

# Electrical

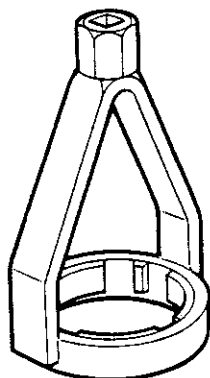
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\*: Some model versions of KG and KS

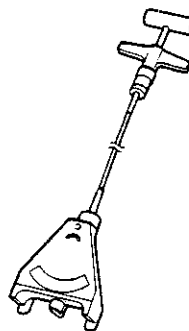


# Special Tools

Ref. No.	Tool Number	Description	Qty.	Page Reference
①	07NAC-SR20100	Fuel Sender Wrench	1	23-131
②	07JGG-0010100	Belt Tension Gauge	1	23-116



①



②



# Troubleshooting

## Tips and Precautions

### Before Troubleshooting

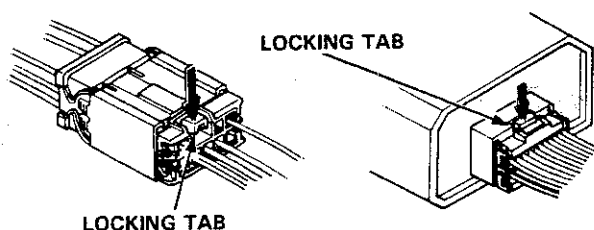
- Check applicable fuses in the appropriate fuse box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Check the alternator belt tension.

### CAUTION:

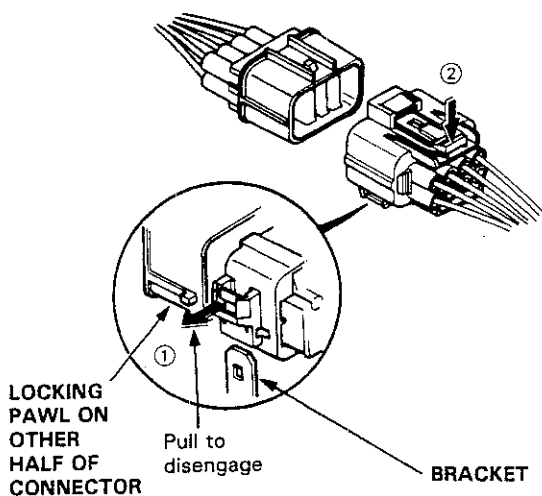
- Do not quick-charge a battery unless the battery ground cable has been disconnected. Otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the battery ground cable loosely connected or you will severely damage the wiring.

### Handling Connectors

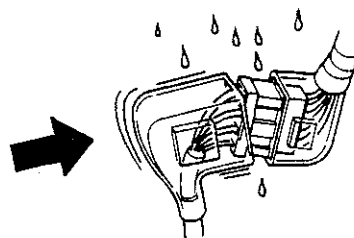
- Make sure the connectors are clean and have no loose wire terminals.
- Make sure multiple cavity connectors are packed with grease (except watertight connectors).
- All connectors have push-down release type locks



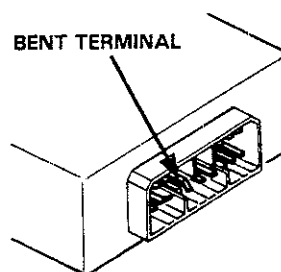
- Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
- Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount.



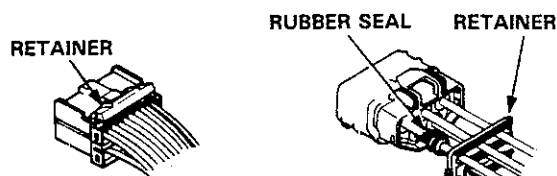
- Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
- Always reinstall plastic covers.



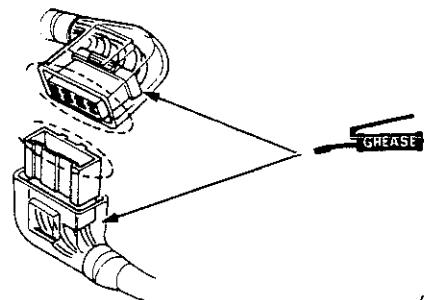
- Before connecting connectors, make sure the terminals are in place and not bent.



- Check for loose retainer and rubber seals



- The backs of some connectors are packed with grease. Add grease, if it's needed. If the grease is contaminated, replace it.

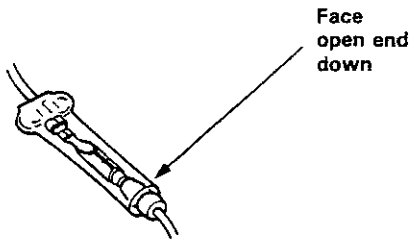


(cont'd)

# Troubleshooting

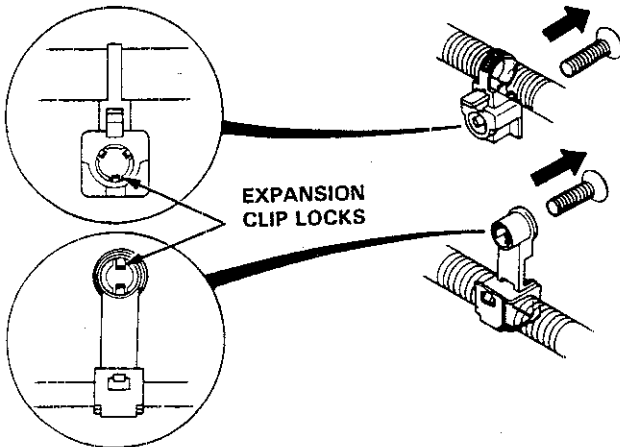
## Tips and Precautions (cont'd)

- Insert the connector all the way and make sure it is securely locked
- Position wires so that the open end of the cover faces down.

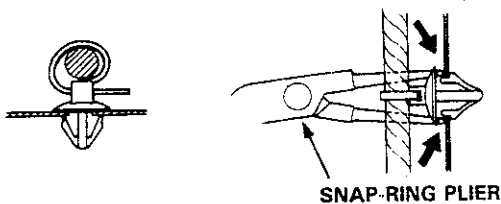


### Handling Wires and Harnesses

- Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
- Remove clips carefully; don't damage their locks.

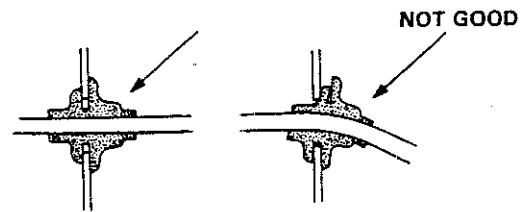


Slip pliers under the clip base and through the hole at an angle, then squeeze the expansion tabs to release the clip.



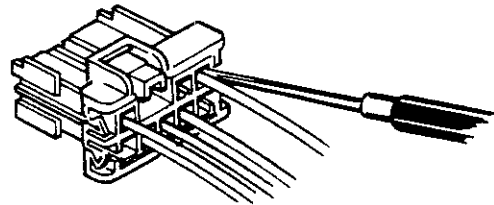
- After installing harness clips, make sure the harness doesn't interfere with any moving parts.
- Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.

- Seat grommets in their grooves properly

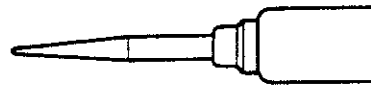


### Testing and Repairs

- Do not use wires or harnesses with broken insulation. Replace them or repair them by wrapping the break with electrical tape.
- After installing parts, make sure that no wires are pinched under them.
- When using electrical test equipment, follow the manufacturer's instructions and those described in this manual
- If possible, insert the probe of the tester from the wire side (except waterproof connector).



- Use a probe with a tapered tip.





# Troubleshooting

## Power Roof (Service Tips)

- Do not open/close the power roof while driving.
- Do not try to open/close the power roof when it is iced by snow or at extreme low temperatures.
- Do not open/close the wet power roof after rain or snow or cleaning with water.
- Do not open/close the power roof when the car is raised by using the safety stands.

## Five-step Troubleshooting

### 1. Verify The Complaint

Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.

### 2. Analyze The Schematic

Look up the schematic for the problem circuit. Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.

Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.

### 3. Isolate The Problem By Testing The Circuit

Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting. Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

### 4. Fix The Problem

Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.

### 5. Make Sure The Circuit Works

Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on that fuse. Make sure no new problems turn up and the original problem does not recur.

# How to Use This Section

## Schematic Symbols

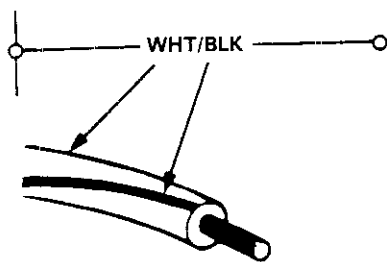
<b>BATTERY</b>  or 		<b>GROUND</b> Ground terminal  Component ground 		<b>FUSE</b> 	<b>COIL SOLENOID</b> 	<b>CIGARETTE LIGHTER</b> 
<b>RESISTOR</b> 	<b>VARIABLE RESISTOR</b> 	<b>THERMISTOR</b> 	<b>IGNITION SWITCH</b> 	<b>BULB</b> 	<b>HEATER</b> 	
<b>MOTOR</b> 	<b>PUMP</b> 	<b>CIRCUIT BREAKER</b> 	<b>HORN</b> 	<b>DIODE</b> 	<b>SPEAKER BUZZER</b> 	
<b>ANTENNA</b> Mast  Window 		<b>TRANSISTOR (Tr)</b> 				
<b>RELAY (In normal position)</b> Normally open relay  Normally closed relay 		<b>CONDENSER</b> 				
<b>SWITCH (In normal position)</b> Normally open switch  Normally closed switch 		<b>LUMINOUS DIODE (LED)</b> 				
<b>CONNECTION</b> Input  Output 	<b>CONNECTOR</b> Male  Female 	<b>REED SWITCH</b> 				

## Wire Color Codes

The following abbreviations are used to identify wire colors in the circuit schematics.

WHT	White
YEL	Yellow
BLK	Black
BLU	Blue
GRN	Green
RED	Red
ORN	Orange
PNK	Pink
BRN	Brown
GRY	Gray
PUR	Purple
LT BLU	Light Blue
LT GRN	Light Green

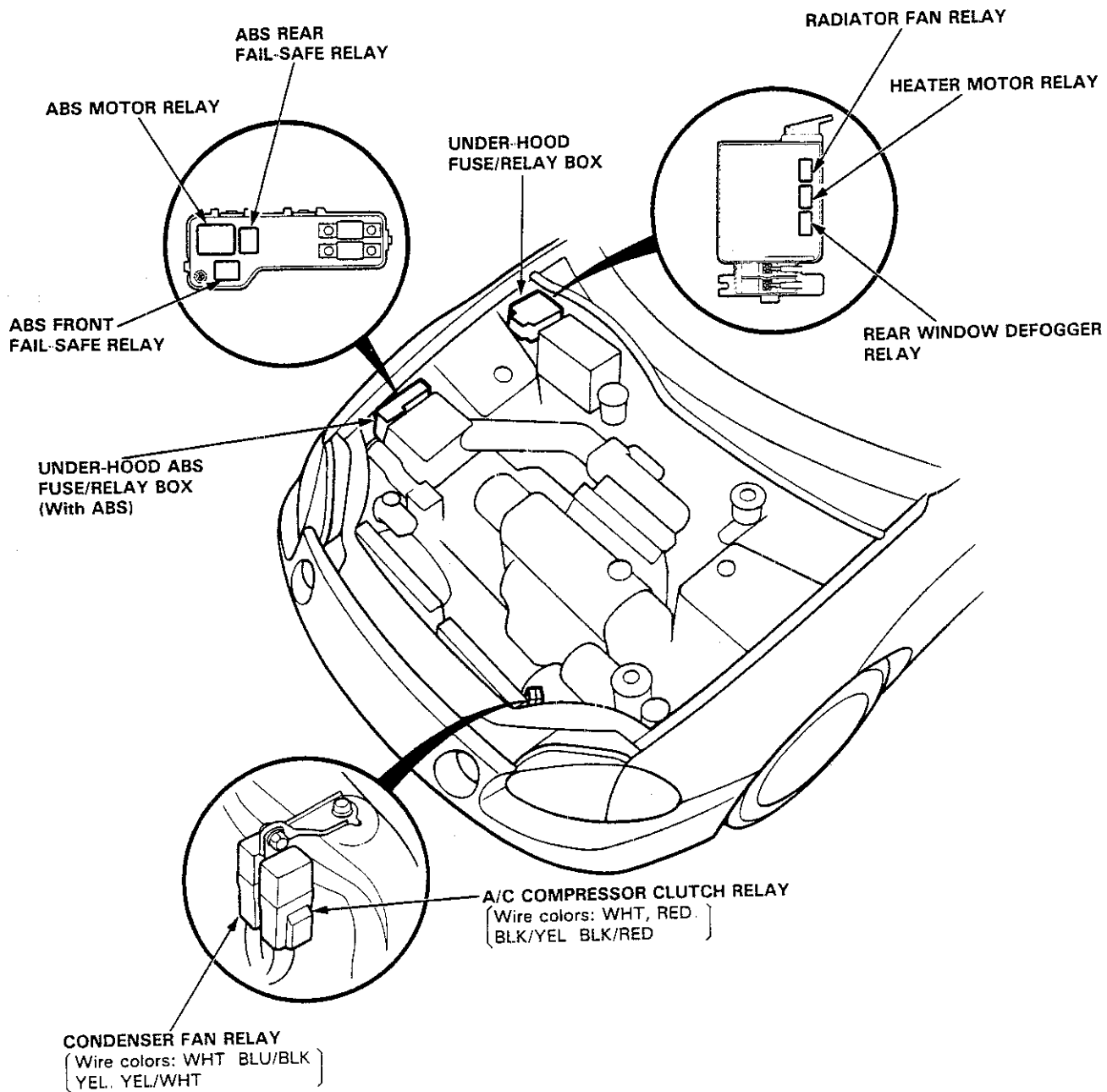
The wire insulator has one color or one color with another color stripe. The second color is the stripe





# Relay and Control Unit Locations

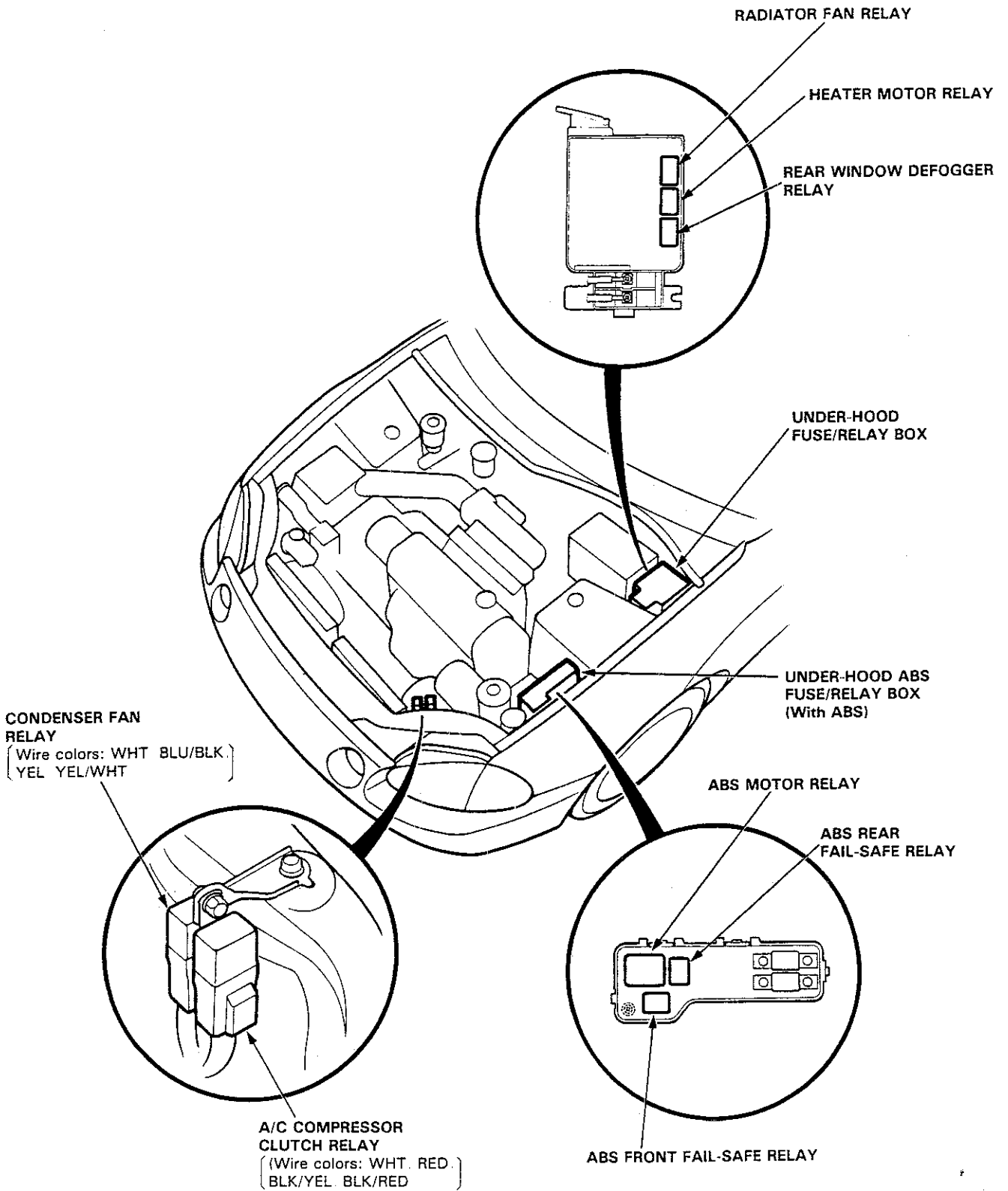
Engine Compartment (LHD)





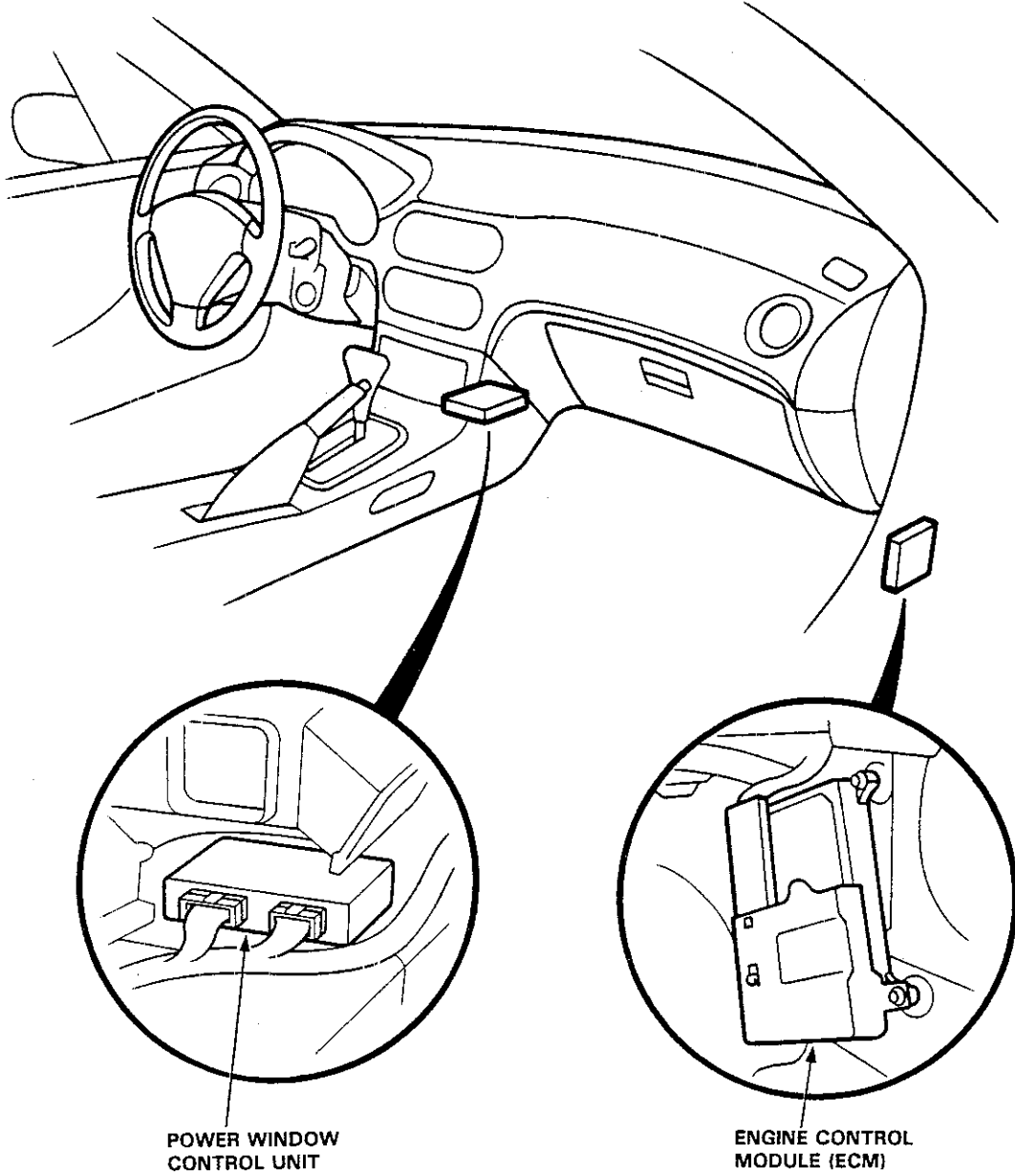


# Engine Compartment (RHD)



# Relay and Control Unit Locations

Dashboard (LHD)



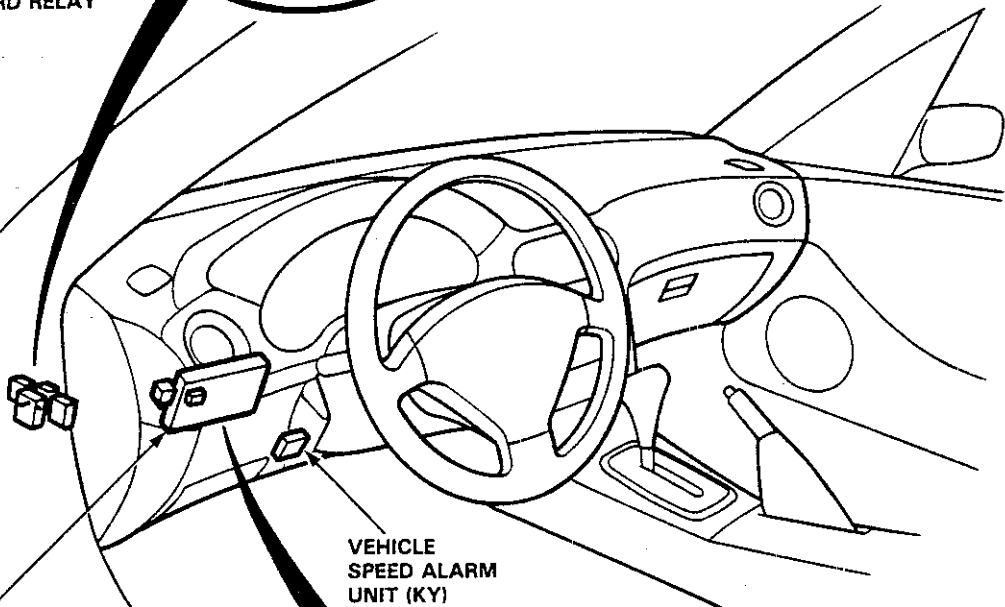


HEADLIGHT WASHER  
CONTROL UNIT  
(Some model versions of KG and KS)

ECM MAIN RELAY

ACCESSORY LIGHT  
RELAY

TURN SIGNAL/  
HAZARD RELAY

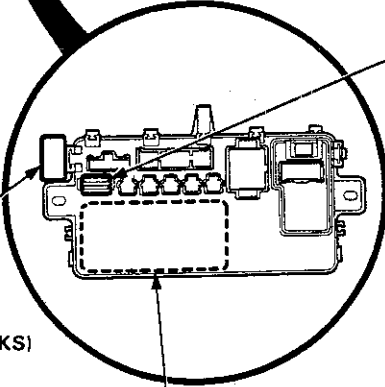


UNDER-DASH FUSE/RELAY  
BOX

POWER WINDOW  
RELAY

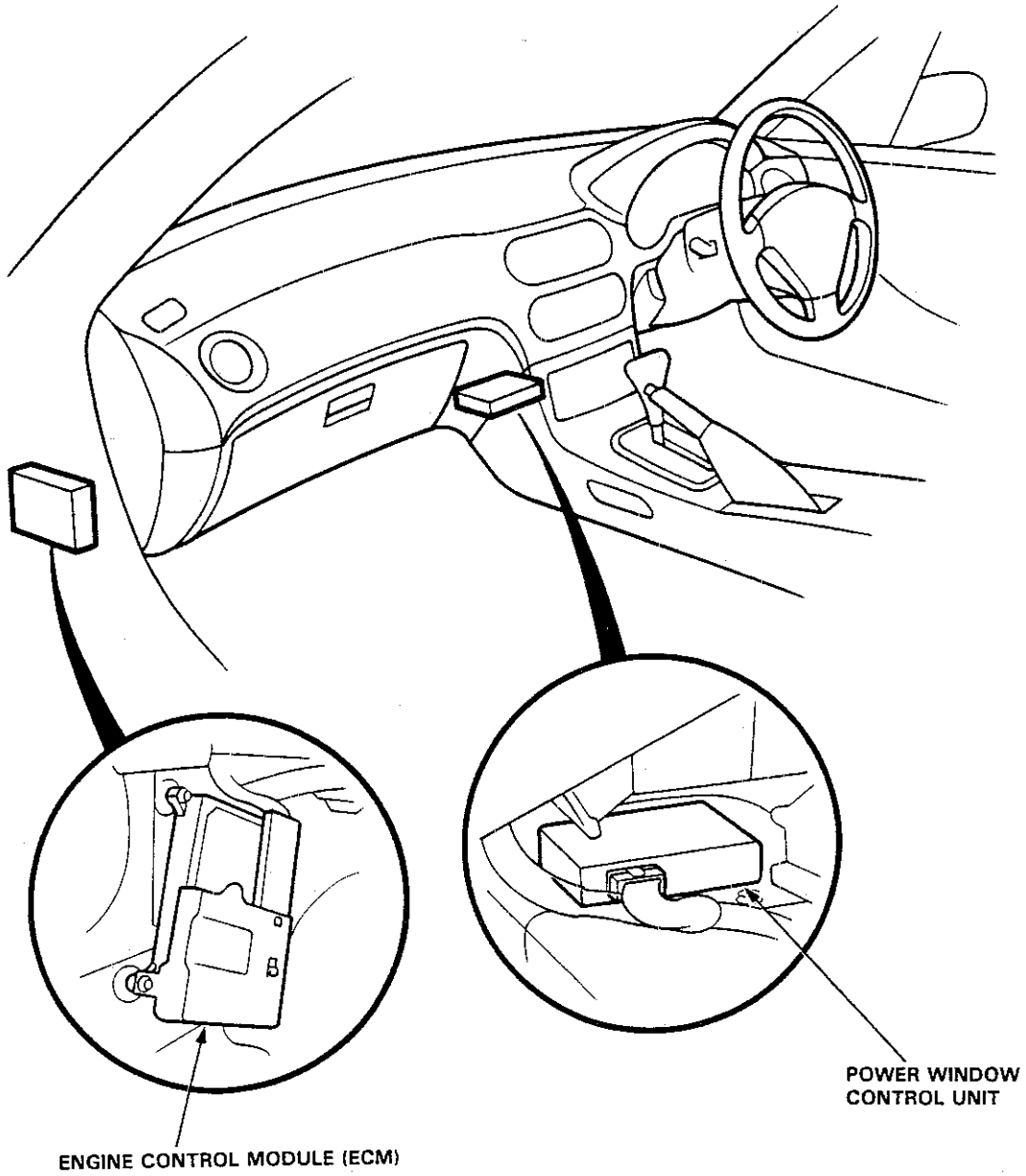
SEAT HEATER MAIN RELAY  
(Some model versions of KG and KS)

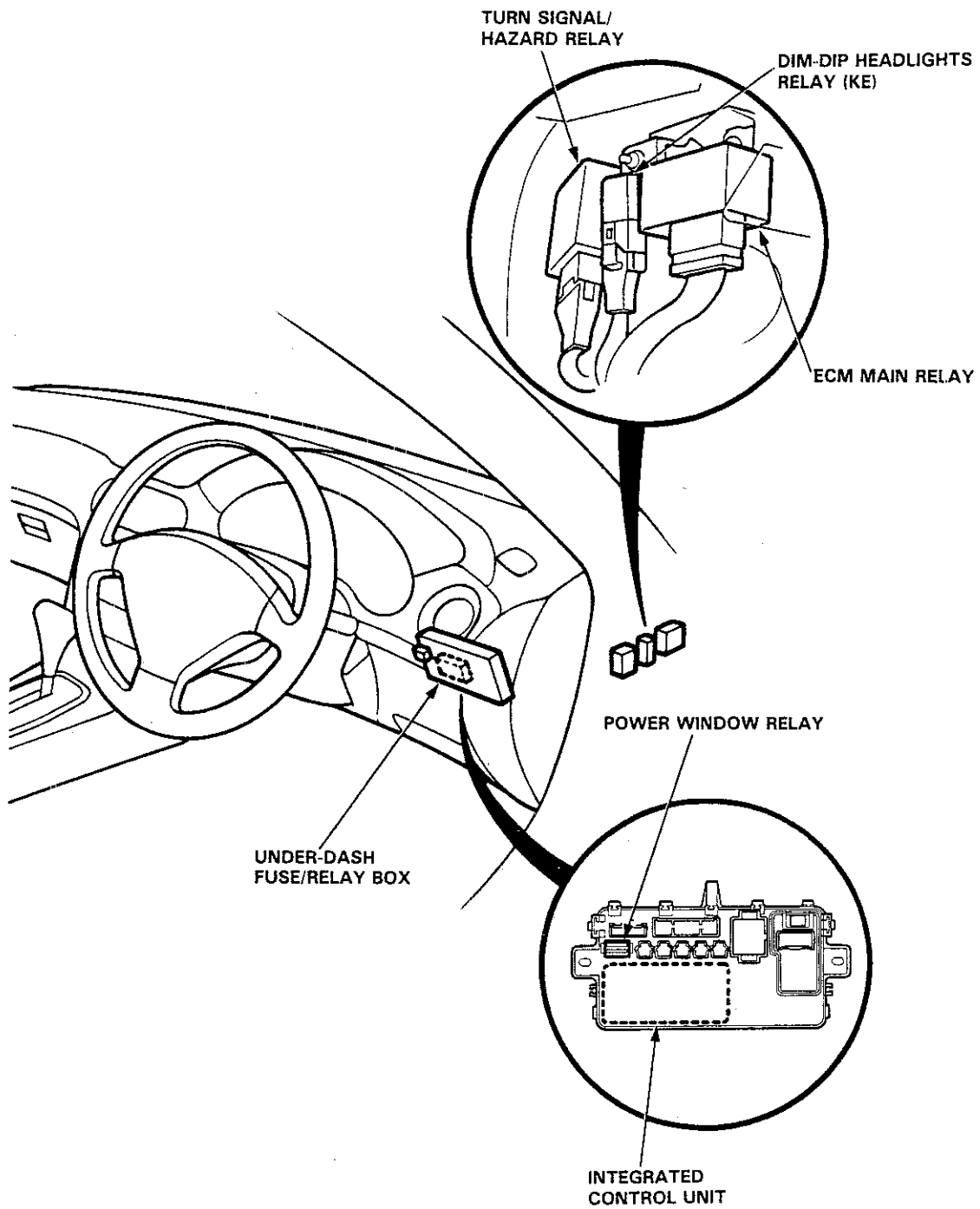
INTEGRATED  
CONTROL UNIT



# Relay and Control Unit Locations

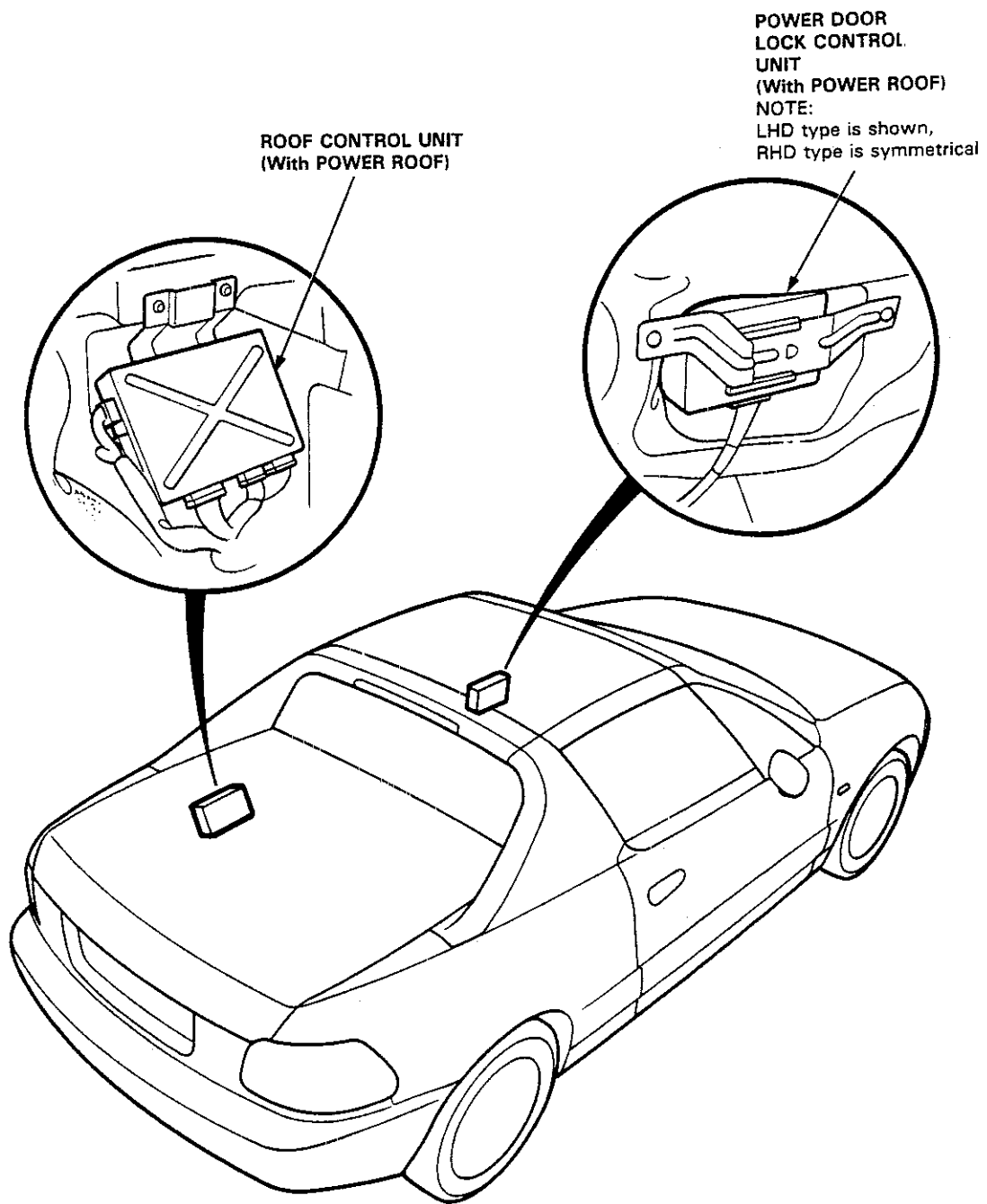
Dashboard (RHD)

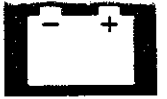




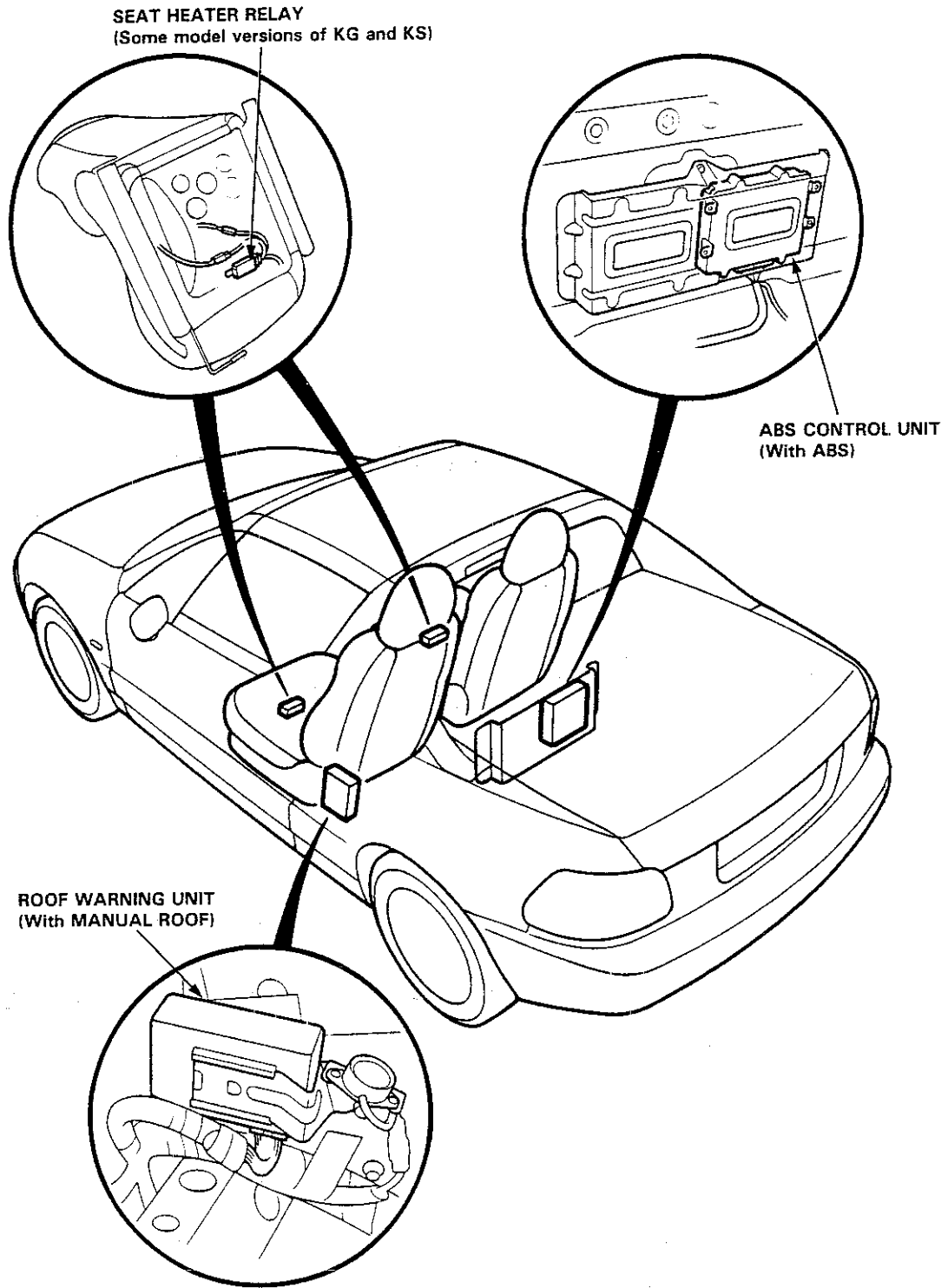
# Relay and Control Unit Locations

## Door and Trunk



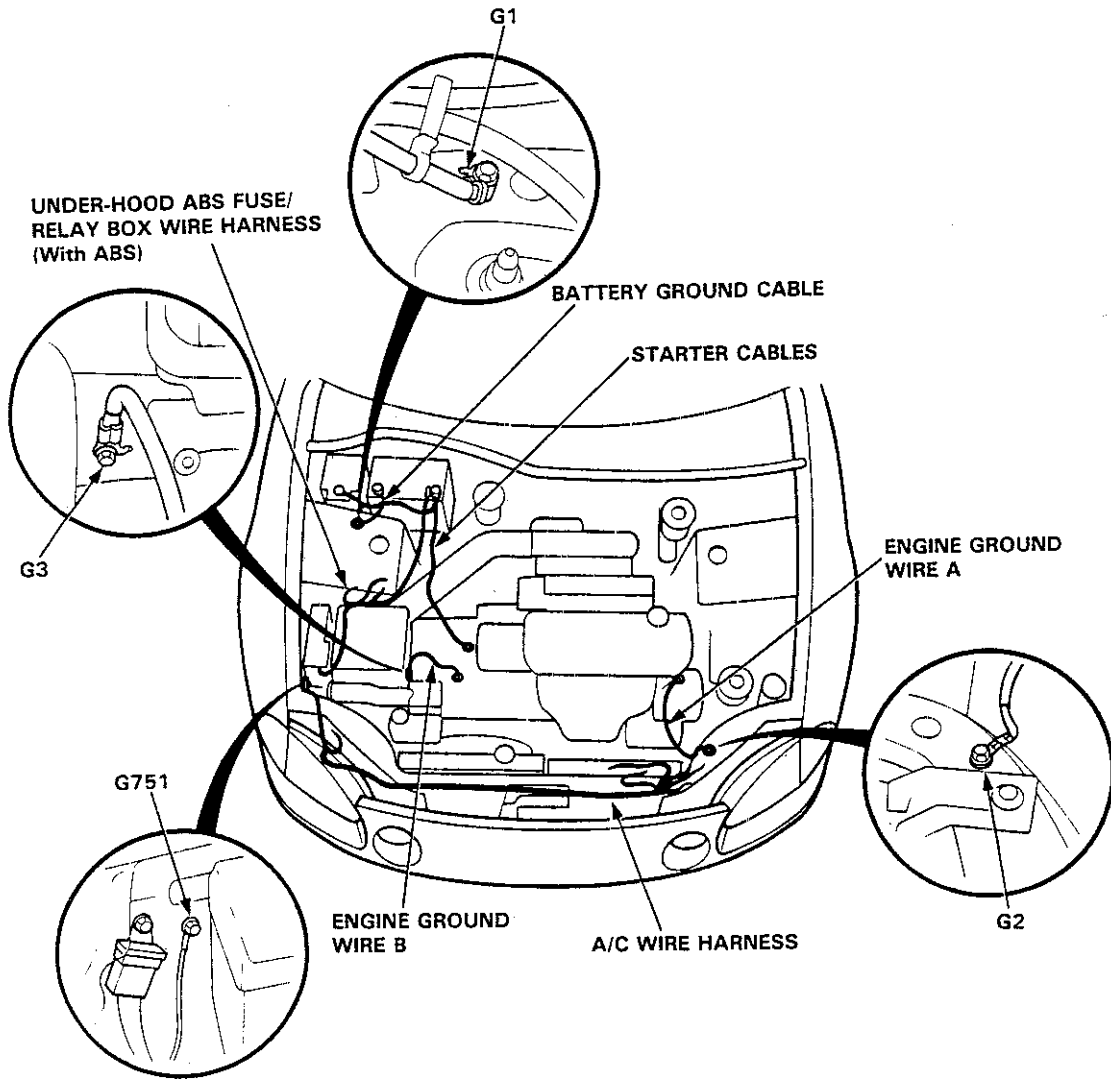


# Floor and Trunk



# Wire Harness and Ground Locations

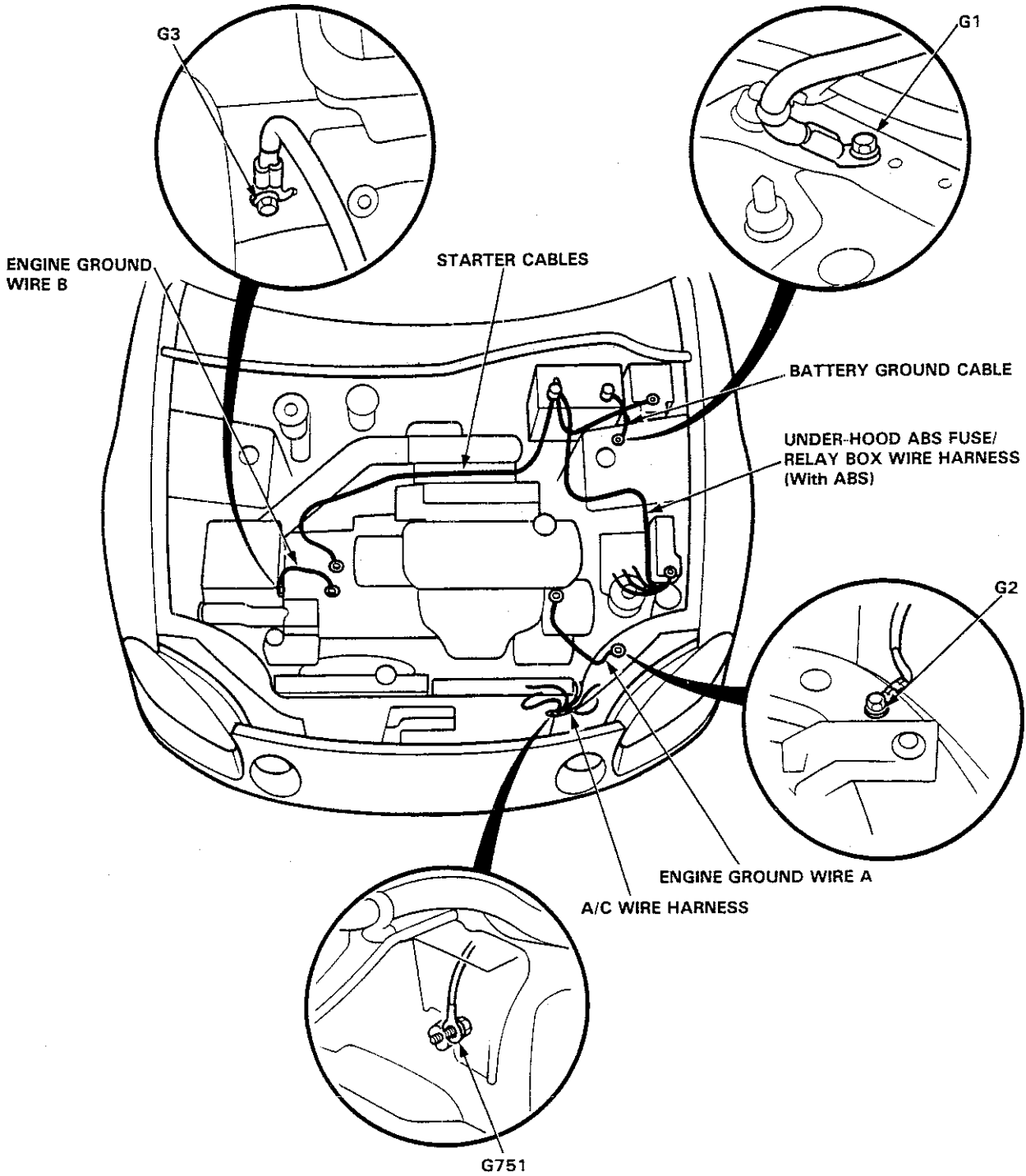
Engine Compartment (LHD)







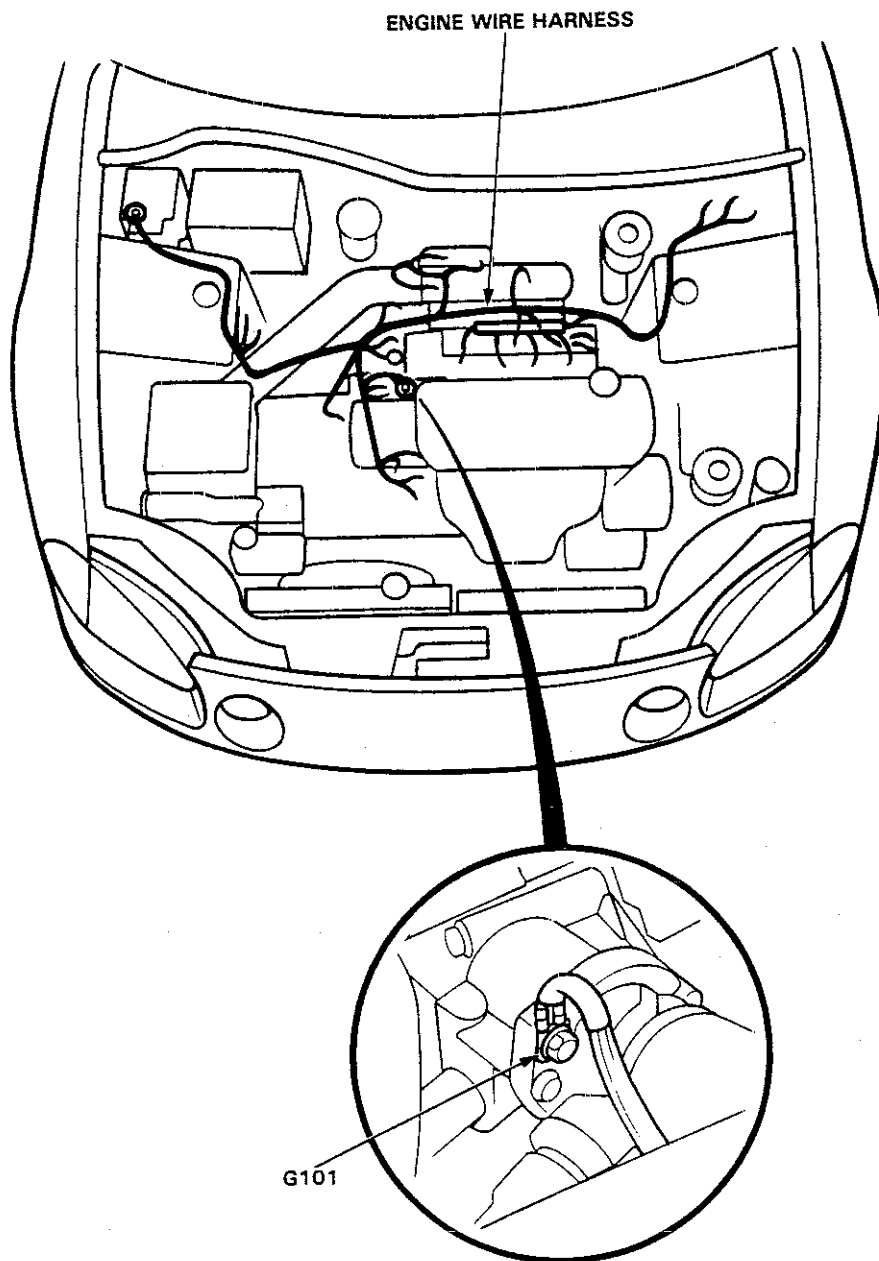
# Engine Compartment (RHD)



# Wire Harness and Ground Locations

Engine Compartment (LHD)

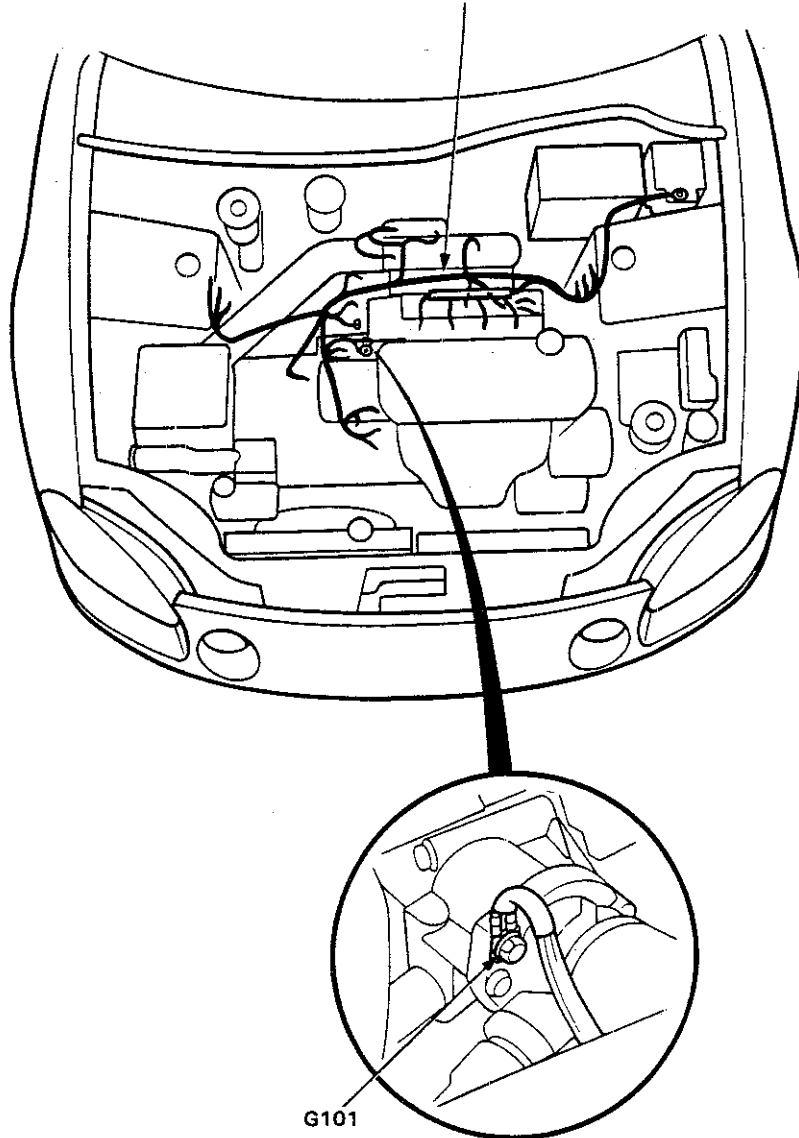
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# Engine Compartment (RHD)

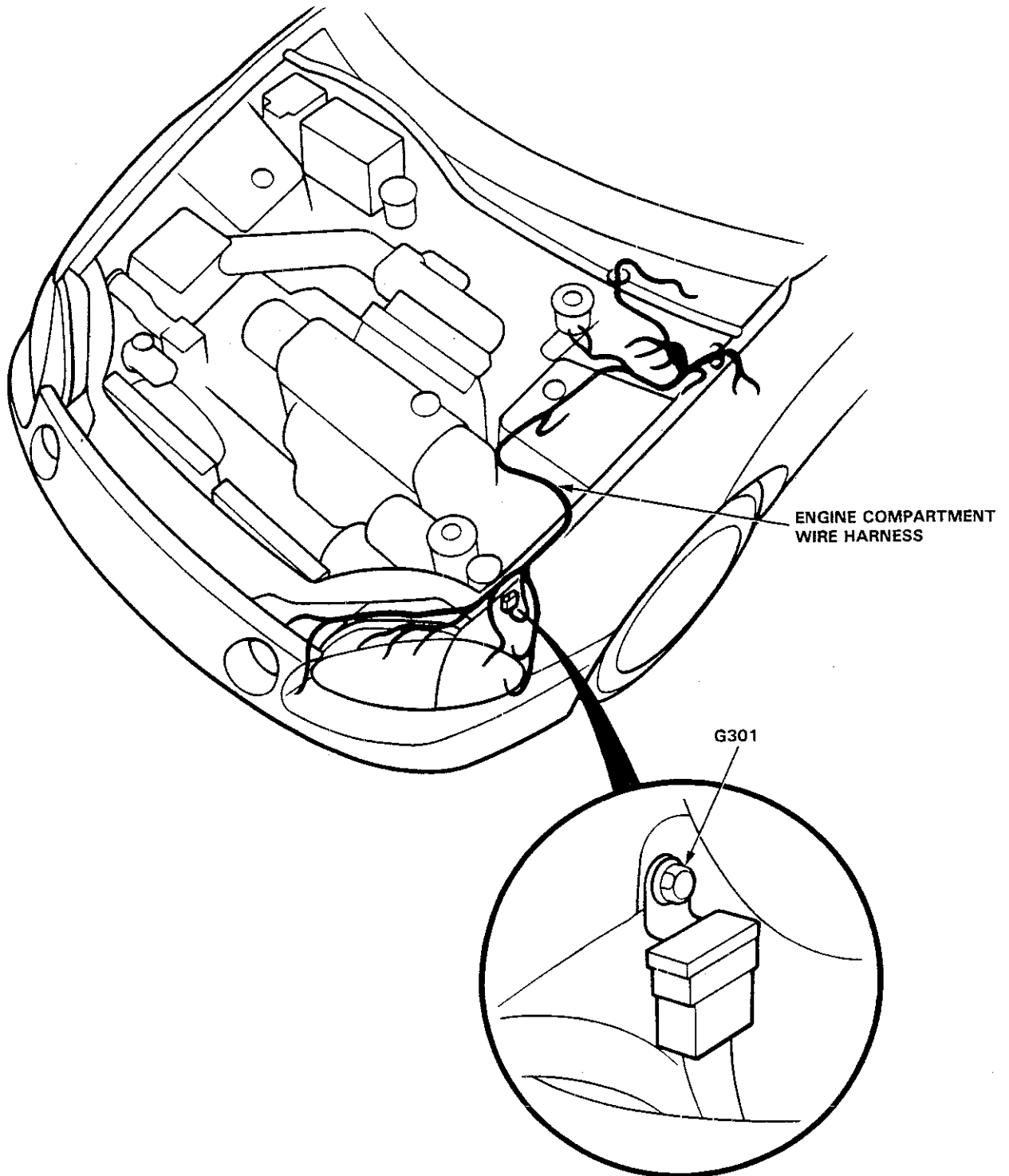
ENGINE WIRE HARNESS



# Wire Harness and Ground Locations

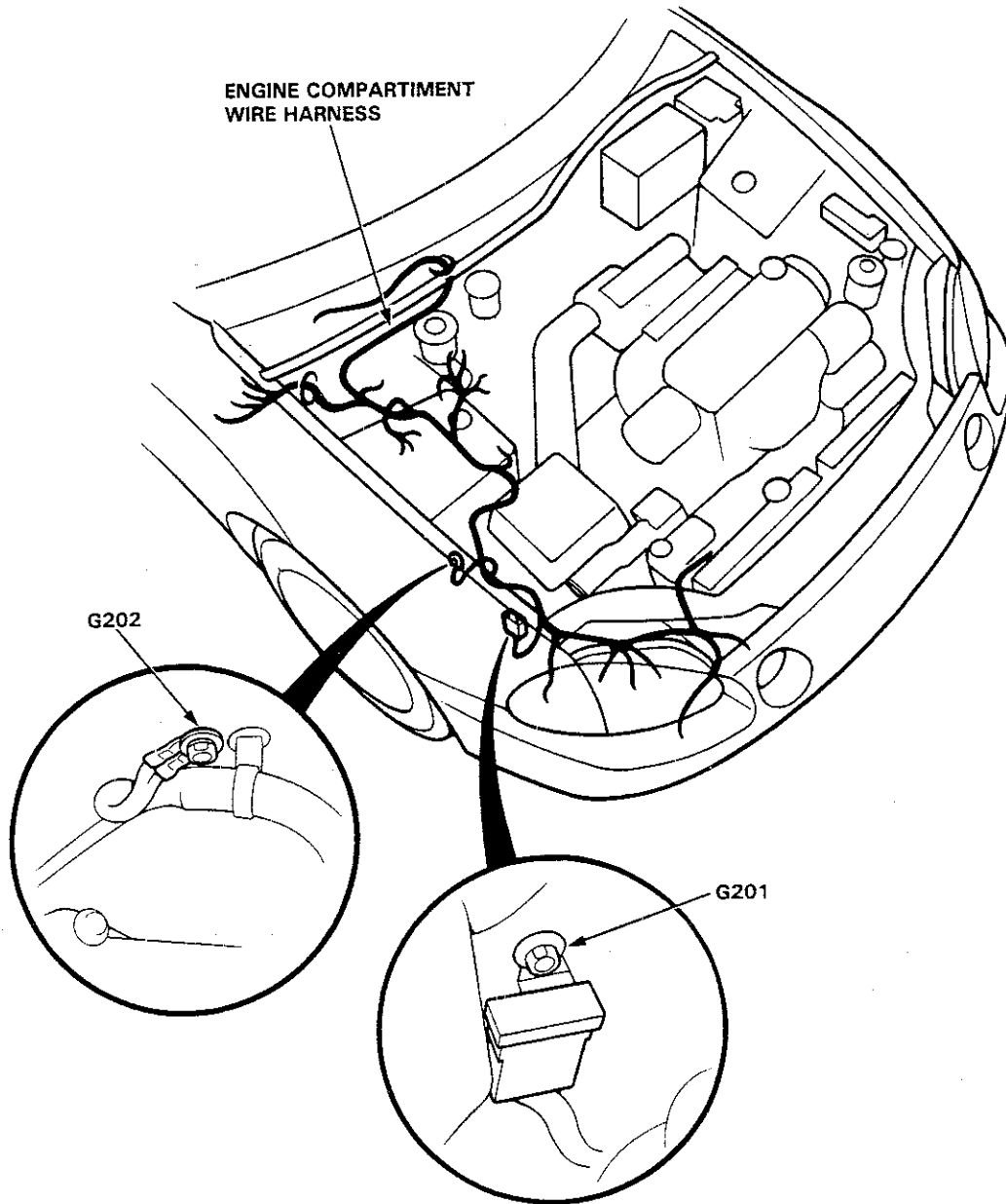
## Engine Compartment (LHD)

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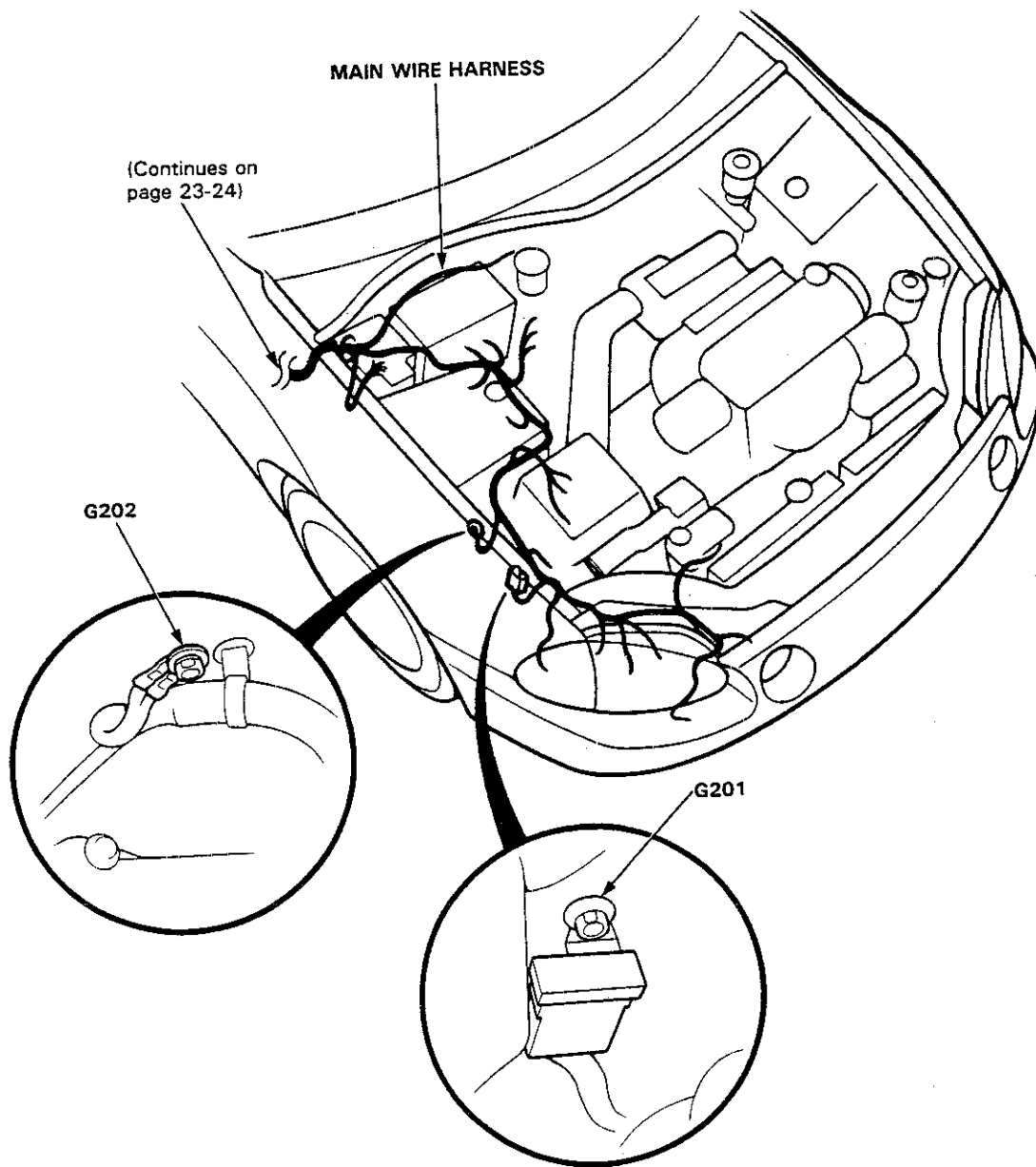
# Engine Compartment (RHD)

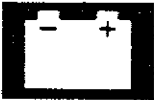


# Wire Harness and Ground Locations

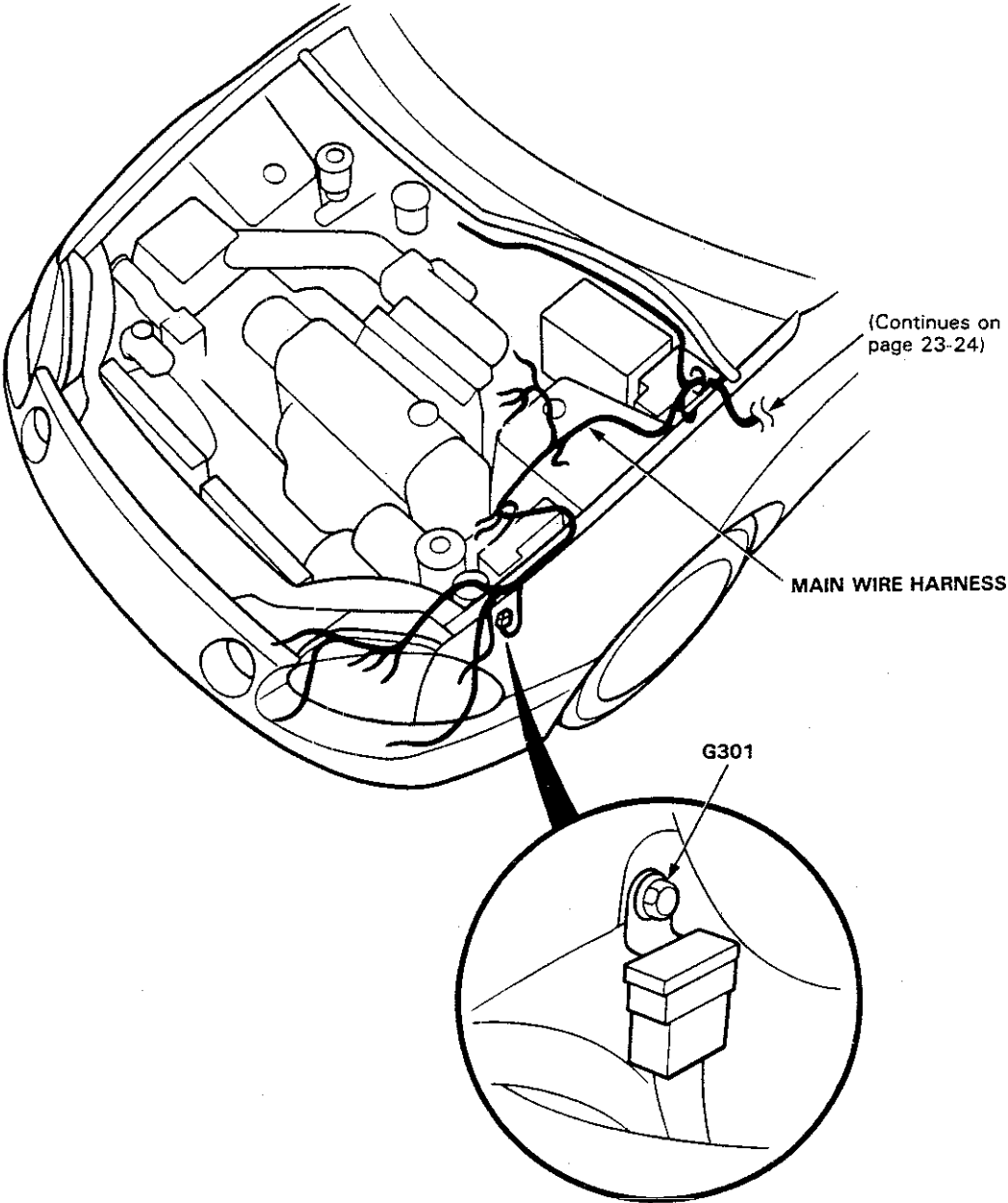
## Engine Compartment (LHD)

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Engine Compartment (RHD)

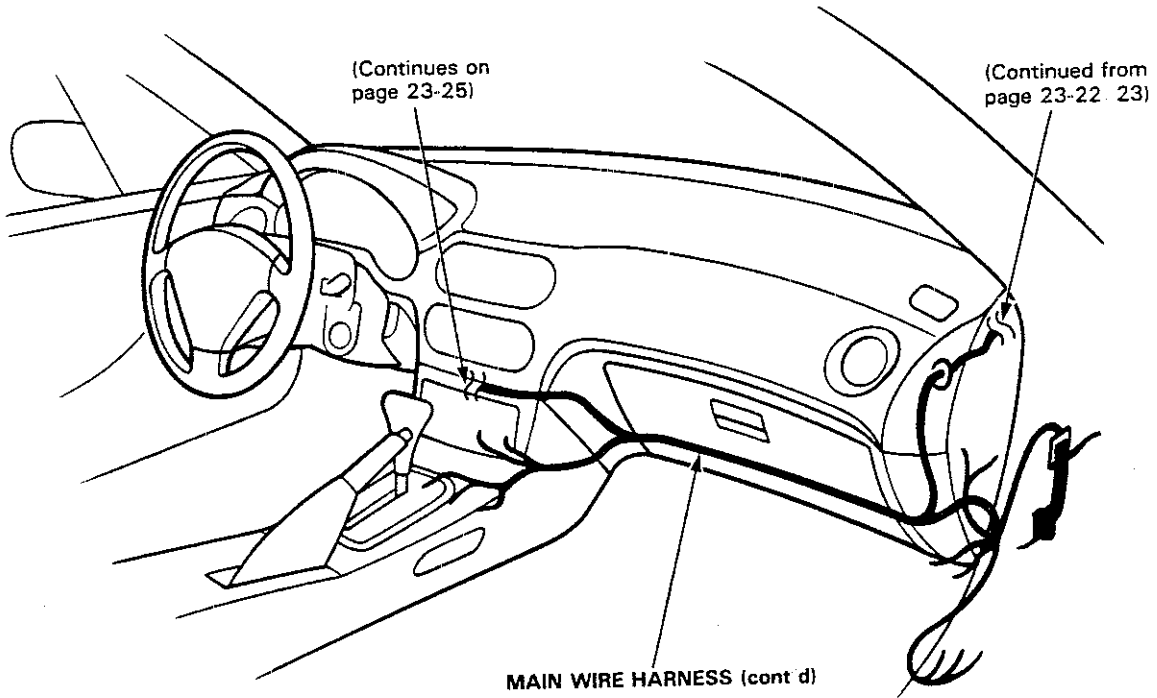


# Wire Harness and Ground Locations

## Dashboard and Floor

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NOTE: LHD type is shown; RHD type is symmetrical.



