

General Description

The lightbar control unit (LBCU) instrument cluster is a full-featured, individual-gauge cluster with an intelligent lightbar (ILB). The individual gauges have light-emitting diode (LED) backlighting. The lightbar control unit receives inputs for the gauges. See [Fig. 1](#) for a typical instrument gauge panel, and see [Fig. 2](#) for the LBCU message center.

- The amber check engine indicator light (CHECK ENGINE legend) illuminates when certain faults are detected. If a critical engine condition exists (for example, low oil pressure or high coolant temperature), the check engine light will illuminate to alert the driver to correct the condition as soon as possible. See the **Cummins or Mercedes-Benz Operation and Maintenance Manual** for more information.

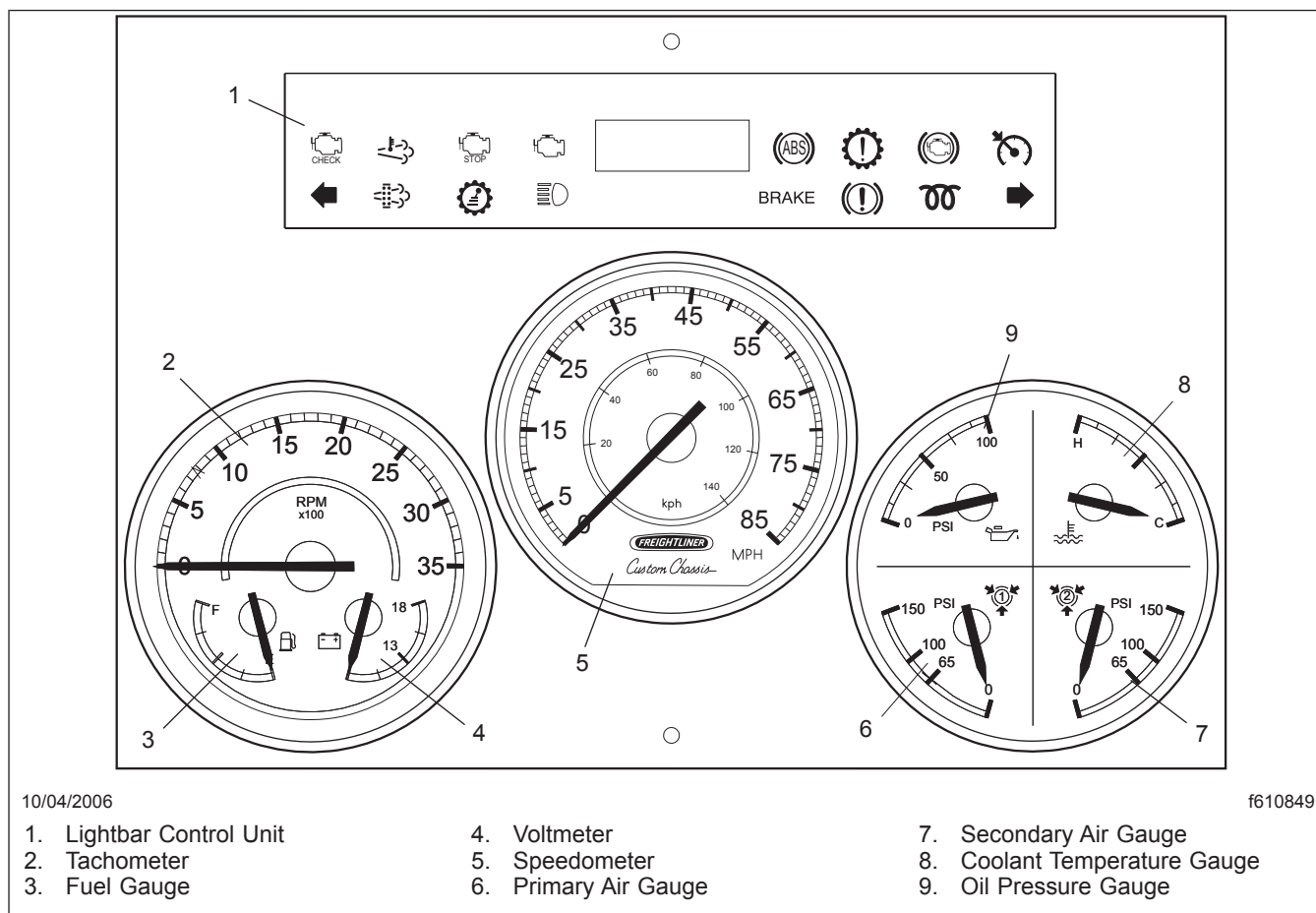


Fig. 1, Typical Instrument Panel, EPA07 Compliant

Warning and Indicator Lights

There are 17 warning and indicator lights installed in the LBCU message center. These indicator lights are listed by their position in the dash message center.

The warning and indicator lights operate as follows:

- The High Exhaust System Temperature (HEST) light alerts the operator of high exhaust temperature during the regeneration (regen) process when the speed is below 5 mph (8 km/h), or during a manual regen. The HEST lamp does not signify the need for any kind of vehicle or engine service; it only alerts the vehicle operator to high exhaust temperatures.

