Description of Revisions: *This service bulletin is updated and replaces the version dated September 2002. This information applies to 1999, 2000, 2001, and 2002 (through June 9, 2002) model-year vehicles.*

System Operation

General Information

Initial Power On

When the ignition key is turned to the ON position, the following events occur: All of the message center (MC) lights illuminate. The icons (warning indicators) illuminate for 1 second, performing a bulb check and indicating that they are all working. After 1 second, all of the lighted icons go out except for the:

- low oil pressure
- low air pressure
- parking brake
- check engine

The lights in these four icons go out once the engine has started and air pressure is above 70 psi (485 kPa). The parking brake icon remains illuminated until the parking brake is released.

NOTE: The right-hand bottom position of the MC is not used at this time.

Also at initial power on, the instrument pointers move counterclockwise to the zero position and vibrate briefly. This is a calibration function of the instruments allowing them to have a zero reference for operation. This is a normal function and occurs each time the system is powered on.

The high-beam icon illuminates anytime that the high beams are switched on. The ignition key does not need to be in the ON position for the high-beam icon to illuminate or for the hazard flasher or turn signals to operate.

With the Engine Running

When the engine is first started, the low oil pressure icon illuminates and the warning buzzer sounds, until there is detectable oil pressure.

The warning buzzer sounds to indicate the following conditions:

- low oil pressure
- low coolant level
- high coolant temperature
- low air pressure

The buzzer stays on until all of these conditions return to normal ranges.

The low air chime sounds until air pressure is above 70 psi (485 kPa). It also sounds any time that the system is powered and air pressure drops below 70 psi (485 kPa). The parking brake chime sounds until the parking brake is released.

IMPORTANT: During startup with weak batteries, the MC may not function properly until system voltage is above 9.6 v. This can take up to 50 seconds after startup.

Odometer and Trip Odometer

The MC is equipped with a speedometer and a tachometer. A digital odometer display is located in the speedometer and a digital trip odometer display is located in the tachometer.

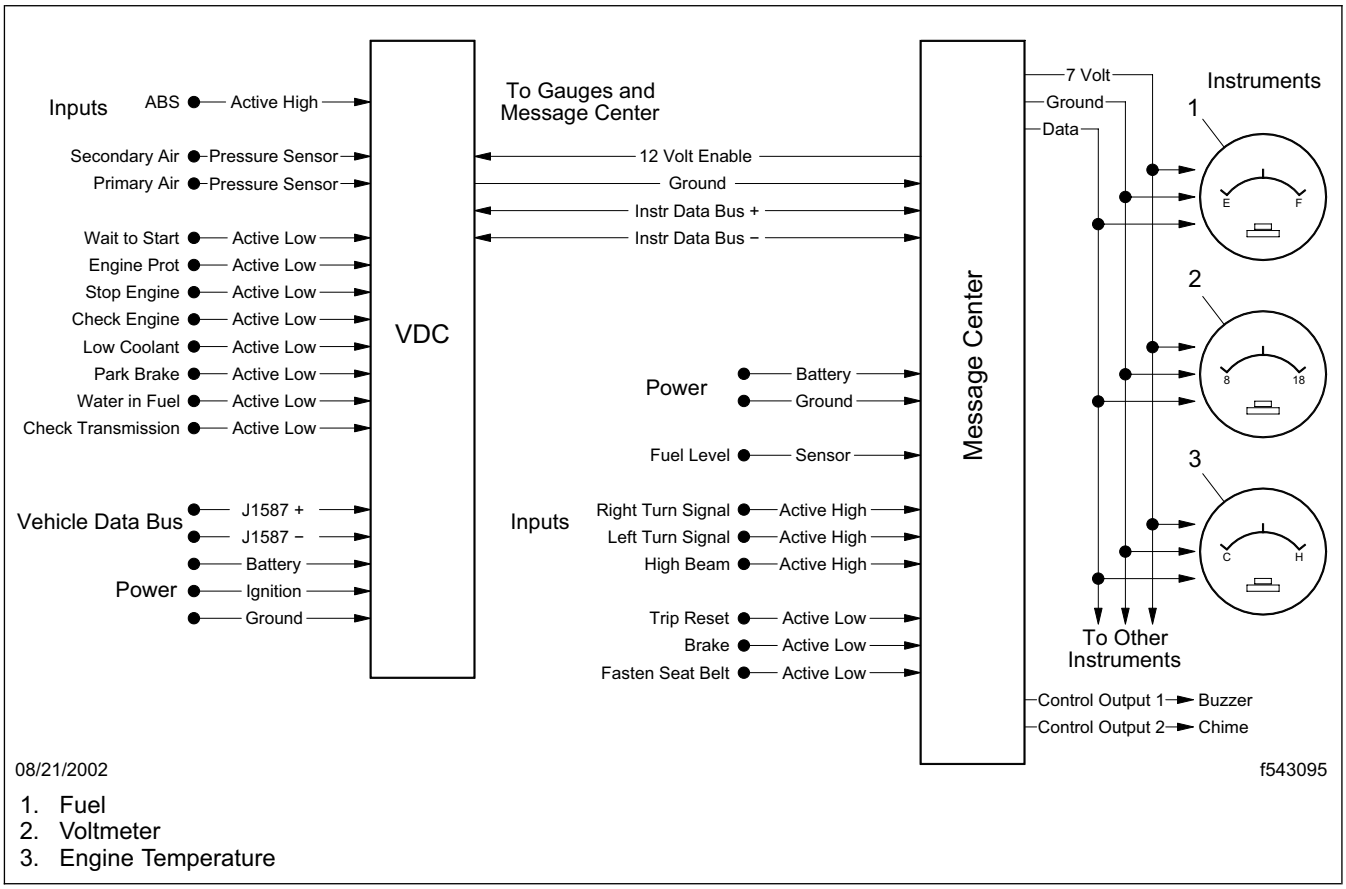
Both odometers can display either English or metric values (miles or kilometers). A trip reset switch is located on the lower right corner of the dash panel. If the switch is depressed for more than 4 seconds, both displays will cycle between English and metric. At the left sides of the odometer displays, a triangle will point to either an "m" or a "k," depending on which scale is selected.

