

Engine Electrical



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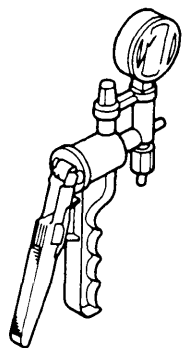
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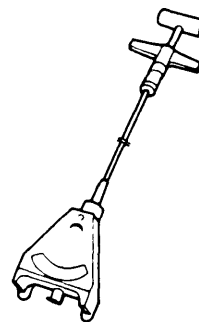
Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	A973X - 041 - XXXXX	Vacuum Pump/Gauge, 0 - 30 in.Hg.	1	4-40
*②	07JGG - 001010A	Belt Tension Gauge	1	4-33
③	07PAZ - 0010100	SCS Service Connector	1	4-16

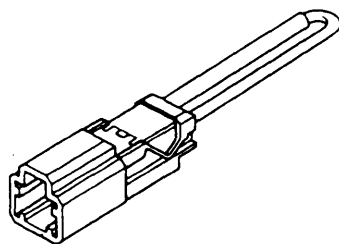
* Included in the Belt Tension Gauge Set, T/N 07JGG - 001000A



①



②

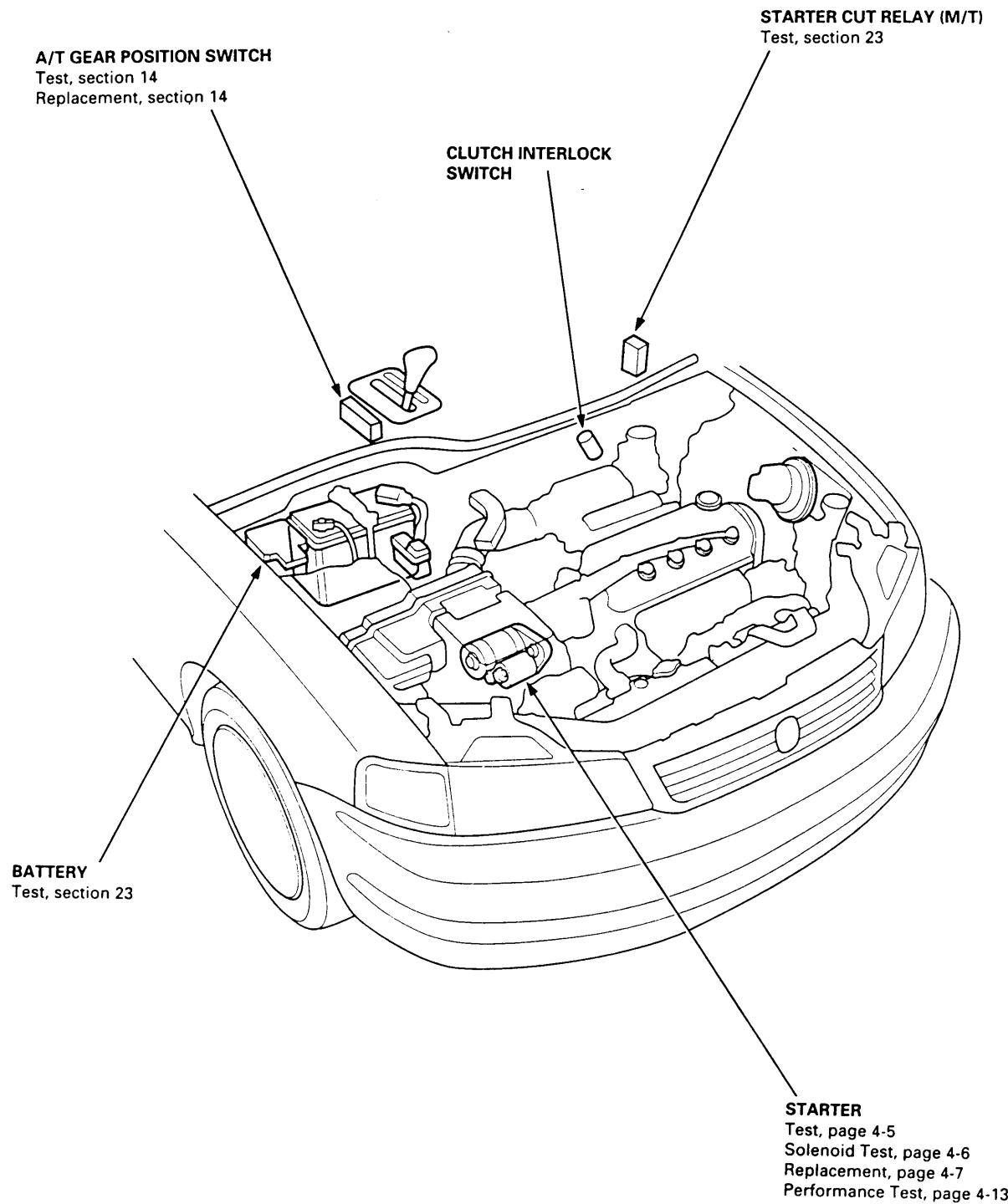


③



Starting System

Component Location Index



Circuit Diagram



Starter Test

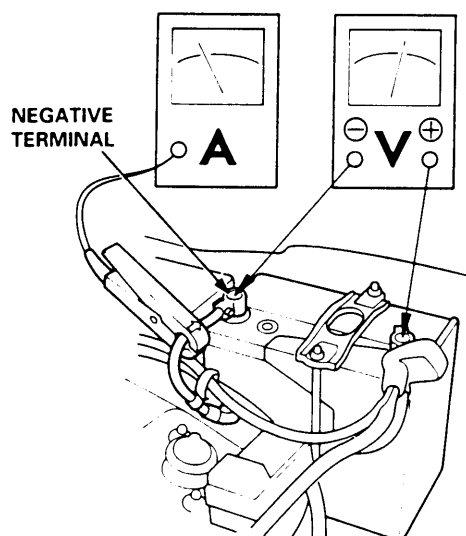
NOTE: The air temperature must be between 59 and 100°F (15 and 38°C) before testing.

Recommended Procedure:

- Use a starter system tester.
- Connect and operate the equipment in accordance with the manufacturer's instructions.
- Test and troubleshoot as described.

Alternate Procedure:

- Use following equipment:
 - Ammeter, 0 – 400 A
 - Voltmeter, 0 – 20 V (accurate within 0.1 volt)
 - Tachometer, 0 – 1,200 rpm
- Hook up a voltmeter and ammeter as shown.

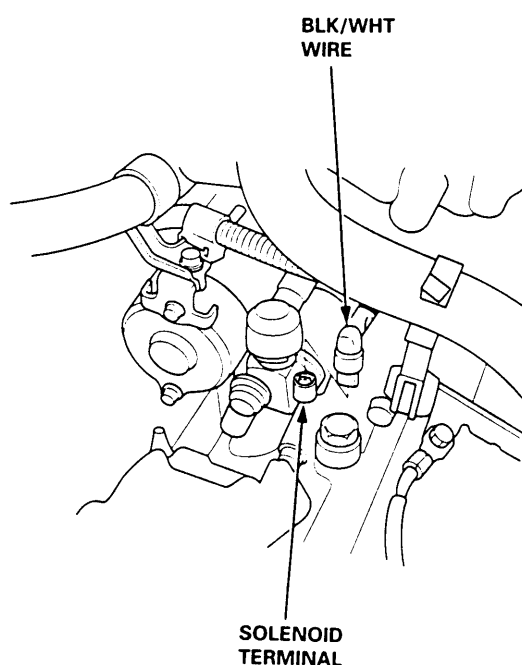


NOTE: After this test, or any subsequent repair, reset the ECM/PCM to clear any codes (see section 11).

Check the Starter Engagement:

1. Remove the No. 44 (15 A) fuse from the under-hood fuse/relay box.
2. Turn the ignition switch to START (III) with the shift lever in **N** or **P** position (A/T) or with the clutch pedal depressed (M/T). The starter should crank the engine.
 - If the starter does not crank the engine, go to step 3.
 - If it cranks the engine erratically or too slowly, go to "Check for Wear and Damage" on the next page.

3. Check the battery, battery positive cable, ground, starter cut relay, and the wire connections for looseness and corrosion. Test again.
If the starter still does not crank the engine, go to step 4.
4. Unplug the connector (BLK/WHT wire and solenoid terminal) from the starter.
5. 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 it, and diagnose its internal problem.
 - If the starter cranks the engine, go to step 6.
6. Check the ignition switch (see section 23).
 7. Check the starter cut relay and clutch interlock switch (see section 23).
 8. Check the A/T gear position switch (see section 14).
 9. Check for an open in the wire between the ignition switch and starter.

(cont'd)

Starting System

Starter Test (cont'd)

Check for Wear and Damage

The starter should crank the engine smoothly and steadily. If the starter engages, but cranks the engine erratically, remove it, and inspect the starter drive gear and torque converter or 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.

If damaged, replace the gears.

Check Cranking Voltage and Current Draw

Cranking voltage should be no less than 8.5 volts.

Current draw should be no more than 350 amperes.

If cranking voltage is too low, or current draw too high, check for:

- dead or low battery.
- open circuit in starter armature commutator segments.
- starter armature dragging.
- shorted armature winding.
- excessive drag in engine.

Check Cranking rpm

Engine speed during cranking should be above 100 rpm.

If speed is too low, 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.

Check Starter Disengagement

With the shift lever in **N** or **P** position (A/T) or with the clutch pedal depressed (M/T), turn the ignition switch to START (III), and release to ON (II).

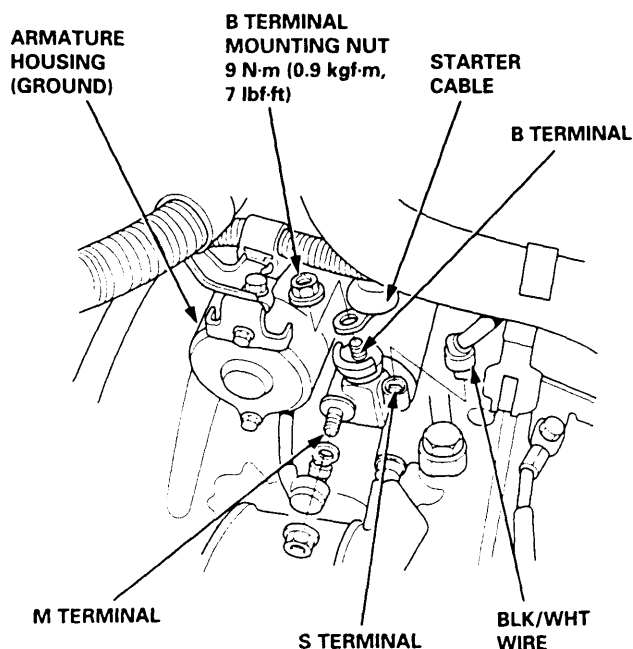
The starter drive gear should disengage from the torque converter or flywheel ring gear when you release the key.

If the drive gear hangs up on the torque converter or flywheel ring gear, check for:

- solenoid plunger and switch malfunction.
- dirty drive gear assembly or damaged overrunning clutch.

Starter Solenoid Test

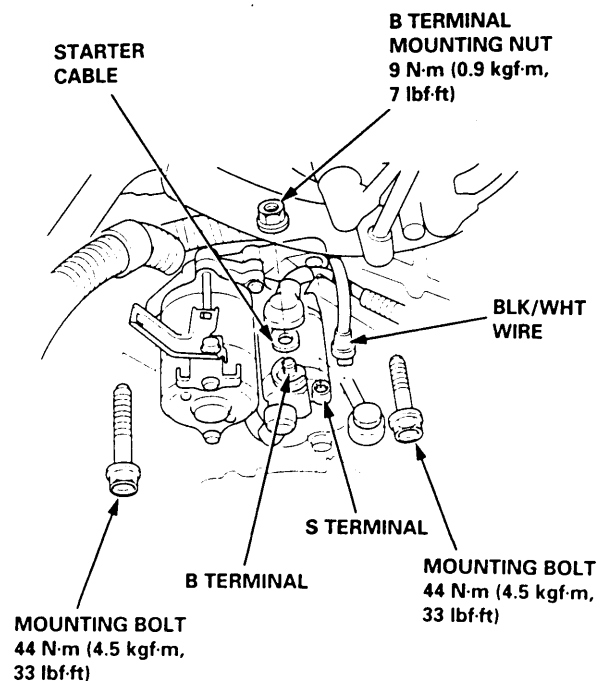
1. Check the hold-in coil for continuity between the S terminal and the armature housing (ground). The coil is OK if there is continuity.



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

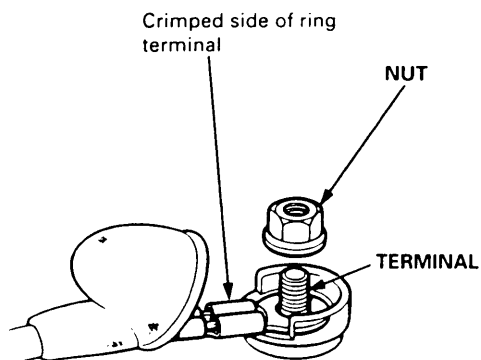
Starter Replacement

1. Disconnect the battery negative cable.
2. Disconnect the starter cable from the B terminal on the solenoid, then disconnect the BLK/WHT wire from the S terminal.



3. Remove the two bolts holding the starter, then remove the starter.
4. Install in the reverse order of removal.

NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out.

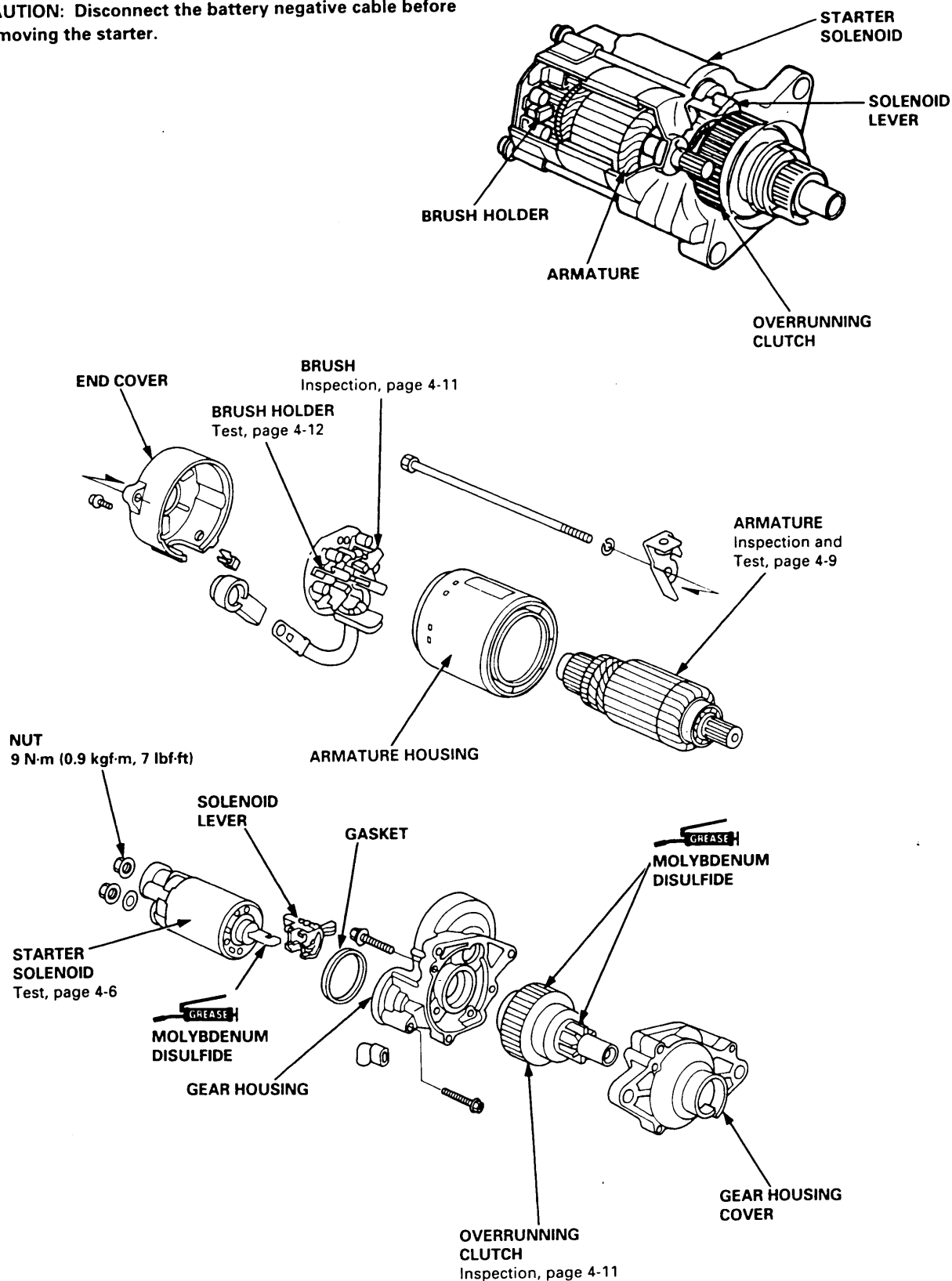


5. Connect the battery positive cable and negative cable to the battery.

Starting System

Starter Overhaul

CAUTION: Disconnect the battery negative cable before removing the starter.

