

## ENGINE ELECTRICAL SYSTEM

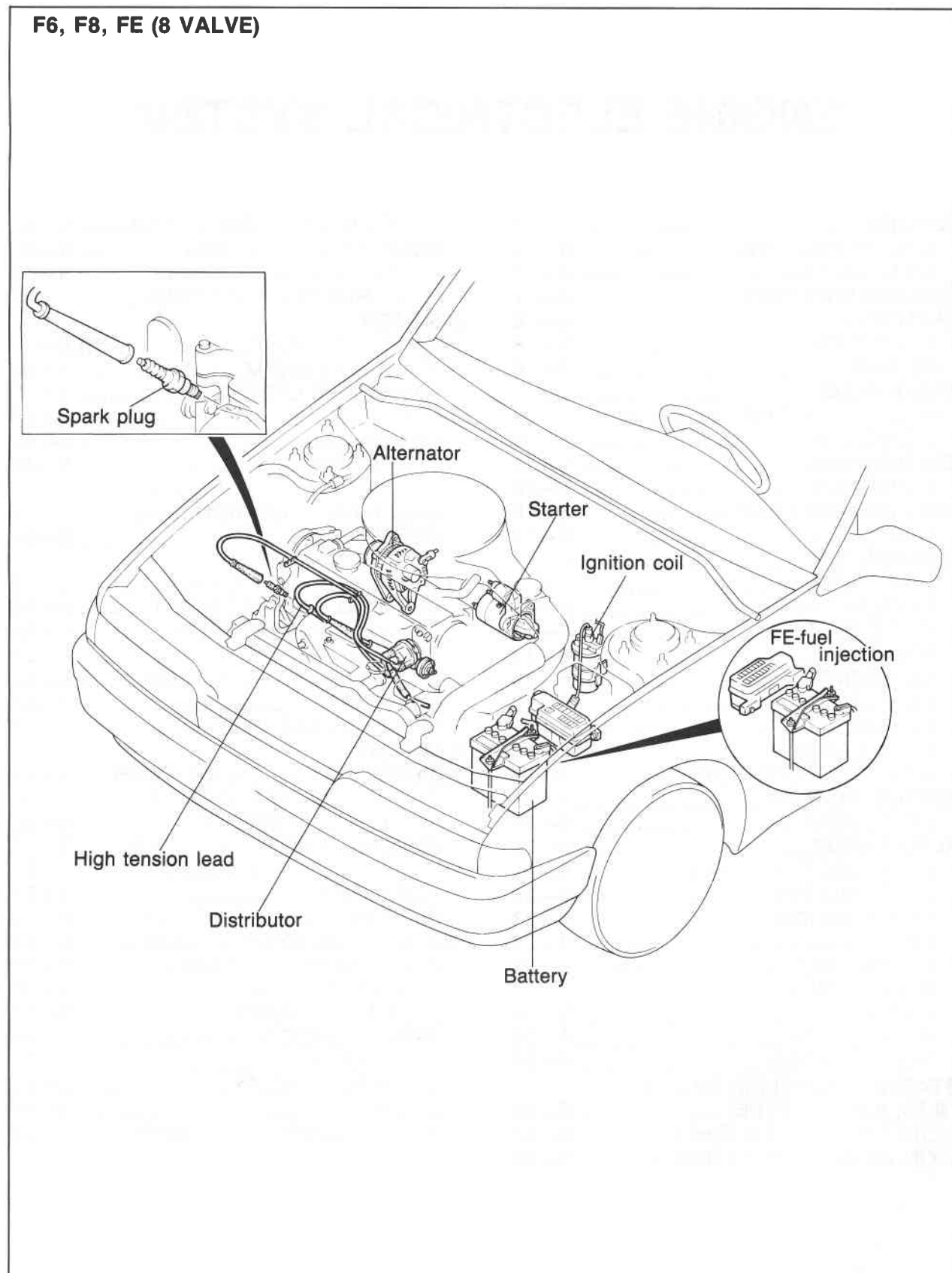
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## 5 OUTLINE

### OUTLINE

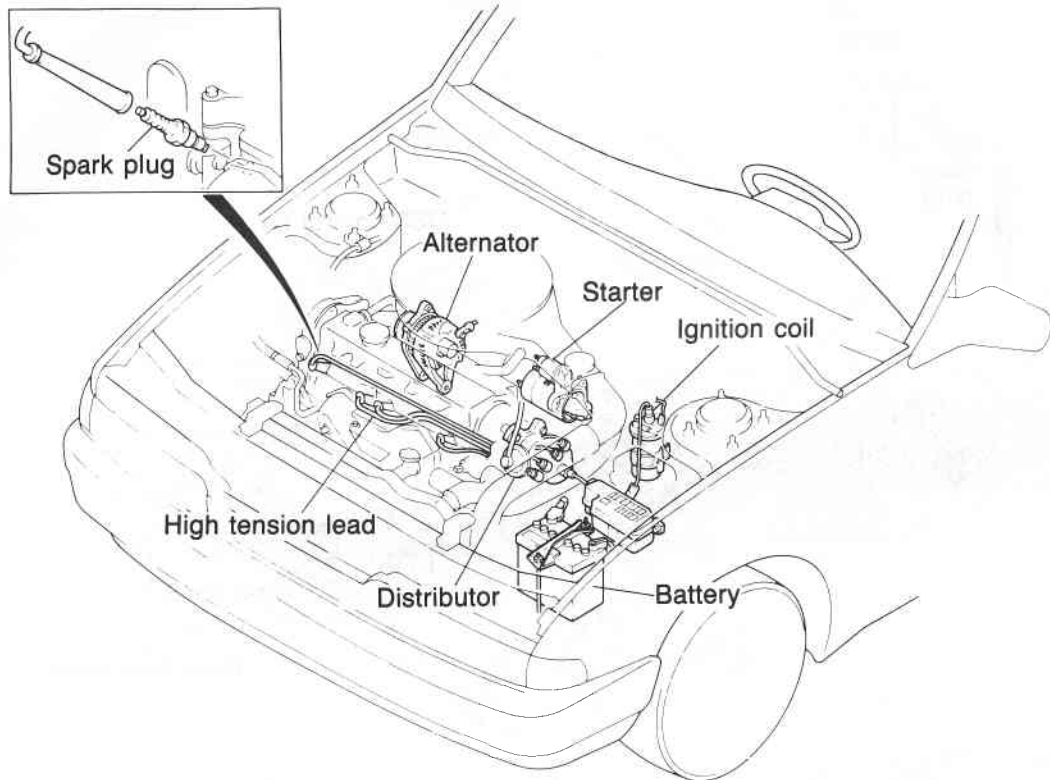
#### STRUCTURAL VIEW

F6, F8, FE (8 VALVE)

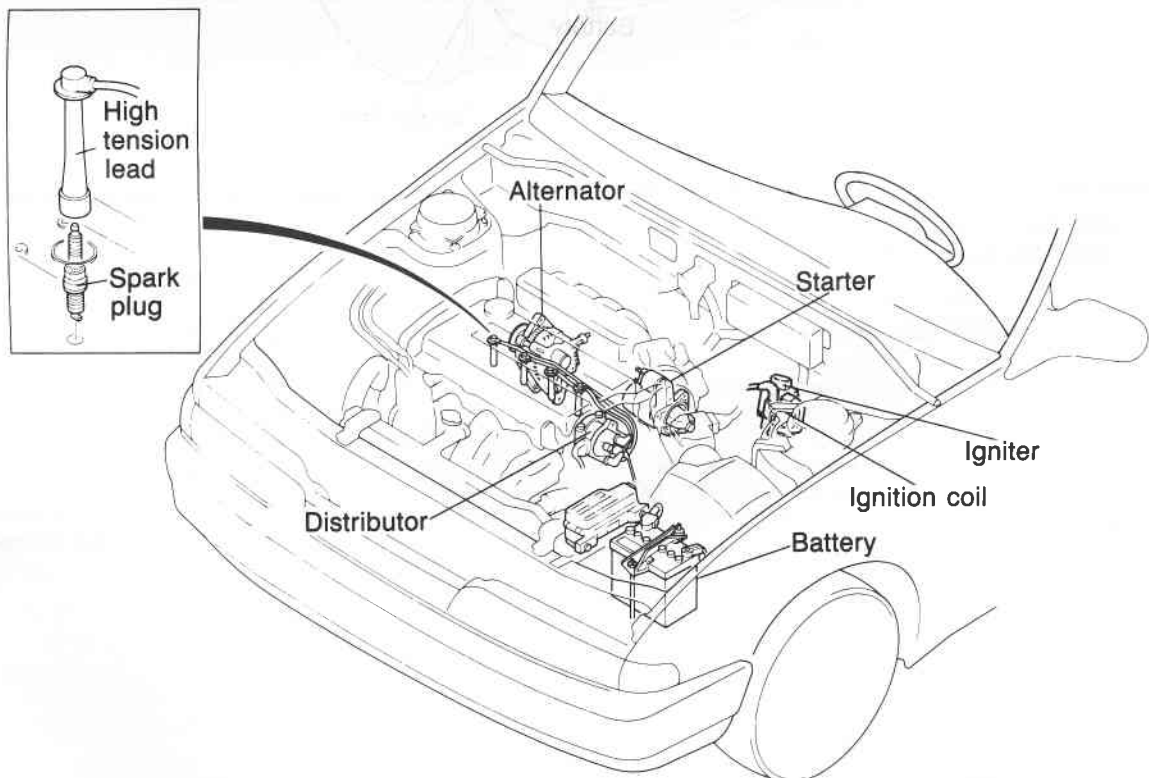


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**FE (12 VALVE)**

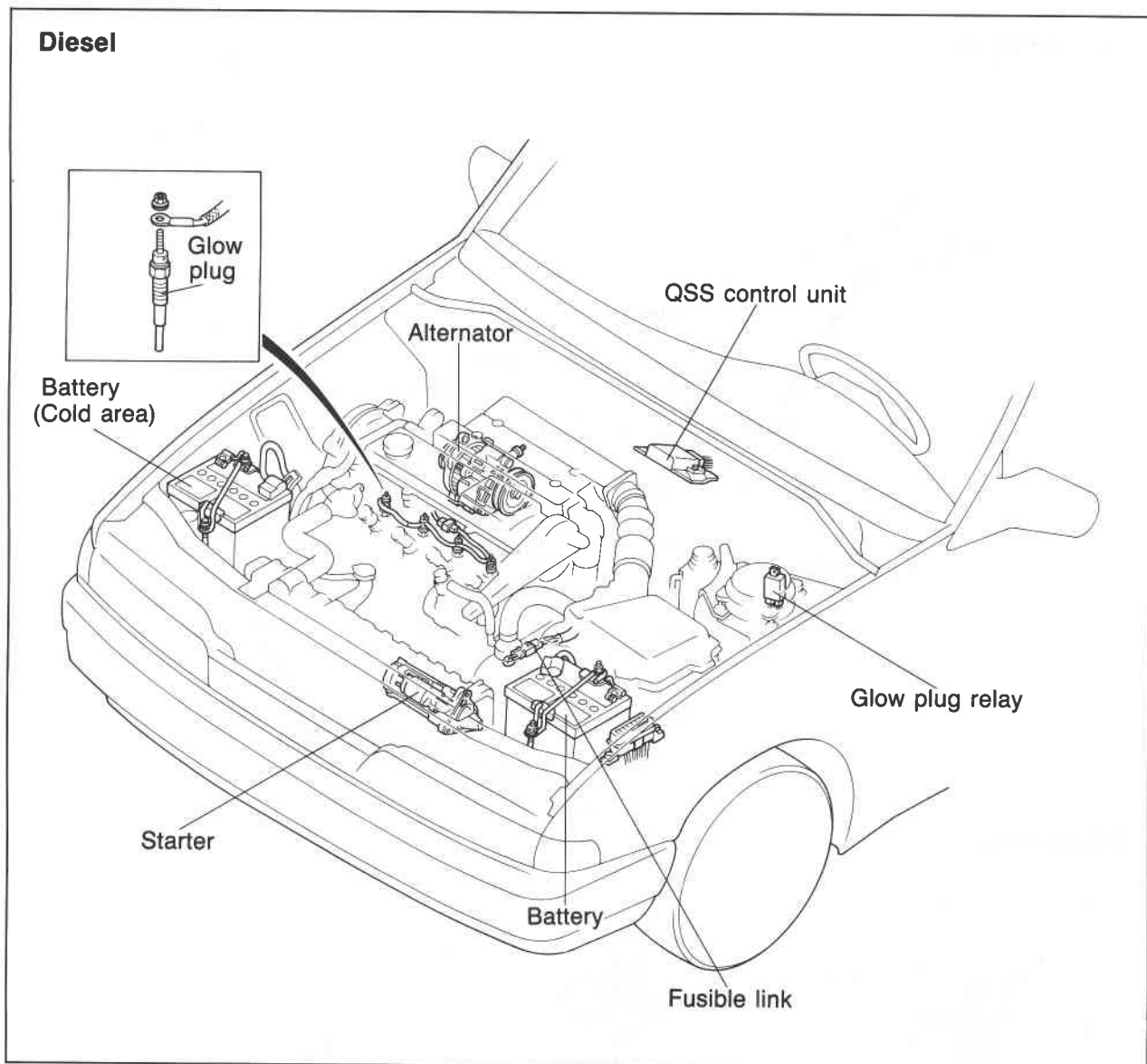


**FE (DOHC)**



## 5 OUTLINE

### Diesel



## SPECIFICATIONS Gasoline Engine

Engine		F6	F8	FE (8 VALVE)	FE (12 VALVE)	FE (DOHC)
Item	Voltage	12, Negative ground				
	Type and capacity (20 hour rate)	34B19L(S) (33 Ah): General 50D20L (50 Ah), 55D23L (60 Ah): ECE				
Alternator	Type	A.C.				
	Output	12—70				
	Regulator type	Transistorized (built-in IC regulator)				
	Regulated voltage	14.1—14.7				
	Brush length	16.5 (0.650)				
	mm (in)	8.0 (0.315)				
	Drive belt tension mm (in)/98 N (10 kg, 22 lb)	New: 6—8 (0.24—0.32), Used: 7—9 (0.28—0.35)				
Starter	Type	Coaxial reduction: Middle East & General (FE · carburetor) Non-reduction: Others				
	Output	12—0.85 12—0.95 12—1.4 12—0.95				
	Brush length	17.0 (0.669)				
	mm (in)	Unleaded fuel 17.0 (0.669) Others 17.5 (0.689)				
	Standard	17.0 (0.669)				
Ignition timing	Minimum	11.5 (0.453)				
	mm (in)	Unleaded fuel 11.5 (0.453) Others 10.0 (0.394)				
Ignition timing		6 ± 1° BTDC (Vacuum hose disconnected)				
		12 ± 1° BTDC (Test connector grounded)				
Distributor	Type	Fully transistorized (HEI)				
	Centrifugal spark advance (crank angle/engine speed) degree/rpm	Electronic spark advance				
		F6 —2—2/1,000 6—10/2,100 14—18/6,100				
		F8 —2—2/1,000 10—14/2,100 18—22/6,100				
		FE (8 VALVE)—Carburetor Unleaded fuel (MTX) —2—2/1,760 12—16/3,360 22—26/5,320 (ATX) —2—2/1,300 12—16/3,360 22—26/5,320				
		Others —2—2/1,460 10—14/2,540 22—26/5,540				
		FE (12 VALVE)—Carburetor —2—2/1,200 10—14/2,400 10—14/4,000 16—20/5,000				
		FE—Fuel injection (except FE DOHC) —2—2/1,000 10—14/2,600 10—14/4,600 16—20/5,800				

\* Unleaded fuel model

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## 5 OUTLINE

Engine		F6	F8	FE (8 VALVE)	FE (12 VALVE)	FE (DOHC)
Item						
Distributor	Vacuum spark advance (Crank angle/Vacuum)  degree/mmHg (inHg)	F6 and F8 -2—2/100 6—10/300  FE (8 VALVE)—Carburetor Unleaded fuel -2—2/120 8—12/245  Others (MTX) -2—2/100 16—20/250 (ATX) -2—2/100 10—14/200  FE (12 VALVE)—Carburetor -2—2/120 11—15/300  FE—Fuel injection (except FE DOHC) [A chamber] -2—2/125 18—22/300  [B chamber] -2—2/125 -6—10/200				
Spark plug	Type	FE (8 VALVE)* <sup>1</sup> NGK: BPR5ES-11, BPR6ES-11 Nippon Denso: W16EXR-U11, W20EXR-U11  Others NGK: BPR5ES, BPR6ES Nippon Denso: W16EXR-U, W20EXR-U			NGK: BCPR5E, BCPR6E Nippon Denso: Q16PR-U, Q20PR-U	Unleaded fuel NGK: BCPR5E-11 BCPR6E-11 BCPR7E-11  Leaded fuel NGK: BCPR5E BCPR6E
	Plug gap mm (in)	0.75—0.85 (0.030—0.033), FE (8 VALVE)* <sup>1</sup> 1.0—1.1 (0.039—0.043)			0.7—0.8 (0.028—0.031)	1.0—1.1 * <sup>1</sup> (0.039—0.043) 0.7—0.8 * <sup>2</sup> (0.028—0.031)
Firing order		1—3—4—2				

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## Diesel Engine

Engine		RF-N	RF-CX
Item			
Battery	Voltage V	12, Negative ground	
	Type and capacity (20 hour rate)	80D26L (65) 50D20L, 50D20R (50)—ECE	80D26L (65) 65D23L, 65D23R (55)
Alternator	Type	A.C.	
	Output V—A	12—70	12—75
	Regulator type	Transistorized (built-in IC regulator)	
	Regulated voltage V	14.1—14.7	
	Brush length mm (in)	Standard 16.5 (0.650)	21.5 (0.846)
		Minimum 8.0 (0.315)	8.0 (0.315)
Starter	Drive belt tension mm (in)/98 N (10 kg, 92 lb)	New: 9—11 (0.35—0.43), Used: 12—14 (0.47—0.55)	
	Type	Reduction	
	Output V—kW	12—2.0, 12—2.2 (Cold area)	
	Brush length mm (in)	Standard 2.0 kW: 17.0 (0.669), 2.2 kW: 18.0 (0.709)	
Firing order		Minimum 2.0 kW: 11.0 (0.453), 2.2 kW: 11.0 (0.453)	
		1—3—4—2	

\*<sup>1</sup> Unleaded fuel model

\*<sup>2</sup> Leaded fuel model

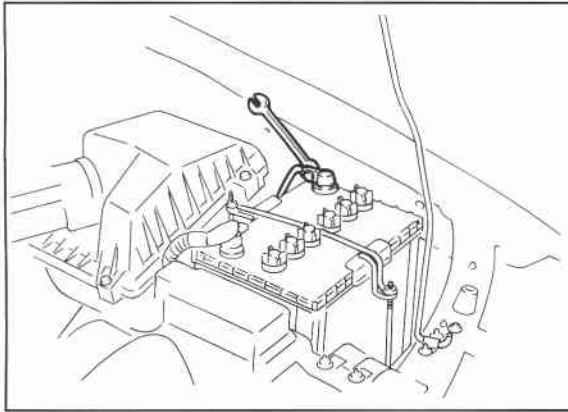
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## TROUBLESHOOTING GUIDE

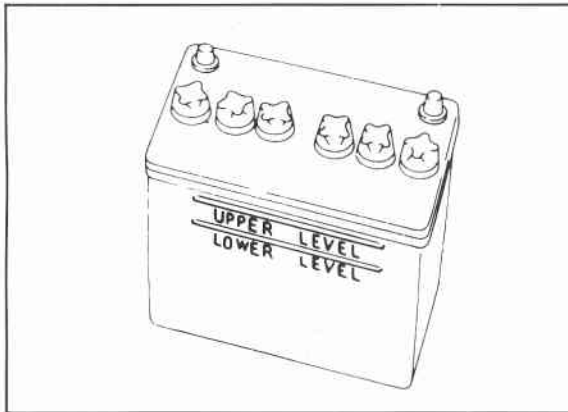
Problem	Possible cause	Remedy	Page
<b>Starter does not turn at all, or its turning speed is too slow to start the engine.</b>	Battery and related parts Poor contact of battery terminals Poor grounding of negative cable Voltage drop caused by discharged battery Insufficient voltage caused by battery malfunction	Clean and tighten Clean and repair Recharge Replace	5— 8 — 5— 8 5— 8
	Ignition switch and related parts Poor contact of ignition switch Loose ignition switch wiring or connector Broken wire between ignition switch and magnetic switch	Replace Repair Repair or replace	— — 5—38,45,56,66
	Magnetic switch and related parts Loose wiring and/or connectors Burnt magnetic switch contact plate or improper contact Broken wire in magnetic switch pull-in coil Broken wire magnetic switch holding coil	Repair Replace Replace Replace	5—38,45,56,66 5—43,54,64,74 5—43,54,64,74 5—43,54,64,74
	Starter Poor contact of brushes  Fatigued brush spring Poor grounding of field coil Poor soldering of field coil Commutator malfunction Grounded armature Worn parts	Adjust contact or replace Replace Replace Repair Repair or Replace Replace Replace	5—43,54,64,74 — — — — — —
<b>Starting problem</b>	Gasoline engine Insufficient battery capacity Malfunction of spark plug (s)  Loose positive terminal Damaged distributor cap or rotor Ignition coil malfunction Igniter malfunction	Recharge Clean, adjust or replace Tighten Replace Replace Replace	5— 8 5— 9 — 5—16 5—10 5—16,20
	Diesel engine Insufficient battery capacity QSS system malfunction	Recharge Replace	5— 8 5—76
<b>Starter turns but pinion gear does not mesh with ring gear</b>	Starter Tip of overrunning clutch pinion is worn Weakened overrunning clutch drive spring Worn overrunning clutch Improper sliding of spline  Worn bushing Worn ring gear	Replace Replace Replace Adjust contact and repair, or replace Replace Replace	— — — 5—40,54,70 — —
<b>Starter turns continuously (does not stop)</b>	Magnetic switch Sticking contact place of magnetic switch Layer shorting coil of magnetic switch Ignition switch does not return	Replace Replace Replace	5—43,54,64,74 5—43,54,64,74 —
<b>Misfiring</b>	Dirty or damaged spark plug (s) Malfunction of wiring, or open circuit Damaged distributor cap	Clean or replace Repair or Replace Replace	5— 9 5—10 5—16
<b>Discharging of battery</b>	Alternator Loose drive belt Grounded or broken stator coil Broken rotor coil Poor contact of brush and slip ring	Adjust Replace Replace Replace Clean, repair or replace	5—37 5—32 5—32 5—32
	Malfunction of rectifier Malfunction of IC regulator	Replace Replace	5—34 —
	Battery and related parts Insufficient or unsuitable battery electrolyte Malfunction of battery electrode (internal short-circuit) Poor contact of battery terminal (s) Excessive electric load	Adjust Replace Clean and tighten Check power consumption and short circuit	5— 8 5— 8 5— 8 —
	IC regulator malfunction Operating in extremely high temperature	Replace Repair	— —
<b>Poor acceleration</b>	Mis-adjusted ignition timing Distributor malfunction	Adjust Repair or replace	5—11 5—11
<b>Knocking</b>	Mis-adjusted ignition timing Distributor malfunction	Adjust Repair or replace	5—11 5—11

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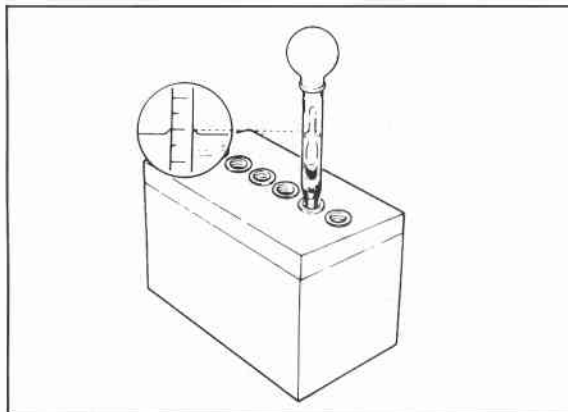
## 5 BATTERY



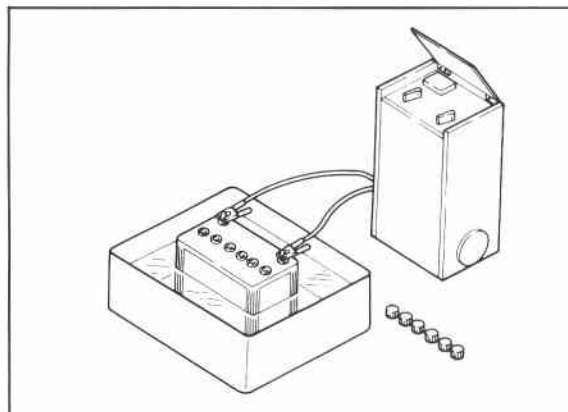
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4BG05X-007



76G05X-004



4BG05X-009

### BATTERY

#### INSPECTION

##### Terminal and Cable

1. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat them with grease after tightening the terminal.
2. Inspect for corroded or frayed battery cables.
3. Check the rubber protector on the positive terminal for proper coverage.

##### Electrolyte Level

1. Check whether or not the electrolyte level lies between the "UPPER LEVEL" and the "LOWER LEVEL" lines.
2. If low, add distilled water by the "UPPER LEVEL". Do not overfill.

##### Specific Gravity

1. Measure the specific gravity by using a hydrometer.
2. If the specific gravity reading is standard or less, recharge the battery.

**Standard gravity: 1.22**

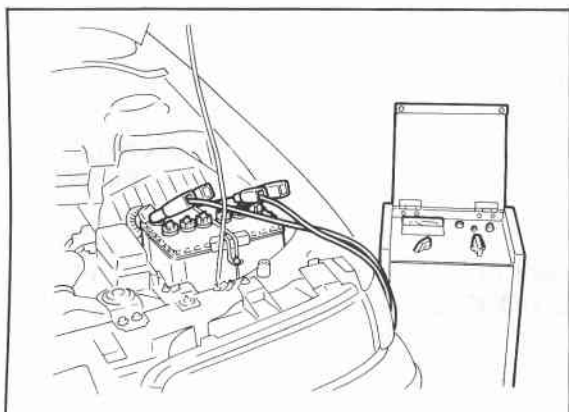
**Fully charged gravity: 1.27—1.29**

### RECHARGE

#### Quick Charge

1. Remove the battery from the vehicle.
2. Remove all the vent caps.
3. Perform a quick charge (6A or above, but max. 20A).
4. Add distilled water if necessary while charging.
5. Cool the battery not to exceed the electrolyte temperature over 55°C (131°F) while charging.
6. Charge once more if the specific gravity is under fully charged gravity.

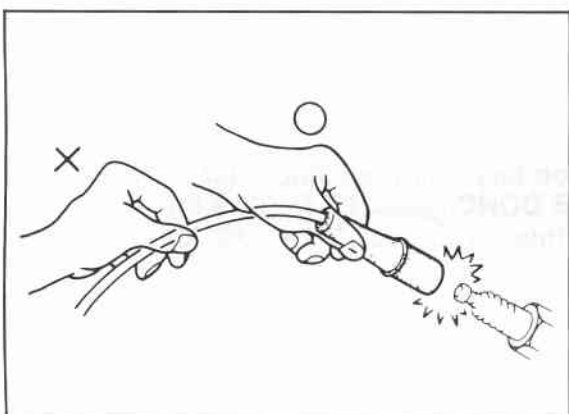




4BG05X-010

## Slow Charge

1. Stop the engine
2. Turn all the accessories off.
3. Remove the negative battery cable.
4. Perform a slow charge (3.5A to 4.5A).
5. Add distilled water if necessary while charging.
6. Charge once more if the specific gravity is under fully charged gravity.



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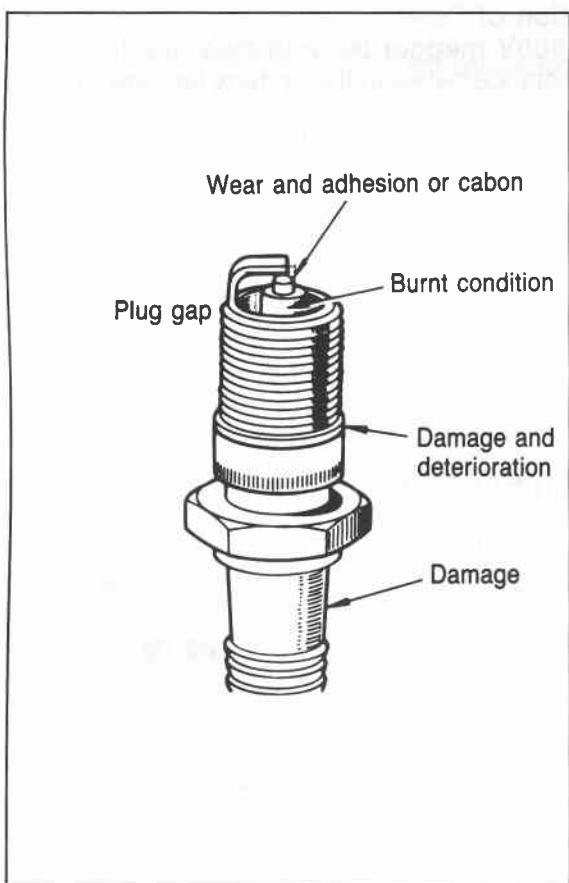
## SPARK PLUG

### REMOVAL AND INSTALLATION

Note the following points:

1. When the high-tension lead is to be pulled off, be sure to pull the boot itself, and not the wire.
2. Tighten the spark plugs to the specified torque.

**Tightening torque: 15—23 N·m  
(1.5—2.3 m·kg, 10.8—16.6 ft·lb)**



76G05X-005

### INSPECTION

Check the following points. If a problem is found, replace the spark plug.

1. Damaged insulation
2. Worn electrodes
3. Carbon deposits  
If cleaning is necessary, use a plug cleaner or a wire brush. Clean the upper insulator also.
4. Damaged gasket
5. Burnt condition of spark insulator
6. If it is black with carbon deposits, either misfiring due to improper proportions of gas and air or overheating of the plug may have occurred.

### Plug gap:

**FE (12VALVE) and FE DOHC Leaded fuel model:**

**0.70—0.80 mm (0.028—0.031 in)**

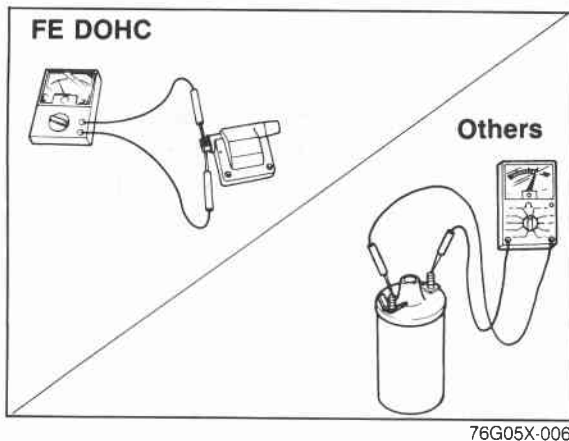
**FE (8VALVE) and FE DOHC Unleaded fuel model:**

**1.0—1.10 mm (0.039—0.043 in)**

**Others:**

**0.75—0.85 mm (0.030—0.034 in)**

## 5 IGNITION COIL, HIGH-TENSION LEAD



### IGNITION COIL

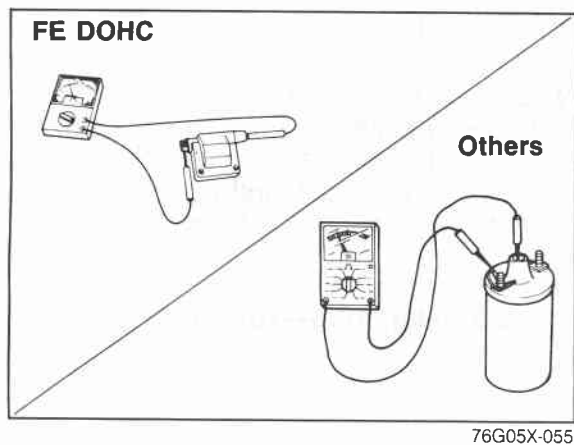
#### INSPECTION Primary Coil

Use an ohmmeter and check for resistance in the primary coil. If it is not within the specification, replace the coil.

**Primary coil resistance: (at 20°C 68°F)**

**FE DOHC...0.72—0.88  $\Omega$**

**Others.....1.04—1.27  $\Omega$**



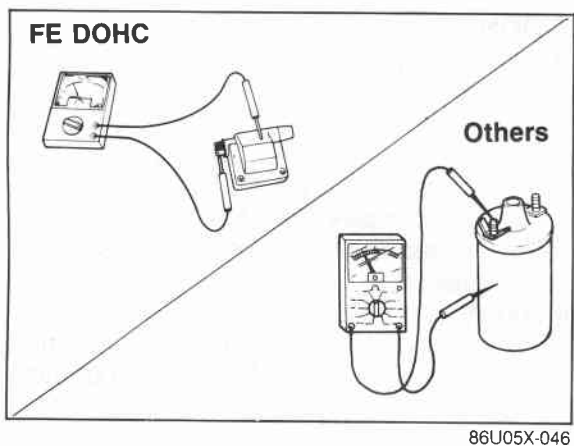
#### Secondary Coil

Use a ohmmeter to measure the resistance of the secondary coil. If it is not within specification, replace the coil.

**Secondary coil resistance: (at 20°C 68°F)**

**FE DOHC.....10.3—13.9 k $\Omega$**

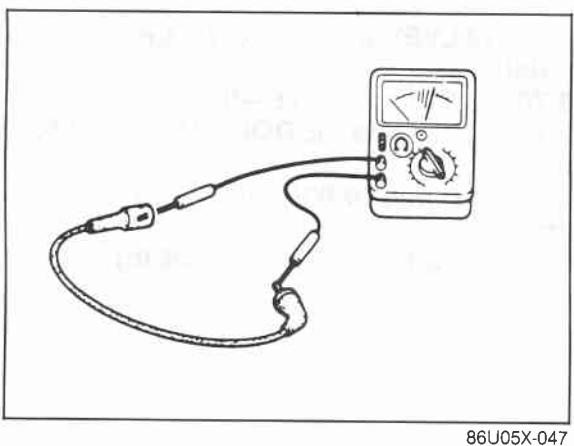
**Others..... 7.1— 9.7 k $\Omega$**



#### Insulation of Case

Use a **500V megger** tester to measure the insulation resistance between the primary terminal and the case.

The standard reading is **10 M $\Omega$  or more**.

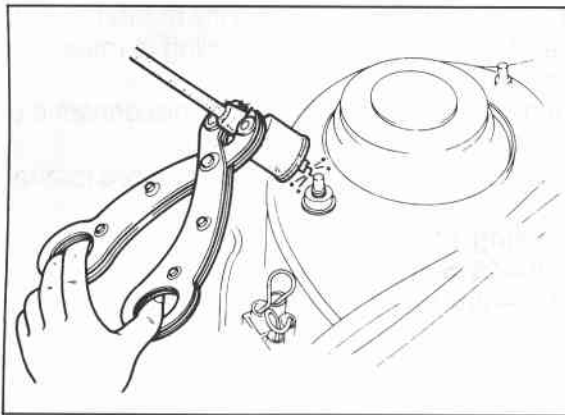


### HIGH-TENSION LEAD

#### INSPECTION

Measure the resistance using an ohmmeter.

**Resistance: 16 k $\Omega$  per 1m (3.28 ft)**

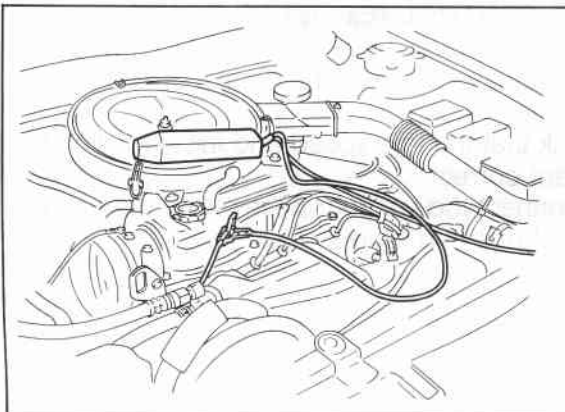


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## DISTRIBUTOR

### SPARK TEST

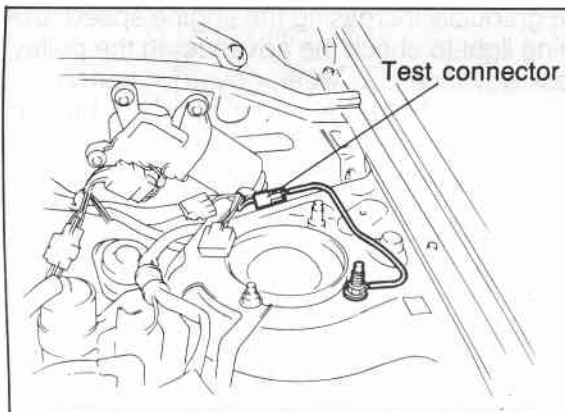
1. Disconnect the distributor lead from the distributor.
2. Hold it with insulated pliers approx. 5—10 mm (0.20—0.39 in) from a ground.
3. Crank the engine and check that a strong blue spark is visible.
4. If there is no spark, the ignition coil or pick-up coil may be bad.  
Check once again after replacing the ignition coil or pick-up coil.