To reset the trip odometer, depress the switch for less than 4 seconds. The odometer resets to either 0 miles or 0 kilometers. The display indicates in 1/10 (mile or kilometer) increments, depending on the scale selected.

Message Center (MC)

The message center (MC) is located in the dash panel and contains the icons that illuminate to warn of potential problems. See **Fig. 1**. The MC has a built-in diagnostic function that indicates whether or not the MC is receiving data from the vehicle data computer (VDC). If data is not received from the VDC for more than 45 seconds, the icon lights will "dance" or initiate a chase pattern, indicating no reception of data. Data is sent from the VDC to the MC and on to the instruments. See **Fig. 2** and **Fig. 3**.

See **Table 1** and **Table 2**.



1. Fuel
2. Voltmeter
3. Engine Temperature

Fig. 1, Vehicle Data Computer (VDC)/Message Center (MC) System

Vehicle Data Computer (VDC)

The vehicle data computer (VDC) is critical to the instrument system. See Fig. 1. It is usually mounted in or near the engine compartment. The VDC has direct communications with the engine electronic control module (ECM) through the J1587 databus. The VDC and the MC, in the dash panel, communicate via a separate twisted pair of wires (339D + and 339D –).

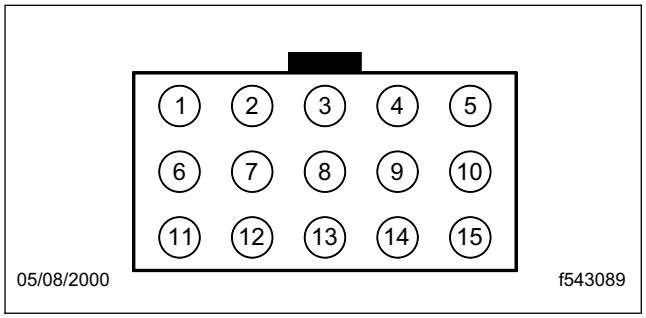


Fig. 2, MC 15-Pin Connector (from face of connector)

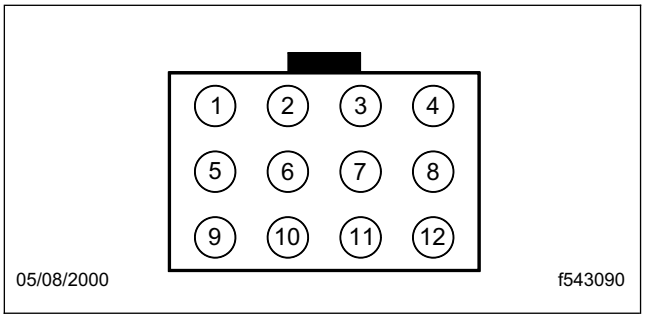


Fig. 3, MC 12-Pin Connector (from face of connector)

To reduce the amount of wire and the number of components used in the system, the VDC has two integral air transducers. The transducers monitor both primary and secondary air pressure and drive the air pressure instruments. Rear, primary air pressure (green hose) is routed to port 3. Front, secondary air pressure (red hose) is routed to port 4.

IMPORTANT: The VDC must be installed so that moisture, which could freeze in cold weather and cause damage, will not accumulate at the air transducers. Mount the VDC vertically so that it is the highest point in the air system, with the air lines routed upward to the air transducers. If the VDC cannot be mounted as the highest point in the system make loops in the routing of the airlines. Make the loops below the level of the transducers.

The VDC is contained in a rugged case and is resistant to water splash and spray. It is not intended to be submerged in water or exposed to flying debris. Do not mount the VDC in a wheel well or near the engine exhaust.

CAUTION

The VDC mounts on four rubber boots, one at each corner. Do not tighten the mounting bolts to the extent that the rubber boots are forced out of position from under the VDC housing. If this happens, excessive vibration may damage the internal electronics. See Fig. 4 and Fig. 5.

See Table 3 and Table 4.

