

## USING THE ELECTRICAL WIRING DIAGRAM

One of the keys to a quick and successful electrical diagnosis is correctly using the **Toyota Electrical Wiring Diagram or EWD**. The EWD is not just a book of wiring diagrams, but an *information resource for anything electrical* on the vehicle. Everything from connector ID and location to what circuits share splice points is included in this manual.

Because there is so much information, it takes a little practice to learn where it is located, and what each of the EWD symbols and individual sections can tell you. We will take a detailed look at all of these features, and how to use them in diagnosing an electrical problem.

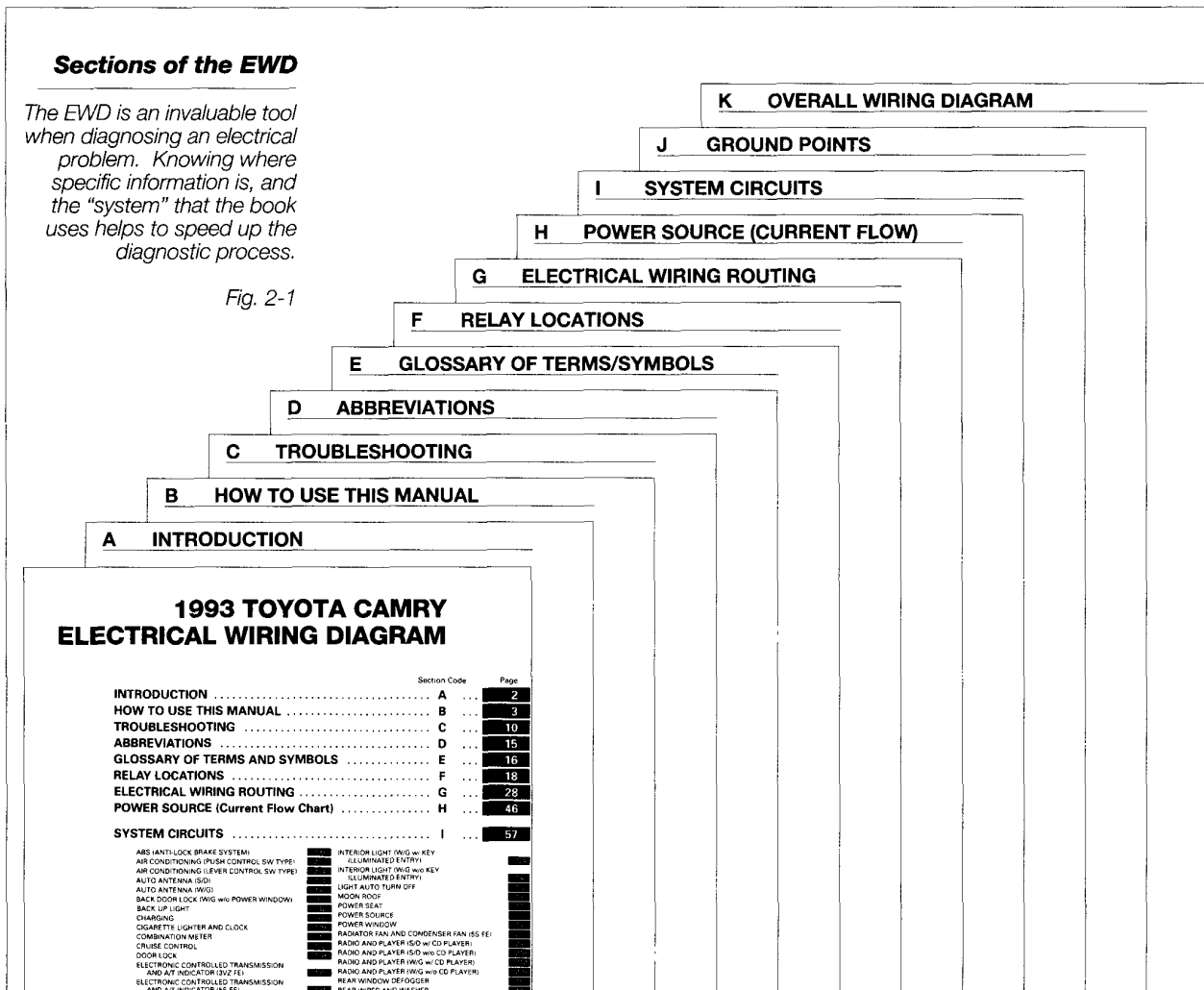
### NOTE

As you follow your instructor's "tour" of the EWD Sections, it is recommended that you use the **actual EWD, instead of this technician handbook**. This way, you will be getting a "feel" for the actual tool that you have at your dealership. For a review of the EWD and its sections, view the Toyota Technical Training Video *Using the Electrical Wiring Diagram* (p/n 00401-42925).

### Sections of the EWD

The EWD is an invaluable tool when diagnosing an electrical problem. Knowing where specific information is, and the "system" that the book uses helps to speed up the diagnostic process.

Fig. 2-1



## The Table of Contents

With the large number of pages and sections in the EWD, the fastest way to find the wiring diagram or information you need is to use the **Table of Contents**.

There are two table of contents that are available. One is on the title page of the book. This lists all of sections (A-K) and the also has an *alphabetical list* of all the **System Circuit Diagrams** located in Section I. These wiring diagrams are the “heart” of the EWD, and the place to start when diagnosing an electrical problem. There is also a listing of each System Circuit Diagram on the first page of Section I.

### Table of Contents

The table of contents is found on the title page of the EWD. A second table of contents for just the System Circuit Diagrams is found at the beginning of Section I.

Fig. 2-2

## 1993 TOYOTA CAMRY ELECTRICAL WIRING DIAGRAM

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## Section I System Circuit Diagrams

The EWD is built around the use of the **System Circuit Diagrams**. These wiring diagrams provide “circuit road maps” for individual circuits or systems on the vehicle. You’ll find that there are a lot of advantages to using this type of diagram over the “old-style” *overall wiring diagrams*.

### Advantages

- **More Information**

There is a lot of written information (such as component ID’s) on each diagram that works with the **support materials/other Sections** in the manual. Also, the **symbols** that are used *graphically* give you information about components, connectors, or wires. Understanding the full meaning of the symbols and “ID callouts” will save you time when trying to locate or identify these components on the car.

- **Easier to Use**

Every diagram shows only one system at a time. The parallel connections to other circuits can be traced using Power Source and Ground Point sections. Tracing current flow through the circuit is also easier because the **power is at the top** and the **ground is at the bottom** of each page.

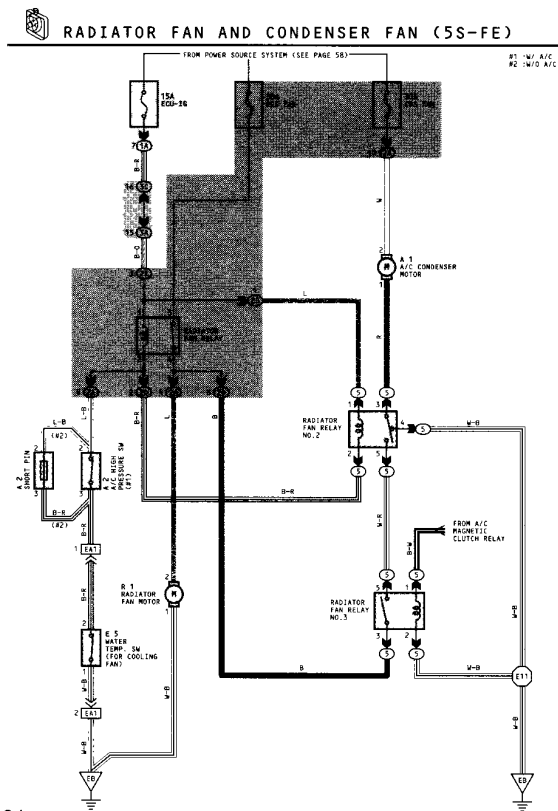
- **Printed in Color**

Because the diagrams are printed in color, identifying the wires shown on the wiring diagram in the vehicle harness or at the connectors is a lot easier.

### System Circuit Diagrams

The entire EWD is built around the System Circuit Diagram. Every number, letter, shape, and shading on the diagram tells you information that can help you to locate or identify components on the car faster.

Fig. 2-3

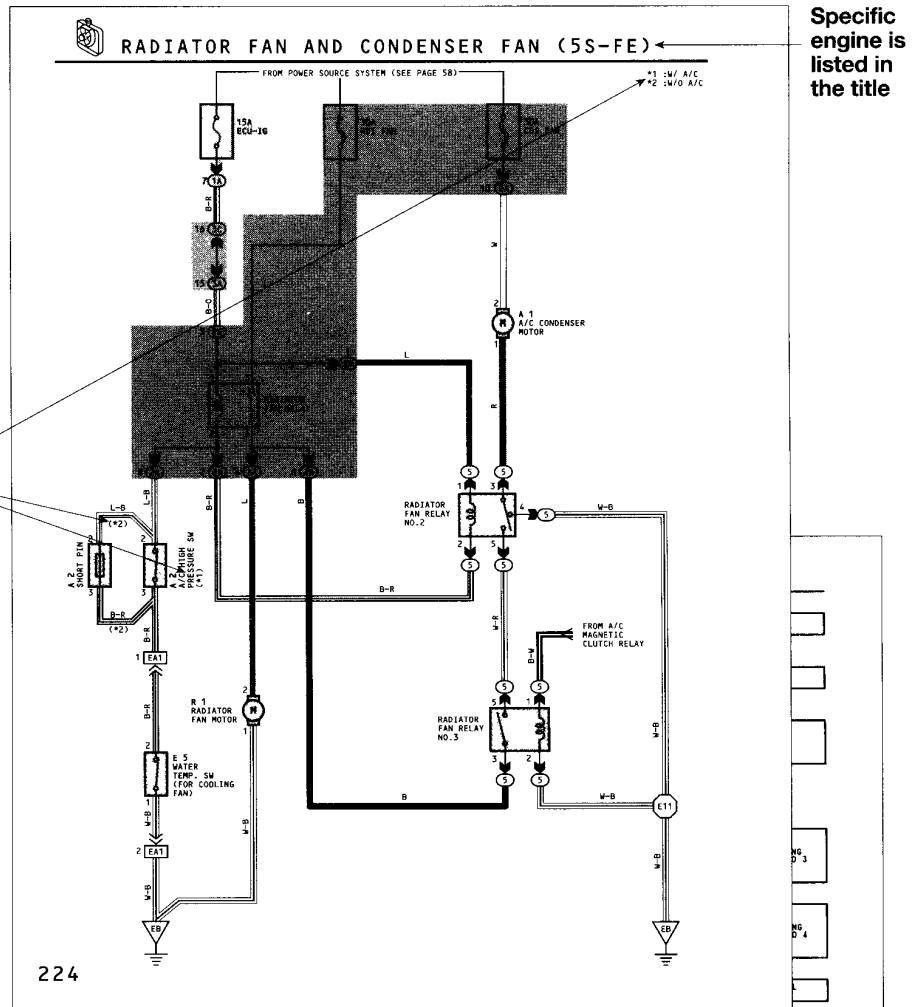


**Watch for \*Asterisks, (Parenthesis), and the Title at the Top**

These small notes will make a big difference! These marks alert you to different wiring or connections based upon model, engine type, Calif., Federal, or Canadian specification