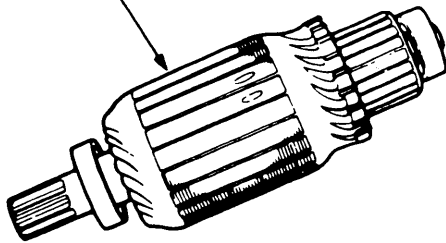


Armature Inspection and Test

1. Inspect the armature for wear or damage due to contact with the permanent magnet or field winding.

If there is wear or damage, replace the armature.

Inspect for damage.

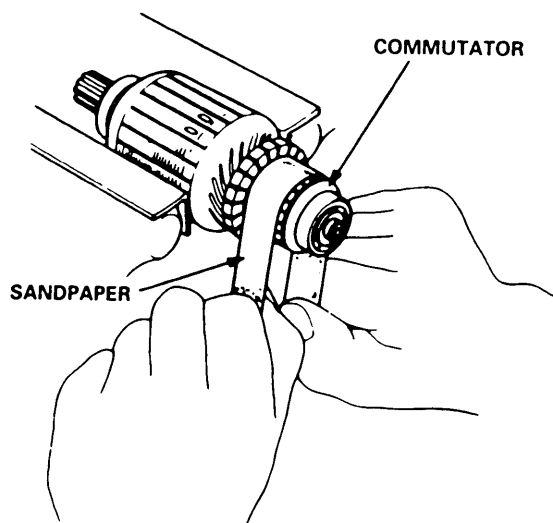


2. Check commutator surface and diameter.

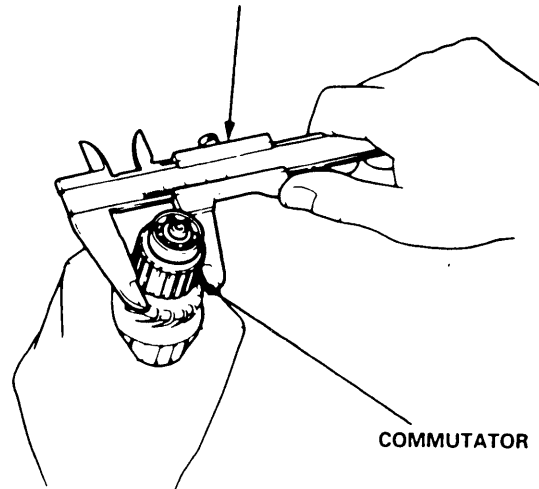
- If the surface is dirty or burnt, resurface with emery cloth or a lathe within the following specifications, or recondition with #500 or #600 sandpaper.
- If commutator diameter is below the service limit, replace the armature.

Commutator Diameter

Standard (NEW)	Service Limit
28.0 – 28.1 mm (1.102 – 1.106 in)	27.5 mm (1.083 in)



VERNIER CALIPER

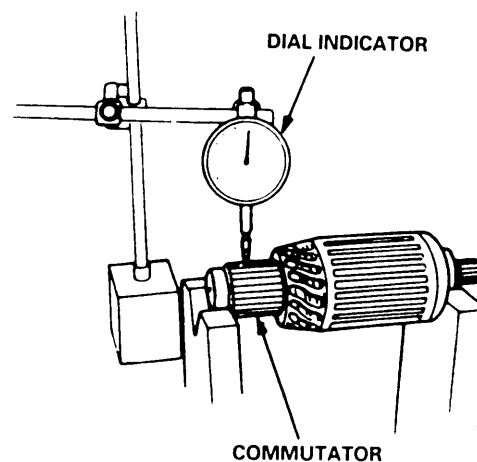


3. Measure the commutator runout.

- 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)	Service Limit
0 – 0.02 mm (0 – 0.0008 in)	0.05 mm (0.002 in)

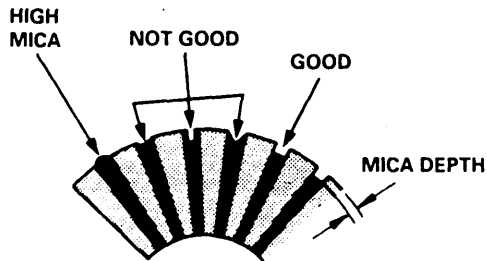


(cont'd)

Starting System

Armature Inspection and Test (cont'd)

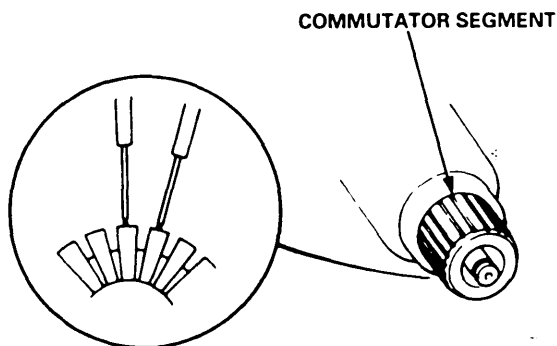
4. Check the mica depth. If necessary, undercut the mica with a hacksaw blade to achieve the proper depth. If service limit cannot be maintained, replace the armature.



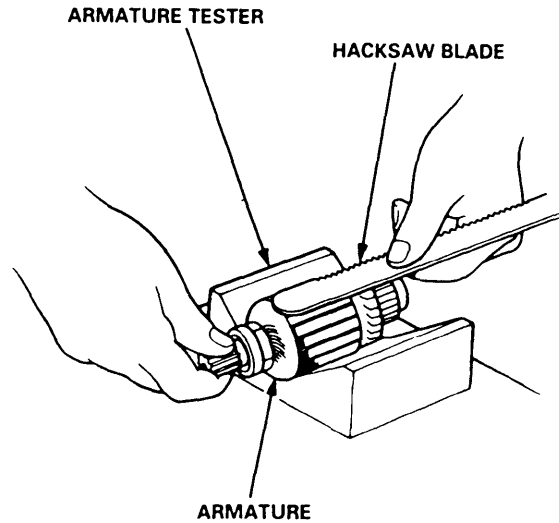
Commutator Mica Depth

Standard (NEW)	Service Limit
0.4 – 0.5 mm (0.016 – 0.02 in)	0.15 mm (0.006 in)

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

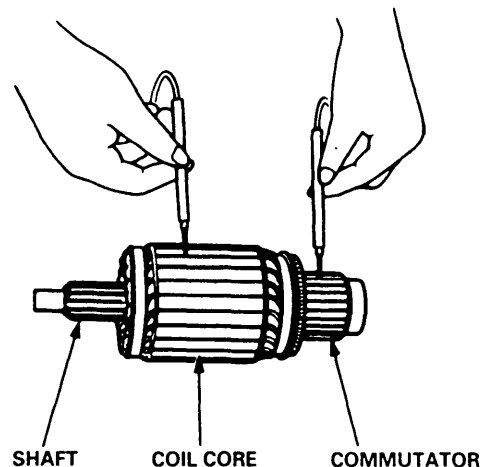


6. Place the armature on an armature tester. Hold a hacksaw blade on the armature core.



If the blade is attracted to the core or vibrates while the core is turned, the armature is shorted. Replace the armature.

7. Check with an ohmmeter that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If there is continuity, replace the armature.

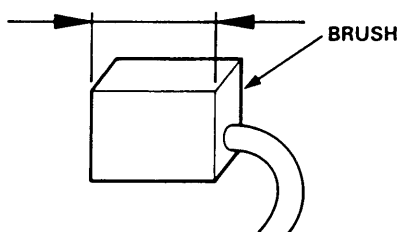


Brush Inspection

Measure the brush length. If not within the service limit, replace the brush holder assembly.

Brush Length

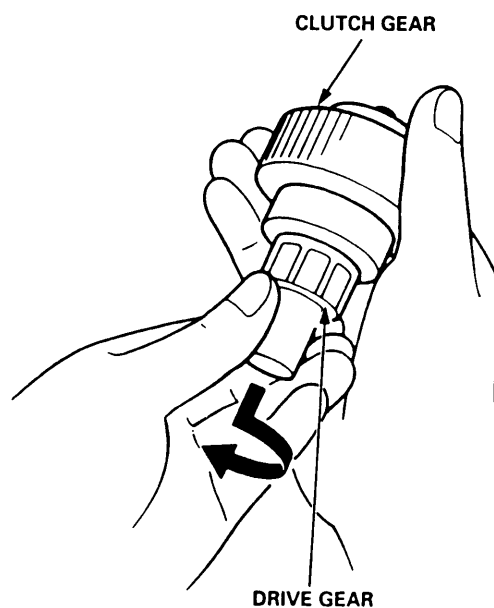
Standard (NEW)	Service Limit
15.8 – 16.2 mm (0.62 – 0.64 in)	11.0 mm (0.43 in)



NOTE: To seat new brushes after installing them in their holders, slip a strip of #500 or #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 the same contour as the commutator.

Overrunning Clutch Inspection

1. Slide the overrunning clutch along the shaft. Does it move freely? If not, replace it.
2. Rotate the overrunning clutch both ways. Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or it locks in both directions, replace it.

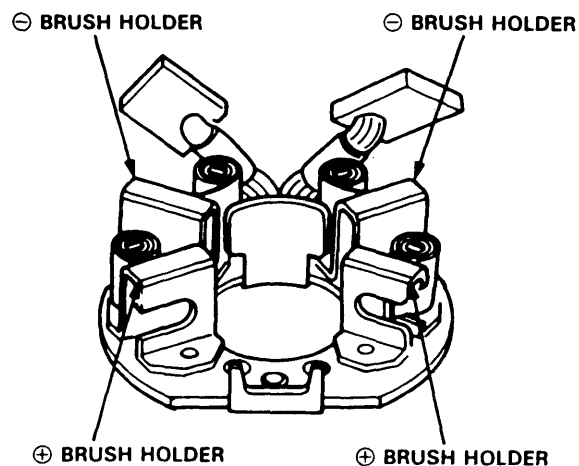


3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.
4. Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

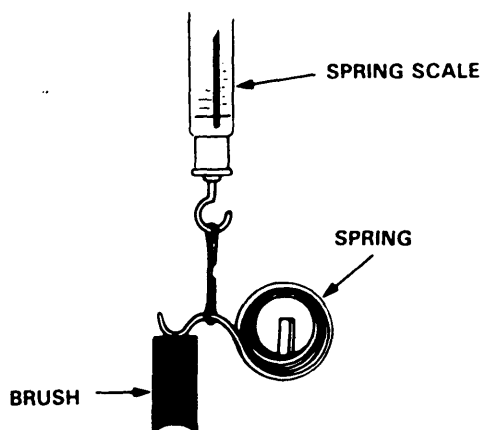
Starting System

Brush Holder Test

1. Check that there is no continuity between the ⊕ and ⊖ brush holders.
If there is continuity, replace the brush holder assembly.



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

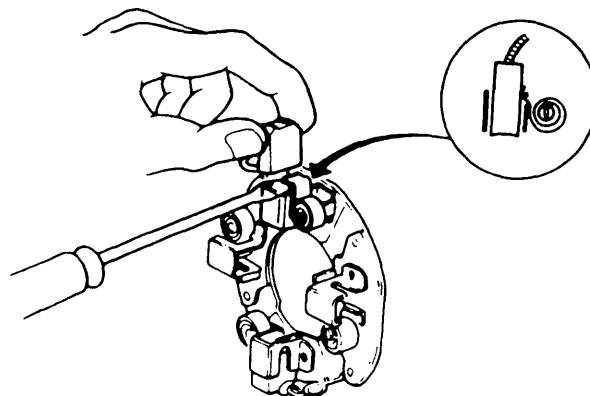


Spring Tension
18.5 – 23.5 N
(1.85 – 2.35 kgf, 4.1 – 5.2 lbf)

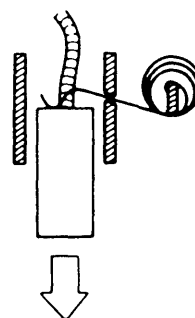
Starter Reassembly

NOTE: Use the illustration on page 4-8 as reference for reassembly.

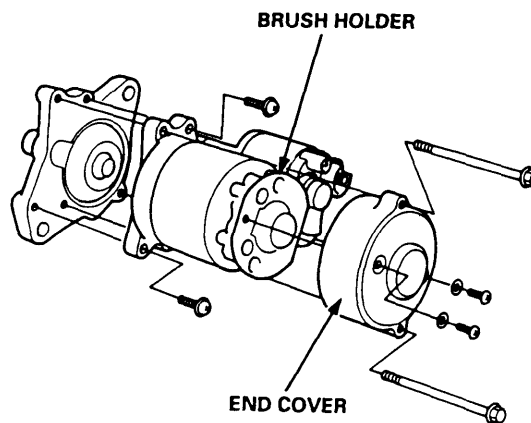
1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



2. 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.



3. Install the end cover on the brush holder.



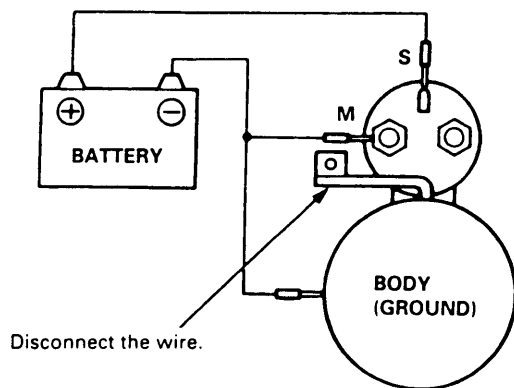
Performance Test

NOTE: Before starting the following checks, disconnect the wire from terminal M, and make a connection as described below using as heavy a wire as possible (preferably equivalent to the wire used for the vehicle).

Pull-in Coil Test:

Connect the battery as shown. If the starter pinion pops out, it is working properly.

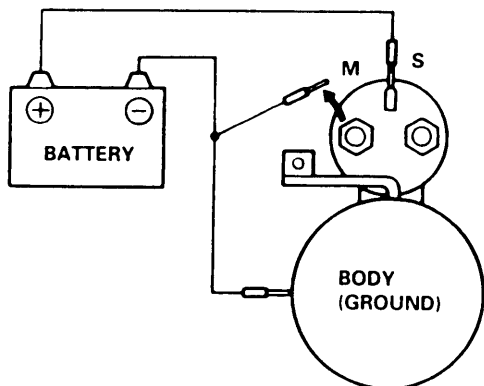
CAUTION: Do not leave the battery connected for more than 10 seconds.



Hold-in Coil Test:

Disconnect the battery from the M terminal. If the pinion does not retract, the hold-in coil is working properly.

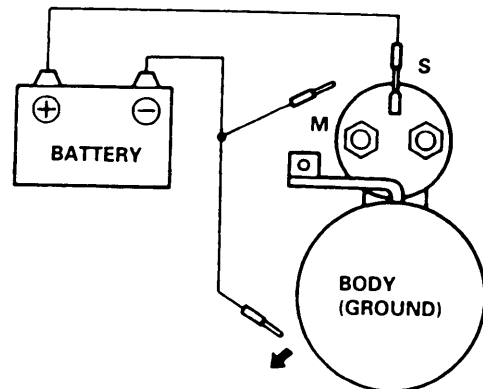
CAUTION: Do not leave the battery connected for more than 10 seconds.



Retracting Test:

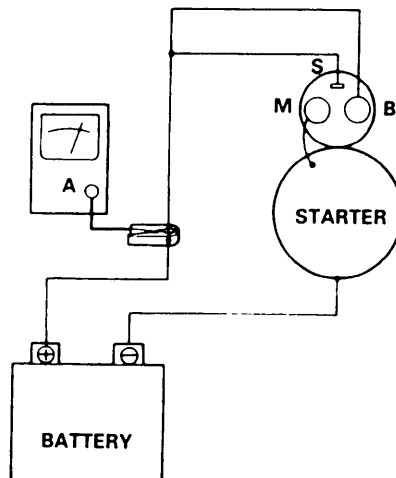
Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly.