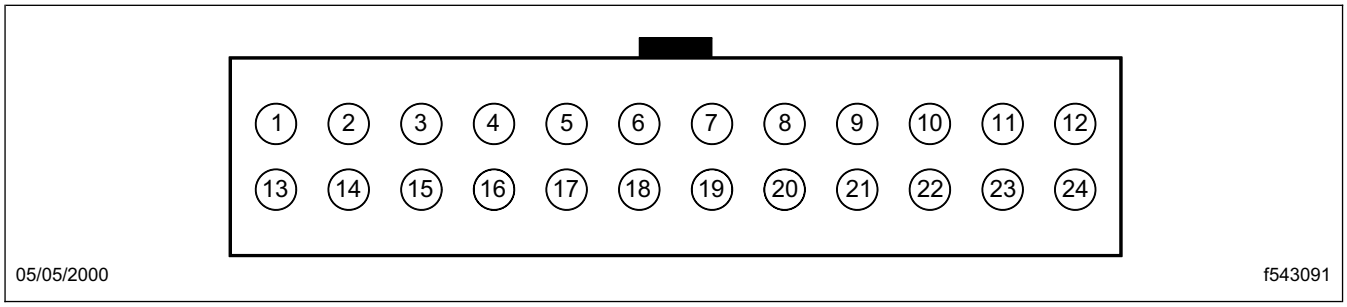


Fig. 4, VDC J1 Connector (from face of connector)

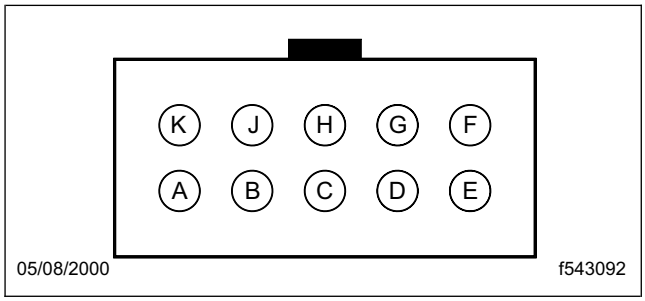


Fig. 5, VDC J2 Connector (from face of connector)

Instruments

General Information

The vehicle instruments receive their operating data either directly from the engine ECM or from sensors at various locations on the vehicle. See **Table 5**. All of the information is transmitted to the VDC and MC and then on to the instruments through a twisted-pair databus from the MC. See **Fig. 6** and **Table 6**. The instruments are connected to the MC by a "spider harness" with a 5-way connector. See **Fig. 7** and **Table 7**.

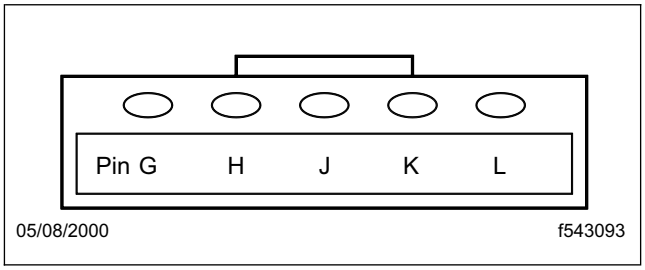


Fig. 6, Instrument Harness Connector (from face of connector)

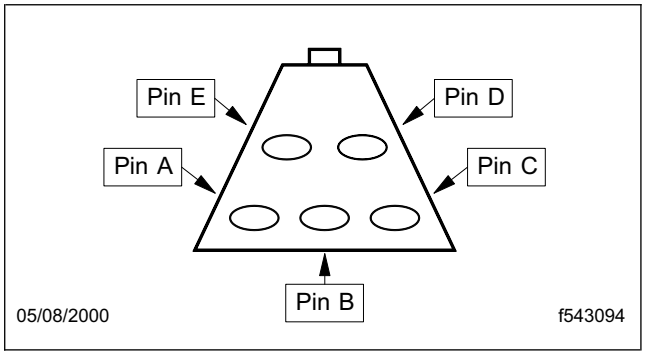


Fig. 7, Spider Harness Connector (from face of connector)

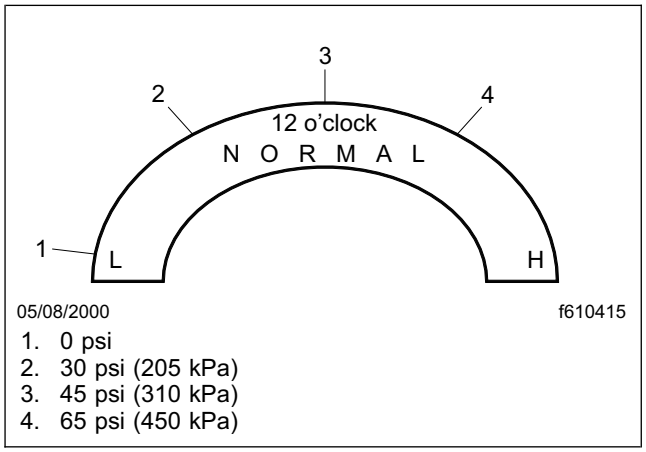
Instrument Warning Zones

Several of the vehicle instruments have a white operational range bar corresponding to the normal sweep of the pointer. If the pointer is within this white zone, the instrument function is within the normal design range of operation. Some instruments have a yellow or red warning zone at the ends of the white zone. Only if the pointer moves into a warning zone, and stays there, does the operator need to have the system checked. See **Fig. 8**, **Fig. 9**, **Fig. 10**, **Fig. 11**, and **Fig. 12**.

NOTE: The instruments indicate approximate values. There may be a ± 5 percent variation in readings between vehicles.

