

APPENDIX

Electrical Troubleshooting Manual

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GENERAL

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INTRODUCTION S02GI003

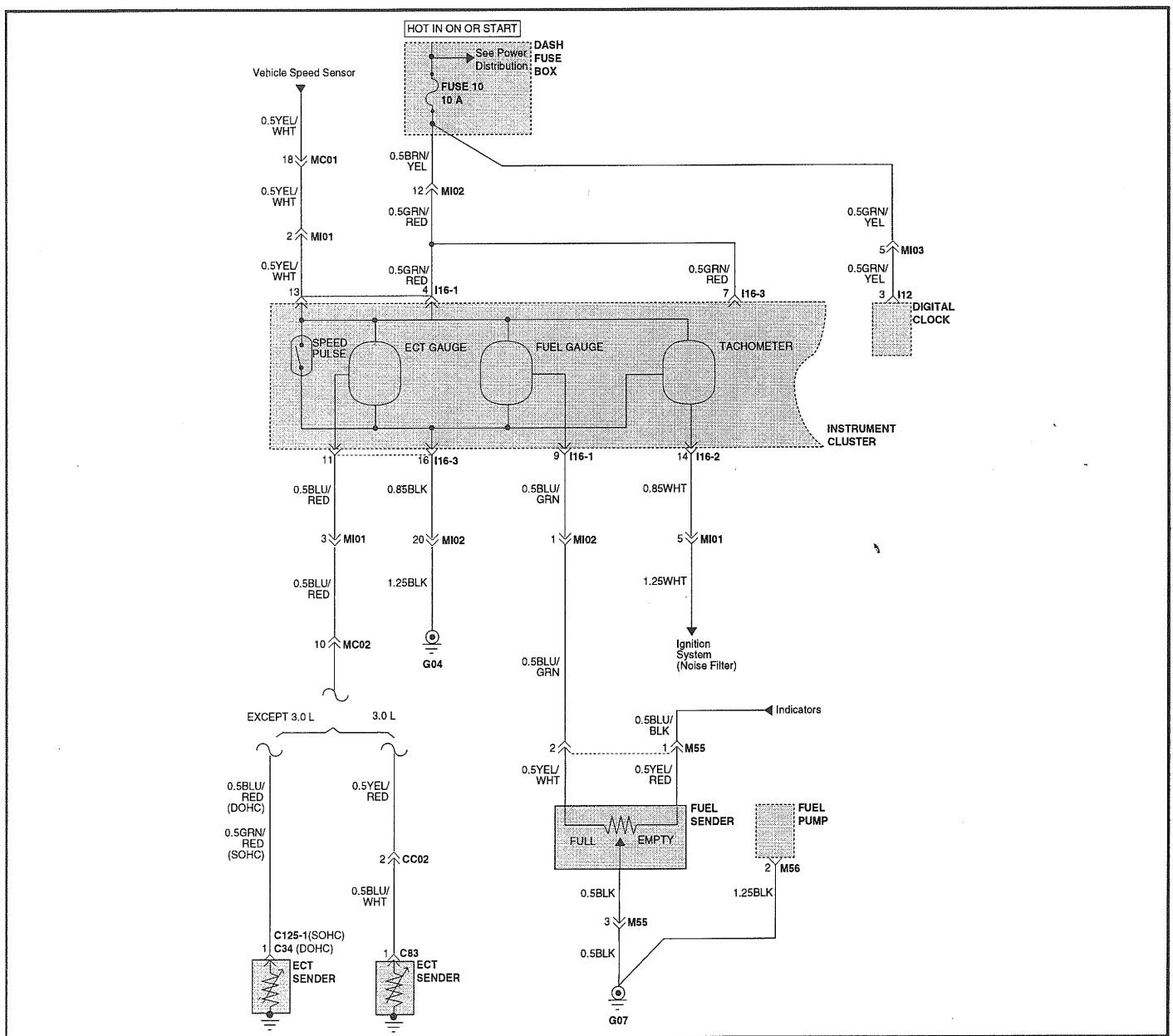
This Manual consists of five major diagnostic sections for electrical problem troubleshooting.

- Schematic diagrams
- Component location indexes
- Component location
- Connector configurations
- Harness layouts

SCHEMATIC DIAGRAM

The starting point of each system section is the schematic diagram, these diagrams show how all the components work together, such as electrical current paths from power source to ground (via electrical load), switch connections at each positions, and other related circuit functions.

It is important to fully understand how a circuit work prior to troubleshooting and diagnosis.



COMPONENT LOCATION INDEXES

When you want to locate the schematic components on the vehicle, use the Component Location Index which follows each schematic. A Component Location Index Lists major components, connectors, grounds and their physical location and figure page reference.

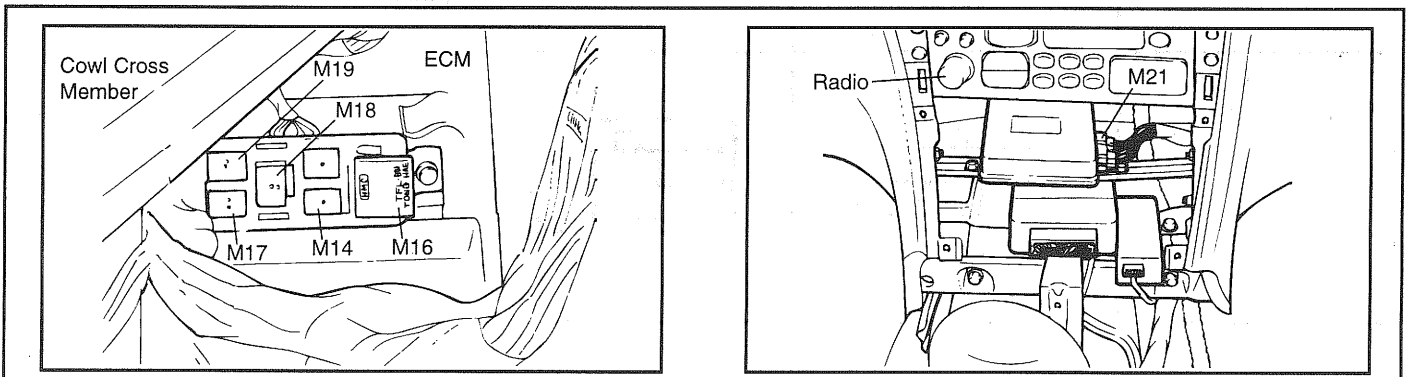
	Location Reference Page
Components	
Digital clock (I12)	CL-15
Instrument cluster (I16-1 ~ I16-3)	CL-15
Fuel sender (M55)	CL-19
Fuel pump (M56)	CL-19
Engine coolant temperature sender (C34/C83)	CL-5, CL-8
Connectors	
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MC02	CL-21
CC02	CL-8
Grounds	
G04	CL-23
G07	CL-23
Diodes	
Z01	CL-24
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YGI-003A