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### IGNITION TIMING

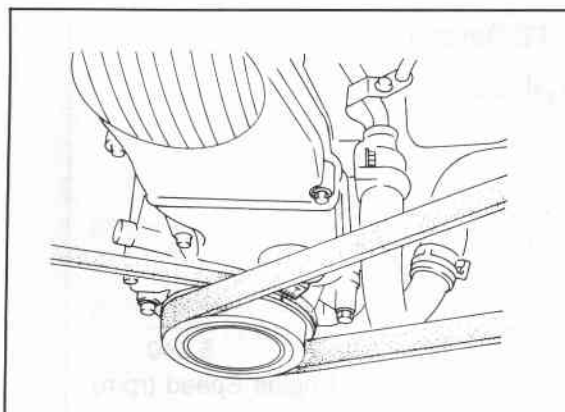
1. Warm up the engine to the normal operating temperature.
2. Turn all electric loads OFF.
3. Connect a tachometer and timing light to the engine.



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4. Connect a jumper wire between the test connector and ground. (Only for FE DOHC)
5. Check the idle speed. Set to the specified speed if necessary.

**Idle speed:** 750  $\pm$  50 rpm (FE DOHC)  
 800  $\pm$  50 rpm (F6, F8 FE—MTX)  
 900  $\pm$  50 rpm (F8, FE—ATX in "P" range)  
 950  $\pm$  50 rpm (F6—ATX in "P" range)



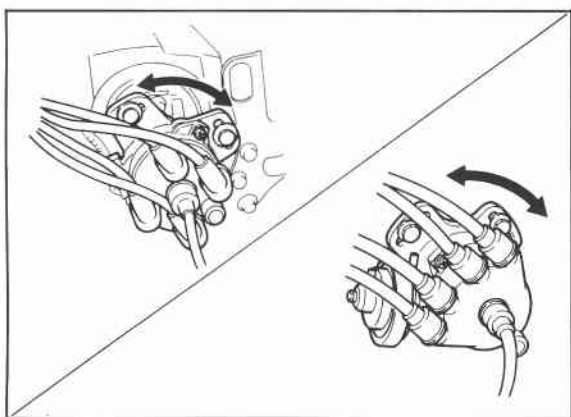
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6. Check that the timing mark (Yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

### Ignition timing:

**FE DOHC:** 12  $\pm$  1° BTDC  
 (Test connector grounded)  
**Others:** 6  $\pm$  1°  
 (Vacuum hoses disconnected and plugged)

## 5 DISTRIBUTOR



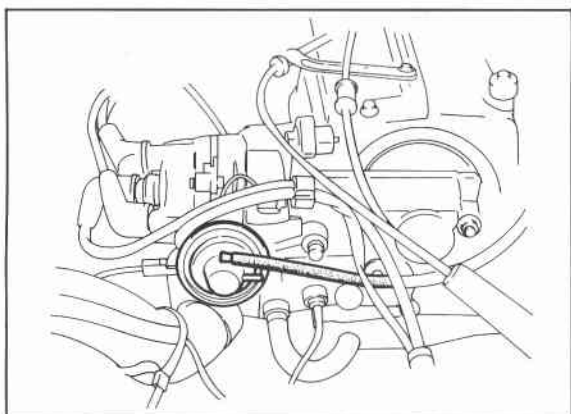
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8. If the mark is not aligned, loosen the distributor lock bolt, and turn the distributor housing to make the adjustment.
9. Reconnect the vacuum hoses, or disconnect the jumper wire from the test connector.
10. Tighten the distributor lock bolt to specified torque.

### Tightening torque:

**18.6—25.5 N·m**

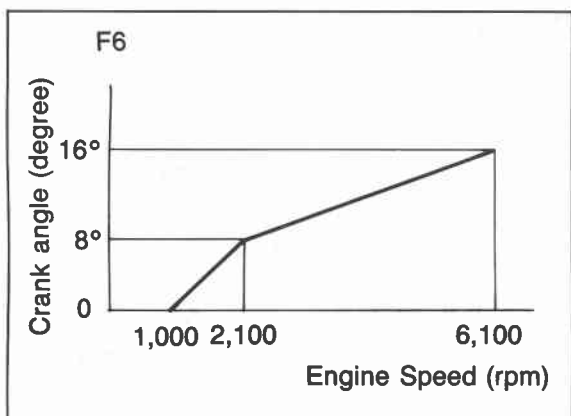
**(1.9—2.6 m·kg, 13.7—18.8 ft·lb)**



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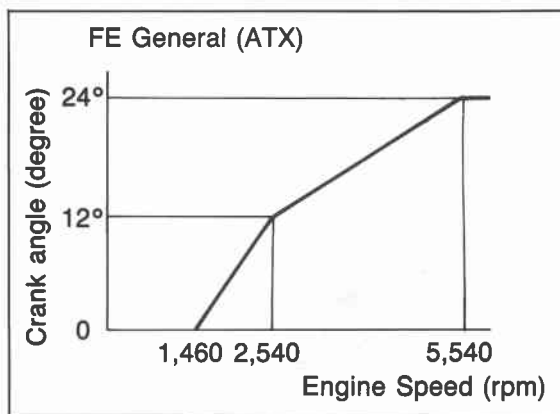
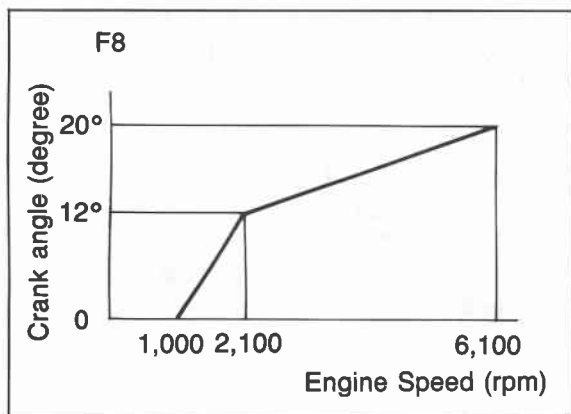
### SPARK CONTROL (Except FE DOHC) Centrifugal Advance

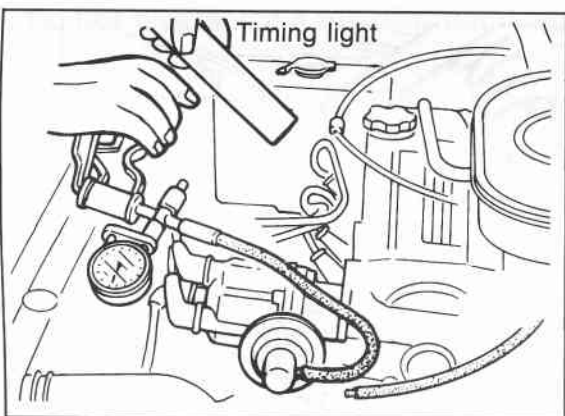
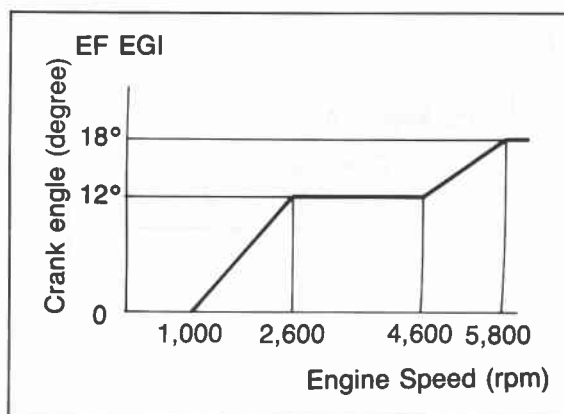
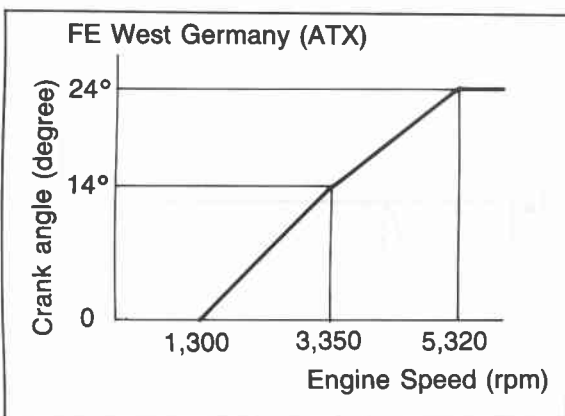
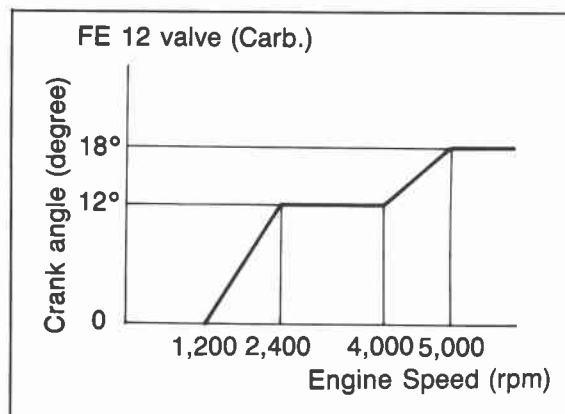
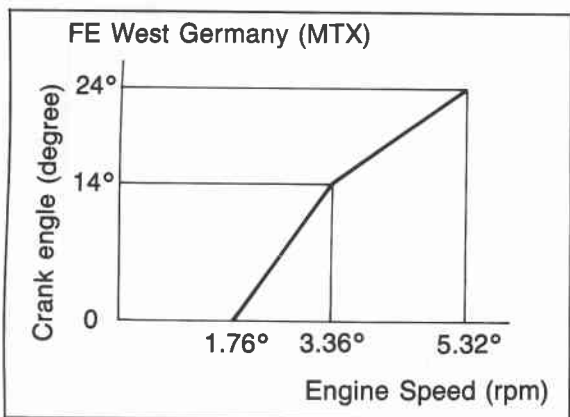
1. Warm up the engine to the normal operating temperature.
2. Check that the idle speed and initial ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control unit and plug them.



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4. While gradually increasing the engine speed, use a timing light to check the advance on the pulley.  
Excess advance..... weak governor spring  
(If the governor spring is broken, the advance will rise very high)  
Insufficient advance...governor weight or cam malfunction

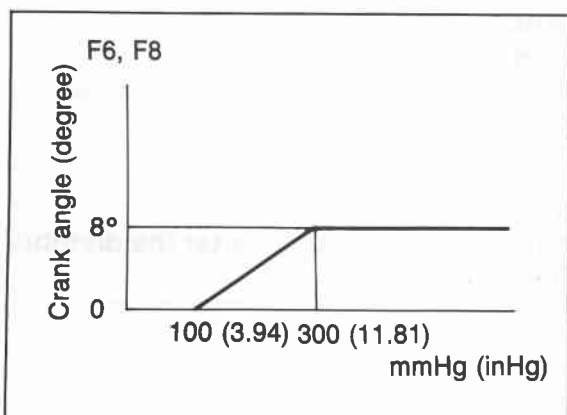




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## Vacuum Advance

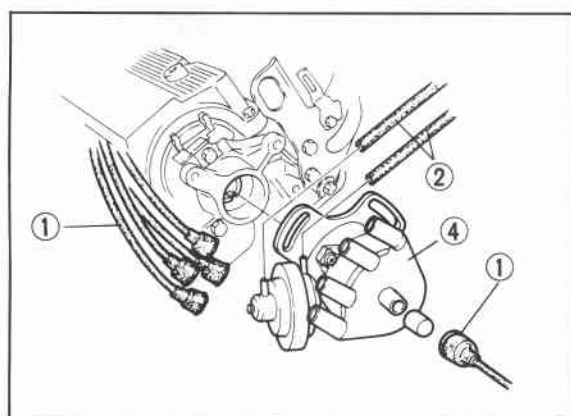
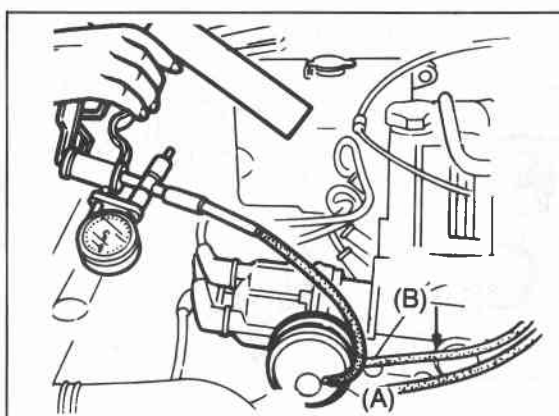
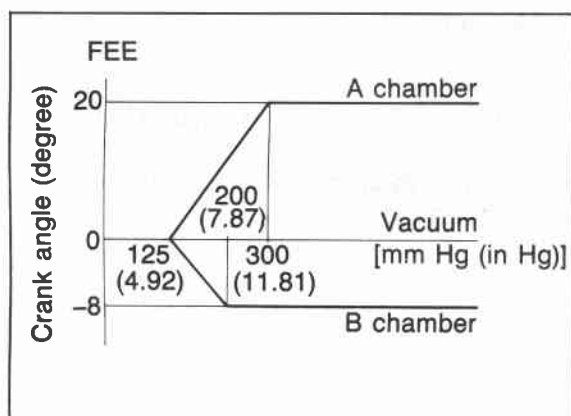
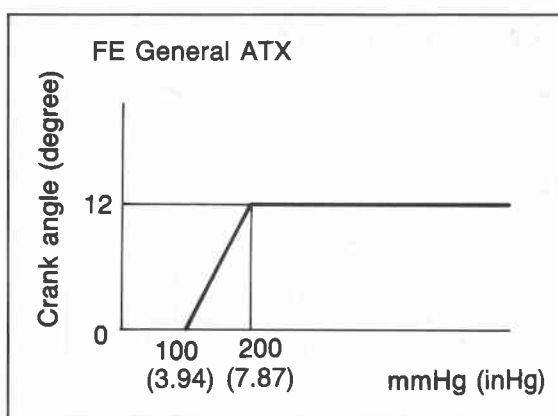
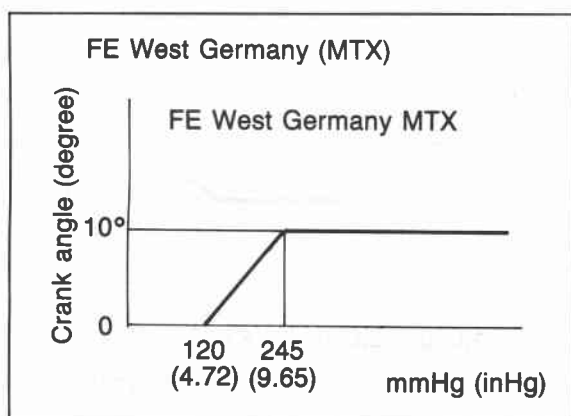
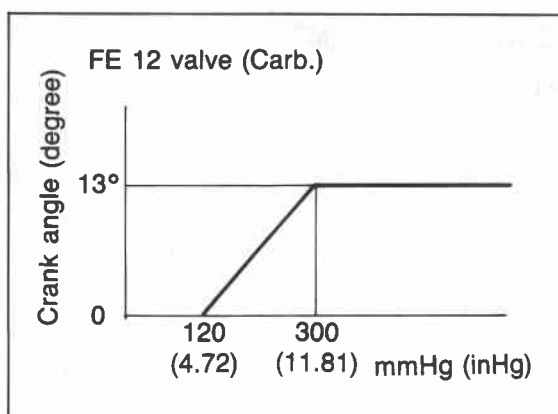
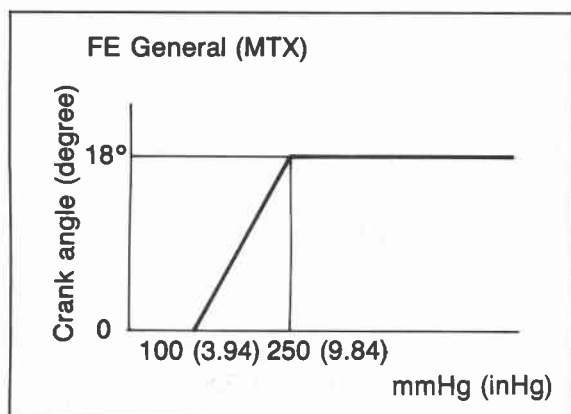
1. Warm up the engine to the normal operating temperature.
2. Check that the idle speed and ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control unit, and plug them.
4. Connect a vacuum pump to the vacuum control unit.



86U05X-055

5. Apply vacuum and check the advance with the timing light.

## 5 DISTRIBUTOR



76G05X-010

### REMOVAL

1. Remove the high-tension leads.
2. Disconnect the vacuum hose(s) and wiring.
3. Loosen the distributor lock bolt(s).
4. Remove the distributor.

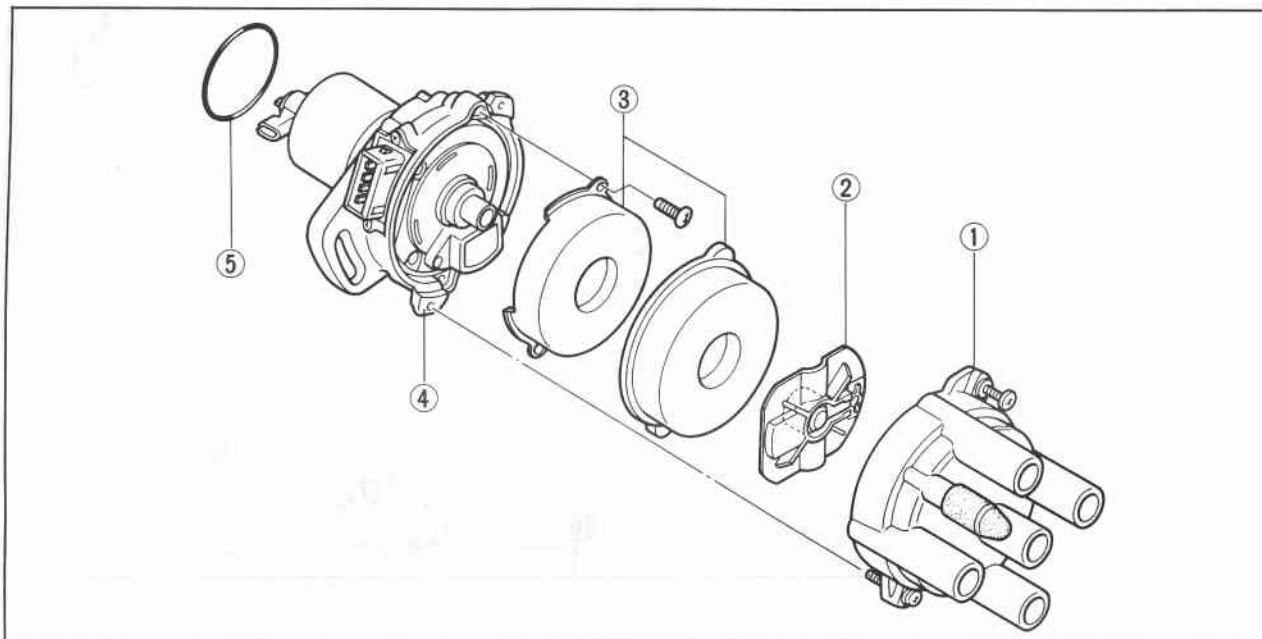
### Note

**Do not turn the crankshaft after the distributor has been removed.**

## DISASSEMBLY

Disassemble in the order shown in the figure.

### FE DOHC



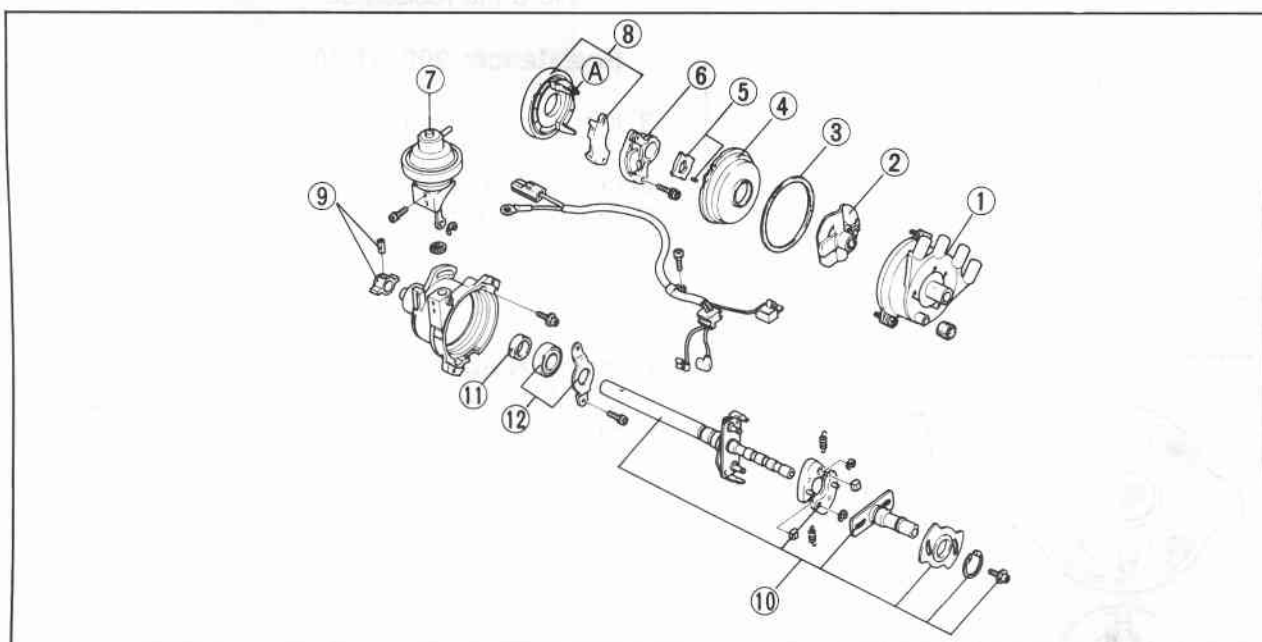
76G05X-011

- |                      |                    |           |
|----------------------|--------------------|-----------|
| 1. Cap               | 3. Cover           | 5. O-ring |
| 2. Distributor rotor | 4. Distributor set |           |

### Caution

Do not disassemble the distributor set.

### FE 12 Valve Caburetor Engine

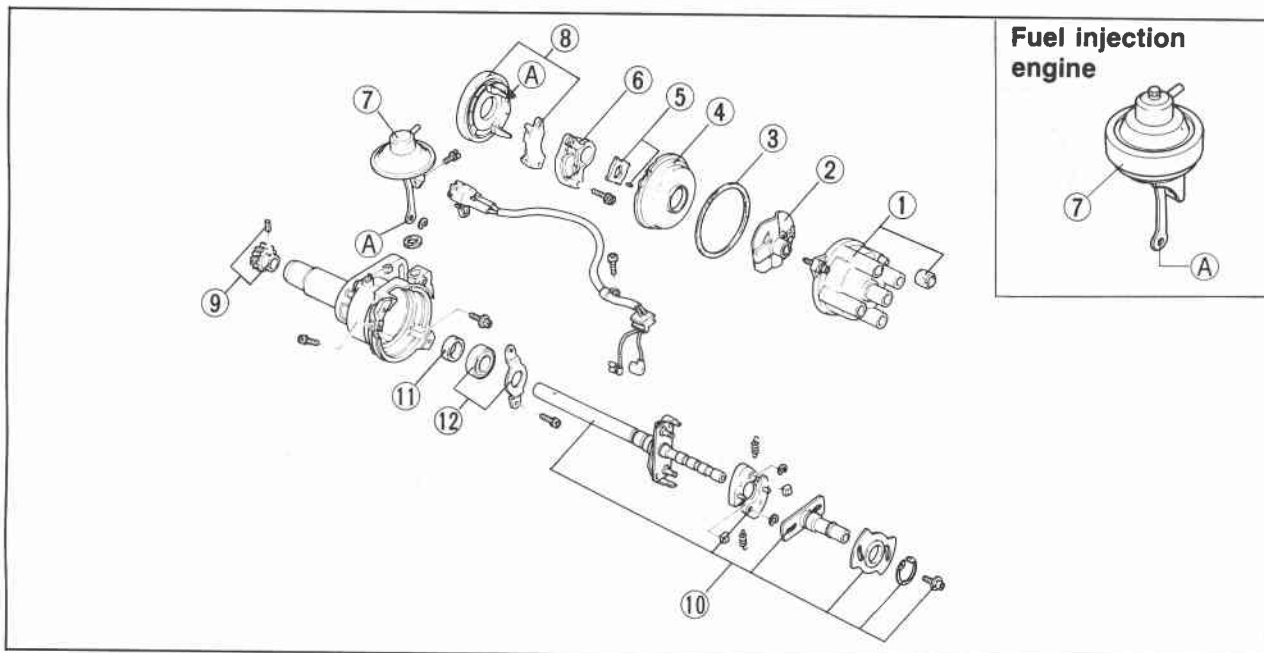


76G05X-012

- |           |                              |                  |
|-----------|------------------------------|------------------|
| 1. Cap    | 5. Signal rotor and pin      | 9. Coupling set  |
| 2. Rotor  | 6. Pick-up coil with igniter | 10. Governor set |
| 3. Gasket | 7. Vacuum control unit       | 11. Oil seal     |
| 4. Cover  | 8. Breaker                   | 12. Bearing      |

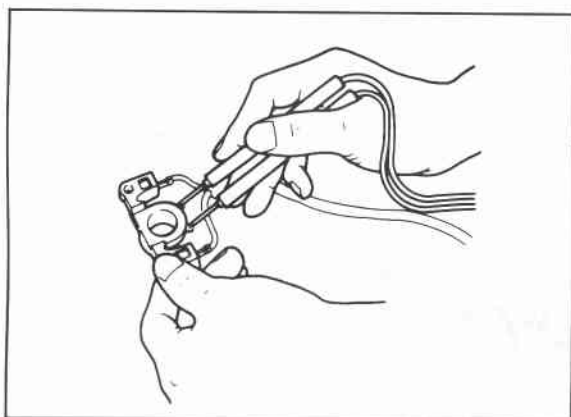
## 5 DISTRIBUTOR

### Others



76G05X-013

- |           |                              |                  |
|-----------|------------------------------|------------------|
| 1. Cap    | 5. Signal rotor              | 9. Coupling set  |
| 2. Rotor  | 6. Pick-up coil with igniter | 10. Governor set |
| 3. Gasket | 7. Vacuum control unit       | 11. Oil seal     |
| 4. Cover  | 8. Breaker                   | 12. Bearing      |



76G05X-14

### INSPECTION

#### Pick-up Coil with Igniter (Except FE DOHC)

1. Connect an ohmmeter to the pick-up coil.
2. Measure the resistance.

**Resistance: 900—1,200  $\Omega$**

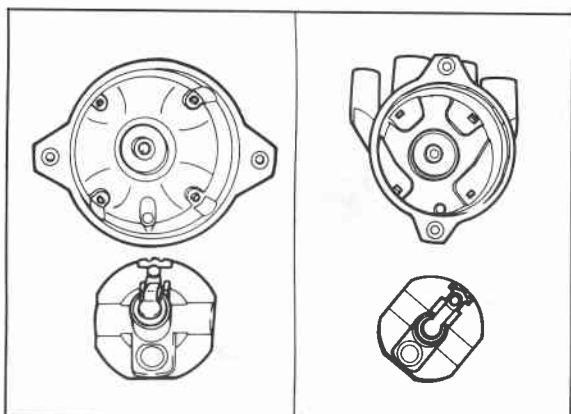
3. If it is not within specification, replace it.

#### Control Module (FE DOHC)

Refer to page 4C—108.

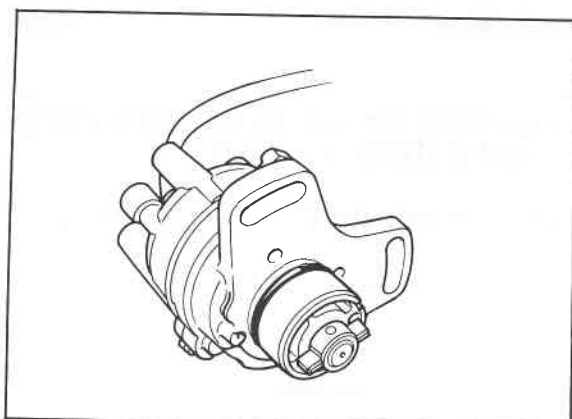
### Cap and Rotor

1. Check for corrosion, damage, and cracks.
2. Replace if necessary.



86U05X-060

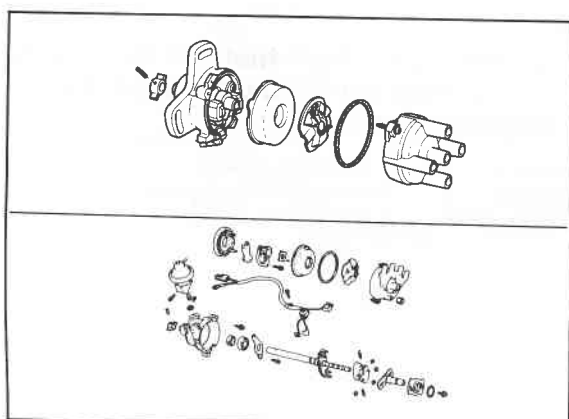




86U05X-061

## Distributor Shaft, O-Ring, and Oil Seal

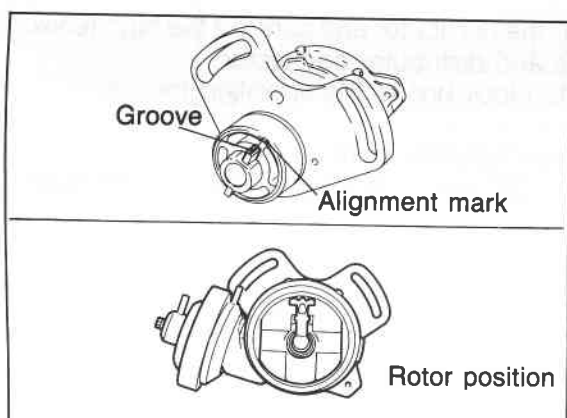
1. Check for damage to the distributor shaft, O-ring, and oil seal.



86U05X-062

## ASSEMBLY

Assemble in the reverse order of disassembly, referring to the assembly note.

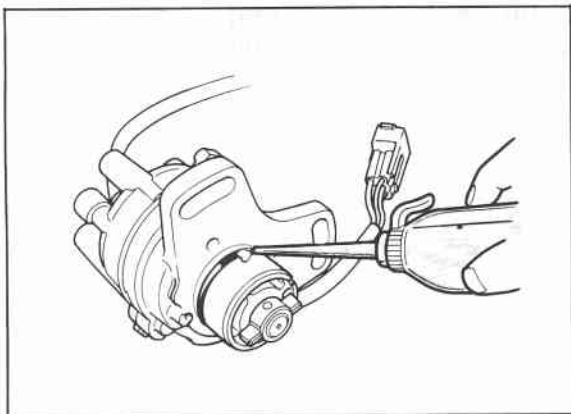


76G05X-015

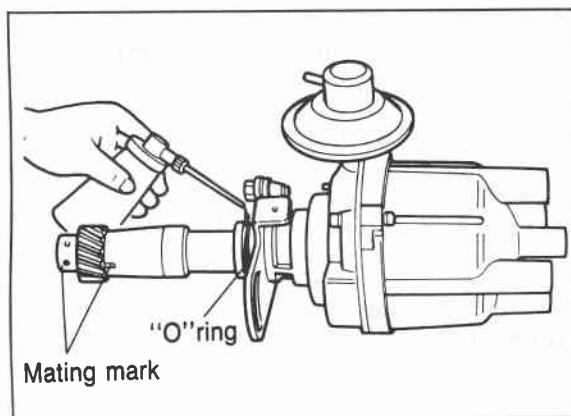
## Assembly Note (FE DOHC and FE 12 Valve Caburetor)

Align the coupling set blade with the alignment mark and check that the rotor is aligned as shown in the illustration.

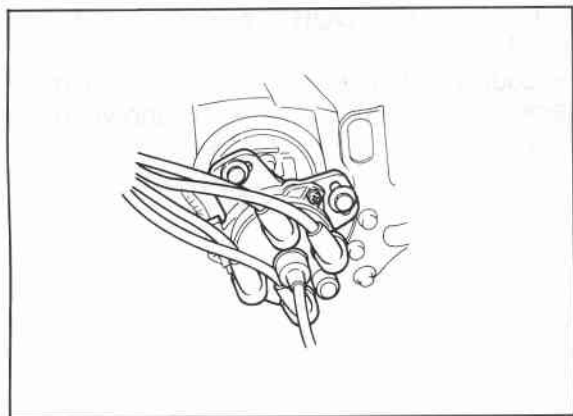
## 5 DISTRIBUTOR



76G05X-056



76G05X-016



86U05X-064

### INSTALLATION

#### Note

After installing the distributor, adjust the ignition timing (Refer to 5—11).

1. Apply engine oil to the O-ring and driven gear.

#### Note

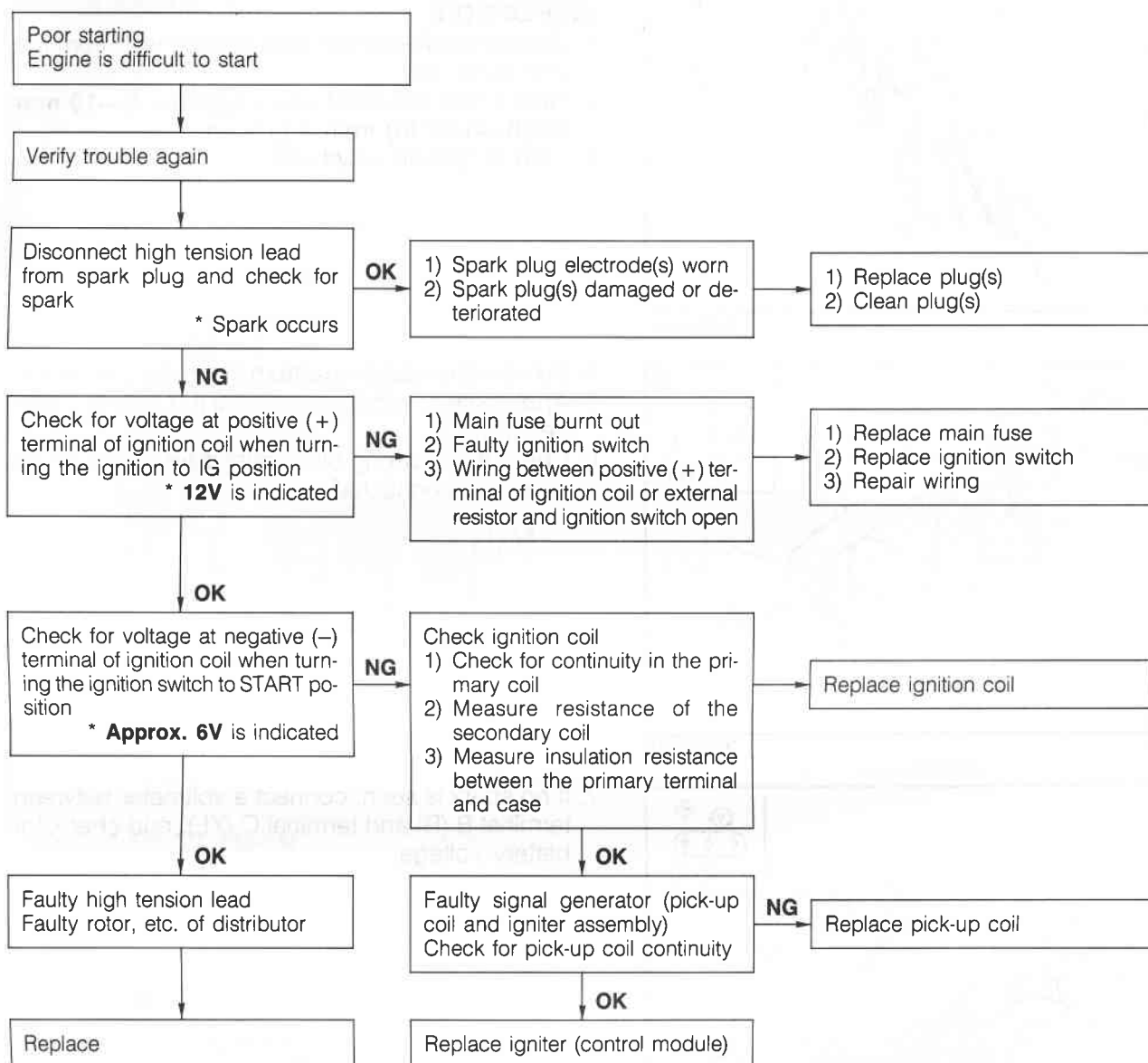
Gear driven type, check that the No.1 cylinder is at top dead center and align the distributor matching marks.

2. Install the distributor and connect the high-tension leads and distributor connector.
3. Tighten lock bolt to the specified torque.