CAUTION: Do not leave the battery connected for more than 10 seconds.



Starter No-load Test:

1. Clamp the starter firmly in a vise.
2. Connect the starter to the battery as described in the diagram below, and confirm that the motor starts and keeps rotating.



3. If the electric current and motor speed meet the specifications when the battery voltage is at 11.5 V, the starter is working properly.

Specifications:

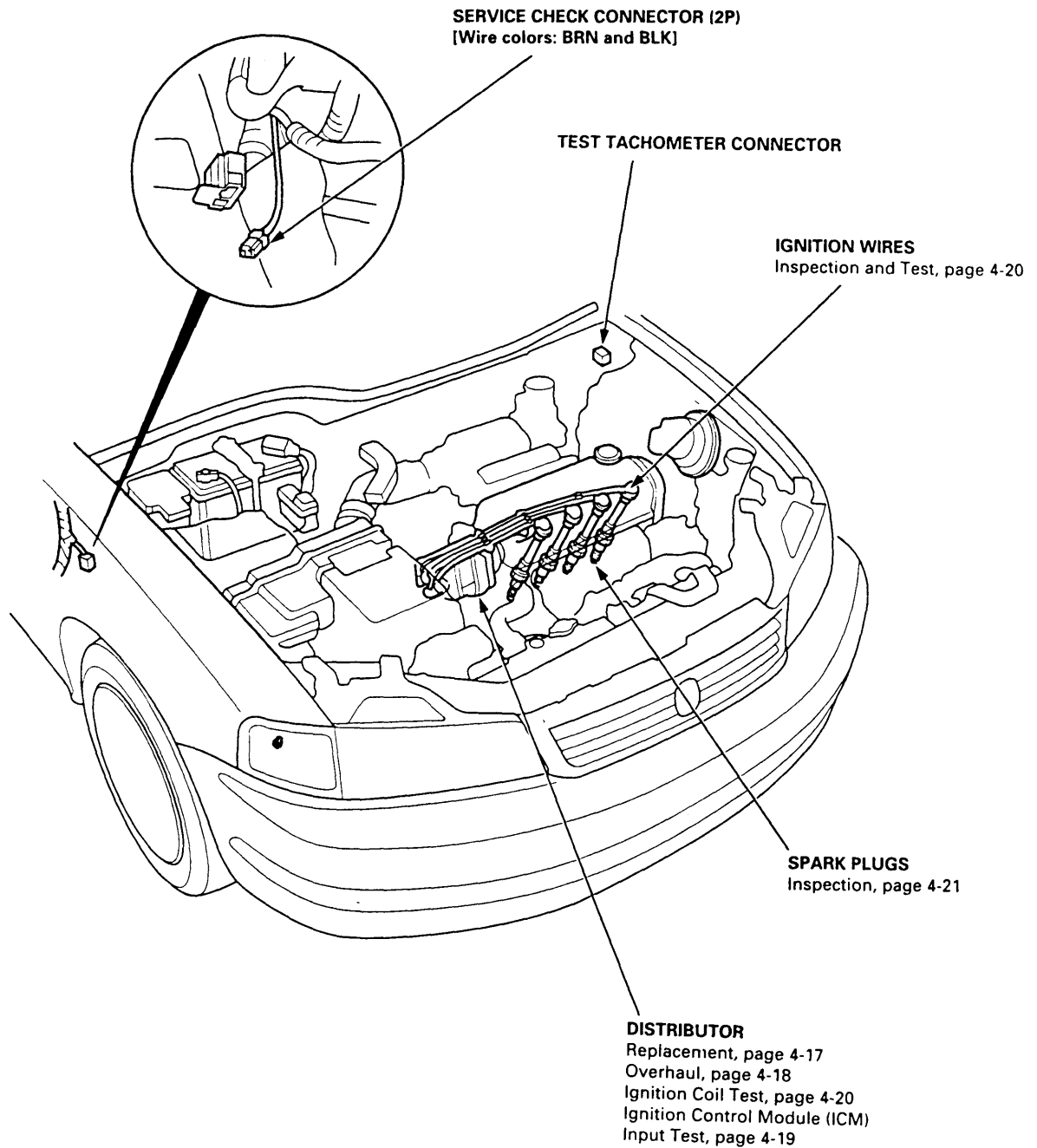
80 A or less (Electric current), 2,600 rpm or more (Motor-speed)

Ignition System

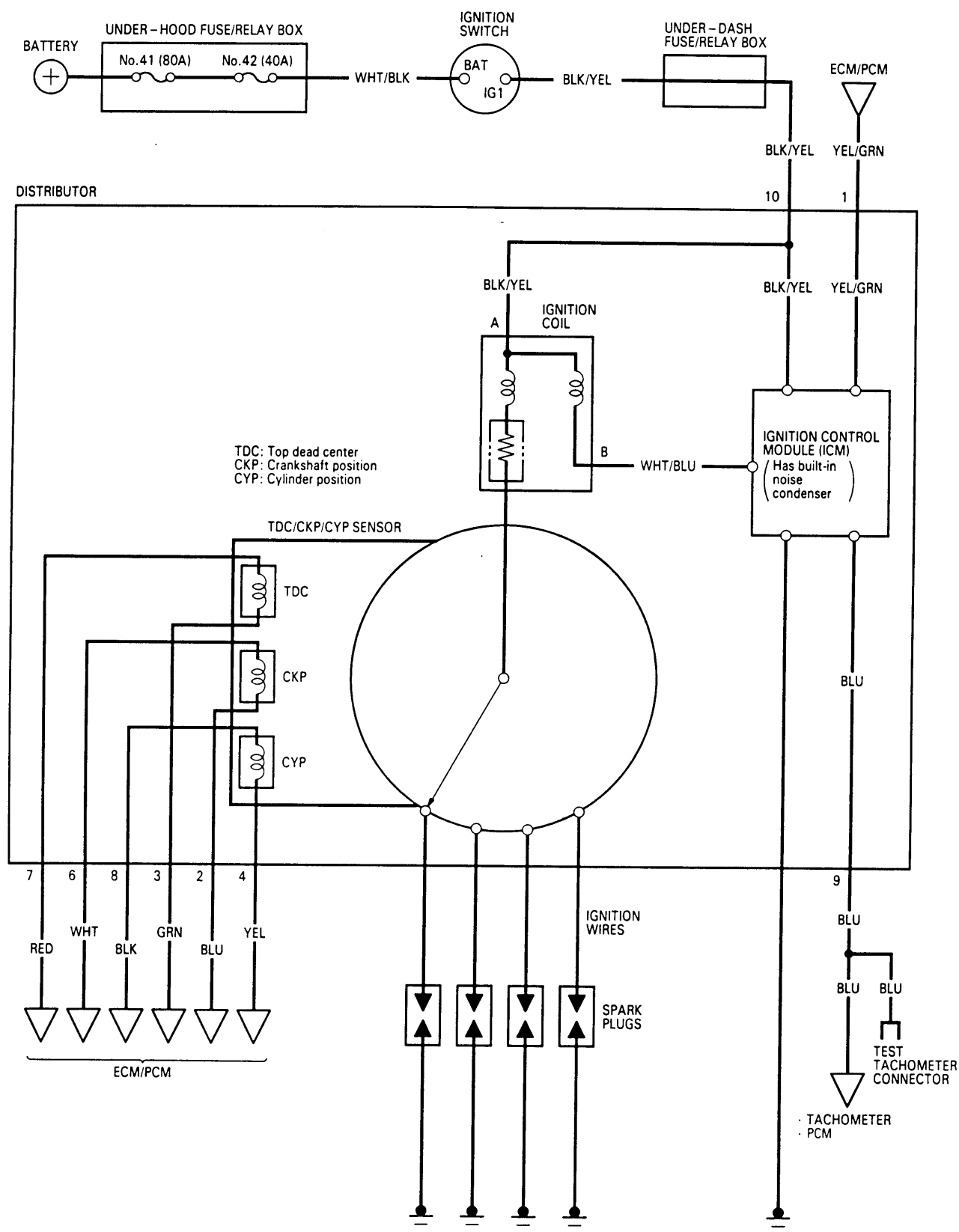
Component Location Index

IGNITION TIMING CONTROL SYSTEM

- Troubleshooting, section 11
- Idle speed Inspection/Adjustment, section 11
- Inspection and Setting, page 4-16



Circuit Diagram



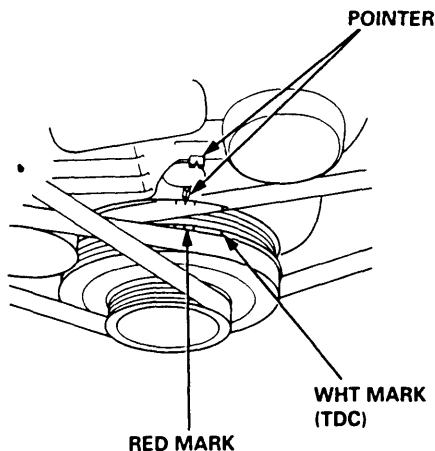
Ignition System

Ignition Timing Inspection and Setting

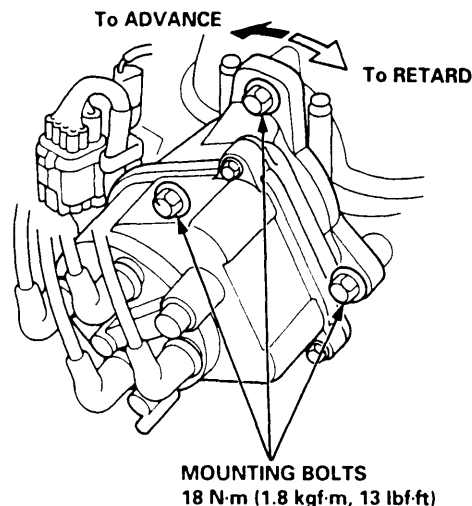
1. Check the idle speed, and adjust it if necessary (see section 11).
2. Remove the service check connector 2P (BRN and BLK wires) from the connector holder located under the dash on the front passenger side, then connect the SCS service connector (T/N 07PAZ - 0010100) to it.
3. Start the engine. Hold the engine at 3,000 rpm with no load (A/T in **N** or **P**, M/T in neutral) until the radiator fan comes on, then let it idle.
4. Connect the timing light to the No. 1 ignition wire, then point the light toward the pointer on the timing belt cover.
5. Check the ignition timing in no load conditions: headlights, blower fan, rear window defogger, and air conditioner are not operating.

Ignition Timing:

M/T	$12^{\circ} \pm 2^{\circ}$ BTDC (RED) during idling in neutral
A/T	$12^{\circ} \pm 2^{\circ}$ BTDC (RED) during idling in N or P



6. Adjust the ignition timing if necessary, as follows. Loosen the distributor mounting bolts, and turn the distributor ignition (DI) housing counterclockwise to advance the timing, or clockwise to retard the timing.

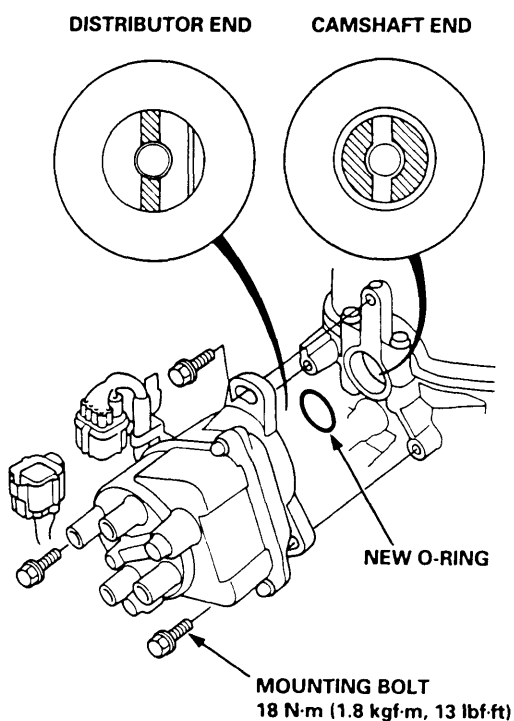


7. Tighten the distributor mounting bolts, and recheck the ignition timing.
8. Disconnect the SCS service connector from the service check connector.

Distributor Replacement

Removal:

1. Disconnect the connector from the distributor.
2. Disconnect the ignition wires from the distributor ignition (DI) cap.
3. Remove the mounting bolts from the distributor, then remove the distributor from the cylinder head.



Installation:

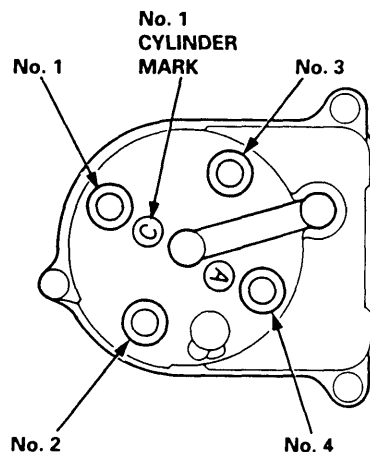
NOTE: Before you install the distributor, bring the No. 1 piston to compression stroke TDC.

1. Coat a new O-ring with engine oil, then install it.
2. Slip the distributor into position.

NOTE: The lug on the end of the distributor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor 180° out of time.

3. Install the mounting bolts, and tighten them lightly.

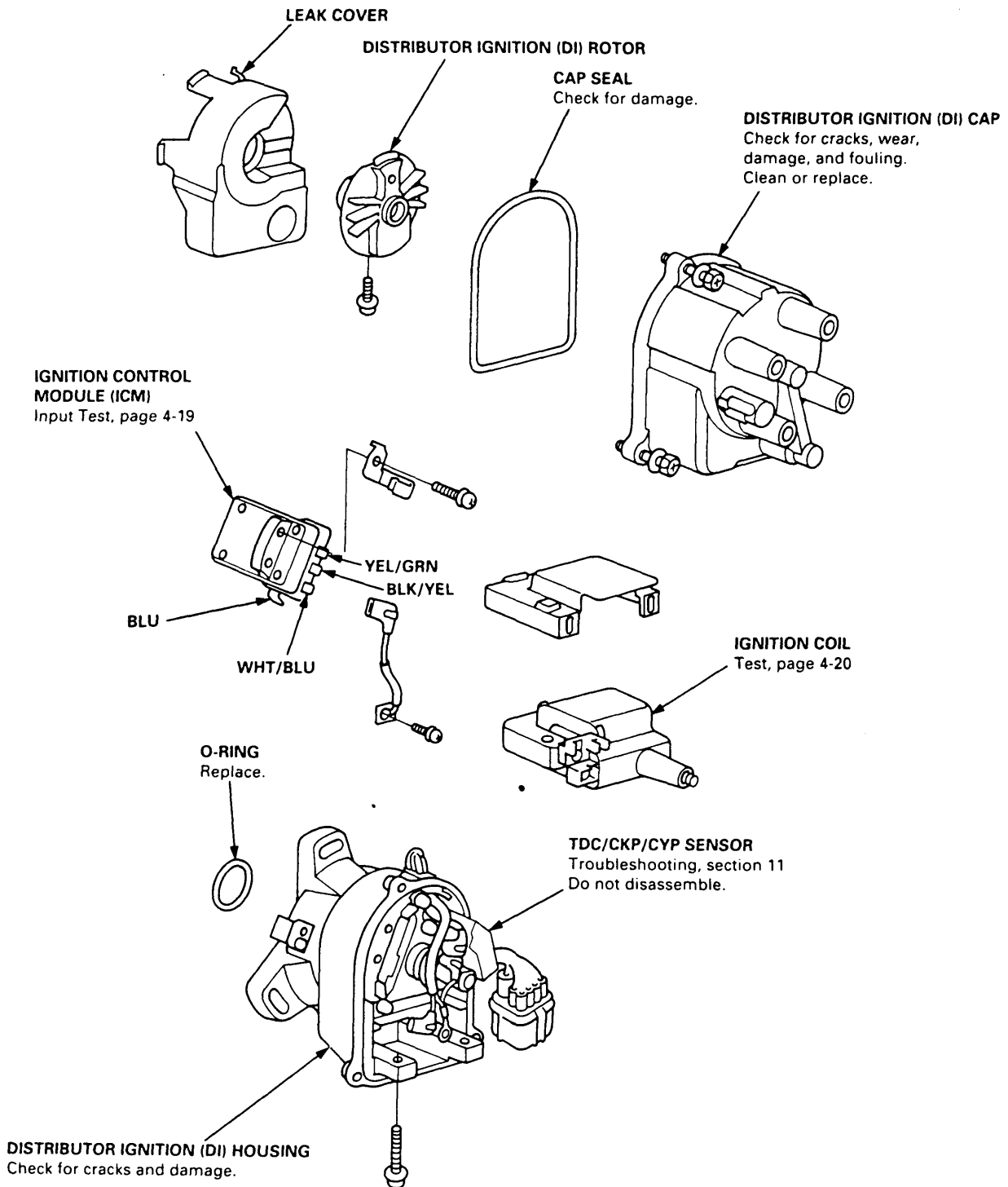
4. Connect the ignition wires to the distributor ignition (DI) cap as shown.



