

## BRAKING SYSTEM

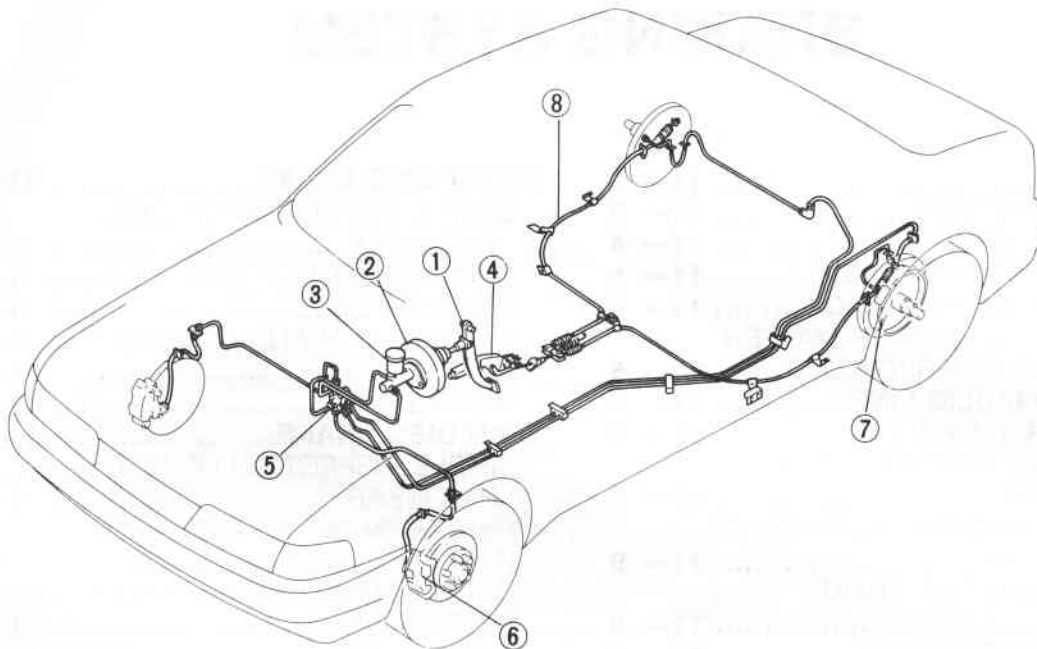
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# 11 OUTLINE

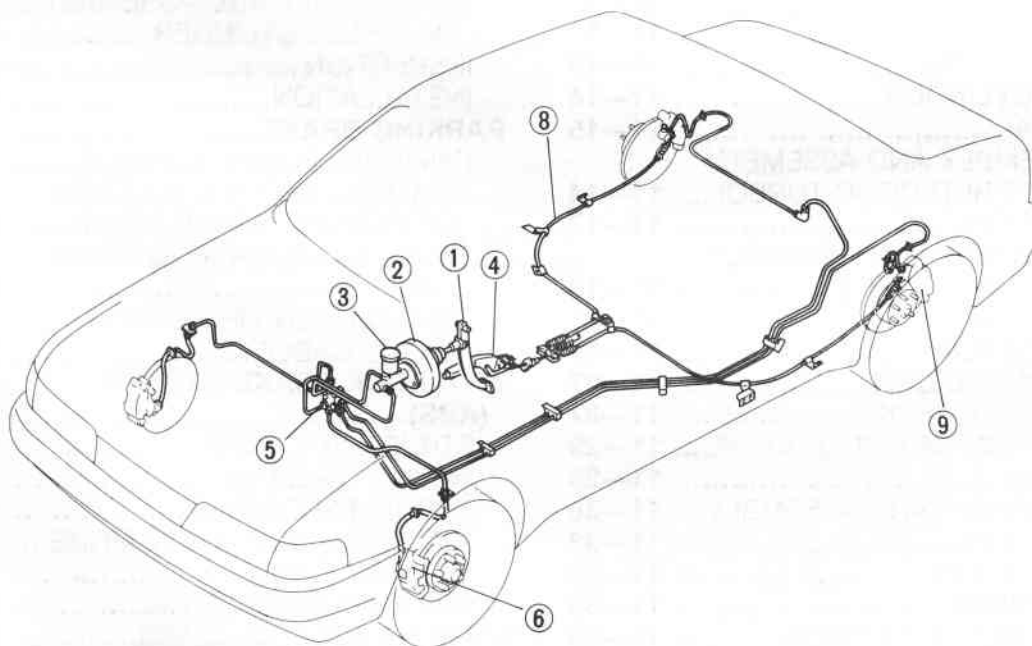
## OUTLINE

### STRUCTURAL VIEW

Front disc/rear drum brake



4-wheel disc brake



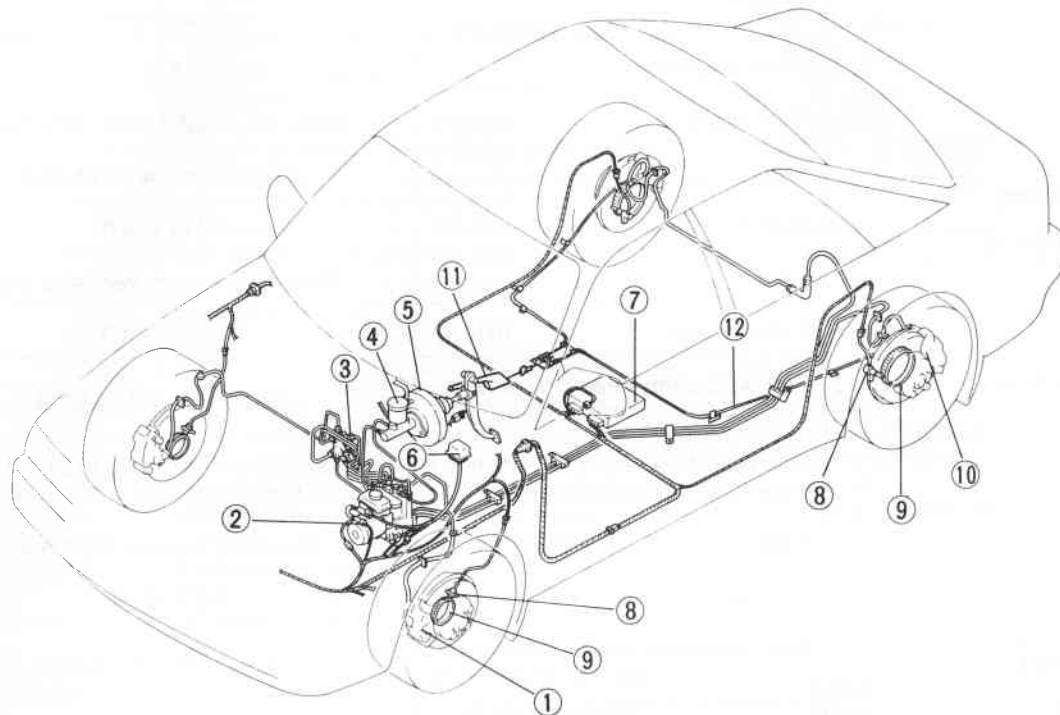
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- 1. Brake pedal
- 2. Power brake unit
- 3. Brake master cylinder

- 4. Parking brake lever
- 5. Dual proportioning valve
- 6. Front disc brake

- 7. Rear drum brake
- 8. Parking brake cable
- 9. Rear disc brake

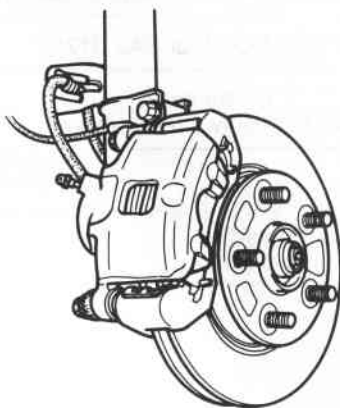
## Anti-lock brake system (ABS)



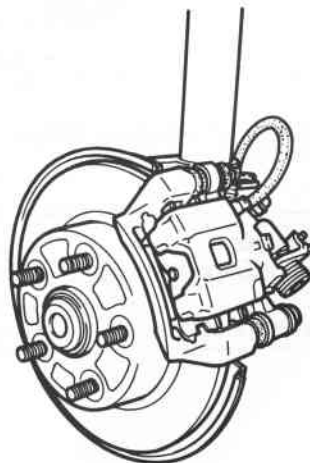
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- |                     |                       |                         |
|---------------------|-----------------------|-------------------------|
| 1. Front disc brake | 5. Power brake unit   | 9. Sensor rotor         |
| 2. Hydraulic unit   | 6. Relay box          | 10. Rear disc brake     |
| 3. Pipe joint       | 7. Control unit       | 11. Parking brake lever |
| 4. Master cylinder  | 8. Wheel speed sensor | 12. Parking brake cable |

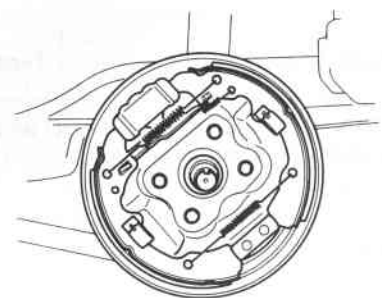
Front disc brake  
(Ventilated disc)



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 mm (in) (outer diameter x thickness)	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 mm (in) (outer diameter x thickness)	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 mm (in) (width x length x thickness)	(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

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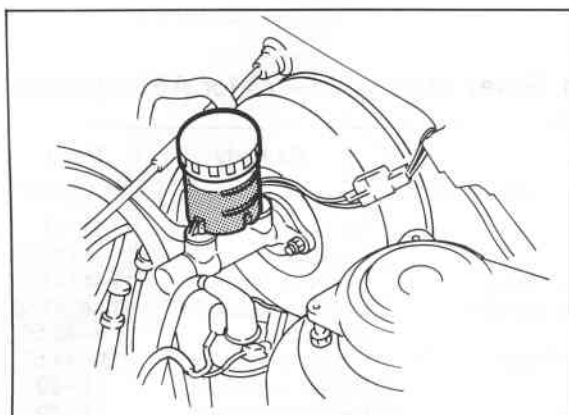
## TROUBLESHOOTING GUIDE

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	—
<b>Brakes do not release</b>	Unequal tire air pressures	Refer to Section 12	—
	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

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# 11 ON-VEHICLE MAINTENANCE, BRAKE HYDRAULIC LINE



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## ON-VEHICLE MAINTENANCE

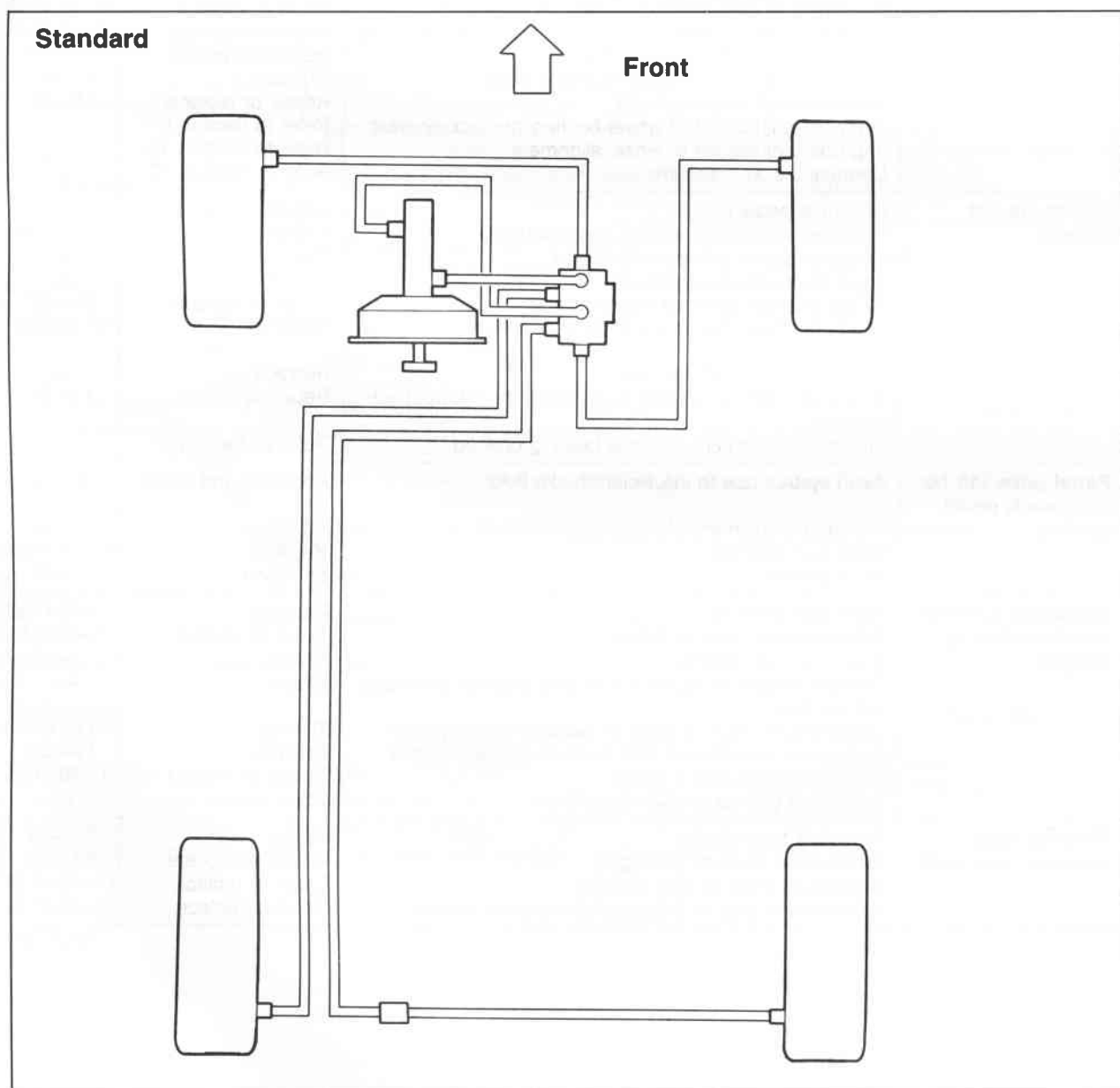
### BRAKE FLUID LEVEL IN MASTER CYLINDER RESERVOIR

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**

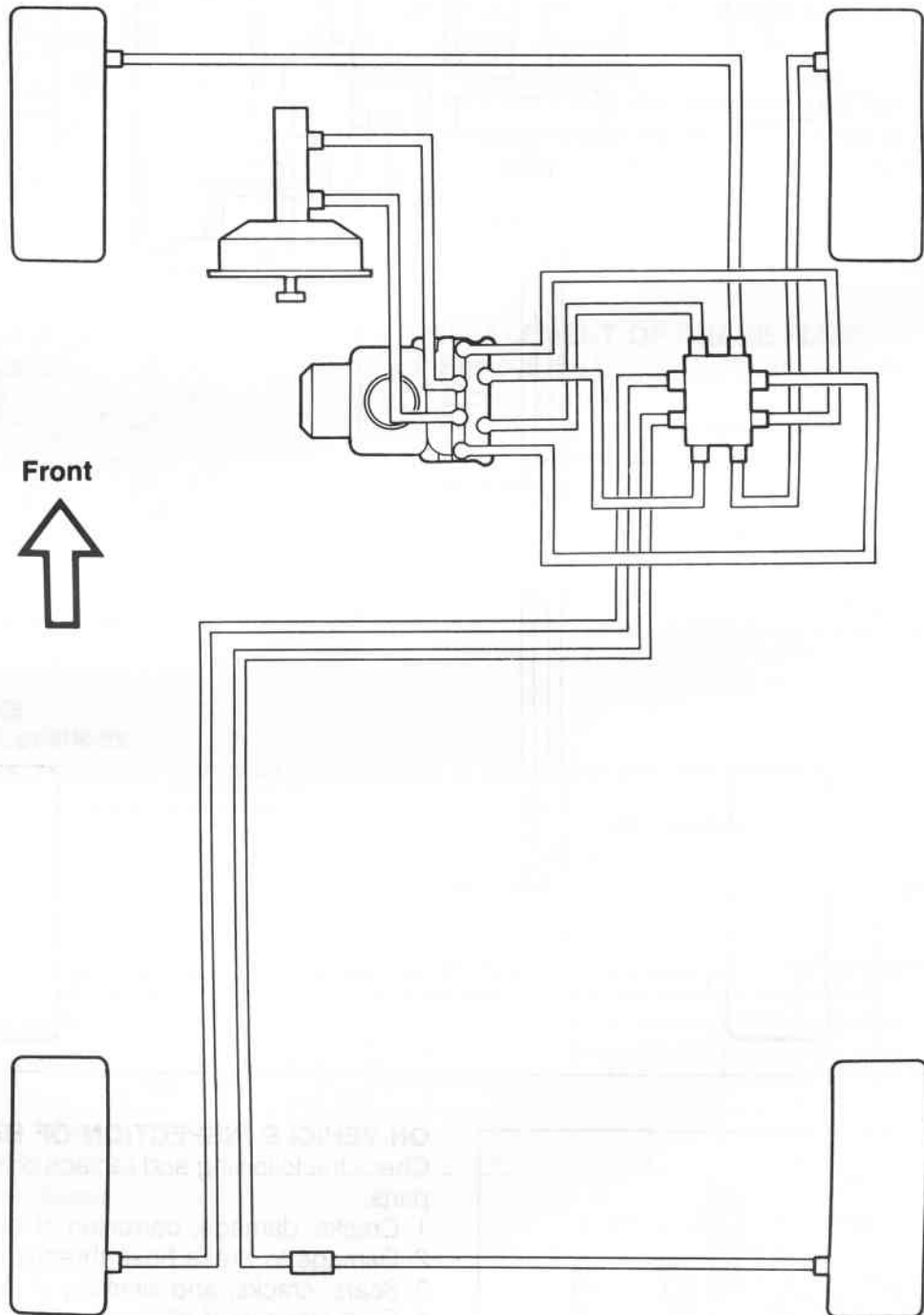
## BRAKE HYDRAULIC LINE

### STRUCTURAL VIEW



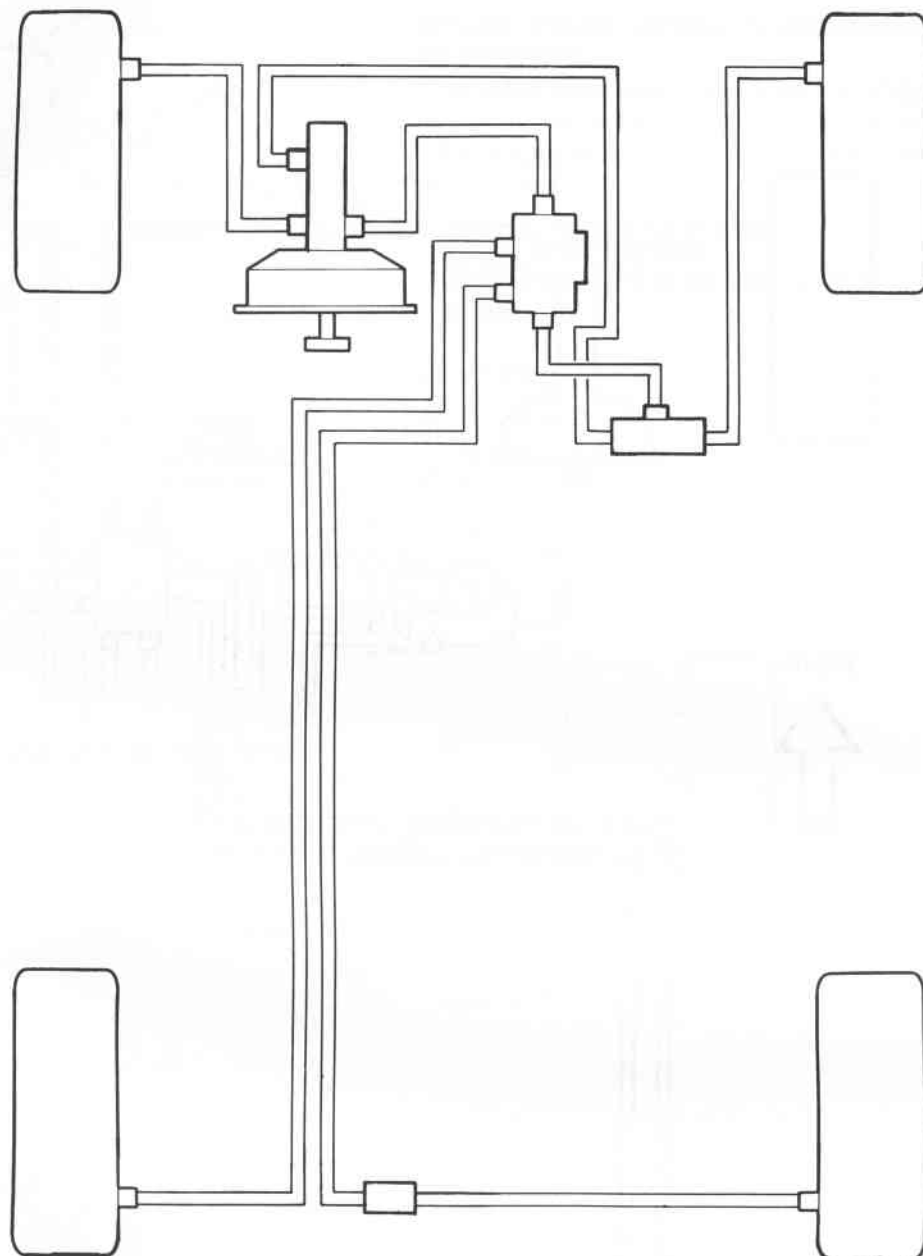
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ABS

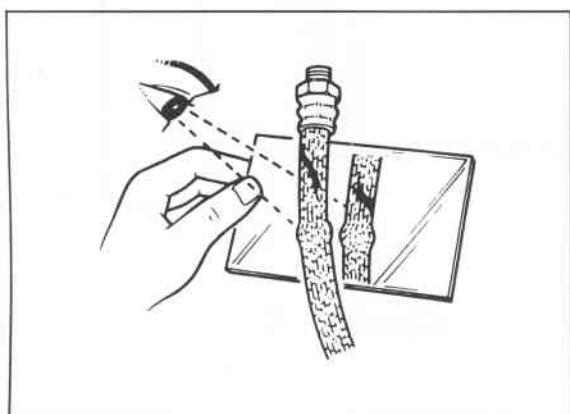


# 11 BRAKE HYDRAULIC LINE

RF-CX



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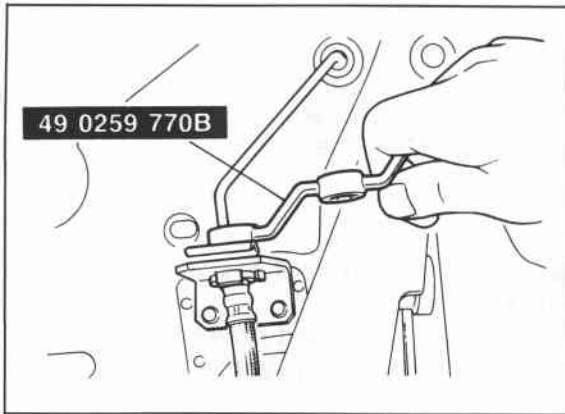


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## ON-VEHICLE INSPECTION OF BRAKE LINES

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



## REMOVAL AND INSTALLATION OF BRAKE LINES

1. Loosen or tighten the flare nut with the **SST**.

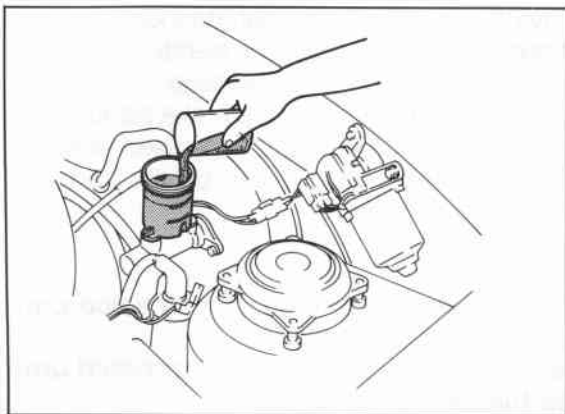
**Flare nut tightening torque: 13—22 N·m  
(1.3—2.2 m·kg, 9—16 ft·lb)**

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.

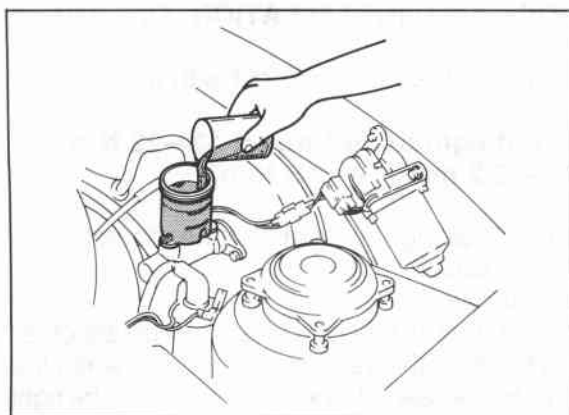
Removed part			Air bleeding location			
			Front		Rear	
			Right side	Left side	Right side	Left side
Master cylinder			*	*	*	*
Wheel cylinder or caliper	Front	Right side	*	—	—	—
		Left side	—	*	—	—
	Rear disc	Right side	—	—	*	—
		Left side	—	—	—	*
	Rear drum	Right side	—	—	*	—
		Left side	—	—	—	*
Dual proportioning valve			*	*	*	*
Hydraulic unit (ABS)			*	*	*	*

ABS: Anti-lock Brake System

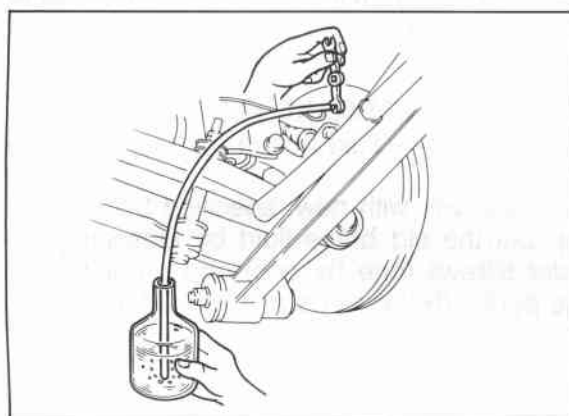
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\*: Indicates where air bleeding is necessary

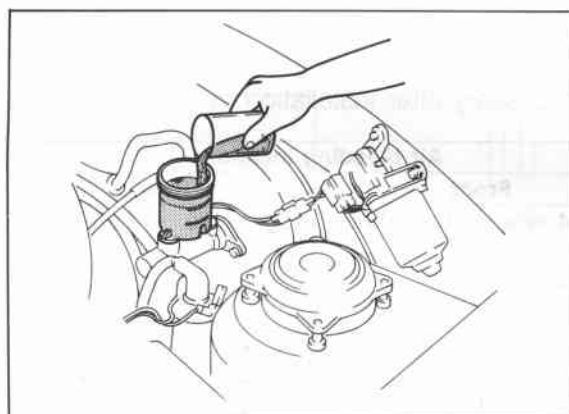
# 11 BRAKE HYDRAULIC LINE



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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.

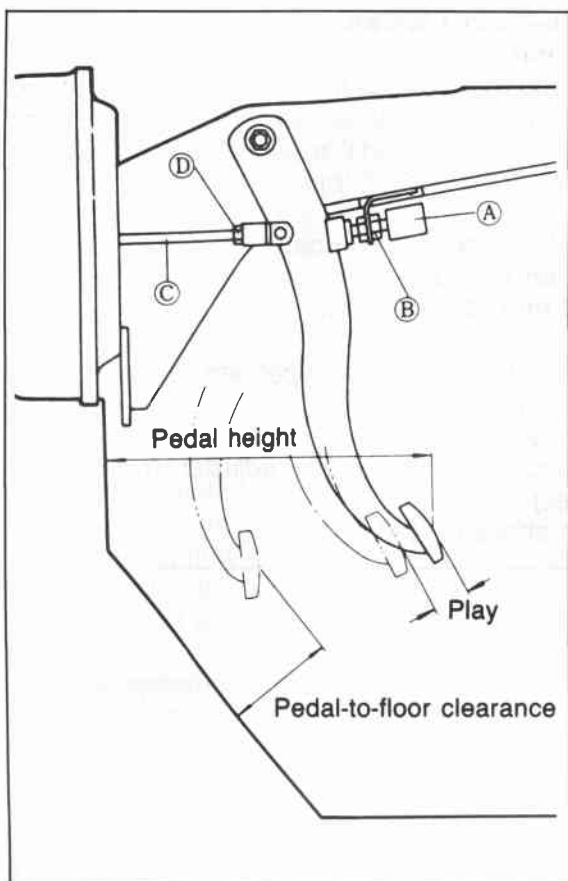
## Bleeder screw tightening torque:

6—9 N·m (60—90 cm·kg, 52—78 in·lb)

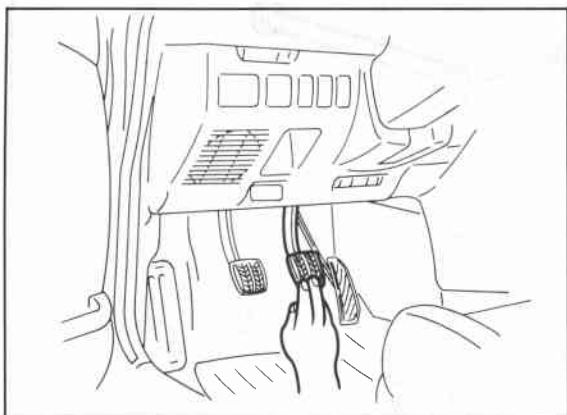
## Caution

Be sure to clean away any spilled fluid with rags.

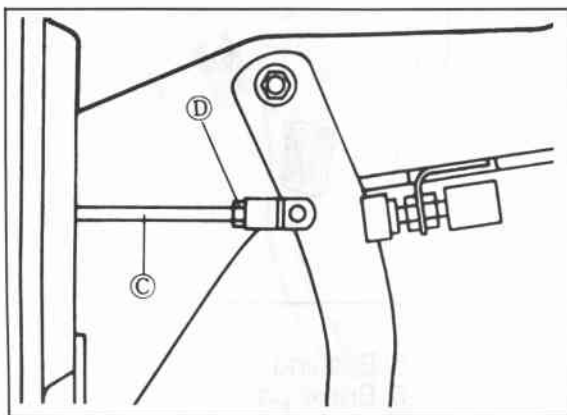
8. Add brake fluid to the reservoir up to the specified level.



76G11X-008



76G11X-099



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## 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 N·m (1.4—1.8 m·kg, 10—13 ft·lb)

#### Locknut D tightening torque:

24—34 N·m (2.4—3.5 m·kg, 17—25 ft·lb)

#### 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)

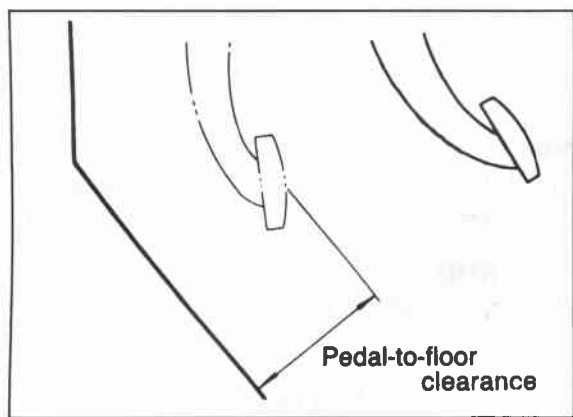
#### Adjustment

Loosen the locknut D of the operating rod C; then turn the rod to adjust the free play.

#### Locknut D tightening torque:

24—34 N·m (2.4—3.5 m·kg, 17—25 ft·lb)

# 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).

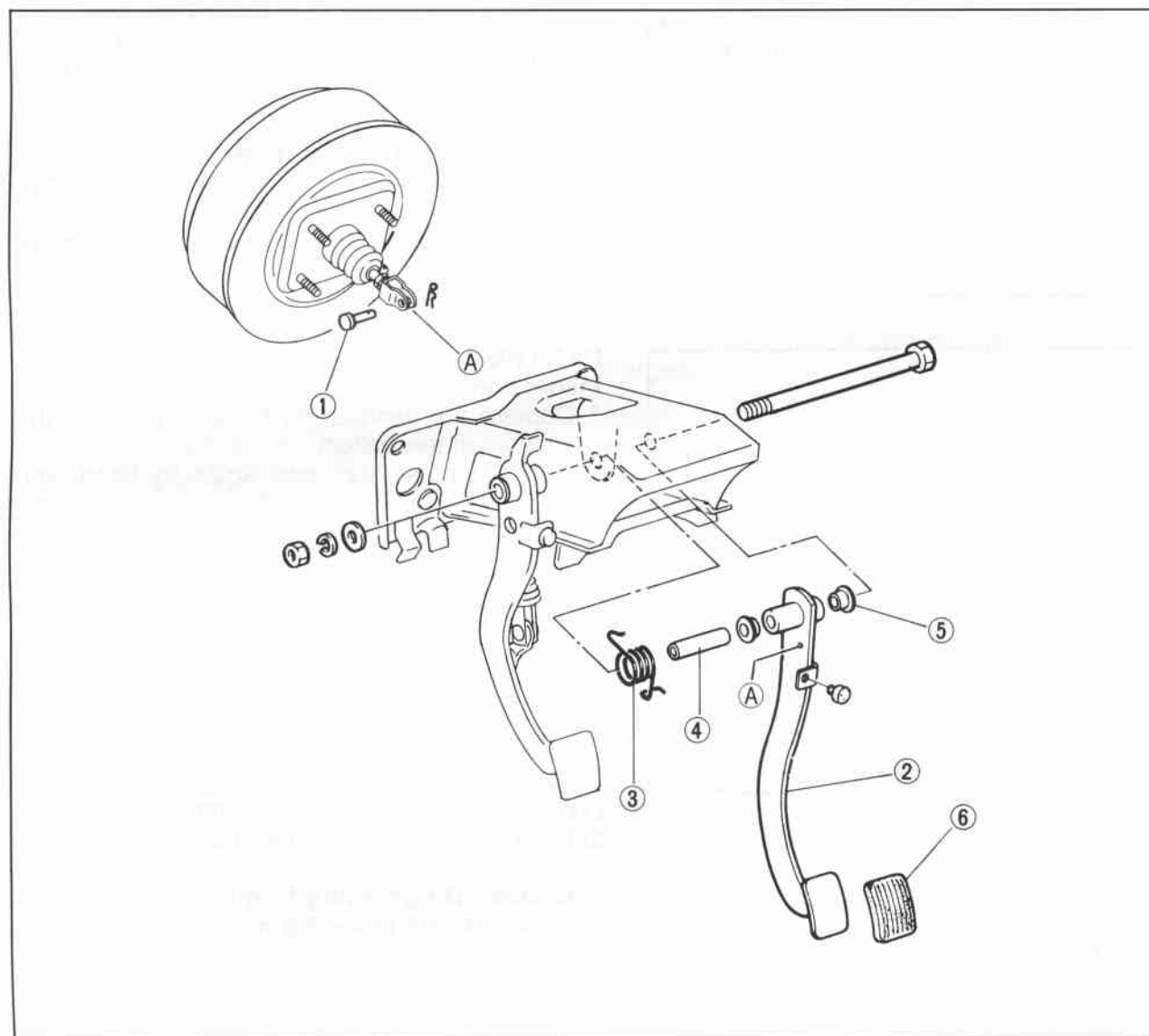
**Pedal-to-floor clearance:**  
**LHD and RHD**  
**95 mm (3.7 in) min.**

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.



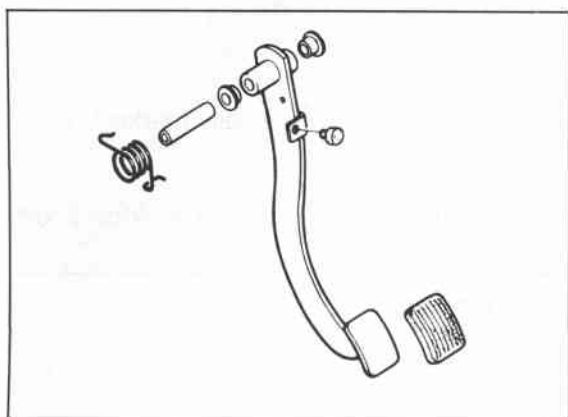
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1. Clevis pin
2. Brake pedal

3. Return spring
4. Guide pipe

5. Bushing
6. Brake pad





86U11X-021

## INSPECTION

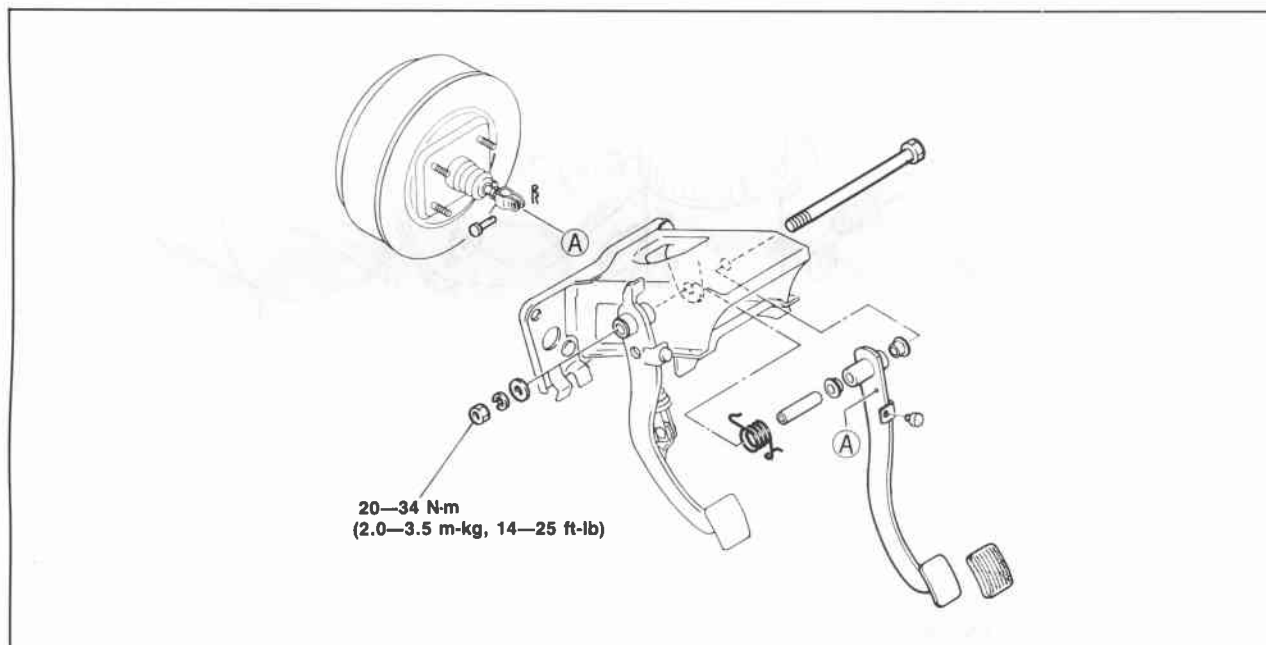
Check the following and replace or repair any faulty parts.

