

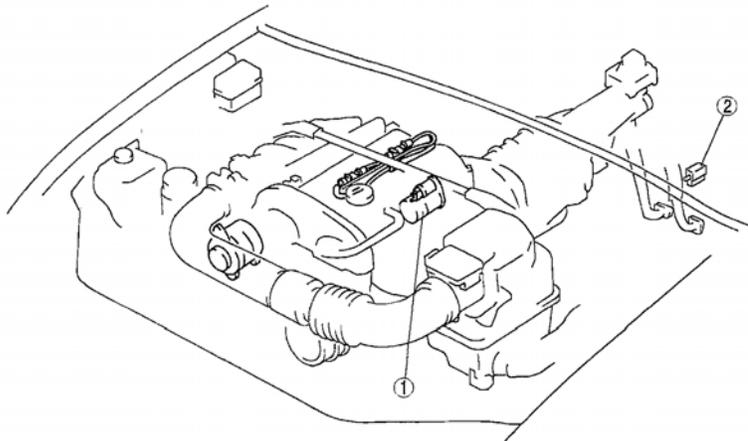
## 2005 Mazda MX-5 Miata

2005 ENGINE Starting System - MX-5 Miata

### 2005 ENGINE

#### Starting System - MX-5 Miata

## STARTING SYSTEM LOCATION INDEX



1	Starter (See STARTER REMOVAL/ INSTALLATION.) (See STARTER INSPECTION.) (See STARTER DISASSEMBLY/ ASSEMBLY.)
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2	Starter interlock switch (See STARTER INTERLOCK SWITCH INSPECTION (MT).)
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**Fig. 1: Locating Components Of Starting System**  
Courtesy of MAZDA MOTORS CORP.

## STARTER REMOVAL/INSTALLATION

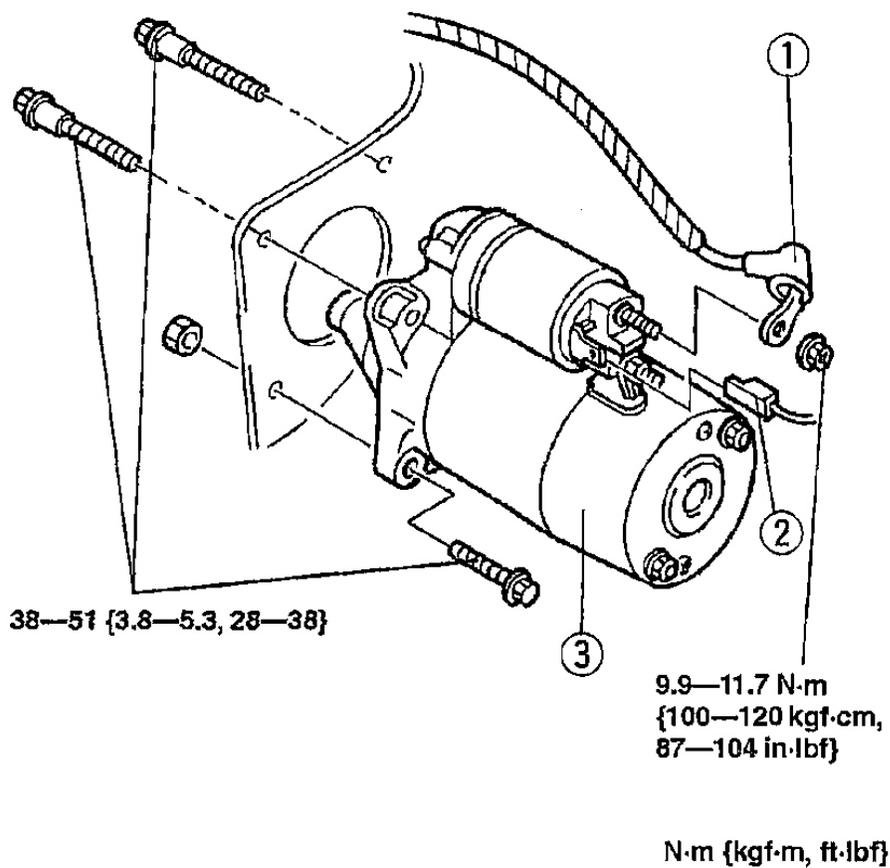
### WARNING:

- 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.

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1	Terminal B wire
2	Terminal S wire
3	Starter

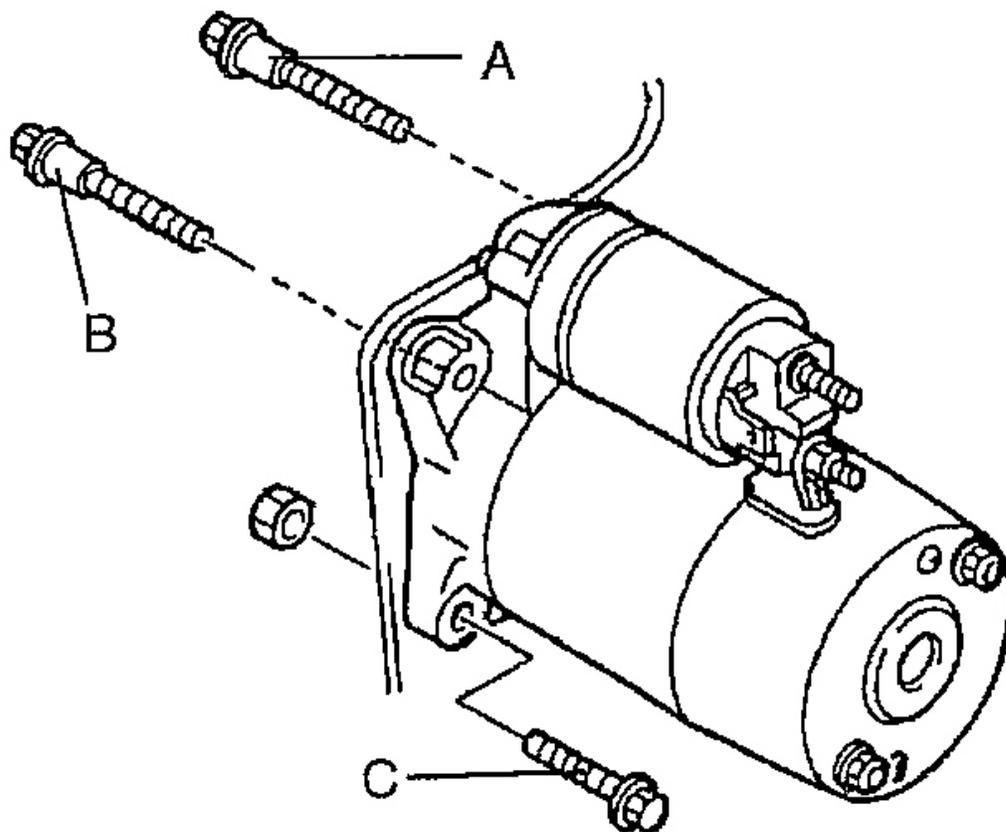
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**Fig. 2: Removing Intake Manifold Bracket & Torque Specifications**  
Courtesy of MAZDA MOTORS CORP.