5. Connect the connector to the distributor.
6. Set the ignition timing (see previous page).
7. After setting the ignition timing, tighten the mounting bolts.

Ignition System

Distributor Overhaul

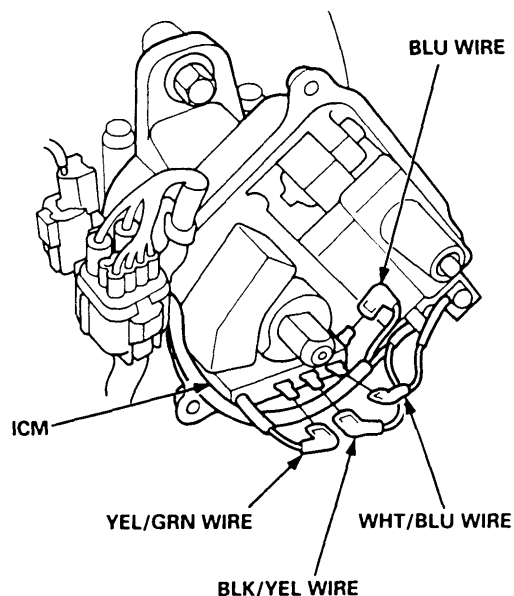


Ignition Control Module (ICM) Input Test

NOTE:

- See section 11 if the malfunction indicator lamp (MIL) came on.
- Perform an input test for the ignition control module (ICM) after finishing the fundamental tests for the ignition system and the fuel and emissions systems.

1. Remove the distributor ignition (DI) cap, the distributor ignition (DI) rotor and the leak cover.
2. Disconnect the wires from the ICM.



3. Turn the ignition switch ON (II). Check for voltage between the BLK/YEL wire and body ground. There should be battery voltage.
 - If there is no battery voltage, check the BLK/YEL wire between the under-dash fuse/relay box and the ICM.
 - If there is battery voltage, go to step 4.
4. Turn the ignition switch ON (II). Check for voltage between the WHT/BLU wire and body ground. There should be battery voltage.
 - If there is no battery voltage, check:
 - the ignition coil.
 - the WHT/BLU wire between the ignition coil and the ICM.
 - If there is battery voltage, go to step 5.
5. Disconnect the ECM/PCM connector A (32P). Check for continuity on the YEL/GRN wire between the ECM/PCM and the ICM. There should be continuity.

6. Check for continuity on the YEL/GRN wire to body ground. There should be no continuity. If there is continuity (short to ground), the ICM is probably damaged.
7. Check for continuity on the BLU wire between the test tachometer connector and the ICM. There should be continuity.
8. Check for continuity on the BLU wire to body ground. There should be no continuity.
9. If all the tests are normal, replace the ICM.

Ignition System

Ignition Coil Test

Using an ohmmeter, measure resistance between the terminals. If the resistance is not within specifications, replace the ignition coil.

NOTE: Resistance will vary with the coil temperature; specifications are at 68°F (20°C).

Primary Winding Resistance

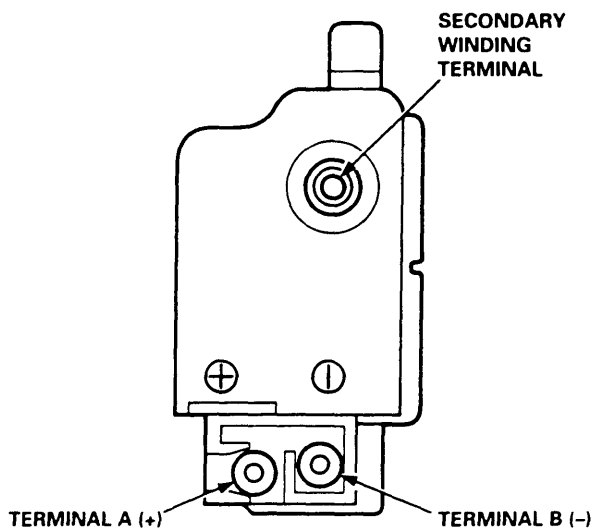
(Between the A and B terminals):

0.63 – 0.77 Ω

Secondary Winding Resistance

(Between the A and secondary winding terminals):

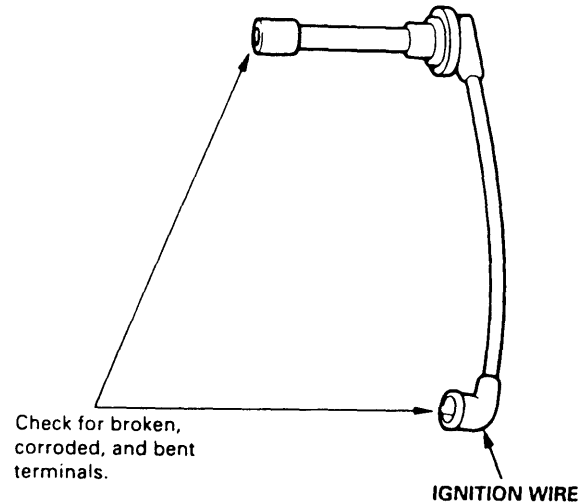
12.8 – 19.2 k Ω



Ignition Wire Inspection and Test

CAUTION: Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wires; you might break them inside.

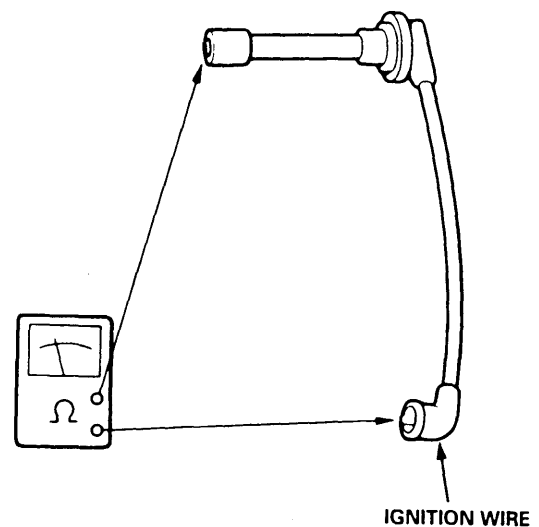
1. Check the condition of the ignition wire terminals. If any terminal is corroded, clean it, and if it is broken or distorted, replace the ignition wire.



2. Connect ohmmeter probes and measure resistance.

Ignition Wire Resistance:

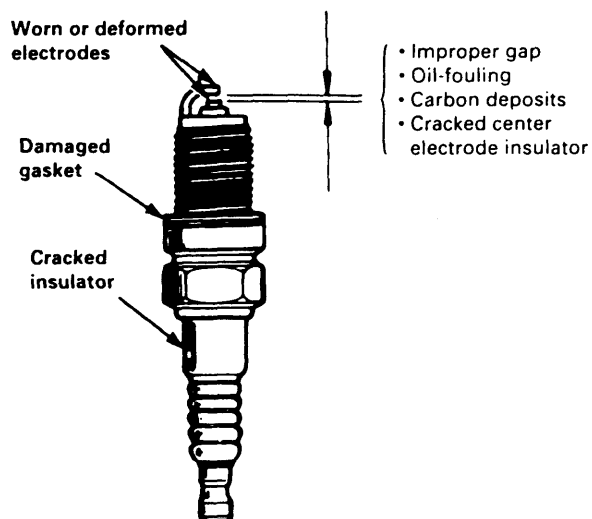
25 k Ω max. at 68°F (20°C)



3. If resistance exceeds 25 k Ω , replace the ignition wire.

Spark Plug Inspection

1. Inspect the electrodes and ceramic insulator for:



Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too hot
- Insufficient cooling

Fouled plugs may be caused by:

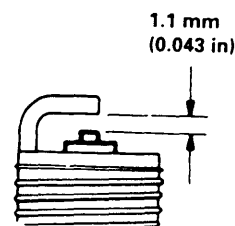
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too cold
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

2. Check the electrode gap.

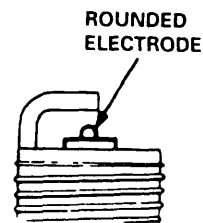
- Adjust the gap with a suitable gapping tool.

Electrode Gap

Standard	1.1 $\pm$ 0.1 mm (0.043 $\pm$ 0.004 in)
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- Replace the plug if the center electrode is rounded as shown below:



Spark Plugs:

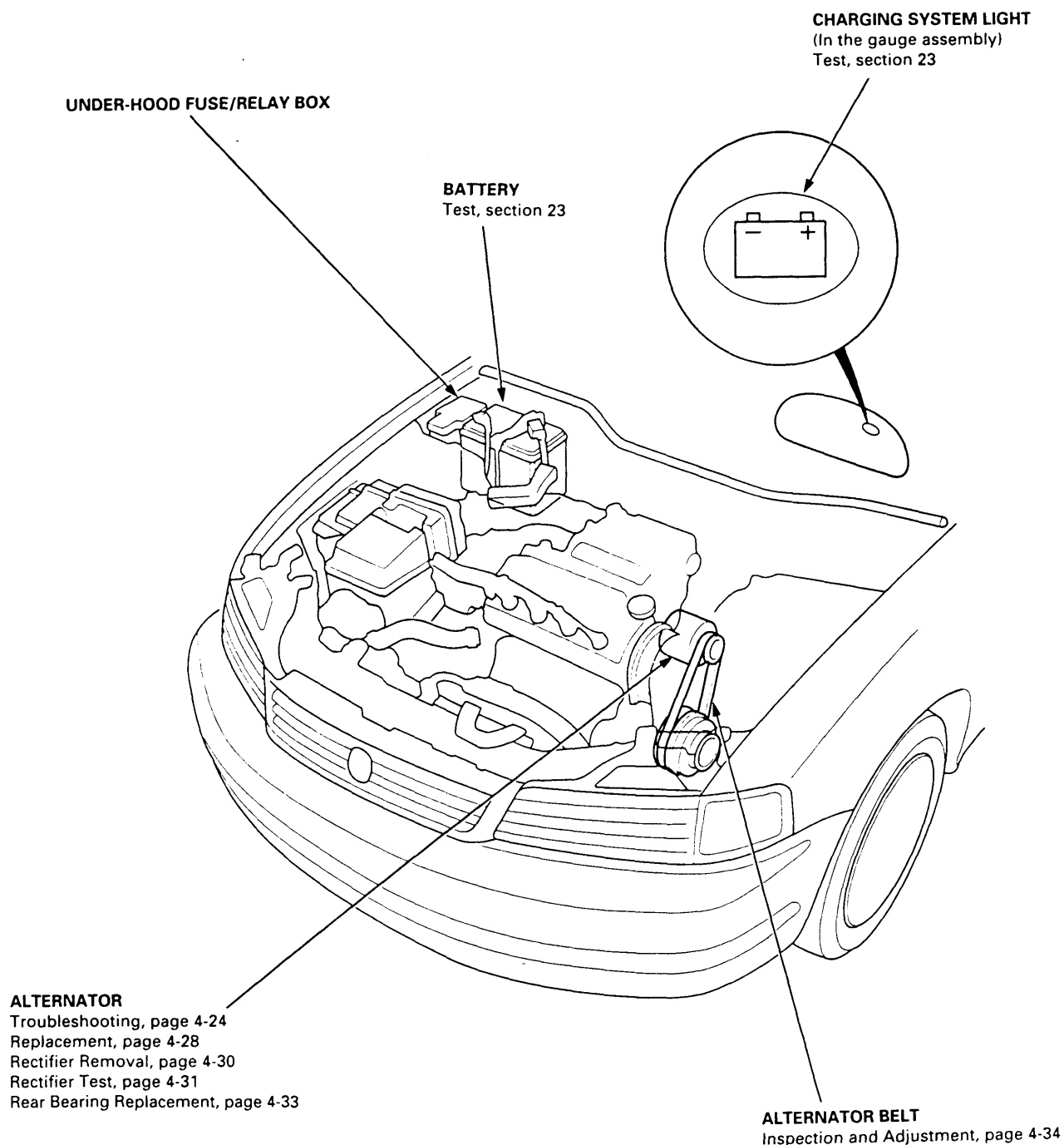
ZFR5F-11 (NGK)

KJ16CR-L11 (ND)

3. Apply a small quantity of anti-seize compound to the plug threads, and screw the plugs into the cylinder head finger-tight. Then torque them to 18 N·m (1.8 kgf·m, 13 lbf·ft).

