2001 ACCESSORIES & EQUIPMENT

Analog Instrument Panels - Catera

DESCRIPTION & OPERATION

WARNING: **Vehicles are equipped with air bag supplemental restraint system. Before attempting ANY repairs involving steering column, instrument panel or related components, see SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM in appropriate AIR BAG RESTRAINT SYSTEMS article.**

INSTRUMENT PANEL CLUSTER

Displays Test

Certain Instrument Panel Cluster (IPC) features are tested when ignition switch is turned to RUN position to verify features are working properly. Following occurs at start up, ABS indicator illuminates for 3 seconds, air bag indicator illuminates, brake indicator illuminates for 3 seconds, brake pad wear indicator illuminates for 3 seconds, brake to shift indicator illuminates, charge indicator illuminates, check engine indicator illuminates, coolant temperature indicator illuminates for 3 seconds, fasten safety belt indicator illuminates for 5 seconds and then flashes continuously, fuel cap indicator illuminates, leveling indicator illuminates for 3 seconds, low coolant level indicator illuminates for 3 seconds, low engine oil level indicator illuminates, low fuel indicator illuminates for 3 seconds, low oil pressure indicator illuminates, low washer fluid indicator illuminates for 3 seconds, sport mode indicator illuminates for 3 seconds and traction control indicator illuminates for 3 seconds.

Engine Coolant Temperature Gauge

IPC displays engine coolant temperature as determined by engine coolant temperature sensor. IPC receives a hardwire input from engine coolant temperature sensor indicating engine coolant temperature.

Engine Oil Pressure Gauge

IPC displays engine oil pressure as determined by engine oil pressure switch. IPC receives a hardwire input from engine oil pressure switch indicating engine oil pressure.

Fuel Gauge

IPC displays fuel level as determined by fuel level sender. When fuel level is less than a pre-determined value, low fuel indicator illuminates.

Odometers

Each IPC is equipped with a season and a trip odometer. The IPC uses odometer rolling count message from EBCM to determine vehicle mileage.

Season Odometer

Season odometer displays total accumulated miles of vehicle. This value is permanently stored in the IPC. If an odometer malfunction occurs or if the IPC must be replaced, an authorized Delphi service center must be contacted to program proper vehicle specifics (including mileage) for the IPC. The season odometer is capable of displaying a maximum of 999,999 miles depending on units selected. Leading zeros are not displayed. Display will not roll-over to 000,000 if maximum displayed miles are reached. If display limit is exceeded, the maximum value is displayed.

Trip Odometer

Trip odometer displays the accumulated miles to the tenths of a mile since last reset. This value is stored in the IPC. Displayed trip odometer is reset on IPC by pressing trip reset button.

Speedometer

IPC displays vehicle speed as determined by EBCM. IPC monitors vehicle speed signal circuit to determine vehicle speed.

Tachometer

IPC monitors engine speed signal circuit from the EBCM to determine engine speed.

Voltage Gauge

IPC displays system voltage as detected at switched battery input of IPC.

INDICATOR/WARNING MESSAGE

ABS Indicator

IPC illuminates ABS indicator when IPC detects a malfunction with anti-lock brake system, IPC performs bulb display test at start of each ignition cycle, indicator illuminates for approximately 3 seconds.

Air Bag Indicator

IPC illuminates air bag indicator when IPC detects a malfunction with Supplemental Inflatable Restraint (SIR) system. IPC receives a discrete input from Sensing And Diagnosing Module (SDM) requesting illumination, IPC performs bulb display test at the start of each ignition cycle, IPC illuminates air bag indicator.

Brake Pad Wear Indicator

IPC illuminates brake pad wear indicator when IPC detects a hardwire input from left or right side disc brake pad wear sensor (signal is low). IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Brake System Indicator

IPC illuminates brake indicator when IPC detects a low brake fluid condition. IPC receives a discrete input from brake fluid level switch requesting illumination. IPC detects park brake is engaged. IPC receives a discrete input from park brake switch requesting illumination. IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Charging System Indicator

IPC illuminates charge indicator when generator output is less than 11 volts or 16 volts or more. IPC receives a discrete input from generator requesting illumination. IPC performs bulb display test at the start of each ignition cycle. IPC illuminates charge indicator, when ignition switch is in the RUN position.

Cruise Control Indicator

IPC illuminates the CRUISE indicator when Engine Control Module (ECM) detects that cruise control is requested.

Engine Coolant Temperature Indicator

IPC illuminates the coolant temperature indicator when IPC determines that the coolant temperature is 248°F (121°C) or more from engine coolant temperature gauge sensor. IPC performs bulb display test at start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Low Coolant Level Indicator

IPC illuminates low coolant indicator when IPC detects a low coolant level condition (signal is low) from coolant level sensor. IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Low Engine Oil Level Indicator

IPC illuminates the low engine oil level indicator when IPC detects an open from engine oil level sensor. IPC performs bulb display test at the start of each ignition cycle. IPC illuminates low engine oil level indicator.

Low Oil Pressure Indicator

IPC illuminates the low oil pressure indicator when IPC detects low oil pressure (signal is low) from engine oil pressure gauge switch. When low oil pressure indicator is on, there is an audible warning that chimes through the IPC. IPC performs bulb display test at the start of each ignition cycle. IPC illuminates the low oil pressure indicator.

Fasten Safety Belt Indicator

IPC illuminates the fasten safety belt indicator when IPC detects that the seat belt is unbuckled. IPC illuminates indicator for 5 seconds and then flashes indicator. IPC activates audible warning for 8 seconds or until seat belt is buckled. IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 5 seconds.

FUEL CAP Indicator

IPC illuminates the FUEL CAP indicator when IPC receives a hardwire input from ECM when fuel cap is not closed. IPC performs bulb display test at the start of each ignition cycle. IPC illuminates FUEL CAP indicator.

Low Fuel Indicator

IPC illuminates the low fuel indicator when IPC detects the fuel level is less than a pre-determined value. IPC receives a hardwire input from fuel sender indicating fuel level voltage. IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Fog Lamp Indicator

IPC illuminates the fog lamp indicator when malfunction relay K134 detects that the lamps are requested (signal is low) from multifunction relay K134.

Headlamp On Required Indicator

IPC illuminates the headlamp on required indicator when ambient light sensor detects it is dark enough outside that headlamps and/or other exterior lamps are required. Body Control Module (BCM) sends a hardwire (signal is low) output to IPC.

High Beam Indicator

IPC illuminates the high beam indicator when BCM detects that high beams are requested (signal is low).

Turn Signals Indicator

IPC illuminates the right or left turn signal indicator when IPC detects a turn signal request or a hazard request.

Malfunction Indicator Lamp

Powertrain Control Module (PCM) illuminates the Malfunction Indicator Lamp (MIL) SERVICE ENGINE SOON or CHECK ENGINE when PCM detects a malfunction in emissions system. PCM performs bulb display

test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds, when ignition switch is in RUN position.

BRAKE TO SHIFT Indicator

IPC illuminates the BRAKE TO SHIFT indicator when BCM sends a hard wire input to IPC (signal is low). IPC illuminates BRAKE TO SHIFT indicator when BCM determines that a shift is necessary. IPC performs bulb display test at the start of each ignition cycle. The illuminates BRAKE TO SHIFT indicator.

Sport Mode Indicator

IPC receives a hardwire input from Transmission Control Module (TCM) (signal is low) when sport mode button is pushed on the IPC. When this lamp is illuminated vehicle will have slightly firmer shifts and increased performance for part and full throttle situations. This lamp will also flash when there may be a problem with the automatic transmission. TCM performs a continual self diagnosis of certain control functions. Lamp will flash only when an error is detected. TCM will store in memory a current and/or history trouble code when a problem is detected. IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Suspension Indicator

IPC illuminates the LEVELING indicator when IPC detects a malfunction with the automatic leveling control system. IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Theft System Indicators

IPC illuminates SECURITY indicator in message center as determined by Vehicle Theft Deterrent (VTD) system. IPC receives a class 2 serial data message from theft deterrent controller module requesting illumination. VTD system requests IPC to illuminate SECURITY indicator only when the ignition switch is in RUN position. VTD system uses SECURITY indicator as a malfunction indicator. Content Theft Deterrent (CTD) system requests IPC to illuminate indicator only when ignition switch is in OFF position. CTD system uses indicator to identify system status.

Traction Control Indicator

IPC illuminates the traction control indicator when Electronic Brake Control Module (EBCM) detects a malfunction in the traction control system. IPC receives a hardwire input (signal is low) from the EBCM requesting illumination. IPC performs bulb display test at start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

Trunk Ajar Indicator

IPC illuminates the trunk ajar indicator when rear compartment lid ajar indicator switch closes indicating trunk is open. IPC performs bulb display test at the start of each ignition cycle.

Vehicle Overspeed Indicator

When vehicle speed reaches 120 km/h plus or minus 2 km/h, IPC illuminates the OVERSPEED indicator in message center. When vehicle speed is reduced to 115 km/h plus or minus 2 km/h message turns off.

Washer Fluid Indicator

IPC illuminates the low washer fluid indicator when IPC detects a low washer fluid condition (signal circuit is low). IPC performs bulb display test at the start of each ignition cycle. Indicator illuminates for approximately 3 seconds.

AUDIBLE WARNINGS

Audible warnings alert driver of a system concern or a critical vehicle condition. Instrument Panel Cluster (IPC) generates audible warning for key in ignition, fasten safety belt, and low engine oil pressure conditions. Headlamp switch generates audible warning for lights on condition. Following lists audible warning priority and pulse rate:

- Fast rate chime (200 pulses per minute).
- Medium rate chime (150 pulses per minute).
- Slow rate chime (50 pulses per minute).
- Single chime.

Fasten Safety Belt Warning

IPC activates fasten safety belt audible warning for 5-8 seconds. Fasten safety belt warning sounds and fasten seat belt indicator illuminates when ignition switch is in RUN, BULB TEST, or START position. IPC detects that driver's seat belt is not buckled (signal is low). If seat belt is buckled before ignition switch is in RUN, BULB TEST, or START position, chime does not sound. If seat belt is buckled while chime is sounding, chime stops.

Key-In-Ignition Warning

IPC activates the key-in-ignition audible warning. Key-in-ignition warning sounds when ignition switch is in OFF, LOCK, or ACCY position. IPC determines that the driver's door is open (signal is low). IPC determines that the key-in-ignition switch is closed (signal is high).

Lights On Warning

Headlamp switch activates lights on audible warning. Lights on warning sounds when key is not in ignition. Headlamp switch determines that driver's door is open (signal is low). Headlamp switch determines that headlamp switch is in park or headlight position.

Additional Chimes

Low engine oil pressure chime will turn on when low engine oil pressure indicator turns on in IPC. Overspeed chime will turn on when OVERSPEED indicator turns on in driver information center.

COMPONENT LOCATIONS

COMPONENT LOCATIONS

Component	Location
Coolant Temperature Gauge Sensor	On Coolant Bridge, At Rear Of Engine
Data Link Connector	To Left Of Steering Column
Engine Control Module	Left Front Corner Of Engine Compartment, In ECM Housing
Electronic Brake/Traction Control Module	Left Front Corner Of Engine Compartment, Attached To Lower Frame Rail
Engine Oil Level Sensor	Lower Right Front Of Engine Block
Engine Oil Pressure Gauge Switch	Lower Right Front Of Engine Block
Fuel Tank Sender	Inside Fuel Tank
Instrument Panel Fuse Block	Lower Left Side Of Steering Column, On Instrument Panel
In-Line Connector C102	Left Front Of Engine Compartment, Behind Battery
In-Line Connector C105	Left Front Of Engine Compartment, Behind Battery
In-Line Connector C115	On Top Of Rear Of Engine

In-Line Connector C200B	Bottom Of Left "A" Pillar
In-Line Connector C400	Under Vehicle, Near Front Of Fuel Tank
Splice S222	In Instrument Panel Wiring Harness, about 13" (330.2 mm) From Cruise Release Switch Branch Break-Off
Splice S238	In Instrument Panel Wiring Harness, About 7" (177.8) mm From Cruise Release Switch Branch Break-Off, To Right Of DLC Connector Branch Break-Off

PROGRAMMING

INSTRUMENT CLUSTER PROGRAMMING/SYNCHRONIZATION

When installing a new Instrument Panel Cluster (IPC) it must be programmed. To program the new IPC, connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Using scan tool, perform following steps:

1. Under instrument panel cluster, select PROGRAMMING option.
2. Follow programming instructions on display screen.

TROUBLE SHOOTING

PRELIMINARY INSPECTION

Verify customer complaint by operating suspected system. Verify instrument panel warning lamps are illuminating. Visually inspect for obvious signs of mechanical and electrical damage. Check for blown fuses. Check battery state of charge. Inspect for loose or corroded connections, damaged wiring harnesses and/or switches. Check for a broken or partially broken wire inside insulation, which could cause system malfunction but prove good in a continuity/voltage check with system disconnected. Pay special attention to harness routing where wires are hinged or make sharp bends. Ensure any aftermarket electronic equipment is properly installed. If fault is found, repair as necessary. If no fault is found, perform self-diagnostics. See **SELF-DIAGNOSTIC SYSTEM** .

INTERMITTENTS

PROBLEM DIAGNOSIS

Intermittent problem diagnosis requires duplication of circuit or component failure in order to identify problem. See **TEST PROCEDURES** . These procedures may lead to Powertrain Control Module (PCM) recording a DTC which may help diagnosis.

If system does not set a DTC, use scan tool or DVOM to monitor voltage or resistance values while attempting to reproduce conditions which will create an intermittent problem.

When monitoring voltage, ensure specified test conditions are met. When monitoring resistance, ensure ignition switch is in LOCK position or negative battery cable is disconnected. A status change on scan tool or DVOM while performing test procedures indicates area of problem.

TEST PROCEDURES

Intermittent Simulation

Use the following methods to reproduce conditions causing intermittent problem(s):

- Apply light vibration to components.
- Apply small amount of heat to component.

- Wiggle or bend wiring harness.
- Remove/apply vacuum supply source.

