

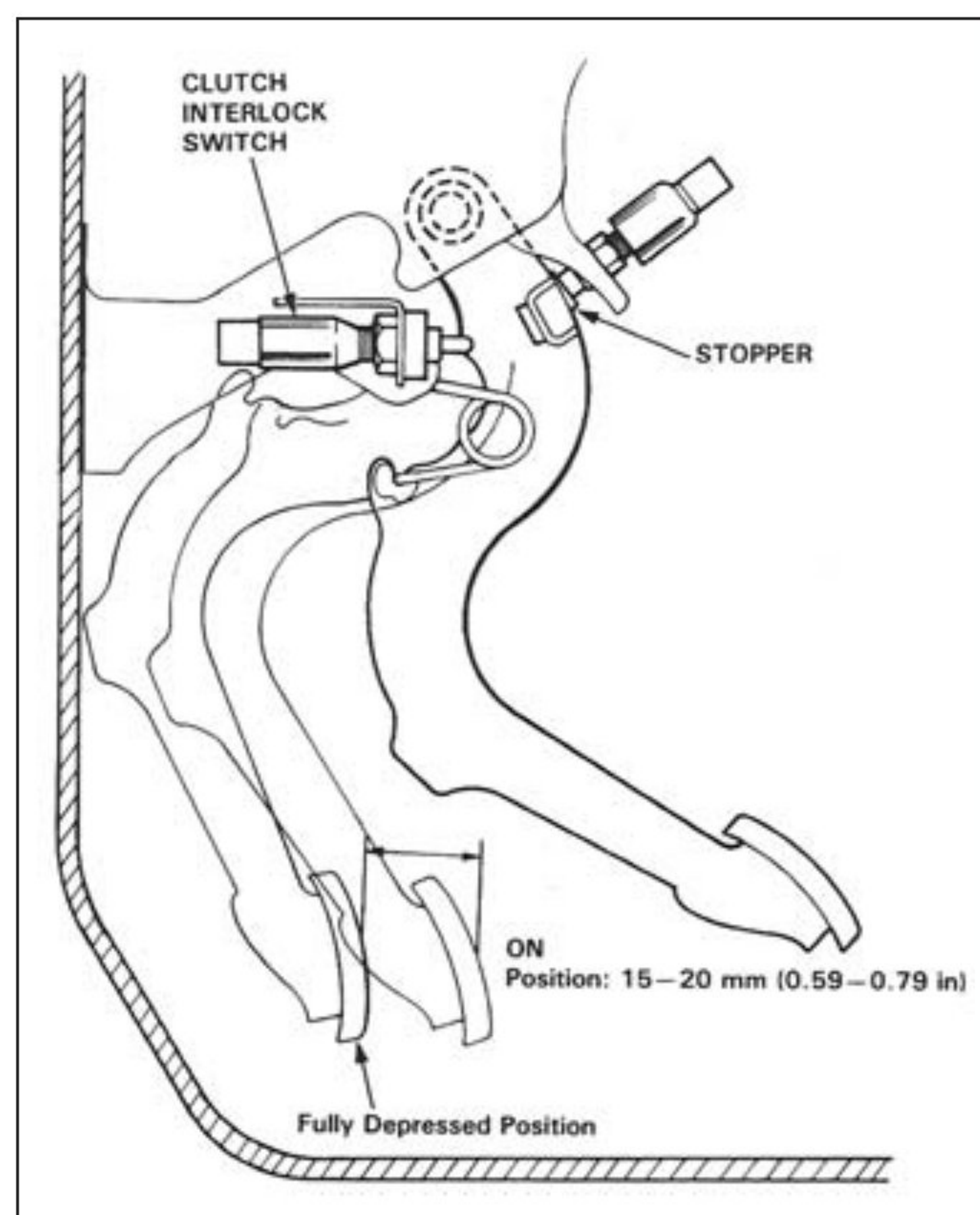
Honda Motor Co., Ltd.

Starting System

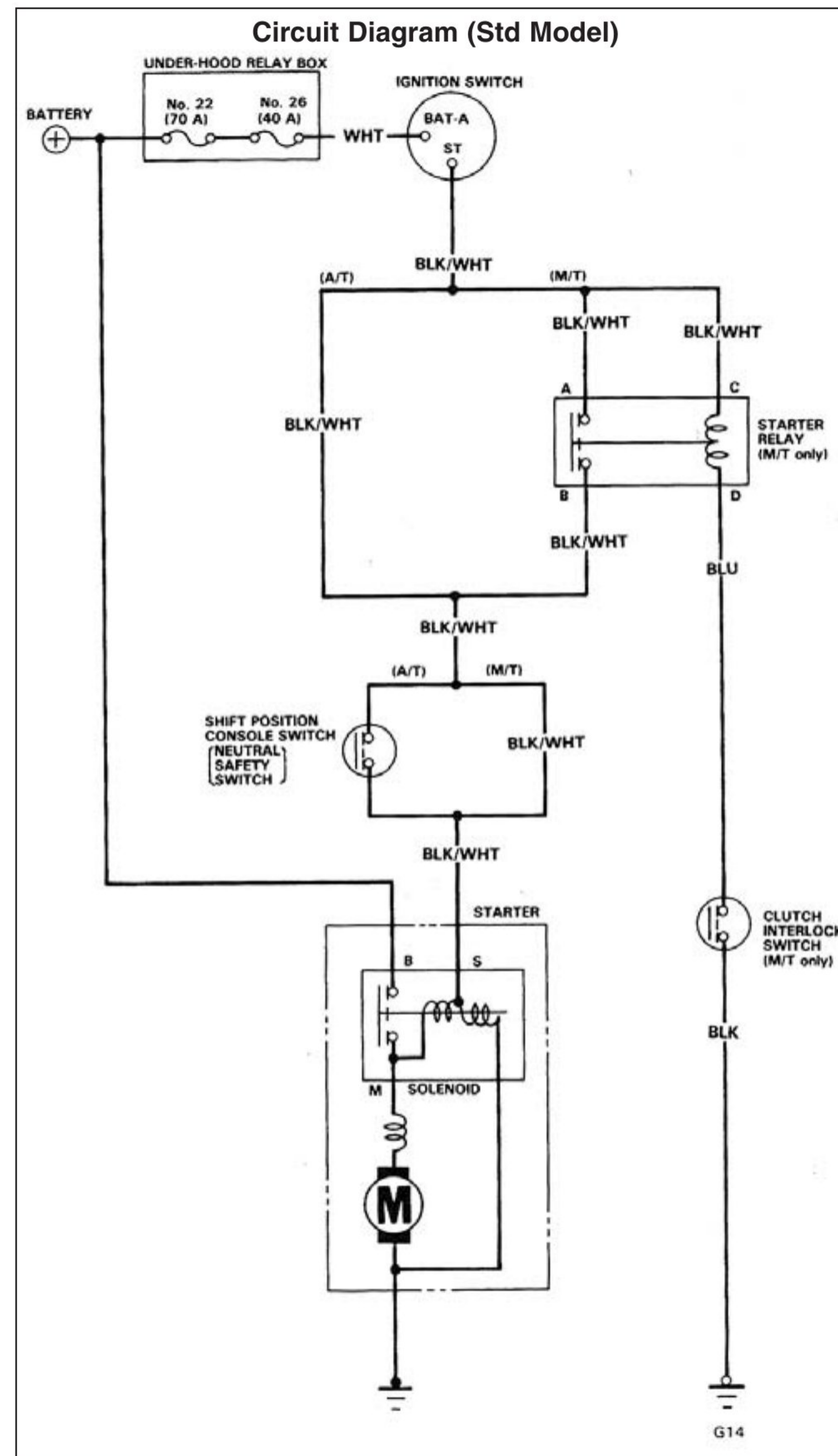
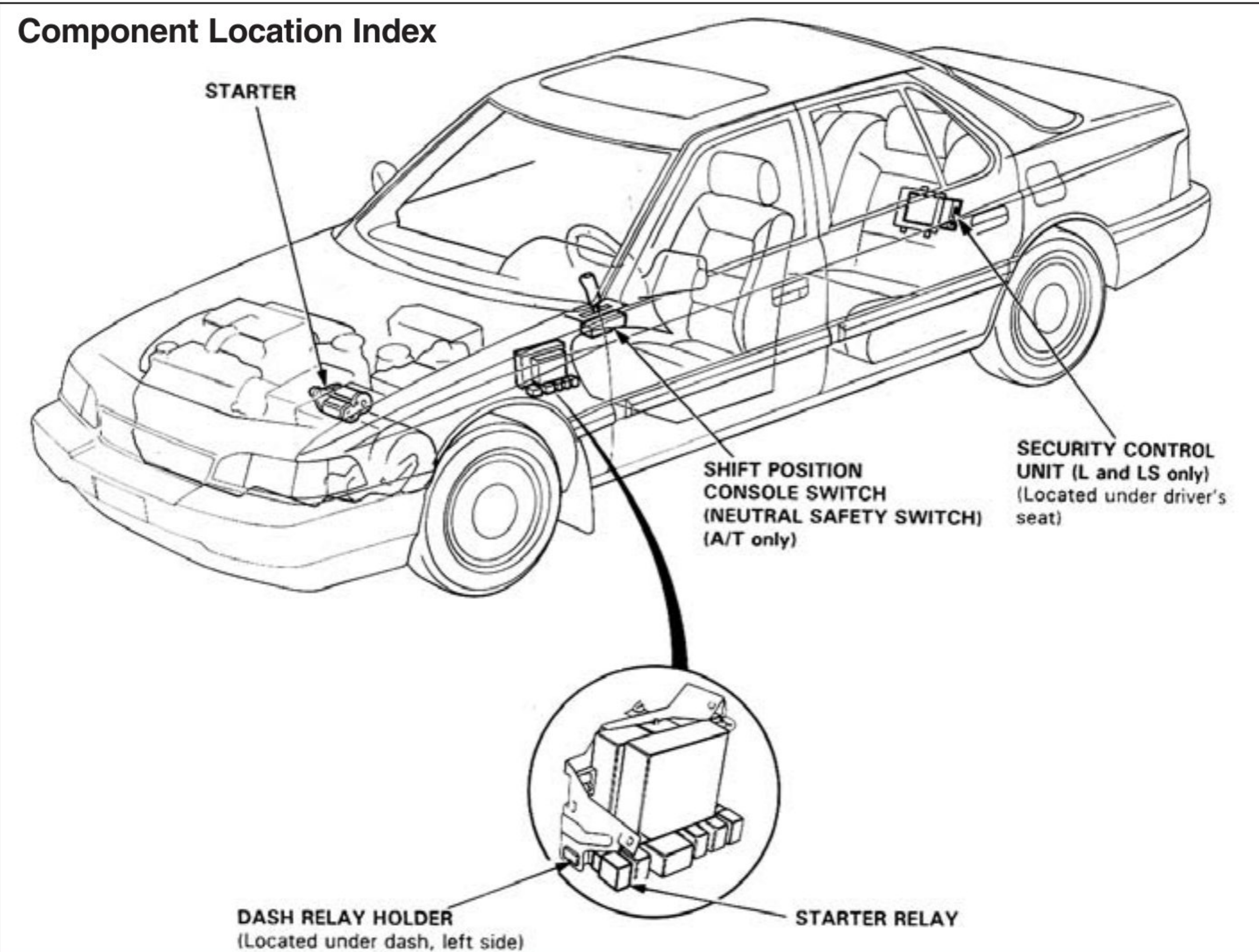
Starter Interlock System (M/T only)

The starter interlock system prevents the engine from starting unless the clutch pedal is fully depressed. The clutch interlock switch turns on at the position where the clutch disengages: 15 to 20 mm (0.59 to 0.79 in.) from fully depressed position.

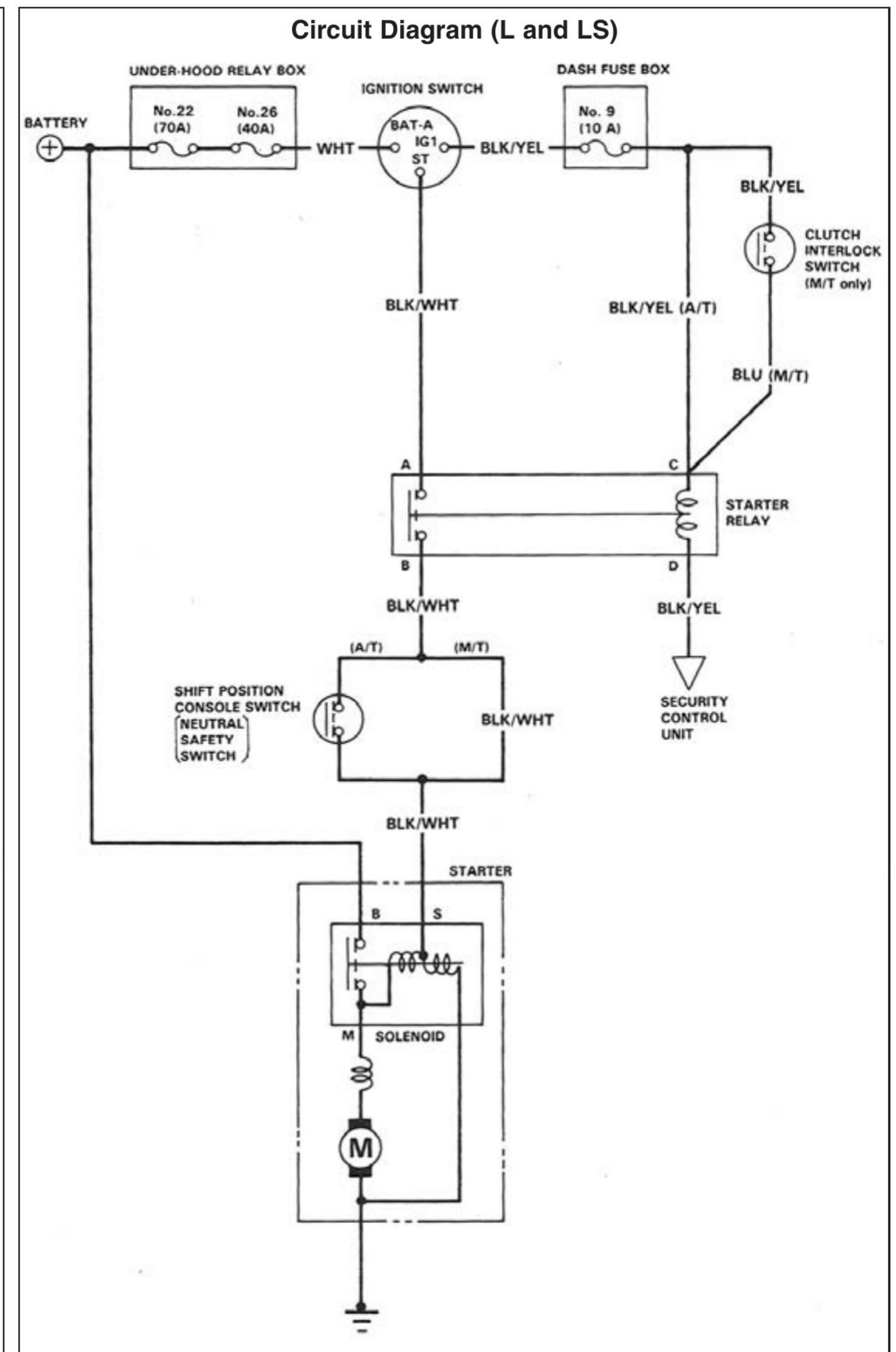
Full stroke of clutch pedal is 145 to 150 mm (5.7 to 5.9 in.) from fully released position.



Component Location Index



The car equipped with the security alarm system (L and LS only) has a



starter relay in the starting system circuit to help prevent burglary of the car. The security control unit provides and removes ground for the starter relay. When the security control unit provides ground for the starter relay, the starter relay operates and the electric current flows through the starter relay to the starter solenoid.

Once the anti-burglary signal is input to the security control unit, the security control unit no longer provides ground for the starter relay.

Starter Test

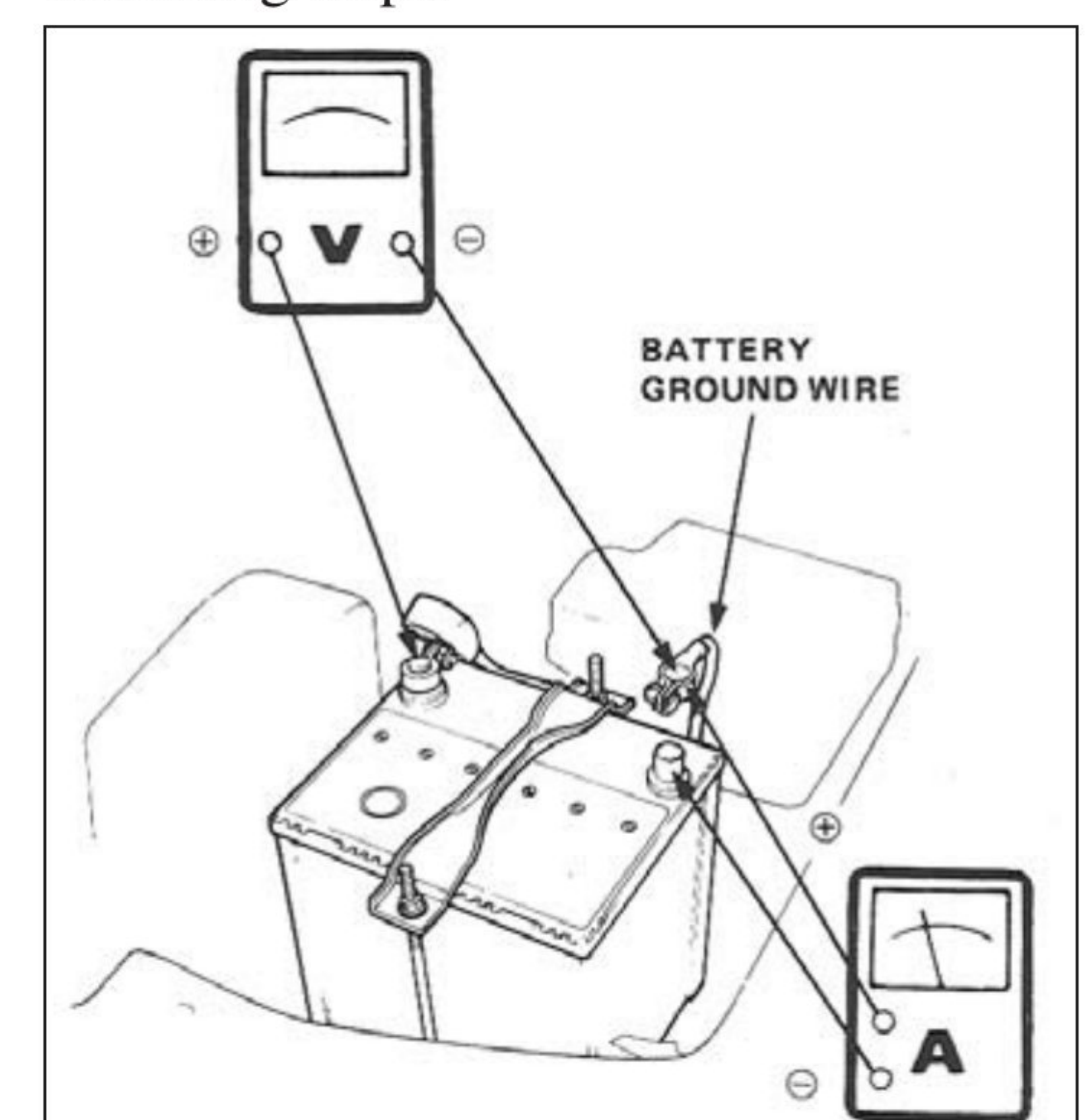
Note that the air temperature must be between 15 and 38 degrees C (59 and 100 degrees F) before testing.

Recommended procedure includes using a starter system tester. Connect and operate the equipment in accordance with manufacturer's instructions. Test and troubleshoot as directed.

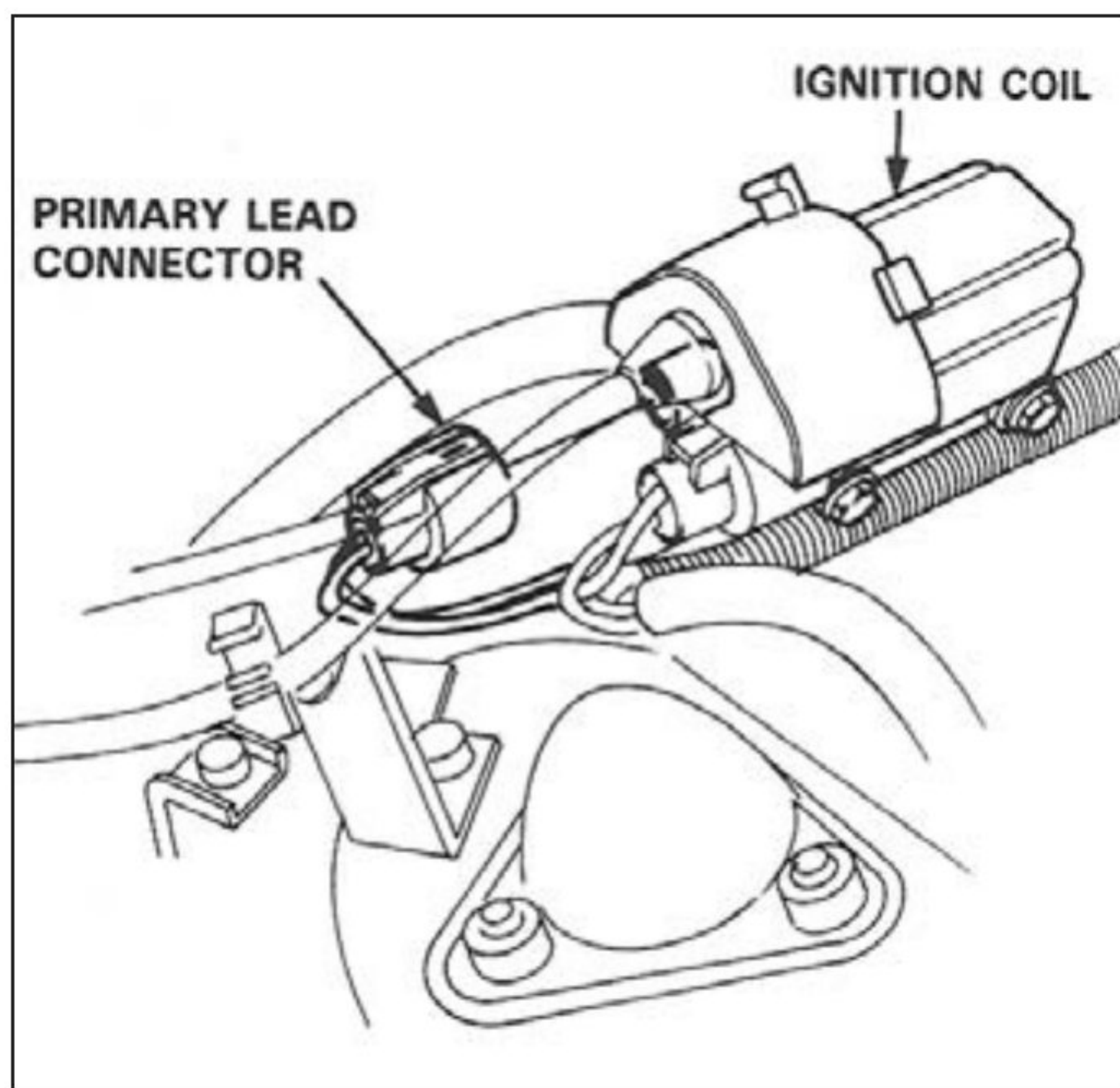
Alternate procedure includes use

of the following equipment: ammeter, 0 to 400 A; voltmeter, 0 to 20 V (accuracy within 0.1 volt); tachometer, 0 to 1,200 rpm.

