2003-06 ENGINE

Starting System - MDX

COMPONENT LOCATION INDEX

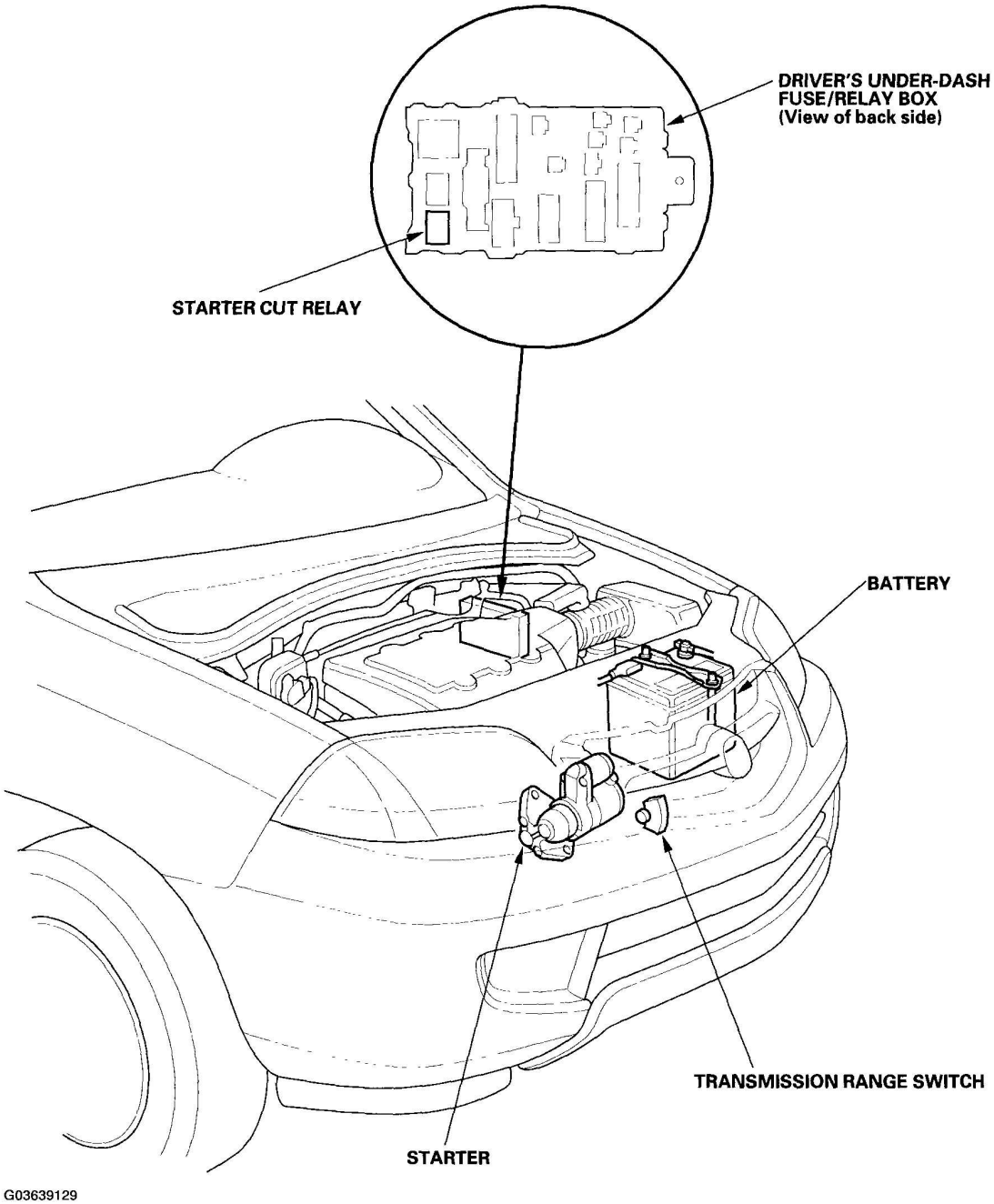

Fig. 1: Locating Starting System Components

Courtesy of AMERICAN HONDA MOTOR CO., INC.

SYMPTOM TROUBLESHOOTING INDEX

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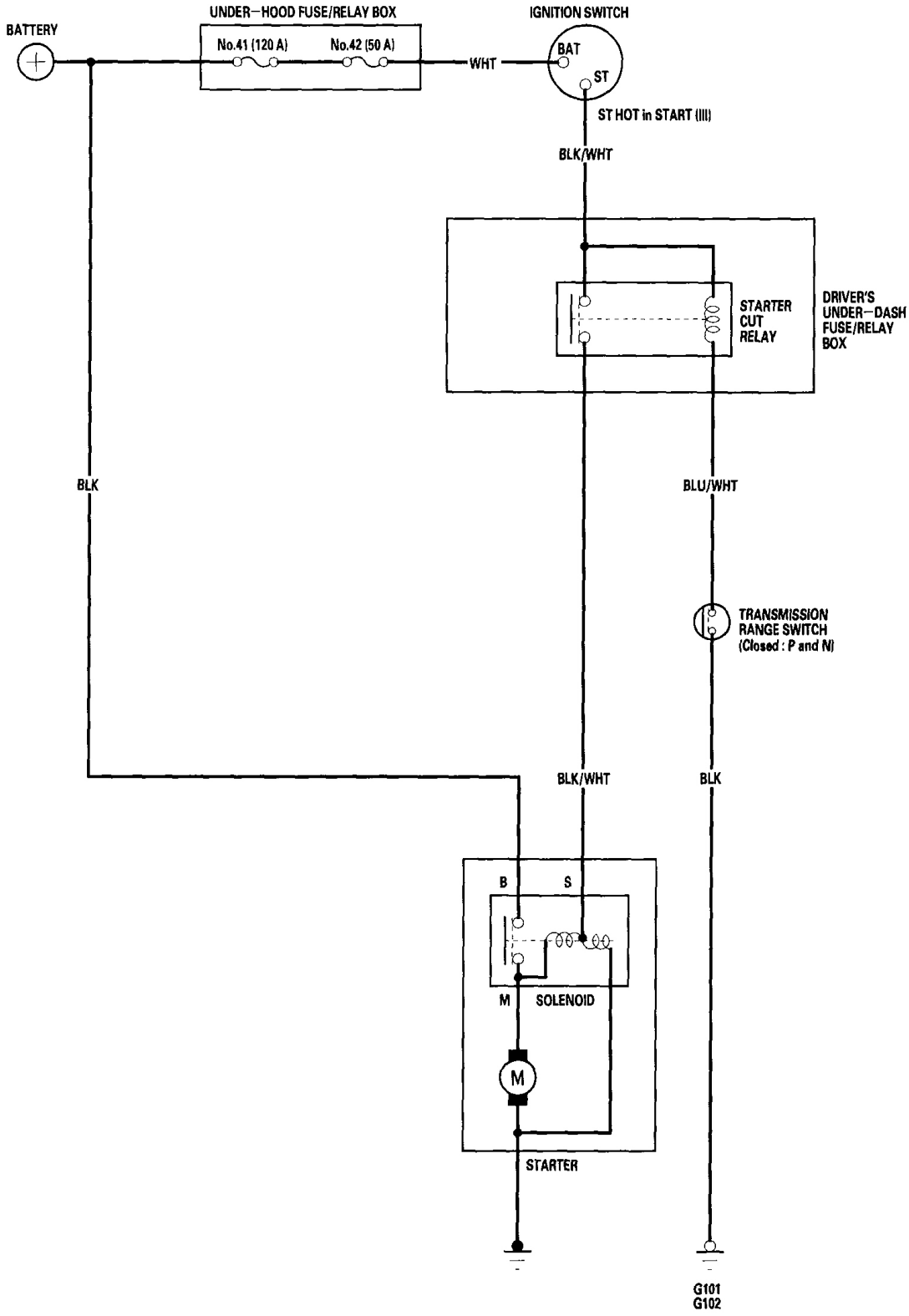
Symptom	Diagnostic procedure	Also check for
Engine does not start (does not crank)	1. Check for loose battery terminals or connections. 2. Test the battery for a low charge (see **BATTERY TEST**). 3. Check the starter (see **STARTER SOLENOID TEST**). 4. Check the starter cut relay (see **POWER RELAY TEST**). 5. Check the transmission range switch (see **TRANSMISSION RANGE SWITCH TEST**). 6. Check the ignition switch or wire (see **IGNITION SWITCH**).	Poor ground at G101, G102
Engine cranks, but does not start	1. Check for PGM-FI DTCs. 2. Check the fuel pressure (see **FUEL PUMP CIRCUIT TROUBLESHOOTING**). 3. Check for a plugged or damaged fuel line (see **FUEL LINE INSPECTION**). 4. Check for a plugged fuel filter (see **FUEL PRESSURE REGULATOR REPLACEMENT**). 5. Check the throttle body (see **THROTTLE BODY TEST**). 6. Check for low engine compression (see **ENGINE COMPRESSION INSPECTION**). 7. Check for a damaged or broken timing belt.	
	1. Check for PGM-FI DTCs. 2. Check the fuel pressure (see **FUEL PUMP CIRCUIT TROUBLESHOOTING**).	

Engine is hard to start	3. Check for a plugged or damaged fuel line (see **FUEL LINE INSPECTION**). 4. Check for a plugged fuel filter (see **FUEL PRESSURE REGULATOR REPLACEMENT**).	
Engine cranks slowly	1. Check for loose battery terminals or connections. 2. Test the battery for a low charge (see **BATTERY TEST**). 3. Check the starter for binding (see **STARTER OVERHAUL**). 4. Check for excessive drag in the engine.	

CIRCUIT DIAGRAM


BATTERY
UNDER–HOOD FUSE/RELAY BOX
No.41 (120 A)
No.42 (50 A)
WHT
IGNITION SWITCH
BAT
ST
ST HOT in START (III)
BLK/WHT
STARTER CUT RELAY
DRIVER'S UNDER–DASH FUSE/RELAY BOX
BLK
BLU/WHT
TRANSMISSION RANGE SWITCH (Closed : P and N)
BLK/WHT
BLK
B
S
M
SOLENOID
M
STARTER
G101
G102

G03639130

Fig. 2: Starting System Circuit Diagram
Courtesy of AMERICAN HONDA MOTOR CO., INC.

STARTER CIRCUIT TROUBLESHOOTING

NOTE:

- **Air temperature must be between 59 and 100 ℉ (15 a nd 38 ℃) during this procedure.**
- **After this inspection, you must reset the powertrain control module (PCM), using the Honda Diagnostic System (HDS) (see HDS CLEAR COMMAND), otherwise the PCM continues to stop the fuel injectors.**
- **The battery must be in good condition and fully charged.**

1. Hook up the following equipment:
   - Ammeter, 0-400 A
   - Voltmeter, 0-20 V (accurate within 0.1 V)

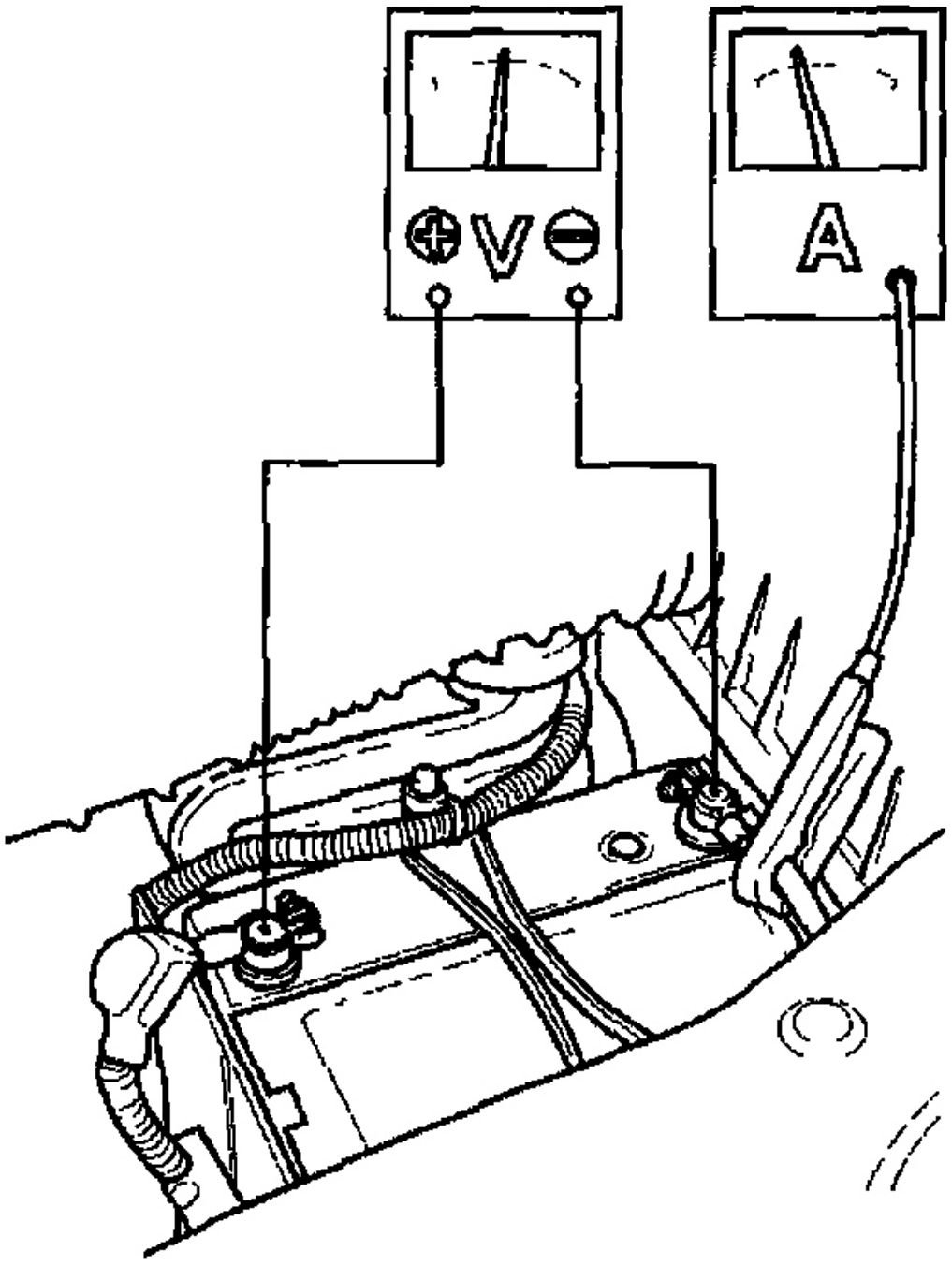


Fig. 3: Hooking Up Ammeter And Voltmeter To Battery

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Connect the HDS to the data link connector (DLC) (see step 2 on **GENERAL TROUBLESHOOTING INFORMATION**).
3. Turn the ignition switch ON (II), and select PGM-FI, INSPECTION, then ALL INJECTORS OFF on the HDS.
4. With the shift lever in P or N position, turn the ignition switch to START (III).