General Information

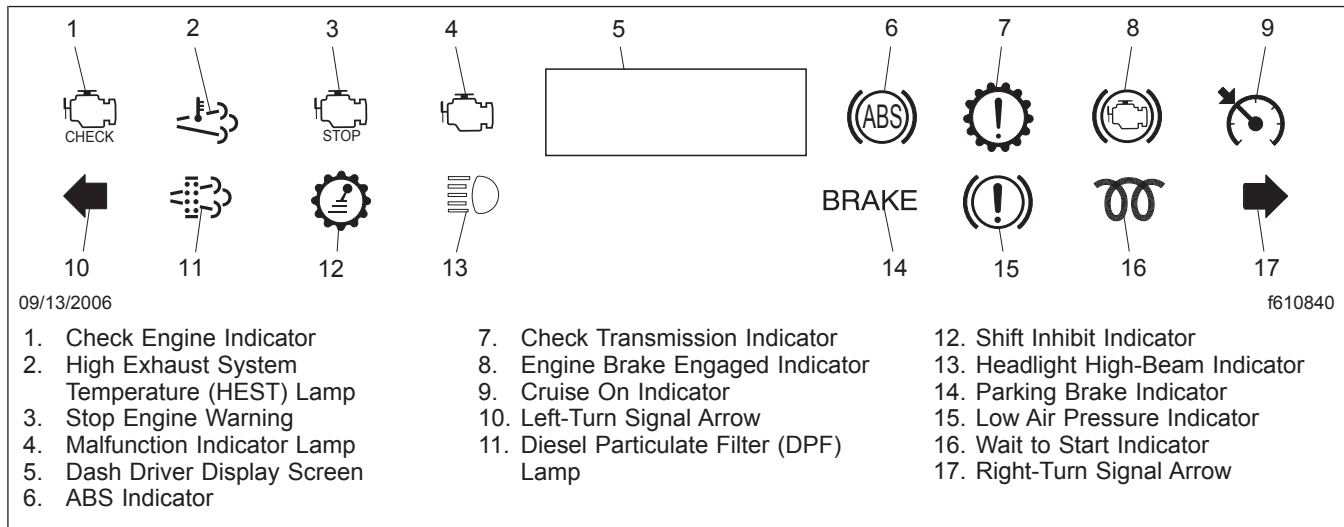


Fig. 2, LBCU Message Center, EPA07 Compliant

- The red stop engine warning light indicates a serious fault that requires the engine be shut down immediately. The driver must safely bring the vehicle to a stop on the side of the road and shut down the engine as soon as the red light is seen. If the engine shuts down while the vehicle is in a hazardous location, the engine can be restarted after turning the key to the OFF position for a few seconds. See the **Cummins or Mercedes-Benz Operation and Maintenance Manual** for more information.
 - The Malfunction Indicator Lamp (MIL) indicates an engine emissions-related fault, including, but not limited to, the aftertreatment system. The MIL applies to the Mercedes-Benz engine only. See the engine operation manual for details.
 - The LBCU's interactive graphical display screen communicates real-time information about the status and performance of the vehicle.
 - The ABS indicator illuminates when a problem is detected with the ABS. This telltale is directly controlled by the ABS via hard wire input to the cluster.
 - The check transmission warning light will come on during vehicle operation (not during start-up) if the electronic control unit (ECU) has signalled a diagnostic code. Diagnostic codes indicate malfunctions in transmission operation.
- This telltale is directly controlled by the transmission via hard wire input to the cluster.
- The green engine brake indicator illuminates when the engine brake is applied. Wait until the indicator light goes off to start the engine.
 - The green cruise control indicator illuminates when the cruise control is on.
 - The green left-turn and right-turn signal indicator lights flash on and off when the outside turn signal lights are flashing.
 - The solid yellow Diesel Particulate Filter (DPF) lamp indicates that a manual regen is required soon, and should be scheduled for the earliest convenient time. A blinking yellow (DPF) lamp indicates that a manual regen is required immediately, or an engine derate may occur.
 - The yellow shift inhibit indicator illuminates when the transmission ECU is prohibiting shifting.
 - The blue high-beam indicator light illuminates when the headlights are on high beam.
 - The red parking brake light indicates when the parking brake is activated and the ignition switch is in the ON position.
 - The red low air warning light normally illuminates when the air pressure in the air tanks falls below 65 psi (448 kPa). The light will normally come on when the engine is first started,

