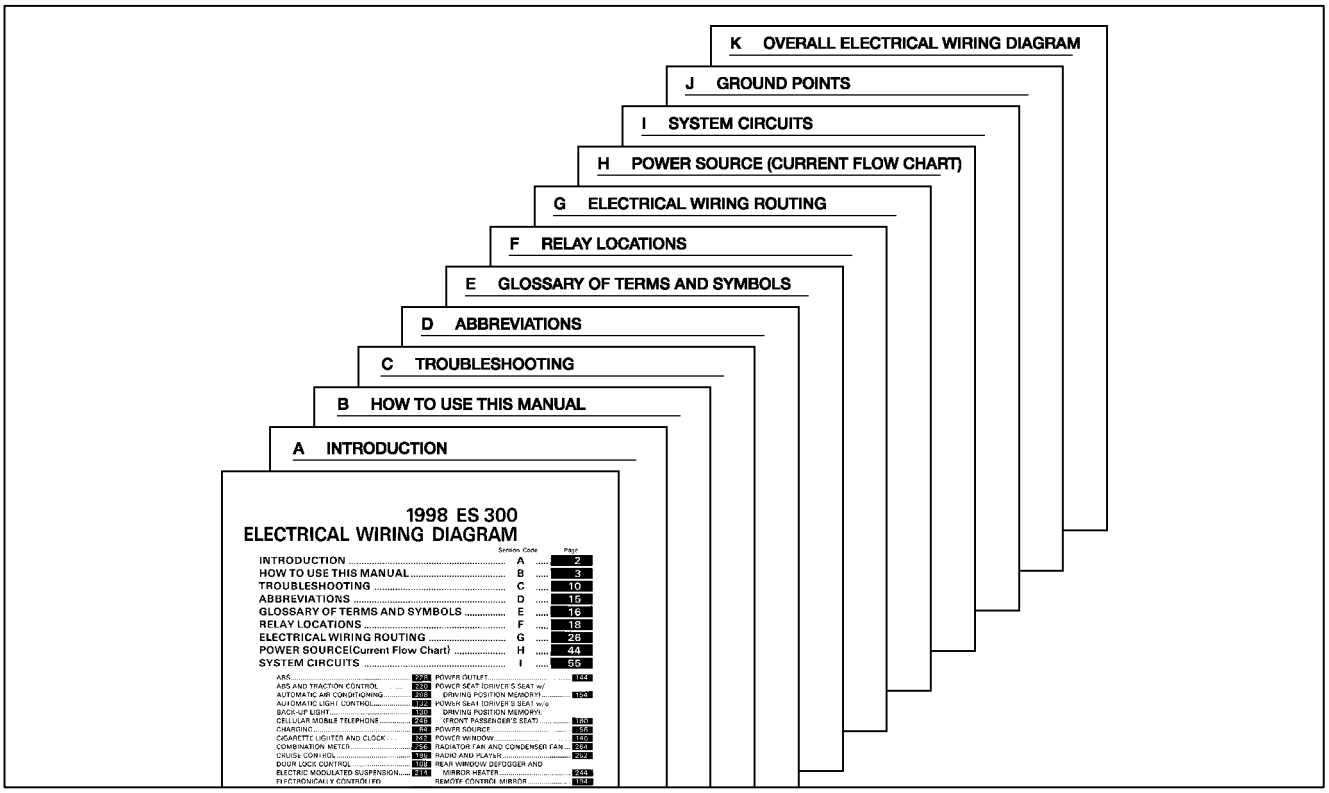
Section 2

Using the Electrical Wiring Diagram



Learning Objectives:

1. Introduce the features of each EWD section.
2. Explain how to use the System Circuit Diagram
3. Explain how the System Circuit Diagram works with the additional support sections in the EWD.
4. Show how to apply the System Circuit Diagrams and support sections in the diagnostic process
5. Explain and practice the process of tracing current flow in a circuit.

Notes

Introduction

One of the keys to a quick and successful electrical diagnosis is correctly using the **Lexus 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.

Sections of the EWD (Through 1998 MY)

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.

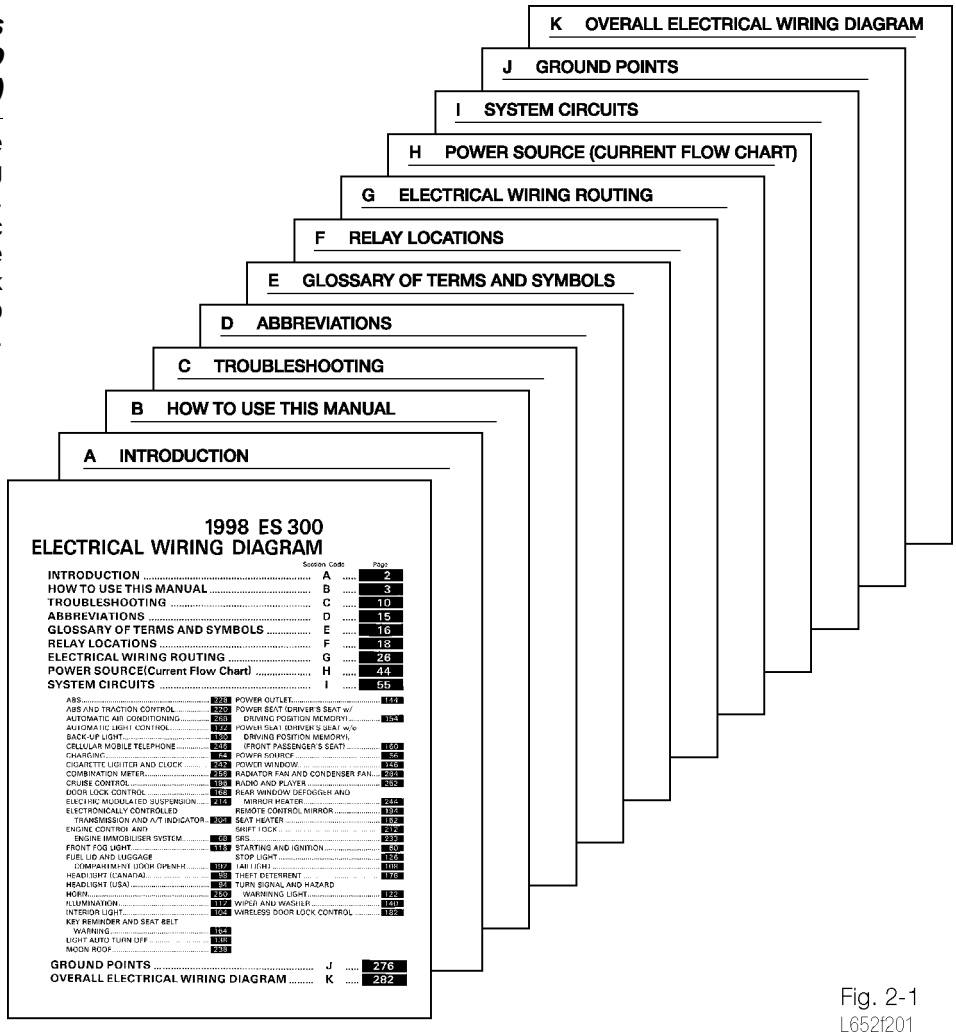


Fig. 2-1
L652f201

Sections of the EWD (Starting 2000 MY)

Starting in the 2000 Model Year, the EWD sections have been rearranged and some new sections have been added.

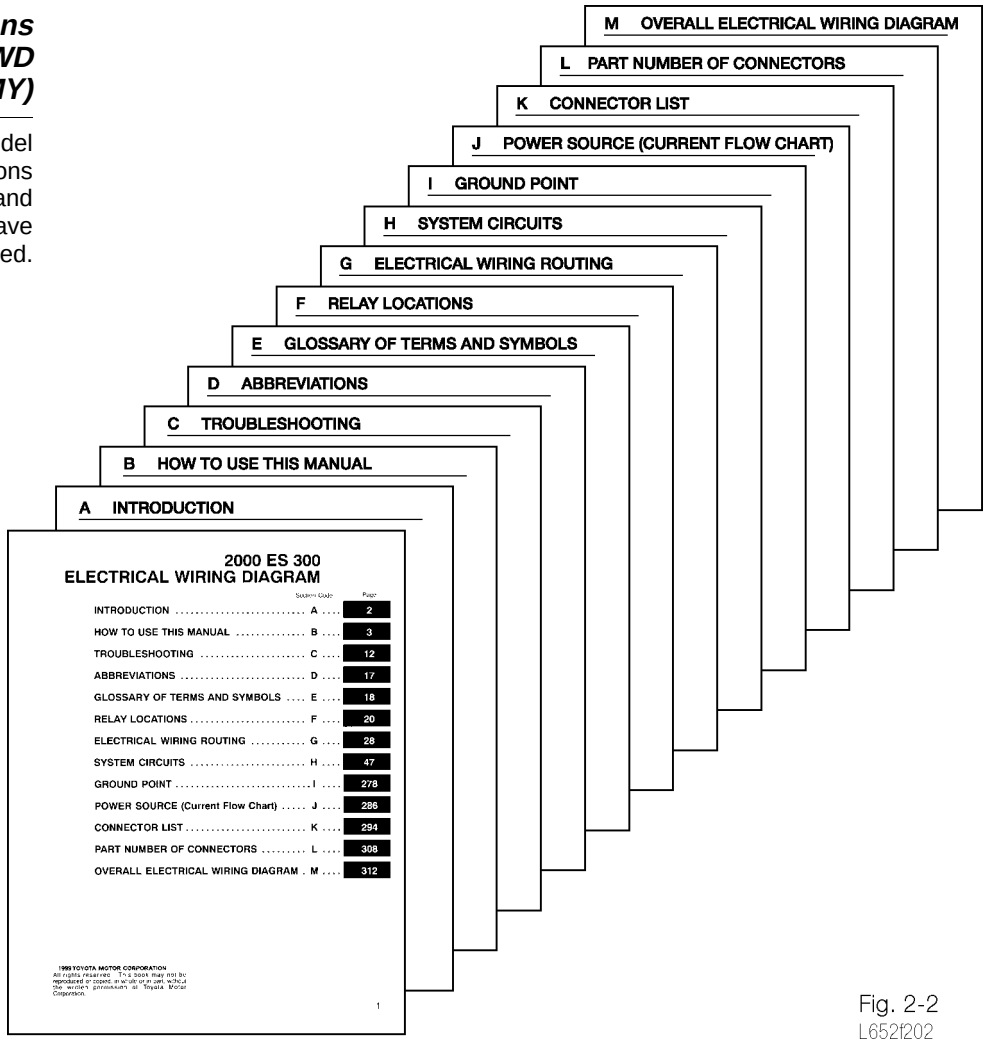


Fig. 2-2
L652f202

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 the sections (1998 MY = A-K; 2000 MY = A-M) and 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 (Section H starting with 1999 MY).

1998 ES 300
ELECTRICAL WIRING DIAGRAM

1

1999 ES 300
ELECTRICAL WIRING DIAGRAM

1

2000 ES 300
ELECTRICAL WIRING DIAGRAM

1

Fig. 2-3
L652f203

Section I System Circuit Diagrams

The EWD is built around the use of the **System Circuit Diagrams** (Section I through 1998 MY, Section H starting with 1999 MY). 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 IDs) 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.