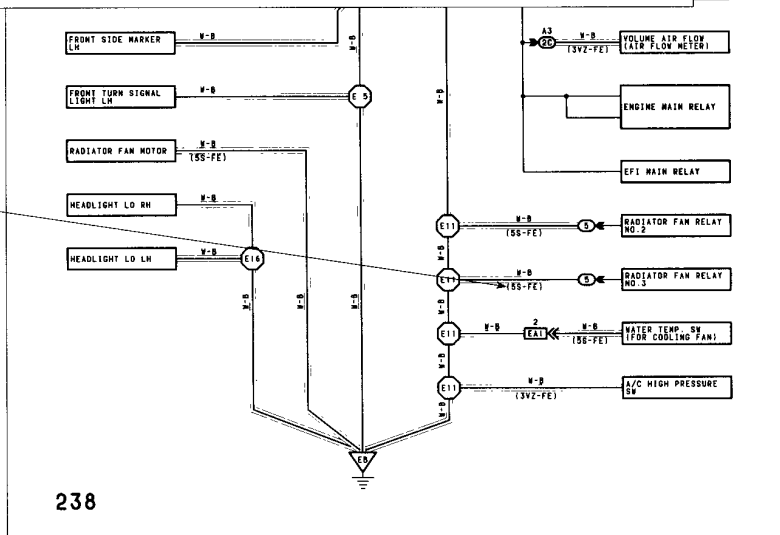
Fig. 2-4

Asterisk Indicates with or without AC



Specific engine is listed in the title

Parenthesis is used to indicate wires of connection on different engines or specifications. Can also be used to show difference between SEDAN and WAGON models



## Understanding the System Circuit Diagram

On each **System Circuit Diagram**, there is a lot of information that is given to you through the use of different symbols, colors, numbers, and letters. Understanding the meaning behind each of these is very important to effectively use the EWD.

### Wire Colors

Besides being shown in color, wire colors are also indicated by an alphabetical code next to each of the wires. The first letter represents the basic wire color, and the second letter indicates the color of the "stripe" on the wire.

#### NOTE

- **Blue Wires**

As you look at the list below, note that the color **blue** is represented by the letter "**L**" to separate it from the letter "**B**" used to identify "black". Also note that there is no "light blue" wire designation used in Toyota wiring harnesses. If it is any shade of blue, it's considered **blue (L)**.

- **Component "Pigtails"**

The wire colors of component "pigtails" (such as on an igniter) **are not shown in the EWD**. The colors in the EWD represent the vehicle harness up to where it is connected to the component.

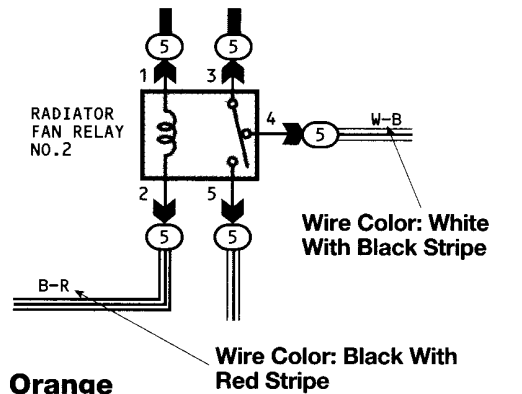
- **Silver Bands on the Wire Insulation**

On some wires, you will find small silver "bands". These bands (which are not shown on the wiring diagram) indicate that the wire uses a **PVC insulation**. This insulation is lighter in weight and thinner than the normal insulation, making the wire diameter appear smaller than it actually is. (May look like a 20 ga. wire on the outside, but is really a 16 ga. when the wire strands are examined.)

### Wire Identification

Wires are identified by color and by the letters next to the wire. The letter that follows the "-" is the stripe on the wire. Note that the color BLUE is represented by the letter "L".

Fig. 2-5



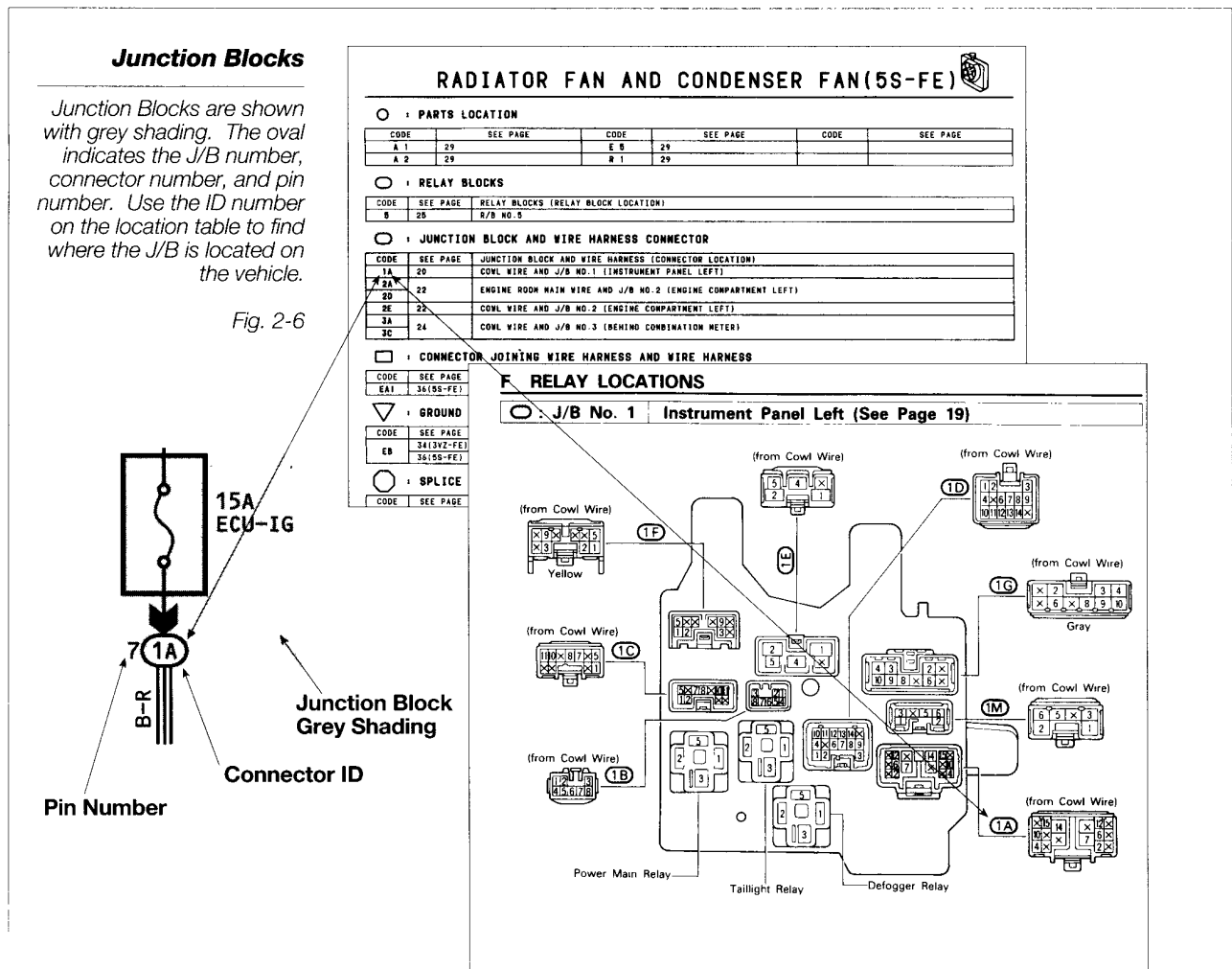
- |                         |                   |
|-------------------------|-------------------|
| <b>B</b> = Black        | <b>O</b> = Orange |
| <b>BR</b> = Brown       | <b>P</b> = Pink   |
| <b>G</b> = Green        | <b>R</b> = Red    |
| <b>GR</b> = Grey        | <b>V</b> = Violet |
| <b>B</b> = Blue         | <b>W</b> = White  |
| <b>LG</b> = Light Green | <b>Y</b> = Yellow |

L (Blue) Base Wire Color  
Y (Yellow) Color of Stripe

**Junction Blocks** Junction blocks are used to distribute power and ground to the different circuits. A junction block joins the circuits using layers of insulated, solid metal plates, eliminating the need for many additional splices, and improving reliability.

**Key Features**

- Grey Shading**  
 Every junction block shown on the wiring diagram is highlighted with grey shading. If there is more than one junction block shown in a single diagram, a different grey shading is used for each Junction Block.
- ID Numbers**  
 Connections to the J/B are indicated with an **oval**. The J/B number and the connector number are inside the oval, with pin number just to the left. Use these ID numbers with the **Junction Block and Wire Harness Connector location table** in the support section which follows each wiring diagram. This table has a *written* description of where the J/B is located, and a page number in **Section F Relay Locations** where a complete diagram of the J/B is located.



**Relay Blocks** A relay block acts as a central location for relays, harness-to-harness connectors, and fuses. Although similar in appearance to a Junction Block, relay blocks are different because they do not have internal circuits inside to distribute power or ground, like a junction block.