Monitor circuit/component voltage or resistance while attempting to simulate intermittent. If vehicle is running, monitor for DTCs. Use test results to identify problem component or circuit.

TROUBLE SHOOTING INTERMITTENTS

Symptom Definition

Malfunction Indicator Light (MIL) comes on but does not stay on. A stored DTC may or may not exist.

Possible Causes & Corrections

Use the following procedures to determine possible causes of intermittent MIL operation:

- Check for poor mating of one connector to another. Terminals may not be fully seated. Check for improperly formed or damaged terminals. Check wire-to-terminal connections.
- Check for poor connection from ignition coil to ground or arcing at spark plug wires or plugs.
- Check for poor connections at PCM ground terminals.
- Check for electrical system interference caused by defective relay, PCM-driven solenoid or switch, which may cause sharp electrical surge. This type of problem will normally occur when problem component is operated.
- Check for aftermarket parts which may not have been produced to manufacturer's specifications. Solenoids without original equipment diodes for circuit protection or voltage regulators using transistors instead of silicone-chip circuitry may cause voltage surges (up to 300 volts) in PCM wiring, causing temporary PCM shutdown. PCM shutdown is a normal response to system over voltage (over 16 volts on most models). PCM re-powers when condition ceases to exist. A rapid shutdown and re-power could cause a flickering MIL with no DTCs set in memory.
- Check for improper installation of electrical accessories such as auxiliary lights, cell phones or 2-way radios.
- Ensure ground wire from PCM to distributor or ignition module is connected to a good ground.
- Check for intermittent short to ground on data circuits of DLC or in MIL circuit. See ENGINE PERFORMANCE article in WIRING DIAGRAMS.
- On vehicles not equipped with a driver information center, use scan tool to check for intermittent wiring problem. See SCAN TOOL USAGE under SELF-DIAGNOSTIC SYSTEM in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

SELF-DIAGNOSTIC SYSTEM

INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK

1. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. If scan tool powers up, go to next step. If scan tool does not power up, go to SCAN TOOL DOES NOT POWER UP under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODULES - CATERA article.
2. Turn ignition switch to RUN position. Using scan tool, attempt to establish communication with Instrument Panel Cluster (IPC). If scan tool communicates with IPC, go to next step. If scan tool does not communicate with IPC, go to SCAN TOOL DOES NOT COMMUNICATE WITH KEYWORD DATA LINE under SYSTEM TESTS in BODY CONTROL MODULES - CATERA article.
3. Turn ignition switch to RUN position. Using scan tool, attempt to establish communication with Engine Control Module (ECM). If scan tool communicates with ECM, go to next step. If scan tool does not communicate with ECM, go to SCAN TOOL DOES NOT COMMUNICATE WITH KEYWORD DATA LINE under SYSTEM TESTS in BODY CONTROL MODULES - CATERA article.

4. Using scan tool, select DISPLAY DTCs function and retrieve any ECM or IPC DTCs. If scan tool displays any DTCs, go to next step. If scan tool does not display any DTCs, diagnose system by symptom. See **SYMPTOM INDEX** under SYSTEM TESTS.
5. If scan tool displays any DTCs which begin with "U", perform appropriate test. See SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in BODY CONTROL MODULES under SYSTEM TESTS - CATERA article. If scan tool displays any other DTCs, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** .

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DIAGNOSTIC TROUBLE CODE DEFINITION INDEX

DTC (1)	Description	(2) Perform Test
014	Coolant Temperature Low	**DTC 014**
051 Or 052	Reprogram Cluster Or Cluster Malfunction	**DTC 051 Or 052**
167	Fuel Gauge Voltage Low	**DTC 167**
168	Fuel Gauge Voltage High	**DTC 168**
P0460	Fuel Level Sensor Voltage Out Of Range	**DTC P0460**
Bxxx	Body Control Module Malfunction	(3)
Pxxx	Powertrain Control Module Malfunction	(4)
Uxxx	Communication Malfunction	(3)

(1) DTCs listed in this table are only for testing covered in this article. For complete DTC listing, see BODY CONTROL MODULES - CATERA article.

(2) Perform appropriate test under DIAGNOSTIC TESTS.

(3) For diagnostic procedures, see BODY CONTROL MODULES - CATERA.

(4) For diagnostic procedures, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

CLEARING DIAGNOSTIC TROUBLE CODES

Connect scan tool to Data Link Connector (DLC). Follow instructions on scan tool display to clear DTCs.

DIAGNOSTIC TESTS

NOTE: Diagnostic Trouble Code (DTC) tests are written specifically for use with GM Tech 2 scan tool. Generic scan tool can be used but may have limited functions. This article only covers portion of those systems and DTC tests which relate to analog instrument panel system diagnosis.

NOTE: Use adapter from Terminal Test Adapter Kit (J-35616-A) connected to DVOM when making all measurements.

NOTE: Unless otherwise specified, make all voltage and resistance measurements with a Digital Volt-Ohmmeter (DVOM) having an input impedance of 10 megohms or greater.

NOTE: Do not replace Body Control Module (BCM) unless a DTC remains current after all DTC repairs have been performed. Do not replace BCM if only history DTCs are

set.

NOTE: Before replacing any control module, ensure all module ground and power circuits are functioning properly. For circuit identification, see GROUND DISTRIBUTION and POWER DISTRIBUTION articles in WIRING DIAGRAMS.

DTC 014: COOLANT TEMP VOLTAGE LOW

Description

Instrument cluster contains a microprocessor which sends voltage to engine coolant temperature gauge sensor. Temperature gauge sensor is a thermistor. When engine coolant temperature changes, resistance in gauge sensor changes. Instrument cluster monitors changes in voltage caused by changes in resistance of sensor to determine coolant temperature. When resistance of sensor decreases, a smaller voltage drop across gauge sensor indicates a higher coolant temperature. When resistance increases, a larger voltage drop is sensed, indicating a lower coolant temperature.

Coolant temperature gauge circuit is tested every 100 milliseconds. DTC 14 will set when circuit is shorted to ground or coolant sensor is internally shorted (less than 15 ohms) for more than 8 seconds.

When DTC is set, module stores DTC 014 in memory, and coolant temperature gauge pointer will return to zero position.

DTC is cleared when, resistance is 15 ohms or more for 4 seconds, during next monitoring cycle. If conditions for fault are no longer present. DTC can be cleared using a scan tool.

Testing

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Disconnect Instrument Panel Cluster (IPC) 26-pin harness connector C1. IPC harness connector is located on back of instrument cluster. Turn ignition switch to RUN position. Check for short to ground in engine coolant temperature signal circuit, Blue wire between IPC harness connector C1 terminal No. 21 and engine coolant temperature gauge sensor. See **Fig. 1** . If short to ground is found, go to next step. If no short to ground is found, go to step 4 .
3. Disconnect engine coolant temperature gauge sensor harness connector. Sensor is located under intake manifold on coolant crossover. Turn ignition switch to RUN position. Check for short to ground in engine coolant temperature signal circuit, Blue wire between IPC harness connector C1 terminal No. 21 and engine coolant temperature gauge sensor. See **Fig. 1** . If short to ground is found, repair as necessary and go to step 6 . If no short to ground is found, go to step 5 .
4. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 6 .
5. Replace engine coolant temperature gauge sensor. After repairs are made, go to next step.
6. Connect scan tool to data link connector. Using scan tool, clear IPC DTCs. Operate system verifying repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

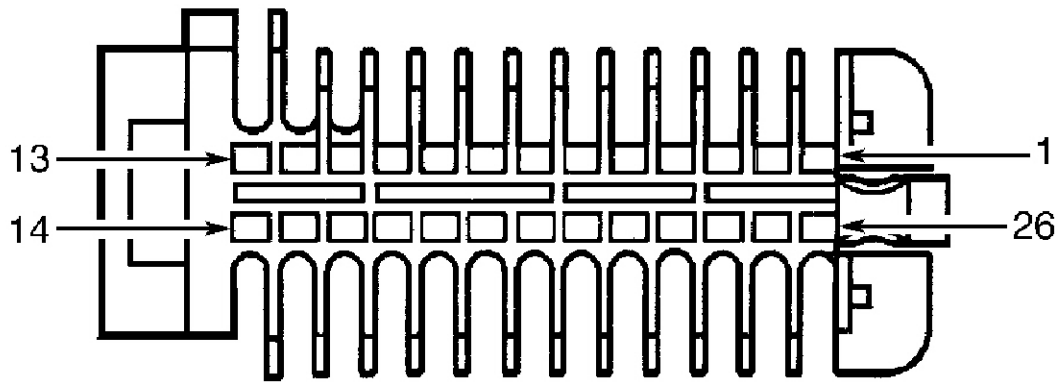


Fig. 1: Identifying Instrument Panel Cluster Harness Connector C1 Terminals
Courtesy of GENERAL MOTORS CORP.

Diagnostic Aids

Use freeze frame and/or failure records data to locate an intermittent condition. If DTC cannot be duplicated, information included in freeze frame and/or failure records data may aid in determining number of miles since DTC set. Fail counter and pass counter can also aid in determining number of ignition cycles that diagnostic reported a pass and/or fail. Operate vehicle within same freeze frame conditions (RPM, engine load, vehicle speed, temperature, etc.). This will aid in isolating when DTC failed.

If DTC is history or intermittent DTC, while performing tests, wiggle wiring and connectors. Before replacing instrument cluster, check all power and ground circuits to cluster. Visually inspect wiring harness and harness connectors for the following conditions:

- Damage or corrosion.
- Water intrusion.
- Poor terminal contact.
- Misrouted harness.
- Rubbed through wire insulation.
- Broken wire inside insulation.

DTC 051 OR 052: REPROGRAM CLUSTER OR CLUSTER MALFUNCTION

Description

Calibrations for instrument cluster are stored in Electrically Erasable Programmable Read Only Memory (EEPROM). When ignition is first turned on, instrument cluster performs internal tests on EEPROM and can determine the integrity of EEPROM's nonvolatile memory. DTC 51 indicates that EEPROM is either not programmed or an internal malfunction exists. DTC 052 indicates that EEPROM is partially programmed.

Testing

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Using scan tool, select PROGRAMMING from SPECIAL FUNCTIONS menu. Reprogram Instrument Panel Cluster (IPC). See **INSTRUMENT CLUSTER PROGRAMMING/SYNCHRONIZATION** under

PROGRAMMING. If programming is not successful, go to next step. If programming is successful, go to step 4 .

3. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
4. Using scan tool, clear IPC DTCs. Operate system verifying repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

DTC 167: FUEL GAUGE VOLTAGE LOW

Description

Fuel level sensor in fuel tank is a variable resistor. As fuel level changes, resistance of fuel sensor changes. The Instrument Panel Cluster (IPC) monitors changes in voltage caused by changes in resistance of sensor determining fuel level.

The fuel gauge circuit is tested every 100 milliseconds. DTC 167 will set when circuit is shorted to ground, or resistance of fuel sensor is out of range (less than 30 ohms) for 8 seconds or more.

When DTC sets, module stores DTC 167 in memory. Fuel gauge will return to zero position.

Resistance must be 30 ohms or more for 4 seconds to clear fault in next monitoring cycle. Conditions for fault are no longer present. DTC can be cleared using a scan tool.

Testing

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Disconnect Instrument Panel Cluster (IPC) 26-pin harness connector C1. IPC harness connector is located on back of instrument cluster. Remove IPC to access harness connector, see **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. Turn ignition switch to RUN position. Check for short to ground in fuel level sender signal circuit, Blue/Black wire between IPC harness connector C1 terminal No. 20 and fuel pump and sender harness connector terminal "D". See **Fig. 1** and **Fig. 2** . If short to ground is found, go to next step. If no short to ground is found, go to step 6 .
3. Disconnect 8-pin in-line harness connector C400. In-line harness connector is located under vehicle, near front of fuel tank. Check for short to ground in fuel level signal circuit, Blue/Black wire between in-line harness connector C400 terminal "C" and fuel pump and sender harness connector terminal "D". See **Fig. 2** and **Fig. 3** . If short to ground is found, go to next step. If no short to ground is found, go to step 7 .
4. Disconnect Engine Control Module (ECM) 64-pin harness connector C2. ECM is located left front corner of engine compartment, in ECM housing. Check for short to ground in fuel level signal circuit, Blue/Black wire between ECM harness connector C2 terminal No. 22 and IPC harness connector C1 terminal No. 20. See **Fig. 1** and **Fig. 4** . If no short to ground is found, go to next step. If short to ground is found, repair as necessary and go to step 8 .
5. Replace ECM. See appropriate REMOVAL, OVERHAUL & INSTALLATION - CARS article in ENGINE PERFORMANCE. After repairs are made, go to step 8 .
6. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 8 .
7. Replace fuel pump and sender assembly. See **FUEL PUMP & SENDER ASSEMBLY** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
8. Using scan tool, clear ECM and IPC DTCs. Operate system verifying repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

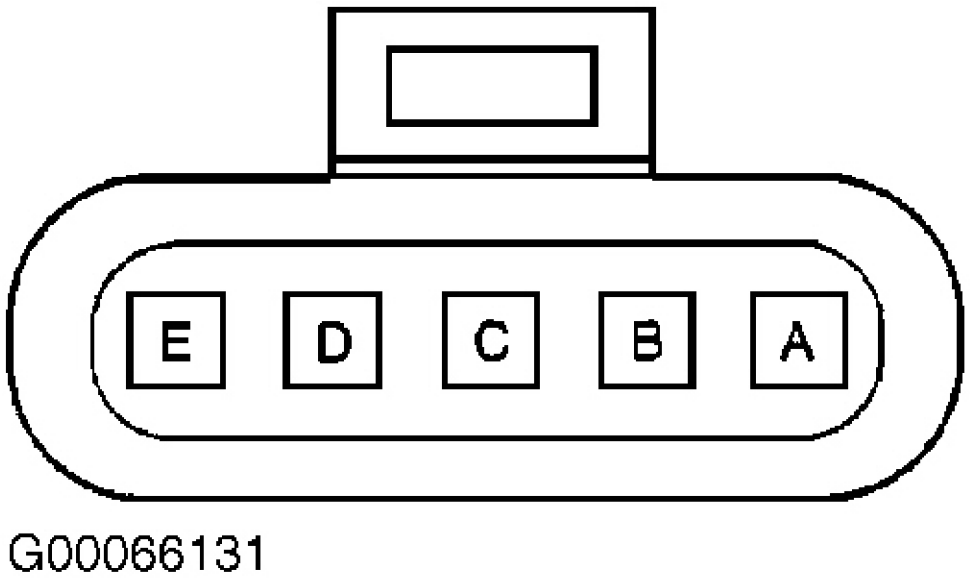


Fig. 2: Identifying Fuel Pump & Sender Harness Connector Terminals
Courtesy of GENERAL MOTORS CORP.