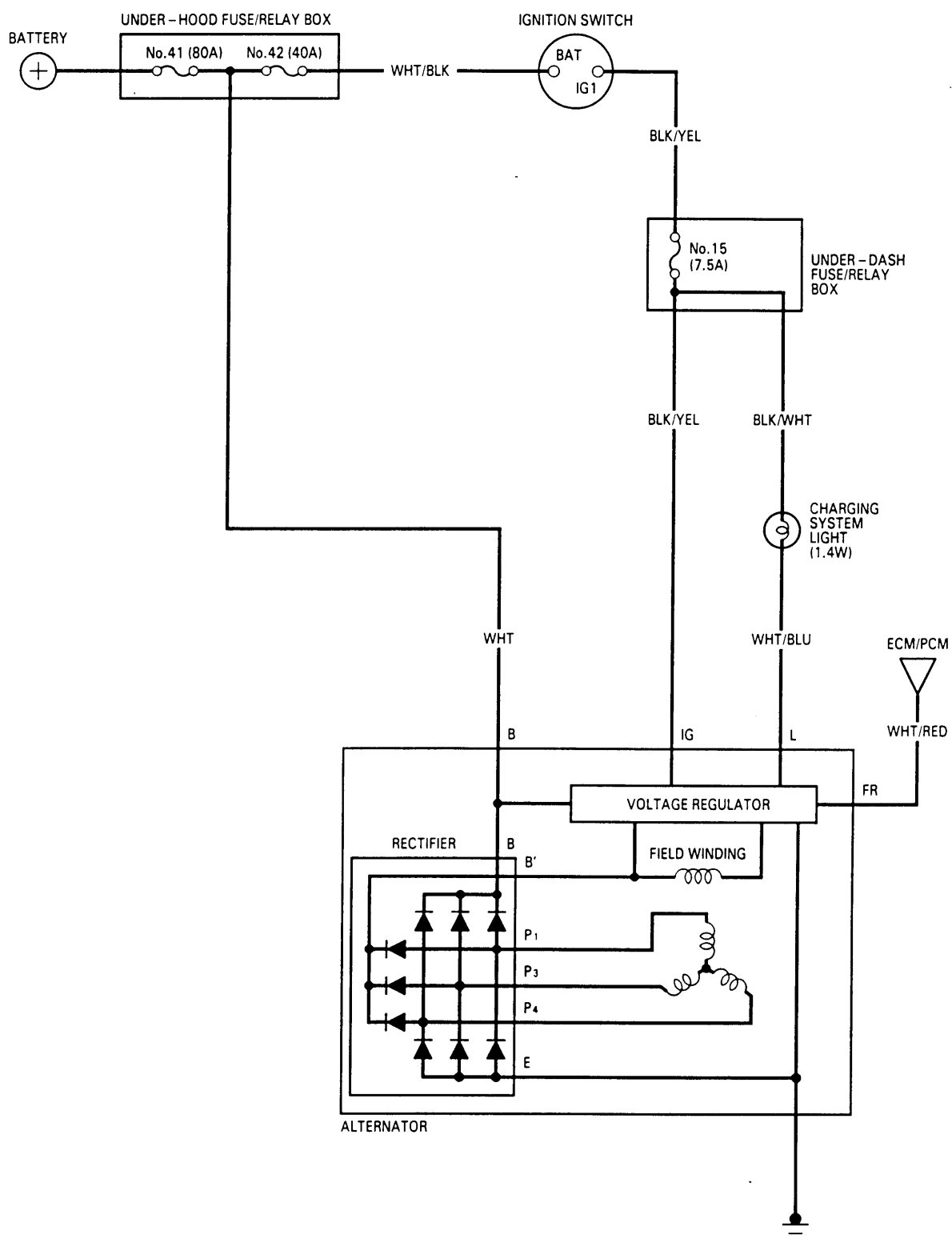
Charging System

Component Location Index





Circuit Diagram



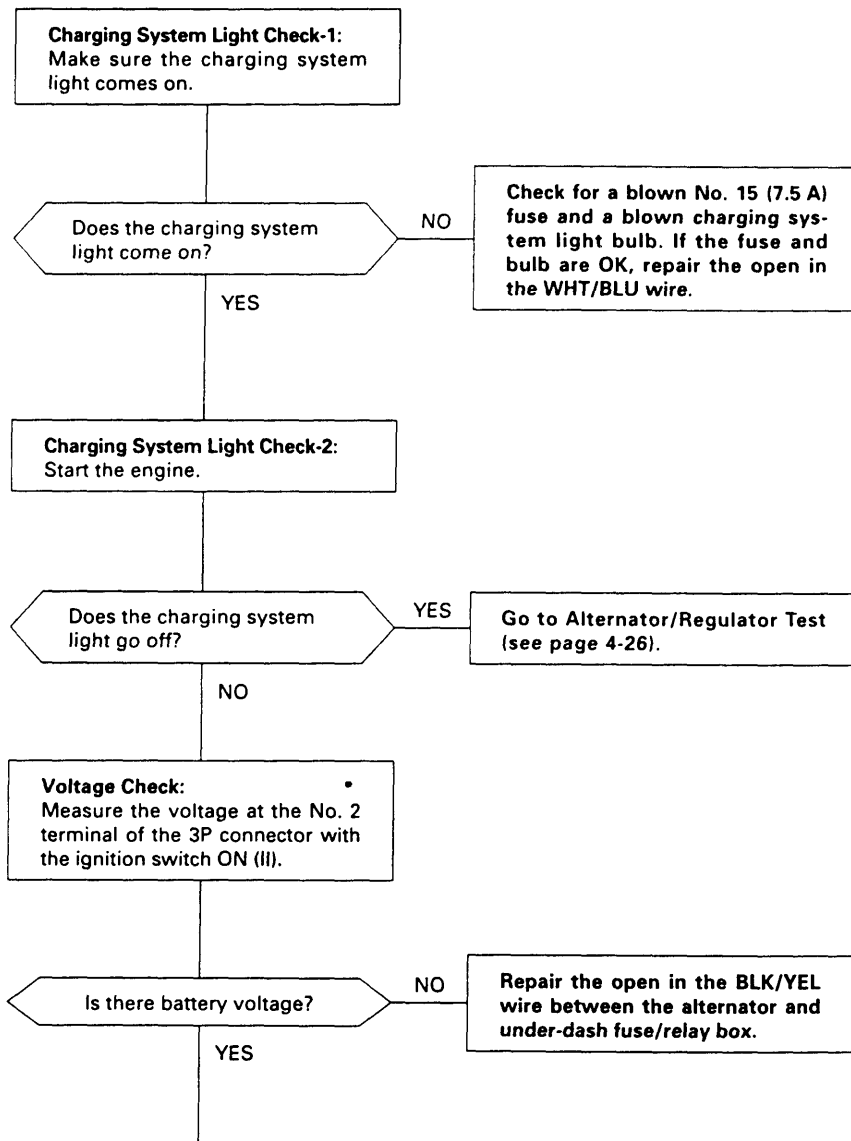
Charging System

Troubleshooting

If the charging system light does not come on or does not go off, or the battery is dead or low, test the following items in the order listed below:

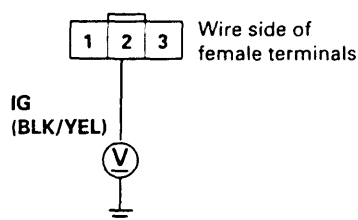
1. Battery (see section 23)
2. Charging system light
3. Voltage
4. Alternator/regulator

Charging System Light Test



(To next page)

ALTERNATOR 3P CONNECTOR



(From previous page)

Check for an open in the L circuit:

1. Turn the ignition switch OFF.
2. Disconnect the 3P connector from the alternator.
3. Ground the No. 3 terminal of the 3P connector with a jumper wire.
4. Turn the ignition switch ON (II).

Does the charging system light come on?

NO

Turn the ignition switch OFF, and repair the open in the WHT/BLU wire.

YES

Check for an open in the L circuit (cont'd):

Disconnect the jumper wire between the No. 3 terminal of the 3P connector and ground.

Does the charging system light go off?

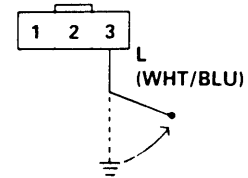
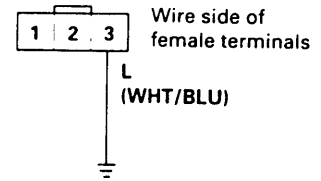
YES

Test and repair the alternator components.

NO

Turn the ignition switch OFF, and repair the short to ground in the WHT/BLU wire.

ALTERNATOR 3P CONNECTOR



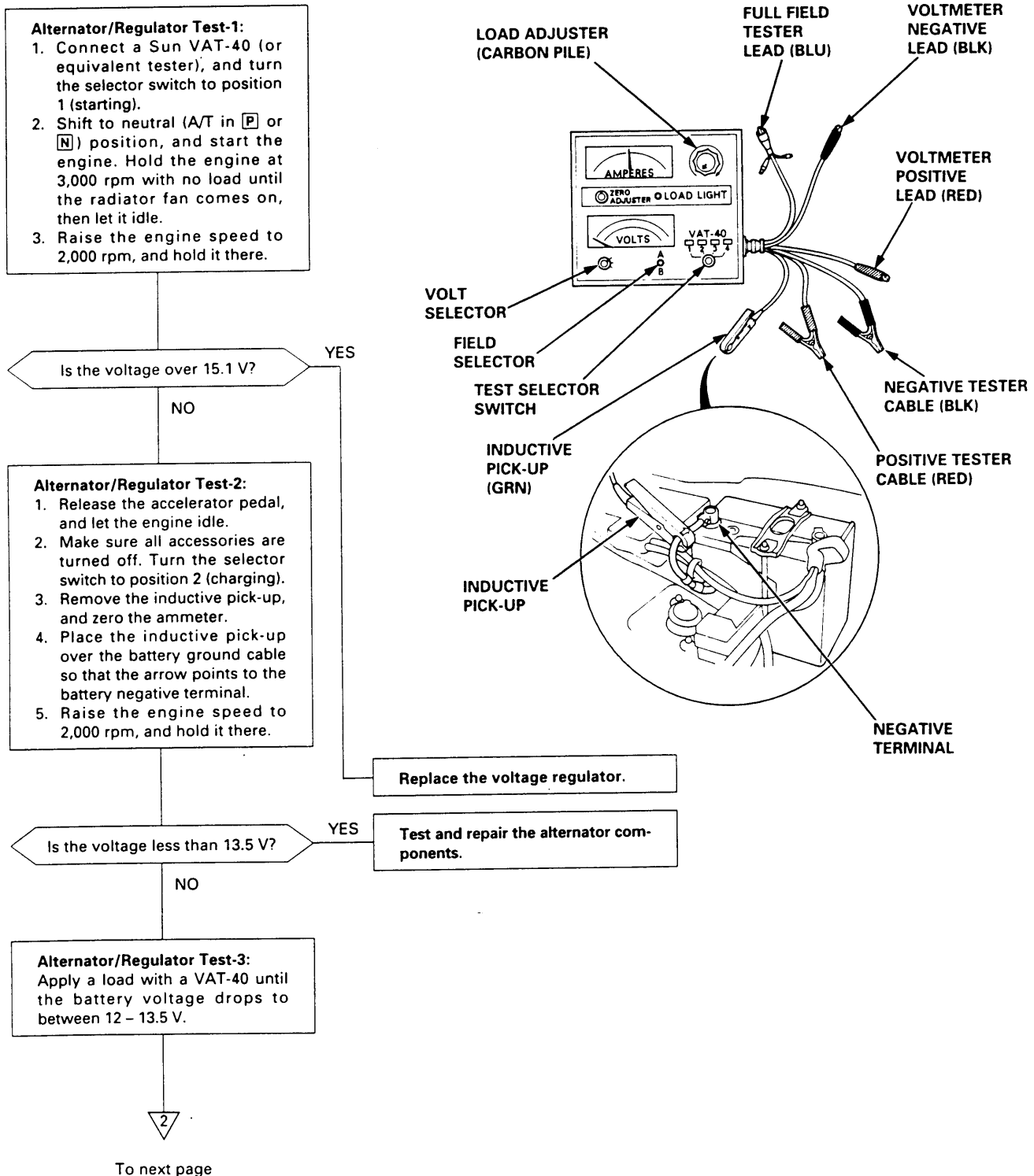
(cont'd)

Charging System

Troubleshooting (cont'd)

Alternator/Regulator Test

NOTE: Make sure the battery is sufficiently charged (see section 23).



From previous page

2

Is the amperage 50 A or more?

YES

The charging system is OK.

NO

Alternator/Regulator Test-4:
With the engine speed still at 2,000 rpm, full-field the alternator.

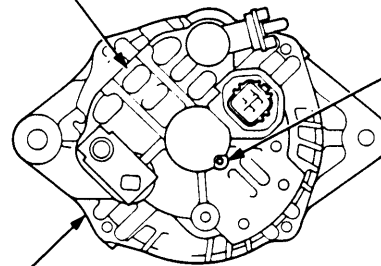
CAUTION: The voltage will rise quickly when the alternator is full-fielded. Do not allow the voltage to exceed 18 V; it may damage the electrical system.

NOTE: Attach a probe to a 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 the amperage reading.

REGULATOR
(Located inside the end cover)

FULL FIELD ACCESS HOLE

END COVER



Is the alternator output 50 A or more?

NO

Test and repair the alternator components.

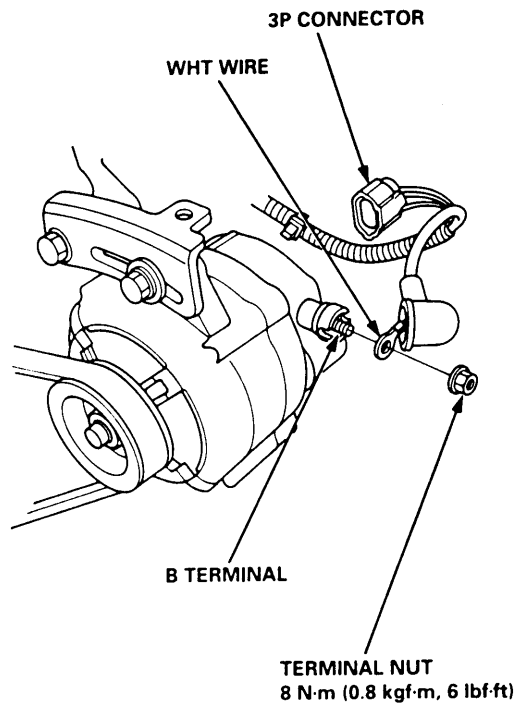
YES

Replace the voltage regulator.

Charging System

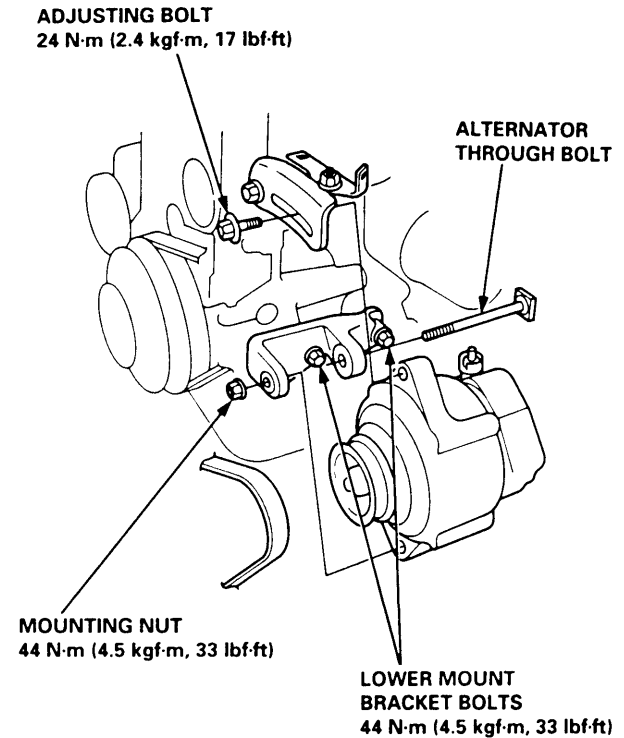
Alternator Replacement

1. Remove the battery negative cable, then disconnect the positive cable.
2. Disconnect the 3P connector from the alternator.



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

4. Remove the adjusting bolt, mounting nut, then remove the alternator belt from the pulley.

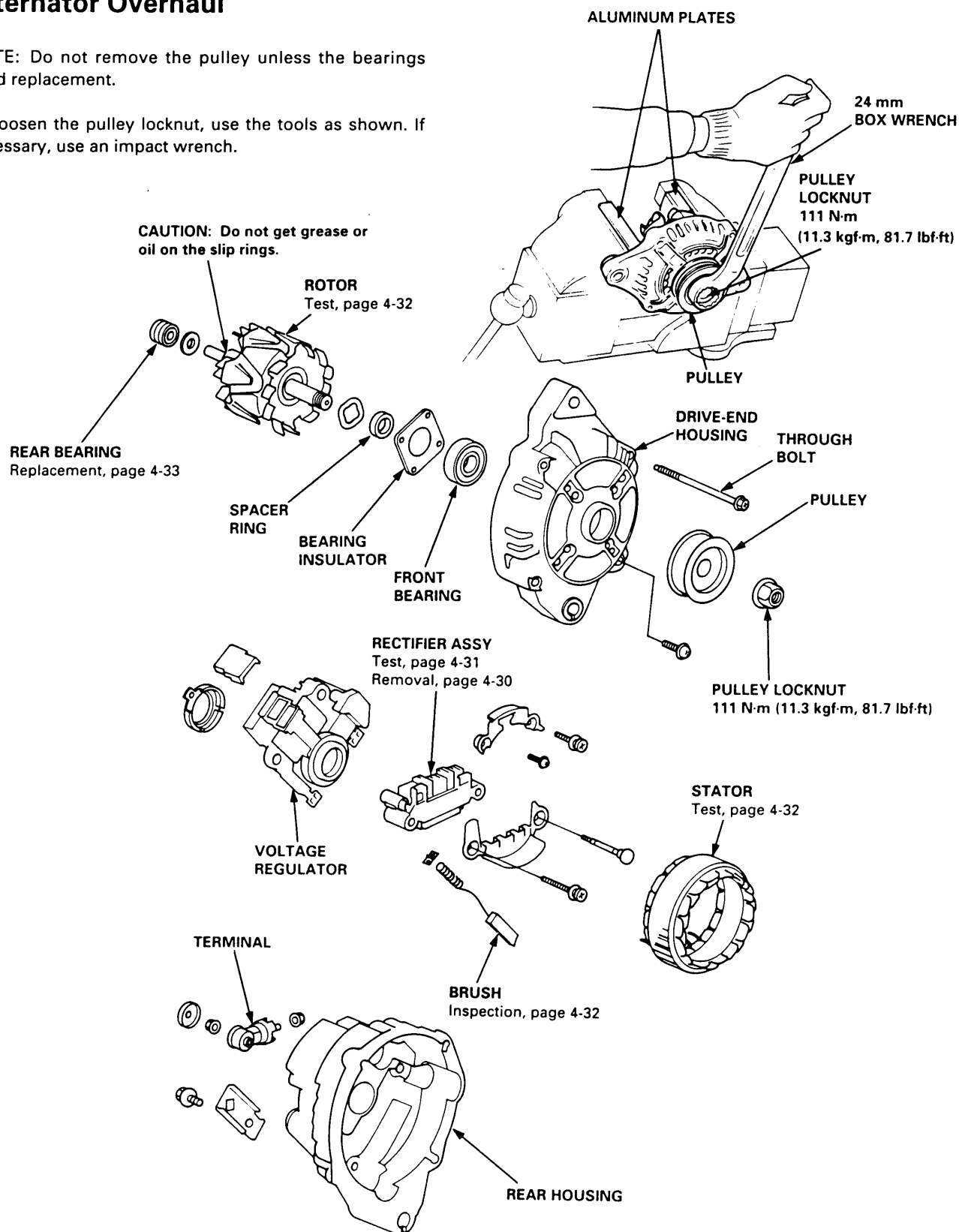


5. Pull out the through bolt, then remove the alternator from the mount brackets.
6. Remove the lower mount bracket, then remove the alternator from below the vehicle.
7. Install in the reverse order of removal.
8. Adjust the alternator belt tension after installation (see page 4-34).

