

## 01-19 STARTING SYSTEM

### STARTING SYSTEM

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### STARTER

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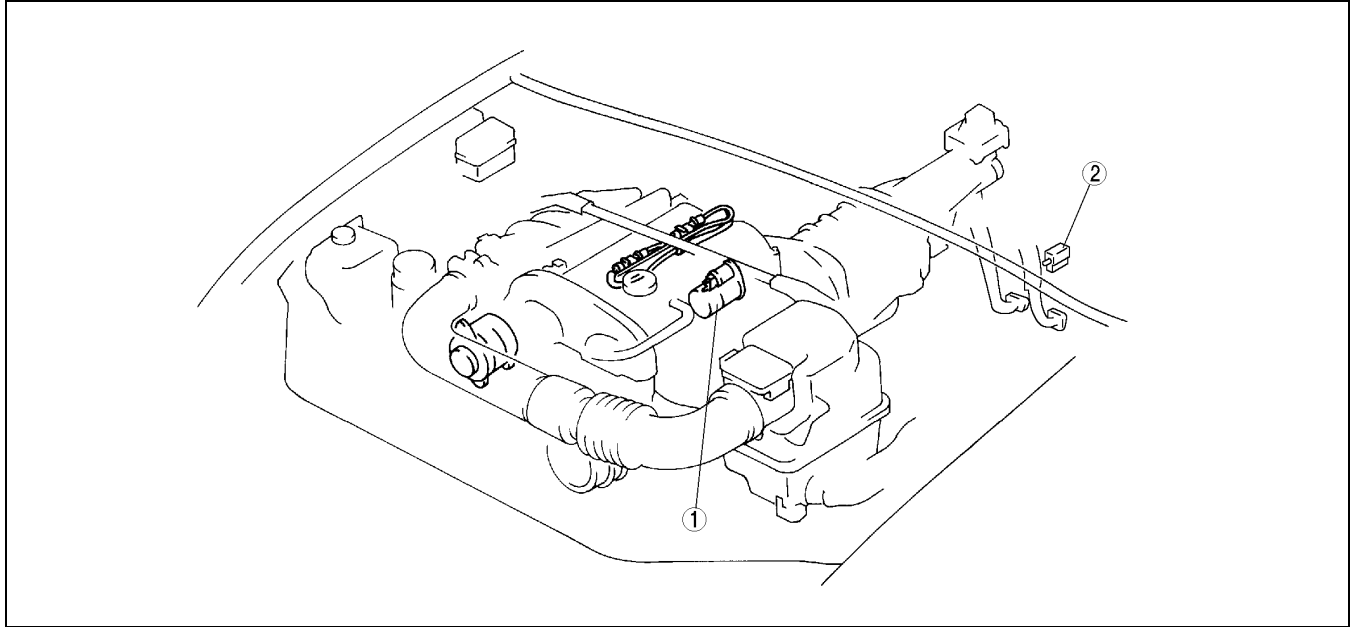
### STARTER INTERLOCK SWITCH

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### STARTING SYSTEM LOCATION INDEX

A5U011918400W01



Z5U0119WA1

1

Starter  
(See 01-19-2 STARTER REMOVAL/  
INSTALLATION)  
(See 01-19-2 STARTER INSPECTION)  
(See 01-19-7 STARTER DISASSEMBLY/  
ASSEMBLY)

2

Starter interlock switch  
(See 01-19-8 STARTER INTERLOCK SWITCH  
INSPECTION (MT))