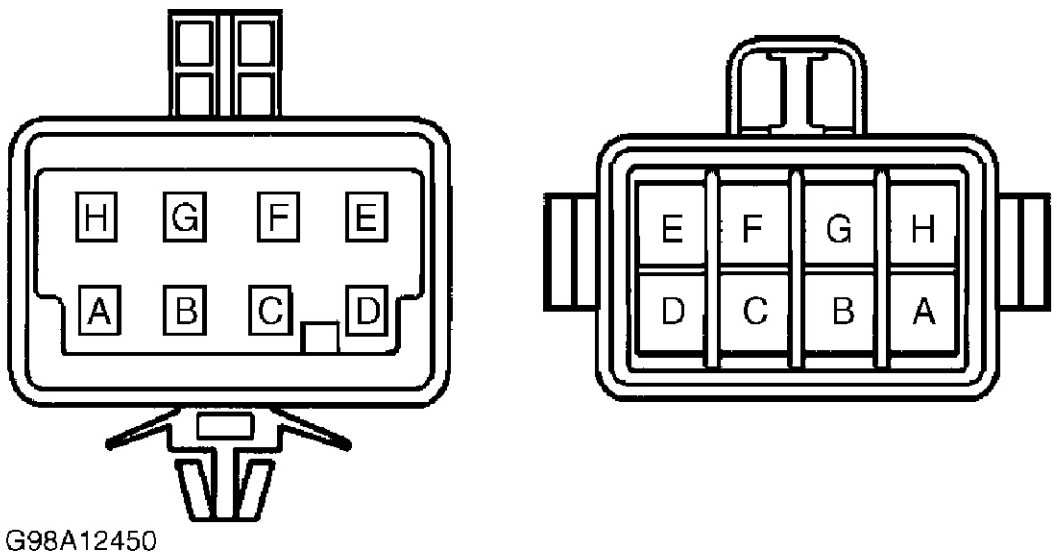


Fig. 3: Identifying In-Line Harness Connector C400 Terminals
Courtesy of GENERAL MOTORS CORP.

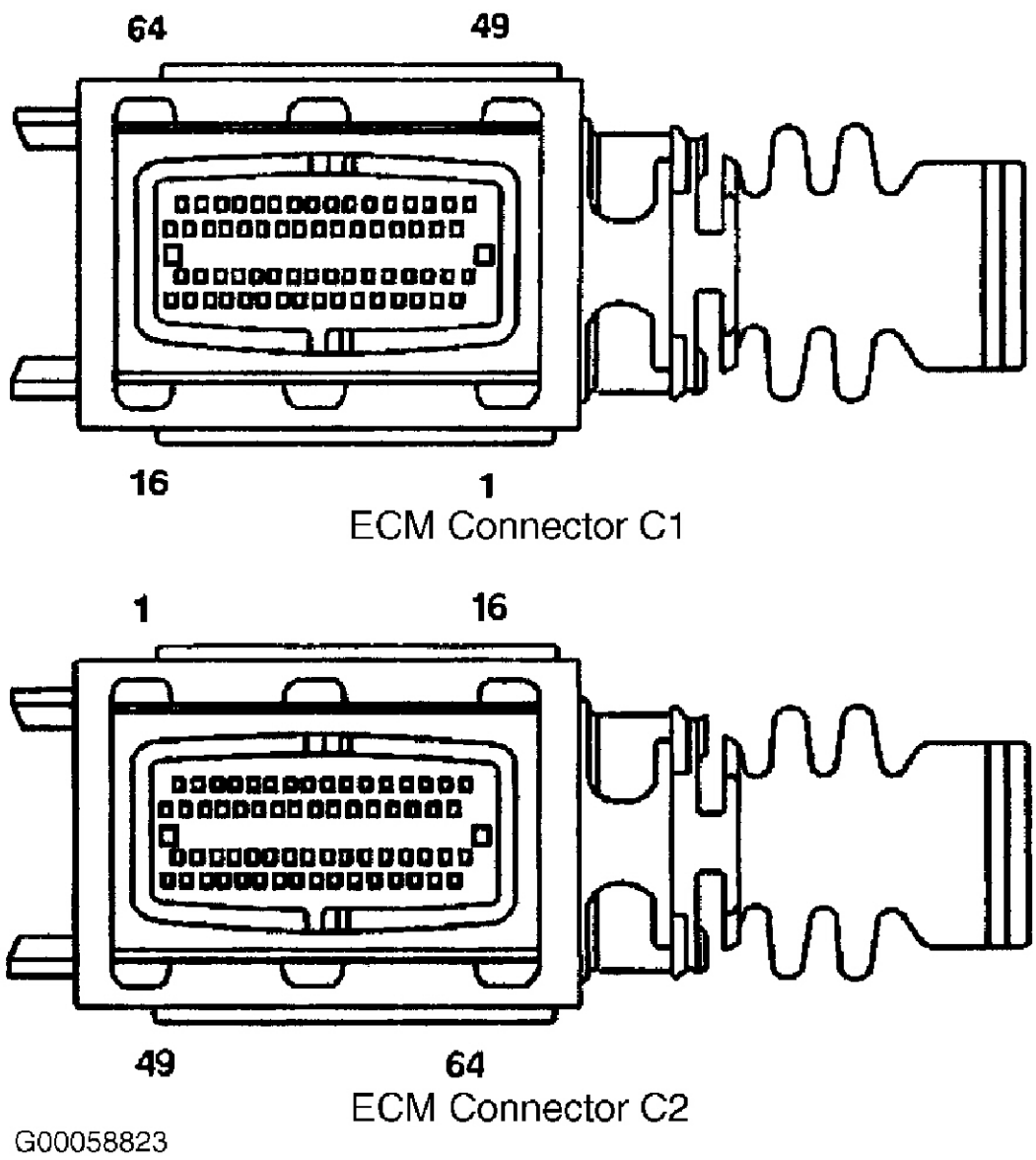


Fig. 4: Identifying Engine Control Module Harness Connectors
Courtesy of GENERAL MOTORS CORP.

Diagnostic Aids

Use freeze frame and/or failure records data to locate an intermittent condition. If DTC cannot be duplicated, information included in freeze frame and/or failure records data may aid in determining number of miles since DTC set. Fail counter and pass counter can also aid in determining number of ignition cycles that diagnostic reported a pass and/or fail. Operate vehicle within same freeze frame conditions (RPM, engine load, vehicle speed, temperature, etc.). This will aid in isolating when DTC failed.

If DTC is history or intermittent DTC, while performing tests, wiggle wiring and connectors. Before replacing instrument cluster, check all power and ground circuits to cluster. Visually inspect wiring harness and harness connectors for the following conditions:

- Damage or corrosion.
- Water intrusion.
- Poor terminal contact.
- Misrouted harness.
- Rubbed through wire insulation.
- Broken wire inside insulation.

DTC 168: FUEL GAUGE VOLTAGE HIGH

Description

Fuel level sensor in fuel tank is a variable resistor. As fuel level changes, resistance of fuel sensor changes. Instrument Panel Cluster (IPC) monitors changes in voltage caused by changes in resistance of fuel level sensor determining fuel level.

Fuel gauge circuit is tested every 100 milliseconds. DTC 168 will set when circuit is open or shorted to battery voltage. Resistance of fuel sensor is out of range (more than 350 ohms) for 8 seconds or more.

When DTC sets, module stores DTC 168 in memory, and fuel gauge will return to zero position.

DTC will clear if, resistance is 350 ohms or more for 4 seconds during next monitoring cycle. Conditions for fault are no longer present. DTC can be cleared using a scan tool.

Testing

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Disconnect Instrument Panel Cluster (IPC) 26-pin harness connector C1. IPC harness connector is located on back of instrument cluster. Turn ignition switch to RUN position. Check for short to voltage in fuel level sender signal circuit, Blue/Black wire between IPC harness connector C1 terminal No. 20 and fuel pump and sender harness connector terminal "D". See **Fig. 1** and **Fig. 2** . If short to voltage is found, go to next step. If no short to voltage is found, go to step 6 .
3. Disconnect 8-pin in-line harness connector C400. In-line harness connector is located under vehicle, near front of fuel tank. Check for short to voltage in fuel level signal circuit, Blue/Black wire between in-harness connector C400 terminal "C" and fuel pump and sender harness connector terminal "D". See **Fig. 2** and **Fig. 3** . If short to voltage is found, go to next step. If no short to voltage is found, go to step 7 .
4. Disconnect Engine Control Module (ECM) 64-pin harness connector C2. ECM is located left front corner of engine compartment, in ECM housing. Check for short to voltage in fuel level signal circuit, Blue/Black wire between ECM harness connector C2 terminal No. 22 and IPC harness connector C1 terminal No. 20. See **Fig. 1** and **Fig. 4** . If no short to voltage is found, go to next step. If short to voltage is found, repair as necessary and go to step 8 .
5. Replace ECM. See appropriate REMOVAL, OVERHAUL & INSTALLATION - CARS article in ENGINE PERFORMANCE. After repairs are made, go to step 8 .
6. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 8 .
7. Replace fuel pump and sender assembly. See **FUEL PUMP & SENDER ASSEMBLY** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
8. Using scan tool, clear ECM and IPC DTCs. Operate system verifying repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

Diagnostic Aids

Use freeze frame and/or failure records data to locate an intermittent condition. If DTC cannot be duplicated, information included in freeze frame and/or failure records data may aid in determining number of miles since DTC set. Fail counter and pass counter can also aid in determining number of ignition cycles that diagnostic reported a pass and/or fail. Operate vehicle within same freeze frame conditions (RPM, engine load, vehicle speed, temperature, etc.). This will aid in isolating when DTC failed.

If DTC is history or intermittent DTC, while performing tests, wiggle wiring and connectors. Before replacing

instrument cluster, check all power and ground circuits to cluster. Visually inspect wiring harness and harness connectors for the following conditions:

- Damage or corrosion.
- Water intrusion.
- Poor terminal contact.
- Misrouted harness.
- Rubbed through wire insulation.
- Broken wire inside insulation.

DTC P0460: FUEL LEVEL SENSOR VOLTAGE OUT OF RANGE

Description

Fuel tank sending unit consists of a float that rides on surface of fuel in fuel tank and a variable resistor controlled by float arm. When voltage is supplied to fuel gauge, current flows through gauge to variable resistor and then to ground. The position of the display is determined by amount of current flowing through gauge. Fuel level sender signal circuit connects to the Instrument Panel Cluster (IPC) and a splice in this circuit provides a signal to Engine Control Module (ECM).

As fuel level decreases sending unit resistance increases, and when fuel level increases, sending unit resistance decreases. The display of correct fuel level is dampened slightly upon start-up, cycling of ignition, and will stabilize after approximately 12 seconds.

DTC sets when, fuel level sensor voltage at ECM is less than 0.1 volts, or 4.8 volts or more. Condition is present for one second or more.

When DTC sets, ECM will not illuminate the Malfunction Indicator Light (MIL).

A history DTC clears after 40 consecutive warm-up cycles in which there are no failures reported by this diagnostic or any other non-emission related diagnostic. Scan tool can be used to clear MIL/DTC.

Testing

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Using scan tool, select DISPLAY DTCs function and retrieve any IPC DTCs. If scan tool does not display DTCs 167 or 168, go to next step. If scan tool displays DTCs 167 or 168, perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** .
3. Disconnect Engine Control Module (ECM) 64-pin harness connector C2. ECM is located left front corner of engine compartment, in ECM housing. Check for open in fuel level signal circuit, Blue/Black wire between ECM harness connector C2 terminal No. 22 and IPC harness connector C1 terminal No. 20. See **Fig. 1** and **Fig. 4** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5 .
4. Replace ECM. See appropriate REMOVAL, OVERHAUL & INSTALLATION - CARS article in ENGINE PERFORMANCE. After repairs are made, go to next step.
5. Using scan tool, clear ECM DTCs. Operate system verifying repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

Diagnostic Aids

Use freeze frame and/or failure records data to locate an intermittent condition. If DTC cannot be duplicated,

information included in freeze frame and/or failure records data may aid in determining number of miles since DTC set. Fail counter and pass counter can also aid in determining number of ignition cycles that diagnostic reported a pass and/or fail. Operate vehicle within same freeze frame conditions (RPM, engine load, vehicle speed, temperature, etc.). This will aid in isolating when DTC failed.

If DTC is history or intermittent DTC, while performing tests, wiggle wiring and connectors. Before replacing instrument cluster, check all power and ground circuits to cluster. Visually inspect wiring harness and harness connectors for the following conditions:

- Damage or corrosion.
- Water intrusion.
- Poor terminal contact.
- Misrouted harness.
- Rubbed through wire insulation.
- Broken wire inside insulation.

SYSTEM TESTS

CAUTION: When battery is disconnected or modules are replaced, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

NOTE: Before replacing any control module, ensure all module ground and power circuits are functioning normally. For circuit identification, see GROUND DISTRIBUTION and POWER DISTRIBUTION articles in WIRING DIAGRAMS.

NOTE: Before beginning system testing, perform PRELIMINARY INSPECTION under TROUBLE SHOOTING.

NOTE: For aid in identifying circuits or wiring during system testing. See wiring diagrams in appropriate article for system being tested.

NOTE: Use adapter from Terminal Test Adapter Kit (J-35616-A) connected to DVOM when making all measurements.