**Key Features**

- **ID Numbers**

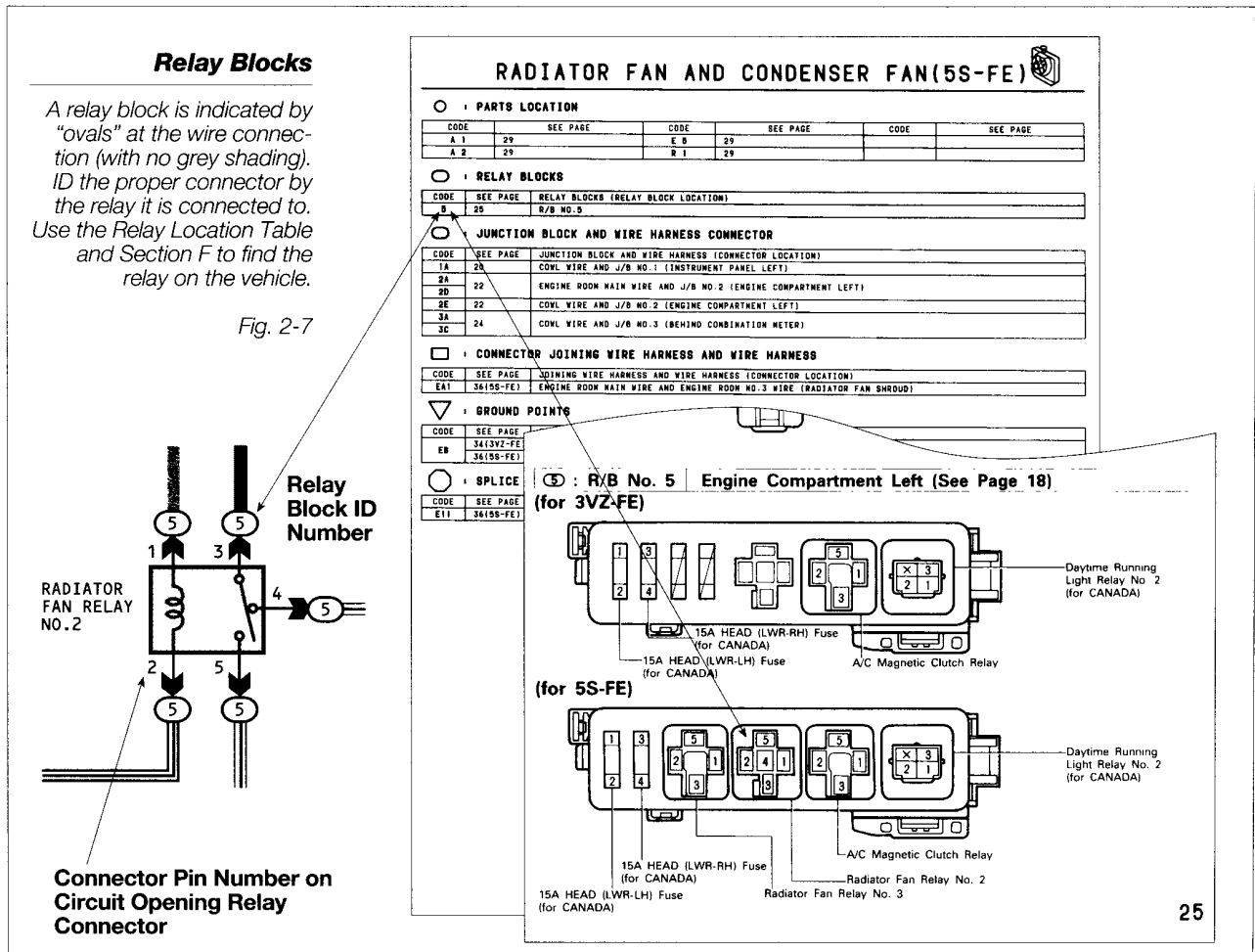
The ID number in an oval (similar to a J/B), tells you which Relay Block the relay is located in. The connector to each relay is identified only by the relay that it is connected to (there is no individual connector number as on a J/B). Note that the Relay Block ID number sequence is integrated into the same sequence as the Junction Block ID's. (This means that if there is a Relay Block #4, there **will not** be a Junction Block #4.)

- **No Shading**

Relay Blocks are not shaded on the diagram like a Junction Block is.

- **Location on the Vehicle**

The location of a Relay Block can be found by matching the ID number on the **Relay Block location table** in the support section that follows each system circuit diagram. This will direct you to a diagram of the relay block located in **Section F** of the EWD.



**Components/Parts** All loads, relays, switches, ECU-type controllers, capacitors (noise filters) and isolation diodes are treated as component **parts** in the circuit.

**Key Features**

- **ID Numbers**

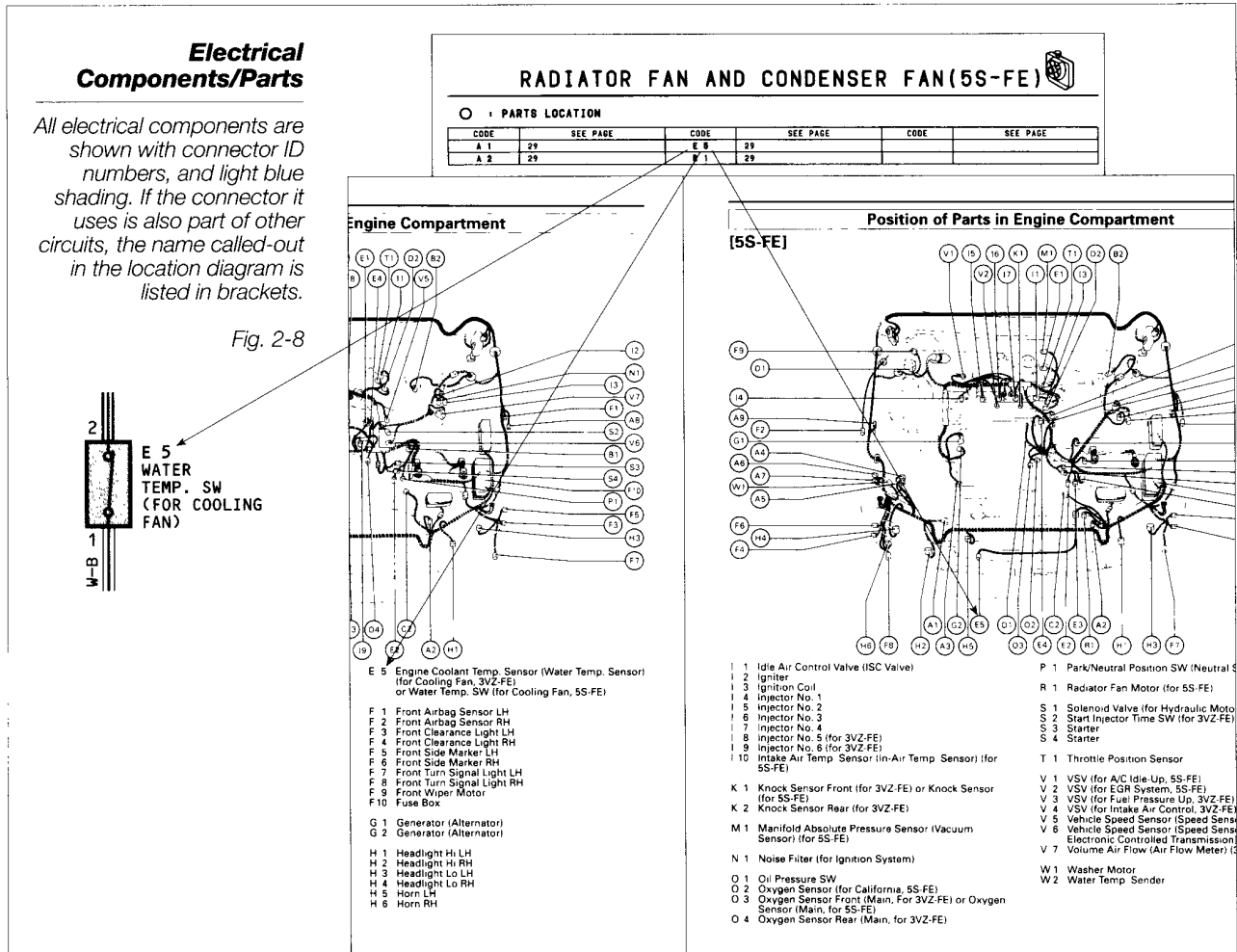
Each component connector has an ID number. **This ID number usually begins with the first letter of the name of the component.** (This is unlike the splice points and harness-to-harness connectors which use the letters E, I, and B to indicate engine compartment, instrument panel, or body wiring harness location.) Use the ID number with the parts location table that follows each wiring diagram. This will refer you to a harness connector diagram in Section G where the component connector's location is shown.

- **“Light Blue” Shading**

Parts are always shaded in blue.

- **Common Connectors**

When 2 parts or circuits use a common connector (such as the headlight and turn signal circuits using the combination switch connector) the **connector name used in the Section G Wire Routing diagram** is shown in brackets under the component name.





### Pin Numbers and Connectors

Whenever a wire is connected to an electrical component, the **pin number** is listed next to each wire. These pin numbers correspond to the connector diagrams provided in the support section which follows each wiring diagram.

#### Key Features

- **Connector ID**

Connectors at the component are identified by the **component connector ID number**.

- **Connector Color**

The color of the connector is **white** unless another color is listed.

- **Pin Numbering**

Connector pin numbers are always shown from the **mating** side of the connector, not the “harness” side of the connector. If you are backprobing the connector for a voltage check, remember that the pin numbering becomes the “mirror” of what is pictured in the diagram.

#### HINT

Use the wire color in the wiring diagram to “double check” that you are looking at the correct pin.

- **Dot in the Connector**

A “•” in the connector cavity indicates that the cavity is used but by another circuit.

- **X in the Connector**

An X in the connector indicates that the cavity is empty.

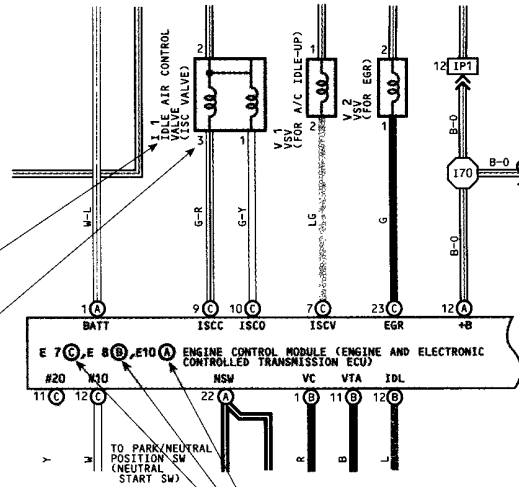
- **Multiple Connectors on a Single Component**

If there are multiple connectors on a single component (such as on the TCCS ECM), each connector will have an individual **parts/connector ID** number, and will also be identified with a “**letter in a circle**”. This letter in a circle is used as a “shorthand” way to ID the connector next to each of the pins, and is also used on the connector diagrams that follow the System Circuit Diagram.

## Pin Numbering on the EWD

Pin numbers are next to the wire. Use the component ID number to find the connector diagram which is part of the support section. The pin numbers are shown from the front or "mating" side of the connector, and not the harness side. If there is more than one connector for a single component, a letter is assigned as a "call-out" for that connector.