Where connectors are listed, the number of cavities are provided. This figure indicates the total number of cavities in the connector, regardless of how many are actually used. This information along with housing color will be useful for you to identify connectors on the vehicle. Almost all components, connectors, grounds or splices shown on a schematic can be pinpointed visually by using the Component Location Illustrations.

COMPONENT LOCATIONS

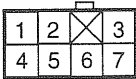
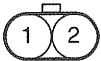
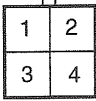
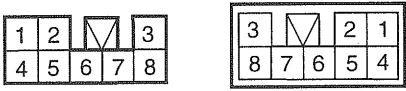
Component Locations give easy access to find the schematic components on the vehicle shown in the Component Location Index.



MGI-001A

CONNECTOR CONFIGURATIONS

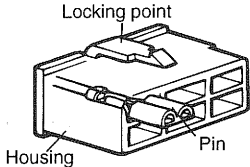
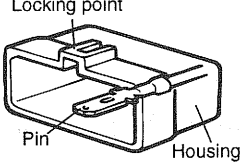
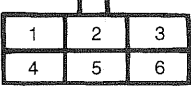
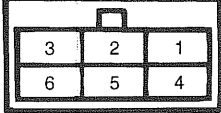
This section shows the cavity or terminal locations in all the multi-pin connectors shown in the schematic diagrams. It is helpful for you to locate check points, together with the wire colors and terminal numbers in the schematic. The configuration drawings show the connector views as seen from a component after the harness connector has been disconnected. When more than one connector is connected to a component, the connector are all shown together. Both halves of in line connectors are shown together.

<p>D15 D35</p> 	<p>D16 D36</p> 	<p>D17 D37</p> 	<p>BLANK</p>
<p>MD05 MD06</p> 		<p>BLANK</p>	<p>BLANK</p>

YGI-004A

CONNECTOR VIEW AND THE NUMBERING ORDER

1. CONNECTOR VIEW

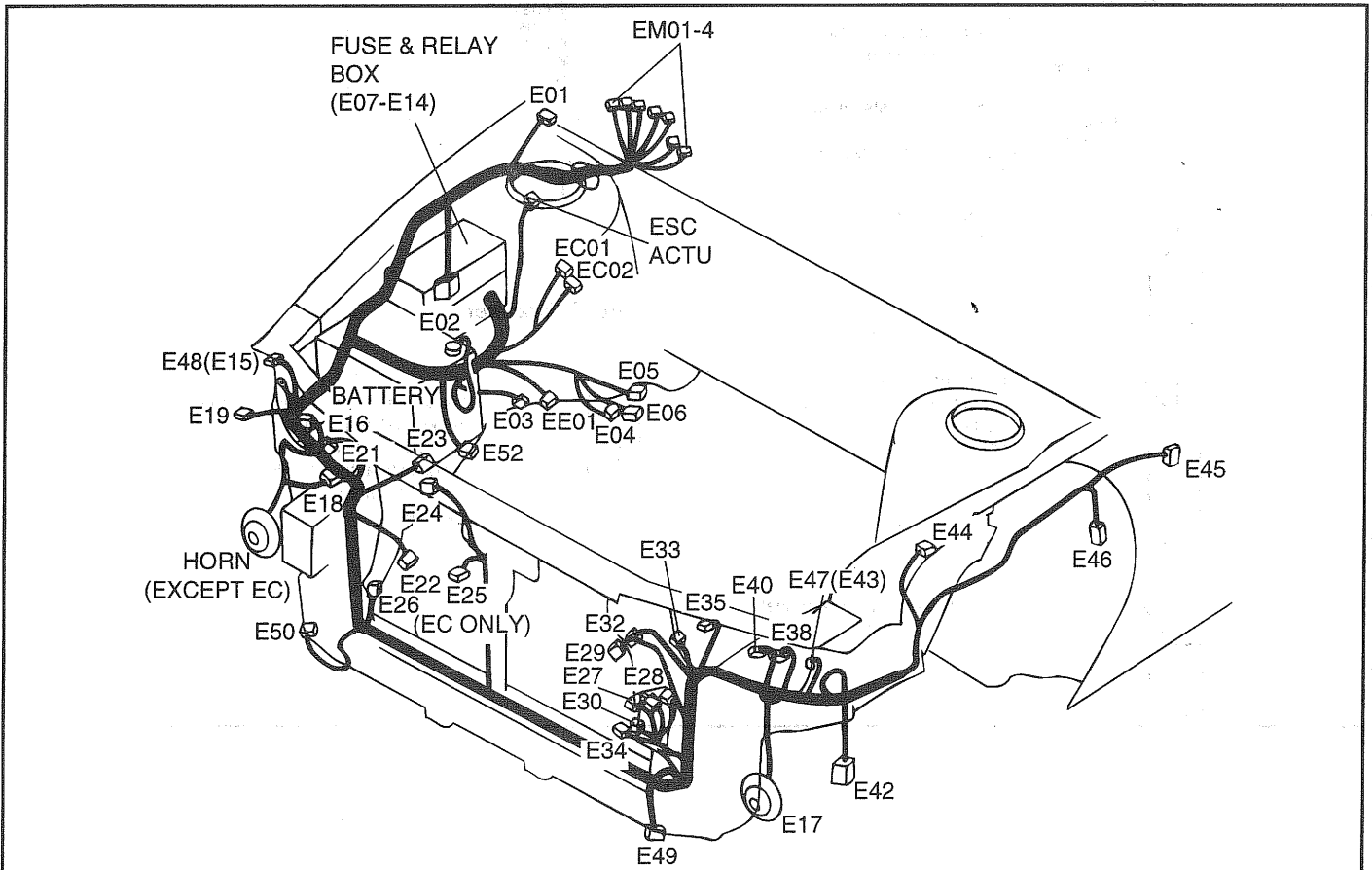
	Female	Male	Remarks
<p>Actual Illustration</p>	 <p>MGI-002A</p>	 <p>MGI-003A</p>	<p>The connector figures described in this manual are not considered the shape of connector housing. So, when distinguishing between female and male connector, refer to the numbering order in the following table</p>
<p>Illustration in the Shop manual</p>	 <p>MGI-004A</p>	 <p>MGI-005A</p>	