Hook up voltmeter and ammeter as shown below, then complete the following steps:



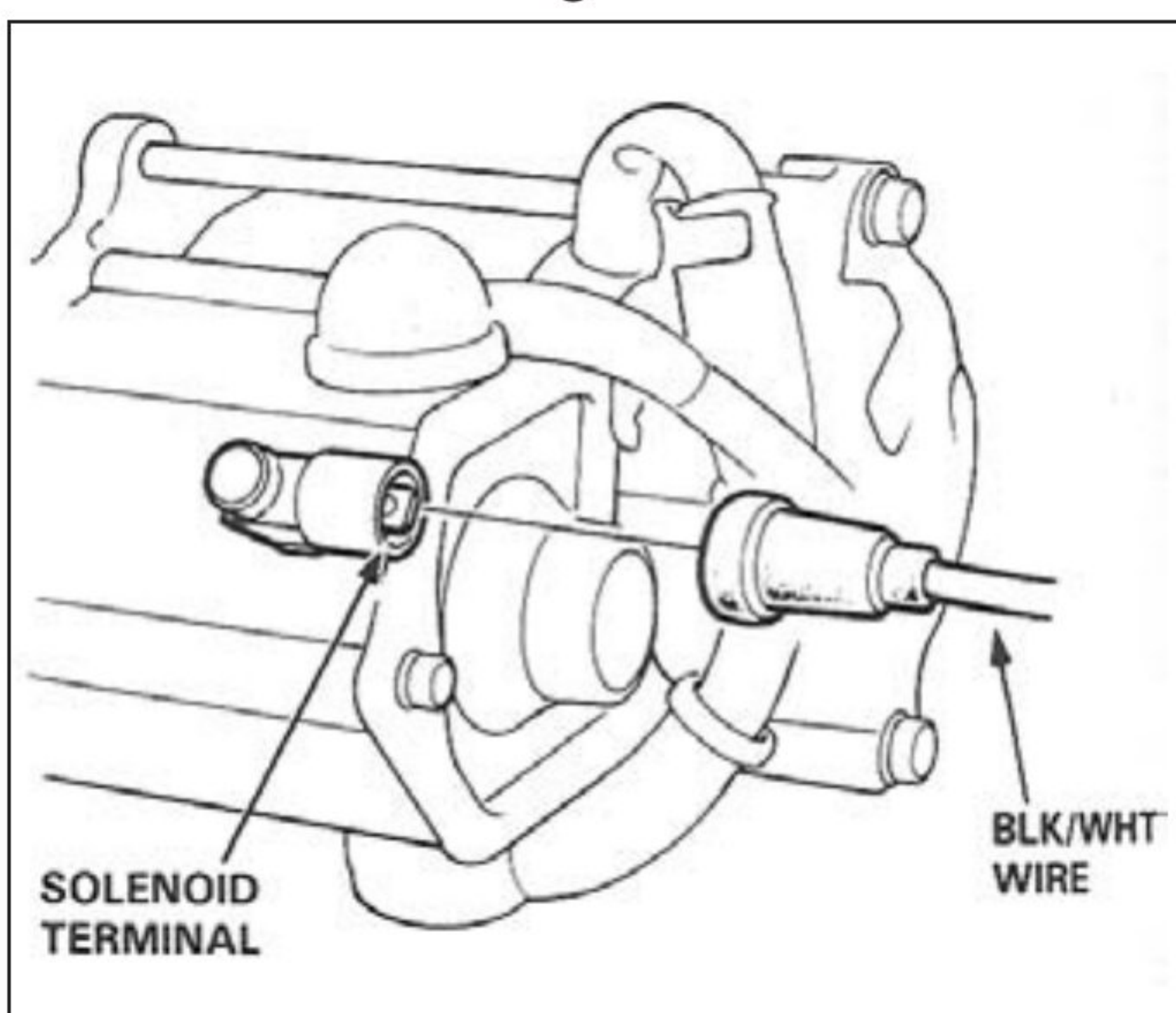
1. Disconnect the primary lead connector from the ignition coil.



2. Check the starter engagement: Press the clutch pedal all the way (M/T only), and turn the ignition switch to 'start.' The starter should crank the engine. Note that on cars equipped with manual transmissions, the engine will not crank unless the clutch pedal is fully depressed.

If the starter does not crank the engine, check the battery, battery positive wire and ground, and the wire connections for looseness or corrosion.

Test again. If the starter does not crank the engine, bypass the ignition switch circuit as follows: Unplug the connector (BLK/WHT wire) from the starter. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal. The starter should crank the engine.



If the starter still does not crank the engine, remove the starter and diagnose its internal problems.

If the starter cranks the engine, check for an open in the BLK/WHT wire circuit between the starter and ignition switch, and connectors. Check the ignition switch. On cars with automatic transmission, check the shift position console switch (neutral safety switch) and connector. On cars with manual transmission, check the starter relay, clutch interlock switch and connectors.

3. Check for wear or damage. The starter should crank the engine smoothly and steadily. If the starter engages, but cranks the engine erratically, remove the starter motor. Inspect the starter, drive gear, and flywheel ring gear for damage. Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held. Replace the gears if damaged.
4. Check cranking voltage and current draw. Voltage should be no less than 8.0 volts. Current should be no greater than 350 amperes. If voltage is too low, or current draw too high, check for:
 - battery fully charged;
 - open circuit in starter armature commutator segments;
 - starter armature dragging;
 - shorted armature winding;
 - excessive drag in engine.
5. Check cranking rpm. Engine speed during cranking should be above 100 rpm. If not, check for:
 - loose battery or starter terminals;
 - excessively worn starter brushes;
 - open circuit in commutator segments;
 - dirty or damaged helical spline or drive gear;
 - defective drive gear overrunning clutch.

6. Check the starter disengagement. Press the clutch pedal all the way (M/T only), turn the ignition switch to 'start' and release to 'run.' The starter drive gear should disengage from the flywheel ring gear.

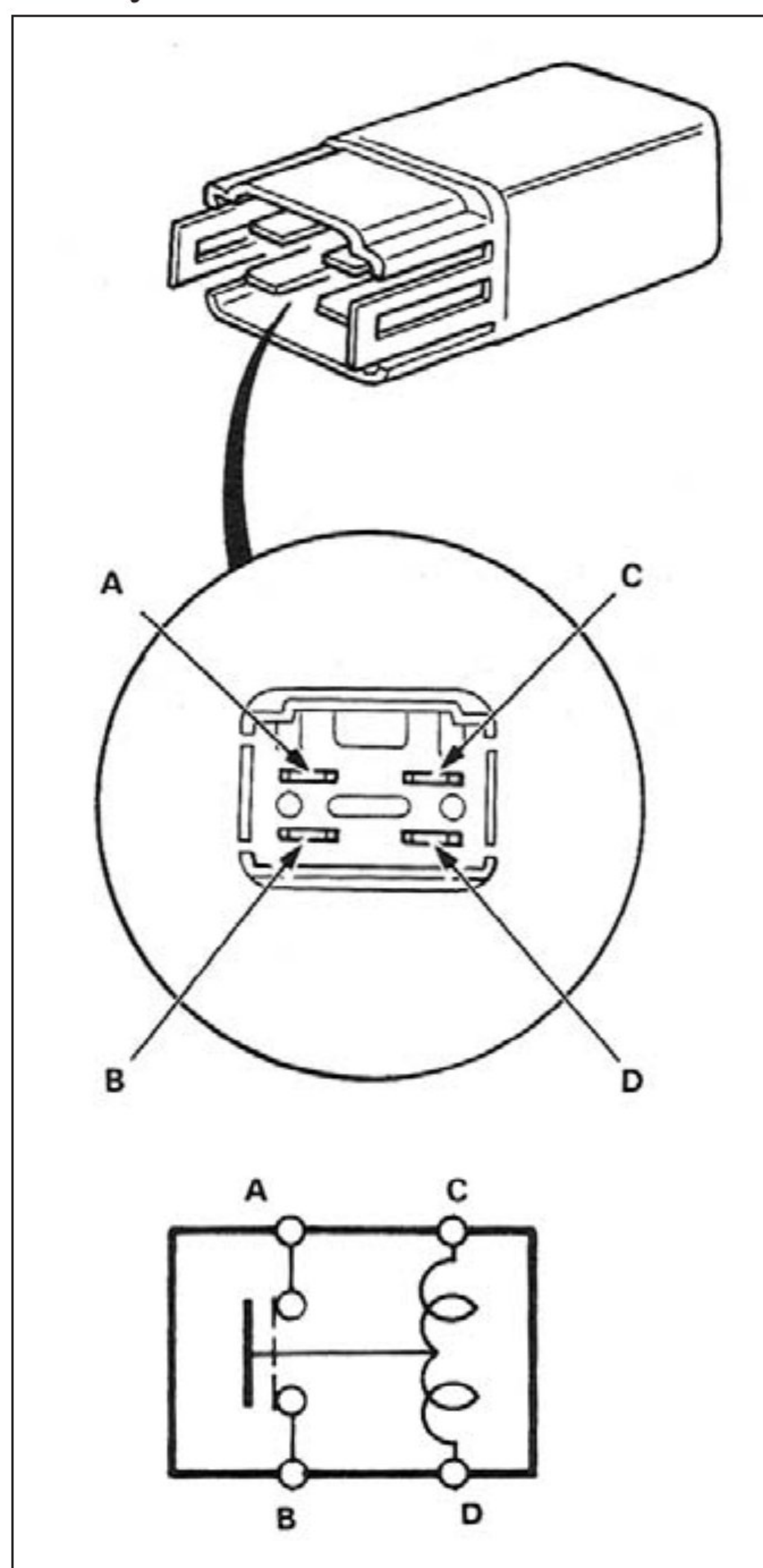
If the drive gear hangs up on the flywheel ring gear, check the sole-

noid plunger and switch for malfunction. Also inspect the drive gear assembly for dirty or damaged overrunning clutch.

Starter Relay Test (M/T only)

Remove the dashboard lower panel and the starter relay in the dash relay holder.

There should be continuity between the A and B terminals when the battery is connected to the C and D terminals. There should be no continuity when the battery is disconnected.

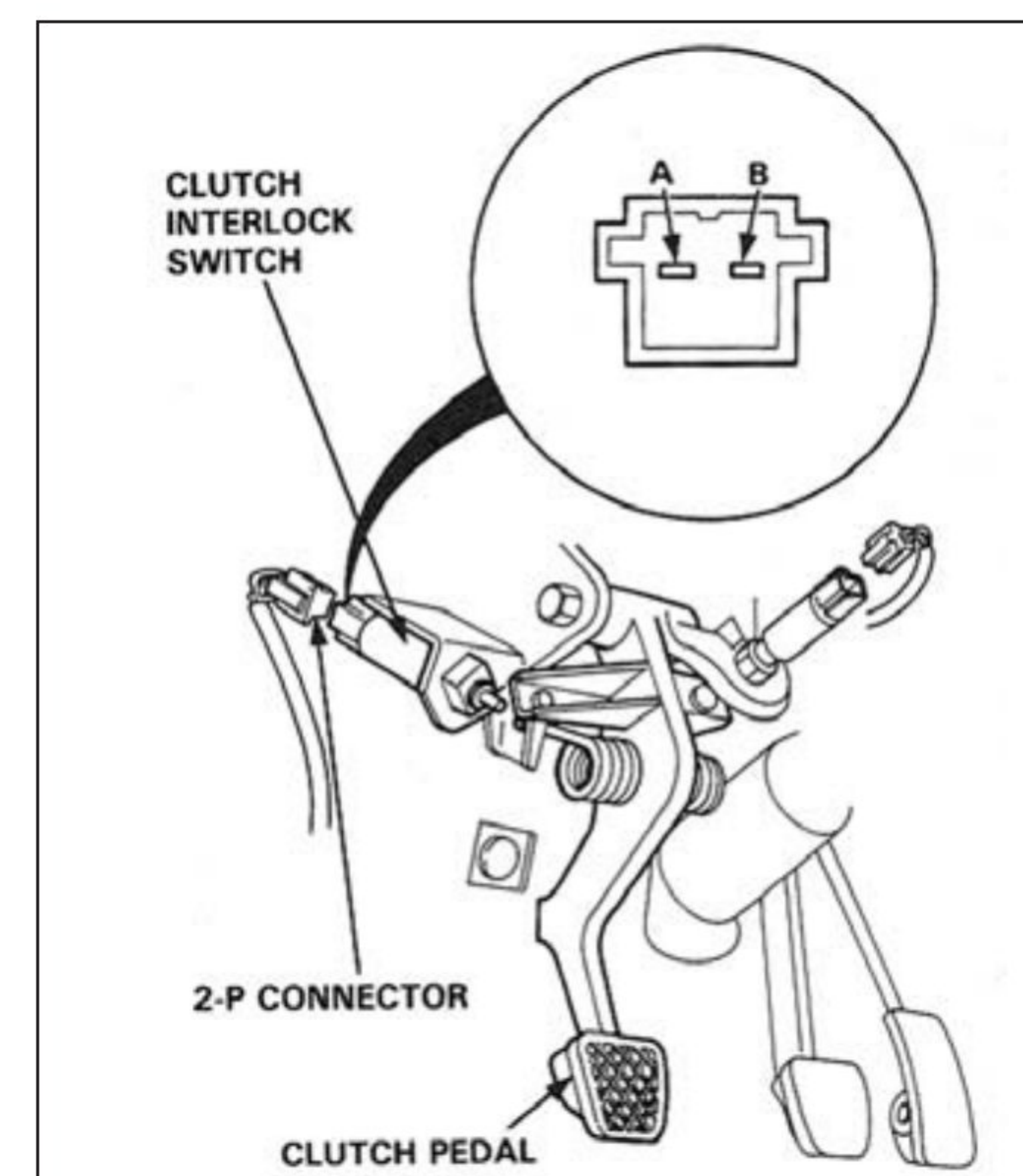


Terminal	A	B
Clutch Pedal		
RELEASED		
PUSHED	○	○

Clutch Interlock Switch Test (M/T only)

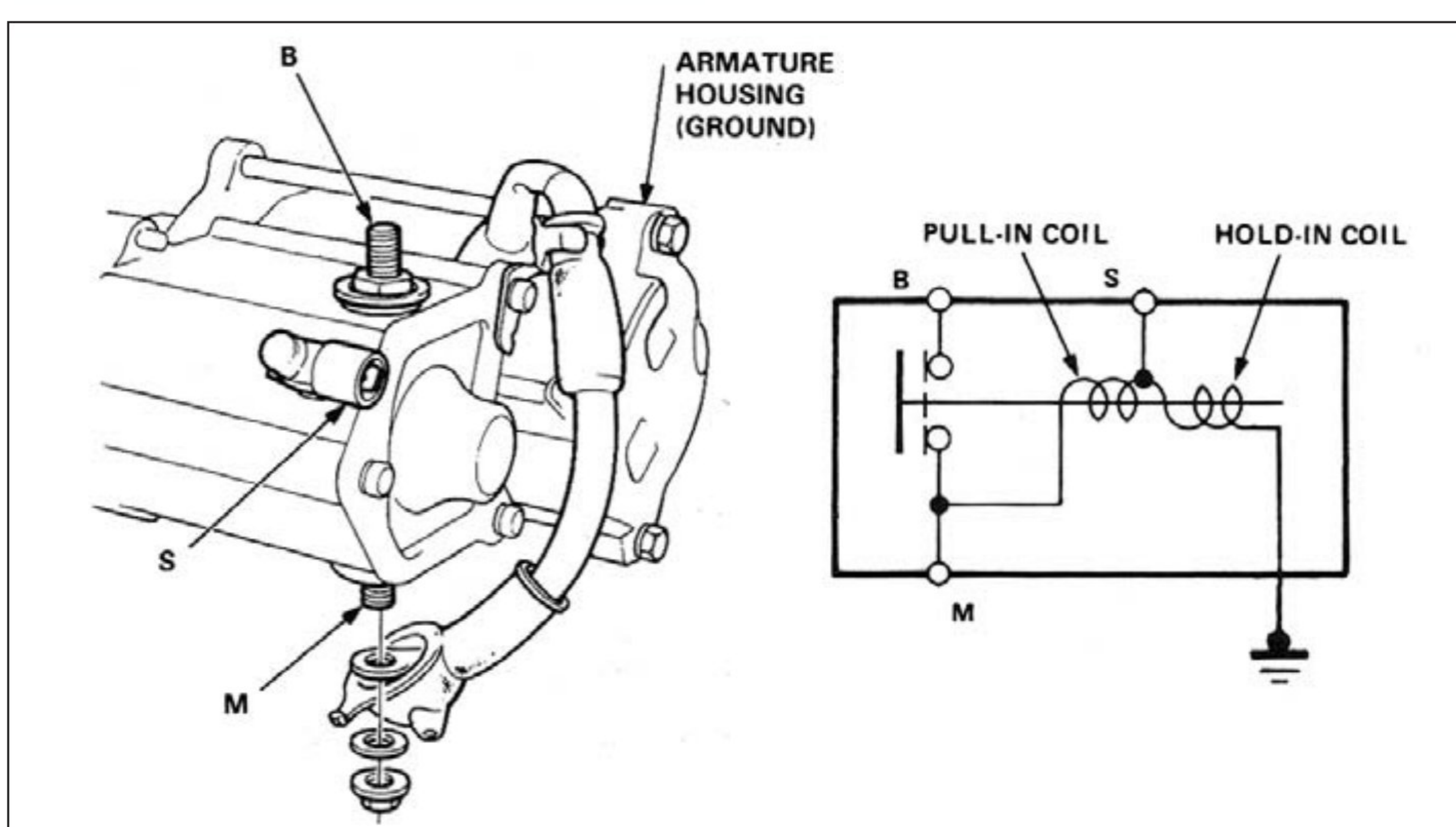
Remove the instrument lower cover, then disconnect the 2-P connector from the switch. Check for continuity between the terminals according to the table.

If necessary, replace the switch or adjust switch position.



Starter Solenoid Test

Check the hold-in coil for continuity between the S terminal and the armature housing (ground). Coil is OK if there is continuity, as shown below.

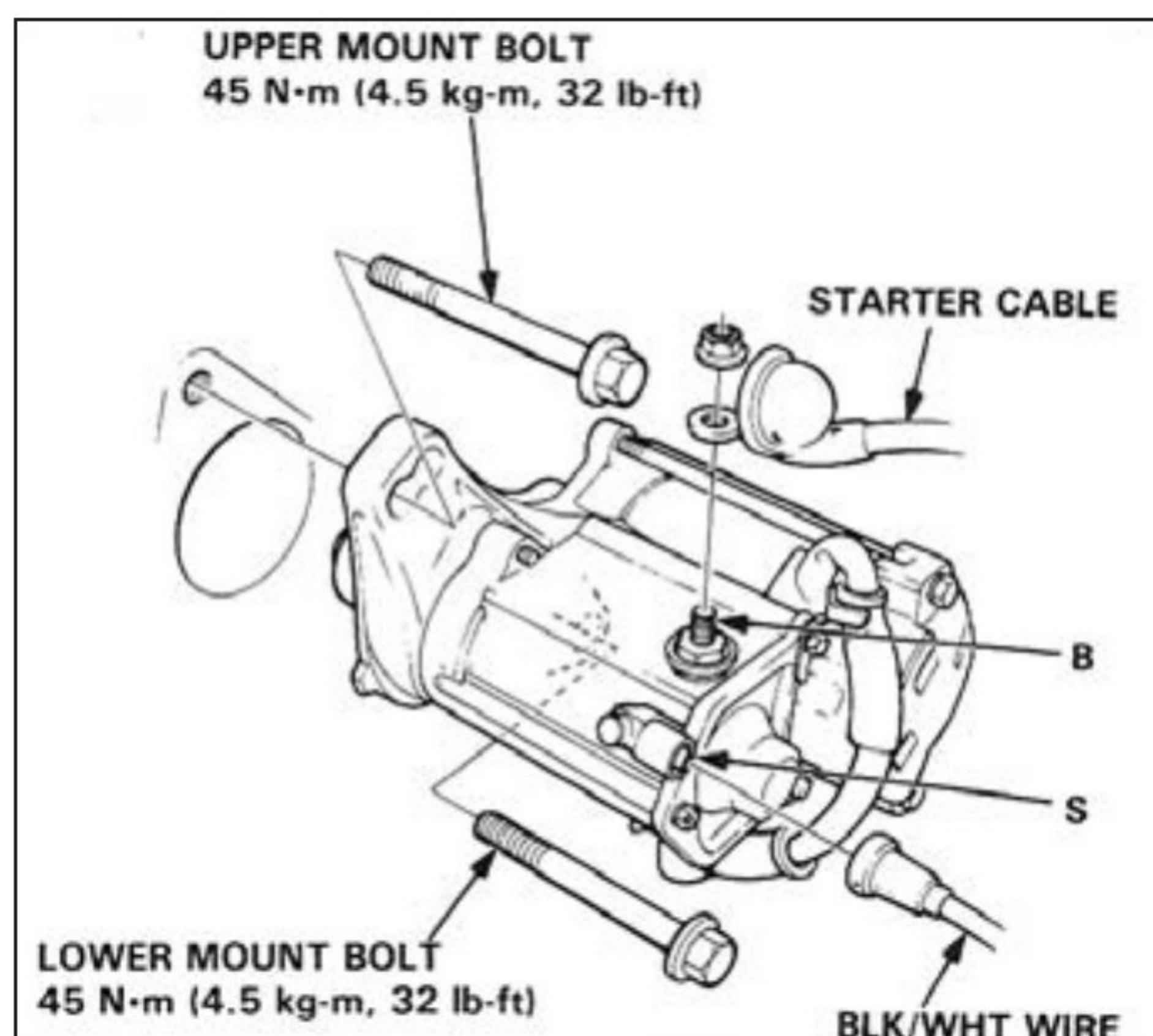


Check the pull-in coil for continuity between the S and M terminals. Coil is OK if there is continuity.