Alternator Overhaul

NOTE: Do not remove the pulley unless the bearings need replacement.

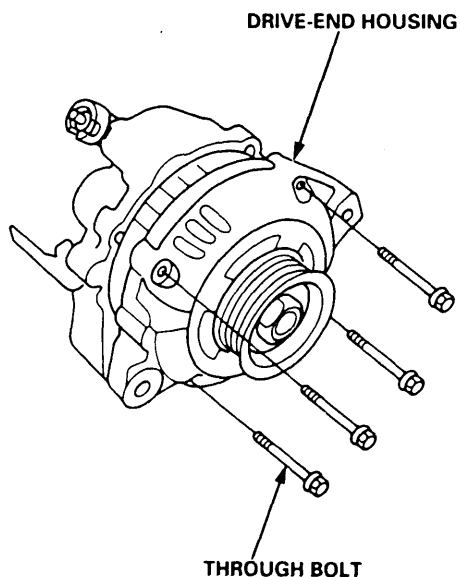
To loosen the pulley locknut, use the tools as shown. If necessary, use an impact wrench.



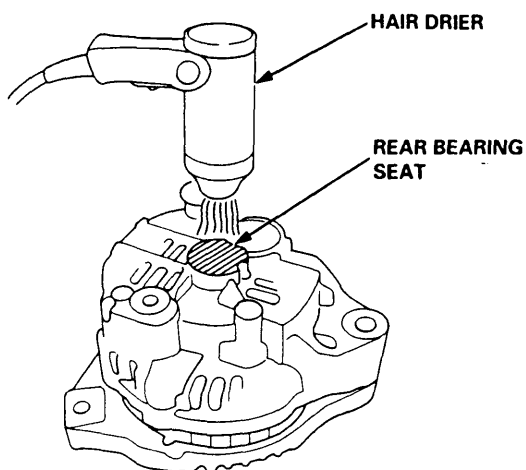
Charging System

Rectifier Removal

1. Remove the four through bolts.

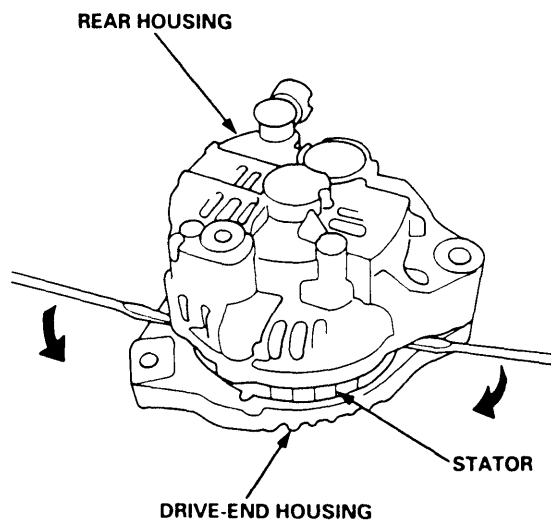


2. Heat the rear bearing seat with a 1,000 W hair drier for about five minutes (120 – 140°F, 50 – 60°C).



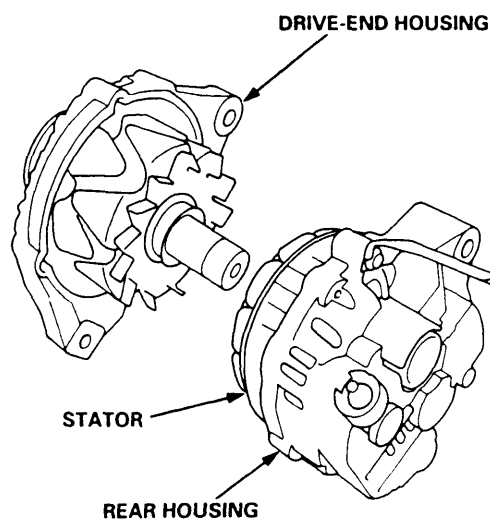
3. Separate the rear housing from the drive-end housing by inserting a flat tip screwdriver into the openings and prying them apart.

NOTE: Be careful not to damage the stator with the tip of the screwdriver.

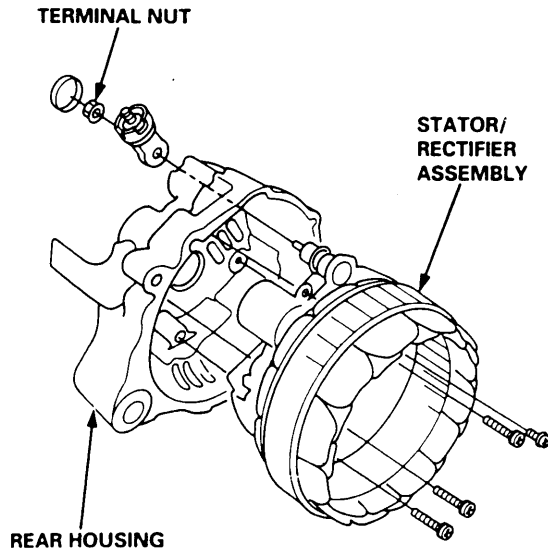


4. Separate the rear housing and drive-end housing.

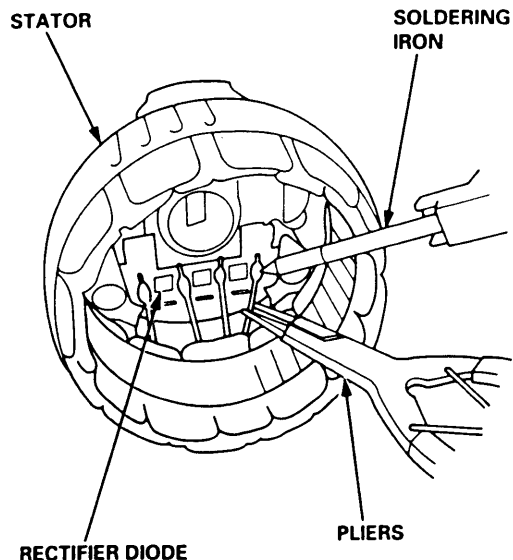
NOTE: Separate the rear housing and drive-end housing with the stator attached to the rear housing.



5. Separate the rear housing from the stator/rectifier assembly by removing the four screws and the terminal nut.



6. Unsolder the rectifier from the stator leads.
 - To avoid damaging the diodes with heat, pinch the stator leads between pliers to carry heat off, and apply the soldering iron only long enough to separate the leads from the rectifier.
 - Use a 100 W soldering iron.

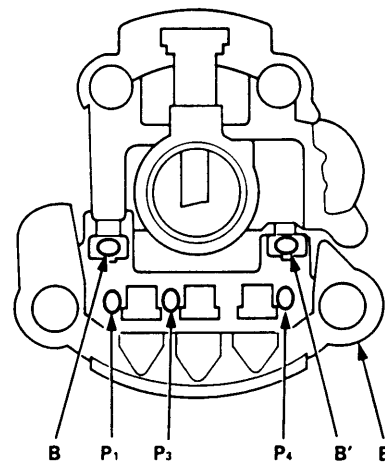


7. Install the new rectifier in the reverse order of removal.
 - Apply the soldering iron only long enough to ensure a good connection so the heat will not damage the diodes.
 - Use only a rosin core type solder or solder joints will corrode.

Rectifier Test

NOTE: The diodes are designed to allow current to pass in one direction while blocking it in the opposite direction. Since the alternator rectifier is made up of nine diodes, each diode must be tested for continuity in both directions with an ohmmeter that has diode checking capability; a total of 18 checks.

1. Check for continuity in each direction between
 - the B and P terminals.
 - the B' and P terminals.
 - E (ground) and the P terminals.
 All diodes should have continuity in only one direction.

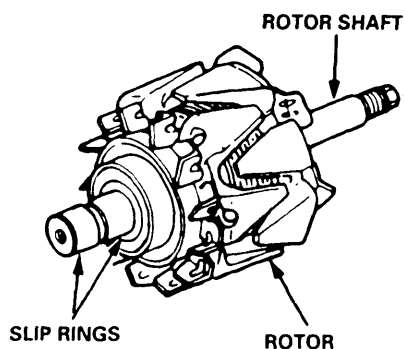


2. If any of the diodes fails, replace the rectifier assembly. (Diodes are not available separately.)

Charging System

Rotor Slip Ring Test

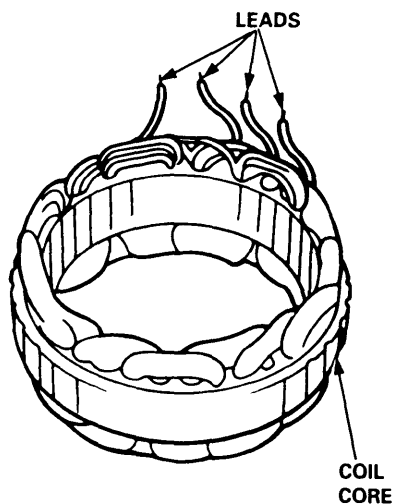
1. Check the resistance between the slip rings. There should be 1.8 – 3.0 ohms.
 - If resistance meets the specification, go to step 2.
 - If resistance does not meet the specification, replace the alternator.



2. Check that there is no continuity between the slip rings and the rotor or rotor shaft.
3. If the rotor fails either continuity check, replace the alternator.

Stator Test

1. Check that there is continuity between each pair of leads.



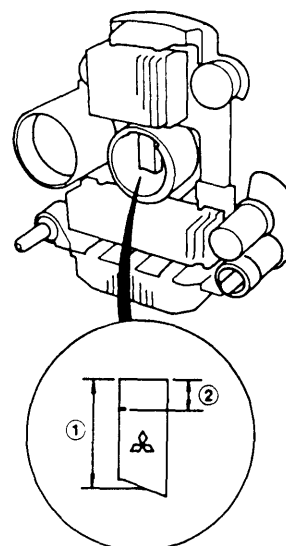
2. Check that there is no continuity between each lead and the coil core.
3. If the coil fails either continuity check, replace the alternator.

Alternator Brush Inspection

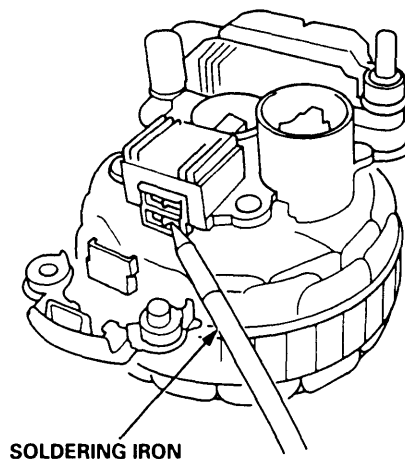
1. Separate the drive-end housing from the rear housing as described on page 4-30.
2. Separate the rear housing from the stator/rectifier assembly by removing the four screws and the terminal nut from the rear housing (see page 4-30).
3. Measure the length of the brushes with vernier calipers.

Alternator Brush Length:

① Standard (NEW)	② Service Limit
19.0 mm (0.75 in)	5.0 mm (0.20 in)

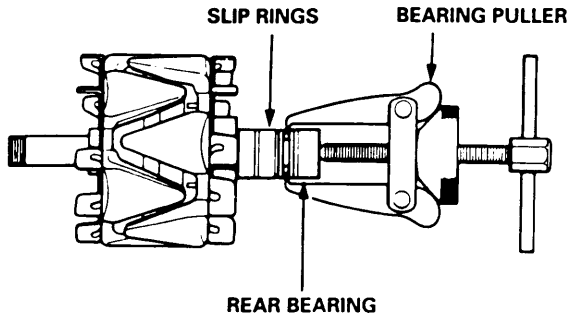


4. If the brushes are less than the service limit, replace them.

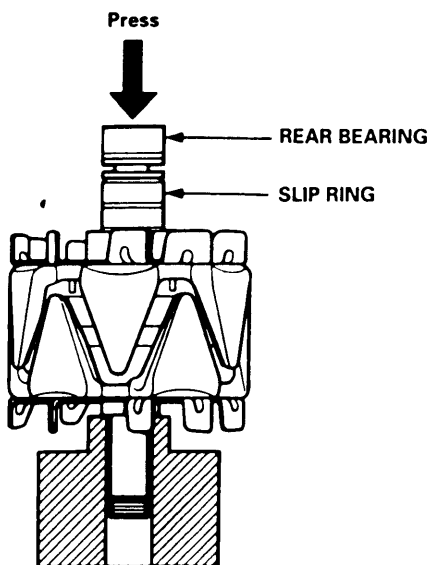


Rear Bearing Replacement

1. Pull off the rear bearing.
 - Make sure the tips of the bearing puller jaws are thin enough to fit between the bearing and the slip rings.
 - Do not reuse the bearing.

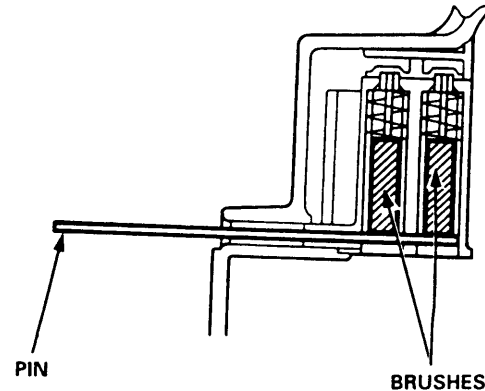


2. Use a hand press to install the new bearing. Apply pressure only on the inner race to avoid damaging the bearing.

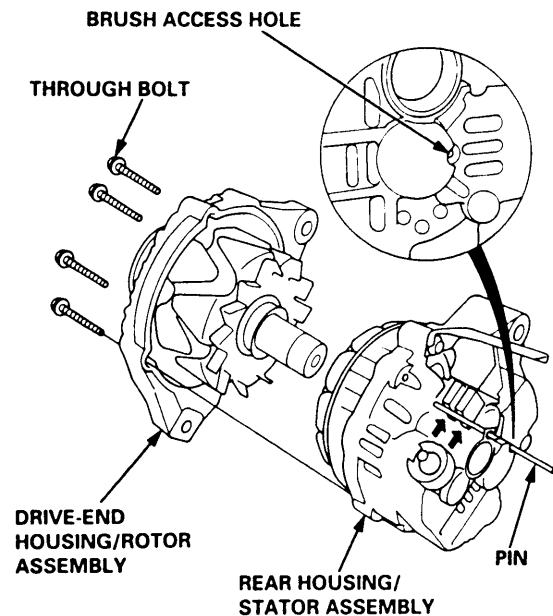


Alternator Reassembly

1. Push the brushes in, then insert a pin or drill bit (about 1.8 mm diameter) to hold them there.



2. Heat the rear bearing seat in the rear housing as described on page 4-30. After heating, continue immediately with assembling before the rear bearing seat cools completely.
3. Put the rear housing/stator assembly and drive-end housing/rotor assembly together, tighten the four through bolts and pull out the pin.



4. After assembling the alternator, turn the pulley by hand to make sure the rotor rotates smoothly and without noise.

Charging System

Alternator Belt Inspection and Adjustment

NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

Deflection method:

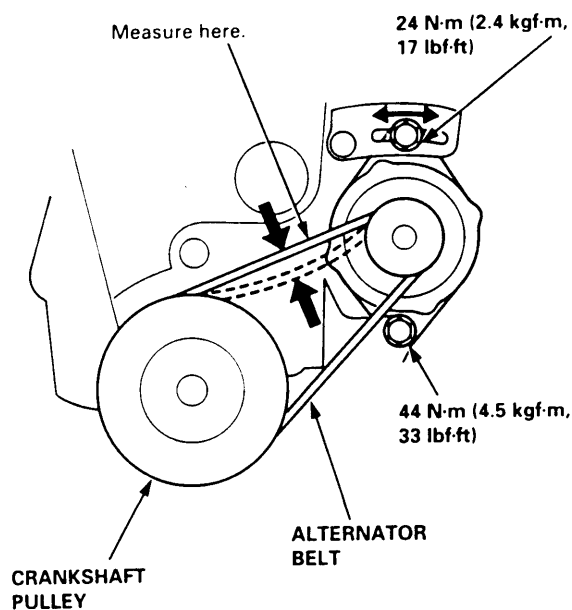
Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection between the alternator and crankshaft pulley.