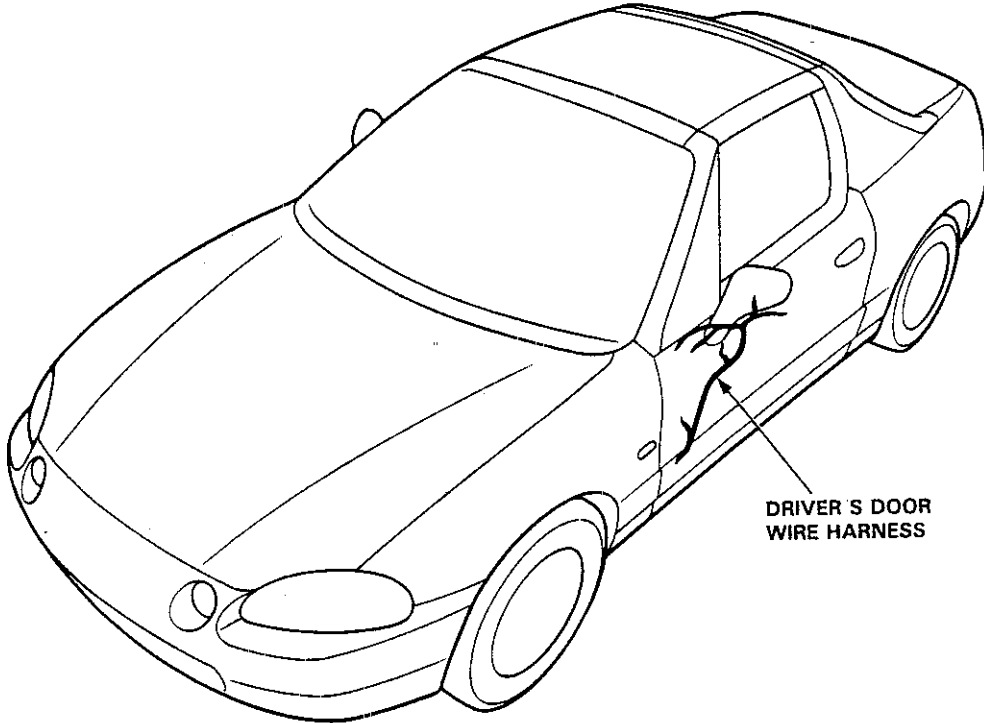




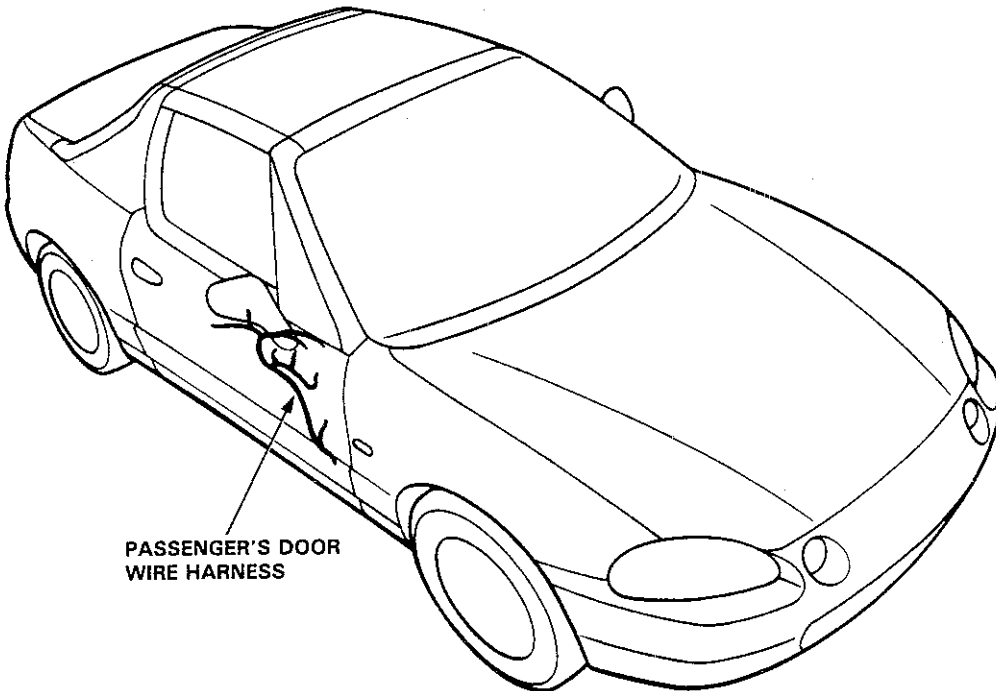
# Door

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NOTE: LHD type is shown; RHD type is symmetrical.



DRIVER'S DOOR  
WIRE HARNESS

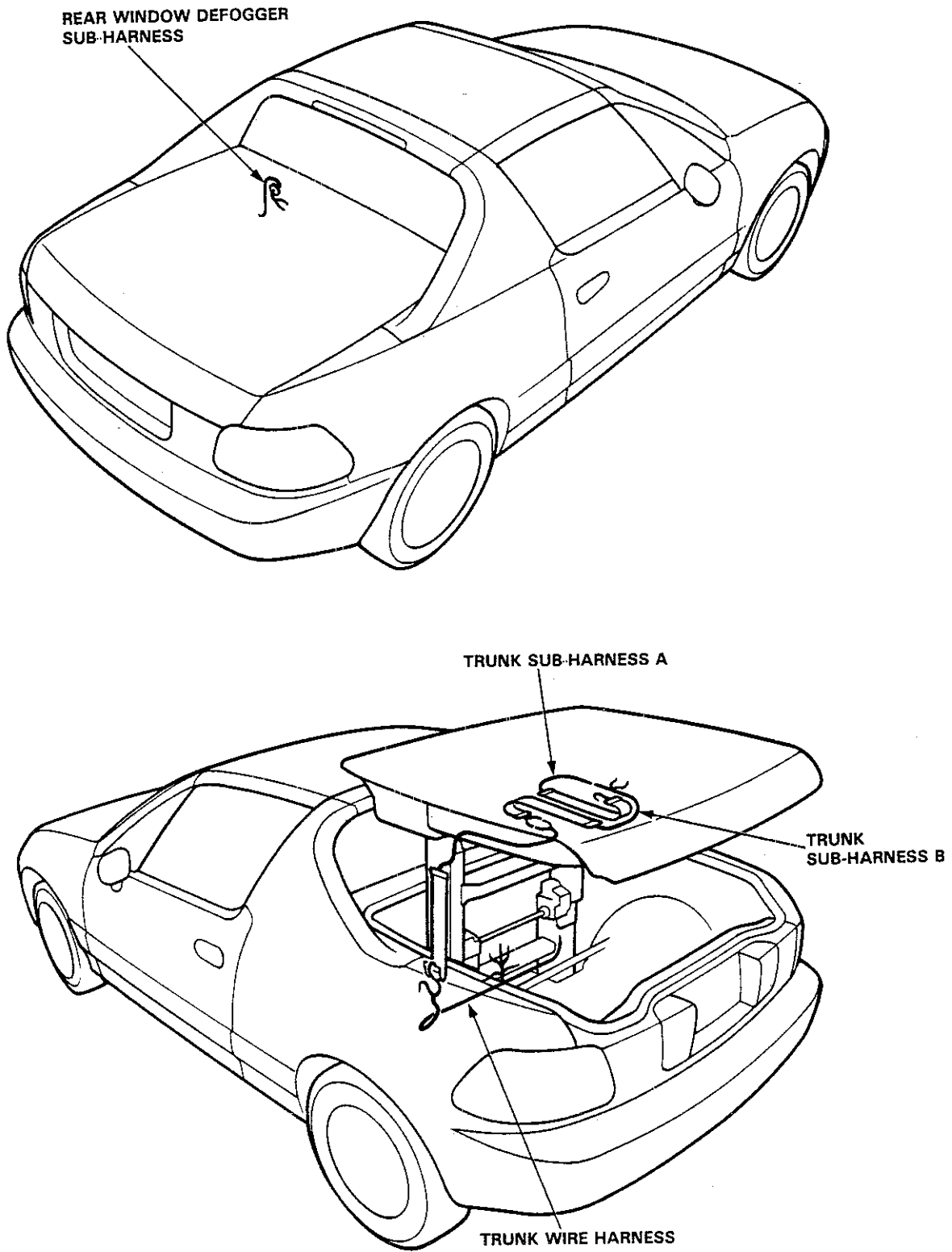


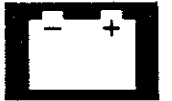
PASSENGER'S DOOR  
WIRE HARNESS

# Wire Harness and Ground Locations

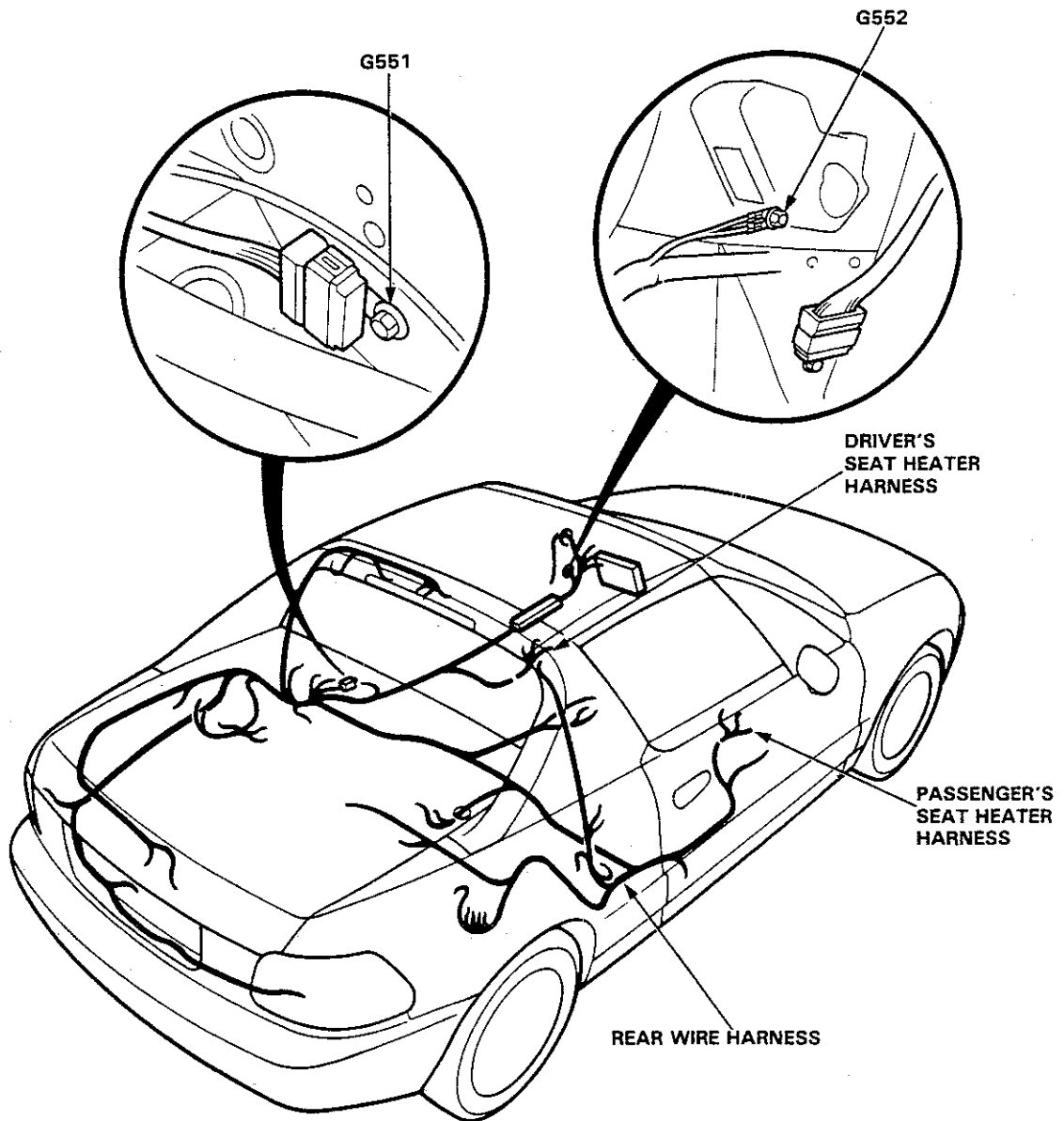
Rear

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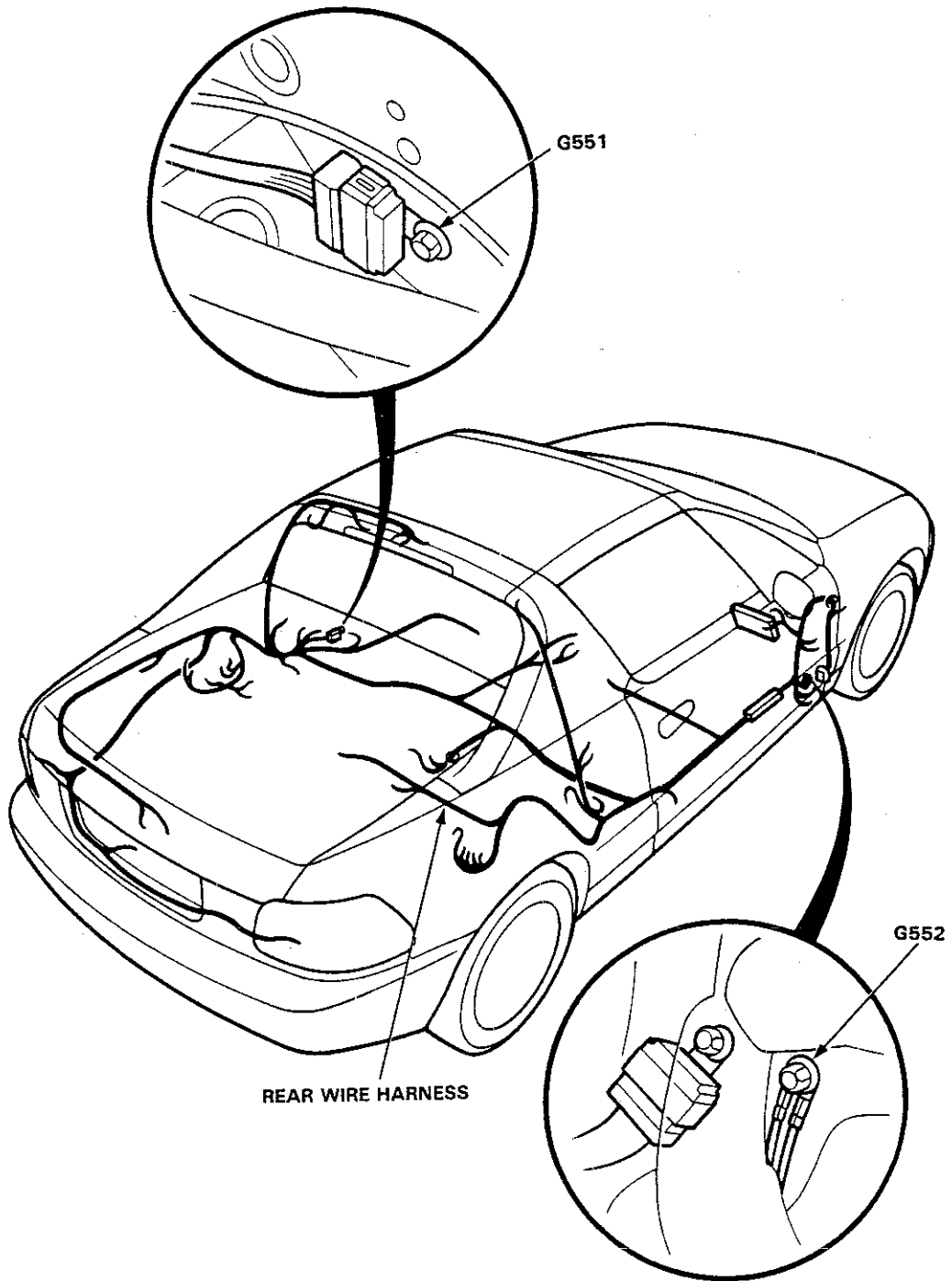
Floor (LHD)



# Wire Harness and Ground Locations

Floor (RHD)

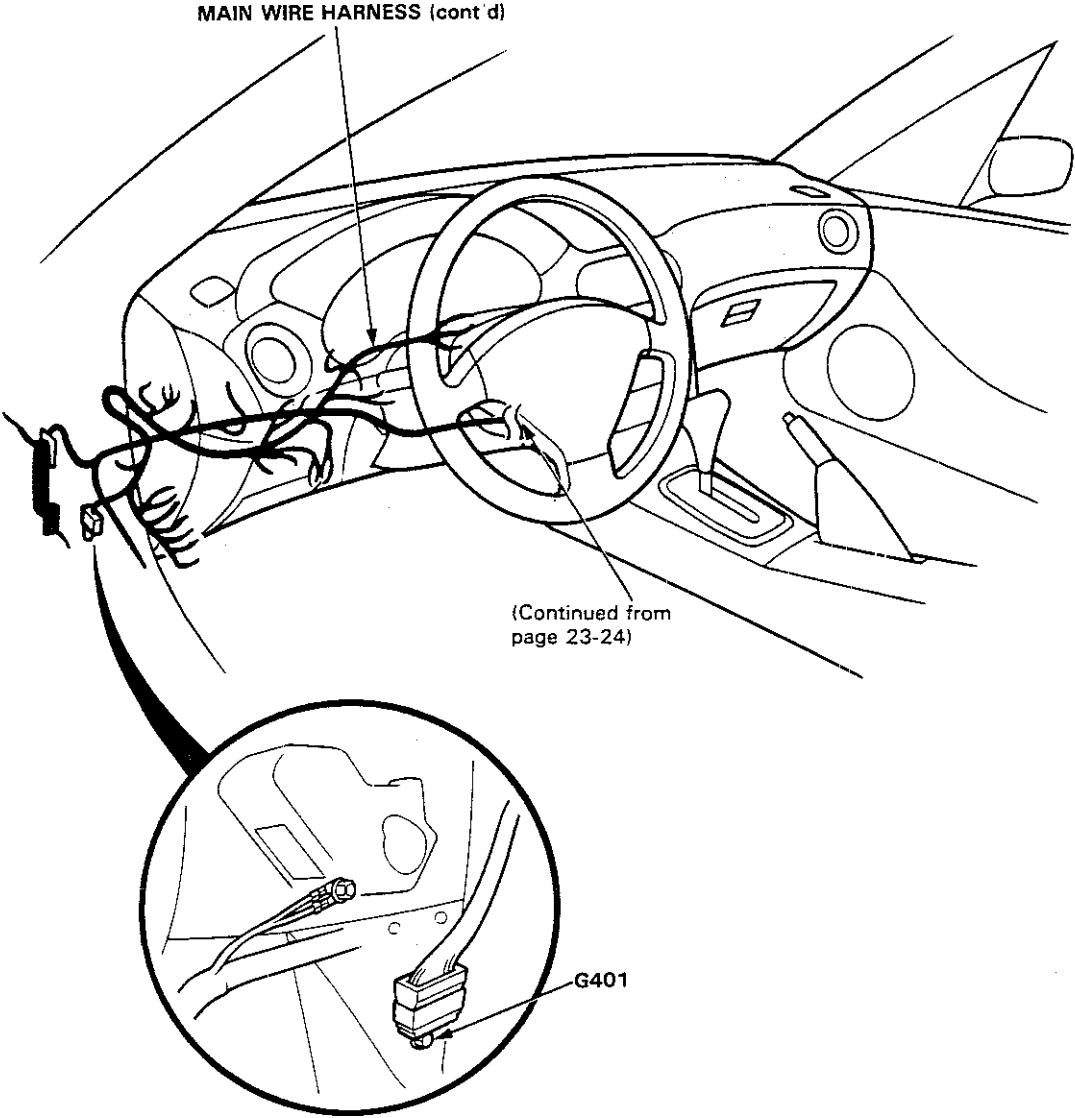
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# Dashboard

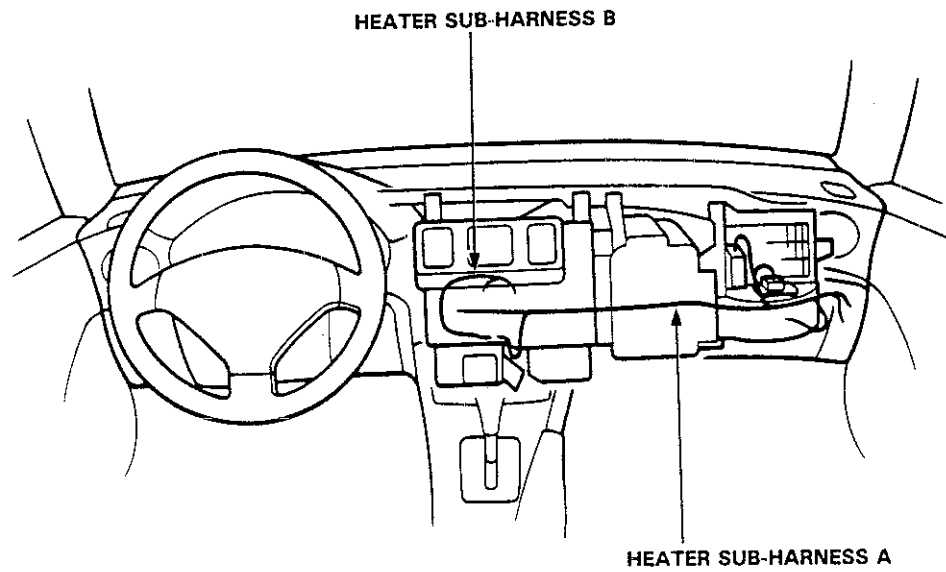
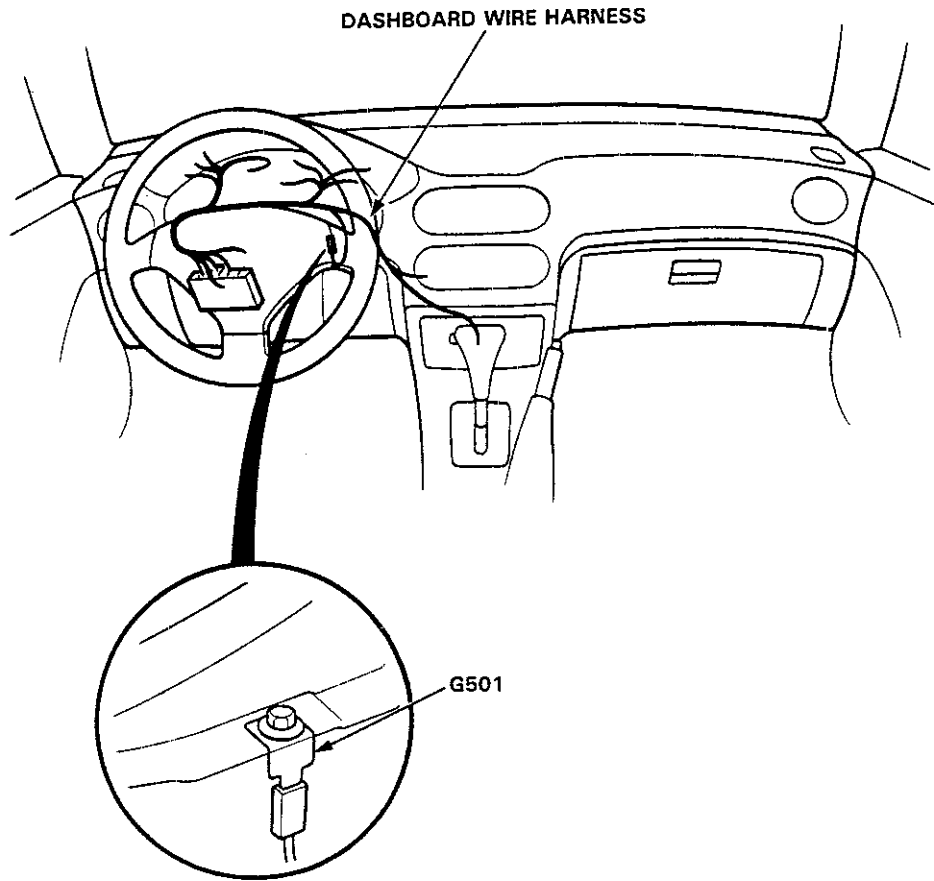
NOTE: LHD type is shown; RHD type is symmetrical

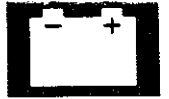


# Wire Harness and Ground Locations

## Dashboard

NOTE: LHD type is shown; RHD type is symmetrical.

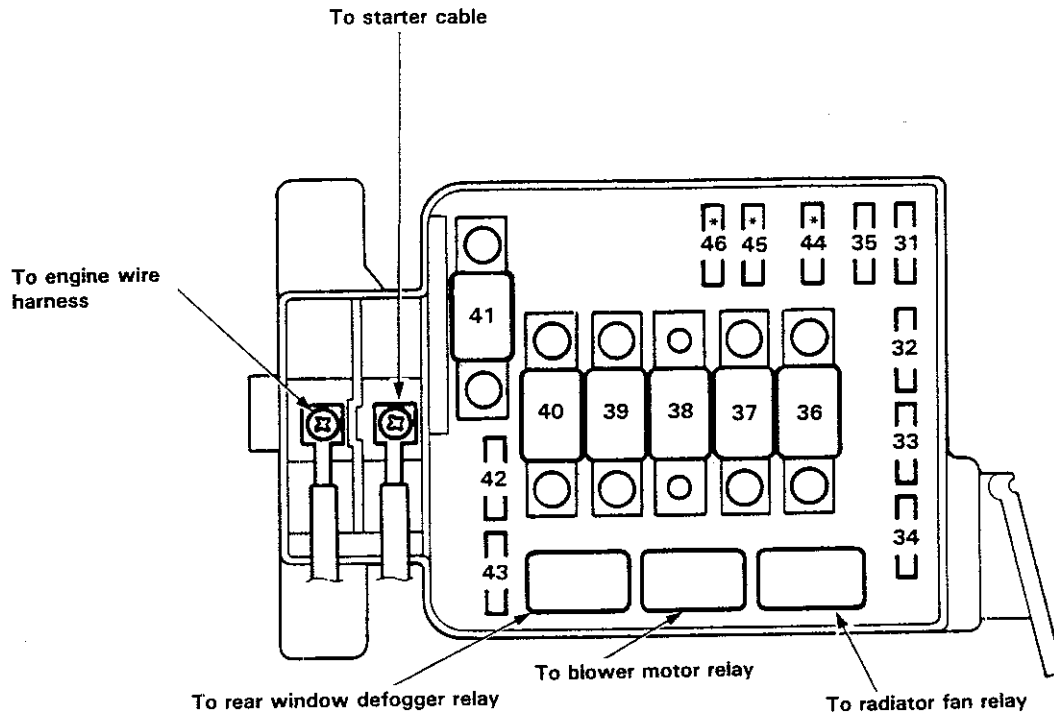




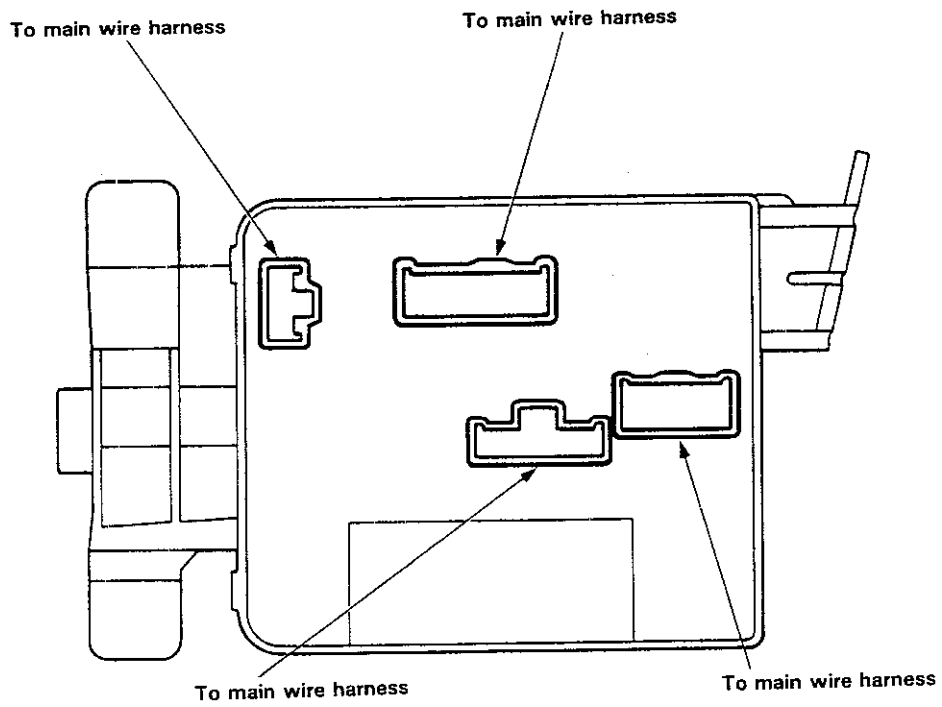
# Fuses

## Under-hood Fuse/Relay box

\*: Not used



NOTE: View from the backside of the under-hood fuse/relay box





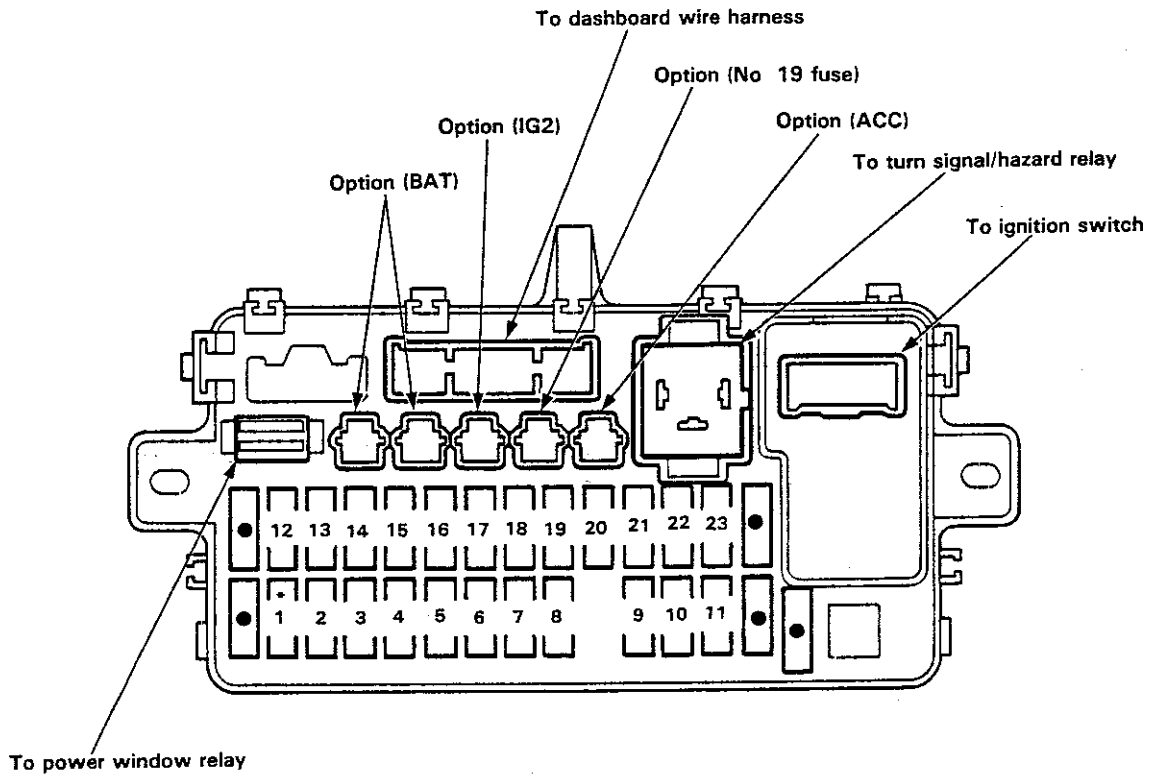


Fuse Number	Amps	Wire Color	Component or Circuit Protected
31	15 A	YEL/WHT	ECM main relay
32	7.5 A	WHT/BLU	ECM, Clock, Roof control unit
33	15 A	BLK/RED	Radiator fan relay (contacts), Radiator fan motor
34	15 A	BLK/GRN	Rear window defogger relay (contacts), Rear window defogger
35	20 A	WHT	Condenser fan motor, A/C compressor clutch
36	50 A	WHT/RED	Option, Ceiling light, Power window system
37	30 A	BLU/WHT	Blower motor relay
38	30 A	WHT/BLU	Roof control unit
39	50 A	WHT/BLK	Ignition switch (BAT)
40	50 A	WHT	Combination light switch
41	80 A	—	Power distribution
42	15 A	WHT/GRN	Horn, Brake system
43	10 A	WHT/GRN	Turn signal/hazard flasher system
44	—	—	Not used
45	—	—	Not used
46	—	—	Not used

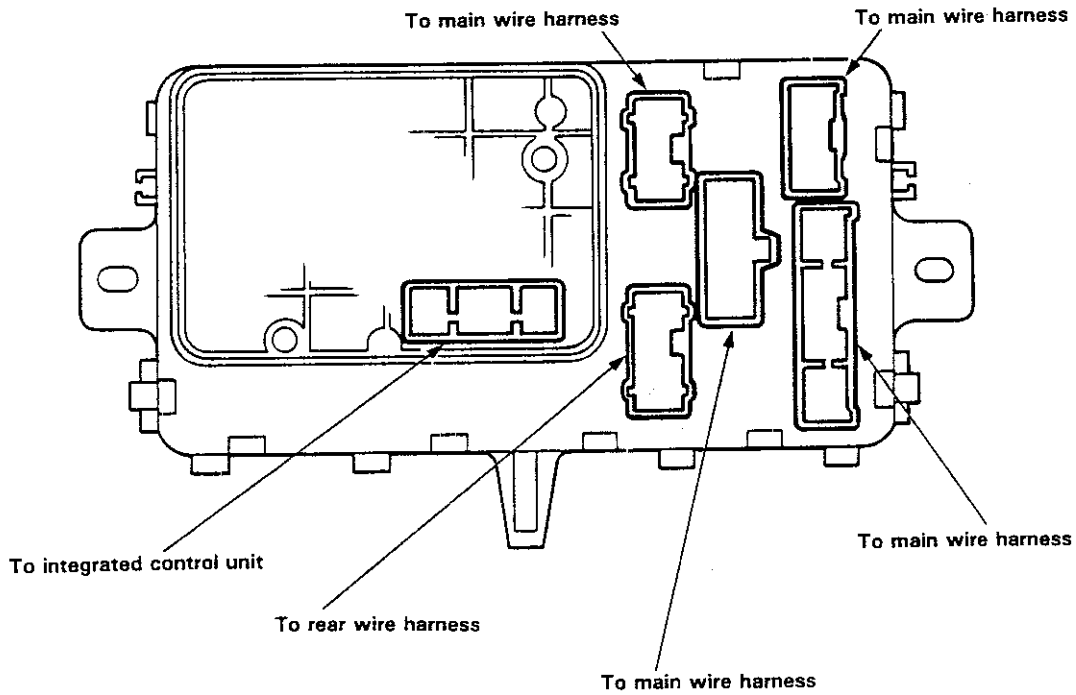
# Fuses

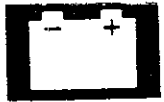
## Under-dash Fuse/Relay Box

- : Spare fuse
- \*: Not used



NOTE: View from the backside of the under-dash fuse/relay box





Fuse Number	Amps	Wire Color	Component or Circuit Protected
1	—	—	Not used
2	20 A	WHT/BLK	Seat heaters (*1)
3	7.5 A	WHT/BLU	Ceiling light, Trunk light, Integrated control unit (KY)
4	20 A	YEL/BLK	Roof control unit (*2)
5	20 A	BLU/BLK [WHT/YEL]	Power window control unit
6	20 A	WHT/GRN	Power door lock control unit (Except KP, KT)
7	20 A	GRN/BLK	Power window control unit, Roof control unit (*2)
8	20 A	WHT/YEL [BLU/BLK]	Power window control unit
9	10 A	RED/BLU	Right headlight (High beam)
10	10 A	RED/GRN	Left headlight (High beam), High beam indicator light
11	10 A	BLU/RED	Accessory lights (KY)
	20 A	WHT/BLK	Headlight washer control unit (*1)
12	15 A	BLK/YEL	Alternator (IG 1), ECM main relay
13	7.5 A	BLK/YEL	Rear window defogger relay, ABS motor relays
14	20 A	GRN/BLK	Wiper and washer motors
15	10 A	YEL	Gauge and indicator lights, Roof control unit (*2), Roof warning unit (*3)
16	7.5 A	YEL/BLK	LHD: Integrated control unit (KS), Option RHD: Option (KE)
17	10 A	RED/BLU	LHD: Left taillight (KF, KG, KS), Option
		WHT/YEL	RHD: Integrated control unit (KE), Option
18	7.5 A	BLU/WHT	ECM, ECM main relay
19	10 A	RED/BLK	Dash lights, Right taillight, Front parking lights
20	7.5 A	RED/WHT	Rear fog light (European models)
21	10 A	RED/WHT	Right headlight (Low beam)
22	10 A	RED/YEL	Left headlight (Low beam)
23	15 A	YEL/RED	Stereo radio/cassette player, Cigarette lighter

\*1: Some model versions of KG and KS

\*2: With power roof

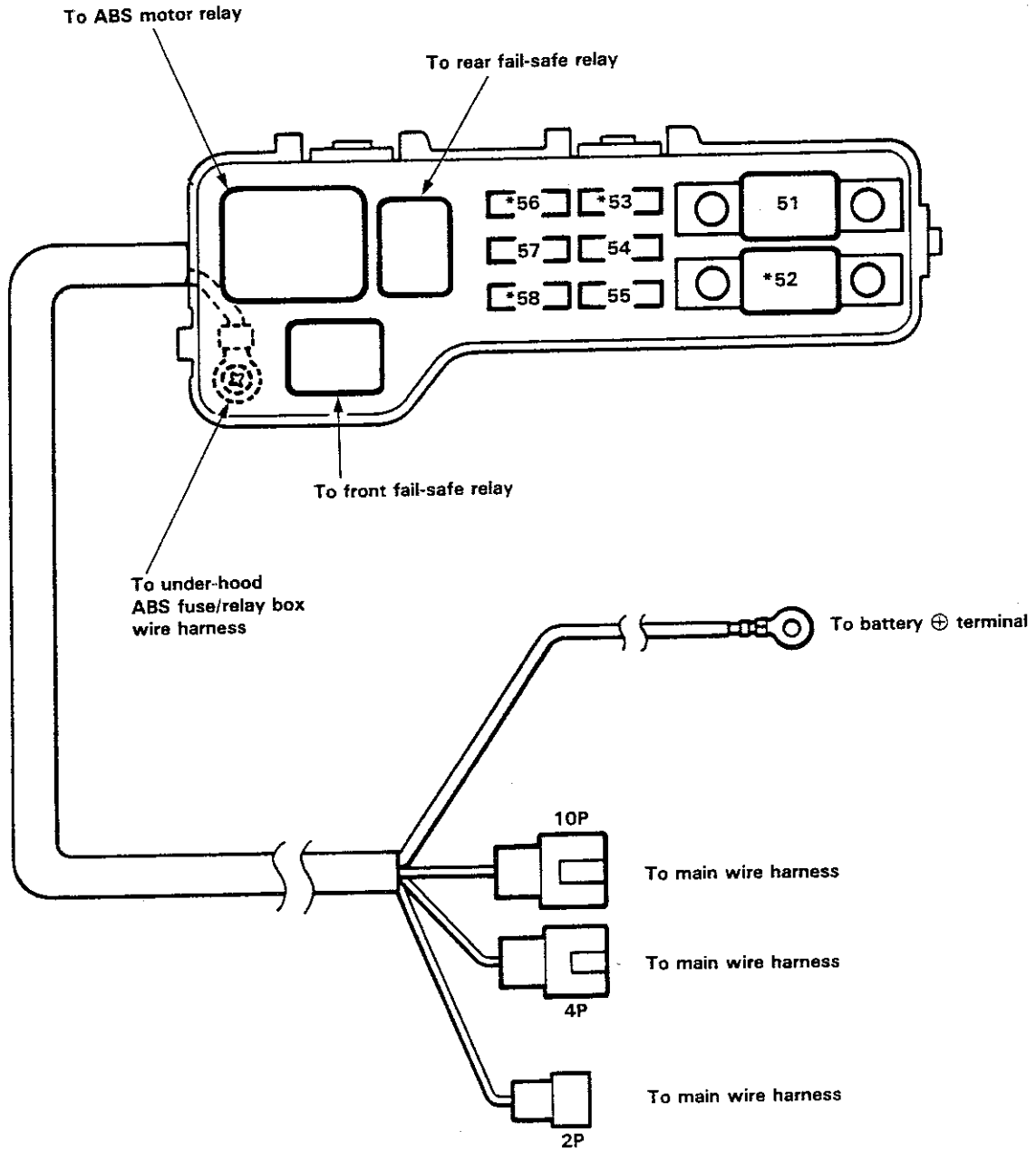
\*3: With manual roof

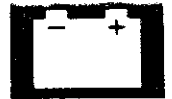
[ ]: RHD

# Fuses

## Under-hood ABS Fuse/Relay Box

\*: Not used

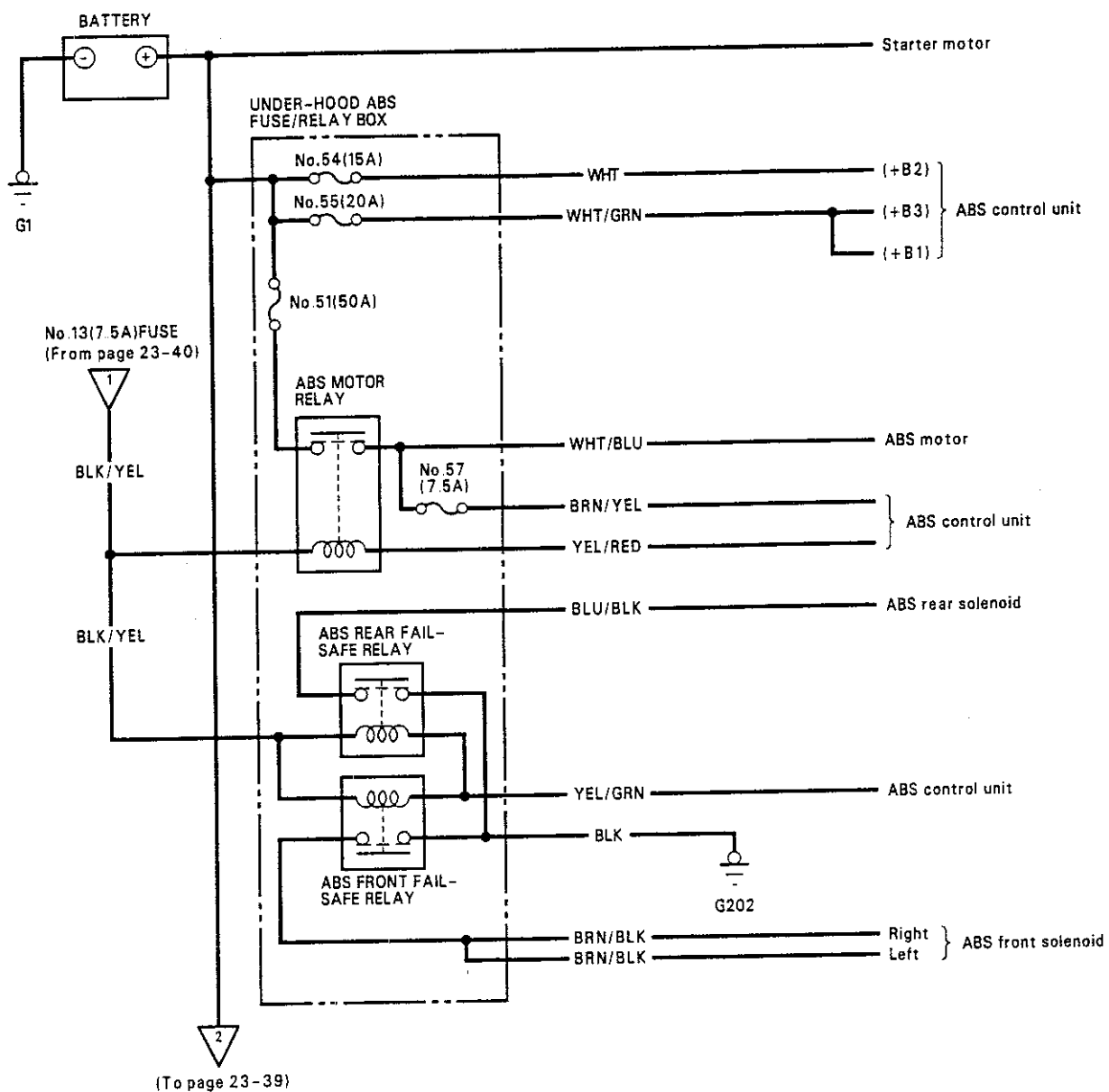


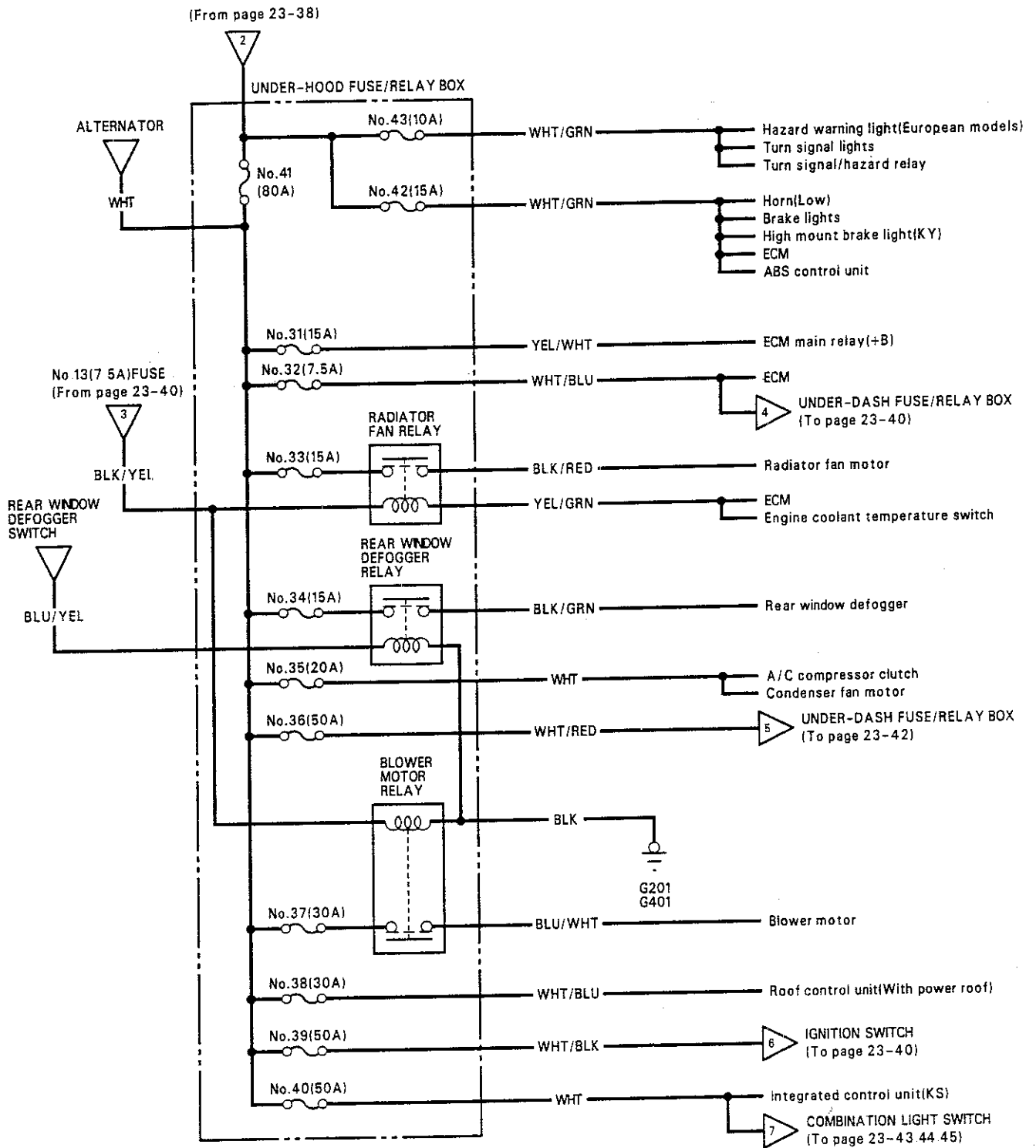


Fuse Number	Amps	Wire Color	Component or Circuit Protected
51	50 A	WHT/BLU	ABS motor relay (contacts), ABS motor
52	—	—	Not used
53	—	—	Not used
54	15 A	WHT	ABS control unit (+B2)
55	20 A	WHT/GRN	ABS control unit (+B1, +B3)
56	—	—	Not used
57	7.5 A	BRN/YEL	ABS control unit
58	—	—	Not used

# Power Distribution (LHD)

## Circuit Identification



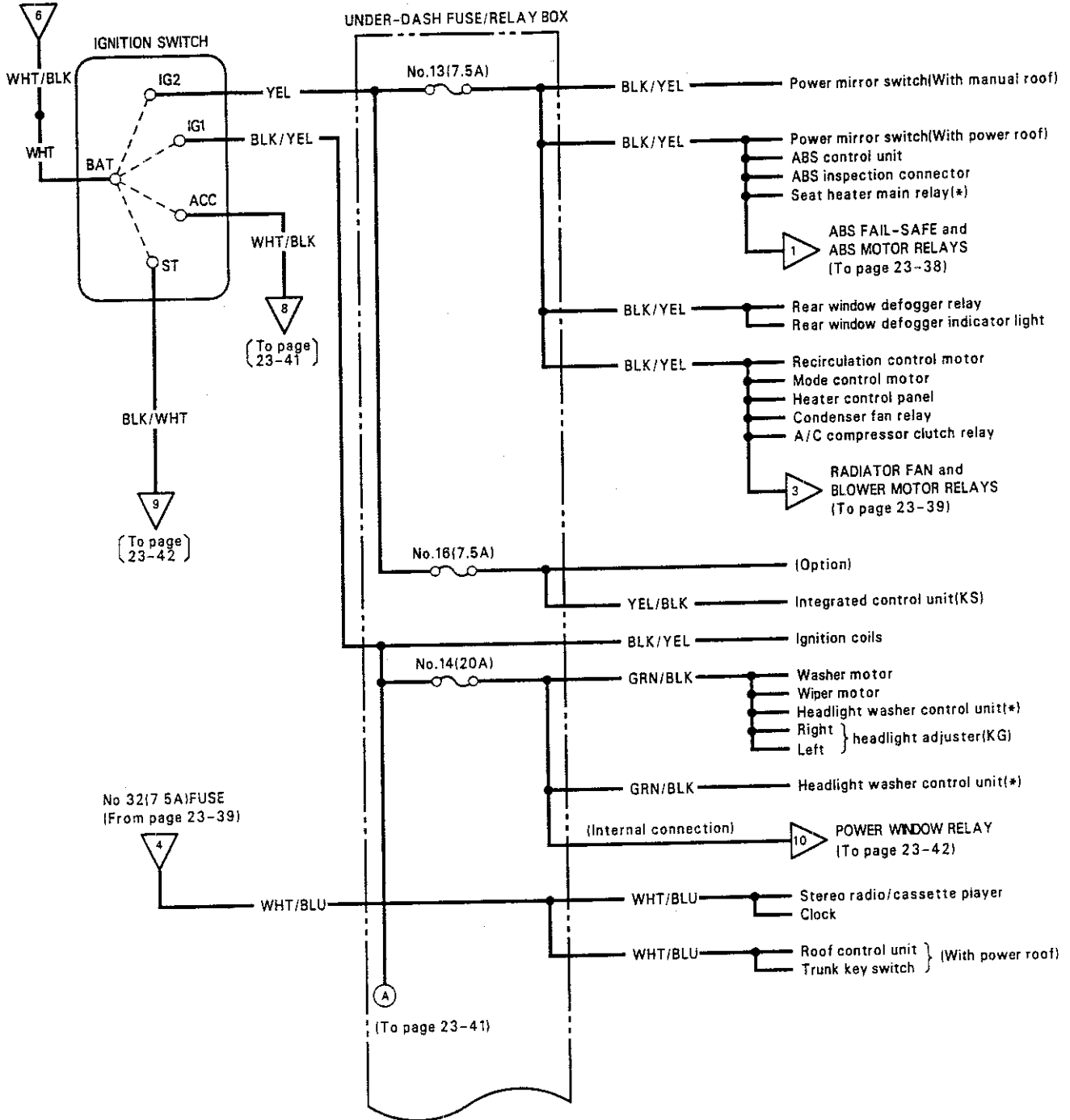


(cont d)

# Power Distribution (LHD)

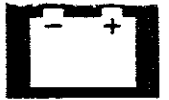
## Circuit Identification (cont'd)

No.39(50A)FUSE  
(From page 23-39)