Starter Replacement

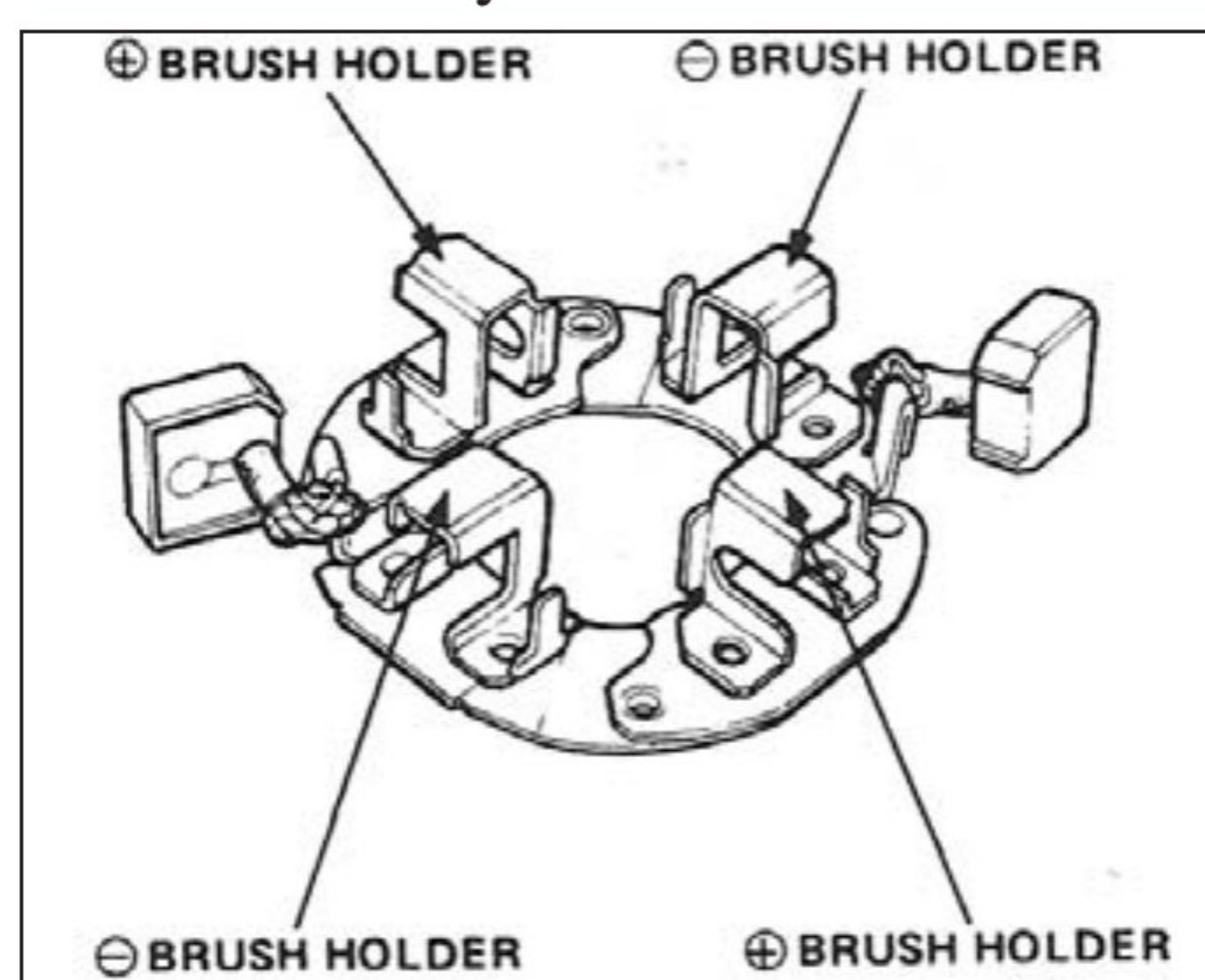
Disconnect the ground wire from the battery negative (-) post. Disconnect the starter cable from the B terminal on the solenoid, and the BLK/WHT wire from the S terminal.

Remove the two bolts holding the starter, and remove the starter.



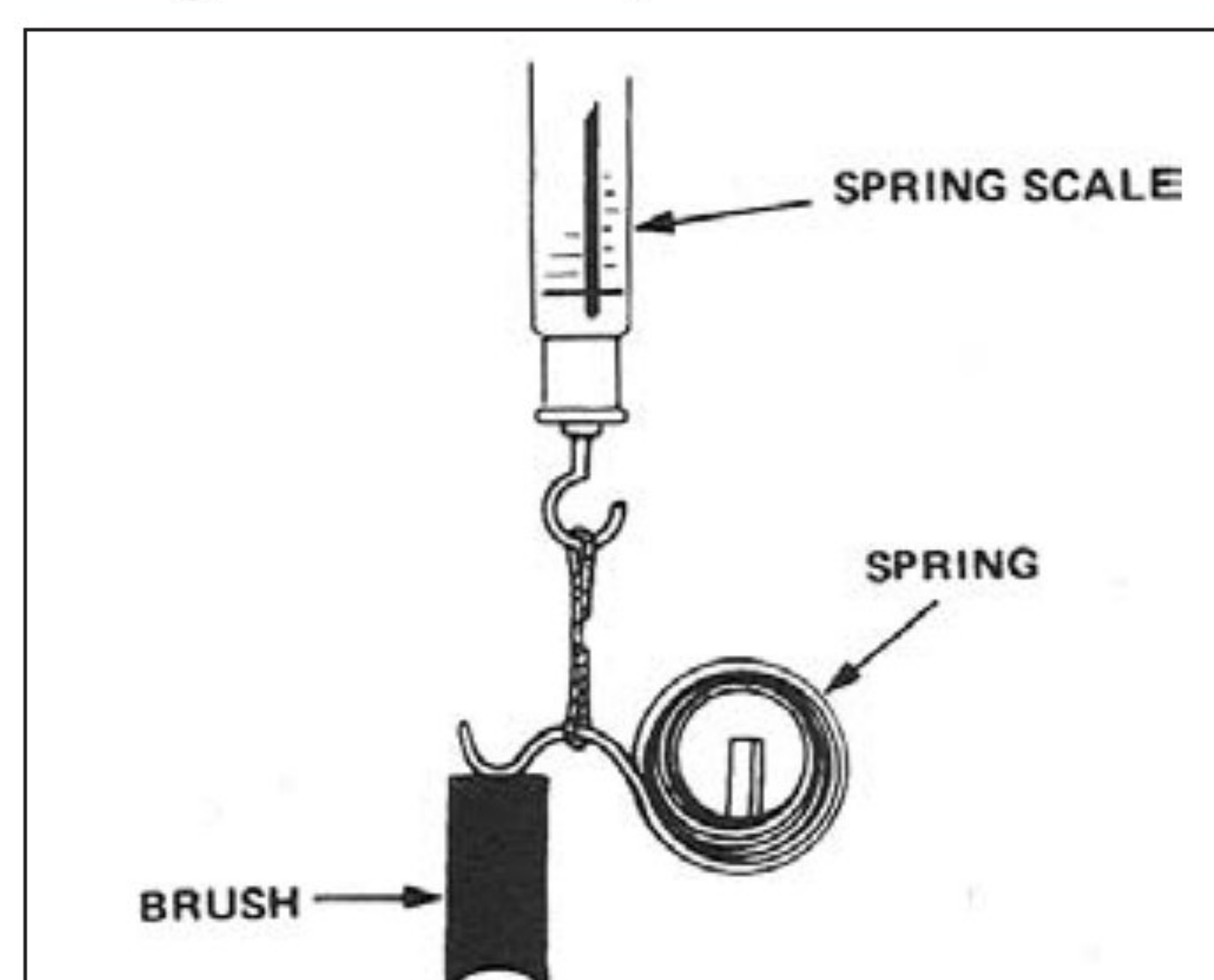
Starter Brush Holder Test

Check that there is no continuity between the (+) and (-) brush holders. If continuity exists, replace the brush holder assembly.



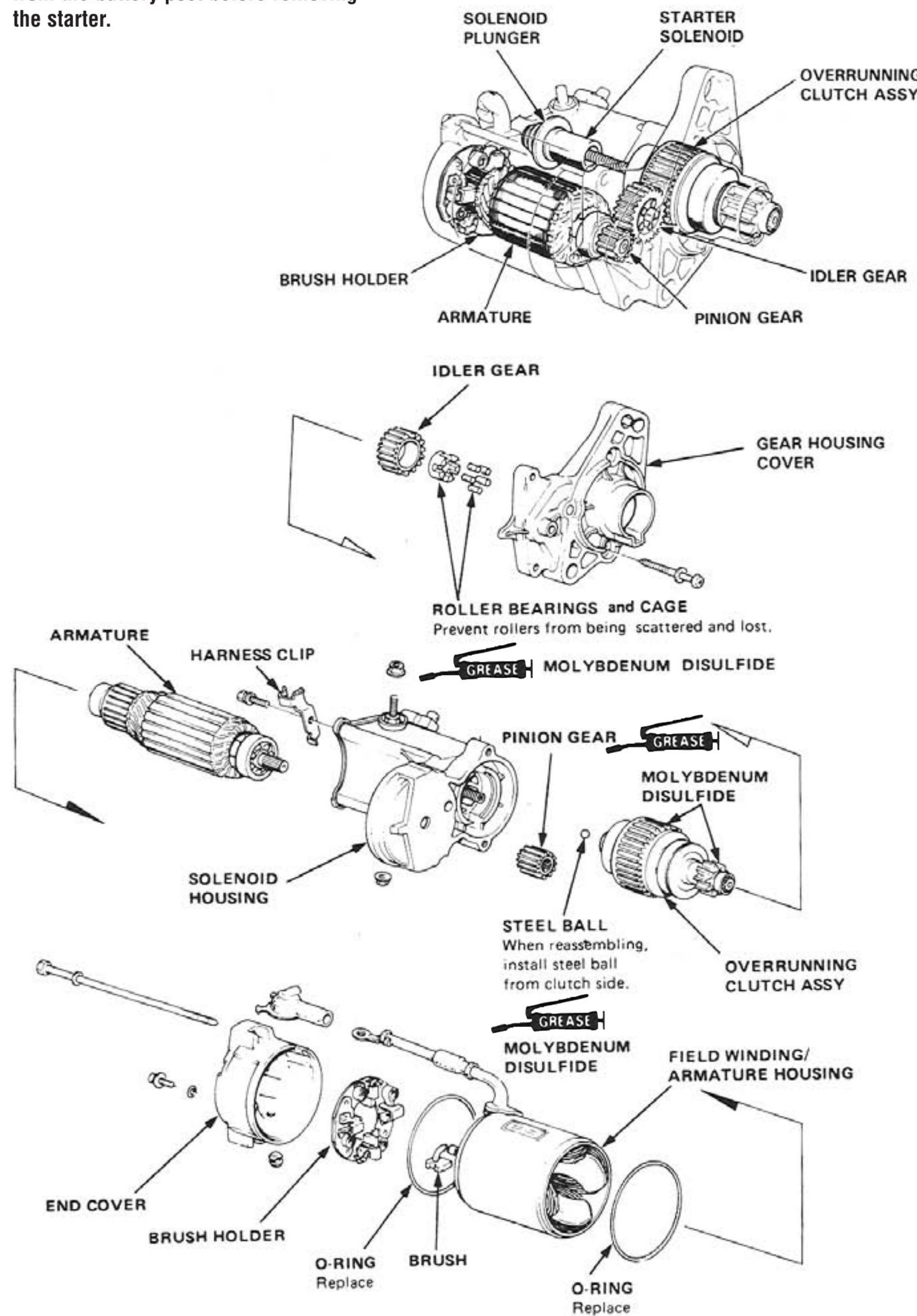
Insert the brush into the brush holder, and bring the brush into contact with commutator, then attach a spring scale to the spring. Measure the spring tension at the moment the spring lifts off the brush.

Spring Tension: 17 to 24 N (1.7 to 2.7 kg, 3.7 to 5.3 lb.).



Starter Overhaul

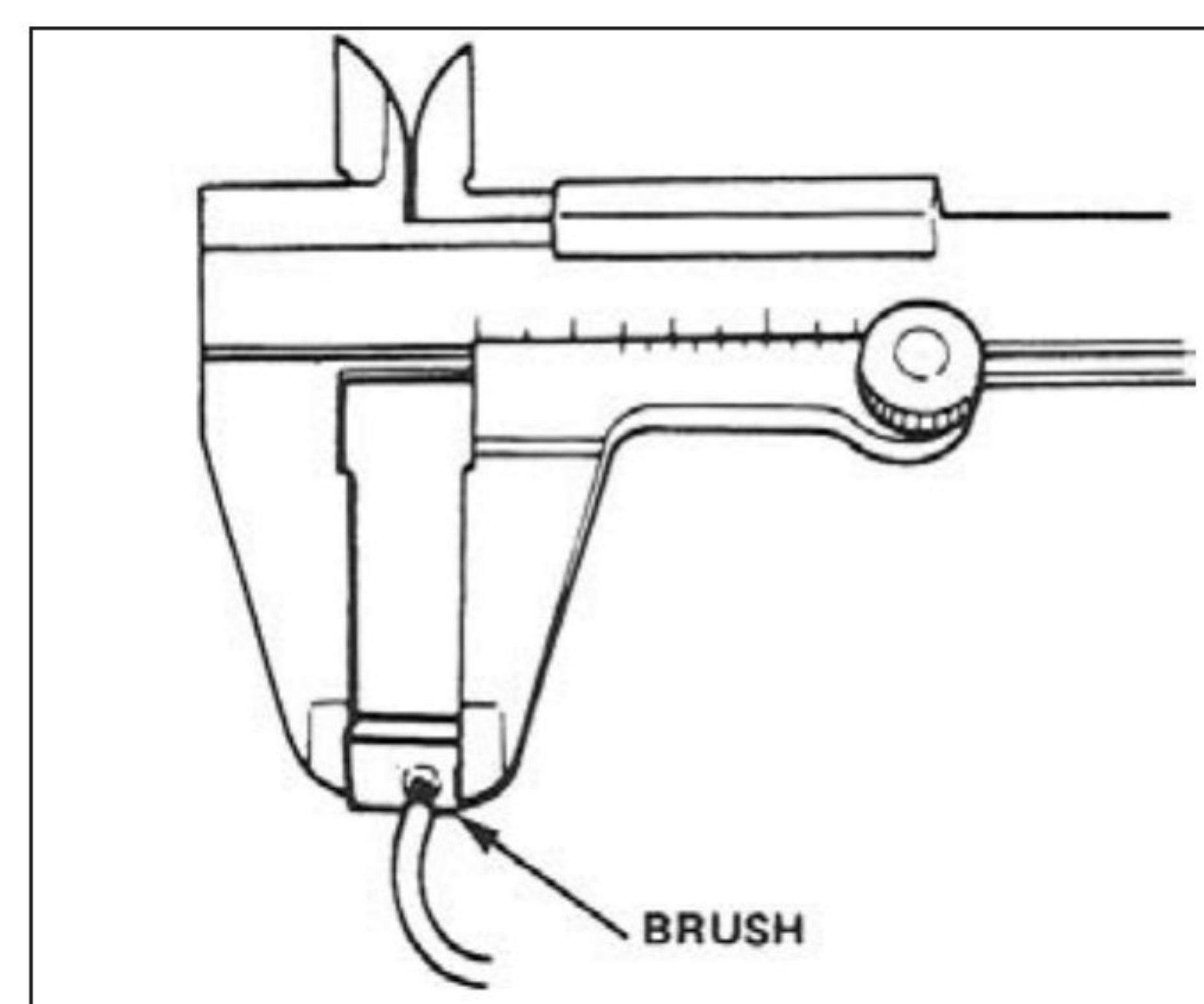
CAUTION: Disconnect the ground wire from the battery post before removing the starter.



Starter Brush Inspection

Measure brush length. If not within service limit, replace the armature housing and brush holder assembly. Standard (new) brush length: 15.0 to 15.5 mm (0.59 to 0.61 in.); service limit: 10.0 mm (0.39 in.).

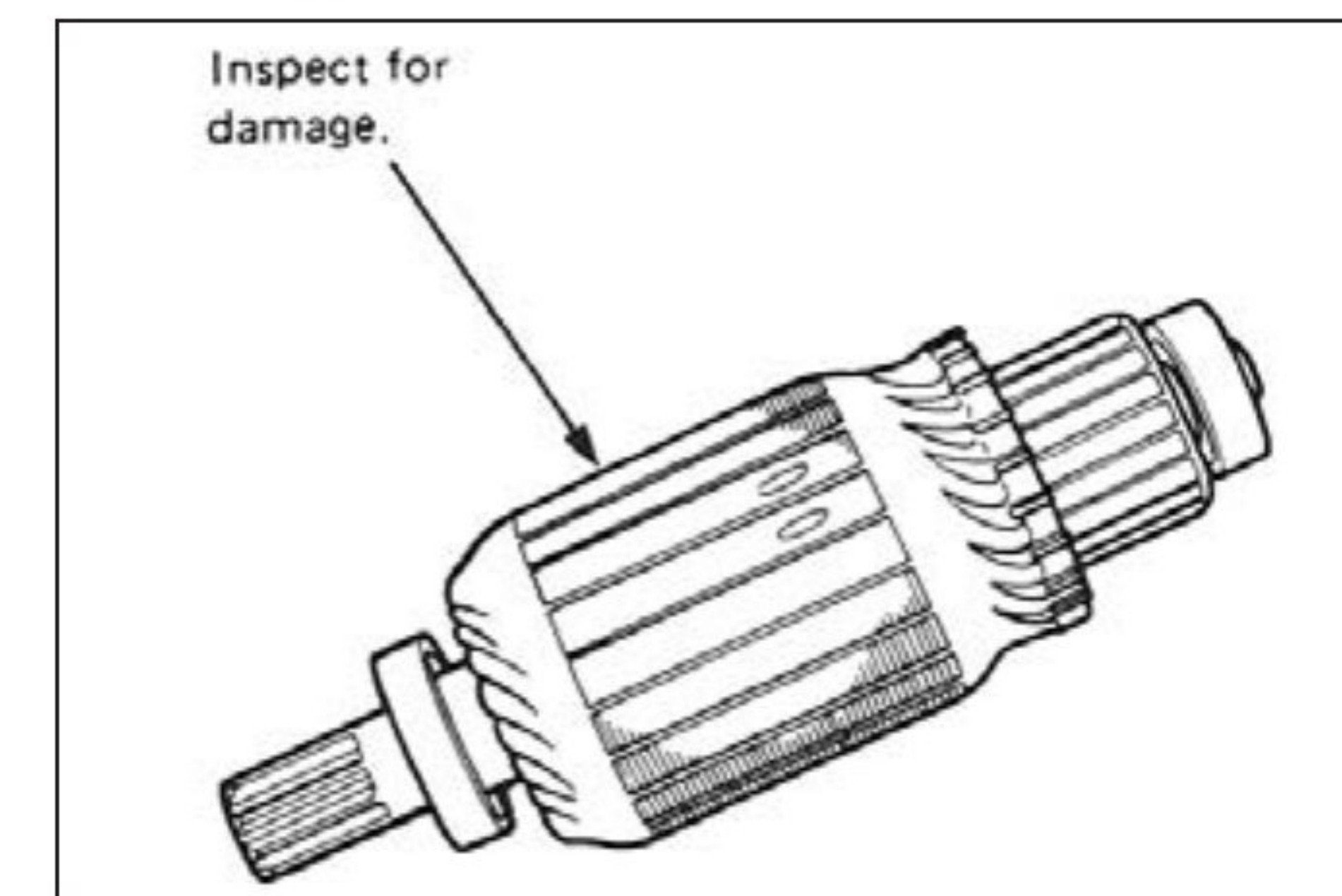
To seat new brushes after installing them in their holders, slip a strip of No. 500 or No. 600 sandpaper, with the grit side up, over the commutator, and smoothly rotate the armature. The contact surface of the brushes will be sanded



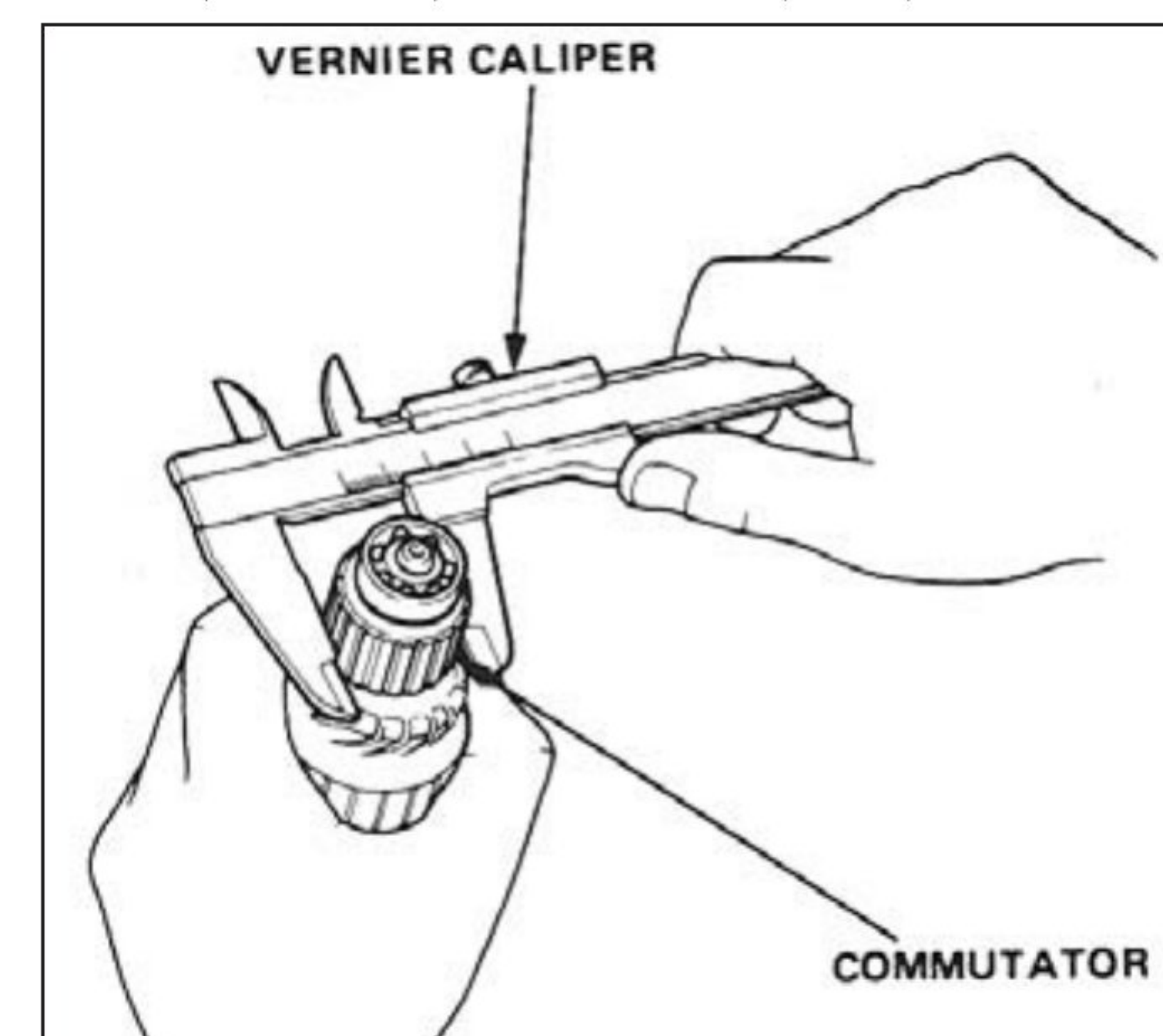
to same contour as the commutator.