Fig. 2-9



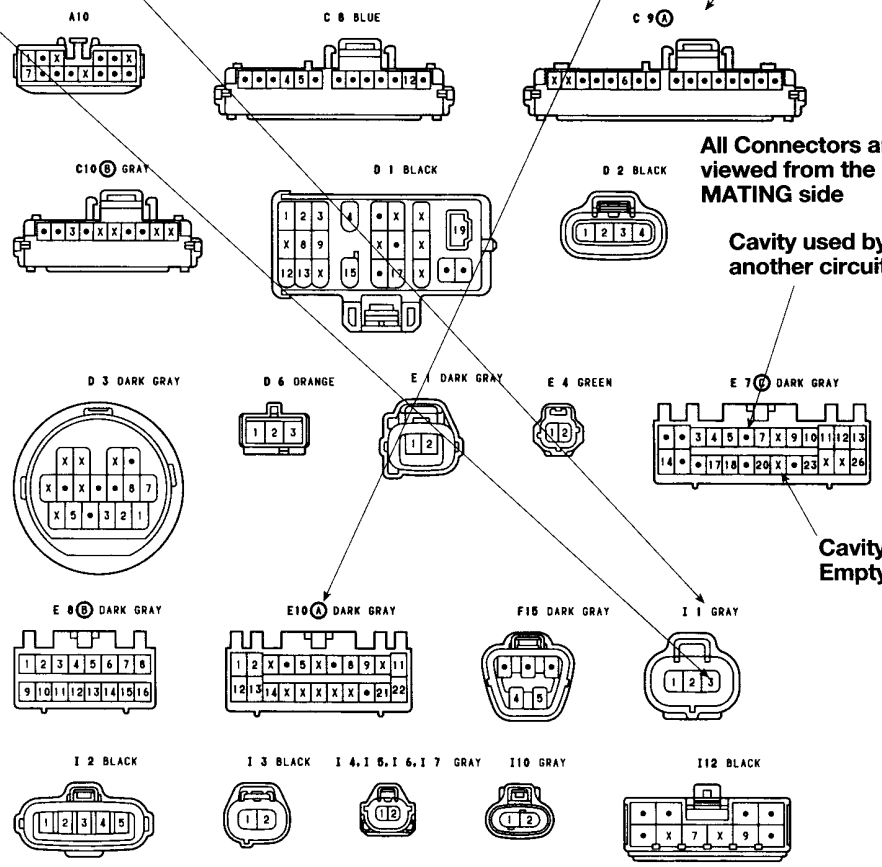
Part/Connector ID Number

Multiple Connector ID Letter

Pin Number

## ENGINE CONTROL (5S-FE A/T)

Color of Connector (If blank - WHITE)



All Connectors are viewed from the MATING side

Cavity used by another circuit

Cavity Empty

## Connector Joining Wire Harness and Wire Harness

A **connector joining wire harness and wire harness** or “harness-to-harness connector” is located within the harness, and is not found at an individual component.

- **ID Numbers**

ID numbers will begin with **E** for engine, **I** for instrument panel, and **B** for body. Use the ID number to find the connector in Section G of the EWD.

- **Connector Diagrams**

Diagrams for these connectors are not located with the component connectors which follow the wiring diagram. Because these connectors are used in a number of different circuits, all the information about them is located in **Section G** of the EWD. The **Wire Harness Joining Wire Harness** location table describes the location and tells you the page to turn to for the location diagram and connector/pin details.

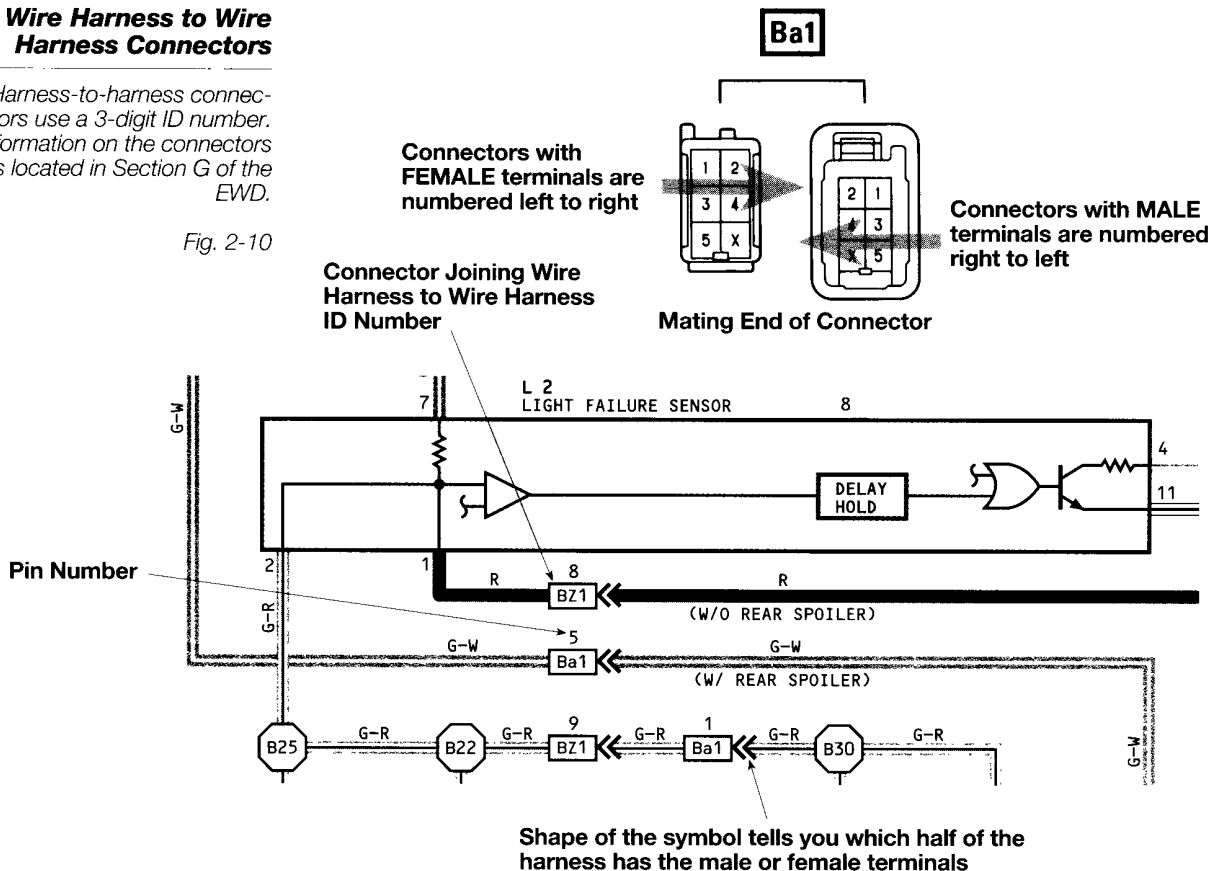
- **Male and Female Terminals**

Male and female **terminal side** of the harness is shown by the shape of the symbol.

### Wire Harness to Wire Harness Connectors

Harness-to-harness connectors use a 3-digit ID number. Information on the connectors is located in Section G of the EWD.

Fig. 2-10



## Locating a Harness-to-Harness Connector

Use the ID number on the Location Table. Turn to the Section G page for pin numbering and a location diagram.

Fig. 2-11

**SYSTEM OUTLINE**  
CURRENT IS APPLIED AT ALL TIMES THROUGH A STOP FUSE TO TERMINAL 2 OF THE STOP LIGHT SW WHEN THE IGNITION SW IS TURNED ON. CURRENT FLOWS FROM THE SAME FUSE TO TERMINAL 8 OF THE LIGHT FAILURE SENSOR, AND ALSO FLOWS THROUGH THE REAR LIGHT WARNING LIGHT TO TERMINAL 4 OF THE LIGHT FAILURE SENSOR.

**STOP LIGHT DISCONNECTION WARNING**  
WHEN THE IGNITION SW IS TURNED ON AND THE BRAKE PEDAL IS PRESSED (STOP LIGHT SW ON), IF THE STOP LIGHT CIRCUIT IS OPEN, THE CURRENT FLOWING FROM TERMINAL 7 OF THE LIGHT FAILURE SENSOR TO TERMINAL 1,2 CHANGES. AS THE LIGHT FAILURE SENSOR DETECTS THE DISCONNECTION AND THE WARNING CIRCUIT OF THE LIGHT FAILURE SENSOR IS ACTIVATED AS A RESULT, THE CURRENT FLOWS FROM TERMINAL 4 OF THE LIGHT FAILURE SENSOR → TERMINAL 11 → GROUND AND TURNS THE REAR LIGHT WARNING LIGHT ON. BY PRESSING THE BRAKE PEDAL, THE CURRENT FLOWING TO TERMINAL 9 OF THE LIGHT FAILURE SENSOR KEEPS THE WARNING CIRCUIT ON HOLD AND THE WARNING LIGHT ON UNTIL THE IGNITION SW IS TURNED OFF.

**SERVICE HINTS**  
**B10 STOP LIGHT SW**  
 2-11-CLOSED WITH BRAKE PEDAL DEPRESSED  
**L 2 LIGHT FAILURE SENSOR**  
 1,2-7-GROUND APPROX. 12VOLT'S WITH STOP LIGHT SW ON  
 4-9-GROUND APPROX. 12VOLT'S WITH IGNITION SW AT ON POSITION  
 11-GROUND ALWAYS CONTINUITY

**○ : PARTS LOCATION**

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
C 3	30	B 2	30	B10	31
M10	31	B 3	30	B11	31
J 1	30	B 4	31	B19	30
L 3	31	B 9	31		

**○ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR**

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS CONNECTOR LOCATION
1B	20	CONV. WIRE AND J/FB NO.1 (INSTRUMENT PANEL LEFT)
1H	20	FLOOR NO.1 WIRE AND J/FB NO.1 (INSTRUMENT PANEL LEFT)
1R	20	CONV. WIRE AND J/FB NO.1 (INSTRUMENT PANEL LEFT)