# STARTING SYSTEM

## STARTER REMOVAL/INSTALLATION

A5U011918400W02

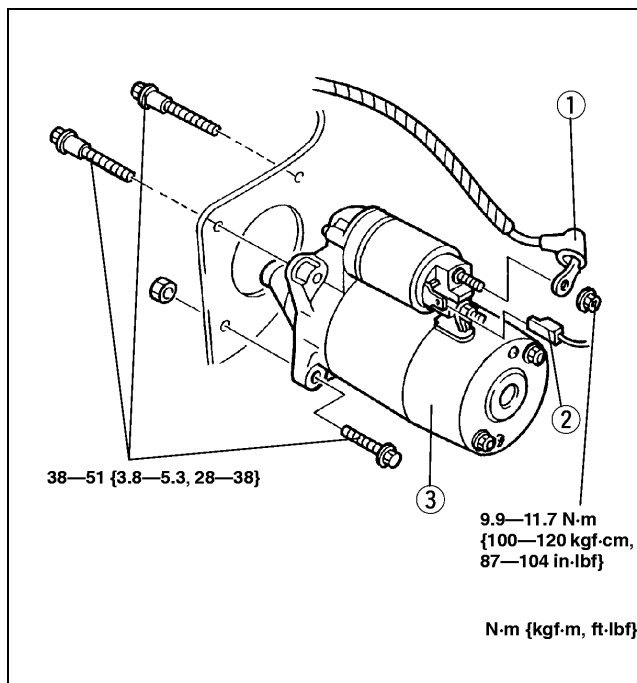
### Warning

- When the battery cable are connected, touching the vehicle body with starter terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery before performing the following operation.

1. Disconnect the negative battery cable.
2. Remove the intake manifold bracket.
3. Remove the oil filler tube. (AT)
4. Remove in the order indicated in the table.

1	Terminal B wire
2	Terminal S wire
3	Starter (See 01-19-2 Starter Installation Note)

5. Install in the reverse order of removal.



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### Starter Installation Note

1. Temporarily tighten the starter fitting bolt A.
2. Tighten the starter fitting bolts B and C.

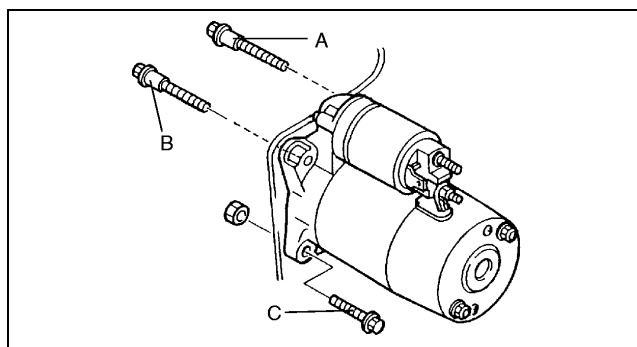
#### Tightening torque

44-60 N·m {4.4-6.2 kgf·m, 32-44 ft·lbf}

3. Tighten the starter fitting bolt A.

#### Tightening torque

44-60 N·m {4.4-6.2 kgf·m, 32-44 ft·lbf}



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## STARTER INSPECTION

A5U011918400W03

### On-vehicle Inspection

1. Verify that the battery is fully charged.
2. Crank the engine and verify that the starter turns smoothly without any noise.
  - Measure the voltage at terminals S and B when the ignition switch is in the START position.
  - If the voltage is within the specification, remove the starter and inspect the magnetic switch and the starter.
  - If the voltage is not as specified, inspect the wiring harness, ignition switch, starter interlock switch (MT), and transmission range switch (AT).

### Specification

Above 8 V

### No Load Test

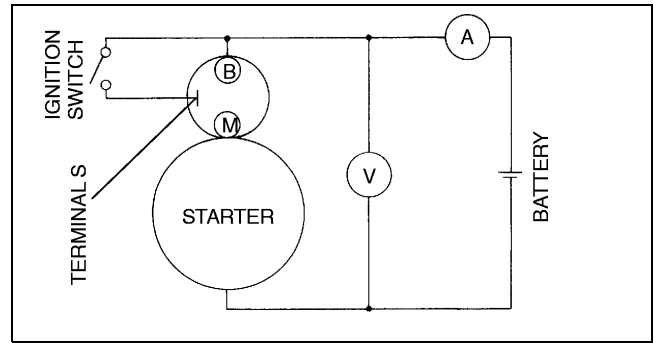
1. Verify that the battery is fully charged.

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2. Connect the starter, battery, voltmeter, and ammeter as shown.
3. Operate the starter and verify that it turns smoothly.
4. Measure the voltage and current while the starter is operating.
  - If not as specified, repair or replace the inner parts.