   Did the starter crank the engine normally?

   YES - The starting system is OK. Go to step 11 .

   NO - Go to step 5.
5. Check the battery condition. Check electrical connections at the battery, negative battery cable to the body, engine ground cables, and the starter for looseness and corrosion. Then try starting the engine again.

   Did the starter crank the engine?

   YES - Repairing the loose connection fixed the problem. The starting system is now OK. Go to step 11 .

   NO - If the starter will not crank the engine at all, go to step 6. If it cranks the engine erratically or too slowly, go to step 9 . If it will not disengage from the torque converter ring gear when you release the key, check for the following until you find the cause.

   - Solenoid plunger and switch malfunction
   - Dirty drive gear or damaged overrunning clutch.
6. Make sure the transmission is in Park or Neutral, then disconnect the BLK/WHT wire (A) from the starter solenoid (B). Connect a jumper wire from the battery positive terminal to the solenoid terminal.

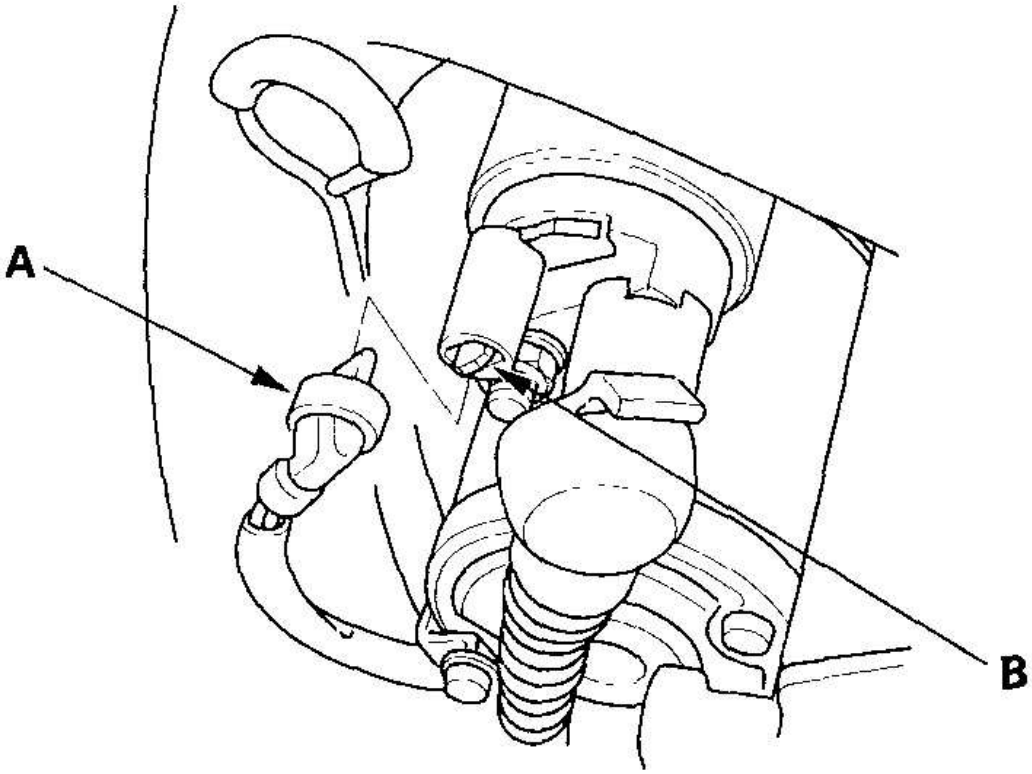


Fig. 4: Disconnecting BLK/WHT Wire From Starter Solenoid
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Did the starter crank the engine?

YES - Go to step 7.

NO - Remove the starter, and repair or replace as necessary.

7. Check the following items in the order listed until you find the open circuit.
   - The BLK/WHT wire and connectors between the under-dash fuse/relay box and the ignition switch, and between the under-dash fuse/relay box and the starter.
   - The ignition switch (see **IGNITION SWITCH**).
   - The transmission range switch and connector, (see **TRANSMISSION RANGE SWITCH TEST**).
   - The starter relay (see **POWER RELAY TEST**).
8. Check the cranking voltage and the current draw.

Is the cranking voltage greater than or equal to 7.7 V and is the current draw less than or equal to 400 A?

YES - Go to step 9.

NO - Replace the starter, or remove and disassemble it, and check for the following until you find the cause.

- Drag in the starter armature
- Shorted armature winding
- Excessive drag in the engine

9. Check the engine speed while cranking the engine.

Is the engine speed above 100 rpm?

YES - Go to step 10.

NO - Replace the starter, or remove and disassemble it, and check for the following until you find the cause.

- Open circuit in the starter armature commutator segments
- Excessively worn starter brushes
- Open circuit in the commutator brushes
- Dirty or damaged helical splines or drive gear
- Faulty drive gear clutch

10. Remove the starter, and inspect its drive gear, and the torque converter ring gear for damage. Replace any damaged parts.
11. Select PCM reset to cancel ALL INJECTORS OFF on the HDS (see **HDS CLEAR COMMAND**).

STARTER SOLENOID TEST

1. Make sure you have the anti-theft codes for the radio and the navigation system, then write down the customer's audio presets. Make sure the ignition switch is OFF.
2. Disconnect the negative cable from the battery first, then disconnect the positive cable.
3. Check the hold-in coil for continuity between the S terminal and the armature housing (ground). There should be continuity.
   - If there is continuity, go to step 4.
   - If there is no continuity, replace the solenoid.

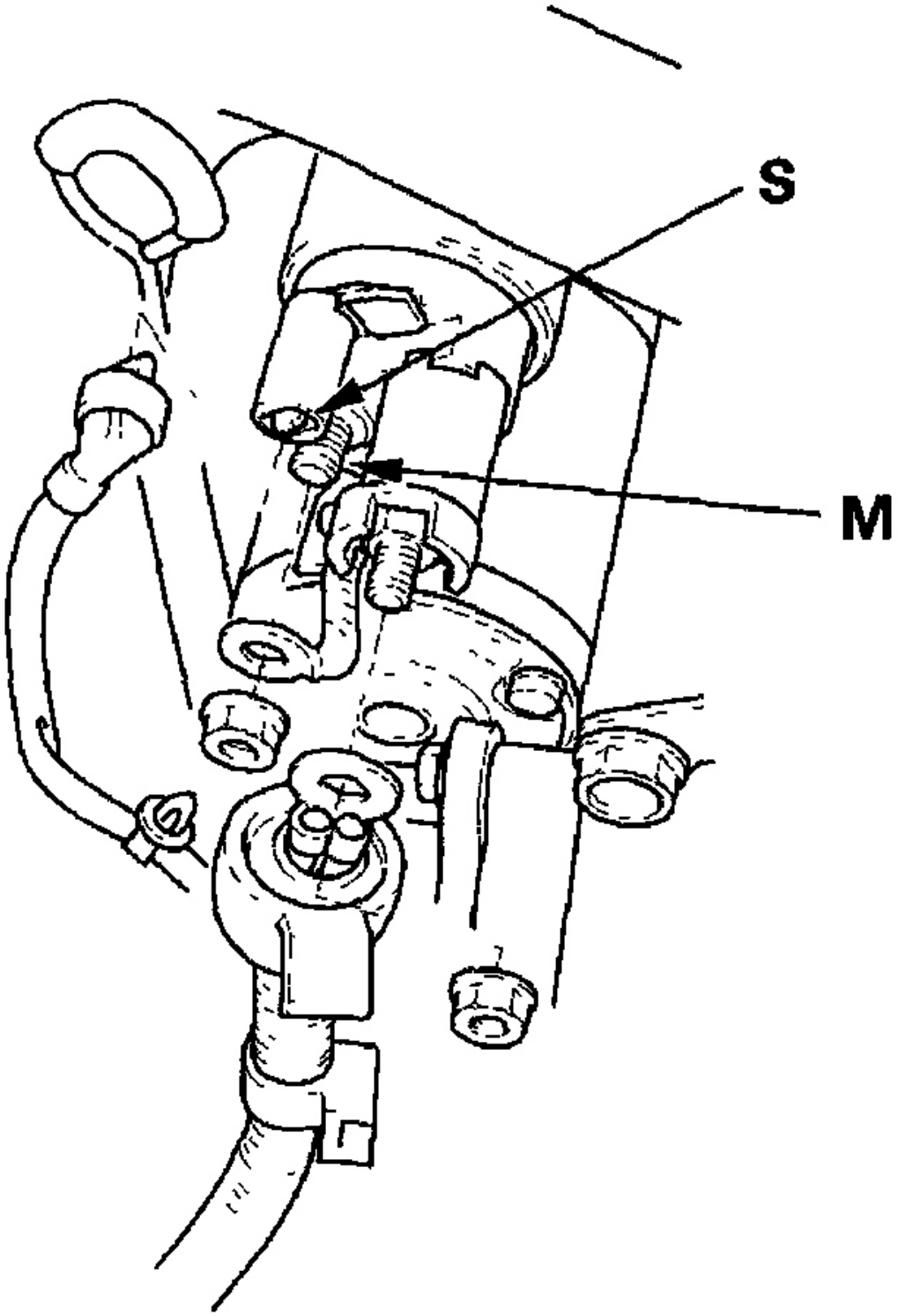


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Fig. 5: Checking Hold-In Coil For Continuity Between S Terminal And Armature Housing (Ground)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Check the pull-in coil for continuity between the S terminal and M terminal. There should be continuity.
   - If there is continuity, the solenoid is OK.
   - If there is no continuity, replace the solenoid.
5. Connect the positive cable to the battery first, then connect the negative cable.
6. Enter the anti-theft codes for the radio and the navigation system.
7. Enter the customer's audio presets, and set the clock.
8. Do the power window unit reset procedure (see **RESETTING THE POWER WINDOW CONTROL UNIT**).

STARTER PERFORMANCE TEST

1. Disconnect the wire from the M terminal.
2. Make a connection as shown in **Fig. 6** using as heavy a wire as possible (preferably equivalent to the wire used for the vehicle). To avoid damaging the starter, never leave the battery connected for more than 10 seconds.