Armature Inspection and Test

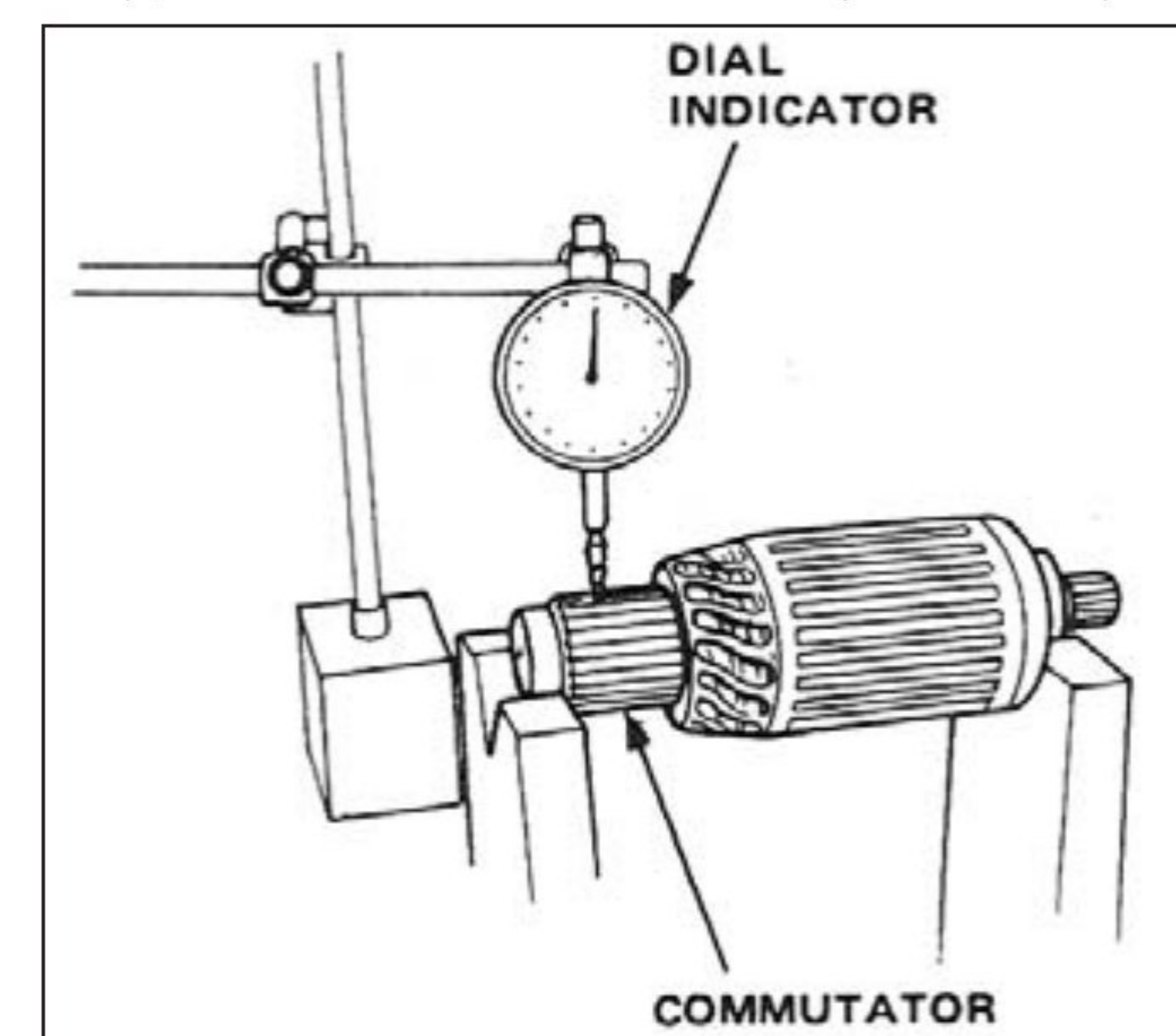
Inspect the armature for wear or damage due to contact with the field coil magnets.



A dirty or burned commutator surface may be resurfaced with emery cloth or a lathe within the following specifications. Standard (new) commutator diameter: 29.9 to 30.0 mm (1.177 to 1.181 in.); service limit: 29.0 mm (1.14 in.). Standard (new) commu-



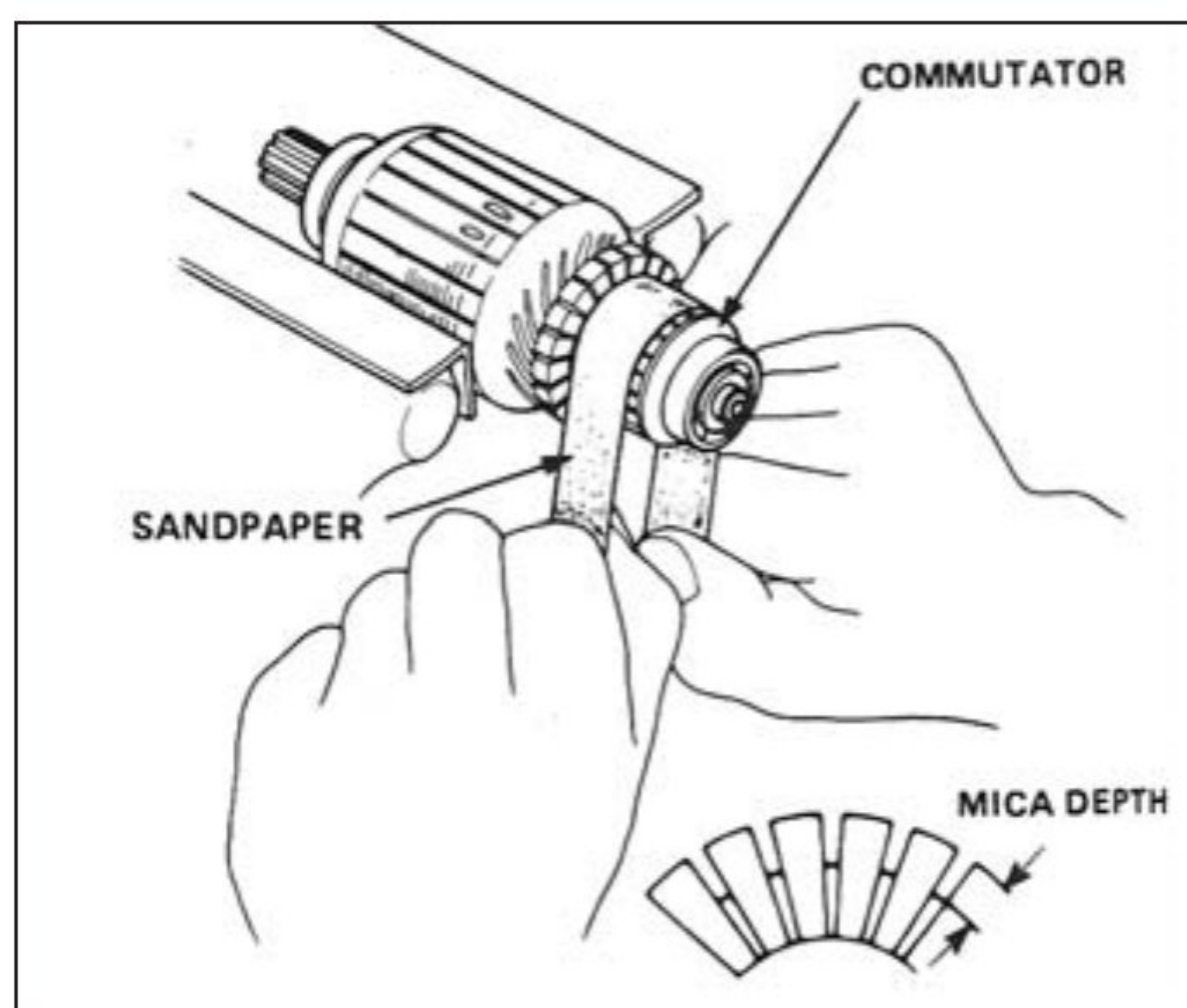
tator runout: 0 to 0.05 mm (0 to 0.002 in.); service limit: 0.4 mm (0.016 in.).



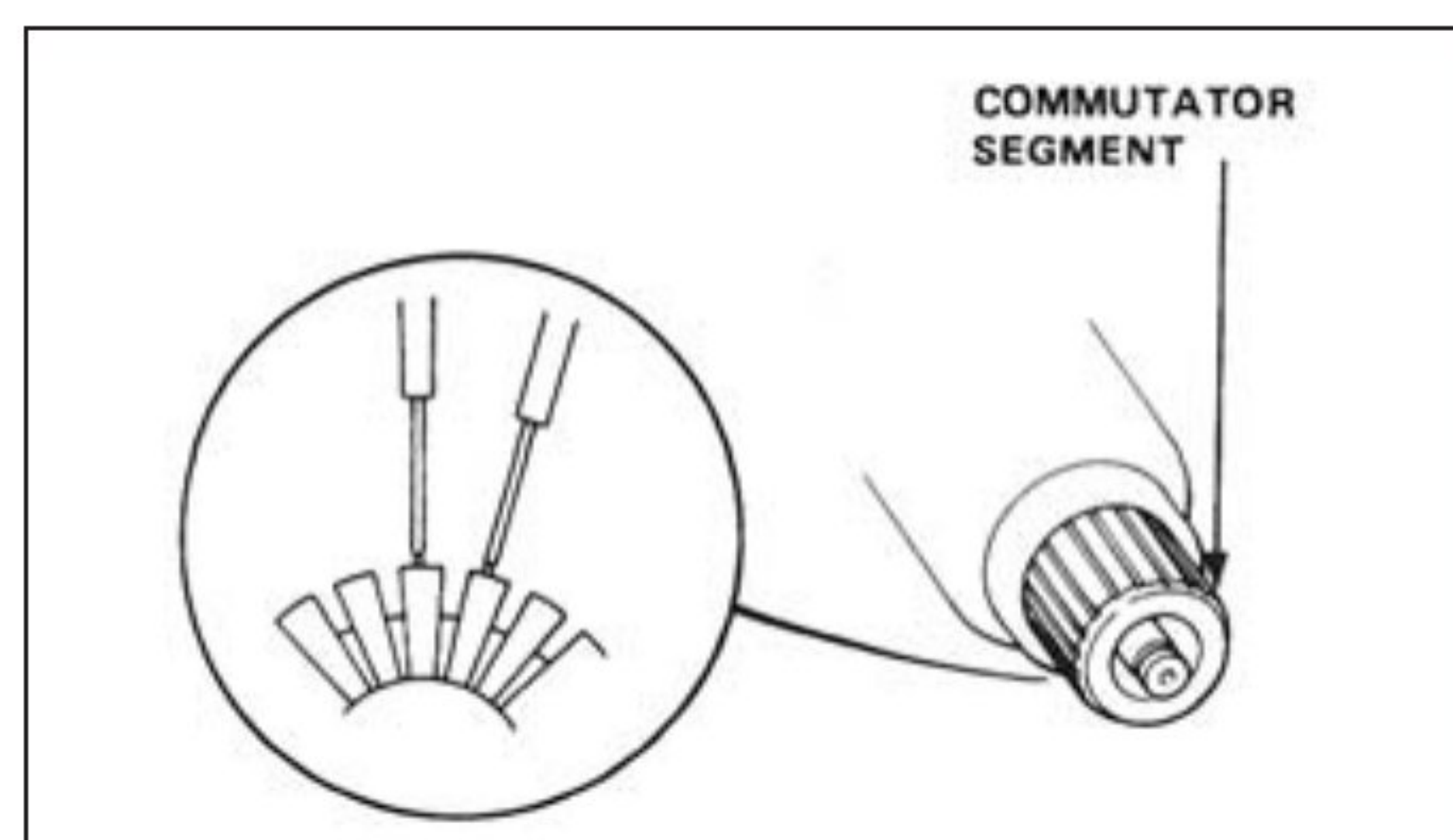
If the commutator runout and diameter are within limits, check the commutator for damage or for carbon dust or brass chips between the segments.

If surface is dirty, recondition it with a No. 500 or No. 600 sandpaper. Then check mica depth. If necessary, undercut mica with a hacksaw blade to

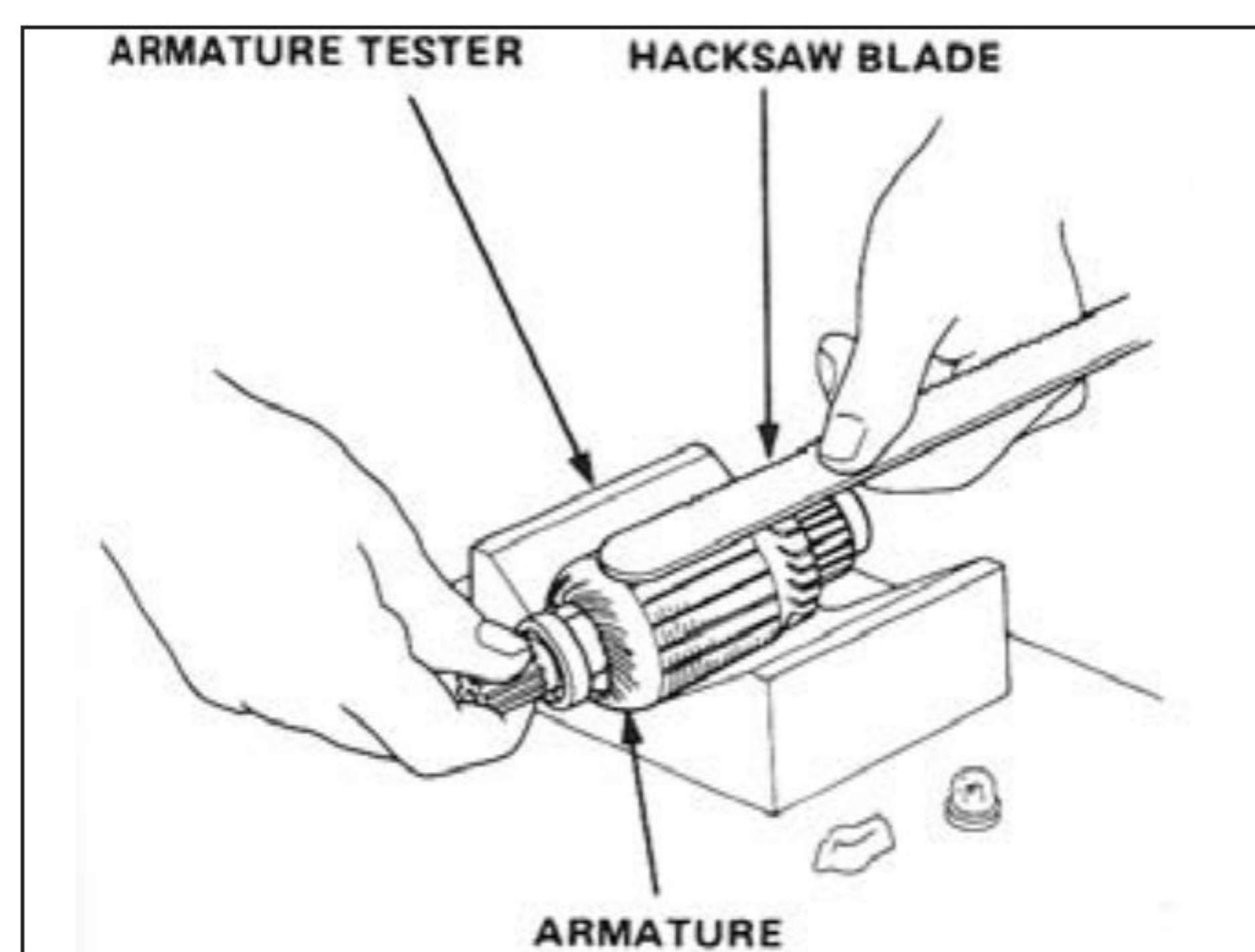
achieve proper depth. Standard (new) commutator mica depth: 0.5 to 0.8 mm (0.019 to 0.031 in.); service limit: 0.2 mm (0.008 in.).



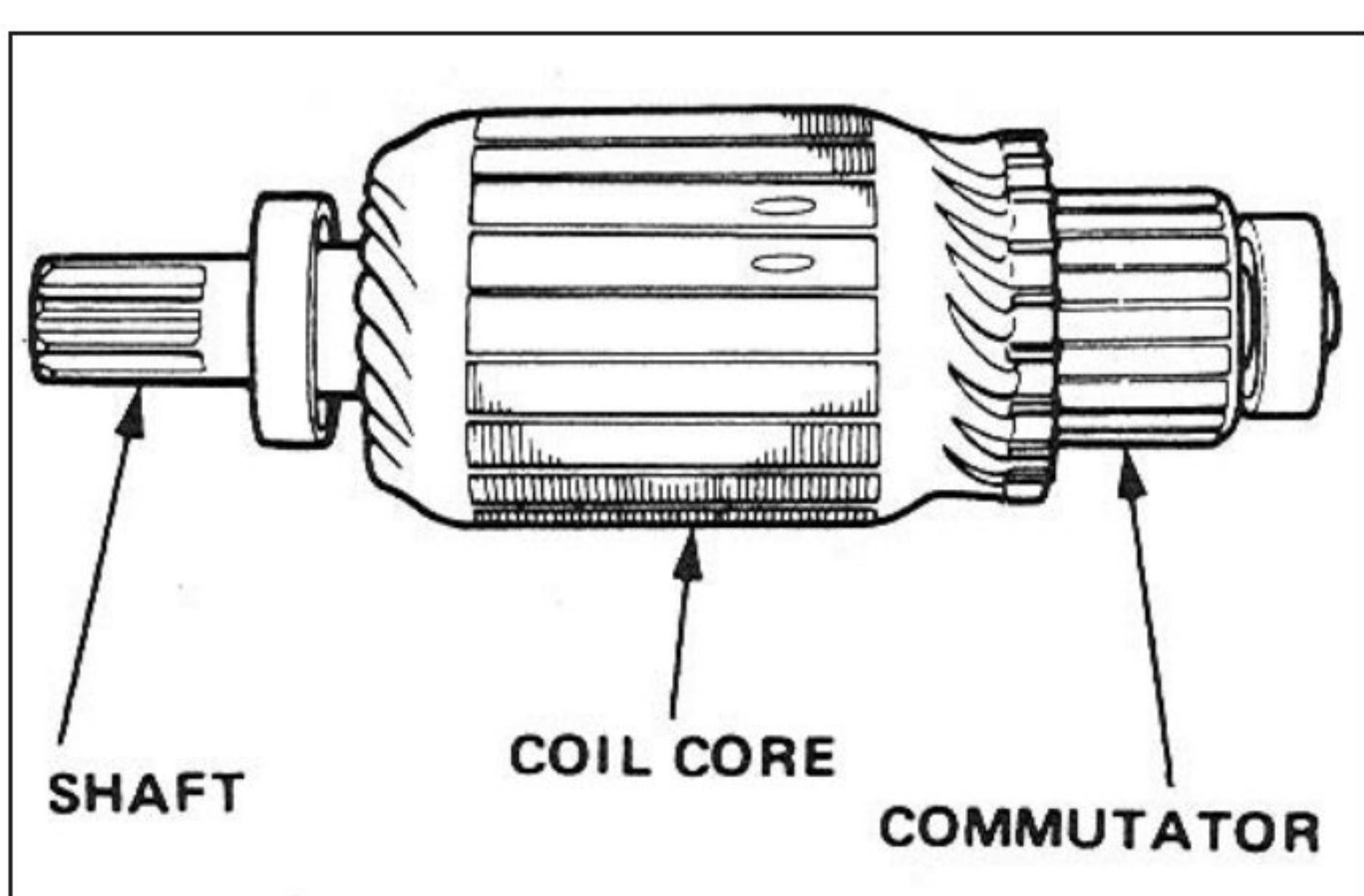
Check for continuity between each segment of the commutator. If an open circuit exists between any segment, replace the armature.



Place the armature on an armature tester. Hold a hacksaw blade on the armature core. If the blade is attracted to the core or vibrates while core is turned, the armature is shorted. Replace the armature.

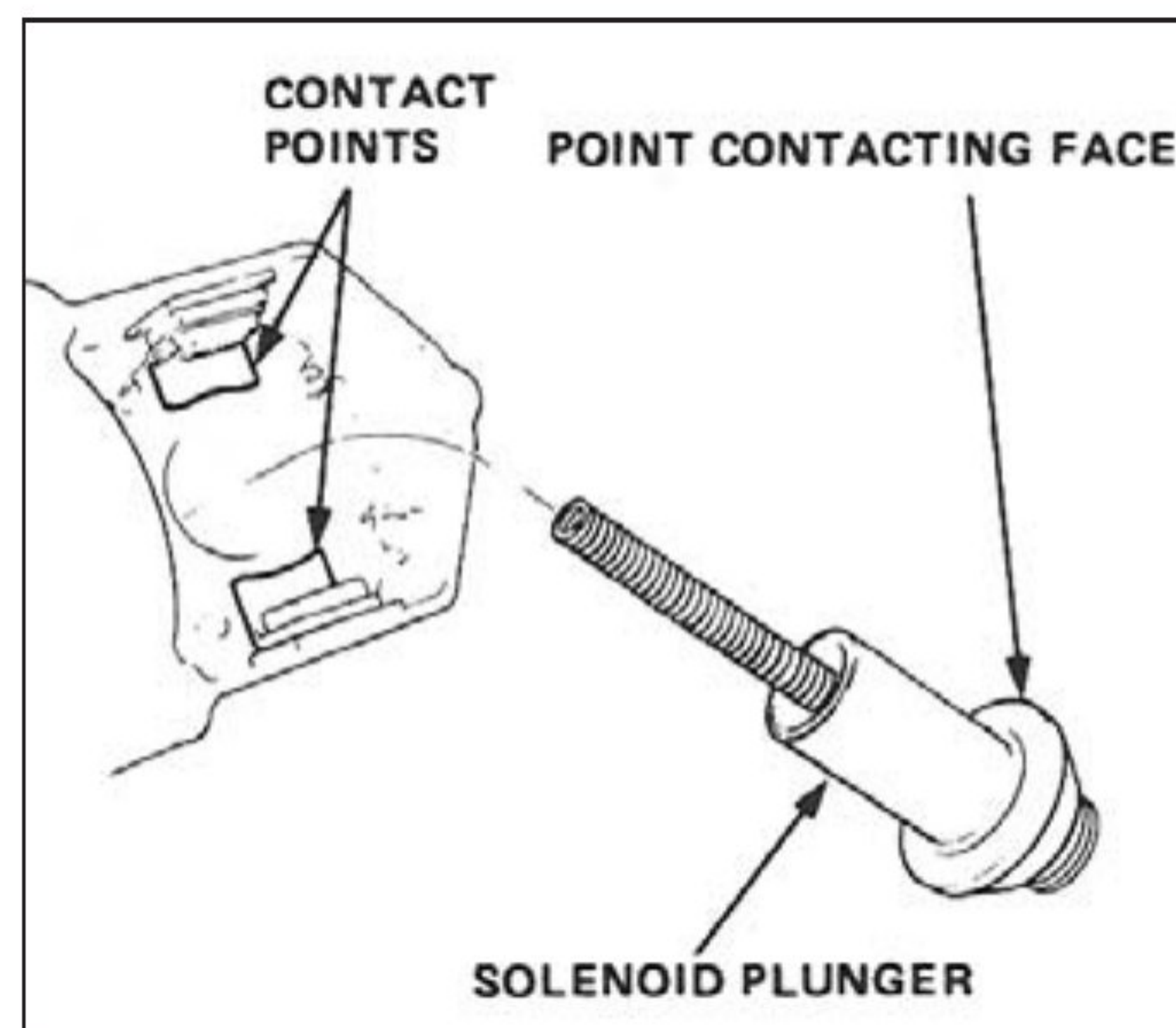


With an ohmmeter, check that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If continuity exists, replace the armature.