## Specification

Voltage (V)	11
Current (A)	Below 90



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## Magnetic Switch Operation Inspection

### Caution

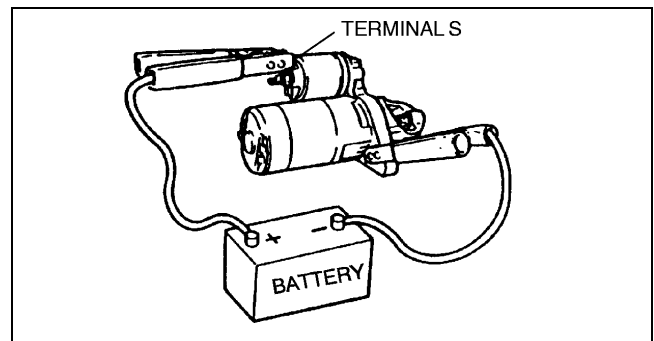
- Applying power for more than 10 seconds can damage the starter. Do not apply power for more than the aforementioned time.

### Pull-out test

#### Note

- In case the battery is being charged, the pinion may turn while in a protruded state. This is normal because the current flows to the motor through the pull-in coil and the motor turns.

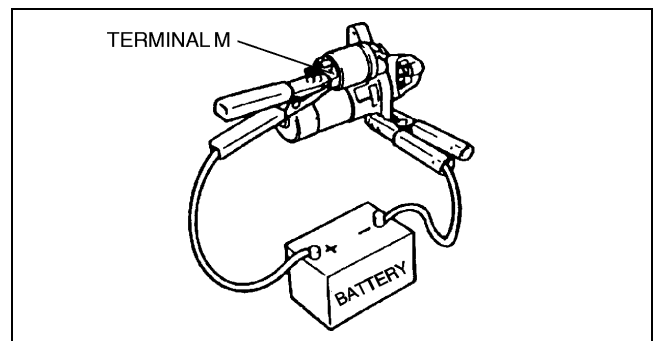
1. Verify that the drive pinion is pulled out with battery positive voltage connected to terminal S and the starter body grounded.
  - If not pulled out, repair or replace the starter.



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### Return test

1. Disconnect the motor wire from terminal M.
2. Connect battery positive voltage to terminal M and ground the starter body.
3. Pull out the drive pinion with a screwdriver. Verify that it returns to its original position when released.
  - If not does not return, repair or replace the starter.

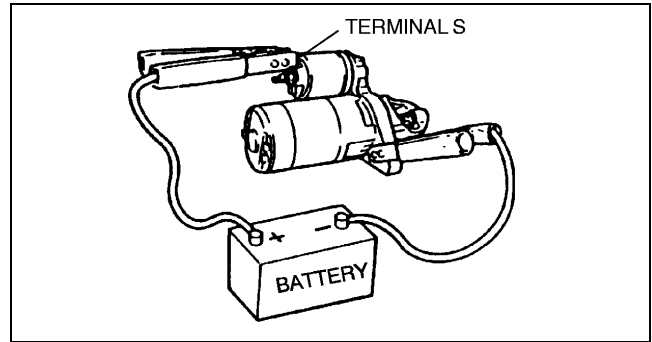


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### Pinion Gap Inspection

1. Pull out the drive pinion with battery positive voltage connected to terminal S and the starter body grounded.

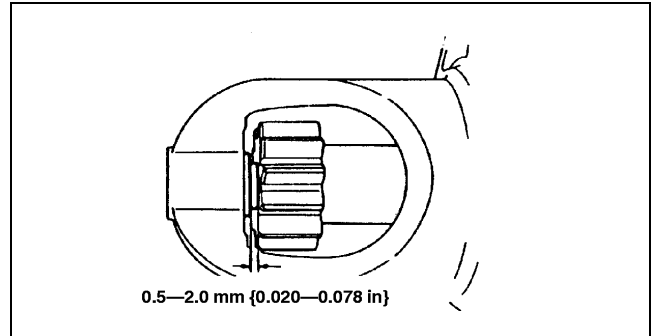


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2. Measure the pinion gap while the drive pinion is pulled.
  - If not as specified, adjust with an adjustment washer (between the drive housing front cover and the magnetic switch).