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

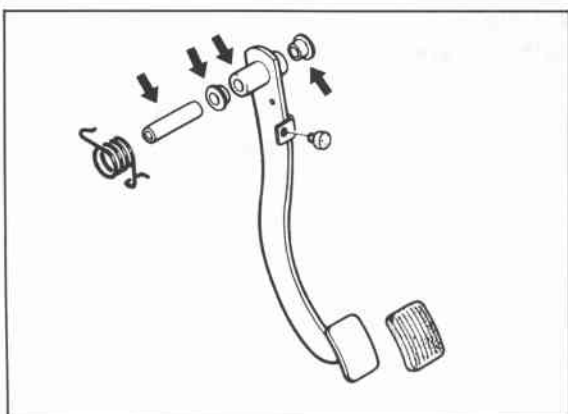
## INSTALLATION

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

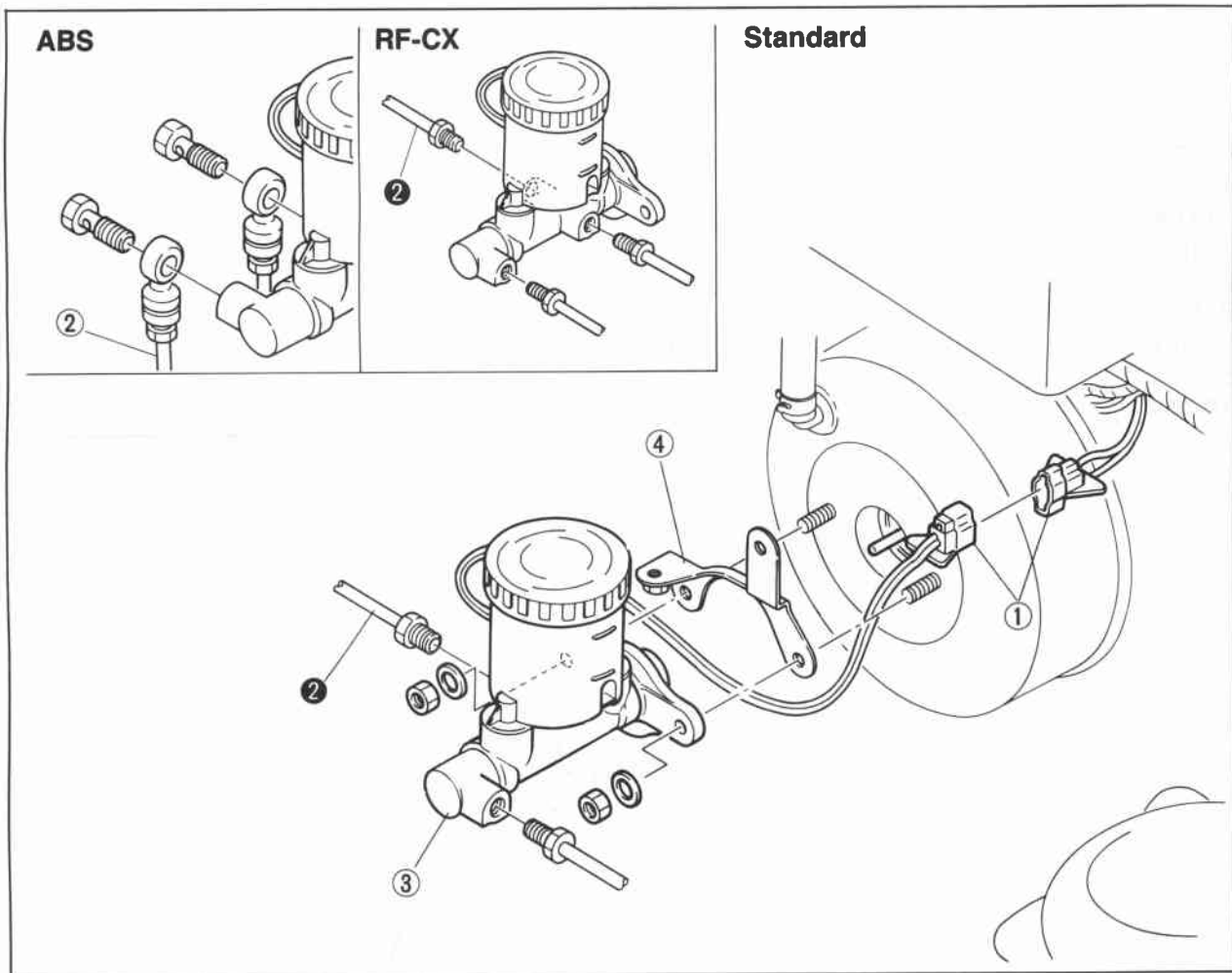
## MASTER CYLINDER

### REMOVAL

Remove in the sequence shown in the figure, referring to removal note for specially marked parts.

#### Caution

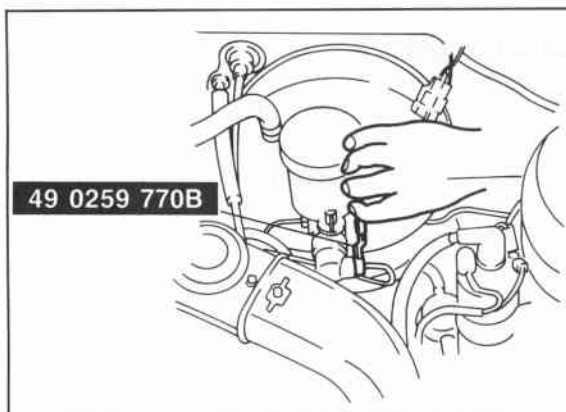
**Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



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)

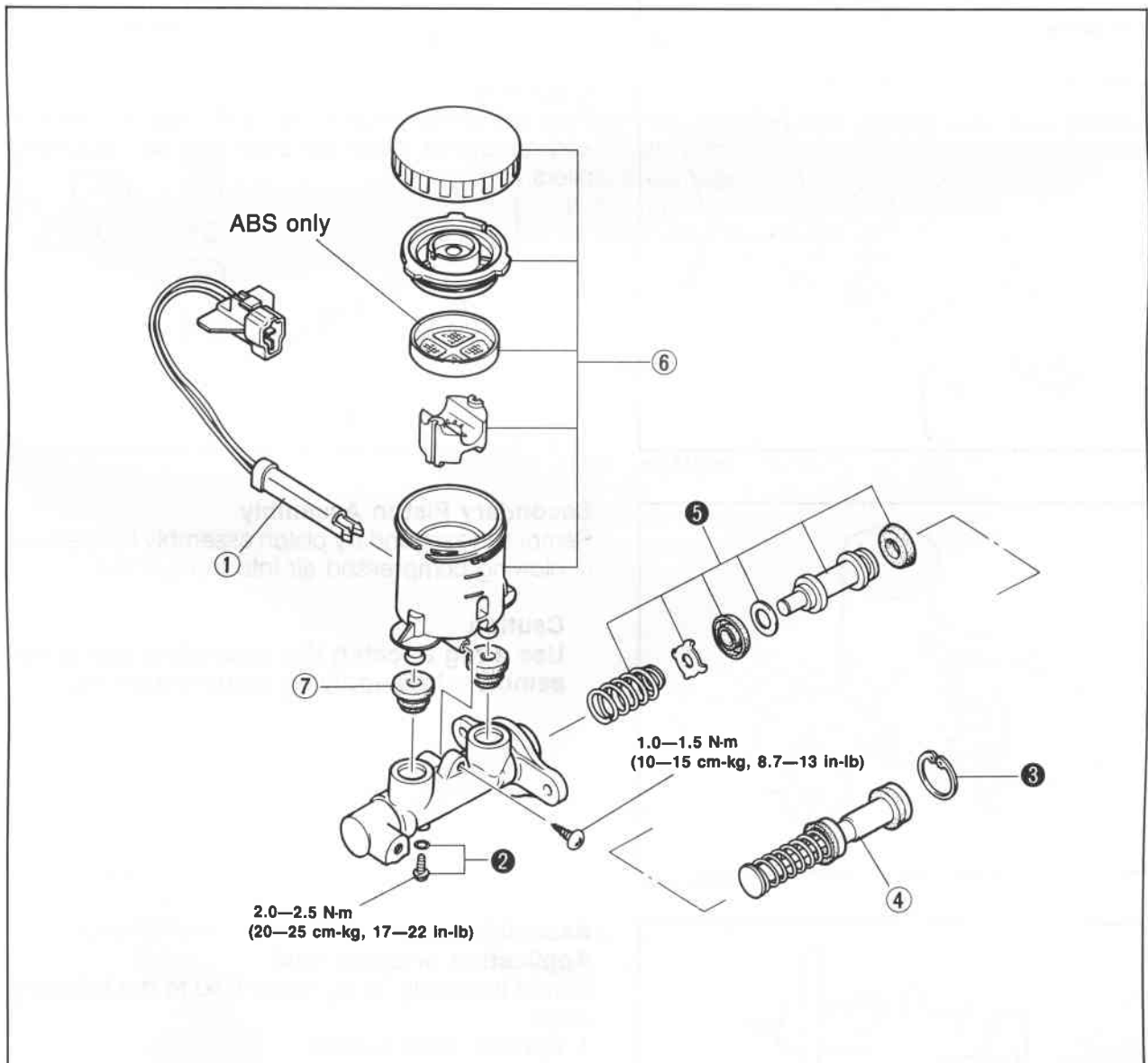
1. Pour out the brake fluid.
2. Disassemble in the sequence shown in the figure, referring to disassembly note for specially marked parts.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.

### Caution

- a) Do not 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.

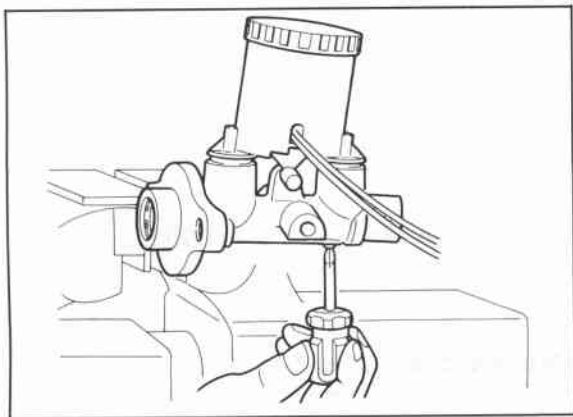


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1. Fluid level sensor
2. Stopper screw and O-ring
3. Snap ring
4. Primary piston assembly

5. Secondary piston assembly
6. Reservoir assembly
7. Bushing

# 11 MASTER CYLINDER



86U11X-027

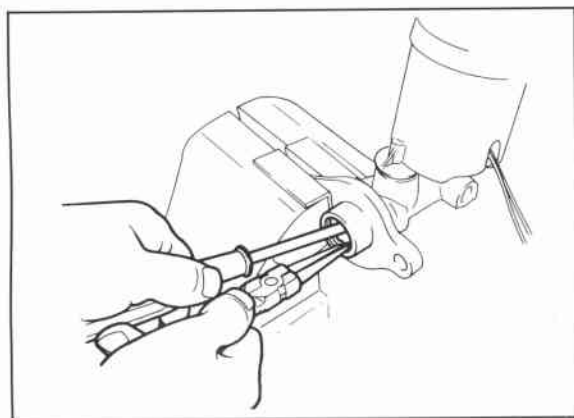
## Disassembly Note

### Stopper screw

Remove the stopper screw with a Phillips screwdriver.

## Note

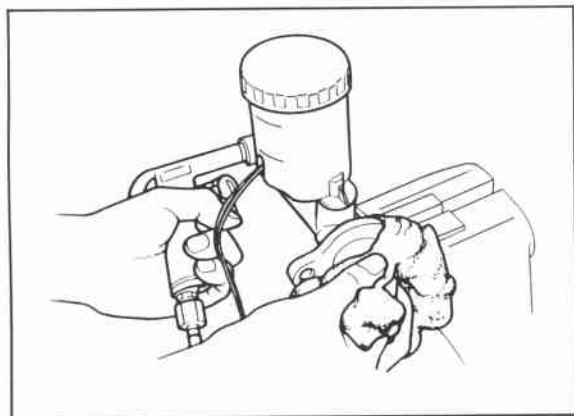
**Prepare a suitable container for the brake fluid to drain into.**



86U11X-028

## Snap ring

Push the primary piston with a Phillips screwdriver and remove or install the snap ring with snap-ring pliers.



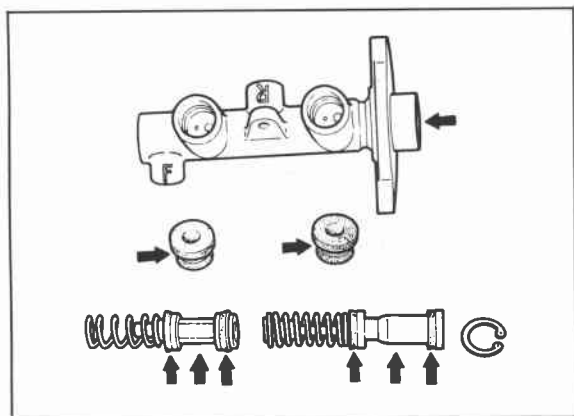
86U11X-029

## 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.**



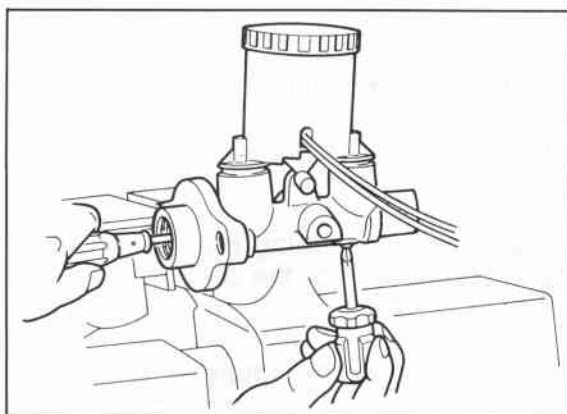
86U11X-030

## Assembly Note

### Application of brake fluid

Before assembly, apply brake fluid to the following parts:

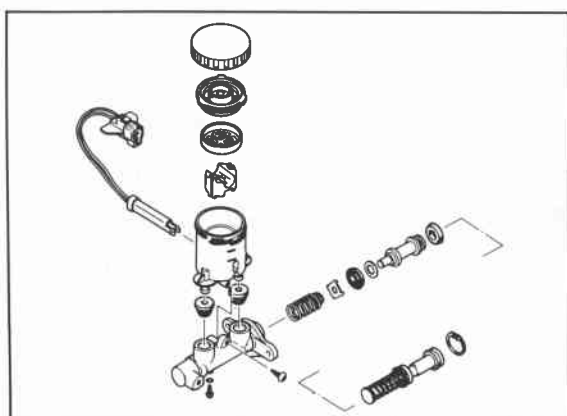
1. Cylinder inner surface
2. Piston
3. Piston cups
4. Bushings



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)

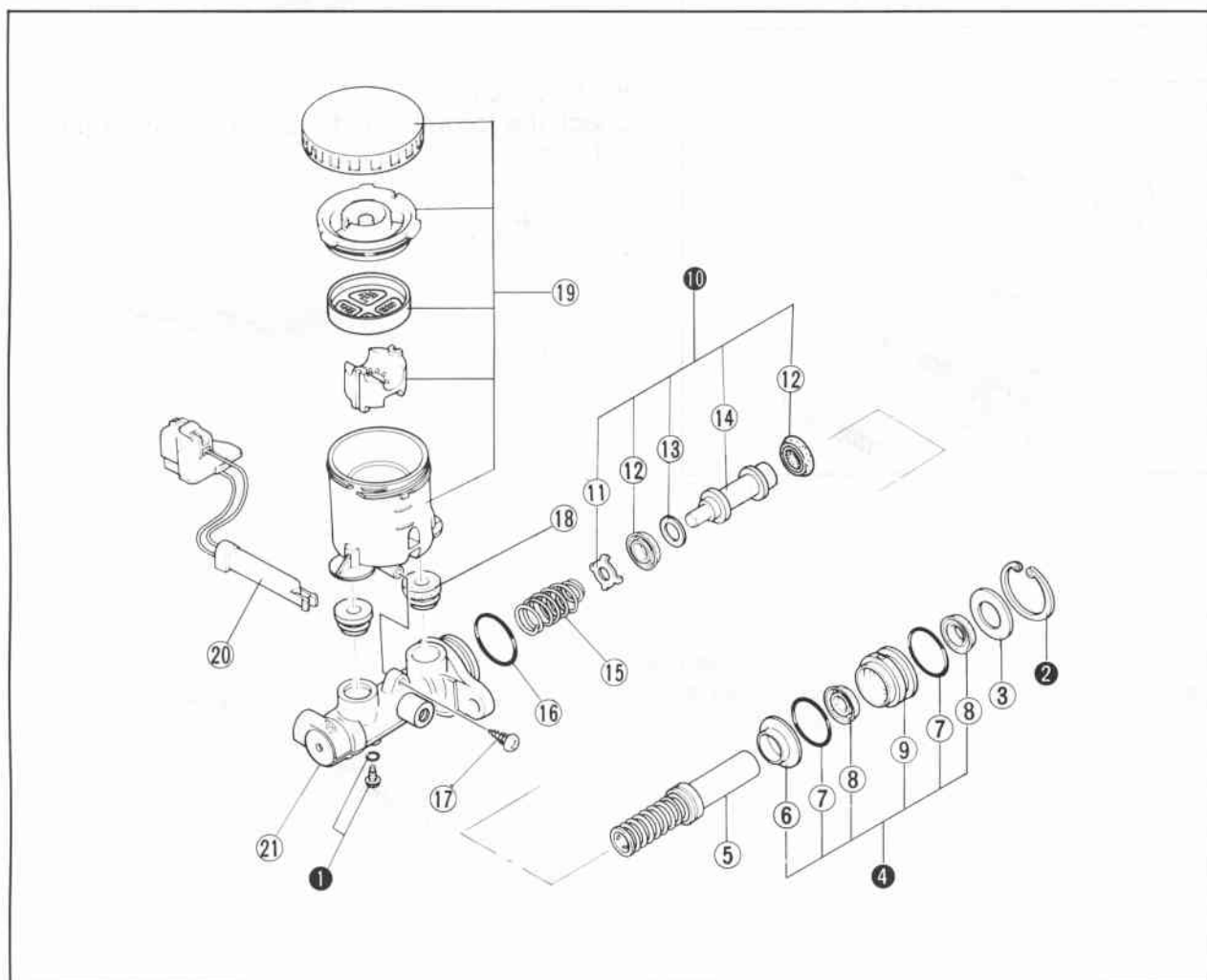
1. Pour out the brake fluid.
2. Disassemble in the sequence shown in the figure, referring to disassembly note for specially marked parts.
3. Assemble in the reverse order of disassembly, referring to assembly note for specially marked parts.

### Caution

- a) Do not 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.

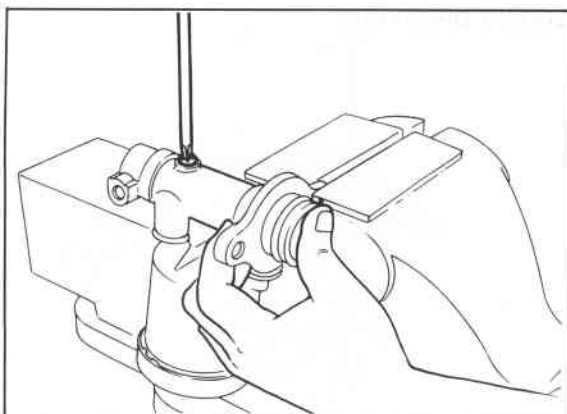
### Note

The primary piston assembly is not repairable. Replace it as an assembly.



76G11X-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                   |                          |

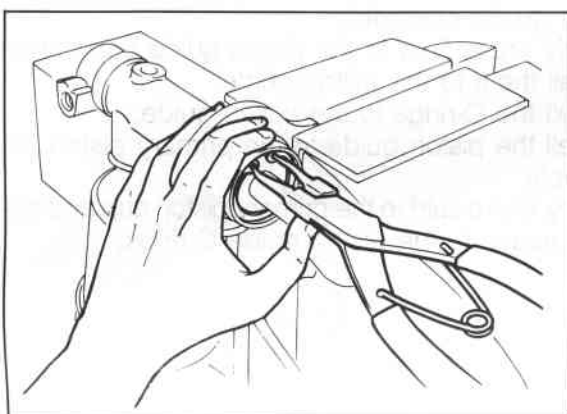


76G11X-015

## Disassembly Note

### Stopper screw

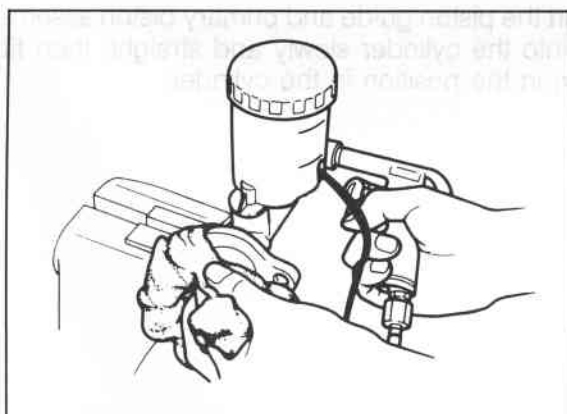
Push the piston in by hand and remove the stopper screw.



76G11X-016

## Snap ring

Push the piston in fully with a rod and remove the snap ring using snap ring pliers.



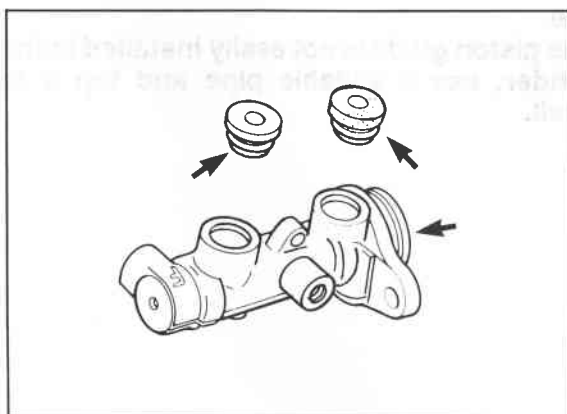
76G11X-017

## 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

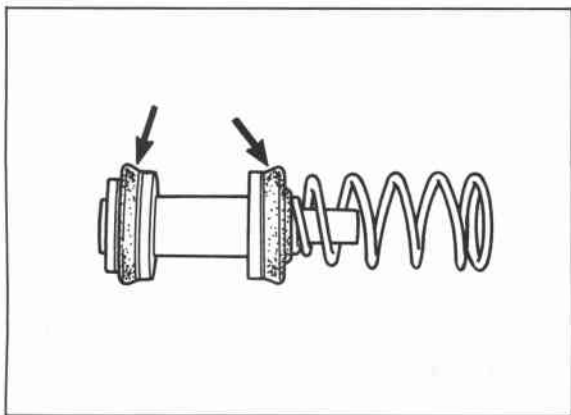
## Assembly Note

### Application of brake fluid

Before assembly, apply brake fluid to the following parts:

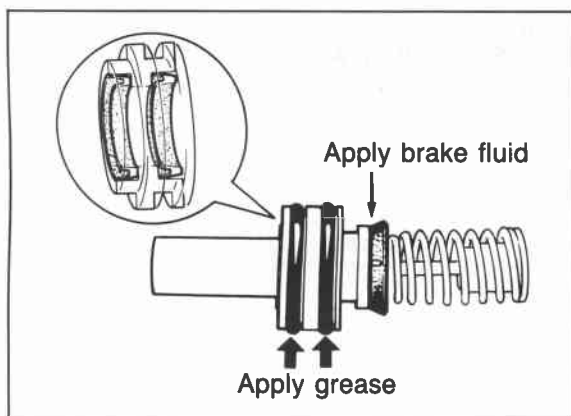
1. Bushing
2. Cylinder inner wall

# 11 MASTER CYLINDER



76G11X-019

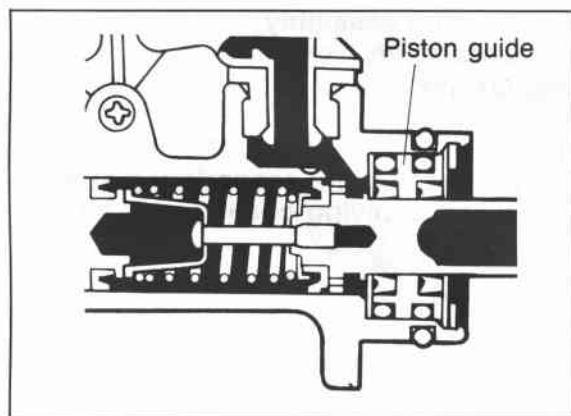
## 3. Secondary piston cup



76G11X-020

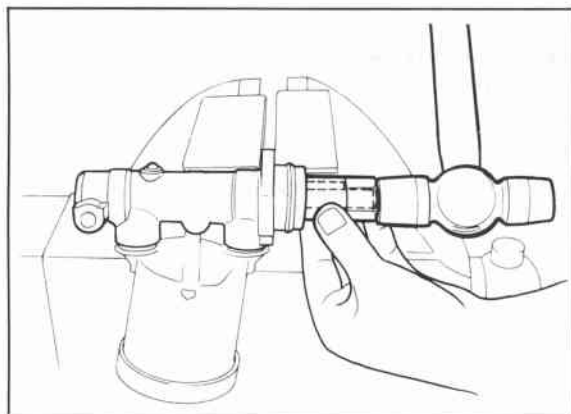
## Piston guide assembly

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.

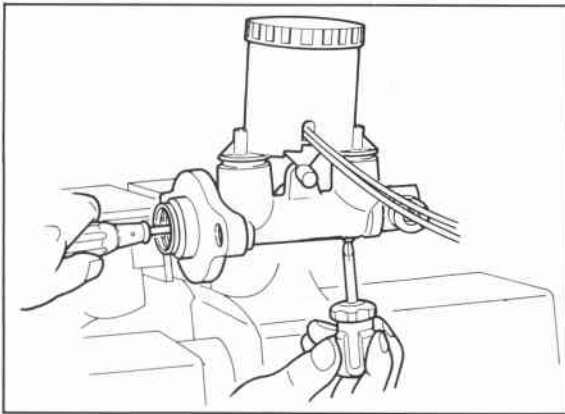


76G11X-022

## Note

If the piston guide is not easily installed in the cylinder, use a suitable pipe and tap it to install.

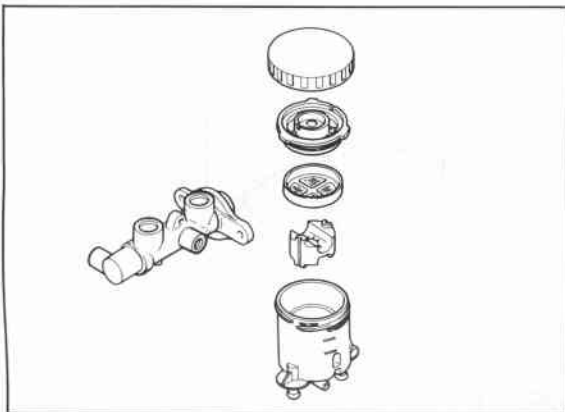




86U11X-031

## 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.

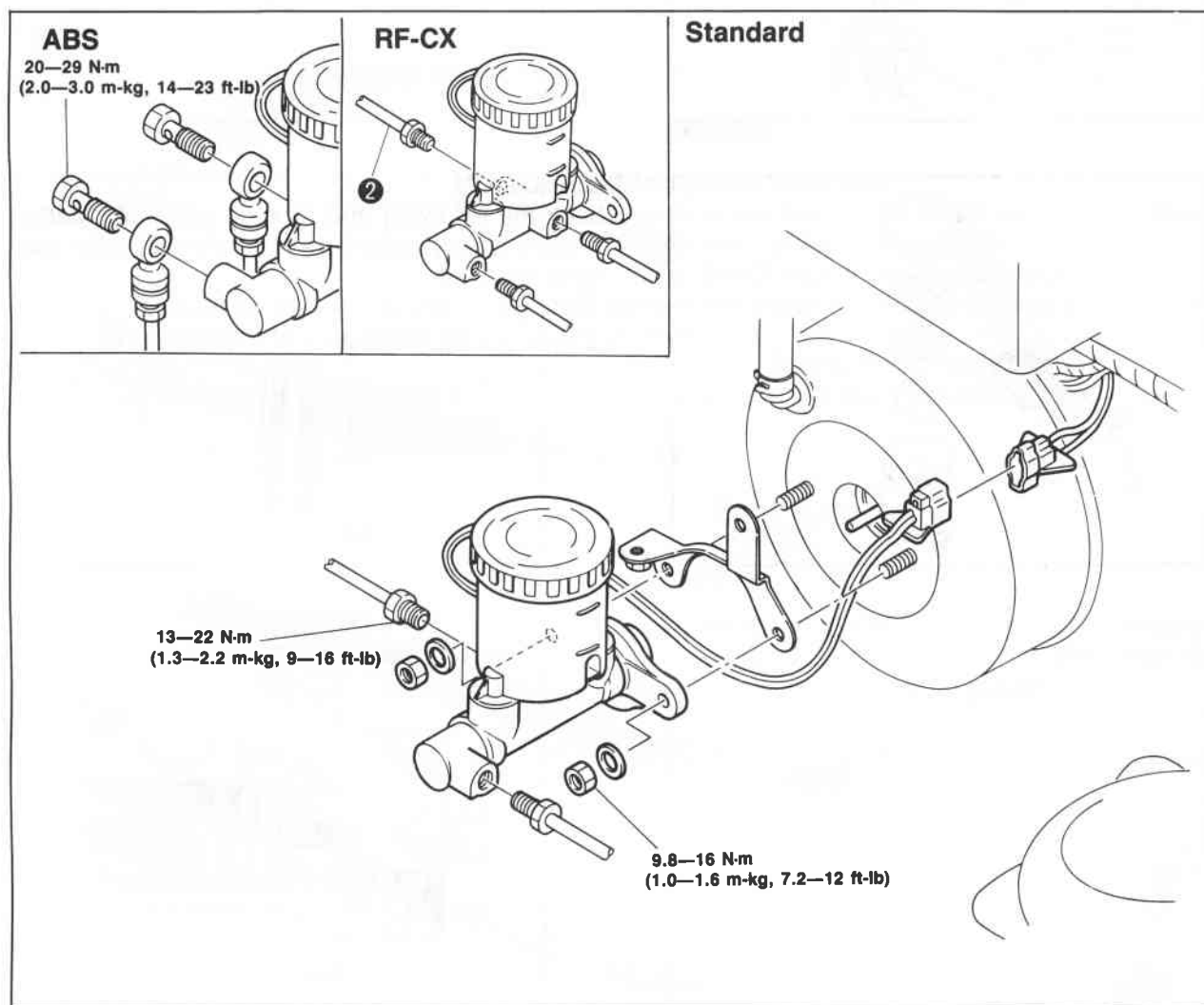
1. Piston and cylinder bore for abnormal wear, rust, and damage
2. Springs for weakness and damage
3. Reservoir for damage and deformation

# 11 MASTER CYLINDER

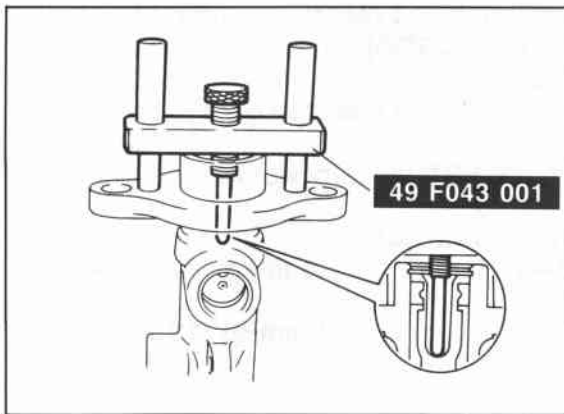
## INSTALLATION

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



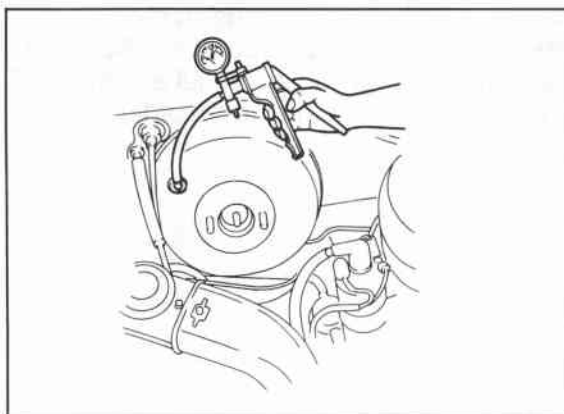
76G11X-024

## Installation Note

### Piston to push rod clearance adjustment (Except RHD DOHC TURBO)

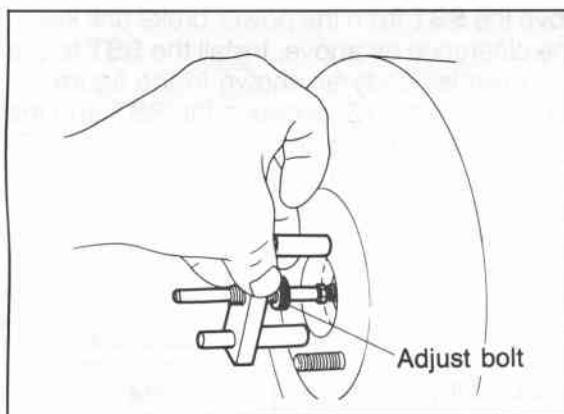
Before installing the master cylinder, check the clearance between the piston of the master cylinder and the push rod of the power brake unit as follows.

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.



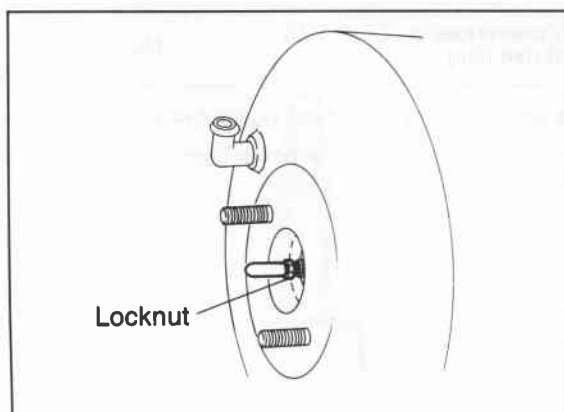
76G11X-100

2. Apply **500 mmHg (19.7 inHg)** vacuum to the power brake unit with a vacuum pump.



86U11X-036

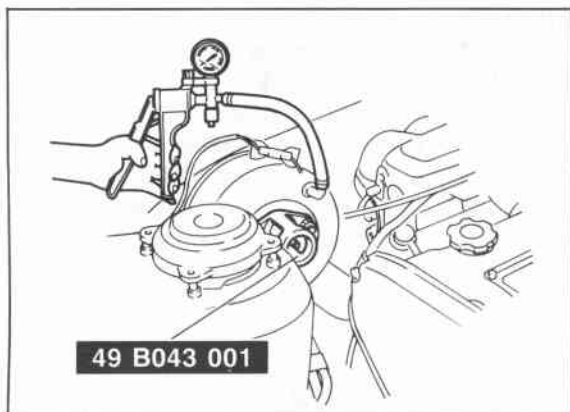
3. Invert the **SST** used in step 1, and place it on the power brake unit.



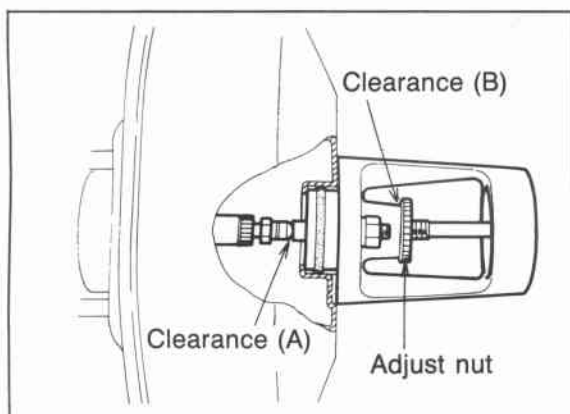
76G11X-101

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.

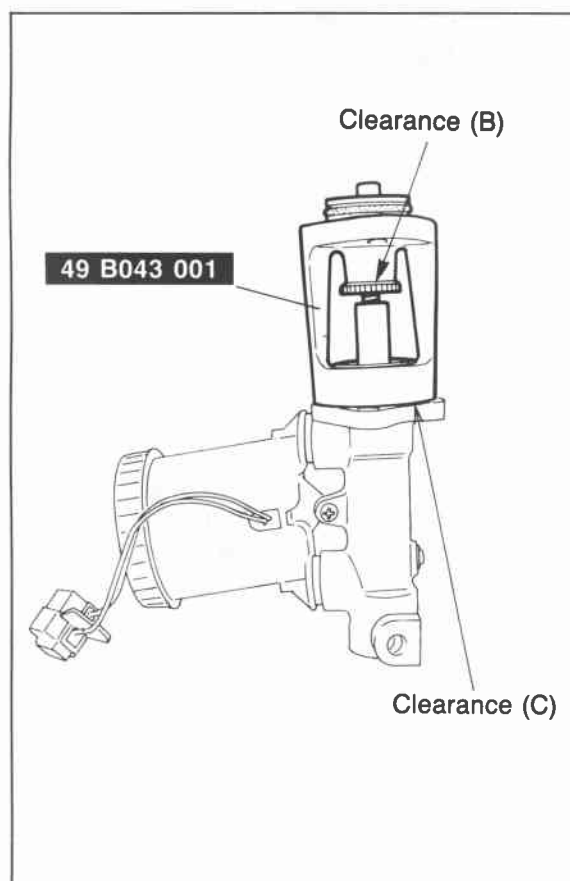
# 11 MASTER CYLINDER



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.

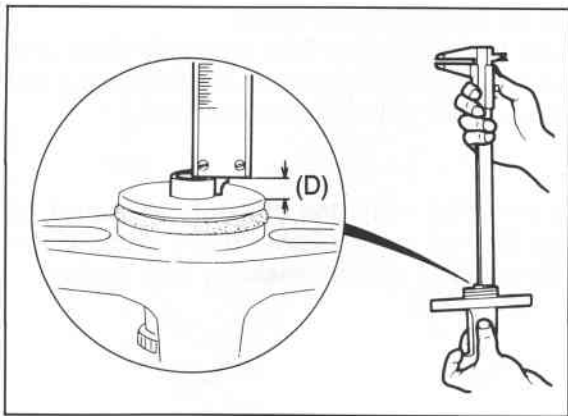
5. Measure clearance (C) between the **SST** and the master cylinder, and then measure clearance (B) between the adjust nut and the **SST** body.

### Judgement Table

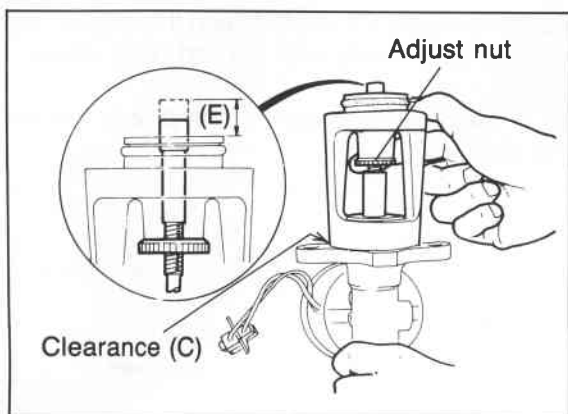
	Measurement	Necessity of adjustment
(a)	Clearance at (C)	Yes
(b)	Clearance at (B)	Yes
	Both clearances of (C) and (B) are 0 mm (0in)	No

(a) is when the push rod of the power brake unit extends.

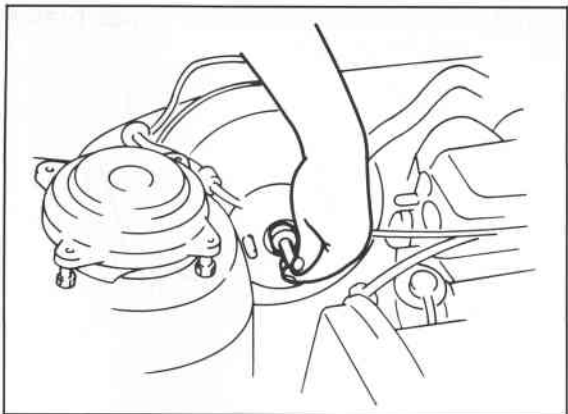
(b) is when the push rod of the power brake unit is recessed.



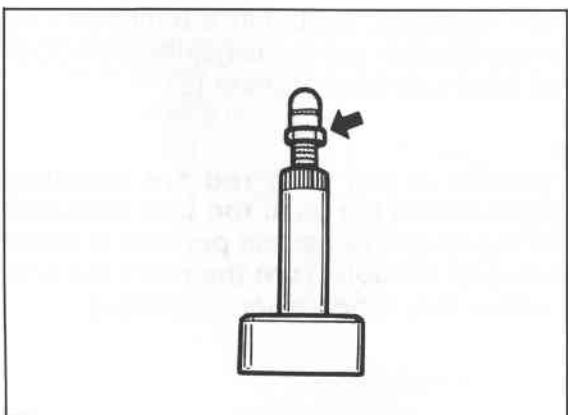
76G11X-028



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

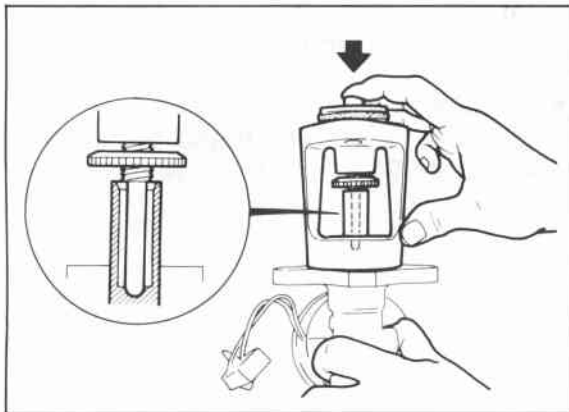
- (4) Remove the push rod from the power brake unit.