#### Torque specification:

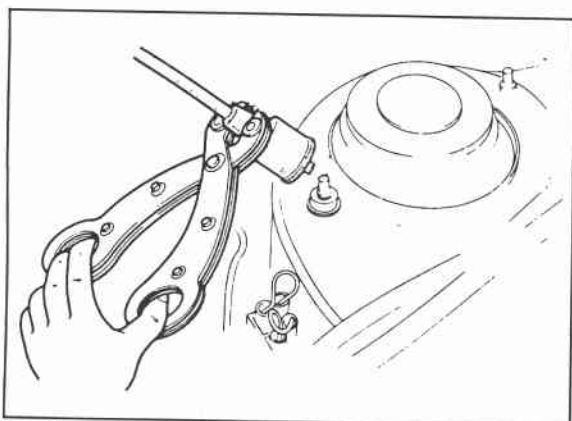
19—25 N·m (1.9—2.6 m·kg, 14—18 ft·lb)

## H.E.I. TROUBLESHOOTING (Except FE DOHC)



76G05X-017

## 5 IGNITER (FE DOHC)

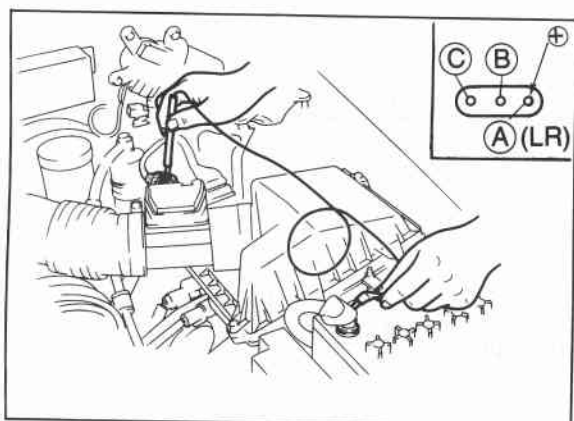


76G05X-018

### IGNITER

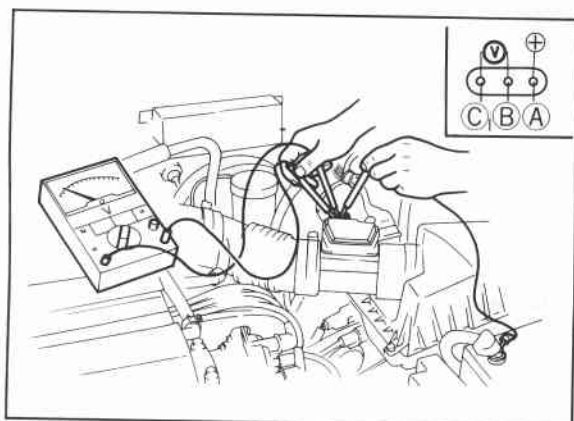
#### INSPECTION

1. Disconnect the center high tension lead from the distributor cap.
2. Hold it with insulated pliers **approx. 5—10 mm (0.20—0.39 in)** from a ground.
3. Turn the ignition switch ON.



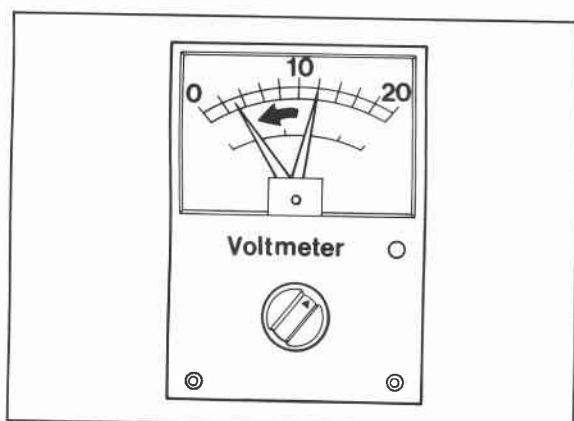
76G05X-019

4. Remove the rubber seal from the igniter connector.
5. Apply battery voltage to terminal A (LR) with a jumper wire.
6. Check that a strong blue spark is visible when the wire is disconnected.



76G-05X-020

7. If no spark is seen, connect a voltmeter between terminal B (B) and terminal C (YL), and check for battery voltage.



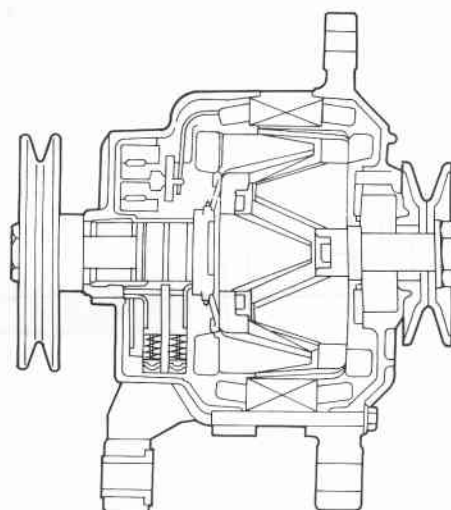
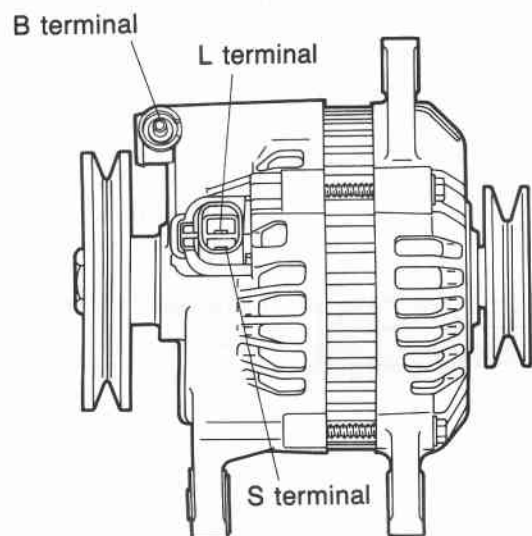
76G05X-021

8. Repeat steps 5 and check that the voltage changes to **2—3V**.
9. If the voltage is not as specified, replace the igniter.
10. If the voltage is as specified, check the ignition coil and high tension lead.

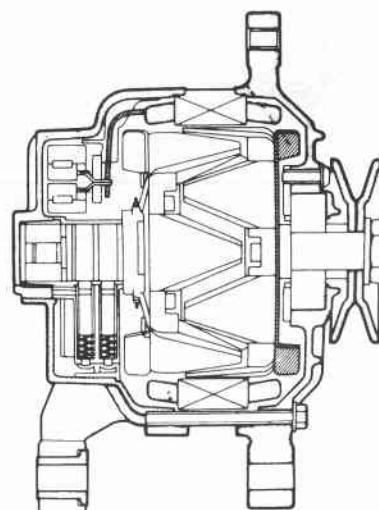
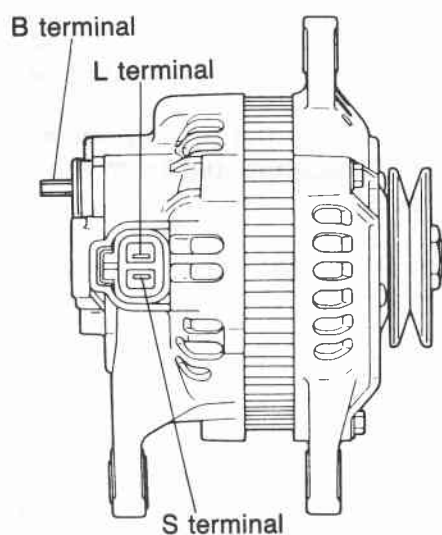
## ALTERNATOR

### CROSS-SECTIONAL VIEW

#### RF-CX Model

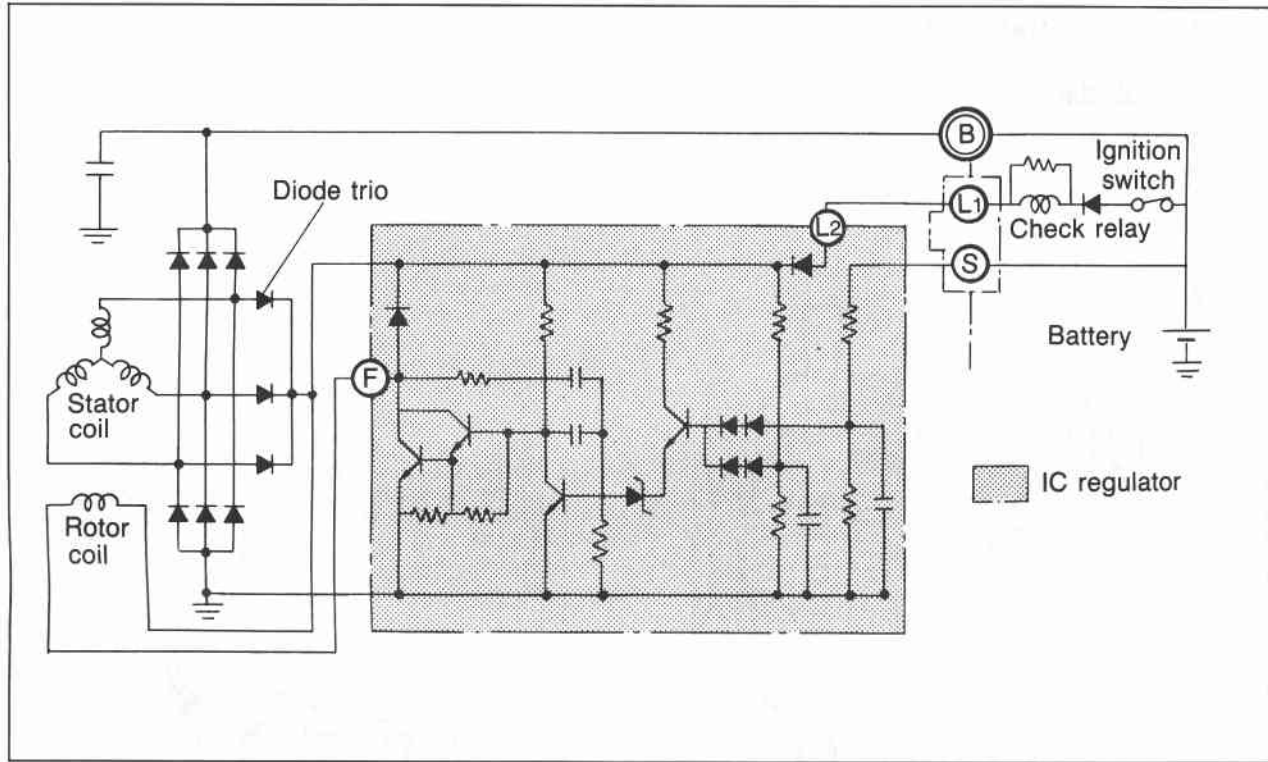


#### Except RF-CX Model

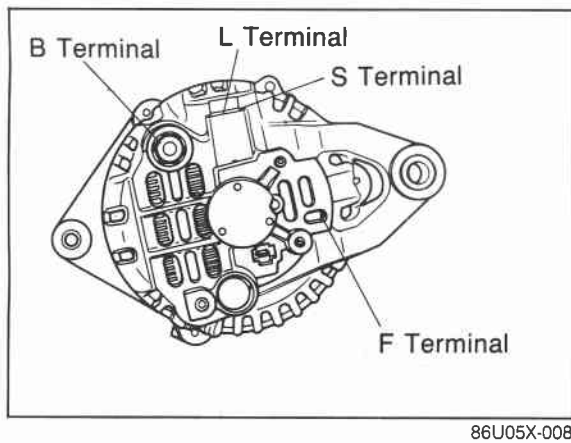


# 5 ALTERNATOR

## CHARGING SYSTEM



76G05X-023



86U05X-008

### Caution

- Be sure the battery connections are not reversed, because this will damage the rectifier.
- Do not use high-voltage testers such as a megger, because they will damage the rectifier.
- Remember that battery voltage is always applied to the alternator B terminal.
- Do not ground the L terminal while the engine is running.
- Do not start the engine while the connector is disconnected from the L and S terminals.

## TROUBLESHOOTING

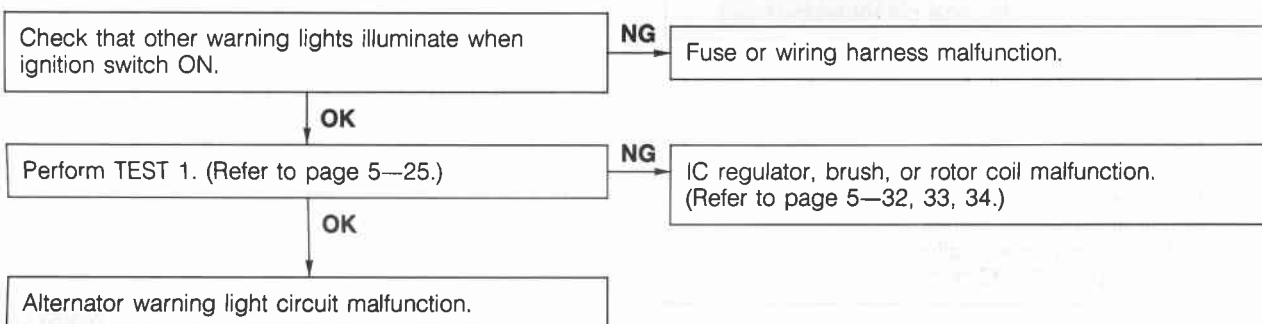
### Preliminary Check

1. Turn the ignition switch ON, and check that the alternator warning light illuminates.
2. Start the engine, and check that the alternator warning light goes off.



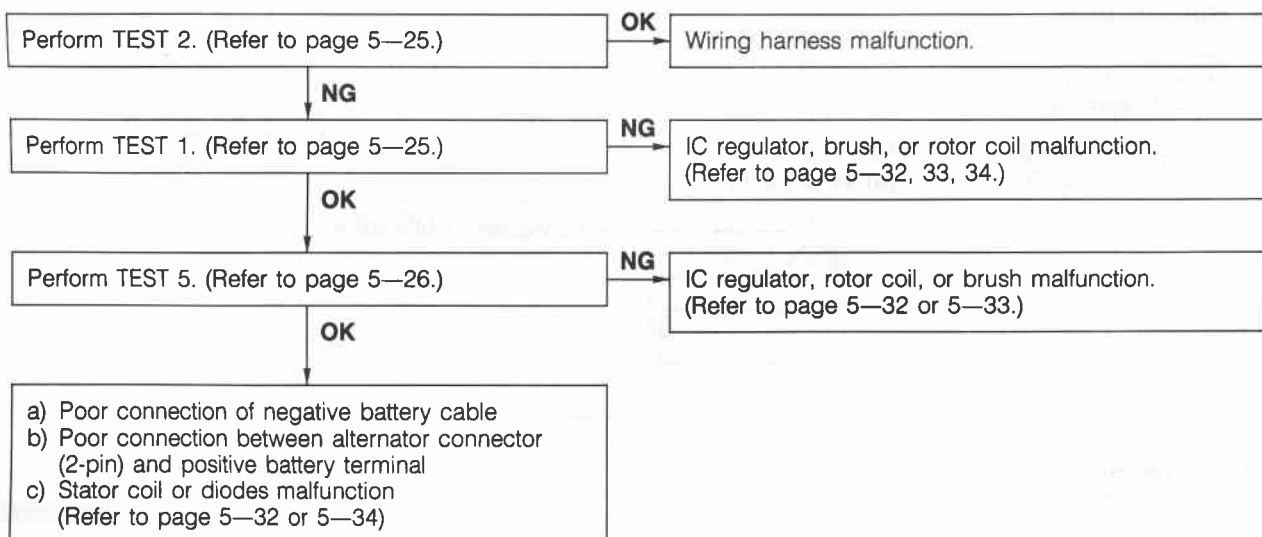
76G05X-024

### 1. Alternator warning light always not illuminate



76G05X-025

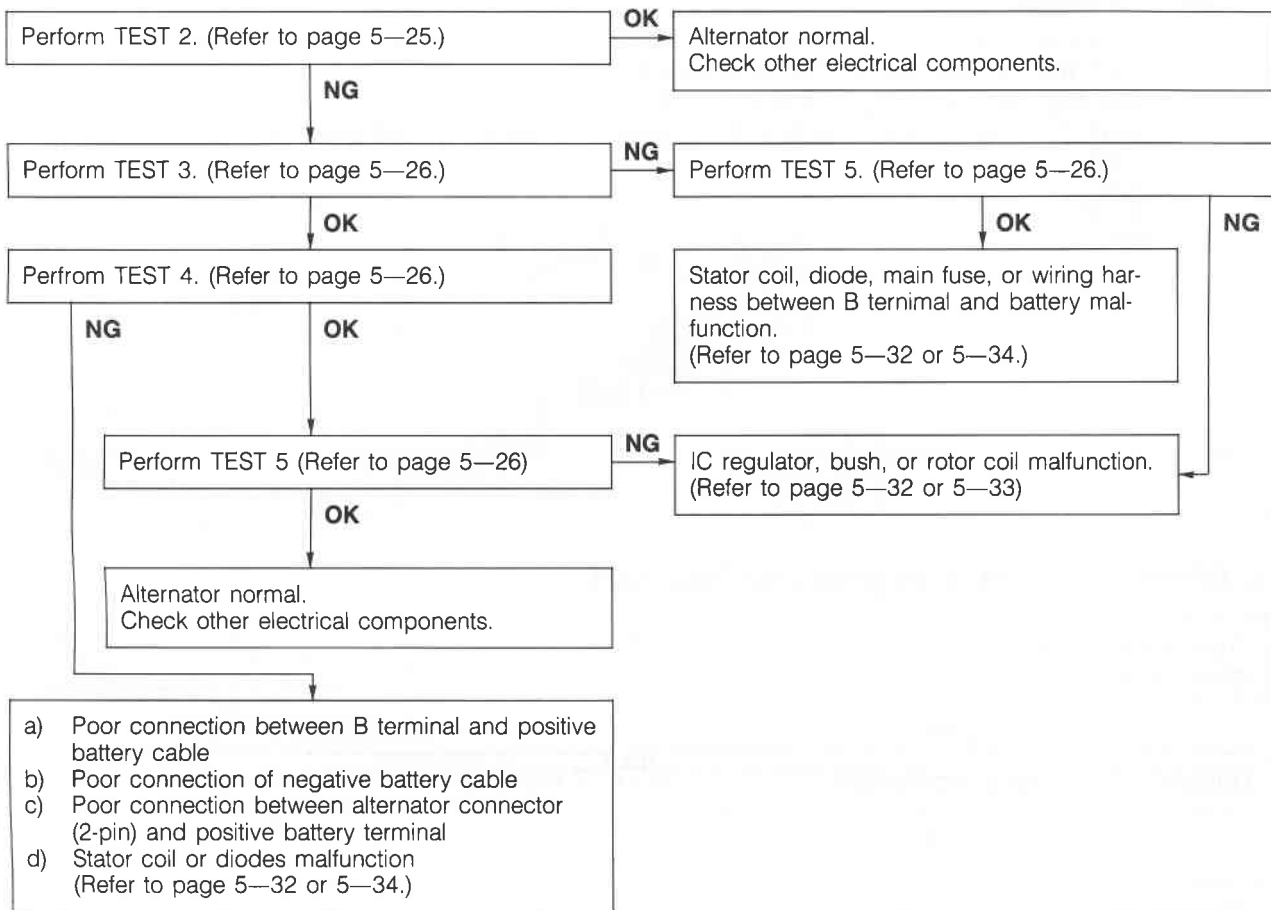
### 2. Alternator warning light illuminates when engine running



76G05X-026

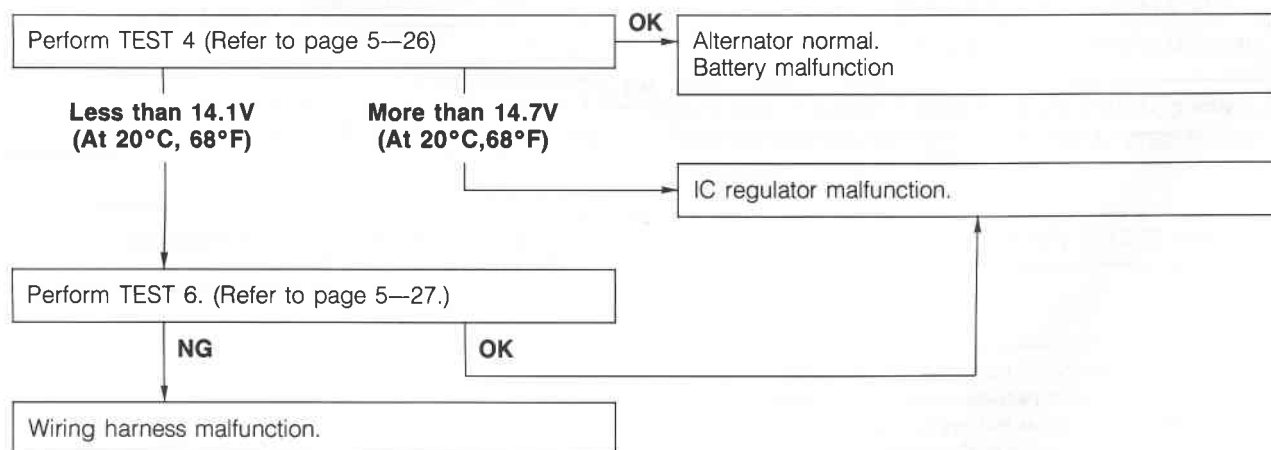
## 5 ALTERNATOR

### 3. Alternator warning light operates properly, but battery discharged



76G05X-027

### 4. Battery overcharged



76G05X-028

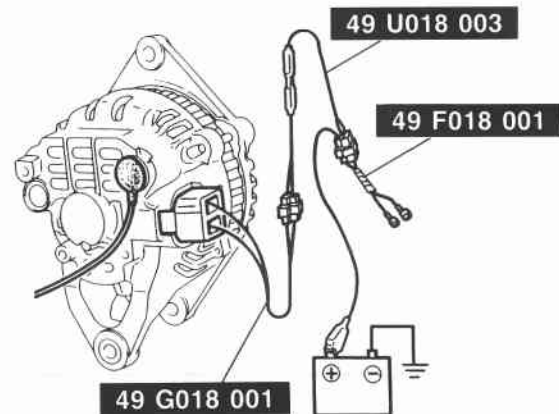


## Warning

Disconnect the negative battery terminal when disconnect or reconnect B terminal.

### TEST 1

1. Disconnect the alternator connector (2-pin).
2. Connect the **SST**.



4. Connect the red clip of the adapter harness to the battery (+), and check that the red lamp and green lamp illuminate.
5. Start the engine and check that both lamps go off.

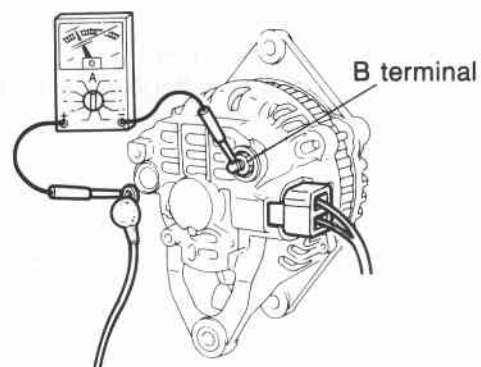
86U05X-010

### TEST 2

1. Connect an ammeter (**75A min.**) between the wire and the B terminal.
2. Turn all headlights and accessories on, and depress the brake pedal.
3. Start the engine and check that output current is **70A (RF-CX: 75A) or more** at **2,500—3,000 rpm** of the engine speed.

## Caution

Do not ground the B terminal.

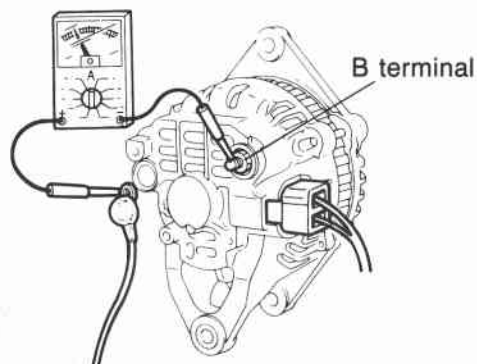


76G05X-029

## 5 ALTERNATOR

### TEST 3

1. Turn all electric loads off and release the brake pedal.
2. Check that output current is **5A or more** at **2,500—3,000 rpm** of the engine speed.

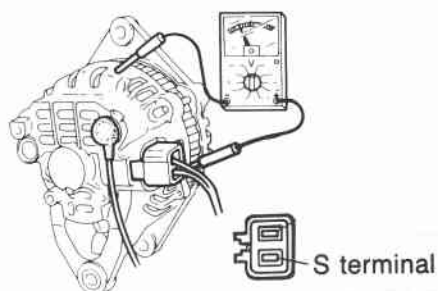


86U05X-013

### TEST 4

1. Turn all electric loads off and release the brake pedal.
2. Check that output voltage between S terminal and ground is within specification at **2,500—3,000 rpm** of the engine speed.

**Voltage: 14.1—14.7V**

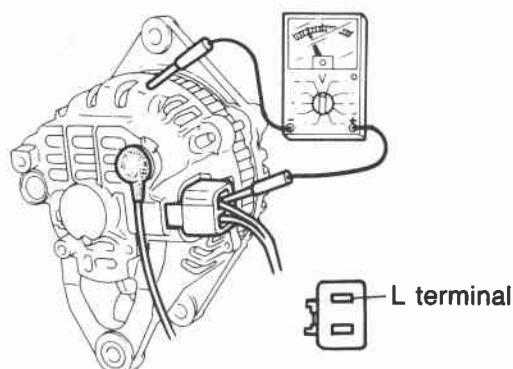


86U05X-072

### TEST 5

1. Turn the ignition switch ON.
2. Check that L terminal voltage is within specification.

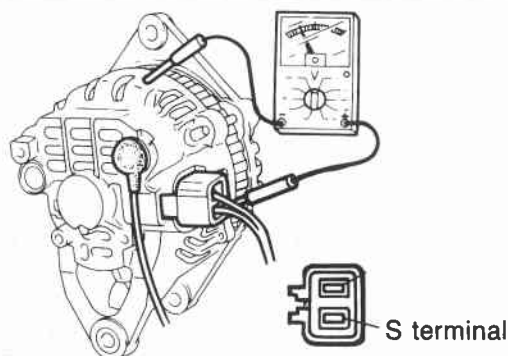
**Voltage: 1—5V**



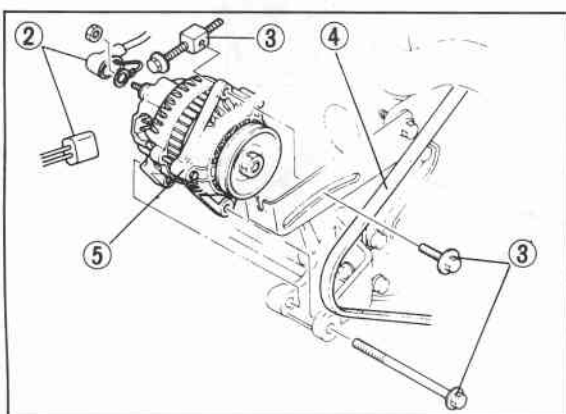
86U05X-073

## TEST 6

1. Turn the ignition switch ON.
2. Turn all electric loads off and release the brake pedal.
3. Check that voltage between S terminal and ground is battery voltage.



86U05X-074

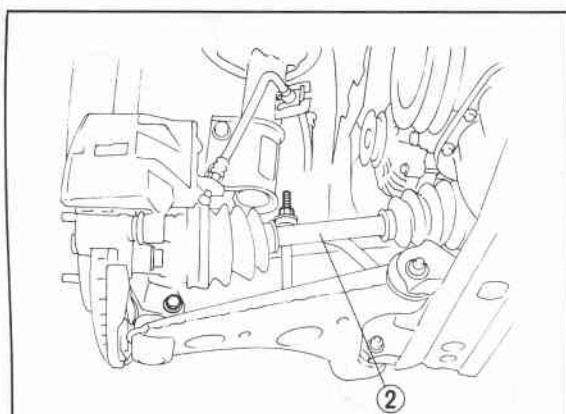


76G05X-057

## REMOVAL (GASOLINE)

Remove in the sequence shown in the figure.

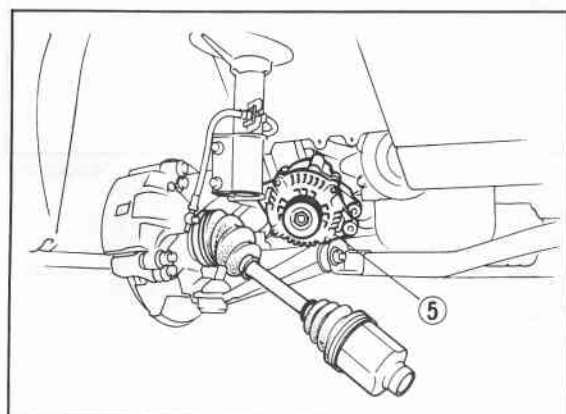
1. Disconnect the negative battery terminal.
2. Disconnect the wire and connector from the alternator.
3. Remove the bolts.
4. Remove the V-belt.
5. Remove the alternator to upper side (LHD) or lower side (RHD).



76G05X-030

## REMOVAL (DIESEL)

1. Disconnect the negative battery terminal.
2. Remove the right hand driveshaft (Refer to Section 9).



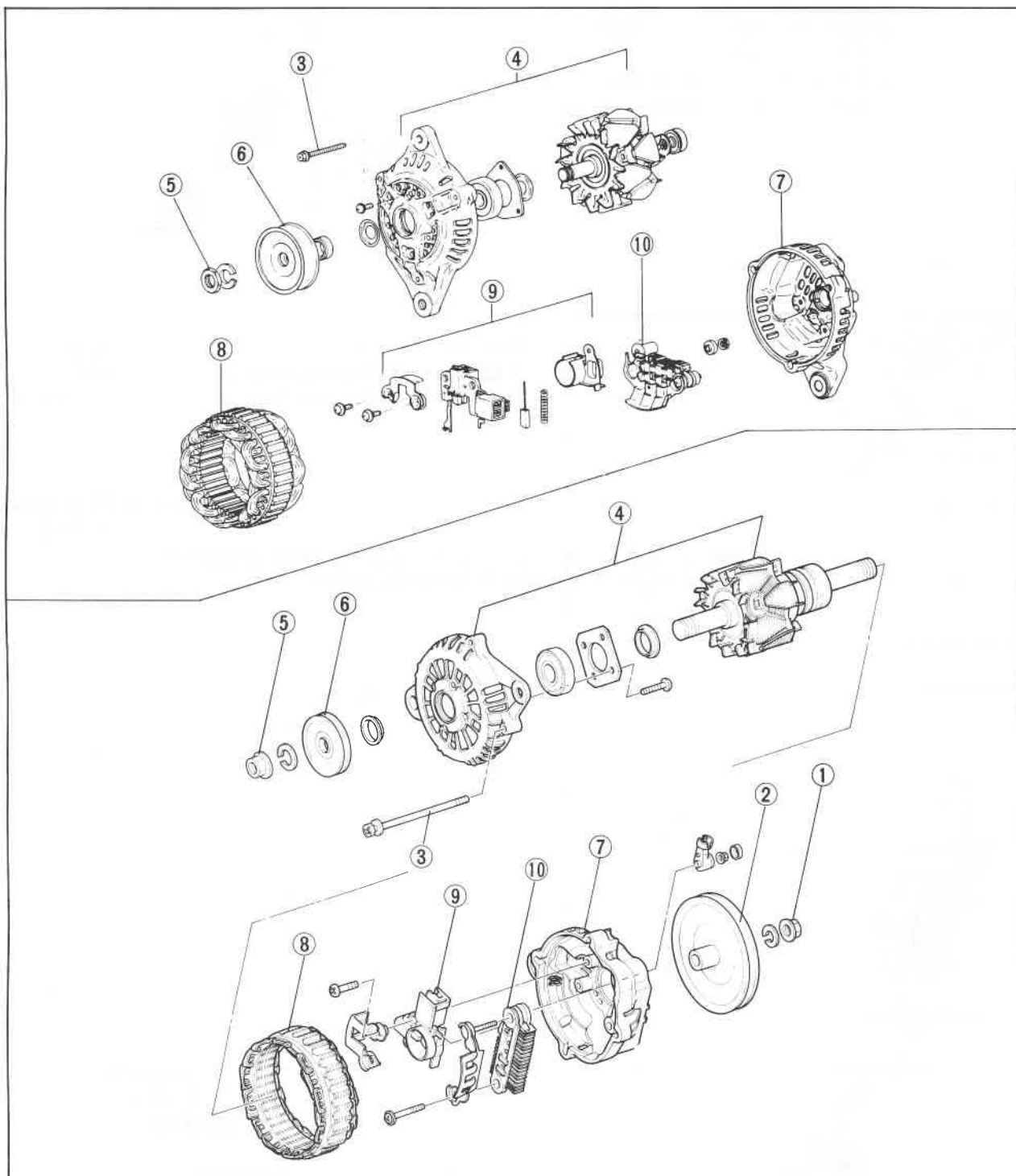
76G05X-031

3. Disconnect the wire and connector from the alternator.
4. Loosen the idle pulley nuts and remove the drive belts.
5. Remove the bolts and remove the alternator from under the vehicle.

## 5 ALTERNATOR

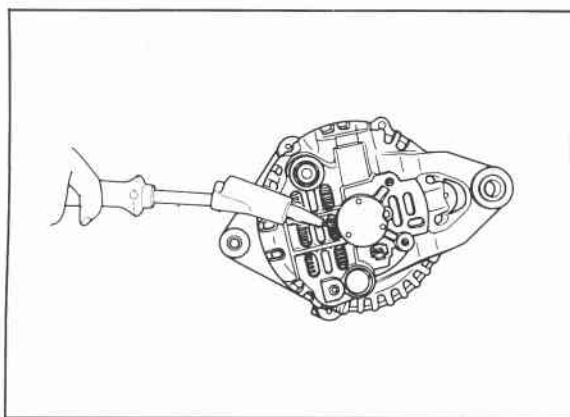
### DISASSEMBLY

Disassemble in the sequence shown in the figure.



76G05X-033

- |                            |                          |
|----------------------------|--------------------------|
| 1. Lock nut (RF-CX)        | 6. Pulley                |
| 2. Pulley (RF-CX)          | 7. Rear bracket          |
| 3. Bolt                    | 8. Stator                |
| 4. Front bracket and rotor | 9. Brush holder assembly |
| 5. Lock nut                | 10. Rectifier            |



86U05X-020

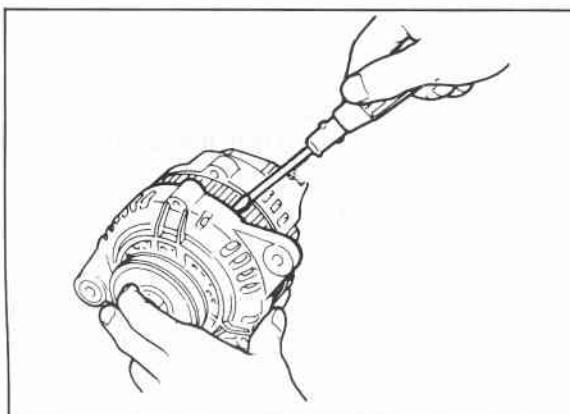
1. Place a soldering iron (200W) on the bearing box for **3 or 4 minutes** to heat it to about **50—60°C (122—140°F)**.

Pull out the three bolts, and then insert a screwdriver between the stator and front bracket and separate them.

## Note

a) If the bearing box is not heated, the bearing cannot be pulled out because the rear bearing and rear bracket fit together very tightly.

b) Be careful not to force the screwdriver in too far. The stator may become scratched.

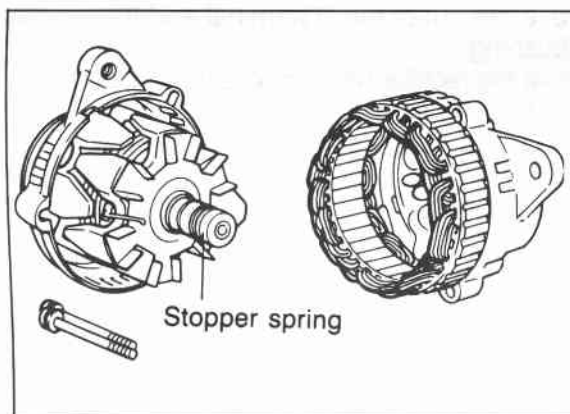


63U05X-999

2. Separate the rear and front sections.

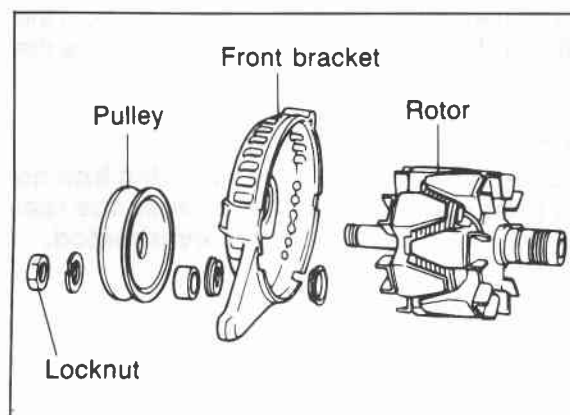
## Note

Be careful not to lose the stopper spring that fits around the circumference of the rear bearing.



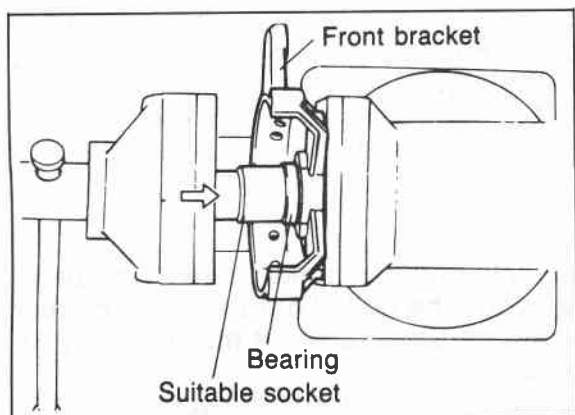
5BU05X-057

3. Place the rotor in a vise and loosen the pulley nut, then disassemble the pulley, rotor, and front bracket.



86U05X-021

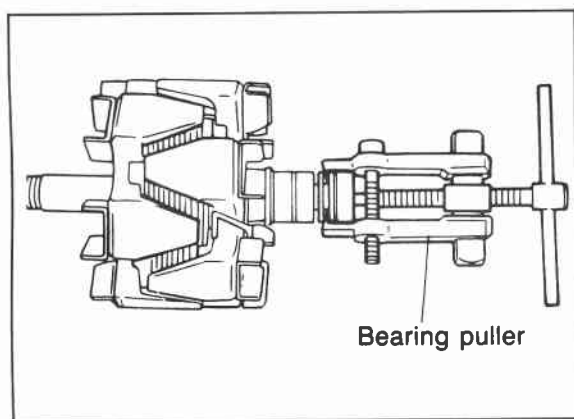
## 5 ALTERNATOR



86U05X-076

### 4. Replace the front bearing

Using a socket which exactly fits on the outer race of the bearing, carefully press in the bearing. Use a hand press or a vise.