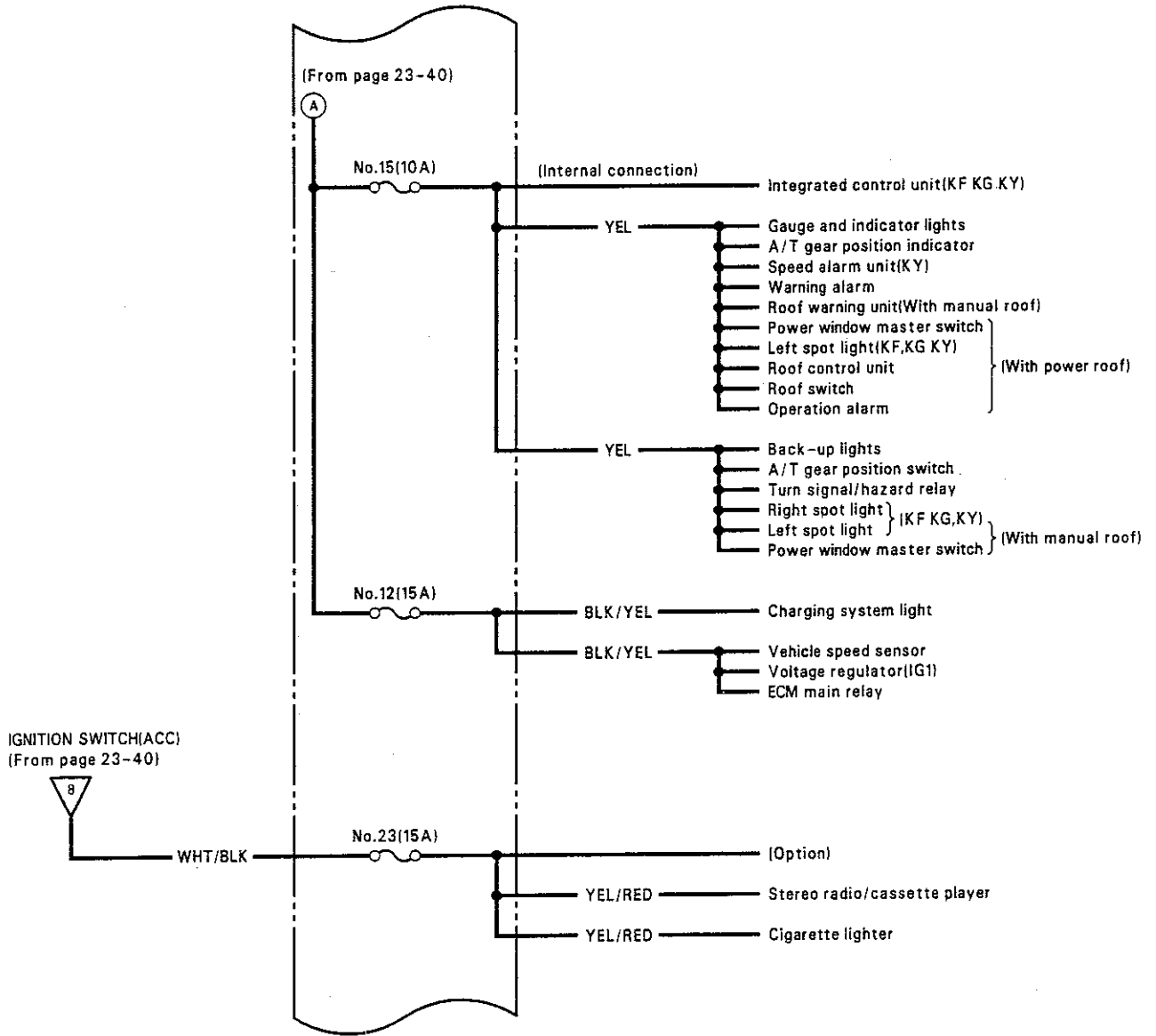


\*:Some model versions of KG and KS





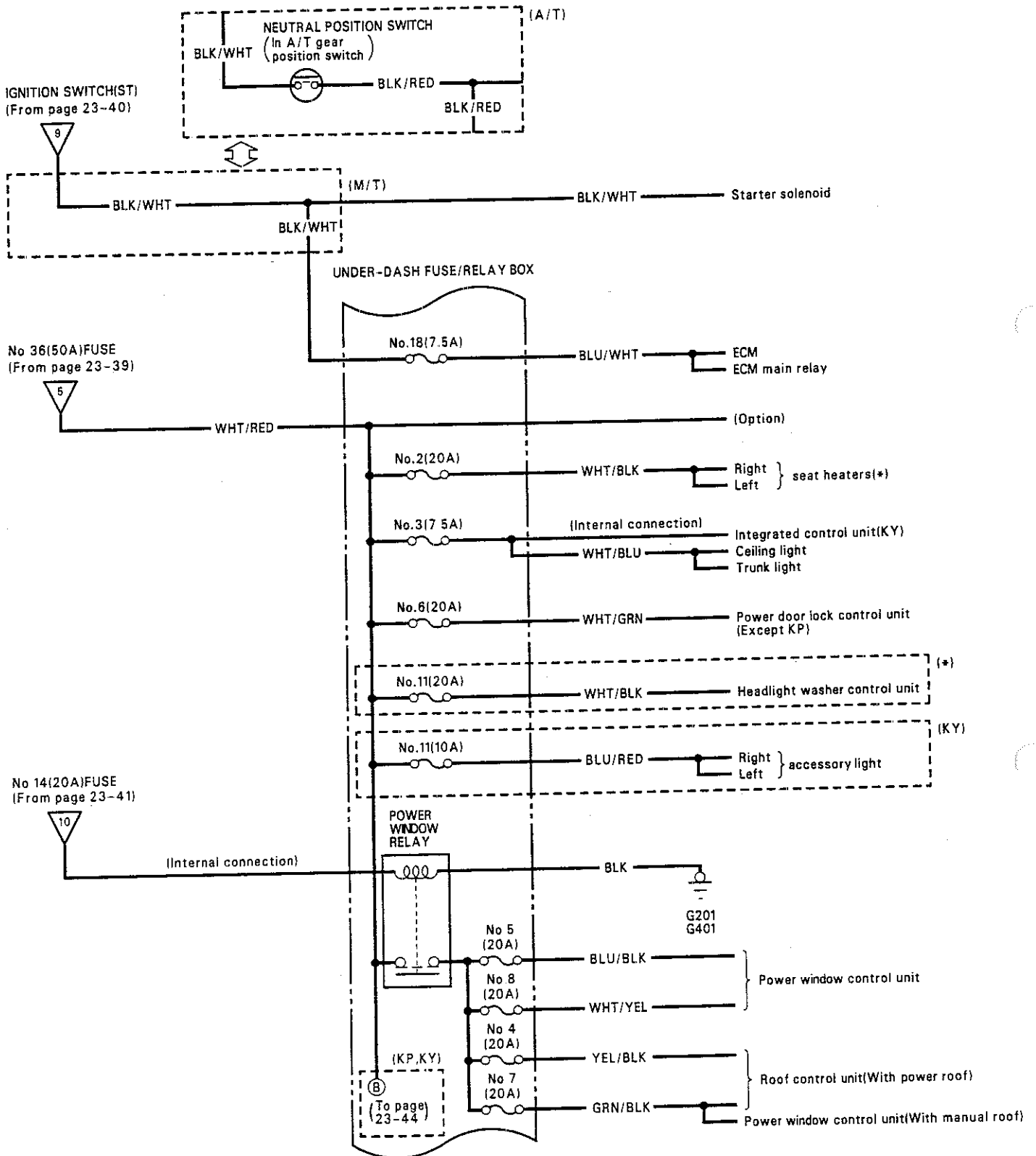
UNDER-DASH FUSE/RELAY BOX



(cont d)

# Power Distribution (LHD)

## Circuit Identification (cont'd)

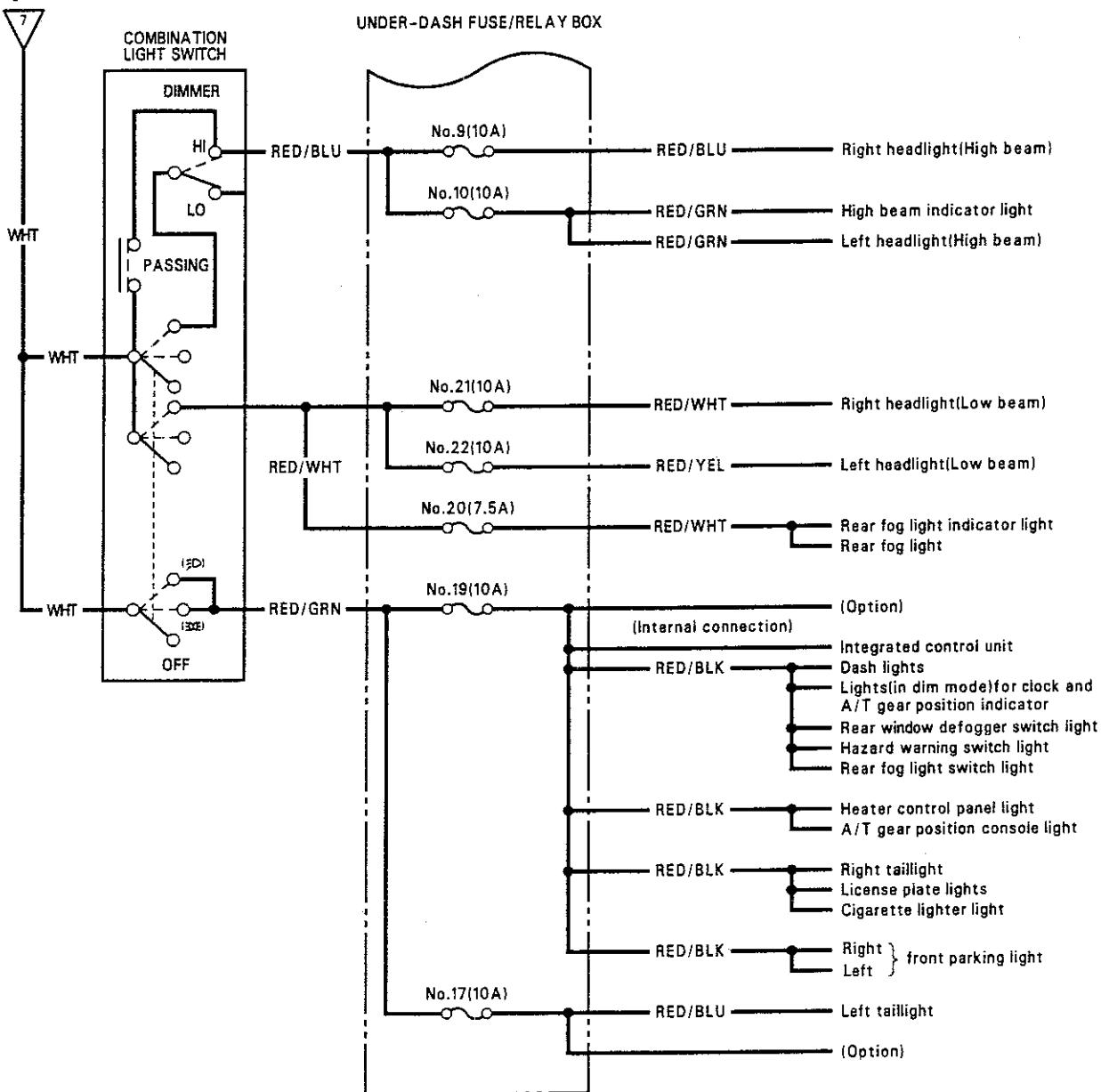


\*:Some model versions of KG and KS



KF,KG :

No.40(50A)FUSE  
(To page 23-39)



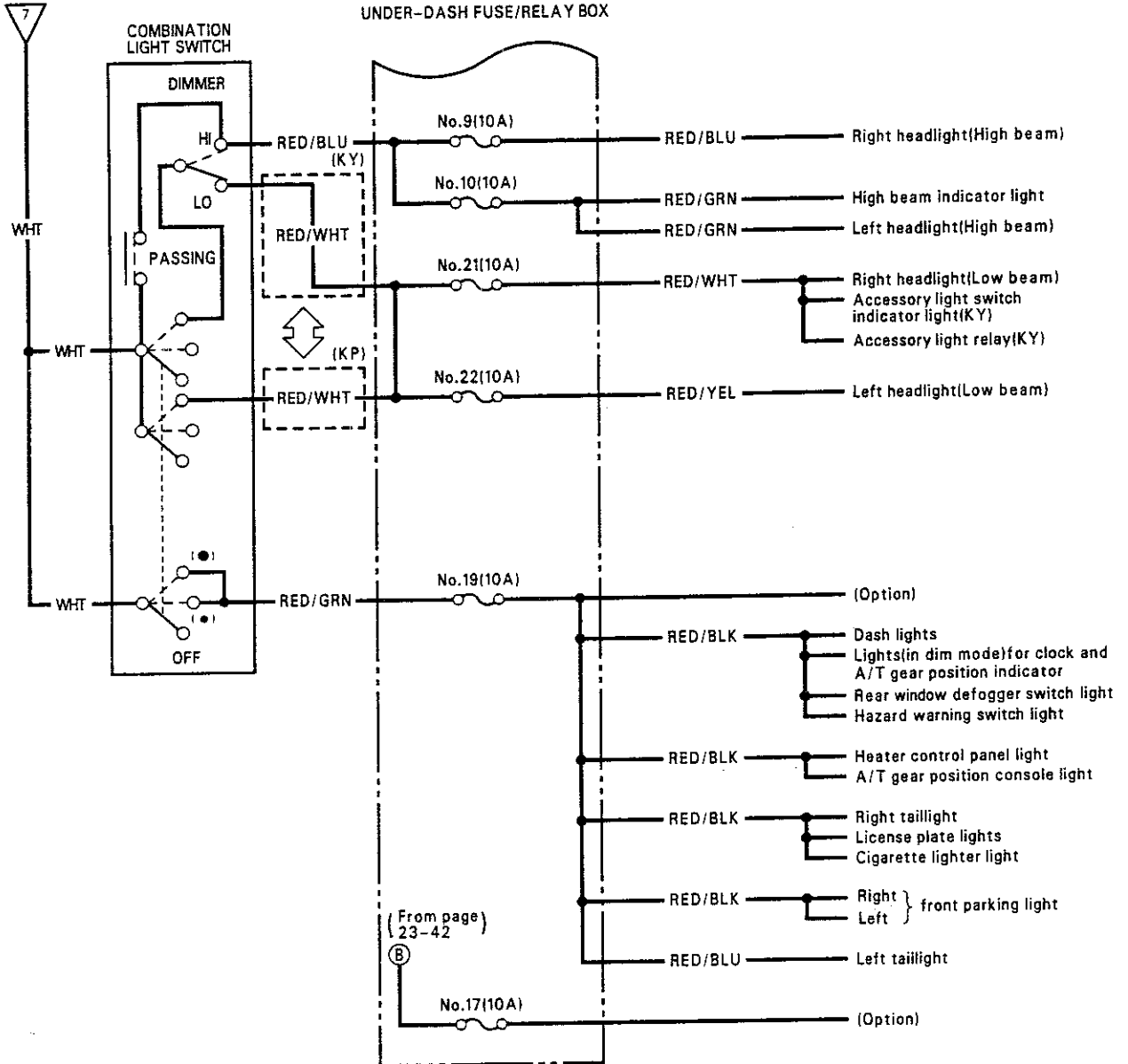
(cont d)

# Power Distribution (LHD)

## Circuit Identification (cont'd)

KP, KY :

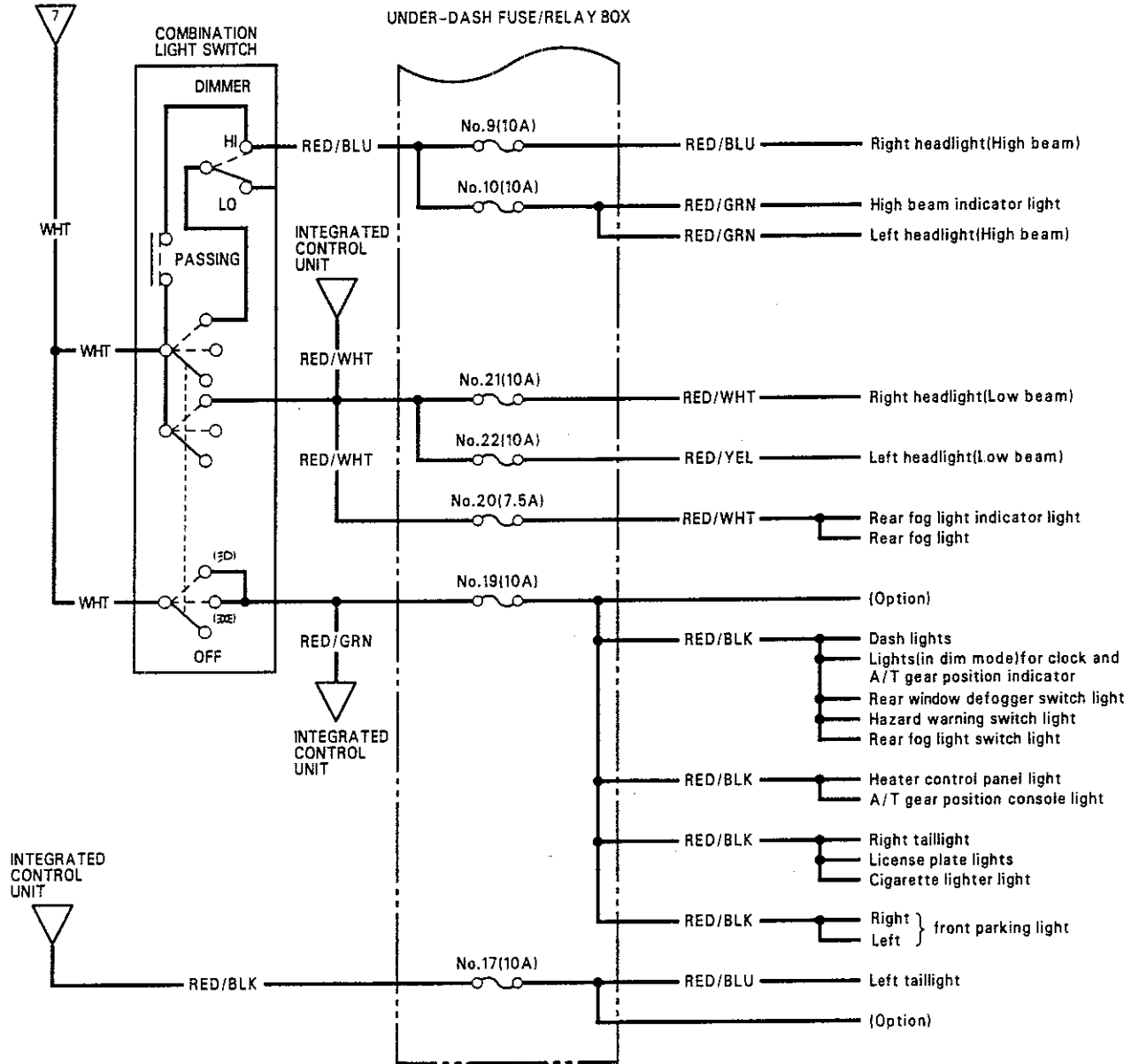
No. 40(50A) FUSE  
(To page 23-39)





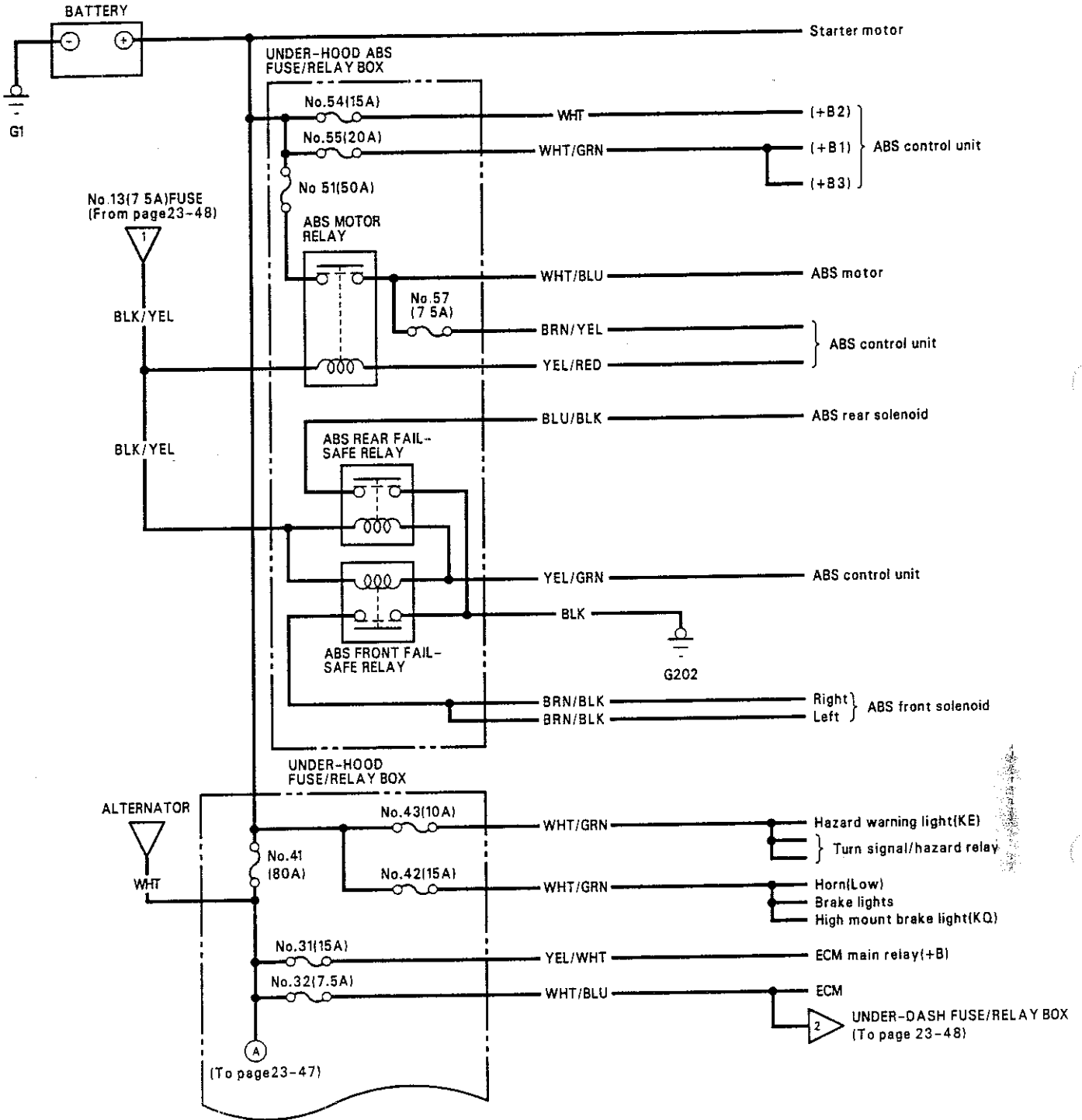
KS :

No.40(50A)FUSE  
(To page 23-39)



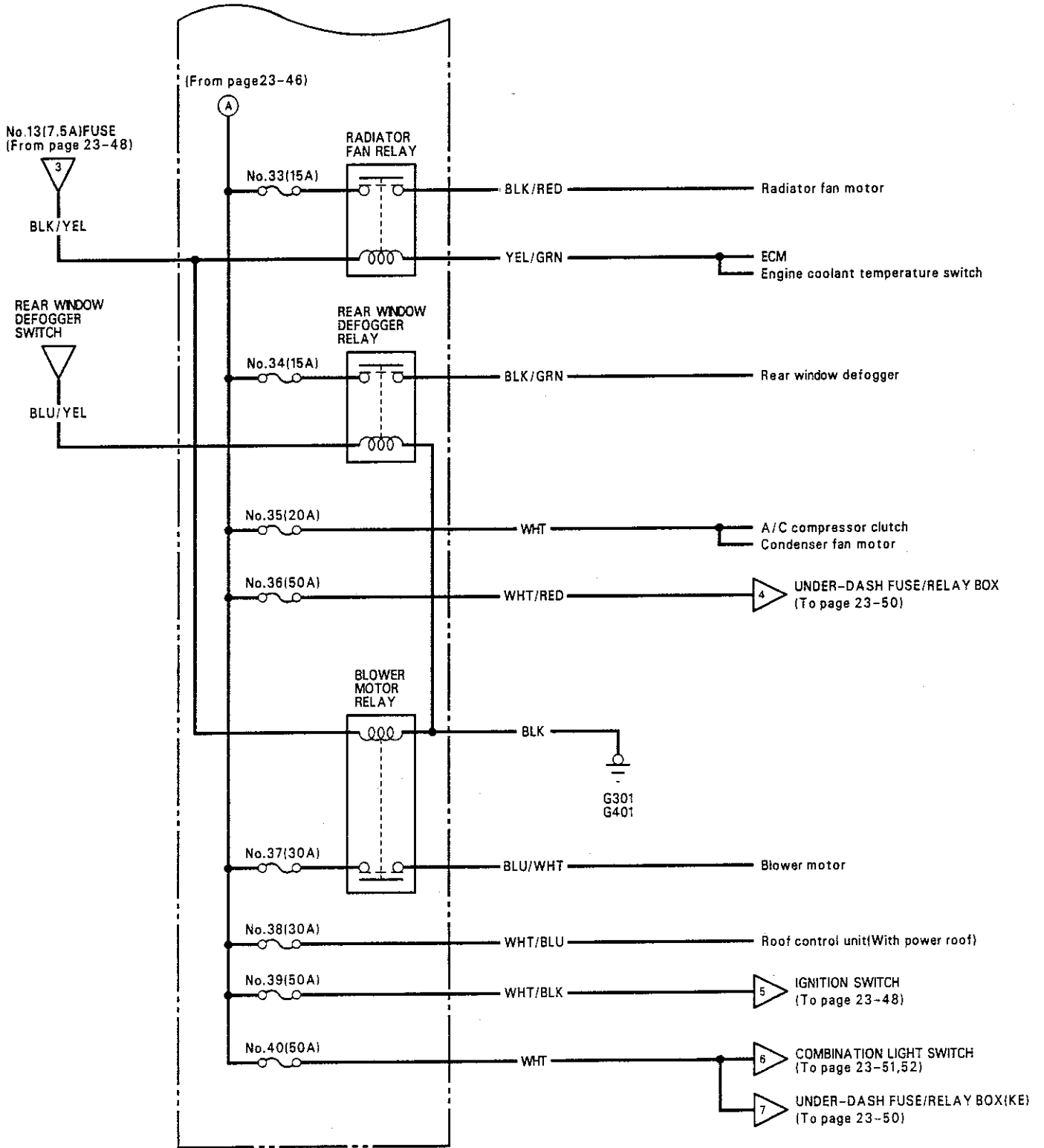
# Power Distribution (RHD)

## Circuit Identification





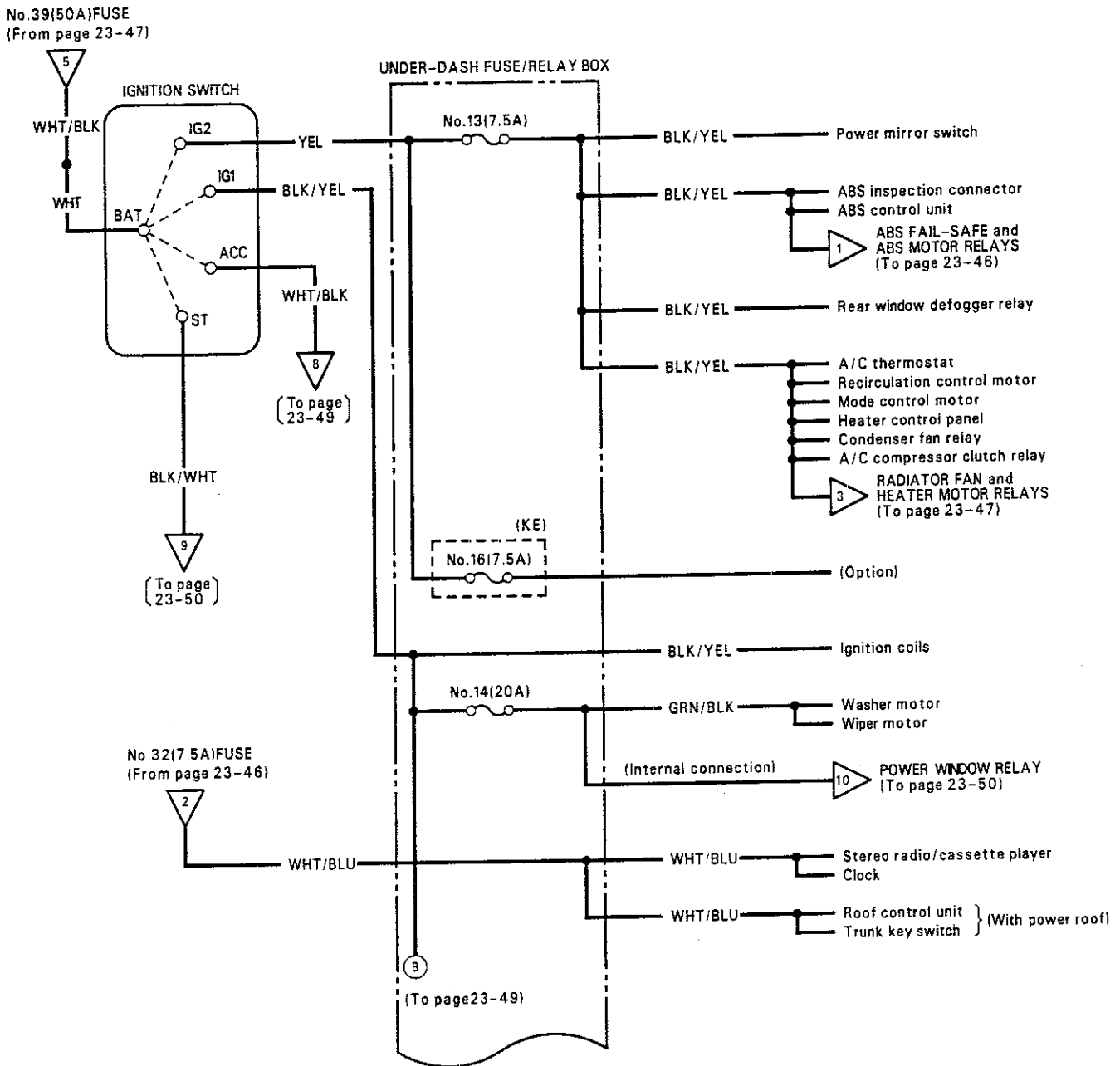
UNDER-HOOD FUSE/RELAY BOX



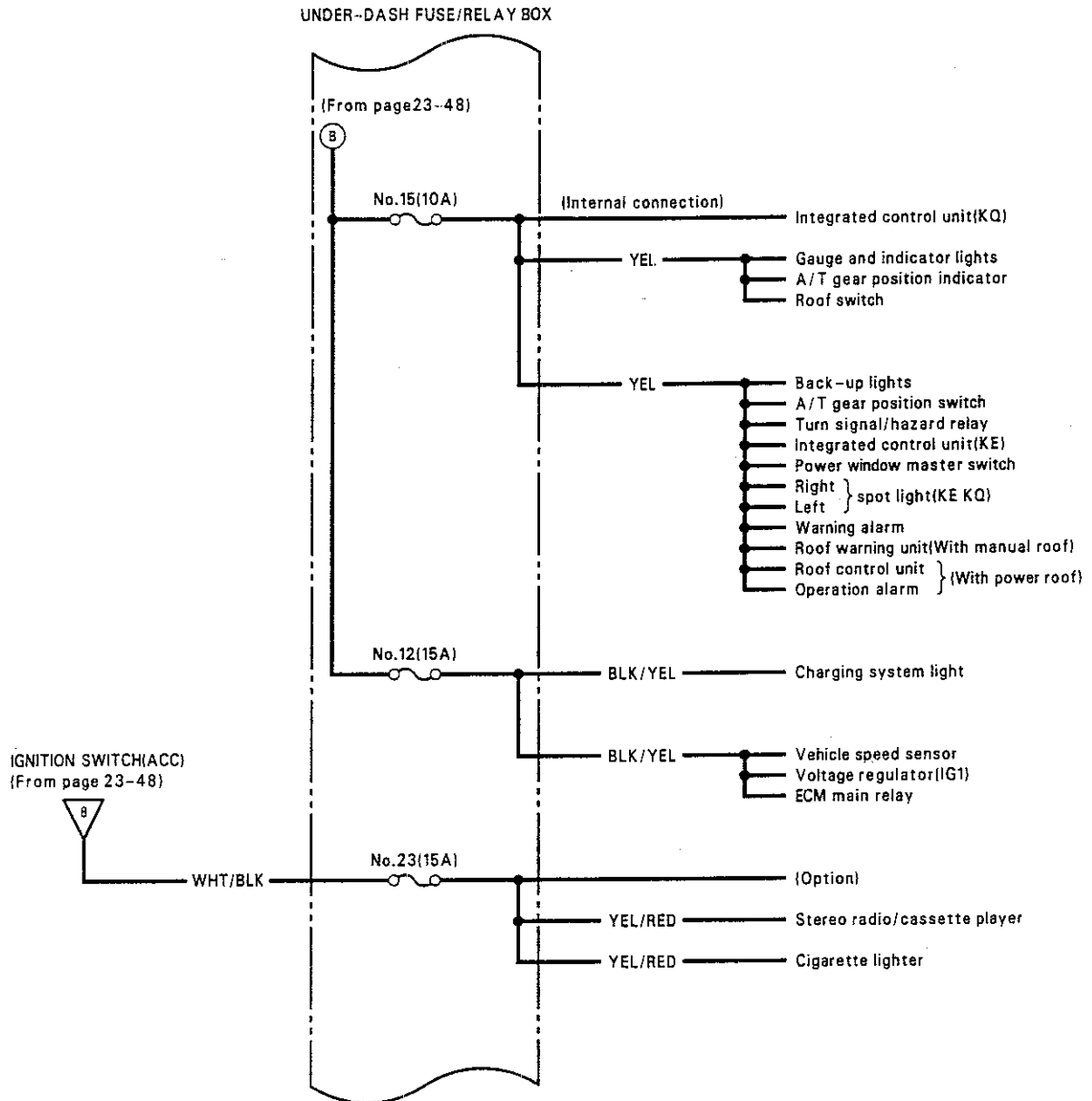
(cont d)

# Power Distribution (RHD)

## Circuit Identification (cont'd)



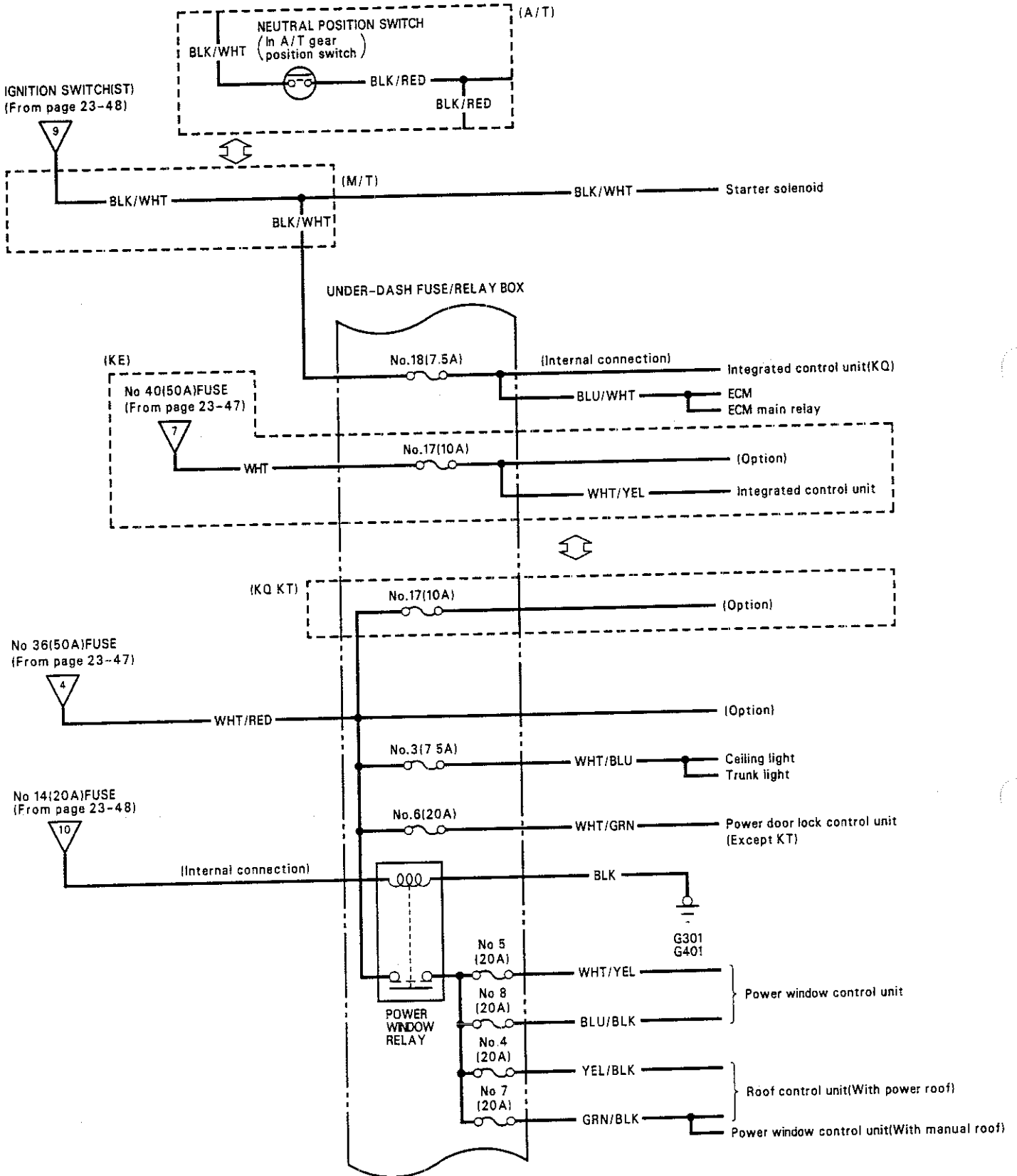




(cont d)

# Power Distribution (RHD)

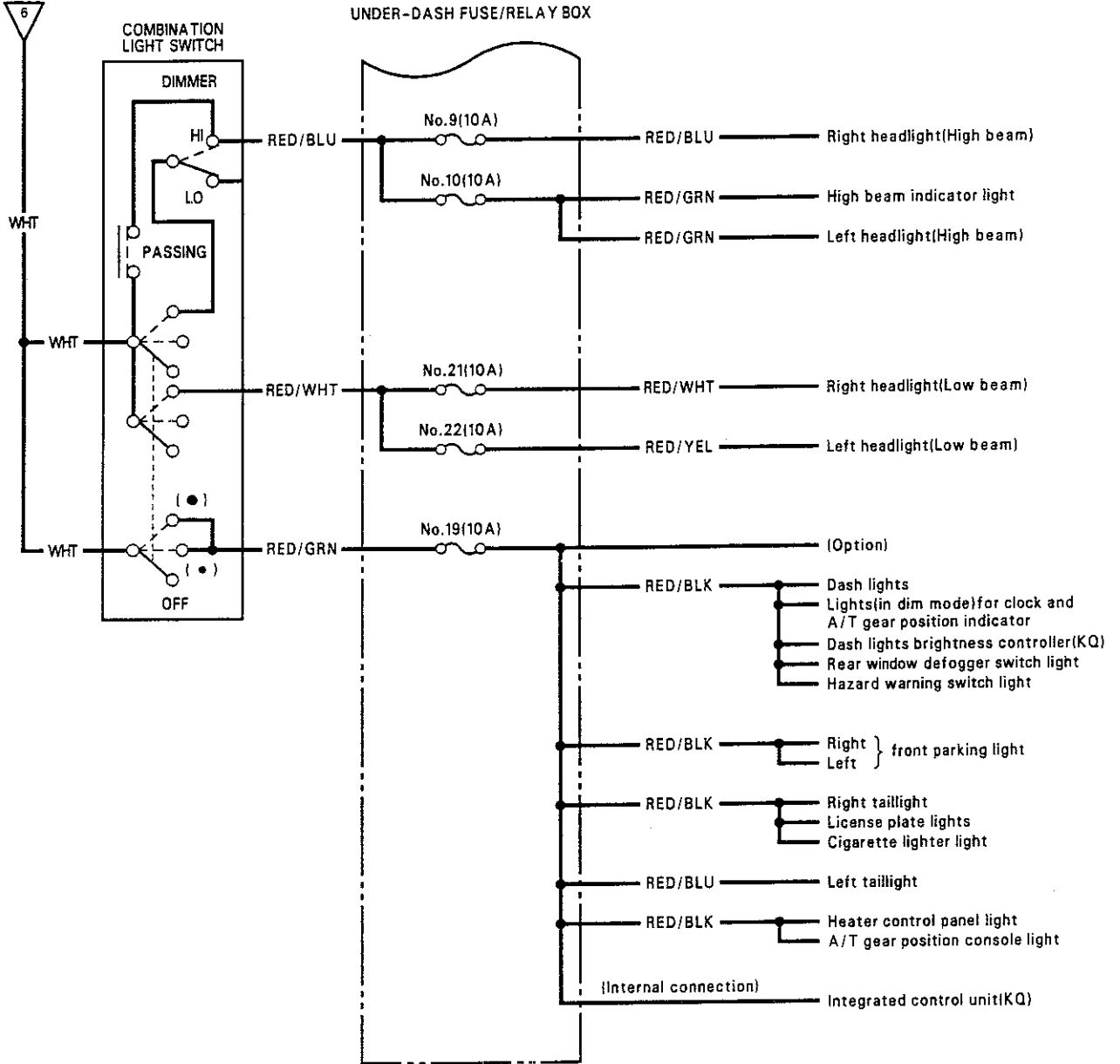
## Circuit Identification (cont'd)





KQ,KT :

No.40(50A)FUSE  
(From page 23-47)



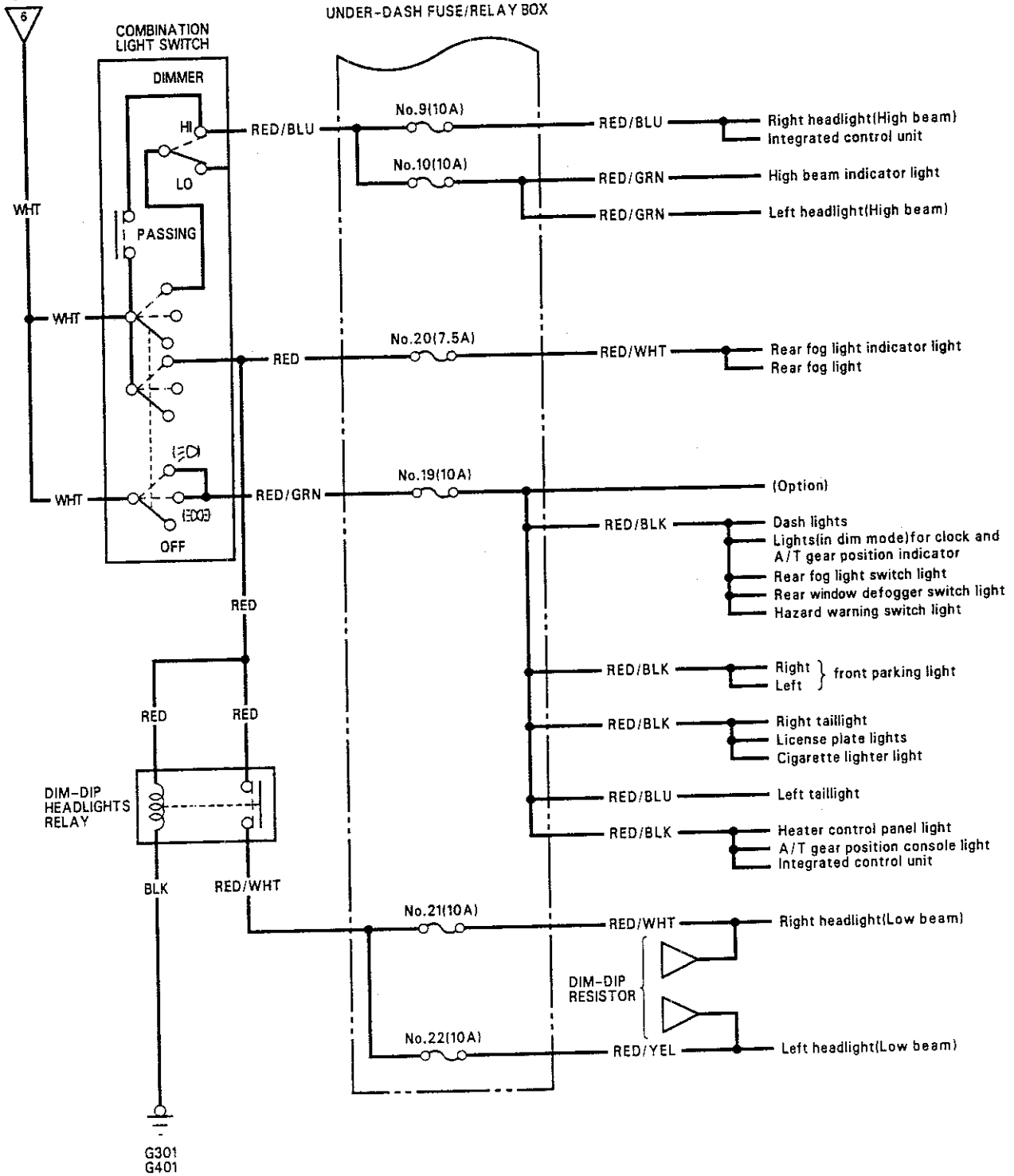
(cont d)

# Power Distribution (RHD)

## Circuit Identification (cont'd)

KE :

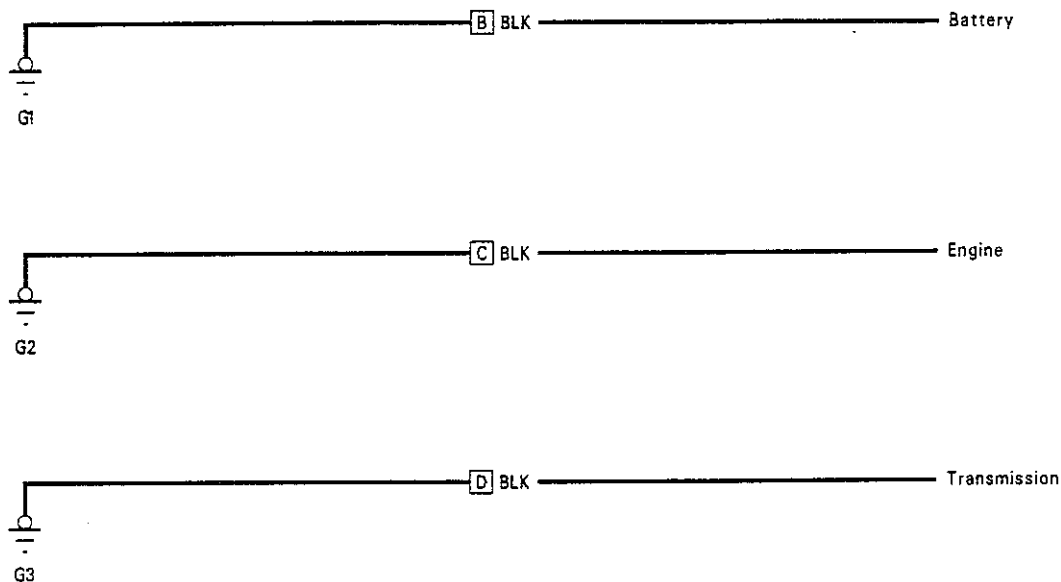
No.40(50A)FUSE  
(To page 23-47)



# Ground Distribution

## Circuit Identification

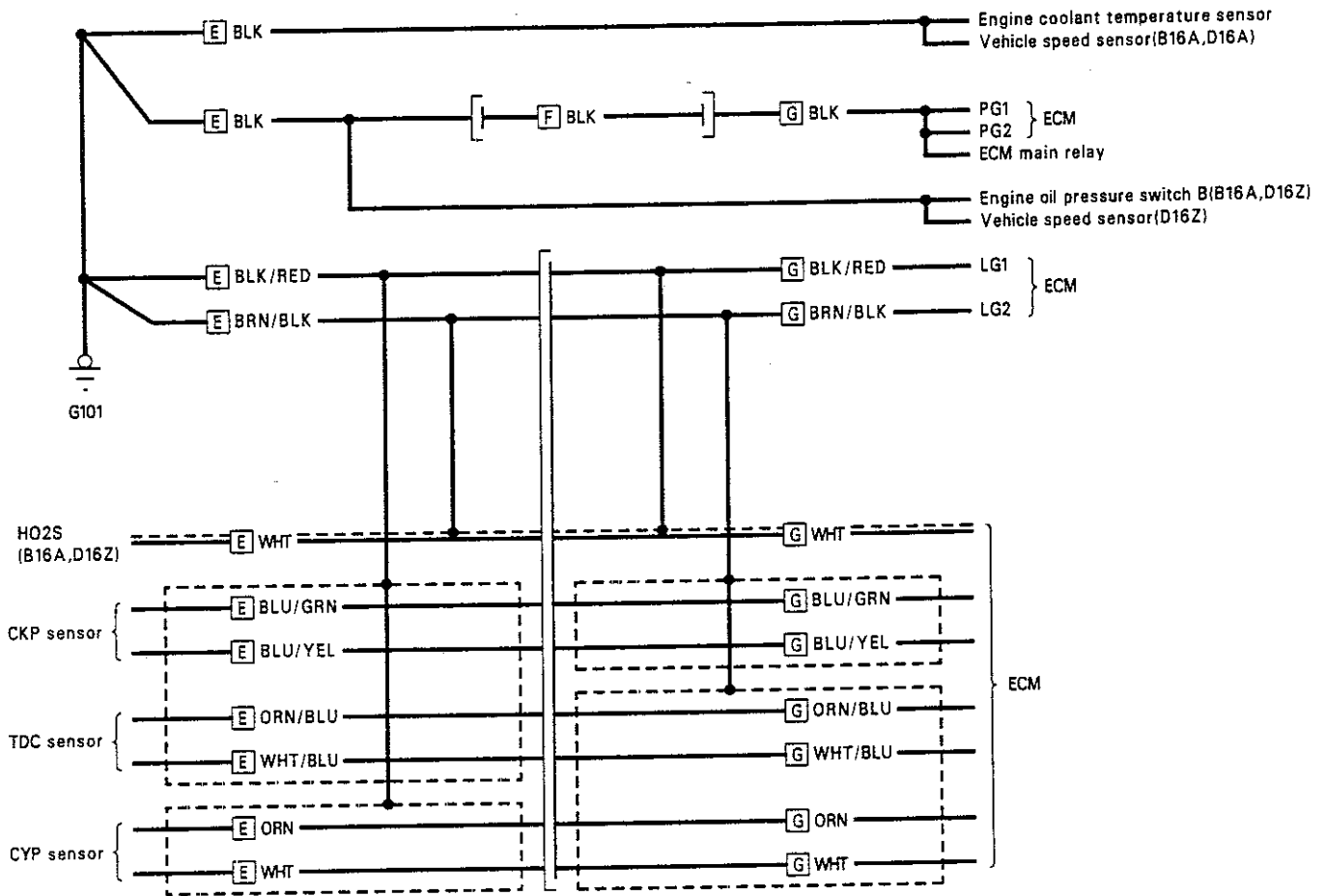
---



- B** : Battery ground cable
- C** : Engine ground wire A
- D** : Engine ground wire B

# Ground Distribution

## Circuit Identification (cont'd)

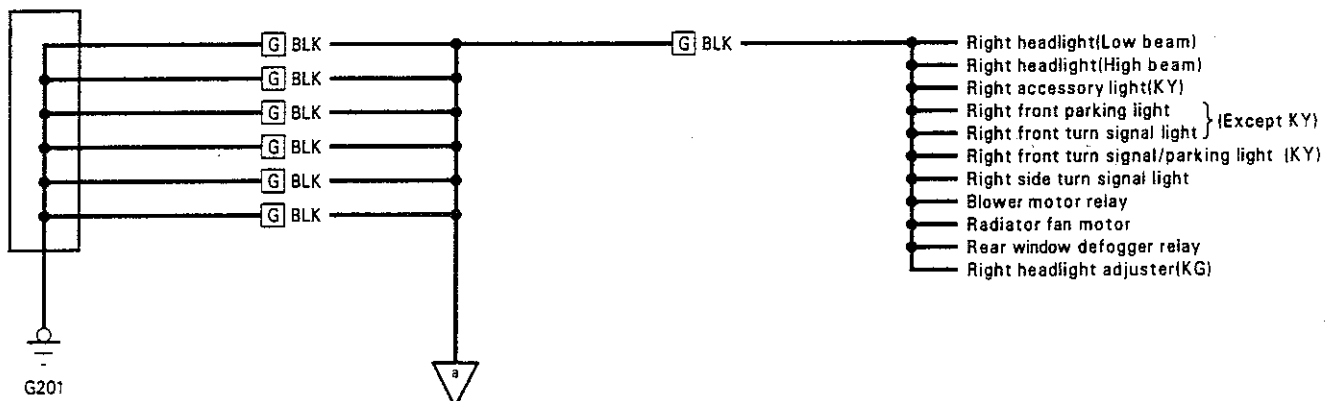
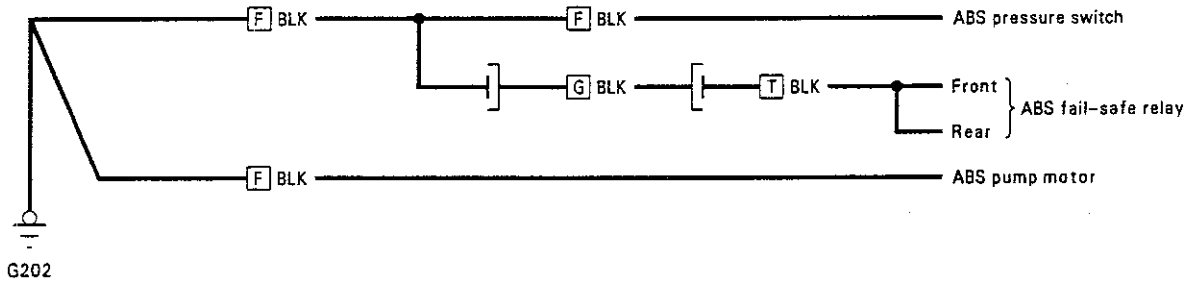
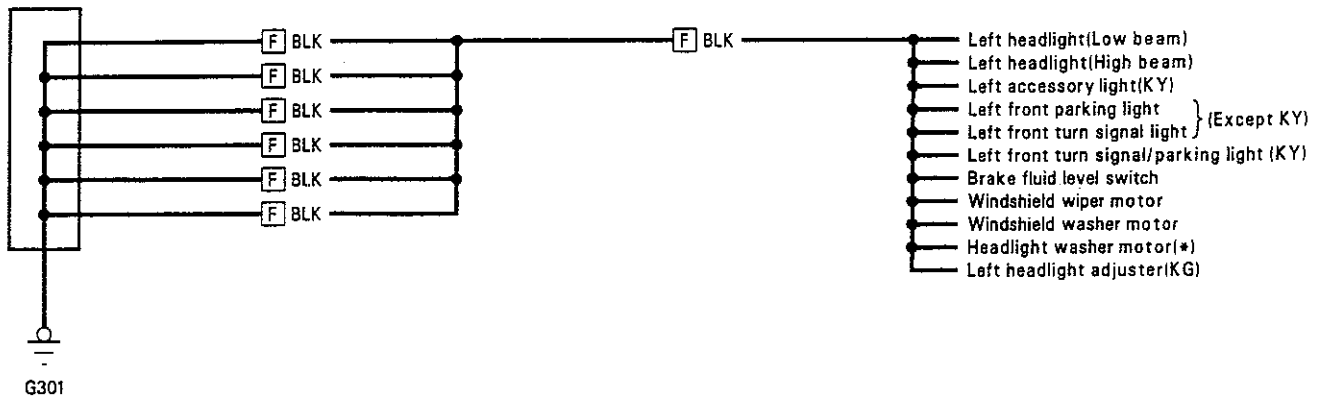


- E** : Engine wire harness
- F** : Engine compartment wire harness
- G** : Main wire harness

----- : Shielded wire



LHD :



(To page 23-56)

\*:Some model versions of KG and KS

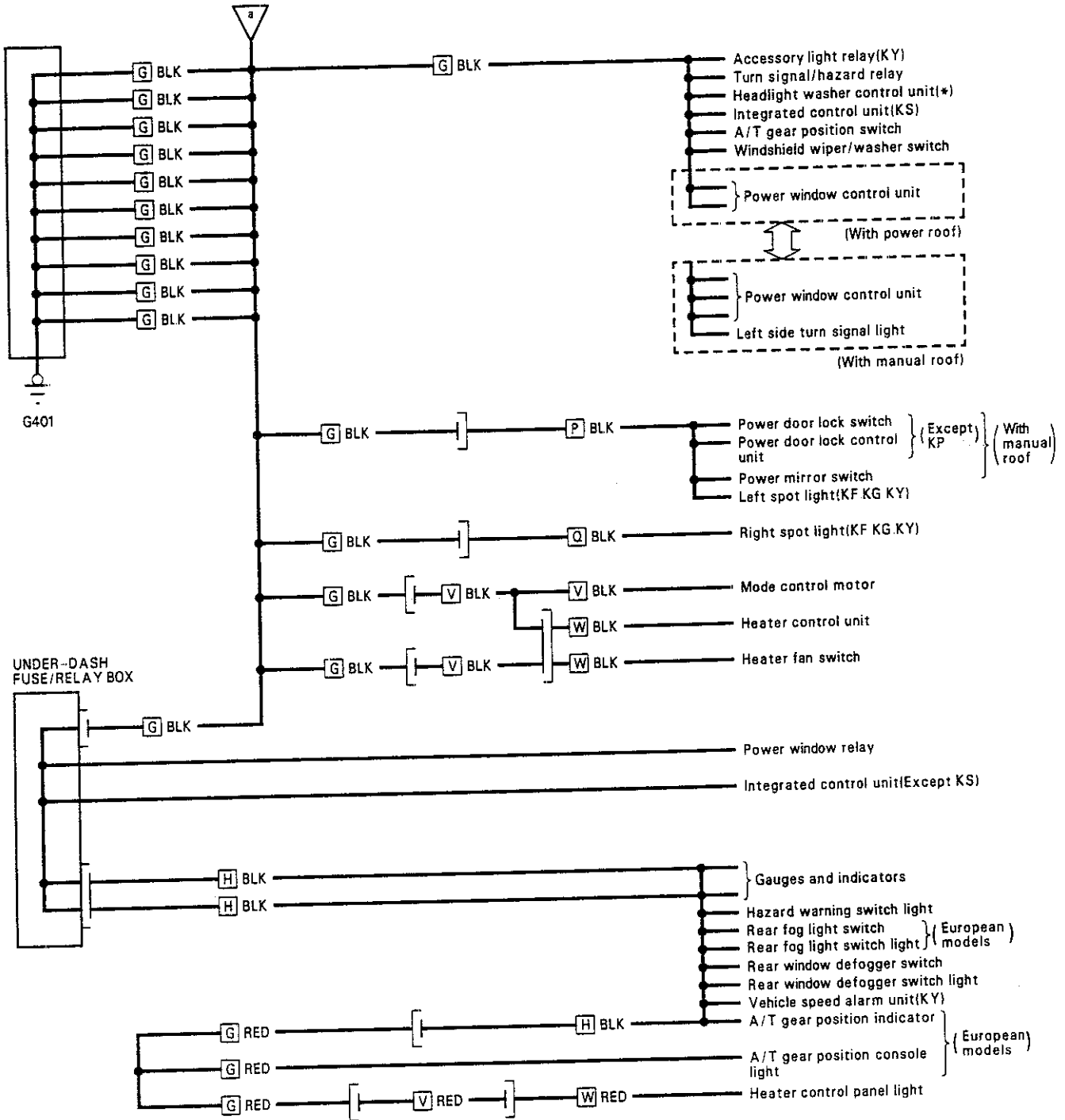
- [F] : Engine compartment wire harness
- [G] : Main wire harness
- [T] : Under-hood ABS fuse/relay box wire harness

# Ground Distribution

## Circuit Identification (cont'd)

LHD :

(From page 23-55)



\*:Some model versions of KG and KS

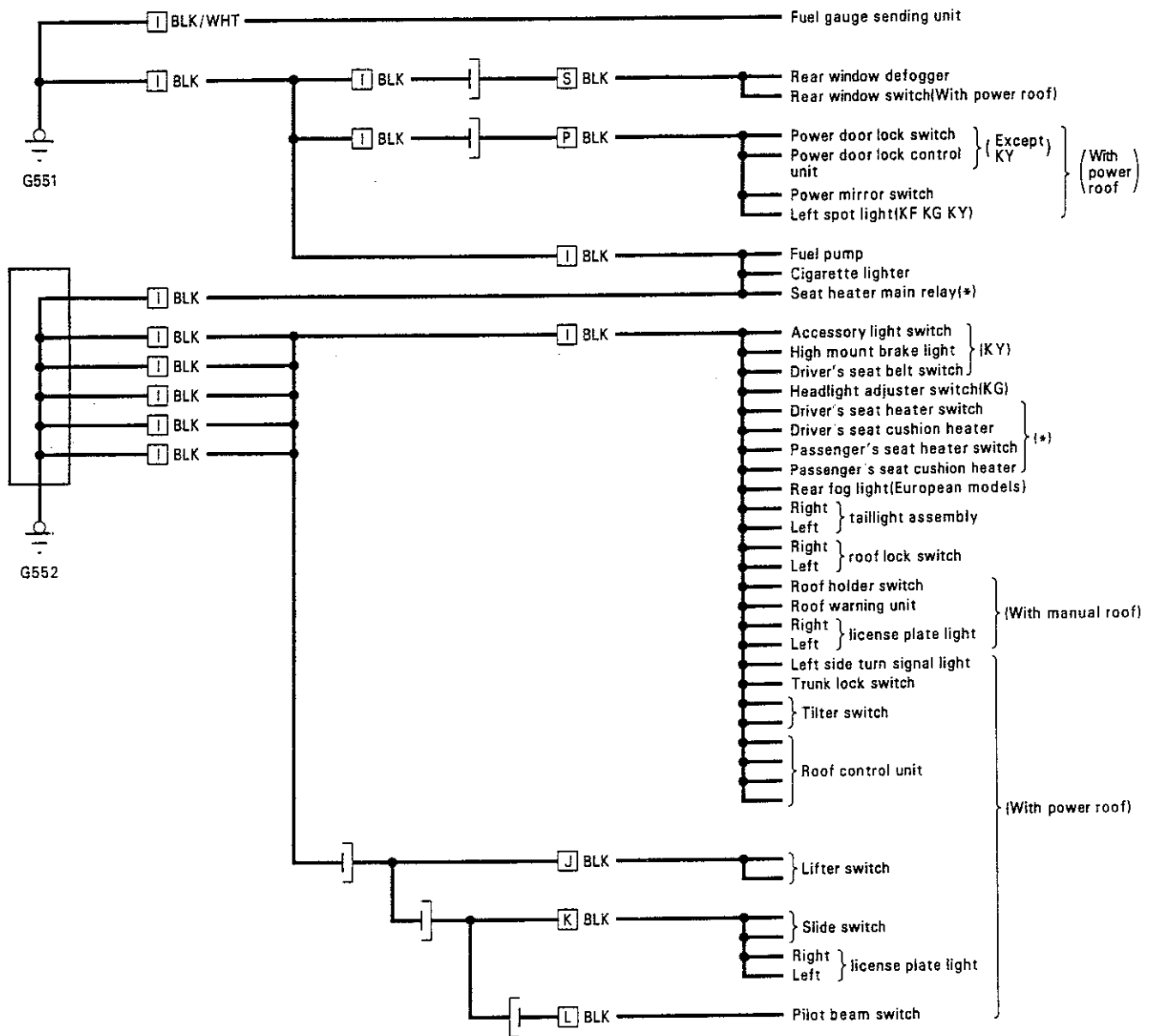
- G : Main wire harness
- H : Dashboard wire harness
- P : Driver's door wire harness