- (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



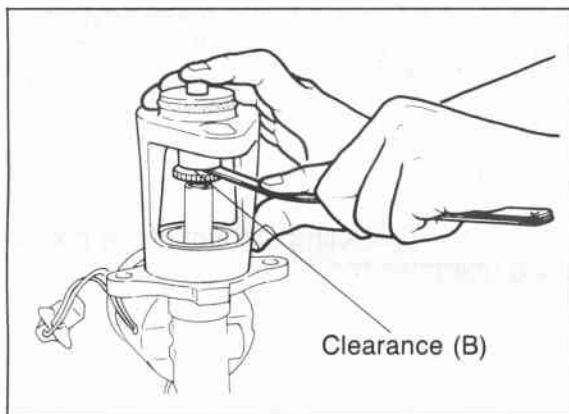
76G11X-031

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

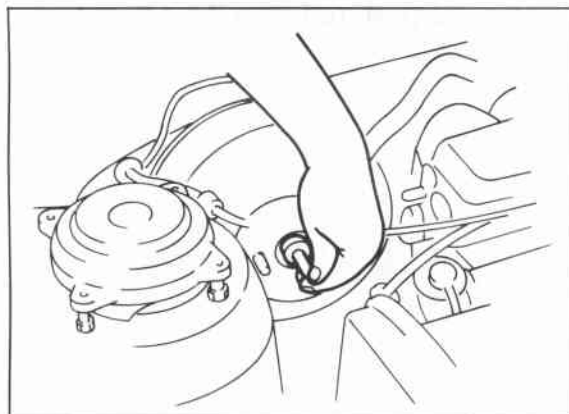
When pushing only use enough pressure to bottom the rod in the piston. If too much pressure is applied a false reading will occur.



76G11X-032

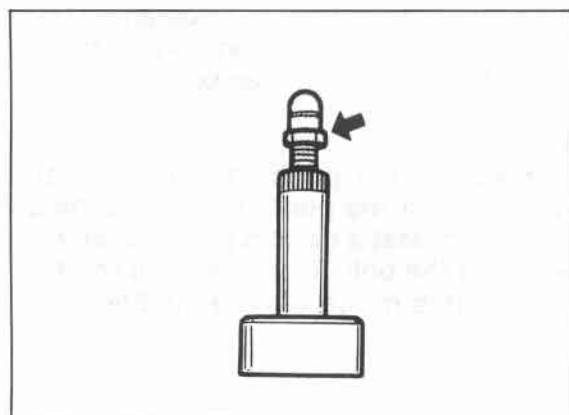
- (2) Measure clearance (B) between the adjust nut and the **SST** body with the rod held down.

(B) = Recessed amount of the power brake unit push rod



63G11X-353

- (3) Remove the push rod from the power brake unit.

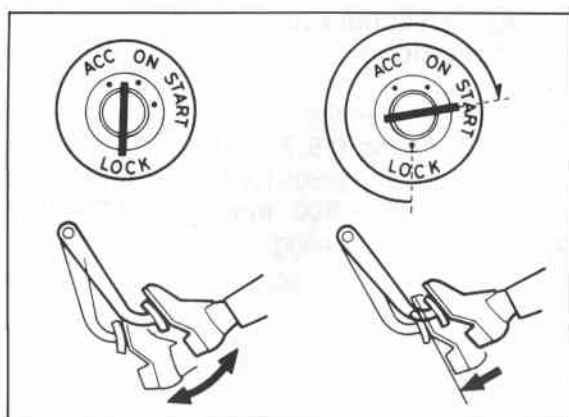


76G11X-033

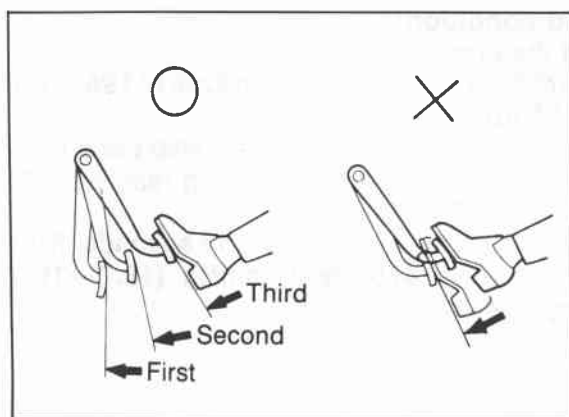
- (4) Make the push rod clearance 0 mm (0in) by turning the push rod and lengthening the push rod length by the amount of (B).

## Note

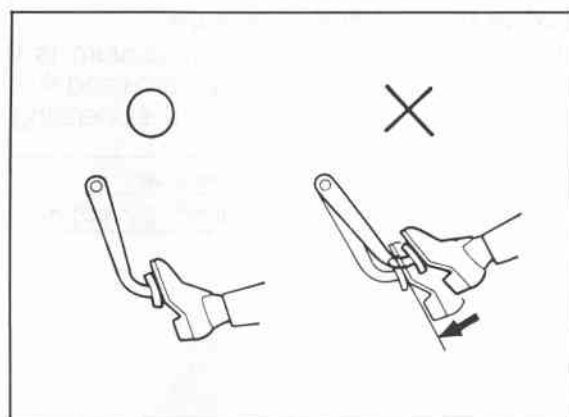
The threads of the push rod are specially designed so that the push rod bolt becomes harder to turn past a certain point to prevent loosening of the bolt. Turn the push rod bolt only within this range when adjusting.



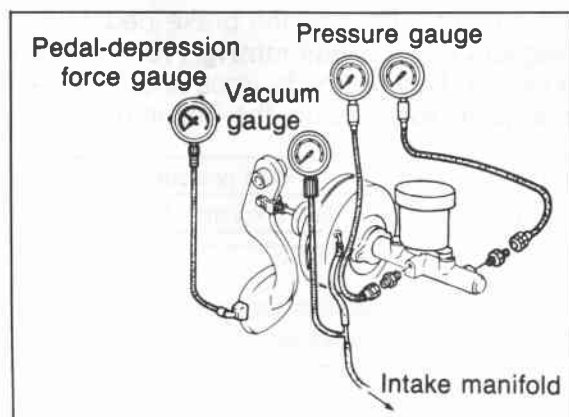
86U11X-038



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".

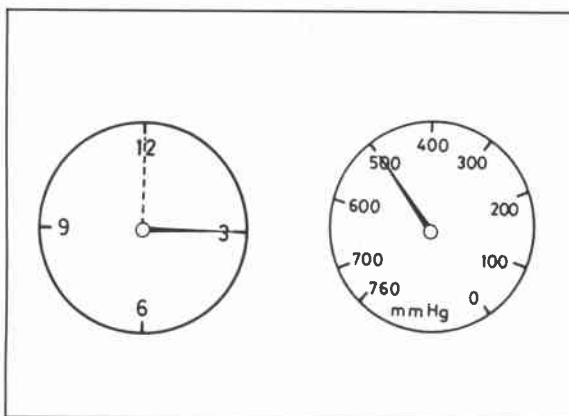
#### Method Using Tester

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.**

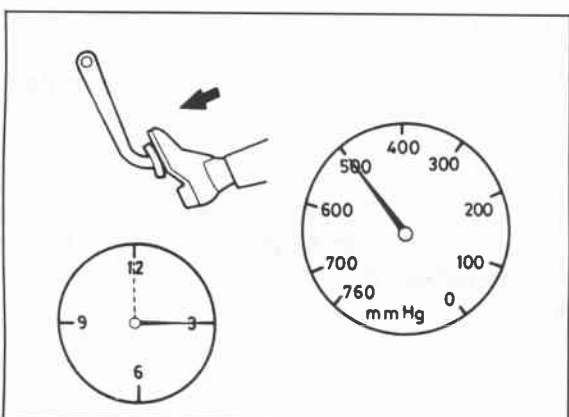
# 11 POWER BRAKE UNIT



76G11X-065

## a) Checking for vacuum loss Unloaded condition

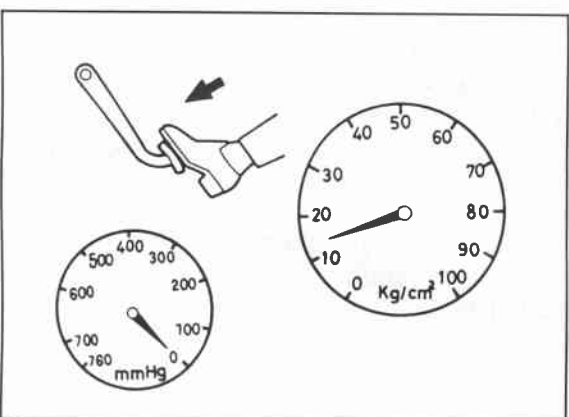
1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.



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.

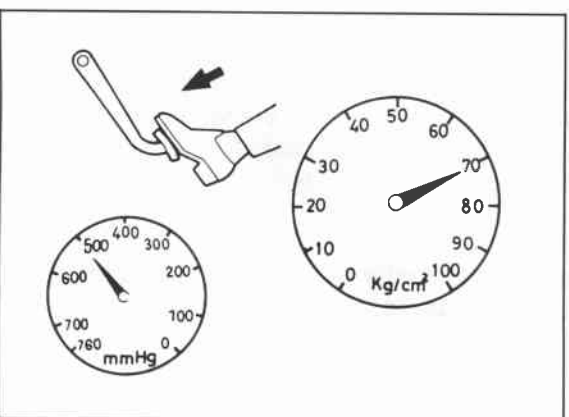


76G11X-067

## 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.

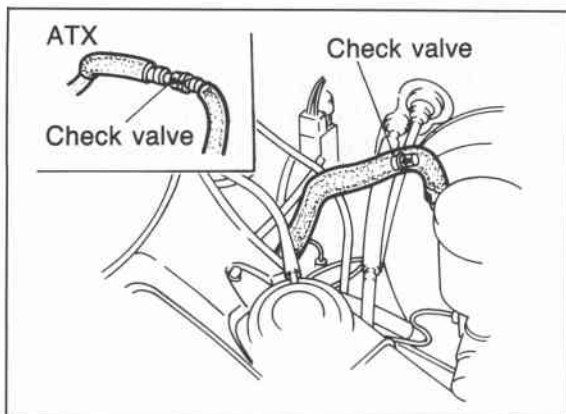


76G11X-068

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.

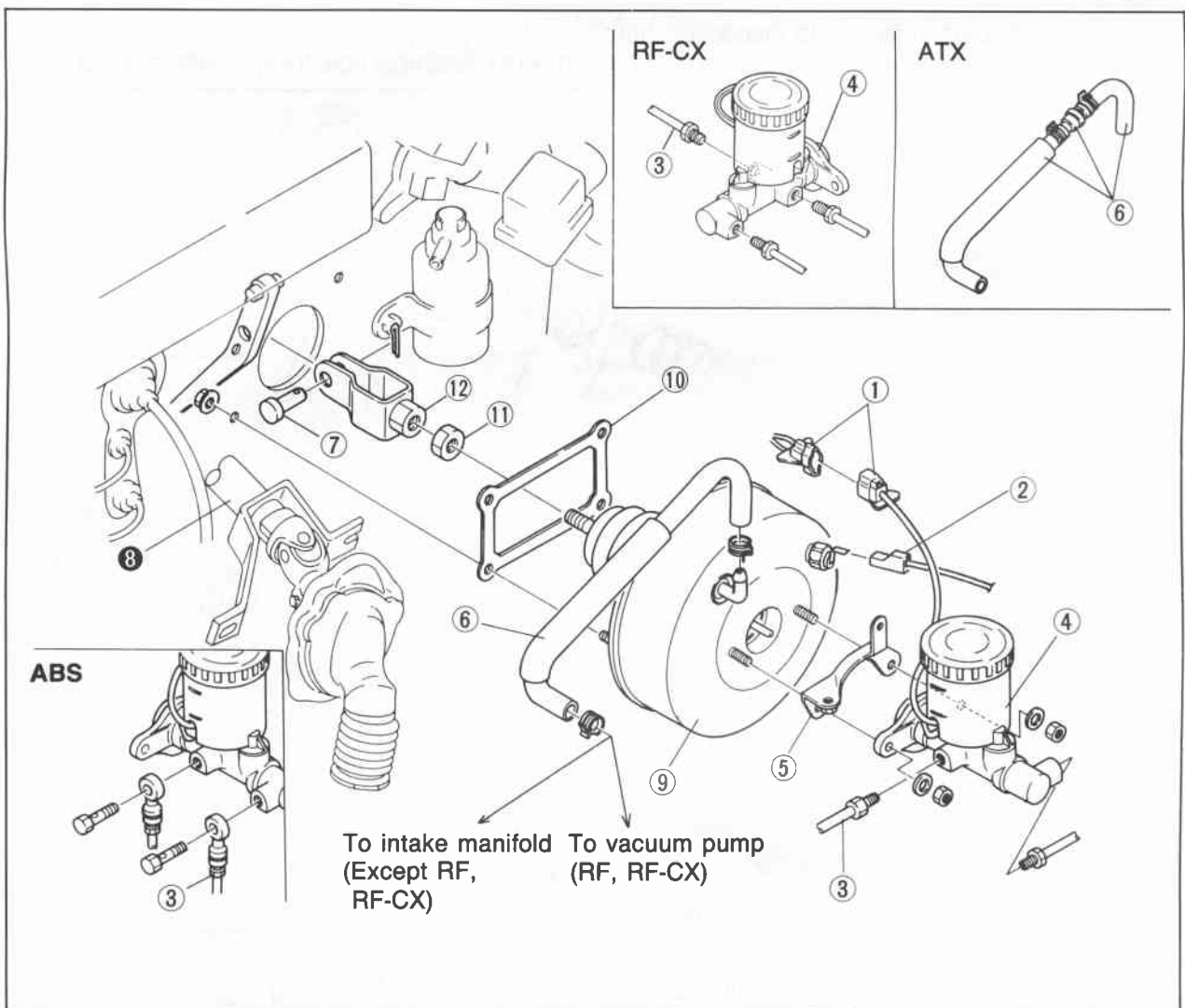
### Inspection

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

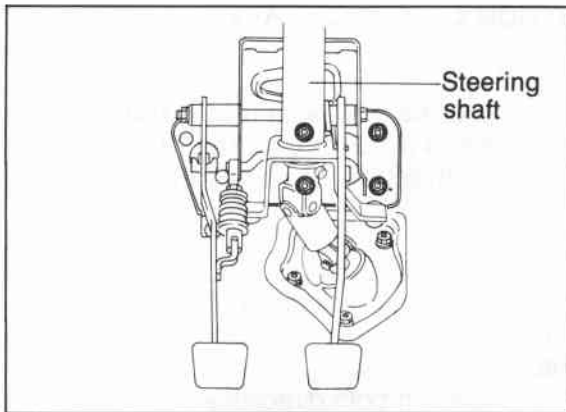
Remove in the sequence shown in the figure, referring to removal note for specially marked parts.



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



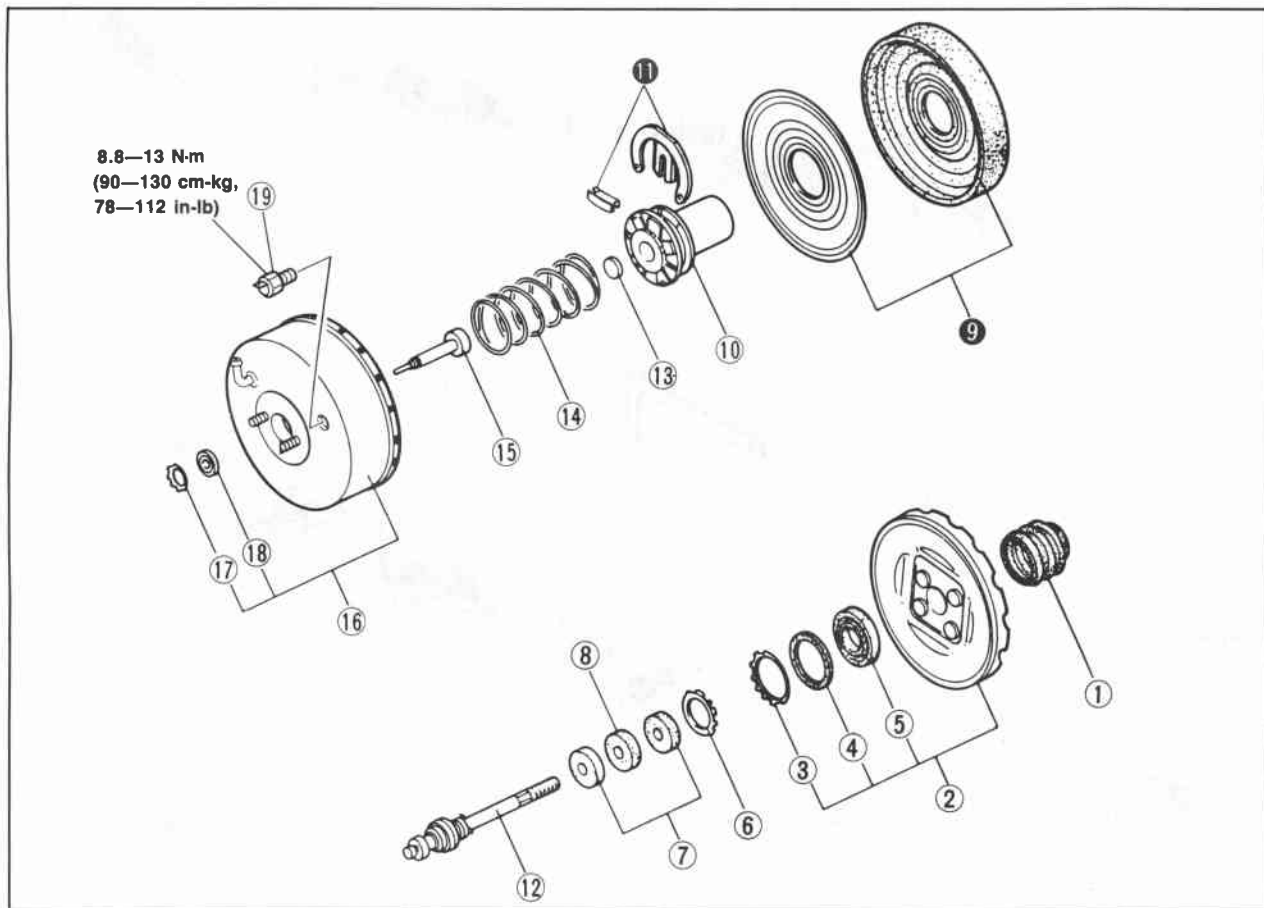
76G11X-102

## 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.)

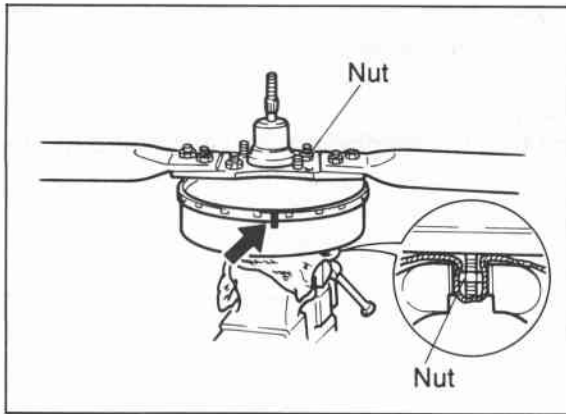
## DISASSEMBLY AND ASSEMBLY

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

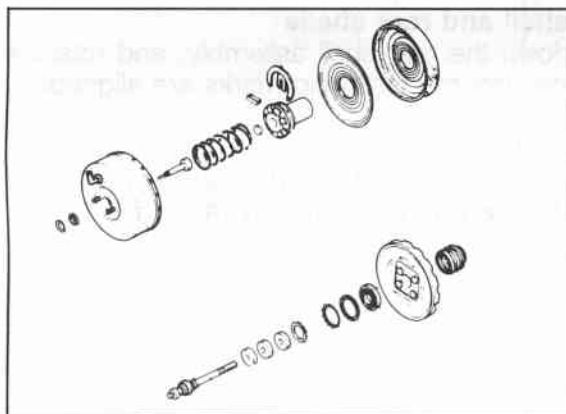
**The rear shell is spring loaded; loosen it carefully.**

## Retainer key

Depress the plunger rod fully; then remove the retainer key.



86U11X-049



86U11X-050

## Assembly Note

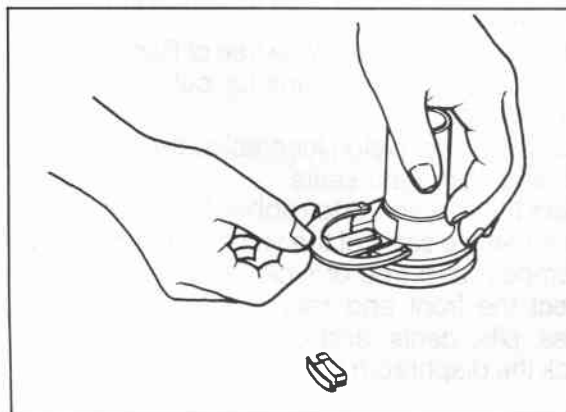
### Application of Grease

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

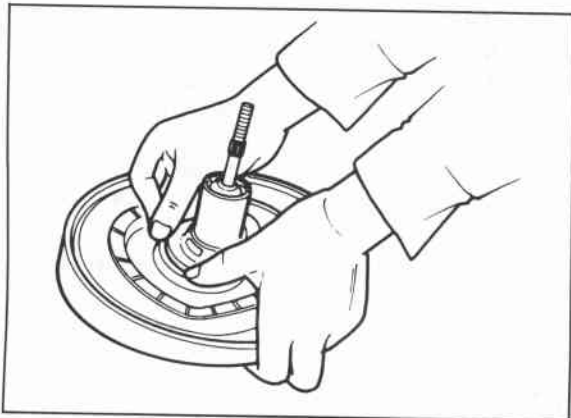
## Retainer key

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.



86U11X-051

# 11 POWER BRAKE UNIT



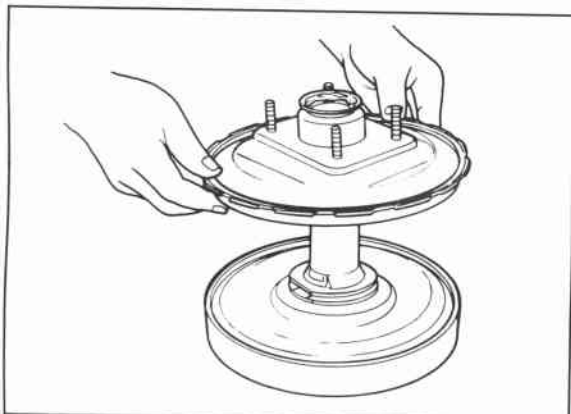
86U11X-052

## Diaphragm

Install the diaphragm to the power piston and plate.

### Caution

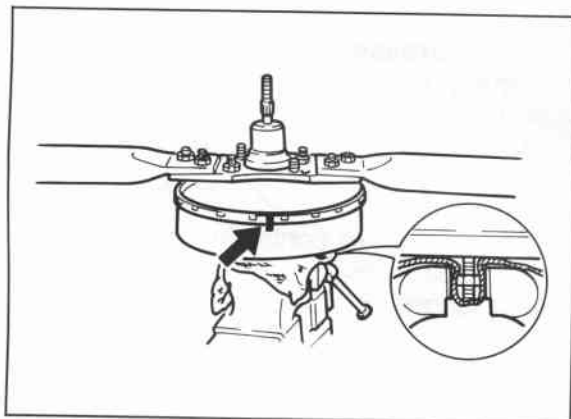
**Check that the diaphragm is well seated in the groove.**



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.



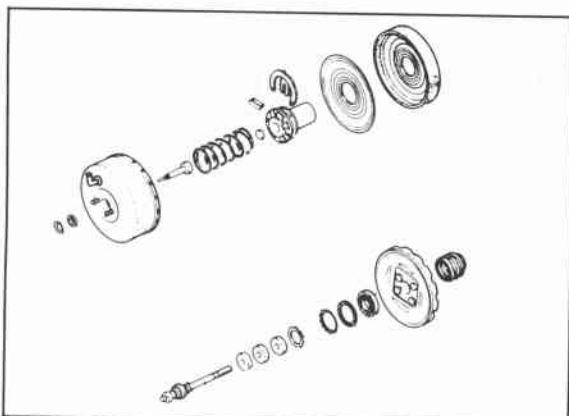
76G11X-072

## 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

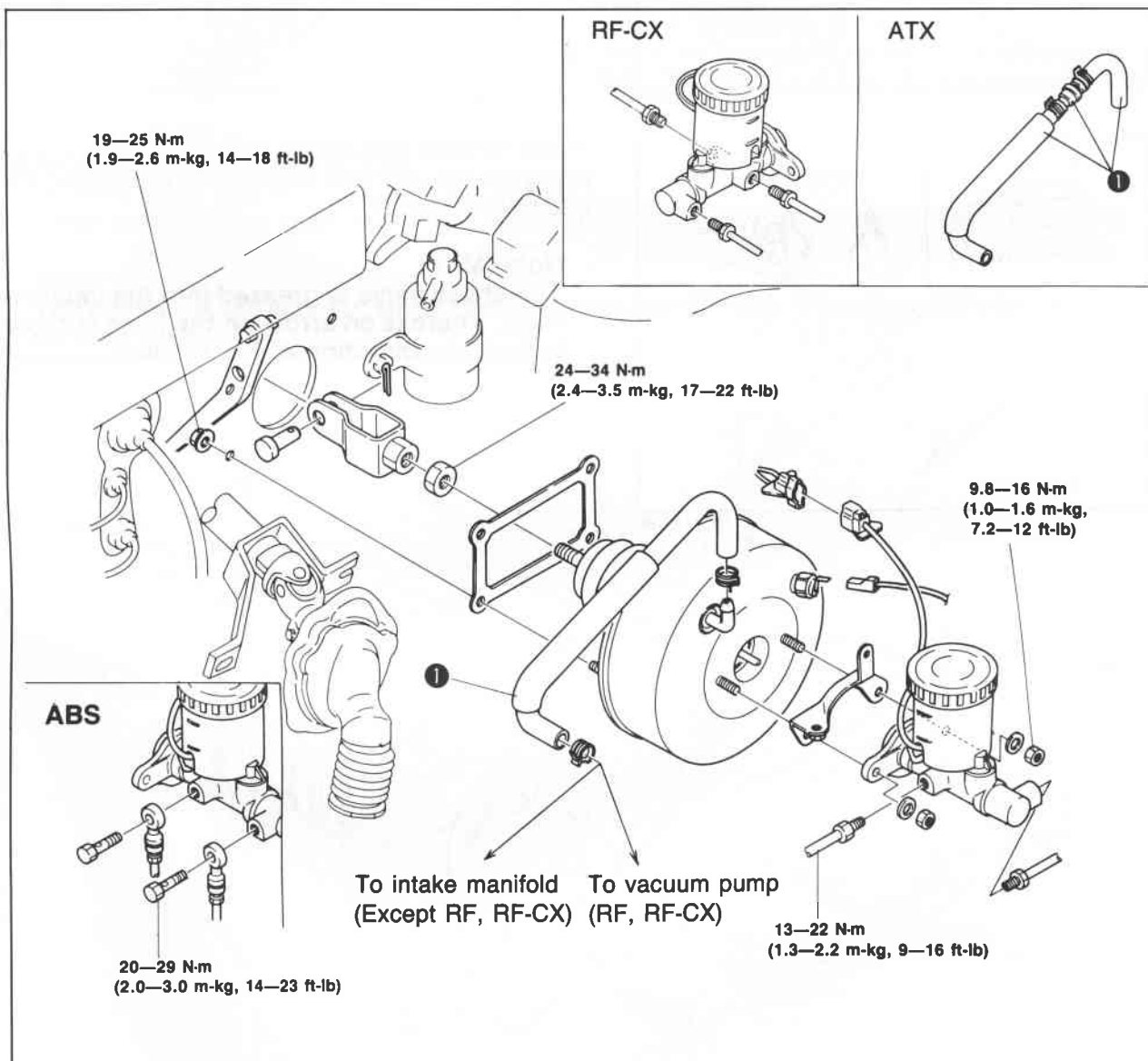
## INSPECTION

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.

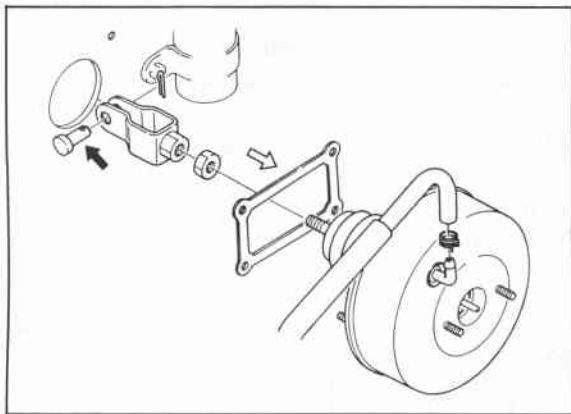
## Torque specifications



76G11X-035

1. Vacuum hose and check valve

# 11 POWER BRAKE UNIT

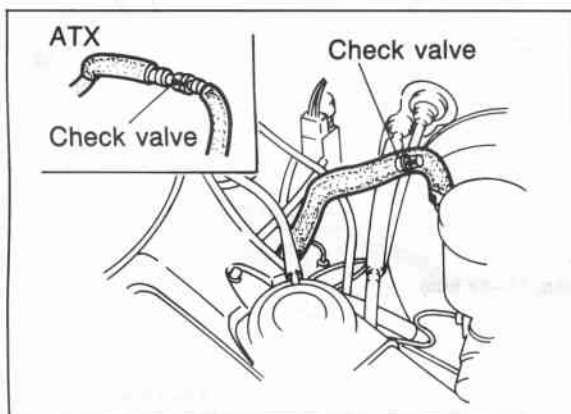


86U11X-057

## Installation Note

### Application of grease and sealant

1. Apply grease to the clevis pin contact surface.
2. Apply sealant to the gasket contact surface.



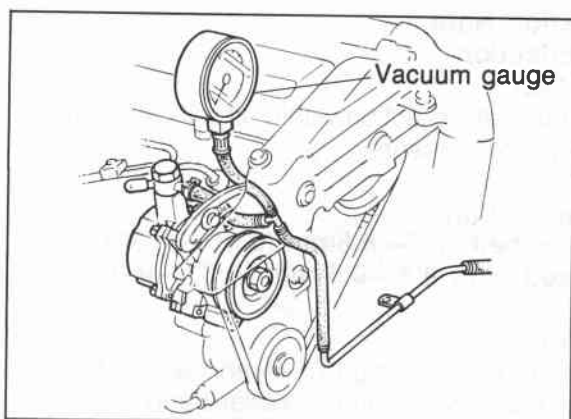
76G11X-036

## 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  $\pm$  30 rpm**

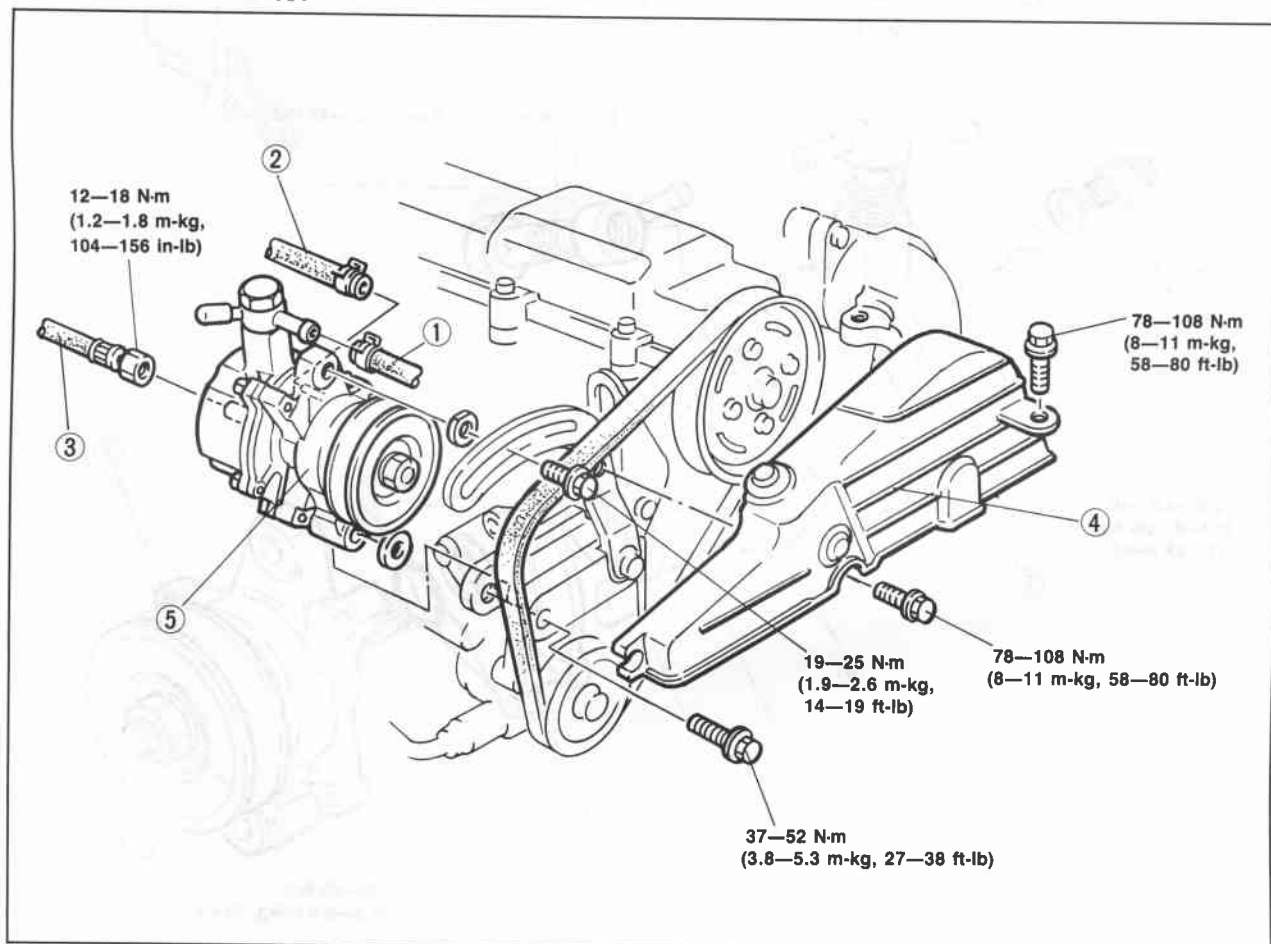
4. Check that the vacuum reaches **500 mmHg (19.7 inHg)** in **8 seconds** or less.
5. Check that the maximum vacuum is within approx. **700—720 mmHg (27.6—28.3 inHg)** in **80 seconds** or less.