but goes off when the air pressure in the air tanks reaches approximately 65 to 76 psi (448 to 524 kPa).

- The yellow wait-to-start indicator light illuminates when the intake heater is active. This telltale is directly controlled by the engine via hard wire input to the cluster.

Audible Alarms

During start-up, the LBCU will perform a self-test and an audible alarm will sound until the self-test is completed. If any faults are found during the self-test, ERROR will appear on the display screen. Acknowledge any alarms before proceeding. The alarm will also sound if any of the following conditions occur:

- Air pressure falls below 65 psi (448 kPa).
- Anytime the low air warning light is activated. On the air system, the low air light/audible alarm will normally come on when the engine is first started, but will go off when the air pressure in the air tanks reaches approximately 65 to 76 psi (448 to 524 kPa). The parking brake will not disengage until the air pressure has reached 65 psi (448 kPa).
- Emergency engine shutdown is activated.
- The parking brake is applied and the transmission is not in neutral.
- The transmission is in neutral or the ignition is off, and the parking brake is not set and the service brake is not depressed.
- The turn indicator is active.
- Anytime the ignition is turned off when the panel lamps are still illuminated.

Power Initialization

When the ignition is turned on, the information center will illuminate with the Freightliner Custom Chassis logo. If there are no alarms detected from the self-test, the driver checklist is displayed.

Menu Structure and Navigation

The LBCU is an interactive graphical display that is capable of displaying text messages and graphics to communicate real-time information to the operator

about the status and performance of the vehicle. This information is organized in a menu-structured format.

Navigate the menu structure using the toggle switch, located in the driver's area. The "up" arrow of the toggle switch is yellow. See [Fig. 3](#).

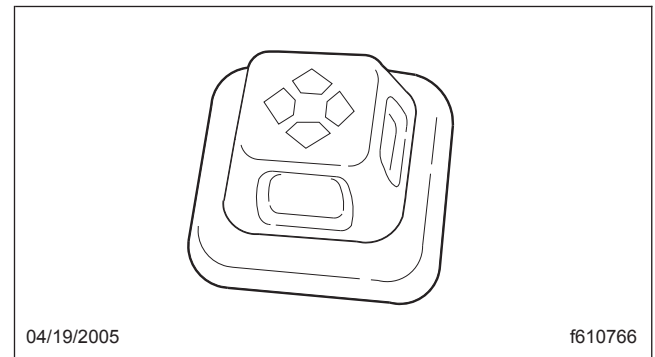


Fig. 3, Toggle Switch

The menu structure is organized around three menu screens: the ignition off screen, the home screen, and the setup/maintenance/diagnostics screen. Each of these screens contains lists of the sub-menu screens that can be accessed by highlighting the desired sub-menu and clicking the right arrow on the toggle switch.

