure	Flow chart No.
Warning light	Voltmeter		
ON  OFF		Hydraulic unit Harness	Right front wheel speed sensor ABS-1
			Left front wheel speed sensor ABS-2
			Rear wheel speed sensor ABS-3
		Right front sensor rotor ABS-4	
		Left front sensor rotor ABS-5	
		Right rear sensor rotor ABS-6	
		Left rear sensor rotor ABS-7	
		Hydraulic unit Harness Control unit connector (11-pin) ABS-8	
			
		Relay box Hydraulic unit Harness ABS-9 ABS-10 ABS-11 ABS-12 ABS-13 ABS-14	
			
		Hydraulic unit Harness Control unit ABS-15 ABS-16	
			
		Control unit ABS-17 ABS-18	
			
	No signal; failure conditions not stored in memory	Control unit Control unit connector (17-pin) Battery capacity Alternator output voltage Wiring harness (warning light-control unit-check connector)	Inspect, and repair or replace as necessary
			
	No problem	When warning light does not illuminate with engine running and no jumper wire	
			

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

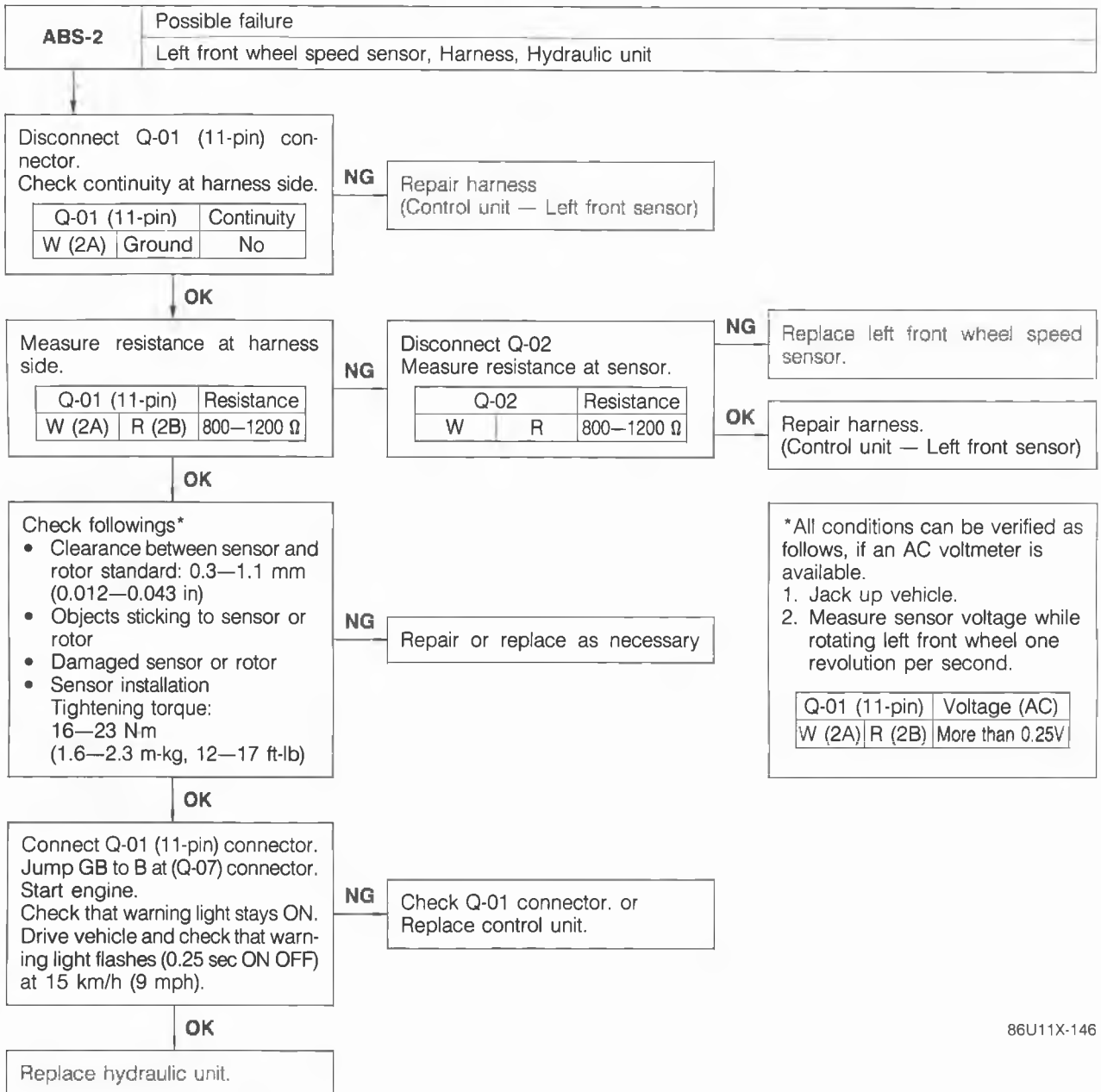
## Flow Chart (Refer to Wiring Diagram, Page 11—72.)



76G11X-055



# ANTI-LOCK BRAKE SYSTEM (ABS) 11



86U11X-146

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

<b>ABS-3</b>	Possible failure
	Rear wheel speed sensor, Harness, Hydraulic unit

Disconnect Q-01 (11-pin) connector.  
Check continuity at harness side.

Q-01 (11-pin)		Continuity
G (2H)	Ground	No
YG (2E)		

**NG** Repair harness  
(Control unit — Rear speed sensor)

**OK**

Measure resistance at harness side.

Q-01 (11-pin)		Resistance
YG (2E)	YL (2F)	800—1200 Ω
G (2H)	L (2J)	

**NG** Disconnect Q-09 and Q-05  
Measure resistance at sensor.

Q-09, Q-05		Resistance
YG	YL	800—1200 Ω
G	L	

**NG** Replace rear wheel speed sensor.

**OK** Repair harness.  
(Control unit — Rear speed sensor)

**OK**

Check followings\*

- Clearance between sensor and rotor standard: 0.3—1.1 mm (0.012—0.043 in)
- Objects sticking to sensor or rotor
- Damaged sensor or rotor
- Sensor installation  
Tightening torque:  
16—23 N·m  
(1.6—2.3 m·kg, 12—17 ft·lb)

**NG** Repair or replace as necessary

\*All conditions can be verified as follows, if an AC voltmeter is available.

1. Jack up vehicle.
2. Measure sensor voltage while rotating rear wheel one revolution per second.

R wheel	Q-01 (11-pin)	Voltage (AC)
Left	YG (2E)   YL (2F)	More than
Right	G (2H)   L (2J)	0.25V

**OK**

Connect Q-01 (11-pin) connector.  
Jump GB to B at Q-07 connector.  
Start engine.  
Check that warning light stays ON.  
Drive vehicle and check that warning light flashes (0.25 sec ON OFF) at 15 km/h (9 mph).

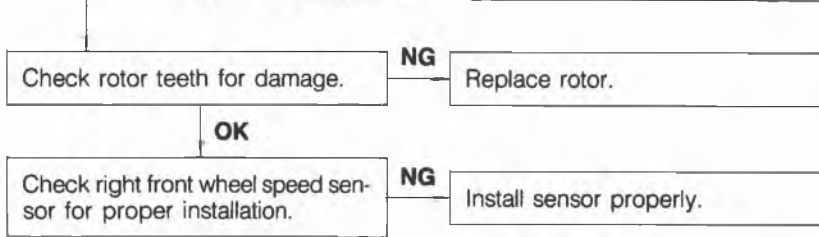
**NG** Check Q-01 connector, or  
Replace control unit.

**OK**

Replace hydraulic unit.

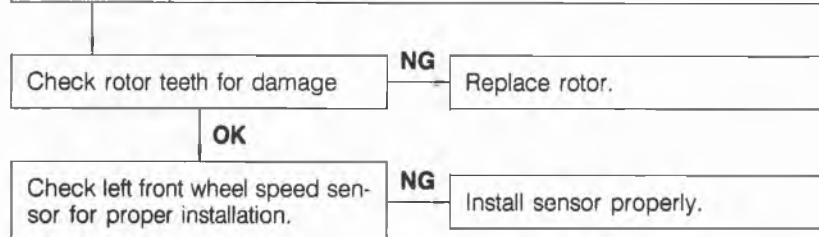
86U11X-147

<b>ABS-4</b>	Possible failure
	Right front sensor rotor



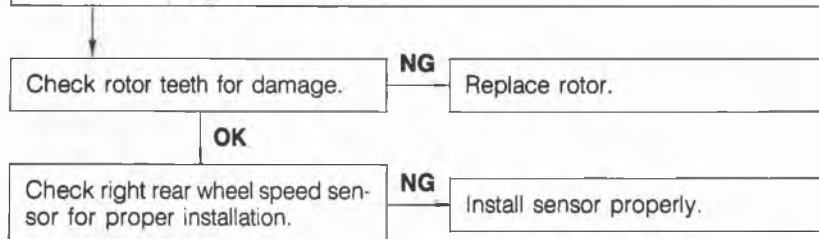
86U11X-148

<b>ABS-5</b>	Possible failure
	Left front sensor rotor



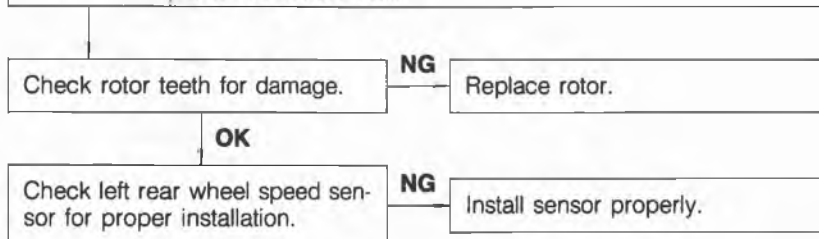
86U11X-149

<b>ABS-6</b>	Possible failure
	Right rear sensor rotor



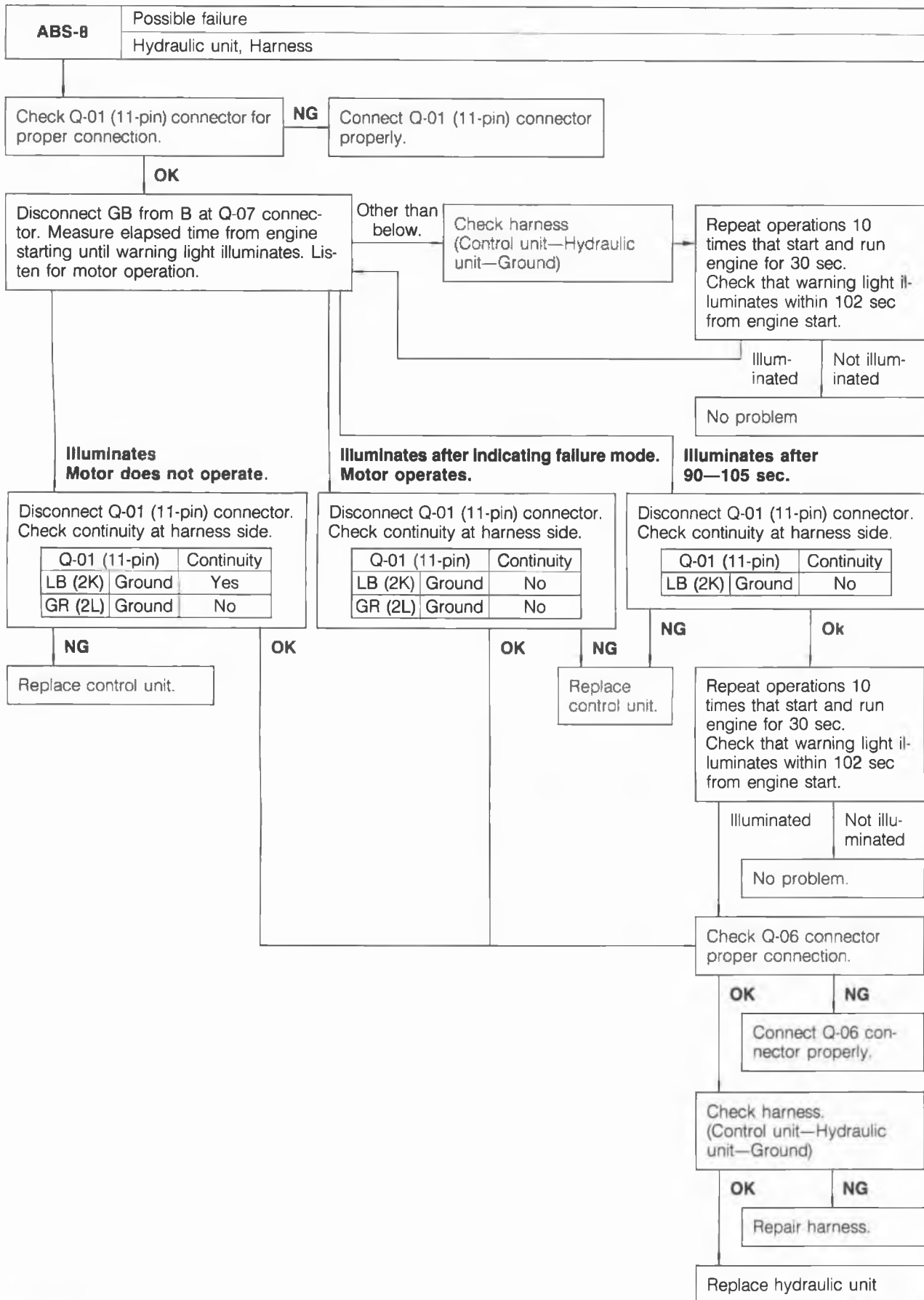
86U11X-150

<b>ABS-7</b>	Possible failure
	Left rear sensor rotor



86U11X-151

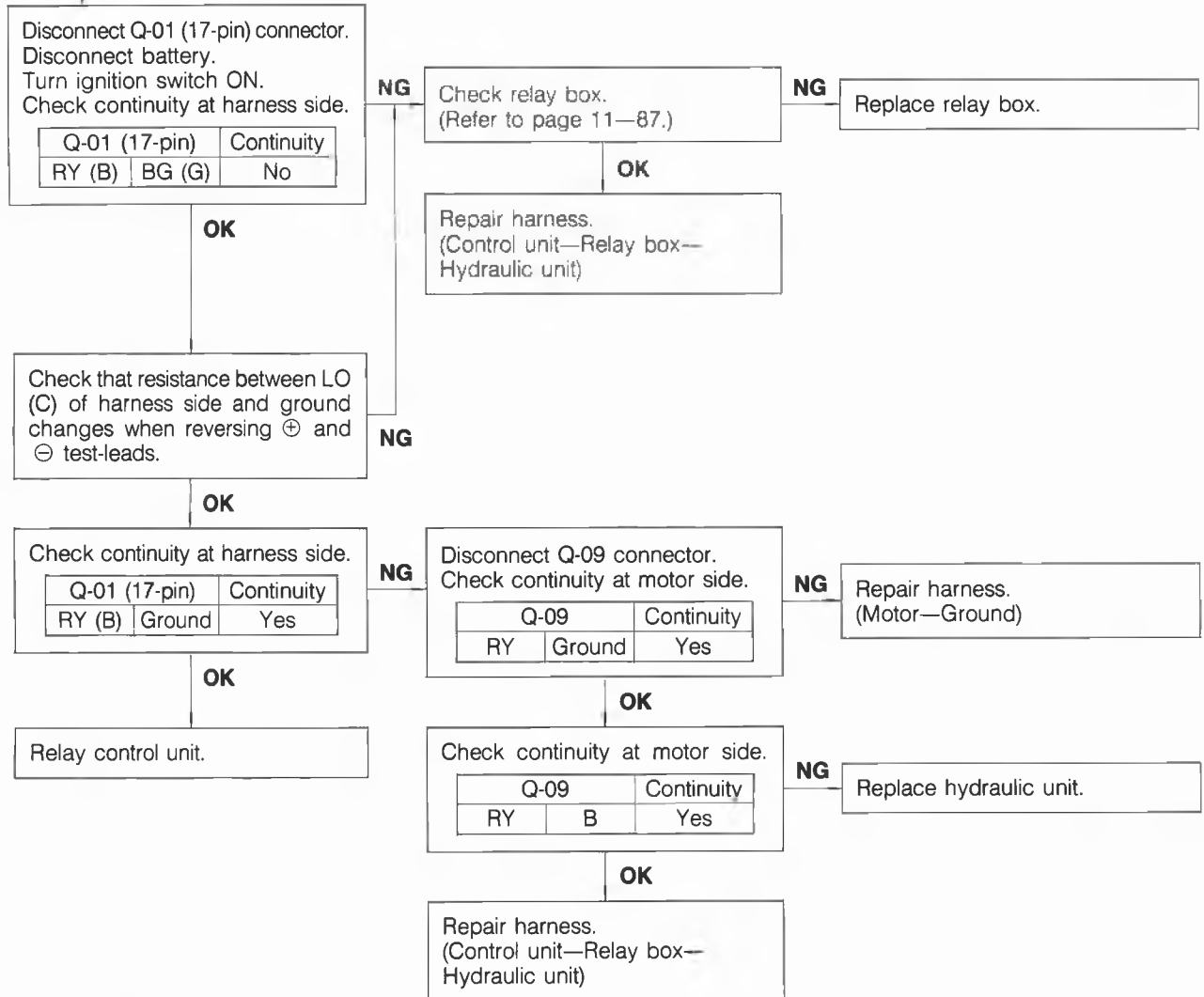
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



76G11X-093

# ANTI-LOCK BRAKE SYSTEM (ABS) 11

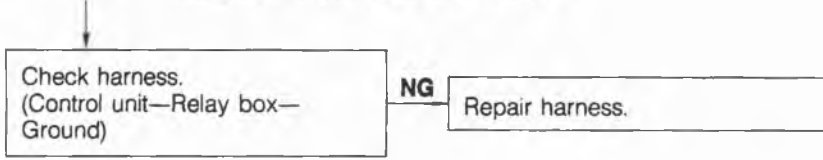
<b>ABS-9</b>	Possible failure
	Relay box, Hydraulic unit, Harness



76G11X-056

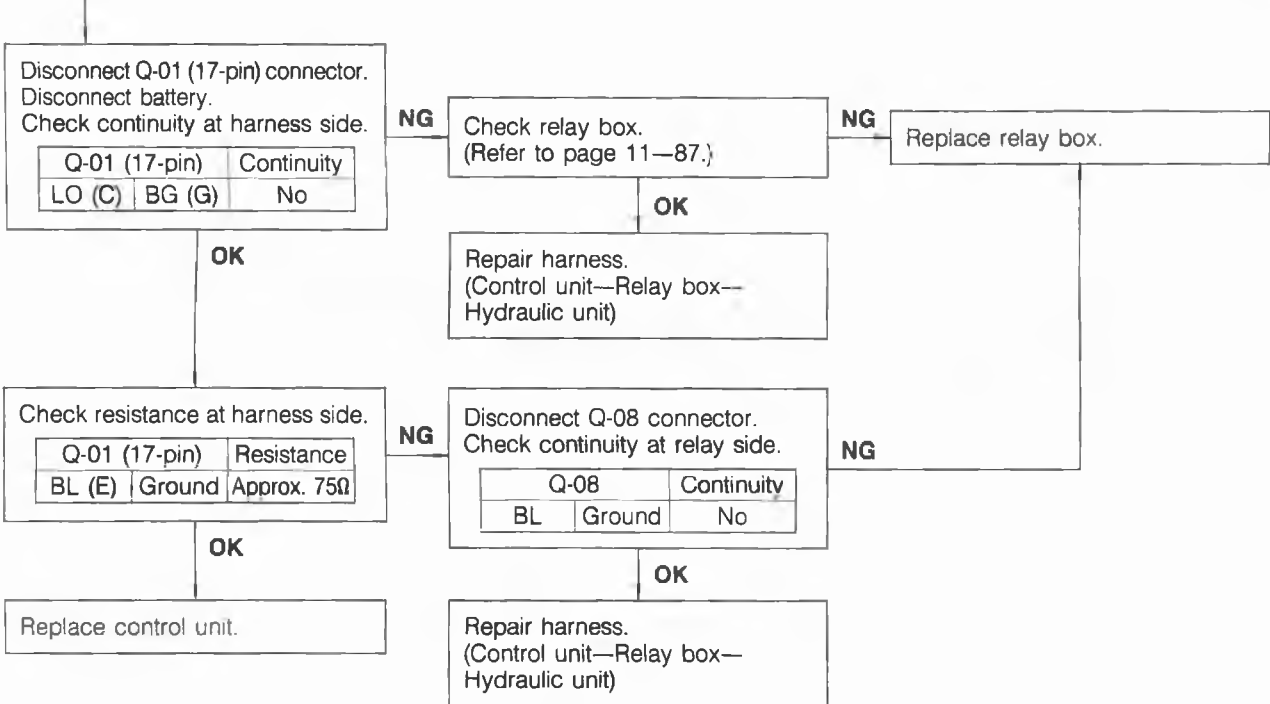
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

<b>ABS-10</b>	Possible failure
	Relay box, Hydraulic unit, Harness



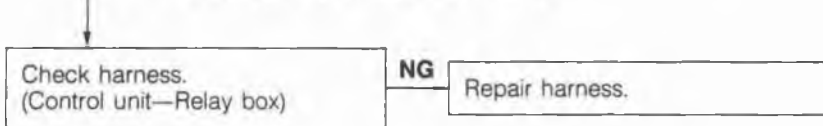
86U11X-154

<b>ABS-11</b>	Possible failure
	Relay box, Hydraulic unit, Harness

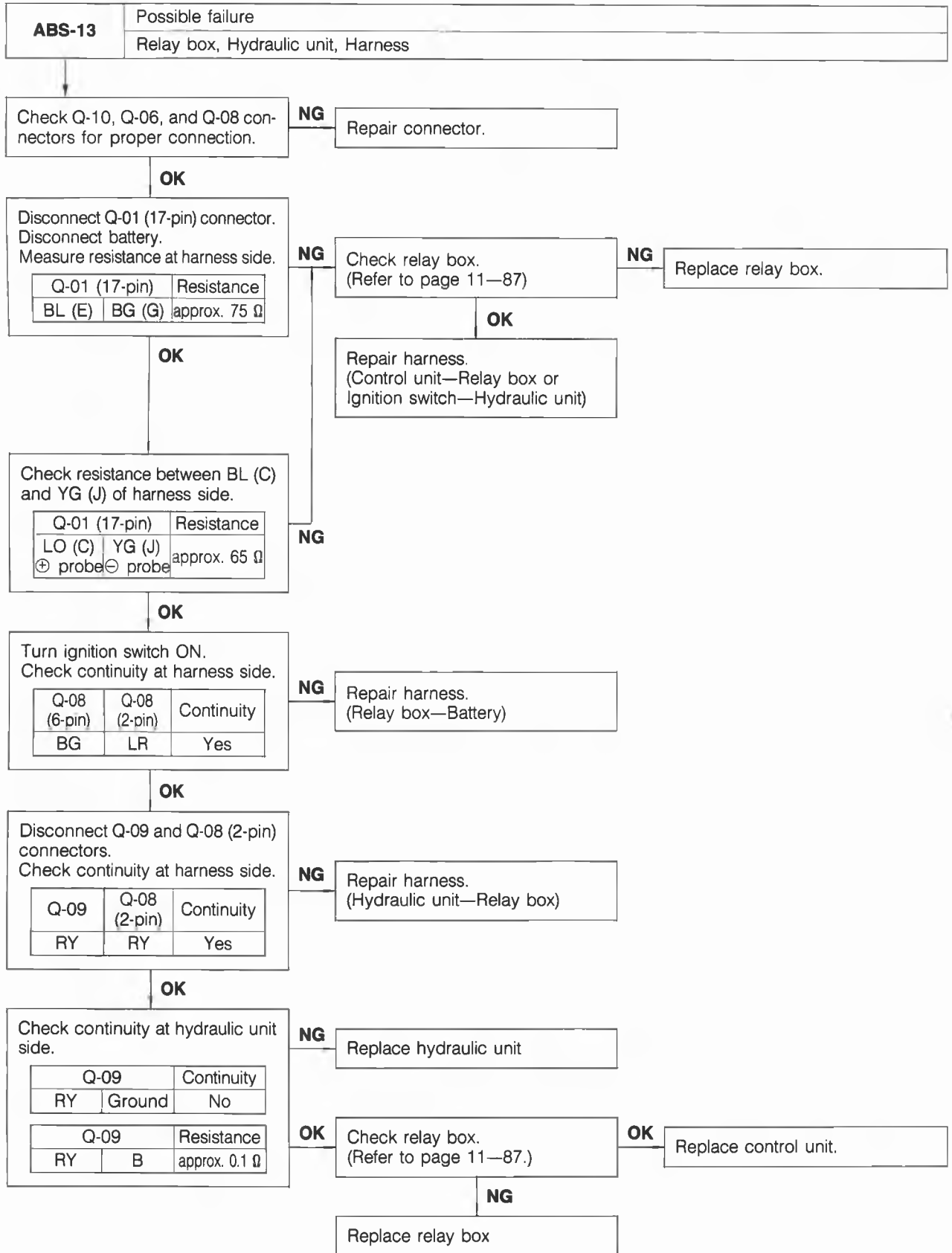


76G11X-057

<b>ABS-12</b>	Possible failure
	Relay box, Hydraulic unit, Harness



86U11X-156



# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

<b>ABS-14</b>	Possible failure
	Relay box, Hydraulic unit, Harness

Start and stop engine 5 times without depressing brake pedal, and check that motor operates occasionally and warning light stays ON.

**OK** → Go to ABS-13.

**NG**

Check Q-10, Q-06 and Q-08 connectors for proper connection. Check related harness for open or short circuit.

**NG** → Repair harness. (Battery—Relay box—Hydraulic unit)

76G11X-094

<b>ABS-15</b>	Possible failure
	Control unit, Harness, Hydraulic unit

Disconnect Q-10 and Q-01 (17-pin and 11-pin) connectors. Check continuity at hydraulic unit side.

Q-10		Continuity
BR	Ground	No

**NG** → Repair harness. (Hydraulic unit—Control unit)

**OK**

Disconnect Q-06 connector. Check continuity at hydraulic side.

Q-10		Continuity
BR	Ground	No

**NG** → Replace hydraulic unit.

**OK**

Check Q-06 connector for proper connection.

**NG** → Repair Q-06 connector.

**OK**

Disconnect Q-06 connector. Measure resistance at hydraulic unit side.

Q-06	Q-10	Resistance
Br BW L YG YR YW	BR	approx. 3 Ω

**OK**

Connect Q-06 and Q-10 connectors. Check continuity at harness side.

Q-01 (17-pin)		Continuity
Br (K) BW (O) L (R) YG (J) YR (M) YW (Q)	LO (C)	Yes (Less than 100 Ω)

**NG** → Repair harness. (Control unit—Hydraulic unit)

**OK** → Replace control unit.

**NG**

Replace hydraulic unit.

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# ANTI-LOCK BRAKE SYSTEM (ABS) 11

<b>ABS-16</b>	Possible failure
	Control unit, Harness

Disconnect Q-01 (17-pin) and Q-10 connectors.  
Check that hydraulic unit and harness resistance does not fluctuate when moving harness.

Q-01 17-pin)	Q-10	Resistance
Br (K) BW (O) L (R) YG (J) YR (M) YW (Q)	BR	Must be constant

**NG** Repair connector or harness.  
(Q-01 (17-pin), Q-10)

**OK** Replace control unit.

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<b>ABS-17</b>	Possible failure
	Control unit

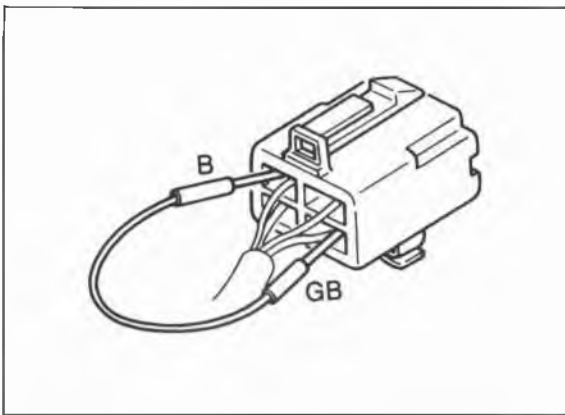
Replace control unit.

<b>ABS-18</b>	Possible failure
	Control unit

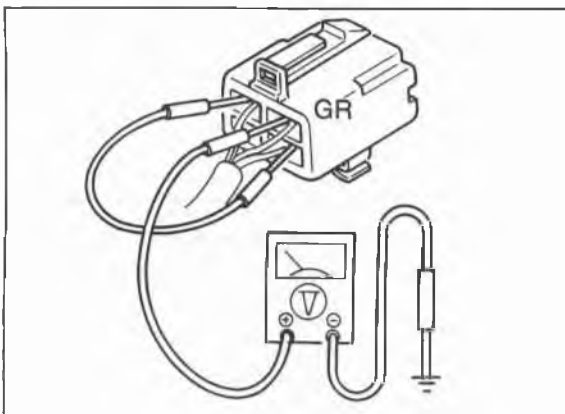
Replace control unit.

86U11X-161

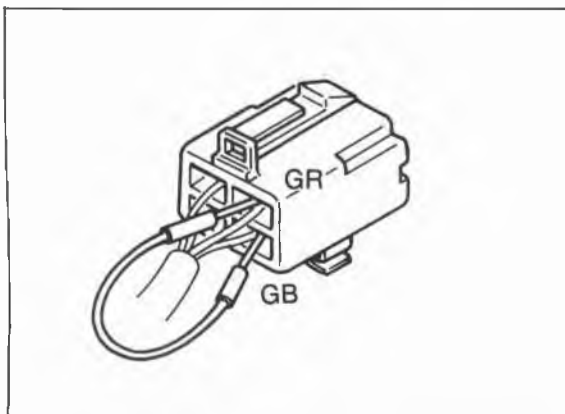
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



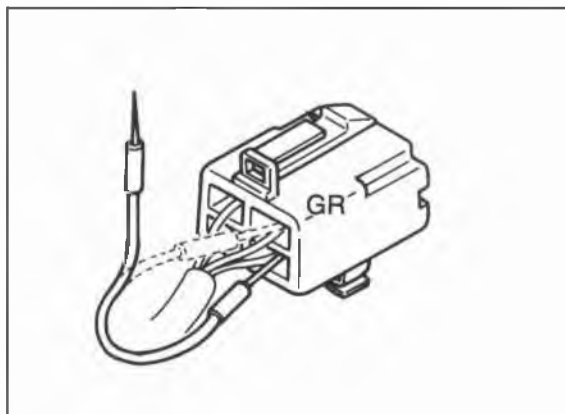
86U11X-162



76G11X-059



86U11X-164



86U11X-165

## DIAGNOSIS INDICATION MODE

To obtain the diagnosis indication mode, proceed as follows:

1. Remove the driver's seat.
2. Connect terminal wires (GB) and (B) of the check connector (at control unit) with a jumper wire.
3. Start the engine.

### Note

**The system is now in the diagnosis indication mode.**

4. Observe the warning light for illumination or count flashing.
5. Connect an analog voltmeter to terminal wire (GR), and count the times voltage is output.

### Note

**a) The voltmeter will fluctuate between 0V and approx. 12V.**

**b) Determine the failure and flow chart number with the Diagnosis Table. (Refer to page 11—75.)**

## MEMORY CANCEL

### Note

**Failures are contained in the control unit memory. They are not erased when the battery is disconnected. Follow the procedure below to erase them.**

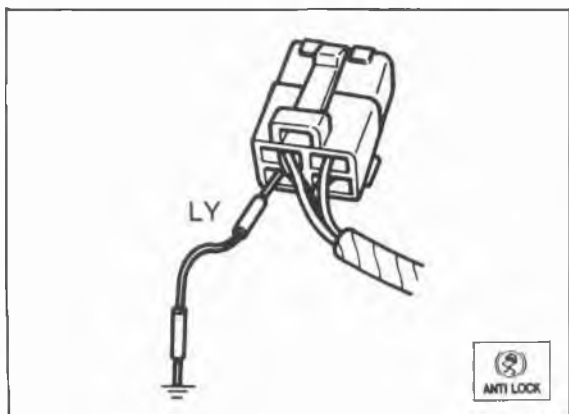
1. Connect the terminal wires (GR) and (GB) of the check connector with a jumper wire.
2. Turn the ignition switch ON.
3. Check that the warning light is illuminated, and wait 1—2 seconds.
4. Turn the ignition switch OFF.
5. Disconnect the jumper wire from terminal wire (GR).
6. Start the engine and wait for the warning light to go OFF.

### Note

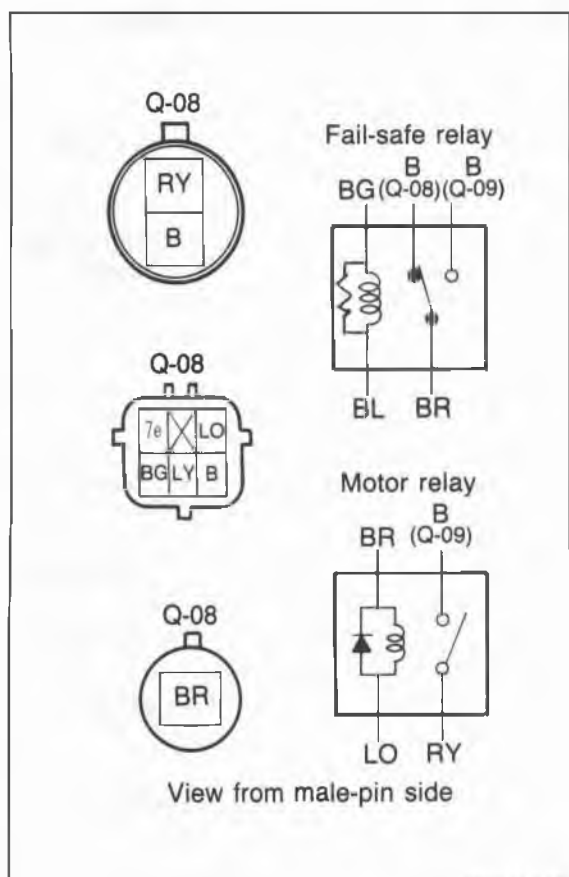
**a) One failure memory is erased each time the above steps are taken.**

**b) If the warning light illuminates or blinks after step 6, read and note diagnosis indication. The memory has the capacity for storing 32 failures.**

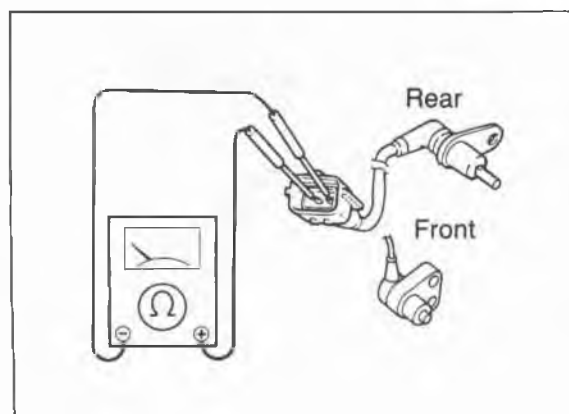
7. Turn the ignition switch OFF.
8. Remove the jumper wire.



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## ABS WARNING LIGHT

### Inspection for No Illumination

1. Check that other warning lights illuminate. If not, check the METER 10A fuse for burning out.
2. Turn the ignition switch ON.
3. Ground the LY terminal of the check connector with a jumper wire.
4. Check that the ABS warning light illuminates. If not illuminated, check the bulb and harness (battery → check connector).
5. Check for 12V at F (LY) terminal of the control unit connector.

If the voltage is not as specified, check the harness (bulb → control unit).

If the voltage is as specified, replace the relay box and the control unit.

## RELAY BOX

### Inspection of Fail-safe Relay

1. Check for continuity of the relay with an ohmmeter. Replace the relay box if necessary.

Connecting to		BR	B (Q-08)	B (Q-09)
12V	Ground			
—	—	○—○		
BG	BL	○—○		○—○

○—○: Indicates continuity

2. Check that the resistance between terminal wire (BR) and terminal wire (LY) changes when reversing the ⊕ and ⊖ test-leads. Replace the relay box if necessary.

### Inspection of Motor Relay

1. Check for continuity of the relay with an ohmmeter. Replace the relay box if necessary.

Connecting to		RY	B (Q-09)
12V	Ground		
—	—		
BR	LO	○—○	○—○

○—○: Indicates continuity

2. Check that the resistance between terminal wire (BR) and terminal wire (LO) changes when reversing the ⊕ and ⊖ test-leads. Replace the relay box if necessary.

## WHEEL SPEED SENSOR

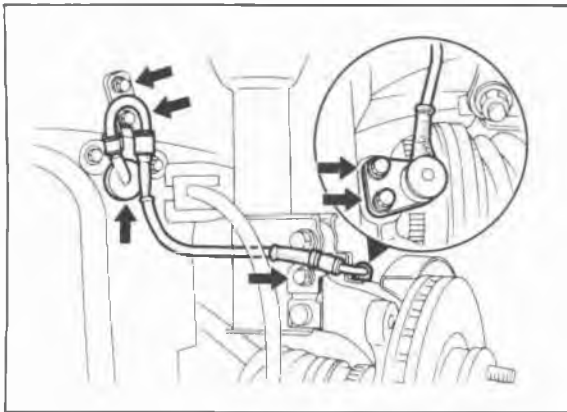
### Inspection

1. Measure the resistance of the sensor with an ohmmeter.

**Resistance: 800—1,200 Ω**

2. If the resistance is not within specification, replace the sensor.
3. Check that the harness is not twisted and does not contact other objects when turning the steering wheel is turned fully.

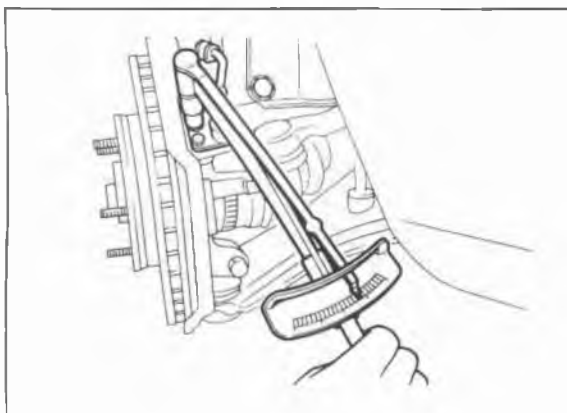
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



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## Removal of Front Wheel Speed Sensor

1. Remove the wheel and tire.
2. Remove the parts shown in the figure, and remove the sensor from the knuckle.



86U11X-170

## Installation of Front Wheel Speed Sensor

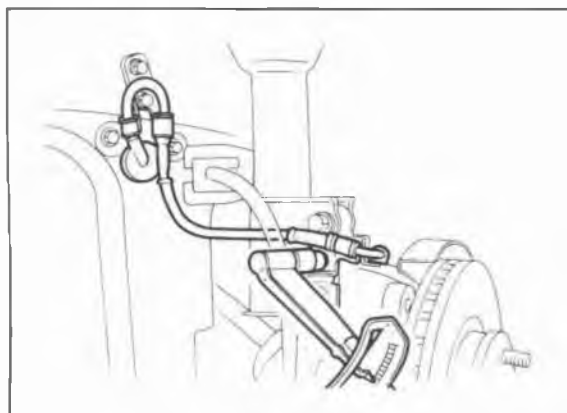
1. Install the sensor to the knuckle.

### Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

### Caution

The left and right sensors are not interchangeable. L or R is indicated on the bracket.



86U11X-171

2. Install the sensor harness bracket onto the knuckle.

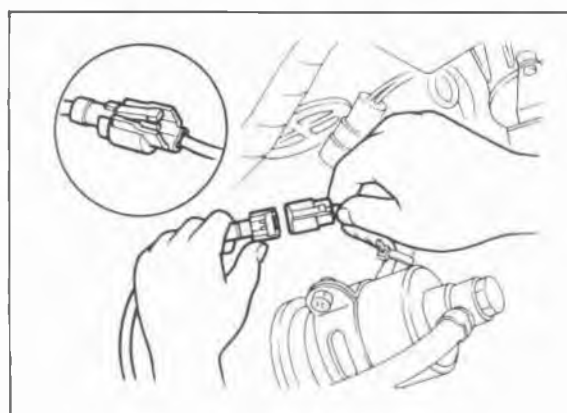
### Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

3. Push the sensor harness through the splash shield and secure it with the clip.
4. Install the sensor harness bracket to the body.

### Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

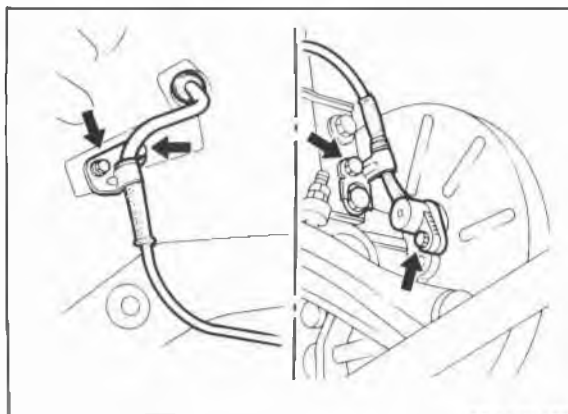


86U11X-172

### Caution

Verify that the harness is not twisted and does not contact the shock absorber or body when the steering wheel is turned.

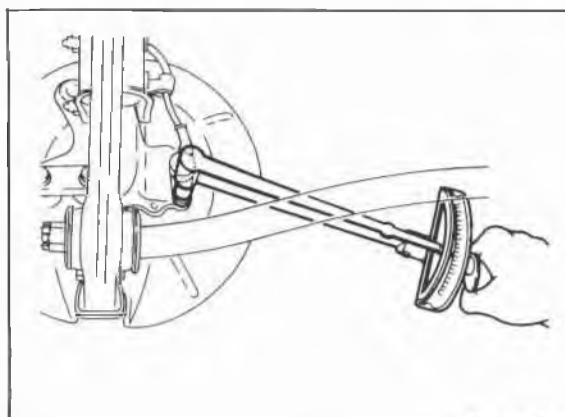
5. Connect the sensor connector.
6. Install the wheel and tire.



86U11X-173

## Removal of Rear Wheel Speed Sensor

1. Remove the wheel and tire.
2. Remove the parts shown in the figure, and remove the sensor from the hub spindle.



86U11X-174

## Installation of Rear Wheel Speed Sensor

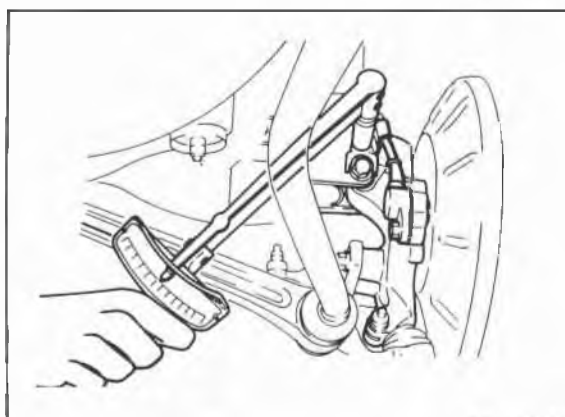
1. Install the sensor to the hub spindle.

### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

### Caution

**The left and right sensors are not interchangeable. L or R is indicated on the bracket.**



86U11X-175

2. Install the sensor harness bracket onto the knuckle.

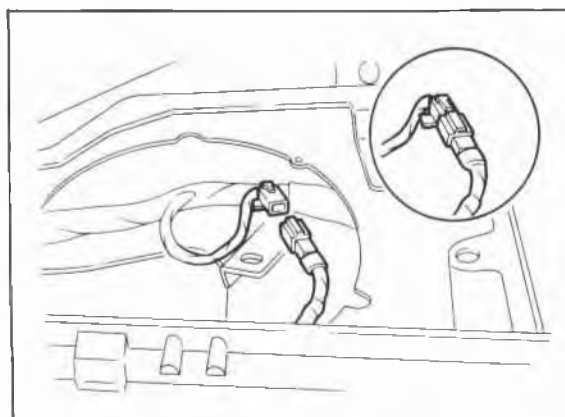
### Tightening torque:

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

3. Feed the sensor harness through the body and install the grommet.
4. Install the sensor harness bracket to the body.

### Tightening torque:

**11—26 N·m (1.1—2.6 m·kg, 8—19 ft·lb)**



76G11X-060

### Caution

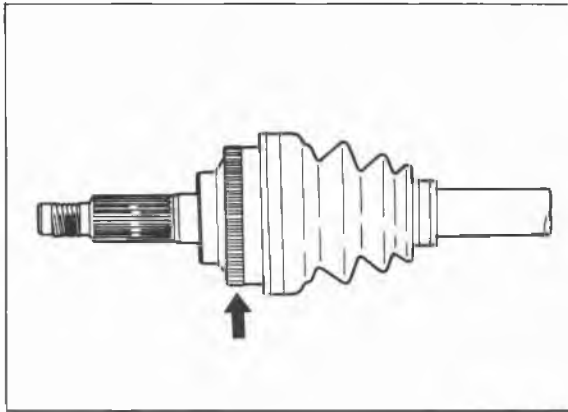
**Verify that the harness is not twisted and does not contact the shock absorber or body when the steering wheel is turned.**

5. Connect the sensor connector.
6. Install the wheel and tire.

## BRAKE LIGHT SWITCH

Refer to page 15—58.

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



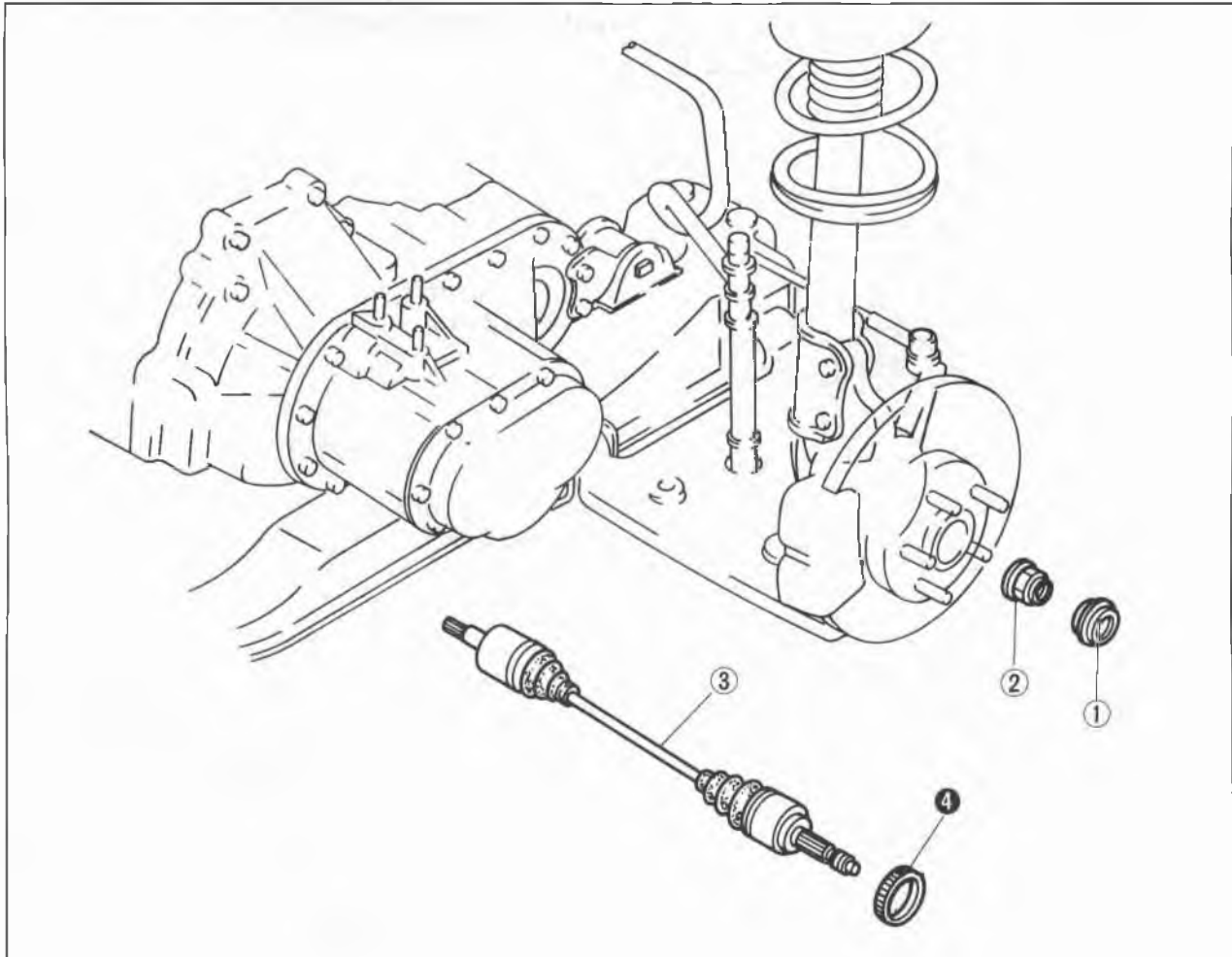
86U11X-177

## SENSOR ROTOR Inspection

Check the sensor rotor for missing or damaged teeth.

## Removal of Front Sensor Rotor

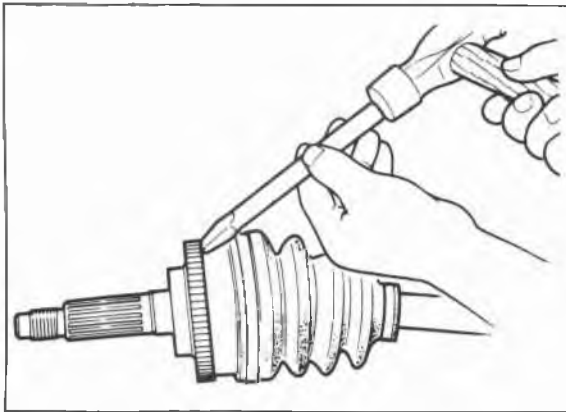
1. Loosen the front wheel lug nuts.
2. Block the rear wheels.
3. Jack up the front of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure, referring to removal note for the specially marked parts.



86U11X-178

1. Hub cap
2. Locknut

3. Driveshaft (Refer to section 9)
4. Sensor rotor



86U11X-179

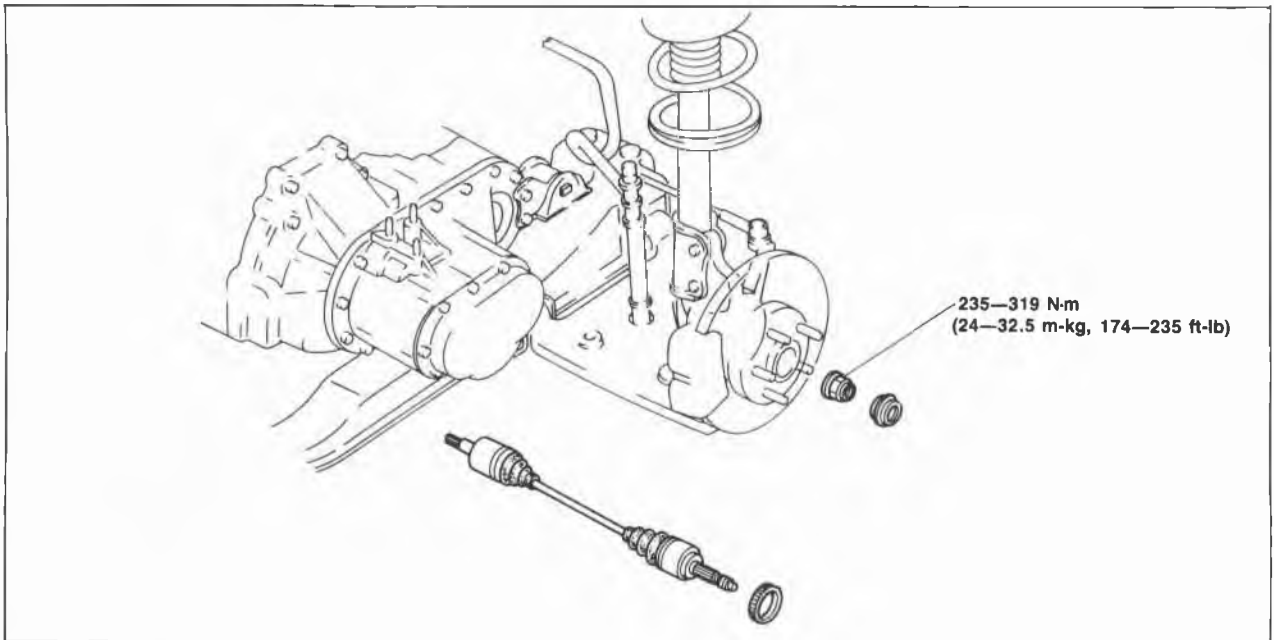
## Removal note Sensor rotor

Tap the sensor rotor off the drive shaft with a chisel.

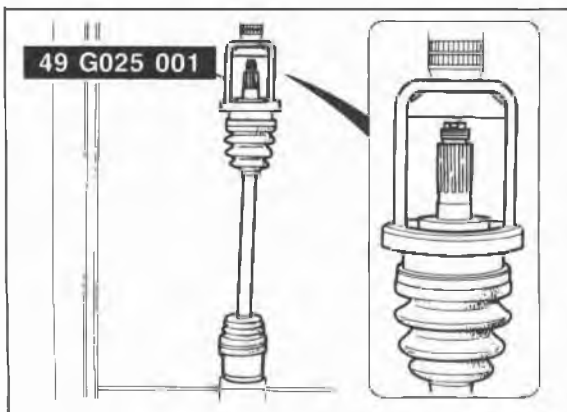
## Installation of Front Sensor Rotor

Install in the reverse order of removal, referring to installation note for the specially marked parts.

## Torque specifications



86U11X-180



86U11X-181

## Installation note Sensor rotor

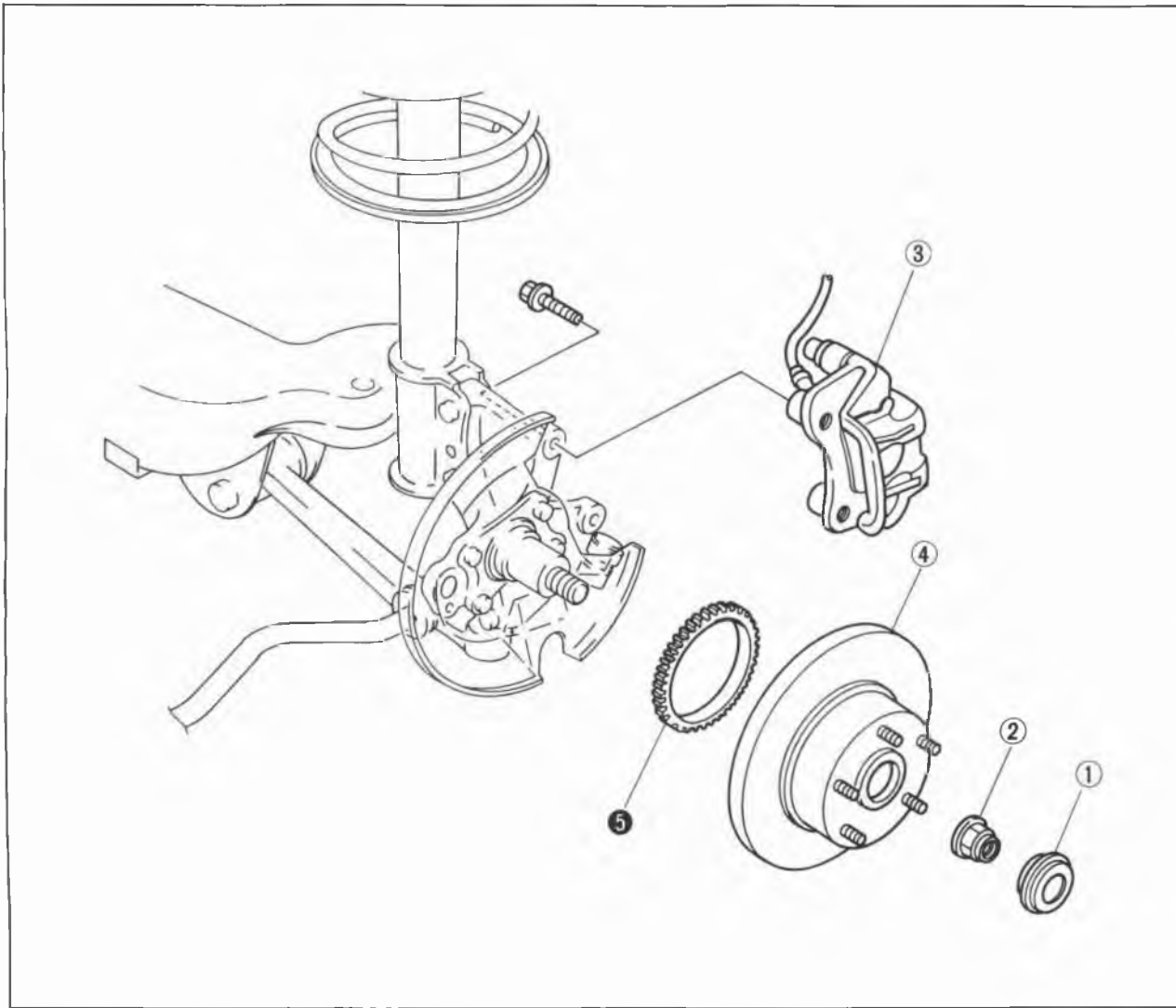
Press the sensor rotor onto the driveshaft with the SST.

**Caution**  
Install the sensor rotor with chamfered edge toward the driveshaft.

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

## Removal of Rear Sensor Rotor

1. Loosen the rear wheel lug nuts.
2. Block the front wheels.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure, referring to removal note for the specially marked parts.

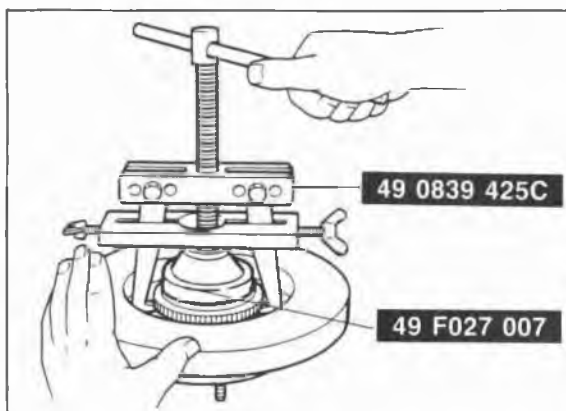


86U11X-182

1. Hub cap  
2. Locknut

3. Caliper assembly and  
mounting support

4. Disc plate  
5. Sensor rotor



86U11X-183

### Removal note Sensor rotor

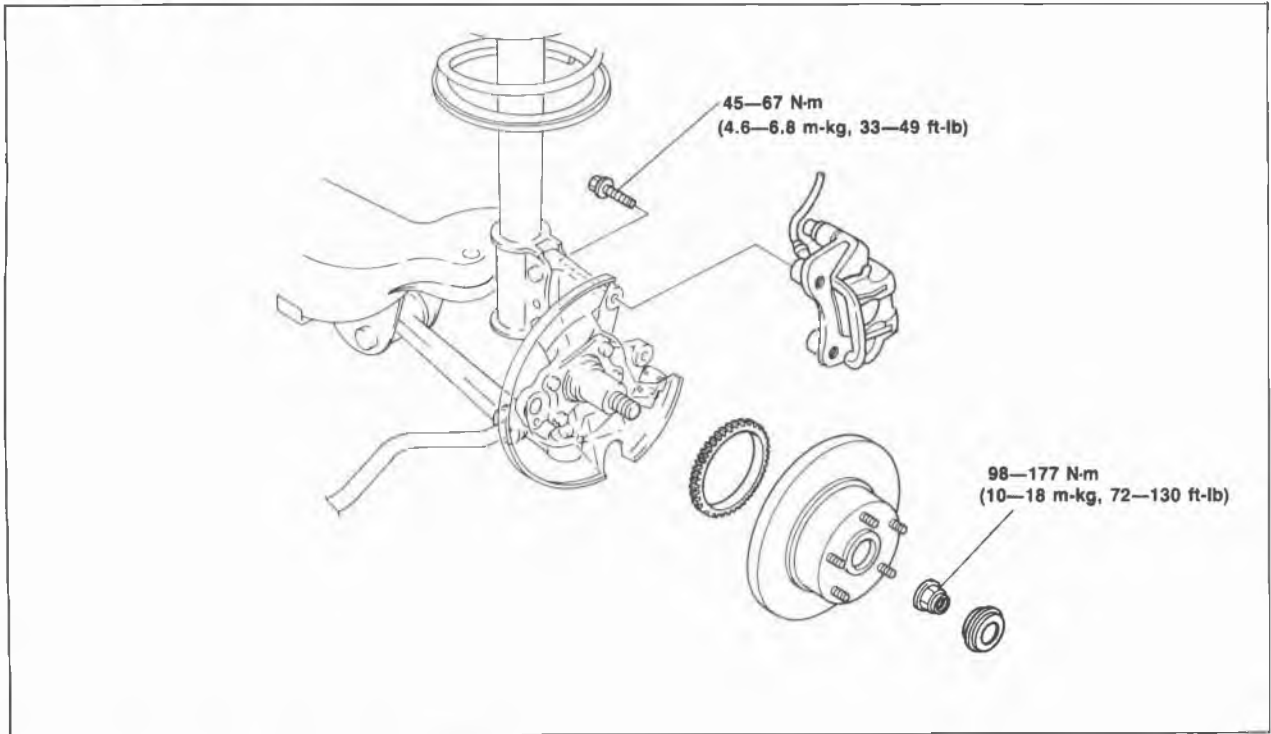
Remove the sensor rotor from the hub assembly with the **SST**.



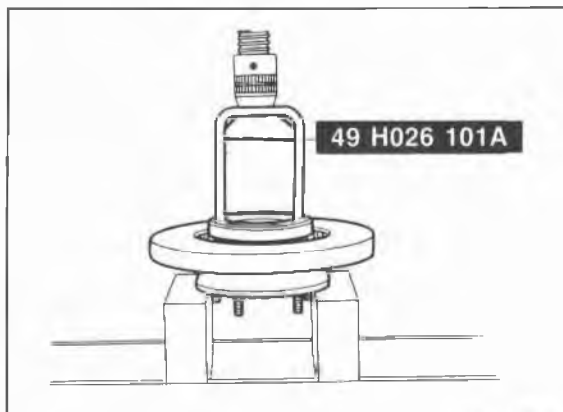
## Installation of Rear Sensor Rotor

Install in the reverse order of removal, referring to installation note for the specially marked parts.

### Torque specifications



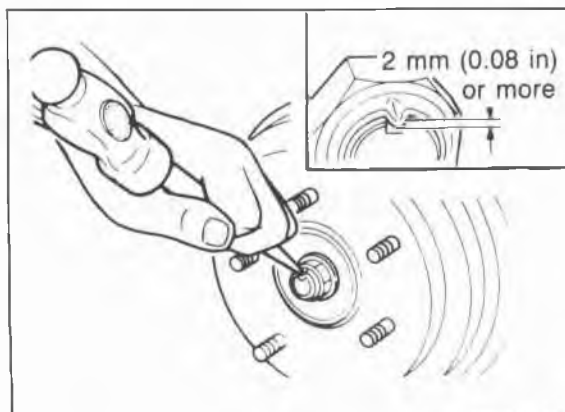
86U11X-184



86U11X-185

### Installation Sensor rotor

Press the sensor rotor onto the hub with the **SST**.



86U11X-186

### Locknut

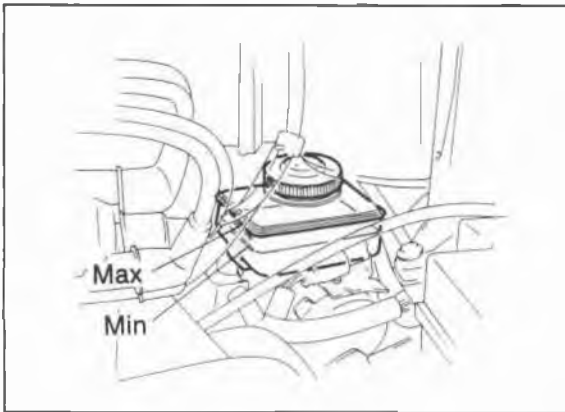
1. Install and tighten the locknut.
2. Stake a new locknut securely in the driveshaft groove.

### Caution

**Do not use a pointed tool for staking.**

3. Check that the hub rotates freely by hand.

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

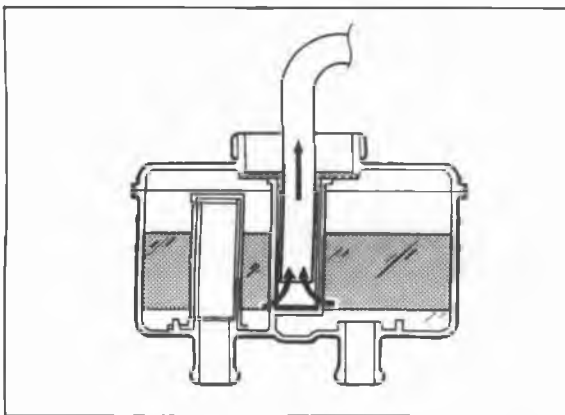


86U11X-187

## HYDRAULIC UNIT FLUID

### Inspection of Level

1. Run the engine for 10 seconds to let the pump motor build pressure in the accumulator; then stop the engine.
2. Check that the fluid level is between the Max and Min lines of the reservoir.
3. If the level is lower than the Min line and leakage from cap is not found, replace the hydraulic unit assembly.



76G11X-061

### Replacement

1. Remove the reservoir cap and retainer.
2. Use a suction pump and a soft vinyl hose to suck fluid from the reservoir.

### Caution

- a) A hard hose may damage the filter in the reservoir.
- b) Only the amount of fluid shown can be removed from the reservoir.

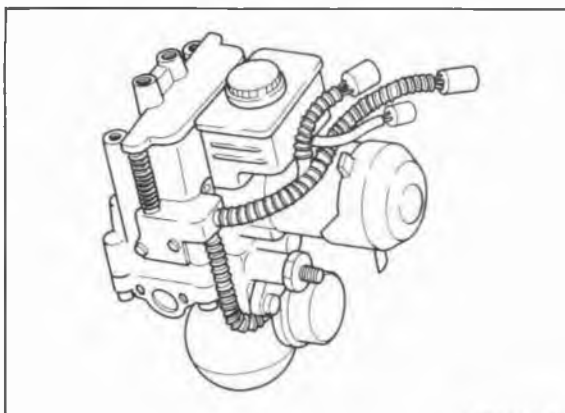
3. Fill the reservoir with the specified type and amount of brake fluid.

### Caution

- a) Do not allow any foreign material to enter the reservoir.
- b) Do not soak the upper filter with brake fluid. Otherwise, pouring fluid may be difficult.

**Fluid: DOT-3 or DOT-4 or SAE J1703**

4. Check the fluid level as described above.



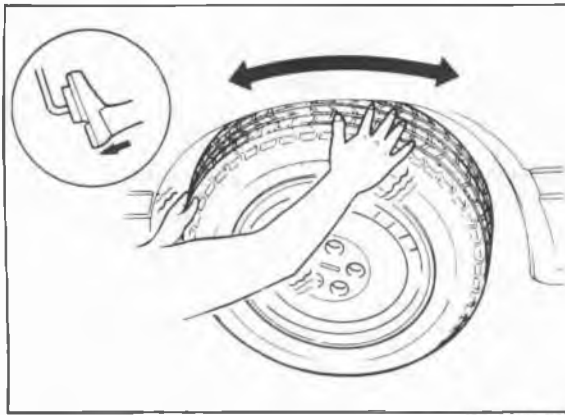
76G11X-097

## HYDRAULIC UNIT

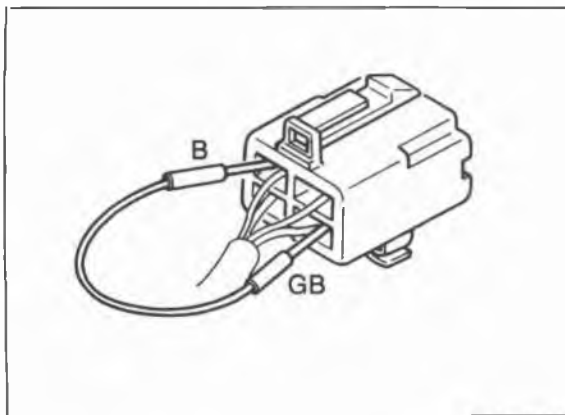
### Warning

The accumulator contains high-pressure gas; do not attempt to disassemble it or subject it to hard shocks or high heat.

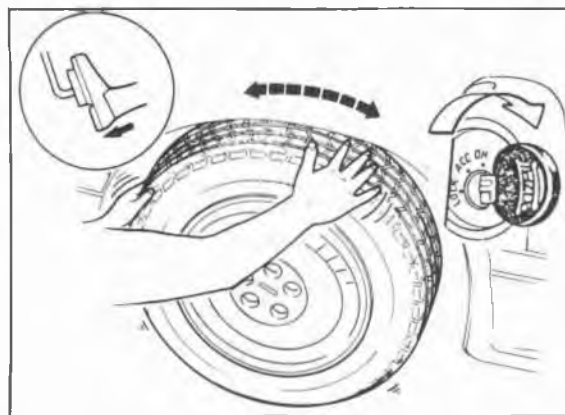
When the hydraulic unit is scrapped, the high-pressure gas must be released. Turn the screw on the accumulator bottom one full turn only and allow the gas to escape gradually.



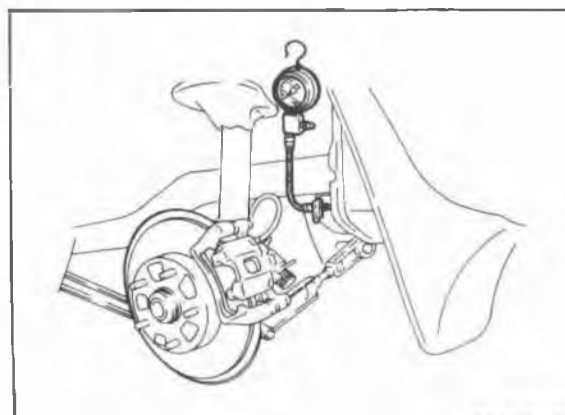
86U11X-190



86U11X-191



76G11X-098



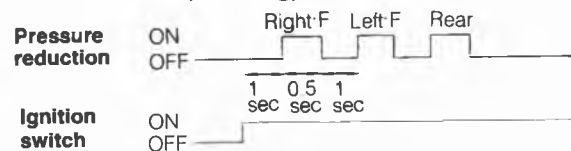
86U11X-193

## Inspection of Pressure Reduction

1. Check that the battery is fully charged.
2. Jack up the vehicle and support it with safety stands.
3. Release the parking brake.
4. Check the wheel for brake drag while turning it by hand.

5. Connect terminal wires (GB) and (B) of the check connector with a jumper wire.
6. Have an assistant depress the brake pedal; then verify that the wheel cannot be turned.
7. Run the engine for 10 sec, and stop it.

8. With the brake pedal depressed, turn the ignition switch ON.
9. With the brake pedal still depressed, check that the wheel can be turned intermittently (when pressure reduction is operating).



10. Check operation at the remaining wheels.
11. If not operated correctly, check the warning light and brake light switch circuit for proper operation.

## Inspection of Proportioning Valve

### Note

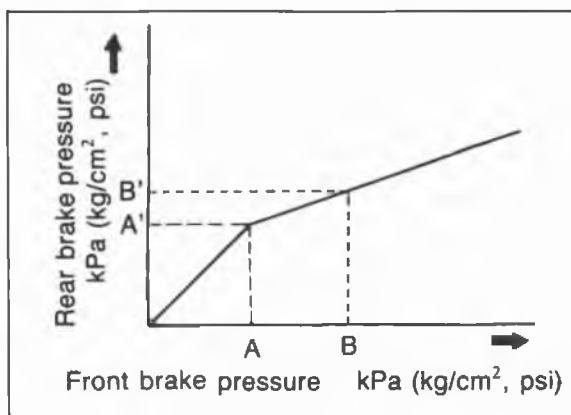
The proportioning valve is built into the hydraulic unit.

1. Disconnect the flexible hose from the brake pipe; then connect one pressure gauge to the front brake pipe, the other to the rear brake pipe.

### Note

Use a pressure gauge [9,810 kPa (100 kg/cm<sup>2</sup>, 1,422 psi)].

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



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2. Bleed air from the system.
3. Depress the brake pedal, and compare the fluid pressure of the front brake with that of the rear brake.

Fluid pressure		kPa (kg/cm <sup>2</sup> , psi)	
Front brake side		Rear brake side	
A	2,943 (30,427)	A'	2,747—3,139 (28—32, 398—455)
B	6,867 (70,995)	B'	3,924—4,316 (40—44, 569—626)

4. If the measurement is not within specification replace the hydraulic unit assembly.

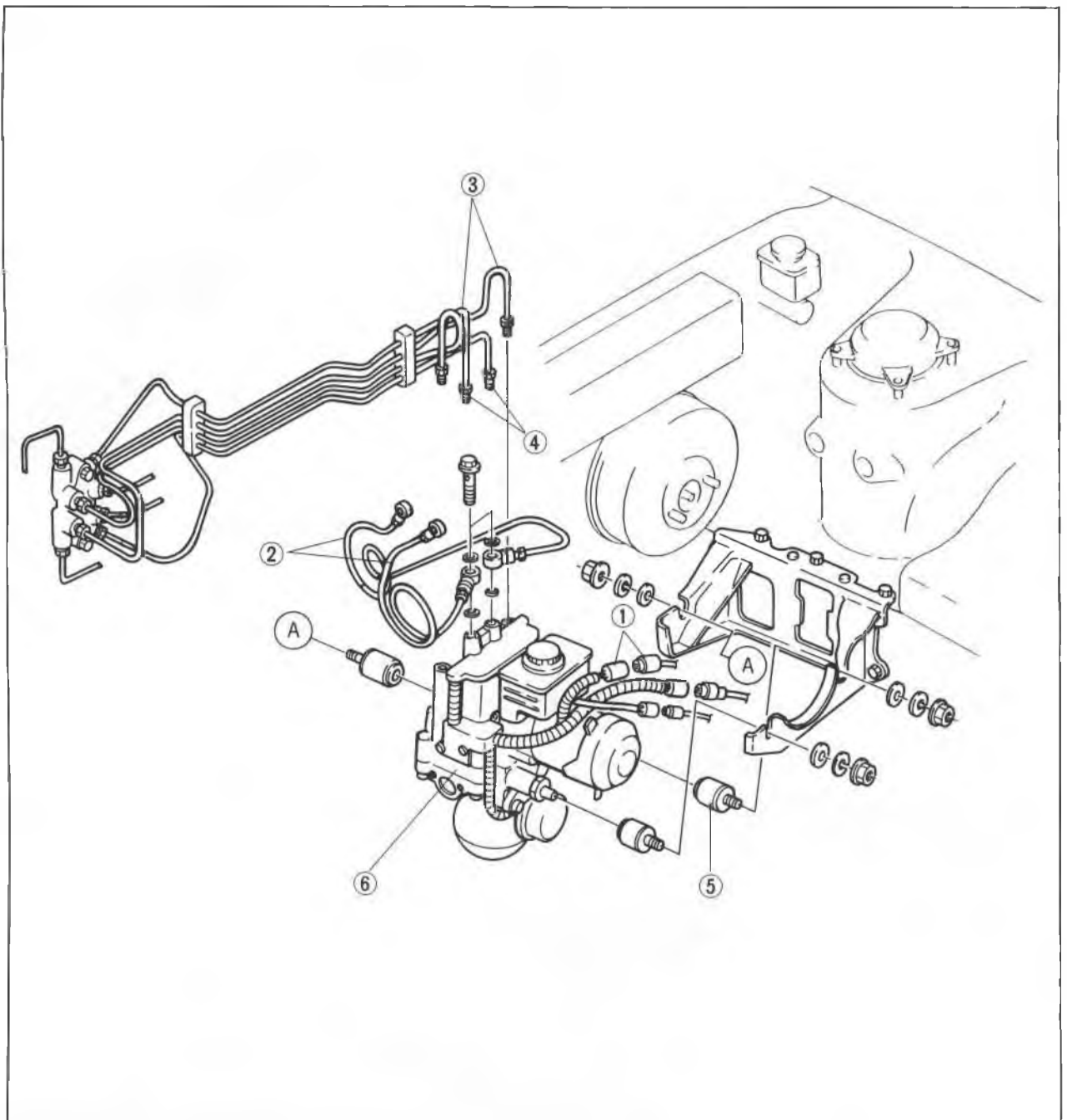
## REMOVAL

### Caution

- a) Brake fluid will damage painted surfaces. If it does get on the painted surfaces, wipe it off immediately.
- b) Do not tip the hydraulic unit to prevent the brake fluid in the reservoir from draining.

1. Remove the nuts mounting the fuel filter and ignitor to the bracket and move them toward the engine.
2. Remove the air cleaner assembly.
3. Remove the master cylinder. (Refer to page 11—14.)
4. Remove the hydraulic unit in the sequence shown in the figure.

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- 1. Coupler
- 2. Brake pipe (from master cylinder)
- 3. Brake pipe (to front brakes)

- 4. Brake pipe (to rear brakes)
- 5. Mount bushing
- 6. Hydraulic unit

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

## INSTALLATION

1. Install in the reverse order of removal.

Before installing the air cleaner assembly, igniter, and fuel filter:

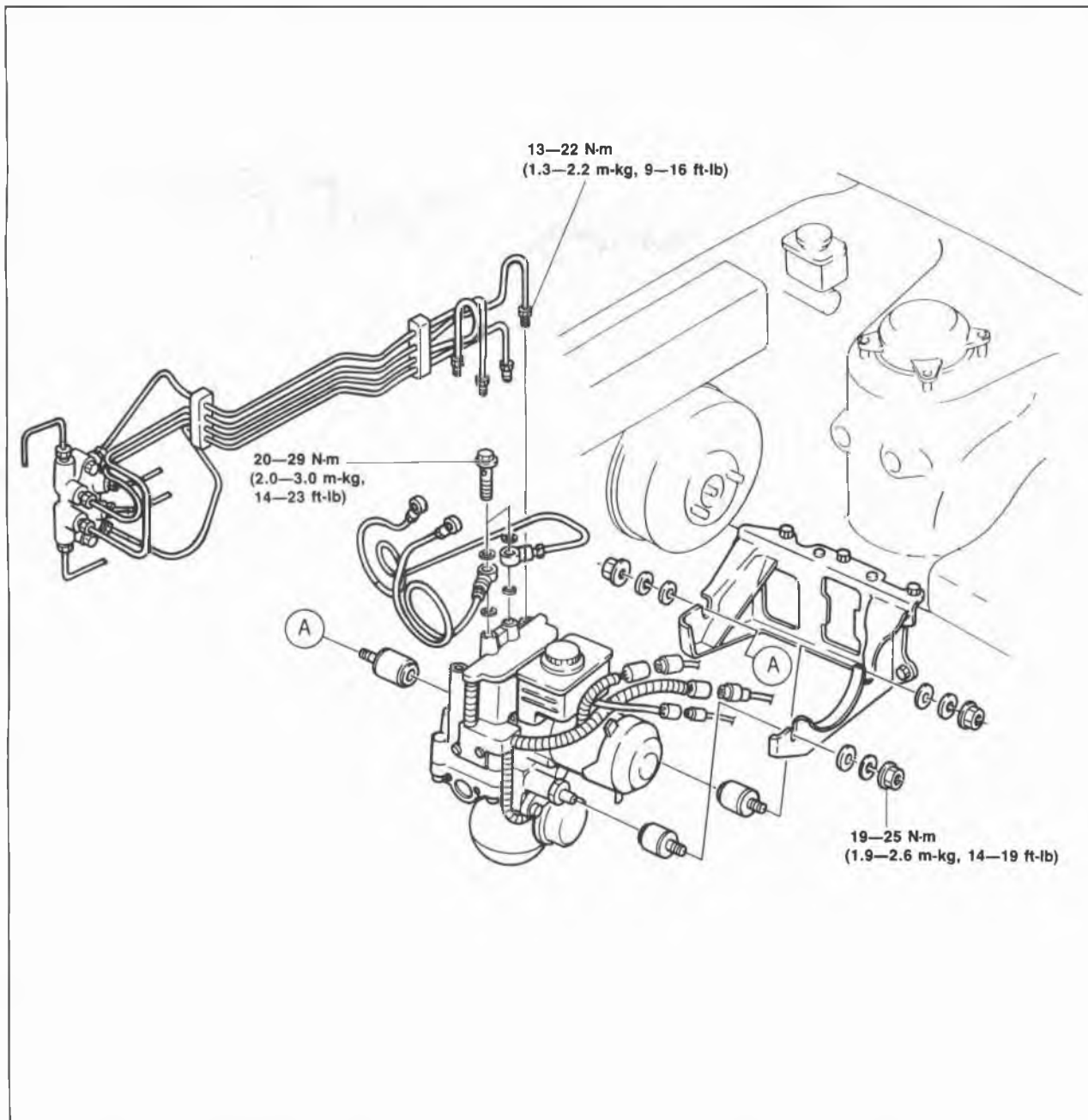
- (1) Add brake fluid and bleed air. (Refer to page 11—9.)
- (2) Check each part for fluid leakage.
- (3) Check the brake fluid level of both the master cylinder reservoir and hydraulic unit reservoir.

2. Tighten all bolts and nuts to the specified torque, referring to torque specifications.

3. After installation:

- (1) The sealing reservoir cap (red) is installed on the new hydraulic unit to prevent the brake fluid from leaking while shipping. Replace it with an original cap (black) after replacing the hydraulic unit.
- (2) Check that the hydraulic unit operates properly by testing the pressure reduction. (Refer to page 11—95.)

## Torque specifications



76G11X-063

## CONTROL UNIT CIRCUIT

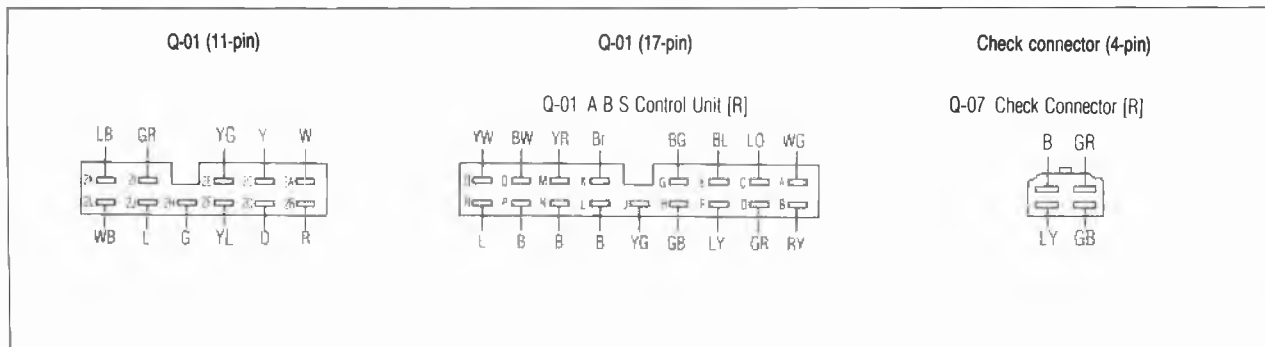
### Inspection of Control Unit Circuit

1. Start the engine, and run it for 10 seconds.
2. Disconnect the connectors from the control unit. Check the connector at the harness side as shown in the table below.

Terminal	Connection or measured item	Check item	Tester connection	Condition	Voltage or resistance	
Q-01 11-pins	Wheel speed sensor	Left front	Voltage (AC)	2A (W) — 2B (R)	Turn wheel 1 revolution per second	More than 0.25V (AC)
			Resistance		—	800—1,200Ω
		Right front	Voltage (AC)	2C (Y) — 2D (O)	Turn wheel 1 revolution per second	More than 0.25V (AC)
			Resistance		—	800—1,200Ω
	Left rear	Voltage (AC)	2E (YG) — 2F (YL)	Turn wheel 1 revolution per second	More than 0.25V (AC)	
		Resistance		—	800—1,200Ω	
	Right rear	Voltage (AC)	2H (G) — 2J (GR)	Turn wheel 1 revolution per second	More than 0.25V (AC)	
		Resistance		—	800—1,200Ω	
2I (GR)	Low pressure switch	Continuity	2I (GR) — Ground	—	Continuity	
2K (LB)	High pressure switch	Continuity	2K (LB) — Ground	—	Continuity	
2L (WB)	Alternator output	Voltage	2L (WB) — Ground	Run engine	Approx. 14V	
Q-01 17-pins	A (WG)	Brake light switch	Voltage	A (WG) — Ground	Depress brake pedal	12V
	B (RY)	Motor	Continuity	B (RY) — Ground	—	Continuity
	C (LO)	Motor relay	Resistance	C (Lo)(⊕ test-lead)-J	—	Approx. 60—70Ω
	D (GR)	Check connector	Continuity	D (GR) — A (GR, Q-07)	—	Continuity
	E (BL)	Fail-safe relay	Resistance	E (BL) — G (BG)	—	Approx. 70—80Ω
	F (LY)	Warning light	Continuity	F (LY) — Ground	—	Continuity
	G (BG)	Battery	Voltage	G (BG) — Ground	Turn ignition SW ON	12V
	H (GB)	Check connector	Continuity	H (GB) — B (GB, Q-07)	—	Continuity
	J (YG)	Solenoid valve	Resistance	J(YG) — K (Br)	—	Approx. 5.5—7.0Ω
	K (Br)					
	M (YR)					
	O (BW)					
	Q (YW)	Solenoid valve		Q (YW) — R (L)		
	R (L)	Ground circuit	Continuity	L (B) — Ground	—	Continuity
N (B)	N (B) — Ground					
P (B)	P (B) — Ground					
C (B)	C (B, Q-07) — Ground					
4-pins						

### Control Unit Connector

View from harness side



## WHEELS AND TIRES

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SPECIAL NOTE .....	12— 5

86U12X-001





# 12 OUTLINE, TROUBLESHOOTING GUIDE

## OUTLINE

### SPECIFICATIONS

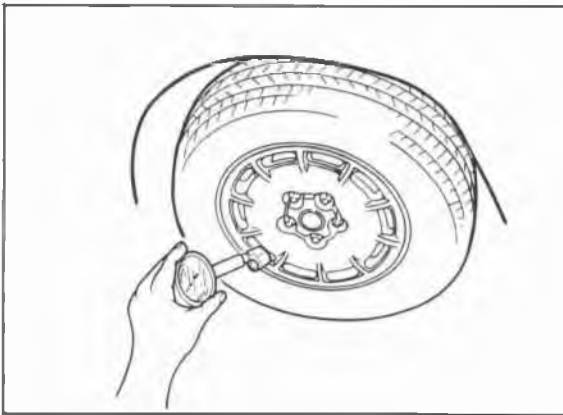
Item		Type	Standard	Temporary spare (If equipped)
Wheel	Size		5-J x 13	4-T x 15
			5 1/2-JJ x 14	
			6-JJ x 15	
	Off set	mm (in)	42 (1.65)	53 (2.09)
	Diameter of pitch circle	mm (in)	114.3 (4.5)	
	Material		Steel or aluminum alloy	Steel
Number of fixing nuts	13 inch-wheel	4		4 or 5
	14 inch-wheel	5		
	15 inch-wheel			
Tire	Size	13 inch-wheel	6.45—13—6PR 165 SR13 165/80R13 82S 185/70HR13 185/70R13 85H	T125/70D15
		14 inch-wheel	185/70HR14 185/70R14 87H 185/70R14 88H 185/70VR14	
		15 inch-wheel	195/60R15 86H 195/60VR15	
	Air pressure kPa (kg/cm <sup>2</sup> , psi)	Front	216 (2.2, 31) or 196 (2.0, 28) *See tire labels for application	412 (4.2, 60)
	Rear	177 (1.8, 26)		

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## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Premature tire wear</b>	Incorrect tire pressure	Adjust	12— 2
<b>Tire squeal</b>	Incorrect tire pressure Tire deterioration	Adjust Replace	12— 2 —
<b>Road noise or body vibration</b>	Insufficient tire pressure Unbalanced wheel(s) Deformed wheel(s) or tire(s) Irregular tire wear	Adjust Adjust Repair or replace Replace	12— 2 12— 5 — —
<b>Steering wheel vibration</b>	Irregular tire wear Right and left tread depths different Deformed or unbalanced wheel(s) Deformed tire(s) Unequal tire pressures Loose lug nuts	Replace Replace Replace or adjust Replace Adjust Tighten	— — 12— 5 — 12— 2 12— 5
<b>Uneven (one-sided) braking</b>	Unequal tire pressures	Adjust	12— 2
<b>Steering wheel doesn't return properly, or pulls to either left or right while vehicle moving on level road surface</b>	Incorrect tire pressure Irregular tire wear (left and right are different) Unequal tire pressures Different types or brands of tires mixed (right/left) Improperly tightened lug nuts	Adjust Replace Adjust Replace Tighten	12— 2 — 12— 2 — 12— 5
<b>General driving instability</b>	Unequal tire pressures Deformed or unbalanced wheel(s) Loose lug nuts	Adjust Replace or adjust Tighten	12— 2 12— 5 12— 5
<b>Excessive steering wheel play</b>	Loose lug nuts	Tighten	12— 5

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86U12X-004

## WHEELS AND TIRES

### INSPECTION AND ADJUSTMENTS

Check the following, and adjust or replace as necessary.

#### 1. Air pressure

Check the air pressure of all tires, including the spare tire, with an air pressure gauge. (Refer to page 12—2.)

#### Caution

**The air pressure must be measured when the tire is cold.**

#### 2. Tire wear

### Specifications

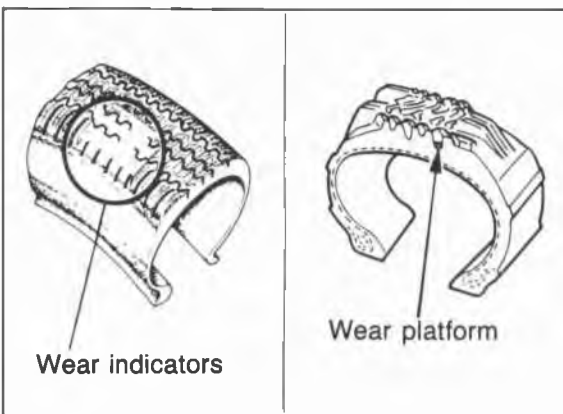
#### Remaining tread

**Ordinary tires: 1.6 mm (0.063 in) min.**

(Tire should be replaced if wear indicators are exposed.)

**Snow tires: 50% of tread**

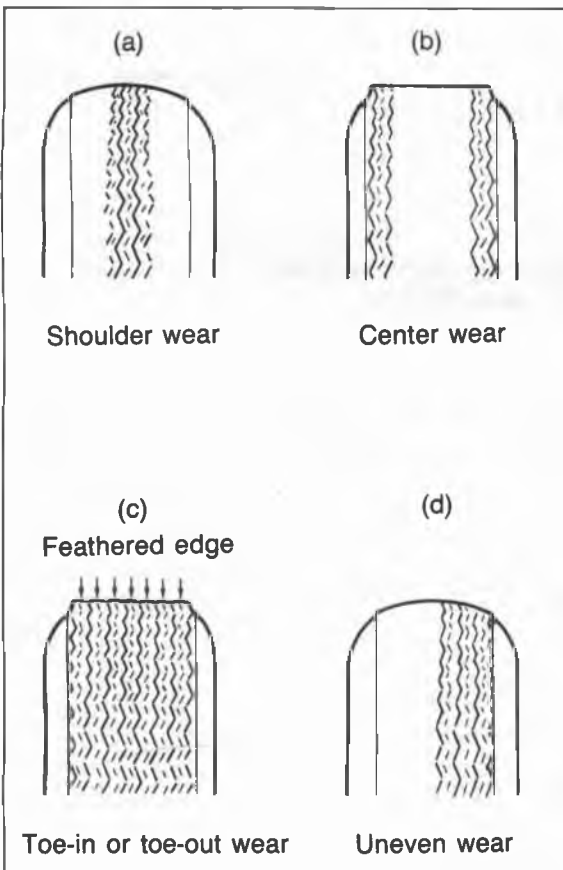
(Tire should be replaced if wear indicators are exposed.)



86U12X-005

### Troubleshooting guide

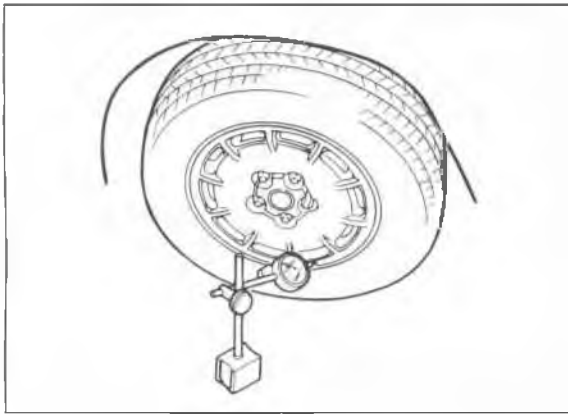
Abnormal tire wear patterns shown in the illustration can occur. Refer to the chart for the probable causes and remedies.



76G12X-003

	Probable cause	Remedy
(a)	<ul style="list-style-type: none"> <li>Underinflation (both sides worn)</li> <li>Incorrect camber (one side worn)</li> <li>Hard cornering</li> <li>Lack of rotation</li> </ul>	<ul style="list-style-type: none"> <li>Measure and adjust pressure</li> <li>Repair or replace axle and suspension parts</li> <li>Reduce speed</li> <li>Rotate tires</li> </ul>
(b)	<ul style="list-style-type: none"> <li>Overinflation</li> <li>Lack of rotation</li> </ul>	<ul style="list-style-type: none"> <li>Measure and adjust pressure</li> <li>Rotate tires</li> </ul>
(c)	<ul style="list-style-type: none"> <li>Incorrect toe-in</li> </ul>	<ul style="list-style-type: none"> <li>Adjust toe-in</li> </ul>
(d)	<ul style="list-style-type: none"> <li>Incorrect camber or caster</li> <li>Malfunctioning suspension</li> <li>Unbalanced wheel</li> <li>Out-of-round brake drum or disc</li> <li>Other mechanical conditions</li> <li>Lack of rotation</li> </ul>	<ul style="list-style-type: none"> <li>Repair or replace axle and suspension parts</li> <li>Repair or replace</li> <li>Balance or replace</li> <li>Correct or replace</li> <li>Correct or replace</li> <li>Rotate tires</li> </ul>

# 12 WHEELS AND TIRES

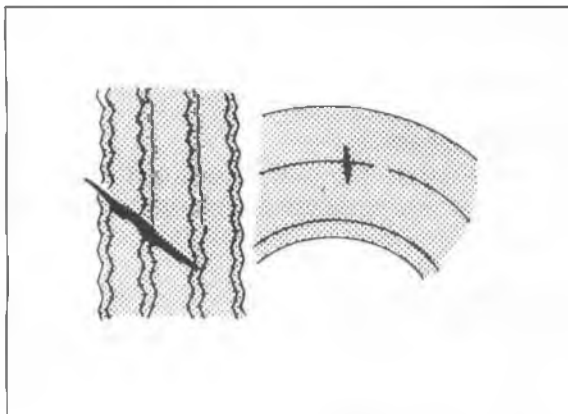


86U12X-007

3. Wheel deflection  
Set the probe of a dial indicator against the wheel, and turn the wheel one full revolution.

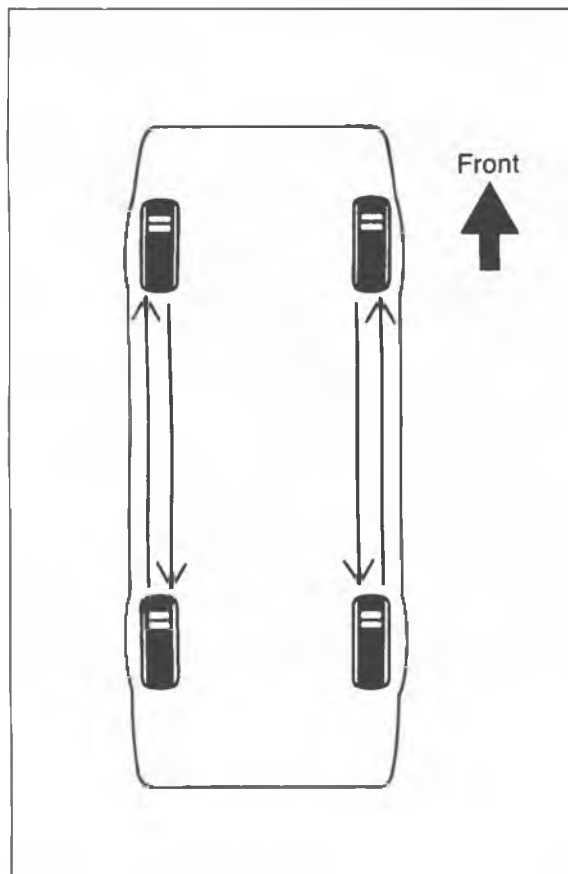
**Wheel deflection limit** mm (in)

	Horizontal	Vertical
Steel wheel	2.5 (0.098)	2.0 (0.079)
Aluminum wheel	2.0 (0.079)	



86U12X-008

4. Cracks, damage, or foreign matter (such as metal pieces, nails, and stones) in the tire and cracks, deformation, and damage to the wheel
5. Loose wheel lug nut(s)
6. Air leaking from the valve stem



76G12X-004

### TIRE ROTATION

To prolong tire life and assure uniform wear, rotate the tires every 6,000 km (3,750 miles) or sooner if irregular wear develops.

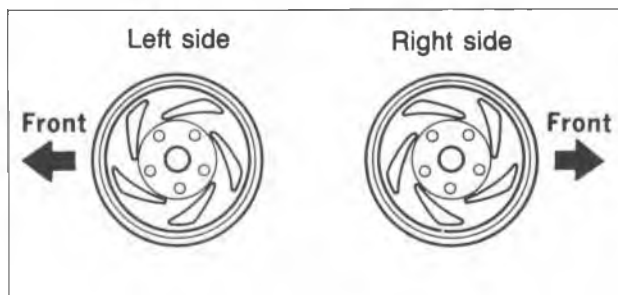
**Caution**

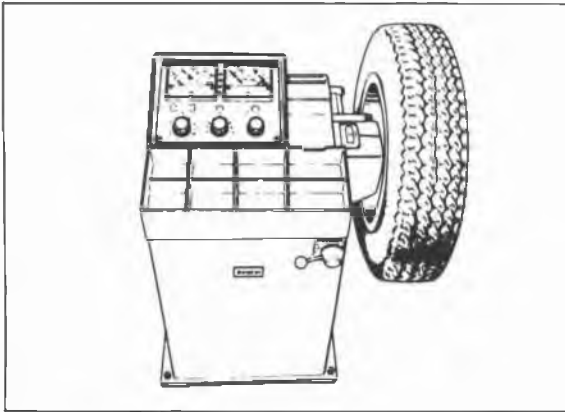
- Do not include "TEMPORARY USE ONLY" spare tire in rotation.
- After rotating the tires, adjust each tire to the specified air pressure. (Refer to page 12—2.)

**Note**

The optional unidirectional wheels are marked to indicate direction of travel.

Unidirectional wheel





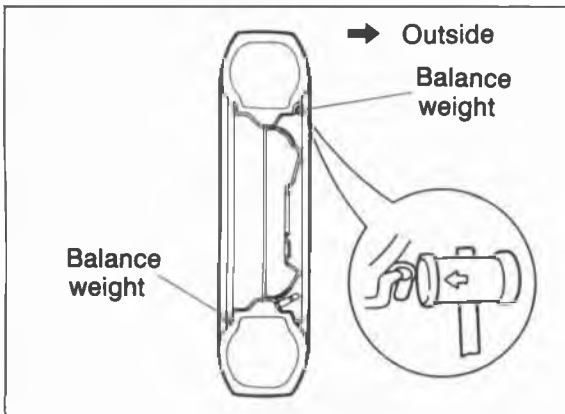
76G12X-005

## WHEEL BALANCE

If a wheel becomes unbalanced or if a tire is replaced or repaired, the wheel must once again be balanced to within specification.

**Maximum unbalance (at rim edge):** g (oz)

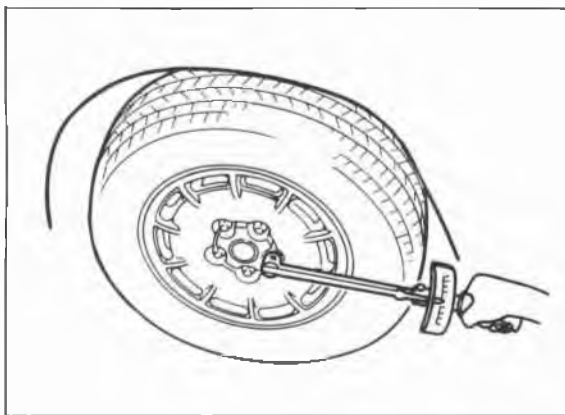
13 inch-wheel	11 (0.39)
14 inch-wheel	10 (0.35)
15 inch-wheel	9 (0.32)



86U12X-011

## Caution

- Do not use more than two balance weights on the inner or outer side of the wheel. If the total weight exceeds 100 g (3.5 oz), re-balance after moving the tire around on the rim.
- Attach the balance weights tightly so that they do not protrude more than 3 mm (0.12 in) beyond the wheel edge.
- Select suitable balance weights for steel or aluminum alloy wheels.
- Do not use an on-car balancer on ATX models. Use of this type of balancer may cause clutch damage.



86U12X-012

## WHEEL MOUNTING

Tighten the lug nuts to the specified torque in a criss-cross fashion.

**Tightening torque:**

**88—118 N·m (9—12 m·kg, 65—87 ft·lb)**

## Caution

- The wheel-to-hub contact surfaces must be clean.
- Never apply oil to the nuts, bolts, or wheels; doing so might cause looseness or seizure of the lug nuts.

## SPECIAL NOTE

### Regarding wheels and tires:

- Do not use wheels or tires other than the specified types.
- Aluminum wheels are easily scratched. When washing them, use a soft cloth, never a wire brush. If the vehicle is steam cleaned, do not allow boiling water to contact the wheels.
- If alkaline compounds (such as salt water or road salts), get on aluminum wheels, wash them as soon as possible to prevent damage. Use only a neutral detergent.

86U12X-013

# 12 WHEELS AND TIRES

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## **Regarding tire replacement:**

Note the following points when tires are to be removed from or mounted onto the wheels.

1. Be careful not to scratch the tire bead, the rim bead, or the edge of the rim.
2. Apply a soapy solution to the tire bead and the edge of the rim.
3. Use a wire brush, sandpaper, or cloth to clean and remove all rust, dirt, etc., from the rim edge and the rim bead. For aluminum wheels, use only a cloth for this purpose; never use a wire brush or sandpaper.
4. Remove any pebbles, glass, nails, etc., embedded in the tire tread.
5. Be sure the air valve is installed correctly.
6. After mounting a tire onto a wheel, inflate the tire to 250—300 kPa (2.55—3.06 kg/cm<sup>2</sup>, 35.55—42.66 psi). Check to be sure that the bead is seated correctly onto the rim and that there are no air leaks. Then reduce the pressure to the specified level.
7. If a tire iron is used to change a tire on an aluminum wheel, be sure to use a piece of rubber between the iron lever and the wheel in order to avoid damage to the wheel. Work should be done on a rubber mat, not on a hard or rough surface.

76G12X-006

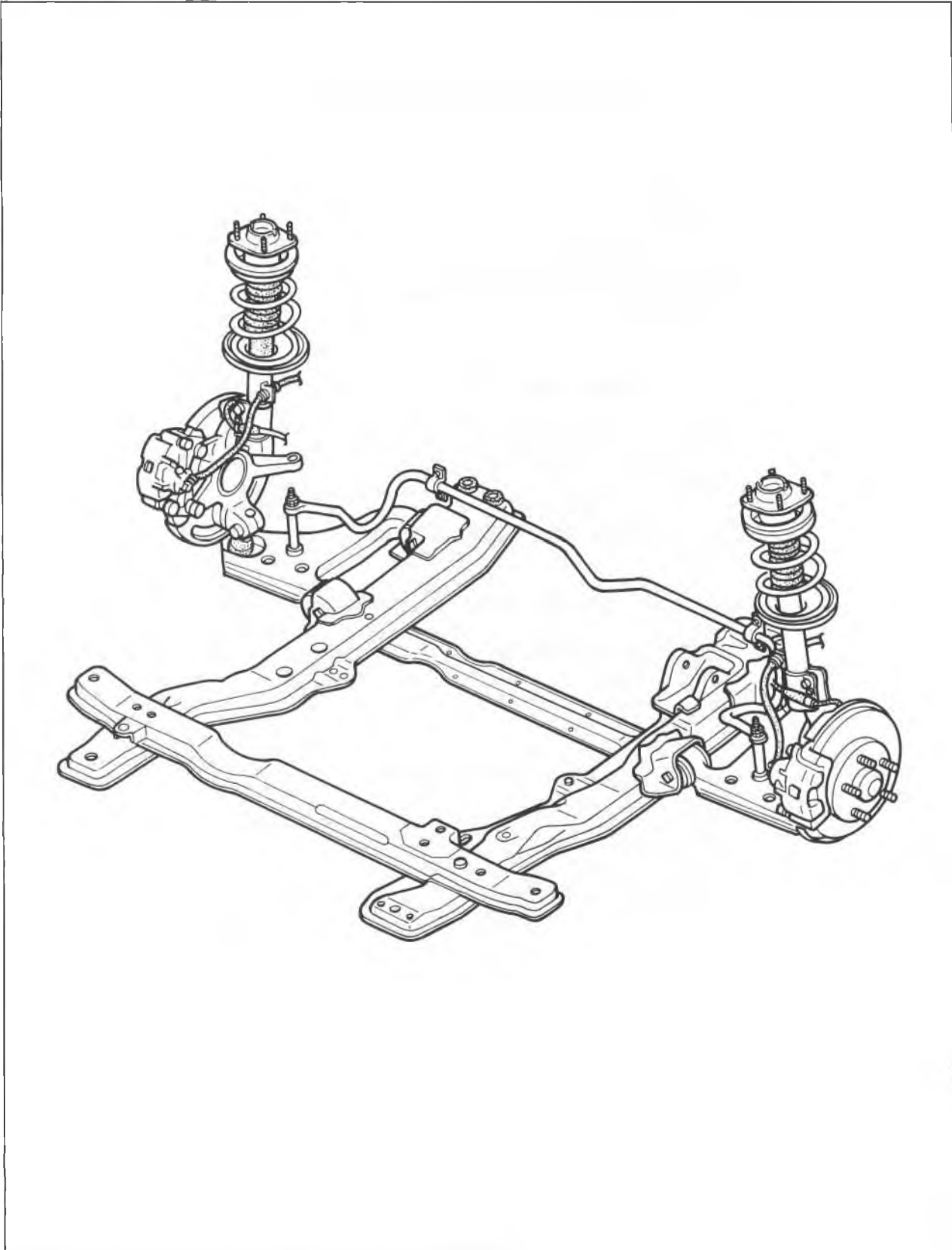
## SUSPENSION

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# 13 OUTLINE

## OUTLINE

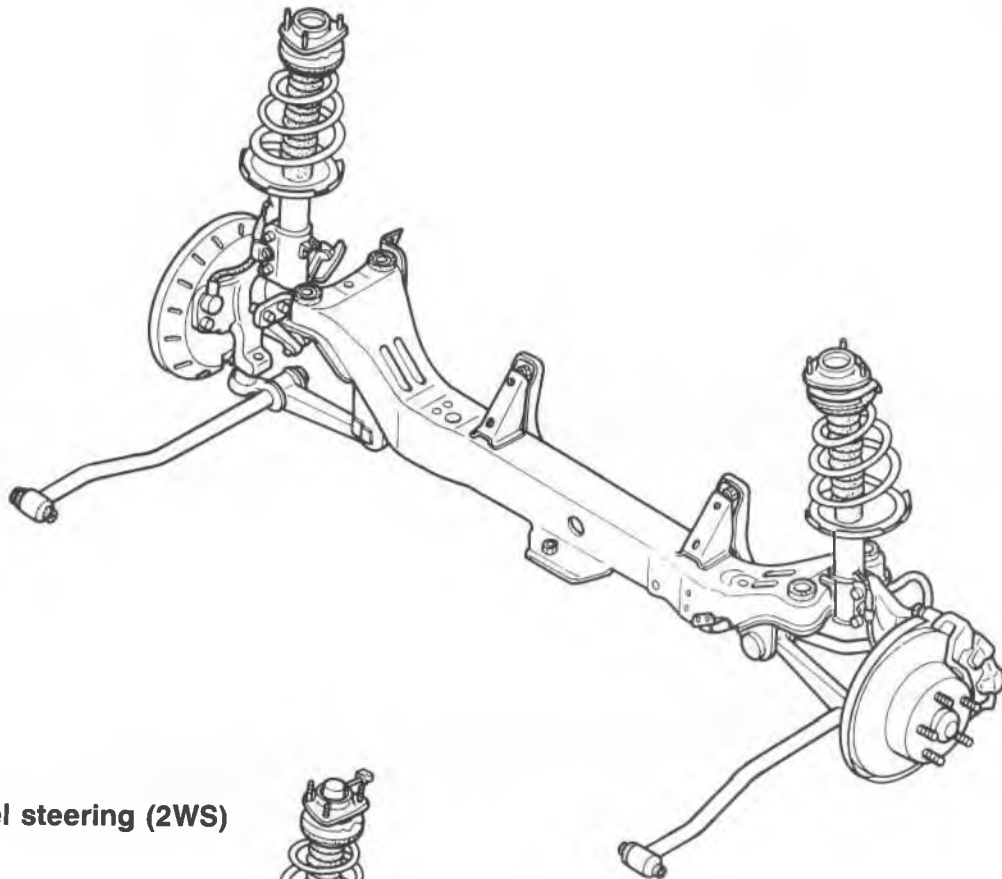
### STRUCTURAL VIEW Front Suspension



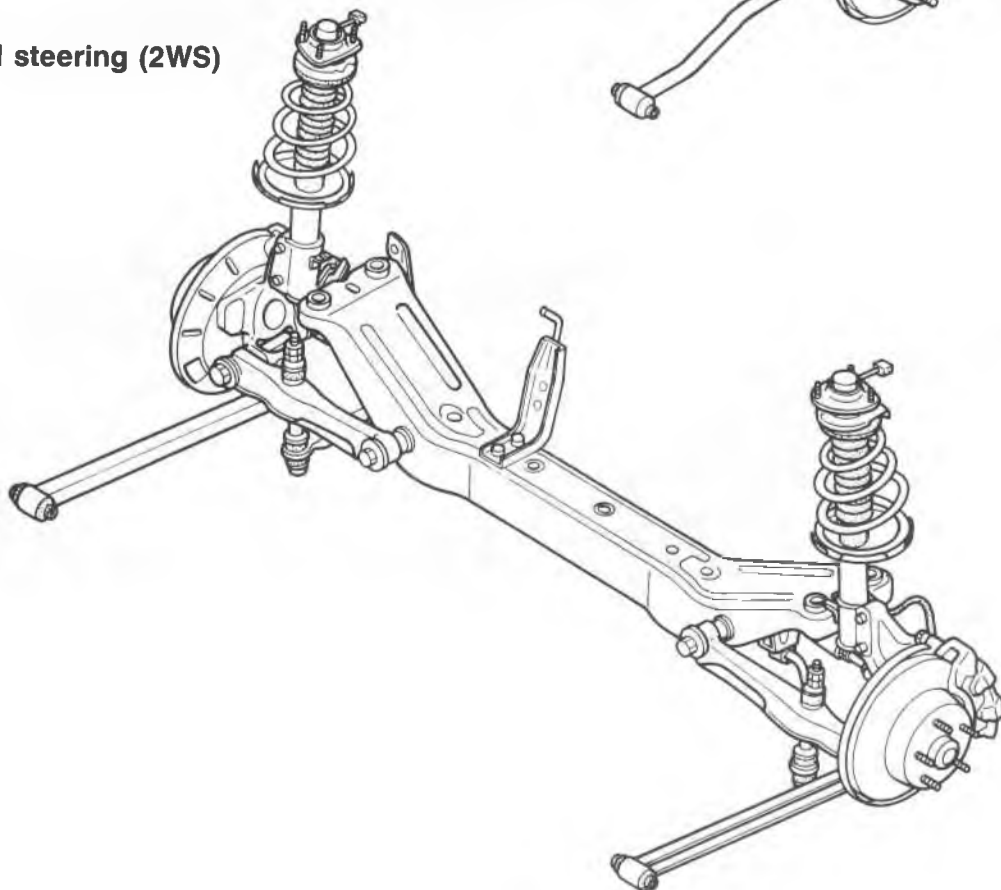
86U13X-002

Rear Suspension

4-wheel steering (4WS)



2-wheel steering (2WS)





# 13 OUTLINE

## SPECIFICATIONS Front Suspension

Item		Specifications							
Suspension type		Strut							
Front wheel alignment	Toe-in mm (in)	0 ± 3 (0 ± 0.12)							
	Camber angle	0°17' ± 45'							
	Caster angle	1°13' ± 45'							
	King pin angle	12°47'							
Maximum front steering angle	Inner	36°00' ± 2°							
	Outer	31°00' ± 2°							
Stabilizer	Type	Torsion bar							
	Diameter mm (in)	20.0 (0.79)							
Shock absorbers	Standard suspension	Oil type							
	Auto adjust suspension	Low-pressure gas sealed type							
*Coil springs	Identification color	Green	Light green	Pink	Brown	Purple	Gray	Orange	
	Wire diameter mm (in)	12.6 (0.49)	12.8 (0.50)	12.9 (0.51)	13.1 (0.52)	13.3 (0.53)	13.6 (0.54)	12.5 (0.49)	
	Coil inner diameter mm (in)	147.5 (5.8)							
	Free length mm (in)	353 (13.9)	362 (14.3)	370 (14.6)	372 (14.6)	365 (14.4)	350 (13.8)	344 (13.5)	
	Coil number	5.09	5.31	5.42	5.53	5.46	5.34	4.99	

\* Refer to pages 13—5, 6, 7 spring applications.

## Rear Suspension

Item			Specifications							
Suspension type			Strut							
Rear wheel alignment	Toe-in mm (in)	2WS	0 ± 3 (0 ± 0.12)							
		4WS	3 ± 3 (0.12 ± 0.12)							
	Camber angle	2WS	-0°30' ± 45'							
Maximum rear steering angle (4WS)		4WS	0°00' ± 45'							
		Inner	5°00' ± 45'							
Stabilizer	Diameter mm (in)	Outer	5°00' ± 45'							
		Type	Torsion bar							
Shock absorbers		Diameter mm (in)	16 (0.63)							
		Standard suspension	Oil type							
*Coil springs		Auto adjust suspension	Low-pressure gas sealed type							
		Identification color	Orange	White	Yellow	Brown	Blue	Green	Red	Pink
		Wire diameter mm (in)	11.6 (0.45)	11.7 (0.46)	11.8 (0.46)	11.9 (0.47)	12.1 (0.48)	12.2 (0.48)	12.4 (0.49)	12.6 (0.50)
		Coil inner diameter mm (in)	127.5 (5.0)							
		Free length mm (in)	297 (11.7)	306 (12.0)	314 (12.4)	323 (12.7)	327 (12.9)	332 (13.1)	336 (13.2)	340 (13.4)
Coil number	5.44	5.58	5.72	5.87	6.03	6.04	6.21	6.36		

\*Refer to pages 13—8, 9, 10 spring applications.

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## Front Coil Springs

Model	Market	Engine	Transaxle	Sun-roof	AAS	ABS	Identification color								
							Green	Light green	Pink	Brown	Purple	Gray	Orange		
Sedan	ECE	F8	M4	—	—	—	○								
			M5	—	—	—	○								
			4HAT	—	—	—				○					
		FE	M5	—	—	—			○						
				○	—	—			○						
				—	○	—	○								
			○	○	—	○									
			4HAT	—	—	—						○			
				—	○	—					○				
		○		—	—							○			
		FE (DOHC)	M5	—	—	—						○			
				—	○	—			○			○			
				—	○	○			○						
				—	—	○						○			
				○	—	—						○			
				○	○	—						○			
		FE (Fuel Injection)	M5	—	—	—			○						
				—	○	—								○	
	EC-AT		○	—	—					○					
	RF-N	M5	—	—	—						○				
			—	—	—							○			
	Left Hand Drive	F8	M5	—	—	—		○							
				—	○	—		○							
		4HAT	—	—	—					○					
	RF-N	M5	—	—	—						○				
			—	—	—						○				
	Middle East	FE	M5	—	—	—		○							
				—	○	—			○						
				4HAT	—	—	—				○				
	Right Hand Drive	F6	3AT	—	—	—			○						
—				—	—										
FE		M5	—	—	—		○								
			—	○	—			○							
4HAT		—	—	—					○						
		—	○	—							○				
FE (DOHC)		M5	—	—	—				○						
			—	○	○			○							
RF-N		M5	—	—	—					○					
F8		M5	—	—	—			○							
	4HAT		—	—	—					○					

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○.....Available  
 —.....Not available

M4, M5..... Manual transaxle  
 EC-AT.....Electronically controlled automatic transaxle  
 4HAT.....Hydraulic controlled automatic transaxle  
 4WS..... 4-Wheel steering  
 AAS.....Auto adjusting suspension  
 ABS.....Anti-lock brake system  
 3AT..... Automatic transaxle

# 13 OUTLINE

Model	Market	Engine	Trans- xle	Sun- roof	AAS	ABS	Identification color								
							Green	Light green	Pink	Brown	Purple	Gray	Orange		
Hatchback	ECE	F8	M4	—	—	—	○								
			M5	—	—	—		○							
			4HAT	—	—	—				○					
		FE	M5	—	—	—		○							
				○	—	—		○							
			4HAT	—	—	—				○					
		FE (DOHC)	M5	○	—	—						○			
				—	○	—				○					
				—	○	○				○					
				—	—	○						○			
				○	—	—						○			
				○	○	—					○				
	○			○	○					○					
	○			—	○							○			
	—			—	○								○	(4WS)	
	○	—	○									○	(4WS)		
	Left Hand Drive	F8	M5	—	—	—		○							
			4HAT	—	—	—				○					
		FE	M5	—	—	—	○								
				—	○	—		○							
	Middle East	FE	M5	—	—	—	○		○						
				—	○	—				○					
				—	○	—					○				
	Right Hand Drive	F8	M5	—	—	—	○								
4HAT			—	—	—	○									
FE		M5	—	—	—	○									
			—	○	—		○								
		4HAT	—	—	—				○						
FE (DOHC)		M5	—	—	—					○					
			—	○	—					○					
			—	○	○					○					

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Model	Market	Engine	Transaxle	Sun-roof	AAS	ABS	Identification color							
							Green	Light green	Pink	Brown	Purple	Gray	Orange	
Coupe/MX-6	ECE	FE	M5	—	—	—		○						
				○	—	—			○					
		4HAT	—	—	—					○				
			○	—	—						○			
		FE (DOHC)	M5	—	—	—					○			
				—	○	—				○				
				—	○	○				○				
				—	—	○					○			
				○	—	—					○			
				○	○	—					○			
	Left Hand Drive	FE	M5	—	—	—	○							
				—	○	—			○					
	Middle East	FE	M5	—	—	—		○						
				○	—	—				○				
	Right Hand Drive	F8	M5	—	—	—			○					
				—	○	—				○				
		FE	M5	—	—	—	○							
				—	○	—				○				
		4HAT	—	—	—					○				
			—	○	—							○		
FE (DOHC)	M5	—	—	—					○					
		—	○	—						○				
		—	○	○					○					

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# 13 OUTLINE

## Rear Coil Springs

Model	Market	Engine	Transaxle	Sun-roof	AAS	ABS	Identification color								
							Orange	White	Yellow	Brown	Blue	Green	Red	Pink	
Sedan	ECE	F8	M4	—	—	—					R		L		
			M5	—	—	—					R		L		
			4HAT	—	—	—					R		L		
		FE	M5	—	—	—					R		L		
				○	—	—					R		L		
			—	○	—				R		L				
			○	○	—				R		L				
			4HAT	—	—	—					R		L		
				—	○	—				R		L			
		FE (DOHC)	M5	—	—	—					R		L		
				—	○	—				R		L			
				—	○	○				R		L			
				—	—	○						R		L	
				○	○	—				R		L			
				○	○	○				R		L			
				○	—	○						R		L	
				○	—	—						R		L	
		FE (Fuel Injection)	M5	—	—	—					R		L		
				—	○	—					R		L		
			EC-AT	○	—	—						R		L	
		RF-N	M5	—	—	—					R		L		
				—	—	—					R		L		
		Left Hand Drive	F8	M5	—	—	—					R		L	
					—	○	—					R		L	
	Middle East	FE	M5	—	—	—				R		L			
				—	○	—					R		L		
	Right Hand Drive	F6	3AT	—	—	—					L		R		
				—	—	—					L		R		
		FE	M5	—	—	—				L		R			
				—	○	—					L		R		
		4HAT	—	—	—				L		R				
			—	○	—					L		R			
		FE (DOHC)	M5	—	—	—				L		R			
				—	○	○					L		R		
		RF-N	M5	—	—	—				L		R			
		F8	M5	—	—	—					L		R		
				—	—	—					L		R		

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○..... Available  
—..... Not available

R..... Right side  
L..... Left side

M4, M5 Manual transaxle      3AT..... Automatic transaxle  
EC-AT... Electronically controlled automatic transaxle  
4HAT.... Hydraulic controlled automatic transaxle  
4WS..... 4-wheel steering  
AAS..... Auto adjusting suspension  
ABS..... Anti-lock brake system

Model	Market	Engine	Transaxle	Sun-roof	AAS	ABS	Identification color								
							Orange	White	Yellow	Brown	Blue	Green	Red	Pink	
Hatchback	ECE	F8	M4	—	—	—				R		L			
			M5	—	—	—					R		L		
			4HAT	—	—	—					R		L		
		FE	M5	—	—	—					R		L		
				○	—	—						R		L	
			4HAT	—	—	—					R		L		
		FE (DOHC)	M5	○	—	—					R		L		
				—	○	—				R		L			
				—	○	○									
				—	—	○					R		L		
				○	—	—							R		L
				○	○	—					R		L		
	○			○	○					R		L			
	○	—	○							R		L			
	Left Hand Drive	F8	M5	—	—	—					R		L		
				4HAT	—	—	—					R		L	
		FE	M5	—	—	—			R		L				
				—	○	—						R		L	
	Middle East	FE	M5	—	—	—			R		L				
				—	○	—					R		L		
4HAT				—	—	—			R		L				
Right Hand Drive	F8	M5	—	—	—					L		R			
			4HAT	—	—	—					L		R		
		FE	M5	—	—	—			L		R				
				—	○	—					L		R		
	FE (DOHC)	M5	—	—	—					L		R			
			—	○	—					L		R			
			—	○	○						L		R		
			—	○	○					L		R			

76G13X-007

# 13 OUTLINE

Model	Market	Engine	Transaxle	Sun-roof	AAS	ABS	Identification color							
							Orange	White	Yellow	Brown	Blue	Green	Red	Pink
Coupe/MX-6	ECE	FE	M5	—	—	—			R		L			
				○	—	—			R		L			
			4HAT	—	—	—			R		L			
				○	—	—			R		L			
		FE (DOHC)	M5	—	—	—			R		L			
				—	○	—		R		L				
				—	○	○		R		L				
				—	—	○			R		L			
				○	—	—			R		L			
				○	○	—		R		L				
				○	○	○		R		L				
				○	—	○			R		L			
	Left Hand Drive	FE	M5	—	—	—	R		L		L			
				—	○	—			R		L			
	Middle East	FE	M5	—	—	—		R		L				
				○	○	—			R		L			
	Right Hand Drive	F8	M5	—	—	—			L		R			
				—	—	—	L		R		R			
		FE	M5	—	○	—			L		R			
				—	—	—	L		R		R			
		FE (DOHC)	M5	—	—	—		L		R		R		
				—	○	—			L		R		R	
				—	○	○		L		R				

76G13X-008

**TROUBLESHOOTING GUIDE**

<b>Problem</b>	<b>Possible Cause</b>	<b>Remedy</b>	<b>Page</b>
<b>Body "rolls"</b>	Weak stabilizer	Replace	13—23, 27
	Worn or deteriorated stabilizer or suspension arm bushing	Replace	13—39, 41
	Shock absorber malfunction	Replace	13—13, 29
<b>Poor riding comfort</b>	Weak coil spring	Replace	13—15, 32
	Shock absorber malfunction	Replace	13—13, 29
<b>Body tilt</b>	Worn coil spring	Replace	13—15, 32
	Worn stabilizer or suspension bushing	Replace	13—23, 27, 39, 41
<b>Abnormal noise from suspension system</b>	Poor lubrication or wear of lower arm ball joint	Replace	13—18, 36
	looseness of peripheral connections	Tighten	
	Shock absorber malfunction	Replace	13—13, 29
	Worn or deteriorated stabilizer or suspension arm bushing	Replace	13—23, 27, 39, 41
	Worn or damaged front strut bearing	Replace	13—15
<b>"Heavy" steering wheel operation</b>	Lower arm ball joint stuck	Replace	13—18, 36
	Ball joints stuck or damaged	Replace	13—18, 36
	Ball joints insufficiently lubricated; foreign material; abnormal wear	Lubricate or replace	13—18, 36
	Improperly adjusted wheel alignment (toe-in)	Adjust	13—50, 52
	Worn or damaged steering gear bushing	Refer to section 10	—
	Improperly adjusted pinion pre-load	Refer to section 10	—
	Damaged steering gear	Refer to section 10	—
	Insufficient grease on steering gear	Refer to section 10	—
	Malfunction of steering shaft universal joint	Refer to section 10	—
	Low tire pressure	Refer to section 12	—
Abnormal tire wear	Refer to section 12	—	
<b>Steering wheel pulls to one side</b>	Weak coil spring	Replace	13—15, 32
	Lower arm or stabilizer bushing worn or damaged	Replace	13—20, 38
	Damaged knuckle arm	Refer to section 9	—
	Lower arm damaged or loose	Replace or tighten	13—18
	Improperly adjusted wheel alignment (toe-in)	Adjust	13—50, 52
	Damaged steering linkage	Refer to section 10	—
	Damaged wheel bearing	Refer to section 9	—
	Uneven tire pressure	Refer to section 12	—
	Abnormal tire wear	Refer to section 12	—
Brakes dragging	Refer to section 11	—	
<b>Steering wheel vibrates</b>	Suspension arm or stabilizer bushing worn or deteriorated	Replace	13—23, 27, 39, 41
	Worn lower arm ball joint	Replace	13—18, 36
	Shock absorber malfunction or looseness	Replace or tighten	13—13, 29
	Improperly adjusted wheel alignment (toe-in)	Adjust	13—50, 52
	Damaged linkage	Refer to section 10	—
	Improperly adjusted pinion preload	Refer to section 10	—
	Worn steering gear bushing	Refer to section 10	—
	Loose steering shaft universal joint	Refer to section 10	—
	Damaged wheel bearing	Refer to section 9	—
	Abnormal tire wear	Refer to section 12	—
	Abnormal tire wear	Refer to section 12	—
Damaged or unbalanced wheel	Refer to section 12	—	

76G13X-009



# 13 TROUBLESHOOTING GUIDE

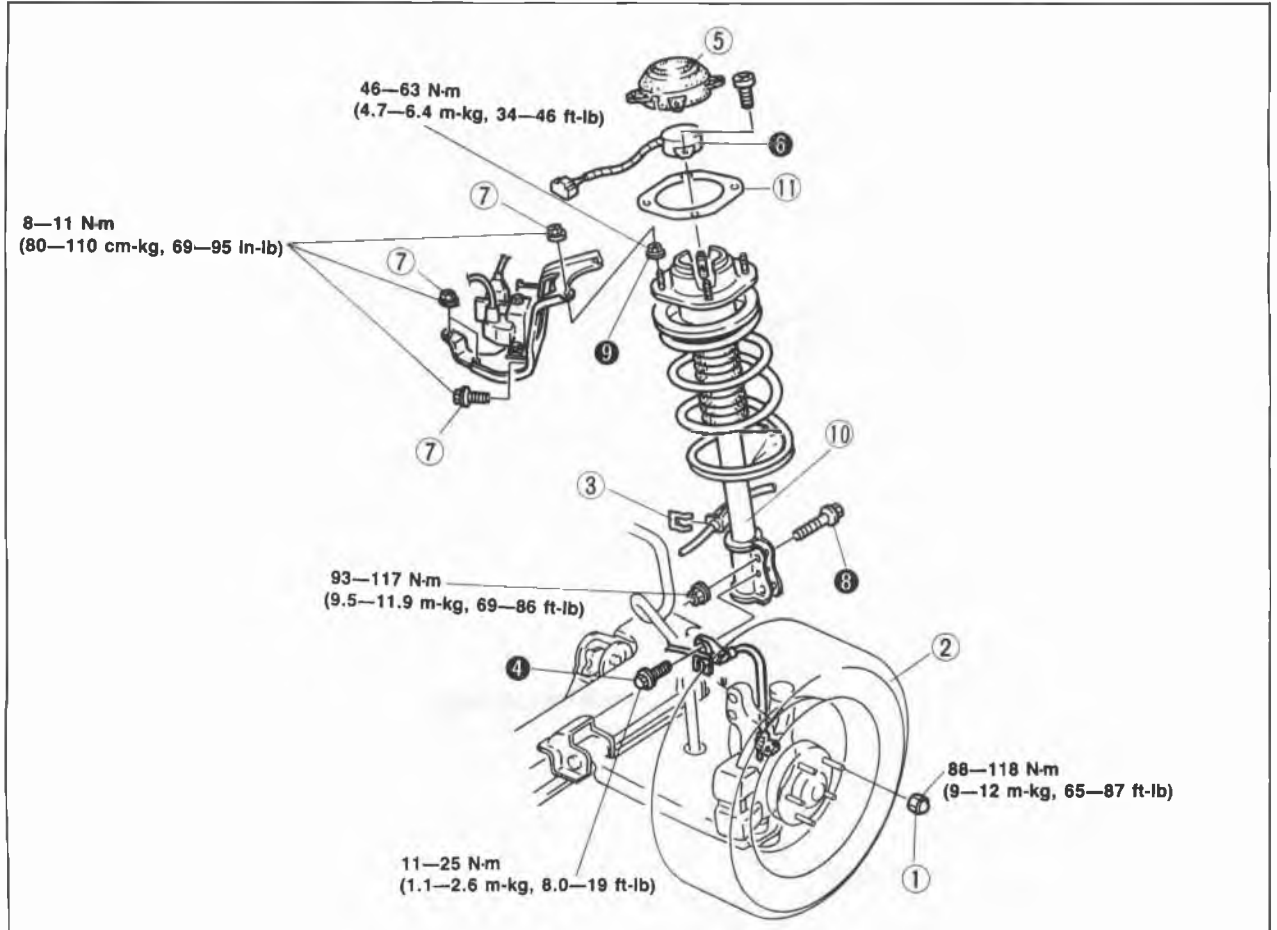
Problem	Possible Cause	Remedy	Page
<b>Excessive steering wheel play</b>	Worn or damaged lower arm bushing	Replace	13—20, 38
	Improperly adjusted pinion preload	Refer to section 10	—
	Worn rack and pinion	Refer to section 10	—
	Loose steering shaft universal joint	Refer to section 10	—
<b>General instability</b>	Weak coil springs	Replace	13—15, 32
	Shock absorber malfunction	Replace	13—13, 29
	Worn or damaged lower arm or stabilizer bushing	Replace	13—20, 38
	Improperly adjusted wheel alignment	Adjust	13—50, 52
	Improperly adjusted pinion preload	Refer to section 10	—
	Loose steering shaft universal joint	Refer to section 10	—
	Incorrect tire pressure	Refer to section 12	—
	Damaged or unbalanced wheel	Refer to section 12	—
Malfunction of wheel bearing	Refer to section 9	—	

76G13X-009

## FRONT SHOCK ABSORBER AND SPRING

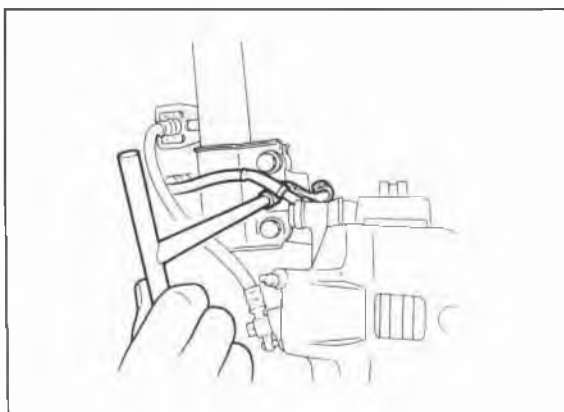
### REMOVAL AND INSTALLATION

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Install in the reverse order of removal, referring to the installation note for specially marked parts.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-012

- |                                   |   |                             |
|-----------------------------------|---|-----------------------------|
| 1. Lug nut                        | 5. Rubber cap                             | 8. Bolt and nut             |
| 2. Wheel and tire                 | 6. Actuator (AAS)                         | 9. Nut                      |
| 3. Clip                           | 7. Nuts and bolts (Ignition coil bracket) | 10. Shock absorber assembly |
| 4. Harness and bracket bolt (ABS) |   | 11. Seat                    |

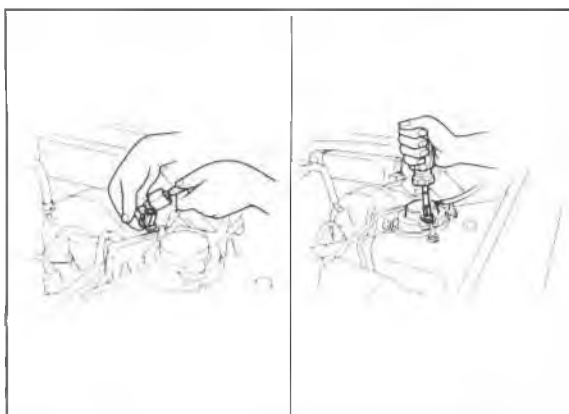


86U13X-010

#### Removal Note ABS Harness bracket

Remove the ABS harness and bracket.

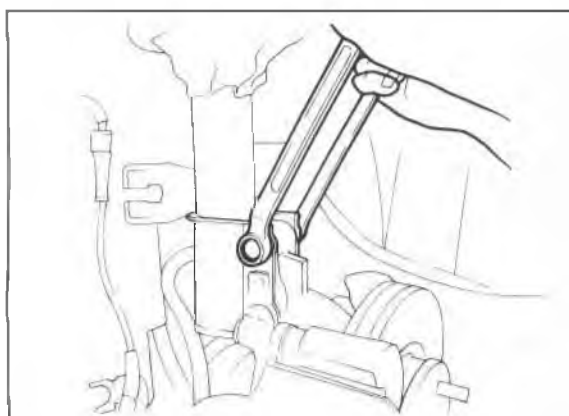
# 13 FRONT SHOCK ABSORBER AND SPRING



86U13X-011

## AAS actuator

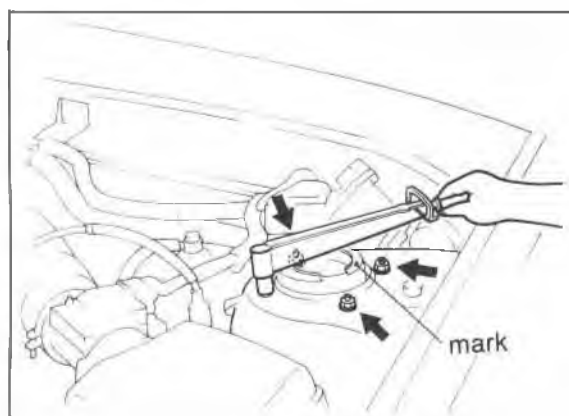
1. Disconnect the AAS actuator connector.
2. Remove the AAS actuator.



76G13X-013

## Shock absorber clinch bolts and nuts

1. Remove the shock absorber clinch bolts and nuts.
2. Remove the shock absorber upper mounting nuts.



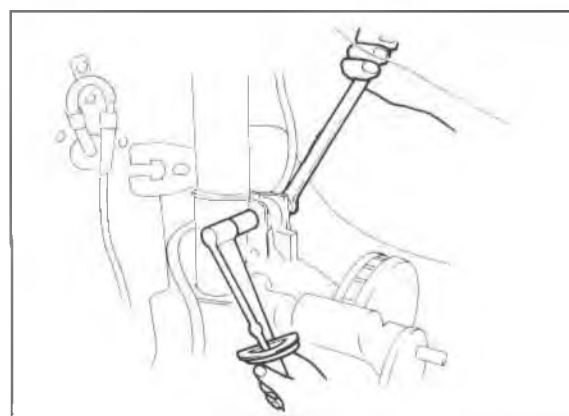
86U13X-013

## Installation Note

### Mounting block

Install the mounting block to the suspension tower with the white mark facing the front-inside direction.

**Tightening torque: 46—63 N·m  
(4.7—6.4 m·kg, 34—46 ft·lb)**



86U13X-014

## Shock absorber clinch bolts and nuts

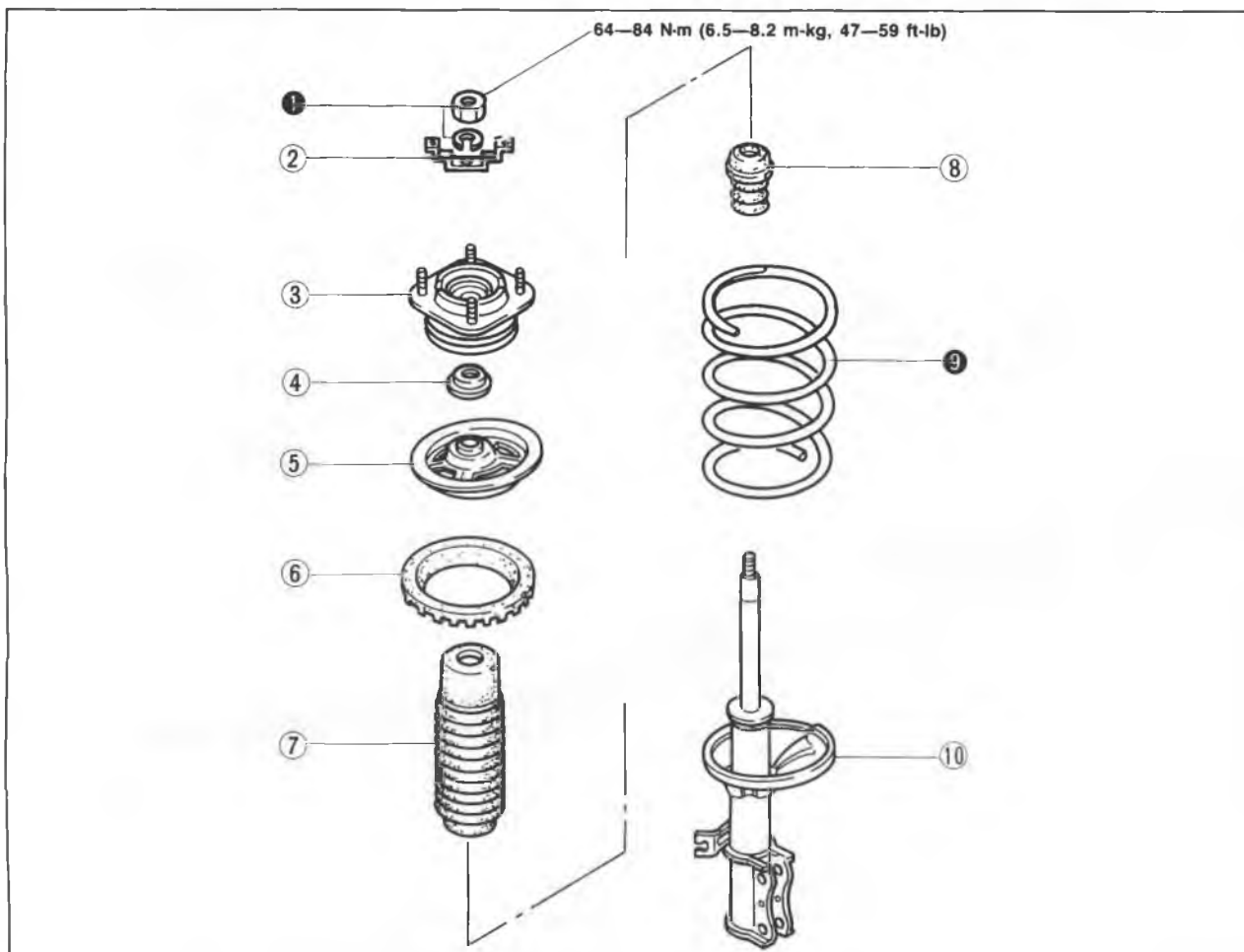
Install the clinch bolts and nuts.

**Tightening torque: 93—117 N·m  
(9.5—11.9 m·kg, 69—86 ft·lb)**

# FRONT SHOCK ABSORBER AND SPRING 13

## DISASSEMBLY AND ASSEMBLY

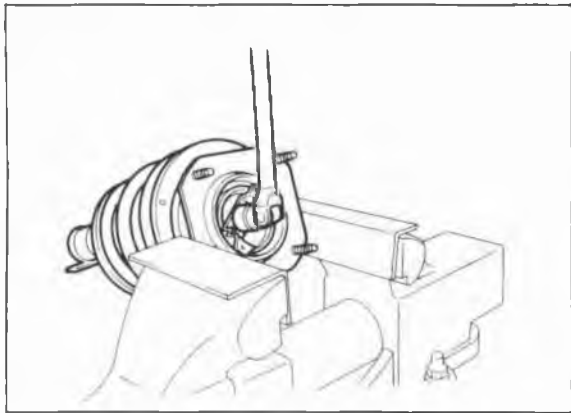
1. Disassemble in the sequence shown in the figure, referring to the disassembly note for specially marked parts.
2. Inspect all components and parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to the assembly note for specially marked parts.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-014

- |                     |                      |                    |
|---------------------|----------------------|--------------------|
| 1. Nut              | 5. Spring upper seat | 9. Coil spring     |
| 2. Actuator bracket | 6. Spring seat       | 10. Shock absorber |
| 3. Mounting block   | 7. Dust boot         |                    |
| 4. Bearing          | 8. Bound stopper     |                    |

# 13 FRONT SHOCK ABSORBER AND SPRING



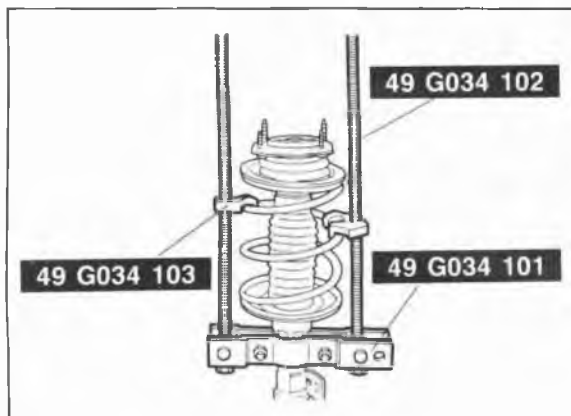
76G13X-015

## Disassembly Note

1. Loosen the piston rod upper nut several turns, but do not remove.

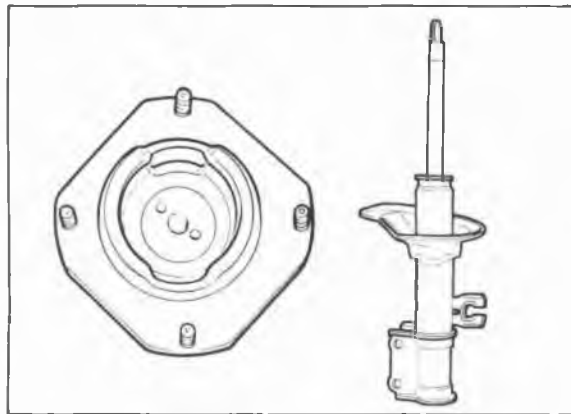
## Caution

- a) Do not remove the nut.
- b) Use copper or aluminum plates in the jaws of a vice.



86U13X-018

2. Set the **SST** in a vise.
3. Secure the shock absorber in the **SST**.
4. Compress the coil spring with the **SST**, then remove the upper nut.
5. Remove the coil spring.

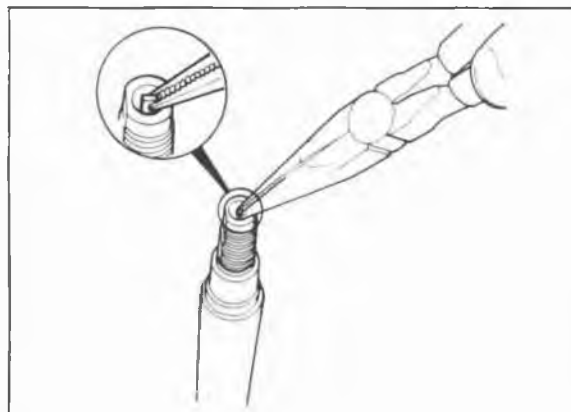


76G13X-016

## Inspection Note

Check the following and repair or replace any faulty parts.

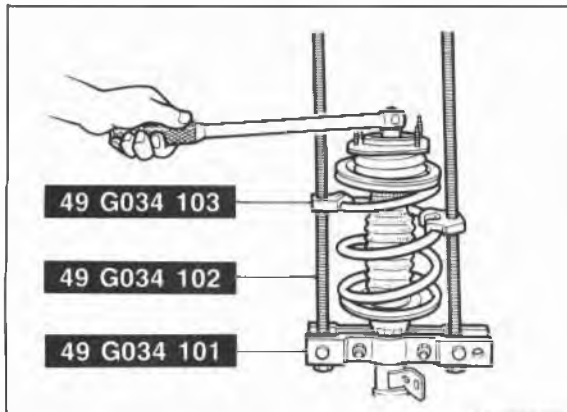
1. Oil leakage or abnormal noise from shock absorbers
2. Deterioration or damage of mounting block and bearing
3. Wear or damage of bound stopper



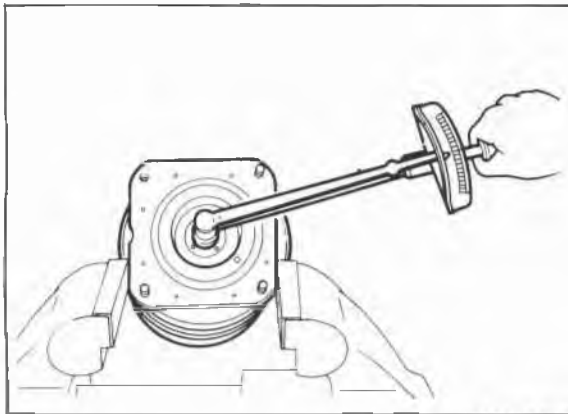
86U13X-020

4. Smooth rotation of control rod (AAS)

## FRONT SHOCK ABSORBER AND SPRING 13



86U13X-021



### Assembly Note

1. Set the **SST** in a vise
2. Secure the shock absorber in the **SST**.
3. Install the bound stopper and dust boot to the shock absorber.
4. Install the compressed coil spring (compressed with **SST**).
5. Install the rubber seat, spring upper seat, bearing and mounting block.

6. Remove the **SST**.
7. Secure the mounting block in a vise.

### Caution

**Use copper or aluminum plates in the jaws of a vice.**

8. Tighten the piston rod upper nut.

### Tightening torque:

**64—84 N·m (6.5—8.2 m·kg, 47—59 ft·lb)**

### Caution

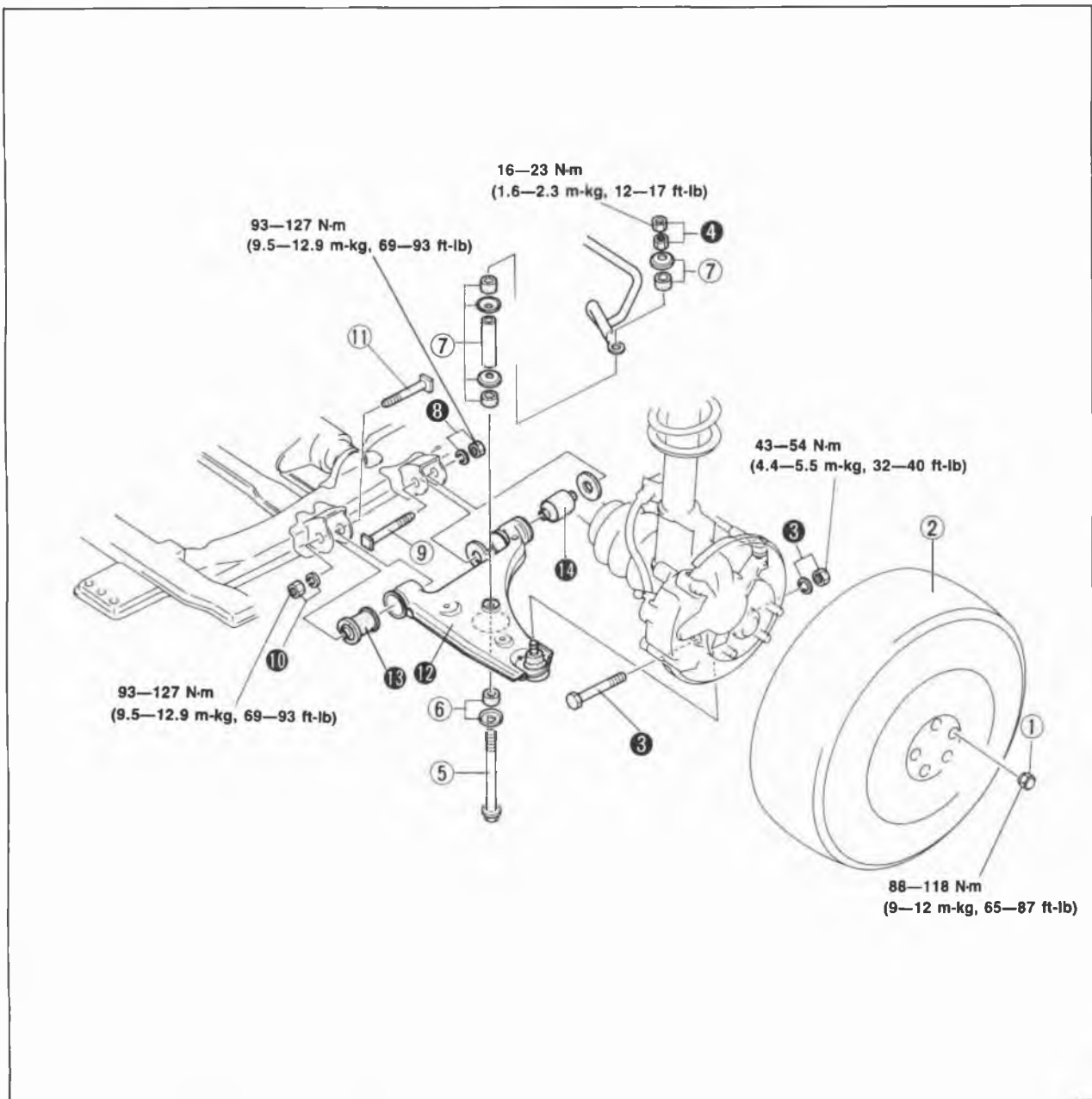
**Check that the spring is well seated in the upper seats.**

# 13 FRONT LOWER ARM

## FRONT LOWER ARM

### REMOVAL AND INSTALLATION

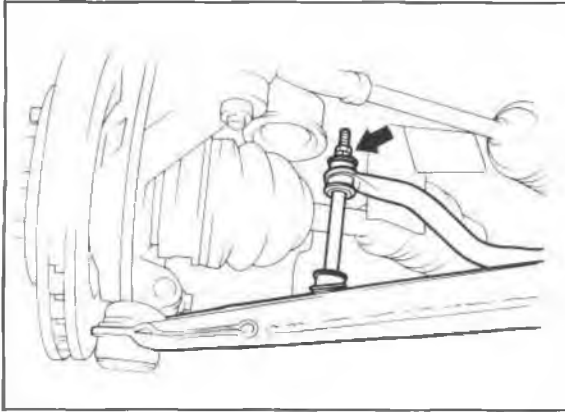
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Inspect all components and parts, referring to inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-018

- |                   |                                 |                     |
|-------------------|---------------------------------|---------------------|
| 1. Lug nut        | 6. Retainer and bushing         | 10. Nut             |
| 2. Wheel and tire | 7. Retainer, bushing and spacer | 11. Bolt            |
| 3. Bolt and nut   | 8. Nut                          | 12. Front lower arm |
| 4. Nuts           | 9. Bolt                         | 13. Front bushing   |
| 5. Bolt           |                                 | 14. Rear bushing    |

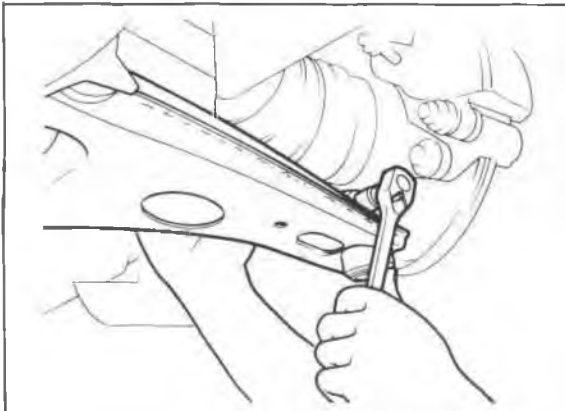
## FRONT LOWER ARM 13



86U13X-024

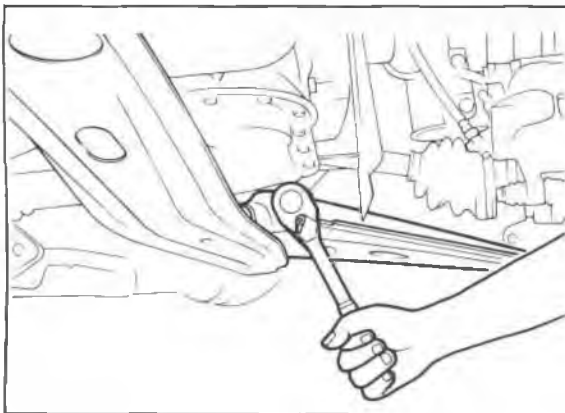
### Removal Note

1. Remove the stabilizer bar control link.



86U13X-025

2. Remove the lower arm ball joint.

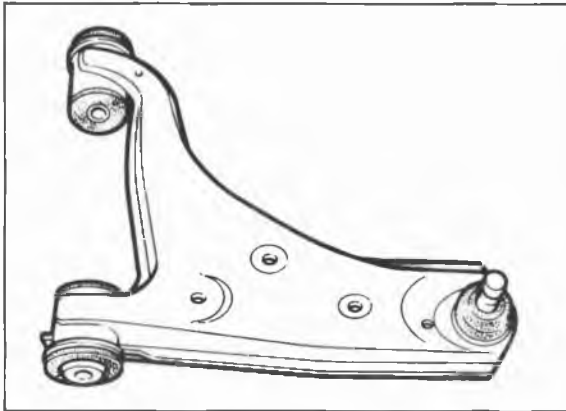


86U13X-026

3. Remove the lower arm spindle from the lower arm.



# 13 FRONT LOWER ARM



86U13X-027

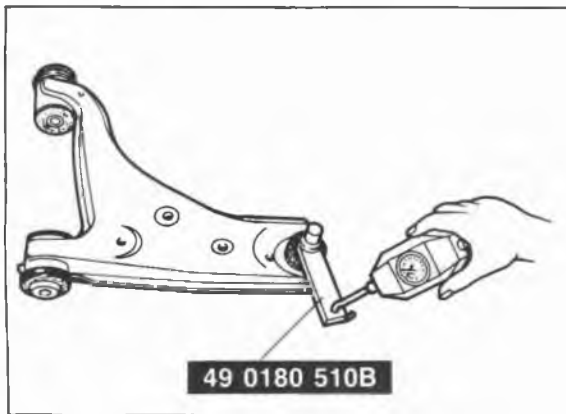
## Inspection Note

Check the following and repair or replace any faulty parts.

1. Lower arm for damage or cracks
2. Preload of ball joint
3. Bushings for deterioration or wear
4. Dust boot for damage

## Note

If it is necessary to replace the ball joint, replace the lower arm assembly.



49 0180 510B

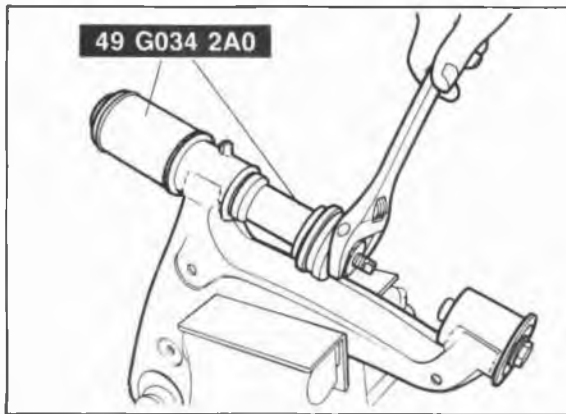
86U13X-028

## Ball joint preload

Attach the **SST** to the ball stud, and measure the preload with a pull scale.

## Caution

Measure the preload after shaking ball joint the stud 3 or 4 times.



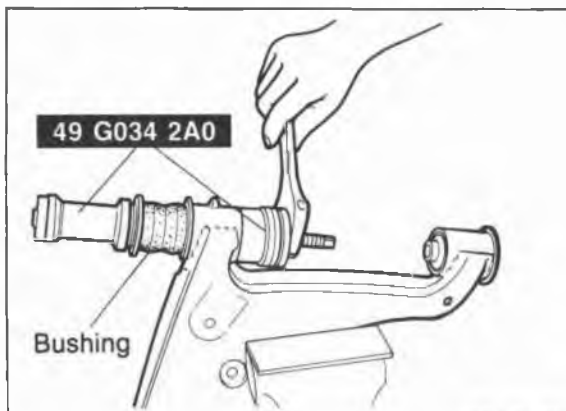
49 G034 2A0

86U13X-029

## Lower arm bushing (Front)

### Removal

1. Cut away the projecting rubber of the lower arm bushing.
2. Set the **SST** on the lower arm and remove the bushing.



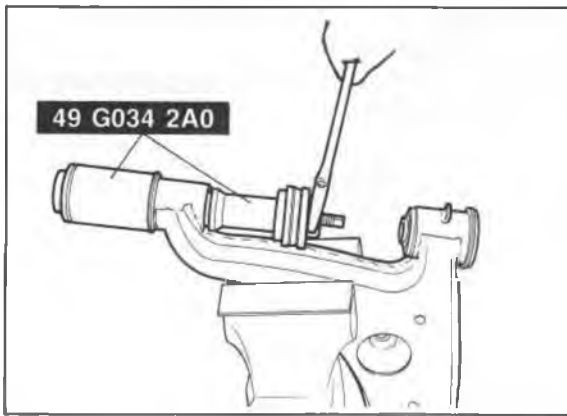
49 G034 2A0

Bushing

86U13X-030

### Installation

Apply soapy water to the new bushing, then pull it into the lower arm with the **SST**.

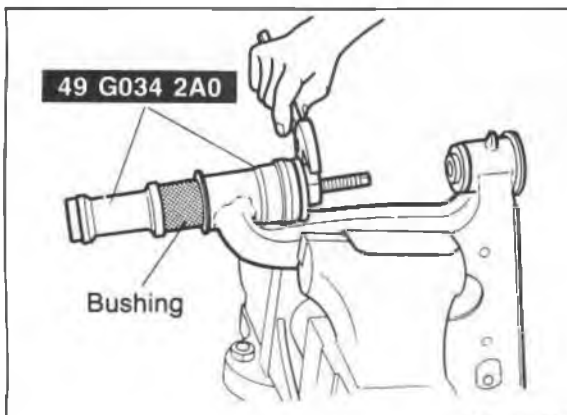


86U13X-031

## Lower arm bushing (Rear)

### Removal

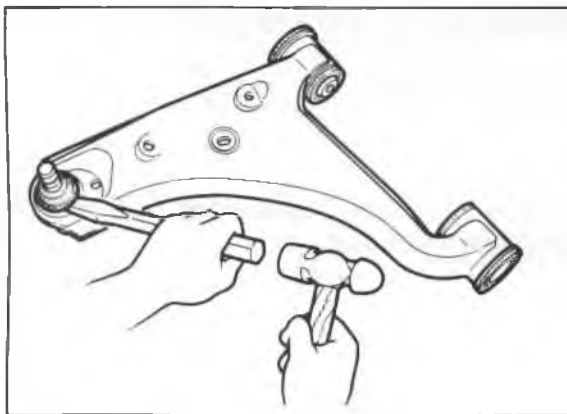
Set the **SST** on the lower arm and remove the bushing.



86U13X-032

### Installation

Install the new bushing, and then pull it into the lower arm with the **SST**.



86U13X-033

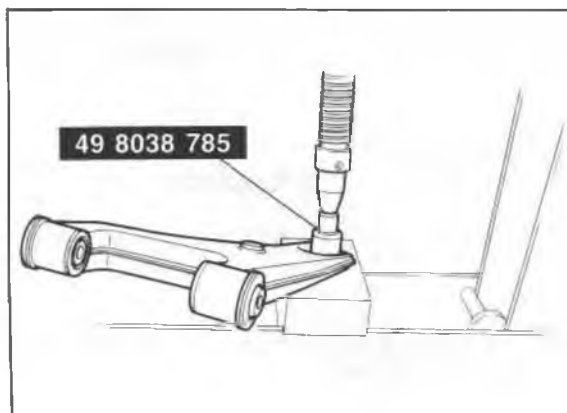
## Ball joint dust boot

### Removal

Remove the dust boot with a chisel.

### Caution

**Do not damage the ball joint.**

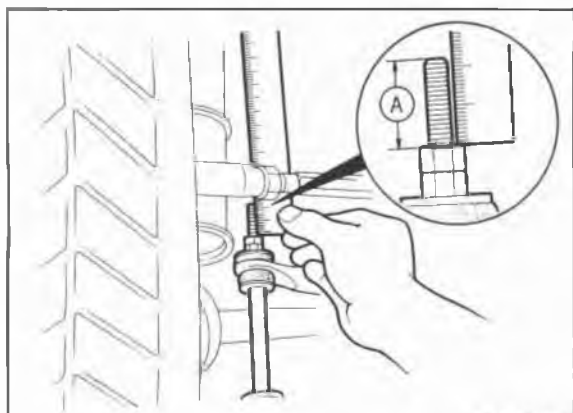


86U13X-034

### Installation

1. Liberally coat the inside of the new dust boot with grease.
2. Install the dust boot onto the ball joint with the **SST**.

# 13 FRONT LOWER ARM

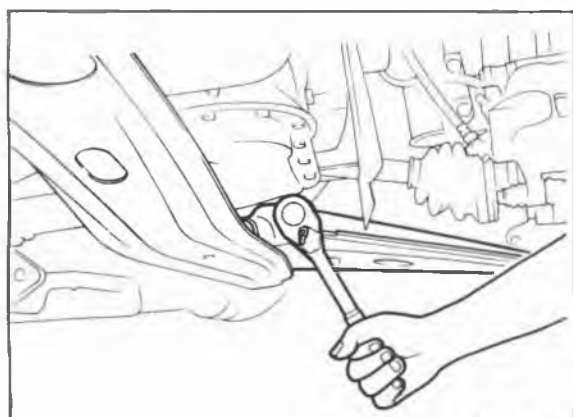


76G13X-019

## Installation Note

### Stabilizer control link

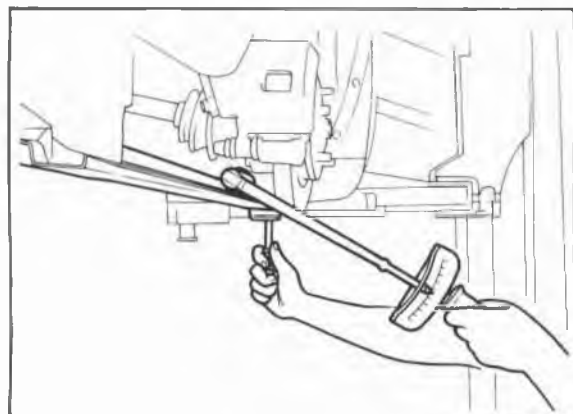
Tighten the link nut so that there is **20.1 mm (0.79 in)** of thread (A) exposed.



86U13X-036

## Lower arm

1. Install the lower arm spindle to the lower arm, and loosely tighten the nut.



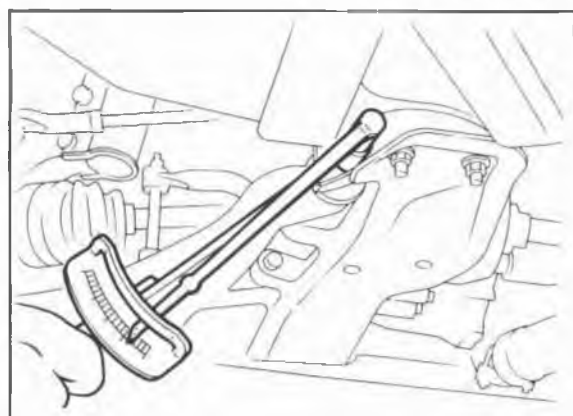
86U13X-037

2. Install the lower arm ball joint to the knuckle arm.

**Tightening torque: 43—54 N·m  
(4.4—5.5 m·kg, 32—40 ft·lb)**

## Caution

**Lower the vehicle and check the torque with the vehicle unloaded.**



86U13X-038

3. Lower the vehicle from the jack. Torque the lower arm spindle nut which was loosely tightened in step (1).

**Tightening torque:  
Front and rear lower arm spindle nut**

**93—127 N·m (9.5—12.9 m·kg, 69—93 ft·lb)**

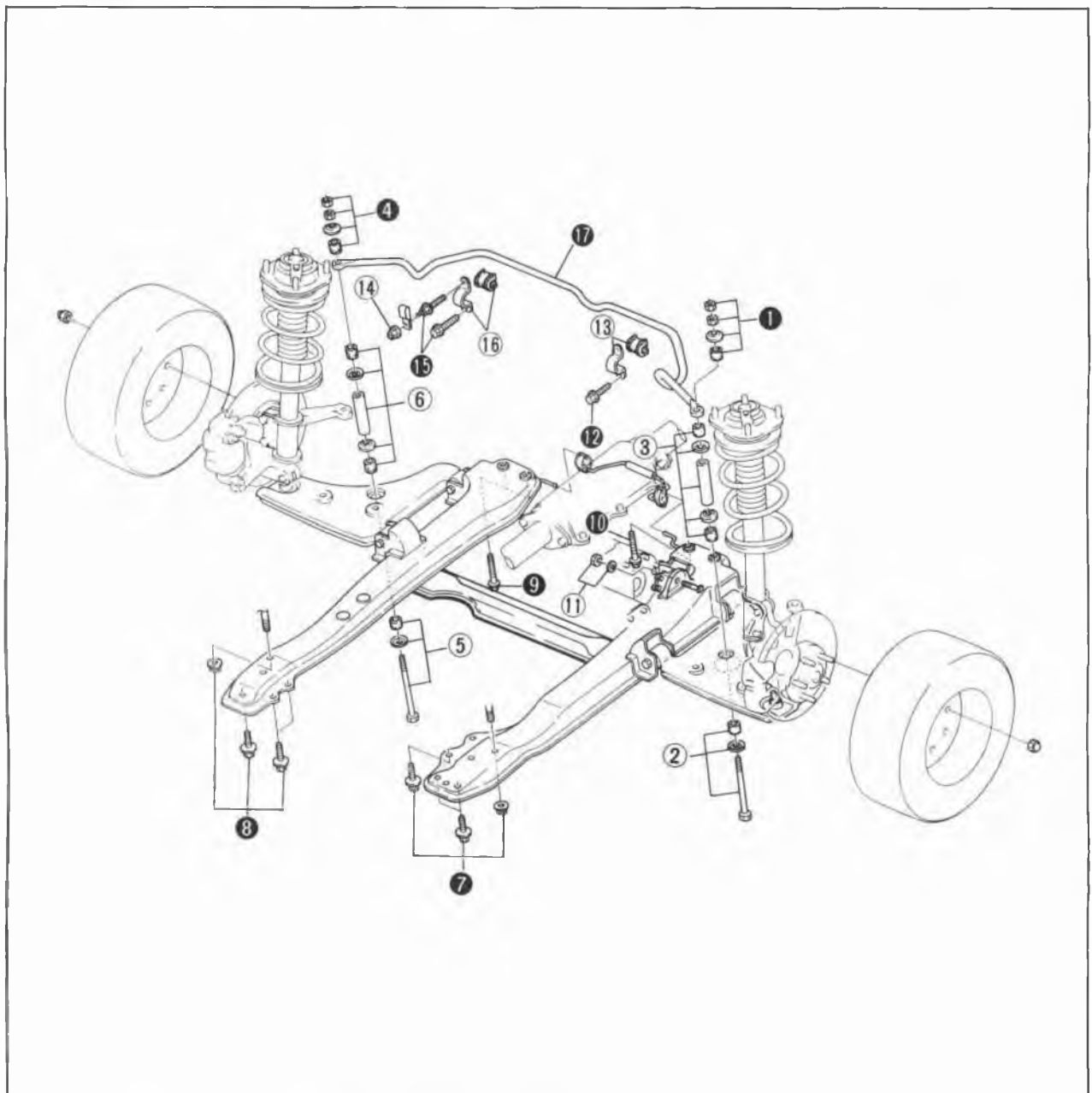
## Caution

**Lower the vehicle and check the torque with the vehicle unloaded.**

**FRONT STABILIZER (4WS)**

**REMOVAL AND INSTALLATION**

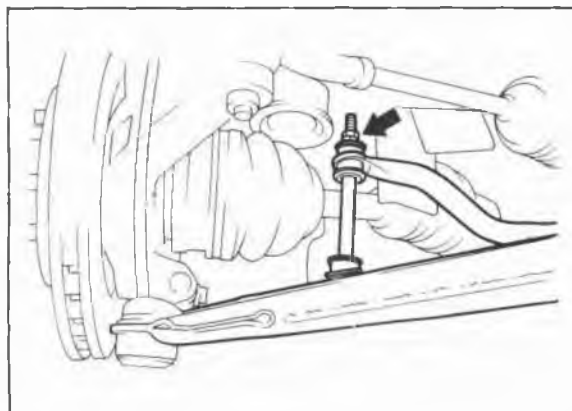
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Inspect all components and parts, referring to the inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to page 13—26.