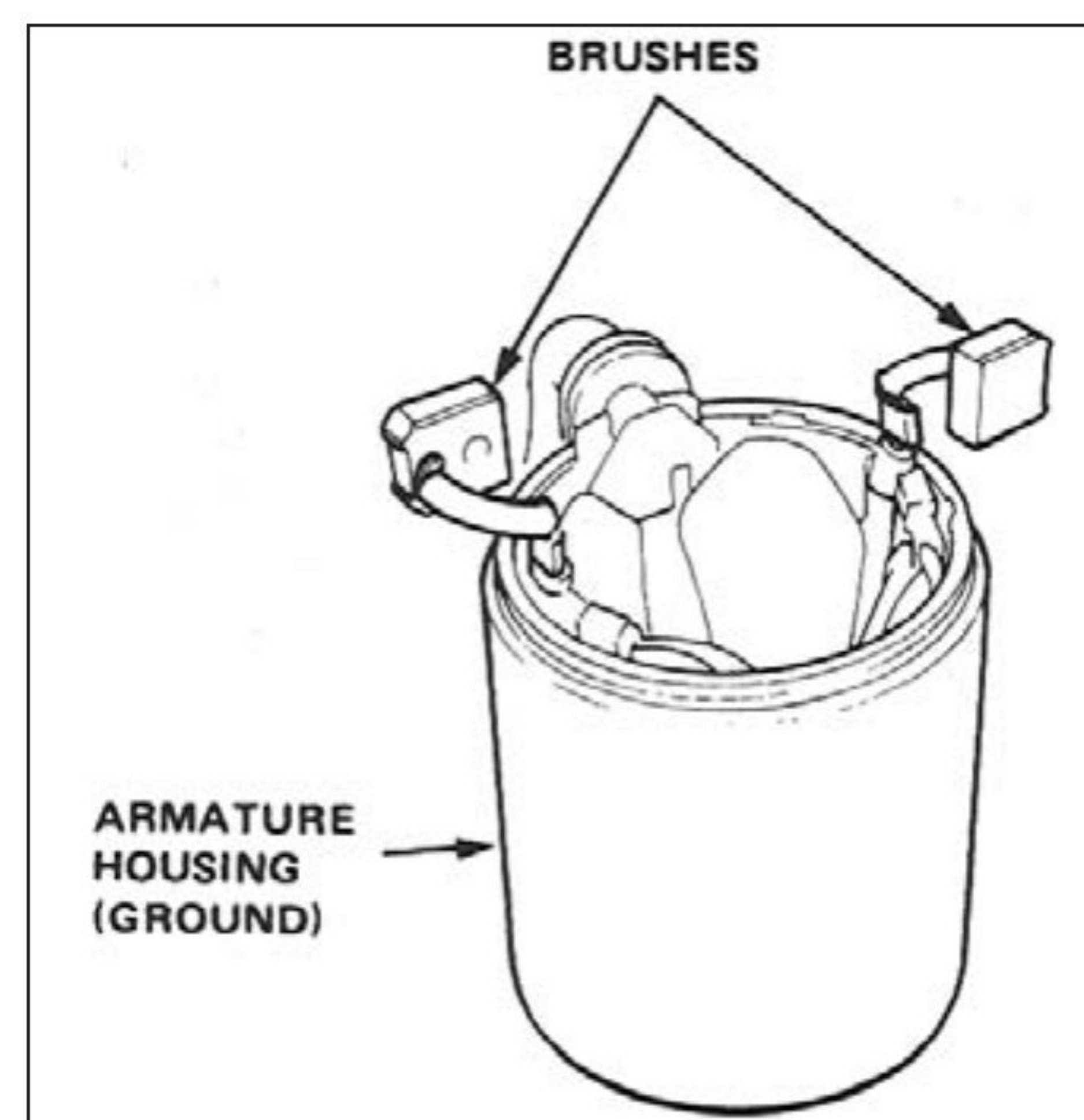
Solenoid Plunger Inspection

Check the contact points, and face of the starter solenoid plunger for burning, pitting or any other defects. If surfaces are rough, recondition with a strip of No. 500 or No. 600 sandpaper.



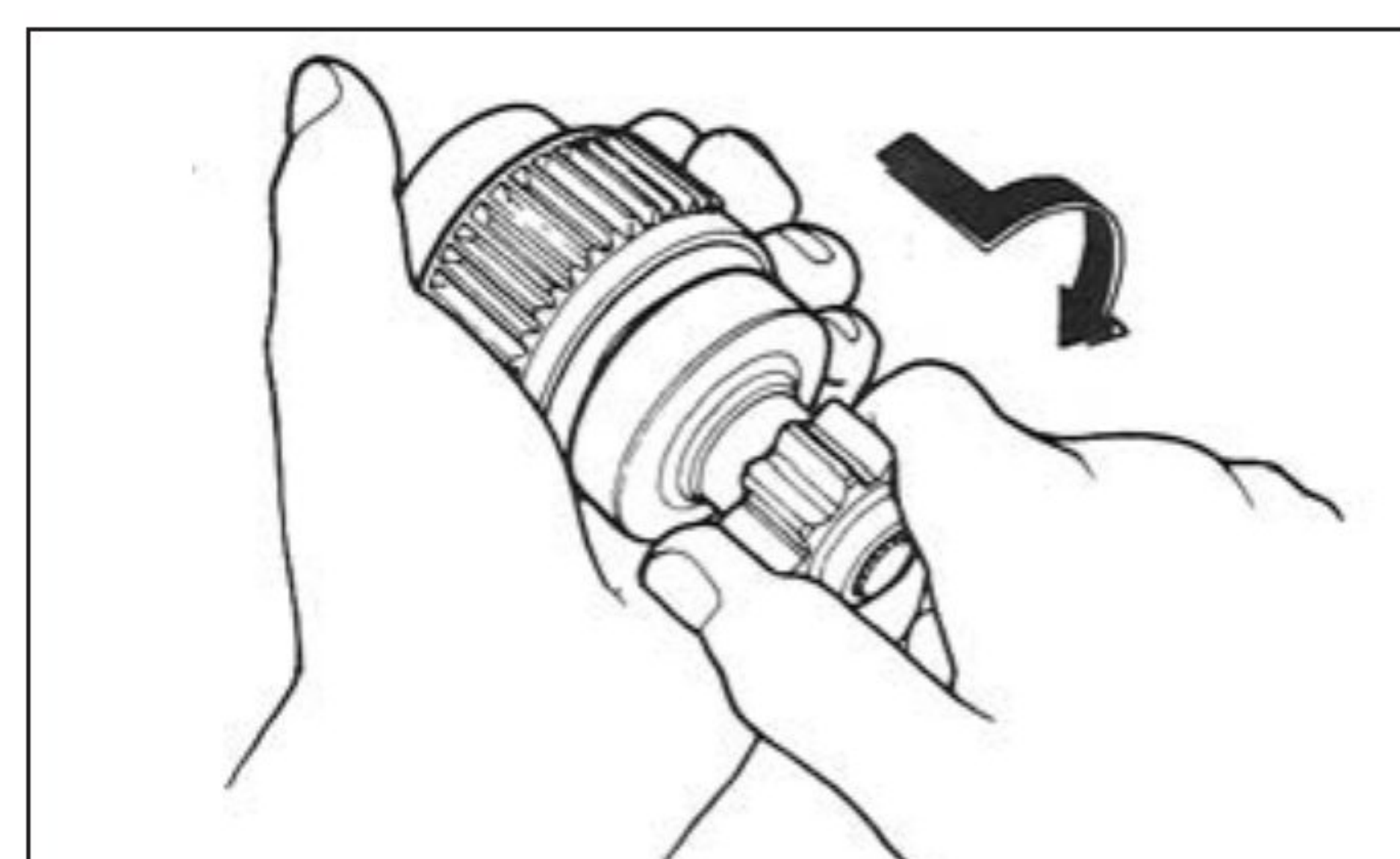
Starter Field Winding Test

Check for continuity between the brushes. If no continuity, replace the armature housing. Check for continuity between each brush and the armature housing (ground). If continuity exists, replace the armature housing.



Overrunning Clutch Inspection

Move the overrunning clutch along the shaft. If it doesn't move freely, or if the clutch slips when the armature is rotated while holding the drive gear, replace the clutch assembly.



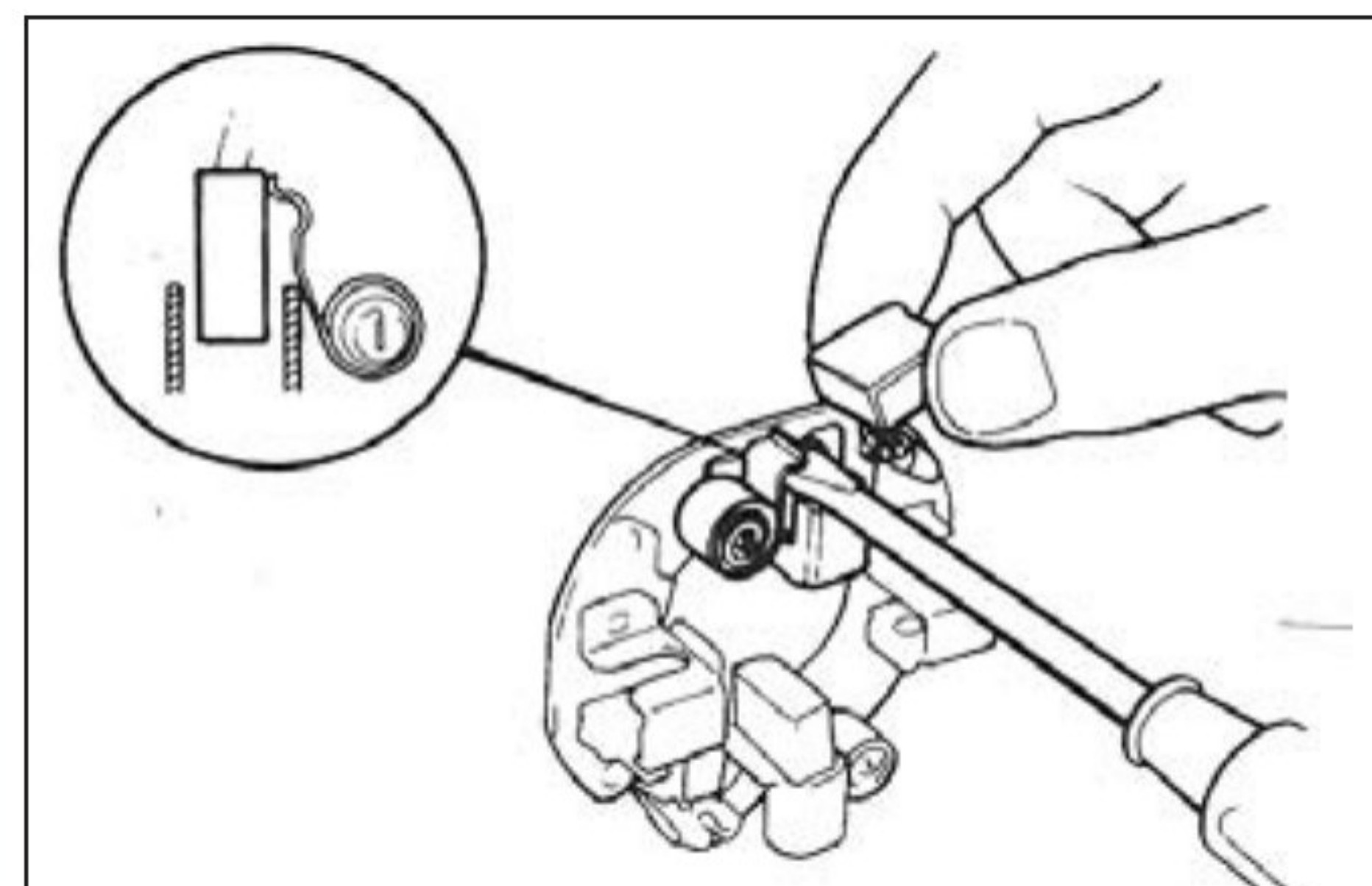
If the gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately. Check the condition of the flywheel

or torque converter ring gear if the starter drive gear teeth are damaged.

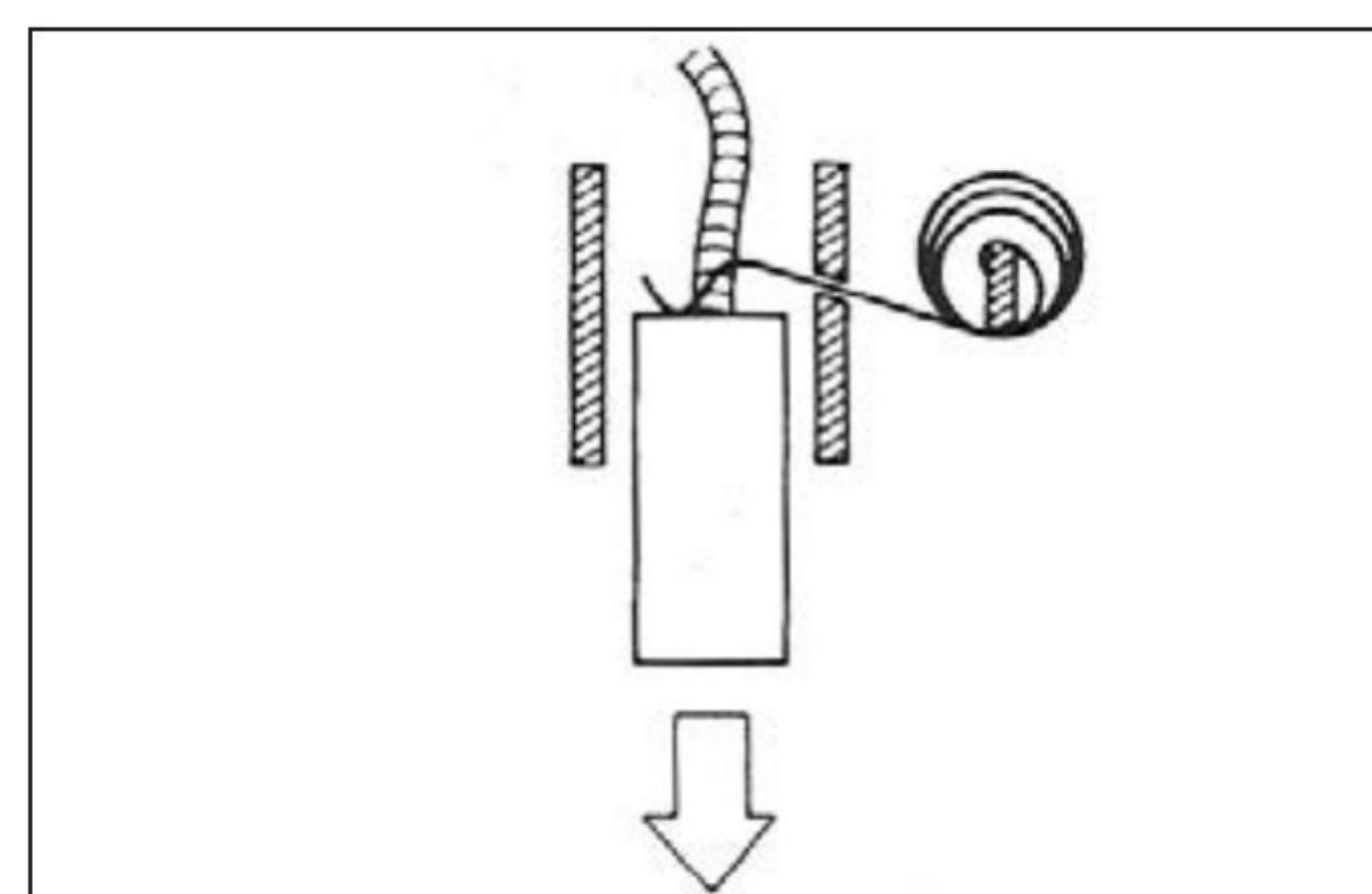
Starter Reassembly

Reassemble the starter in the reverse order of disassembly.

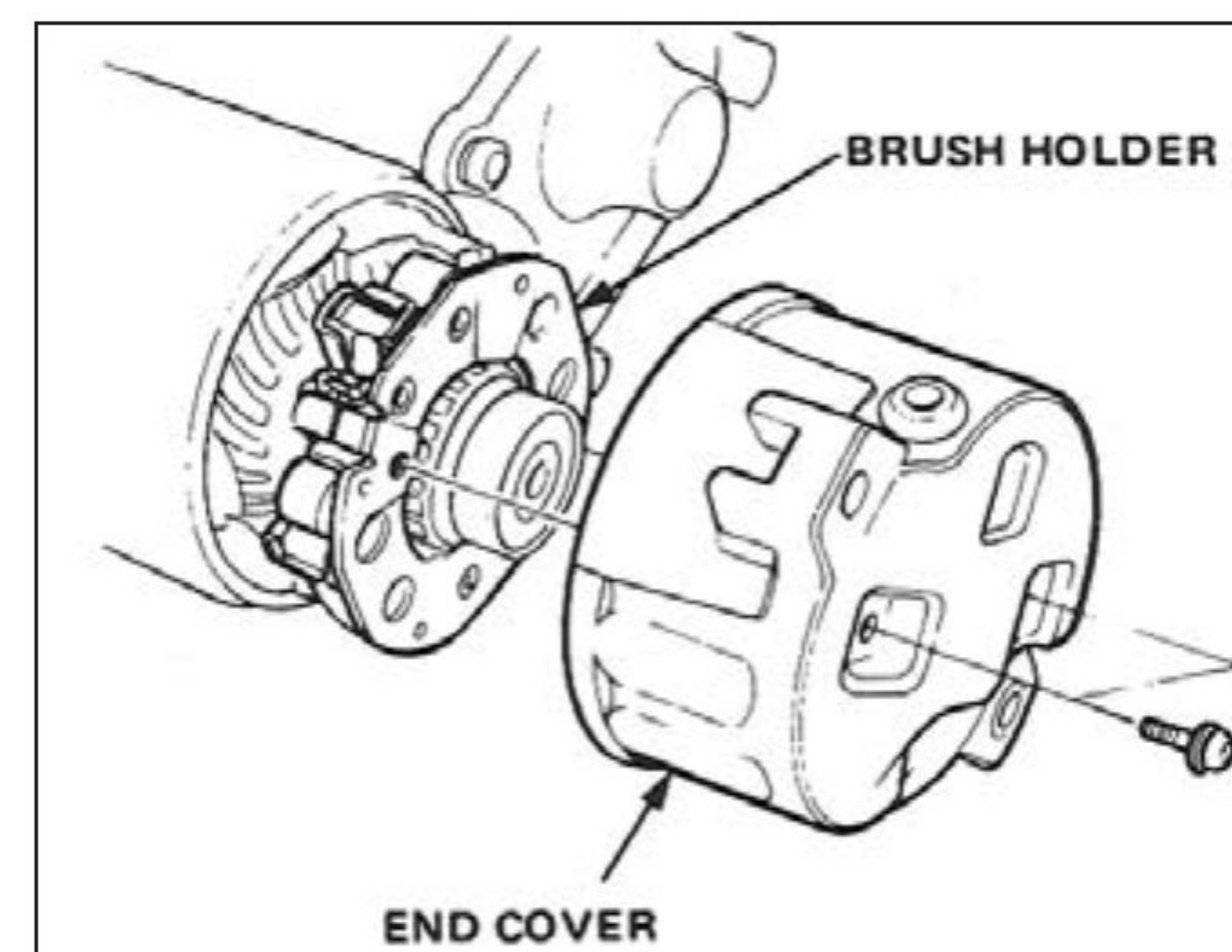
Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



Install the armature in the housing. Next pry back each brush spring again and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



Install the end cover on the brush holder.



Charging System

Alternator and Regulator Test

First make sure you have a good battery, and that the alternator belt is tight and in good condition. Also make sure the connections at the alternator and main fuses are good. Next, check the No. 9 (10 A) fuse in the dash fuse box and the No. 38 (10 A) fuse in the underhood relay box. (If blown, the charge warning light will come on even if the system's working properly.)

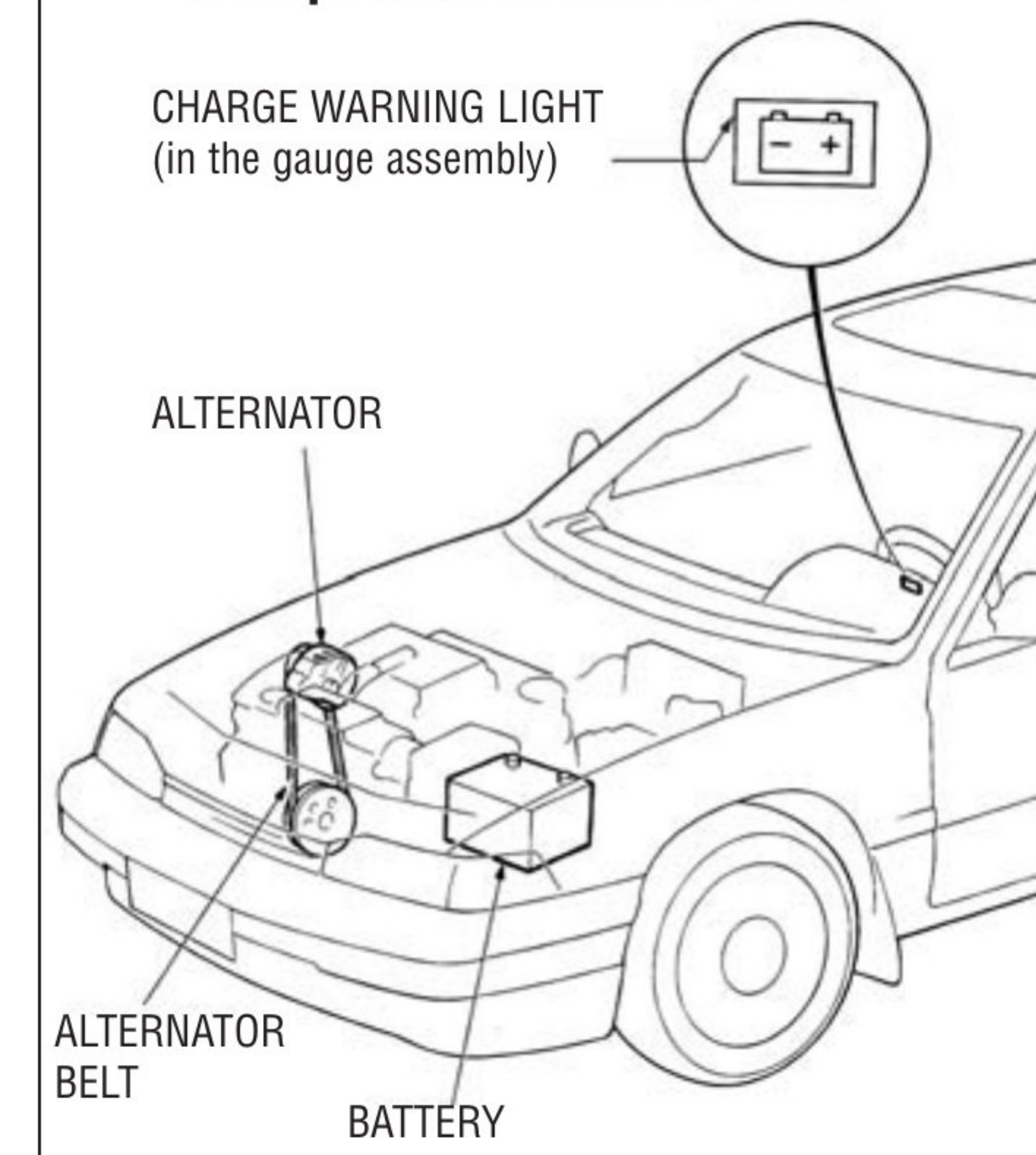
Disconnect the alternator connector

from the alternator. With the ignition switch on, there should be battery voltage between the IG (BLK/YEL) terminal and body ground, and between the S (YEL/BLU) terminal and body ground.