NOTE: Unless otherwise specified, make all voltage and resistance measurements with a Digital Volt-Ohmmeter (DVOM) having an input impedance of 10 megohms or greater.

SYMPTOM INDEX

Symptom	Perform Test
Chime Always On	A
Chime Inoperative	B
Engine Coolant Temperature Gauge Inoperative/Inaccurate	C
Engine Oil Pressure Gauge Inaccurate/Inoperative	D
Fuel Gauge Inaccurate/Inoperative	E
Speedometer &/Or Odometer Inoperative	F
Tachometer Inaccurate/Inoperative	G

Generator Gauge Inaccurate/Inoperative	**H**
ABS Indicator Always On	(1)
ABS Indicator Inoperative	(1)
Air Bag Indicator Always On	(2)
Air Bag Indicator Does Not Come On	(2)
Brake Pad Wear Indicator Always On	**I**
Brake Pad Wear Indicator Inoperative	**J**
Brake Warning Indicator Always On	**K**
Brake Warning Indicator Inoperative W/Parking Brake Set	**L**
Brake Warning Indicator Inoperative W/Low Fluid Level	**M**
Charge Indicator Always On	(3)
Charge Indicator Inoperative	(3)
Cruise Control Indicator Always On	(4)
Cruise Control Indicator Inoperative	(4)
Coolant Temperature Indicator	(5)
Fasten Safety Belt Indicator/Chime Always On	**N**
Fasten Safety Belt Indicator/Chime Inoperative	**O**
Fog Lamp Indicator Inoperative	**P**
Fuel Cap Missing Indicator Always On	**Q**
Fuel Cap Missing Indicator Inoperative	**R**
Headlamps Required Indicator Always On	**S**
Headlamps Required Indicator Inoperative	**T**
High Beam Indicator Inoperative	**U**
Low Engine Coolant Indicator Always On	**V**
Low Engine Oil Level Indicator Always On	**W**
Low Fuel Indicator	(6)
Low Oil Pressure Indicator	(7)
Low Washer Fluid Indicator Malfunction	(8)
Malfunction Indicator Light Inoperative	(9)
Security Indicator Inoperative	(10)
Sport Mode Switch/Indicator Always On Or Inoperative	(11)
Trunk Ajar Indicator Always On	**X**
Trunk Ajar Indicator Inoperative	**Y**
Turn Signal Lamps And/Or Indicators Always On Or Flashing	**Z**
Turn Signal Lamps And/Or Indicators Inoperative	**AA**

(1) See ANTI-LOCK/TCS - CATERA article in BRAKES

(2) For information on air bag DIAGNOSIS & TESTING or DISPOSAL PROCEDURES, see MITCHELL(R) AIR BAG SERVICE & REPAIR MANUAL, DOMESTIC & IMPORTED MODELS.

(3) See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS.

(4) See CRUISE CONTROL SYSTEMS - CATERA article.

(5) See TEST C: ENGINE COOLANT TEMPERATURE GAUGE INOPERATIVE/INACCURATE.

(6) See TEST E: FUEL GAUGE INACCURATE OR INOPERATIVE.

(7) See TEST D: ENGINE OIL PRESSURE GAUGE INACCURATE/INOPERATIVE.

(8) See WIPER/WASHER SYSTEMS - CATERA article.

(9) See DTC P0650: MIL CONTROL CIRCUIT under DIAGNOSTIC TESTS in SELF-DIAGNOSTICS - GASOLINE - 3.0L "V" BODY article in ENGINE PERFORMANCE.

(10) See ANTI-THEFT SYSTEM - CATERA article.

(11) See appropriate ELECTRONIC CONTROLS article in AUTOMATIC TRANSMISSIONS.

TEST A: CHIME ALWAYS ON

1. After reviewing audible warnings description and operation, and preforming preliminary inspection, go to next step. See **AUDIBLE WARNINGS** under DESCRIPTION & OPERATION, and **PRELIMINARY INSPECTION** under TROUBLE SHOOTING.
2. If no indicators are illuminated, go to next step. If any indicators are illuminated, repair by symptom. See **SYMPTOM INDEX** table.
3. Turn ignition switch to OFF position. Turn headlight switch off. Remove key from ignition switch. Open driver's door. If chime sounds, go to next step. If chime does not sound, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
4. Turn ignition switch to OFF position. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Disconnect ignition switch 7-pin harness connector. Turn ignition switch to RUN position. Using scan tool, observe KEY-IN-IGNITION parameter in BODY CONTROL MODULE (BCM) input data list. If scan tool parameter displays NO, go to next step. If scan tool parameter does not display NO, go to step 6 .
5. Replace ignition switch. See STEERING COLUMN SWITCHES - CATERA article. After repairs are made, go to step 8 .
6. Check for short to voltage in key in ignition input circuit, Red wire between ignition switch harness connector "W" and fuse block CLAMP W PBSL fuse (10-amp). See POWER DISTRIBUTION article in WIRING DIAGRAMS. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 8 .
7. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
8. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST B: CHIME INOPERATIVE

1. After reviewing audible warnings description and operation, and preforming preliminary inspection, go to next step. See **AUDIBLE WARNINGS** under DESCRIPTION & OPERATION, and **PRELIMINARY INSPECTION** under TROUBLE SHOOTING.
2. Turn ignition switch to RUN position. Observe seat belt indicator on instrument cluster during bulb check. If seat belt indicator illuminates, go to next step. If seat belt indicator does not illuminate, go to **TEST O: FASTEN SAFETY BELT INDICATOR/CHIME INOPERATIVE** .
3. Check engine oil pressure gauge for proper operation. If engine oil pressure gauge operates normally, go to next step. If engine oil pressure gauge does not operate normally, go to **TEST D: ENGINE OIL PRESSURE GAUGE INACCURATE/INOPERATIVE** .
4. If lights on chime is inoperative, go to next step. If lights on chime is operative, go to step 6 .

5. Open left front door. Check for open in Gray/White wire between headlight switch harness connector terminal No. 18 and gauge cluster harness connector C2 terminal No. 16. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 7 .
6. Place ignition key in ignition switch. Open left front door. Check for open in Gray/White wire between door jamb switch harness connector and gauge cluster harness connector C2 terminal No. 16. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 10 .
7. Check for open in Yellow wire between headlight switch harness connector terminal No. 14 and instrument panel fuse block LO BEAM LH fuse (22-amp). See HEADLIGHT SYSTEMS & DAYTIME RUNNING LIGHTS article. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 14 .
8. Check for open in Yellow wire between headlight switch harness connector terminal No. 6 and BCM harness connector C2 terminal D10. See HEADLIGHT SYSTEMS & DAYTIME RUNNING LIGHTS article. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 14 .
9. Check for poor, loose or corroded terminals in headlight switch harness connector. If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 13 .
10. Check for open in ignition switch control circuit. See POWER DISTRIBUTION article in WIRING DIAGRAMS. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 14 .
11. Check for poor, loose or corroded terminals in IPC harness connector. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 14 .
12. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 14 .
13. Replace headlight switch. See **HEADLIGHT SWITCH** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
14. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST C: ENGINE COOLANT TEMPERATURE GAUGE INOPERATIVE/INACCURATE

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Turn ignition switch to RUN position. Using scan tool, observe COOLANT TEMP parameter in Instrument Panel Cluster (IPC) data list. If parameter matches temperature gauge display, go to next step. If parameter does not match temperature gauge display, go to step 4 .
3. Using scan tool, observe ECT SENSOR parameter in Powertrain Control Module (PCM) data list. If COOLANT TEMP parameter does not match ECT SENSOR parameter, go to next step. If COOLANT TEMP parameter matches ECT SENSOR parameter, repair overheating concern.
4. Turn ignition switch to OFF position. Disconnect in-line White 20-pin harness connector C105. In-line harness connector is located at left front of engine compartment, behind battery. Turn ignition switch to RUN position. Coolant temperature gauge should register 100°F (37°C). If gauge displays specified value, go to next step. If gauge does not display specified value, go to step 7 .
5. Turn ignition switch to OFF position. Connect Signal Generator and Instrument Panel Tester (J 33431-C) between ground and Engine Coolant Temperature (ECT) sensor signal circuit (Blue wire). See **WIRING DIAGRAMS** . Set resistance on signal generator to 44 ohms. Turn ignition switch to RUN position. Coolant temperature gauge should register 280°F (138°C). If gauge does not display specified value, go to next step. If gauge displays specified value, go to step 8 .
6. Check for open, high resistance or short to voltage in Blue wire between ECT sensor harness connector

terminal No. 1 and IPC harness connector C1 terminal No. 21. See **Fig. 1** . If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 11 .

7. Check for short to ground in Blue wire between ECT sensor harness connector terminal No. 1 and IPC harness connector C1 terminal No. 21. See **Fig. 1** . If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 11 .
8. Check for open, high resistance, short to ground or short to voltage in Blue wire between ECT harness connector terminal No. 1 and in-line harness connector C105 terminal No. 15. See **Fig. 5** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 14 .
9. Check for poor connection or high resistance in ECT sensor case ground. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 14 .
10. Check for poor, loose or corroded terminal in ECT sensor harness connector. If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 12 .
11. Check for poor, loose or corroded terminal in IPC harness connector. If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 13 .
12. Replace ECT sensor. After repairs are made, go to step 14 .
13. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
14. Using scan tool clear any DTCs. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

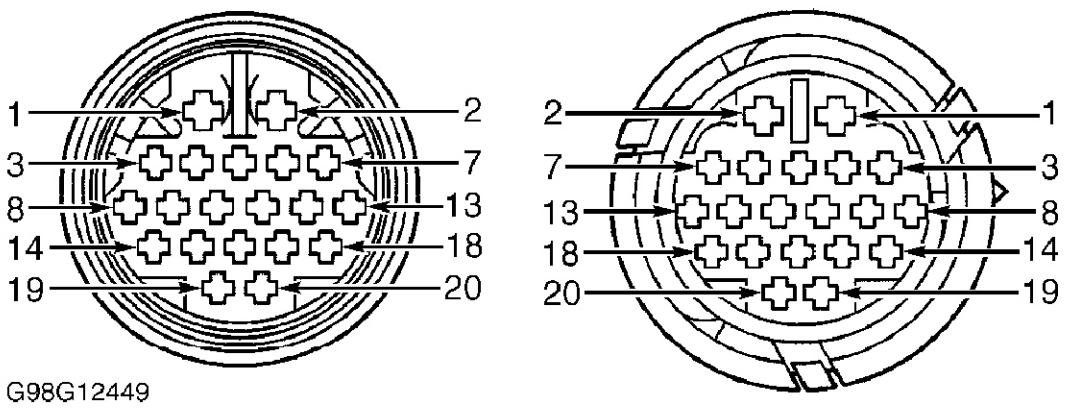


Fig. 5: Identifying In-Line Connector C105 Terminals
Courtesy of GENERAL MOTORS CORP.

TEST D: ENGINE OIL PRESSURE GAUGE INACCURATE/INOPERATIVE

CAUTION: Ensure engine oil level is correct and engine has sufficient oil pressure before performing test.

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Start engine. Observe engine oil pressure gauge. Gauge should display 0-73 psi (0-500 kPa). If gauge does not display specified value, go to next step. If gauge displays specified value, concern maybe intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Turn ignition switch to OFF position. Disconnect in-line Brown 6-pin harness connector C102. In-line harness connector C102 is located at left front of engine compartment, behind battery. Connect Signal Generator and Instrument Panel Tester (J 33431-C) between ground and male terminal side of in-line harness connector C102 terminal No. 2 (Blue/Green wire). See **Fig. 6** . Turn ignition switch to RUN position. Dial

signal generator to specified value, and compare engine oil pressure gauge display to specified value. See **ENGINE OIL PRESSURE GAUGE SPECIFICATIONS** table. If engine oil pressure gauge display matches specified value, go to next step. If engine oil pressure gauge display does not match specified value, go to step 5 .

ENGINE OIL PRESSURE GAUGE SPECIFICATIONS

Gauge Specification (psi)	Signal Generator Setting (Ohms)
80	200
140	40
1.2	0

4. Check for open, high resistance, short to ground, or short to voltage in Blue/Yellow wire between in-line harness connector C102 terminal No. 14 and engine oil pressure sensor terminal. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 8 .
5. Check for open, a high resistance, a short to ground, or a short to voltage in Blue/Yellow wire between in-line harness connector C102 terminal No. 14 and cluster harness connector C2 terminal No. 26. See **Fig. 6** and **Fig. 7** . If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 7 .
6. Check for poor, loose or corroded terminals in engine oil pressure sensor harness connector. Check case ground of engine oil pressure sensor for poor connection. If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 8 .
7. Check for poor, loose or corroded terminals in IPC harness connectors. If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 9 .
8. Replace engine oil pressure sensor. After repairs are made, go to step 10 .
9. Replace gauge cluster. See **GAUGE CLUSTER** under REMOVAL & INSTALLATION. Go to step 8 .
10. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

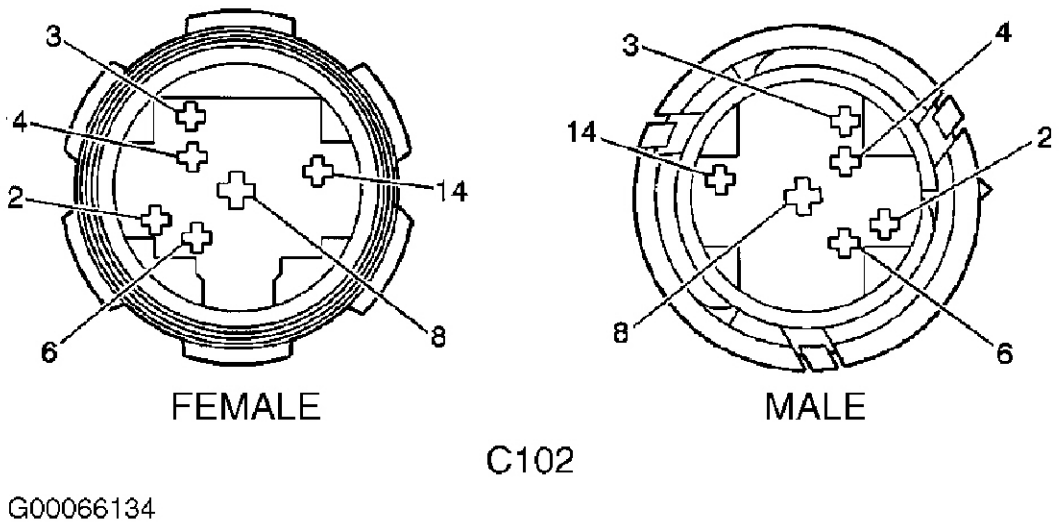


Fig. 6: Identifying In-Line Harness Connector C102 Terminals
Courtesy of GENERAL MOTORS CORP.