## 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

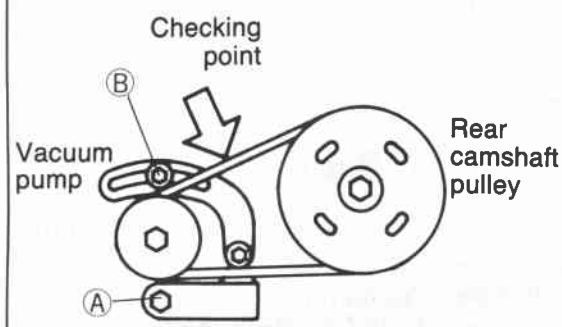
1. Vacuum hose
2. Oil return hose

3. Oil inlet hose
4. Drive belt 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)**

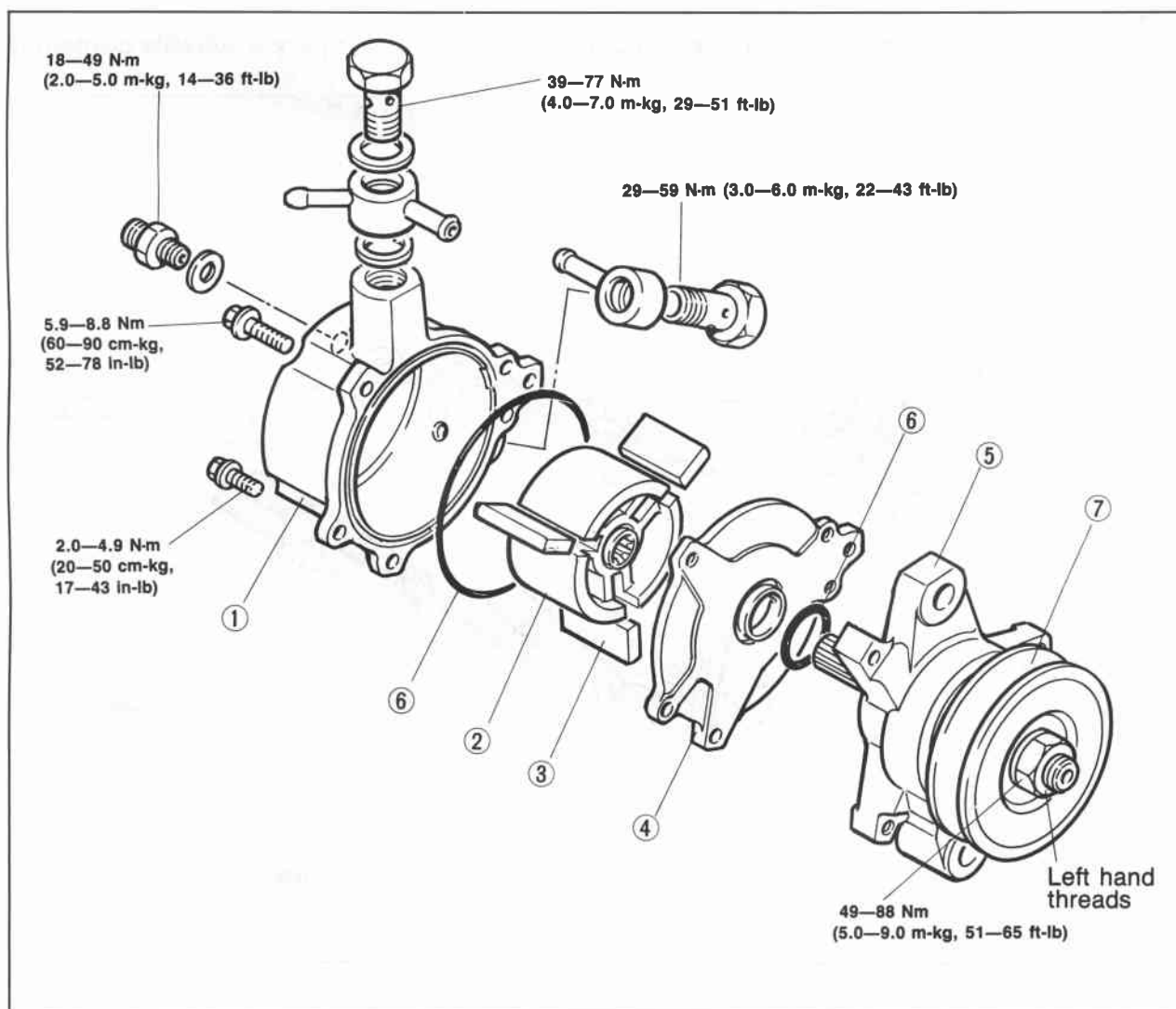
**Used belt: 8.5—9.5 mm (0.33—0.37)**

## 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.



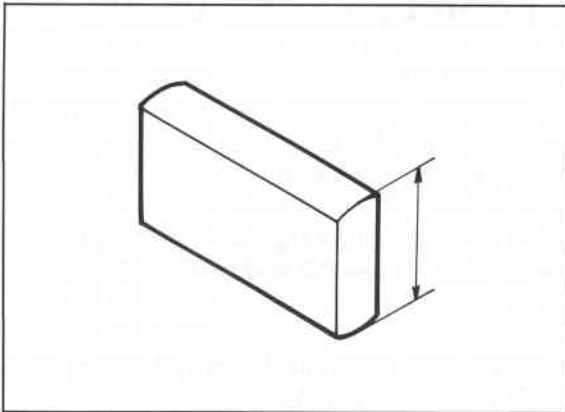
76G11X-040

1. Vacuum pump housing
2. Rotor
3. Vane

4. Center plate
5. Vacuum pump bracket assembly

6. O-ring
7. Pulley





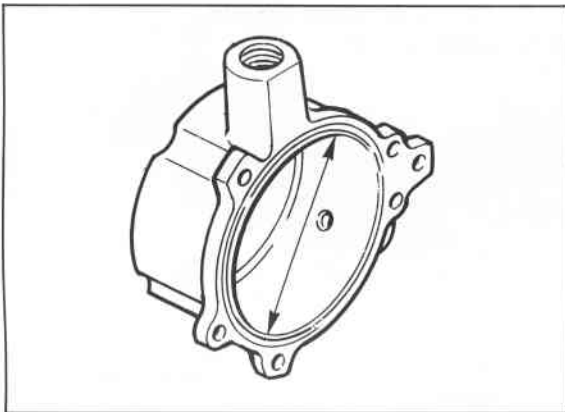
76G11X-041

## 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)**



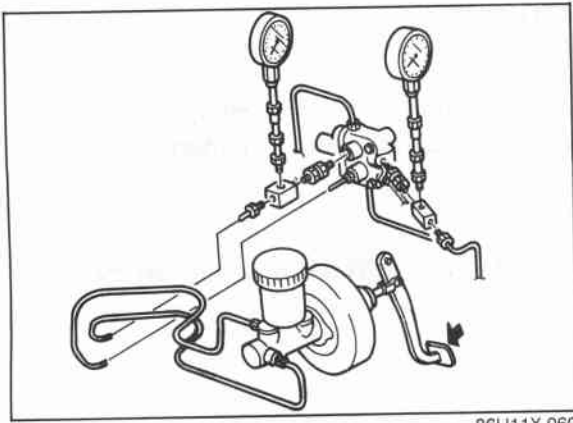
76G11X-042

4. Check the housing inner diameter.

### Diameter:

**57.0—57.1 mm (2.244—2.248 in)**

# 11 DUAL PROPORTIONING VALVE



86U11X-060

## DUAL PROPORTIONING VALVE

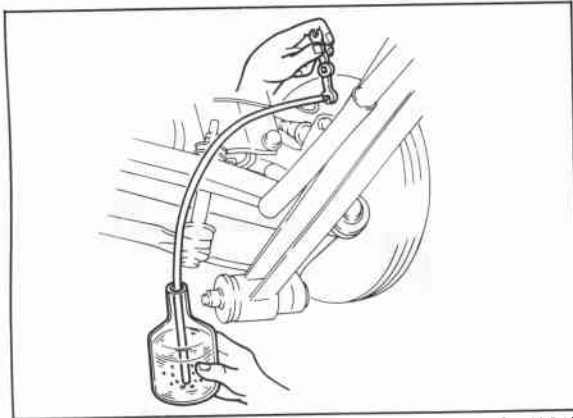
### FUNCTION CHECK

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)

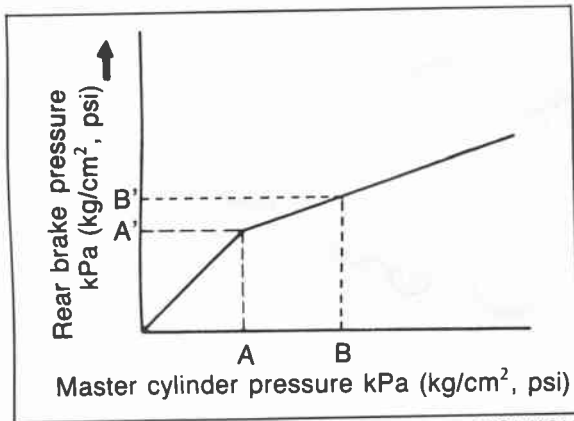
### Note

**Disconnect and connect the brake pipes with the SST (49 0259 770B).**



76G11X-043

2. Bleed air from the brake system.  
(Refer to page 11—9.)



76G11X-044

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

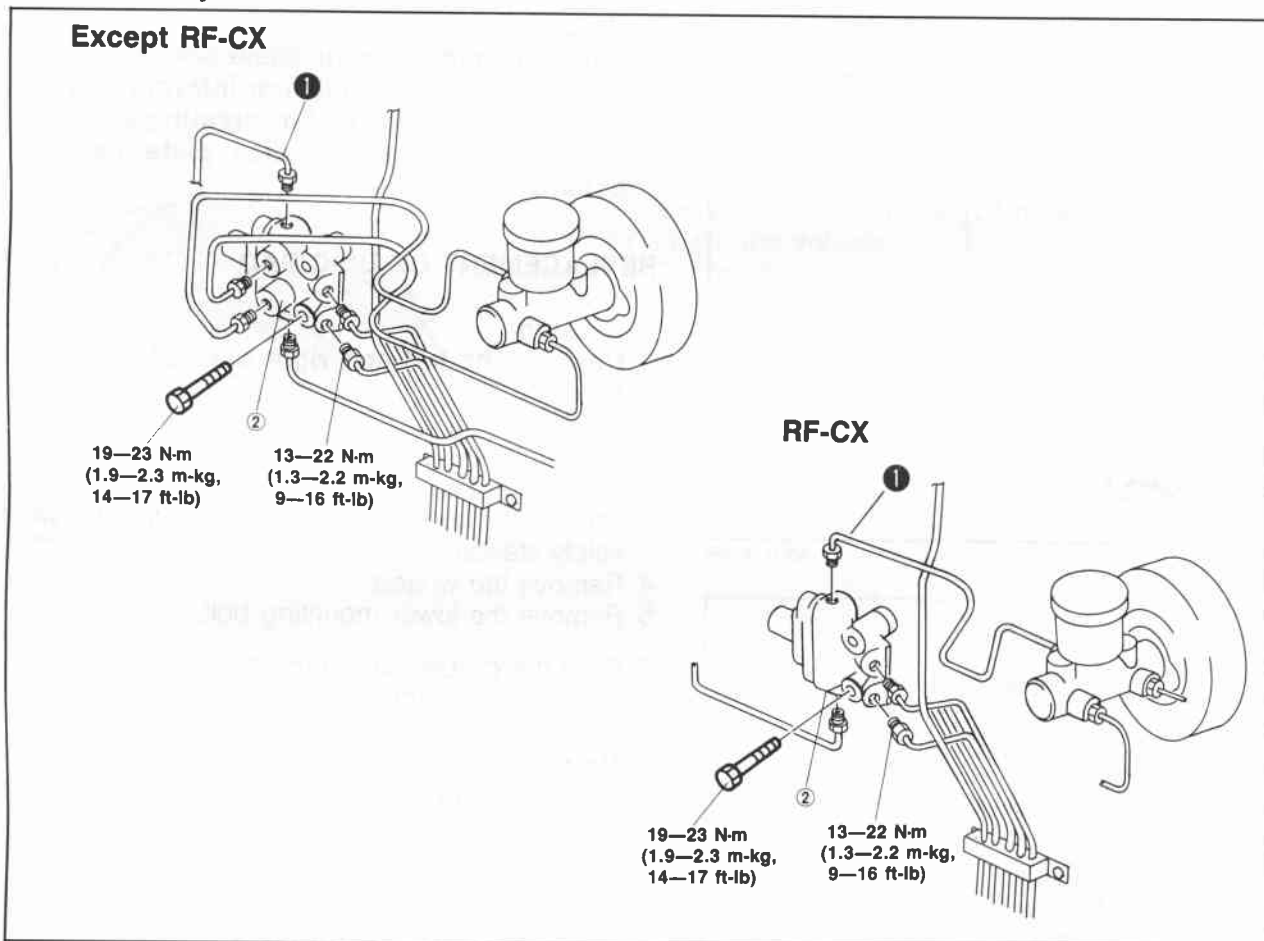
	Fluid pressure kPa (kg/cm <sup>2</sup> , psi)			
	A	A'	B	B'
Except General LHD and RHD	1,962 (20,284)	1,962 ± 196 (20 ± 2, 284 ± 28)	6,867 (70,995)	3,434 ± 196 (35 ± 2, 498 ± 28)
General LHD and RHD	2,943 (30,427)	2,943 ± 196 (30 ± 2, 427 ± 28)		4,120 ± 196 (42 ± 2, 597 ± 28)

## 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

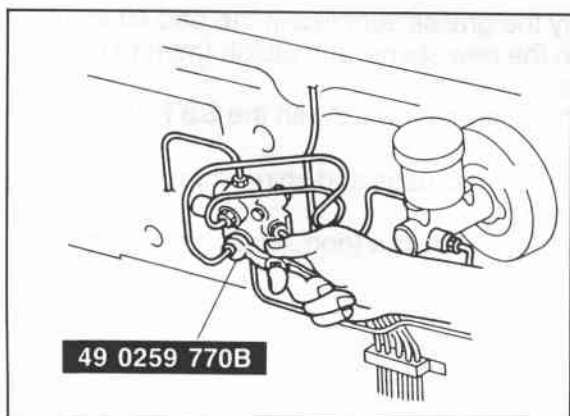
Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.



76G11X-045

1. Brake pipe

2. Dual proportioning valve



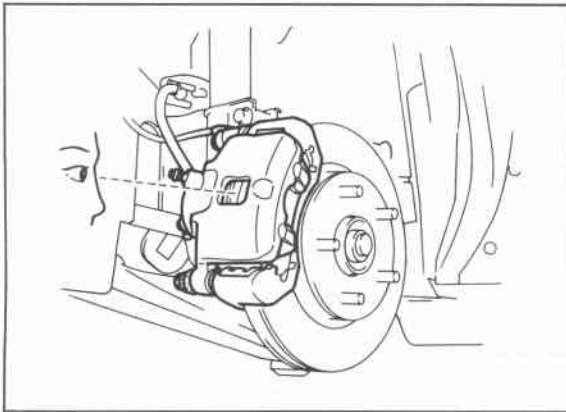
76G11X-103

### Removal and Installation Note

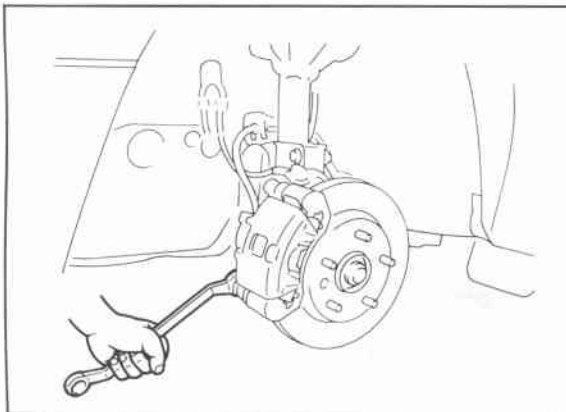
#### Brake pipe

Disconnect or connect the brake pipes with the SST.

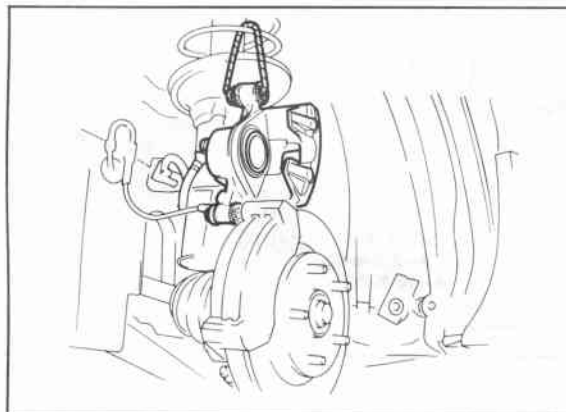
# 11 FRONT DISC BRAKE



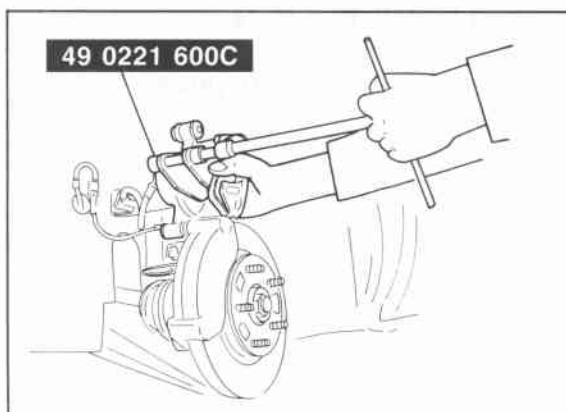
76G11X-073



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

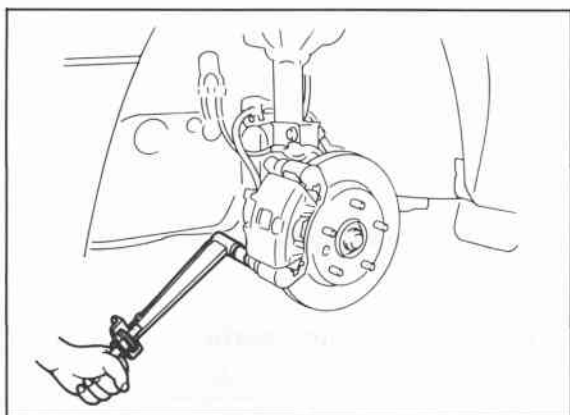
**V-springs are equipped for non-asbesto pad type.**

8. Remove the pads and shims.

#### Warning (Asbesto 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-asbesto pad type).

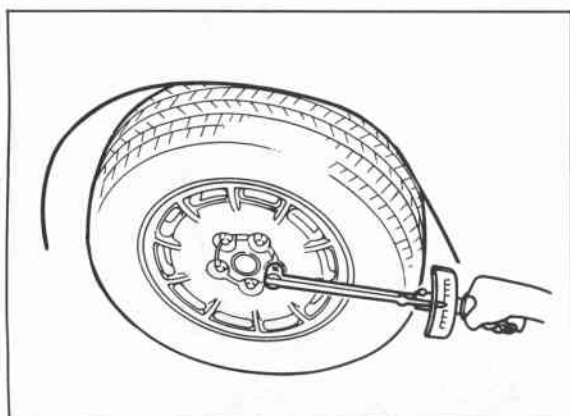


76G11X-076

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

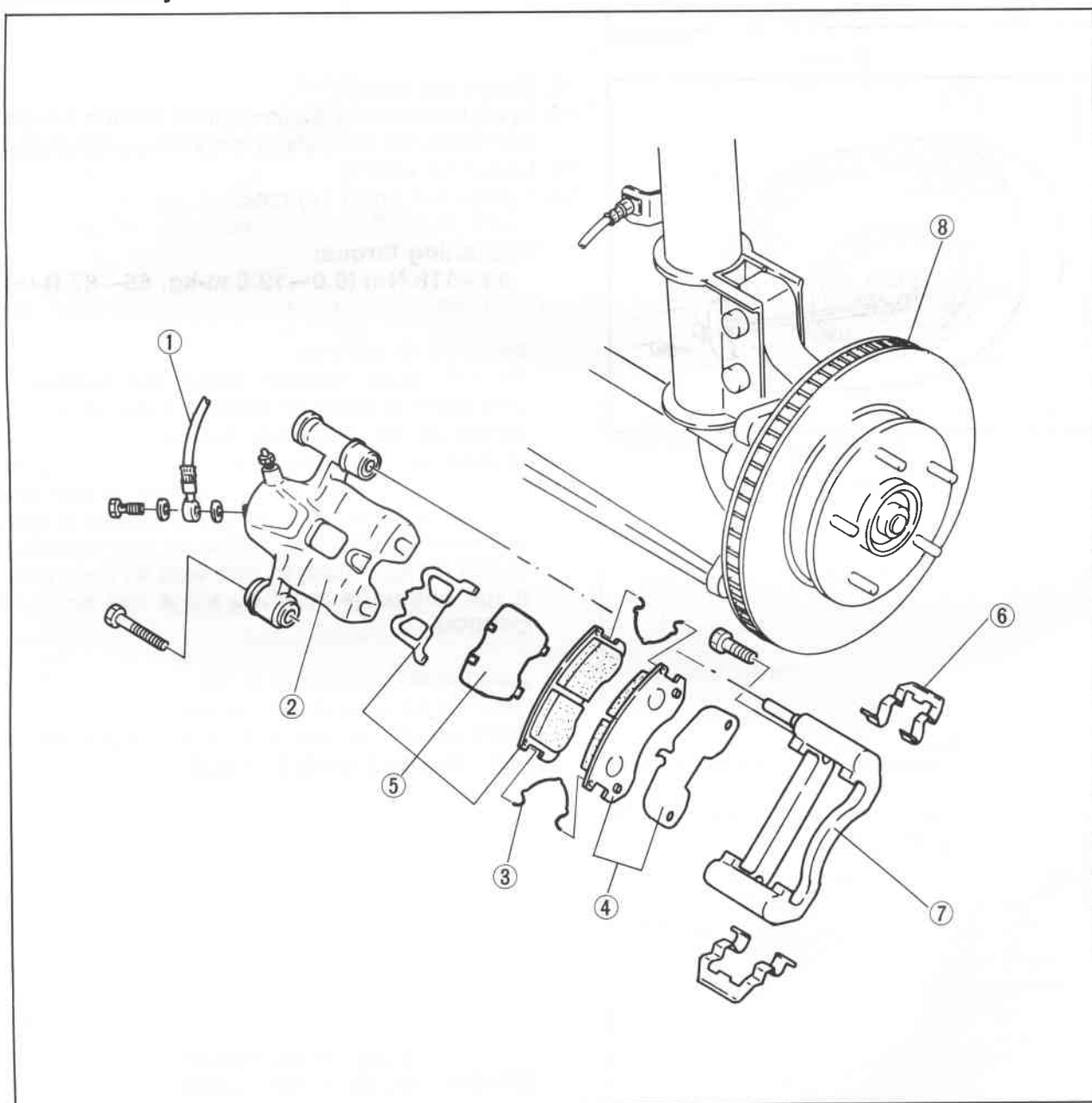
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the sequence shown in the figure.

### 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.



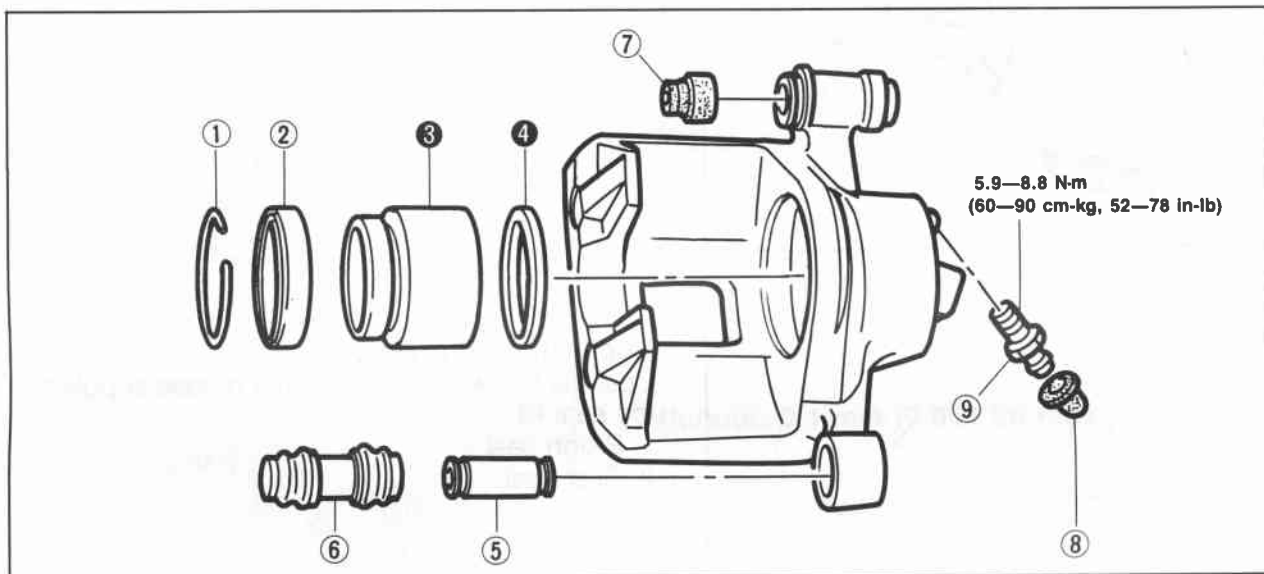
76G11X-078

1. Flexible hose
2. Caliper assembly
3. V-spring
4. Outer pad and shim

5. Inner pad and shim
6. Guide plate
7. Mounting support
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.

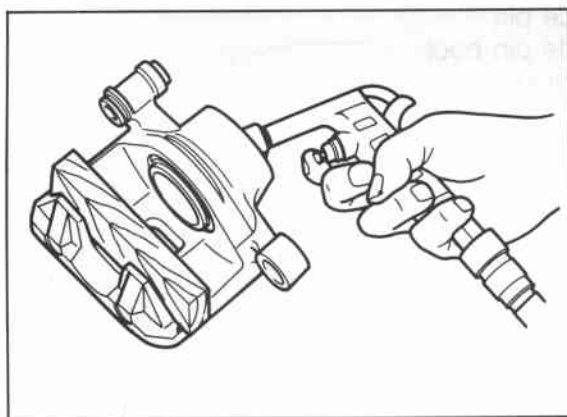


76G11X-079

1. Snap ring
2. Dust seal
3. Piston

4. Piston seal
5. Guide pin
6. Pin boot

7. Bushing
8. Cap
9. Bleeder screw



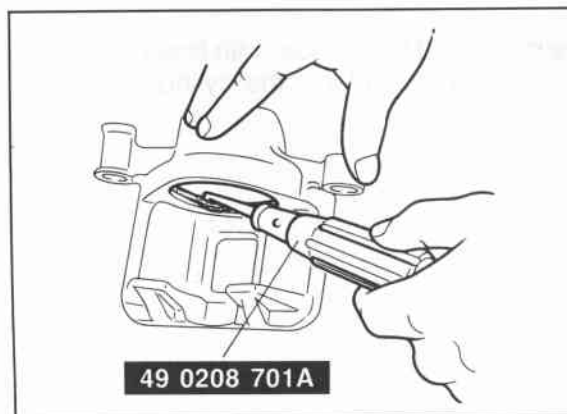
76G11X-080

### 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.**

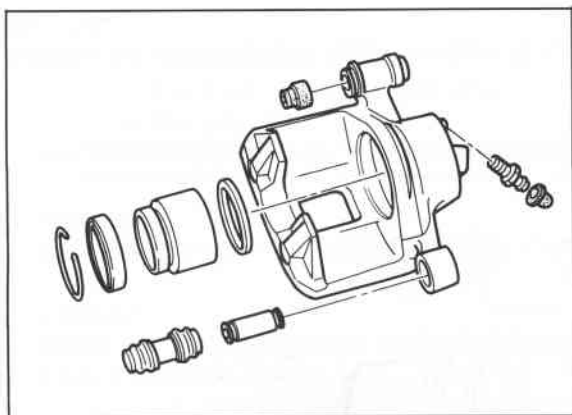


86U11X-074

### 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.

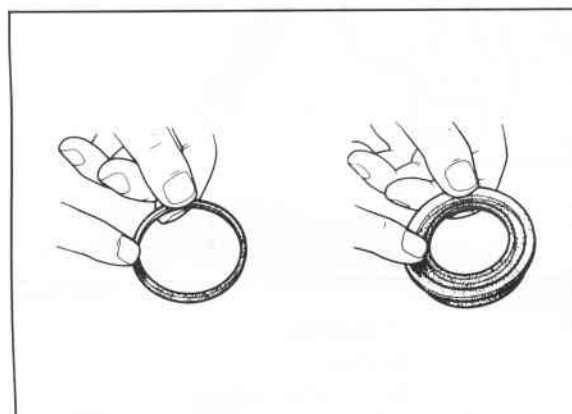
1. Cylinder and piston for wear or rust
2. Caliper body for damage or cracks
3. Boot for damage or poor sealing

## Assembly Note

### Application of grease

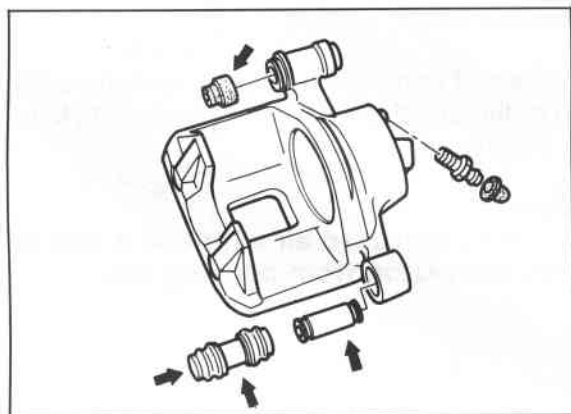
Coat the following parts with the grease supplied in the seal kit.

1. Piston seal
2. Dust seal



76G11X-081

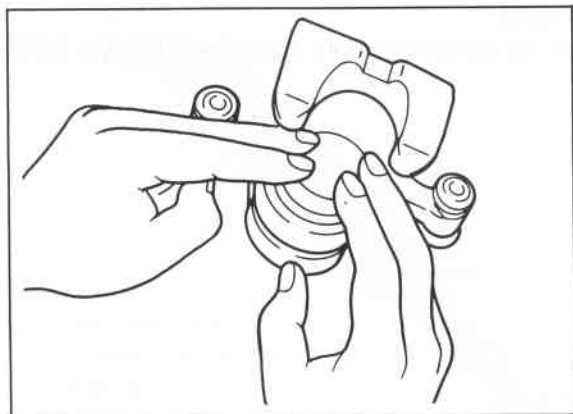
3. Guide pin
4. Guide pin boot
5. Bushing



86U11X-077

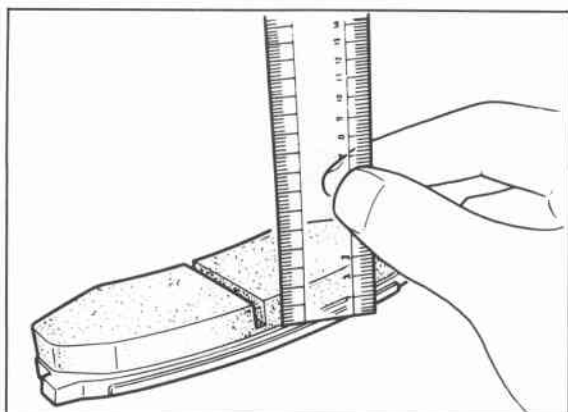
## Piston

Coat the piston and the cylinder with brake fluid; then insert the piston straight into the cylinder.



86U11X-078





86U11X-079

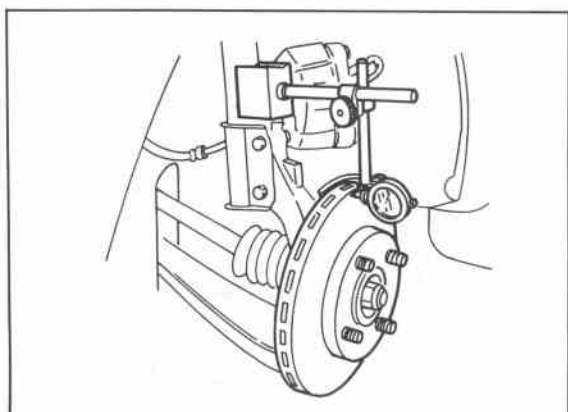
## INSPECTION

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

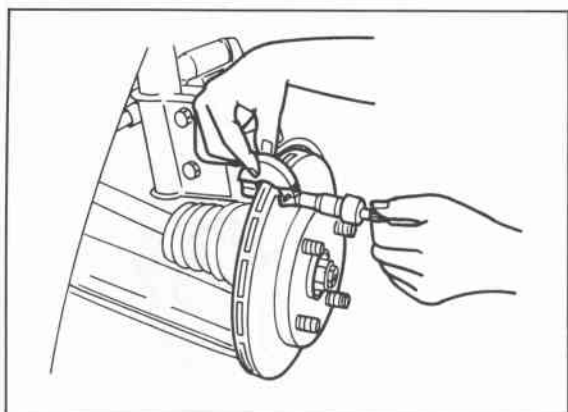
### Disc Plate

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

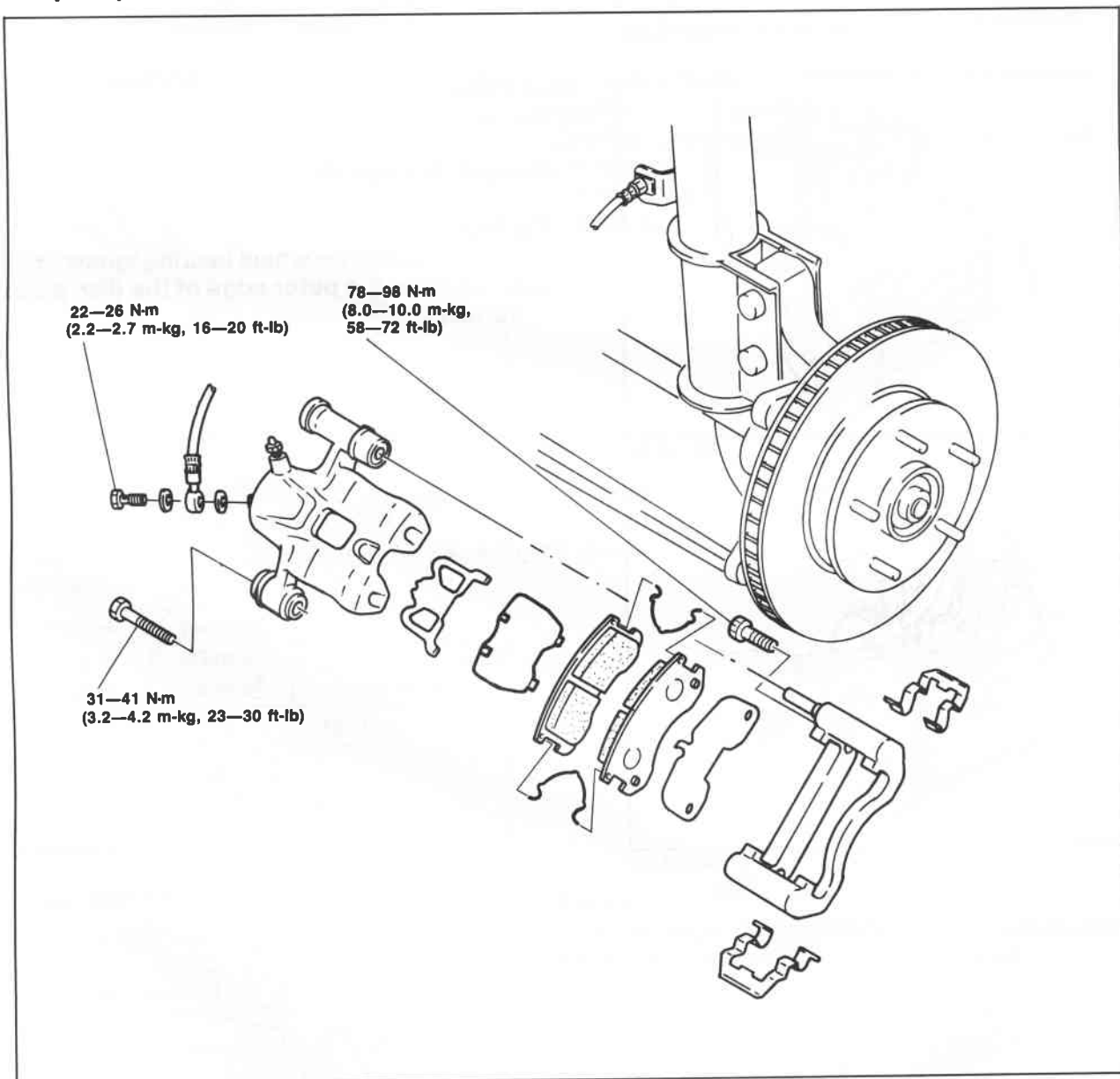
## INSTALLATION

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.

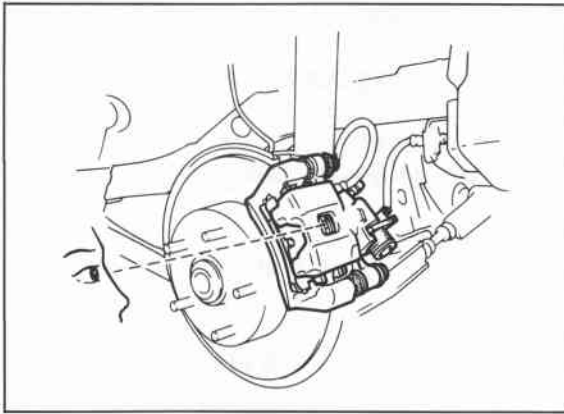
### Note

Refer to page 11—40 for pad installation.

### Torque specifications



76G11X-047

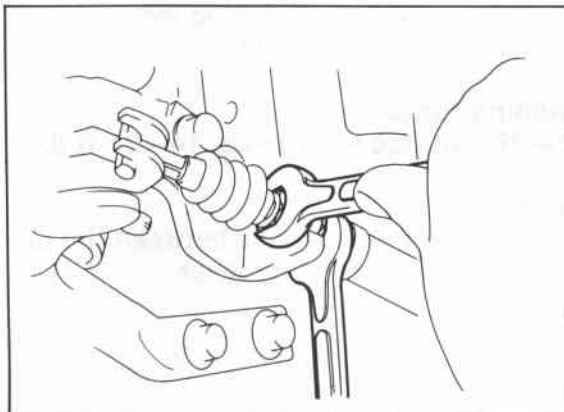


76G11X-082

## 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.**



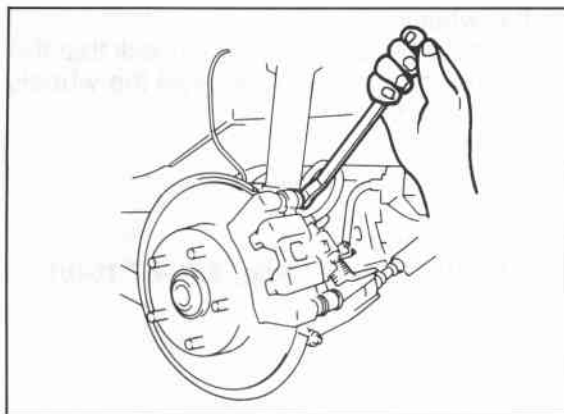
86U11X-084

### REPLACEMENT OF DISC PAD

#### Caution

**Replace the left and right pads at the same time.**

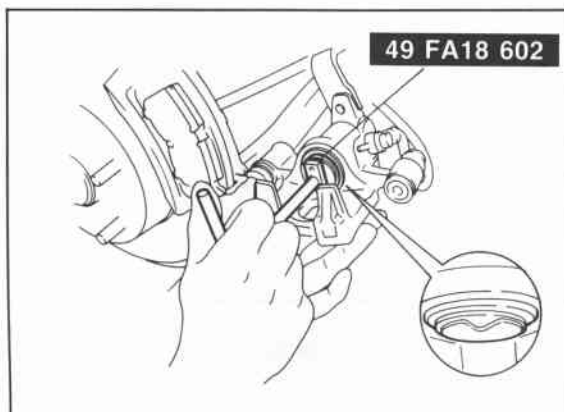
1. Loosen the wheel lug nuts.
2. Release the parking brakes.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove the parking brake cable from the cable bracket and the operating lever.
6. Remove the upper mounting bolt; then pivot the caliper.
7. Remove 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

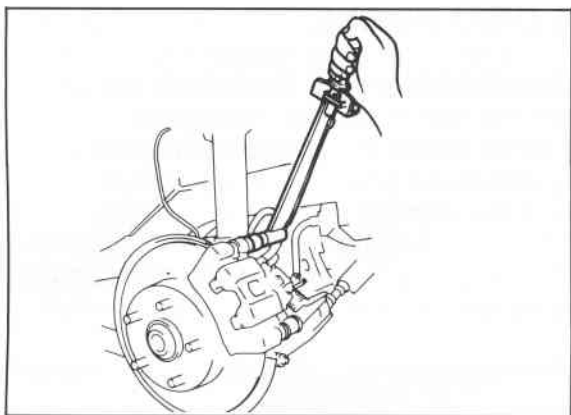
9. Apply the grease supplied in the pad attachment set to the new shims; then attach them to the new pads.
10. Turn the piston fully inward by rotating the **SST** clockwise. Align the piston groove as shown in the illustration.

#### 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

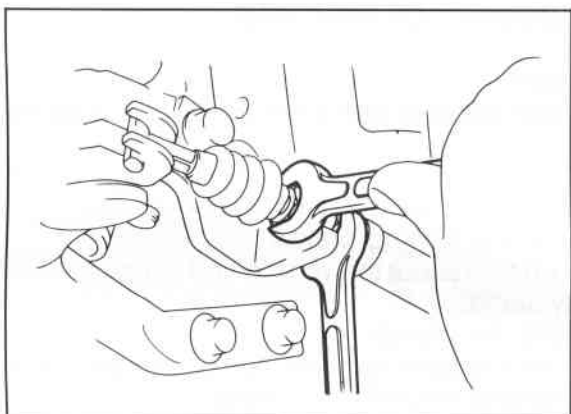


86U11X-087

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

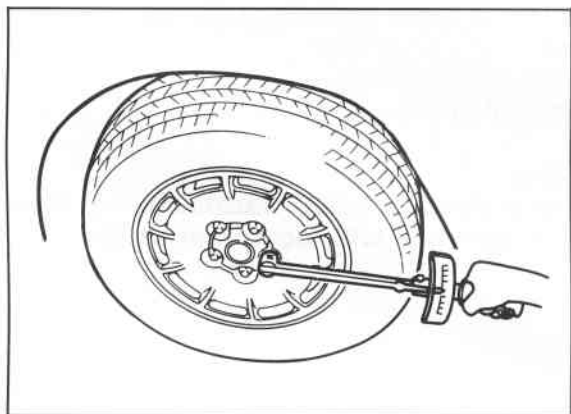
15. Connect the parking cable end to the operating lever; then tighten the locknut.

**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

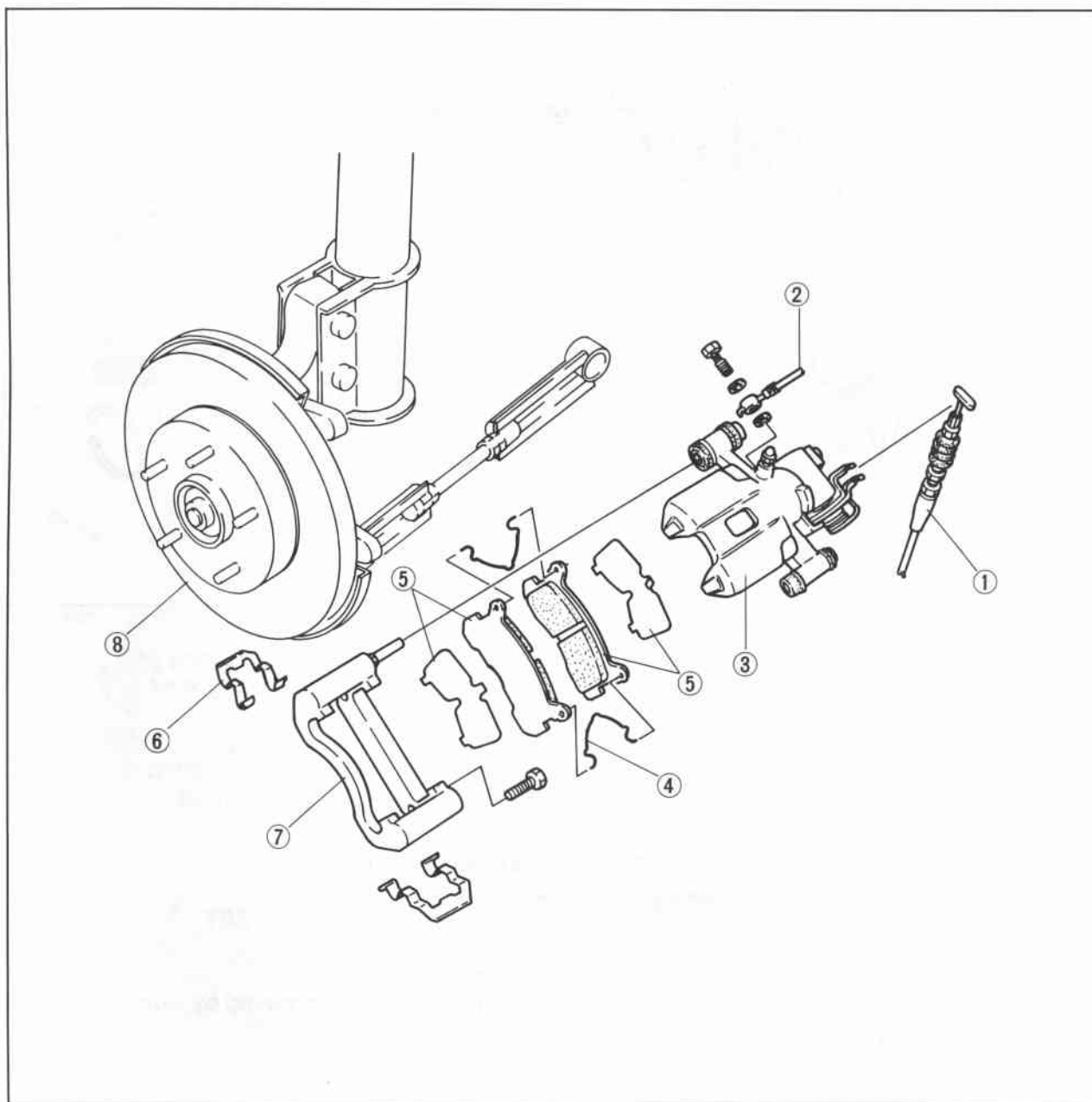
1. Loosen the wheel lug nuts.
2. Release the parking brakes.
3. Jack up the rear of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure.