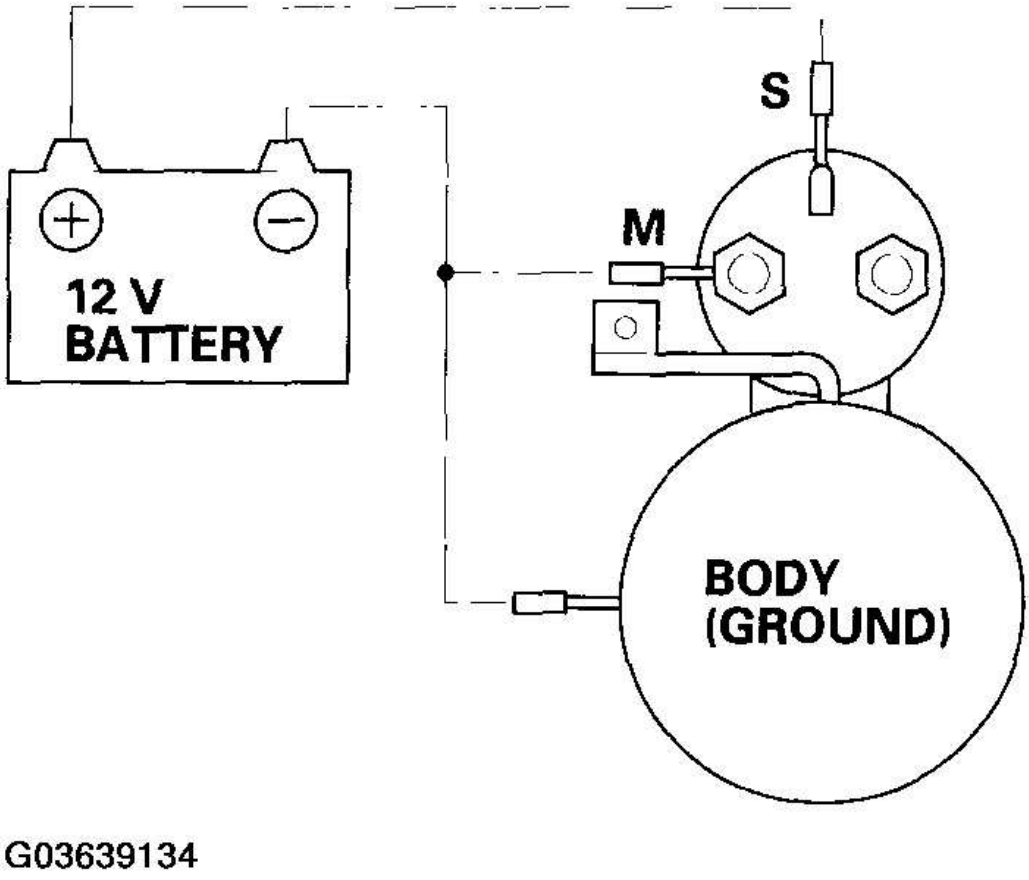

Fig. 6: Making Connection Using Heavy Wire Possible
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Connect the battery as shown. Make sure you disconnect the starter motor wire from the solenoid. If the starter pinion moves out, it is working properly.
4. Disconnect the negative battery terminal from the M terminal. If the pinion does not retract, the hold-in coil of the solenoid is working properly.

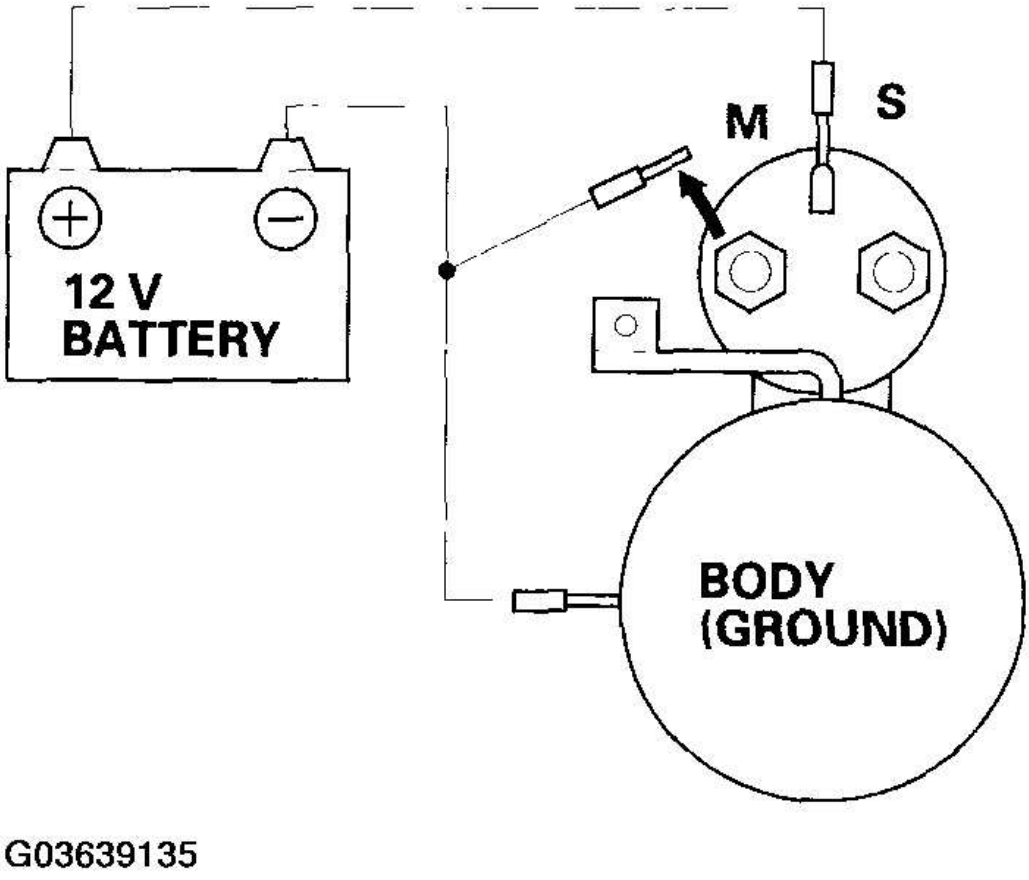

Fig. 7: Disconnecting Negative Battery Terminal From M Terminal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Disconnect the negative battery terminal from the starter body. If the pinion retracts immediately, it is working properly.

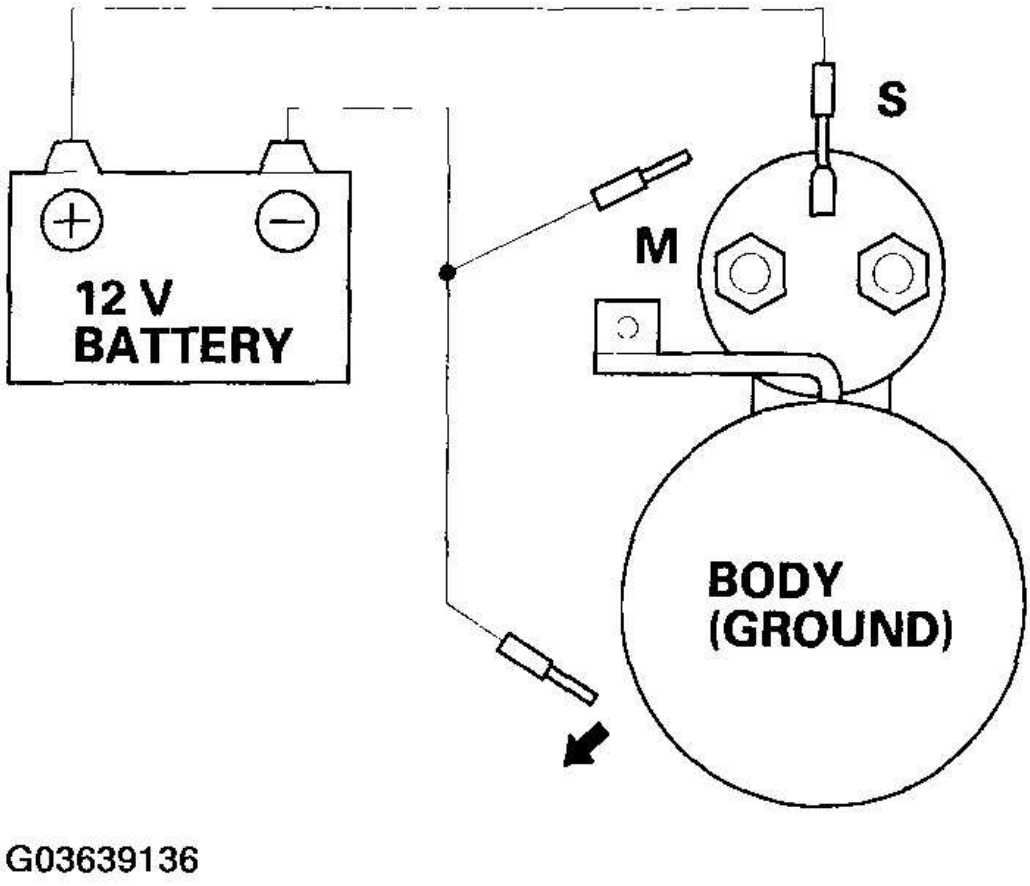

Fig. 8: Disconnecting Negative Battery Terminal From Starter Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Clamp the starter firmly in a vise.
7. Reconnect the wire to the M terminal.
8. Connect the starter to the battery as shown in **Fig. 9** , and check that the motor starts and keeps rotating.

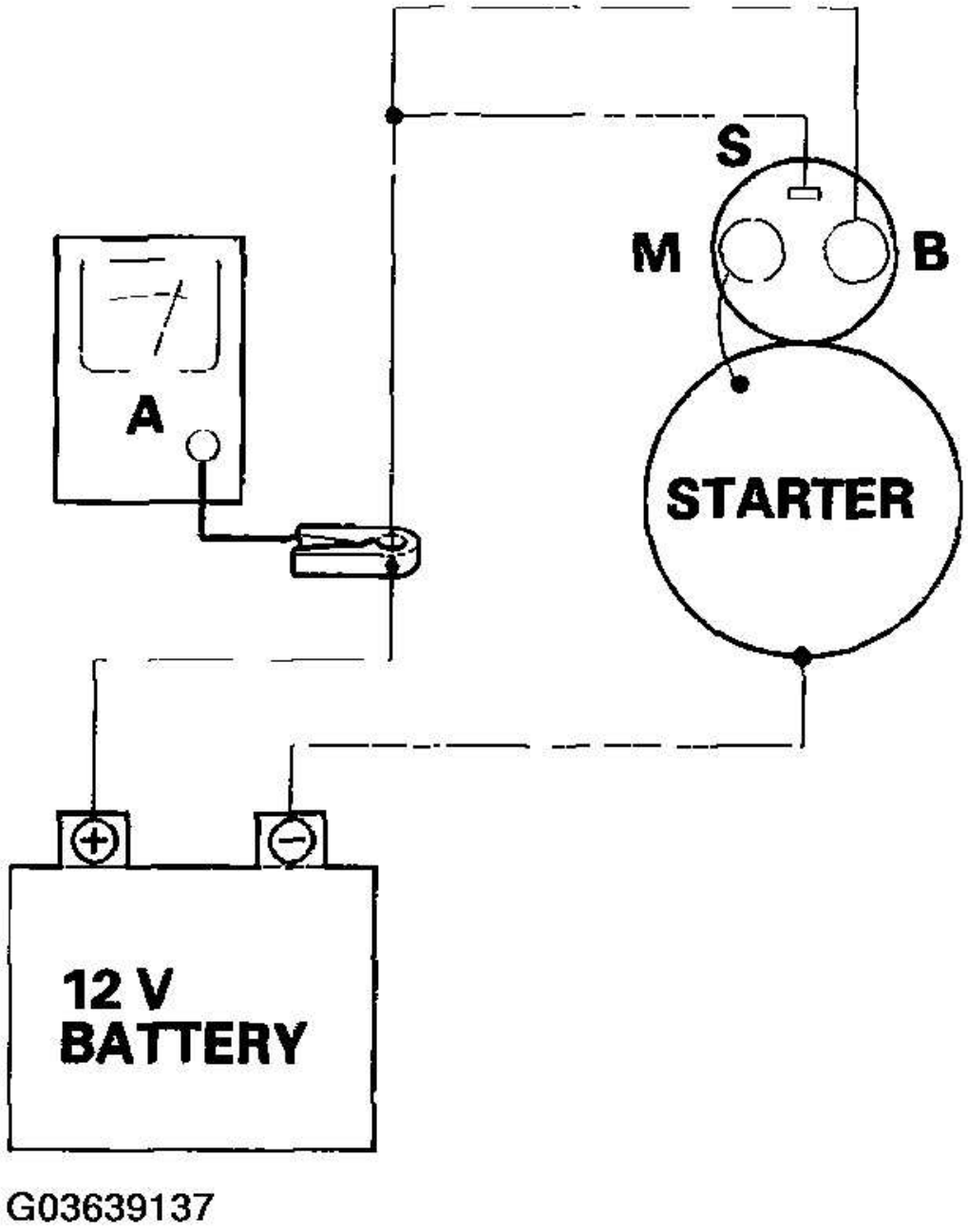

Fig. 9: Connecting Starter To Battery
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If the electric current and motor speed meet the specifications when the battery voltage is at 11 V, the

starter is working properly.

Specifications

Electric Current: 80 A or less
Motor Speed: 1,180 rpm or more

STARTER REMOVAL AND INSTALLATION

REMOVAL

1. Make sure you have the anti-theft codes for the radio, and the navigation system, then write down the customer's audio presets. Make sure the ignition switch is OFF.
2. Disconnect the negative cable from the battery first, then disconnect the positive cable.
3. Remove the battery.
4. Remove the harness clamps (A).