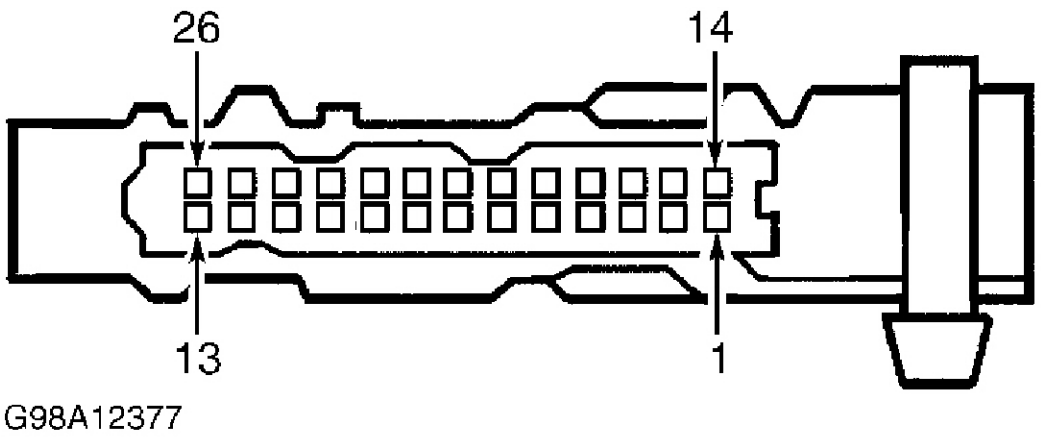


Fig. 7: Identifying Gauge Cluster Harness Connector C2 Terminals
Courtesy of GENERAL MOTORS CORP.

TEST E: FUEL GAUGE INACCURATE/INOPERATIVE

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Disconnect in-line Black 8-pin harness connector C400. In-line harness connector C400 is located under vehicle, near front of fuel tank. Turn ignition switch to RUN position. Connect Signal Generator and Instrument Panel Tester (J 33431-C) between in-line harness connector C400 terminals "C" and "D", fuel level sensor signal circuit and fuel level sensor low reference circuit (female terminal side). See **Fig. 3** . Connect DVOM to signal generator and instrument panel tester. Vary resistance on signal generator and instrument panel tester between 50-250 ohms comparing reading to fuel level specifications table. See **FUEL LEVEL SPECIFICATIONS** table. If fuel gauge displays correct readings, go to step 4 . If fuel gauge does not display correct readings, leave signal generator and instrument panel tester connected and go to next step.

FUEL LEVEL SPECIFICATIONS

Fuel Gauge Display	Ohms	Fuel Level	Fuel Remaining
E	278	4 Volts	.66 Gals.
1/4	196	3.3 Volts	5.28 Gals.
1/2	141	2.7 Volts	8.84 Gals.
3/4	91	2.1 Volts	12.8 Gals.
F	500	1.2 Volts	15.71 Gals.
Low Fuel Indicator On	256	3.8 Volts	1.98 Gals

NOTE: Turn ignition switch to OFF position momentarily between resistance settings to quickly update scan tool display.

3. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Turn ignition switch to RUN position. Vary resistance from 50-280 ohms comparing reading to fuel level specifications table. See **FUEL LEVEL SPECIFICATIONS** table. Using scan tool, observe FUEL LEVEL GAUGE (voltage) parameter in IPC data list. If scan tool parameter does not display correct fuel level voltage, go to next step. If scan tool parameter displays correct fuel level voltage, go to step 9 .
4. Check for poor, loose or corroded terminals in fuel level sensor harness connector. Check for high resistance

in Blue/Black wire between fuel pump and sender harness connector terminal "D" and in-line harness connector C400 terminal "C". See **Fig. 2** and **Fig. 3** . Check for high resistance in Black wire between fuel level sensor harness connector terminal "C" and in-line harness connector C400 terminal "G". Check for a misaligned fuel level sensor or deformed fuel tank. If problem is found, make necessary repairs and go to step 12 . If no problem is found, go to step 7 .

5. Check for high resistance in fuel level signal circuit (Blue/Black wire) between fuel pump and sender harness connector terminal "D" and IPC harness connector terminal No. 20. See **Fig. 1** and **Fig. 2** . If no problem is found, go to next step. If problem is found, make necessary repairs and go to step 12 .
6. Check for high resistance in fuel level sensor low reference circuit (Black wire) between ground and fuel level sender harness connector terminal "C". See **WIRING DIAGRAMS** . If problem is found, make necessary repairs and go to step 12 . If no problem is found, go to step 9 .
7. Remove fuel pump and sender. See **FUEL PUMP & SENDER ASSEMBLY** under REMOVAL & INSTALLATION. Check for stuck fuel level sensor, or foreign material in fuel tank. If no problem is found, go to next step. If problem is found, make necessary repairs and go to step 12 .
8. Using DVOM connected to fuel level sensor harness connector terminals "C" and "D", measure resistance while moving fuel level sensor up and down. See **Fig. 2** . Resistance should change smoothly from 50-280 ohms. If resistance changes as specified, go to **DIAGNOSTIC AIDS** . If resistance does not change as specified, go to step 10 .
9. Check for poor, loose or corroded terminals in IPC harness connector. If problem is found, repair as necessary and go to step 12 . If no problem is found, go to step 11 .
10. Replace fuel pump and sender assembly. See **FUEL PUMP & SENDER ASSEMBLY** under REMOVAL & INSTALLATION. After repairs are made, go to step 12 .
11. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
12. Using scan tool clear ECM and IPC DTCs. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

Diagnostic Aids

Ensure fuel level is in same range as customer concern. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.

TEST F: SPEEDOMETER &/OR ODOMETER INACCURATE OR INOPERATIVE

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Raise vehicle drive wheels and support vehicle. Start engine. Place transmission into Drive position. Using scan tool, observe VEHICLE SPEED parameter in IPC data list. If VEHICLE SPEED parameter matches speedometer display, go to next step. If VEHICLE SPEED parameter does not match speedometer display, go to step 4 .
3. If odometer operates normally, concern maybe intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS. If odometer does not operate normally, go to step 8 .
4. Turn ignition switch to OFF position. Disconnect Electronic Brake Control Module (EBCM) harness connector. ECBM is located at left front corner of engine compartment, attached to lower frame rail. Turn ignition switch to RUN position. Using DVOM measure voltage between ground and EBCM harness connector C1 terminal No. 23. See **WIRING DIAGRAMS** . If voltage reading is less than 9 volts, go to next step. If voltage reading is 9 volts or more, go to step 6 .
5. Check for open or short to ground in Blue/Red wire between EBTCM harness connector C1 terminal No. 23 and IPC harness connector C1 terminal No. 23. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 11 . If no problem is found, go to step 7 .

6. Check for short to voltage in vehicle speed signal circuit (Blue/Red wire) between EBTCM harness connector C1 terminal No. 23 and IPC harness connector C1 terminal No. 23. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 11 . If no problem is found, go to step 8 .
7. Check for poor, loose or corroded terminals in IPC harness connectors. If problem is found, repair as necessary and go to step 11 . If no problem is found, go to step 9 .
8. Check for poor, loose or corroded terminals in EBTCM harness connectors. If problem is found, repair as necessary and go to step 11 . If no problem is found, go to step 10 .
9. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 11 .
10. Replace EBCM. See appropriate ANTI-LOCK article in BRAKES. After repairs are made, go to next step.
11. Reconnect all harness connectors and reinstall all components. Check speedometer operation. If speedometer operates properly, system is okay. If speedometer does not operate properly, go to step 2 .

TEST G: TACHOMETER INACCURATE/INOPERATIVE

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Raise vehicle drive wheels and support vehicle. Start engine. Place transmission into Drive position. Using scan tool, observe ENGINE SPEED parameter in IPC data list. If ENGINE SPEED parameter matches tachometer display, go to next step. If ENGINE SPEED parameter does not match tachometer display, leave vehicle supported and go to step 4 .
3. If tachometer operates normally, concern maybe intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS. If tachometer does not operate normally, go to step 12 .
4. Turn ignition switch to OFF position. Disconnect Heating Ventilation Air Conditioning (HVAC) module 22-pin harness connector C1. HVAC harness connector C1 is located on rear of module, to access harness connector remove HVAC control module, see AUTOMATIC A/C-HEATER SYSTEMS - CATERA article. Start engine. Place transmission into Drive position. Using scan tool, observe ENGINE SPEED parameter in IPC data list. If ENGINE SPEED parameter does not match tachometer display, go to next step. If ENGINE SPEED parameter matches tachometer display, go to step 8 .
5. Turn ignition switch to OFF position. Disconnect Engine Control Module (ECM) 64-pin harness connector C2. ECM is located left front corner of engine compartment, in ECM housing. Turn ignition switch to RUN position. Using DVOM, measure voltage between ground and ECM harness connector C2 terminal No. 35 (Green wire). See **Fig. 4** . If less than 9 volts exists, go to next step. If 9 volts or more exists, go to step 7 .
6. Check for open, high resistance or short to ground in RPM signal output circuit (Green wire) between IPC harness connectors C1 terminal No. 22 and C2 terminal No. 13, and ECM harness connector C2 terminal No. 35. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 9 .
7. Check short to voltage in RPM signal output circuit (Green wire) between IPC harness connectors C1 terminal No. 22 and C2 terminal No. 13, and ECM harness connector C2 terminal No. 35. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 10 .
8. Check for poor, loose or corroded terminals in HVAC harness connector. If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 11 .
9. Check for poor, loose or corroded terminals in IPC harness connector. If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 12 .
10. Check for poor, loose or corroded terminals in ECM harness connector. If problem is found, repair as necessary and go to step 14 . If no problem is found, go to step 13 .
11. Replace HVAC control module. See AUTOMATIC A/C-HEATER SYSTEMS - CATERA article. After

repairs are made, go to step 14 .

12. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 14 .
13. Replace ECM. See appropriate REMOVAL, OVERHAUL & INSTALLATION - CARS article in ENGINE PERFORMANCE. After repairs are made, go to next step.
14. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST H: GENERATOR GAUGE INACCURATE OR INOPERATIVE

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. If generator gauge does not operate normally, go to next step. If generator gauge operates normally, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Turn ignition switch to OFF position. Connect scan tool to Data Link Connector (DLC). DLC is located under left side of instrument panel. Using scan tool, observe SWITCHED BATTERY VOLTAGE parameter in Instrument Panel Cluster (IPC) data list. If SWITCHED BATTERY VOLTAGE parameter is not 9-16 volts, go to next step. If SWITCHED BATTERY VOLTAGE parameter is 9-16 volts, go to step 6 .
4. Check for open in switched battery voltage circuit (Brown wire) between instrument panel fuse block CLAMP 15 CRUISE fuse (15-amp) and gauge cluster harness connector C2 terminal No. 20. See **Fig. 7** . See **WIRING DIAGRAMS** . If no problem exists, go to next step. If problem exists, repair as necessary and go to step 7 .
5. Check for poor, loose or corroded terminals in gauge cluster harness connector. If no problem exists, go to next step. If problem exists, repair as necessary and go to step 7 .
6. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
7. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST I: BRAKE PAD WEAR INDICATOR ALWAYS ON

1. Ensure front brake linings are okay. See appropriate article in BRAKES. If front brake linings are okay, go to next step.
2. Disconnect right brake pad wear sensor harness connector. Turn ignition switch to RUN position. Measure voltage between right brake pad wear sensor harness connector terminals No. 2 (Gray/Red wire) and No. 3 (Black wire). If voltage is about 12 volts, go to next step. If voltage is not about 12 volts, go to step 4 .
3. Measure resistance between right brake pad wear sensor terminals No. 2 and 3. If resistance is less than .5 ohm, go to step 5 . If resistance is .5 ohm or more, go to step 6 .
4. Turn ignition switch to OFF position. Using DVOM, measure resistance between ground and right brake pad wear sensor harness connector terminal No. 3 (Black wire). If resistance is less than .5 ohm, go to step 7 . If resistance is .5 ohm or more, go to step 8 .
5. Inspect gauge cluster harness connector for poor connections. Repair connector as necessary and go to step 9 . If connector is okay, go to step 10 .
6. Replace right brake pad wear sensor. After repairs are made, go to step 9 .
7. Disconnect left brake pad wear sensor harness connector. Measure resistance between left brake pad wear sensor connector (sensor side) terminals No. 2 (Yellow/Red wire) and No. 3 (Gray/Red wire). If resistance is less than .5 ohm, go to step 11 . If resistance is .5 ohm or more, go to step 12 .
8. Repair open in Black wire between right brake pad wear sensor harness connector ground and terminal No. 3. Ground point is located under battery tray. See **WIRING DIAGRAMS** . After repairs are made, go to

next step.

9. Reconnect all harness connectors and reinstall all components. Turn ignition switch to RUN position. Disconnect one brake pad wear sensor harness connector. If brake pad wear indicator turns on, system is okay.
10. Replace gauge cluster. See **GAUGE CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 9 .
11. Turn ignition switch to RUN position. Using DVOM, measure voltage between ground and left brake pad wear sensor harness connector terminal No. 2 (Yellow/Red wire). If voltage is about 12 volts, go to step 13 . If voltage is not about 12 volts, go to step 14 .
12. Replace left brake pad wear sensor. After repairs are made, go to step 9 .
13. Check for open in Gray/Red wire between left brake pad wear sensor harness connector terminal No. 3 and right brake pad wear sensor harness connector terminal No. 2. If problem is found, repair as necessary and go to step 9 . If no problem is found, go to step 15 .
14. Check for open in Yellow/Red wire between left brake pad wear sensor harness connector terminal No. 2 and gauge cluster harness connector terminal No. 2. See **Fig. 7** . If problem is found, repair as necessary and go to step 9 . If no problem is found, go to next step.
15. Fault is intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS. If problem is found, repair as necessary and go to step 9 .