5. Install in the reverse order of removal.

### STARTER INSTALLATION NOTE

1. Temporarily tighten the starter fitting bolt A.



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**Fig. 3: Tightening Starter Fitting Bolt**  
Courtesy of MAZDA MOTORS CORP.

2. Tighten the starter fitting bolts B and C.

**Tightening torque**

38-51 N. m {3. 8-5. 3 kgf. m, 28-38 ft. lbf}

3. Tighten the starter fitting bolt A.

**Tightening torque**

38-51 N. m {3. 8-5. 3 kgf. m, 28-38 ft. lbf}

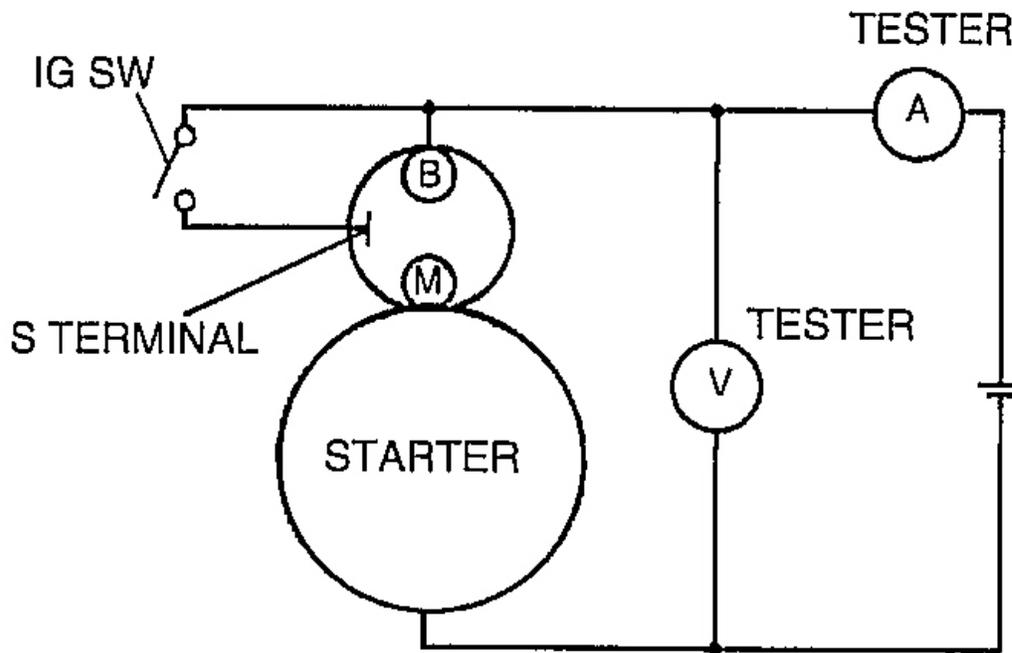
## STARTER INSPECTION

### ON-VEHICLE INSPECTION

1. Verify that the battery is fully charged.
2. The starter is normal if it rotates smoothly and without any noise when the engine is cranked.
  - If the starter does not operate, inspect the following:
    - Remove the starter, and inspect the starter unit.
    - Inspect the related wiring harnesses, the ignition switch, and the transaxle range switch (AT).

### NO LOAD TEST

1. Verify that the battery is fully charged.
2. Connect the starter, battery, voltmeter, and ammeter as shown in the figure.



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**Fig. 4: Connecting Starter, Battery, Voltmeter, And Ammeter**  
Courtesy of MAZDA MOTORS CORP.

3. Operate the starter and verify that it turns smoothly.

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4. Measure the voltage and current while the starter is operating.
  - If not as specified, repair or replace the inner parts.

#### **NO LOAD TEST SPECIFICATION**

Voltage (V)	11
Current (A)	90 or less

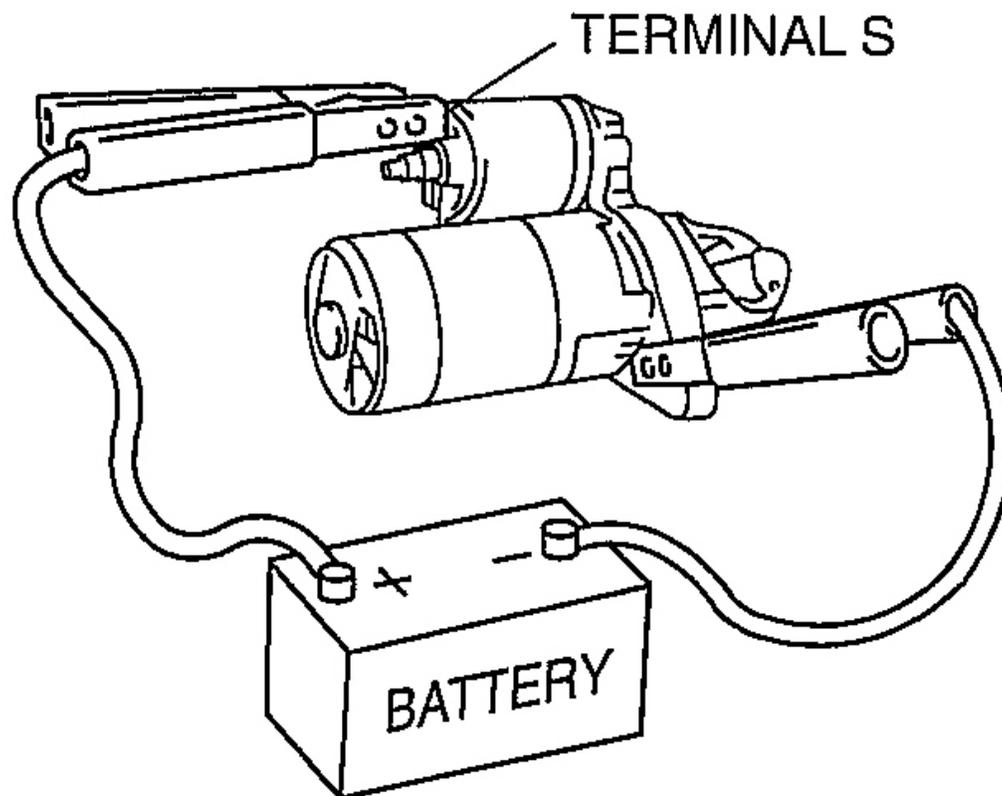
#### **MAGNETIC SWITCH OPERATION INSPECTION**

##### **Pull-out test**

##### **NOTE:**

- **In case the battery is being charged, the pinion may turn during 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 GND.
  - If not pulled out, repair or replace the starter.