### Specification

0.5—2.0 mm {0.020—0.078 in}

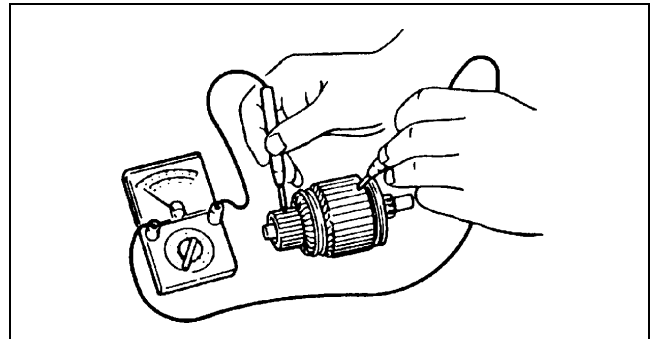


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### Starter Inner Parts Inspection

#### Armature

1. Verify that there is no continuity between the commutator and the core at each segment using an ohmmeter.
  - If there is continuity, replace the armature.
2. Verify that there is no continuity between the commutator and the shaft using an ohmmeter.
  - If there is continuity, replace the armature.

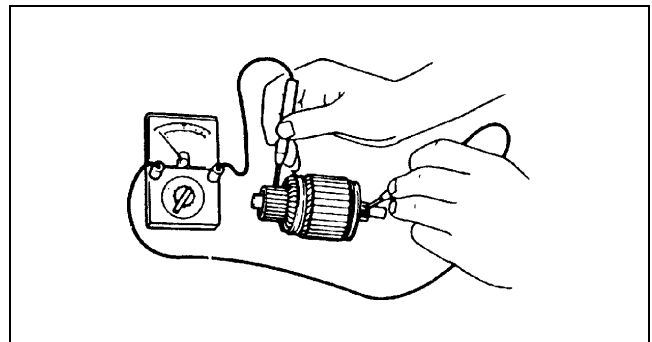


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3. Place the armature on V-blocks, and measure the runout using a dial indicator.
  - If not within the specification, repair using a lathe or replace the armature.

### Runout

0.1 mm {0.004 in} max.



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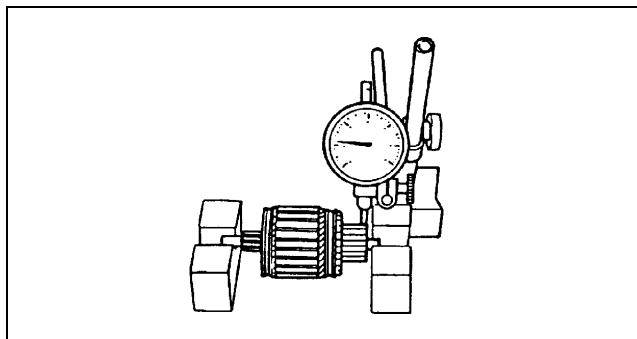
4. Measure the commutator diameter.
  - If not within the minimum specification, replace the armature.

**Standard commutator diameter**

**29.4 mm {1.16 in}**

**Minimum commutator diameter**

**28.8 mm {1.13 in}**



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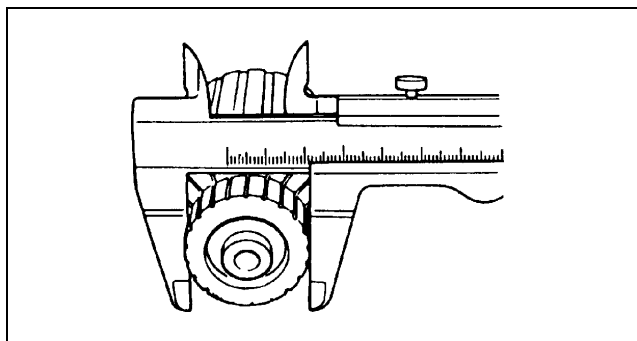
5. Measure the segment groove depth of commutator.
  - If not within the minimum specification, undercut the grooves to the standard depth.