2. NUMBERING ORDER

	Numbering order	Remarks
Female Connector	<p>MGI-006A</p>	Numbered in order from upper left to lower right
Male Connector	<p>MGI-007A</p>	Numbered in order from upper right to lower left

HARNESS LAYOUTS





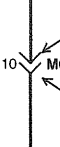
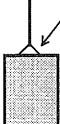
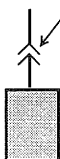
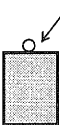
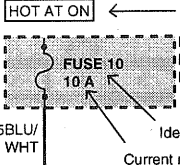
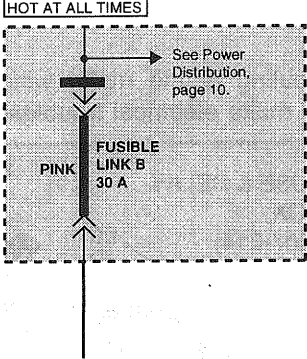

Harness layouts show the routing of the major wiring harnesses and the in-line connectors between the major harnesses. These layouts will make electrical troubleshooting easier.



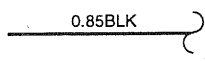
SYMBOLS S02GI004

The symbols and the abbreviations explained in this section are used throughout the manual.

SYMBOLS IN SCHEMATIC

<p>Components</p> <p> A solid line means the entire component is shown.</p> <p> A broken line indicates only part of the component is shown.</p> <p> STOP LAMP SWITCH Closed with pedal depressed The name of the component appears next to its upper right corner. Notes about component function follow its name.</p>	<p>Diode</p> <p> This diode allows current to flow only in the direction of the arrow.</p>
<p>Connectors</p> <p> Each connector is numbered for reference in the component location index. The index also lists the total number of cavities. Wires may not be used in all cavities.</p> <p> This means the connector connects directly to the component.</p> <p> This indicates the connector connects to a lead (pigtail), wired directly to the component.</p> <p> This indicates a screw terminal on the component.</p>	<p>Fuse and Fusible link</p> <p> HOT AT ON ← This means power is supplied with the ignition in RUN. FUSE 10 10 A DASH FUSE BOX 0.5BLU/WHT ← Identification Current rating</p> <p> HOT AT ALL TIMES See Power Distribution, page 10. ENGINE COMPARTMENT RELAY BOX FUSIBLE LINK B 30 A PINK</p>
	<p>Circuit Breaker</p> <p> Basically a reusable fuse, a circuit breaker will heat and open if too much current flows through it. Some units automatically reset when cool, others must be manually reset.</p>

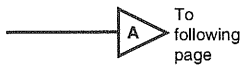
Wires



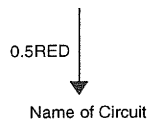
A wavy line means the wire is broken but is to be continued.



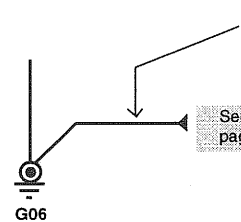
Wire insulation is yellow with a red strip.



Current path is continued on the same page or another page. The arrow shows the direction of current flow. You should look for the "A" in the marked position.

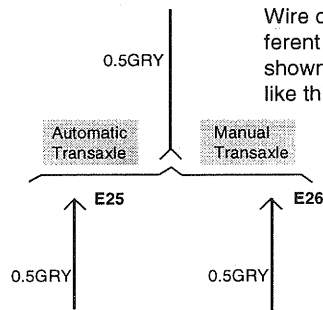


A wire connects to another circuit. The wire is shown again on that circuit which the arrow is pointing.

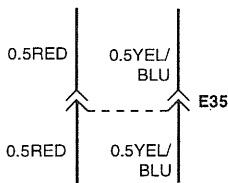


A broken line means only some of the circuit is shown: refer to the circuit listed for the complete schematic.

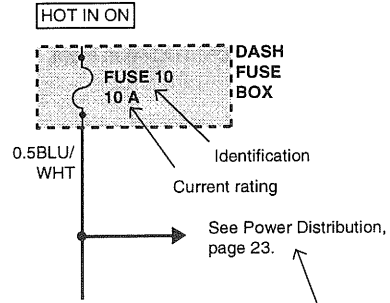
See Ground Distribution, page 15



Wire choices for options or different models are labeled and shown with a "choice" bracket like this.

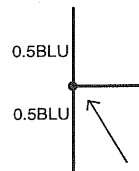


This dashed line means the RED and YEL/BLU wires are both in connector E35.