- Q : Passenger's door wire harness
- V : Heater sub-harness A
- W : Heater sub-harness B





LHD :



\*:Some model versions of KG and KS

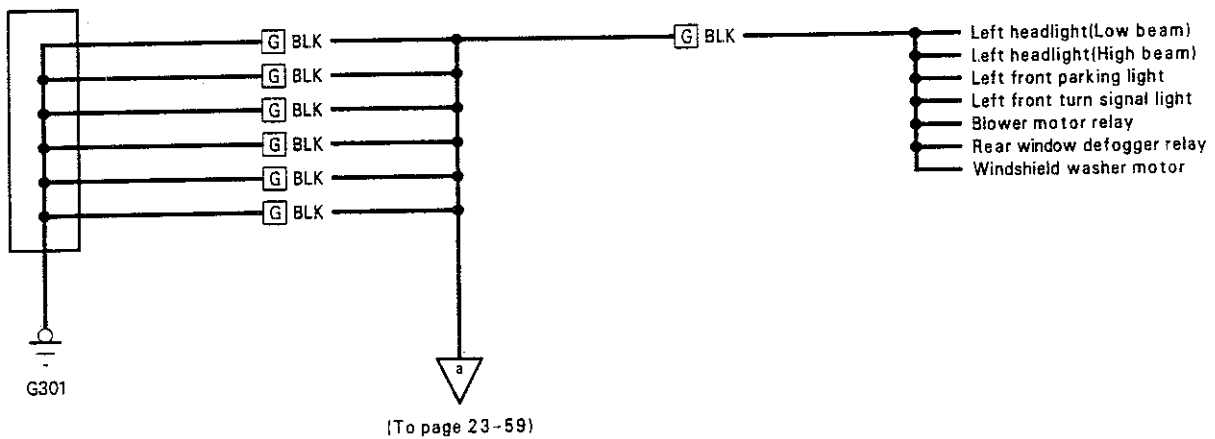
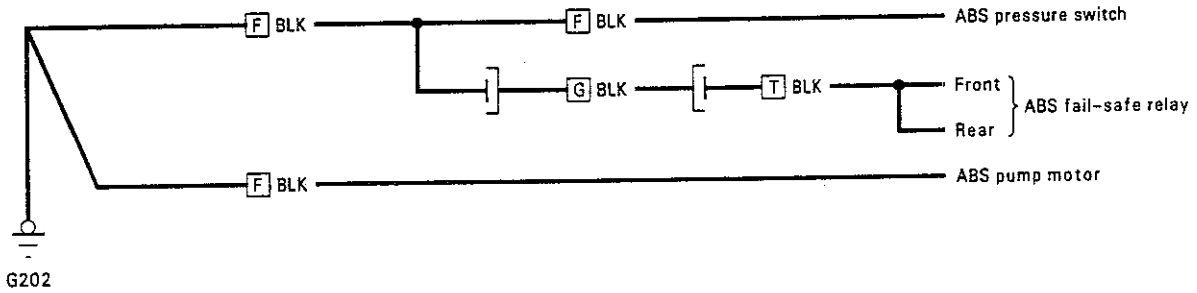
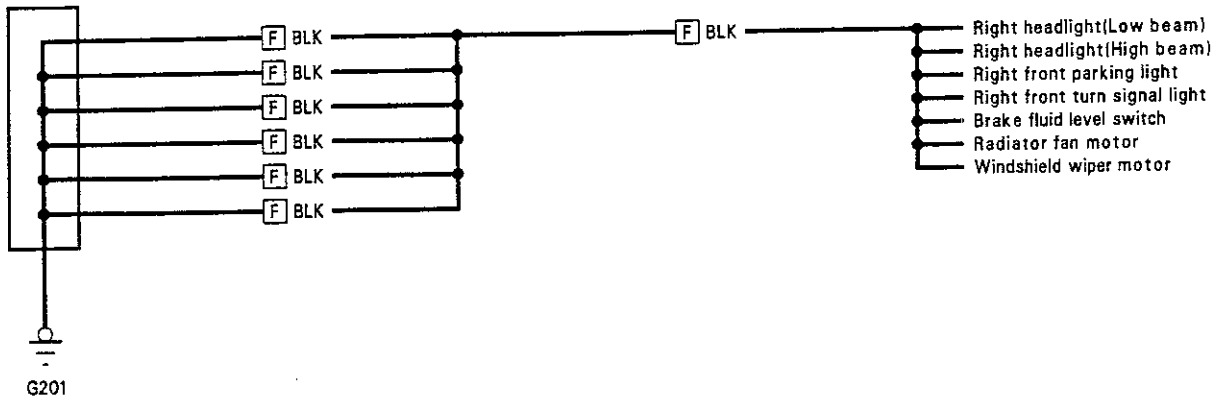
- I** : Rear wire harness
- J** : Trunk wire harness
- K** : Trunk sub-harness B

- L** : Trunk sub-harness A
- P** : Driver s door wire harness
- S** : Rear window defogger sub-harness

# Ground Distribution

## Circuit Identification

RHD :

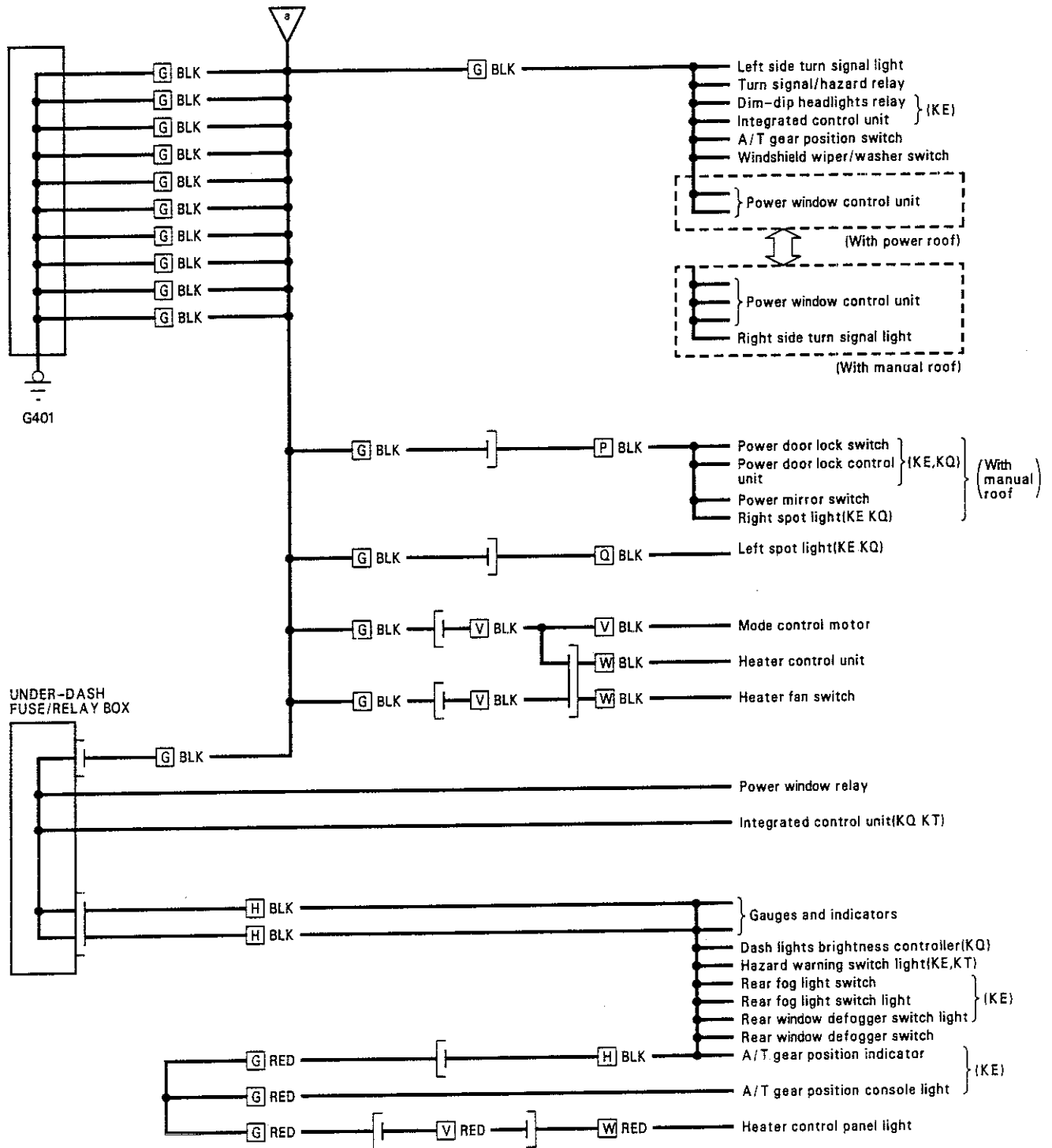


- F** : Engine compartment wire harness
- G** : Main wire harness
- T** : Under-hood ABS fuse/relay box wire harness



RHD :

(From page 23-58)



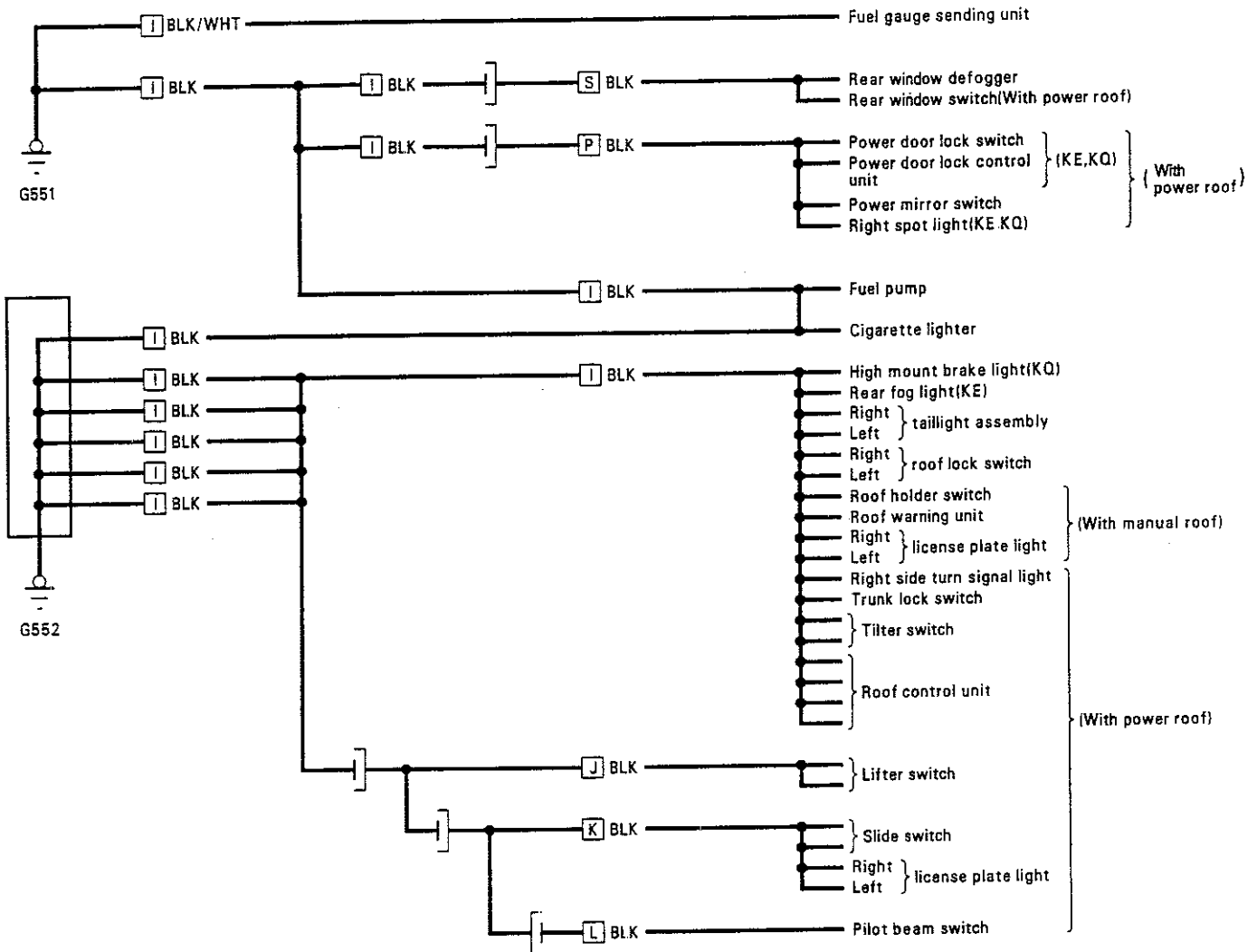
- G** : Main wire harness
- H** : Dashboard wire harness
- P** : Driver's door wire harness

- Q** : Passenger's door wire harness
- V** : Heater sub-harness A
- W** : Heater sub-harness B

# Ground Distribution

## Circuit Identification (cont'd)

RHD :



- I** : Rear wire harness
- J** : Trunk wire harness
- K** : Trunk sub-harness B

- L** : Trunk sub-harness A
- P** : Driver's door wire harness
- S** : Rear window defogger sub-harness



[H] : Dashboerd wire harness  
[U] : A/C wire harness

# Battery

## Test

### ⚠ WARNING

- Battery fluid (electrical) contains sulfuric acid. It may cause severe burns if it gets on your skin or in your eyes.

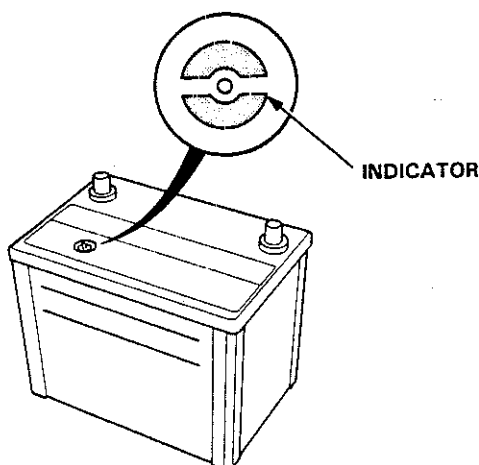
Wear protective clothing and a face shield.

- If electrolyte gets on your skin or clothes, rinse it off with water immediately.
- If electrolyte gets in your eyes, flush it out by splashing water in your eyes for at least 15 minutes; call a physician immediately.
- A battery gives off hydrogen gas. If ignited, the hydrogen will explode and could crack the battery case and splatter acid on you. Keep sparks, flames, and cigarettes away from the battery.
- Overcharging will raise the temperature of the electrolyte. This may force electrolyte to spray out of the battery vents. Follow the charger manufacturer's instructions and charge the battery at a proper rate.

NOTE: To get accurate results, the temperature of the electrolyte must be between 15 and 38°C (59 and 100°F) before testing.

### Test Equipment Required:

- Battery tester with:
  - Voltmeter with 0–18 V scale, ammeter with 0–100 A and 0–500 A scales, and a carbon pile with 0–300 W.
- 12 V Battery charger:
  - Fast charge capability of 50 A and slow charge capability of 5 A.



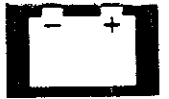
### Test Procedure:

1. Check for damage: If the case is cracked or the posts are loose, replace the battery.
2. Check the indicator (for basic charge condition): Blue or Green is OK. If the indicator is Red, peel the tape off, remove the caps, and add distilled water; then reinstall the caps and tape. If the indicator is White or Dark, go to step 3.
3. Test the battery load capacity by connecting a battery tester and applying a load of three times the battery ampere hour rating. When the load has been applied for exactly 15 seconds, the battery voltage reading should stay above 9.6 V.
  - If the reading stays above 9.6 V, the battery is OK; clean its terminals and case, and reinstall it.
  - If the reading is between 6.5 and 9.6 V, fast charge the battery by connecting a battery charger for three minutes at an initial rate of 40 amps.

**CAUTION: Amperage will drop as voltage increases; do not increase the amperage to compensate or you may damage the battery.**

Watch the battery voltage during the entire three minutes; the highest reading should stay below 15.5 V.

- If the reading stays below 15.5 V, the battery is OK; clean its terminals and case, and reinstall it.
- If the reading exceeds 15.5 V at any time during the three minutes of fast charging, the battery is not good; replace it.
- If the reading drops below 6.5 V, slow charge the battery by connecting a battery and charge at 5 amps for no more than 24 hours (or until the indicator shows full charge, or the specific gravity of the electrolyte is at least 1.270). Then test the load capacity again.
  - If the voltage stays above 9.6 V, the battery is OK; clean its terminals and case, and reinstall it.
  - If the voltage still drops below 6.5 V, the battery is not good; replace it.



# Under-dash Fuse/Relay Box

## Removal/Installation

### Removal:

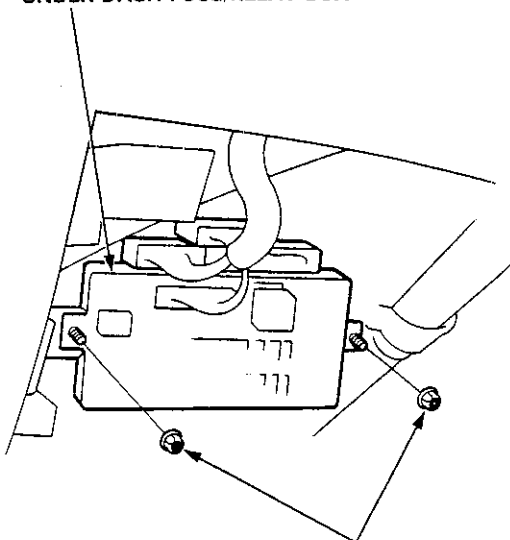
1. Disconnect the negative battery cable.
2. Remove the dashboard lower cover.



DASHBOARD LOWER COVER

3. Remove the mounting nuts and pull the fuse box out from under the dash.

UNDER-DASH FUSE/RELAY BOX



MOUNTING NUTS

4. Disconnect the fuse box connectors and take out the fuse box.

### Installation:

1. Reconnect the connectors to the fuse box.
2. Install the fuse box.
3. Reinstall the dashboard lower cover.
4. Connect both the negative cable and positive cable to the battery.
5. Confirm that all systems work properly.

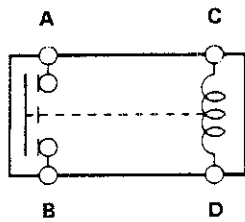
# Power Relay

## Relay Test

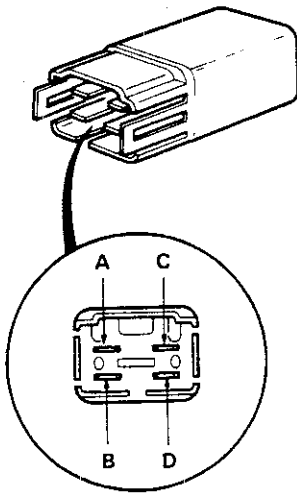
### NORMALLY OPEN type:

NOTE: See page 23-204 for the turn signal/hazard relay input test.

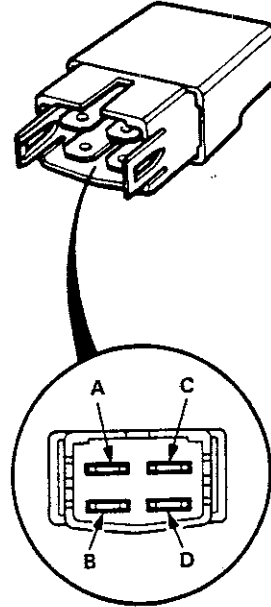
1. Remove the power relay from its socket.
2. There should be continuity between the A and B terminals when power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.



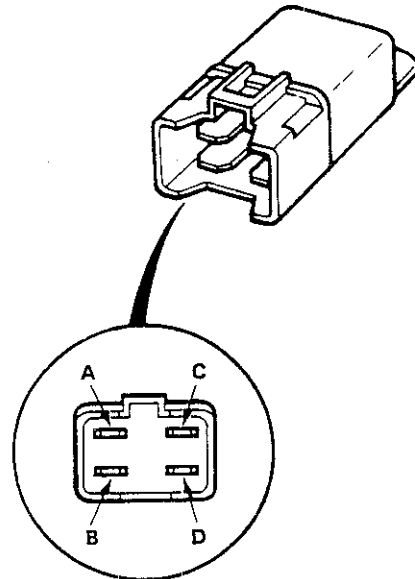
- Power window relay
- Radiator fan relay
- Rear window defogger relay
- Heater motor relay



- ABS front fail-safe relay
- ABS rear fail-safe relay



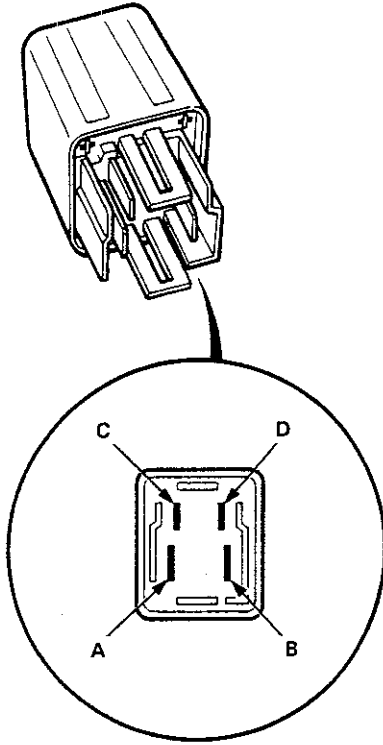
- Accessory lights relay
- Dim-dip headlights relay
- Seat heater main relay
- Condenser fan relay
- A/C compressor clutch relay







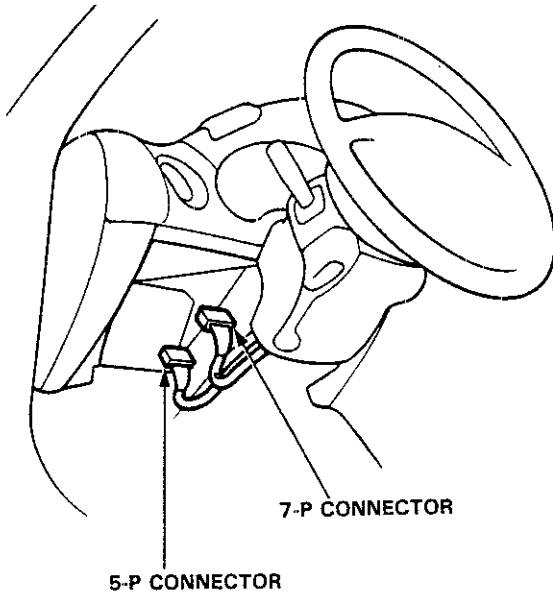
● ABS motor relay



# Ignition Switch

## Test

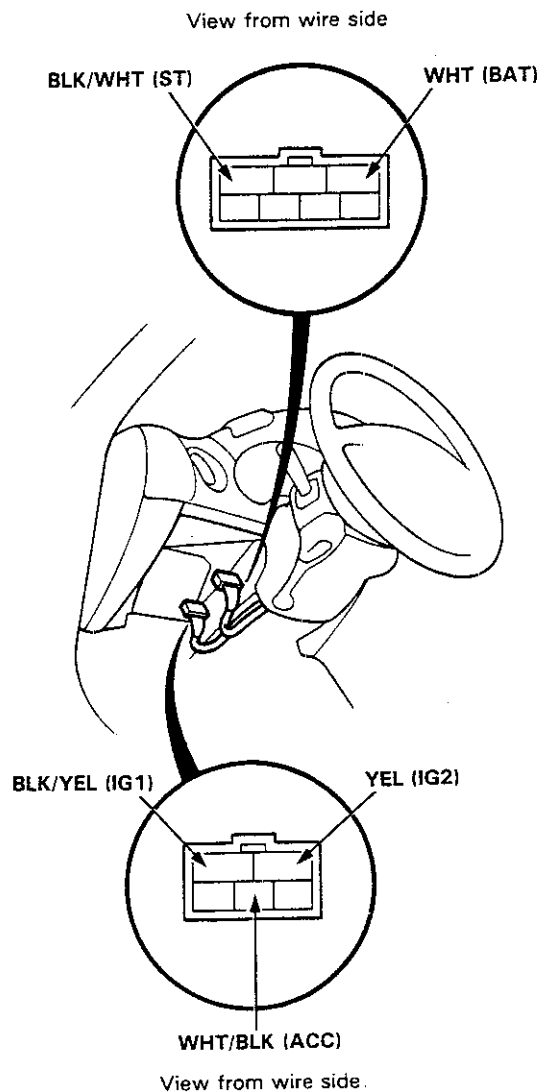
1. Remove the dashboard lower cover (see page 23-63).
2. Disconnect the 5-P and 7-P connectors from the under-dash fuse/relay box.



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

Terminal Position	WHT/BLK (ACC)	WHT (BAT)	BLK/YEL (IG1)	YEL (IG2)	BLK/WHT (ST)
0					
I	○ — ○				
II	○ — ○ — ○ — ○				
III		○ — ○ — ○ — ○			

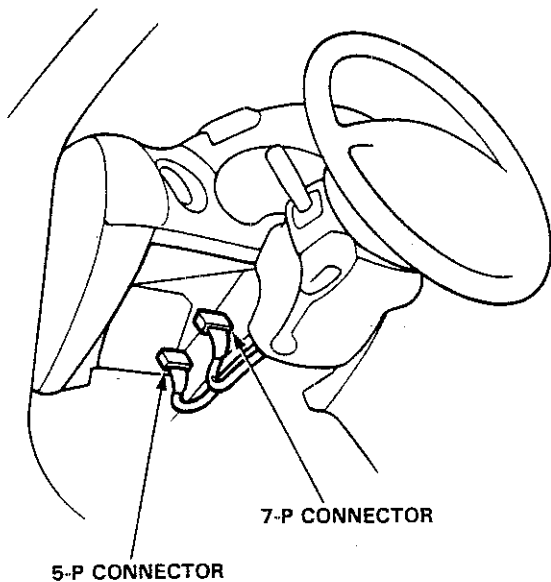
4. If continuity checks do not agree with the table, replace the steering lock assembly.



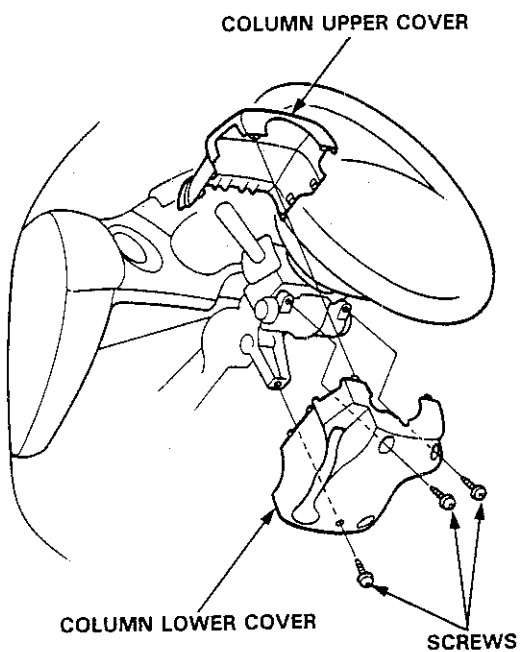


## Steering Lock Replacement

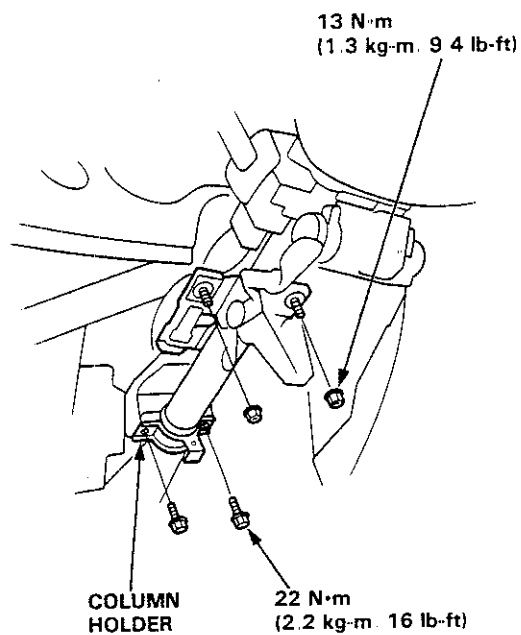
1. Disconnect the negative battery cable
2. Remove the dashboard lower cover (see page 23-63).
3. Disconnect the 5-P and 7-P connectors from the under-dash fuse/relay box.



4. Remove the steering column covers

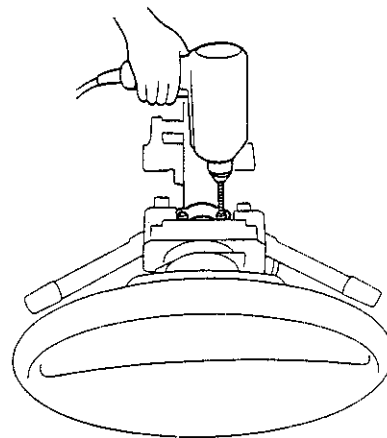


5. Remove the column holder mounting bolts and nuts.



6. Lower the steering column assembly
7. Center punch each of the two shear bolts and drill their heads off with a 3/16 in. drill bit.

**CAUTION:** Do not damage the switch body when removing the shear bolts.

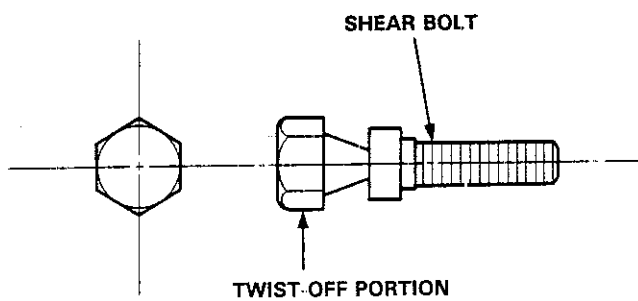


(cont'd)

# Ignition Switch

## Steering Lock Replacement (cont'd)

8. Remove the shear bolts from the switch body.
9. Install the new ignition switch without the key inserted.
10. Loosely tighten the new shear bolts.
11. Insert the ignition key and check for proper operation of the steering wheel lock and that the ignition key turns freely.
12. Tighten the shear bolts until the hex heads twist off.

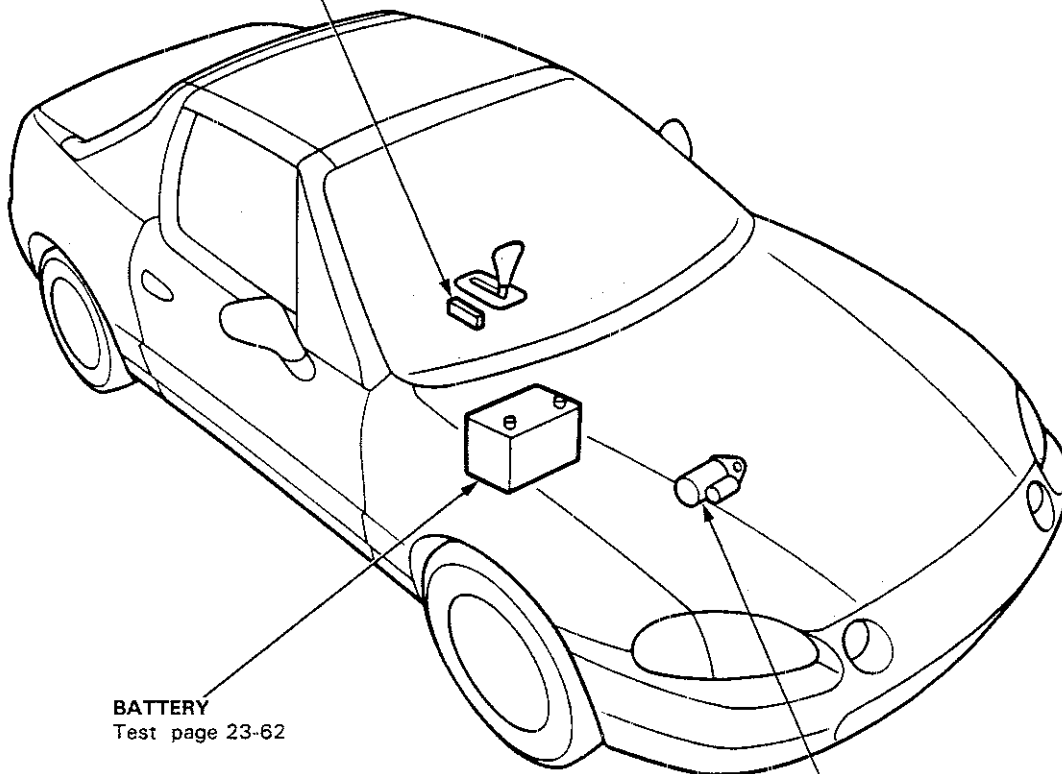




# Starting System

## Component Location Index

**A/T GEAR POSITION SWITCH (A/T)**  
Test, page 23-142  
Replacement, page 23-143



**BATTERY**  
Test, page 23-62

**STARTER**  
Test, page 23-72  
Solenoid Test, page 23-75 and 76  
Replacement, page 23-74  
Overhaul, pages 23-77 thru 79  
Reassembly, page 23-85

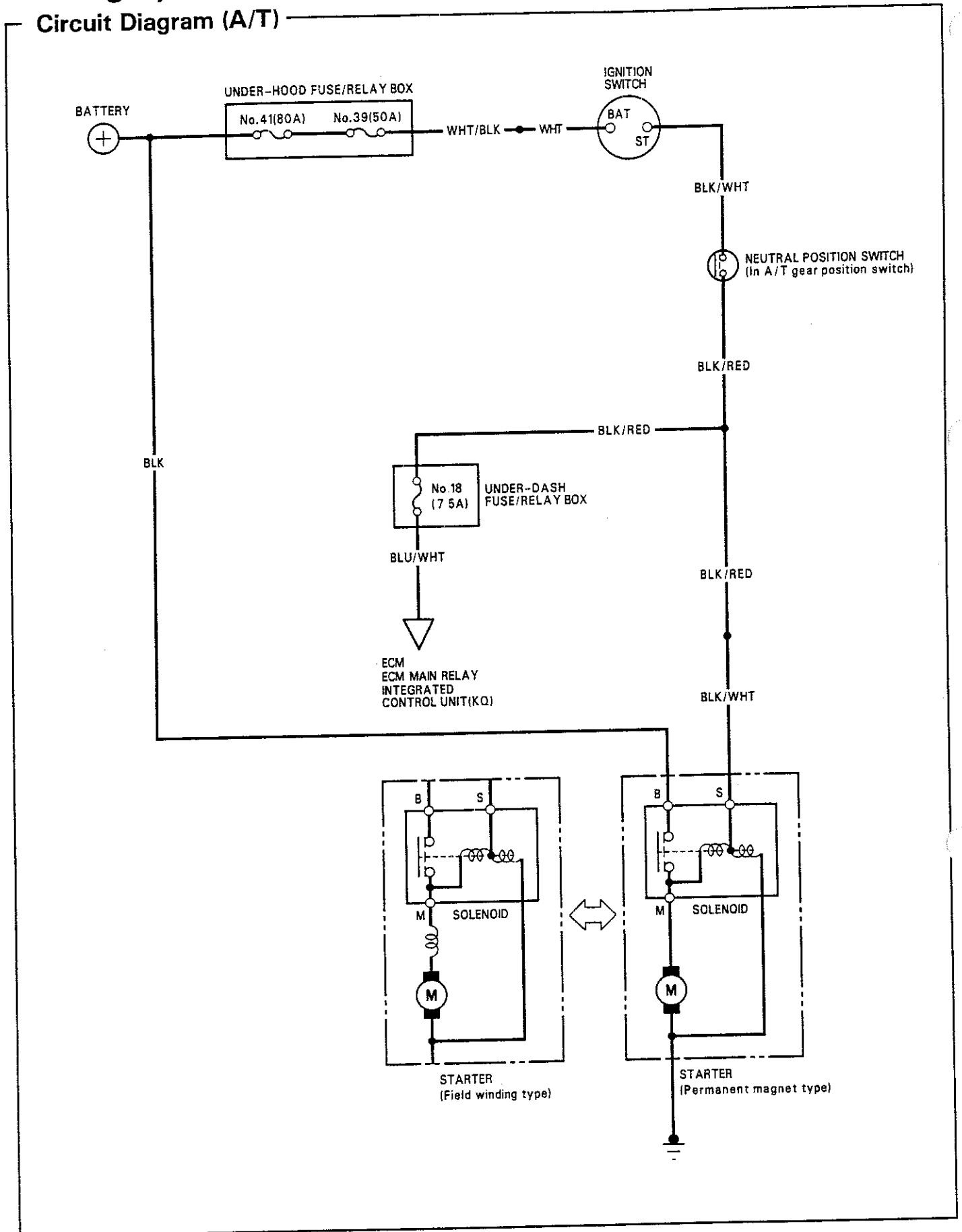
## Description

### Permanent Magnet Type Starter:

In some versions the previously used field winding inside the armature housing has been replaced with a permanent magnet to reduce weight and increase reliability

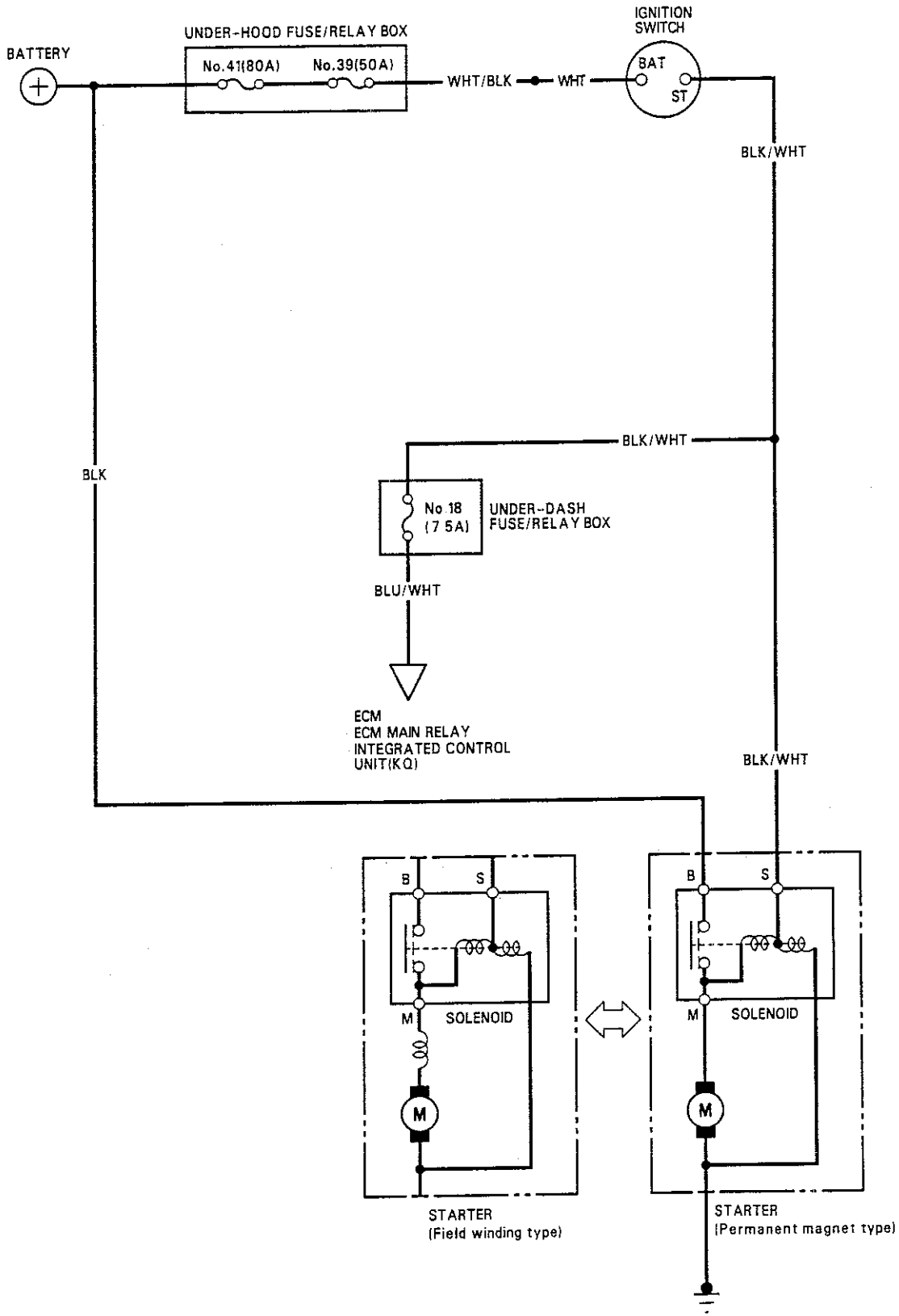
# Starting System

## Circuit Diagram (A/T)





# Circuit Diagram (M/T)



# Starting System

## Starter Test

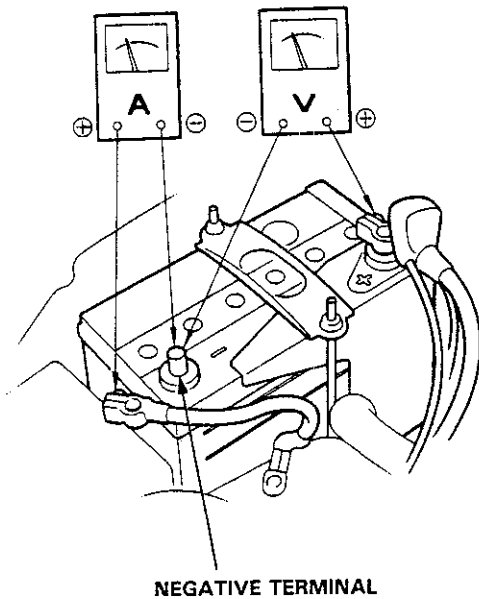
NOTE: The air temperature must be between 15 and 38°C (59 and 100°F) before testing

### Recommended Procedure:

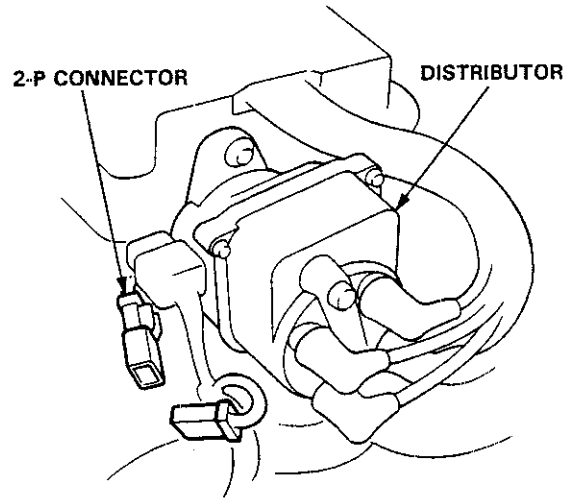
- Use a starter system tester.
- Connect and operate the equipment in accordance with the manufacturer's instructions
- Test and troubleshoot as described.

### Alternator Procedure:

- Use the following equipment:
  - Ammeter, 0–400 A
  - Voltmeter, 0–20 V (accurate within 0.1 volt)
  - Tachometer, 0–1200 rpm
- Hook up voltmeter and ammeter as shown.



1. Disconnect the 2-P connector (ignition coil primary lead) from the distributor



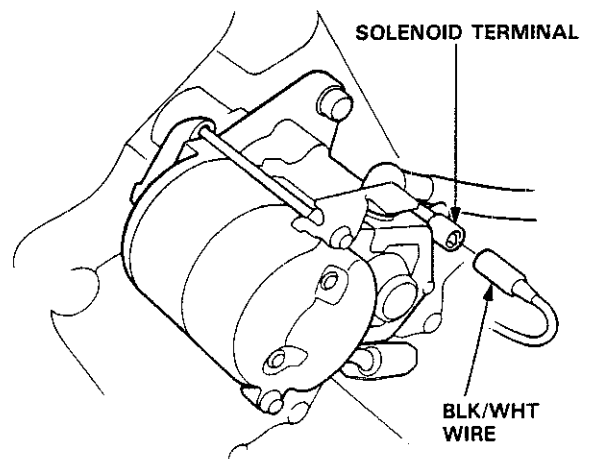
2. Check the starter engagement:  
Turn the ignition switch to "Start". The starter should crank the engine.

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

- Test again.

If the starter still does not crank the engine, bypass the ignition switch circuit as follows (make sure the transmission is in neutral):

Unplug the connector (BLK/WHT wire and solenoid terminal wire) from the starter. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal. The starter should crank the engine

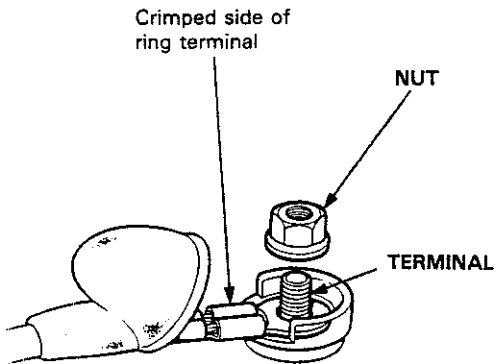






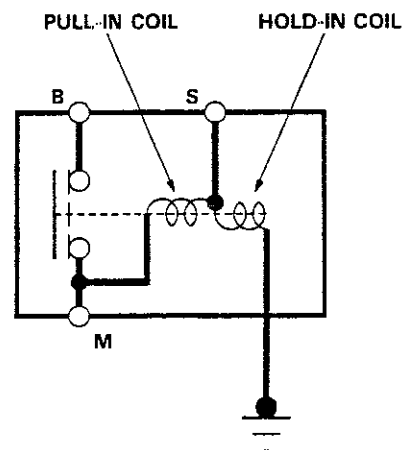
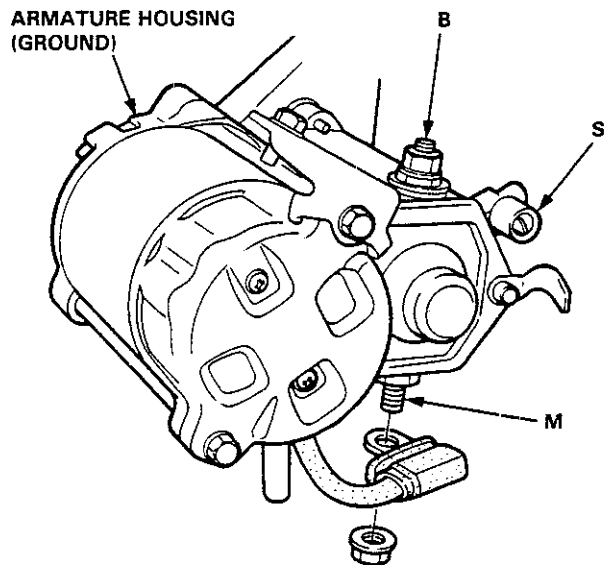
4. Install in the reverse order of removal.

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



## Starter Solenoid Test (Nippondenso)

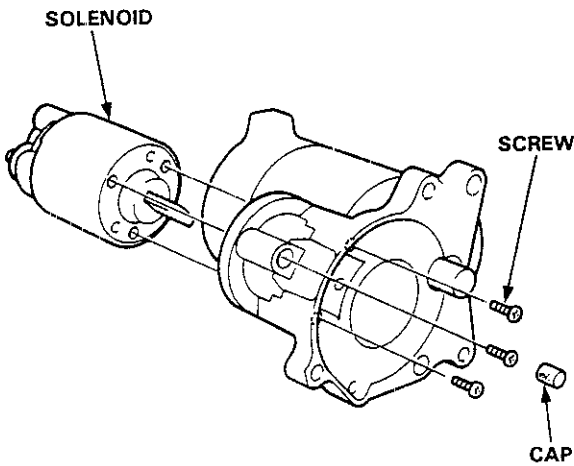
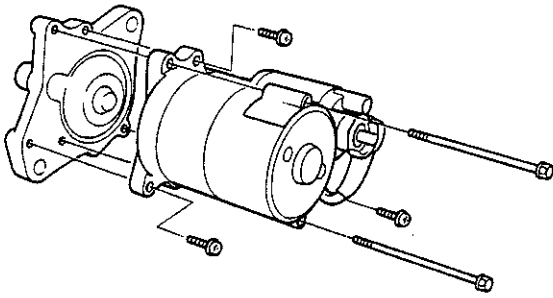
1. Check the hold-in coil for continuity between the S terminal and the armature housing (ground).  
Coil is OK if there is continuity.
2. Check the pull-in coil for continuity between the S and M terminals.  
Coil is OK if there is continuity.



# Starting System

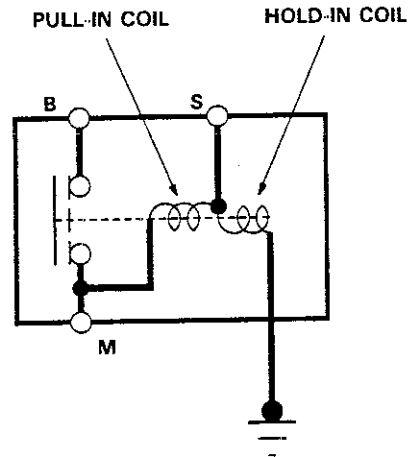
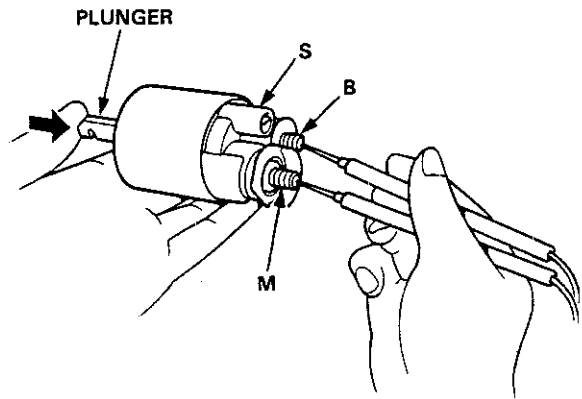
## Starter Solenoid Test (Mitsuba)

1. Remove the starter solenoid from the gear housing



2. Check for continuity between the terminals in each solenoid plunger position according to the table.

Terminal	B	M	S	GROUND
Position				
RELEASED		○	○	○
PUSHED	○	○	○	○





— 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 the connectors. Check the ignition switch.

On cars with automatic transmission, check the A/T gear position switch (neutral position switch) and connector.

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 more than 400 amperes.

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

- Fully charged battery.
- 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 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.

6. Check the starter disengagement:  
Turn the ignition switch to "III" and release to "II".  
The starter drive gear should disengage from the flywheel ring gear, check for:

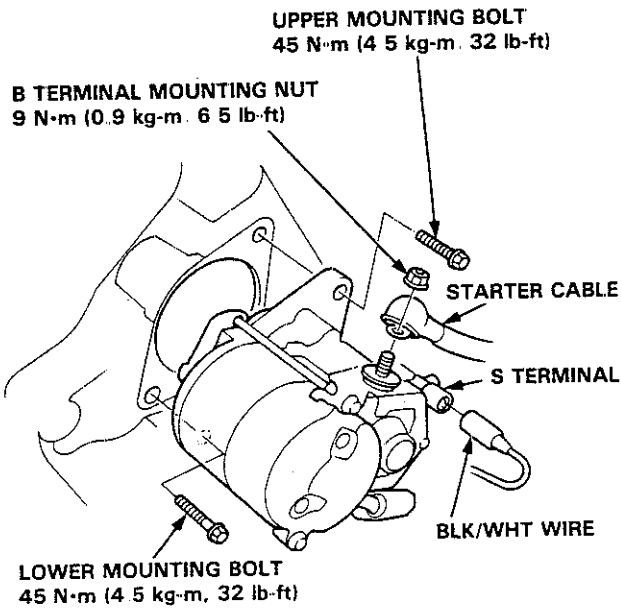
- Solenoid plunger and switch malfunction.
- Dirty drive gear assembly or damaged overrunning clutch.

# Starting System

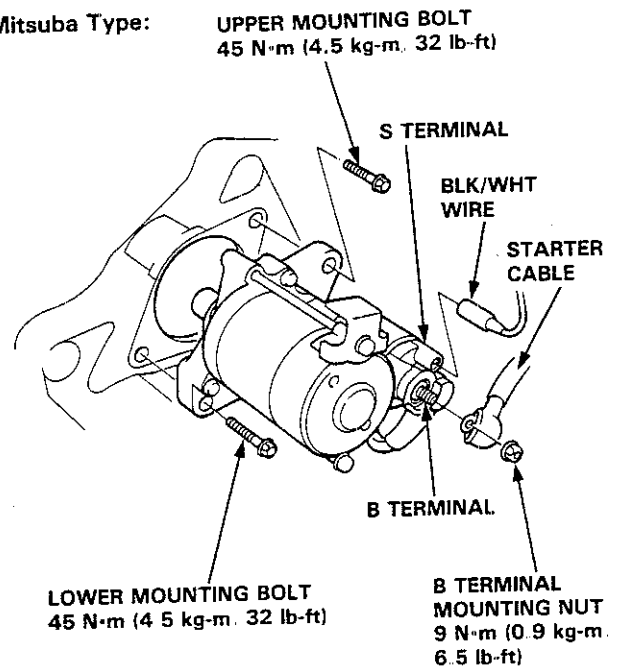
## Starter Replacement

- 1 Disconnect the negative cable from the battery
- 2 Disconnect the starter cable from the B terminal on the solenoid, then the BLK/WHT wire from the S terminal.
- 3 Remove the two bolts holding the starter, and remove the starter.

### Nippondenso Type:



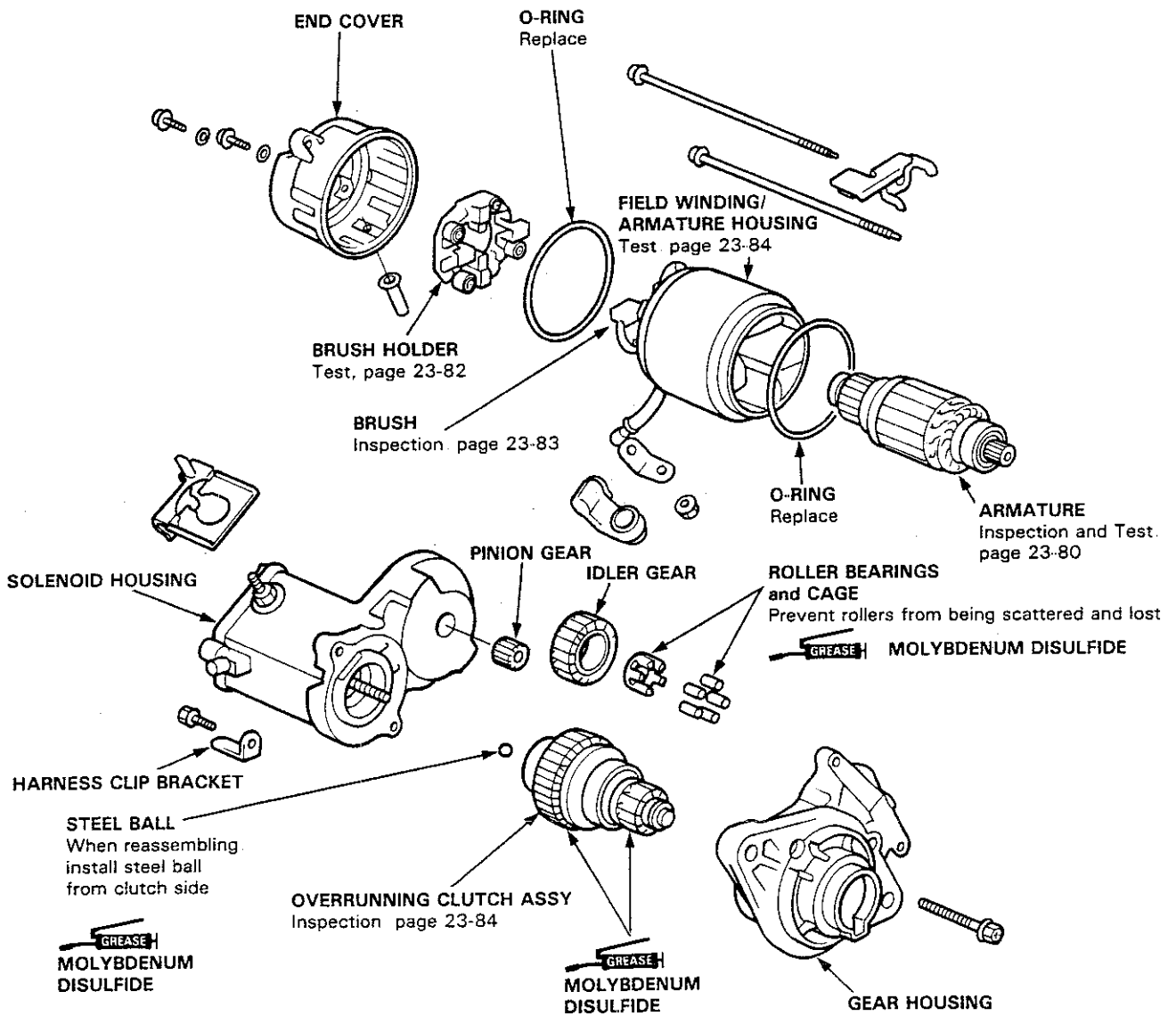
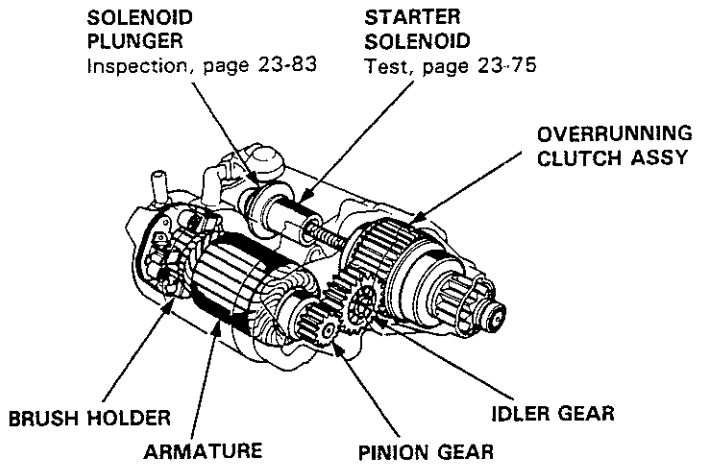
### Mitsuba Type:





# Starter Overhaul (Nippondenso)

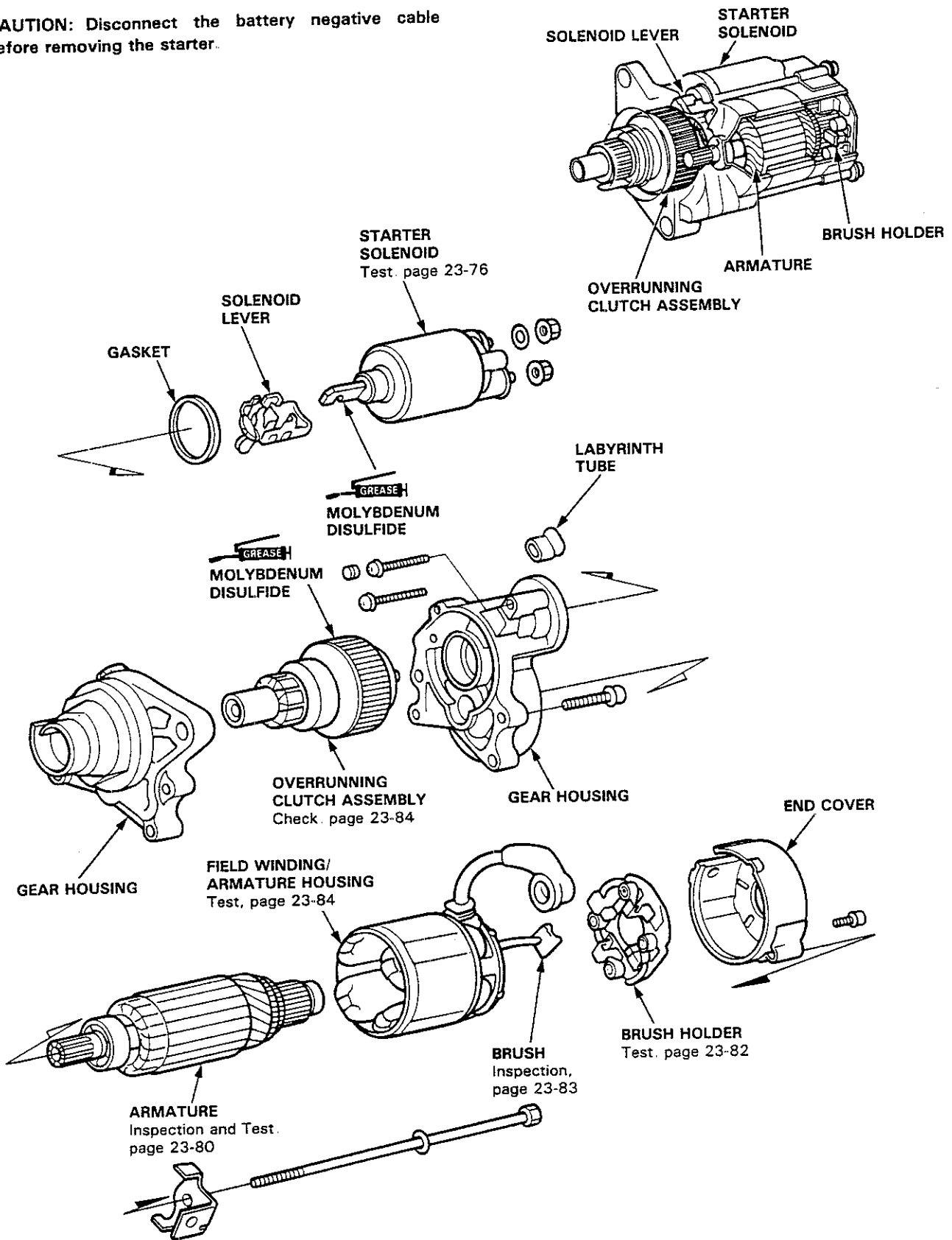
**CAUTION:** Disconnect the battery negative cable before removing the starter.



