
Electrical Troubleshooting

320i

BMW of North America, Inc.



SECTION 1 INTRODUCTION

BMW 320i

The BMW 320i Electrical Troubleshooting Manual is a newly developed system of diagramming and presenting electrical data for automotive troubleshooting. The Manual is designed to explain how each circuit was designed to operate and to locate electrical components on the vehicle. Components are grouped by function such as "Auxiliary Fan" and "Windshield Wipers and Washer". All grounds associated with each circuit are grouped together. The diagram clearly shows the electrical interdependence among components. Three power buses are used on the diagram — the "Battery Bus", the "Start-Run Bus" and the "Accessory-Run-Start Bus". These three power buses are drawn as horizontal lines at the top of each page. (The "Accessory-Run-Start Bus" is shown only on page 4-11. The "Battery Bus" is connected directly to the battery at all times. See page 4-3, section A11. There is a direct connection from the battery to the battery bus. All circuits connected to the "Battery Bus" have voltage available at all times - regardless of the position of the Ignition Switch. For example, the Auxiliary Fan circuit is connected to the "Battery Bus" as shown on page 4-7, section A5. If voltage is not present at the bus and bus troubleshooting is therefore required, see page 4-7, section C17 for detailed bus wiring. The "Start-Run Bus" is "hot", or energized, whenever the Ignition Key is in the Start or Run positions. See page 4-3, section B23. The "Accessory-Run-Start Bus" is "hot" whenever the Ignition Key is in the Start, Run or Accessory position. See page 4-11, section B13.

The schematic also diagrams "ground buses" to further clarify circuit operation. For example, see page 4-11, section G6. The windshield wiper motor is shown grounded via Splice S42 to Ground point G49. See page 4-12 for detailed ground bus wiring for the windshield wiper motor.

Complicated electromechanical devices such as Ignition and Light switches are diagrammed for easy correlation of switch position and current path through the switch. See page 4-11, section C19. When the Hazard Switch is in the OFF position as shown, current flows from terminal 15 to terminal 49; when the Hazard Switch is in the ON position current flows from terminal 30 to terminal 49. There are four poles or sections of the Hazard Switch which move together when the switch is operated.

Notes are used extensively to explain the operation of individual components and circuits. For example, on page 4-3, section G11, Note B explains the design operation of the Unloader Relay. On page 4-4, section E8, the note in parenthesis states that the Driver's Seat Belt Switch is open when buckled.

Section 3.0 of the Manual contains photographs and diagrams which locate electrical components on the vehicle.

When a component is shown at only one location on a schematic, it is outlined with a heavy solid line. For example, on page 4-11, section G5, note the heavy solid line outlining the Windshield Wiper Motor. Components which are shown at more than one location on the schematic are outlined with a heavy dash-dot line. For example, the Ignition Switch shown on page 4-11, section B13.

Components which contain transistors and other electronic components are labeled on the schematic "transistorized." No attempt should be made to troubleshoot these assemblies without special test equipment.

Two electrical measuring instruments are necessary in order to use the ETM properly and efficiently. These are a voltmeter capable of measuring up to 15 volts D.C. and either a continuity tester or ohmmeter.

1 VERIFY THE COMPLAINT

Check the complaint yourself to be sure the problem was correctly stated to you.

2 LOCATE THE FAULT ON THE SCHEMATIC

Use the index on page 4-1 to locate the circuit.

3 ANALYZE THE CIRCUIT

Before working on the vehicle, study the problem circuit until you understand how it works. As an example, consider the case of a complaint that the turn signals are inoperative. As shown on the schematic on page 4-11, the Turn Signal Lights are connected to the Turn Signal Switch. Power to this switch comes from the Flasher Unit, which is used for both hazard flashing and turn signal flashing. Therefore the Flasher Unit can be readily checked by operating the Hazard Flasher Switch. If this causes the lights to flash properly, it shows that the flasher and the lights are ok.

As shown on the schematic, power for turn signals comes from Fuse 15 via the Windshield Wiper Switch. Therefore, if the windshield wiper operates, the fuse is good. In order to determine if power is getting to the flasher, check for power at terminal 49 of the Flasher Unit, by means of a test light or voltmeter. If there is power at the terminal, the trouble is likely to be in the Turn Signal Switch or in the green/yellow wire to the switch. Unplug connector C63, and by means of a test light or voltmeter, check for power at the connector terminal of the green/yellow wire which goes to the Flasher Unit. Switch on the Hazard Flasher Switch. As the vehicle lights flash in the hazard mode, the test light should also flash. If it does not, you know to look for an open circuit in the wire from connector C63 to the Flasher Unit, or a loose connection at one end of the wire.