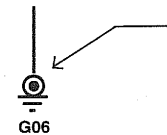
Where separate wires join, only the splice is shown: for details on the additional wiring, refer to the circuit listed.

Splices



Splices are numbered and shown as a dot with circle. The exact location and connection of these splices may vary among vehicles.

Ground - "G"

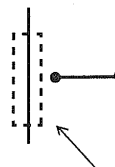


This symbol means the end of the wire is attached to a metal part of the vehicle.

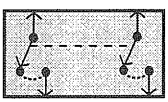
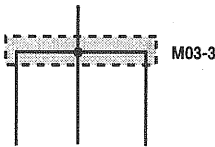
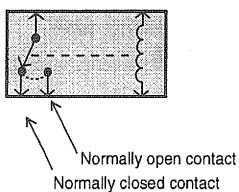
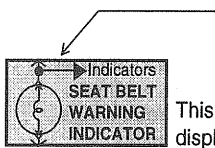


This ground symbol (dot and 3 lines overlapping the component) means the housing of the component is attached to a metal part of the vehicle.

Shield Wire



This represents RFI (Radio Frequency Interference) Shielding around a wire. The shielding is always connected to ground.

<p>Switches</p>  <p>These switches move together: a dashed line shows a mechanical connection between them.</p>	<p>Joint Connectors</p>  <p>This is a connector showing the join among wires.</p>
<p>Relays</p>  <p>This is a relay shown with no current flowing through its coil. When a current flows through coil, contact will toggle.</p>	<p>Indicator</p>  <p>This indicates seat belt warning indicator continues to other indicators within instrument cluster.</p> <p>This is an indicator which displays the lighted symbol.</p>

YGI-008A

WIRE COLOR ABBREVIATIONS

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

Symbol	Color of wire	Symbol	Color of wire
BLK	Black	LT GRN	Light Green
BLU	Blue	ORN	Orange
BRN	Brown	PNK	Pink
GRN	Green	RED	Red
GRY	Gray	WHT	White
LT BLU	Light Blue	YEL	Yellow

HARNESS CLASSIFICATION AND CONNECTOR IDENTIFICATION

Electrical wiring connectors are classified according to the wiring parts in the Harness Layout.

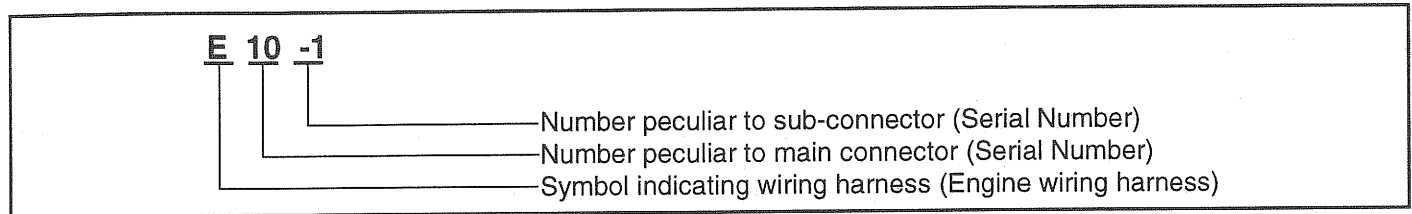
HARNESS CLASSIFICATION

Harness name	Location	Symbol
Engine and its extension harness	Engine compartment	E
Main roof or Sunroof, SRS Air Bag, ABS and their extension harness	Passenger compartment	M
control (ECM) harness	Engine compartment	C
Floor and Rear floor, Trunk lid (Tail gate), Rear and their extension harnesses	Passenger compartment/ Luggage compartment	R
Crash pad, instrument and their extension harnesses	Under crash pad	I
Door and its extension harness	Door	D

CONNECTOR IDENTIFICATION

A connector identification symbol consists of a wiring harness location classification symbol corresponding to each other wiring harness location and number peculiar to the connector.

These connector locations can be found in the WIRING HARNESS LAYOUT.

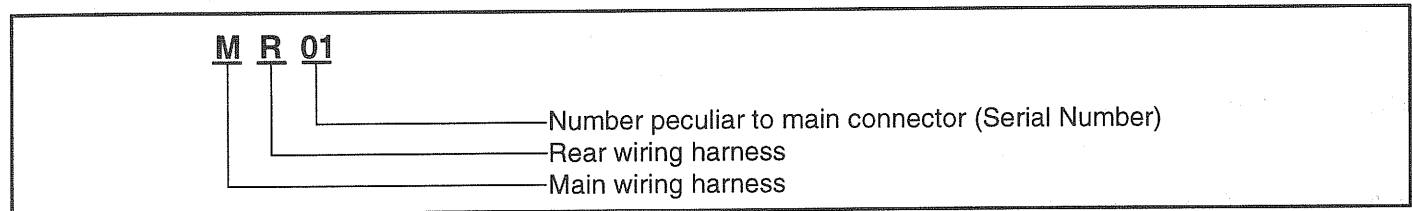


XGI-009A

NOTE

Connectors which connect each wiring harness are represented by the following symbols.

For example :



XGI-009B

TROUBLESHOOTING INSTRUCTIONS S02GI005

TROUBLESHOOTING PROCEDURES

The following five-step troubleshooting procedure is recommended.

Step 1. Verify the customer complaints

Turn on all the components in the problem circuit to check the accuracy of the customer complaints. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the probable causes.

Step 2. Read and analyze the schematic diagram

Locate the schematic for the problem circuit. Determine how the circuit is supposed to work by tracing the current paths from the power source through the system components to ground. If you do not understand how the circuit should work, read the circuit operation text. Also check other circuits that share with the problem circuit. The name of circuits that share the same fuse, ground, or switch, for example, are referred to on each diagrams. Try to operate any shared circuits you did not check in step 1. If the shared circuit works, the shared wiring is okay, and the cause must be within the wiring used only by the problem circuit. If several circuit fails at the same time, the fuse or ground is a likely cause.