TEST J: BRAKE PAD WEAR INDICATOR INOPERATIVE

1. Inspect brake pads for wear, damage to sensors or damaged wiring and/or connectors. If no problems are found, go to next step. If problem is found, repair as necessary and go to step 5 .
2. Turn ignition switch to RUN position. Disconnect left brake pad wear sensor harness connector. If brake pad wear indicator turns on, go to next step. If brake pad wear indicator does not turn on, go to step 4 .
3. Disconnect right brake pad wear sensor harness connector. Check for short to ground in Gray/Red wire between left brake pad wear sensor harness connector terminal No. 3 and right brake pad wear sensor harness connector terminal No. 2. If problem is found, repair as necessary and go to step 5 . If no problem is found, go to step 10 .
4. Measure voltage between ground and left brake pad wear sensor harness connector terminal No. 2 (Yellow/Red wire). If voltage is about 12 volts, go to step 6 . If voltage is not about 12 volts, go to step 7 .
5. Reconnect all harness connectors and reinstall all components. Turn ignition switch to RUN position. Disconnect one brake pad wear sensor harness connector. If brake pad wear indicator turns on, system is okay.
6. Remove instrument cluster and check brake pad wear indicator light bulb. If problem is found, replace as necessary and go to step 5 . If no problem is found, go to step 8 .
7. Check for short to ground in Yellow/Red wire between left brake pad wear sensor harness connector terminal No. 2 and gauge cluster harness connector terminal No. 2. See **Fig. 7** . If problem is found, repair circuit as necessary and go to step 5 . If no problem is found, go to step 10 .
8. Inspect gauge cluster harness connector for poor connections. If no problem is found, go to next step. If problem is found, repair connector as necessary and go to step 5 .
9. Replace gauge cluster. See **GAUGE CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 5 .
10. Fault is intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS. If problem is found, repair as necessary and go to step 5 .

TEST K: BRAKE WARNING INDICATOR ALWAYS ON

1. After reviewing indicator/warning description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.

2. Disconnect parking brake switch harness connector. Turn ignition switch to RUN position. If BRAKE indicator illuminates, go to next step. If BRAKE indicator does not illuminate, go to step 4 .
3. Disconnect brake fluid level sensor harness connector. If BRAKE indicator illuminates, go to step 5 . If BRAKE indicator does not illuminate, go to step 6 .
4. Replace parking brake switch. After repairs are made, go to step 7 .
5. Check for short to ground in BRAKE indicator signal circuit. See **WIRING DIAGRAMS** . If problem is found, repair as necessary. If no problem is found, replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 7 .
6. Replace brake fluid level sensor. After repairs are made, go to next step.
7. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST L: BRAKE WARNING INDICATOR INOPERATIVE W/PARKING BRAKE SET

1. After reviewing indicator/warning description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.
2. Disconnect parking brake switch harness connector. Turn ignition switch to RUN position. Connect a fused jumper wire between ground and parking brake switch harness connector. If BRAKE indicator does not illuminate, go to next step. If BRAKE indicator illuminates, go to step 5 .
3. Disconnect brake fluid level switch harness connector. Connect a fused jumper wire between ground and brake fluid level switch harness connector terminal "B" (Brown/Red wire). If BRAKE indicator illuminates, go to next step. If BRAKE indicator does not illuminate, go to step 6 .
4. Check for open or a high resistance brake signal circuit between IPC harness connector C1 terminal No. 15 and brake fluid level sensor or parking brake switch. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 8 .
5. Replace parking brake switch. After repairs are made, go to step 8 .
6. Replace BRAKE indicator bulb, in instrument cluster. Reconnect all harness connector or components which were disconnected. Engage parking brake. If BRAKE indicator does not illuminate, go to next step. If BRAKE indicator illuminates, go to step 8 .
7. Check for short to ground in BRAKE indicator signal circuit. See **WIRING DIAGRAMS** . If problem is found, repair as necessary. If no problem is found, replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
8. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST M: BRAKE WARNING INDICATOR INOPERATIVE W/LOW FLUID LEVEL

1. After reviewing indicator/warning description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.
2. If BRAKE indicator illuminates with parking brake set, go to next step. If BRAKE indicator does not illuminate with parking brake set, go to **TEST L: BRAKE WARNING INDICATOR INOPERATIVE W/PARK BRAKE SET** .
3. Disconnect brake fluid level sensor harness connector. Turn ignition switch to RUN position. Connect a fused jumper wire between brake fluid level sensor harness connector terminals "A" (Black wire) and "B" (Brown/Red wire). If BRAKE indicator does not illuminate, go to next step. If BRAKE indicator illuminates, go to step 5 .
4. Check for open or a high resistance brake signal circuit between IPC harness connector C1 terminal No. 15 and brake fluid level sensor or parking brake switch. See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 6 .
5. Replace brake fluid level sensor. After repairs are made, go to next step.

6. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST N: FASTEN SAFETY BELT INDICATOR/CHIME ALWAYS ON

1. After reviewing indicator/warning description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.
2. Observe SEAT BELT indicator on instrument cluster, while cycling ignition switch from OFF to RUN positions. If SEAT BELT indicator remains illuminated at all times, go to next step. If SEAT BELT indicator illuminates normally, concern maybe intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Turn ignition switch to OFF position. Disconnect seat belt switch harness connector. Seat belt harness connector is part of seat belt buckle. Check for short to ground in seat belt switch signal circuit (Black/Blue wire) between gauge cluster harness connector C2 terminal No. 3 and seat belt switch. See **WIRING DIAGRAMS** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6 .
4. Check for short in seat belt switch. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6 .
5. Replace gauge cluster. See **GAUGE CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
6. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 3 .

TEST O: FASTEN SAFETY BELT INDICATOR/CHIME INOPERATIVE

1. After reviewing indicator/warning description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.
2. Observe SEAT BELT indicator on instrument cluster, while cycling ignition switch from OFF to RUN positions. If SEAT BELT indicator remains illuminated at all times, go to next step. If SEAT BELT indicator illuminates normally, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Turn ignition switch to OFF position. Disconnect seat belt switch harness connector. Seat belt harness connector is part of seat belt buckle. Check for open or high resistance in seat belt switch signal circuit (Black/Blue wire) between gauge cluster harness connector C2 terminal No. 3 and seat belt switch. See **WIRING DIAGRAMS** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7 .
4. Check for open or high resistance in seat belt switch. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7 .
5. Check for open or high resistance in seat belt switch ground circuit (Black wire) between ground and seat belt switch. Ground point is located under battery tray. See **WIRING DIAGRAMS** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7 .
6. Replace gauge cluster. See **GAUGE CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
7. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 3 .

TEST P: FOG LAMP INDICATOR INOPERATIVE

1. If lighting system diagnostic systems check has been performed, go to next step. If lighting system diagnostic systems check has not been performed, go to LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODULES - CATERA article.
2. Check fog light indicator bulb for open. To access bulb, remove Instrument Panel Cluster (IPC). See

INSTRUMENT PANEL CLUSTER under REMOVAL & INSTALLATION. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6 .

3. Disconnect IPC 26-pin harness connector C1. Turn fog light switch on. Using test light connected to ground, probe IPC harness connector C1 terminal No. 5 (Brown wire). If test light does not illuminate, go to next step. If test light illuminates, go to step 5 .
4. Repair open or high resistance in fog lights supply voltage circuit (Brown wire) between IPC harness connector C1 terminal No. 5 and fog light switch. See **WIRING DIAGRAMS** . After repairs are made, go to step 6 .
5. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
6. Connect all harness connectors and components that were disconnected. If fog light indicator operates normally, testing is complete. If fog light indicator does not operate normally, go to step 2 .

TEST Q: FUEL CAP MISSING INDICATOR ALWAYS ON

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to OFF position. Disconnect Engine Control Module (ECM) 64-pin harness connector C2. Turn ignition switch to RUN position. If FUEL CAP indicator is on, go to next step. If FUEL CAP indicator is not on, go to step 4 .
3. Check for short to ground in fuel cap indicator control circuit (Gray wire) between ECM harness connector C2 terminal No. 22 and IPC harness connector terminal No. 3. See **Fig. 1** and **Fig. 4** . If problem is found, repair as necessary and go to step 6 . If no problem is found, go to step 5 .
4. Replace ECM. See appropriate REMOVAL, OVERHAUL & INSTALLATION article in ENGINE PERFORMANCE. After repairs are made, go to step 6 .
5. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
6. Operate system to verify repair. If symptom operates normally, testing complete. If system does not operate normally, go to step 2 .

TEST R: FUEL CAP MISSING INDICATOR INOPERATIVE

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. Turn ignition switch to OFF position. Disconnect Engine Control Module (ECM) 64-pin harness connector C2. Turn ignition switch to RUN position. Connect a 3-amp fused jumper wire between ground and ECM harness connector C2 terminal No. 33 (Gray wire). See **Fig. 4** . If FUEL CAP indicator is on, go to next step. If FUEL CAP indicator is not on, go to step 4 .
3. Check for poor, loose or corroded terminals in ECM harness connector C2. If problem is found, repair as necessary and go to step 8 . If no problem is found, go to step 5 .
4. Check for open in fuel cap indicator control circuit (Gray wire) between ECM harness connector C2 terminal No. 22 and IPC harness connector terminal No. 3. See **Fig. 1** and **Fig. 4** . If problem is found, repair as necessary and go to step 8 . If no problem is found, go to step 6 .
5. Replace ECM. See appropriate REMOVAL, OVERHAUL & INSTALLATION article in ENGINE PERFORMANCE. After repairs are made, go to step 8 .
6. Inspect for poor, loose or corroded terminals in IPC harness connector. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 8 .
7. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After

repairs are made, go to next step.

8. Operate system to verify repair. If symptom operates normally, testing complete. If system does not operate normally, go to step 2 .

TEST S: HEADLAMPS REQUIRED INDICATOR ALWAYS ON

1. If lighting system diagnostic systems check has been performed, go to next step. If lighting system diagnostic systems check has not been performed, go to LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODULES - CATERA article.
2. Operate headlights verify that low beams and twilight sentinel feature operate normally. If lighting systems operate normally, go to next step. If lighting systems do not operate normally, perform lighting system diagnostic systems check. See LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODES - CATERA article.
3. Check for short to ground in headlamps required indicator control circuit (Brown/Yellow wire) between IPC harness connector C1 terminal No. 12 and Body Control Module (BCM) harness connector C2 terminal C7. See **Fig. 1** and **Fig. 8** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5 .
4. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
5. Connect all harness connectors and components that were disconnected. Verify that headlamps required indicator operates normally. If headlamps required indicator operates normally, testing is complete. If headlamps required indicator does not operate normally, go to step 2 .

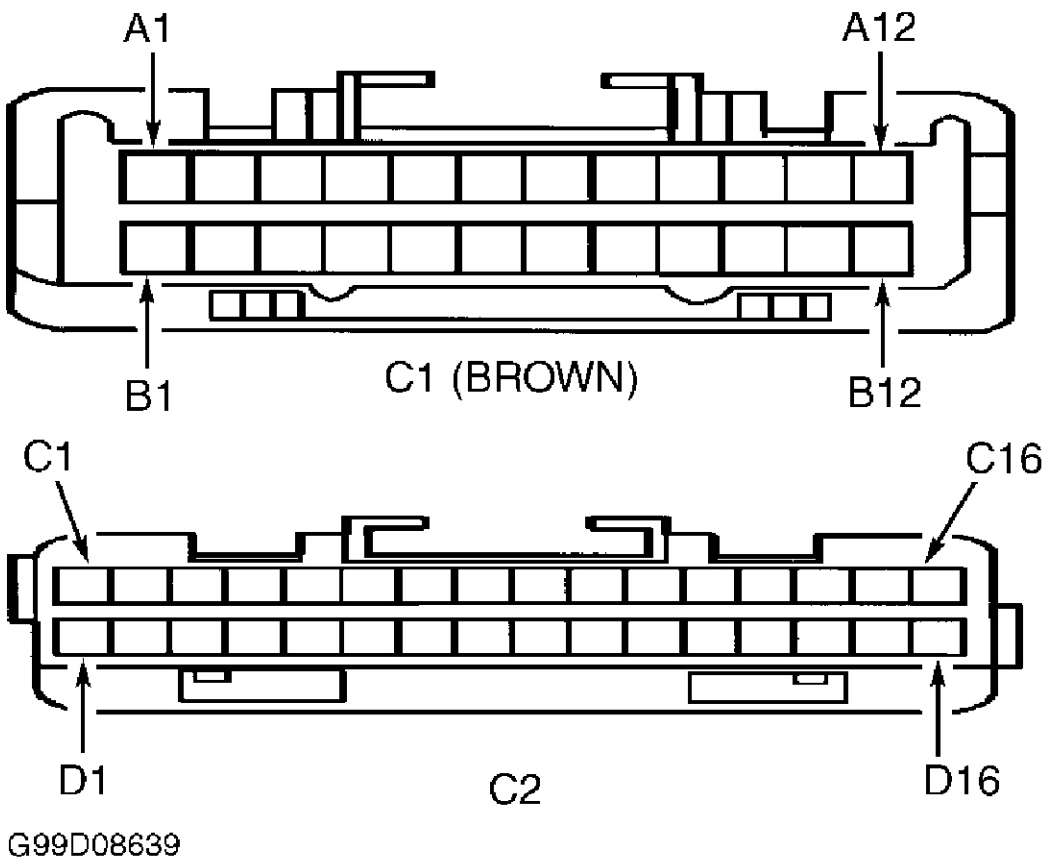


Fig. 8: Identifying Body Control Module Harness Connector Terminals
Courtesy of GENERAL MOTORS CORP.