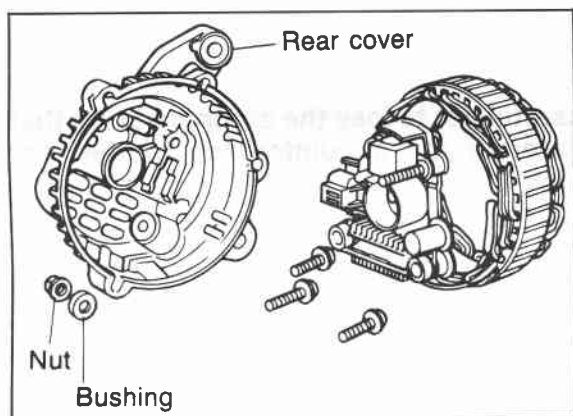


86U05X-086

### 5. Replace the rear bearing

The bearing can be pulled off by using a bearing puller.

When it is pressed on, press it on so that the groove at the bearing circumference is at the slip ring side.

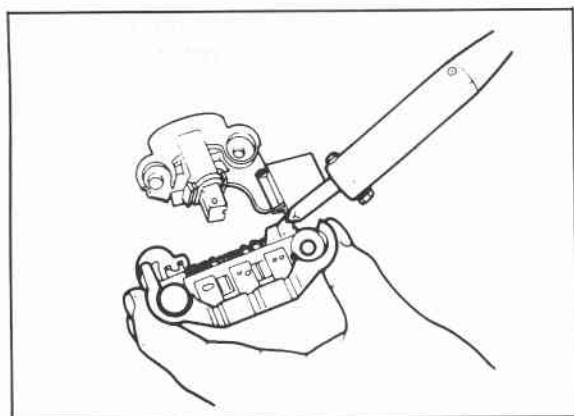


86U05X-077

### 6. Remove the nut of the B terminal and the insulation bushing.

### 7. Remove the rectifier holding screws and the brush holder holding screw.

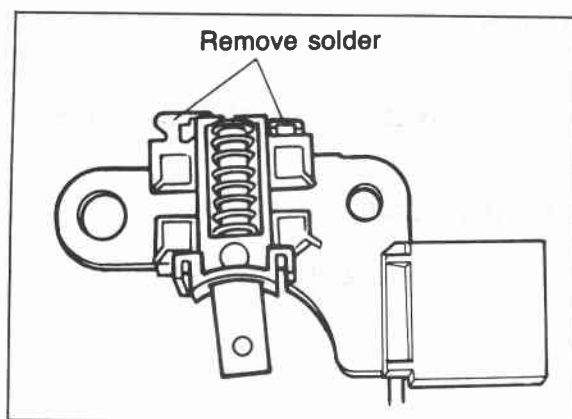
### 8. Separate the rear bracket and the stator.



### 9. Use a soldering iron to remove the solder from the rectifier and the stator leads, and then remove the IC regulator.

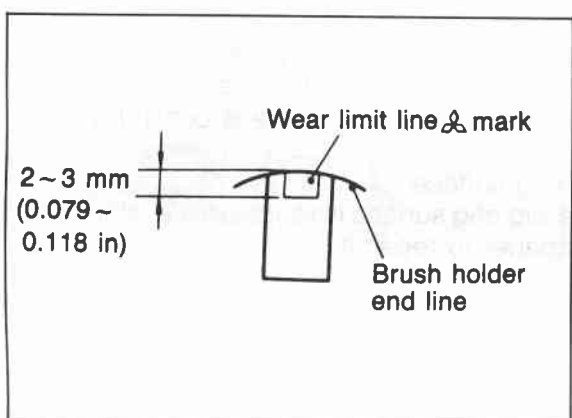
#### Caution

**Disconnect quickly, use the soldering iron no more than about 5 seconds because the rectifier may be damaged if it is overheated.**



86U05X-088

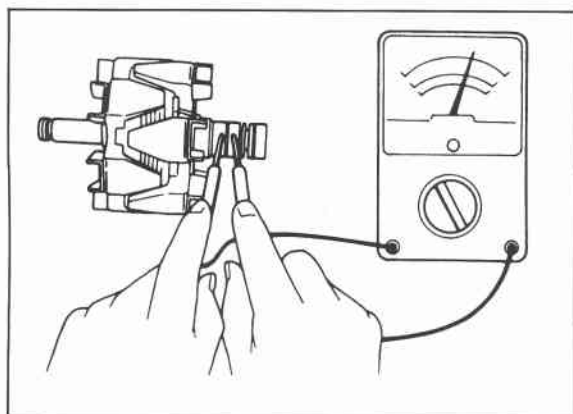
10. Replace the brushes  
Remove the solder from the pigtail, and then remove the brush.



86U05X-089

11. When soldering the brush, solder the pigtail so that the wear limit line of the brush projects **2—3 mm (0.079—0.118 in)** out from the end of the brush holder.

## 5 ALTERNATOR



86U05X-078

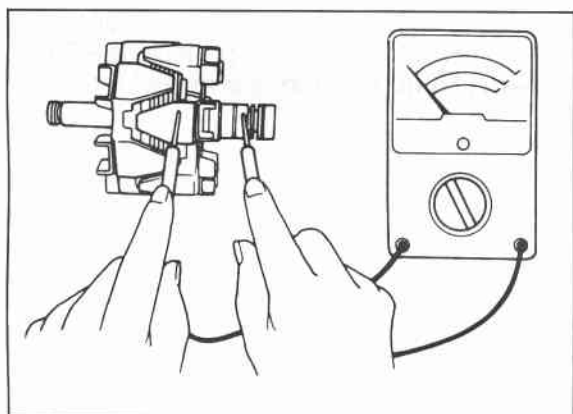
### INSPECTION

#### Rotor

1. Wiring damage
  - (1) Check the resistance between the slip rings using an ohmmeter.

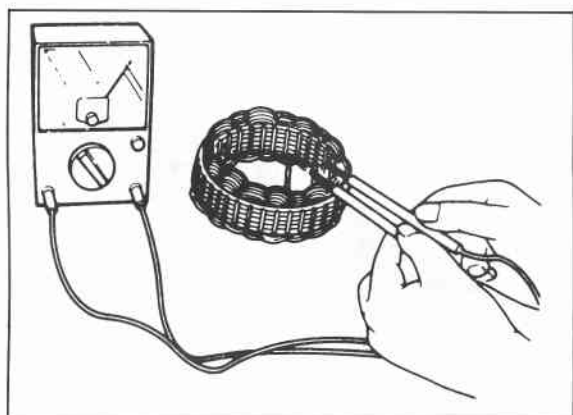
**Specification: 2—6  $\Omega$**

- (2) If it is not within specification, replace the rotor



86U05X-080

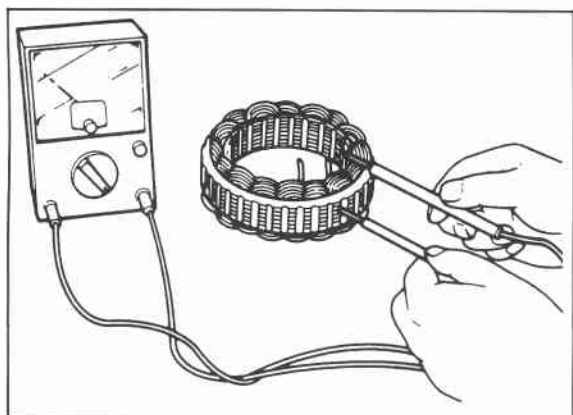
2. Ground of the field coil
  - (1) Check for continuity between the slip ring and the core using an ohmmeter.
  - (2) Replace the rotor if there is continuity.
3. Slip ring surface  
If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.



86U05X-081

#### Stator

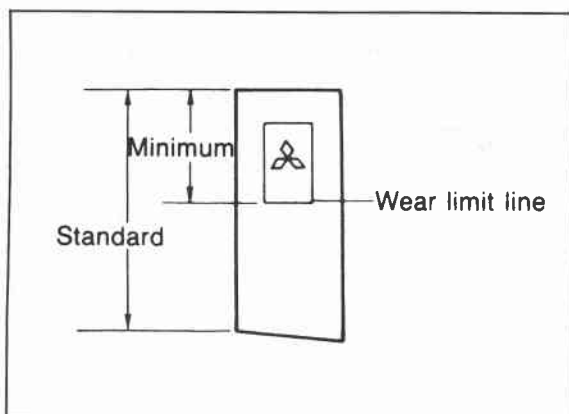
1. Wiring damage
  - (1) Check for continuity between the stator coil leads using an ohmmeter.
  - (2) Replace the stator if there is no continuity.



86U05X-082

2. Ground of the stator coil
  - (1) Check for continuity between the stator coil leads and the core using a circuit tester.
  - (2) Replace the stator if there is continuity.



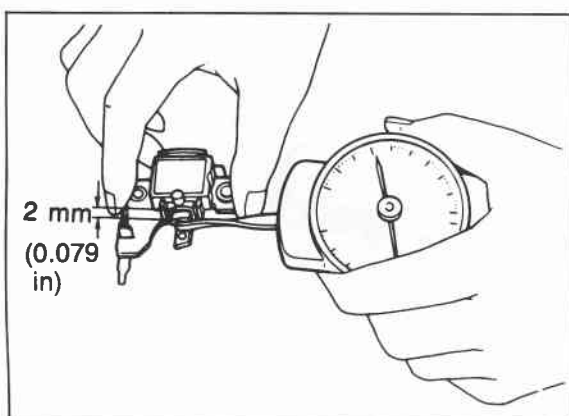


76G05X-034

## Brush

If the brushes are worn almost to or beyond the limit, replace them.

**Standard: 16.5 mm (0.650 in)**  
**21.5 mm (0.846 in)—RF-CX**  
**Minimum: 8 mm (0.315 in)**



86U05X-090

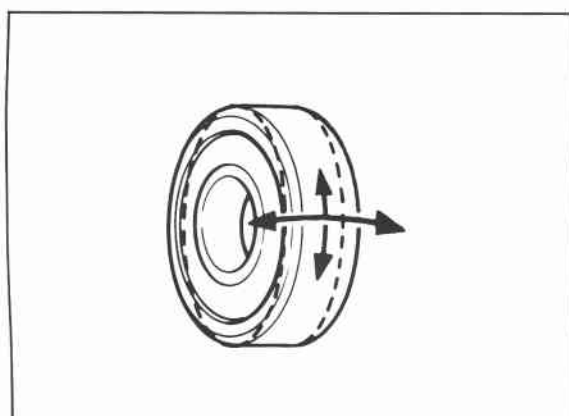
## Brush Spring

1. Measure the force of the brush spring using a spring pressure gauge.
2. Replace the spring if necessary.

**Standard force: 3.0—4.2 N**  
**(310—430 g, 10.9—15.2 oz)**  
**Minimum: 1.7—2.5 N**  
**(170—250 g, 6.0—8.8 oz)**

## Note

**Read the spring pressure gauge at the brush tip projection of 2 mm (0.079 in).**

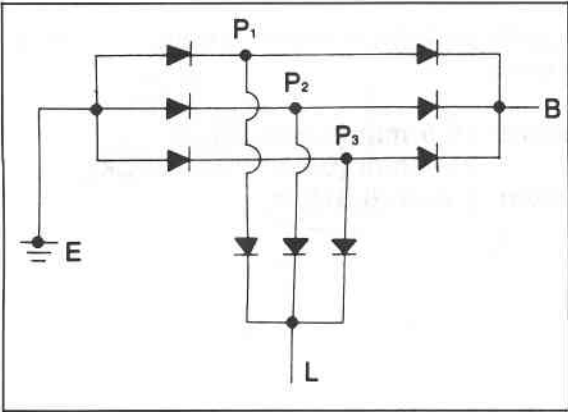


86U05X-023

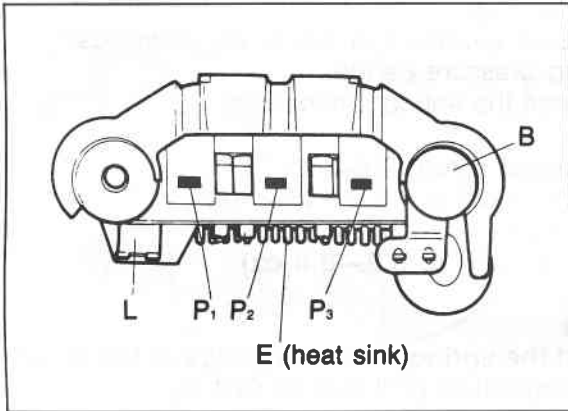
## Bearing

1. Check for abnormal noise, looseness, or insufficient lubrication.
2. Replace the bearing(s) if there is any abnormality.

# 5 ALTERNATOR



86U05X-024



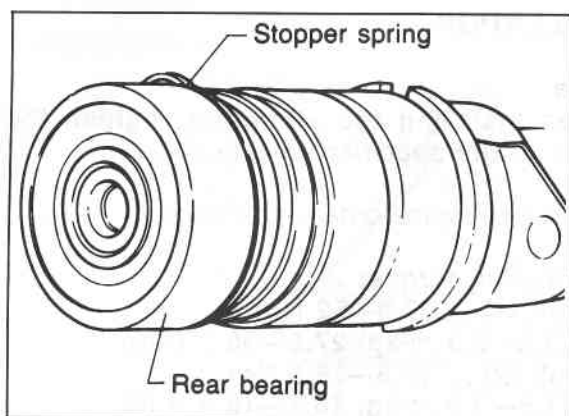
86U05X-025

## Rectifier

1. Check for continuity of the diodes using an ohmmeter.

Negative (Black)	Positive (Red)	Continuity
E	P <sub>1</sub> , P <sub>2</sub> , P <sub>3</sub>	Yes
B		No
L		No
P <sub>1</sub> , P <sub>2</sub> , P <sub>3</sub>	E	No
	B	Yes
	L	Yes

2. Replace the rectifier.



86U05X-026

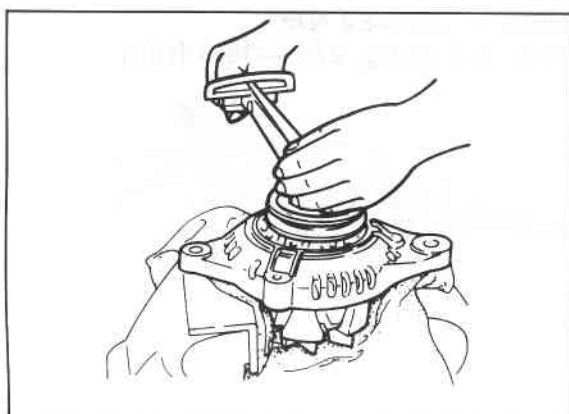
## ASSEMBLY

Assemble in the reverse order of disassembly, referring to assembly note.

### Assembly Note

#### Stopper spring installation

1. Fit the stopper spring into the eccentric groove of the rear bearing circumference.
2. Check that the protruding part of the spring is fitted into the deepest part of the groove.



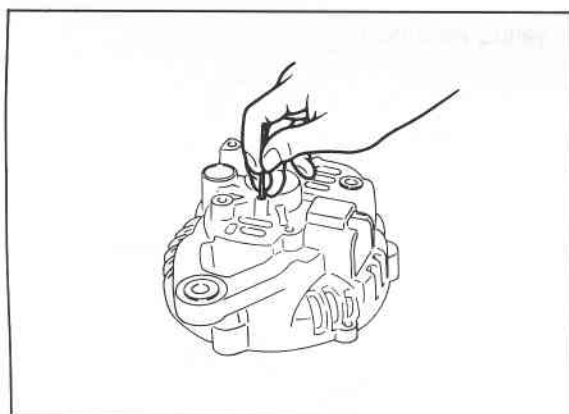
86U05X-027

### Front bracket and rotor

When assembling the front bracket and rotor, tighten the locknut to the specified torque.

#### Tightening torque:

**49—88 N·m (5—9 m·kg, 36—65 ft·lb)**



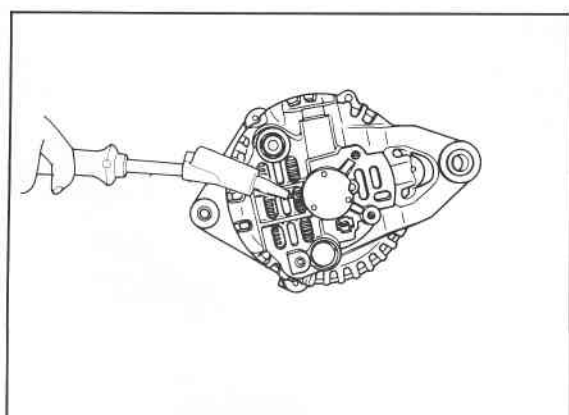
86U05X-028

### Brush lifting

1. Before assembly, use a finger to hold the brushes into the brush holder; then pass a wire ( $\phi 2$  mm, 40—50 mm,  $\phi 0.08$  in, 1.6—2.0 in) through the hole shown in the figure.
2. Secure the brushes in position.

#### Note

**Be sure to remove wire after assembly is completed.**

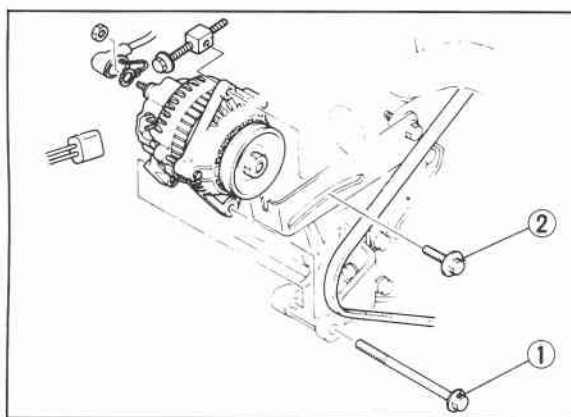


4BG05X-054

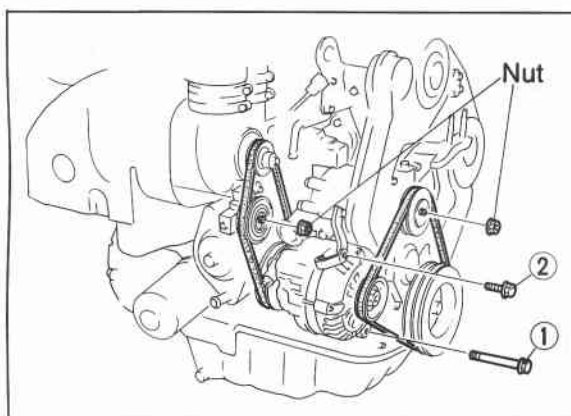
### Rear bearing installation

1. Heat the rear bracket.
2. Press the rear bearing into the rear bracket.
3. Check that the rotor turns easily.

## 5 ALTERNATOR



69G05X-018



76G05X-036

### INSTALLATION

#### Note

When installing the alternator, tighten the bolts to the specified torque.

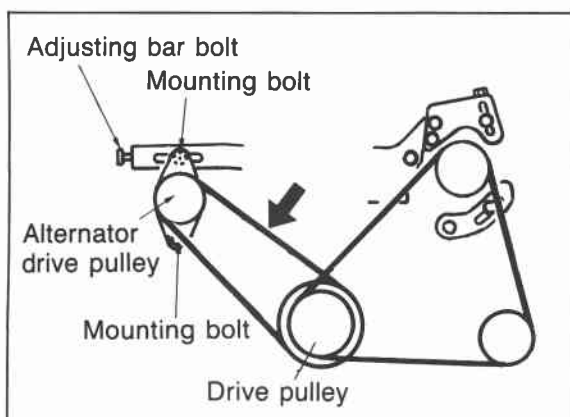
Install in the reverse order of removal.

#### Tightening torque:

Bolt (1).....37.3—52 N·m  
(3.8—5.3 m·kg, 27.5—38.3 ft·lb)

Bolt (2).....18.6—25.5 N·m  
(1.9—2.6 m·kg, 13.7—18.8 ft·lb)

Nut.....37—52 N·m  
(3.8—5.3 m·kg, 27.5—38.3 ft·lb)



76G05X-037

## V-BELT TENSION (GASOLINE)

### Adjustment

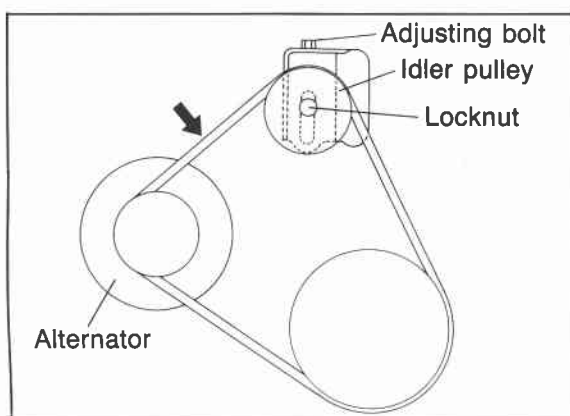
1. Loosen the alternator mounting bolt and adjusting bar bolt.
2. Adjust the alternator belt deflection while pushing the V-belt with a force of 98 N (10 kg, 22 ft-lb).

### Deflection:

**New:** 6—8 mm (0.24—0.31 in)

**Used:** 7—9 mm (0.27—0.35 in)

3. Tighten the bolts and recheck the tension.



76G05X-038

## V-BELT TENSION (DIESEL)

### Adjustment

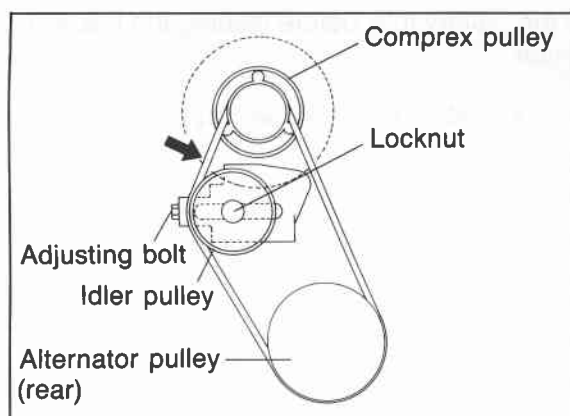
1. Loosen the alternator idler pulley locknut.
2. Adjust the alternator belt deflection while pushing the V-belt with a force of 98 N (10 kg, 22 ft-lb).

### Deflection:

#### Alternator

**New:** 8—10 mm (0.31—0.39 in)

**Used:** 9—11 mm (0.35—0.43 in)



76G05X-058

### Comprex

**New:** 4.0—5.0 mm (0.16—0.20 in)

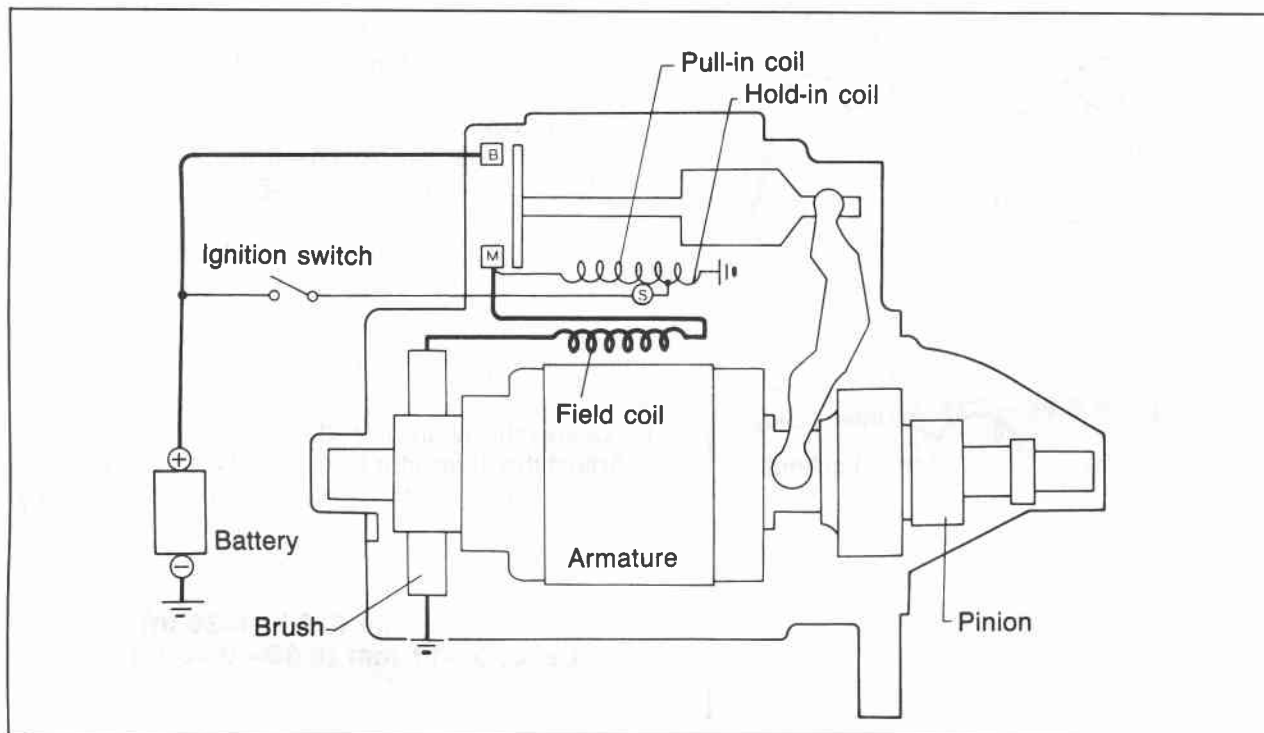
**Used:** 4.5—5.5 mm (0.18—0.21 in)

3. Tighten the bolts and nuts and recheck the tension.

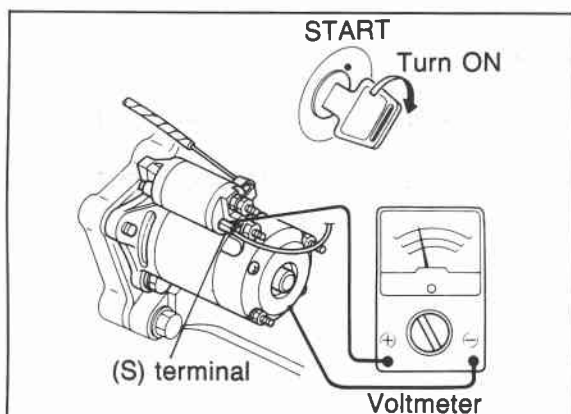
## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)

### STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)

#### STARTING SYSTEM CIRCUIT



76G05X-039



4BG05X-074

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspections.

##### A. If the magnetic switch does not function during starting.

1. Turn the ignition switch to the start position.
2. Measure the voltage between the S terminal and ground.
3. If the measured value is standard voltage or more, there is starter malfunction.
4. If it is less than standard voltage, there is a malfunction in the wiring.

**Standard voltage: 8 V**

#### Caution

**If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.**

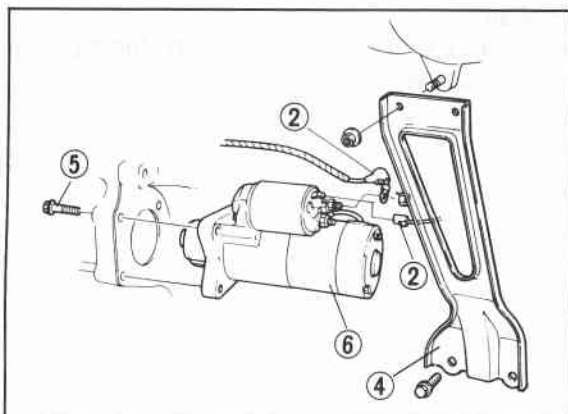
##### B. If the starter won't crank, or if the cranking speed is slow.

The problem may be a malfunction of the starter or in the wiring.

#### Note

**The cranking speed is greatly affected by the viscosity of the engine oil.**

# STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE) 5



76G05X-040

## REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Raise the front of the vehicle and support it with safety stands.
4. Remove the intake manifold bracket. (Fuel Injection Engine)
5. Remove the starter bolts.
6. Draw out the starter from lower side of the vehicle.

Installation in the revers order of removal.

## Tightening torque

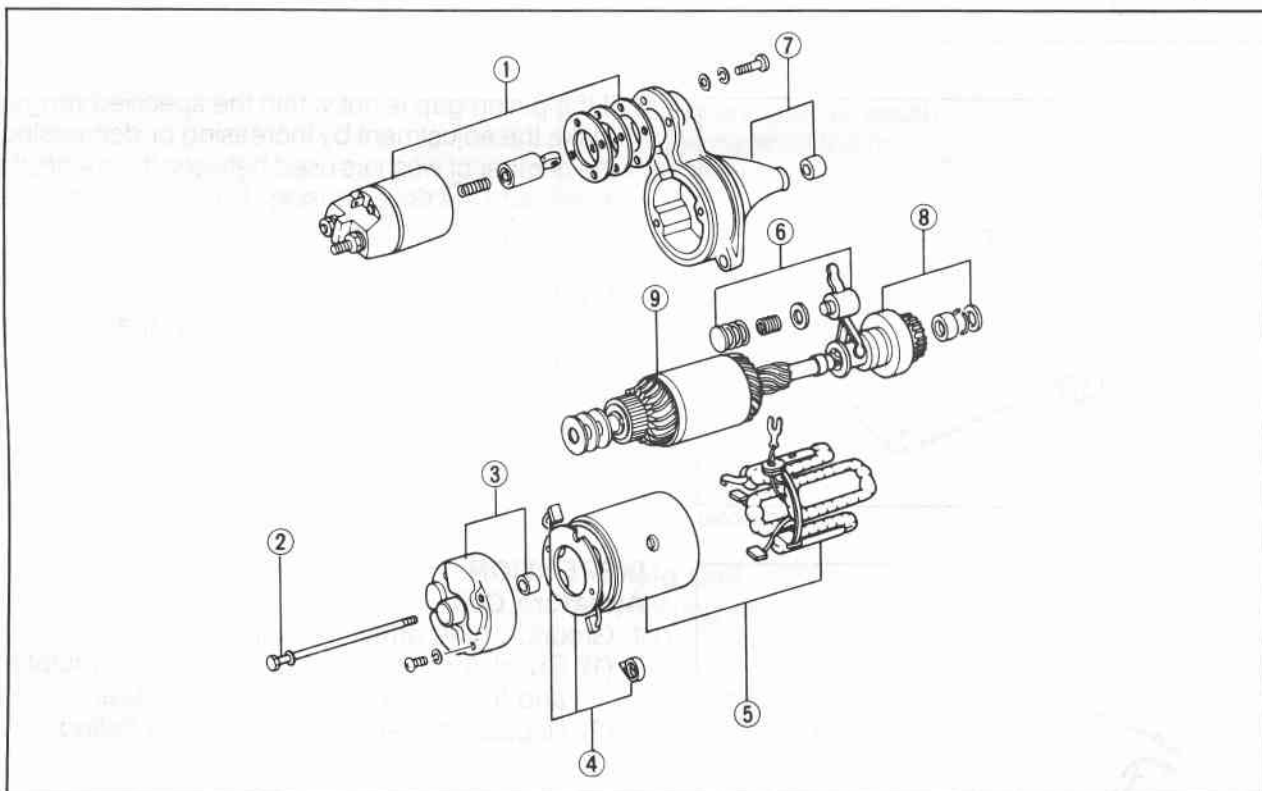
**Bolts.....**37—52 N·m  
(3.8—5.3 m·kg, 27—38 ft·lb)  
**B terminal.....**9.8—11.8 N·m  
(1.0—1.2 m·kg, 87—104 in·lb)

**Intake manifold bracket bolt**  
37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)  
**Nut.....**  
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the numbered order shown in the figure.
2. Assembly is the reverse order of disassembly.

4BG05X-049



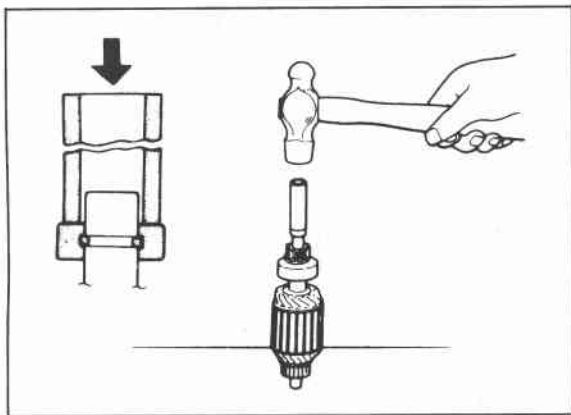
4BG05X-075

1. Magnetic switch
2. Bolt
3. Rear cover
4. Brush-holder assembly

5. Yoke
6. Lever
7. Drive housing  
(front cover)

8. Drive pinion
9. Armature

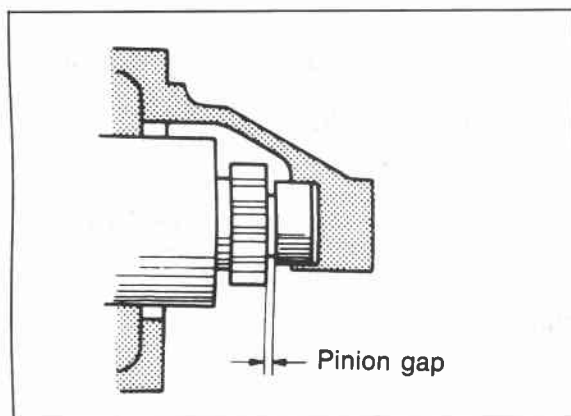
## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)



4BG05X-078

### Drive Pinion

Remove the stopper for the overrunning clutch by using a pipe as shown in the figure.



4BG05X-079

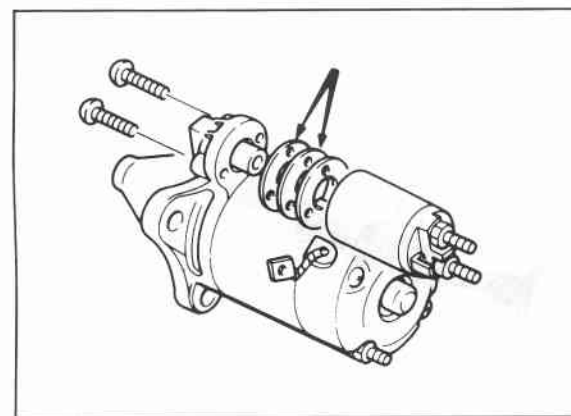
### Adjustment of Pinion Gap

1. Disconnect the wiring from terminal (M).
2. Apply battery power to the terminal (S) and ground the starter motor body, the pinion will eject outward and then stop.
3. Measure the clearance (pinion gap) between the pinion and the stopper.

**Pinion gap: 0.5—2.0 mm (0.020—0.079 in)**

### Caution

**Do not let electricity flow continuously for more than 10 seconds.**

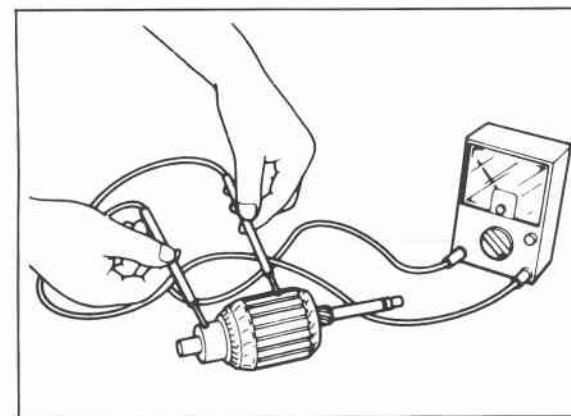


4BG05X-080

4. If the pinion gap is not within the specified range, make the adjustment by increasing or decreasing the number of washers used between the magnetic switch and the drive housing. The gap will become smaller if the number of washers is increased.

### Caution

**Do not use the washers more than 2 mm (0.079 in) in all.**



4BG05X-081

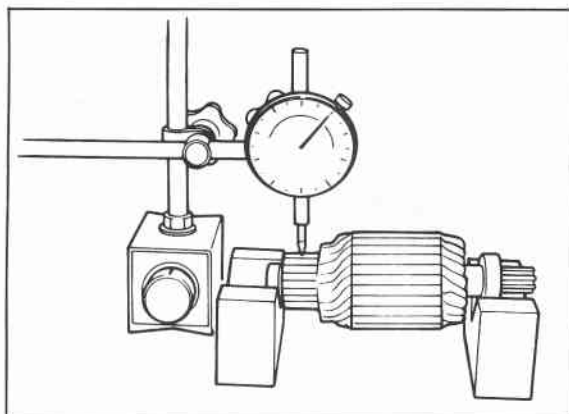
### INSPECTION

#### Armature Coil

1. Ground of the armature coil
  - (1) Check for continuity between the commutator and the core by using a circuit tester.
  - (2) Replace the armature if there is continuity.



## STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE) 5



4BG05X-082

### 2. Vibration of the commutator

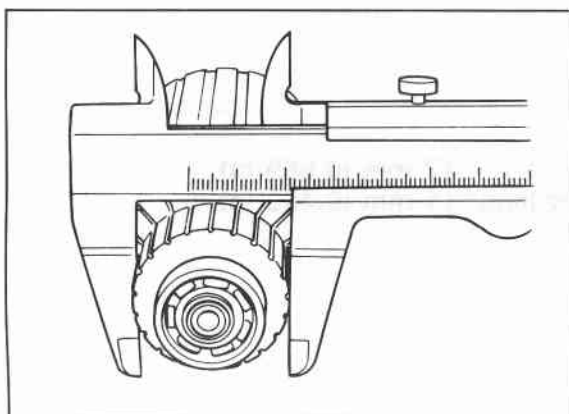
- (1) Place the armature on V blocks, and measure the vibration by using a dial gauge.
- (2) If the vibration is Limit or more, repair so that it becomes standard by using a lathe, or replace the armature.

**Standard vibration: 0.05 mm (0.002 in)**

**Limit: 0.4 mm (0.018 in)**

### Note

**Before checking, be sure that there is no play in the bearings.**



4BG05X-083

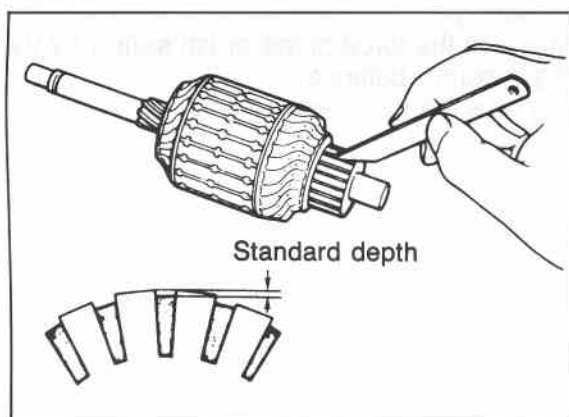
### 3. Outer diameter of the commutator

Replace the armature if the outer diameter of the commutator is grind limit or less.

### 4. Roughness of the commutator surface

- (1) If the commutator surface is dirty, wipe it with a cloth.
- (2) If it is rough, repair it by using a lathe or fine sandpaper.

**Grind limit: 31 mm (1.22 in)**



4BG05X-084

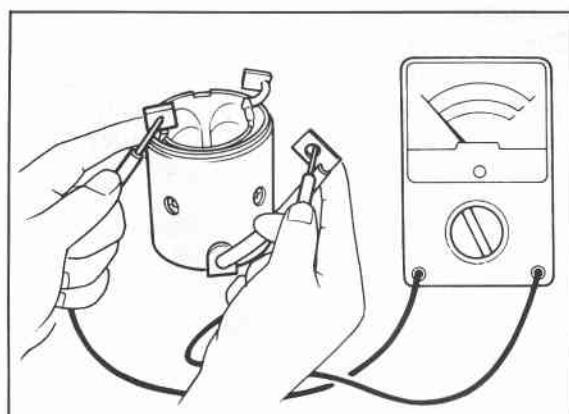
### 5. Segment groove depth

If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

**Standard depth:**

**0.5—0.8 mm (0.020—0.031 in)**

**Limit depth: 0.2 mm (0.008 in)**



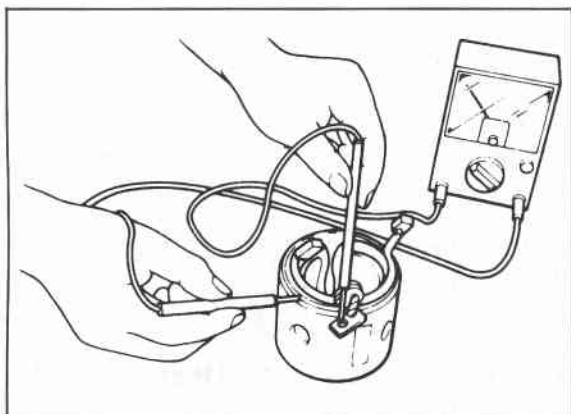
4BG05X-085

### Field Coil

#### 1. Wiring damage

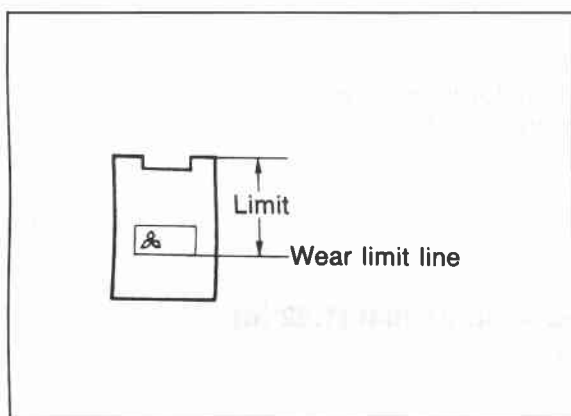
- (1) Check for continuity between the connector and brushes by using a circuit tester.
- (2) Replace the yoke assembly if there is no continuity.

## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)



4BG05X-086

2. Ground of the field coil
  - (1) Check for continuity between the connector and yoke by using a circuit tester.
  - (2) Repair, or replace the yoke assembly if there is continuity.
3. Installation of the field coil  
Replace the yoke assembly if the field coil is loose.



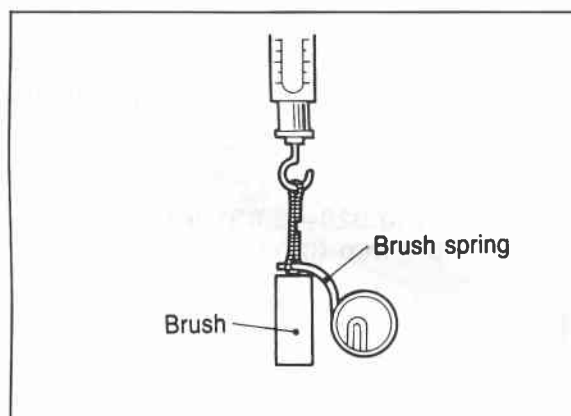
4BG05X-087

### Brush and Brush Holder

1. Brush  
If the brushes are worn beyond the wear limit, or if the wear is near the limit, replace the brushes.

**Standard: 17 mm (0.669 in)**

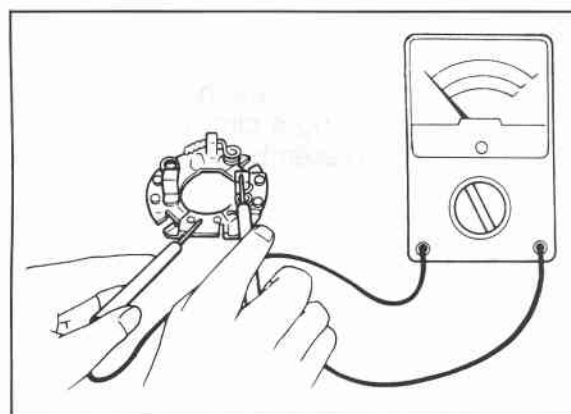
**Wear limit: 11 mm (0.433 in)**



4BG05X-088

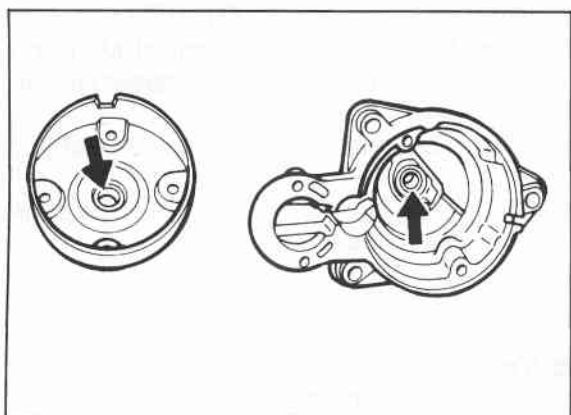
2. Brush spring
  - (1) Measure the force of the brush spring by using a spring balance.
  - (2) Replace the brush spring if the force is Limit or less.

**Limit: 9 N (900 g, 31.75 oz)**



4BG05X-089

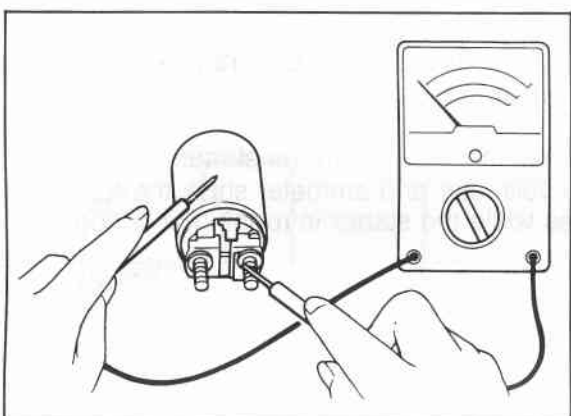
3. Brush holder
  - (1) Check for continuity between the insulated brush and the plate by using a circuit tester.
  - (2) Repair or replace if there is continuity.
  - (3) Also check to be sure that the brush slides smoothly inside the brush holder.



4BG05X-090

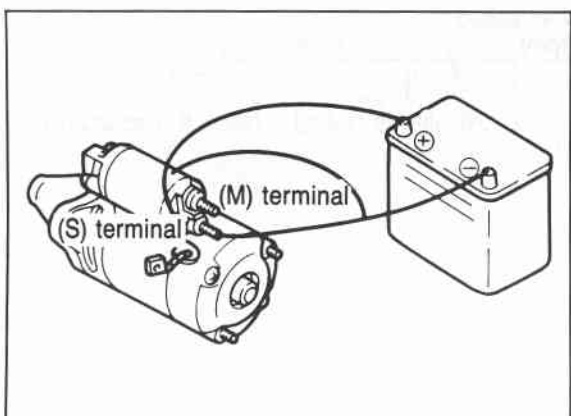
## Drive Pinion and Housing

1. Pinion gear
  - (1) Check for wear or damage of the pinion gear.
  - (2) Replace if necessary.
  - (3) If the pinion gear is seriously damaged, also check the flywheel ring gear.
2. Bushing
  - (1) Check for wear or damage.
  - (2) Replace if necessary.



4BG05X-091

3. Switch coil
  - (1) Check for continuity between the M terminal and the body by using a circuit tester.
  - (2) Replace the switch if there is no continuity.



4BG05X-092

## PERFORMANCE INSPECTION

### Magnetic Switch

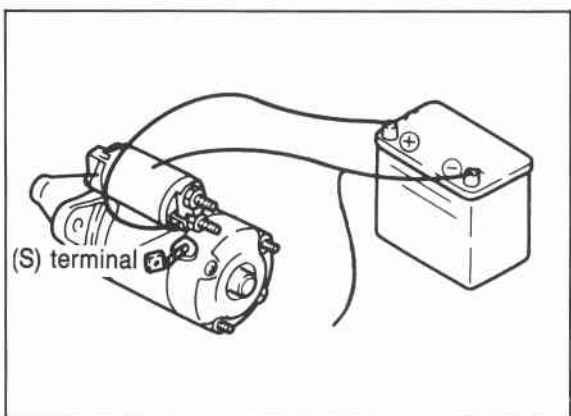
Disconnect the terminal **M wire**, and make the following tests.

### Pull-in Test

The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

### Caution

**Do not supply power continuously for more than 10 seconds.**

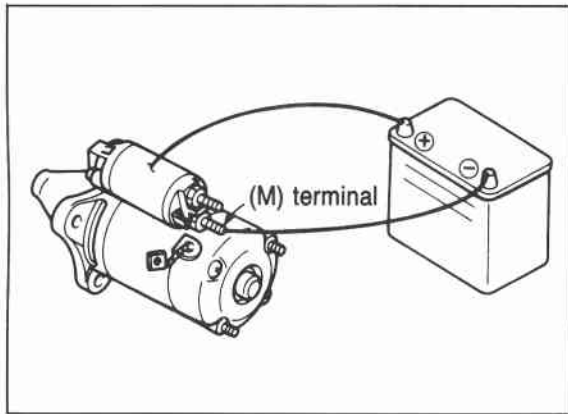


4BG05X-093

### Hold-in Test

1. After completing the pull-in test, disconnect the wire from terminal M (with the pinion left ejected).
2. The hold-in coil is functioning properly if the pinion does not return.

## 5 STARTER (GASOLINE ENGINE, 0.85, 0.95 KW TYPE)



4BG05X-094

### Return Test

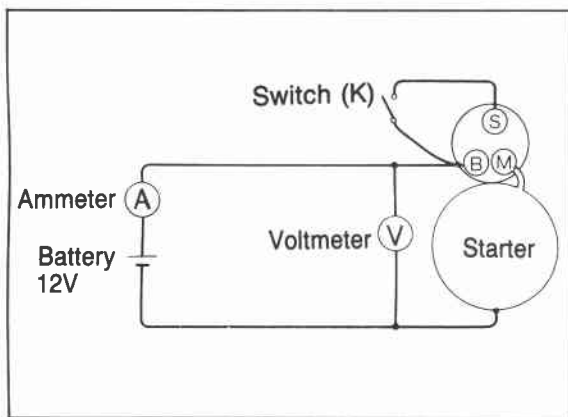
1. Connect the battery between terminal M of the magnetic switch and the body, as shown in the figure.
2. Pull the pinion out manually to the pinion stopper position.
3. The pinion should immediately return to its original position when it is released.

### No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

### Note

**Use wires as thick as possible and tighten each terminal fully.**



76G05X-059

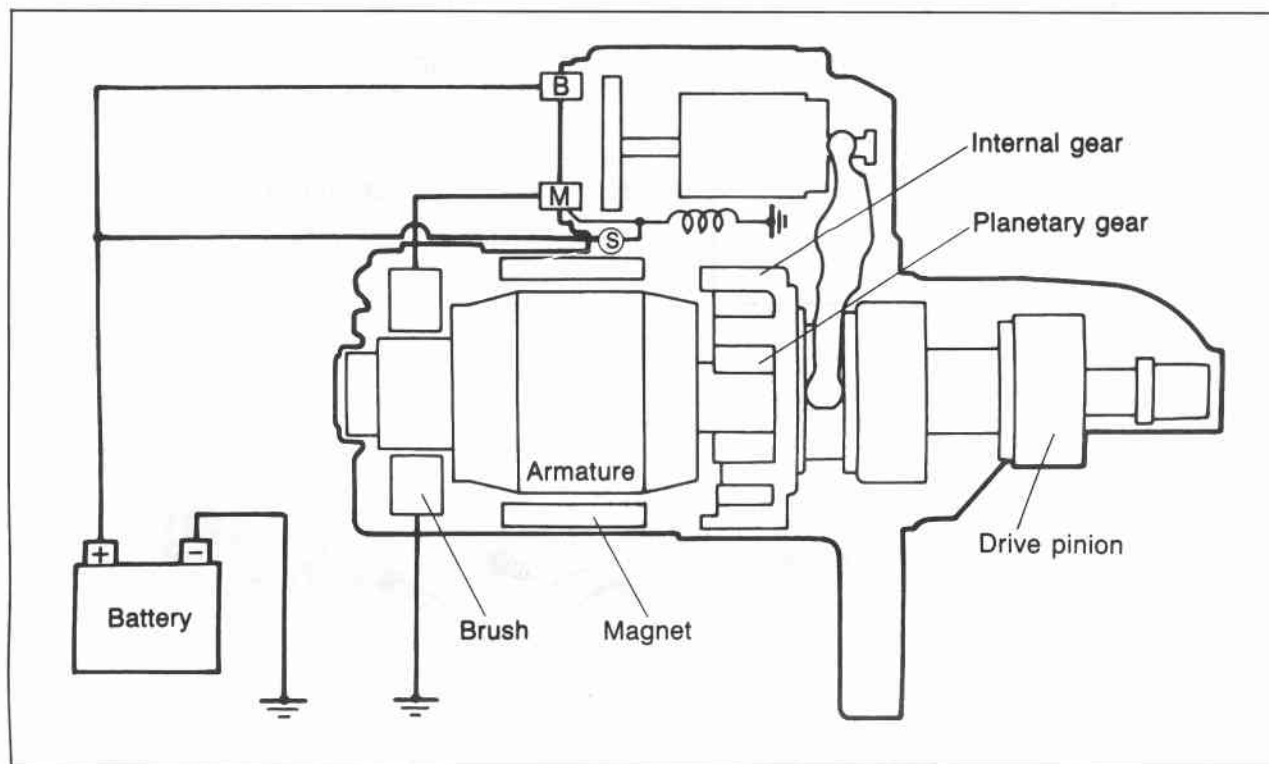
2. Close switch "K" to run the starter.
3. If the voltmeter and ammeter show the following values while the starter is running, it is normal.

	0.85 kW type	0.95 kW type
Battery voltage (volt)	11.5	
Current (ampere)	60 or less	
Gear shaft speed (rpm)	6,500 or more	6,600 or more

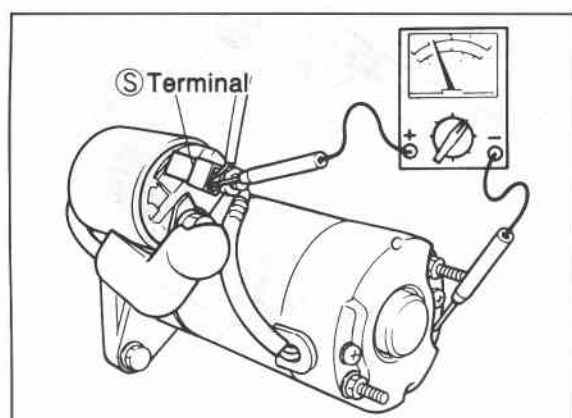
4. If any abnormality is noted, check it according to "INSPECTION"

## STARTER (GASOLINE ENGINE, 1.4 KW TYPE)

### STARTING SYSTEM



76G05X-041



86U05X-031

### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspection.

1. Turn the ignition switch to the start position.
2. Check that the starter motor operates.
3. If the starter does not operate, check the voltage between S terminal and ground using a voltmeter.
4. If the voltage is 8V or more, the starter is malfunction.
5. If less than 8V, the wiring harness is malfunction.

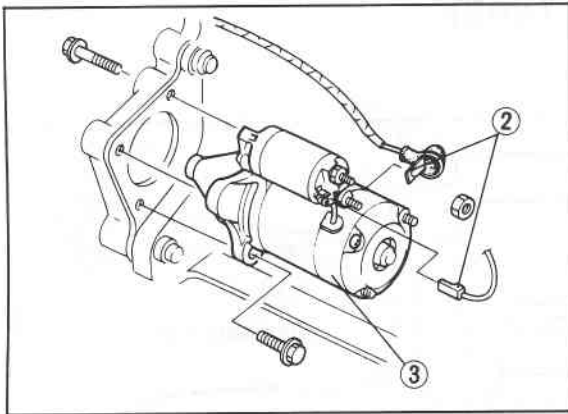
### Caution

If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

### Note

The cranking speed is greatly affected by the viscosity of the engine oil.

## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



76G05X-042

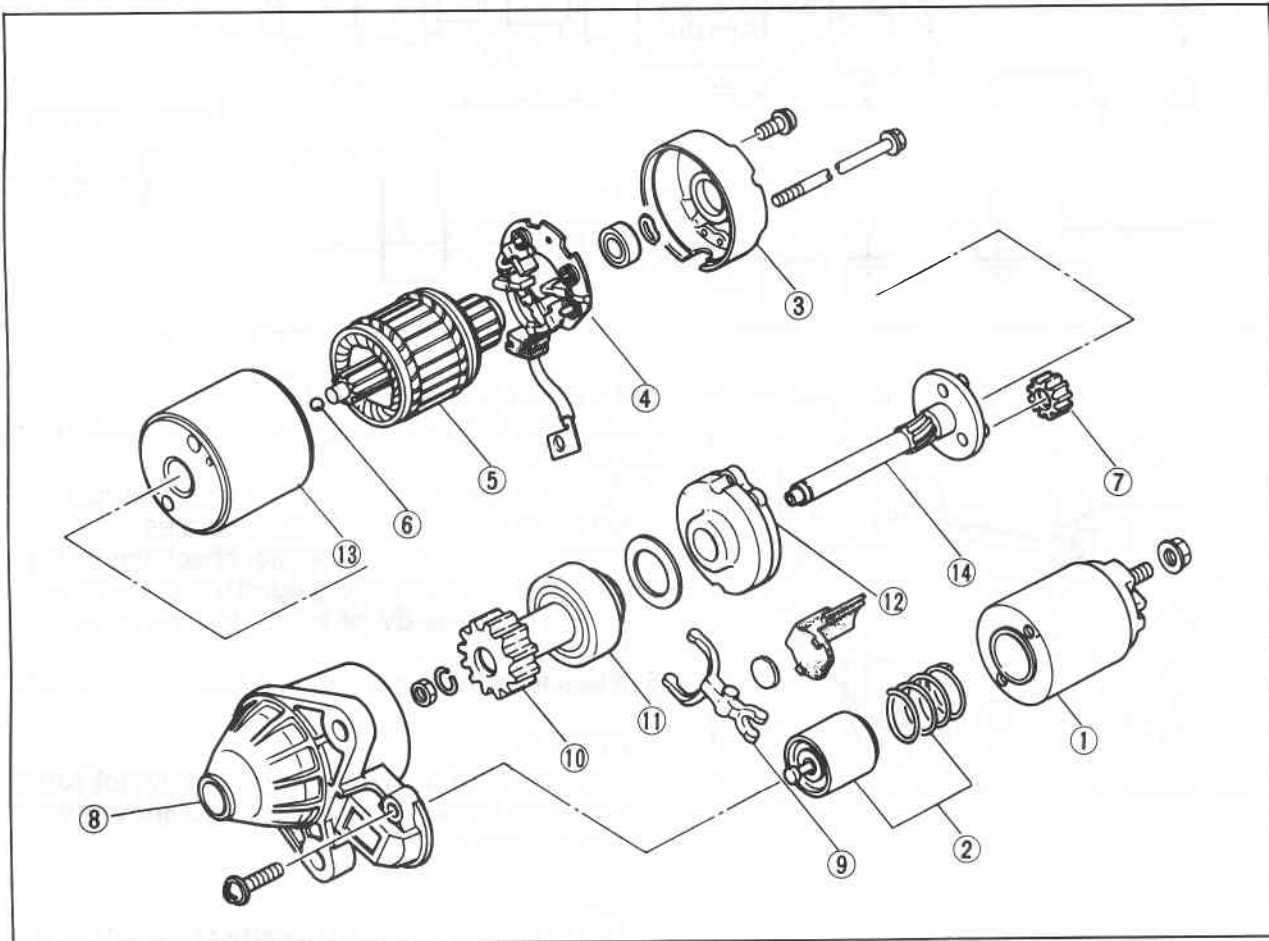
### REMOVAL

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Raise the front of the vehicle and support it with safety stands.
4. Remove the starter bolts.
5. Draw out the starter from lower side of the vehicle.

### Note

**Remove the lowest starter bolt last.**

### DISASSEMBLY



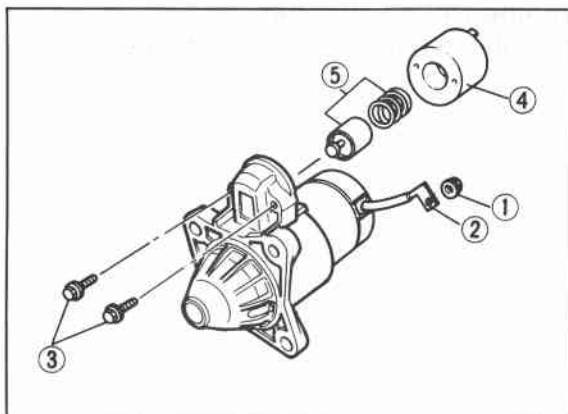
86U05X-083

- |                          |                              |                        |
|--------------------------|------------------------------|------------------------|
| 1. Magnetic switch       | 6. Ball                      | 11. Overrunning clutch |
| 2. Plunger and spring    | 7. Planetary gear            | 12. Internal gear      |
| 3. Rear housing          | 8. Drive housing front cover | 13. Yoke assembly      |
| 4. Brush holder assembly | 9. Lever                     | 14. Gear shaft         |
| 5. Armature              | 10. Drive pinion             |                        |

### Caution

**Do not strike the yoke with a hammer, drop it or put it in a vise when disassembling the starter.**

## STARTER (GASOLINE ENGINE, 1.4 KW TYPE) 5

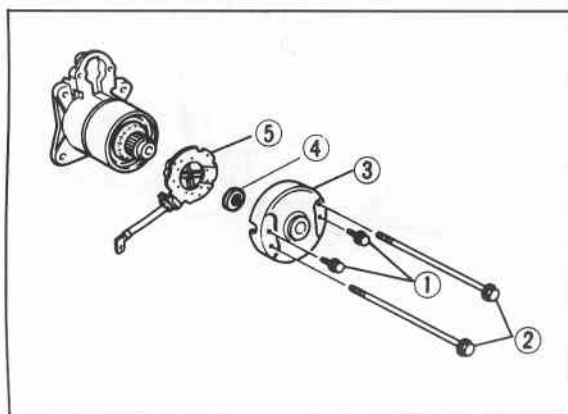


86U05X-33

### Magnetic Switch

Remove the following parts:

- (1) M terminal nut
- (2) Wire
- (3) Switch installation screws
- (4) Magnetic switch
- (5) Plunger and plunger spring



7BU05X-034

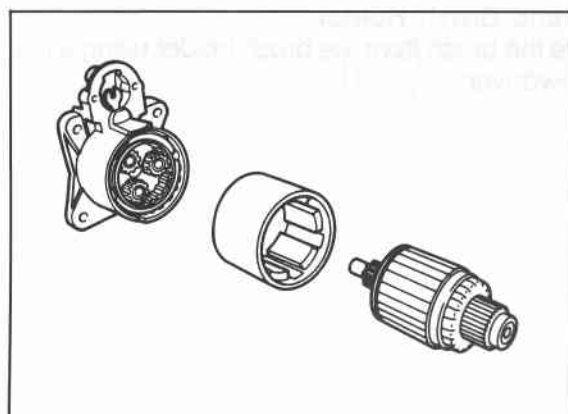
### Rear Bracket and Brush Holder

Remove the following parts:

- (1) Brush holder installation screws
- (2) Through bolts
- (3) Rear cover
- (4) Wave washer
- (5) Brush holder assembly

### Note

Put an aligning mark on the yoke and rear bracket for reassembly before removing the rear bracket.



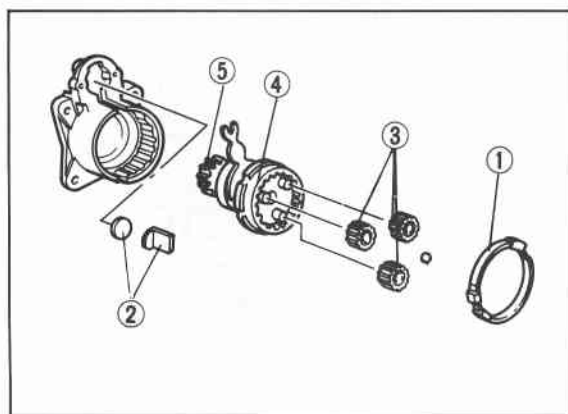
7BU05X-035

### Yoke and Armature

Remove the armature and yoke.

### Note

Put an aligning mark on the yoke and front bracket for reassembly before removing the front bracket.



7BU05X-110

### Overrunning Clutch, Planetary Gears, and Internal Gear.

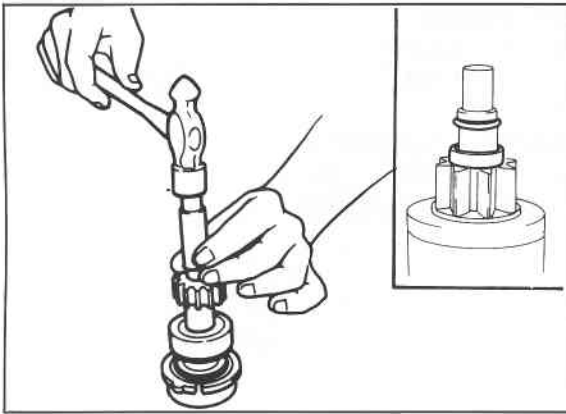
Remove the following parts:

- (1) Gasket
- (2) Plate
- (3) Planetary gears
- (4) Internal gear
- (5) Drive pinion

### Note

Do not lose the ball.

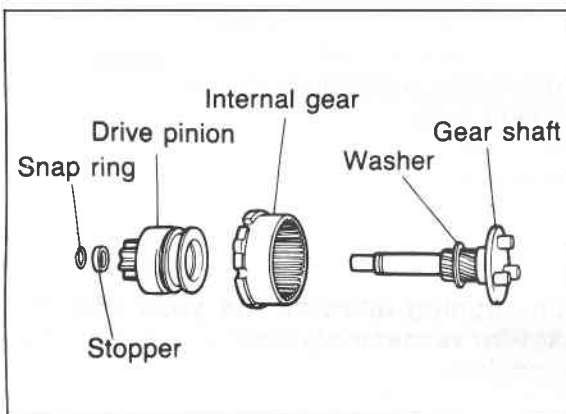
## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



86U05X-034

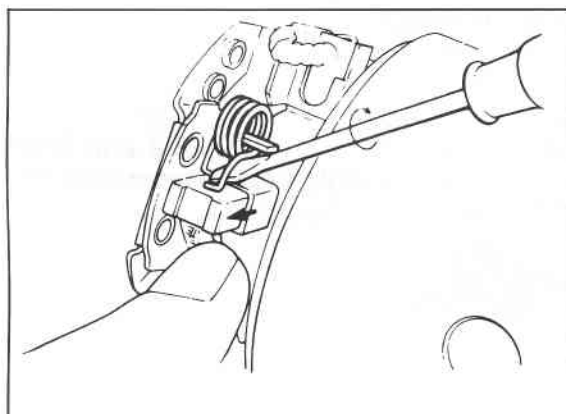
### Overrunning Clutch Stopper

1. Remove the overrunning clutch stopper using a pipe.



7BU05X-037

2. Disassemble the drive pinion, internal gear and washer from the gear shaft.

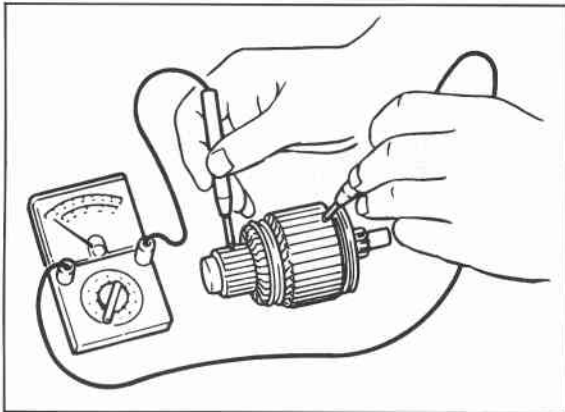


7BU05X-038

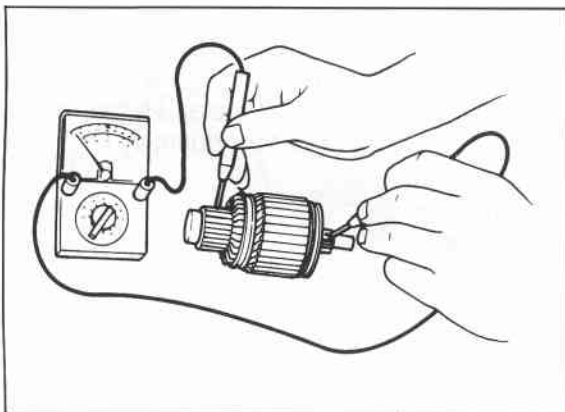
### Brush and Brush Holder

Remove the brush from the brush holder using a flat-tip screwdriver.

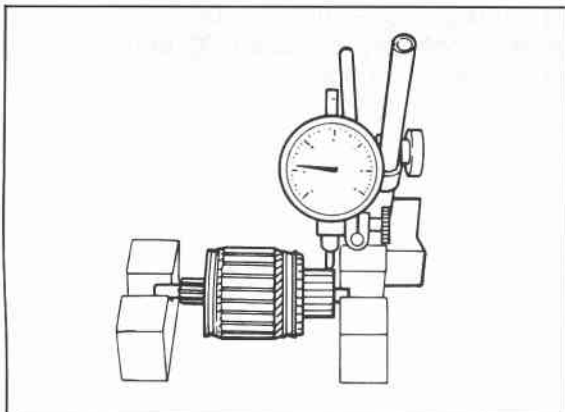




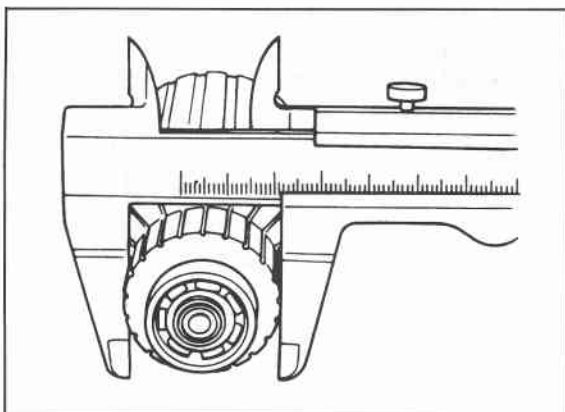
67U05X-048



67U05X-049



7BU05X-039



7BU05X-040

## INSPECTION

### Armature

1. Ground of armature coil  
Check for continuity between the commutator and the core using a circuit tester. Replace the armature if there is continuity.
2. Insulation of armature coil  
Check for continuity between the commutator and the shaft using a circuit tester. Replace the armature if there is continuity.

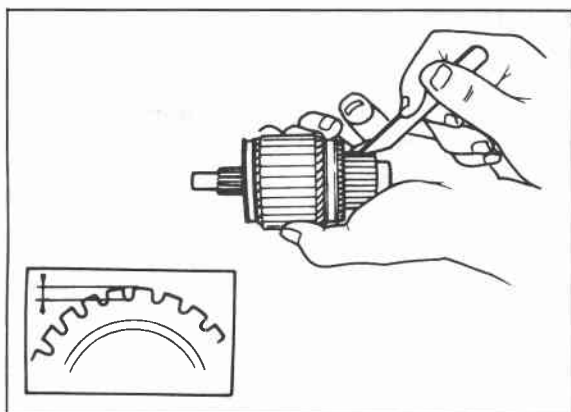
3. Runout of commutator
  - (1) Place the armature on V blocks, and measure the runout using a dial gauge.
  - (2) If the runout is excessive, replace the armature.

**Runout: 0.05 mm (0.002 in)**  
**Maximum: 0.1 mm (0.004 in)**

4. Outer diameter of commutator  
Replace the armature if the outer diameter of the commutator is less than the grind limit.
5. Roughness of commutator surface  
Repair using a lathe or fine sandpaper if it is rough; wipe it with a rag if it is dirty.

**Grind limit: 28.8 mm (1.13 in)**

## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



7BU05X-041

### 6. Segments groove depth

If the depth of the groove is less than standard, undercut the grooves to the standard depth.

**Standard depth: 0.5—0.8 mm (0.02—0.03 in)**

**Minimum depth: 0.2 mm (0.008 in).**

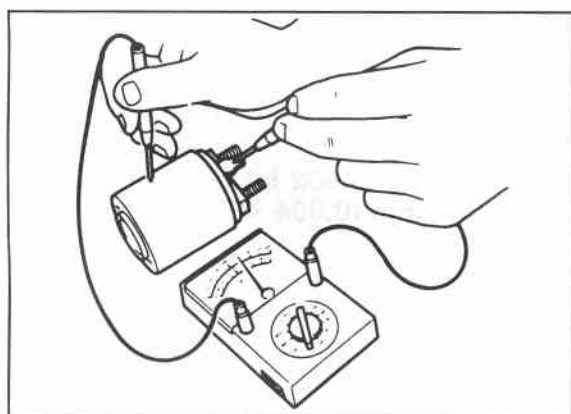


67U05X-053

### Magnetic Switch

#### 1. Wiring damage (S terminal — M terminal).

Check for continuity between the S terminal and the M terminal using a circuit tester. Replace the magnetic switch if there is no continuity.



67U05X-054

#### 2. Wiring damage (S terminal — body)

Check for continuity between S terminal and body using a circuit tester.

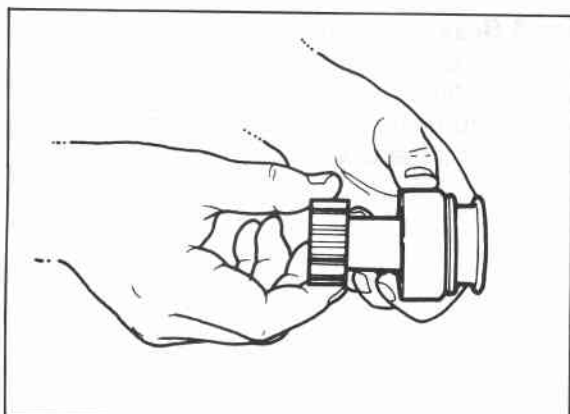
Replace the magnetic switch if there is no continuity.



67U05X-055

#### 3. Ground of magnetic switch

Check for continuity between M and B terminals using a circuit tester. Replace the magnetic switch if there is continuity.