76G13X-020

- |                                  |                                  |                         |
|----------------------------------|----------------------------------|-------------------------|
| 1. Nut, retainer, and bushing    | 6. Bushing, retainer, and spacer | 11. Bolt                |
| 2. Bolt, retainer, and bushing   | 7. Bolt and nut                  | 12. Bolt                |
| 3. Bushing, retainer, and spacer | 8. Bolt and nut                  | 13. Bushing and bracket |
| 4. Nut, retainer, and bushing    | 9. Bolt                          | 14. Nut                 |
| 5. Bolt, retainer, and bushing   | 10. Bolt                         | 15. Bolt                |
|                                  |                                  | 16. Bushing and bracket |
|                                  |                                  | 17. Stabilizer          |

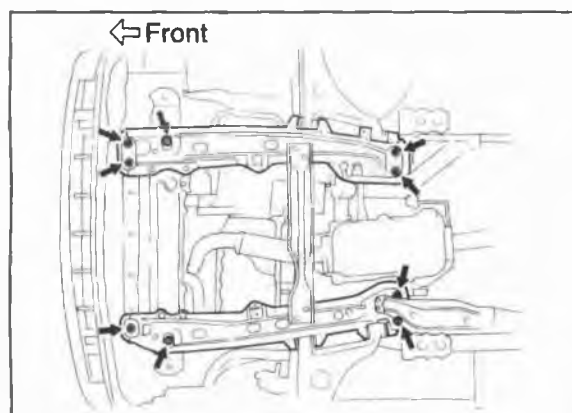
# 13 FRONT STABILIZER (4WS)



86U13X-040

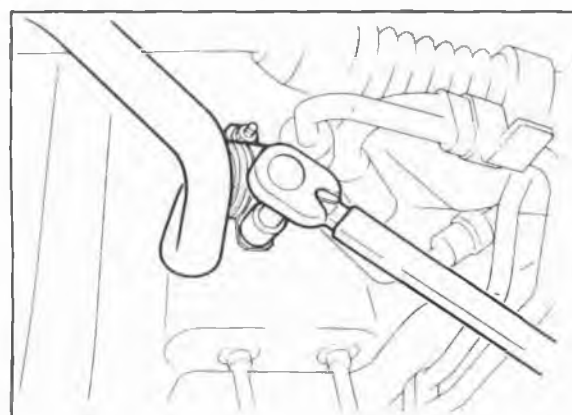
## Removal Note

1. Remove the wheel and tire.
2. Remove the stabilizer bar control link.



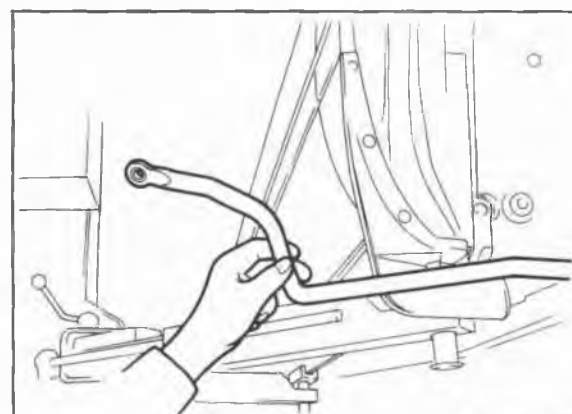
86U13X-041

3. Remove the bolts indicated by the arrows.



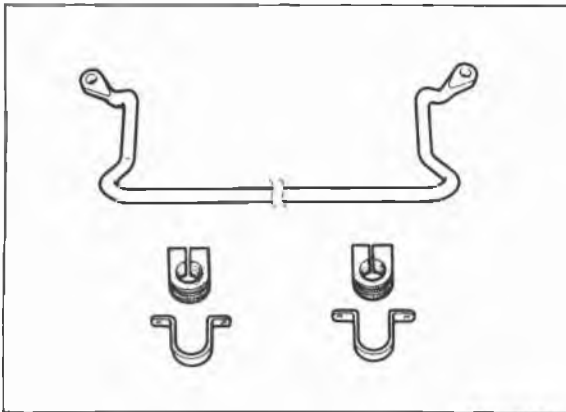
86U13X-042

4. Remove the stabilizer bushing and bracket.

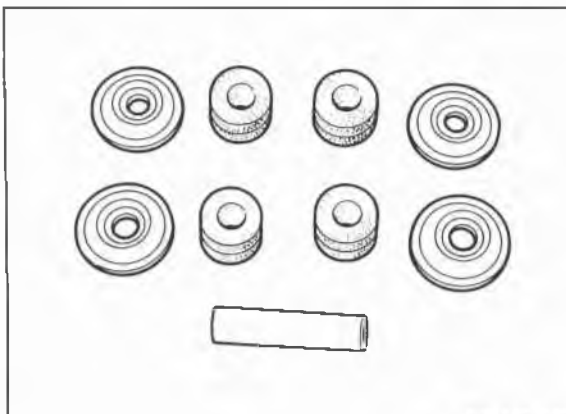


86U13X-043

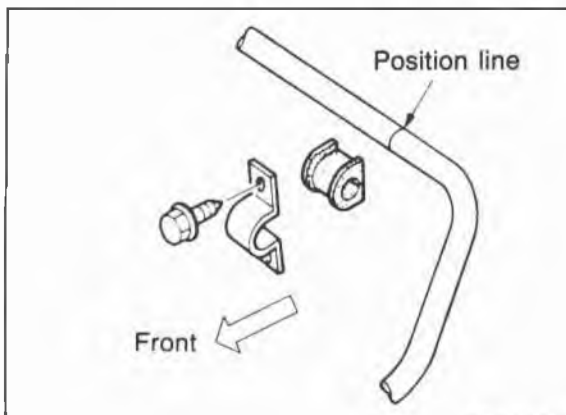
5. Remove the stabilizer.



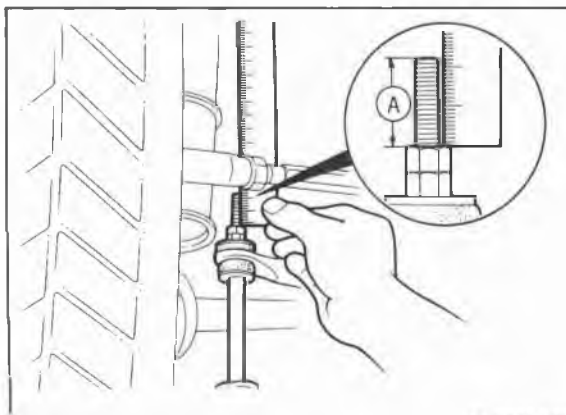
86U13X-044



69G13X-029



86U13X-045



86U13X-046

### Inspection Note

Check the following and repair or replace any faulty parts.

1. Stabilizer for bending or damage
2. Stabilizer bushings for deterioration or wear
3. Retainers and spacers for bending or damage
4. Bushings for deterioration or wear
5. Bolts for bending or damage

### Installation Note

#### Stabilizer bushing and control link

Align the bushing with the installation position line on the stabilizer, mount it so that the notch faces the rear of the chassis.

#### Caution

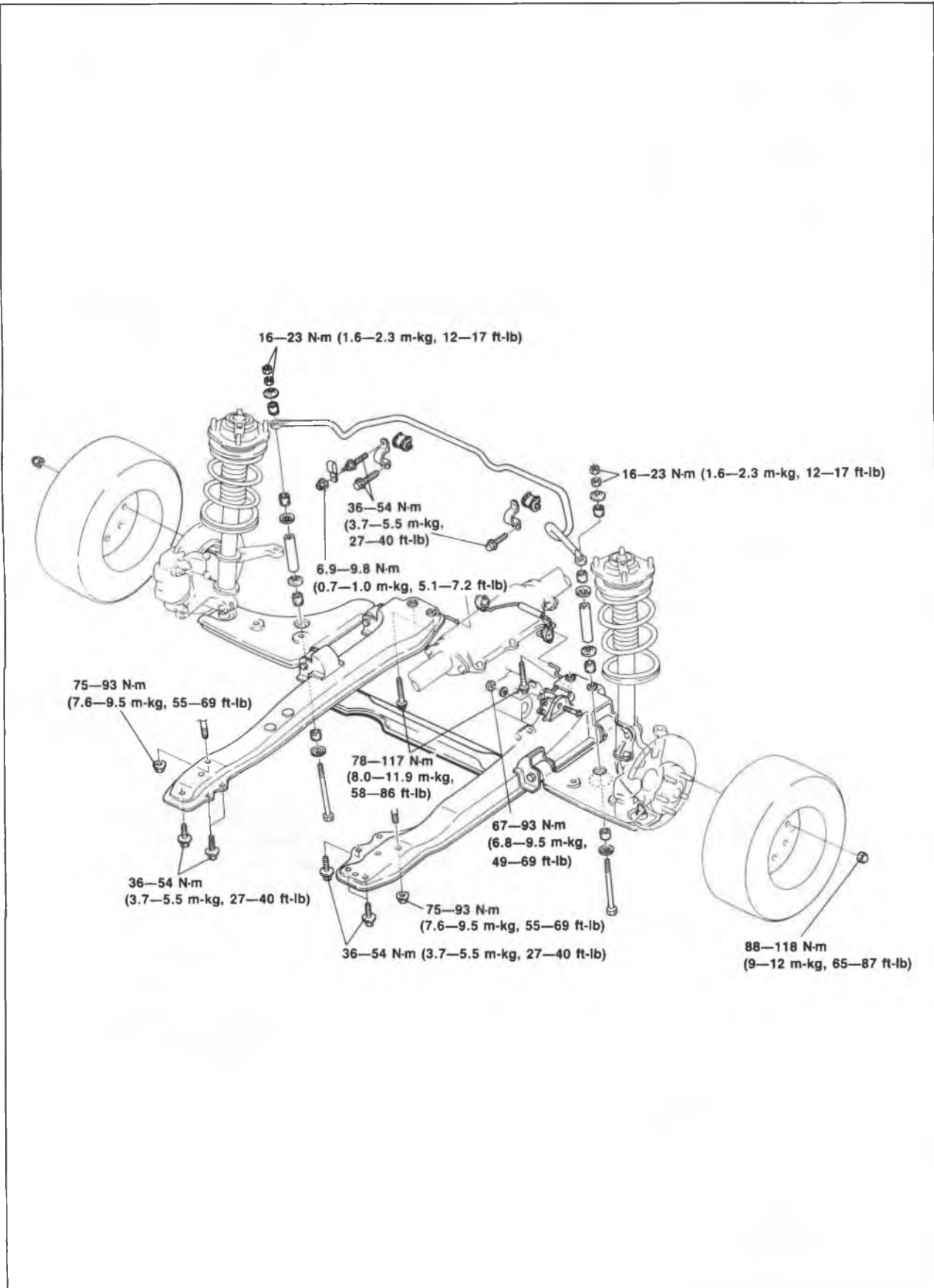
**Mount the brackets of the stabilizer first and loosely tighten them. After mounting the control links, tighten the bracket to the specified torque with the vehicle on the ground and unloaded.**

**Tightening torque: 36—54 N·m  
(3.7—5.5 m·kg, 27—40 ft·lb)**

Tighten the link nut so that there is **20.1mm (0.79 in)** of thread (A) exposed beyond it.

# 13 FRONT STABILIZER (4WS)

## Tightening torques

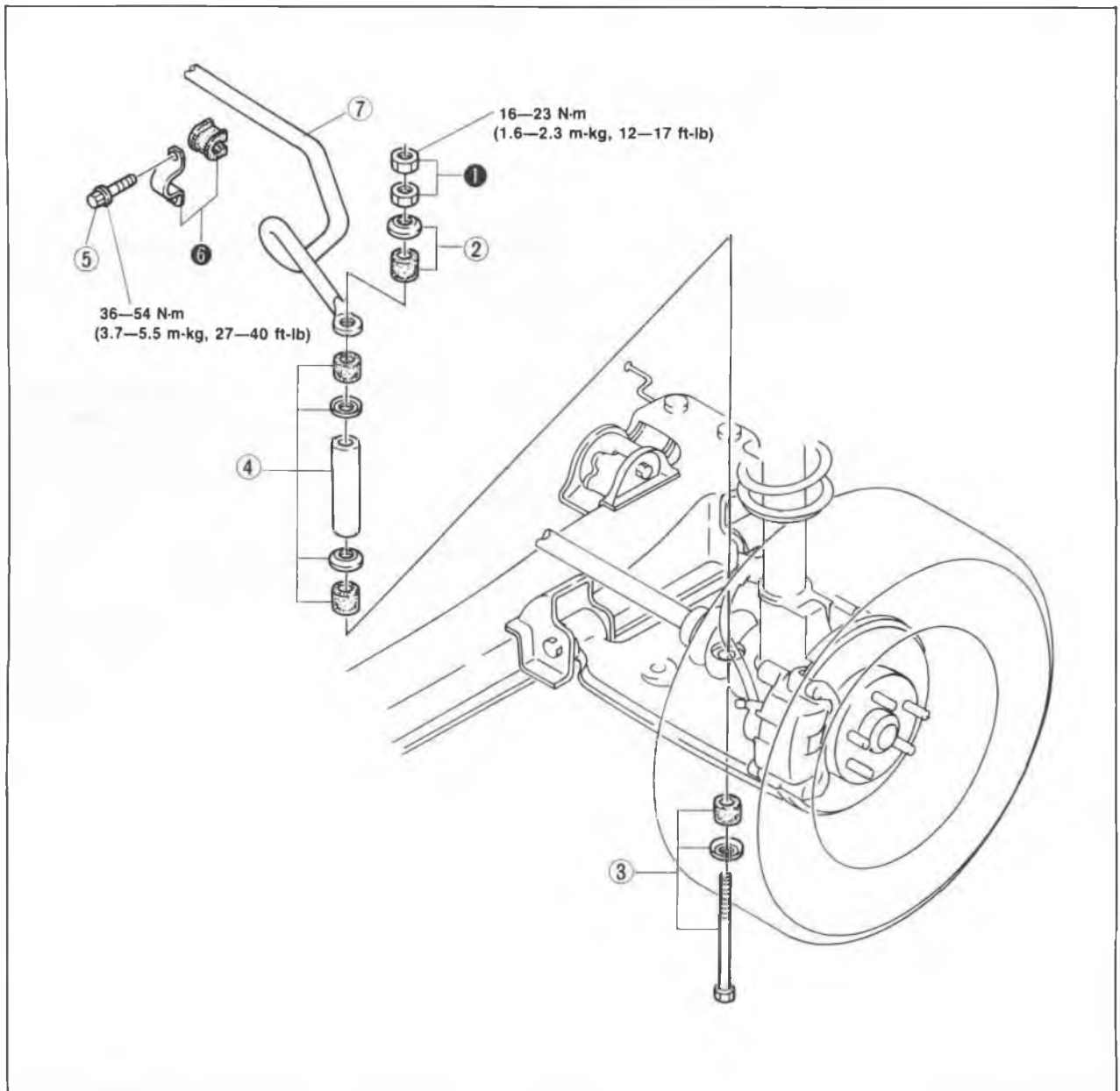


76G13X-034

## FRONT STABILIZER

### REMOVAL AND INSTALLATION

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure.
3. Inspect all components and parts, referring to the inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to the figure.

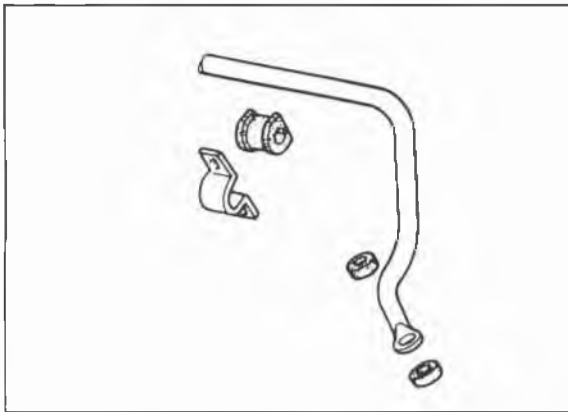


76G13X-021

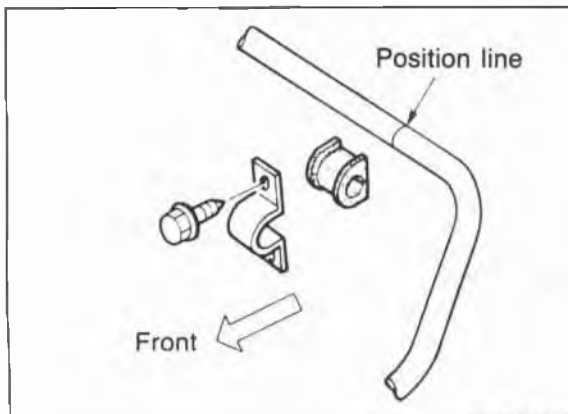
- |                                |                                  |                        |
|--------------------------------|----------------------------------|------------------------|
| 1. Nuts                        | 4. Bushing, retainer, and spacer | 6. Bushing and bracket |
| 2. Retainer and bushing        |                                  | 7. Stabilizer          |
| 3. Bolt, retainer, and bushing | 5. Bolt                          |                        |



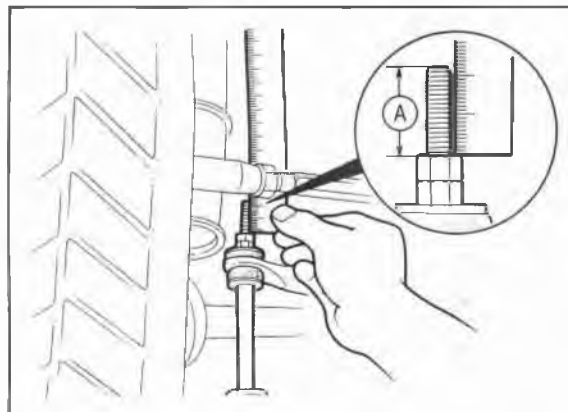
# 13 FRONT STABILIZER



86U13X-049



86U13X-050



86U13X-051

## Inspection Note

Check the following and repair or replace any faulty parts.

1. Stabilizer for bending or damage
2. Stabilizer bushings for deterioration or wear.
3. Retainers and spacers for bending or damage.
4. Mounting bushings for deterioration or wear.
5. Bolts for bending or damage.

## Installation Note

### Stabilizer bushing

Align the bushing with the installation position line on the stabilizer, and mount it so that the notch faces the rear of the chassis.

### Caution

**Mount the brackets of the stabilizer first and loosely tighten them. After mounting the control links, tighten the brackets to the specified torque with the vehicle on the ground and unloaded.**

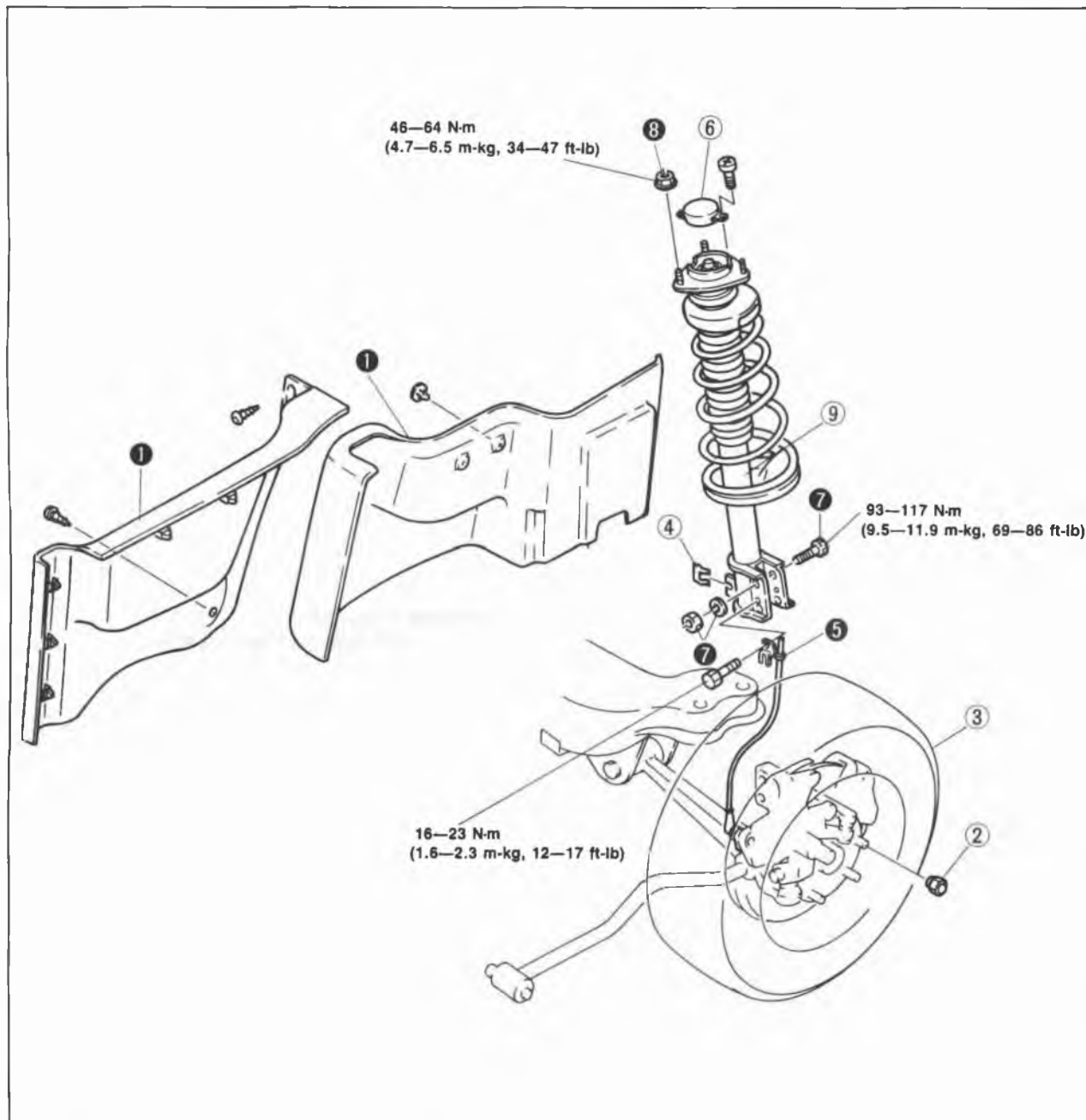
**Tightening torque: 36—54 N-m  
(3.7—5.5 m-kg, 27—40 ft-lb)**

Tighten the link nut so that there is **20.1 mm (0.79 in)** of thread (A) exposed beyond it.

## REAR SHOCK ABSORBER AND SPRING

### REMOVAL AND INSTALLATION

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Install in the reverse order of removal, referring to the installation note for specially marked parts.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-010

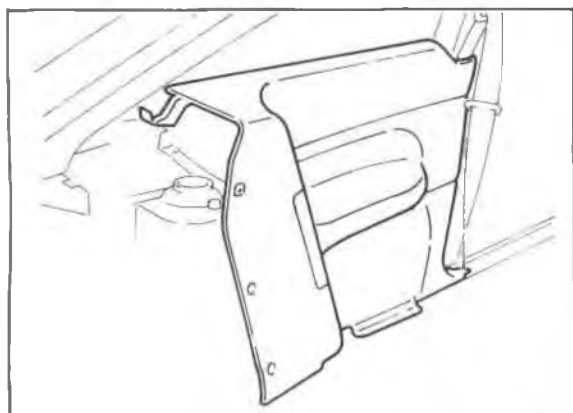
1. Trim
2. Lug nut
3. Wheel and tire

4. Clip
5. Harness and bracket (ABS)
6. Actuator (AAS)

7. Bolt and nut
8. Nut
9. Shock absorber assembly

# 13 REAR SHOCK ABSORBER AND SPRING

---

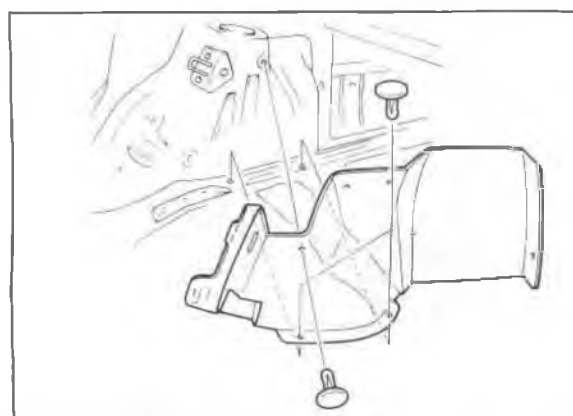


76G13X-011

## Removal Note

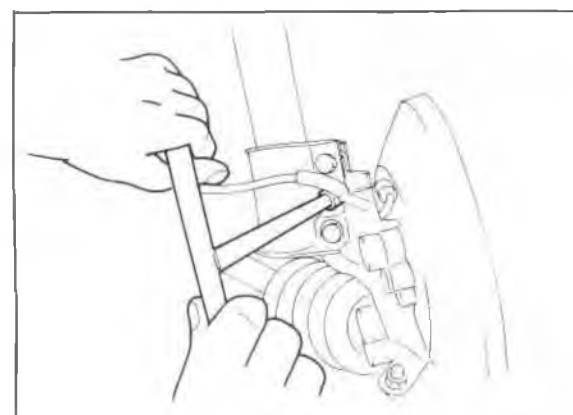
### Trim

1. Remove the quarter trim.



86U13X-054

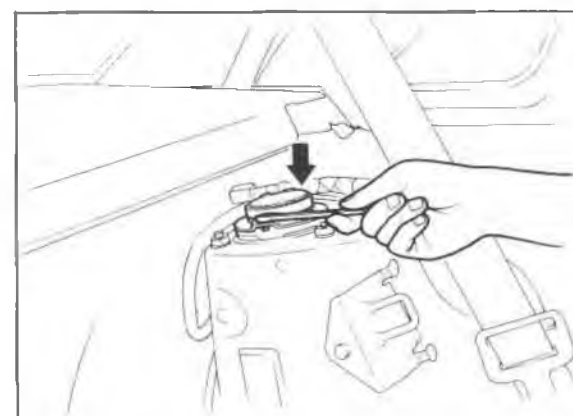
2. Remove the trim.



86U13X-055

## ABS harness bracket

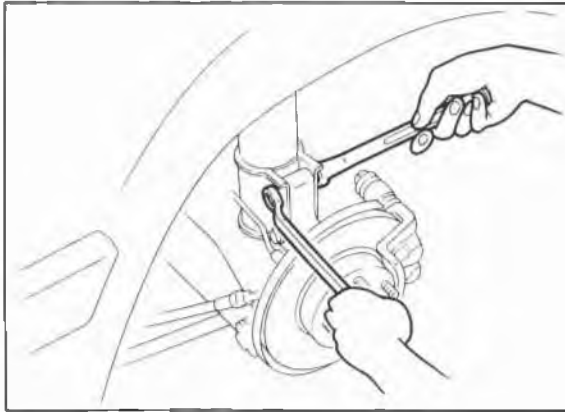
Remove the ABS harness and bracket.



86U13X-056

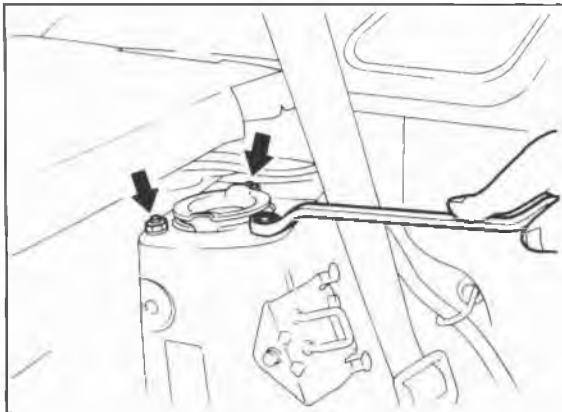
## AAS actuator

1. Disconnect the AAS actuator connector.
2. Remove the AAS actuator.



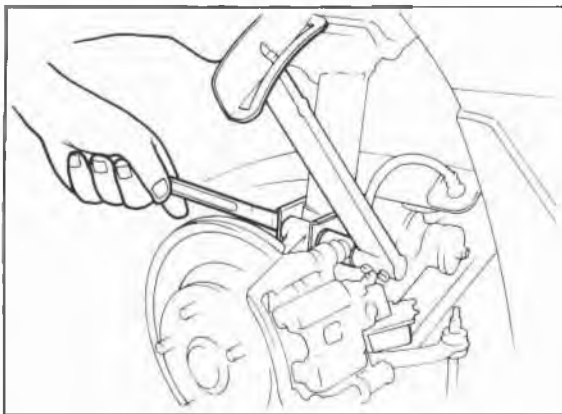
86U13X-057

**Shock absorber clinch bolts and nuts**  
Remove the clinch bolts.



86U13X-058

**Shock absorber upper nuts**  
Remove the upper mounting shock absorber nuts.



86U13X-059

**Installation Note**  
**Shock absorber**

Tighten the shock absorber mounting bolts and nuts.

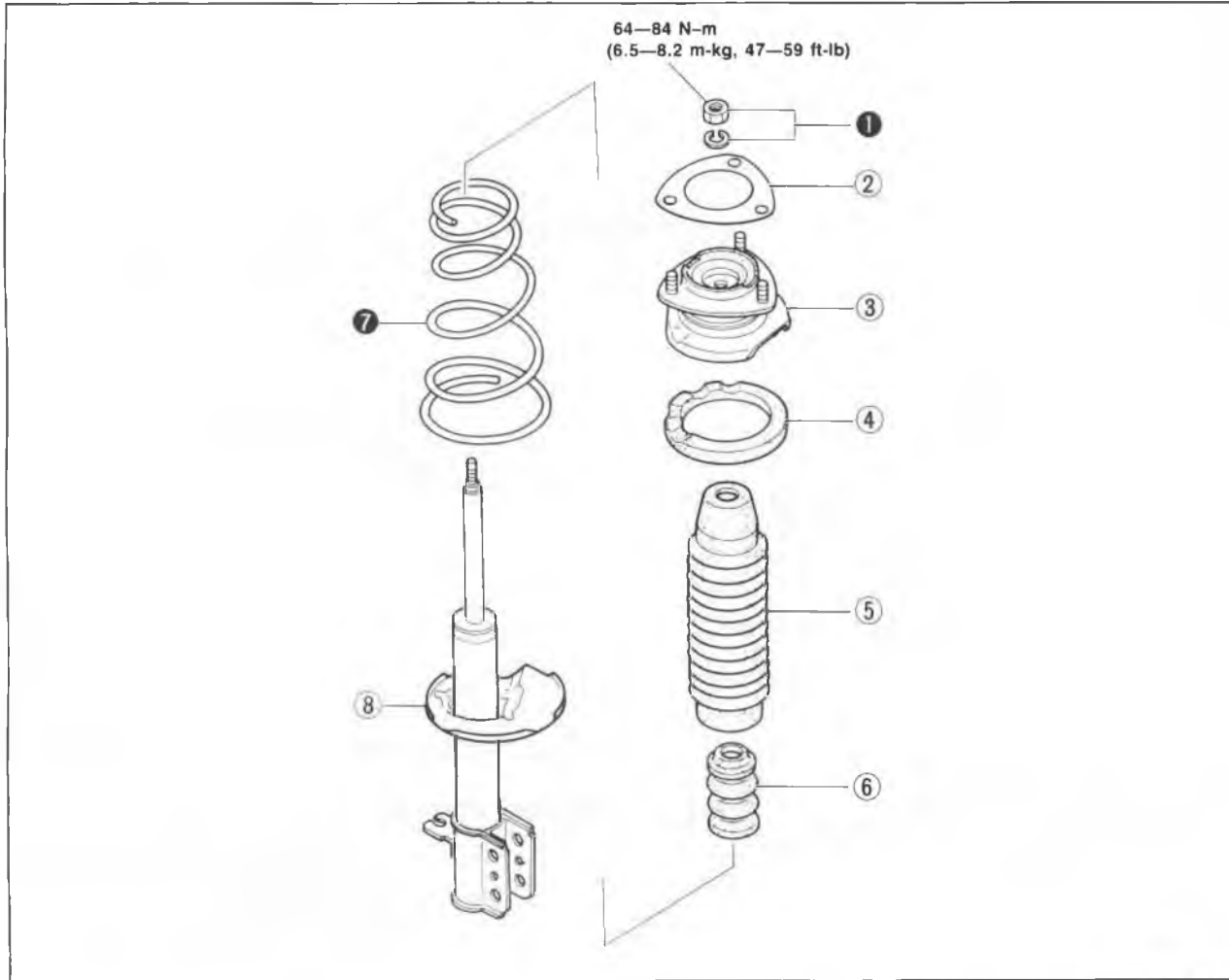
**Tightening torque:**

- Upper nuts 46—64 N·m**  
(4.7—6.5 m·kg, 34—47 ft·lb)
- Clinch bolts 93—117 N·m**  
(9.5—11.9 m·kg, 69—86 ft·lb)

# 13 REAR SHOCK ABSORBER AND SPRING

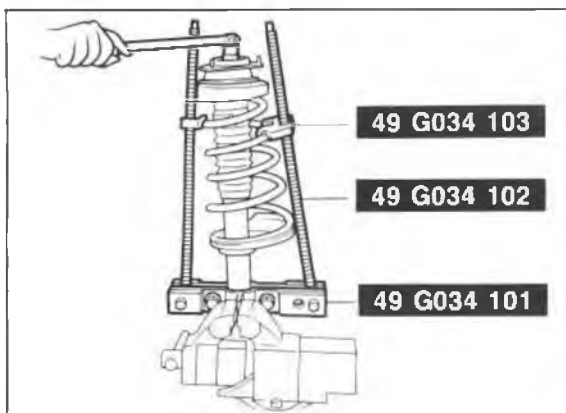
## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the sequence shown in the figure the referring to the disassembly note for specially marked parts.
2. Inspect all components and parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to the assembly note for specially marked parts.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-022

- |                   |                  |                   |
|-------------------|------------------|-------------------|
| 1. Nut            | 4. Spring seat   | 7. Coil spring    |
| 2. Seat           | 5. Dust boot     | 8. Shock absorber |
| 3. Mounting block | 6. Bound stopper |                   |



86U13X-061

### Disassembly Note

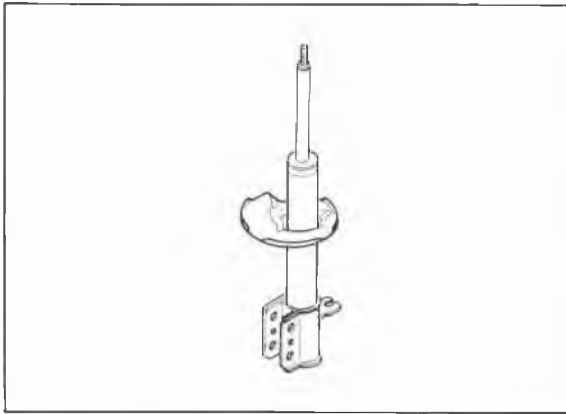
1. Loosen the piston rod upper nut several turns, but do not remove.

### Caution

- a) Do not remove the nut.
- b) Use copper or aluminum plates in the jaws of the vise.

2. Set the **SST** in a vise.
3. Secure the shock absorber in the **SST**.
4. Compress the coil spring with the **SST**, then remove the nut.
5. Remove the coil spring.

## REAR SHOCK ABSORBER AND SPRING 13

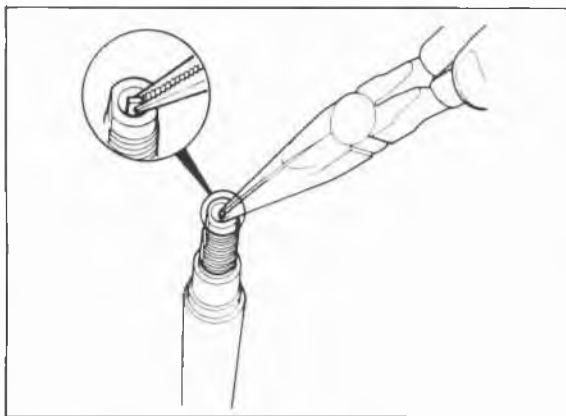


86U13X-062

### Inspection Note

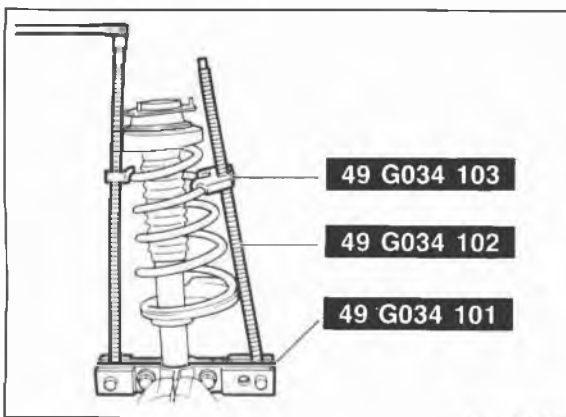
Check the following and repair or replace any faulty parts.

1. Oil leakage or noise from shock absorbers
2. Deterioration or damage of mounting block
3. Wear or damage of bound stopper



86U13X-063

4. Rotation of the control rod (AAS).



86U13X-064

### Assembly Note

1. Set the **SST** in a vise
2. Secure the shock absorber in the **SST**.
3. Install the bound stopper and dust boot onto the shock absorber.
4. Install the compressed coil spring (compressed with **SST**).
5. Install the spring seat and mounting block.

6. Remove the **SST**.
7. Secure the mounting blocks in the vise.

### Caution

**Use copper or aluminum plate in the jaws of a vice.**

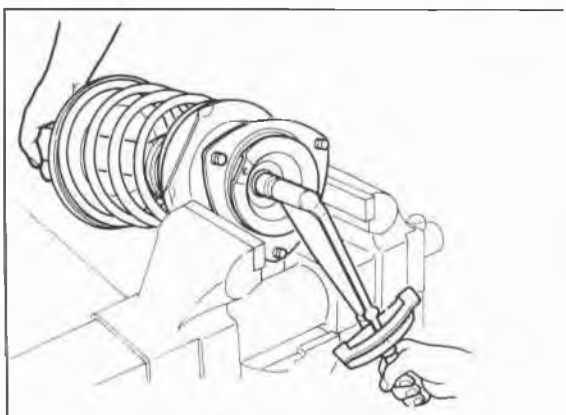
8. Tighten the piston rod upper nut.

### Tightening torque:

**64—84 N·m (6.5—8.2 m·kg, 47—59 ft·lb)**

### Caution

**Check that the spring is well seated in the upper seats.**



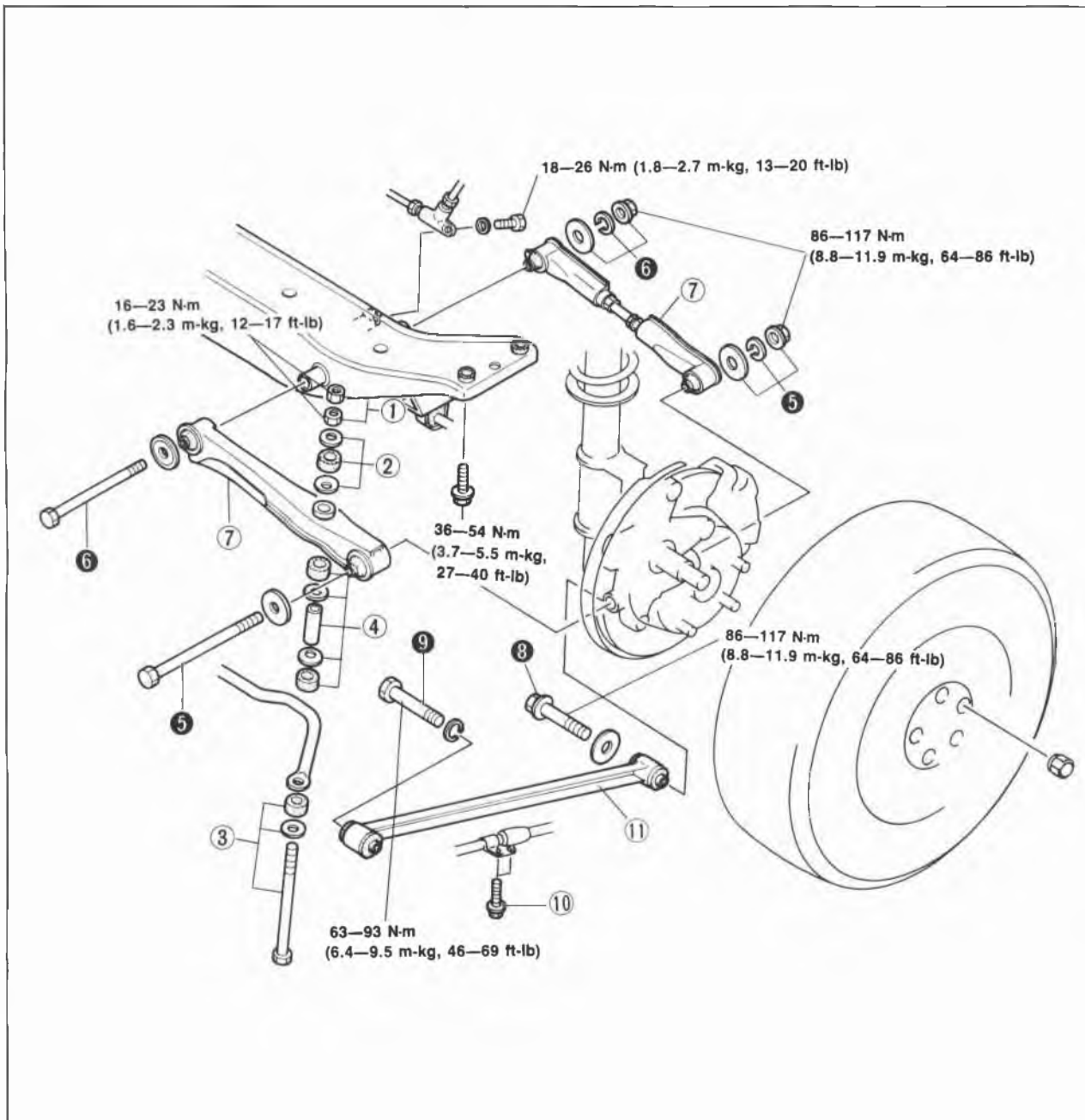
76G13X-023

# 13 LATERAL LINK AND TRAILING LINK

## LATERAL LINK AND TRAILING LINK

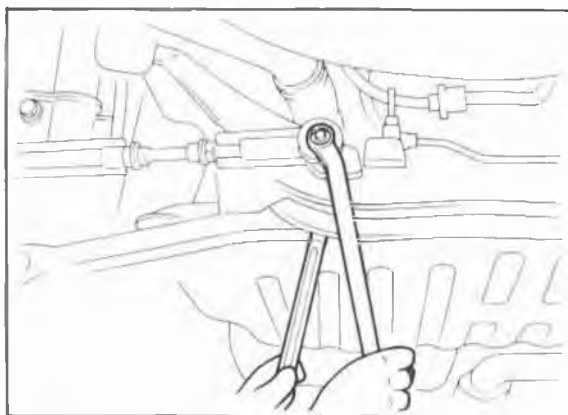
### REMOVAL AND INSTALLATION

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Inspect all components and parts, referring to inspection the note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-024

- |                                  |                 |                   |
|----------------------------------|-----------------|-------------------|
| 1. Nut                           | 5. Bolt and nut | 9. Bolt           |
| 2. Bushing and retainer          | 6. Bolt and nut | 10. Bolts         |
| 3. Retainer, bushing, and bolt   | 7. Lateral link | 11. Trailing link |
| 4. Retainer, bushing, and spacer | 8. Bolt         |                   |

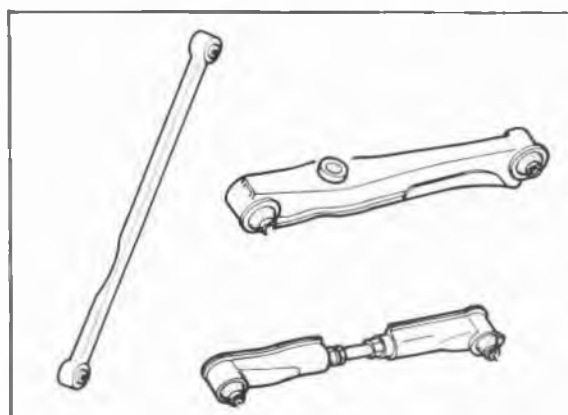


86U13X-066

## Removal Note

### Lateral links

1. Loosen the crossmember mounting bolts and allow it to drop down for clearance.
2. Remove the lateral links.



86U13X-067

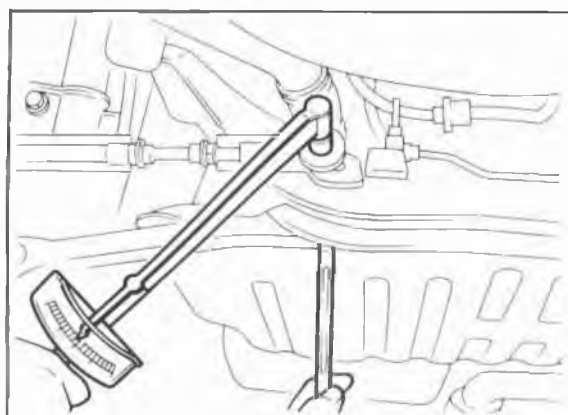
## Inspection Note

Check the following and repair or replace any faulty parts.

1. Deformed or cracked lateral link and trailing link
2. Damaged or worn bushings

## Note

**If it is necessary to replace the bushing, replace the lateral link or trailing link assembly.**



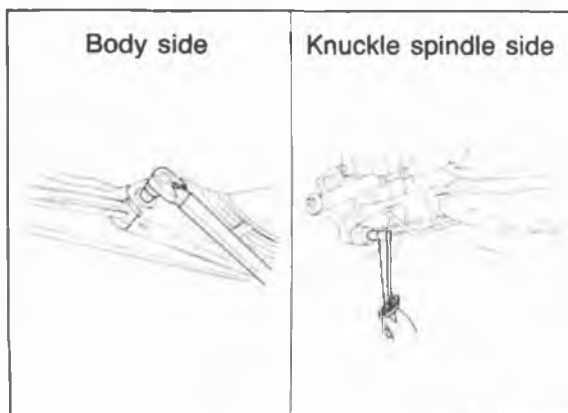
86U13X-068

## Installation Note

### Lateral links

Loosely tighten the mounting bolts of each link, and lower the vehicle from the safety stands. Adjust the toe-in, and then tighten the bolts with the vehicle unloaded.

**Tightening torque: 86—117 N·m  
(8.8—11.9 m·kg, 64—86 ft·lb)**



86U13X-069

## Trailing link

1. Loosely tighten the mounting bolt and nut.
2. Lower the vehicle from the safety stands.
3. Tighten the bolt and nut with the vehicle unloaded.

## Tightening torque:

**Body side 63—93 N·m**

**(6.4—9.5 m·kg, 46—69 ft·lb)**

**Knuckle spindle side 86—117 N·m**

**(8.8—11.9 m·kg, 64—86 ft·lb)**

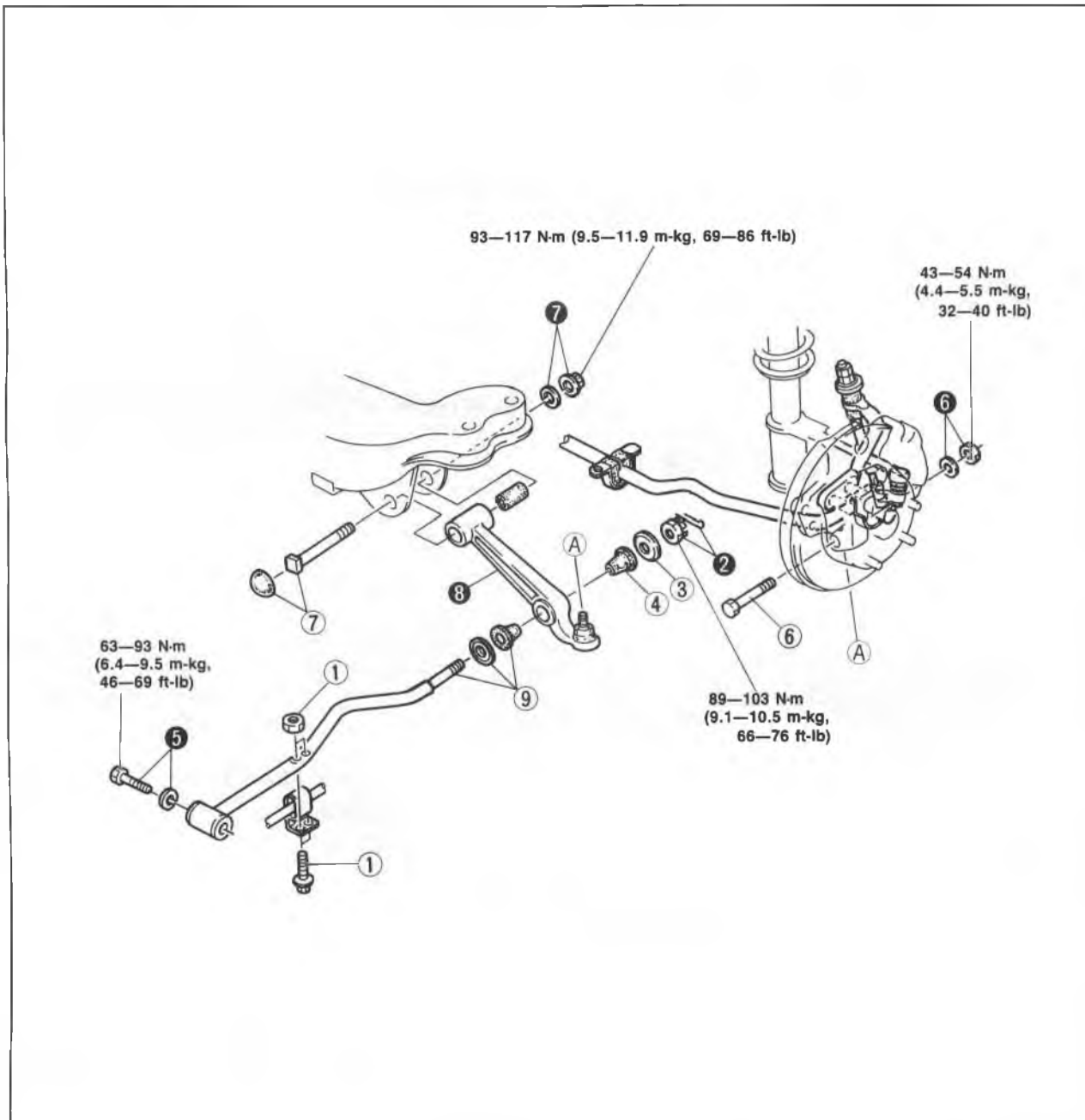


# 13 REAR LOWER ARM AND TRAILING LINK (4WS)

## REAR LOWER ARM AND TRAILING LINK (4WS)

### REMOVAL AND INSTALLATION

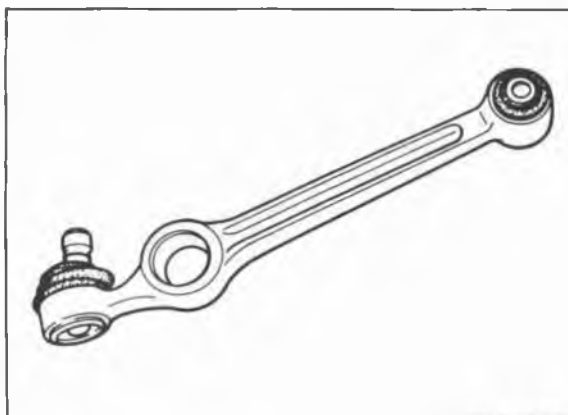
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure.
3. Inspect all components and parts, referring to the inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to the figure.



76G13X-025

- |                       |                 |   |
|-----------------------|-----------------|---|
| 1. Bolt and nut       | 5. Bolt         | 9. Trailing link, retainer, and bushing |
| 2. Cotter pin and nut | 6. Bolt and nut | 10. Bushing                             |
| 3. Retainer           | 7. Bolt and nut |   |
| 4. Bushing            | 8. Lower arm    |   |

## REAR LOWER ARM AND TRAILING LINK (4WS) 13



86U13X-071

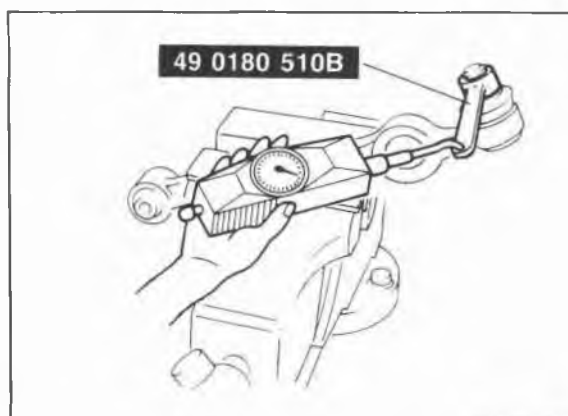
### Inspection Note

Check the following and repair or replace any faulty parts.

1. Deformation or cracks in lower arm and trailing link
2. Deformation or wear of bushing
3. Rotation torque of ball joint

### Note

If it is necessary to replace the ball joint, replace the lower arm assembly.

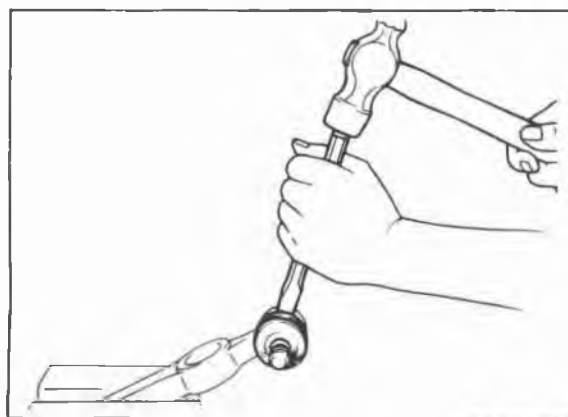


86U13X-072

### Measurement of ball joint rotation torque

Connect the **SST** to the ball stud, then measure by using a pull scale.

**Rotation torque: 1.8—3.1 N·m**  
**(18—31 cm·kg, 15.6—26.9 in·lb)**  
**pull scale reading: 18—30 N**  
**(1.8—3.1 kg, 3.9—6.8 lb)**



86U13X-073

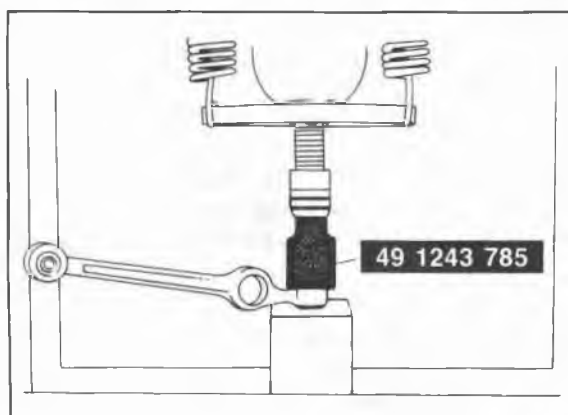
### Dust boot

#### Removal

Use a chisel to remove the dust boot.

#### Caution

Do not damage the ball joint.

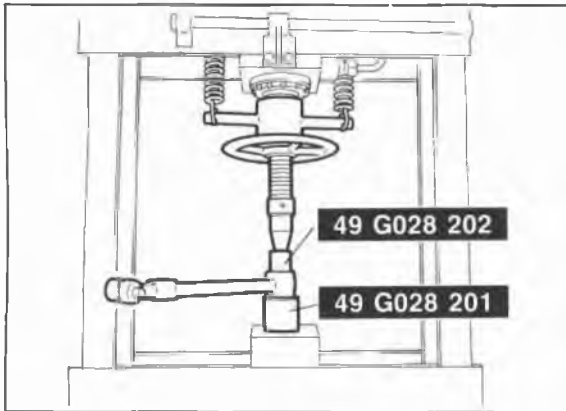


76G13X-026

### Installation

Apply lithium grease to the inside of the new dust boot, then install it with the **SST**.

# 13 REAR LOWER ARM AND TRAILING LINK (4WS)

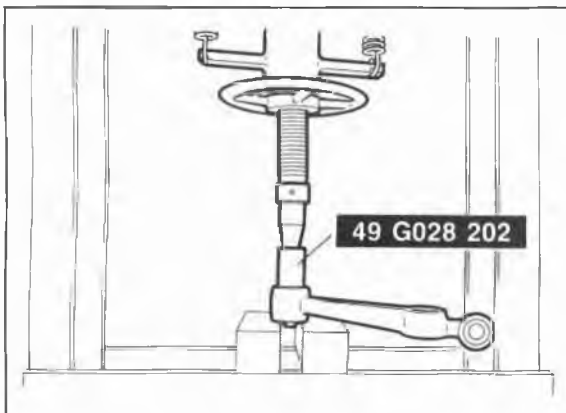


86U13X-075

## Lower arm bushing

### Removal

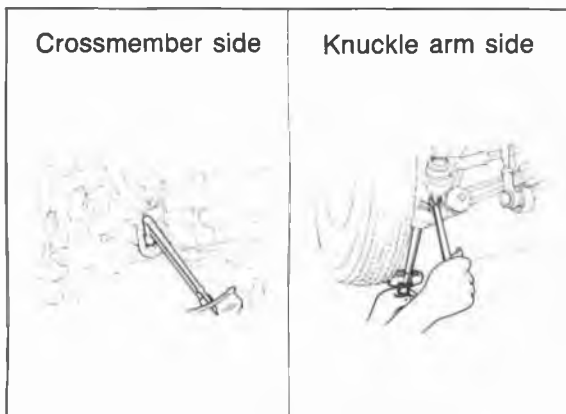
Use the **SST** as shown in the figure, and remove the bushing.



86U13X-076

### Installation

Apply soapy water to the bushing and press it into the lower arm with the **SST**.



86U13X-077

### Installation Note

#### Lower arm

Tighten the lower arm to the crossmember and knuckle arm.

#### Tightening torque:

**Crossmember side 93—117 N·m**

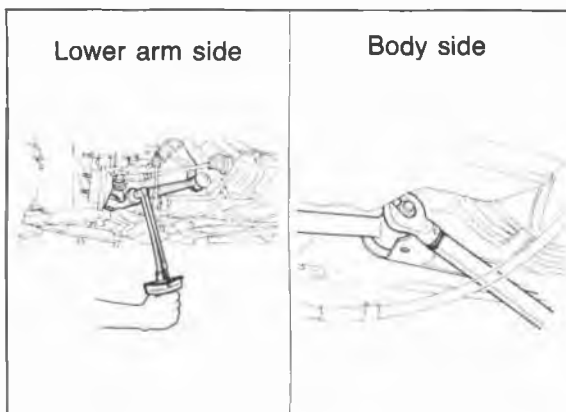
**(9.5—11.9 m·kg, 69—86 ft·lb)**

**Knuckle arm side 43—54 N·m**

**(4.4—5.5 m·kg, 32—40 ft·lb)**

#### Caution

**Lower the vehicle and check the torque with the vehicle unloaded.**



86U13X-078

### Trailing link

Tighten the trailing link to the body and lower arm.

#### Tightening torque:

**Body side 63—93 N·m**

**(6.4—9.5 m·kg, 46—69 ft·lb)**

**Lower arm side 89—103 N·m**

**(9.1—10.5 m·kg, 66—76 ft·lb)**

#### Caution

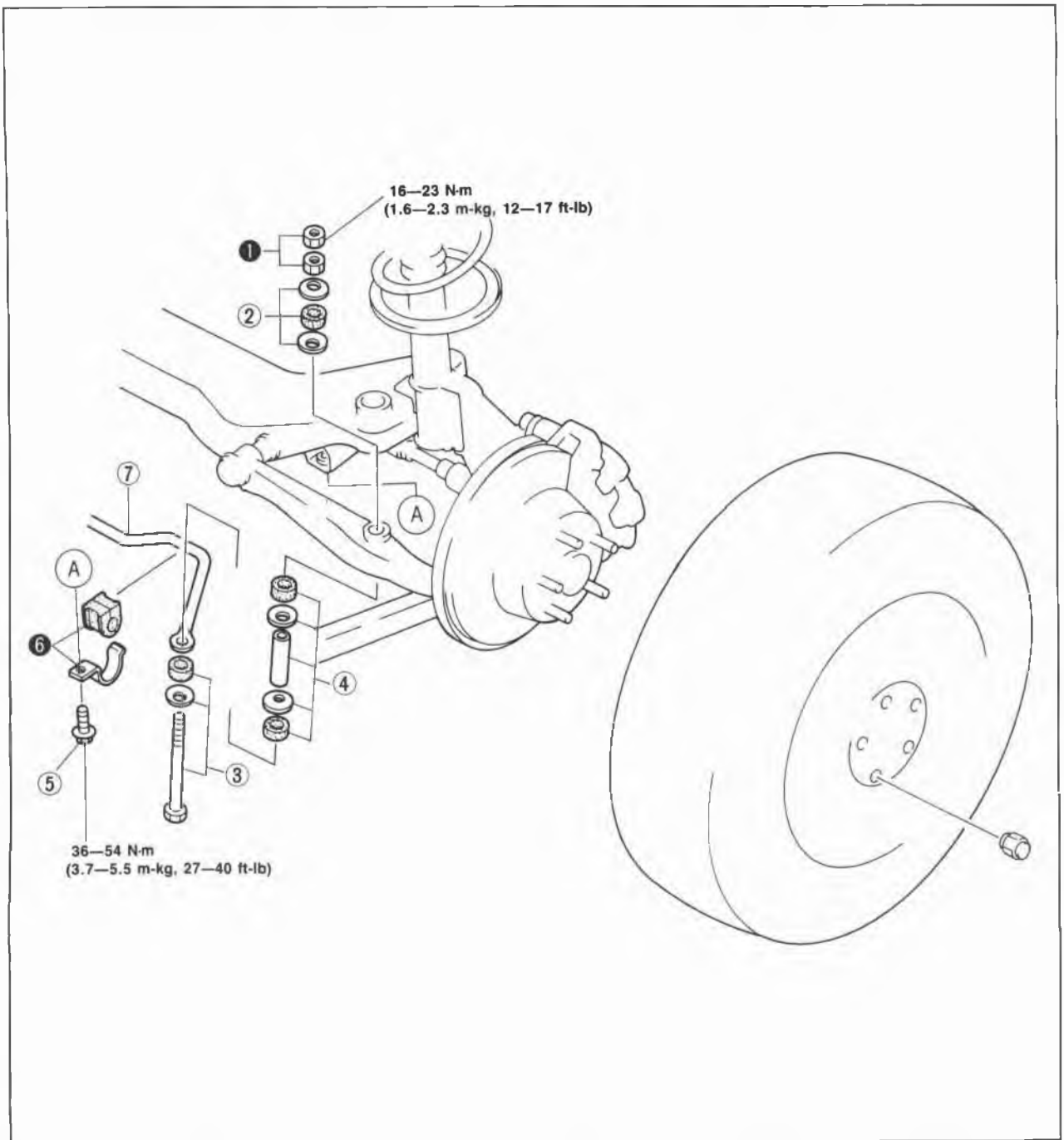
**a) Lower the vehicle and check the torque with the vehicle unloaded.**

**b) If the cotter pin was removed, replace it with a new one.**

## REAR STABILIZER

### REMOVAL AND INSTALLATION

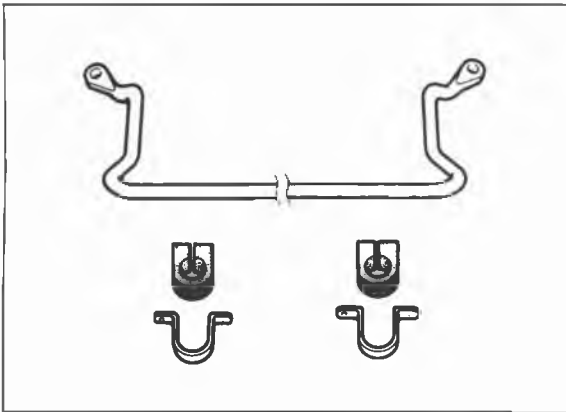
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure.
3. Inspect all components and parts, referring to the inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to the figure.



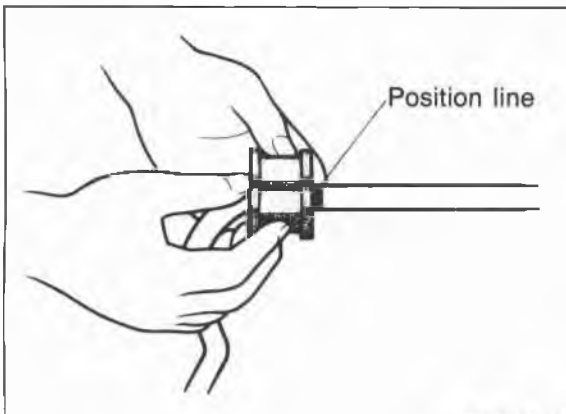
76G13X-027

- |                                |                                  |                        |
|--------------------------------|----------------------------------|------------------------|
| 1. Nuts                        | 4. Retainer, bushing, and spacer | 6. Bushing and bracket |
| 2. Bushing and retainer        |                                  | 7. Stabilizer          |
| 3. Retainer, bushing, and bolt | 5. Bolt                          |                        |

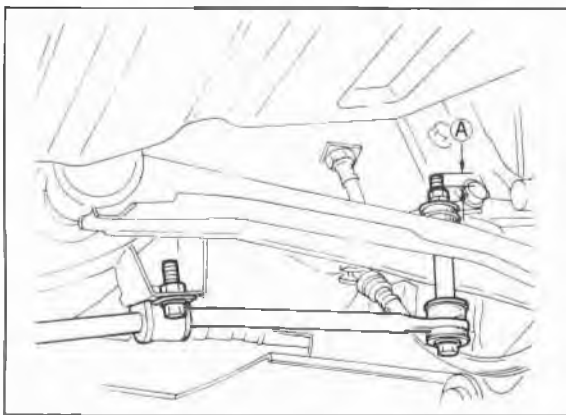
# 13 REAR STABILIZER



86U13X-080



86U13X-081



86U13X-082

## Inspection Note

Check the following and replace or repair any faulty parts.

1. Stabilizer for bending or damage
2. Stabilizer bushings for deterioration or wear
3. Retainers and spacers for bending or damage
4. Mounting bushings for deterioration or wear
5. Bolts for bending or damage

## Installation Note

### Stabilizer bushing and bracket

1. Install the bushing on the stabilizer.
2. Align the bushing with the stabilizer installation Position line.
3. Install the stabilizer bracket and loosely tighten the bolts.
4. Install the link to the upper link, and tighten the nut and bolt.
5. Install the retainers, rubber bushings and nuts.
6. Lower the vehicle, then tighten the bolts with the vehicle unloaded.

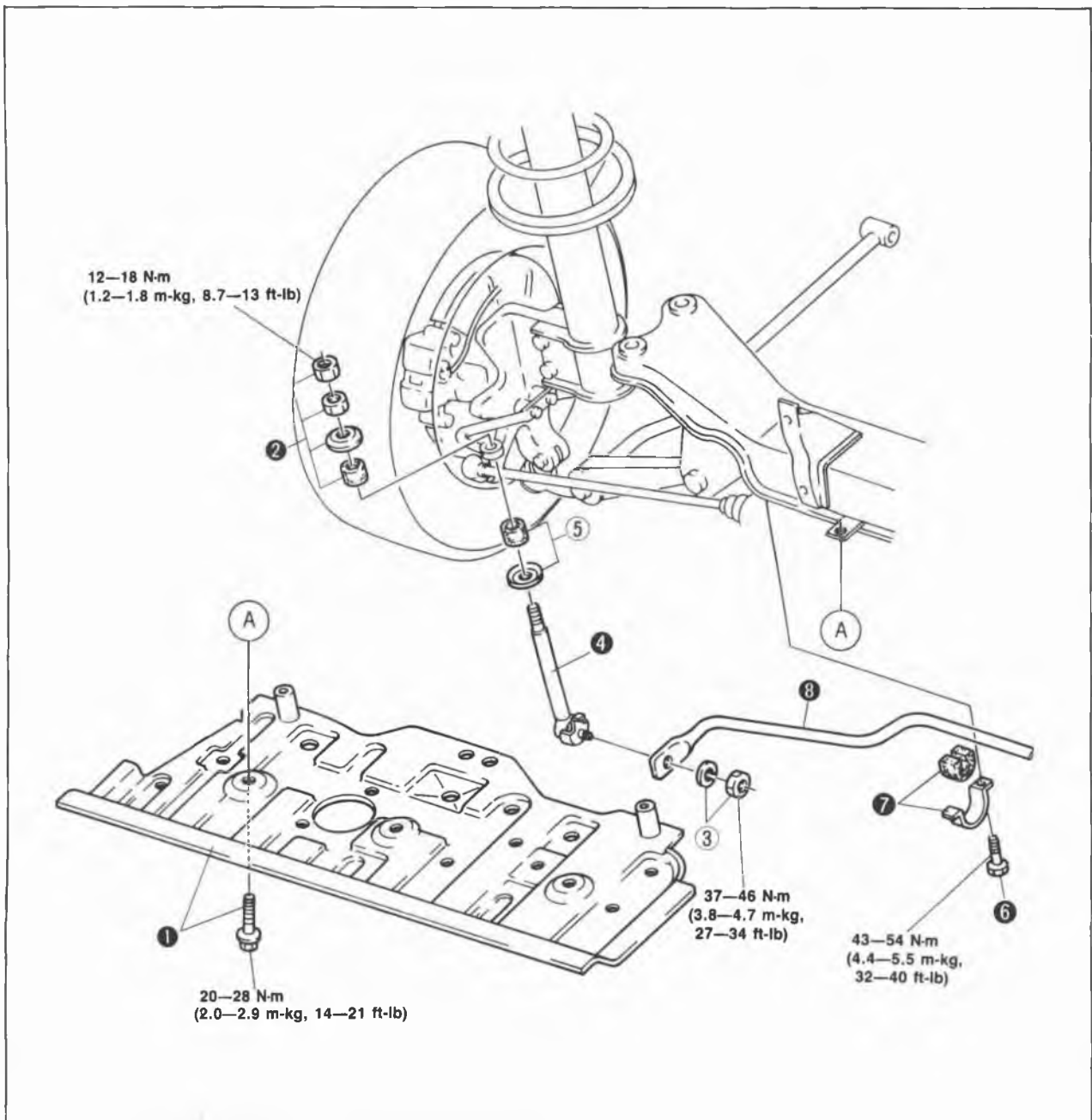
**Tightening torque: 36—54 N·m  
(3.7—5.5 m·kg, 27—40 ft·lb)**

7. Tighten the link nut so that there is **10.4 mm (0.41 in)** of thread (A) exposed.

## REAR STABILIZER AND CONTROL LINK (4WS)

### REMOVAL AND INSTALLATION

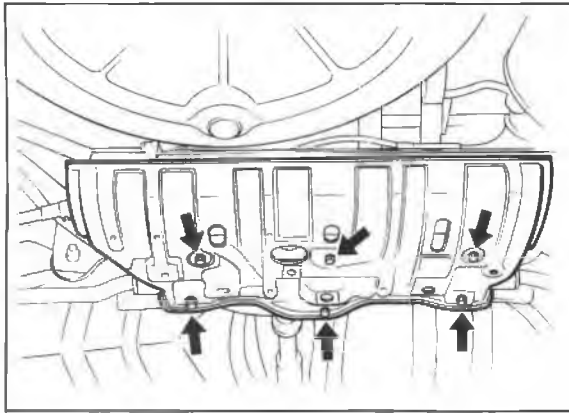
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Inspect all components and parts, referring to inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torques, referring to the figure.



76G13X-028

- |                                  |                          |                        |
|----------------------------------|--------------------------|------------------------|
| 1. Rear steering cover and bolts | 3. Nut                   | 6. Bolt                |
| 2. Nut; bushing, and retainer    | 4. Control link assembly | 7. Bushing and bracket |
|                                  | 5. Bushing and retainer  | 8. Rear stabilizer     |

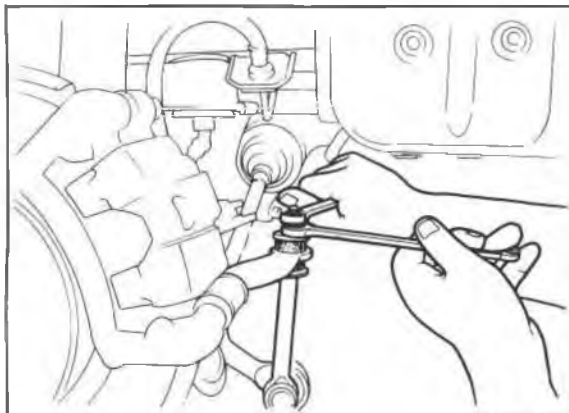
# 13 REAR STABILIZER AND CONTROL LINK (4WS)



86U13X-084

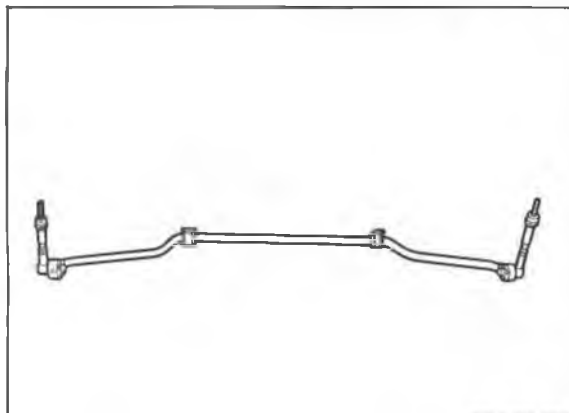
## Removal Note

1. Remove the rear steering cover bolts.



86U13X-085

2. Remove the stabilizer bar control link.

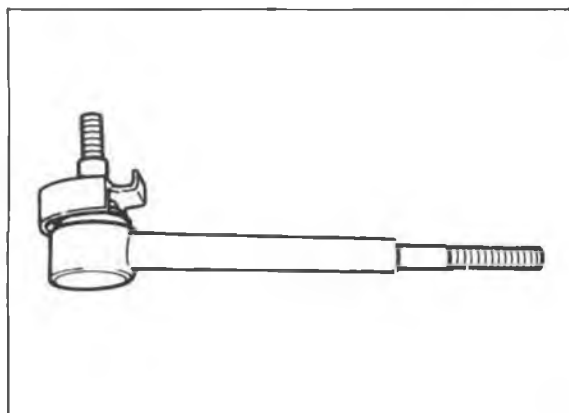


86U13X-086

## Inspection Note

Check the following and repair or replace any faulty parts.

1. Worn or deteriorated rubber bushing
2. Bent, deteriorated, or damaged stabilizer

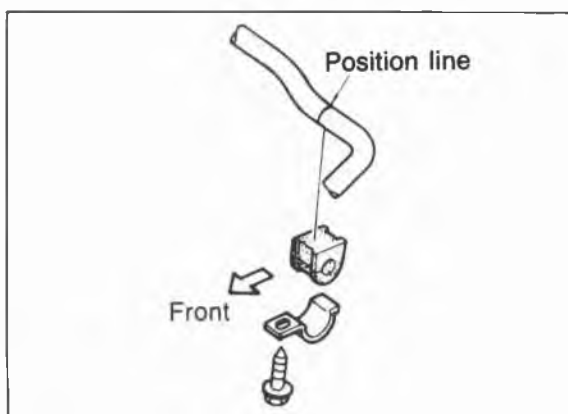


86U13X-087

3. Damaged control link
4. Damaged control link dust boot
5. Worn or deteriorated bushing

## Note

**If it is necessary to replace the ball joint, replace the control link assembly.**



76G13X-029

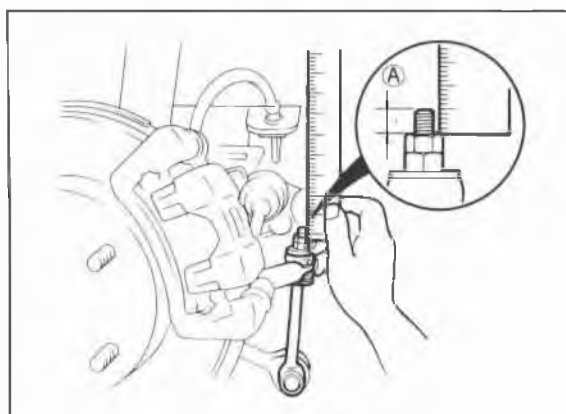
### Stabilizer bushing installation

Align the bushing with the stabilizer installation position line, and attach it so that the seam faces the front of the vehicle.

### Caution

Mount the brackets of the stabilizer first and loosely tighten them. After mounting the control links, tighten the brackets to the specified torque with the vehicle on the ground and unloaded.

**Tightening torque: 43—54 N·m  
(4.4—5.5 m·kg, 32—40 ft·lb)**



86U13X-089

Tighten the link nut so that there is **13 mm (0.51 in)** of thread (A) exposed.

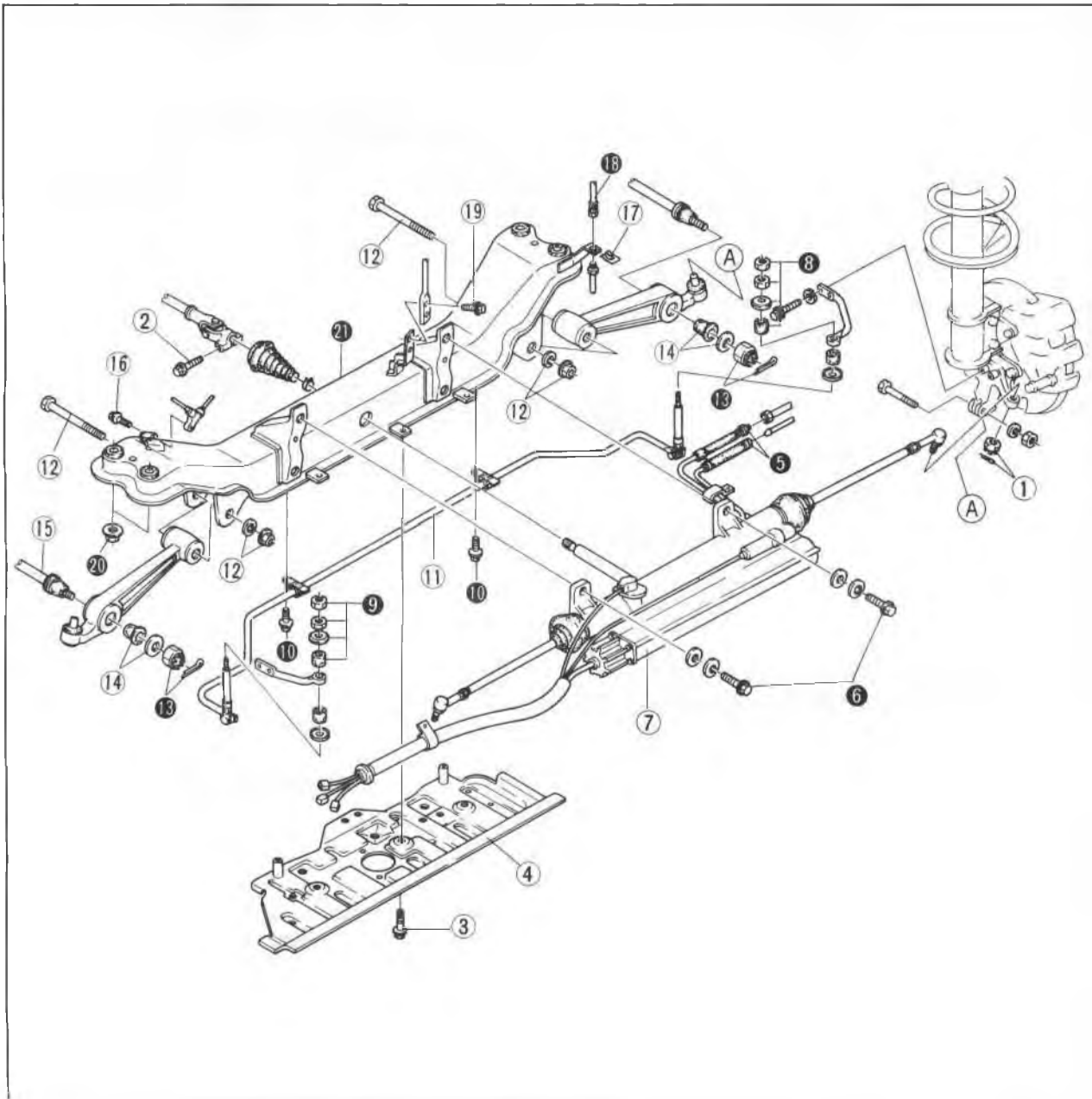


# 13 REAR CROSSMEMBER (4WS)

## REAR CROSSMEMBER (4WS)

### REMOVAL AND INSTALLATION

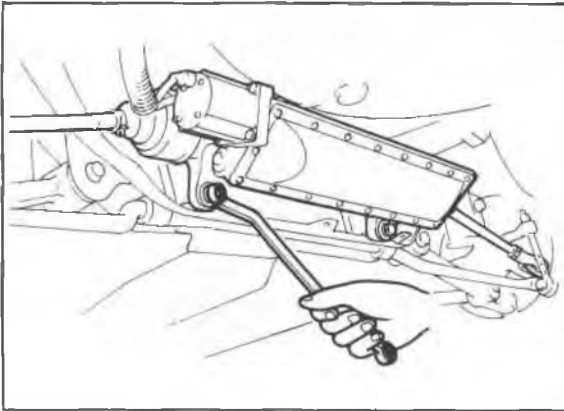
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the sequence shown in the figure, referring to the removal note for specially marked parts.
3. Inspect all components and parts, referring to inspection note.
4. Install in the reverse order of removal, referring to the installation note for specially marked parts.
5. Tighten all nuts and bolts to the specified torque, referring to page 13—49.



76G13X-030

- |                           |                               |                   |
|---------------------------|-------------------------------|-------------------|
| 1. Cotter pin and nut     | 8. Nut, retainer, and bushing | 15. Trailing link |
| 2. Bolt                   | 9. Nut, retainer, and bushing | 16. Bolt          |
| 3. Bolt                   | 10. Bolts                     | 17. Clip          |
| 4. Cover                  | 11. Stabilizer                | 18. Brake pipe    |
| 5. Oil hose and pipe      | 12. Nuts and bolts            | 19. Bolt          |
| 6. Bolts                  | 13. Cotter pin and nut        | 20. Nut           |
| 7. Rear steering assembly | 14. Bushing and retainer      | 21. Crossmember   |

## REAR CROSSMEMBER (4WS) 13

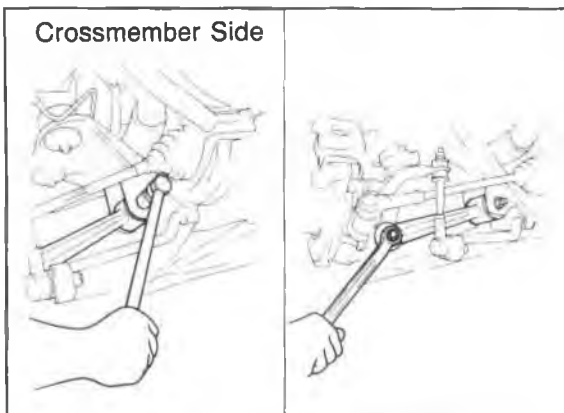


86U13X-091

### Removal Note

#### Rear steering control system

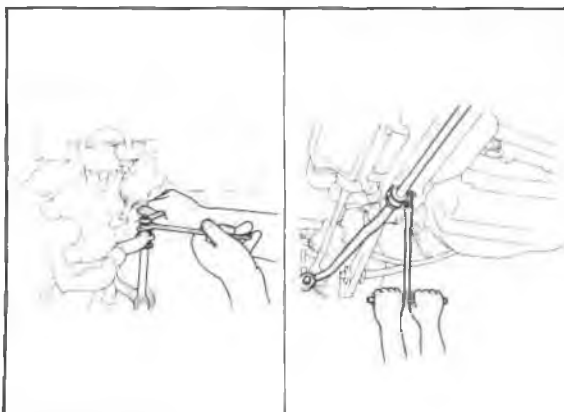
Remove the rear steering. (Refer to Section 10)



86U13X-092

### Lower arm and trailing link

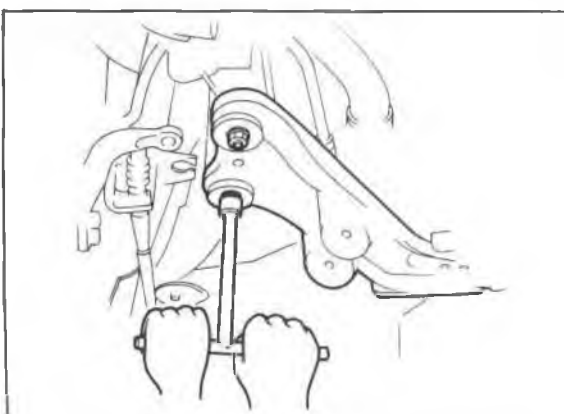
1. Remove the lower arm from the crossmember.
2. Remove the trailing link from the lower arm and body.



86U13X-093

### Stabilizer and control link

Remove the stabilizer bar control link.

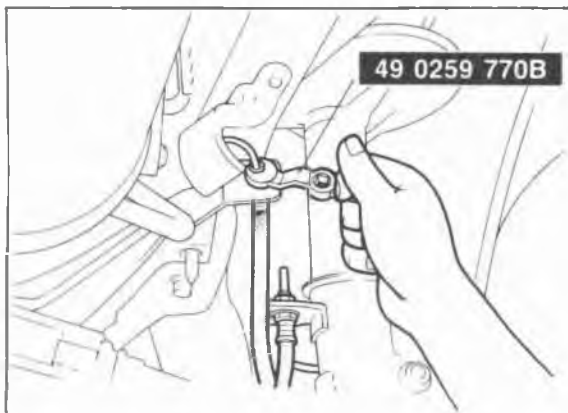


86U13X-094

### Crossmember

Remove the crossmember from the body.

# 13 REAR CROSSMEMBER (4WS)



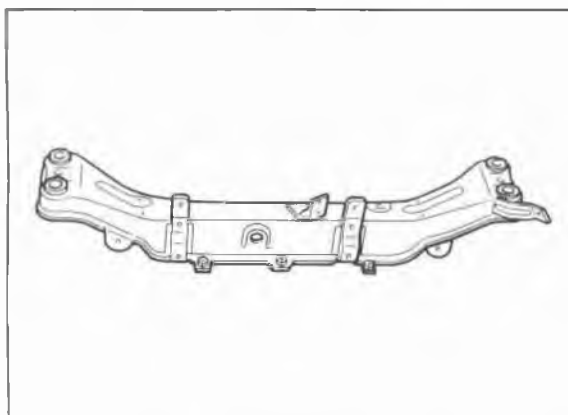
86U13X-095

## Brake lines

1. When disconnecting the flexible hose and brake line, remove the clip after first loosening the flare nut.
2. When connecting the flexible hose, do not tighten too tight or twist.
3. Air bleed the brake system. (Refer to Section 11)

## Caution

**Do not allow brake fluid to get on painted surfaces. If it does, wipe it off immediately.**

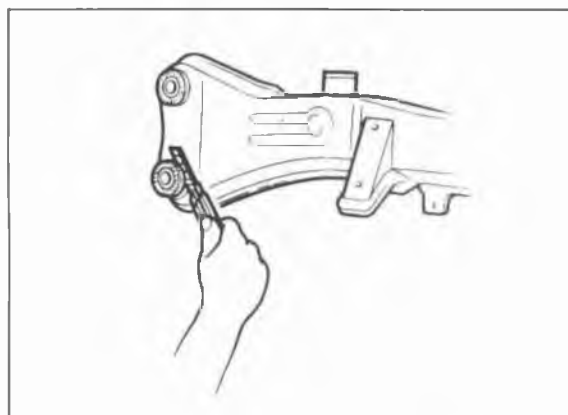


86U13X-096

## Inspection Note

Check the following and repair or replace any faulty parts.

1. Crossmember for bending or damage
2. Crossmember mounts for deterioration or wear

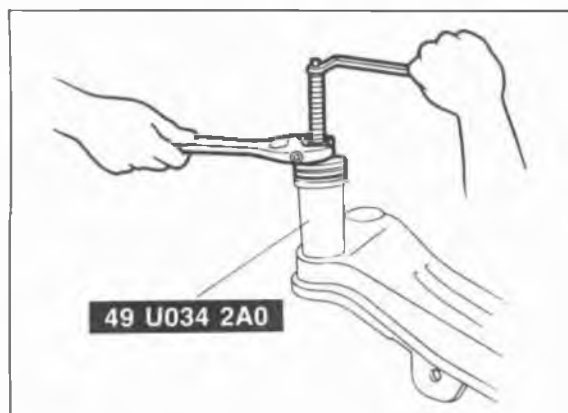


86U13X-097

## Crossmember bushing

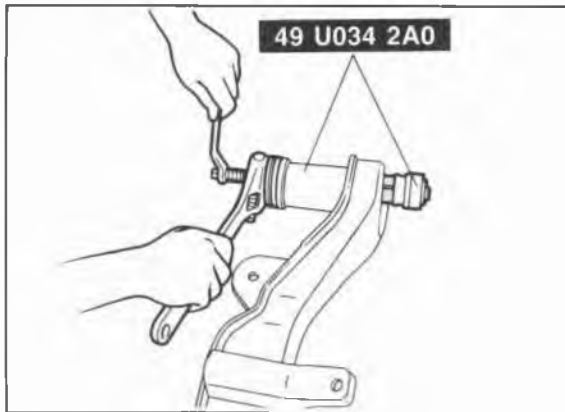
### Removal

1. Cut away the projecting rubber of the crossmember bushing.



86U13X-098

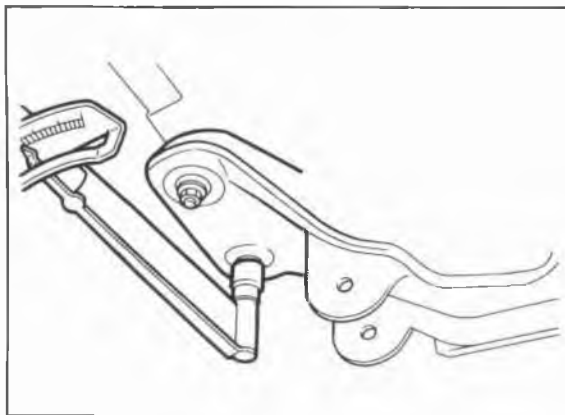
2. Remove the bushing from the crossmember with the **SST**.



86U13X-099

### Installation

Apply soapy water to the bushing, then press it into the crossmember with the **SST**.



86U13X-100

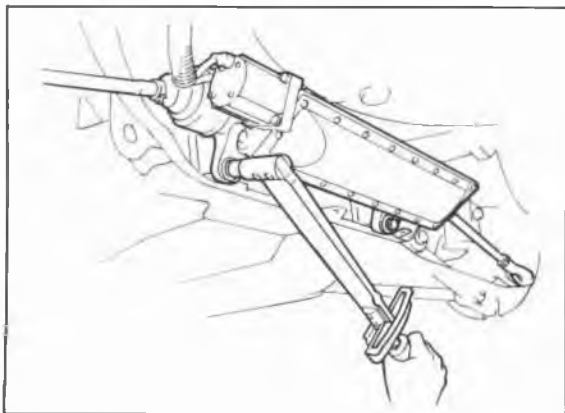
### Installation Note

1. Mount the crossmember to the body, and loosely tighten the nuts.

### Caution

**Lower the vehicle then tighten the nuts to the specified torque with the vehicle unloaded.**

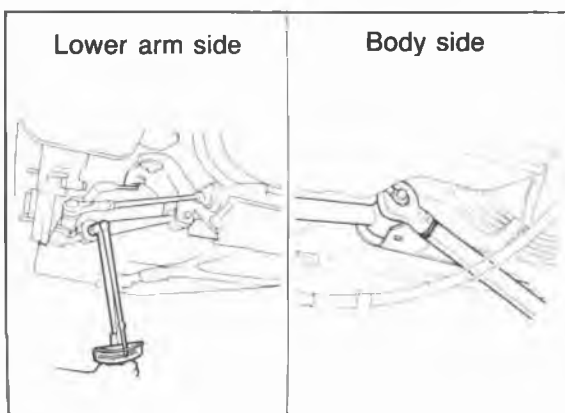
**Tightening torque: 93—117 N·m  
(9.5—11.9 m·kg, 69—86 ft·lb)**



86U13X-101

2. Mount the rear steering to the crossmember, and tighten the bolts. (Refer to Section 10)

**Tightening torque: 31—46 N·m  
(3.2—4.7 m·kg, 24—34 ft·lb)**



86U13X-102

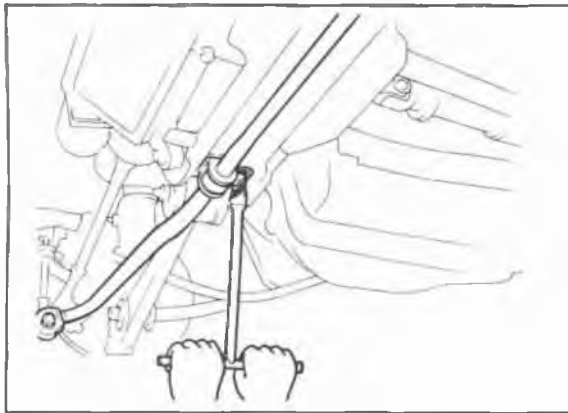
3. Install the lower arm to the crossmember.
4. Install the trailing link to the lower arm and body.

### Caution

**Lower the vehicle then tighten the bolts to the specified torque with the vehicle unloaded.**

**Tightening torque:**  
**Lower arm side 89—103 N·m  
(9.1—10.5 m·kg, 66—76 ft·lb)**  
**Body side 63—93 N·m  
(6.4—9.5 m·kg, 46—69 ft·lb)**

# 13 REAR CROSSMEMBER (4WS)

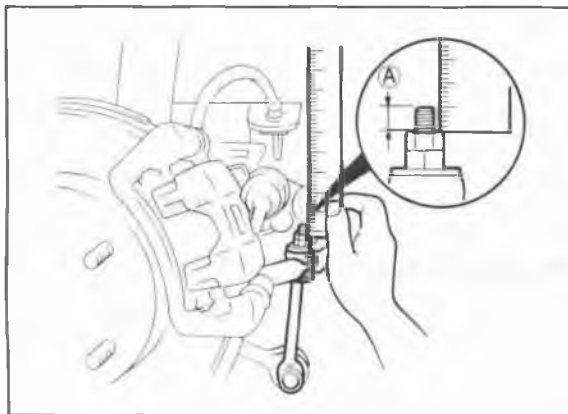


86U13X-103

5. Install the stabilizer bushings and brackets.

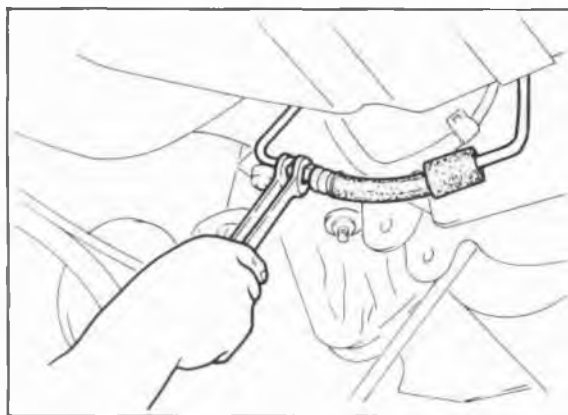
**Tightening torque: 43—54 N·m  
(4.4—5.5 m·kg, 32—40 ft·lb)**

**Caution**  
**Lower the vehicle and check the torque with the vehicle unloaded.**



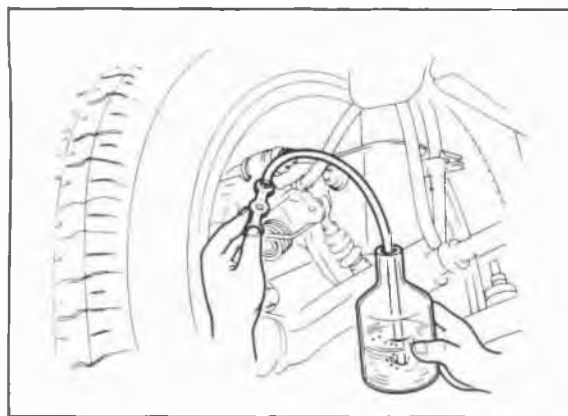
86U13X-104

6. Install the stabilizer control link.  
Tighten the link nuts so that there is **13 mm (0.51 in)** of thread (A) exposed.



86U13X-105

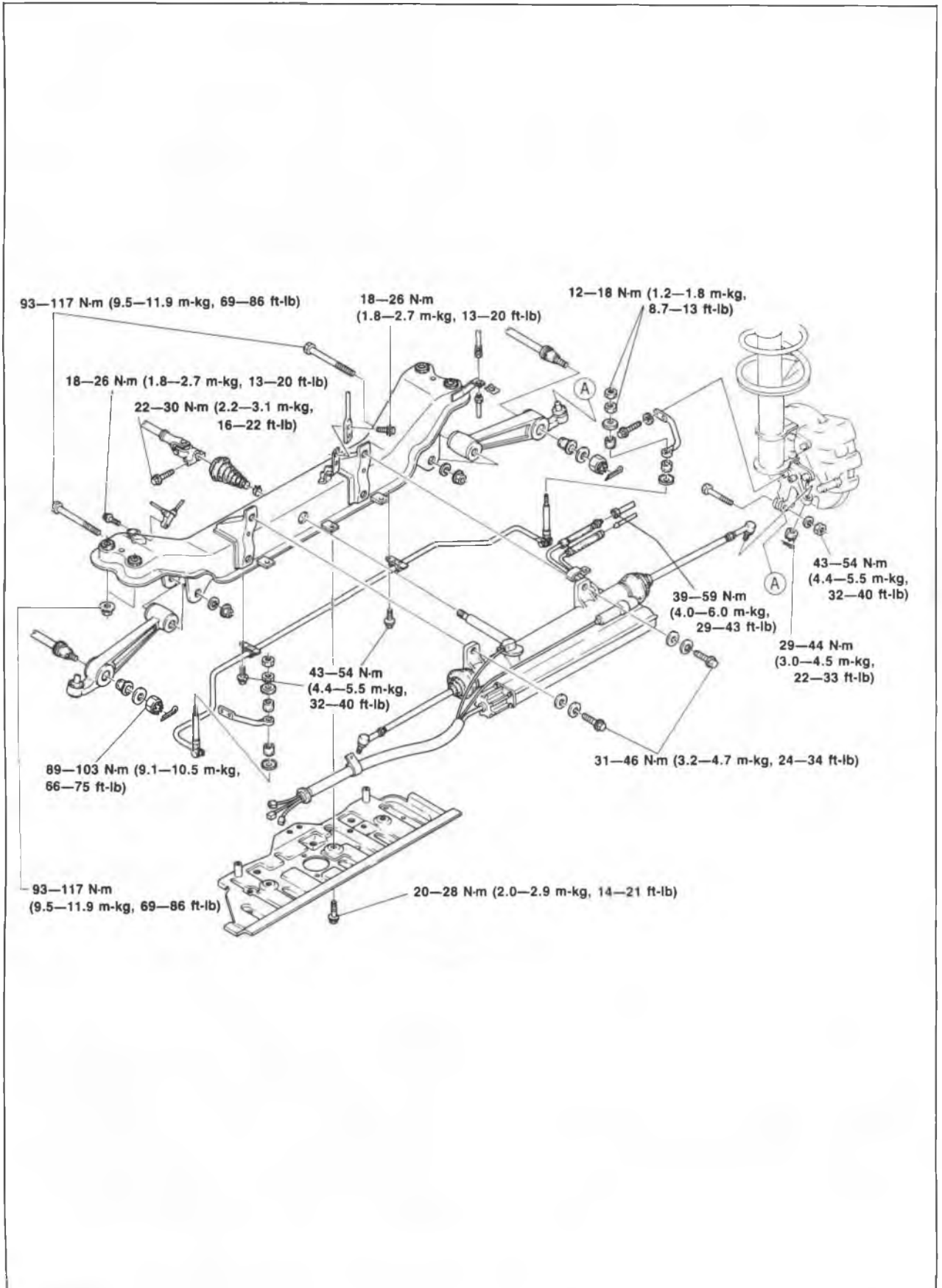
7. Install the rear steering pipe and hose.



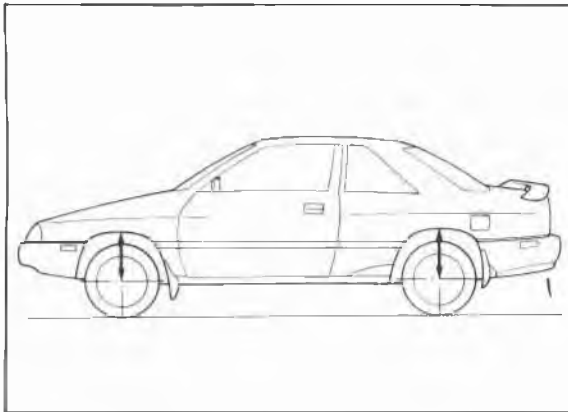
86U13X-106

8. Air bleed the brake system. (Refer to Section 11)

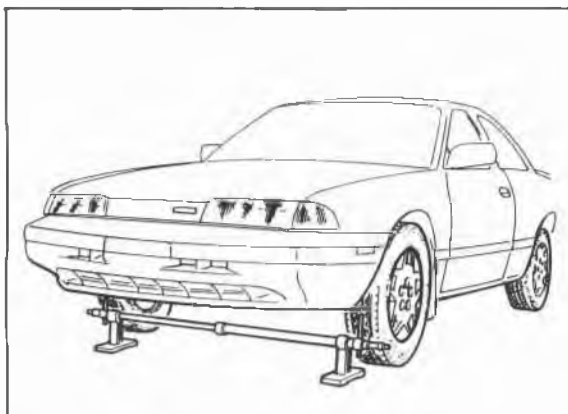
## Tightening torques



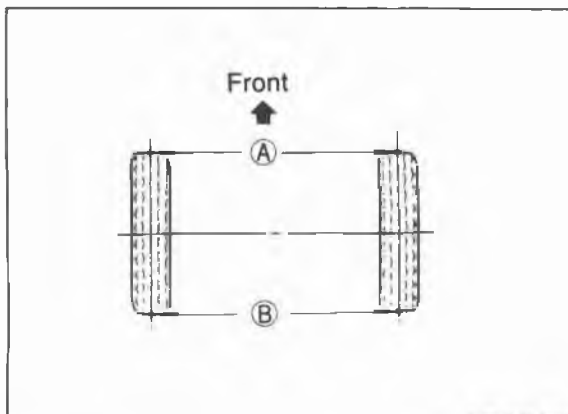
# 13 FRONT WHEEL ALIGNMENT



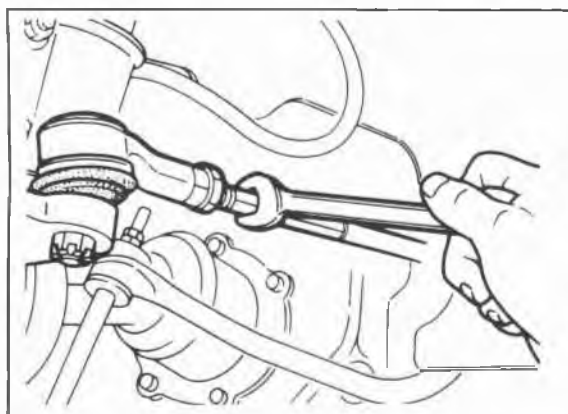
86U13X-108



86U13X-109



69G10X-031



86U13X-110

## FRONT WHEEL ALIGNMENT

### Pre-inspection

1. Check the tire inflation and bring to the recommended pressure.
2. Inspect the front wheel bearing play and correct, if necessary.
3. Inspect the wheel and tire runout.
4. Inspect the ball joints and steering linkage for any excessive looseness.
5. The vehicle must be on level ground and have no luggage or passenger load.
6. The difference in height between the left and right sides from the center of the wheel to the fender brim must be within **10 mm (0.39 in)**.

### Caution

- a) **Front and rear wheel alignment should be checked simultaneously. If adjustment is made to either the front or rear wheels, recheck the alignment, particularly toe-in, on all other wheels.**
- b) **Check and adjust the steering angle transfer shaft after adjusting the front wheel alignment. (Refer to Section 10)**

### TOE-IN

#### Inspection

1. Raise the front of the vehicle until the wheels clear the ground.
2. Turn the wheels by hand, mark a line in the center of each tire tread using a scribing block.
3. Place the front wheels in the straight-ahead position and lower the vehicle.
4. Measure the distance between the lines at the front and rear of the wheels.

**Both measurements must be taken at equal distances from the ground.**

**Toe-in (distance greater at rear than front):  
3 ± 3 mm (0.12 ± 0.12 in)**

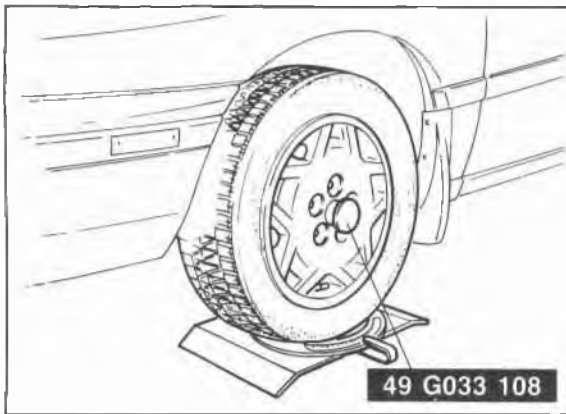
#### Adjustment

To adjust the toe-in, loosen the left and right tie-rod lock nuts, then turn the tie-rods by the same amount.

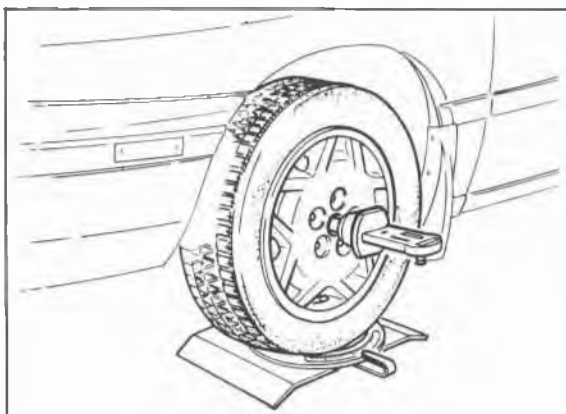
### Caution

- a) **The left and right tie-rods are both right threaded, so, to increase the toe-in, turn the right tie-rod toward the front of the vehicle, and turn the left tie-rod by the same amount toward the rear.**
- b) **One turn of the tie-rod (both sides) changes the toe-in by about 7.2 mm (0.28 in).**
- c) **Tighten the tie-rod locknuts to the specified torque.**

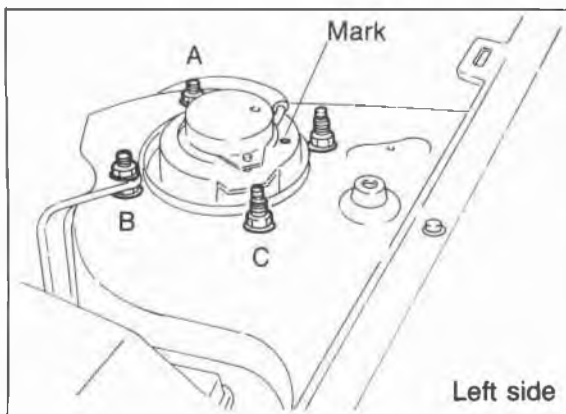
**Tightening torque: 69—98 N·m  
(7—10 m·kg, 51—72 ft·lb)**



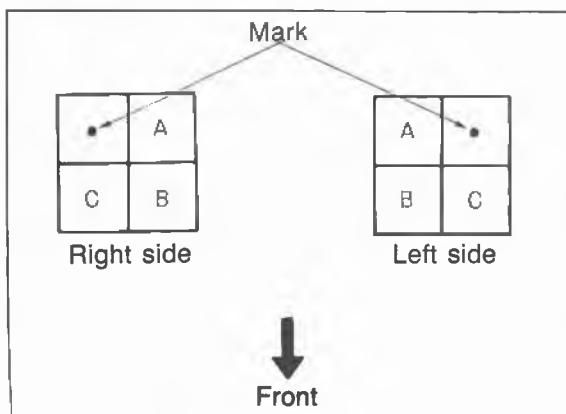
86U13X-111



86U13X-112



86U13X-113



76G13X-032

## CAMBER AND CASTER

### Inspection

The camber and caster is measured by placing the front wheels on a turning-radius gauge in accordance with the manufacturer's instructions.

Proceed in the following order:

1. Jack up the vehicle and remove the wheel caps and nuts. Then attach the **SST** to the wheel hub as shown in the figure.

2. Attach the caster/camber gauge to the adapter and measure the camber and caster.

**Camber angle:  $0^{\circ}17' \pm 45'$**

**Caster angle:  $1^{\circ}13' \pm 45'$**

**Left/right difference:**

**Camber: 30' max.**

**Caster: 40' max.**

### Adjustment

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the mounting block nuts.
3. Push the mounting block downward, and turn it to the desired position.
4. Retighten the nuts to the specified torque.

**Tightening torque: 46—63 N·m**

**(4.7—6.4 m·kg, 34—46 ft·lb)**

Mark	Difference from standard position	
	Camber angle	Caster angle
A	27'	0°
B	27'	+28'
C	0°	+28'

## Steering Angle (turning angle to left and right)

### Inspection

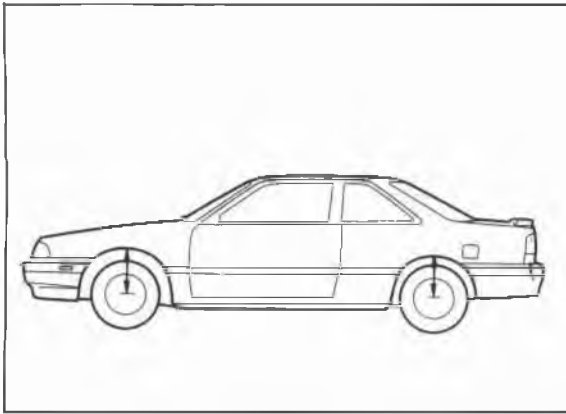
The steering angle is measured by placing the front wheels on a turning-radius gauge.

**Inward  $36^{\circ}00' \pm 2^{\circ}$**

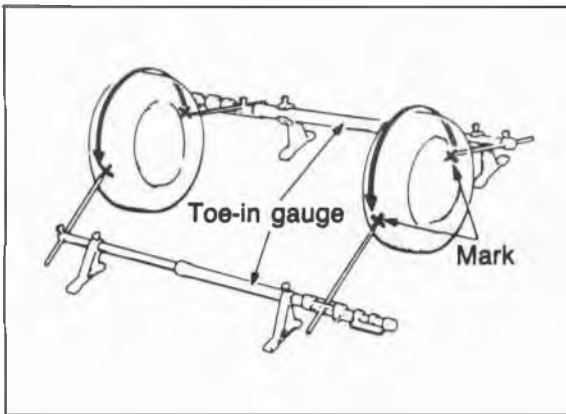
**Outward  $31^{\circ}00' \pm 2^{\circ}$**



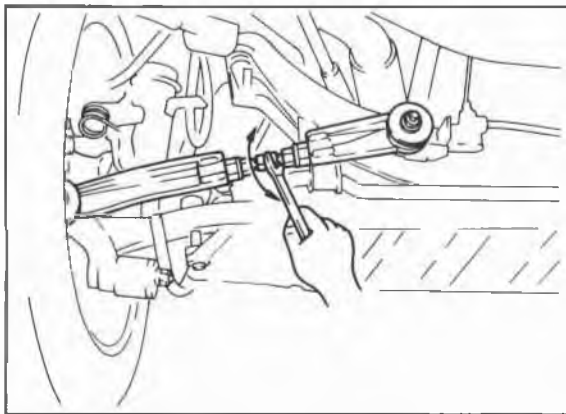
# 13 REAR WHEEL ALIGNMENT



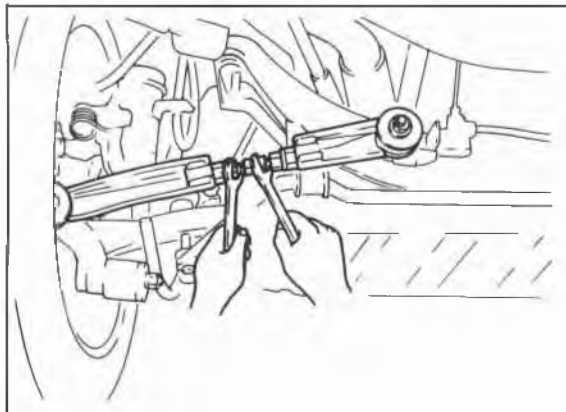
76G13X-033



86U13X-116



86U13X-117



86U13X-118

## REAR WHEEL ALIGNMENT

### PRE-INSPECTION

1. Check the tire inflation and bring to the recommended pressure.
2. Inspect the wheel and tire runout.
3. The vehicle must be on level ground and have no luggage or passenger load.
4. Check that the suspension is correctly adjusted.
5. The difference in height between the left and right sides from the center of the wheel to the fender rim should be within **10 mm (0.39 in)**.

### Caution

**a) Front and rear wheel alignments should be checked simultaneously. If adjustment is made to either the front or rear wheels, recheck the alignment, particularly toe-in, on all other wheels.**

**b) Check and adjust the steering angle transfer shaft after adjusting the rear wheel alignment. (Refer to Section 10.)**

### TOE-IN

#### Inspection

1. Raise the rear of the vehicle until the wheels clear the ground.
2. Turn the wheels by hand, mark a line in the center of each tire tread using a scribing block.
3. Lower the vehicle.
4. Measure the distance between the marked lines at the front and rear of the wheels.

#### Toe-in

**0 ± 3 mm (0 ± 0.12 in) 2WS**

**3 ± 3 mm (0.12 ± 0.12 in) 4WS**

#### Adjustment (2WS)

1. Loosen the adjusting rod lock nuts, then adjust the toe-in.
2. To increase the toe-in, turn the adjusting rods as follows:  
Right rod — Turn counterclockwise  
Left rod — Turn clockwise  
To decrease the toe-in, turn the adjusting rods as follows:  
Right rod — Turn clockwise  
Left rod — Turn counterclockwise

### Caution

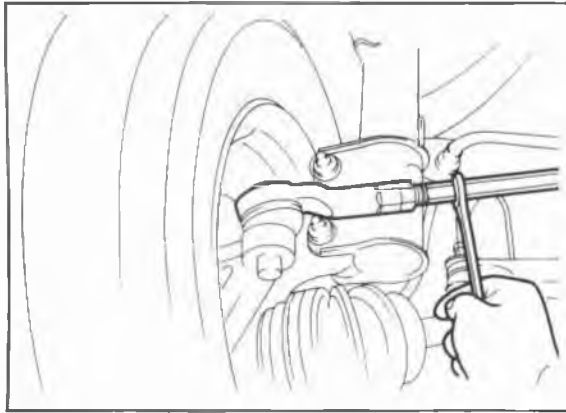
**a) Both the left and right rods must be adjusted by the same amount.**

**b) One turn of the adjusting rod (both sides) changes the toe-in by about 11.6 mm (0.46 in).**

3. Tighten the adjusting rod lock nuts to the specified torque.

#### Tightening torque:

**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**



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### Adjustment (4WS)

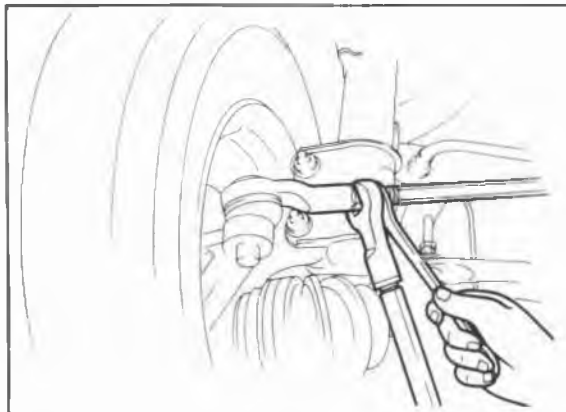
To adjust the toe-in, loosen the left and right tie-rod locknuts, and turn the tie-rods by the same amount.

#### Caution

- a) The left and right tie-rods are both right threaded, so, to increase the toe-in, turn the right tie-rod toward the front of the vehicle, and turn the left tie-rod by the same amount toward the rear.
- b) One turn of the tie-rod (both sides) changes the toe-in by about 7.8 mm (0.31 in).
- c) Adjust the toe-in after adjusting the steering angle.

Tighten the tie-rod locknuts to the specified torque.

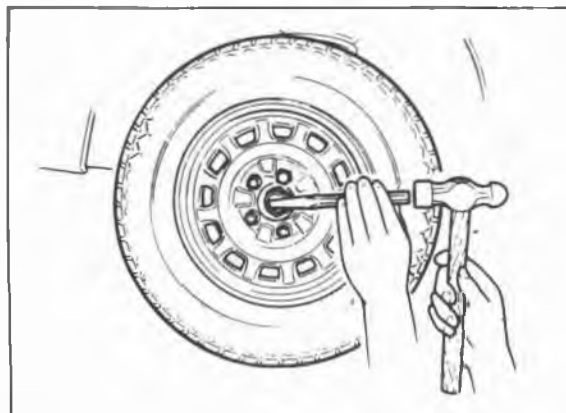
**Tightening torque: 69—98 N·m  
(7—10 m·kg, 51—72 ft·lb)**



86U13X-120

### CAMBER Preparation

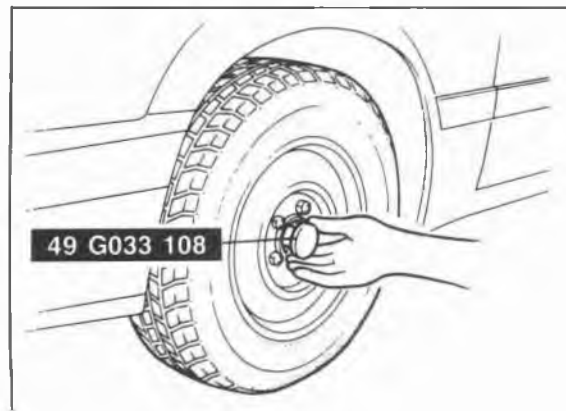
1. Remove the center caps from the wheels.
2. Uncrimp the locknut and remove it.



86U13X-121

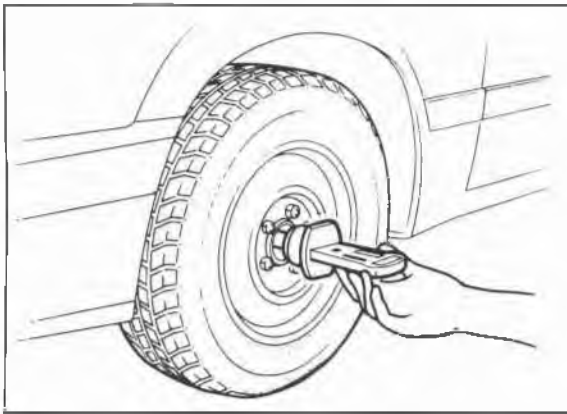
### Inspection

1. Install the **SST** to the driveshaft.



86U13X-122

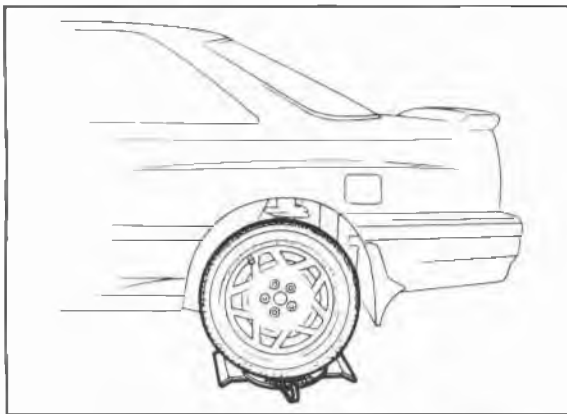
# 13 REAR WHEEL ALIGNMENT



86U13X-123

2. Measure the camber angle with the caster/camber gauge.

**Camber:  $-0^{\circ}30' \pm 45'$  (2WS)  
 $0^{\circ}00' \pm 45'$  (4WS)**



86U13X-124

## REAR TURNING ANGLE (4WS)

1. Place the rear wheels on a turning radius gauge.
2. Jack up the front of the vehicle.
3. Start the engine and let it idle.

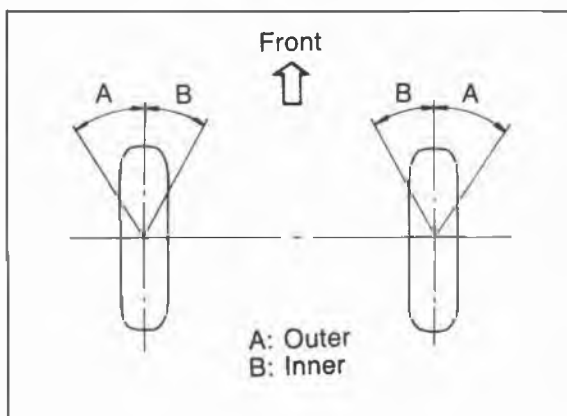
### Caution

**If the engine is stopped while the steering wheel is left turned to one side or the other, the rear wheels will return to the straight-ahead direction, and, when the engine is later started once again, the direction of the rear wheels will change. Be sure, therefore, to check to be sure that the wheels are not touching, or close to, anyone's hands or feet, or any other object, when the engine is stopped or started.**

4. Turn the steering wheel fully left and right, and measure the rear turning angle.

**Rear turning angle Inner  $5^{\circ}00' \pm 45'$   
Outer  $5^{\circ}00' \pm 45'$**

5. If not within specification, adjust the rear turning angle. (Refer to Section 10)



86U13X-125

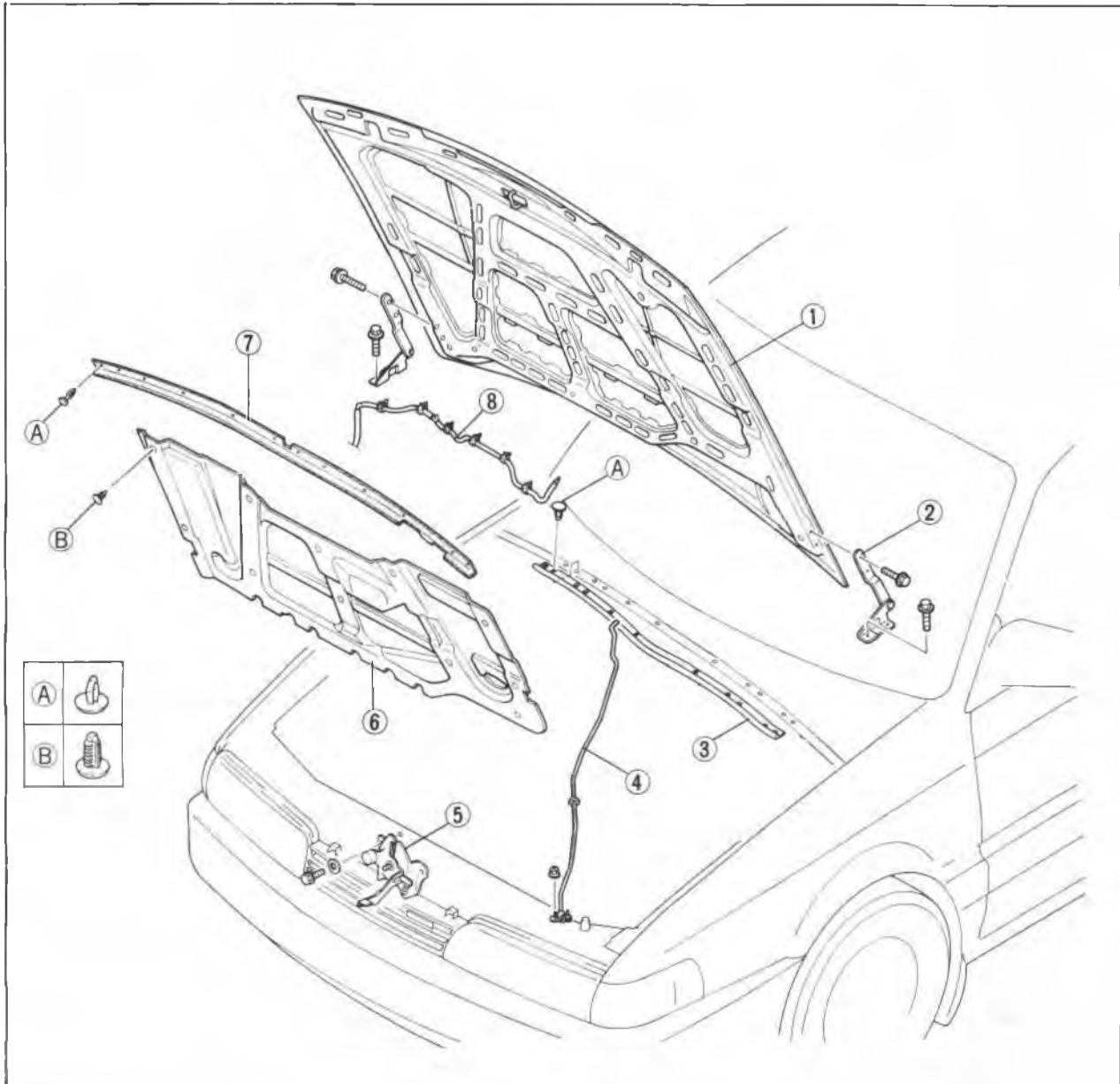
# BODY

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# 14 BONNET

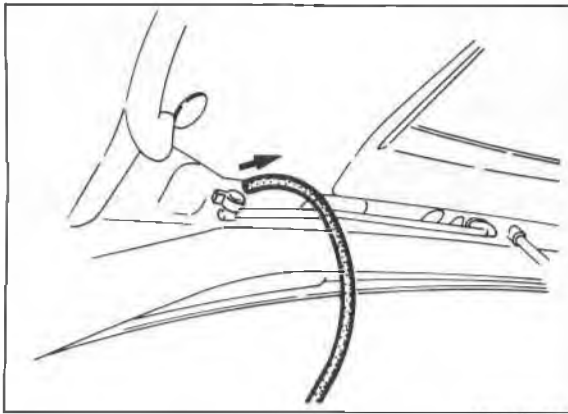
## BONNET

### STRUCTURAL VIEW



76G14X-602

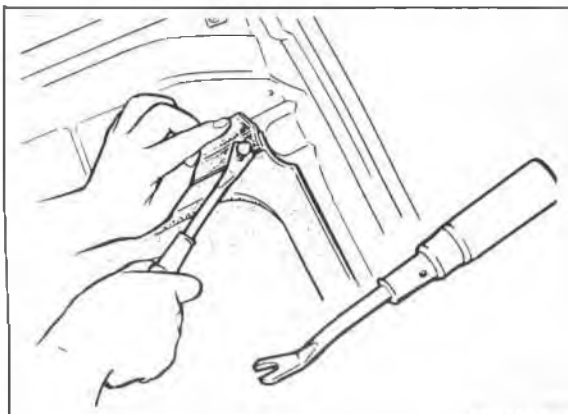
- |                     |                     |                           |
|---------------------|---------------------|---------------------------|
| 1. Bonnet           | 4. Bonnet stay      | 7. Front seal rubber      |
| 2. Hinge            | 5. Bonnet lock      | 8. Windshield washer hose |
| 3. Cowl seal rubber | 6. Bonnet insulator |                           |



86U14X-003

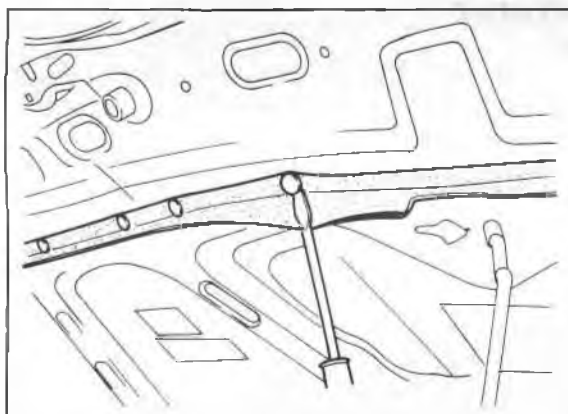
## REMOVAL

1. Disconnect the windshield washer hose at the joint shown in the figure.



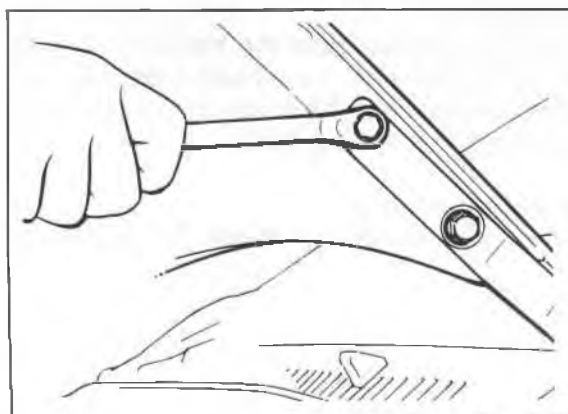
76G14X-603

2. Remove bonnet insulator fasteners, then remove the insulator.



86U14X-005

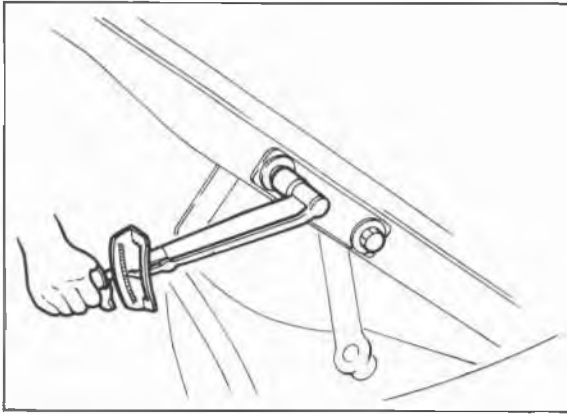
3. Remove the front seal rubber fasteners, then remove the seal rubber.



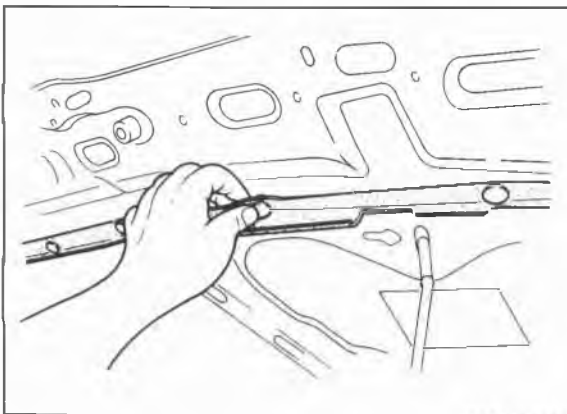
76G14X-604

4. Remove the bonnet hinge installation bolts, then remove the bonnet.

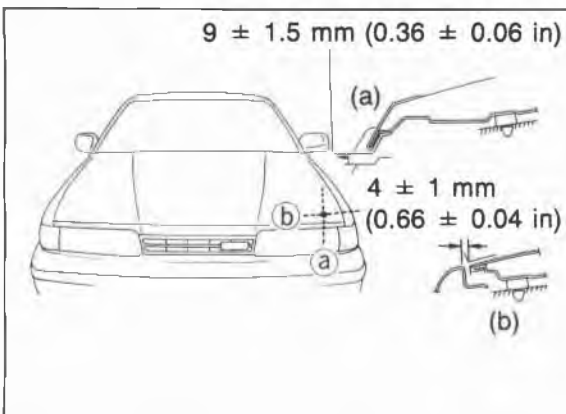
# 14 BONNET



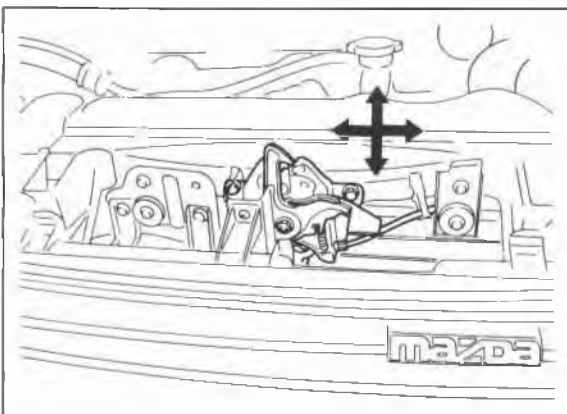
76G14X-605



76G14X-606



76G14X-607



76G14X-608

## INSTALLATION

Install in the reverse order of removal, noting the following:

1. Bonnet hinge installation bolts

### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Push the fasteners into the bonnet.

## ADJUSTMENT

### Bonnet

Adjust the bonnet laterally and vertically by loosening the bonnet to hinge mounting bolts and repositioning the bonnet.

### Bonnet Lock

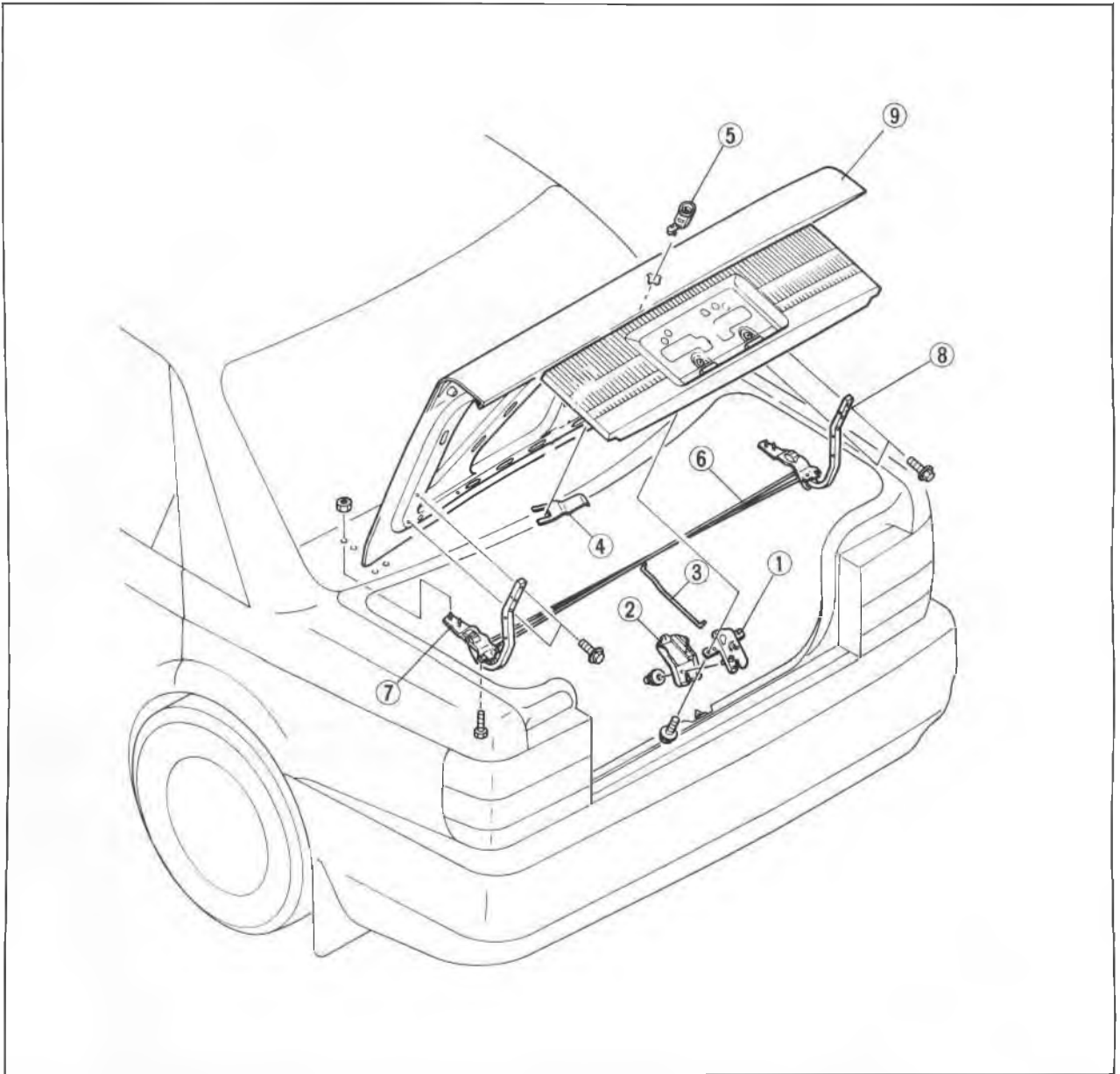
Adjust the bonnet lock after the bonnet has been aligned. The lock can be moved vertically and horizontally. Align it with the striker on the bonnet after loosening the mounting bolts.

### Tightening torque:

**7.8—11 N·m (0.8—1.1 m·kg, 5.8—8.0 ft·lb)**

TRUNK LID

STRUCTURAL VIEW (SEDAN AND COUPE/MX-6)

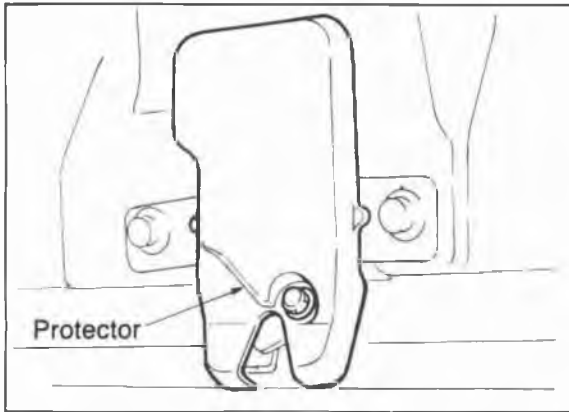


76G14X-040

- |                               |                           |                            |
|-------------------------------|---------------------------|----------------------------|
| 1. Trunk lid lock             | 4. Retainer               | 7. Trunk lid hinge bracket |
| 2. Trunk lid opener protector | 5. Trunk lid key cylinder | 8. Trunk lid hinge         |
| 3. Opening rod                | 6. Balance spring         | 9. Trunk lid               |



# 14 TRUNK LID

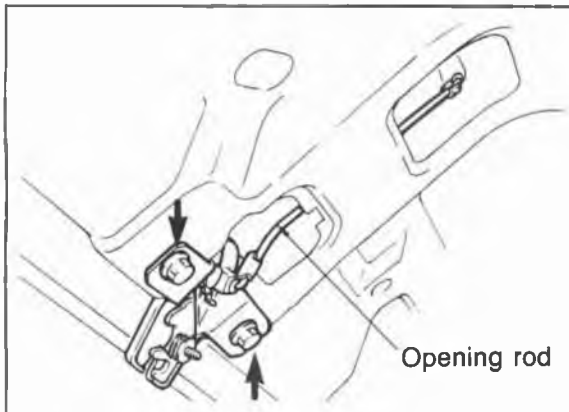


86U14X-012

## REMOVAL

### Trunk Lid Opener

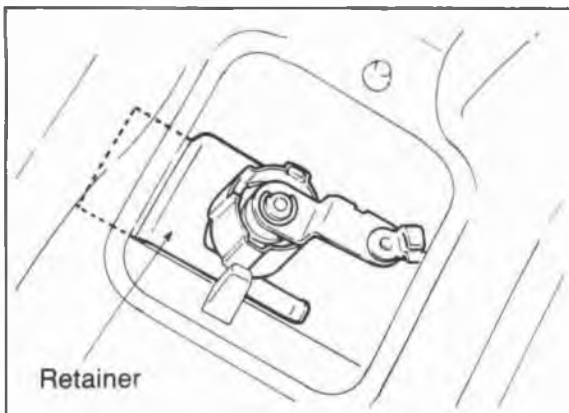
1. Remove the nut and the protector.



86U14X-013

2. Remove the opening rod.

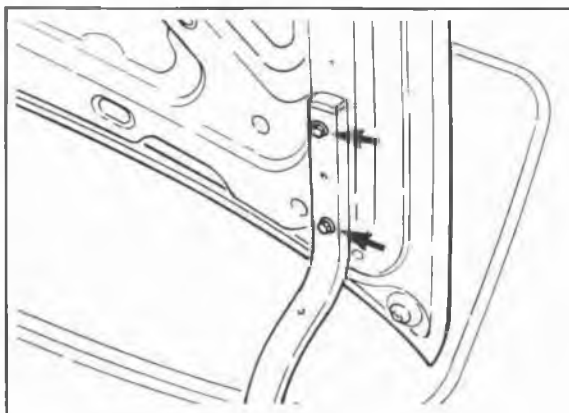
3. Remove the bolts and the trunk lid opener.



86U14X-014

### Trunk Lid Key Cylinder

Remove the retainer and the trunk lid key cylinder.



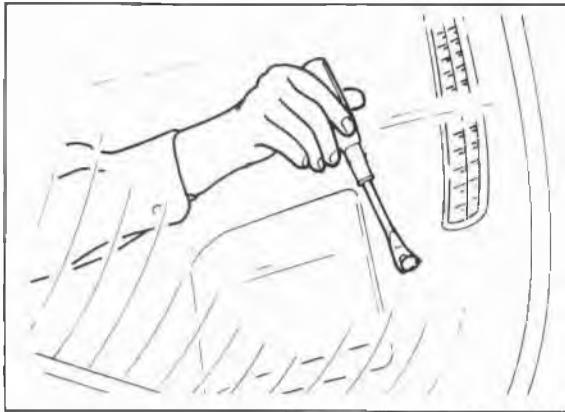
76G14X-041

### Trunk Lid

1. Remove the trunk lid installation bolts, then remove the trunk lid.

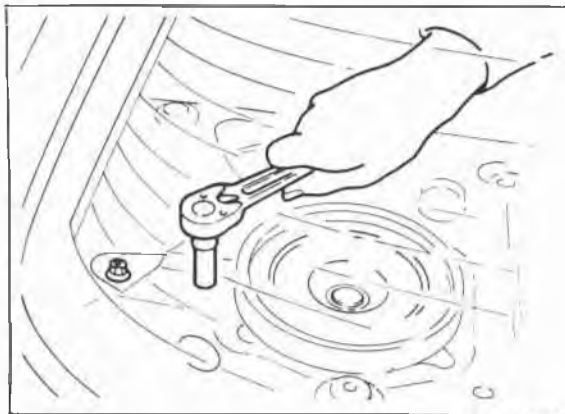
2. Remove the balance spring.

3. Remove the rear seat. (Refer to page 14—100)



86U14X-016

4. Remove the fasteners and remove the rear package tray.



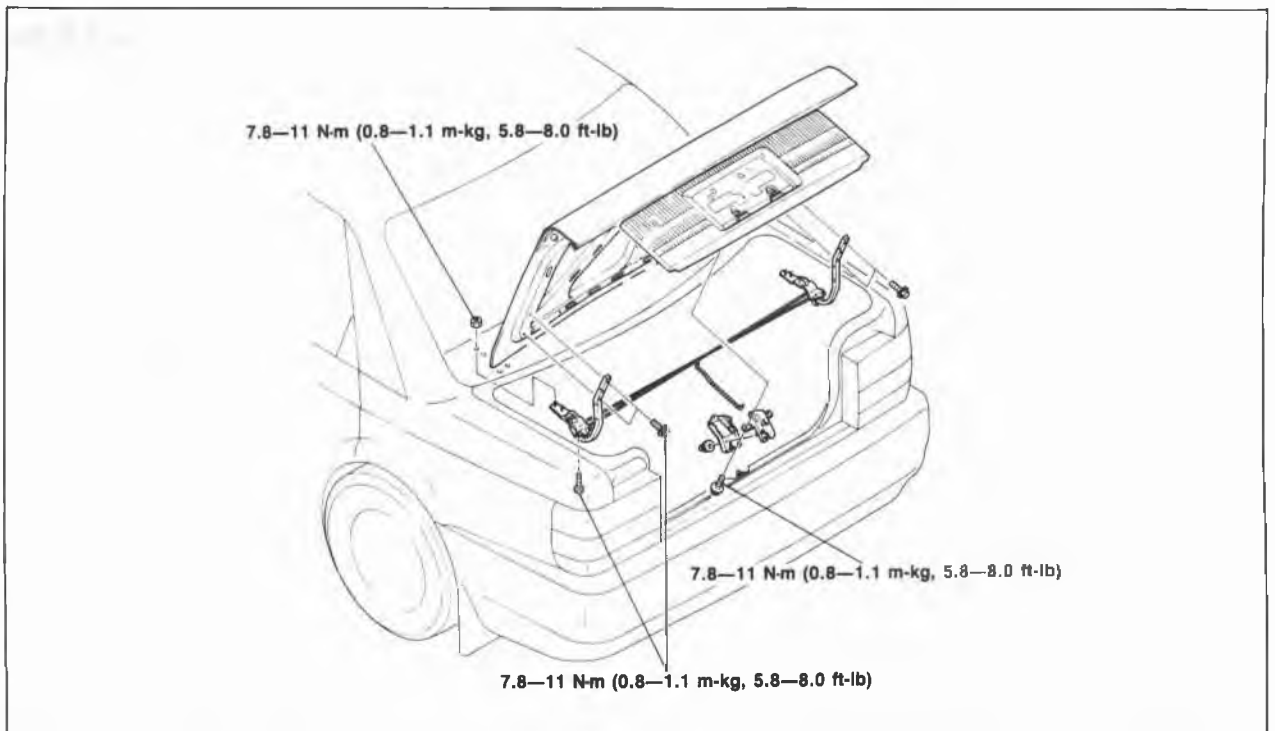
86U14X-017

5. Remove the bolts and remove the trunk lid hinge bracket.

## INSTALLATION

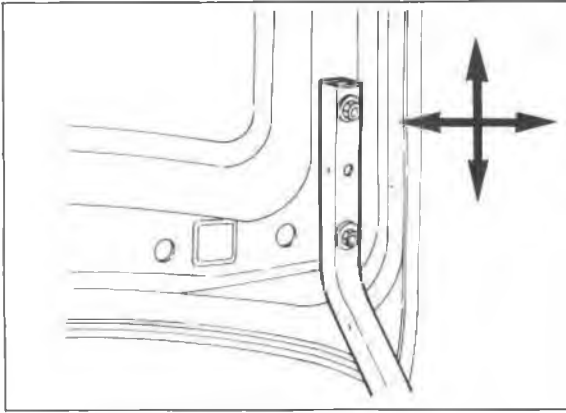
Install in the reverse order of removal.

### Tightening torque:



86U14X-018

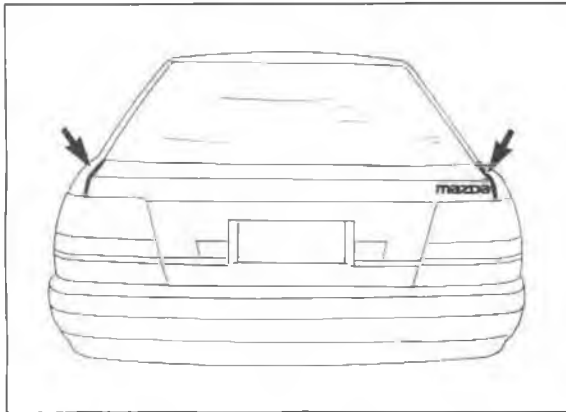
# 14 TRUNK LID



86U14X-019

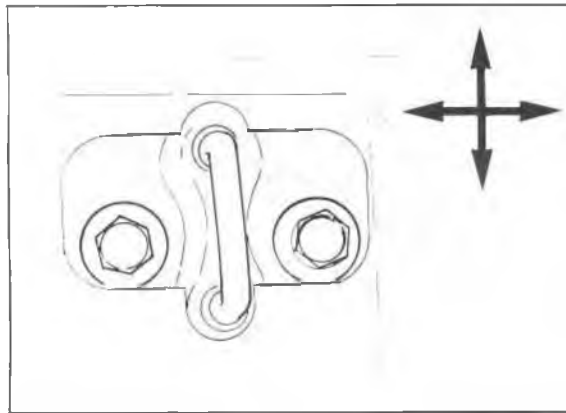
## ADJUSTMENT Trunk Lid

1. Adjust the trunk lid by loosening the lid to hinge mounting bolts and repositioning it.



86U14X-020

2. Align the trunk lid evenly as shown in the figure.



86U14X-021

## Trunk Lid Striker

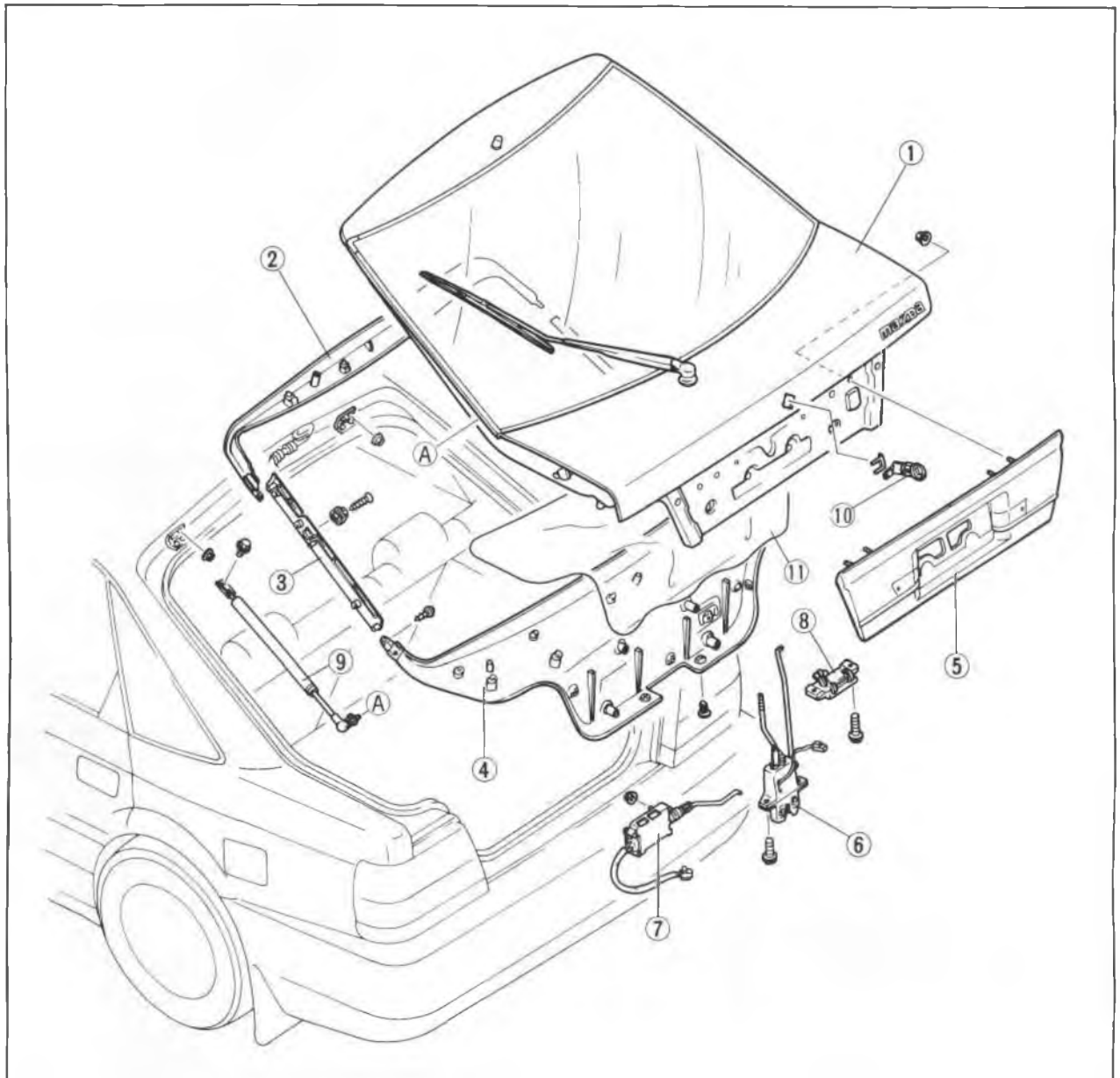
1. Loosen the striker mounting bolts.
2. Tighten the bolts after adjusting.

### Tightening torque:

7.8—11 N·m (0.8—1.1 m·kg, 5.8—8.0 ft·lb)

REAR HATCH

STRUCTURAL VIEW



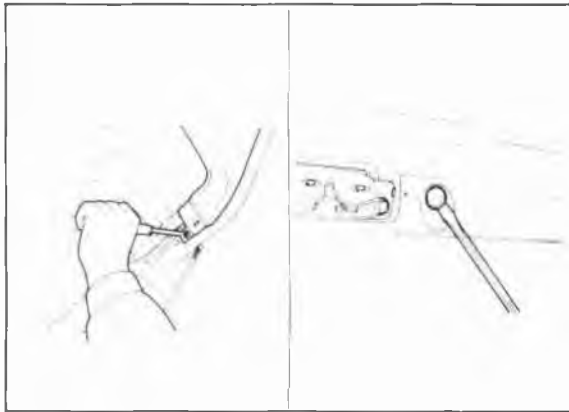
86U14X-022

- 1. Rear hatch
- 2. Upper trim
- 3. Side trim
- 4. Lower trim

- 5. Rear finisher
- 6. Rear hatch lock
- 7. Lock controller
- 8. Rear hatch outer handle

- 9. Stay damper
- 10. Key cylinder
- 11. Rear hatch screen

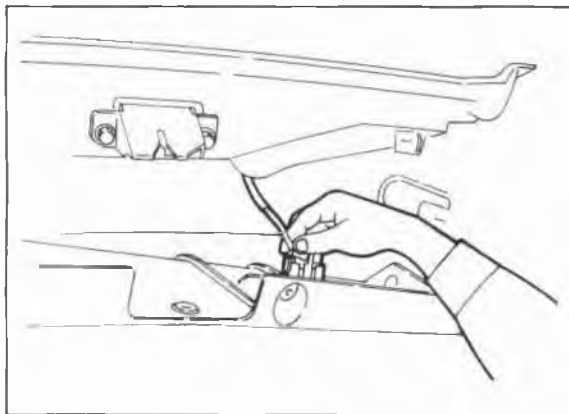
# 14 REAR HATCH



86U14X-023

## REMOVAL

1. Disconnect the negative battery cable.
2. Remove the rear hatch trim.

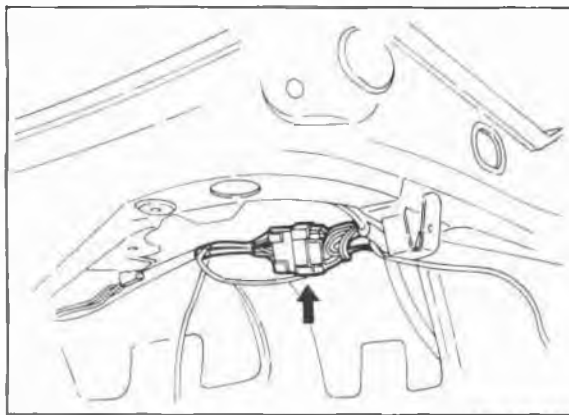


86U14X-024

3. Disconnect the connector, then remove the cargo room light.
4. Remove the rear hatch screen.

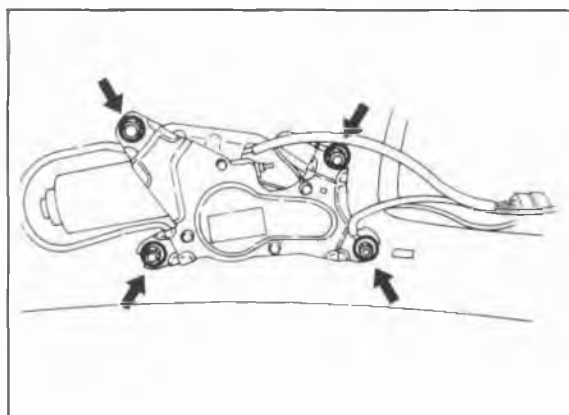
## Caution

**Remove the screen carefully so that it may be reused.**



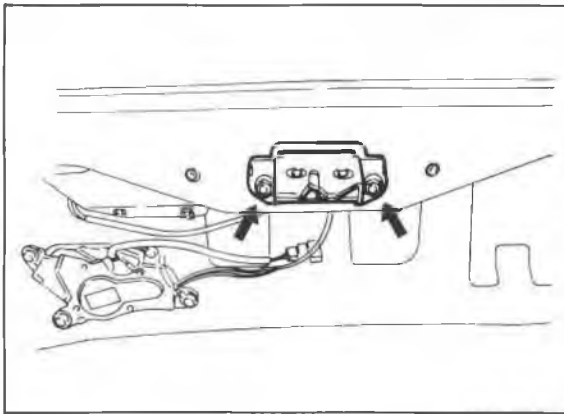
86U14X-025

5. Disconnect the rear defogger and wiper motor connectors, then remove the wire harness through the rear hatch.



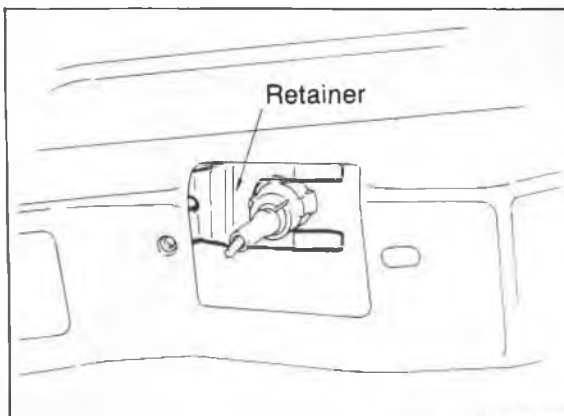
86U14X-026

6. Remove the wiper arm.
7. Remove the wiper motor.



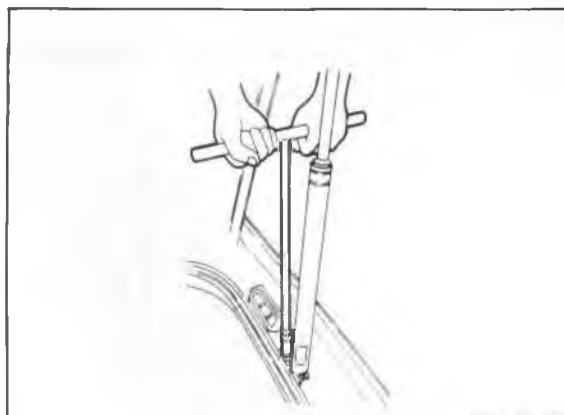
86U14X-027

8. Remove the opening rod.
9. Remove the rear hatch opener.



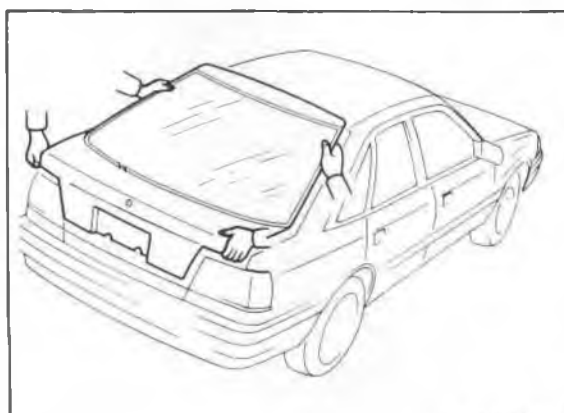
86U14X-028

10. Remove the retainer, and the key cylinder.



86U14X-029

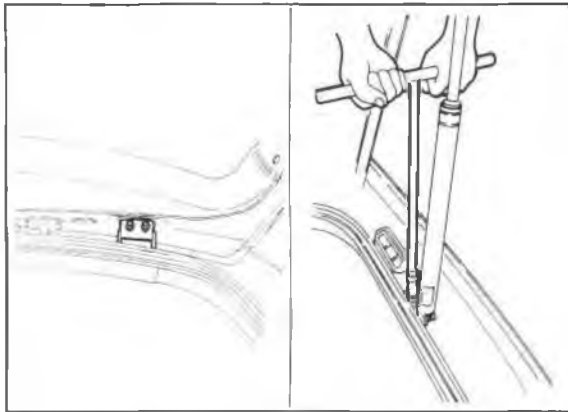
11. Remove the stay damper mounting bolts.
12. Disconnect the rear washer hose.
13. Remove the wiring harness.



86U14X-030

14. Remove the rear hatch hinge to door mounting bolts.
15. Remove the rear hatch.

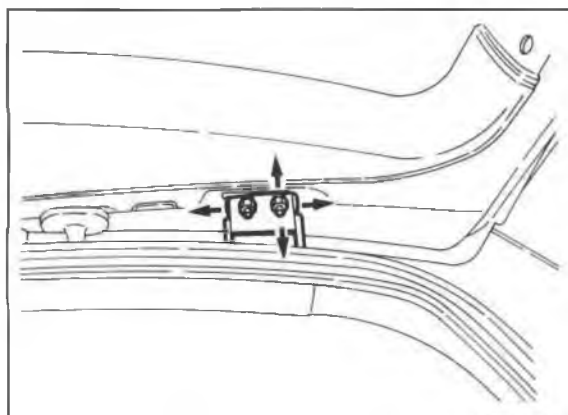
# 14 REAR HATCH



86U14X-031

## INSTALLATION

Install in the reverse order of removal.

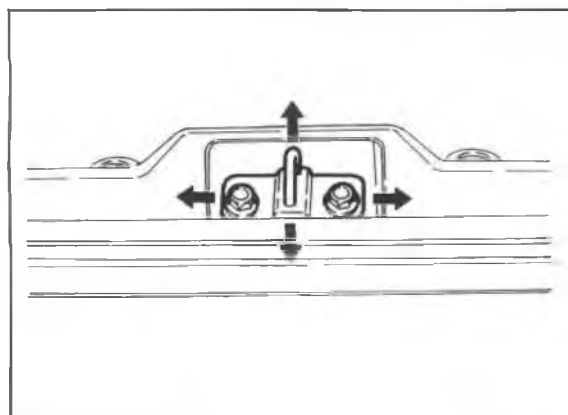


86U14X-032

## ADJUSTMENT

### Rear Hatch Hinge

Loosen the door hinge mounting nuts and make the adjustment.



86U14X-033

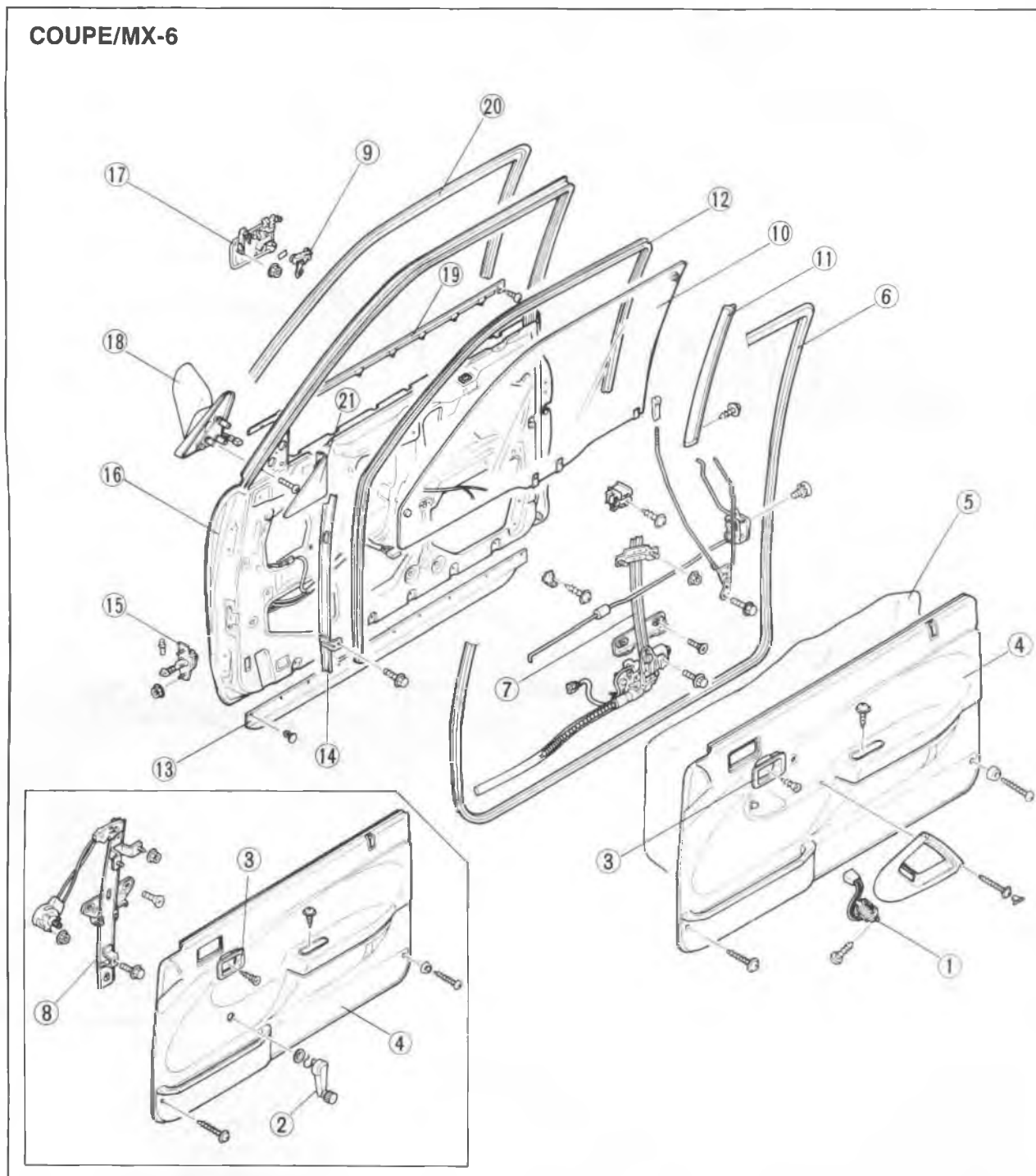
### Striker

Loosen the striker mounting bolts and make the adjustment.