Deflection:

Used Belt: 8.0 – 10.5 mm (0.31 – 0.41 in)

New Belt: 6.0 – 8.5 mm (0.24 – 0.33 in)

NOTE: If the belt is worn or damaged, replace it.



Belt tension gauge method:

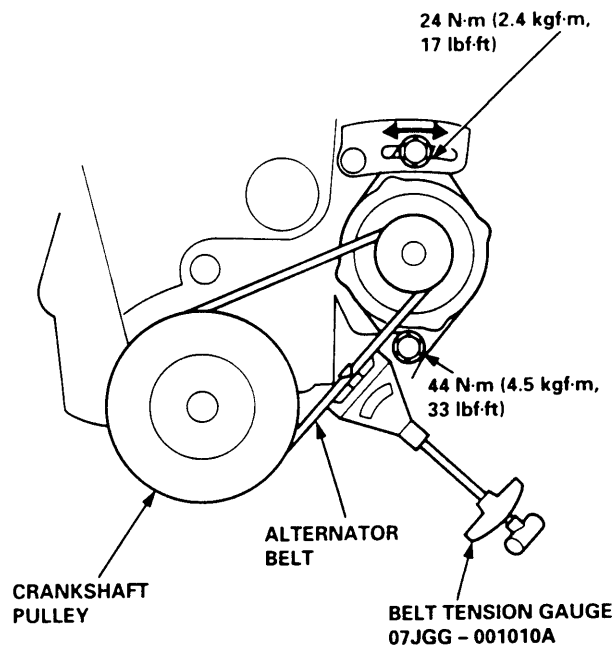
1. Remove the three bolts from the left end of the splash shield, and pull it back as needed.
2. Attach the belt tension gauge to the belt, and measure the tension. Follow the gauge manufacturer's instructions.

Tension:

Used Belt: 300 – 490 N (35 – 50 kgf, 77 – 110 lbf)

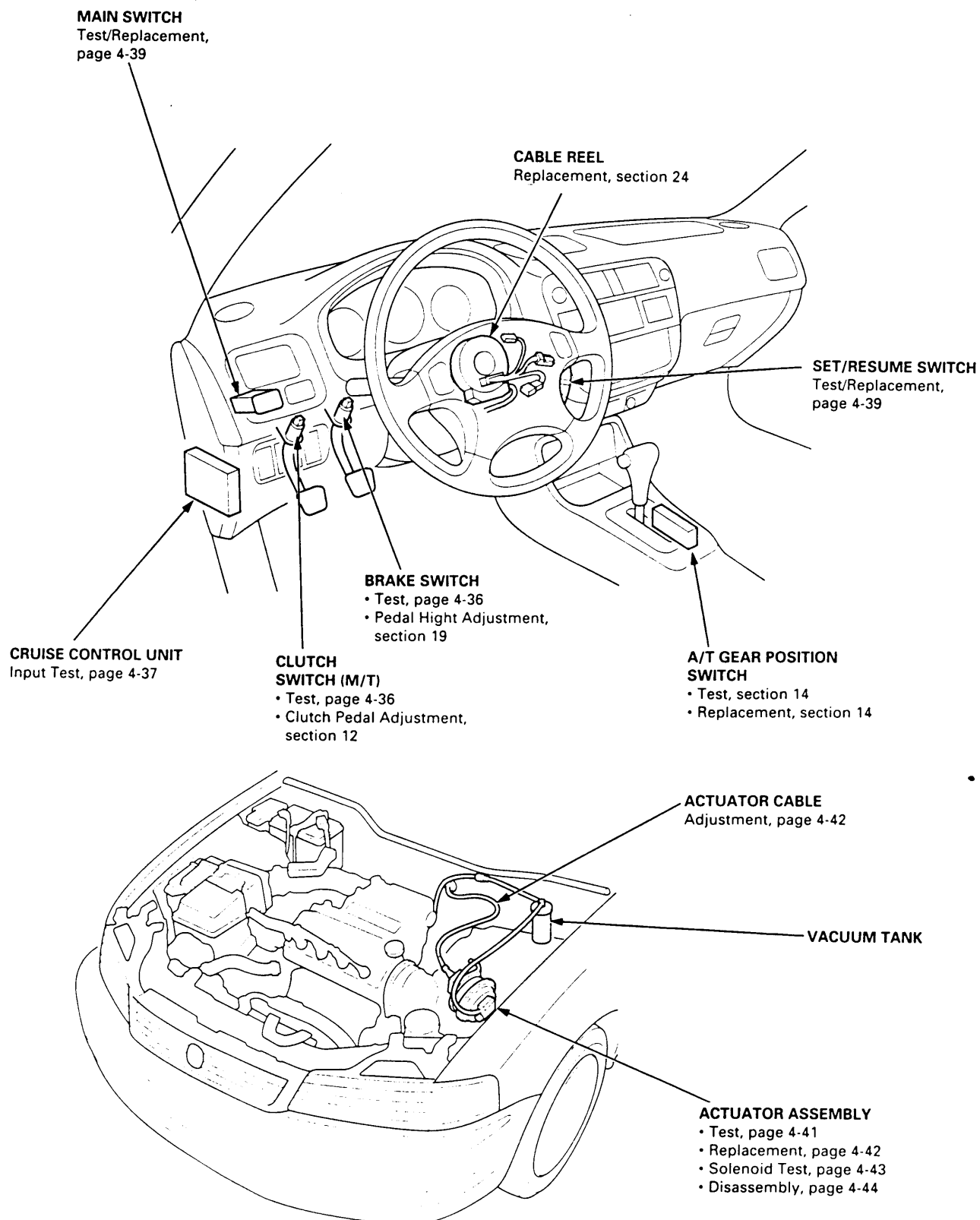
New Belt: 540 – 740 N (55 – 75 kgf, 121 – 165 lbf)

NOTE: If the belt is worn or damaged, replace it.



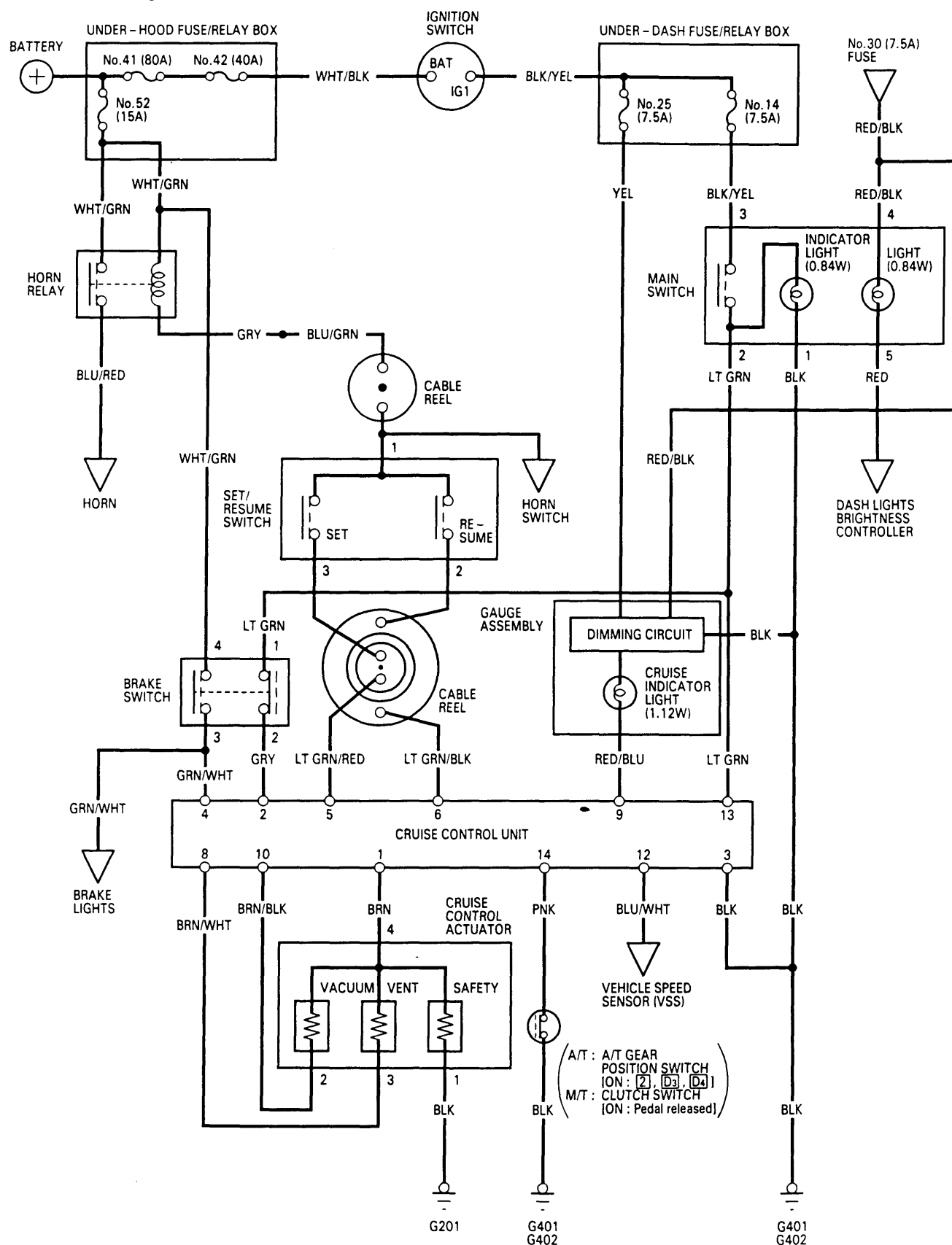
Cruise Control

Component Location Index



Cruise Control

Circuit Diagram



Control Unit Input Test

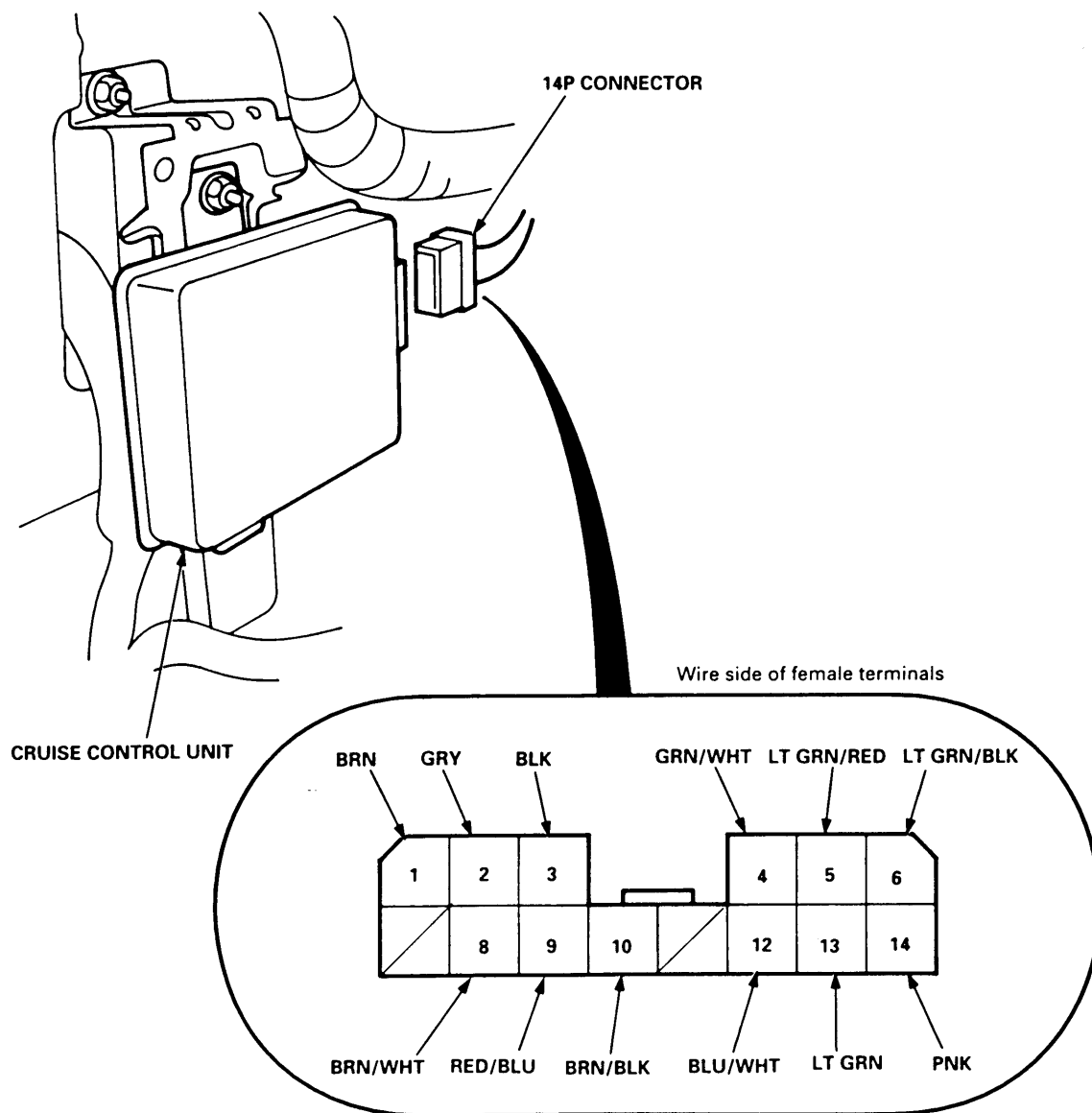
SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS section (24) before performing repairs or service.

1. Remove the driver's dashboard lower cover (see section 20).
2. Disconnect the 14P connector from the control unit.
3. Inspect the connector and socket terminals to be sure they are all making good contact.

If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.

If the terminals look OK, make the following input tests at the connector.

- If any test indicates a problem, find and correct the cause, then recheck the system.
- If all the input tests prove OK, the control unit must be faulty; replace it.



(cont'd)

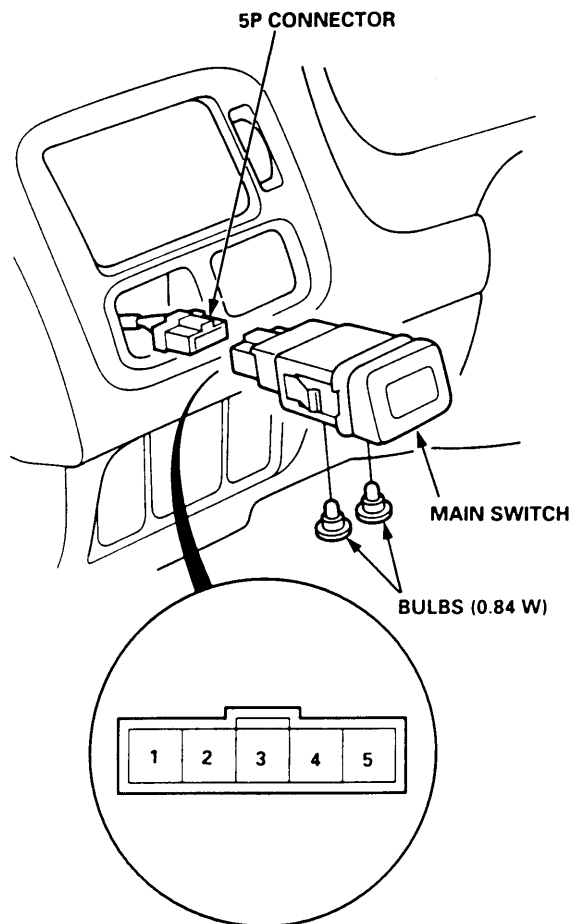
Cruise Control

Control Unit Input Test (cont'd)

Cavity	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
8	BRN/WHT	Under all conditions	Check for resistance to ground: There should be 80 – 120 Ω .	- Faulty actuator solenoid - Poor ground (G201) - An open in the wire
1	BRN	Under all conditions	Check for resistance to ground: There should be 40 – 60 Ω .	
10	BRN/BLK	Under all conditions	Check for resistance to ground: There should be 70 – 110 Ω .	
2	GRY	Ignition switch ON (II), main switch ON and brake pedal depressed, then released	Check for voltage to ground: There should be 0 V with the pedal depressed and battery voltage with the pedal released.	- Faulty brake switch - An open in the wire
3	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	- Poor ground (G401, G402) - An open in the wire
4	GRN/WHT	Brake pedal depressed, then released	Check for voltage to ground: There should be battery voltage with the pedal depressed, and 0 V with the pedal released.	- Blown No. 52 (15 A) fuse in the under-hood fuse/relay box - Faulty brake switch - An open in the wire
5	LT GRN/ RED	Set button depressed	Check for voltage to ground: There should be battery voltage.	- Blown No. 52 (15 A) fuse in the under-hood fuse/relay box - Faulty horn relay - Faulty set/resume switch - Faulty cable reel - An open in the wire
6	LT GRN/ BLK	Resume button depressed		
9	RED/BLU	Ignition switch ON (II)	Attach to ground: Cruise indicator light in the gauge assembly should come on.	- Blown bulb - Blown No. 25 (7.5 A) fuse in the under-dash fuse/relay box - Faulty dimming circuit in the gauge assembly - An open in the wire
12	BLU/WHT	Ignition switch ON (II) and main switch ON; raise the front of the vehicle, and rotate one wheel slowly with the other one blocked.	Check for voltage between the BLU/WHT $\oplus$ and BLK $\ominus$ terminals: There should be 0 – 5 V or more –0 – 5 V or more repeatedly.	- Faulty vehicle speed sensor (VSS) - An open in the wire
13	LT GRN	Ignition switch ON (II) and main switch ON	Check for voltage to ground: There should be battery voltage.	- Blown No. 14 (7.5 A) fuse in the under-dash fuse/relay box - Faulty main switch - An open in the wire
14	PNK	A/T: Shift lever in 2 , D₃ or D₄ M/T: Clutch pedal released	Check for continuity to ground: There should be continuity. NOTE: There should be no conti- nuity when the clutch pedal is depressed or when the shift lever is in other positions.	- Faulty A/T gear position switch - Faulty or misadjusted clutch switch (M/T) - Poor ground (G401, G402) - An open in the wire

Main Switch Test/Replacement

- Remove the driver's dashboard lower cover (see section 20).
- Carefully push out the switch from behind the dashboard.
- Disconnect the connector from the switch.