86U05X-035

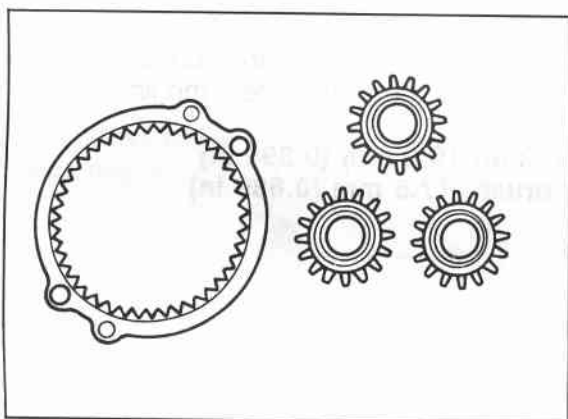
## Overrunning Clutch

Turn the pinion shaft by hand and hold the overrunning clutch.

Replace the overrunning clutch if the pinion turns in both directions or in neither direction.

### Note

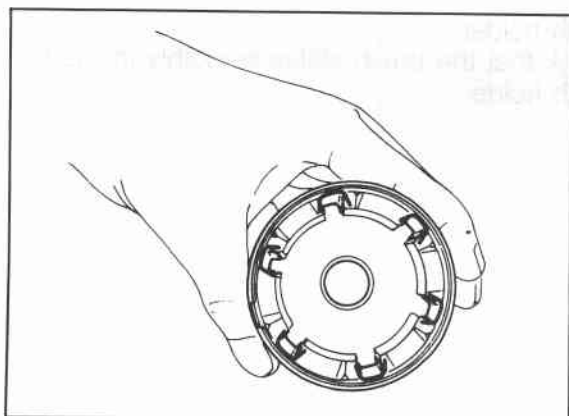
**Do not wash the overrunning clutch with solvent; it is packed with grease and sealed.**



67U05X-057

## Internal Gear and Planetary Gears

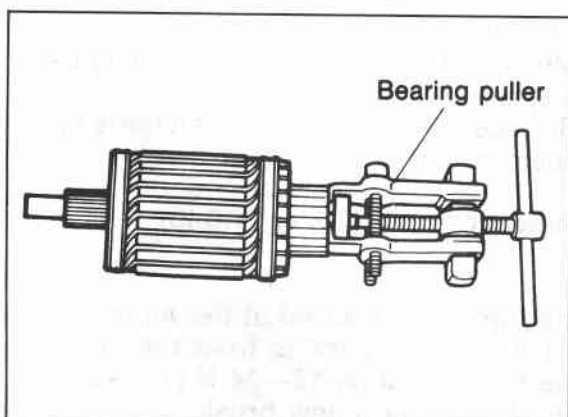
1. Internal gear  
Check for wear or damage. Replace if necessary.
2. Planetary gears  
Check for wear or damage. Replace if necessary.



67U05X-058

## Yoke

Check for damage. Replace if necessary.



67U05X-059

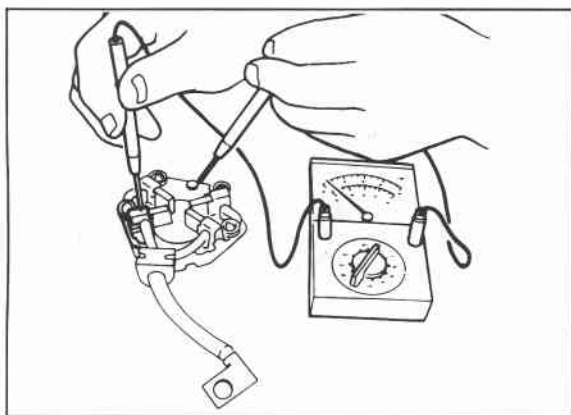
## Bearing

Check for abnormal noise, looseness, binding. Replace the bearing if there is any problem.

### Note

**Use a bearing puller to remove the bearings.**

## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)

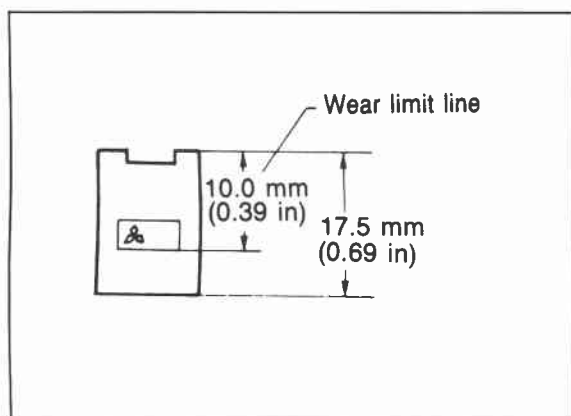


67U05X-060

### Brush and Brush Holder

#### 1. Insulation of brush holder

Check for continuity between the insulated brush and the plate using a circuit tester. Replace the brush holder if there is continuity.



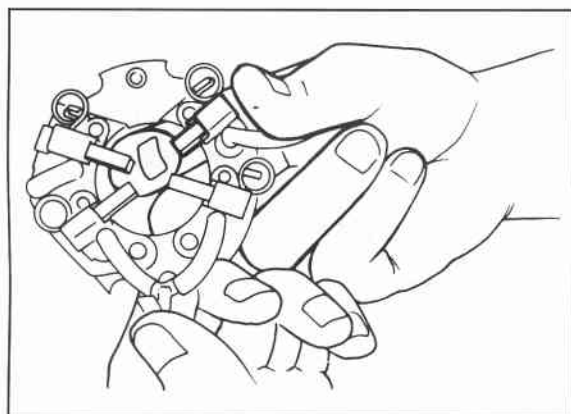
7BU05X-043

#### 2. Brush

Replace the brushes if they are worn beyond the wear limit, or if the wear is near the limit.

**Wear limit: 10.0 mm (0.394 in)**

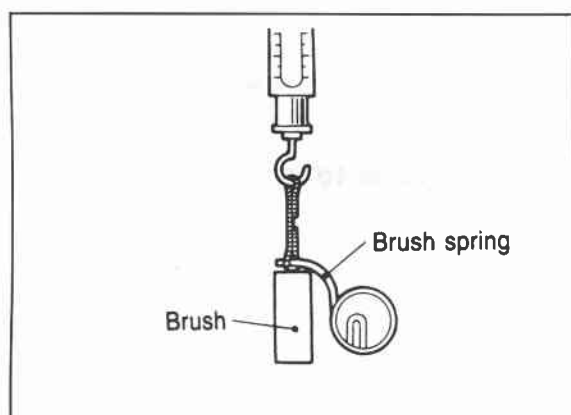
**New brush: 17.5 mm (0.689 in)**



67U05X-062

#### 3. Brush holder

Check that the brush slides smoothly inside the brush holder.



86U05X-036

#### 4. Brush spring

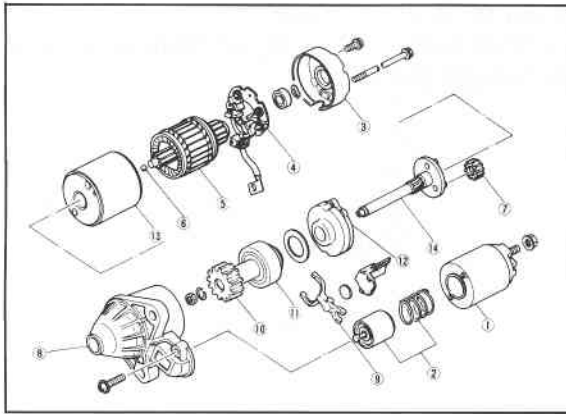
- (1) Measure the force of the brush spring using a spring balance.
- (2) Replace the brush spring if the force is below specification.

**Specification: 7 N (0.7 kg, 1.5 lb)**

#### Note

- a) The force is measured at the moment the brush spring separates from the brush.
- b) The force must be 18—24 N (1.8—2.4 kg, 4.0—5.3 lb) for a new brush spring.

## STARTER (GASOLINE ENGINE, 1.4 KW TYPE) 5



86U05X-037

### ASSEMBLY

Assemble in the reverse order of disassembly, referring to the assembly note.

### Assembly Note

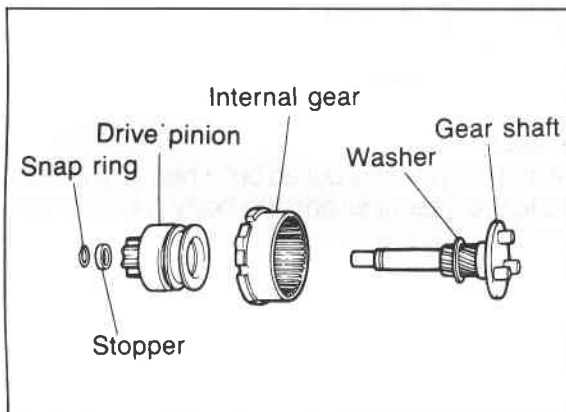
#### Lubricate

During assembly lubricate the following points:

1. Gear of armature shaft
2. Internal gear and planetary gears
3. Plunger circumference
4. Lever
5. Ball
6. Gear shaft spline
7. Front bracket housing

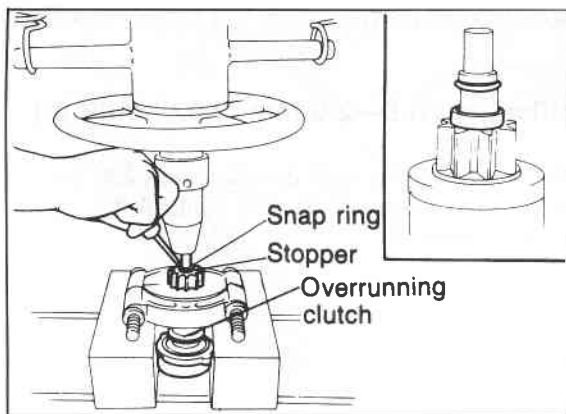
### Installation of Overrunning Clutch

1. Install the washer, internal gear, drive pinion stopper, and the snap ring on the gear shaft.



7BU05X-045

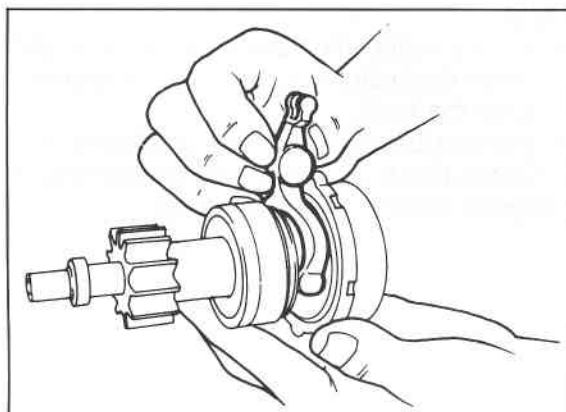
2. Press the stopper and the snap ring into position as shown in the figure.



7BU05X-046

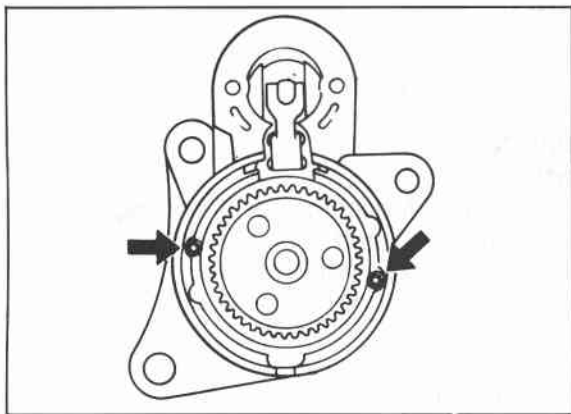
### Installation of lever

Check the lever faces in the correct direction.



7BU05X-047

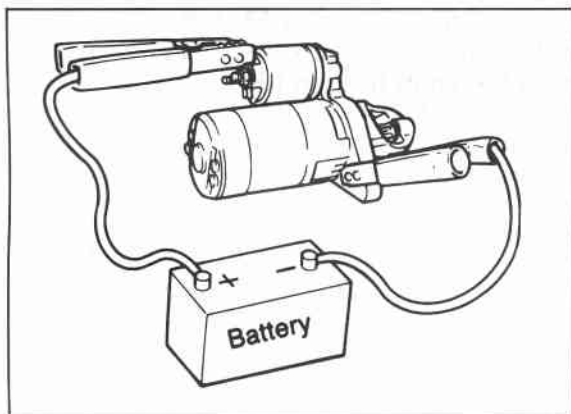
## 5 STARTER (GASOLINE ENGINE, 1.4 KW TYPE)



7BU05X-048

### Installation of Brush Holder

Install the brush holder assembly and rear cover and align the through bolts.



86U05X-038

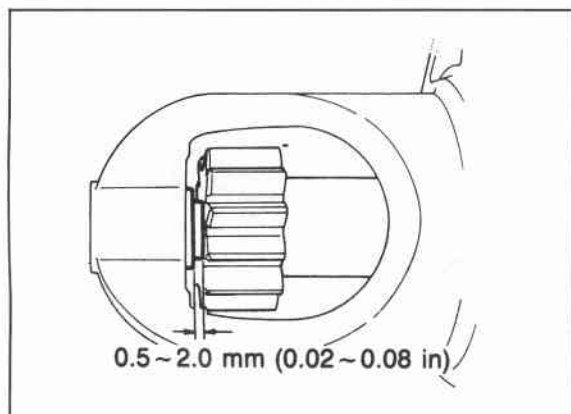
### CHECKING OPERATION

#### Magnetic Switch

Make the following tests:

#### Pull-out test

1. Check that the pinion is pulled out when 12V is connected to the S terminal and the body is grounded.

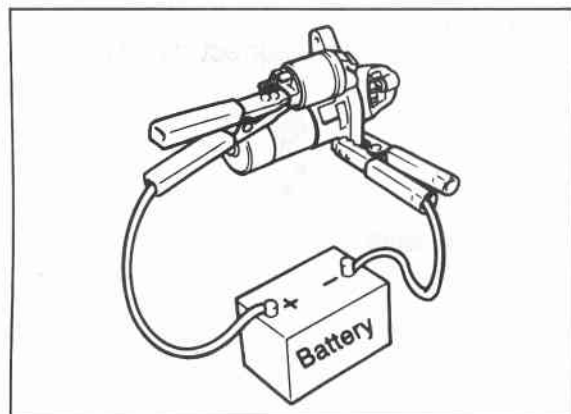


7BU05X-050

2. Measure the pinion gap while the pinion is pulled out.

**Specification: 0.5—2.0 mm (0.02—0.08 in)**

3. Adjust the pinion gap with an adjust washer (drive housing front cover—magnetic switch) if it is not within specification.

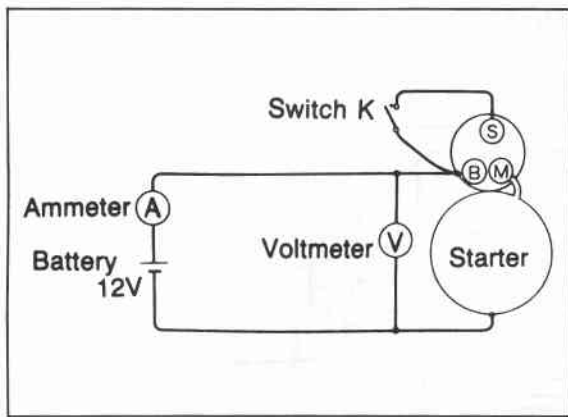


86U05X-039

#### Return test

1. Disconnect the motor wire from the M terminal, and then connect the battery power to the M terminal and ground the body.
2. Pull out the overrunning clutch with a flat-tip screwdriver. Check that the overrunning clutch returns to its original position when released.

## STARTER (GASOLINE ENGINE, 1.4 KW TYPE) 5



86U05X-040

### No-Load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

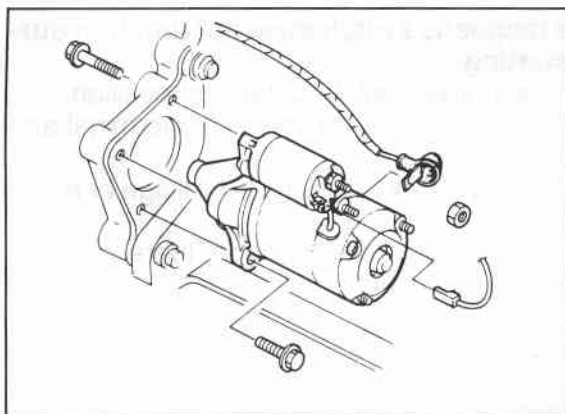
### Note

**Use heavy gauge wires and tighten each terminal fully.**

2. Close switch K to run the starter.
3. Check for the following:

Voltage	(V)	11.0
Current	(A)	90 max.
Gear shaft speed	(rpm)	3,000 min.

4. If any abnormality is noted, check for the cause according to "Inspection".



76G05X-043

### INSTALLATION

Install in the reverse order of removal.

### Note

**When installing the starter, tighten the bolts to the specified torque.**

### Tightening torque:

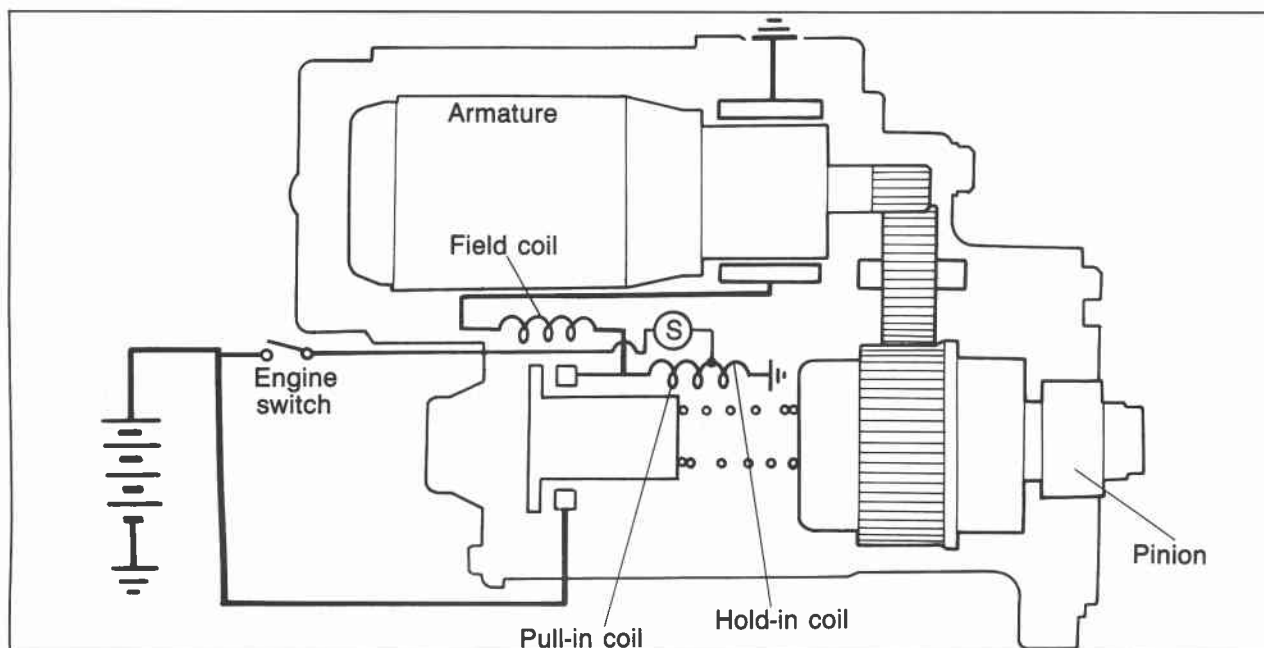
**Bolts..... 37—52 N·m**  
(3.8—5.3 m·kg, 27—38 ft·lb)

**B terminal..... 9.8—11.8 N·m**  
(1.0—1.2 m·kg, 87—104 in·lb)

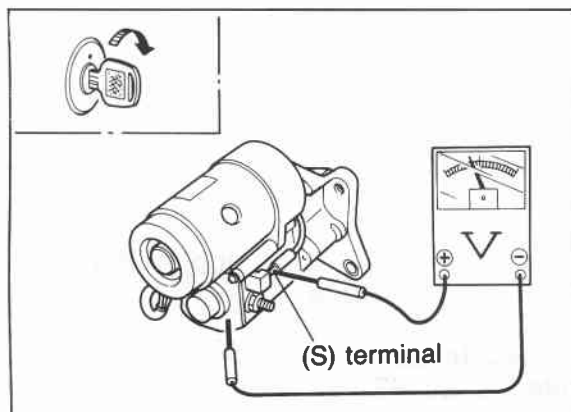
## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)

### STARTER (DIESEL ENGINE, 2.0 KW TYPE)

#### STARTING SYSTEM CIRCUIT



4BG05X-096



76G05X-060

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspections.

##### A. If the magnetic switch does not function during starting.

1. Turn the ignition switch to the start position.
2. Measure the voltage between the S terminal and ground.
3. If the measured value is standard voltage or more, there is starter malfunction.
4. If it is less than standard voltage, there is a malfunction in the wiring.

**Standard voltage: 8 V**

#### Caution

If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

##### B. If the starter won't crank, or if the cranking speed is slow.

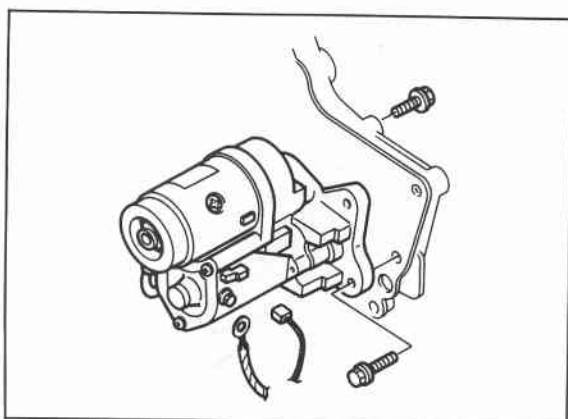
The problem may be a malfunction of the starter or in the wiring.

#### Note

The cranking speed is greatly affected by the viscosity of the engine oil.



## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5



76G05X-044

### REMOVAL AND INSTALLATION

Removal is as follows:

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Remove the starter.

Install in the reverse order of removal.

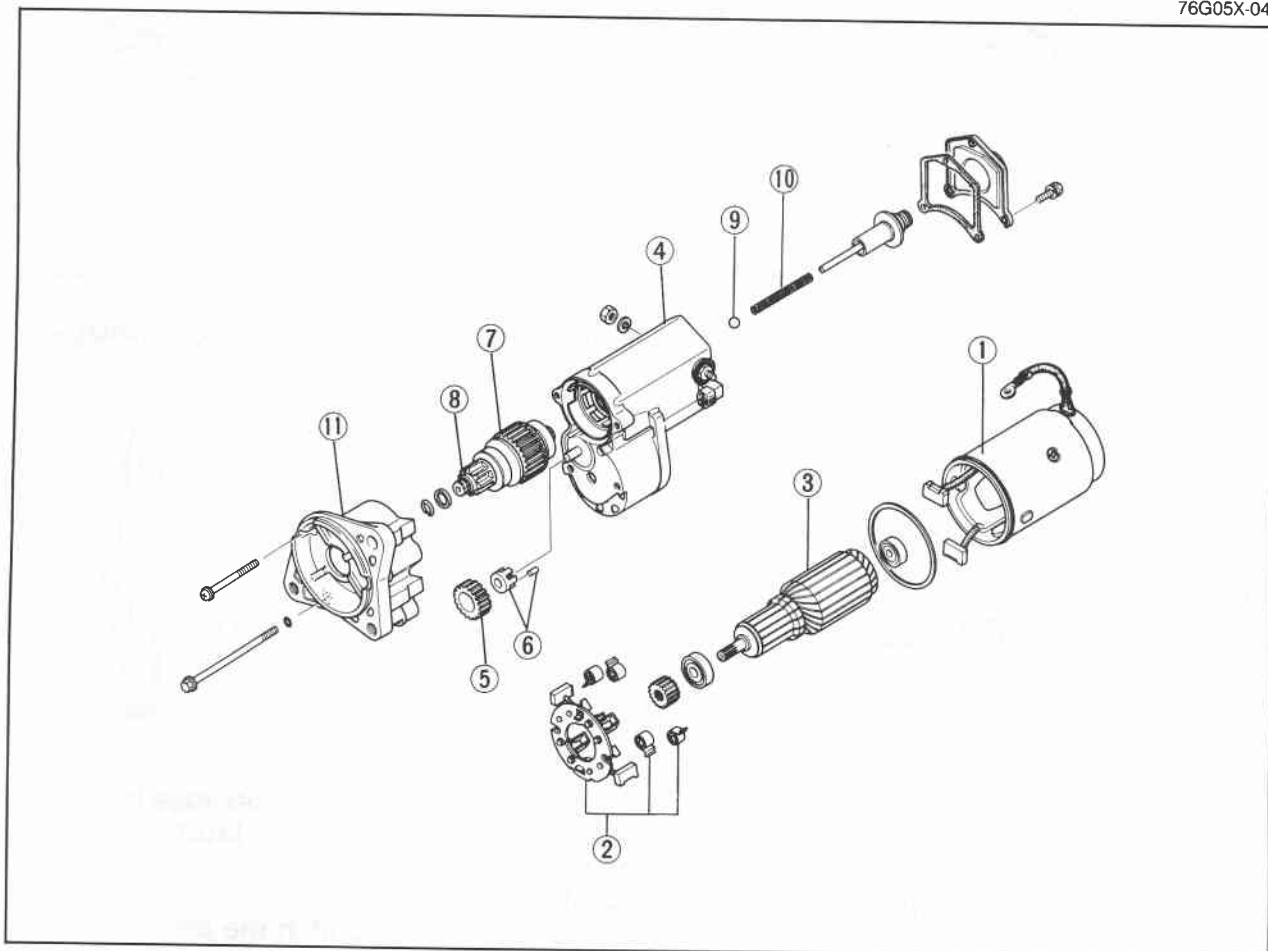
### Tightening torque:

- Bolts**..... 64—89 N·m  
(6.5—9.1 m·kg, 47—66 ft·lb)  
**B terminal**..... 9.8—11.8 N·m  
(1.0—1.2 m·kg, 87—104 in·lb)

### DISASSEMBLY AND ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

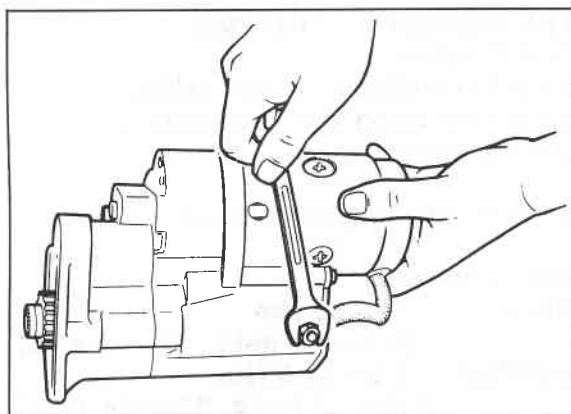
76G05X-045



4BG05X-047

- |                             |                                 |
|-----------------------------|---------------------------------|
| 1. Yoke assembly            | 7. Over-running clutch assembly |
| 2. Brush holder             | 8. Pinion gear                  |
| 3. Armature                 | 9. Steel ball                   |
| 4. Magnetic switch assembly | 10. Coil spring                 |
| 5. Idler gear               | 11. Housing                     |
| 6. Retainer and rollers     |                                 |

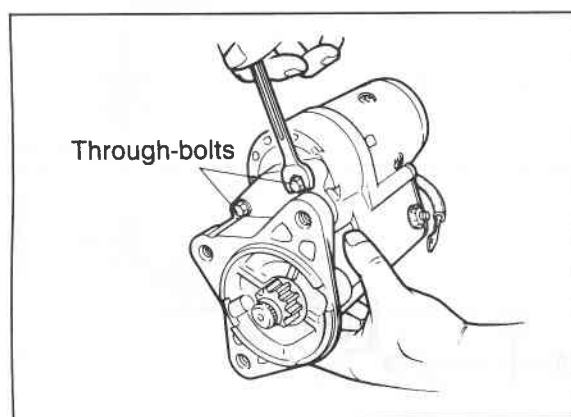
## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



4BG05X-098

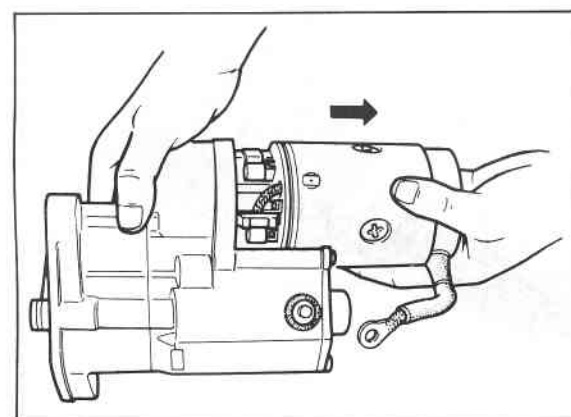
### Disassembly

1. Remove the lead wire connected to the magnetic switch.



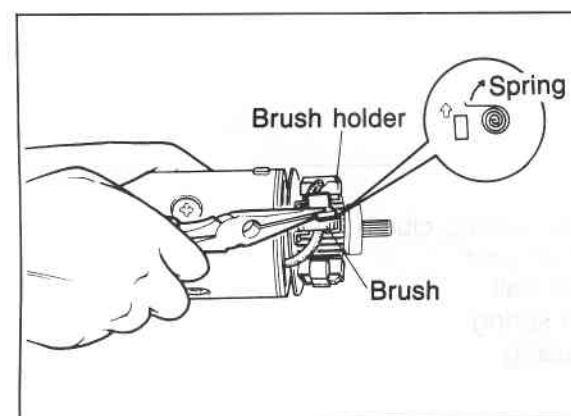
4EG05X-041

2. Remove the two through-bolts.



4EG05X-042

3. Remove the yoke from the magnetic switch.



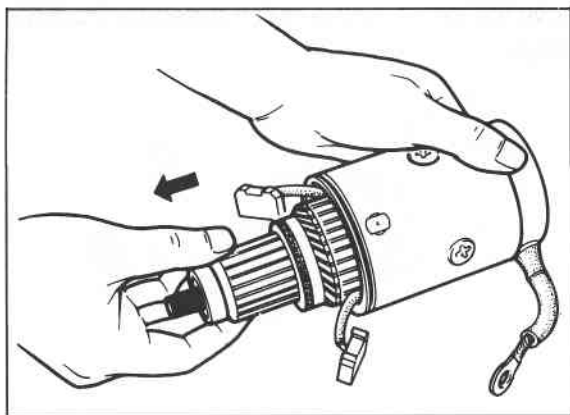
4EG05X-043

4. Using radio pliers or a similar tool, raise the + side brush spring and remove the brush.

### Caution

**Be careful not to scratch the brush or commutator.**

## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5

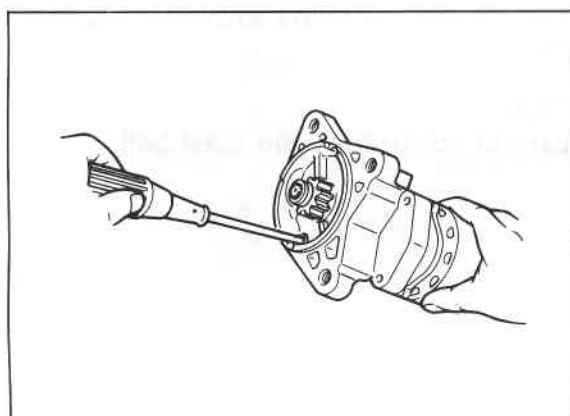


4EG05X-044

5. Remove the armature from the yoke.

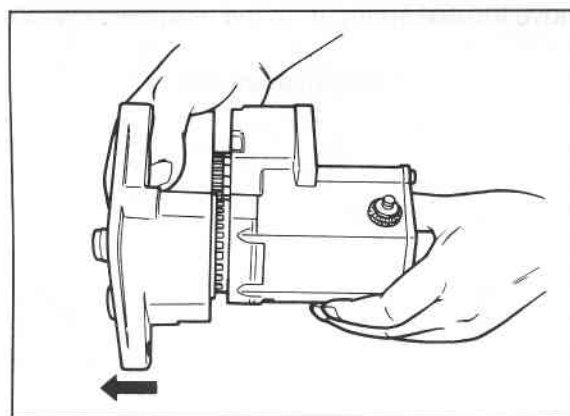
**Caution**

**Be careful not to drop the armature.**



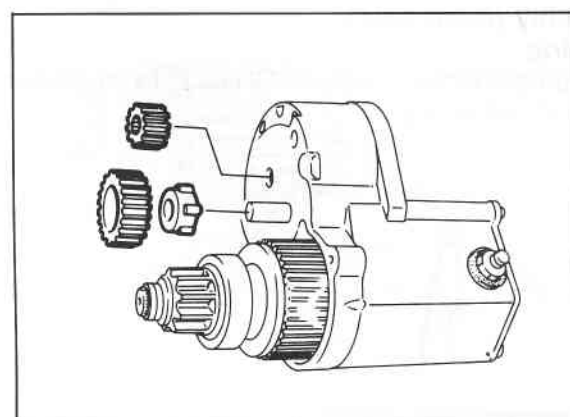
4EG05X-045

6. Remove the two screws which hold the housing and the magnetic switch.



4EG05X-046

7. Remove the housing from the magnetic switch.



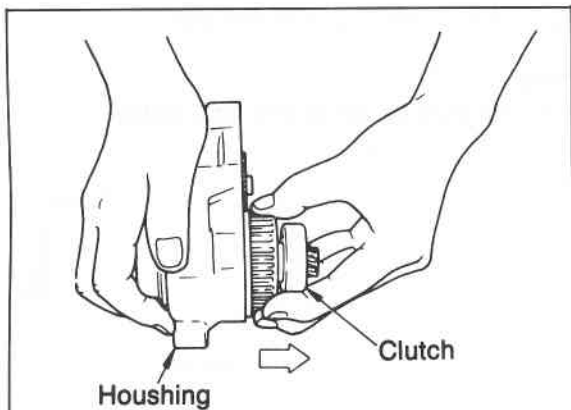
4EG05X-047

8. Remove the idle gear, retainer and roller.

**Caution**

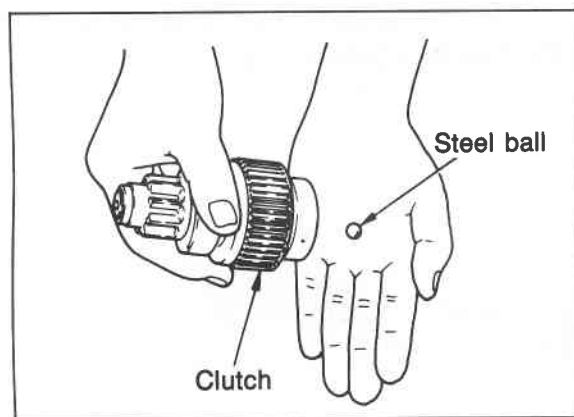
**Be careful not to lose the roller.**

## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



4EG05X-048

9. Remove the over-running clutch assembly from the housing.

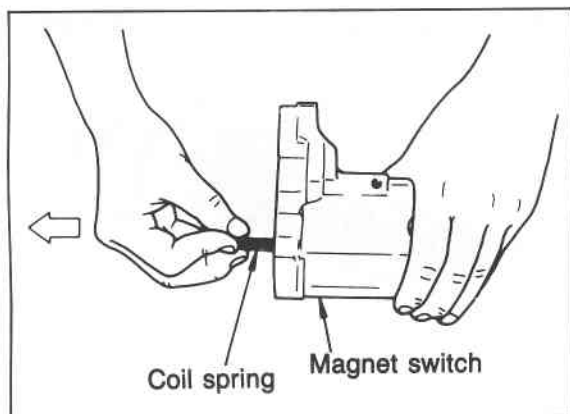


4EG05X-049

10. Remove the steel ball from the over-running clutch assembly.

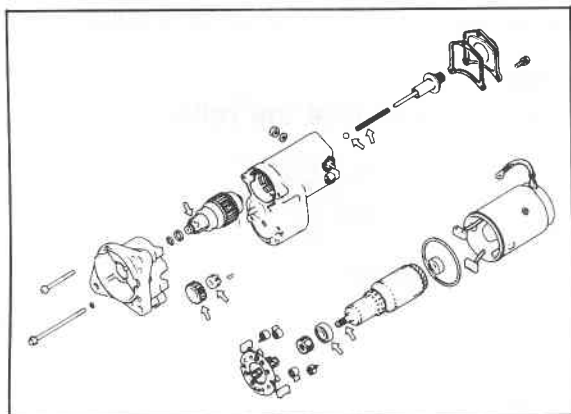
### Caution

**Be careful not to lose the steel ball.**



4EG05X-050

11. Remove the coil spring from the magnetic switch.

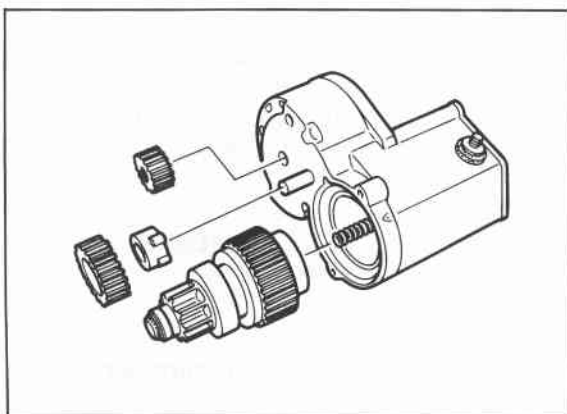


4BG05X-099

### Assembly (main point)

#### Greasing

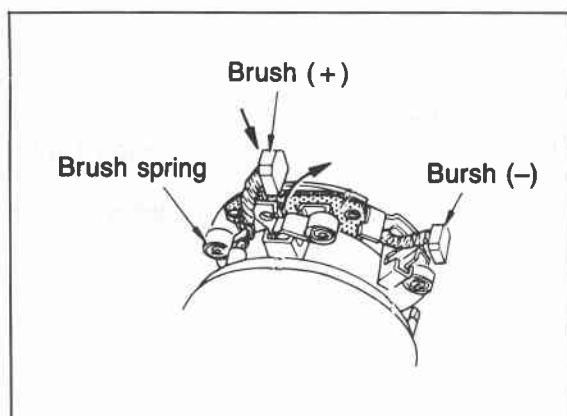
Apply grease (lithium base, NLGI No. 2) to the places shown in the figure.