TEST T: HEADLAMPS REQUIRED INDICATOR INOPERATIVE

1. If lighting system diagnostic systems check has been performed, go to next step. If lighting system diagnostic systems check has not been performed, go to LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODES - CATERA article.
2. Operate headlights verifying that daytime running lights, low beams and twilight sentinel feature operate normally. If lighting systems operate normally, go to next step. If lighting systems do not operate normally, perform lighting system diagnostic systems check. See LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODES - CATERA article.
3. Check headlights required indicator bulb for open. To access bulb, remove Instrument Panel Cluster (IPC). See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 7 .
4. Turn ignition switch to OFF position. Disconnect Instrument Panel Cluster (IPC) 26-pin harness connector C1. Turn ignition switch to RUN position. Turn twilight sentinel switch to OFF position. Cover headlamp automatic control ambient light sensor. Place headlight switch in OFF position. Place transaxle in Drive position. Using test light connected to battery voltage, probe IPC harness connector C1 terminal No. 12 (Brown/Yellow wire). See **Fig. 1** . If test light does not illuminate, go to next step. If test light illuminates, go to step 6 .
5. Repair open or high resistance in headlamps required indicator control circuit (Brown/Yellow wire) between IPC harness connector C1 terminal No. 12 and Body Control Module (BCM) harness connector C2 terminal C7. See **Fig. 1** and **Fig. 8** . After repairs are made, go to step 7 .
6. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
7. Connect all harness connectors and components that were disconnected. Verify that headlamps required indicator operates normally. If headlamps required indicator operates normally, testing is complete. If headlamps required indicator does not operate normally, go to step2 .

TEST U: HIGH BEAM INDICATOR INOPERATIVE

1. If lighting system diagnostic systems check has been performed, go to next step. If lighting system diagnostic systems check has not been performed, go to LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODES - CATERA article.
2. Check high beam indicator bulb for open. To access bulb, remove Instrument Panel Cluster (IPC). See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 5 .
3. Turn ignition switch to OFF position. Disconnect Instrument Panel Cluster (IPC) 26-pin harness connector C1. Turn ignition switch to RUN position. Check for open or high resistance in high beam supply voltage circuit (White wire) between IPC harness connector C1 terminal No. 9 and Body Control Module (BCM) harness connector C2 terminal C8. See **Fig. 1** and **Fig. 8** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 6 .
4. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 6 .
5. Replace high beam indicator bulb. After repairs are made, go to next step.
6. Connect all harness connectors and components that were disconnected. Verify that high beam indicator operates normally. If high beam required indicator operates normally, testing is complete. If high beam indicator does not operate normally, go to step 2 .

TEST V: LOW ENGINE COOLANT INDICATOR ALWAYS ON

NOTE: Cooling fluid minimum capacity sensor can also be referred to as low coolant level switch.

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel

cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.

2. Verify that engine coolant is properly filled. Turn ignition switch to RUN position, and observe low coolant level indicator. If LOW ENGINE COOLANT indicator illuminates, go to next step. If LOW ENGINE COOLANT indicator does not illuminate, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Turn ignition switch to OFF position. Disconnect cooling fluid minimum capacity sensor 2-pin harness connector. Cooling fluid minimum capacity sensor is located on right side of engine compartment, in bottom of coolant overflow bottle. Connect a 3-amp fused jumper wire between cooling fluid minimum capacity sensor harness connector terminals "A" (Black wire) and "B" (Brown/Black wire). Turn ignition switch to RUN position. Observe LOW ENGINE COOLANT on instrument cluster. If indicator does not illuminate, go to next step. If indicator illuminates, go to step 6 .
4. Check for poor, loose or corroded terminals in cooling fluid minimum capacity sensor. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 10 .
5. Replace cooling fluid minimum capacity sensor. After repairs are made, go to step 10 .
6. Check for open in cooling fluid minimum capacity sensor circuit (Brown/Blue wire) between gauge cluster harness connector C2 terminal No. 3 and cooling fluid minimum capacity sensor harness connector terminal "B". See **WIRING DIAGRAMS** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 10 .
7. Check for open in cooling fluid minimum capacity sensor ground circuit (Black wire) between ground and cooling fluid minimum capacity sensor harness connector terminal "A". Ground point is located under battery tray. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 10 .
8. Check for poor, loose or corroded terminals in IPC harness connector. If no problem is found, go to next step. If problem is found, repair as necessary and go to step 10 .
9. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
10. Connect all harness connectors and components that were disconnected. Operate system to verify repair. If system is operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST W: LOW ENGINE OIL LEVEL INDICATOR ALWAYS ON

1. If instrument panel cluster diagnostic system check has been performed, go to next step. If instrument panel cluster diagnostic system check has not been performed, go to **INSTRUMENT PANEL CLUSTER DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.
2. If engine oil level sensor indicator is always on, go to next step. If engine oil level sensor indicator operates normally, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Turn ignition switch to OFF position. Disconnect engine oil level sensor 2-pin harness connector. Engine oil level sensor is located at lower right front of engine block. Connect a fused jumper wire between ground and engine oil level sensor harness connector terminal No. 2 (Brown/Green wire). Turn ignition switch to RUN position. If engine oil level sensor indicator illuminates, go to next step. If engine oil level sensor indicator does not illuminate, go to step 5 .
4. Check for open, high resistance or short to voltage in engine oil level sensor signal circuit (Brown/Green wire) between gauge cluster harness connector C2 terminal No. 4 and engine oil level sensor harness connector terminal No. 2. See **Fig. 7** . See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 7 .
5. Check for open or high resistance in engine oil level switch ground circuit (Black wire) between ground and engine oil level sensor harness connector terminal No. 1. Ground point is located under battery tray. See **WIRING DIAGRAMS** . If no problem is found, go to next step. If problem is found, repair as necessary and go to step 10 .
6. Check for poor, loose or corroded terminals in engine oil level sensor harness connector. If problem is found,

repair as necessary and go to step 10 . If no problem is found, go to step 8 .

7. Check for poor, loose or corroded terminals in IPC harness connector. If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 9 .
8. Replace engine oil level sensor. After repairs are made, go to step 10 .
9. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
10. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST X: TRUNK AJAR INDICATOR ALWAYS ON

1. After reviewing indicator/warning message description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.
2. Observe trunk ajar indicator on instrument cluster with trunk closed. If trunk ajar indicator is illuminated, go to next step. If trunk ajar indicator is not illuminated, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Disconnect rear compartment courtesy lamp. Rear compartment courtesy lamp is located on rear compartment lid. If trunk ajar indicator does not illuminate, go to next step. If trunk ajar indicator illuminates, go to step 5 .
4. Connect rear compartment courtesy lamp. Disconnect rear compartment courtesy lamp switch harness connector. If trunk ajar indicator illuminates, go to step 7 . If trunk ajar indicator does not illuminate, go to step 6 .
5. Check for short to ground in signal circuit of rear compartment courtesy lamp (Brown/Blue wire) between IPC harness connector C1 terminal No. 10 and rear compartment courtesy lamp switch. See **Fig. 1** . See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 9 .
6. Check for poor, loose or corroded terminals in rear compartment courtesy lamp switch harness connector. If problem is found, repair as necessary and go to step 10 . If no problem is found, go to step 8 .
7. Repair short to ground in (Brown/Blue wire) between IPC harness connector C1 terminal No. 10 and rear compartment courtesy lamp switch. See **WIRING DIAGRAMS** . After repairs are made, go to step 10 .
8. Replace rear compartment courtesy lamp switch. After repairs are made, go to step 10 .
9. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
10. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST Y: TRUNK AJAR INDICATOR INOPERATIVE

1. After reviewing indicator/warning message description and operation, go to next step. See **INDICATOR/WARNING MESSAGE** under DESCRIPTION & OPERATION.
2. Observe trunk ajar indicator on instrument cluster with trunk closed. If trunk ajar indicator is illuminated, go to next step. If trunk ajar indicator is not illuminated, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Disconnect rear compartment courtesy lamp. Rear compartment courtesy lamp is located on rear compartment lid. Connect fused jumper wire between ground and rear compartment courtesy lamp signal circuit of bulb holder (Brown/Blue wire). If trunk ajar indicator illuminates, go to next step. If trunk ajar indicator does not illuminate, go to step 6 .
4. Connect fused jumper wire between rear compartment courtesy lamp ground (Black wire) and rear compartment courtesy lamp signal circuit of bulb holder (Brown/Blue wire). If trunk ajar indicator illuminates, go to next step. If trunk ajar indicator does not illuminate, go to step 8 .

5. Connect rear compartment courtesy lamp. Disconnect rear compartment courtesy lamp switch harness connector. Connect fused jumper wire between ground and rear compartment courtesy lamp switch harness connector (Brown/Blue wire). If trunk ajar indicator illuminates, go to step 7 . If trunk ajar indicator does not illuminate, go to step 9 .
6. Check for open or high resistance in rear compartment courtesy lamp signal circuit (Brown/Blue wire) between IPC harness connector C1 terminal No. 10 and rear compartment courtesy lamp. See **Fig. 1** . See **WIRING DIAGRAMS** . If problem is found, repair as necessary and go to step 13 . If no problem is found, go to step 12 .
7. Check for poor, loose or corroded terminal in rear compartment courtesy lamp switch harness connector. If problem is found, repair as necessary and go to step 13 . If no problem is found, go to step 10 .
8. Check for poor, loose or corroded terminal in rear compartment courtesy lamp harness connector. If problem is found, repair as necessary and go to step 13 . If no problem is found, go to step 11 .
9. Repair open or high resistance rear compartment courtesy lamp switch signal circuit (Brown/Blue wire) between IPC harness connector C1 terminal No. 10 and rear compartment courtesy lamp switch. See **WIRING DIAGRAMS** . After repairs are made, go to step 13 .
10. Replace rear compartment courtesy lamp assembly. After repairs are made, go to step 13 .
11. Replace rear compartment courtesy lamp switch. After repairs are made, go to step 13 .
12. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
13. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 3 .

TEST Z: TURN SIGNAL LAMPS AND/OR INDICATORS ALWAYS ON OR FLASHING

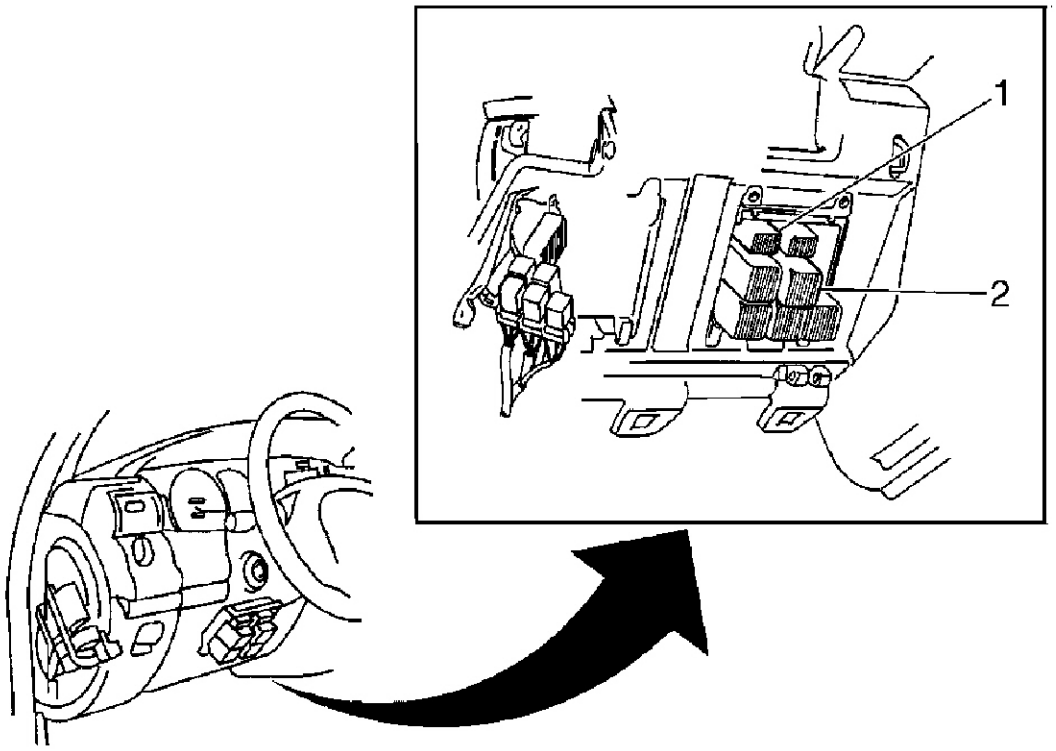
1. If lighting system diagnostic systems check has been performed, go to next step. If lighting system diagnostic systems check has not been performed, go to LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODES - CATERA article.
2. Turn ignition switch to RUN position. Move turn signal switch to left and then right positions while observing turn signal lamps and indicators. If turn signals do not operate normally, go to next step. If turn signals operate normally, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. Ensure that turn signal and hazard switches are in off position. If turn signal lights are not flashing, go to next step. If any turn signal light is flashing, go to step 5 .
4. If turn signal indicators are always on, go to step 9 . If turn signal indicators are not on, go to step 6 .
5. Disconnect turn signal switch harness connector. If any turn signals lights are flashing, go to step 8 . If turn signals lights are not flashing, go to step 7 .
6. Repair short to voltage in supply voltage circuit of always on turn signal. See EXTERIOR LIGHTS article. After repairs are made, go to step 10 .
7. Replace turn signal switch. See STEERING COLUMN SWITCHES - CATERA article. After repairs are made, go to step 10 .
8. Replace hazard warning switch. After repairs are made, go to step 10 .
9. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to next step.
10. Operate system to verify repair. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .

TEST AA: TURN SIGNAL LAMPS AND/OR INDICATORS INOPERATIVE

1. If lighting system diagnostic systems check has been performed, go to next step. If lighting system diagnostic systems check has not been performed, go to LIGHTING SYSTEM DIAGNOSTIC SYSTEMS CHECK under SELF-DIAGNOSTIC SYSTEM in BODY CONTROL MODES - CATERA article.