If there is no voltage check for:

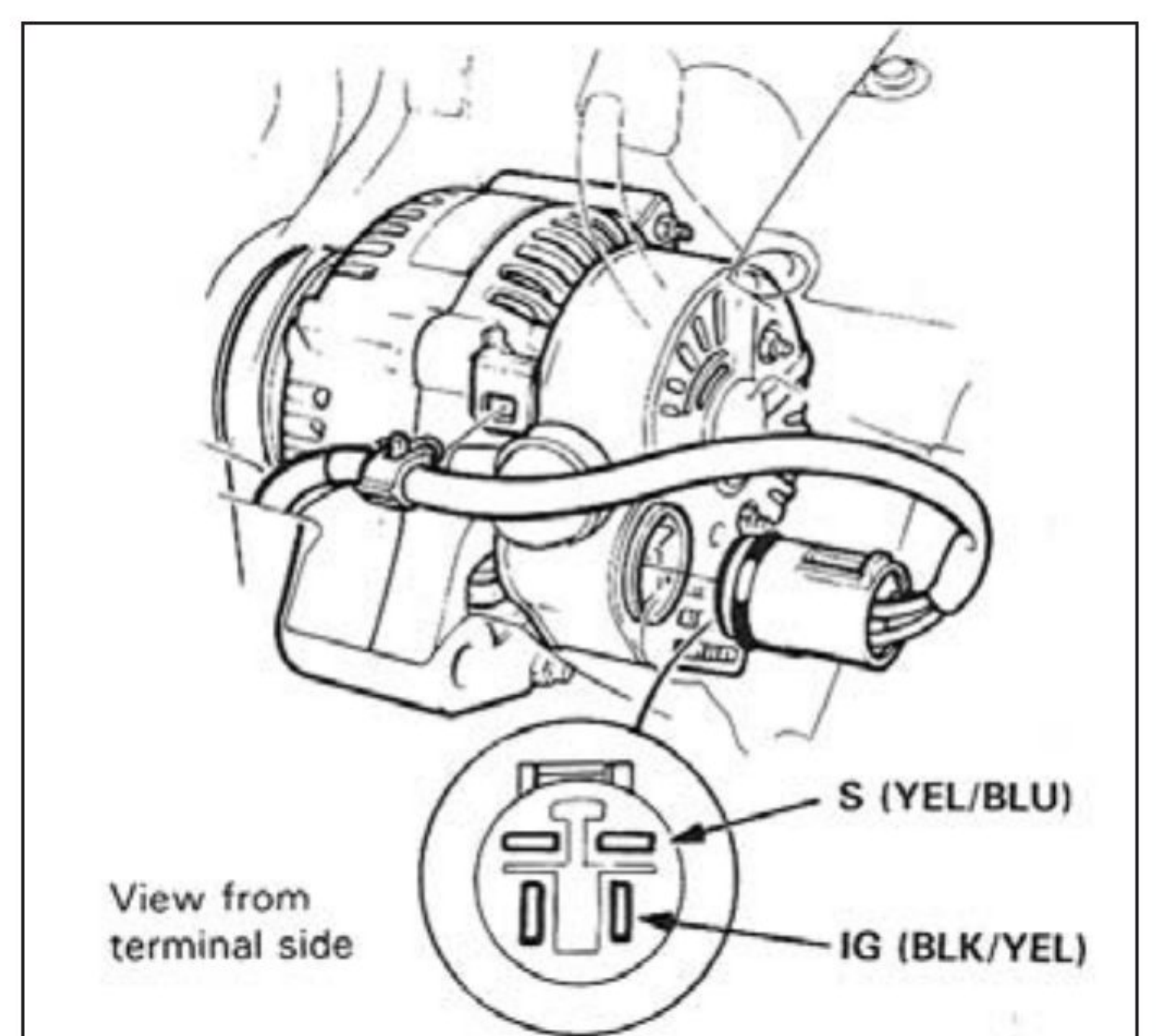
- Blown No. 9 (10 A) fuse in the dash fuse box or No. 38 (7.5 A) fuse in the underhood relay box.

Component Location Index



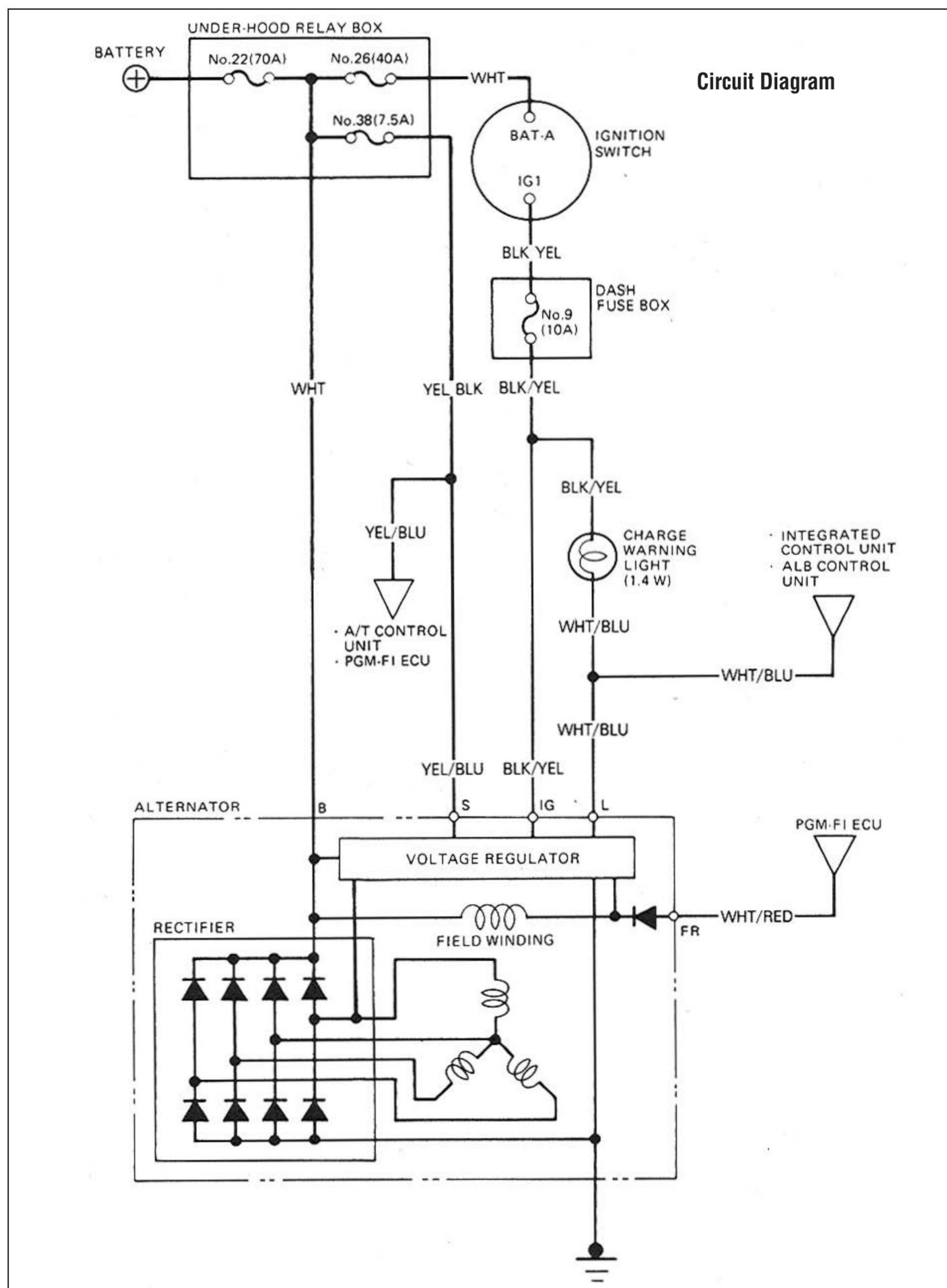
- An open in the BLK/YEL wire between the dash fuse box and the voltage regulator, or the YEL/BLU wire between the underhood relay box and the voltage regulator.

If there is battery voltage, connect the SUN VAT-40 (or equivalent) and turn the test selector switch to the "Starting (No. 1)" position, following the manufacturer's instructions.



Start the engine. Turn off all accessories, move the test selector switch to the "Charging (No. 2)" position, remove the inductive pick-up, and zero the ammeter.

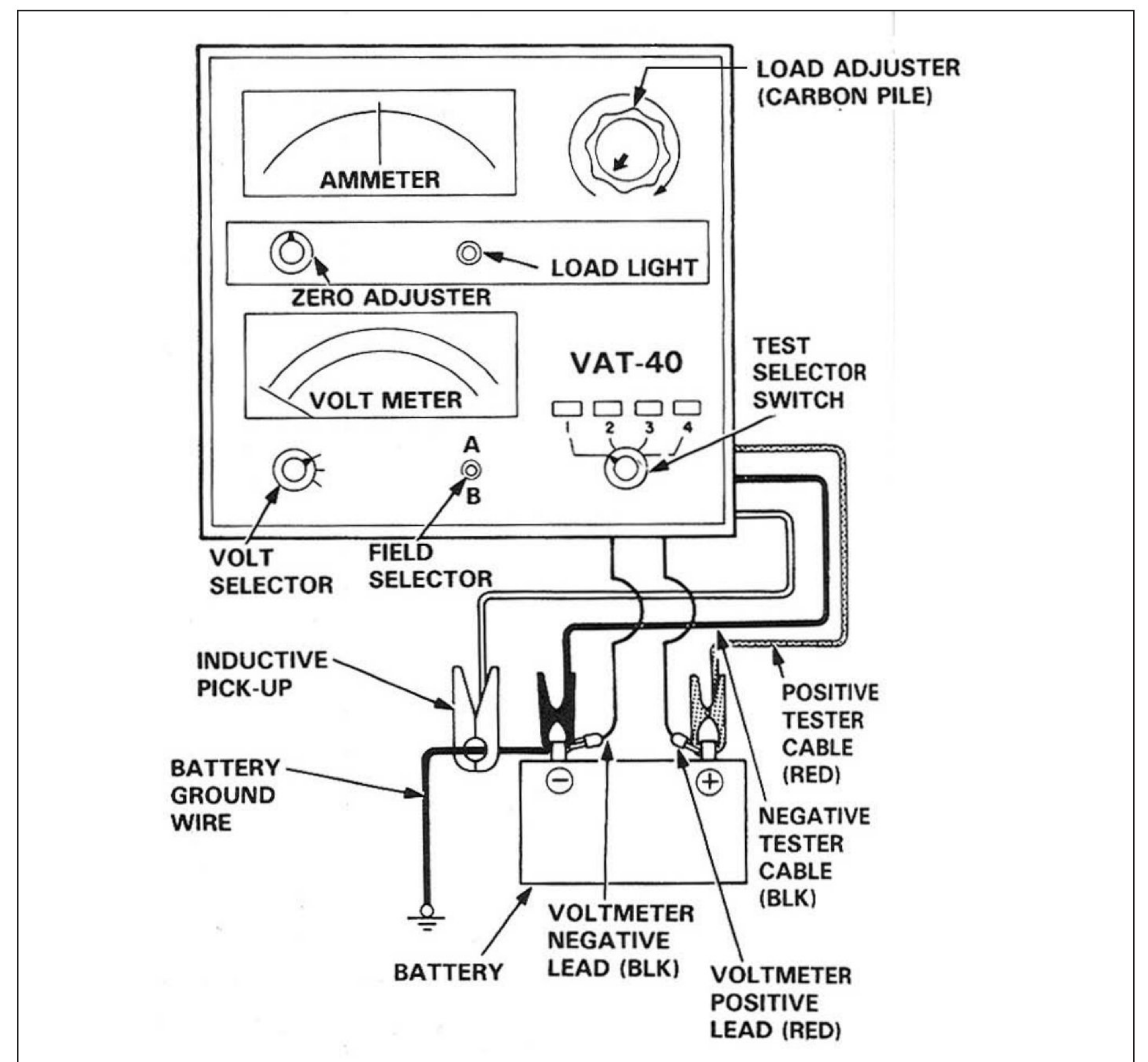
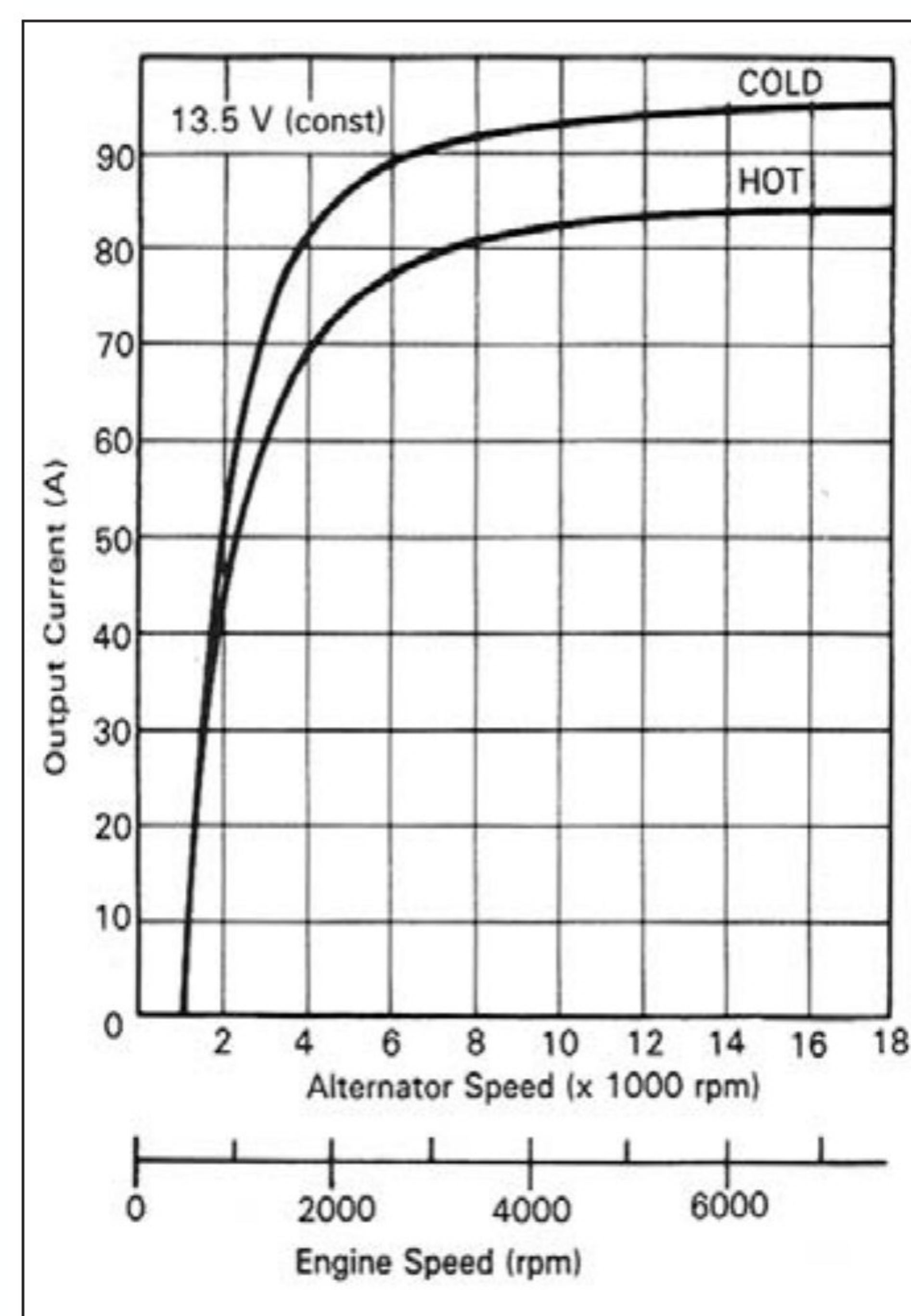
Reconnect the inductive pick-up to the battery ground wire, so the arrow is pointing away from the battery.



Raise engine speed to 2,000 rpm and hold (make sure cooling fans are off). Apply a "load" with the carbon pile, so the voltage drops to no less than 12 volts. Check the maximum amperage reading and compare with the chart below.

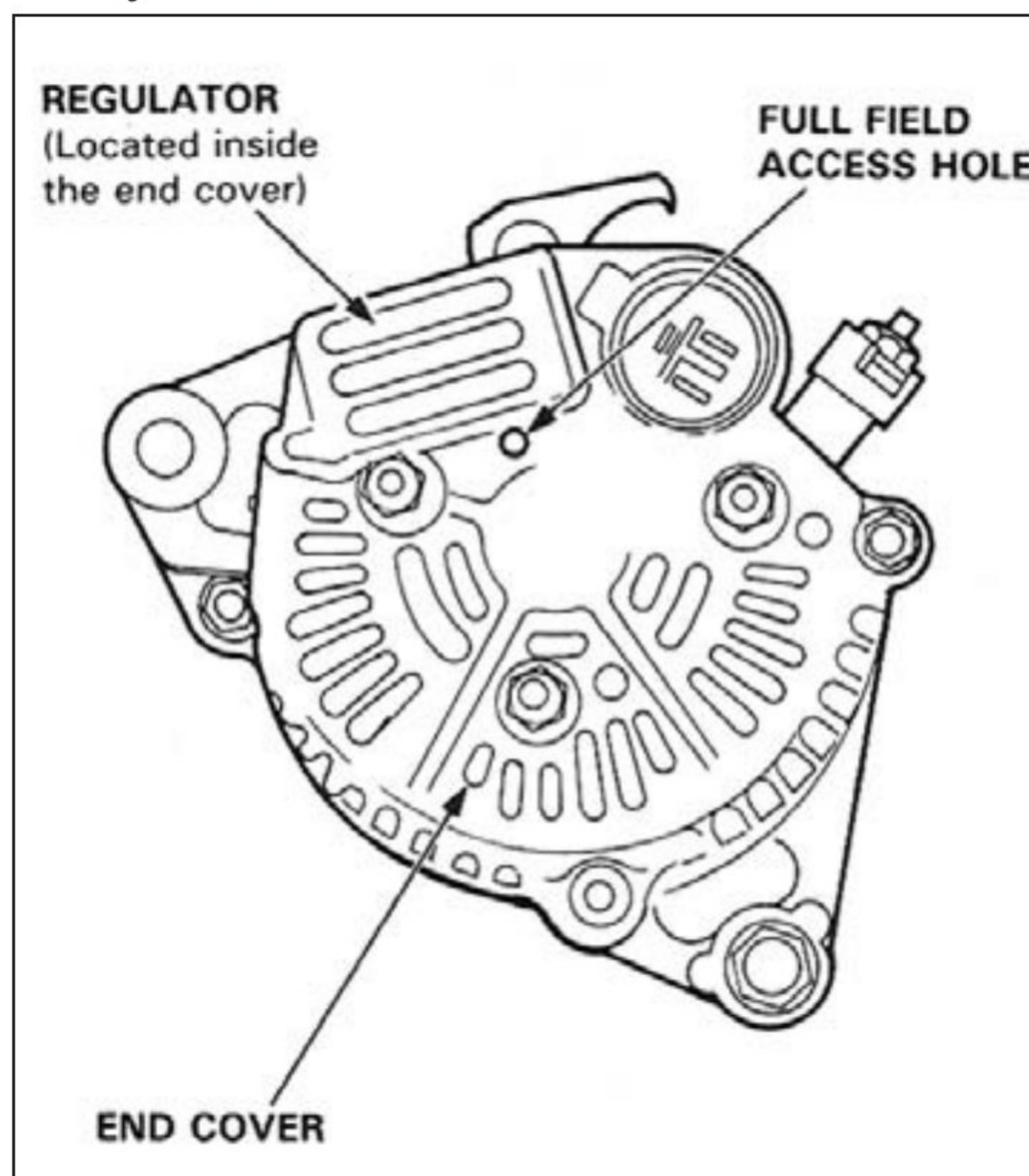
Subtract five to 10 amperes from the maximum reading due to engine operation. If amperage is within specification, the system is OK. Proceed to the Charge Warning Light Test. If amperage is not within specification, perform full field test. Attach a probe to the VAT-40 full field test lead and insert the probe into the full field access hole at the back of the alternator. Switch the field selector to the "A" (ground) position momentarily and check amperage reading.

As an alternative, use a screwdriver



and an ammeter to full field the alternator.

CAUTION: The voltage will rise quickly when the alternator is full field. Do not allow the voltage to exceed 18 volts or damage to the electrical system may result.



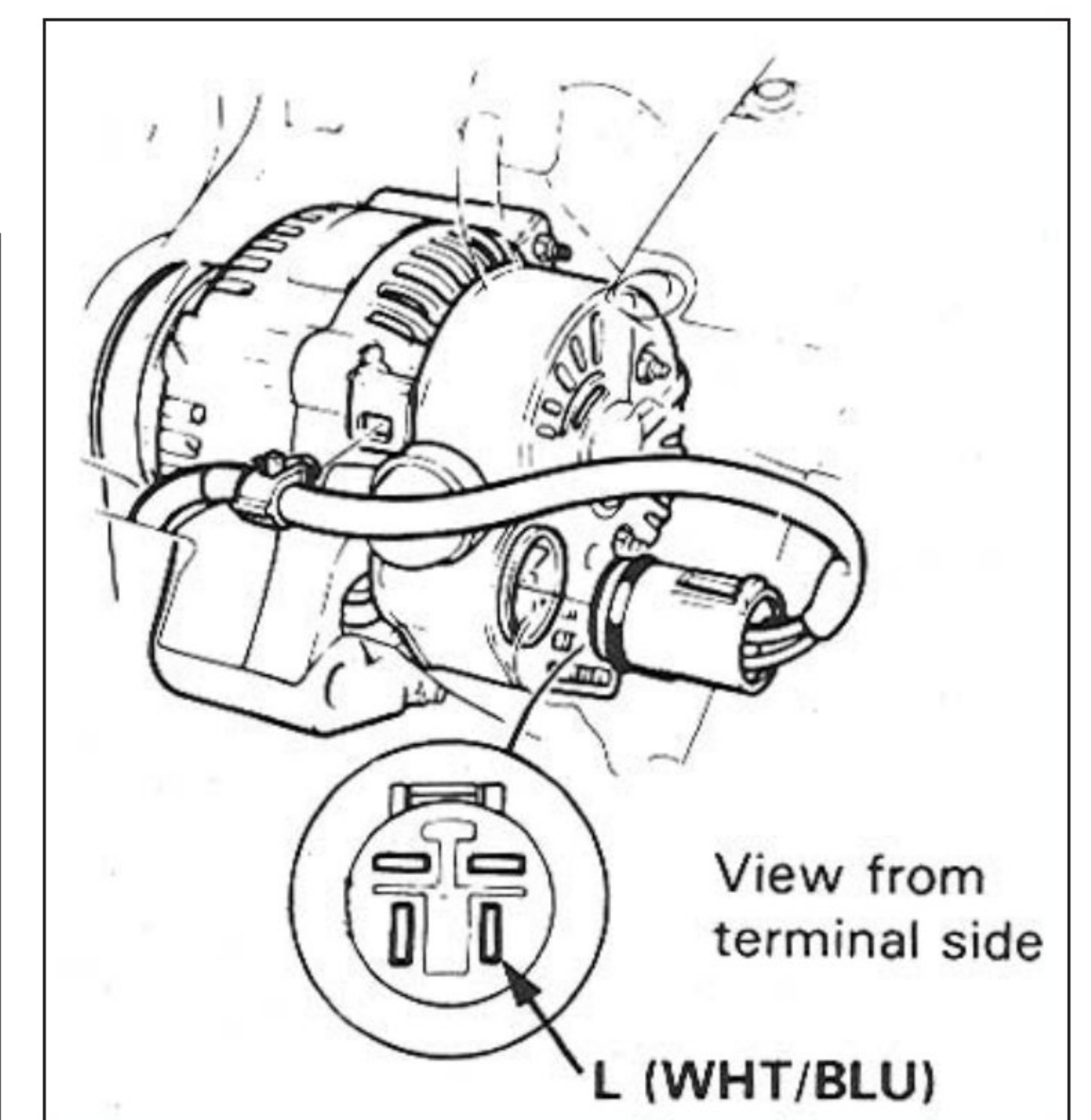
If the amperage is within specification, replace the regulator. If the amperage is not within specification, replace the alternator.

Charge Warning Light Test

Before testing, check the wire harness connection and alternator belt tension.

Turn the ignition switch on. The charge warning light should come on. If

it does not come on, unplug the alternator connector and short the pin of the L (WHT/BLU) terminal to ground.



If the warning light still does not come on, check for:

- Blown No. 9 (10 A) fuse in the dash fuse box.
- Bad bulb.
- An open in the WHT/BLU wire between the warning light and voltage regulator.
- An open in the BLK/YEL wire between the warning light and the dash fuse box, or the dash fuse box and the ignition switch.