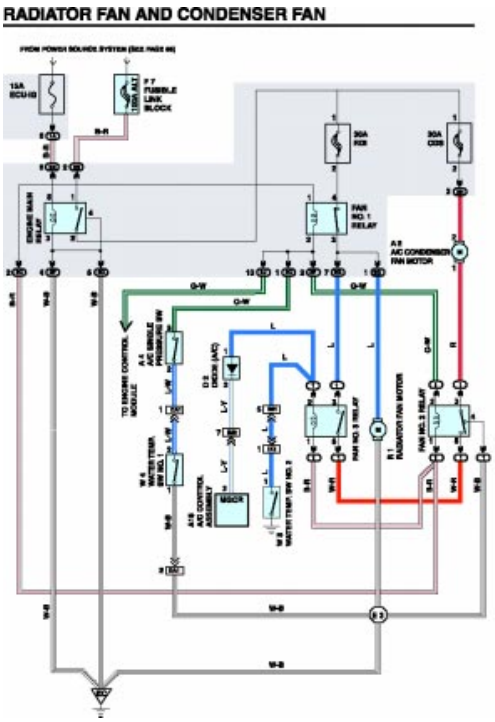


Fig. 2-4
L652f204

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, California, Federal, or Canadian specifications

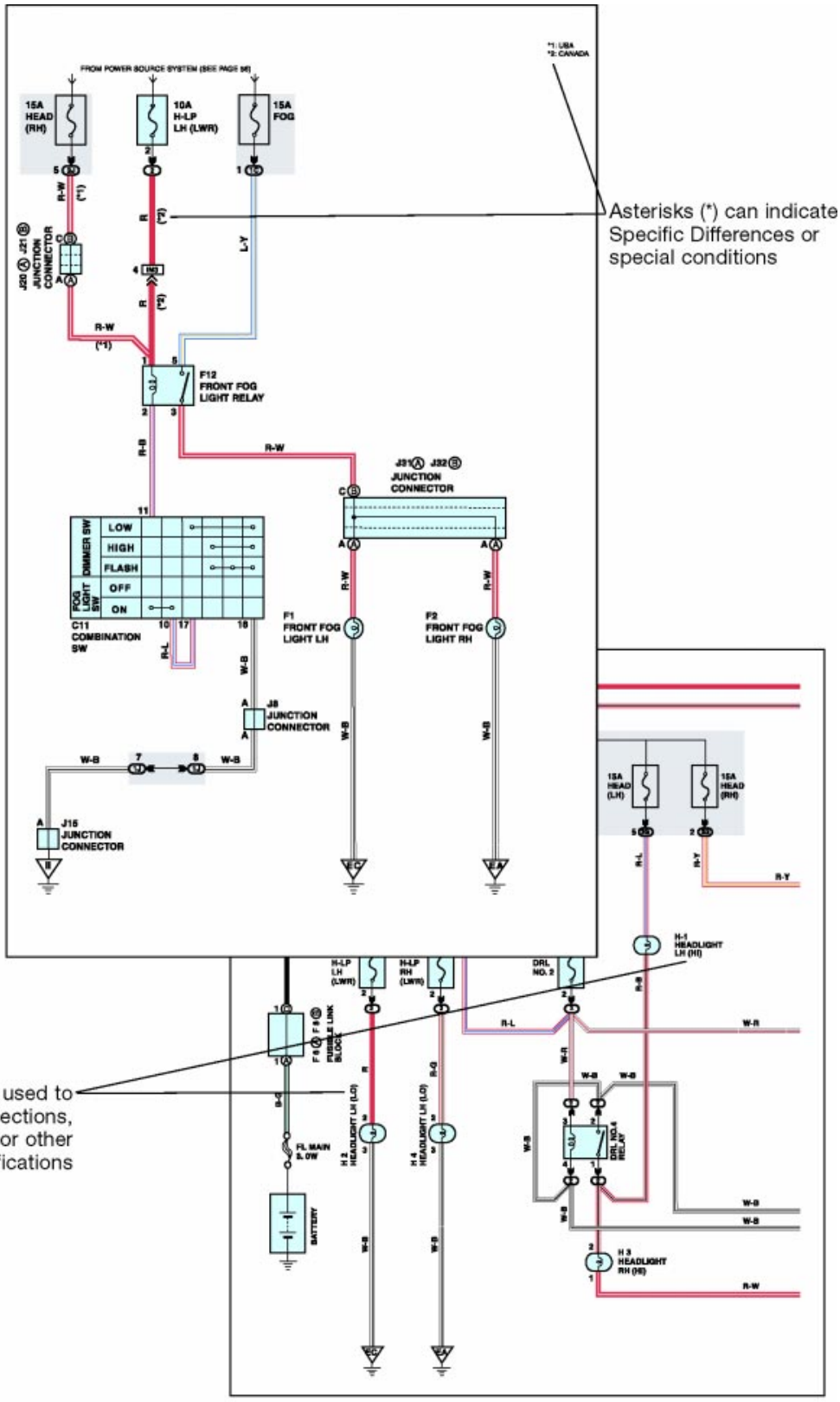


Fig. 2-5
L652f205

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.

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.

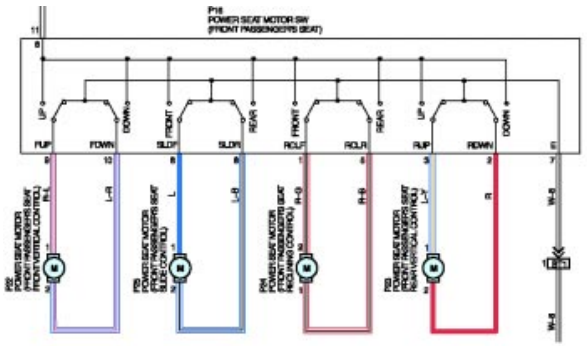
Wire Colors

- **Blue Wires**
  As you look at the list below, note that the color **blue** is presented 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 Lexus wiring harnesses. If it is any shade of blue, its 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".

B	=	Black	Y	=	Yellow
BR	=	Brown	SB	=	Sky Blue
G	=	Green	O	=	Orange
GR	=	Grey	P	=	Pink
L	=	Blue	R	=	Red
LG	=	Light Green	V	=	Violet
			W	=	White



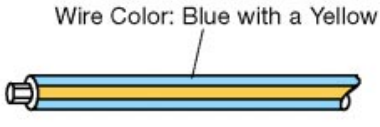


Fig. 2-6
L652f206

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.

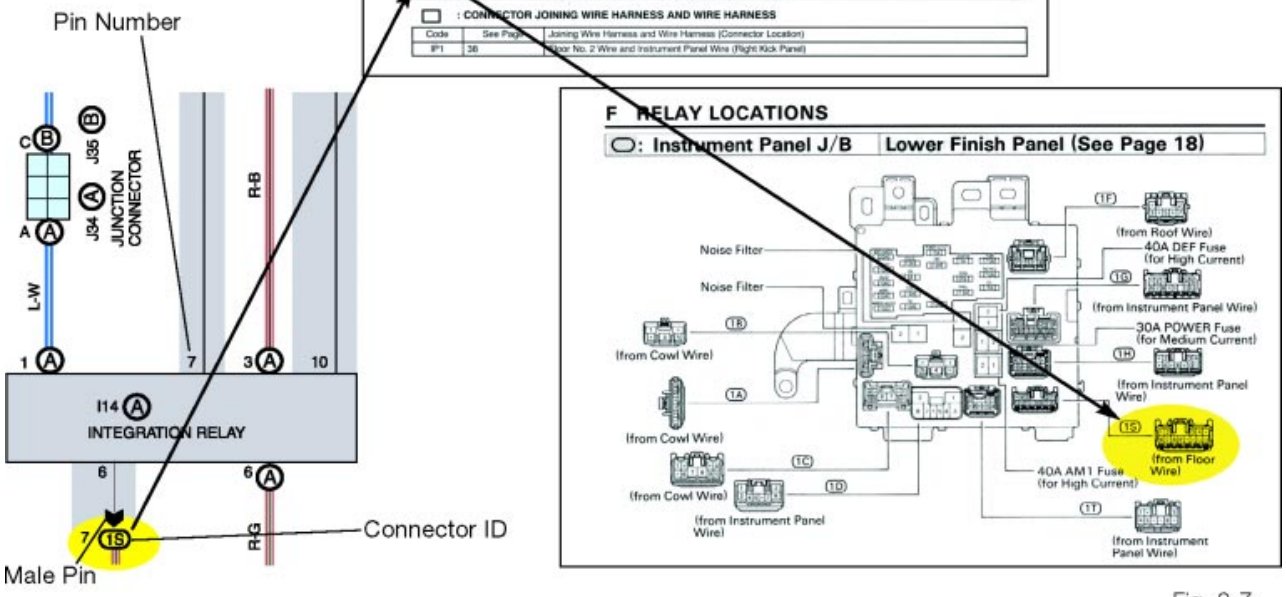
Key Features

- **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 may be 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.

Junction Blocks

Junction Blocks are shown with grey shading. The oval indicates the J/B number, connector number, and pin number. Use the ID number on the location table to find where the J/B is located on the vehicle.



Junction Blocks: Grey Shading

Fig. 2-7
L652f207

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 IDs.
- **No Shading**
  Relay Blocks are not shaded on the diagram like a Junction Block.
- **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.

Relay Blocks

A relay block is indicated by "ovals" at the wire connection (with no grey shading). ID the proper connector by the relay it is connected to. Use the Relay Location Table and Section F to find the relay on the vehicle.

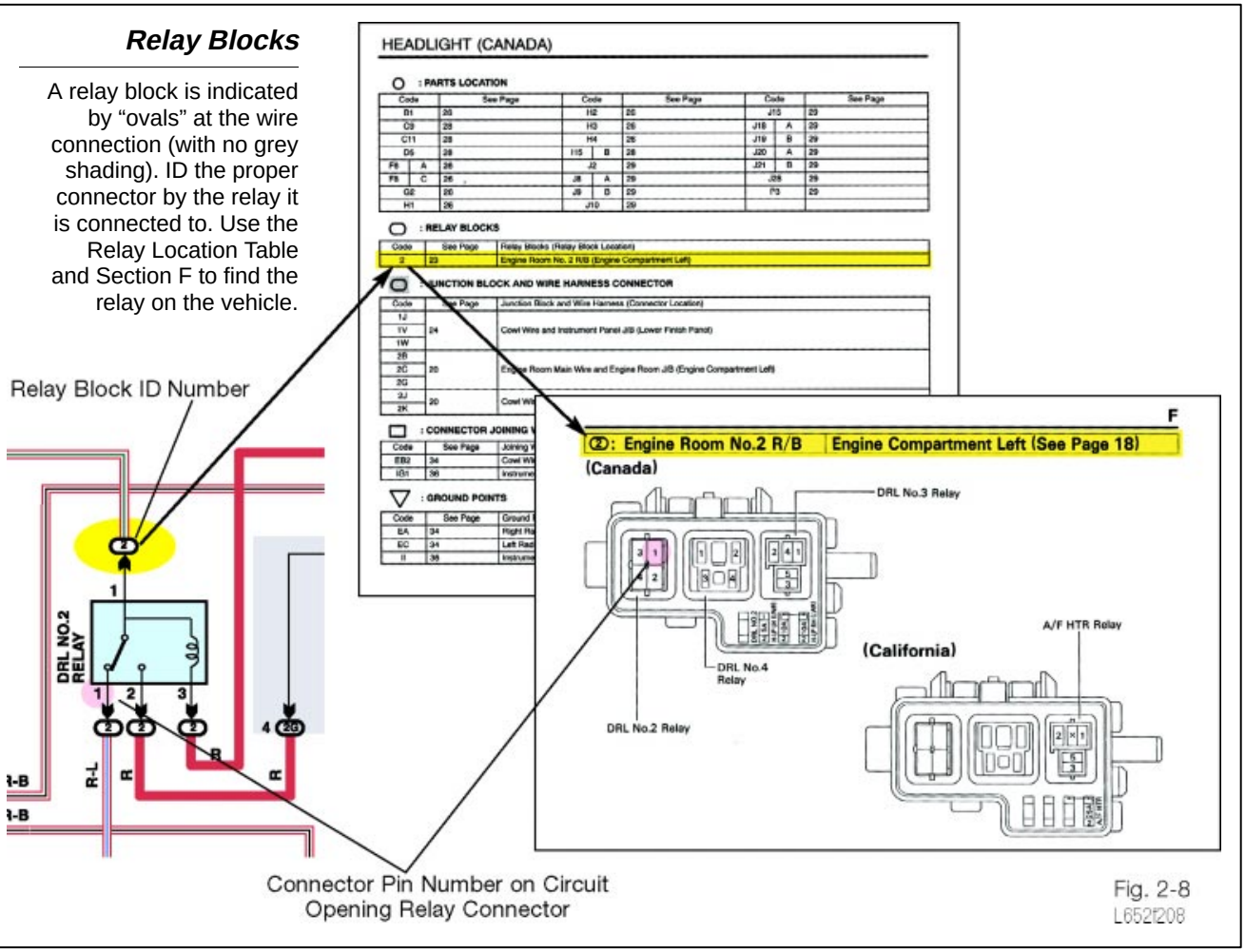


Fig. 2-8
L652f208

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. Only component connectors are shown in the system diagram.
- **"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.