4 CORRECT THE FAILURE**5** CHECK FOR PROPER CIRCUIT OPERATION

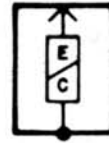
Good practice calls for rechecking all circuits you have worked on.

SECTION 2 SYMBOLS AND DATA

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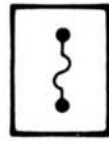
BATTERY



ELECTRIC CLUTCH



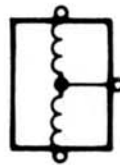
CAPACITOR



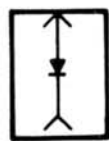
FUSE



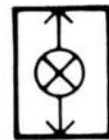
COIL



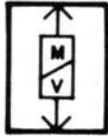

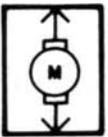
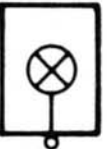
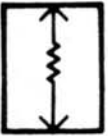
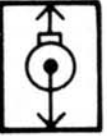
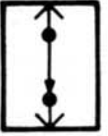
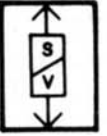
GAUGE OR METER


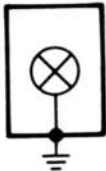

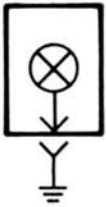
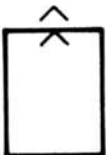

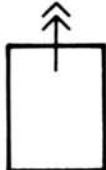
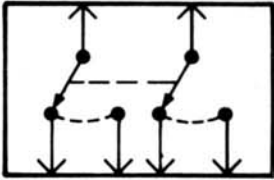


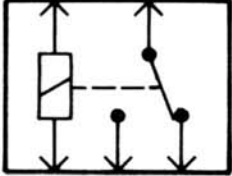

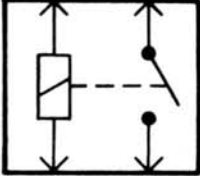
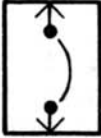



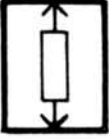
DIODE



LIGHT

 <p>MAGNETIC VALVE</p>	 <p>SWITCH, NORMALLY OPEN 1 POLE</p>
 <p>MOTOR</p>	 <p>TERMINAL SCREW</p>
 <p>RESISTOR, FIXED</p>	 <p>SLIP RING</p>
 <p>SWITCH, NORMALLY CLOSED 1 POLE</p>	 <p>SOLENOID VALVE</p>

 <p>COMPONENT SHOWN COMPLETE IN ONE POSITION ON SCHEMATIC</p>	 <p>GROUND THROUGH COMPONENT MOUNTING SCREW</p>
 <p>COMPONENT SHOWN IN MORE THAN ONE POSITION ON SCHEMATIC</p>	 <p>GROUND THROUGH WIRE ATTACHING TO COMPONENT</p>
 <p>CONNECTOR MOUNTED ON COMPONENT</p>	 <p>RESISTOR, TEMPERATURE VARIABLE</p>
 <p>CONNECTOR MOUNTED ON CABLE</p>	 <p>SWITCH, TWO POLES, TWO POSITIONS. MAY BE ROTARY OR PUSH-PULL</p>

 <p>RELAY WITH NORMALLY OPEN AND NORMALLY CLOSED CONTACTS</p>	 <p>GROUND POINT</p>
 <p>RELAY WITH NORMALLY OPEN CONTACT</p>	 <p>CIRCUIT BREAKER</p>
 <p>SPLICE</p>	 <p>CONNECTOR, UNUSED TERMINAL</p>
 <p>CONNECTOR, ONE TERMINAL</p>	 <p>THERMOSTATIC VALVE</p>

WIRE SIZE AND COLOR

Wire size and insulation color is shown on the schematic as an aid in locating specific wires. Wires whose cross section area is .75 square millimeters are not labeled. All other wire sizes are labeled. The first color shown is the base or overall insulation color. Second color, if any, designates the color of striping. All ground wires have brown insulation and are unmarked.