4BG04X-100

## Coil spring and steel ball installation

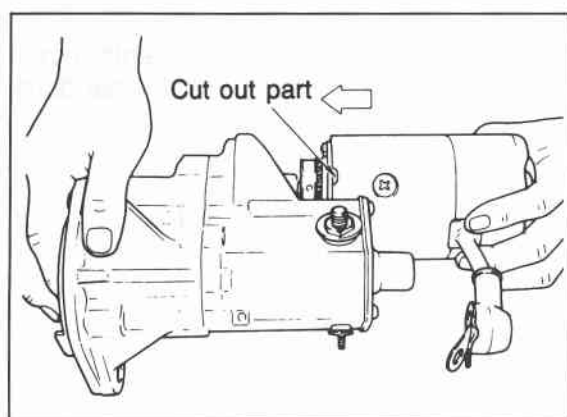
1. Install the coil spring and steel ball to the magnetic switch before installing the over-running clutch assembly.
2. Assemble the retainer and roller to the idler gear.



4BG05X-101

## Brush installation

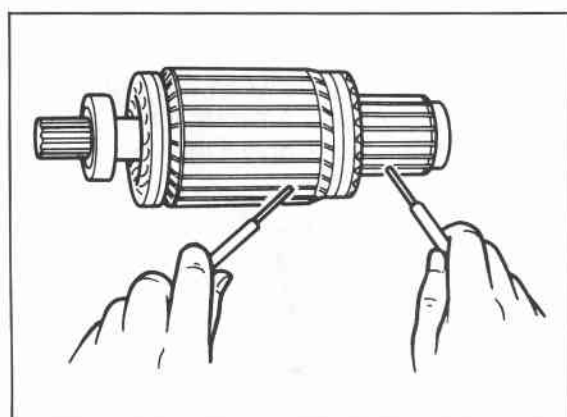
1. Assemble the brush holder to the yoke.
2. Assemble the two brushes on the yoke side to the brush holder.



4BG05X-102

## Magnetic switch installation

Align the cut out part with the projection of the magnetic switch.



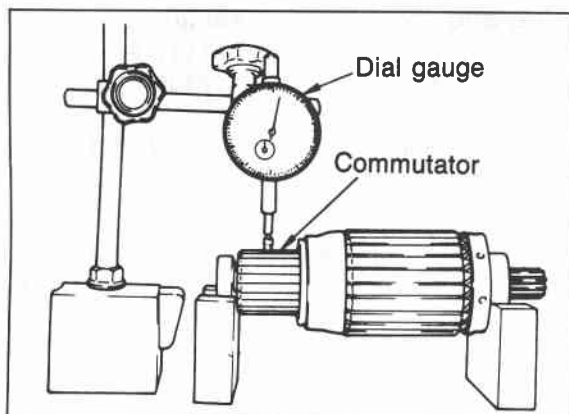
4BG05X-081

## INSPECTION

### Armature Coil

1. Ground of the armature coil
  - (1) Check for continuity between the commutator and the core by using a circuit tester.
  - (2) Replace the armature if there is continuity.

## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



4BG05X-082

### 2. Vibration of the commutator

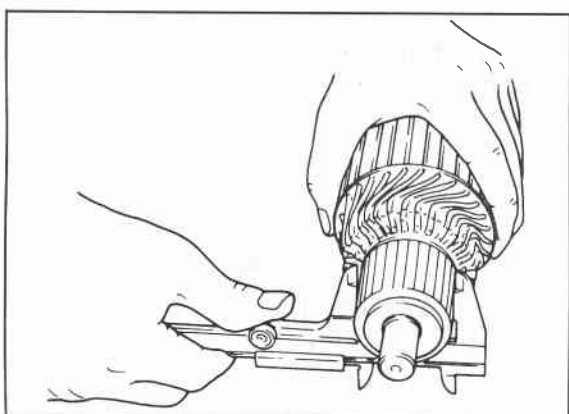
- (1) Place the armature on V blocks, and measure the vibration by using a dial gauge.
- (2) If the vibration is Limit or more, repair so that it becomes standard by using a lathe, or replace the armature.

**Standard vibration: 0.05 mm (0.002 in)**

**Limit: 0.4 mm (0.018 in)**

### Note

**Before checking, be sure that there is no play in the bearings.**



4BG05X-103

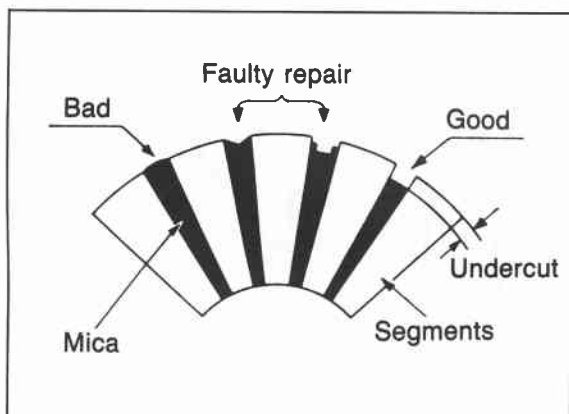
### 3. Outer diameter of the commutator

Replace the armature if the outer diameter of the commutator is grind limit or less.

### 4. Roughness of the commutator surface

- (1) If the commutator surface is dirty, wipe it with a cloth.
- (2) If it is rough, repair it by using a lathe or fine sandpaper.

**Grind limit: 34 mm (1.34 in)**



4BG05X-084

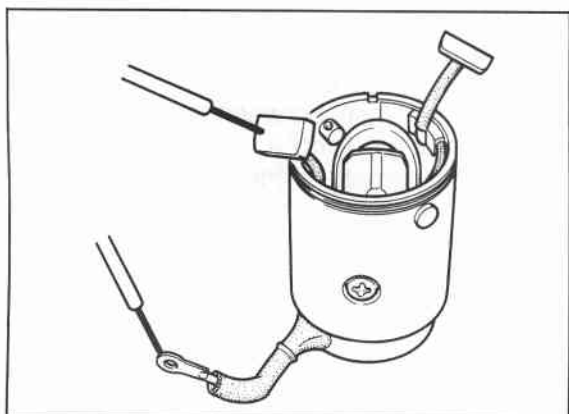
### 5. Segment groove depth

If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

**Standard depth:**

**0.5—0.8 mm (0.020—0.031 in)**

**Limit depth: 0.2 mm (0.008 in)**



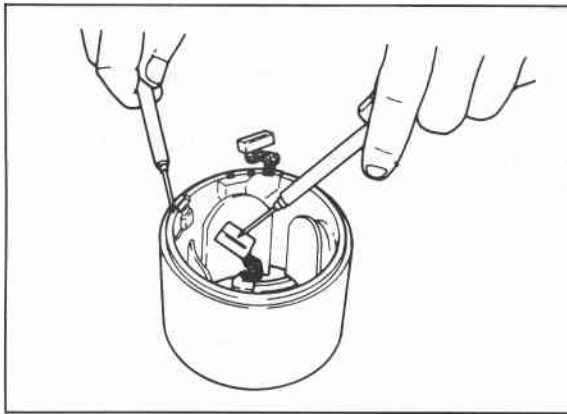
4BG05X-085

### Field Coil

#### 1. Wiring damage

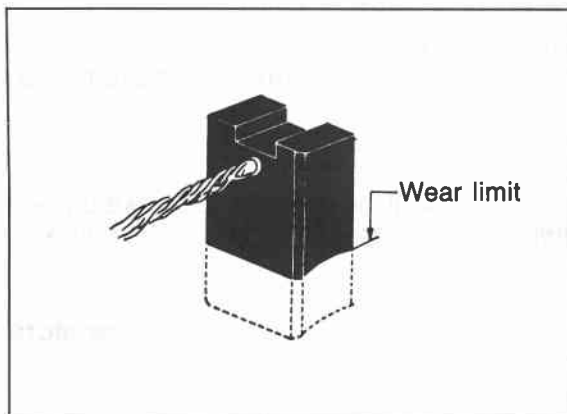
- (1) Check for continuity between the connector and brushes by using a circuit tester.
- (2) Replace the yoke assembly if there is no continuity.

## STARTER (DIESEL ENGINE, 2.0 KW TYPE) 5



4BG05X-086

2. Ground of the field coil
  - (1) Check for continuity between the connector and yoke by using a circuit tester.
  - (2) Repair, or replace the yoke assembly if there is continuity.
3. Installation of the field coil  
Replace the yoke assembly if the field coil is loose.



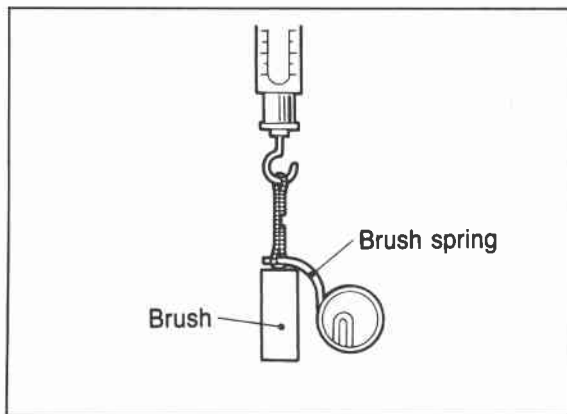
4BG05X-087

### Brush and Brush Holder

1. Brush  
If the brushes are worn beyond the wear limit, or if the wear is near the limit, replace the brushes.

**Standard: 17 mm (0.669 in)**

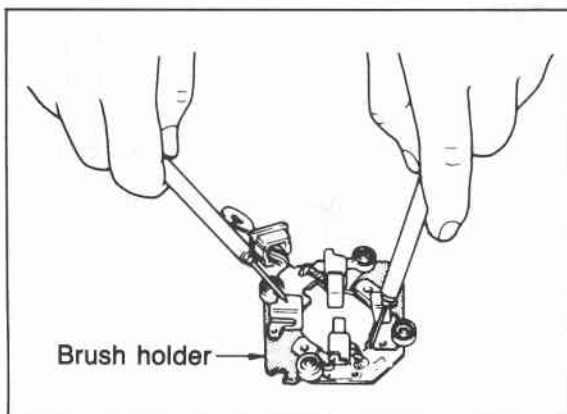
**Wear limit: 11 mm (0.433 in)**



4BG05X-088

2. Brush spring
  - (1) Measure the force of the brush spring by using a spring balance.
  - (2) Replace the brush spring if the force is limit or less.

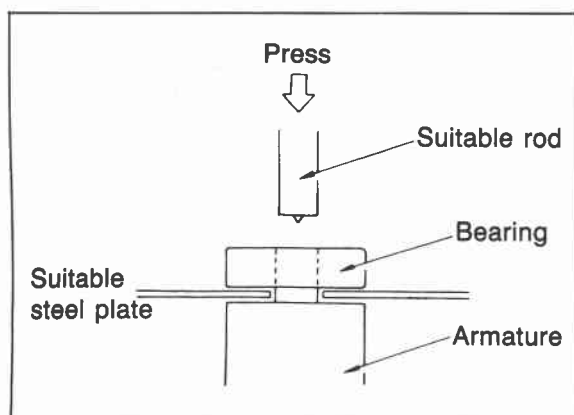
**Limit: 9 N (900 g, 31.75 oz)**



4BG05X-089

3. Brush holder
  - (1) Check for continuity between the insulated brush and the plate by using a circuit tester.
  - (2) Repair or replace if there is continuity.
  - (3) Also check to be sure that the brush slides smoothly inside the brush holder.

## 5 STARTER (DIESEL ENGINE, 2.0 KW TYPE)



4BG05X-104

### Bearing

Check for abnormal noise, looseness, insufficient lubrication, etc. Replace the bearing if there is any abnormality.

Take out the bearing, as shown in the figure, by using the suitable tools.

### PERFORMANCE INSPECTION

#### Magnetic Switch

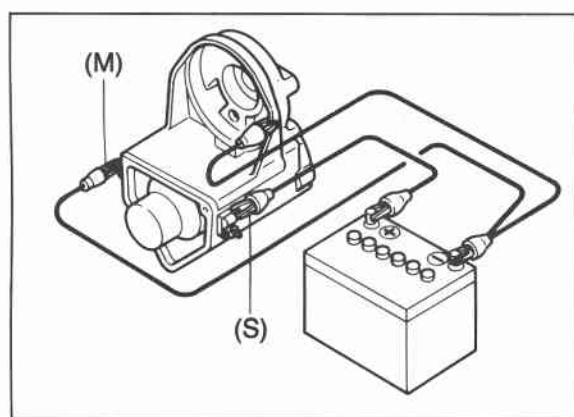
Disconnect the terminal **M wire**, and make the following tests.

#### Pull-in Test

The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

#### Caution

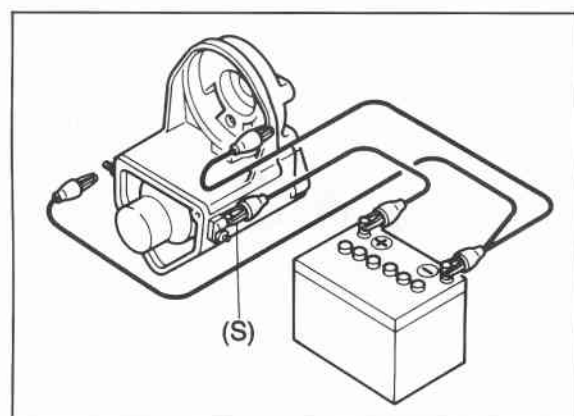
**Do not supply power continuously for more than 10 seconds.**



4BG05X-092

#### Hold-in Test

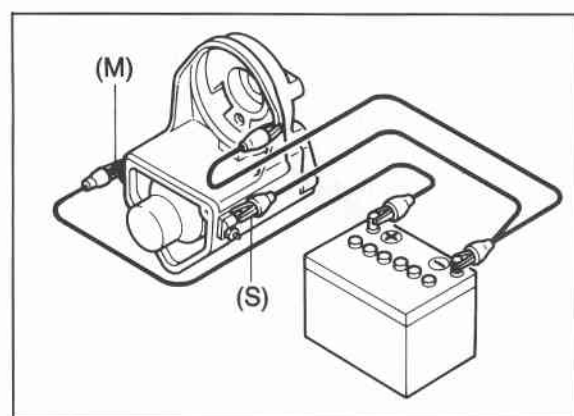
1. After completing the pull-in test, disconnect the wire from terminal **M** (with the pinion left ejected).
2. The hold-in coil is functioning properly if the pinion does not return.



4BG05X-093

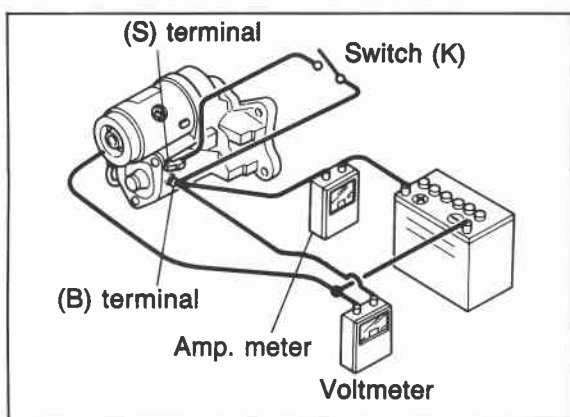
#### Return Test

1. Connect the battery between terminal **M** of the magnetic switch and the body, as shown in the figure.
2. Pull the pinion out manually to the pinion stopper position.
3. The pinion should immediately return to its original position when it is released.



4BG05X-094





4BG05X-105

## No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

## Note

**Use wires as thick as possible and tighten each terminal fully.**

2. Close switch "K" to run the starter. If the voltmeter and ammeter show the following values while the starter is running, it is normal.

**Battery voltage: 11.5 volts**

**Current: 120 amperes or less**

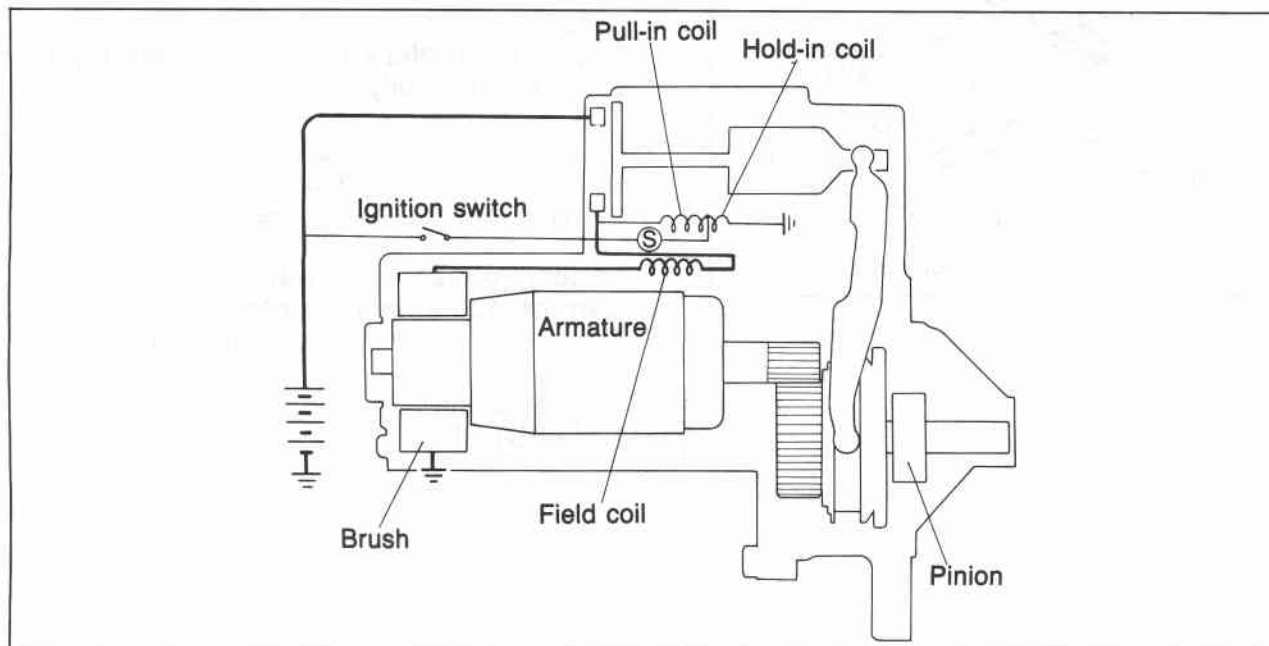
**Gear shaft speed: at 4,000 or more**

3. If any abnormality is noted, check it according to "INSPECTION"

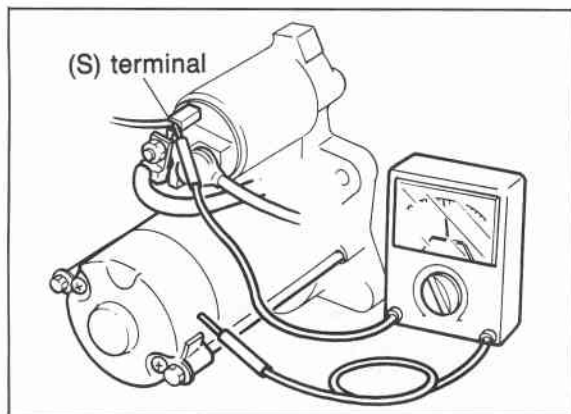
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)

### STARTER (DIESEL ENGINE, 2.2 KW TYPE)

#### STARTING SYSTEM CIRCUIT



4BG05X-106



76G05X-060

#### ON-VEHICLE INSPECTION

Charge the battery fully before starting the following inspections.

##### A. If the magnetic switch dose not function during starting.

1. Turn the ignition switch to the start position.
2. Measure the voltage between the S terminal and ground.
3. If the measured value is standard voltage or more, there is starter malfunction.
4. If it is less than standard voltage, there is a malfunction in the wiring.

**Standard voltage: 8 V**

#### Caution

If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

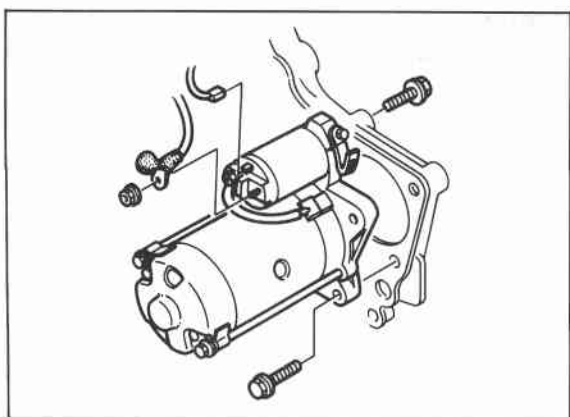
##### B. If the starter won't crank, or if the cranking speed is slow.

The problem may be a malfunction of the starter or in the wiring.

#### Note

The cranking speed is greatly affected by the viscosity of the engine oil.

## STARTER (DIESEL ENGINE, 2.2 KW TYPE) 5



76G05X-046

### REMOVAL AND INSTALLATION

Removal is as follows:

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Remove the starter.

Install in the reverse order of removal.

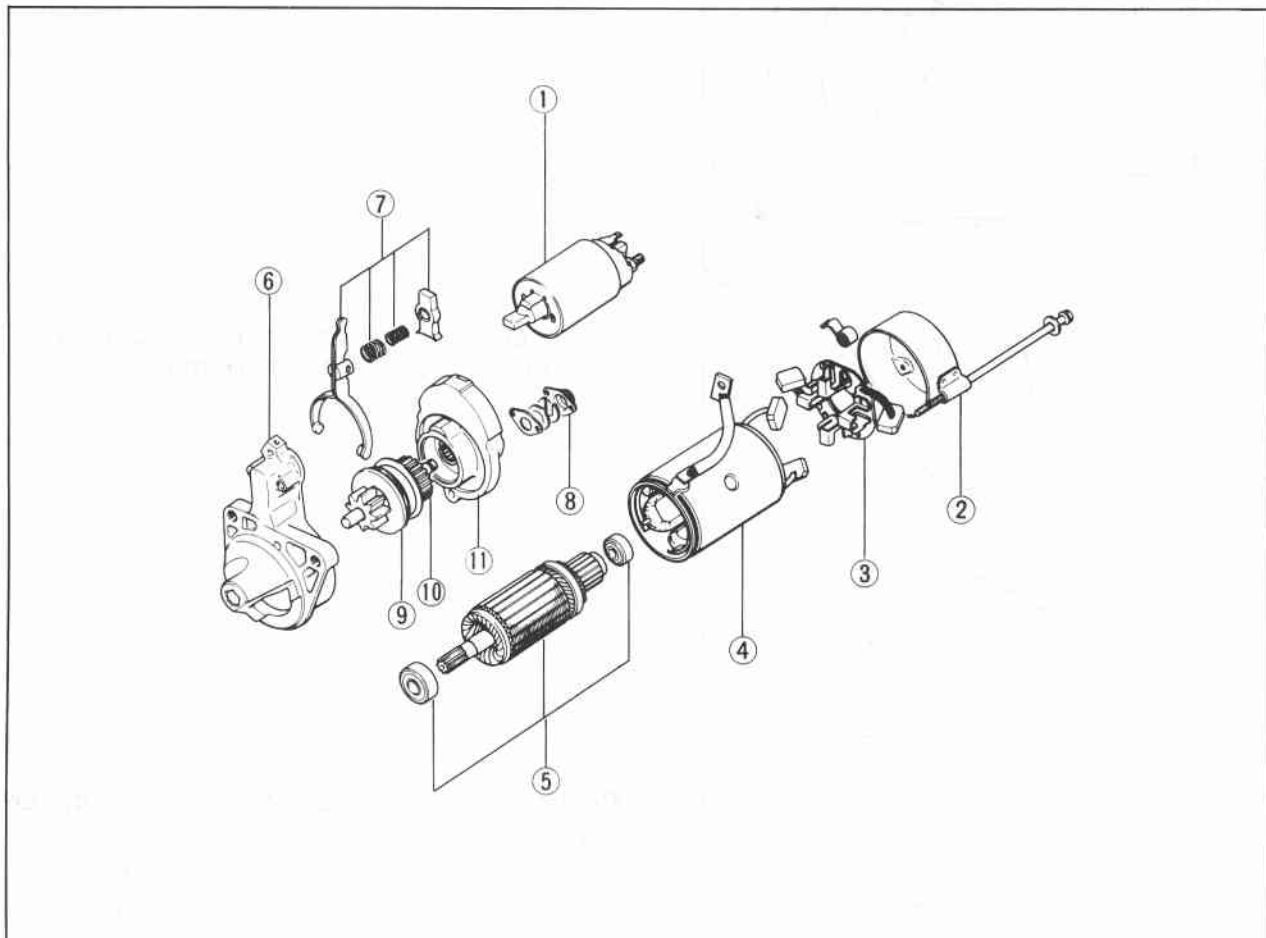
### Tightening torque:

- Bolts**..... 64—89 N·m  
(6.5—9.1 m·kg, 47—66 ft·lb)
- B terminal**..... 9.8—11.8 N·m  
(1.0—1.2 m·kg, 87—104 in·lb)

### DISASSEMBLY AND ASSEMBLY

1. Disassemble in the numbered order shown in the figure.
2. Assembly in the reverse order of disassembly.

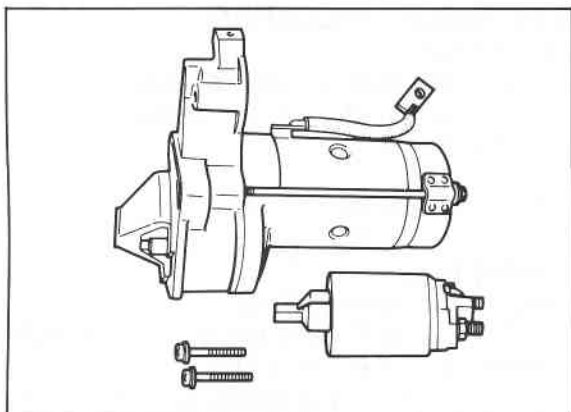
4BG05X-049



4BG05X-107

- |                          |  |
|--------------------------|--|
| 1. Magnetic switch       | 7. Lever   |
| 2. Rear cover            | 8. Cover   |
| 3. Brush-holder assembly | 9. Drive pinion and over-running clutch assembly |
| 4. Yoke                  | 10. Reduction gear                               |
| 5. Armature              | 11. Center bracket                               |
| 6. Front housing         |  |

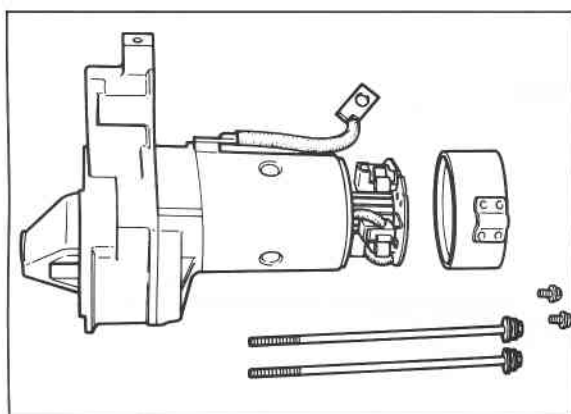
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-108

### Disassembly

1. Remove the magnetic switch.



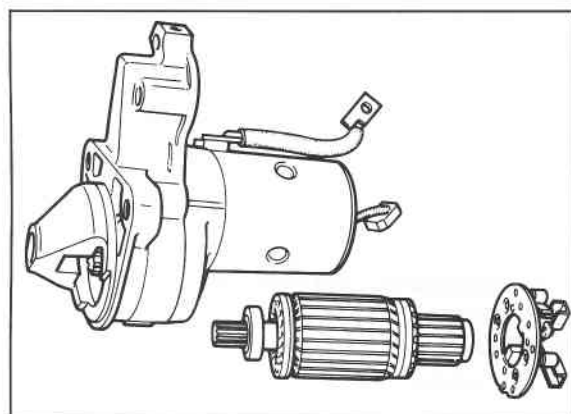
4EG05X-069

2. Remove the rear housing.



36G05X-032

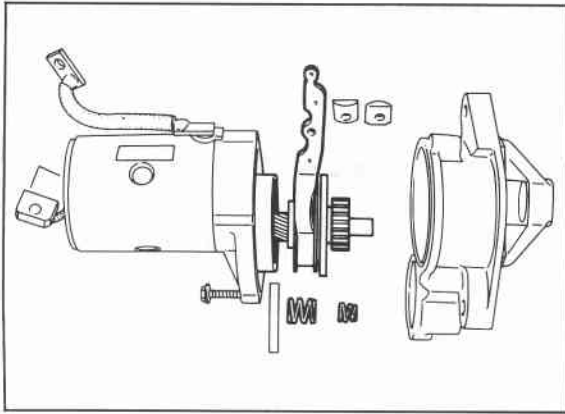
3. Using radio pliers or a similar tool, raise the positive (+) side brush spring, and remove the brush.



36G05X-033

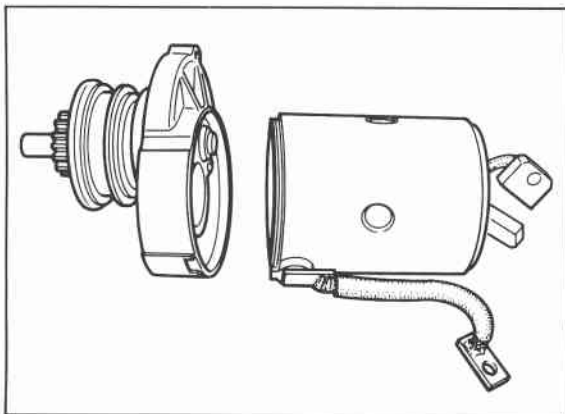
4. Remove the brush holder assembly and the armature.

## STARTER (DIESEL ENGINE, 2.2 KW TYPE) 5



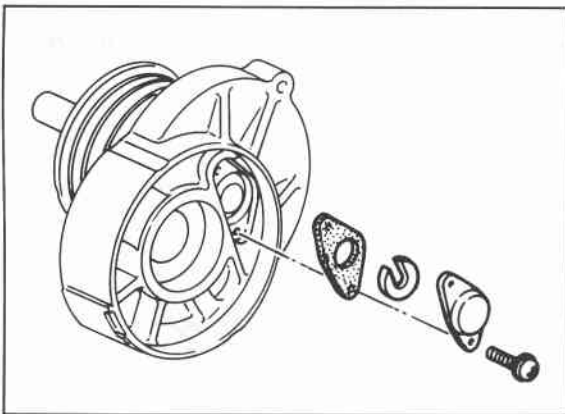
36G05X-034

5. Remove the front cover, and remove the lever and springs (two).



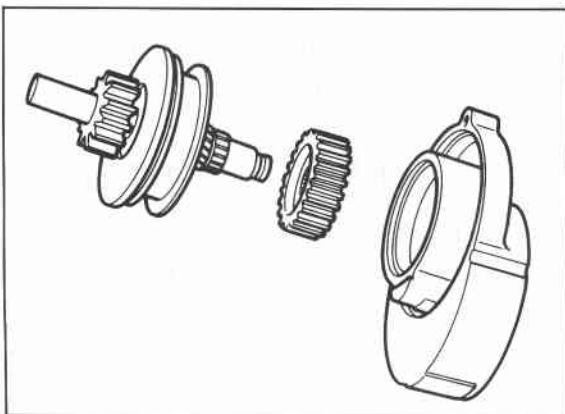
36G05X-035

6. Separate the yoke and center bracket.



36G05X-036

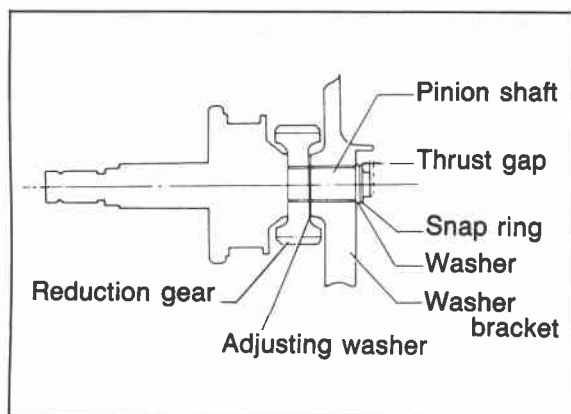
7. Remove the cover and pull out the snap ring and washer.



36G05X-037

8. Remove the pinion, over-running clutch assembly and reduction gear from the center bracket.

## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-109

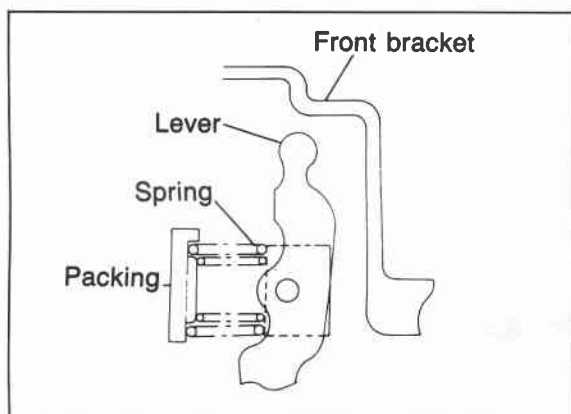
### Assembly (main point)

#### Pinion shaft play

1. Measure the thrust gap by moving the pinion shaft axial direction.

**Standard play: Less than 0.5 mm (0.02 in)**

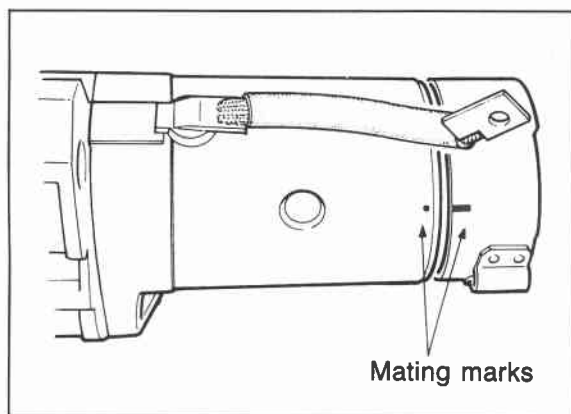
2. Adjust the play with the adjusting washer.



4BG05X-110

### Lever installation

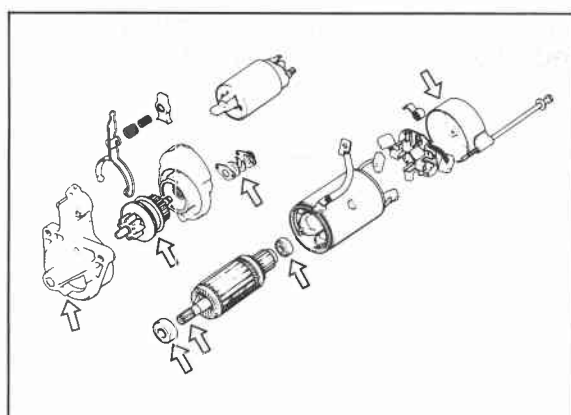
Install the lever as shown in figure.



4BG05X-111

### Rear bracket installation

Align the matching marks when assembling the rear bracket.

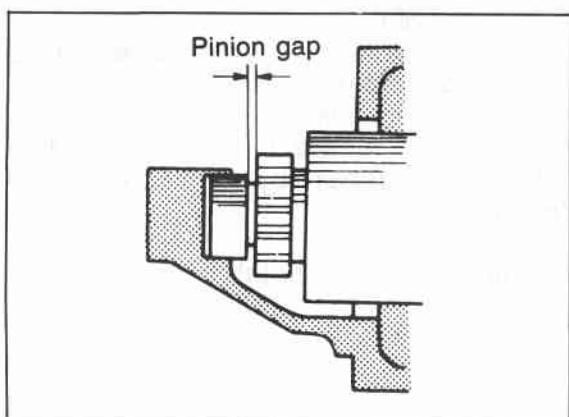


4BG05X-112

### Greasing

When disassembling or assembling the starter, grease each sliding part, gear and bearing.

- (1) Armature shaft gear
- (2) Reduction gear
- (3) Ball bearings (both ends of armature)
- (4) Bearing box of rear bracket
- (5) Snap ring of pinion shaft
- (6) Sleeve bearing, pinion lever sliding part, others



4BG05X-113

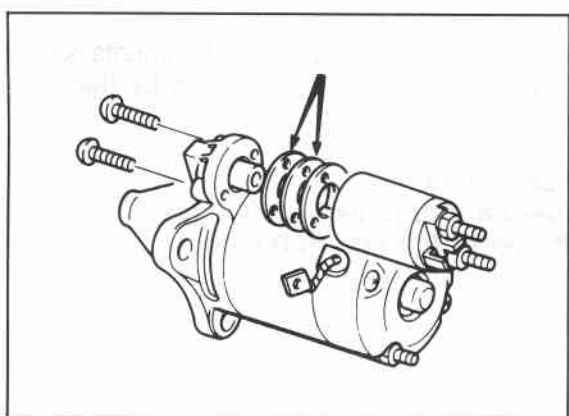
## Adjustment of pinion gap

1. Disconnect the wiring from terminal (M).
2. Apply battery power to the terminal (S) and ground the starter motor body, the pinion will eject outward and then stop.
3. Measure the clearance (pinion gap) between the pinion and the stopper.