**□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

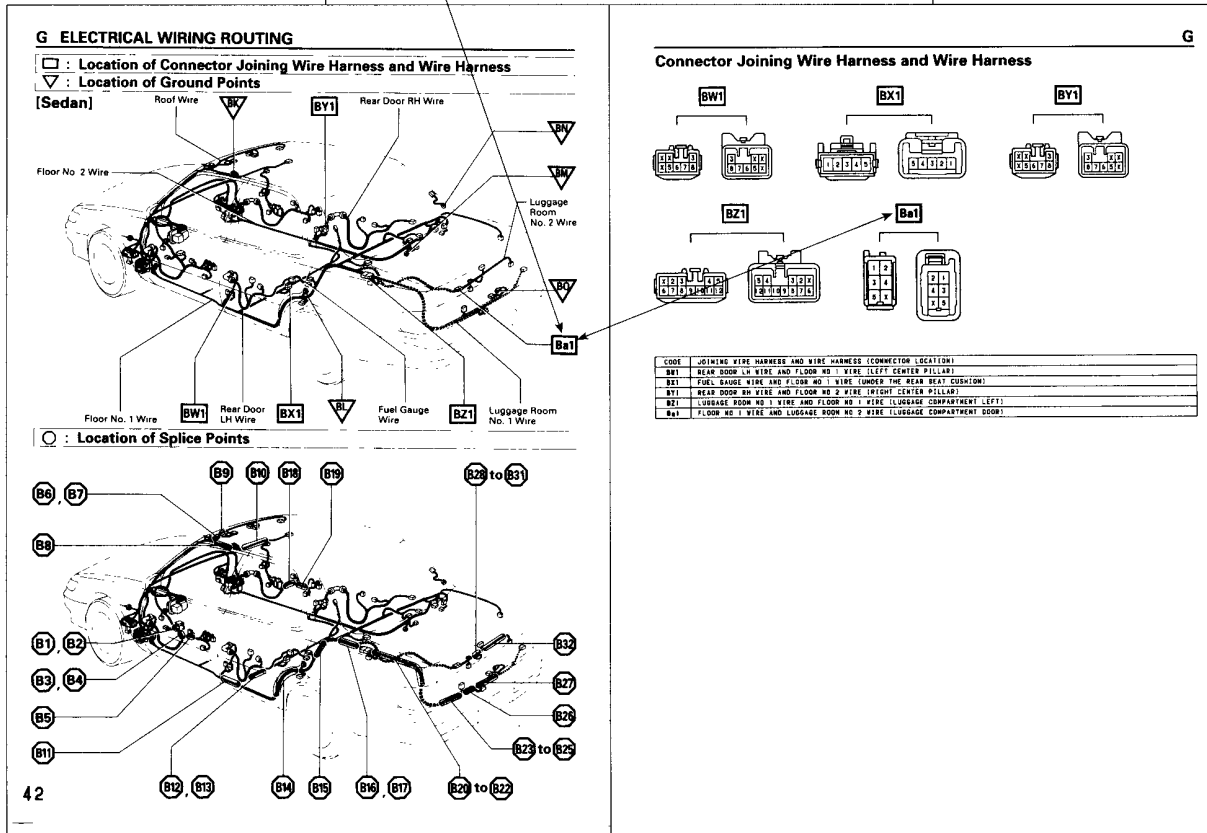
CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
L21	20	FLOOR NO.1 WIRE AND CONV. WIRE (LEFT CENTER PILLAR)
B21	42(18/20)	LUGGAGE ROOM NO.1 WIRE AND FLOOR NO.1 WIRE (LUGGAGE COMPARTMENT LEFT)
Ba1	42(18/20)	FLOOR NO.1 WIRE AND LUGGAGE ROOM NO.2 WIRE (LUGGAGE COMPARTMENT DOOR)

**▽ : GROUND POINTS**

CODE	SEE PAGE	GROUND POINTS LOCATION
BL	42(18/20)	UNDER THE LEFT QUARTER PILLAR
BD	42(18/20)	BACK PANEL CENTER

**○ : SPLICE POINTS**

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
B10	42(18/20)	FLOOR NO.1 WIRE	B06	42(18/20)	LUGGAGE ROOM NO.1 WIRE
B11	42(18/20)	FLOOR NO.1 WIRE	B08		
B17			B21	42(18/20)	LUGGAGE ROOM NO.2 WIRE
B19	42(18/20)	LUGGAGE ROOM NO.1 WIRE	B22		



## Switches and Relays

A simple single-pole, single-throw switch is relatively easy to understand on a wiring diagram. However, if the switch is a *multi-pole* (has more than one pin that is being switched), or *gang* type switch (where the movement of the switch lever moves a number of switches open or closed), the symbol used on the wiring diagram can be more difficult to understand.

### Key Features

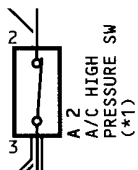
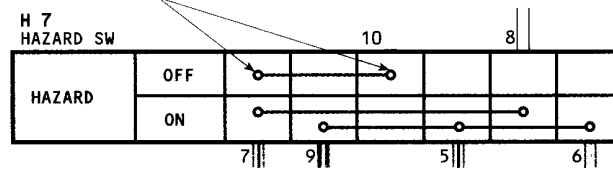
- Switches are shown in the OFF position**  
 All switches and relays are shown in the OFF position. If it's a relay, you know that the relay coil is **not "energized"**.
- Multi-pole Switches**  
 For multi-pole switches such as the Combination Switch, or the Heater Fan Switch, the schematic symbol is a little more complicated. A circle and line indicate which pins are connected together under each of the different switch positions. On the Heater Fan Switch, a "bus bar" is moved for each switch position, changing the pin connections in the switch.
- "Gang" type Switches**  
 If it is a fairly simple "gang" type switch, a **dotted line** inside the switch will connect the "arms" of the switches together.

**Switches**

Multi-pole switches can be a tricky to follow. In some switches, a circle and line indicates which pins are connected in a particular switch position. On some switches, a "bus bar" is used to show the various pin connections.

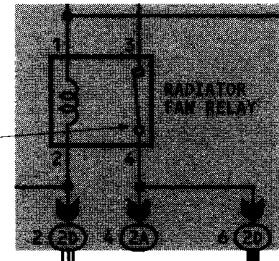
Fig 2-12

There is continuity between Pin 10 and Pin 7 in the OFF position

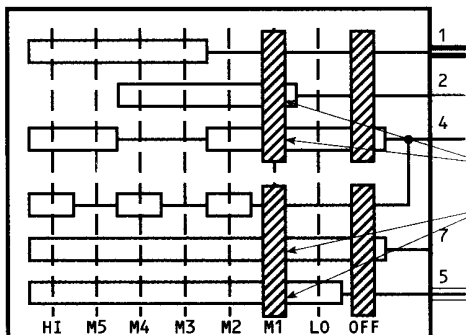


If the switch is used as a "sensor", look at the System Outline or Service Hints for the conditions that cause it to be open or closed.

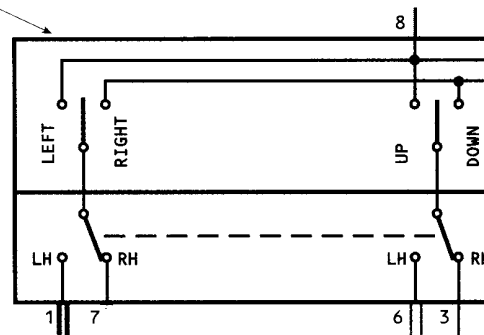
Relays are shown DE-ENERGIZED



Example of Gang-type switch in Remote Control Mirror Assembly



In the M1 Position, there is continuity between Pin 2 and 4, and Pin 7 and 8



**Shielding** On low voltage/low current flow wires (such as those used on the oxygen sensor, knock sensor, and distributor G and Ne signals) **shielding** is used. When a wire is shielded, an additional ground wire is wrapped around the insulation of the low current wire to absorb any electro-magnetic interference. In the EWD, shielding is represented by a dotted line around a wire. **Do not confuse this with the dotted line used inside a multi-pole "gang" type switch.**

**CAUTION**

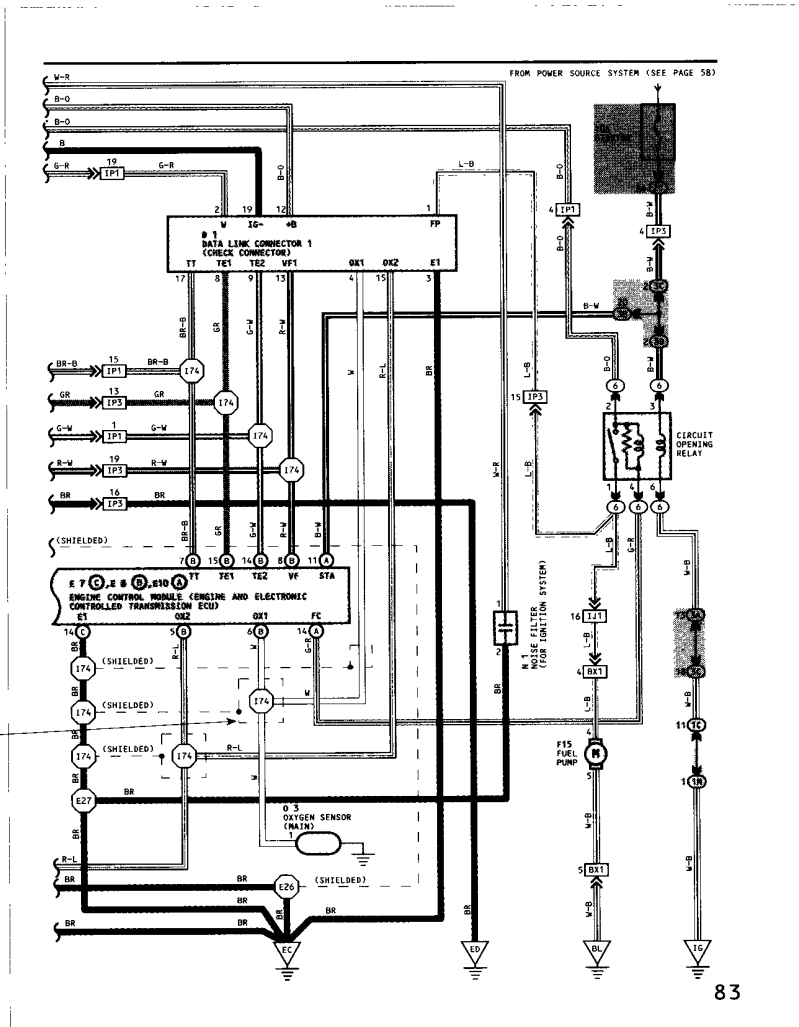
When checking for voltage in a circuit that uses shielded wires, **NEVER** puncture the insulation with the test probe! This will short the sensor wire to the ground.

**Shielded Wires**

Shielded wires are indicated by a dotted line around a portion of the wire. NEVER probe through the insulation of a shielded wire—a short-to-ground will result.

Fig. 2-13

Shielding on low current flow sensor wires



**Splice Points** In order to distribute power and ground to the various circuits, **splices** within the harness are used. An octagon with an ID number (again with *E* for engine, *I* for instrument panel, and *B* for body, plus a sequential number) is used to represent a splice. This ID number corresponds to the **splice point location table** that follows the wiring diagram. This table has both a description of where the splice is located, and the page number of the Section G location diagram.