COLOR	COLOR CODE USED IN ETM	COLOR CODE USED ON EARLIER SCHEMATICS
White	wt	WS
Green	gn	GN
Brown	bn	BR
Yellow	yl	GE
Gray	gy	GR
Blue	bu	BL
Red	rd	RT
Black	bk	SW
Violet	vi	VI

Example:

Wire designation: 2.5 gy/rd

Wire size: 2.5 mm²

Insulation base color: gray

Insulation strip color: red

The following table shows wire size in American Wire Gauge (AWG) to be used if metric sized wire is unavailable.

METRIC (Crosssectional area in mm ²)	AWG
.75	18
1	16
2.5	12
4	10
6	8
8	8
16	4

SECTION 3 COMPONENT LOCATION AND TERMINAL PHOTOGRAPHS

BMW 320i

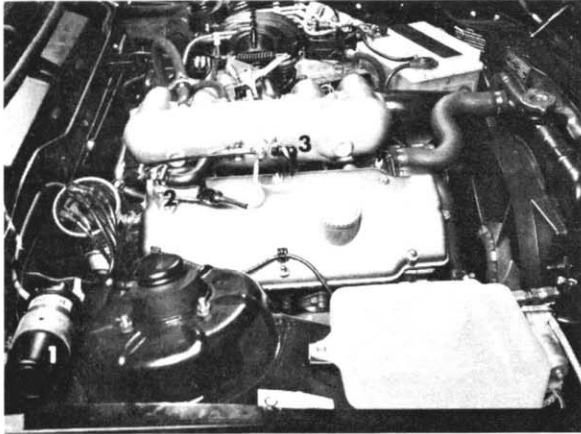


Fig. 1 ENGINE RIGHT SIDE

- 1 - Ignition Coil
- 2 - Auxiliary Air Valve
- 3 - Cold Start Injector Valve

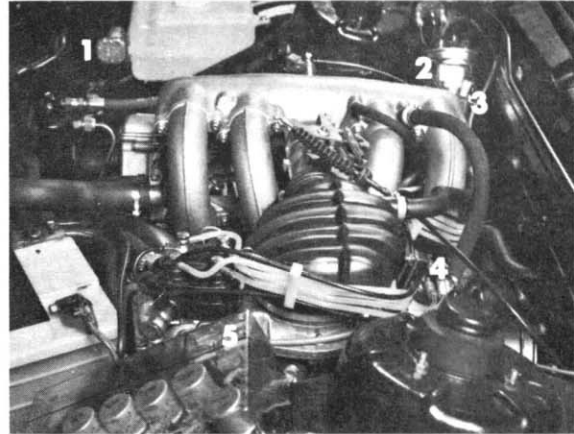


Fig. 2 ENGINE LEFT SIDE

- 1 - Windshield Washer Pump
- 2 - Tachometer Pickup
- 3 - Oil Pressure Switch
- 4 - Brake Fluid Level Switch
- 5 - Diagnostic Connector



Fig. 3 DISTRIBUTION BOX

- 1 - Fuel Pump Relay
- 2 - Low Beam Relay
- 3 - High Beam Relay
- 4 - Unloader Relay
- 5 - Auxiliary Fan Relay
- 6 - Diagnostic Plug
- 7 - Horn Relay

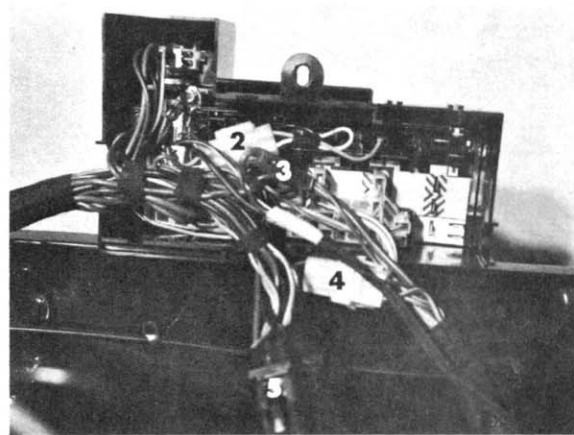


Fig. 4 DISTRIBUTION BOX

- 1 - Diagnostic Plug
- 2 - Connector C20f
- 3 - Connector C20m
- 4 - Connector C20k
- 5 - Connector C20h