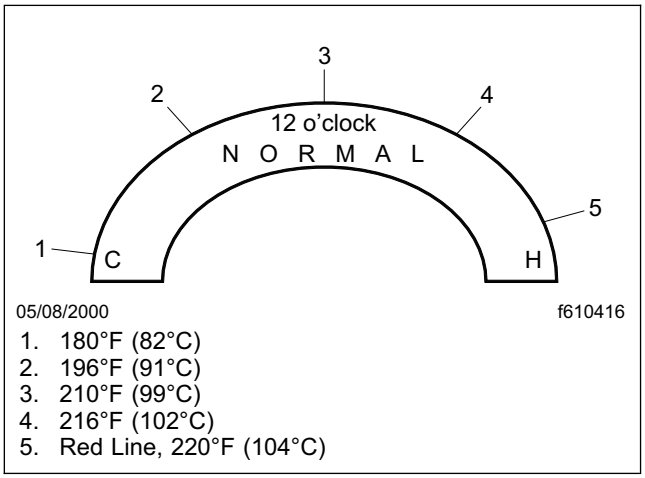
Medallion II Instrument System

The Medallion II System is a microprocessor-based system using sensor and databus information to display both instrument and warning information. With this type of system, a good, clean ground is very important. If the system should behave erratically, check the grounds at the VDC (pin J), the MC (pin 4), and the battery (negative terminal).



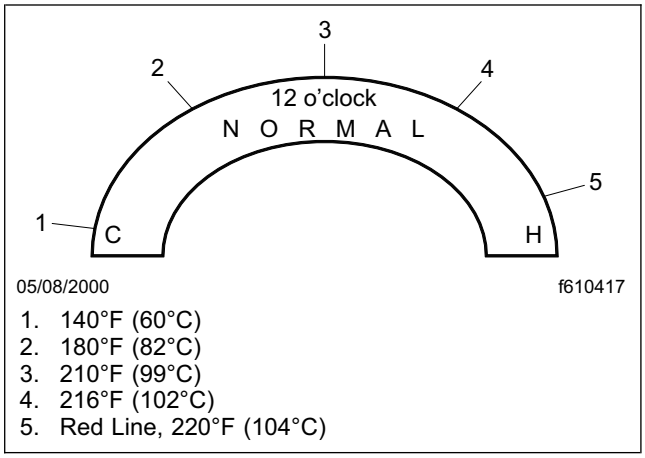
1. 0 psi
2. 30 psi (205 kPa)
3. 45 psi (310 kPa)
4. 65 psi (450 kPa)

Fig. 8, Oil Pressure



1. 180°F (82°C)
2. 196°F (91°C)
3. 210°F (99°C)
4. 216°F (102°C)
5. Red Line, 220°F (104°C)

Fig. 9, Engine Temperature (vehicles built before March 1, 2000)



1. 140°F (60°C)
2. 180°F (82°C)
3. 210°F (99°C)
4. 216°F (102°C)
5. Red Line, 220°F (104°C)

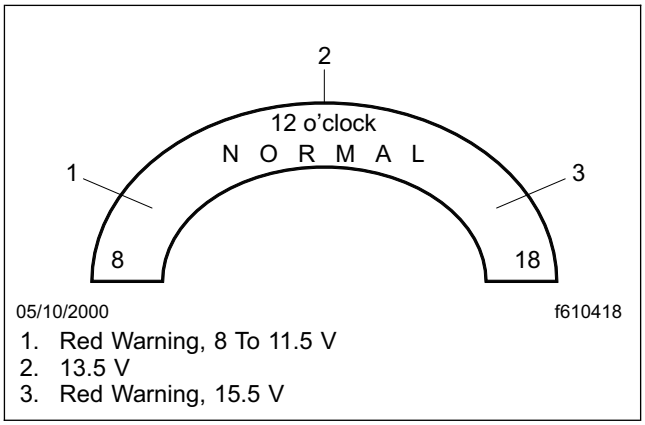
Fig. 10, Engine Temperature (vehicles built on and after March 1, 2000)

System Troubleshooting

Instrument Troubleshooting

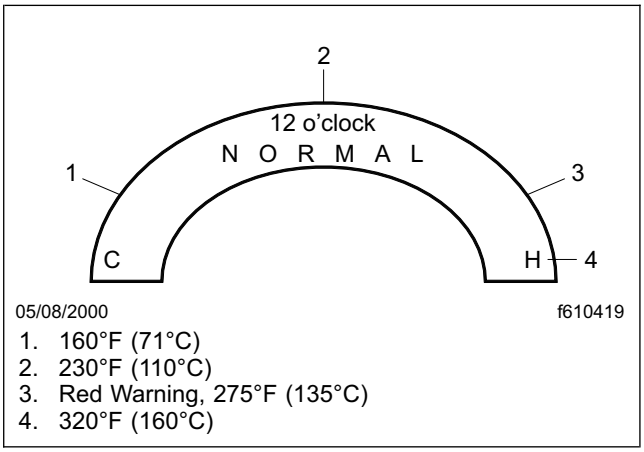
All of the instruments are designed in the same way. All use a microprocessor, a stepper motor, and LED lighting. Each instrument receives information via a single data line (pin 9) of the MC. Any connector can be plugged into any instrument and that instrument will work, provided data is being transmitted along the data line. Follow the steps below to determine if either a harness or an instrument is faulty.

1. Watch the instruments and turn the ignition key to the ON position. All of the instruments should reset or zero.
2. With the ignition key in the ON position, and the vehicle not yet running, the instruments that have information will begin working.
3. If any instrument did not reset, swap instrument connectors with one that did reset and repeat the process.