Step 3. Inspect the circuit/component with the problem isolated

Make a circuit test to check the diagnosis you made in step 2. Remember that a logical, simple procedure is the key to efficient troubleshooting. Narrow down the probable causes using the troubleshooting hints, system diagnosis charts. Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

Step 4. Repair the problem

Once the problem is found, make the necessary repairs.

Step 5. Made sure the circuit works

Repeat the system check to be sure you have repaired the problem. If the problem was a blown fuse, be sure to test all of the circuits on that fuse.

TROUBLESHOOTING EQUIPMENTS

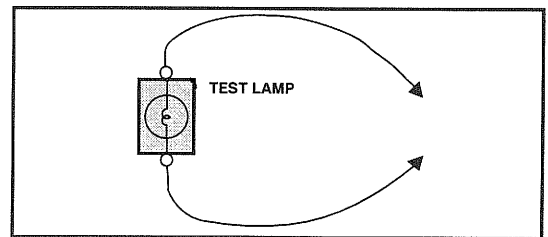
VOLTMETER AND TEST LAMP

Use a test lamp or a voltmeter on circuits without solid-state units and use a test lamp to check for voltage. A test lamp is made up of 12-volt bulb light with a pair of leads attached. After grounding one lead, touch the other lead to various points along the circuit where voltage should be present. When the bulb goes on, there is voltage at the point being tested.

CAUTION

A number of circuits include solid-state modules such as Engine Control Module (ECM) used with computer command control injection. Voltage in these circuits should be tested only with a 10-megaohm or higher impedance digital voltmeter. Never use a test lamp on circuits that contain solid-state modules. Damage to the modules may result.

A voltmeter can be used in place of a test lamp. While a test lamp shows whether the voltage is present or not, a voltmeter indicates how much voltage is present.



YGI-011A

SELF-POWERED TEST LAMP AND OHMMETER

Use a self-powered test lamp or a ohmmeter to check for continuity. Self-powered test lamp is made of a bulb, battery and two leads are touched together, the lamp will go on. Prior to checking the points, first disconnect the battery ground cable or remove the fuse which feeds the circuit you are working on.

CAUTION

Never use a self-powered test lamp on circuits that contain solid state modules. Damage to these modules may result.

An ohmmeter can be used in place of a self-powered test lamp. The ohmmeter shows how much resistance there is between two points along a circuit. Low resistance means good continuity.

Circuits which include any solid-state devices should be tested only with a 10-megaohm or higher impedance digital multimeter. When measuring resistance with a digital multimeter, battery negative terminal should be disconnected. Otherwise, there may incorrect readings. Diodes and solid-state devices in a circuit can make an ohmmeter give a false reading. To find out if a component is affecting a measurement, take one reading, reverse the leads and take a second reading. If they differ, the solid-state device is affecting the measurement.

JUMPER WIRE WITH FUSE

Use a jumper wire with fuse to by pass an open circuit.

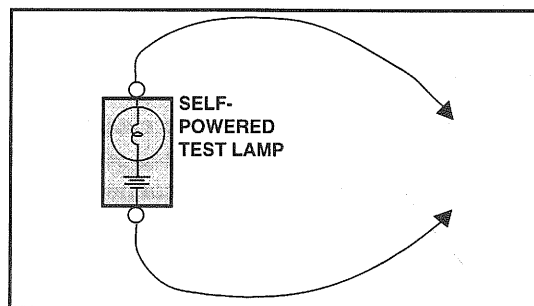
A jumper wire is made up of an in-line fuse holder connected to a set of test leads. This tool is available with small clamp connectors providing adaption to most connectors without damage.

CAUTION

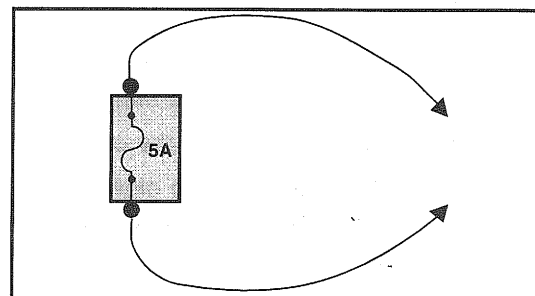
Do not use a fuse with a higher rating than the specified fuse that protects the circuit being tested. Do not use this tool in any situation to substitute for input or output at the solid-state control module, such as ECM, TCM, etc.

SHORT FINDER

Short finder is available to locate short to a ground. The short finder creates a pulsing magnetic field in the shorted circuit and shows you the location of the short through body trim or sheet metal.



YGI-011B



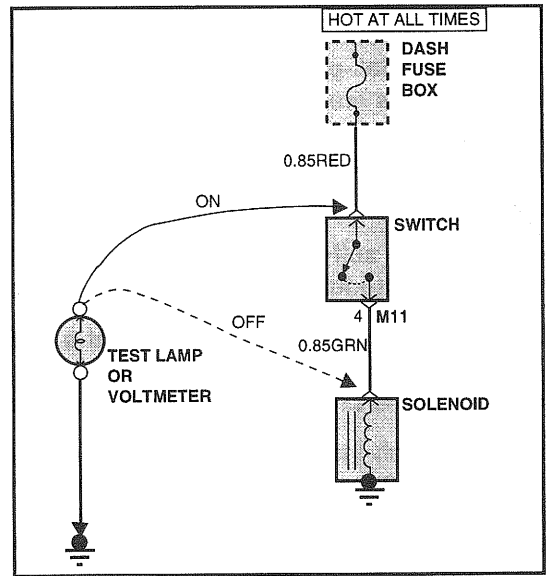
YGI-012A

TROUBLESHOOTING TEST

TESTING FOR VOLTAGE

This test measures voltage in a circuit. When testing for voltage at a connector, you do not have to separate the two halves of the connector. Instead, probe the connector from the back. Always check both sides of the connector because dirt and corrosion between its contact surfaces can cause electrical problems.