# Starting System

## Starter Overhaul (Mitsuba: Field Winding Type)

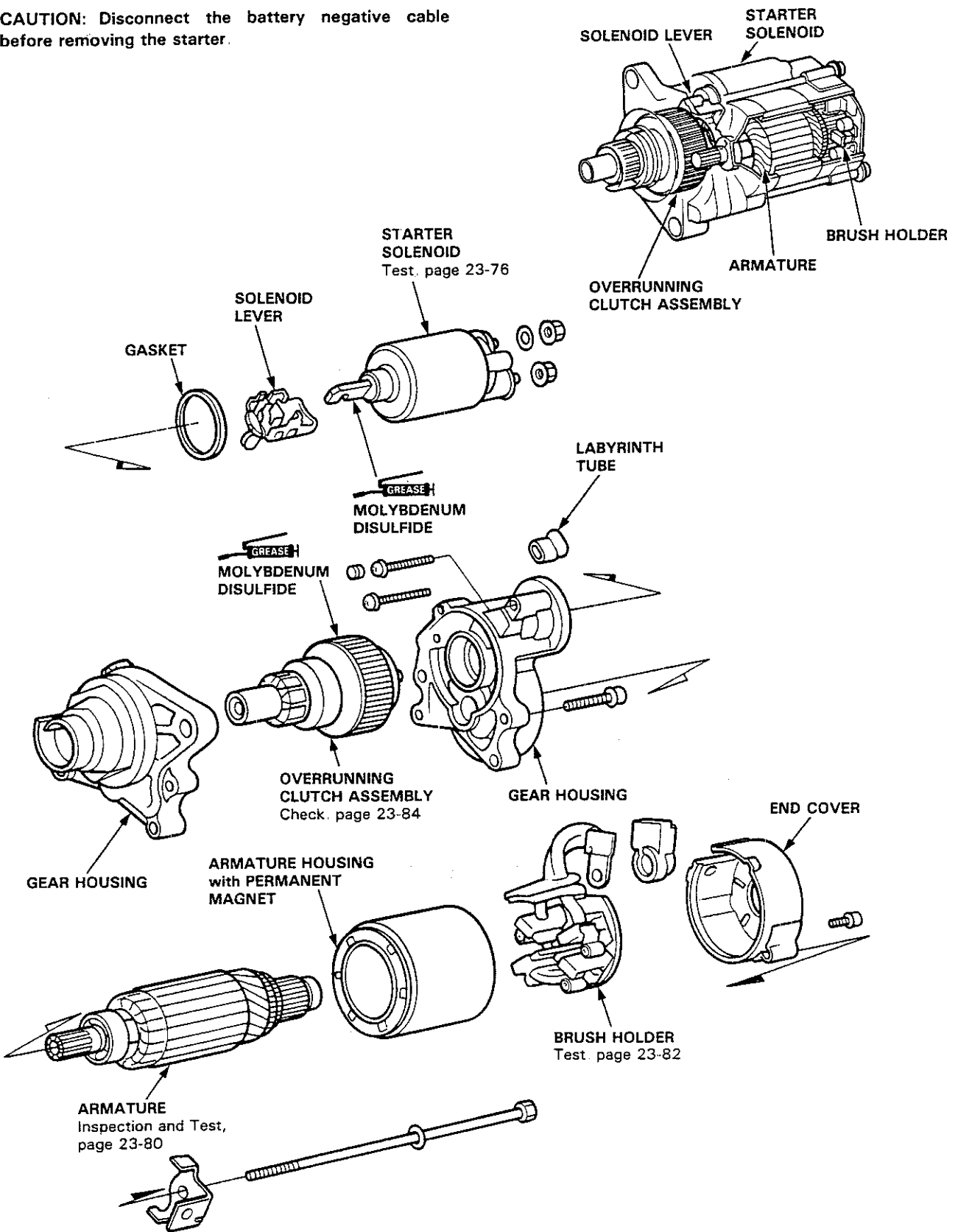
**CAUTION:** Disconnect the battery negative cable before removing the starter.





# Starter Overhaul (Mitsuba: Permanent Magnet Type)

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

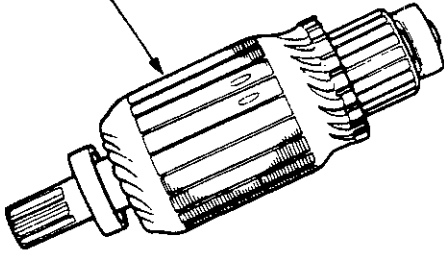


# Starting System

## Armature Inspection and Test

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

Inspect for damage

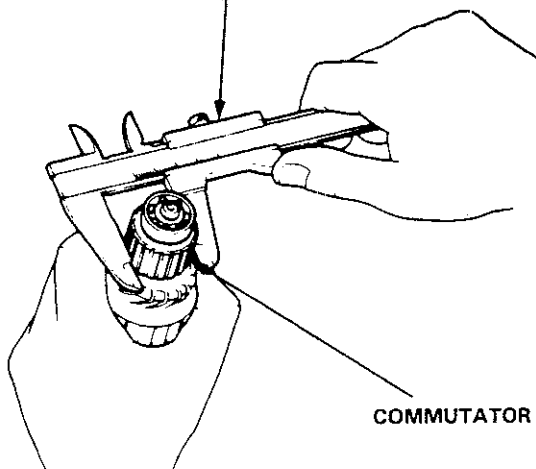


- 2 A dirty or burnt commutator surface may be resurfaced with emery cloth or a lathe within the following specifications

### Commutator Diameter

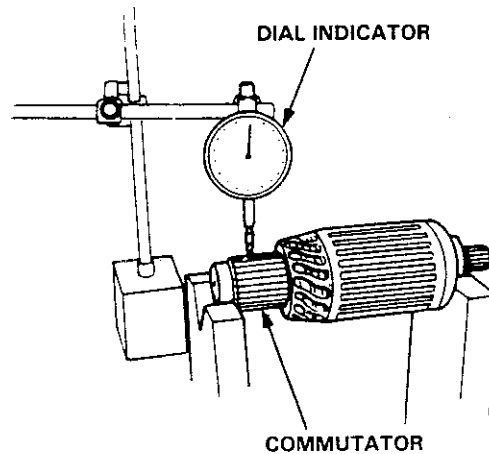
	Standard (NEW)	Service Limit
Nippondenso	30.0 mm (1.18 in)	29.0 mm (1.14 in)
Mitsuba	28.0–28.1 mm (1.102–1.106 in)	27.5 mm (1.083 in)

VERNIER CALIPER



### Commutator Runout

	Standard (NEW)	Service Limit
Nippondenso	0–0.1 mm (0.004 in)	0.4 mm (0.015 in)
Mitsuba	0–0.002 mm (0.0008 in)	0.05 mm (0.002 in)

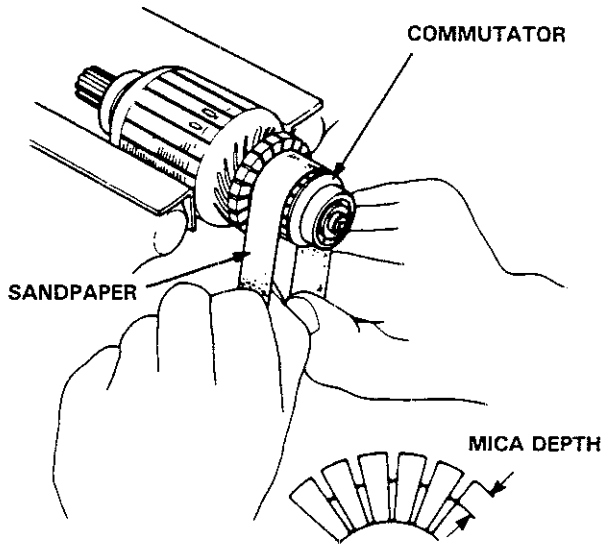


- 3 If the commutator runout and diameter are within limits, check the commutator for damage or for carbon dust or brass chips between the segments.





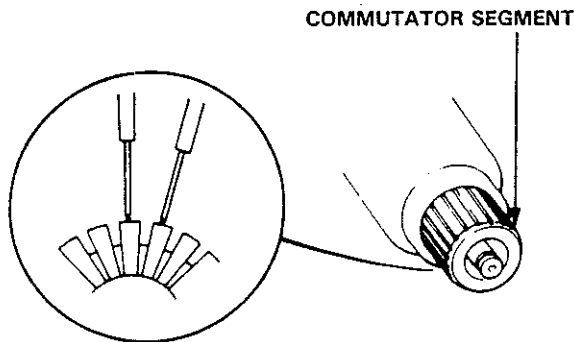
- IF the surface is dirty, recondition it with a #500 or #600 sandpaper. Then, check mica depth. If necessary, undercut mica with a hacksaw blade to achieve proper depth.



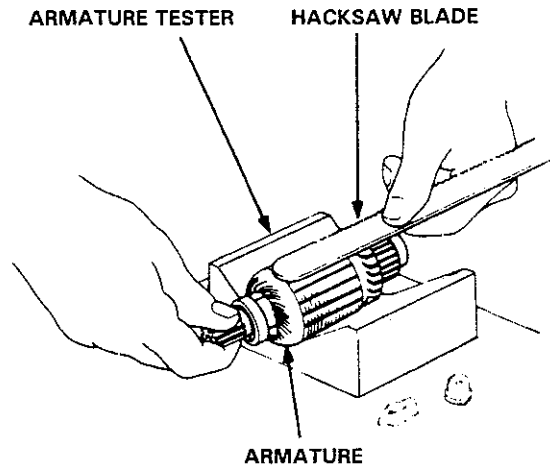
#### Commutator Mica Depth

	Standard (NEW)	Service Limit
Nippondenso	0.5–0.8 mm (0.02–0.03 in)	0.20 mm (0.008 in)
Mitsuba	0.4–0.5 mm (0.016–0.02 in)	0.15 mm (0.006 in)

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

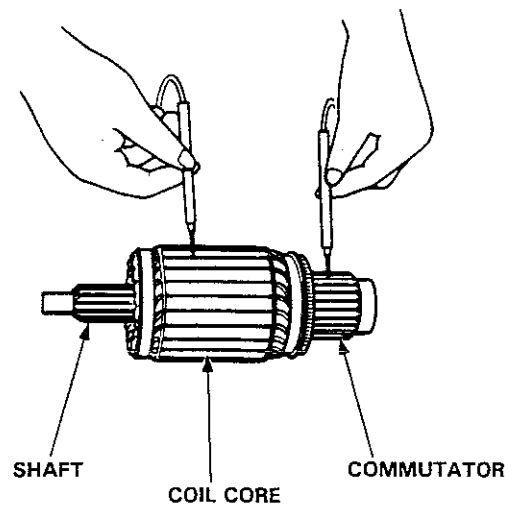


- Place the armature on an armature tester. Hold a hacksaw blade on the armature core.



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

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

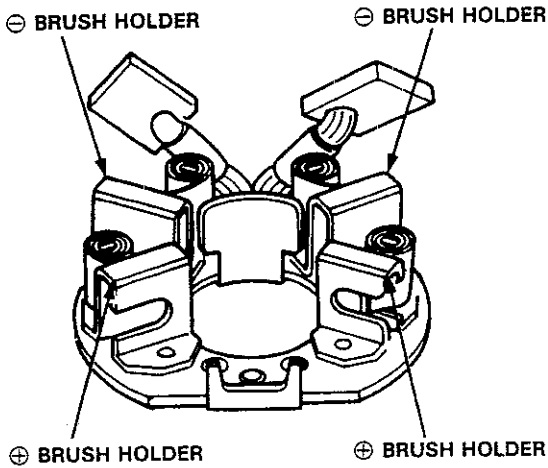


# Starting System

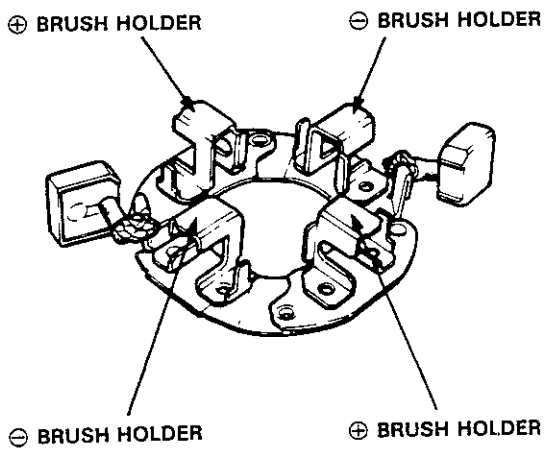
## Starter Brush Holder Test

1. Check that there is no continuity between the  $\oplus$  and  $\ominus$  brush holder.  
If continuity exists, replace the brush holder assembly.

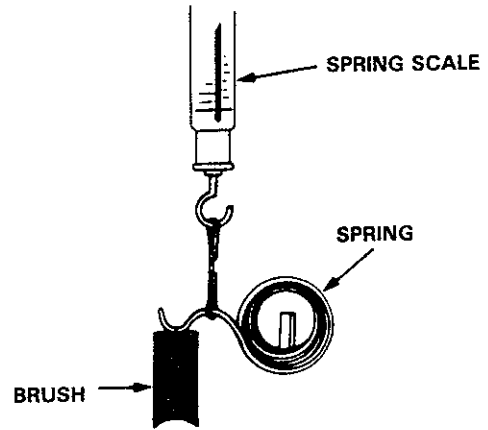
### Mitsuba Type:



### Nippondenso Type:



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
Nippondenso (1.0 KW)	17–24 N (1.70–2.40 kg, 3.74–5.28 lb)
Nippondenso (1.2 KW)	14–20 N (1.40–2.0 kg, 3.08–4.4 lb)
Mitsuba (1.0, 1.2 KW)	18.5–23.5 N (1.85–2.35 kg, 4.07–5.17 lb)
Mitsuba (1.4 KW)	16–18 N (1.60–1.80 kg, 3.52–3.96 lb)

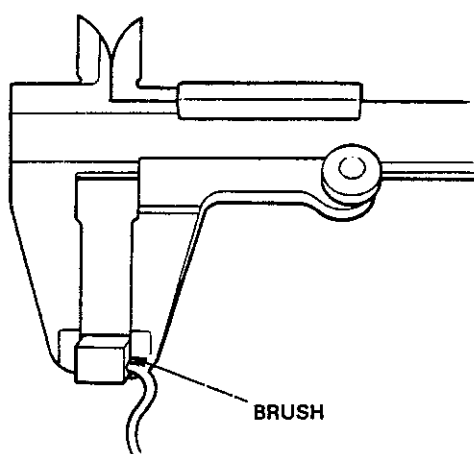


## Starter Brush Inspection

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

### Brush Length

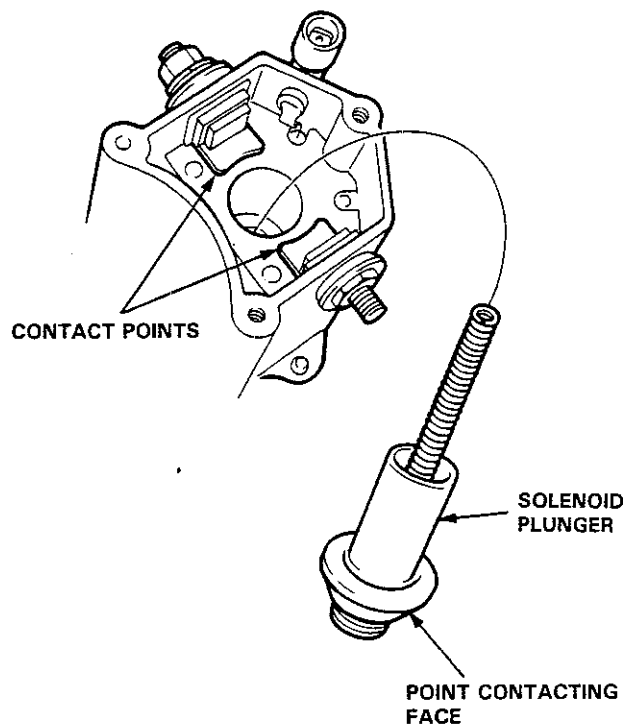
	Standard (NEW)	Service Limit
Nippondenso	13.0–13.5 mm (0.51–0.53 in)	8.5 mm (0.33 in)
Mitsuba	14.3–14.7 mm (0.56–0.58 in)	9.3 mm (0.37 in)



**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.

## Solenoid Plunger Inspection (Nippondenso)

Check the contact points and face of the starter solenoid plunger for burning, pitting or any other defects. If surfaces are rough, recondition them with a strip of #500 or #600 sandpaper.

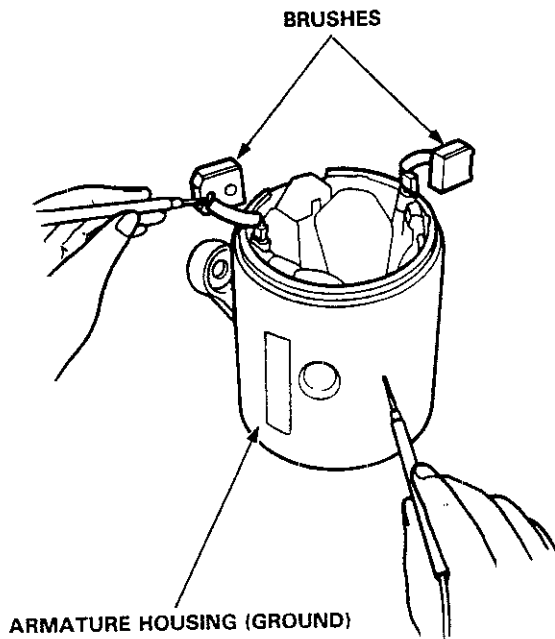


# Starting System

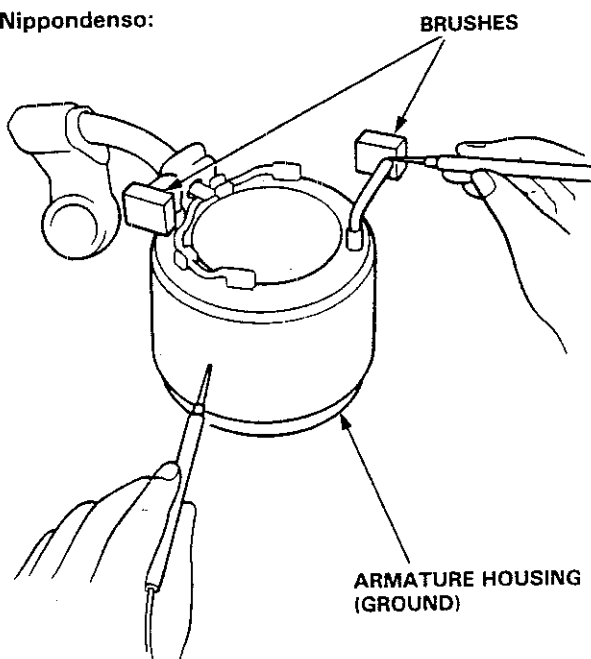
## Starter Field Winding Test

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

Mitsuba (field winding type):

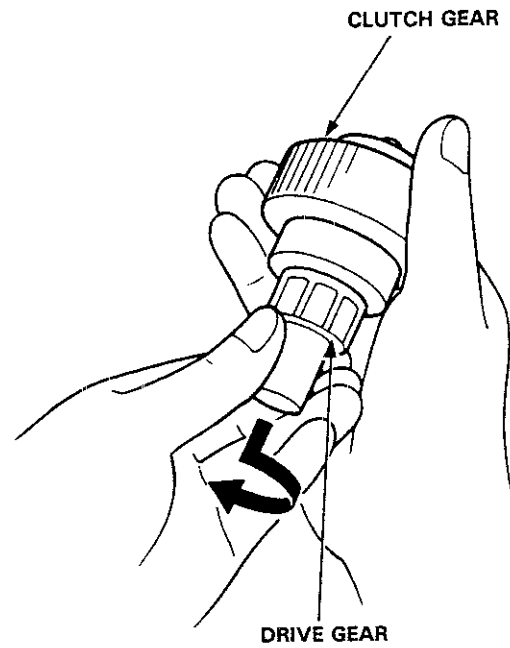


Nippondenso:

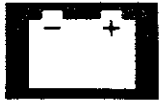


## Overrunning Clutch Inspection

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.



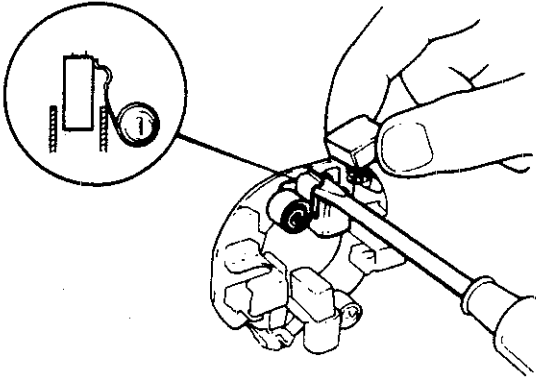
3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.
4. Check the condition of the flywheel or torque converter ring if the starter drive gear teeth are damaged.



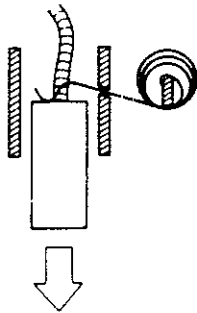
## Starter Reassembly

Reassemble the starter in the reverse order of disassembly.

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

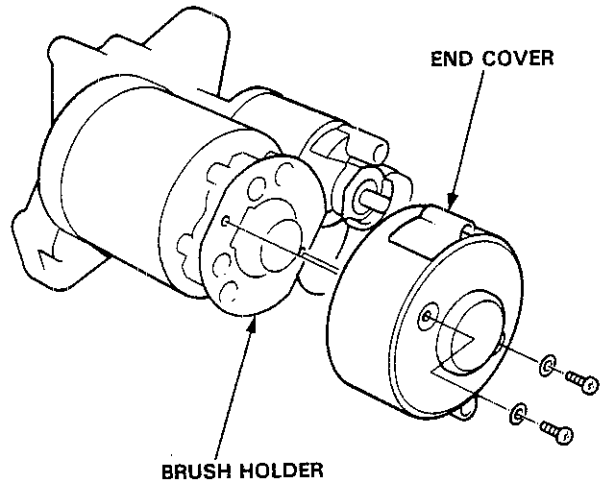


2. Install the armature in the housing. Next pry back each brush spring again and push the brush down until it seats against the commutator then release the spring against the end of the brush.

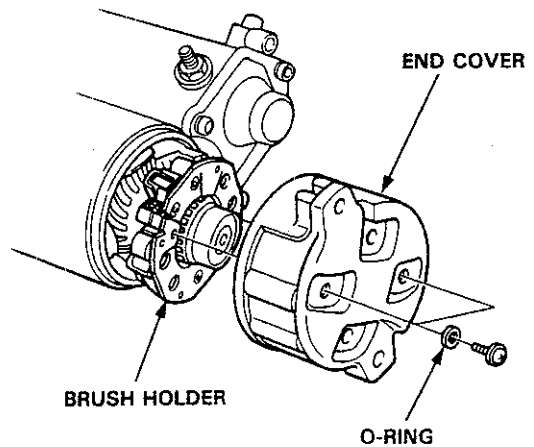


3. Install the end cover on the brush holder.

**Mitsuba:**



**Nippondenso:**



# Starting System

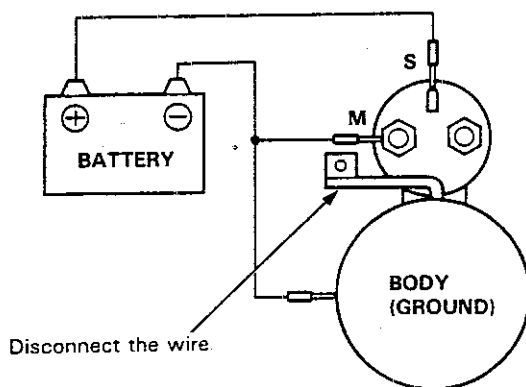
## Performance Test

**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 car).

### Pull-in Coil Test:

Connect the battery as shown. If the pinion protrudes, it is working properly.

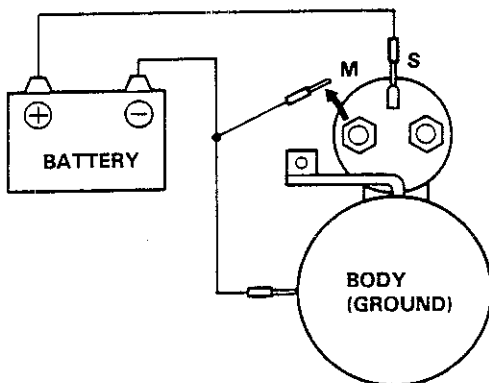
**NOTE:** Do not leave the battery connected for more than 10 seconds.



### Hold-in Coil Test:

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

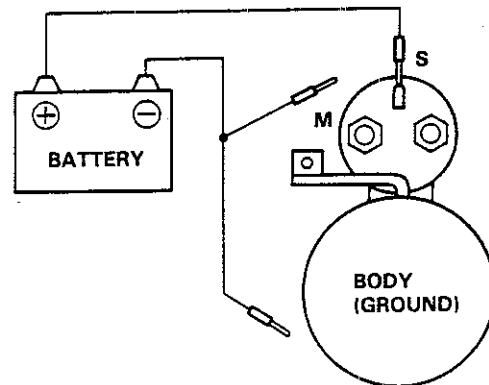
**NOTE:** Do not leave the battery connected for more than 10 seconds.

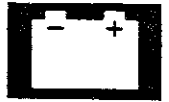


### Retracting Test:

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

**NOTE:** 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 V, the starter is working properly

**Specifications:**

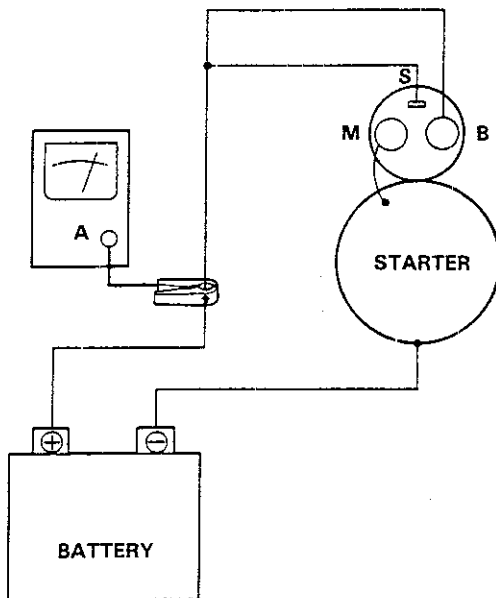
Mitsuba: 80 A or less (Electric current),  
(1.4 KW) 2600 rpm or more (Motor speed)

Mitsuba: 100 A or less (Electric current),  
(1.2 KW) 3000 rpm or more (Motor speed)

Mitsuba: 100 A or less (Electric current),  
(1.0 KW) 3000 rpm or more (Motor speed)

Nippondenso: 90 A or less (Electric current),  
(1.2 KW) 3000 rpm or more (Motor speed)

Nippondenso: 90 A or less (Electric current),  
(1.0 KW) 3000 rpm or more (Motor speed)



# Ignition System

## Component Location Index

### IGNITION TIMING CONTROL SYSTEM

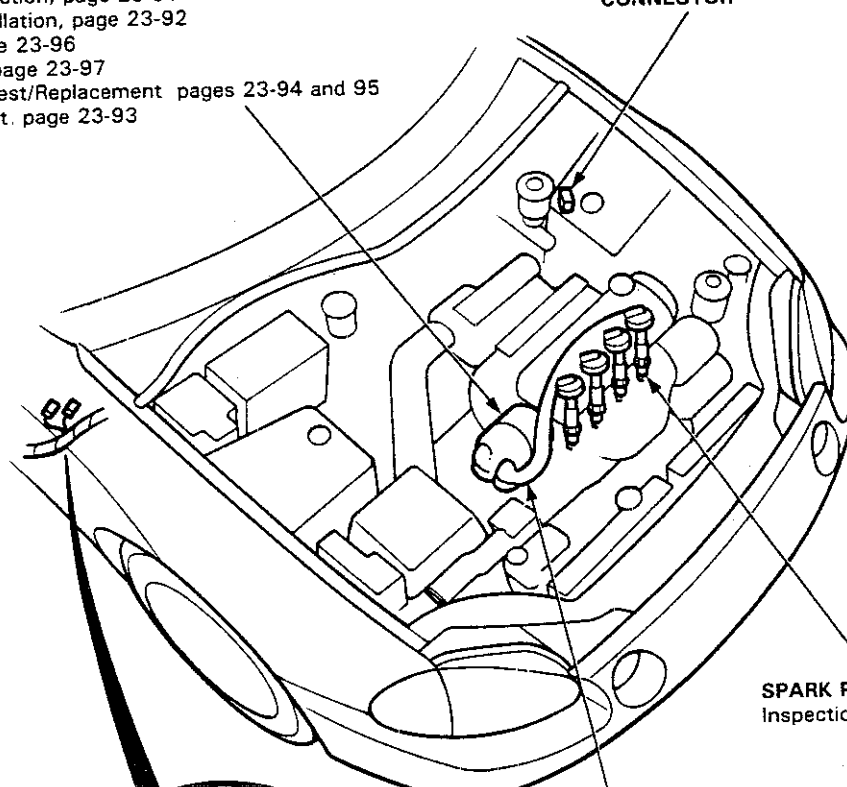
- Troubleshooting, section 11
- Inspection and setting, page 23-90

NOTE: The illustration shows LHD type; the test tachometer and service check connectors of RHD type are located symmetrical.

#### DISTRIBUTOR

Top End Inspection, page 23-91  
Removal/Installation, page 23-92  
Overhaul, page 23-96  
Reassembly, page 23-97  
Ignition Coil Test/Replacement, pages 23-94 and 95  
ICM Input Test, page 23-93

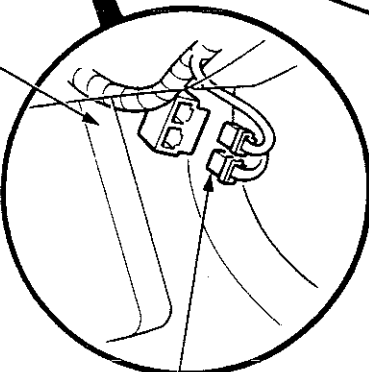
#### TEST TACHOMETER CONNECTOR



#### SPARK PLUGS Inspection, page 23-98

#### IGNITION WIRES Inspection, page 23-97

#### ENGINE CONTROL MODULE (ECM)

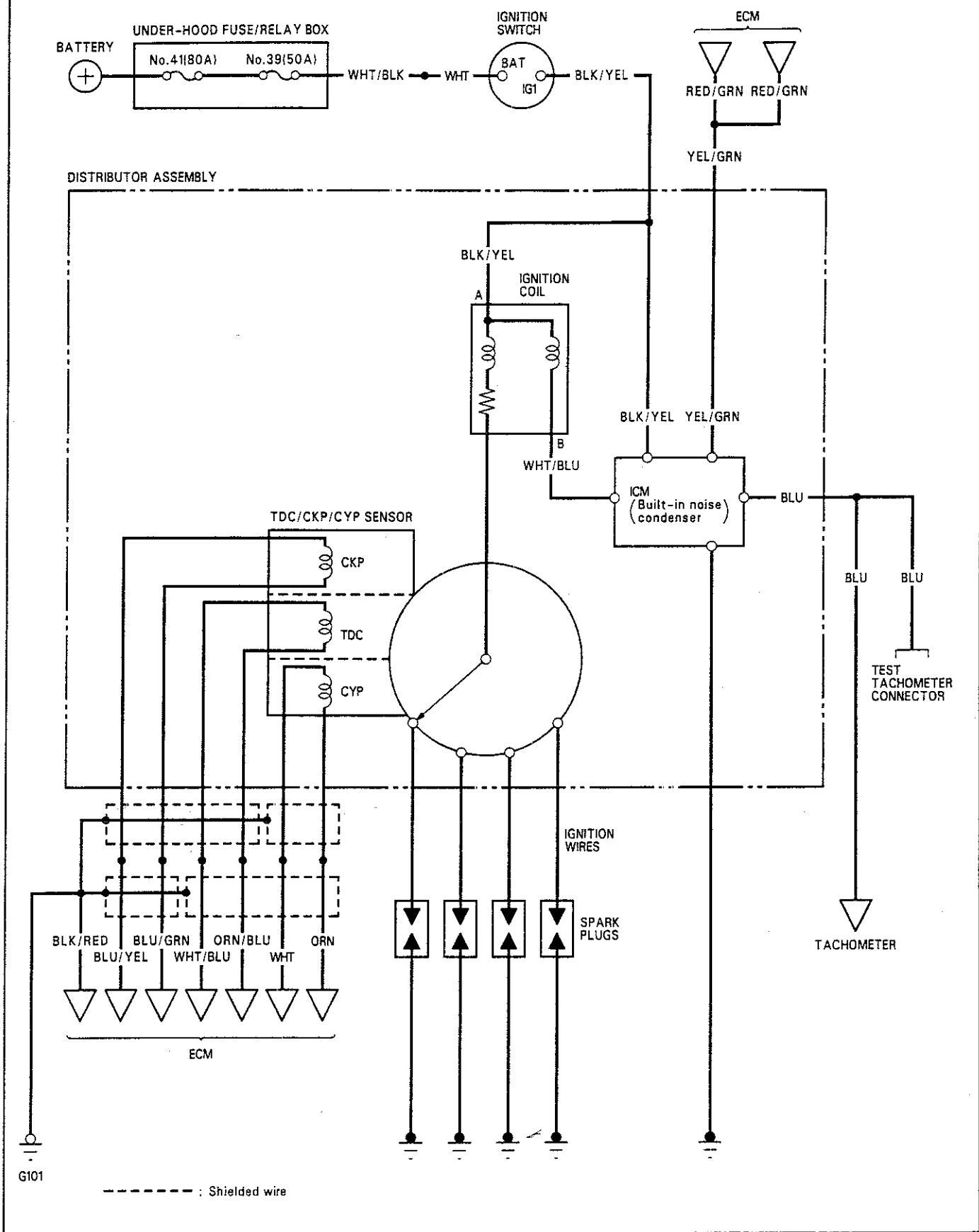


#### SERVICE CHECK CONNECTOR (for the ECM)





# Circuit Diagram

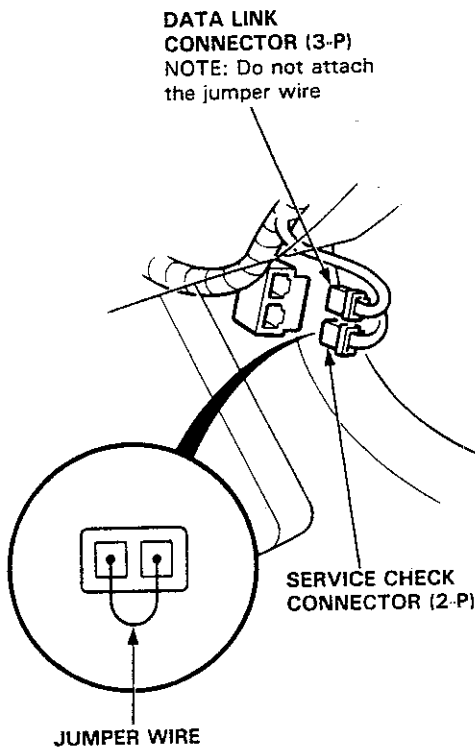


# Ignition System

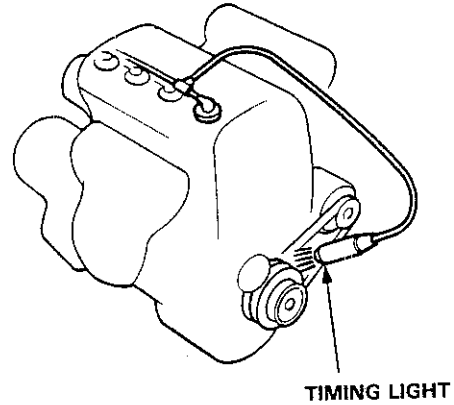
## Ignition Timing Inspection and Setting

1. Start the engine and allow it to warm up (radiator fan comes on)
2. Pull out the service check connector located behind the right kick panel. Connect the WHT/GRN and BRN terminals with a jumper wire.

NOTE: The illustration shows LHD type; RHD type is symmetrical.



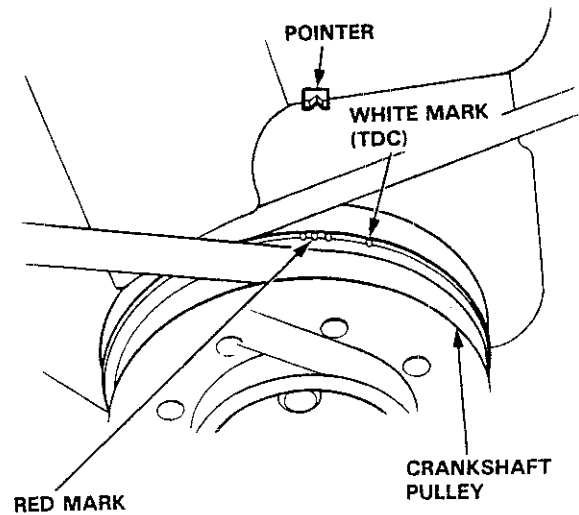
3. Connect a timing light to the #1 ignition wire and point it toward the pointer on the timing belt cover



4. Adjust ignition timing if necessary, to the following specifications:

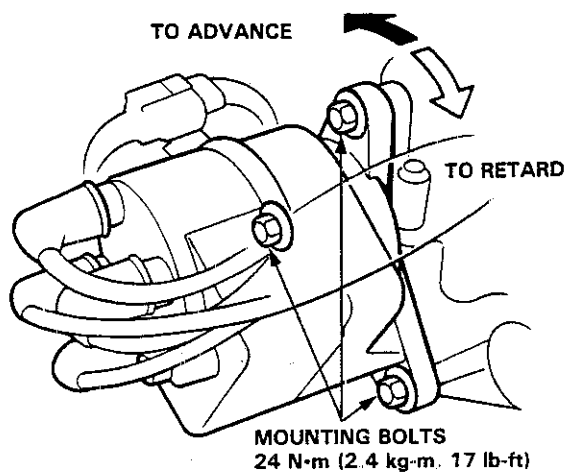
Ignition Timing:  
16° BTDC (RED) at 750 rpm

NOTE: Shift lever in neutral position





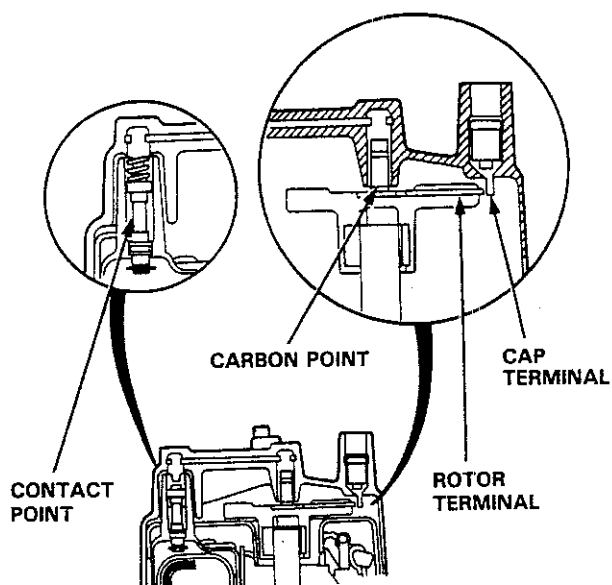
5. If it is necessary to adjust the ignition timing, loosen the distributor mounting bolts, and turn the distributor housing counterclockwise to advance the timing, or clockwise to retard the timing.



6. Tighten the adjusting bolts and recheck the timing.
7. Remove the jumper wire from the service check connector.

## Distributor Top End Inspection

1. Check for rough or pitted rotor and cap terminals.
2. Scrape or file off the carbon deposits. If rough, smooth the rotor terminal with an oil stone or #600 sandpaper.
3. Check the distributor ignition cap for cracks, wear and damage. If necessary, clean or replace it.

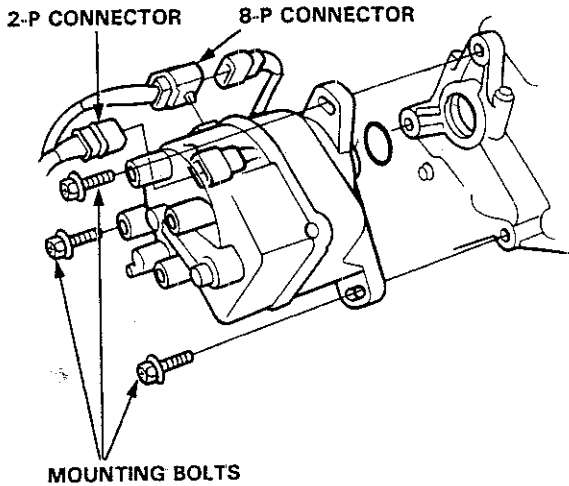


# Ignition System

## Distributor Removal/Installation

### Removal:

1. Disconnect the 2-P and 8-P connectors from the distributor.
2. Disconnect the ignition wires from distributor ignition cap.

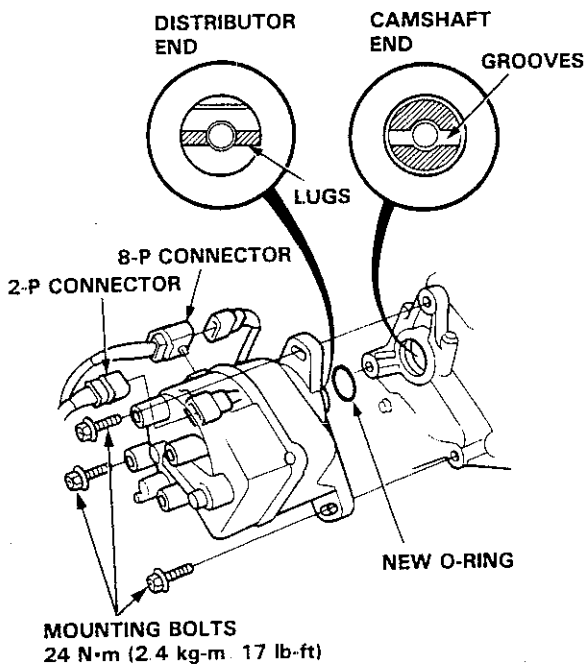


3. Remove the distributor mounting bolts, then remove the distributor from the cylinder head.

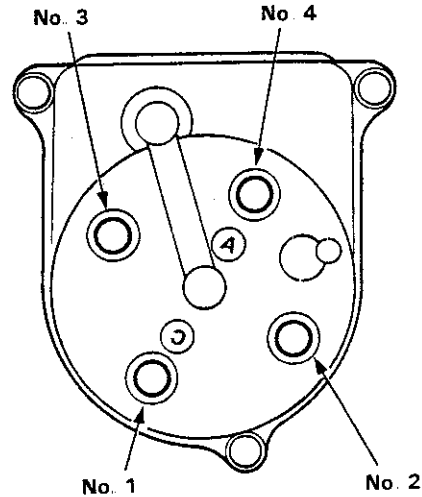
### Installation:

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

NOTE: The lugs 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 temporarily.
4. Connect the 2-P and 8-P connectors to the distributor.
5. Connect the ignition wires as shown.



6. Set the timing with a timing light (see page 23-90)
7. After setting the timing, tighten the mounting bolts.

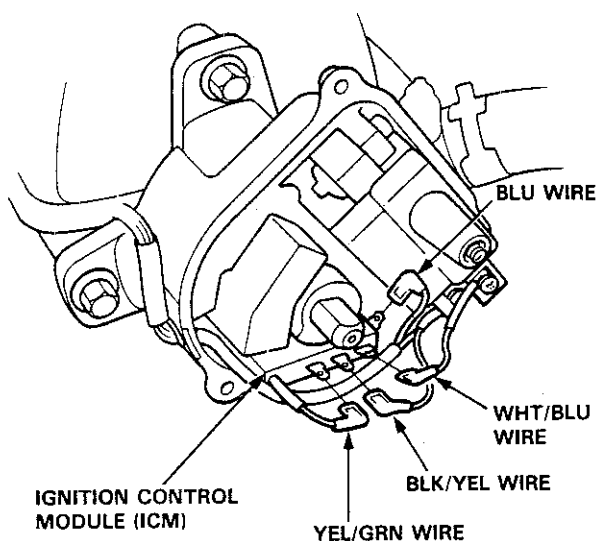


## Ignition Control Module Input Test

### NOTE:

- See section 11 when the self-diagnostic indicator blinks.
- Perform an input test for the ignition control module after finishing the fundamental tests for the ignition system and the fuel and emission system.
- The tachometer should operate normally.

- 1 Remove the distributor ignition cap, the rotor, and the inner cover
- 2 Disconnect the BLK/YEL, WHT/BLU, YEL/GRN, and BLU wires from the ignition control module.



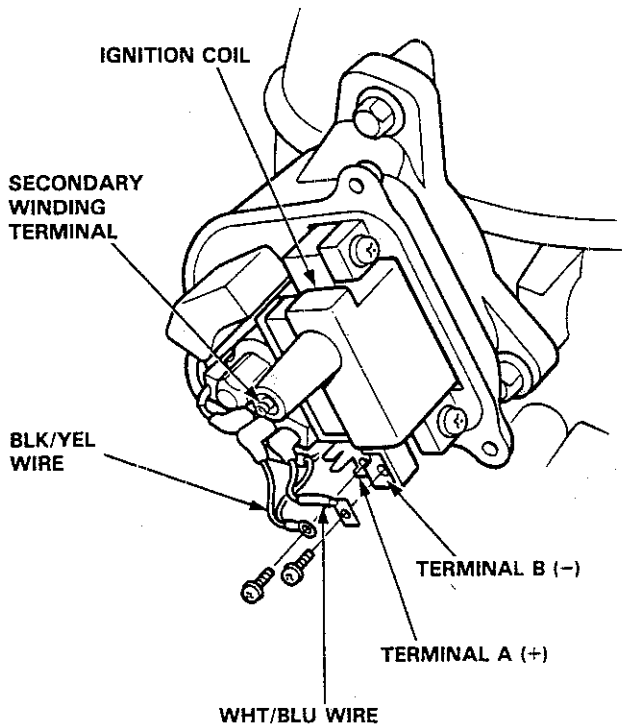
- 3 Turn the ignition switch ON. Check for voltage between the BLK/YEL wire and body ground. There should be battery voltage.
  - If there is no battery voltage, check the BLK/YEL wire between the ignition switch and the ignition control module.
  - If there is battery voltage, go to step 4
- 4 Turn the ignition switch ON. Check for voltage between the WHT/BLU wire and body ground. There should be battery voltage.
  - If there is no battery voltage, check for:
    - Ignition coil
    - WHT/BLU wire between the ignition coil and the ignition control module.
  - If there is battery voltage, go to step 5.

- 5 Check the YEL/GRN wire between the engine control module and the ignition control module
- 6 Check the BLU wire between the tachometer and the ignition control module
- 7 If all tests are normal, replace the ignition control module.

# Ignition System

## Ignition Coil Test

1. With the ignition switch OFF, remove the distributor ignition cap.
2. Remove the two screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals A (+) and B (-) respectively

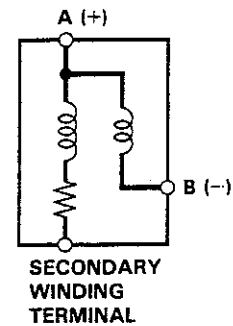


3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

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

**Primary Winding Resistance**  
(between the A and B terminals):  
0.6—0.8 ohms

**Secondary Winding Resistance**  
(between the A and secondary winding terminals):  
12,800—19,200 ohms

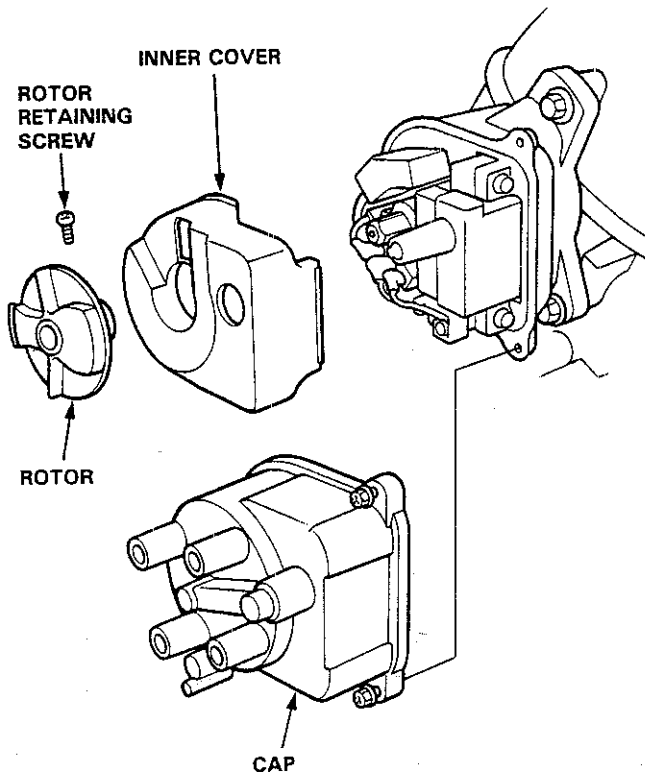




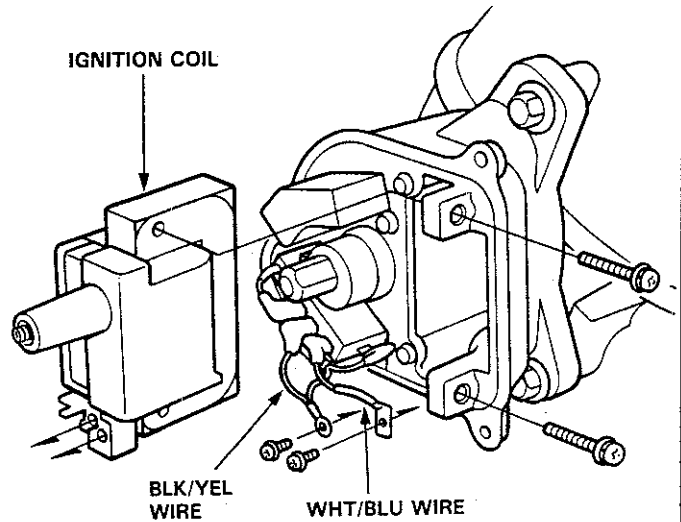
# Ignition System

## Ignition Coil Replacement

1. With the ignition switch OFF, remove the distributor ignition cap and rotor, then remove the inner cover

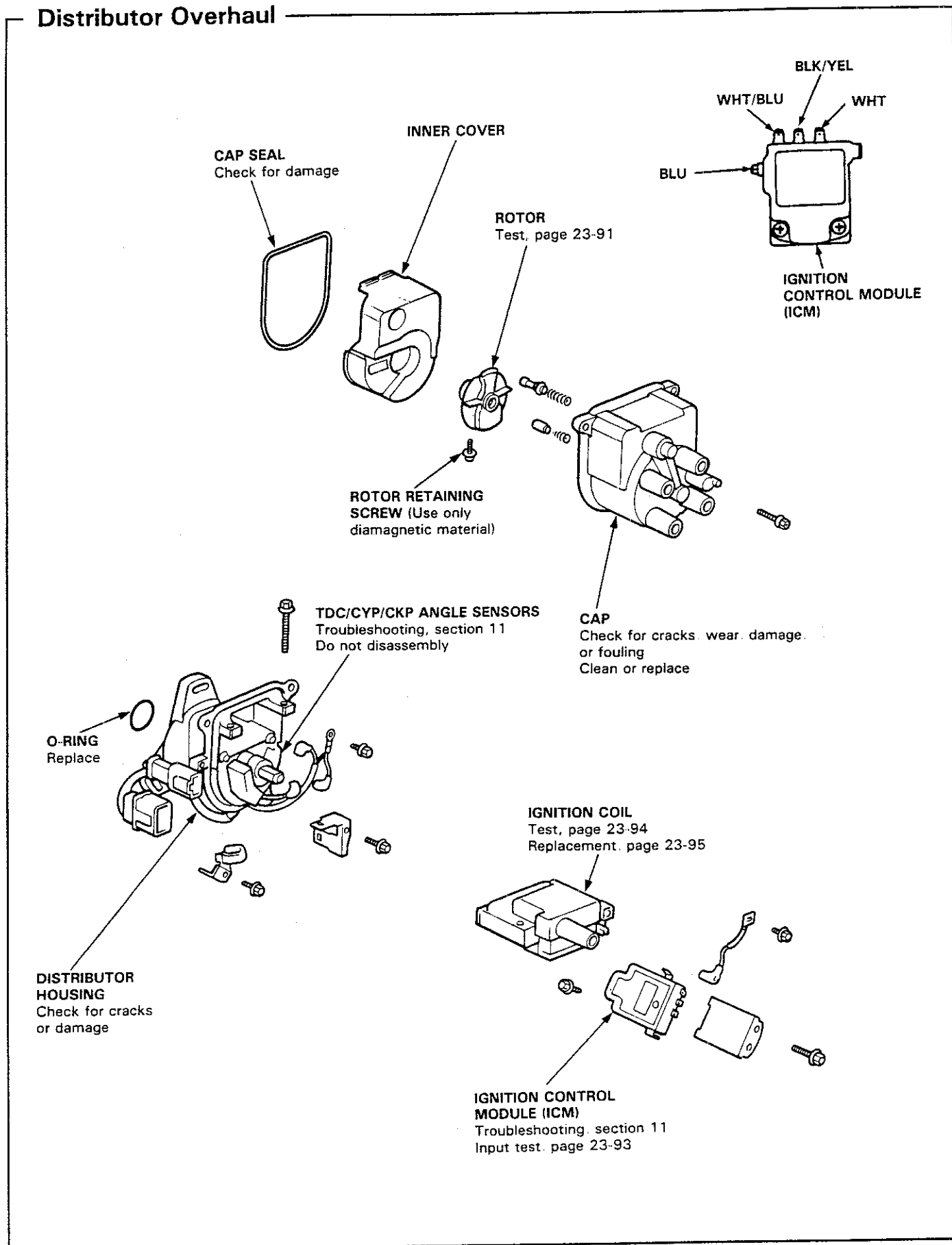


2. Remove the two screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals.
3. Remove the two screws and slide the ignition coil out of the distributor housing.



# Ignition System

## Distributor Overhaul



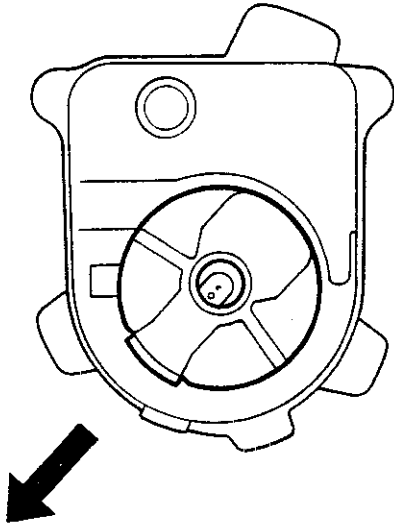




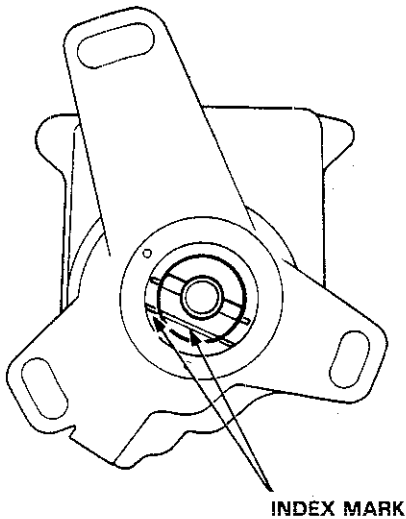
## Distributor Reassembly

Reassemble the distributor shaft and housing in the reverse order of disassembly.

1. Install the rotor, then turn it so that it faces in the direction shown (toward the No. 1 cylinder).



2. Slip the thrust washer and coupling onto the shaft
3. Check that the rotor is still pointing toward the No. 1 cylinder, then align the index mark on the housing with the index mark on the coupling

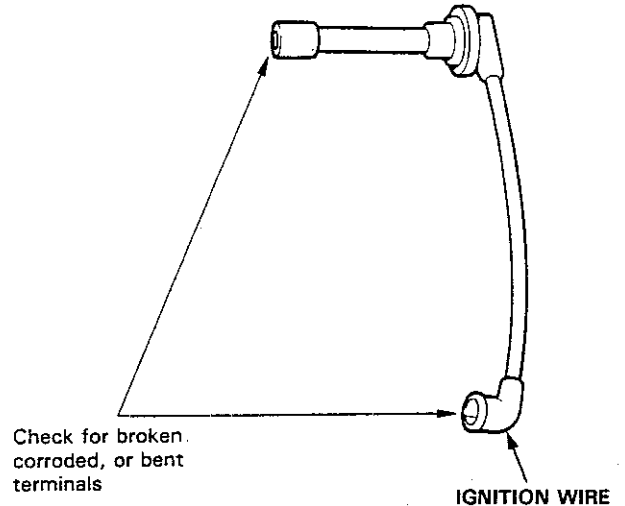


4. Drive in the pin and secure it with the pin retainer

## Ignition Wire Inspection and Test

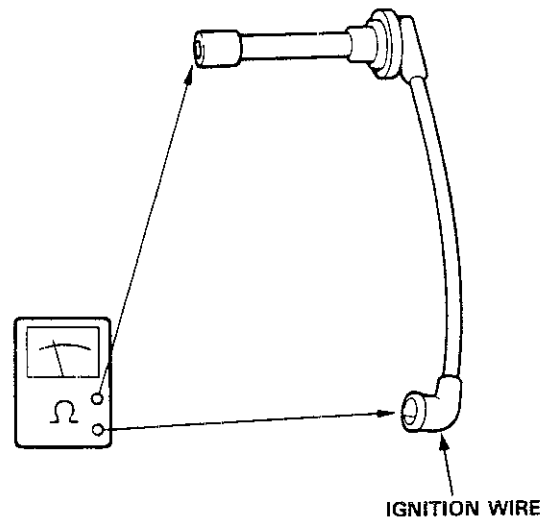
**CAUTION:** Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wires; you might break them inside.

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



2. Connect ohmmeter probes and measure resistance.

**Ignition Wire Resistance:**  
25,000 ohms max. at 20°C (70°F)

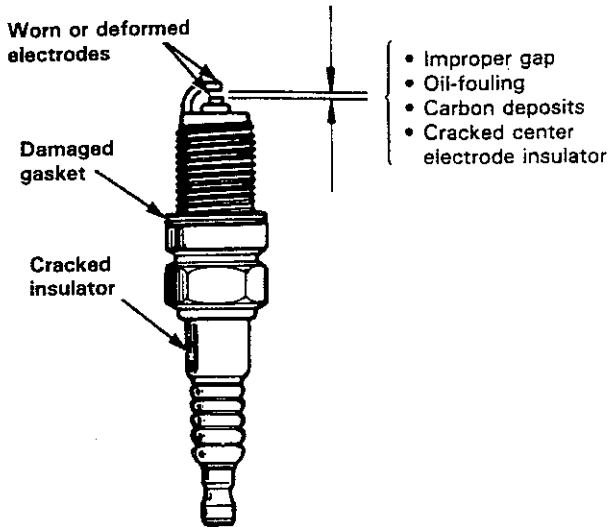


3. If resistance exceeds 25,000 ohms, replace the ignition wire.

# Ignition System

## Spark Plug Inspection

1. Inspect the electrodes and ceramic insulator for:



**Burned or worn electrodes may be caused by:**

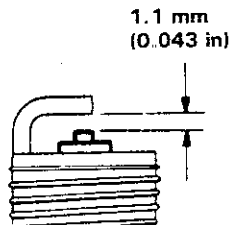
- Advanced ignition timing
- Loose spark plug
- Plug heat range too low
- Insufficient cooling

**Fouled plug may be caused by:**

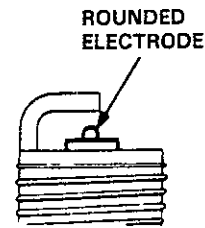
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too high
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

2. Adjust the gap with a suitable gapping tool.

**Electrode Gap: 1.1 mm (0.043 in)**



3. Replace the plug if the center electrode is rounded as shown below:



NOTE: Do not use spark plugs other than those listed below, because these plugs are a new type (ISO standard)



These marks are sealed on the timing belt cover

### Spark Plug

#### D16Z6/D16Z7 engine

BKR6E-11 (NGK) K20PR-U11 (Nippondenso)	For all normal driving.
BKR7E-11 (NGK) K22PR-U11 (Nippondenso)	For hot climates or continuous high speed driving.

#### D16A9/B16A2 engine

BKR6E-N11 (NGK) K20PR-L11 (Nippondenso)	For all normal driving
BKR7E-N11 (NGK) K22PR-L11 (Nippondenso)	For hot climates or continuous high speed driving.

4. Screw the plugs into the cylinder head finger-tight, then torque them to 18 N·m (1.8 kg-m, 13 lb-ft).

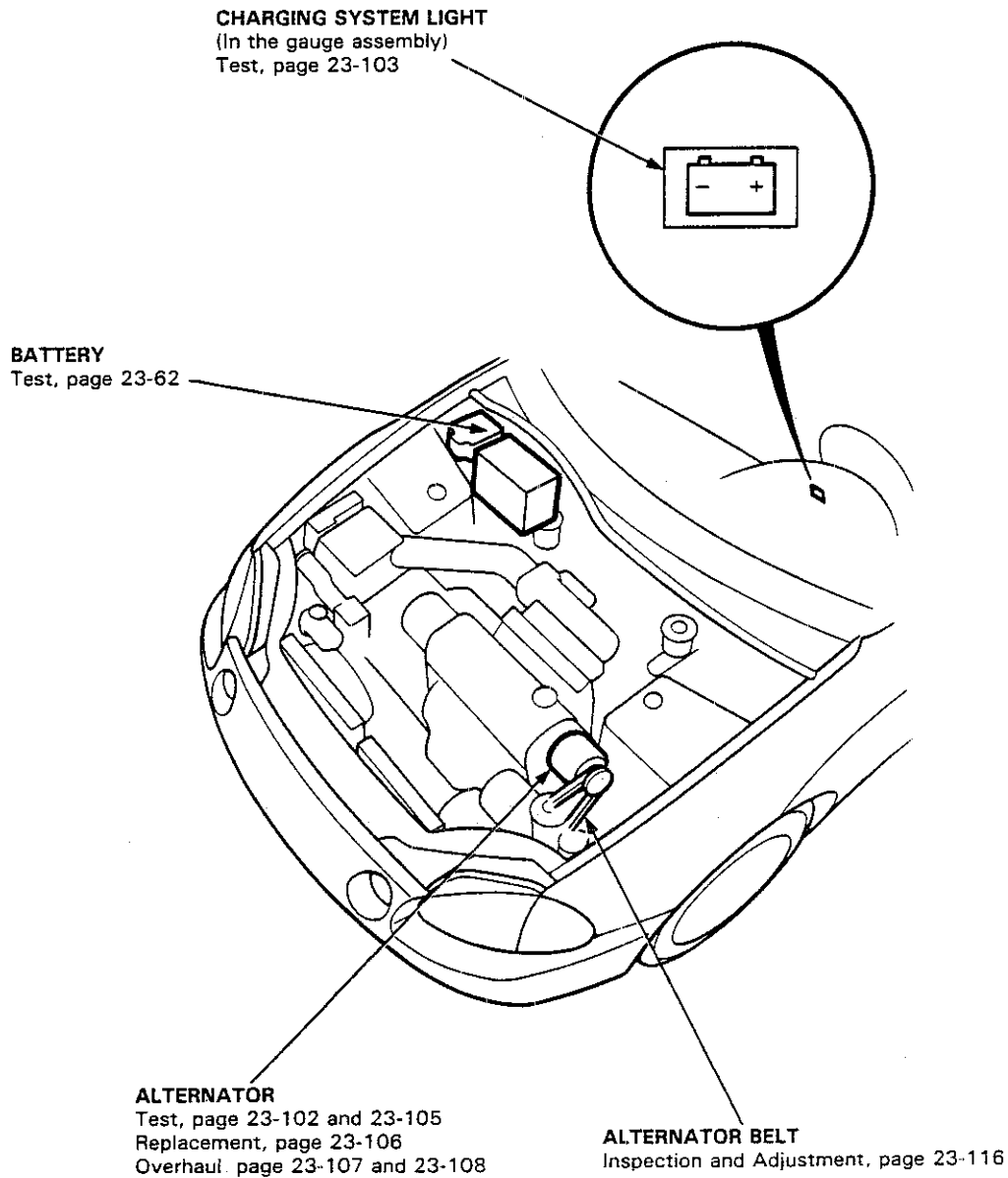
NOTE: Apply a small quantity of anti-seize compound to the plug threads before installing.