## 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

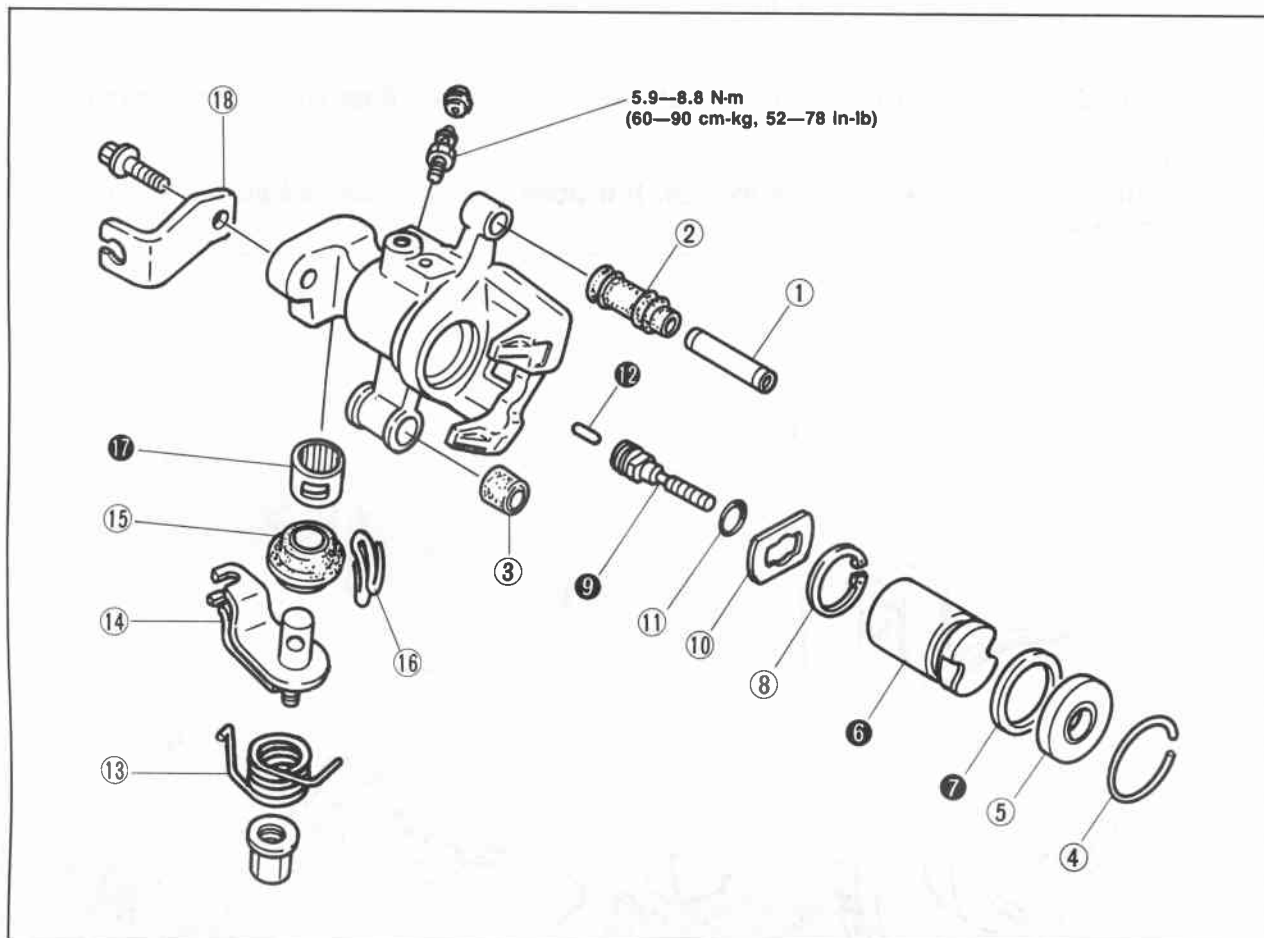
4. V-spring
5. Pad and shim
6. Guide plate

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   |

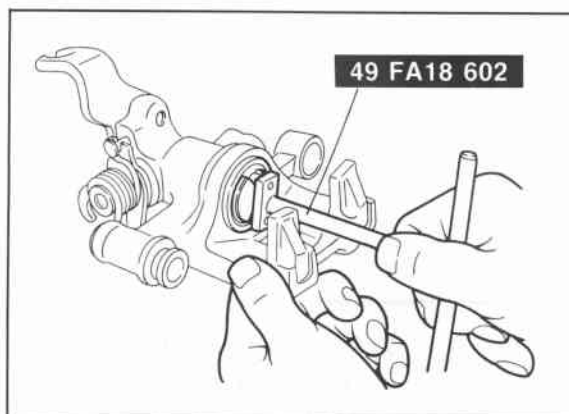
### Disassembly Note

#### Piston

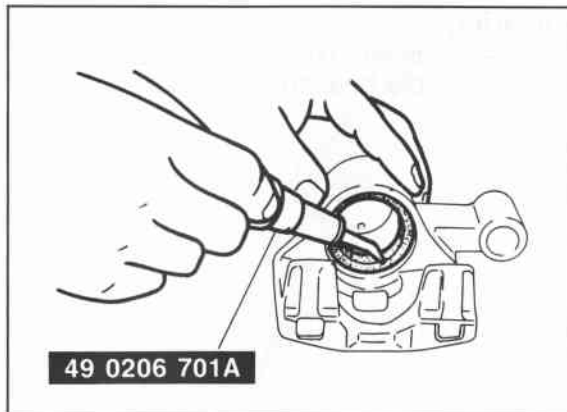
Remove the piston with the SST.

#### Note

The piston can be removed by turning the SST counterclockwise.



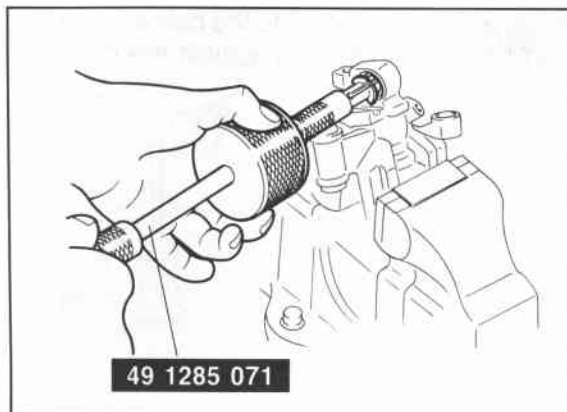
86U11X-092



86U11X-093

## Piston seal

Remove the piston seal with the **SST**.



86U11X-094

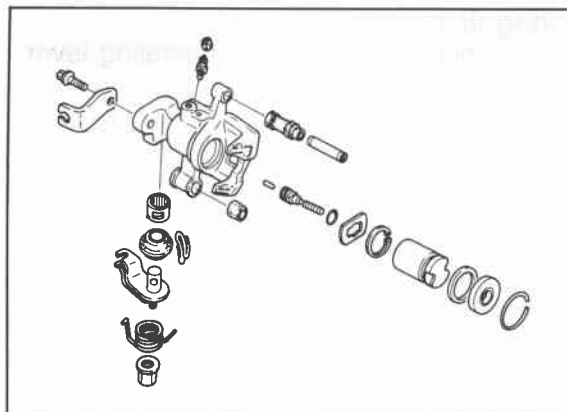
## Needle bearing

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**.

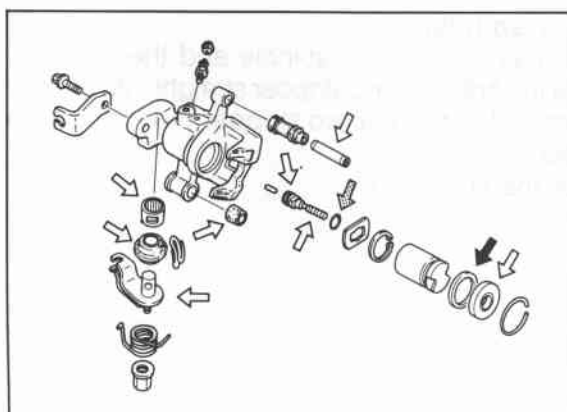


86U11X-095

## 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

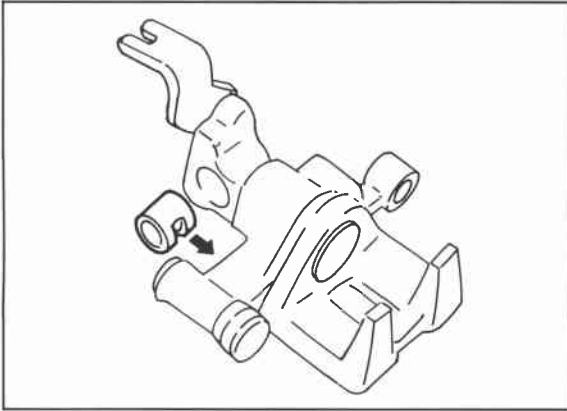
## Assembly Note

### 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

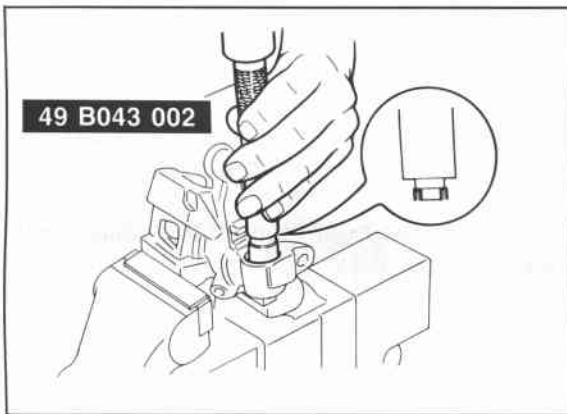
# 11 REAR DISC BRAKE



86U11X-097

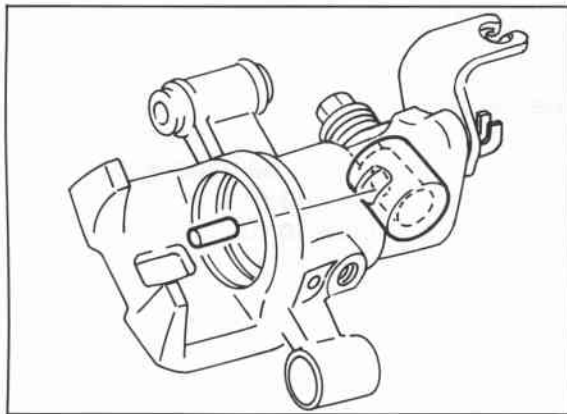
## Needle bearing

1. Align the needle bearing hole with the caliper hole, and set the needle bearing in the caliper.



86U11X-098

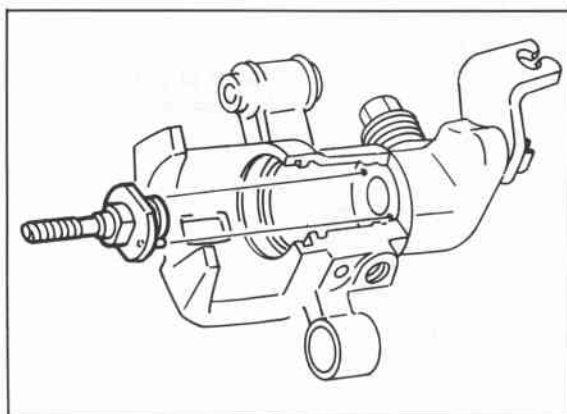
2. Press the needle bearing into the caliper with the **SST** until the **SST** bottoms against the caliper.



86U11X-099

## Connecting link

Install the connecting link into the operating lever.

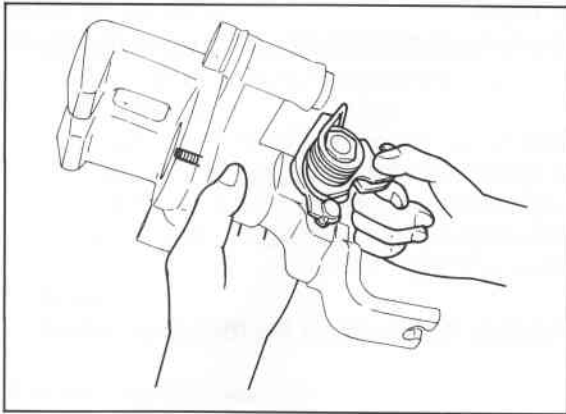


86U11X-100

## Adjuster spindle

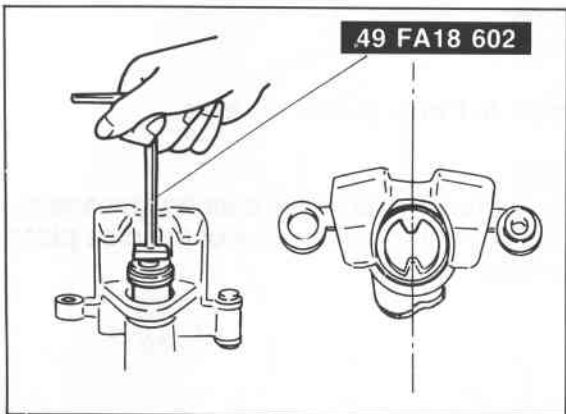
1. Assemble the adjuster spindle and the stopper.
2. Install the adjuster and stopper straight into the caliper cylinder with the two stopper pins fit into the caliper.
3. Install the snap ring.





86U11X-101

4. Move the operating lever and check that the adjuster spindle moves smoothly.



87U11X-102

## Piston

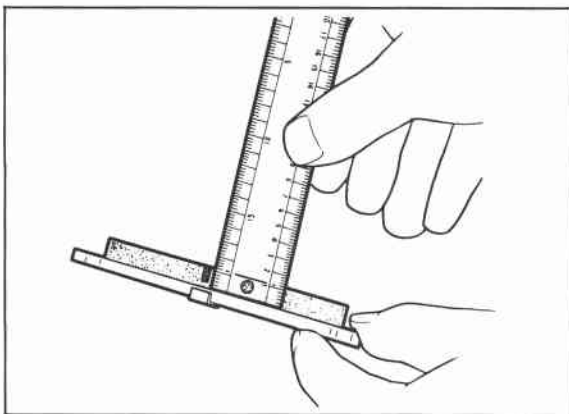
1. Clean the piston.
2. Install the dust seal in the piston groove.
3. Turn the piston into the caliper cylinder while rotating the **SST** clockwise.

## 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

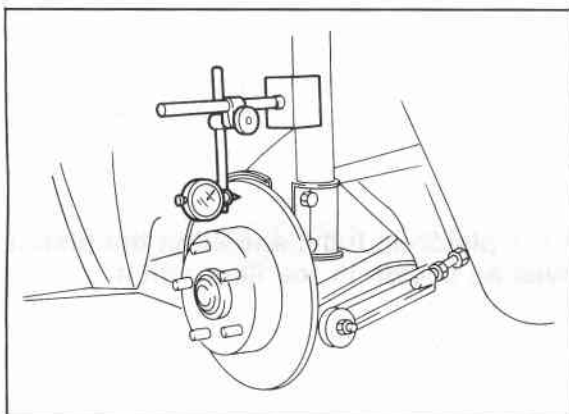
## INSPECTION

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

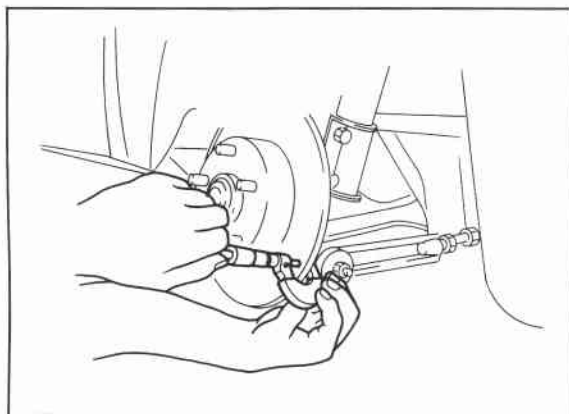
### Disc Plate

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)**

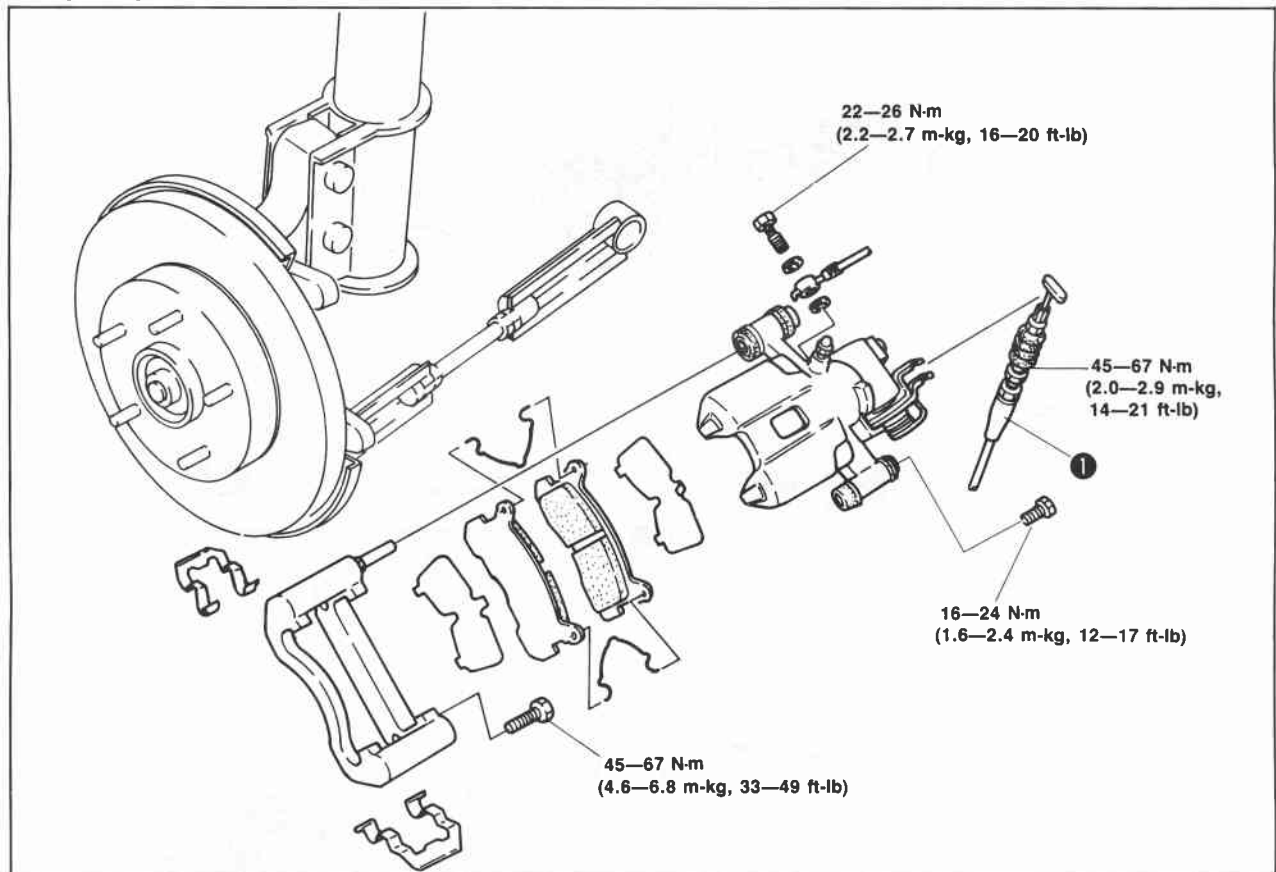
## INSTALLATION

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

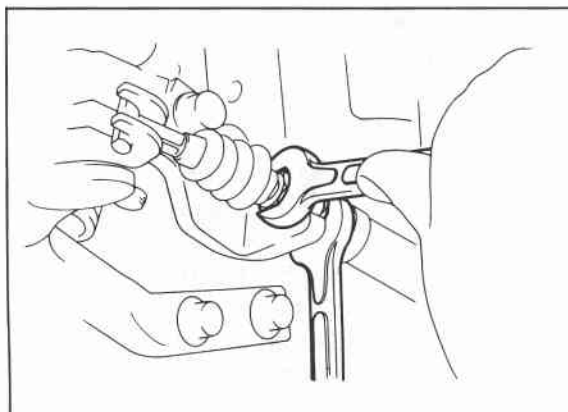
Refer to page 11—47 for pad installation.

## 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

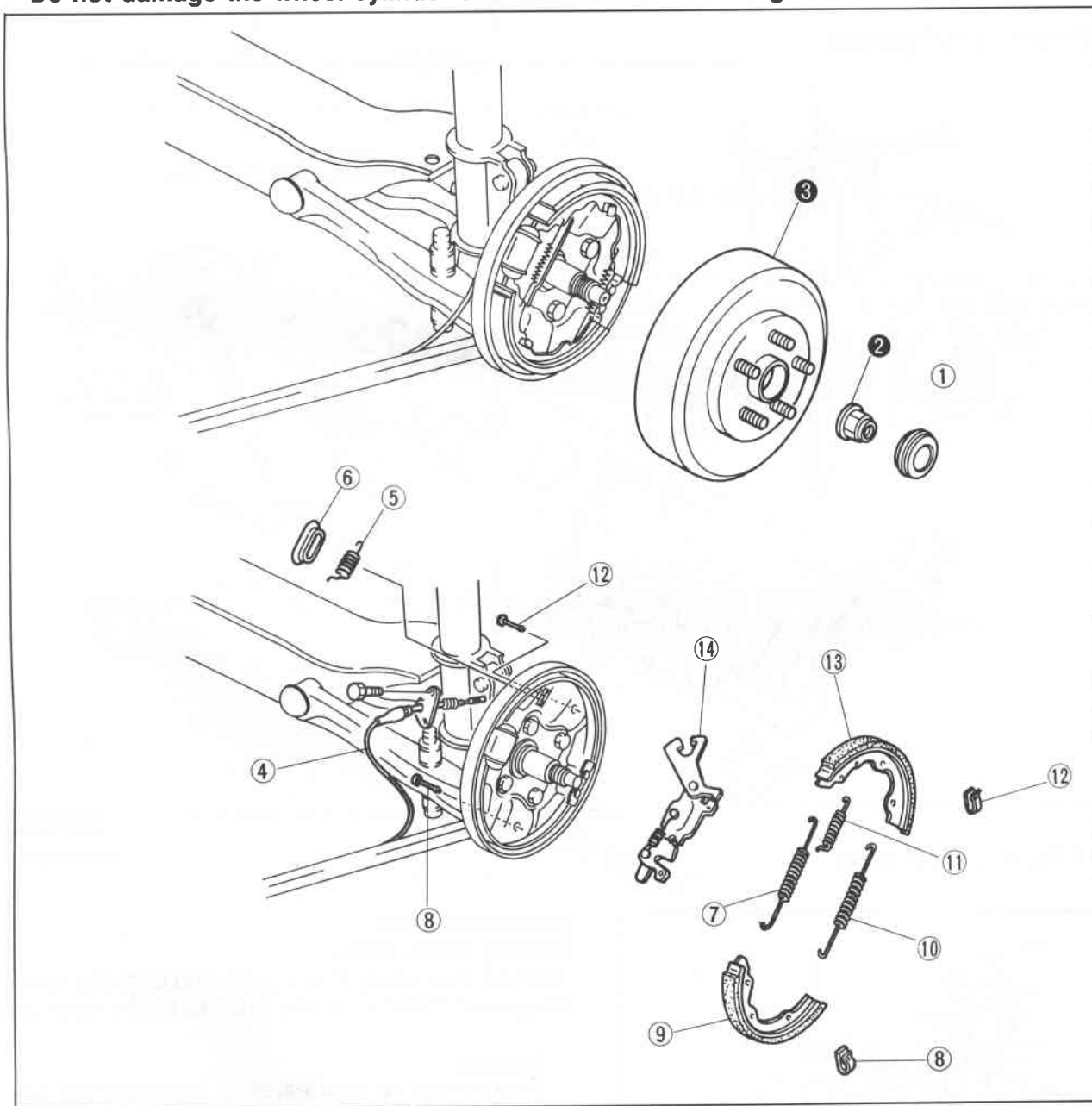
## REAR DRUM BRAKE

### 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.

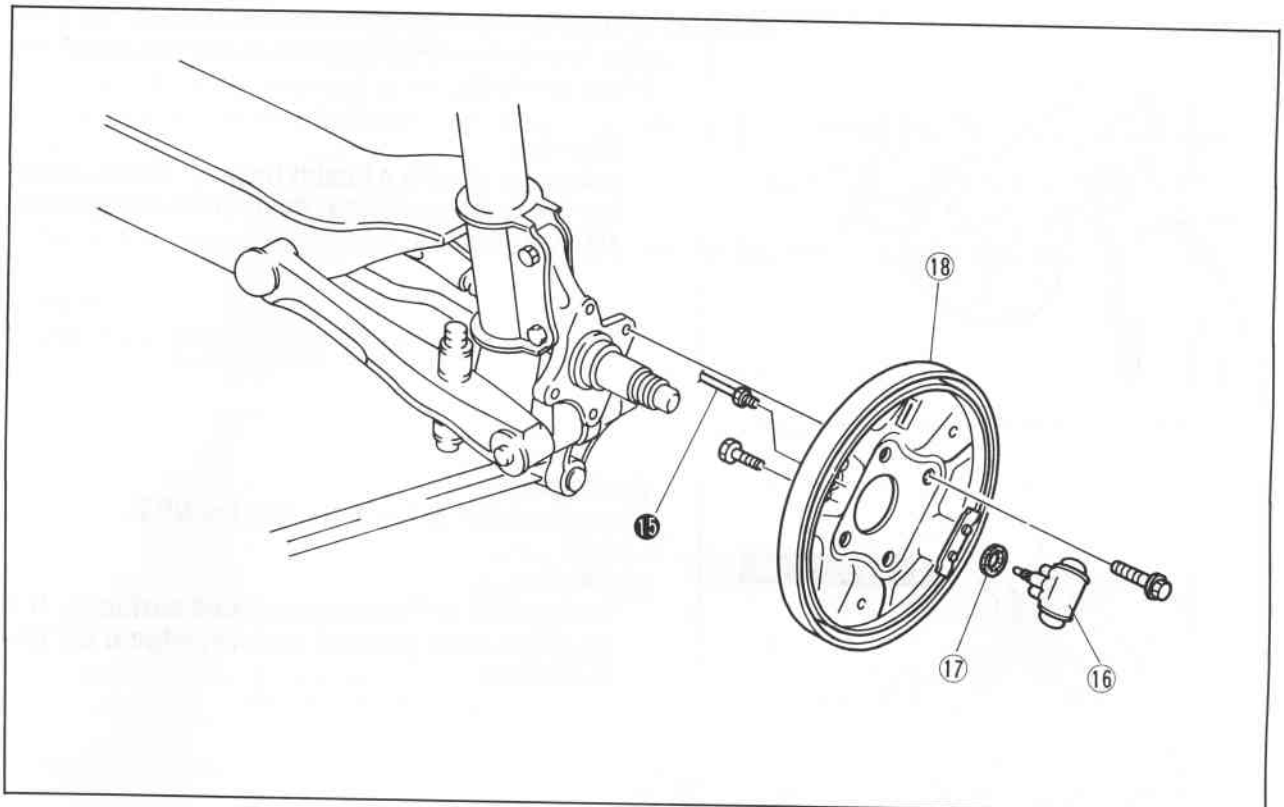
### Caution

**Do not damage the wheel cylinder dust boots when removing the brake shoes.**



86U11X-108

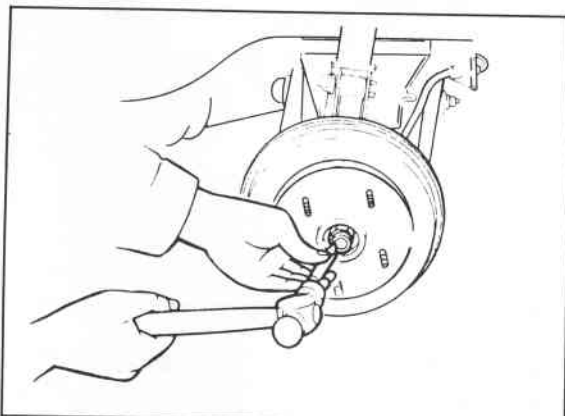
- |                        |                              |                                |
|------------------------|------------------------------|--------------------------------|
| 1. Hub cap             | 6. Dust cover                | 11. Anti-rattle spring         |
| 2. Locknut             | 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

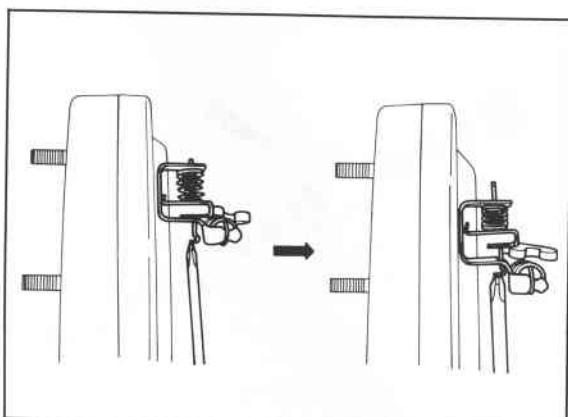


86U11X-110

## Removal Note Locknut

Uncrimp the locknut, and remove it.

**Caution**  
Do not reuse the locknut.

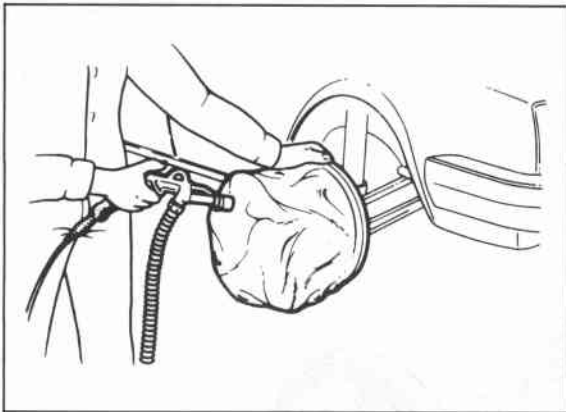


86U11X-111

## 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

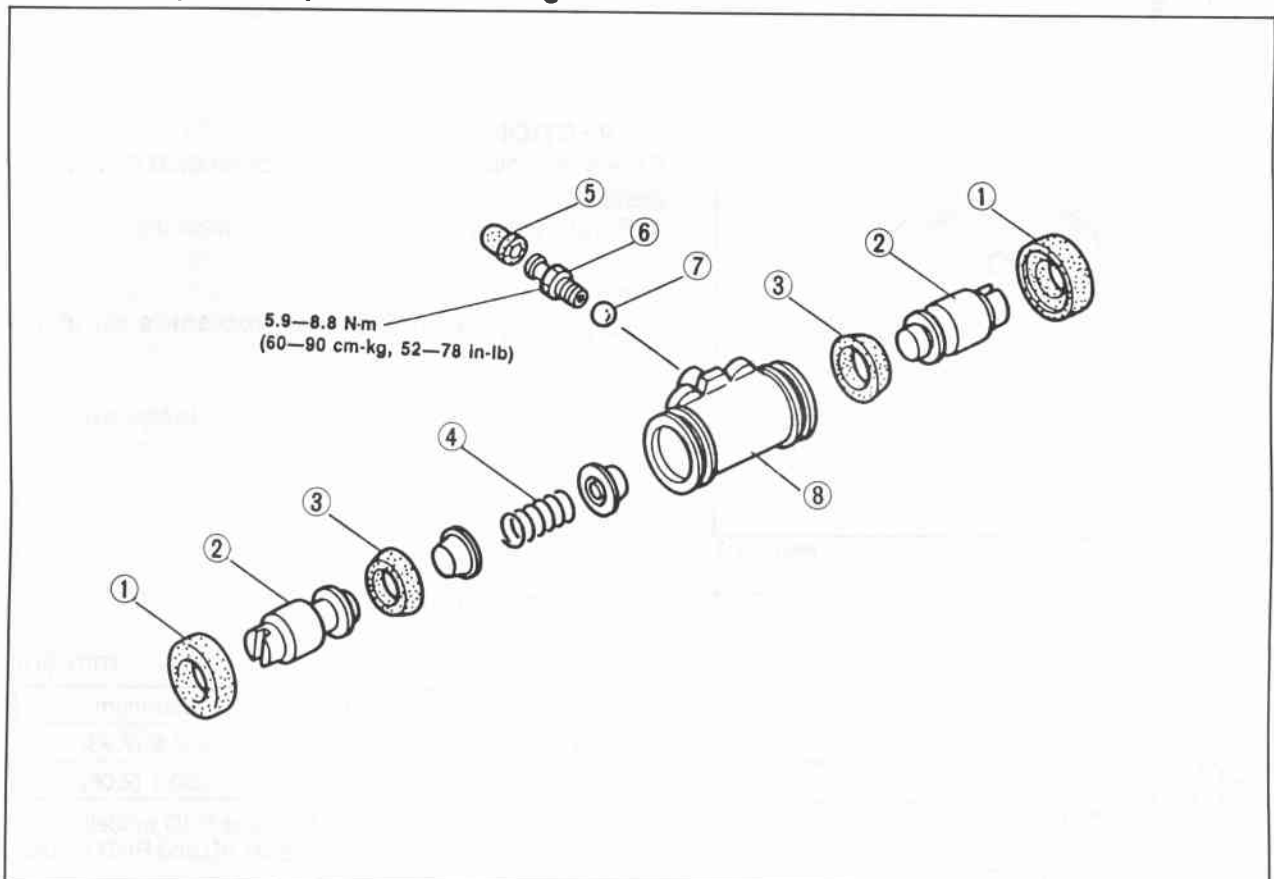
1. Disassemble in the sequence shown in the figure.
2. Inspect all parts, referring to inspection note.
3. Assemble in the reverse order of disassembly, referring to assembly note for the specially marked parts.

### Caution

Do not damage the piston or cylinder. Do not let foreign material into the cylinder.

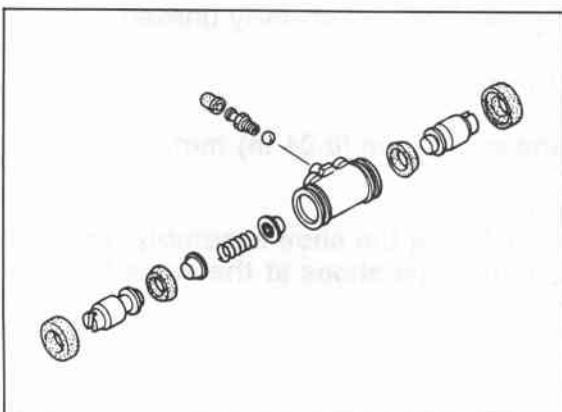
### Note

Use new piston cups when installing.



76G11X-087

- |               |                  |                        |
|---------------|------------------|------------------------|
| 1. Dust boot  | 4. Spring        | 7. Steel ball          |
| 2. Piston     | 5. Rubber cap    | 8. Wheel cylinder body |
| 3. Piston cup | 6. Bleeder screw |                        |



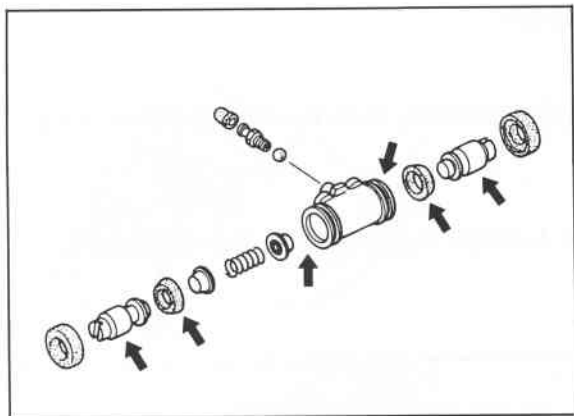
86U11X-115

### 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

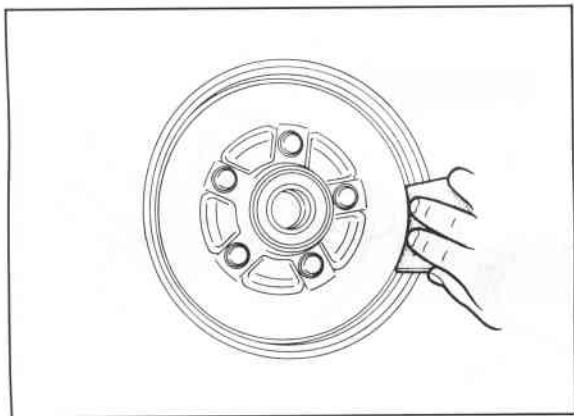


86U11X-116

## Assembly Note

Before assembly, apply brake fluid to the following parts:

1. Piston cup
2. Cylinder inner wall
3. Piston



86U11X-117

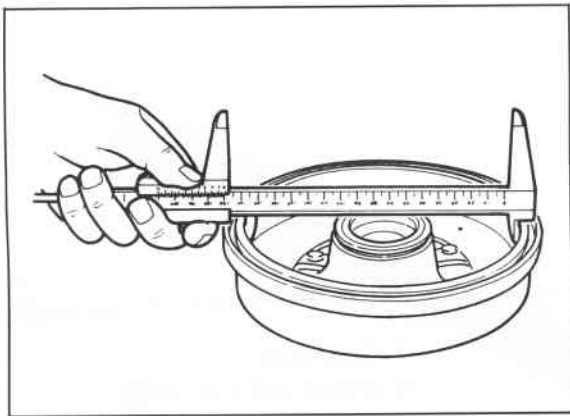
## INSPECTION

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.**



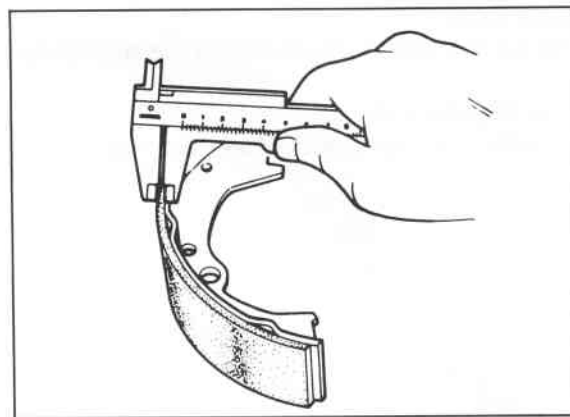
76G11X-049

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



86U11X-119

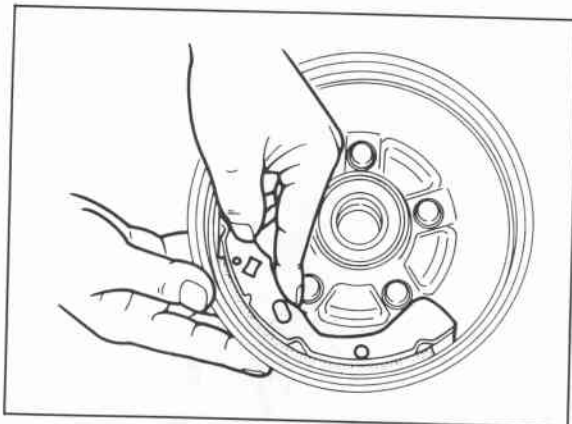
3. Peeling, cracking, or extremely uneven wear of lining
4. Lining wear

**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-120

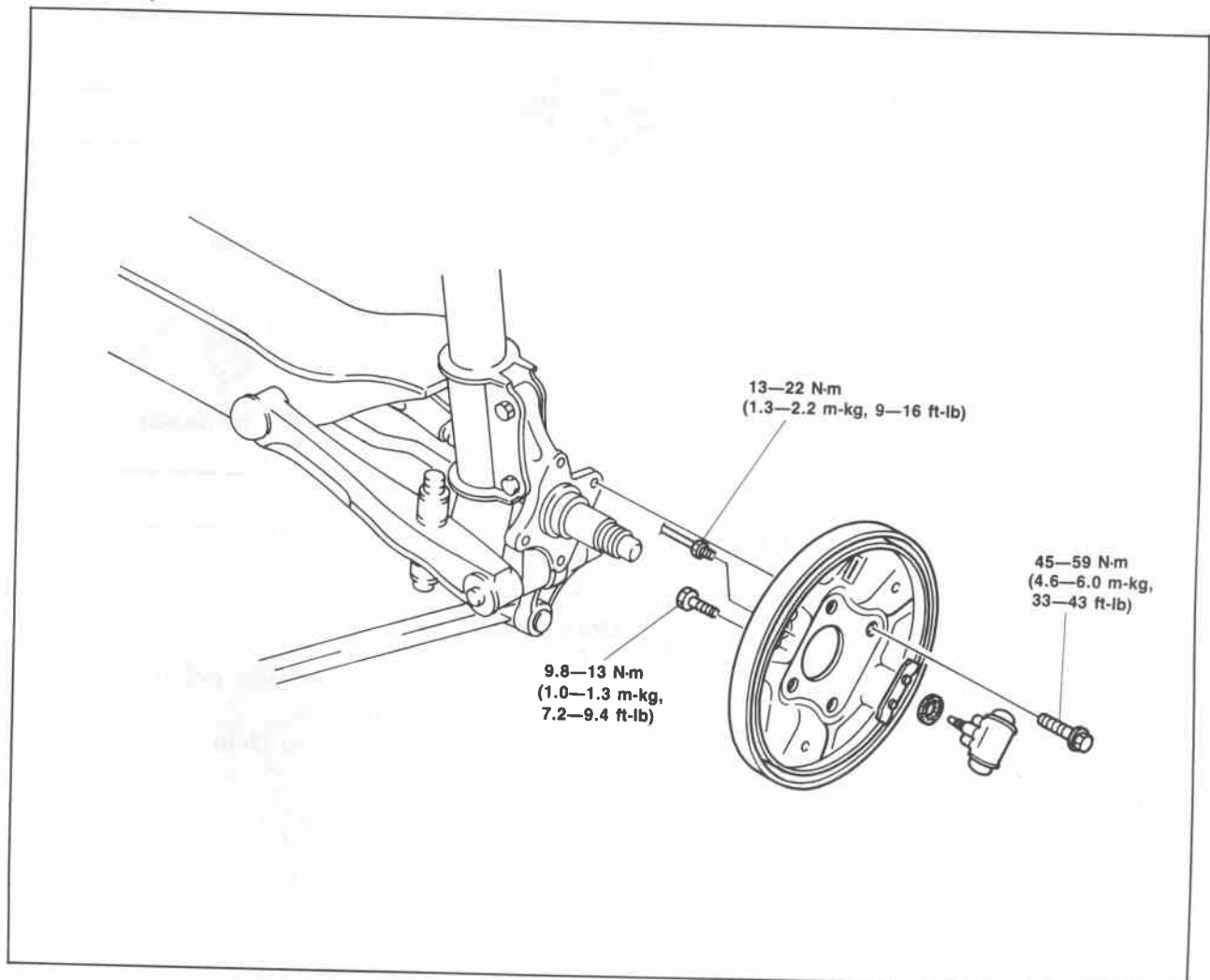
## 5. Fit of drum and lining

- (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.