Ignition Off Screen

When the ignition is OFF and the headlights are ON, the odometer is displayed. When the ignition is OFF and the generator is ON, the generator hours are displayed (if connected by the body builder).

Home Screen

NOTE: Alarm messages have priority over other display screens. If no alarms are present or all alarms have been acknowledged, the driver checklist will be displayed.

The following options are found in the menu and sub-menus of the home screen.

- A pretrip inspection checklist that includes 19 items and 10 driver-entered options. Once each item has been reviewed, click the right arrow of the toggle switch to place a check by the item. Click the left arrow to exit the checklist.

General Information

- **Driver's Favorite Categories**—There are nine categories that the driver can select from; three can be viewed at one time. Select the category desired by using the up/down toggle switch. Then, click the right arrow of the toggle switch for three seconds to access the sub-menus within each category. Finally, click the left arrow of the toggle switch to exit.
- **Setup/Maintenance/Diagnostics screen** is actually three different categories for the driver to use. They are as follows:
 1. **Setup**—Includes set time and date, configure checklist, select metric/english, set LCD properties.
 2. **Maintenance**—Includes engine oil, engine air filter, engine fuel filter, transmission oil, generator oil, generator fuel filter, generator use time.
 3. **Diagnostics**—Includes check gauges, check icons, check inputs, check outputs, engine diagnostics, ABS diagnostics, hardware/software version, and software debug display (this menu is used by the gauge manufacturer only).

The following steps are used to make changes within the various categories.

1. From the Driver's Favorite Category menu, hold down the right arrow of the toggle switch for five seconds to select the setup/maintenance/diagnostics screen.
2. Press the down arrow on the toggle switch to select either setup, maintenance, or diagnostics.
3. Press the right arrow on the toggle switch to select the sub-category; "Set Time and Date" for example.
4. Use the left/right arrows on the toggle switch to change the information, and the up/down arrows to move within the sub-category.
5. Once all changes have been made, hold down the right arrow on the toggle switch.

NOTE: For menu structure road maps illustrating the screens that are available in the information center and the path to specific screens, see **Chapter 2 of the Recreational Vehicle Chassis Operator's and Maintenance Manual.**

Replacement

1. Remove the dash panel that covers the LBCU. Remove the four Torx screws, then carefully lift the dash panel to gain access to the LBCU.
2. Disconnect the electrical harness connectors from the back of the LBCU. This includes the 32-pin LBCU connector, the 24-pin LBCU connector, and the 4-pin gauge LIN (Local Interconnect Network) bus connector
3. Remove the LBCU faceplate. Place a small flat blade under each center-end of the LBCU faceplate. Carefully pry the faceplate forward to release the locking end tabs. See [Fig. 1](#).