# Charging System

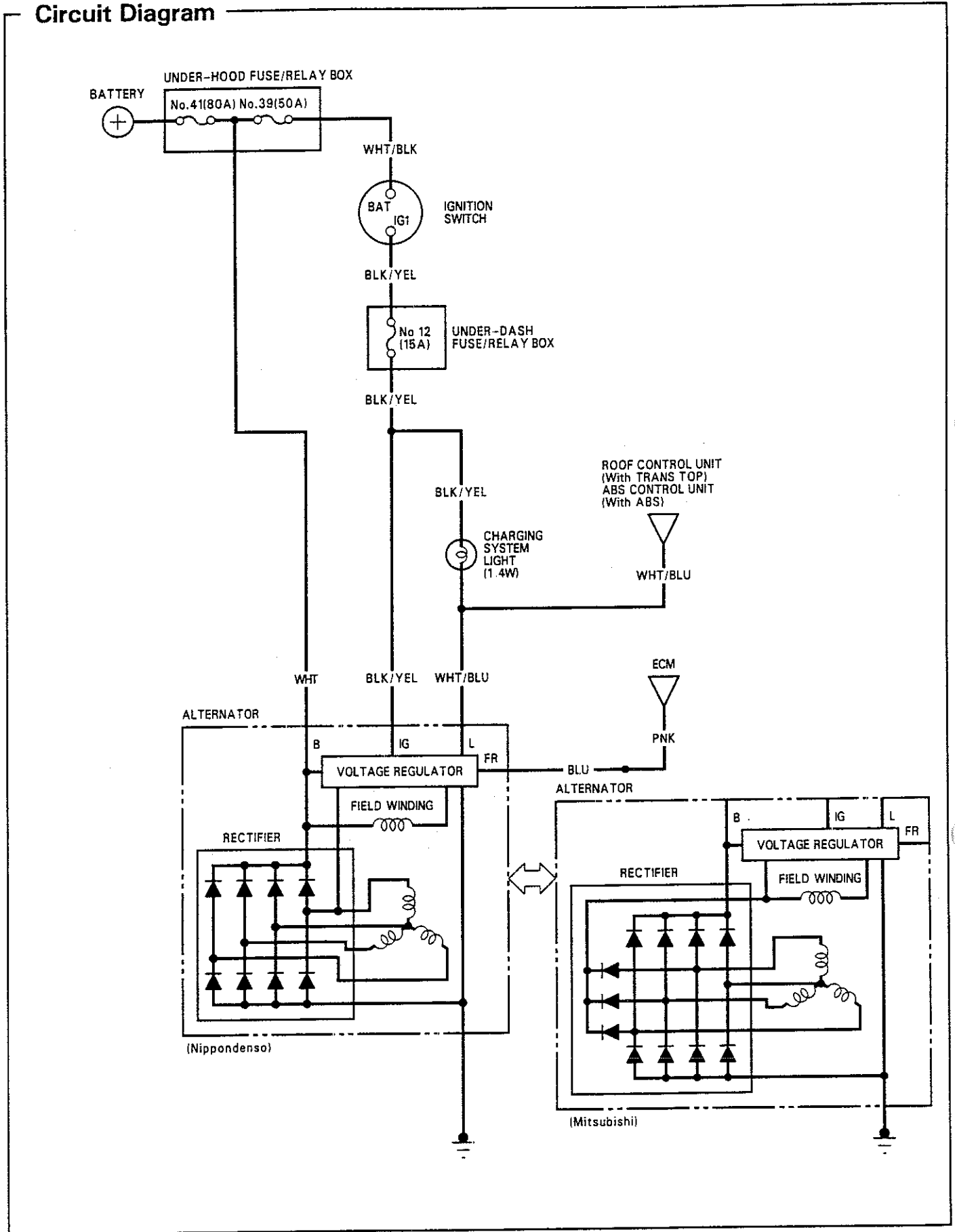
## Component Location Index

NOTE: RHD is symmetrical to the LHD type except of engine and alternator locations which remain the same.



# Charging System

## Circuit Diagram

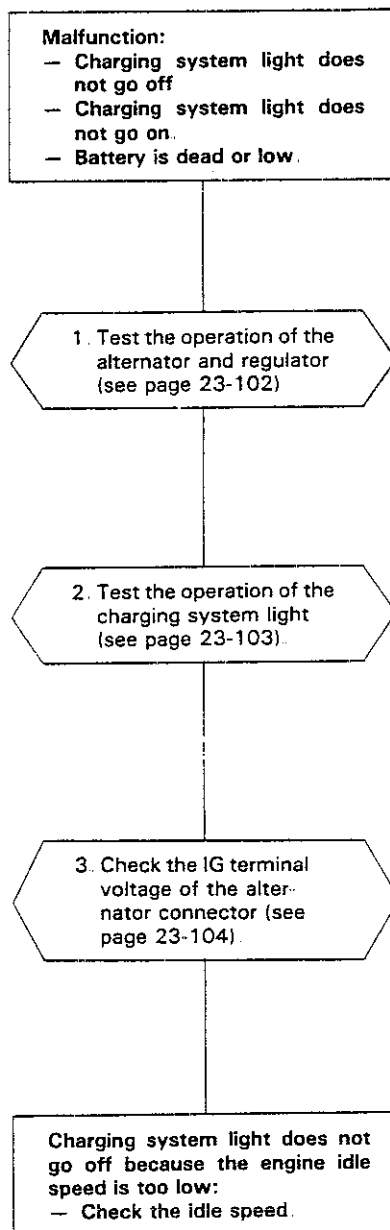




## Troubleshooting

### NOTE:

- Before troubleshooting check:
  - Tightness of the alternator belt (see page 23-116).
  - That the self-diagnosis indicator light of the ECM does not blink. If it blinks (20 times), refer to section 11.
- Troubleshoot by performing following tests in the order listed below.



(cont'd)

# Charging System

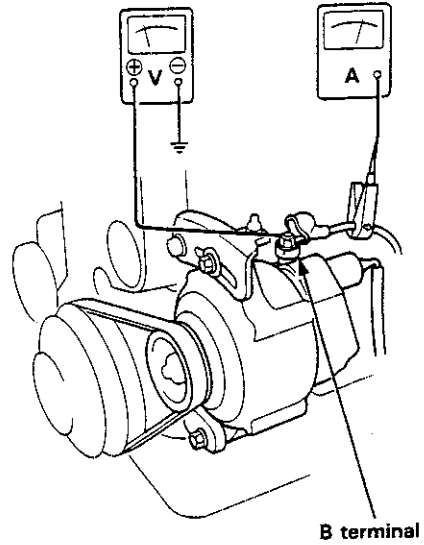
## Troubleshooting (cont'd)

### Alternator/Regulator Operation Test

**CAUTION:** Be careful during testing as the cooling fan comes on suddenly while the engine is running.

Be sure to use a good battery (see page 23-62). Disconnect the B terminal and connect an ammeter and a voltmeter as shown.

**NOTE:** Be sure to use an ammeter capable of measuring amperages higher than 120 A.



Start the engine and let it idle until it reaches normal operating temperature (cooling fan comes on two times).

Raise the engine speed to 2000 rpm and hold it there. Turn the headlights (HI) on and check the voltage at the battery terminals.

**CAUTION:** As the headlights warm up considerably, do not cover them.

Is the voltage between 13.9 and 15.1 V?

NO

Test the alternator (see page 23-105).

YES

Turn the blower motor and the rear window defogger on and check the battery voltage.

Is the battery voltage less than 13.5 V?

NO

Turn also the fog lights, brake lights, etc. on.

YES

Read the amperage

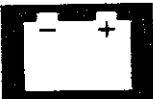
Are there more than 40 A?

NO

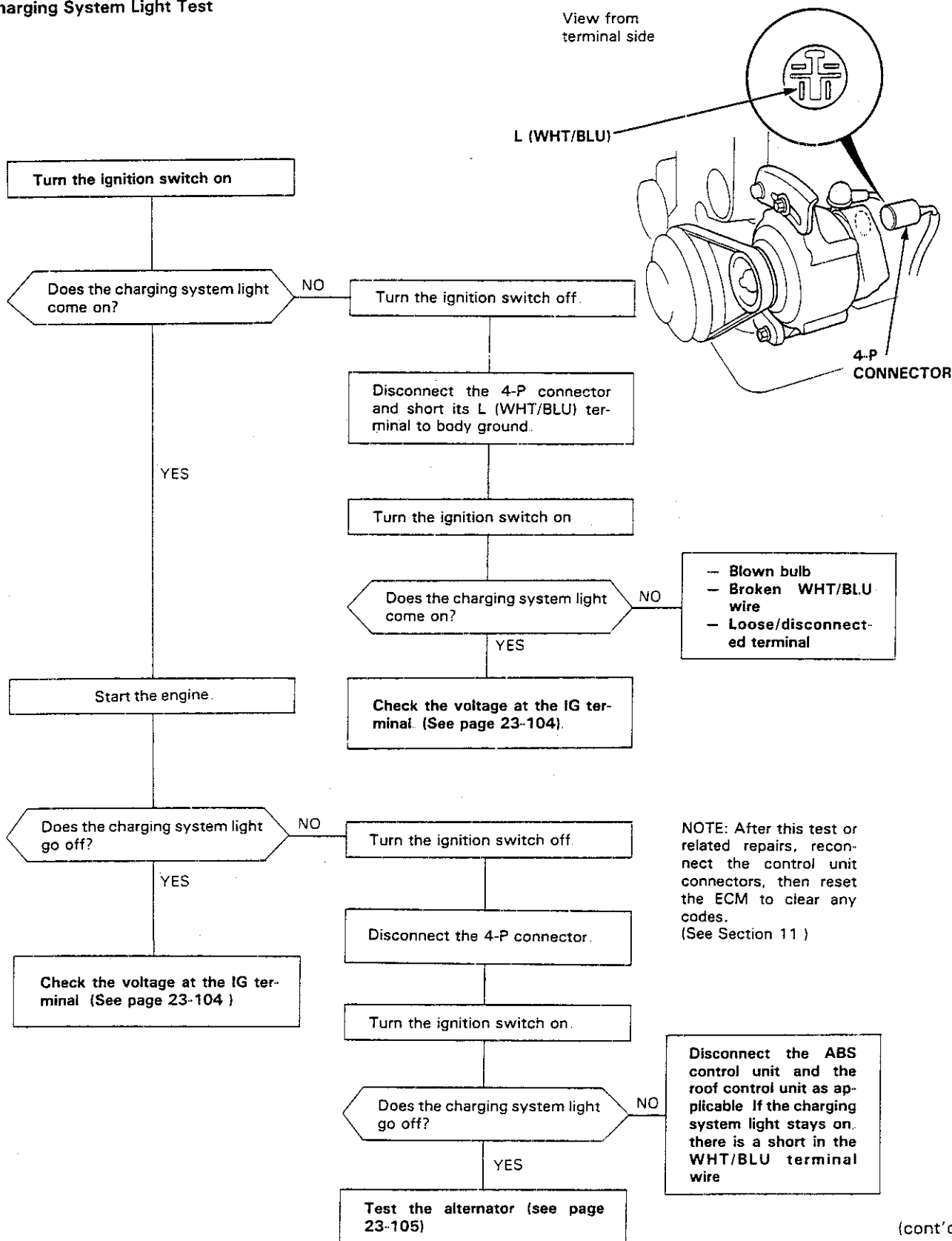
Test the alternator (see page 23-105).

YES

Alternator/Regulator operation is OK. Test the charging system light operation (see page 23-103).



### Charging System Light Test

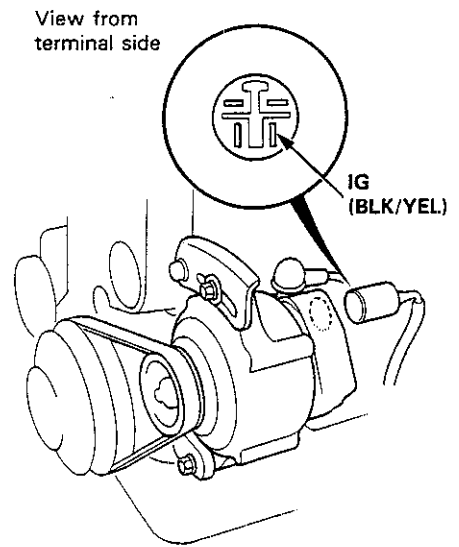
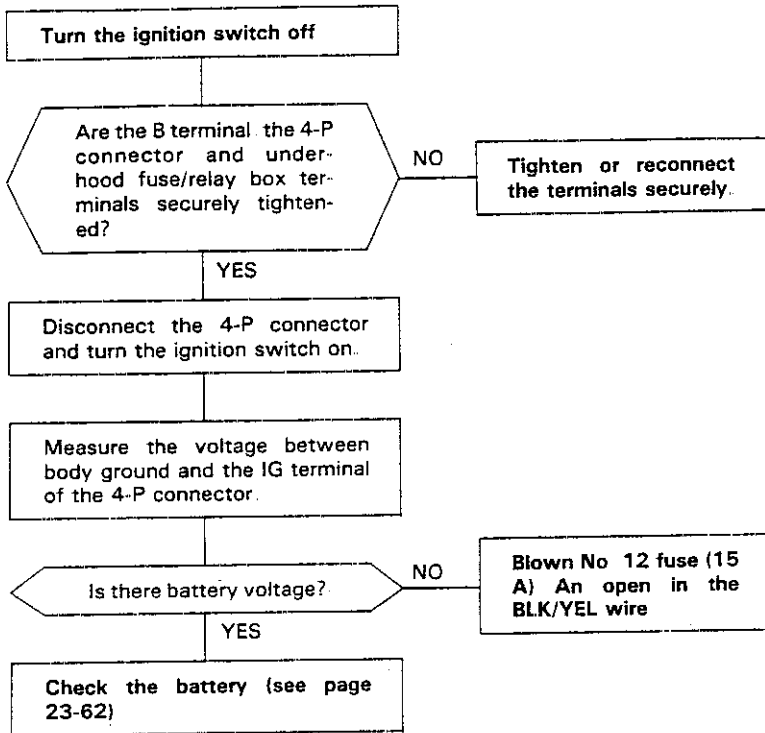


(cont'd)

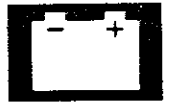
# Charging System

## Troubleshooting (cont'd)

### Voltage Check at IG terminal

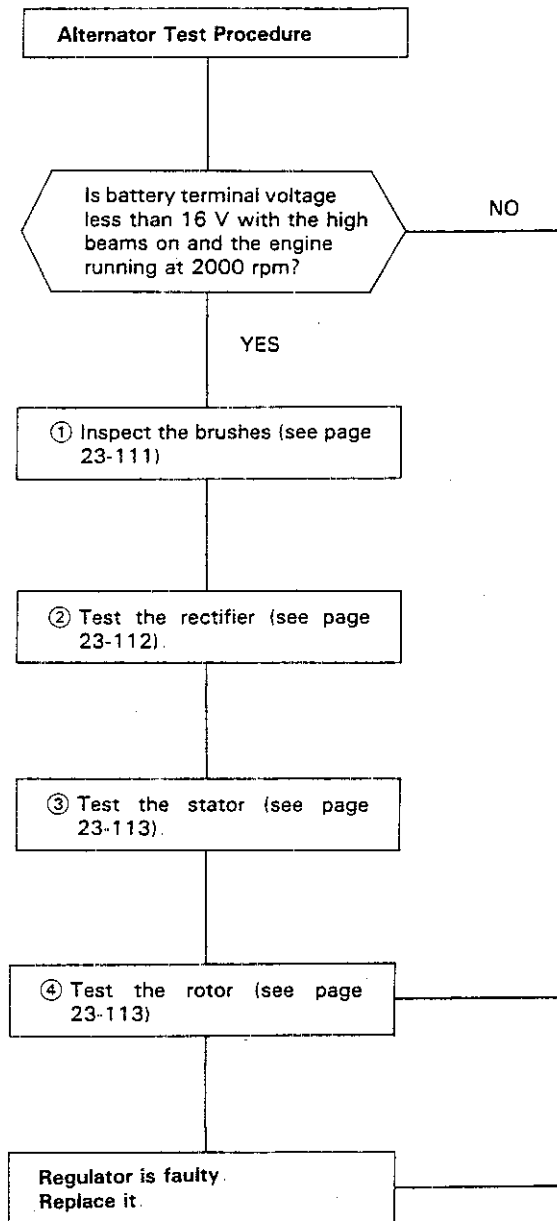






## Alternator Test

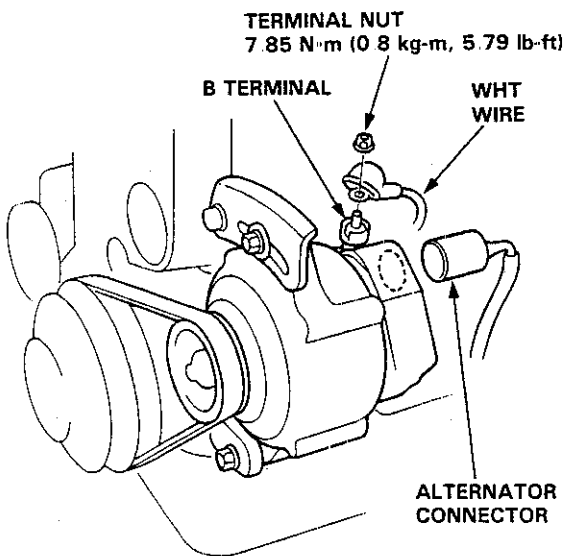
NOTE: Because an overall check is necessary to avoid misleading conclusions, test the alternator in the order described below.



# Charging System

## Alternator Replacement

1. Disconnect the cable from the battery negative (-) terminal.
2. Disconnect the alternator connector from the alternator.
3. Remove the terminal nut and the WHT wire from the B terminal

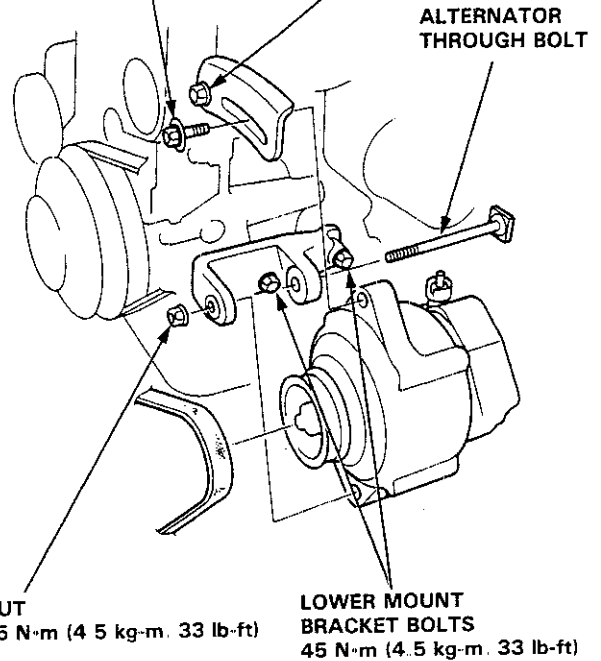


4. Remove the adjusting bolt (B16A2 engine: adjusting nut) and through bolt nut, then remove the alternator belt from the pulley.
5. Pull out the alternator through bolt and the upper through bolt (B16A2 engine), then remove the alternator

Except B16A2 engine:

ALTERNATOR ADJUSTING BOLT  
24 N·m (2.4 kg-m, 17 lb-ft)

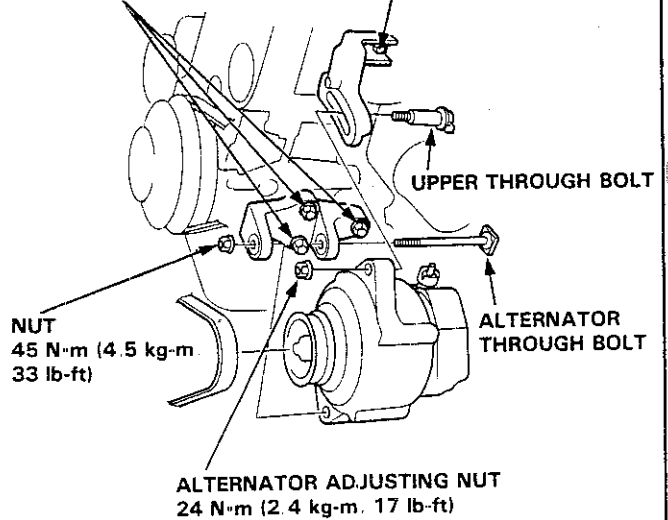
UPPER MOUNT BRACKET BOLT  
45 N·m (4.5 kg-m, 33 lb-ft)



B16A2 engine:

LOWER MOUNT BRACKET BOLTS  
45 N·m (4.5 kg-m, 33 lb-ft)

UPPER MOUNT BRACKET BOLT  
45 N·m (4.5 kg-m, 33 lb-ft)



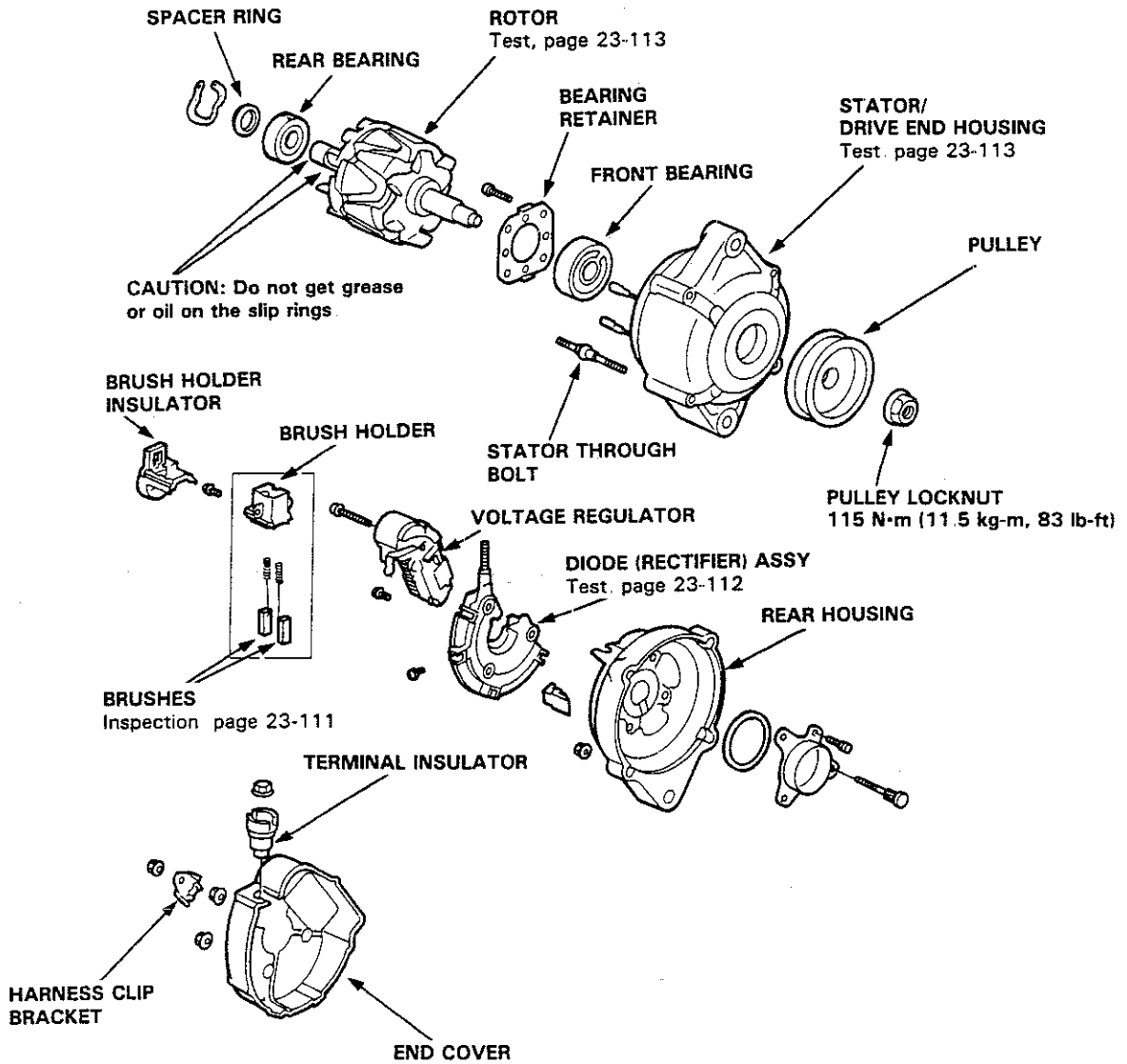
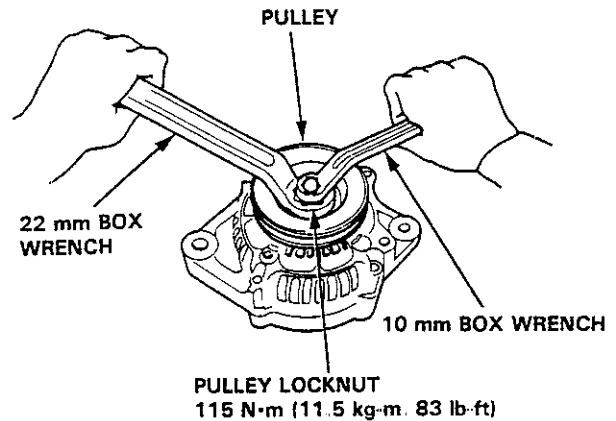
6. If necessary, remove the mount bracket bolts, and the upper and lower mount brackets.
7. Adjust the alternator belt tension after installation (see page 23-116).



## Alternator Overhaul (Nippondenso)

NOTE: Only if the front bearing needs replacement, it is necessary to separate the pulley, drive end housing, and the rotor.

To loosen the locknut for removing the pulley from the rotor, use 10 mm and 22 mm wrenches. If necessary, use an impact wrench.

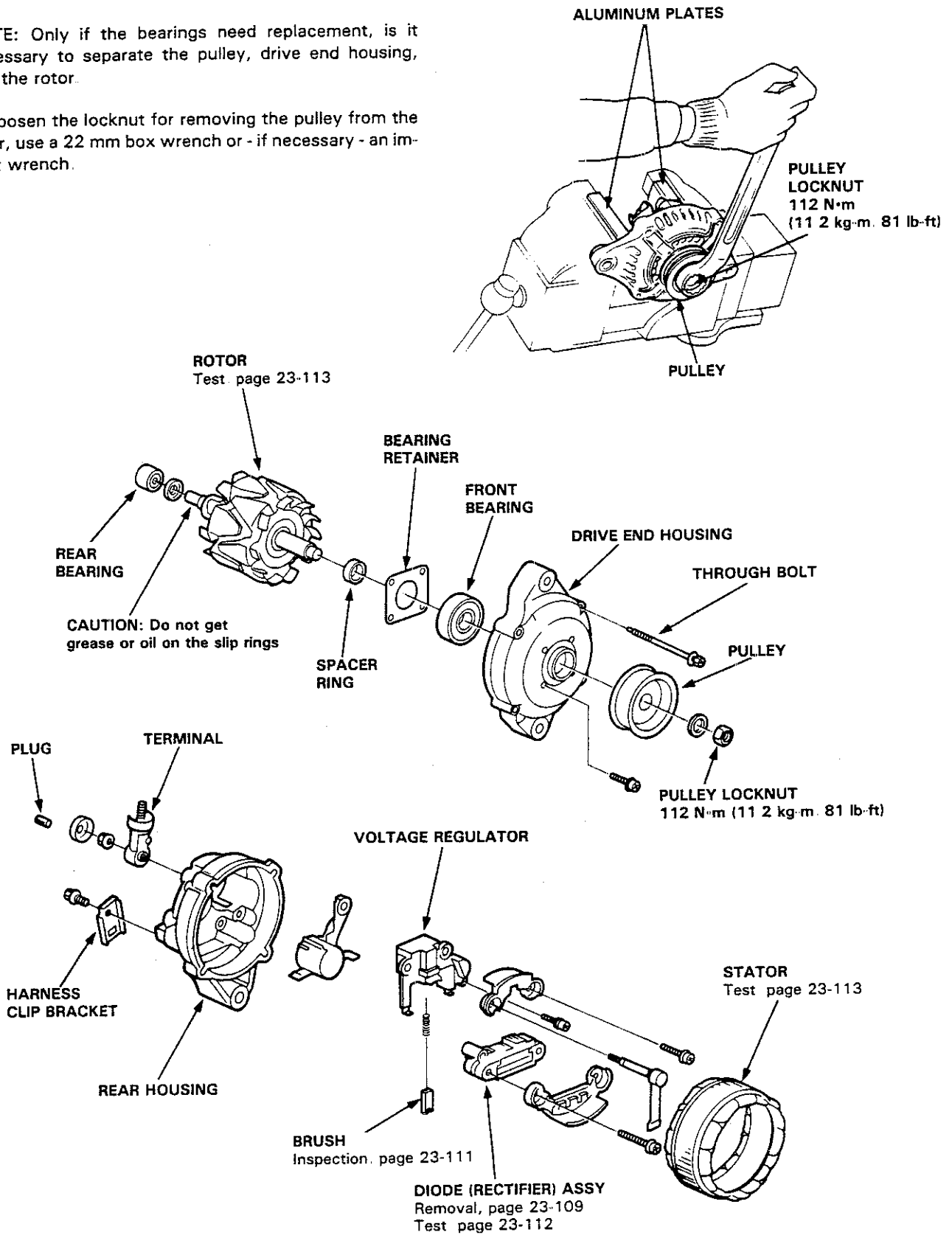


# Charging System

## Alternator Overhaul (Mitsubishi)

NOTE: Only if the bearings need replacement, is it necessary to separate the pulley, drive end housing, and the rotor.

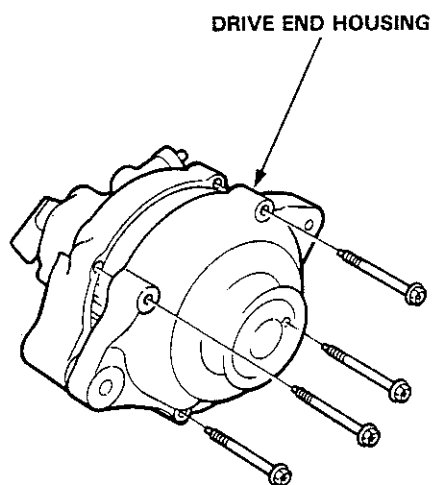
To loosen the locknut for removing the pulley from the rotor, use a 22 mm box wrench or - if necessary - an impact wrench.



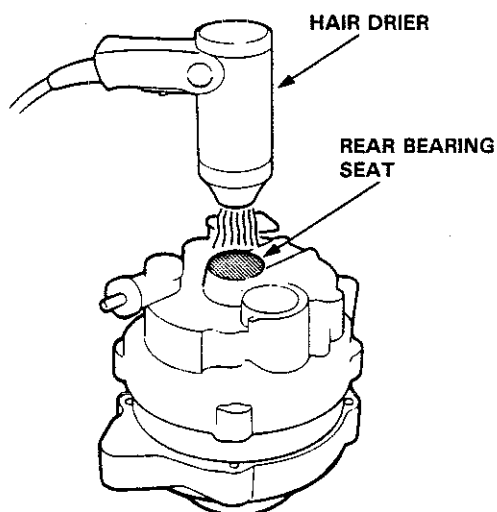


## Rectifier Removal (Mitsubishi)

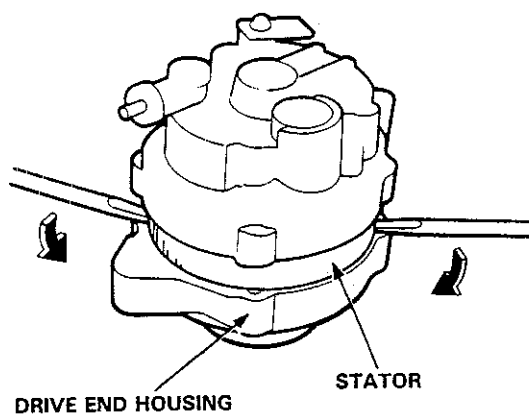
1. Remove the four through bolts



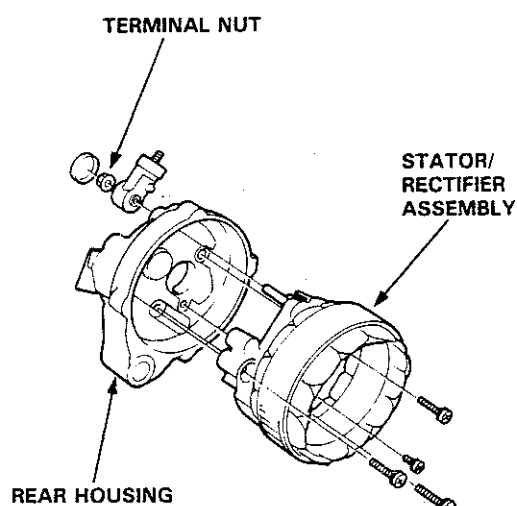
2. Heat the rear bearing seat with a 1000 W hair drier for about five minutes (50–60°C, 130°F)



3. Separate the rear housing from the drive end housing by inserting a flat tip screwdriver into the openings and prying them apart. Take care not to damage the stator with the tip of the screwdriver.



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



(cont'd)

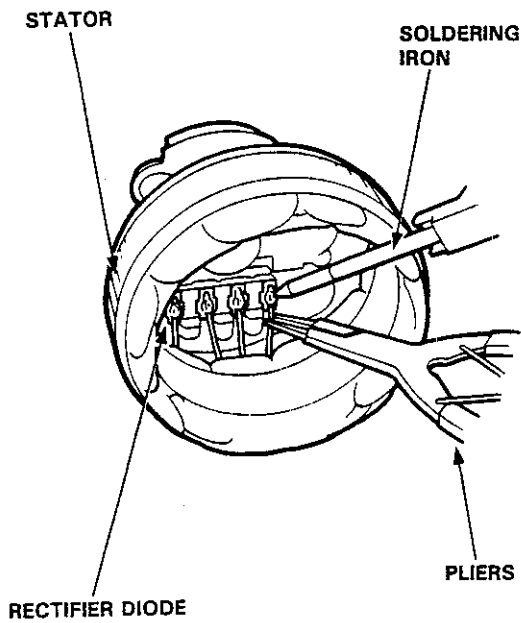
# Charging System

## Rectifier Removal (Mitsubishi) (cont'd)

5. Unsolder the rectifier from the stator leads.

**NOTE:**

- 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 diode.
- Use a 100 W soldering iron



6. 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.



## Alternator Brush Inspection

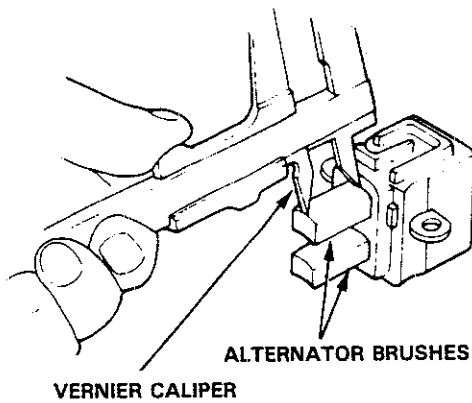
**CAUTION:** When replacing the brushes, use only a rosin core type solder or solder joints will corrode.

### Nippondenso Type:

1. Remove the end cover, then take out the brush holder by removing its two screws.
2. Measure the length of the brushes with a vernier caliper.

### Alternator Brush Length:

Standard: 10.5 mm (0.41 in)  
Service Limit: 5.5 mm (0.22 in)



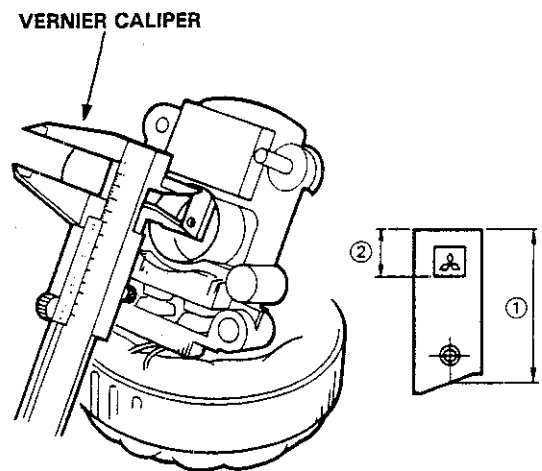
If the brushes are not within the service limit, replace the brush assembly

### Mitsubishi Type:

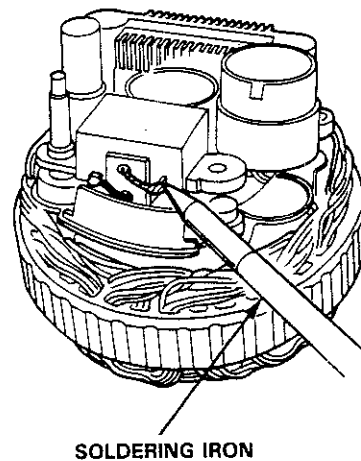
1. Separate the drive end housing from the rear housing as described on page 23-132.
2. Separate the rear housing from the stator/rectifier assembly by removing the 4 screws and the terminal nut from the rear housing (see page 23-132).
3. Measure the length of the brushes with a vernier caliper.

### Alternator Brush Length:

① Standard : 22.0 mm (0.90 in)  
② Service Limit: 8.0 mm (0.31 in)



If the brushes are not within the service limit, replace them.



# Charging System

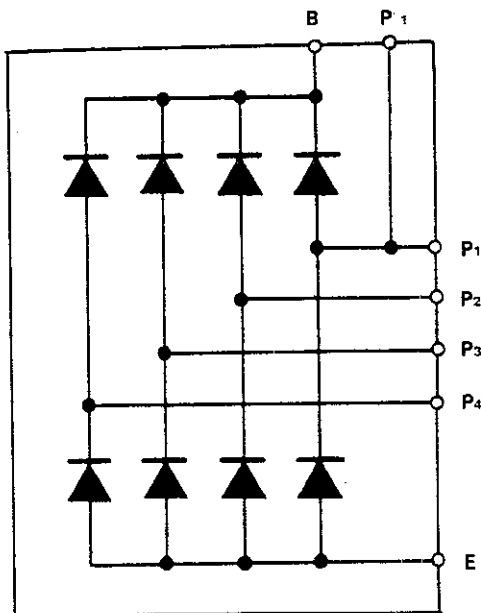
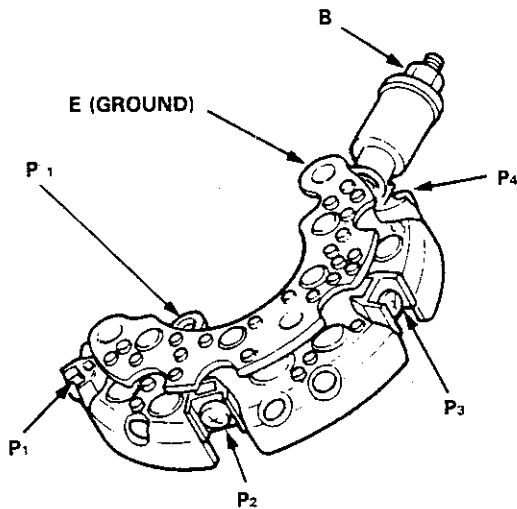
## Rectifier Test

### Nippondenso Type:

**NOTE:**

- The diodes are designed to allow current to pass in one direction while blocking the opposite direction. Each diode must be tested for continuity in both directions. Since the rectifier is made up of eight diodes, there are a total of 16 checks.
- Use an ohmmeter capable of checking diodes.

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



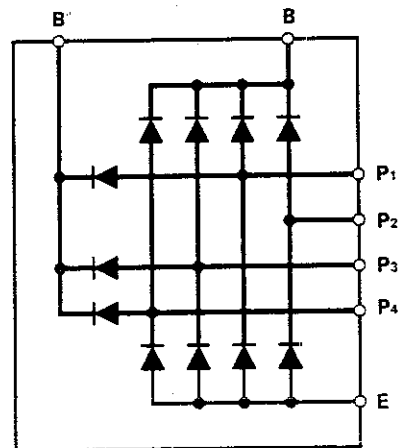
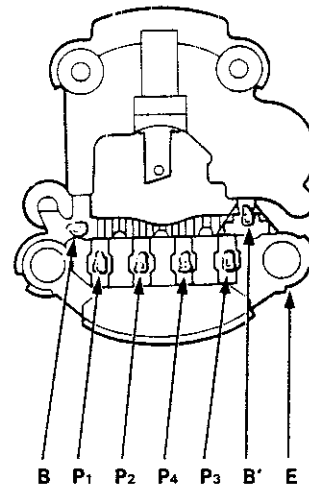
2. If any of the eight diodes fails, replace the rectifier assembly (diodes are not available separately).

### Mitsubishi Type:

**NOTE:**

- The diodes are designed to allow current to pass in one direction while blocking the opposite direction. Each diode must be tested for continuity in both directions. Since the rectifier is made up of eleven diodes, there are a total of 22 checks.
- Use an ohmmeter capable of checking diodes.

1. Check for continuity in each direction between the B and P terminals, E (ground) and P terminals, and between the B' and P (except P4) terminals of each diode pair. All diodes should have continuity in only one direction.



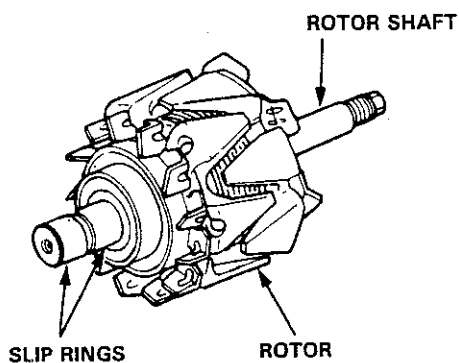
2. If any of the eleven diodes fails, replace the rectifier assembly (diodes are not available separately)





## Rotor Slip Ring Test

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

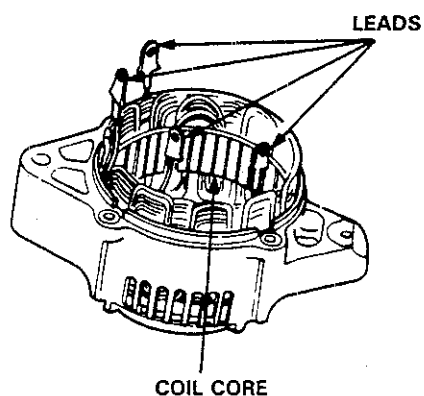


If the rotor fails either continuity check, replace the alternator.

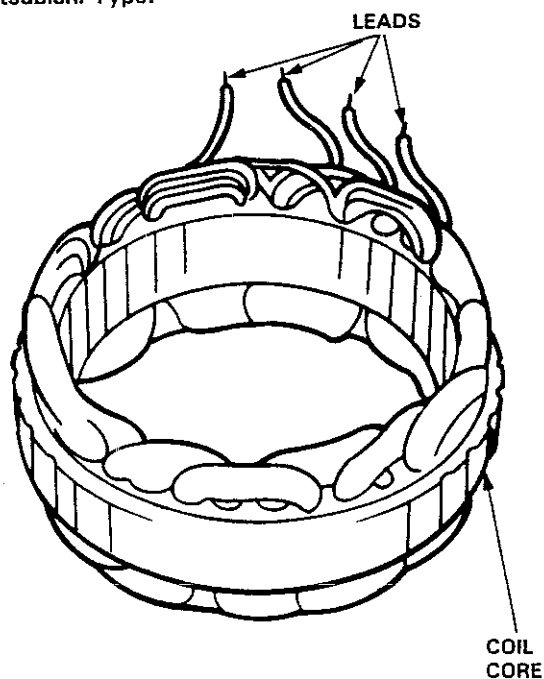
## Stator Test

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.

Nippondenso Type:



Mitsubishi Type:



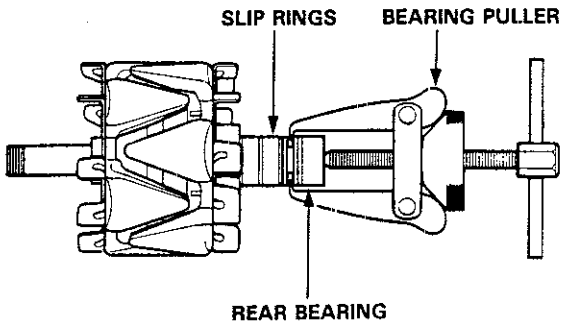
3. If the coil core fails either continuity check, replace the alternator.

# Charging System

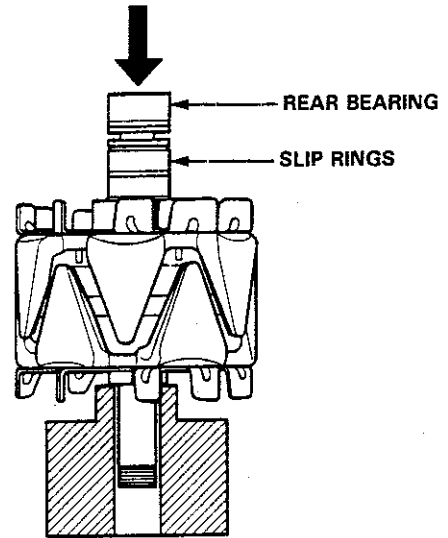
## Rear Bearing Replacement (Mitsubishi)

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.



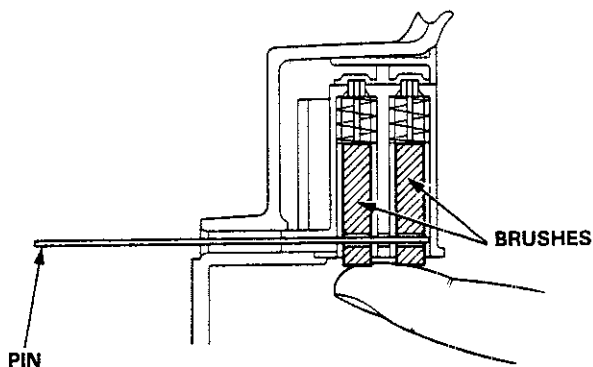
2. Use a hand press to install the new bearing. Apply pressure only on the inner race to avoid damaging the bearing.





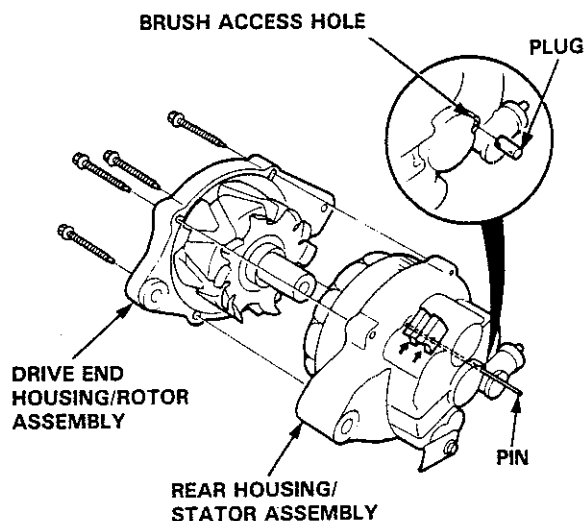
## Alternator Reassembly (Mitsubishi)

1. Push the brushes in so the holes in them line up with the hole in the housing, 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 in page 23-109. 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, pull out the pin, and plug the brush access hole.



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

# Charging System

## Alternator Belt Inspection and Adjustment

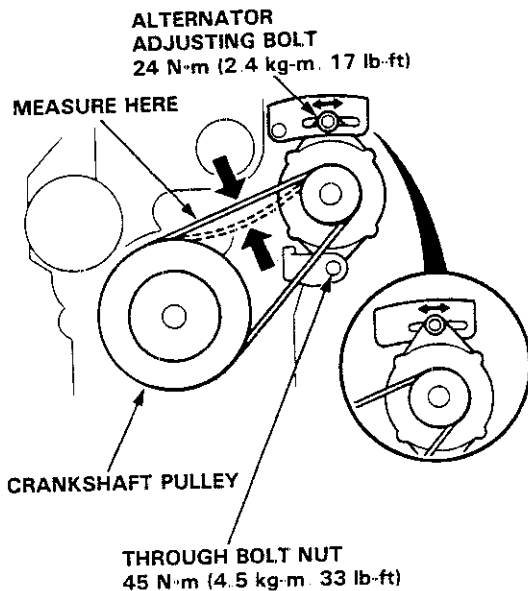
### Deflection method:

Apply a force of 100 N (10 kg, 22 lb) and measure the belt deflection between the alternator and the crankshaft pulley.

Deflection: 7.0–10.5 mm (0.28–0.41 in)

### NOTE:

- On a brand-new belt (one that has been run for less than five minutes) the deflection should be 5.5–8.0 mm (0.22–0.31 in) (except B16A2 engine) or 5.0–7.0 mm (0.20–0.28 in) (B16A2 engine) when first measured.
- If there are cracks or any damage evident in the belt, replace it with a new one.



### If adjustment is necessary:

1. Loosen the alternator adjusting bolt or adjusting nut (B16A2 engine) and the through bolt nut.
2. Move the alternator to obtain the proper belt tension, then retighten the adjusting bolt or adjusting nut (B16A2 engine) and the through bolt nut to the specified torques.
3. Recheck the deflection of the belt.

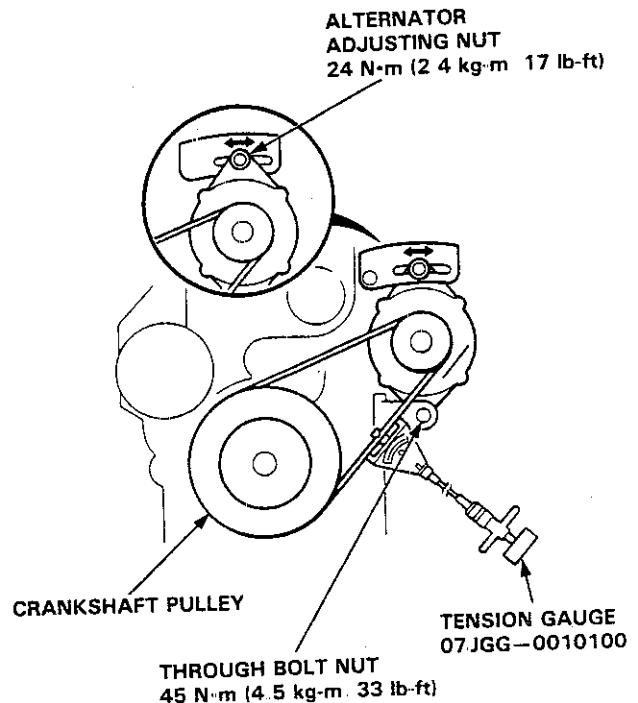
### Tension gauge method:

Attach the belt tension gauge to the belt and measure the belt tension.

Tension: 350–500 N (35–50 kg, 77–110 lb)

### NOTE:

- On a brand-new belt (one that has been run for less than five minutes), the tension should be 550–750 N (55–75 kg, 121–165 lb) (except B16A2 engine) or 700–900 N (70–90 kg, 154–198 lb) (B16A2 engine) when first measured.
- Follow the manufacturer's instructions for the belt tension gauge.
- If there are cracks or any damage evident in the belt, replace it with a new one.



### If adjustment is necessary:

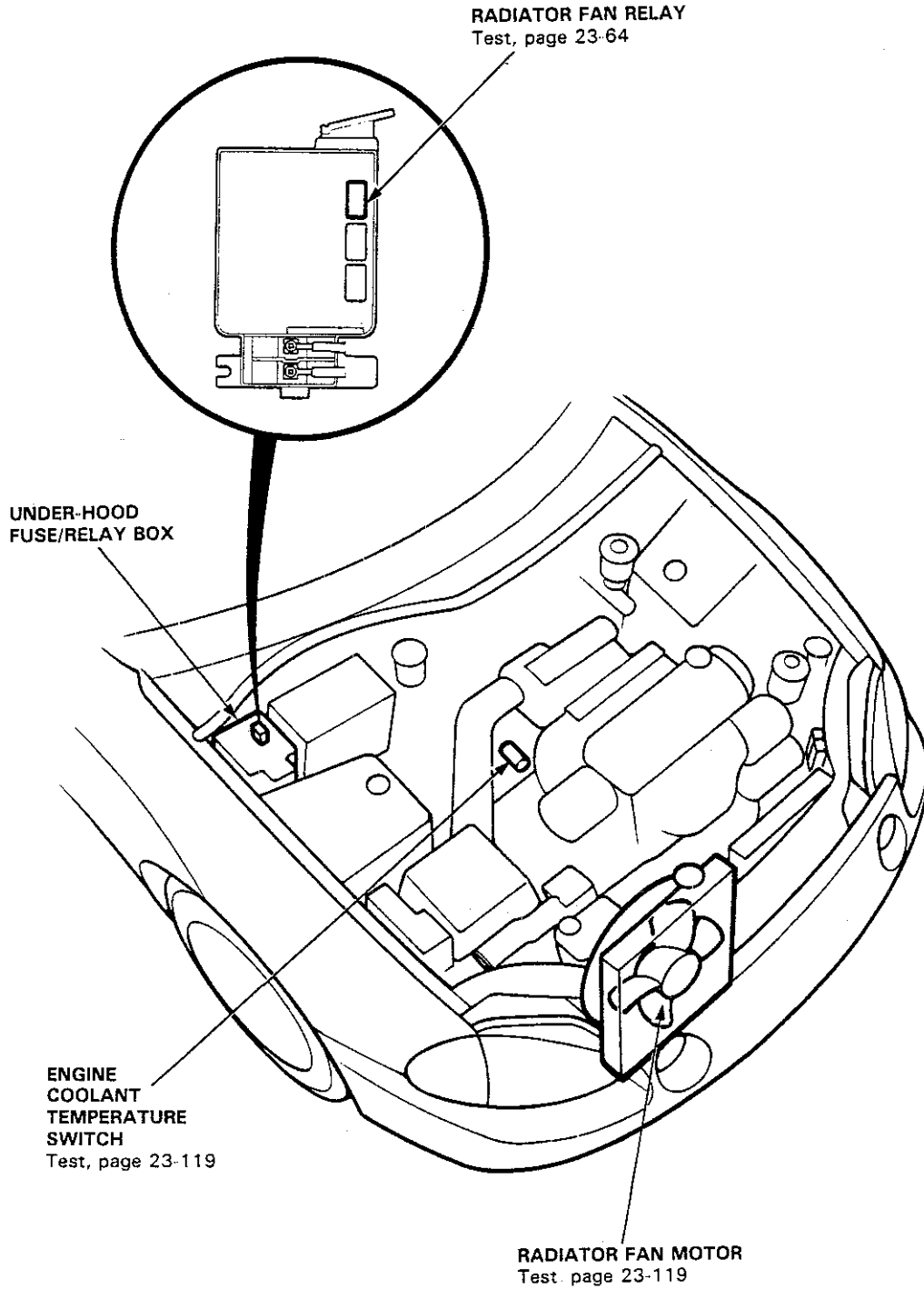
1. Loosen the alternator adjusting bolt or adjusting nut (B16A2 engine) and the through bolt nut.
2. Move the alternator to obtain the proper belt tension, then retighten the adjusting bolt or adjusting nut (B16A2 engine) and the through bolt nut to the specified torques.
3. Recheck the tension of the belt.



# Radiator Fan Control

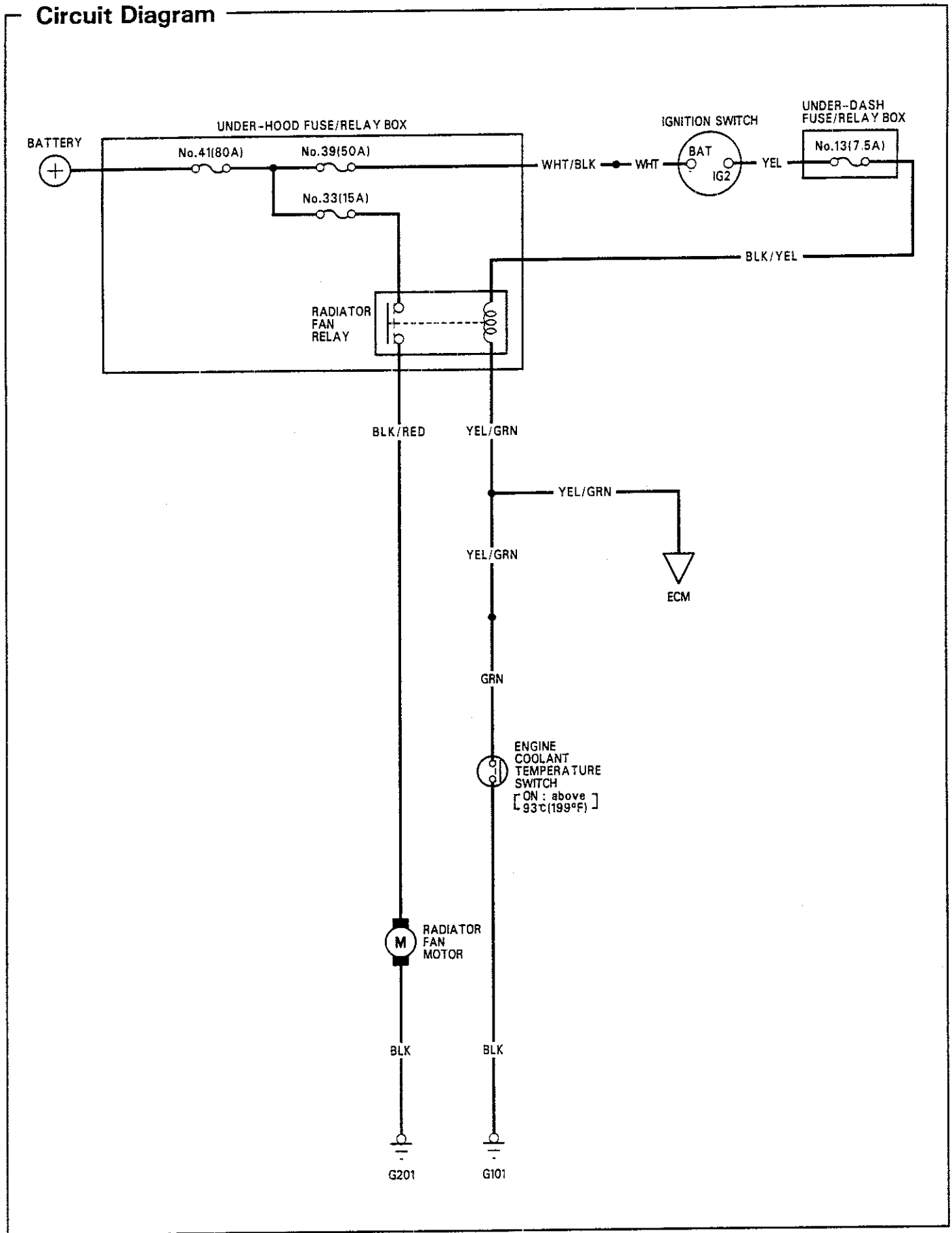
## Component Location Index

NOTE: The illustration shows LHD type; the radiator fan relay of the RHD type is located symmetrically.



# Radiator Fan Control

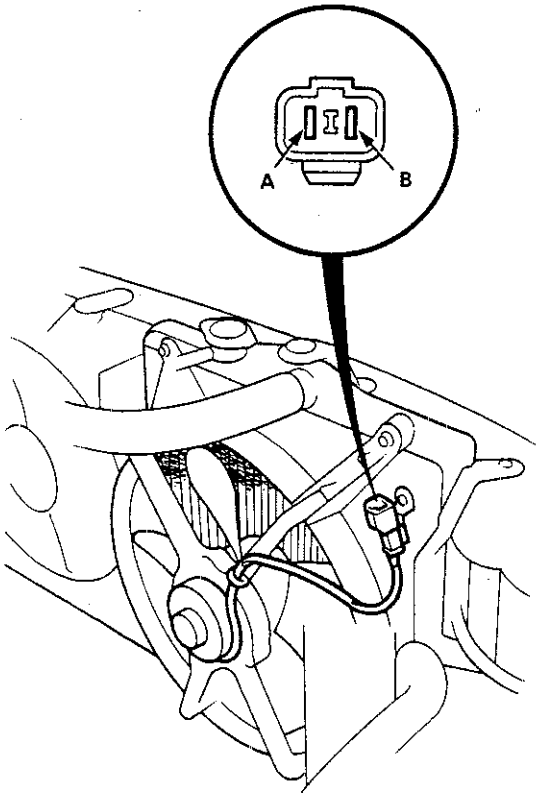
## Circuit Diagram





## Fan Motor Test

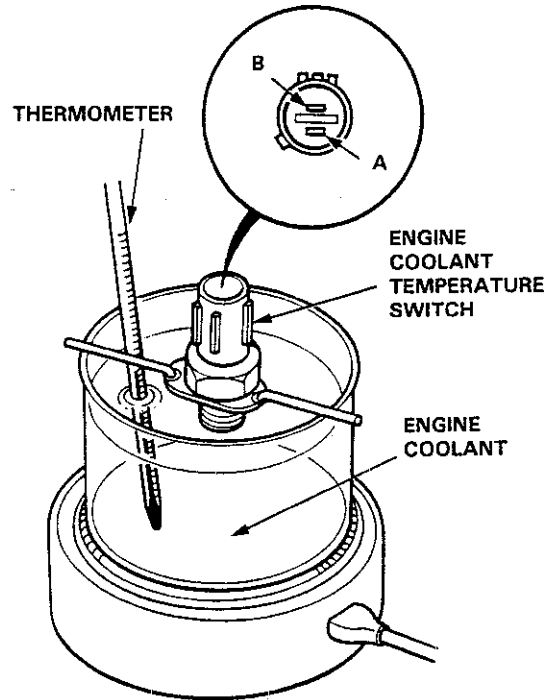
1. Disconnect the 2-P connector from the radiator fan motor
2. Test motor operation by connecting battery power to the B terminal, and ground to the A terminal.
3. If the motor fails to run smoothly, replace it.



## Engine Coolant Temperature Switch Test

NOTE: Bleed air from the cooling system after installing the engine coolant temperature switch (see section 10).