If the light comes on, check the alter-

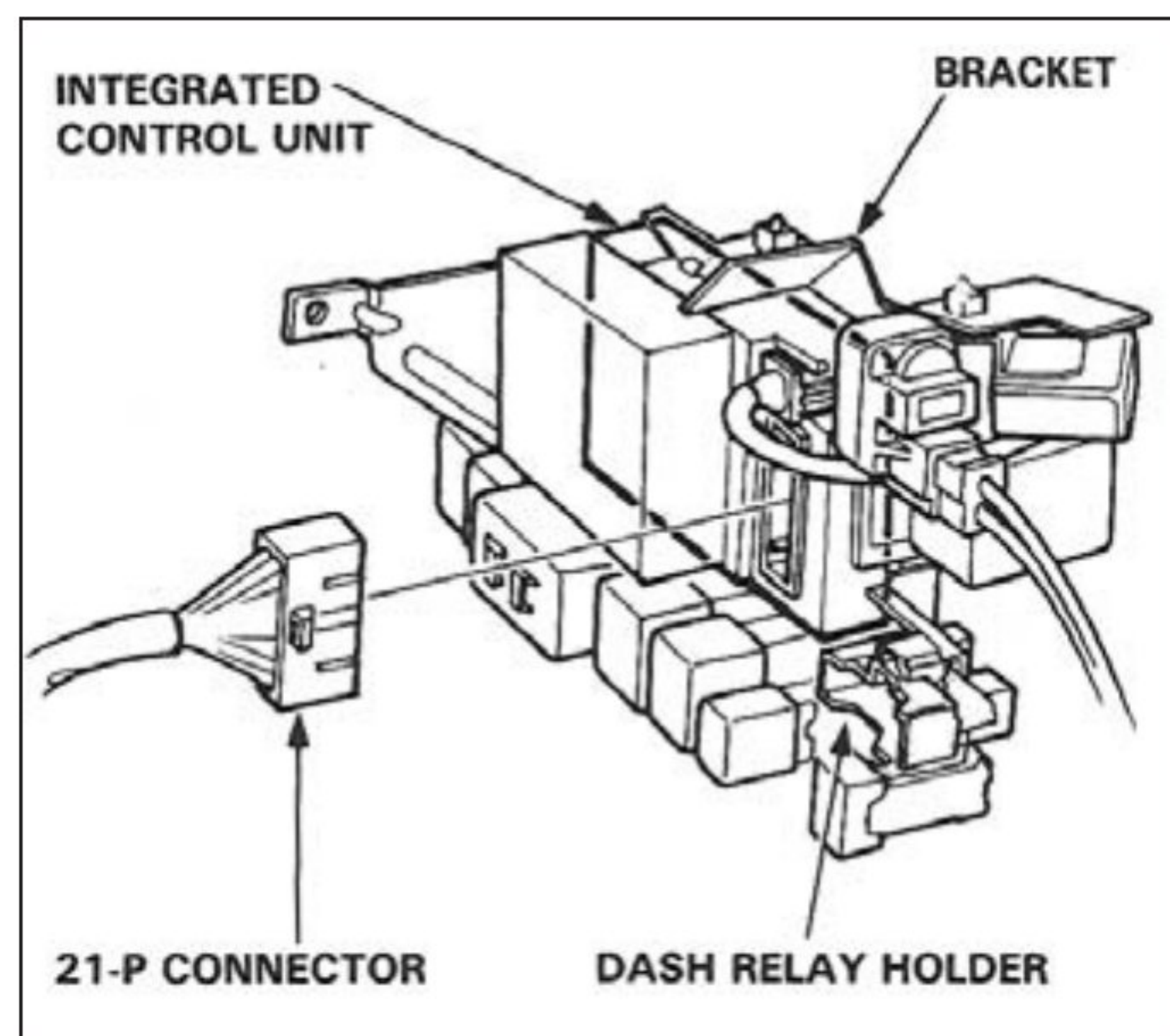
nator and regulator.

Start the engine and let it idle. The charge warning light should go off.

If it stays on this time, check the No. 38 (7.5 A) fuse in the underhood relay box and the YEL/BLU wire between the underhood relay box and the alternator.

If the fuse and wire are OK, check the alternator and regulator. If the system is charging, proceed as follows.

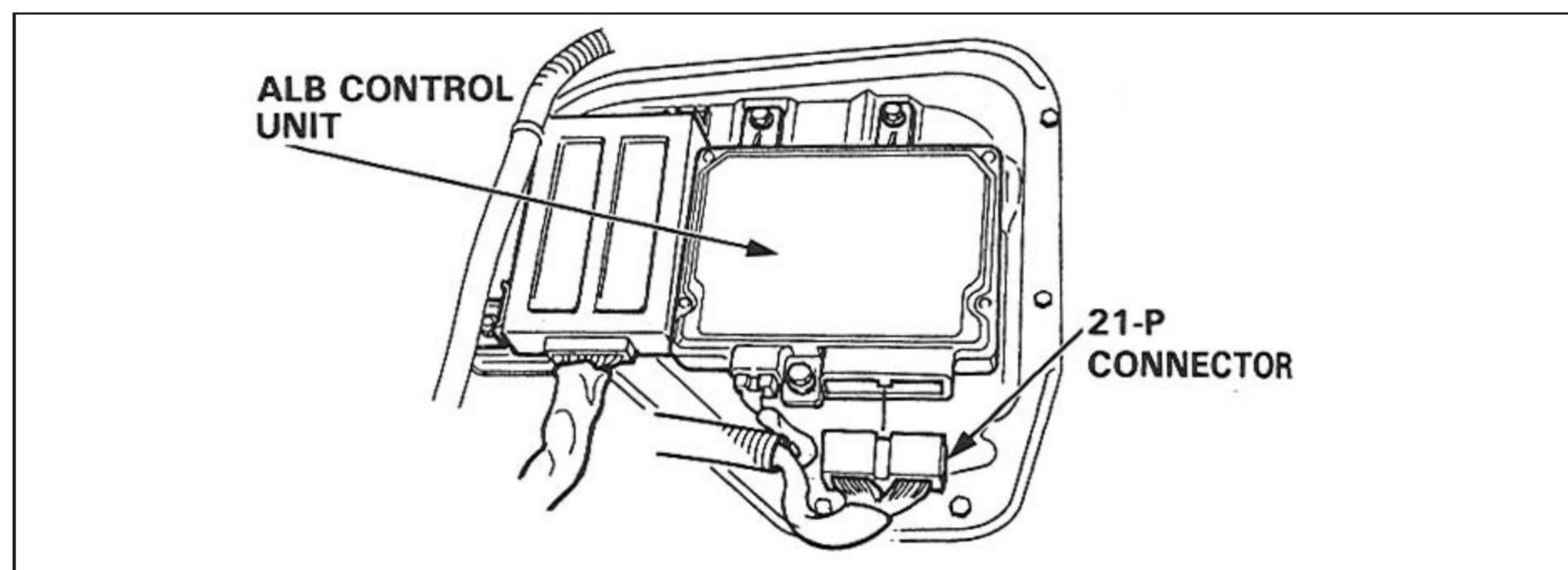
Remove the dashboard lower panel and the dash relay holder from the bracket, then disconnect the 21-P connector from the integrated control unit. With the engine running, the charge warning light should go out.



If the light goes out, there is a short in the integrated control unit.

If the light does not go out in the standard model, there is a short to ground in the WHT/BLU wire from the warning light to the control unit. If the light does not go out on the L and LS, proceed.

Next, remove the trunk front trim panel and disconnect the 21-P connector from the ALB control unit. With the engine running, the charge warning light should go out. If the light goes out, there is a short in the ALB control unit. If the light does not out, there is a short to ground in the WHT/BLU wire from the warning light to the control unit.

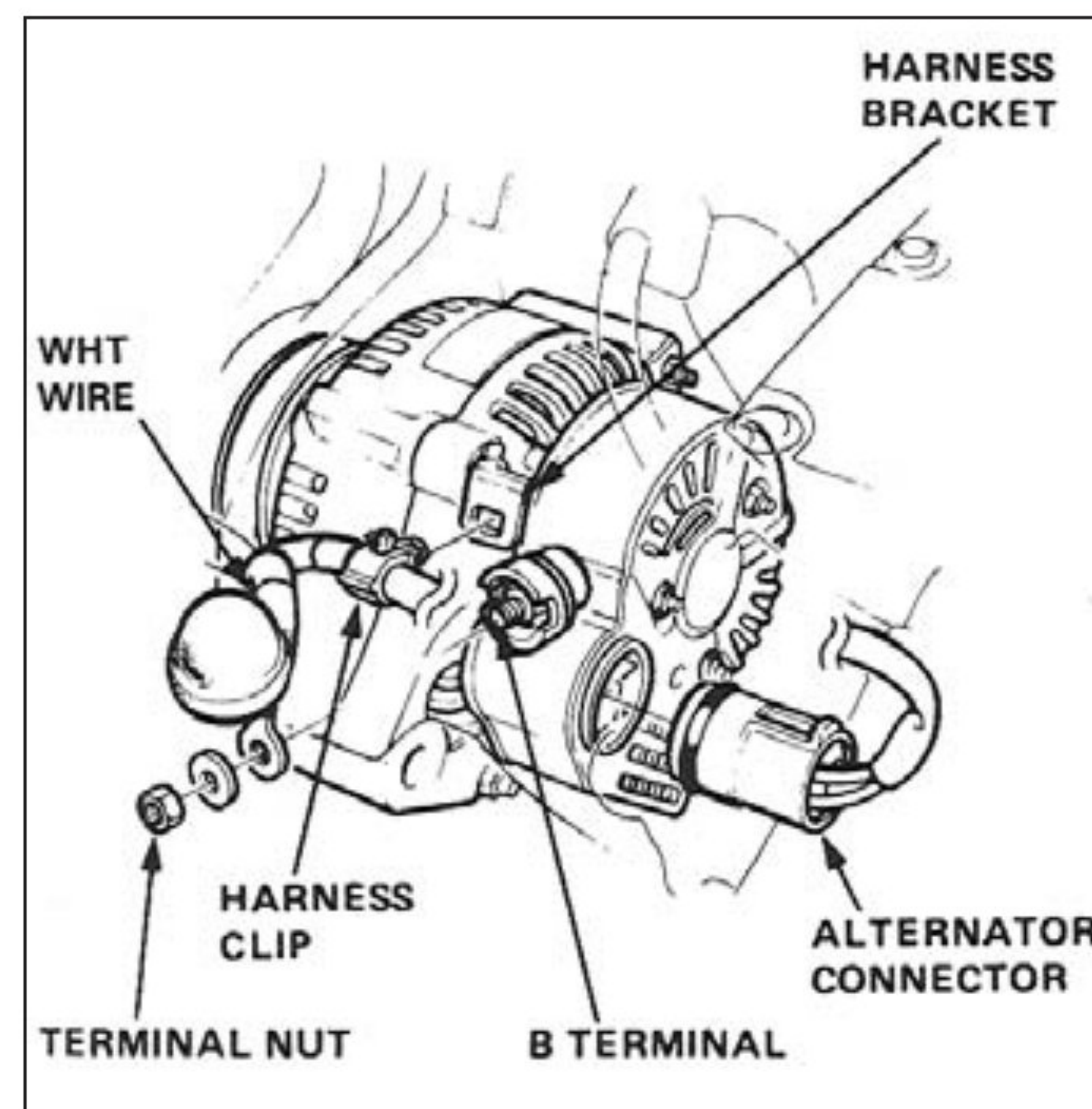


Alternator Replacement

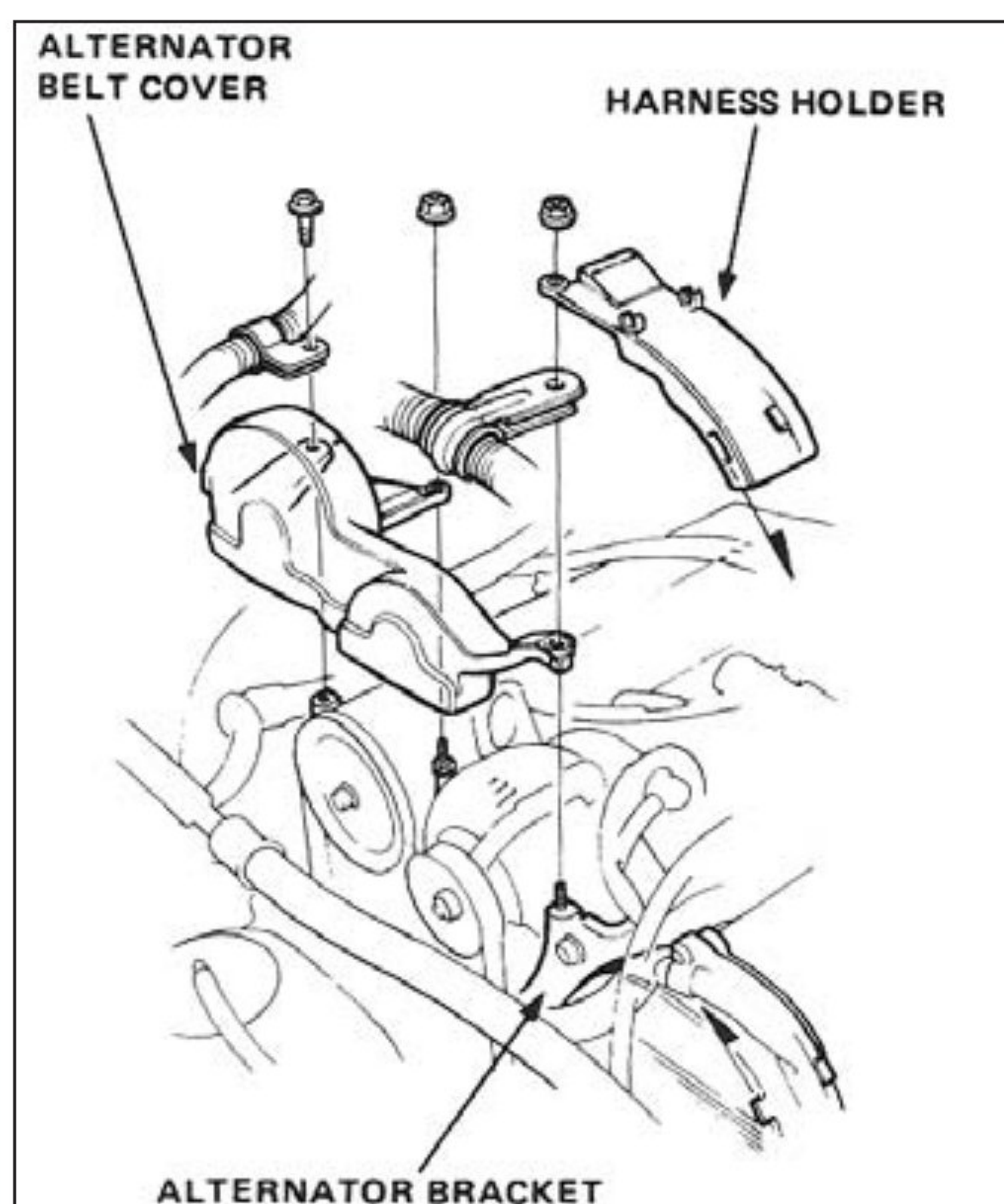
Disconnect the ground wire from the battery negative (-) post.

Disconnect the alternator connector from the alternator, and remove the clip from the harness bracket.

Remove the terminal nut and the WHT wire from the B terminal.



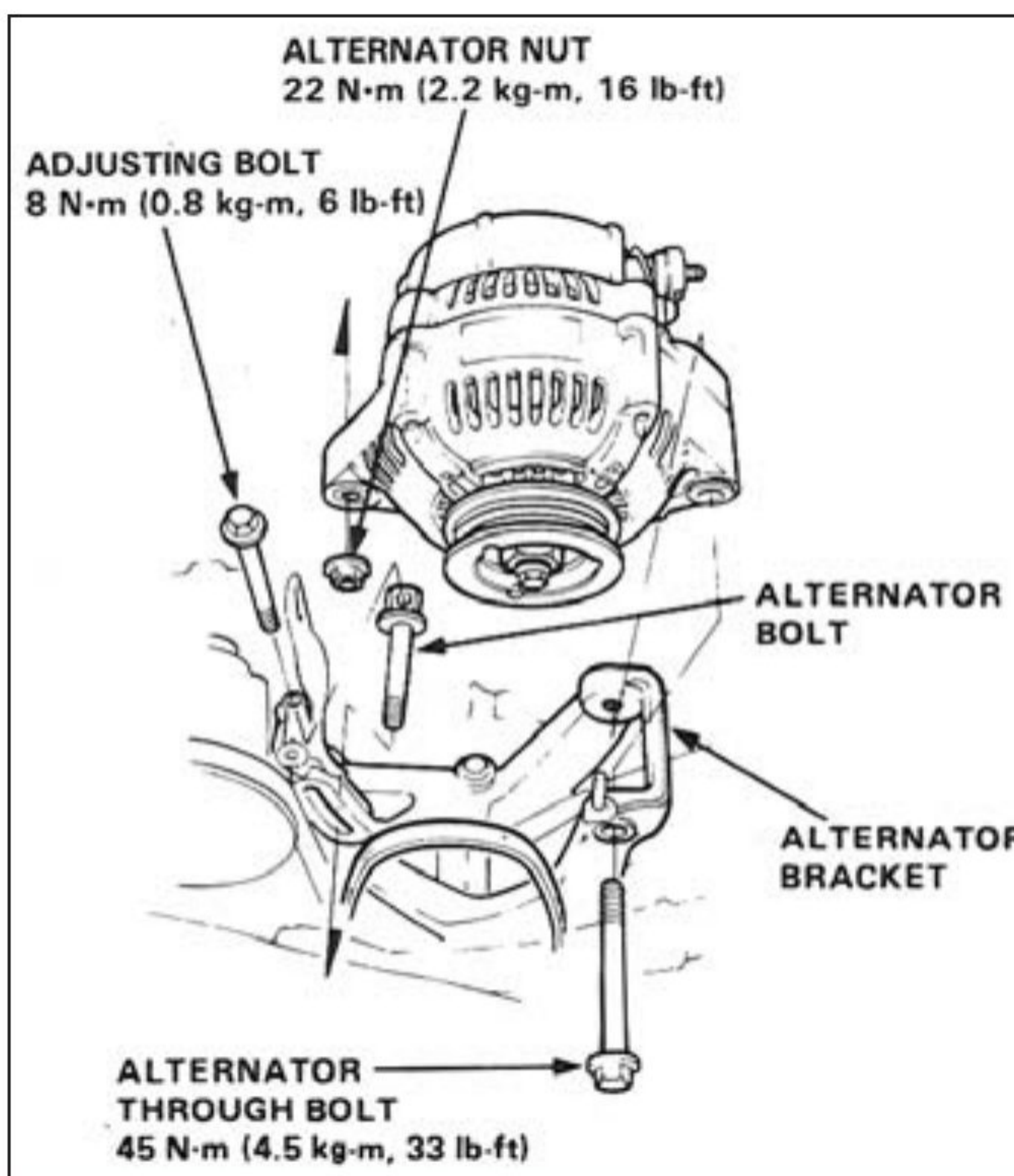
Remove the harness holder and belt cover from the alternator bracket.



Loosen the through bolt and adjusting bolt, and remove the alternator nut, then remove the belt from the pulley.

Remove the bolt and through bolt,

then alternator from the bracket.



Adjust the alternator belt tension after installing.

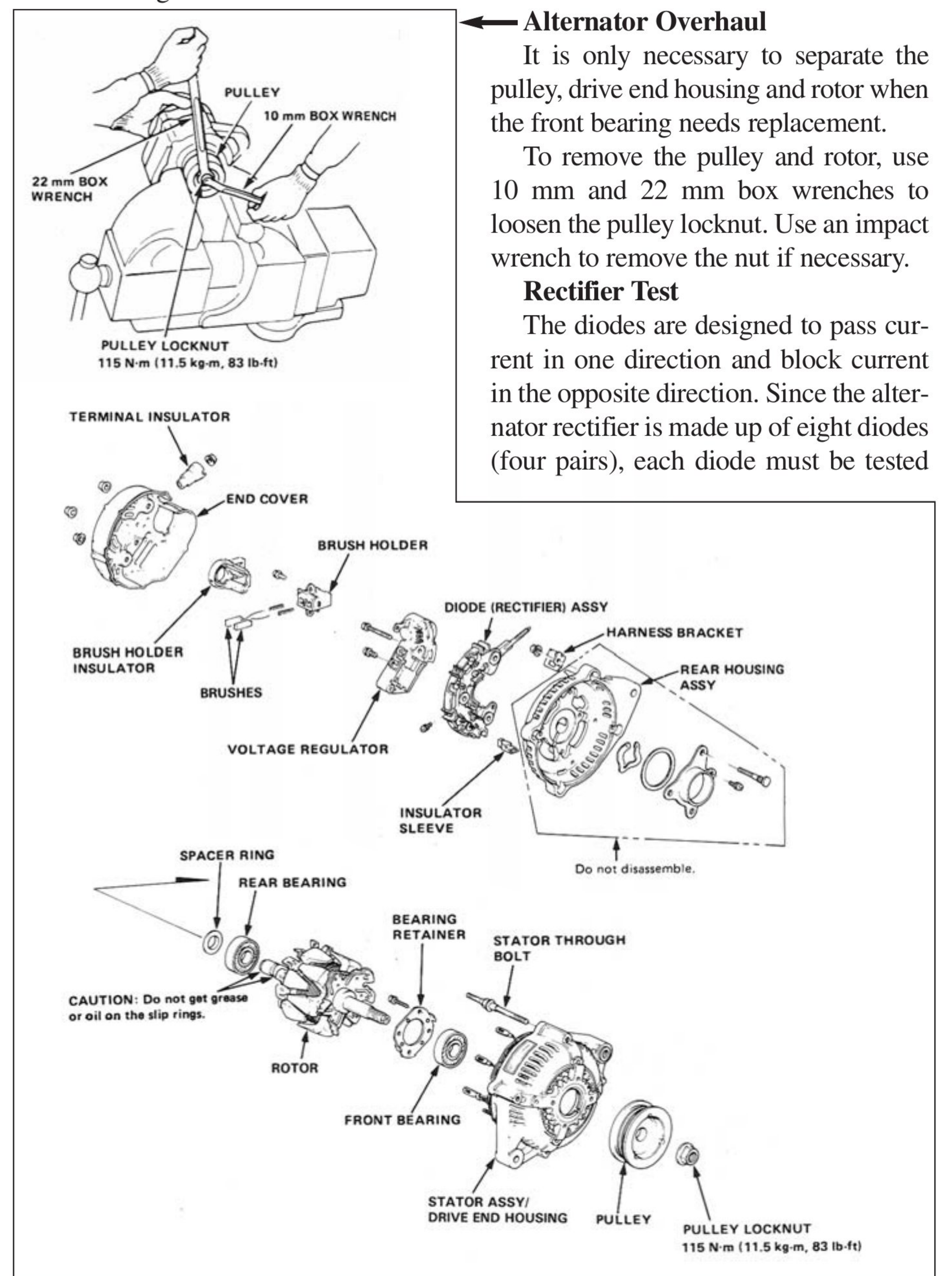
Alternator Overhaul

It is only necessary to separate the pulley, drive end housing and rotor when the front bearing needs replacement.

To remove the pulley and rotor, use 10 mm and 22 mm box wrenches to loosen the pulley locknut. Use an impact wrench to remove the nut if necessary.