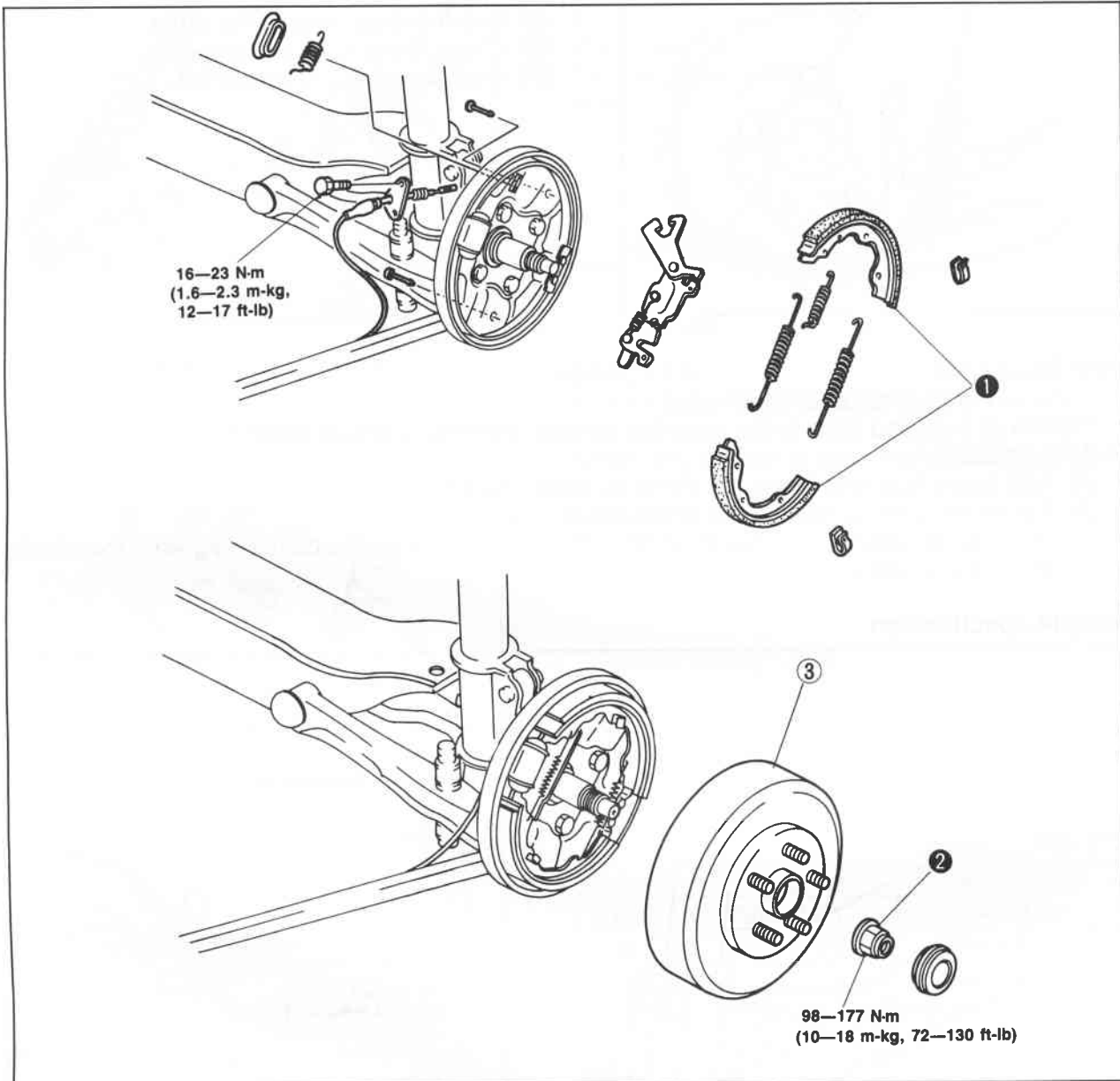
## Torque specification



76G11X-050

# 11 REAR DRUM BRAKE

## Torque specification

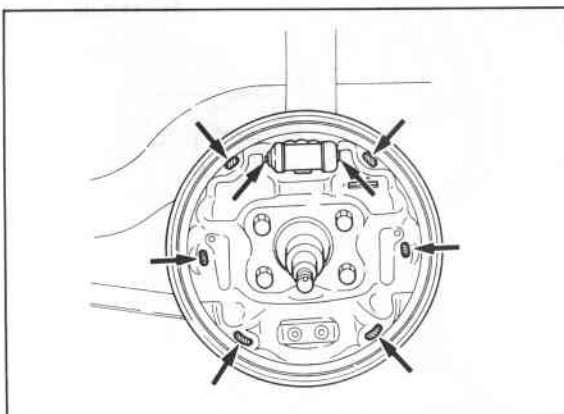


86U11X-122

1. Brake shoe

2. Brake drum

3. Locknut

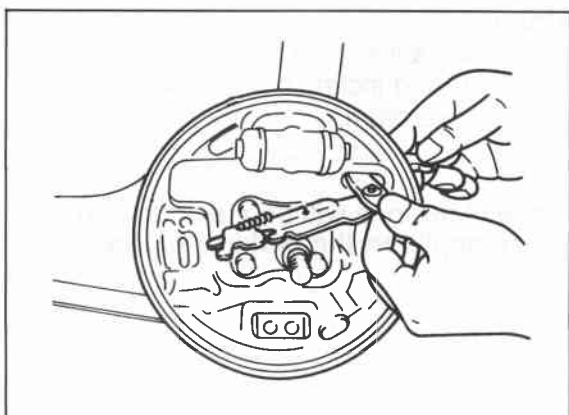


76G11X-088

### Installation Note Brake shoes

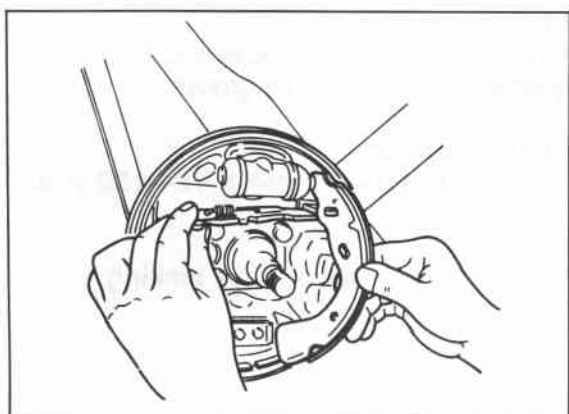
1. Apply grease to:
  - (1) Shoe and cylinder contact points
  - (2) Shoe anchor points
  - (3) Projections of backing plate

## REAR DRUM BRAKE 11



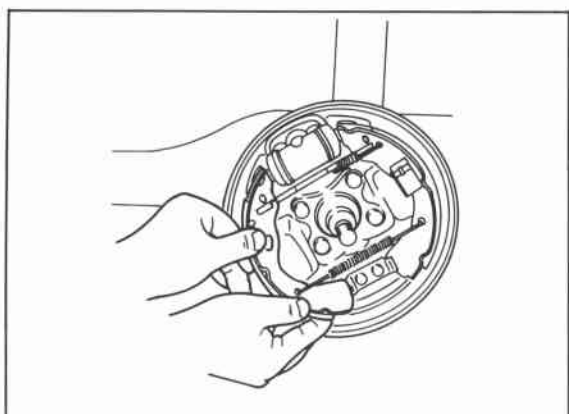
86U11X-124

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.



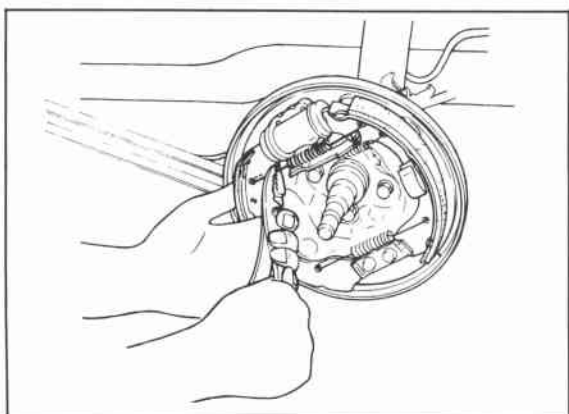
86U11X-125

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

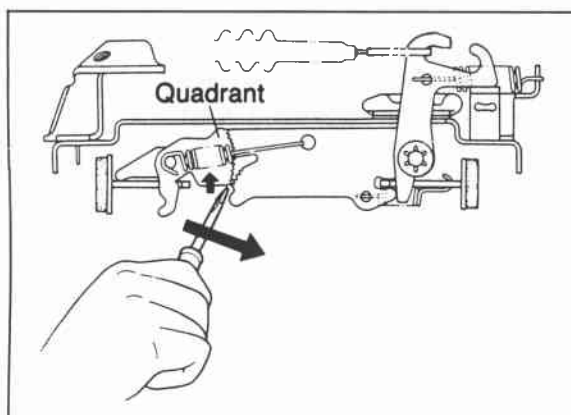
7. Install the return spring (lower) to the shoes (trailing side and leading side).
8. Install the shoe leading side to the operating lever, then to the wheel cylinder and anchor plate.
9. Fix the shoe with the hold spring and hold pin.



86U11X-127

10. Install the return spring (upper).

# 11 REAR DRUM BRAKE



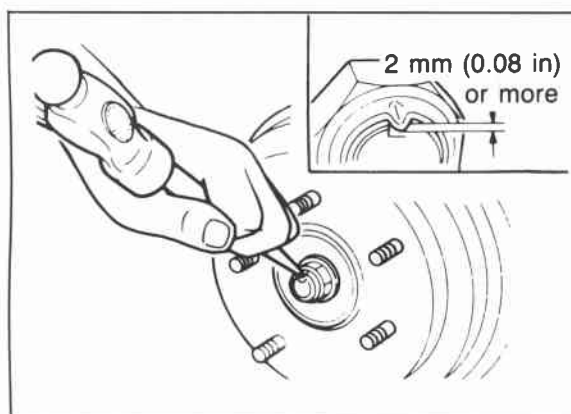
76G11X-089

## 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.

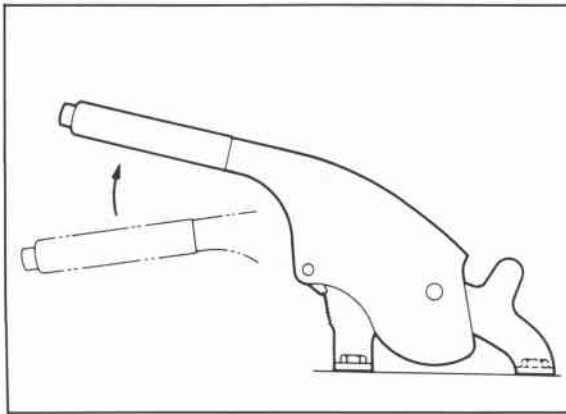
## PARKING BRAKE

### ON-VEHICLE MAINTENANCE

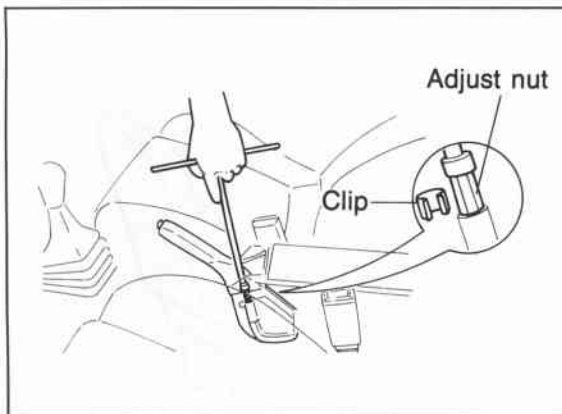
#### Parking Brake Lever Stroke Inspection

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

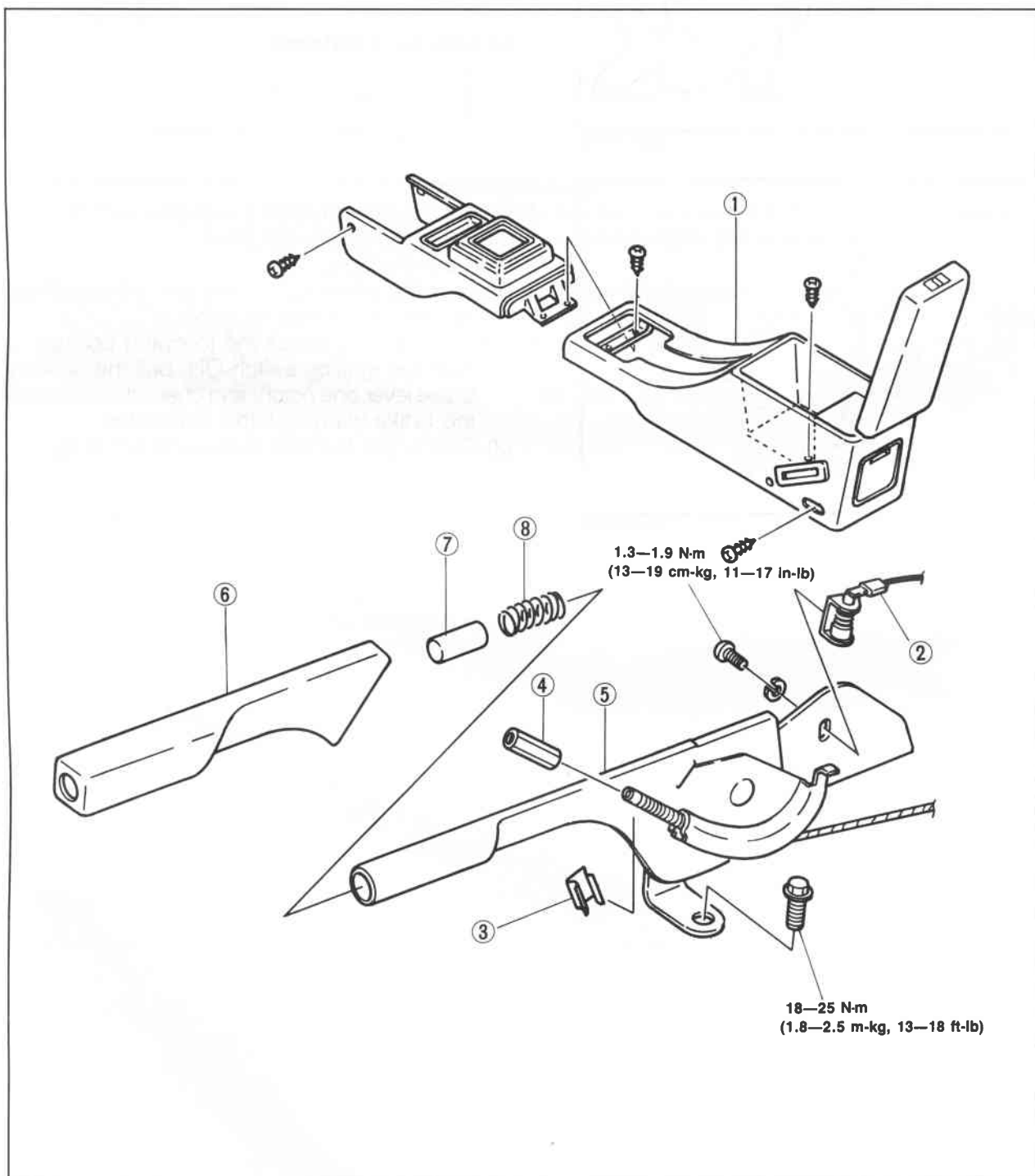
### Adjustment

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

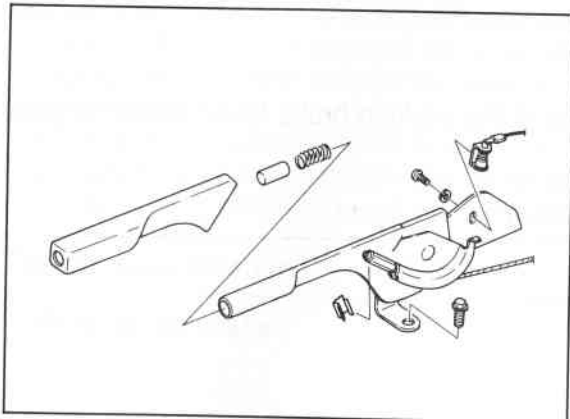
## REMOVAL AND INSTALLATION OF PARKING BRAKE LEVER

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                 | 6. Cover               |           |

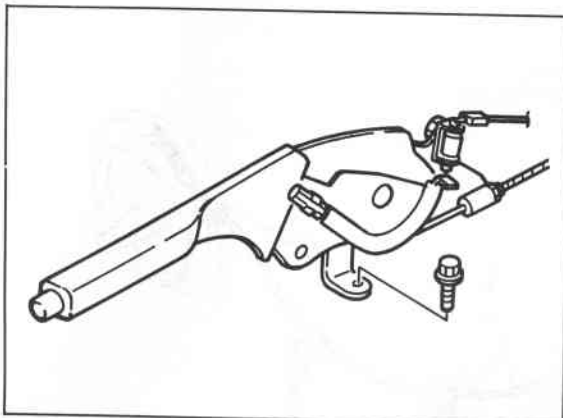


76G11X-090

## 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

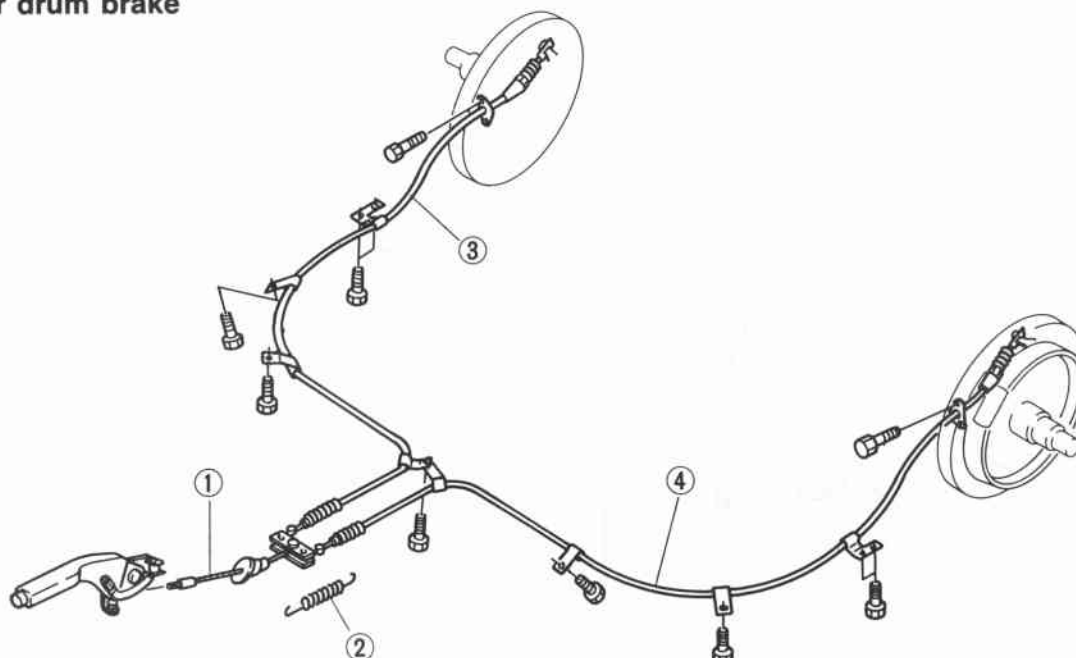
1. Install the parking switch so that it contacts the parking brake lever when the lever is released.
2. Turn the ignition switch ON, and check that the parking brake warning lamp illuminates with the lever pulled one notch.

# 11 PARKING BRAKE

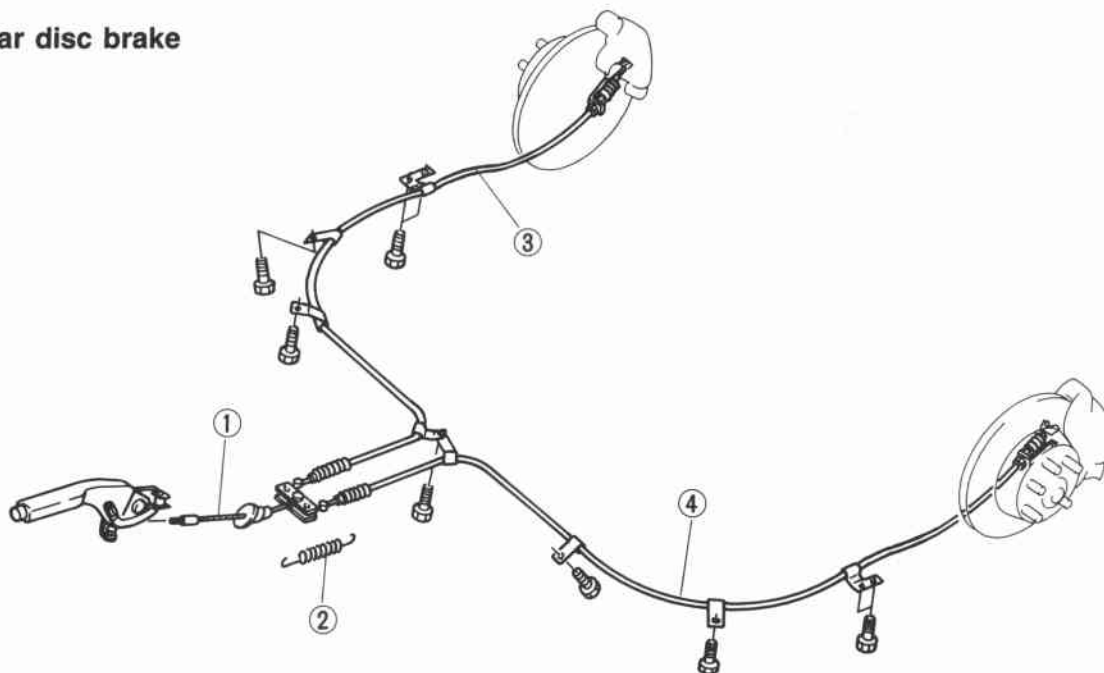
## REMOVAL OF PARKING BRAKE CABLE

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)

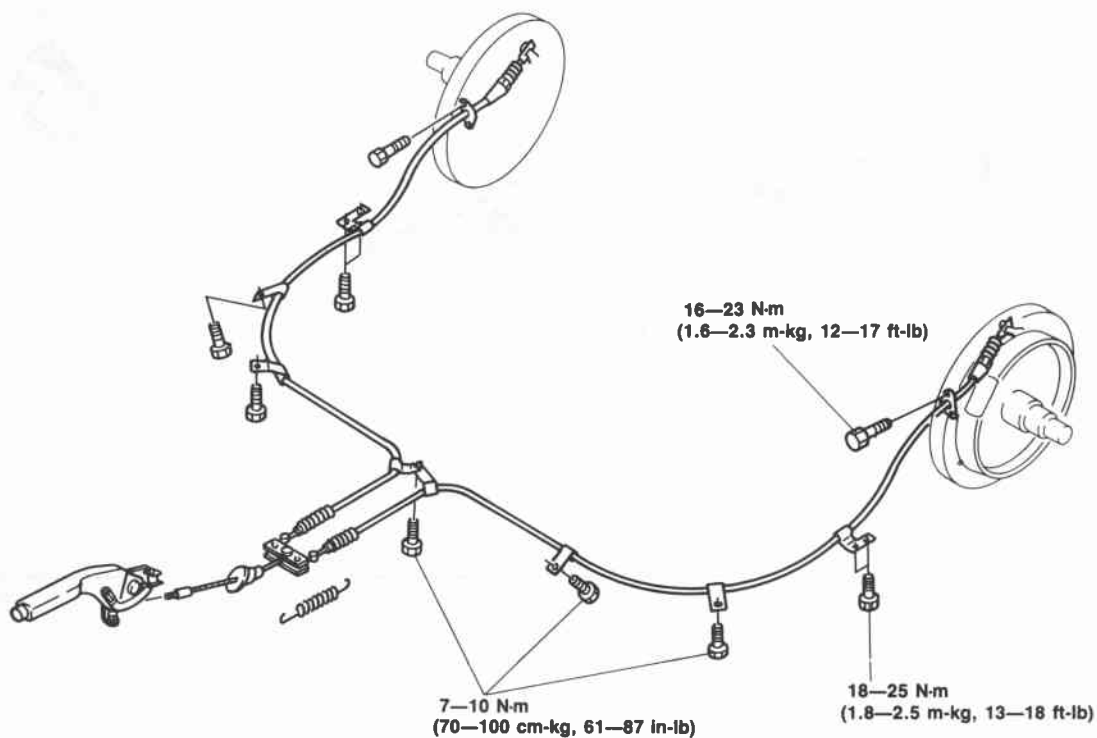


## INSTALLATION OF PARKING BRAKE CABLE

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

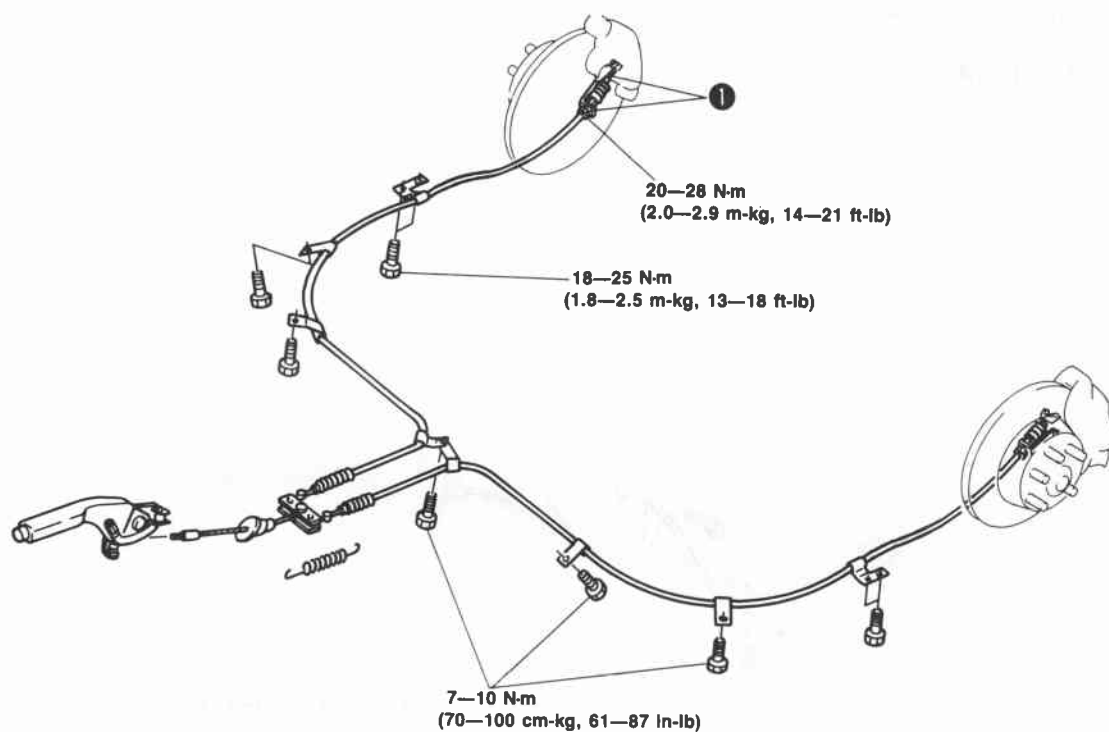
### Rear drum brake



76G11X-053

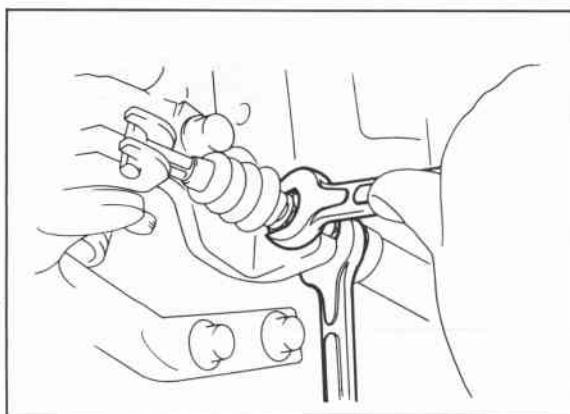
# 11 PARKING BRAKE

## 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:

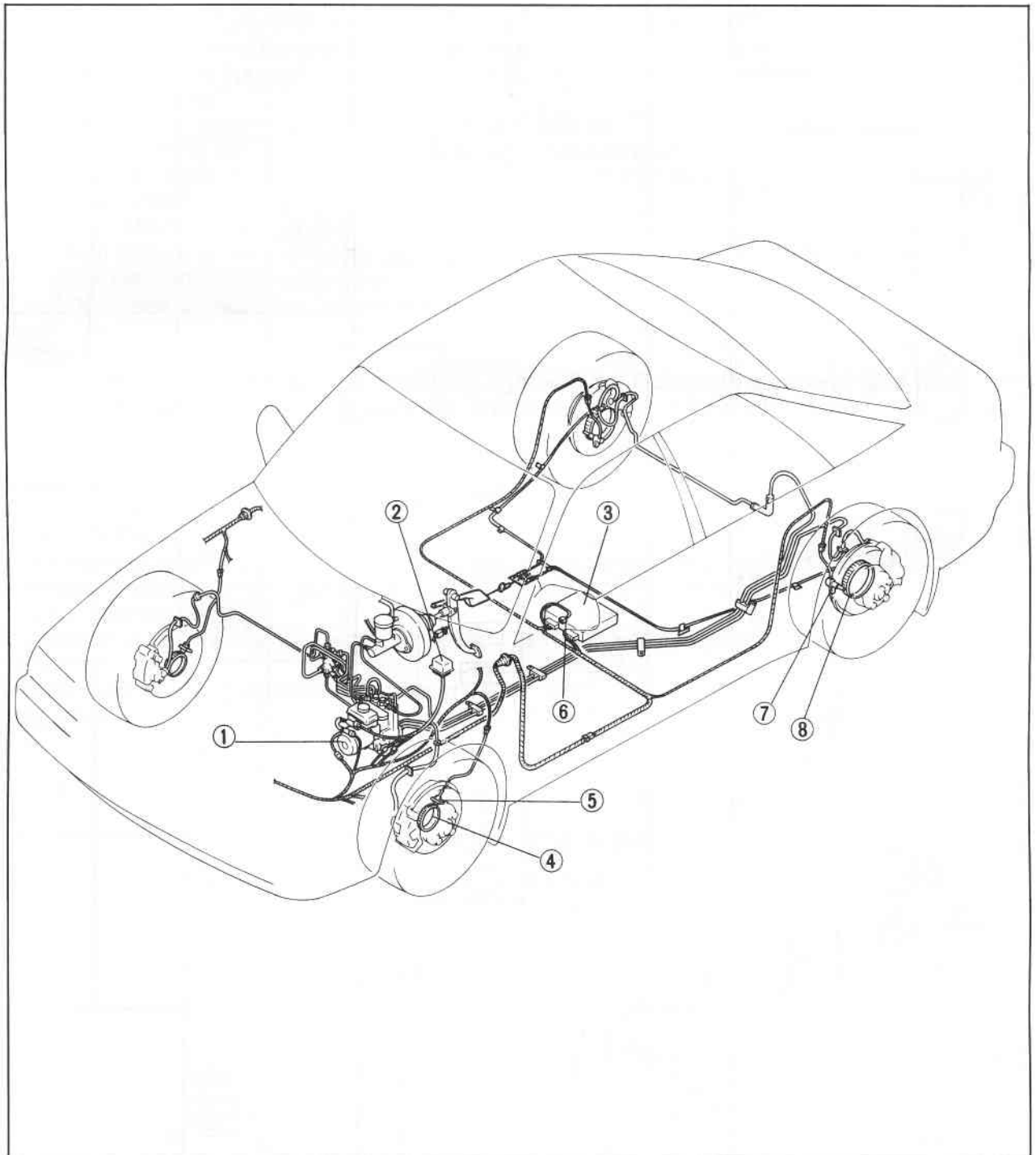
20–28 N·m (2.0–2.9 m·kg, 14–21 ft·lb)

#### Caution

There must be no clearance between the cable end and the operating lever.

## ANTI-LOCK BRAKE SYSTEM (ABS)

### STRUCTURAL VIEW



86U11X-140

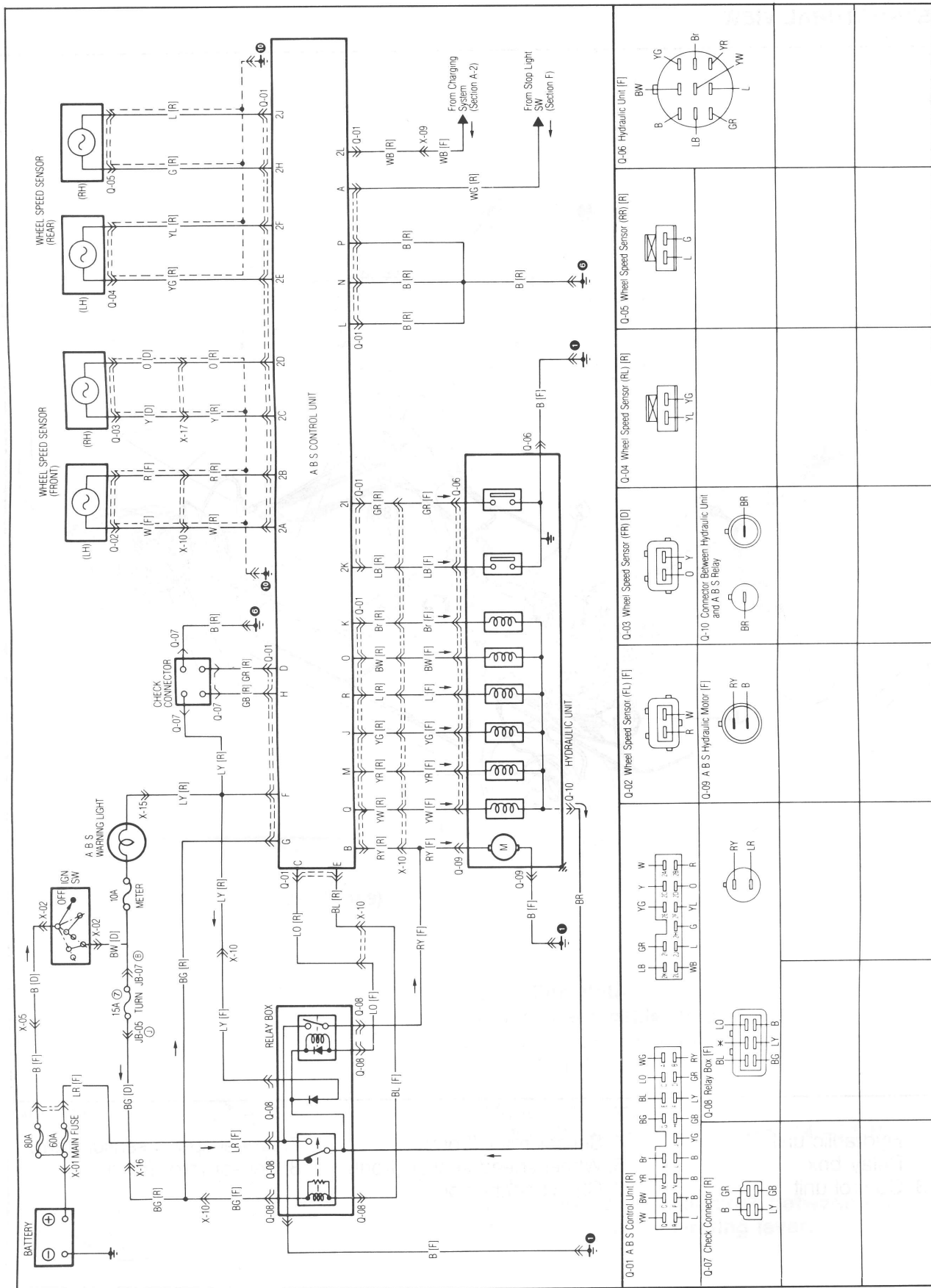
- 1. Hydraulic unit
- 2. Relay box
- 3. Control unit

- 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



86U11X-141

## 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.

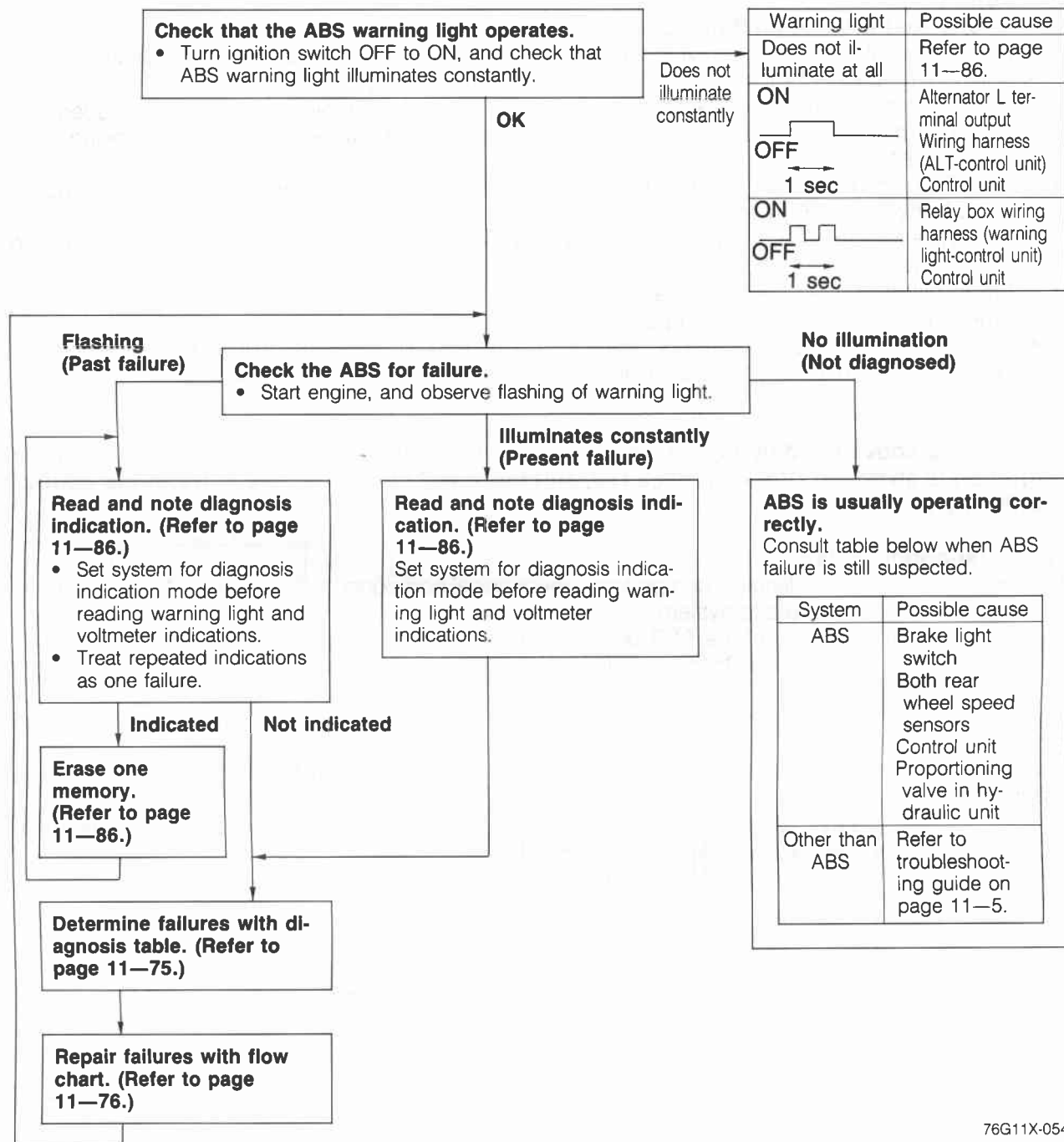
The location of a malfunction is indicated by the technician switching the system to the diagnosis-indication mode.