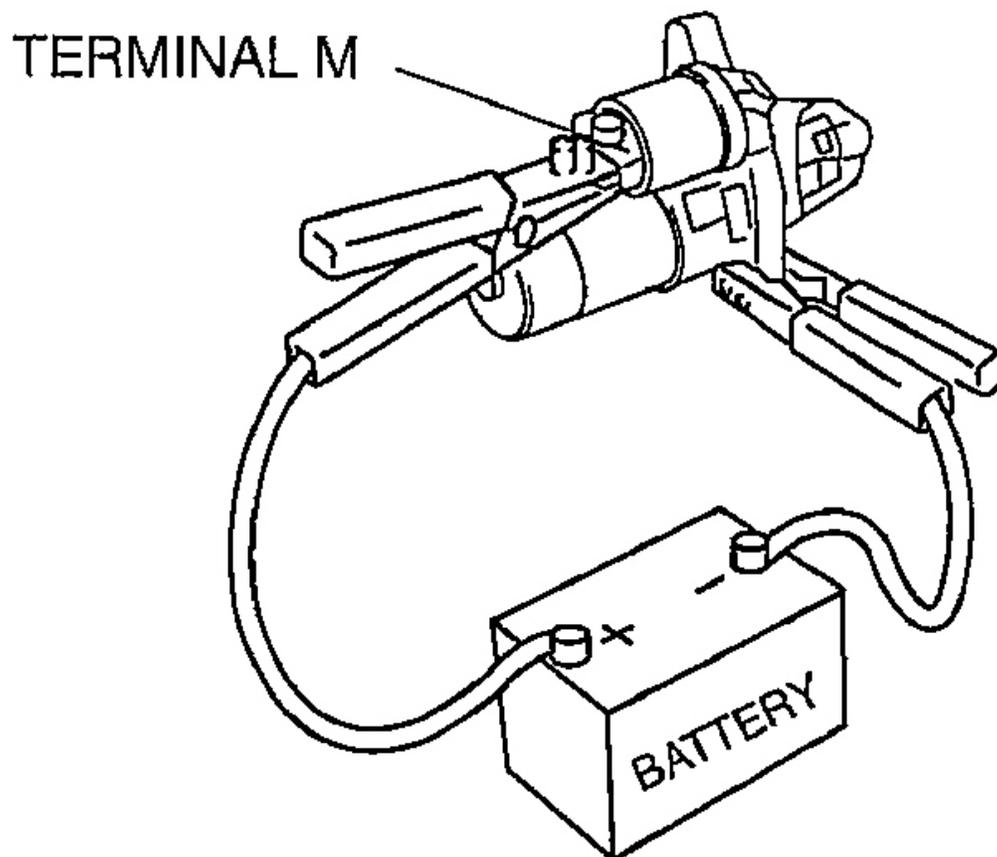


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**Fig. 5: Checking Magnetic Switch Operation**  
Courtesy of MAZDA MOTORS CORP.

**Return test**

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



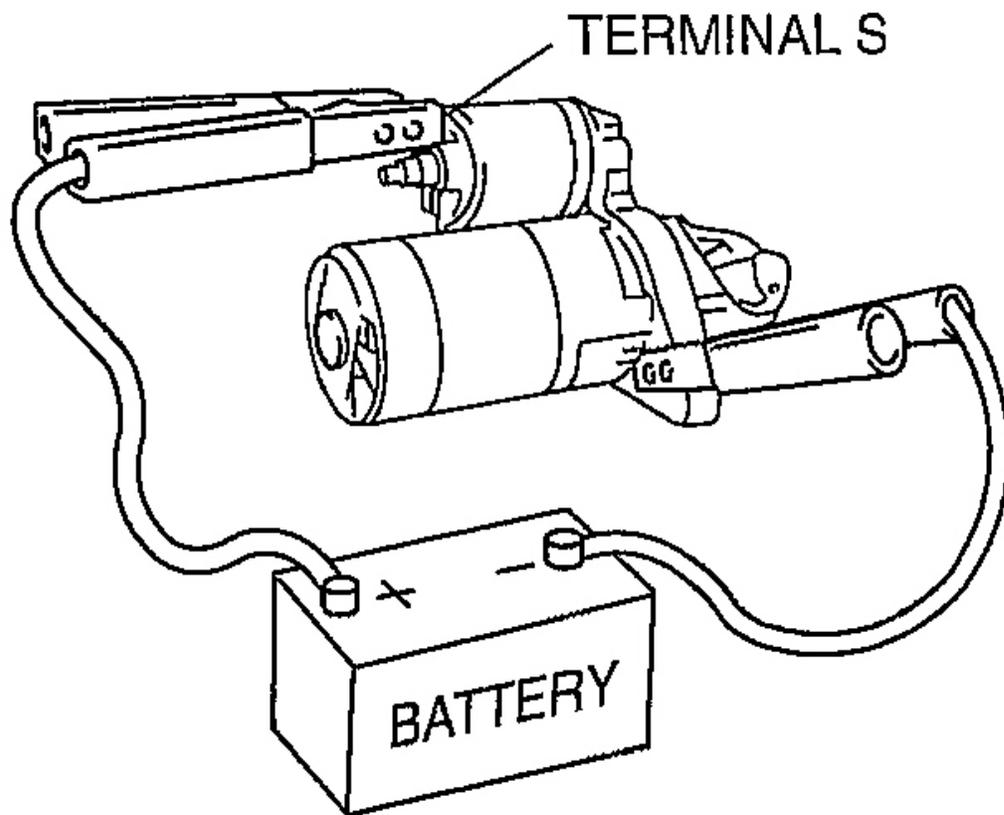
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**Fig. 6: Connecting Battery Positive Voltage To Terminal M And GND Starter Body**  
Courtesy of MAZDA MOTORS CORP.

#### PINION GAP INSPECTION

- CAUTION:**
- Applying power for more than 10 s can damage the starter. Do not apply power for more than the aforementioned time.

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



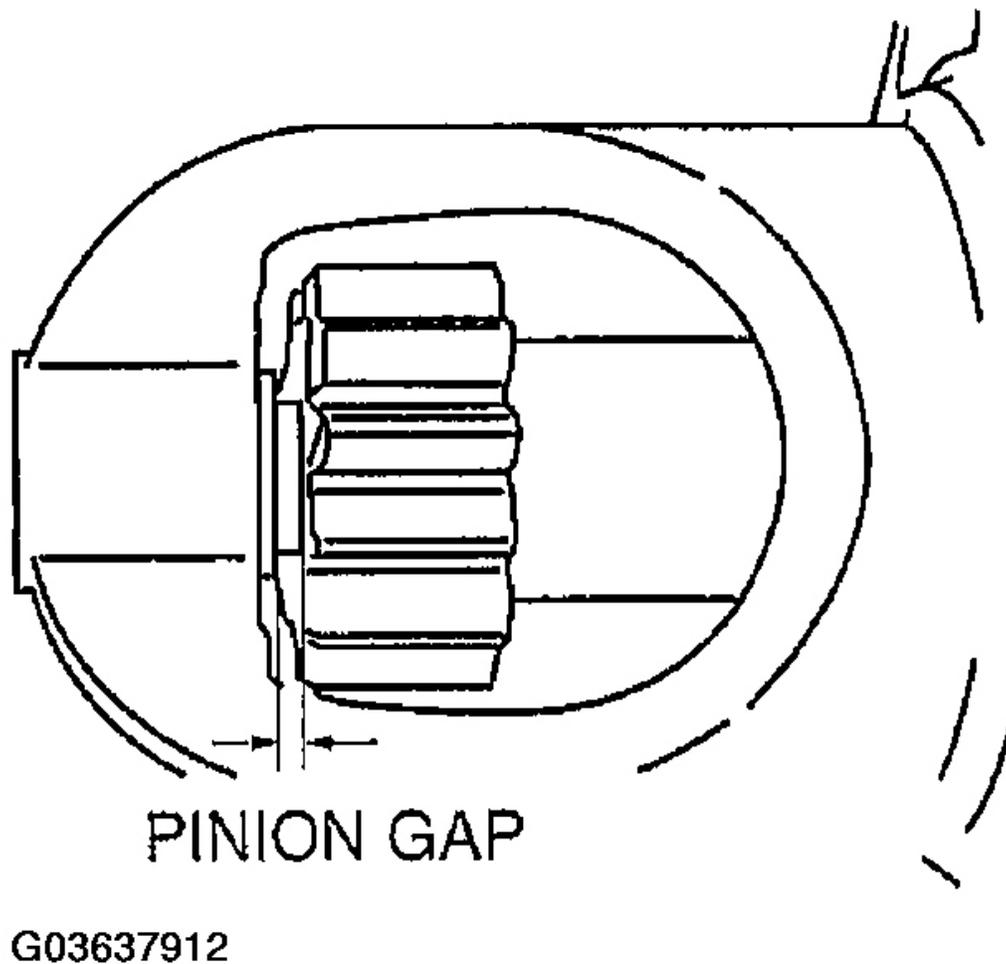
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**Fig. 7: Pulling Out Drive Pinion With Battery Positive Voltage Connected To Terminal S And Starter Body Gnd**  
Courtesy of MAZDA MOTORS CORP.