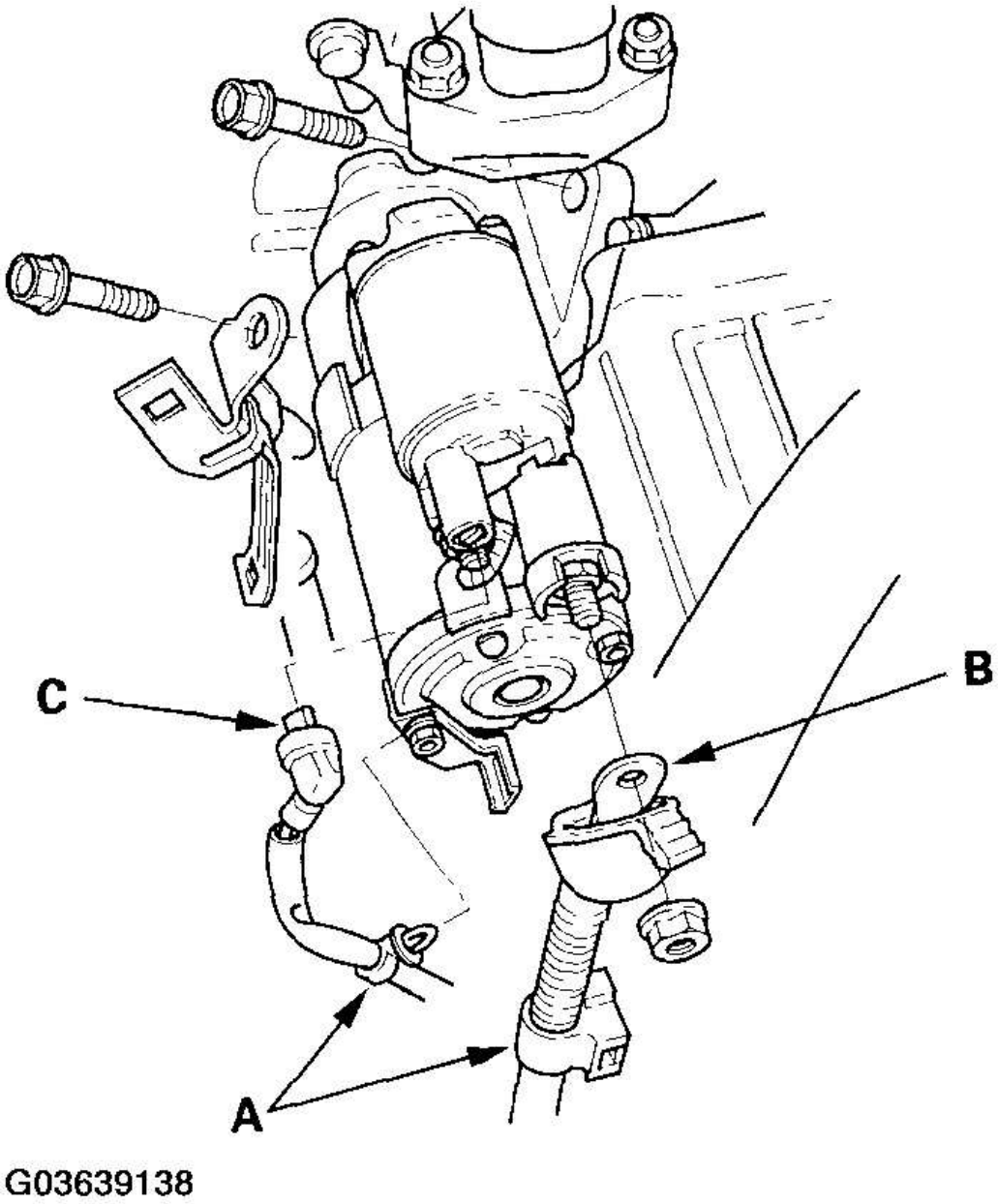

Fig. 10: Removing Harness Clamps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Disconnect the starter cable (B) from the B terminal, then disconnect the BLK/WHT wire (C) from the S terminal.
6. Remove the two bolts holding the starter.

INSTALLATION

1. Check the seals (A) if they are damaged, go to step 2. if they are not damaged, go to step 4 .

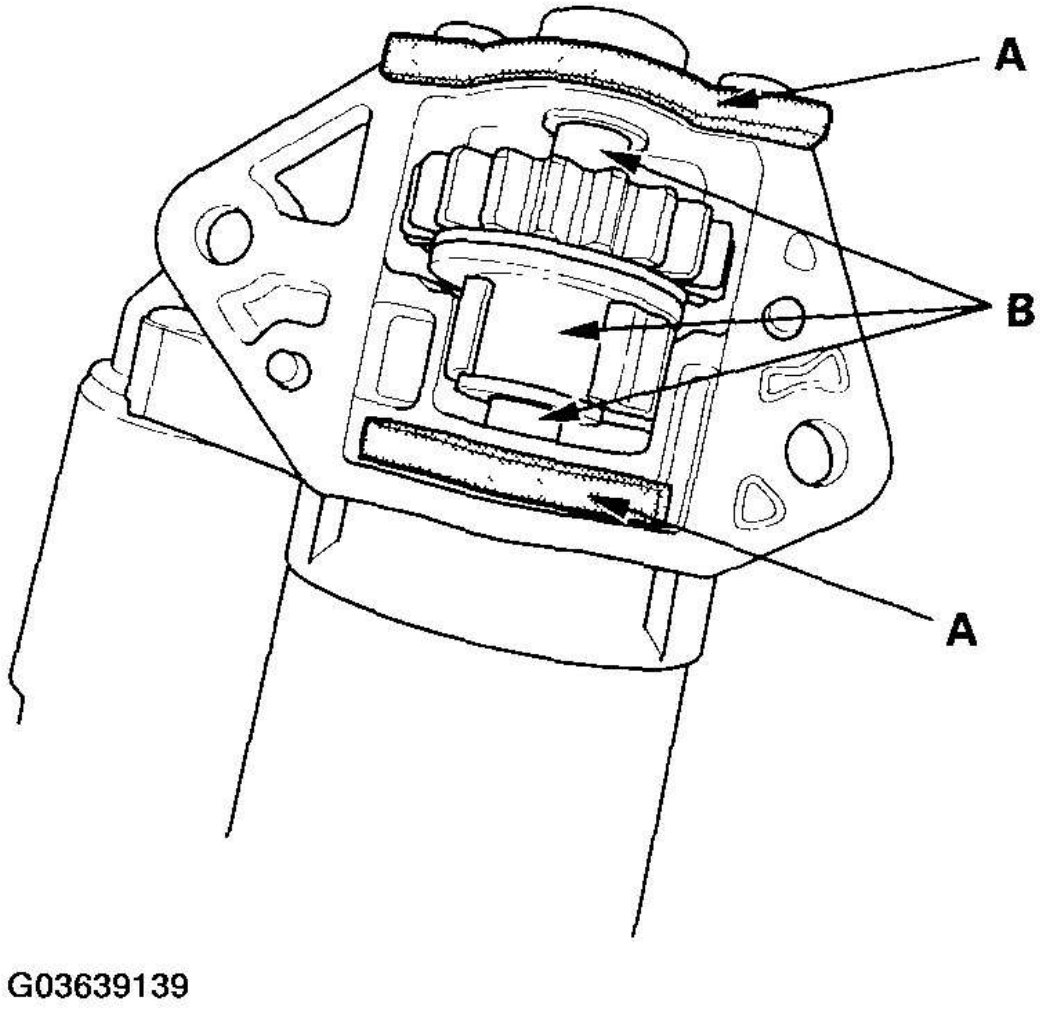

Fig. 11: Checking Seals For Damage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the seals, and clean the bonding surface with a sponge dampened in alcohol. Be careful not to wipe off the grease from the axis area (B). After cleaning. Keep oil, grease, and water from getting on the clean surface.
3. Install the starter (A), then install the harness clamps (B), and connect the B terminal (C) and BLK/ WHT wire (D). Make sure the crimped side of the B terminal is facing out.

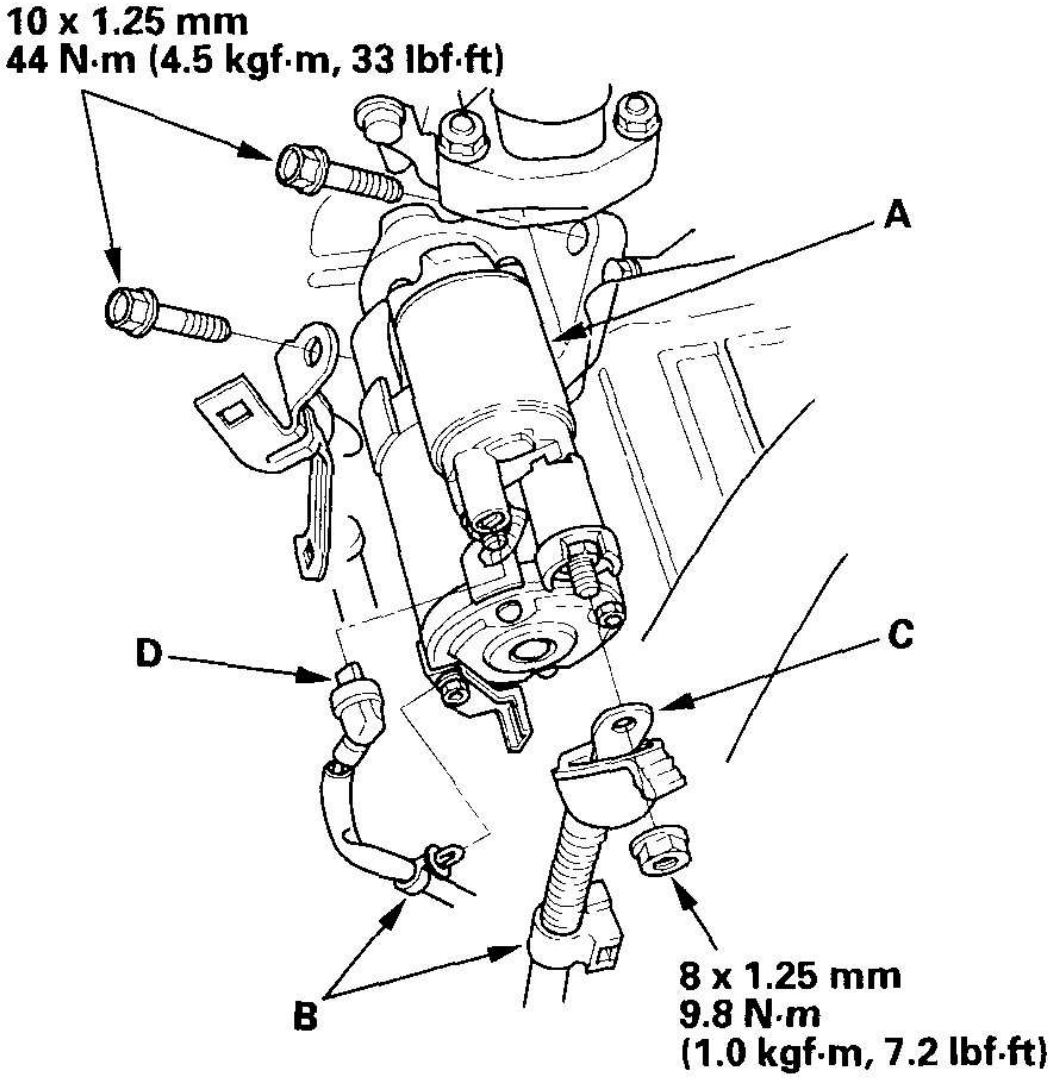

Fig. 12: Installing Starter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Connect the positive cable to the battery first, then connect the negative cable.
5. Start the engine to make sure the starter works property.
6. Enter the anti-theft codes for the radio and the navigation system.
7. Enter the customer's audio presets.
8. Do the power window control unit reset procedure (see **RESETTING THE POWER WINDOW CONTROL UNIT**).