**FRONT DOORS**

**STRUCTURAL VIEW**

**COUPE/MX-6**

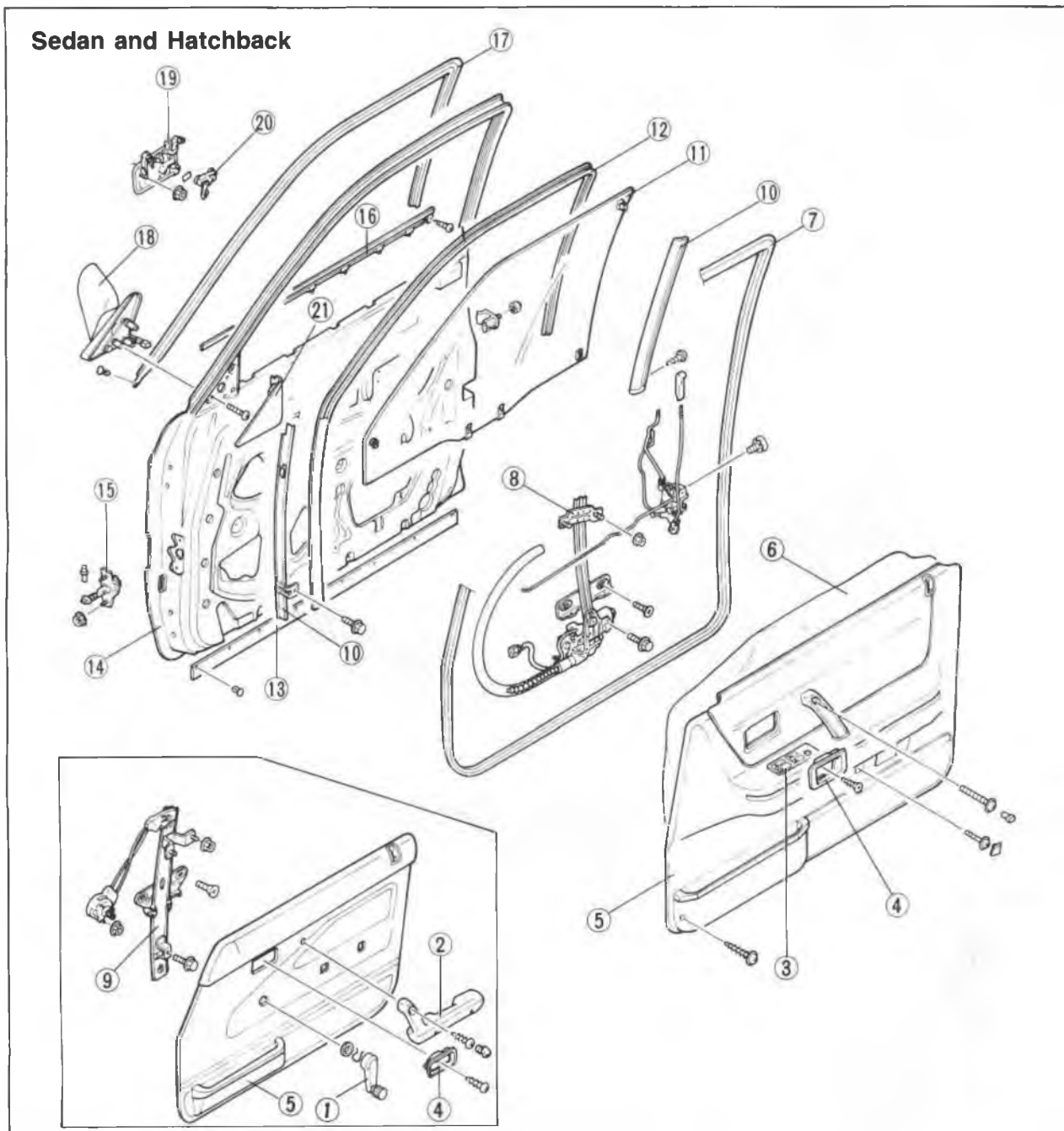


86U14X-034

- |                           |                            |                        |
|---------------------------|----------------------------|------------------------|
| 1. Power window switch    | 8. Regulator (manual type) | 15. Door checker       |
| 2. Regulator handle       | 9. Key cylinder            | 16. Door               |
| 3. Inner handle cover     | 10. Glass                  | 17. Outer handle       |
| 4. Door trim              | 11. Glass guide            | 18. Door mirror        |
| 5. Door screen            | 12. Runchannel             | 19. Beltline molding   |
| 6. Weatherstrip           | 13. Weatherstrip           | 20. Weatherstrip       |
| 7. Regulator (power type) | 14. Glass guide            | 21. Sail inner garnish |

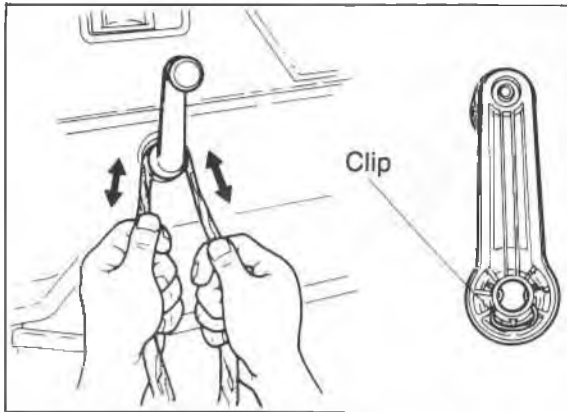


# 14 FRONT DOORS



86U14X-035

- |                        |                            |                        |
|------------------------|----------------------------|------------------------|
| 1. Regulator handle    | 8. Regulator (power type)  | 15. Door checker       |
| 2. Arm rest            | 9. Regulator (manual type) | 16. Beltline molding   |
| 3. Power window switch | 10. Glass guide            | 17. Weatherstrip       |
| 4. Inner handle cover  | 11. Glass                  | 18. Door mirror        |
| 5. Door trim           | 12. Runchannel             | 19. Outer handle       |
| 6. Door screen         | 13. Weatherstrip           | 20. Key cylinder       |
| 7. Weatherstrip        | 14. Door                   | 21. Sail inner garnish |



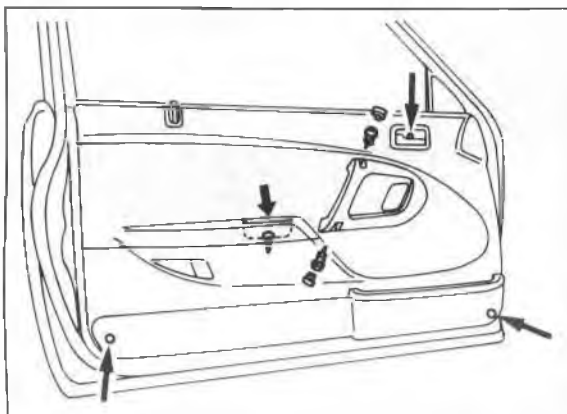
86U14X-036

## REMOVAL Front Door Glass and Regulator

### Note

**Raise the door glass 100 mm (3.94 in) from the fully open position.**

1. Remove the clip and regulator handle.  
(Manual type)

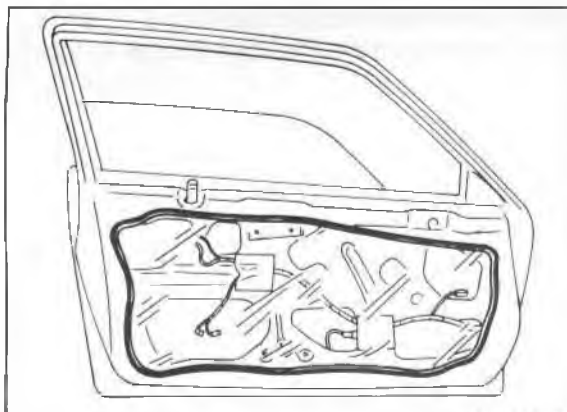


86U14X-037

2. Remove the inner handle cover, the screws (arrows), and the door trim.

### Note

**For vehicles with power windows, disconnect the connectors.**

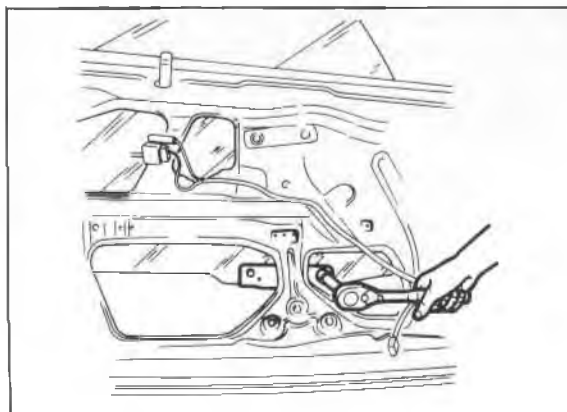


86U14X-038

3. Remove the door screen.

### Caution

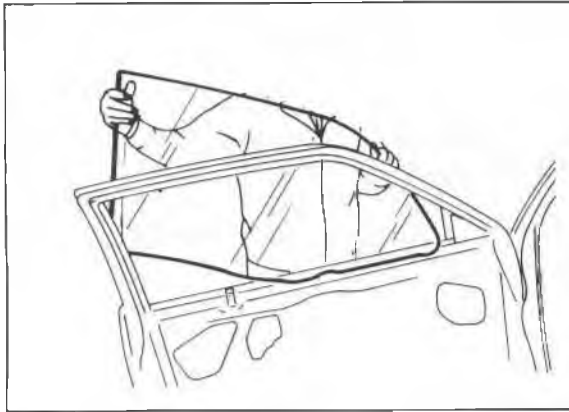
**Remove the screen carefully so that it may be reused.**



86U14X-039

4. Position the door glass so that the mounting bolts can be removed from the service holes.
5. Remove the mounting bolts.

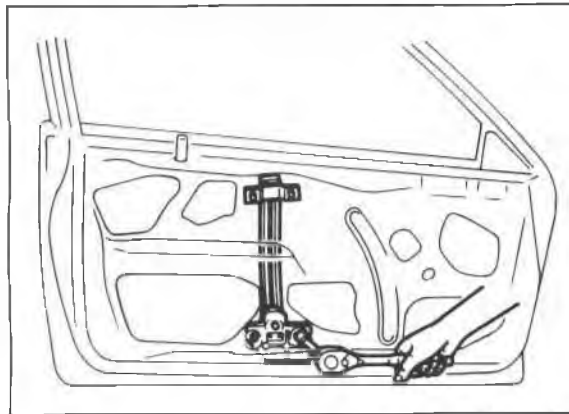
# 14 FRONT DOORS



86U14X-060

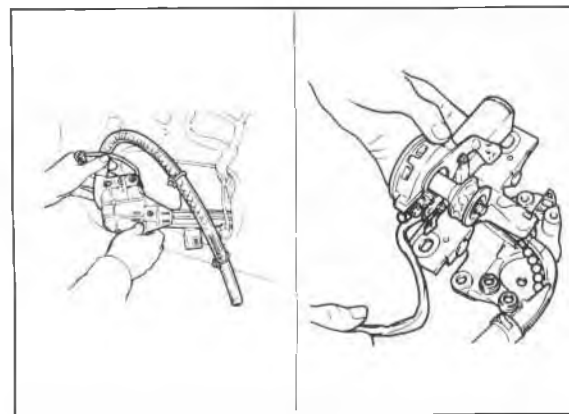
6. Remove the beltline molding. (Refer to page 14—39)

7. Remove the door glass upward.



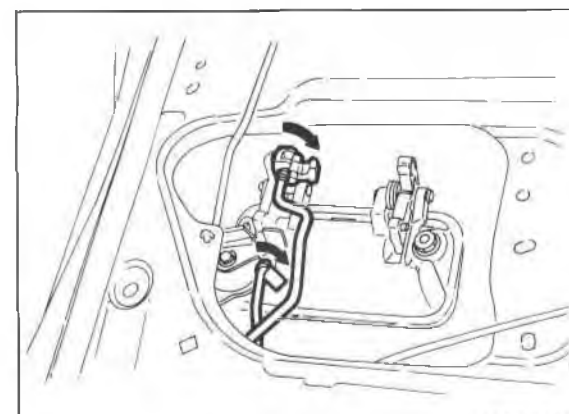
86U14X-040

8. Remove the mounting bolts, and remove the regulator through the service hole.



86U14X-041

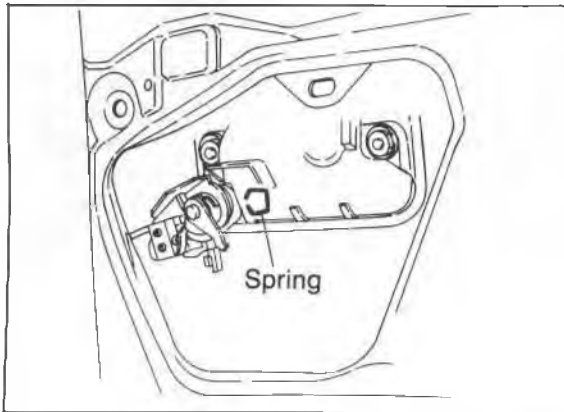
9. Remove the window motor mounting bolt, and remove the motor from the regulator (power window).



69G14X-036

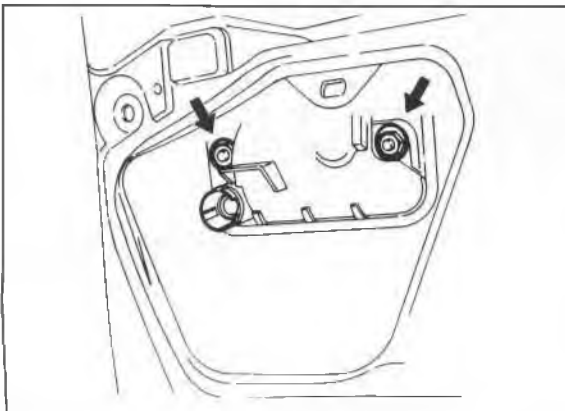
## Removal of Outer Handle and Key Cylinder

1. Disconnect the rod from the outer handle.



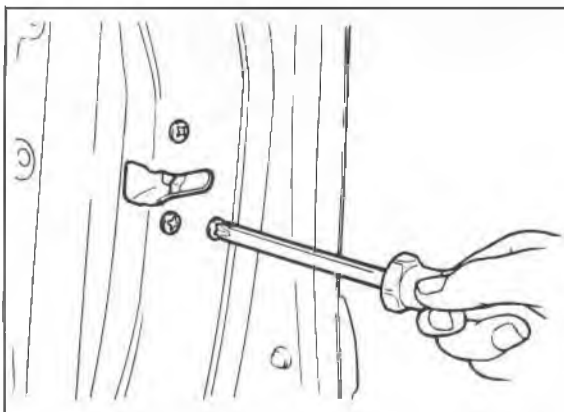
86U14X-042

2. Remove the key cylinder spring.
3. Remove the key cylinder.



86U14X-043

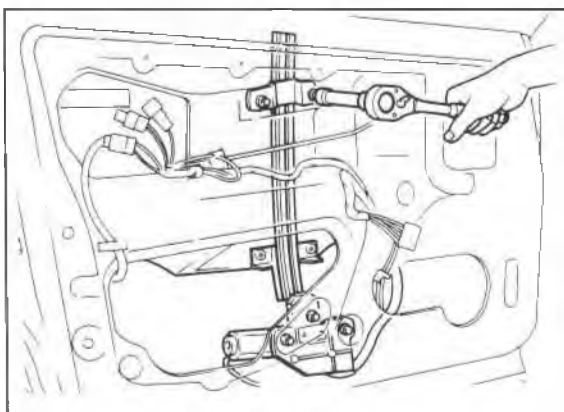
4. Remove the mounting nuts and remove the outer handle.



69G14X-038

### Removal of Door Lock Assembly

1. Remove the mounting screws.
2. Remove the door lock assembly.



63U14X-035

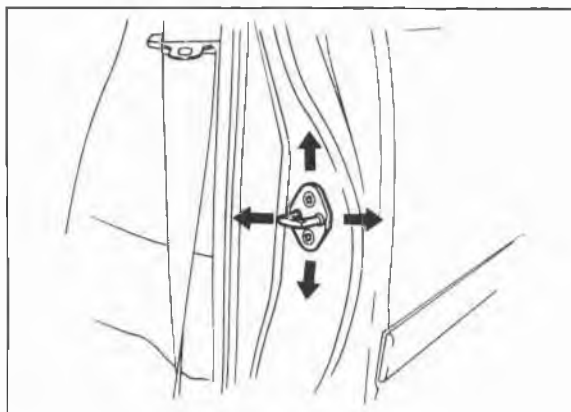
### INSTALLATION

Install in the reverse order of removal, noting the following.

### Power Window

Before installing the motor, connect the leads to a battery and run the regulator down to the position shown.

# 14 FRONT DOORS



86U14X-044

## ADJUSTMENT Door Lock Striker

1. Check that the door can be closed easily and whether there is any looseness. If there is a problem, loosen the striker mounting screws and adjust by moving the striker down, or laterally.
2. Check the rear offset of the door to the body. If there is a problem, adjust by moving the door lock striker laterally.



86U14X-045

## Door Hinge

1. If looseness is found when the door is opened, tighten the door hinge mounting bolts (arrows).
2. Align the door and body by loosening and adjusting the door hinge mounting bolts.

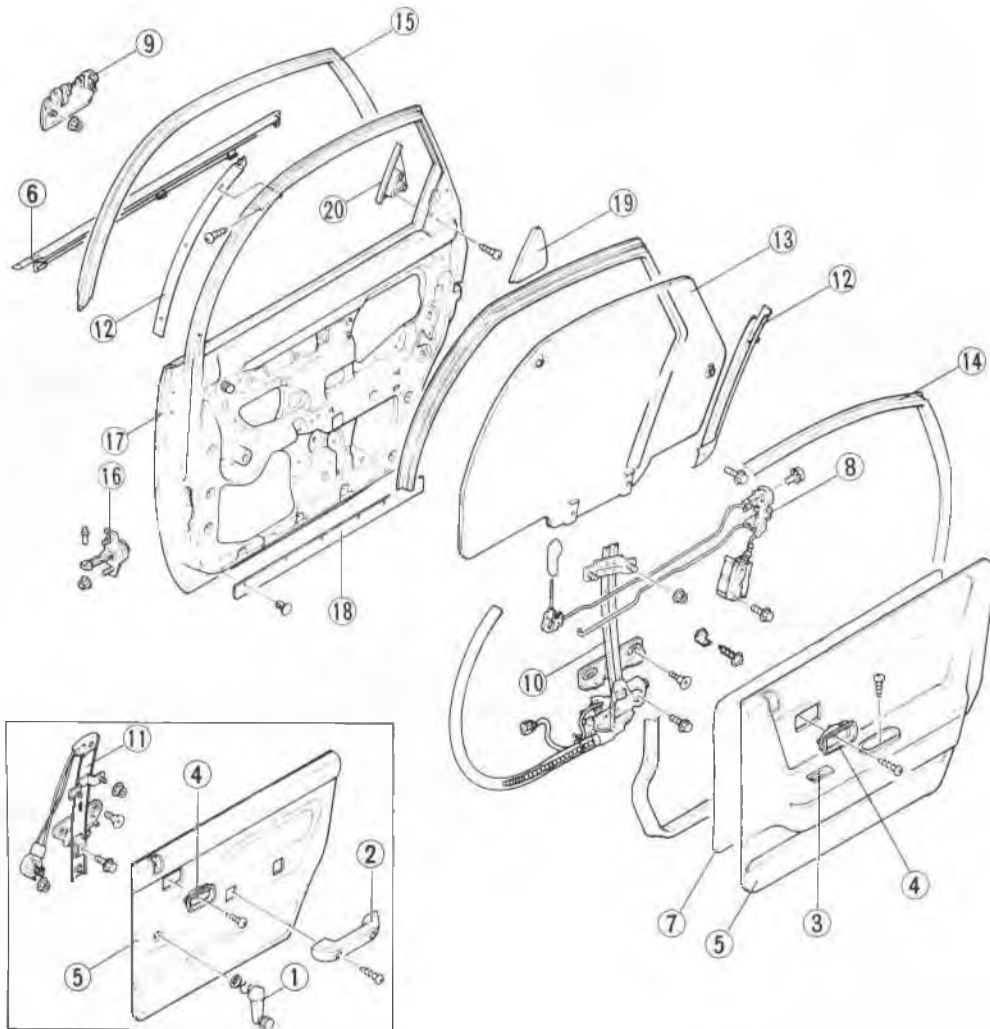
### Note

**If noise is heard from the checker when the door is opened, apply grease to the checker cam.**

## REAR DOORS

### STRUCTURAL VIEW

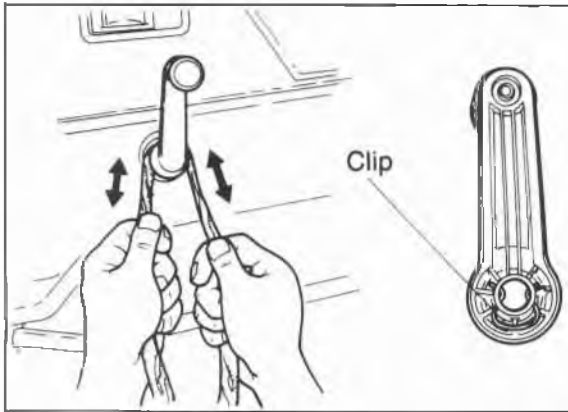
#### Sedan and Hatchback



86U14X-046

- |                                      |                             |                        |
|--------------------------------------|-----------------------------|------------------------|
| 1. Regulator handle<br>(manual type) | 7. Door screen              | 14. Weatherstrip       |
| 2. Arm rest                          | 8. Door lock                | 15. Weatherstrip       |
| 3. Power window switch               | 9. Outer handle             | 16. Door checker       |
| 4. Inner handle cover                | 10. Regulator (power type)  | 17. Door               |
| 5. Door trim                         | 11. Regulator (manual type) | 18. Weatherstrip       |
| 6. Belt line molding                 | 12. Glass guide             | 19. Sail inner garnish |
|                                      | 13. Glass                   | 20. Sail outer garnish |

# 14 REAR DOORS

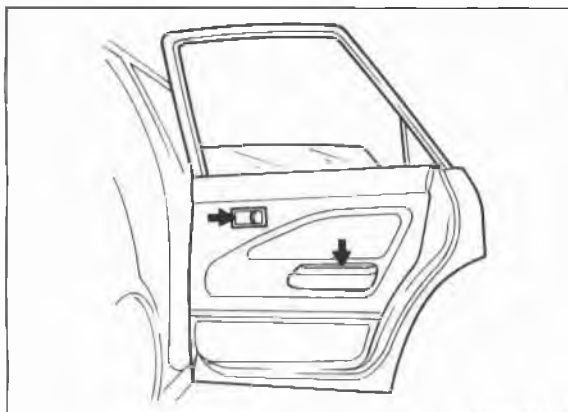


86U14X-047

## REMOVAL

### Rear Door Glass and Regulator

1. Lower the door glass the way.
2. Remove the clip. (Manual type)
3. Remove the regulator handle. (Manual type)

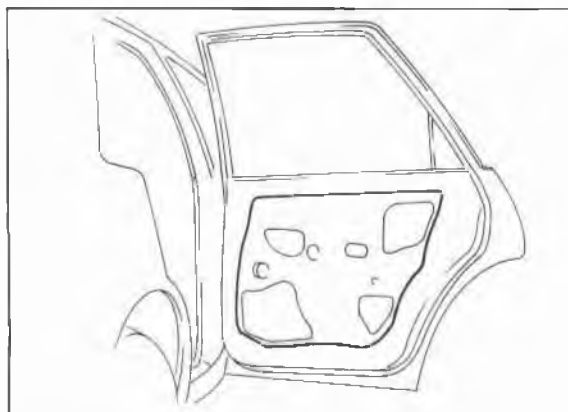


86U14X-048

4. Remove the inner handle cover.
5. Remove the door trim.

### Note

**For vehicles with power windows, disconnect the connectors.**

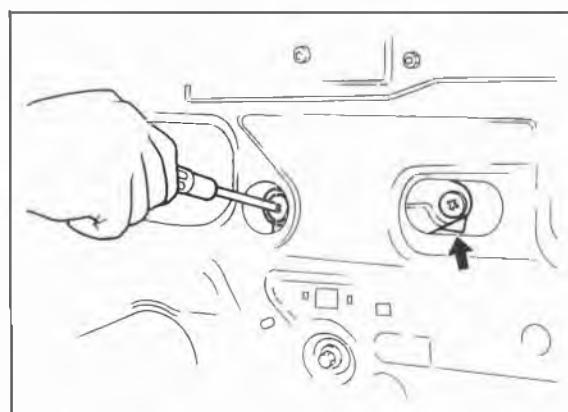


86U14X-049

6. Remove the door screen.

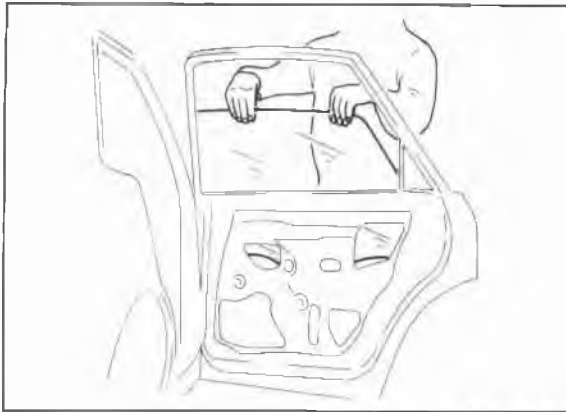
### Caution

**Remove the screen carefully so that it may be reused.**



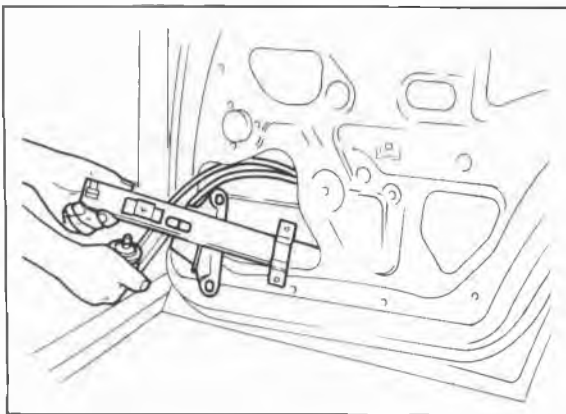
86U14X-050

7. Position the door glass so that the mounting bolts can be removed from the service hole.
8. Remove the mounting bolts.



86U14X-051

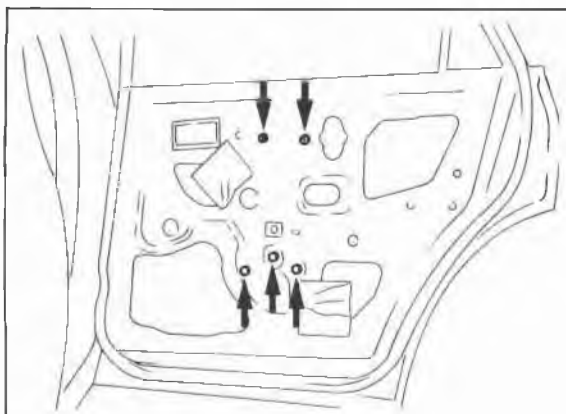
9. Remove the door glass upward.



86U14X-052

10. Remove the mounting bolts, and remove the window regulator through the service hole.

11. Remove the window motor mounting bolts, then remove the motor from the regulator (power window).



86U14X-053

## INSTALLATION

Install in the reverse order of removal, noting the following.

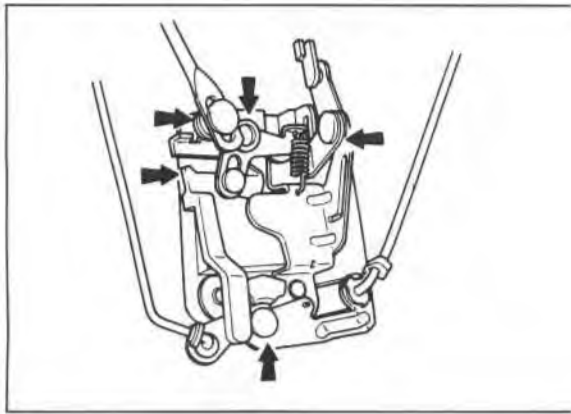
### Tightening torque:

Torque		Nm (m-kg, ft-lb)
Door lock assembly		4.22—6.18 (0.43—0.63, 3.10—4.54)
Outer handle		8.8—13 (0.9—1.3, 6.5—9.4)
Glass guide		7.8—11 (0.8—1.1, 5.8—8.0)
Regulator	Nut	8.8—13 (0.9—1.3, 6.5—9.4)
	Bolt	7.8—11 (0.8—1.1, 5.8—8.0)
Door lock striker		18—26 (1.8—2.7, 13—20)

Before installing the motor, connect the leads to a battery and run regulator down to the position shown.



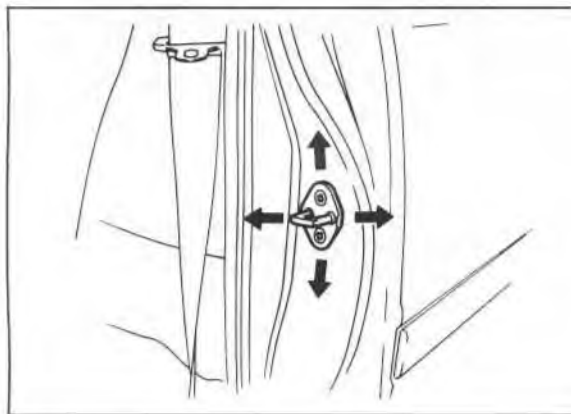
# 14 REAR DOORS



86U14X-054

## Installation of door lock and outer handle

1. Before installing the door lock, apply grease to the places shown in the figure.
2. After installation, check that the door opens smoothly, and that the operation of the lock is correct when using the key and the door lock knob.



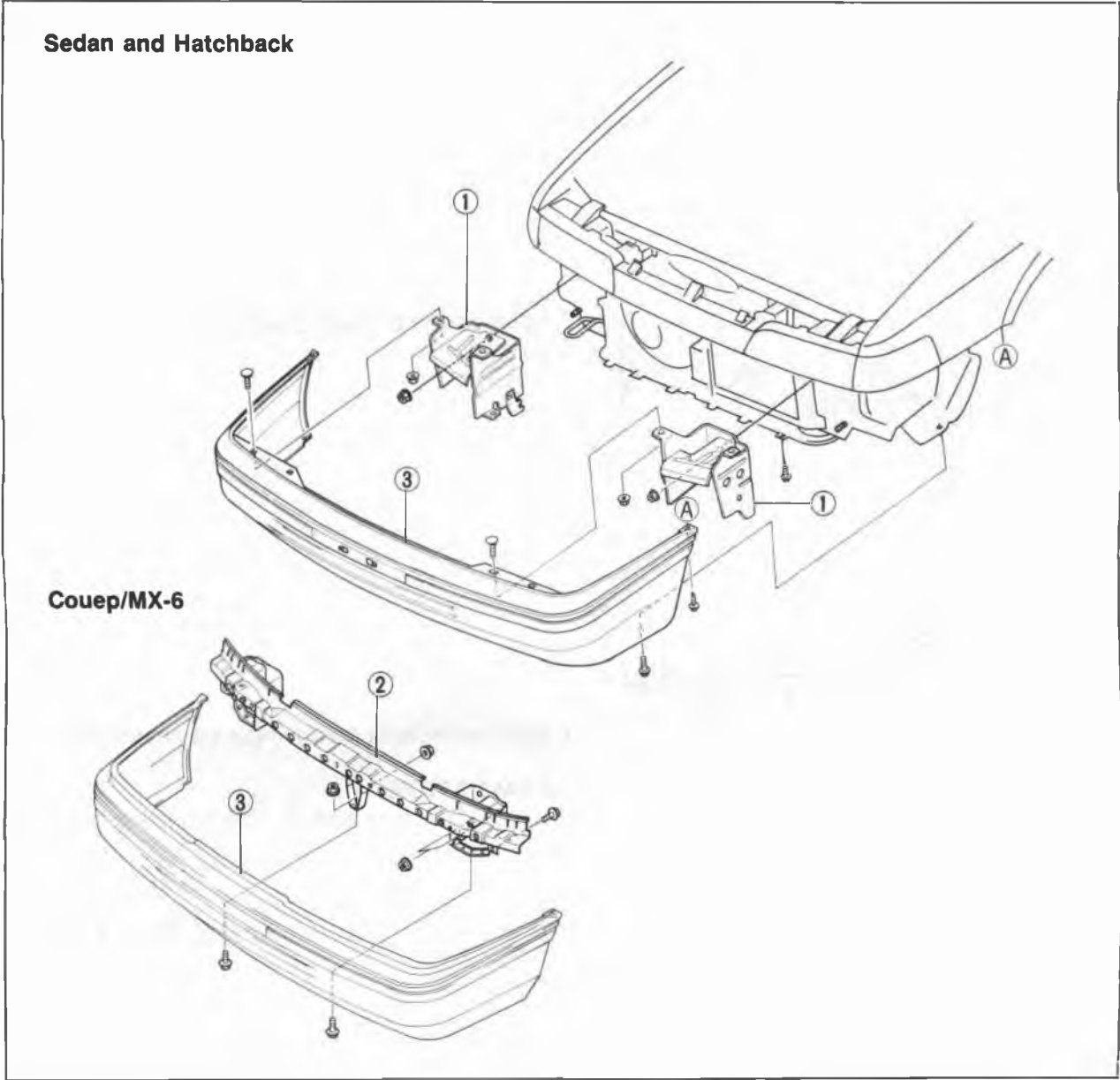
86U14X-055

## ADJUSTMENT

### Door Lock Striker

1. Check that the door can be closed easily and whether there is any looseness. If there is a problem, loosen the striker mounting screws and adjust by moving the striker vertically, or laterally.
2. Check the rear offset of the door to the body. If there is a problem, adjust by moving the door lock striker laterally.

**FRONT BUMPER**  
**STRUCTURAL VIEW**



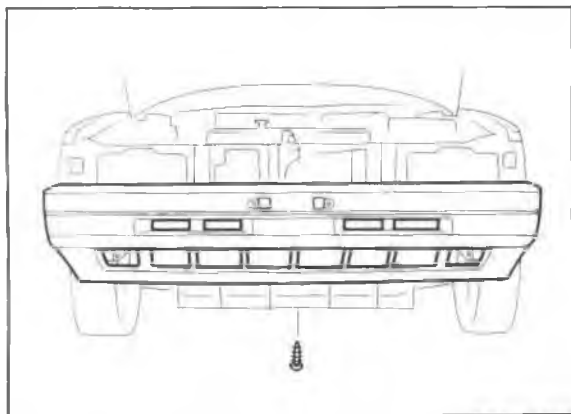
1. Bumper stay

2. Reinforcement

3. Bumper

76G14X-002

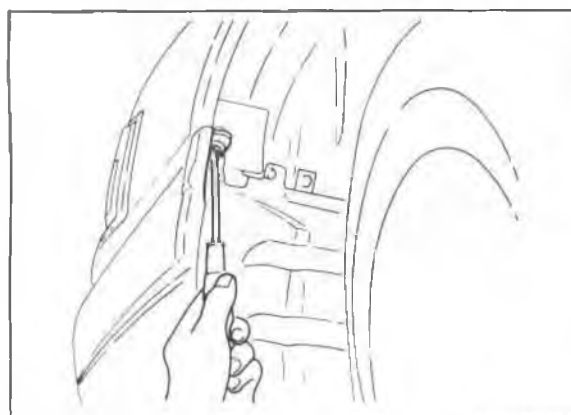
# 14 FRONT BUMPER



86U14X-057

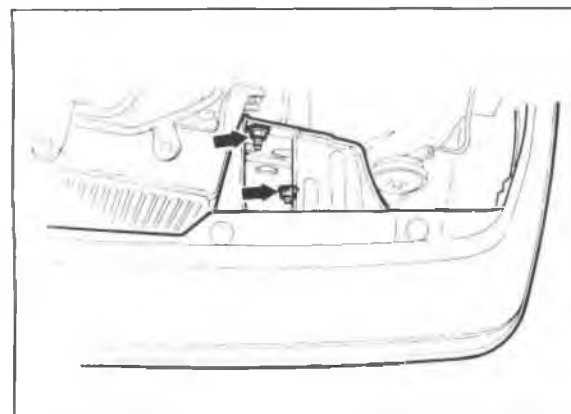
## REMOVAL

1. Remove the under cover mounting screws.



86U14X-058

2. Remove the bumper mounting screws.



76G14X-037

3. Remove the front side bumper stay mounting nuts.

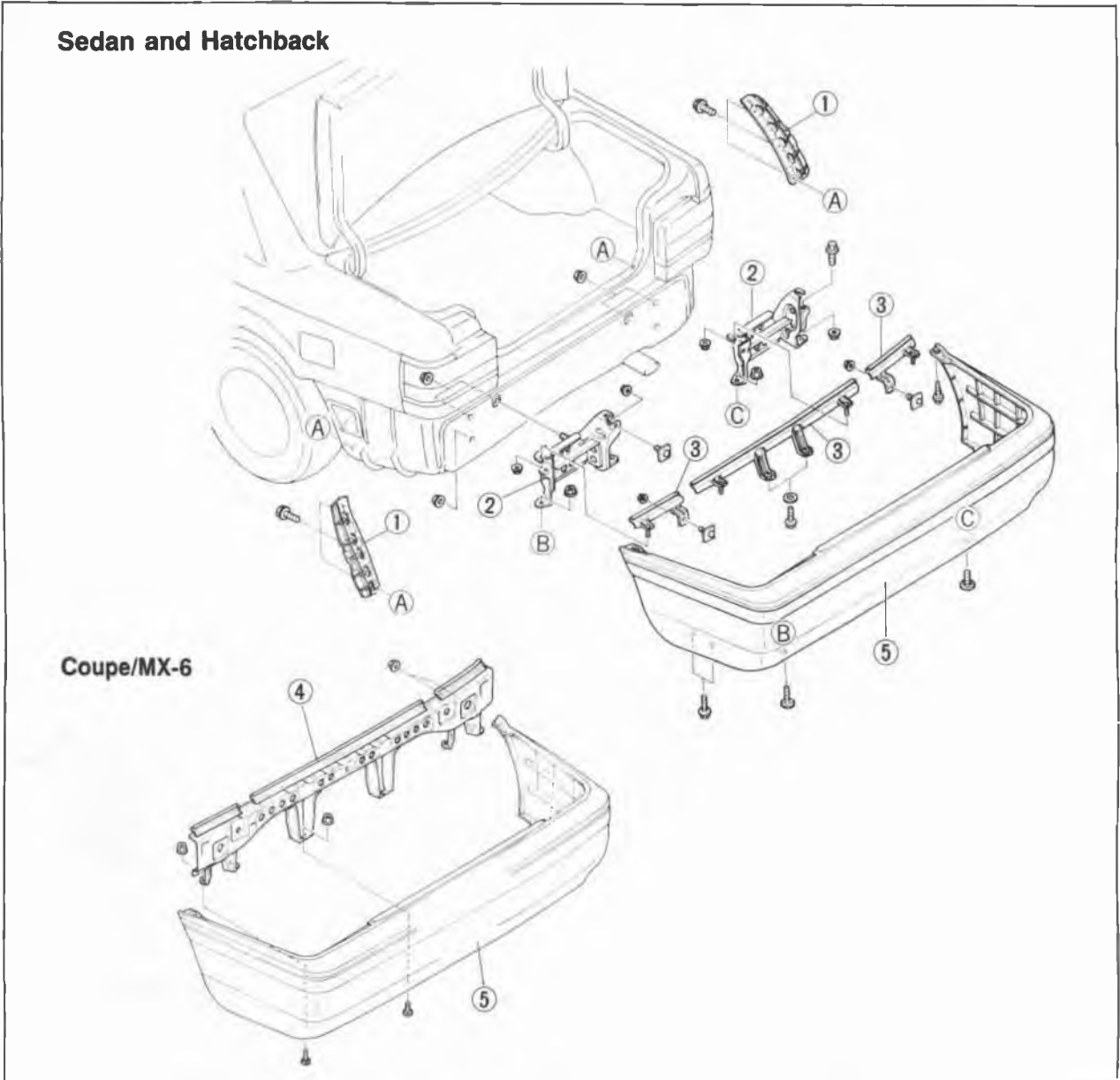
## INSTALLATION

Install the front side bumper stay mounting nuts and tighten the stay mounting nuts.

### Tightening torque:

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

**REAR BUMPER  
STRUCTURAL VIEW**



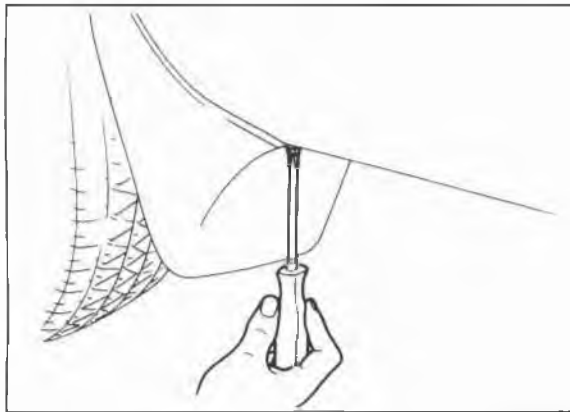
76G14X-003

1. Splash shield  
2. Bumper stay

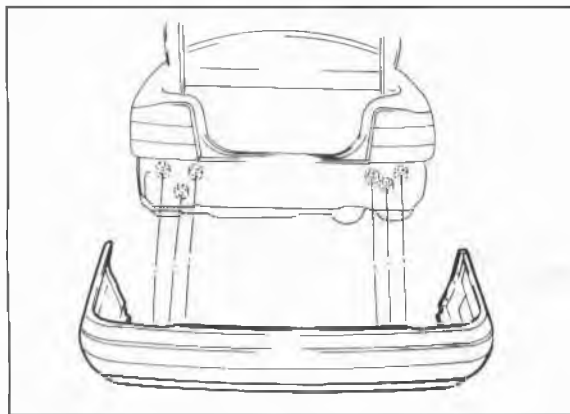
3. Set plate  
4. Reinforcement

5. Bumper

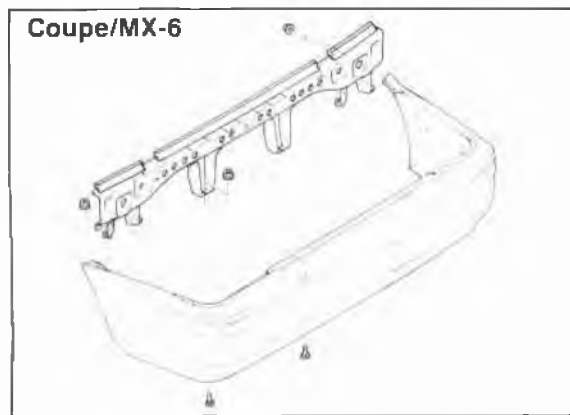
# 14 REAR BUMPER



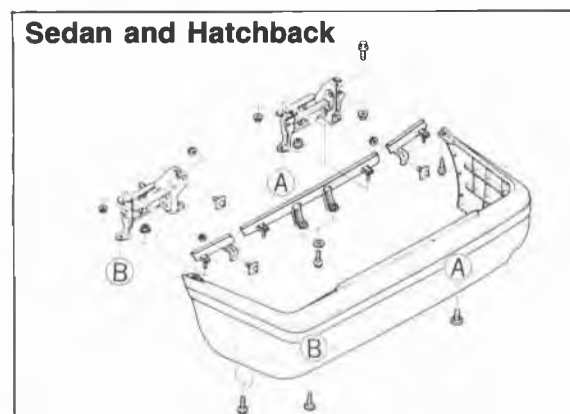
86U14X-061



86U14X-062



76G14X-004



## REMOVAL

1. Remove the screws shown in the figure.

2. Remove the bumper mounting nuts.

3. Remove the nuts and fasteners shown in the figure and remove the reinforcement and bumper stay from the bumper.

## INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

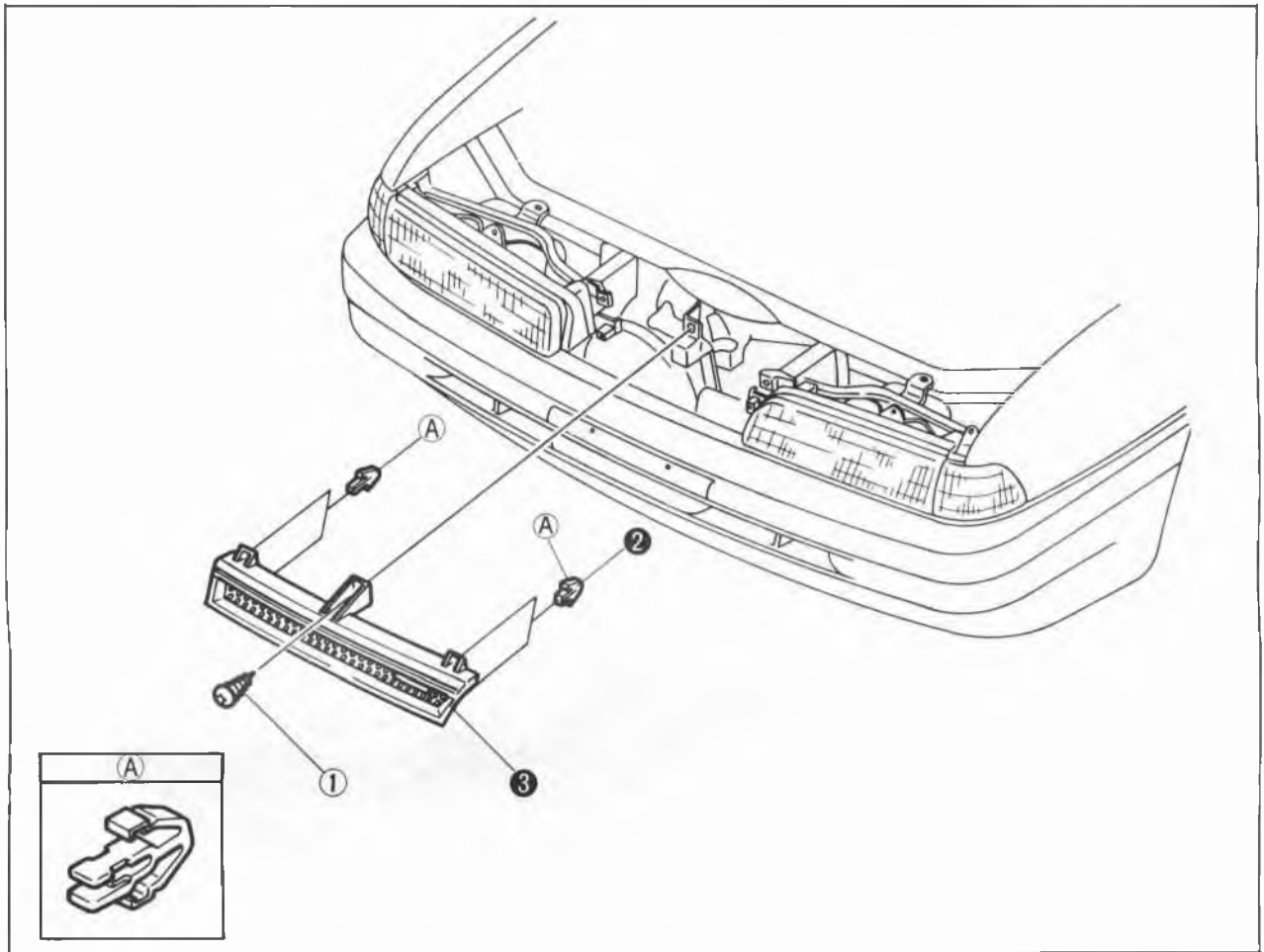
**Bumper stay installation nuts:**

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

## RADIATOR GRILLE

### REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure, referring to removal note for the specially marked parts.
2. Install in the reverse order of removal, referring to installation note for the specially marked parts.

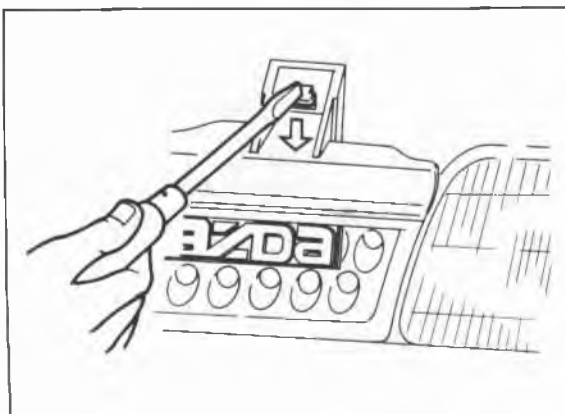


86U14X-065

1. Screw

2. Fasteners

3. Radiator grille



86U14X-066

#### Removal Note Fasteners

Push the tabs of the fasteners (5) with a small screwdriver.

#### Installation Note

Insert the fasteners into the grille, then align with the installation holes in the body and press in the grille.

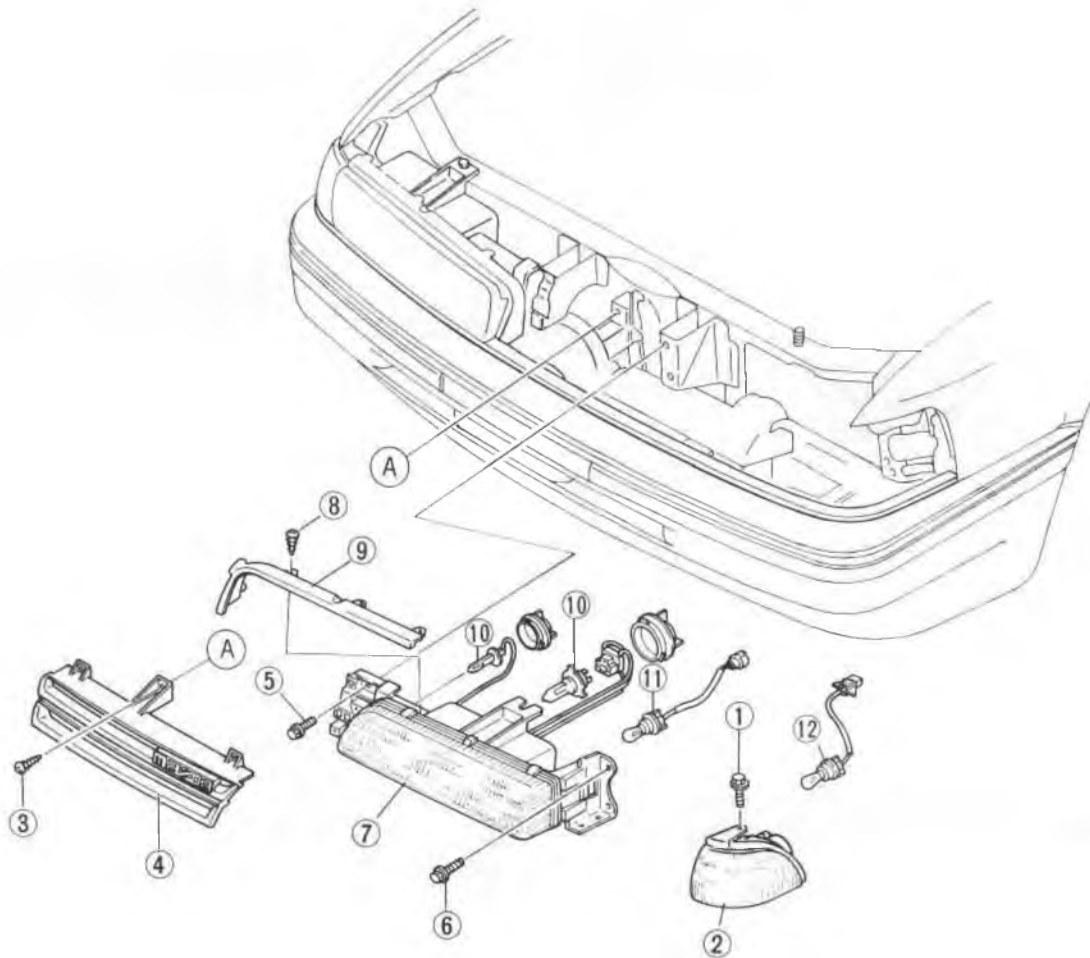
# 14 HEADLIGHT AND COMBINATION LIGHT

## HEADLIGHT AND COMBINATION LIGHT

### REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure, referring to removal note for the specially marked parts.
3. Install in the reverse order of removal.

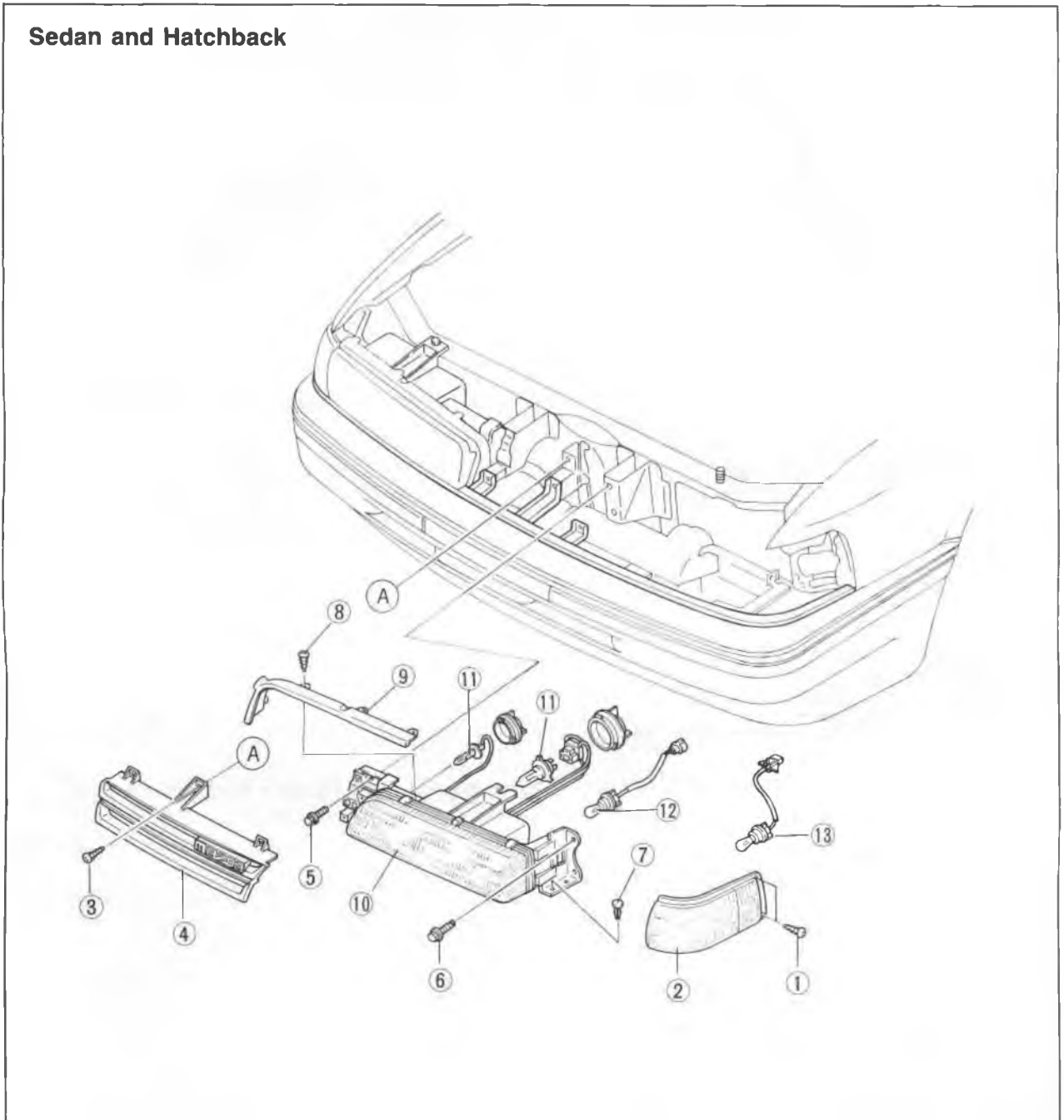
#### Coupe/MX-6



76G14X-005

- |                               |                                    |                                |
|-------------------------------|------------------------------------|--------------------------------|
| 1. Screw                      | 6. Bolts                           | 11. Parking light bulb 5W      |
| 2. Turn signal light assembly | 7. Headlight assembly              | 12. Turn signal light bulb 21W |
| 3. Screw                      | 8. Screws                          |                                |
| 4. Radiator grille            | 9. Light garnish                   |                                |
| 5. Bolts                      | 10. Headlight bulb<br>60 + 55W/55W |                                |

## Sedan and Hatchback



76G14X-006

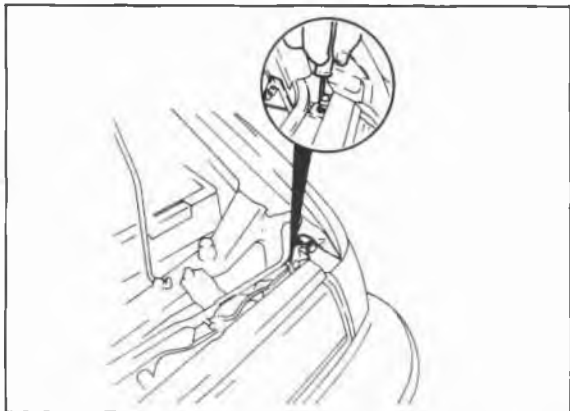
- 1. Screw
- 2. Turn signal light assembly
- 3. Screw
- 4. Radiator grille
- 5. Bolts

- 6. Bolts
- 7. Fastener
- 8. Screw
- 9. Light garnish
- 10. Headlight assembly

- 11. Headlight bulb  
60 + 55/55W
- 12. Parking light bulb 5W
- 13. Turn signal light bulb  
21W



# 14 HEADLIGHT AND COMBINATION LIGHT

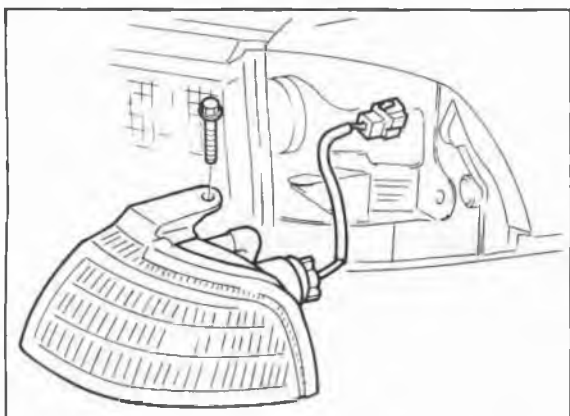


76G14X-007

## Removal Note

### Turn signal light (Coupe/MX-6)

1. Remove the screws shown in the figure.
2. Disconnect the turn signal light connector.



86U14X-070

3. Remove the turn signal light assembly.

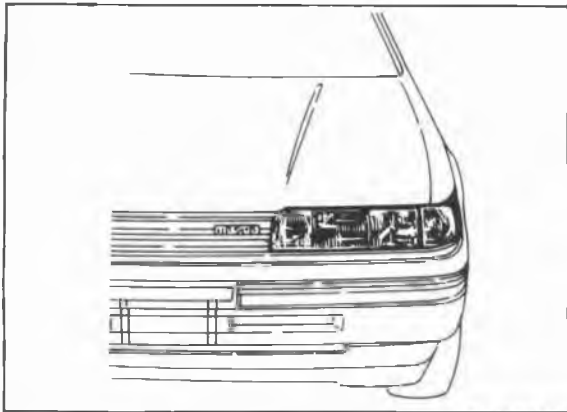


76G14X-008

### Turn signal light (Sedan and Hatchback)

1. Remove the screws shown in the figure.
2. Disconnect the turn signal and parking light connector.
3. Remove the turn signal and parking light assembly.

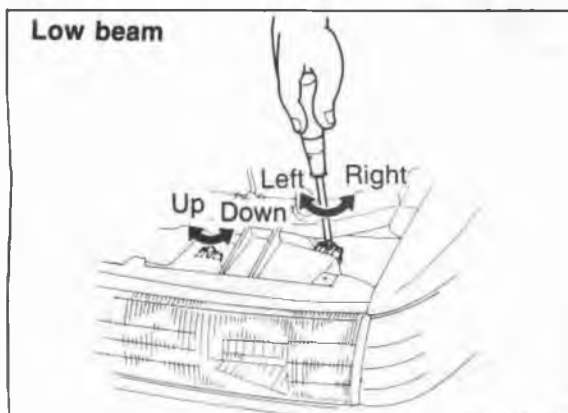
# HEADLIGHT AND COMBINATION LIGHT 14



86U14X-073

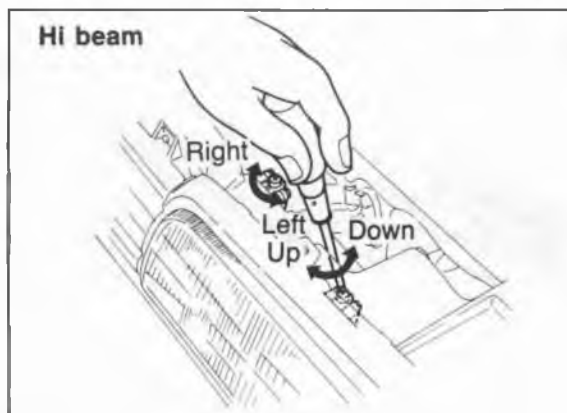
## AIMING Headlight

1. Adjust the tires to the standard pressure.
2. Position the vehicle on a flat level surface (unloaded condition).



76G14X-009

3. Adjust the headlights to meet local regulations.  
To adjust, turn the adjusting screws.

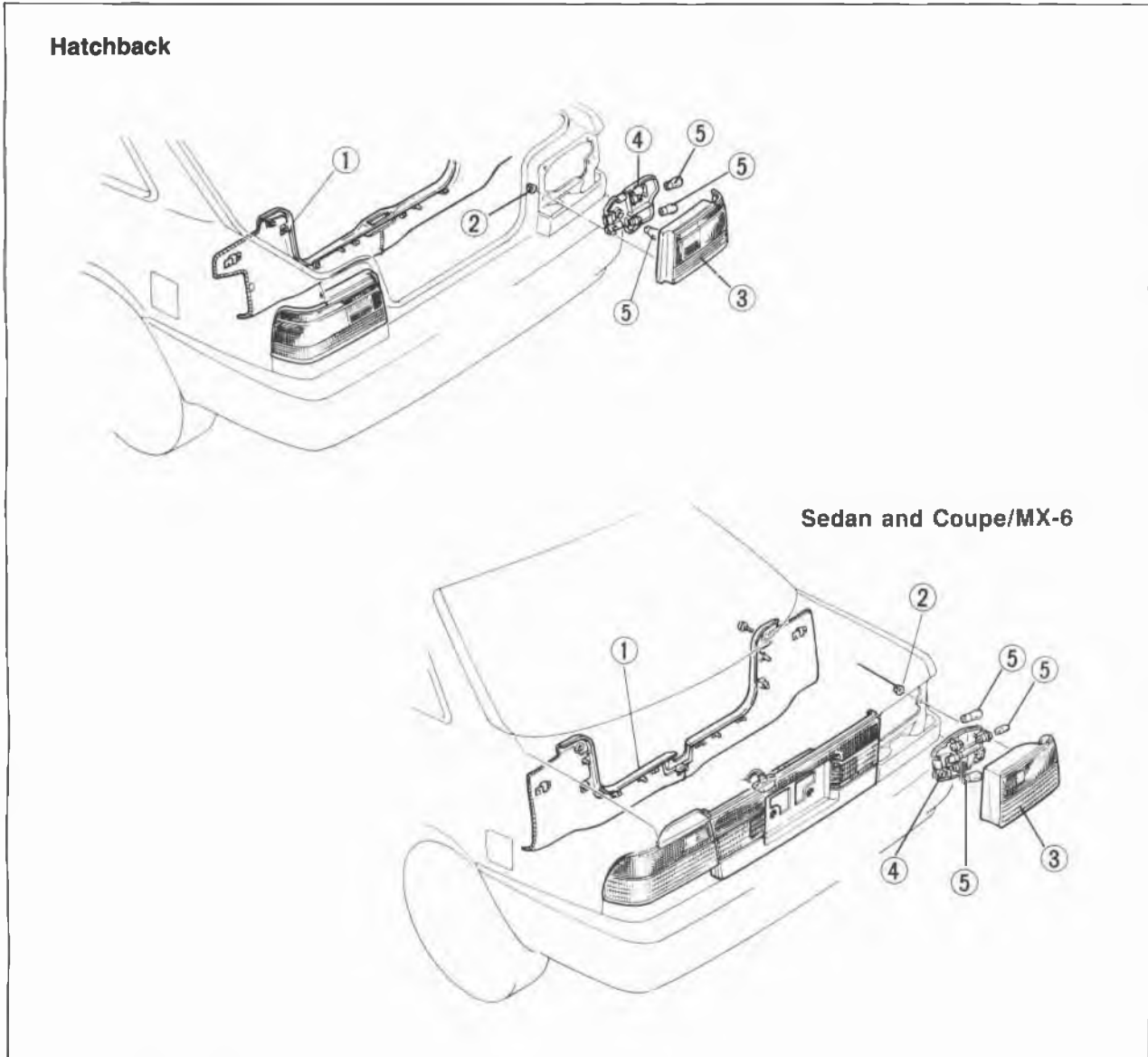


# 14 REAR COMBINATION LIGHTS

## REAR COMBINATION LIGHTS

### REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.



76G14X-010

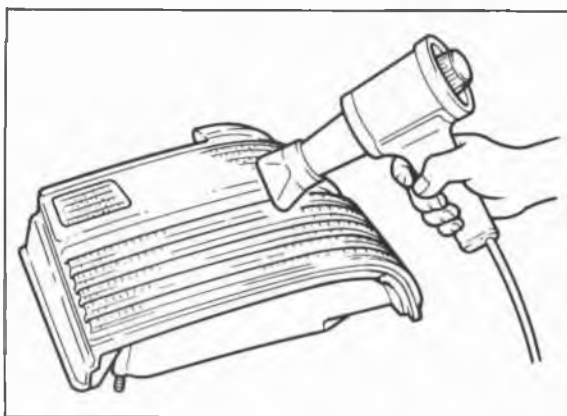
### Hatchback

1. End trim
2. Nuts
3. Lens and body
4. Cover
5. Bulb: Turn signal light 21W  
Brake and tail light 21W  
Side marker light 5W

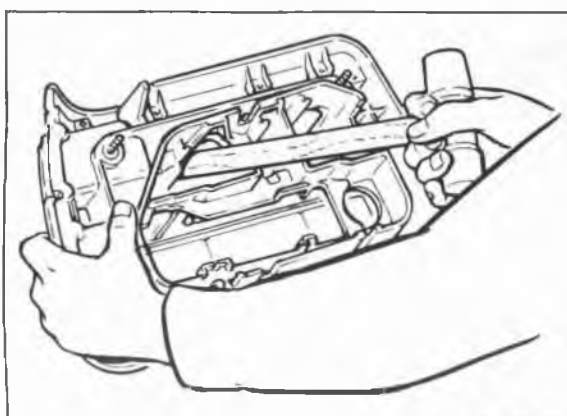
### Sedan and Coupe/MX-6

1. End trim
2. Nuts
3. Lens and body
4. Cover
5. Bulb: Turn signal light 21W  
Brake and tail light 21W  
Side marker light 5W

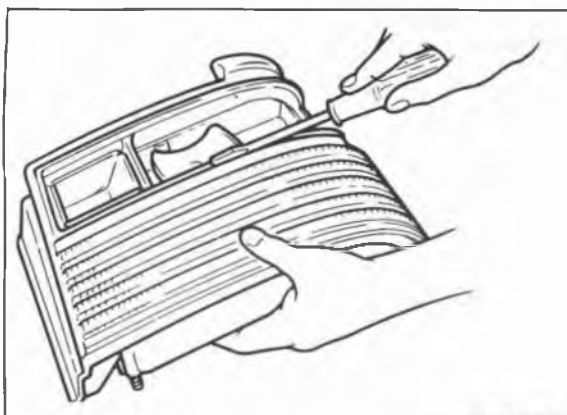
## REAR COMBINATION LIGHTS 14



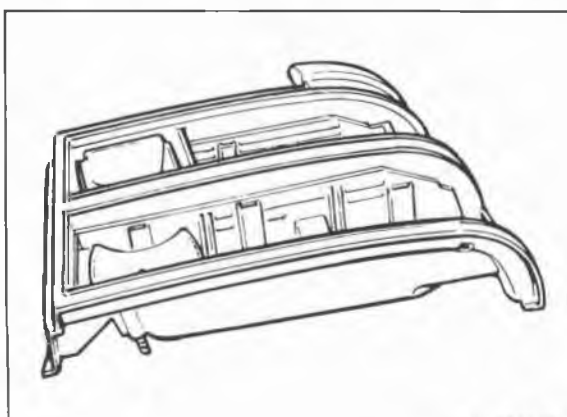
86U14X-077



76U14X-034



86U14X-078



86U14X-079

### REPLACEMENT OF REAR COMBINATION LIGHT LENS

1. Use a hot air blower to soften the "hot melt" (bonding agent) around the lens.

2. Remove the lens from the light housing by pushing the rear of the lens with a hammer handle or round bar.

3. Heat the light housing, and remove the "hot melt" and any fragments of the lens.

#### Note

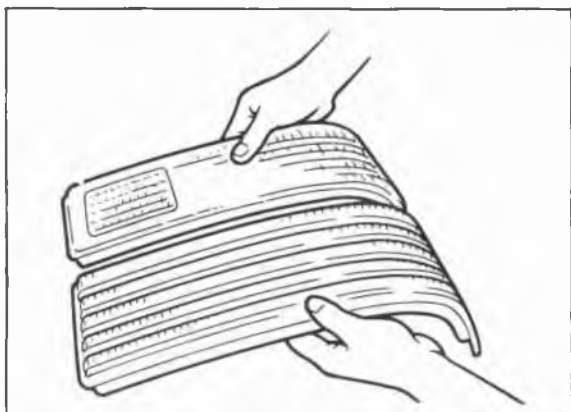
a) The "hot melt" should be reused if possible.

b) If the "hot melt" can be reused, the following step is unnecessary.

4. Put **Uni-sealer** (8531 77 739) adhesive in the light housing groove.

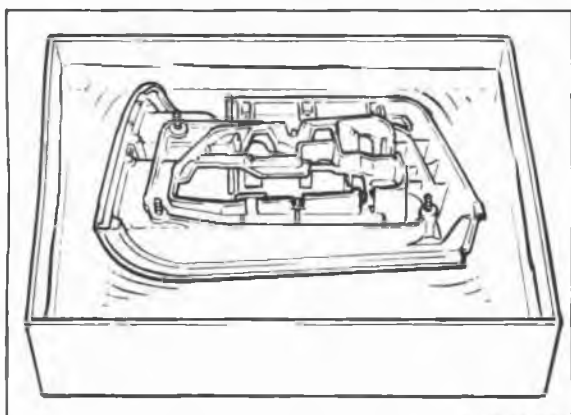
## 14 REAR COMBINATION LIGHTS

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86U14X-080

5. Fit the new lens onto the light housing. Press the lens firmly so that it will adhere.



76U14X-038

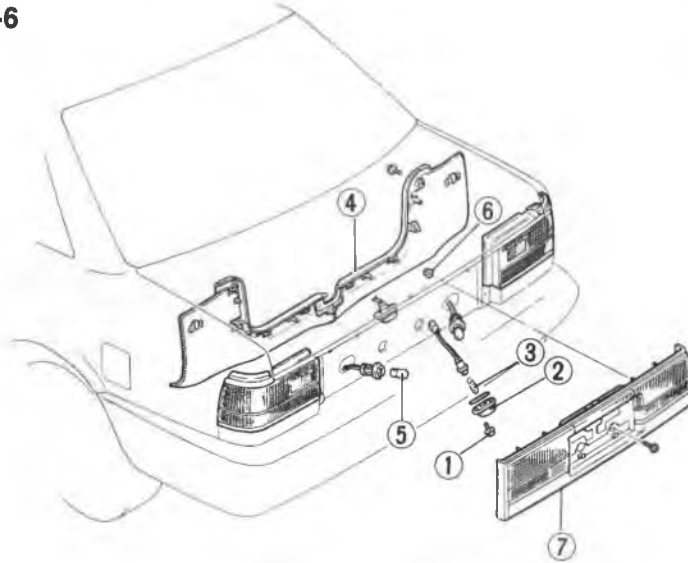
6. Immerse the combination light in water to check for leaks.

## LICENSE PLATE LIGHT AND CARGO ROOM LIGHT

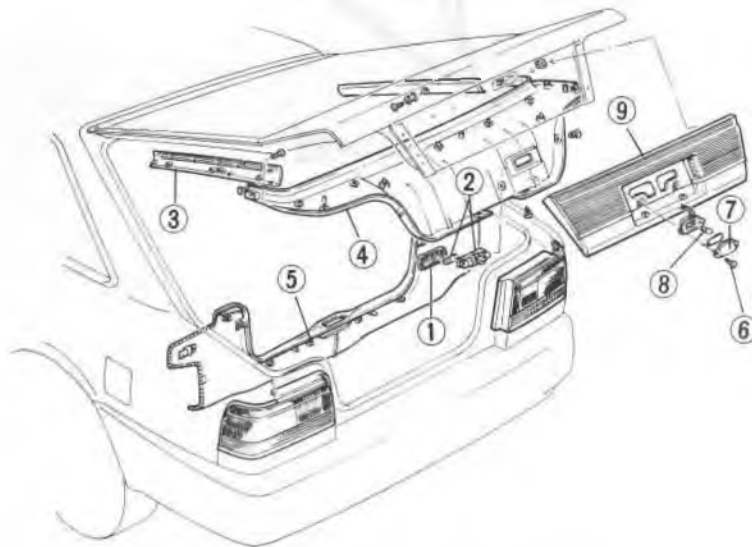
### REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.

#### Sedan and Coupe/MX-6



#### Hatchback



76G14X-011

#### Sedan and Coupe/MX-6

##### License plate light

1. Screws
2. Lens
3. Bulb 5W x 2

##### Back up light

4. End trim
5. Bulb 21W
6. Nuts
7. Rear finisher

#### Hatchback

##### Cargo room light

1. Lens
2. Switch and bulb assembly 5W

##### License plate light

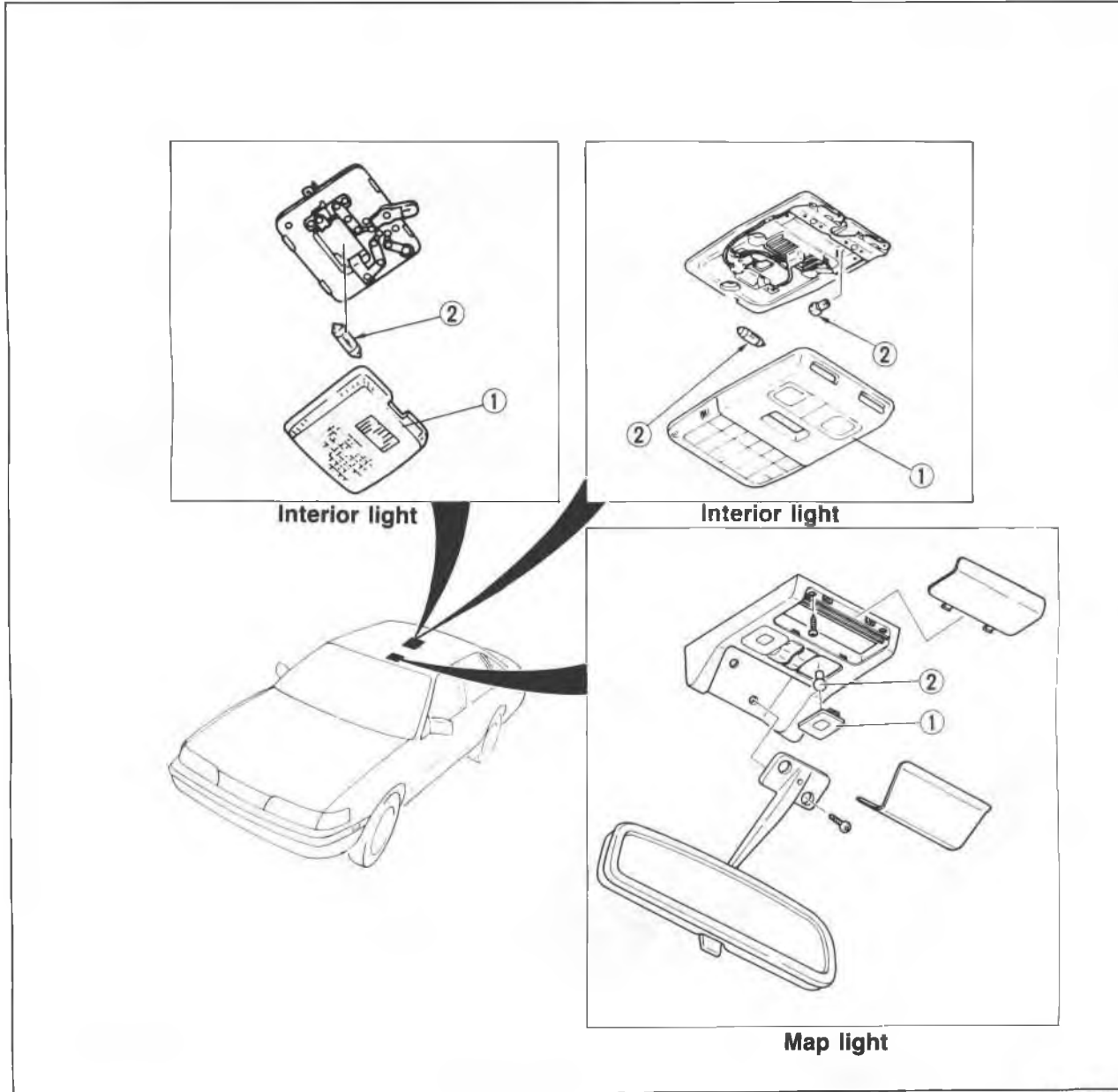
3. Side trim
4. Lower trim
5. End trim
6. Screws
7. Lens
8. Bulb 5W x 2
9. Rear finisher

# 14 INTERIOR LIGHT AND MAP LIGHT

## INTERIOR LIGHT AND MAP LIGHT

### REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.



86U14X-082

### Interior Light

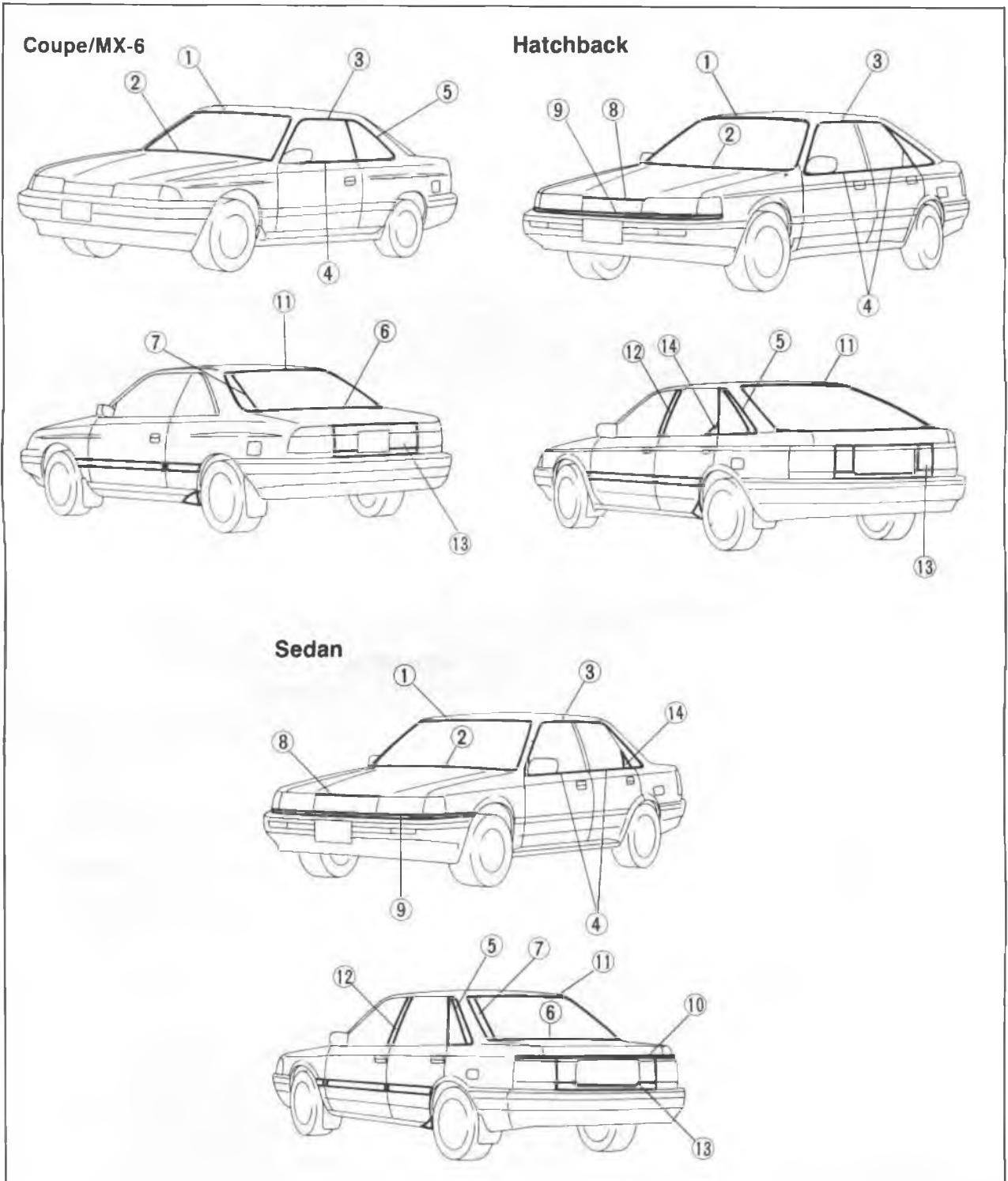
1. Lens
2. Bulb 10W

### Map Light

1. Lens
2. Bulb 8W

MOLDING AND GARNISH

STRUCTURAL VIEW

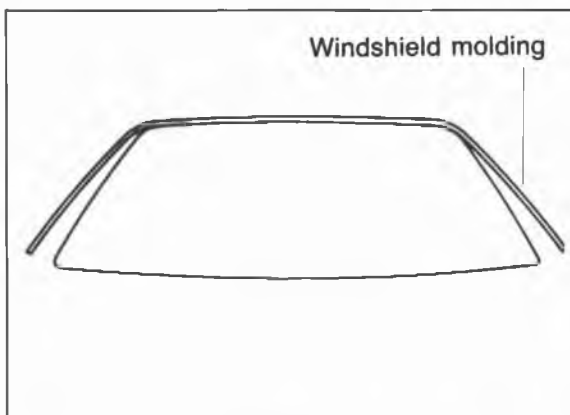


76G14X-012

- |                             |                              |                               |
|-----------------------------|------------------------------|-------------------------------|
| 1. Windshield molding       | 6. Rear window lower molding | 11. Rear window upper molding |
| 2. Windshield lower molding | 7. Rear window side molding  | 12. Center pillar garnish     |
| 3. Drip molding             | 8. Bonnet molding            | 13. Rear finisher             |
| 4. Beltline molding         | 9. Front lower molding       | 14. Sail garnish              |
| 5. Quarter window molding   | 10. Trunk lid molding        |                               |



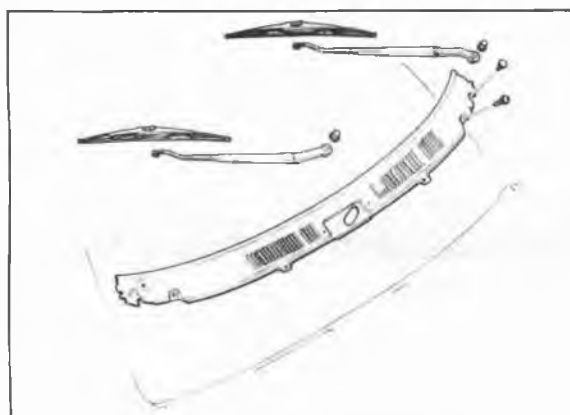
# 14 MOLDING AND GARNISH



76G14X-035

## WINDSHIELD MOLDING Removal and Installation

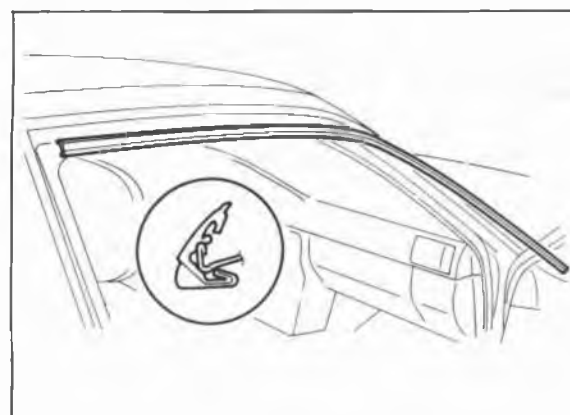
1. Remove the windshield molding. (Refer to page 14—48)
2. Install the windshield molding. (Refer to page 14—51)



86U14X-086

## WINDSHIELD LOWER MOLDING Removal and Installation

1. Remove the wiper arms.
2. Remove the lower molding screws and the lower molding.
3. Install in the reverse order of removal.



86U14X-087

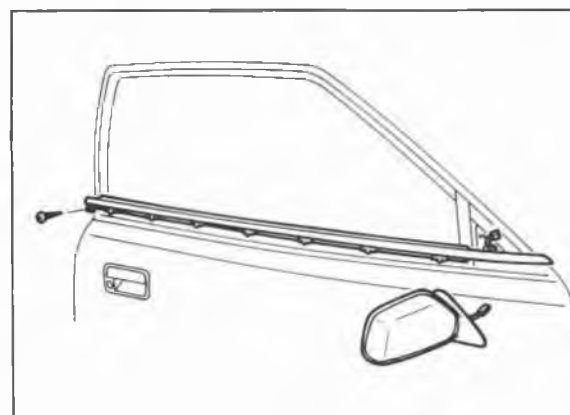
## DRIP MOLDING Removal and Installation

1. Insert a screwdriver between the roof rail and drip molding and slightly loosen the end of the molding.

### Note

**Be careful not to scratch the molding.**

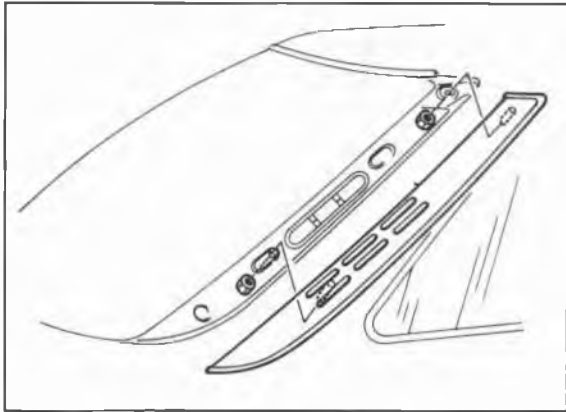
2. Remove the molding by twisting upward with both hands.
3. Install in the reverse order of removal.



86U14X-088

## BELTLINE MOLDING Removal and Installation

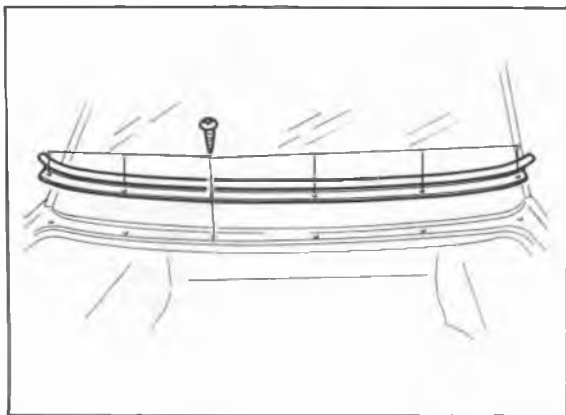
1. Remove the door mirror.
2. Remove the screw from the end of the beltline molding, then pull the molding up to remove it.
3. Install in the reverse order of removal.



86U14X-089

## REAR WINDOW SIDE MOLDING (SEDAN) Removal and Installation

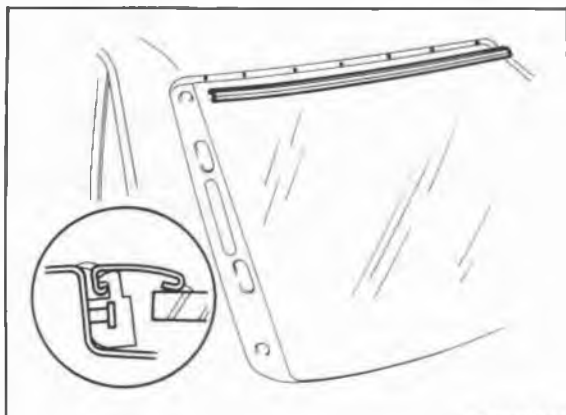
1. Remove the rear side seatback bolt, then the rear side seatback.
2. Remove the rear pillar trim.
3. Remove the window side molding nuts, then the window side molding.
4. Install in the reverse order of removal.



76G14X-013

## REAR WINDOW LOWER MOLDING (SEDAN AND COUPE/MX-6) Removal and Installation

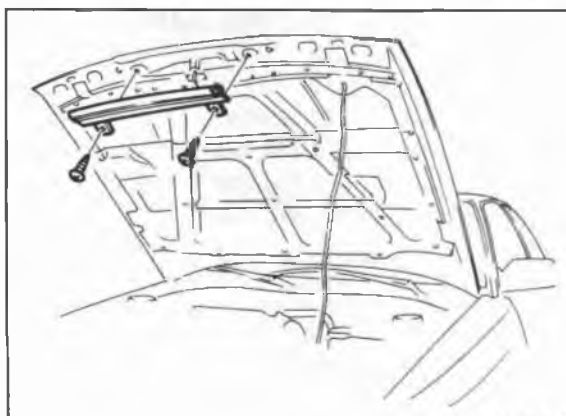
1. Remove the rear window lower molding screws, then the rear window lower molding.
2. Install in the reverse order of removal.



76G14X-014

## REAR WINDOW UPPER MOLDING (SEDAN, HATCHBACK AND COUPE/MX-6) Removal and Installation

1. Remove the rear window side molding. (Refer to page 14—54)
2. Remove the rear window upper molding.
3. Install in the reverse order of removal.

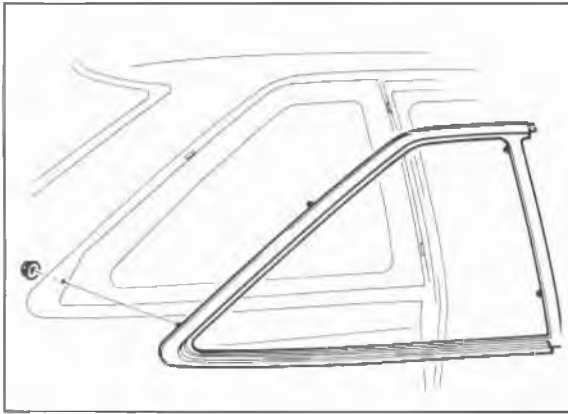


76G14X-015

## BONNET MOLDING (SEDAN AND HATCHBACK) Removal and Installation

1. Remove the bonnet molding screws, then the bonnet molding.
2. Install in the reverse order of removal.

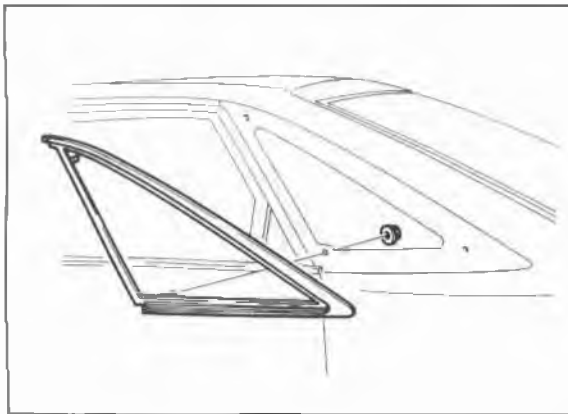
# 14 MOLDING AND GARNISH



76G14X-016

## QUARTER WINDOW MOLDING (COUPE/MX-6) Removal and Installation

1. Remove the seat belts.
2. Remove the rear header screw.
3. Remove the screws and the quarter trim.
4. Remove the screws and the center pillar trim.
5. Remove the quarter window molding mounting installation nuts.
6. Remove the screws and the quarter window molding.
7. Install in the reverse order of removal.

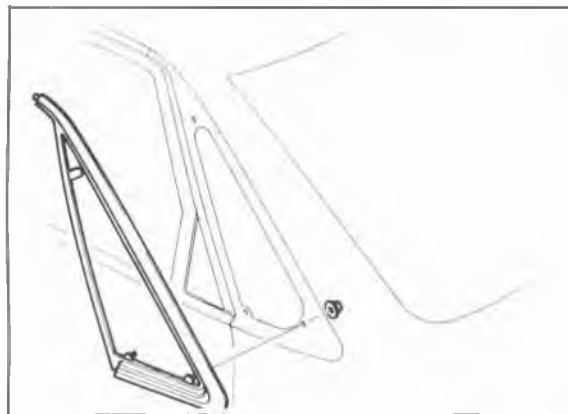


76G14X-017

## QUARTER WINDOW MOLDING (HATCHBACK)

### Removal and Installation

1. Remove the rear header screw.
2. Remove the bolt and the rear side seatback.
3. Remove the screws and the package side shelf.
4. Remove the screws and the rear pillar trim.
5. Remove the nuts and the quarter window molding.
6. Install in the reverse order of removal.

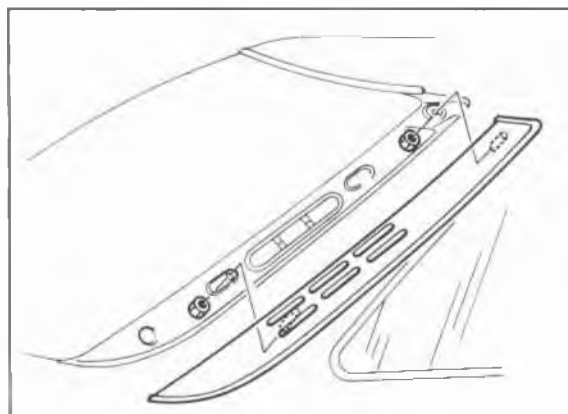


86U14X-095

## QUARTER WINDOW MOLDING (SEDAN)

### Removal and Installation

1. Remove the rear header screw.
2. Remove the bolt and the rear side seatback.
3. Remove the quarter trim.
4. Remove the nuts and the quarter window molding.
5. Install in the reverse order of removal.

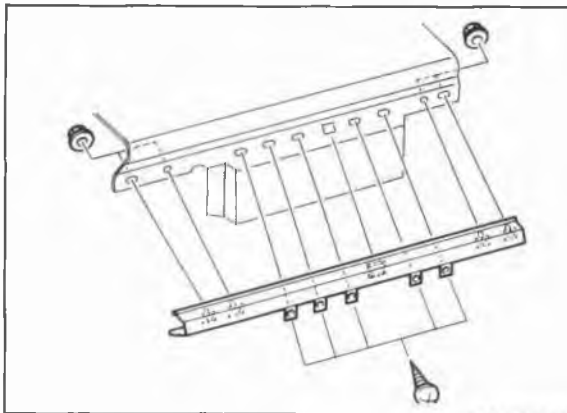


76G14X-018

## REAR WINDOW SIDE MOLDING (COUPE/MX-6)

### Removal and Installation

1. Remove the seat belts.
2. Remove the rear header screw.
3. Remove the screws and the quarter side trim.
4. Remove the screws and the center pillar trim.
5. Remove the nuts and the rear window side molding.
6. Install in the reverse order of removal.

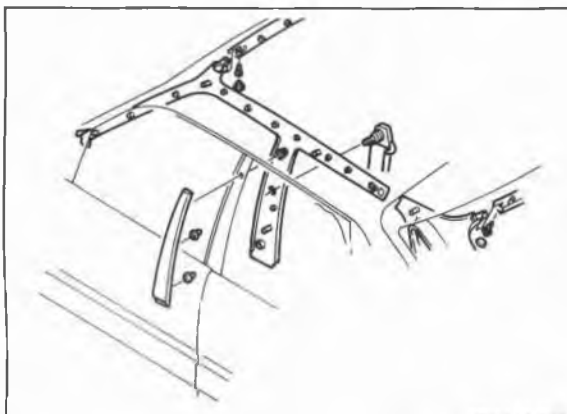


76G14X-019

## TRUNK LID MOLDING (SEDAN AND HATCHBACK)

### Removal and Installation

1. Remove the rear finisher.
2. Remove the nuts and screws and remove the trunk lid molding.
3. Install in the reverse order of removal.

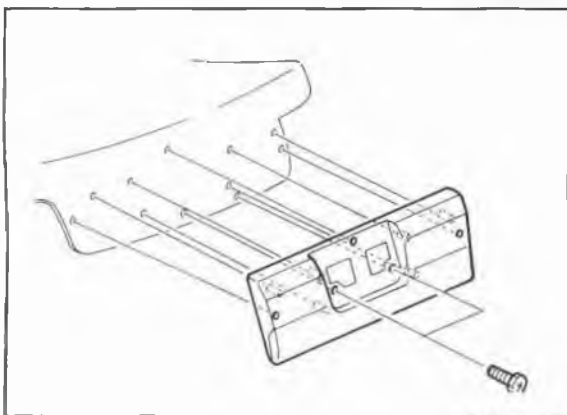


76G14X-020

## CENTER PILLAR GARNISH (SEDAN AND HATCHBACK)

### Removal and Installation

1. Remove the seat belts.
2. Remove the front header trim.
3. Remove the center pillar trim.
4. Remove the nuts with a deep socket wrench, then remove the garnish.
5. Install in the reverse order of removal.

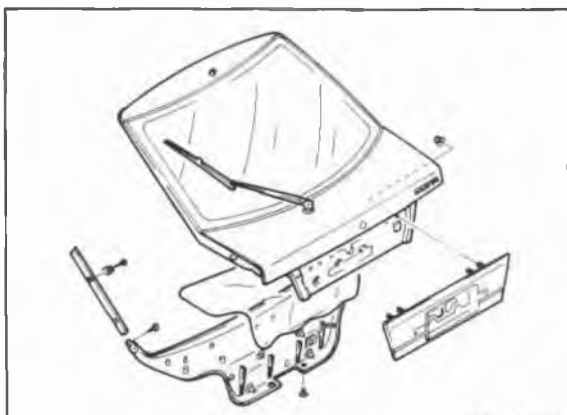


76G14X-021

## REAR FINISHER (COUPE/MX-6 AND SEDAN)

### Removal and Installation

1. Remove the nuts and the rear finisher.
2. Install in the reverse order of removal.



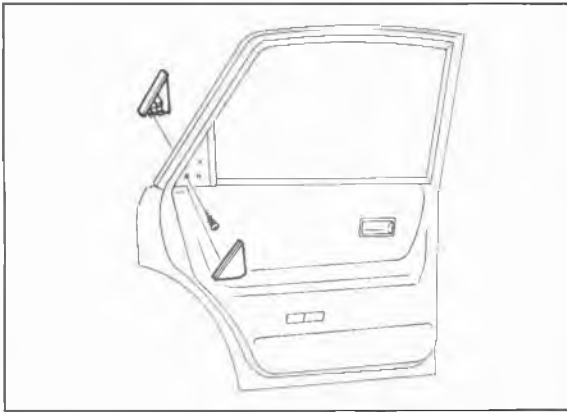
76G14X-022

## REAR FINISHER (HATCHBACK)

### Removal and Installation

1. Remove the hatchback door side trims.
2. Remove the hatchback door lower trim.
3. Remove the hatchback door screen.
4. Remove the nuts and the rear finisher.
5. Install in the reverse order of removal.

# 14 MOLDING AND GARNISH



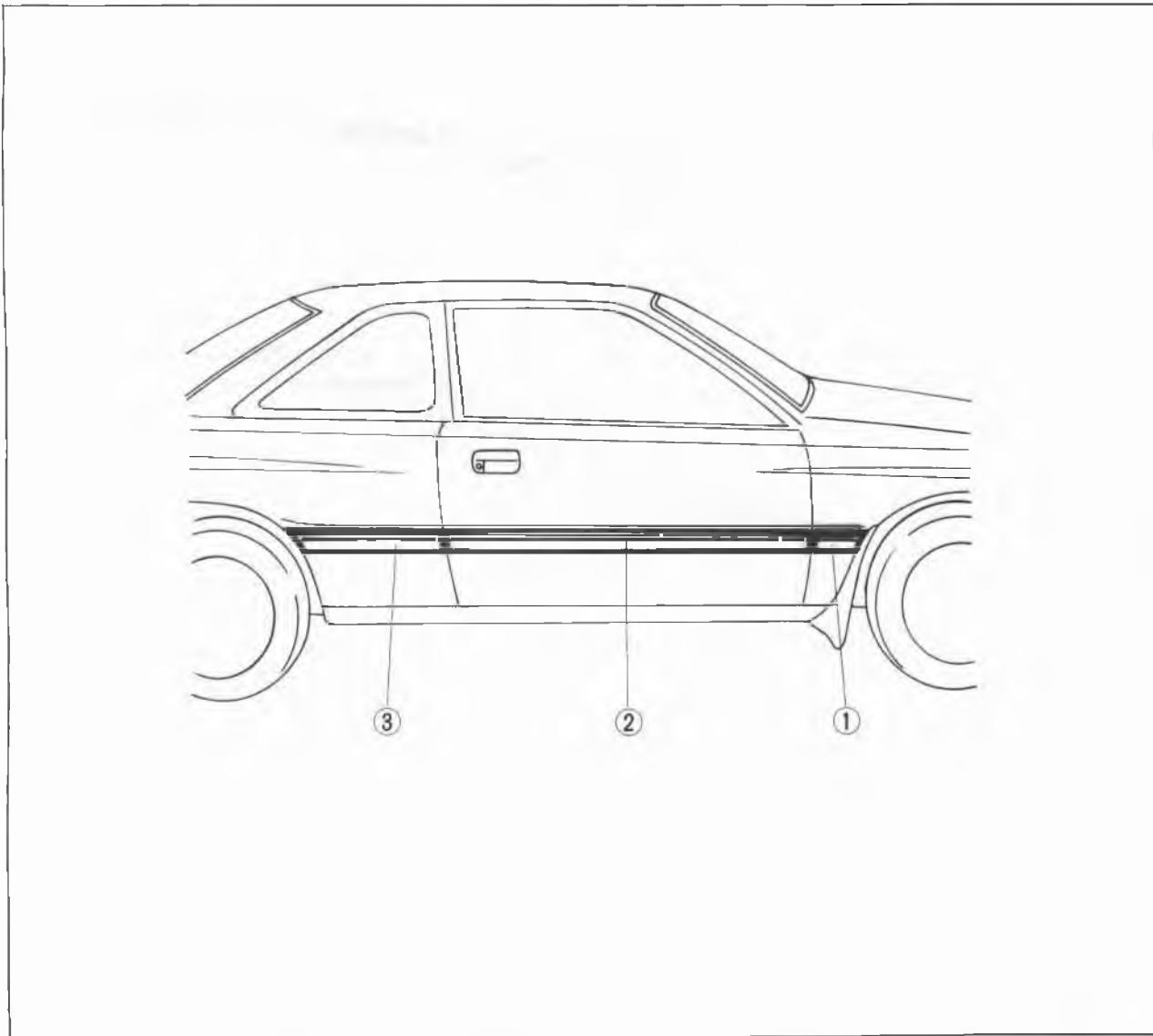
76G14X-023

## SAIL GARNISH (SEDAN AND HATCHBACK)

### Removal and Installation

1. Remove the sail inner garnish.
2. Remove the screws and remove the sail garnish.
3. Install in the reverse order of removal.

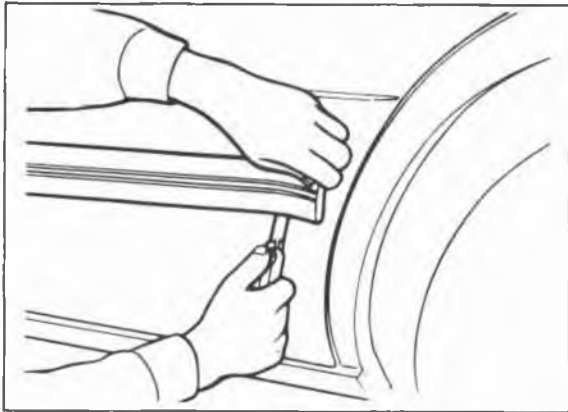
## SIDE PROTECTOR MOLDING Structural View



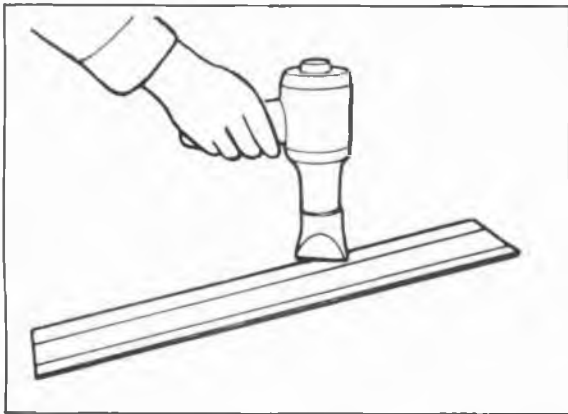
86U14X-102

1. Side protector A molding      2. Side protector B molding      3. Side protector C molding

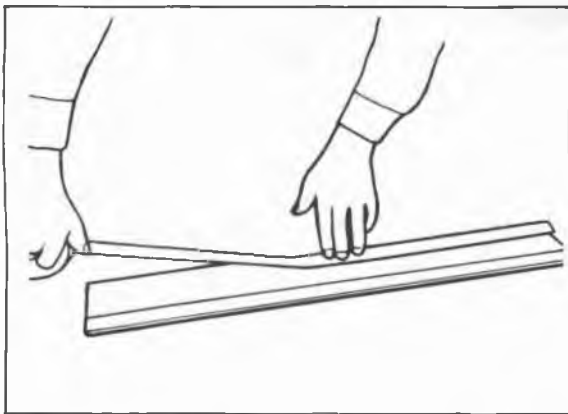
## SIDE PROTECTOR MOLDING 14



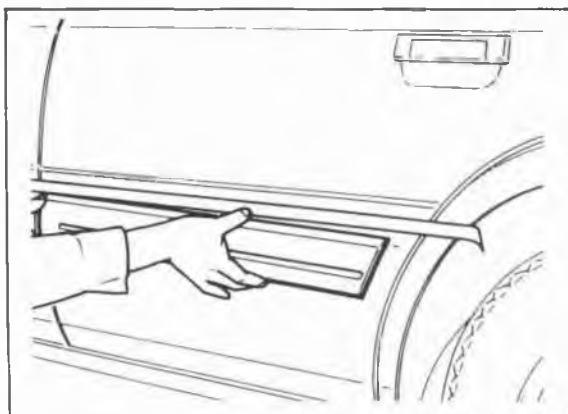
7BU14X-034



7BU14X-035



7BU14X-036



7BU14X-037

### Removal

1. Using a screwdriver or knife, twist the molding end, being careful not to damage the painted surface, and separate the adhesive for **20–30 mm (0.79–1.18 in)**.
2. Pull the separated portion to remove it.
3. Use a knife to remove any adhesive remaining on the body or molding.

### Note

**Remove as much adhesive as possible without damaging the painted surface.**

4. If the adhesive is difficult to remove, soften it with a hot air blower.

### Installation

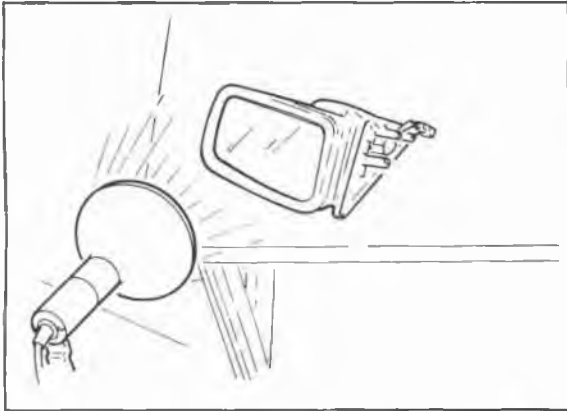
1. Remove any grease or dirt from the molding adhesion surface and the body surface.
2. Mark the installation position on the body with masking tape.
3. Attach double-sided adhesive tape to the molding adhesion surface.

4. Align the molding on the body, and attach it securely.

### Note

**Adhesion conditions deteriorate if air temperature is 20°C (68°F) or less; heating of the body is thus recommended.**

# 14 DOOR MIRROR

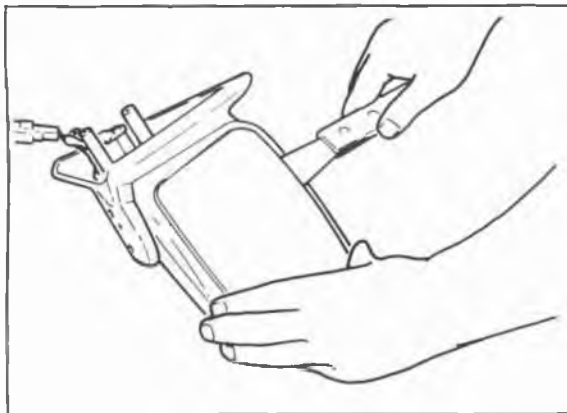


76G14X-042

## DOOR MIRROR

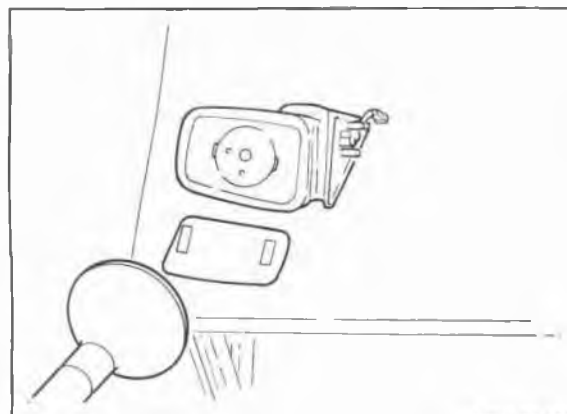
### DISASSEMBLY

1. Warm the frame and the mirror glass with a lamp **(500W)** to approx. **70°C (158°F)** for approx. 3 minutes.



86U14X-104

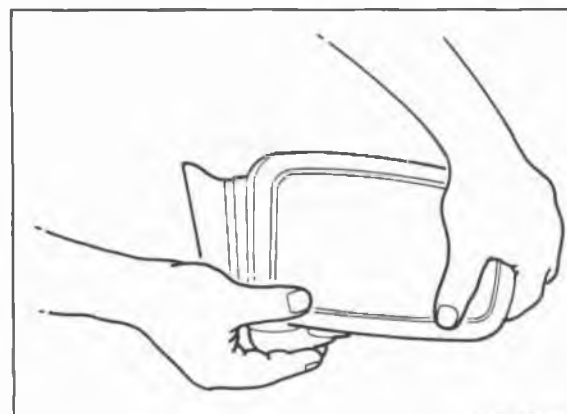
2. Insert a scraper between the mirror glass and the frame, then pry the mirror loose.
3. Remove any remaining adhesive.



86U14X-106

### ASSEMBLY

1. Warm the frame with a lamp.



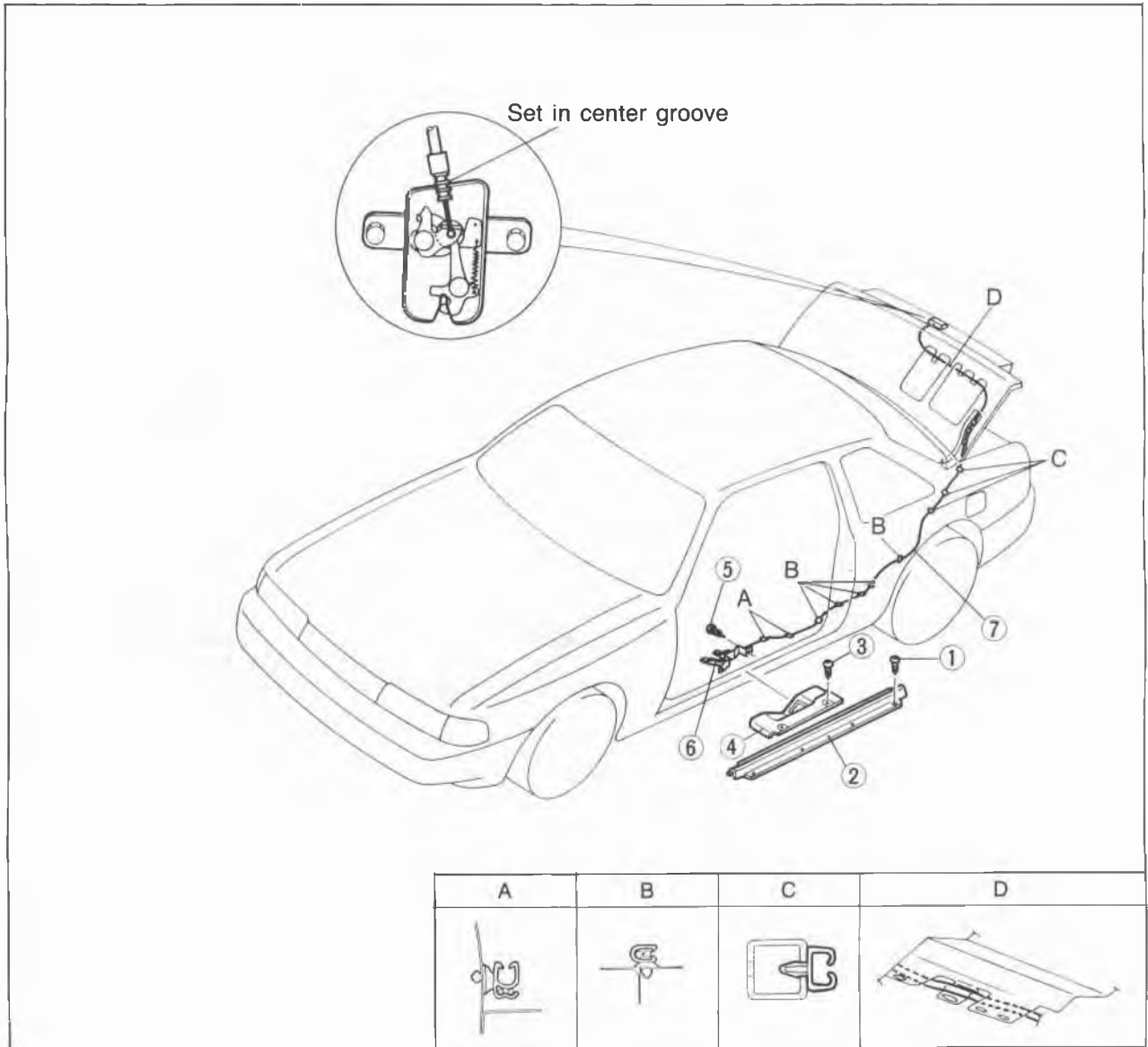
86U14X-107

2. Install the glass in the frame, then gently press it in to secure it.

## TRUNK-LID LOCK REMOTE RELEASE

### REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.



86U14X-108

1. Screws
2. Scuff plate
3. Screws

4. Cover
5. Bolts
6. Release lever

7. Release wire

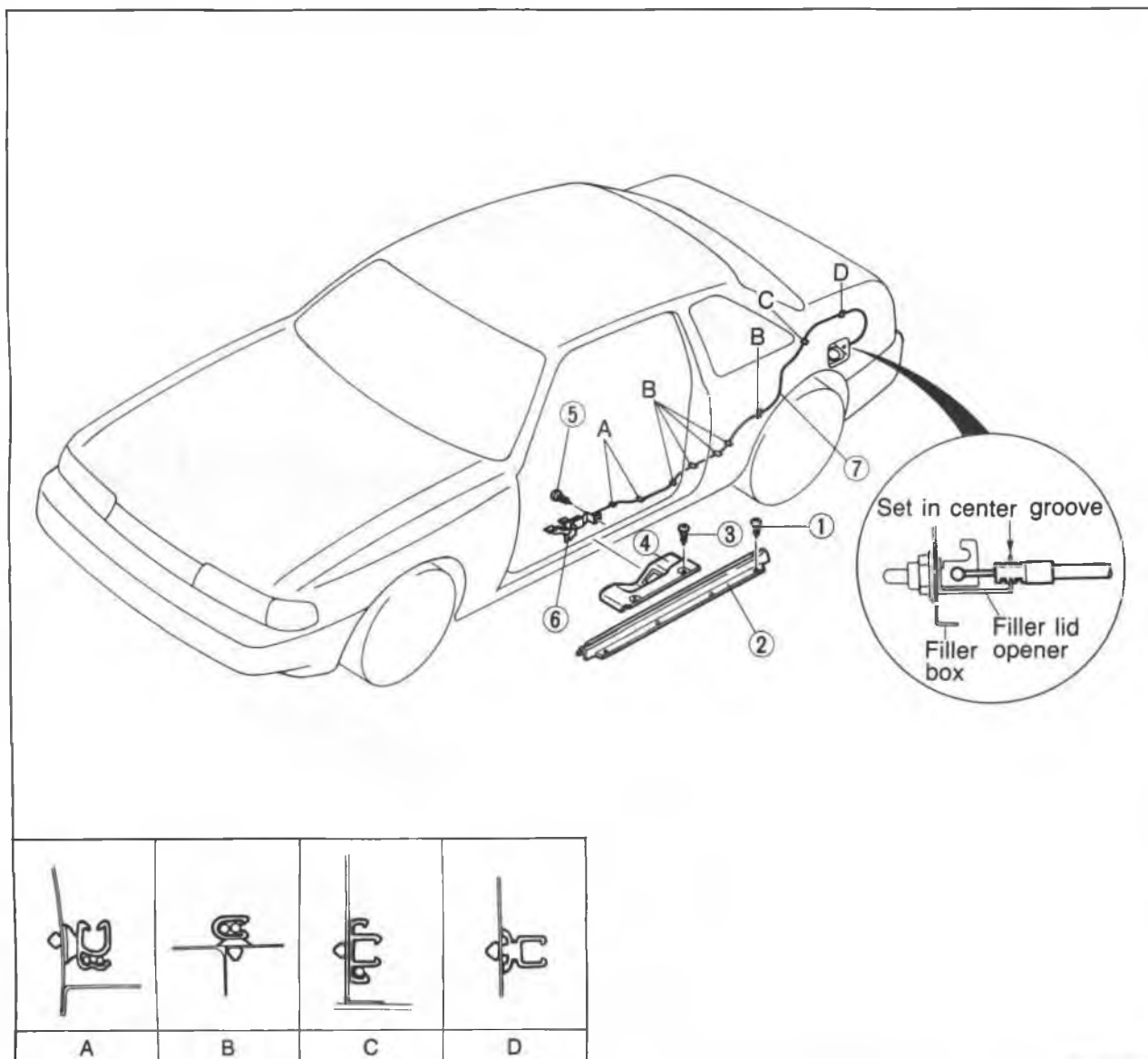


# 14 FUEL FILLER LID REMOTE RELEASE

## FUEL FILLER LID REMOTE RELEASE

### REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.



1. Screws
2. Scuff plate
3. Screws

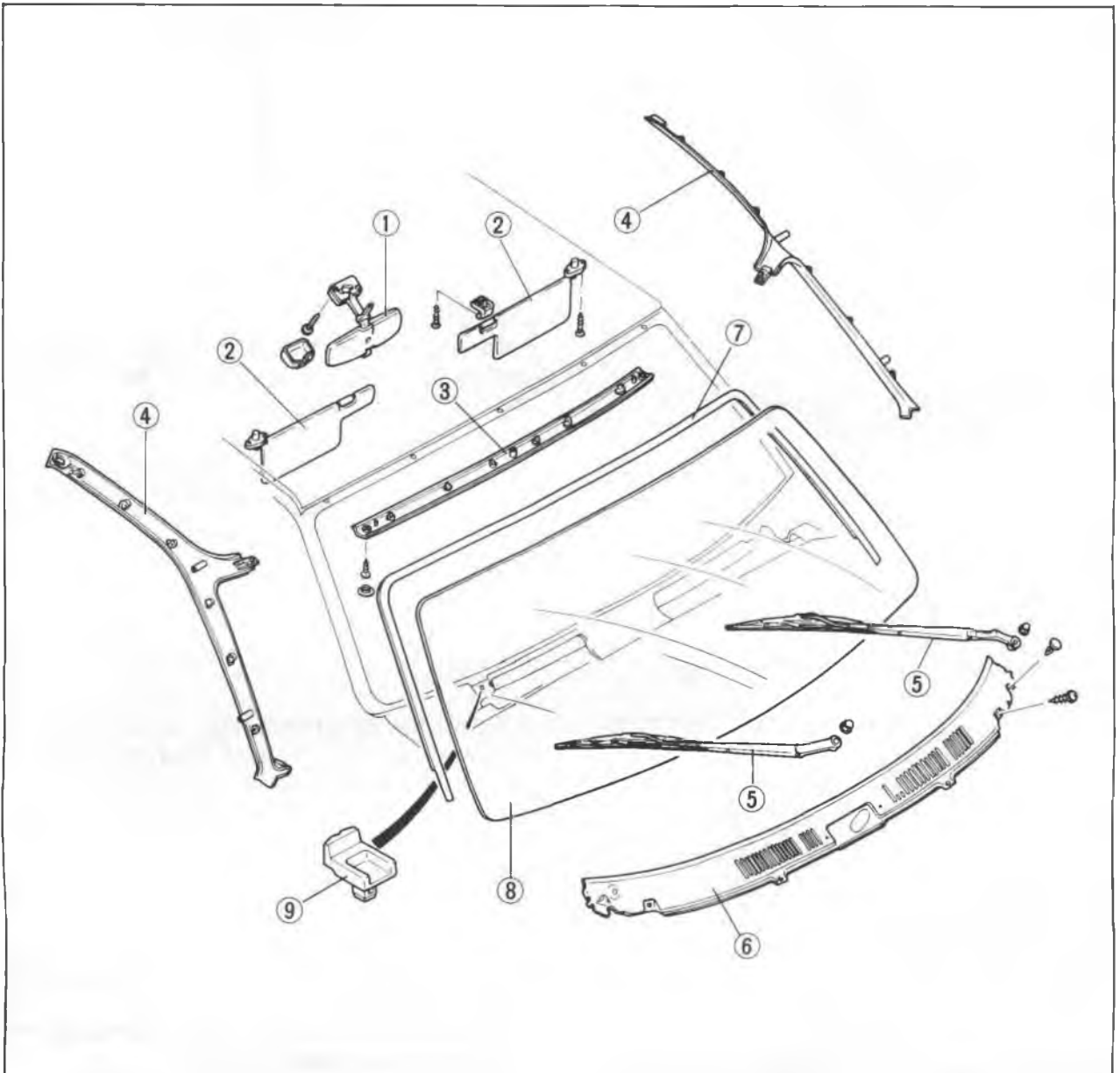
4. Cover
5. Bolts
6. Release lever

7. Release wire

86U14X-109

## WINDSHIELD GLASS

### STRUCTURAL VIEW



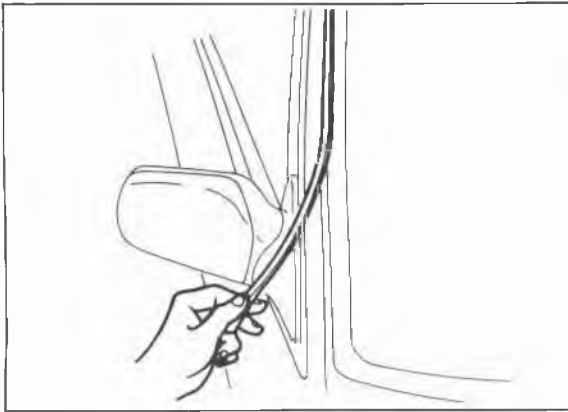
86U14X-110

- |                      |                      |                             |
|----------------------|----------------------|-----------------------------|
| 1. Rear view mirror  | 4. Front pillar trim | 7. Front windshield molding |
| 2. Sunvisor          | 5. Wiper arm         | 8. Windshield glass         |
| 3. Front header trim | 6. Lower molding     | 9. Spacer                   |

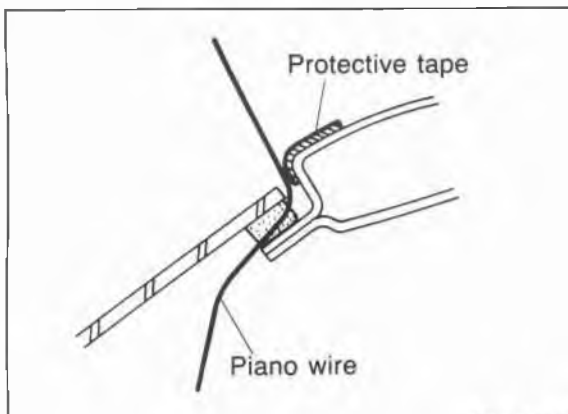
**Note**

**Use window tool set (49 0305 870A) to remove and install the glass.**

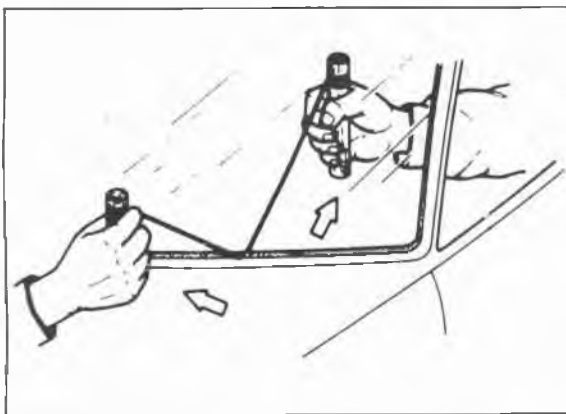
# 14 WINDSHIELD GLASS



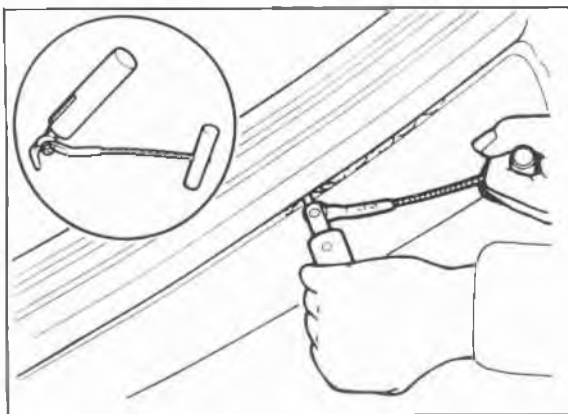
86U14X-111



86U14X-112



86U14X-113



86U14X-114

## REMOVAL

1. Remove the rearview mirror, sunvisors, front pillar trim, and front header trim.
2. Remove the wiper arms and lower molding.
3. Remove the front window molding.

## Caution

**Before removing the sealant, apply adhesive tape to the body and instrument panel to protect them from damage.**

4. Make a small hole through the sealant.
5. Pass the piano wire through the hole.
6. Wind each end of the wire around a bar.
7. Pull the wire to and fro, and saw through the sealant around the edge of the glass. Then remove the glass.

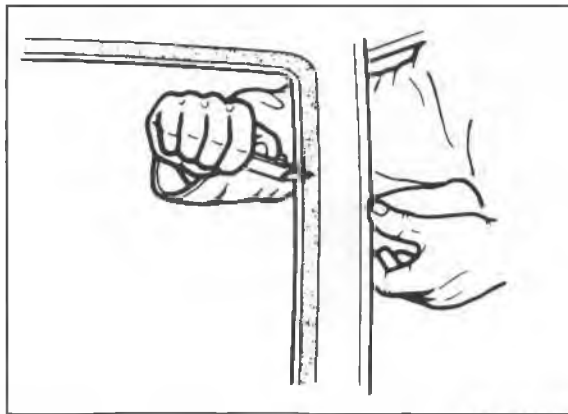
## Caution

- a) Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking.
- b) Be careful that the wire does not rub on the body or instrument panel.

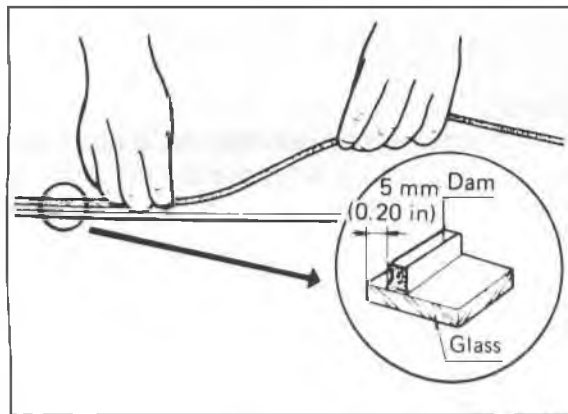
## Note

**If the glass is not to be reused, a tool like that shown in the figure may be used.**

Insert the blade in the sealant, and pull on the bars.



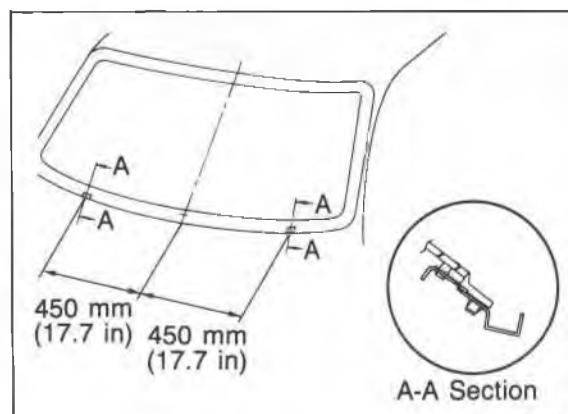
86U14X-115



86U14X-116



86U14X-117



76G14X-043

## INSTALLATION

1. Cut away the old sealant with a sharp knife so that **1 to 2 mm (0.04 to 0.08 in)** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to build up to a **2 mm (0.08 in)** layer.

2. Carefully clean a **5 cm (1.97 in)** wide area around the circumference of the glass and the bond on the body.
3. Bond a new dam along the circumference of the glass **5 mm (0.20 in)** from the edge.

**Caution**  
Securely bond the dam and allow it to dry.

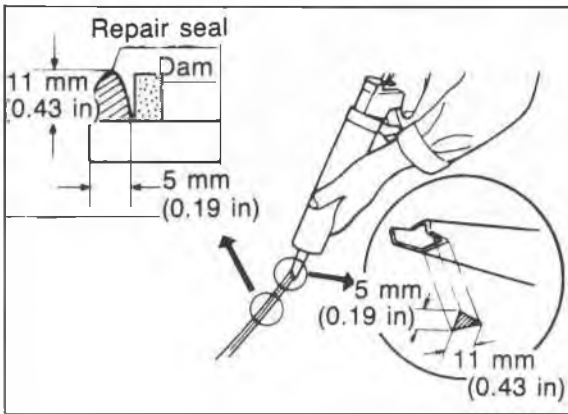
4. Apply primer with a brush to the bonding area of the glass and the body, and allow it to dry for **approx. 30 minutes**.

**Caution**  
Keep the area free of dirt. Do not touch the surface. If primer gets on the hands, remove it immediately.

5. Bond the spacers to the body as shown.

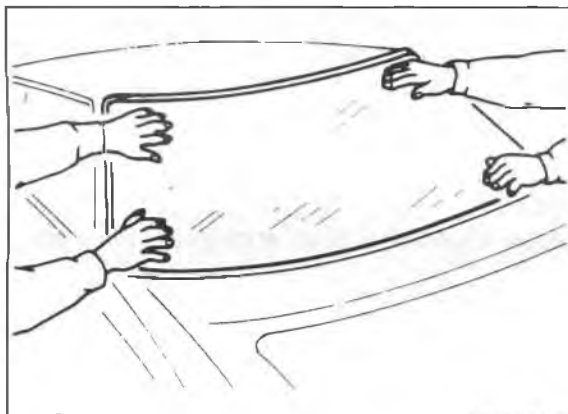
**Caution**  
Damaged spacers must be replaced.

# 14 WINDSHIELD GLASS



86U14X-119

6. Prepare the nozzle of the sealant gun so that it has a flange that can run along the edge of the glass, and a V from which the sealant can flow. Once the primer is dry, apply the sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a ridge of sealant **11 mm (0.43 in)** high. Keep the bead of sealant smooth and even, reshaping it where necessary with a spatula.

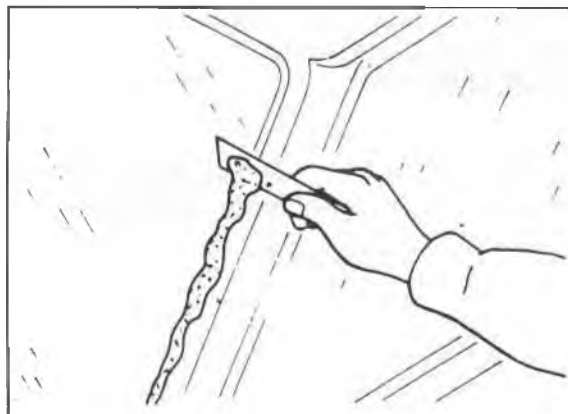


7BU14X-026

7. Lift the glass into place. Push it in lightly toward the vehicle to compress the sealant.

### Caution

**Open the windows to prevent the glass from being pushed out by air pressure if a door is closed.**

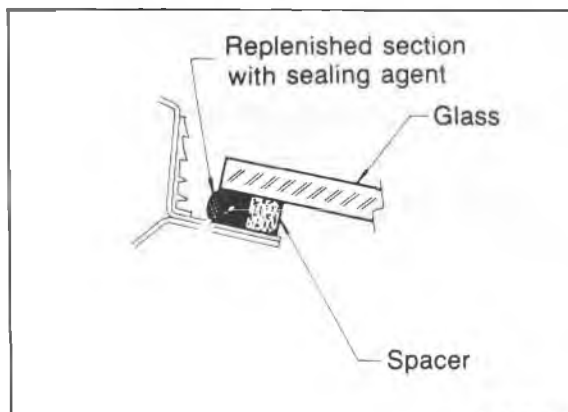


76G14X-044

### Hardening time of repair seal

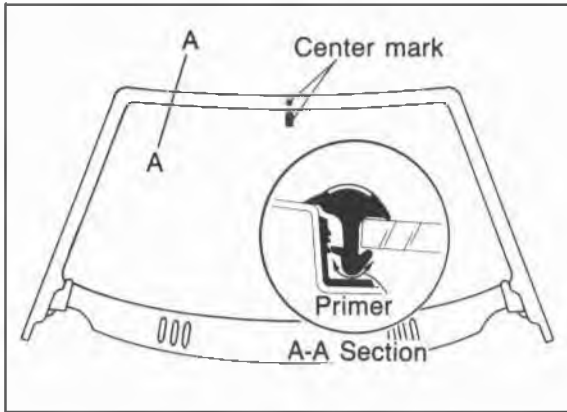
Temperature	Surface hardening time	Time required until car can be put in service
5°C (41°F)	Approx. 1.5 hrs	12 hrs
20°C (68°F)	Approx. 1 hr	4 hrs
35°C (95°F)	Approx. 10 min.	2 hrs

8. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact.



86U14X-120

9. Check for water leaks. If a leak is found, wipe the water off well and add **repair seal** (B001 77 739) where needed.

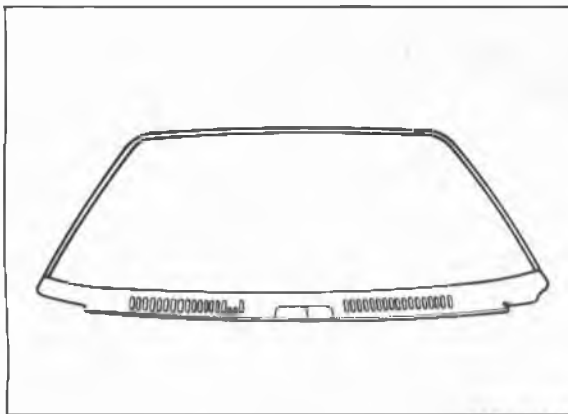


86U14X-121

10. Align the alignment mark of the molding with that on the lap of the glass and push the molding into place along the top.

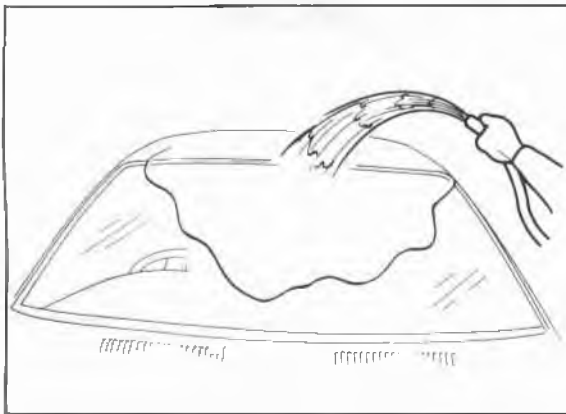
**Caution**

- a) Apply primer with a brush to the bonding area of the molding, and allow it to dry for approx. 30 minutes.  
b) Use a new window molding



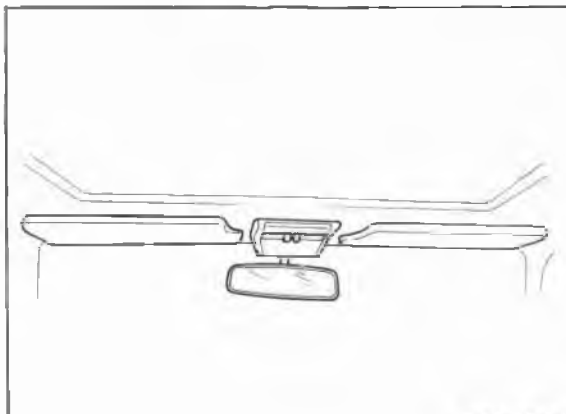
76G14X-045

11. Insert the molding ends into the flanges of the lower molding. Then push it in along the sides.



86U14X-123

12. After checking for water leakage, mount the pillar garnish.



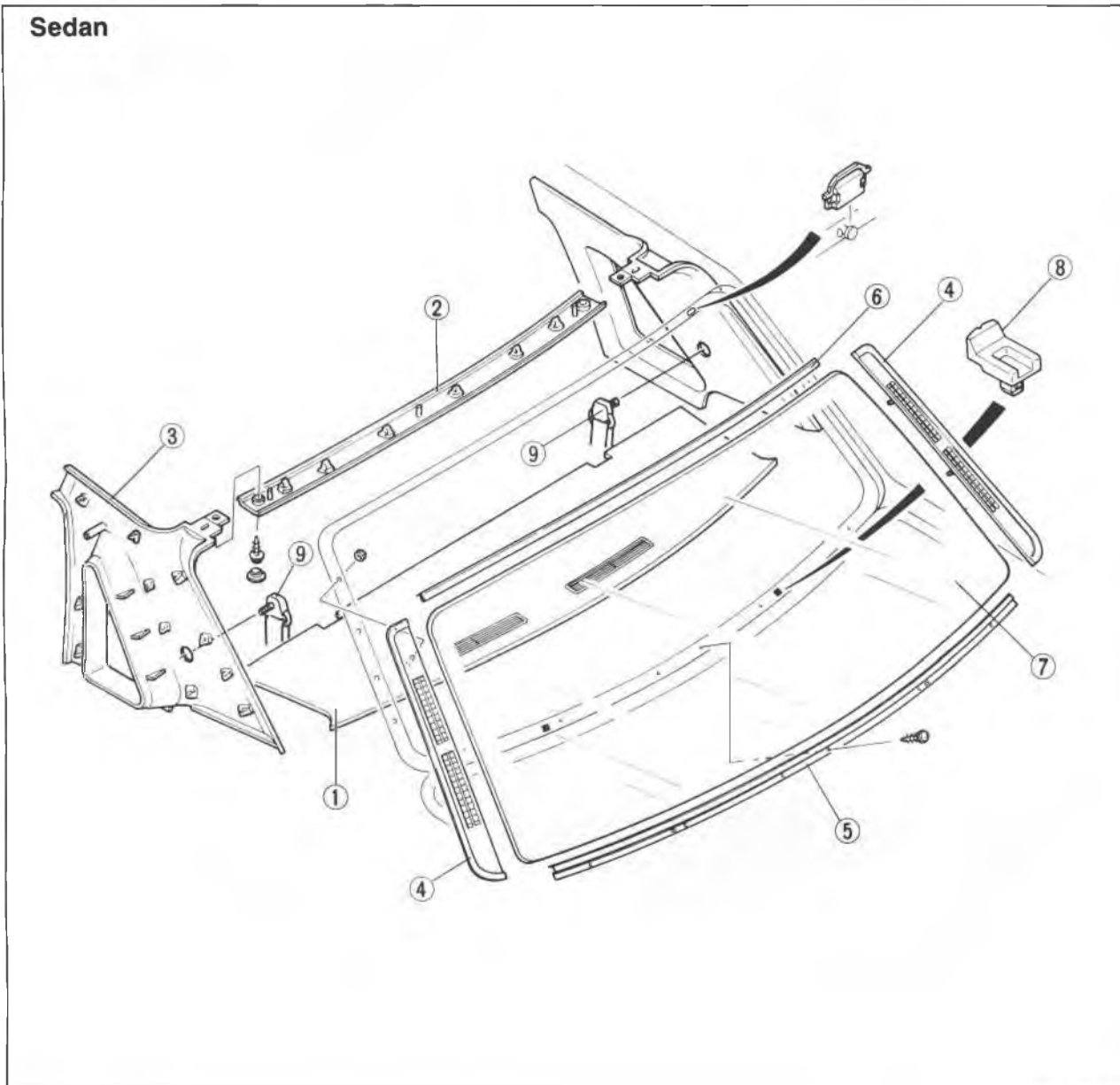
86U14X-124

13. Attach the front header trim, pillar trim, sunvisors, and rearview mirror.

# 14 REAR WINDOW GLASS

## REAR WINDOW GLASS

### STRUCTURAL VIEW



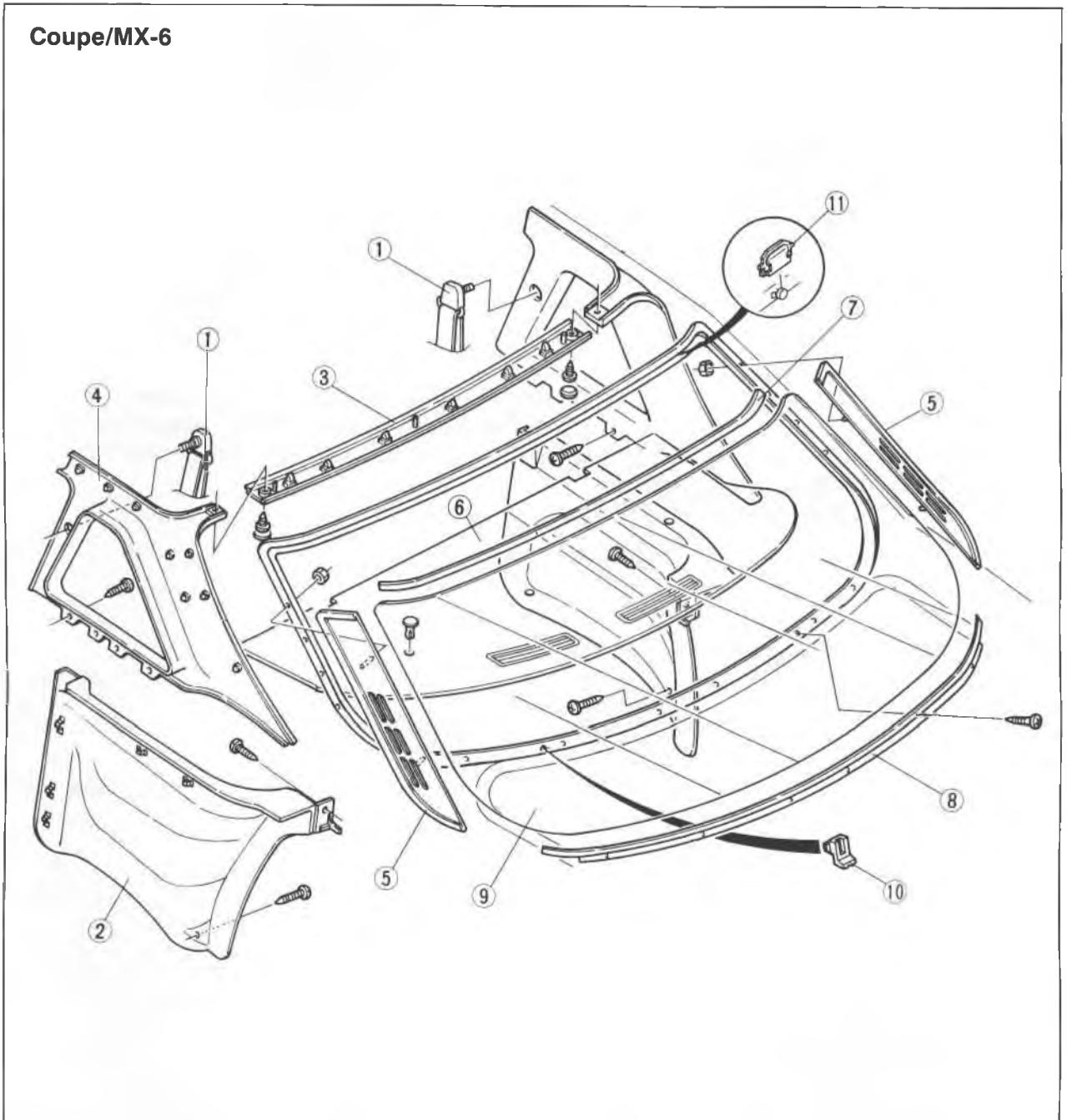
86U14X-125

- |                      |                              |                      |
|----------------------|------------------------------|----------------------|
| 1. Rear package tray | 4. Rear window side molding  | 7. Rear window glass |
| 2. Rear header trim  | 5. Rear window lower molding | 8. Spacer            |
| 3. Rear pillar trim  | 6. Rear window upper molding | 9. Seat belt bolts   |

#### Note

Use window tool set (49 0305 870A) to remove and install the glass.

## Coupe/MX-6

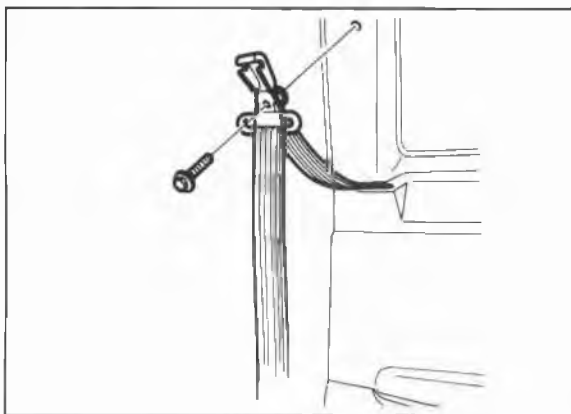


76G14X-046

- |                     |                              |                              |
|---------------------|------------------------------|------------------------------|
| 1. Seat belt bolts  | 5. Rear window side molding  | 8. Rear window lower molding |
| 2. Rear side trim   | 6. Rear package tray         | 9. Rear window glass         |
| 3. Rear header trim | 7. Rear window upper molding | 10. Spacer                   |
| 4. Rear pillar trim |                              | 11. Clips                    |



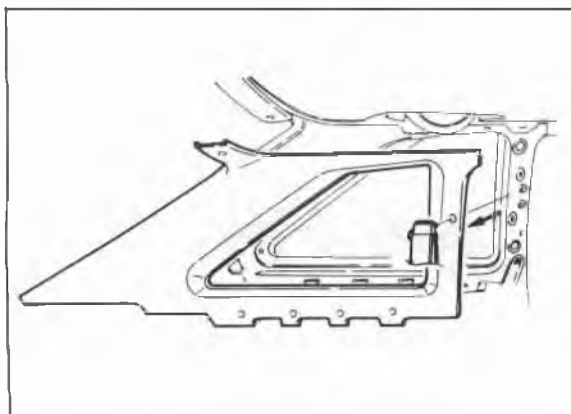
# 14 REAR WINDOW GLASS



86U14X-127

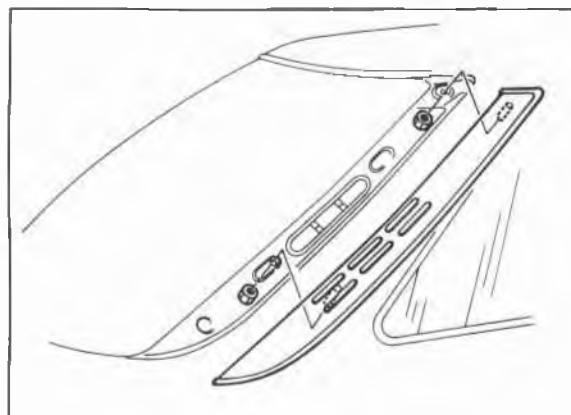
## REMOVAL

1. Disconnect the negative battery cable.
2. Disconnect the defogger connector.
3. Remove the seat belts.



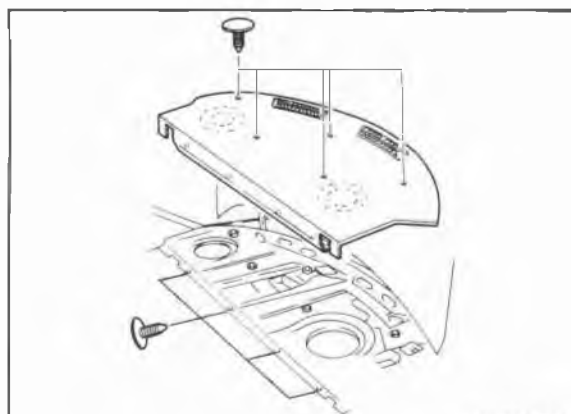
76G14X-034

4. Remove the screws and the quarter trim.
5. Remove the screws and the center pillar trim.
6. Remove the screws and the rear header.



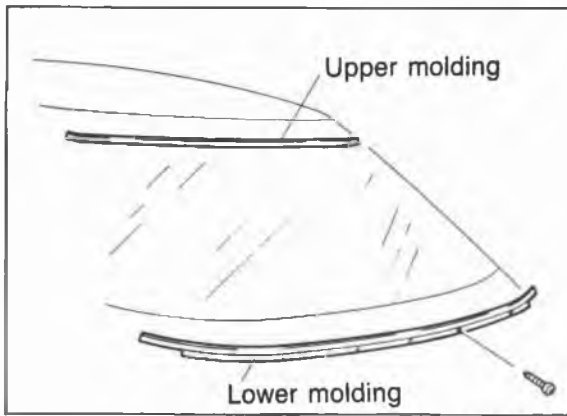
86U14X-129

7. Remove the nuts and the rear window side molding.



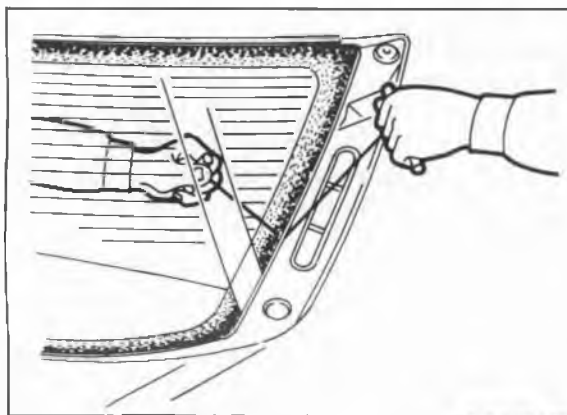
86U14X-130

8. Remove the fasteners and the rear package tray.



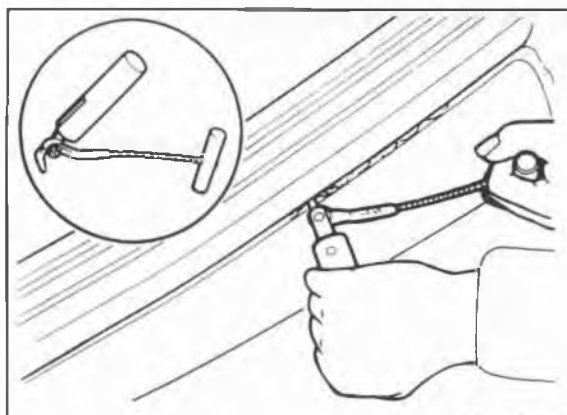
86U14X-131

9. Remove the lower and upper window molding.



86U14X-132

10. Use an awl to make a hole in the sealant. Pass the end of a piece of the piano wire (**about 40 cm 15.7 in**) through the hole, and attach bars to both ends.
11. Apply protective tape along the edge of the body to the glass as shown.
12. Two people should hold the bars, one inside and one outside the vehicle, and then "saw" the sealant from around the glass.
13. Remove the glass from the body.

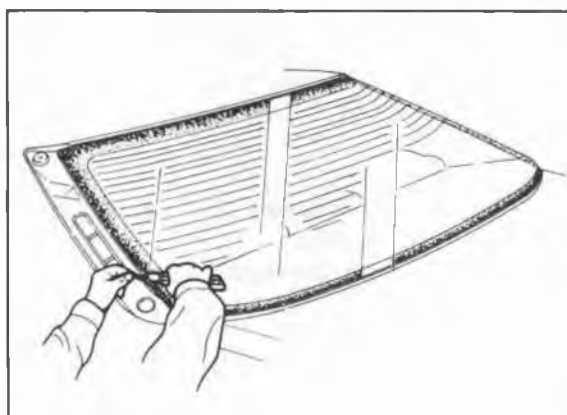


86U14X-133

### Caution

- a) Cut along the border between the glass and the sealant.
- b) If too much heat develops, the piano wire may break, so cool it occasionally, or don't work on one place too long.
- c) If the glass is not to be reused, a tool like that shown in the figure is faster than piano wire.

Insert the blade in the sealant, pull on the bars, and cut the sealant.



86U14X-134

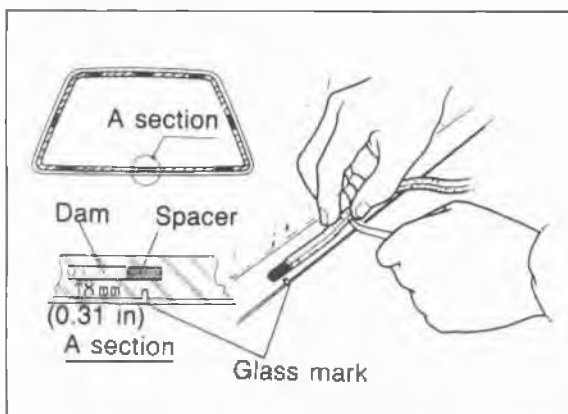
### INSTALLATION

1. Use a knife to smoothly trim the sealant on the body. Leave a layer about **1 or 2 mm (0.04 to 0.08 in)** thick.

### Caution

If some sealant flakes off, use new sealant to patch it.

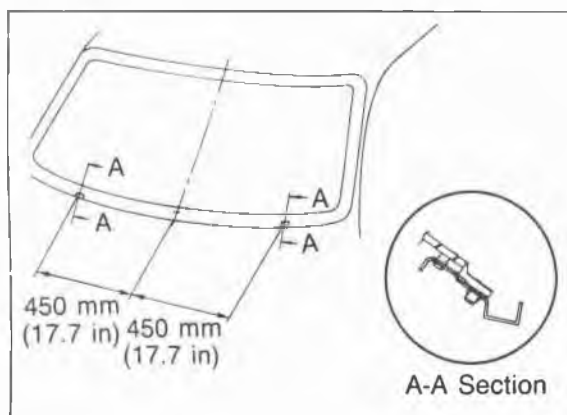
# 14 REAR WINDOW GLASS



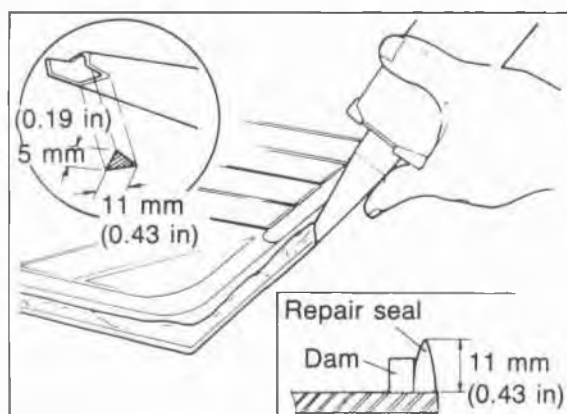
63U14X-064



63U14X-065



63U14X-066



63U14X-067

2. Carefully clean and remove any grease from a **5 cm (1.97 in)** wide area around the circumference of the glass and the remaining bond on the body.
3. Bond a dam along the circumference of the glass **8 mm (0.31 in)** from the edge.

### Caution

**Securely bond the dam and let it dry.**

4. Apply primer with a brush to the circumference of the glass and the body and let them naturally dry for 20 to 30 minutes.

### Caution

**Be sure not to allow dirt, water, oil, etc. to come in contact with the coated surfaces and do not touch it with your hand.**

5. Install the spacers at the positions shown in the figure.

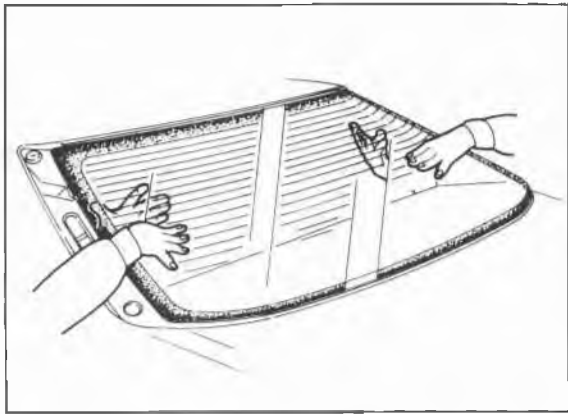
### Caution

**Spacer, with flaws, must be replaced.**

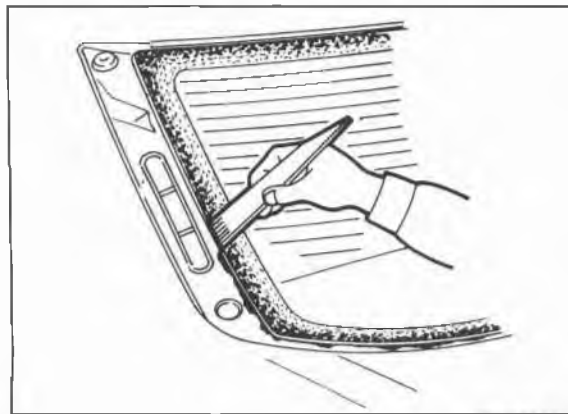
6. When the primer has dried, apply an **11 mm (0.43 in)** thick bead of **repair seal (B001 77 739)** **11 mm (0.43 in)** from the periphery of the window glass using a sealant gun.

### Caution

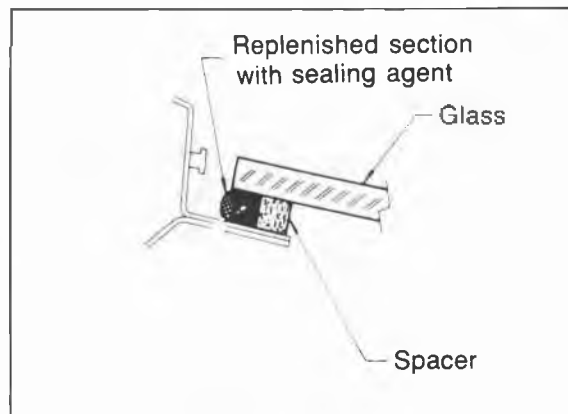
**Cut the nozzle of the repair seal cartridge as illustrated in the figure. If necessary, smooth the repair seal to correct any irregularities.**



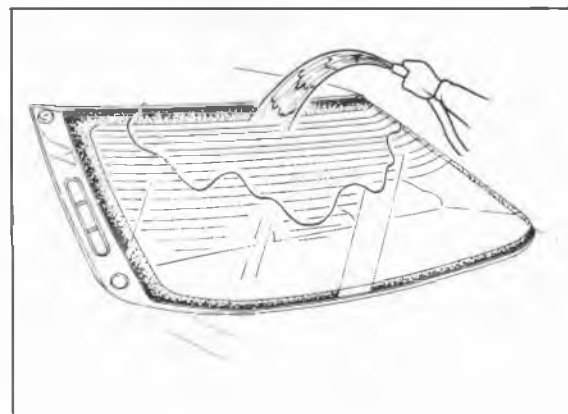
86U14X-135



63U14X-069



63U14X-070



86U14X-136

7. Attach the back door glass to the body.

### Caution

**Keep the door glass open until the repair seal hardens to some degree to prevent pressure from being exerted on the rear glass, if the door is closed quickly.**

### Hardening time of repair seal

Temperature	Surface hardening time	Time required until car can be put in service
5°C (41°F)	Approx. 1.5 hrs	12 hrs
20°C (68°F)	Approx. 1 hr	4 hrs
35°C (95°F)	Approx. 10 min	2 hrs

8. Remove any excess or add repair seal where necessary.

9. Check for water leaks. If a leak is found, wipe the water off well and add **repair seal** (B001 77 739).

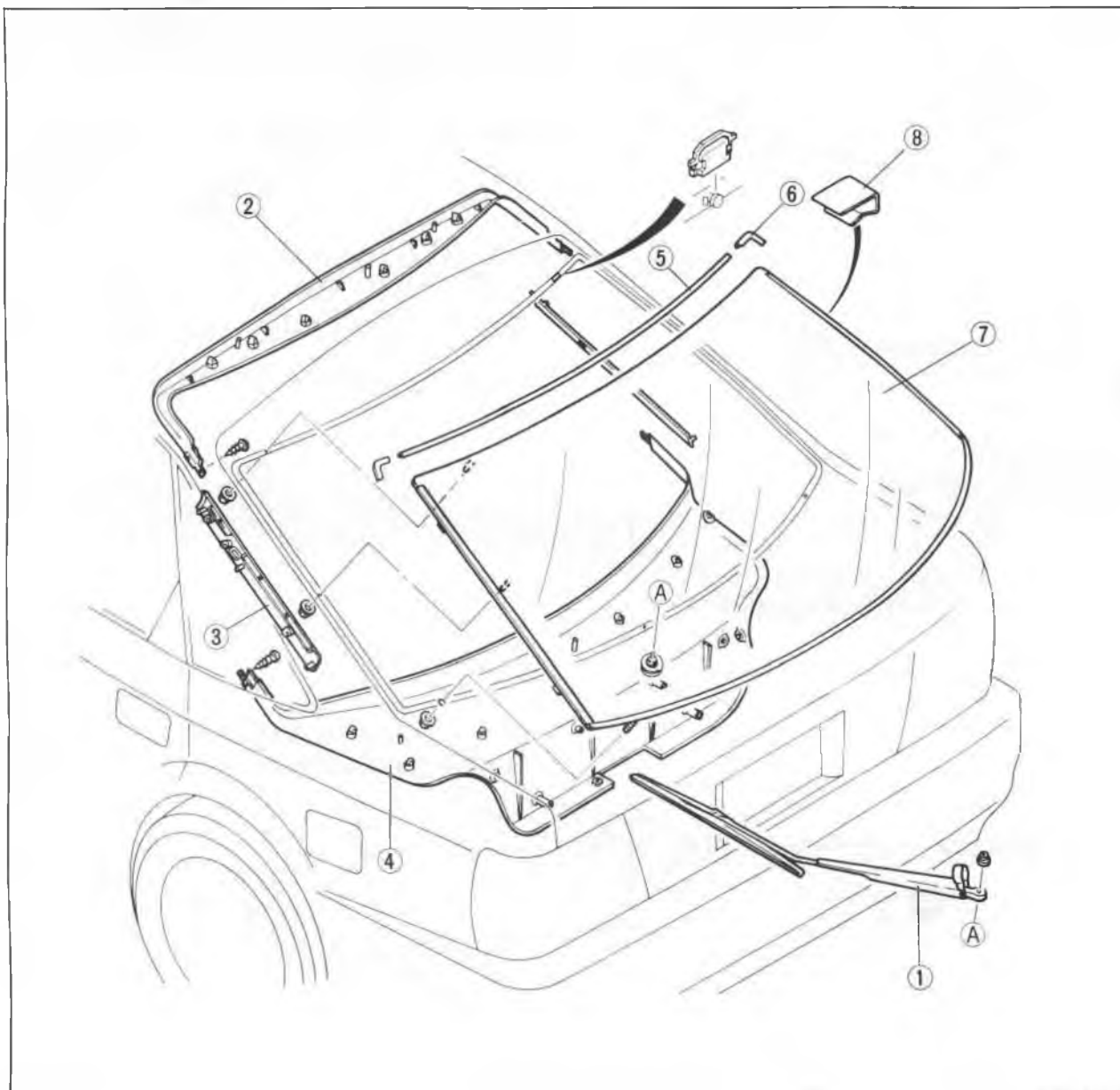
10. After checking for water leakage, install the molding and trim.

11. Connect the defogger connector.

# 14 REAR HATCH GLASS

## REAR HATCH GLASS

### STRUCTURAL VIEW



86U14X-137

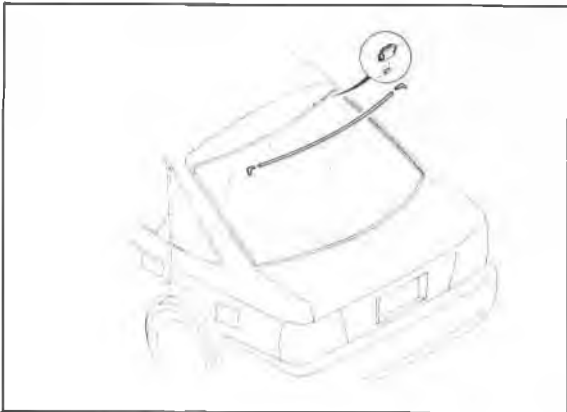
- 1. Rear wiper arm
- 2. Upper trim
- 3. Side trim

- 4. Lower trim
- 5. Window upper molding
- 6. Window upper molding joint

- 7. Rear hatch glass
- 8. Clips

#### Note

Use window tool set (49 0305 870A) to remove and install the glass.



86U14X-138

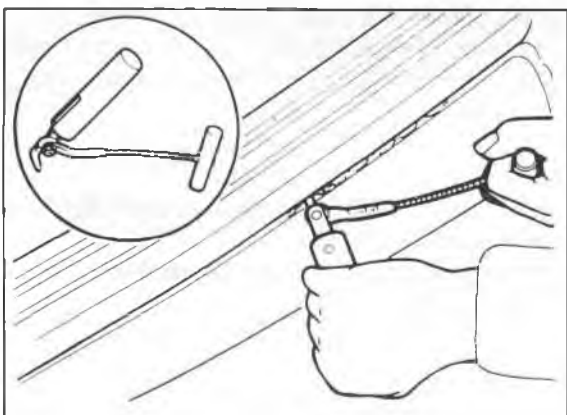
## REMOVAL

1. Remove the wiper arm, rear hatch trim and defogger connector.
2. Remove the rear window upper molding.
3. Remove the glass mounting nuts.



86U14X-139

4. Use an awl to make a hole in the sealant. Pass the end of a piece of the piano wire (**about 40 cm 15.7 in**) through the hole, and attach bars to both ends.
5. Apply protective tape along the edge of the rear hatch body to the glass as shown.
6. Two people should hold the bars, one inside and one outside the vehicle, and then "saw" the sealant from around the glass.
7. Remove the glass from the back door body.

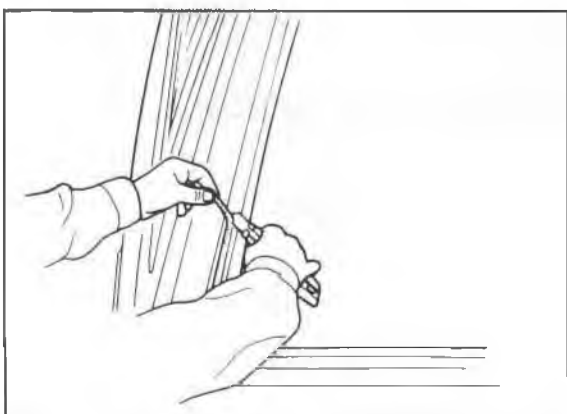


86U14X-140

## Caution

- a) **Cut along the border between the glass and the sealant.**
- b) **If too much heat develops, the piano wire may break, so cool it occasionally or don't work on one place too long.**
- c) **If the glass is not to be reused, a tool like that shown in the figure is faster than piano wire.**

Insert the blade in the sealant, pull on the bars, and cut the sealant.



86U14X-141

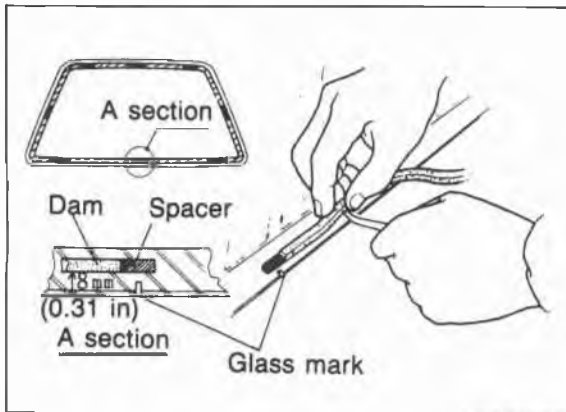
## INSTALLATION

1. Use a knife to smoothly trim the sealant on the body. Leave a layer about **1 or 2 mm (0.04 to 0.08 in)** thick.

## Caution

**If some sealant flakes off, use new sealant to patch it.**

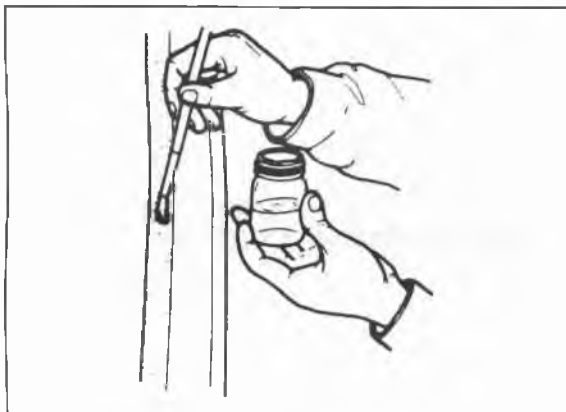
# 14 REAR HATCH GLASS



63U14X-064

2. Carefully clean and remove any grease from a **5 cm (1.97 in)** wide area around the circumference of the glass and the remaining bond on the body.
3. Bond a dam along the circumference of the glass **8 mm (0.31 in)** from the edge.

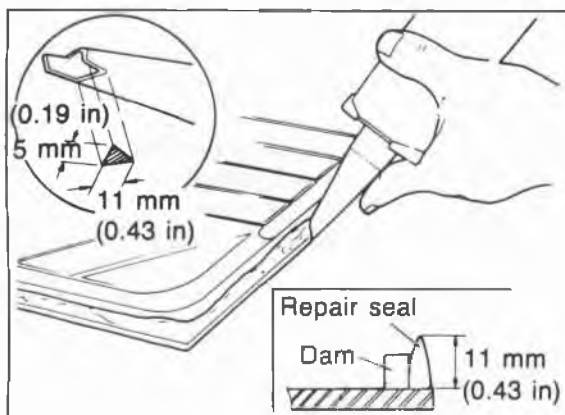
**Caution**  
Securely bond the dam and let it dry.



63U14X-065

4. Apply primer with a brush to the circumference of the glass and the body and let them naturally dry for **20 to 30 minutes**.

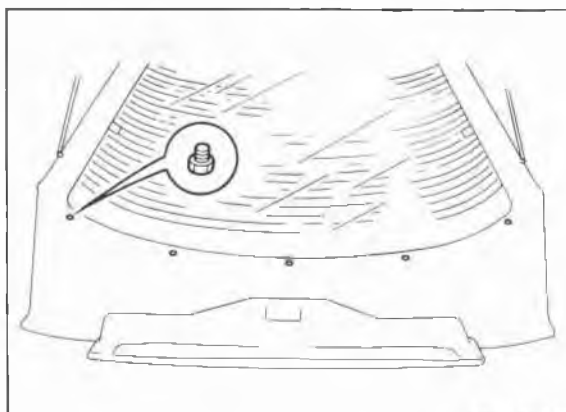
**Caution**  
Be sure not to allow dirt, water, oil, etc. to come in contact with the coated surfaces and do not touch it with your hand.



63U14X-067

5. When the primer has dried, apply an **11 mm (0.43 in)** thick bead of **repair seal (B001 77 739)** **11 mm (0.43 in)** from the periphery of the window glass using a sealant gun.

**Caution**  
Cut the nozzle of the repair seal cartridge as illustrated in the figure.  
If necessary, smooth the repair seal to correct any irregularities.