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






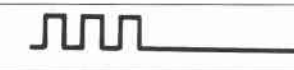











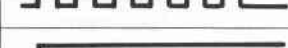


















76G11X-054

# ANTI-LOCK BRAKE SYSTEM (ABS) 11

## Diagnosis Table

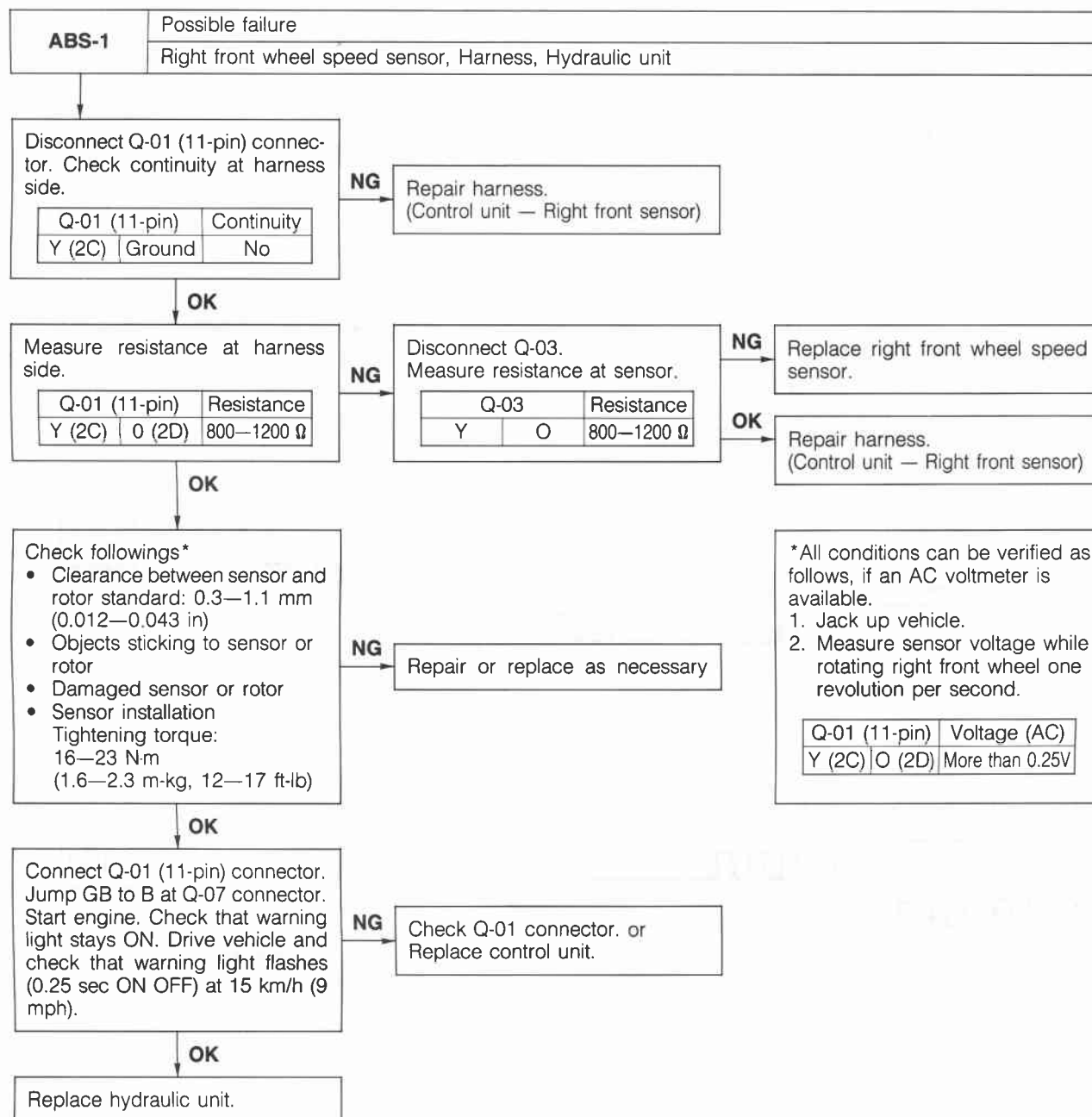
### Note

Flashing of the warning light shows past failure, and its illumination shows present failure.

Diagnosis indication		Possible failure		Flow chart No.	
Warning light	Voltmeter				
<div>ON</div>  <div>OFF</div>	12V  0V	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	
 					
 					
 					
 					
 		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		

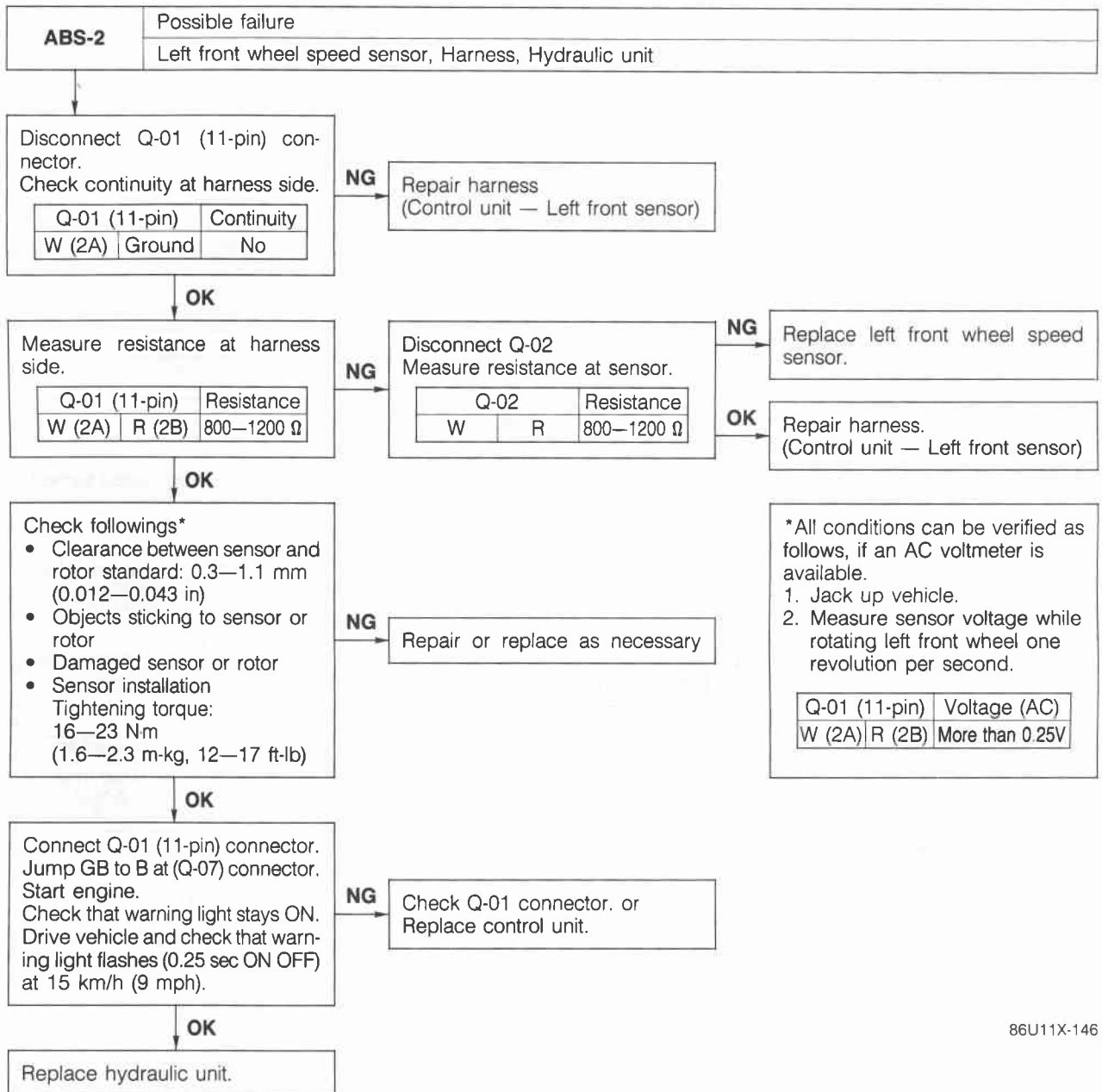
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

## Flow Chart (Refer to Wiring Diagram, Page 11—72.)



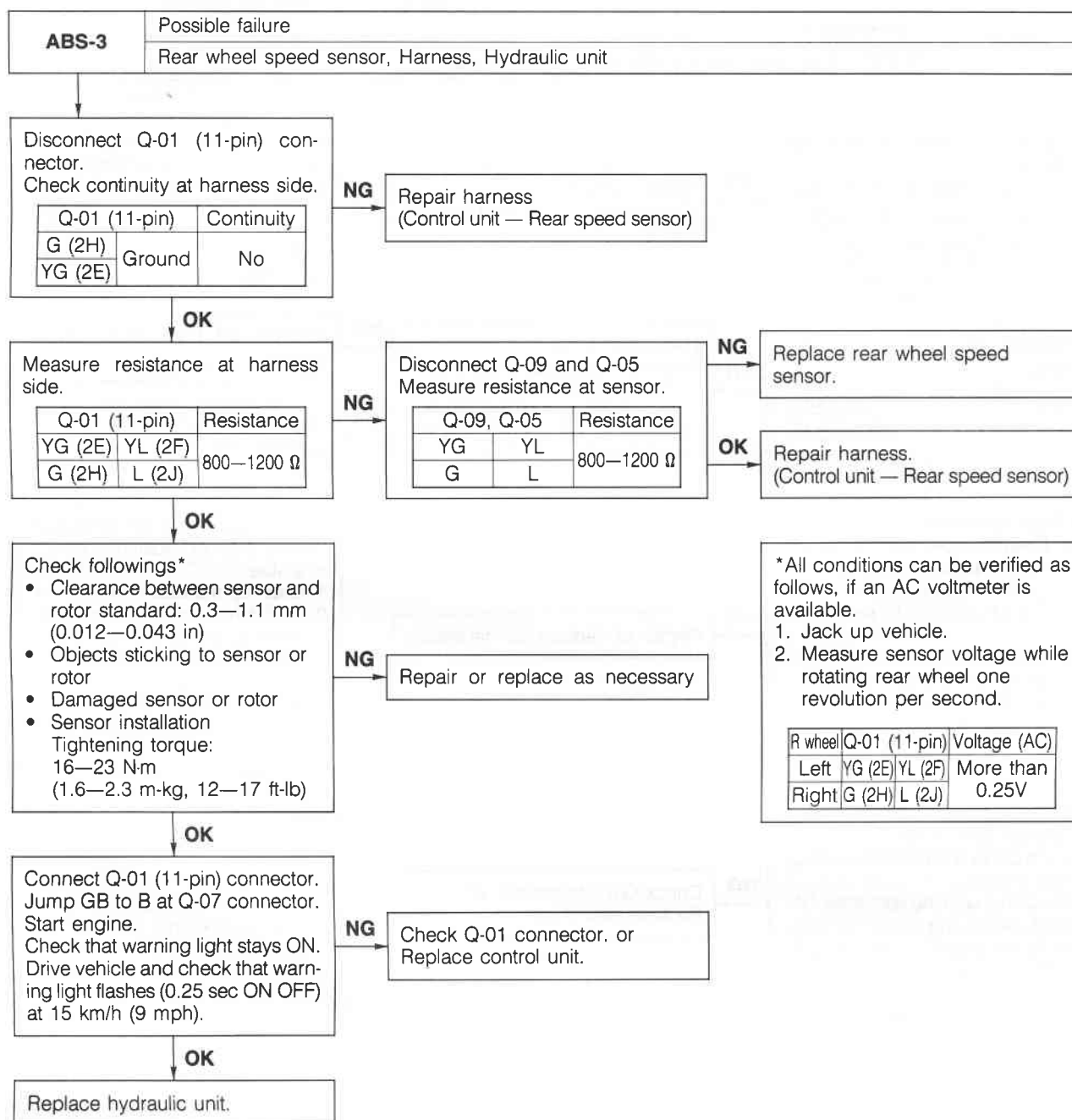
76G11X-055





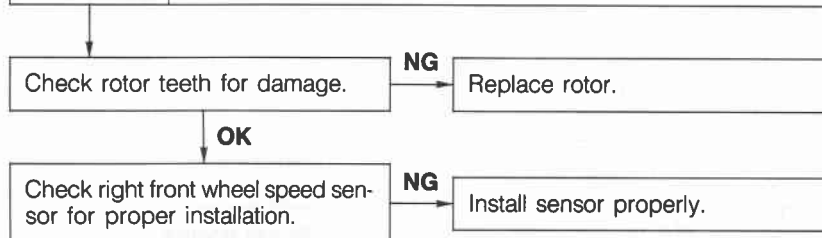
86U11X-146

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



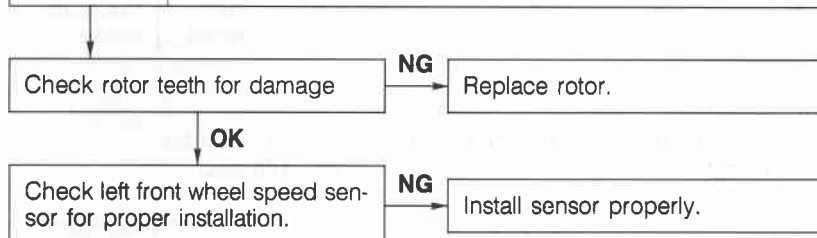
86U11X-147

<b>ABS-4</b>	Possible failure
	Right front sensor rotor



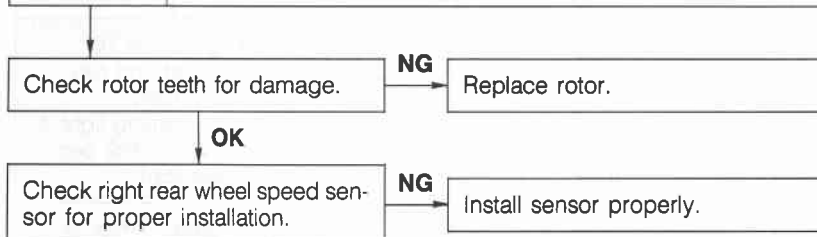
86U11X-148

<b>ABS-5</b>	Possible failure
	Left front sensor rotor



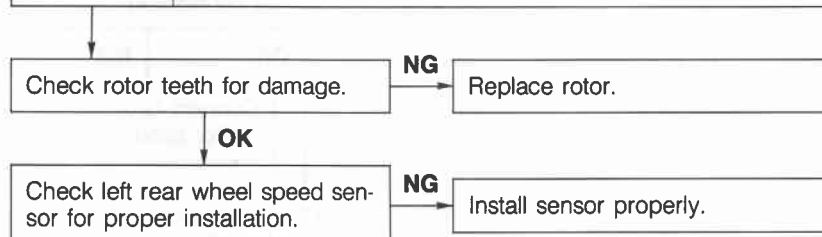
86U11X-149

<b>ABS-6</b>	Possible failure
	Right rear sensor rotor



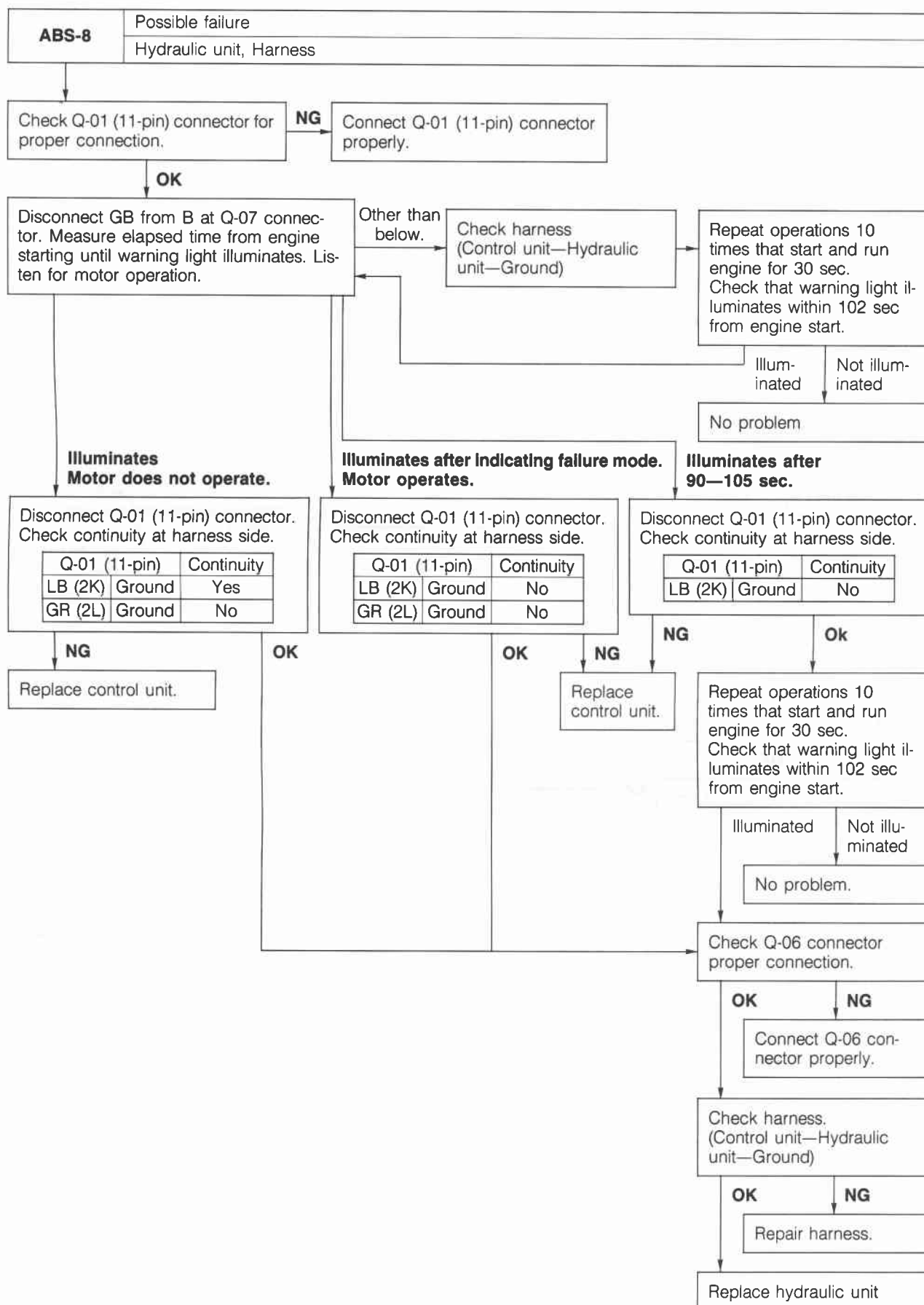
86U11X-150

<b>ABS-7</b>	Possible failure
	Left rear sensor rotor

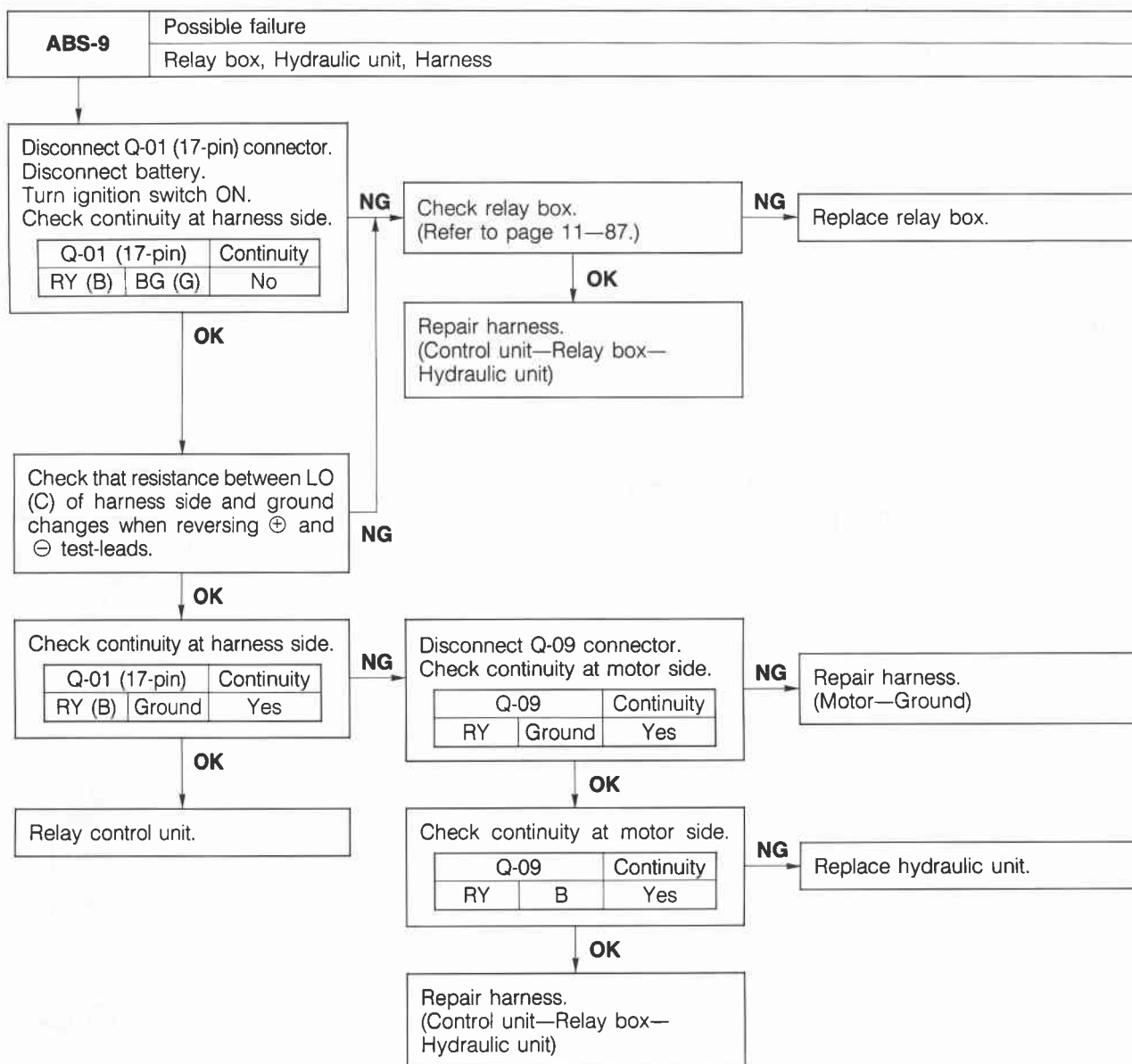


86U11X-151

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



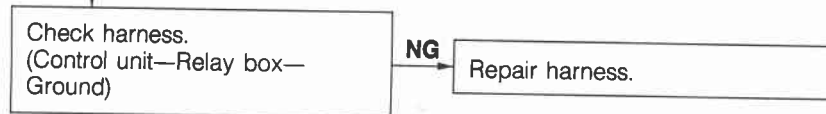
76G11X-093



76G11X-056

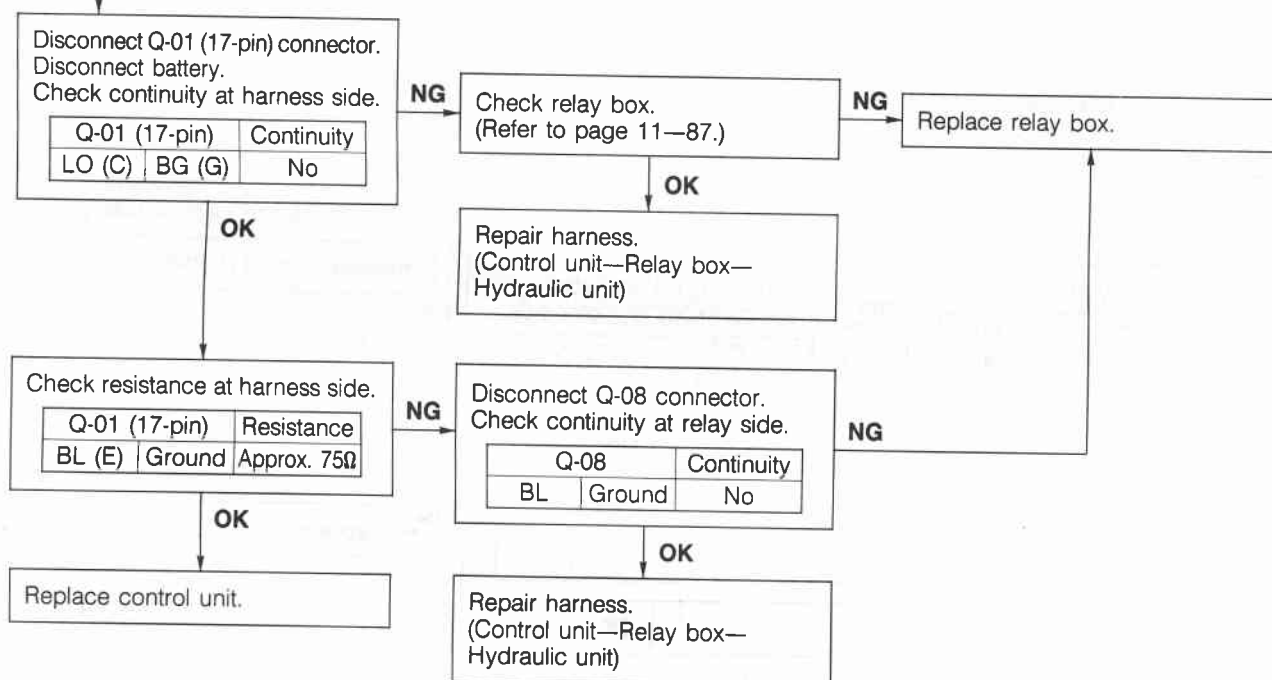
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

<b>ABS-10</b>	Possible failure
	Relay box, Hydraulic unit, Harness



86U11X-154

<b>ABS-11</b>	Possible failure
	Relay box, Hydraulic unit, Harness

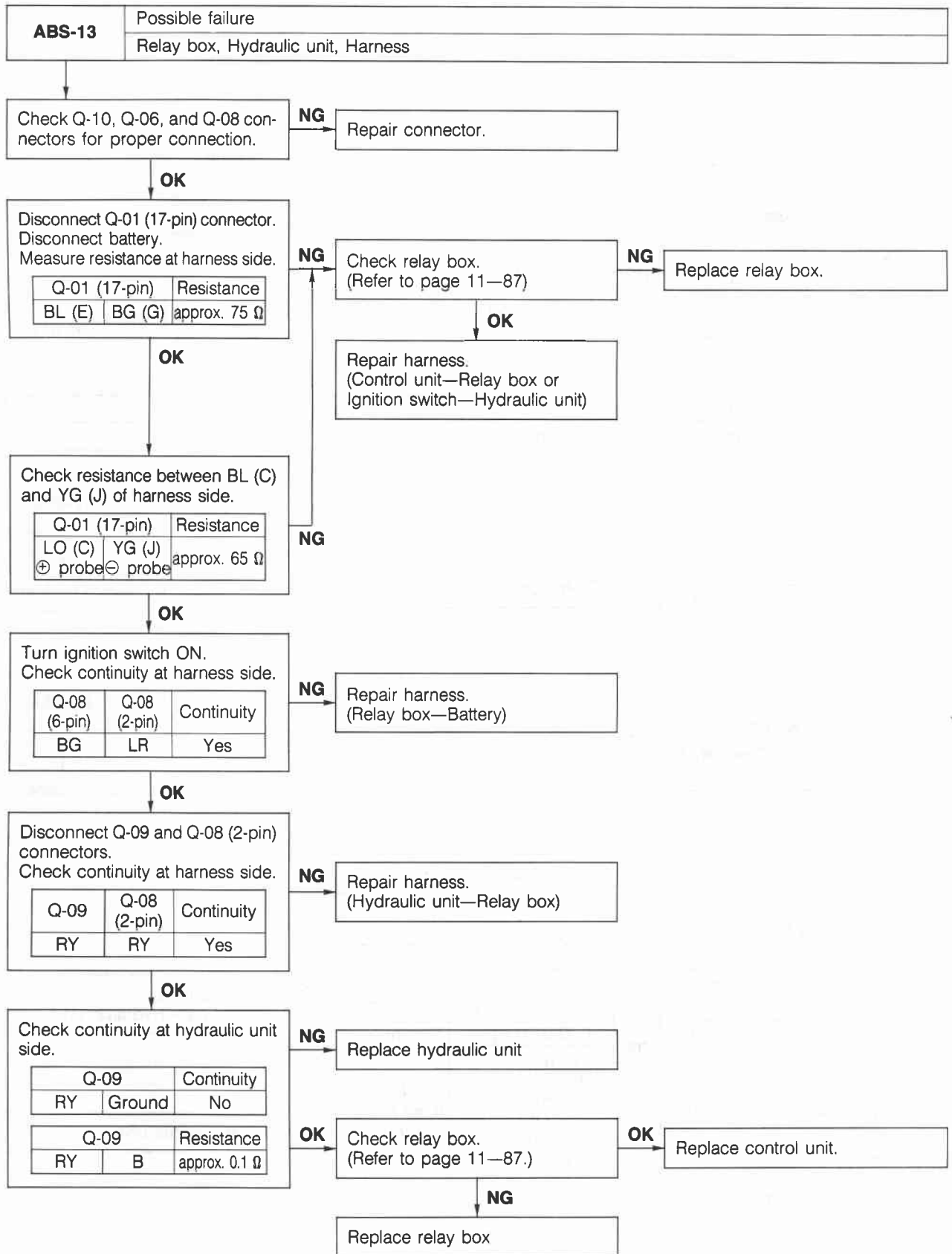


76G11X-057

<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

**NG** → Replace hydraulic unit.

**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.

76G11X-095



<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.

86U11X-160

<b>ABS-17</b>	Possible failure
	Control unit

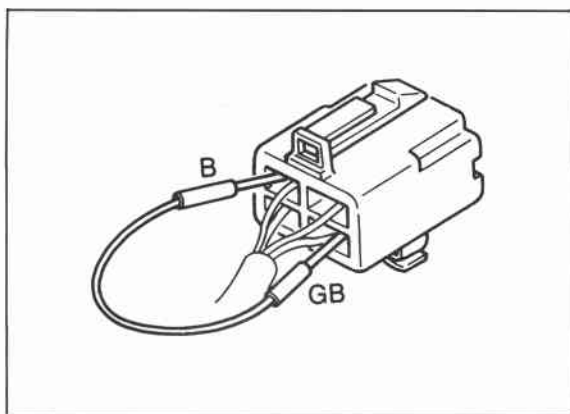
Replace control unit.

<b>ABS-18</b>	Possible failure
	Control unit

Replace control unit.

86U11X-161

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



86U11X-162

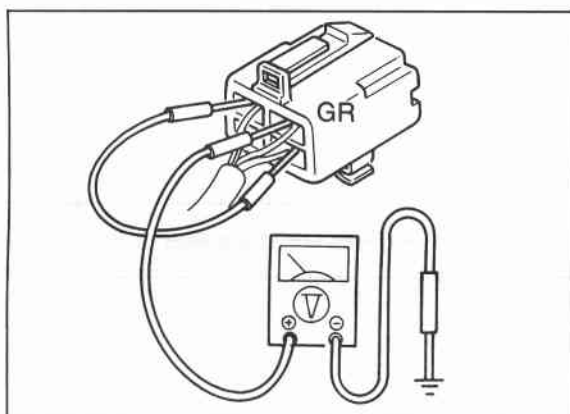
## DIAGNOSIS INDICATION MODE

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.**



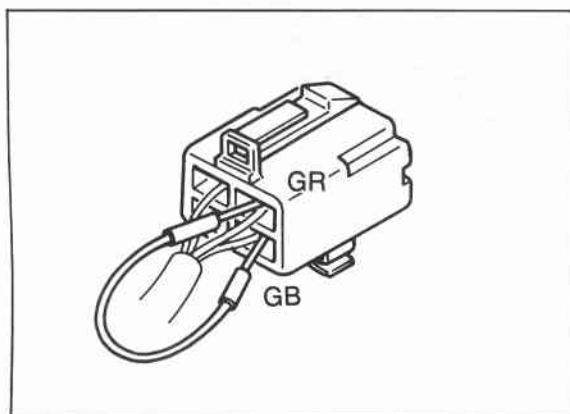
76G11X-059

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.)**



86U11X-164

## MEMORY CANCEL

### Note

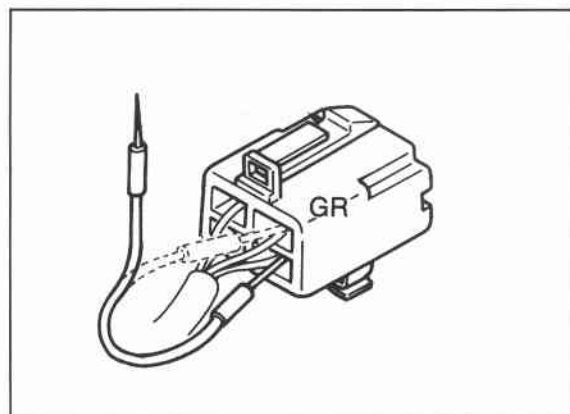
**Failures are contained in the control unit memory. They are not erased when the battery is disconnected. Follow the procedure below to erase them.**

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

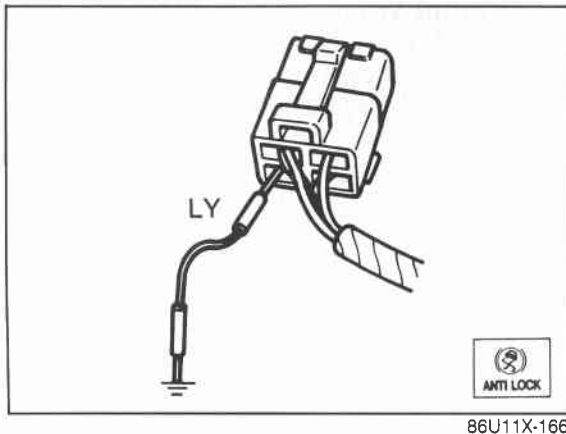
**a) One failure memory is erased each time the above steps are taken.**

**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.**

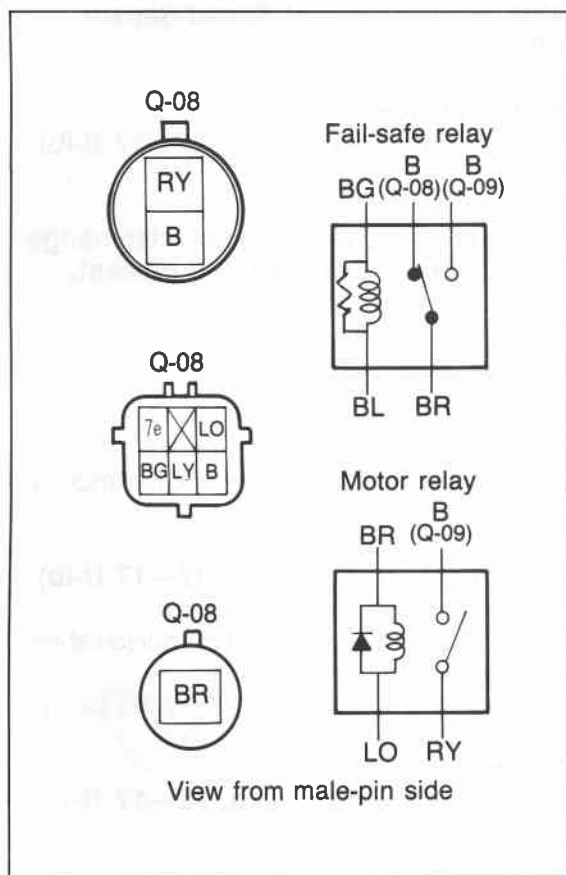


86U11X-165

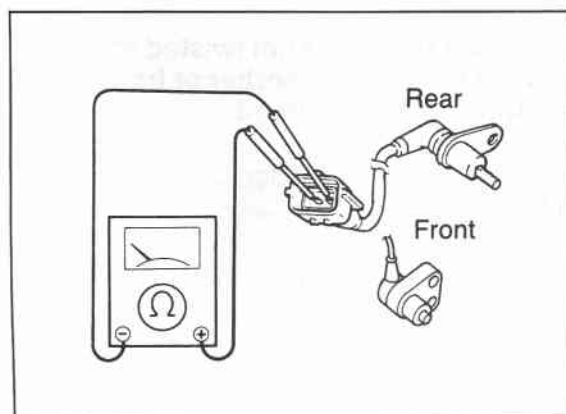
7. Turn the ignition switch OFF.
8. Remove the jumper wire.



86U11X-166



86U11X-167



76G11X-096

## 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				
12V	Ground	BR	B (Q-08)	B (Q-09)
—	—	○	○	—
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			
12V	Ground	RY	B (Q-09)
—	—	—	—
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

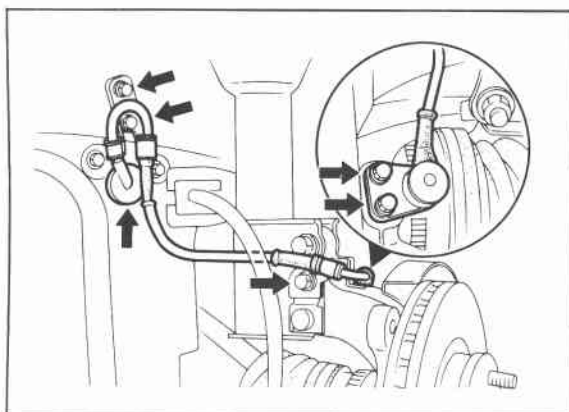
### Inspection

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.