9. Set the clock.

STARTER OVERHAUL

DISASSEMBLY/REASSEMBLY

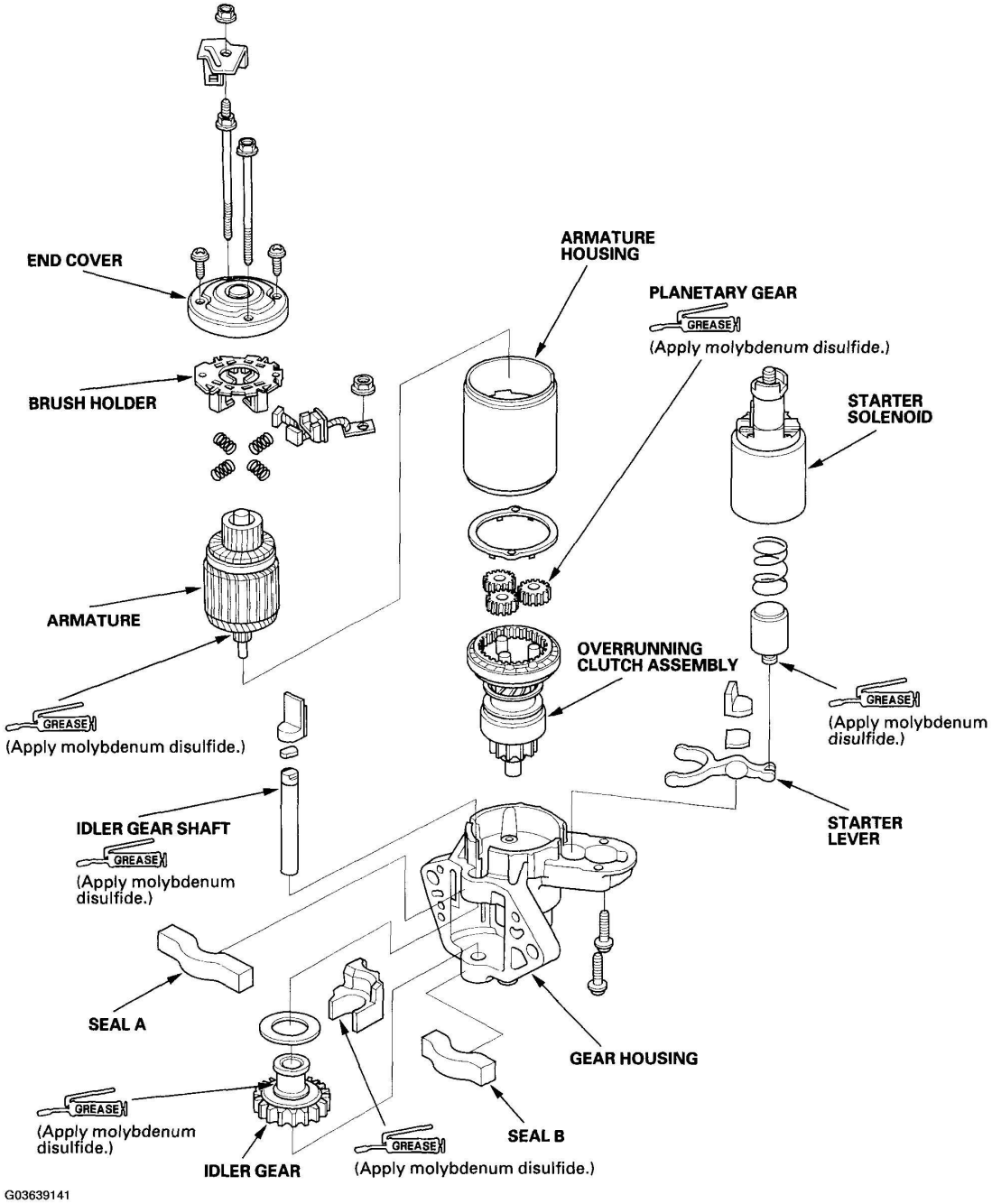

Fig. 13: Exploded View Of Starter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

BRUSH HOLDER REMOVAL

1. Remove the starter (see **STARTER REMOVAL AND INSTALLATION**).
2. Disconnect the wire from the M terminal, and remove the end cover.
3. Place a 29.4 mm (1.16 in.) outside diameter plastic pipe on the armature.

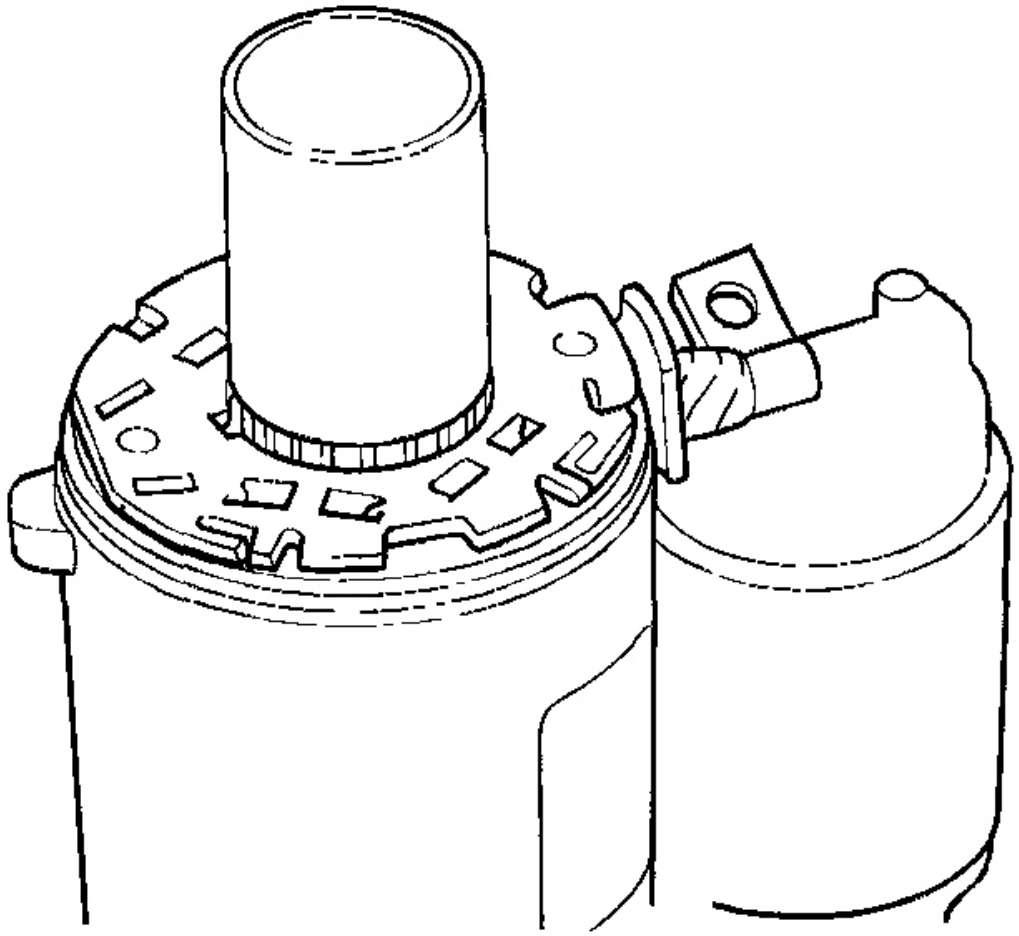

Fig. 14: Removing Outside Diameter Plastic Pipe On Armature
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Move the brush holder (A) up to the pipe (B) while holding the pipe so the brushes do not pop out from the holder.

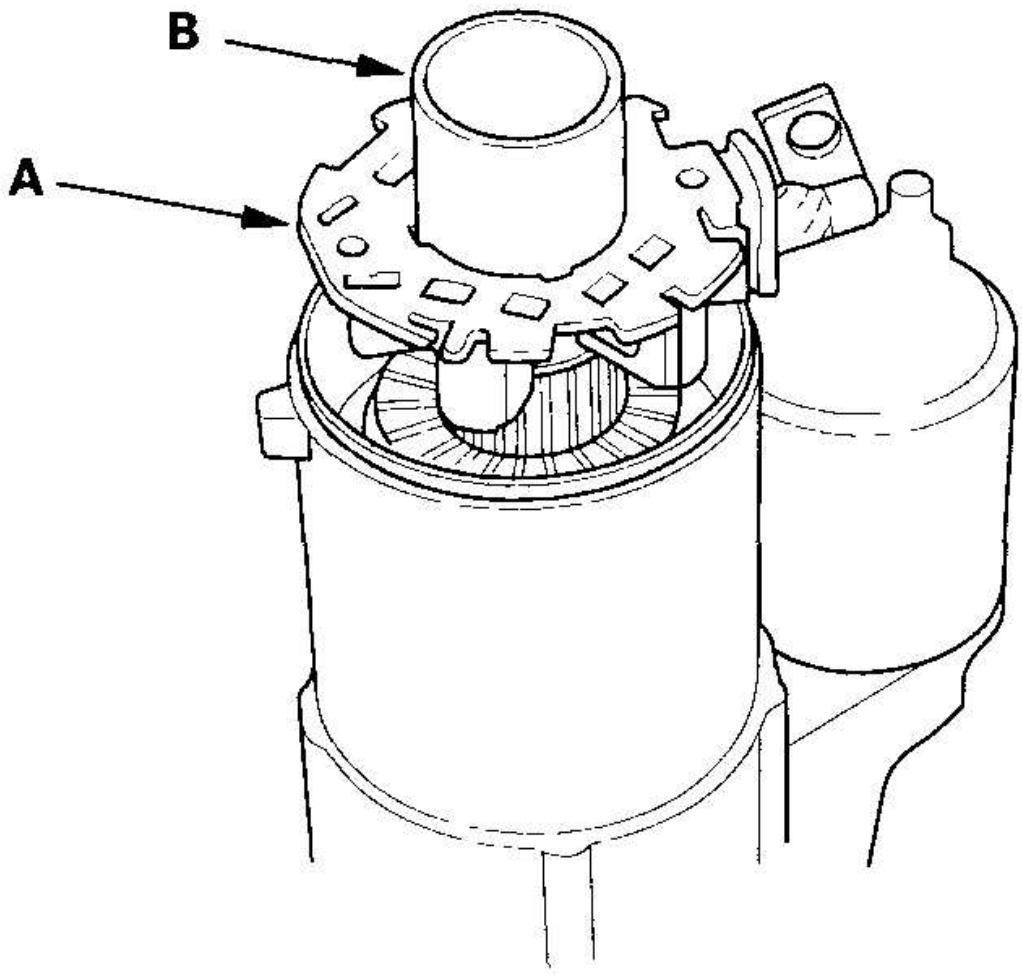

Fig. 15: Moving Brush Holder Up To Pipe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Armature Inspection and Test

5. Disassemble the starter as shown in **Fig. 13** .
6. Inspect the armature for wear or damage from contact with the permanent magnet. If there is wear or damage, replace the armature.

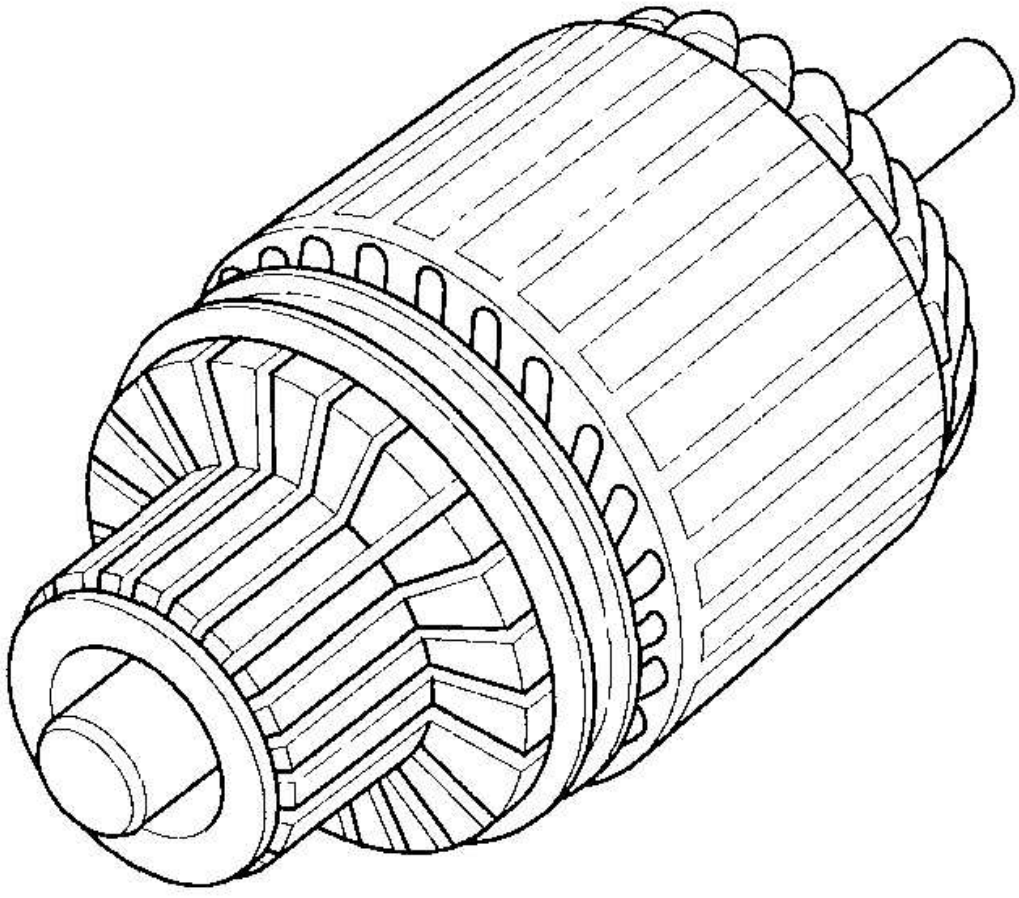

Fig. 16: Inspecting Armature For Wear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Check the commutator (A) surface. If the surface is dirty or burnt, resurface with emery cloth or a lathe within the following specifications, or recondition with #500 or #600 sandpaper (B).