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

**Specification**

**0.5-2.0 mm {0.020-0.078 in}**

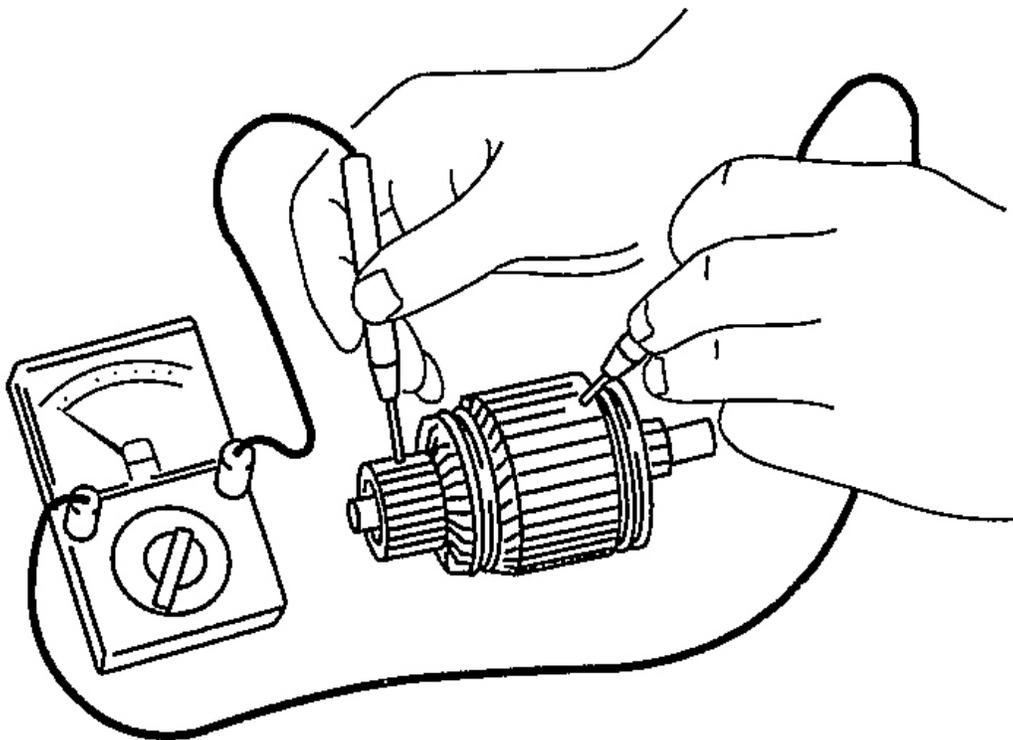


**Fig. 8: Measuring Pinion Gap**  
Courtesy of MAZDA MOTORS CORP.

### STARTER INNER PARTS INSPECTION

#### Armature

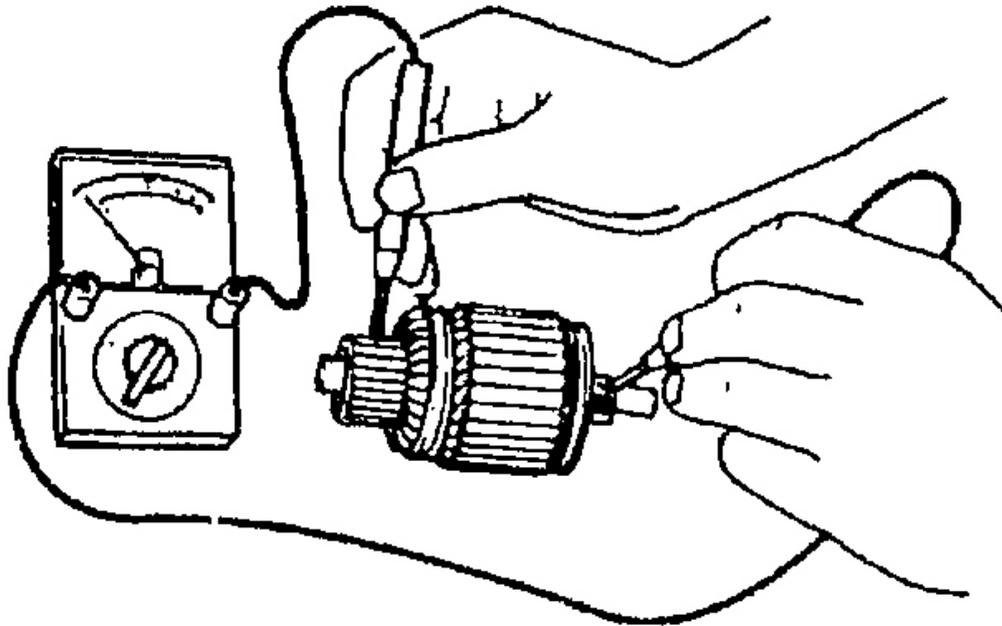
1. Verify that there is no continuity between the commutator and the core at each segment using an ohmmeter.
  - If there is continuity, replace the armature.



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**Fig. 9: Inspecting Starter Inner Parts**  
Courtesy of MAZDA MOTORS CORP.