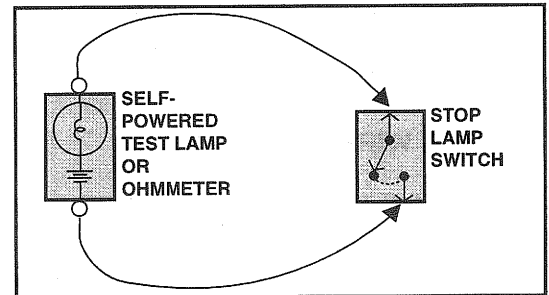
1. Connect one lead of a test lamp or voltmeter to a ground.
2. If you are using a voltmeter, be sure it is the voltmeter's negative lead test you have connected to ground.
3. Connect the other lead of the test lamp or voltmeter to a selected test point (connector or terminal).
4. If the test lamp glows, there is voltage present. If you are using a voltmeter, note the voltage reading. A loss of more than 1 volt from specifications indicates a problem.



YGI-013A

TESTING FOR CONTINUITY

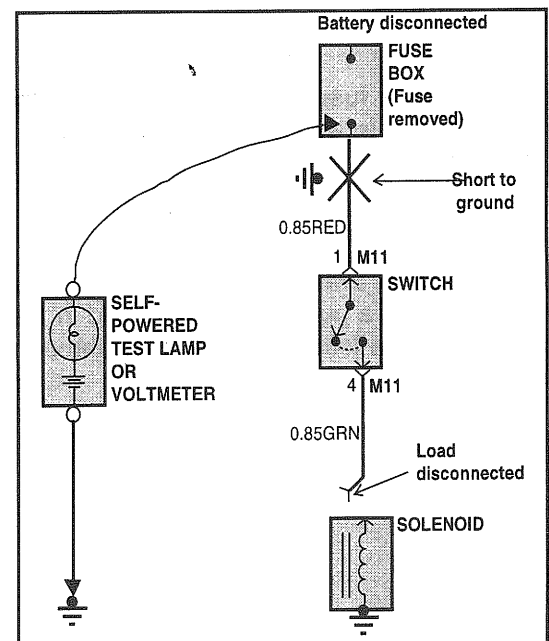
1. Disconnect the battery negative terminal.
2. Connect one lead of a self-powered test lamp or ohmmeter to one end of the part of the circuit you wish to test. If you are using an ohmmeter, hold the leads together and adjust the ohmmeter to read zero ohms.
3. Connect the other lead to the other end.
4. If the self-power test lamp glows, there is continuity. If you are using an ohmmeter, low or zero resistance means good continuity.



YGI-013B

TESTING FOR SHORT TO GROUND

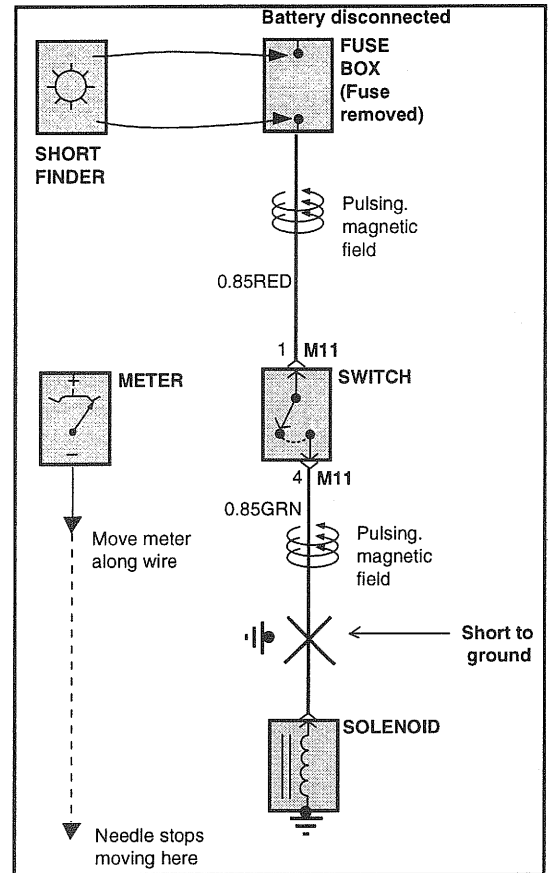
1. Disconnect the battery negative terminal.
2. Connect one lead of a self-powered test lamp or an ohmmeter to the fuse terminal on the load side.
3. Connect the other lead to a ground.
4. Beginning near the fuse block move the harness from side to side. Continue this point (about six inches apart) while watching the self-powered test lamp or ohmmeter.
5. When the self-powered test lamp glows, or ohmmeter registers, there is a short to a ground in the wiring near that point.



YGI-013C

TESTING FOR A SHORT WITH A SHORT FINDER

1. Remove the blown fuse. Leave the battery connected.
2. Connect the short finder across the fuse terminals.
3. Close all switches in series in the circuit you're testing.
4. Turn on the short circuit locator. It sends pulses of current to the short. This creates a pulsing magnetic field around the wiring between the fuse box and the short.
5. Beginning at the fuse box, slowly move the short finder along the circuit wiring. The meter will show current pulses through sheet metal and body trim. As long as the meter is between the fuse and the short, the needle will move with each current pulse. Once you move the meter past the point of the short, the needle will stop moving. Check around this area to locate the cause of the short circuit.