1. Remove the engine coolant temperature switch from the thermostat housing.
2. Suspend the engine coolant temperature switch in a container of coolant as shown



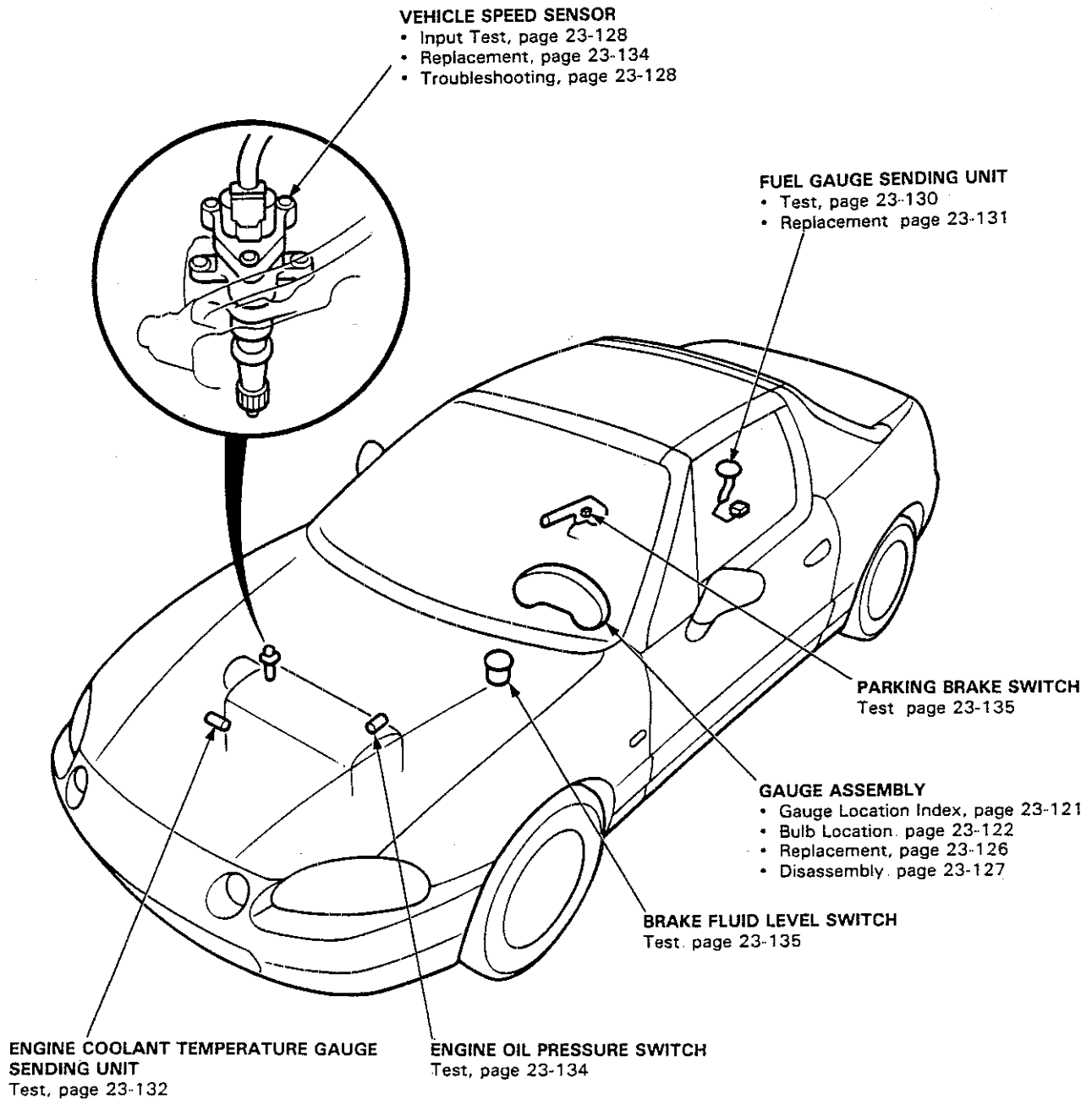
3. Heat the coolant and check coolant temperature with a thermometer.
4. Check for continuity between the A and B terminals according to the table.

		Terminal	
		A	B
SWITCH	ON	91°-95°C (196°-203°F)	
	OFF	3°-8°C lower than the temperature when it goes on.	

# Gauge Assembly

## Component Location Index

NOTE: LHD type is shown below.







## Gauge/Terminal Locations Index

### SPEEDOMETER:

Indicates 60 km/h at  $637 \text{ min}^{-1}$  (rpm) [60 mph at  $1026 \text{ min}^{-1}$  (rpm)] of the vehicle speed sensor.

### FUEL GAUGE

- Gauge Test, page 23-130
- Sending Unit Test, page 23-131

### ENGINE COOLANT TEMPERATURE GAUGE

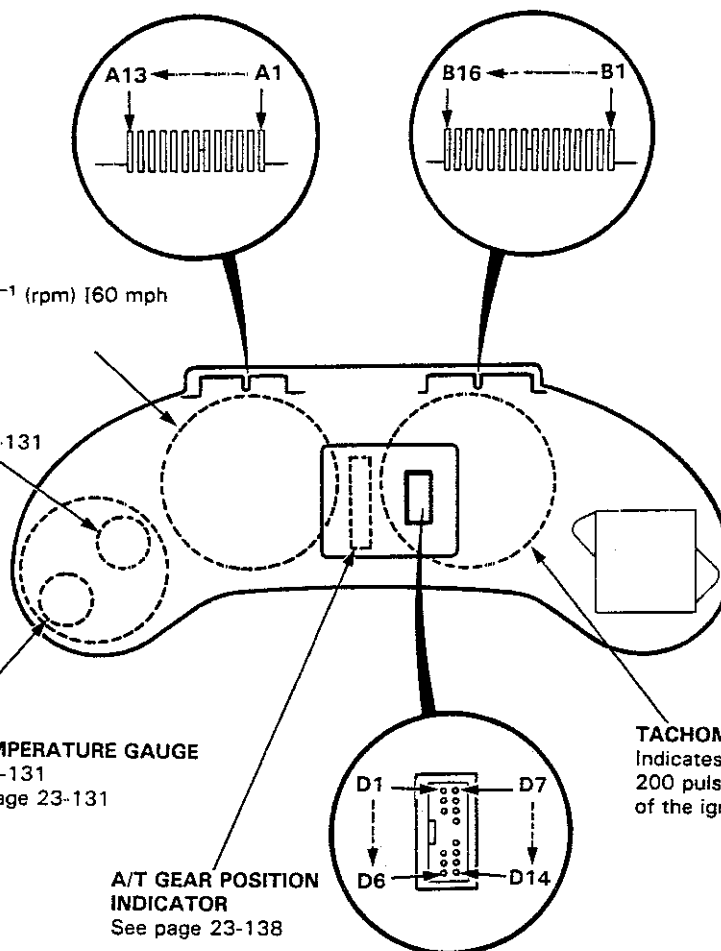
- Gauge Test, page 23-131
- Sending Unit Test, page 23-131

### A/T GEAR POSITION INDICATOR

See page 23-138

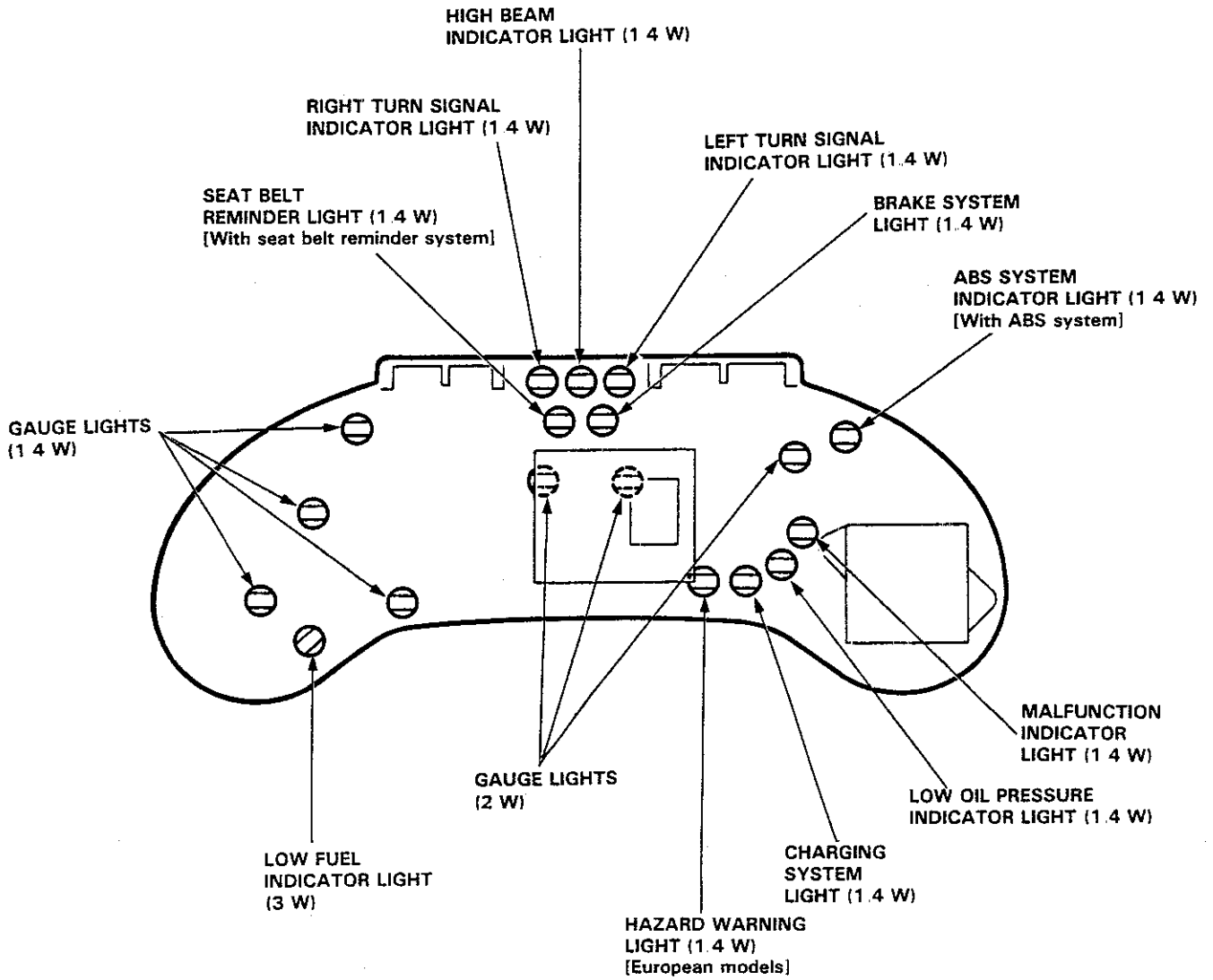
### TACHOMETER:

Indicates  $100 \text{ min}^{-1}$  (rpm) at 200 pulses per minute of the ignition control module.



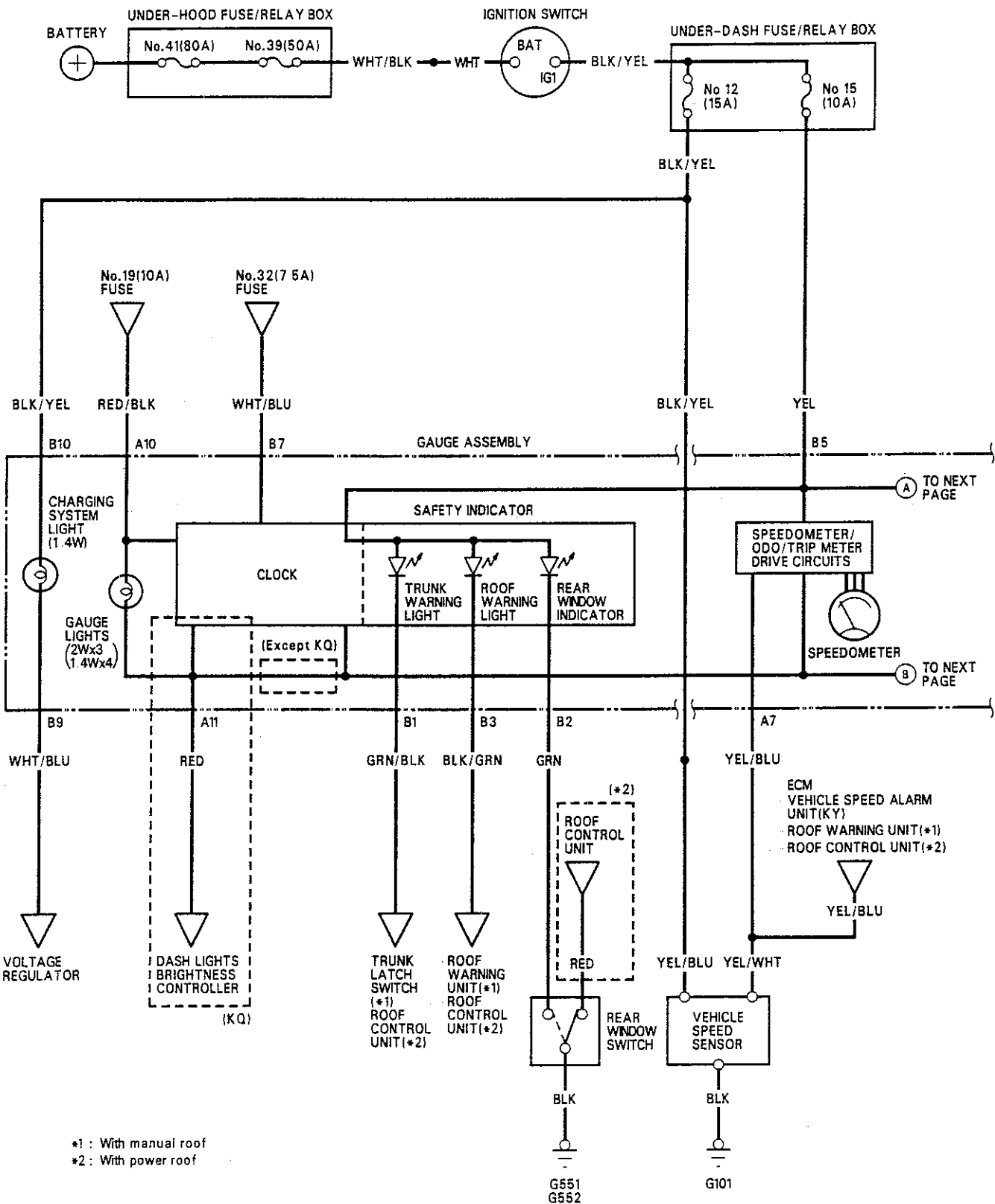
# Gauge Assembly

## Bulb Locations





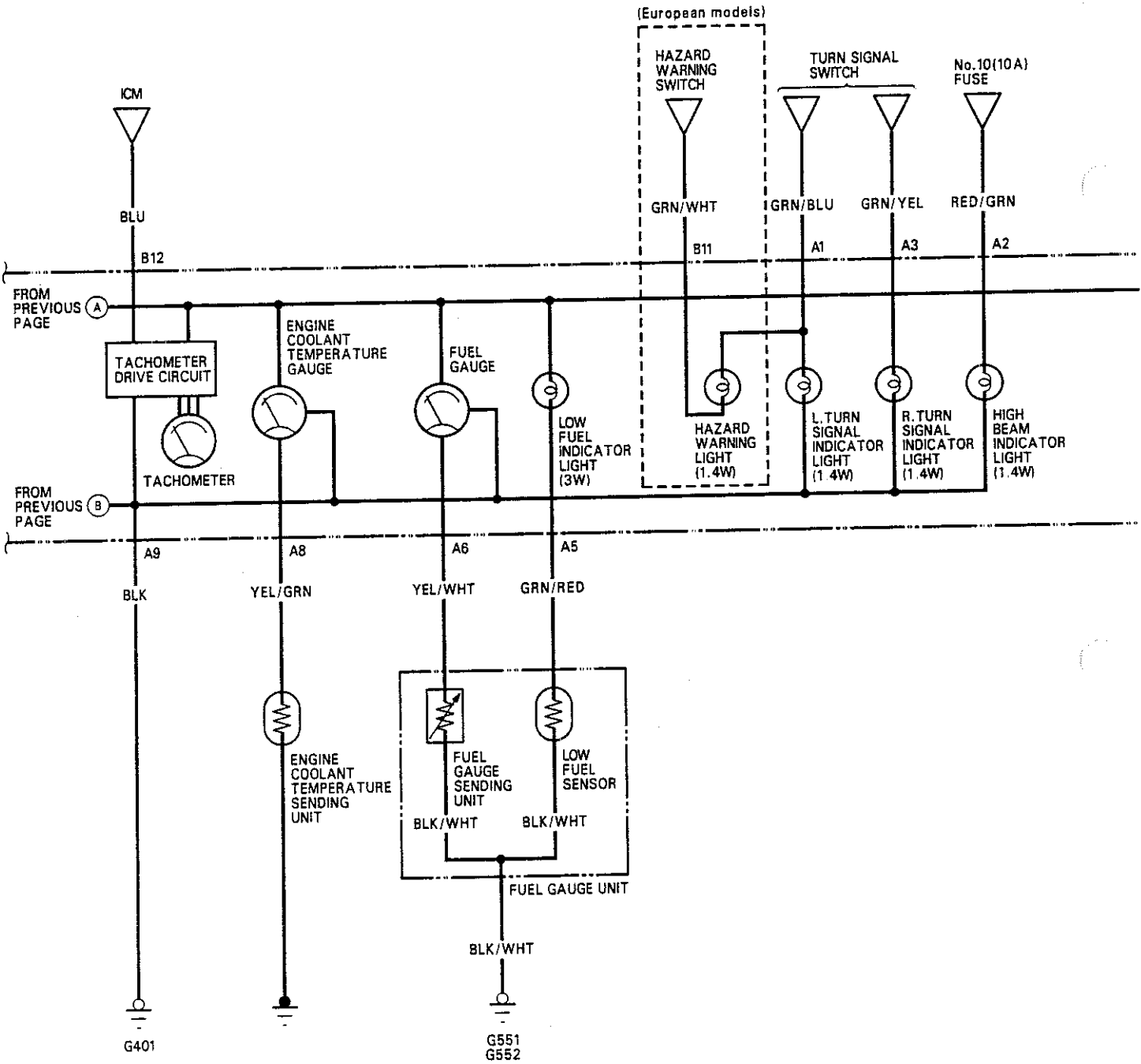
# Circuit Diagram

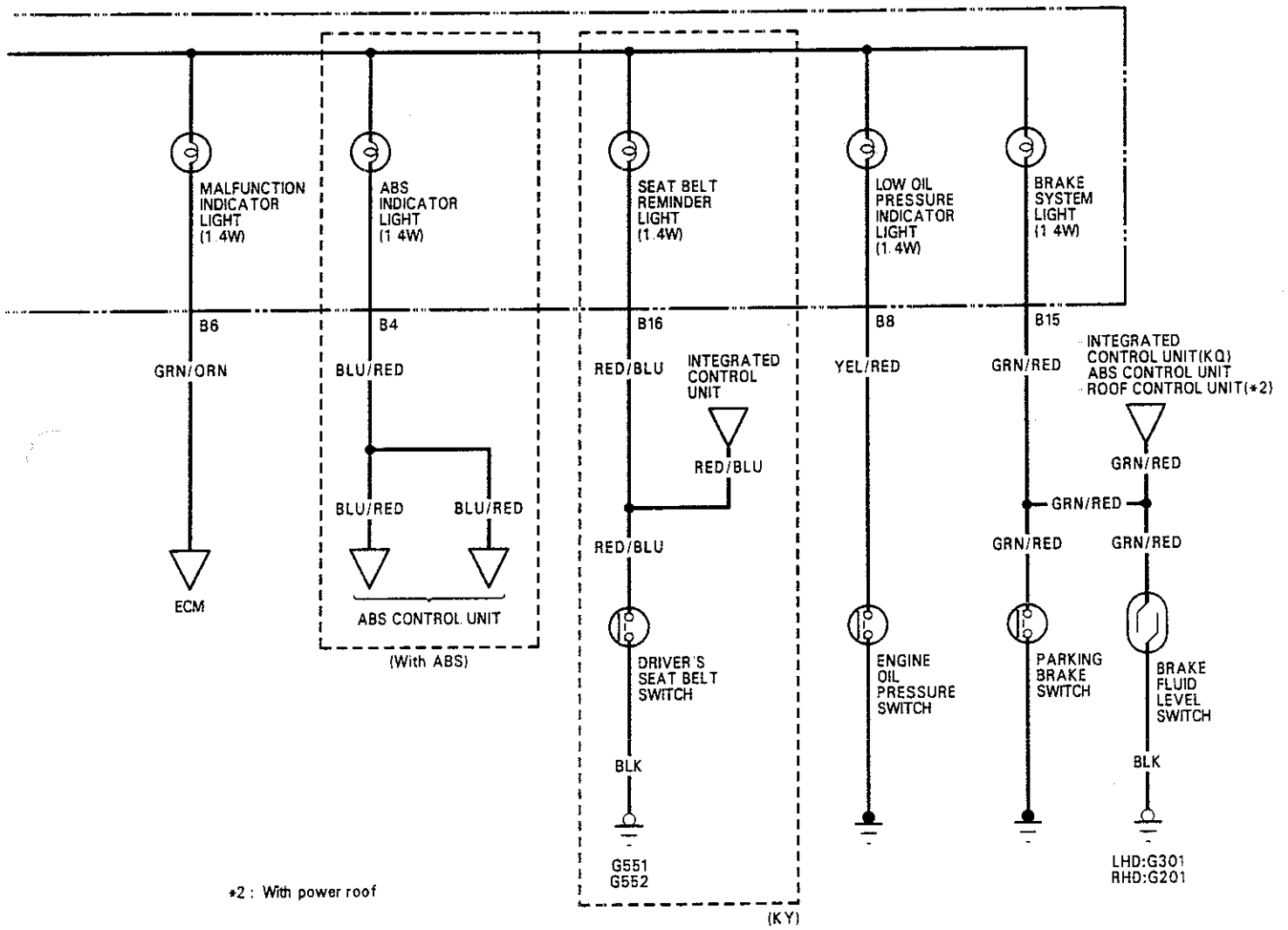


(cont d)

# Gauge Assembly

## Circuit Diagram(cont'd)

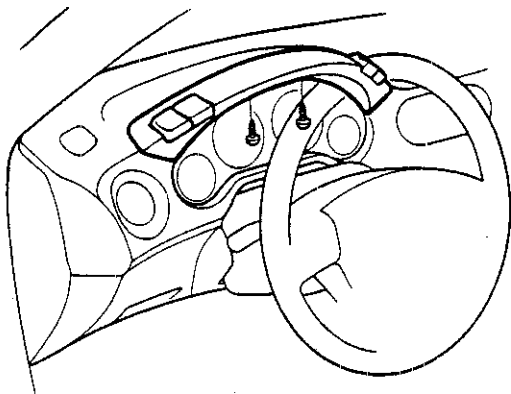




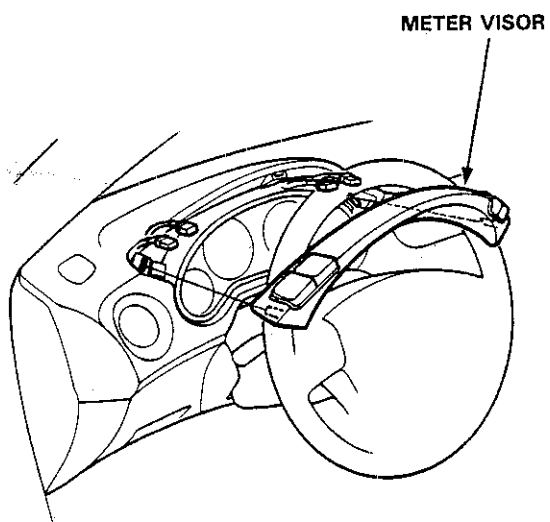
# Gauge Assembly Replacement

NOTE: RHD type is symmetrical to LHD type.

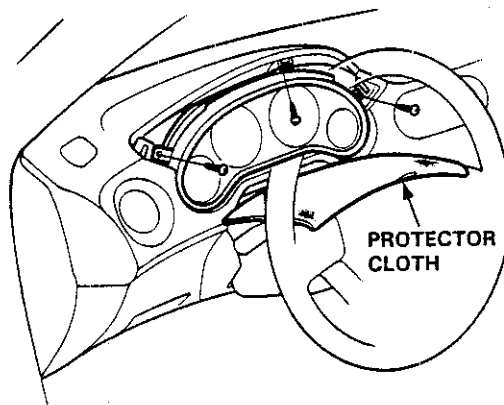
1. Remove the two screws



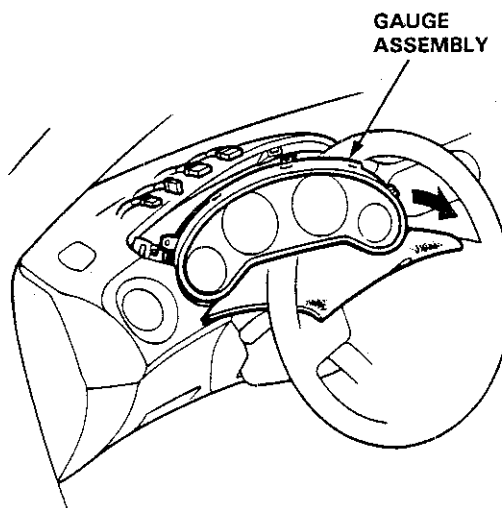
2. Disconnect the connectors, then remove the meter visor.



3. Remove the three screws.



4. Disconnect the connectors, then remove the gauge assembly.



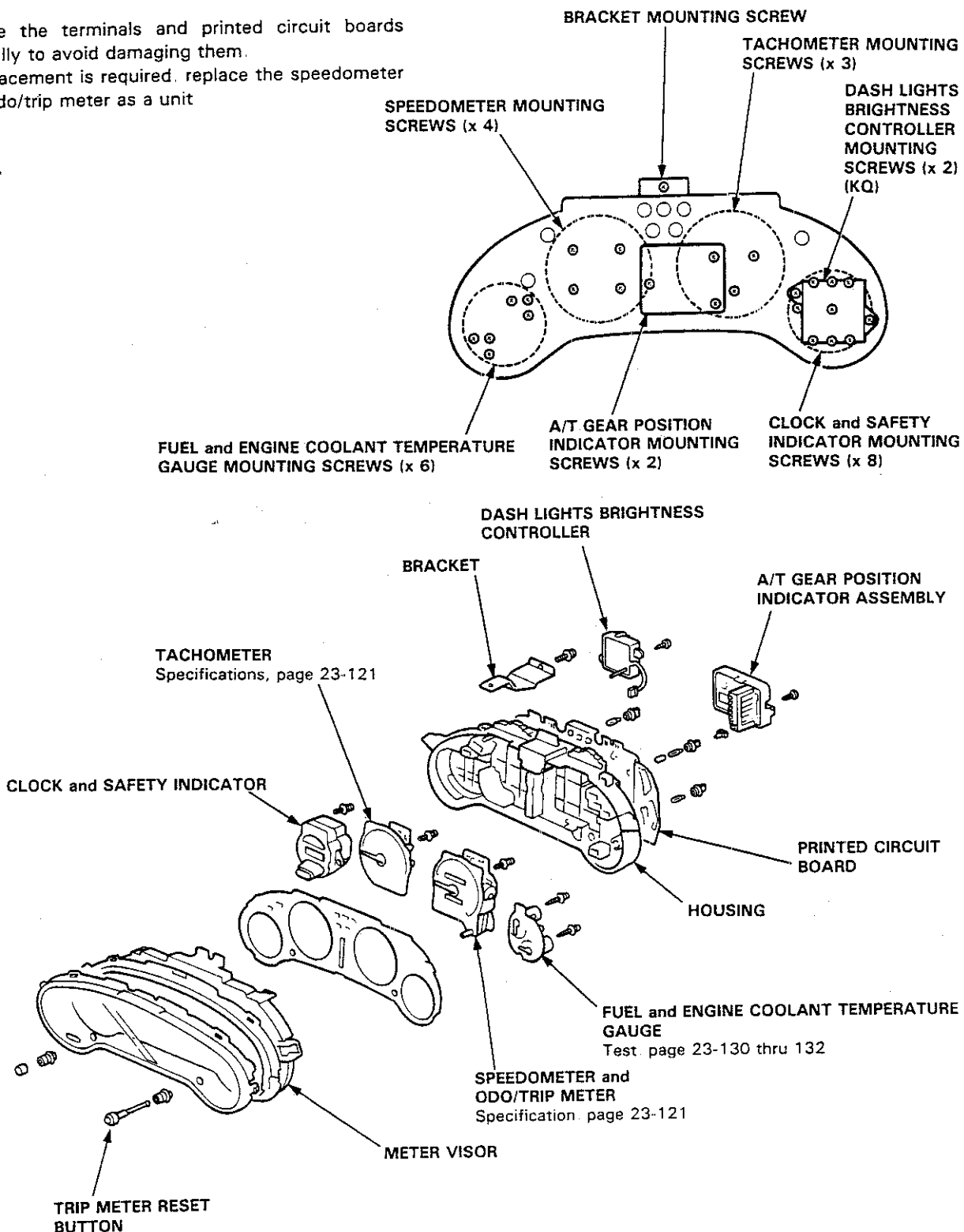
5. Install the gauge assembly in the reverse order of removal. After installing, check the operation of all lights and gauges.



# Disassembly

## NOTE:

- Handle the terminals and printed circuit boards carefully to avoid damaging them.
- If replacement is required, replace the speedometer and odo/trip meter as a unit



# Speedometer/Trip Meter/Odometer

## Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence

Symptom	Item to be inspected	Blown No. 15 (10 A) fuse (in the under-dash fuse/relay box)	Speedometer	Odo/Trip meter	Printed circuit board	Vehicle speed sensor input test	Odometer connector at printed circuit board	Vehicle speed sensor test flow chart
Odometer and trip meter operate, but speedometer does not work.			1		2			
Speedometer works but odometer and trip meter do not operate.				1	2		3	
Speedometer, odometer, and trip meter do not work.		1				2		3

NOTE: Vehicle speed sensor ground is via ECM (G101)

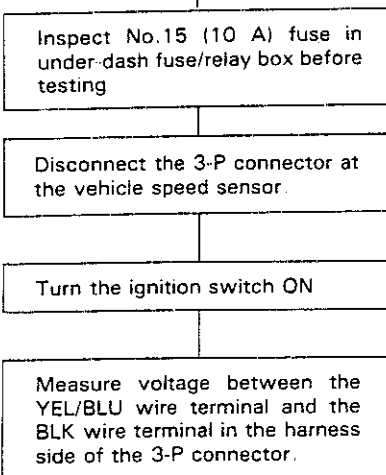
### Vehicle Speed Sensor Input Test (At harness side of 3-P connector)

No.	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Open wire</li> <li>• Poor ground (G101)</li> </ul>
2	YEL/BLU	Ignition switch ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 15 (10 A) fuse</li> <li>• Short to ground</li> </ul>
3	YEL/WHT	Ignition switch ON	Check for voltage to ground: There should be about 5 V.	<ul style="list-style-type: none"> <li>• Short to ground</li> <li>• Open in the wire</li> </ul>

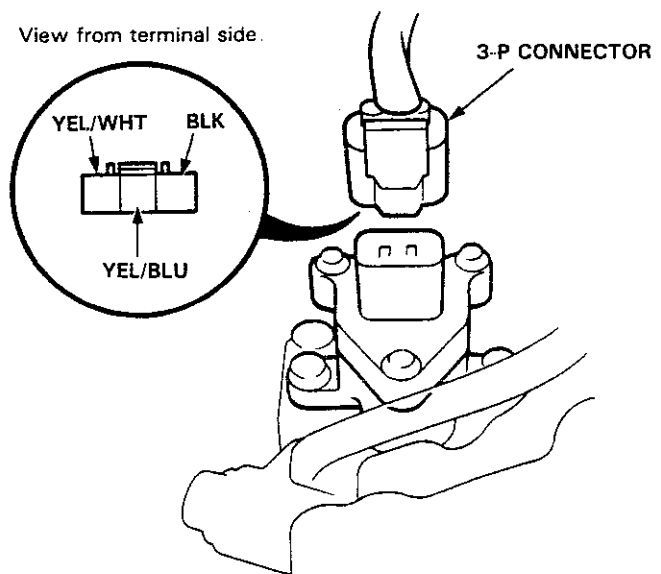
NOTE: A short to ground in the YEL/WHT wire can be caused by a short in any component connected to it

### Vehicle Speed Sensor Test

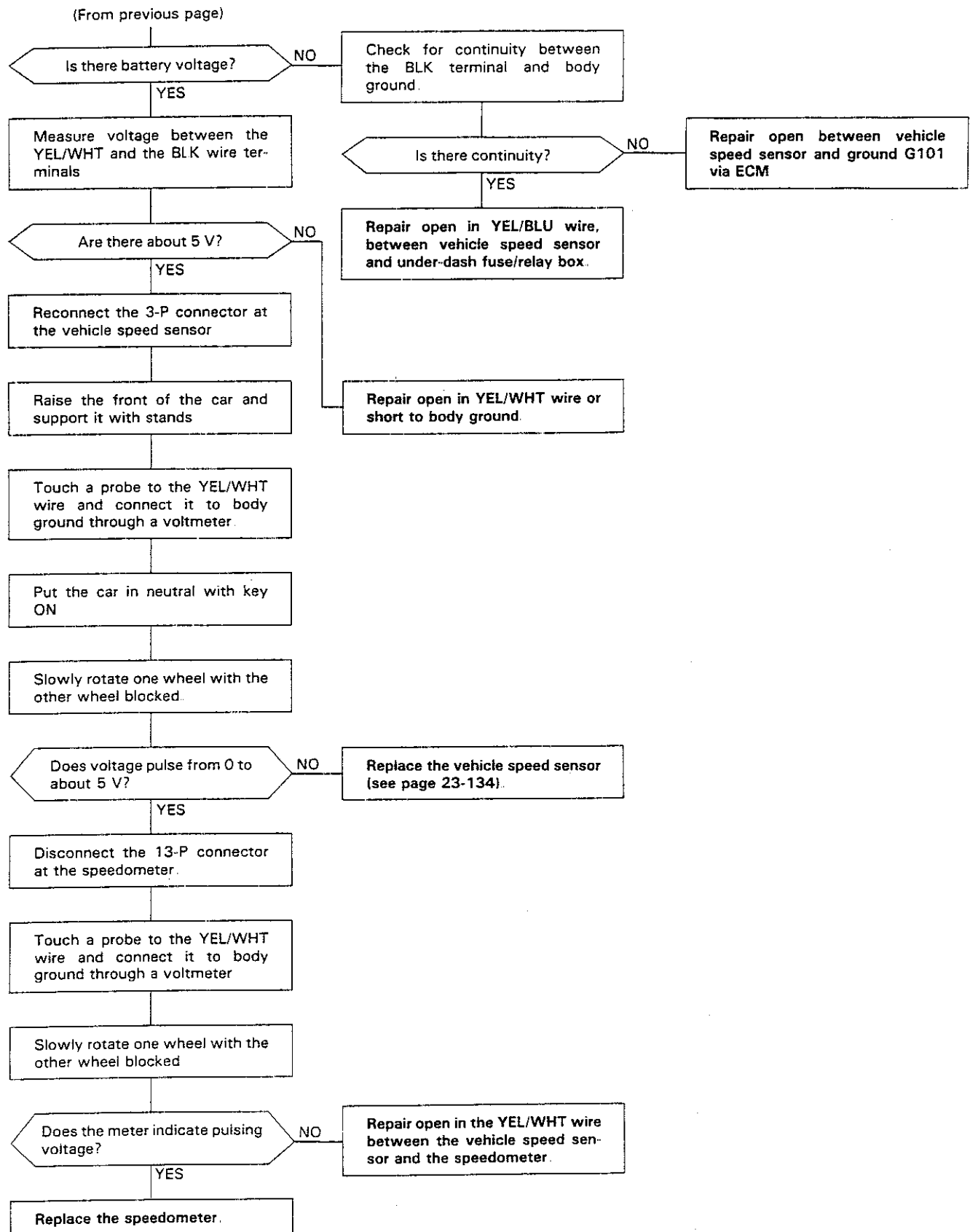
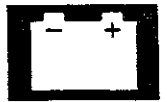
Speedometer does not work



(To next page)





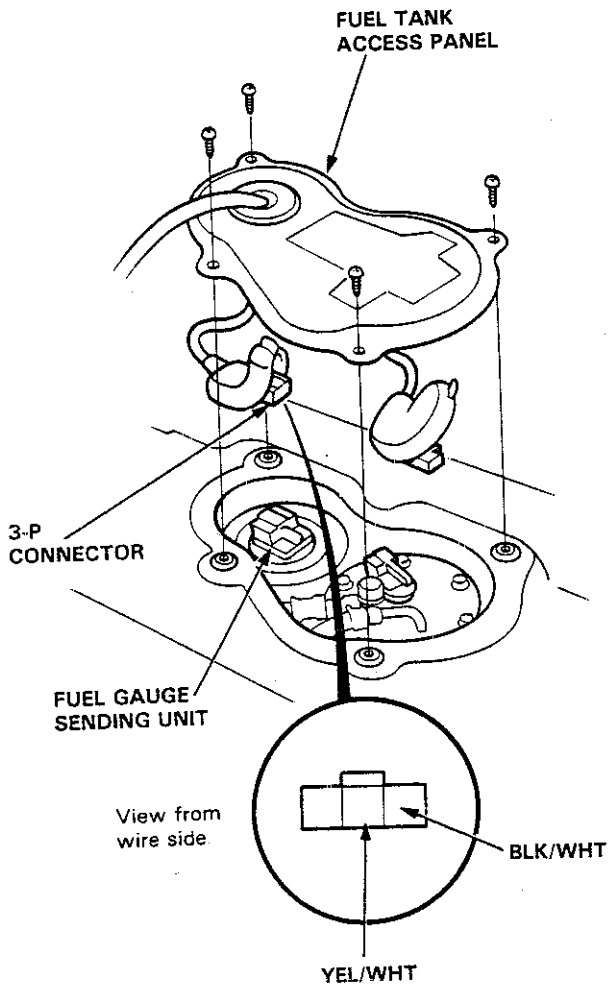


# Fuel Gauge

## Gauge Test

NOTE: Refer to pages 23-123 and 124 for the circuit diagram of the fuel gauge

1. Check the No. 15 (10 A) fuse in the under-dash fuse/relay box before testing.
2. Remove the personal trunk assembly (see section 20).
3. Remove the fuel tank access panel from the floor.
4. Disconnect the 3-P connector from the fuel gauge sending unit.



5. Connect the voltmeter positive probe to the YEL/WHT terminal and the negative probe to the BLK/WHT terminal, then turn the ignition switch ON. There should be between 5 and 8 V.

- If the voltage is as specified, go to step 5.
- If the voltage is not as specified, check for:
  - An open in the YEL, YEL/WHT or BLK/WHT wires
  - Loose or disconnected terminals.
  - Faulty fuel gauge

6. Turn the ignition switch OFF. Connect a jumper wire between the YEL/WHT and BLK/WHT terminals.

**CAUTION:** Do not connect power and ground to the terminals; it will damage the fuel gauge.

7. Turn the ignition switch ON. Check if the gauge indicates "F".

**CAUTION:** Disconnect the jumper wire as soon as the gauge reaches "F", or you will damage the gauge.

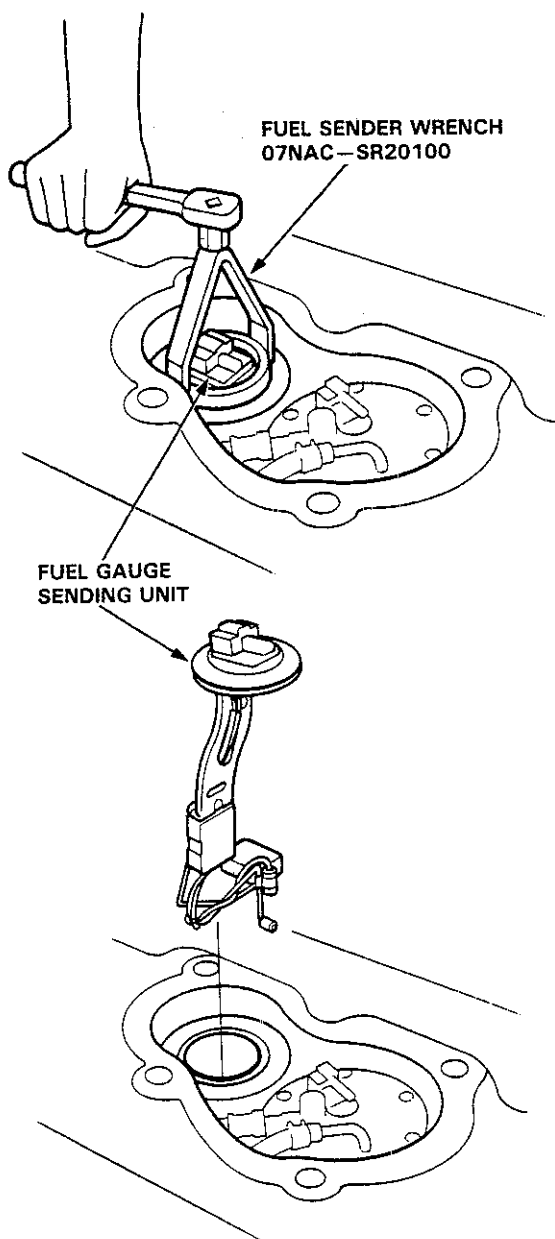
- If the fuel gauge does not work at all, replace it.
- If the fuel gauge is OK, inspect the sending unit.



## Sending Unit Test

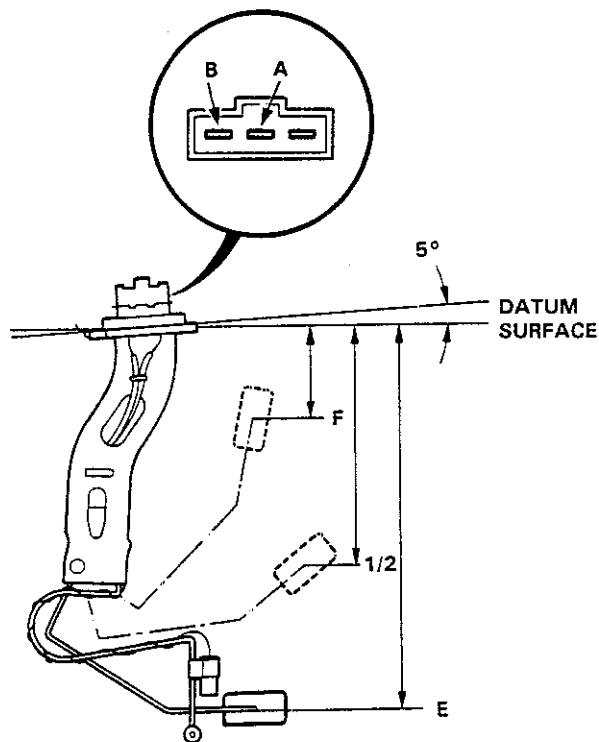
**⚠ WARNING** Do not smoke while working on the fuel system. Keep open flame away from the work area.

1. Remove the personal trunk assembly (see section 20).
2. Remove the fuel tank access panel from the floor.
3. With the ignition switch OFF, disconnect the 3-P connector from the fuel gauge sending unit.
4. Remove the fuel gauge sending unit using a special tool.



5. Measure the resistance between the A and B terminal by moving the float to the distances listed for E (EMPTY), 1/2 (HALF FULL), and F (FULL).

Float position	E	1/2	F
Distance	228.8 mm (9.01 in)	144.6 mm (5.69 in)	57.3 mm (2.26 in)
Resistance ( $\Omega$ )	105-110	25.5-39.5	2-5



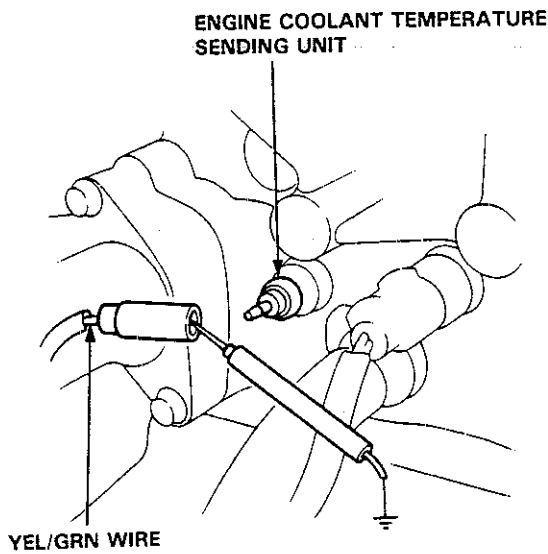
6. If unable to obtain the above readings, replace the fuel gauge sending unit.

# Engine Coolant Temperature Gauge

## Gauge Test

NOTE: Refer to pages 23-123 and 124 for the circuit diagram of the engine coolant temperature gauge.

1. Check the No. 15 (10 A) fuse in the under-dash fuse/relay box before testing.
2. Make sure the ignition switch is OFF, then disconnect the YEL/GRN wire from the engine coolant temperature sending unit and ground it with a jumper wire.



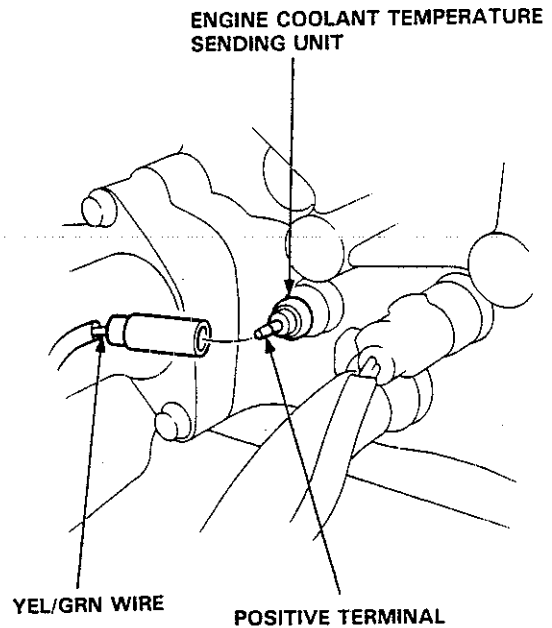
3. Turn the ignition switch ON. Check that the pointer of the temperature gauge starts moving toward the "H" (except KF) or "C" (KF) marks.

**CAUTION:** Turn the ignition switch OFF before the pointer reaches "H" (except KF) or "C" (KF) on the gauge dial. Failure to do so may damage the gauge.

- If the pointer of the gauge does not move at all, check for:
  - An open in the YEL or YEL/GRN wire. If the wires are OK, replace the engine coolant temperature gauge.
- If the gauge works, inspect the sending unit.

## Sending Unit Test

1. Disconnect the YEL/GRN wire from the sending unit.
2. With the engine cold, use an ohmmeter to measure resistance between the positive terminal and the engine (ground).



3. Check the temperature of the engine coolant.
4. Run the engine and measure the change in resistance with the engine at operating temperature (radiator fan comes on).

Temperature	56°C (133°F) (engine cold)	85°C (185°F) — 100°C (212°F)
Resistance (Ω)	137	46 — 30.4

5. If the readings you get are substantially different from the specifications above, replace the sending unit.



# Low Fuel Warning System

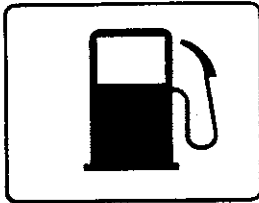
## Indicator Light Test

NOTE: Refer to page 23-124 for the diagram of the low fuel indicator circuit.

1. Park the car on level ground

**⚠ WARNING** Do not smoke while working on the fuel system. Keep open flame away from the work area. Drain fuel only into an approved container.

2. Drain the fuel tank into an approved container. Then install the drain bolt with a new washer.
3. Add less than 6.5 ℓ (1.7 U.S. Gal, 1.4 Imp. Gal) of fuel and turn the ignition switch ON. The low fuel indicator light should come on within four minutes



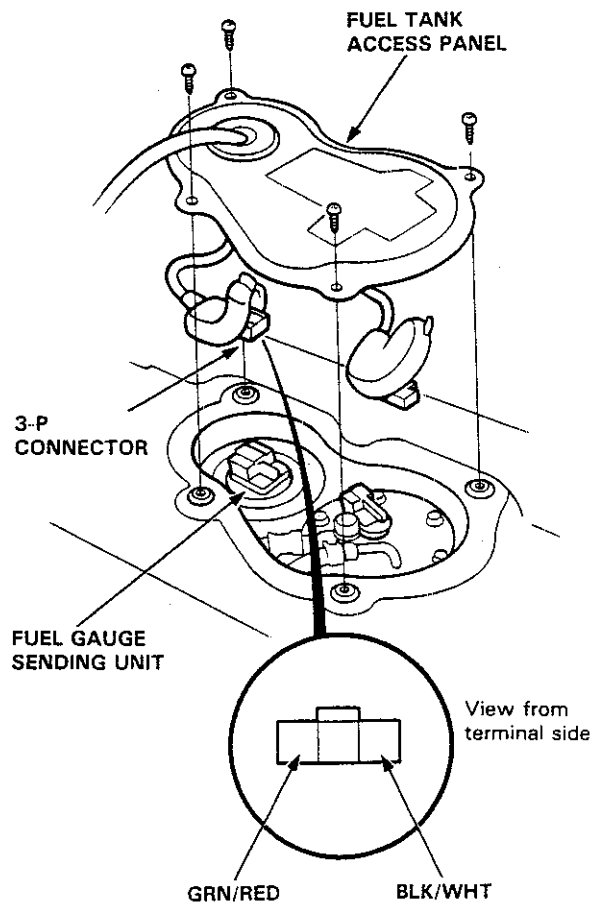
LOW FUEL INDICATOR LIGHT (In the gauge assembly)

4. Then add one more gallon of fuel [approx. 4 ℓ (1.1 U.S. Gal, 0.9 Imp. Gal)]. The light should go off within four minutes.

- If the indicator light did not come on in step 3, remove the fuel tank access panel and disconnect the 3-P connector from the fuel gauge sending unit. Connect the GRN/RED terminal to the BLK/WHT terminal with a jumper wire.

— If the light comes on, the problem is the sending unit.

— If the light does not come on, the problem is an open in the GRN/RED wire to the gauge assembly, no power to the gauge, a bad bulb, or poor ground

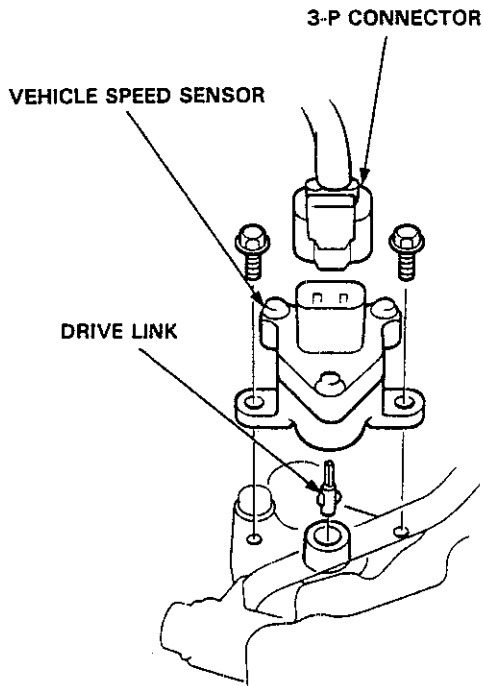


## Vehicle Speed Sensor

### Replacement

1. Disconnect the 3-P connector from the vehicle speed sensor
2. Remove the mounting bolts, then remove the vehicle speed sensor

**NOTE:** The vehicle speed sensor drive link is a very small part, be careful not to lose it.



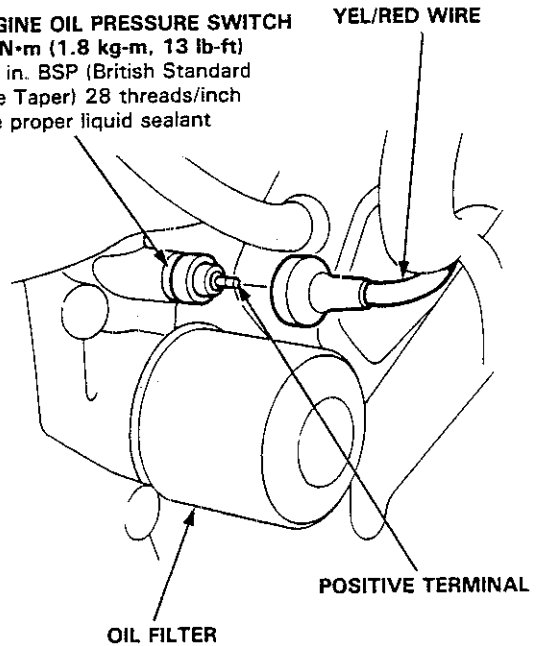
3. Install in the reverse order of removal.

## Engine Oil Pressure Warning System

### Switch Test

1. Remove the YEL/RED wire from the engine oil pressure switch.
2. There should be continuity between the positive terminal and the engine (ground) with the engine stopped. There should be no continuity when the engine runs.

**ENGINE OIL PRESSURE SWITCH**  
18 N·m (1.8 kg·m, 13 lb·ft)  
1/8 in. BSP (British Standard Pipe Taper) 28 threads/inch  
Use proper liquid sealant



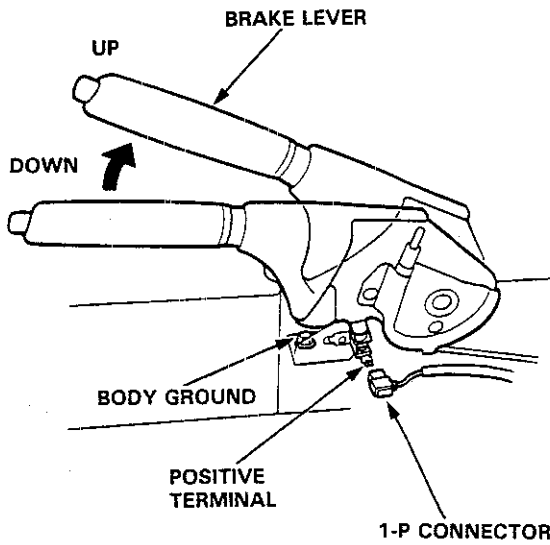
3. If the switch fails to operate, check the engine oil level. If the engine oil level is OK, check the engine oil pressure and, if necessary, inspect the oil pump (see section 8).



# Brake Warning System

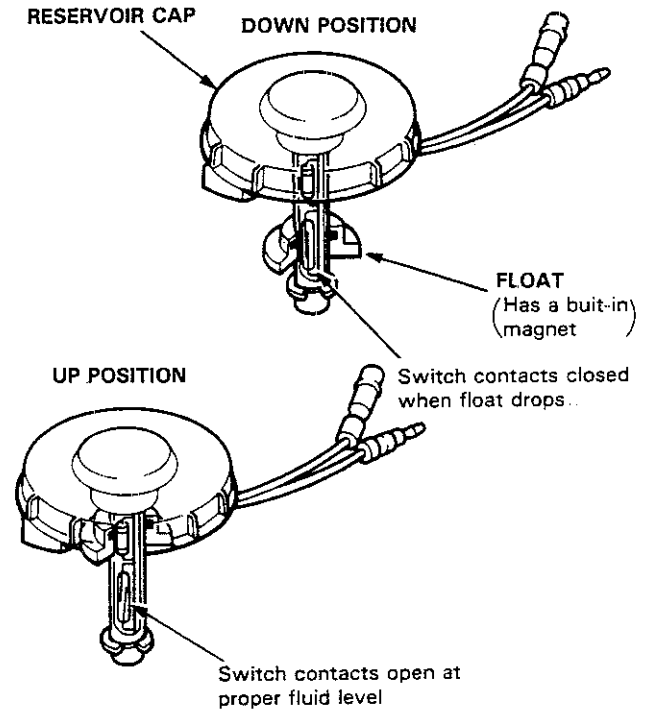
## Parking Brake Switch Test

1. Remove the rear console and disconnect the connector from the switch.
2. There should be continuity between the positive terminal and body ground with the brake lever up. There should be no continuity with the brake lever down.



## Brake Fluid Level Switch Test

1. Remove the reservoir cap. Check that the float moves up and down freely. Replace the reservoir cap assembly if the float does not move freely.
2. Check for continuity between the terminals with the float up and down. There should be continuity with the float down and no continuity with the float up. Replace the reservoir cap assembly if necessary.

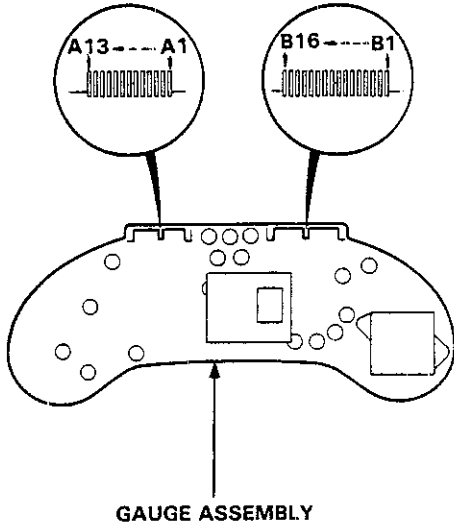


# Clock

## Terminals

**NOTE:**

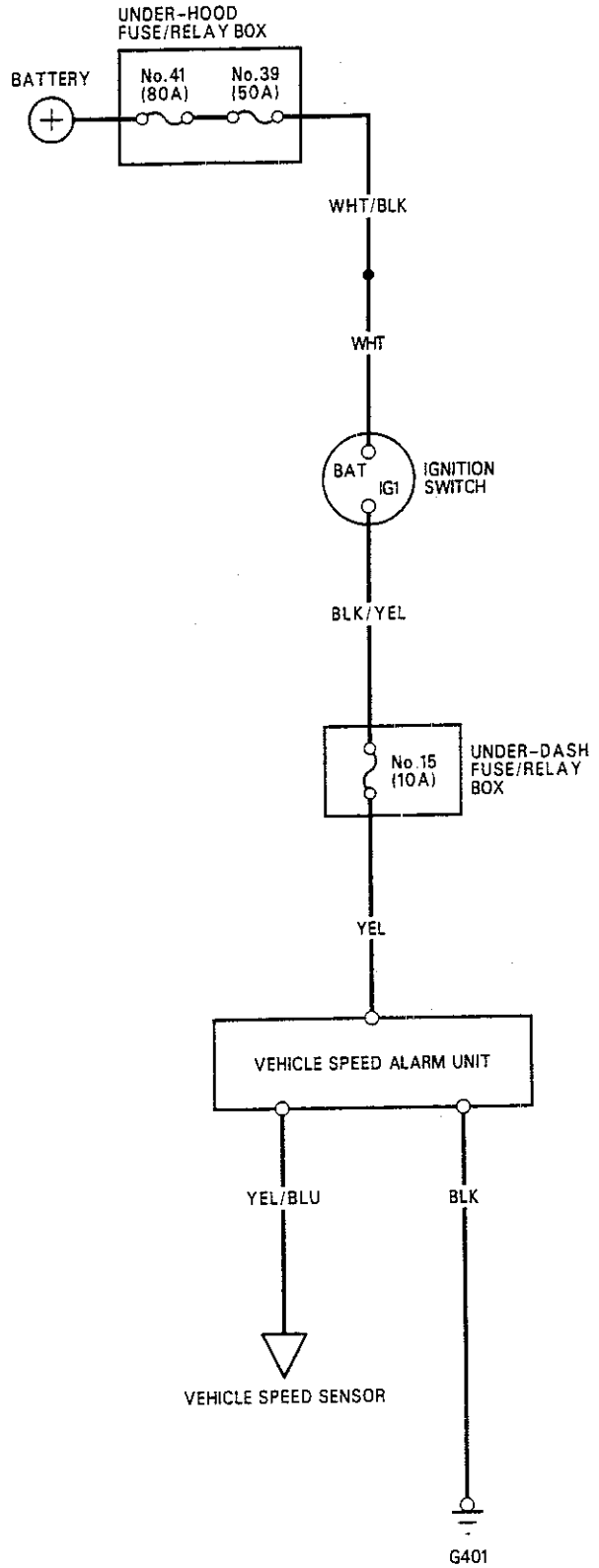
- Refer to page 23-123 for the clock system circuit
- For removal and replacement of the clock, see pages 23-126 and 127



Terminal	Wire	Connects to
B7	WHT/BLU	Constant power (Time memory)
A10	RED/BLK	Lights-on signal
B5	YEL	IG1 (Main clock power supply)
A9	BLK	Ground

# Vehicle Speed Alarm System (KY)

## Circuit





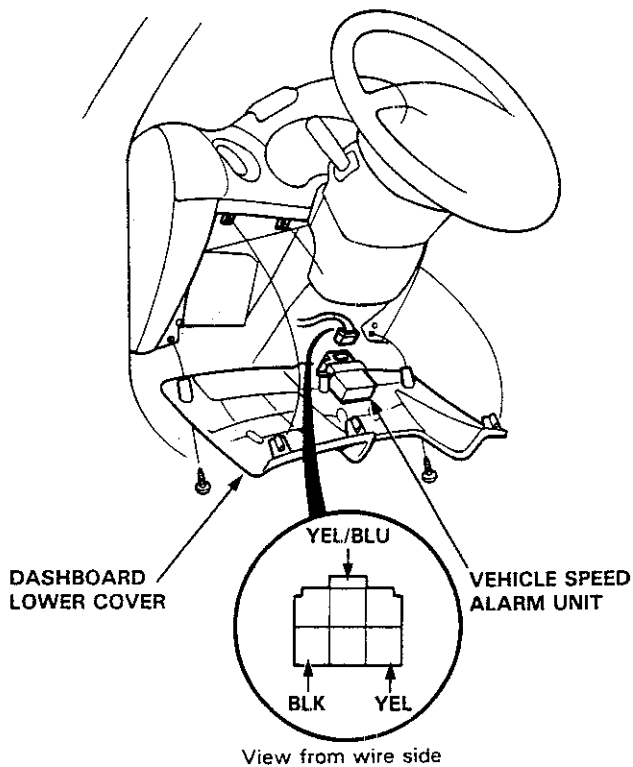


# Vehicle Speed Alarm System (KY)

## Vehicle Speed Alarm Unit Test

NOTE: Before testing, check the No. 15 (10 A) fuse in the under-dash fuse/relay box.

1. Remove the dashboard lower cover, then disconnect the 6-P connector from the vehicle speed alarm unit



2. Check for continuity between the BLK terminal and body ground. There should be continuity

- If there is no continuity, check for:
  - An open in the BLK wire
  - Poor ground (G201, G401).
- If there is continuity, go to step 3.