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



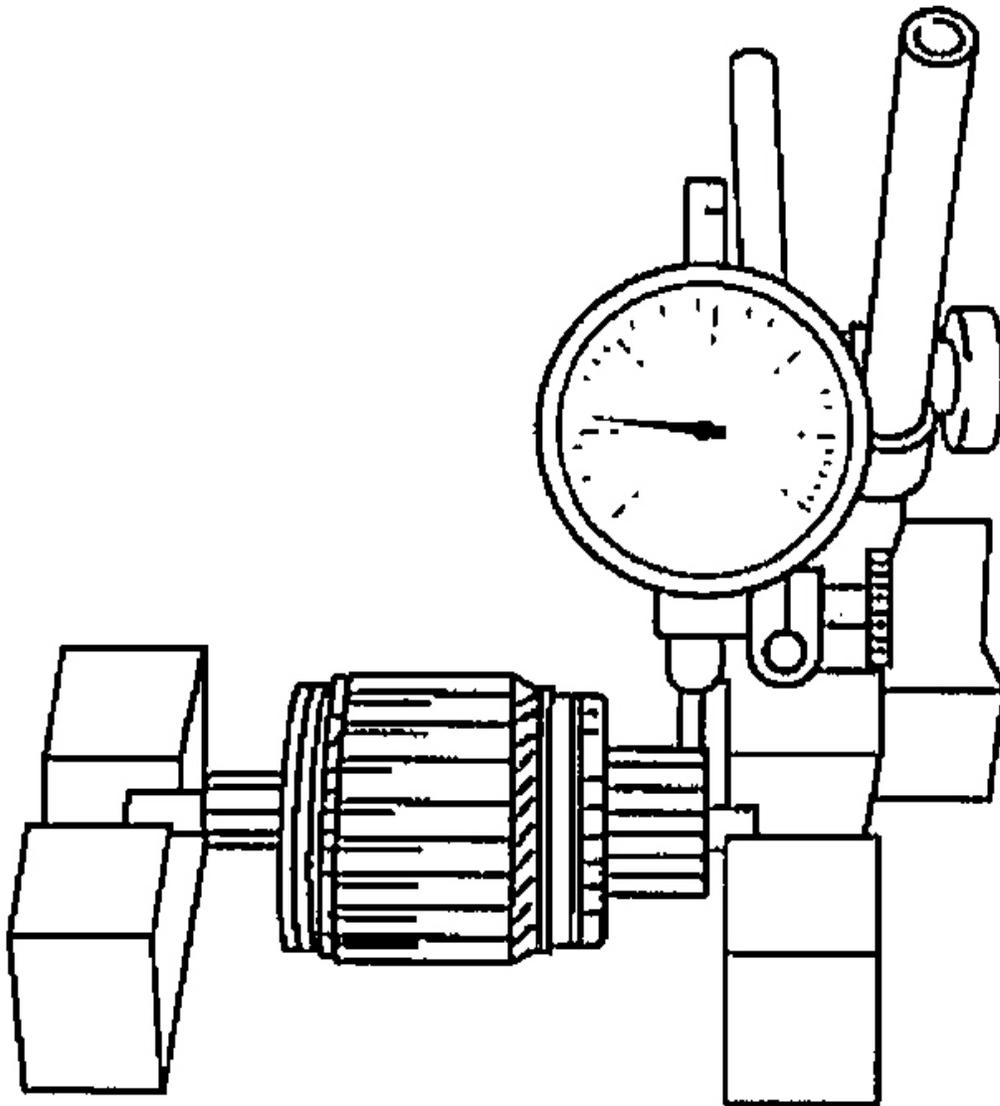
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**Fig. 10: Checking Continuity Between Commutator And Shaft Using An Ohmmeter**  
Courtesy of MAZDA MOTORS CORP.

3. Place the armature on V-blocks, and measure the runout using a dial indicator.

**Runout**

**0.1 mm {0.004 in} max.**



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**Fig. 11: Measuring Runout Using A Dial Indicator**  
Courtesy of MAZDA MOTORS CORP.

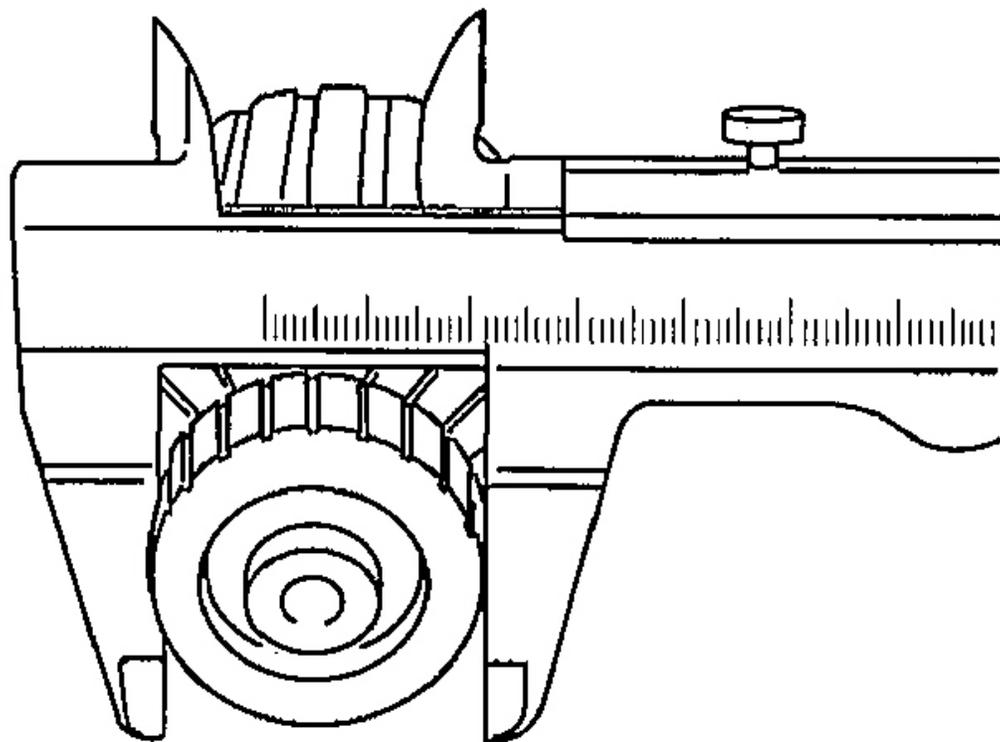
4. Measure the commutator diameter.
  - If it is less than the specification, replace the armature.

**Standard commutator diameter**

29.4 mm {1.16 in}

Minimum commutator diameter

28.8 mm {1.13 in}



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**Fig. 12: Measuring Commutator Diameter**  
Courtesy of MAZDA MOTORS CORP.

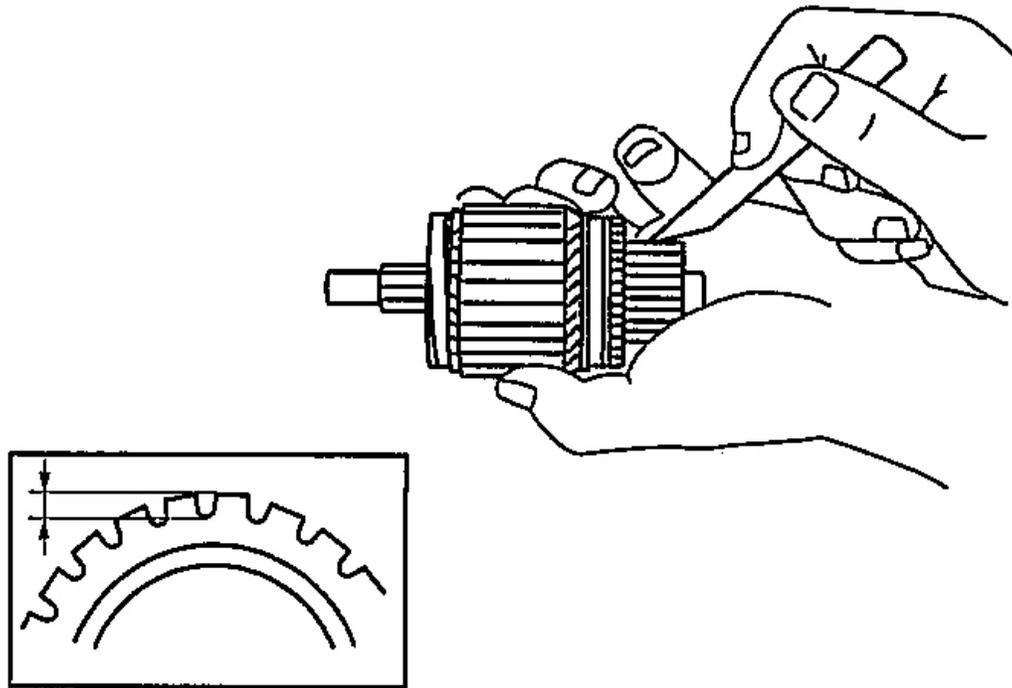
5. Measure the segment groove depth of commutator.
  - If it is less than the specification, undercut the grooves to the standard depth.