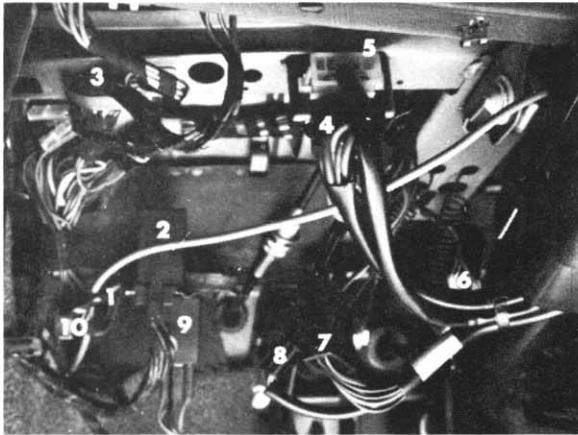


Fig. 5 LOWER LEFT INSTRUMENT PANEL

- 1 - Flasher
- 2 - Wiper Interval Control
- 3 - Connector C47 (Hidden in this view)
- 4 - Connector C60
- 5 - Connector C63
- 6 - Brake Light Switch
- 7 - Connector C56
- 8 - Connector C65
- 9 - Seatbelt Warning Timer
- 10 - Ground G49
- 11 - Starting Relay (Not shown in this view)