Electrical Components/Parts

All electrical components are shown with connector ID numbers, and light blue shading. If the connector it uses is also part of other circuits, the name called-out in the location diagram is listed in brackets.

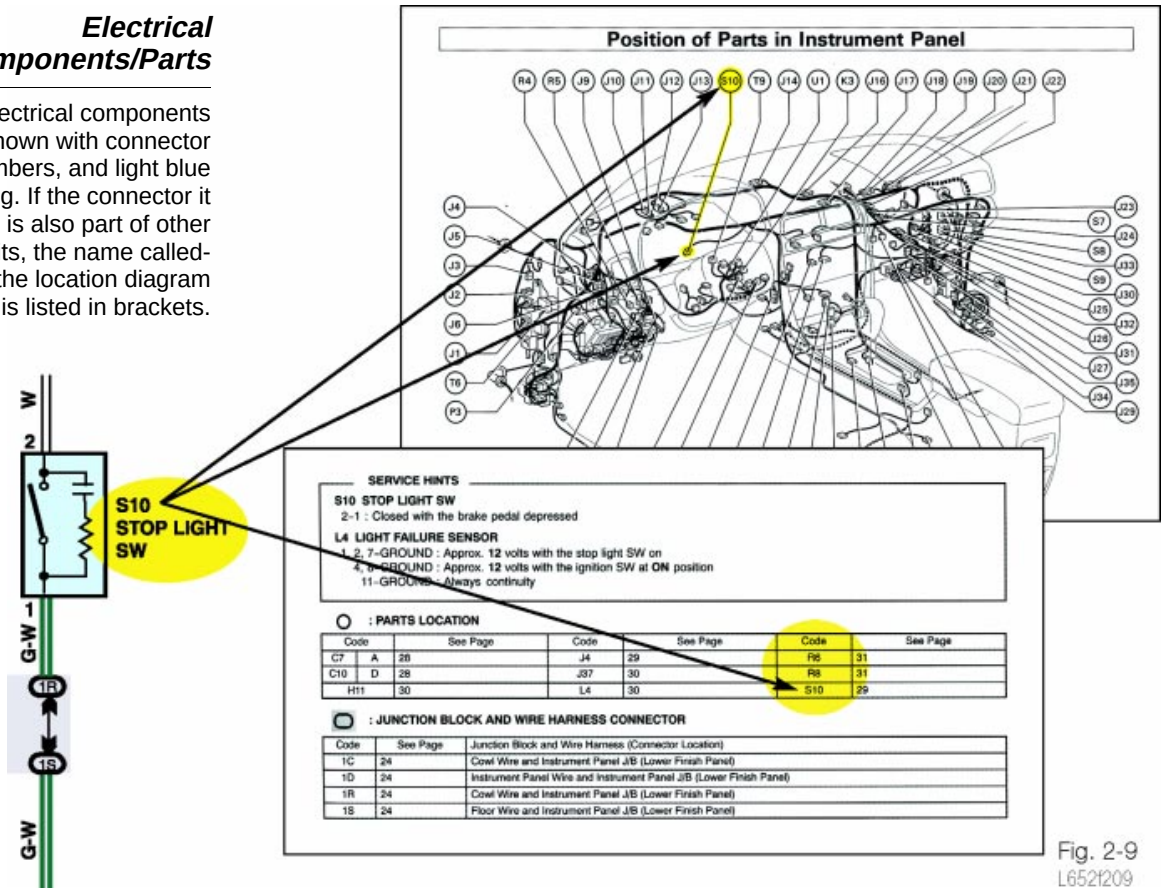


Fig. 2-9
L652f209

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.

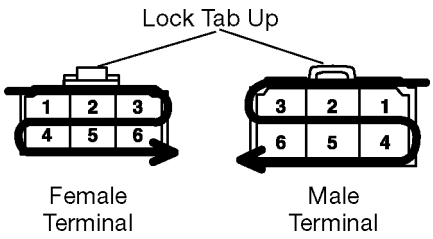
Key Features

- **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 (when available - EWD pre-2000 MY)**
  A "•" in the connector cavity indicates that the cavity is used but by another circuit.
- **X in the Connector (when available - EWD pre-2000 MY)**
  An "X" in the connector indicates that the cavity is empty.
- **Pin numbering on male and female terminals**



- **Second row numbering begins back under #1**
- **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 "callout" for that connector.

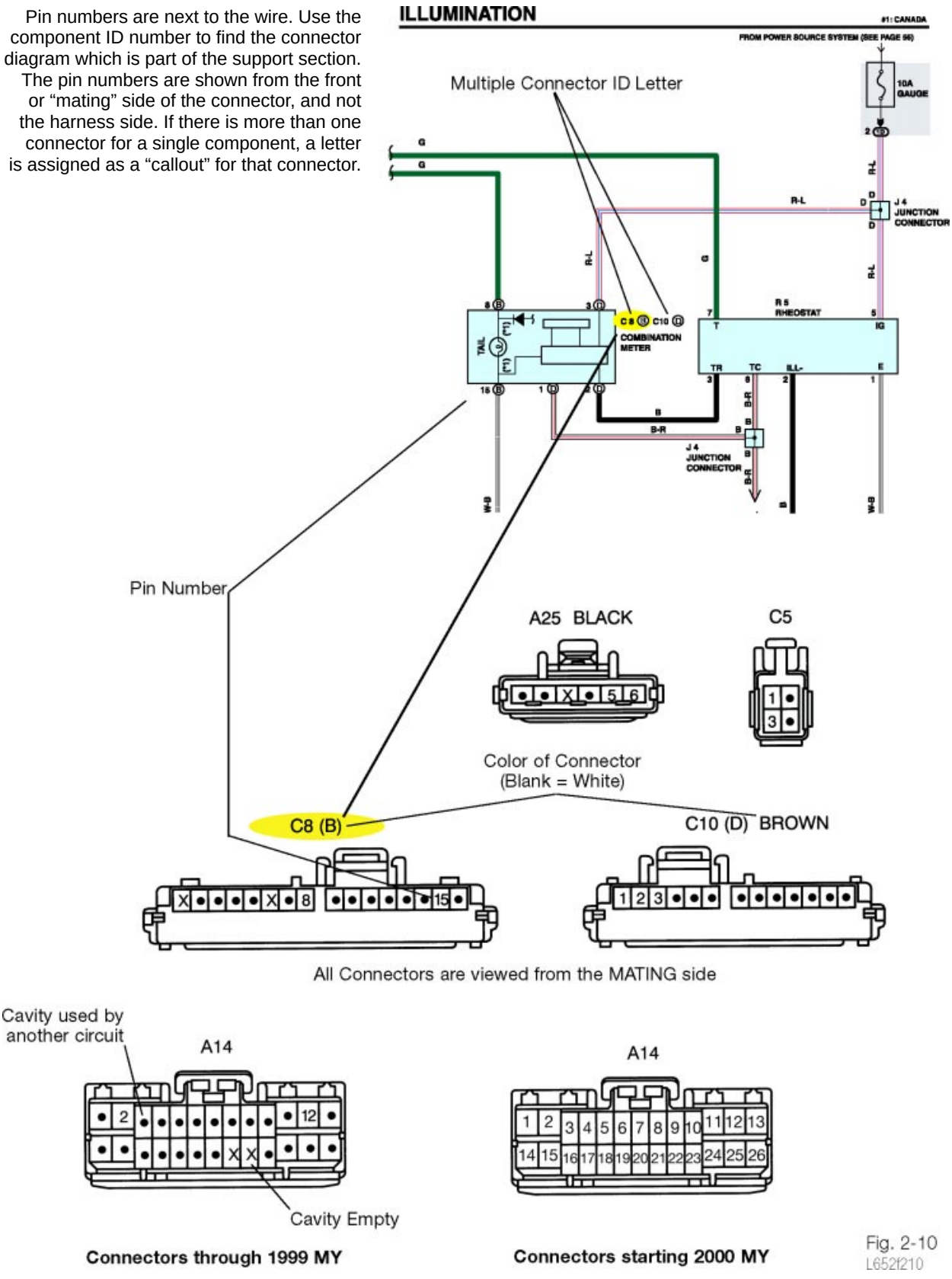


Fig. 2-10
L652f210

Connector Joining Wire Harness to Wire Harness

A **connector joining wire harness to 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. Male terminals shown with symbol:

Male = 

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.

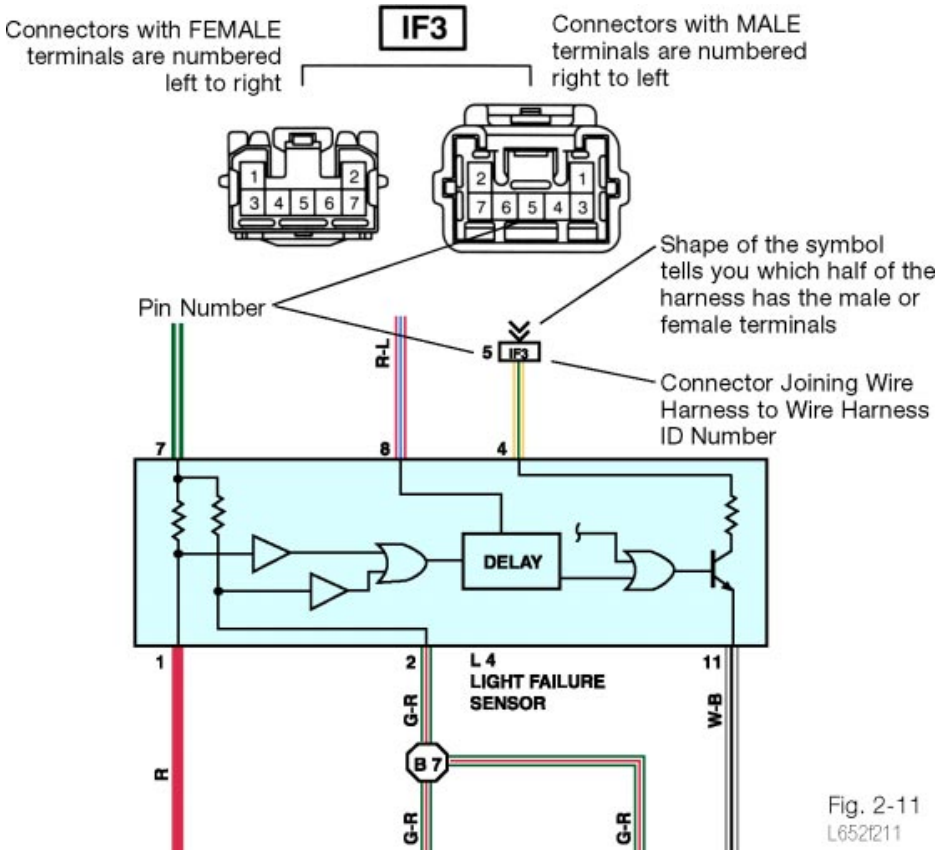


Fig. 2-11
L652f211

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.