**Standard depth**

0.5 mm {0.02 in}

**Minimum depth**

0.2 mm {0.008 in}

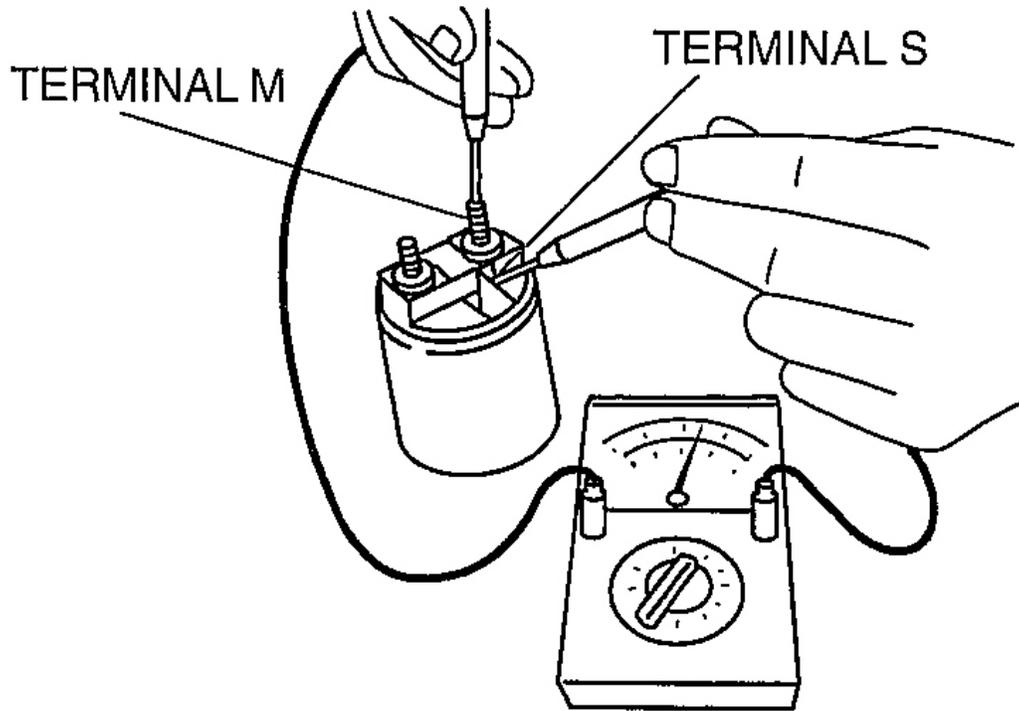


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**Fig. 13: Measuring Segment Groove Depth Of Commutator**  
Courtesy of MAZDA MOTORS CORP.

#### Magnetic switch

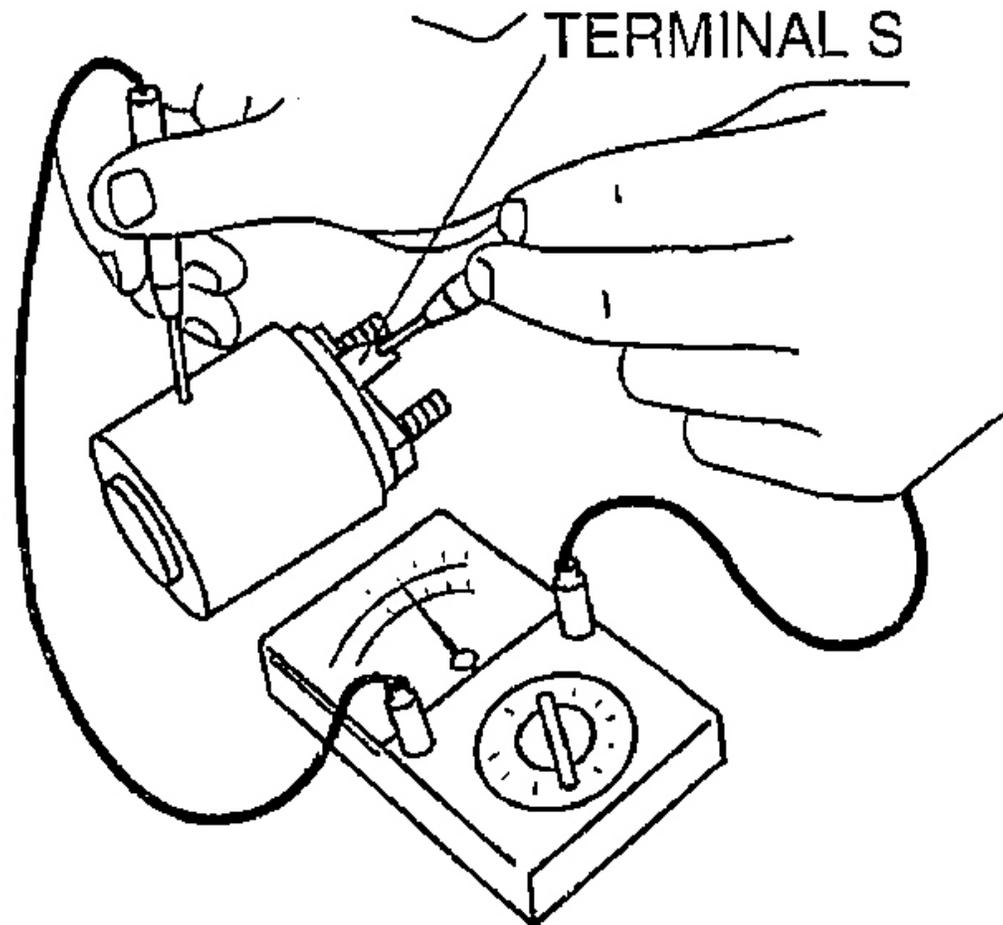
1. Inspect for continuity between terminals S and M using an ohmmeter.
  - If there is no continuity, replace the magnetic switch.



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**Fig. 14: Inspecting For Continuity Between Terminals S And M Using An Ohmmeter**  
Courtesy of MAZDA MOTORS CORP.