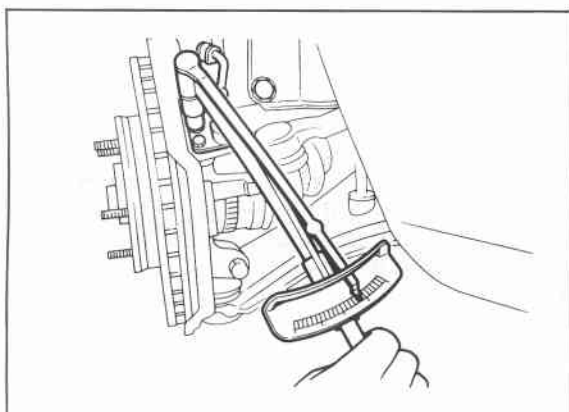
# 11 ANTI-LOCK BRAKE SYSTEM (ABS)



86U11X-169

## 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

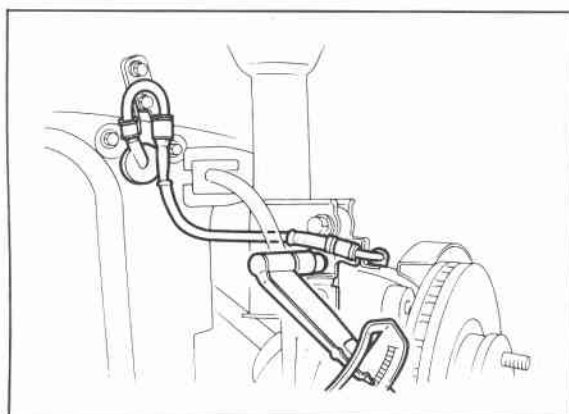
1. Install the sensor to the knuckle.

### 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.

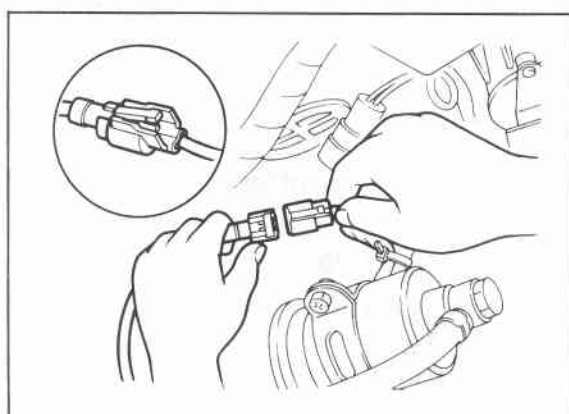
### Tightening torque:

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)

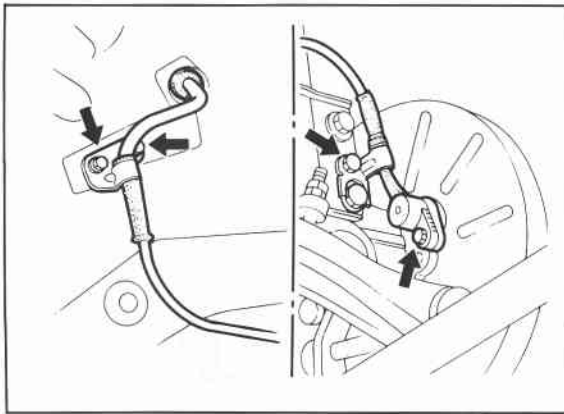


86U11X-172

### Caution

Verify that the harness is not twisted and does not contact the shock absorber or body when the steering wheel is turned.

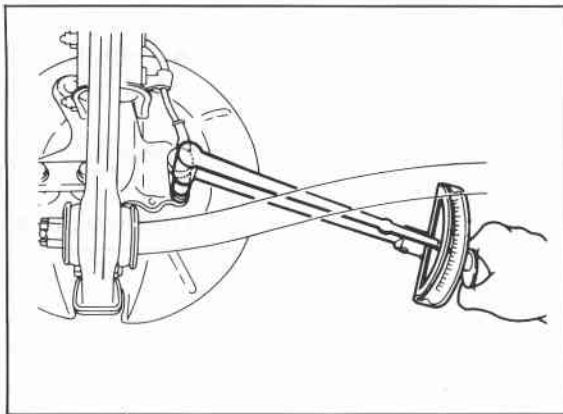
5. Connect the sensor connector.
6. Install the wheel and tire.



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

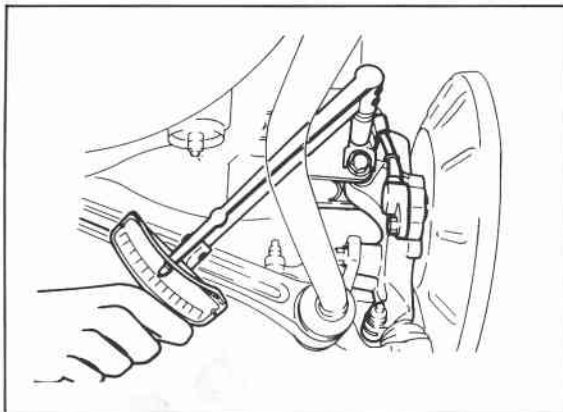
1. Install the sensor to the hub spindle.

### 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.

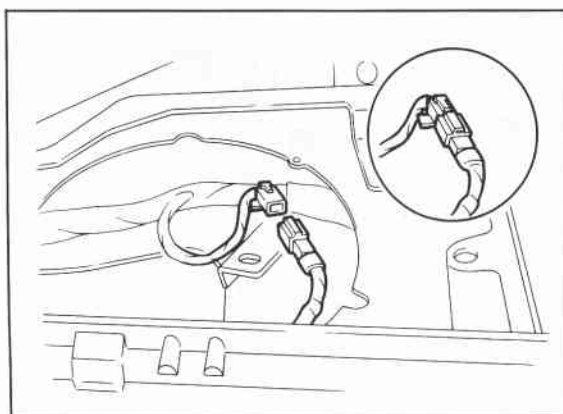
### Tightening torque:

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

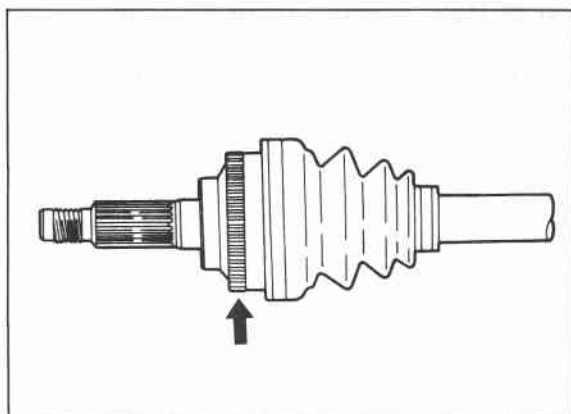
Verify that the harness is not twisted and does not contact the shock absorber or body when the steering wheel is turned.

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

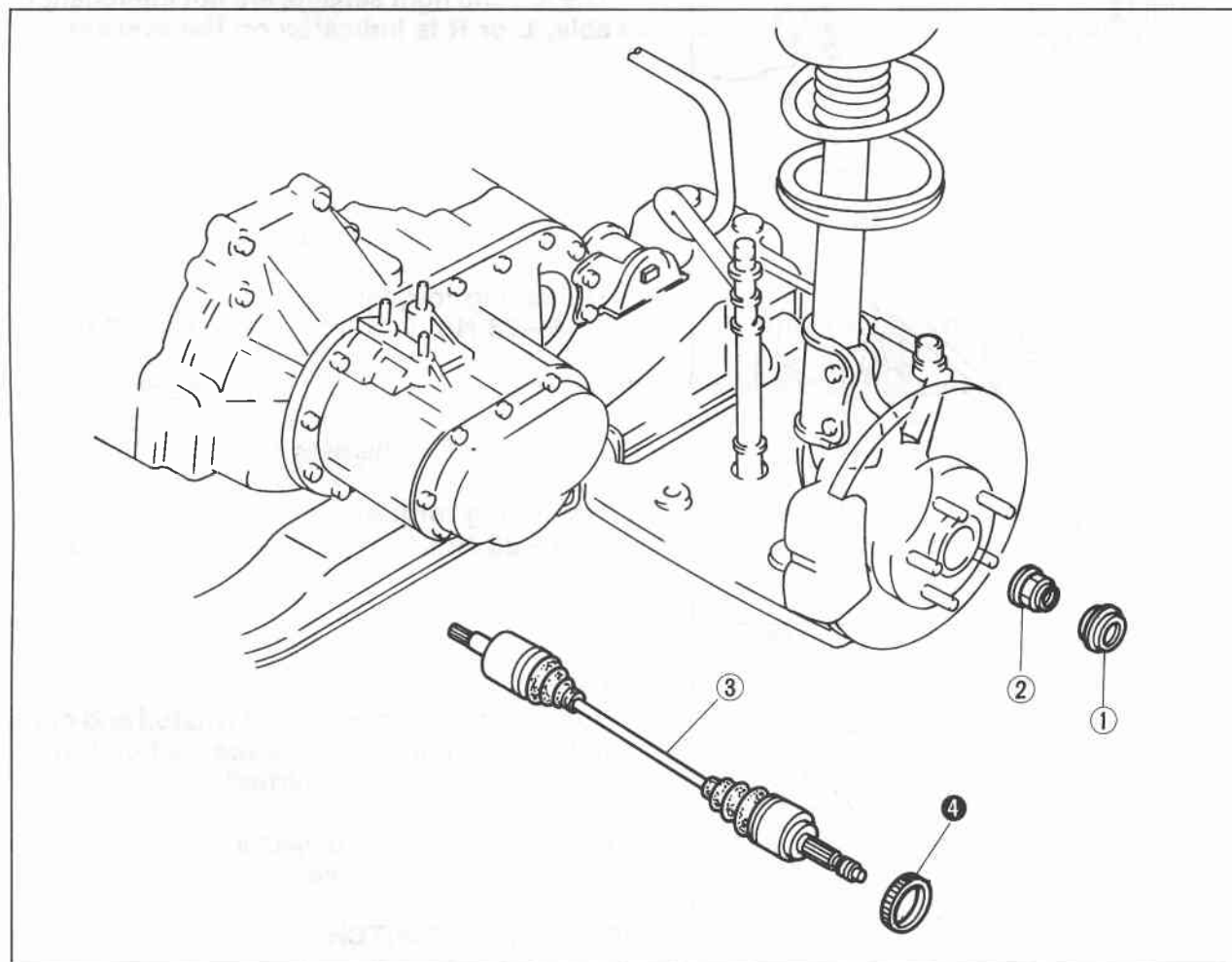
## SENSOR ROTOR

### Inspection

Check the sensor rotor for missing or damaged teeth.

## Removal of Front Sensor Rotor

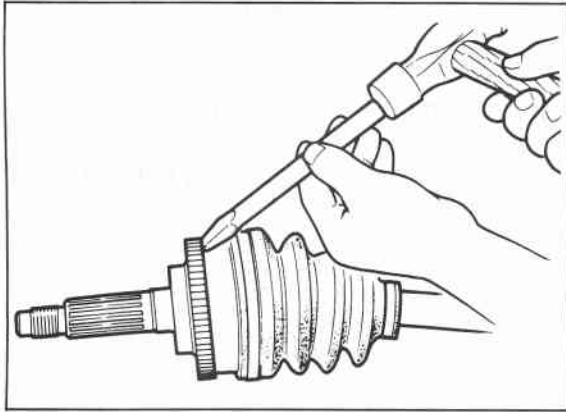
1. Loosen the front wheel lug nuts.
2. Block the rear wheels.
3. Jack up the front of the vehicle and support it with safety stands.
4. Remove the wheels.
5. Remove in the sequence shown in the figure, referring to removal note for the specially marked parts.



86U11X-178

1. Hub cap
2. Locknut

3. Driveshaft (Refer to section 9)
4. Sensor rotor



86U11X-179

## Removal note

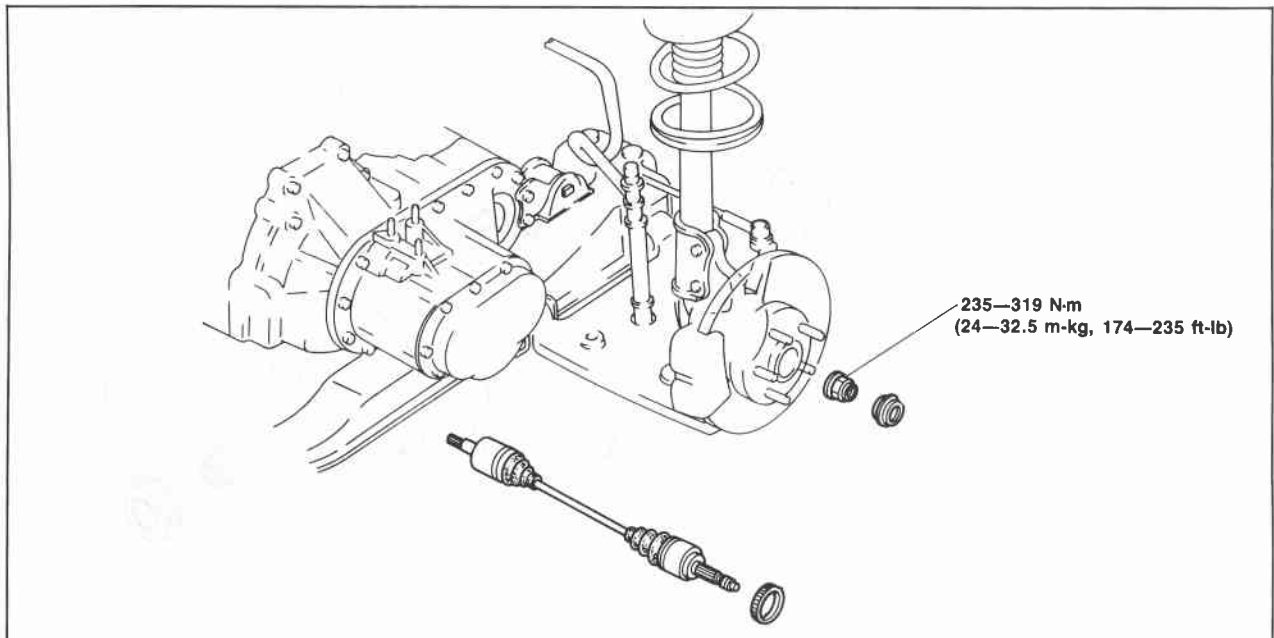
### Sensor rotor

Tap the sensor rotor off the drive shaft with a chisel.

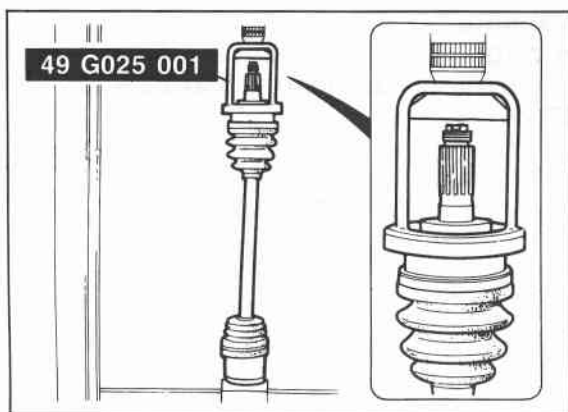
## Installation of Front Sensor Rotor

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.

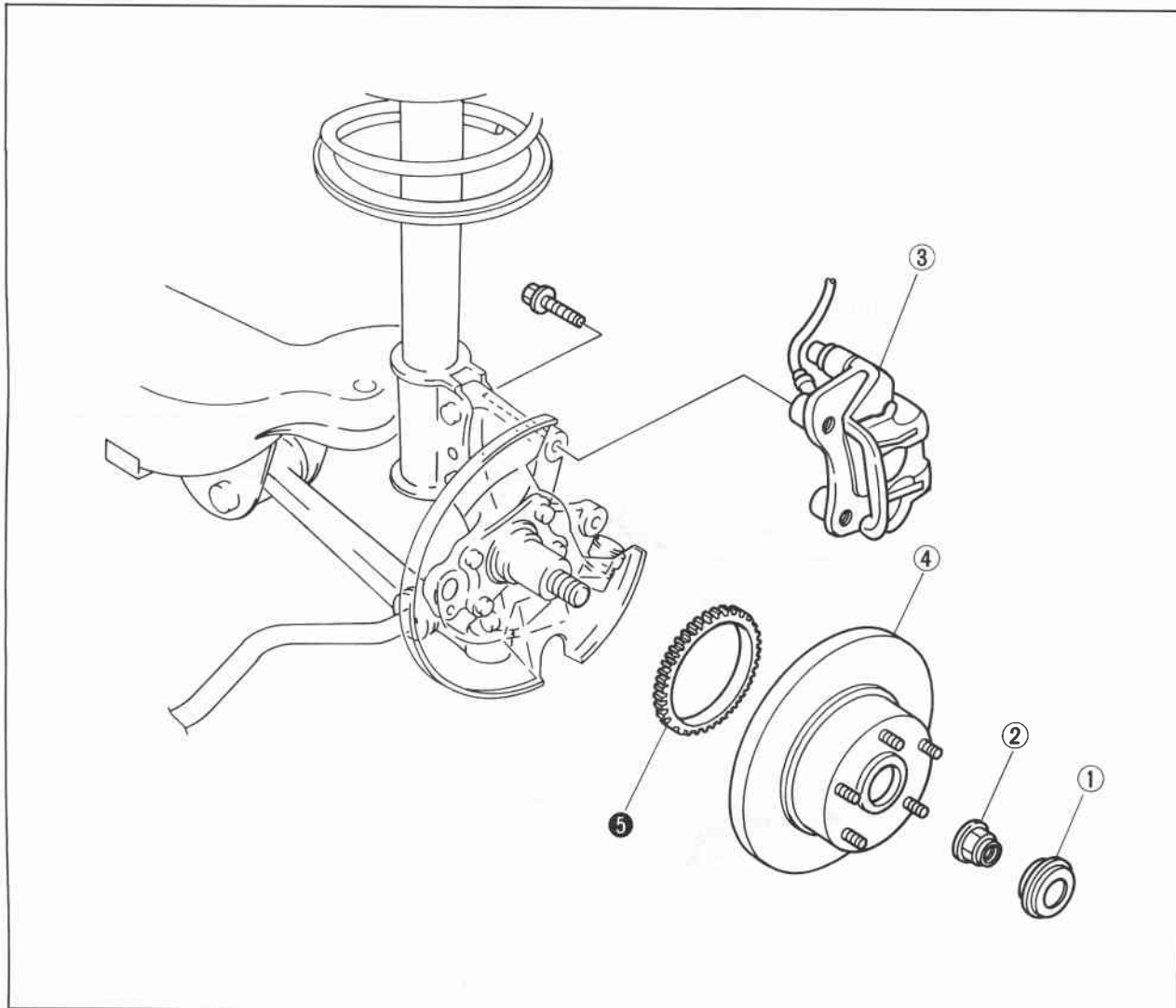
## Caution

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.

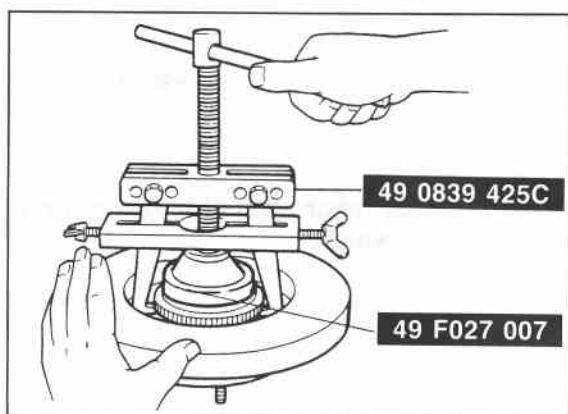


86U11X-182

1. Hub cap  
2. Locknut

3. Caliper assembly and  
mounting support

4. Disc plate  
5. Sensor rotor



86U11X-183

### Removal note Sensor rotor

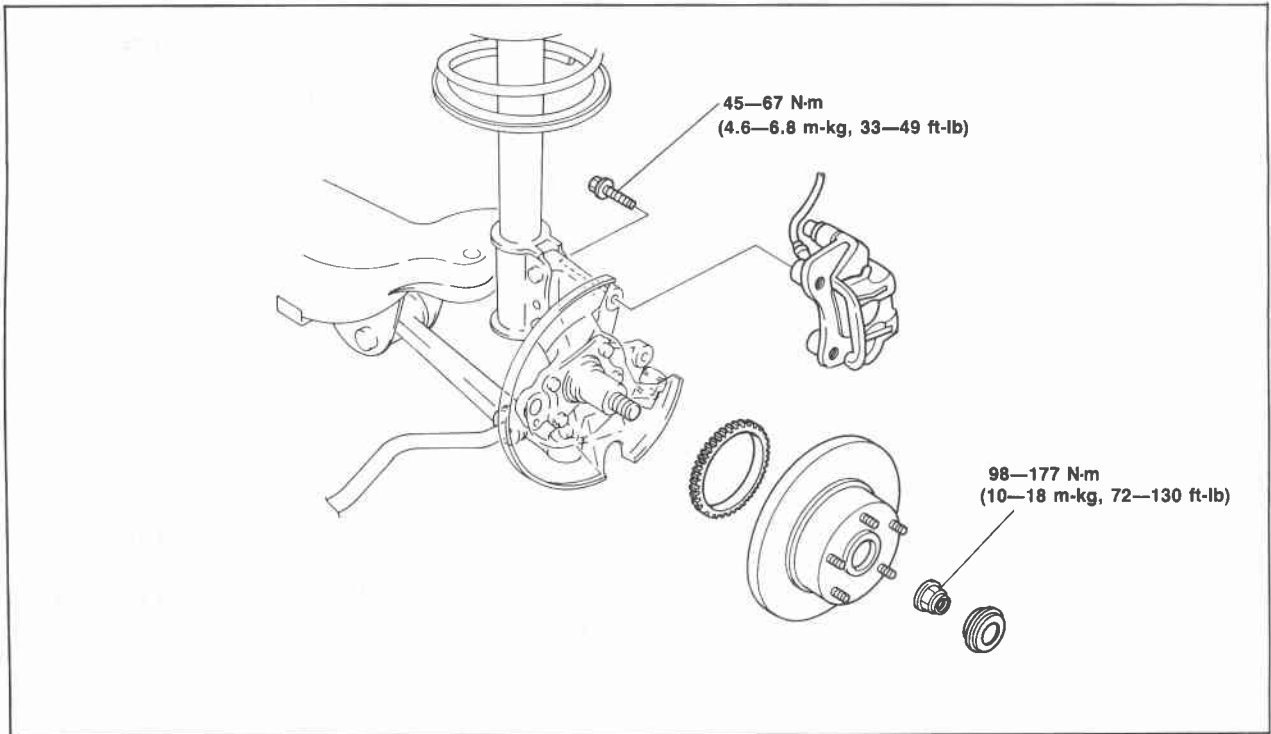
Remove the sensor rotor from the hub assembly with the **SST**.



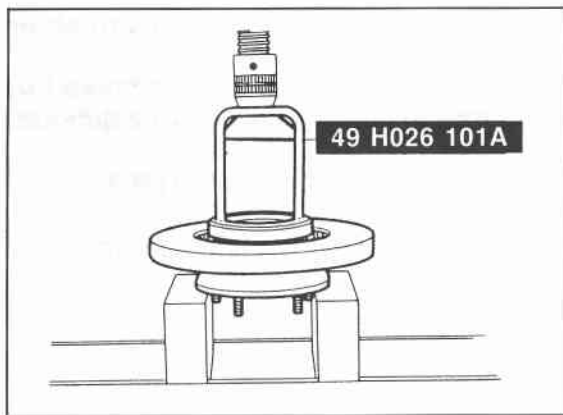
## Installation of Rear Sensor Rotor

Install in the reverse order of removal, referring to installation note for the specially marked parts.

### Torque specifications



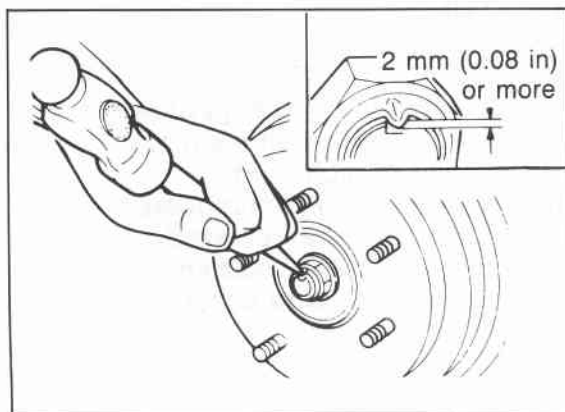
86U11X-184



86U11X-185

### Installation Sensor rotor

Press the sensor rotor onto the hub with the **SST**.



86U11X-186

### Locknut

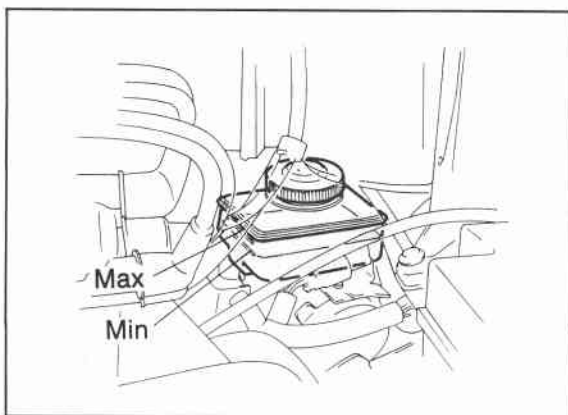
1. Install and tighten the locknut.
2. Stake a new locknut securely in the driveshaft groove.

### Caution

**Do not use a pointed tool for staking.**

3. Check that the hub rotates freely by hand.

# 11 ANTI-LOCK BRAKE SYSTEM (ABS)

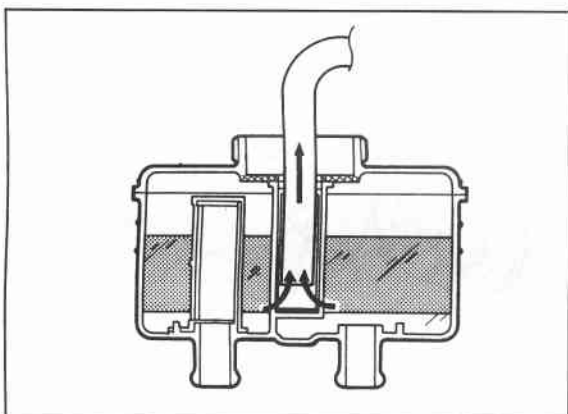


86U11X-187

## 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.

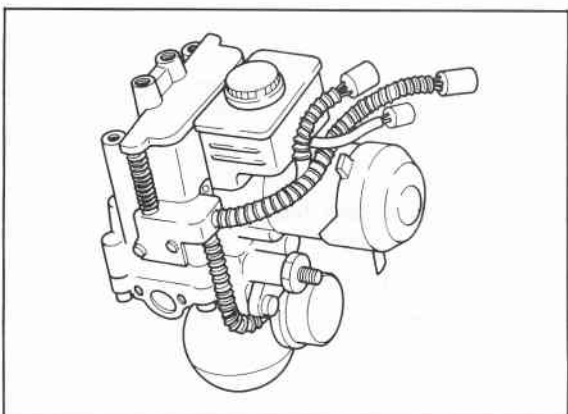
3. Fill the reservoir with the specified type and amount of brake fluid.

### 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.



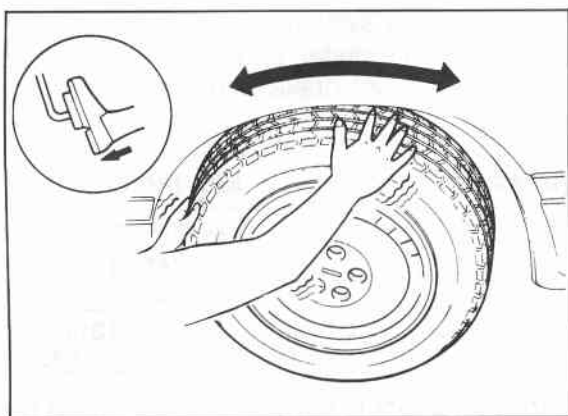
76G11X-097

## HYDRAULIC UNIT

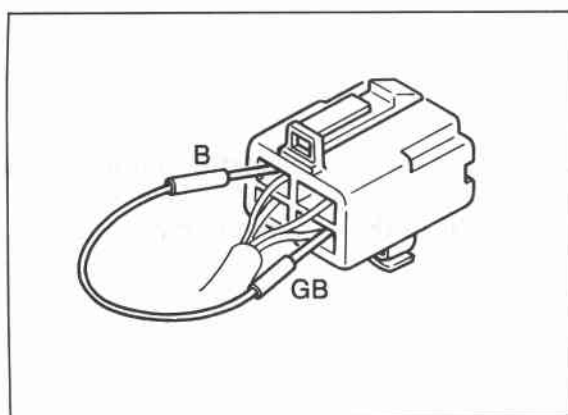
### Warning

The accumulator contains high-pressure gas; do not attempt to disassemble it or subject it to hard shocks or high heat.

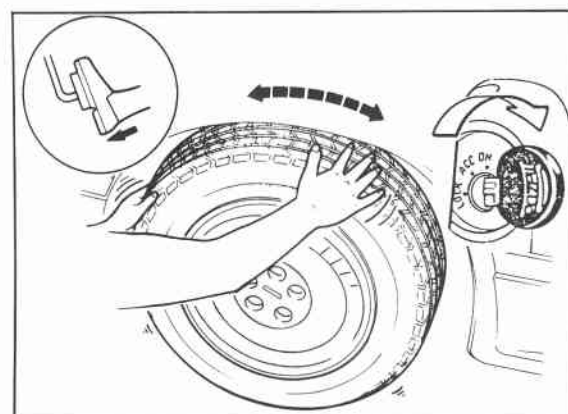
When the hydraulic unit is scrapped, the high-pressure gas must be released. Turn the screw on the accumulator bottom one full turn only and allow the gas to escape gradually.



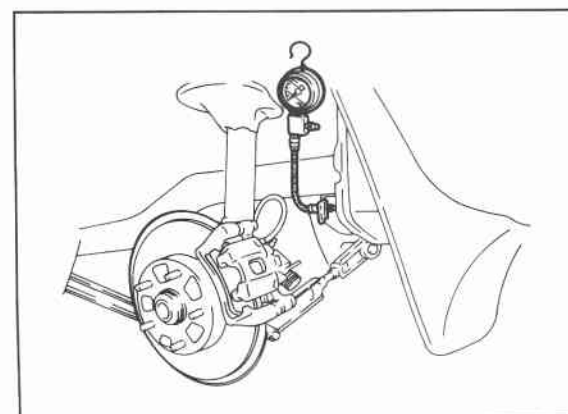
86U11X-190



86U11X-191



76G11X-098



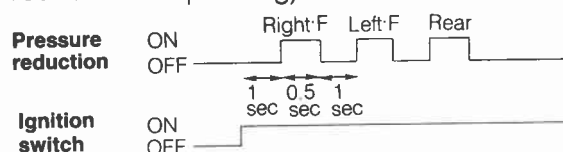
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## Inspection of Pressure Reduction

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

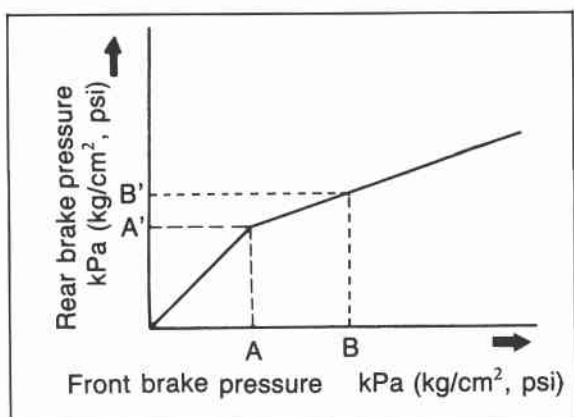
The proportioning valve is built into the hydraulic unit.

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)



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.

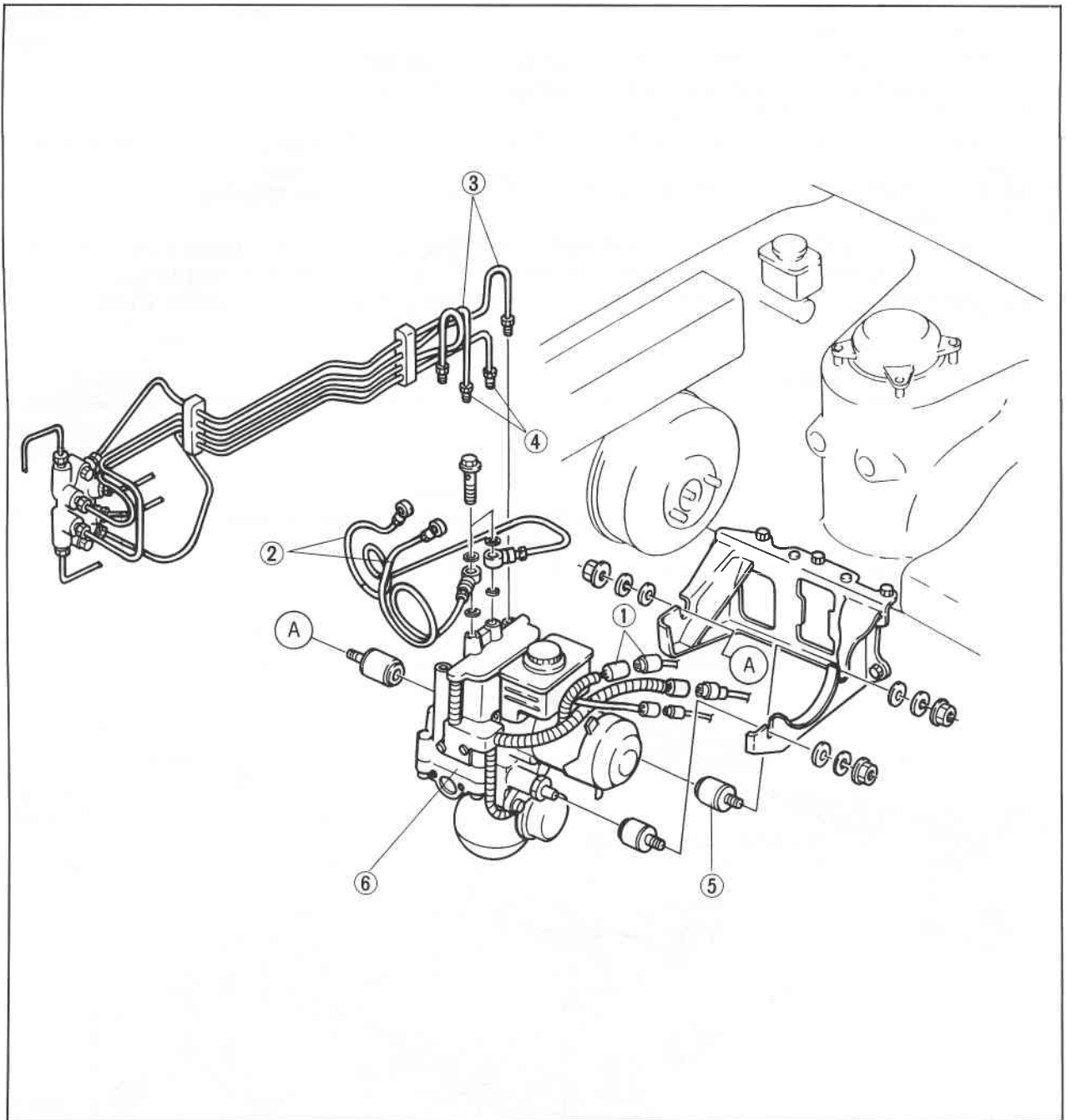
## REMOVAL

### 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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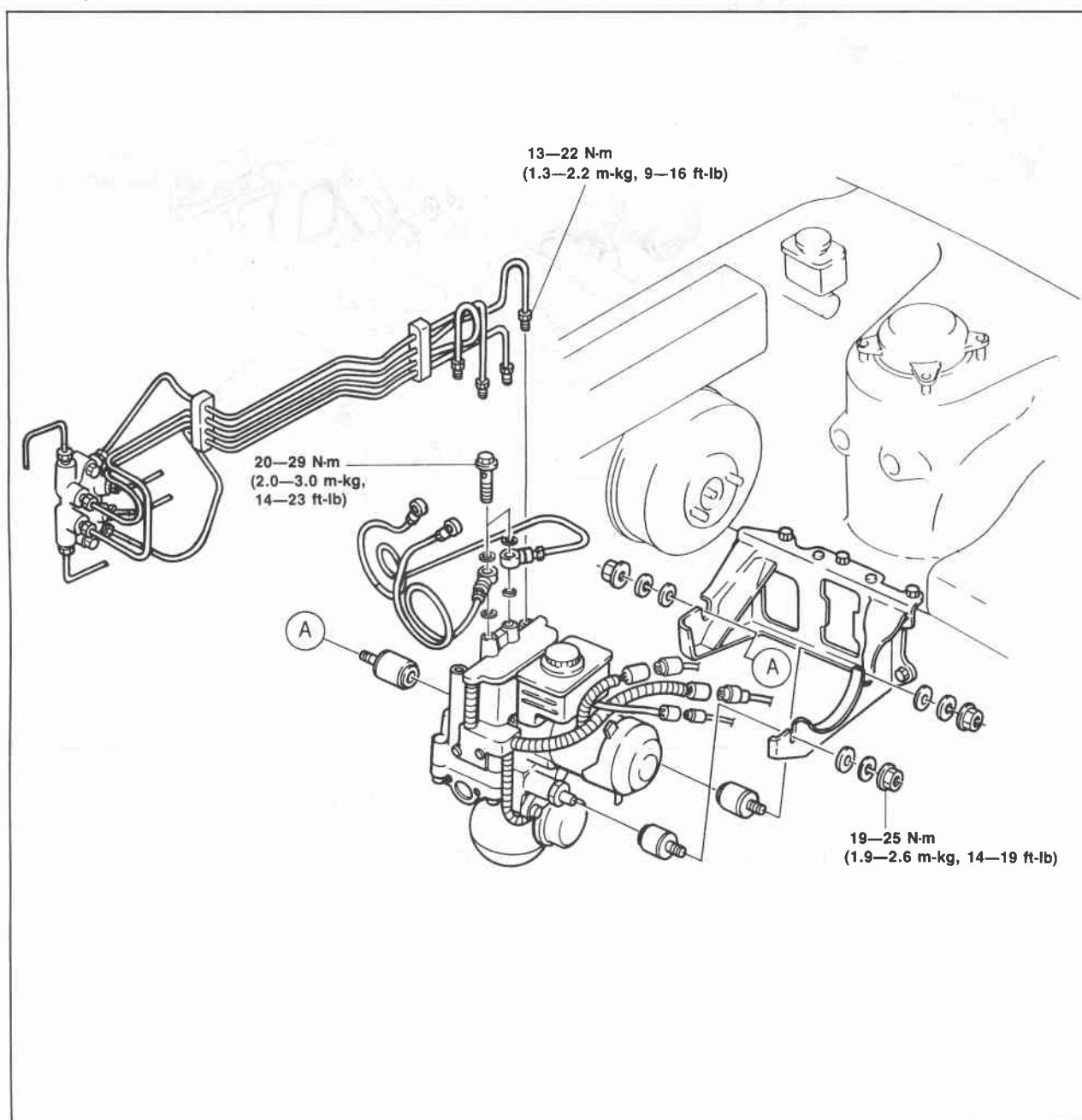
- |                                      |                                |
|--------------------------------------|--------------------------------|
| 1. Coupler                           | 4. Brake pipe (to rear brakes) |
| 2. Brake pipe (from master cylinder) | 5. Mount bushing               |
| 3. Brake pipe (to front brakes)      | 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



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## 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	2A (W), 2B (R)	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
	2C (Y), 2D (O)		Right front	Voltage (AC)	2C (Y) — 2D (O)	Turn wheel 1 revolution per second	More than 0.25V (AC)
				Resistance		—	800—1,200Ω
	2E (YG), 2F (YL)		Left rear	Voltage (AC)	2E (YG) — 2F (YL)	Turn wheel 1 revolution per second	More than 0.25V (AC)
				Resistance		—	800—1,200Ω
	2H (G), 2J (L)		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)	M (YR) — O (BW)					
	O (BW)						
	Q (YW)			Q (YW) — R (L)			
	R (L)	Ground circuit					Continuity
	L (B)						
	N (B)						
	P (B)						
	4-pins	C (B)			C (B,Q-07) — Ground		

### Control Unit Connector

View from harness side