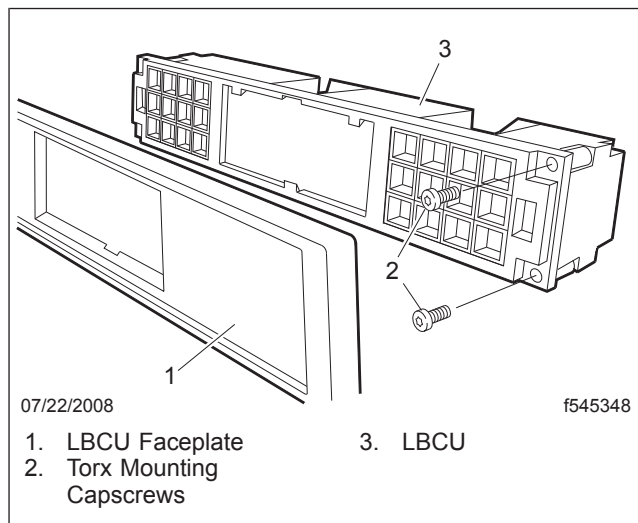


Fig. 1, LBCU Replacement

4. Remove the LBCU by removing the four Torx mounting capscrews from the front of the LBCU.
5. Install the new LBCU. Place the LBCU into the opening from the back and install the four Torx mounting capscrews in the front of the LBCU.
6. Install the LBCU faceplate. Position the faceplate over the front of the LBCU, then carefully press the faceplate on until the end tabs lock in place.
7. Connect the three electrical harness connectors to the back of the LBCU.
8. Install the dash panel with the four Torx screws.
9. Turn on the ignition and test the operation of the LBCU.

3- and 5-Inch Gauges

1. Remove the dash panel that covers the LBCU. Remove the four Torx screws, then carefully lift the dash panel to gain access to the LBCU.
2. Unplug the wiring harness from the back of the gauge.

IMPORTANT: If multiple gauges are being replaced, note the location of each gauge before removing them.

3. Remove the two wing nuts or the thumb screw that secure the bracket to the gauge; remove the gauge. See [Fig. 1](#) and [Fig. 2](#).

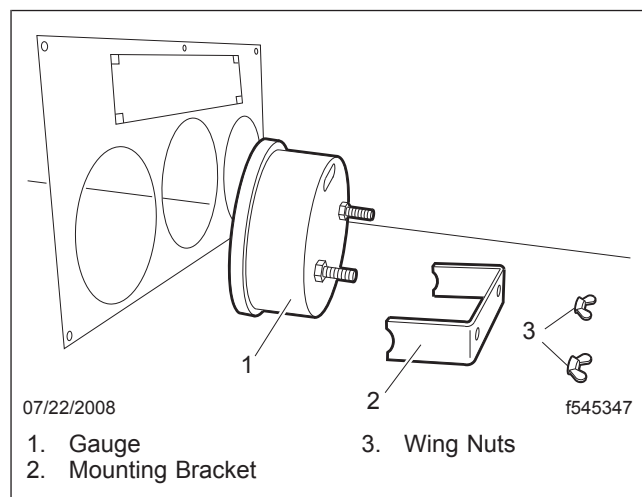


Fig. 1, Wing Nut Mounted Gauge

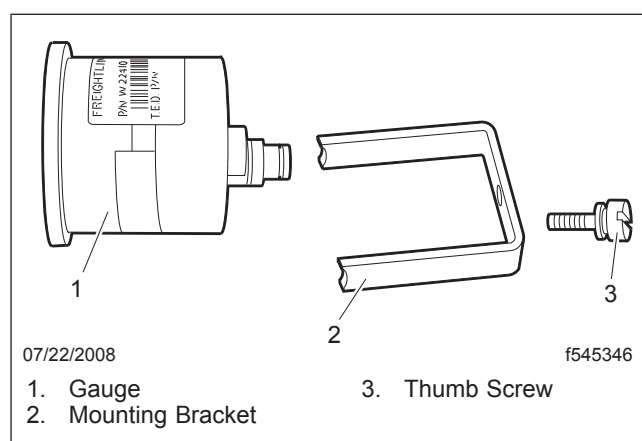


Fig. 2, Thumb Screw Mounted Gauge

4. Correctly orient the replacement gauge and install it through the opening at the front.
5. Install the mounting bracket on the back of the gauge and use the two wing nuts or the thumb screw to hold it in place.
6. Connect the wiring harness to the back of the gauge.
7. Install the dash panel with the four Torx screws.

Air Gauges

1. Remove the dash panel that covers the LBCU. Remove the four Torx screws, then carefully lift the dash panel to gain access to the LBCU.

IMPORTANT: Bleed off all air before removing the air hoses.

2. Using a paint pen, mark the air hoses for ease of installation. After bleeding all air from the system, disconnect the air gauge hoses.
3. Unplug the wiring harness from the back of the gauge.