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	24	Cowl Wire and Instrument Panel J/B (Lower Finish Panel)
1D	24	Instrument Panel Wire and Instrument Panel J/B (Lower Finish Panel)
1R	24	Cowl Wire and Instrument Panel J/B (Lower Finish Panel)
1S	24	Floor Wire and Instrument Panel J/B (Lower Finish Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IF3	36	Floor Wire and Instrument Panel Wire (Left Kick Panel)

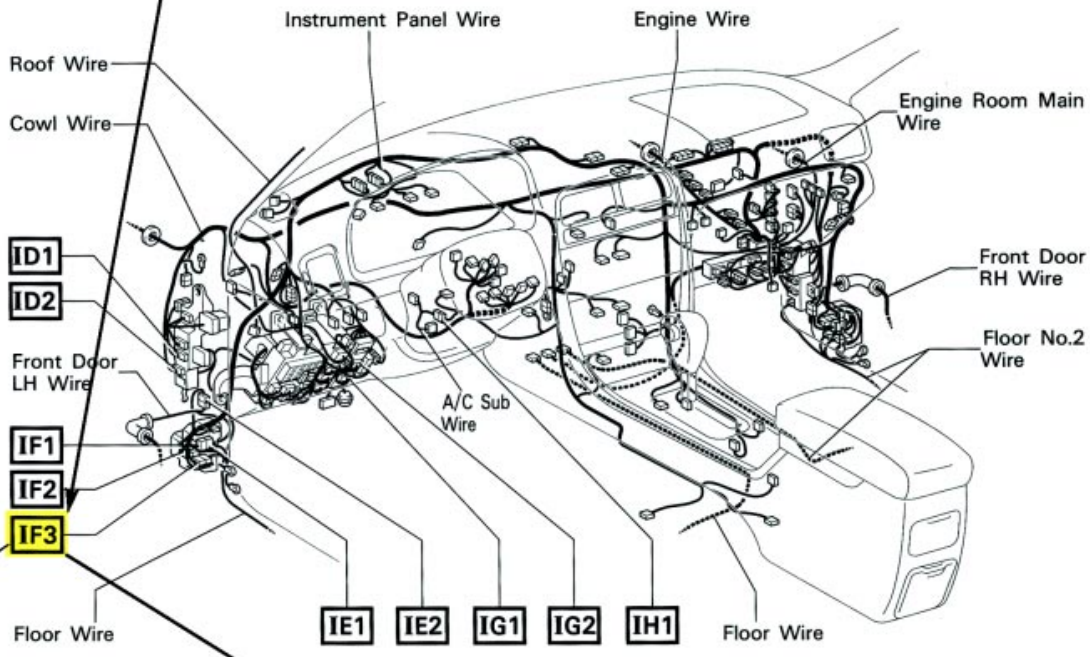
: GROUND POINTS

Code	See Page	Ground Points Location
BN	40	Under the Left Center Pillar
BP	40	Back Panel Center

Gives the page in Section G for location

G ELECTRICAL WIRING ROUTING

: Location of Connector Joining Wire Harness and Wire Harness



Shows what the connector looks like and pin location

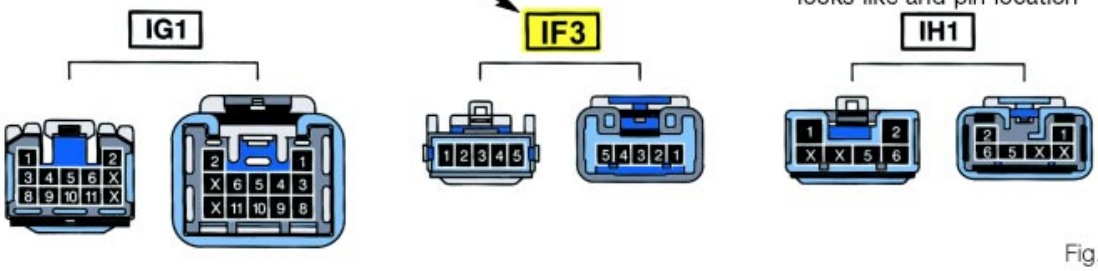


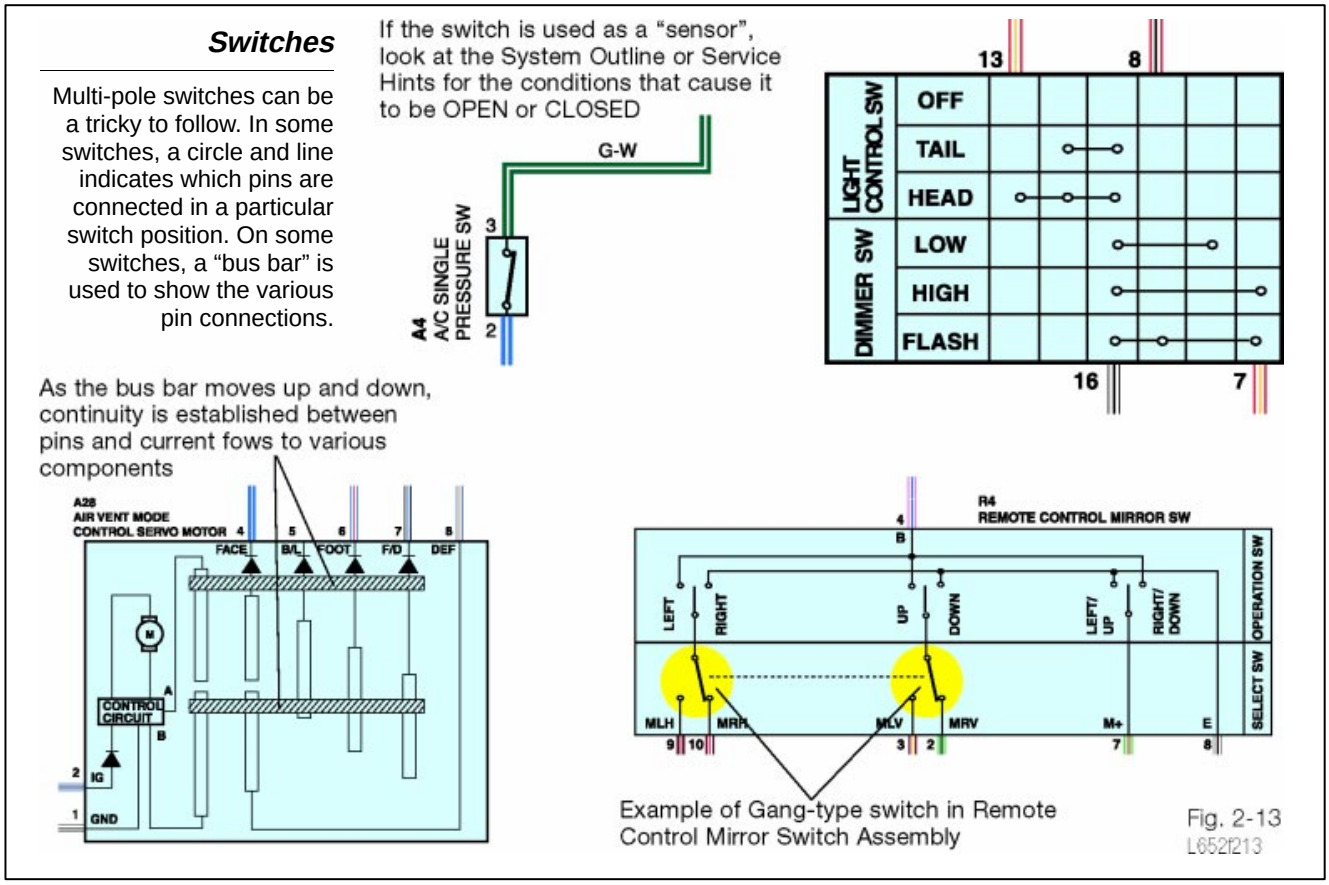
Fig. 2-12
L652f212

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 Normal position (Key off and out of ignition, doors closed but not locked.)**
  All switches and relays are shown in the Normal position or at rest. 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.



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.

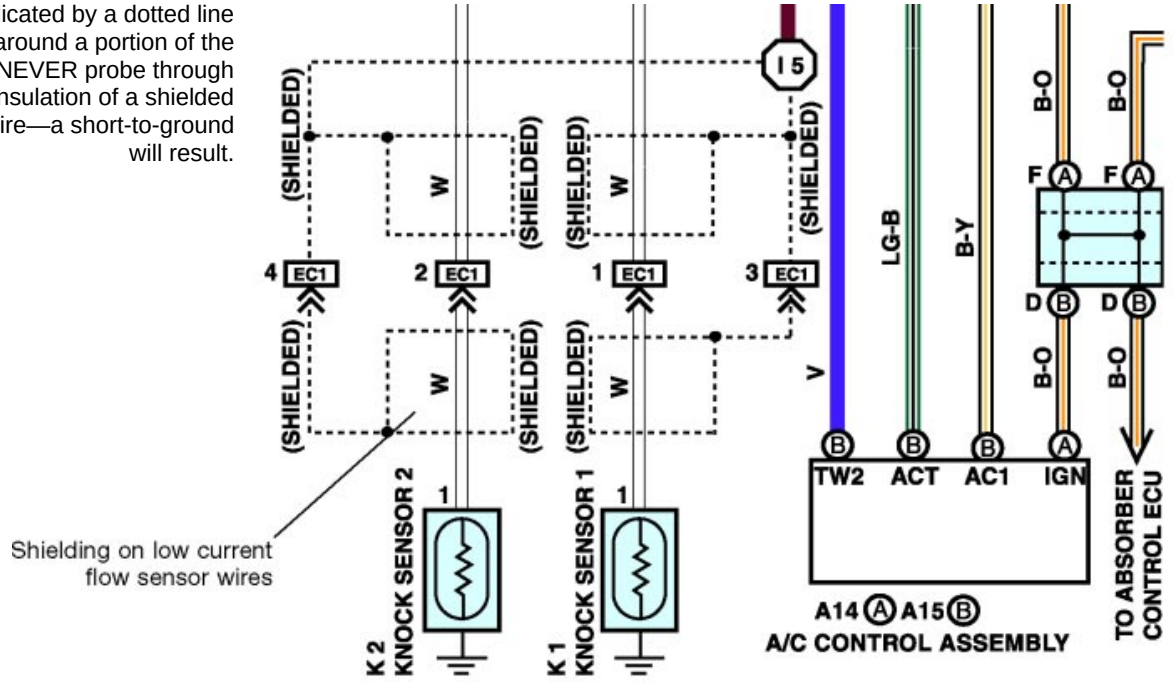


Fig. 2-14
L652f214

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.