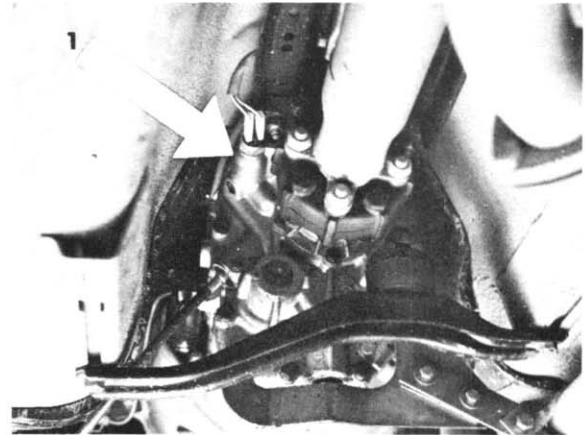


Fig. 6 MANUAL TRANSMISSION
1 - Backup Light Switch

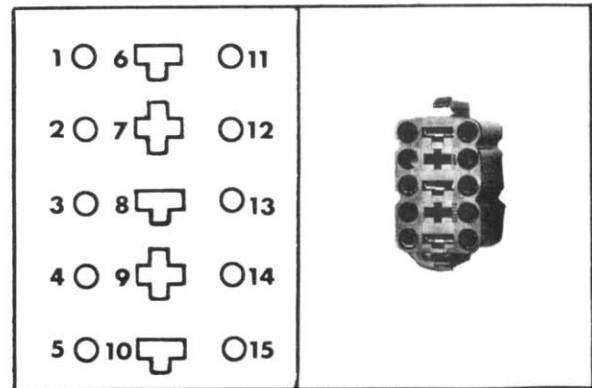


Fig. 8 ENGINE CONNECTOR - C20h

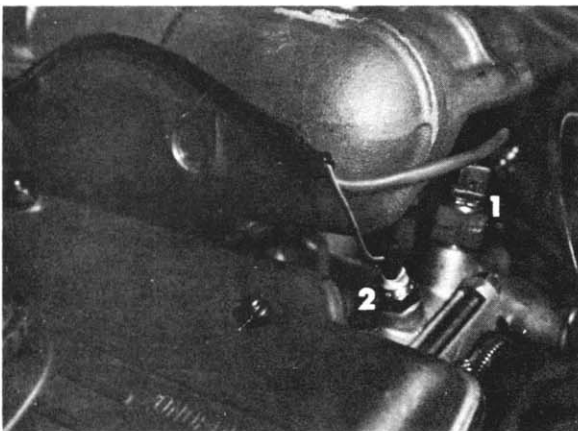


Fig. 7 TOP FRONT ENGINE

- 1 - Thermo-time Switch
- 2 - Engine Temperature Sender

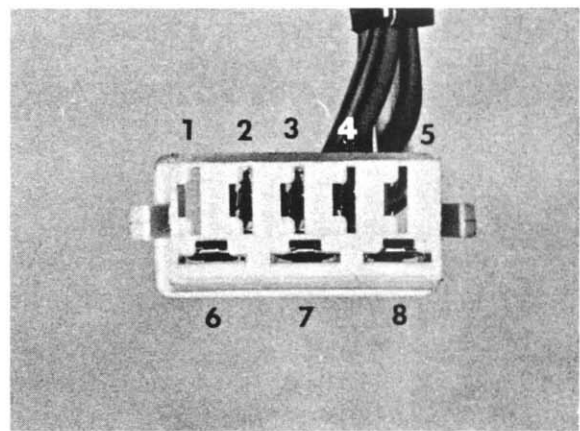


Fig. 9 FACE OF 8-PIN CONNECTOR PLUG

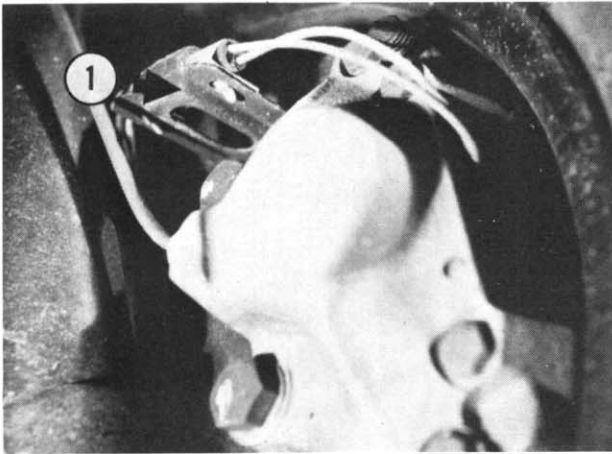


Fig. 10 BEHIND LH FRONT WHEEL
1 – Brake Lining Sensor Connector (C75)