IMPORTANT: If multiple gauges are being replaced, note the location of each gauge before removing them.

4. Remove the two wing nuts or the thumb screw that secure the bracket to the gauge; remove the gauge. See [Fig. 1](#) and [Fig. 2](#).
5. Correctly orient the replacement gauge and install it through the opening at the front.
6. Install the mounting bracket on the back of the gauge and use the two wing nuts or the thumb screw to hold it in place.
7. Connect the wiring harness to the back of the gauge.
8. Connect the air gauge hoses.
9. Install the dash panel with the four Torx screws.

Telltale Replacement

Replacement

The term "telltale" refers to the small plastic lens in the top row of the LBCU faceplate (dash message center) with a warning or indicator message printed on it. See [Fig. 1](#). These are replaceable.

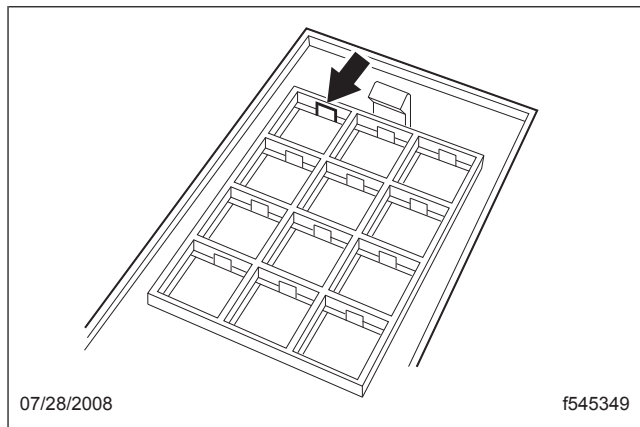


Fig. 1, LBCU Telltales

IMPORTANT: Light-emitting diodes (LEDs) are used in the LBCU to light the individual telltales. If any of the LEDs stop working on the LBCU, the LBCU has to be replaced. It is not possible to replace individual LEDs.

**CAUTION**

Electronic components of the ICU are vulnerable to damage from static electricity. If available, wear a wrist grounding strap connected to a ground in the cab or workbench. If a grounding strap is not available, touch a grounded component immediately before doing any work that could bring a tool or body part in contact with ICU circuitry.

1. Remove the dash panel that covers the LBCU. Remove the four Torx screws, then carefully lift the dash panel to gain access to the LBCU.
2. Place a flat blade under each end of the LBCU faceplate and carefully pry it off the LBCU.
3. Using a pair of needlenose pliers or a similar tool, grab the exposed tab along the side of the telltale slot and carefully slide the telltale out from the slot. See [Fig. 2](#) for an example of telltale removal.

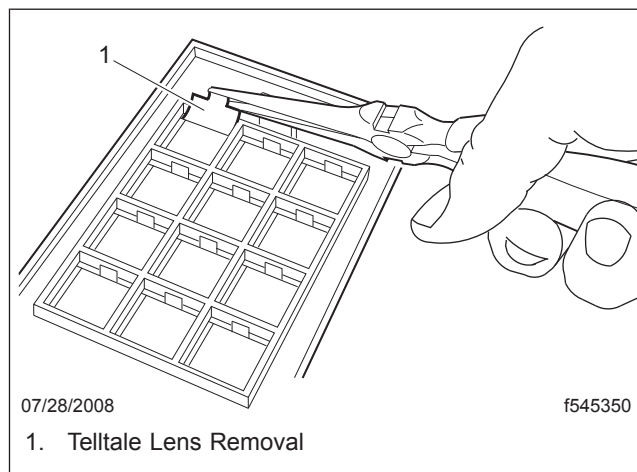


Fig. 2, Telltale Removal

4. Place the replacement telltale in its correct slot the same way it was removed. Properly orient the telltale so the text is readable from the front, then slide the telltale into its slot. See [Fig. 3](#).