SCHEMATIC DIAGRAMS

FUSE AND RELAY INFORMATION	SD-2
POWER DISTRIBUTION	SD-8
DASH FUSE BOX DETAILS	SD-14
GROUND DISTRIBUTION	SD-24
DATA LINK DETAILS	SD-48
VEHICLE SPEED SENSOR	SD-52
IGNITION SYSTEM (DOHC)	SD-54
IGNITION SYSTEM (V6)	SD-58
IGNITION SYSTEM (SOHC)	SD-62
STARTING SYSTEM	SD-64
CHARGING SYSTEM	SD-68
COOLING SYSTEM	SD-72
ENGINE CONTROL SYSTEM (EC WITH DOHC)	SD-76
ENGINE CONTROL SYSTEM (DOHC EXCEPT EC)	SD-84
ENGINE CONTROL SYSTEM (EC WITH V6)	SD-92
ENGINE CONTROL SYSTEM (V6 EXCEPT EC)	SD-100
ENGINE CONTROL SYSTEM (SOHC)	SD-108
AUTOMATIC TRANSAXLE CONTROL SYSTEM (DOHC, SOHC)	SD-116
AUTOMATIC TRANSAXLE CONTROL SYSTEM (V6)	SD-120
SHIFT AND KEY LOCK CONTROL SYSTEM	SD-124
ANTI-LOCK BRAKE SYSTEM (ABS)	SD-126
BRAKE WARNING SYSTEM	SD-130
IMMOBILIZER CONTROL SYSTEM	SD-132
CIGARETTE LIGHTER	SD-134
DIGITAL CLOCK	SD-136
ETACS (ELECTRONIC TIME & ALARM CONTROL SYSTEM)	SD-138
INDICATORS	SD-144
GAUGES	SD-148
INTERMITTENT WIPER AND WASHER (WITHOUT ETACM)	SD-150
POWER DOOR LOCKS	SD-152
POWER DOOR MIRRORS	SD-156
POWER SEAT	SD-158
SEAT WARMER	SD-160
POWER WINDOWS	SD-162
REAR WINDOW DEFOGGER (WITHOUT ETACM)	SD-166
SUN ROOF	SD-168
TRUNK LID OPENER	SD-170
SOUND SYSTEM	SD-172
POWER ANTENNA	SD-176
HORNS	SD-178
SEAT BELT WARNING (WITHOUT ETACM)	SD-180
ACOUSTIC WARNING SYSTEM	SD-182
HEAD LAMP WASHER	SD-184
HEAD LAMPS	SD-186
DAYTIME RUNNING LIGHTS	SD-188
DIM DIP LIGHTS	SD-192
HEAD LAMP LEVELING DEVICE	SD-196
TURN/HAZARD LAMPS	SD-198
FRONT FOG LAMPS	SD-202
REAR FOG LAMPS	SD-204
TAIL, PARKING AND LICENSE LAMPS	SD-206
BACK UP LAMPS	SD-210
STOP LAMPS	SD-212
COURTESY AND TRUNK LAMPS	SD-214
ILLUMINATIONS	SD-218
AIR BAG SYSTEM (SRS)	SD-224
CRUISE CONTROL SYSTEM	SD-226
BLOWER CONTROL (MANUAL A/C ONLY)	SD-230
A/C COMPRESSOR CONTROLS (MANUAL)	SD-232
BLOWER AND A/C COMPRESSOR CONTROLS (AUTOMATIC)	SD-236