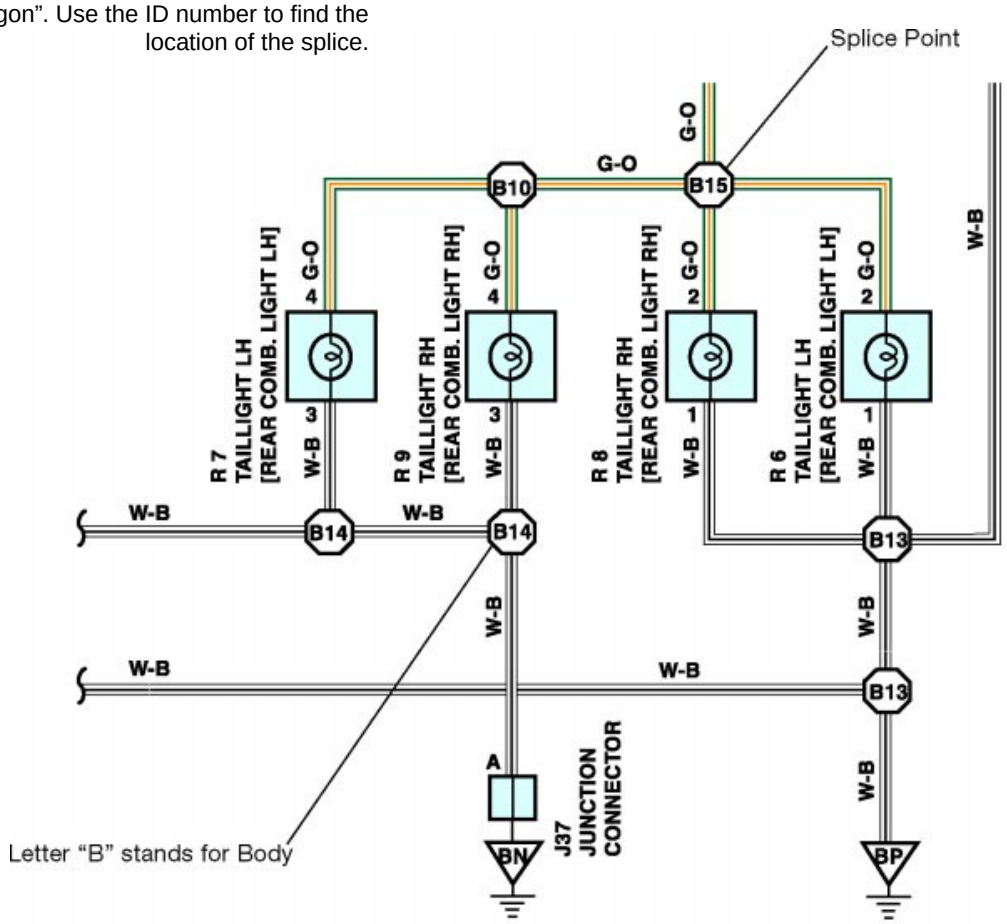
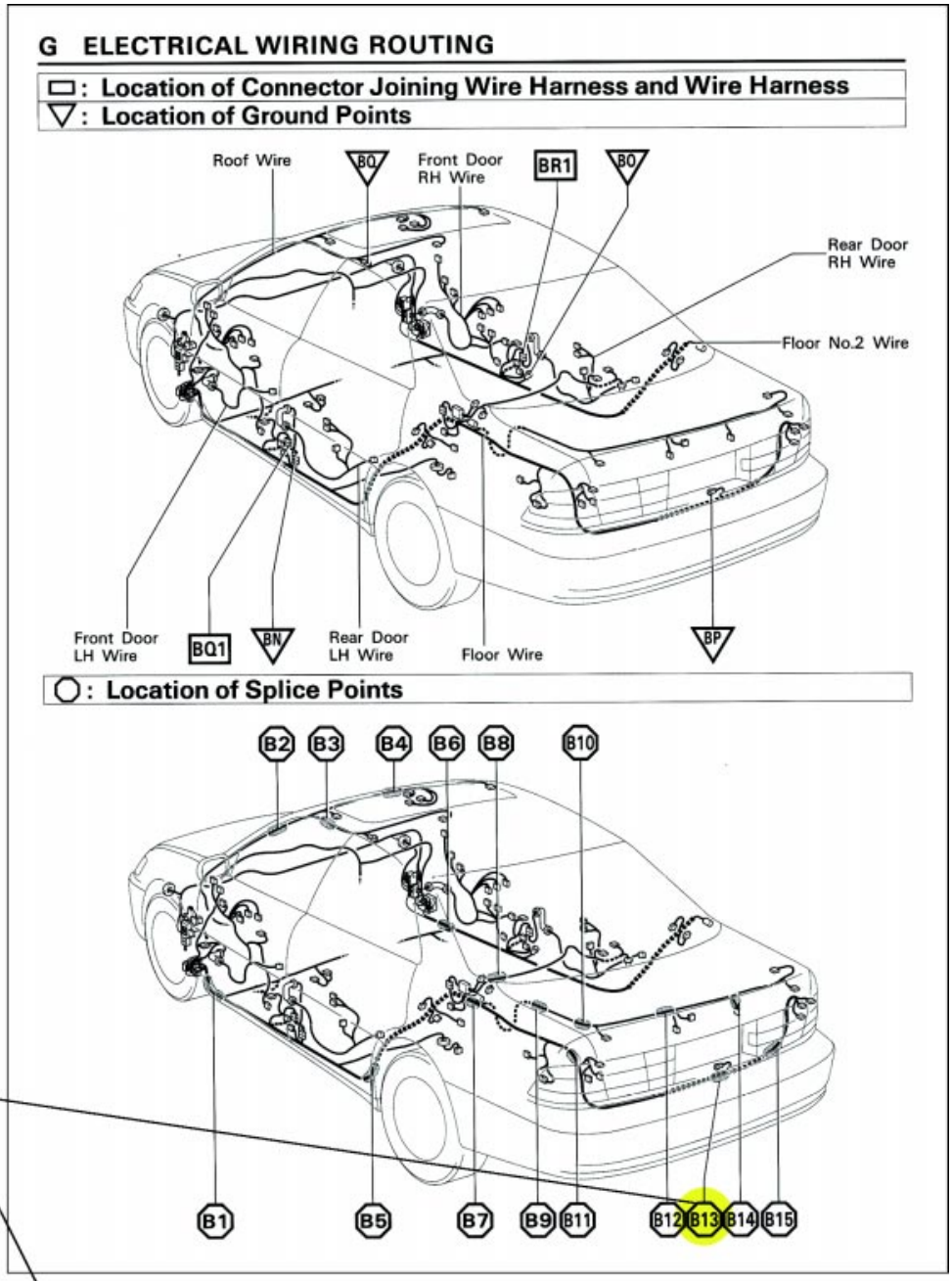


Fig. 2-15
L652f215

Locating a Splice Point

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



Splice Point

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	34	Cowl Wire	B12		
B5			B13	40	Floor Wire
B10	40	Floor Wire	B14		
B11			B15		

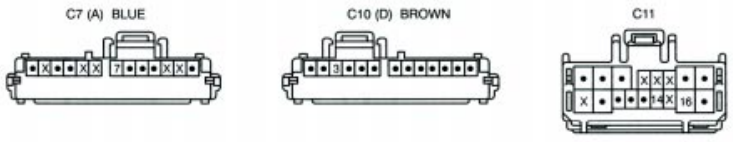


Fig. 2-16
L652f216

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

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.

Key Features

- **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** (**Section H** starting with 2000 MY) 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** (**Section K** in 1999 MY; and **Section J** starting with 2000 MY). 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 IDs, splice IDs, wire colors, and support sections), it is not as useful.

Section I Power Source (System Circuit)

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

Note: Starting with 1999 MY, Section H Power Source (System Circuit).

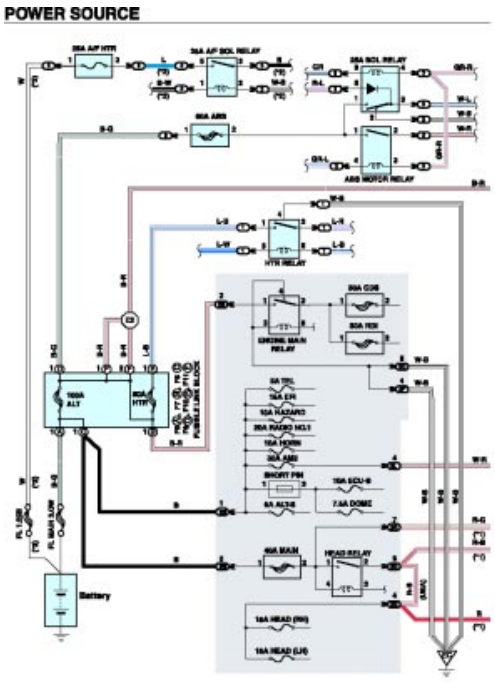


Fig. 2-17
L652f217

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.

Note: Section K in 1999 MY; and Section J starting with 2000 MY. (See Figure 2-19)

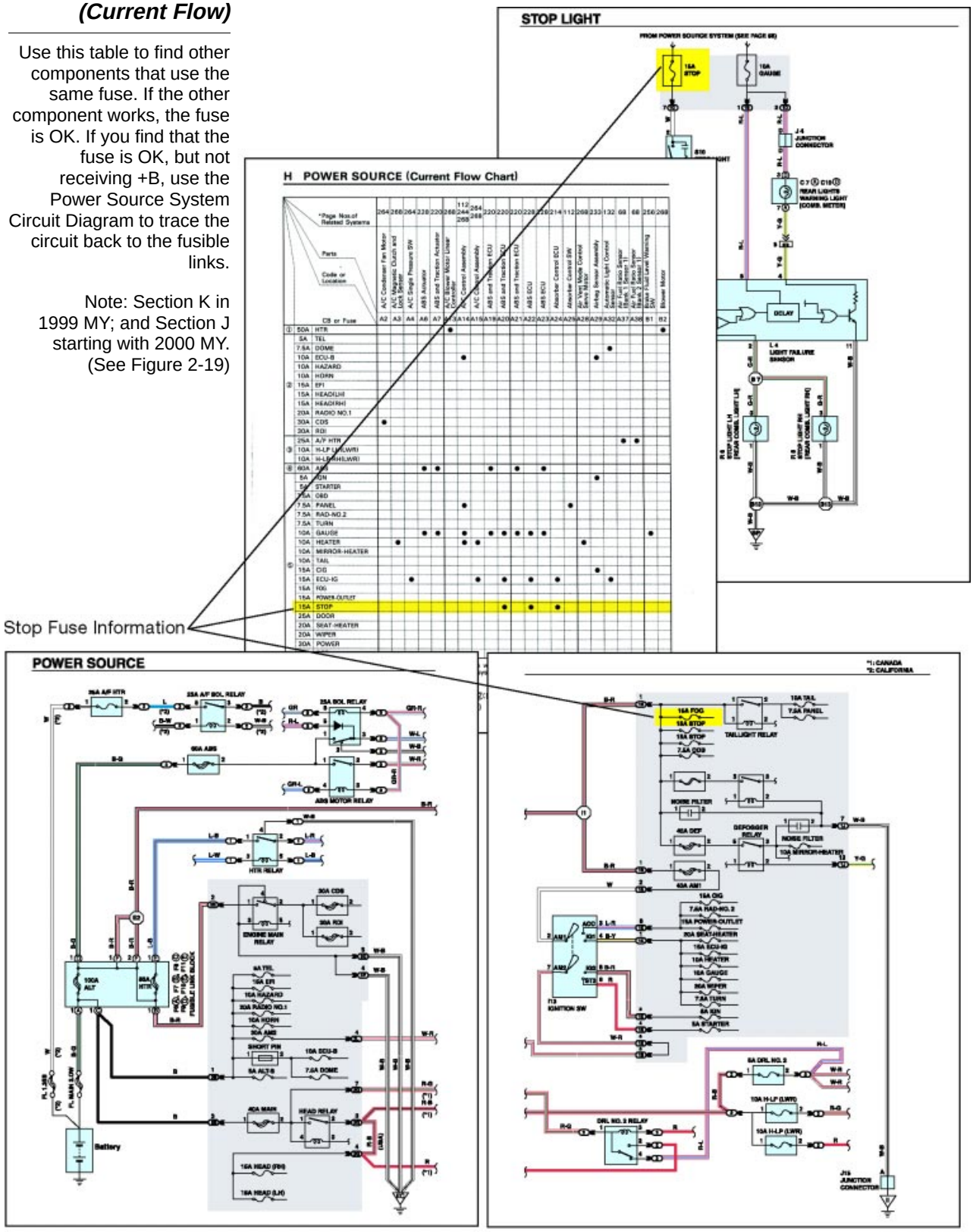


Fig. 2-18
L652I219

Power Source (Current Flow) Starting with 1999 MY

Starting with the 1999 MY, the Power Source (Current Flow Chart) change to a table format.