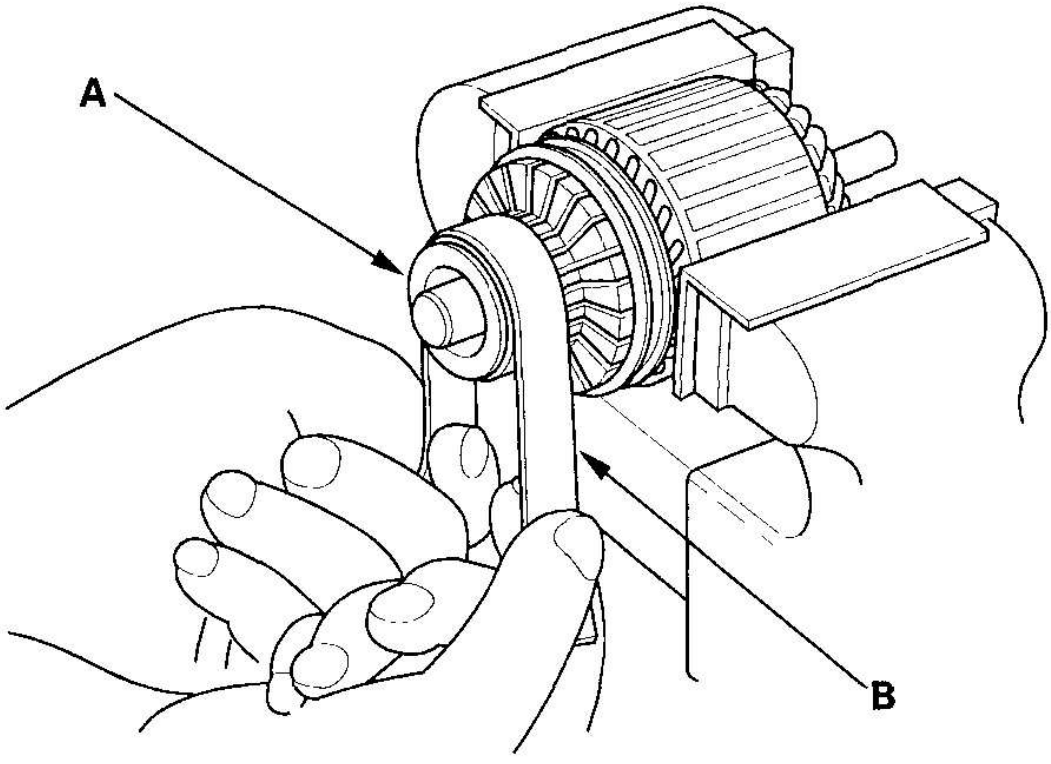

Fig. 17: Checking Commutator Surface
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Check the commutator diameter. If the diameter is out of the service limit, replace the armature.

Commutator Diameter

Standard (New): 29.3-29.5 mm (1.154-1.161 in.)
Service Limit: 28.8 mm (1.134 in.)

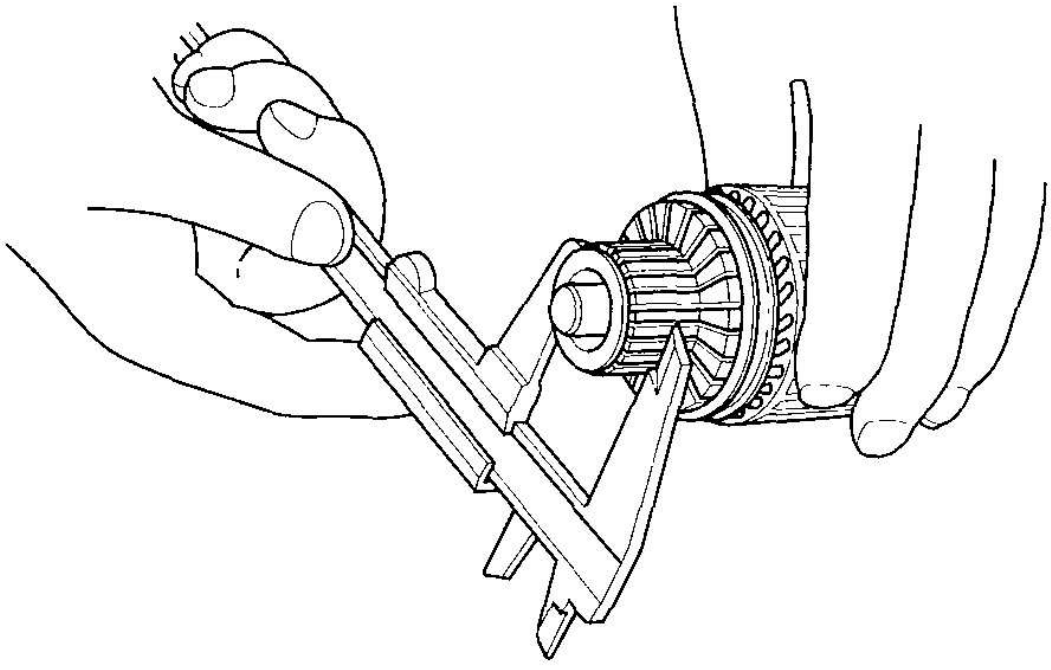

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Fig. 18: Checking Commutator Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Measure the commutator (A) runout.
    - If the commutator runout is within the service limit, check the commutator for carbon dust or brass chips between the segments.
    - If the commutator runout is not within the service limit, replace the armature.

    Commutator Runout

    Standard (New): 0.05 mm (0.002 in.) max.
    Service Limit: 0.1 mm (0.004 in.)

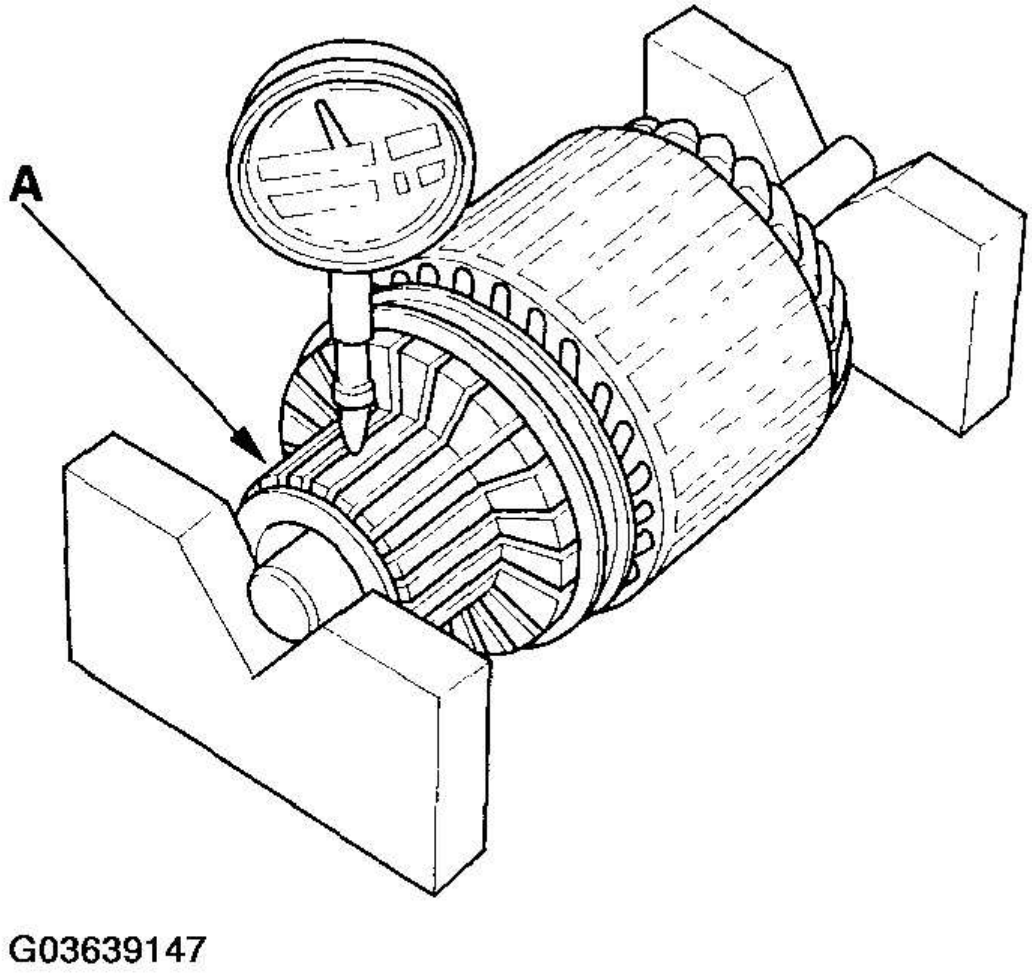

Fig. 19: Measuring Commutator Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check the mica depth (A). If the mica is too high (B), undercut the mica with a hacksaw blade to the proper depth. Cut away all the mica (C) between the commutator segments. The undercut should not be too shallow, too narrow, or V-shaped (D).

Commutator Mica Depth

Standard (New): 0.40-0.60 mm (0.016-0.024 in.)
Service Limit: 0.20 mm (0.008 in.)

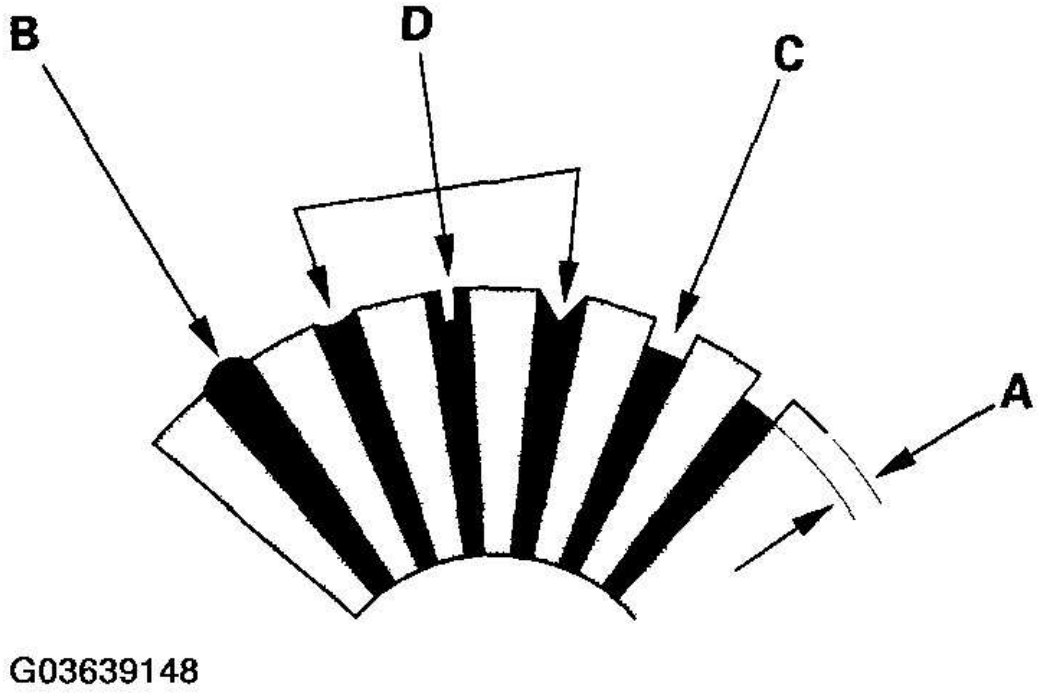

Fig. 20: Checking Mica Depth
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Check for continuity between the segments of the commutator. If there is an open circuit between any segments, replace the armature.

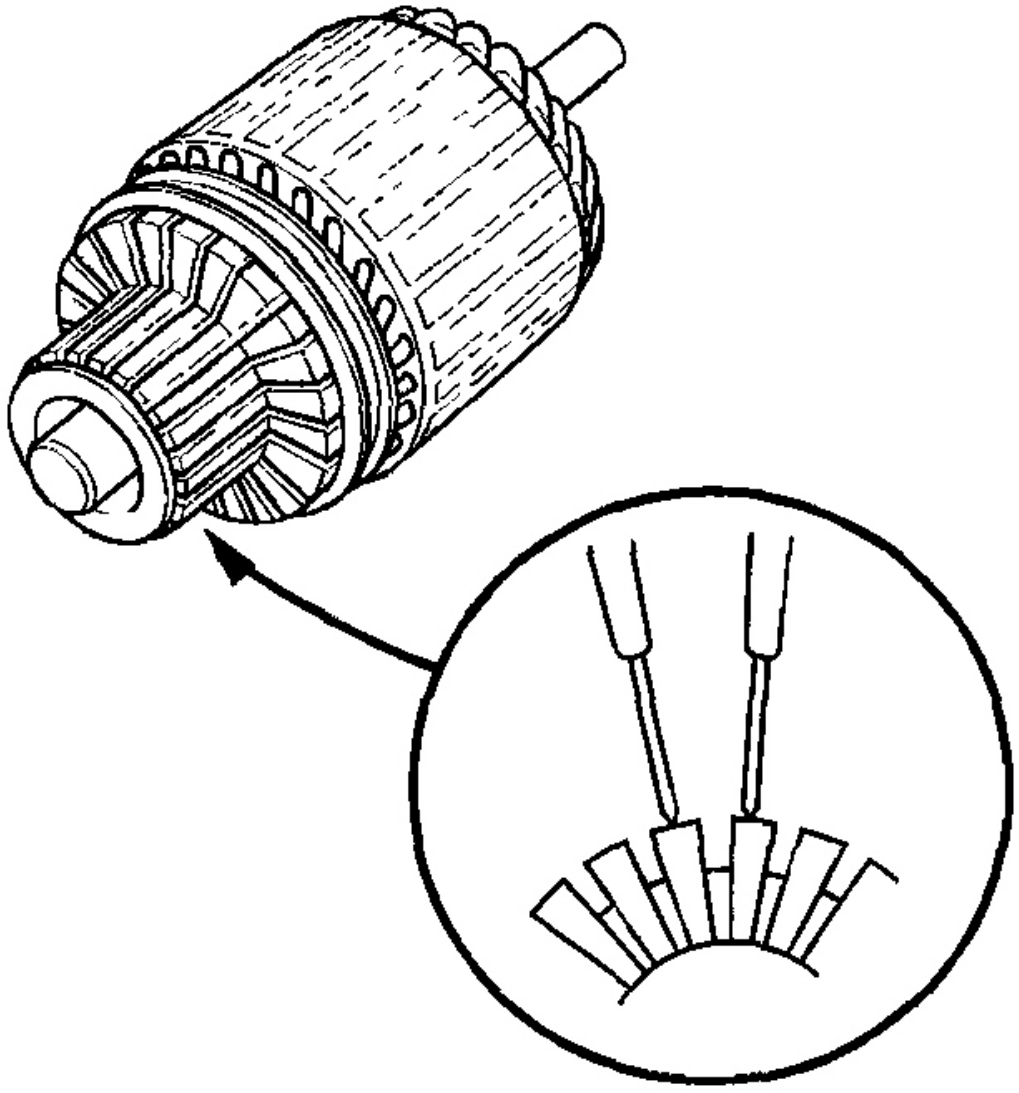

Fig. 21: Checking For Continuity Between Segments Of Commutator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Place the armature (A) on an armature tester (B). Hold a hacksaw blade (C) on the armature core. If the blade is attached to the core or vibrates while the core is turned, the armature is shorted. Replace the armature.