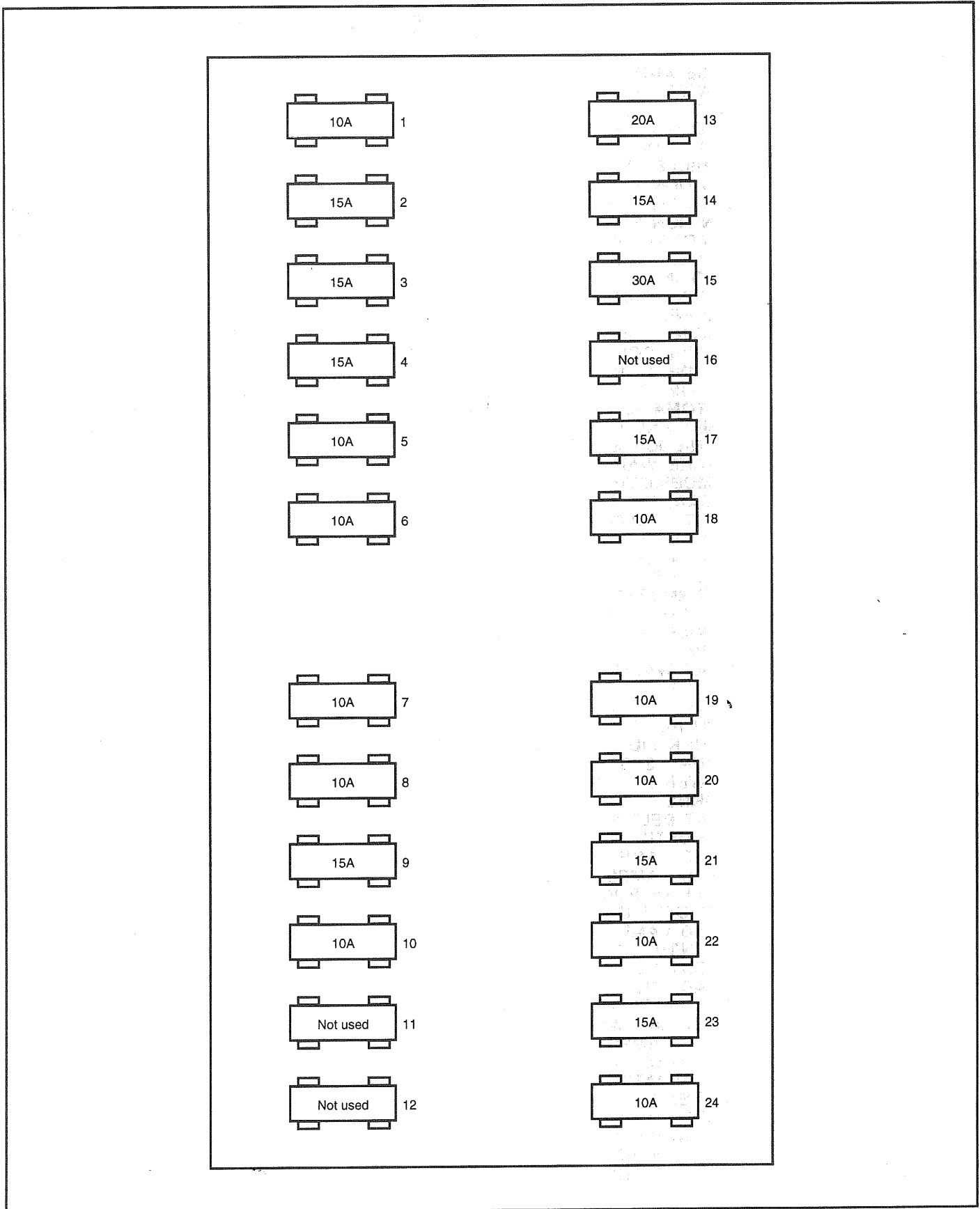


FUSE AND RELAY INFORMATION

S6SD0010

DASH FUSE BOX

LAYOUT

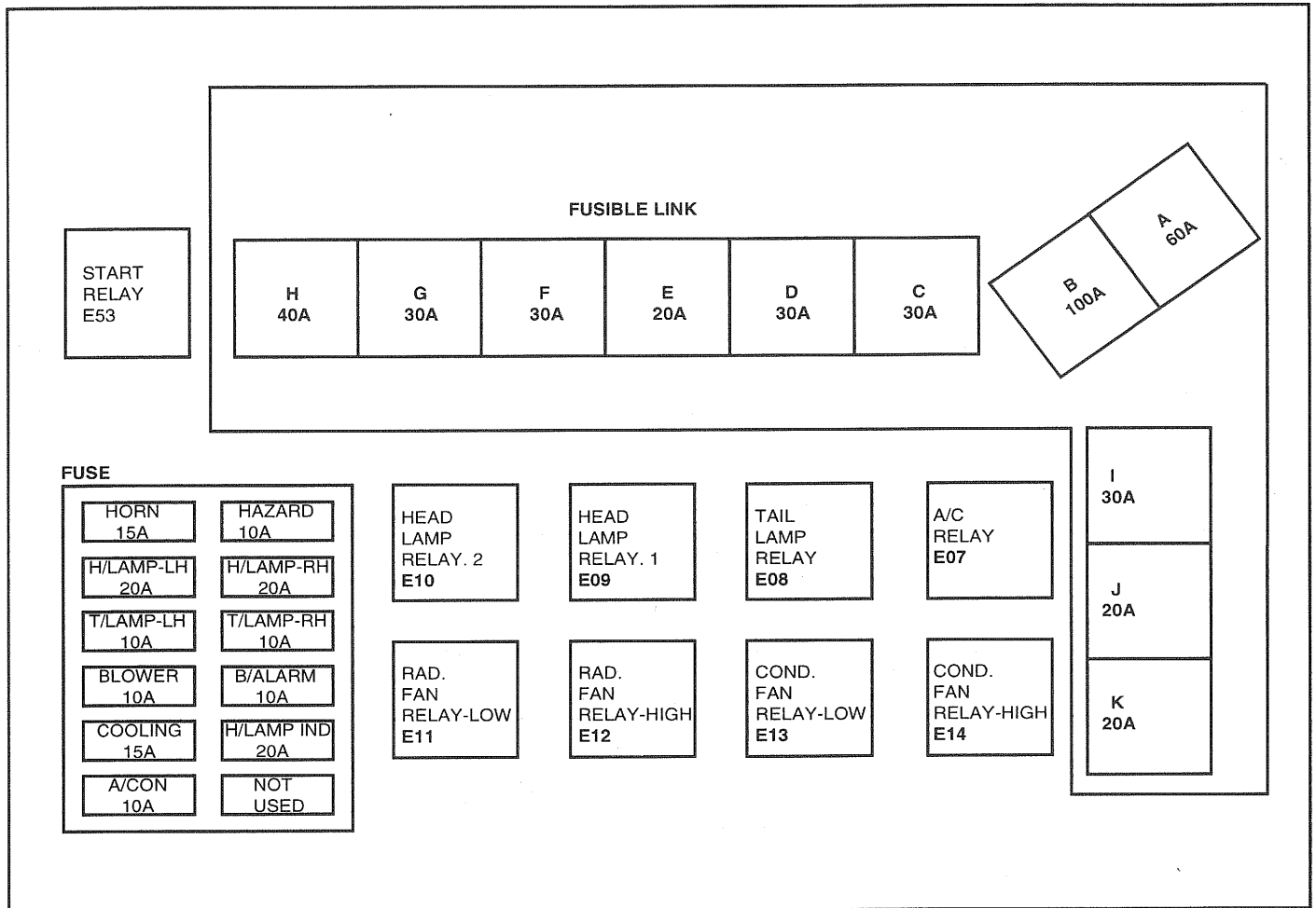


CIRCUIT

Fuse	Amperages	Circuits
1	10A	B/Alarm
2	15A	Stop lamp, A/C
3	15A	Fog lamp
4	15A	Sunroof
5	10A	Audio, Power antenna, ETACM, Immobilizer
6	10A	Courtesy lamp, A/C, Trunk room lamp
7	10A	Turn signal lamp, Back-up lamp, ETACM
8	10A	Seatbelt, A/T interlock
9	15A	Airbag
10	10A	Instrument Cluster, Clock, Immobilizer
11	Not used	Not used
12	Not used	Not used
13	20A	Power seat
14	15A	Trunk lid opener, Power door lock
15	30A	Rear window defogger
16	Not used	Not used
17	15A	Power door mirror, Cigarette lighter
18	10A	Audio, A/T interlock
19	10A	ABS
20	10A	Cruise
21	15A	Seat warmer
22	10A	TCM, Blower, Headlamp, Power window
23	15A	Wiper and washer
24	10A	Rear fog lamp

ENGINE COMPARTMENT RELAY AND FUSE BOX

LAYOUT



S6SD001B