1. Red Warning, 8 To 11.5 V
2. 13.5 V
3. Red Warning, 15.5 V

Fig. 11, Voltmeter



1. 160°F (71°C)
2. 230°F (110°C)
3. Red Warning, 275°F (135°C)
4. 320°F (160°C)

Fig. 12, Transmission Temperature

4. If an instrument still fails to reset, it is faulty. If an instrument does reset, look for a problem with a connector or the harness. See **Table 6** and **Table 7**.
5. If all of the instruments reset and appear to work properly, start the engine and test the inputs that drive each instrument. See **Table 8**.
6. If after performing all of the tests a single instrument will reset but will not respond after the sensor has been determined to function properly, then the instrument is faulty.

Medallion II VDC/MC Troubleshooting

The VDC receives both digital and analog inputs and converts them into an all-digital signal. The MC uses this signal to activate the warning lights and drive the instruments.

A good portion of the information that the VDC receives comes directly from the engine databus. If the databus transmission is not received by the VDC for 18 seconds, the odometer light will begin flashing. After an additional 23 seconds, the instruments will reset to zero. And after 45 seconds, the MC lights will begin scrolling or initiate a chase pattern. When communication with the databus is re-established, the system will function normally.

If the MC and the instruments fail to activate, ground pin 8 of the MC. The instruments and lights should go through the power up sequence. This will eliminate half of the system when trying to diagnose a non-functioning system.

Troubleshooting Tables

Problem—The Message Center and the Instruments Do Not Activate With the Ignition Key in the ON Position

Diagnostic Check	Remedy
Measure battery voltage at pin F of the VDC (vehicle data compute) J2 connector and at pin 5 of the MC (message center) 15-pin connector (circuit 437).	If there is no voltage at these locations, locate and repair a bad connection in the harness or connector.
Measure ignition voltage at pin E of the VDC J2 connector, with the ignition key in the ON position.	If there is no voltage, locate and repair a bad connection in the harness or connector.

Diagnostic Check	Remedy
Check for a ground reading at pin 8 of the MC 15-pin connector (circuit 339 A) and at pin G of the VDC J2 connector, with the ignition key in the ON position.	If there is no ground reading, check continuity of the harness. If the harness is good, replace the VDC.
Check for a 12 v reading at pin 8 of the MC 15-pin connector (circuit 339 A) and at pin G of the VDC J2 connector, with the ignition key in the OFF position.	If 12 v is measured at pin 8 of the MC 15-pin connector, but not at pin G of the VDC J2 connector, check the wiring harness. If there is no voltage at pin 8 of the MC 15-pin connector replace the MC.
Disconnect the MC 15-pin connector and measure pin 8 for voltage (short to power).	If voltage is measured with the MC 15-pin connector disconnected, then wire 339 A is shorted to power at some location. Locate the short to 12 v and repair the harness.
Check pins J and H of the VDC J2 connector (circuits GND 9 and GND 6) for ground and continuity.	If pins J and H are grounded, locate and repair an open circuit in the harness.
Ground pin 4 of the MC 15-pin connector (circuit GND 9).	If the system works, there is an open circuit between pin 4 of the MC 15-pin connector and pin H of the VDC J2 connector (circuit GND 9). If the system still does not work, replace the MC.

Problem—The Message Center/Instruments Do Not Turn Off With the Ignition Key in the OFF Position

Diagnostic Check	Remedy
Disconnect pin E of the VDC J2 connector (circuit 71 D) with the ignition key in the ON position.	If the system shuts down, locate and repair a harness short to battery voltage. If the system does not shut down, replace the VDC.
Disconnect pin 8 of the MC 14-pin connector (circuit 339 A).	If the system shuts down, repair the harness between pin 8 of the MC 15-pin connector and pin G of the VDC J2 connector. If the system will not shut down, replace the MC.

Problem—The Message Center Is On But the Instruments Do Not Come On

Diagnostic Check	Remedy
Measure voltage at instrument cavity pin K of the cluster harness (circuit 339 B).	If 7 v is not measured, repair the harness. If 7 v is measured, replace the instrument or instruments.
Ground cavity pin J of the cluster harness (circuit GND 7) to test an instrument.	If the instrument activates, locate and repair a bad ground in the harness.
Disconnect all of the instruments, then connect them one at a time.	As each instrument is connected, they will all work until the shorted one is connected. Then they will all stop working. Replace the instrument that is shorted.

Problem—No Instrument Backlighting

Diagnostic Check	Remedy
Measure for 12 v at the instrument connector cavity pin G (circuit 29 A), with the headlights on.	If no voltage is measured, repair the harness. If 12 v is measured at pin G, replace the faulty instrument.

Problem—Erratic Instrument Operation

Diagnostic Check	Remedy
Swap instrument connectors to locate the faulty connector or harness.	When a faulty connector or harness is found, repair the connector or harness.

Diagnostic Check	Remedy
Check continuity between pin 9 of the MC 15-pin connector and the instrument connector cavity pin H (circuit 999).	If there is no continuity, repair the connector or harness. NOTE: At least one gauge must be connected for this test.
Measure for 7 v at the instrument connector pin K, with the ignition key in the ON position.	If 7 v is not measured, repair the harness.
Check instrument connector pin J for continuity to ground.	If pin J is not grounded properly, repair the harness.

Problem—The Instruments Will Reset at Power On, But Will Not Display Data

Diagnostic Check	Remedy
Swap the connectors between the instrument(s) that works and the instrument(s) that does not work.	If an instrument begins working with a different connector, note the faulty connector and repair it. If the instrument still doesn't work, use service software and a laptop computer to determine if data is being transmitted by the VDC. If there is data on the databus, replace the instrument.