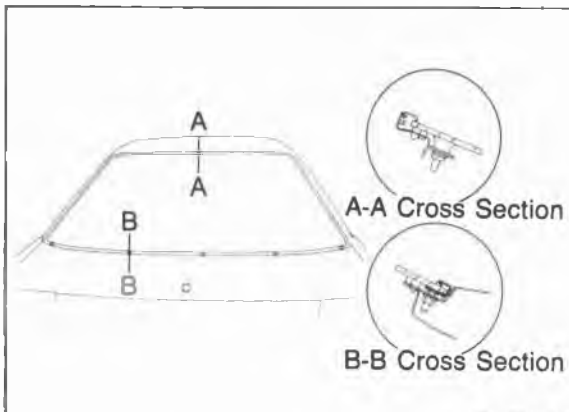


86U14X-142

6. Tighten the rear hatch glass mounting nuts.

**Tightening torque:**  
**2.9 N·m (30 cm·kg, 26 in·lb)**

# REAR HATCH GLASS 14

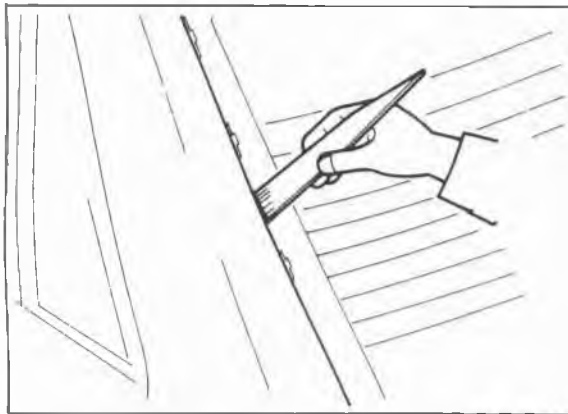


86U14X-143

- Keep the door glass open until the repair seal hardens to some degree to prevent pressure from being exerted on the rear hatch glass. If the door is closed quickly etc.

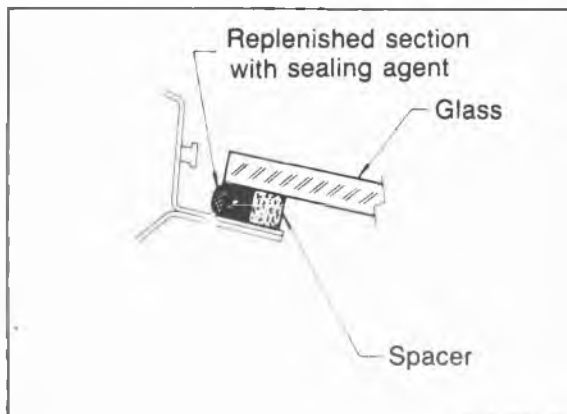
### Hardening time of repair seal

Temperature	Surface hardening time	Time required until car can be put in service
5°C (41°F)	Approx. 1.5 hrs	12 hrs
20°C (68°F)	Approx. 1 hr	4 hrs
35°C (95°F)	Approx. 10 min	2 hrs



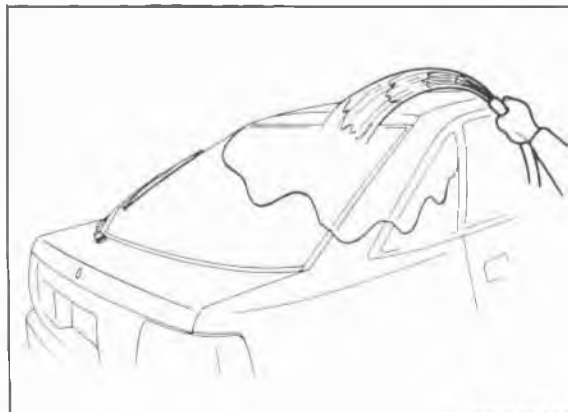
86U14X-144

- Remove any excess or add repair seal where necessary.



86U14X-146

- Check for water leaks. If a leak is found, wipe the water off well and add **repair seal** (B001 77 739).



86U14X-147

- After checking for water leakage, install the mold.
- Install the wiper arm, door trim, and defogger connector.

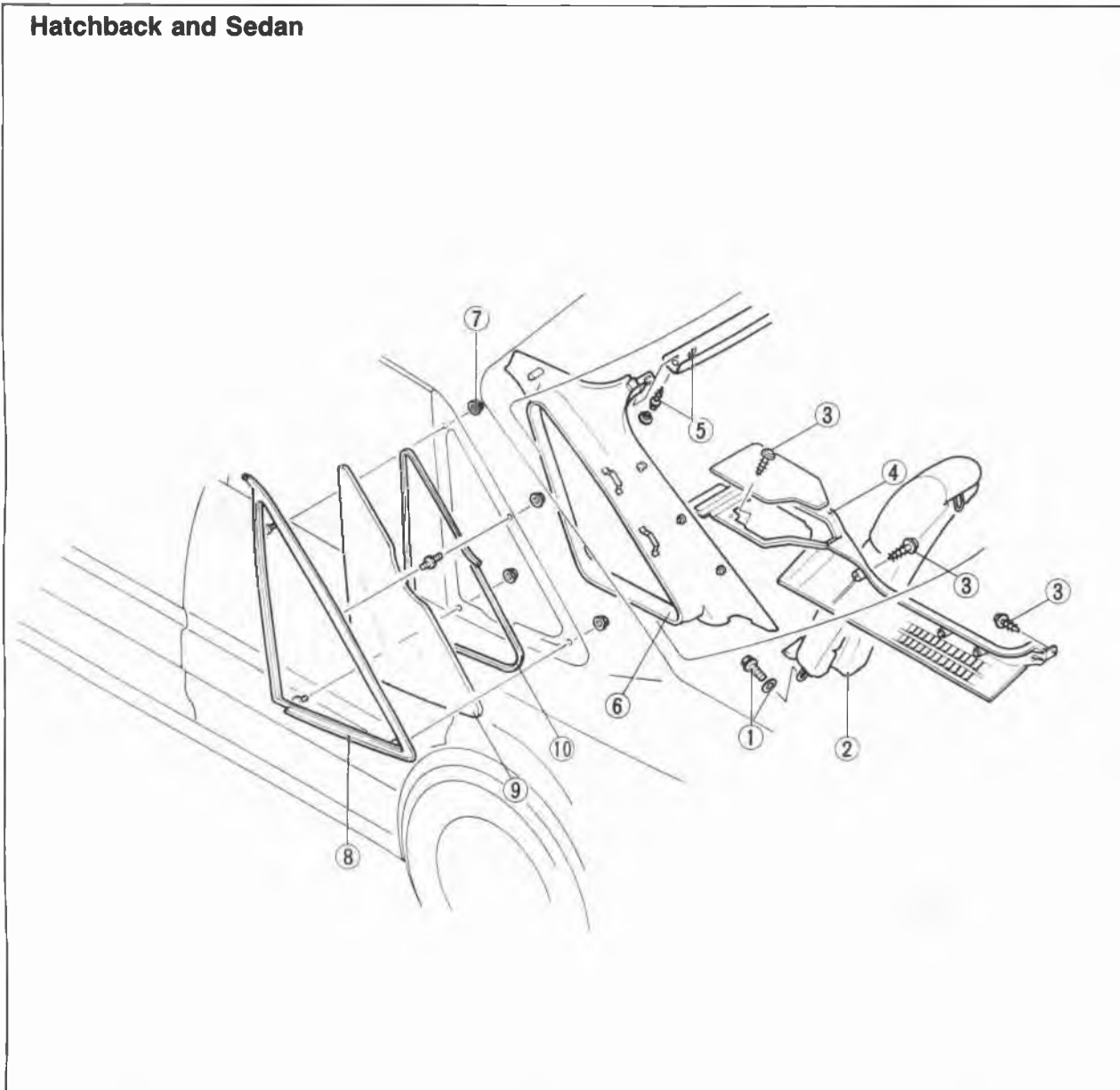


# 14 QUARTER WINDOW GLASS

## QUARTER WINDOW GLASS

### STRUCTURAL VIEW

Hatchback and Sedan



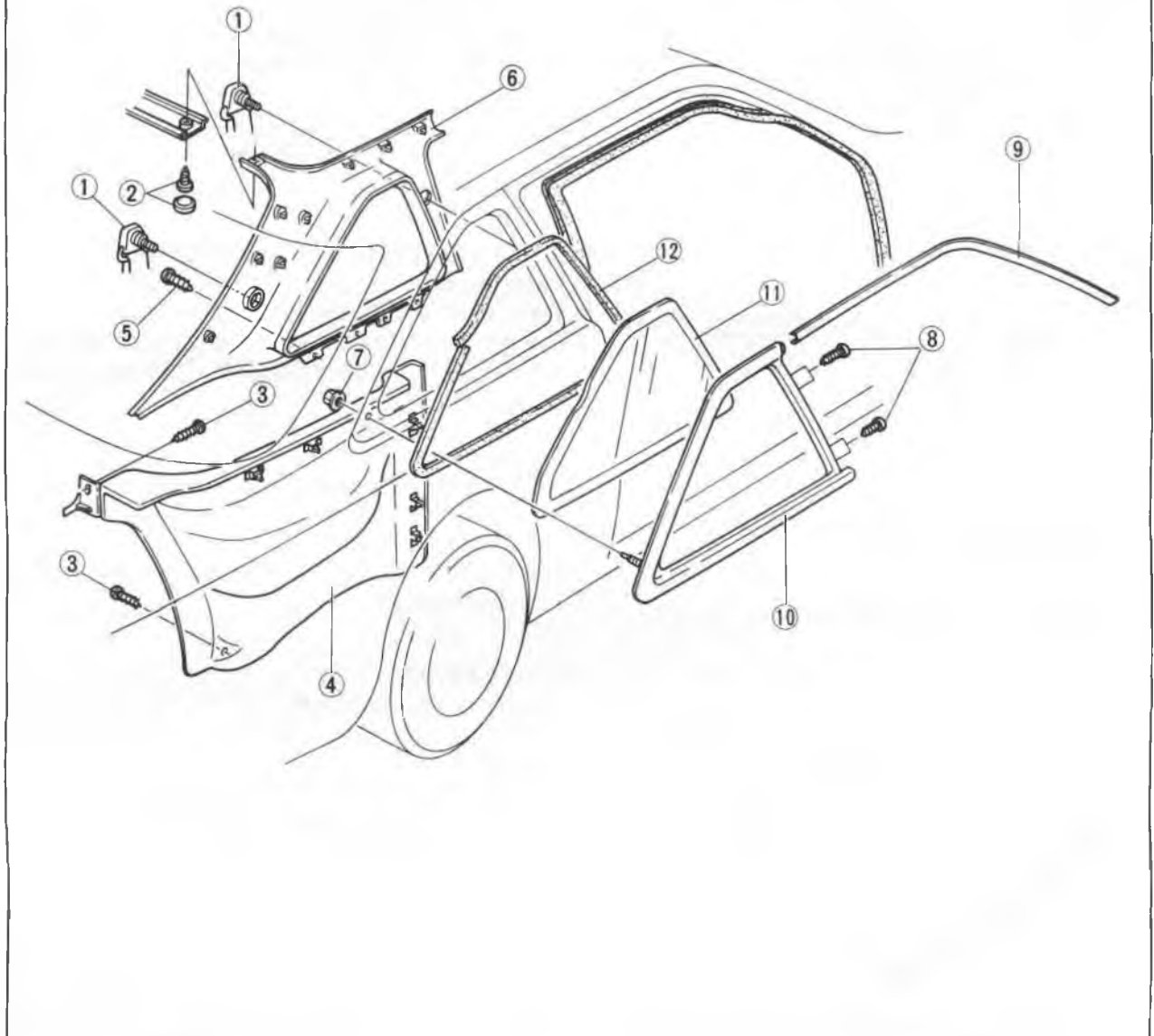
76G14X-024

- |                       |                                      |                           |
|-----------------------|--------------------------------------|---------------------------|
| 1. Bolt               | 4. Package side shelf<br>(Hatchback) | 7. Nuts                   |
| 2. Rear side seatback | 5. Rear header trim screw            | 8. Quarter window molding |
| 3. Screw (Hatchback)  | 6. Rear pillar trim                  | 9. Quarter window glass   |
|                       |                                      | 10. Dam                   |

#### Note

Use window tool set (49 0305 870A) to remove and install the glass.

## Coupe/MX-6



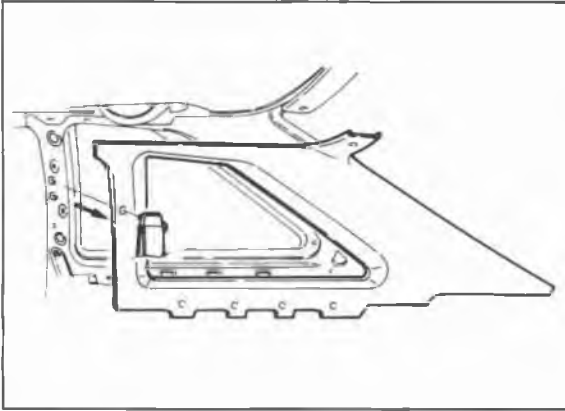
86U14X-149

- 1. Seat belt bolts
- 2. Screw
- 3. Screw
- 4. Side trim

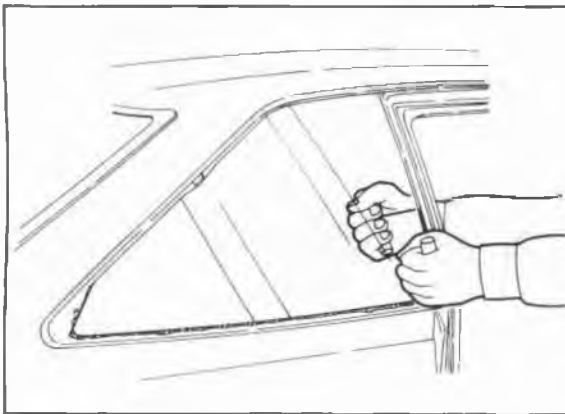
- 5. Screw
- 6. Rear pillar trim
- 7. Nut
- 8. Screw

- 9. Drip molding
- 10. Quarter window molding
- 11. Quarter window glass
- 12. Dam

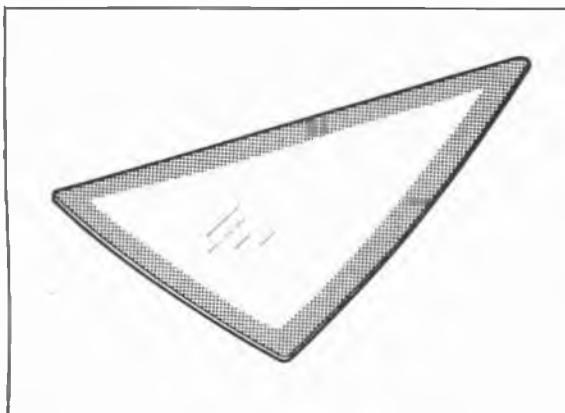
# 14 QUARTER WINDOW GLASS



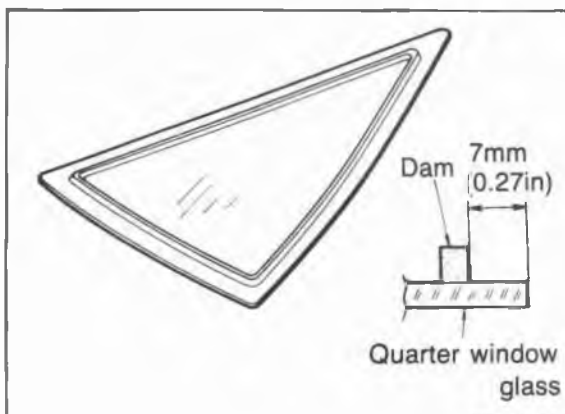
76G14X-025



86U14X-151



86U14X-152



86U14X-153

## REMOVAL

1. Fold down the rear seatback, and remove the rear side seatback. (Hatchback)
2. Remove the luggage compartment cover and the package side shelf. (Hatchback)
3. Remove the seat bolts.
4. Remove the rear pillar trim.
5. Remove the mounting nut and fastener, and remove the quarter window molding.

6. Make a small hole through the sealant.
7. Pass the piano wire through the hole.
8. Wind each end of the wire around a bar.
9. Pull the wire to and fro, and saw through the sealant around the edge of the glass. Then remove the glass.

## Caution

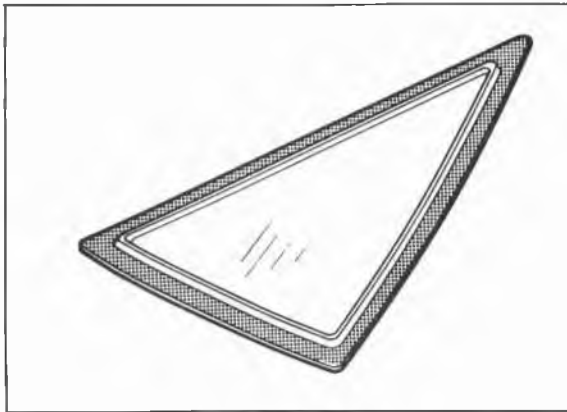
- a) Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking.
- b) Be careful that the wire does not rub on the vehicle paint.

## INSTALLATION

1. Use the knife to smoothly cut the sealant on the body side, leaving a layer about **1 or 2 mm (0.04 to 0.08 in)** thick.
2. Carefully clean around the edge of the quarter window glass (**up to approx. 5 cm (0.2 in)** from the edge), and the adhesion surface at the body side.

3. Attach a **dam (G043 50 762)** around the glass, **approx. 7 mm (0.28 in)** from the edge.

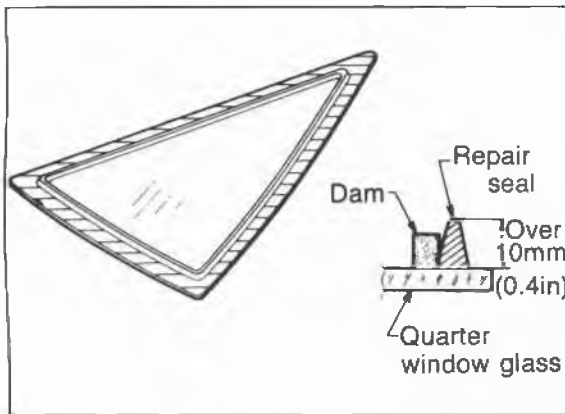
## QUARTER WINDOW GLASS 14



86U14X-154

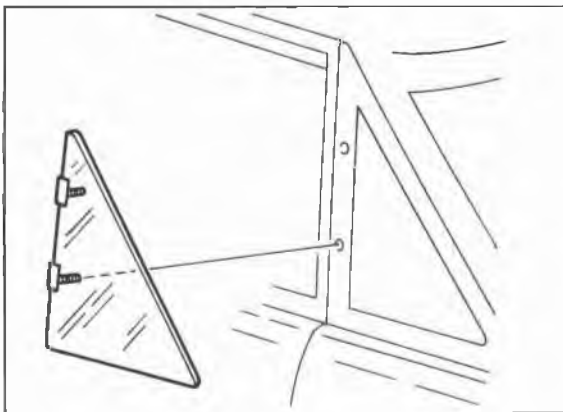
4. Apply a thin coat of primer to the bonding area of the body and glass, and **allow 30 minutes** for it to dry.

**Caution**  
**Keep the area free of dirt. Do not touch the surface. If primer gets on the hands, remove it immediately.**



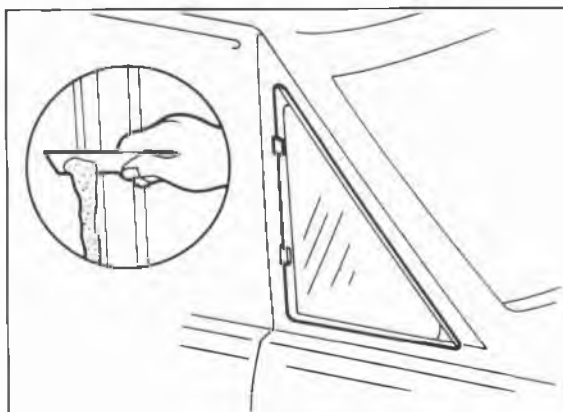
86U14X-155

5. After the primer dries, apply a bead of repair seal to a height of **10 mm (0.4 in) min.** around the edge of the glass.



86U14X-156

6. Attach the glass to the body.

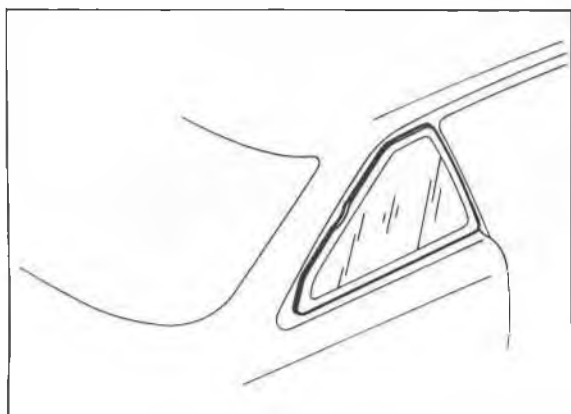


86U14X-157

7. Remove excess sealant. Add sealant where necessary.

# 14 QUARTER WINDOW GLASS

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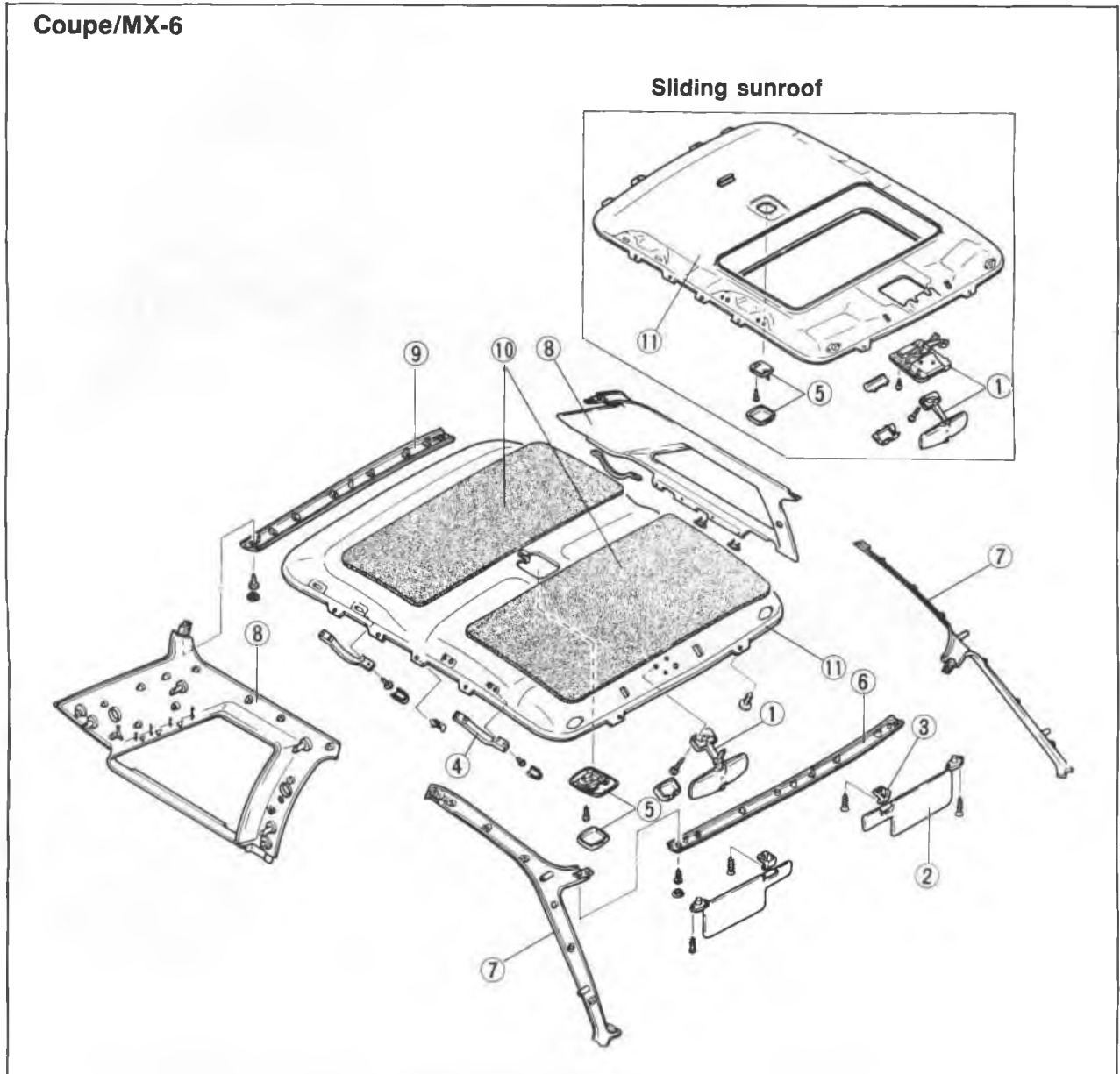
86U14X-158

8. Check for water leaks. If a leak is found, wipe the water off well and add **repair seal** (B001 77 739).
9. Install in the reverse order of removal.

## HEADLINER

### STRUCTURAL VIEW

Coupe/MX-6



86U14X-159

- 1. Rearview mirror and overhead console
- 2. Sunvisor
- 3. Center adapter

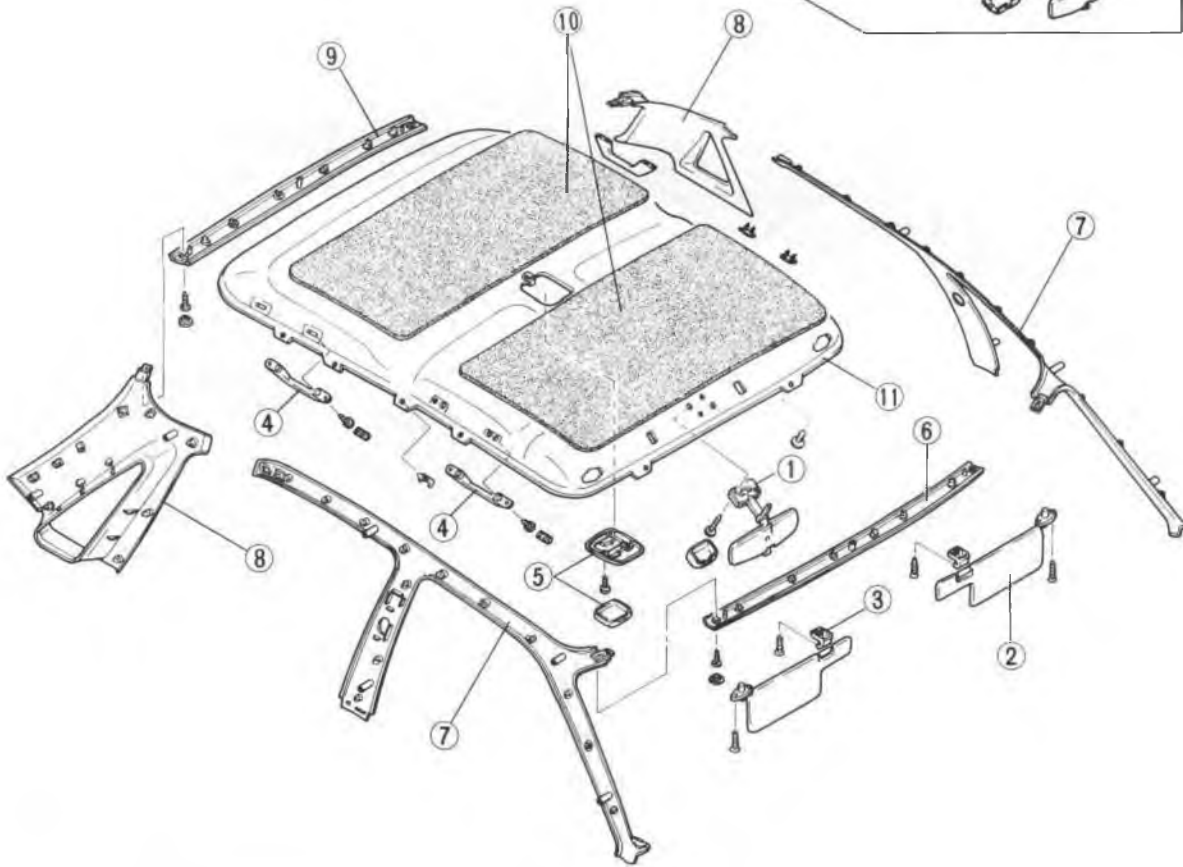
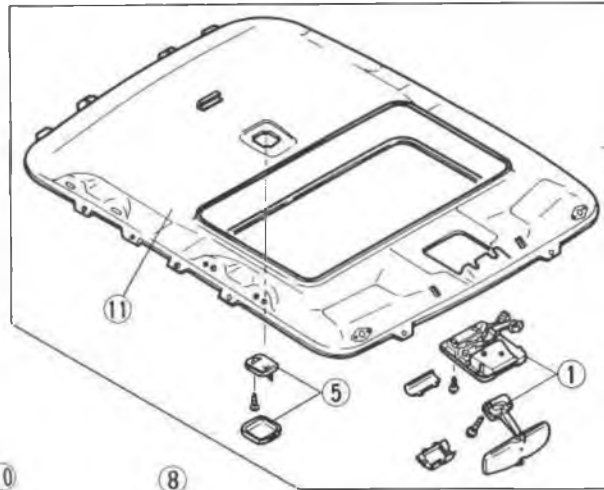
- 4. Assist handle
- 5. Interior light
- 6. Front header trim
- 7. Front pillar trim

- 8. Rear pillar trim
- 9. Rear header trim
- 10. Insulator
- 11. Headliner

# 14 HEADLINER

## Sedan and Hatchback

### Sliding sunroof

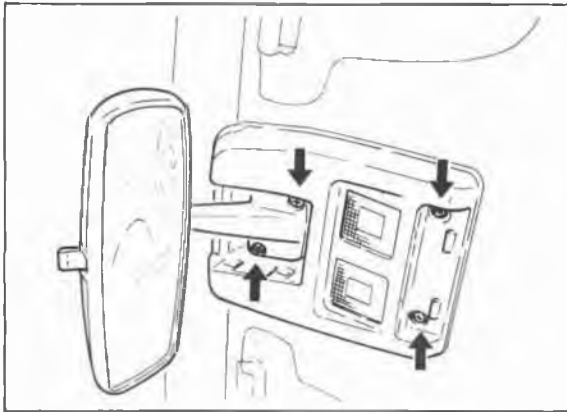


86U14X-160

- 1. Rearview mirror and overhead console
- 2. Sunvisor
- 3. Center adapter

- 4. Assist handle
- 5. Interior light
- 6. Front header trim
- 7. Front pillar trim

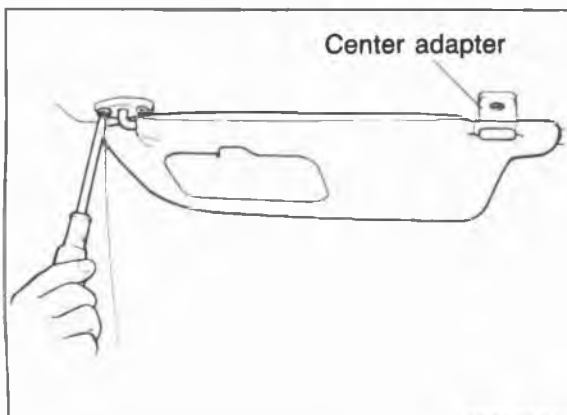
- 8. Rear pillar trim
- 9. Rear header trim
- 10. Insulator
- 11. Headliner



86U14X-161

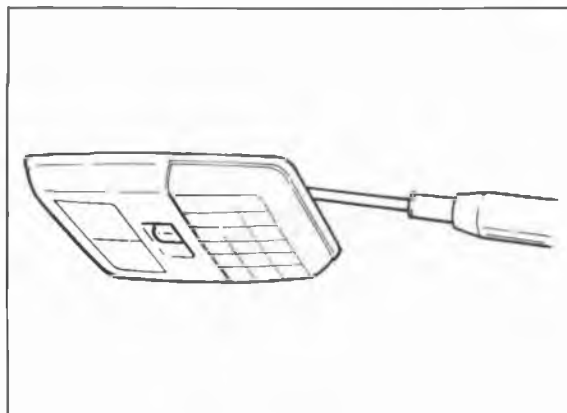
## REMOVAL

1. Remove the overhead console cover.
2. Remove the rearview mirror.
3. Remove the overhead console mounting screws.
4. Disconnect the connectors and remove the overhead console.



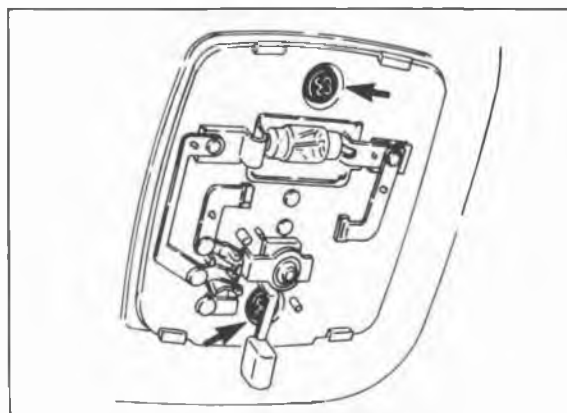
69G14X-241

5. Remove the sunvisors.
6. Remove the center adapters.



86U14X-162

7. Remove the interior light lens with a protected small screwdriver.

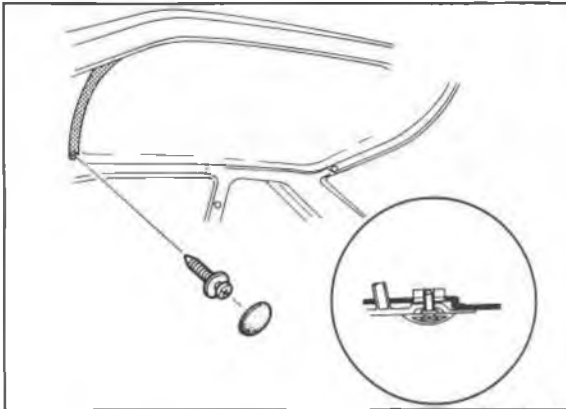


86U14X-163

8. Remove the interior light mounting screws and disconnect the connector.
9. Remove the interior light.

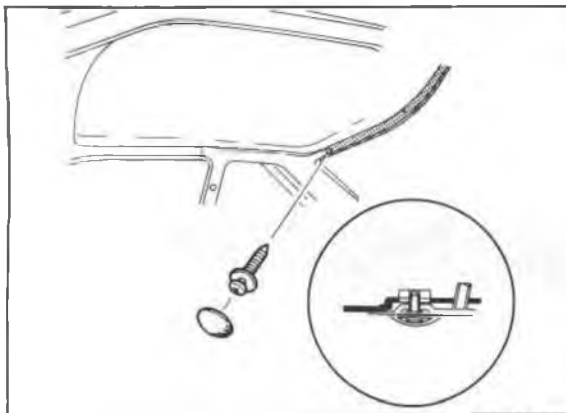


# 14 HEADLINER



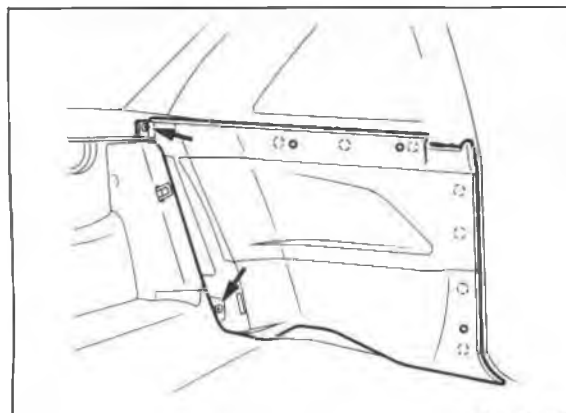
86U14X-164

10. Remove the caps and screws at the ends of the front header trim.



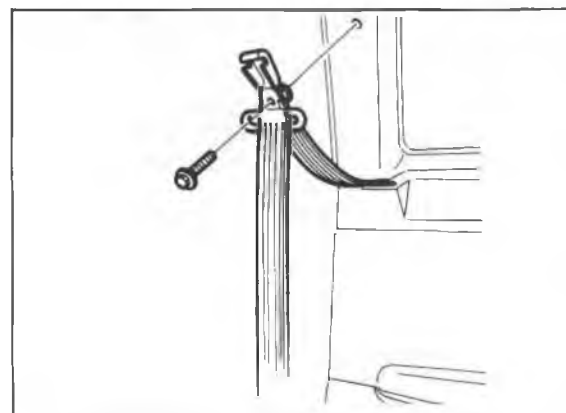
86U14X-165

11. Remove the caps and screws at the ends of the rear header trim.



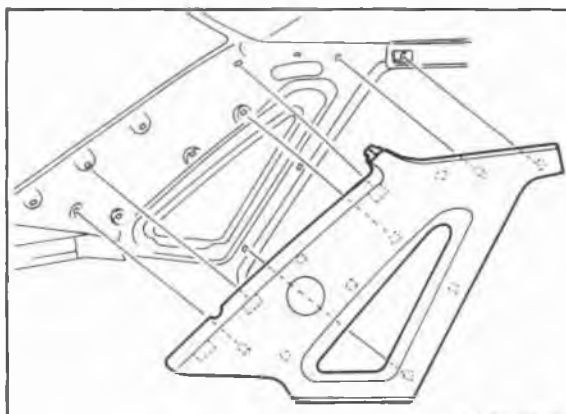
86U14X-166

12. Remove the rear side trim.



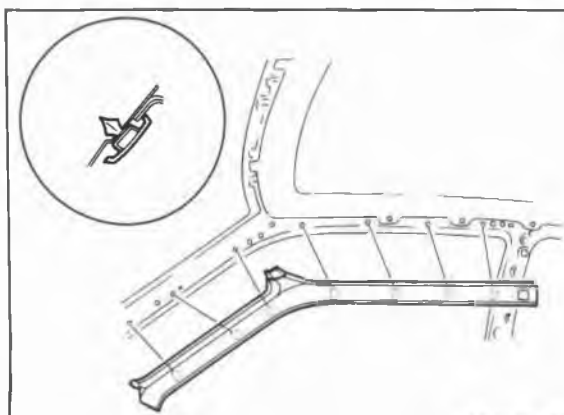
86U14X-167

13. Remove the seat belt mounting bolts.



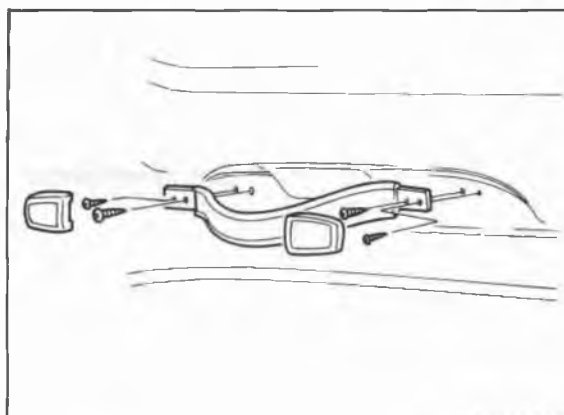
86U14X-168

14. Remove the rear pillar trim with a protected standard screwdriver.



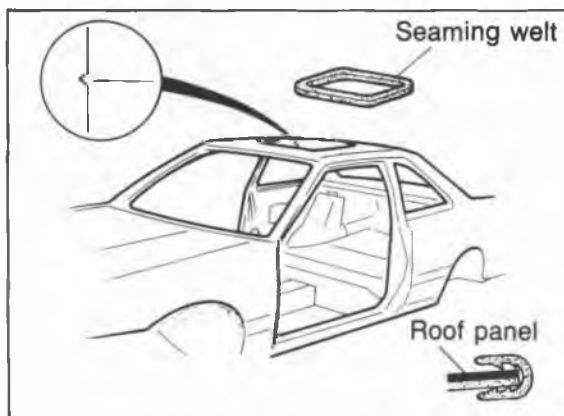
86U14X-169

15. Remove the front pillar trim using a protected standard screwdriver.



86U14X-170

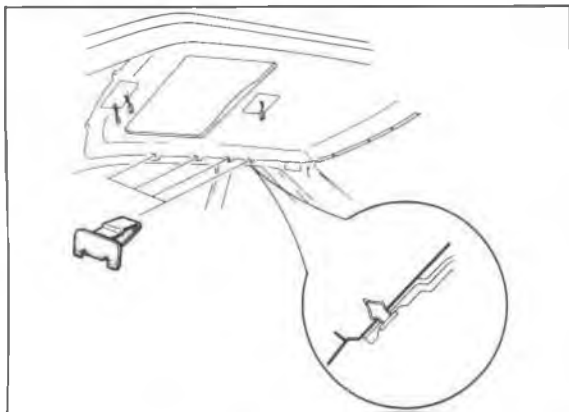
16. Remove the assist handles.



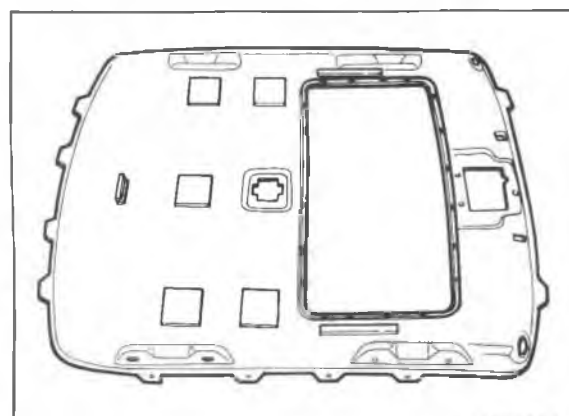
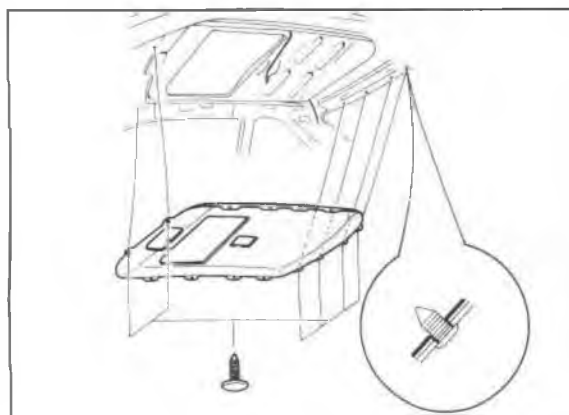
86U14X-171

17. Remove the sliding sunroof seaming welt.

# 14 HEADLINER



86U14X-172



86U14X-173

18. Remove the fasteners and remove the headliner.

## INSTALLATION

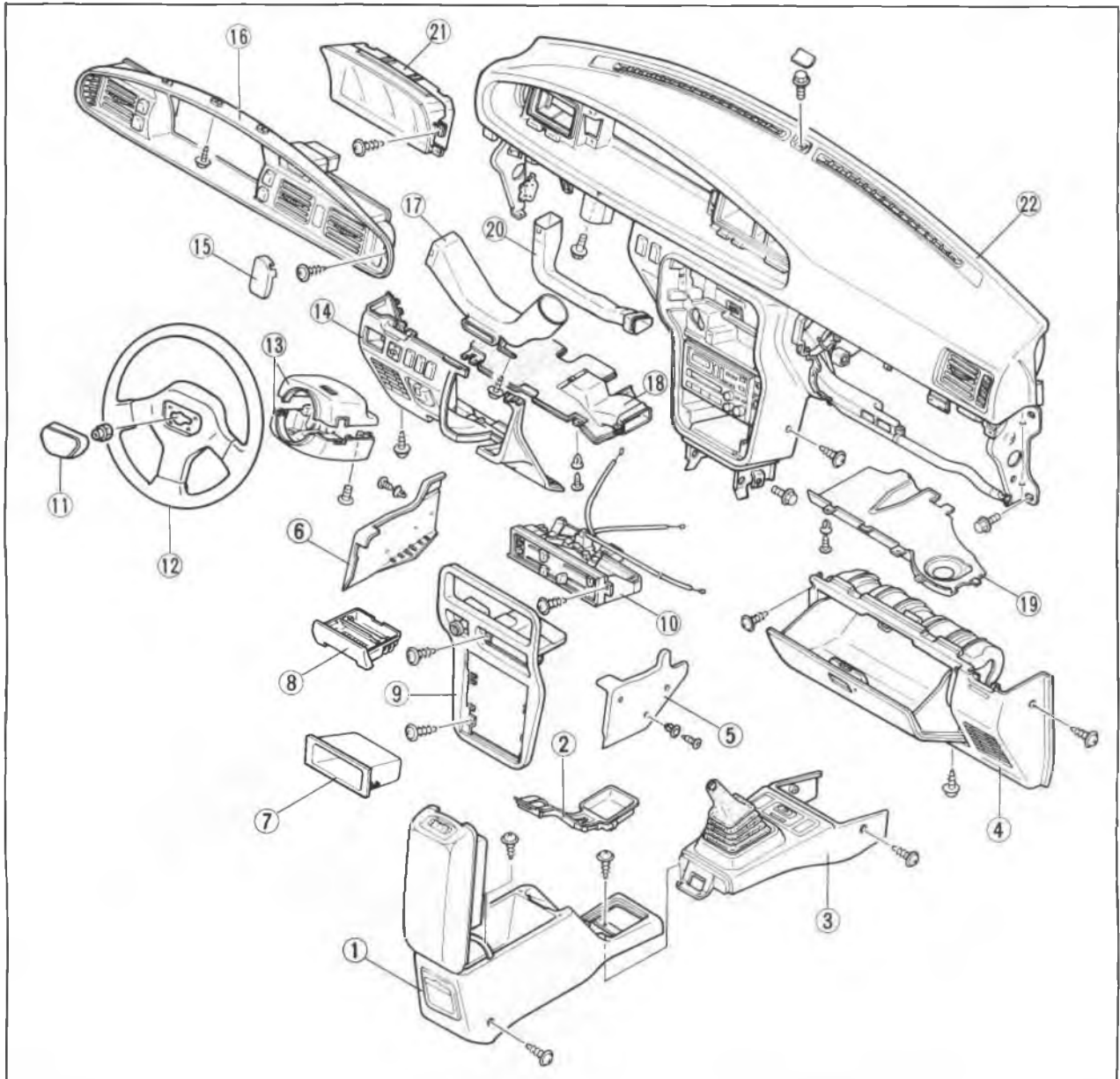
Install in the reverse order of removal, noting the following.

### Note

**Align the trim and clip positions, then install the clips by striking them lightly.**

## INSTRUMENT PANEL

### STRUCTURAL VIEW

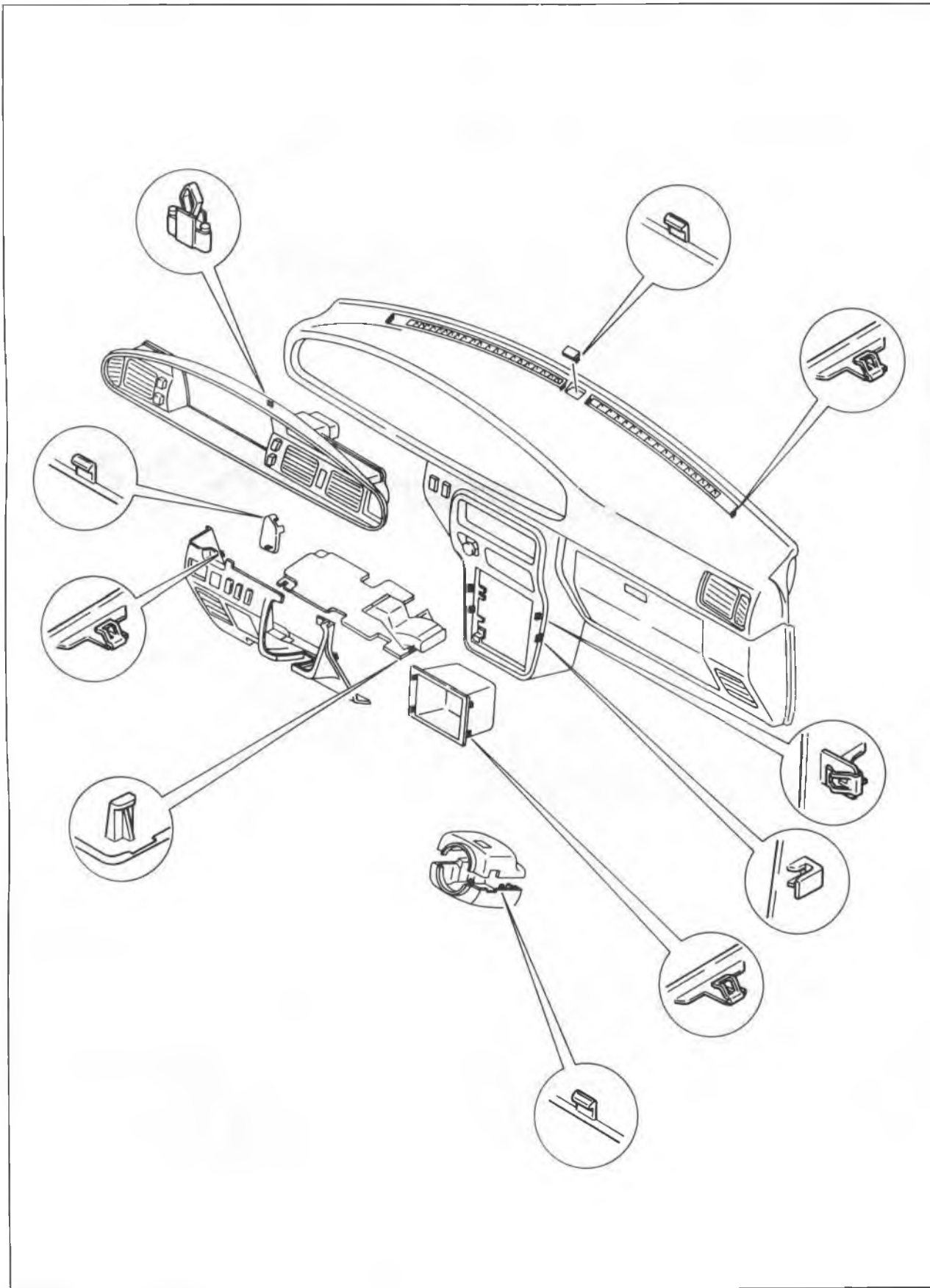


76G14X-036

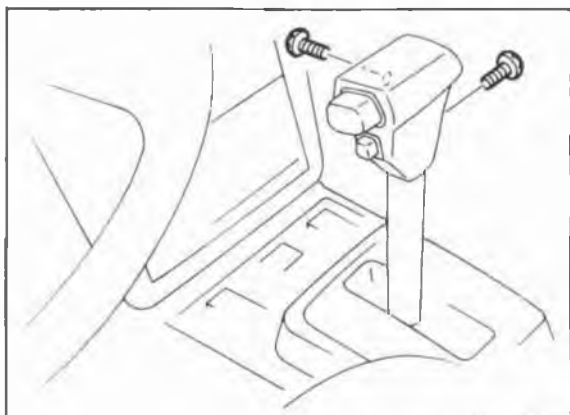
- |                      |                             |                          |
|----------------------|-----------------------------|--------------------------|
| 1. Rear console      | 8. Ashtray                  | 15. Cap                  |
| 2. Upper plate.      | 9. Center panel             | 16. Meter hood           |
| 3. Front console     | 10. Heater control assembly | 17. Duct                 |
| 4. Glove compartment | 11. Steering wheel cap      | 18. Duct and under cover |
| 5. Side cover        | 12. Steering wheel          | 19. Under cover          |
| 6. Side cover        | 13. Column cover            | 20. Duct                 |
| 7. Box               | 14. Switch panel            | 21. Meter assembly       |
|                      |                             | 22. Instrument panel     |

# 14 INSTRUMENT PANEL

## INSTALLATION VIEW



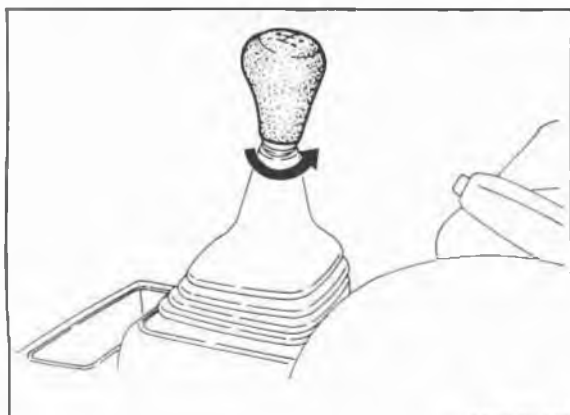
67U14X-003



86U14X-175

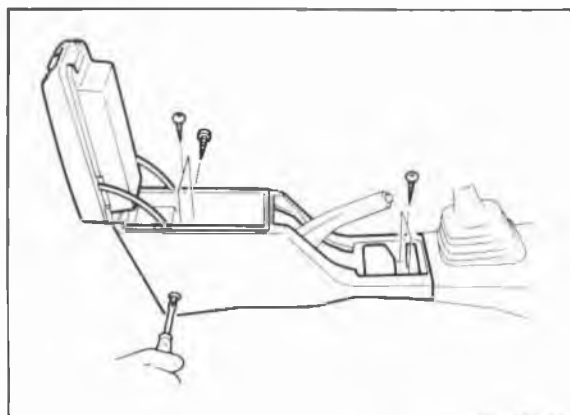
## REMOVAL

1. Remove the screws and remove the shift lever knob (ATX).



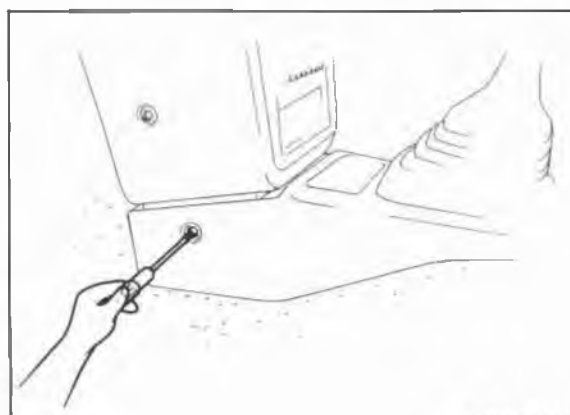
86U14X-176

2. Remove the shift lever knob (MTX).



86U14X-178

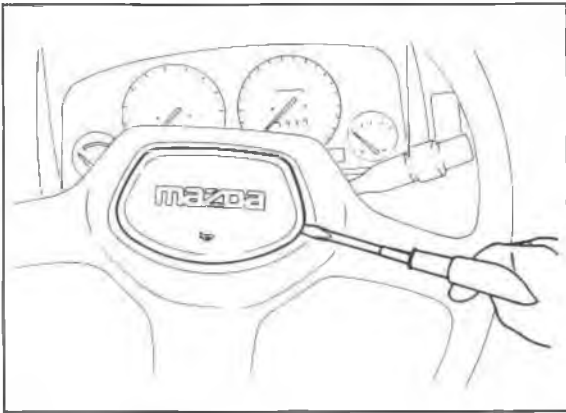
3. Remove the rear console mounting screws.  
4. Pull the console rearward and remove it.



86U14X-179

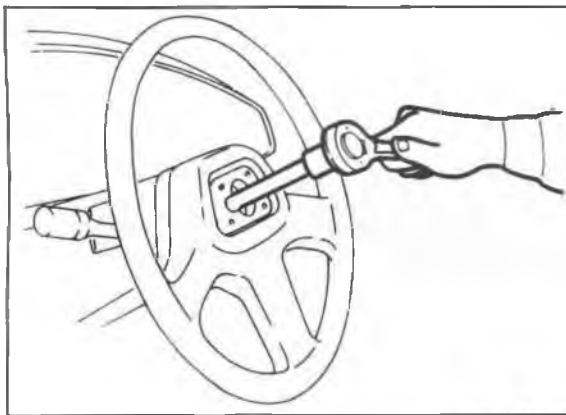
5. Remove the front console mounting screws.

# 14 INSTRUMENT PANEL



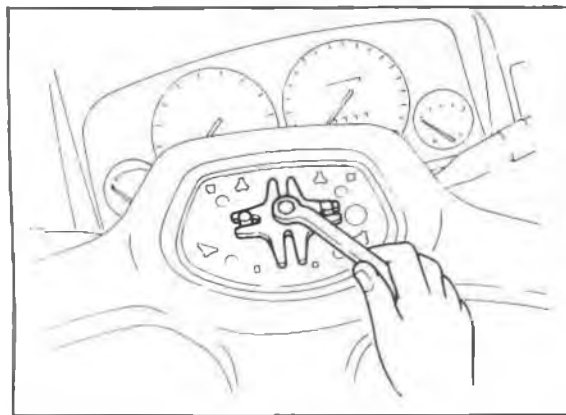
76G14X-026

6. Remove the steering wheel cap.



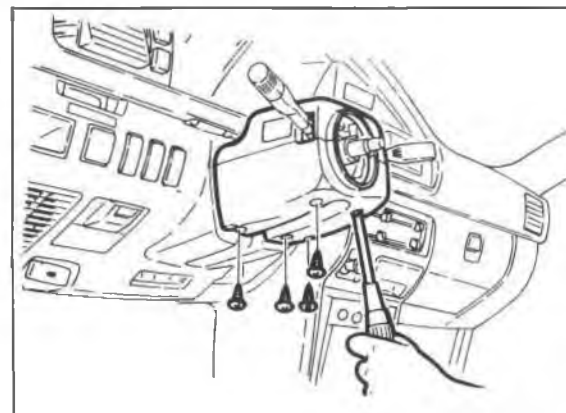
86U14X-180

7. Remove the steering wheel mounting nut.



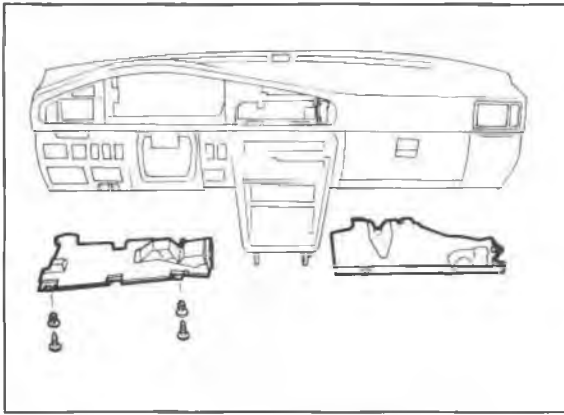
76G14X-027

8. Remove the steering wheel with a steering wheel puller.



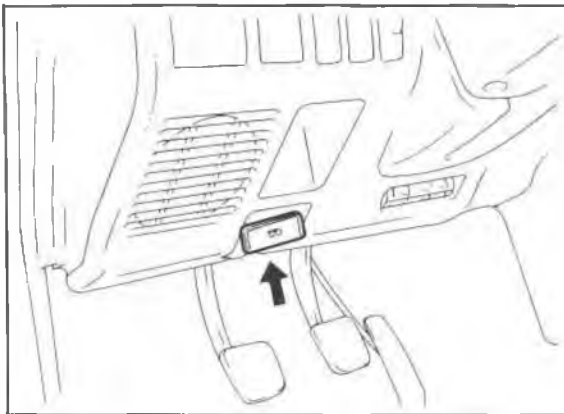
76G14X-028

9. Remove the screws and remove the column covers (upper and lower).



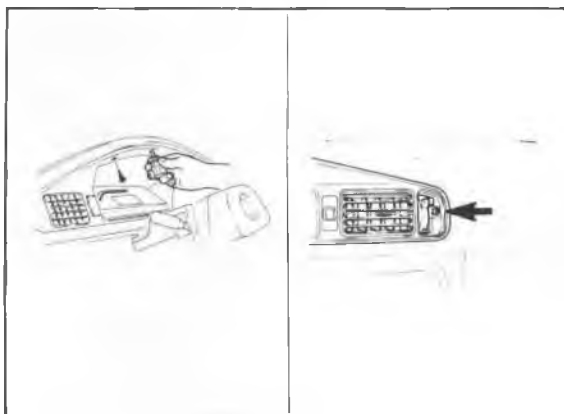
76G14X-029

10. Remove the screws and remove the under covers.



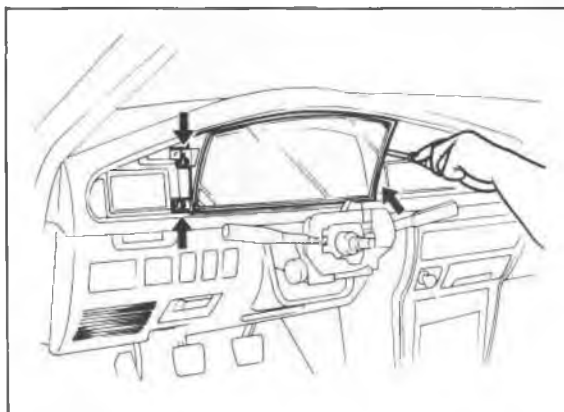
76G14X-030

11. Loosen the nut and remove the hood release knob.



86U14X-185

12. Remove the screws and pull out the meter hood.  
13. Disconnect the connectors and remove the meter hood.

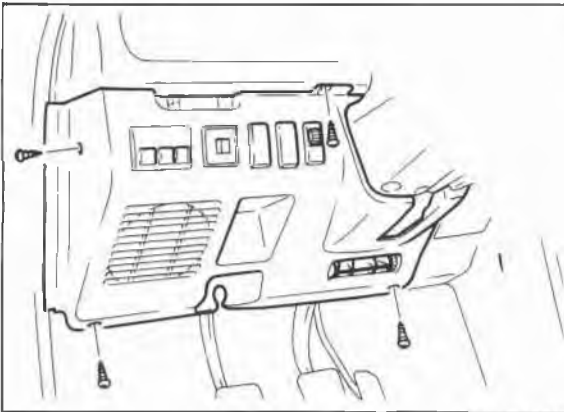


86U14X-186

14. Remove the screws and pull the meter assembly outward.  
15. Disconnect the speedometer cable at the speedometer.  
16. Disconnect the gauge connectors.  
17. Remove the meter assembly.

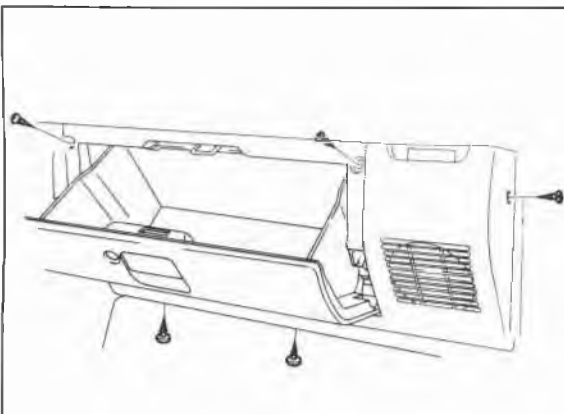


# 14 INSTRUMENT PANEL



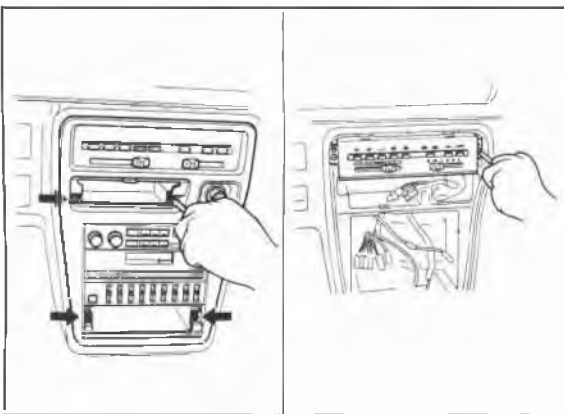
86U14X-187

18. Remove the screws and pull the panel outward.
19. Disconnect the connectors and remove the switch panel.



86U14X-188

20. Remove the screws and remove the glove box.
21. Disconnect the glove box light connector.

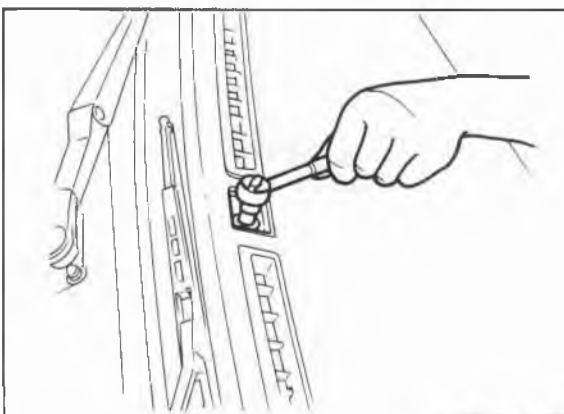


86U14X-189

22. Remove the center panel.
23. Remove the screws and slide out the heater control assembly.
24. Disconnect the control wires at the DEF, MAX—COLD and REC positions (lever type control).

### Note

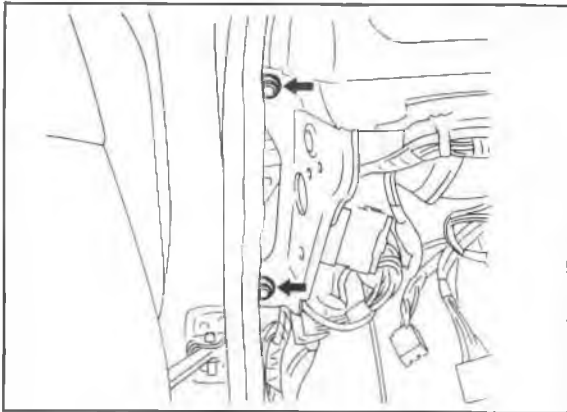
**Disconnect the connectors at the rear of the control (Logicon type).**



86U14X-190

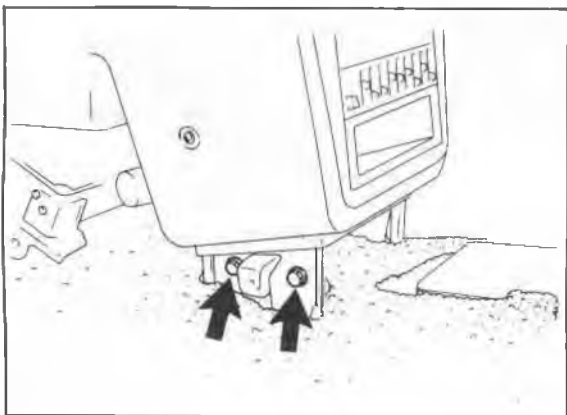
25. Remove the center cap.
26. Remove the instrument panel mounting bolt.

# INSTRUMENT PANEL 14



86U14X-191

27. Remove the instrument panel side mounting bolts.



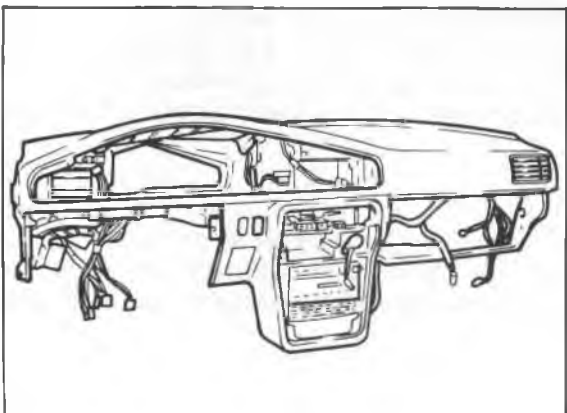
86U14X-192

28. Remove the instrument panel center bracket mounting bolts.



86U14X-193

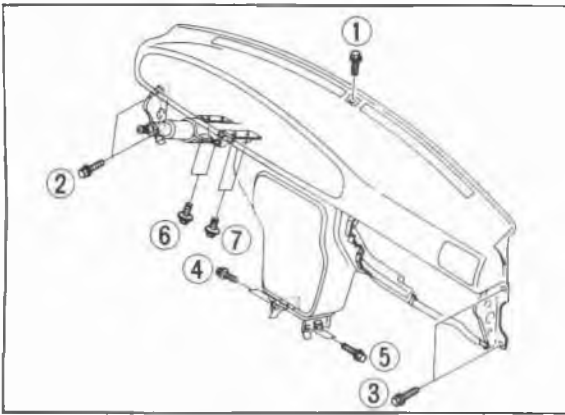
29. Remove the steering shaft mounting bolts.



86U14X-194

30. Disconnect the dash harness connectors.  
31. Remove the instrument panel.

# 14 INSTRUMENT PANEL



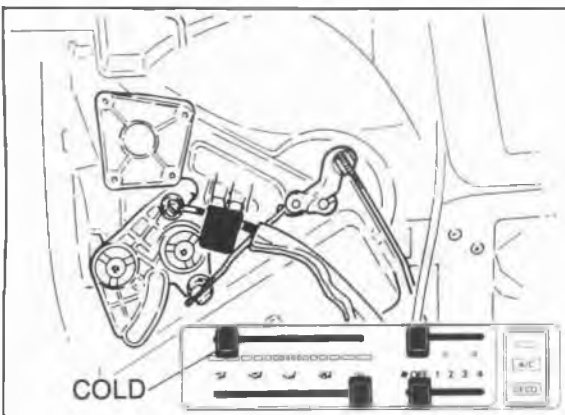
86U14X-195

## INSTALLATION

Install in the reverse order of removal, noting the following.

### 1. Tightening torque:

Bolt	Torque	Nm (m-kg, ft-lb)
①		4.22—6.18 (0.43—0.63, 3.10—4.54)
② ③		8.8—14 (0.9—1.4, 6.5—10)
④ ⑤		8.8—14 (0.9—1.4, 6.5—10)
⑥ ⑦		8.8—14 (0.9—1.4, 6.5—10)
Steering wheel		39—49 (4.0—5.0, 29—36)



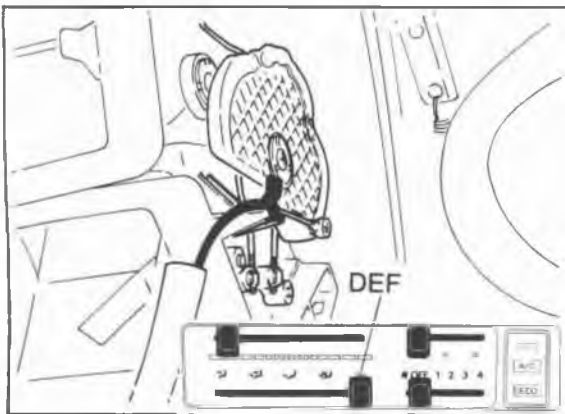
69G14X-224

### 2. Air-mix door control wire

- Set TEMP lever at MAX—COLD position.
- Connect the control wire and clamp it with the shutter lever on the heater unit all the way to the right side.

#### Caution

**Move the temperature control lever to check that the wire is secured. Also, check that it moves the full stroke between HOT and COLD.**



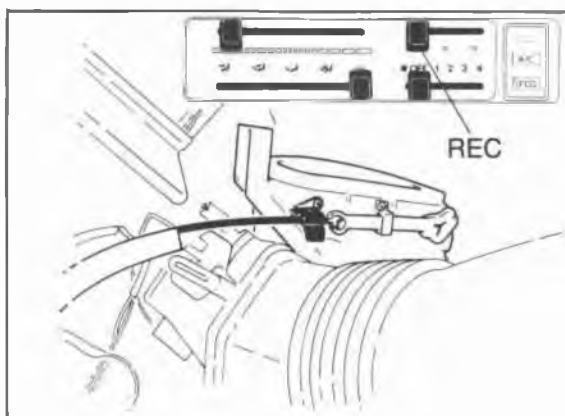
69G14X-225

### 3. Mode control wire

- Set MODE control lever to DEF position.
- Connect the control wire and clamp it with the shutter lever on the heater unit at its closest point.

#### Caution

**Move the mode lever to check that the wire is secured. Also, check that it moves the full stroke between DEF and VENT.**



69G14X-226

### 4. REC-FRESH air selector wire

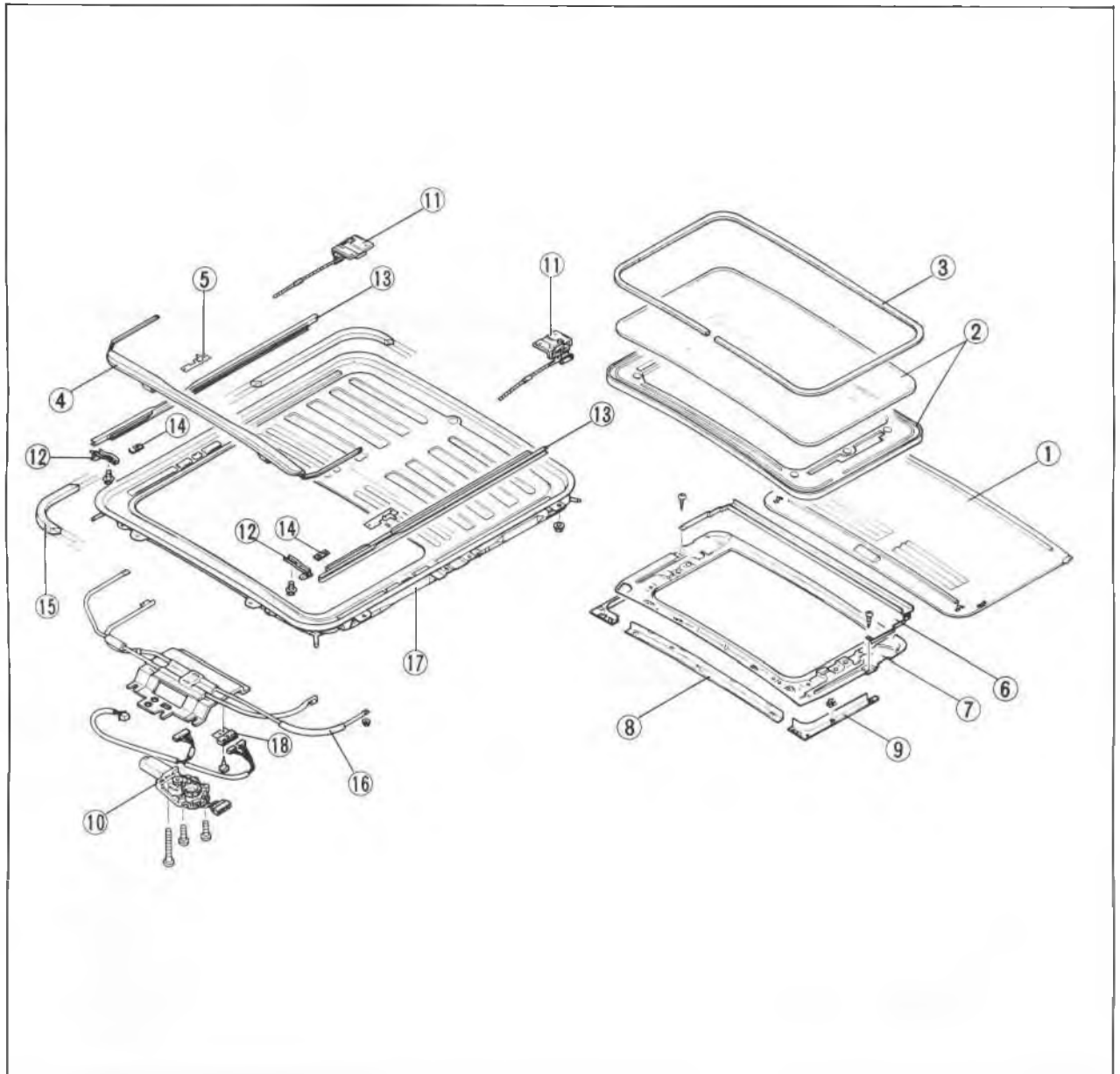
- Set the selector lever to REC position.
- Connect the control wire and clamp it with the shutter lever on the blower unit at its closest point.

#### Caution

**Move the recirculate-fresh air switch lever to check that the wire is secured. Also, check that it moves the full stroke between REC and FRESH.**

## SLIDING SUNROOF

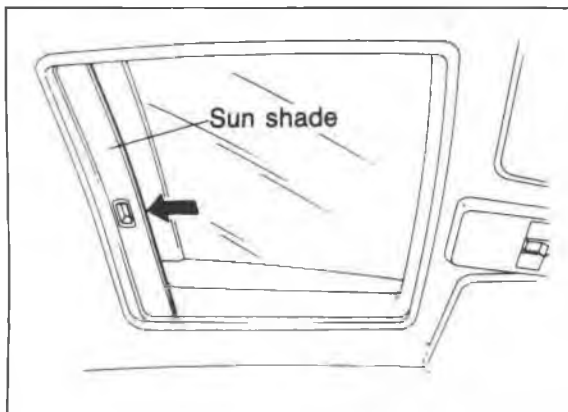
### STRUCTURAL VIEW



86U14X-196

- |                 |                           |                    |
|-----------------|---------------------------|--------------------|
| 1. Sun shade    | 7. Lower panel            | 13. Guide rails    |
| 2. Slide panel  | 8. Lower panel cover      | 14. Guide          |
| 3. Weatherstrip | 9. Decoration cover       | 15. Packing        |
| 4. Deflector    | 10. Motor assembly        | 16. Tube assembly  |
| 5. Set plate    | 11. Guide brackets (rear) | 17. Frame assembly |
| 6. Drip rail    | 12. Guide bracket (front) | 18. Sunroof relay  |

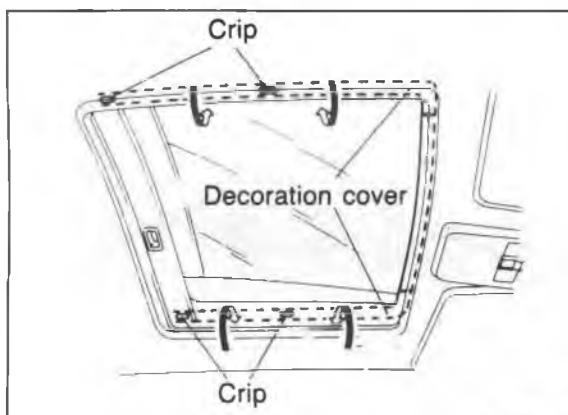
# 14 SLIDING SUNROOF



76U14X-043

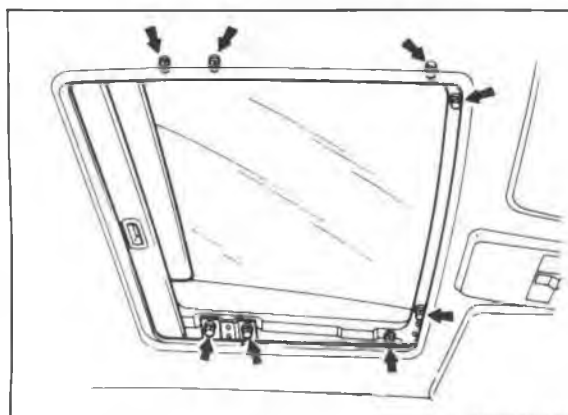
## REMOVAL

1. Slide the sun shade all the way to the rear.
2. Fully close the sliding panel.



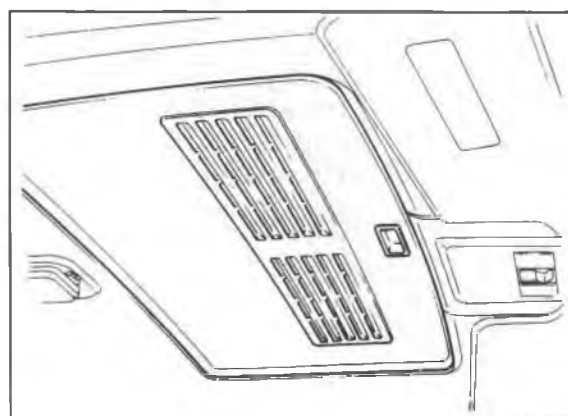
76U14X-044

3. Remove the left and right decoration covers.



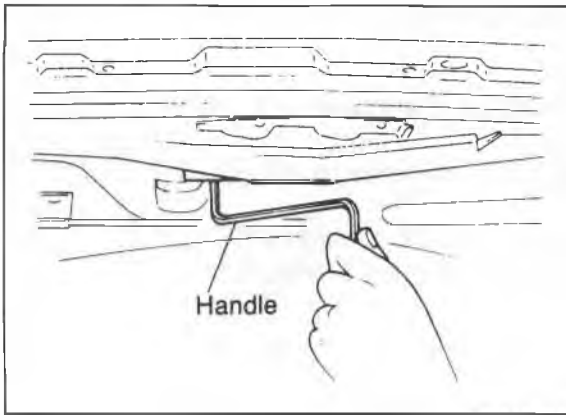
76U14X-045

4. Remove the installation nuts for the sliding panel and lower panel.
5. Remove the sliding panel by pushing it upward from inside the vehicle.



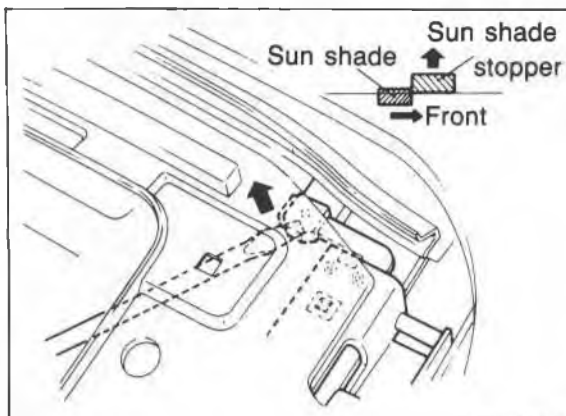
76U14X-046

6. Fully close the sun shade.



76U14X-047

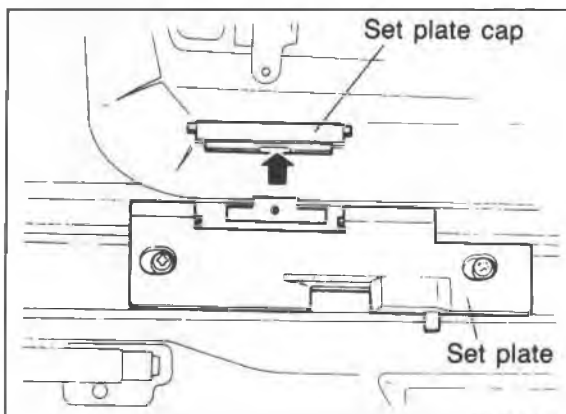
7. Turn the handle and move the sun shade **5—10 mm (0.19—0.39 in)** to the rear.



76U14X-048

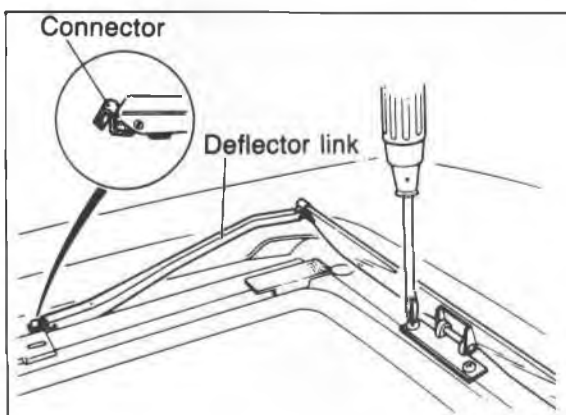
8. Use a flat-tip screwdriver to lift the sun shade stopper at the rear of the cable holder, then release the stopper and move the sun shade toward the front.

9. Turn the handle to fully open the lower panel. (Leave the sun shade fully closed.)



76U14X-049

10. Open the sun shade half way and remove the set plate cap. Pull out the sun shade from the notch of the set plate.



76U14X-050

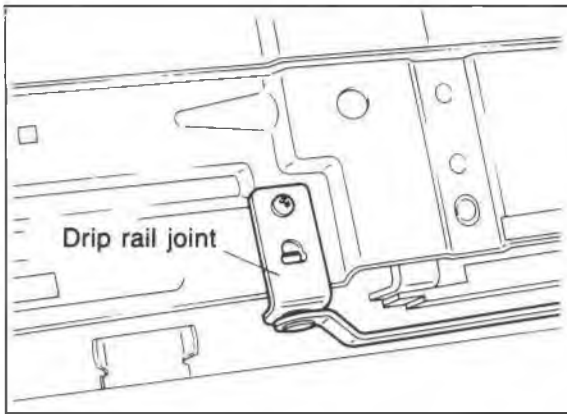
11. Use a flat-tip screwdriver to pry up the connector at the rear of the deflector link, being careful not to scratch it, and remove the deflector link.

12. Remove the screws and remove the deflector.

### Note

**Because force is applied to the deflector by the spring in the direction of opening, hold so that the deflector doesn't contact the roof panel, then pull out the deflector link.**

# 14 SLIDING SUNROOF



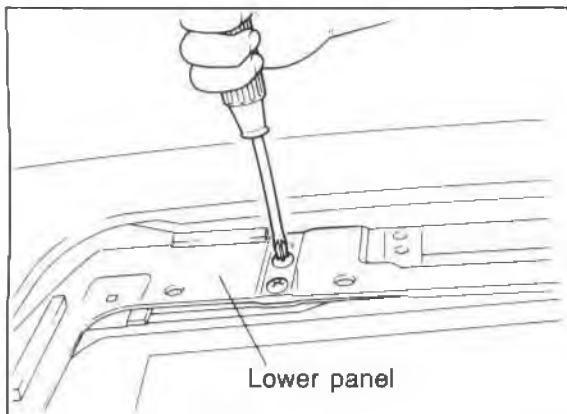
76U14X-051

13. Completely close the lower panel.

**Note**

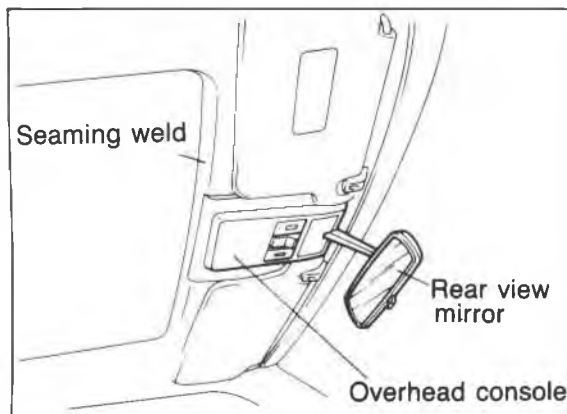
**Because the lower panel will move forward out of place, turn the motor using the handle while pushing to the rear to close fully.**

14. After removing the screw and the drip rail joint link, push the drip rail backward and inward.



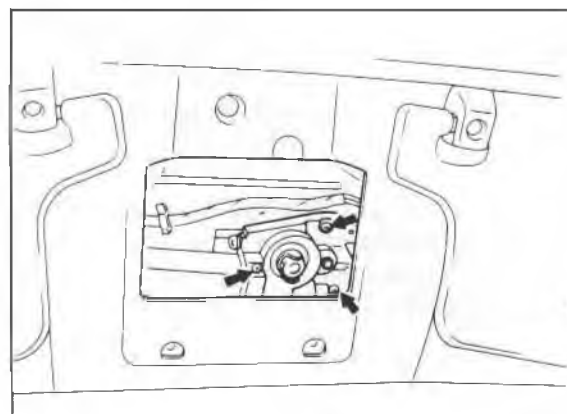
76U14X-052

15. After removing the installation screw of the guide bracket assembly (rear), remove the right side of the guide (front).
16. Remove the lower panel.



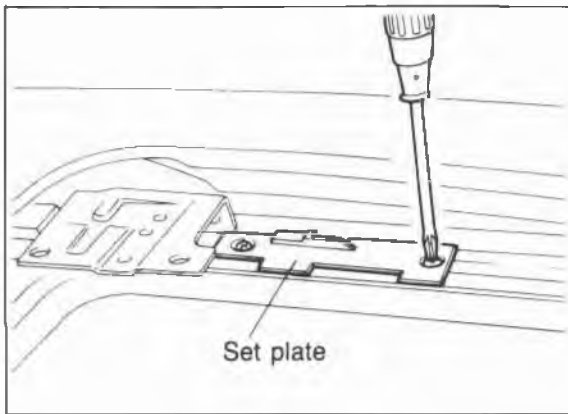
76U14X-053

17. Remove the rear view mirror, overhead console, and seaming welt.



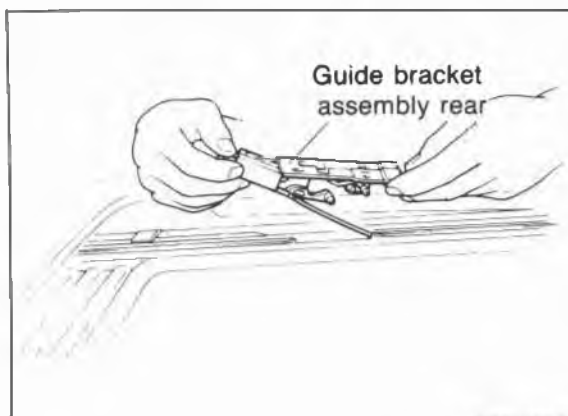
76U14X-054

18. After removing the 3 screws, remove the motor and pull out the harness coupler.



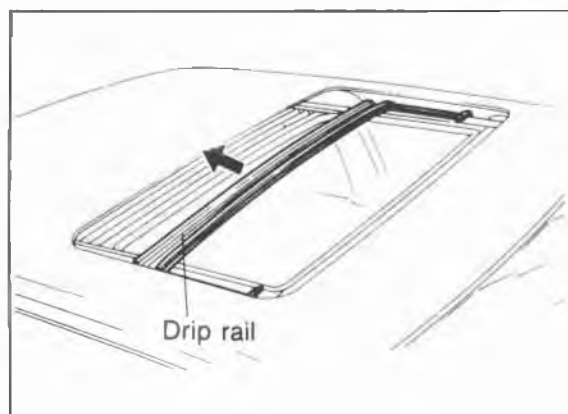
76U14X-055

19. Push the rear guide bracket backward and downward about **10 cm (3.9 in)**.
20. Remove the screw and the set plate.



76U14X-056

21. Move the rear guide bracket all the way forward, and pull out while lifting from the rear.
22. Move the drip rail forward then pull out from the notch of the guide rail.



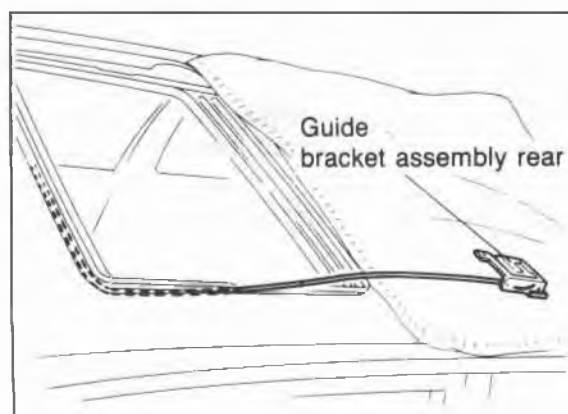
76U14X-057

## INSTALLATION

1. Insert the drip rail.

### Note

**Paying attention to the direction of the rail, push in from the open part to the position where it is not visible.**



76U14X-058

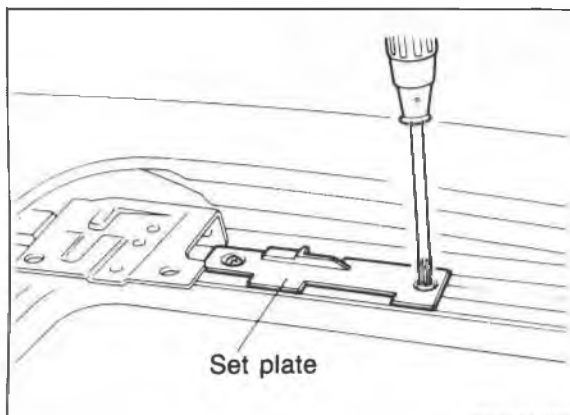
2. Insert the drive cable into the tube.

### Note

**Apply a liberal coat of grease to the drive cable and the sliding part of the guide bracket assembly (rear), then push the cable all the way forward.**

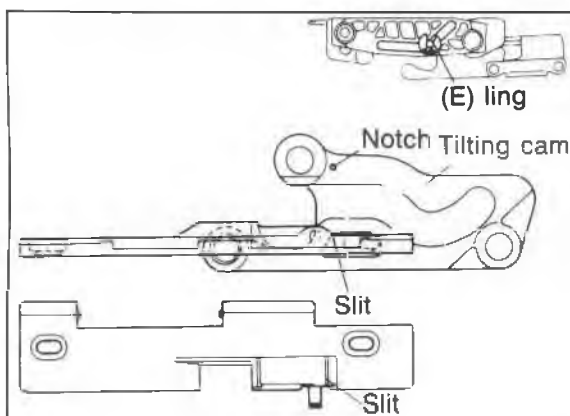


# 14 SLIDING SUNROOF



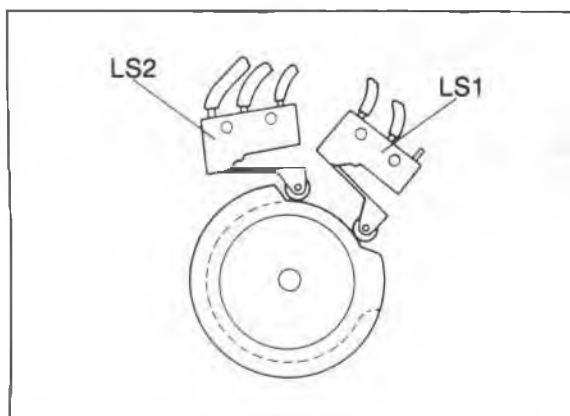
76U14X-059

3. After moving the guide bracket assembly slightly toward the rear, tighten the screw, taking care regarding the direction the set plate faces.



76U14X-060

4. Align the projection of the tilting cam and the slit in the set plate.

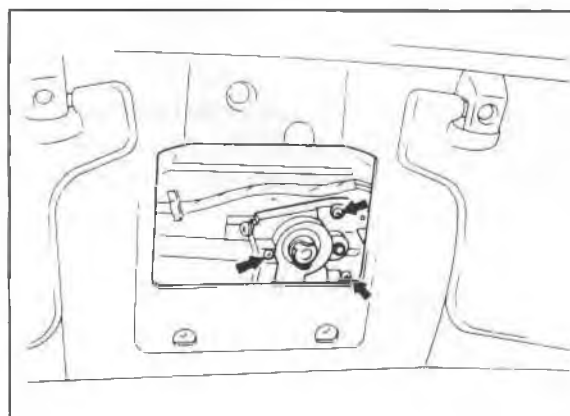


76U14X-061

5. Check that the limit switches (LS1 and LS2) of the motor are as shown in the figure at the OFF position.

### Note

- a) Be careful of the cam position.
- b) Use the handle to position it correctly.



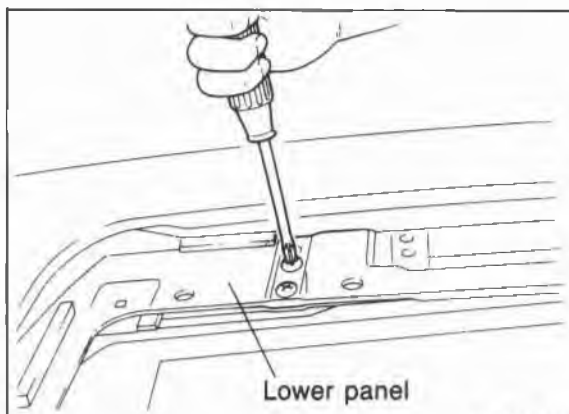
76U14X-062

6. Install the motor assembly.

### Note

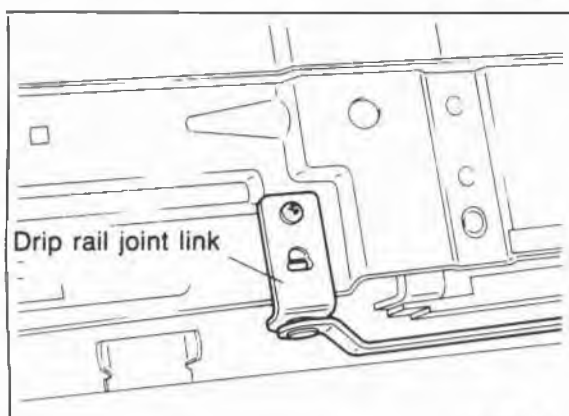
There are 2 types of screws, long and short. Be sure to use the correct ones.

7. Connect the wiring of the motor assembly and the motor switch.



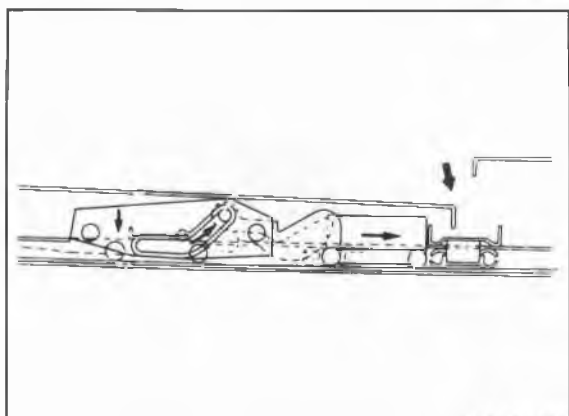
76U14X-063

8. Install the lower panel and tighten the screws.
9. Install the guide front and tighten the screws.



76U14X-064

10. Pull out the drip rail from the rear, and secure the link by the screw.



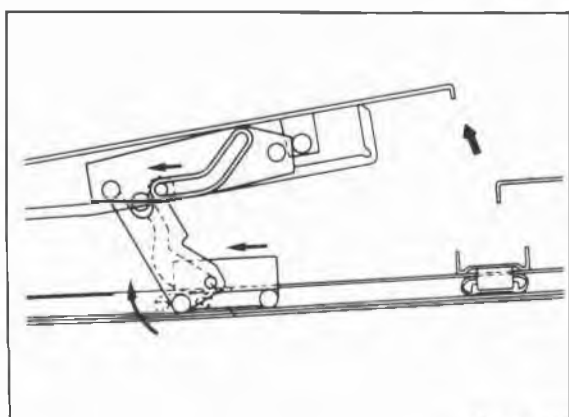
76U14X-065

11. Using the handle turn the motor to fully open the lower panel.

**Note**

a) Because the roof panel and lower panel might interfere with each other when the lower panel is opened, check as shown in the figure, that the guide roller is completely fitted into the guide rail.

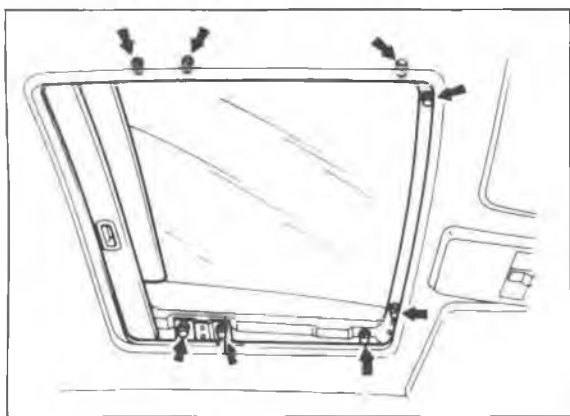
b) Turn the motor while pushing the cable.



76U14X-066

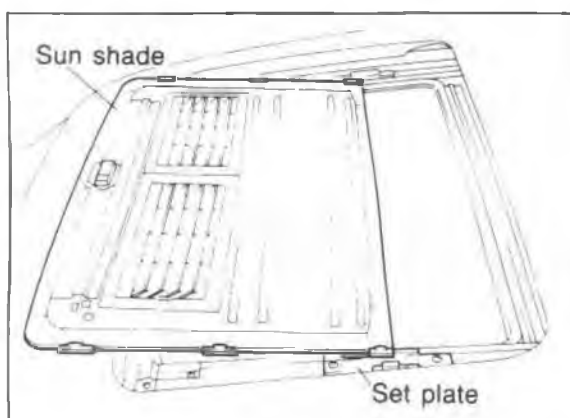
12. Secure the deflector by tightening the screw, and then install the deflector link.
13. Turn the motor using the handle, and visually check the sliding, tilt-down and tilt-up operations.

# 14 SLIDING SUNROOF



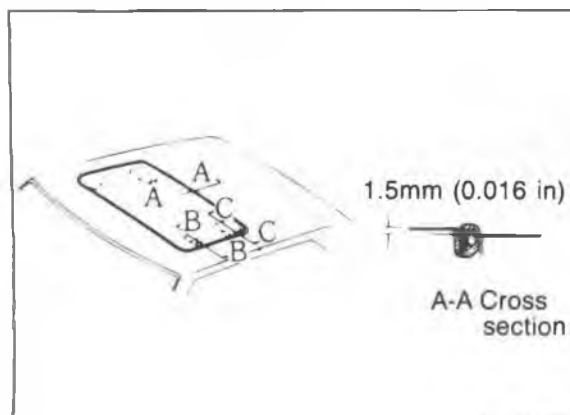
76U14X-067

14. Fully close the lower panel.
15. Install the slide panel to the lower panel, and tighten securely.



76U14X-068

16. Insert the sun shade from the notch in the set plate, and push it all the way back.
17. Insert the set plate cap.

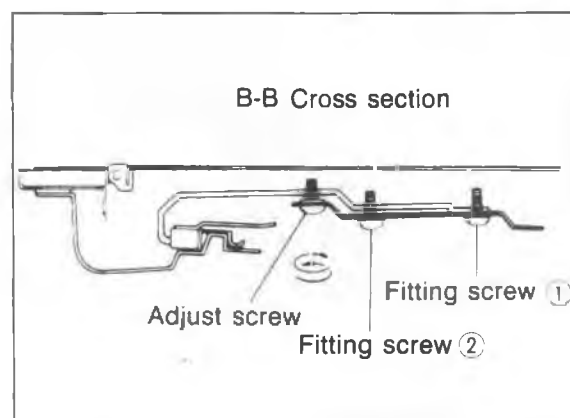


76U14X-069

18. Adjust the height of the slide panel.

(Cross-section A-A)

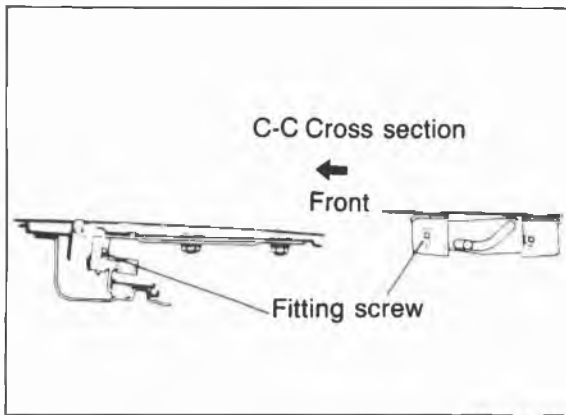
Adjust so that the height difference between the outer panel and roof panel is **1.5 mm (0.06 in) max.**



76U14X-070

(Cross-section B-B adjustment)

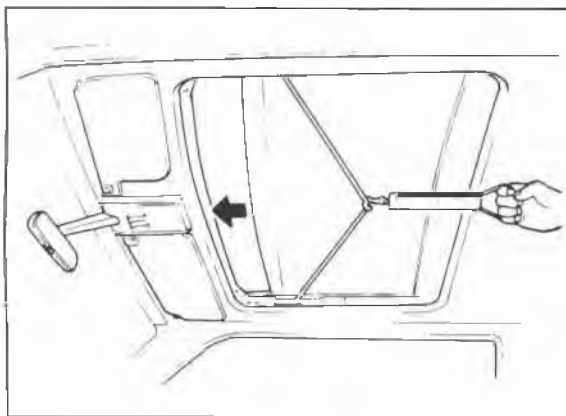
- (1) Loosen installation screws (1) and (2).  
If the adjustment is only about **2 mm (0.08 in)** don't loosen screw (1).
- (2) Turn the screws to adjust.  
Turning to the right raises, and to the left lowers.
- (3) Tighten installation screws (1) and (2).



76U14X-071

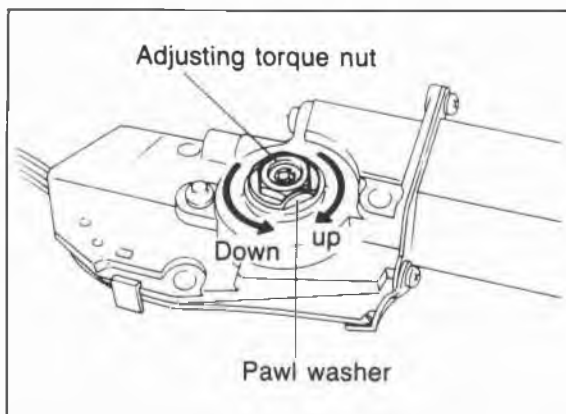
(Cross-section C-C adjustment)

- (1) Loosen the installation screw and the adjust screw.  
The adjustment will be easier if the installation screw is not loosened too much.
- (2) Adjust by moving the outer panel from the inside or outside.
- (3) Tighten the adjust screw first, and then the installation screw.



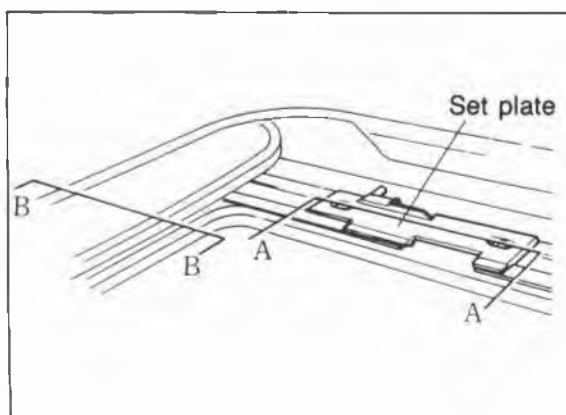
76U14X-072

19. Measure the moving load of the panel, and adjust it to **15—25 kg (33.1—55.7 lb)** using the torque adjustment nut on the motor.
20. To measure, use the deep hole in the center of the lower panel.



76U14X-073

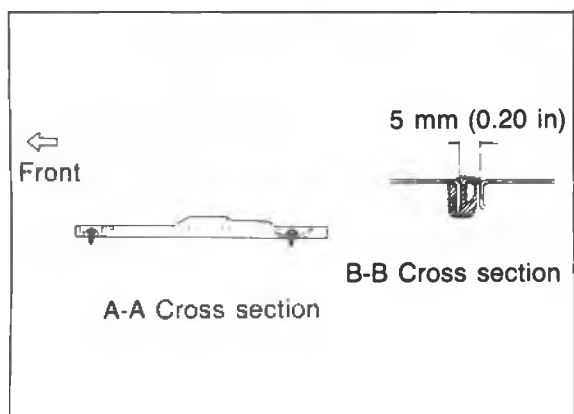
21. After adjustment, be sure to lock the nut with the pawl washer.
22. Install the ornamental cover.
23. Install the front peripheral parts.



76U14X-202

24. After installation is completed, check the operation.
  - (1) Is the battery voltage correct?
  - (2) Is there any foreign material on the sliding parts of the sunroof?
  - (3) When the slide panel is opened, does the roof panel interfere with the rear part? If so, open the slide panel fully and move the set plate forward.

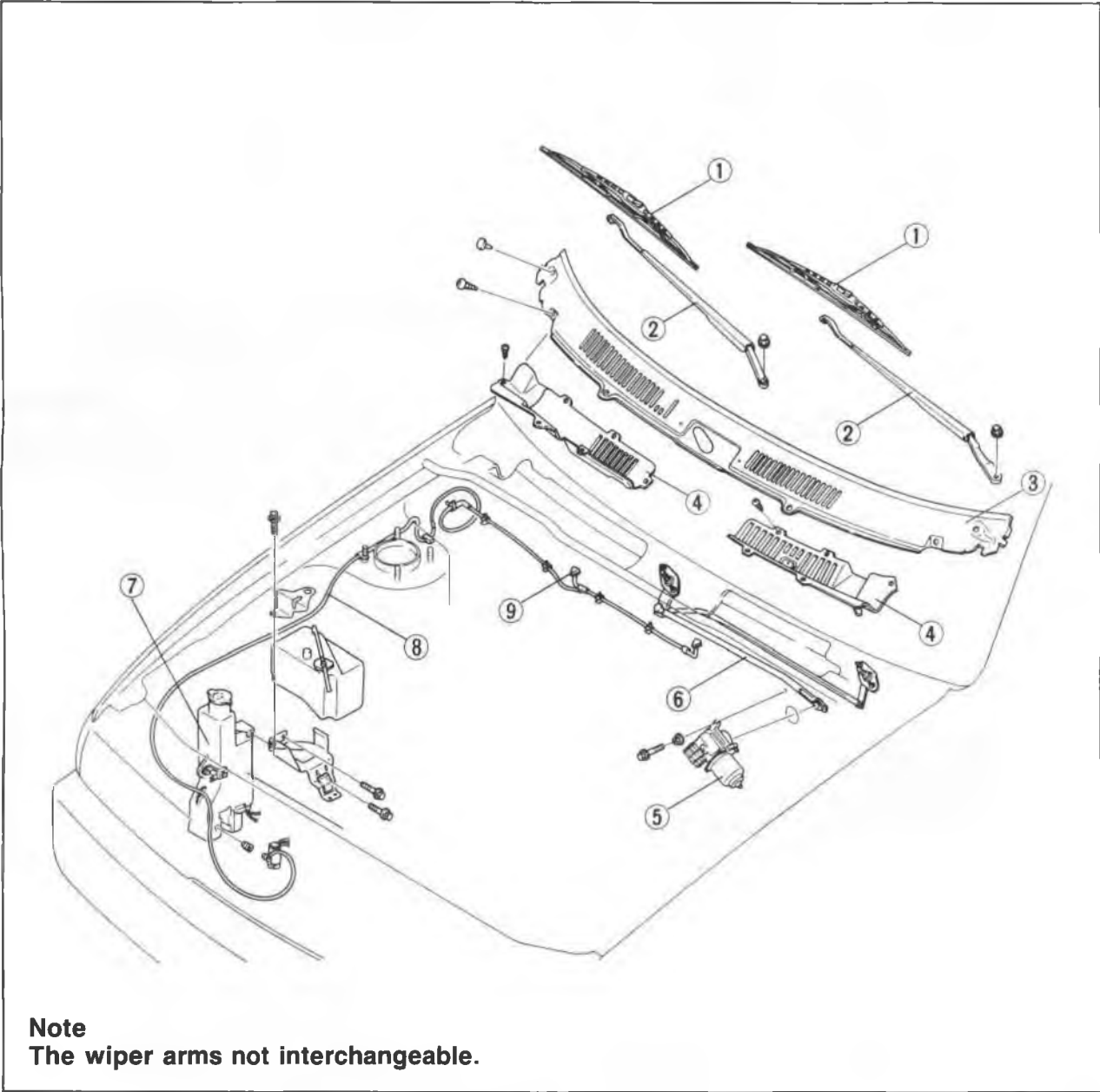
# 14 SLIDING SUNROOF



76U14X-203

**Caution:**  
If the stopper is moved too far forward, there might be a malfunction or leaking. Do not leave a gap of more than 5 mm (0.2 in) between the slide panel and roof panel.

WINDSHIELD WIPER  
STRUCTURAL VIEW

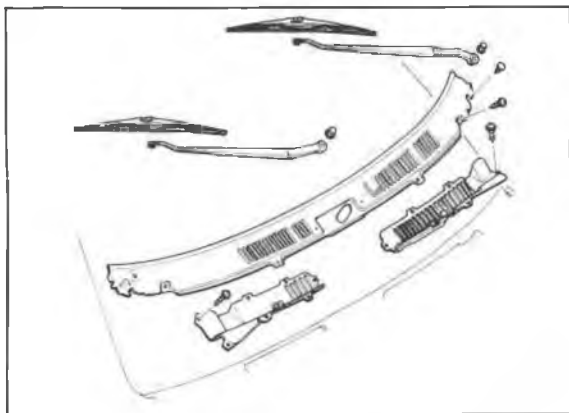


**Note**  
The wiper arms not interchangeable.

63U14X-132

- 1. Wiper blade
- 2. Wiper arm
- 3. Lower molding
- 4. Cover
- 5. Wiper motor
- 6. Link assembly
- 7. Washer tank
- 8. Hose
- 9. Washer nozzle

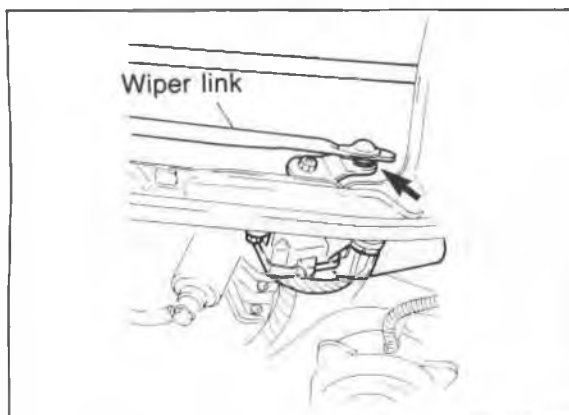
# 14 WINDSHIELD WIPER



86U14X-168

## REMOVAL

1. Disconnect the negative battery cable.
2. Remove the wiper arms.
3. Remove the lower molding.
4. Remove the cover.

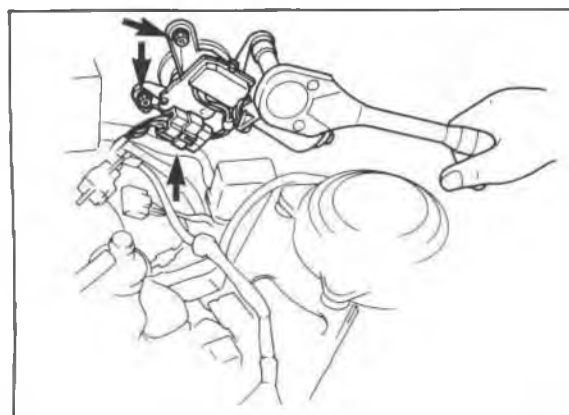


86U14X-169

5. Disconnect the wiper link from the motor.

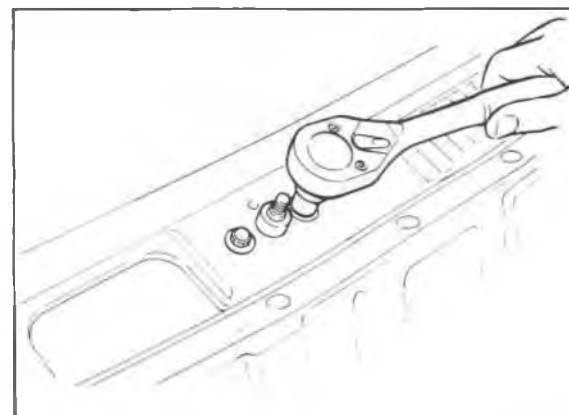
## Caution

**Do not remove the motor arm unless necessary. The motor arm position on the motor shaft decides the automatic stop position. (lowest position of the wiper arm)**



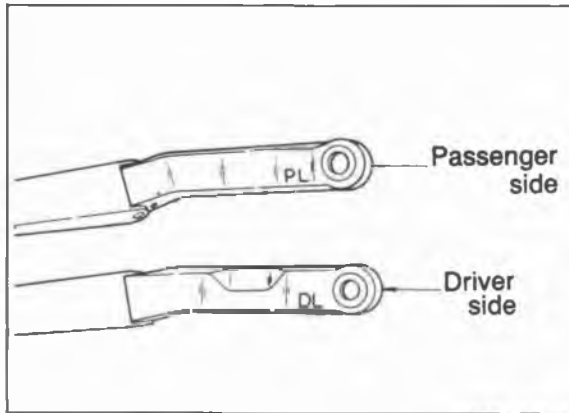
86U14X-170

6. Disconnect the connector.
7. Remove the wiper motor.



86U14X-171

8. Remove the wiper link assembly mounting bolts.
9. Lift the wiper link assembly out from the left side (driver's side) service hole.



76G14X-047

## INSTALLATION

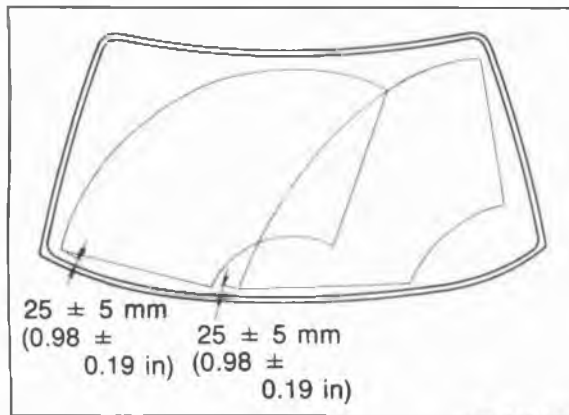
Install in the reverse order of removal.

### Note

The wiper arms are identified by marks on the arms.

DL: driver side

PL: passenger side

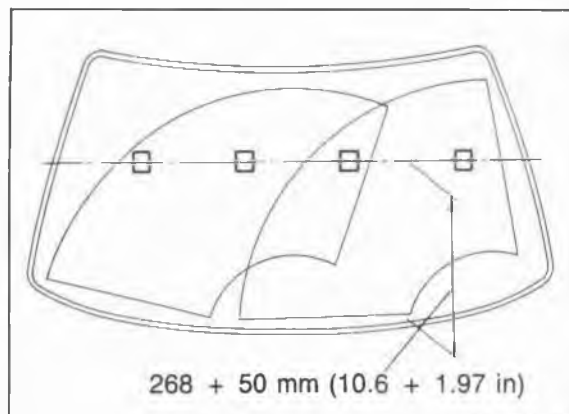


86U14X-173

## ADJUSTMENT

### Arm Height

Set the arm height as shown in the figure.



86U14X-174

### Adjustment of washer spray

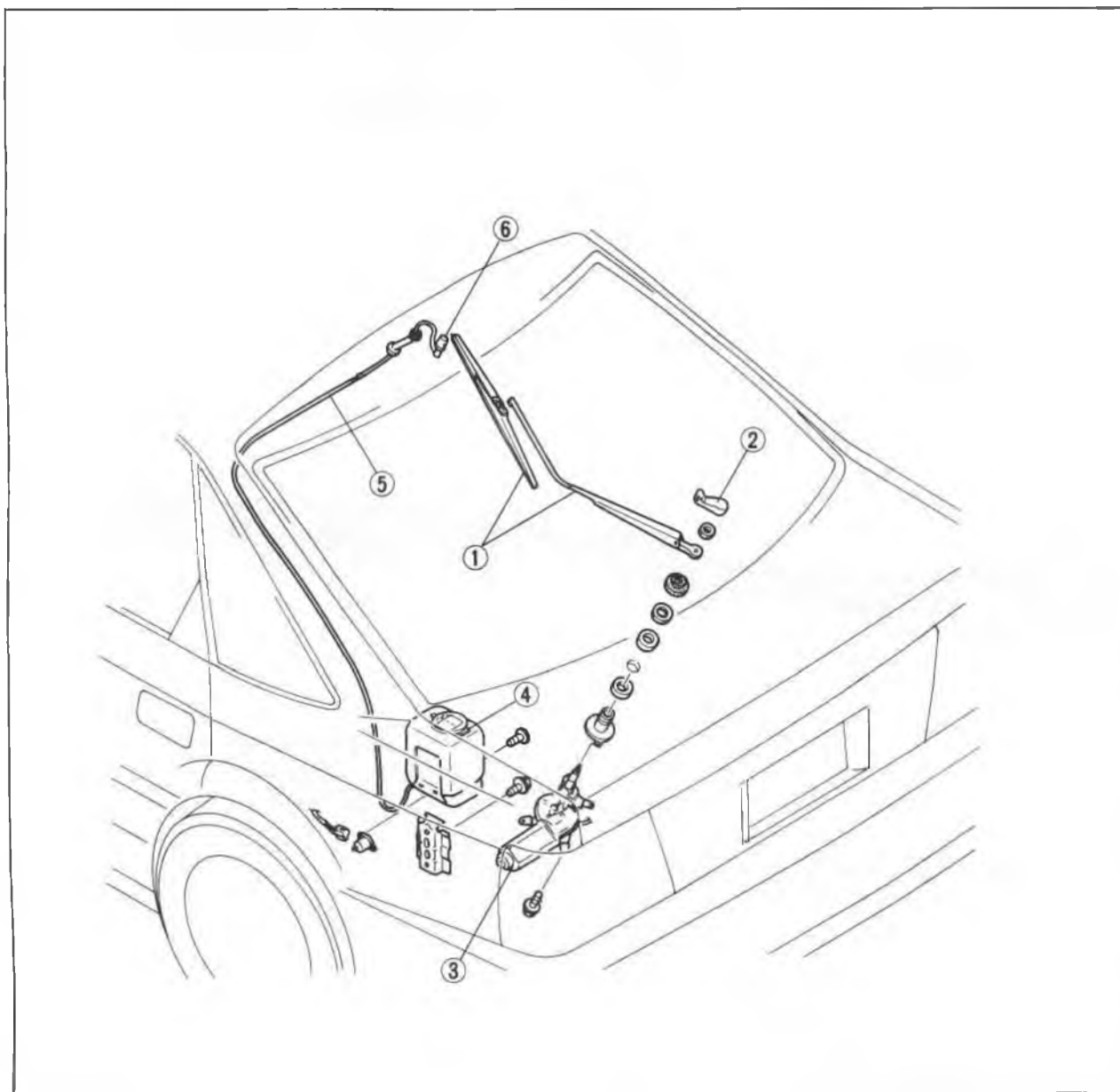
Inserting a needle or similar object into the nozzle hole and bend to change the spray direction.



# 14 REAR WINDOW WIPER

## REAR WINDOW WIPER

### STRUCTURAL VIEW (HATCHBACK)

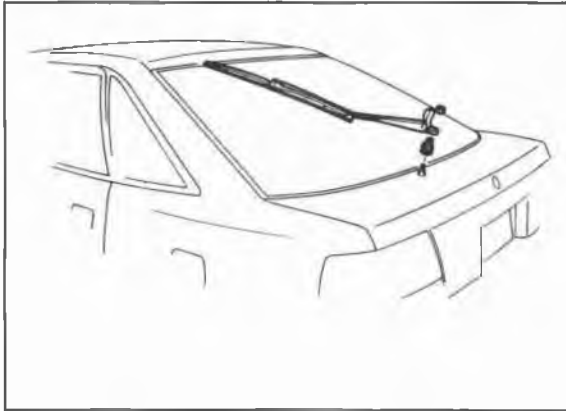


76G14X-031

1. Wiper arm and blade  
2. Seal cap

3. Wiper motor  
4. Washer tank

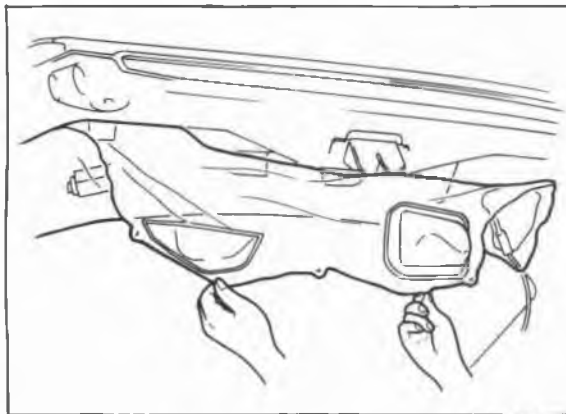
5. Hose  
6. Washer nozzle



86U14X-176

## REMOVAL

1. Disconnect the negative battery cable.
2. Remove the wiper arm.
3. Open the rear hatch.

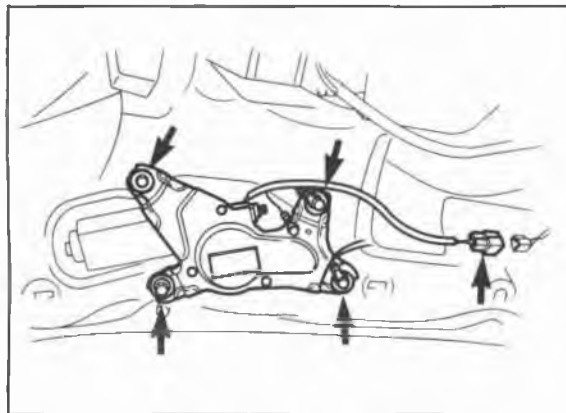


86U14X-178

4. Remove the rear hatch trim (upper, side and lower).
5. Remove the rear hatch screen.

## Note

**Remove the screen carefully so that it may be reused.**



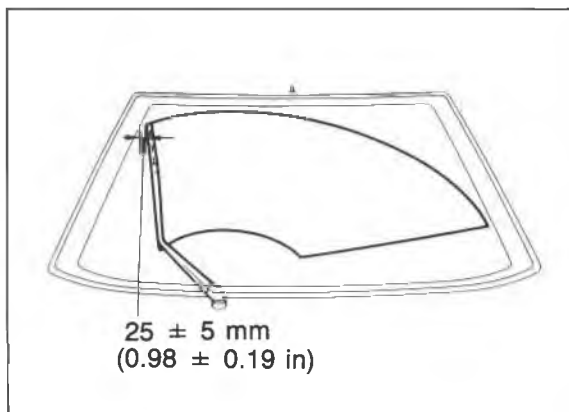
86U14X-179

6. Disconnect the rear wiper motor connector.
7. Remove the rear wiper motor.

## INSTALLATION

Install in the reverse order of removal.

# 14 REAR WINDOW WIPER

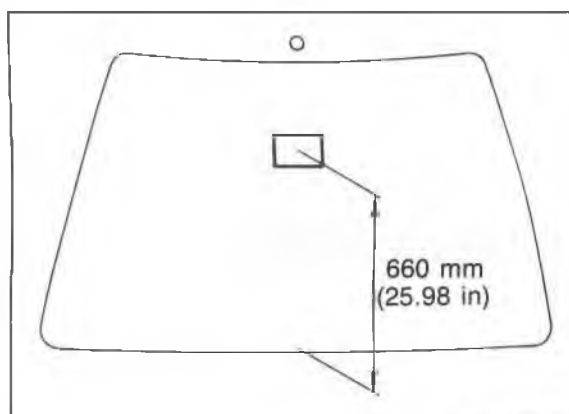


86U14X-180

## ADJUSTMENT

### Arm Height

Set the height as shown in the figure.



86U14X-181

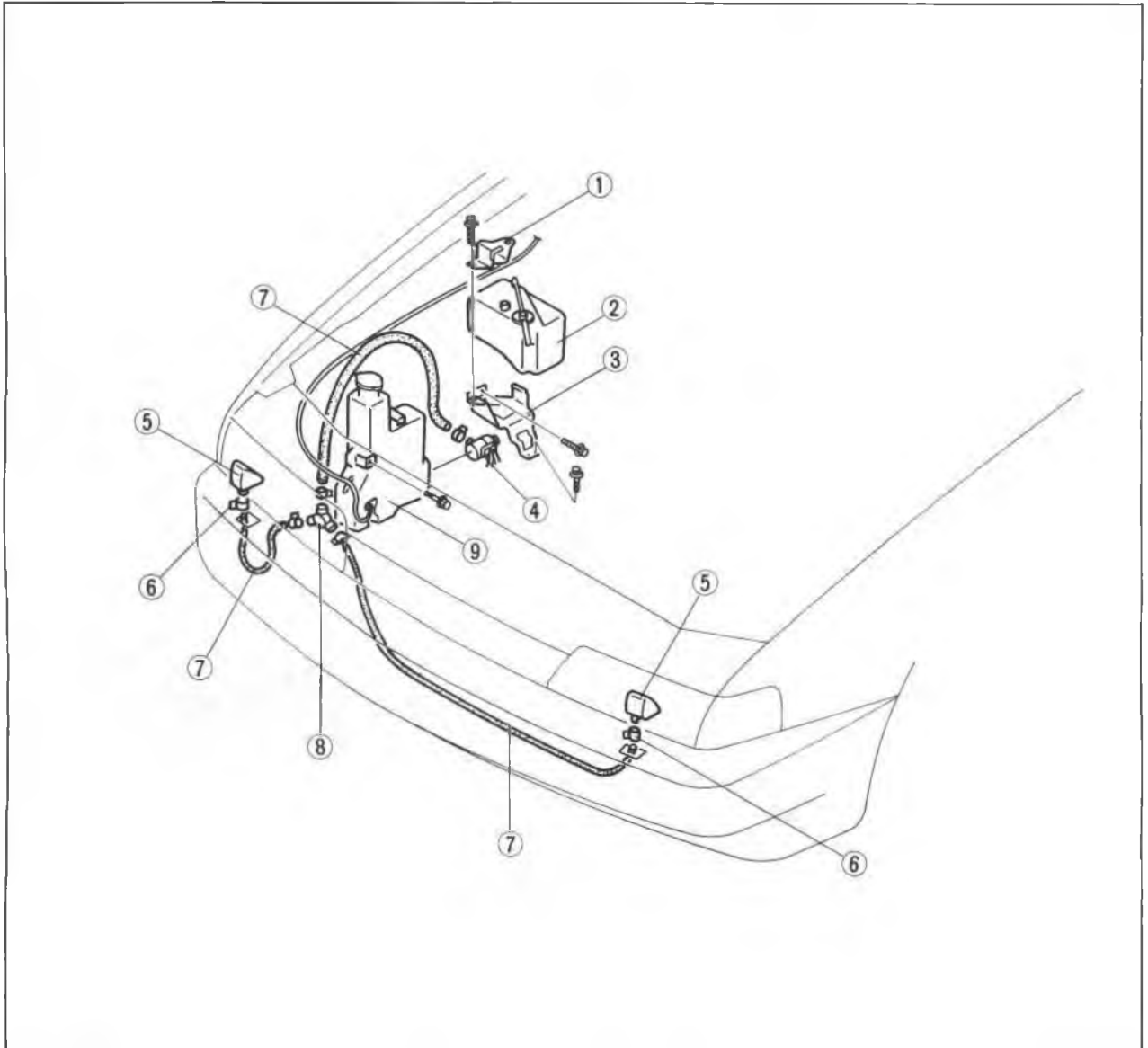
### Adjustment of washer spray

Insert a needle or similar object into the nozzle hole and bend to change the spray direction.

## HEADLIGHT WASHER

### REMOVAL AND INSTALLATION

1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.



76G14X-039

- 1. Bracket
- 2. Coolant reservoir
- 3. Bracket

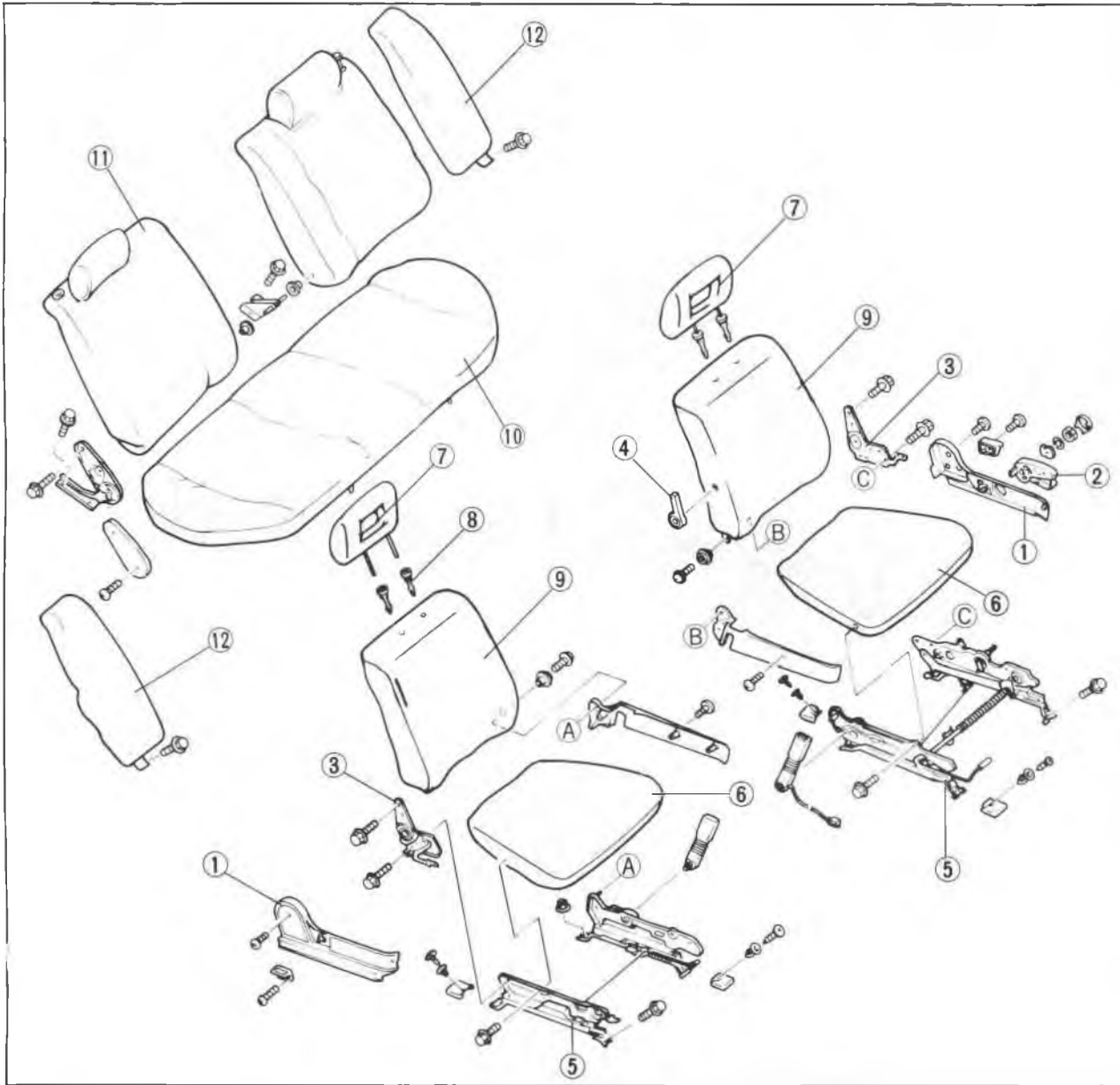
- 4. Washer pump
- 5. Washer nozzles
- 6. Clips

- 7. Hose
- 8. Joint
- 9. Washer tank

# 14 SEAT

## SEAT

### STRUCTURAL VIEW



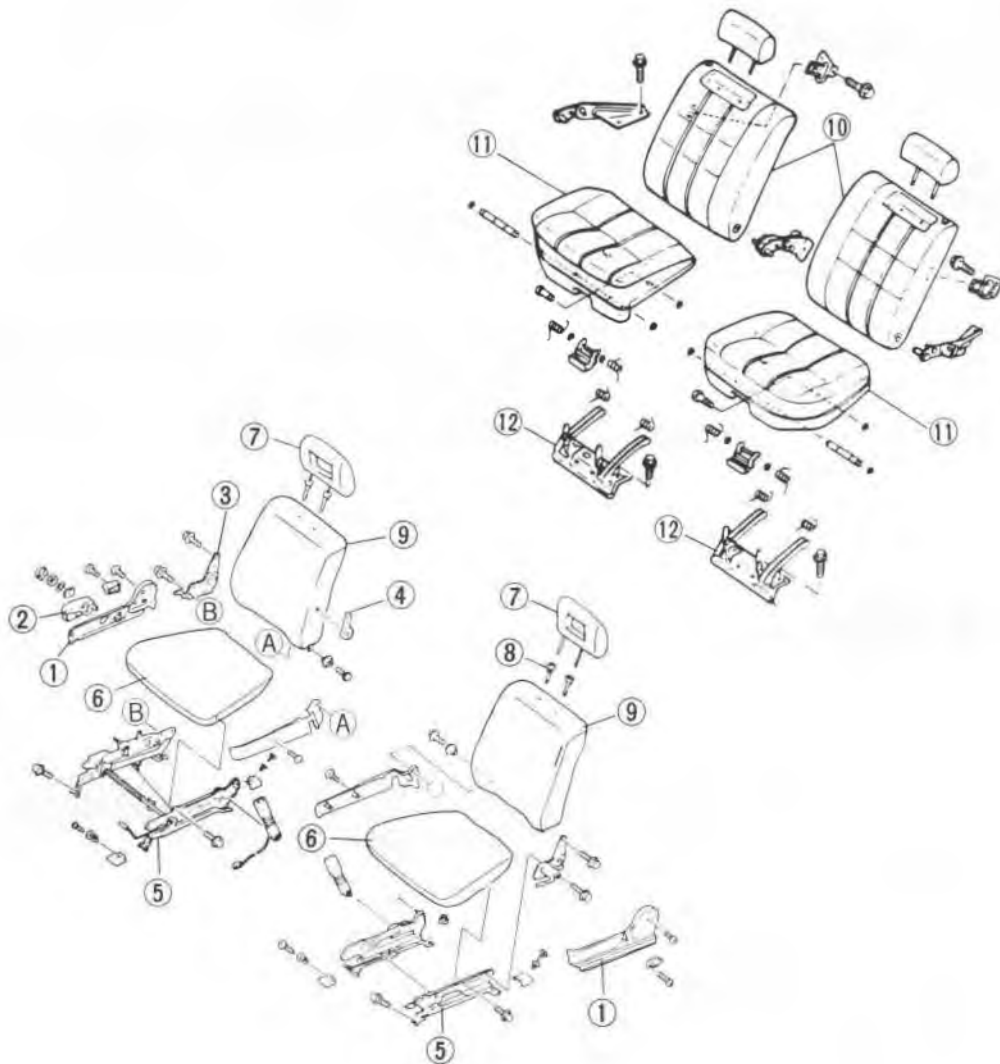
76G14X-033

- 1. Seat side cover
- 2. Lifter lever
- 3. Reclining knuckle
- 4. Lumbar support lever

- 5. Seat adjuster
- 6. Front seat cushion
- 7. Headrest
- 8. Headrest pole

- 9. Front seat back
- 10. Rear seat cushion
- 11. Rear seat back
- 12. Seat side

## Hatchback



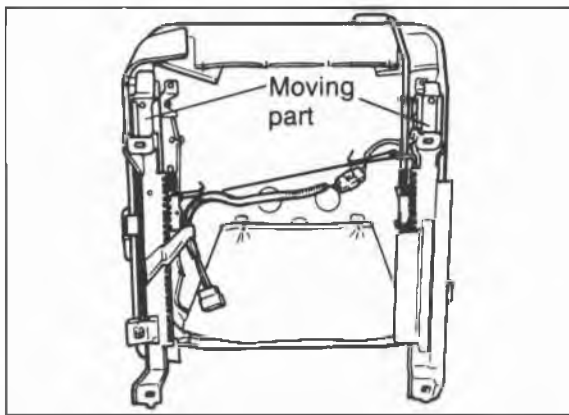
76G14X-038

- 1. Seat side cover
- 2. Lifter lever
- 3. Reclining knuckle
- 4. Lumber support lever
- 5. Seat adjuster

- 6. Front seat cushion
- 7. Headrest
- 8. Headrest pole
- 9. Front seat back
- 10. Rear seatbacks  
(split-folding rear seat)

- 11. Rear seat cushion  
(flat-folding rear seat)
- 12. Stay

# 14 SEAT



69G14X-228

## INSPECTION

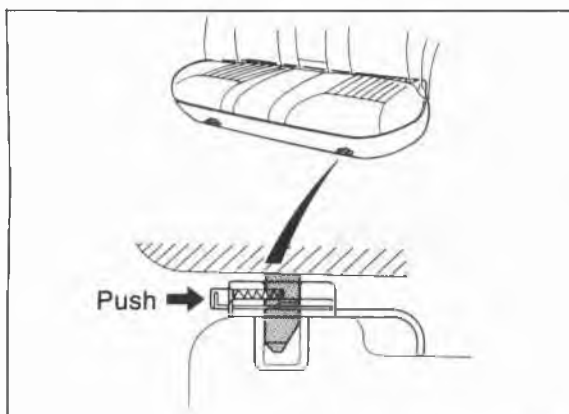
### Inspection of Front Seat

1. Check that the seat adjuster lever and recliner knuckle lever move smoothly.
2. Check the seat mounting bolts for looseness. If necessary, tighten the bolts to the specified torque.

### Tightening torque:

**Seat mounting bolt: 38—51 N·m  
(3.9—5.2 m·kg, 28—38 ft·lb)**

3. Apply grease to the moving parts.
4. Check the seat adjuster lever for wear.

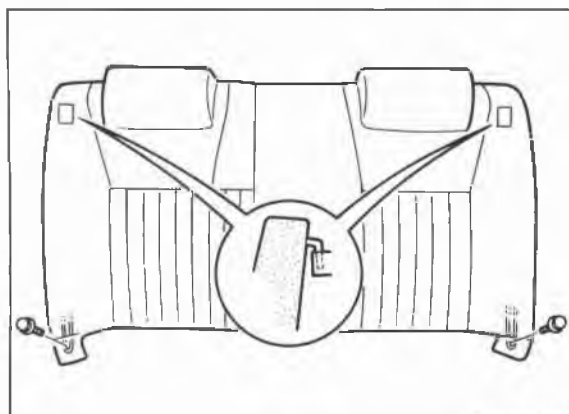


76G14X-048

## REAR SEAT (Sedan and Coupe/MX-6)

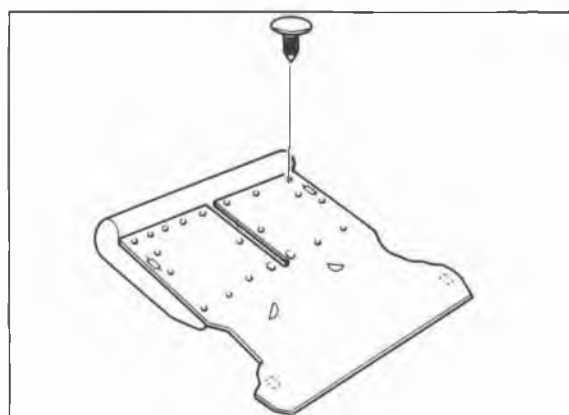
### Removal

1. Push the locks as shown in the figure to release the cushion, then lift the seat cushion out.



69G14X-236

2. Remove the end bolts, and lift the seat back off the hooks.



86U14X-184

3. Remove the fastener.
4. Remove the seat back.

### Installation

Install in the reverse order of removal.

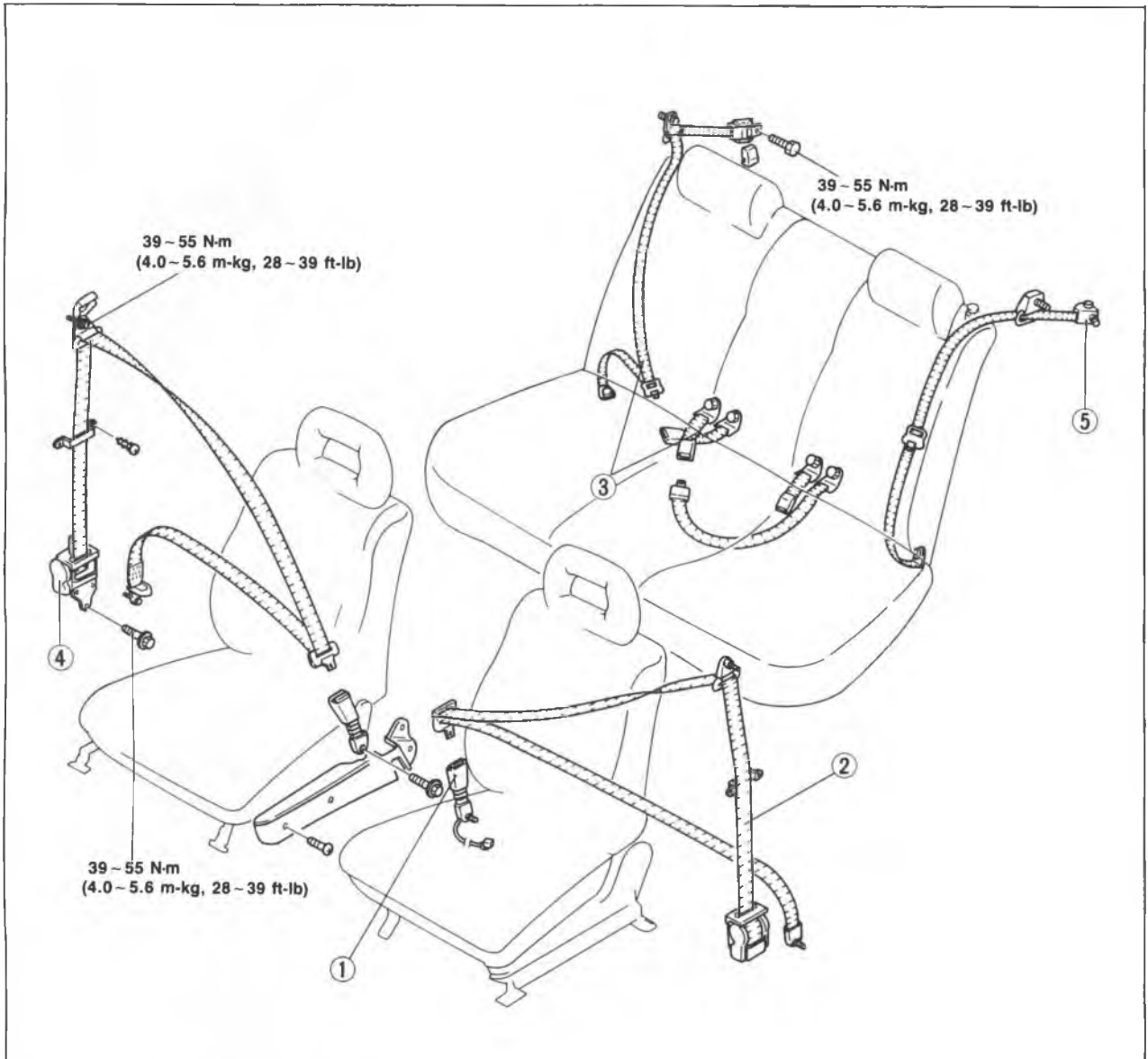
### Note

### Tightening torque:

**Seat back:  
16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

## SEAT BELTS

### STRUCTURAL VIEW

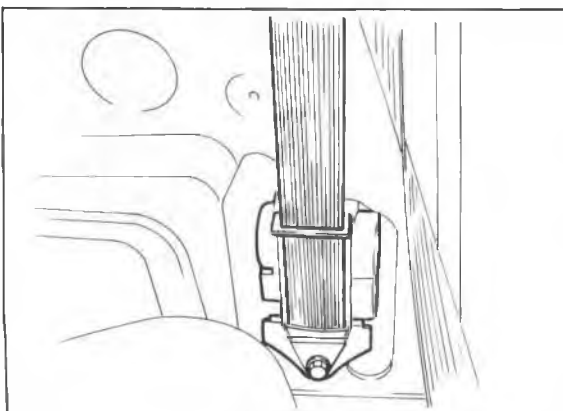


76G14X-032

1. Buckles  
2. Front seat belts

3. Rear seat belts  
4. Retractors

5. Retractors



86U14X-187

### INSPECTION

1. Check that the belt can be pulled out smoothly and that it retracts lock when belt pulled quickly.
2. Inspect the webbing for scars, tears, and wear and for deformation of the fittings.

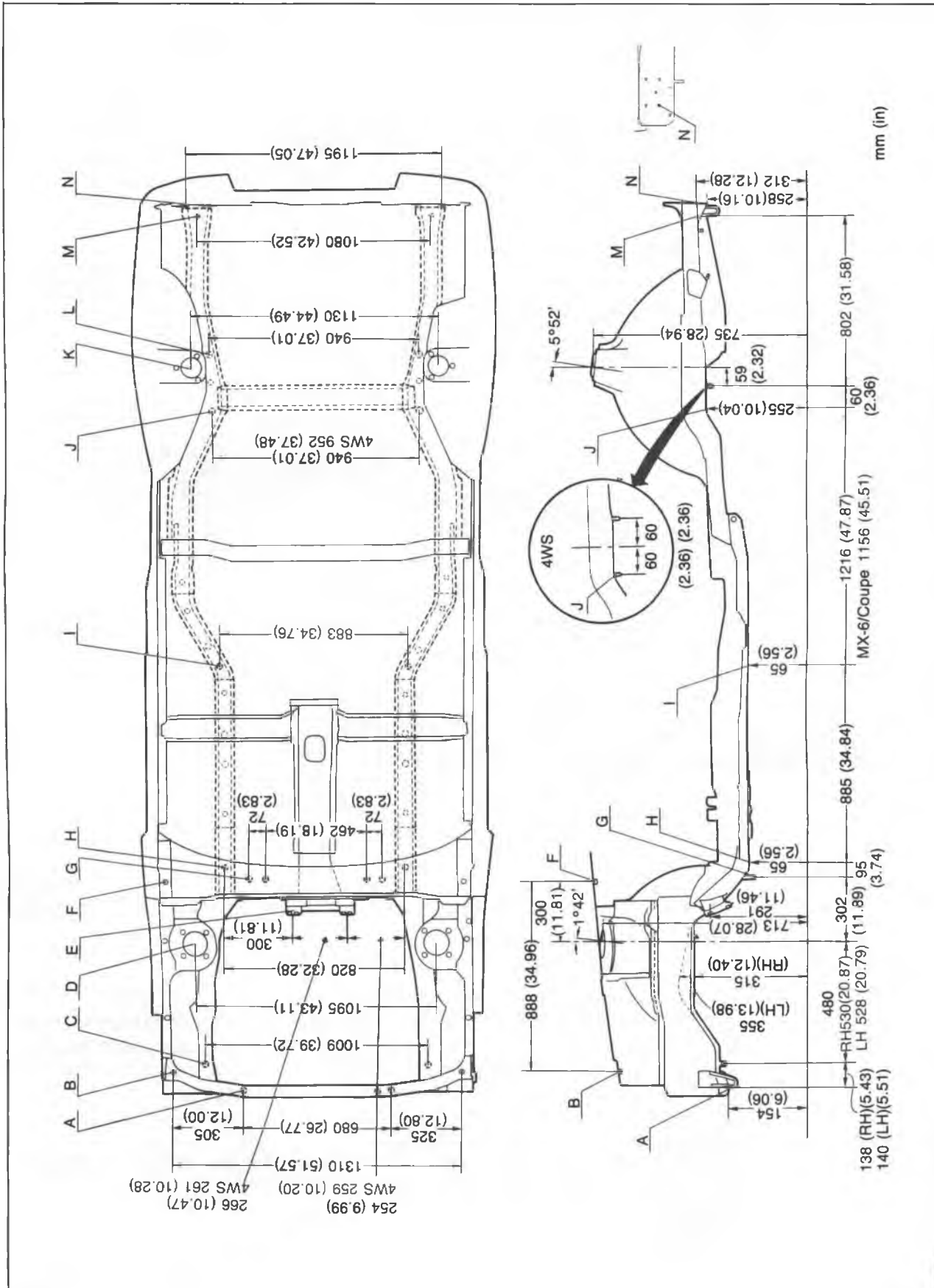
### Caution

**Do not disassemble the buckle or ELR assembly.**



# 14 UNDERBODY PROJECTED DIMENSIONS

## UNDERBODY PROJECTED DIMENSIONS



86U14X-193

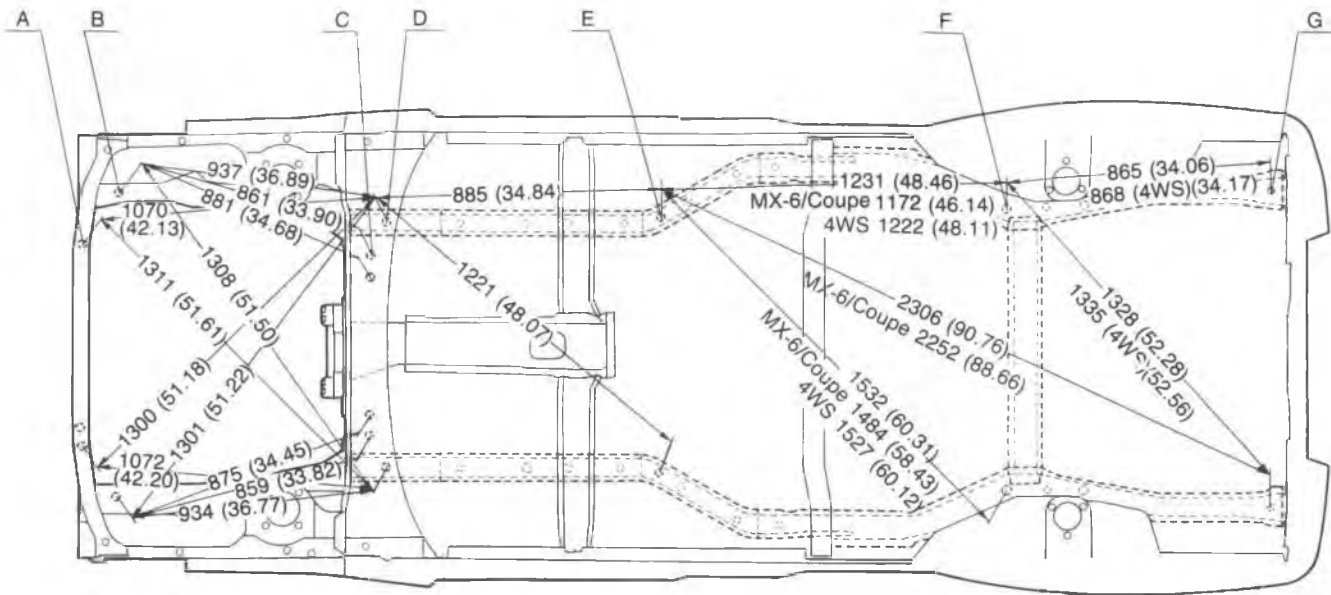
- A: Frame mounting nut (M10)
- B: Front fender panel mounting nut (M6)
- C: Crossmember mounting bolt (M12)
- D: Front mounting block
- E: Steering bracket mounting nut (M12)
- F: Front fender panel mounting nut (M6)
- G: Frame mounting bolt (M12)
- H: Front frame, lower standard hole (8 $\phi$ )

- I : Front frame [c], lower standard hole (12φ)
- J : Crossmember mounting nut (M10)  
(Crossmember mounting bolt (M10)...4WS)
- K : Rear mounting block
- L : Crossmember mounting nut (M10)  
(Crossmember mounting bolt (M12)...4WS)
- M : Rear frame, lower standard hole(10φ)
- N : Rear bumper mounting hole (14φ)  
(outside,lower)

86U14X-193

# 14 UNDERBODY STRAIGHT-LINE DIMENSIONS

## UNDERBODY STRAIGHT-LINE DIMENSIONS



mm (in)

- A: Frame mounting nut (M10)
- B: Crossmember mounting bolt (M12)
- C: Frame mounting bolt (M12)
- D: Front frame, lower standard hole (8 $\phi$ )  
(Protector mounting nut (M8)... 4WS)

- E: Front frame [c], lower standard hole (12 $\phi$ )
- F: Crossmember mounting nut (M10)  
(Crossmember mounting bolt (M12)... 4WS)
- G: Rear frame, lower standard hole (10 $\phi$ )

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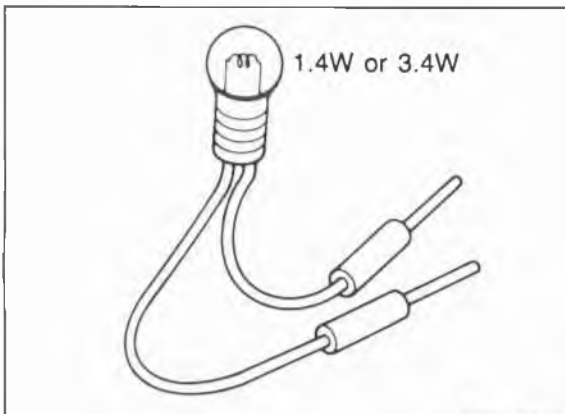
# 15 INTRODUCTION

## INTRODUCTION

### HOW TO USE THIS SECTION

Information regarding removal and installation of electrical equipment is given in **SECTION 14**. Understanding will be easier if this section is used in conjunction with the **WIRING DIAGRAMS**.

63U15X-002



69G15X-002

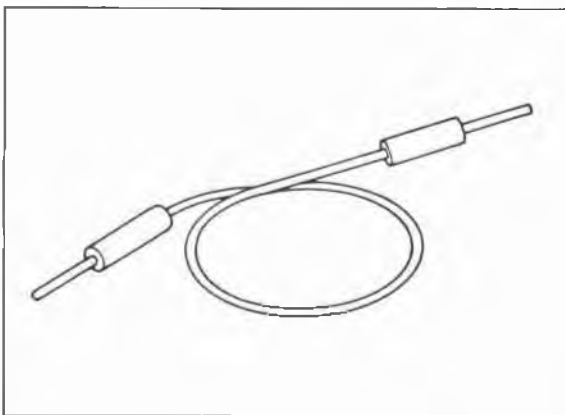
### ELECTRICAL TROUBLESHOOTING TOOLS

#### Test Light

The test light, as shown in the figure, uses a 12V bulb. The two leads should be connected to probes. The test light is used for simple voltage checks and to check for short circuits.

#### Caution

**When checking the control unit, never use a bulb over 3.4W.**



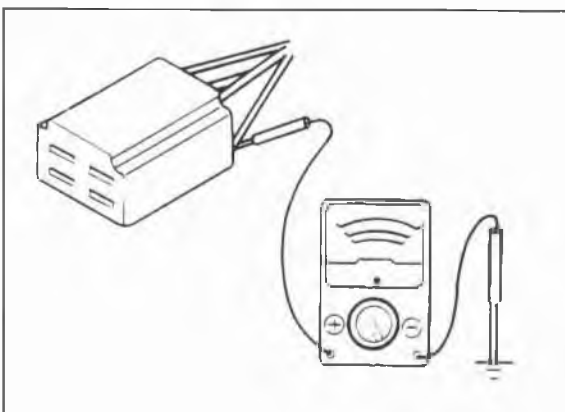
61G15X-002

#### Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and to verify the condition of ground connections.

#### Caution

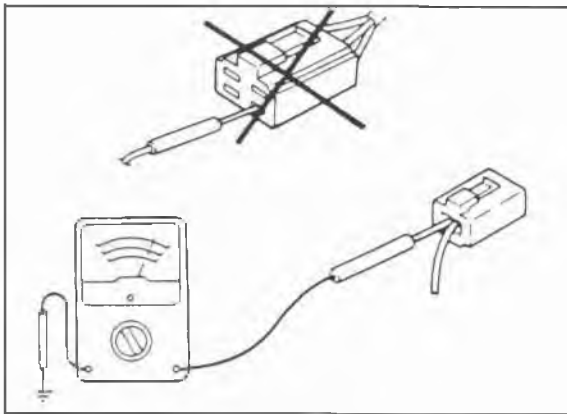
**Do not connect the jumper wire between a power source line and body ground, because doing so may cause burning or other damage to harnesses or electronic components, etc.**



69G15X-003

#### Voltmeter

The DC voltmeter is used for measurement of circuit voltage. A voltmeter with a range of 15V or more is used. It is used by connecting the positive (+) probe (red lead) to the point where voltage is to be measured and connecting the negative (-) probe (black lead) to the body ground.



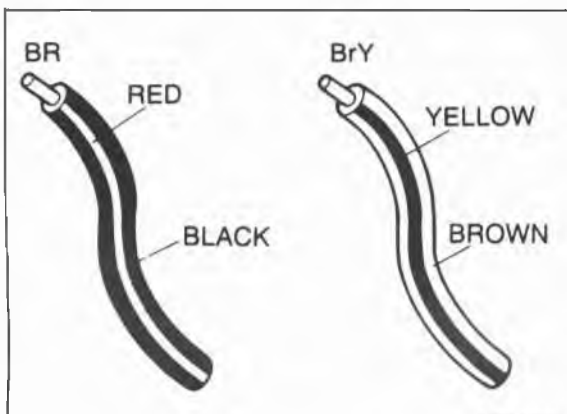
63U15X-005

## Ohmmeter

The ohmmeter is used to measure the resistance between two points in a circuit, and is also used to check for continuity and diagnosis of short circuits.

### Caution

**Do not attempt to connect the ohmmeter to any circuit to which voltage is applied, because doing so may burn or otherwise damage the ohmmeter.**

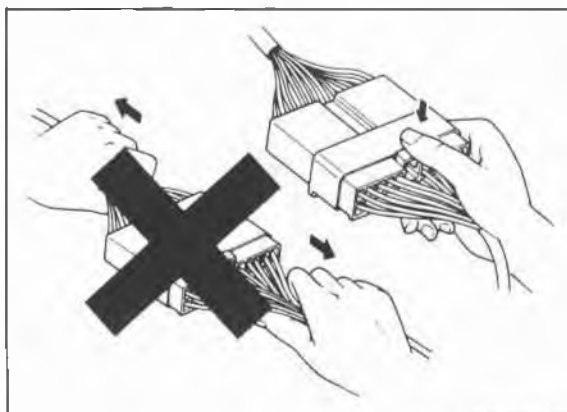


47U15X-008

## PRECAUTION Wiring Color Code

Two-color wires are indicated by a 2-letter symbol. The first letter indicates the base color of the wire and the second indicates the color of the stripe.

CODE	COLOR
B	BLACK
Br	BROWN
G	GREEN
L	BLUE
Lb	LIGHT BLUE
Lg	LIGHT GREEN
O	ORANGE
R	RED
Y	YELLOW
W	WHITE



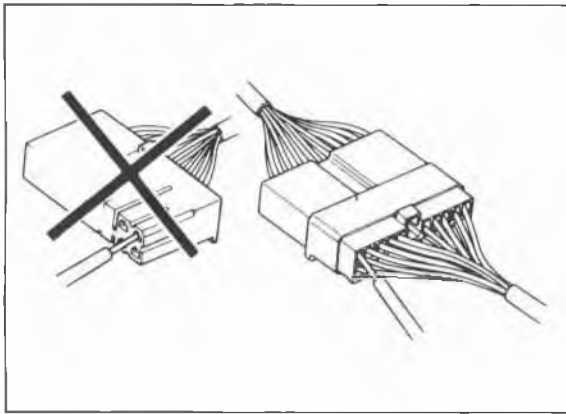
69G15X-004

## Bulkhead-Type Connector

This connector can be separated by pressing the lock lever.

Do not pull the wire when removing the connector; be careful to hold the connector itself when disconnecting.

# 15 INTRODUCTION

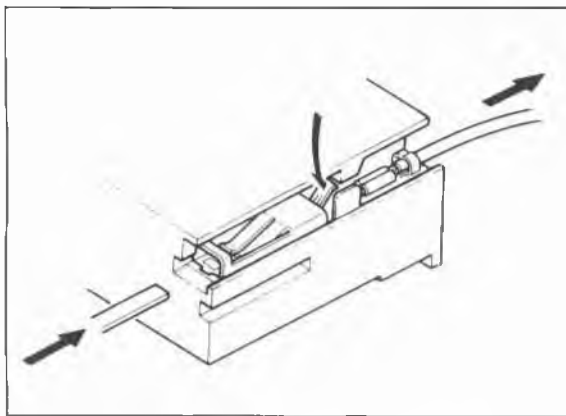


69G15X-005

## Inspection note

When checking the continuity or voltage with a circuit tester, insertion of the test probe into the receptacle connector may open the fitting of the connector and result in poor contact.

Therefore, insert the test probe only from the wire harness side.



5BU15X-003

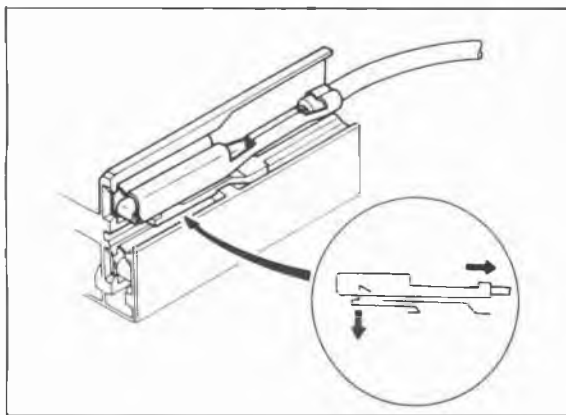
## Replacement of Terminal

Use the appropriate tools to remove the terminal, as shown in the figure.

When installing a terminal, be sure to press it in until it locks securely.

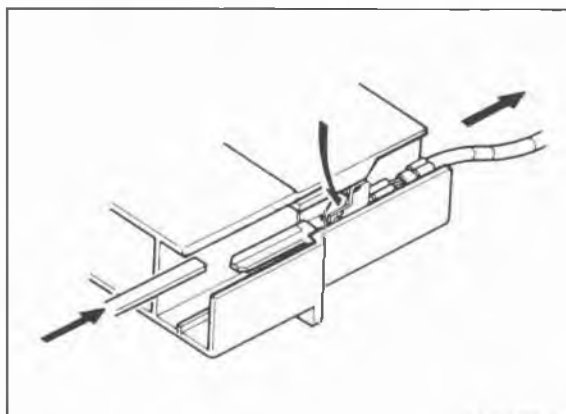
### < Female Type No.1 >

Insert a push-tool or thin piece of metal from the terminal side of the connector, and then, with the locking tabs of the terminal pressed down, pull the terminal out from the rear side.



5BU15X-004

### < Female Type No.2 >

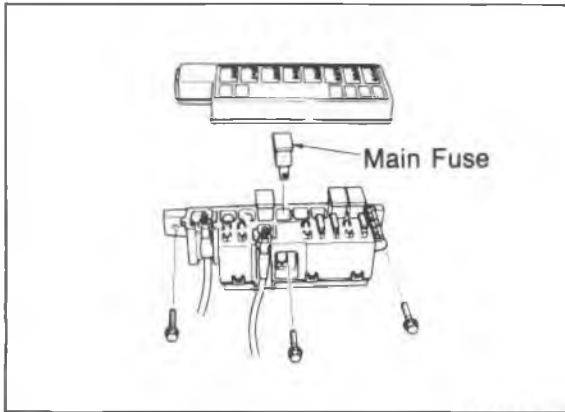


47U15X-012

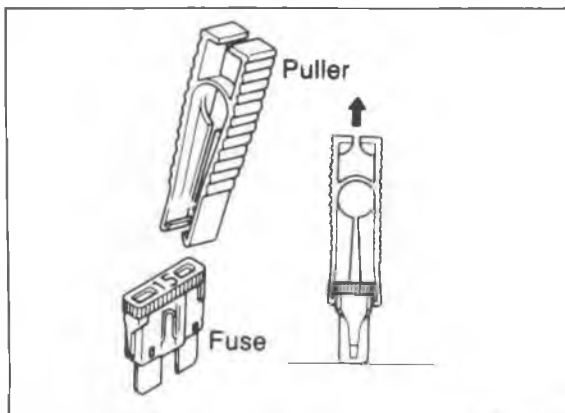
### < Male Type >

Same as the female type.

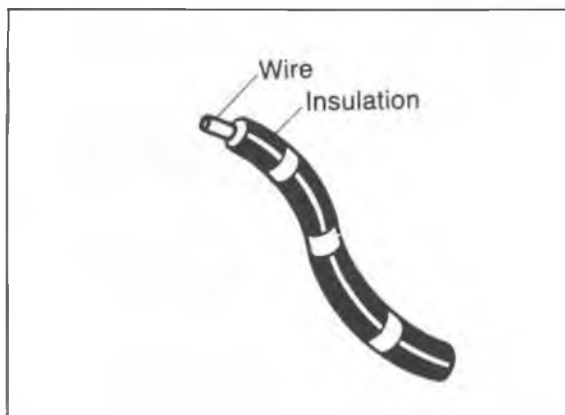




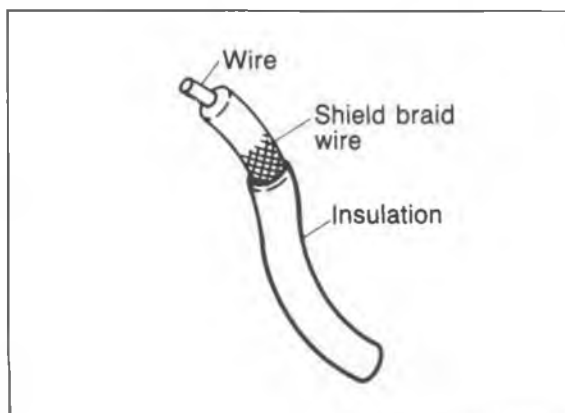
69G15X-006



4BG15X-003



69G15X-007



69G15X-008

## Replacement of Fuse

1. When replacing a fuse, be sure to replace it with one of the specified capacity.  
If, after a fuse has been replaced, it fails again, there is probably a short in the circuit, and the wiring should be checked.
2. Be sure the negative battery terminal is disconnected before replacing a main fuse.

3. When replacing a fuse, use the supplied fuse puller in the fuse box cover.

## Thin Insulation Wire

To reduce the weight of the wiring harness, a thin coating of high resistance insulation material is used.

## Shielded braid wire

This wire is used to prevent a malfunction in important circuits that are susceptible to outside signals or interference.

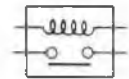

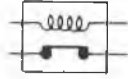





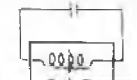

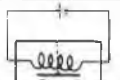





- Eg.
- Ignition coil
  - O<sub>2</sub> sensor

# 15 INTRODUCTION









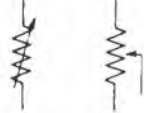



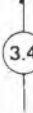
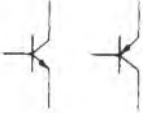



## ELECTRICAL SYMBOLS

### Switches and Relays

There is an NC (normally closed) and NO (normally open) indication for switches and relays; this indicates the condition when there has been no change of operating conditions.