### Note

**Be careful not to let electricity flow continuously for more than 10 seconds.**

**Pinion gap: 0.5—2.0 mm (0.020—0.079 in)**

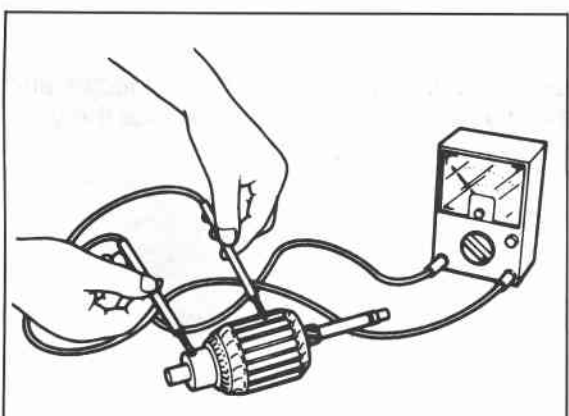


4BG05X-080

4. If the pinion gap is not within the specified range, make the adjustment by increasing or decreasing the number of washers used between the magnetic switch and the drive housing. The gap will become smaller if the number of washers is increased.

### Caution

**Do not use the washers more than plates.**

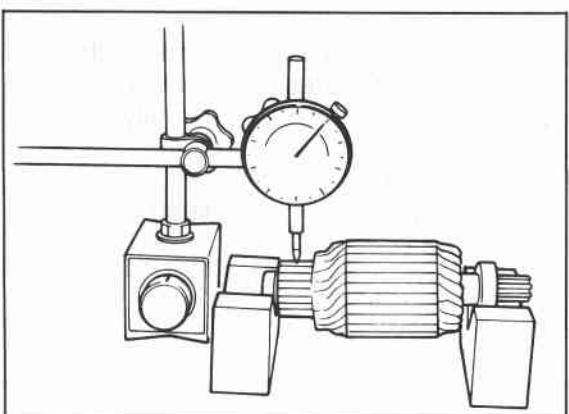


4BG05-081

## INSPECTION

### Armature Coil

1. Ground of the armature coil  
Check for continuity between the commutator and the core by using a circuit tester. Replace the armature if there is continuity.



4BG05X-082

2. Vibration of the commutator  
Plate the armature on V blocks, and measure the vibration by using a dial gauge. If the vibration is Limit or more, repair so that is standard by using a lathe, or replace the armature.

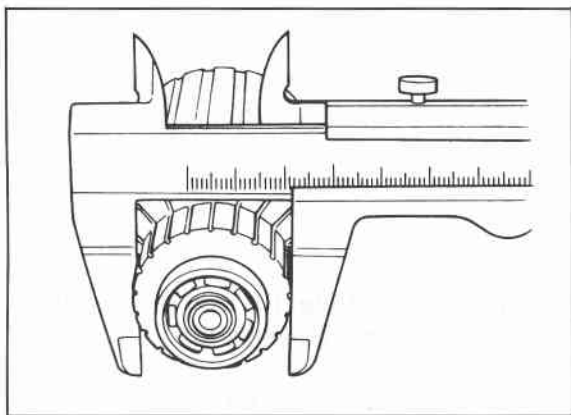
**Standard vibration: 0.05 mm (0.002 in)**

**Limit: 0.4 mm (0.018 in)**

### Note

**Before checking, be sure that there is no play in the bearings.**

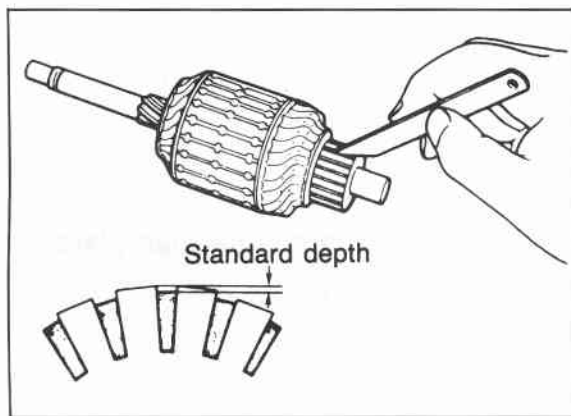
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-115

3. Outer diameter of the commutator  
Replace the armature if the outer diameter of the commutator is grind limit or less.
4. Roughness of the commutator surface  
If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair it by using a lathe or fine sandpaper.

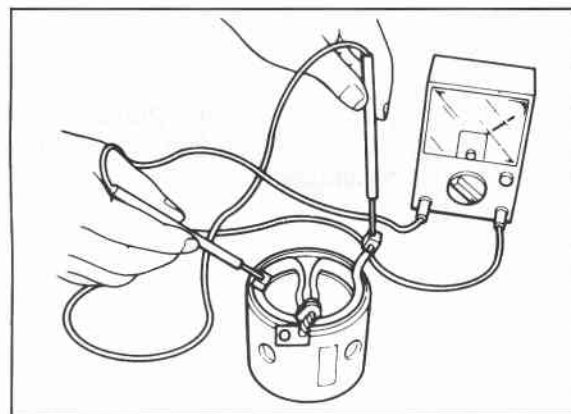
**Grind limit: 31 mm (1.22 in)**



4BG05X-084

5. Segments groove depth  
If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

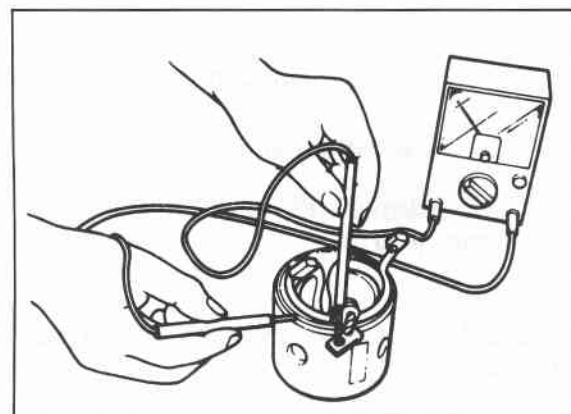
**Standard depth:**  
**0.5—0.8 mm (0.020—0.031 in)**  
**Limit depth: 0.2 mm (0.008 in)**



4BG05X-085

### Field Coil

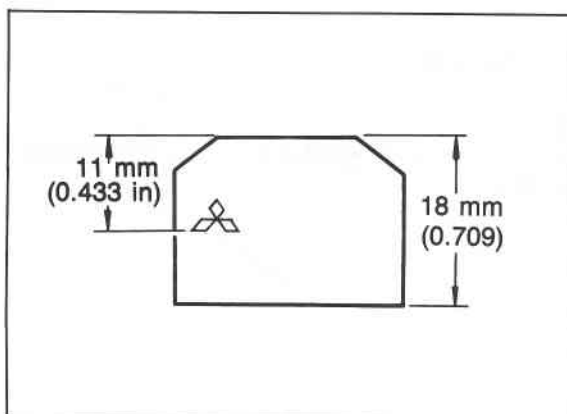
1. Wiring damage  
Check for continuity between the connector and brushes by using a circuit tester. Replace the yoke assembly if there is no continuity.



4BG05X-086

2. Ground of the field coil  
Check for continuity between the connector and yoke by using a circuit tester. Repair, or replace the yoke assembly if there is continuity.
3. Installation of the field coil  
Replace the yoke assembly if the field coil is loose.





76G05X-047

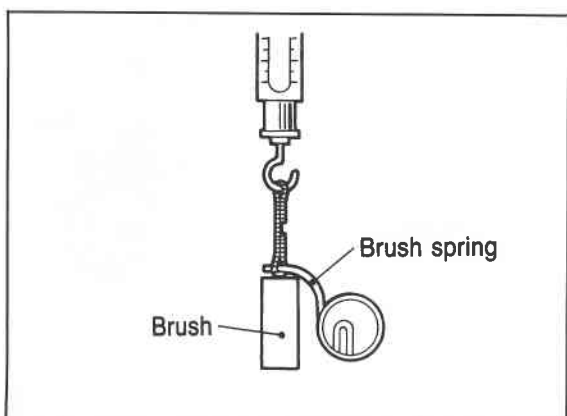
## Brush and Brush Holder

### 1. Brush

If the brushes are worn beyond the wear limit, or if the wear is near the limit, replace the brushes.

**Standard: 18 mm (0.709 in)**

**Wear limit: 11 mm (0.433 in)**



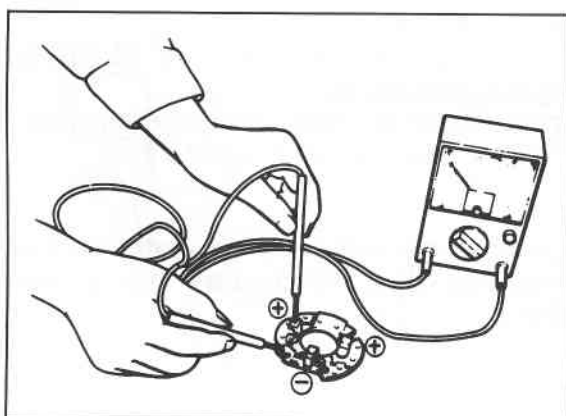
48G05X-088

### 2. Brush spring

(1) Measure the force of the brush spring by using a spring balance.

(2) Replace the brush spring if the force is Limit or less.

**Limit: 9 N (900 g, 31.75 oz)**



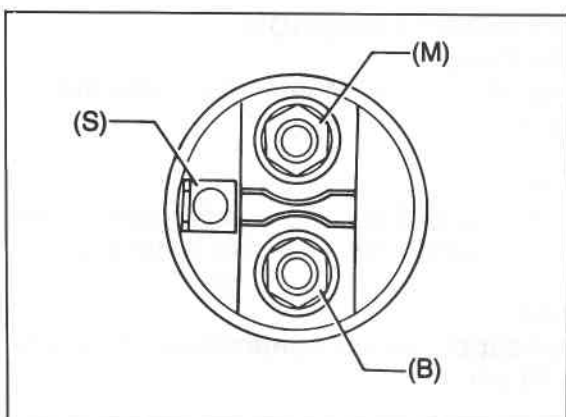
48G05X-089

### 3. Brush holder

(1) Check for continuity between the insulated brush and the plate by using a circuit tester.

(2) Repair or replace if there is continuity.

(3) Also check to be sure that the brush slides smoothly inside the brush holder.



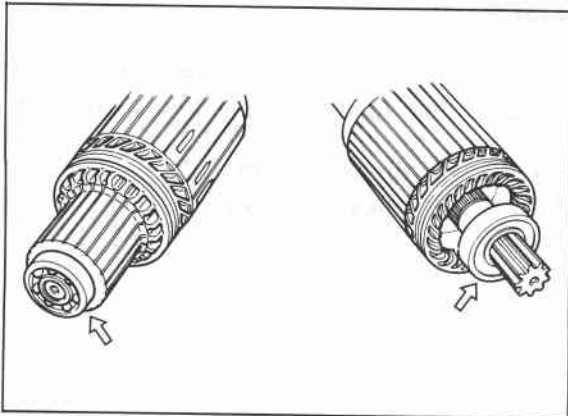
48G05X-116

## Magnetic Switch

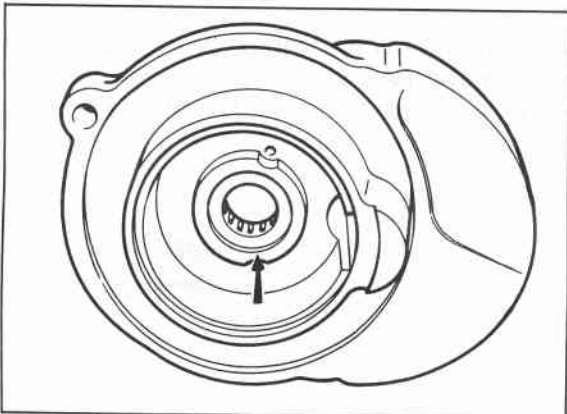
1. Check continuity between (S) terminal and (M) terminal, and between (S) terminal and ground (body).

2. If there is no continuity, the wire is broken so replace the magnetic switch.

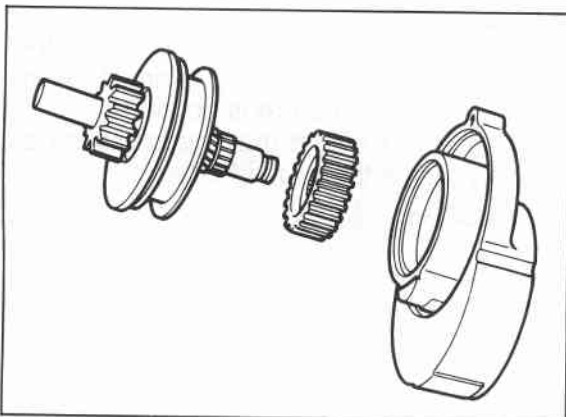
## 5 STARTER (DIESEL ENGINE, 2.2 KW TYPE)



4BG05X-117



4BG05X-118



4BG05X-119

### Gear

Wear and damage

### Bearing

Replace the bearing when it is noisy or does not rotate smoothly.

### Over-running Clutch

1. Replace the pinion when a worn pinion or damaged pinion are found.
2. If the pinion does not rotate in both directions when rotating the pinion by hand, replace it.

### Note

**Do not wash the over-running clutch in gas or kerosene, this will destroy the grease packing.**

## PERFORMANCE INSPECTION

### Magnetic Switch

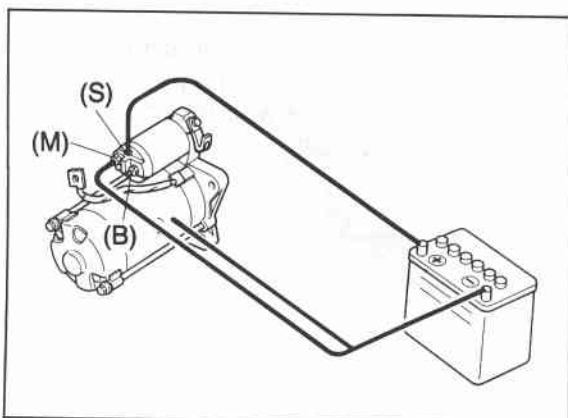
Disconnect the terminal **M wire**, and make the following tests.

### Pull-in Test

The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

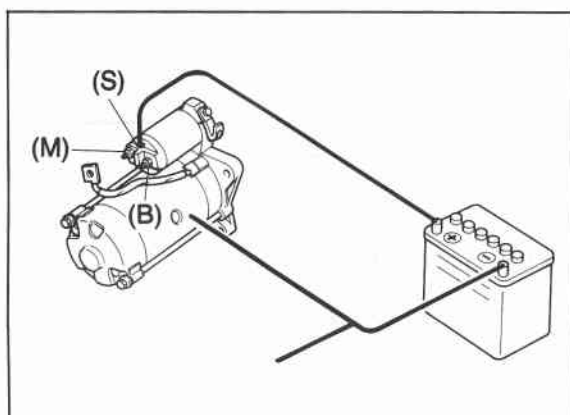
### Caution

**Do not supply power continuously for more than 10 seconds.**



4BG05X-092

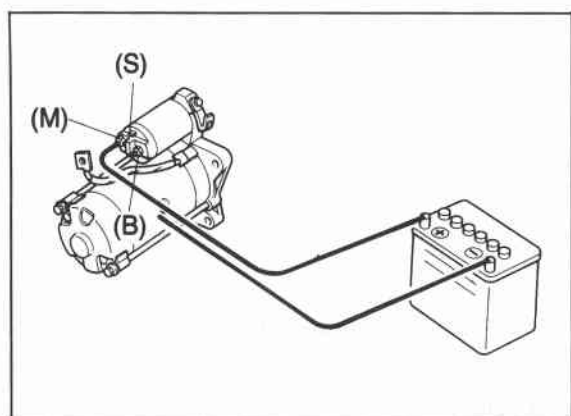
## STARTER (DIESEL ENGINE, 2.2 KW TYPE) 5



4BG05X-093

### Hold-In Test

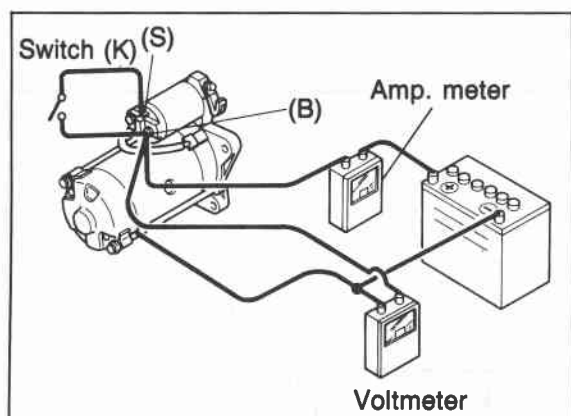
1. After completing the pull-in test, disconnect the wire from terminal M (with the pinion left ejected).
2. The hold-in coil is functioning properly if the pinion does not return.



4BG05X-094

### Return Test

1. Connect the battery between terminal M of the magnetic switch and the body, as shown in the figure.
2. Pull the pinion out manually to the pinion stopper position.
3. The pinion should immediately return to its original position when it is released.



4BG05X-120

### No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

#### Note

**Use wires as thick as possible and tighten each terminal fully.**

2. Close switch "K" to run the starter. If the voltmeter and ammeter show the following values while the starter is running, it is normal.

**Battery voltage: 11.0 volts**

**Current: 130 amperes or less**

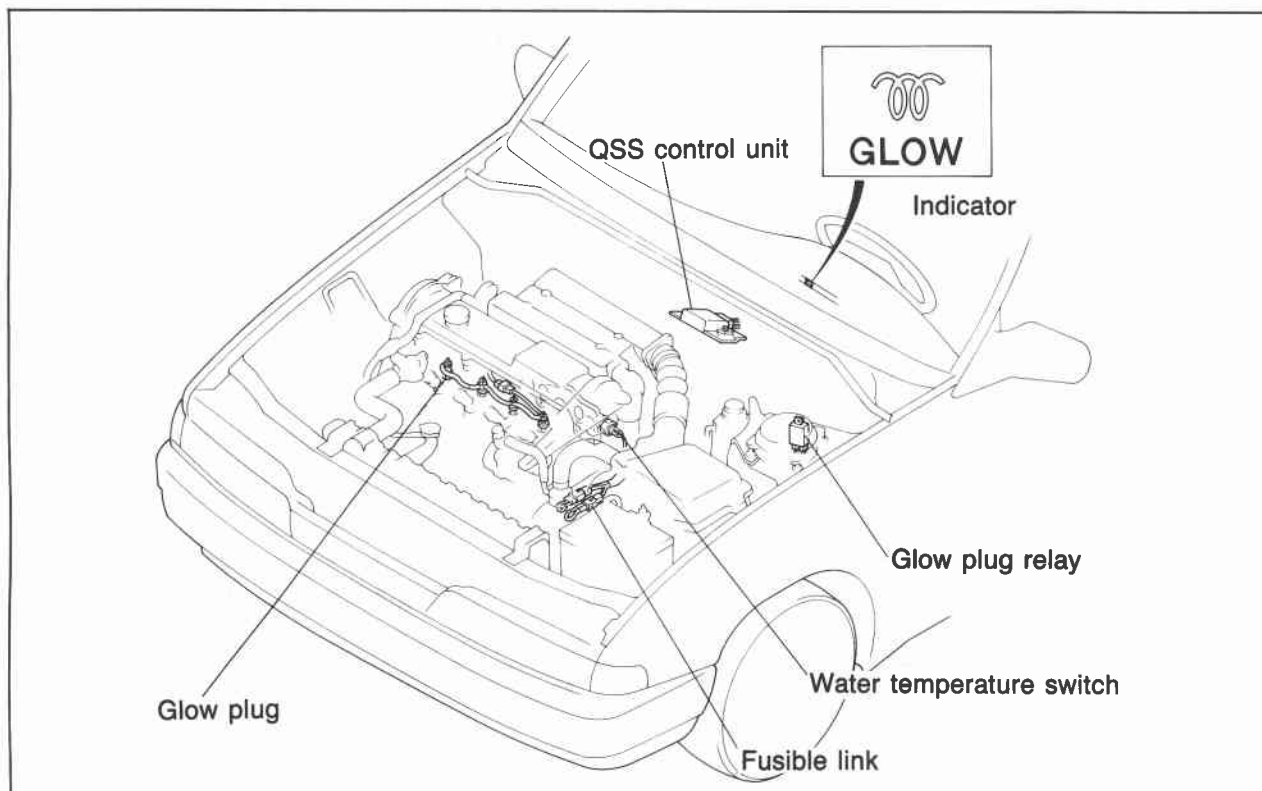
**Gear shaft speed: at 4,500 rpm or more**

3. If any abnormality is noted, check it according to "INSPECTION".

## 5 QUICK START SYSTEM (QSS)

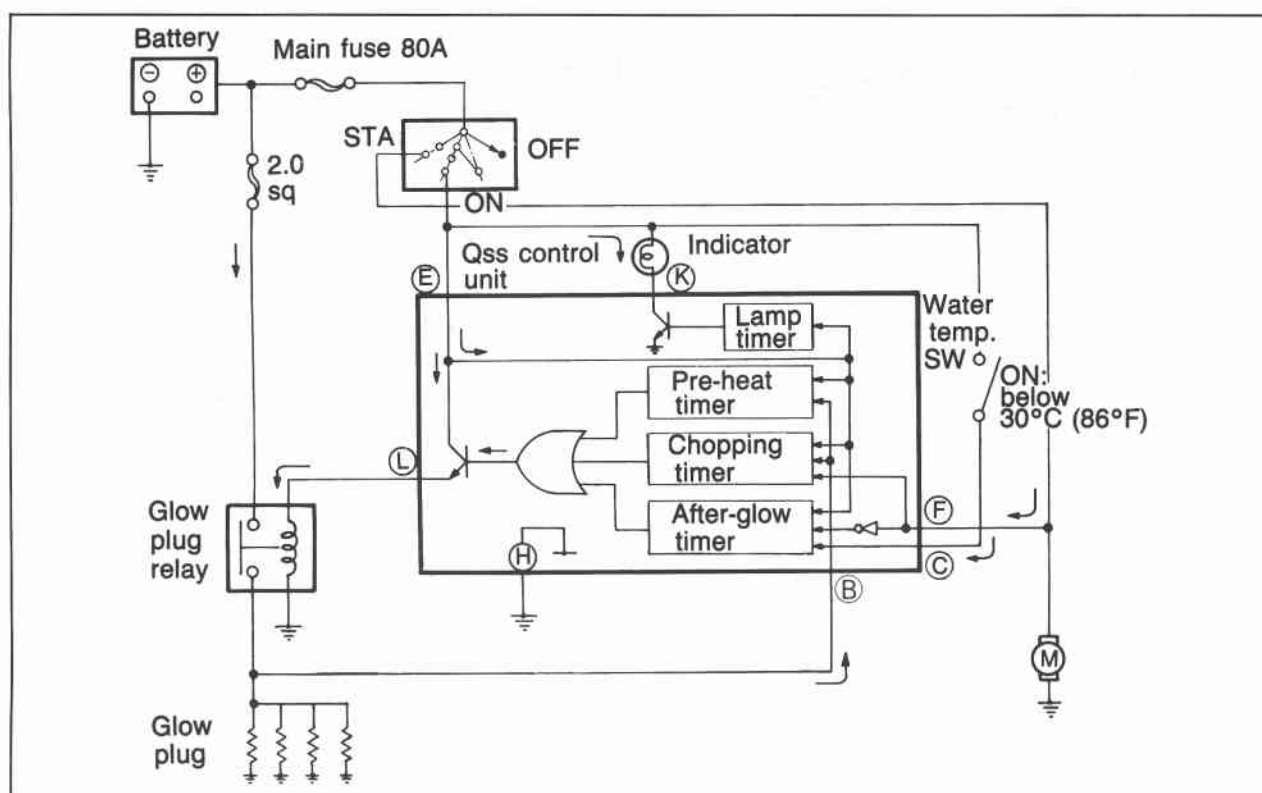
### QUICK START SYSTEM (QSS)

#### COMPONENT LOCATION



76G05X-048

#### CIRCUIT DIAGRAM



76G05X-049

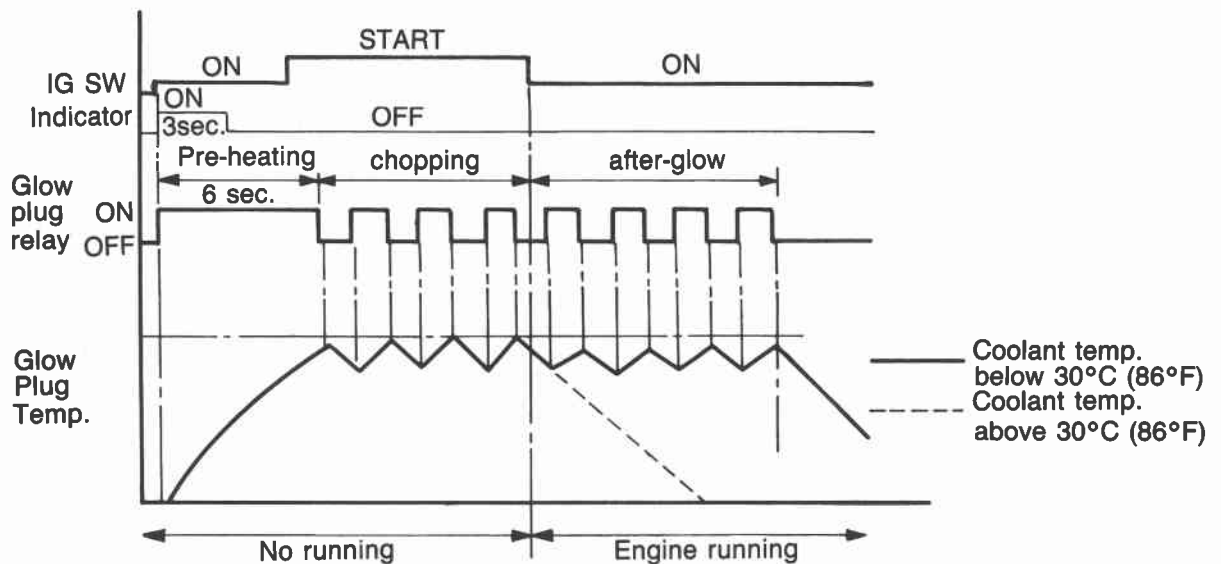
## SYSTEM OPERATION

The Quick Start System has three functions: **Pre-heating**, **Chopping**, and **After-glow**; as used in the previous model. Each function operates as follows:

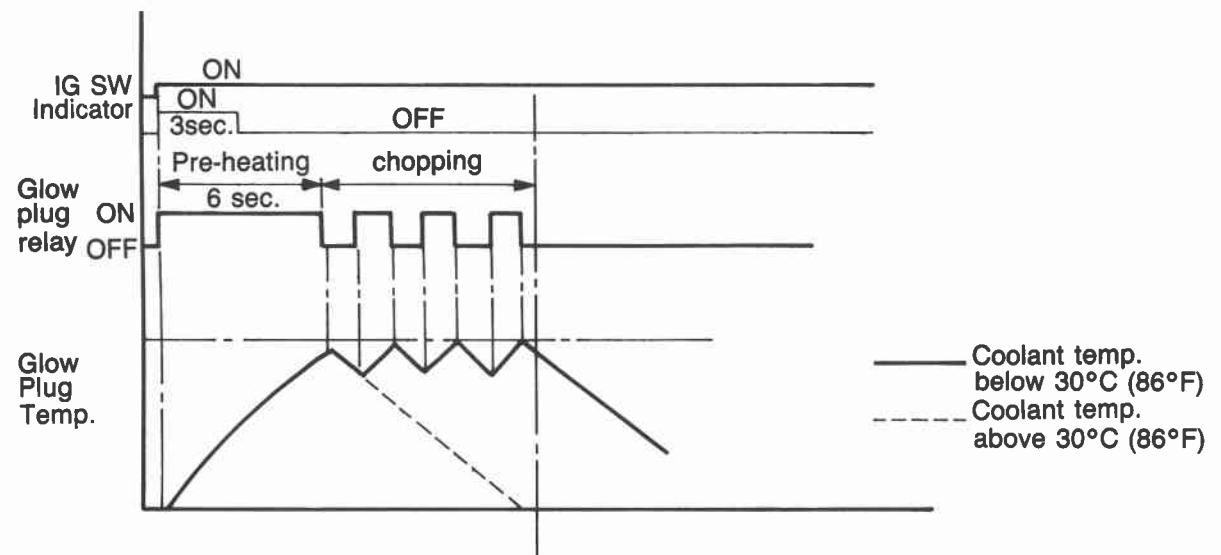
1. Pre-heating : After ignition switch is turned to ON position, current flows to glow plug for 6 sec.
2. Chopping : While engine switch is in START position, current flows to glow plug continuously.
3. After-glow (coolant temperature below 30°C (86°F):
  - a) When engine switch is kept in ON position after pre-heating, current flows to glow plug continuously for 15 sec.
  - b) After engine has started, current flows to glow plug continuously for 15 sec.

Indicator lamp: Indicator illuminates for 3 sec. after ignition is ON position.

### When ignition switch is ON-START-ON position



### When ignition switch is kept in ON position



## 5 QUICK START SYSTEM (QSS)

### TROUBLESHOOTING GUIDE

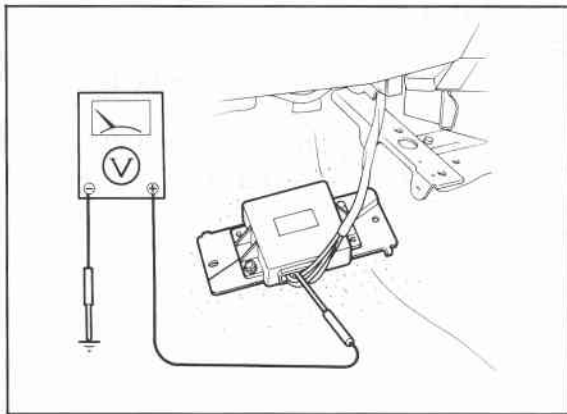
#### Preliminary Checks

When troubleshooting, check below first.

1. Main fuse
2. Fuses
3. Connectors
4. Ground circuit
5. Wiring harness

Condition	Cause
Glow plug relay does not close.	<ol style="list-style-type: none"><li>1. Faulty glow plug relay</li><li>2. Faulty control unit internal circuit</li><li>3. Poor contact or disconnection between control unit terminal ① and harness</li><li>4. Faulty START harness (open circuit at ⑥ terminal in control unit)</li><li>5. Poor contact or disconnection between glow plug relay terminal and harness</li><li>6. Faulty glow plug</li></ol>
Glow plug relay does not open	<ol style="list-style-type: none"><li>1. Faulty glow plug relay</li><li>2. Faulty control unit internal circuit</li></ol>
Glow plug relay does not repeat ON and OFF.	<ol style="list-style-type: none"><li>1. Faulty poor contact of engine switch</li><li>2. Poor contact or disconnection of starter harness</li><li>3. Faulty control unit internal circuit</li></ol>
Glow plug relay does not repeat ON and OFF within 15 sec. after turning the engine switch ON.	<ol style="list-style-type: none"><li>1. Faulty water temperature switch</li><li>2. Faulty control unit internal circuit</li><li>3. Faulty glow plug relay</li><li>4. Poor contact or disconnection between control unit ③ and water temperature switch</li></ol>

76G05X-051



63G05X-337

## CONTROL UNIT

### Inspection

1. Connect a voltmeter to the control unit as shown in the figure.
2. Check the voltage of the terminal.
3. Replace the control unit if necessary.

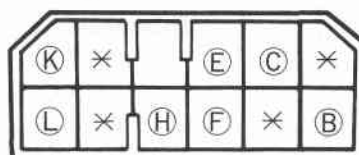
### Caution

**If the proper voltage is not indicated on the voltmeter, check all wiring connections and finally, check that component.**

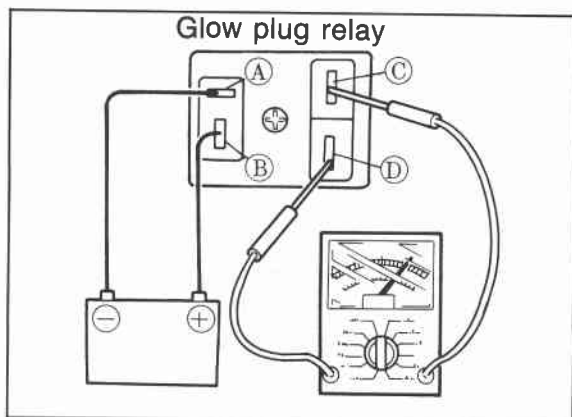
## Control Unit Connector

Terminal	Input	Output	Connection to	Operation condition		Voltage	Remark
L (GW)	○	○	Glow plug relay	Engine switch: ON (No cranking)	for 6 sec.	approx. 12V	
					after 6 sec.	0V ↔ 12V	Coolant temperature; below 30°C (86°F)
						0V	Coolant temperature; above 30°C (86°F)
H (B)	—	—	Ground	—		0V	
E (BW)	○		Engine switch (ON)	Engine switch: ON		approx. 12V	
F (BR)	○		Engine switch (START)	Engine switch: START		approx. 12V	
C (BrB)	○		Water temperature switch	Engine switch: ON (No cranking)		approx. 12V	Coolant temperature; below 30°C (86°F)
						approx. 0V	Coolant temperature; above 30°C (86°F)
B (Gr)		○	Glow plug	At cranking		0V ↔ 12V	
				For 15 sec. after engine has started		0V ↔ 12V	Coolant temperature; below 30°C (86°F)
				After 15 sec.		0V	
				After engine has started		0V	Coolant temperature; above 30°C (86°F)
K (WR)		○	Indicator	Engine switch: ON	For 3 sec.	0V	
					after 3 sec.	approx. 12V	

76G05X-052



## 5 QUICK START SYSTEM (QSS)

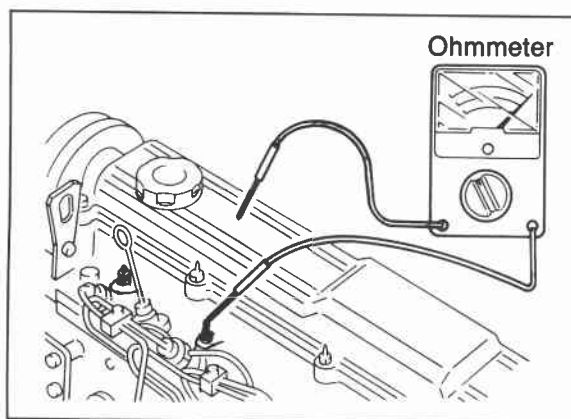


4BG05X-123

### GLOW PLUG RELAY

#### Inspection

1. As shown in the figure, connect the battery and an ohmmeter to the relay.
2. If the ohmmeter shows continuity when the battery is connected, and no continuity when the battery is disconnected, the relay is good.
3. Replace the relay if it fails this test.

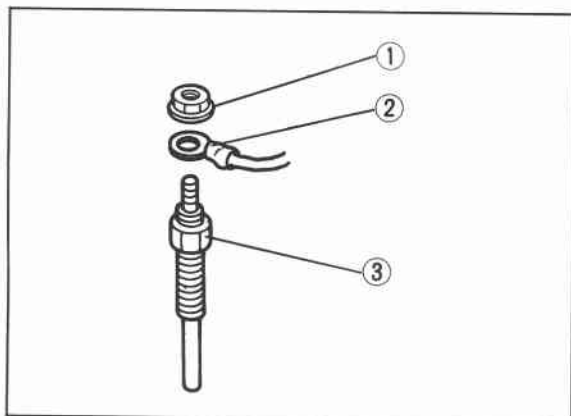


4BG05X-121

### GLOW PLUG

#### Inspection

1. Check the continuity between the positive terminal of the glow plug and cylinder head with a circuit tester.
2. If there is no continuity, replace the glow plug.



76G05X-053

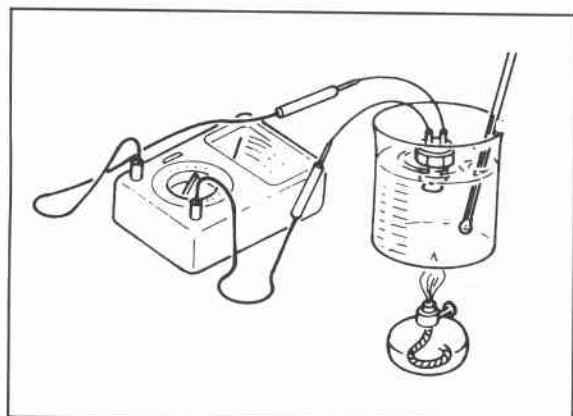
#### Removal

Remove in the following order:

1. Glow plug connector attaching nut.
2. Glow plug connector.
3. Glow plug

#### Installation

Install the glow plug, reverse order of removal.



63G05X-336

### WATER TEMPERATURE SWITCH

#### Removal

Remove the water temperature switch from the radiator.

#### Installation

Install in the reverse order of removal.

#### Inspection

1. Place the water temperature switch in water with a thermometer and heat the water gradually.
2. Check the temperature at which continuity exists between the terminals.
3. Replace the switch, if necessary.

**Specified temperature: above 28—32°C  
(82—90°F)**