3. Check for voltage between the YEL terminal and body ground with the ignition switch ON. There should be battery voltage

- If there is no voltage, check for an open in the YEL wire
- If there is battery voltage, go to step 4

4. Turn the ignition switch OFF, reconnect the 6-P connector to the vehicle speed alarm unit, and connect the voltmeter to the YEL/BLU terminal

5. Raise the front of the car and support it with stands (see section 1)

6. Turn the ignition switch ON again and slowly rotate one wheel with the other wheel blocked, then check if the voltmeter indicator moves alternately from 0 V to 5 V and from 5 V to 0 V

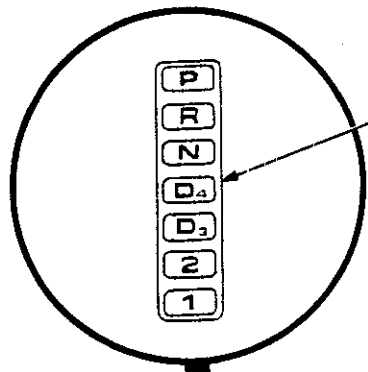
- If there is no voltage, check for:
  - Defective vehicle speed sensor (see page 23-128)
  - An open in the YEL/BLU wire.

7. Replace the vehicle speed alarm unit if the vehicle speed sensor is not faulty

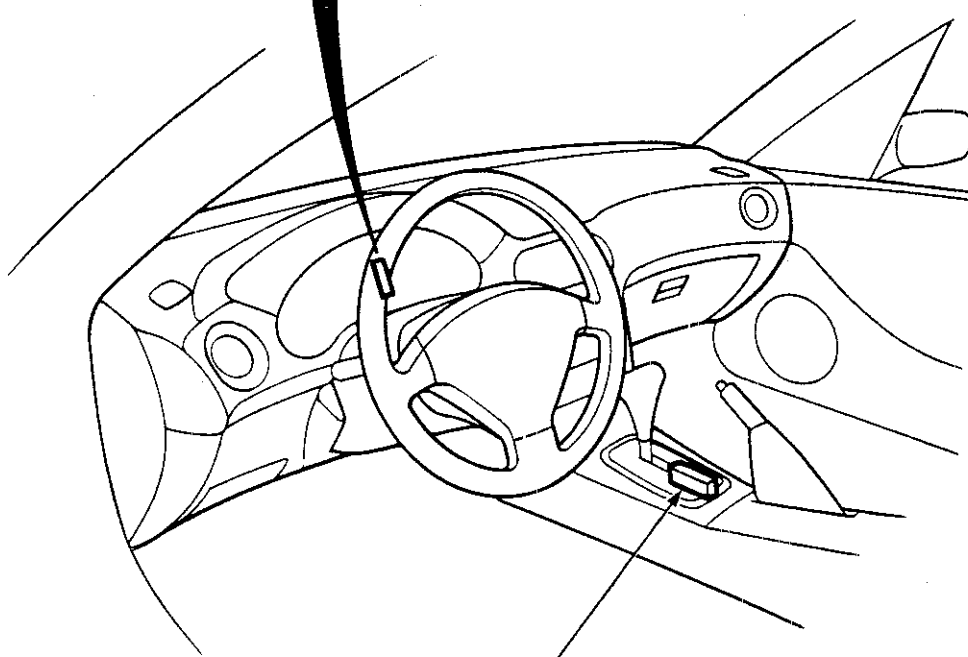
# A/T Gear Position Indicator

## Component Location Index

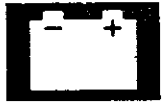
**GAUGE ASSEMBLY**  
Removal, page 23-126  
Disassembly page 23-127



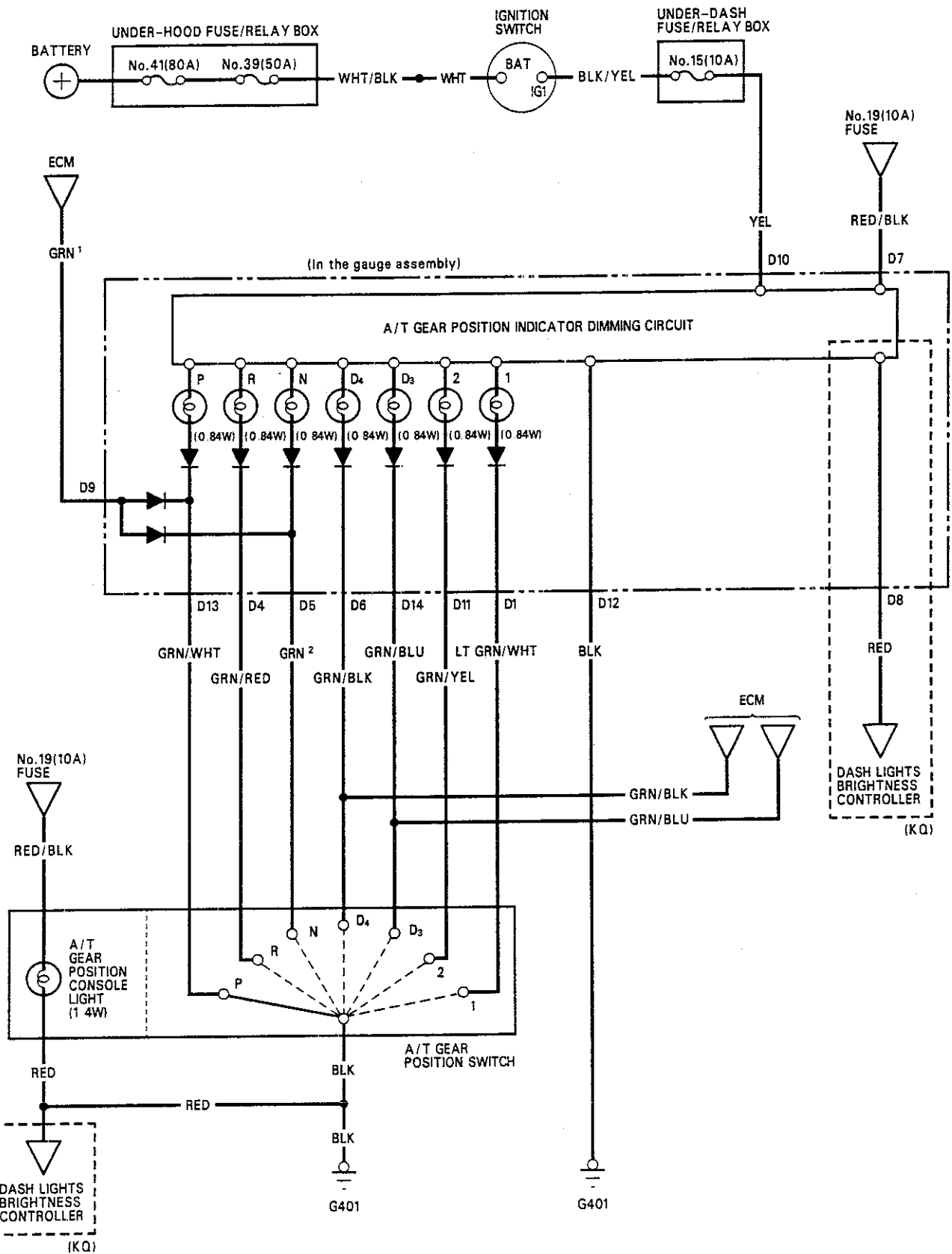
**A/T GEAR POSITION INDICATOR**  
Input Test page 23-140



**A/T GEAR POSITION SWITCH**  
Test, page 23-142  
Replacement, page 23-143  
Adjustment, page 23-142



# Circuit Diagram



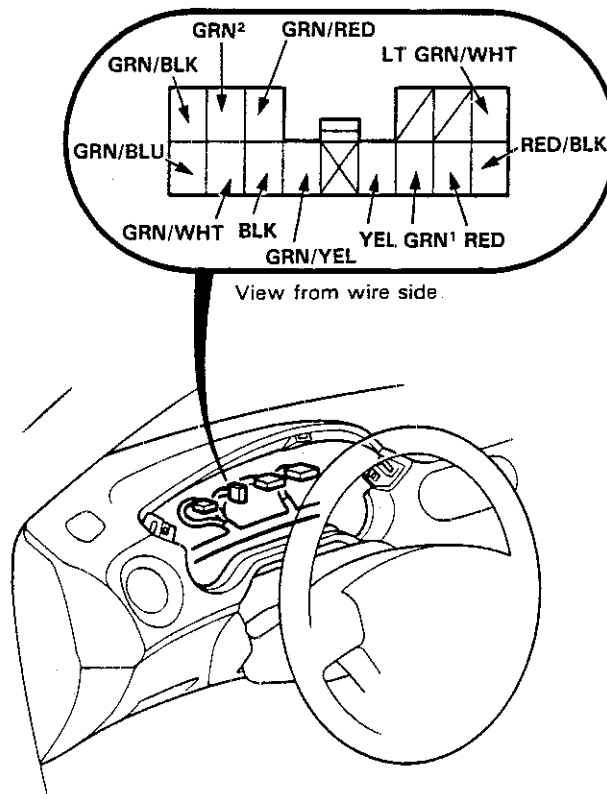
# A/T Gear Position Indicator

## Indicator Input Test

Remove the gauge assembly from the dashboard (see page 23-126), and disconnect the 14-P connector from it. Inspect the connector 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 terminals.
  - If any test indicates a problem, find and correct the cause, then recheck the system.
  - If all the input tests prove OK, the indicator must be faulty; replace the gauge assembly.

NOTE: Wires with the same color have been given a number suffix to distinguish them (for example, GRN<sup>1</sup> and GRN<sup>2</sup> are not the same)



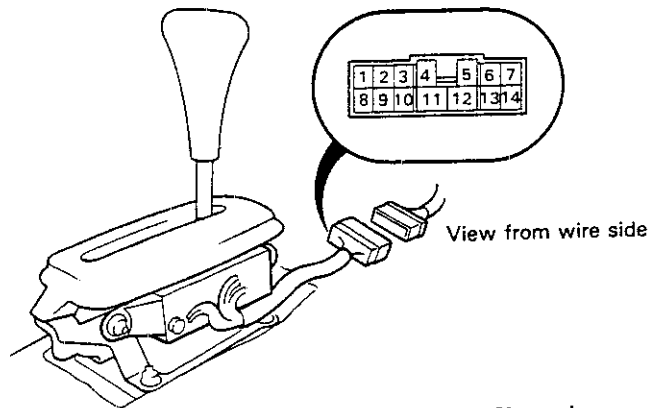


No	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G401)</li> <li>• An open in the wire.</li> </ul>
2	YEL	Ignition switch ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 15 (10 A) fuse.</li> <li>• An open in the wire.</li> </ul>
3	GRN/WHT	Shift lever in position P.	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other position	<ul style="list-style-type: none"> <li>• Faulty A/T gear position switch.</li> <li>• Poor ground (G401).</li> <li>• An open in the wire.</li> </ul>
	GRN/RED	Shift lever in position R.		
	GRN <sup>2</sup>	Shift lever in position N.		
	GRN/BLK	Shift lever in position D <sub>4</sub> .		
	GRN/BLU	Shift lever in position D <sub>3</sub> .		
	GRN/YEL	Shift lever in position 2.		
	LT GRN/WHT	Shift lever in position 1.		
4	RED/BLK and RED	Comb. light switch ON and dash lights brightness control dial on full bright.	Check for voltage between RED/BLK and RED terminals: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Faulty dash lights brightness control system</li> <li>• An open in the wire.</li> </ul>
5	GRN <sup>1</sup>	Ignition switch ON.	Check for voltage to ground: There should be more than 5 V.	<ul style="list-style-type: none"> <li>• Faulty ECM</li> <li>• An open in the wire</li> </ul>

# A/T Gear Position Indicator

## A/T Gear Position Switch Test

1. Remove the center console, then disconnect the 14-P connector from the switch.
2. Check for continuity between the terminals in each switch position according to the table.
  - Move the lever back and forth at each position without touching the push button, and check for continuity within the range of free play
  - If there is no continuity within the range of free play, adjust the position of the switch as described below.



A/T Gear Position Switch

Back-up Light Switch Neutral Safety Switch

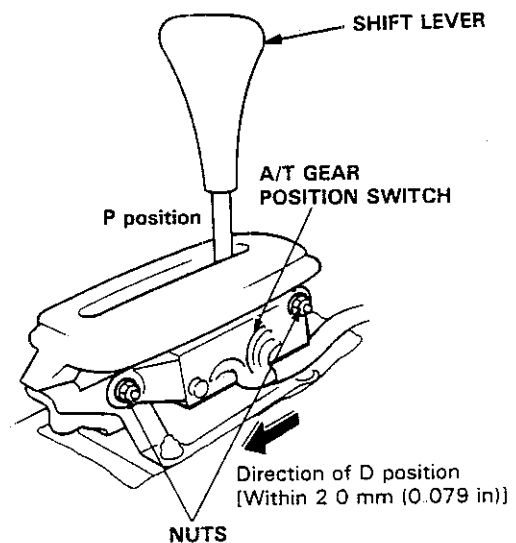
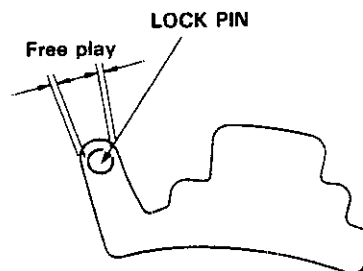
Terminal	7	6	3	2	1	8	9	10	4	5	11	12
Position												
1	○—○											
2	○—○	○—○										
D <sub>3</sub>	○—○	○—○	○—○									
D <sub>4</sub>	○—○	○—○	○—○	○—○								
N	○—○				○—○						○—○	○—○
R	○—○						○—○		○—○	○—○		
P	○—○							○—○			○—○	○—○

### Adjustment:

1. Shift to "P" position and loosen the nuts.
2. Slide the switch in the direction of D position [within 2.0 mm (0.079 in)] until there is continuity between No. 7 and No. 10 terminals in the range of free play of the shift lever.
3. Recheck for continuity between each of the terminals.

### NOTE:

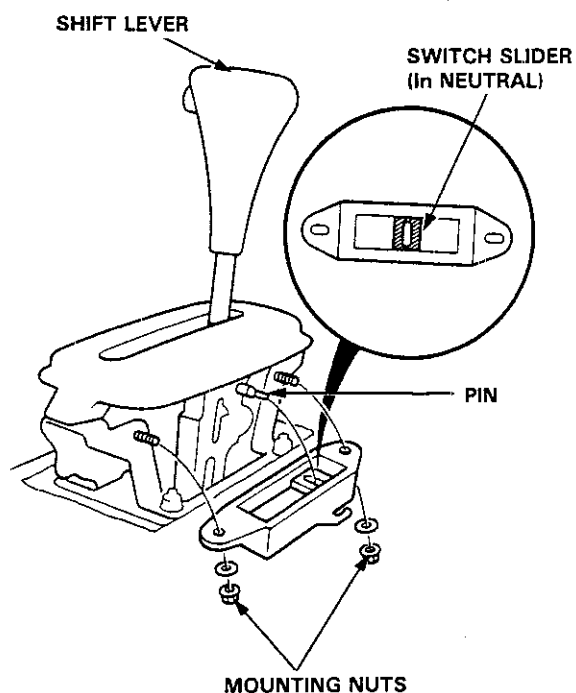
- If adjustment is not possible, check for damage to the shift lever detent and/or bracket. If there is no damage, replace the A/T gear position switch
- The engine should start when the shift lever is in position N in the range of free play.





## A/T Gear Position Switch Replacement

1. Remove the center console, then disconnect the 14-P connector from the switch
2. Remove the two switch mounting nuts, and replace the switch.



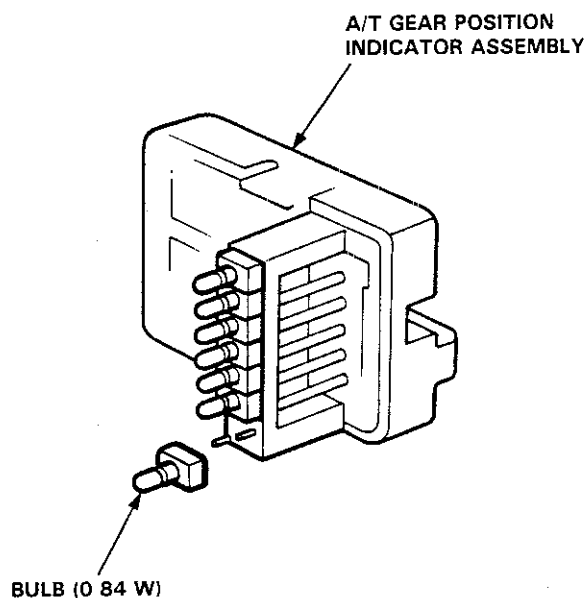
3. Position the slider on the new switch to "Neutral" as shown above.
4. Shift the shift lever to "Neutral", then slip the switch into position.
5. Attach the switch with the two nuts.
6. Test the switch in the P and N positions

NOTE: The engine should start when the shift lever is in position N anywhere in the range of free play.

7. Connect the 14-P connector, clamp the harness, and install the center console.

## Bulb Replacement

1. Remove the gauge assembly (see page 23-126)
2. Remove the A/T gear position indicator assembly (see page 23-127)
3. Remove the bulb from the A/T gear position indicator assembly.



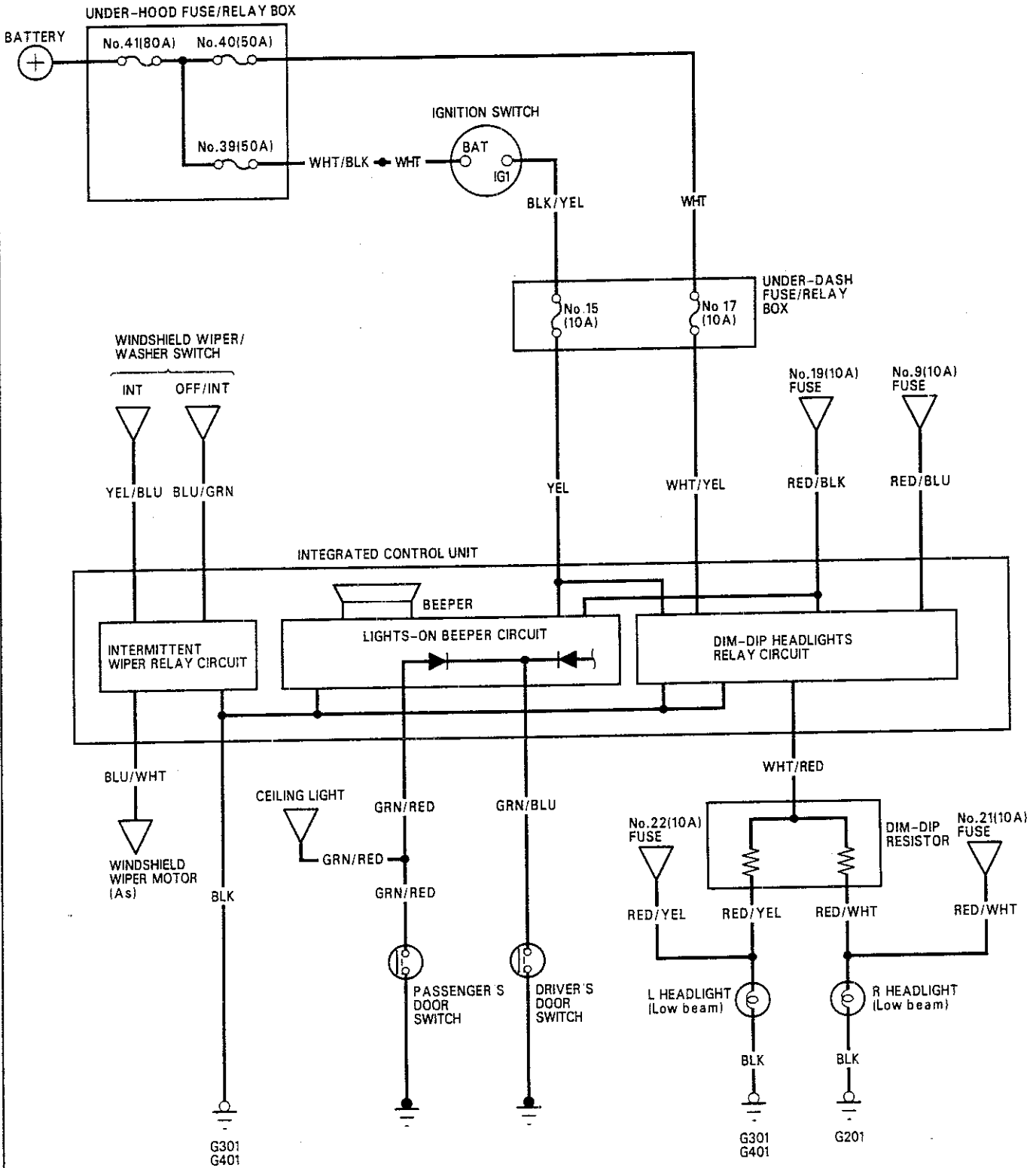
4. Install the indicator in the reverse order of removal.

# Integrated Control Unit

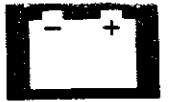
## Circuit Diagram (With Dim-dip Headlights)

### Description

An integrated control unit, located behind the dashboard lower cover, integrates the functions of the dim-dip headlights relay circuit, lights-on beeper circuit, and the intermittent wiper relay circuit onto one circuit board, sharing common circuit functions.





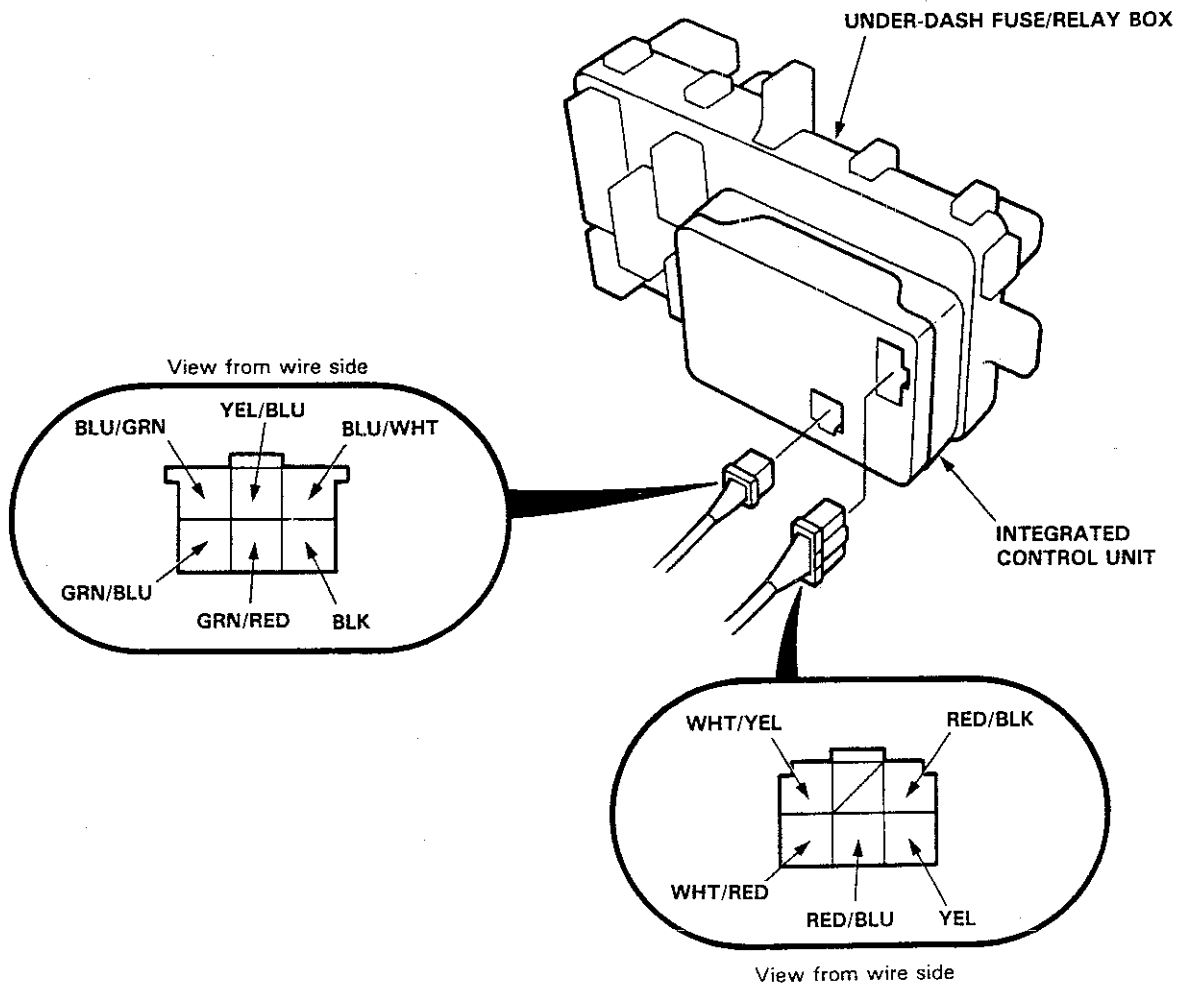


## Input Test (With Dim-dip Headlights)

Remove the dashboard lower cover, then disconnect the 6-P connectors from the integrated control unit. Inspect the connector and socket terminals to be sure they are all making good contact.

- If any 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 terminals.
  - 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

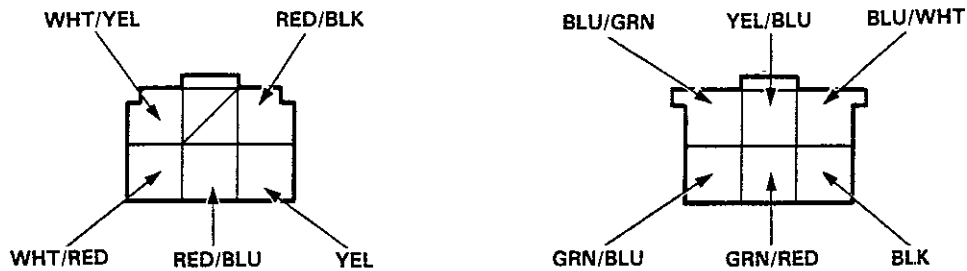
NOTE: Do not disconnect any other connectors from the under-dash fuse/relay box except those for the integrated control unit



(cont'd)

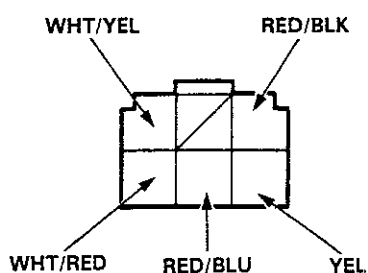
# Integrated Control Unit

## Input Test (With Dim-dip Headlights) (cont'd)

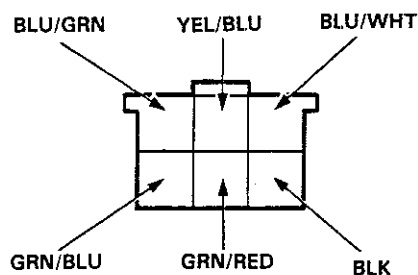


### Dim-dip headlights relay:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	WHT/YEL	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 17 (10 A) fuse</li> <li>• An open in the wire.</li> </ul>
3	YEL	Turn the ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 15 (10 A) fuse.</li> <li>• An open in the wire.</li> </ul>
4	RED/BLK	Turn the headlight switch to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 19 (10 A) fuse.</li> <li>• Faulty headlight switch</li> <li>• An open in the wire.</li> </ul>
5	RED/BLU	Turn the headlight switch to ON and the dimmer switch to HI.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 9 (10 A) fuse.</li> <li>• Faulty headlight switch.</li> <li>• An open in the wire.</li> </ul>
6	WHT/RED	Connect a jumper wire between the WHT/YEL and WHT/RED terminals.	The headlights (LOW) should come on.	<ul style="list-style-type: none"> <li>• Poor ground (G201, G301).</li> <li>• Blown bulbs.</li> <li>• Faulty dim-dip resistor</li> <li>• An open in the wire.</li> </ul>



View from wire side



View from wire side

**Lights-on beeper:**

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401)</li> <li>• An open in the wire.</li> </ul>
2	RED/BLK	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 19 (10 A) fuse.</li> <li>• An open in the wire.</li> </ul>
3	YEL	Turn the ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 15 (10 A) fuse.</li> <li>• An open in the wire.</li> </ul>
4	GRN/BLU	Driver's door open.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty driver's door switch</li> <li>• An open in the wire.</li> </ul>
5	GRN/RED	Passenger's door open.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty passenger's door switch</li> <li>• An open in the wire.</li> </ul>

**Intermittent wiper relay:**

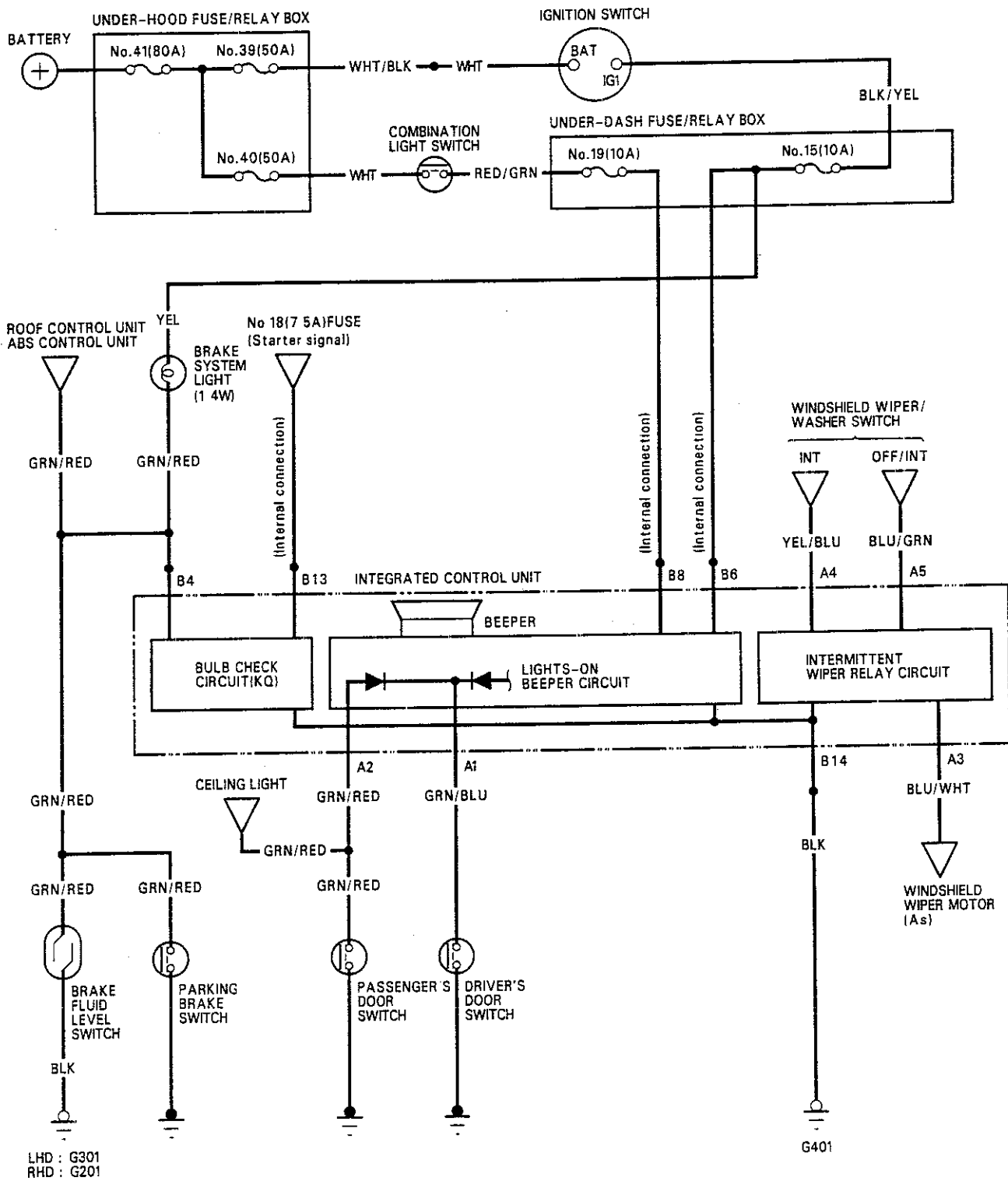
No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401)</li> <li>• An open in the wire.</li> </ul>
2	YEL/BLU	Turn the ignition switch to ON and the windshield wiper switch to INT.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 14 (20 A) fuse</li> <li>• Faulty windshield wiper switch.</li> <li>• An open in the wire.</li> </ul>
3	BLU/WHT and BLU/GRN	Windshield wiper switch turned to OFF or INT, wiper blades in rest position.	Check for continuity between the BLU/WHT and BLU/GRN terminals: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty windshield wiper switch.</li> <li>• Faulty windshield wiper motor</li> <li>• An open in the wire.</li> </ul>

# Integrated Control Unit

## Circuit Diagram (KG,KF,KQ)

### Description

An integrated control unit, located behind the dashboard lower cover, integrates the functions of the bulb check circuit (KQ), lights-on beeper circuit, and the intermittent wiper relay circuit onto one circuit board, sharing common circuit functions



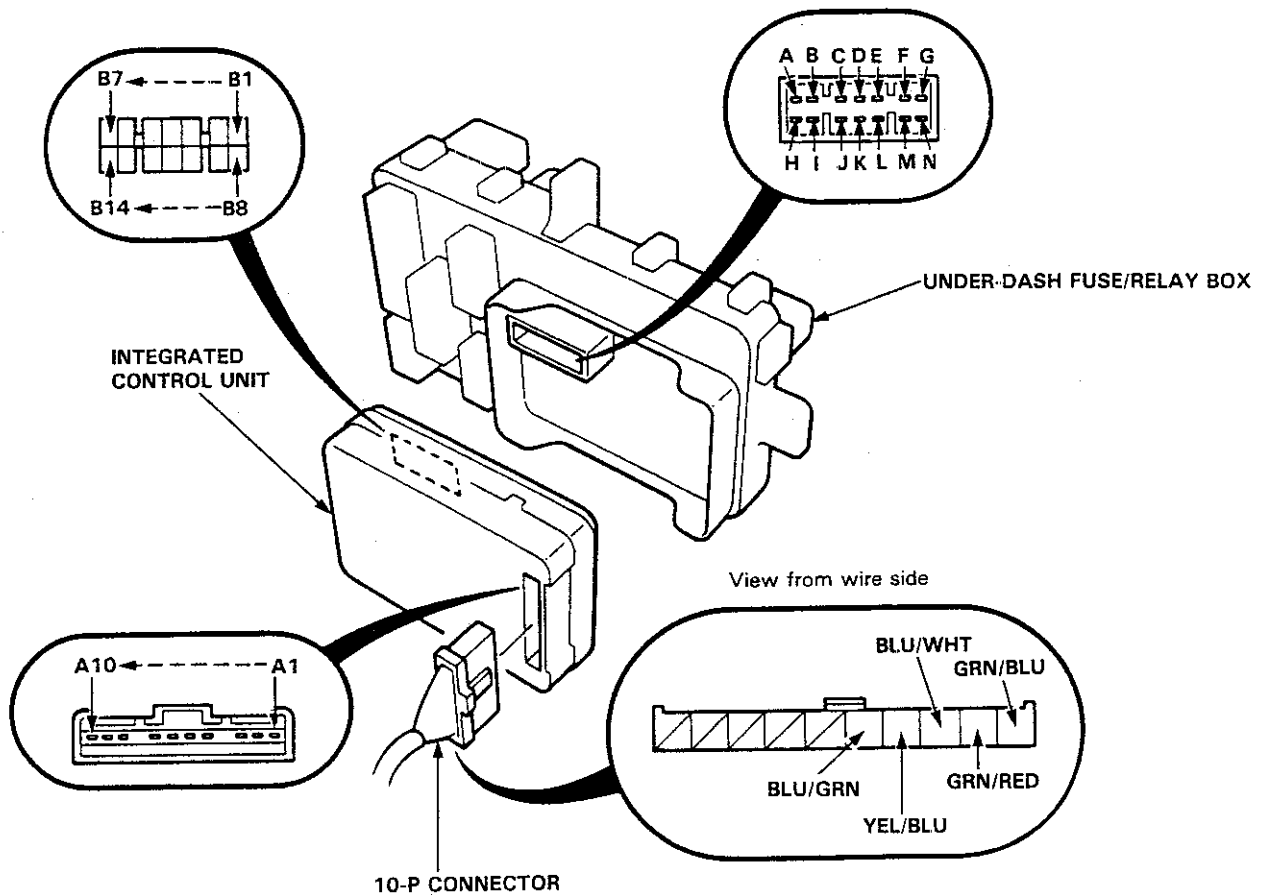


## Input Test (KG, KF, KQ)

Remove the dashboard lower cover, then disconnect the 10-P connector from the integrated control unit. Next, remove the integrated control unit from the under-dash fuse/relay box. Inspect the connector and socket terminals to be sure they are all making good contact

- If any 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 and socket terminals
  - 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.

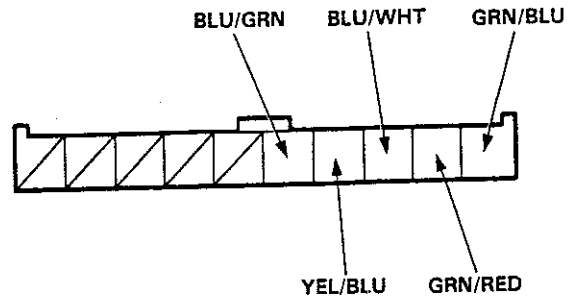
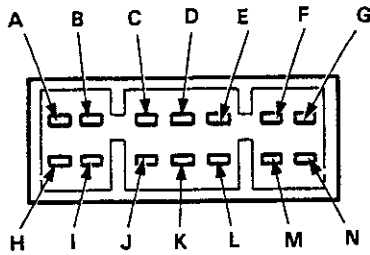
NOTE: Do not disconnect any other connectors from the under-dash fuse/relay box except those for the integrated control unit.



(cont'd)

# Integrated Control Unit

## Input Test (KG, KF, KQ) (cont'd)



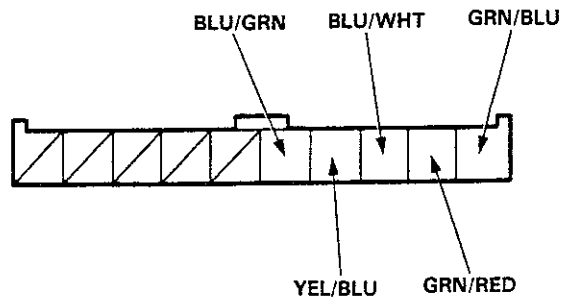
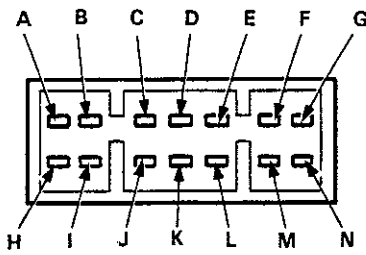
### Bulb check circuit (KQ):

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	N	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	M	Turn the ignition switch to START.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 18 (7.5 A) fuse.</li> <li>• Faulty neutral safety switch (A/T).</li> <li>• An open in the wire.</li> </ul>
3	D	Ignition switch turned to ON, brake fluid reservoir full, and parking brake lever down.	Connect to ground: The brake system light should come on.	<ul style="list-style-type: none"> <li>• Blown No. 15 (10 A) fuse</li> <li>• Blown bulb.</li> <li>• An open in the wire.</li> </ul>

### Lights-on beeper:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	N	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G401, *)</li> <li>• An open in the wire.</li> </ul>
2	H	Turn the headlight switch to ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 19 (10 A) fuse</li> <li>• An open in the wire.</li> </ul>
3	F	Turn the ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 15 (10 A) fuse</li> <li>• An open in the wire.</li> </ul>
4	GRN/BLU	Driver's door open.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty driver's door switch.</li> <li>• An open in the wire</li> </ul>
5	GRN/RED	Passenger's door open.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty passenger's door switch.</li> <li>• An open in the wire.</li> </ul>

\*: G201 (LHD)  
 G301 (RHD)



View from wire side

**Intermittent wiper relay:**

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	N	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G401, *).</li> <li>• An open in the wire.</li> </ul>
2	YEL/BLU	Turn the ignition switch to ON and the windshield wiper switch to INT.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 14 (20 A) fuse.</li> <li>• Faulty windshield wiper switch</li> <li>• An open in the wire</li> </ul>
3	BLU/WHT and BLU/GRN	Windshield wiper switch turned to OFF or INT, wiper blades are in rest position.	Check for continuity between the BLU/WHT and BLU/GRN terminals: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty windshield wiper switch.</li> <li>• Faulty windshield wiper motor.</li> <li>• An open in the wire.</li> </ul>

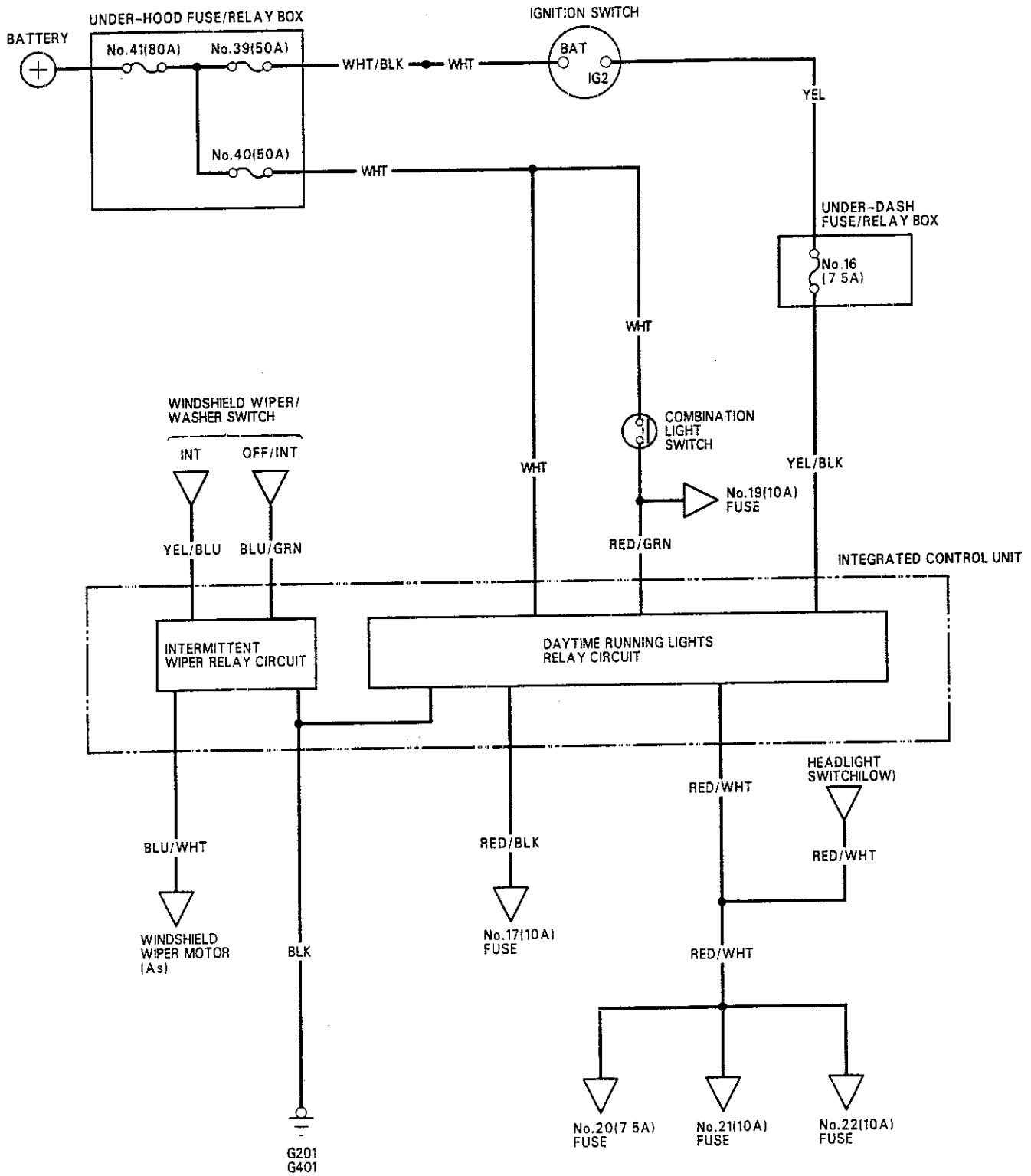
\*: G201 (LHD)  
G301 (RHD)

# Integrated Control Unit

## Circuit Diagram (With Daytime Running Lights)

### Description

An integrated control unit, located behind the dashboard lower cover, integrates the functions of the daytime running lights relay circuit and the intermittent wiper relay circuit onto one circuit board, sharing common circuit functions





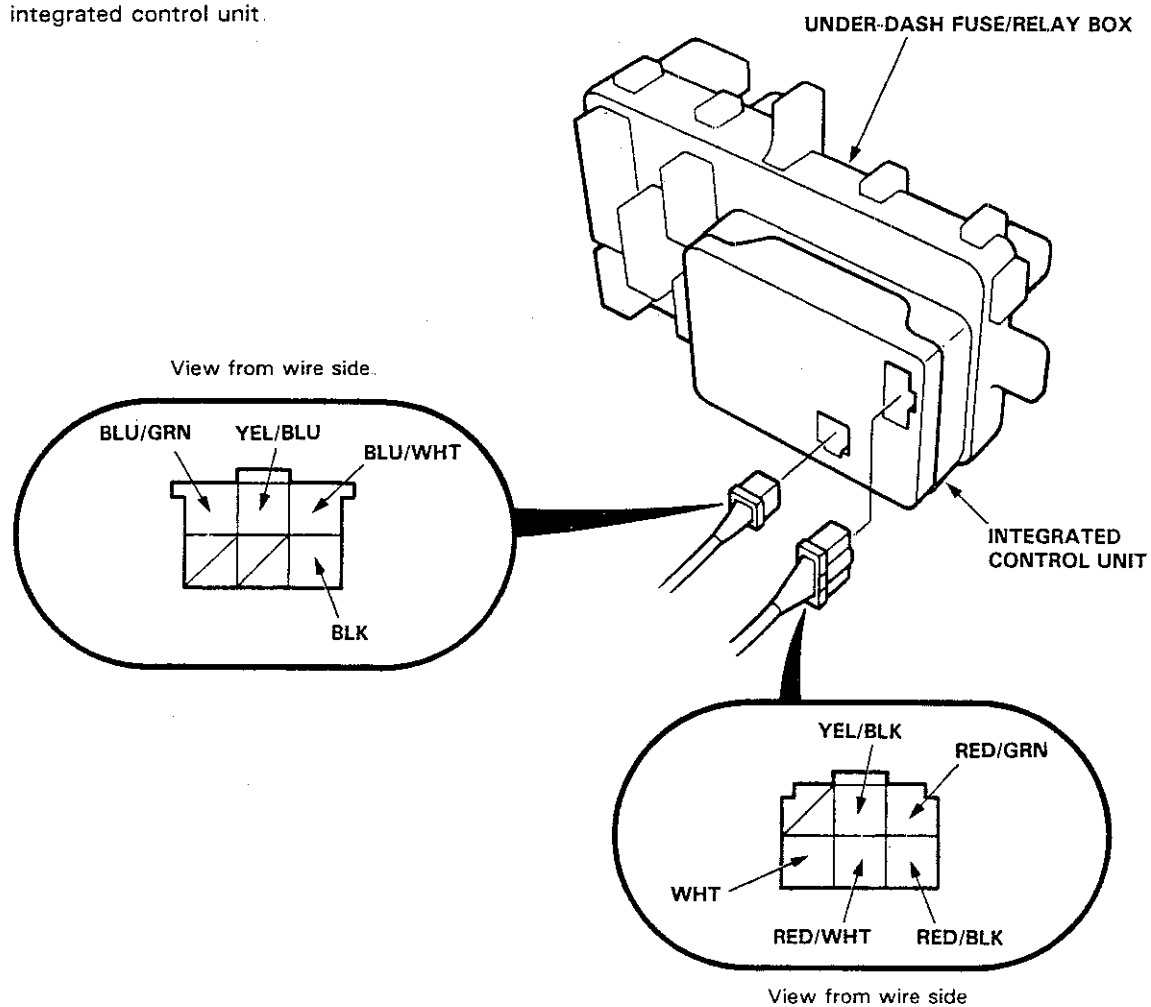


## Input Test (With Daytime Running Lights)

Remove the dashboard lower cover, then disconnect the 6-P connectors from the integrated control unit. Inspect the connector and socket terminals to be sure they are all making good contact

- If any 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 terminals.
  - 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.

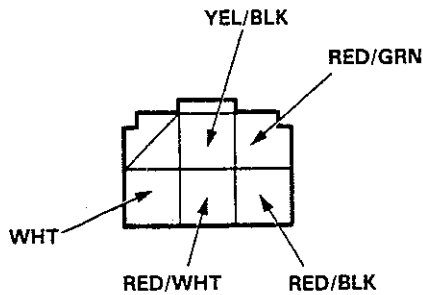
NOTE: Do not disconnect any other connectors from the under-dash fuse/relay box except those for the integrated control unit.



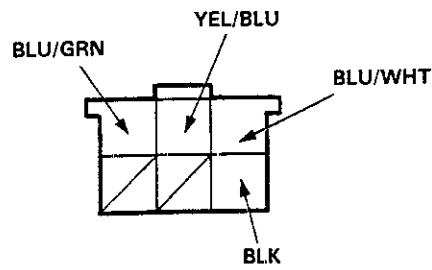
(cont'd)

# Integrated Control Unit

## Input Test (With Daytime Running Lights) (cont'd)



View from wire side



View from wire side.

### Daytime running lights relay:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G201, G401).</li> <li>• An open in the wire.</li> </ul>
2	WHT	Under all conditions	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 40 (50 A) fuse</li> <li>• An open in the wire.</li> </ul>
3	YEL/BLK	Ignition switch turned to ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 16 (7.5 A) fuse</li> <li>• An open in the wire.</li> </ul>
4	RED/GRN	Headlight switch turned to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 40 (50 A) fuse</li> <li>• Faulty headlight switch.</li> <li>• An open in the wire.</li> </ul>
5	RED/BLK	Connect a jumper wire between the WHT and RED/BLK terminals.	The left taillight should come on.	<ul style="list-style-type: none"> <li>• Blown No. 17 (10 A) fuse.</li> <li>• Blown bulb.</li> <li>• An open in the wire.</li> </ul>
6	RED/WHT	Connect a jumper wire between the WHT and RED/WHT terminals.	Both headlights (LOW), the rear fog light, and the rear fog indicator light should come on	<ul style="list-style-type: none"> <li>• Blown No. 21 and 22 (10 A) or No. 20 (7.5 A) fuse.</li> <li>• Blown bulbs</li> <li>• An open in the wire.</li> </ul>

### Intermittent wiper relay:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G201, G401).</li> <li>• An open in the wire.</li> </ul>
2	YEL/BLU	Turn the ignition switch to ON and the windshield wiper switch to INT.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 14 (20 A) fuse.</li> <li>• Faulty windshield wiper switch</li> <li>• An open in the wire.</li> </ul>
3	BLU/WHT and BLU/GRN	Windshield wiper switch turned to OFF or INT, wiper blades are in rest position.	Check for continuity between the BLU/WHT and BLU/GRN terminals: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty windshield wiper switch.</li> <li>• Faulty windshield wiper motor.</li> <li>• An open in the wire.</li> </ul>

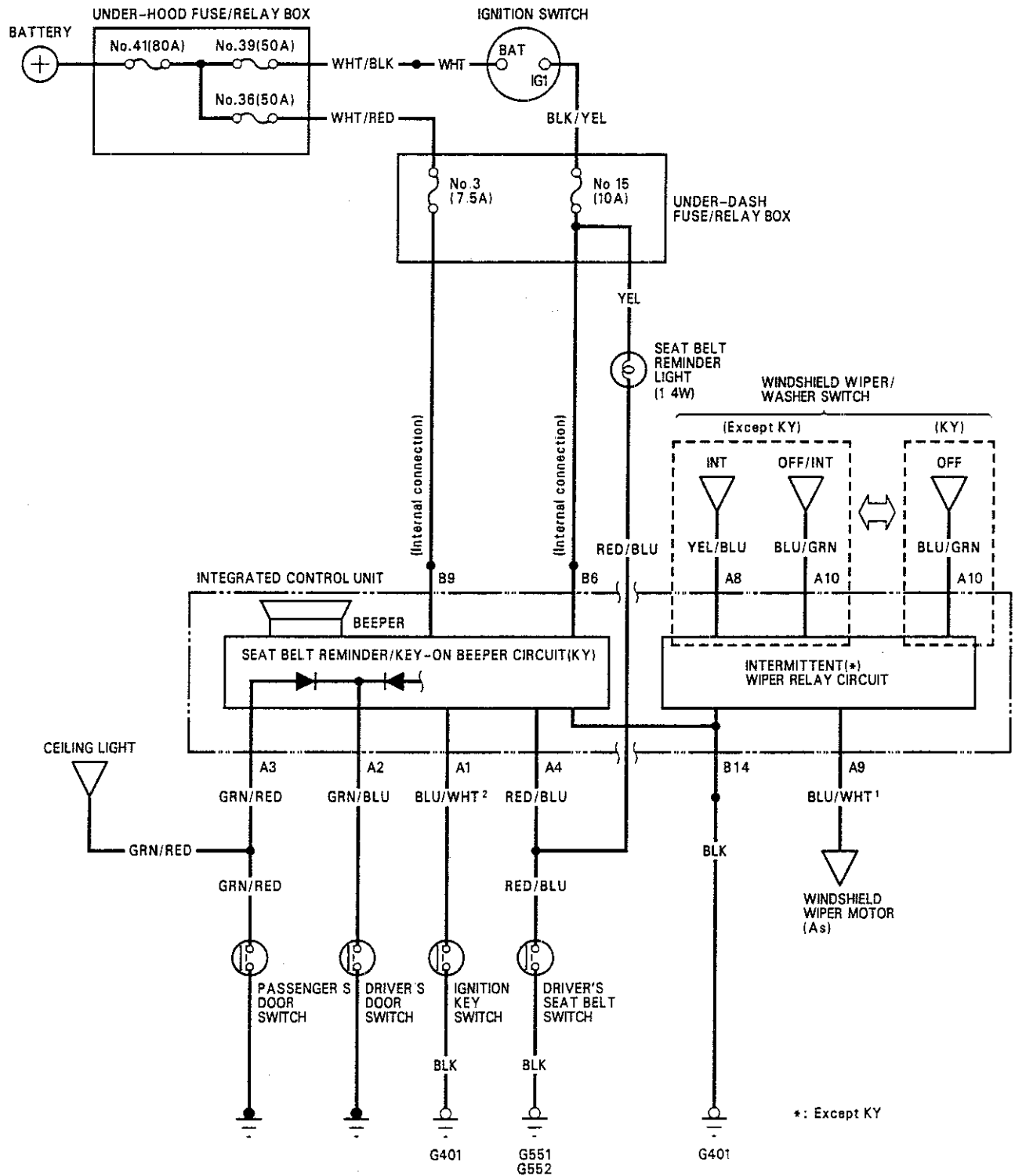


# Circuit Diagram (KY, KP, KT)

## Description

An integrated control unit, located behind the dashboard lower cover, integrates the functions of the seat belt reminder/key-on beeper circuit (KY) and the intermittent\* wiper relay circuit onto one circuit board, sharing common circuit functions.

NOTE: Wires with the same color have been given a number suffix to distinguish them (BLU/WHT<sup>1</sup> and BLU/WHT<sup>2</sup> are not the same).



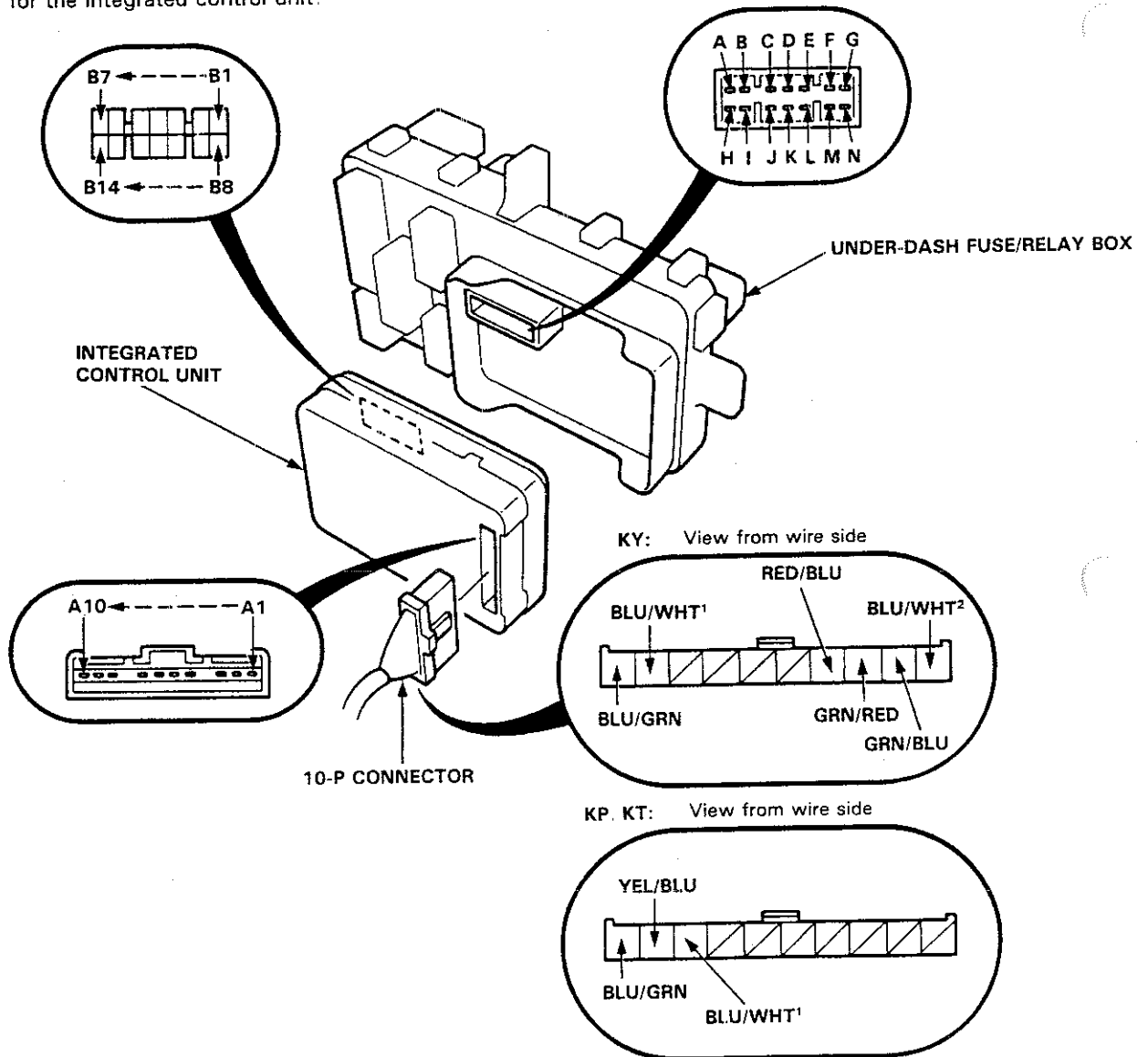
# Integrated Control Unit

## Input Test (KY, KP, KT)

Remove the dashboard lower cover, then disconnect the 10-P connector from the integrated control unit. Next, remove the integrated control unit from the under-dash fuse/relay box. Inspect the connector and socket terminals to be sure they are all making good contact.

- If any terminals are bent, loose or corroded, repair as necessary, and recheck the system
- If the terminals look OK, make the following input tests at the connector and socket terminals.
  - 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.

NOTE: Do not disconnect any other connectors from the under-dash fuse/relay box except those for the integrated control unit.



**Intermittent wiper relay:**

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	N	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"><li>• Poor ground (G401, *)</li><li>• An open in the wire.</li></ul>
2	YEL/BLU (Except KY)	Turn the ignition switch to ON and the windshield wiper switch to INT.	Check for voltage to ground: There should be battery voltage	<ul style="list-style-type: none"><li>• Blown No. 14 (20 A) fuse.</li><li>• Faulty windshield wiper switch.</li><li>• An open in the wire.</li></ul>
3	BLU/WHT <sup>1</sup> and BLU/GRN	Windshield wiper switch turned to OFF or INT, wiper blades are in rest position.	Check for continuity between the BLU/WHT and BLU/GRN terminals: There should be continuity.	<ul style="list-style-type: none"><li>• Faulty windshield wiper switch</li><li>• Faulty windshield wiper motor</li><li>• An open in the wire.</li></ul>

\*: G201 (LHD)  
G301 (RHD)

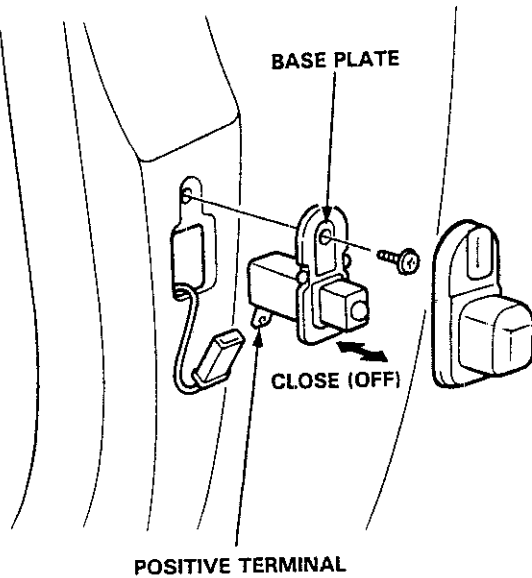
**Seat belt reminder/key-on beeper (KY):**

No	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	N	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"><li>• Poor ground (G201, G401).</li><li>• An open in the wire.</li></ul>
2	I	Under all conditions	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"><li>• Blown No. 3 (7.5 A) fuse.</li><li>• An open in the wire.</li></ul>
3	F	Turn the ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"><li>• Blown No. 15 (10A) fuse.</li><li>• An open in the wire.</li></ul>
4	RED/BLU	Driver's seat belt is unbuckled.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"><li>• Poor ground (G551, G552)</li><li>• Faulty driver's seat belt switch.</li><li>• An open in the wire.</li></ul>
5	GRN/BLU	Driver's door is open.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"><li>• Faulty driver's door switch.</li><li>• An open in the wire.</li></ul>
6	GRN/RED	Passenger's door is open.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"><li>• Faulty passenger's door switch</li><li>• An open in the wire.</li></ul>
7	BLU/WHT <sup>2</sup>	Ignition key is inserted into the ignition switch.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"><li>• Faulty ignition key switch.</li><li>• Poor ground (G201, G401)</li><li>• An open in the wire.</li></ul>

## Door Switch

### Test

1. Open the door
2. Remove the screw.
3. Disconnect the 1-P connector from the switch.



4. There should be continuity between the positive terminal and the base plate (ground) with the switch released (door open)  
There should be no continuity with the switch pushed (door closed).

## Seat Belt Reminder

### Seat Belt Switch Test

1. Slide the driver's seat back, then disconnect the 2-P connector from the seat belt switch under it
2. There should be continuity between the A and B terminals when the driver's seat belt is unbuckled. There should be no continuity when the driver's seat belt is buckled.