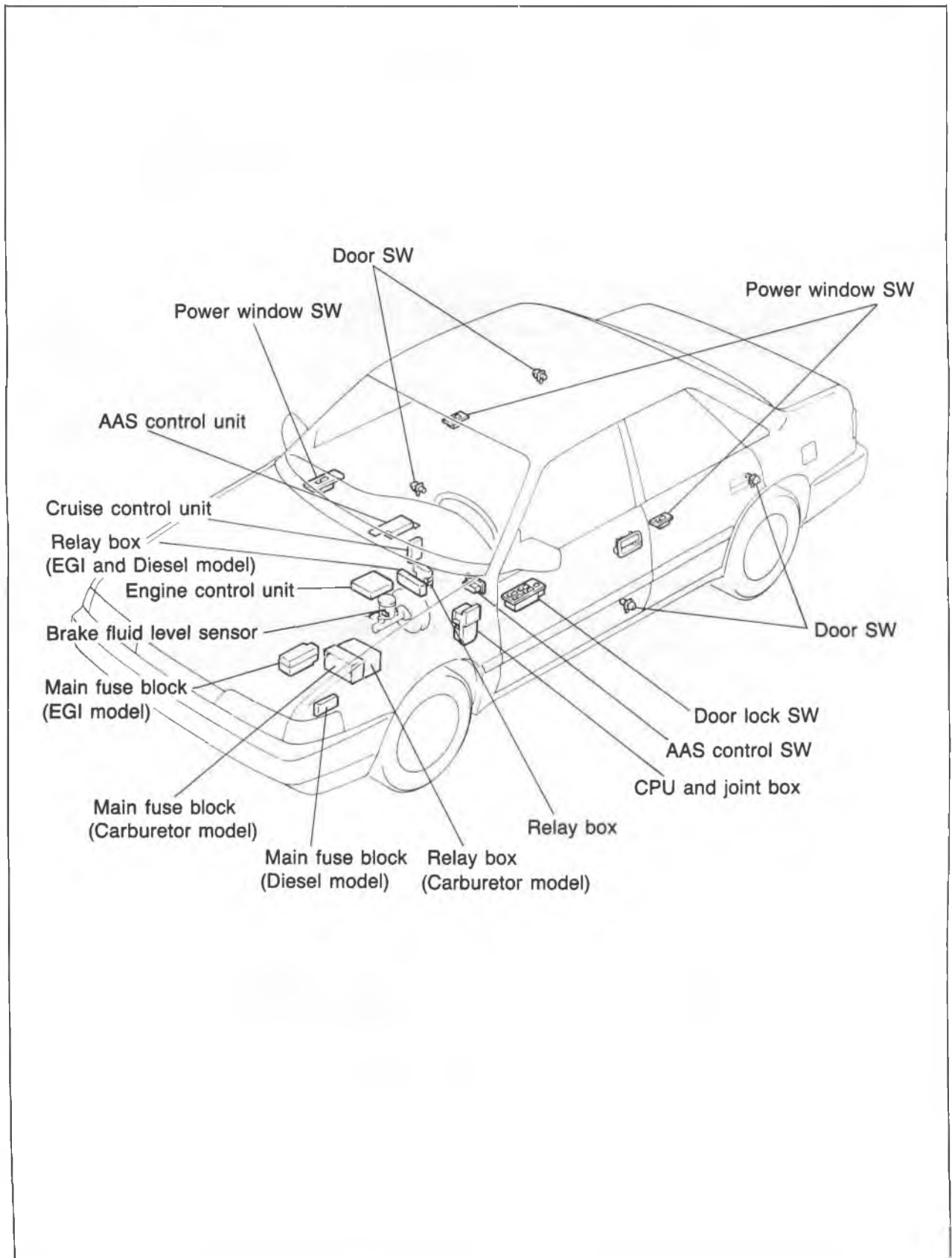
	Relay		Switch	
	NO type relay	NC type relay	NO switch	NC switch
Not in operation (No power supply)	  Stop	  Flow	  Stop	  Flow
In operation (Power supply)	  Flow	  Stop	  Flow	  Stop

### Other Electrical Symbols

		 Holder	 Box	
BATTERY	BODY GROUND	FUSE		FUSIBLE LINK
				
MOTOR	COIL, SOLENOID	RESISTOR	VARIABLE RESISTOR	
				
THERMISTER	DIODE	CONDENSER	LIGHT	
				
TRANSISTOR	SPEAKER	CIGARETTE LIGHTER	HEATER	

**LOCATION OF UNIT, RELAY AND SWITCH**

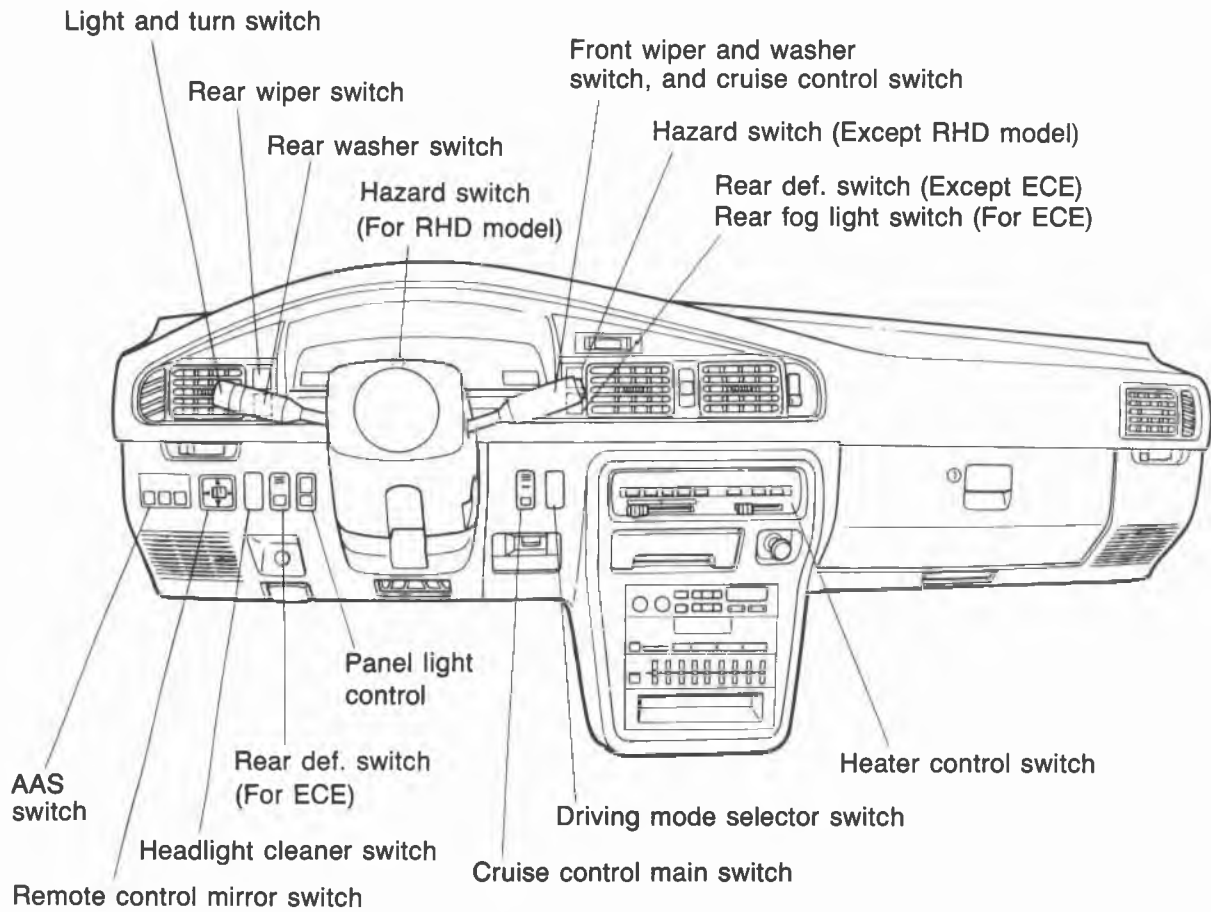
**STRUCTURAL VIEW**



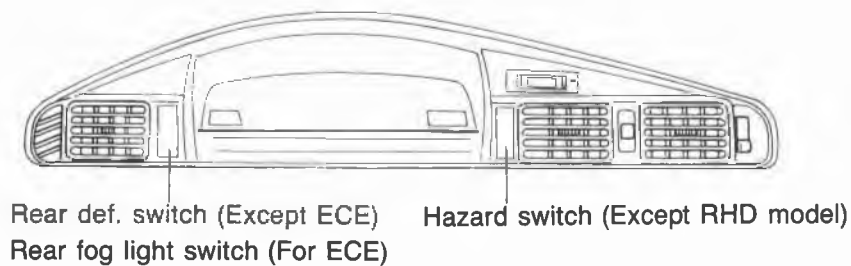
# 15 LOCATION OF UNIT, RELAY AND SWITCH

## STRUCTURAL VIEW

### Hatchback



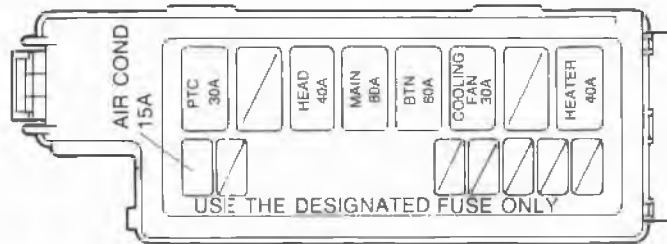
### Coupe/MX-6 and Sedan



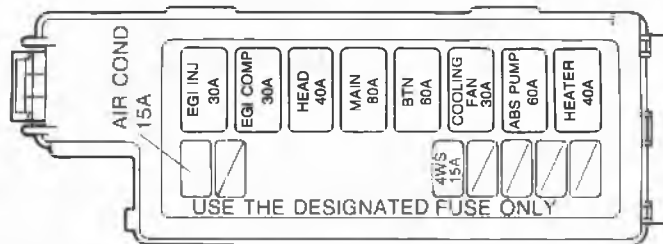
## MAIN FUSE BLOCK

### STRUCTURAL VIEW

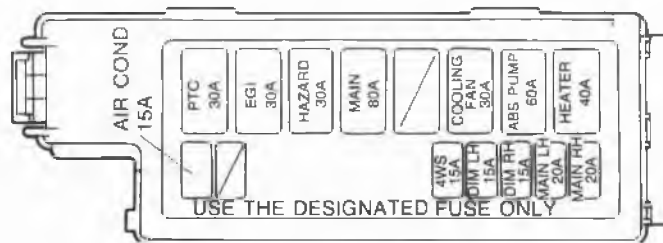
**LHD and RHD General, Middle East, ECE (Carburetor model)**



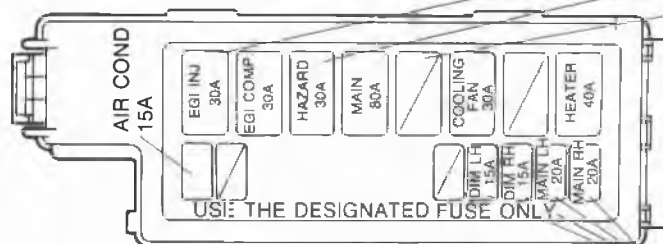
**ECE (EGI model)**



**West Germany (Carburetor and EGI model)**



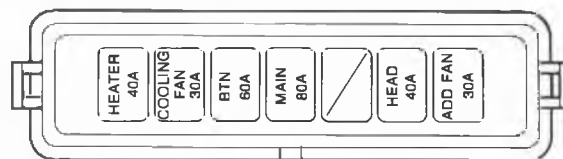
**Unleaded fuel model (EGI)**



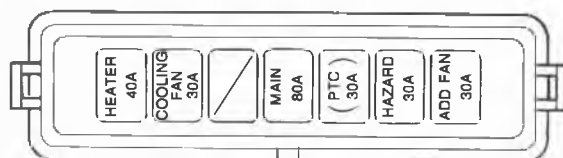
PTC 30A (Sweden)  
HEAD 40A (Sweden)  
BTN 40A (Sweden)

**LHD and RHD General, ECE (Diesel model)**

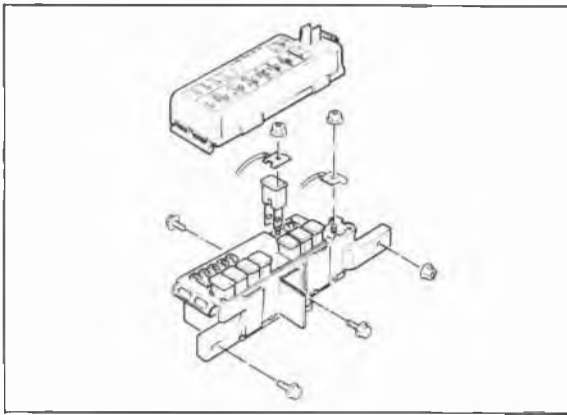
Except Sweden



**West Germany (Diesel model)**



# 5 IGNITION SWITCH

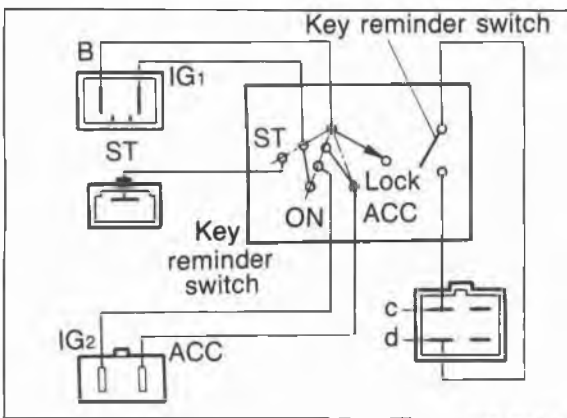


76G15X-026

## REPLACEMENT

Disconnect the negative battery terminal. 30, 40 and 60A fuses: pull out and push in a new fuse. 80A fuse:

1. Remove the main fuse box.
2. Open the cover.
3. Remove the terminal.
4. Pull out and push in a new fuse.



69G15X-014

## IGNITION SWITCH

### INSPECTION

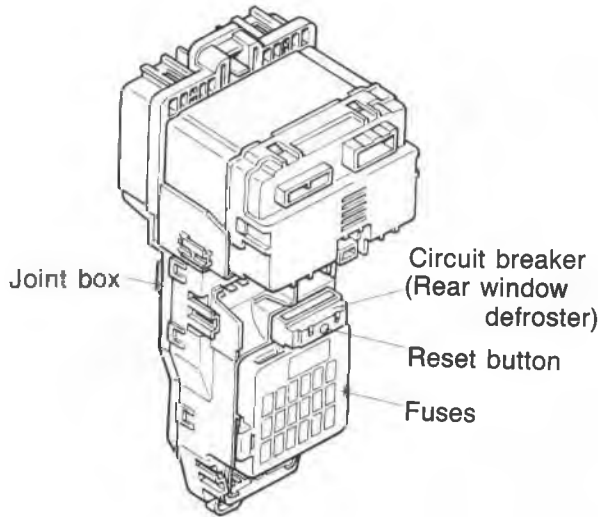
1. Use an ohmmeter to check continuity of the terminals of the switch.
2. If continuity is not as specified, replace the switch.

Terminal / Position		Terminal						
		B	ACC	IG2	IG1	ST	c	d
LOCK	Remove							
	Insert						○—○	○—○
ACC		○—○					○—○	○—○
ON		○—○		○—○			○—○	○—○
ST		○—○			○—○		○—○	○—○

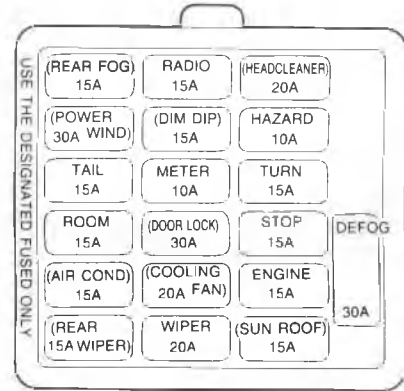
○—○: Indicates continuity

## JOINT BOX AND FUSE

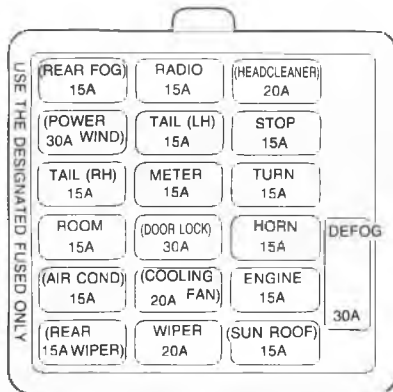
### STRUCTURAL VIEW



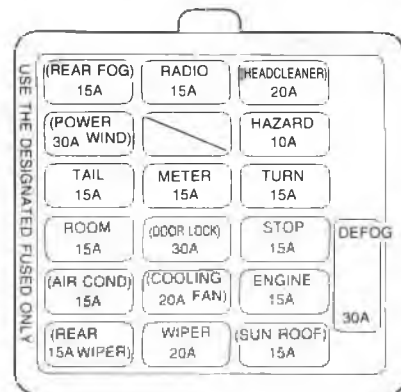
#### UK, RHD General



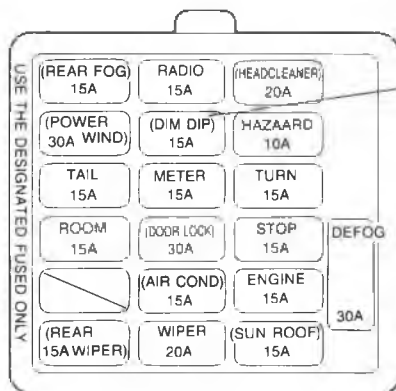
#### West Germany



#### ECE, Middle East, LHD General



#### ECE, LHD and RHD General (Diesel model)



#### West Germany (Diesel model)

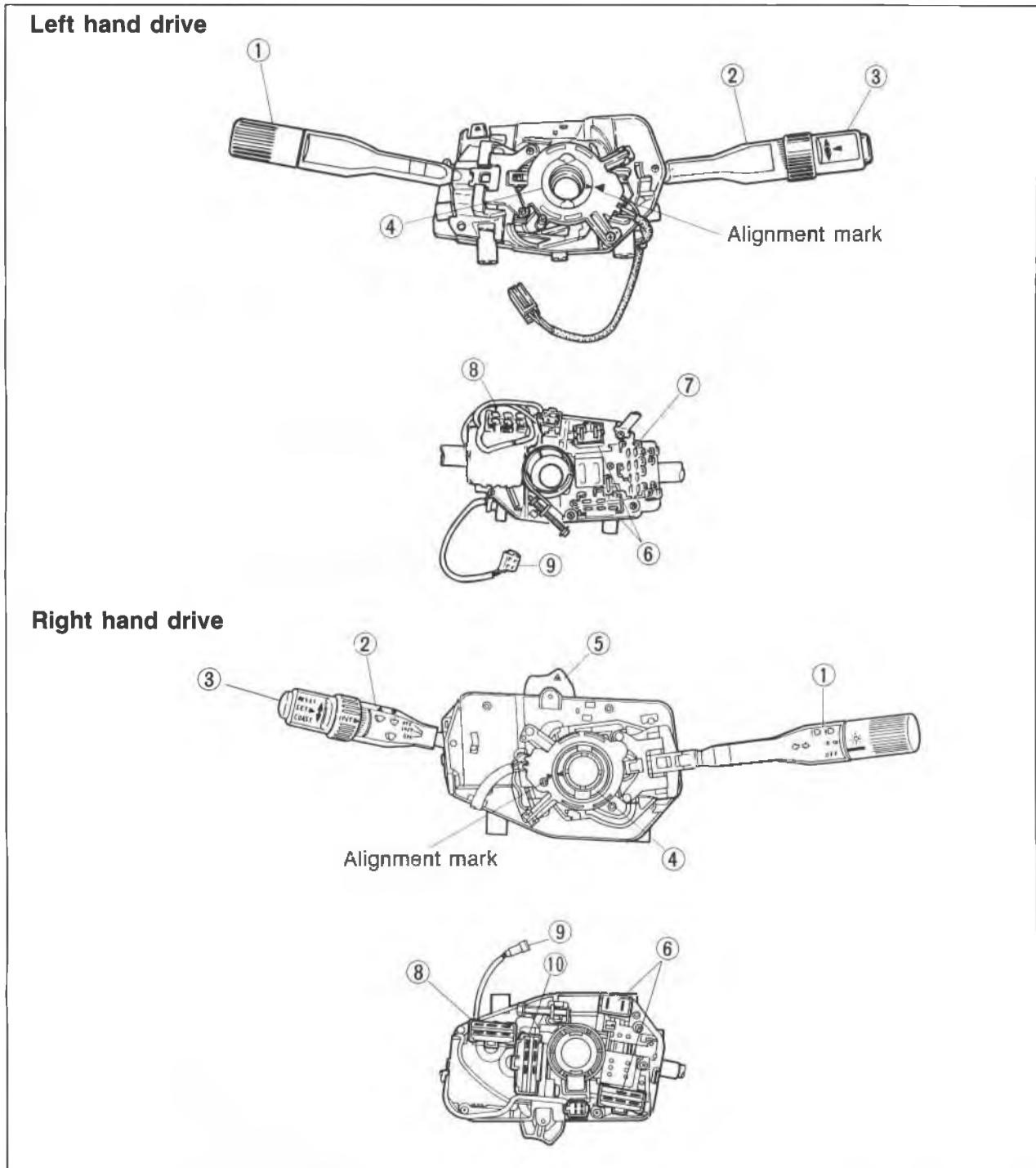


RHD General only

# 15 COMBINATION SWITCH

## COMBINATION SWITCH

### STRUCTURAL VIEW

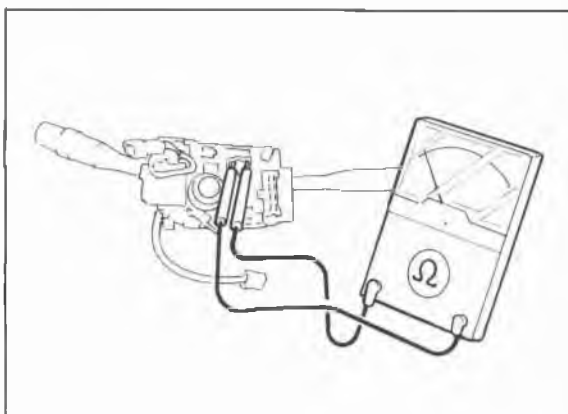


76G15X-002

1. Light and turn signal switch lever
2. Windshield wiper and washer switch lever
3. Cruise control switch
4. Steering angle sensor
5. Hazard switch
6. Light switch connectors

7. Turn signal switch connector
8. Windshield wiper and washer switch connector
9. Steering angle sensor connector
10. Turn signal and hazard switch connector

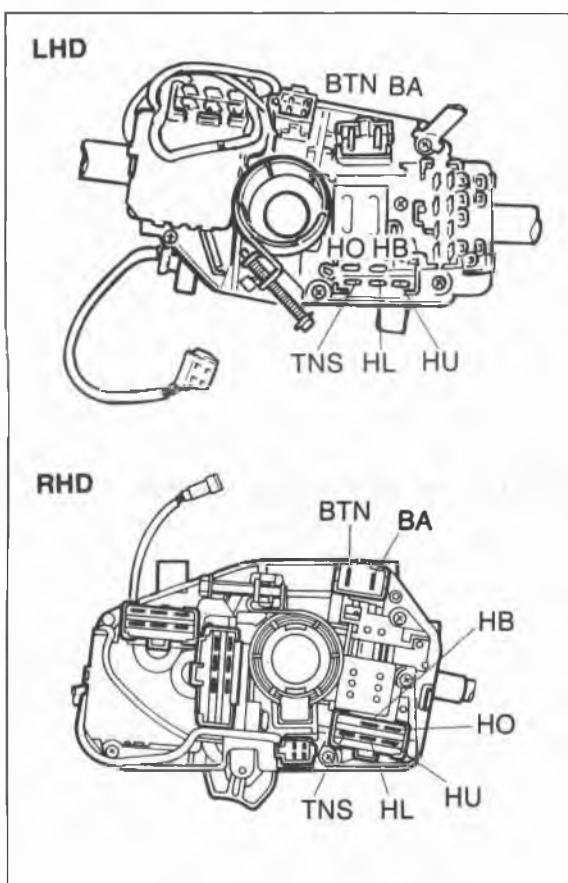




86U15X-008

## INSPECTION

1. Check for continuity or the resistance between the terminals in each position with an ohmmeter.
2. If the continuity or resistance is not as specified, replace the switch.



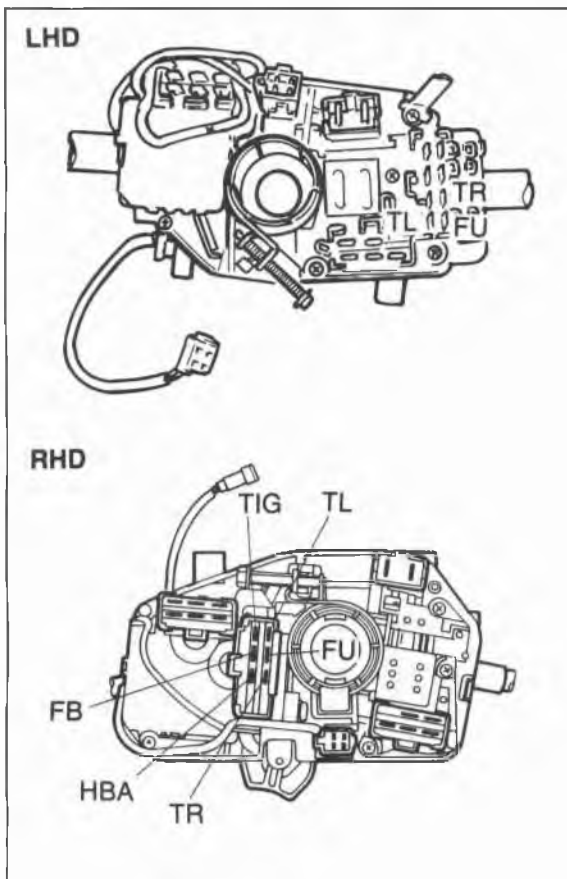
76G15X-027

## Light, dimmer, and passing switch

Position		Terminal					
		HB	HL	HU	BA	BTN	TNS
Headlight	Low beam	○—○			○	○—○	
	High beam	○—○		○	○	○—○	
Passing				○—○			
Tail, parking						○—○	

○—○: indicates continuity

# 15 COMBINATION SWITCH



76G15X-028

## Turn signal switch For LHD

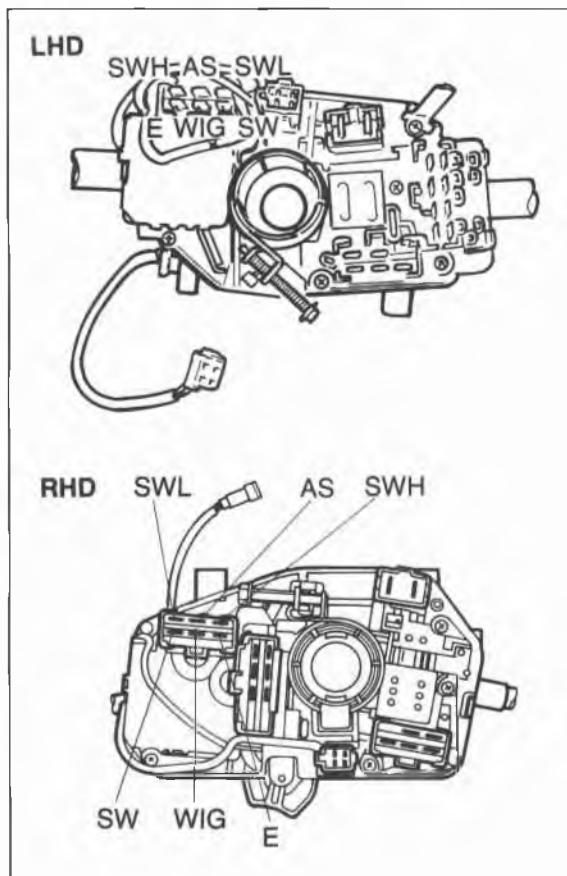
Terminal	FU	TL	TR
Position			
Left	○—○	○—○	
Right	○—○		○—○

○—○: indicates continuity

## For RHD (with hazard switch)

Hazard switch	Turn switch	FU	TL	TR	TIG	HBA	FB
OFF	Left	○—○			○—○		○—○
	OFF				○—○		○—○
	Right	○—○		○—○	○—○		○—○
ON	OFF	○—○	○—○	○—○		○—○	

○—○: indicates continuity

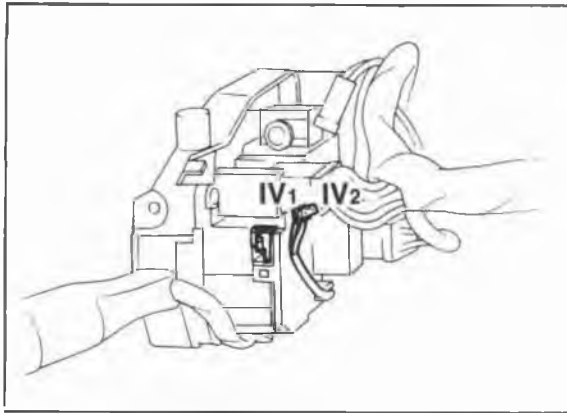


76G15X-029

## Windshield wiper and washer switch

Terminal	AS	WIG	SWL	SWH	E	SW
Position	one touch					
	Wiper switch					
	OFF	OFF	○—○			
	ON			○—○	○—○	
	INT			○—○	○—○	
I (Low)			○—○	○—○		
II (High)				○—○	○—○	
Washer switch ON					○—○	○—○

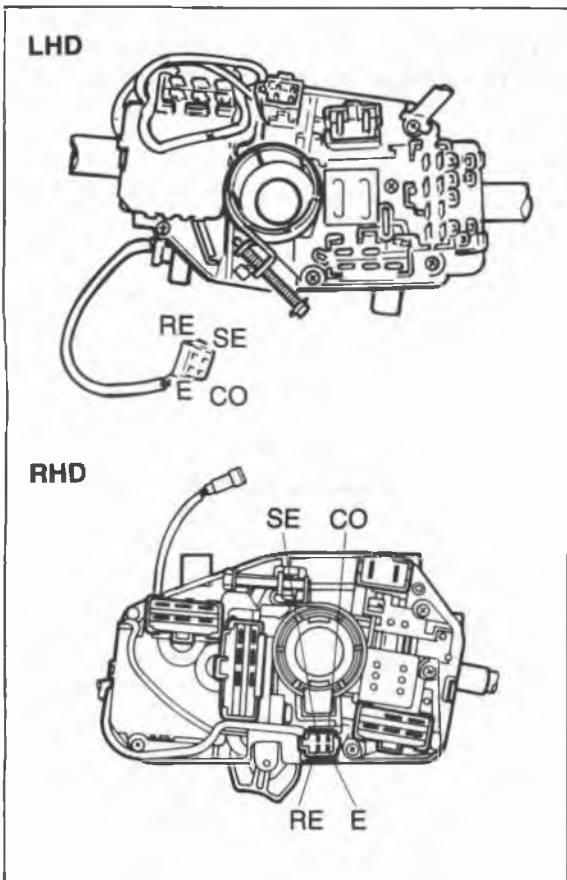
○—○: indicates continuity



86U15X-012

### Variable speed intermittent wiper timer control resistance

Position	Terminal	IV1 — IV2
Slow		0 — 1 kΩ
Fast		40 — 60 kΩ



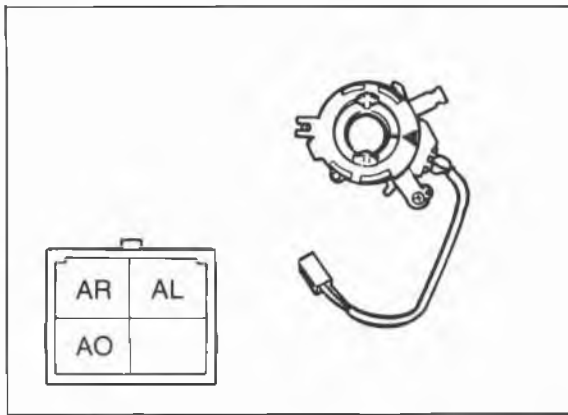
76G15X-030

### Cruise control switch

Position	Terminal	CO	RE	SE	E
OFF					
SET				○—○	
Resume			○	○—○	○
Coast		○			○

○—○: indicates continuity

# 15 COMBINATION SWITCH



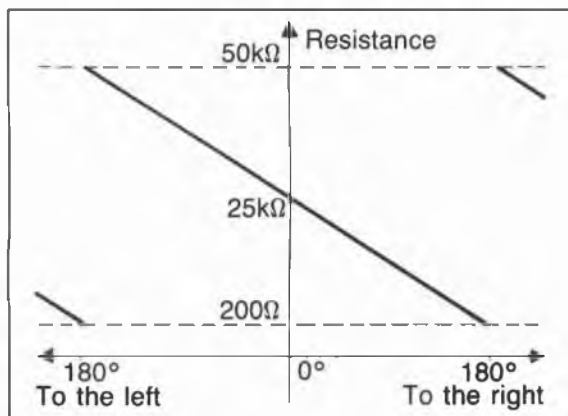
86U15X-014

## Steering angle sensor

Terminal	Steering wheel position	Resistance value
AO to AR	Turn the wheel a little at a time from the straight-ahead position 180° to the right.	Decreases from about 25 kΩ to about 200 Ω.
AO to AR	Straight-ahead position	About 25 kΩ
AO to AR	Turn the wheel a little at a time from the straight-ahead position 180° to the left.	Increases from about 25 kΩ to about 50 kΩ.
AL to AR	Straight-ahead position	About 50 kΩ

### Note

When the steering wheel is turned more than the specified angle in the above test, the resistance value will become as shown in the table below.



86U15X-015

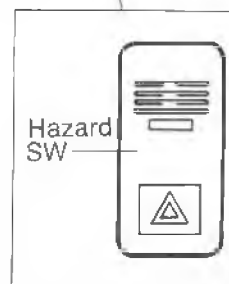
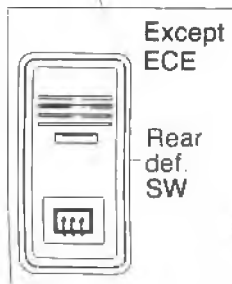
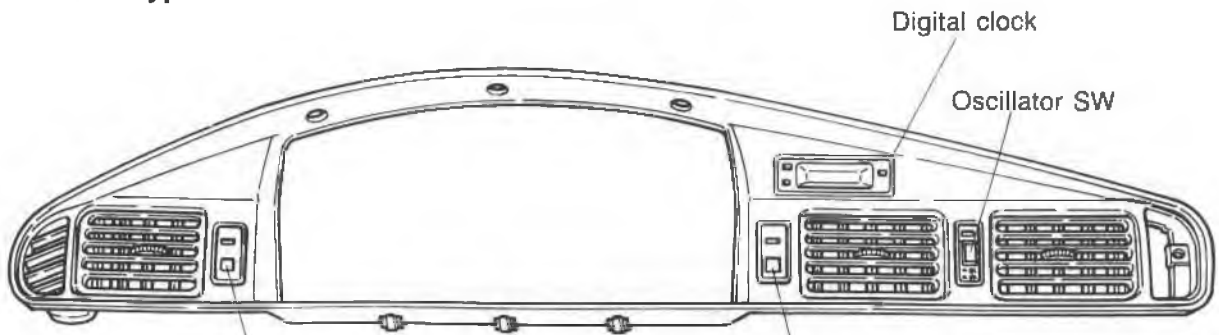
Terminal	Steering wheel position	Resistance value
AO to AR	When turned 180° or more to the right from the straight-ahead position.	Resistance slowly and gradually decreases after there is once an indication of about 50 kΩ.
AO to AR	When turned 180° or more to the left from the straight-ahead position.	Resistance slowly and gradually increases after there is once an indication of about 200 Ω.

## CLUSTER SWITCH

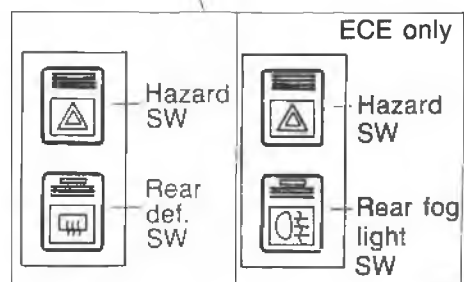
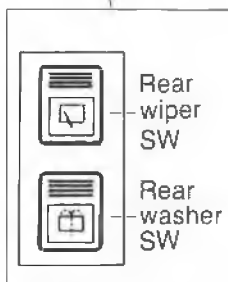
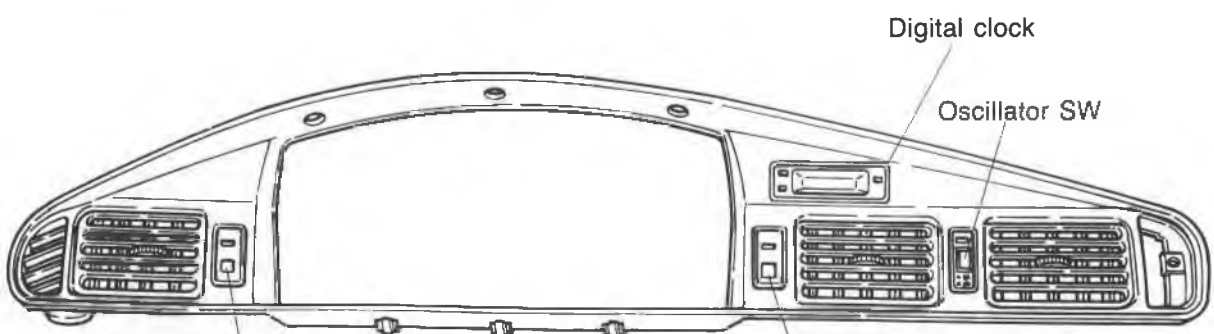
### STRUCTURAL VIEW

For Left Hand Drive

Rocker type



Push type

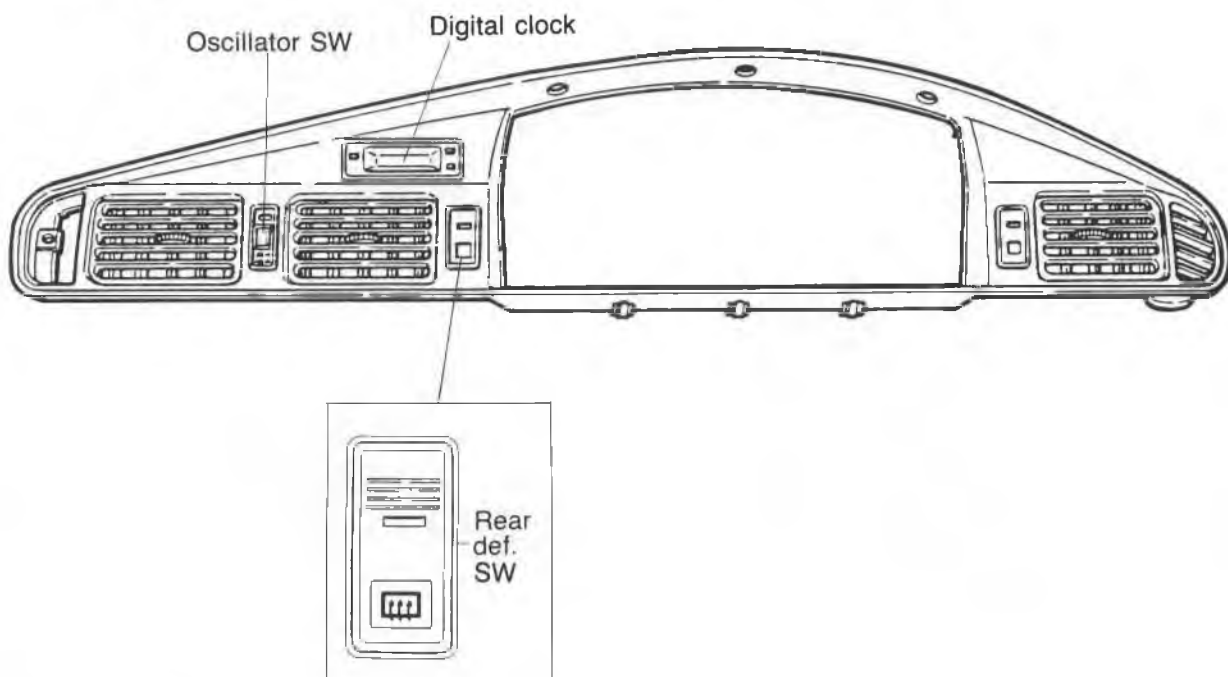


# 15 CLUSTER SWITCH

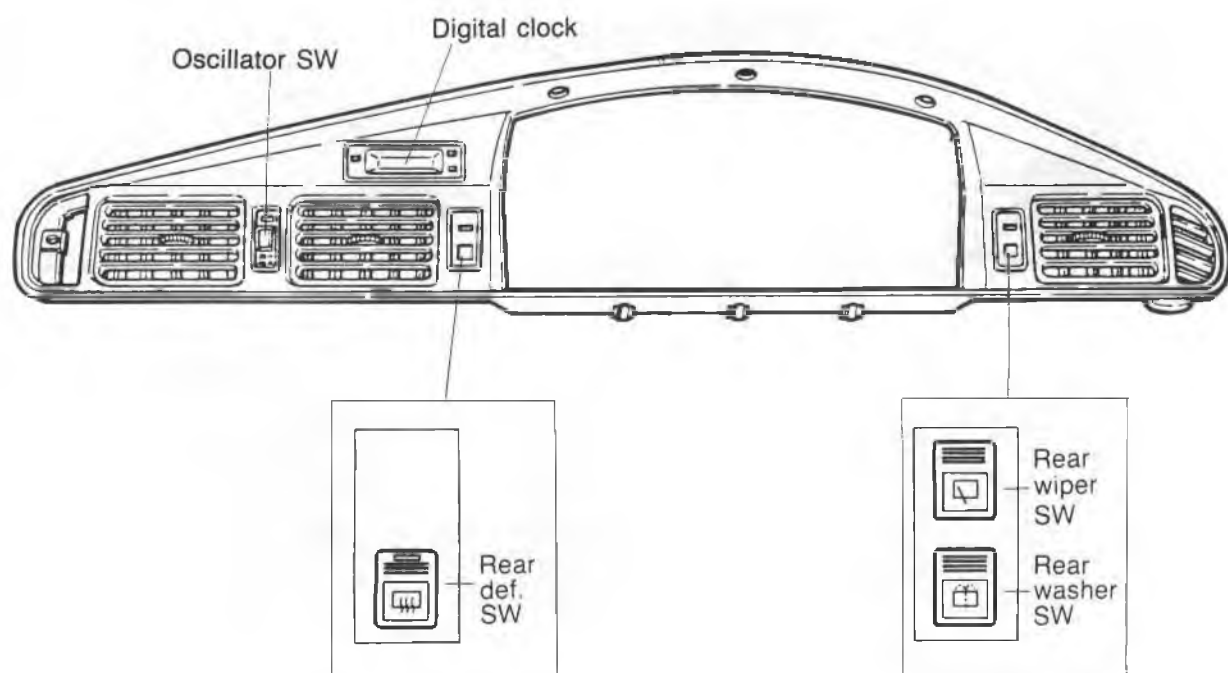
## STRUCTURAL VIEW

For Right Hand Drive

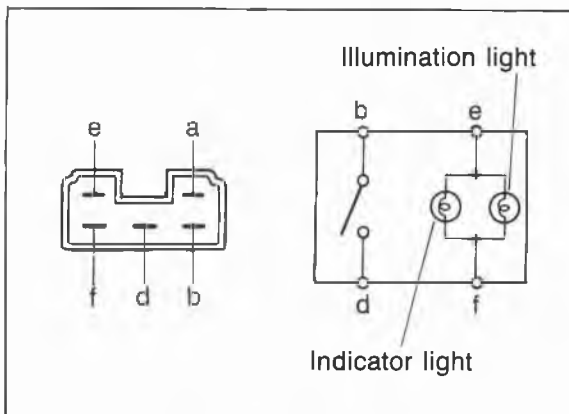
Rocker type



Push type



76G15X-004



76G15X-088

## INSPECTION OF ROCKER TYPE

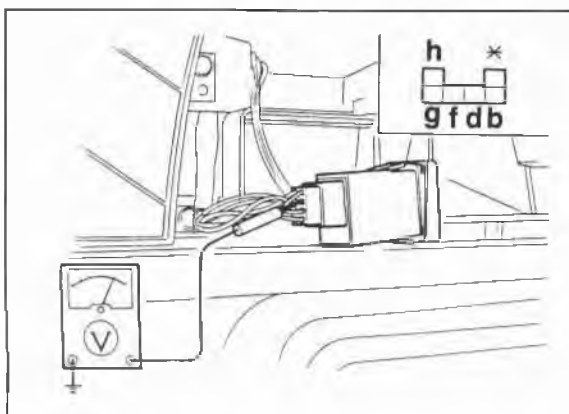
### Hazard switch

1. Check for continuity between the terminals in each position with an ohmmeter.

Position	Terminal	a	b	d	e	f
OFF					○—○	○—○
ON			○—○		○—○	○—○

○—○: Indicates continuity

2. If continuity is not as specified, replace the switch or replace the light(s).



86U15X-018

### Defroster switch

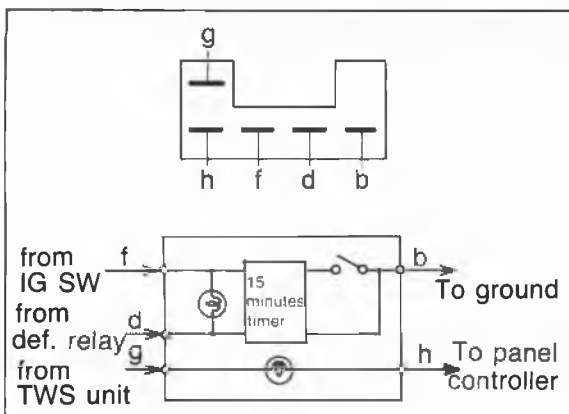
1. Turn the ignition switch ON.
2. Push the defroster switch to ON, and check the lights for lighting.
3. If the lights do not light, replace the lights.
4. Check that the switch goes off after 15 min from switch ON.
5. Check the voltage between each terminal and a body ground.

Position	Terminal voltage (V)				
	b	d	f	g	h
OFF	0	12	12	0	12
ON	0	0	12	0	12
ON (head light switch ON)	0	0	12	2-12	12
OFF (head light switch ON)	0	12	12	2-12	12

6. If the voltage of "d" terminal is 12V with switch off but not 0V with switch on, replace the defroster switch.

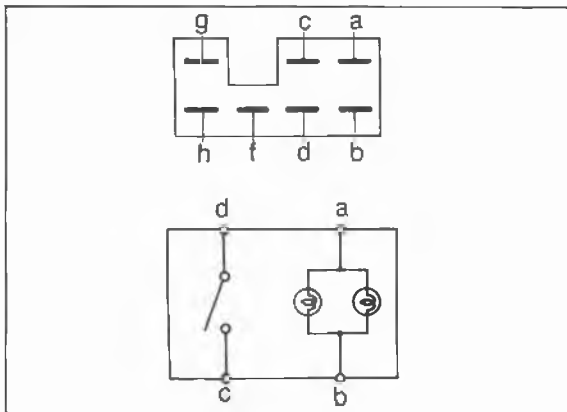
If the voltage of "d" terminal is not 12V with switch off, trouble is in defroster relay or harness.

If the voltages of the other terminals are not correct, trouble is in the other parts or harness.

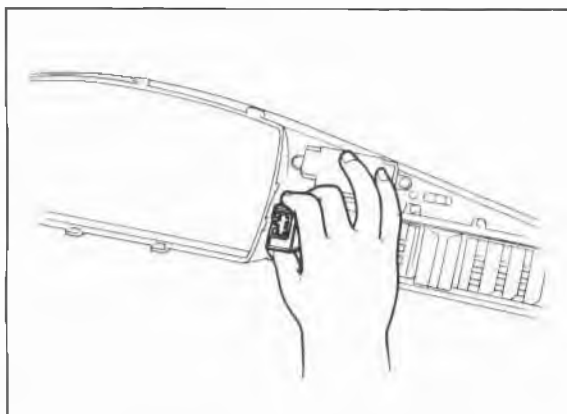


86U15X-019

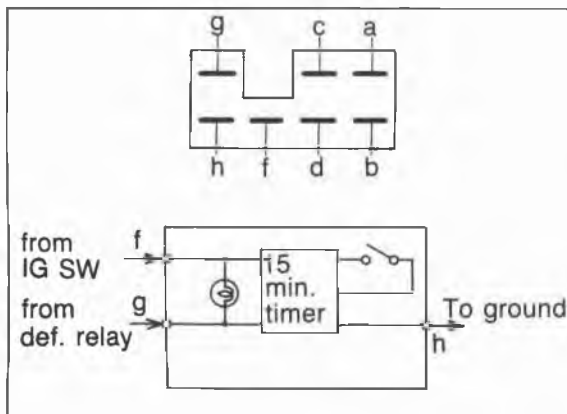
# 15 CLUSTER SWITCH



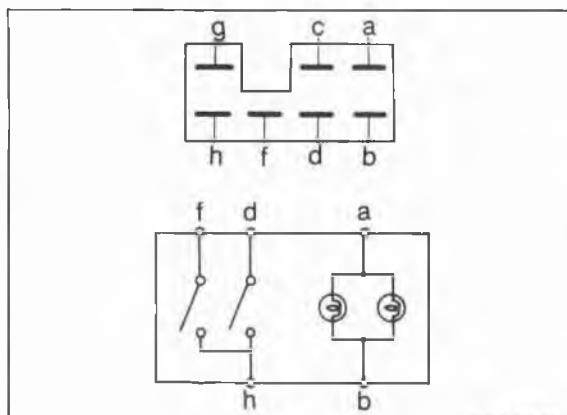
86U15X-020



86U15X-021



86U15X-022



86U15X-023

## INSPECTION OF FOUR SWITCH TYPE

### Hazard switch

1. Check for continuity between terminals of the switch.

Position \ Terminal	a	b	c	d
OFF	○—○	○—○		
ON	○—○	○—○	○—○	○—○

○—○: Indicates continuity

2. If continuity is not as specified, replace the switch.

### Defroster switch

1. Turn the ignition switch ON.
2. Check the light for lighting.
3. If the light doesn't light, replace the light.
4. Check that the switch goes off after 15 min from switch on.
5. Check the voltage between each terminal and a body ground.

Position	Terminal voltage (V)		
	f	g	h
OFF	12	12	0
ON	12	0	0

6. If the voltage of terminal "g" is 12V with switch off but not 0V with switch on, replace the defroster switch

If the voltage of terminal "g" is not 12V with switch off, trouble is in defroster relay or harness.

If the voltage of terminal "f" and "h" is not correct, the trouble is in the other parts or harness.

### Rear wiper and washer switch

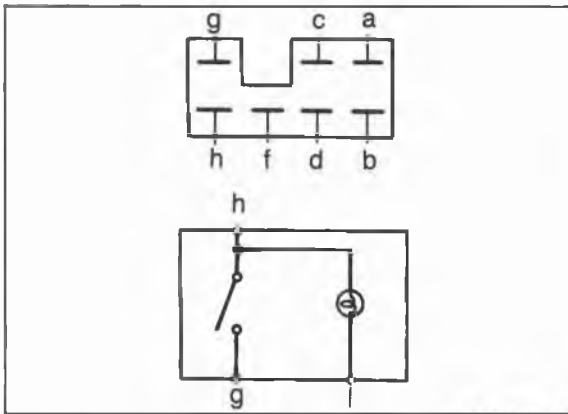
1. Check for continuity between the terminals in each position with an ohmmeter.

Position \ Terminal	a	b	d	f	h
Rear wiper switch	OFF	○—○			
	ON	○—○	○—○		○—○
Rear washer switch	OFF	○—○			
	ON	○—○		○—○	○—○

○—○: Indicates continuity

2. If continuity is not as specified, replace the switch.





76G15X-006

### Rear fog light switch

1. Check for continuity between the terminals in each position with an ohmmeter.

Position	Terminal	f	g	h
OFF		○	—	○
ON		○	○	○

○—○: Indicates continuity

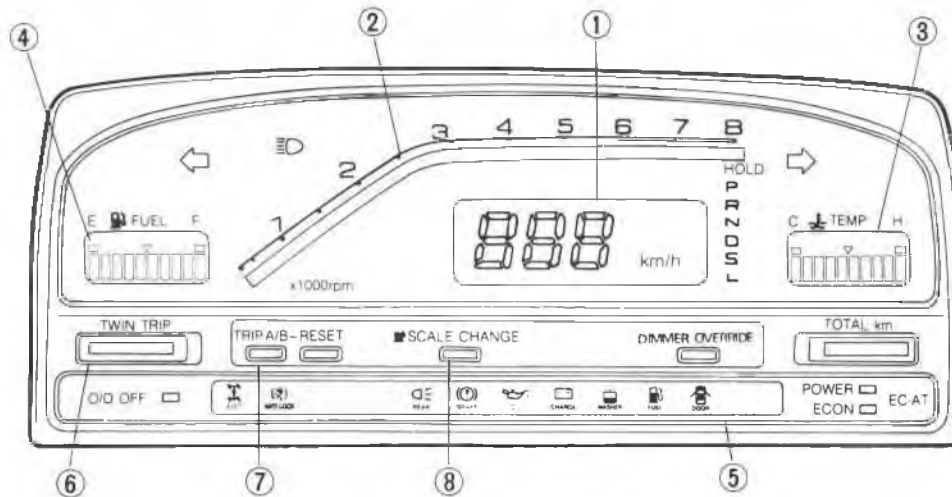
2. If continuity is not as specified, replace the switch or replace the light(s).

# 15 METER

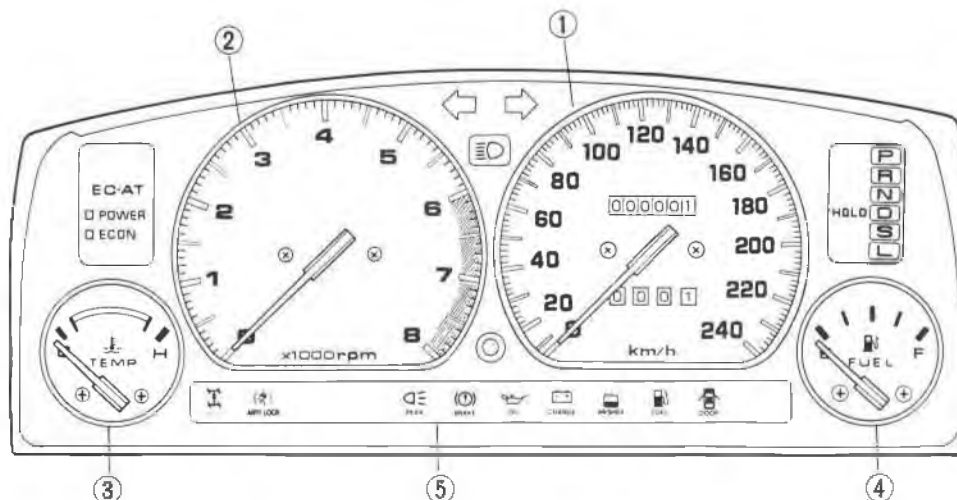
## METER

### STRUCTURAL VIEW

#### DIGITAL ELECTRONIC DISPLAY METER



#### ANALOG DISPLAY METER

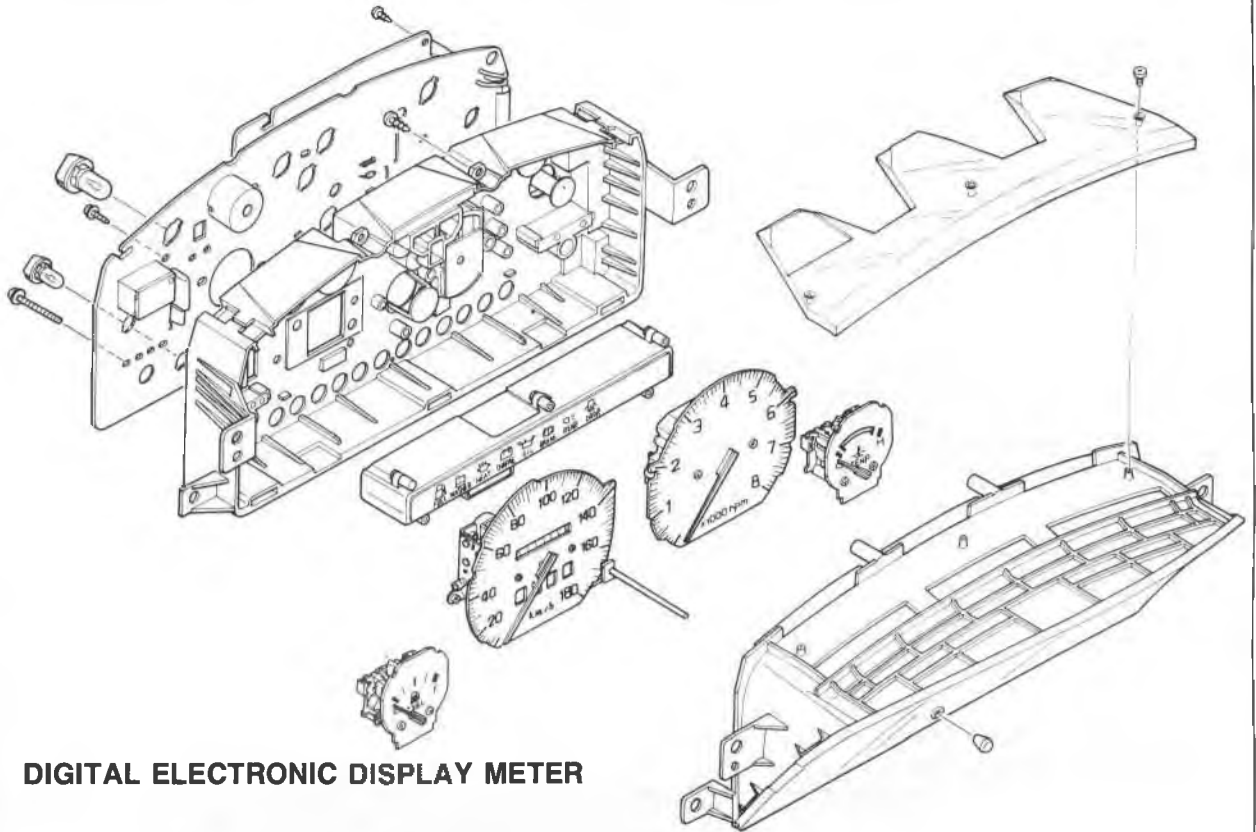


76G15X-007

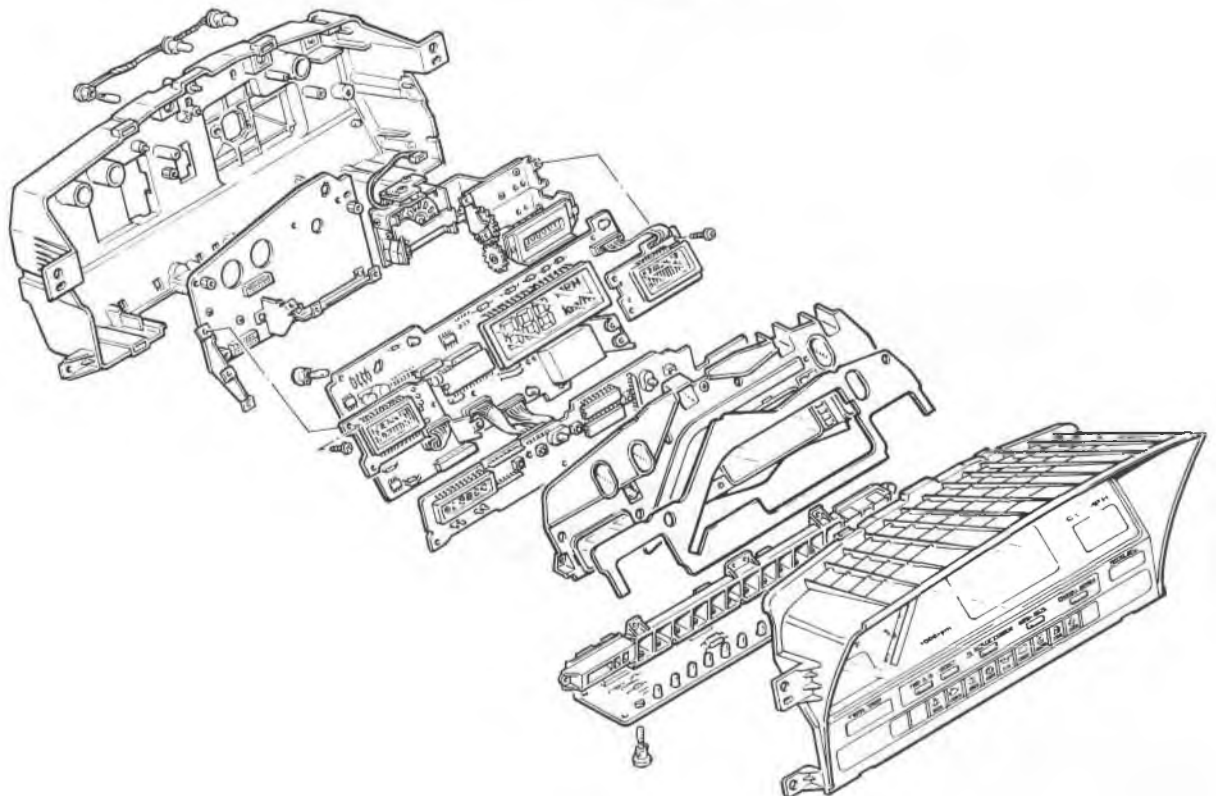
- 1. Speedometer
- 2. Tachometer
- 3. Water temperature gauge
- 4. Fuel gauge
- 5. Warning and indicator lights
- 6. Tripmeter
- 7. Twin tripmeter change switch
- 8. Fuel gauge scale change switch

DISASSEMBLY AND ASSEMBLY

**ANALOG DISPLAY METER**



**DIGITAL ELECTRONIC DISPLAY METER**

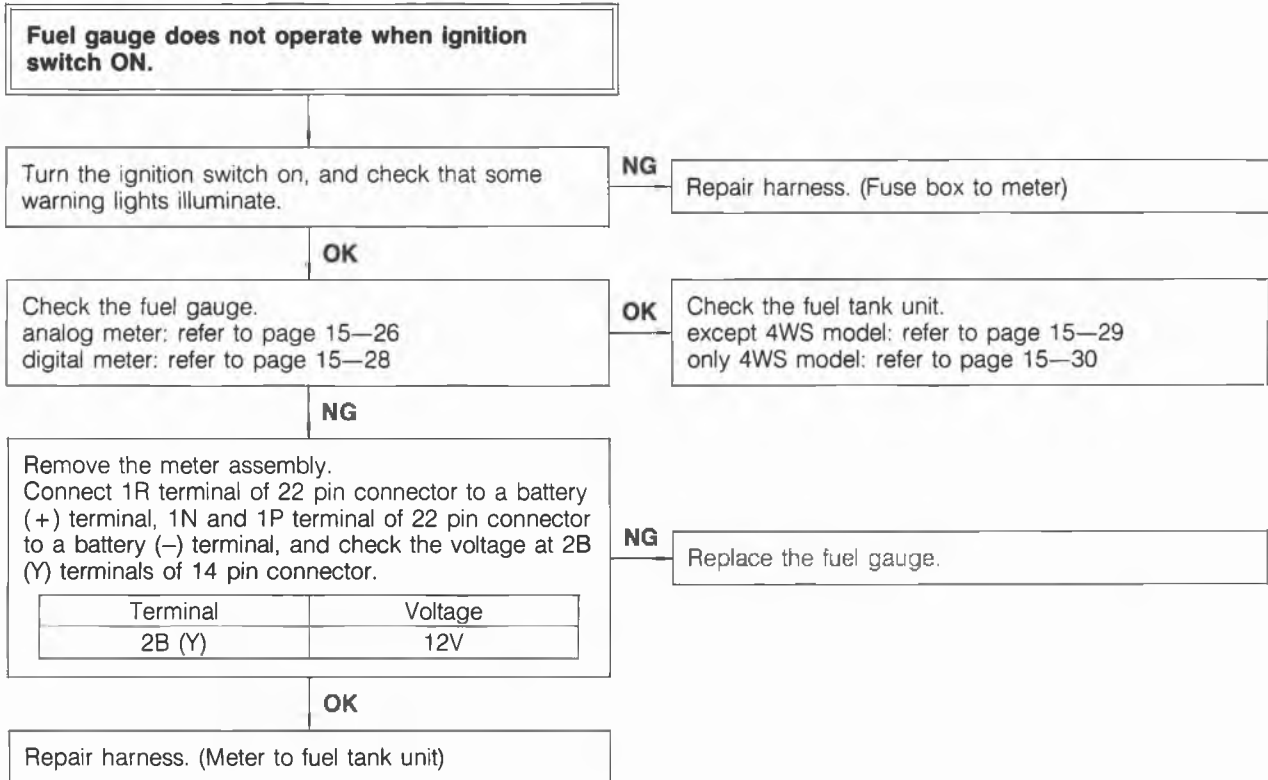


# 15 METER

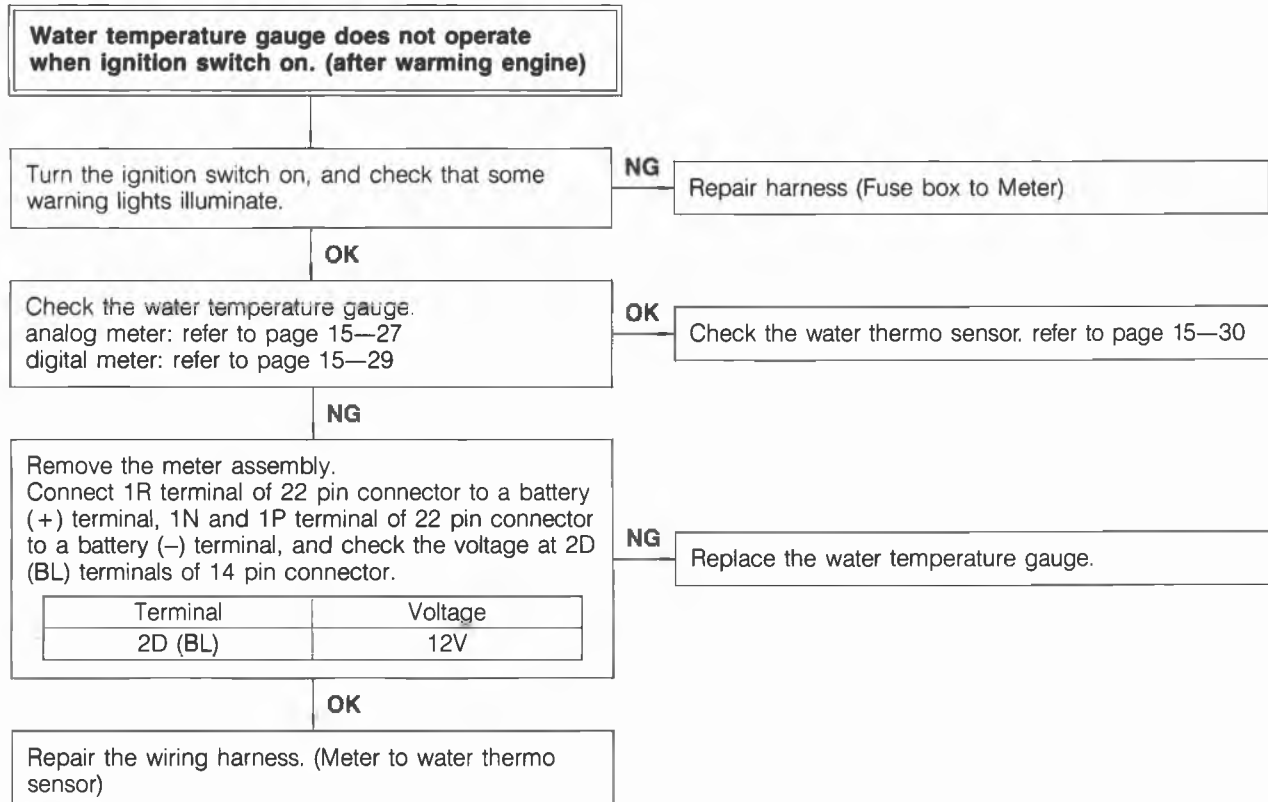
## TROUBLESHOOTING

### Note

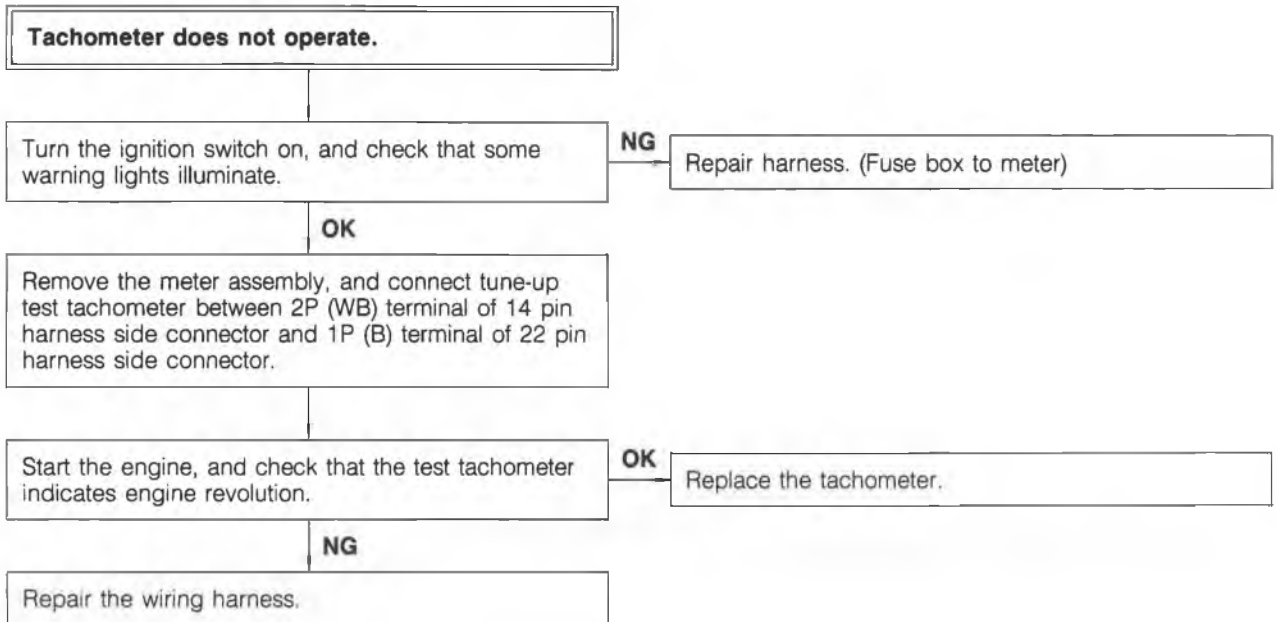
Check the METER 10 or 15A fuse in the fuse box for fusing before troubleshooting.



76G15X-031



76G15X-032



86U15X-028

# 15 METER

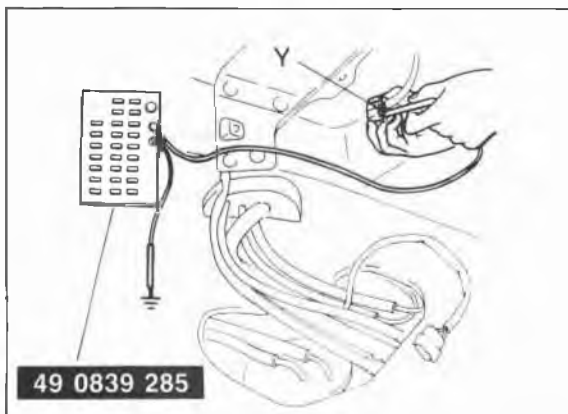
Standard indication (km/h)	Allowable range (km/h)
40	40— 43
80	80— 84
120	120—126

Standard indication (mph)	Allowable range (mph)
30	30—32
50	50—53
80	80—84

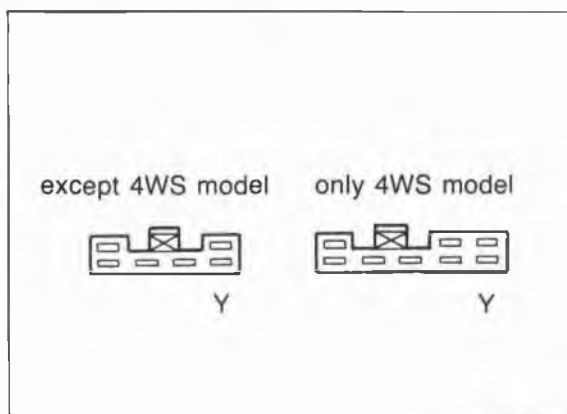
86U15X-029

Standard Indication (rpm)	Allowable range (rpm)
1000	850—1090
2000	1910—2210
3000	2850—3330
4000	3820—4420
5000	4790—5510
6000	5760—6600

86U15X-030



86U15X-031



86U15X-032

## INSPECTION OF ANALOG METER Speedometer

1. Using a speedometer tester, check the speedometer for allowable indication error, and check the operation of the odometer. Replace if necessary.
2. Check the speedometer for fluctuation and/or abnormal noise.

### Caution

**a) If significant fluctuation occurs or the speedometer does not move at all, remove the speedometer cable. If normal, replace the speedometer assembly.**

**b) Tire wear and improper inflation will increase speedometer error.**

## Tachometer

1. Connect a test tachometer to the engine, and start the engine.
2. Check the tachometer for allowable indicator error. Replace if necessary.

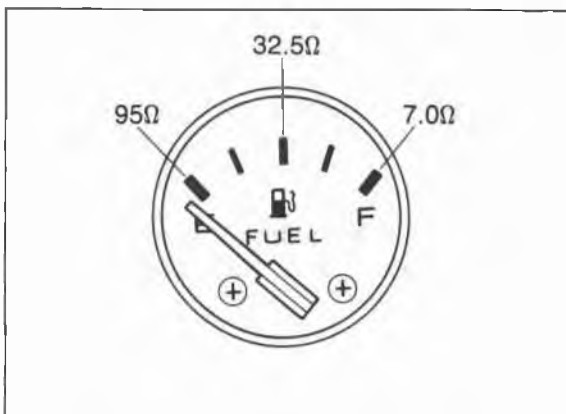
### Caution

**When removing or installing the tachometer, be careful not to drop it.**

## Fuel Gauge

1. Disconnect the connector from the fuel tank unit.

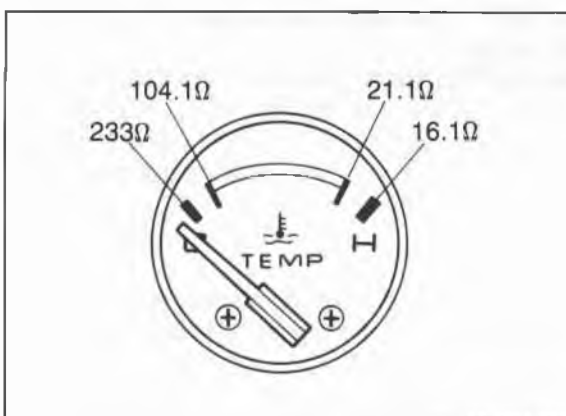
2. Connect the red lead of the **SST** to the terminal "Y", and the black lead to a body ground.



86U15X-033



86U15X-034



86U15X-035

Standard indication (km/h)	Allowable range (km/h)
60	60—63

Standard indication (mph)	Allowable range (mph)
60	60—63

86U15X-036

3. Set the **SST** to the resistance values shown in the figure.
4. Turn the ignition switch ON, and check that the needle indicator displays the correct values. If the needle displays correctly, check the gauge unit. If not, replace the fuel gauge in the meter or repair the wiring harness.

### Caution

- a) Continue the above checks for at least two minutes each to correctly judge the condition.
- b) The allowable indication error is twice the width of the needle.

### Water Temperature Gauge

1. Disconnect the connector from the water thermo sensor.
2. Connect the red lead of the **SST** to the connector, and the black lead to a body ground.

3. Set the **SST** to the resistance values shown in the figure.
4. Turn the ignition switch ON, and check that the needle indicator displays the correct values. If the needle displays the correct values, the trouble is in the gauge unit; if not, the trouble is in the meter or the wiring harness.

### Caution

- a) Continue the above checks for at least two minutes each to correctly judge the condition.
- b) The allowable indication error is twice the width of the needle.

### INSPECTION OF DIGITAL METER

#### Speedometer

1. Using a speedometer tester, check the speedometer for allowable indication error, and check the operation of the odometer. Replace the meter assembly if necessary.
2. Check the speedometer for fluctuation and/or abnormal noise.

### Caution

- a) If significant fluctuation occurs or the speedometer does not move at all, remove the speedometer cable. If normal, replace the digital meter assembly.
- b) Tire wear and improper inflation will increase speedometer error.

# 15 METER

Standard Indication (rpm)	Allowable range (rpm)
1000	900— 950
2000	1900—1950
3000	2900—2950
4000	3900—3950
5000	4900—4950
6000	5900—5950

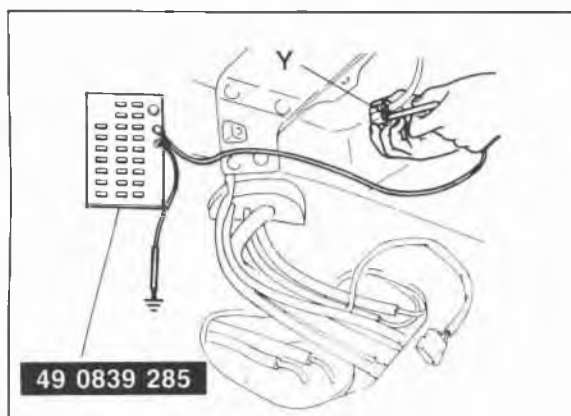
86U15X-037

## Tachometer

1. Connect a test tachometer to the engine, and start the engine.
2. Check the tachometer for the allowable indicator error. Replace digital meter assembly.

### Caution

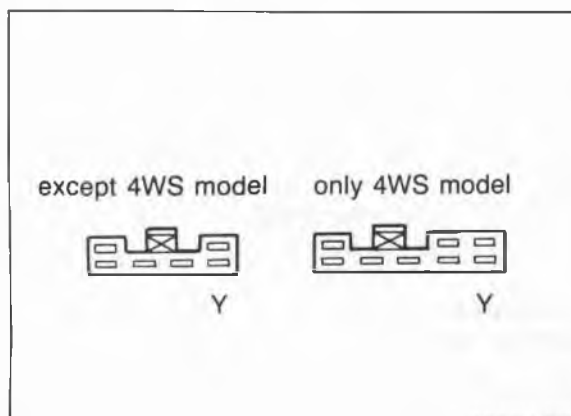
**When removing or installing the tachometer, be careful not to drop it or subject it to sharp impact.**



86U15X-038

## Fuel Gauge

1. Disconnect the connector from the fuel tank unit.
2. Connect the red lead of the **SST** to terminal "Y" and the black lead to body ground.

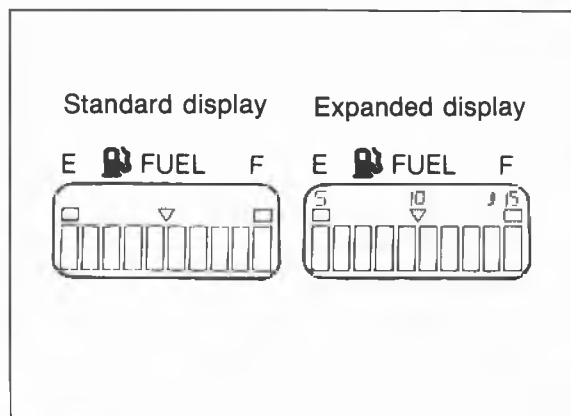


86U15X-039

3. Set the **SST** to the resistance values shown the following table.
4. Turn the ignition switch ON and check that the segment displays the correct values in each range. If the segment displays the correct values, check the gauge unit. If not, replace the digital meter assembly.

### Caution

**Continue the above inspections for at least two minutes each to correctly judge the condition.**



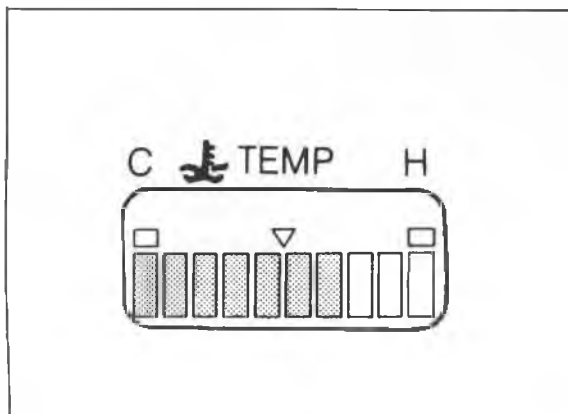
86U15X-040

Segment	Standard display	Expanded display
	Resistance ( $\Omega$ )	
1—10	less than 8	less than 63
1— 9	8—14	63—66
1— 8	14—20	66—70
1— 7	20—25	70—74
1— 6	25—30	74—78
1— 5	30—37	78—82
1— 4	37—46	82—86
1— 3	46—63	86—90
1— 2	63—86	90—93
1	86—98	93—98
1 (flashing)	more than 98	less than 98





86U15X-041



86U15X-042

## Water Temperature Gauge

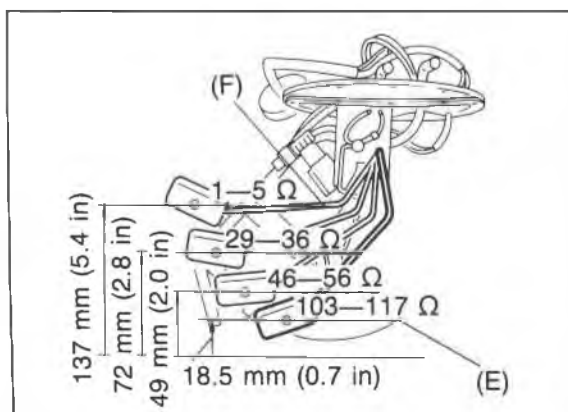
1. Remove the connector from the water thermo sensor.
2. Connect the red lead of the **SST** to the connector, and the black lead to a body ground.

3. Set the **SST** to the resistance values shown in the following table.
4. Turn the ignition switch ON and check that the segment displays the correct values. If the segment displays the correct values, check the gauge unit. If not, replace the digital meter assembly or repair wiring harness.

### Caution

**Continue the above checks for at least two minutes each to correctly judge the condition.**

Segment	Resistance ( $\Omega$ )	Segment	Resistance ( $\Omega$ )
1—10	less than 17	1—5	33—89
1— 9	17—20	1—4	89—120
1— 8	20—26	1—3	120—145
1— 7	26—28	1—2	145—177
1— 6	28—33	1	more than 177

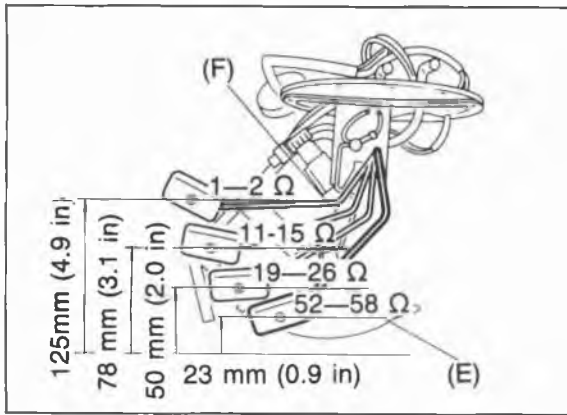


86U15X-043

## INSPECTION OF METER SENDER Fuel tank unit (except 4WS model)

1. Disconnect the connector from the fuel tank unit.
2. Remove the fuel tank unit from the tank.
3. Connect an ohmmeter to terminal "b" of connector.
4. Move the unit arm slowly from point (F) to point (E), and read the resistance values. If not as specified, replace the unit.

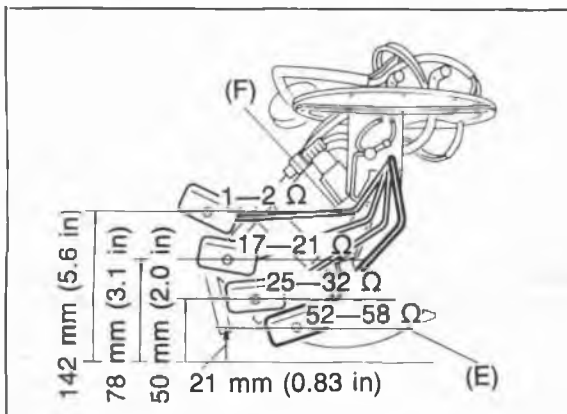
# 15 METER



86U15X-044

## Fuel transfer unit (only 4WS model)

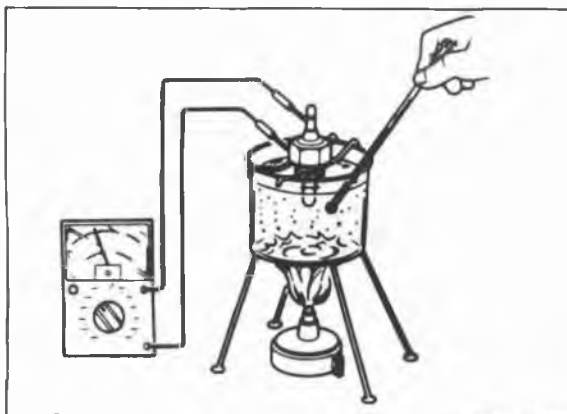
1. Remove the fuel transfer unit referring to section 4.
2. Remove the connector from the fuel transfer unit.
3. Connect an ohmmeter between "b" and "d" terminal of the connector.
4. Move the unit arm slowly from point (F) to point (E), and read the resistance values.
5. If not as specified, replace the unit.



86U15X-045

## Fuel tank unit (only 4WS model)

1. Remove the fuel tank unit.
2. Remove the connector from the fuel tank unit.
3. Connect an ohmmeter between "d" terminal of the connector and fuel tank unit cover.
4. Move the unit arm slowly from point (F) to point (E) and read the resistance values.
5. If not as specified, replace the unit.



76G15X-089

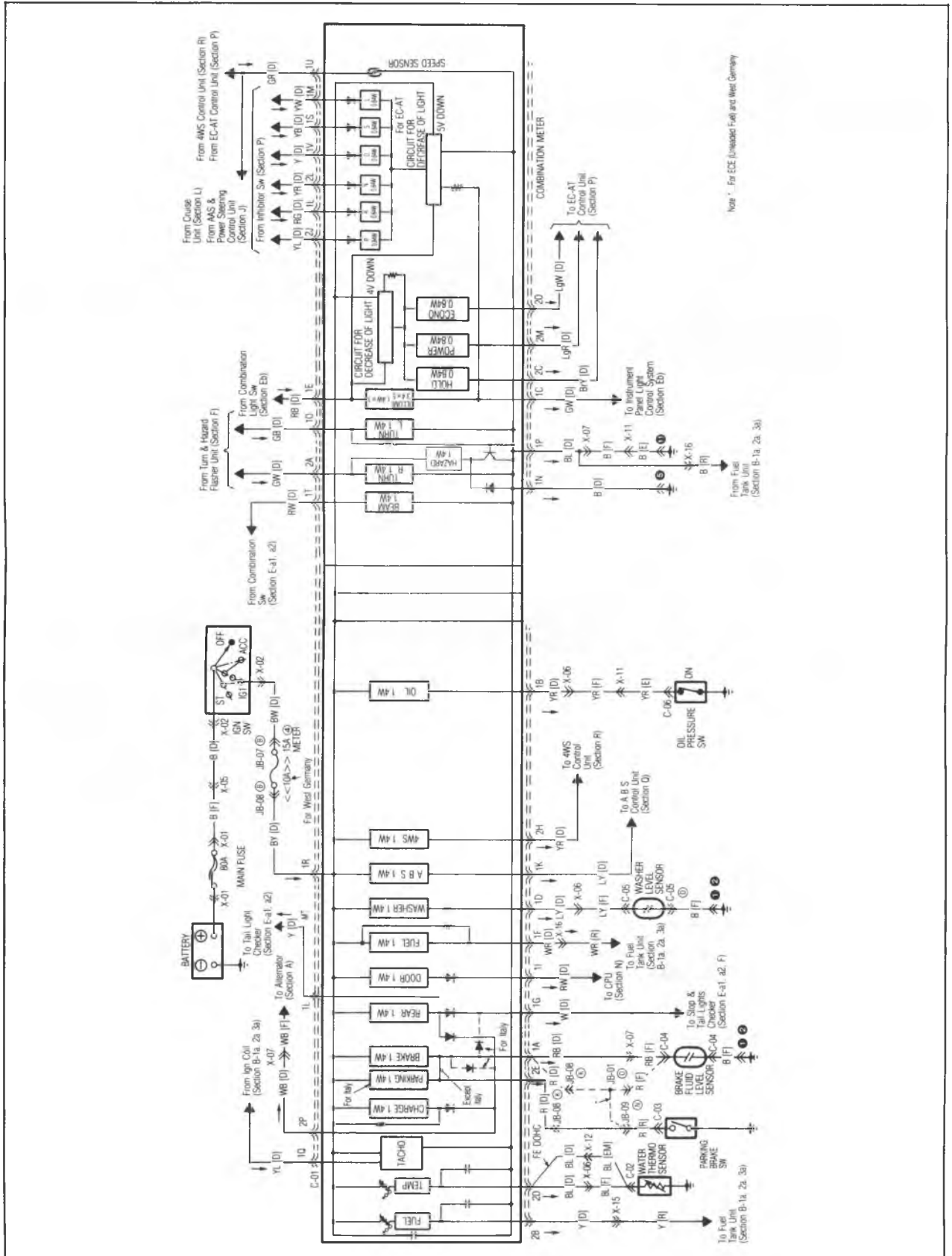
## Water Thermo Sensor

1. Remove the sensor.
2. Place the sensor in water along with a thermometer.
3. Heat the water gradually, and check the resistance of the sensor with an ohmmeter.
4. If the resistance is not as specified, replace the sensor.

**Resistance: 49.3—57.7 Ω at 80°C (176°F)**

## WARNING LIGHT AND SENDER

### CIRCUIT DIAGRAM



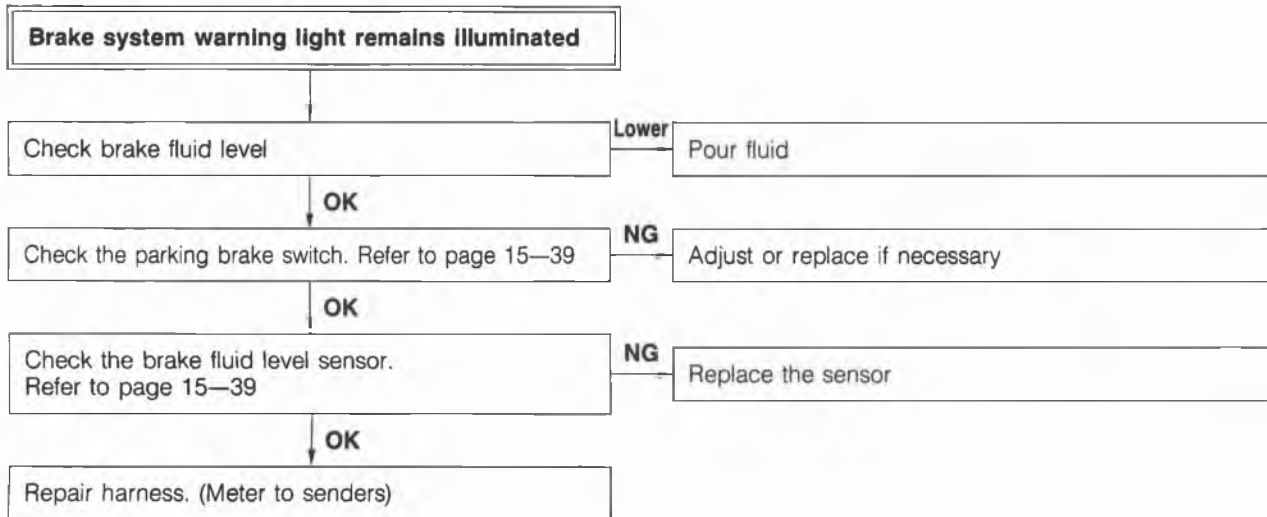
# 15 WARNING LIGHT AND SENDER

## TROUBLESHOOTING

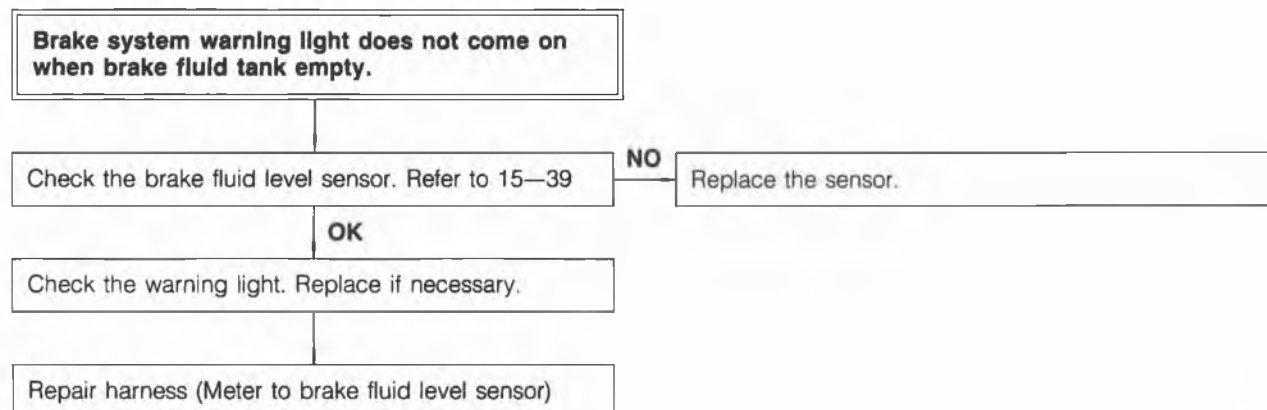
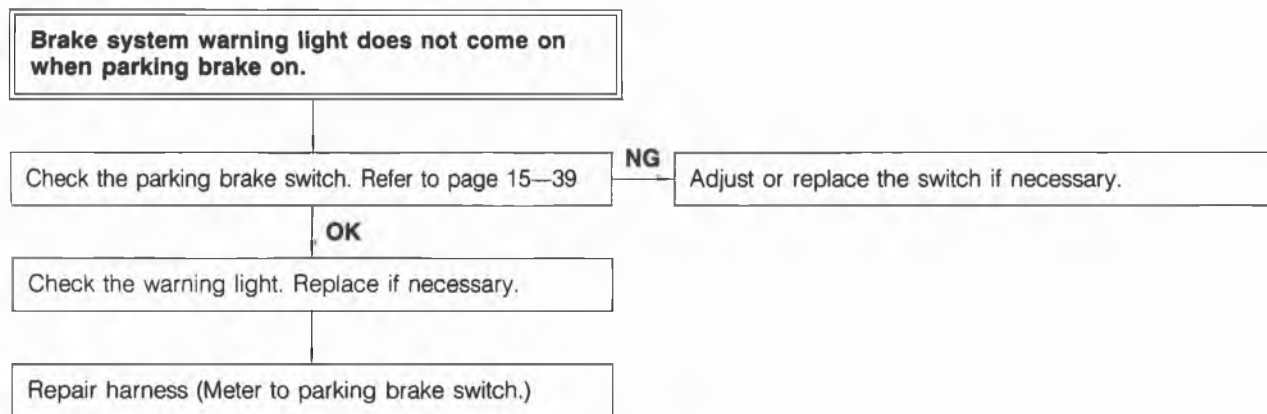
### Note

Check the "Meter 10 or 15A" fuse in the fuse box before troubleshooting. If normal, refer to the following troubleshooting chart.

### Brake System Warning Light

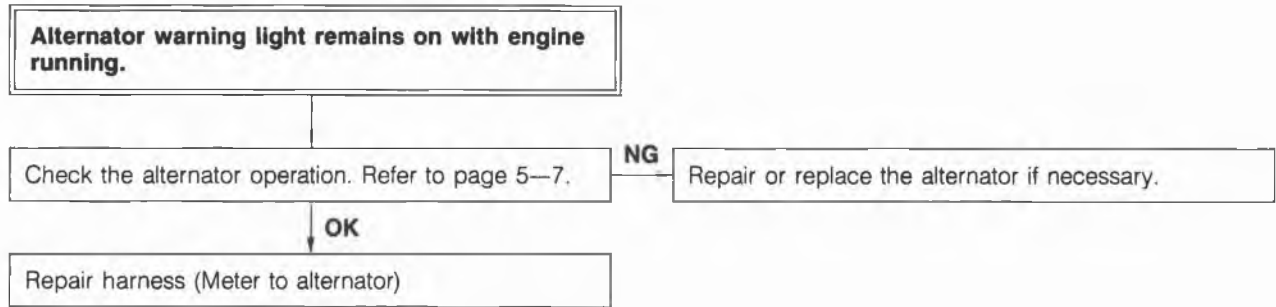


76G15X-033

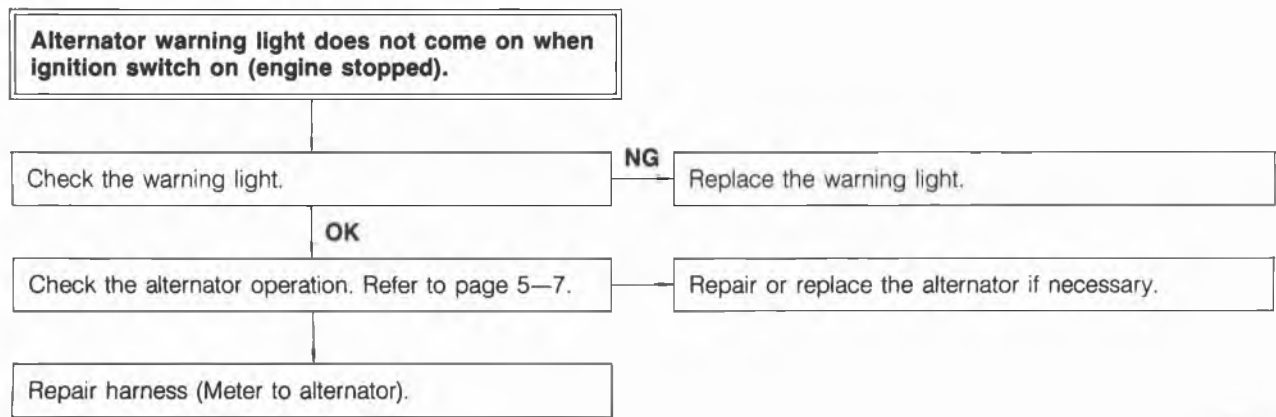


76G15X-034

## Alternator Warning Light

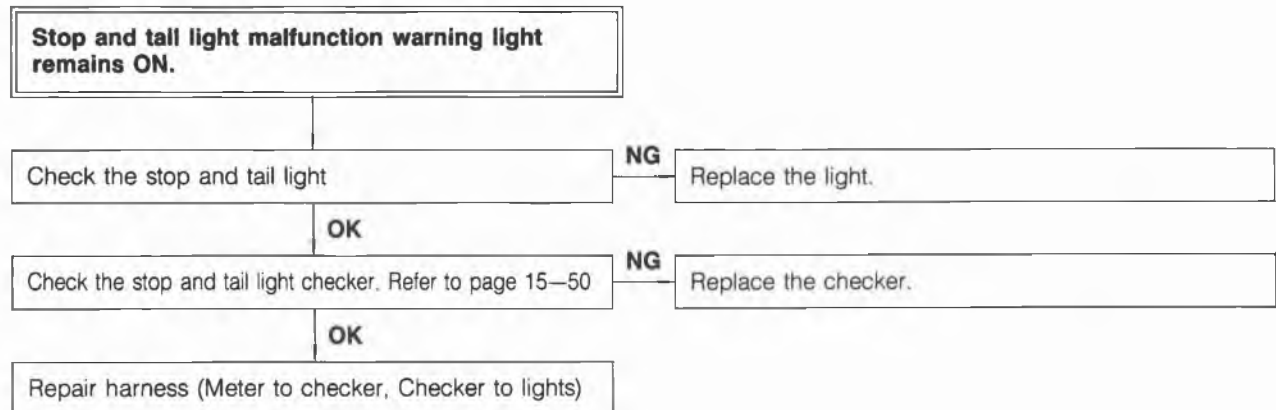


86U15X-050



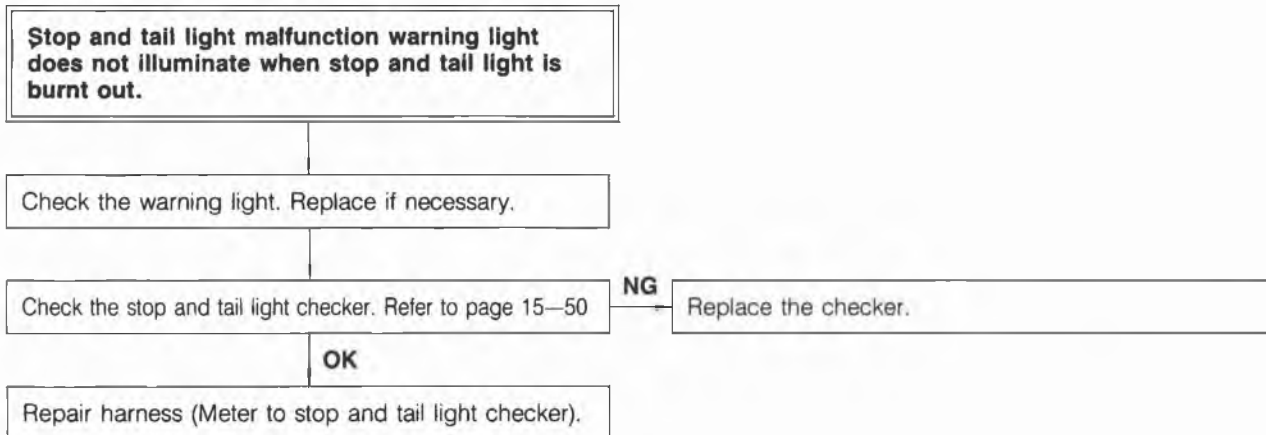
86U15X-051

## Stop And Tail Light Malfunction Warning Light



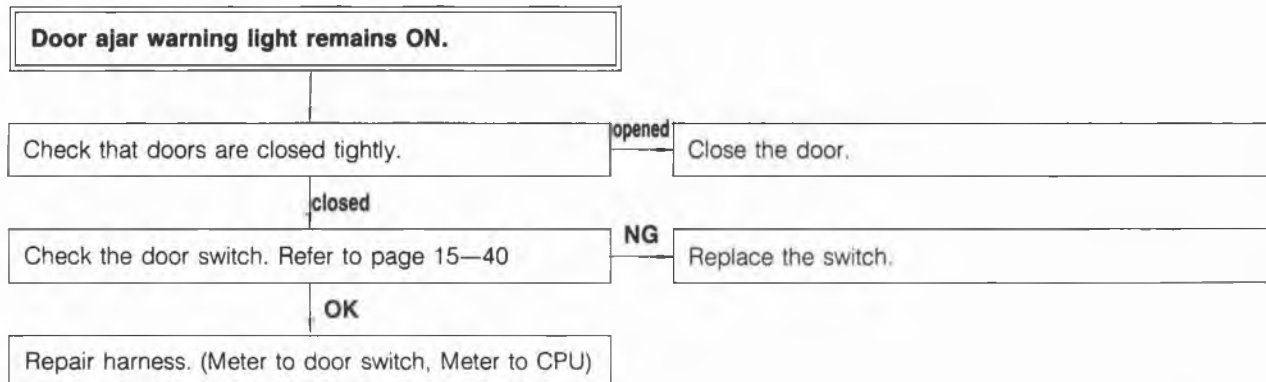
76G15X-035

# 15 WARNING LIGHT AND SENDER

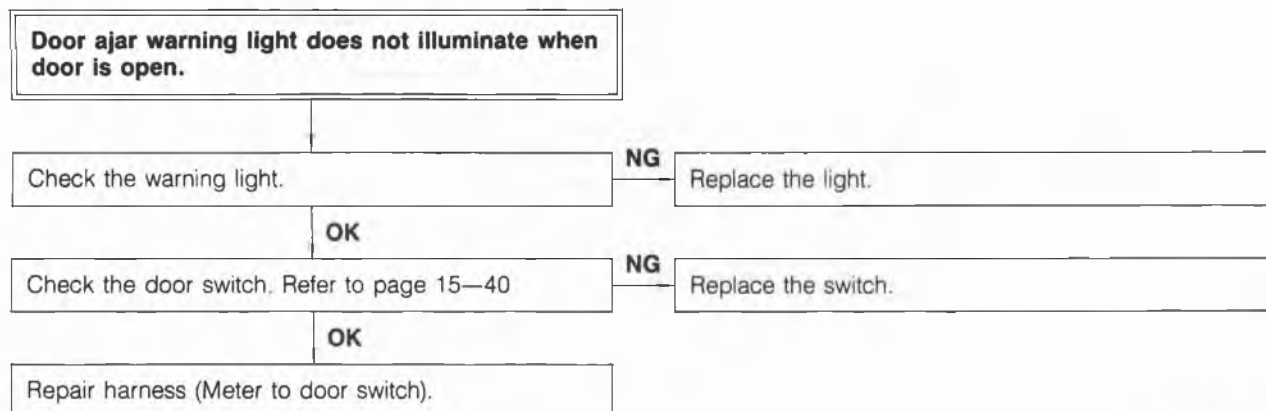


76G15X-036

## Door Ajar Warning Light

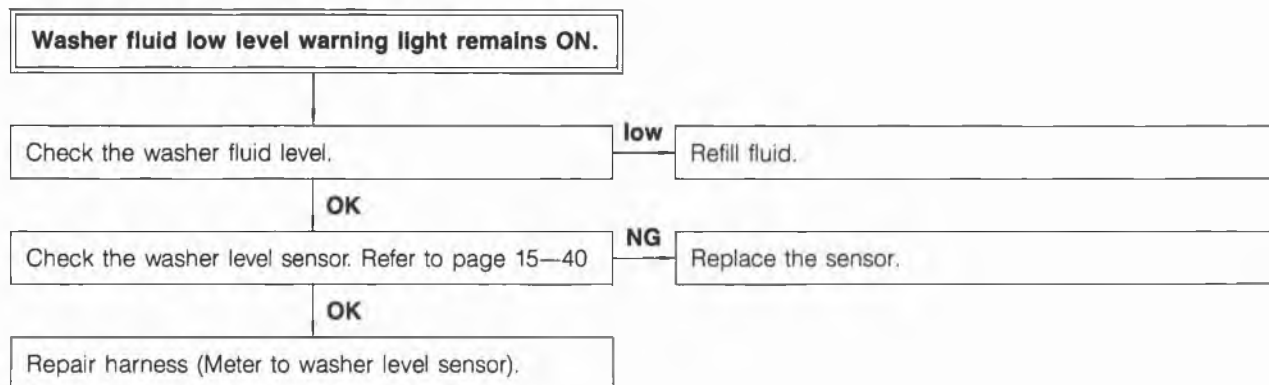


76G15X-037

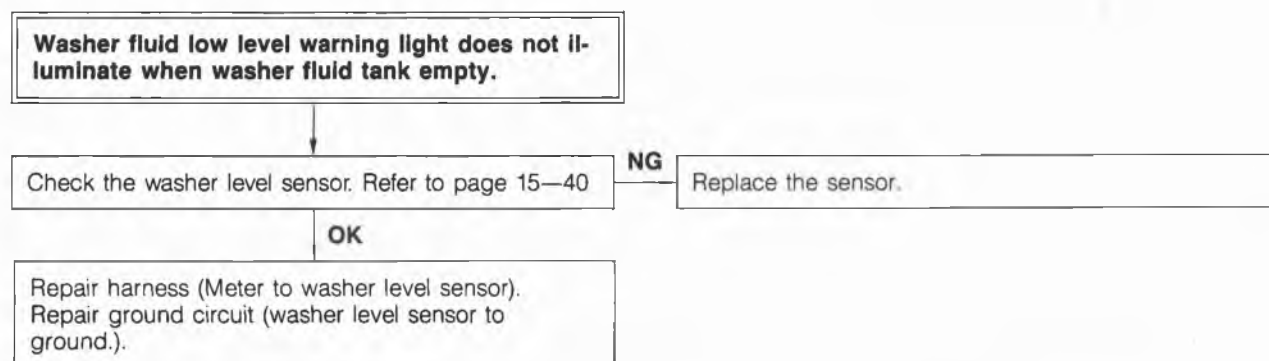


76G15X-038

## Washer Fluid Low Level Warning Light

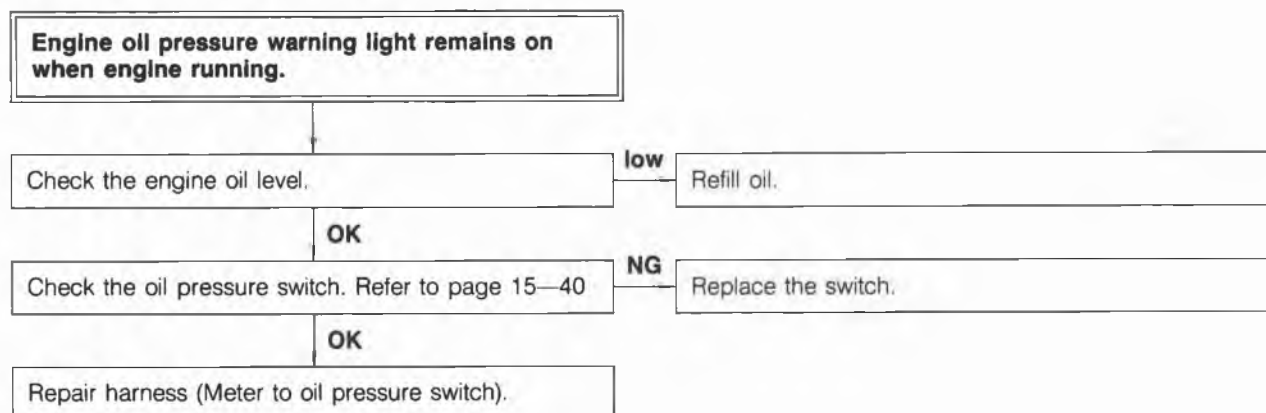


76G15X-039



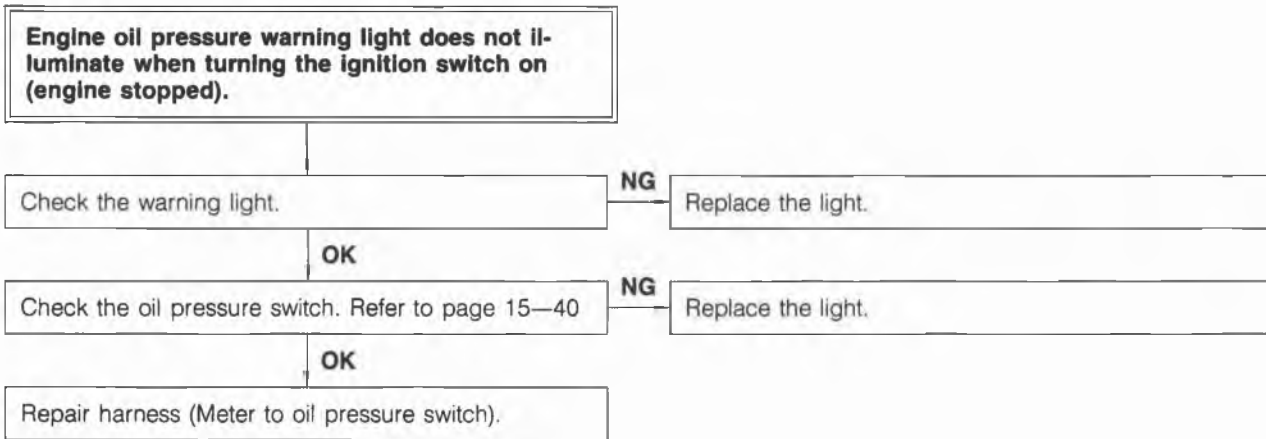
76G15X-040

## Engine Oil Pressure Warning Light



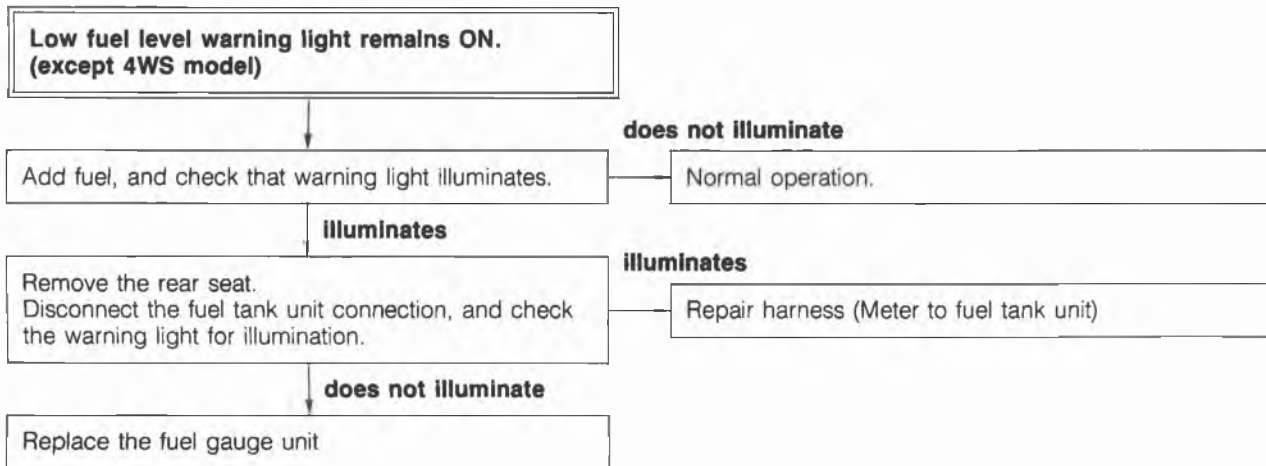
76G15X-041

# 15 WARNING LIGHT AND SENDER

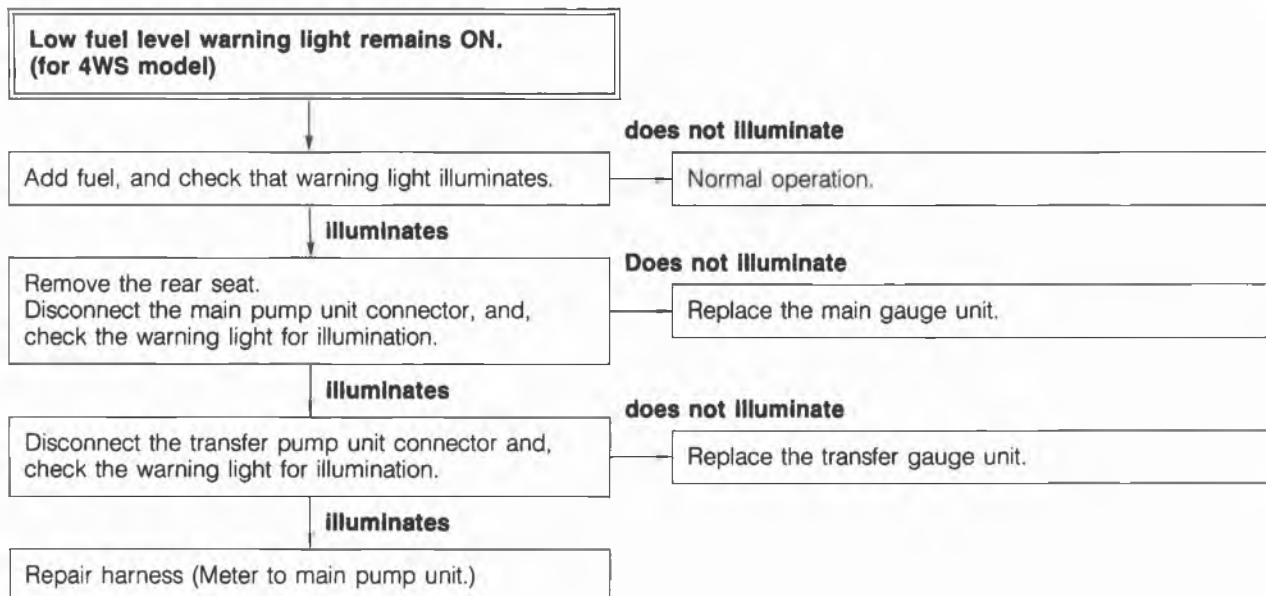


76G15X-042

## Low Fuel Level Warning Light



86U15X-060



86U15X-061



**Low fuel level warning light illuminates earlier than fuel gauge indicates low fuel.**

Refer to page 4C—59

76G15X-090

## Seat Belt Warning Light

**Seat belt warning light remains ON even if 6 seconds pass after ignition switch ON.**

Check that the seat belt warning light comes on when turning the ignition switch ON with unfastened seat belt.

**OK** Normal operation.

**NG**

Repair harness (Meter to CPU) or replace CPU

76G15X-043

## EC-AT Mode Indicator Light

POWER and ECONO indicator lights do not illuminate.

Check the hold switch. Refer to page 7B—63

**NG** Replace the switch.

**OK**

Check the mode switch. Refer to page 7B—63

**NG** Replace the switch.

**OK**

Replace the bulb or repair the harness (Meter to mode switch, EC-AT switch to control unit).

76G15X-091

**HOLD indicator lights do not illuminate when ignition switch and hold switch ON.**

Check the hold switch. Refer to page 7B—63

**NG** Replace the switch.

**OK**

Disconnect the EC-AT control unit connector and check the voltage at **BrY (2K)** terminal of the harness side connector with ignition switch on.

**NG** Replace the bulb or repair the harness (Meter to control unit).

Terminal	Voltage
BrY (2K)	12V

76G15X-044

# 15 WARNING AND SENDER

## Shift Indicator Light

All shift indicator lights do not illuminate when ignition switch on. (other warning light are all right.)

Check the voltage at **BY** terminal of the inhibitor switch connector with ignition switch on.

Terminal	Voltage
BY	12V

NG

Repair the harness (Fuse box to inhibitor switch).

OK

Check the inhibitor switch. Refer to page 7B—65

NG

Replace the inhibitor switch.

OK

Check the bulbs of the shift indicator lights.

NG

Replace the bulb.

OK

Turn the ignition switch on, and check the voltage at each terminal of the meter connector with each condition.

Terminal	Selector lever	Voltage
YL (2J)	P	12V
RG (1L)	R	12V
YR (2L)	N	12V
Y (1V)	D	12V
YB (1S)	2	12V
YW (1M)	1	12V

NG

Repair the harness (Inhibitor switch to meter).

76G15X-087

## O/D OFF Indicator Light

O/D OFF indicator light does not illuminate when ignition switch ON and O/D OFF switch released.

Check the O/D OFF switch. Refer to page 7B—64

NG

Replace the switch.

OK

Check for 12V at **BrB** terminal of the O/D OFF switch connector.

NG

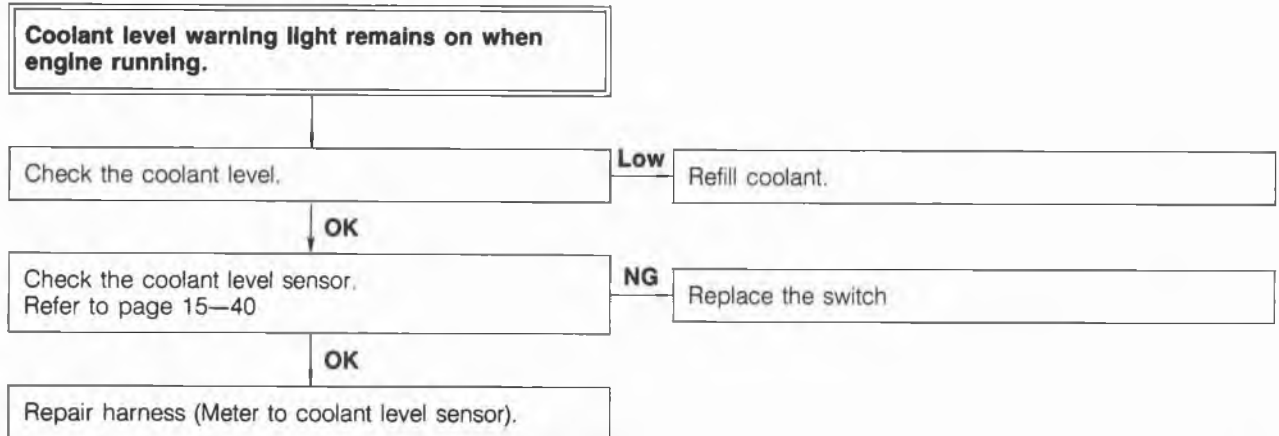
Replace the bulb or repair the harness (Meter to O/D OFF switch).

OK

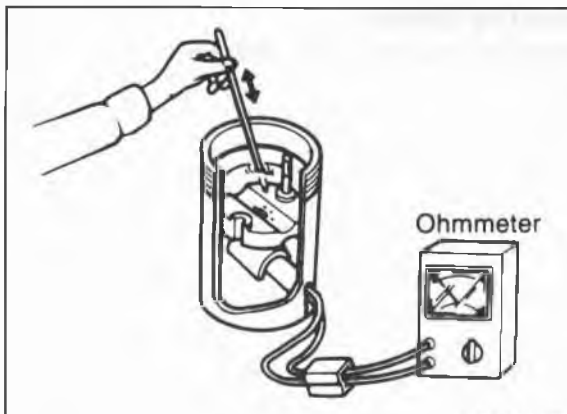
Repair the harness (O/D OFF switch to ground).

76G15X-092

## Coolant Level Warning Light



76G15X-093



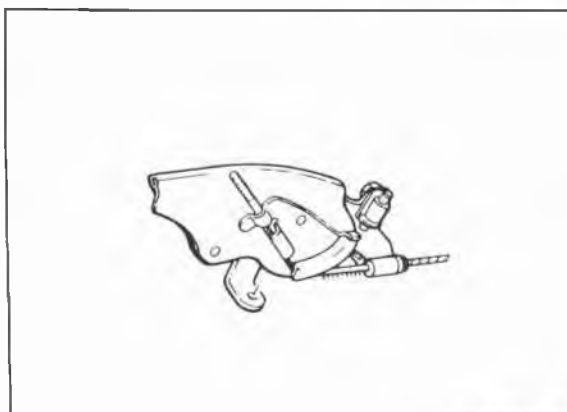
86U15X-065

### INSPECTION Brake Fluid Level Sensor

1. Check for continuity of the sensor with an ohmmeter.

Float level	Continuity
Below min	Yes
Above min	No

2. If continuity is not as specified, replace the sensor.



86U14X-066

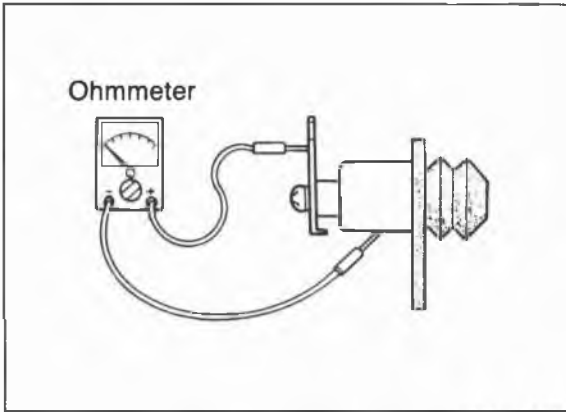
### Parking Brake Switch

1. Check for continuity between (R) terminal and a body ground with an ohmmeter.

Lever	Continuity
Pulled one notch	Yes
Released	No

2. If continuity is not as specified, adjust the switch or replace the switch.

# 15 WARNING AND SENDER



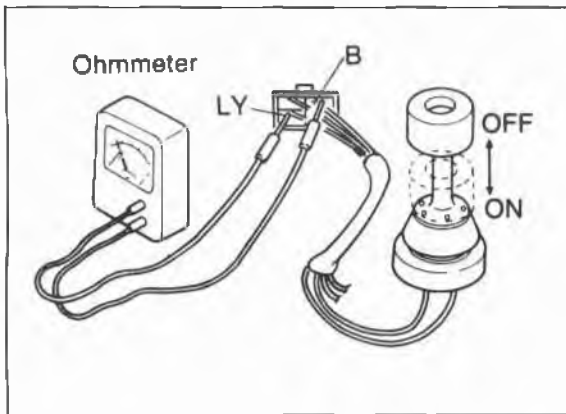
86U15X-068

## Door Switch

1. Check for continuity of the switch with an ohmmeter.

Switch	Continuity
Pushed	No
Released	Yes

2. If continuity is not as specified, replace the switch.



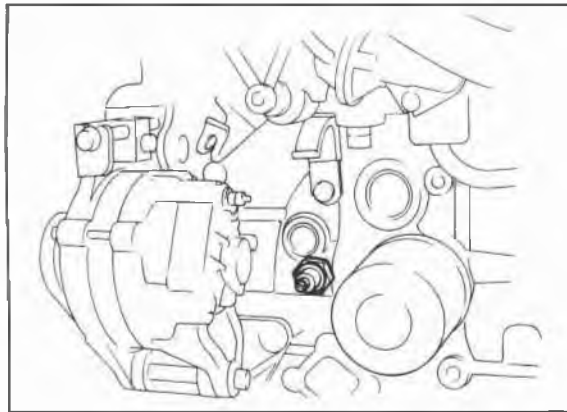
86U15X-069

## Washer Level Sensor

1. Check for continuity between **C (LY)** terminal and **D (B)** terminal of the washer level sensor connector.

Terminals	Float level	Continuity
C (LY)—D (B)	Bottom	Yes
	Above bottom	No

2. If continuity is not as specified, replace the sensor.

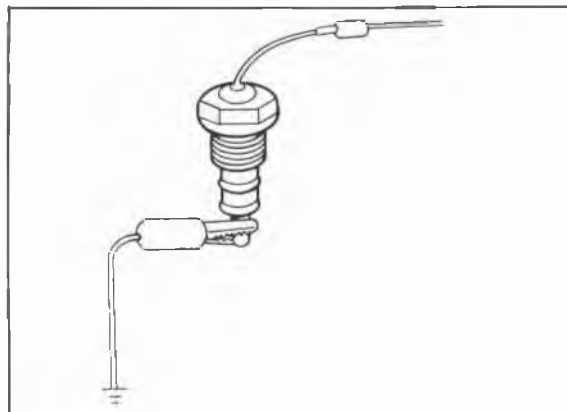


86U15X-070

## Oil Pressure Switch

1. Disconnect the connector from the oil pressure switch.
2. Check for continuity between the switch and a body ground with each condition.

Engine	Continuity
Running	Yes
Stop	No



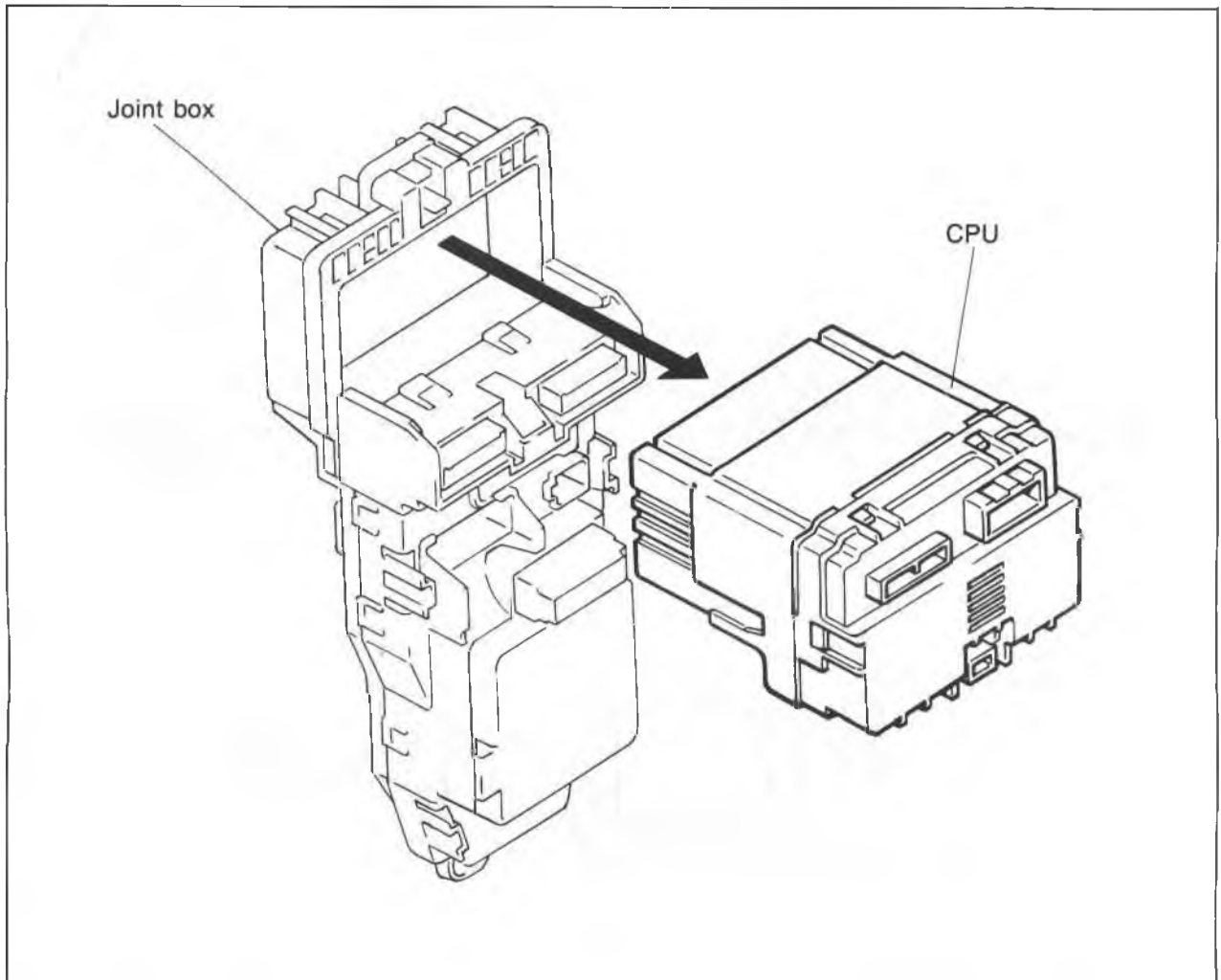
73G15X-013

## Coolant Level Sensor

1. Remove the level sensor and connect the connector.
2. With the sensor not grounded to the body, start the engine.
3. After checking that the warning light illuminates, ground the threaded part of the sensor.
4. If the warning light remains illuminated, the sensor is faulty and replace it.

**CENTRAL PROCESSING UNIT (CPU)**

**STRUCTURAL VIEW**



86U15X-071

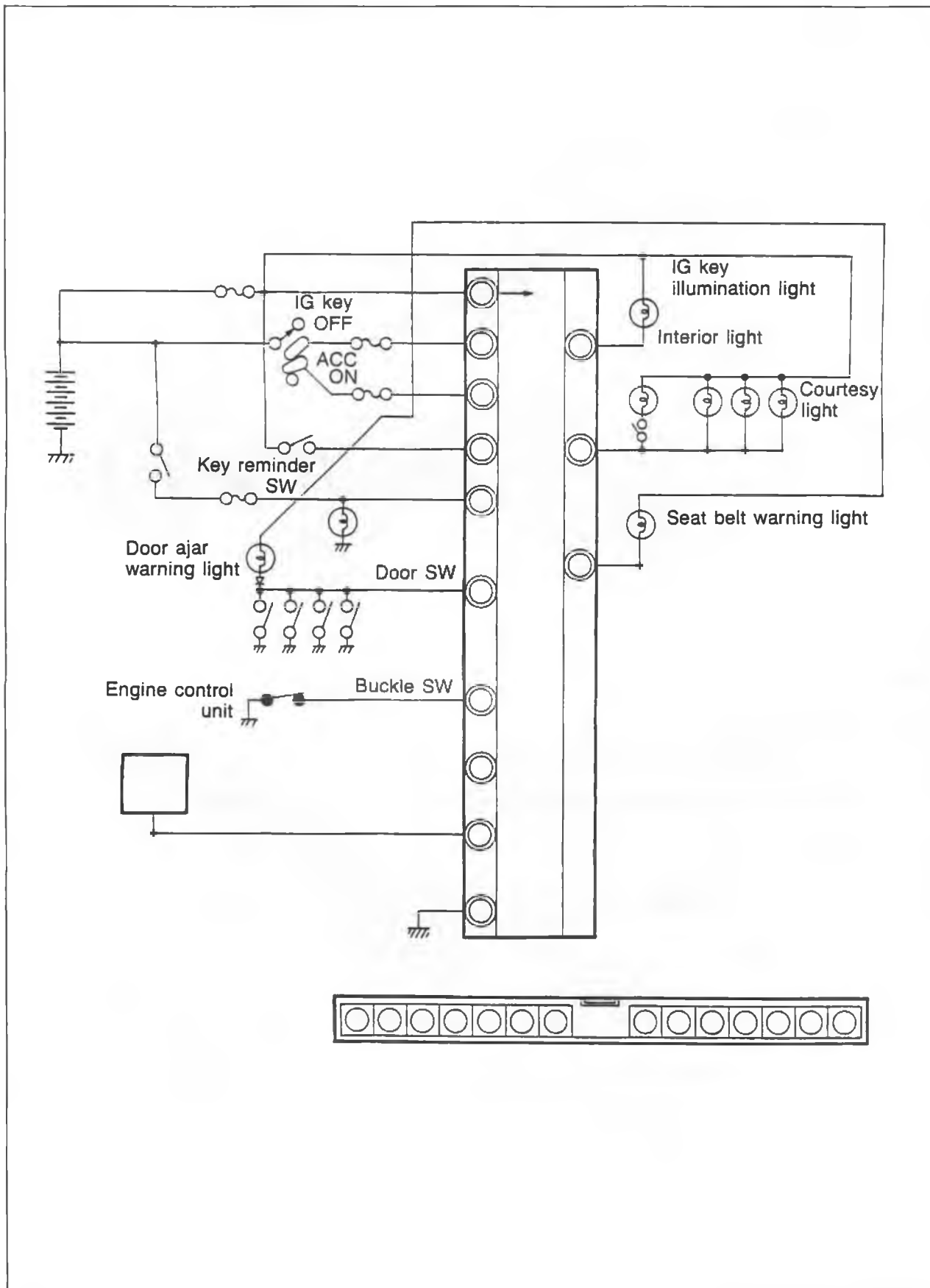
**FUNCTIONS**

System	Function
<b>Sound Alarm System</b>	Key reminder alarm
	Light-off reminder alarm
	Seat belt alarm
<b>Timer System</b>	Seat belt timer
	Key illumination light timer
	Interior light timer

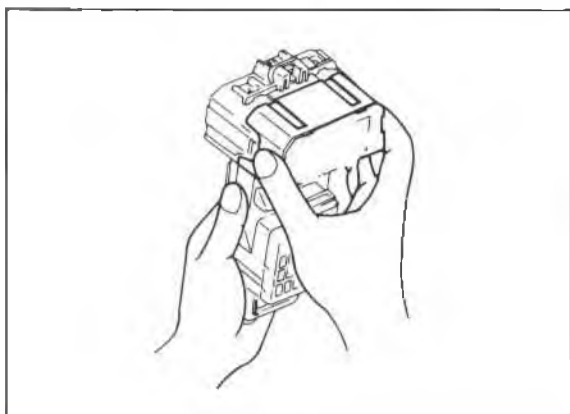
76G15X-008

# 15 CENTRAL PROCESSING UNIT (CPU)

## CIRCUIT DIAGRAM



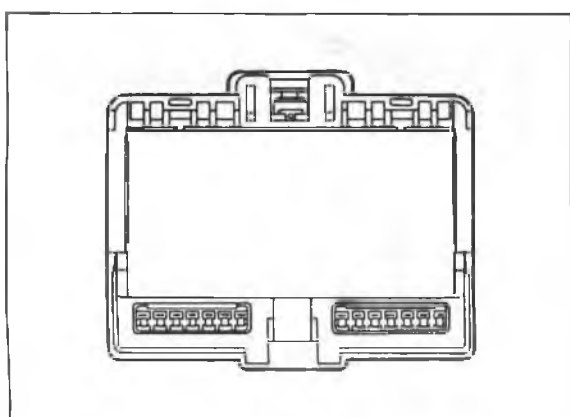
86U15X-073



86U15X-074

### REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the CPU connectors.
3. Release the lock and remove the CPU from the joint box.
4. Install in the reverse order of removal.



86U15X-075

### ON-VEHICLE INSPECTION

**Note:** Check the voltage between “a through l” terminal and ground.  
 Check the continuity between “m, n” terminal and ground.

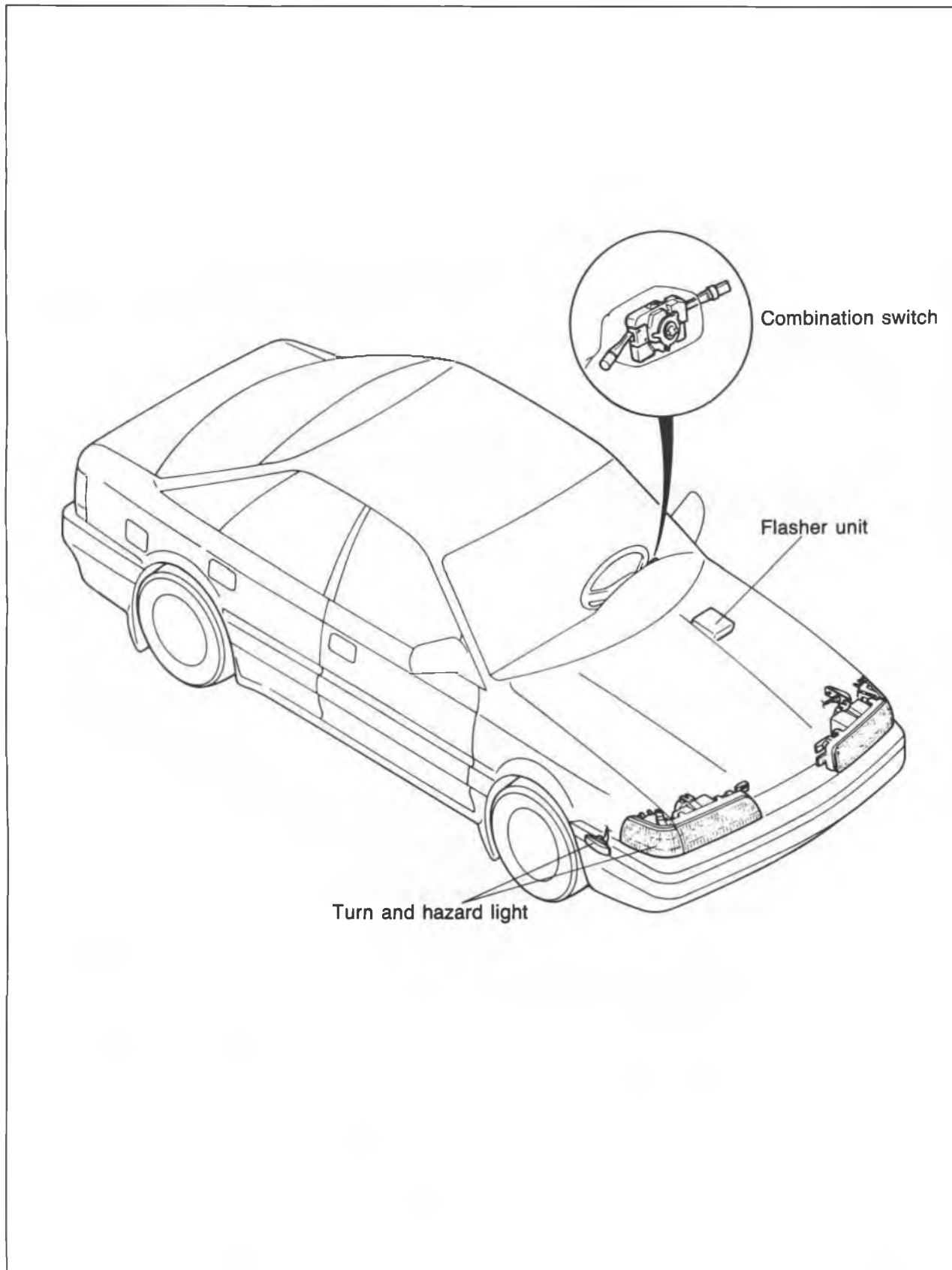
Terminal	Connecting to	Measurement condition	Measurement value
a	Interior light and courtesy lights	Any time	Approx. 12V
b	Battery	Any time	Approx. 12V
c	No used	—	—
d	Ground	Any time	0V
e	Seat belt warning light	Ignition switch ON	Approx. 12V
f	Engine control unit	Engine running	Approx. 12V
g	Key cylinder illumination light	Any time	Approx. 12V
i	Key reminder switch	Insert the key into the cylinder Pull out the key from the cylinder	Approx. 12V 0V
j	Ignition switch (ON)	Ignition switch ON Ignition switch OFF or ACC	Approx. 12V 0V
k	Ignition switch (ACC)	Ignition switch ON or ACC Ignition switch OFF	Approx. 12V 0V
l	Light switch (In the combination switch)	Turn the light switch ACC and ON Light switch OFF	Approx. 12V 0V
m	Seat belt switch	Seat belt fastened Seat belt unfastened	0Ω ∞
n	Door switch	Door closed Door open	∞ 0Ω

76G15X-009

# 15 TURN AND HAZARD LIGHT

## TURN AND HAZARD LIGHT

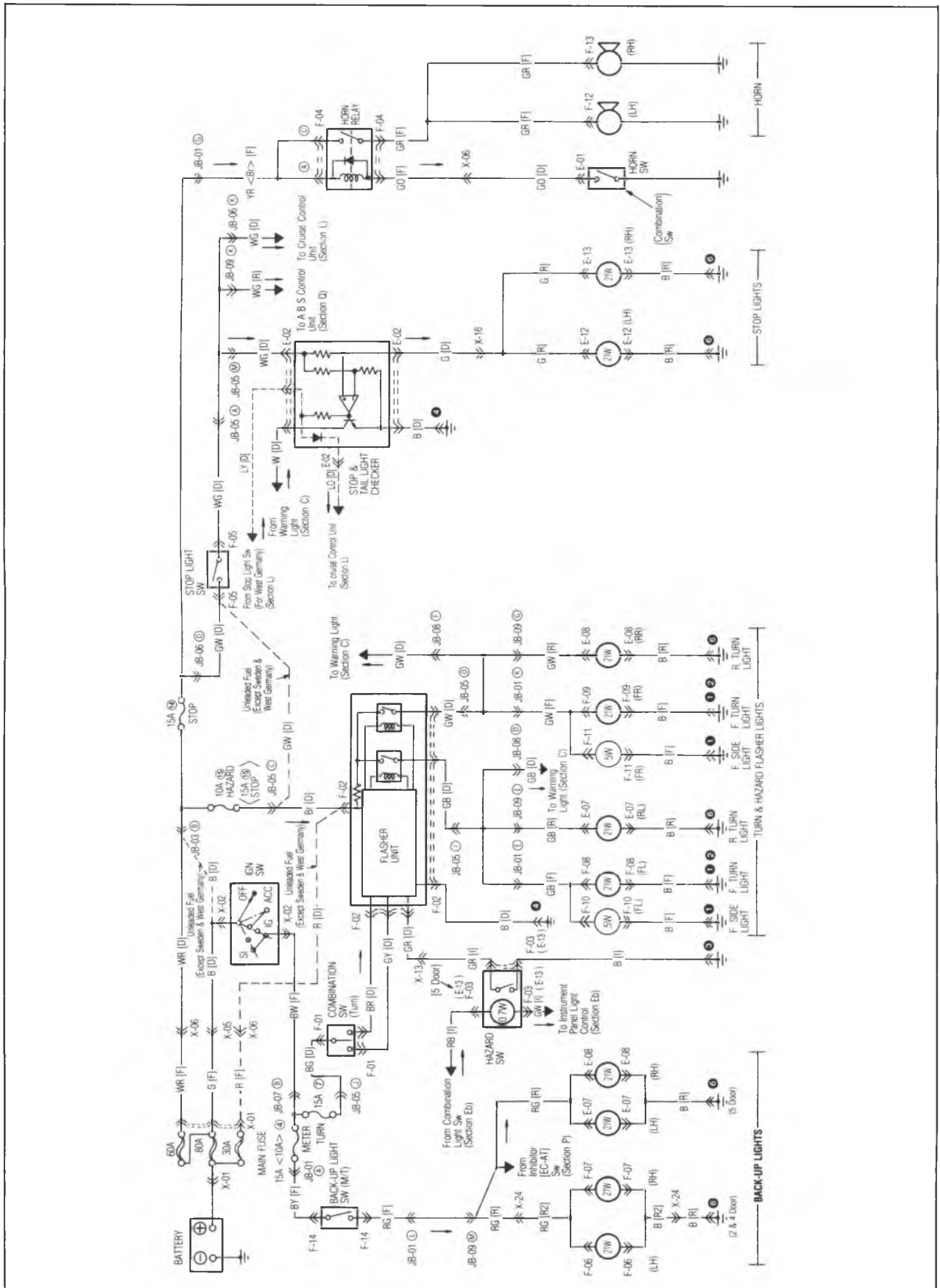
### STRUCTURAL VIEW



86U15X-077



## CIRCUIT DIAGRAM



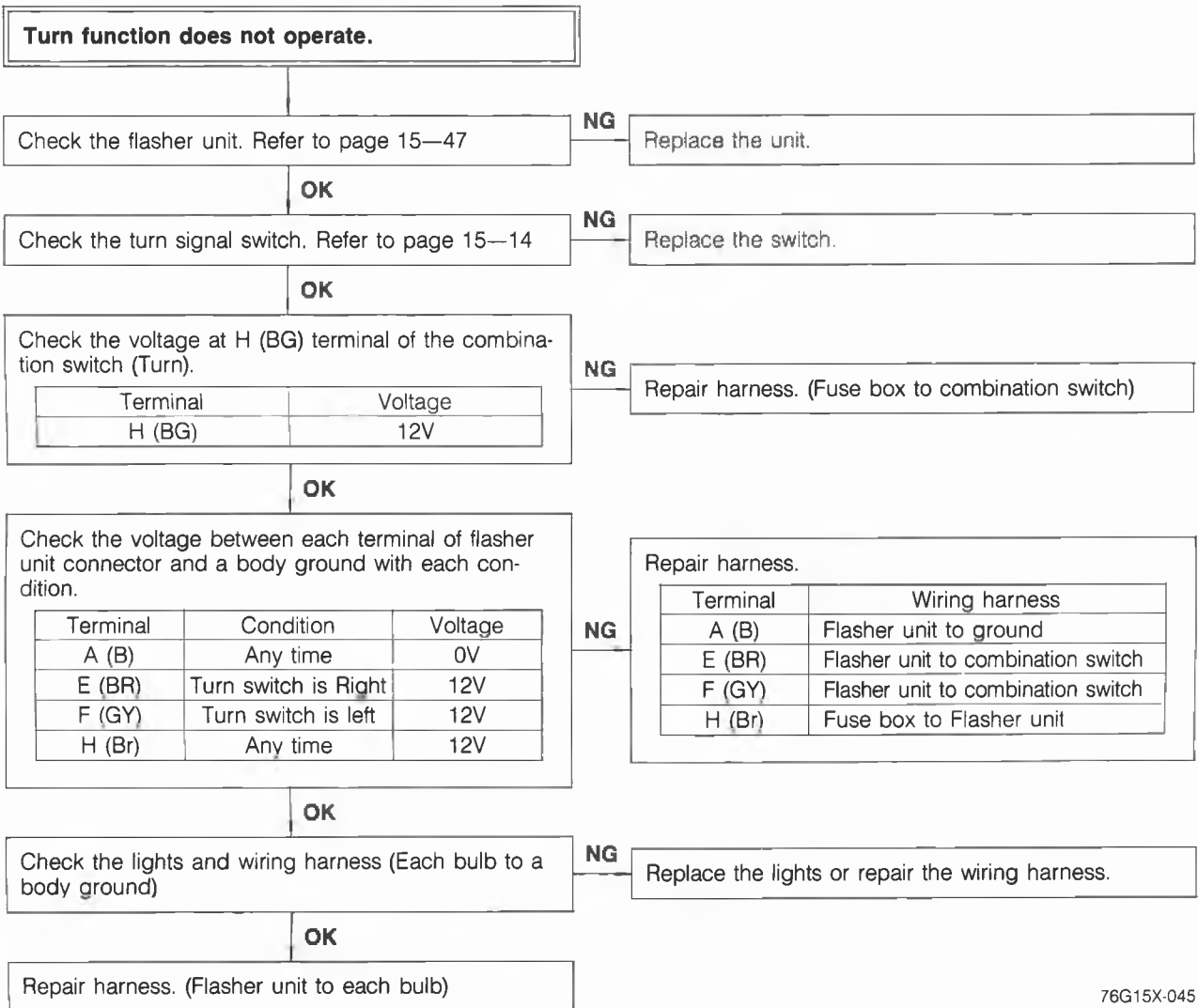
86U15X-078

# 15 TURN AND HAZARD LIGHT

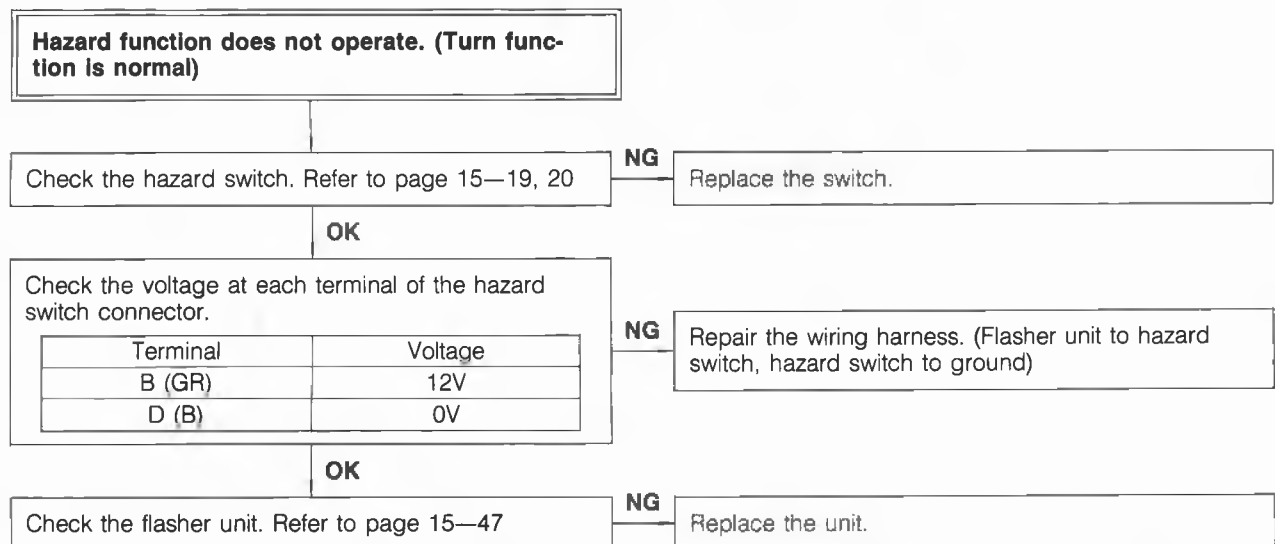
## TROUBLESHOOTING

### Note

Check the TURN 15A fuse in the fuse box before troubleshooting.



76G15X-045

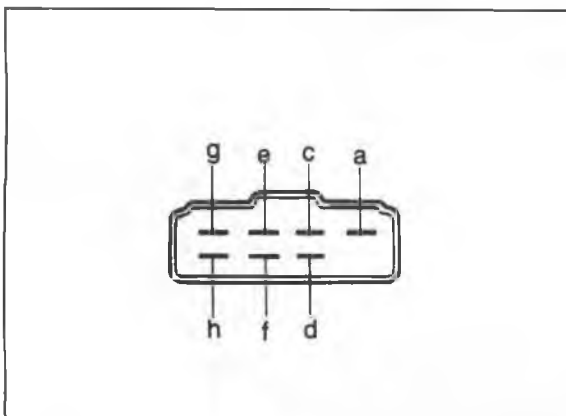


76G15X-046

**Rapid flashing**

Check the lights and wiring harness between each bulb and a body ground (rapid flashing side).

86U15X-081



76G15X-047

**INSPECTION  
Hazard and Flasher Unit  
For LHD**

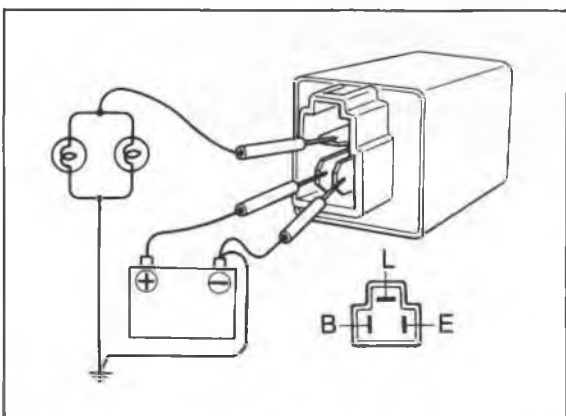
1. Check for continuity between terminals of the hazard and flasher unit.

Terminal	Continuity	Terminal	Continuity	Terminal	Continuity
a-c	X	d-e	X	f-g	X
a-d	X	d-f	X	f-h	X
a-e	○	d-g	X	g-a	X
a-f	○	d-h	X	g-c	X
a-g	X	e-a	X	g-d	X
a-h	X	e-c	X	g-e	X
c-a	○	e-d	X	g-f	X
c-d	○	e-f	X	g-h	X
c-e	○	e-g	X	h-a	○
c-f	○	e-h	X	h-c	○
c-g	○	f-a	X	h-d	○
c-h	○	f-c	X	h-e	○
d-a	X	f-d	X	h-f	○
d-c	X	f-e	X	h-g	○

○: Indicates continuity X: No continuity

**Note**  
Set the tester to x1000Ω range.

2. If continuity is not as specified, replace the switch.



76G15X-048

**For RHD**

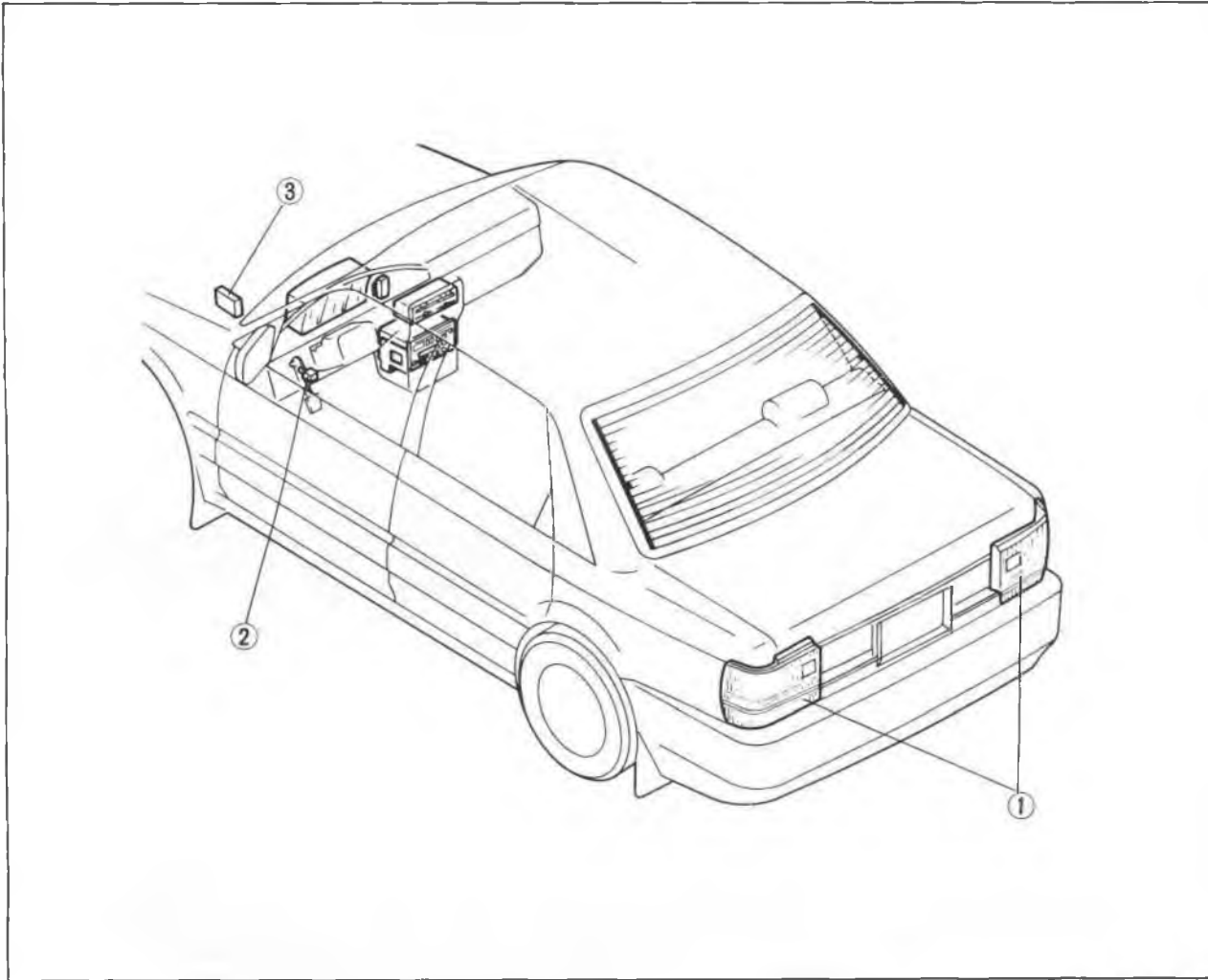
1. Apply 12V to the "B" terminal of the unit and connect "E" terminal to the ground.
2. Confirm that the two paralleled lamps come on when connected between the "L" terminal and the ground.

**Caution**  
Do no reverse the polarity of the electrical source to the terminals.

# 15 STOP LIGHT

## STOP LIGHT

### STRUCTURAL VIEW

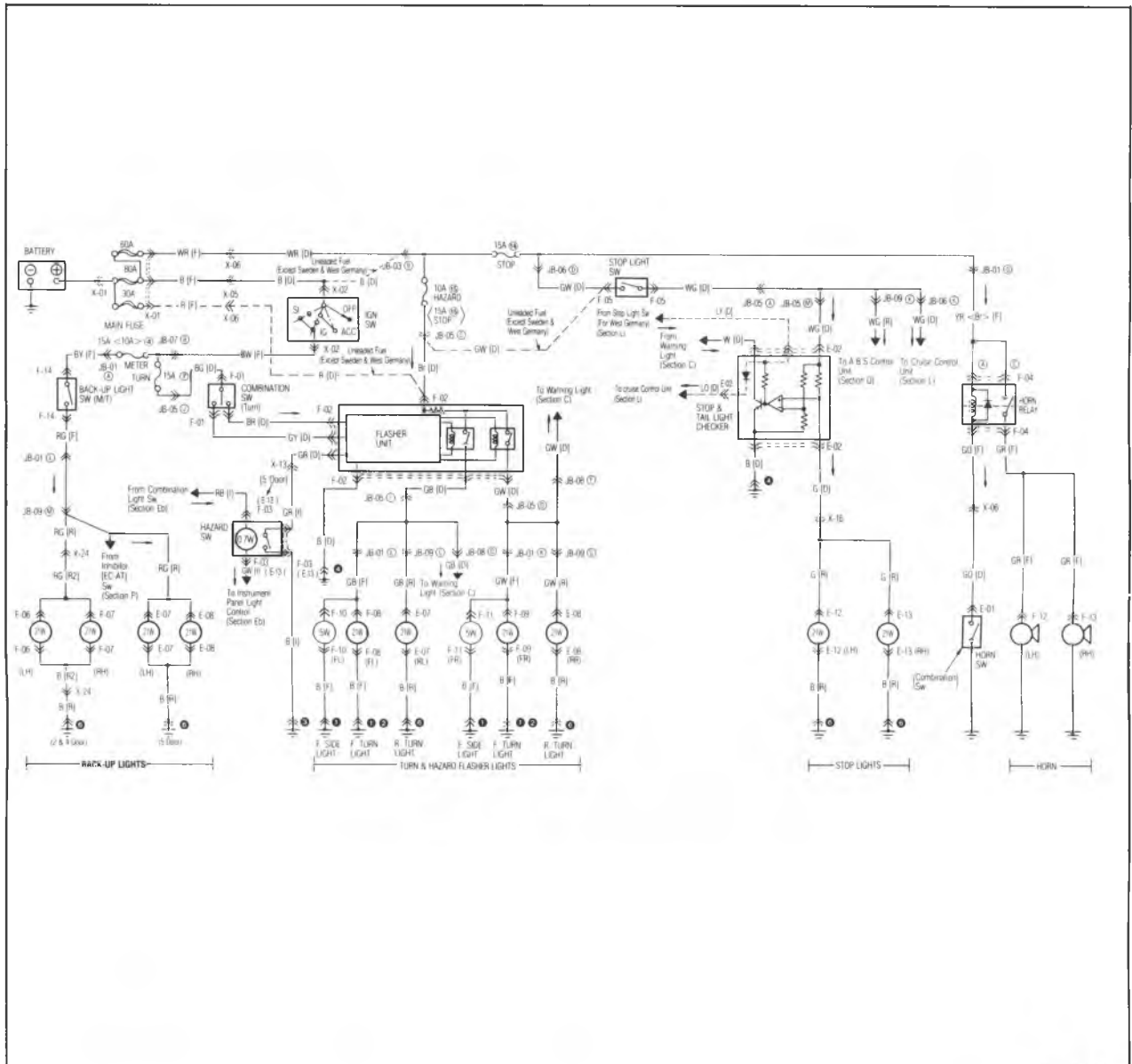


86U15X-083

- 1. Stop light
- 2. Stop light switch

- 3. Stop and tail light checker

## CIRCUIT DIAGRAM



86U15X-084

## TROUBLESHOOTING

### Note

Check the STOP 15A fuse in the fuse box before troubleshooting.

One side stop light does not illuminate.

Replace the light or repair the wiring harness (Stop and tail light checker to light, light to ground).

86U15X-085

# 15 STOP LIGHT

Both side stop lights do not illuminate when brake on.

Check the voltage at A (GW) terminal of stop light switch connector.

Terminal	Voltage
A (GW)	12V

NG Repair harness. (Fuse box to stop light switch)

OK

Check the stop light switch. Refer to page 15—51

NG Replace the switch.

OK

Check the voltage between each terminal of the stop and tail light checker connector and a body ground when brake on.

Terminal	Voltage
B (B)	0V
C (WG)	12V

NG Repair the wiring harness. (Stop light switch to stop and tail light checker, stop and tail light checker to body ground)

OK

Check the stop and tail light checker. Refer to page 15—50

NG Replace the checker.

OK

Check the stop lights

NG Replace the light.

OK

Repair the wiring harness. (Stop and tail light checker to bulb, bulb to body ground)

76G15X-049

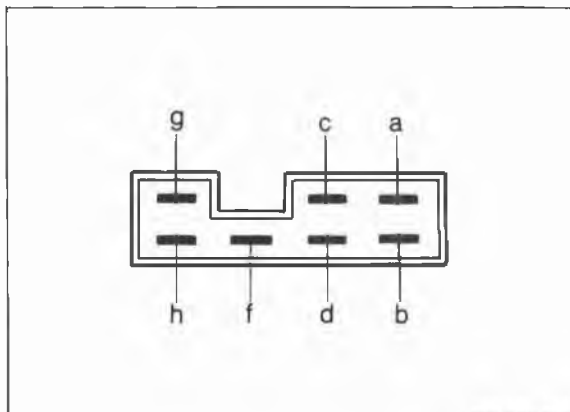
## Light Checker

1. Check for continuity between terminals of the stop and tail light checker.

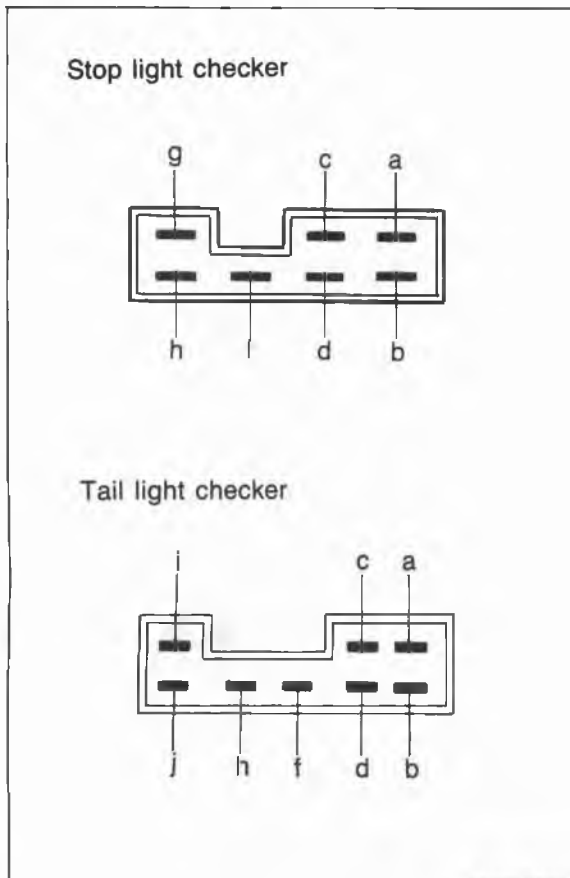
### Stop and tail light checker (except West Germany)

Terminal	Continuity	Terminal	Continuity	Terminal	Continuity
+   -		+   -		+   -	
a-b	○	c-d	X	f-g	X
a-c	○	c-f	○	f-h	○
a-d	X	c-g	X	g-a	○
a-f	○	c-h	○	g-b	○
a-g	X	d-a	○	g-c	○
a-h	○	d-b	○	g-d	X
b-a	○	d-c	○	g-f	○
b-c	○	d-f	○	g-h	○
b-d	X	d-g	X	h-a	○
b-f	○	d-h	○	h-b	○
b-g	X	f-a	○	h-c	○
b-h	○	f-b	○	h-d	X
c-a	○	f-c	○	h-f	○
c-b	○	f-d	X	h-g	X

○: Indicates continuity X: No continuity



76G15X-050



76G15X-051

### Stop light checker (for West Germany)

Terminal		Continuity	Terminal		Continuity	Terminal		Continuity
+	-		+	-		+	-	
a-b		○	c-d		X	f-g		X
a-c		○	c-f		X	f-h		X
a-d		X	c-g		X	g-a		X
a-f		X	c-h		X	g-b		X
a-g		X	d-a		○	g-c		X
a-h		X	d-b		○	g-d		X
b-a		○	d-c		○	g-f		X
b-c		○	d-f		X	g-h		X
b-d		X	d-g		X	h-a		X
b-f		X	d-h		X	h-b		X
b-g		X	f-a		X	h-c		X
b-h		X	f-b		X	h-d		X
c-a		○	f-c		X	h-f		X
c-b		○	f-d		X	h-g		X

### Tail light checker (for West Germany)

Terminal		Continuity	Terminal		Continuity	Terminal		Continuity
+	-		+	-		+	-	
a-b		○	c-i		X	h-d		X
a-c		○	c-j		○	h-f		○
a-d		○	d-a		○	h-i		X
a-f		X	d-b		○	h-j		X
a-h		X	d-c		○	i-a		○
a-i		X	d-f		X	i-b		○
a-j		○	d-h		X	i-c		○
b-a		○	d-i		X	i-d		○
b-c		○	d-j		○	i-f		X
b-d		○	f-a		X	i-h		X
b-f		X	f-b		X	i-j		○
b-h		X	f-c		X	j-a		○
b-i		X	f-d		X	j-b		○
b-j		○	f-h		○	j-c		○
c-a		○	f-i		X	j-d		○
c-b		○	f-j		X	j-f		X
c-d		○	h-a		X	j-h		X
c-f		X	h-b		X	j-i		X
c-h		X	h-c		X	—		—

○: Indicates continuity    X: No continuity

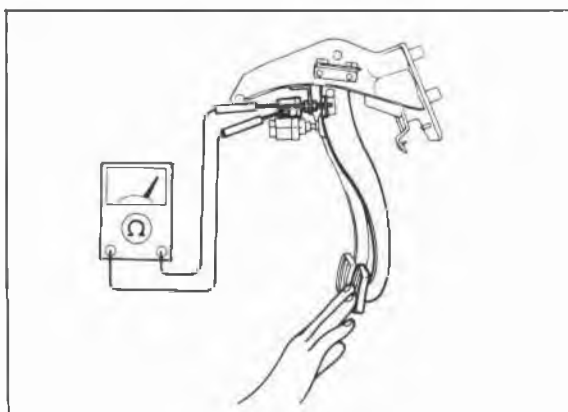
### Note

Set the tester to x1000Ω range.

- If continuity is not as specified, replace the light checker.

### Stop Light Switch

- Disconnect the stop light switch connector.
- Check for continuity between terminals of the switch.