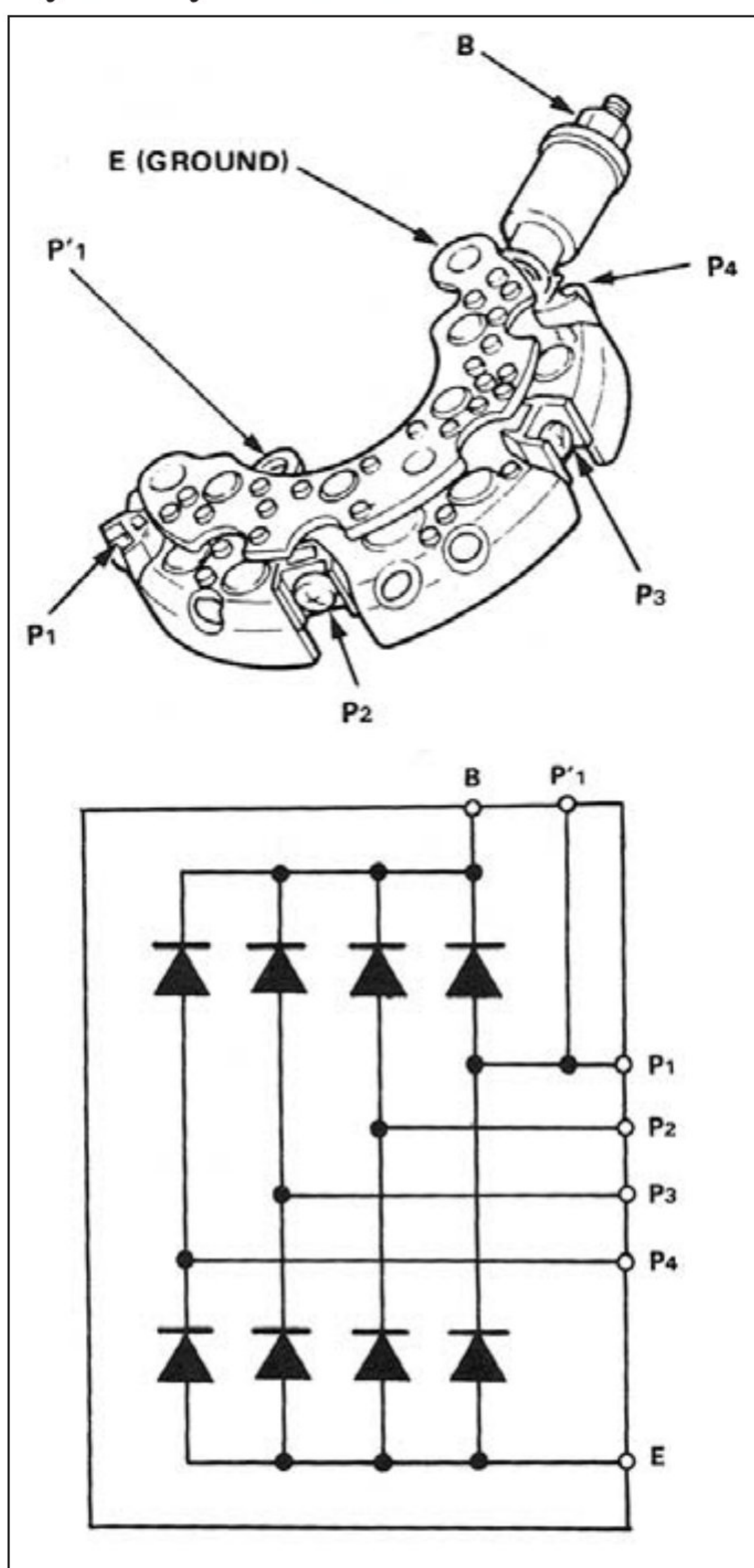
Rectifier Test

The diodes are designed to pass current in one direction and block current in the opposite direction. Since the alternator rectifier is made up of eight diodes (four pairs), each diode must be tested



for continuity in both directions; a total of 16 checks.

Check for continuity in each direction, between the B and P (of each diode pair) terminals, and between the E (ground) and P (of each diode pair) terminals. All diodes should have continuity in only one direction.

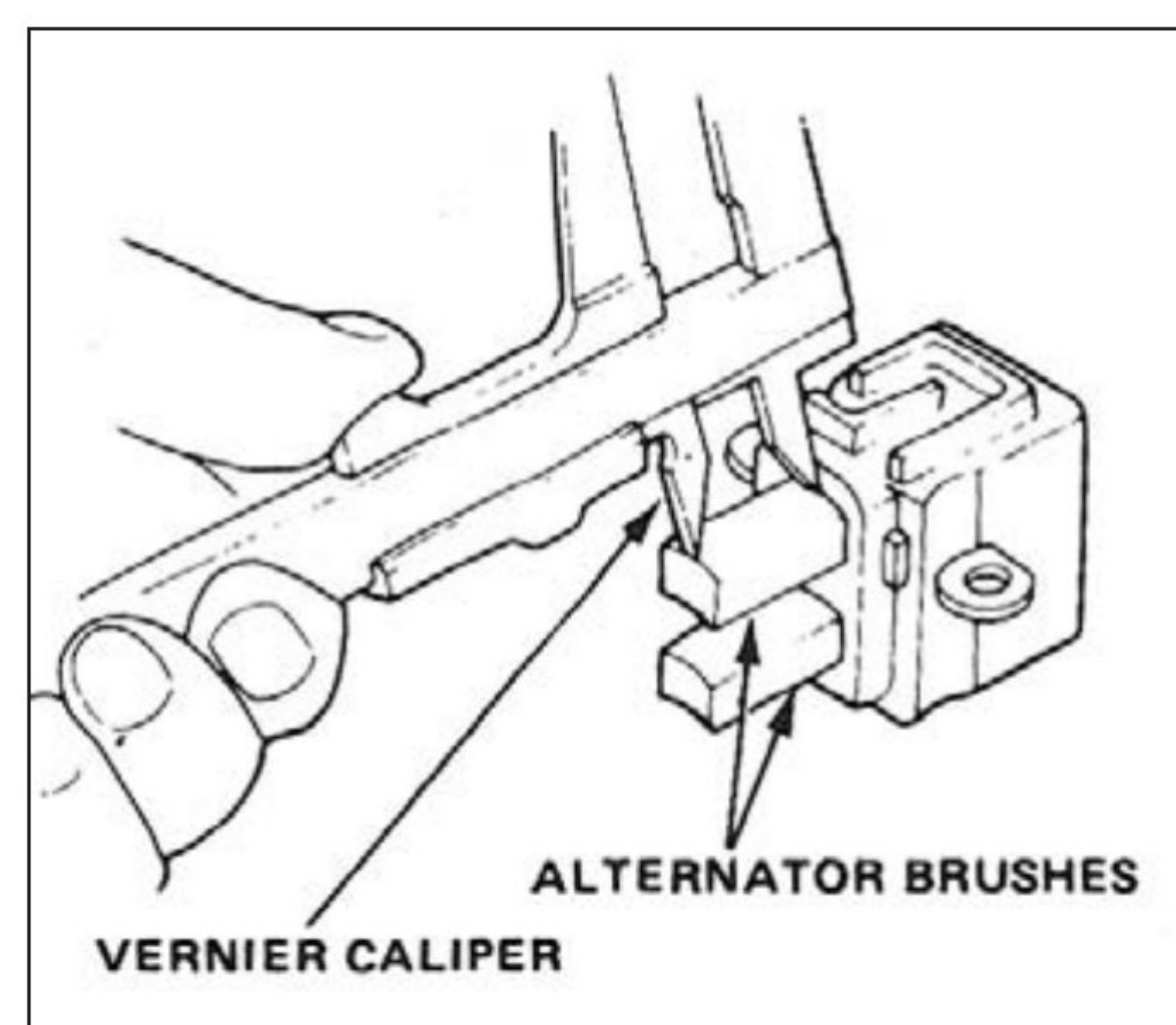


If any of the eight diodes fails, replace the rectifier assembly. (Diodes are not available separately.)

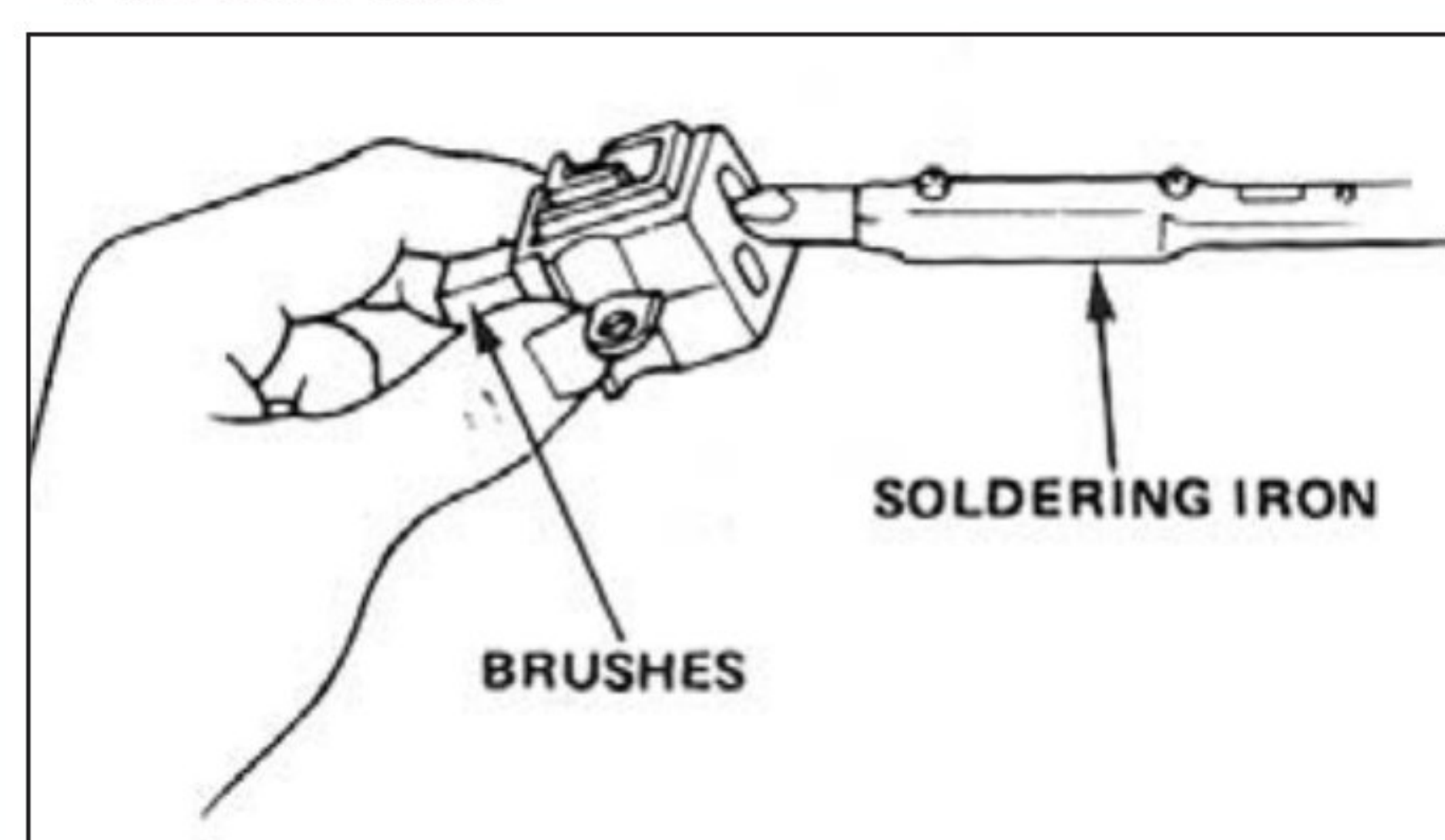
Alternator Brush Inspection

Remove the end cover, then take out the brush holder by removing its two screws.

Measure length of the brushes with a vernier caliper. Standard alternator brush length is 10.5 mm (0.41 in.); service limit: 5.5 mm (0.22 in.).



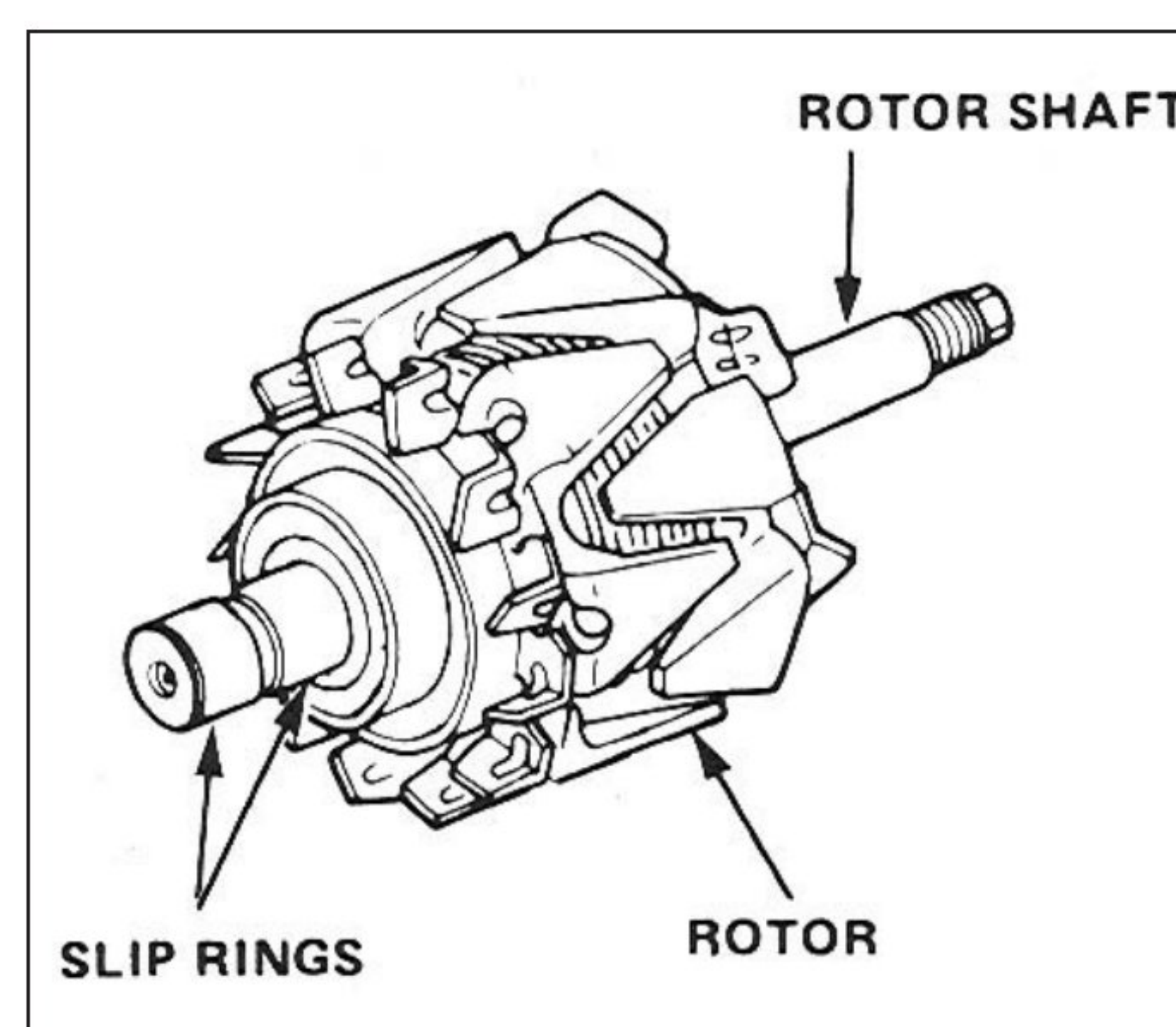
If the brushes are not within the service limit, replace them. CAUTION: When replacing the brushes, use only a rosin core type solder or solder joints will corrode.



Rotor Slip Ring Test

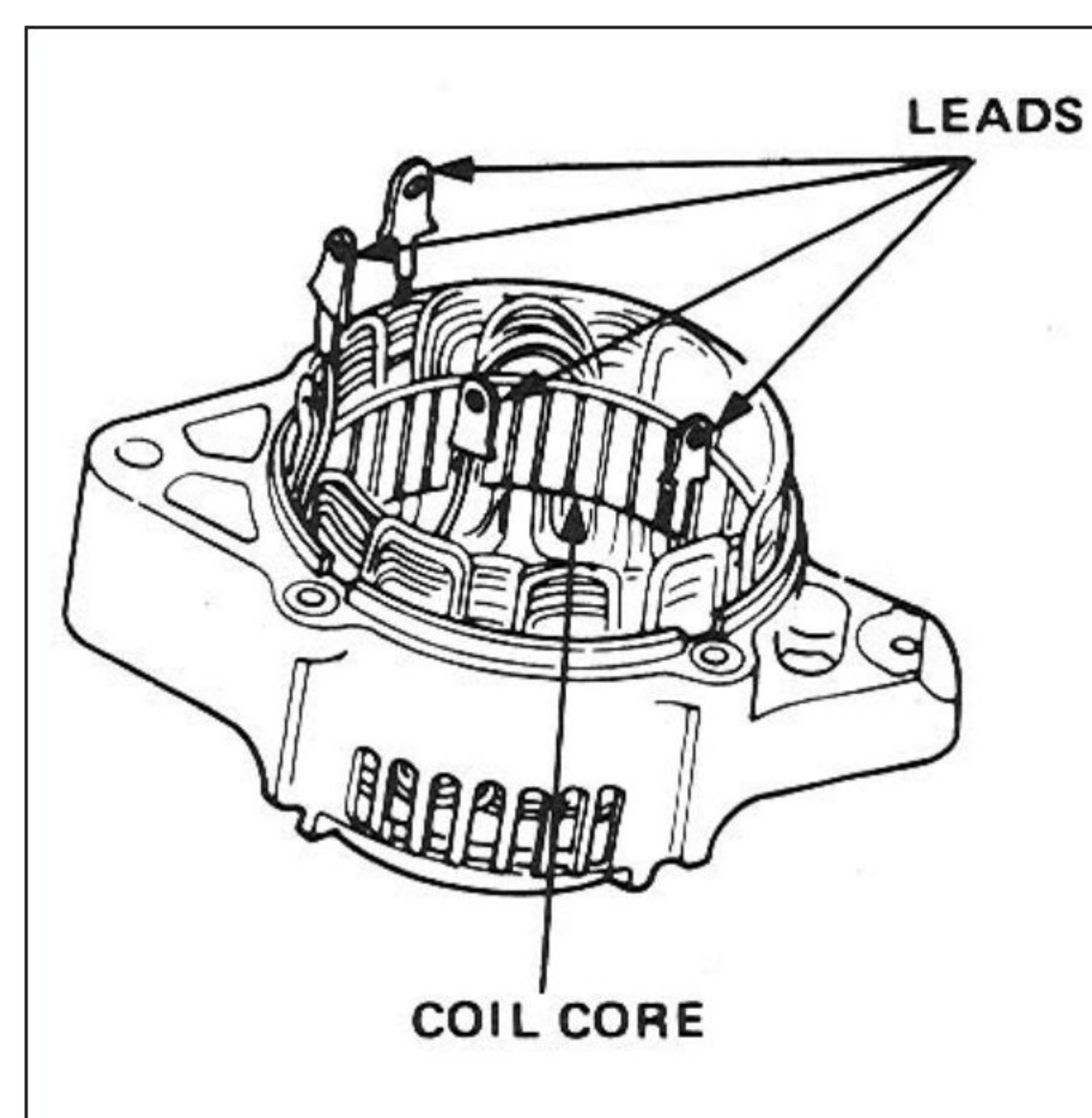
Check that there is continuity between the slip rings. Check that there is no continuity between the rings and the rotor or rotor shaft.

If the rotor fails either continuity check, replace it.



Stator Test

Check that there is continuity between each pair of leads. Check that there is no continuity between each lead and the coil core.

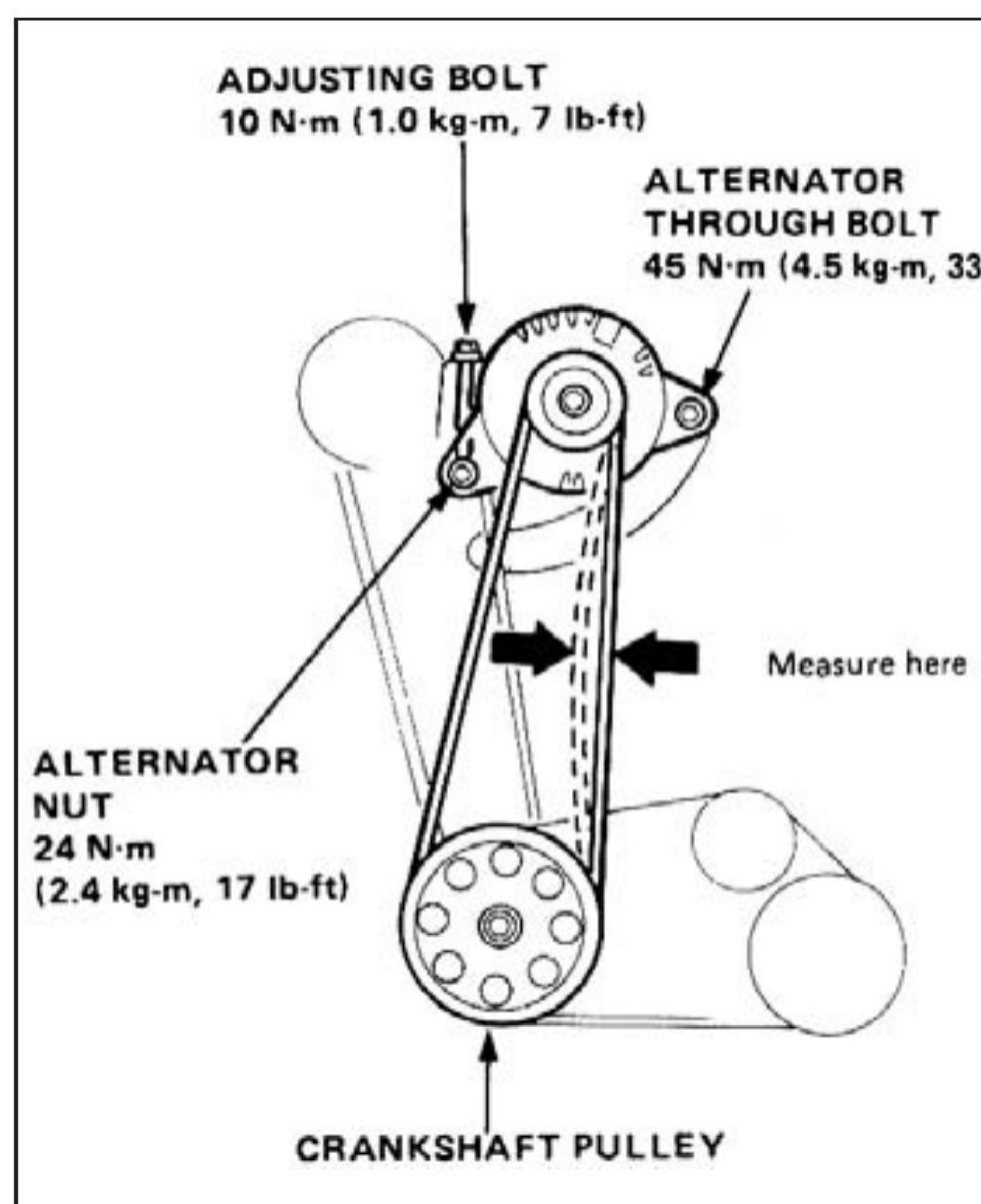


If the coil fails either continuity check, replace the stator.

Alternator Belt Adjustment

Apply a force of 98 N (10 kg, 22 lb.) and measure the deflection between the

alternator and the crankshaft pulley. Deflection: 17.0 to 19.5 mm (0.67 to 0.77 in.).



Note that on a brand new belt, the deflection should be 11 to 13 mm (0.43 to 0.51 in.) when first measured.

Loosen the alternator nut and through bolt.

Move the alternator by turning the adjusting bolt to obtain the proper belt tension, then retighten the bolt and nut. Recheck the deflection of the belt.

Courtesy Honda Motor Company, 1990 Legend Service Manual.

See Part II, Power Windows, in the August Issue.