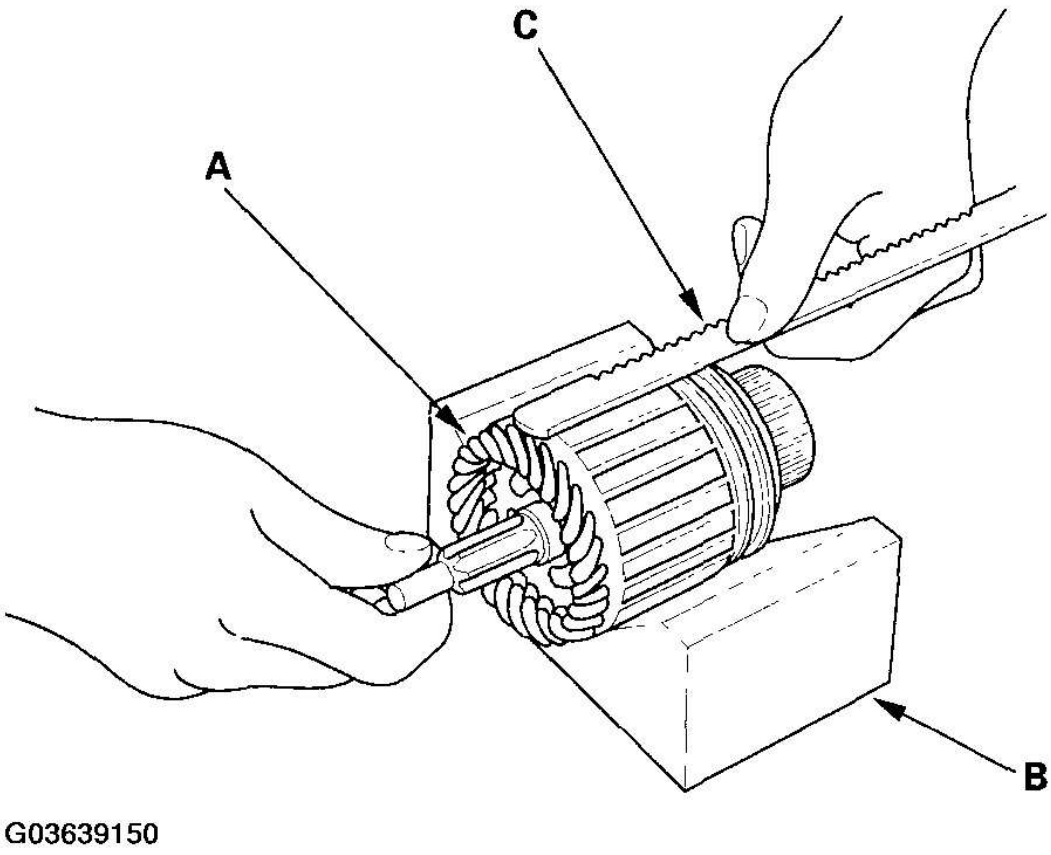

Fig. 22: Checking Armature For Short
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Check for continuity between the commutator (A) and armature coil core (B), and between the commutator and armature shaft (C). If there is continuity, replace the armature.

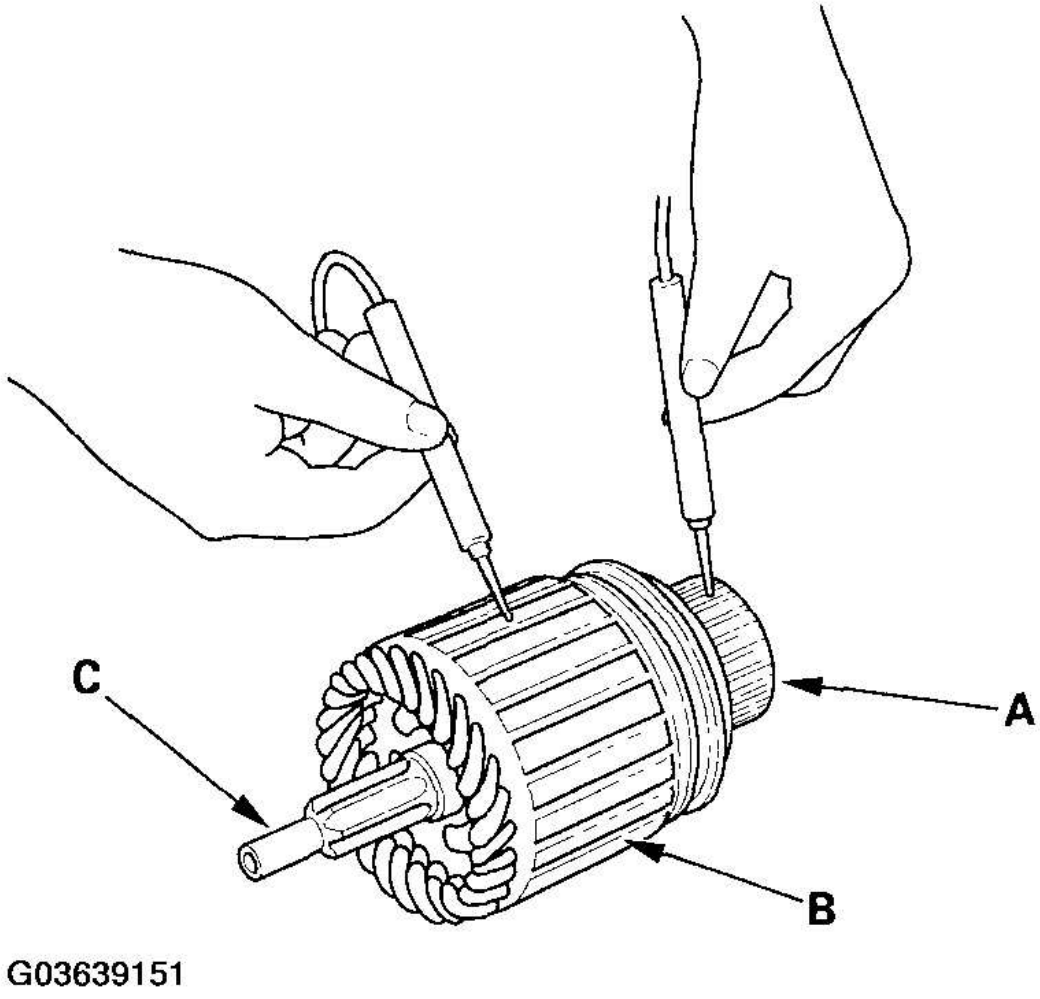

Fig. 23: Checking For Continuity Between Commutator And Armature Coil Core
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Starter Brush Inspection

14. Measure the brush length (A). If it is shorter than the service limit, replace the brush holder assembly.

Brush Length

Standard (New): 7.7-8.0 mm (0.30-0.31 in.)
Service Limit: 0.9 mm (0.04 in.)

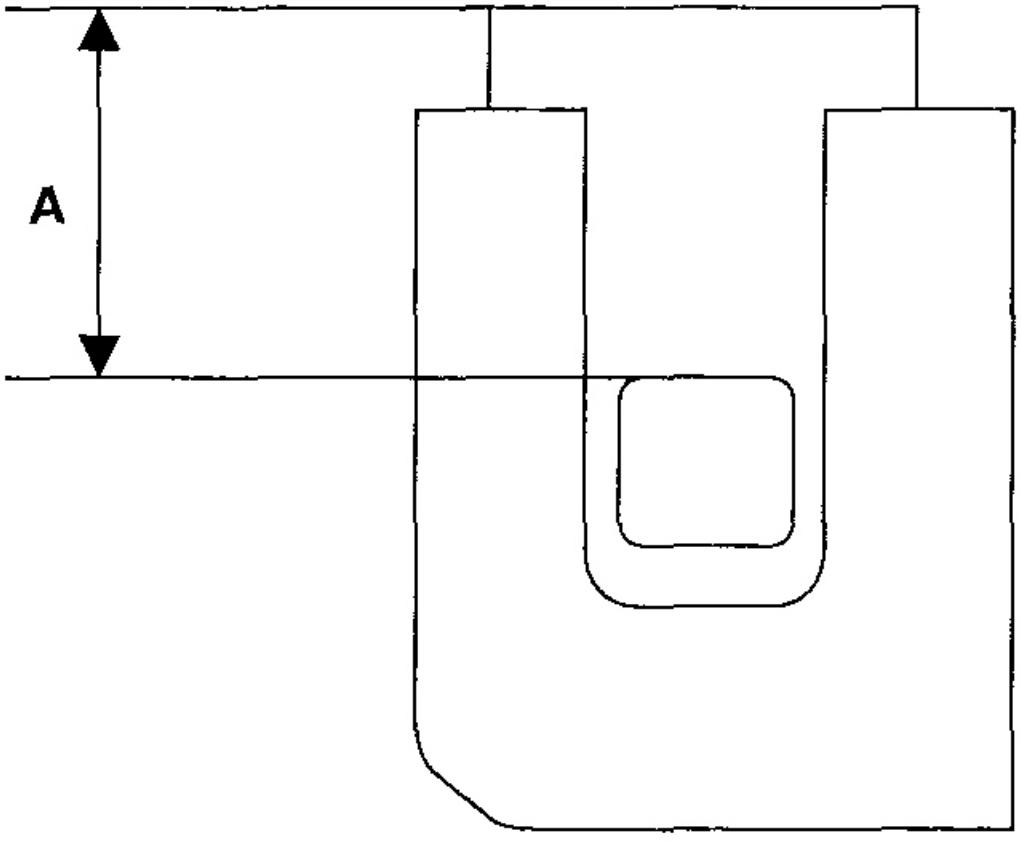

Fig. 24: Measuring Brush Length
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Starter Brush Holder Test

15. Check for continuity between the (+) brush (A) and (-) brush (B). If there is continuity, replace the brush holder assembly.

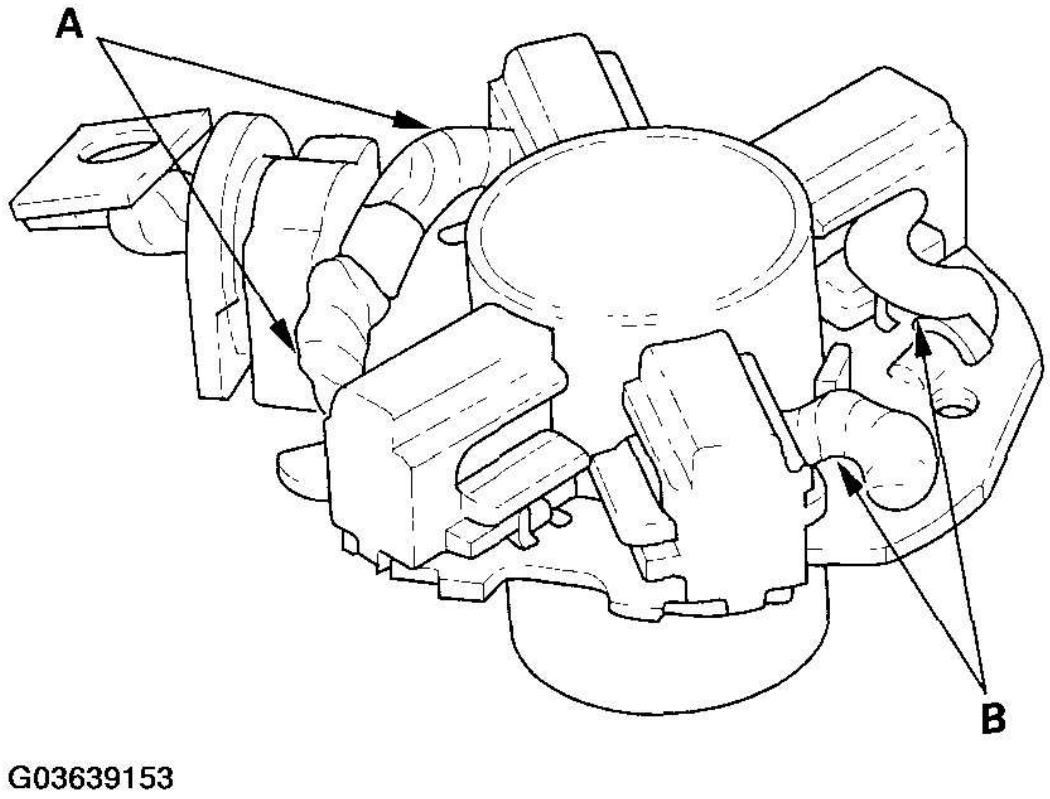

Fig. 25: Checking For Continuity Between Brushes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Planetary Gear Inspection