86U15X-088

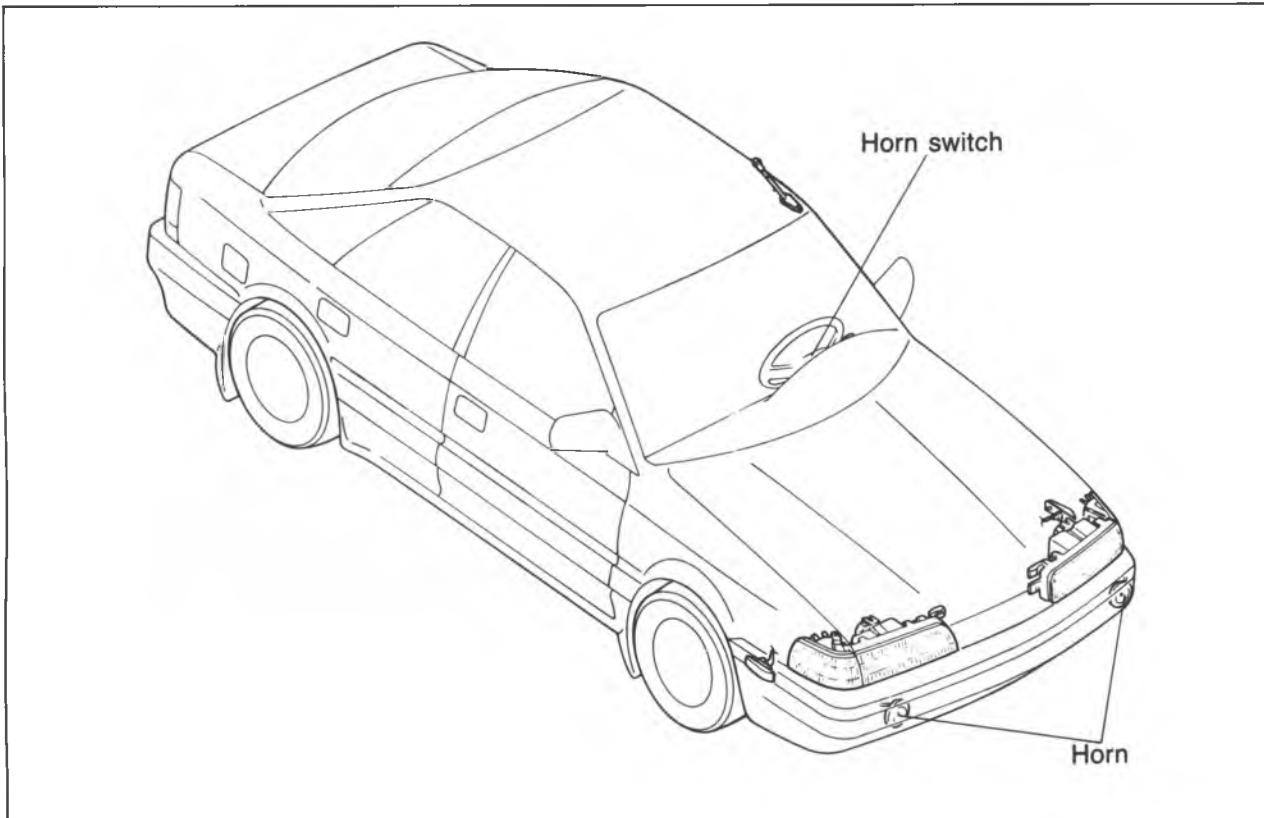
Position	Terminal	
	a	b
Pedal depressed	○—○	○—○
Pedal released		

○—○ : Indicates continuity

# 15 HORN

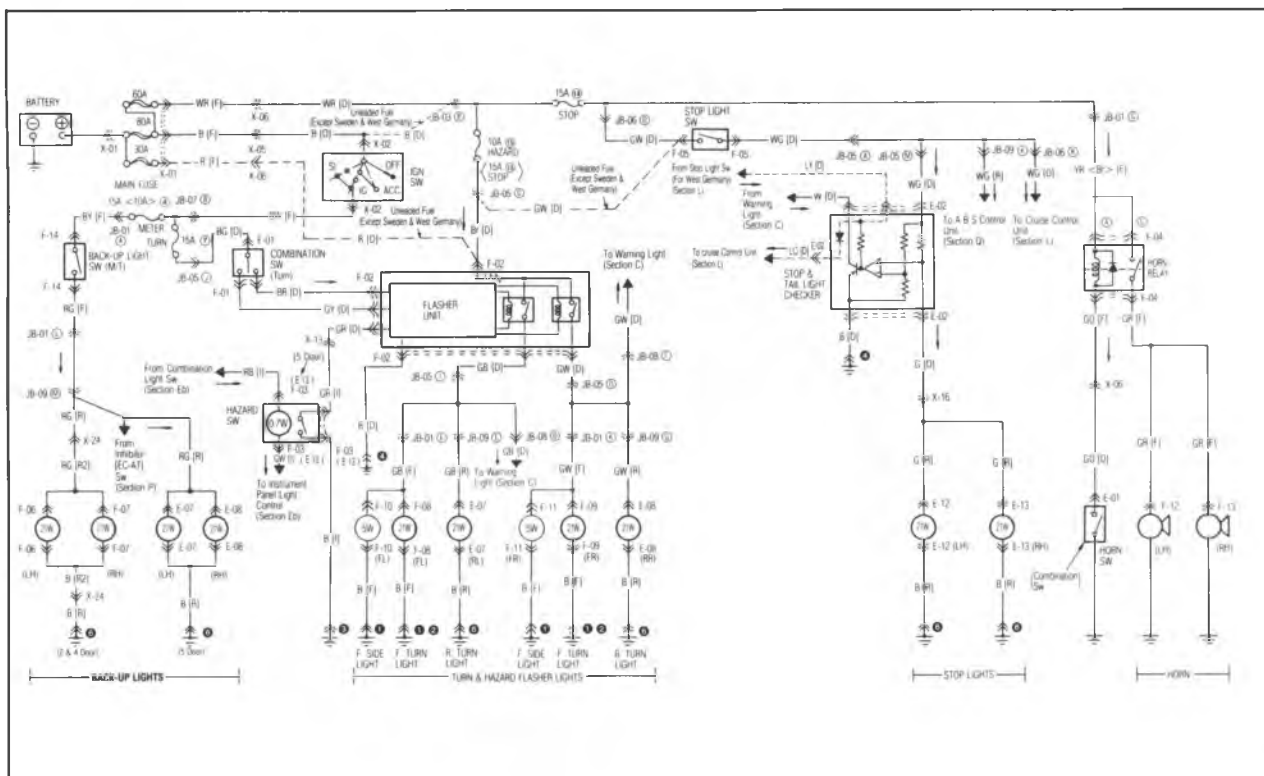
## HORN

### STRUCTURAL VIEW



86U15X-089

### CIRCUIT DIAGRAM

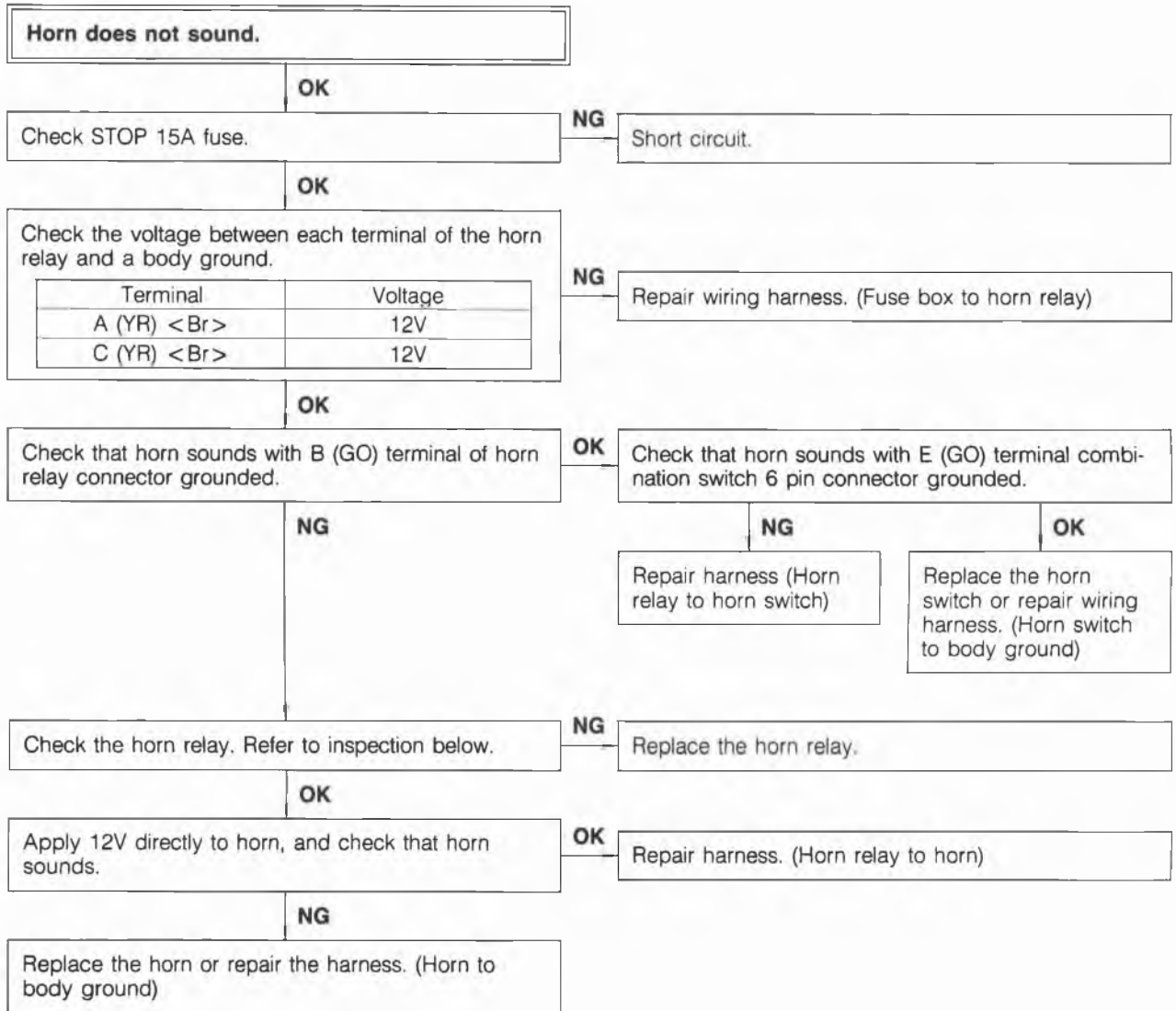


86U15X-090

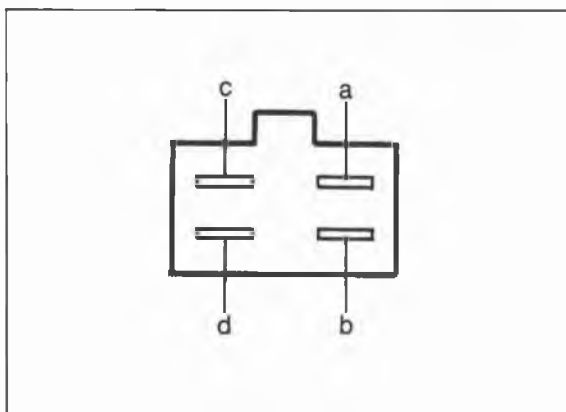


## TROUBLESHOOTING

< >...For West Germany



76G15X-052



86U15X-092

## INSPECTION

### Horn Relay

Check for continuity between terminals of the relay.

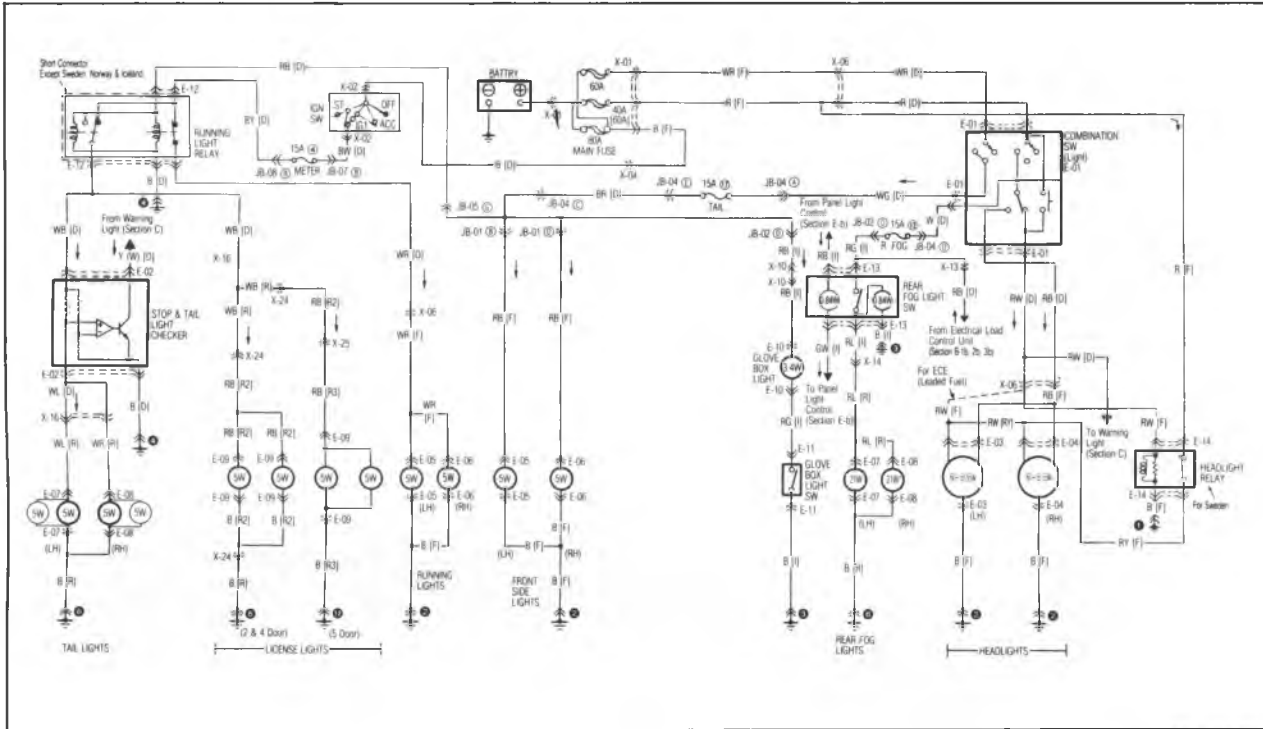
Connecting to		Terminal			
12V	Ground	a	b	c	d
—	—	○	○		
a	b			○	○

○—○: indicates continuity

# 15 HEADLIGHT

## HEADLIGHT

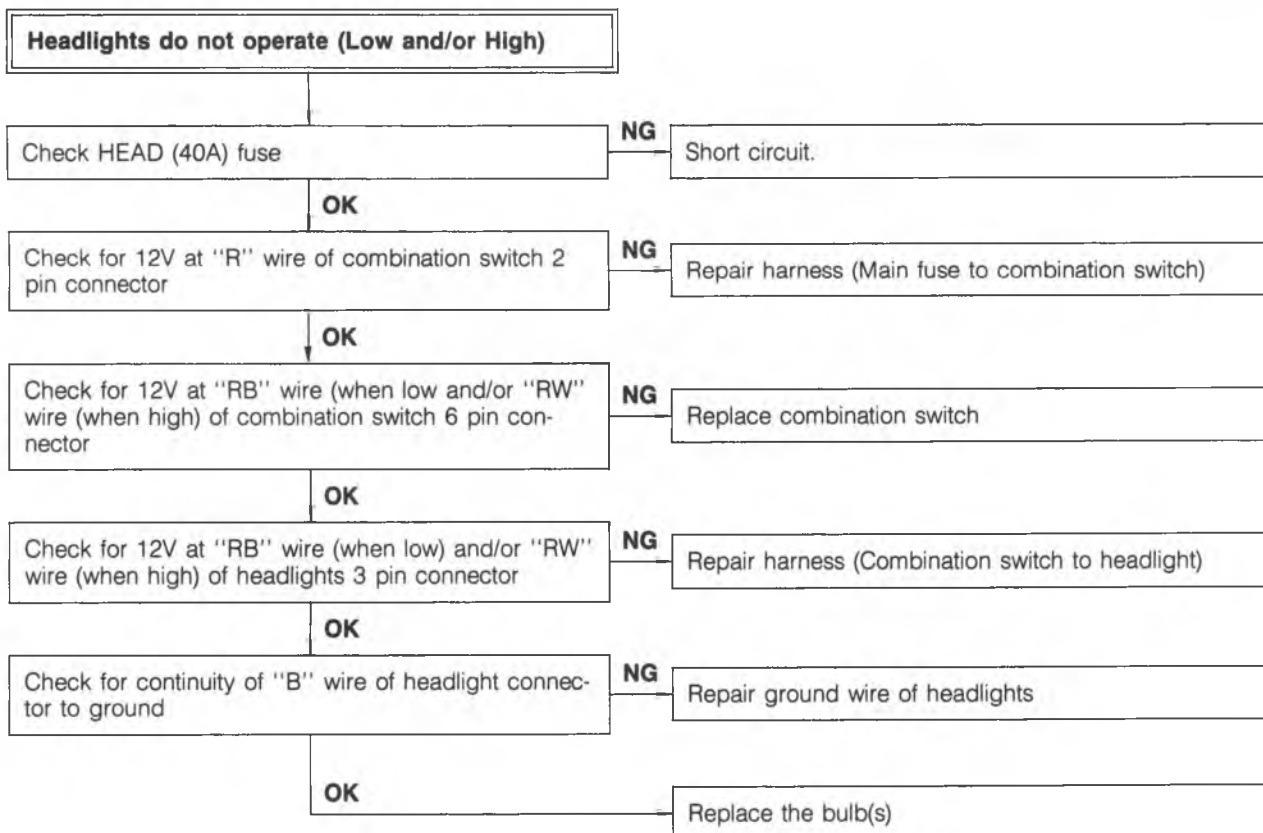
### CIRCUIT DIAGRAM



86U15X-094

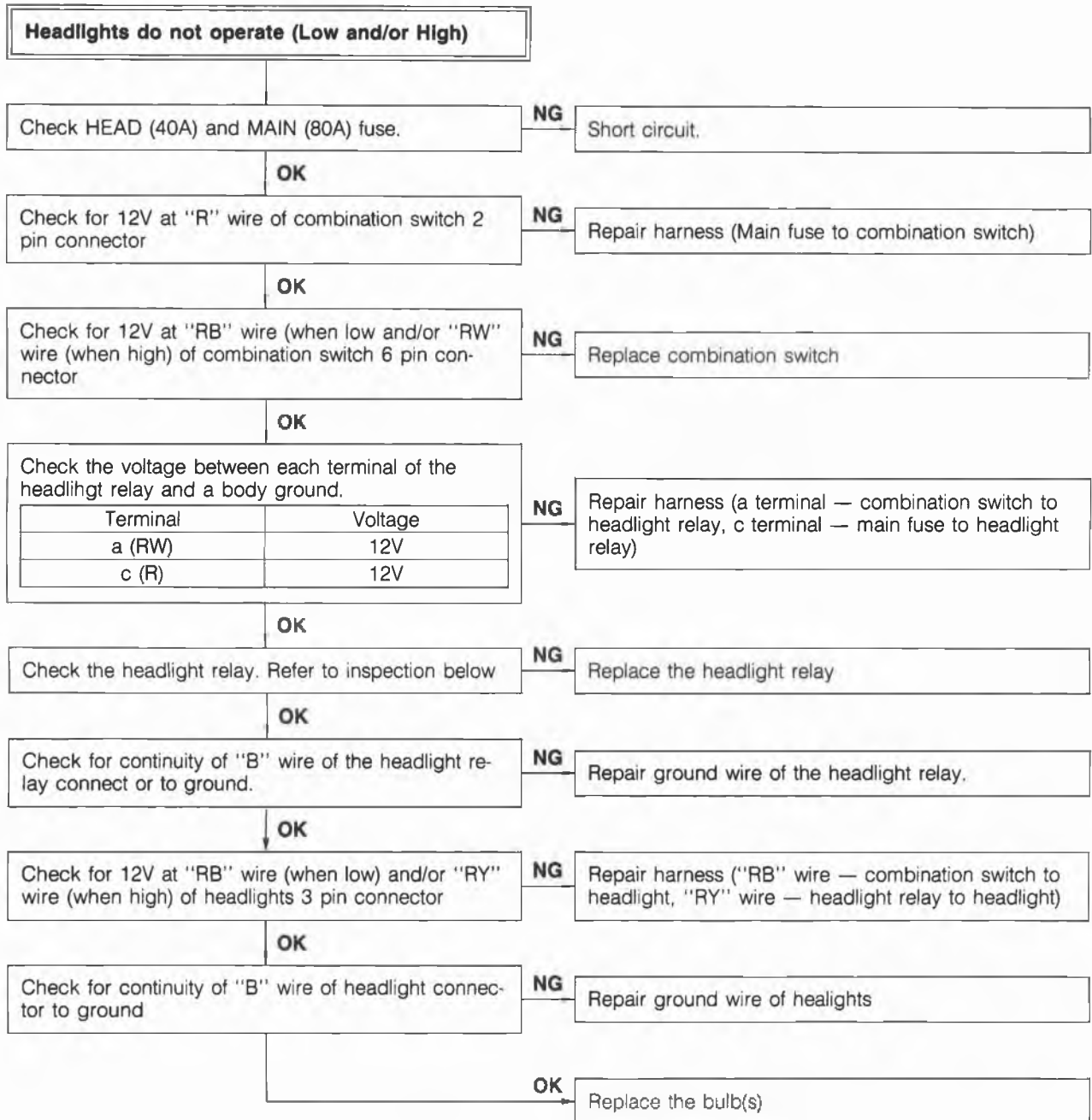
## TROUBLESHOOTING

### Leaded Fuel Model

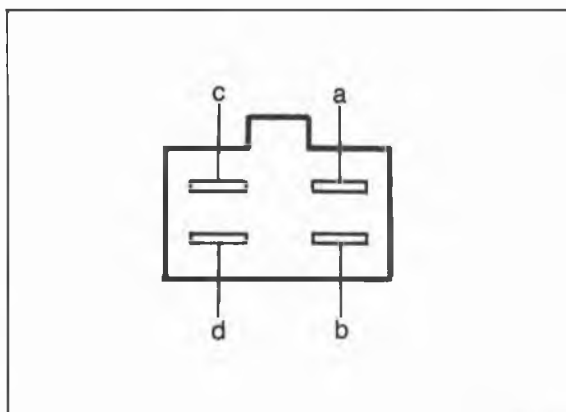


76G15X-055

## Unleaded fuel model



76G15X-053



76G15X-054

### INSPECTION Headlight Relay

Check for continuity between terminals of the relay.

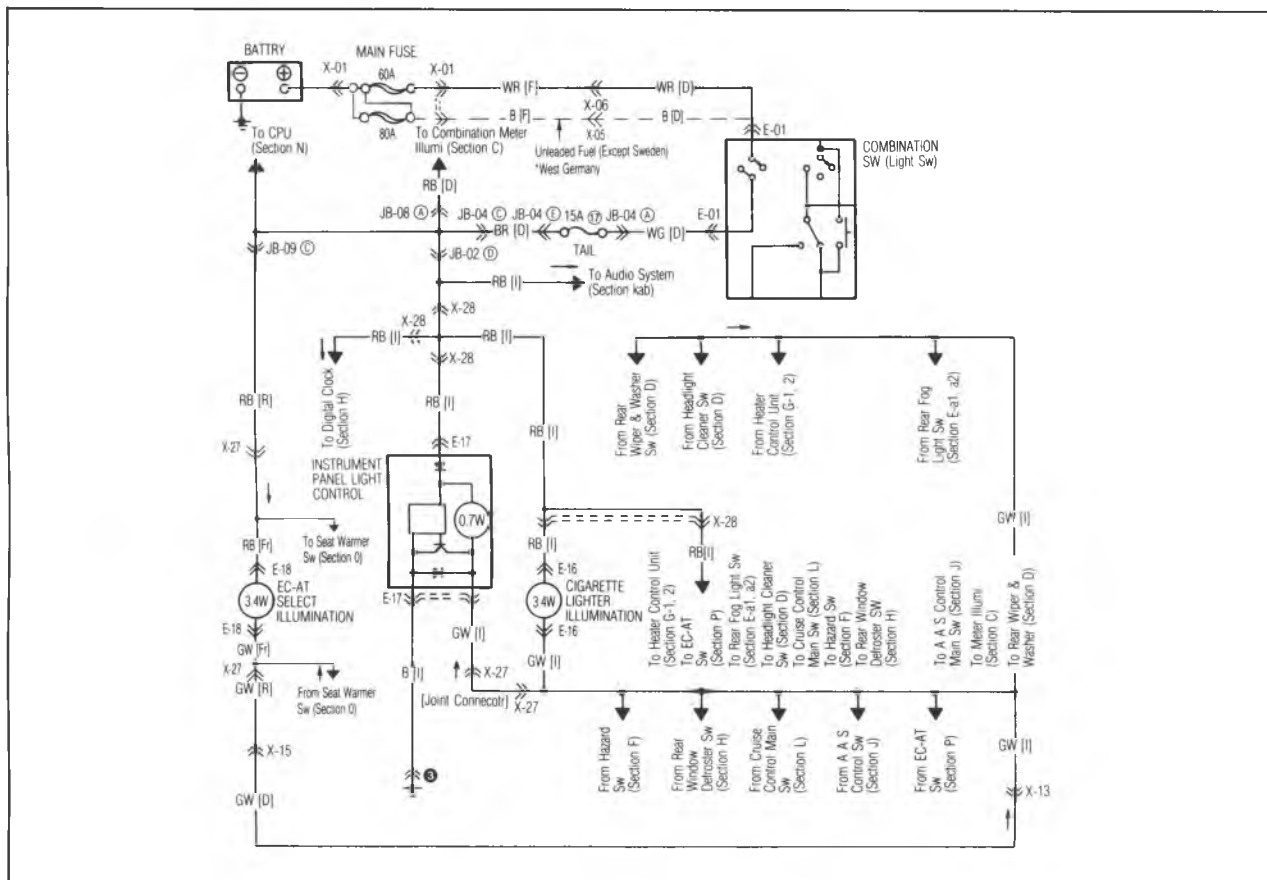
Connecting to		Terminal			
12V	Ground	a	b	c	d
—	—	○	○		
a	b			○	○

○—○: indicates continuity

# 15 PANEL LIGHT CONTROL

## PANEL LIGHT CONTROL

### CIRCUIT DIAGRAM



86U15X-098

### TROUBLESHOOTING

**Brightness of the illumination lights cannot be controlled.**

Check the panel light controller. Refer to page 15—57

NG

Replace the controller.

OK

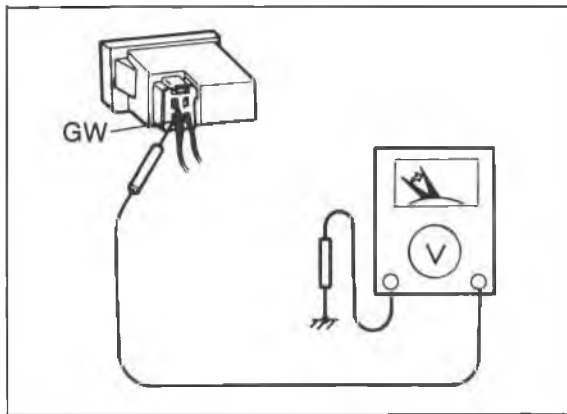
Check the voltage between each terminal of the panel light controller connector and a body ground.

Terminal	Voltage
B (RB)	12V
C (B)	0V

NG

Repair the wiring harness. (Fuse box to panel light controller, Panel light controller to body ground)

76G15X-056



86U15X-100

## INSPECTION

### Panel Light Controller

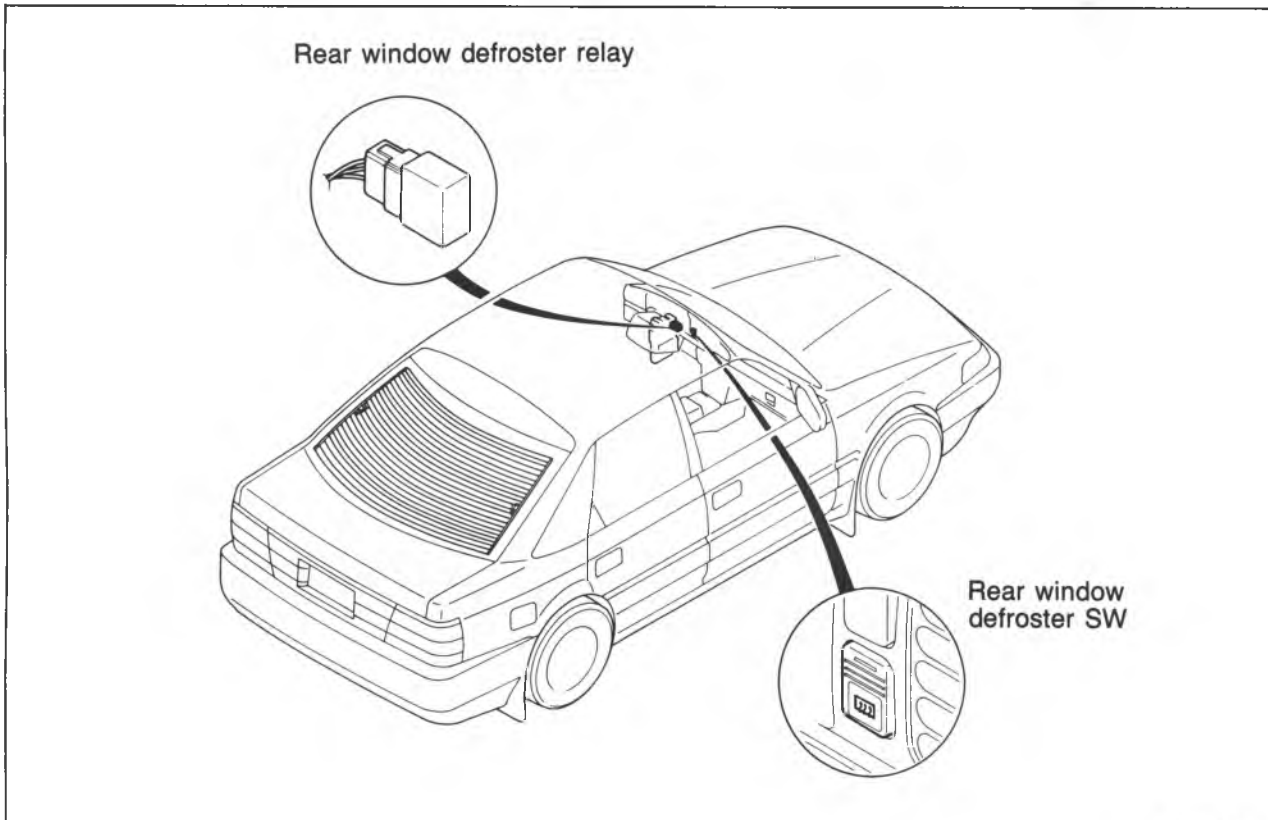
1. Remove the panel light controller.
2. Check the voltage at **D (GW)** terminal of the panel light controller.

Panel light controller	Voltage
Min	10V
Max.	0V

# 15 REAR WINDOW DEFROSTER

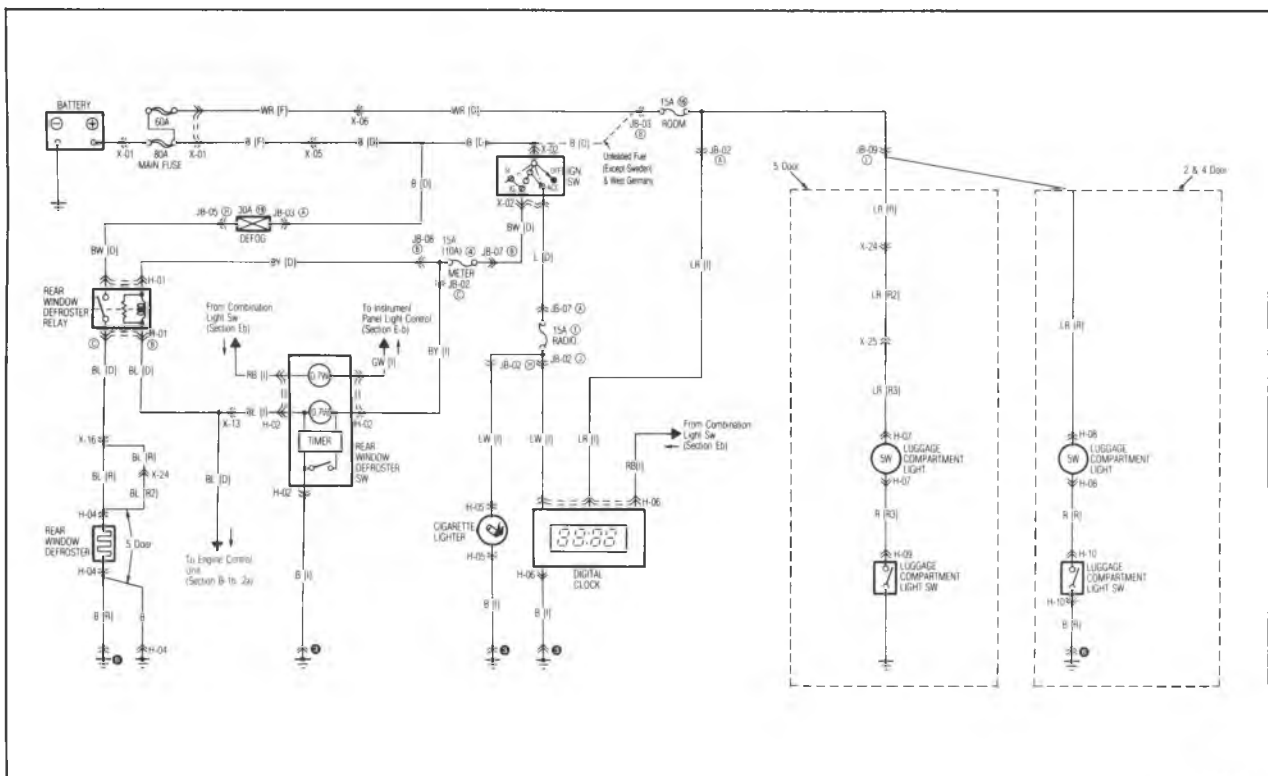
## REAR WINDOW DEFROSTER

### STRUCTURAL VIEW



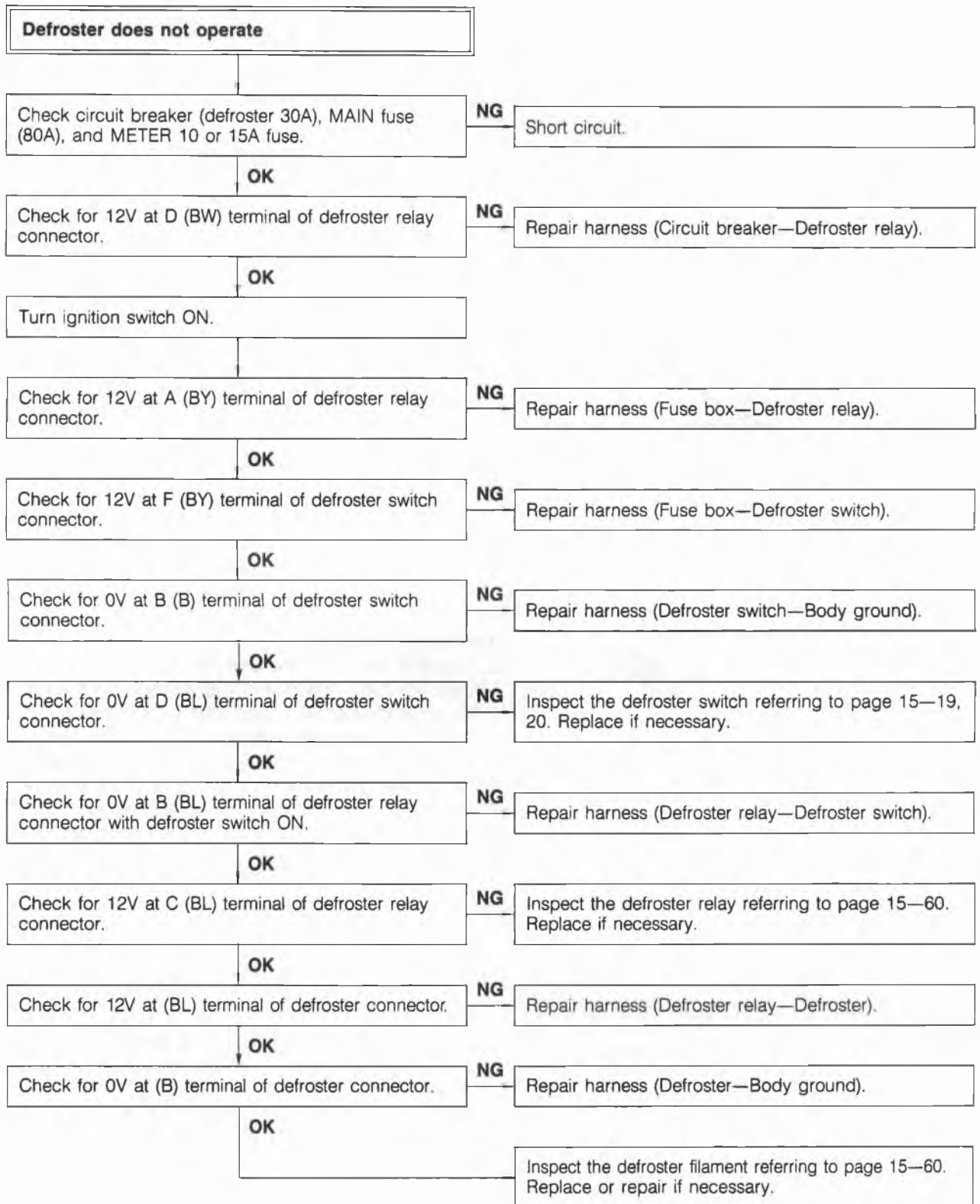
86U15X-101

### CIRCUIT DIAGRAM



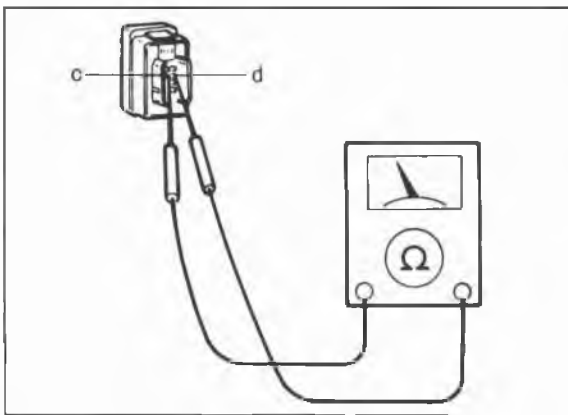
86U15X-102

## TROUBLESHOOTING



76G15X-057

# 15 REAR WINDOW DEFROSTER



86U15X-104

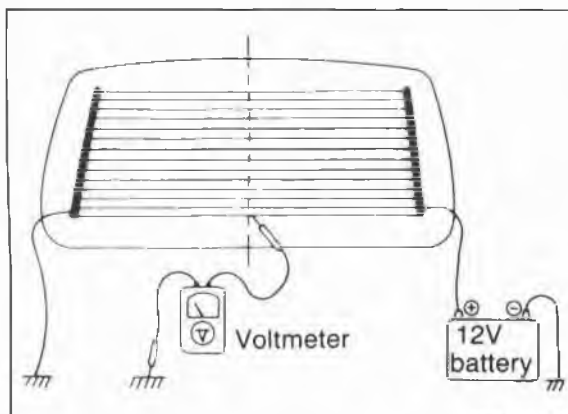
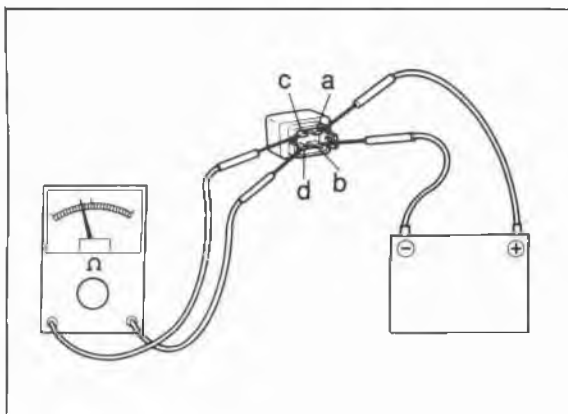
## INSPECTION Defroster Relay

1. Check for continuity between terminals of the relay.

Connecting to		a	b	c	d
12V	ground				
—	—	○—○			
a	b			○—○	

○—○: Indicates continuity

2. If continuity is not as specified, replace the relay.



76G15X-058

## Defroster Filament

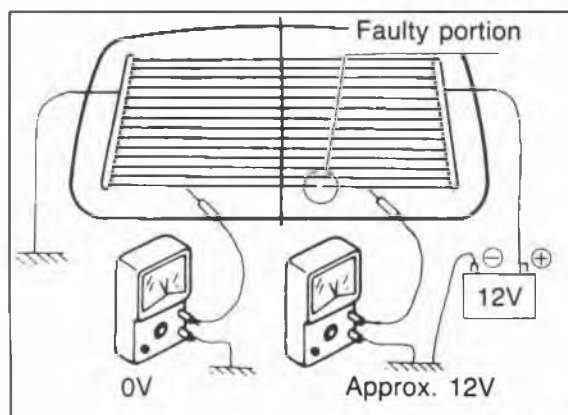
1. Turn the rear window defroster switch ON.
2. Connect the + terminal of the voltmeter to the center of each filament and the - terminal to the body. The standard voltage at the center of each filament is approximately 6V. If the meter indication is high, there is a short circuit between the center and the grounded side of the filament. If the indication is low or zero, the fault is between the center and positive side.

## Repairing Filament

1. Use paint thinner or ethyl alcohol to clean the damaged part of the filament.
2. Attach tape to both sides of the damaged part of the filament.
3. Using a small brush or marking pen, apply silver paint (part no 2835 77 600) or equivalent to the damaged part.
4. Let the paint set for 24 hours at 20°C (68°F) to let it dry completely. (If a blow dryer is used to heat it to 60°C (140°F), it can be dried in about 30 minutes.)

## Note

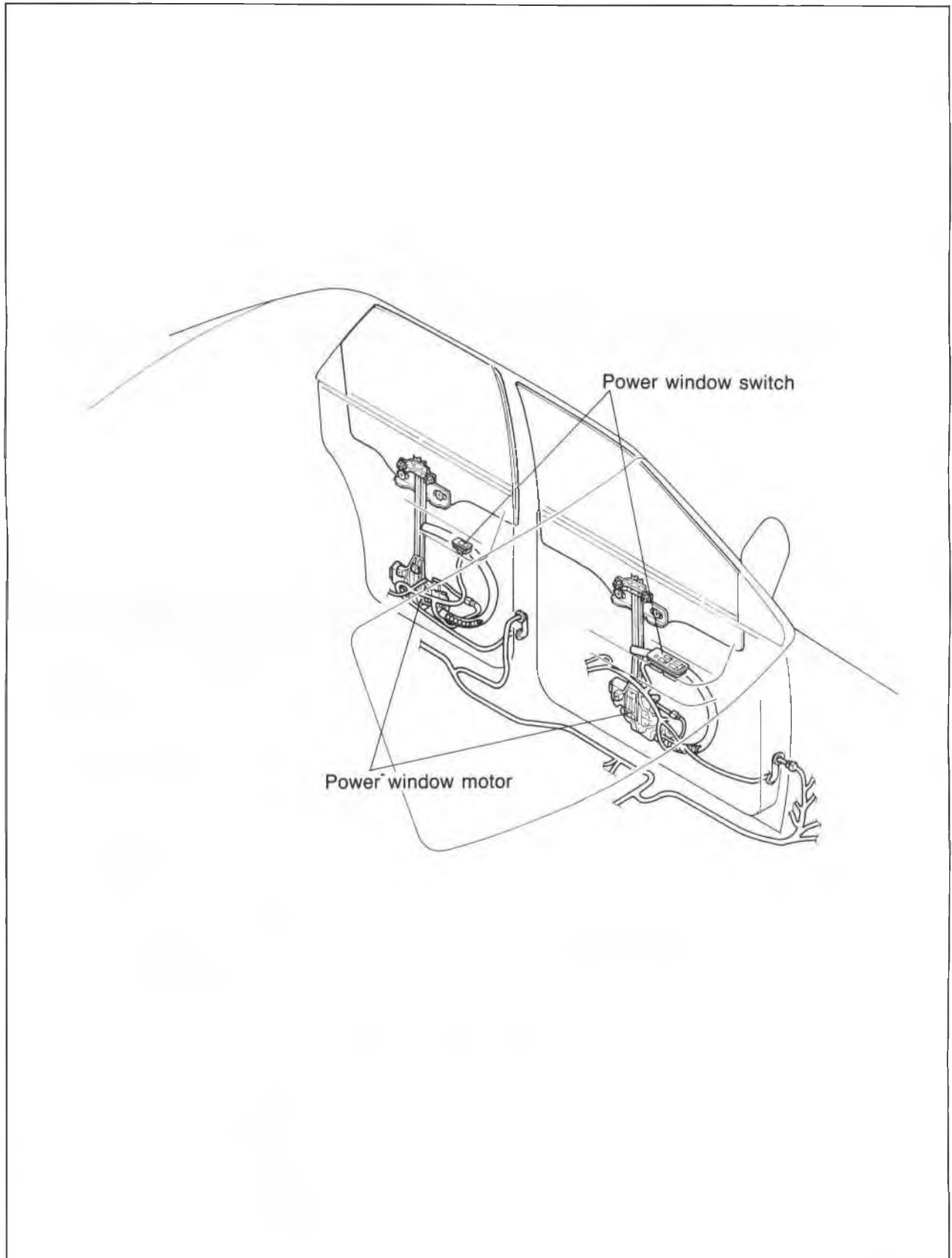
- a) Do not use the rear-window defroster until the paint is dry.
- b) Do not use gasoline or similar solvents to clean the damaged part.



86U15X-107



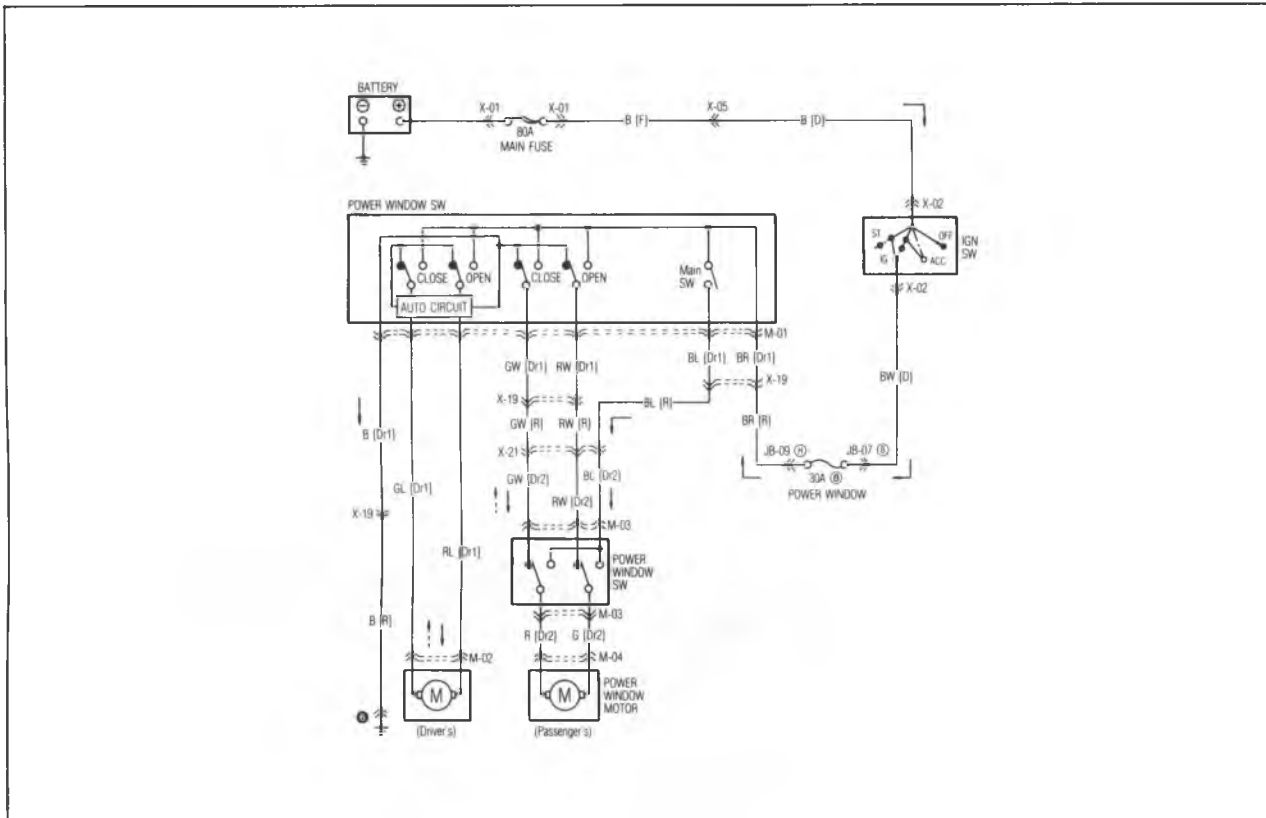
POWER WINDOW  
STRUCTURAL VIEW



# 15 POWER WINDOW

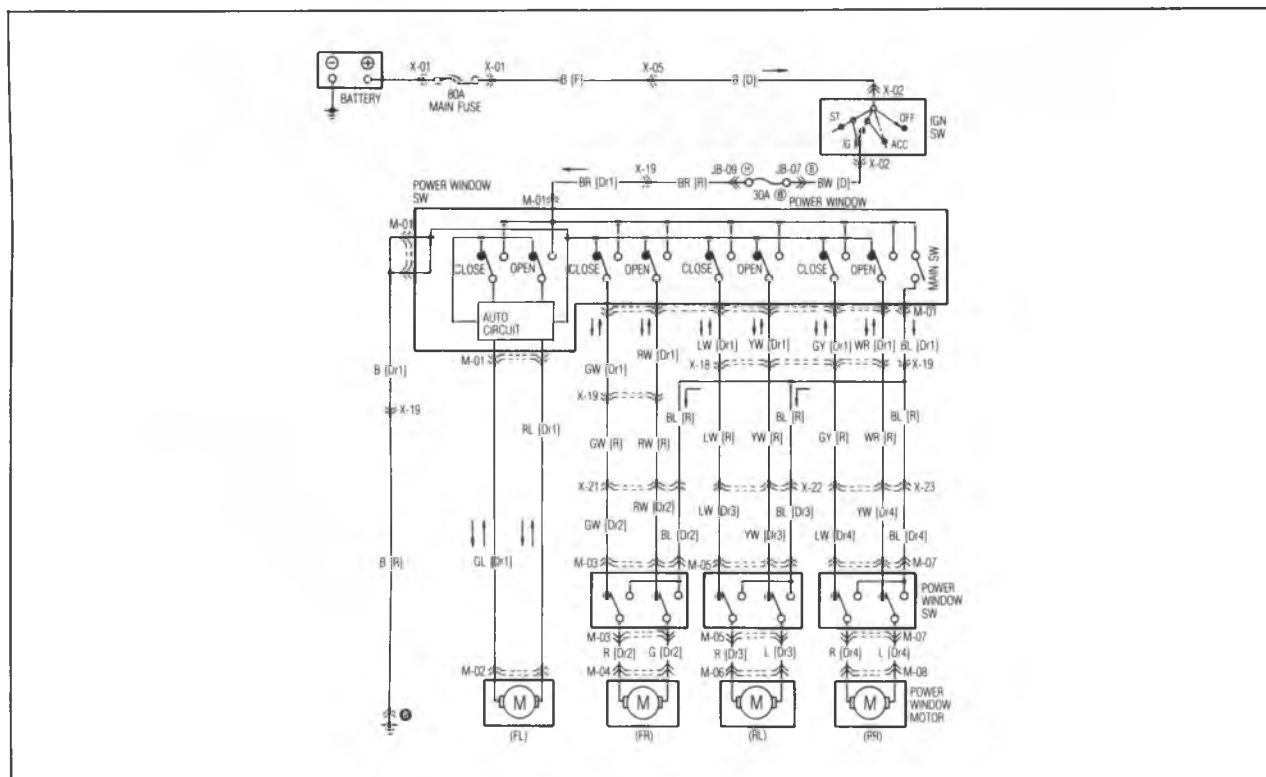
## CIRCUIT DIAGRAM

(Coupe/MX-6)

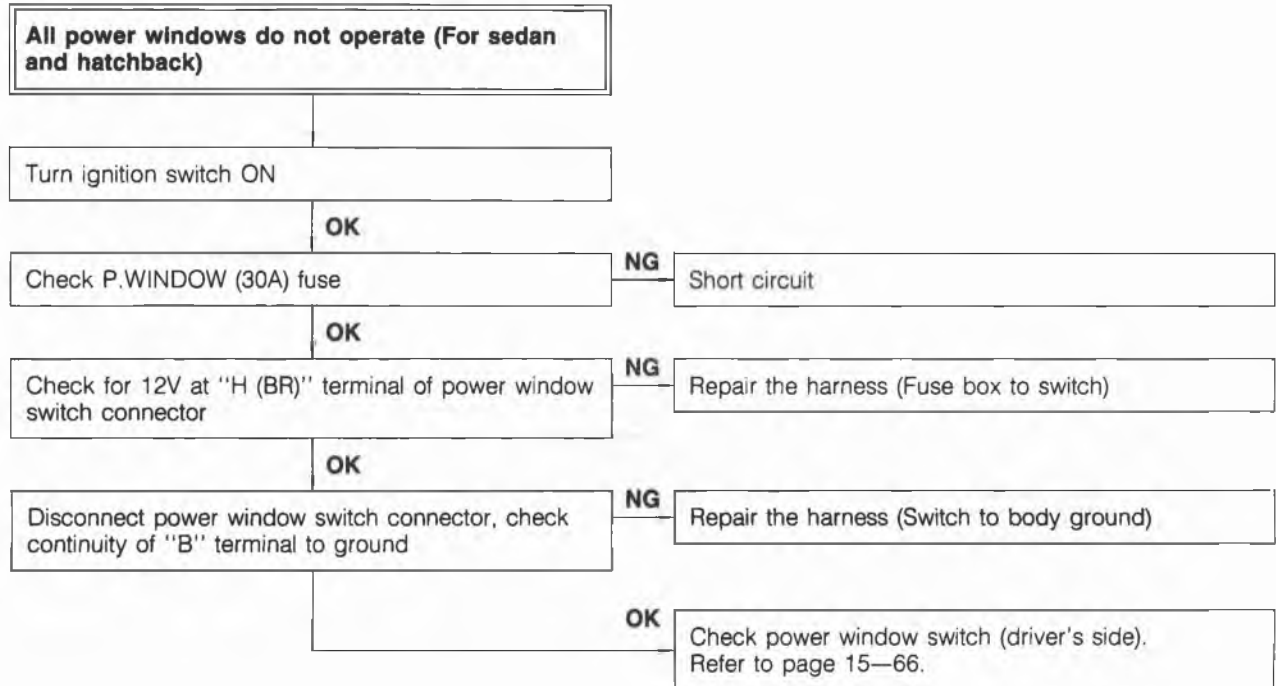


76G15X-010

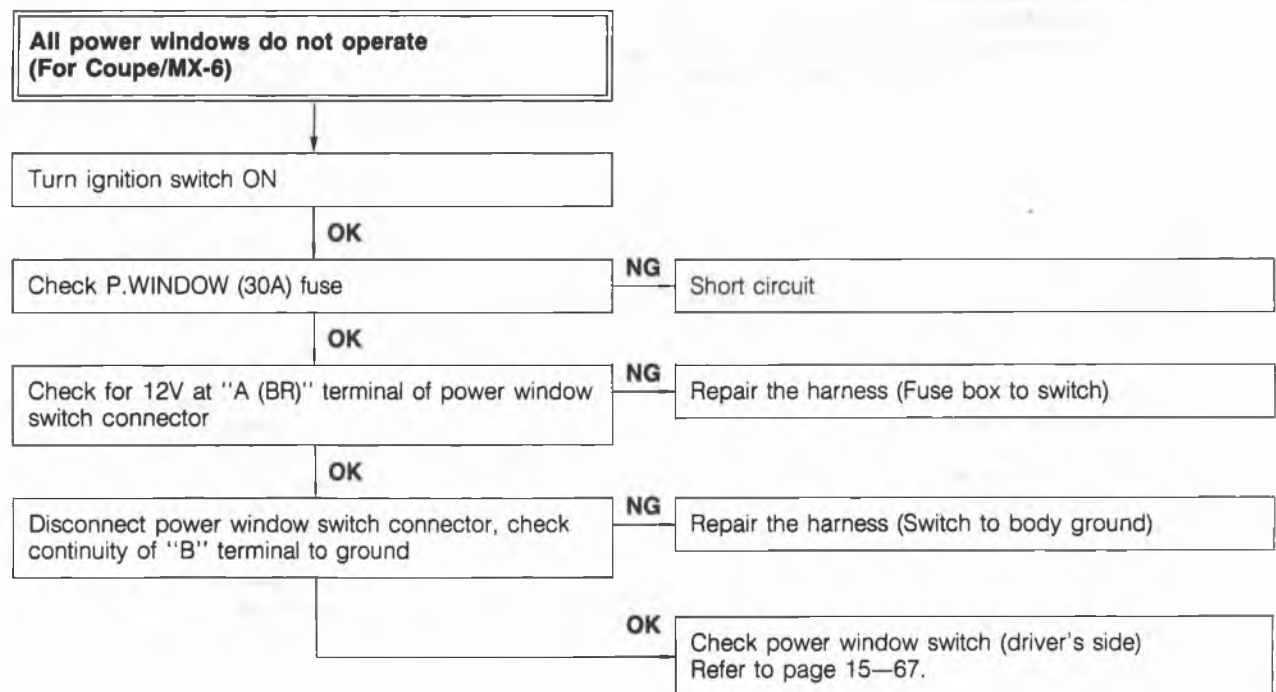
(For Sedan and Hatchback)



## TROUBLESHOOTING



76G15X-011



76G15X-012

# 15 POWER WINDOW

**Only driver's side power window does not operate (For sedan and hatchback)**

Turn ignition switch ON

Check for 12V at "RB" terminal and "GB" terminal of power window switch connector

- Up: "A (GL)" terminal
- Down: "D (RL)" terminal

NG

Check power window switch (driver's side). Refer to page 15-66.

OK

Check for 12V at "RB" terminal and "GB" terminal of motor connector

- Up: "A (GL)" terminal
- Down: "B (RL)" terminal

NG

Repair the harness (Switch to motor)

OK

Check motor. Refer to page 15-68.

76G15X-013

**Only driver's side power window does not operate (For Coupe/MX-6)**

Turn ignition switch ON

Check for 12V at "RB" terminal and "GB" terminal of power window switch connector

- Up: "G (GL)" terminal
- Down: "H (RL)" terminal

NG

Check power window switch (driver's side). Refer to page 15-67.

OK

Check for 12V at "RB" terminal and "GB" terminal of motor connector

- Up: "A (GL)" terminal
- Down: "B (RL)" terminal

NG

Repair the harness (Switch to motor)

OK

Check motor. Refer to page 15-68.

76G15X-014

**Power windows (except for driver's side) cannot be operated by main switch**

Turn ignition switch ON

**Note**  
Use only the main switch during the checking operation.

Check for 12V at terminal of power window switch connector while operating main switch (driver's side)

Door	Operation	Wire
Passenger side	Up	"GW"
	Down	"RW"
Rear left side (except Coupe)	Up	"LW"
	Down	"YW"
Rear right side (except Coupe)	Up	"GY"
	Down	"WR"

**NG** Check power window switch (driver's side). Refer to page 15—66, 67.

**OK**

Check for 12V at terminal to each door power window switch connector (5 pin) while operating main switch (driver's side)

Door	Operation	Wire
Passenger side	Up	"GW"
	Down	"RW"
Rear left side (except Coupe)	Up	"LW"
	Down	"YW"
Rear right side (except Coupe)	Up	"GY"
	Down	"WR"

**NG** Repair harness (Main switch—Switch on each door)

**OK**

Check for 12V at "R" terminal and "G" terminal of each door switch connector (5 pin) while operating main switch (driver's side)

- Up: "R" terminal
- Down: "G" terminal

**NG** Check switch on each door. Refer to page 15—67.

**OK**

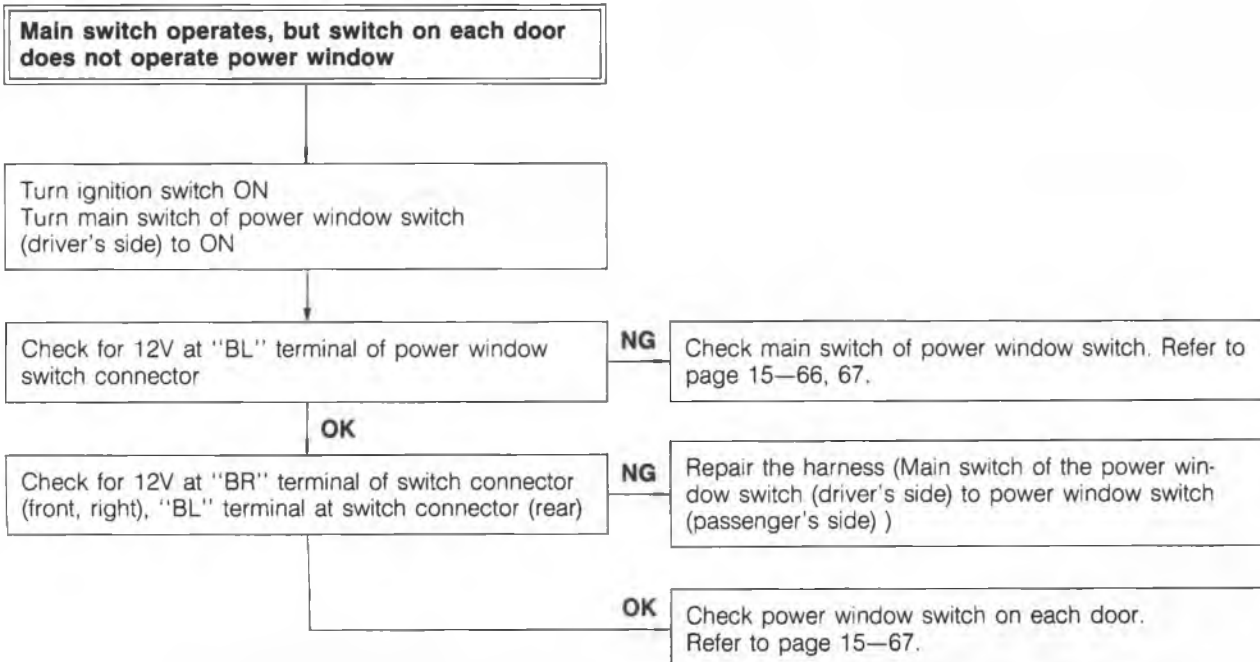
Check for 12V at "R" terminal and "G" terminal of each motor connector (2P) while operating main switch (driver's side)

- Up: "R" terminal
- Down: "G" terminal

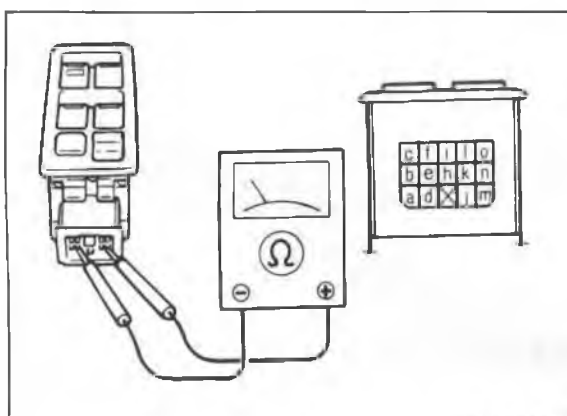
**NG** Repair harness (Switch on each door ~ Motor)

**OK** Check motor. Refer to page 15—68.

# 15 POWER WINDOW



76G15X-059



76G15X-016

## INSPECTION

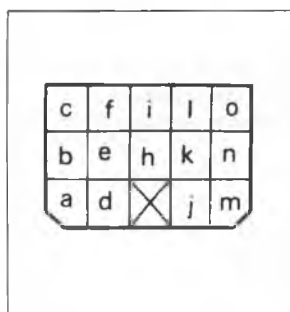
### Power Window Driver's Side Switch (For Sedan and Hatchback)

Check for continuity between terminals of the switch.

#### Main switch

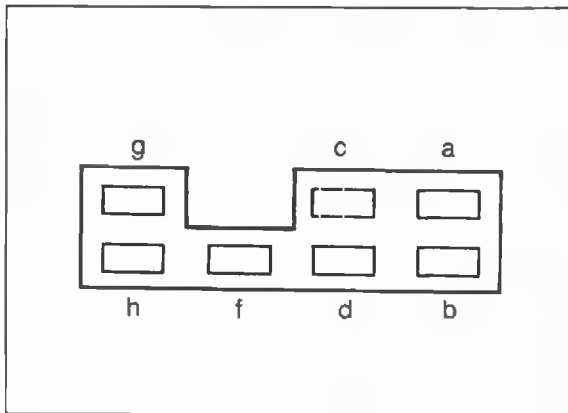
Position	Terminal	h	i
Lock			
Unlock		○	○

○—○: Indicates continuity



Switch	Driver's side				Passenger's side				Rear right				Rear left			
Terminal	h	f	d	a	h	f	m	j	h	f	e	b	h	f	n	k
UP	○			○	○			○	○			○	○			○
OFF		○	○	○		○	○	○		○	○	○		○	○	○
DOWN	○			○	○			○	○			○	○			○

○—○: Indicates continuity



76G15X-017

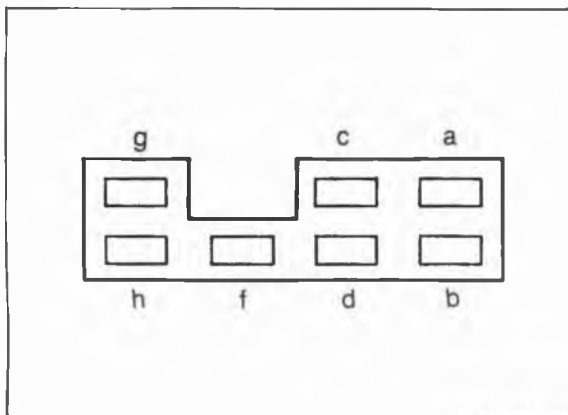
**(For Coupe/MX-6)**

Check for continuity between terminals of the switch.

**Main switch**

Position \ Terminal	a	c
Lock		
Unlock	○—○	○—○

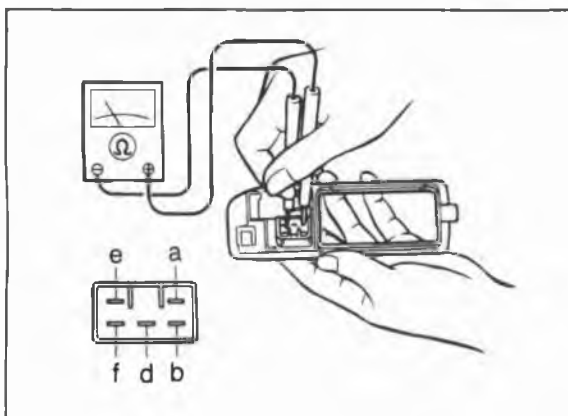
○—○: Indicates continuity



86U15X-118

Switch \ Terminal	Driver's side				Passenger's side			
	a	b	h	g	a	b	d	f
UP	○—○			○—○	○—○		○—○	
OFF		○—○		○—○		○—○	○—○	○—○
DOWN	○—○		○—○		○—○		○—○	○—○

○—○: Indicates continuity



76G15X-018

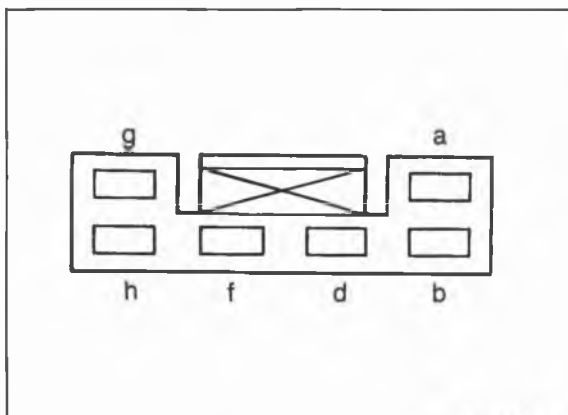
**Switch on Each Side**

**(For Sedan And Hatchback)**

Check for continuity between terminals of the switch.

Position \ Terminal	a	b	d	e	f
UP	○—○	○—○	○—○	○—○	
OFF	○—○			○—○	○—○
DOWN		○—○	○—○	○—○	○—○

○—○: Indicates continuity



76G15X-019

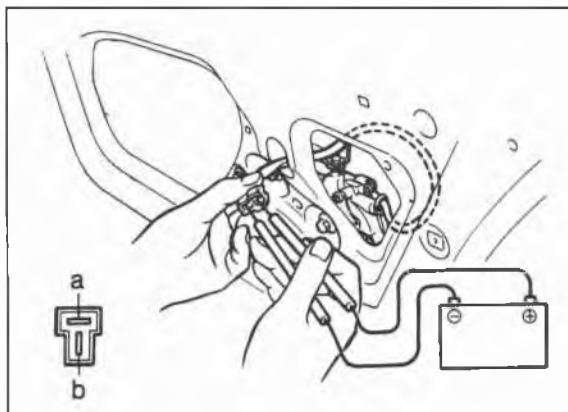
**(For Coupe/MX-6)**

Check for continuity between terminals of the switch.

Position \ Terminal	a	b	d	f	h
UP	○—○	○—○	○—○	○—○	
OFF	○—○			○—○	○—○
DOWN		○—○	○—○	○—○	○—○

○—○: Indicates continuity

# 15 POWER WINDOW



86U15X-121

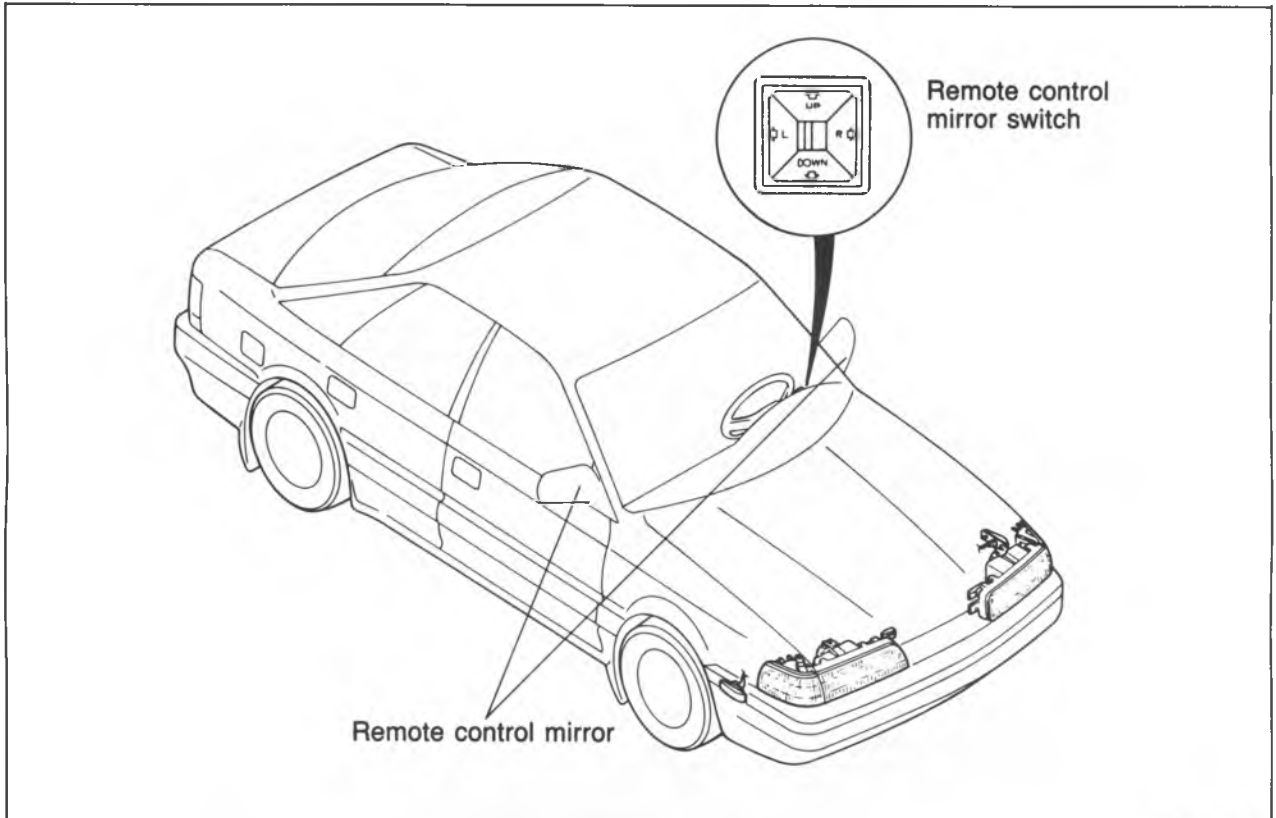
## Power Window Motor

1. Connect 12V to the "a" terminal and ground the "b" terminal of the motor connector, and check that the motor operates.
2. Reverse the above connections and check for reverse operation of the motor.



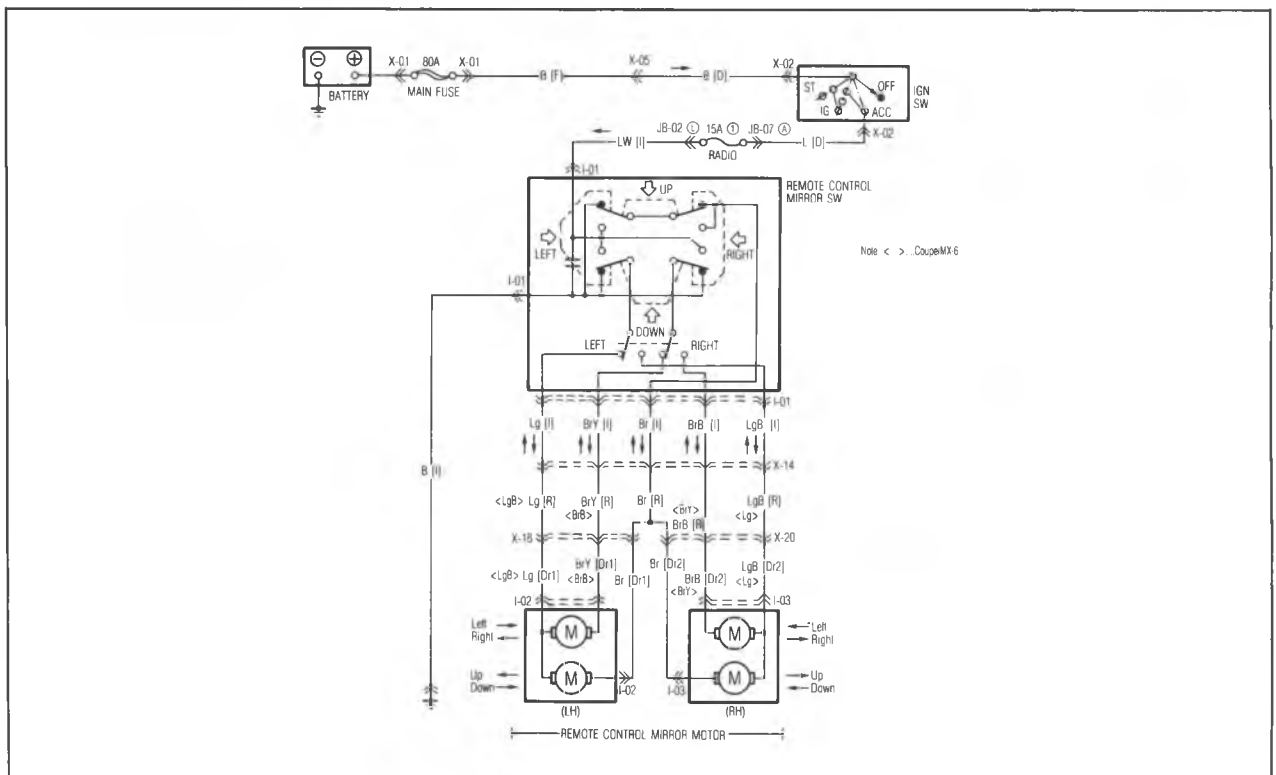
## REMOTE CONTROL MIRROR

### STRUCTURAL VIEW



86U15X-122

### CIRCUIT DIAGRAM



86U15X-123

# 15 REMOTE CONTROL MIRROR

## TROUBLESHOOTING

Remote control mirrors do not operate.

Check the voltage between each terminal of the remote control mirror switch connector and a body ground with ignition switch in ACC.

Terminal	Voltage
G (LW)	12V
H (B)	0V

NG Replace RADIO 15A fuse or repair the harness (Fuse box to switch, switch to body ground)

OK

Check the remote control mirror switch. Refer to following inspection.

NG Replace the switch.

OK

Check for continuity between each terminals of the remote control mirror motor.

Terminal		
Br	Lg	BrY
○	○	○

○—○: indicate continuity

NG Replace the motor.

OK

Repair the harness. (Switch to Motor)

86U15X-124

## INSPECTION

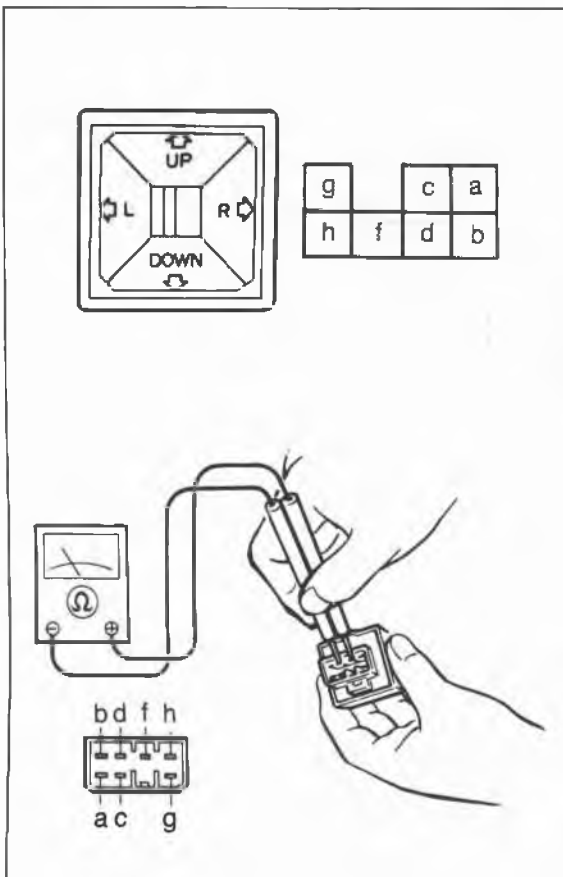
### Remote Control Mirror Switch

1. Remove the negative battery cable.
2. Remove the remote control mirror switch.
3. Check for continuity between the terminals using an ohmmeter.

Position	Operation	g	h	a	b	f	d	c
Left	Up	○	○	○	○	○		
	Down	○	○	○	○	○		
	Left	○	○	○	○	○		
	Right	○	○	○	○	○		
Right	Up	○	○			○	○	○
	Down	○	○			○	○	○
	Left	○	○			○	○	○
	Right	○	○			○	○	○

○—○: Indicates continuity

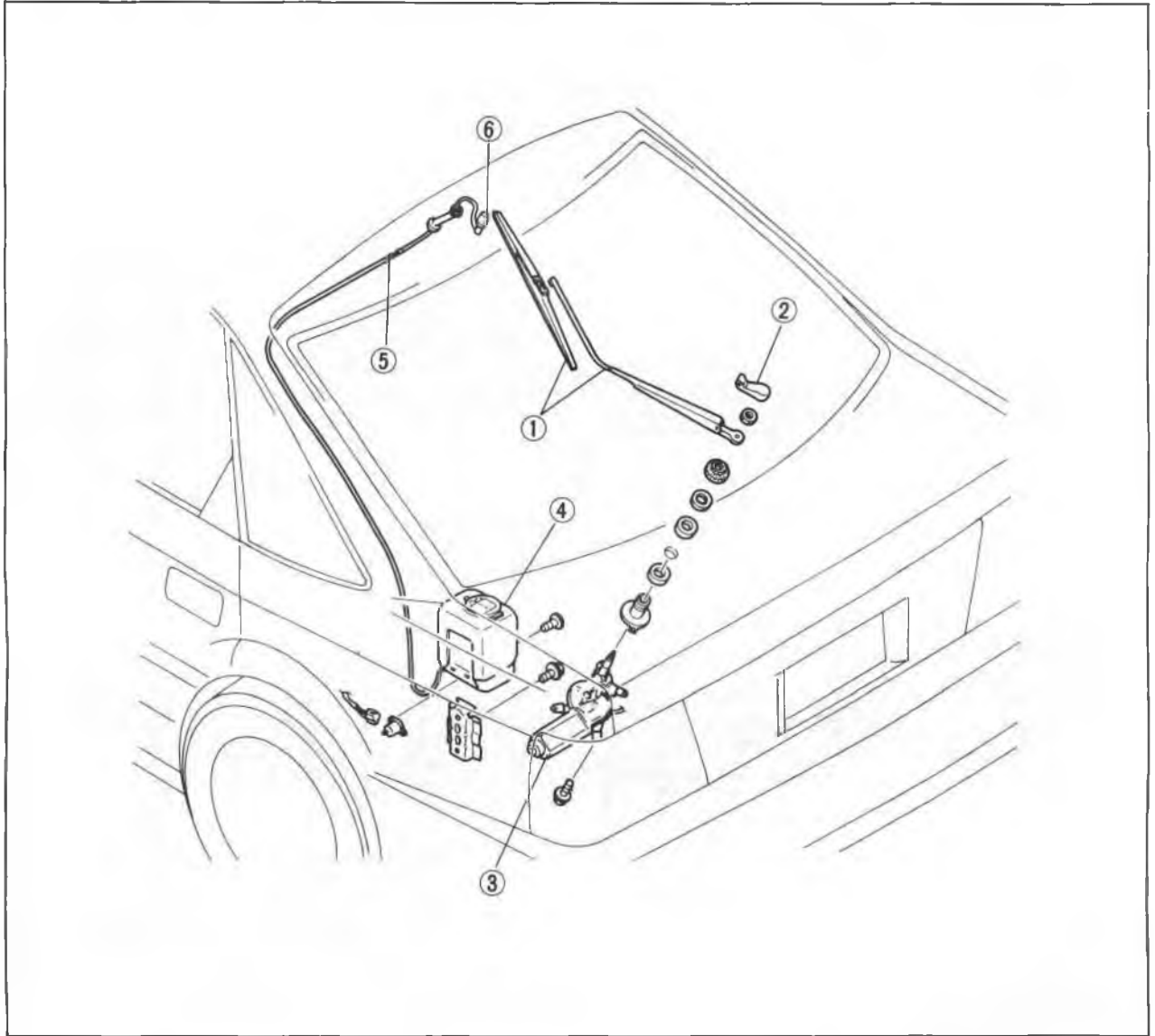
4. If continuity is not as specified, replace the remote control mirror switch.



86U15X-125

REAR WINDOW WIPER

STRUCTURAL VIEW



86U15X-126

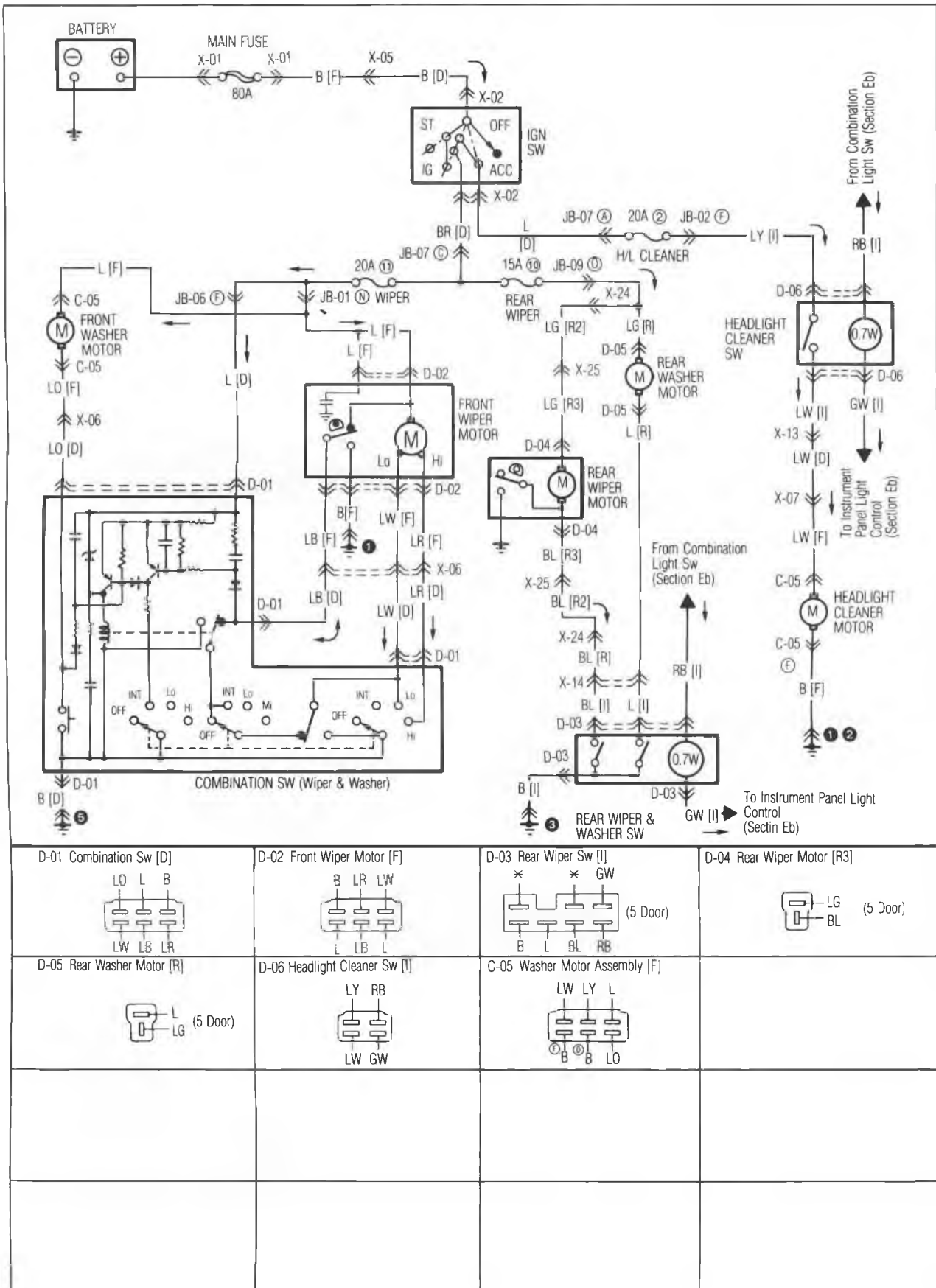
1. Wiper arm and blade  
2. Seal cap

3. Wiper motor  
4. Washer tank and motor

5. Hose  
6. Washer nozzle

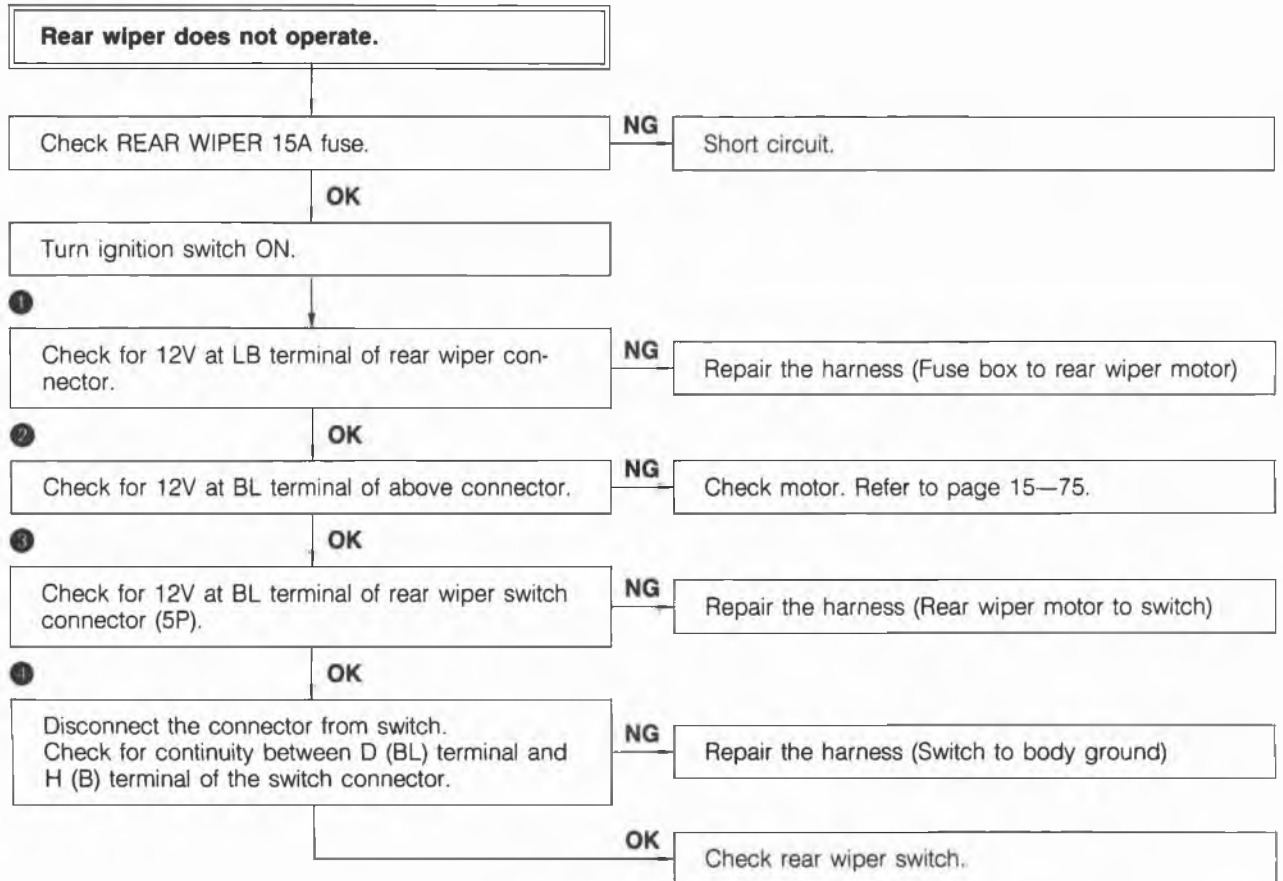
# 15 REAR WINDOW WIPER

## CIRCUIT DIAGRAM

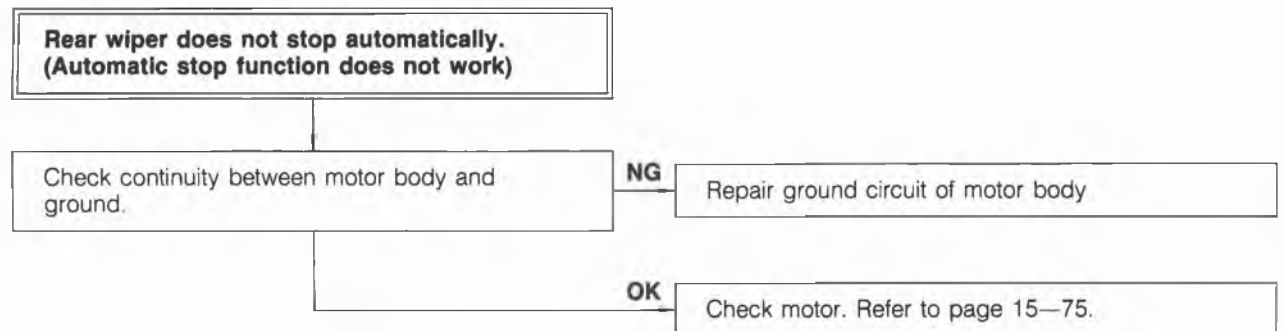


86U15X-127

## TROUBLESHOOTING

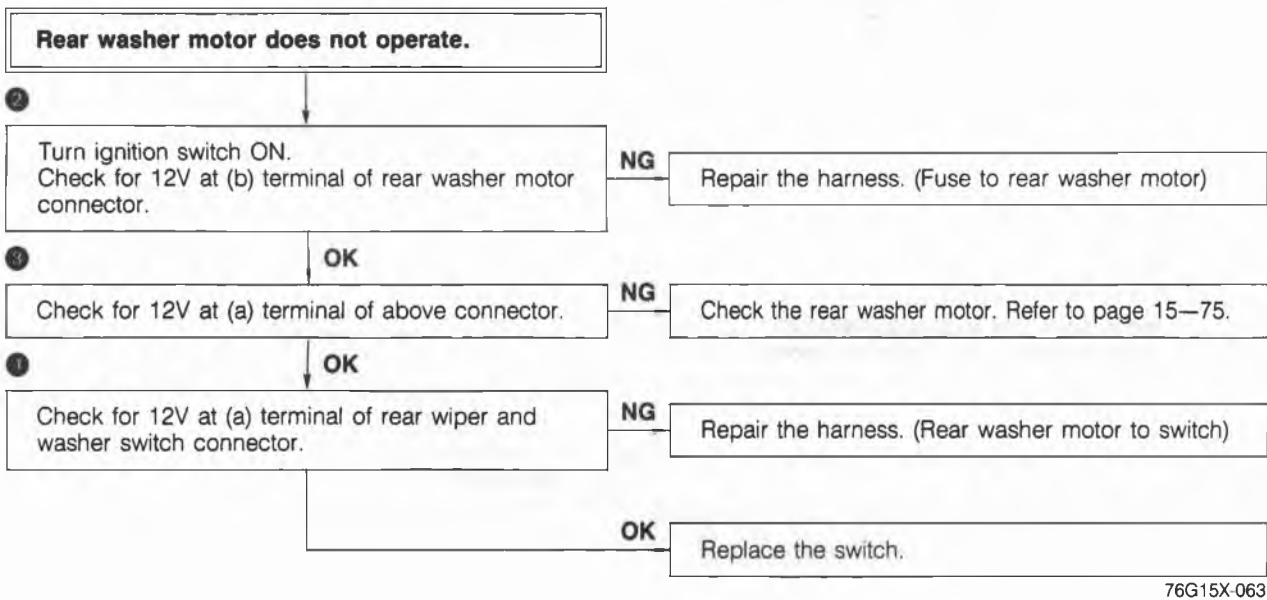
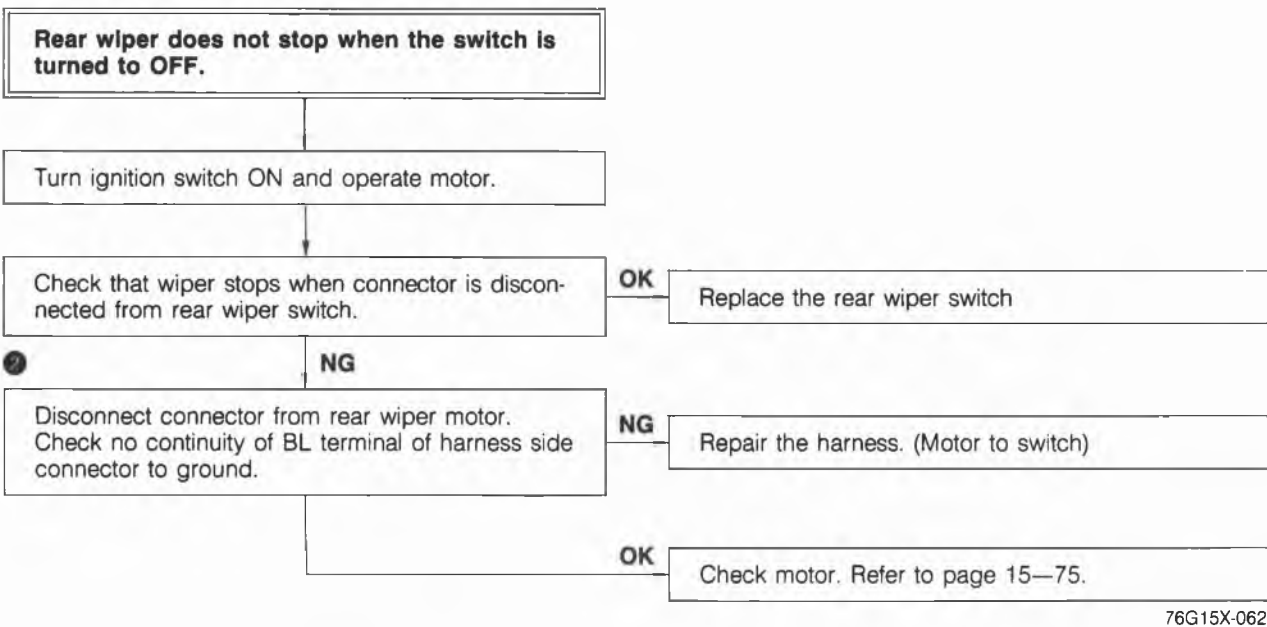


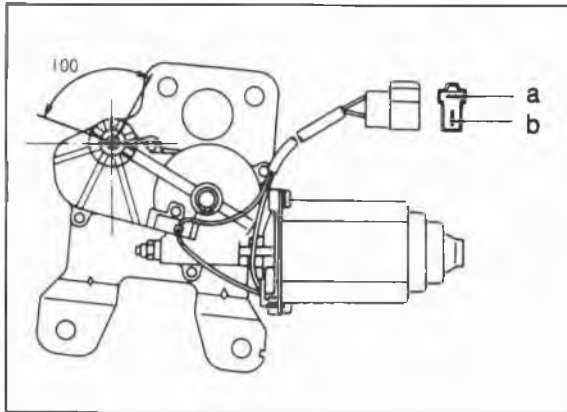
76G15X-060



76G15X-061

# 15 REAR WINDOW WIPER





86U15X-132

## INSPECTION

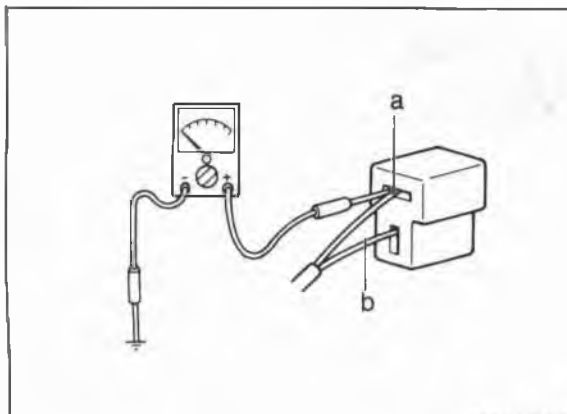
### Operation Check of Rear Wiper Motor

1. Check that the motor operates continuously when 12V is connected to the (a) terminal and ground is connected to the (b) terminal of the motor.
2. Start the motor again.

Disconnect the ground from the (b) terminal, and then connect the ground to the motor body immediately. Check that the motor shaft reaches the auto-stop position, and that there is conductivity through the grounding of the motor body.

### Note:

**Be sure to re-install the rubber seal correctly.**



76G15X-094

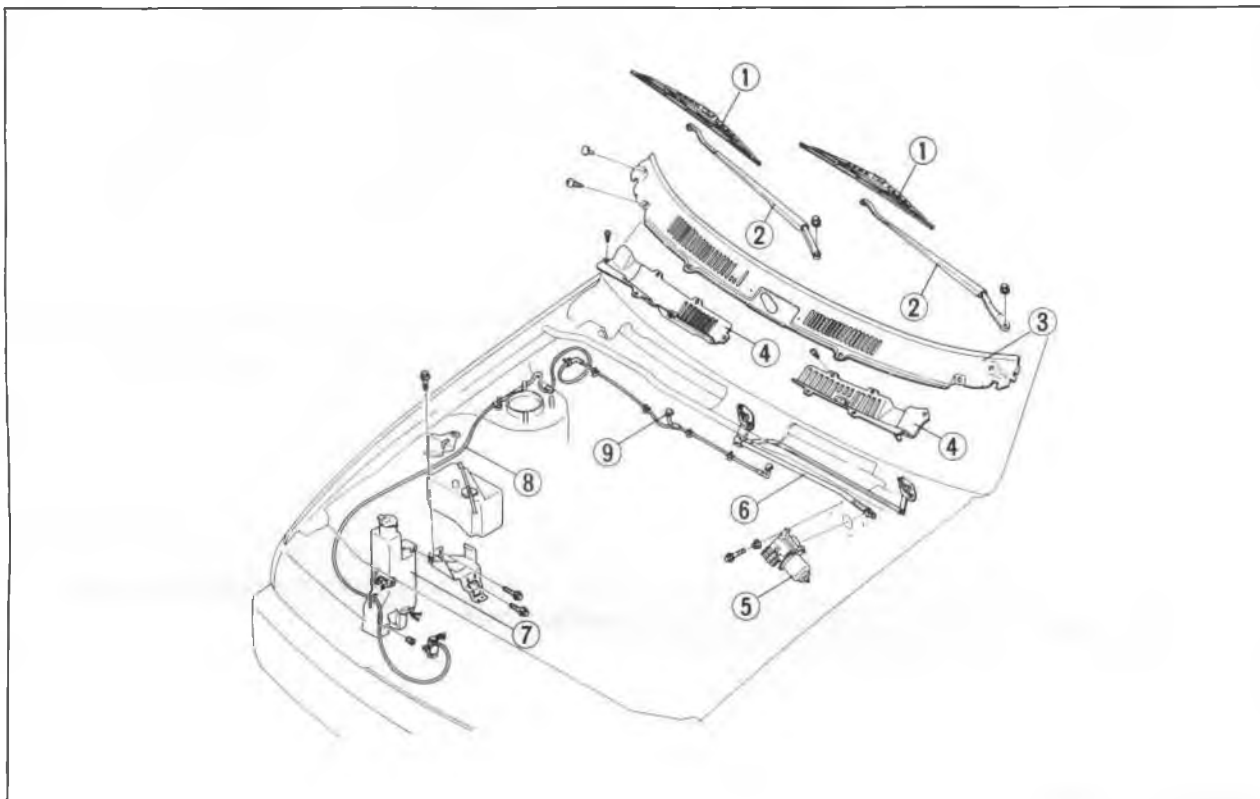
### Operation Check of Rear Washer Motor

1. Using a voltmeter, measure the voltage between the (b) terminal and a body ground with the ignition switch ON.
2. If no voltage, check the fuse or repair the harness.
3. If the (b) terminal voltage is 12 V, connect the (a) terminal to a body ground.
4. If the washer motor does not operate, replace the washer motor.

# 15 WINDSHIELD WIPER

## WINDSHIELD WIPER

### STRUCTURAL VIEW



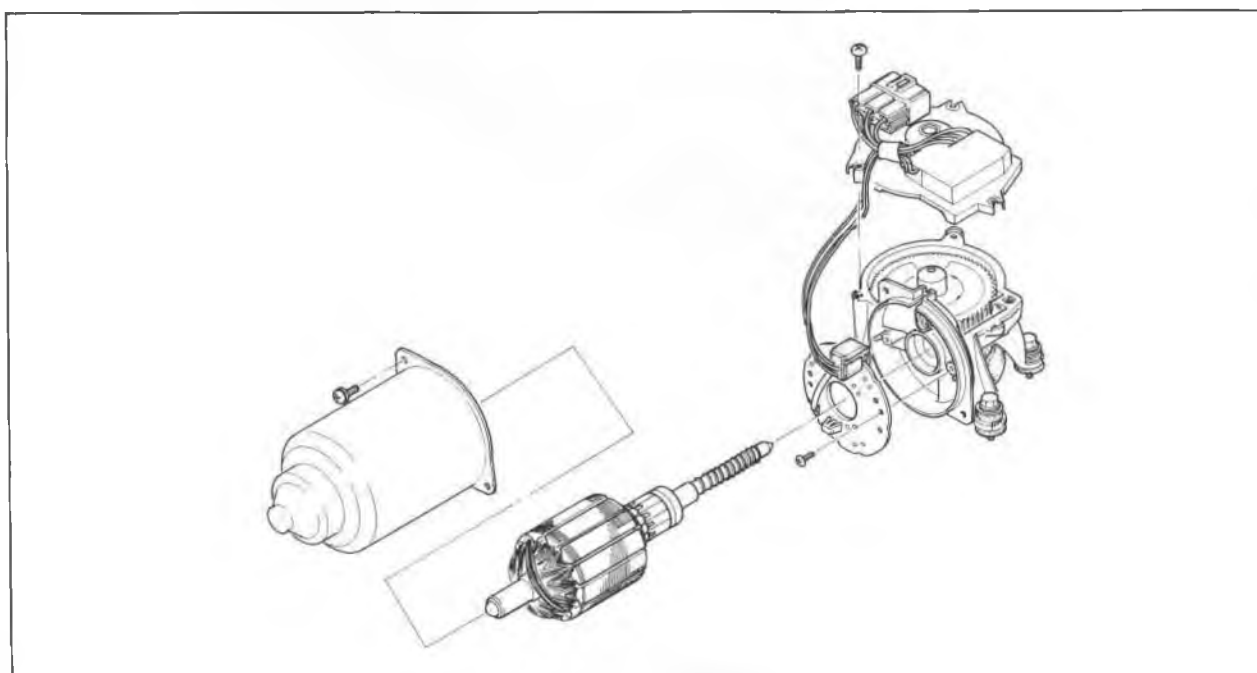
86U15X-134

1. Wiper blade  
2. Wiper arm  
3. Cowl grille

4. Cover  
5. Wiper motor  
6. Link assembly

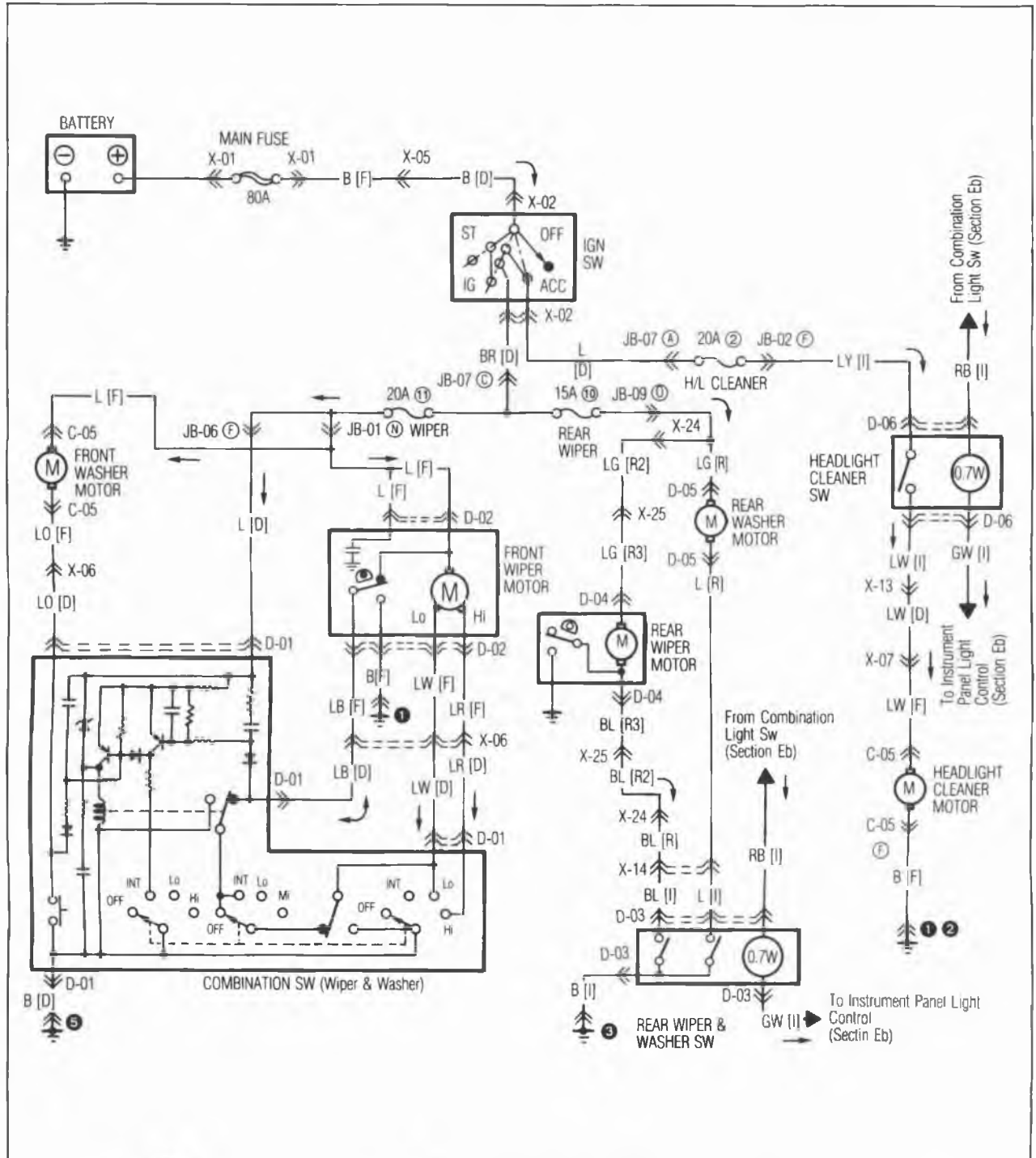
7. Washer tank  
8. Nozzle hose  
9. Washer nozzle

### DISASSEMBLY AND ASSEMBLY OF WIPER MOTOR





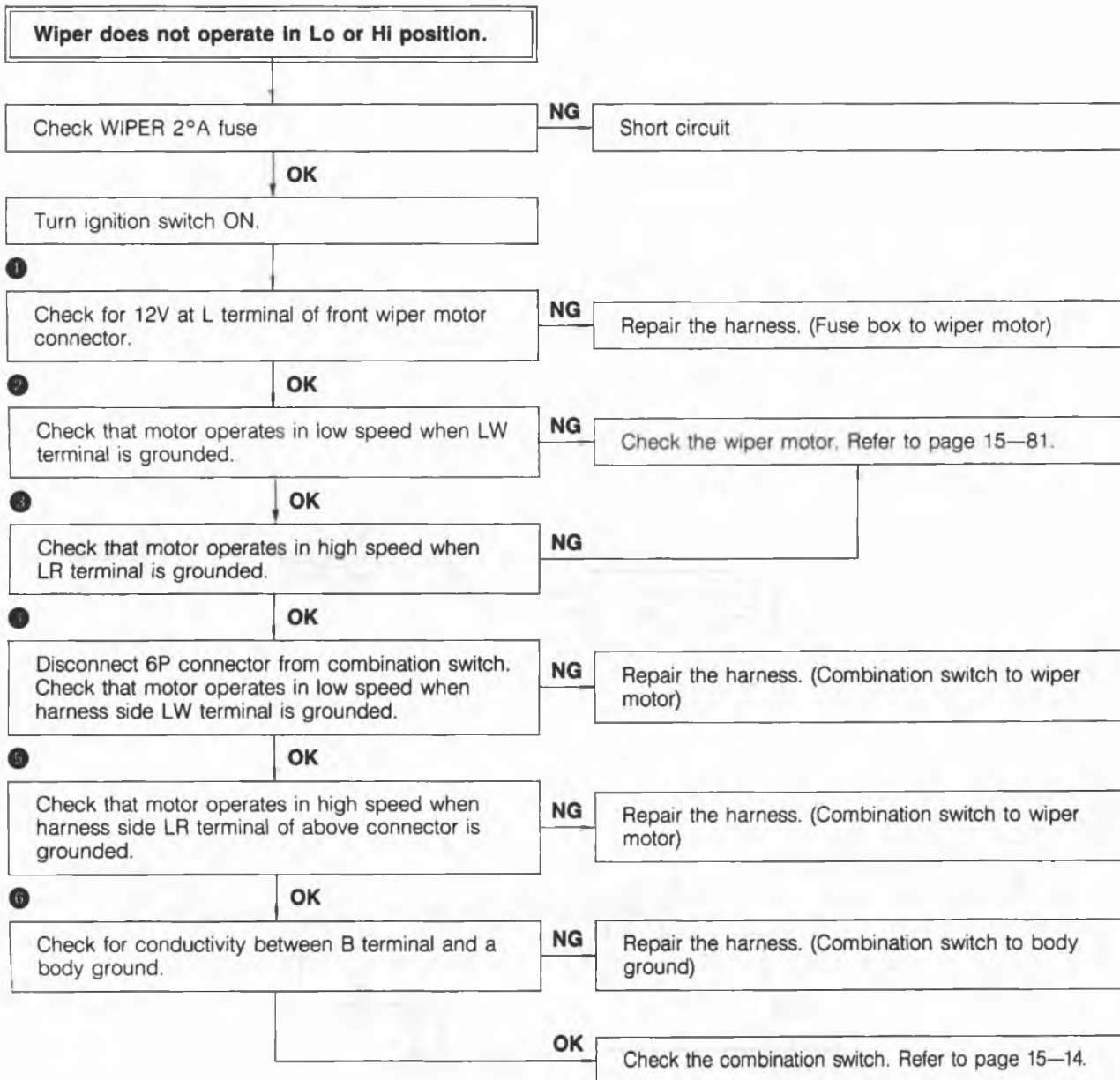
## CIRCUIT DIAGRAM



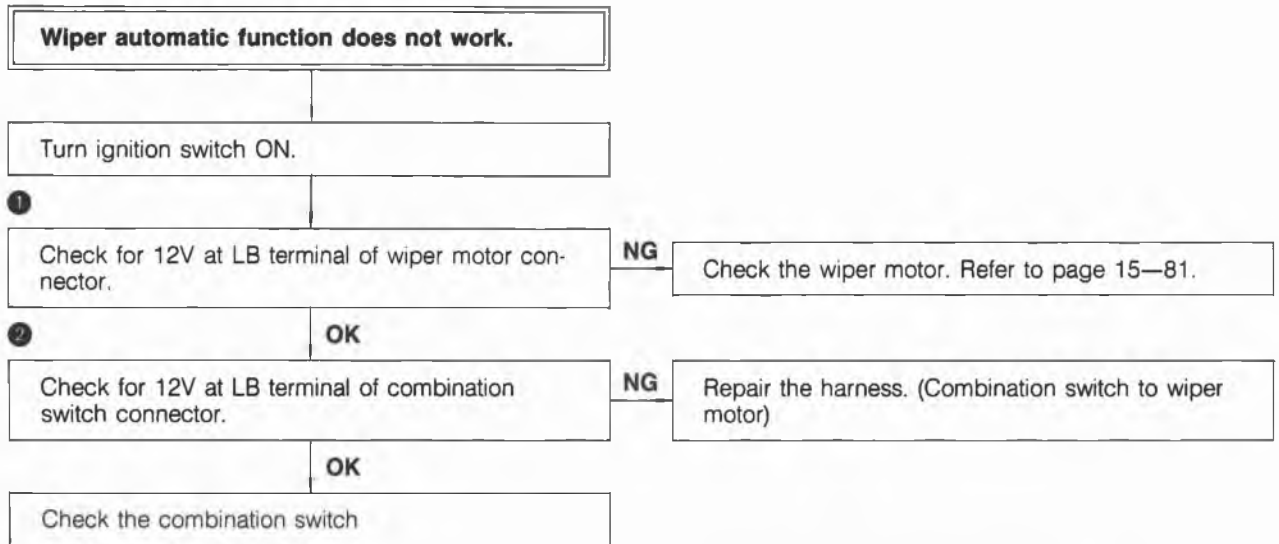
<p>D-01 Combination Sw [D]</p>	<p>D-02 Front Wiper Motor [F]</p>	<p>D-03 Rear Wiper Sw [I]</p>	<p>D-04 Rear Wiper Motor [R3]</p>
<p>D-05 Rear Washer Motor [R]</p>	<p>D-06 Headlight Cleaner Sw [I]</p>	<p>C-05 Washer Motor Assembly [F]</p>	

# 15 WINDSHIELD WIPER

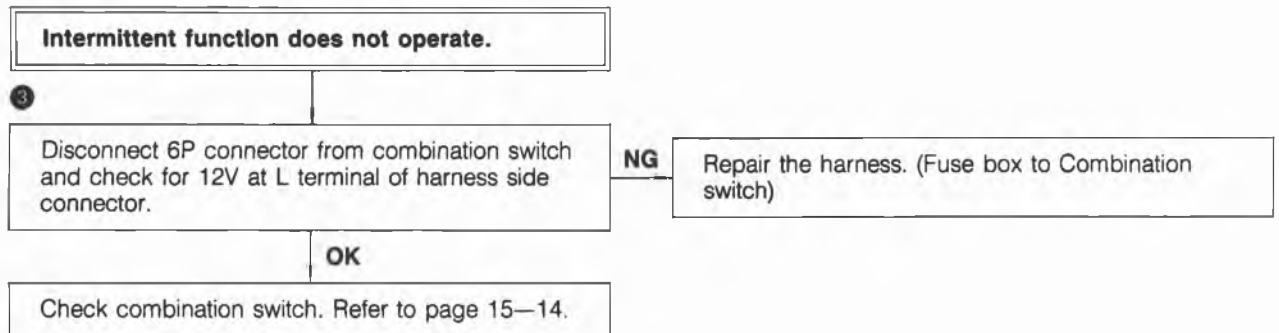
## TROUBLESHOOTING



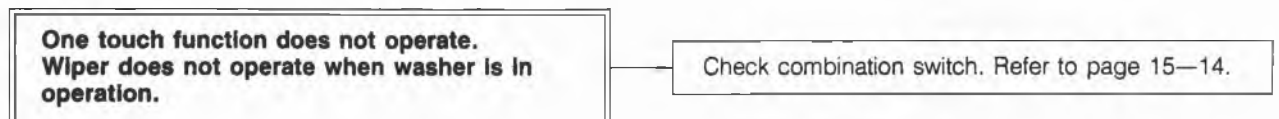
76G15X-064



76G15X-065

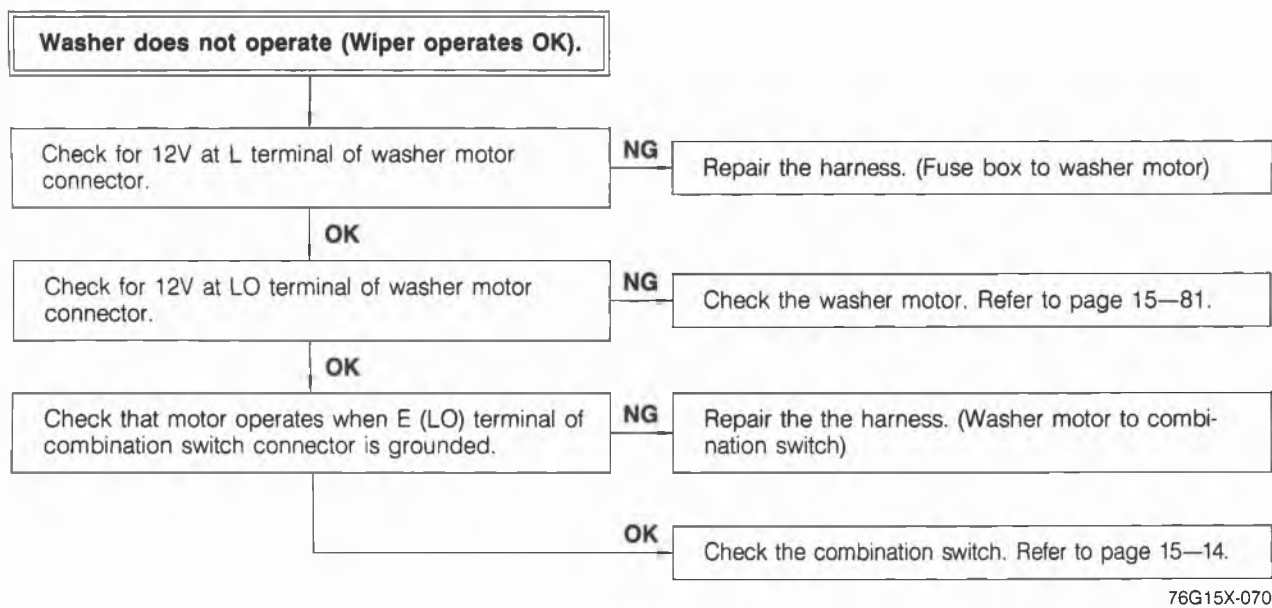
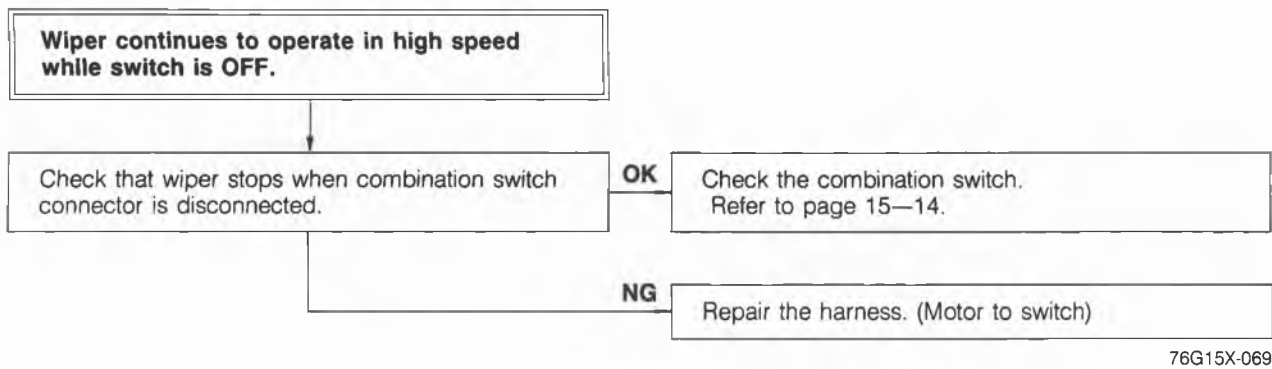
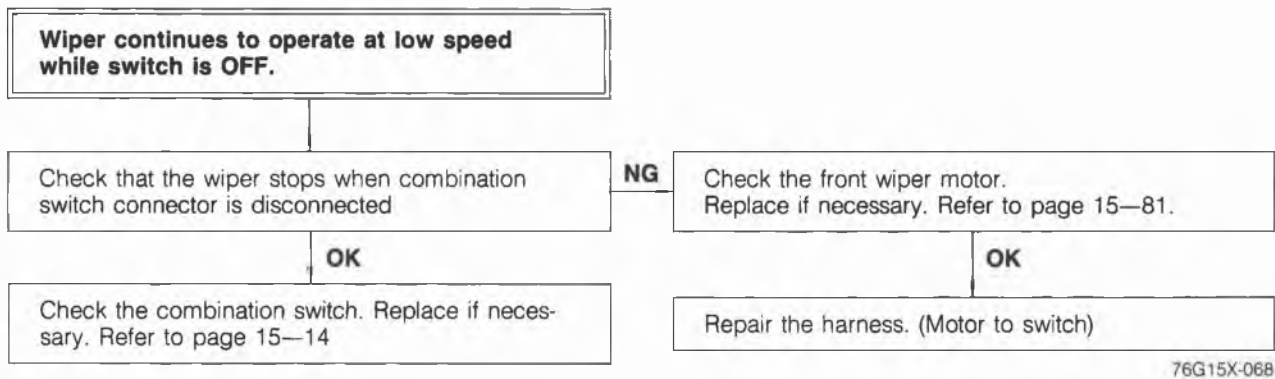


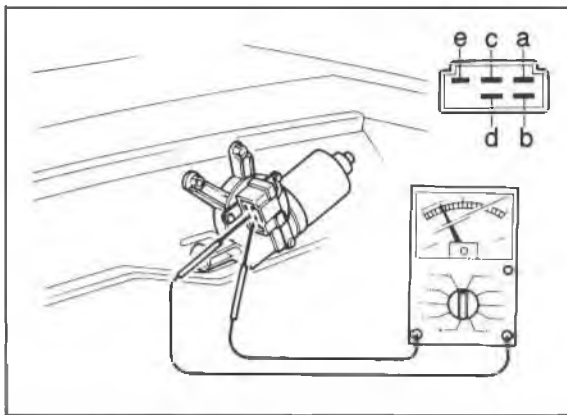
76G15X-066



76G15X-067

# 15 WINDSHIELD WIPER





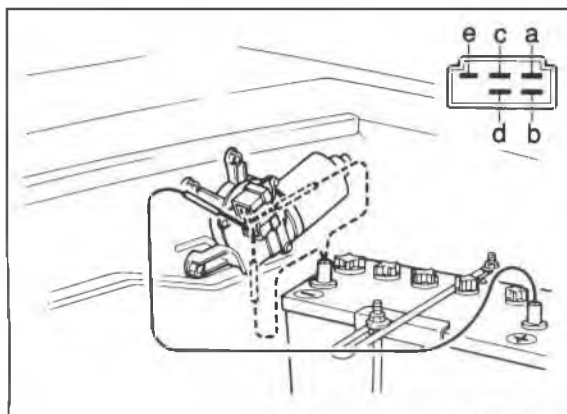
76G15X-071

## INSPECTION

### Wiper Motor

1. Check for continuity between the terminals when wiper in normal resting position.

Terminals	Continuity
b—a	Yes
d—c	Yes
b—d	Yes
e—d	No

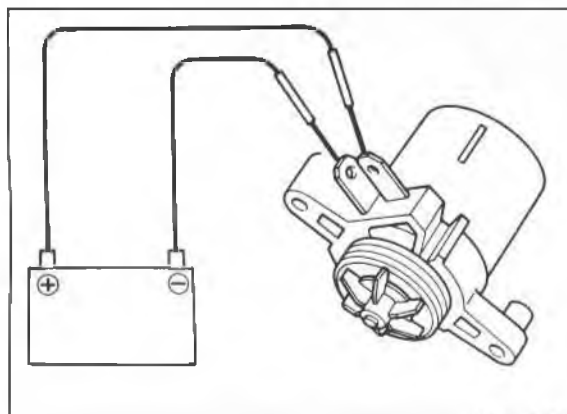


86U15X-144

## Checking Operation

1. Check the operation by applying 12V between each terminal of the motor connector.

Terminal		Operation speed
12V	Ground	
b	a	Low
	c	High



86U15X-145

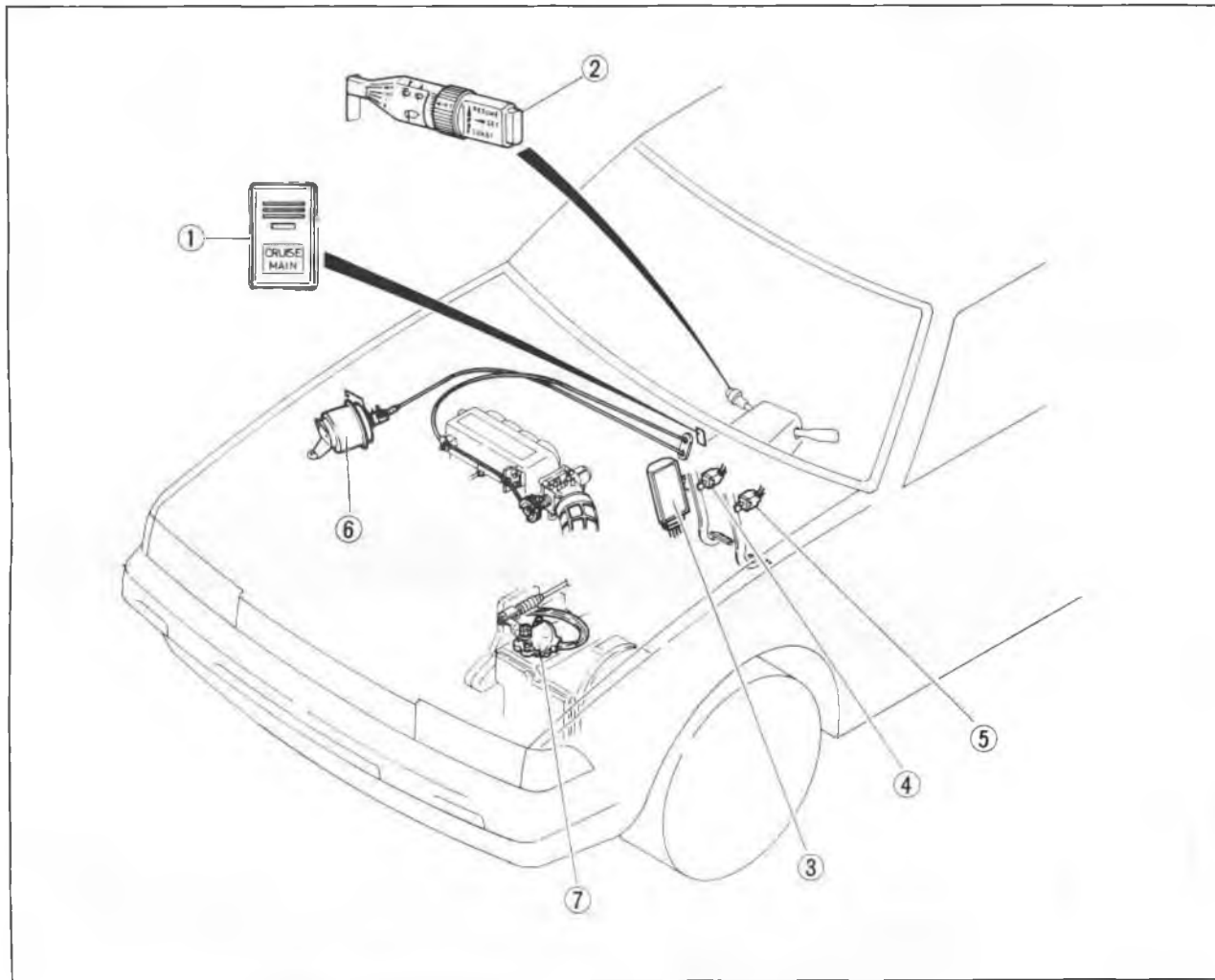
## Washer Motor

1. Check for continuity of the motor with an ohmmeter.
2. Connect 12V to the "a" terminal and the ground to the "b" terminal, and check that the motor operates.

# 15 CRUISE CONTROL SYSTEM

## CRUISE CONTROL SYSTEM

### STRUCTURAL VIEW



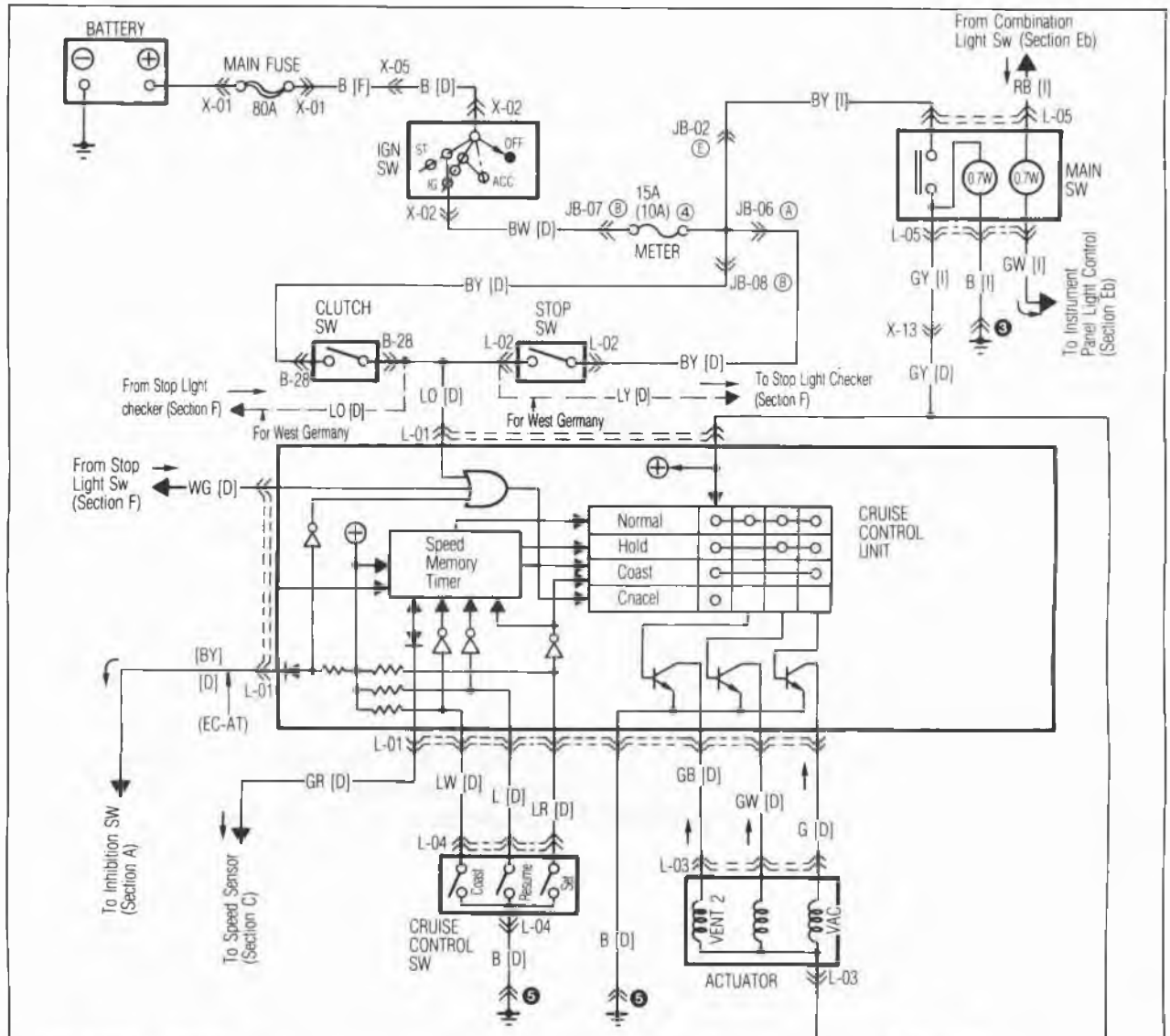
86U15X-146

1. Main switch  
2. Control switch  
3. Control unit

4. Stop switch  
5. Clutch switch (MTX)  
6. Actuator

7. Inhibitor switch (ATX)

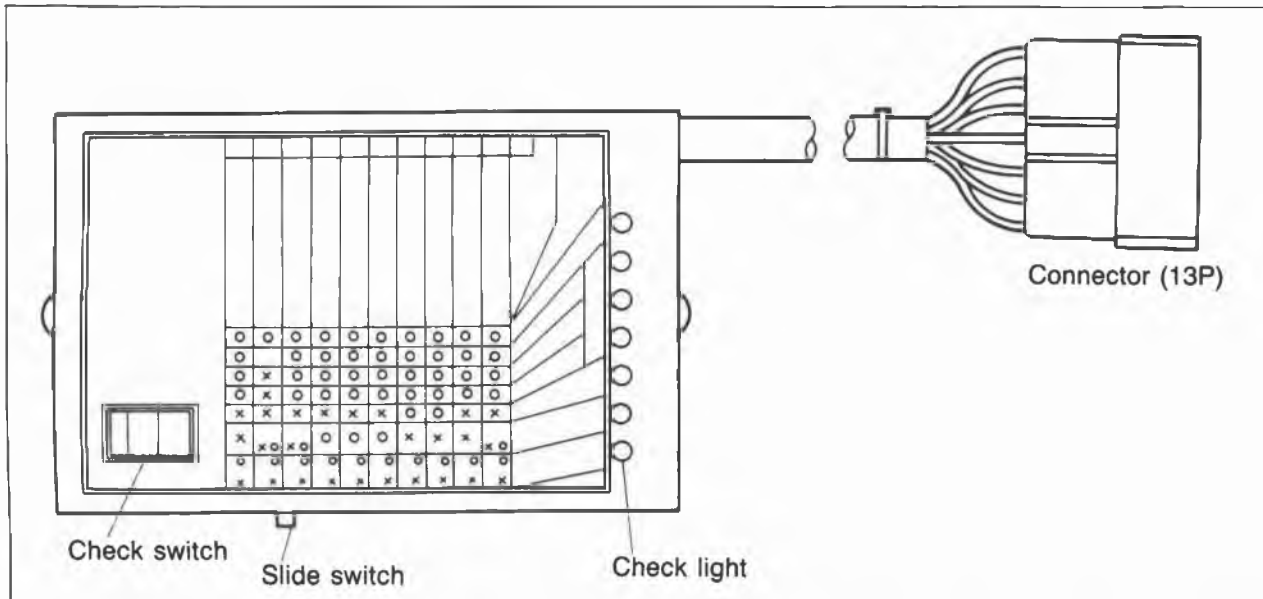
## CIRCUIT DIAGRAM



<p>L-01 Cruise Control Unit [D]</p>	<p>L-02 Stop Sw [D]</p>	<p>L-03 Actuator [D]</p>	
<p>L-04 Cruise Control Sw [D]</p>	<p>L-05 Main Sw [I]</p>	<p>B-26 Clutch Sw [D]</p>	

# 15 CRUISE CONTROL SYSTEM

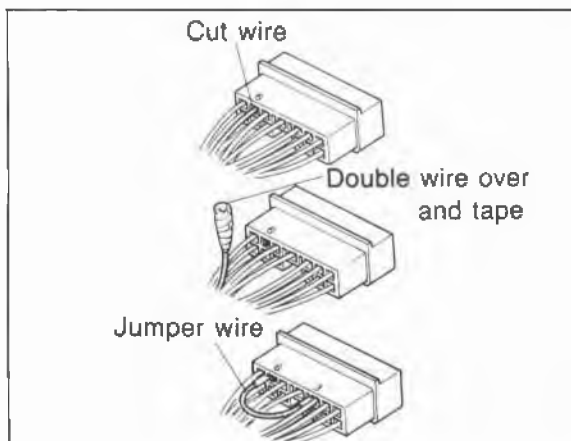
## ON-VEHICLE INSPECTION (USING ACC CHECKER 49 9200 010)



76G15X-072

### Note:

When checking the actuator on '88 models with EC-AT using this checker, the checker should be modified as shown below in order to avoid damage of the EC-AT control unit.



### Modification Procedure

1. Cut the wire at terminal no.6 indicated on ACC checker connector.
2. Tape exposed end of wire cut in step 1 as shown.

This modification does not affect the usage of the ACC checker except when used on the '81 RX-7 and 626 models. When the modified ACC checker is used on these models, use a jumper wire and jump across terminal no.6 to 3 indicated on ACC checker connector as shown.

## Function of the ACC CHECKER

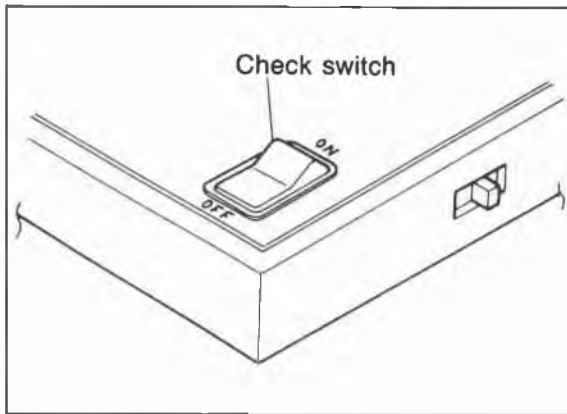
### A. Check lights

Each item is verified by a check light, as described below.

Check light	Check Items
<b>MAIN SW.</b>	Ignition switch, fuse, main switch and associated wiring harness terminals and connectors.
<b>ACTUATOR—VAC</b>	VAC coil continuity in the actuator and associated harness.
<b>ACTUATOR—VENT 2</b>	VENT 2 coil continuity in the actuator and associated harness.
<b>ACTUATOR—VENT 1</b>	VENT 1 coil continuity in the actuator and associated harness.
<b>CLUTCH/BRAKE SW.</b>	Clutch switch (M/T vehicles only), brake switch and associated harness
<b>COMBINATION/INH. SW.</b>	"SET", "COAST" and "RESUME" positions in the combination switch, inhibitor switch (A/T vehicles only), and associated harness.
<b>GENERATOR</b>	Speed sensor output and associated harness.

76U15X-193

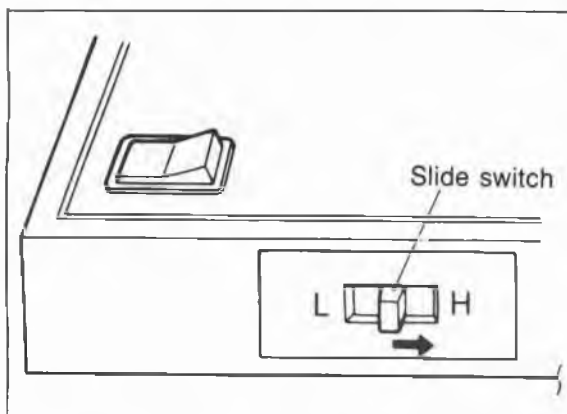




76G15X-073

## B. Check Switch

The check switch in the ACC checker is used to check the actuator operation while the engine is running. When the check switch is held on after the engine is started, the engine speed increases to approximately 2,000 to 3,000 rpm and is maintained at that level. When the check switch is released, the engine speed decreases to idle speed.



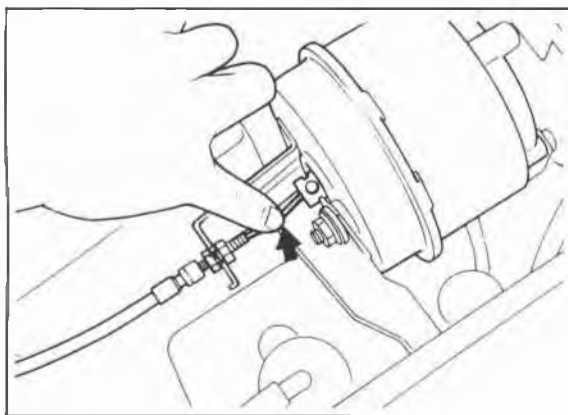
76U15X-319

## C. Slide switch

Before using the check switch, first move the slide switch to the "L" position.

Then use the check switch to increase the engine rpm.

If the engine rpm stabilizes after increasing to 2,000—3,000 rpm, there is no problem. If there is no increase at all, or only a slight increase, try again after setting the slide switch to the "H" position. If there is still no increase to 2,000—3,000 rpm, adjust the free play of the actuator inner cable.



76G15X-074

## Preparation

### 1. ACC checker installation

Depress the lock hook of the harness connector. Remove the connector from the ACC control unit after the ignition switch and main switch are turned off, and then connect the harness connector to the ACC checker.

### 2. Checking the free play of the actuator inner cable

Remove the clip and adjust the nut so that the actuator control cable play is as follows when the cable is pressed lightly.

**Standard play: 1—3 mm (0.039—0.118 in)**

# 15 CRUISE CONTROL SYSTEM

## Checking the System

### Check table

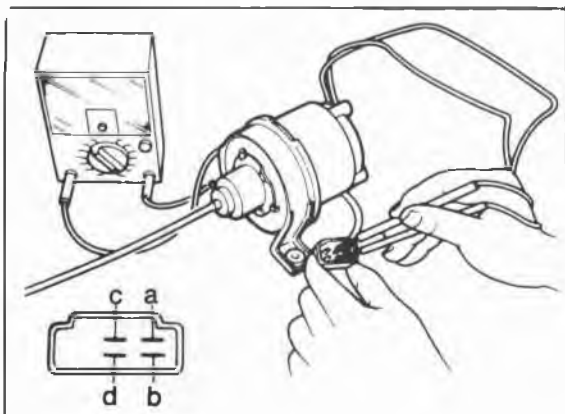
O: Represents: Light ON  
X: Represents: Light OFF

CHECK ITEMS AND CONDITIONS	CHECK LIGHTS (correct response)							TROUBLESHOOTING (INCORRECT RESPONSE)
	MAIN SW	ACTUATOR			CLUTCH/BRAKE SW	COMBINATION/INH SW	GENERATOR	
		VAC	VENT2	VANT1				
1. MAIN SW. CONTINUITY: • Ignition switch ON • Main switch ON	O	O	O	O	X	A/T O M/T X	O or X	ALL LIGHTS OFF: Check ignition switch, main switch, fuse, and associated harness terminals and connectors
2. INHIBITOR SW. CONTINUITY: • Ignition and main switch ON. • Shift lever to "D" (A/T) • Depress brake pedal	O	O	O	O	X	X	O or X	COMBINATION/INH. SW. LIGHT ON: Check inhibitor switch and associated harness.
3. BRAKE SW. CONTINUITY: • Ignition and main switch ON • Shift lever to "D" (A/T) • Depress brake pedal	O	O	O	O	O	X	O or X	CLUTCH/BRAKE SW. LIGHT OFF: Check brake switch and associated harness.
4. CLUTCH SW. CONTINUITY: • Ignition switch ON • Main switch ON • Depress clutch pedal	O	O	O	O	O	X	O or X	CLUTCH/BRAKE SW. LIGHT OFF: Check clutch switch and associated harness.
5. "SET" POSITION OF COMBINATION SWITCH: • Ignition switch ON • Main switch ON • Shift lever to "D" (A/T) • Push to "SET" position of combination switch	O	O	O	O	X	O	O or X	COMBINATION/INH. SW. LIGHT OFF: Check "SET" position of combination switch and associated harness.
6. "COAST" POSITION OF COMBINATION SWITCH • Ignition switch ON • Main switch ON • Shift lever to "D" (A/T) • Turn to "COAST" position of combination switch	O	O	O	O	X	O	O or X	COMBINATION/INH. SW. LIGHT OFF: Check "COAST" position in combination switch and associated harness.
7. "RESUME" POSITION OF COMBINATION SWITCH • Ignition switch ON • Main switch ON • Shift lever to "D" (A/T) • Turn to "RESUME" position of combination switch	O	O	O	O	X	O	O or X	COMBINATION/INH. SW. LIGHT OFF: Check "RESUME" position of combination switch and associated harness.

76U15X-198

CHECK ITEMS AND CONDITIONS	CHECK LIGHTS (correct response)						TROUBLESHOOTING (INCORRECT RESPONSE)	
	MAIN SW	ACTUATOR			CLUTCH/BRAKE SW	COMBINATION/INH SW		GENERATOR
		VAC	VENT2	VANT1				
8. START THE ENGINE • Shift lever to "N" position (A/T)	○	○	○	○	X	A/T ○ M/T X	○ or X	—
9. ACTUATOR OPERATION: (EGI model only) • After engine is started, set the slide switch "L" or "H". Then turn on check switch (keep in "D" position) <b>Note: Engine speed should increase to 2,000—3,000 rpm. If over 4,000 rpm release the switch immediately.</b>	○	X ↓ ○	X	X	X	A/T ○ M/T X	○ or X	If engine speed does not come up to and remain in the 2,000 to 3,000 rpm. range, check the actuator and associated harness.
10. SPEED SENSOR OUTPUT Keeping idling condition, drive vehicle slowly.	○	○	○	○	X	X	○ ↓ X	If GENERATOR LIGHT does not flash, trouble may be with speed sensor and associated harness.

76U15X-199

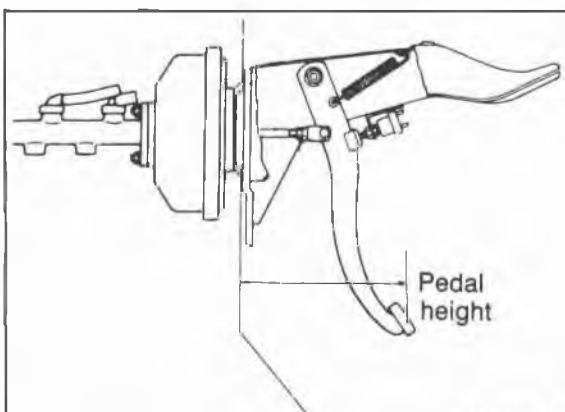


76G15X-075

### INSPECTION Actuator

Measure the actuator solenoid resistance by using an ohmmeter.

Check terminals	Resistance
c — d	Approx. 25 to 35 ohms
c — a	
c — b	



76G15X-076

### Cruise Control Unit

If there is an operation malfunction of the cruise control system, and no abnormal condition when checking above, replace the cruise control unit and check system operation.

### Clutch Switch, Brake Switch

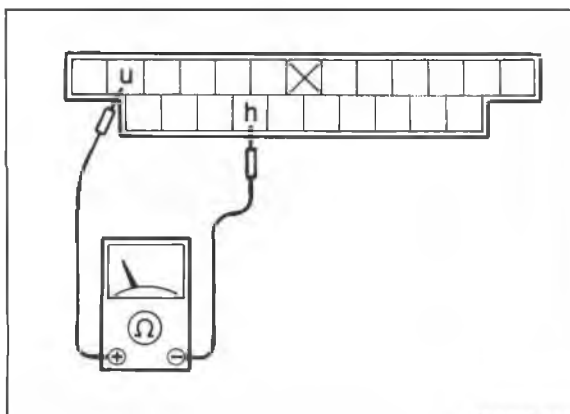
When removing these switches, turn each of them so that the corresponding pedal height agrees with the standard value.

**Brake pedal height: 222  $\pm$ 5 mm (8.74  $\pm$ 0.20 in)**

**Clutch pedal height:  
216.5  $\pm$ 5 mm (8.52  $\pm$ 0.20 in)**

# 15 CRUISE CONTROL SYSTEM

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76G15X-077

## Speed sensor

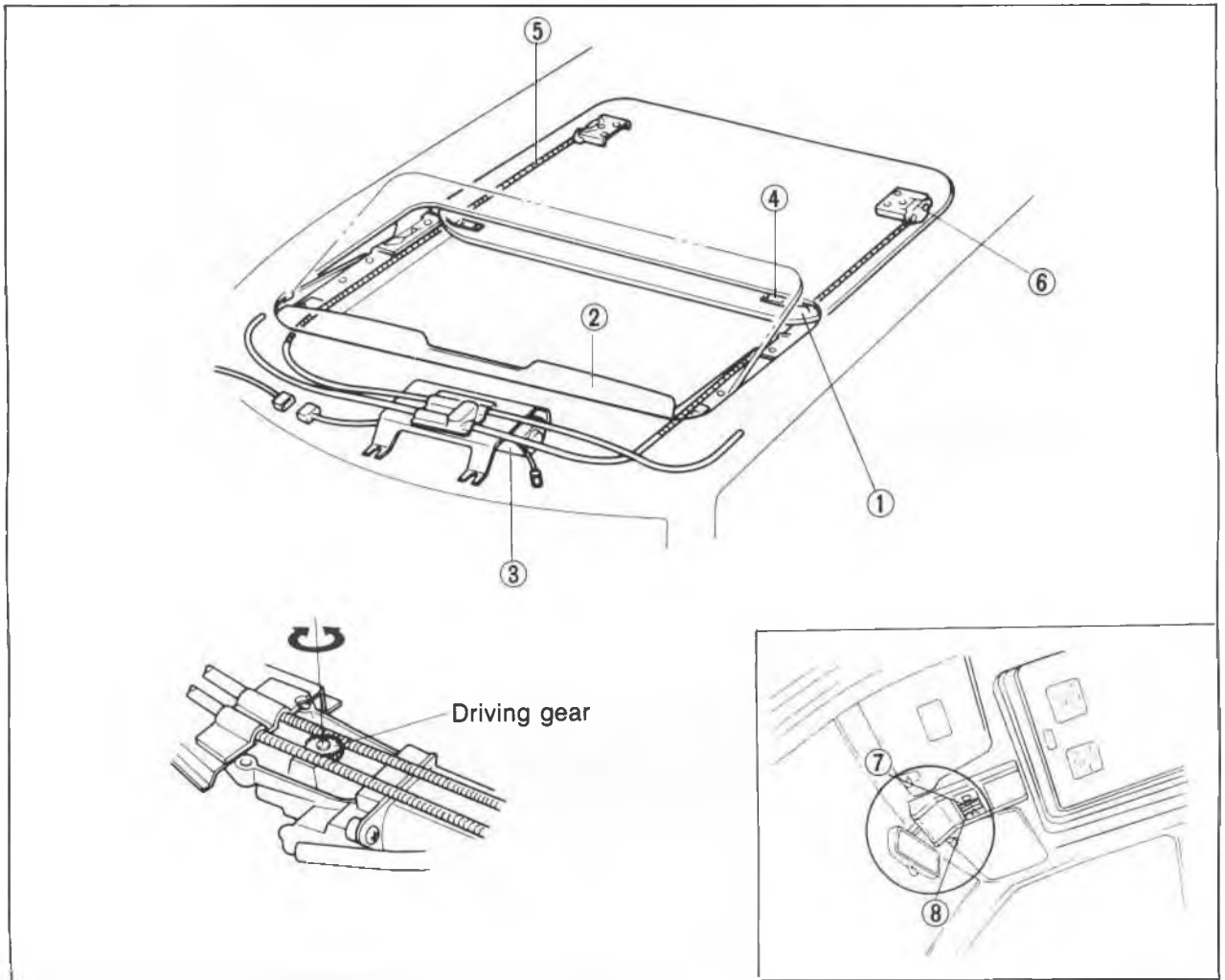
1. Remove the combination meter.
2. Connect an ohmmeter between "u" and "n" terminals of the 22 pin connector.
3. Confirm continuity between terminals when rotating the speedometer cable shaft.
4. If not 4 times per rotation, replace the speedometer.

## Inhibitor switch

Refer to Section 7B.

SLIDING SUNROOF

STRUCTURAL VIEW



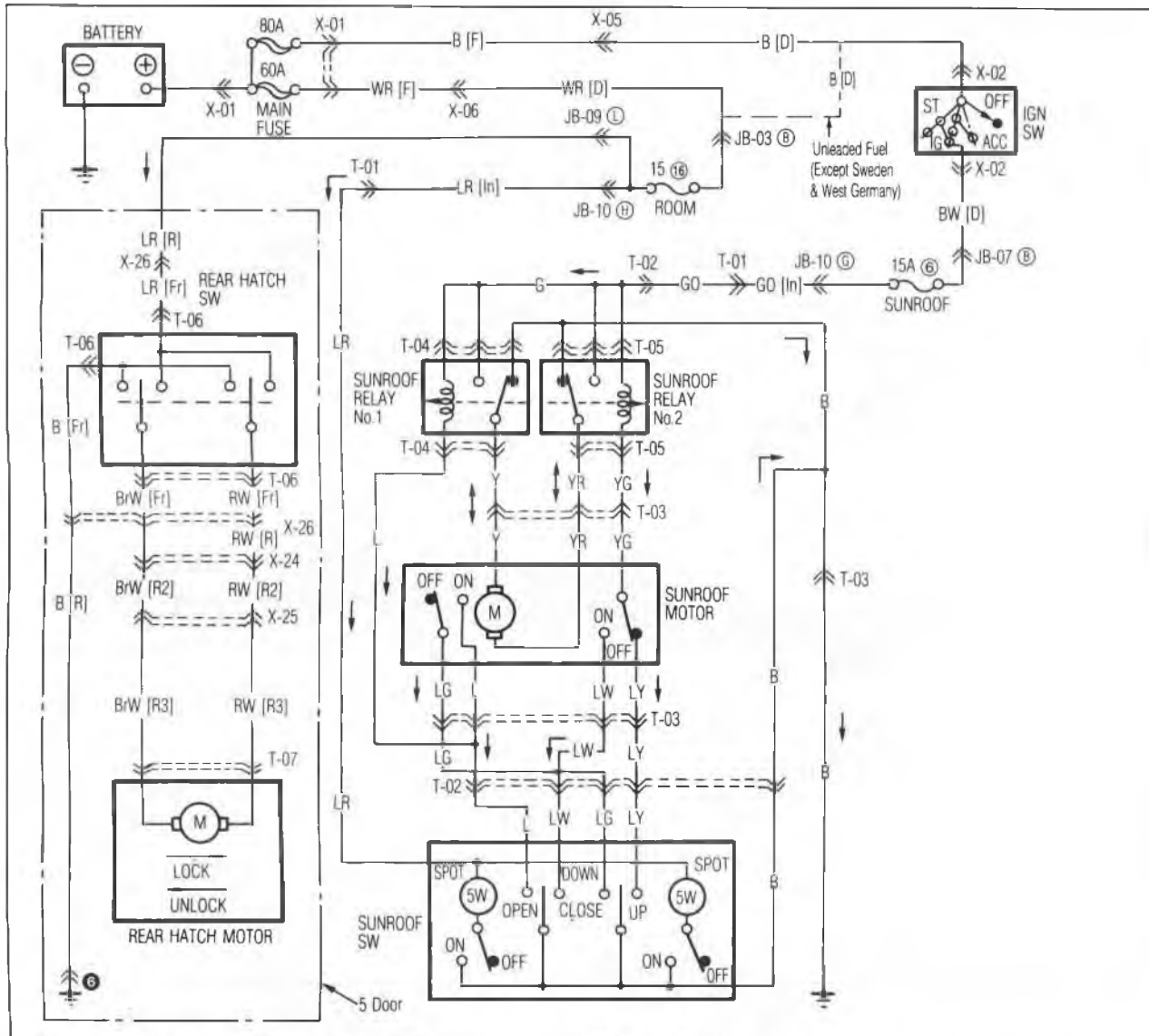
86U15X-148

- 1. Slide panel
- 2. Deflector assembly
- 3. Motor assembly
- 4. Guide bracket

- 5. Driving cable
- 6. Guide bracket assembly rear
- 7. Tilt up switch
- 8. Slide switch

# 15 SLIDING SUNROOF

## CIRCUIT DIAGRAM



<p>T-01 Connector Between Interior Light Harness [In] and Sunroof</p>	<p>T-02 Sunroof Sw</p>	<p>T-03 Sunroof Motor</p>	
<p>T-04 Sunroof Relay No. 1</p>	<p>T-05 Sunroof Relay No. 2</p>	<p>T-06 Rear Hatch Sw [R]</p> <p>5 Door</p>	<p>T-07 Rear Hatch Motor [R3]</p>

86U15X-149

## TROUBLESHOOTING

**Sunroof does not operate correctly.**

Check SUNROOF 15A fuse.

Turn ignition switch ON

Check the voltage at each terminal of the sunroof relay No. 1 and No. 2.

Relay	Terminal	Voltage
No. 1	G	12V
	G	12V
	B	0V
No. 2	G	12V
	G	12V
	B	0V

**NG** Repair the harness. (Fuse box to relay, Relay to body ground)

**OK**

Check the sunroof relays. Refer to page 15—92.

**NG** Replace the relays.

**OK**

Check the voltage at each terminal of the sunroof motor.

Terminal	Voltage
Y	0V
YR	0V
YG	12V

**NG** Repair the harness. (Relay to motor).

**OK**

Check the sunroof motor and limit switch. Refer to page 15—92, 93.

**NG** Replace the motor and limit switch.

**OK**

Check for 12V at L terminal of the sunroof motor connector.

**NG** Repair the harness. (Relay to motor)

**OK**

Check the voltage at each terminal of the sunroof switch connector with each roof condition.

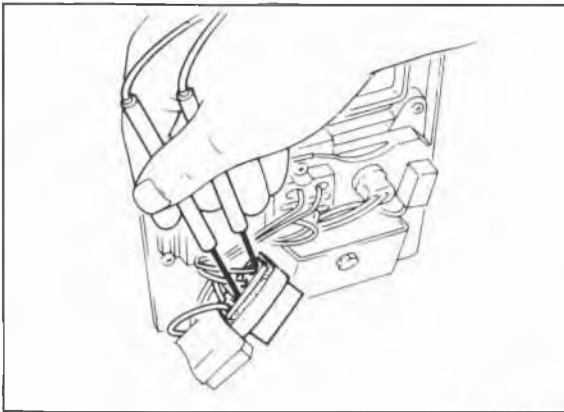
Terminal	Roof condition	Voltage
L	Close	12V
LY		12V
LG	Open	12V
LW	Tilt up	12V
LR	Any time	12V
B		0V

**NG** Repair the harness. (Motor to switch Fuse box to switch Switch to body ground)

**OK**

Check the sunroof switch. Replace if necessary. Refer to page 15—92.

# 15 SLIDING SUNROOF



76U15X-156

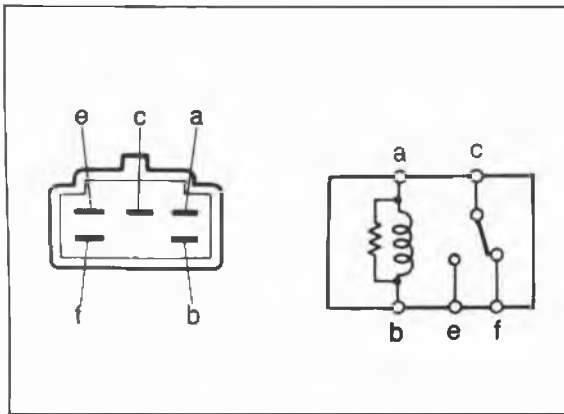
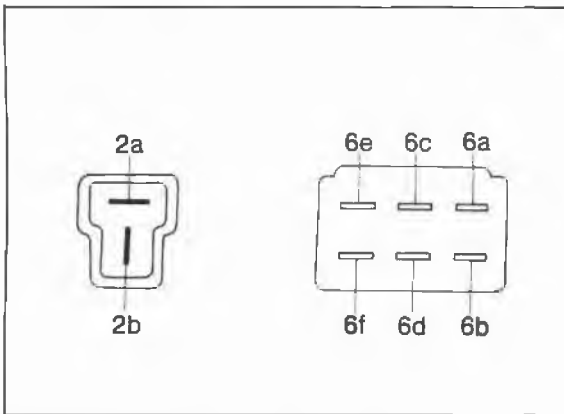
## INSPECTION Switch

Use an ohmmeter to check the continuity of the terminals of the switch.

If continuity is not as indicated, replace the switch.

Terminal Position		2a	2b	6a	6b	6c	6d	6e	6f
		OFF	○	○					
Slide SW	OPEN						○		○
	CLOSE					○			○
Tilt SW	UP				○				○
	DOWN							○	○

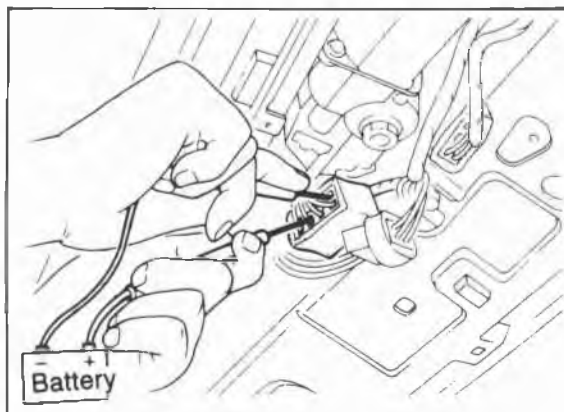
○—○: Indicates conductive



76U15X-314

## Relay

1. Check the continuity between a—b and c—f.
2. Apply power source to the terminal a.
3. Connect the negative lead to the terminal b.
4. Check the continuity between c—e.

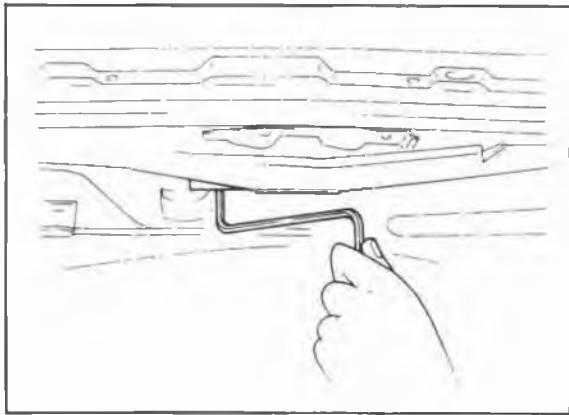


76U15X-315

## Motor

1. Disconnect the connector of the motor.
2. Apply power source to YR and connect Y to the ground.
3. Check that motor turns in the direction from the tilt up, to the closed, to the open position.
4. Reverse the connection and check motor turns from the open, to the closed, to the tilt up position.

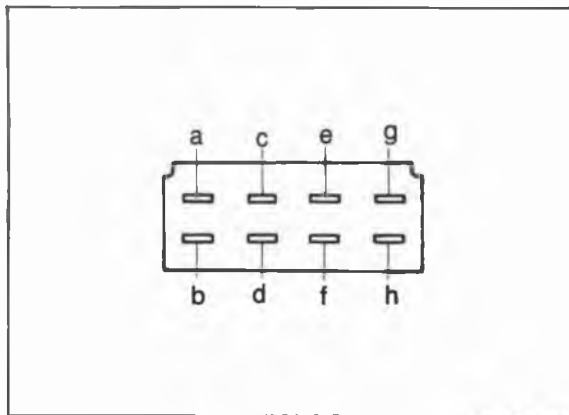




76U15X-160

### Limit Switch

1. Using hex-head wrench furnished in the glove box, set the sunroof in each position.



76U15X-161

2. Use an ohmmeter to check the continuity of the terminals of the switch.

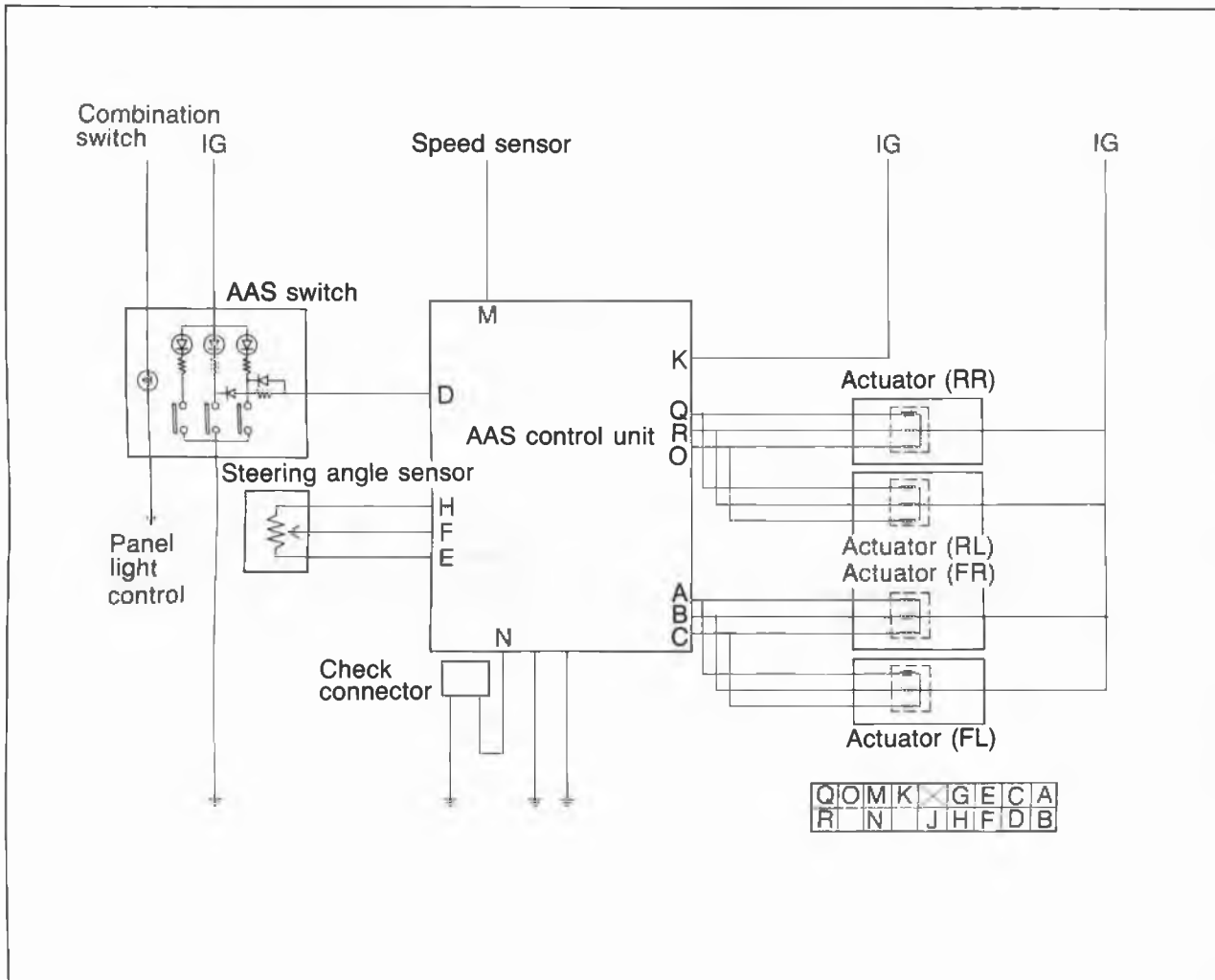
Terminal color	SW		LS1		LS2	
	e	d	a	b	c	
Roof condition	L	LG	YG	LW	LY	
Open			○	○		
Close			○		○	
Tilt up	○	○	○		○	

○—○: Indicates conductive

# 15 AUTO ADJUSTING SUSPENSION (AAS)

## AUTO ADJUSTING SUSPENSION (AAS)

### CIRCUIT DIAGRAM



86U15X-151

### TROUBLESHOOTING GUIDE

The AAS control unit has a self-diagnosis function detecting the unit itself, electrical parts for AAS system, and wiring harness open circuit, to inform mechanics. If it detects their malfunctions, outputs the output pattern to A (LW) terminal of service connector according to the settled pattern for each malfunction.

Troubleshooting against AAS system can be conducted by knowing the output pattern (See page 15—96, 97) to detect trouble location.

76G15X-020



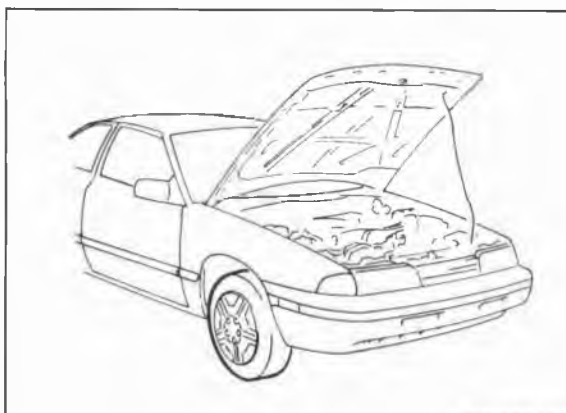
76G15X-079

### TROUBLESHOOTING

#### How To Use Self-Diagnosis System

By using the control unit's self-diagnosis function and a voltmeter, malfunctions of the system are easily determined. When diagnosing malfunctions, follow the steps below.

1. Connect a voltmeter to A (LW) terminal of the service connector in engine room.
2. Read out the output patterns (See page 15—96) in following condition.



86U15X-154

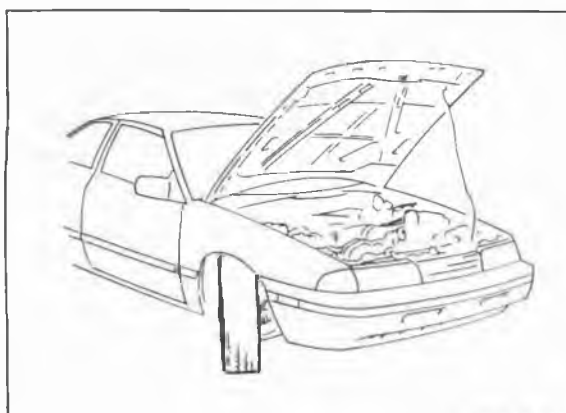
## Checking Condition

### Note:

Turn the ignition switch OFF to reset the control unit before each test.

### Condition A

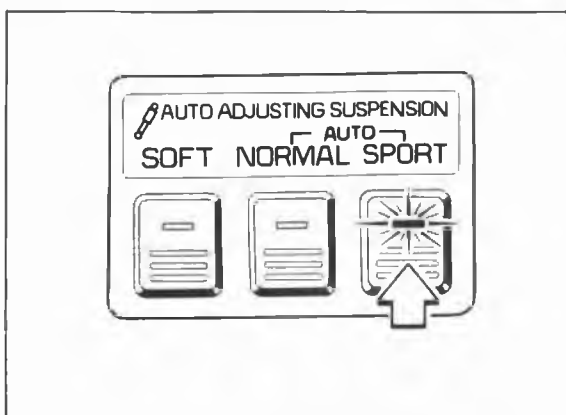
1. Turn the ignition switch ON.
2. Set steering wheel in the straight-ahead position, and check the output pattern.