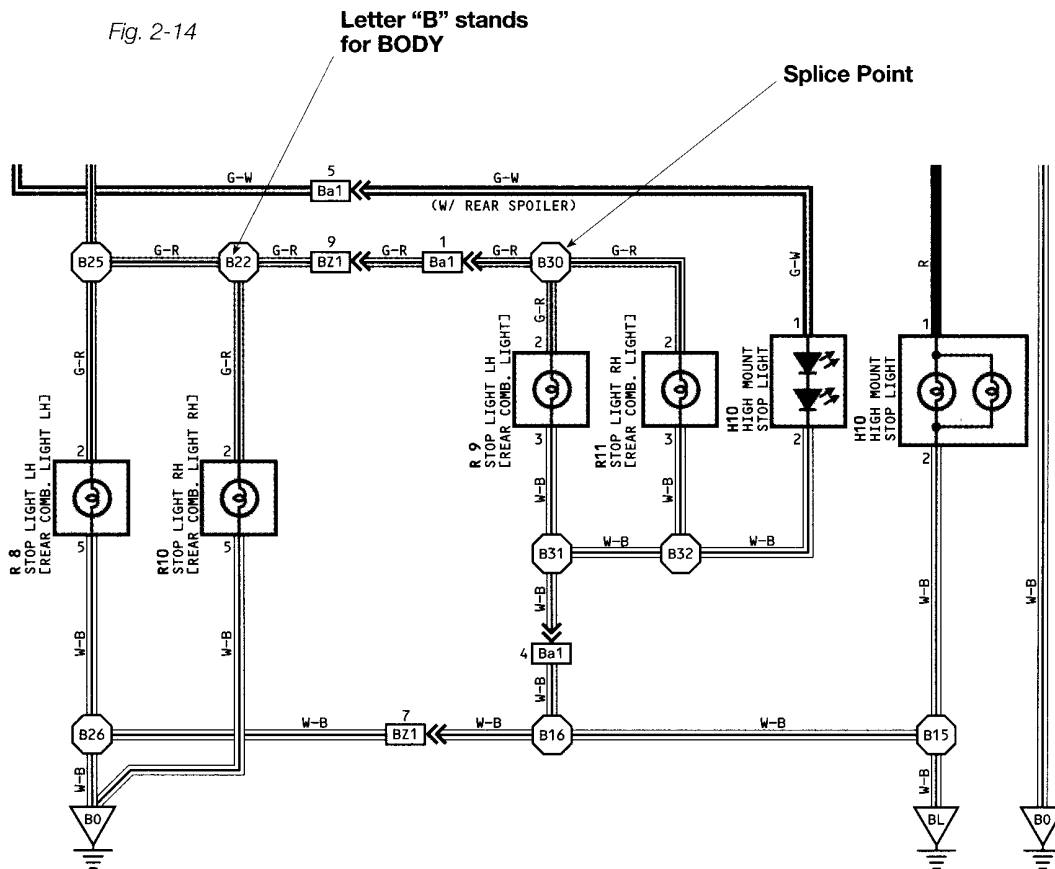
**NOTE**

When making checks on the vehicle, **use connectors and harness-to-harness connectors as your test point of "first choice"**. Splices tend to be difficult to find in the harness because they are wrapped in tape or plastic conduit. Also, the location diagram given in Section G will give you *only a general idea* of where the splice is located. Inspect the individual splice points only if the checks at the connectors "point to" the splice as being the problem.

**Splice Point Symbol**

A splice point is represented by an "octagon". Use the ID number to find the location of the splice.

Fig. 2-14



## Locating a Splice Point

Look up the ID number on the Splice Location Table. Turn to the Section G page listed for a diagram.

Fig. 2-15

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1B	20	CDL WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)
1N	20	FLOOR NO.1 WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)
1M	20	CDL WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)

**□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

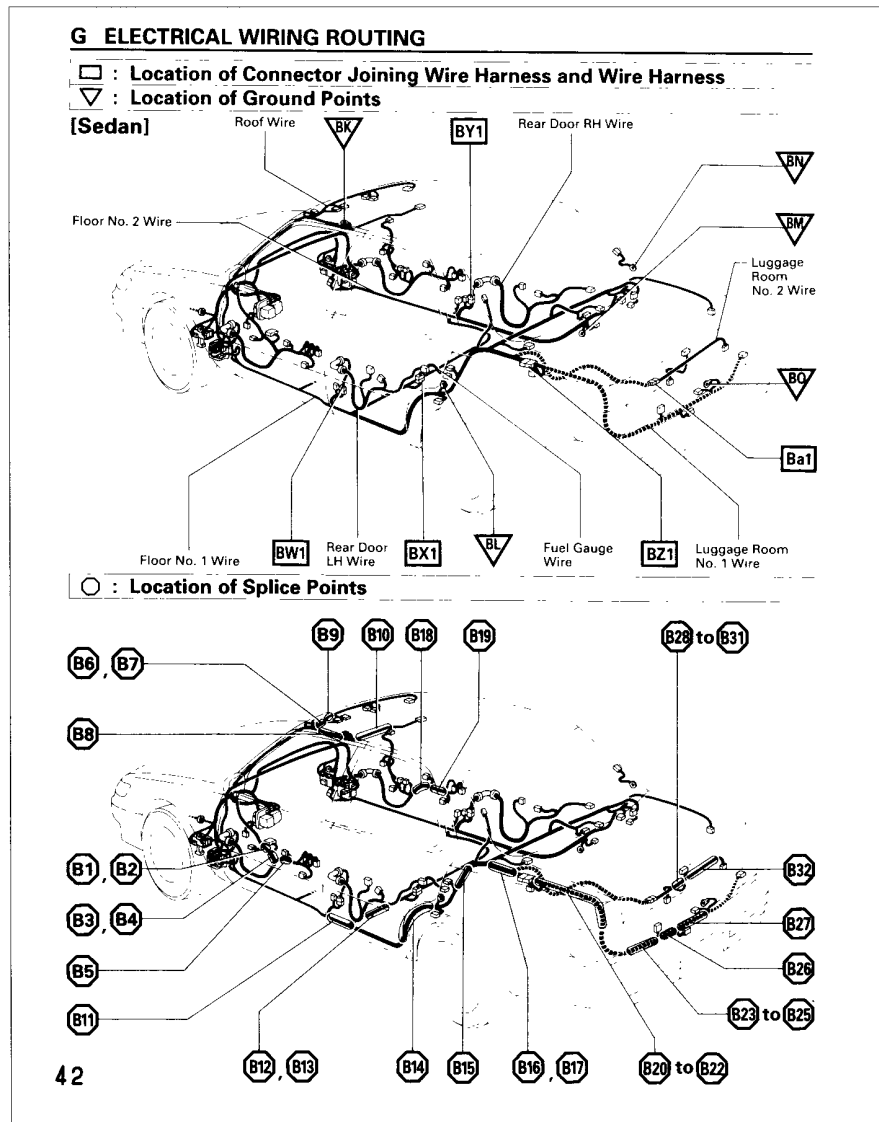
CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
JJ1	34	FLOOR NO.1 WIRE AND CDL WIRE (LEFT KICK PANEL)
BZ1	42(S/D)	LUGGAGE ROOM NO.1 WIRE AND FLOOR NO.1 WIRE (LUGGAGE COMPARTMENT LEFT)
Ba1	42(S/D)	FLOOR NO.1 WIRE AND LUGGAGE ROOM NO.2 WIRE (LUGGAGE COMPARTMENT DOOR)

**▽ : GROUND POINTS**

CODE	SEE PAGE	GROUND POINTS LOCATION
BL	42(S/D)	UNDR THE LEFT QUARTER PILLAR
BG	44(W/G)	BACK PANEL CENTER

**○ : SPLICE POINTS**

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
B18			B26	42(S/D)	LUGGAGE ROOM NO.1 WIRE
B16	42(S/D)	FLOOR NO.1 WIRE	B30		
B17			B31	42(S/D)	LUGGAGE ROOM NO.2 WIRE
B22	42(S/D)	LUGGAGE ROOM NO.1 WIRE	B32		





**Power and Ground Distribution** If there is a problem which causes an entire circuit to be inoperative, the first two areas you need to check are the circuit's fuse and ground. The EWD can direct you to other circuits which **share** the fuse or ground point. By operating these circuits, you can check the condition of the fuse and ground point without making a *physical inspection*. This saves you time! The following sections outline how this is done.

**Power Distribution** If you can find another circuit which uses a particular fuse, and it operates correctly, you will have confirmed that the fuse is GOOD.

Key Features

- **Section H Power Source (Current Flow)**

Go to the System Circuit Diagram for the problem circuit. On the diagram, the fuse is always located at the top of the page. To find additional circuits that share the same fuse, use the second chart in Section H Power Source (Current Flow). This multi-page chart lists every load on the vehicle, with the fuse that it's connected to.

- **Power Source System Circuit Diagram**

If you find that a fuse is not receiving B+, use the **Power Source** system circuit diagram in **Section I** for fusible link information. This color wiring diagram contains all of the features and location information found in each system circuit diagram. You can also use the **Power Source (Current Flow)** chart in **Section H**. The flow chart located at the beginning of Section H also traces the B+ side of the fuse to its fusible link source. But, because it does not have all the features of the Power Source System Circuit Diagram (such as connector ID's, splice ID's, wire colors, and support sections), it is not as useful.

## Section H Power Source (Current Flow)

Use this table to find other components that use the same fuse. If the other component works, the fuse is OK. If you find that the fuse is OK, but not receiving B+, use the Power Source System Circuit Diagram to trace the circuit back to the fusible links.

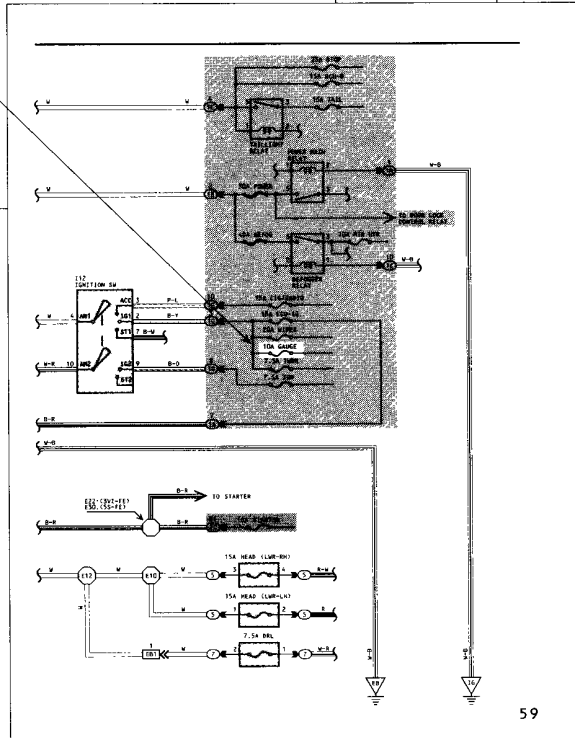
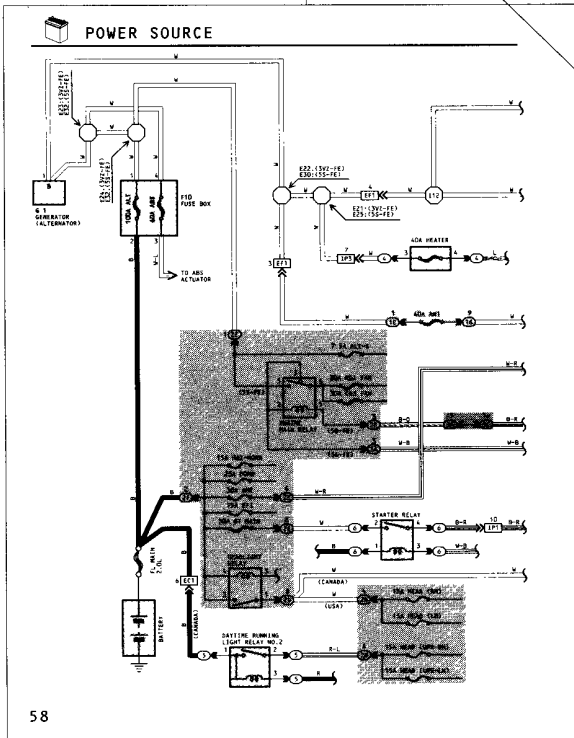
Fig. 2-16