Note: Section K 1999 MY, Section J starting 2000 MY.

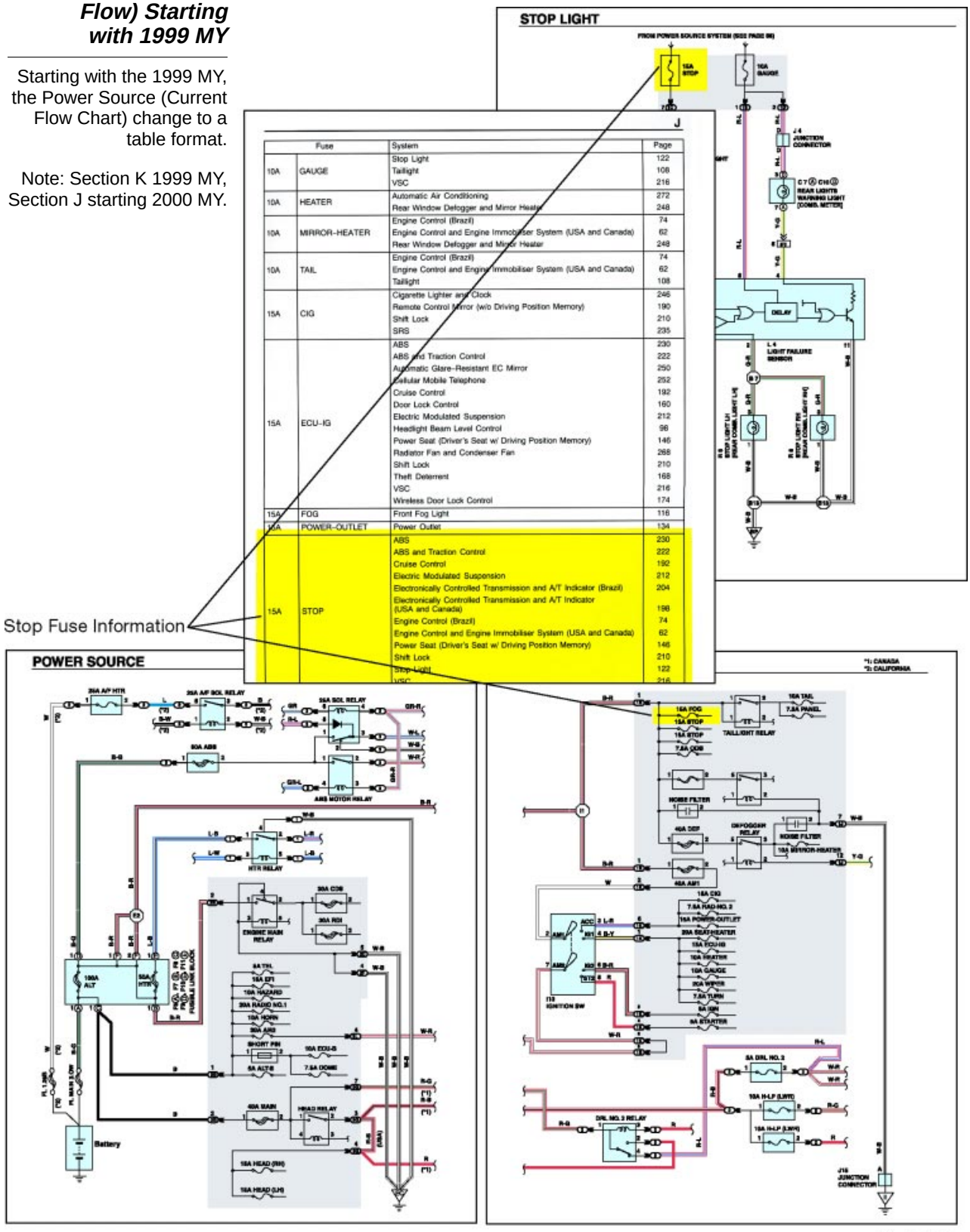


Fig. 2-19
L652I219

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.

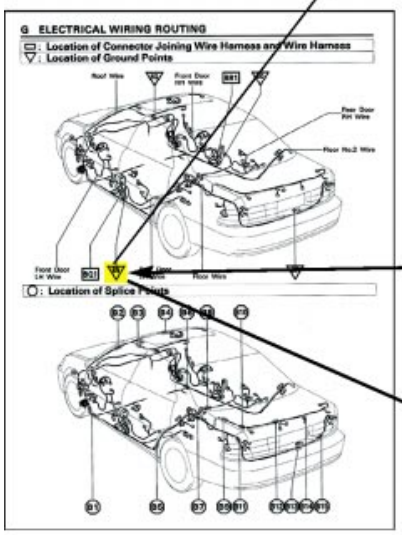
Key Features

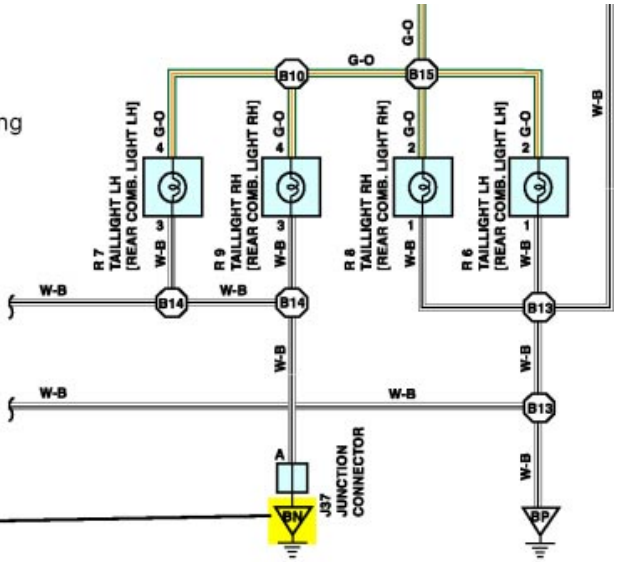
- **Ground Point ID**
  To check the grounding point, look for the triangle shaped ground symbol on the bottom of the page. All ground points have a two-letter ID number: the first letter represents *E*ngine, *I*nstrument panel, or *B*ody, the same as with the splice points and harness-to-harness connectors.
- **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.

Find the ground point by using the Ground ID number





: GROUND POINTS

Code	See Page	Ground Points Location
EA	34	Right Radiator Side Support
EC	34	Left Radiator Side Support
II	36	Instrument Panel Brace LH
BN	40	Under the Left Center Pillar
BP	40	Back Panel Center

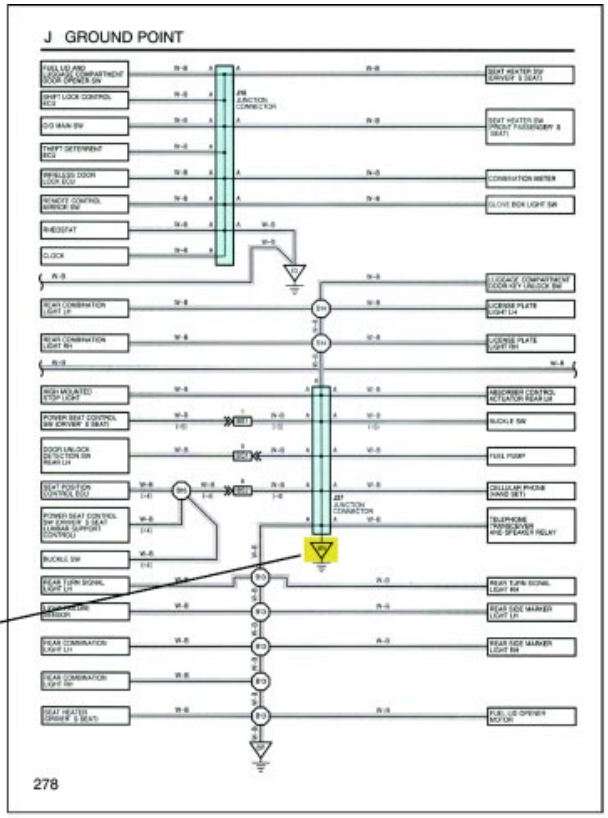
Fig. 2-20
L652f220

Section J
Ground Points

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

Note: Section I starting with 1999 MY.