86U15X-155

### Condition B

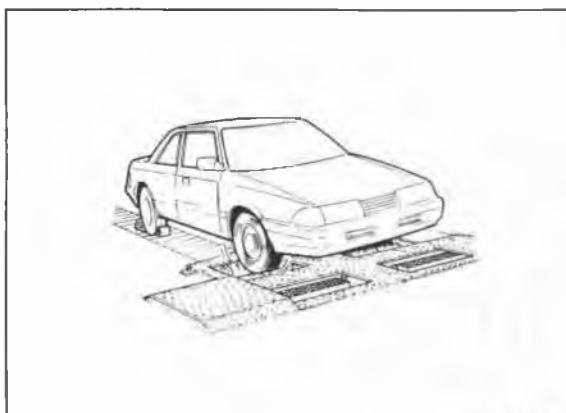
1. Turn the ignition switch ON.
2. Turn the steering wheel right and left, and check the output pattern.



86U15X-156

### Condition C

1. Turn the ignition switch ON.
2. Change the AAS switch from NORMAL to SPORT or from SPORT to NORMAL, and check the output pattern.



86U15X-157

### Condition D



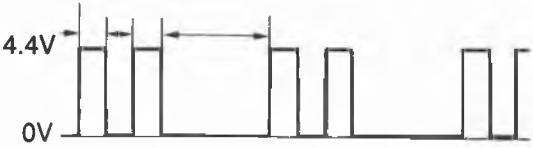

1. Operate the vehicle on a chassis roller.
2. Check the output pattern at above 15 km/h (9.3 mph).

### Caution

- a) Block the rear wheels.
- b) In vehicle equipped with ABS, ABS warning light may come on, which is not a failure. The light goes off by turning ignition switch OFF and again ON.

# 15 AUTO ADJUSTING SUSPENSION (AAS)

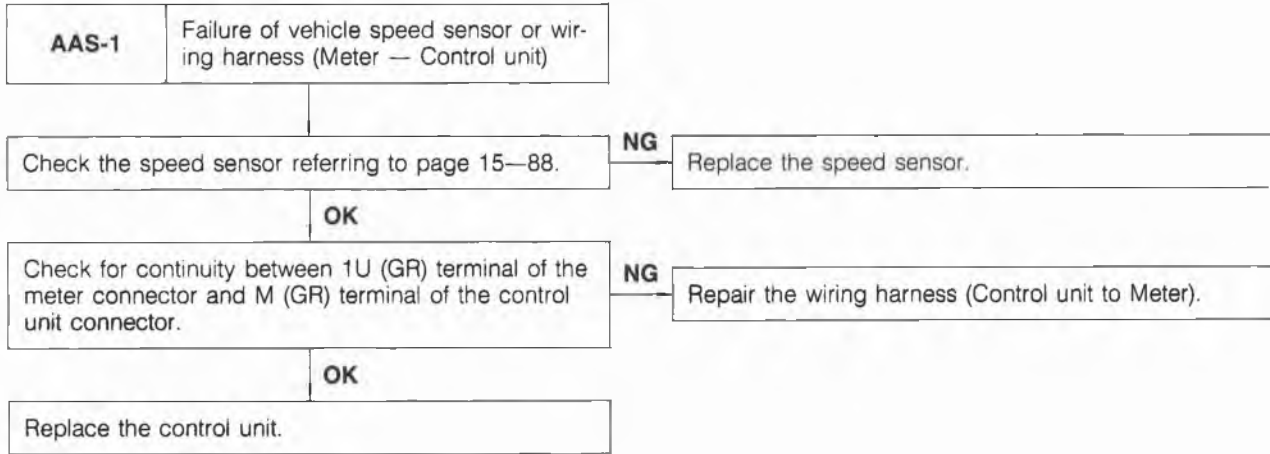
Condition	Output pattern	Malfunction	Flow chart No.
<b>A</b> Set steering wheel in straight ahead position		Vehicle speed sensor or wiring harness (Meter — Control unit)	AAS-1 Refer to page 15-98
		Steering wheel angle sensor or wiring harness (Angle sensor — Control unit)	AAS-2 Refer to page 15-98
		Normal operation or wiring harness (Fuse box — Control unit, control unit — Body ground)	AAS-3 Refer to page 15-99
<b>B</b> Turn the steering wheel right and left		Vehicle speed sensor or wiring harness (Meter — Control unit)	AAS-1 Refer to page 15-98
		Normal operation	—
		Wiring harness (Fuse box — Control unit, Control unit — Body ground) See page	AAS-4 Refer to page 15-99
<b>C</b> Change the switch from NORMAL to SPORT or from SPORT to NORMAL		Normal operation	—
		Front actuators or wiring harness (Control unit — Front right or left actuator)	AAS-5 Refer to page 15-100
		Rear actuators or wiring harness (Control unit — Rear right or left actuator)	AAS-6 Refer to page 15-101

<p style="text-align: center;"><b>C</b> (Cont'd)</p>		<p>AAS switch or wiring harness (Fuse box — Control box and AAS switch, AAS switch — Control box and Body ground)</p>	<p>AAS-7 Refer to page 15-102</p>
<p style="text-align: center;"><b>D</b></p> <p>Operate the vehicle at above 15 km/h (9.3 mph) on a chassis roller</p>		<p>Normal operation</p>	<p style="text-align: center;">—</p>
		<p>Speed sensor or Steering wheel angle sensor or wiring harness (Control unit — Meter, Control unit — Angle sensor)</p>	<p>AAS-8 Refer to page 15-102</p>
		<p>Speed sensor or Wiring harness (Control unit — Meter, Fuse box — Control unit, Control unit — Body ground)</p>	<p>AAS-9 Refer to page 15-103</p>

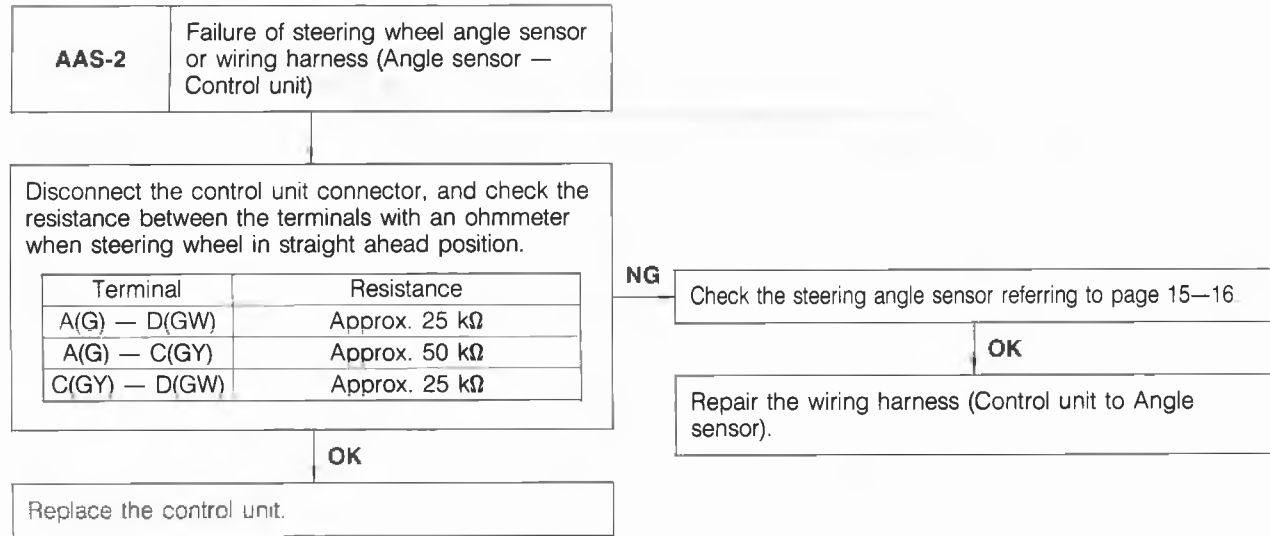
76G15X-080

# 15 AUTO ADJUSTING SUSPENSION

## Inspection of circuit



76G15X-081



76G15X-082

**AAS-3** Normal operation or failure of the wiring harness (Fuse box to Control unit, Control unit to Body ground)

Check the voltage between each terminal of the control unit connector and a body ground with ignition ON.

Terminal	Voltage
G (B)	0V
J (B)	0V
K (BY)	Approx. 12V

**OK** Normal operation.

**NG**

Replace TURN 15A fuse or repair the wiring harness (Fuse box to Control unit, Control unit to Body ground.)

86U15X-161

**AAS-4** Failure of wiring harnesses (Fuse box to Control unit, Control unit to Body ground).

Check the voltage between each terminal of control unit connector and a body ground with ignition ON.

Terminals	Voltage
G (B)	0V
J (B)	0V
K (BY)	Approx. 12V

**OK** Replace the control unit.

**NG**

Replace TURN 15A fuse or repair the wiring harnesses (Fuse box to Control unit, Control unit to Body ground.)

86U15X-162

# 15 AUTO ADJUSTING SUSPENSION (AAS)

**AAS-5** Failure of the front actuators or the wiring harness (Control unit to Front-right or front-left actuator)

Check the voltage between each terminal of front-right and front-left connectors and a body ground with ignition ON.

	Terminal	Voltage
Left side	D (BR)	Approx. 12V
Right side	D (BR)	Approx. 12V

**NG** Replace POWER WIND 30A fuse in fuse box or wiring harness (Fuse box to Actuators).

**OK**

Disconnect the front-left actuator connector and check the voltage between each terminal of the control unit connector and a body ground with ignition ON.

Terminal	Voltage
A (WR)	Approx. 12V
B (WL)	Approx. 12V
C (WY)	Approx. 12V

**NG** Check the voltage between each terminal of the front-right actuator connector and a body ground with ignition ON.

Terminal	Voltage
A (WR)	Approx. 12V
B (WL)	Approx. 12V
C (WY)	Approx. 12V

**OK**

Reconnect the front-left actuator connector.

**NG** Replace front-right actuator.

**OK** Repair the wiring harness (Front-right actuator to Control unit).

Disconnect the front-right actuator connector and check the voltage between each terminal of the control unit connector and a body ground with ignition ON.

Terminal	Voltage
A (WR)	Approx. 12V
B (WL)	Approx. 12V
C (WY)	Approx. 12V

**NG** Check the voltage between each terminal of the front-left actuator connector and a body ground with ignition ON.

Terminal	Voltage
A (WR)	Approx. 12V
B (WL)	Approx. 12V
C (WY)	Approx. 12V

**OK**

Replace the control unit.

**NG** Replace front-left actuator.

**OK** Repair wiring harness (Front-left actuator to Control unit).

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**AAS-6** Failure of the rear actuators or wiring harness (Control unit to rear-right or rear-left actuator)

Check the voltage between each terminal of rear-right and rear-left actuator connectors and a body ground with ignition ON.

	Terminal	Voltage
Left side	D (BR)	Approx. 12V
Right side	D (BR)	Approx. 12V

**NG** Replace POWER WIND 30A fuse in fuse box or wiring harness (Fuse box to Actuators).

**OK**

Disconnect the rear-left actuator connector and check the voltage between each terminal of the control unit connector and a body ground with ignition ON.

Terminal	Voltage
O (YL)	Approx. 12V
Q (YR)	Approx. 12V
R (YG)	Approx. 12V

**NG** Check the voltage between each terminal of the rear right side actuator connector and a body ground with ignition ON.

Terminal	Voltage
A (YR)	Approx. 12V
B (YG)	Approx. 12V
C (YL)	Approx. 12V

**OK**

Reconnect the rear-left actuator connector.

**NG** Replace rear-right actuator.

**OK** Repair wiring harness (Rear-right actuator to Control unit).

Disconnect the rear-right actuator connector and check the voltage between each terminal of the control unit connector and a body ground with ignition ON.

Terminal	Voltage
O (YL)	Approx. 12V
Q (YR)	Approx. 12V
R (YG)	Approx. 12V

**NG** Check the voltage between each terminal of the rear-left actuator connector and a body ground with ignition ON.

Terminal	Voltage
A (YR)	Approx. 12V
B (YG)	Approx. 12V
C (YL)	Approx. 12V

**OK**

Replace the control unit.

**NG** Replace rear-left actuator.

**OK** Replace wiring harness (Rear-left actuator to Control unit).

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# 15 AUTO ADJUSTING SUSPENSION

**AAS-7** Failure of AAS switch or wiring harness (Fuse box to Control unit and AAS switch, AAS switch to Control unit and Body ground)

Check the voltage between each terminal of AAS switch connector and a body ground with ignition ON.

Terminal	Voltage
F (BY)	12V
H (B)	0V

**NG** Replace METER 10 or 15A fuse or repair the wiring harness (Fuse box to AAS switch, AAS switch to Body ground).

**OK**

Check the operation of the AAS switch referring to page 15-104.

**NG** Replace the AAS switch.

**OK**

Check for continuity, between D (LY) terminal of control unit and D (LY) terminal of AAS switch.

**NG** Repair wiring harness.

**OK**

Replace the control unit.

**AAS-8** Failure of speed sensor or steering wheel angles sensor or wiring harness (Control unit to Meter, Control unit to Angle sensor).

Disconnect the control unit connector, and check the resistance between the terminals with steering wheel in straight ahead position with an ohmmeter.

Terminal	Resistance
A(G) — D(GW)	Approx. 25 kΩ
A(G) — C(GY)	Approx. 50 kΩ
C(GY) — D(GW)	Approx. 25 kΩ

**NG** Check the steering angle sensor referring to page 15-16.

**OK**

Repair the wiring harness (control unit to Angle sensor).

**OK**

Go to AAS-1 routine.

78G15X-083

# AUTO ADJUSTING SUSPENSION 15

AAS-9 Failure of speed sensor or wiring harness (Control unit to Meter, Fuse box to Control unit, Control unit to Body ground)

Check the voltage between each terminal of control unit connector and a body ground with ignition ON.

Terminal	Voltage
G (B)	0V
J (B)	0V
K (BY)	Approx. 12V

NG

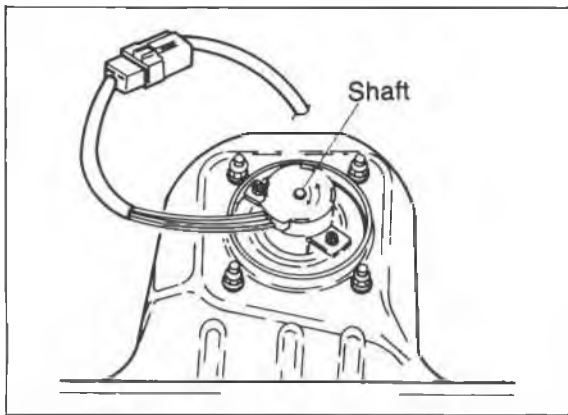
Replace METER 10 or 15A fuse or repair the wiring harness (Fuse box to Control unit, Control unit to Body ground).

OK

Go to AAS-1 routine.

76G15X-084

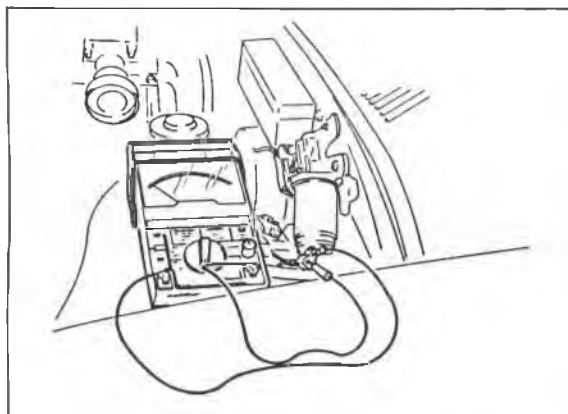
# 15 AUTO ADJUSTING SUSPENSION



86U15X-167

## Actuator Inspection

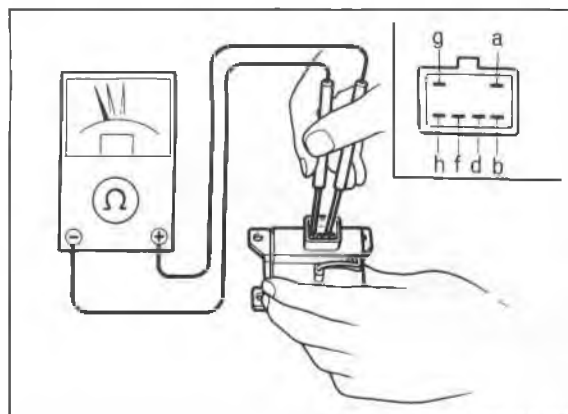
1. Turn the ignition switch ON.
2. Alternately switch ON the "NORMAL" and "SPORT" switches. Check whether the shaft of the actuator installed on the front and rear damper operates. (Visual inspection)



86U15X-168

3. If the actuator does not operate, disconnect the actuator connector and check for a few ohms resistance between the terminals.

	Terminal	Resistance
Front	A(WR) — D(BR)	2—8 ( $\Omega$ )
	B(WL) — D(BR)	
	C(WR) — D(BR)	
Rear	A(YR) — D(BR)	
	B(YG) — D(BR)	
	C(YL) — D(BR)	



76G15X-095

## AAS Switch Inspection

1. Use an ohmmeter to check continuity of the terminals of the switch.
2. If continuity is not as specified, replace the switch.

Position \ Terminal	a	b	d	f	g	h
SOFT	○—○			○—▶—○		
NORMAL	○—○		○—▶—○			
SPORT	○—○		○—▶—○			

○—○: Indicates continuity

## Steering Wheel Angle Sensor Inspection

See page 15—16

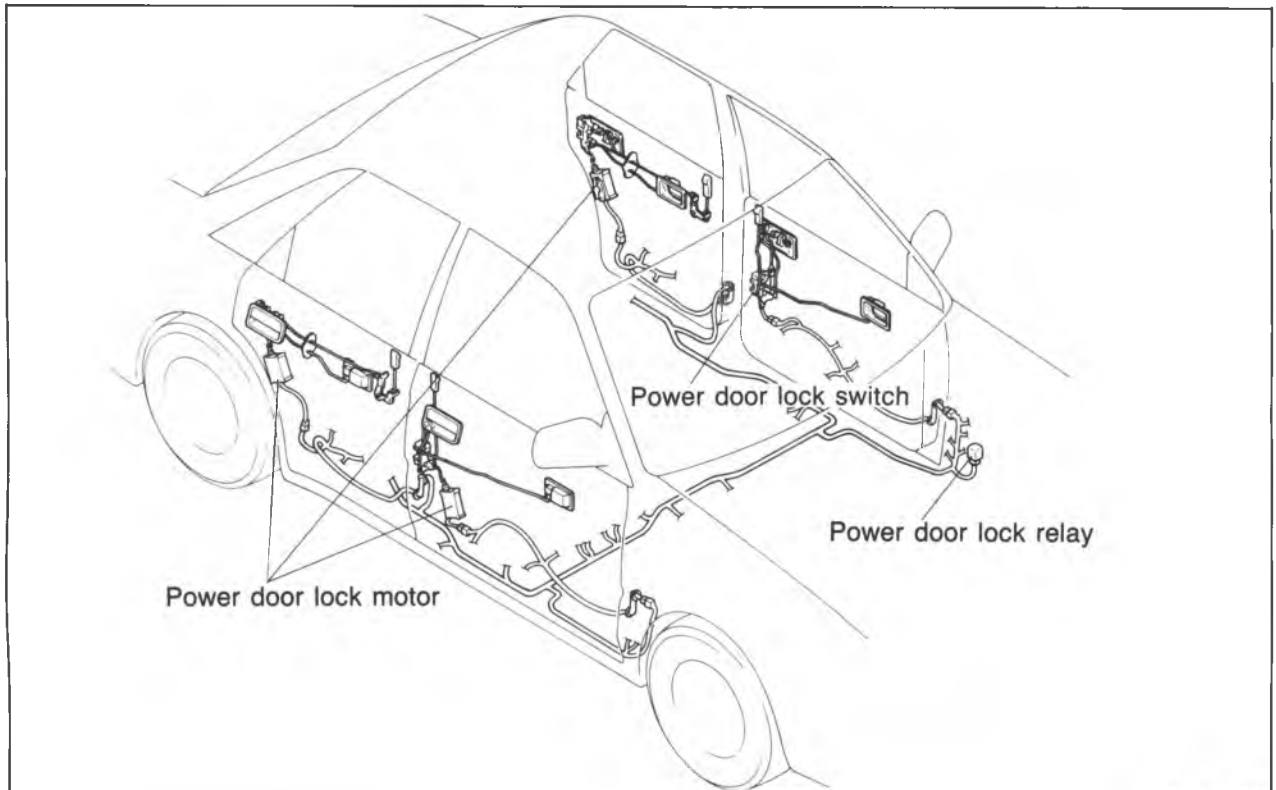
## Vehicle Speed Sensor Inspection

See page 15—88

76G15X-085

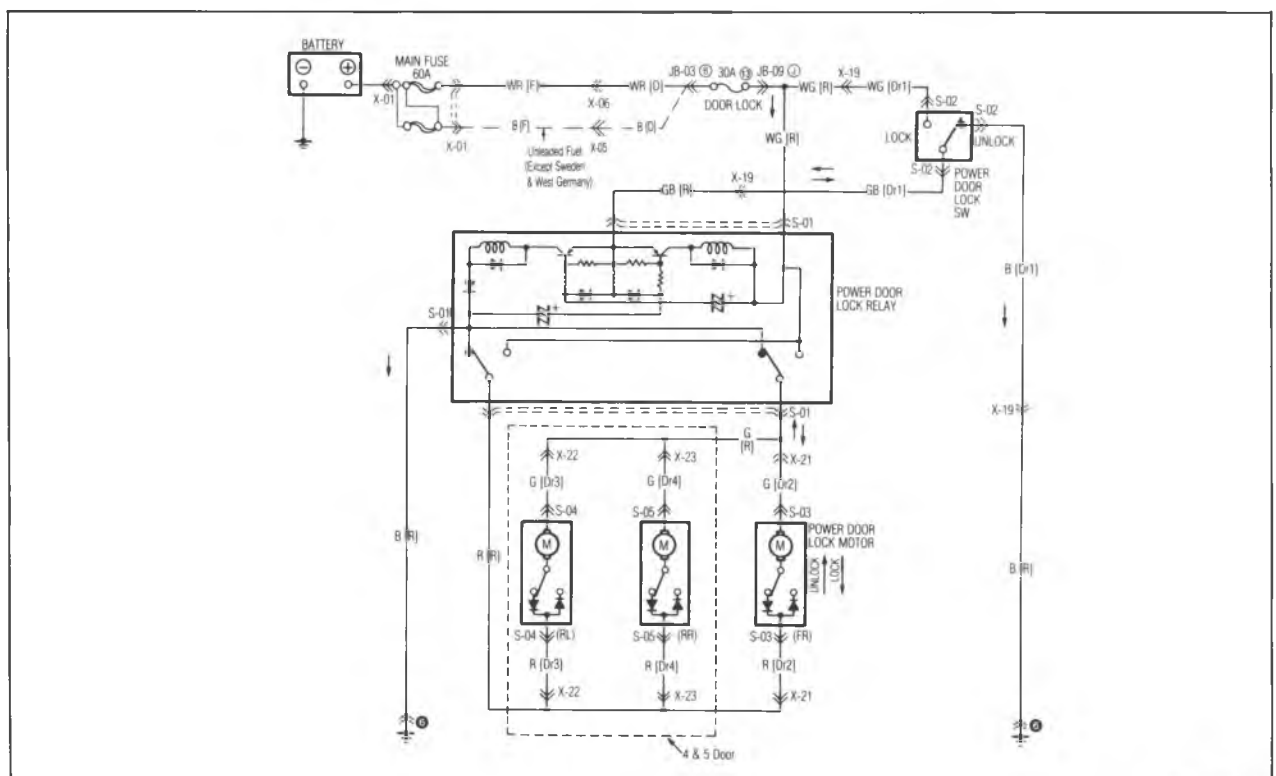
## POWER DOOR LOCK

### STRUCTURAL VIEW



86U15X-170

### CIRCUIT DIAGRAM



86U15X-171

# 15 POWER DOOR LOCK

## TROUBLESHOOTING

**Power door lock does not operate.**

Check DOOR LOCK 30A fuse.

NG

Short circuit.

OK

Check the voltage at each terminal of the power door lock relay connector.

Terminal	Voltage
WG	12V
B	0V

NG

Repair the harness. (Fuse box to relay, Relay to ground)

OK

Check the power door lock switch. Refer to page 15—107.

NG

Replace the switch.

OK

Check the voltage at GB terminal of the power door lock relay with each switch condition.

Terminal	Condition	Voltage
GB	Lock	12V
	Unlock	0V

NG

Repair the harness. (Door lock switch to relay)

OK

Check the voltage at R and G terminal of the power door lock relay with each switch condition.

Terminal	Condition	Voltage
R	Lock	0V
	Unlock	12V
G	Lock	12V
	Unlock	0V

NG

Replace the door lock relay.

OK

Check the power door lock motor. Refer to page 15—107.

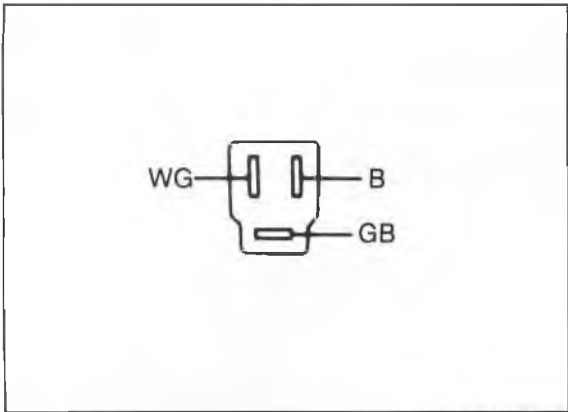
NG

Replace the door lock motor.

OK

Repair the harness. (Relay to each motors)

76G15X-086



86U15X-173

**INSPECTION**

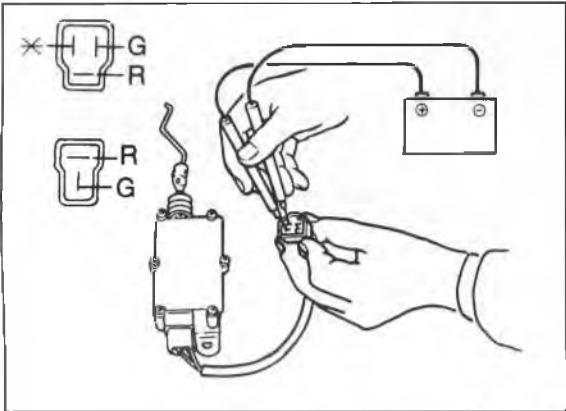
**Power Door Lock Switch**

1. Check for continuity of the switch with an ohmmeter.

	WG	GB	B
Lock	○—○	○—○	
Unlock		○—○	○—○

○—○: indicates continuity

2. If continuity is not as specified, replace the switch.



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**Power Door Lock Motor**

1. Check operation of the door lock actuator when the battery voltage is applied to the terminal.

Connecting to		Door lock motor
12V	ground	
G	R	LOCK (Pull)
R	G	UNLOCK (Release)

2. If not, replace the door lock motor.

# 15 AUDIO SYSTEM

## AUDIO SYSTEM

### OUTLINE OF AUDIO

#### SYSTEM 1

AM RADIO (MTR)

#### SYSTEM 2

AM/SW RADIO (MTR)



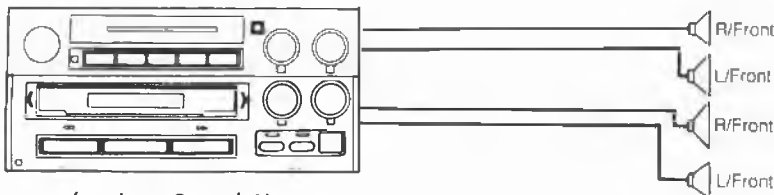
(system 1 and 2)

#### SYSTEM 3

AM RADIO (MTR) + CASSETTE TAPE PLAYER

#### SYSTEM 4

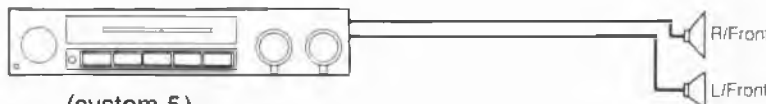
AM/SW RADIO (MTR) + CASSETTE TAPE PLAYER



(system 3 and 4)

#### SYSTEM 5

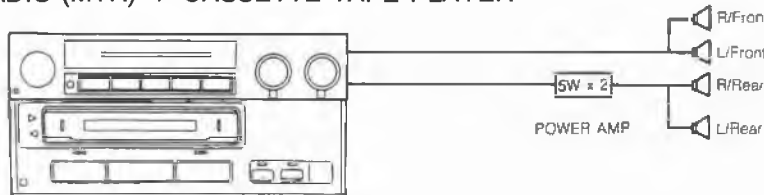
AM/FM RADIO (MTR)



(system 5)

#### SYSTEM 6

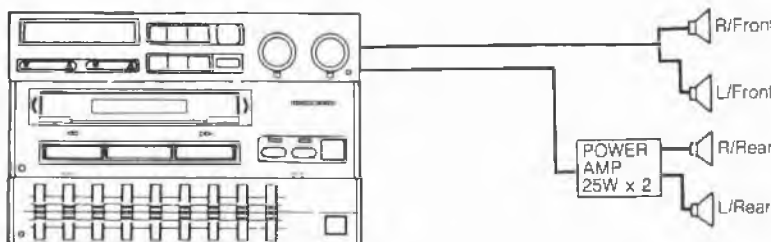
AM/FM RADIO (MTR) + CASSETTE TAPE PLAYER



(system 6)

#### SYSTEM 7

AM/FM MULTIPLEX RADIO (ETR) + CASSETTE TAPE PLAYER + GRAPHIC EQUALIZER



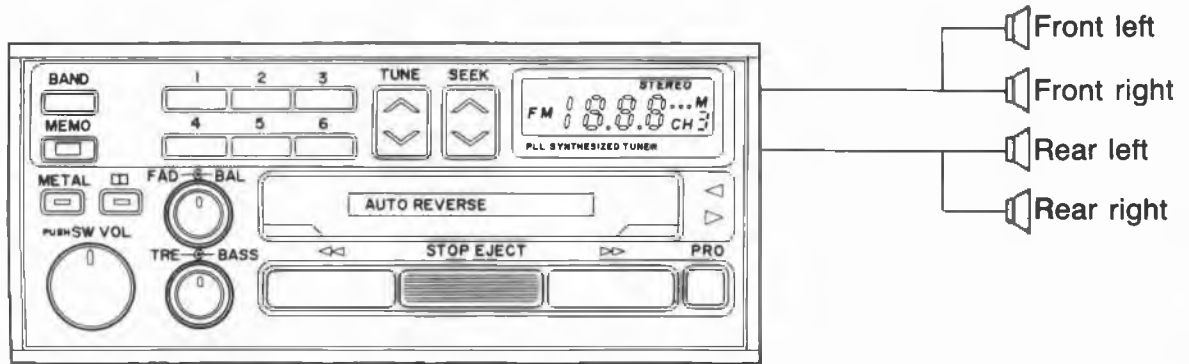
(system 7)

76G15X-021



**SYSTEM 8  
AM/FM/LW RADIO WITH CASSETTE TAPE PLAYER**

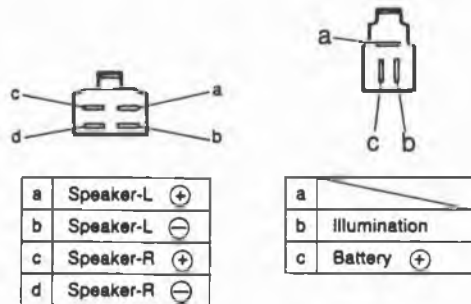
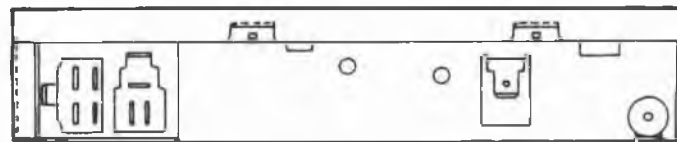
**SYSTEM 9  
AM/FM/SW RADIO WITH CASSETTE TAPE PLAYER**



(system 8 and 9)

**REAR CONNECTOR VIEW**

**AM/SW or AM RADIO (MTR)**



# 15 AUDIO SYSTEM

## AM/FM MULTIPLEX RADIO (ETR)

a	Speaker-L ⊕
b	Speaker-L ⊖
c	Speaker-R ⊕
d	Speaker-R ⊖

a	Battery ⊕
---	-----------

a	Motor antenna (Earthed when radio is ON)
b	Illumination
c	ACC ⊕

To AMP	
1	Output-F-R ⊕
2	Battery ⊕
3	Output-F-L ⊕
4	Output-F-R ⊖
5	Output-F-L ⊖
6	Ground
E	Shield ground

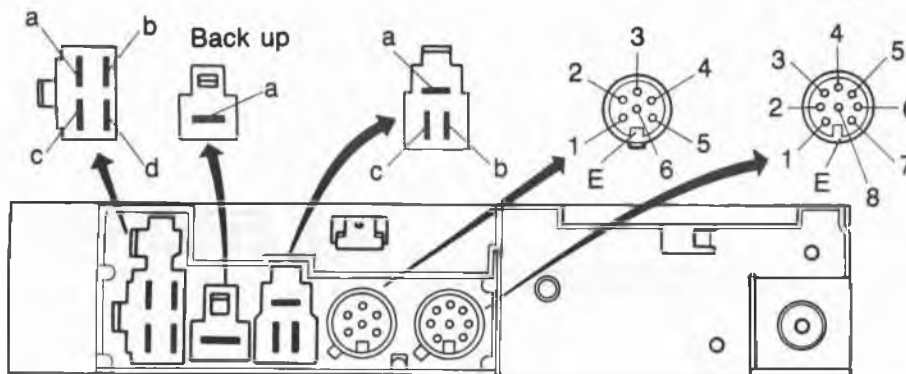
To cassette deck or equalizer

1	Output-L ⊕
2	Input-L ⊕
3	ACC ⊕
4	Illumination
5	Signal ground
6	Input-R ⊕
7	Output-R ⊕
8	Not used
E	Shield ground

To front speaker

To AMP

To cassette deck or equalizer

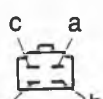
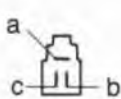


56G15X-085

## AM/FM MULTIPLEX RADIO (MTR)

a	Antenna relay (Earth when radio is ON)
b	Illumination
c	Battery (ACC)

To front speaker

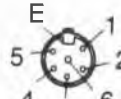


a	Speaker-L ⊕
b	Speaker-L ⊖
c	Speaker-R ⊕
d	Speaker-R ⊖

1	Output-R-R ⊕	Output-F-R ⊕
2	ACC ⊕	ACC ⊕
3	Output-R-L ⊕	Output-F-R ⊕
4	Output-R-R ⊖	Output-F-R ⊖
5	Output-R-L ⊖	Output-F-L ⊖
6	Ground	Ground
E	Shield ground	Shield ground

To rear AMP

To front AMP



1	Output-L ⊕
2	Input-L ⊖
3	ACC ⊕
4	Illumination
5	Signal ground
6	Input-R ⊕
7	Output-R ⊕
8	Not used
E	Shield ground

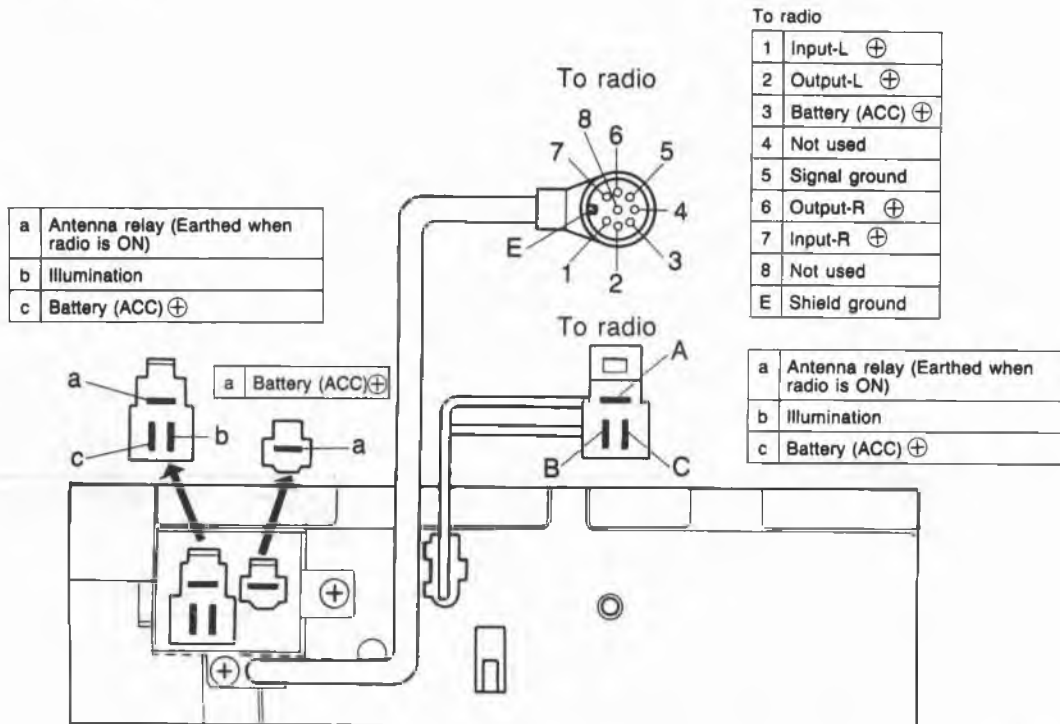
Not used  
(Never connect  
back-up line)

Antenna  
feeder



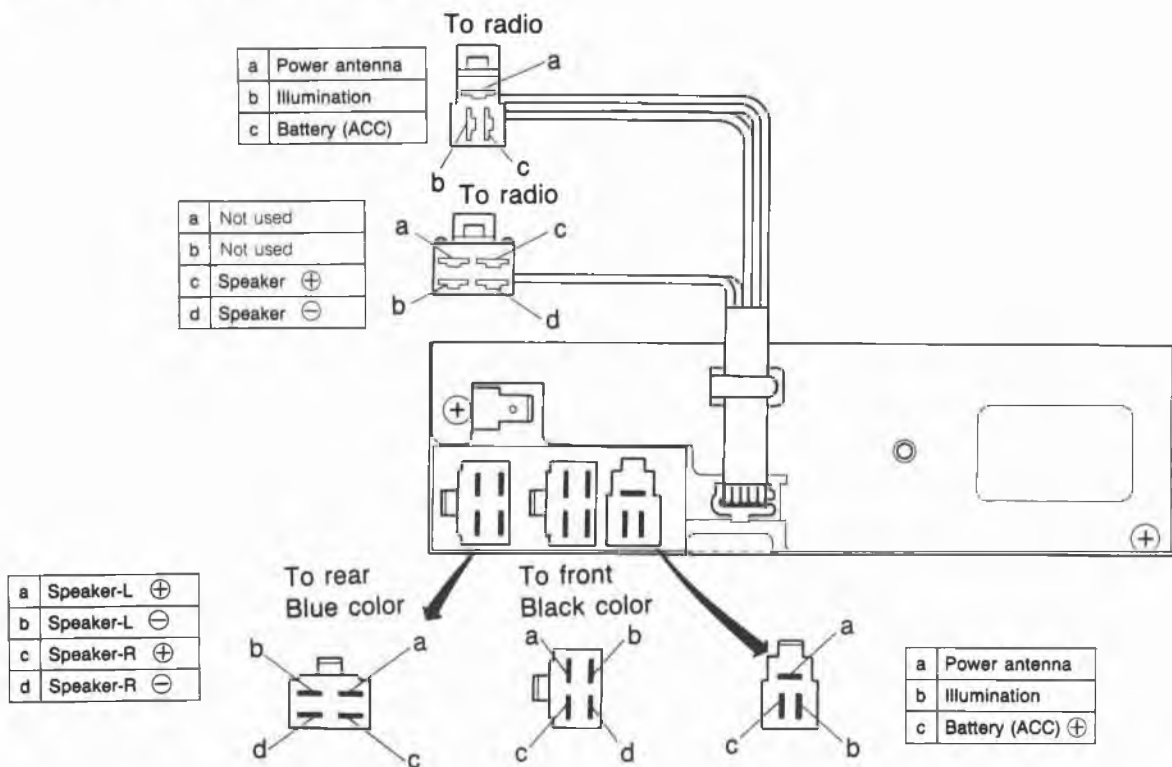
56G15X-086

## CASSETTE DECK



56G15X-088

## CASSETTE DECK (SYSTEM 3 AND 4)

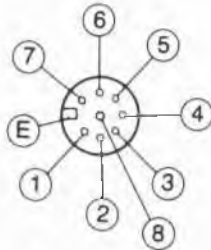


56G15X-089

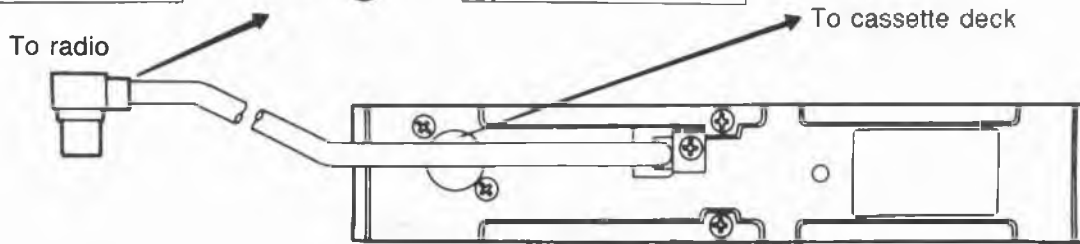
# 15 AUDIO SYSTEM

## GRAPHIC EQUALIZER

1	INPUT-L ⊕
2	OUTPUT-L ⊕
3	BATTERY (ACC) ⊕
4	ILLUMINATION
5	SIGNAL GROUND
6	OUTPUT-R ⊕
7	INPUT-R ⊕
8	NOT USED
E	SHIELD GROUND



1	NOT USED
2	INPUT-L ⊕
3	BATTERY (ACC) ⊕
4	NOT USED
5	SIGNAL GROUND
6	INPUT-R ⊕
7	NOT USED
8	NOT USED
E	SHIELD GROUND



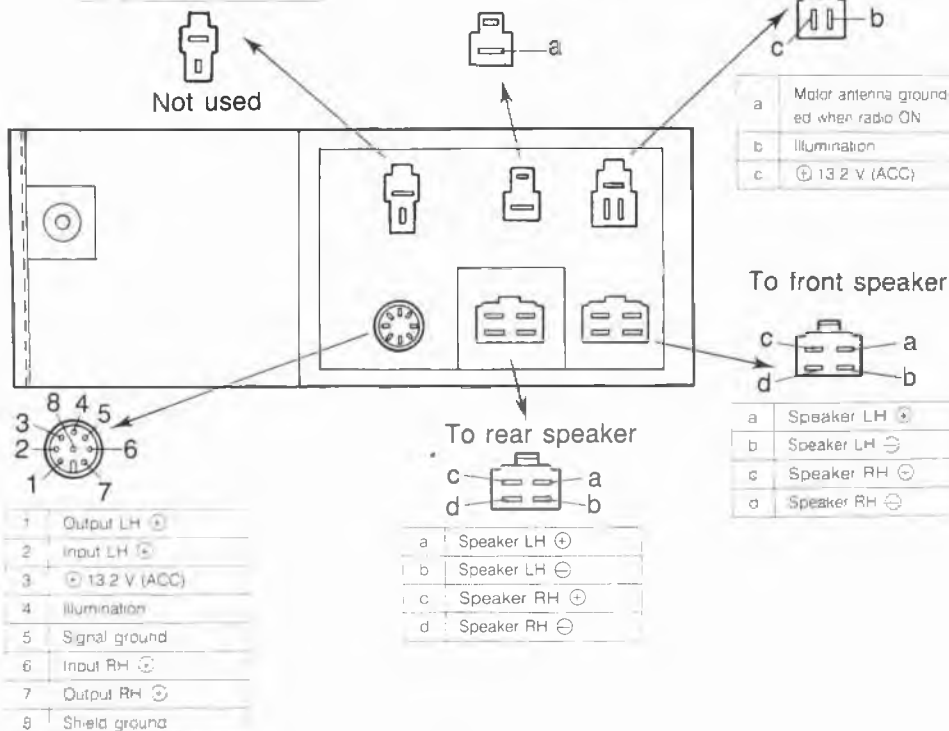
56G15X-091

## AM/FM/SW RADIO WITH CASSETTE TAPE PLAYER

a	Amp cont (13.2 V)
b	Battery

a	Back-up
---	---------

a	Motor antenna grounded when radio ON
b	Illumination
c	⊕ 13.2 V (ACC)



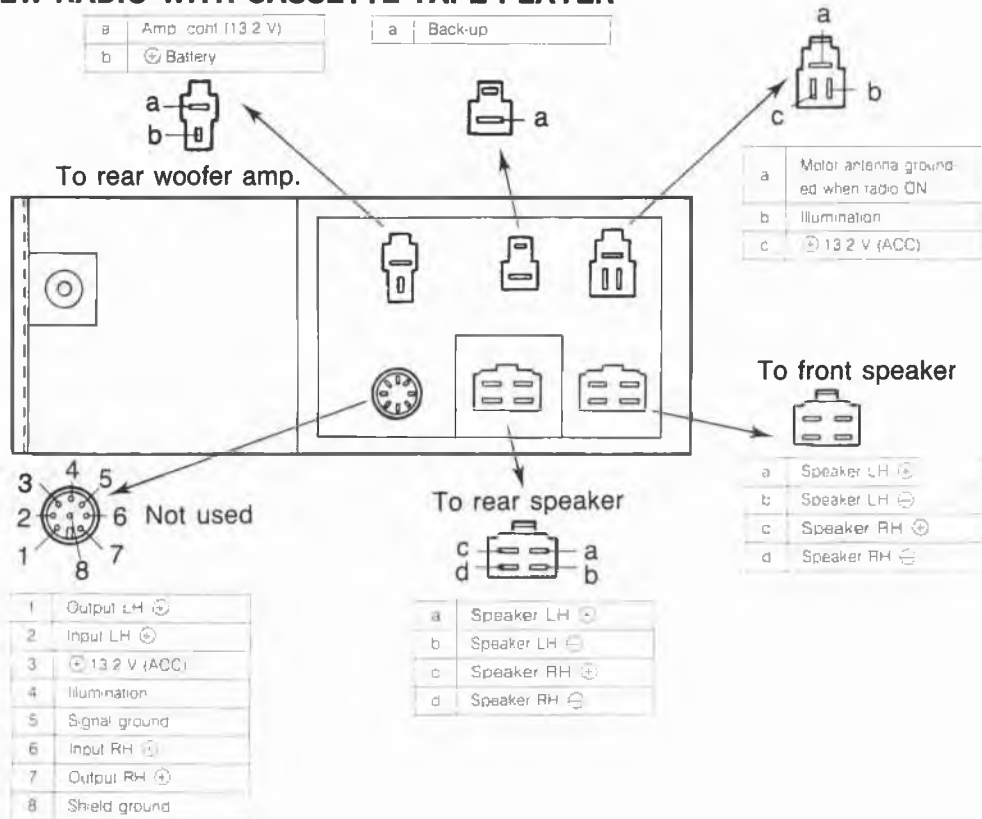
1	Output LH ⊕
2	Input LH ⊕
3	⊕ 13.2 V (ACC)
4	Illumination
5	Signal ground
6	Input RH ⊕
7	Output RH ⊕
8	Shield ground

a	Speaker LH ⊕
b	Speaker LH ⊖
c	Speaker RH ⊕
d	Speaker RH ⊖

a	Speaker LH ⊕
b	Speaker LH ⊖
c	Speaker RH ⊕
d	Speaker RH ⊖

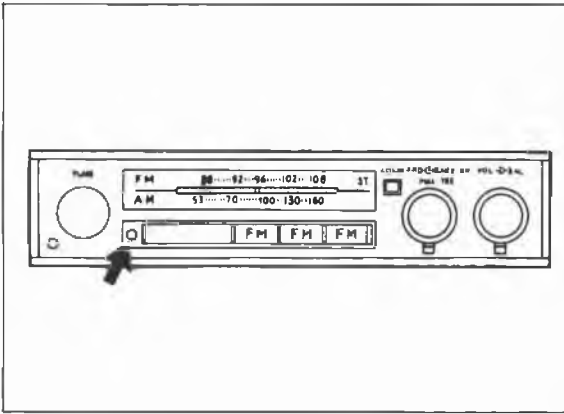
76G15X-023

## AM/FM/LW RADIO WITH CASSETTE TAPE PLAYER



76G15X-024

# 15 AUDIO SYSTEM



56G15X-106

## ADJUSTMENT (MTR)

### Antenna adjustment

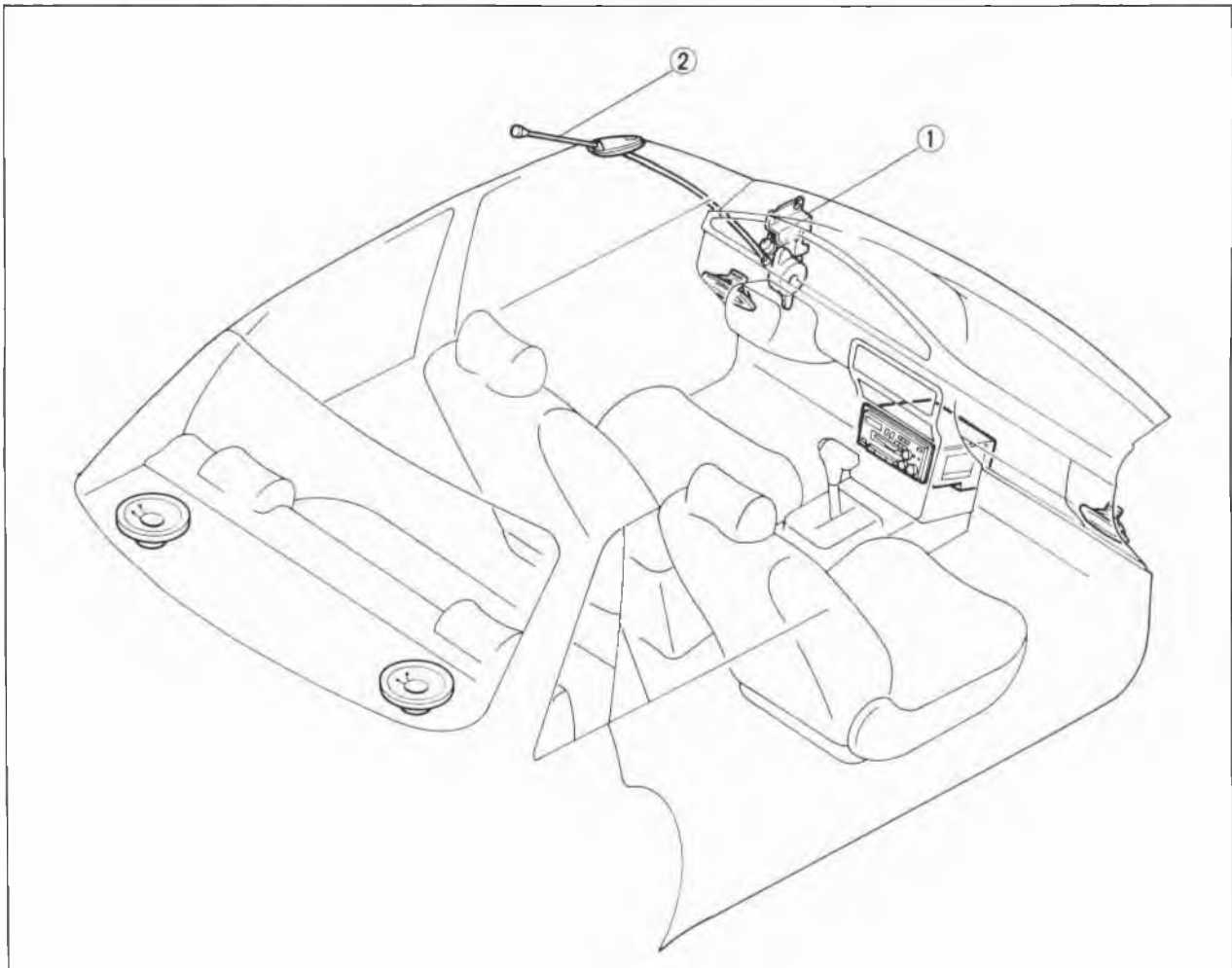
Use the following adjustment procedure to obtain optimum antenna and radio reception sensitivity.

1. Extend the antenna fully.
2. Set the ignition key to ACC.
3. Turn on the radio, and set it to AM reception.
4. Tune in a distant station with a weak signal at around 1400 kHz. If such a station cannot be found, use static to make the adjustment.
5. Turn the antenna trimmer adjustment screw to the left and right to find the maximum sensitivity (of either the broadcast or the static).

### Note

**If there is no change in the sensitivity, either the tuned signal is too strong, or there is an antenna malfunction or broken wire.**

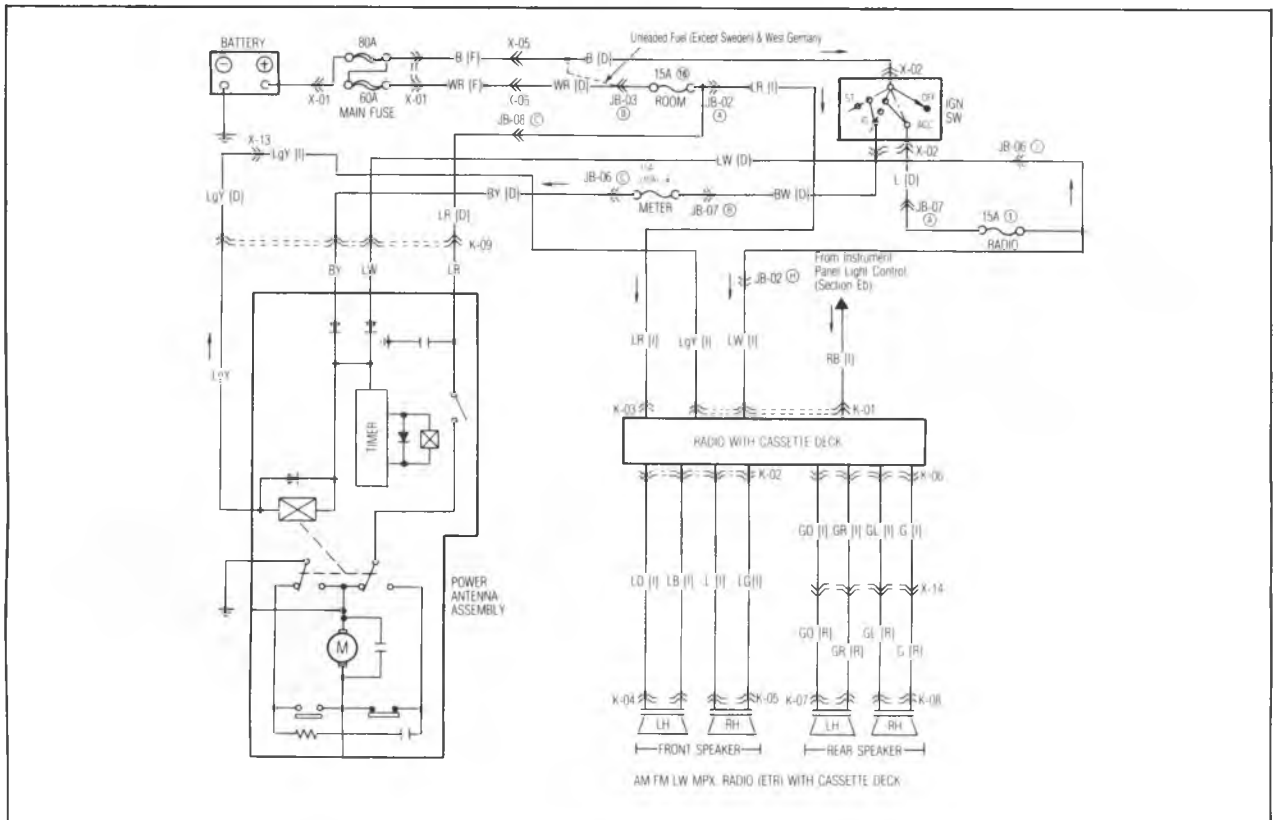
## POWER ANTENNA STRUCTURAL VIEW



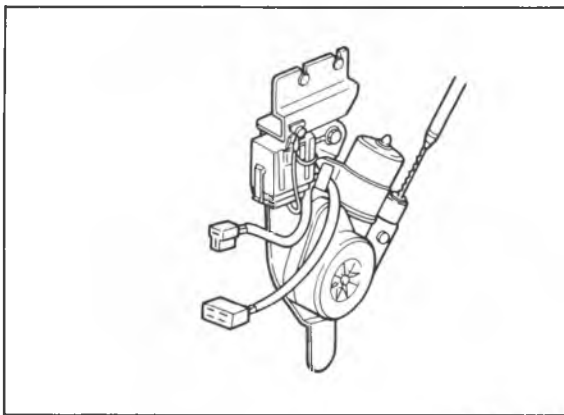
76G15X-025

1. Antenna motor
2. Antenna

## Power Antenna Circuit



86U15X-194



76G15X-096

### Inspection Of Power Antenna Relay

1. Check the voltage at each terminal of the relay connector harness side with each condition.

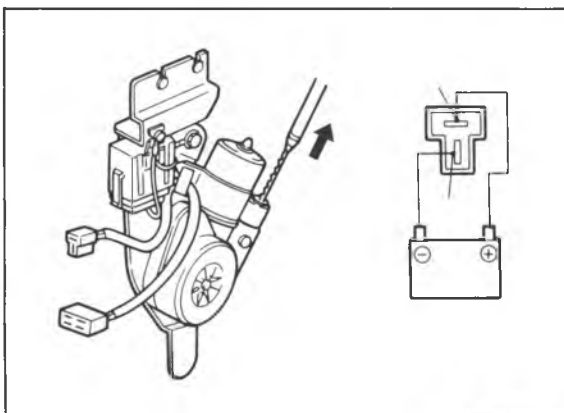
Terminal	Condition	Voltage
LW	Ignition switch ACC	12V
BY	Ignition switch ON	12V
LgW	Ignition switch ACC and radio power switch ON	0V
LR	Any time	12V

If not, repair the harness.

2. Turn the ignition switch on, and check the operation of the power antenna with each condition.

Condition	Antenna operation
GW wire is connected to a body ground	Rises
GW wire is not connected to a body ground	Goes down

If the power antenna does not operate, replace the power antenna relay or power antenna motor.

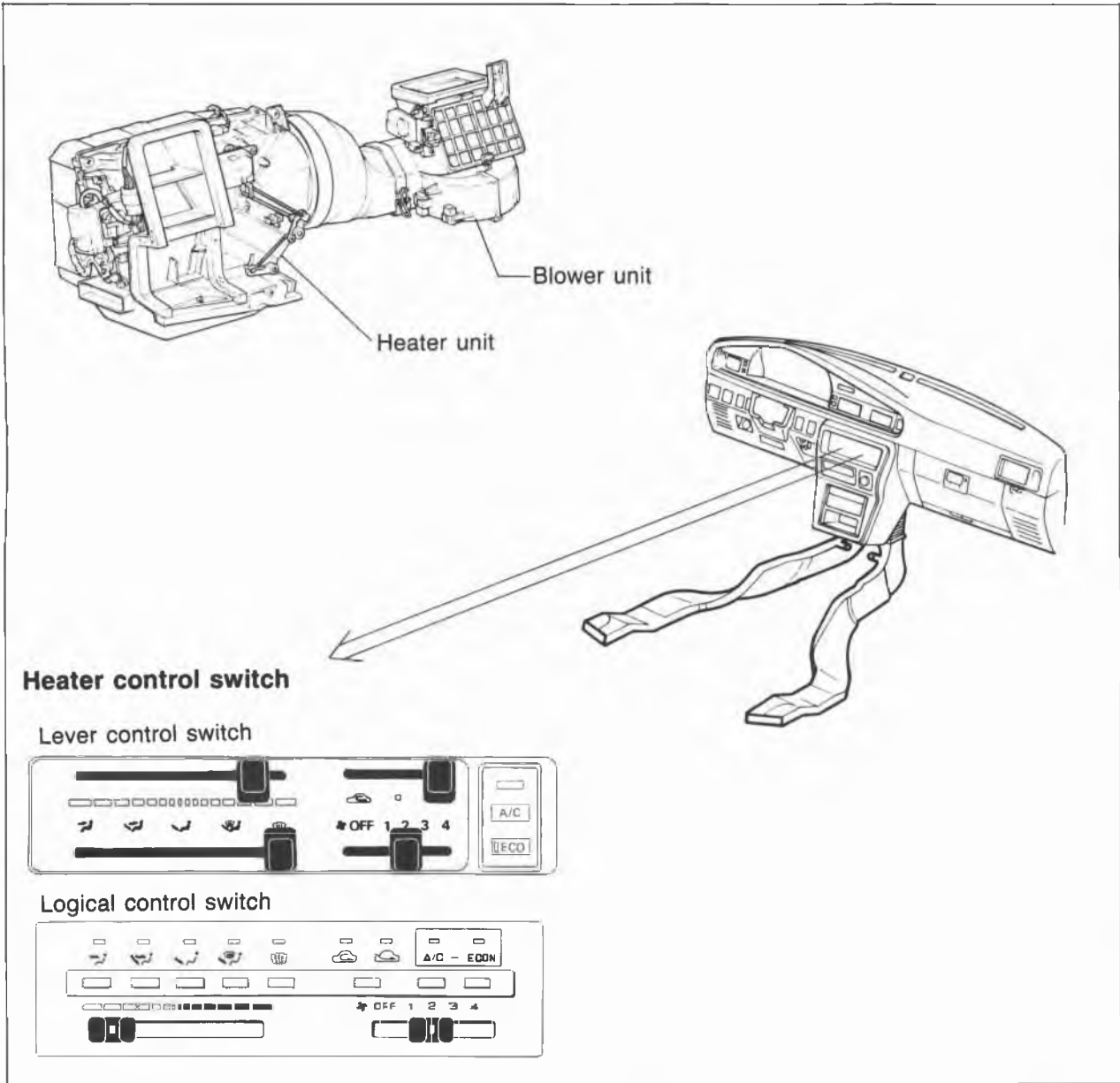


86U15X-196

# 15 HEATER

## HEATER

### STRUCTURAL VIEW



86U15X-197



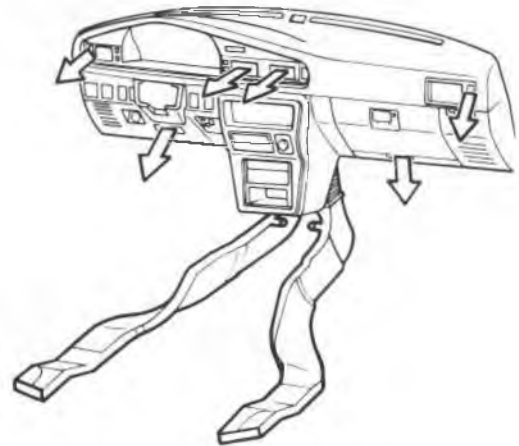
## AIR FLOW AT EACH MODE

### VENT mode

Type A



Type B

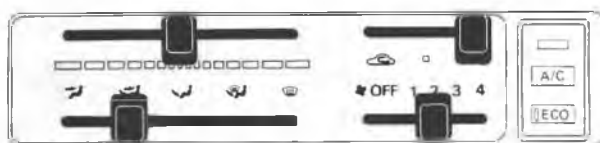


→ Fresh air

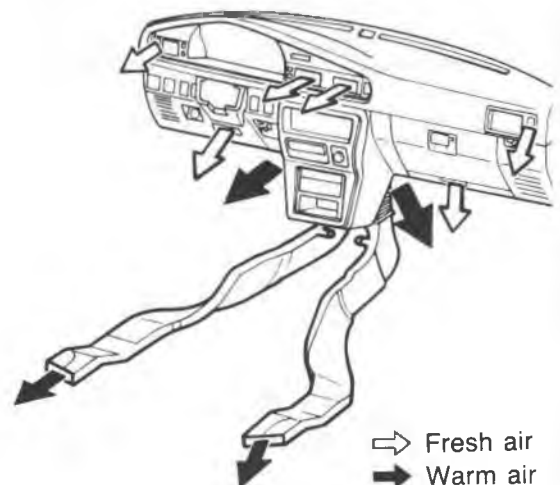
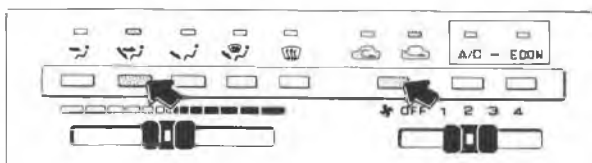
86U15X-198

### BI-LEVEL mode

Type A



Type B



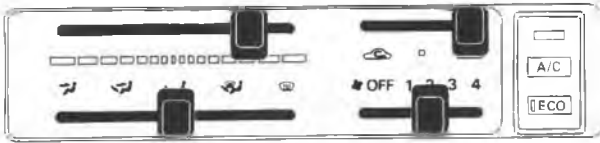
→ Fresh air  
→ Warm air

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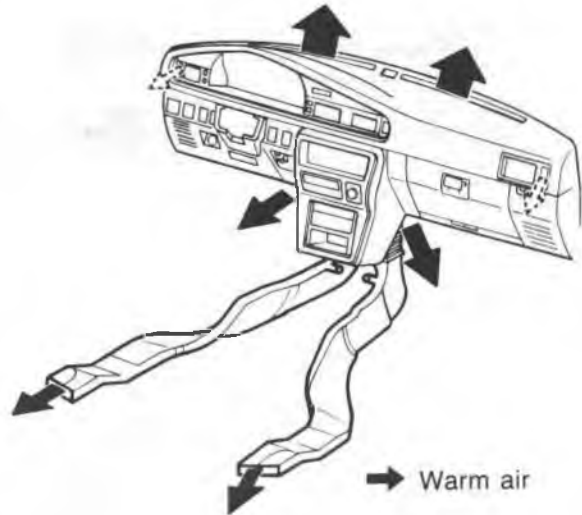
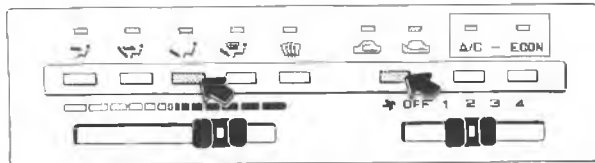
# 15 HEATER

## HEAT mode

Type A



Type B



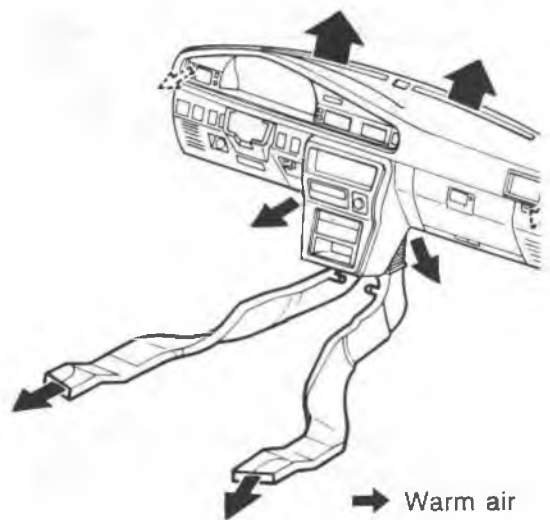
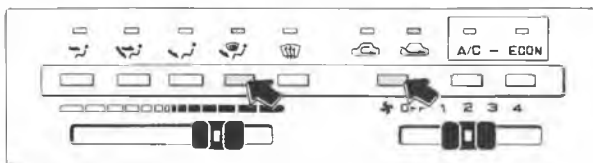
86U15X-200

## HEAT/DEF mode

Type A



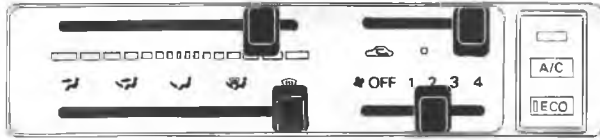
Type B



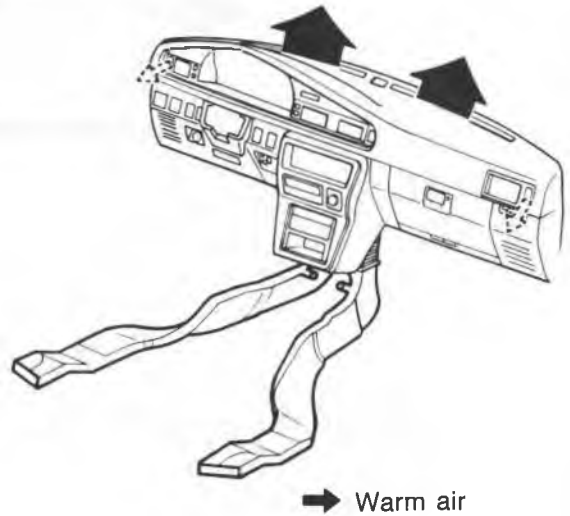
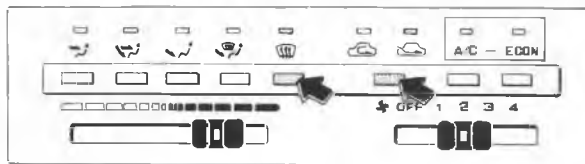
86U15X-201

## DEF mode

Type A



Type B



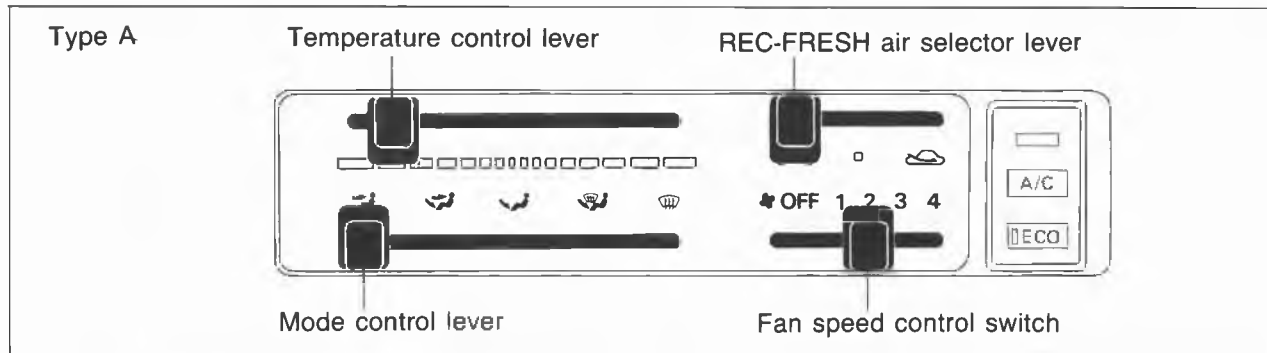
86U15X-202

## RATE OF AIR FLOW

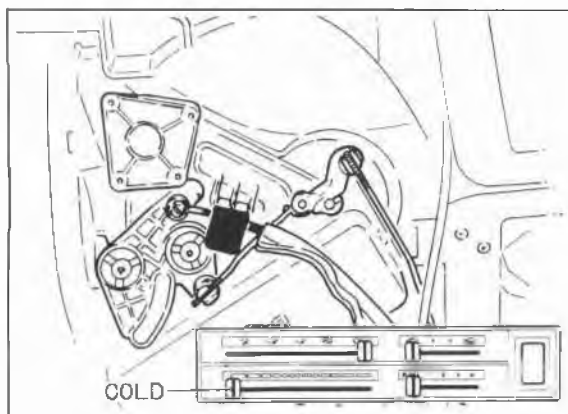
MODE	AIR	VENT OPEN	DEF OPEN	HEAT OPEN
VENT	FRESH	100%	—	—
BI-LEVEL	1/2 warm	50%	—	50%
HEAT	WARM	—	20%	80%
DEFROSTER/HEAT	WARM	—	50%	50%
DEFROSTER	WARM	—	100%	—

# 15 HEATER

## LEVER CONTROL TYPE



69G15X-203



86U15X-203

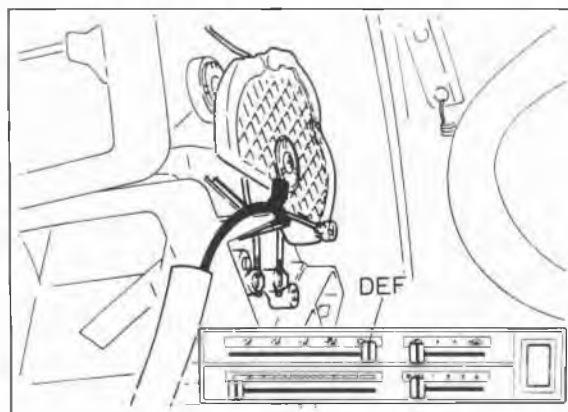
### Adjustments

#### Air-mix door control wire

1. Set temperature control lever at MAX-COLD position.
2. Connect and clamp the control wire with the shutter lever on the heater unit all the way to the right side.

#### Caution

Move the temperature control lever to be sure the wire is attached. Also, be sure it can move the full stroke between HOT and COLD.



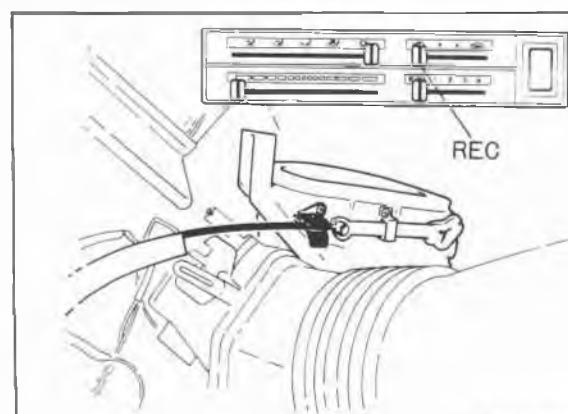
86U15X-204

#### Mode control wire

1. Set mode control lever to DEF position.
2. Connect and clamp the control wire with the shutter lever on the heater unit at its closest point.

#### Caution

Move the mode lever to be sure the wire is attached. Also, be sure it can move the full stroke between DEF and VENT.



86U15X-205

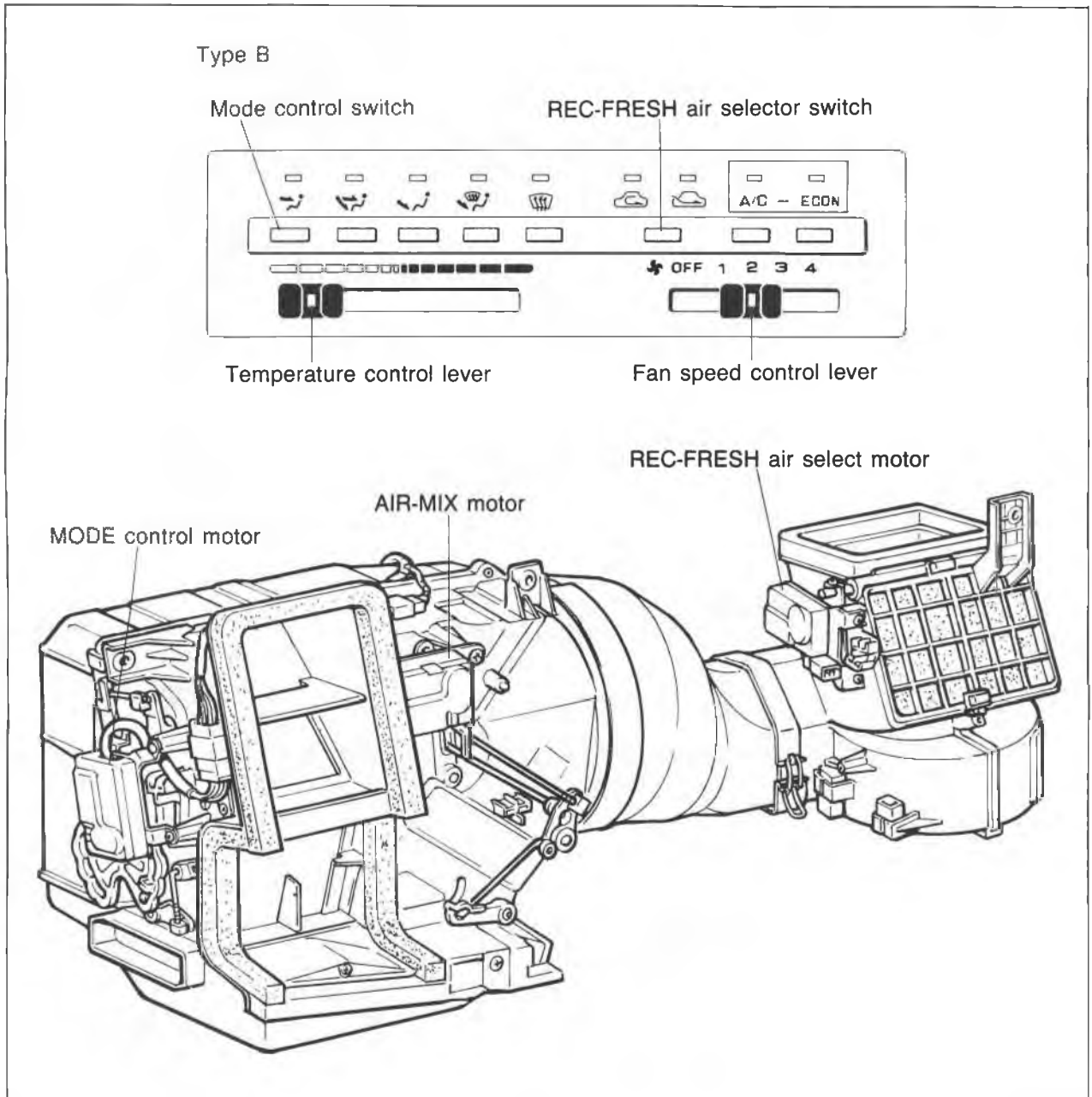
#### REC-FRESH air selector wire

1. Set the selector lever to REC position.
2. Connect and clamp the control wire with the shutter lever on the blower unit at its closest point.

#### Caution

Move the rec-fresh lever to be sure the wire is attached. Also, be sure it can move the full stroke between REC and FRESH.

## LOGICAL CONTROL TYPE



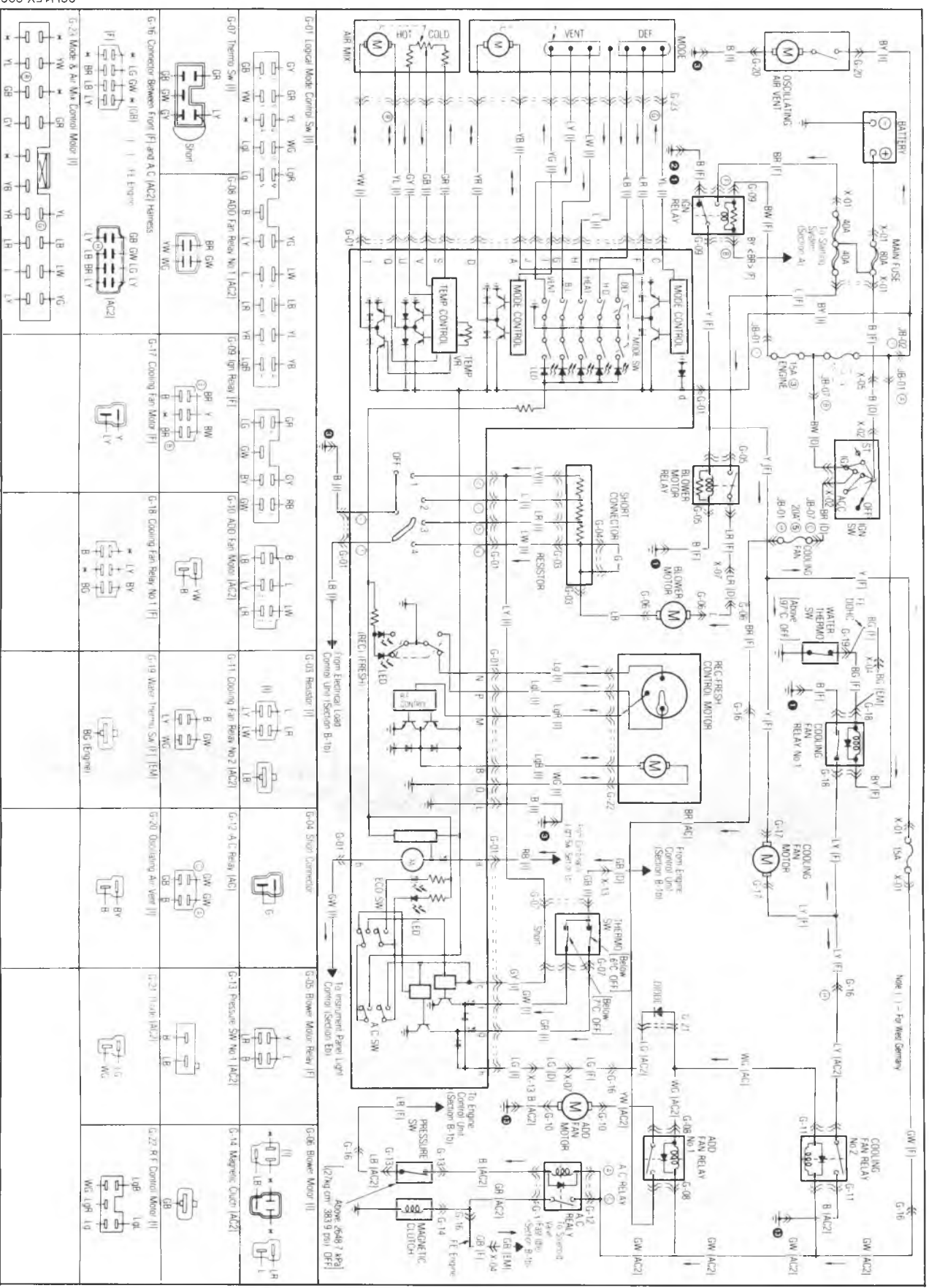
69G15X-207

### Outline of Components

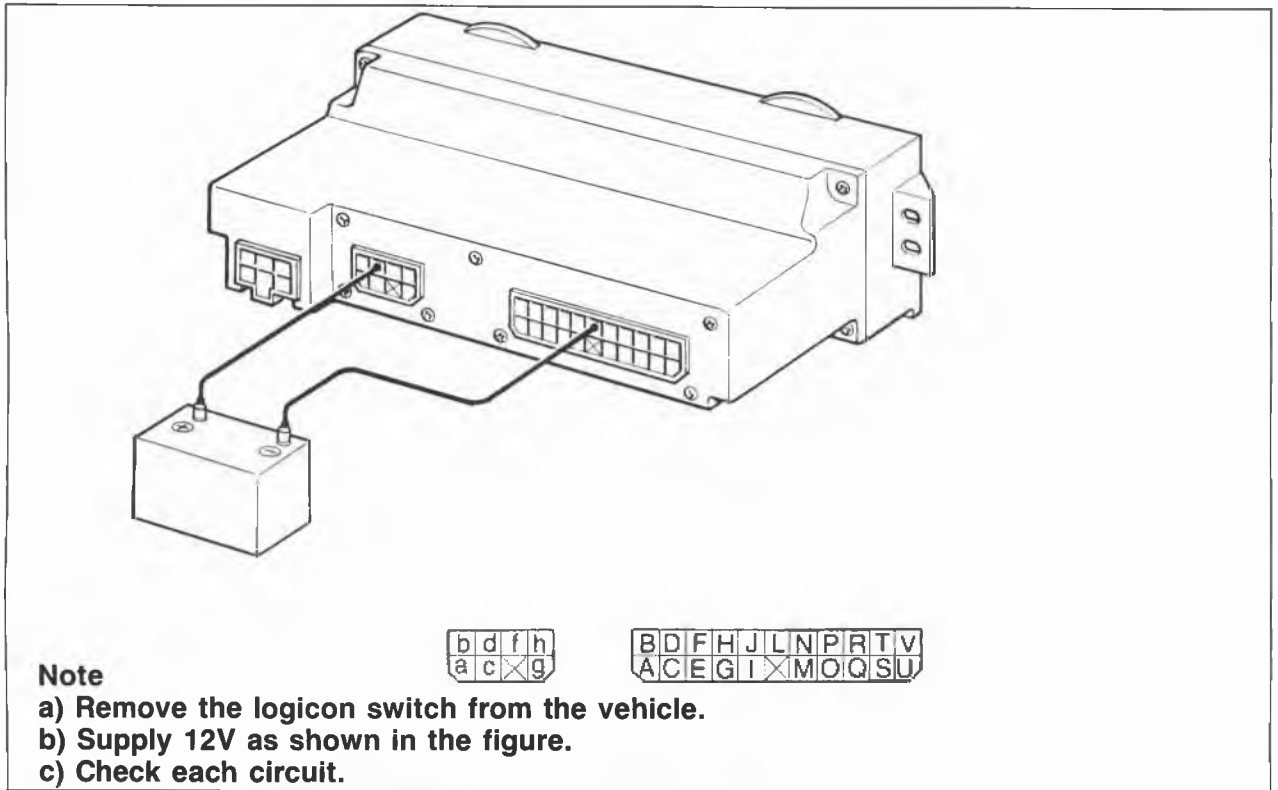
Part Name	Description
<b>Logical control switch</b>	One-touch, push type, mode control switch
<b>MODE control motor</b>	Controls air outlet for each mode Drives VENT, HEAT and DEF doors
<b>AIR MIX motor</b>	Controls air outlet temperature by operating the air mix doors
<b>REC-FRESH air select motor</b>	Controls intake air by driving the rec-fresh air select door

# 15 HEATER

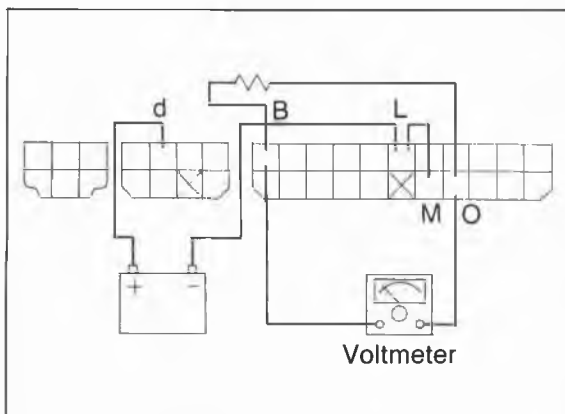
## Circuit Diagram



## LOGICON SWITCH Inspection



86U15X-207



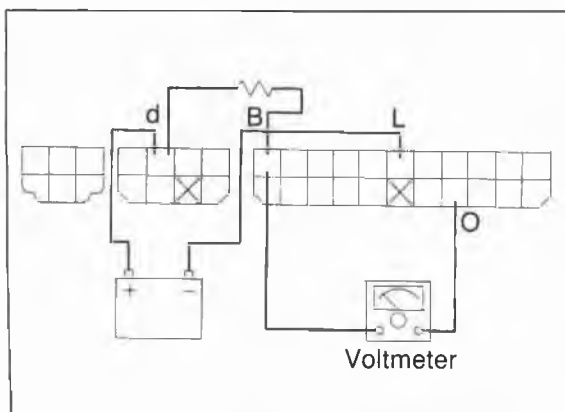
86U15X-208

### Checking REC-FRESH Air Selector Circuit

1. Connect a jumper wire between M terminal and L terminal.

Connect a resistance (at least 1 kΩ) between B terminal and O terminal, and check the voltage between these terminals using a voltmeter.

Terminals	Voltage
B — O	Approx. 12V

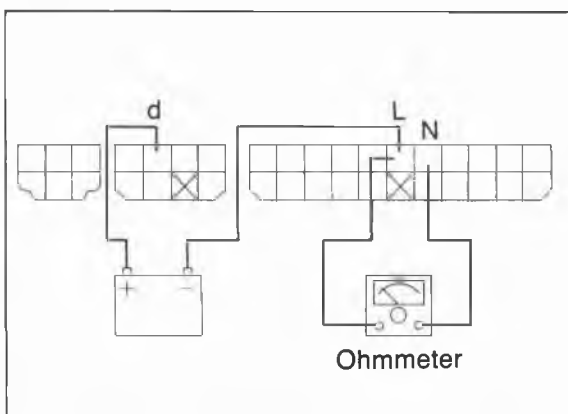


86U15X-209

2. Connect a resistance (at least 1 kΩ) between d terminal and B terminal, and check the voltage between d terminal and O terminal using a voltmeter.

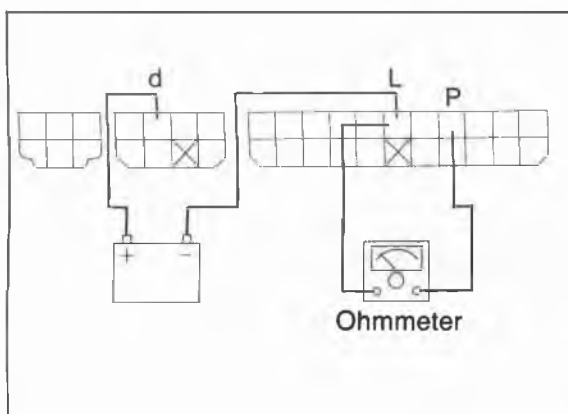
Terminals	Voltage
B — O	Less than 1V

# 15 HEATER



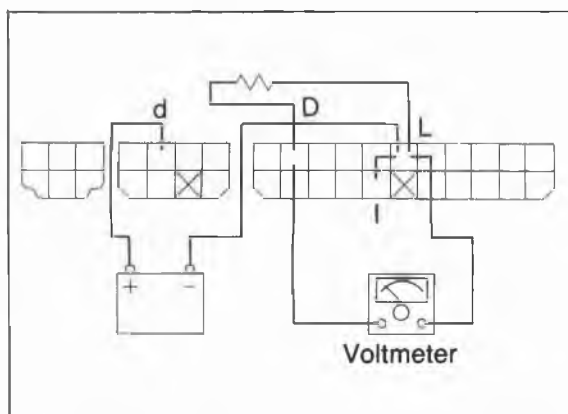
86U15X-210

3. Check for continuity between N terminal and L terminal with the REC-FRESH selector switch in FRESH position (out) using an ohmmeter.



86U15X-211

4. Check for continuity between P terminal and L terminal with the REC-FRESH air selector switch in REC position (in) using ohmmeter.



86U15X-212

### Checking Mode Control Circuit

1. Connect a jumper wire between I terminal and L terminal.

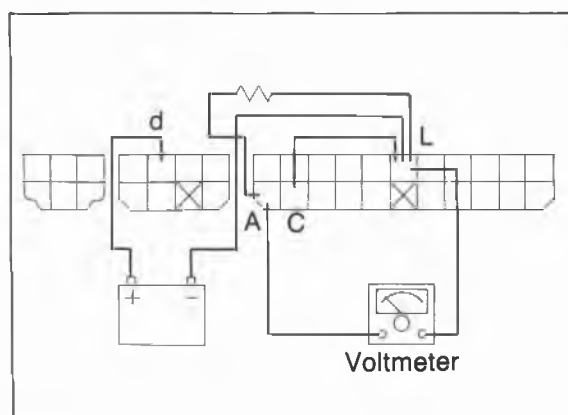
Connect a resistance (at least  $1\text{ k}\Omega$ ) between D terminal and L terminal, and check the voltage between these terminals using a voltmeter.

Terminals	Voltage
D — L	Approx. 12V

2. Connect a jumper wire between C terminal and L terminal.

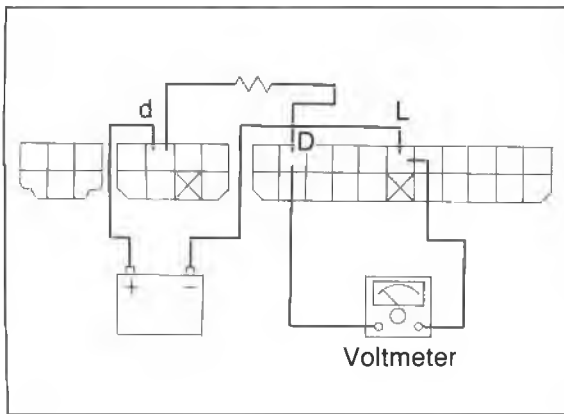
Connect a resistance (at least  $1\text{ k}\Omega$ ) between A terminal and L terminal, and check the voltage between these terminals using a voltmeter.

Terminals	Voltage
A — L	Approx. 12V



86U15X-213

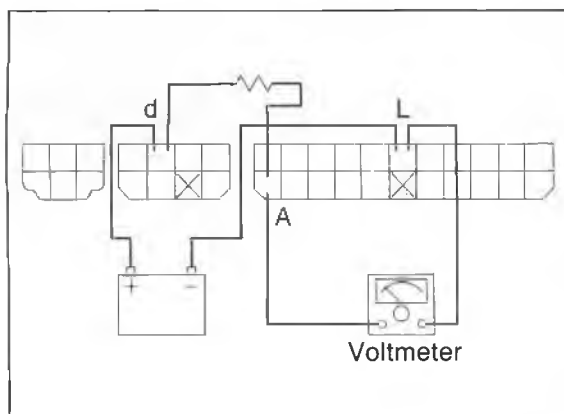




86U15X-214

3. Connect a resistance (at least 1 kΩ) between d terminal and D terminal, and check the voltage between D terminal and L terminal using a voltmeter.

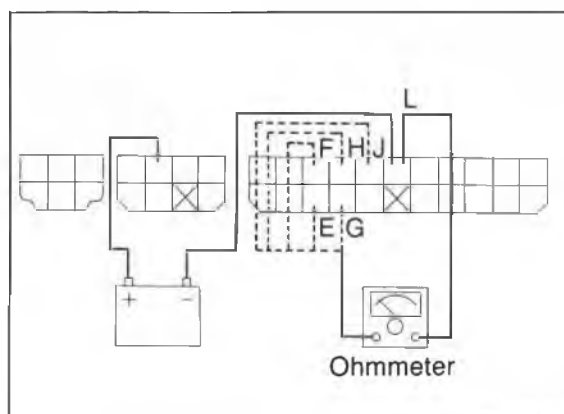
Terminals	Voltage
D — L	Less than 1V



86U15X-215

4. Connect a resistance (at least 1 kΩ) between d terminal and A terminal, and check the voltage between A terminal and L terminal using a voltmeter.

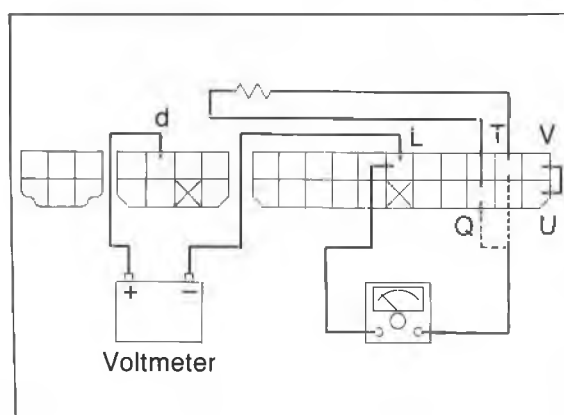
Terminal	Voltage
A — L	Less than 1V



86U15X-216

5. Check for continuity between each terminal with following condition using an ohmmeter.

Condition	Terminals	Continuity
Push the VENT switch	J — L	Yes
Push the B/L switch	G — L	Yes
Push the HEAT switch	H — L	Yes
Push the H/D switch	E — L	Yes
Push the DEF switch	F — L	Yes



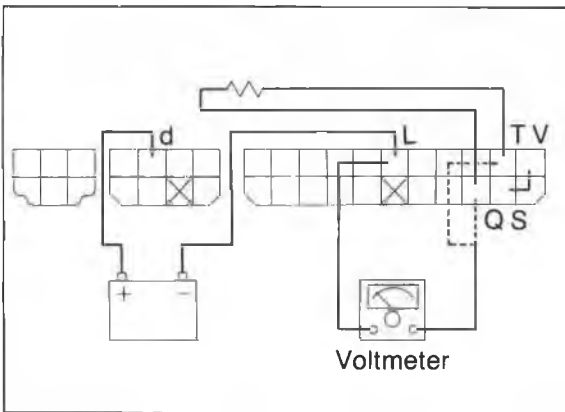
86U15X-217

### Checking Air Mix Control Circuit

1. Connect a resistance (at least 1 kΩ) between Q terminal and T terminal.  
Set temperature control lever to center position between MAX HOT and MAX COLD.  
Connect a jumper wire between V terminal and U terminal, and check the voltage between each terminals.

Terminals	Voltage
T — L	Approx. 12V
Q — L	Less than 1V

# 15 HEATER

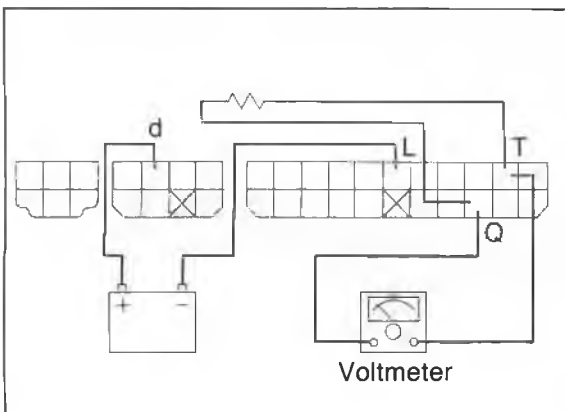


86U15X-218

2. Connect a resistance (at least 1 kΩ) between Q terminal and T terminal.

Set temperature control lever to center position between MAX HOT and MAX COLD. Connect a jumper wire between V terminal and S terminal, and check the voltage between each terminal using a voltmeter.

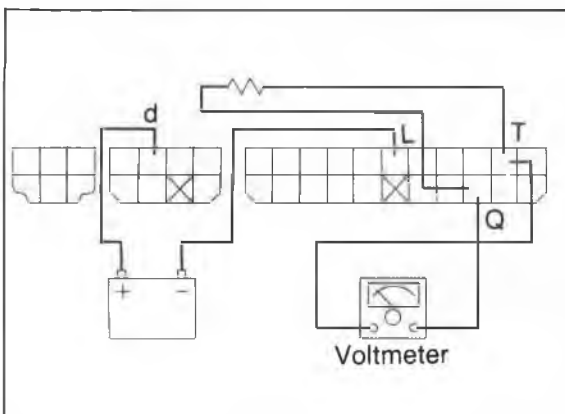
Terminals	Voltage
Q — L	Approx. 12V
T — L	Less than 1V



86U15X-219

3. Connect a resistance (at least 1 kΩ) between Q terminal and T terminal.

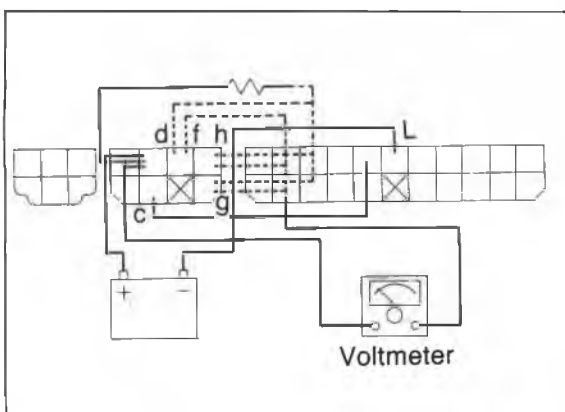
Set temperature control lever to MAX HOT, and check that Q terminal voltage is higher than terminal t voltage.



86U15X-220

4. Connect a resistance (at least 1 kΩ) between Q terminal and terminal t.

Set temperature control lever to MAX COLD, and check that T terminal voltage is higher than Q terminal voltage.

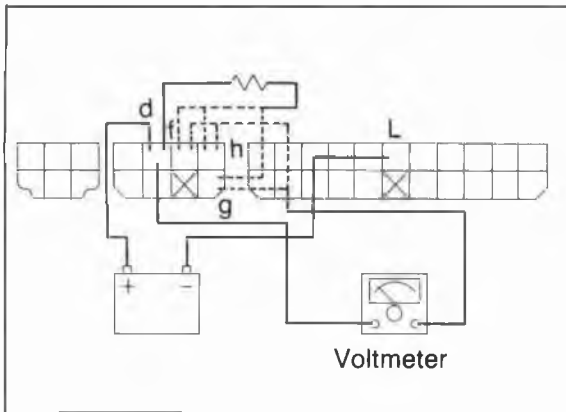


86U15X-221

## Checking A/C Switch and ECO Switch Circuit

1. Turn the A/C switch off.  
Connect a jumper wire between terminal c and terminal L.  
Connect a resistance (at least 1 kΩ) between each terminals, and check the voltage between these terminals.

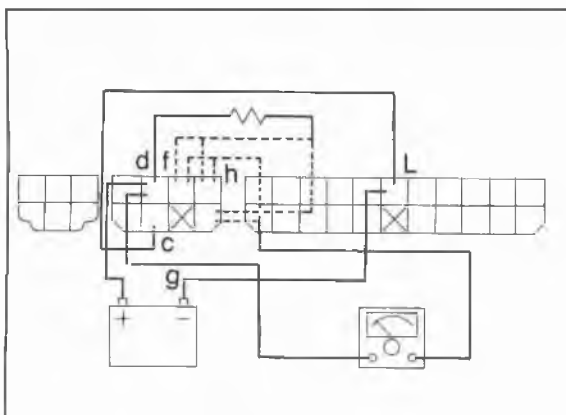
Terminals	Voltage
d — g	0V
d — f	0V
d — h	0V



86U15X-222

- Turn the A/C switch on.  
Connect a resistance (at least 1 k $\Omega$ ) between each terminal, and check the voltage between these terminals.

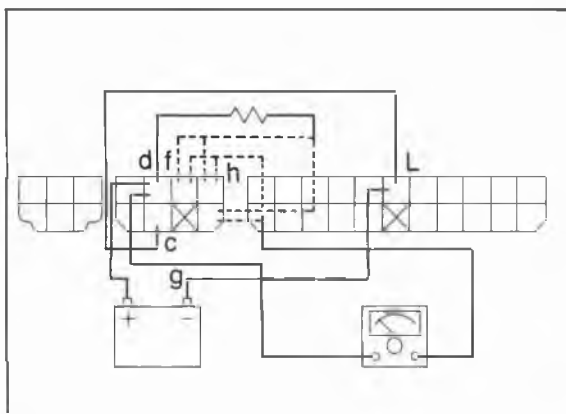
Terminals	Voltage
d — g	0V
d — f	0V
d — h	0V



86U15X-223

- Turn the A/C switch on and the ECO switch off.  
Connect a jumper wire between terminal c and L terminal.  
Connect a resistance (at least 1 k $\Omega$ ) between each terminals, and check the voltage between these terminals.

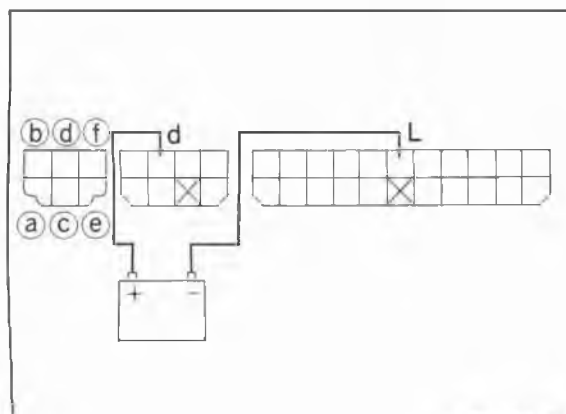
Terminals	Voltage
d — g	0V
d — f	Approx. 12V
d — h	Approx. 12V



86U15X-224

- Turn the A/C switch and the ECO switch on.  
Connect a jumper wire between terminal c and L terminal.  
Connect a resistance (at least 1 k $\Omega$ ) between each terminal, and check the voltage between these terminals.

Terminals	Voltage
d — g	Approx. 12V
d — f	0V
d — h	Approx. 12V



86U15X-225

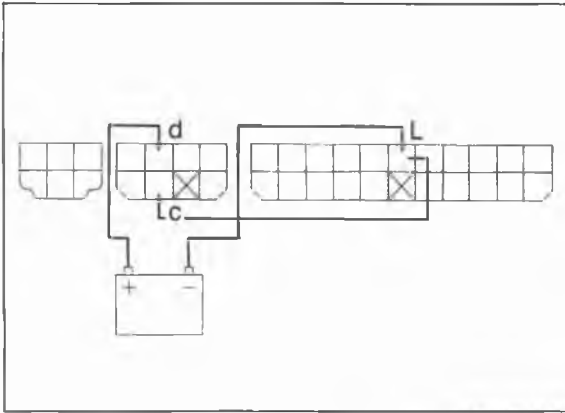
### Checking Fan Speed Control Lever

Check for continuity between each terminal of 6 pin connector.

Fan switch condition	(a)	(b)	(c)	(d)	(e)	(f)
OFF						
1				○—○		
2			○—○			
3		○—○				
4	○—○					

○—○: indicates continuity

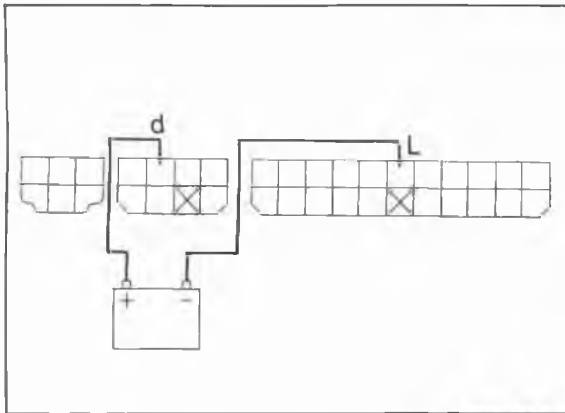
# 15 HEATER



86U15X-226

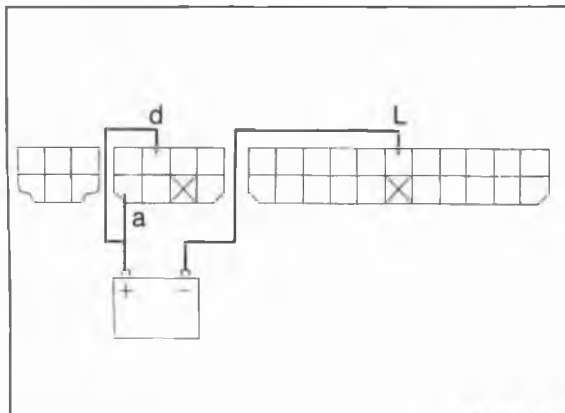
## Checking Dim Indicator Circuits (Indicator circuit)

1. Connect a jumper wire between terminal c and terminal L.  
Check for illumination at A/C switch indicator with A/C switch on.  
Check for illumination at ECO switch indicator with ECO switch on.



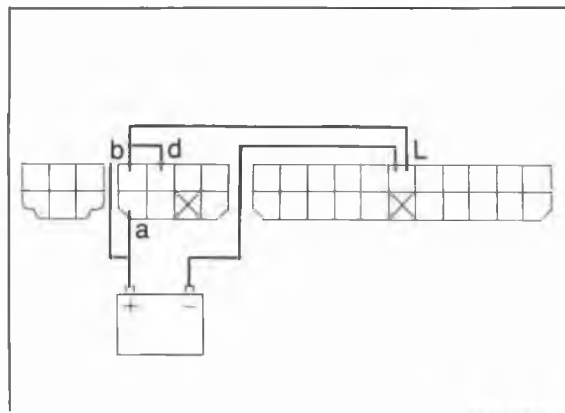
86U15X-227

2. Check that the mode control switch and REC-FRESH select switch indicators when the respective switches ON.



86U15X-228

3. Apply 12V to terminal a, and check that the indicators are dim.



86U15X-229

## Checking Illumination Circuit

1. Connect a jumper wire between terminal b and terminal L.
2. Apply 12V to terminal a, and check that the indicators are dim.

# AIR CONDITIONING SYSTEM

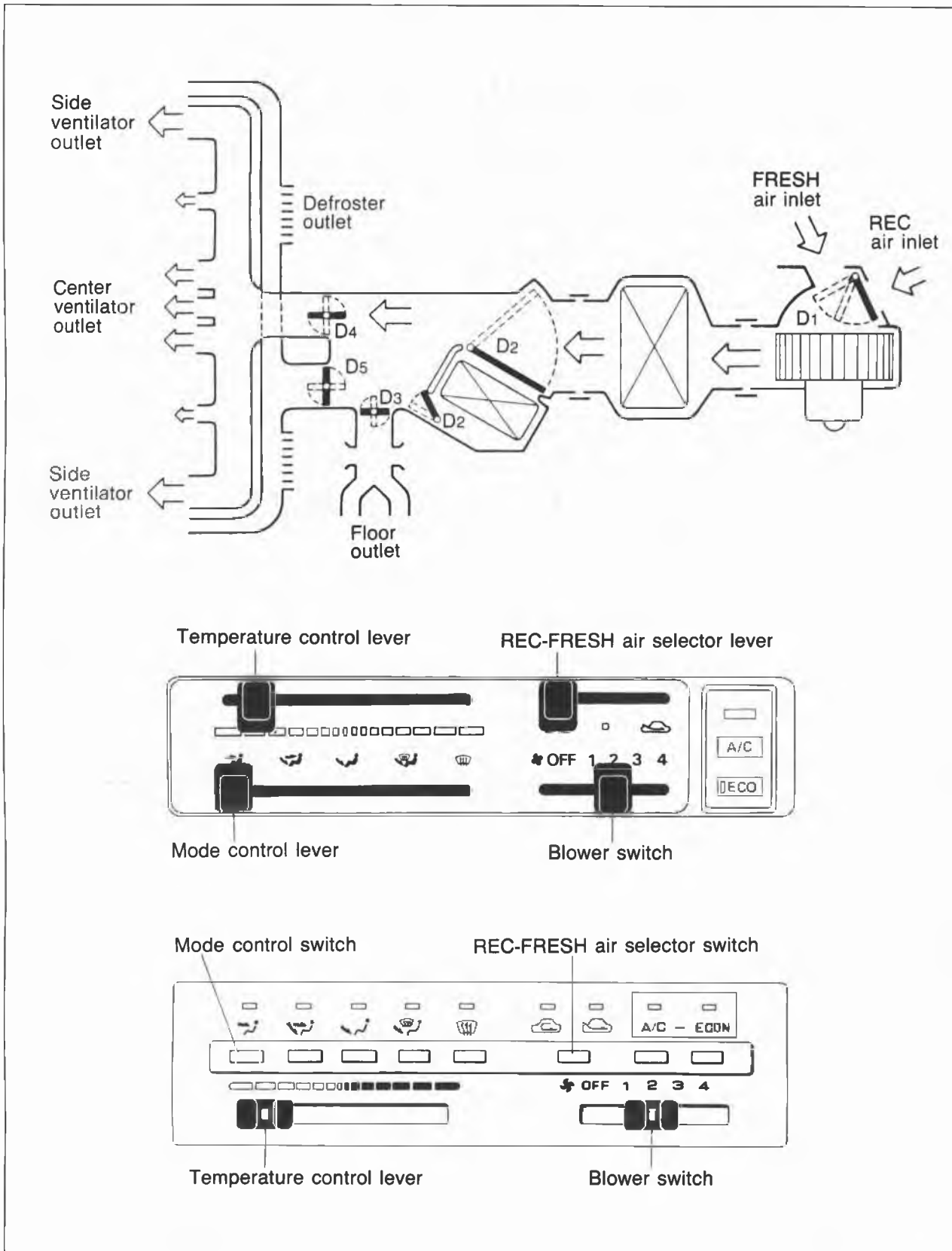
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AIR CONDITIONING COMPONENTS .....	16— 4
TROUBLESHOOTING GUIDE.....	16— 5
CIRCUIT DIAGRAM .....	16— 6
REFRIGERATION SYSTEM .....	16— 8
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	16—30
	INSPECTION OF A/C RELAY .....
	16—30
	INSTALLATION OF A/C RELAY .....
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	16—30
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	16—30
	REMOVAL OF THERMOSTAT .....
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# 16 OUTLINE

## OUTLINE

### AIR DISTRIBUTION

Vehicles with air conditioner



69G16X-002

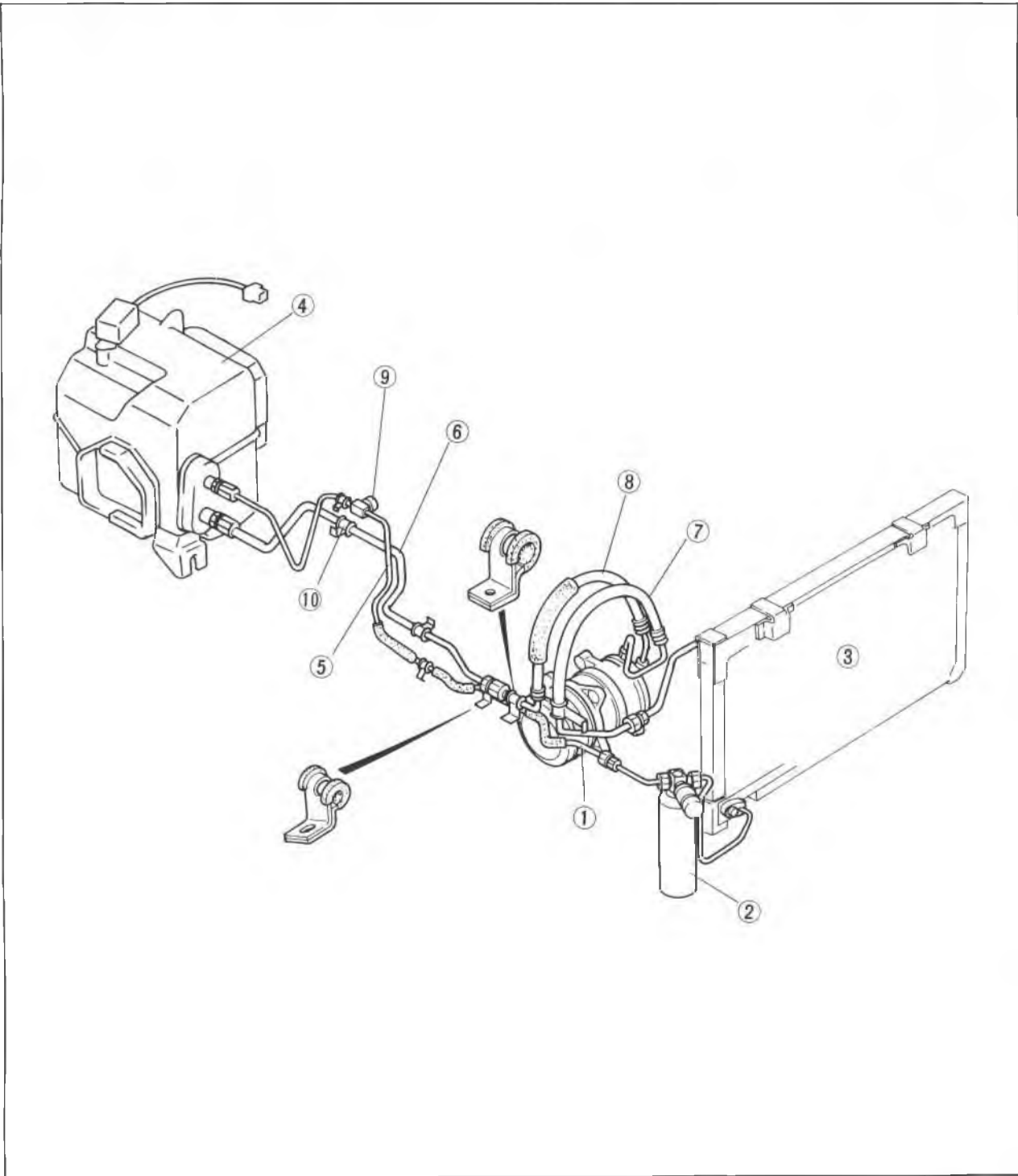
**The air distribution is shown in the figure.**

1. The door (D1) is used to select either fresh air from outside or recirculated air. Setting the RECIRC/FRESH control lever (switch) to the FRESH position will allow outside air to come inside. Setting the RECIRC/FRESH control lever (switch) to the RECIRC position will allow inside air to recirculate.
2. Outlet airflow is controlled by doors D3, D4, D5.  
Moving (pushing) the mode control lever (switch) opens and shuts the doors (D3, D4, D5) and creates the air passage according to the lever position.
  - 1) Setting the lever to the VENT position (push the VENT switch) creates the air passage to the ventilator outlets, and air comes into the passenger compartment from the ventilator outlets.
  - 2) Setting the lever to the BI-LEVEL position (push the BI-LEVEL switch) creates the air passage to the ventilator outlets and to the floor outlets.
  - 3) Setting the lever to the HEAT position (push the HEAT switch) creates the air passage to the floor outlets.  
(A little air comes from the defroster outlets.)
  - 4) Setting the lever to the DEF/HEAT position (push the DEF/HEAT switch) creates the air passage to the floor outlets and to the defroster outlets.
  - 5) Setting the lever to the DEF position (push the DEF switch) creates the air passage to the defroster outlets.
3. The cooling or heating temperature is controlled by doors D2.

76G16X-002

# 16 OUTLINE

## AIR CONDITIONING COMPONENTS



76G16X-003

- |                       |                                  |
|-----------------------|----------------------------------|
| 1. Compressor         | 6. Low pressure pipe             |
| 2. Receiver-drier     | 7. High pressure hose            |
| 3. Condenser          | 8. Low pressure hose             |
| 4. Cooling unit       | 9. Service valve (High-pressure) |
| 5. High-pressure pipe | 10. Service valve (Low-pressure) |

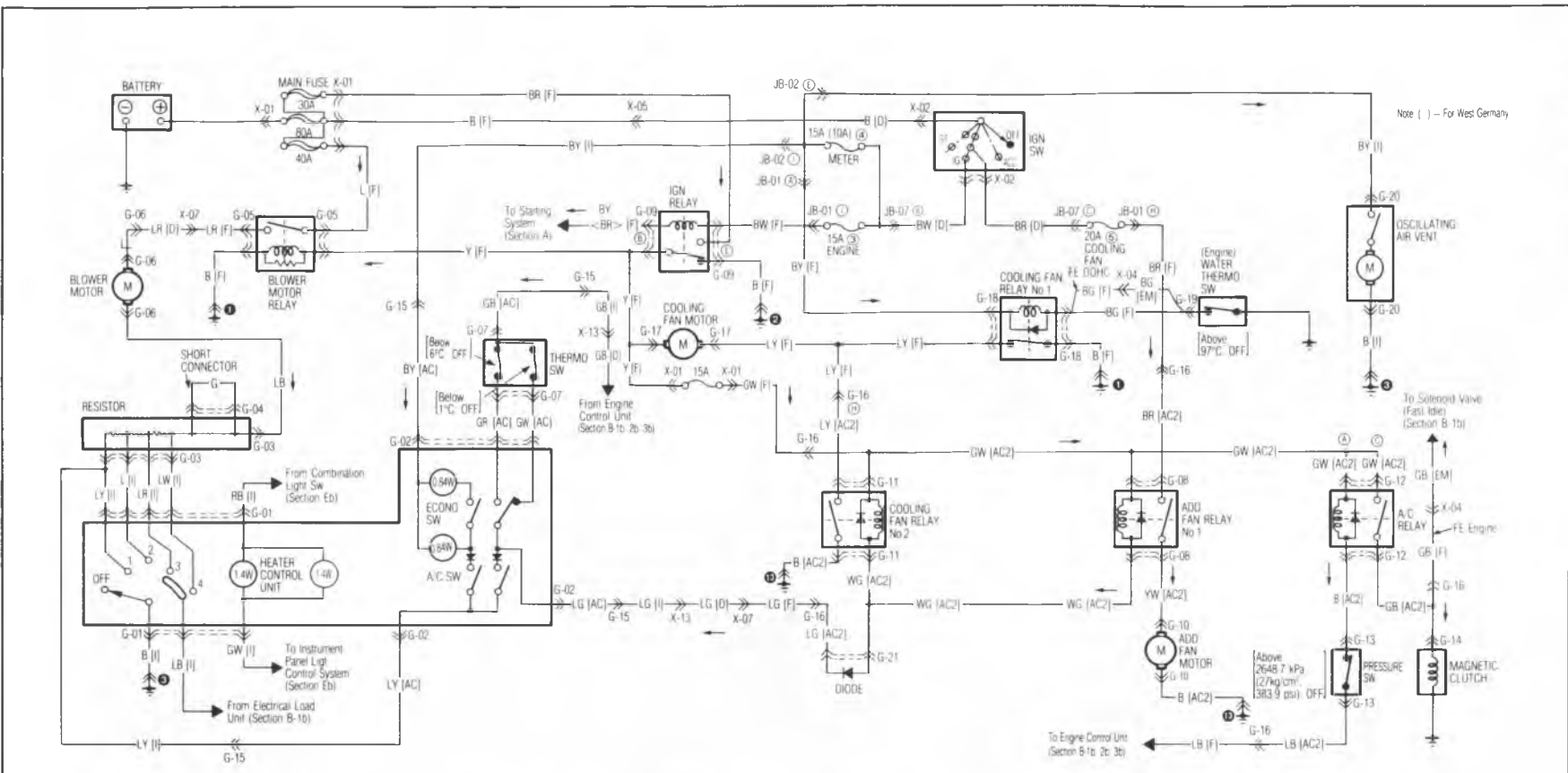


## TROUBLESHOOTING GUIDE

Problem	Probable cause	Remedy	Reference page
<b>No blower operation</b>	<ol style="list-style-type: none"> <li>1. Main fuse (30 A) is open</li> <li>2. Malfunction of the blower motor</li> <li>3. Faulty resistor</li> <li>4. Malfunction of the blower switch</li> <li>5. Open or loose connection in an electrical circuit</li> </ol>	Replace Replace Replace Replace Repair	16—6, 7
<b>Insufficient air</b>	<ol style="list-style-type: none"> <li>1. Obstruction in the inlet of the blower unit</li> <li>2. Clogged evaporator</li> <li>3. Frosted evaporator</li> <li>4. Air leakage</li> </ol>	Remove the obstruction Clean the evaporator with compressed air Check the thermostat Check for leakage at both sides of the cooling unit	16—26 16—27 16—30 16—26
<b>Compressor does not run, or runs insufficiently</b>	<ol style="list-style-type: none"> <li>1. Malfunction of the A/C relay</li> <li>2. Malfunction of the thermostat</li> <li>3. Malfunction of the refrigerant-pressure switch</li> <li>4. Air conditioner fuse (15 A) failure</li> <li>5. Compressor drive belt is loose</li> <li>6. Internal problem of the compressor</li> <li>7. Battery voltage too low</li> <li>8. Layer short in the magnet coil</li> <li>9. Clutch face dirty with oil</li> <li>10. Excessive gap between the drive plate and the pulley</li> <li>11. Open circuit in the magnet coil</li> <li>12. Open circuit</li> </ol>	Check operation Check operation Check operation Replace Readjust Repair or replace the compressor Recharge the battery Replace Clean or replace the clutch Adjust the gap Replace Repair	16—30 16—30 16—31 16—23 16—13 16—13 16—13 16—13 16—13 16—6, 7
<b>Refrigeration pressure is abnormal</b>	Normal pressures are: High pressure..... <b>1472—1765 kPa</b> <b>(15—18 kg/cm<sup>2</sup>, 214—255 psi)</b> Low pressure..... <b>197—294 kPa</b> <b>(2—3 kg/cm<sup>2</sup>, 29—42 psi)</b> when: ambient temperature.....35°C (95°F) engine speed.....1,500 rpm		
<b>Low pressure is too high</b>	<ol style="list-style-type: none"> <li>1. Internal malfunction of the compressor</li> <li>2. Faulty contact of the sensing bulb of the expansion valve</li> <li>3. Faulty insulation of the sensing bulb of the expansion valve</li> <li>4. Expansion valve open too much</li> </ol>	Repair or replace the compressor Repair Repair Replace	16—13 16—26 16—26 16—26
<b>Low pressure is too low</b>	<ol style="list-style-type: none"> <li>1. Insufficient refrigerant</li> <li>2. Receiver-drier is clogged</li> <li>3. Expansion valve is clogged</li> <li>4. Faulty thermostat</li> <li>5. Frosted piping</li> </ol>	Charge with refrigerant Replace Replace Check operation Clean or replace the piping	16—8 16—25 16—26 16—30 16—29
<b>High pressure is too high</b>	<ol style="list-style-type: none"> <li>1. Poor cooling of condenser</li> <li>2. Loose cooling fan drive belt</li> <li>3. Too much refrigerant</li> <li>4. Air in the system</li> </ol>	Check and clean Readjust Discharge the excess refrigerant Evacuate and charge the system	16—24 16—23 16—8 16—8
<b>High pressure is too low</b>	<ol style="list-style-type: none"> <li>1. Insufficient refrigerant</li> <li>2. Internal malfunction of the compressor</li> </ol>	Charge with refrigerant Repair or replace the compressor	16—8 16—13

76G16X-004

## CIRCUIT DIAGRAM

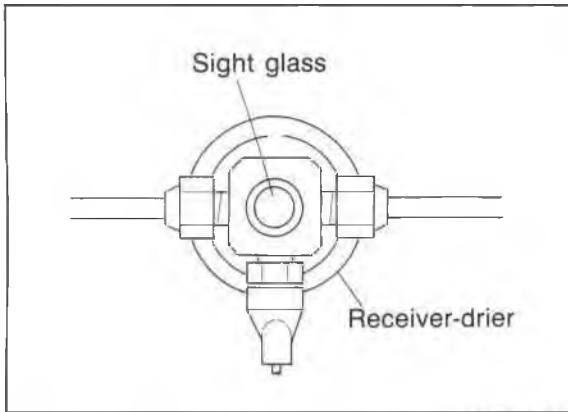


<p>G-01 Heater Control Unit [I]</p>	<p>G-02 A/C Sw [AC]</p>	<p>G-03 Resistor [I]</p>	<p>G-04 Short Connector</p>	<p>G-05 Blower Motor Relay [F]</p>	<p>G-06 Blower Motor [D]</p>	<p>G-07 Thermo Sw [AC]</p>	<p>G-08 ADD Fan Relay No 1 [AC2]</p>
<p>G-09 Ign Relay [F]</p>	<p>G-10 ADD Fan Relay No 2 [AC2]</p>	<p>G-11 Cooling Fan Relay No 2 [AC2]</p>	<p>G-12 A/C Relay [AC2]</p>	<p>G-13 Pressure Sw No 1 [AC2]</p>	<p>G-14 Magnetic Clutch [AC2]</p>	<p>G-15 Connector Between Instrument Panel [I] and No 2 A/C [AC] Harness</p>	
<p>G-16 Connector Between Front [F] and AC [AC2] Harness</p>	<p>G-17 Cooling Fan Motor [F]</p>	<p>G-18 Cooling Fan Relay No 1 [F]</p>	<p>G-19 Water Thermo Sw [F] [EM]</p>	<p>G-20 Oscillating Air Vent [I]</p>	<p>G-21 Diode [AC2]</p>		

76G16X-603



# 16 OUTLINE



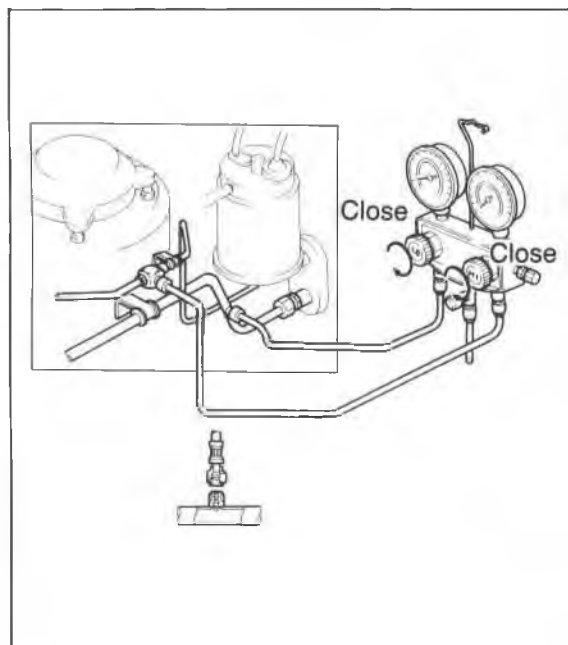
76G16X-005

## REFRIGERATION SYSTEM

### Checking the Refrigerant Charge

1. Run the engine at idle.
2. Operate the air conditioner at maximum cooling for a few minutes.
3. Check the amount of refrigerant by observing the sight glass on the receiver-drier. (Refer to following table.)

Item	Symptom	Amount of refrigerant	Remedy
1	Bubbles present in sight glass.	Insufficient refrigerant.	Check for leakage with a gas leak tester.
2	No bubbles present in sight glass.	No (or insufficient) refrigerant.	Refer to items 3 and 4.
3	No temperature difference between compressor inlet and outlet.	System is empty or nearly empty.	Evacuate and charge the system. Then check for leakage with a gas leak tester.
4	Temperature between compressor inlet and outlet is noticeably different.	Proper amount of (or too much) refrigerant.	Refer to items 5 and 6.
5	Immediately after the air conditioner is turned off, refrigerant in sight glass stays clear.	Too much refrigerant.	Discharge the excess refrigerant (to the specified amount).
6	When the air conditioner is turned off, refrigerant foams and then stays clear.	Proper amount of refrigerant.	Refrigerant amount is normal.



69G16X-017

### Installation of the Manifold Gauge Set

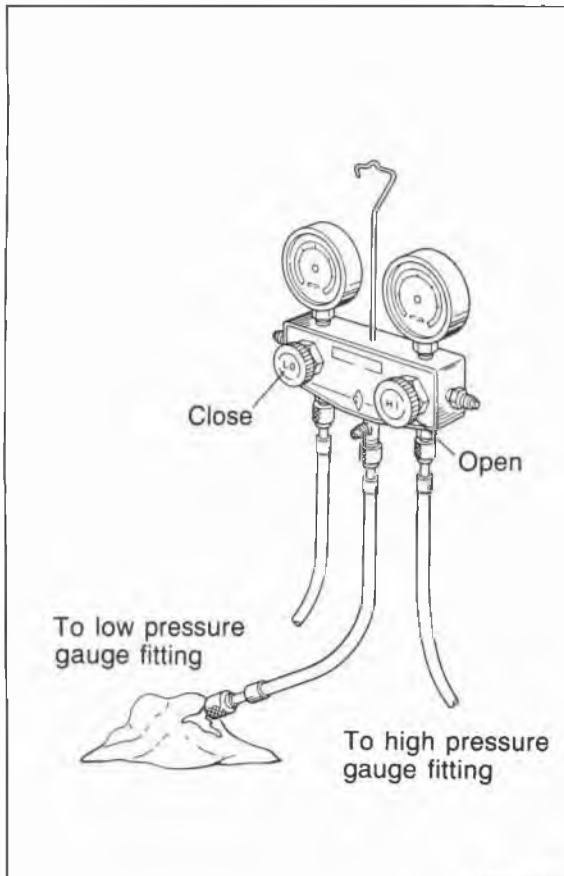
#### Note:

**Fittings for attaching the manifold gauge set are on the high and low pressure pipes.**

1. Close both hand valves of the manifold gauge set.
2. Install the charging hoses in the gauge set to the fittings.

Connect the low-pressure hose to the low-pressure gauge fitting and the high-pressure hose to the high-pressure gauge fitting.

Tighten the hose nuts by hand.



76G16X-631

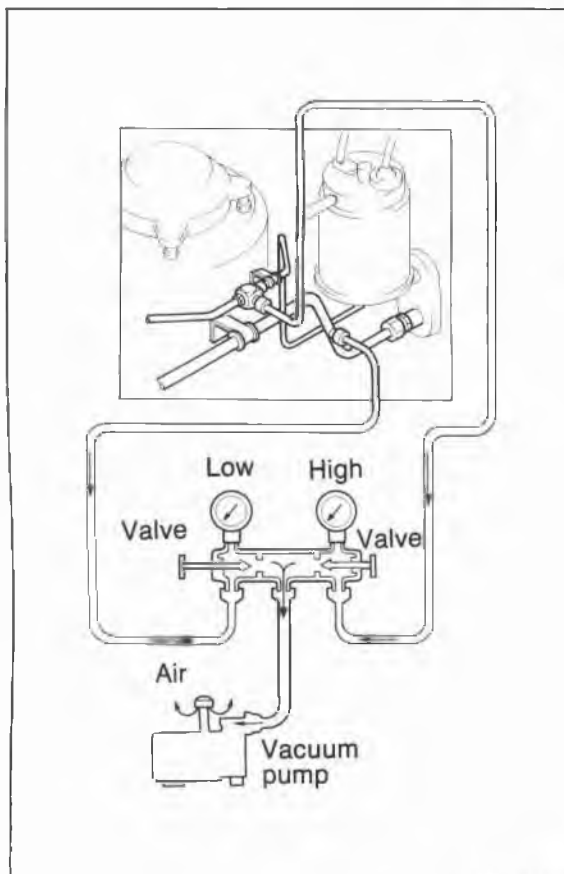
## Discharging the Refrigeration System

1. Connect the manifold gauge set to the system.
2. Place the free end of the center hose on a shop towel.
3. Slowly open the high pressure manual valve to adjust the refrigerant flow. Open the valve only slightly.

### Caution

**If refrigerant is allowed to escape too fast, the compressor oil will be drawn out of the system.**

4. Check the shop towel to make sure no oil is being discharged. If oil is present, partially close the manual valve.
5. After the manifold gauge reading drops below **343 kPa (3.5 kg/cm<sup>2</sup>, 50 psi)**, slowly open the low pressure manual valve.
6. As the system pressure drops, gradually open both the high- and low-pressure manual valves until both gauges read **0 kPa (0 kg/cm<sup>2</sup>, 0 psi)**.

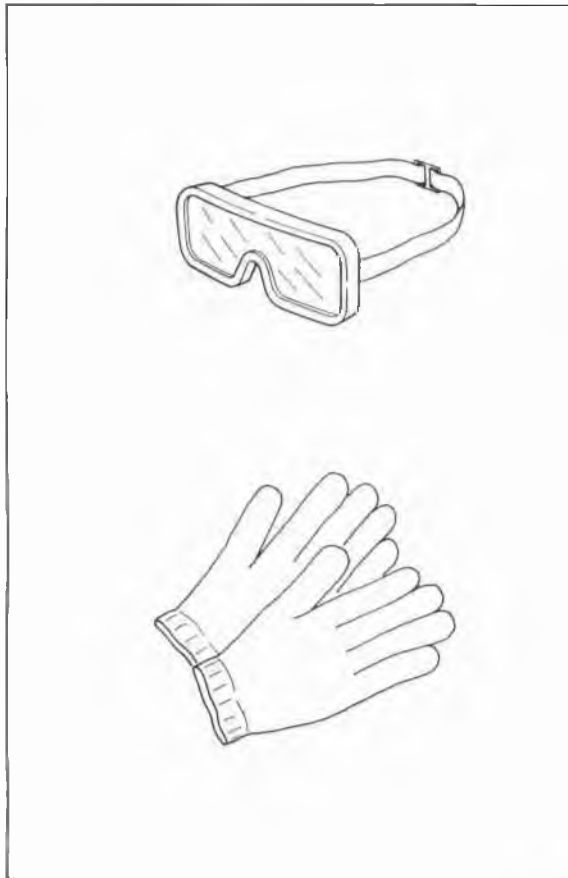


69G16X-019

## Evacuation of the Refrigeration System

Whenever the air-conditioning system has been exposed to the atmosphere, it must be evacuated.

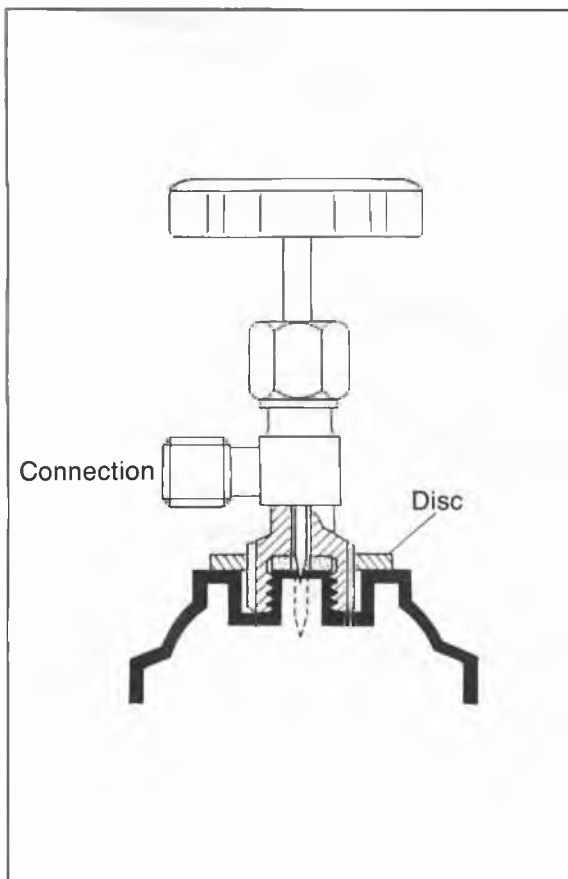
1. Connect the manifold gauge set.
2. Connect the center hose of the gauge set to the vacuum pump inlet.
3. Operate the vacuum pump, then open both manual valves.
4. When the low pressure gauge indicates approximately **710 mmHg (28 inHg)**, close both manual valves and stop the vacuum pump.
5. Check to be sure that the degree of pressure does not change after 10 minutes or more in this condition. If the pressure changes, check the system for leaks, and repair if necessary.
6. If no leaks are found, once again operate the vacuum pump and open both manual valves to obtain **760 mmHg (30 inHg)**.
7. Close both manual valves, and stop the vacuum pump. Disconnect the hose from the vacuum pump.



69G16X-020

## Safety Precautions

1. The R-12 liquid refrigerant is highly volatile. A drop of it on the skin of your hand could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. If the refrigerant splashes into your eyes, wash them with clean water immediately. It is standard practice to wear goggles or glasses to protect your eyes, and gloves to protect your hands.
3. The R-12 container is a highly pressurized vessel. Never leave it in a hot place, and check to be sure that the temperature where it is stored is below **52°C (126°F)**.
4. A halide leak detector is often used to check the system for refrigerant leakage. Remember that R-12, upon coming into contact with flame (this detector burns like propane to produce a small flame), produces phosgene, a toxic gas.



69G16X-021

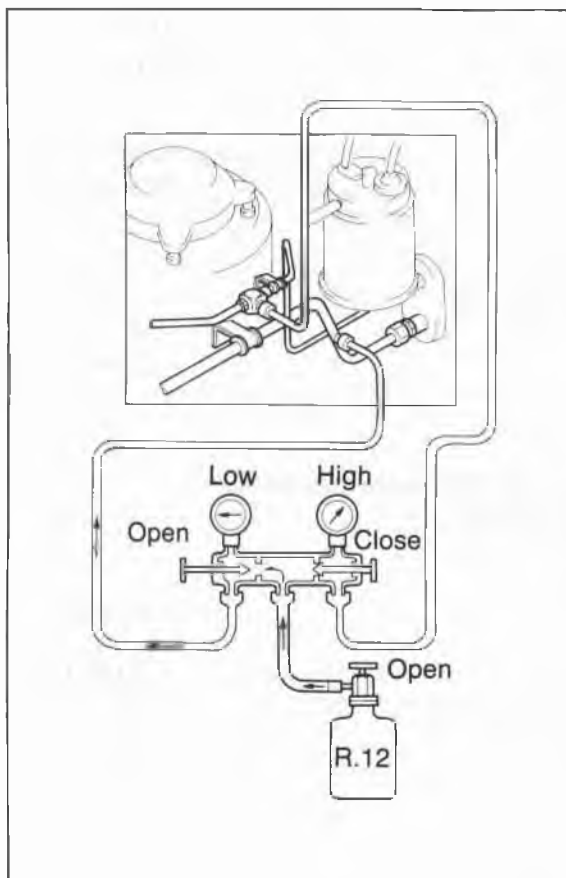
## Refrigerant Container Service Valve

1. Before connecting the valve to the refrigerant container, turn the handle fully counterclockwise.
2. Turn the disc counterclockwise until it reaches its highest position.
3. Connect the center hose to the valve fitting. Turn the disc fully clockwise by hand.
4. Turn the handle clockwise to make a hole in the sealed tap.
5. Turn the handle fully counterclockwise to fill the center hose with air. Do not open the high- and low-pressure manual valves.
6. Loosen the center hose nut connected to the center fitting of the manifold gauge. Allow air to escape for a few seconds, then tighten the nut.

## Leak-Testing the System

After finishing the evacuation of the system, check it for leaks.

1. Install the refrigerant container valve.
2. Open the high-pressure manual valve to charge the system with refrigerant gas.
3. When the low-pressure gauge reads **98.1 kPa (1 kg/cm<sup>2</sup>, 14.2 psi)**, close the high-pressure manual valve.
4. Using a halide gas leak detector, propane torch, or electric leak detector, check the system for leaks. If a leak is found, repair the faulty component or connection, then evacuate the system.



76G16X-632

## Charging the System

1. Close both the high- and low-pressure manual valves completely after the system is evacuated.
2. Install the refrigerant container service valve.
3. Open the low-pressure manual valve and charge the system with refrigerant gas.
4. When charging the system becomes difficult, run the engine at fast idle and operate the air conditioner.

### Caution

**Be sure to keep the container in the upright position to prevent liquid refrigerant from being charged into the system through the suction side and possibly damaging the compressor.**

5. Charge the system to the specified amount, then close the low-pressure manual valve.

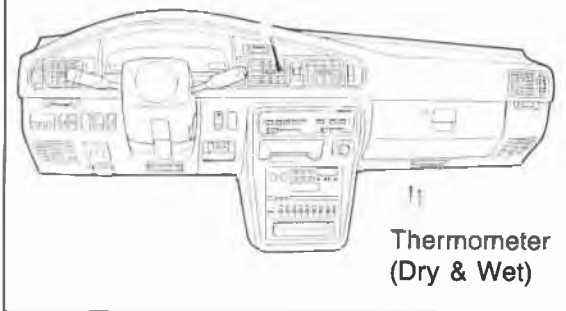
**Specified amount: 800 g (28.24 oz)**

### Note:

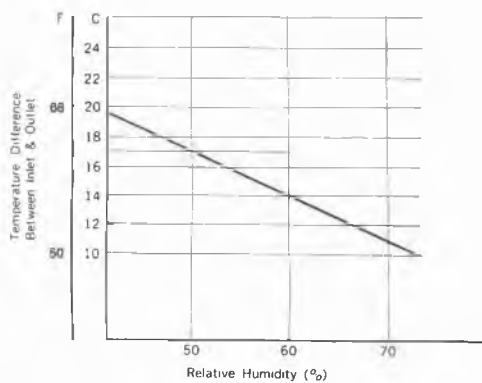
**If the sight glass on the receiver-drier is free of bubbles, the system is fully charged.**

6. Close the low-pressure manual valve and the service valve of the refrigerant container.
7. Stop the air conditioner and the engine.
8. Quickly disconnect both hoses from the gauge fittings.
9. Put the cap nuts on the gauge fittings.

## Thermometer (Dry)



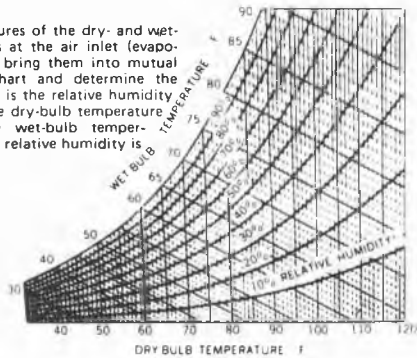
76G16X-633



69G16X-024

### DETERMINING THE RELATIVE HUMIDITY:

Read the temperatures of the dry- and wet-bulb thermometers at the air inlet (evaporator inlet). Then bring them into mutual relation on the chart and determine the intersection, which is the relative humidity. For example, if the dry-bulb temperature is 90°F, and the wet-bulb temperature is 78°F, the relative humidity is 60%.

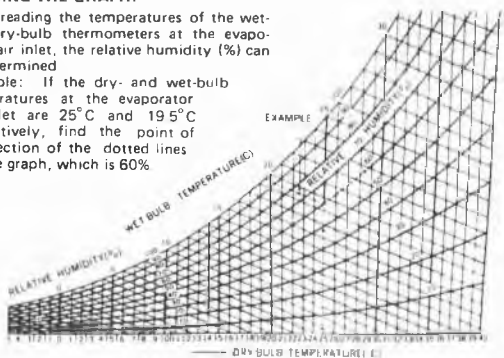


76G16X-634

### READING THE GRAPH:

After reading the temperatures of the wet- and dry-bulb thermometers at the evaporator air inlet, the relative humidity (%) can be determined.

Example: If the dry- and wet-bulb temperatures at the evaporator air inlet are 25°C and 19.5°C respectively, find the point of intersection of the dotted lines in the graph, which is 60%.



## Performance Test

After finishing repairs, be sure to conduct a performance test of the air conditioning system as follows.

### Procedure

1. Connect the manifold gauge set. (Refer to page 16—8)
2. Run the engine and keep the engine speed at **1750 rpm**.
3. Operate the air conditioner at MAX COOLING.
4. Open all windows and doors.
5. Insert a dry-bulb thermometer in the center of the ventilator outlet.
6. Place a dry and wet thermometer close to the inlet of the blower inlet.
7. The high pressure should be within **1374—1569 kPa (14.0—16.0 kg/cm<sup>2</sup>, 200—227 psi)**.

### Note:

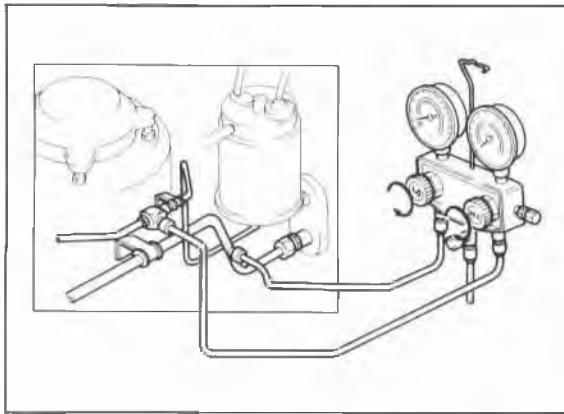
**If the pressure is too high, pour water on the condenser; if it is too low, cover the front surface of the condenser.**

8. The dry-bulb thermometer at the inlet should be within **25—35°C (77—95°F)**. Operate the air conditioning system in this condition until the conditions of the high and low pressure gauges and thermometers are stabilized.

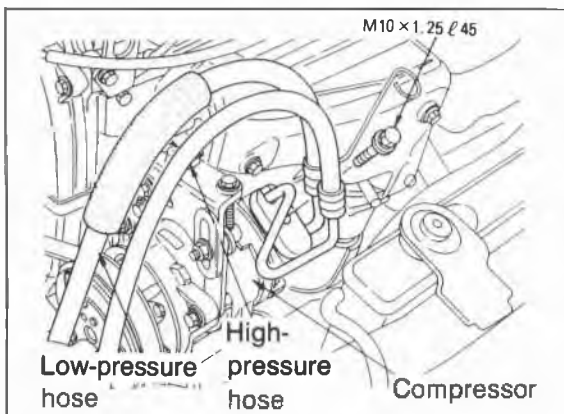
### Reading the standard performance curve

1. Read the inlet temperature and get the relative humidity from the psychrometric chart.
2. Read the cool air temperature at the air outlet.
3. Determine the difference between the inlet and outlet dry-bulb temperature.
4. For example, when the difference is **17°C (30.6°F)** and the relative humidity is **60%**:  
If the closing point is the upper part of the line, cooling performance is satisfactory.

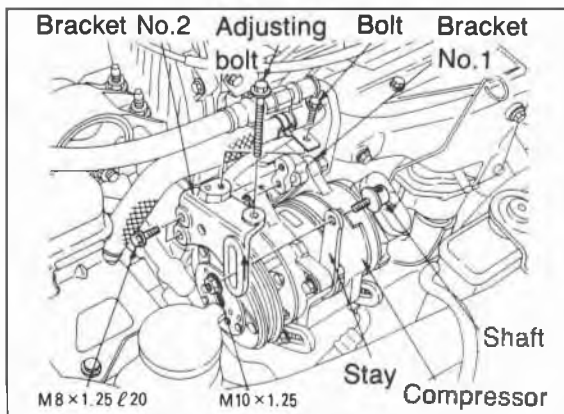




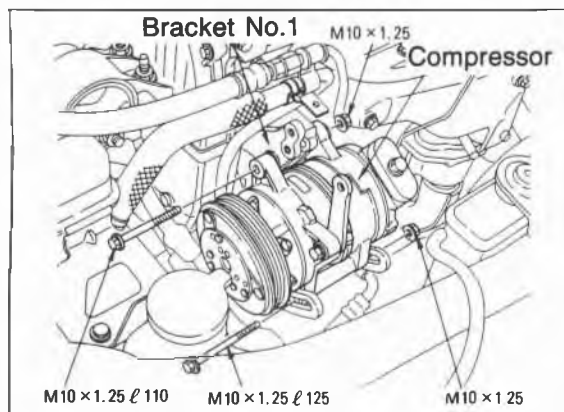
69G16X-026



76G16X-635



69G16X-028



76G16X-636

## COMPRESSOR

### ON-VEHICLE INSPECTION

1. Connect the manifold gauge set.
2. Run the engine at **1,500 rpm**.
3. Check the compressor flow:
  - a) High pressure is not low and low pressure is not higher than normal.
  - b) Metallic sound.
  - c) Check to be sure that the high-pressure and low-pressure gauges show the same value immediately after the air conditioner is switched OFF. If both gauges show the same value immediately, it can be assumed that the gasket or the valve inside the compressor is damaged.
4. Stop the engine.
5. Check the shaft seal and others for leakage.
6. Inspect the drive plate pulley magnetic clutch for signs of oil.
7. Check the clearance between the drive plate and pulley. (Refer to page 16—21.)  
If any of the above checks reveal faults, repair the compressor or magnetic clutch.

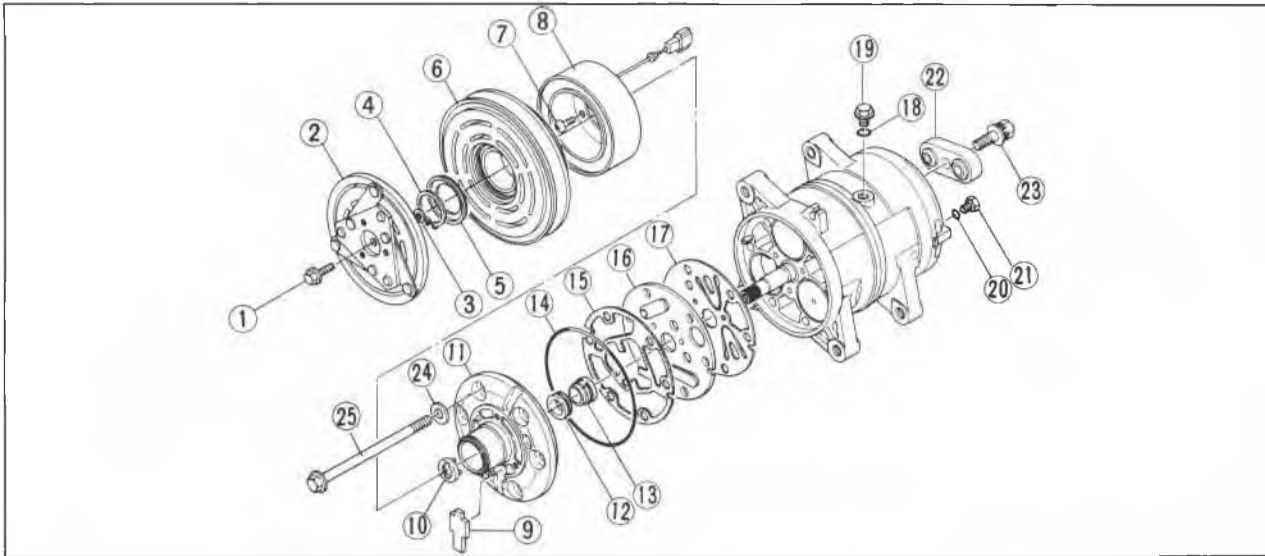
### REMOVAL OF COMPRESSOR

1. Perform the Oil Return Operation. (See below.)
2. Disconnect the battery ground cable.
3. Disconnect the clutch lead wire from the wiring harness.
4. Discharge the refrigerant from the refrigeration system.
5. Disconnect the two flexible hoses. Plug the open fittings immediately to keep moisture out of the system.
6. Loosen the drive belt.
7. Remove the compressor mounting bolts and the compressor.

### Oil Return Operation

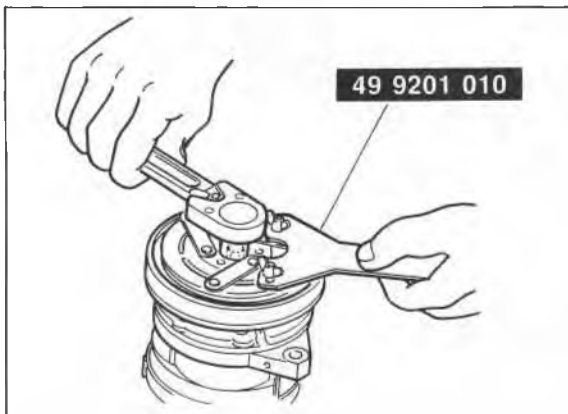
1. If the refrigerant level is low, charge the system to the specified amount.
2. Run the engine and air conditioner at idle and at maximum cooling for at least **20 minutes**.

# 16 COMPRESSOR



69G16X-030

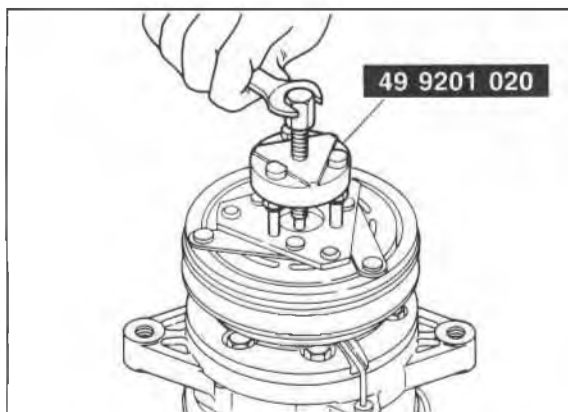
- |                    |                         |                     |
|--------------------|-------------------------|---------------------|
| 1. Bolt            | 9. Felt                 | 17. Suction valve   |
| 2. Drive plate     | 10. Shaft seal cover    | 18. O-ring          |
| 3. Shim            | 11. Front cylinder head | 19. Oil filler plug |
| 4. Snap ring       | 12. Seal seat           | 20. O-ring          |
| 5. Cover           | 13. Shaft seal          | 21. Drain plug      |
| 6. Pulley assembly | 14. O-ring              | 22. Plate           |
| 7. Screw           | 15. Gasket              | 23. Bolt            |
| 8. Coil            | 16. Valve plate         | 24. Gasket          |
|                    |                         | 25. Bolt            |



76G16X-605

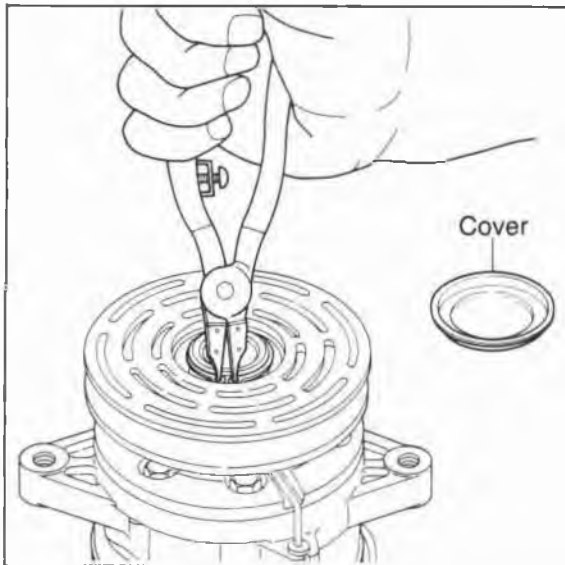
## DISASSEMBLY OF MAGNETIC CLUTCH

1. Using the **SST** to prevent drive plate rotation, remove the center bolt.



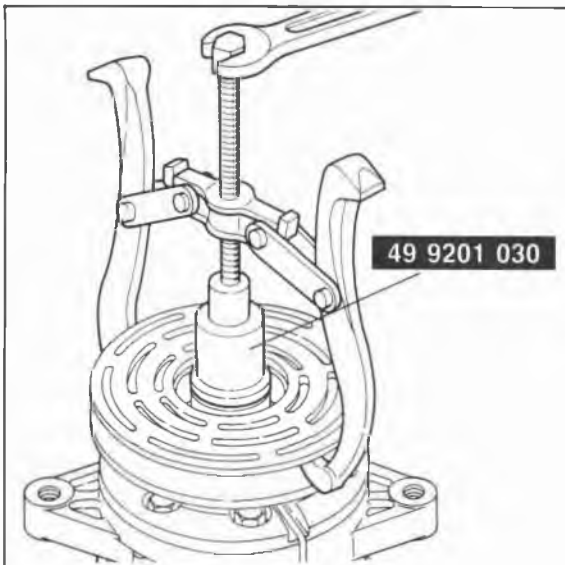
76G16X-606

2. Using the **SST**, remove the drive plate.  
3. Remove the shims from either the drive shaft or the drive plate.



69G16X-033

4. Using external snap ring pliers, remove the snap ring and then the cover.



76G16X-607

5. Place the **SST** on the hub of the front head and use it to remove the pulley assembly.

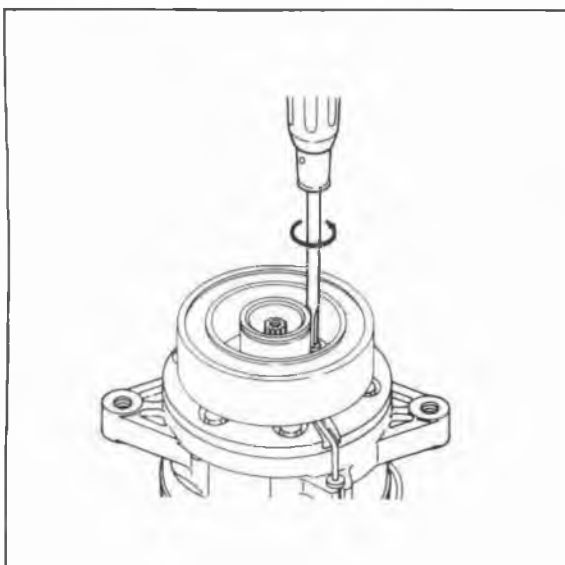
**Note:**

**To keep it from changing shape, hook the pulley puller's hook onto the V-pulley section.**

6. Remove the coil lead wire from the wire holder on the compressor.  
Remove the coil by removing the screws.

**Note:**

**Do not suspend the coil by holding the lead wire.**



69G16X-035

7. Inspection

a) Drive plate

If the frictional surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.

b) Pulley assembly

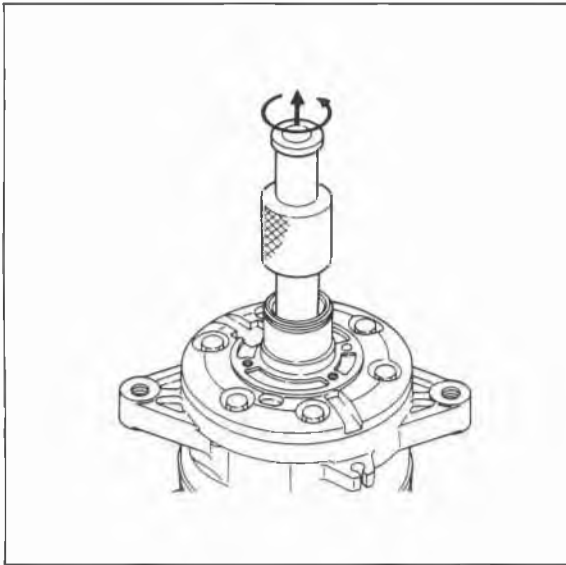
Check the appearance of the pulley assembly. If the frictional surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and drive plate should be replaced. The frictional surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

c) Coil

Check the coil for a loose connector or cracked insulation.

8. Remove the felt.

# 16 COMPRESSOR

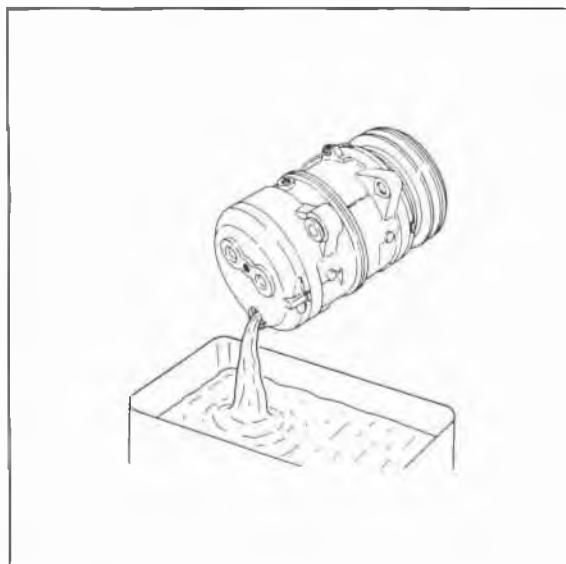
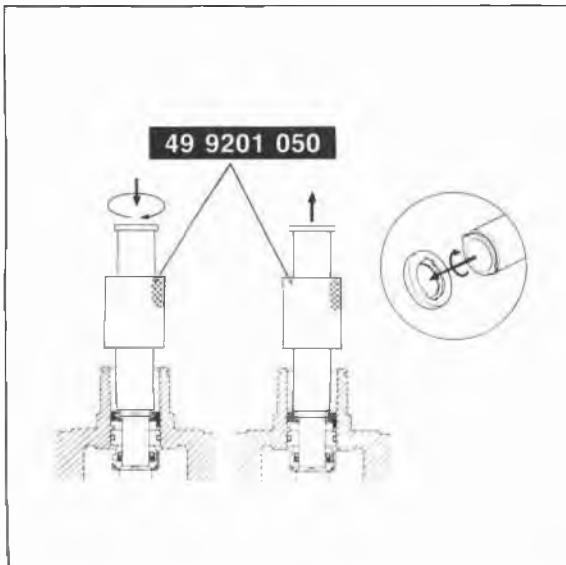


76G16X-608

## DISASSEMBLY OF COMPRESSOR

### Shaft Seal Assembly

1. Using the **SST**, remove the shaft seal cover as follows: attach the remover hook to the shaft seal cover hook and draw the cover out slowly.



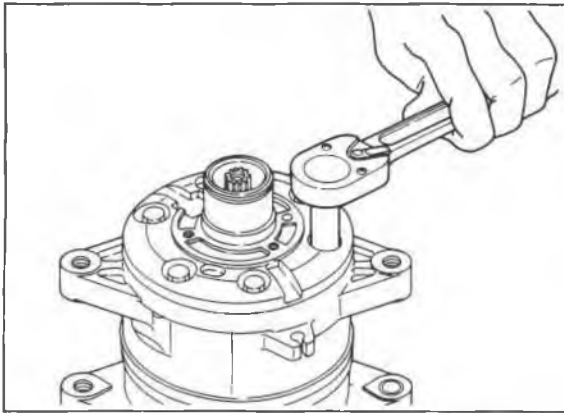
69G16X-037

### Compressor Oil

1. Remove the drain plug and the oil filler plug, then drain out the oil.
2. Measure the drained oil with a measuring cylinder.
3. Check the drained oil for any of the following conditions:
  - a) Whether the opacity of the oil has increased.
  - b) Whether the oil color has changed to red.
  - c) Whether foreign matter, such as metal filings, etc., is present in the oil.

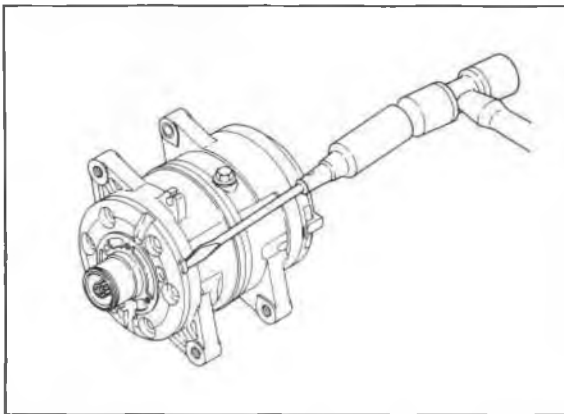
#### Note:

**If the oil drained from the compressor is as described above, replaced it with new oil.**



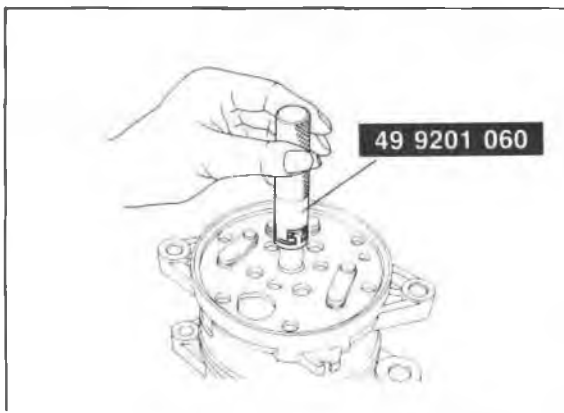
69G16X-038

4. Remove the six screws.



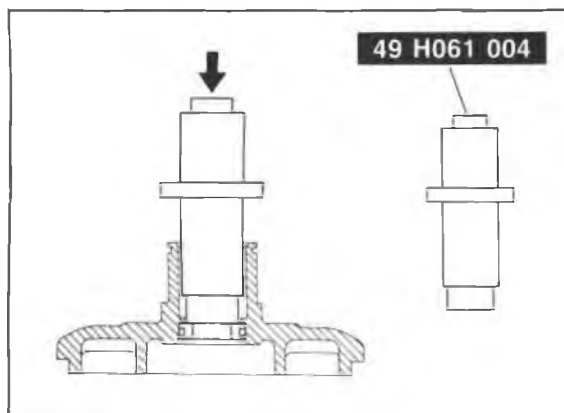
69G16X-039

5. Alternately tap two projections on the circumference of the front head with a screwdriver and plastic mallet, and remove the front head.



76G16X-609

6. Using the **SST**, remove the shaft seal.



76G16X-610

7. Using the **SST**, remove the seal seat.

# 16 COMPRESSOR



76G16X-611

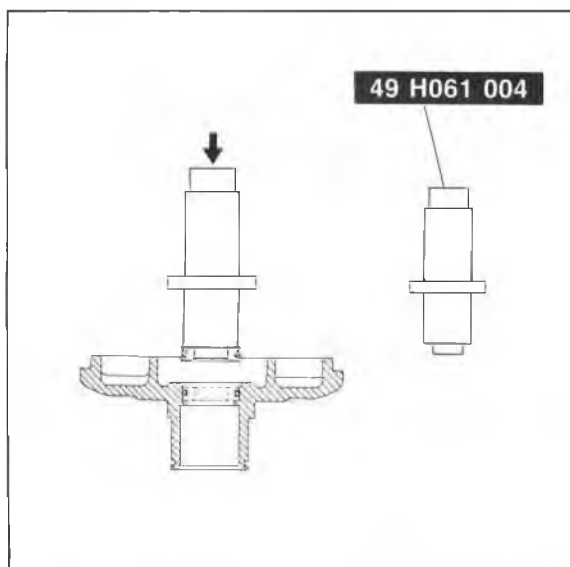
## ASSEMBLY OF COMPRESSOR Shaft Seal Assembly

The shaft seal assembly should not be reused. Always use a new shaft seal kit when reassembling the compressor. Be extremely careful that the surface of the shaft seal to be installed is not scratched or damaged in any way. Be sure that the seal seat and shaft seal are free of dust or dirt which could damage the shaft seal surface.

1. Clean the sealed section of the compressor.
2. Apply clean compressor oil to the new shaft seal and to the driveshaft.

If the slip faces are dirty, clean them with thinner, and, after drying the clean faces, apply clean compressor oil to them.

3. Fit the **SST** onto the end of the driveshaft.
4. Use the **SST** to install the new shaft seal onto the driveshaft, with chamfered portion of the shaft seal retainer facing the corresponding chamfered part of the drive shaft.

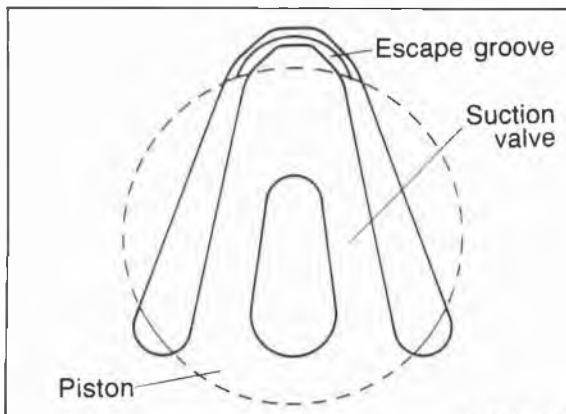


76G16X-612

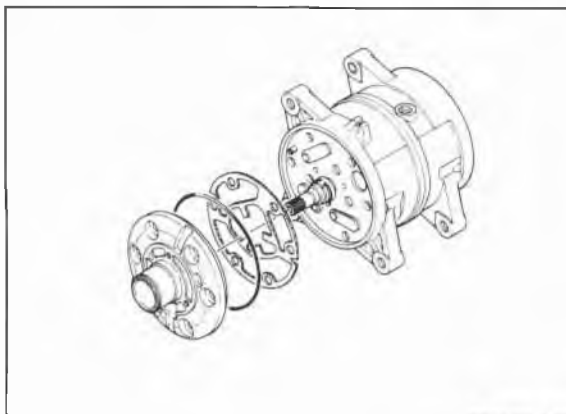
5. Coat the O-ring with clean compressor oil and install it onto the seal seat.  
Coat the seal seat with clean compressor oil.
6. Use the **SST** to install the seal seat.