Gauge Fuse Information

H POWER SOURCE (Current Flow Chart)

Parts	120	120	110	120	110, 114	116	142	170														
* Page Nos. of Related Systems	124, 126, 128, 130	124, 126, 128, 130	114, 120, 128, 130	124, 126, 128, 130	110, 114, 116, 118, 120, 122, 124, 126, 128, 130	116, 118, 120, 122, 124, 126, 128, 130	142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170	170														
Ignition Key Cylinder Lock																						
Ignition Relay																						
Integrator Light																						
Key Interlock Solenoid																						
License Plate Light																						
Light Failure Sensor																						
Luggage Compartment Light																						
Trunk Light																						
Moisture Control Relay																						
Moisture Control SW (and Personal Light)																						
Moisture Motor																						
Noise Filter for Stop Light																						
Oil Pressure SW																						
Oil Main SW and A/T																						
Oil Pressure SW (for 3.0L 4A) and A/T																						
Neutral Start SW (A/T)																						
Neutral Start SW (A/T) for 3.0L 4A																						
Neutral Start SW (for 3.0L 4A)																						
Power Seat Control SW																						
Power Seat Motor (for Power Seat Motor for Right Hand Control)																						
Power Seat Motor (for Right Hand Control)																						
Right Hand Control																						
Location	111	113	114	K3	L1	L2	L3	L4	M2	M3	M5	N2	O1	O5	P1	P2	P3	P4	P5	P6	P7	
15A TAIL																						
15A ECU-B																						
20A WIPER																						
7.5A TURN																						
7.5A IGN																						
15A CIG/RADIO																						
15A ECU-IG																						
10A GAUGE																						
10A MIR/HTR																						
25A STOP																						
30A POWER																						
40A DEF/OG																						
10A STARTER																						
15A HEAD (RH) (USA)																						
15A HEAD (LH) (USA)																						
15A HEAD (LH) (CANADA)																						
7.5A ALT S																						
20A DOME																						
15A EFI																						
15A HAZ/HORN																						
30A CDS FAN																						
30A RDI FAN																						
10A A/C																						
40A HEATER																						
15A HEAD (RH) (CANADA)																						
15A HEAD (LH) (CANADA)																						
7.5A ORL (CANADA)																						

These are the page numbers of the first page on which the related system is shown. The part indicated is located somewhere in the system, not necessarily on the page indicated here.



**Ground Distribution** In the electrical system, a load's ground point is often shared with other circuits. If another circuit which shares the ground point with your inoperative circuit works properly, then you know that the **grounding point** is OK. This does not eliminate the possibility of a problem on the *ground side* of the circuit, or a poor connection problem between ground point terminals "stacked" onto a single ground point.

**Key Features**

- **Ground Point ID**

To check the grounding point, look for the triangle shaped ground symbol on the bottom of the page. All ground points have a two-letter ID number: the first letter represents *Engine*, *Instrument panel*, or *Body*, the same as with the splice points and harness-to-harness connectors.

- **Finding Circuits Which Share the Ground Point**

Using the Ground Point ID, turn to Section J, Ground Point, in the EWD. In this section, each ground point is listed with the names of all components and splices that are connected to it.

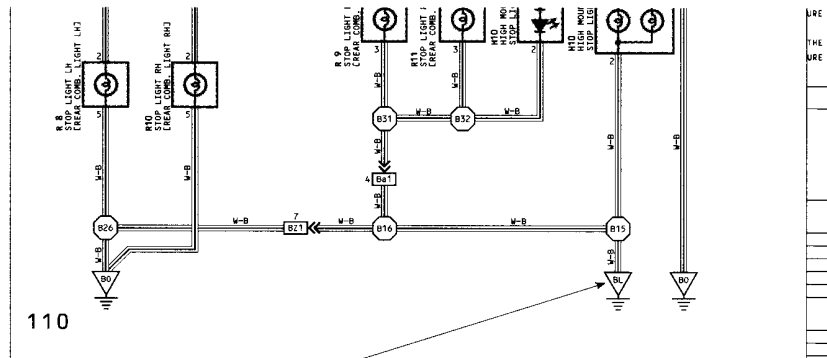
- **Locating the Ground Point on the Vehicle**

If you determine that there is a problem with the ground, use the **Ground Point Location** table that follows the system circuit diagram, for a description of the ground location, and the page number to turn to for a diagram of where the ground point is located.

**Ground Points**

Look at the "triangle" for the ground ID number. For location of the ground on the vehicle, use the ground location table in the support section.

Fig. 2-17



Find the ground point by using the Ground ID number

IN	EV	LOOK NO. 1	WIRE NO. 1	LOOK NO. 2	WIRE NO. 2	INSTRUMENT PANEL LEFT
1M	20	COVL WIRE AND J/B NO. 1 (INSTRUMENT PANEL LEFT)				

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS		
CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
IJ1	38	FLOOR NO. 1 WIRE AND COVL WIRE (LEFT KICK PANEL)
B1	421S/D	LUGGAGE ROOM NO. 1 WIRE AND FLOOR NO. 1 WIRE (LUGGAGE COMPARTMENT LEFT)
Ba1	421S/D	FLOOR NO. 1 WIRE AND LUGGAGE ROOM NO. 2 WIRE (LUGGAGE COMPARTMENT DOOR)

▽ : GROUND POINTS		
CODE	SEE PAGE	GROUND POINTS LOCATION
BL	421S/D	UNDER THE LEFT QUARTER PILLAR
B0	421S/D	BACK PANEL CENTER

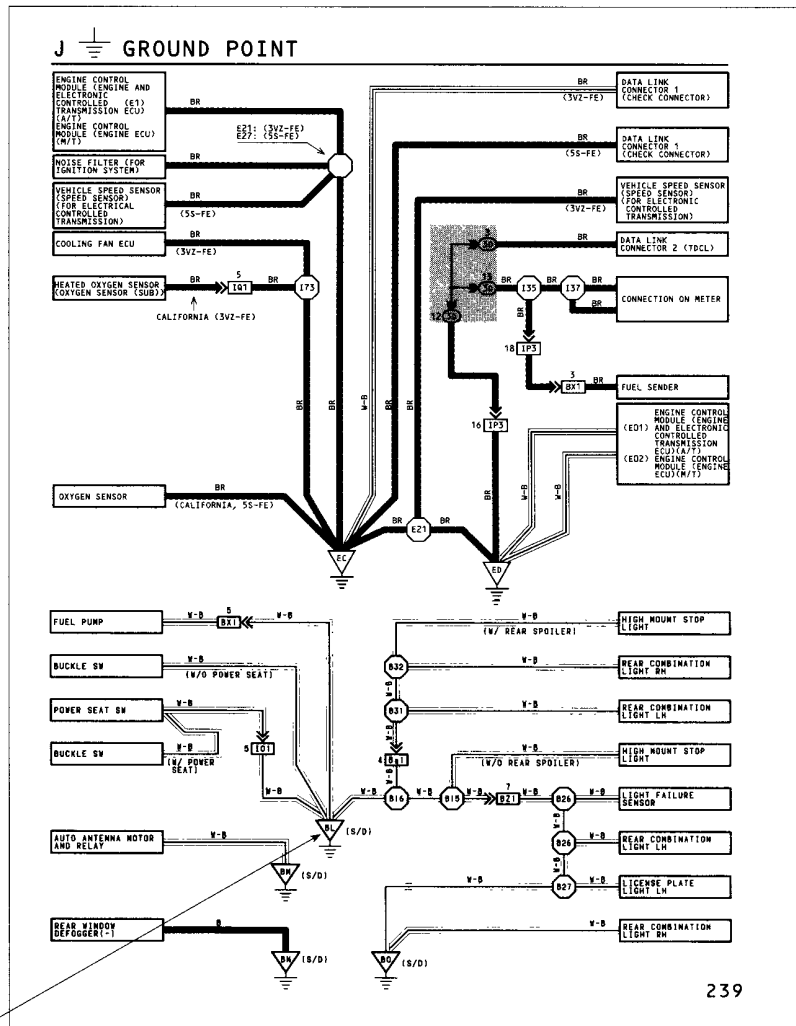
  

○ : SPLICE POINTS					
CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
B16			B26	421S/D	LUGGAGE ROOM NO. 1 WIRE
B14	421S/D	FLOOR NO. 1 WIRE	B30		
B17			B31	421S/D	LUGGAGE ROOM NO. 2 WIRE
B22	421S/D	LUGGAGE ROOM NO. 1 WIRE	B32		
B25					

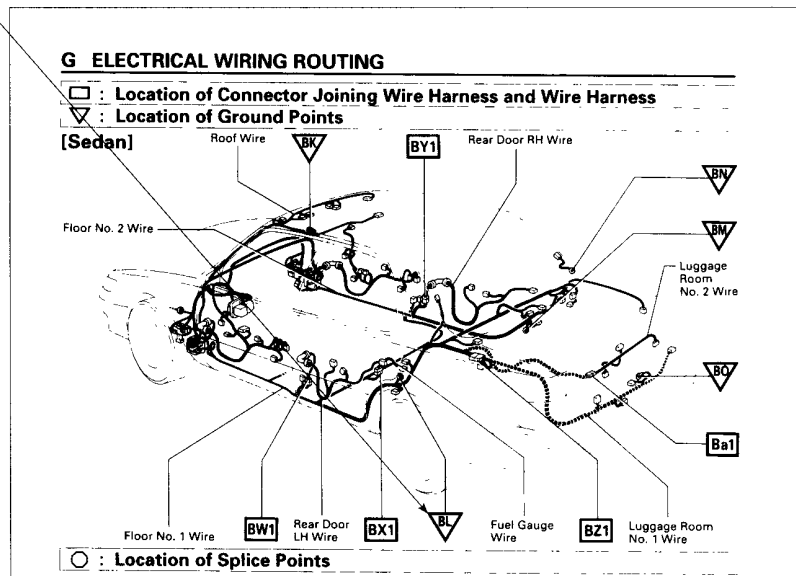
## Section J Ground Points

Look at Section J, Ground Point, for circuits that share the ground, or redundant ground paths.

Fig. 2-18



Follow the ground ID number to Section J and to Section G



## Additional Support Sections

In addition to the wiring diagram and location tables, the EWD provides other resources that you can use when diagnosing a problem.