**Standard depth**

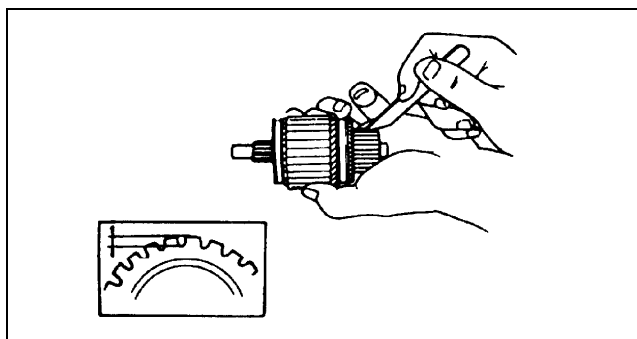
**0.5 mm {0.02 in}**

**Minimum depth**

**0.2 mm {0.008 in}**



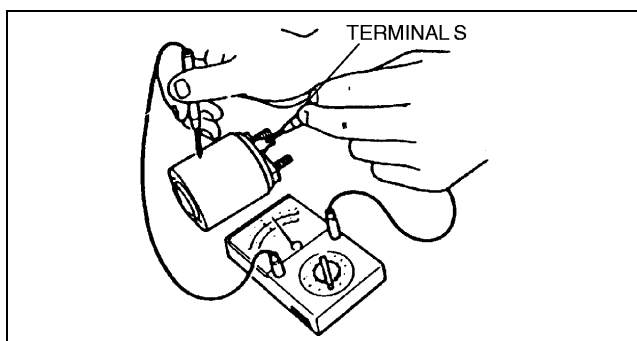
X5U119WAB



X5U119WAC

### Magnetic switch

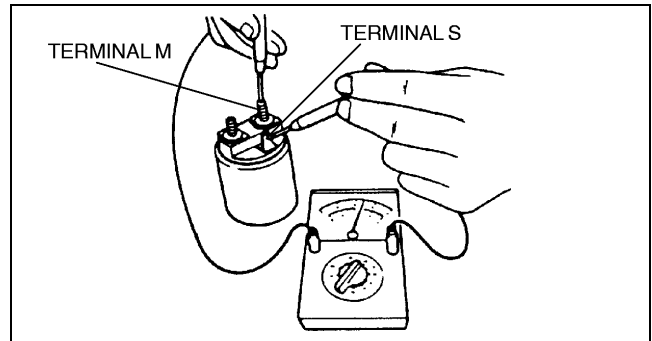
1. Inspect for continuity between terminals S and M using an ohmmeter.
  - If there is no continuity, replace the magnetic switch.



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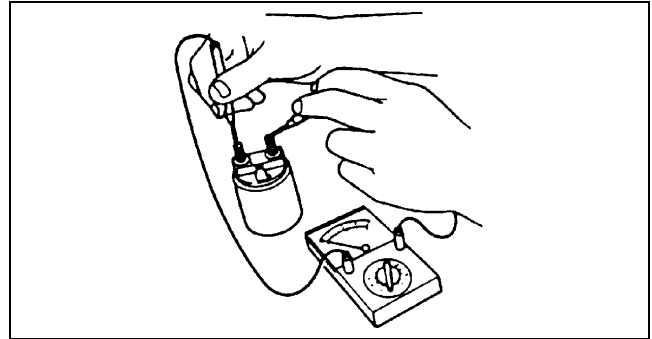
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2. Inspect for continuity between terminal S and the body using an ohmmeter.
  - If there is no continuity, replace the magnetic switch.



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3. Verify that there is no continuity between terminals M and B using an ohmmeter.
  - If there is continuity, replace the magnetic switch.