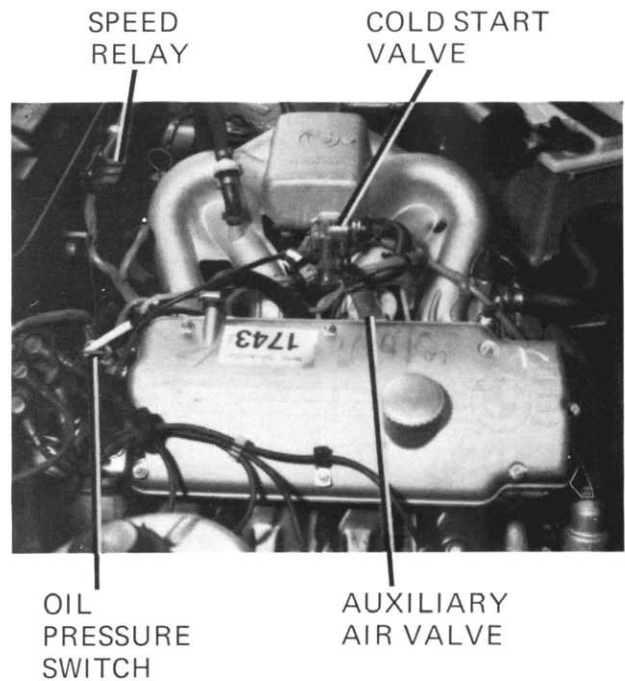


Fig. 11 ENGINE RIGHT SIDE

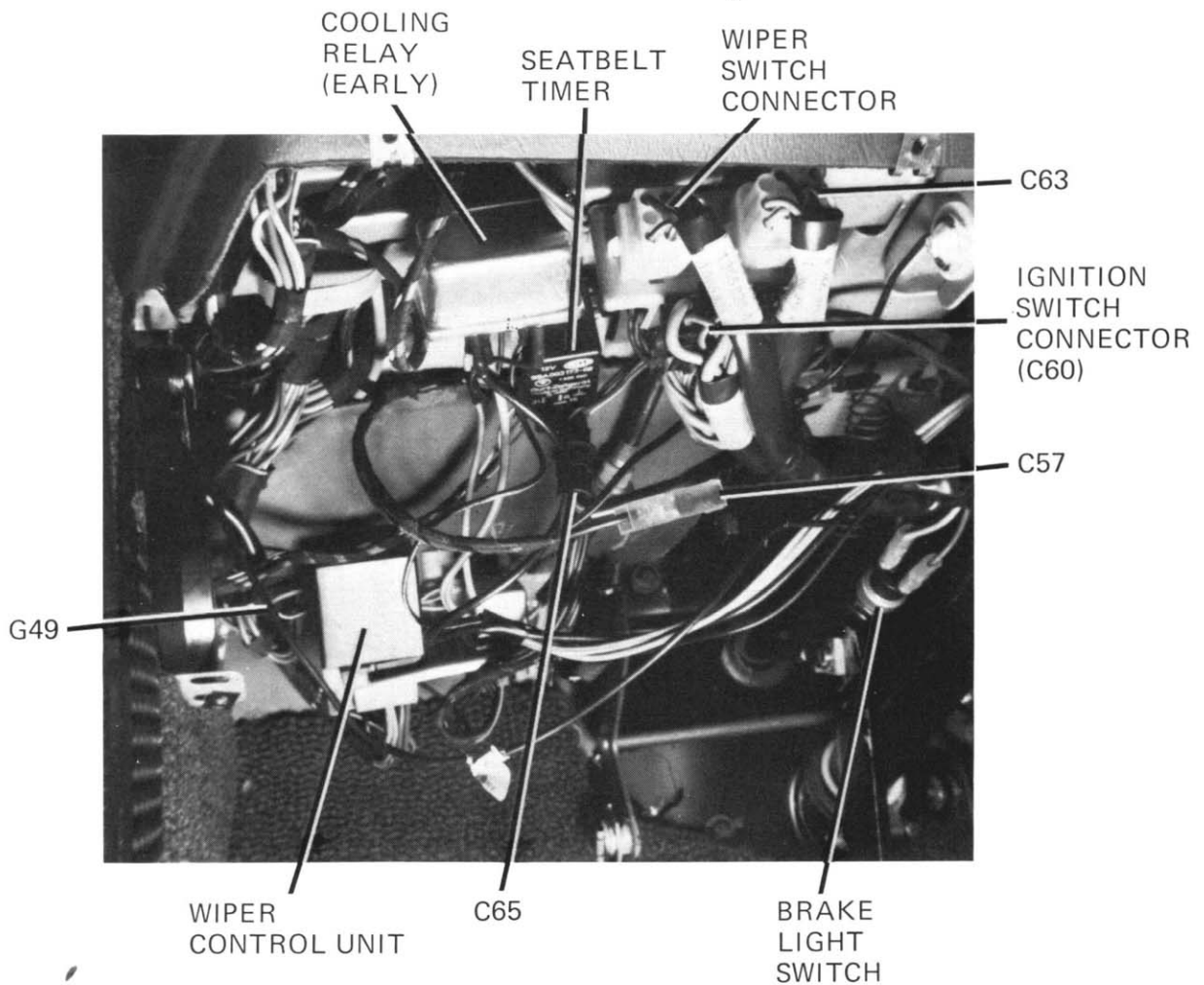


Fig. 12 LOWER LEFT INSTRUMENT PANEL

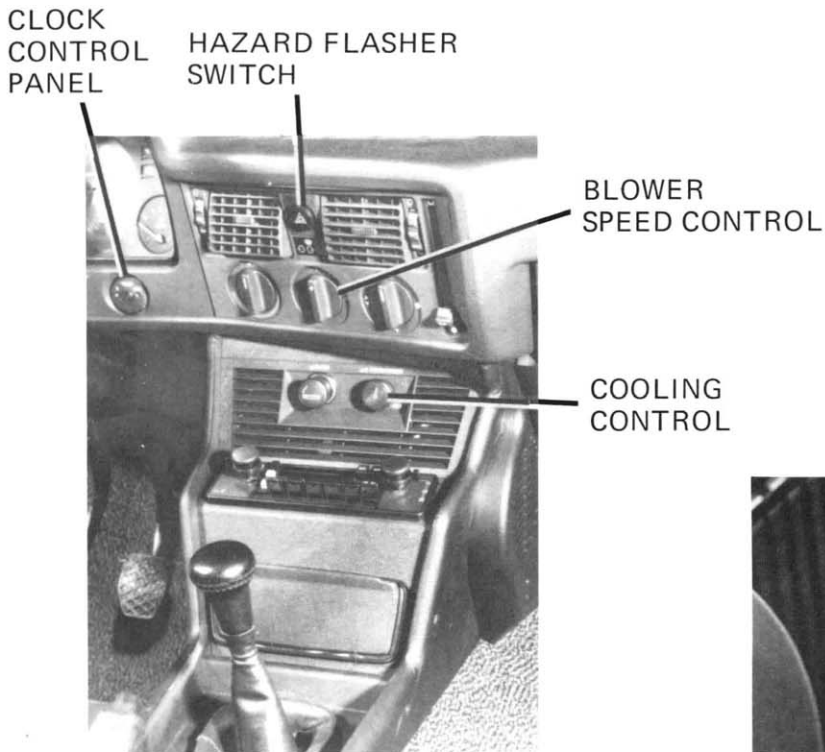