### System Outline

The first step in any diagnostic process is to **verify the problem**. To do this, you'll need to know exactly how the system is supposed to work. The **System Outline** is one of the best places for this information. This section, which follows immediately after the wiring diagram, describes the operation of the circuit, and maps out the path of current flow "step-by-step" for each mode of operation. This is especially useful in circuits which use an ECU to "logically" control a circuit based upon various sensor inputs.

### NOTE

The System Outline section is found only with complicated or ECU controlled circuits. For many system circuit diagrams, no help is given; you must be able to apply basic circuit theory and your own knowledge about how the circuit works to make a successful diagnosis using the EWD.

### System Outline

Use the System Outline to find not only the "paths of current flow" in the circuit, but most importantly, the SEQUENCE of current flow in the system or circuit, and the CONDITIONS under which the ECU will turn a circuit OFF or ON.

Fig. 2-19

**SYSTEM OUTLINE**

CURRENT IS APPLIED AT ALL TIMES THROUGH A STOP FUSE TO TERMINAL 2 OF THE STOP LIGHT SW. WHEN THE IGNITION SW IS TURNED ON, CURRENT FLOWS FROM THE GAUGE FUSE TO TERMINAL 8 OF THE LIGHT FAILURE SENSOR, AND ALSO FLOWS THROUGH THE REAR LIGHT WARNING LIGHT TO TERMINAL 4 OF THE LIGHT FAILURE SENSOR.

**STOP LIGHT DISCONNECTION WARNING**  
WHEN THE IGNITION SW IS TURNED ON AND THE BRAKE PEDAL IS PRESSED (STOP LIGHT SW ON), IF THE STOP LIGHT CIRCUIT IS OPEN, THE CURRENT FLOWING FROM TERMINALS 7 OF THE LIGHT FAILURE SENSOR TO TERMINALS 1,2 CHANGES, SO THE LIGHT FAILURE SENSOR DETECTS THE DISCONNECTION AND THE WARNING CIRCUIT OF THE LIGHT FAILURE SENSOR IS ACTIVATED. AS A RESULT, THE CURRENT FLOWS FROM TERMINAL 4 OF THE LIGHT FAILURE SENSOR → TERMINAL 11 → GROUND AND TURNS THE REAR LIGHT WARNING LIGHT ON. BY PRESSING THE BRAKE PEDAL, THE CURRENT FLOWING TO TERMINAL 8 OF THE LIGHT FAILURE SENSOR KEEPS THE WARNING CIRCUIT ON HOLD AND THE WARNING LIGHT ON UNTIL THE IGNITION SW IS TURNED OFF.

**SERVICE HINTS**

**S10 STOP LIGHT SW**  
2-1: CLOSED WITH BRAKE PEDAL DEPRESSED

**L 2 LIGHT FAILURE SENSOR**  
1, 2, 7-GROUND: APPROX. 12VOLTS WITH STOP LIGHT SW ON  
4, 8-GROUND: APPROX. 12VOLTS WITH IGNITION SW AT ON POSITION  
11-GROUND: ALWAYS CONTINUITY

**○ : PARTS LOCATION**

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
C 9	30	M 2	A 30	R10	31
H10	31	M 3	B 30	R11	31
J 1	30	R 8	31	S10	30
L 2	31	R 9	31		

**○ : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR**

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1B	20	COVL WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)
1H	20	FLOOR NO.1 WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)
1M	20	COVL WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)

**□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)
IJ1	38	FLOOR NO.1 WIRE AND COVL WIRE (LEFT KICK PANEL)
BZ1	42(S/D)	LUGGAGE ROOM NO.1 WIRE AND FLOOR NO.1 WIRE (LUGGAGE COMPARTMENT LEFT)
B&1	42(S/D)	FLOOR NO.1 WIRE AND LUGGAGE ROOM NO.2 WIRE (LUGGAGE COMPARTMENT DOOR)

**▽ : GROUND POINTS**

CODE	SEE PAGE	GROUND POINTS LOCATION
BL	42(S/D)	UNDFR THE LEFT QUARTER PILLAR
80	44(W/G)	BACK PANEL CENTER

**○ : SPLICE POINTS**

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
B15			B26	42(S/D)	LUGGAGE ROOM NO.1 WIRE
B16	42(S/D)	FLOOR NO.1 WIRE	B30		
B17			B31	42(S/D)	LUGGAGE ROOM NO 2 WIRE
B22			B32		
B25	42(S/D)	LUGGAGE ROOM NO.1 WIRE			

**Service Hints** Like the System Outline, the **Service Hints** section follows *selected* wiring diagrams. This section provides pin voltages and/or component resistance values (some of these values are found only in the EWD and are not in the repair manual). However, **Service Hints are not supplied with every wiring diagram**. When they are given, they will cover only *some* of the pin voltages and resistance values in the circuit.

Overall, the **EWD** relies on your skills and electrical knowledge to determine the amount of voltage you should measure at a particular pin.

**Service Hints**  
The Service Hints section can have some helpful information that is not found in the Repair Manual. The information in the Engine Control Section can be of great help when diagnosing a TCCS related problem.

Fig. 2-20



## ENGINE CONTROL (5S-FE A/T)

### SERVICE HINTS

#### E 7, E 8, E 10 ENGINE CONTROL MODULE (ENGINE AND ELECTRONIC CONTROLLED TRANSMISSION ECU)

##### VOLTAGE AT ENGINE CONTROL MODULE (ECU) WIRING CONNECTOR

- BATT - E1: ALWAYS 9.0-14.0VOLTS
- +B - E1: 9.0-14.0VOLTS (IGNITION SW AT ON POSITION)
- +B1 - E1: 9.0-14.0VOLTS (IGNITION SW AT ON POSITION)
- IDL - E2: 9.0-14.0VOLTS (IGNITION SW ON AND THROTTLE VALVE OPEN)
- VC - E2: 4.0- 8.0VOLTS (IGNITION SW AT ON POSITION)
- VTA - E2: 0.3- 0.0VOLTS (IGNITION SW ON AND THROTTLE VALVE FULLY CLOSED)
- : 3.2- 4.9VOLTS (IGNITION SW ON AND THROTTLE VALVE OPEN)
- P1H - E2: 3.3- 3.9VOLTS (IGNITION SW AT ON POSITION)
- #10, #20 - E01, E02: 9.0-14.0VOLTS (IGNITION SW AT ON POSITION)
- THA - E2: 0.6- 3.4VOLTS (IGNITION SW ON AND INTAKE AIR TEMP. 20°C, 68°F)
- TWA - E2: 0.2- 1.0VOLTS (IGNITION SW ON AND COOLANT TEMP. 80°C, 176°F)
- BYA - E1: 6.0-14.0VOLTS (ENGINE CRANKING)
- IGT - E1: PULSE GENERATION (ENGINE CRANKING OR IDLING)
- V - E1: 9.0-14.0VOLTS (NO TROUBLE AND ENGINE RUNNING)
- ACT - E1: 9.0-14.0VOLTS (IGNITION SW ON AND AIR CONDITIONING ON)
- ACA - E1: 7.0-14.0VOLTS (IGNITION SW ON AND AIR CONDITIONING ON)
- TE1 - E1: 9.0-14.0VOLTS (IGNITION SW ON)
- MBV - E1: 0- 3.0VOLTS (IGNITION SW ON AND PARK/NEUTRAL POSITION SW (NEUTRAL START SW) POSITION P OR N POSITION)
- : 9.0-14.0VOLTS (IGNITION SW ON AND EX. PARK/NEUTRAL POSITION SW (NEUTRAL START SW) POSITION P OR N POSITION)

##### RESISTANCE AT ENGINE CONTROL MODULE (ECU) WIRING CONNECTORS (DISCONNECT WIRING CONNECTOR)

- IDL - E2: INFINITY (THROTTLE VALVE OPEN)
- : 2.3KΩ OR LESS (THROTTLE VALVE FULLY CLOSED)
- VTA - E2: 3.3 -10.0KΩ (THROTTLE VALVE FULLY OPEN)
- : 0.2 - 0.8KΩ (THROTTLE VALVE FULLY CLOSED)
- VC - E2: 3.0 - 7.0KΩ
- THA - E2: 2.0 - 3.0KΩ (INTAKE AIR TEMP. 20°C, 68°F)
- TWA - E2: 0.2 - 0.8KΩ (COOLANT TEMP. 80°C, 176°F)
- #1, #E - 6-10.17-0.21KΩ
- ISCC, ISCO - +B, +B1: 19.3-22.3Ω

### ○ PARTS LOCATION

CODE	SEE PAGE	CODE	SEE PAGE	CODE	SEE PAGE
A10	30	E 8	30	J12	31
C 8	30	E10	30	J 1	31
C 9	A 30	F10	32	K 1	29
C10	B 30	I 1	29	N 1	29
D 1	30	I 2	29	N 1	29
D 2	29	I 3	29	O 2	29
D 3	31	I 4	29	O 3	29
D 6	30	I 5	29	T 1	29
E 1	29	I 6	29	V 1	29
E 4	29	I 7	29	V 2	29
E 7	C 30	I10	29	V 5	29

### ○ RELAY BLOCKS

CODE	SEE PAGE	RELAY BLOCKS (RELAY BLOCK LOCATION)
6	26	R/B NO.6

### ○ JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1A		
1B		
1C		
1D	20	COVL WIRE AND J/B NO.1 (INSTRUMENT PANEL LEFT)
1E		
1G		
1H		
2A	22	ENGINE ROOM MAIN WIRE AND J/B NO.2 (ENGINE COMPARTMENT LEFT)
2C	22	ENGINE WIRE AND J/B NO.2 (ENGINE COMPARTMENT LEFT)
3A		
3B	24	COVL WIRE AND J/B NO.3 (BEHIND COMBINATION METER)
3C		
3D		

## Overall Wiring Diagram (Section K)

In the last section of the EWD, the vehicle wiring diagram is printed in the older *map-style* format. If you were “brought up” with this type of wiring diagram, you may prefer to use it because “you can see everything at once.” But with all of the added support information that is provided in the **Section I** wiring diagrams, there is no real advantage in using the overall wiring diagrams, except for the “familiarity” factor. Anything that can be done with the map-style schematic can be done *faster* using the System Circuit Diagrams and support sections in the EWD.

Because there is so much information in the EWD manual, it sometimes can be confusing to use. Being able to quickly find the information you want requires *practice*. During this rest of this course, you’ll be performing worksheets and diagnosing actual on-car problems to make you more familiar with all of the EWD features.

## Overall Wiring Diagrams

The overall wiring diagram is provided in Section K of the EWD. While it’s faster to use the Section I wiring diagrams, the overall wiring diagram can act as a backup to catch any typographical errors found in the System Circuit Diagram

Fig. 2-21