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### Brush and brush holder

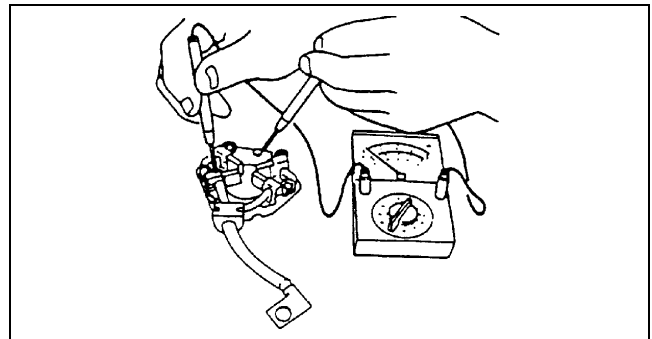
1. Verify that there is no continuity between each insulated brush and the plate using an ohmmeter.
  - If there is continuity, replace the brush holder.
2. Measure the brush length.
  - If any brush is worn almost to or beyond the minimum specification, replace all the brushes.

#### Standard brush length

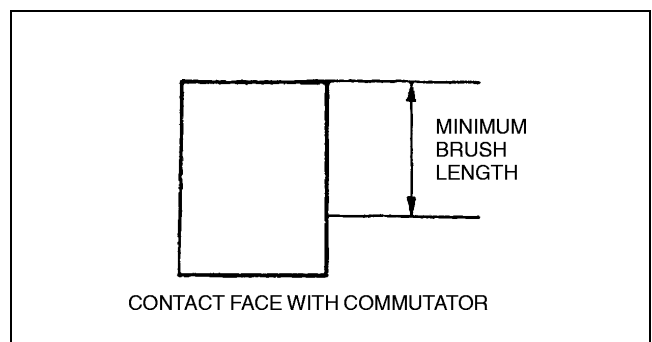
12.3 mm {0.48 in}

#### Minimum brush length

7.0 mm {0.28 in}



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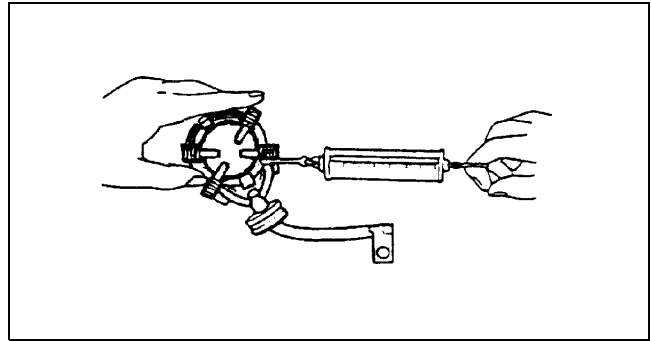
3. Measure the brush spring force using a spring balance.
  - If not within the minimum specification, replace the brush spring.