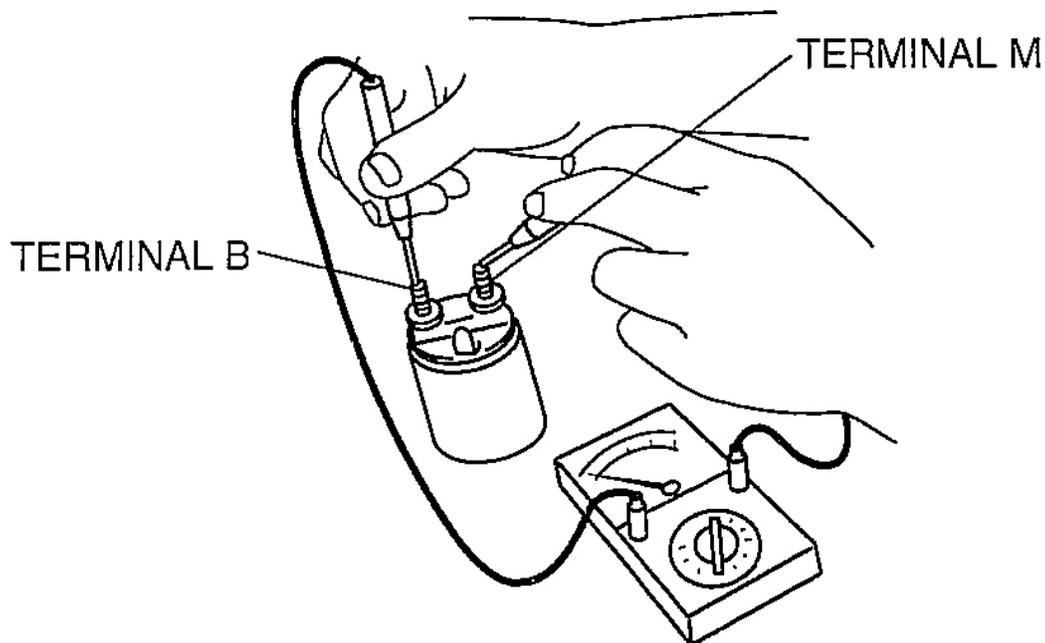
2. Inspect for continuity between terminal S and the body using an ohmmeter.
  - If there is no continuity, replace the magnetic switch.



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**Fig. 15: Inspecting For Continuity Between Terminal S And Body Using An Ohmmeter**  
Courtesy of MAZDA MOTORS CORP.

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

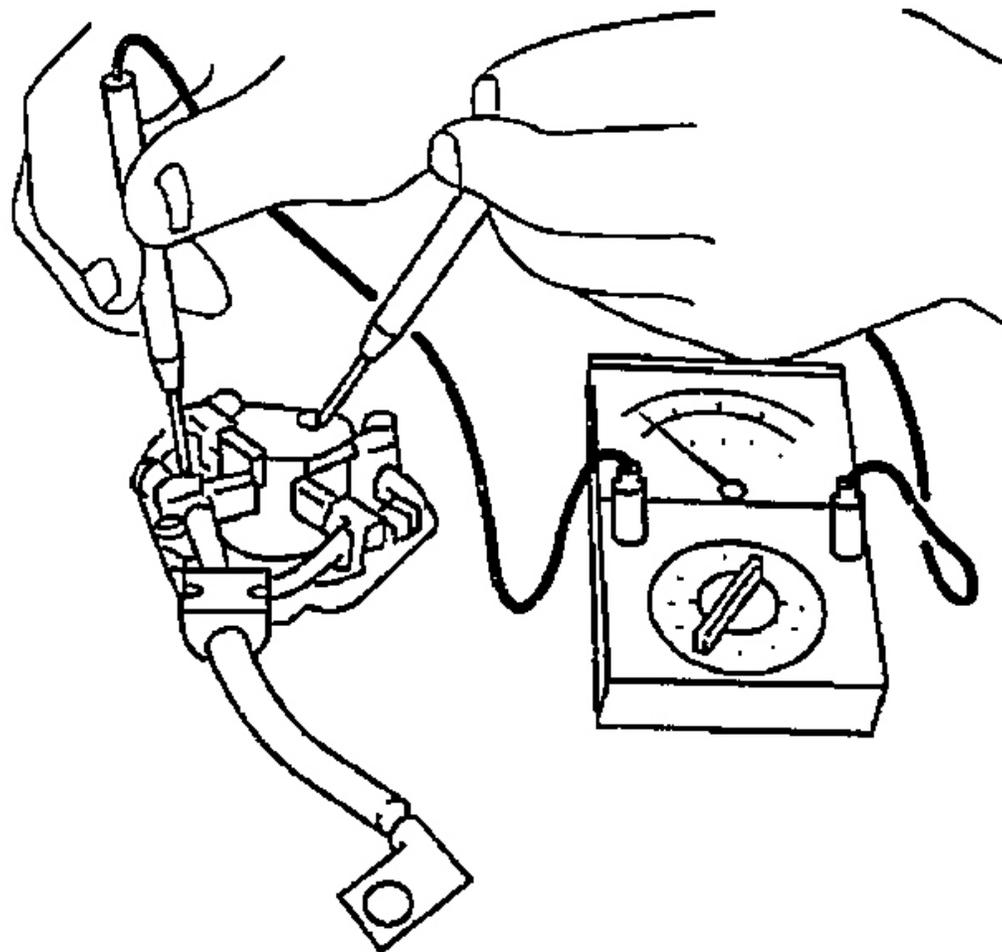


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**Fig. 16: Checking Continuity Between Terminals M And B Using An Ohmmeter**  
Courtesy of MAZDA MOTORS CORP.

**Brush and brush holder**

1. Verify that there is no continuity between each insulated brush and plate using an ohmmeter.
  - If there is continuity, replace the brush holder.



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**Fig. 17: Checking Continuity Between Insulated Brush And Plate Using An Ohmmeter**  
Courtesy of MAZDA MOTORS CORP.

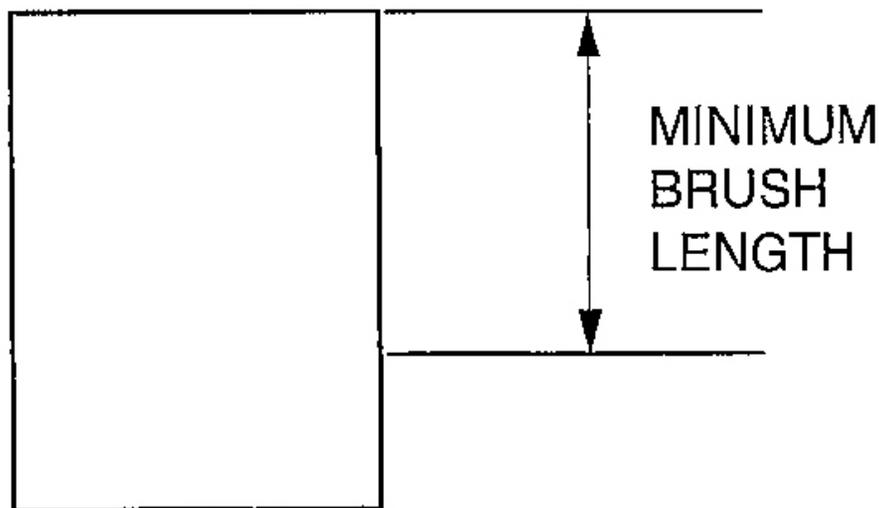
2. Measure the brush length.
  - If any brush is worn almost to or beyond the minimum specification, replace all the brushes.