16. Check the planetary gears (A) and ring gear (B). Replace them if they are worn or damaged.

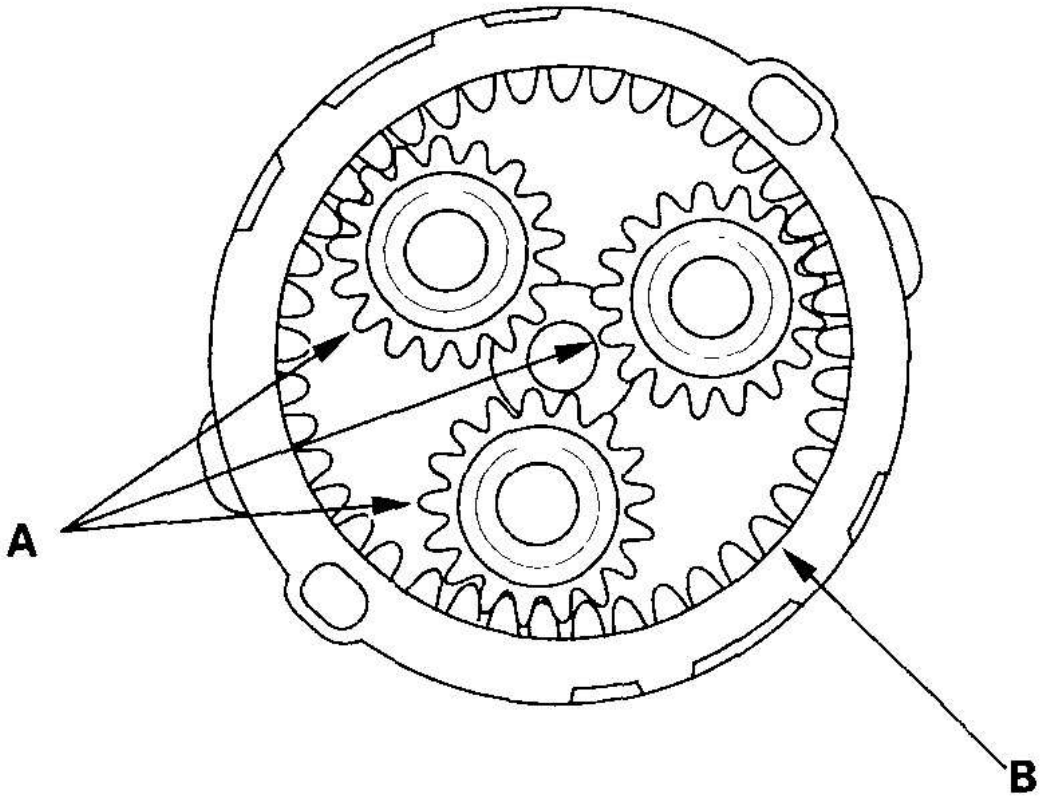

Fig. 26: Checking Planetary Gears And Ring Gear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Overrunning Clutch Inspection

17. Slide the overrunning clutch (A) along the shaft. Replace it if it does not slide smoothly.

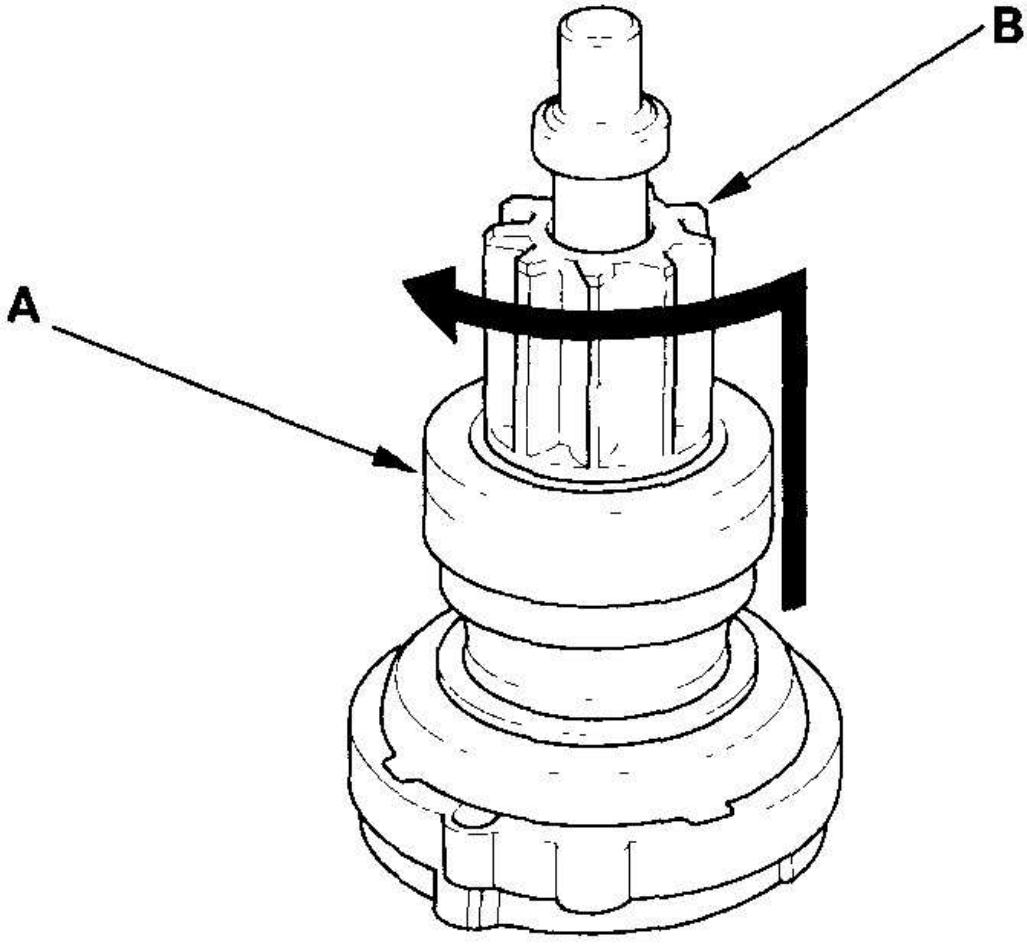

Fig. 27: Sliding Overrunning Clutch Along Shaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Hold the overrunning clutch, and turn the drive gear (B) in the direction shown in **Fig. 27** to make sure it turns freely. Also make sure the drive gear locks in the opposite direction. If it does not lock in either direction or it locks in both directions, replace it.
19. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately. Check the condition of the idler gear and drive plate ring gear to see if the starter drive gear teeth are damaged.

Starter Reassembly

20. Install the armature into the housing.
21. Place the brush holder assembly on the armature, then move the brush holder (A) down to the armature.

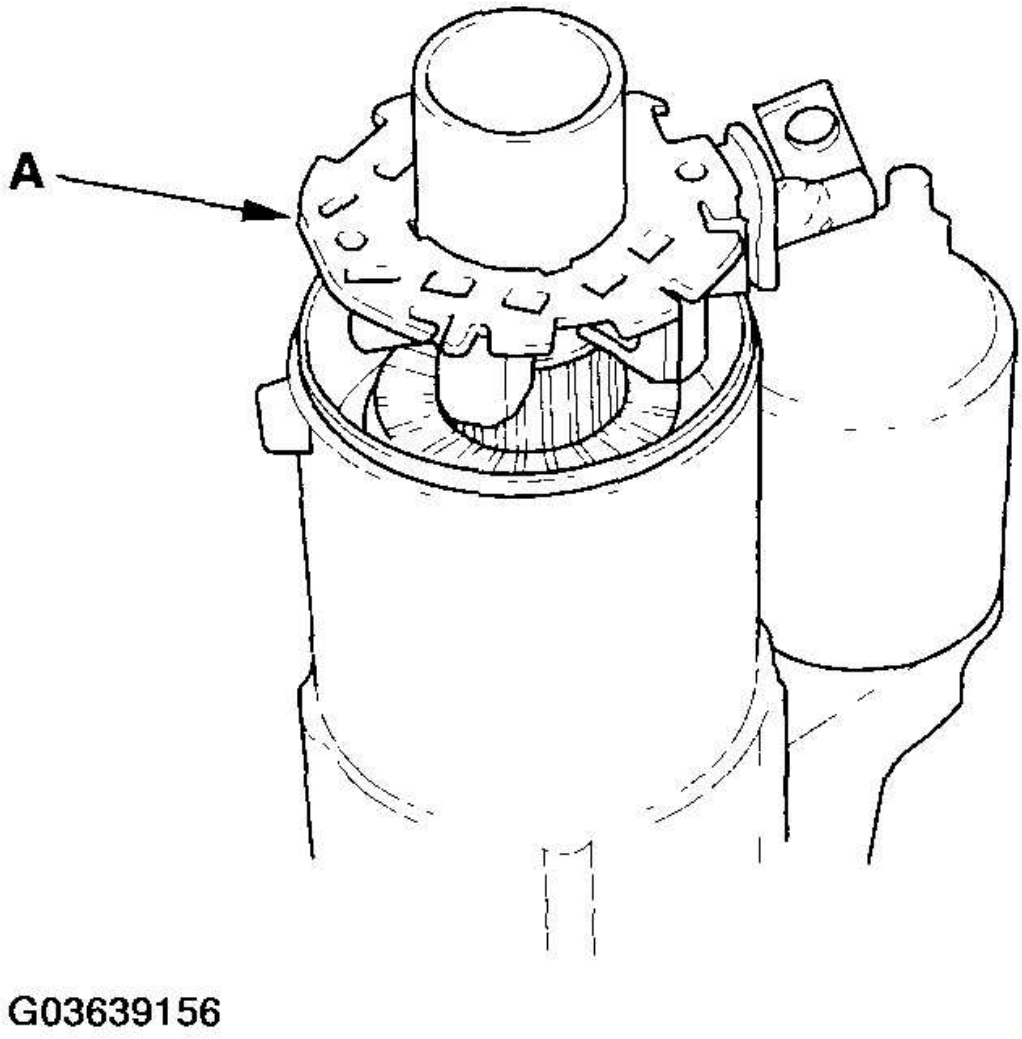

Fig. 28: Placing Brush Holder Assembly On Armature
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the end cover to retain the brush holder.

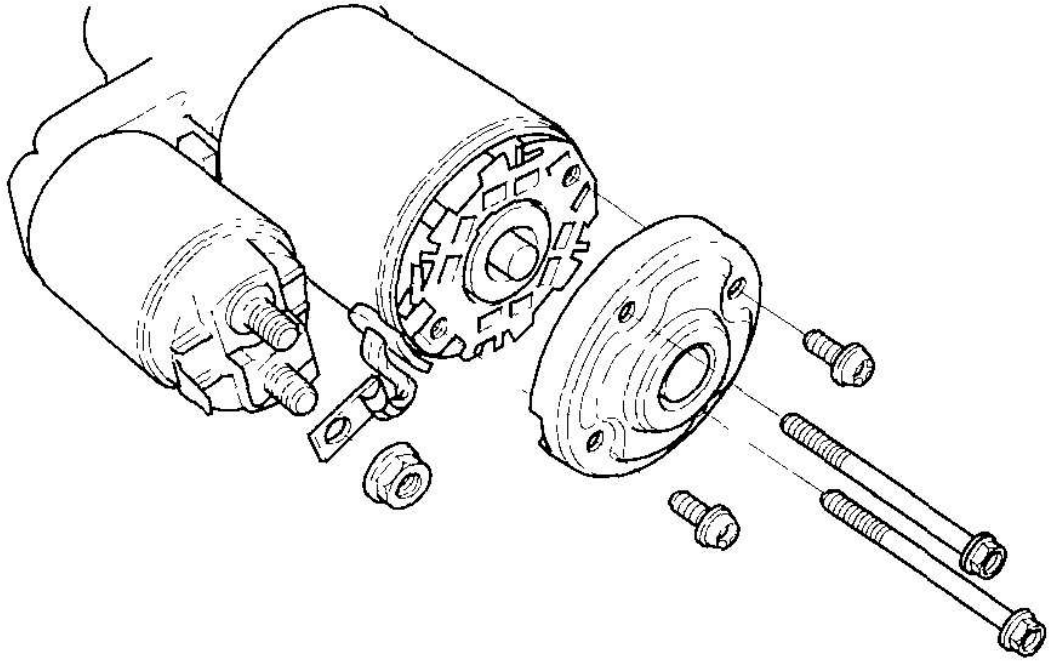

Fig. 29: Installing End Cover To Retain Brush Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.