Problem—The Trip Odometer Reset/Metric Function Does Not Work

Diagnostic Check	Remedy
Check continuity between pin 8 of the MC 12-pin connector and the trip reset switch.	If there is an open circuit, repair the wire harness.
Ground pin 8 of the MC 12-pin connector.	If the trip reset works, replace the reset switch. If the trip reset still doesn't work, replace the MC.

Problem—The Fuel Gauge Is Inaccurate

Diagnostic Check	Remedy
Check resistance at pin 1 of the 12-pin connector.	Resistance should be between 33 ohms (full tank) and 240 ohms (empty tank). If resistance is not within this range, either the sender is faulty or the wiring is corroded. See **Fig. 13**.
Check continuity between pin 1 of the MC 12-pin connector and the fuel sender.	If there is no continuity, repair the harness. NOTE: If resistance values are within the specified range and there is continuity, check the MC ground. If the ground is good, replace the MC.
Disconnect the 12-pin connector at the MC.	The fuel gauge should indicate an empty fuel tank.
Ground pin 1 (wire 47).	The fuel gauge should indicate a full fuel tank.

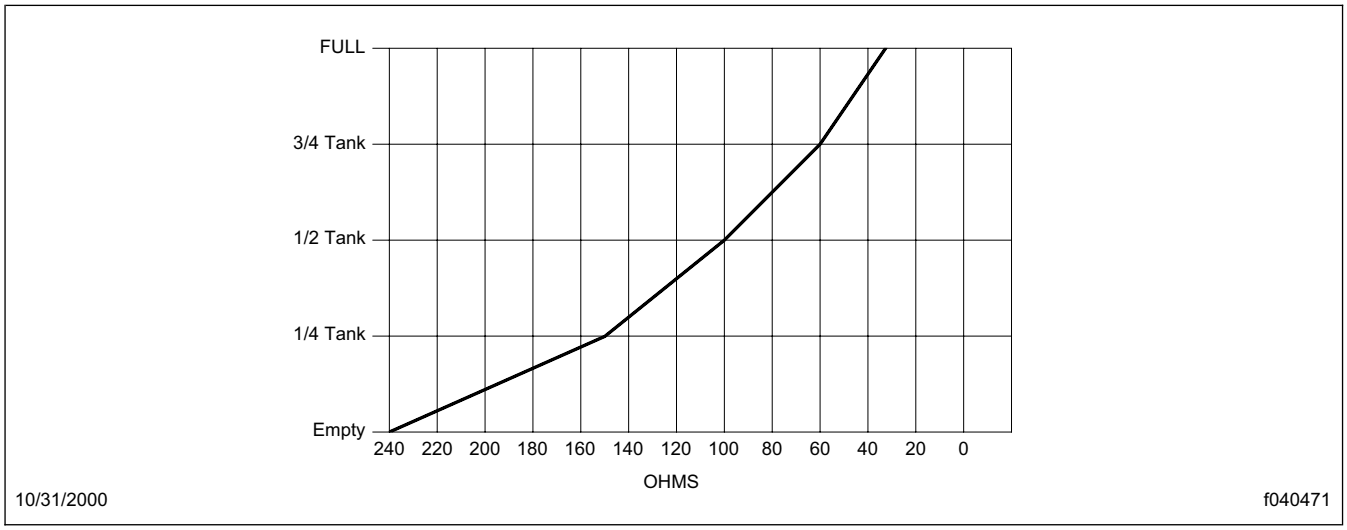


Fig. 13, Fuel Tank Ohms Readings

Problem—The MC Lights Scroll or Chase in a Circular Pattern With the Ignition Key in the ON Position

Diagnostic Check	Remedy
Disconnect the VDC J2 connector and ensure that pins C and D (circuits 339 + and 339 –) are not shorted.	If the pins are shorted, repair the harness. If the pins and harness are not shorted, replace the VDC.
Disconnect the 15-pin MC connector and ensure that pins 1 and 10 (circuits 339 D + and 339 D –) are not shorted at the MC.	If the MC pins are not shorted, check the harness bulkhead connector pins for shorts.

Problem—The MC Lights Scroll or Chase in a Circular Pattern With the Ignition Key in the OFF Position

Diagnostic Check	Remedy
Measure for 10-12 v at pin 8 of the MC 15-pin connector (circuit 339 A). NOTE: Be sure to measure for 10-12 v with the key in the OFF position. Nothing less than 10-12 v is acceptable.	If 10-12 v is not measured, unplug the VDC 10-pin connector and measure for 10-12 v at pin G (circuit 339 A). If 10-12 v is measured, the VDC is faulty. If 10-12 v is not measured at pin G of the VDC 10-pin connector with it unplugged, then unplug the MC 15-pin connector. Check continuity between pin 8 (circuit 339 A) of the 15-pin connector and pin G (circuit 339 A) of the 10-pin connector. If continuity is read, then check for continuity to ground. If the circuit is grounded, install a new circuit 339 A wire between the VDC and the MC. If the wire is not grounded, but there still is no voltage measured at either connector when connected, unplug the 15-pin connector and remove wire 339 A from the pin 8 cavity. Reconnect the connector and measure for 12 v in the empty pin 8 cavity. If 10-12 v is not measured, replace the MC.