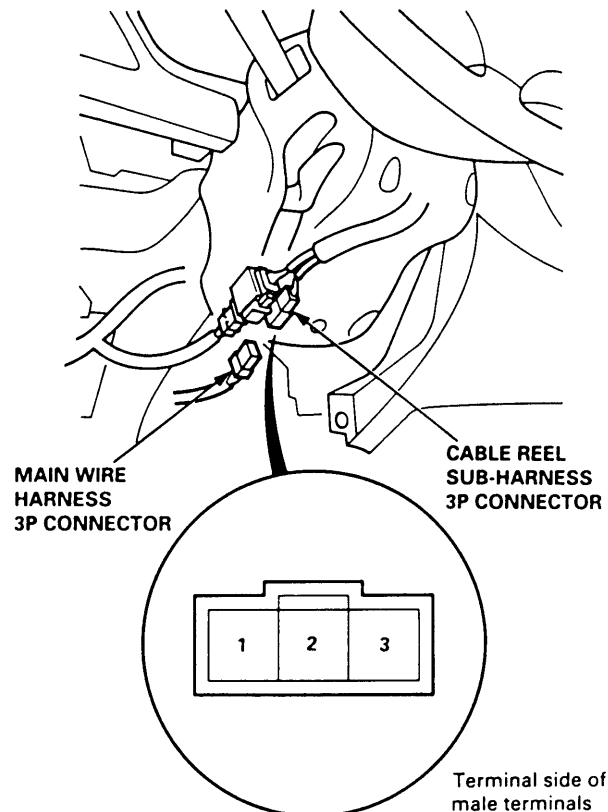
- Check for continuity between the terminals in each switch position according to the table.

Terminal Position	1	2	3	4	5
OFF					
ON					

If there is no continuity, replace the switch.

Set/Resume Switch Test/Replacement

- Disconnect the battery negative cable, then disconnect the positive cable, and wait at least three minutes.
- Disconnect the driver's airbag connector (see section 24).
- Remove the dashboard driver's lower cover (see section 20).
- Disconnect the cable reel sub-harness 3P connector from the main wire harness.



- Check for continuity between the terminals of the cable reel sub-harness 3P connector in each switch position according to the table.

Terminal Position	1	2	3
SET (ON)			
RESUME (ON)			

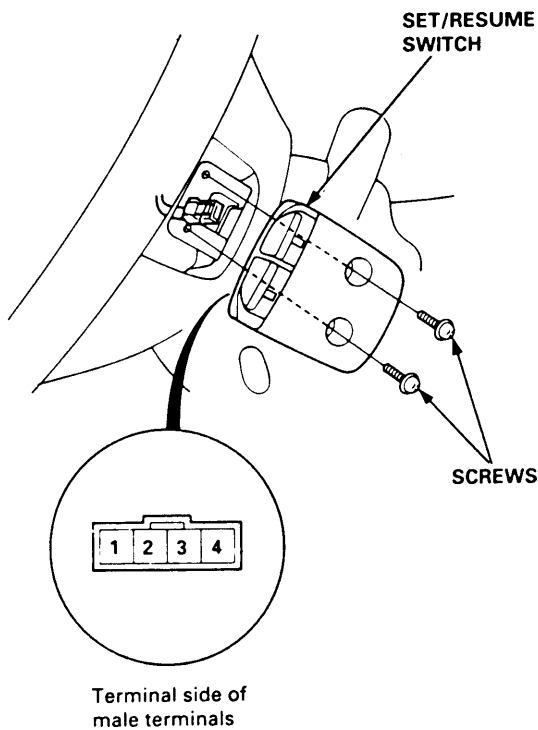
- If there is continuity, and it matches the table, the switch is OK.
- If there is no continuity in one or both positions, go to step 6.

(cont'd)

Cruise Control

Set/Resume Switch Test/Replacement (cont'd)

6. Remove the two screws, then remove the switch.



7. Check for continuity between the terminals in switch position according to the table.

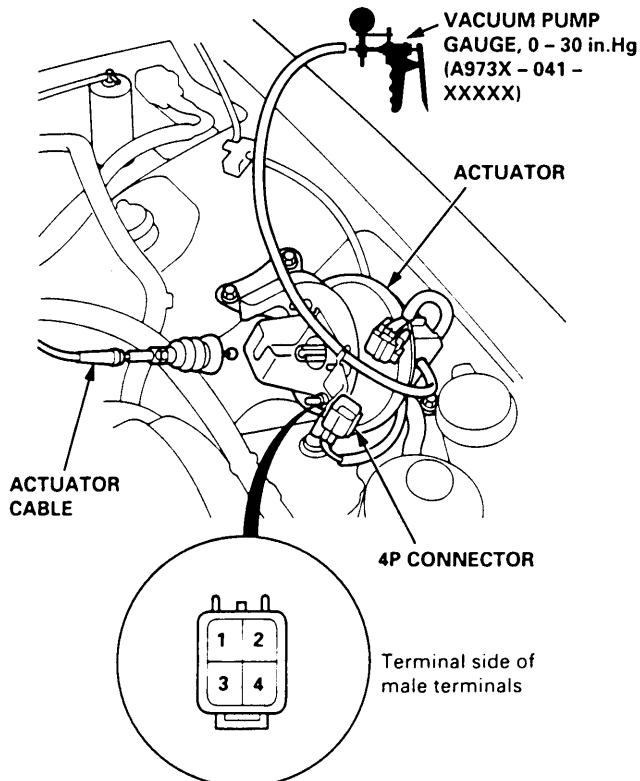
Terminal Position	1	2	3
SET (ON)	○	—	○
RESUME (ON)	○	○	

- If there is continuity, and it matches the table, replace the cable reel.
- If there is no continuity in one or both positions, replace the switch.

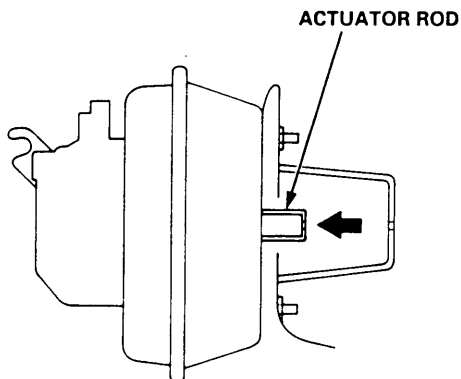
8. If all tests prove OK, reconnect the cable reel and cable reel sub-harness connector, then reinstall the steering column covers.
9. Reconnect the driver's airbag connector, and reinstall the access panel on the steering wheel.
10. Reconnect the battery positive cable, then the negative cable.
11. After connecting the airbag connectors, confirm proper system operation: Turn the ignition switch ON (II); the SRS indicator light should come on for about six seconds and then go off.

Actuator Test

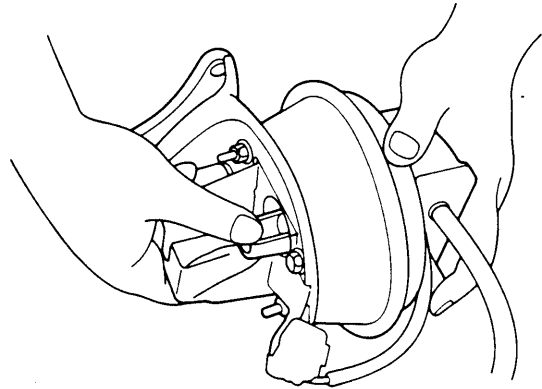
1. Disconnect the actuator cable from the actuator rod and the 4P connector.
2. Connect battery power to the No. 4 terminal and ground to the No. 1, No. 2 and No. 3 terminals.
3. Connect a vacuum pump to the vacuum hose. Then apply vacuum to the actuator.



4. The actuator rod should pull in completely. If the rod pulls in only part-way or not at all, check for a leaking vacuum line or defective solenoid.



5. With voltage and vacuum still applied, try to pull the actuator rod out by hand. You should not be able to pull it out. If you can, it is defective.

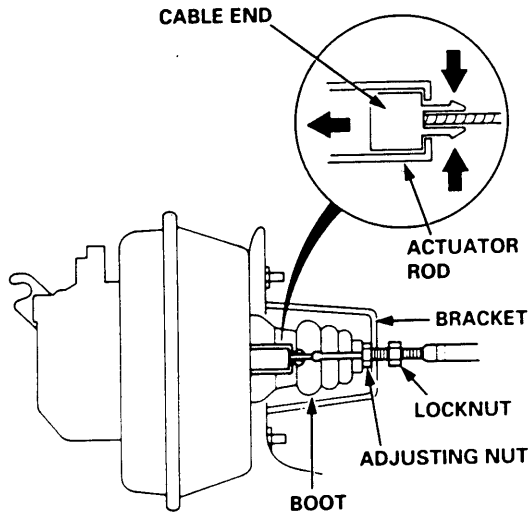


6. Disconnect ground from the No. 3 terminal. The actuator rod should return. If it does not return, but the vent hose and filter are not plugged, the solenoid valve assembly is defective.
7. Repeat steps 2 through 5, and disconnect ground from the No. 1 terminal. The actuator rod should return. If it does not return, but the vent hose and filter are not plugged, the solenoid valve assembly is defective.
8. If you replace the solenoid valve assembly, be sure to use new O-rings on each solenoid.
9. Disconnect power and ground from the 4P connector. Disconnect the vent hose from the actuator. Connect a vacuum pump to the actuator vent hose port, and apply vacuum. The actuator rod should pull in completely. If not, the vacuum valve is stuck open. Replace the actuator.

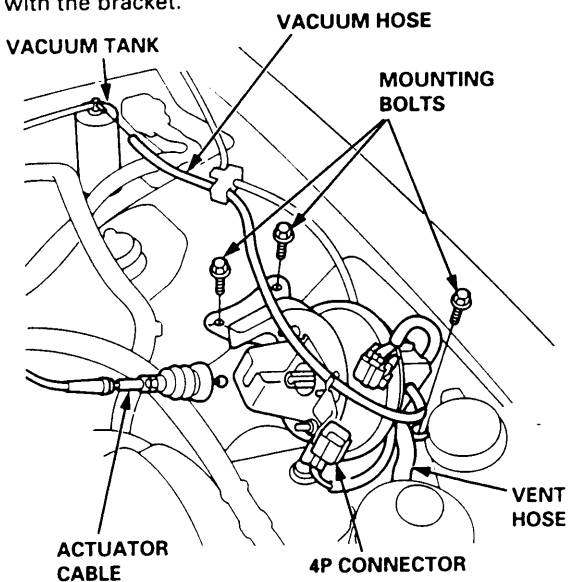
Cruise Control

Actuator Replacement

1. Pull back the boot, and loosen the locknut. Then disconnect the cable from the bracket.
2. Disconnect the cable end from the actuator rod.



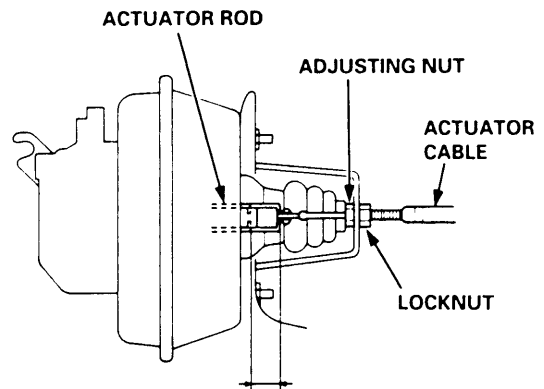
3. Disconnect the 4P connector from the actuator.
4. Disconnect the vacuum hose from the vacuum tank. Pull out the vent hose.
5. Remove the three mounting bolts and the actuator with the bracket.



6. If necessary, disconnect the cable end from the linkage over the accelerator pedal, then turn the grommet 90° in the bulkhead, and remove the cable.
7. Install in the reverse order of removal, and adjust the free play at the actuator rod after connecting the cable (see next column).

Actuator Cable Adjustment

1. Check that the actuator cable operates smoothly with no binding or sticking.
2. Start the engine. Hold the engine at 3,000 rpm with no load (A/T in **N** or **P**, M/T in neutral) until the radiator fan comes on, then let it idle.
3. Measure the amount of movement of the actuator rod until the cable pulls on the accelerator lever (engine speed starts to increase). Free play should be 11 ± 1.0 mm (0.43 ± 0.04 in).



LOCKNUT FREE PLAY: 11 ± 1.0 mm (0.43 ± 0.04 in)

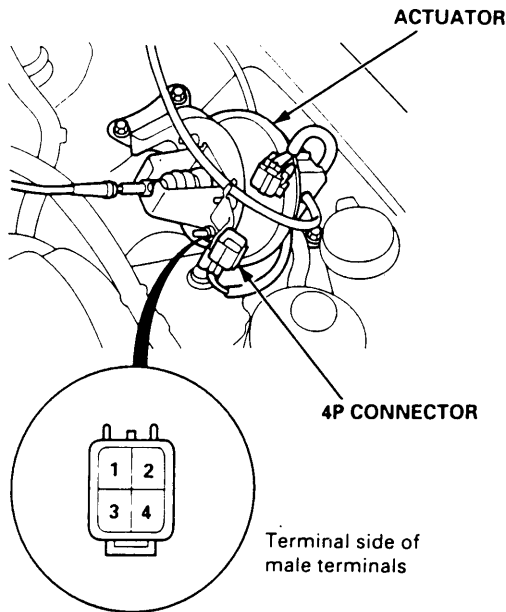
4. If free play is not within specs, loosen the locknut, and turn the adjusting nut as required.

NOTE: If necessary, check the throttle cable free play (see section 11), then recheck the actuator rod free play.

5. Retighten the locknut, and recheck the free play.

Actuator Solenoid Test

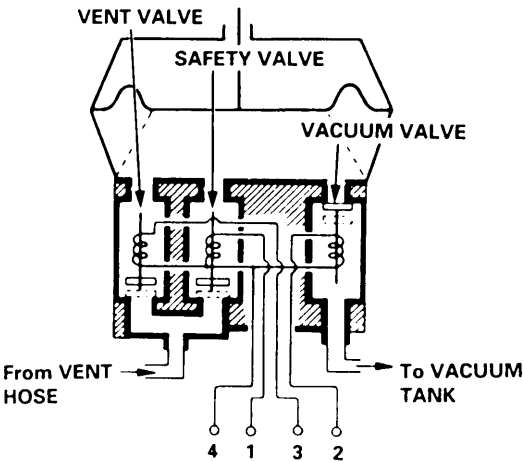
1. Disconnect the 4P connector from the actuator.



2. Check for resistance between the terminals according to the table.

Terminal	1	2	3	4
Resistance (Ω)				
VENT SOLENOID 40 – 60 Ω			○ — ○	
VACUUM SOLENOID 30 – 50 Ω		○ — ○		
SAFETY SOLENOID 40 – 60 Ω	○ — ○			

NOTE: Resistance will vary slightly with temperature; specified resistance is at 70°F (20°C).



Cruise Control

Actuator Disassembly