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



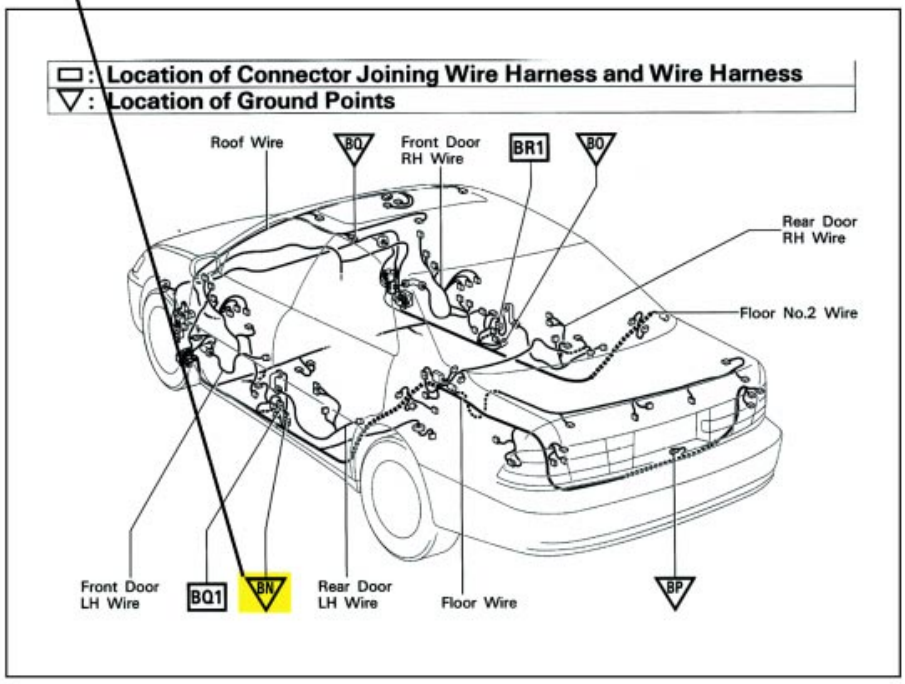


Fig. 2-21
L652I221

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

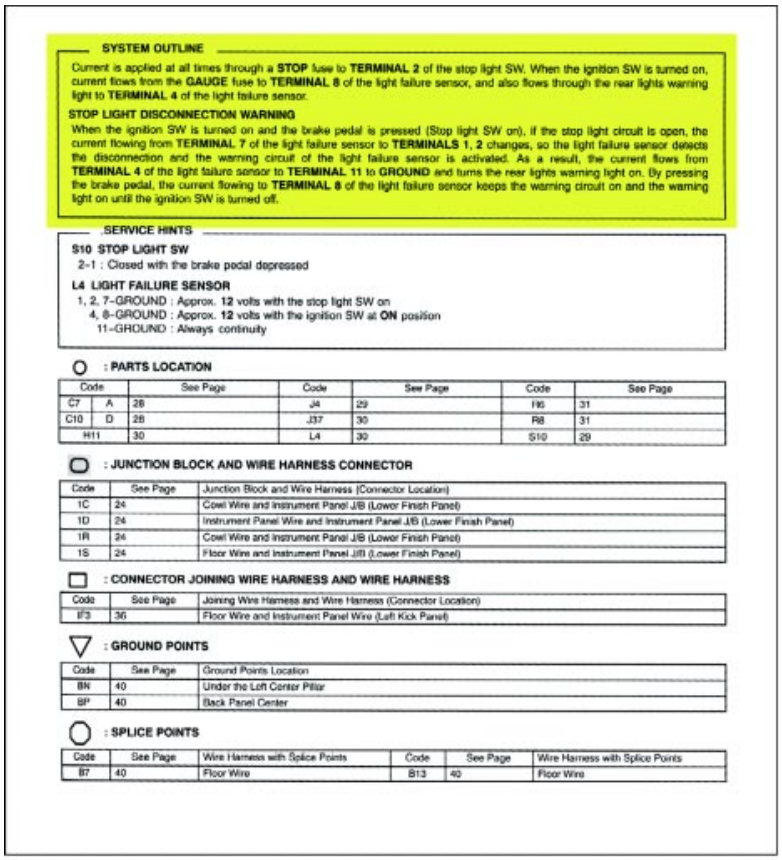
The first step in any diagnostic process is to **verify the problem**. To do this, you'll need to know exactly how the system is supposed to work. The **System Outline** is one of the best places for this information. This section, which follows immediately after the wiring diagram, describes the operation 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.



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 lights 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 **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 to **TERMINAL 11** to **GROUND** and turns the rear lights warning light on. By pressing the brake pedal, the current flowing to **TERMINAL 8** of the light failure sensor keeps the warning circuit on and the warning light on until the ignition SW is turned off.

SERVICE HINTS

S10 STOP LIGHT SW
2–1 : Closed with the brake pedal depressed

L4 LIGHT FAILURE SENSOR
1, 2, 7–GROUND : Approx. **12** volts with the stop light SW on
4, 8–GROUND : Approx. **12** volts with the ignition SW at **ON** position
11–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C7	A	28	J4	29	R6	31
C10	D	28	J37	30	R8	31
H11		30	L4	30	S10	29

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	24	Cowl Wire and Instrument Panel J/B (Lower Finish Panel)
1D	24	Instrument Panel Wire and Instrument Panel J/B (Lower Finish Panel)
1R	24	Cowl Wire and Instrument Panel J/B (Lower Finish Panel)
1S	24	Floor Wire and Instrument Panel J/B (Lower Finish Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IF3	36	Floor Wire and Instrument Panel Wire (Left Kick Panel)

: GROUND POINTS

Code	See Page	Ground Points Location
BN	40	Under the Left Center Pillar
BP	40	Back Panel Center

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B7	40	Floor Wire	B13	40	Floor Wire

Fig. 2-22
L6521222

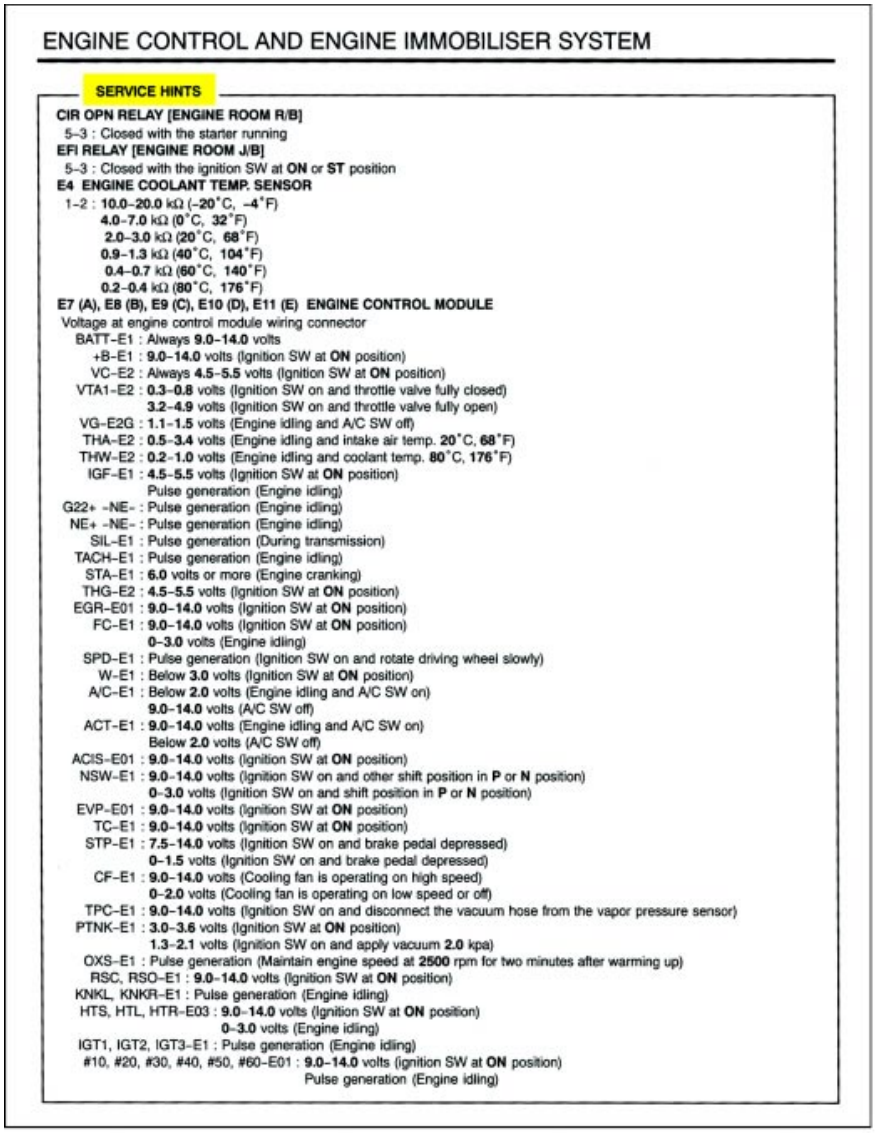
Service Hints

This section provides pin voltages and/or 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.



ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM

SERVICE HINTS

CIR OPN RELAY [ENGINE ROOM R/B]
5–3 : Closed with the starter running
EFI RELAY [ENGINE ROOM J/B]
5–3 : Closed with the ignition SW at **ON** or **ST** position
E4 ENGINE COOLANT TEMP. SENSOR
1–2 : **10.0–20.0** kΩ (**–20**°C, **–4**°F)
4.0–7.0 kΩ (**0**°C, **32**°F)
2.0–3.0 kΩ (**20**°C, **68**°F)
0.9–1.3 kΩ (**40**°C, **104**°F)
0.4–0.7 kΩ (**60**°C, **140**°F)
0.2–0.4 kΩ (**80**°C, **176**°F)
E7 (A), E8 (B), E9 (C), E10 (D), E11 (E) ENGINE CONTROL MODULE
Voltage at engine control module wiring connector
BATT–E1 : Always **9.0–14.0** volts
+B–E1 : **9.0–14.0** volts (Ignition SW at **ON** position)
VC–E2 : Always **4.5–5.5** volts (Ignition SW at **ON** position)
VTA1–E2 : **0.3–0.8** volts (Ignition SW on and throttle valve fully closed)
3.2–4.9 volts (Ignition SW on and throttle valve fully open)
VG–E2G : **1.1–1.5** volts (Engine idling and A/C SW off)
THA–E2 : **0.5–3.4** volts (Engine idling and intake air temp. **20**°C, **68**°F)
THW–E2 : **0.2–1.0** volts (Engine idling and coolant temp. **80**°C, **176**°F)
IGF–E1 : **4.5–5.5** volts (Ignition SW at **ON** position)
Pulse generation (Engine idling)
G22+ –NE– : Pulse generation (Engine idling)
NE+ –NE– : Pulse generation (Engine idling)
SIL–E1 : Pulse generation (During transmission)
TACH–E1 : Pulse generation (Engine idling)
STA–E1 : **6.0** volts or more (Engine cranking)
THG–E2 : **4.5–5.5** volts (Ignition SW at **ON** position)
EGR–E01 : **9.0–14.0** volts (Ignition SW at **ON** position)
FC–E1 : **9.0–14.0** volts (Ignition SW at **ON** position)
0–3.0 volts (Engine idling)
SPD–E1 : Pulse generation (Ignition SW on and rotate driving wheel slowly)
W–E1 : Below **3.0** volts (Ignition SW at **ON** position)
A/C–E1 : Below **2.0** volts (Engine idling and A/C SW on)
9.0–14.0 volts (A/C SW off)
ACT–E1 : **9.0–14.0** volts (Engine idling and A/C SW on)
Below **2.0** volts (A/C SW off)
ACIS–E01 : **9.0–14.0** volts (Ignition SW at **ON** position)
NSW–E1 : **9.0–14.0** volts (Ignition SW on and other shift position in **P** or **N** position)
0–3.0 volts (Ignition SW on and shift position in **P** or **N** position)
EVP–E01 : **9.0–14.0** volts (Ignition SW at **ON** position)
TC–E1 : **9.0–14.0** volts (Ignition SW at **ON** position)
STP–E1 : **7.5–14.0** volts (Ignition SW on and brake pedal depressed)
0–1.5 volts (Ignition SW on and brake pedal depressed)
CF–E1 : **9.0–14.0** volts (Cooling fan is operating on high speed)
0–2.0 volts (Cooling fan is operating on low speed or off)
TPC–E1 : **9.0–14.0** volts (Ignition SW on and disconnect the vacuum hose from the vapor pressure sensor)
PTNK–E1 : **3.0–3.6** volts (Ignition SW at **ON** position)
1.3–2.1 volts (Ignition SW on and apply vacuum **2.0** kpa)
OXS–E1 : Pulse generation (Maintain engine speed at **2500** rpm for two minutes after warming up)
RSC, RSO–E1 : **9.0–14.0** volts (Ignition SW at **ON** position)
KNKL, KNKR–E1 : Pulse generation (Engine idling)
HTS, HTL, HTR–E03 : **9.0–14.0** volts (Ignition SW at **ON** position)
0–3.0 volts (Engine idling)
IGT1, IGT2, IGT3–E1 : Pulse generation (Engine idling)
#10, #20, #30, #40, #50, #60–E01 : **9.0–14.0** volts (Ignition SW at **ON** position)
Pulse generation (Engine idling)

Fig. 2-23
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Overall Wiring Diagrams

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** (**Section H** starting with 1999 MY) 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.

Section K Overall Wiring Diagram

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

Note: Section J for 1999 MY, and Section M starting with 2000 MY.