### Standard spring force

15.05—20.35 N {1.534—2.076 kgf, 3.375—4.567 lbf}

### Minimum spring force

5.9 N {0.60 kgf, 1.32 lbf}



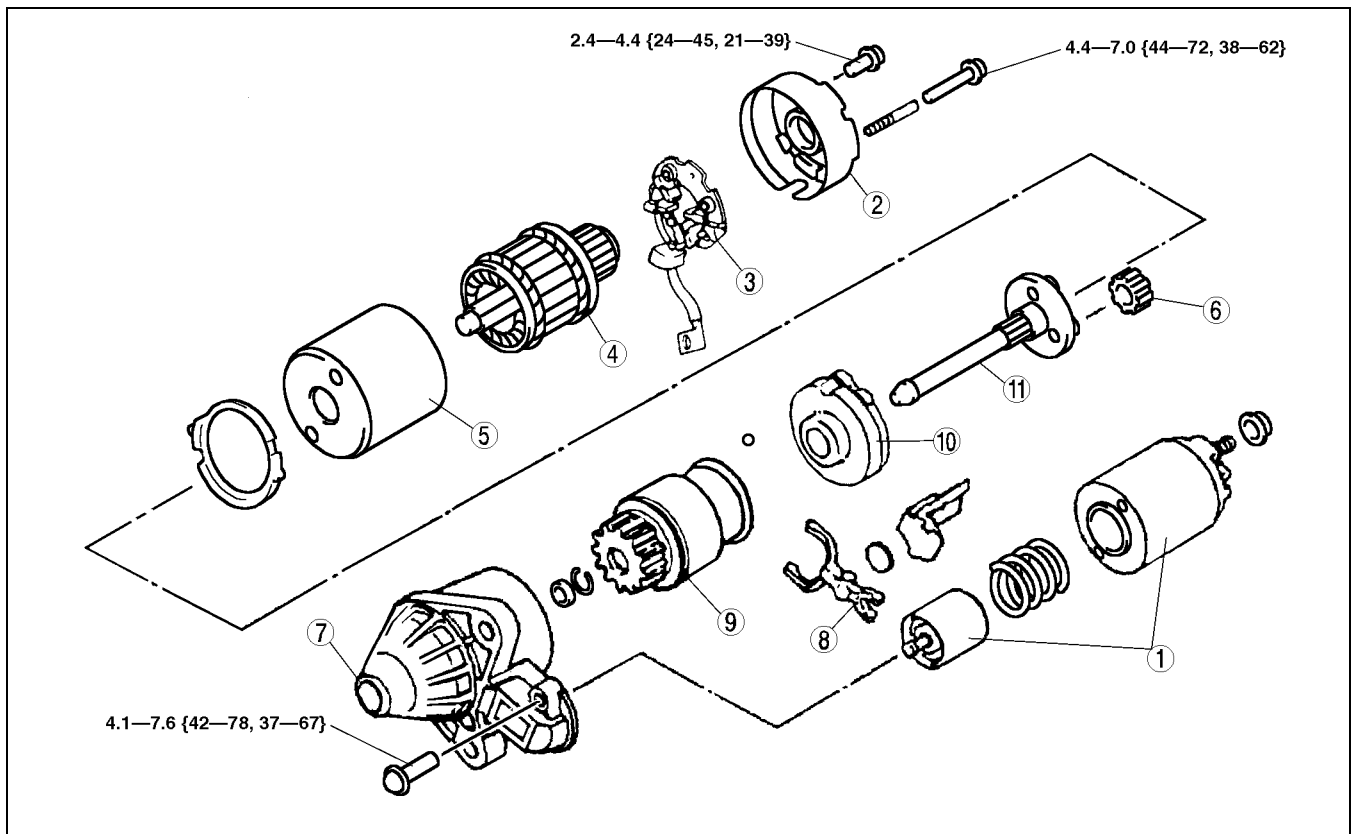
X5U119WAJ

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## STARTER DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



Z5U0119WA0

1	Magnetic switch
2	Rear housing
3	Brush and brush holder
4	Armature
5	Yoke
6	Planetary gear

7	Front cover
8	Lever
9	Drive pinion
10	Internal gear
11	Gear shaft

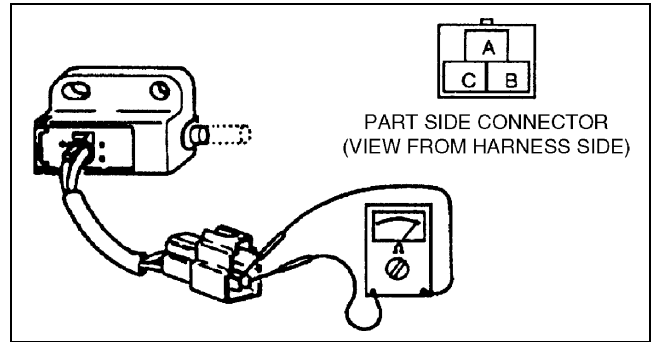
## STARTING SYSTEM

### STARTER INTERLOCK SWITCH INSPECTION (MT)

A5U011943440W01

1. Disconnect the starter interlock switch connector.
2. Inspect for continuity between terminals of the starter interlock switch using an ohmmeter.
  - If not as specified, replace the starter interlock switch.

Terminal	Condition	
	Clutch pedal not depressed	Clutch pedal depressed
B to C	No continuity	Continuity



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