Fig. 13 CENTER DASH AND CONSOLE

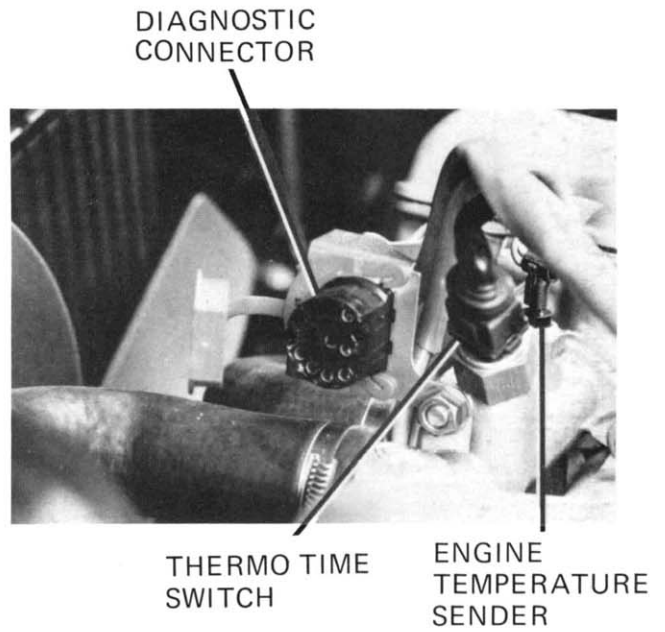


Fig. 14 FRONT TOP OF ENGINES

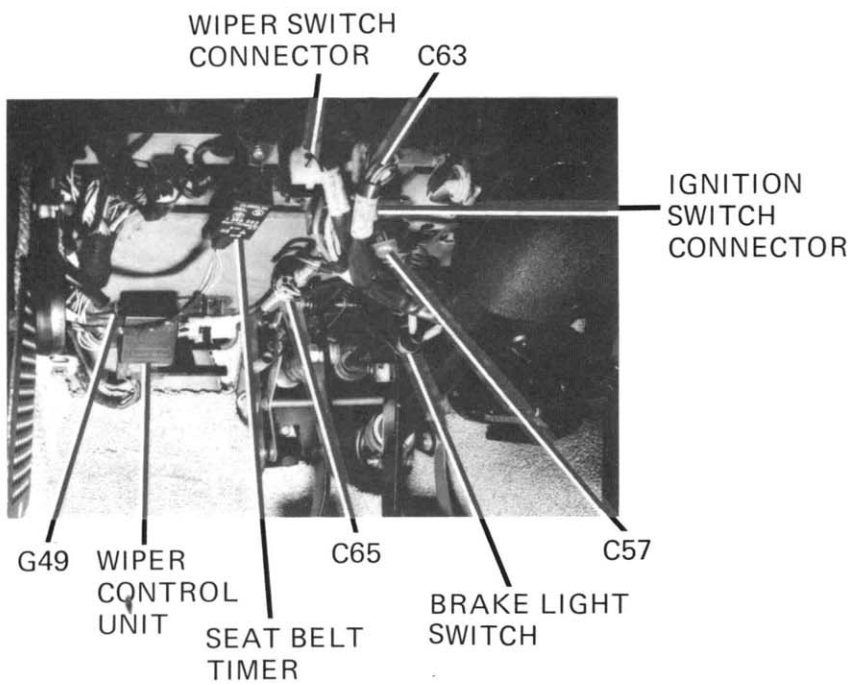


Fig. 15 UNDER LEFT DASH