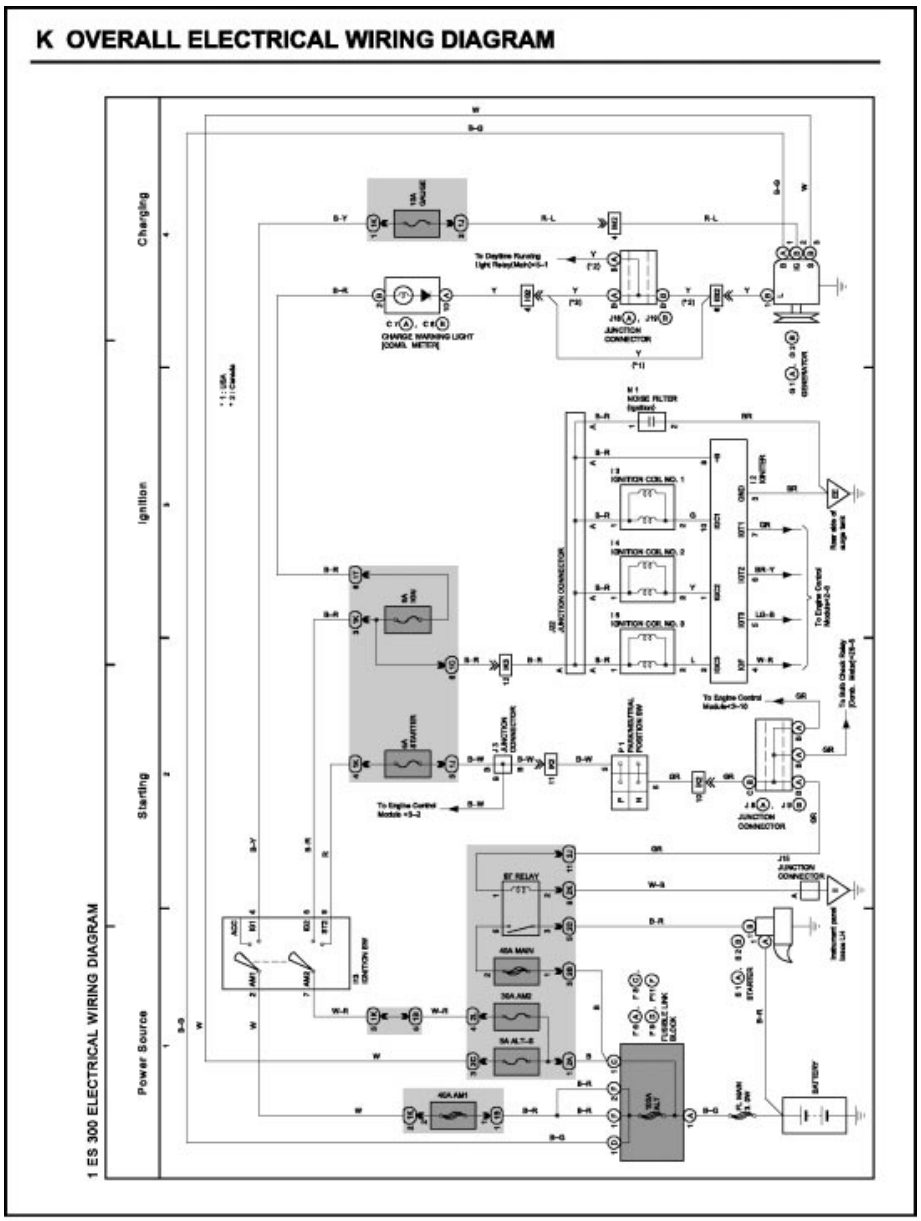

Fig. 2-24
L652f224

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 the 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.

To illustrate how the EWD is used when you are diagnosing an electrical problem, we will use the Lexus Six-Step Troubleshooting procedure for the following problem on a 1998 ES 300.

The six-step troubleshooting procedure will be covered in detail later in this course.

Section C Troubleshooting

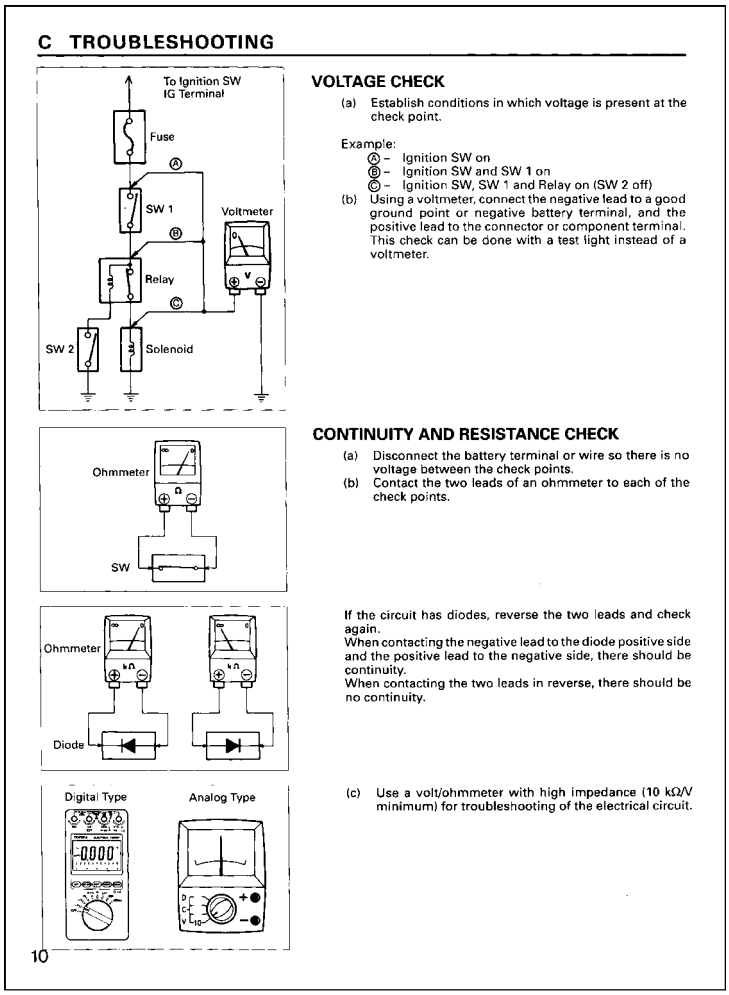

Fig. 2-25
L652f225

Section K Connector List

Section K (starting with 2000 MY) provides a connector list of all connectors applicable to the vehicle. Prior to 2000, connectors were located directly following each circuit to which they are applied.

Section K Connector List

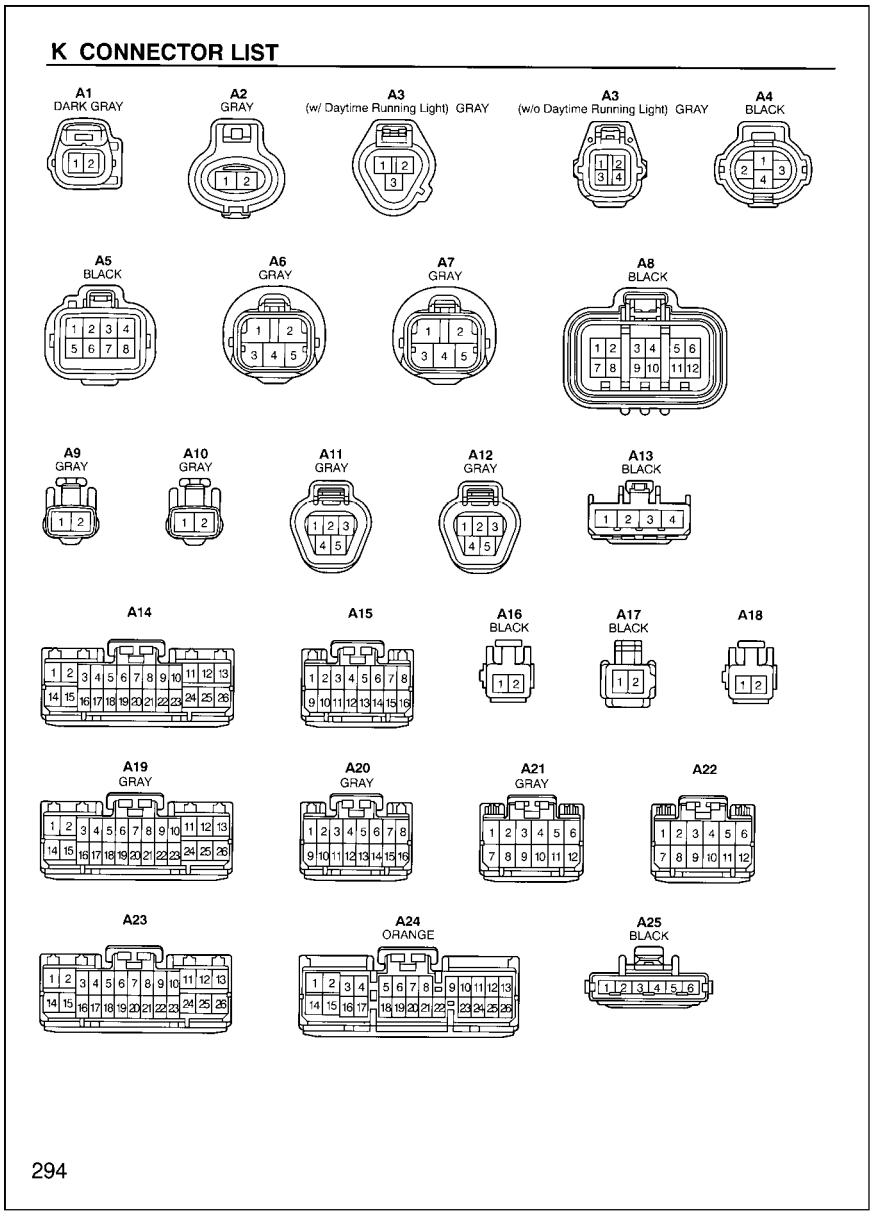

Fig. 2-26
L652f226

Section L

Section L (starting with 1999 MY) contains part numbers and connectors. Each connector has a code designation, a part name, and a part number. However, not all of the connectors or terminals with wire are in supply. Consult the "Parts Catalog News" to determine whether or not the connector you need is available.

Section L
Part Number of Connectors

L PART NUMBER OF CONNECTORS

Code	Part Name	Part Number
P24	Power Seat Motor (Front Passenger's Seat Reclining Control)	90980-10825
P25	Power Seat Motor (Front Passenger's Seat Slide Control)	
P26	Power Seat Position Sensor (Driver's Seat Front Vertical Control)	90980-10808
P27	Power Seat Position Sensor (Driver's Seat Rear Vertical Control)	
P28	Power Seat Position Sensor (Driver's Seat Reclining Control)	
P29	Power Seat Position Sensor (Driver's Seat Slide Control)	
P30	Pretensioner LH	90980-11862
P31	Pretensioner RH	
P32	Power Window Motor and ECU Front LH	90980-11535
P33	Power Window Motor and ECU Front RH	
R 1	Radiator Fan Motor	90980-10928
R 2	Radio and Player	90980-11264
R 3	Radio and Player	90980-10803
R 4	Remote Control Mirror SW	90980-11657
S14	Seat Position Control ECU	90980-11527
S15	Seat Position Control ECU	90980-11502
S16	Side Airbag Sensor LH	90980-11857
S17	Side Airbag Sensor RH	
S18	Side Airbag Squib LH	90980-11864
S19	Side Airbag Squib RH	
T 1	Theft Deterrent Horn	90980-11235
T 2	Throttle Position Sensor	90980-11261
T 3	Theft Deterrent ECU	90980-11424
T 4	Theft Deterrent ECU	90980-11392
T 5	TRAC Off SW	90980-11013
T 6	Turn Signal Flasher Relay	82751-50010
T 7	Telephone Transceiver and Speaker Relay	90980-10803
T 8	Telephone Transceiver and Speaker Relay	90980-10802
T 9	Transponder Key Amplifier	90980-10789
T10	Turbine Speed Sensor	90980-11156
T11	Transponder Key Computer	90980-11556
U 1	Unlock Warning SW (Ignition Key)	90980-10860

Fig. 2-27
L652f227