**Standard brush length**

**12.3 mm {0.48 in}**

**Minimum brush length**

7.0 mm {0.28 in}



CONTACT FACE WITH COMMUTATOR

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**Fig. 18: Measuring Brush Length**  
Courtesy of MAZDA MOTORS CORP.

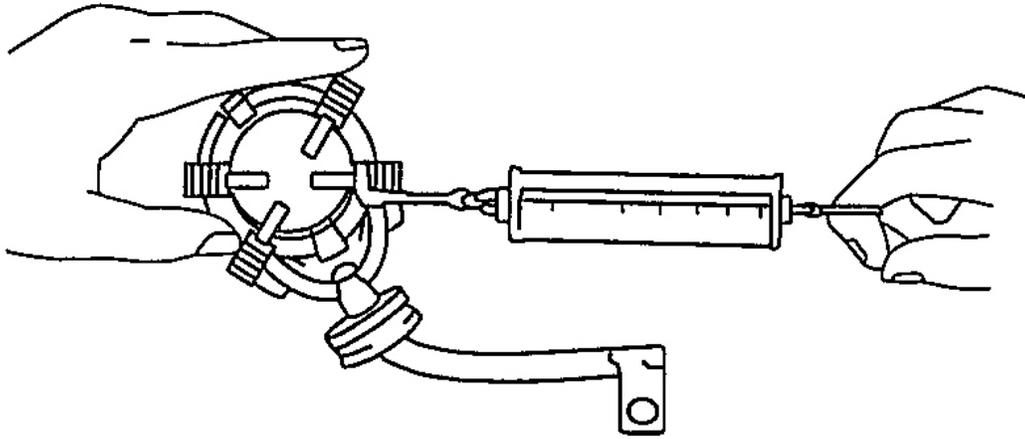
3. Measure the brush spring force using a spring balance.
  - If it is less than the minimum specification, replace the brush spring.

**Standard spring force**

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

**Minimum spring force**

**5.9 N {0.6 kgf, 1.3 lbf}**



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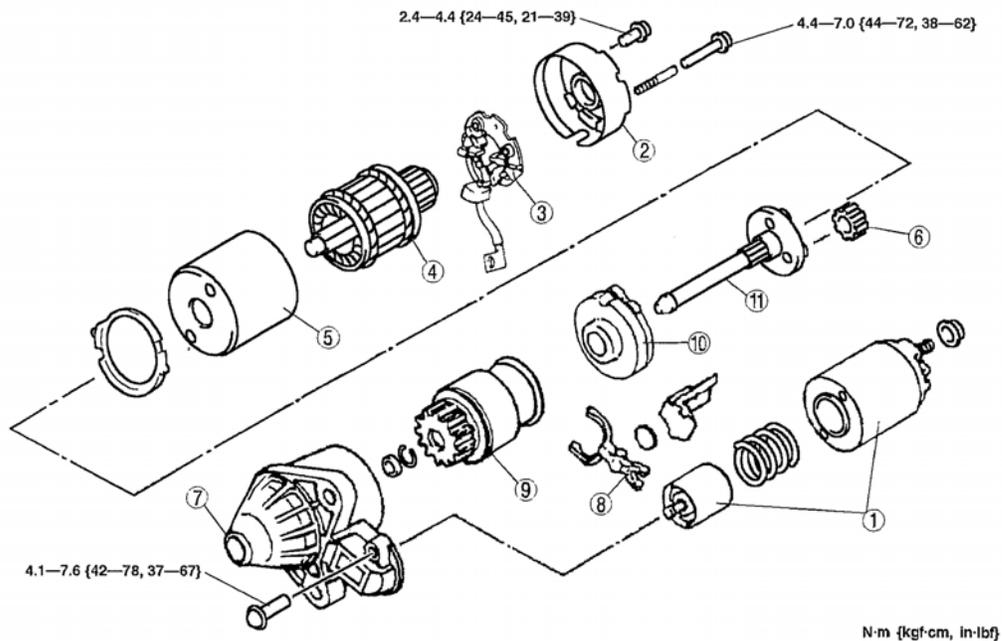
**Fig. 19: Measuring Brush Spring Force Using A Spring Balance**  
Courtesy of MAZDA MOTORS CORP.

## **STARTER DISASSEMBLY/ASSEMBLY**

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

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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

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**Fig. 20: Exploded View Of Starter & Torque Specifications**  
 Courtesy of MAZDA MOTORS CORP.

## STARTER INTERLOCK SWITCH INSPECTION (MT)

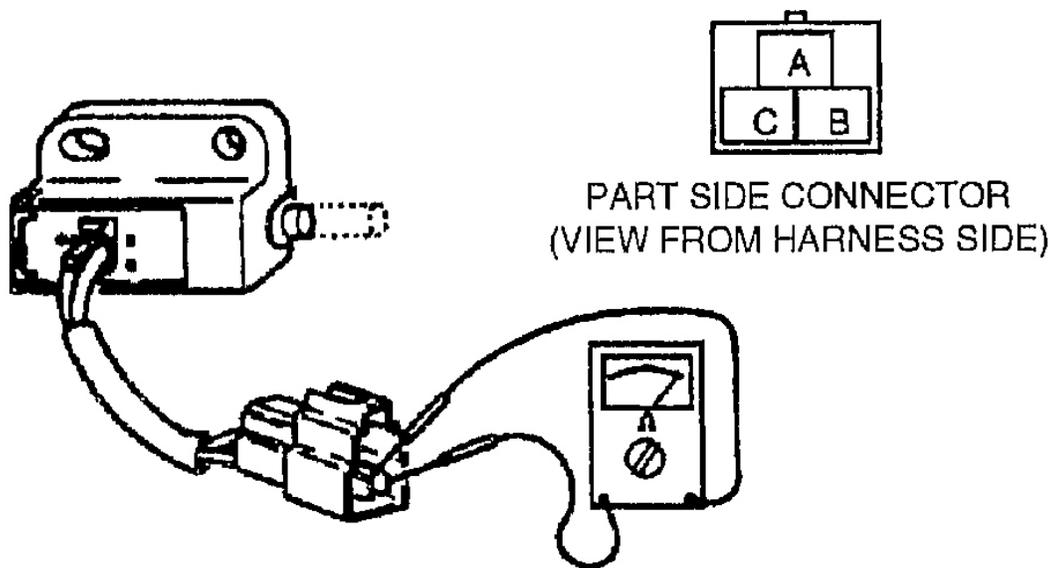
1. Disconnect the starter interlock switch connector.
2. Verify that the continuity is as indicated in the table.
  - If there is any malfunction, replace the starter interlock switch.

○—○ : Continuity

Clutch pedal	Terminal		
	A	B	C
Not depressed			
Depressed		○—○	○—○

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**Fig. 21: Identifying Starter Interlock Switch Terminal**  
 Courtesy of MAZDA MOTORS CORP.



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**Fig. 22: Disconnecting Starter Interlock Switch Connector**  
 Courtesy of MAZDA MOTORS CORP.