2. Turn ignition switch to RUN position. Move turn signal switch from left to right positions, while observing turn signal lights and indicators. If turn signal lights and indicators do not operate normally, go to next step. If turn signal lights and indicators operate normally, concern may be intermittent. See **PROBLEM DIAGNOSIS** under INTERMITTENTS.
3. If all turn signals and indicators are not inoperative, go to next step. If all turn signals and indicators are inoperative, go to step 6 .
4. If front or rear left hand turn signal is operative, go to next step. If front or rear left hand turn signal is inoperative, go to step 19 .
5. If front or rear right hand turn signal is inoperative, go to step 16 . If front or rear right hand turn signals are operative, go to step 22 .
6. Check instrument panel fuse block FLASHER fuse (10-amp). If fuse is okay, go to next step. If fuse is blown, go to step 12 .
7. Check instrument panel fuse block HZD fuse (20-amp). If fuse is okay, go to next step. If fuse is blown, go to step 27 .
8. Press hazard warning switch to on. If hazard lights do not operate normally, go to next step. If hazard lights operate normally, go to step 12 .
9. Press hazard switch to OFF position. Turn ignition switch to RUN position. Remove turn signal light flasher from instrument panel convenience center. Convenience center is located under left side of instrument panel. See **Fig. 9** . Using test light connected to ground, probe turn signal light flasher module socket cavity No. 6 (Blue wire) supply voltage circuit. See **Fig. 10** . If test light does not illuminate, go to next step. If test light illuminates, go to step 11 .
10. Disconnect hazard switch 9-pin harness connector. Hazard switch is located in instrument panel, to left of radio. Using test light connected to ground, probe hazard switch harness connector terminal No. 9 (Brown wire). If test light illuminates, go to step 13 . If test light does not illuminate, go to step 28 .
11. Connect test light between turn signal light flasher module socket cavities No. 4 (Black wire) and No. 6 (Red wire). If test light illuminates, go to step 33 . If test light does not illuminate, go to step 25 .
12. Press hazard switch to OFF position. Turn ignition switch to RUN position. Remove turn signal light flasher from instrument panel convenience center. Convenience center is located under left side of instrument panel. See **Fig. 9** . Using test light connected to ground, probe turn signal light flasher module socket cavity No. 6 (Blue wire) supply voltage circuit. See **Fig. 10** . If test light illuminates, go to step 14 . If test light does not illuminates, go to step 15 .
13. Check for open or high resistance in turn signal/hazard flasher supply voltage circuit (Blue wire) between hazard warning switch harness connector terminal No. 3 and turn signal/hazard flasher module harness connector No. 6. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 32 .
14. Check for open or a high resistance in turn signal flasher signal circuit (Black/White wire) between turn signal/hazard flasher module harness connector No. 8 and both hazard warning switch harness connector terminal No. 3 or turn signal switch harness connector No. 4. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 30 .
15. Check for open or high resistance in hazard warning switch ignition supply voltage circuit (Brown wire) between instrument panel fuse block FLASHER fuse (10-amp) and hazard warning switch harness connector terminal No. 9. See **Fig. 11** . If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 32 .
16. Observe right hand turn signals. If both front and rear turn signals are inoperative, go to next step. If only one turn signal is inoperative, go to step 18 .
17. Check for open or high resistance in right hand turn signal switch turn light supply voltage circuit (Black/Green wire) between turn signal switch harness connector terminal No. 8 and Instrument Panel Cluster (IPC) harness connector C1 terminal No. 18. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 30 .

18. Check for open or high resistance in ground circuit and supply voltage circuit of inoperative lamp. See EXTERIOR LIGHTS article. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 31 .
19. Observe left hand turn signals. If both front and rear turn signals are inoperative, go to next step. If only one turn signal is inoperative, go to step 21 .
20. Check for open or high resistance in left hand turn signal switch turn light supply voltage circuit (Black/White wire) between turn signal switch harness connector terminal No. 9 and IPC harness connector C1 terminal No. 6. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 30 .
21. Check for open or high resistance in ground circuit and supply voltage circuit of inoperative lamp. See EXTERIOR LIGHTS article. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 31 .
22. If turn signal indicators are inoperative, determine if one indicator or both indicators are inoperative. If only one turn signal indicator is inoperative, go to next step. If both turn signal indicators are inoperative, go to step 29 .
23. Check inoperative turn signal indicator bulb, and replace as necessary. If bulb was defective, go to next step. If bulb was not defective, go to step 34 .
24. Check for open or high resistance in inoperative turn signal indicator circuit. See **WIRING DIAGRAMS** . See EXTERIOR LIGHTS article. If problem is found, repair as necessary and go to step 34 . If no problem is found, go to step 29 .
25. Repair open or high resistance in turn signal light flasher module ground circuit (Black wire) between ground and turn signal light flasher module harness connector terminal No. 4. After repairs are made, go to step 34 .
26. Repair short to ground in hazard warning switch ignition supply voltage circuit (Brown wire) between instrument panel fuse block FLASHER fuse and hazard warning switch harness connector terminal No. 9. Repair short to ground in turn signal lamp flasher supply voltage circuit (Blue wire) between hazard warning switch harness connector terminal No. 3 and turn signal/hazard flasher module harness connector terminal No. 6. See **Fig. 10** and **Fig. 11** . After repairs are made, go to step 34 .
27. Repair short to ground in hazard warning switch battery supply voltage circuit (Red wire) between instrument panel fuse block HZD fuse and hazard warning switch harness connector terminal No. 6. After repairs are made, go to step 34 .
28. Repair open or high resistance in hazard warning switch supply voltage circuit (Brown wire) between instrument panel fuse block FLASHER fuse and hazard warning switch harness connector terminal No. 9. See **WIRING DIAGRAMS** . After repairs are made, go to step 34 .
29. Replace IPC. See **INSTRUMENT PANEL CLUSTER** under REMOVAL & INSTALLATION. After repairs are made, go to step 34 .
30. Replace turn signal switch. See STEERING COLUMN SWITCHES - CATERA article. After repairs are made, go to step 34 .
31. Replace inoperative park/turn signal lamp. Replace inoperative rear turn signal bulb. After repairs are made, go to step 34 .
32. Replace hazard warning switch. See **HAZARD WARNING SWITCH** under REMOVAL & INSTALLATION. After repairs are made, go to step 34 .
33. Check for poor, loose or corroded terminals in all turn signal system harness connectors. If problem is found, repair as necessary and go to next step. If no problem is found, replace turn signal/hazard flasher module. After repairs are made, go to next step.
34. Connect all harness connectors and components that were previously disconnected. Verify that turn signal lamps and indicators operate properly. If system operates normally, testing is complete. If system does not operate normally, go to step 2 .



1. Daytime Running Lamps (DRL) Relay K133
2. Turn Signal/Hazard Flasher Module K10

G00066128

Fig. 9: Locating Instrument Panel Convenience Center
Courtesy of GENERAL MOTORS CORP.

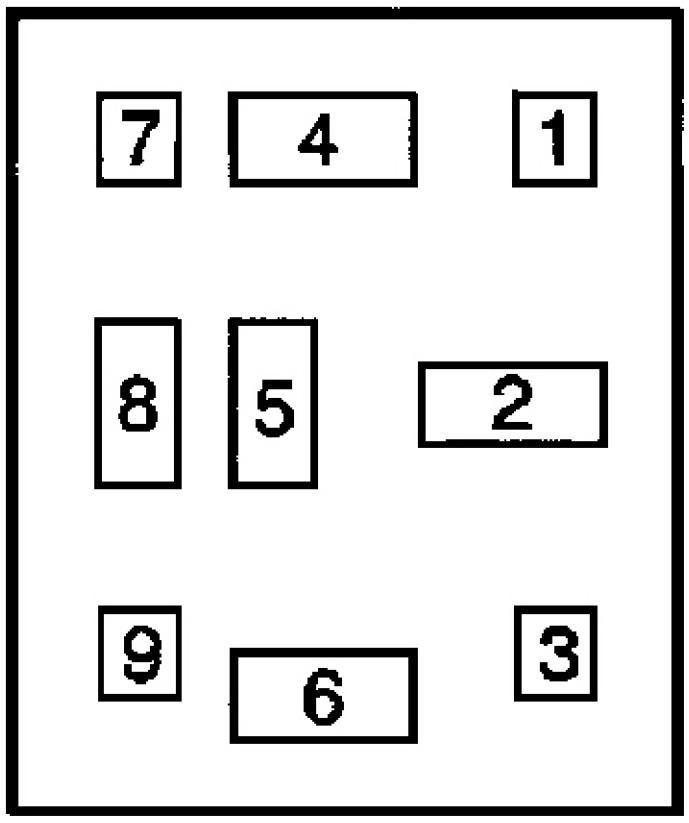


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Fig. 10: Identifying Turn Signal Flasher Module Socket Cavities
Courtesy of GENERAL MOTORS CORP.

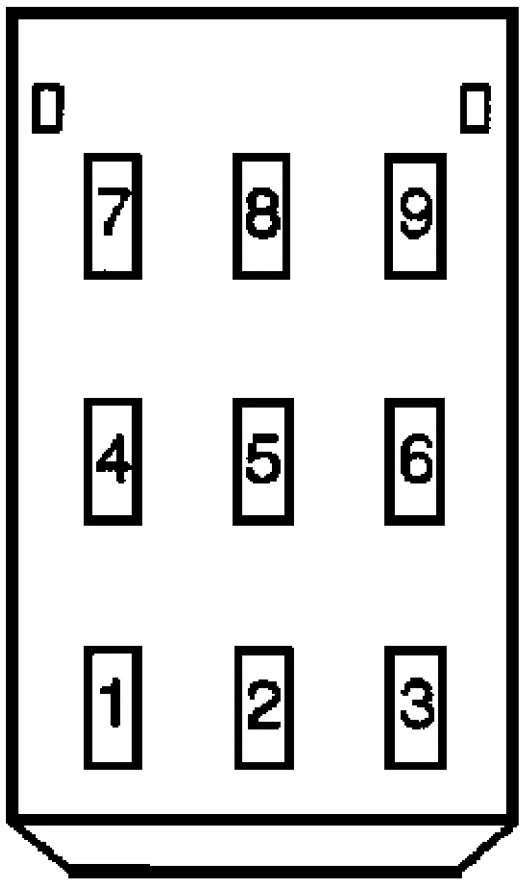

Fig. 11: Identifying Hazard Warning Switch Harness Connector Terminals
Courtesy of GENERAL MOTORS CORP.

REMOVAL & INSTALLATION

WARNING: Deactivate air bag system before performing any service operation. See AIR BAG RESTRAINT SYSTEMS article. DO NOT apply electrical power to any component on steering column without first deactivating air bag system. Air bag may deploy.

CAUTION: When battery is disconnected or modules are replaced, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

FUEL PUMP & SENDER ASSEMBLY

Removal & Installation

Turn ignition switch to OFF position. Relieve fuel pressure at test port using fuel pressure gauge adapter and an approved container. Remove fuel cap. Drain fuel tank. Raise and support vehicle. Disconnect lines and electrical connectors. Support fuel tank. Remove fuel tank straps. Lower fuel tank. Disconnect EVAP sensor connector. Remove spring loaded clamp around fuel tank boot. Using Wrench (J42219B), remove sender assembly lock nut.

To install, install NEW seal and reverse removal procedure. Tighten lock nut to 37 ft. lbs. (50 N.m).

GAUGE CLUSTER

Removal & Installation (Speedometer/Tachometer)

Remove instrument cluster. See **INSTRUMENT PANEL CLUSTER** . Remove screws from speedometer/tachometer gauge module. Pull lock tabs back to remove speedometer/tachometer gauge module from lens. To install, reverse removal procedure.

Removal & Installation (Voltage/Oil Pressure Gauge)

Remove instrument cluster. See **INSTRUMENT PANEL CLUSTER** . Remove screws from voltage/oil pressure gauge. Pull lock tabs back to voltage/oil pressure gauge module from lens. To install, reverse removal procedure.

HAZARD WARNING SWITCH

Removal & Installation

With a flat-blade tool, gently pry on the hazard switch cover and remove from hazard switch. Depressing tabs on hazard switch pry hazard switch in an outward motion disengaging hazard switch from harness connector. Remove hazard switch from instrument panel accessory trim plate. To install, reverse removal procedure.

HEADLIGHT SWITCH

CAUTION: To prevent to instrument panel trim, place a shop towel behind prying tool when removing headlight switch.

Removal & Installation

Using a suitable prying tool, pry left side of headlight switch rearward. Disconnect harness connector. Remove headlight switch. To install, reverse removal procedure.

INSTRUMENT CLUSTER INDICATOR LAMPS

Removal & Installation

Remove instrument cluster. See **INSTRUMENT PANEL CLUSTER** . Remove indicator bulbs by twisting counterclockwise. To install, reverse removal procedure.

INSTRUMENT PANEL CLUSTER

Removal & Installation

1. Remove center air deflectors. Remove 2 screws from center air deflector housing. Remove center air deflector housing. Rotate steering wheel to expose screw location on upper steering column cover. Remove screw cover and screw from left side of upper steering column cover.
2. Rotate steering wheel to expose right side of cover. Remove screw cover and screw from right side of upper steering column cover. Remove upper steering column cover. Remove screw from upper column cover collar. Remove collar from upper column.
3. Remove screw from right side of instrument cluster. Dislodge right side of instrument cluster. Disconnect wiring harness connector from right side of cluster. Slide cluster to right side enough to clear left vent housing. Disconnect harness connector from left side of cluster. Gently remove instrument panel cluster from mounting location.
4. To install, reverse removal procedure. Reprogram instrument panel cluster. See **PROGRAMMING** .

WIRING DIAGRAMS

Fig. 12: Analog Instrument Panel Wiring Diagram (Catera)

2001 Cadillac Catera

2001 ACCESSORIES & EQUIPMENT Analog Instrument Panels - Catera

2001 Cadillac Catera

2001 ACCESSORIES & EQUIPMENT Analog Instrument Panels - Catera

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