Problem—One or More Lights on the MC Stay On While the Vehicle Is Running

Diagnostic Check	Remedy
If a MC light stays on, disconnect the input pin for that light. See Fig. 1 or Fig. 2.	If the light goes out, locate and repair a short in the harness or connector.

Diagnostic Check	Remedy
If the MC light does not go out in the previous test, disconnect the 10-pin (J2) connector at the VDC. Connect pins G, H, and J together and watch to see if the MC performs a bulb check (all lights go out, gauges go to zero, and after 45 seconds all lights begin a chase pattern).	If one or more lights comes on before 45 seconds, replace the MC.
Test the sensor. See the sensor supplier's troubleshooting information.	If the sensor is faulty, replace it. If the sensor is not faulty, replace the MC.

Problem—An Icon on the Message Center Will Not Illuminate

Diagnostic Check	Remedy
Determine the location of the connector pin (VDC or MC) of the icon which will not illuminate. See **Fig. 1**, **Fig. 2**, **Fig. 3**, and **Fig. 4** and **Table 1**, **Table 2**, **Table 3** and **Table 4**.	If the icon does illuminate, inspect the connector or harness for a faulty connector or broken wire.
If the first check does not determine the problem, check the sensor inputs to determine if there is a faulty sensor. See the sensor supplier's troubleshooting information. If the sensor is not faulty, check continuity of the harness wire for that input.	If a sensor is faulty, replace it. Repair a damaged harness as necessary. NOTE: If the checks above are satisfactory, replace the MC.

Problem—The Message Center Lights Display Erratically (not a chase pattern)

Diagnostic Check	Remedy
See **Fig. 1**, **Fig. 2**, **Fig. 3**, and **Fig. 4** and **Table 1**, **Table 2**, **Table 3** and **Table 4**. Check each erratic light for a loose pin connection.	If a loose pin connection is found, repair the connector or harness.
Check pin F on the VDC J2 connector (circuit 82 D) for a loose battery voltage connection.	Repair the loose connection.
Check pin E on the VDC J2 connector (circuit 71 D) for a loose ignition voltage connection.	Repair the loose connection.
Check continuity between pins C and D on the VDC J2 connector (circuits 339 D + and 339 D –) and pins 1 and 10 of the MC 15-pin connector (circuits 339 D + and 339 D –).	If there is no continuity, locate and repair a faulty connector or damaged harness. NOTE: If the checks above are satisfactory, replace the MC.

Problem—The Buzzer Will Not Activate

Diagnostic Check	Remedy
Check for continuity on pin 11 of the MC 15-pin connector (circuit 435 *).	Repair the buzzer connection or the pin at the MC.

Diagnostic Check	Remedy
Measure for 12 v nominal voltage at the buzzer terminals with the ignition key in the OFF position.	If 12 v is not measured, repair the buzzer harness to establish power.
Check pin 11 of the MC 15-pin connector (circuit 435) for a short to ground, when the buzzer should activate.	Repair a damaged harness.

Problem—The Buzzer Stays On

Diagnostic Check	Remedy
Check pin 11 of the MC 15-pin connector (circuit 435 *) or pin 12 (circuit 18) for a short to ground or to power.	Repair a short to ground or to power.

System Design Parameters

Message Center 15-Pin Connector				
Pin	**Input Name**	**Input Characteristic**	**Wire Code**	**Color**
1	Databus +	From VDC pin C	339 D +	White
2	Ground	Chassis ground	GND 9C	Black
3	Instrument Power	7 v DC provided by message center	339 B	White
4	Ground	Ground for instruments	GND 9	Black
5	Battery	12 v DC from battery	437	Red
6	No connection	—	—	—
7	No connection	—	—	—
8	Message center control	From VDC pin G ground to activate	339 A	White
9	Instrument data	Instrumentation data	999	White
10	Data bus –	From VDC pin D	339 D –	White
11	Buzzer*	Output to buzzer-provide GND	435 *	White
12	Chime	Output to chime-provide GND	18	White
13	No connection	—	—	—
14	No connection	—	—	—
15	No connection	—	—	—

* Not used on 2001/2002 model-year chassis.

Table 1, Message Center 15-Pin Connector

Message Center 12-Pin Connector				
Pin	**Input Name**	**Input Characteristic**	**Wire Code**	**Color**
1	Fuel sender	240 to 33 ohm sender	47	White
2	Right turn signal	Switched signal to 12 v DC to activate	61	White
3	Left turn signal	Switched signal to 12 v DC to activate	60	White
4	High beam	Switched signal to 12 v DC to activate	20 H	White
5	No connection*	—	—	—
6	No connection	—	—	—
7	Brake (hydraulic only)	Switched to ground to activate	396	White

Message Center 12-Pin Connector				
Pin	**Input Name**	**Input Characteristic**	**Wire Code**	**Color**
8	Trip reset/metric	Switched to ground to activate	323	White
9	No connection	—	—	—
10	Fasten seat belt	Switched to ground to activate	435	White
11	No connection	—	—	—
12	No connection	—	—	—

* On 2002 model-year chassis, this pin grounds to GND 9C.