### Note:

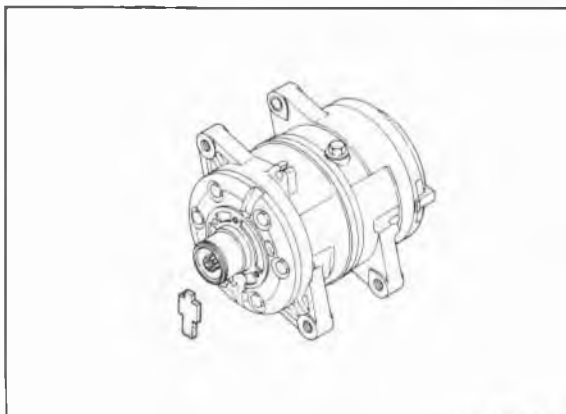
**When installing the seal seat, be careful not to damage the seat surface.**



69G16X-044



69G16X-045



69G16X-046

## Installation of Front Cylinder Head

1. Place the cylinder shaft assembly with the front side upward.
2. Install the front suction valve so that it matches the spring pin.

### Note:

**Check that the valve tallies with the valve escape groove of each cylinder.**

3. Install the front valve plate on the front suction valve.
4. Coat the new gasket with clean compressor oil and install it on the front valve plate.
5. Install the front cylinder head.

In case difficulty is encountered in fitting, install the cylinder head lightly with a plastic mallet.

### Note:

**When installing the front cylinder head, be careful that you do not scratch the seat surface of the seal seat fitted onto the front cylinder head with the lip of the driveshaft.**

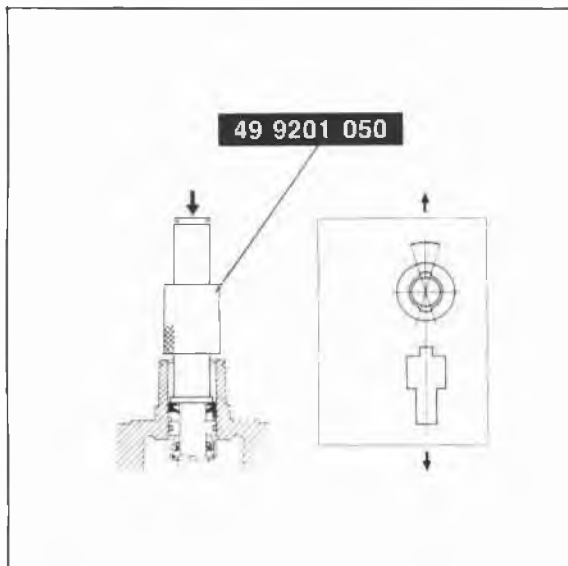
Mount the new gasket on the through-bolts. Insert six through-bolts from the front side and tighten them to **20—24 N·m (2.0—2.4 m·kg, 14.5—17.3 ft·lb)**. Each bolt should be equally tightened more than three times to ensure the specified torque.

The bolts should be tightened in the order shown in the figure.

Place felt on the front cylinder head.

Turn the driveshaft 2 or 3 times by hand, and make sure that it rotates smoothly.

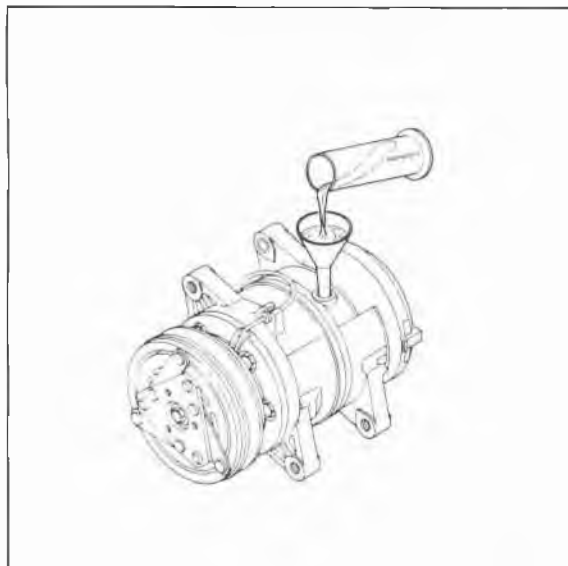
# 16 COMPRESSOR



76G16X-613

## Installation of Shaft Seal Cover

1. Install the guide shaft seal on the drive shaft end.
2. Using the **SST**, install the shaft seal cover.  
Direction of the cover is shown in the figure.



69G16X-048

## Compressor Oil

Compressor Oil: FREOL DS-83P

1. Tighten the oil drain plug using a new O-ring.

**Tightening torque: 13—15 N·m  
(1.3—1.5 m·kg, 9.4—10.8 ft·lb)**

2. Remove the oil filler plug and supply new oil through the filler.

The charging amount is as follows:

Collected amount	Charging amount
More than 60 cc	Same as collected amount
Less than 60 cc	60 cc

3. Tighten the oil filler plug, using a new O-ring.

**Tightening torque: 13—15 N·m  
(1.3—1.5 m·kg, 9.4—10.8 ft·lb)**

## ASSEMBLY OF MAGNETIC CLUTCH

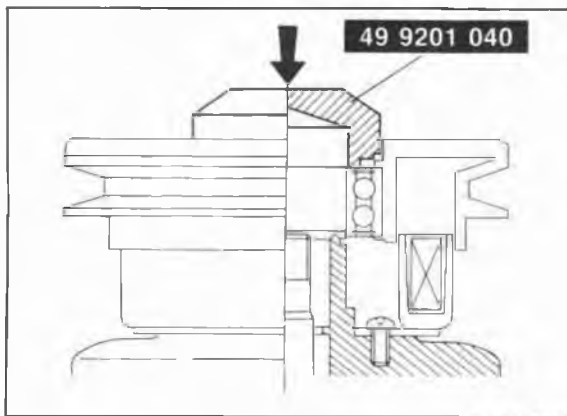
Verify that the felt is installed on the front cylinder head.

1. Install the coil onto the compressor (with the lead wires on top) and tighten the mounting screws.

**Tightening torque: 3.9—5.9 N·m  
(0.4—0.6 m·kg, 2.9—4.3 ft·lb)**

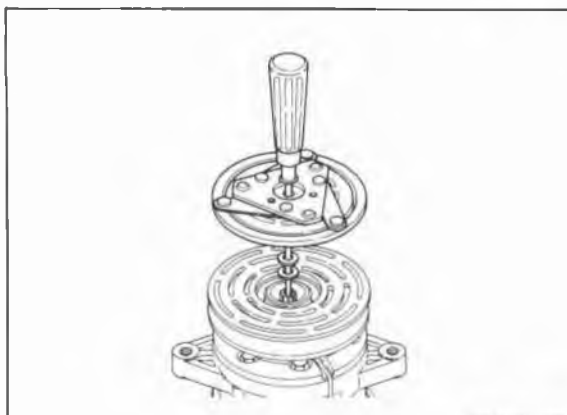
2. Insert the head wire into the wire holder on the compressor.





76G16X-614

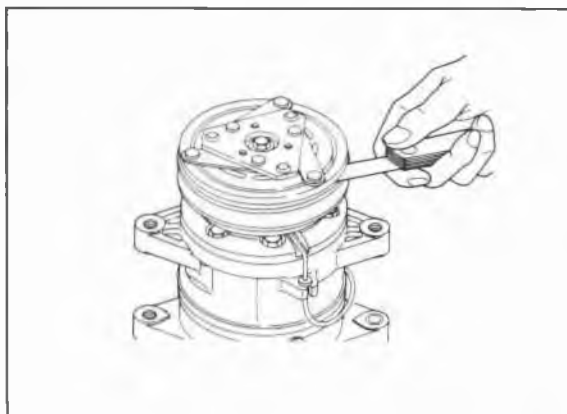
3. Install the pulley assembly by using the **SST**, then install the cover and the snap ring.



76G16X-009

4. Install the drive plate onto the drive shaft together with the original shim(s).
5. Using the **SST (49 9201 010)** to prevent the drive plate rotation, tighten the bolt. (Refer to page 16—14.)

**Tightening torque: 14—16 N·m  
(1.4—1.6 m·kg, 10.1—11.5 ft·lb)**

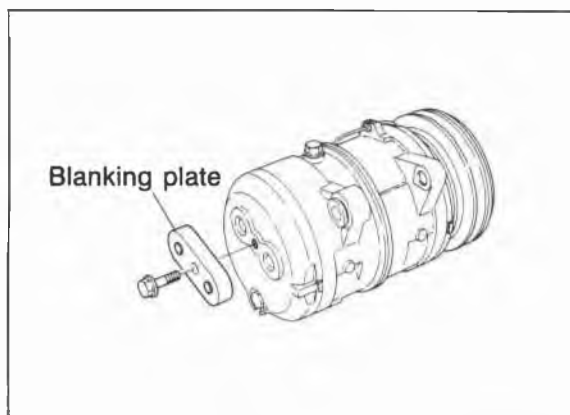


69G16X-051

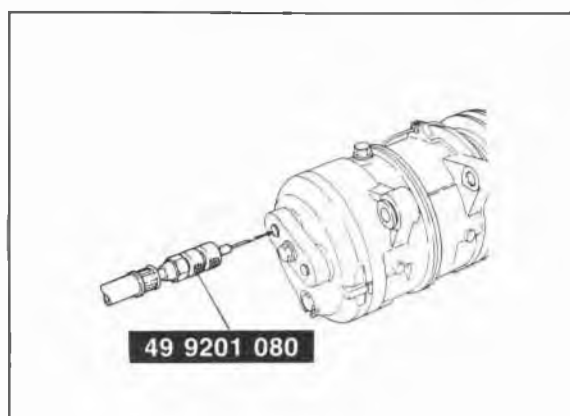
6. Check that clutch clearance is between **0.3—0.6 mm (0.01—0.02 in)**. Adjust clearance by using shim(s), if necessary. Adjusting shims are available in the following thicknesses:  
0.1 mm (0.0039 in)  
0.3 mm (0.0118 in)  
0.5 mm (0.0197 in)

**Standard clearance:  
0.3—0.6 mm (0.01—0.02 in)**

# 16 COMPRESSOR



69G16X-052



76G16X-616

## PERFORMANCE TEST OF COMPRESSOR

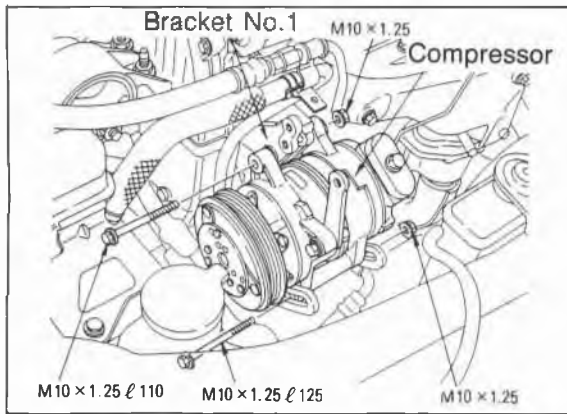
1. Perform the leakage test
  - a) Attach a blanking plate to the open rear fittings.

- b) By using the **SST**, supply the refrigerant through the suction side until the pressure becomes **50—147 kPa (0.5—1.5 kg/cm<sup>2</sup>, 7—35 psi)**.
- c) Using a leak detector, check the compressor for leaks.

2. Evacuate the compressor and charge with refrigerant.  
Be sure the blanking plate is tight and free from moisture and contamination.

**Note:**  
**When storing a compressor, charge it with refrigerant or dry nitrogen gas to prevent corrosion.**

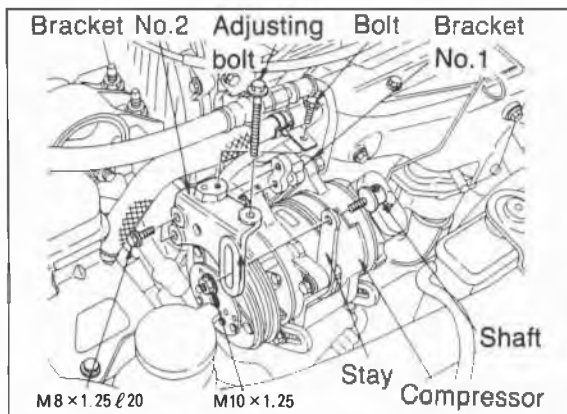
76G16X-617



76G16X-618

## INSTALLATION OF THE COMPRESSOR

1. Install the compressor to the bracket No.1.



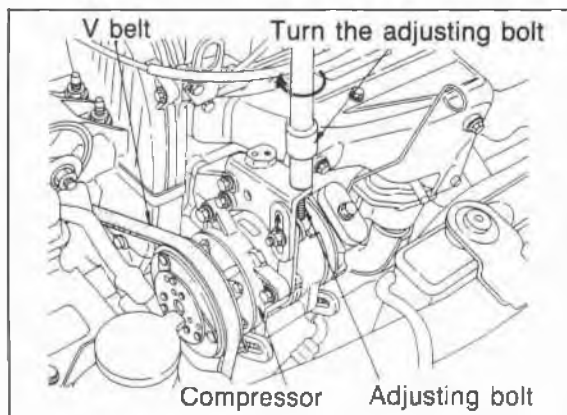
76G16X-619

2. Install the bracket No.2 to the bracket No.1 and compressor.

### Note

**When tighten the bracket No.1 to the bracket No.2, pull up the bracket No.2 fully.**

3. Install the adjusting bolt to the bracket No.2.



76G16X-620

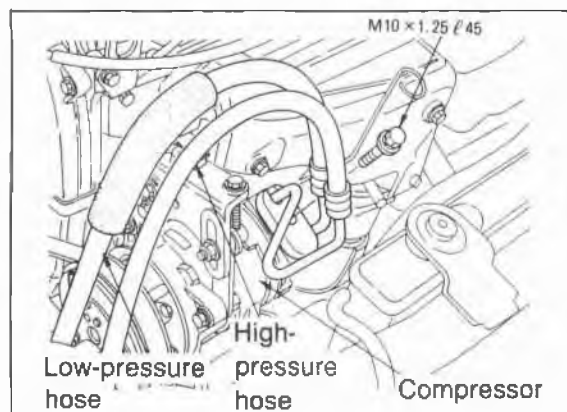
4. Install the air conditioner drive belt, and set the air conditioner drive belt tightening the adjusting volt.

### Air conditioner drive belt deflection

**(When push the air conditioner belt with 10 kg)**

**New: 7—9 mm (0.28—0.35 in)**

**Used: 8—12 mm (0.31—0.47 in)**



76G16X-621

5. Connect the two hoses to the compressor by tightening the bolt.

# 16 CONDENSER

## CONDENSER

### ON-VEHICLE INSPECTION

1. Check the condenser fins for blockage or damage.  
If the fins are clogged, clean them with compressed air.  
If the fins are bent, straighten them with a screwdriver or pair of pliers.
2. Check the condenser fittings for leakage.  
Repair or replace, if necessary.

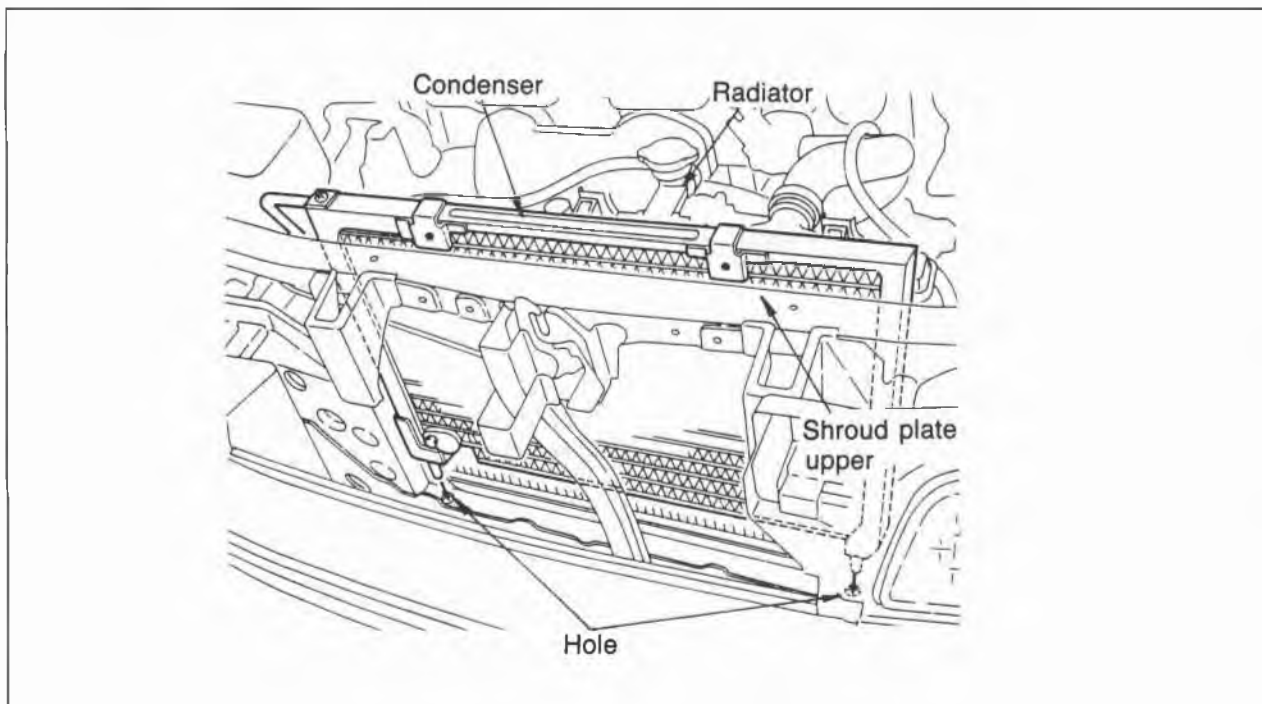
### REMOVAL OF CONDENSER

1. Discharge the air conditioning system. (Refer to page 16—9.)
2. Remove the front grille and the air seal cover.
3. Disconnect the discharge flexible hose from the condenser inlet fitting.
4. Disconnect the liquid line pipe from the condenser outlet fitting.

#### Note:

**Plug the open fittings immediately to keep moisture out of the system.**

6. Remove the condenser.



76G16X-637

### INSTALLATION OF CONDENSER

1. Install the condenser by using the two bolts and two nuts.
2. Connect the liquid line pipe and the discharge flexible hose to the condenser.

#### Tightening torque:

**Liquid line pipe: 15—25 N·m (1.5—2.5 m·kg, 11—18 ft·lb)**

**Discharge flexible hose: 15—22 N·m (1.5—2.2 m·kg, 11—16 ft·lb)**

3. Install the front grille and the air seal cover.
4. If the condenser is replaced with a new one, supply compressor oil.

#### Compressor oil: 30 cc (1.83 cu in)

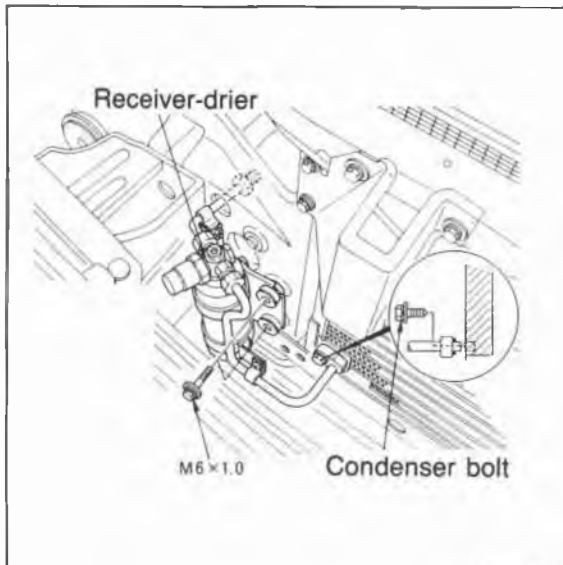
5. Evacuate, charge, and test the air conditioning system.

## RECEIVER-DRIER

### ON-VEHICLE INSPECTION

1. Use a leak detector to check the sight glass, the fusible plug, and the fittings for leakage. Repair or replace, if necessary.
2. Check the receiver-drier for clogging.
  - a) Run the engine at fast idle with the air conditioner on.
  - b) Check both inlet and outlet temperatures. If there is a great difference between the two temperatures, replace the receiver-drier.

76G16X-622



76G16X-638

### REMOVAL OF RECEIVER-DRIER

1. Discharge the air conditioning system. (Refer to page 16—9)
2. Disconnect the two liquid line pipes from the receiver-drier.

**Note:**

**Plug the open fittings immediately to keep moisture out of the system.**

3. Remove the receiver-drier from the bracket.

### INSTALLATION OF RECEIVER-DRIER

1. Install the receiver-drier onto the bracket.

**Note:**

**Do not remove the blind plugs until ready for connection.**

2. Connect the two liquid line pipes to the receiver-drier.

**Tightening torque:**

**15—25 N·m (1.5—2.5 m·kg, 11—18 ft·lb)**

3. If the receiver-drier is replaced with a new one, add compressor oil to the compressor.

**Compressor oil: 10 cc (0.61 cu in)**

# 16 COOLING UNIT

## COOLING UNIT

### ON-VEHICLE INSPECTION OF EXPANSION VALVE

1. Connect the manifold gauge set to the gauge fittings on the low- and high-pressure pipes.
2. Operate the engine at **1,500 rpm** and the air conditioner at **MAX. COOLING**.
3. Check the low and high pressures.  
Normal pressures are:

**Low: 197—294 kPa**  
**(2—3 kg/cm<sup>2</sup>, 28—43 psi)**

**High: 1472—1765 kPa**  
**(15—18 kg/cm<sup>2</sup>, 210—260 psi)**

If pressure is not as specified, replace the expansion valve.

76G16X-623

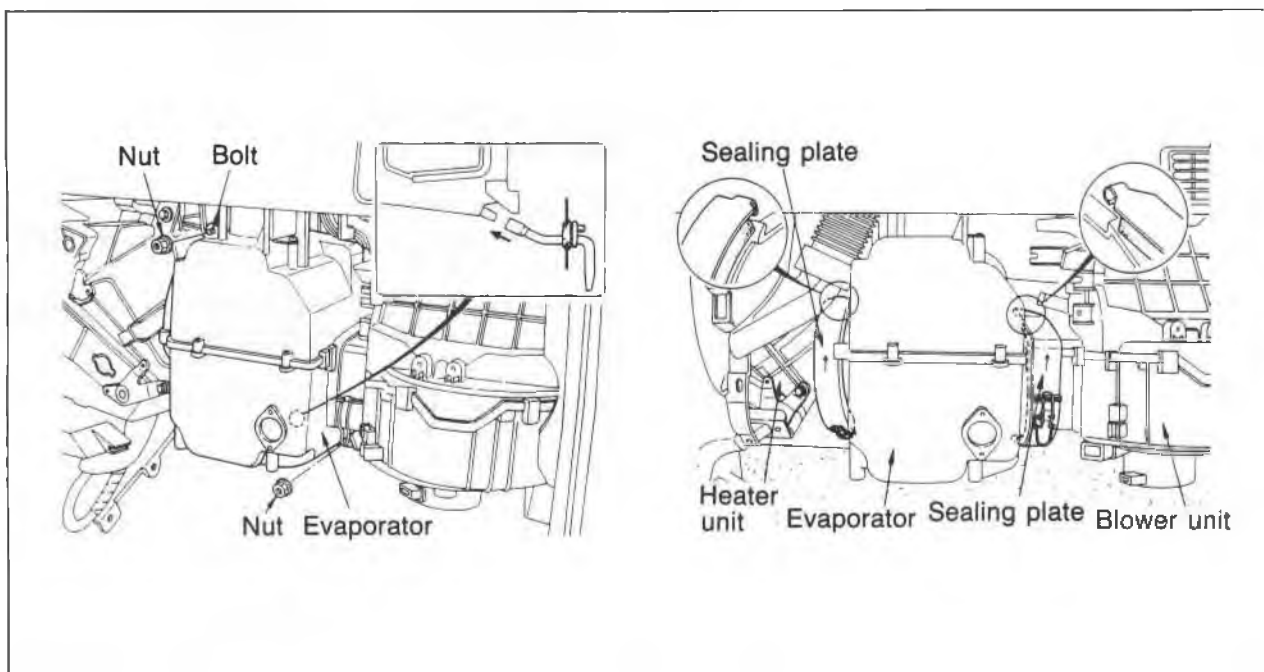
### REMOVAL OF COOLING UNIT

1. Disconnect the battery ground cable.
2. Discharge the air conditioning system. (Refer to page 16—9.)
3. Disconnect the suction low-pressure pipe from the evaporator unit outlet fitting.
4. Disconnect the liquid line pipe from the evaporator unit inlet fitting.

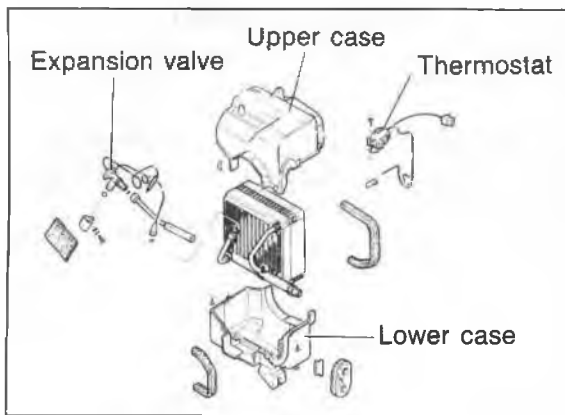
#### Note:

**Plug all open fittings immediately to keep moisture out of the system.**

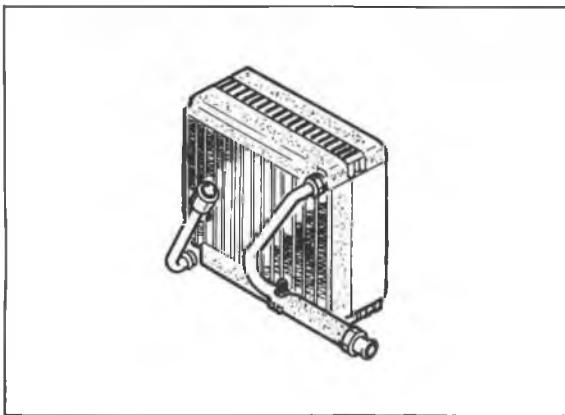
5. Remove the grommets from the expansion valve.
6. Remove the instrument lower panel and the glove box.
7. Remove the sealing plates from both sides of the cooling unit.
8. Disconnect the A/C wiring harness from the evaporator unit.
9. Remove the drain hose from the cooling unit.
10. Remove the two nuts and the cooling unit.



76G16X-624



76G16X-006



## DISASSEMBLY OF COOLING UNIT

1. Remove the screws by using a screwdriver.
2. Remove the upper case.
3. Remove the thermostat.
4. Remove the lower case.
5. Remove the expansion valve.

## INSPECTION OF EVAPORATOR

1. Check the evaporator fins for blockage. If the fins are clogged, clean them with compressed air.

### Caution:

**Never use water to clean the evaporator.**

2. Check the fittings for cracks or scratches. Repair or replace, if necessary.

## ASSEMBLY OF COOLING UNIT

1. Connect the expansion valve to the inlet fitting of the evaporator. Tighten the two bolts by using a wrench.

### Note:

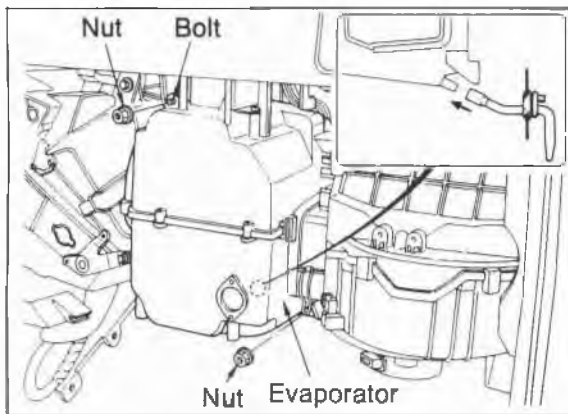
**Be sure that the O-ring is positioned on the pipe fitting.**

**Specified torque: 2.7—3.4 N·m  
(0.27—0.35 m·kg, 2.0—2.5 ft·lb)**

2. Install the lower case onto the evaporator.
3. Install the thermostat in its original position.
4. Install the lower case onto the evaporator.

69G16X-060

# 16 COOLING UNIT



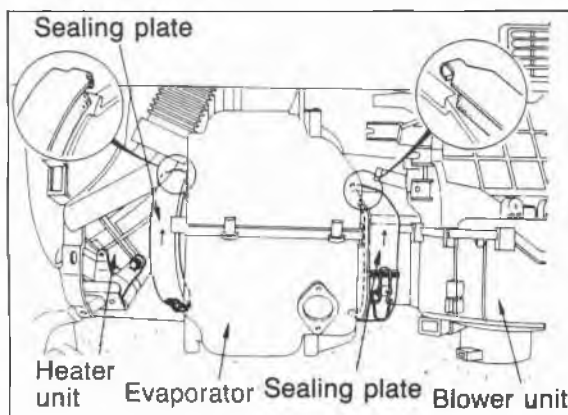
## INSTALLATION OF COOLING UNIT

1. Install the cooling unit by using the two nuts.

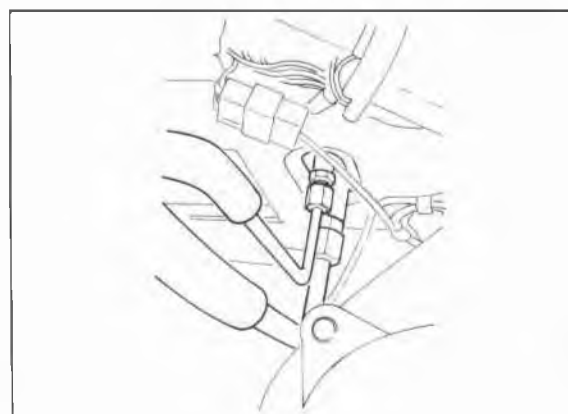
### Note

Adjust and position the unit so that its connections match those of the heater unit and the blower unit.

2. Connect the drain hose.



3. Join the connections on both sides by using the seal plates.
4. Connect the A/C harness to the cooling unit.



5. Connect the liquid line high-pressure pipe and suction low-pressure pipe to the cooling unit.

### Tightening torque:

**15—22 N·m (1.5—2.5 m·kg, 11—18 ft·lb)**

6. Install the instrument lower panel, shower duct and glove box.
7. If the evaporator is replaced, add compressor oil to the compressor.

**Compressor oil: 50 cc (3.05 cu in)**



## REFRIGERANT LINES

### ON-VEHICLE INSPECTION

1. Check all piping connections for leakage by using a leak detector. Replace if necessary.
2. Check that the hose and pipe clamps are not loose.  
Tighten or replace, if necessary.

### REPLACEMENT OF REFRIGERANT LINES

1. Discharge the air conditioning system. (Refer to page 16—9)
2. Replace the faulty pipe or hose.

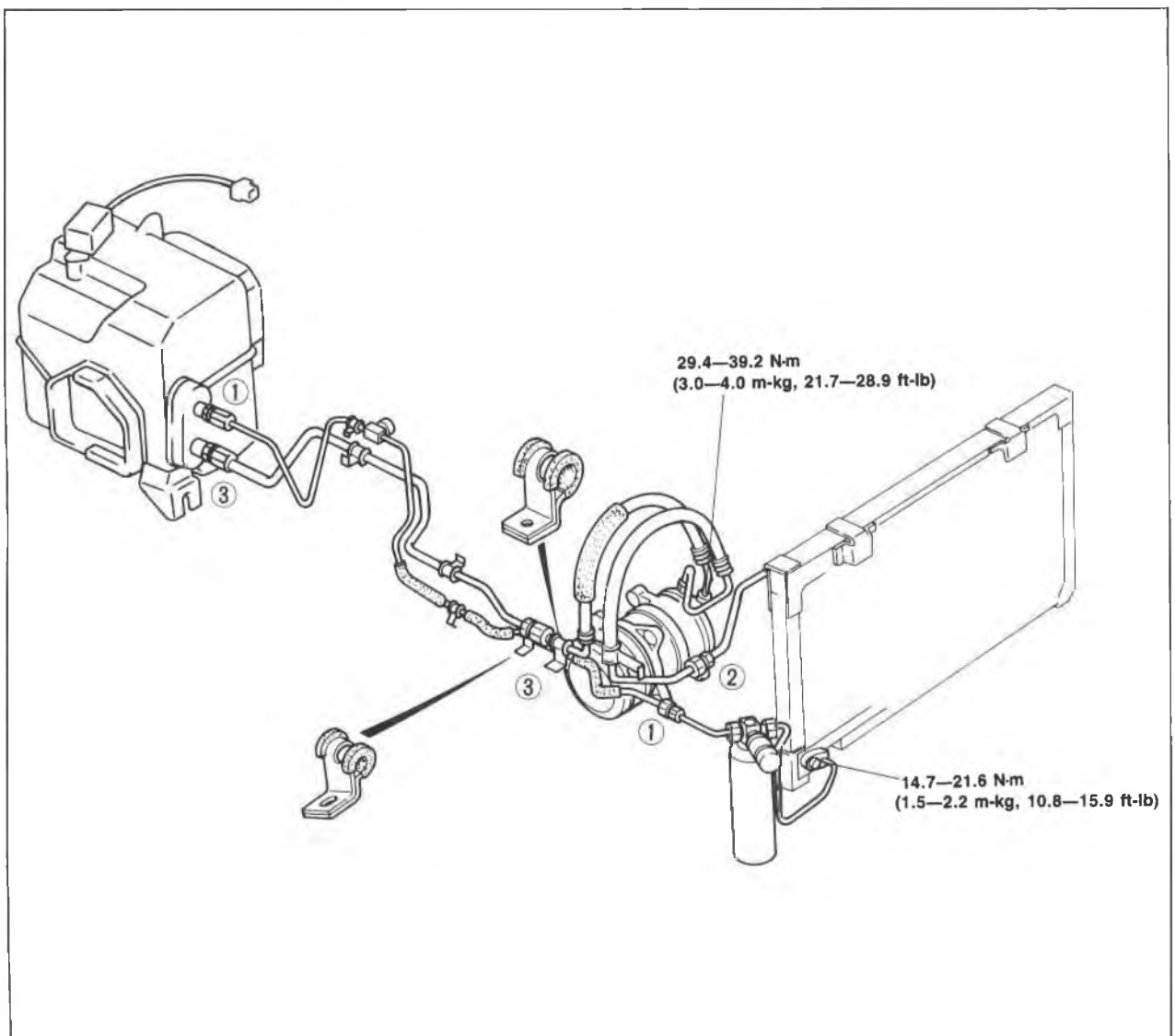
#### Note:

**Plug all open fittings immediately to keep moisture out of the system.**

#### Tightening torque (fittings):

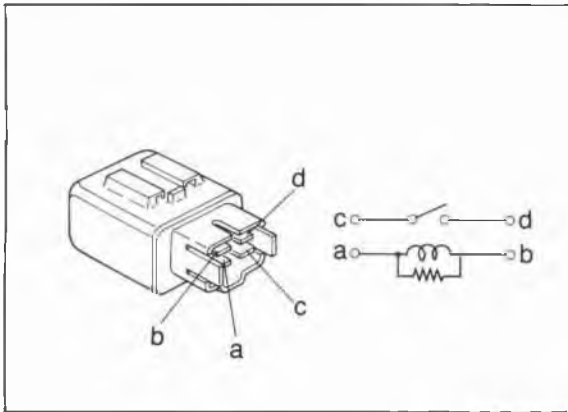
Location	Tightening torque
①	10—20 N·m (1.0—2.0 m·kg, 7.2—14.4 ft·lb)
②	15—25 N·m (1.5—2.5 m·kg, 10.8—18.0 ft·lb)
③	20—29 N·m (2.0—3.0 m·kg, 14.4—21.6 ft·lb)

3. Evacuate, charge, and test the air conditioning system. (Refer to page 16—9.)



76G16X-628

# 16 A/C RELAY



69G16X-063

## A/C RELAY

### REMOVAL OF RELAY

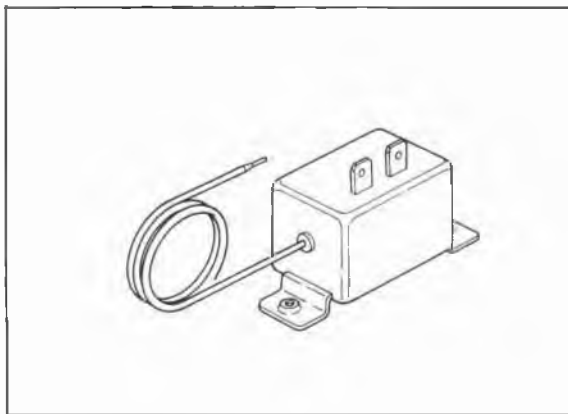
1. Disconnect the negative battery cable.
2. Disconnect the wire harness connector.
3. Remove the relay from the seal plate.

### INSPECTION OF A/C RELAY

1. Using a circuit tester, check that there is continuity between terminals (a) and (b).
2. Apply 12 volts across terminals (a) and (b), and check whether there is continuity between terminals (c) and (d). Replace if necessary.

### INSTALLATION OF A/C RELAY

1. Install the relay to the seal plate.
2. Connect the wire harness connector.
3. Connect the negative battery cable.



76G16X-007

## THERMOSTAT

### ON-VEHICLE INSPECTION

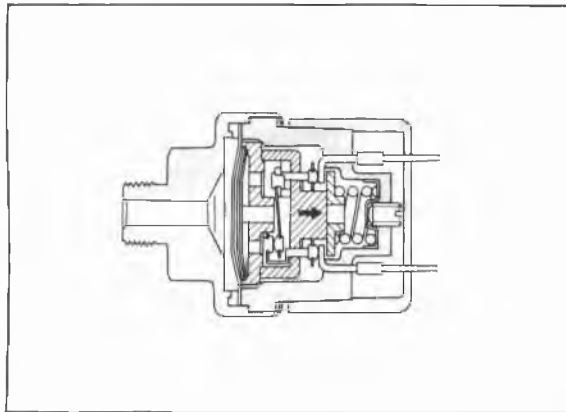
1. Operate the air conditioner at MAX. COOLING.
2. Turn the ECO switch to ON.
3. Block the air inlet of the blower unit with a thick piece of paper.
4. Check whether the relay is turned OFF when the temperature of the evaporator drops below **7°C (44.6°F)**.
5. Turn the ECO switch to OFF.
6. Check whether the relay's turned OFF when the temperature of the evaporator drops below **1°C (33.8°F)**.

### REMOVAL OF THERMOSTAT

1. Disconnect the negative battery cable.
2. Disconnect the A/C wiring harness.
3. Remove the thermostat from the cooling unit.

### INSTALLATION OF THERMOSTAT

1. Install the thermostat by using the two screws.
2. Connect the A/C wiring harness.
3. Connect the negative battery cable.



76G16X-008

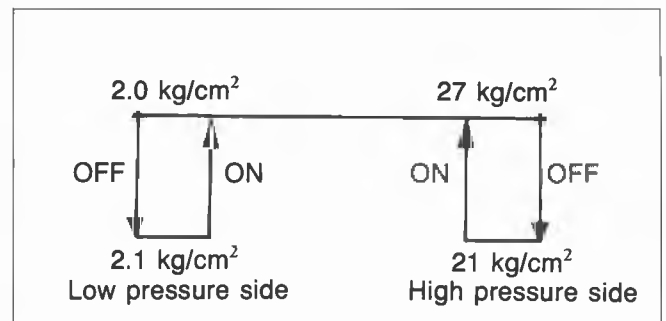
## REFRIGERANT PRESSURE SWITCH

- **Low-pressure side**

If the high pressure in the system drops to below **196 kPa (2.0 kg/cm<sup>2</sup>, 28.4 psi)** the switch cuts the compressor power supply and turns on at a pressure above **206 kPa (2.1 kg/cm<sup>2</sup>, 30.0 psi)**.

- **High-pressure side**

If the high pressure in the system exceeds **2,649 kPa (27 kg/cm<sup>2</sup>, 384 psi)** the switch cuts the compressor power supply and turns on at a pressure above **2,060 kPa (21 kg/cm<sup>2</sup>, 299 psi)**.



## TECHNICAL DATA

MEASUREMENT .....	30— 2
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ENGINE (DOHC) .....	30— 8
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STANDARD BOLT AND NUT TIGHTENING TORQUE .....	30—40

# 30 TECHNICAL DATA

## 0. MEASUREMENT

Item		Engine model	Coupe/MX-6	Sedan	Hatchback
Overall length		mm (in)	4,450 (175.2)	4,515 (177.8)	4,515 (177.8)
Overall width		mm (in)	1,690 (66.5)	1,690 (66.5)	1,690 (66.5)
Overall height (14 inch/13 inch)		mm (in)	1,360 (53.5)/1,345 (52.9)	1,410 (55.5)/1,395 (54.9)	1,375 (54.1)/1,360 (53.5)
Wheel base		mm (in)	2,515 (99.0)	2,575 (101.4)	2,575 (101.4)
Tread (14 inch/13 inch)	mm (in)	Front	1,455 (57.3)/1,460 (57.5)	1,455 (57.3)/(1,460 (57.5)	1,455 (57.3)/1,460 (57.5)
		Rear	1,465 (57.7)/1,455 (57.3)	1,465 (57.7)/1,455 (57.3)	1,465 (57.7)/1,455 (57.3)

## 1A. ENGINE (SOHC) 12-valve

Item		Engine model	FE 12-valve
Type			Gasoline, 4-cycle
Cylinder arrangement and number			In-line, 4-cylinders
Type of combustion chamber			Pentroof
Valve system			OHC, belt-driven
Bore x Stroke		mm (in)	86.0 x 86.0 (3.39 x 3.39)
Total piston displacement		cc (cu in)	1,998 (121.9)
Compression ratio			9.5 : 1
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm		Standard	1,422 (14.5, 206)—280
		Minimum	996 (10.2, 144)—280
		Maximum difference between cylinders	196 (2.0, 28)
Valve timing	IN	Open BTDC	14°
		Close ABDC	56°
	EX	Open BBDC	69°
		Close ATDC	13°
Valve clearance	mm (in)	IN	0; Maintenance free
		EX	0; Maintenance free
<b>Cylinder head</b>			
Height		mm (in)	91.95—92.05 (3.620—3.624)
Distortion		mm (in) Maximum	0.15 (0.006)
Grinding limit		mm (in) Maximum	0.20 (0.008)
<b>Valve and valve guide</b>			
Valve head diameter	mm (in)	IN	32.4—32.6 (1.276—1.283)
		EX	33.9—34.1 (1.335—1.343)
Valve head thickness (margin)	mm (in)	IN	0.8—1.2 (0.031—0.047)
		EX	1.3—1.7 (0.051—0.067)
Valve face angle		IN	45°
		EX	45°
Valve length	mm (in)	IN	Standard 115.81 (4.5594)
			Minimum 115.31 (4.5398)
	EX	Standard	116.21 (4.5752)
		Minimum	115.71 (4.5555)
Valve stem diameter	mm (in)	IN	6.970—6.985 (0.2744—0.2750)
		EX	6.965—6.980 (0.2742—0.2748)
Guide inner diameter	mm (in)	IN	7.01—7.03 (0.2760—0.2768)
		EX	7.01—7.03 (0.2760—0.2768)
Valve stem to guide clearance	mm (in)	IN	0.025—0.060 (0.0010—0.0024)
		EX	0.030—0.065 (0.0012—0.0026)
		Maximum	0.20 (0.0079)
Guide projection (Height "A")		mm (in)	19.8—20.3 (0.780—0.799)

Item		Engine model	FE 12-valve
<b>Valve seat</b>			
Seat angle		IN	45°
		EX	45°
Seat contact width	mm (in)	IN	1.2—1.6 (0.047—0.063)
		EX	1.2—1.6 (0.047—0.063)
Seat sinking (Measure valve protruding length)	IN	Standard	50.2 (1.976)
		Maximum	51.0 (2.008)
	EX	Standard	50.2 (1.976)
		Maximum	51.0 (2.008)
<b>Valve spring</b>			
Free length	IN	Standard	49.5 (1.949)
		Minimum	49.0 (1.929)
	EX	Standard	50.4 (1.984)
		Minimum	48.7 (1.917)
Out-of-square	mm (in)	Maximum	1.8 (0.071)
Setting load/height	N (kg, lb)/mm (in)	IN	203—230 (20.7—23.4, 45.5—51.5)/41 (1.614)
		EX	240—272 (24.5—27.7, 53.9—60.9)/41 (1.614)
<b>Camshaft</b>			
Cam lobe height	IN	Standard	41.290—41.390 (1.6256—1.6295)
		Minimum	41.140 (1.6197)
	EX	Standard	41.797—41.897 (1.6455—1.6495)
		Minimum	41.647 (1.6396)
Journal diameter	Front and Rear (No. 1,5)		31.940—31.965 (1.2575—1.2585)
	Center (No. 2,3,4)		31.910—31.935 (1.2563—1.2573)
	Out-of-round	Maximum	0.05 (0.002)
Camshaft bearing oil clearance	Front and Rear (No. 1,5)		0.035—0.085 (0.0014—0.0033)
	Center (No. 2,3,4)		0.065—0.115 (0.0026—0.0045)
		Maximum	0.15 (0.0059)
Camshaft runout	mm (in)	Maximum	0.03 (0.0012)
Camshaft end play	mm (in)	Standard	0.08—0.16 (0.003—0.006)
		Maximum	0.20 (0.008)
<b>Rocker arm and rocker arm shaft</b>			
Rocker arm inner diameter	mm (in)		19.000—19.033 (0.748—0.749)
Rocker arm shaft diameter	mm (in)		18.959—18.980 (0.746—0.747)
Rocker arm to shaft clearance	mm (in)	Standard	0.020—0.074 (0.0008—0.0029)
		Maximum	0.10 (0.004)
<b>Cylinder block</b>			
Height	mm (in)		289.0 (11.38)
Distortion	mm (in)	Maximum	0.15 (0.006)
Grinding limit	mm (in)		0.20 (0.008)
Cylinder bore diameter	mm (in)	Standard	86.000—86.019 (3.3858—3.3866)
		0.25 (0.010) oversize	86.250—86.269 (3.3957—3.3964)
		0.50 (0.020) oversize	86.500—86.519 (3.4055—3.4062)
Cylinder bore taper and out-of-round	mm (in)	Maximum	0.019 (0.0007)
<b>Piston</b>			
Piston diameter measured at 90° to pin bore axis and 18.0 mm (0.709 in) below oil ring groove	mm (in)	Standard	85.944—85.964 (3.3836—3.3844)
		0.25 (0.010) oversize	86.194—86.214 (3.3935—3.3942)
		0.50 (0.020) oversize	86.444—86.464 (3.4033—3.4041)
Piston to cylinder clearance	mm (in)	Standard	0.036—0.075 (0.0014—0.0030)
		Maximum	0.15 (0.0059)
<b>Piston ring</b>			
Thickness	mm (in)	Top	1.47—1.49 (0.0579—0.0587)
		Second	1.47—1.49 (0.0579—0.0587)

# 30 TECHNICAL DATA

Item		Engine model	FE 12-valve	
End gap measured in cylinder	mm (in)	Top	0.20—0.35 (0.008—0.0138)	
		Second	0.15—0.30 (0.006—0.012)	
		Oil (rail)	0.20—0.70 (0.008—0.0276)	
		Maximum	1.0 (0.039)	
Ring groove width in piston	mm (in)	Top	1.52—1.54 (0.0598—0.0606)	
		Second	1.52—1.54 (0.0598—0.0606)	
		Oil	4.02—4.04 (0.1583—0.1591)	
Clearance of piston ring to ring groove	mm (in)	Top	0.03—0.07 (0.0012—0.0028)	
		Second	0.03—0.07 (0.0012—0.0028)	
		Maximum	0.15 (0.006)	
<b>Piston pin</b>				
Diameter	mm (in)		21.974—21.980 (0.8651—0.8654)	
Interference in connecting rod	mm (in)		0.013—0.037 (0.0005—0.0015)	
Piston to piston pin clearance	mm (in)		0.008—0.024 (0.0003—0.0009)	
Installation pressure	N (kg, lb)		4,900—14,700 (500—1,500, 1,100—3,300)	
<b>Connecting rod and connecting rod bearing</b>				
Length (Center to center)	mm (in)		151.95—152.05 (5.982—5.986)	
Twisting and bending	mm (in)		0.06 (0.0024) max.	
Small end bore	mm (in)		21.943—21.961 (0.8640—0.8646)	
Big end bore	mm (in)		54.002—54.017 (2.1261—2.1266)	
Big end width	mm (in)		26.838—26.890 (1.0566—1.0587)	
Connecting rod side clearance	mm (in)	Standard	0.110—0.262 (0.004—0.010)	
		Maximum	0.30 (0.012)	
<b>Crankshaft</b>				
Crankshaft runout	mm (in)	Maximum	0.03 (0.0012)	
Main journal diameter	mm (in)	Standard size	59.937—59.955 (2.3597—2.3604)	
		0.25 (0.010) undersize	Standard	59.693—59.711 (2.3501—2.3508)
			No.3	59.687—59.705 (2.3499—2.3506)
		0.50 (0.020) undersize	No. 1,2,4,5	59.443—59.461 (2.3403—2.3410)
			No. 3	59.437—59.455 (2.3400—2.3407)
0.75 (0.030) undersize	No. 1,2,4,5	59.193—59.211 (2.3304—2.3311)		
	No. 3	59.187—59.205 (2.3302—2.3309)		
Main journal taper and out-of-round	mm (in)	Maximum	0.05 (0.0020)	
Crankpin diameter	mm (in)	Standard	50.940—50.955 (2.0055—2.0061)	
		0.25 (0.010) undersize	50.690—50.705 (1.9957—1.9963)	
		0.50 (0.020) undersize	50.440—50.455 (1.9858—1.9864)	
		0.75 (0.030) undersize	50.190—50.205 (1.9760—1.9766)	
Crankpin taper and out-of-round	mm (in)	Maximum	0.05 (0.0020)	
<b>Main bearing</b>				
Main journal bearing oil clearance	mm (in)	No. 1,2,4,5	Standard	0.025—0.043 (0.0010—0.0017)
			Maximum	0.08 (0.0031)
		No. 3	Standard	0.031—0.049 (0.0012—0.0019)
			Maximum	0.08 (0.0031)
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)	
<b>Crankpin bearing</b>				
Crankpin bearing oil clearance	mm (in)	Standard	0.027—0.067 (0.0011—0.0026)	
		Maximum	0.10 (0.0039)	
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)	
<b>Thrust bearing (center main bearing)</b>				
Crankshaft end play	mm (in)	Standard	0.08—0.18 (0.0031—0.0071)	
		Maximum	0.30 (0.0118)	
Bearing width	mm (in)	Standard	27.94—27.99 (1.100—1.102)	
		0.25 (0.010) oversize	28.04—28.09 (1.104—1.106)	
		0.50 (0.020) oversize	28.12—28.17 (1.107—1.109)	
		0.75 (0.030) oversize	28.20—28.25 (1.110—1.112)	

Item	Engine model	FE 12-valve
<b>Timing belt</b>		
Belt deflection	mm (in)/98 N (10 kg, 22 lb)	5.5—6.5 (0.22—0.26)

## 8-valve

Item		Engine model		FE 8-valve		F8		F6
				ECE	Middle East General	ECE	General	
Type		Gasoline, 4-cycle						
Cylinder arrangement and number		In-line, 4-cylinders						
Type of combustion chamber		Multispherical						
Valve system		OHC, belt-driven						
Bore x Stroke		mm (in)		86.0 x 86.0 (3.39 x 3.39)	86.0 x 77.0 (3.39 x 3.03)	81.0 x 77.0 (3.19 x 3.03)		
Total piston displacement		cc (cu in)		1,998 (121.9)	1,789 (109.1)	1,587 (96.8)		
Compression ratio				8.6 : 1			9.0 : 1	
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm		Standard		1,275 (13.0, 185)—270			1,128 (11.5, 164)—270	
		Minimum		893 (9.1, 129)—270			790 (8.1, 114)—270	
		Maximum difference between cylinders		196 (2.0, 28)				
Valve timing		IN		Open BTDC	16°	20°	17°	
				Close ABDC	54°	65°	56°	
		EX		Open BBDC	54°	65°	64°	
				Close ATDC	16°	20°	15°	
Valve clearance		mm (in)		IN		0.30 (0.012)		
				EX		0.30 (0.012)		
<b>Cylinder head</b>								
Height		mm (in)		91.95—92.05 (3.620—3.624)				
Distortion		mm (in)		Maximum		0.15 (0.006)		
Grinding limit		mm (in)		Maximum		0.20 (0.008)		
<b>Valve and valve guide</b>								
Valve head diameter		mm (in)		IN		43.9—44.1 (1.728—1.736)		
				EX		35.9—36.1 (1.413—1.421)		
Valve head thickness (margin)		mm (in)		IN		0.8—1.2 (0.031—0.047)		
				EX		1.3—1.7 (0.051—0.067)		
Valve face angle				IN		45°		
				EX		45°		
Valve length		mm (in)		IN		Standard		
				EX		Standard		
		IN		Minimum				
		EX		Minimum				
Valve stem diameter		mm (in)		IN		8.030—8.045 (0.3161—0.3167)		
				EX		8.025—8.040 (0.3159—0.3165)		
Guide inner diameter		mm (in)		IN		8.07—8.09 (0.3177—0.3185)		
				EX		8.07—8.09 (0.3177—0.3185)		
Valve stem to guide clearance		mm (in)		IN		0.025—0.060 (0.0010—0.0024)		
				EX		0.030—0.065 (0.0012—0.0026)		
				Maximum		0.20 (0.0079)		
Guide projection (Height "A")		mm (in)		19.1—19.6 (0.752—0.772)				



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Item		Engine model		FE 8-valve		F8	F6
		ECE	Middle East General				
<b>Valve seat</b>							
Seat angle		IN		45°			
		EX		45°			
Seat contact width	mm (in)	IN		1.2—1.6 (0.047—0.063)			
		EX		1.2—1.6 (0.047—0.063)			
Seat sinking (Measure valve protruding length)	mm (in)	IN	Standard	46.5 (1.831)			
			Maximum	48.0 (1.890)			
	EX	Standard	46.5 (1.831)				
		Maximum	48.0 (1.890)				
<b>Valve spring</b>							
Free length	mm (in)	Outer	Standard	52.0 (2.047)	51.2 (2.016)	52.0 (2.047)	
			Minimum	51.5 (2.028)	50.6 (1.992)	51.5 (2.028)	
		Inner	Standard	44.0 (1.732)	45.7 (1.799)	44.0 (1.732)	
			Minimum	43.3 (1.705)	43.7 (1.720)	43.3 (1.705)	
Out-of-square	mm (in)	Maximum	1.8 (0.071)				
Setting load/height	N (kg, lb)/mm (in)	Outer		128 (13.1, 29)	124 (12.7, 28)	128 (13.1, 29)/36.5 (1.44)	
				136.5 (1.44)	136.5 (1.44)		
Inner			189 (19.2, 42)	193 (19.6, 43)	189 (19.2, 42)/41 (1.61)		
			141 (1.61)	141 (1.61)			
<b>Camshaft</b>							
Cam lobe height	mm (in)	IN	Standard	38.107—38.207 (1.5003—1.5042)			
			Minimum	37.957 (1.4944)			
		EX	Standard	38.110—38.210 (1.5004—1.5043)			
			Minimum	37.960 (1.4945)			
Journal diameter	mm (in)	Front and Rear (No. 1,5)		31.940—32.035 (1.2575—1.2612)			
		Center (No. 2,3,4)		31.910—32.065 (1.2563—1.2624)			
		Out-of-round	Maximum	0.05 (0.002)			
Camshaft bearing oil clearance	mm (in)	Front and Rear (No. 1,5)		0.035—0.085 (0.0014—0.0033)			
		Center (No. 2,3,4)		0.065—0.115 (0.0026—0.0045)			
		Maximum	0.15 (0.0059)				
Camshaft runout	mm (in)	Maximum	0.03 (0.0012)				
Camshaft end play	mm (in)	Standard	0.08—0.16 (0.003—0.006)				
		Maximum	0.20 (0.008)				
<b>Rocker arm and rocker arm shaft</b>							
Rocker arm inner diameter	mm (in)		16.000—16.027 (0.6299—0.6310)				
Rocker arm shaft diameter	mm (in)		15.966—15.984 (0.6286—0.6293)				
Rocker arm to shaft clearance	mm (in)	Standard	0.016—0.061 (0.0006—0.0024)				
		Maximum	0.10 (0.004)				
<b>Cylinder block</b>							
Height	mm (in)		289.0 (11.38)	268.5 (10.57)			
Distortion	mm (in)	Maximum	0.15 (0.006)				
Grinding limit	mm (in)		0.20 (0.008)				
Cylinder bore diameter	mm (in)	Standard	86.000—86.019 (3.3858—3.3866)			81.000—81.019 (3.1890—3.1897)	
		0.25 (0.010) oversize	86.250—86.269 (3.3957—3.3964)			81.250—81.269 (3.1988—3.1996)	
		0.50 (0.020) oversize	86.500—86.519 (3.4055—3.4062)			81.500—81.519 (3.2087—3.2094)	
		0.75 (0.030) oversize	—			81.750—81.769 (3.2185—3.2192)	
		1.00 (0.039) oversize	—			82.000—82.019 (3.2283—3.2291)	
Cylinder bore taper and out-of-round	mm (in)	Maximum	0.019 (0.0007)				
<b>Piston</b>							
Piston diameter measured at 90° to pin bore axis and 18.0 mm (0.709 in) below oil ring groove	mm (in)	Standard	85.944—85.964 (3.3836—3.3844)			80.944—80.964 (3.1868—3.1876)	
		0.25 (0.010) oversize	86.194—86.214 (3.3935—3.3942)			81.194—81.214 (3.1966—3.1974)	
		0.50 (0.020) oversize	86.444—86.464 (3.4033—3.4041)			81.444—81.464 (3.2065—3.2072)	

Item		Engine model		FE 8-valve		F8	F6
		ECE	Middle East General				
		0.75 (0.030) oversize				81.694—81.714 (3.2163—3.2171)	
		1.00 (0.039) oversize				81.944—81.964 (3.2261—3.2269)	
Piston and cylinder clearance	mm (in)	Standard		0.036—0.075 (0.0014—0.0030)			
		Maximum		0.15 (0.0059)			
<b>Piston ring</b>							
Thickness	mm (in)	Top		1.47—1.49 (0.0579—0.0587)			
		Second		1.47—1.49 (0.0579—0.0587)			
End gap measured in cylinder	mm (in)	Top		0.20—0.35 (0.008—0.0138)			
		Second		0.15—0.30 (0.006—0.012)			
		Oil (rail)		0.20—0.70 (0.008—0.0276)			
		Maximum		1.0 (0.039)			
Ring groove width in piston	mm (in)	Top		1.52—1.54 (0.0598—0.0606)			
		Second		1.52—1.54 (0.0598—0.0606)			
		Oil		4.02—4.04 (0.1583—0.1591)			
Clearance of piston ring to ring groove	mm (in)	Top		0.03—0.07 (0.0012—0.0028)			
		Second		0.03—0.07 (0.0012—0.0028)			
		Maximum		0.15 (0.006)			
<b>Piston pin</b>							
Diameter	mm (in)		21.974—21.980 (0.8651—0.8654)				
Interference in connecting rod	mm (in)		0.013—0.037 (0.0005—0.0015)				
Piston to piston pin clearance	mm (in)		0.008—0.024 (0.0003—0.0009)				
Installation pressure	N (kg, lb)		4.900—14,700 (500—1,500, 1,100—3,300)				
<b>Connecting rod and connecting rod bearing</b>							
Length (Center to center)	mm (in)		151.95—152.05 (5.982—5.986)		135.95—136.05 (5.352—5.356)		
Twisting and bending	mm (in)		0.06 (0.0024) max.				
Small end bore	mm (in)		21.943—21.961 (0.8640—0.8646)				
Big end bore	mm (in)		54.002—54.017 (2.1261—2.1266)				
Big end width	mm (in)		26.838—26.890 (1.0566—1.0587)				
Connecting rod side clearance	mm (in)	Standard		0.110—0.262 (0.004—0.010)			
		Maximum		0.30 (0.012)			
<b>Crankshaft</b>							
Crankshaft runout	mm (in)		Maximum		0.03 (0.0012)		
Main journal diameter	mm (in)	Standard size		59.937—59.955 (2.3597—2.3604)			
		0.25 (0.010) undersize	Standard		59.693—59.711 (2.3051—2.3508)		
			No. 3		59.687—59.705 (2.3499—2.3506)		
		0.50 (0.020) undersize	No. 1,2,4,5		59.443—59.461 (2.3403—2.3410)		
			No. 3		59.437—59.455 (2.3400—2.3407)		
0.75 (0.030) undersize	No. 1,2,4,5		59.193—59.211 (2.3304—2.3311)				
	No. 3		59.187—59.205 (2.3302—2.3309)				
Main journal taper and out-of-round	mm (in)		Maximum		0.05 (0.0020)		
Crankpin diameter	mm (in)	Standard		50.940—50.955 (2.0055—2.0061)			
		0.25 (0.010) undersize		50.690—50.705 (1.9957—1.9963)			
		0.50 (0.020) undersize		50.440—50.455 (1.9858—1.9864)			
		0.75 (0.030) undersize		50.190—50.205 (1.9760—1.9766)			
Crankpin taper and out-of-round	mm (in)		Maximum		0.05 (0.0020)		
<b>Main bearing</b>							
Main journal bearing oil clearance	mm (in)	No. 1,2,4,5	Standard		0.025—0.043 (0.0010—0.0017)		
			Maximum		0.08 (0.0031)		
		No. 3	Standard		0.031—0.049 (0.0012—0.0019)		
			Maximum		0.08 (0.0031)		
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)				
<b>Crankpin bearing</b>							
Crankpin bearing oil clearance	mm (in)	Standard		0.027—0.067 (0.0011—0.0026)			
		Maximum		0.10 (0.0039)			
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)				

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Item		Engine model	FE 8-valve		F8	F6
			ECE	Middle East General		
<b>Thrust bearing (center main bearing)</b>						
Crankshaft end play	mm (in)	Standard	0.08—0.18 (0.0031—0.0071)			
		Maximum	0.30 (0.0118)			
Bearing width	mm (in)	Standard	27.94—27.99 (1.100—1.102)			
		0.25 (0.010) oversize	28.04—28.09 (1.104—1.106)			
		0.05 (0.020) oversize	28.12—28.17 (1.107—1.109)			
		0.75 (0.030) oversize	28.20—28.25 (1.110—1.112)			
<b>Timing belt</b>						
Belt deflection	mm (in)/98 N (10 kg, 22 lb)	5.5—6.5 (0.22—0.26)	4.0—5.0 (0.16—0.20)			

## 1B. ENGINE (DOHC)

Item		Engine model	FE DOHC	
			Leaded fuel	Unleaded fuel
Type		Gasoline, 4-cycle		
Cylinder arrangement and number		In-line, 4-cylinders		
Type of combustion chamber		Pentroof		
Valve system		OHC, belt-driven		
Bore x Stroke		mm (in)	86.0 x 86.0 (3.39 x 3.39)	
Total piston displacement		cc (cu in)	1,998 (121.9)	
Compression ratio			10.0 : 1	9.2 : 1
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm	Standard		1,422 (14.5, 206)—290	1,373 (14.0, 199)—310
	Minimum		996 (10.2, 144)—290	961 (9.8, 139)—310
	Maximum difference between cylinders		196 (2.0, 28)	
Valve timing	IN	Open BTDC	10°	10°
		Close ABDC	60°	55°
	EX	Open BBDC	60°	55°
		Close ATDC	10°	10°
Valve clearance	mm (in)	IN	0; Maintenance free	
		EX	0; Maintenance free	
<b>Cylinder head</b>				
Height	mm (in)	mm (in)	133.95—134.05 (5.274—5.278)	
Distortion	mm (in)	Maximum	0.15 (0.006)	
Grinding	mm (in)	Maximum	0.20 (0.008)	
HLA to cylinder head clearance	mm (in)	Standard	0.025—0.066 (0.0010—0.0026)	
		Maximum	0.18 (0.0071)	
<b>Valve and valve guide</b>				
Valve head diameter	mm (in)	IN	33.6—33.8 (1.323—1.331)	
		EX	28.8—29.0 (1.134—1.142)	
Valve head thickness (margin)	mm (in)	IN	1.0—1.7 (0.039—0.067)	
		EX	1.1—1.7 (0.043—0.067)	
Valve face angle		IN	45°	
		EX	45°	
Valve length	mm (in)	IN	Standard	103.18 (4.0622)
			Minimum	102.68 (4.0425)
	EX	Standard	103.94 (4.0921)	
		Minimum	103.44 (4.0724)	
Valve stem diameter	mm (in)	IN	5.970—5.985 (0.2350—0.2356)	
		EX	5.965—5.980 (0.2348—0.2354)	
Guide inner diameter	mm (in)	IN	6.01—6.03 (0.2366—0.2374)	
		EX	6.01—6.03 (0.2366—0.2374)	
Valve stem to guide clearance	mm (in)	IN	0.025—0.060 (0.0010—0.0024)	
		EX	0.030—0.065 (0.0012—0.0026)	
		Maximum	0.20 (0.0079)	
Guide projection (Height "A")	mm (in)	mm (in)	11.4—11.9 (0.449—0.469)	

Item		Engine model		FE DOHC	
				Leaded fuel	Unleaded fuel
<b>Valve seat</b>					
Seat angle		IN		45°	
		EX		45°	
Seat contact width		mm (in)		1.2—1.6 (0.047—0.063)	
		EX		1.2—1.6 (0.047—0.063)	
Seat sinking (Measure valve protruding length) mm (in)		IN		Standard	
				Maximum	
		EX		Standard	
				Maximum	
<b>Valve spring</b>					
Free length		Outer		Standard	
				Minimum	
		Inner		Standard	
				Minimum	
Out-of-square		mm (in)		Maximum	
Setting load/height		N (kg, lb)/mm (in)		Outer.....1.4 (0.055), Inner.....1.3 (0.051)	
				78 (8.0, 17.6)/31.5 (1.240)	
				123 (12.5, 27.5)/33.0 (1.299)	
<b>Camshaft</b>					
Cam lobe height		IN		Standard	
				Minimum	
		EX		Standard	
				Minimum	
Journal diameter		mm (in)		29.940—29.965 (1.1787—1.1797)	
		Out-of-round		Maximum	
				0.05 (0.002)	
Camshaft bearing oil clearance		mm (in)		0.035—0.085 (0.0014—0.0033)	
		Maximum		0.15 (0.0059)	
Camshaft runout		mm (in)		Maximum	
				0.03 (0.0012)	
Camshaft end play		mm (in)		Standard	
				Maximum	
				0.08—0.10 (0.003—0.004)	
				0.20 (0.008)	
<b>Cylinder block</b>					
Height		mm (in)		289.0 (11.38)	
Distortion		mm (in)		Maximum	
				0.15 (0.006)	
Grinding limit		mm (in)		0.20 (0.008)	
Cylinder bore diameter		Standard		86.000—86.019 (3.3858—3.3866)	
		0.25 (0.010) oversize		86.250—86.269 (3.3957—3.3964)	
		0.50 (0.020) oversize		86.500—86.519 (3.4055—3.4062)	
Cylinder bore taper and out-of-round		mm (in)		Maximum	
				0.019 (0.0007)	
<b>Piston</b>					
Piston diameter measured at 90° to pin bore axis and 18.0 mm (0.709 in) below oil ring groove		Standard		85.944—85.964 (3.3836—3.3834)	
		0.25 (0.010) oversize		86.194—86.214 (3.3935—3.3942)	
		0.50 (0.020) oversize		86.444—86.464 (3.4033—3.4041)	
Piston to cylinder clearance		mm (in)		Standard	
				Maximum	
				0.036—0.075 (0.0014—0.0030)	
				0.15 (0.0059)	
<b>Piston ring</b>					
Thickness		mm (in)		Top	
				Second	
				1.47—1.49 (0.0579—0.0587)	
				1.47—1.49 (0.0579—0.0587)	

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Item		Engine model	FE DOHC		
			Leaded fuel	Unleaded fuel	
End gap measured in cylinder	mm (in)	Top	0.20—0.35 (0.008—0.0138)		
		Second	0.15—0.30 (0.006—0.012)		
		Oil (rail)	0.20—0.70 (0.008—0.0276)		
		Maximum	1.0 (0.039)		
Ring groove width in piston	mm (in)	Top	1.52—1.54 (0.0598—0.0606)		
		Second	1.52—1.54 (0.0598—0.0606)		
		Oil	4.02—4.04 (0.1583—0.1591)		
Clearance of piston ring to ring groove	mm (in)	Top	0.03—0.07 (0.0012—0.0028)		
		Second	0.03—0.07 (0.0012—0.0028)		
		Maximum	0.15 (0.006)		
<b>Piston pin</b>					
Diameter	mm (in)		21.987—21.993 (0.8656—0.8659)		
Connecting rod to piston pin clearance	mm (in)		0.010—0.027 (0.0004—0.0011)		
Piston to piston pin clearance	mm (in)		-0.005—0.011 (-0.0002—0.0004)		
<b>Connecting rod and connecting rod bearing</b>					
Length (Center and center)	mm (in)		149.95—150.05 (5.904—5.907)		
Twisting and bending	mm (in)		0.06 (0.0024) max.		
Small end bore	mm (in)		22.003—22.014 (0.8663—0.8667)		
Big end bore	mm (in)		54.002—54.017 (2.1261—2.1266)		
Big end width	mm (in)		26.838—26.890 (1.0566—1.0587)		
Connecting rod side clearance	mm (in)	Standard	0.110—0.262 (0.004—0.010)		
		Maximum	0.30 (0.012)		
<b>Crankshaft</b>					
Crankshaft runout	mm (in)	Maximum	0.03 (0.0012)		
Main journal diameter	mm (in)	Standard size	59.937—59.955 (2.3597—2.3604)		
		0.25 (0.010) undersize	Standard	59.693—59.711 (2.3051—2.3508)	
			No. 3	59.687—59.705 (2.3499—2.3506)	
		0.50 (0.020) undersize	No. 1,2,4,5	59.443—59.461 (2.3403—2.3410)	
			No. 3	59.437—59.455 (2.3400—2.3407)	
0.75 (0.030) undersize	No. 1,2,4,5	59.193—59.211 (2.3304—2.3311)			
	No. 3	59.187—59.205 (2.3302—2.3309)			
Main journal taper and out-of-round	mm (in)	Maximum	0.05 (0.0020)		
Crankpin diameter	mm (in)	Standard	50.940—50.955 (2.0055—2.0061)		
		0.25 (0.010) undersize	50.690—50.705 (1.9957—1.9963)		
		0.50 (0.020) undersize	50.440—50.455 (1.9858—1.9864)		
		0.75 (0.030) undersize	50.190—50.205 (1.9760—1.9766)		
Crankpin taper and out-of-round	mm (in)	Maximum	0.05 (0.0020)		
<b>Main bearing</b>					
Main journal bearing oil clearance	mm (in)	No. 1,2,4,5	Standard	0.025—0.043 (0.0010—0.0017)	
			Maximum	0.08 (0.0031)	
		No. 3	Standard	0.031—0.049 (0.0012—0.0019)	
			Maximum	0.08 (0.0031)	
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)		
<b>Crankpin bearing</b>					
Crankpin bearing oil clearance	mm (in)	Standard	0.027—0.067 (0.0011—0.0026)		
		Maximum	0.10 (0.0039)		
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)		
<b>Thrust bearing (center main bearing)</b>					
Crankshaft end play	mm (in)	Standard	0.08—0.18 (0.0031—0.0071)		
		Maximum	0.30 (0.0118)		
Bearing width	mm (in)	Standard	27.94—27.99 (1.100—1.102)		
		0.25 (0.010) oversize	28.04—28.09 (1.104—1.106)		
		0.50 (0.020) oversize	28.12—28.17 (1.107—1.109)		
		0.75 (0.030) oversize	28.20—28.25 (1.110—1.112)		
<b>Timing belt</b>					
Belt deflection	mm (in)/98 N (10 kg, 22 lb)		7.5—8.5 (0.30—0.33)		

## 1C. ENGINE (DIESEL)

Item		Engine model	RF-CX	RF-N
Type			Diesel, 4-cycle	
Cylinder arrangement and number			In-line, 4-cylinders	
Type of combustion chamber			Swirl chamber	
Valve system			OHC, belt-driven	
Bore x Stroke		mm (in)	86.0 x 86.0 (3.39 x 3.39)	
Total piston displacement		cc (cu in)	1,998 (121.9)	
Compression ratio			21.1 : 1	22.7 : 1
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm	Standard		2,943 (30, 427)-200	
	Minimum		2,649 (27, 384)-200	
	Maximum difference between cylinders		294 (3.0, 43)	
Valve timing	IN	Open BTDC	13°	13°
		Close ABDC	15°	39°
	EX	Open BBDC	60°	60°
		Close ATDC	8°	8°
Valve clearance	mm (in)	IN	Cold: 0.25 (0.010), Warm: 0.30 (0.012)	
		EX	Cold: 0.35 (0.014), Warm: 0.40 (0.016)	
<b>Cylinder head</b>				
Height		mm (in)	133.9—134.1 (5.272—5.280)	
Distortion		mm (in)	0.10 (0.004) max.	
Length of cylinder head bolt below head	mm (in)	Standard	113.2—113.8 (4.457—4.480)	
		Maximum	114.5 (4.508)	
<b>Combustion chamber insert</b>				
Recession		mm (in)	0.020 (0.0008)	
Projection		mm (in)	0.005 (0.0001)	
<b>Valve and valve guide</b>				
Valve head diameter	mm (in)	IN	39.3—39.5 (1.547—1.555)	40.9—41.1 (1.610—1.618)
		EX	35.0—35.2 (1.378—1.386)	35.9—36.1 (1.413—1.421)
Valve head thickness (margin)	mm (in)	IN	1.80 (0.071)	0.80 (0.031)
		EX	1.65 (0.065)	0.80 (0.031)
Valve face angle		IN	60°	45°
		EX	45°	
Valve length	mm (in)	IN	106.9 (4.209)	
		EX	106.8 (4.205)	
Valve stem diameter	mm (in)	IN	7.970—7.985 (0.3138—0.3144)	
		EX	7.965—7.980 (0.3136—0.3142)	
Guide inner diameter	mm (in)	IN	8.025—8.045 (0.3159—0.3167)	
		EX	8.025—8.045 (0.3159—0.3167)	
Valve stem to guide clearance	mm (in)	IN	0.040—0.075 (0.0016—0.0030)	
		EX	0.045—0.080 (0.0018—0.0031)	
		Maximum	0.1 (0.004)	
Guide projection (Height "A")		mm (in)	8.3—8.8 (0.327—0.346)	
<b>Valve seat</b>				
Seat angle		IN	60°	45°
		EX	45°	
Seat contact width	mm (in)	IN	1.4—1.8 (0.055—0.071)	1.7—2.3 (0.067—0.091)
		EX	1.64—2.04 (0.065—0.080)	1.7—2.3 (0.067—0.091)
Seat sinking (Measure valve recession)	IN	Standard	0.75—1.05 (0.030—0.041)	
		Maximum	2.55 (0.100)	
	EX	Standard	0.75—1.05 (0.030—0.041)	
		Maximum	2.55 (0.100)	
<b>Valve spring</b>				
Free length	mm (in)	Standard	45.11 (1.776)	
		Minimum	44.8 (1.764)	

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Item		Engine model	RF-CX	RF-N		
Out-of-square		mm (in)	1.6 (0.063)/2° max.			
Setting load/height		N (kg. lb)/mm (in)	275 (28.0, 62)/39.0 (1.535)			
<b>Tappet</b>						
Tappet outer diameter		mm (in)	34.95—34.97 (1.3764—1.3768)			
Tappet hole diameter		mm (in)	34.99—35.01 (1.3776—1.3787)			
Tappet to tappet hole clearance		mm (in)	Standard	0.02—0.06 (0.0008—0.0024)		
			Maximum	0.10 (0.004)		
<b>Camshaft and camshaft caps</b>						
Cam lobe height		mm (in)	IN	Standard	42.521 (1.6741)	44.306 (1.7443)
				Minimum	42.11 (1.658)	43.90 (1.728)
			EX	Standard	45.300 (1.7835)	
				Minimum	44.90 (1.768)	
Journal diameter		mm (in)	Standard	31.959—31.975 (1.2582—1.2589)		
			Out-of-round	0.05 (0.0020) max.		
Camshaft bearing oil clearance		mm (in)	Standard	0.025—0.066 (0.0010—0.0026)		
			Maximum	0.10 (0.004)		
Camshaft run-out (deflection)		mm (in)	0.10 (0.004) max.			
Camshaft end play		mm (in)	Standard	0.02—0.15 (0.0008—0.0059)		
			Maximum	0.20 (0.008)		
<b>Cylinder block</b>						
Height		mm (in)	301.5 (11.87)			
Distortion		mm (in)	0.10 (0.004) max.			
Cylinder bore diameter		mm (in)	Standard size	86.000—86.022 (3.3858—3.3867)		
			0.25 (0.010) oversize	86.250—86.272 (3.3957—3.3965)		
			0.50 (0.020) oversize	86.500—86.522 (3.4055—3.4064)		
Cylinder bore taper and out-of-round		mm (in)	0.022 (0.0009) max.			
<b>Piston</b>						
Piston diameter (Measured at 90° to pin bore axis and 19 mm (0.75 in) above the bottom of piston)		mm (in)	Standard size	85.957—85.983 (3.3841—3.3852)		
			0.25 (0.010) oversize	86.207—86.233 (3.3940—3.3950)		
			0.50 (0.020) oversize	86.457—86.483 (3.4038—3.4048)		
Piston and cylinder clearance		mm (in)	Standard	0.032—0.050 (0.0013—0.0020)		
			Maximum	0.15 (0.0059)		
<b>Piston ring</b>						
Thickness		mm (in)	Top	1.97—1.99 (0.0776—0.0783)		
			Second	1.97—1.99 (0.0776—0.0783)		
End gap (measured in the cylinder)		mm (in)	Top	0.20—0.35 (0.008—0.014)	0.20—0.40 (0.008—0.016)	
			Second	0.20—0.35 (0.008—0.014)	0.20—0.40 (0.008—0.016)	
			Oil (rail)	0.20—0.40 (0.008—0.016)		
			Maximum	1.0 (0.039)		
Ring groove width in piston		mm (in)	Top	2.17—2.19 (0.0854—0.0862)	2.04—2.06 (0.0803—0.0811)	
			Second	2.03—2.05 (0.0799—0.0807)		
			Oil	4.02—4.04 (0.1583—0.1591)		
Clearance of piston ring to ring groove		mm (in)	Top	0.18—0.22 (0.0071—0.0087)	0.05—0.09 (0.0020—0.0035)	
			Second	0.04—0.08 (0.0016—0.0031)		
			Maximum	0.2 (0.008)		
<b>Piston pin</b>						
Piston pin hole diameter (in piston)			29.997—30.007 (1.1810—1.1814)	24.997—25.007 (0.9841—0.9845)		
Diameter		mm (in)	29.994—30.000 (1.1809—1.1811)	24.994—25.000 (0.9840—0.9843)		
Clearance in connecting rod bushing		mm (in)	0.05 (0.002) max.			

Item		Engine model	RF-CX	RF-N
<b>Connecting rod and connecting rod bearing</b>				
Length (Center to center)	mm (in)		151.95—152.05 (5.9823—5.9862)	
Maximum twisting and bending	mm (in)		0.080 (0.0031) per 50 (1.969)	
Small end bushing inner diameter	mm (in)		30.014—30.030 (1.1817—1.1823)	25.014—25.030 (0.9848—0.9854)
Big end bore	mm (in)		54.002—54.017 (2.1261—2.1266)	
Big end width	mm (in)		25.900—26.100 (1.0197—1.0276)	
Connecting rod side clearance	mm (in)	Standard	0.11—0.262 (0.0043—0.0103)	
		Maximum	0.30 (0.012)	
<b>Crankshaft</b>				
Crankshaft runout	mm (in)		0.05 (0.002) max.	
Main journal diameter mm (in)	Standard size	Standard	59.937—59.955 (2.3597—2.3604)	
		Minimum	59.89 (2.358)	
	0.25 (0.010) undersize	Standard	59.687—59.705 (2.3499—2.3506)	
		Minimum	59.64 (2.348)	
	0.50 (0.020) undersize	Standard	59.437—59.455 (2.3400—2.3407)	
		Minimum	59.39 (2.338)	
0.75 (0.030) undersize	Standard	59.187—59.205 (2.3302—2.3309)		
	Minimum	59.14 (2.328)		
Main journal taper and out-of-round	mm (in)		0.05 (0.002) max.	
Crankpin diameter mm (in)	Standard size	Standard	50.940—50.955 (2.0055—2.0061)	
		Minimum	50.89 (2.004)	
	0.25 (0.010) undersize	Standard	50.690—50.705 (1.9957—1.9963)	
		Minimum	50.64 (1.994)	
	0.50 (0.020) undersize	Standard	50.440—50.455 (1.9858—1.9864)	
		Minimum	50.39 (1.984)	
0.75 (0.030) undersize	Standard	50.190—50.205 (1.9760—1.9766)		
	Minimum	50.14 (1.974)		
Crankpin taper and out-of-round	mm (in)		0.05 (0.002) max.	
<b>Main bearing</b>				
Main journal bearing oil clearance	mm (in)	Standard	0.031—0.050 (0.0012—0.0020)	
		Maximum	0.08 (0.0031)	
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)	
<b>Crankpin bearing</b>				
Crankpin bearing oil clearance	mm (in)	Standard	0.027—0.055 (0.0011—0.0022)	
		Maximum	0.08 (0.0031)	
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)	
<b>Thrust bearing (center main bearing)</b>				
Crankshaft end play	mm (in)	Standard	0.04—0.282 (0.0016—0.0111)	
		Maximum	0.30 (0.012)	
Bearing width	mm (in)	Standard size	2.00—2.05 (0.0787—0.0807)	
		Oversize	2.175—2.225 (0.0856—0.0876)	
<b>Timing belt</b>				
Deflection	mm (in)/N (kg, lb)		9.0—11.5 (0.35—0.45)/98 (10, 22)	
<b>Drive belt deflection</b>				
Alternator	mm (in)	New	8—10 (0.31—0.39)	
		Used	9—11 (0.35—0.43)	
A/C compressor	mm (in)	New	8.5—9.5 (0.33—0.37)	
		Used	9.5—10.5 (0.37—0.41)	
Vacuum pump	mm (in)	New	7.5—8.5 (0.30—0.33)	
		Used	8.5—9.5 (0.33—0.37)	
P/S pump with vacuum pump	mm (in)	New	6.5—7.5 (0.26—0.30)	
		Used	7.0—8.0 (0.28—0.31)	
Pressure wave supercharger	mm (in)	New	4.0—5.0 (0.16—0.20)	
		Used	4.5—5.5 (0.18—0.22)	



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## 2A. LUBRICATION SYSTEM (GASOLINE)

Item		Engine model	FE DOHC	F6, F8, FE SOHC
Lubrication method			Force-fed	
<b>Oil pump</b>				
Type			Trochoid gear	Crescent gear
Regulated pressure		kPa (kg/cm <sup>2</sup> , psi)	490 (5.0, 71)	392 (4.0, 57)
Oil pressure	kPa (kg/cm <sup>2</sup> , psi)	1,000 rpm	147—245 (1.5—2.5, 21—36)	
		3,000 rpm	343—441 (3.5—4.5, 50—64)	294—392 (3.0—4.0, 43—57)
Inner rotor tooth tip to outer rotor clearance	mm (in)	Standard	0.044—0.084 (0.0017—0.0033)	
		Maximum	0.18 (0.0071)	
Outer rotor to body clearance	mm (in)	Standard	0.09—0.176 (0.0035—0.0069)	
		Maximum	0.20 (0.008)	
Side clearance	mm (in)	Standard	0.03—0.09 (0.0012—0.0035)	
		Maximum	0.10 (0.004)	
Inner gear tooth tip to crescent clearance	mm (in)	Standard	0.267—0.38 (0.011—0.015)	
		Maximum	0.40 (0.016)	
Outer gear tooth tip to crescent clearance	mm (in)	Standard	0.20—0.32 (0.008—0.0126)	
		Maximum	0.35 (0.0138)	
Outer gear to body clearance	mm (in)	Standard	0.09—0.184 (0.0035—0.0072)	
		Maximum	0.20 (0.008)	
Side clearance	mm (in)	Standard	0.03—0.063 (0.0012—0.0025)	
		Maximum	0.10 (0.004)	
<b>Oil filter</b>				
Type			Full flow, paper element	
Relief pressure differential		kPa (kg/cm <sup>2</sup> , psi)	78—118 (0.8—1.2, 11—17)	
<b>Oil cooler</b>				
Type			Water cooled	
<b>Oil pressure switch</b>				
Activation pressure		kPa (kg/cm <sup>2</sup> , psi)	29 (0.3, 4.3)	
<b>Engine oil</b>				
Capacity	liters (US qt, Imp qt)	Total (dry engine)	4.3 (4.5, 3.8)	
		Oil pan	3.6 (3.8, 3.2)	
		Oil filter	0.2 (0.21, 0.18)	0.3 (0.32, 0.26)
Grade (API service)			SD, SE, or SF	
Viscosity number	30°C (86°F) or over		SAE 40	
	0°C—40°C (32°F—104°F)		SAE 30	
	-10°C—20°C (14°F—68°F)		SAE 20W-20	
	-10°C—50°C (14°F—122°F) or over		SAE 20W-40 or 20W-50	
	-25°C—30°C (-13°F—86°F)		SAE 10W-30	
	-25°C—50°C (-13°F—122°F) or over		SAE 10W-40 or 10W-50	
	0°C—30°C (32°F—86°F) or below		SAE 5W-30	
	-20°C (-4°F) or below		SAE 5W-20	

**2B. LUBRICATION SYSTEM (DIESEL)**

Item		Engine model	RF-CX	RF-N	
Lubrication method			Force-fed type		
<b>Oil pump</b>					
Type			Trochoid gear		
Gear width		mm (in)	7 (0.28)		
Regulated pressure		kPa (kg/cm <sup>2</sup> , psi)	510—618 (5.2—6.3, 74—90)		
Oil pressure		kPa (kg/cm <sup>2</sup> , psi)			
		1,000 rpm	147—245 (1.5—2.5, 21—36)		
		3,000 rpm	343—441 (3.5—4.5, 50—64)		
Inner rotor tooth tip to outer rotor clearance		mm (in)			
		Standard	0.2 (0.008) or less		
		Maximum	0.24 (0.009)		
Outer rotor to pump body clearance		mm (in)			
		Standard	0.09—0.184 (0.0035—0.0071)		
		Maximum	0.22 (0.009)		
Side clearance		mm (in)			
		Standard	0.03—0.09 (0.0012—0.0036)		
		Maximum	0.14 (0.006)		
<b>Oil filter</b>					
Type			Combined, paper element		
Relief pressure differential		kPa (kg/cm <sup>2</sup> , psi)	78—118 (0.8—1.2, 11—17)		
<b>Oil cooler</b>					
Type			Water cooled, 10 layer	Water cooled, 4 layer	
<b>Oil filter body</b>					
Regulated pressure		kPa (kg/cm <sup>2</sup> , psi)	402—481 (4.1—4.9, 58—70)		
Oil cooler relief pressure differential		kPa (kg/cm <sup>2</sup> , psi)	177—216 (1.8—2.2, 26—31)		
<b>Oil pressure switch</b>					
Activation pressure		kPa (kg/cm <sup>2</sup> , psi)	20—39 (0.2—0.4, 2.8—5.7)		
<b>Engine oil</b>					
Capacity		liters (US qt, Imp qt)			
		Total (dry engine)		6.1 (6.4, 5.4)	
		Oil pan		5.0 (5.3, 4.4)	
		Oil filter		0.5 (0.52, 0.44)	
Grade		API service	CC	CC, CD	
Viscosity number		40°C or over (104°F) or over		SAE 40	
		0°C—40°C (32°F—100°F)		SAE 30	
		-10°C—35°C (15°F—90°F)		SAE 15W-40	
		-10°C—25°C (15°F—77°F)		SAE 20W-20	
		-25°C—30°C (-18°F—86°F)		SAE 10W-30	
		-20°C or below (4°F or below)		SAE 5W-30	

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## 3A. COOLING SYSTEM (GASOLINE)

Item	Engine model		F6, F8, FE SOHC			
	FE DOHC		ECE, Hong Kong Singapore	Middle East General		
Cooling method	Water-cooled, forced circulation					
<b>Water pump</b>						
Type	Centrifugal, timing belt driven					
Impeller diameter	mm (in)	70 (2.76)				
Number of impeller blades	6					
Speed ratio	1 : 1.00		1 : 1.05			
Water seal type	Unified mechanical seal					
<b>Thermostat</b>						
Type	Wax, 2-stage		Wax			
Start to open	°C (°F)	Sub: 83.5—86.5 (182—188) Main: 86.5—89.5 (188—193)	86.5—89.5 (188—193)	80.5—83.5 (177—182)		
Full open	°C (°F)	100 (212)		95 (203)		
Lift	mm (in)	Sub: 1.5 (0.06) min. Main: 8.0 (0.31) min.	8.5 (0.33) min.			
<b>Radiator</b>						
Type	Corrugated fin					
Cap opening valve pressure	kPa (kg/cm <sup>2</sup> , psi)	74—103 (0.75—1.05, 11—15)				
Cooling system pressure	kPa (kg/cm <sup>2</sup> , psi)	103 (1.05, 15)				
<b>Cooling fan</b>						
Type	Electric					
Capacity	W	MTX	80			
		ATX	—	120		
Current	A	MTX	5.6—7.6			
		ATX	—	8.0—11.0		
Number of blades	4					
Outer diameter	mm (in)	MTX	320 (12.6)			
		ATX	340 (13.4)			
Switching temperature OFF → ON	°C(°F)	97 (207)		91 (196)		
<b>Coolant</b>						
Capacity	liters (US qt, Imp qt)	With heater	7.5 (7.9, 6.6)			
		Without heater	7.0 (7.4, 6.2)			
Antifreeze solution	Protection	Mixture percentage (volume) %		Specific gravity of mixture at 20°C (68°F)		
		Water	Solution			
		Above -16°C (3°F)	65		35	1.054
		Above -26°C (-15°F)	55		45	1.066
Above -40°C (-40°F)	45	55	1.078			

**3B. COOLING SYSTEM (DIESEL)**

Item		Engine model	RF-CX, RF-N				
Cooling method			Water-cooled, forced circulation				
<b>Water pump</b>							
Type			Centrifugal, timing belt driven				
Water seal type			Unified mechanical seal				
<b>Thermostat</b>							
Type			Wax, two stage				
Start to open		°C (°F)	Main valve: 86.5—89.5 (188—193)	Sub valve: 78.5—81.5 (173—179)			
Full open lift		mm (in)/°C (°F)	Main valve: 8.0 (0.31) min./100 (212)	Sub valve: 1.5 (0.06) min./100 (212)			
<b>Radiator</b>							
Type			Corrugated fin				
Cap opening valve pressure		kPa (kg/cm <sup>2</sup> , psi)	74—103 (0.75—1.05, 11—15)				
Cooling circuit checking pressure		kPa (kg/cm <sup>2</sup> , psi)	103 (1.05, 15)				
<b>Cooling fan</b>							
Type			Electric				
Number of blade			4				
Outer diameter		mm (in)	340 (13.4)				
Switching temperature OFF → ON		°C (°F)	91 (196)				
Voltage		V	12				
Capacity		W-A	120—8.0-11.0				
<b>Coolant</b>							
Capacity		liters (US qt, Imp qt)	With heater		9.5 (10.0, 8.4)		
			Without heater		9.0 (9.5, 7.9)		
Antifreeze solution		Protection	Mixture percentage (Volume)		Specific gravity of mixture at 20°C (68°F)		
			Water	Solution			
			Above -16°C (3°F)	65		35	1.054
			Above -26°C (-15°F)	55		45	1.066
			Above -40°C (-40°F)	45	55	1.078	

# 30 TECHNICAL DATA

## 4A. FUEL AND EMISSION CONTROL SYSTEM (CARBURETOR) F6 and F8 Engine

Engine		F6		F8		
Spec.		General	Singapore	General	ECE, Hong Kong, & Singapore	
Idle speed	rpm	MTX	800 <sup>+50</sup> / <sub>0</sub>			
		ATX (in N range)	—	950 <sup>+50</sup> / <sub>0</sub>	900 <sup>+50</sup> / <sub>0</sub>	
CO concentration		%		2.0 ± 0.5		
<b>Carburetor</b>						
Type		Down draft, two barrel				
Throat diameter	mm (in)	Primary	30 (1.18)			
		Secondary	34 (1.34)			
Venturi diameter	mm (in)	Primary	23.5 (0.93)			
		Secondary	29.0 (1.14)			
Main nozzle	mm (in)	Primary	2.6 (0.10)			
		Secondary	2.8 (0.11)			
Main jet	mm (in)	Primary	MTX	1.10	1.09 (0.0429)	1.14 (0.045)
			ATX	(0.0433)	1.08 (0.0425)	1.12 (0.044)
		Secondary	1.50 (0.059)			
Main air bleed	mm (in)	Primary	MTX	0.60	0.60 (0.024)	0.55 (0.022)
			ATX	(0.024)	0.80 (0.031)	0.60 (0.024)
		Secondary	0.50 (0.020)			
Slow jet	mm (in)	Primary	0.48 (0.019)	0.46 (0.018)		
		Secondary	1.00 (0.039)		1.10 (0.043)	
Slow air bleed	mm (in)	Primary	No. 1	0.80 (0.031)		
			No. 2	1.90 (0.075)		
		Secondary	No. 1	1.00 (0.039)	0.80 (0.031)	
			No. 2	0.50 (0.020)		
Power jet		mm (in)		0.50 (0.020)		
Fast idle adjustment		mm (in)		1.40—1.76(0.055—0.069)		
Clearance between primary throttle valve and bore				MTX: 0.48—0.64 (0.019—0.025) ATX: 0.56—0.72 (0.022—0.028)		
Float level adjustment	mm (in)	Max. fuel flow "L"		44 (17.3)		
		Clearance between float and air horn without gasket				
		Fuel stop "H"		12.5 (0.49)		
Clearance between float and air horn/without gasket; float lowered by own weight						
Choke breaker diaphragm	mmHg (in Hg)	Start	180—240 (7.1—9.5)		100—160 (3.9—6.3)	
		Stop	290—350 (11.4—13.8)		220—280 (8.7—11.0)	
Choke opener	mmHg (in Hg)	Start	—	35—65 (1.4—2.6)	—	
		Stop	—	130—190 (5.1—7.5)	130—190 (5.1—7.5)	
<b>Accelerator linkage</b>						
Free play of cable at carburetor		mm (in)		1—3 (0.039—0.118)		
<b>Fuel tank</b>						
Capacity		Liters (US gal, Imp gal)		60 (15.9, 13.2)		
<b>Fuel pump</b>						
Type		Mechanical pump				
Delivery pressure		kPa (kg/cm <sup>2</sup> , psi)		20—26 (0.20—0.27, 2.8—3.8)		
Feeding capacity		cc/min (cu in/min)		More than 860 (52.5) at idle		
<b>Fuel filter</b>						
Type		Paper element with magnet				
<b>Air cleaner</b>						
Fresh-Hot switching		Manual	Diaphragm type			
Element type		Oil permeated paper				
Fuel specification		Leaded regular				

## FE Engine

Engine		8 Valve		12 Valve		8 Valve	
Spec.		General		ECE, Hong Kong, & Singapore		Unleaded Fuel (West Germany)	
Idle speed	rpm	MTX	800 <sup>+5%</sup>			850	
		ATX	900 <sup>+5%</sup> (in N range)				
CO concentration	%	2.0 ± 0.5					
<b>Carburetor</b>							
Type		Down draft, two barrel					
Throat diameter	mm (in)	Primary	30 (1.18)				
		Secondary	34 (1.34)				
Venturi diameter	mm (in)	Primary	23.5 (0.93)				
		Secondary	29.0 (1.14)				
Main nozzle	mm (in)	Primary	2.6 (0.10)				
		Secondary	2.8 (0.11)				
Main jet	mm (in)	Primary	MTX	1.14 (0.045)	1.09 (0.0429)	1.14 (0.045)	1.09 (0.0429)
			ATX	1.12 (0.044)	1.08 (0.0425)	1.12 (0.044)	
		Secondary	1.55 (0.061) 1.50 (0.059) 1.55 (0.061) 1.50 (0.059)				
Main air bleed	mm (in)	Primary	MTX	0.50 (0.020)	0.60 (0.024)	0.50 (0.020)	0.50 (0.020)
			ATX	0.55 (0.022)	0.80 (0.031)	0.55 (0.022)	
		Secondary	0.50 (0.020)				
Slow jet	mm (in)	Primary	0.46 (0.018)				
		Secondary	MTX	1.10 (0.043)	1.00 (0.039)	1.10 (0.043)	0.90 (0.035)
			ATX				1.00 (0.031)
Slow air bleed	mm (in)	Primary	No. 1	0.80 (0.031)			
			No. 2	1.90 (0.075)			
		Secondary	No. 1	0.80 (0.031)	1.00 (0.039)	0.80 (0.031)	1.00 (0.039)
			No. 2	0.50 (0.020)			
Power jet	mm (in)	MTX	0.50 (0.020)				0.50 (0.020)
		ATX	0.40 (0.016)				
Fast idle adjustment Clearance between primary throttle valve and bore	mm (in)	MTX	0.48—0.64 (0.019—0.025)	1.40—1.76 (0.055—0.069)	0.48—0.64 (0.019—0.025)		1.40—1.76 (0.055—0.069)
		ATX	0.56—0.72 (0.022—0.028)		0.56—0.72 (0.022—0.028)		
Float level adjustment	mm (in)	Max. fuel flow "L"		44 (17.3)			
		Clearance between float and air horn without gasket					
		Fuel stop "H"		12.5 (0.49)			
Clearance between float and air horn without gasket float lowered by own weight							
Choke breaker diaphragm	mmHg (in Hg)	Start	100—160 (3.9—6.3)	180—240 (7.1—9.4)	100—160 (3.9—6.3)	180—240 (7.1—9.4)	
		Stop	220—280 (8.7—11.0)	290—350 (11.4—13.8)	220—280 (8.7—11.0)	290—350 (11.4—13.8)	
Choke opener	mmHg (in Hg)	Start	—	80—120 (3.1—8.7)	30—70 (1.2—2.8)	—	
		Stop	—	220—280 (8.7—11.0)	130—190 (5.1—7.5)	—	
<b>Accelerator linkage</b>							
Free play of cable at carburetor	mm (in)	1—3 (0.039—0.118)					
<b>Fuel tank</b>							
Capacity	Liters (US gal, Imp gal)	60 (15.9, 13.2)					
<b>Fuel pump</b>							
Type		Mechanical pump					
Delivery pressure	kPa (kg/cm <sup>2</sup> , psi)	20—26 (0.20—0.27, 2.8—3.8)		20—29 (0.20—0.30, 2.8—4.3)		20—26 (0.20—0.27, 2.8—3.8)	
Feeding capacity	cc/min (cu in/min)	More than 860 (52.5) at idle					
<b>Fuel filter</b>							
Type		Paper element with magnet					
<b>Air cleaner</b>							
Fresh-Hot switching		Diaphragm	Manual	Diaphragm	Bimetal		
Element type		Oil permeated paper					
Fuel specification		Leaded super Unleaded super	Leaded regular	Leaded super Unleaded super	Unleaded regular		

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## 4B. FUEL AND EMISSION CONTROL SYSTEMS (FUEL INJECTION FE)

Item		Specifications	
Fuel tank capacity	Liters (US gal, Imp gal)	60 (15.9, 13.2)	
Fuel pump	Type	In-tank, electric motor	
	Fuel pressure kPa (kg/cm <sup>2</sup> , psi)	441—588 (4.5—6.0, 64—85)	
	Feeding capacity cc (cu in)/10 sec.	220 (13.4) min.	
Air cleaner	Element type	Oil permeated	
Accelerator cable	Deflection mm (in)	1—3 (0.04—0.12)	
Idle speed	rpm	ATX: 800 <sup>+5%</sup> (Neutral), ATX: 900 <sup>+5%</sup> (P range)	
Dash pot	Adjustment speed rpm	1,900—2,100	
EGR control valve	Starts to open mmHg (in Hg)	40—60 (1.6—2.4)	
Air control valve	Starts to open mmHg (in Hg)	180—280 (7.1—11)	
Water thermo valve	Opened °C (°F)	Higher than 46—54 (115—129)	
Water thermo switch	Opened At radiator °C (°F)	Lower than 15—19 (59—66)	
Vacuum switch valve	Starts to open mmHg (in Hg)	66—106 (2.6—4.2)	
Water thermo sensor	Resistance	-20°C (-4°F) kΩ	14.5—17.8
		20°C (68°F) kΩ	2.2—2.7
		80°C (176°F) kΩ	0.28—0.35
Throttle sensor	Resistance at fully closed	B ↔ C kΩ	4—6
		A ↔ B Ω	Approx. 500
	Resistance at fully opened	A ↔ B kΩ	Approx. 4.5
	Setting	Closed at mm (in)	0.4 (0.0157)
Open at mm (in)		0.55 (0.022)	
Air flow meter	Resistance of full closed	E2 ↔ Vs Ω	More than 20
		E2 ↔ Vc Ω	100—300
		E2 ↔ Vb Ω	200—400
		E1 ↔ Fc Ω	∞
	Resistance at full open	E1 ↔ Fc Ω	0
Intake air thermo sensor	Resistance	-20°C (-4°F) kΩ	13.6—18.4
		20°C (68°F) kΩ	2.21—2.69
		60°C (140°F) kΩ	0.493—0.667
Pressure regulator	Regulating pressure At idling kPa (kg/cm <sup>2</sup> , psi)	235—275 (2.4—2.8, 34—40)	
Injector	Injection amount cc (cu in)/15 sec.	38—53 (2.3—3.2)	
	Resistance Ω	12—16	
Circuit opening relay	Resistance	STA ↔ E1 Ω	15—30
		B ↔ Fc Ω	80—150
Fuel		Unleaded gasoline	

4C. FUEL AND EMISSION CONTROL SYSTEM (FE DOHC)

Item		Engine model	Unleaded fuel	Leaded fuel
Idle speed		rpm	With test connector grounded 750 ± 50	
<b>Throttle body</b>				
Type			Horizontal draft (2-barrel)	
Throat diameter	mm (in)	No. 1	46 (1.8)	
		No. 2	40 (1.6)	
<b>Fuel pump</b>				
Type			Impeller (in tank)	
Output pressure		kPa (kg/cm <sup>2</sup> , psi)	Main pump: 441—588 (4.5—6.0, 64—85) Transfer pump: 20—25 (0.20—0.25, 2.8—3.6)	
Feeding capacity		cc (cu in)/10 seconds	Main pump: 220 (13.4) min. Transfer pump: 190 (11.6) min.	
<b>Fuel filter</b>				
Type	Low-pressure side		Nylon element	
	High-pressure side		Paper element	
<b>Pressure regulator</b>				
Type			Diaphragm	
Regulating pressure		kPa (kg/cm <sup>2</sup> , psi)	235—275 (2.4—2.8, 34—40)	
<b>Injector</b>				
Type			High-ohmic	
Type of drive			Voltage	
Resistance		Ω	12—16	
Injection amount		cc (cu in)/15 seconds	66—91 (4.03—5.55)	
<b>Idle speed control valve</b>				
Solenoid resistance		Ω	6.3—9.9	
<b>Fuel tank</b>				
Capacity		liters (US gal, Imp gal)	60 (15.9, 13.2) 57 (15.0, 12.5): 4-wheel steering vehicle	
<b>Air cleaner</b>				
Element type			Dry	
<b>Fuel</b>				
Specification			Unleaded (95 RON or more)	Leaded (95 RON or more)



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## 4D. FUEL AND EMISSION CONTROL SYSTEM (DIESEL)

Item			Engine model	RF-CX	RF-N
Idle speed			rpm	720 $\begin{smallmatrix} +30 \\ -20 \end{smallmatrix}$	
Fuel injection pump	Type			VE Type	
	Plunger diameter	mm (in)		9.0 (0.35)	8.0 (0.31)
	Cam height	mm (in)		2.2 (0.08)	
	Governor			Half all speed governor	
	Injection timing			ATDC 1°	TDC 0°
Cam lift at injection timing			mm (in)	1 (0.04)	
Injection nozzle	Type			Throttle	
	Number of nozzle and diameter	mm (in)		1.0 (0.04) x 1	
	Injection pressure	kPa (kg/cm <sup>2</sup> , psi)		13,240 (135, 1,920)	
Free play of cable at injection pump			mm (in)	1.0—3.0 (0.04—0.12)	
Fuel tank capacity			liters (Us gal, Imp gal)	60 (15.9, 13.2)	
Fuel filter type				Cartridge, paper element	
Air cleaner element type				Cartridge, paper element	
Fast idle speed (A/C ON)			rpm	700—750	
Cold start device	Engine speed		rpm	1,100 at below 0°C (32°F)	
	Advance degree	0°C (32°F)		6°	
		60°C (140°F)		0°	

## 5. ENGINE ELECTRICAL SYSTEM Gasoline Engine

Item		Engine		F6	F8	FE (8 VALVE)	FE (12 VALVE)	FE (DOHC)	
Battery	Voltage	V		12, Negative ground					
	Type and capacity (20 hour rate)	34B19L(S) (33 Ah): General 50D20L (50 Ah), 55D23L (60 Ah): ECE							
Alternator	Type	A.C.							
	Output	V—A		12—70					
	Regulator type	Transistorized (built-in IC regulator)							
	Regulated voltage	V		14.1—14.7					
	Brush length mm (in)	Standard	16.5 (0.650)						
		Minimum	8.0 (0.315)						
	Drive belt tension mm (in)/98 N (10 kg, 22 lb)	New: 6—8 (0.24—0.32), Used: 7—9 (0.28—0.35)							
Starter	Type	Coaxial reduction: Middle East & General (FE · carburetor) Non-reduction: Others							
	Output	V—kW		12—0.85	12—0.95		12—1.4	12—0.95	
	Brush length mm (in)	Standard	17.0 (0.669)		Unleaded fuel 17.0 (0.669) Others 17.5 (0.689)		17.0 (0.669)		
		Minimum	11.5 (0.453)		Unleaded fuel 11.5 (0.453) Others 10.0 (0.394)		11.5 (0.453)		
	Ignition timing	6 ± 1° BTDC (Vacuum hose disconnected)							12 ± 1° BTDC (Test connector grounded)
Distributor	Type	Fully transistorized (HEI)							Electronic spark advance
	Centrifugal spark advance (crank angle/engine speed)  degree/rpm	F6 -2—2/1,000 6—10/2,100 14—18/6,100  F8 -2—2/1,000 10—14/2,100 18—22/6,100  FE (8 VALVE)—Carburetor Unleaded fuel (MTX) -2—2/1,760 12—16/3,360 22—26/5,320 (ATX) -2—2/1,300 12—16/3,360 22—26/5,320  Others -2—2/1,460 10—14/2,540 22—26/5,540  FE (12 VALVE)—Carburetor -2—2/1,200 10—14/2,400 10—14/4,000 16—20/5,000  FE—Fuel injection (except FE DOHC) -2—2/1,000 10—14/2,600 10—14/4,600 16—20/5,800							

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Item		Engine				
		F6	F8	FE (8 VALVE)	FE (12 VALVE)	FE (DOHC)
Distributor	Vacuum spark advance (Crank angle/Vacuum)	F6 and F8 -2-2/100 6-10/300				
	degree/mmHg (inHg)	FE (8 VALVE)—Carburetor Unleaded fuel -2-2/120 8-12/245				
Spark plug	Type	FE (8 VALVE)* NGK: BPR5ES-11, BPR6ES-11 Nippon Denso: W16EXR-U11, W20EXR-U11		NGK: BCPR5E, BCPR6E Nippon Denso: Q16PR-U, Q20PR-U	NGK: Unleaded fuel BCPR5E-11 BCPR6E-11 BCPR7E-11	
	Plug gap	Others NGK: BPR5ES, BPR6ES Nippon Denso: W16EXR-U, W20EXR-U			Leaded fuel BCPR5E BCPR6E	
Firing order		1-3-4-2				

## Diesel Engine

Item		Engine		RF-N		RF-CX	
		Voltage		12. Negative ground		12. Negative ground	
Battery	Type and capacity (20 hour rate)		80D26L (65) 50D20L, 50D20R (50)—ECE		80D26L (65) 65D23L, 65D23R (55)		
	Type		A.C.		A.C.		
Alternator	Output		12-70		12-75		
	Regulator type		Transistorized (built-in IC regulator)		Transistorized (built-in IC regulator)		
	Regulated voltage		14.1-14.7		14.1-14.7		
	Brush length mm (in)	Standard	16.5 (0.650)		21.5 (0.846)		
		Minimum	8.0 (0.315)		8.0 (0.315)		
Drive belt tension mm (in)/98 N (10 kg, 92 lb)		New: 9-11 (0.35-0.43), Used: 12-14 (0.47-0.55)		New: 9-11 (0.35-0.43), Used: 12-14 (0.47-0.55)			
Starter	Type		Reduction		Reduction		
	Output		12-2.0, 12-2.2 (Cold area)		12-2.0, 12-2.2 (Cold area)		
	Brush length mm (in)	Standard	2.0 kW: 17.0 (0.669), 2.2 kW: 18.0 (0.709)		2.0 kW: 17.0 (0.669), 2.2 kW: 18.0 (0.709)		
Minimum		2.0 kW: 11.0 (0.453), 2.2 kW: 11.0 (0.453)		2.0 kW: 11.0 (0.453), 2.2 kW: 11.0 (0.453)			
Firing order		1-3-4-2		1-3-4-2			

\*1 Unleaded fuel model

\*2 Leaded fuel model

6. CLUTCH

Item		Engine model		F6	F8	FE	FE DOHC	RF-N	RF-CX		
<b>Clutch control</b>											
Type		Hydraulic									
Master cylinder inner diameter		mm (in)		15.87 (0.625)							
Release cylinder inner diameter		mm (in)		19.05 (0.750)							
Clutch fluid type		DOT-3 or DOT-4, FMVSS 116, or SAE J1703									
<b>Clutch pedal</b>											
Type		Suspended									
Pedal ratio		LHD		6.00							
		RHD		5.96							
Full stroke		mm (in)		135 (5.31)							
Height		mm (in)		216.5—221.5 (8.524—8.720)							
Free play		mm (in)		5—13 (0.20—0.51)							
Distance to floor when clutch fully disengaged		LHD		68 (2.7) or more							
		RHD		85 (3.3) or more							
<b>Flywheel</b>											
Deflection		mm (in)		0.2 (0.008) max.							
Grinding limit		mm (in)		0.5 (0.020) max.							
<b>Clutch disc</b>											
Type		Single dry plate									
Set load		N (kg, lb)		General		3434 (350, 770)	3846 (392, 862)	4316 (440, 968)		3846 (392, 862)	—
				ECE (Except UK)		—	4022 (410, 902)	4611 (470, 1034)		4022 (410, 902)	
				UK		—	3846 (392, 862)	4611 (470, 1034)	4316 (440, 968)	3846 (392, 862)	4022 (410, 902)
Runout		mm (in)		1.0 (0.039) max.							
Wear limit		mm (in)		0.3 (0.012) from rivet head							
Outer diameter		mm (in)		200 (7.874)	215 (8.465)	225 (8.858)					
Inner diameter		mm (in)		130 (5.118)	150 (5.906)						
Facing thickness mm (in)		Flywheel side		3.5 (0.14)							
		Pressure plate side		General		4.1 (0.16)				—	
				ECE (Except UK)		—	3.8 (0.15)				
				UK		—	4.1 (0.16)	3.8 (0.15)	4.1 (0.16)	3.8 (0.15)	
<b>Clutch cover</b>											
Type		Diaphragm spring									
Runout		mm (in)		0.05 (0.0020) max.							
Grinding limit		mm (in)		0.5 (0.020)							

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## 7A. MANUAL TRANSAXLE

Item	Engine model		F6	FE 12 valve	FE 8 valve		F8	RF-N	RF-CX
	Leaded	Unleaded			Carb.	FI			
Transmission									
Shift lever position	Floor shift								
Gear ratio	First	3.307							
	Second	1.833							
	Third	1.310	1.233					1.161	
	Fourth	1.030	0.970			0.914	0.861		
	Fifth	0.837	0.795			0.755	0.680		
	Reverse	3.166							
Oil capacity	liters US qt. Imp qt)		3.35 (3.6, 3.0)						
Fluid type	ATF: DEXRON-II Above 0°F: API GL-4 or GL-5 SAE80W-90 or SAE90								
<b>Clearance</b>									
Clearance of lever and reverse idle gear mm (in)	Standard		0.1—0.32 (0.004—0.013)						
	Wear limit		0.5 (0.020)						
Clearance of shift fork and clutch hub sleeve mm (in)	Standard		0.2—0.4 (0.008—0.016)						
	Wear limit		0.5 (0.020)						
Clearance of synchronizer ring and gear mm (in)	Standard		1.5 (0.059)						
	Wear limit		0.8 (0.021)						
Gear thrust clearance mm (in)	First	Standard	0.05—0.28 (0.002—0.011)						
		Limit	0.3 (0.020)						
	Second	Standard	0.18—0.46 (0.007—0.018)						
		Limit	0.5 (0.02)						
	Third	Standard	0.05—0.20 (0.002—0.008)						
		Limit	0.25 (0.010)						
	Fourth	Standard	0.17—0.37 (0.0064—0.014)						
		Limit	0.4 (0.016)						
Bearing preload of primary shaft gear	Primary shaft 0.1—0.25 N·m (1.0—2.5 cm·kg, 0.86—2.18 in·lb) Secondary shaft 0.2—0.4 N·m (2.0—4.0 cm·kg, 1.7—3.4 in·lb)								
Bearing preload adjust shim	mm (in)		0.25 (0.010), 0.30 (0.012), 0.35 (0.014), 0.40 (0.016), 0.45 (0.018), 0.50 (0.020), 0.55 (0.022), 0.60 (0.024), 0.65 (0.026), 0.70 (0.028), 0.75 (0.030), 0.80 (0.031)						
<b>Drive and differential</b>									
Final gear	Type	Helical gear							
	Reduction ratio	4.105	3.850			4.105	3.850	4.150	
Side bearing preload	1.4—2.0 N·m (14—20 cm·kg, 12—17 in·lb)								
Bearing preload adjust shim	mm (in)		0.10 (0.004), 0.15 (0.006), 0.20 (0.008), 0.25 (0.010), 0.30 (0.012), 0.35 (0.014), 0.40 (0.016), 0.45 (0.018), 0.50 (0.020), 0.55 (0.022), 0.60 (0.024), 0.65 (0.026), 0.70 (0.028), 0.75 (0.030), 0.80 (0.031), 0.85 (0.033), 0.90 (0.035), 0.95 (0.037), 1.00 (0.039), 1.05 (0.041), 1.10 (0.043), 1.15 (0.045), 1.20 (0.047)						
Backlash of side gear and pinion gear	mm (in)		0—0.1 (0—0.004)						

**7B. AUTOMATIC TRANSAXLE (ELECTRONICALLY CONTROLLED AND 4-SPEED)**

Item	Model		G4A-EL (EC-AT)	G4A-HL (4-Speed)	
				FE engine	F8 engine
Gear ratio	1st			2.800	
	2nd			1.540	
	3rd			1.000	
	4th (OD)			0.700	
	Reverse			2.333	
Oil capacity	liters (US qt, Imp qt)			6.2 (6.6, 5.4)	
Fluid type				ATF Dexron II or M III	
Fluid level with the engine idling in P				Between F and L marks on gauge	
<b>Stall speed</b>					
After brake-in	D, S, L	rpm	2170—2270	2430—2530	2180—2280
	R	rpm	2130—2230	2390—2490	2140—2240
<b>Time lag</b>					
N → D		sec	0.5—1.0	0.4—1.2	
N → R		sec	0.5—1.0	0.4—1.5	
<b>Line pressure</b>					
D, S, L	Idle	kPa (kg/cm <sup>2</sup> , psi)	353—432 (3.6—4.4, 51—63)	350—490 (3.6—5.0, 51—71)	
	Stall	kPa (kg/cm <sup>2</sup> , psi)	873—1,040 (8.4—10.6, 127—151)	980—1230 (10.0—12.5, 142—178)	
R	Idle	kPa (kg/cm <sup>2</sup> , psi)	598—942 (6.1—9.6, 87—137)	600—830 (6.1—8.5, 87—121)	
	Stall	kPa (kg/cm <sup>2</sup> , psi)	1,668—2,011 (17.0—20.5, 242—292)	1470—1960 (15.0—20.0, 213—284)	
<b>Throttle pressure</b>					
D	Idle	kPa (kg/cm <sup>2</sup> , psi)	39—88 (0.4—0.9, 6—13)	83—113 (0.85—1.15, 12—16)	
	Stall	kPa (kg/cm <sup>2</sup> , psi)	471—589 (4.8—6.0, 68—85)	540—610 (5.5—6.2, 78—88)	
<b>Governor pressure</b>					
D	30 km/h (19 mph)	kPa (kg/cm <sup>2</sup> , psi)	—	79—114 (0.81—1.16, 12—16)	82—117 (0.84—1.19, 12—17)
	55 km/h (34 mph)	kPa (kg/cm <sup>2</sup> , psi)	—	146—190 (1.49—1.94, 21—28)	157—201 (1.60—2.05, 23—29)
	85 km/h (53 mph)	kPa (kg/cm <sup>2</sup> , psi)	—	276—339 (2.81—3.46, 40—49)	302—366 (3.08—3.73, 44—53)

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## Shift point (G4A-EL)

Range Mode	Throttle condition (Throttle sensor voltage)	Shifting	Drum speed rpm	Vehicle speed km/h (mph)	
Power	Fully opened (4.3 volt)	D1 → D2	4930—5480	54—60 (33—37)	
		D2 → D3	5120—5520	102—110 (63—68)	
		D3 → OD	5380—5710	165—175 (102—109)	
	Half throttle (1.6—2.2 volt)	D1 → D2	3470—4180	38—45 (24—28)	
		D2 → D3	4020—4420	80—88 (50—55)	
		D3 → OD	3820—4530	117—139 (73—86)	
		Lock-up ON (OD)	2670—3170	117—139 (73—86)	
		Lock-up OFF(OD)	2510—2970	110—130 (68—81)	
		OD → D3	2150—2630	94—115 (58—71)	
		D3 → D2	2020—2410	62—74 (38—46)	
	Kick-down	OD → D3	3490—3720	153—163 (95—101)	
		OD → D2	2050—2240	90—98 (56—61)	
		OD → D1	980—1120	43—49 (27—30)	
		D3 → D2	2940—3200	90—98 (56—61)	
		D3 → D1	1400—1500	43—46 (27—29)	
		D2 → D1	2160—2300	43—46 (27—29)	
	Economy	Fully opened (4.3 volt)	D1 → D2	4470—5020	49—55 (30—34)
			D2 → D3	4770—5170	95—103 (59—64)
D3 → OD			5380—5710	165—175 (102—109)	
Half throttle (1.6—2.2 volt)		D1 → D2	2830—3380	31—37 (19—23)	
		D2 → D3	2960—3120	59—68 (37—42)	
		D3 → OD	2870—3460	88—106 (55—66)	
		Lock-up ON (OD)	2010—2420	88—106 (55—66)	
		Lock-up OFF (OD)	1940—2310	85—101 (53—63)	
		OD → D3	1600—1960	70—86 (43—53)	
		D3 → D2	1240—1570	38—48 (24—30)	
Kick-down		OD → D3	3490—3720	153—163 (95—101)	
		OD → D2	1960—2150	86—94 (53—58)	
		OD → D1	980—1120	43—49 (27—30)	
		D3 → D2	2800—3070	86—94 (53—58)	
		D3 → D1	1400—1600	43—49 (27—30)	
		D2 → D1	2160—2460	43—49 (27—30)	
S		Fully opened (4.3 volt)	S1 → S2	4930—5480	54—60 (33—37)
			S2 → S3	5120—5520	102—110 (63—68)
	S4 → S3		3720—3950	163—173 (101—107)	
	S3 → S2		2940—3200	90—98 (56—61)	
	S2 → S1		2160—2310	43—46 (27—29)	
	Half throttle (1.6—2.2 volt)	S1 → S2	3470—4180	38—45 (24—28)	
		S2 → S3	4020—4420	80—88 (50—55)	
		S4 → S3	3720—3950	163—173 (101—107)	
		S3 → S2	2020—2410	62—74 (38—46)	
		L1 → L1	4930—5480	54—60 (33—37)	
L	Fully opened (4.3 volt)	L2 → L1	2160—2310	43—46 (27—29)	
		L1 → L2	3470—4180	38—45 (24—28)	
	Half throttle (1.6—2.2 volt)	L1 → L2	3470—4180	38—45 (24—28)	
Hold	D	D2 → D3	850—1160	17—23 (11—14)	
		D3 → D2	230—420	7—13 (4—8)	
	S	OD → D3	3720—3950	163—173 (101—107)	
		S3 → S2	2940—3200	90—98 (56—61)	
	L	L2 → L1	2160—2460	43—49 (27—30)	
		Fully closed (0.5 volt)	L2 → L1	2160—2460	43—49 (27—30)

**Shift point (G4A-HL)**

Range	Throttle condition	Shifting	Vehicle speed km/h (mph)	
			FE engine	F8 engine
D	Fully opened	1st → 2nd	50—65 (31—40)	47—62 (29—38)
		2nd → 3rd	100—115 (62—71)	94—109 (58—68)
	Half throttle (1/2)	1st → 2nd	17—32 (11—20)	16—31 (10—19)
		2nd → 3rd	42—57 (26—35)	
		3rd → OD	79—94 (49—58)	74—89 (46—55)
		Lock-up	74—89 (46—55)	
	Kick-down	OD → 3rd	More than 88 (55)	More than 82 (51)
		OD → 2nd	34—103 (21—64)	33—97 (20—60)
		OD → 1st	27—49 (17—30)	26—48 (16—30)
		3rd → 2nd	34—103 (21—64)	33—97 (20—60)
		3rd → 1st	11—49 (7—30)	10—48 (6—30)
1	Fully opened	1st → 2nd	56—71 (35—44)	52—67 (32—42)
	Half throttle	1st → 2nd	56—71 (35—44)	52—67 (32—42)
	Kick-down	2nd → 1st	46—61 (29—38)	43—58 (27—36)
D	Fully opened	3rd lock-up	106—121 (66—75)	100—115 (62—71)

Item	Model		G4A-EL (EC-AT)	G4A-HL (4-speed)	
				FE engine	F8 engine
<b>Torque converter</b>					
Stall torque ratio			1.700—1.900 : 1	1.900—2.100 : 1	
Bushing diameter	mm (in)	Standard	53.030 (2.088)		
		Maximum	53.076 (2.090)		
<b>Oil pump</b>					
Clearance					
Cam ring to oil pump cover	mm (in)	Standard	0.005—0.020 (0.0002—0.0008)		
		Maximum	0.080 (0.003)		
Rotor to oil pump cover	mm (in)	Standard	0.005—0.020 (0.0002—0.0008)		
		Maximum	0.030 (0.0012)		
Vane to oil pump cover	mm (in)	Standard	0.015—0.050 (0.0006—0.0020)		
		Maximum	0.080 (0.003)		
Seal pin to oil pump cover	mm (in)	Standard	0.005—0.020 (0.0002—0.0008)		
		Maximum	0.060 (0.002)		
Vane to rotor groove	mm (in)	Standard	0.010—0.045 (0.0004—0.0018)		
		Maximum	0.065 (0.0026)		
Sleeve outer diameter	mm (in)	Standard	28.00 (0.102)		
Rotor bushing in inner diameter	mm (in)	Standard	28.00 (1.102)		
		Maximum	28.05 (1.104)		
Seal pin outer diameter	mm (in)	Standard	5.00 (0.197)		
		Minimum	4.90 (0.193)		
Guide ring outer diameter	mm (in)	Standard	57.85 (2.278)		
		Minimum	57.70 (2.272)		
Valve outer diameter	mm (in)	Standard	12.00 (0.472)		
		Minimum	11.86 (0.467)		



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Item	Model	G4A-EL (EC-AT)	G4A-HL (4-speed)		
			FE engine	F8 engine	
<b>Forward clutch</b>					
Number of drive/driven plate			3/3		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Forward clutch clearance	mm (in)		1.0—1.2 (0.040—0.047)		
Retaining plate sizes	mm (in)		5.9 (0.232), 6.1 (0.240), 6.3 (0.248), 6.5 (0.256), 6.7 (0.264), 8.9 (0.350)		
<b>Coasting clutch</b>					
Number of drive/driven plates			2/2		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Coasting clutch clearance	mm (in)		1.0—1.2 (0.040—0.047)		
Retaining plate sizes	mm (in)		4.6 (0.181), 4.8 (0.189), 5.0 (0.197), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220)		
Return spring free length	mm (in)		29.8 (1.173)		
<b>Reverse clutch</b>					
Number of drive/driven plates			2/2		
Driven plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Reverse clutch clearance	mm (in)		2.1—2.4 (0.083—0.094)		
Retaining plate sizes	mm (in)		6.6 (0.260), 6.8 (0.268), 7.0 (0.276), 7.2 (0.283), 7.4 (0.291), 7.6 (0.299)		
<b>3-4 clutch</b>					
Number of drive/driven plates		5/5	4/4		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
3-4 clutch clearance	mm (in)		1.3—1.5 (0.051—0.059)		
Retaining plate sizes	mm (in)	3.8 (0.150), 4.0 (0.157), 4.2 (0.165), 4.4 (0.173), 4.6 (0.181), 4.8 (0.189)	4.8 (0.819), 5.0 (0.197), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220)		
Return spring free length	mm (in)		33.2 (1.307)		
<b>Low and reverse brake</b>					
Number of drive/driven plates		3/3	4/4		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Low and reverse brake clearance	mm (in)		2.1—2.4 (0.083—0.094)		
Retaining plate sizes	mm (in)	6.8 (0.268), 7.0 (0.276), 7.2 (0.283), 7.4 (0.291), 7.6 (0.299), 7.8 (0.307)	10.0 (0.394), 10.2 (0.402), 10.4 (0.410), 10.6 (0.417), 10.8 (0.425)		
Return spring free length	mm (in)		20.5 (0.807)		
Sun gear drum bushing	mm (in)	Maximum	33.425 (1.316)		
Small sun gear bushing	mm (in)	Maximum	24.021 (0.946)		
<b>Carrier hub</b>					
Clearance between pinion washer and planet carrier	mm (in)	Maximum	0.2—0.7 (0.008—0.028)		
<b>Servo</b>					
Free length of return spring	mm (in)	Standard	43.25 (1.703)	42.0 (1.654)	43.25 (1.703)
<b>2-3 accumulator valve</b>					
2-3 accumulator valve spring	mm (in)	Standard	83.3 mm (3.280)	76.0 (2.992)	

**Control valve spring (G4A-EL)**

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 accumulator small spring	11.0 (0.433)	88.1 (3.348)	1.4 (0.055)	Gray
1-2 accumulator large spring	16.0 (0.630)	78.0 (3.071)	2.0 (0.079)	Blue
Bypass, servo control spring	5.0 (0.197)	33.4 (1.315)	0.55 (0.022)	Maroon
2-3 timing spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
N-R accumulator rear spring	11.1 (0.437)	62.0 (2.441)	1.2 (0.047)	Light green
N-D accumulator front spring	9.8 (0.386)	52.9 (2.083)	1.0 (0.039)	Brown
Coasting bypass spring	5.8 (0.228)	37.7 (1.484)	0.6 (0.024)	Dark blue
3-2 timing spring	8.2 (0.323)	28.6 (0.126)	0.8 (0.031)	Red
3-2 capacity spring	5.4 (0.213)	30.6 (1.205)	0.5 (0.020)	White
Throttle relief ball spring	6.6 (0.260)	21.6 (0.850)	0.8 (0.031)	—
Pressure modifier spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
Low reducing spring	8.7 (0.343)	38.3 (1.508)	0.9 (0.035)	Black
1-2 shift spring	8.7 (0.343)	41.3 (1.626)	1.0 (0.039)	Yellow
2-3, 3-4 shift spring	7.4 (0.291)	36.6 (1.441)	0.8 (0.031)	Gray
Throttle backup spring	9.65 (0.380)	26.9 (1.059)	0.55 (0.022)	Red
Throttle modulator spring	6.3 (0.248)	47.9 (1.886)	0.8 (0.031)	—
Throttle assist spring	5.15 (0.203)	32.3 (1.272)	0.55 (0.022)	Dark green
Throttle spring	5.4 (0.213)	47.2 (1.858)	0.8 (0.031)	Pink
Converter relief ball spring	6.9 (0.272)	24.1 (0.949)	0.9 (0.035)	Maroon
Orifice check valve spring	5.0 (0.197)	12.5 (0.492)	0.23 (0.009)	—
Pressure regulator spring	11.5 (0.453)	26.5 (1.043)	1.0 (0.039)	Maroon
Lock-up control spring	5.0 (0.197)	35.2 (1.386)	0.6 (0.024)	Purple

**Control valve springs (G4A-HL)**

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 accumulator small spring	F8 engine 9.9 (0.400)	84.7 (3.335)	1.2 (0.047)	Red
1-2 accumulator large spring	FE engine 13.0 (0.512)	73.2 (2.881)	1.8 (0.071)	Pink
	F8 engine 16.0 (0.630)	84.7 (3.335)	2.0 (0.079)	White
Bypass spring	5.0 (0.197)	25.1 (0.988)	0.7 (0.028)	Yellow
Servo control spring	4.9 (0.193)	27.1 (1.067)	0.5 (0.020)	Light blue
2-3 timing spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
N-R accumulator rear spring	11.1 (0.437)	68.2 (2.685)	1.0 (0.039)	Blue
N-D accumulator front spring	9.8 (0.386)	60.9 (2.398)	1.1 (0.043)	Yellow
Low reducing spring	8.7 (0.343)	38.3 (1.508)	0.9 (0.035)	Black
OD release spring	6.0 (0.236)	32.6 (1.283)	0.6 (0.024)	Orange
Coasting bypass spring	5.8 (0.228)	31.3 (1.232)	0.6 (0.024)	Yellow
3-2 timing spring	8.2 (0.323)	28.55 (1.124)	0.8 (0.031)	Maroon
3-2 capacity spring	5.55 (0.219)	30.5 (1.201)	0.55 (0.022)	Light green
Throttle relief ball spring	6.6 (0.260)	20.3 (0.799)	0.8 (0.031)	Light green
1-2 shift control spring	5.5 (0.217)	46.0 (1.811)	0.5 (0.020)	Light green
1-2 shift spring	5.0 (0.197)	24.9 (0.980)	0.5 (0.020)	Gray
2-3 shift spring	6.1 (0.240)	39.7 (1.563)	0.65 (0.026)	Pink
3-4 shift spring	6.4 (0.252)	37.0 (1.457)	0.6 (0.024)	—
Throttle backup spring	6.4 (0.252)	33.5 (1.319)	0.6 (0.024)	Pink
Throttle modulator front spring	5.0 (0.197)	27.8 (1.094)	0.6 (0.024)	Red
Throttle modulator rear spring	7.15 (0.281)	30.8 (1.213)	0.85 (0.033)	Red
1 range control spring	6.15 (0.242)	39.2 (1.543)	0.65 (0.026)	White
2 range control spring	3.95 (0.156)	32.1 (1.264)	0.45 (0.018)	—
Kick-down spring	5.4 (0.213)	38.1 (1.500)	0.8 (0.031)	—
Throttle assist spring	5.15 (0.203)	32.3 (1.272)	0.55 (0.022)	Dark green
Throttle spring	5.4 (0.213)	48.3 (1.902)	0.8 (0.031)	—
Converter relief ball spring	6.9 (0.272)	24.1 (0.949)	0.9 (0.035)	Maroon
Orifice check valve spring	5.0 (0.197)	12.5 (0.492)	0.23 (0.009)	—

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Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure regulator spring	9.5 (0.374)	30.7 (1.209)	0.7 (0.028)	—
Lock-up control spring	7.3 (0.287)	46.2 (1.819)	0.8 (0.031)	Blue
Lock-up support spring	6.1 (0.240)	43.5 (1.713)	0.65 (0.026)	Blue
OD lock-up spring	7.1 (0.280)	66.5 (2.618)	0.8 (0.031)	Red

Item	Model	G4A-EL (EC-AT)	G4A-HL (4-speed)	
			FE engine	F8 engine
<b>Gear assembly</b>				
Total end play	mm (in)	0.25—0.50 (0.010—0.020)		
End play adjust race	mm (in)	1.2 (0.047), 1.4 (0.055), 1.6 (0.063), 1.8 (0.071), 2.0 (0.079), 2.2 (0.087)		
Idle gear bearing preload	N·m (cm·kg, in·lb)	0.03—0.9 (0.3—9.0, 0.26—7.8)		
Preload adjust shims	mm (in)	0.10 (0.004), 0.12 (0.005), 0.14 (0.006), 0.16 (0.0063), 0.18 (0.007), 0.20 (0.008)		
Output gear bearing preload	N·m (cm·kg, in·lb)	0.03—0.9 (0.3—9.0, 0.26—7.8)		
Preload adjust shims	mm (in)	0.10 (0.004), 0.12 (0.005), 0.14 (0.006), 0.16 (0.0063), 0.18 (0.007), 0.20 (0.008), 0.50 (0.020)		
<b>Drive and differential</b>				
Final gear	Type	Helical gear		
	Reduction ratio	3,700 : 1		
Side bearing preload	N·m (cm·kg, in·lb)	2.9—3.9 (30—40, 26—35)		
Preload adjust shims	mm (in)	0.10 (0.004), 0.12 (0.005), 0.14 (0.006), 0.16 (0.0063), 0.18 (0.007), 0.20 (0.008), 0.50 (0.020), 0.70 (0.028), 1.00 (0.039)		
Backlash of side gear and pinion mm (in)	Standard	0.025—0.1 (0.001—0.004)		
	Maximum	0.5 (0.020)		
Torque converter distance "A" (Refer to page 7B—214)	mm (in)	25 (0.984)		

7C. AUTOMATIC TRANSAXLE (3-SPEED)

Item		Engine model	FE engine	F6 engine
Model			F3A	
Gear ratio	1st		2.841	
	2nd		1.541	
	3rd		1.000	
	Reverse		2.400	
Oil capacity	Liters (US qt, Imp qt)	6.2 (6.6, 5.5)		
Fluid type		ATF Dexron-II or M-III		
Fluid level with the engine idling at P		Between F and L marks on gauge		
<b>Stall revolution</b>				
After brake in		rpm	2050—2150	1800—2050
<b>Line pressure</b>				
D, 1	Idle	kPa (kg/cm <sup>2</sup> , psi)	294—392 (3—4, 43—57)	
	Stall	kPa (kg/cm <sup>2</sup> , psi)	883—1079 (9—11, 128—156)	
2	Idle	kPa (kg/cm <sup>2</sup> , psi)	785—1177 (8—12, 114—171)	
	Stall	kPa (kg/cm <sup>2</sup> , psi)	785—1177 (8—12, 114—171)	
R	Idle	kPa (kg/cm <sup>2</sup> , psi)	392—687 (4—7, 57—100)	
	Stall	kPa (kg/cm <sup>2</sup> , psi)	1570—1864 (16—19, 228—270)	
<b>Governor pressure</b>				
D	30 km/h (19 mph)	kPa (kg/cm <sup>2</sup> , psi)	78—137 (0.8—1.4, 11—20)	
	50 km/h (31 mph)	kPa (kg/cm <sup>2</sup> , psi)	157—226 (1.6—2.3, 23—33)	
	85 km/h (53 mph)	kPa (kg/cm <sup>2</sup> , psi)	314—402 (3.2—4.1, 46—58)	
<b>Line pressure cut back</b>				
Vacuum of vacuum pump			Governor pressure	kPa (kg/cm <sup>2</sup> , psi)
0 mmHg (0 inHg)			98—157 (1.0—1.6, 14—23)	
200 mmHg (7.87 inHg)			39—98 (0.4—1.0, 6—14)	
<b>Shift point</b>				
Range	Throttle condition (manifold vacuum)	Shifting	Shift point speed km/h (mph)	
D	Fully opened 0—100 mmHg (0—3.94 inHg)	1st → 2nd	47—57 (29—35)	44—54 (27—33)
		2nd → 3rd	106—119 (66—74)	95—108 (59—67)
		3rd → 2nd	95—103 (59—64)	86—94 (53—58)
		2nd → 1st	35—39 (22—24)	34—38 (21—24)
	Half throttle 130 mmHg (5.12 inHg)	1st → 2nd	18—31 (11—19)	18—31 (11—19)
		2nd → 3rd	39—68 (24—42)	44—73 (27—45)
1	Fully closed	2nd → 1st	10—15 (6—9)	10—15 (6—9)
1	Fully closed	2nd → 1st	32—39 (20—24)	33—40 (20—25)
<b>Torque converter</b>				
Stall torque ratio			1.800—2.100 : 1	
Bushing inner diameter	mm (in)	Standard	33.000—33.025 (1.299—1.300)	
		Maximum	33.075 (1.302)	
<b>Oil pump</b>				
Clearance				
Gear and pump cover	mm (in)	Standard	0.02—0.04 (0.0008—0.0016)	
		Maximum	0.08 (0.0031)	
Outer gear and crescent	mm (in)	Standard	0.14—0.21 (0.0055—0.0083)	
		Maximum	0.25 (0.0098)	
Outer gear and housing	mm (in)	Standard	0.05—0.20 (0.002—0.0079)	
		Maximum	0.25 (0.0098)	
Oil seal ring and ring groove	mm (in)	Standard	0.04—0.16 (0.0016—0.0063)	
		Maximum	0.40 (0.0157)	
Pump housing sleeve diameter	mm (in)	Standard	37.950—37.975 (1.494—1.495)	
		Maximum	37.900 (1.492)	
Inner gear bushing inner diameter	mm (in)	Standard	38.0—38.025 (1.496—1.497)	
		Maximum	38.075 (1.499)	

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Item		Engine model	FE engine	F6 engine	
<b>Front clutch</b>					
Number of driven and drive plates			3		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Front clutch clearance		mm (in)	1.6—1.8 (0.063—0.071)		
Retaining plate sizes		mm (in)	5.2 (0.205), 5.4 (0.213), 5.6 (0.220), 5.8 (0.228), 6.0 (0.236), 6.2 (0.244)		
Return spring free length		mm (in)	26.2 (1.031)		
Drum bushing inner diameter	mm (in)	Standard	44.000—44.025 (1.732—1.733)		
		Maximum	44.075 (1.735)		
Front clutch drum end play		mm (in)	0.5—0.8 (0.197—0.0315)		
End play adjust shims		mm (in)	1.3 (0.0512), 1.5 (0.0591), 1.7 (0.0669), 1.9 (0.0748), 2.1 (0.0827), 2.3 (0.0906), 2.5 (0.0984), 2.7 (0.1063)		
<b>Rear clutch</b>					
Number of driven and drive plates			4		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Rear clutch clearance		mm (in)	0.8—1.0 (0.0315— 0.0394)		
Retaining plate sizes		mm (in)	4.8 (0.189), 5.0 (0.197), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220), 5.8 (0.228), 6.0 (0.236), 6.2 (0.244)		
Return spring free length		mm (in)	26.2 (1.031)		
<b>Low and reverse brake</b>					
Number of low and reverse brake plates			4		
Drive plate thickness	mm (in)	Standard	1.6 (0.063)		
		Minimum	1.4 (0.055)		
Low and reverse brake clearance		mm (in)	0.8—1.05 (0.032—0.041)		
Retaining plate sizes		mm (in)	4.6 (0.181), 4.8 (0.189), 5.0 (0.197), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220)		
Return spring free length		mm (in)	27.7 (1.091)		
<b>Servo</b>					
Return spring free length		mm (in)	48.0 (1.89)	45.5 (1.79)	
<b>Governor</b>					
Primary spring	mm (in)	Outer diameter	9.0 (0.354)		
		Free length	17.2 (0.667)		
Secondary spring	mm (in)	Outer diameter	9.25 (0.364)		
		Free length	13.2 (0.520)		
<b>One-way clutch</b>					
Bushings diameter	mm (in)	Standard	129.987—130.013 (5.118—5.119)		
		Maximum	130.063 (5.121)		
<b>Control valve springs</b>					
<b>Spring name</b>			<b>Outer dia. mm (in)</b>	<b>Free length mm (in)</b>	<b>Wire dia. mm (in)</b>
Throttle backup spring			7.3 (0.287)	36.0 (1.417)	0.8 (0.031)
Downshift spring			5.55 (0.219)	21.9 (0.862)	0.55 (0.022)
2-3 shift spring			6.9 (0.272)	41.0 (1.614)	0.7 (0.028)
1-2 shift spring			6.4 (0.252)	31.63 (1.245)	0.4 (0.016)
Second lock spring			5.55 (0.219)	33.5 (1.319)	0.55 (0.022)
Pressure regulator spring			11.7 (0.461)	43.0 (1.693)	1.2 (0.047)
Throttle relief ball spring			7.0 (0.276)	11.2 (0.441)	0.9 (0.035)
Orifice check valve spring			5.0 (0.197)	15.5 (0.610)	0.23 (0.009)

Item		Engine model	FE engine	F6 engine
<b>Gear assembly</b>				
Total end play	mm (in)		0.25—0.50 (0.010—0.0196)	
End play adjust races	mm (in)		1.2 (0.047), 1.4 (0.055), 1.6 (0.063), 1.8 (0.071), 2.0 (0.079), 2.2 (0.087)	
Idle gear bearing preload	Nm (cm-kg, in-lb)		0.03—0.9 (0.3—9.0, 0.26—7.81)	
Preload adjust shims	mm (in)		0.10 (0.0039), 0.12 (0.0047), 0.14 (0.0055), 0.16 (0.0063), 0.20 (0.0078), 0.50 (0.0196)	
Output gear bearing preload	Nm (cm-kg, in-lb)		0.03—0.9 (0.3—9.0, 0.26—7.81)	
Preload adjust shims	mm (in)		0.10 (0.0039), 0.12 (0.0047), 0.14 (0.0055), 0.16 (0.0063), 0.20 (0.0078), 0.50 (0.0196)	
<b>Drive and differential</b>				
Final gear	Type		Helical gear	
	Reduction ratio		3.450 : 1	3.631 : 1
Side bearing preload	Nm (cm-kg, in-lb)		2.1— 3.0 (21—31, 18—27)	
Preload adjust shims	mm (in)		0.10 (0.004), 0.12 (0.005), 0.14 (0.006), 0.16 (0.0063), 0.18 (0.007), 0.20 (0.008), 0.50 (0.020), 0.70 (0.028), 1.00 (0.039)	
Backlash of side gear and pinion mm (in)	Standard		0.025—0.1 (0.001— 0.004)	
	Maximum		0.5 (0.020)	
Torque converter distance A (Refer to 7C—118)	mm (in)		20 (0.787)	

# 30 TECHNICAL DATA

## 9. FRONT AND REAR AXLES

Item	Transaxle type		MTX		ATX	
			Non-Turbo	Turbo	Non-Turbo	Turbo
<b>Driveshaft</b>						
Joint type	Inside		Ball joint		Tripod joint	
	Outside		Ball joint		Ball joint	
Shaft length	mm (in)	Right	360.0 (14.17)	355.5 (14.00)	355.5 (14.00)	348.8 (13.73)
		Left	360.0 (14.17)	355.5 (14.00)	355.5 (14.00)	348.8 (13.73)
Shaft diameter		mm (in)	24 (0.94)	26 (1.02)	24 (0.94)	26 (1.02)
<b>Front axle</b>						
Front wheel bearing end play		mm (in)	0.2 (0.0079) max.			
<b>Rear axle</b>						
Rear wheel bearing end play		mm (in)	0.2 (0.0079) max.			

## 10. STEERING SYSTEM

Item	Type		Manual steering		Power steering	
Steering wheel	Outer diameter	mm (in)	380 (15.0)			
	Turns lock to lock		4.32	2.93		
Steering shaft and joints	Shaft type		Collapsible			
	Joint type		Cross joints (2)			
	Tilt stroke		mm (in)	40 (1.6)		
Front steering gear	Type		Rack and pinion			
	Gear ratio		∞ (infinite)			
Power steering fluid	Capacity	2WS	—		0.9 (0.95, 0.79)	
	liter (US quarts, Imp quarts)	4WS	—		1.0 (1.06, 0.88)	
	Type	2WS 4WS	—		Dexron II or M III	

11. BRAKING SYSTEM

Item		Specifications	
Brake pedal	Height mm (in)	LHD & RHD 222 $\pm 5$ (8.74 $\pm 0.2$ )	
	Free play mm (in)	4—7 (0.16—0.28)	
	Reserve travel mm (in) (Clearance when pedal is depressed at 589 N (60 kg, 132 lb))	95 (3.74) min.	
	Lever ratio	4.2	
	Max. stroke mm (in)	LHD: 136.5 (5.37) RHD: 135 (5.31)	
Master cylinder	Type	Tandem	
	Bore mm (in)	22.22 (0.875)	
	Fluid type	DOT-3 or 4, or SAE J1703	
Front disc brake	Type	Disc (ventilated)	
	Thickness of pad mm (in)	Standard	10.0 (0.39)
		Minimum	2.0 (0.08)
	Area of pad mm <sup>2</sup> (in <sup>2</sup> )	4,800 (7.44)	
	Outer diameter of disc plate mm (in)	14 or 15 inch-wheel: 264 (10.39) 13 inch-wheel: 242 (9.53)	
	Thickness of disc plate mm (in)	Standard	14 or 15 inch-wheel: 24.0 (0.94) 13 inch-wheel: 20.0 (0.79)
		Minimum	14 or 15 inch-wheel: 22.0 (0.87) 13 inch-wheel: 18.0 (0.71)
	Disc plate runout mm (in)	Maximum	0.1 (0.004)
Wheel cylinder bore mm (in)	53.97 (2.125)		
Rear drum brake	Type	Leading-trailing	
	Clearance between shoe and drum	Self-adjusting	
	Thickness of lining mm (in)	Standard	(a): 4.5 (0.18) (b): 5.0 (0.20)
		Minimum	1.0 (0.04)
	Width of lining mm (in)	(a): 30 (1.18) (b): 25 (0.98)	
	Length of lining mm (in)	(a): 219.3 (8.63) (b): 191.9 (7.56)	
	Inner diameter of drum mm (in)	Standard	(a): 228.6 (9.00) (b): 200 (7.87)
		Maximum	(a): 230.1 (9.06) (b): 201.5 (7.93)
Wheel cylinder bore mm (in)	17.46 (0.687)		
Rear disc brake	Type	Disc (solid)	
	Thickness of pad mm (in)	Standard	8.0 (0.31)
		Minimum	1.0 (0.04)
	Area of pad mm <sup>2</sup> (in <sup>2</sup> )	2,900 (4.5)	
	Outer diameter of disc plate mm (in)	259 (10.2)	
	Thickness of disc plate mm (in)	Standard	10.0 (0.40)
		Minimum	8.0 (0.31)
	Disc plate runout mm (in)	Maximum	0.1 (0.04)
Wheel cylinder bore mm (in)	30.2 (1.19)		
Parking brake	Type	Center lever	
	Lever notches (Pulled at 98N (10 kg, 22 lb))	5—7	
Power brake unit	Diameter mm (in)	238 (9.37)	
	Clearance between master cylinder piston and push rod mm (in)	0 (0)	
	Fluid pressure per treading force kPa (kg/cm <sup>2</sup> , psi)/N (kg, lb)	1,177 (12,171)/196 (20, 44) min. when no vacuum is applied 7,063 (72, 1,024)/196 (20, 44) min. when 500 mmHg (19.7 in Hg) vacuum is applied	
Rear wheel hydraulic control device (system)	Type	Dual proportioning valve (Non-ABS) or ABS	
	Switching point kPa (kg/cm <sup>2</sup> , psi)	Except General LHD and RHD: 1,962 (20, 284) General LHD and RHD: 2,942 (30, 427)	

(a): Except 13 inch-wheels in General LHD and RHD vehicles

(b): 13 inch-wheels in General LHD and RHD vehicles



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## 12. WHEEL AND TIRE

Item		Type	Standard	Temporary spare (if equipped)
Wheel	Size		5-Jx13	4-T x 15
			5 1/2-JJx14	
			6JJx15	
	Offset	mm (in)	42 (1.65)	53 (2.09)
	Diameter of pitch circle	mm (in)	114.3 (4.5)	
	Material		Steel or aluminum alloy	Steel
Number of fixing nuts	13 inch-wheel		4	4 or 5
	14 inch-wheel		5	
	15 inch-wheel			
Tire	Size	13 inch-wheel	6.45-13-6PR 165SR13 165/80R13 82S 185/70HR13 185/70R13 85H	T125/70D15
		14 inch-wheel	185/70HR14 185/70R14 87H 185/70R14 88H 185/70VR14	
		15 inch-wheel	195/60R15 86H 195/60VR15	
	Air pressure, kPa (kg/cm <sup>2</sup> , psi)	Front	216 (2.2, 31) or 196 (2.0, 28) Refer to tire labels for applications	412 (4.2, 60)
	Rear	177 (1.8, 26)		
Wheel and tire	Runout mm (in)	Horizontal	Steel wheel: 2.5 (0.098), Aluminum alloy wheel: 2.0 (0.079) max.	
		Vertical	2.0 (0.079) max.	
	Unbalance g (oz)	13 inch-wheel	11 (0.39) max.	
		14 inch-wheel	10 (0.35) max.	
		15 inch-wheel	9 (0.32) max.	

## 13. SUSPENSION

Item		Specification								
<b>Front suspension</b>										
Type		Strut								
Front wheel alignment	Toe-in mm (in)	0 ± 3 (0 ± 0.12)								
	Camber angle	0°17' ± 45'								
	Caster angle	1°13' ± 45'								
	King pin angle	12°47'								
Maximum front steering angle	Inner	36°26'33"								
	Outer	30°59'15"								
Stabilizer	Type	Torsion bar								
	Diameter mm (in)	20.0 (0.79)								
Shock absorbers	Standard suspension	Oil type								
	Auto adjust suspension	Low-pressure gas sealed type								
Coil springs*	Identification color	Orange	Green	Light green	Pink	Brown	Purple	Gray	Blue	
	Wire diameter mm (in)	12.5 (0.49)	12.6 (0.49)	12.8 (0.50)	12.9 (0.51)	13.1 (0.52)	13.3 (0.53)	13.6 (0.54)	13.7 (0.54)	
	Coil inner diameter mm (in)	147.5 (5.8)								
	Free length mm (in)	344 (13.5)	353 (13.9)	362 (14.3)	370 (14.6)	372 (14.6)	365 (14.4)	350 (13.8)	358 (14.1)	
	Coil number	4.99	5.09	5.31	5.42	5.53	5.46	5.34	5.45	

\* Refer to pages 13—5,6,7 for coil spring applications.

Item		Specification							
<b>Rear suspension</b>									
Type		Strut							
Rear wheel alignment	Toe-in mm (in)	2WS	0 ± 3 (0 ± 0.12)						
		4WS	3 ± 3 (0.12 ± 0.12)						
	Camber angle	2WS	-0°30' ± 45'						
		4WS	0°00' ± 45'						
Maximum rear steering angle (4WS)	Inner	5°00' ± 45'							
	Outer	5°00' ± 45'							
Stabilizer	Type	Torsion bar							
	Diameter mm (in)	16 (0.63)							
Shock absorbers	Standard suspension	Oil type							
	Auto adjust suspension	Low-pressure gas sealed type							
Coil springs*	Identification color	Orange	White	Yellow	Brown	Blue	Green	Red	Pink
	Wire diameter mm (in)	11.6 (0.45)	11.7 (0.46)	11.8 (0.46)	11.9 (0.47)	12.1 (0.48)	12.2 (0.48)	12.4 (0.49)	12.6 (0.50)
	Coil inner diameter mm (in)	127.5 (5.0)							
	Free length mm (in)	297 (11.7)	306 (12.0)	314 (12.4)	323 (12.7)	327 (12.9)	332 (13.1)	336 (13.2)	340 (13.4)
	Coil number	5.44	5.58	5.72	5.87	6.03	6.04	6.21	6.36

\* Refer to pages 13—8,9,10 for coil spring applications.

## 15. BODY ELECTRICAL SYSTEM

Item	Body type	Specification (W)		
		MX-6/Coupe	Sedan	Hatchback
Front exterior lights	Halogen headlight	60 + 55/55		
	Turn signal light	21		
	Position light	5		
	Side turn signal light	5		
Rear exterior lights	Back-up light	21		
		23 (Middle east)		
	License plate light	5		
	Stop/Tail light	21/5		
	Turn signal light	21		
	23 (Middle east)			
	Rear fog light	21 (ECE)		

# 30 TECHNICAL DATA

Item	Body type	Specification (W) (BULB TRADE NO)		
		MX-6/Coupe	Sedan	Hatchback
Indicator and warning lights	Brake	1.4		
	Oil pressure	1.4		
	Fuel	1.4		
	Washer level	1.4		
	Rear	1.4		
	4WS	—	—	1.4 (ECE)
	Door	1.4		
	Seat belt	1.4		
	ABS	1.4		
	Alternator	1.4		
	High beam	3.4		
	Turn signal	3.4		
	O/D OFF	0.8		
	A/T mode	0.8 (ECE)		
	A/T position	0.8		
Interior lights	Glove compartment light	3.4		
	Interior light	10		
	Luggage compartment light	5		
Illumination lights	Motor	4.8		
	Hazard switch	1.4		
	Cigar lighter	3.4		
	Auto cruise main switch	0.5		
	AAS switch	1.4		
	Rear defroster switch	1.4		
	A/T switch	1.4		
	A/T	3.4		
IG switch	1.4			

## STANDARD BOLT AND NUT TIGHTENING TORQUE

Diameter mm (in)	Pitch mm (in)	4T			6T			8T		
		N-m	m-kg	ft-lb	N-m	m-kg	ft-lb	N-m	m-kg	ft-lb
6 (0.236)	1 (0.039)	4.2—6.2	0.43—0.63	3.1—4.6	6.9—9.8	0.7—1.0	5.0—7.2	7.8—11.8	0.8—1.2	5.8—8.8
8 (0.315)	1.25 (0.049)	9.8—14.7	1.0—1.5	7.2—10.8	16—23	1.6—2.3	12—17	18—26	1.8—2.7	13—20
10 (0.394)	1.25 (0.049)	20—28	2.0—2.9	14—21	31—46	3.2—4.1	23—34	36—54	3.7—5.5	27—40
12 (0.472)	1.5 (0.059)	34—50	3.5—5.1	25—37	55—80	5.6—8.2	41—59	63—93	6.4—9.5	46—69
14 (0.551)	1.5 (0.059)	—	—	—	75—103	7.7—10.5	56—76	102—137	10—14	75—101
16 (0.630)	1.5 (0.059)	—	—	—	116—157	12—16	85—116	156—211	16—22	115—156
18 (0.709)	1.5 (0.059)	—	—	—	167—225	17—23	123—166	221—299	23—31	163—221
20 (0.787)	1.5 (0.059)	—	—	—	231—314	24—32	171—231	308—417	31—43	227—307
22 (0.866)	1.5 (0.059)	—	—	—	314—423	32—43	231—312	417—564	43—58	307—416
24 (0.945)	1.5 (0.059)	—	—	—	475—546	41—56	298—403	536—726	55—74	396—536

## SPECIAL TOOLS

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## 40 SPECIAL TOOLS

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### GENERAL INFORMATION

The letters "A" and "B" in the Priority column indicate the degree of importance of each tool.

A.....Indispensable

The tools ranked "A" in this list are indispensable for performing operations satisfactorily, easily, safely and efficiently. It would, therefore, be advisable for all service shops to have these tools.

B.....Selective

The tools in this list are not as necessary as tools ranked A, but all service shops should have these tools if possible in order to easily perform operations for efficient repair operations.


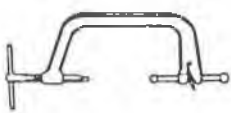

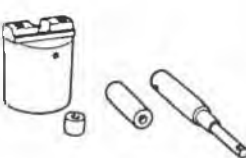


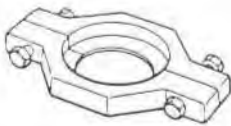
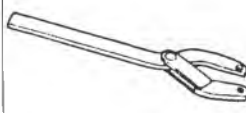
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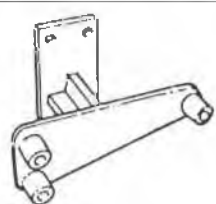
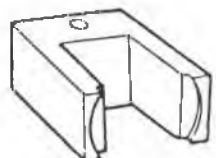



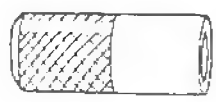
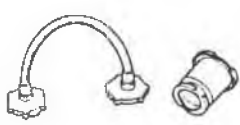

#### **Note**

**When ordering tool sets which consist of several tools, check the List in the Parts Catalogue or Special Service Tools Booklet (4063-11-85B) etc. to make sure that some tools are duplicated in other sets which may already have been purchased. If so, order only those new tools which are needed.**

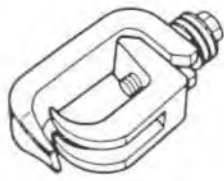


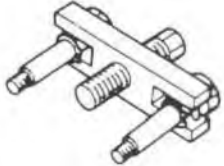

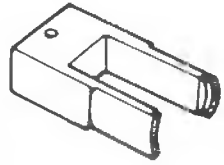


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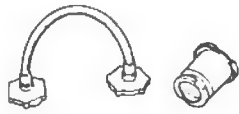
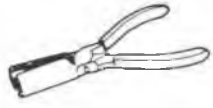
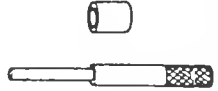
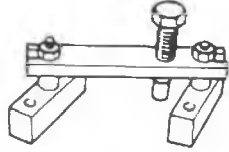
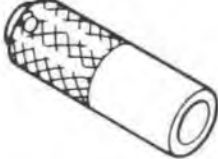



## ENGINE

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0107 680A Engine stand	A	
49 0636 100A Arm, valve spring lifter	A	
49 0223 105B Lifter, valve spring (F6, F8, FE-2V)	A	
49 G030 040 Tool set, piston pin setting (F6, F8, FE SOHC)	A	
49 E301 060 Brake, ring gear	A	
49 H011 101A Lock tool, crankshaft	A	
49 0636 145 Puller, fan puller boss	A	
49 S120 710 Holder, coupling flange	A	

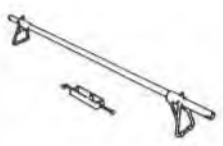
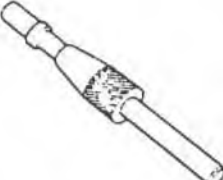


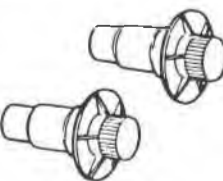
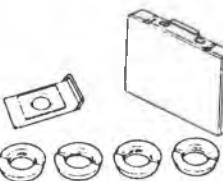

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G030 005A Hanger, engine stand	A	
49 G030 222 Pivot, valve spring lifter (F6, F8, FE SOHC)	A	
49 0249 010A Remover & installer, valve guide (FE-3V)	A	
49 1285 071 Puller bearing	A	
49 0221 251A Remove & installer, valve guide (F6, F8, FE-2V)	A	
49 G030 160 Pusher, valve seal (F6, F8, FE-2V)	A	
49 9200 146 Radiator cap tester adaptor set	A	
49 B012 005 Remover and installer valve guide (FE DOHC)	A	

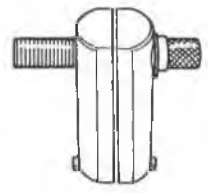

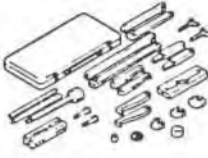
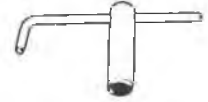
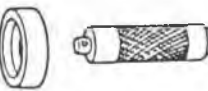
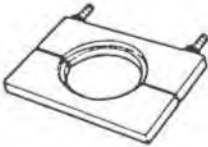
# 40 SPECIAL TOOLS

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 S120 220 Holder, tappet (Diesel)	A	
49 0636 165A Remover & installer, valve guide (Diesel)	A	
49 0223 061 Remover & installer, piston pin (RF-N, FE DOHC)	B	
49 S120 215A Pulley puller (Diesel)	A	
49 V101 060A Brake, ring gear (Diesel)	A	
49 S120 222 Pivot, valve spring lifter (RF-N, RF-CX, FE DOHC)	A	
49 G011 101 Lock tool, crankshaft (RF-N, RF-CX)	A	
49 H012 009 Pusher, valve seal (FE-3V)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 9200 147 Radiator cap tester adaptor set	A	
49 S120 170 Remover, valve seal (RF-N, RF-CX, FE DOHC)	A	
49 0552 165 Remover & installer, valve guide (Diesel)	A	
49 S120 105 Compressor, valve spring (Diesel)	A	
49 S120 160 Pusher, valve seal (Diesel)	A	
49 G012 001 Collar (FE DOHC)	A	
49 G012 002 Pusher, valve seal (FE DOHC)	A	
49 G011 001 Replacer, piston pin (RF-CX)	A	

**CLUTCH AND MANUAL TRANSAXLE**


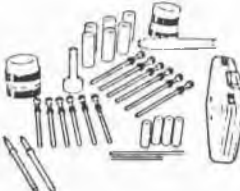
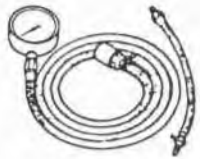
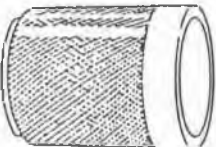




TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G017 5A0 Engine support	A	
49 SE01 310 Centering tool, clutch disc	A	
49 F401 330B Installer set, bearing	B	
49 G030 380B Shim selector set	A	
49 G030 455 Holder, (differential side gear)	B	
49 G017 1A0 Remover set, bearing	A	
49 G017 202 Preload adaptor	A	

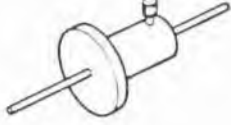
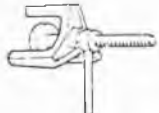
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 FT01 361 Remover, bearing	A	
49 G019 0A0 Hanger, transaxle	A	
49 0839 425C Puller set, bearing	A	
49 G030 440 Holder, primary shaft	A	
49 G030 795 Installer, oil seal	A	
49 G030 370 Removing plate	A	
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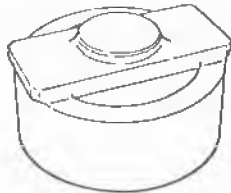



# 40 SPECIAL TOOLS

## AUTOMATIC TRANSAXLE

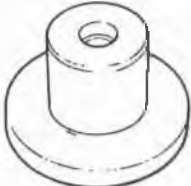
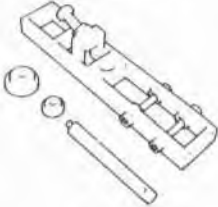




TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G019 0A7A Compressor set, Return spring	A	
49 G019 0A5A Shim selector set	A	
49 0378 400A Gauge set, oil pressure	A	
49 G019 011 Bearing installer	A	
49 FT01 376 Lifter, servo piston (3AT)	A	
49 S120 785 Dsut boots installer	A	
49 FT01 377 Replacer, low reverse piston (3AT)	A	
49 FT 01 374 Holder, one way clutch position (3AT)	A	


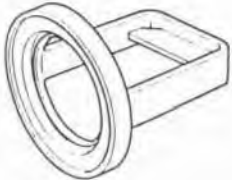

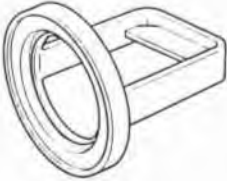

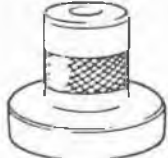
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G032 355 Adjust gauge (3AT)	B	
49 G019 9A2 Tester set, EC-AT (EC-AT)	A	
49 G019 013 Bearing remover	A	
49 G019 022 Attachment K	A	
49 FT01 439 Holder, idle gear shaft	A	
49 G019 012 Leak checker	A	
49 G019 0A2 Turbine shaft holder	A	
49 0378 375 Compressor, clutch spring (3AT)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G019 017 Oil seal installer	A	

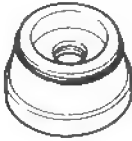
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G019 0A6A Shim selector set (3AT)	A	

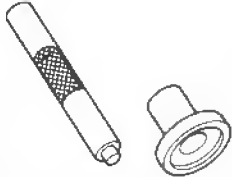
## FRONT AND REAR AXLE

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F026 102 Installer, bearing	A	
49 G033 1A1 Puller set wheel hub	A	
49 F027 007 Attachment φ 72	A	
49 H026 103 Support block	A	
49 G026 101 Replacer bearing	A	
49 G026 102 Replacer bearing	A	



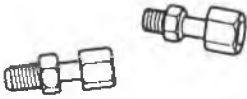
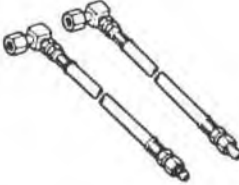
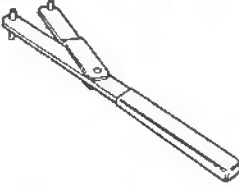

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G033 107 Installer, dust cover	A	
49 G025 001 Installer sensor rotor (ABS)	A	
49 G030 338 Attachment E	A	
49 H026 101A Installer, sensor rotor (ABS)	A	
49 G026 103 Support block	A	
49 V001 795 Installer, oil seal	A	

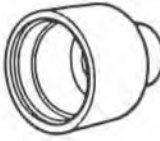




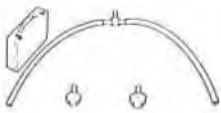
# 40 SPECIAL TOOLS

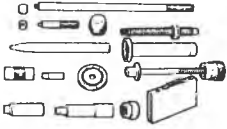
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F027 005 Attachment 62	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 M005 795 Installer set, oil seal	A	

## STEERING


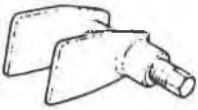

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0118 850C Puller, ball joint	B	
49 0180 510B Attachment	B	
49 B032 302 Adapter	A	
49 H002 671 Adapter, power steering gauge	A	
49 W023 585A Adjust wrench	A	
49 8038 785 Boot installer, ball joint dust cover	A	

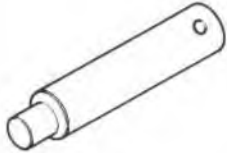

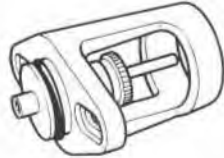
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 1243 785 Boots installer, tie rod	B	
49 0208 701A Air out tool, boot	B	
49 1232 670A Gauge set, power steering	A	
49 G033 108 Adapter, caster camber gauge	A	
49 0727 575 Puller, socket joint (4WS)	B	
49 G032 3A1 Joint hose	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G032 3A0 Repair set, power steering (ESPS)	A	

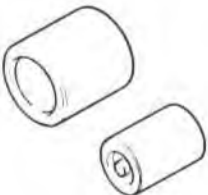
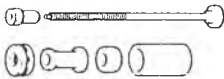
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
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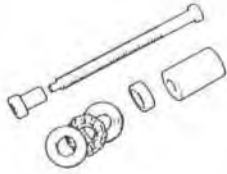
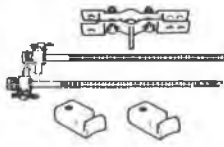
## BRAKE

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0259 770B Wrench, flare nut	A	
49 0221 600C Expand tool, disc brake	B	
49 FA18 602 Wrench disc, brake piston	B	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 B043 002 Bearing installer (Rear disc)	A	
49 F043 001 Adjust gauge	A	
49 B043 001 Adjust gauge (FE DOHC-R.H.D)	—	


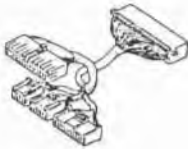

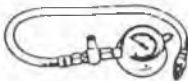
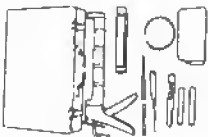



## SUSPENSION

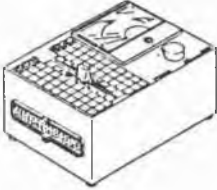

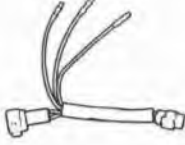
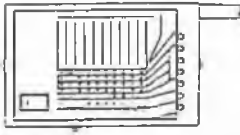
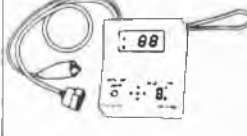
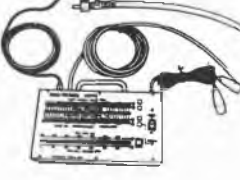
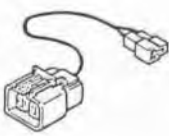
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G028 2A0 Replacer lower arm bush (4WS)	A	
49 G034 2A0 Replacer lower arm bush	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U034 2A0 Replacer rubber bush (4WS)	A	
49 G034 1A0 Coil spring compressor	A	

# 40 SPECIAL TOOLS

## CHECKER AND OTHER

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F018 001 Checker lamp	A	
49 9200 163 Adapter harness	A	
49 G018 902 Injector checker	A	
49 0187 280 Oil pressure gauge	B	
49 0305 870A Tool set, window	A	
49 0839 285 Checker, fuel and thermometer	A	
49 9200 020 V-ribbed belt tension gauge	B	
49 0242 685A Switch starter	B	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 9200 162 Monitor, engine signal	A	
49 U018 003 Adapter harness	A	
49 G018 901 Adapter harness	A	
49 9200 010 ACC checker	A	
49 H018 9A1 Self-diagnosis checker	A	
49 9200 750A Multi-pressure tester	A	
49 G018 001 Adapter harness	A	
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