Table 2, Message Center 12-Pin Connector

Vehicle Data Computer I/O Connections (J1)*				
Pin	**Name**	**Circuit Number**	**Type**	**Comment**
J1–1	Not used	—	—	—
J1–2	Not used	—	—	—
J1–3	Not used	—	—	—
J1–4	ATC	376T1	Switch/active low (sink to ground)	Source 15 m A
J1–5	Not used	—	—	—
J1–6	Not used	—	—	—
J1–7	Not used	—	—	—
J1–8	Not used	—	—	—
J1–9	Not used	—	—	—
J1–10	Check engine	N25/C799	Switch/active low (sink to ground)	Sink 1 m A
J1–11	Stop engine	N 16	Switch/active low (sink to ground)	Sink 1 m A
J1–12	Not used	—	—	—
J1–13	Primary air sensor	—	Internal pressure/flexible hose	0 to 150 psi (0 to 1035 kPa)
J1–14	Not used	—	—	—
J1–15	Secondary air sensor	—	Internal pressure/flexible hose	0 to 150 psi (0 to 1035 kPa)
J1–16	Not used	—	—	—
J1–17	Not used	—	—	—
J1–18	ABS	376L1	Switch/active high	Source 15 m A
J1–19	Check Transmission	E115	Switch/active low (sink to ground)	Sink 1 m A
J1–20	Park	125 *	Switch/active low (sink to ground)	Sink 1 m A
J1–21	Water in fuel	N32	Switch/active low (sink to ground)	Sink 1 m A
J1–22	Low water	173 L	Medallion CLA/act low (sink to ground)	Sink 1 m A
J1–23	Engine protect	N01/C659	Switch/active low (sink to ground)	Sink 1 m A
J1–24	Wait to start	N31/C796	Switch/active low (sink to ground)	Sink 1 m A

* PCB rev. D, software rev. 1.6.

Table 3, Vehicle Data Computer I/O Connections (J1)

Vehicle Data Computer I/O Connections (J2)				
Pin	**Name**	**Type**	**Circuit Number**	**Comment**
J2–A	Vehicle data bus +	J1587	1587 + B	—
J2–B	Vehicle data bus –	J1587	1587 – B	—
J2–C	Instrument data bus +	RS–485	339 D +	To message center
J2–D	Instrument data bus –	RS–485	339 D –	To message center
J2–E	Ignition	Switched 12 v	71 D *	—
J2–F	Battery	12 v nominal	82 D	—
J2–G	12 v control to MC	0 to 0.5 v (key on signal), 12 v (key off signal)	339 A	To message center
J2–H	Cluster ground	Cluster return	GND 9	—
J2–J	Module ground	To chassis ground (battery negative)	GND 6	—
J2–K	Single wire instrument bus	Not used	—	—

Table 4, Vehicle Data Computer I/O Connections (J2)

Instruments/Data Sources	
Instrument	**Source of Data**
Speedometer	Engine ECM (J1587 databus)
Tachometer	Engine ECM (J1587 databus)
Odometer	Engine ECM (J1587 databus)
Trip Odometer	Engine ECM (J1587 databus)
Engine Coolant Temperature	Engine ECM (J1587 databus)
Engine Oil Pressure	Engine ECM (J1587 databus)
Voltage	Engine ECM (J1587 databus)
Transmission Oil Temperature	Transmission ECM (J1587 databus)
Front Air Pressure-Secondary	Vehicle Data Computer Sensor
Rear Air Pressure-Primary	Vehicle Data Computer Sensor
Fuel Level	Fuel Tank Sensor

Table 5, Instruments/Data Sources

Instruments (pinout and voltage)			
Pin	**Information**	**DC Voltage**	**Circuit**
G	Lighting	12 v DC	29 A
H	Databus	3 to 7 v DC	999
J	Ground	—	GND 9 A
K	Power	7 ±0.5 v DC	339 B
L	N/A	—	Plug

Table 6, Instruments (pinout and voltage)

Spider Harness Connector			
Pin	**Circuit**	**Volts**	**Description**
A	29 A	12	Backlighting
B	339 B	7 ±0.5	Power

Spider Harness Connector			
Pin	**Circuit**	**Volts**	**Description**
C	Plug	—	—
D	999	3 to 7	Databus
E	Ground 9	—	Ground

Table 7, Spider Harness Connector

Instrument Input Tests		
Instrument	**Input**	**Test**
Voltmeter	Battery	Use a a laptop computer loaded with the engine manufacturer's diagnostic software to ensure that the instrument matches the battery. NOTE: The signal comes from the ECM.
Fuel	Sender	Pin 1 of the 2-pin message center connector should read between 240 and 33 ohms. If pin 1 is grounded, the fuel gauge will read FULL. See **Fig. 13**.
Primary Air	Air Pressure	The instrument uses direct air pressure into the vehicle data computer. Unplug the airline to determine if air pressure is reaching the VDC. Ensure that there is air pressure at the input.
Secondary Air	Air Pressure	The instrument uses direct air pressure into the vehicle data computer. Unplug the airline to determine if air pressure is reaching the VDC. Ensure that there is air pressure at the input.
Engine Temperature	Engine ECM	Compare the engine ECM reading with the engine manufacturer's diagnostic tool reading.
Oil Pressure	Engine ECM	Compare the engine ECM reading with the engine manufacturer's diagnostic tool reading.
Speedometer	Engine ECM	Compare the engine ECM reading with the engine manufacturer's diagnostic tool reading.
Tachometer	Engine ECM	Compare the engine ECM reading with the engine manufacturer's diagnostic tool reading.
Transmission Oil Temperature	Transmission ECM	Compare the transmission ECM reading with the transmission manufacturer's diagnostic tool reading.

Table 8, Instrument Input Tests

Warranty

This is an informational bulletin only; warranty does not apply.