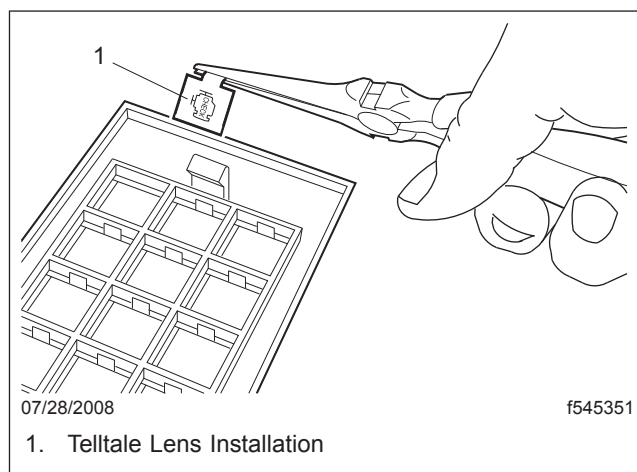


Fig. 3, Telltale Installation

5. Install the dash panel with the four Torx screws.
6. Turn on the ignition keyswitch. Check all LEDs and telltales for correct operation.

J1939 faults consist of the following, in this order:

- Suspect Parameter Number (SPN) – Indicates what function on the ECU has failed.

- Failure Mode Indicator (FMI) – Indicates in what way the function failed.

J1939 Diagnostic Trouble Codes					
Error Description	SPN	SPN J1939 Name	FMI	FMI Explanation	Broadcast Rate: seconds
LBCU Low Voltage	168	Electrical Potential	4	Voltage Below Normal	1
LBCU Controller Failure	611	System Diagnostic Code	14	Special Instructions	15
LBCU Program Memory Failure	612	System Diagnostic Code	14	Special Instructions	15
Fuel Sensor Fault	96	Fuel Level	5	Current Below Normal/Open Circuit	1
Air Pressure Sensor Fault	117	Brake Primary Pressure	9	Abnormal Update Rate	1

Table 1, J1939 Diagnostic Trouble Codes

Diagnosis for Multiple Gauges Not Working (datalink-driven gauges)			
Step	Test Procedure	Test Result	Action
1	Do the affected gauges sweep using the diagnostic display in the LBCU? Does the gauge sweep when requested? (For instructions on how to access the diagnostic menu in the LBCU and select gauges, see Chapter 2 of the <i>Recreational Vehicle Chassis Operator's Manual</i> .)	Yes	Go to step 2 .
		No	Go to step 8 .
2	Are the only affected gauges sensor driven by direct input to the LBCU (fuel sensor and brake air pressure for example)?	Yes	Check the common sensor ground that connects to pin C12. If it is okay and the gauges above are not affected, the LBCU is faulty. Repair as necessary.
		No	Go to step 3 .
3	Is it only J1939/J1587 driven gauges affected?	Yes	Go to step 4 .
		No	Replace the LBCU.
4	Cycle the ignition switch ON, and wait 5 seconds. Does the "no CAN" message appear? If the gauge is driven by a J1587 message, wait 40 seconds to see if the "no J1587 data" warning message appears.	Yes	The most likely cause is something taking the entire J1939 datalink down, in which case the LBCU menu will show an error message. Repair as necessary.
		No	Go to step 5 .
5	In ServiceLink®, does the FCCC LBCU show up in the ECU list (address 23 in J1939)?	Yes	Go to step 6 .
		No	Check the J1939 datalink to the LBCU. If it is okay, the LBCU is most likely faulty. Repair as necessary.

Troubleshooting

Diagnosis for Multiple Gauges Not Working (datalink-driven gauges)			
Step	Test Procedure	Test Result	Action
6	In ServiceLink®, does the engine ECU show up in the LBCU list (address 0 on J1939)?	Yes	Go to step 7 .
		No	Check the J1939 datalink to the engine ECU. If it is okay, the engine ECU is faulty. Repair as necessary.
7	In ServiceLink®, open the "LBCU Cluster Datalink Monitor" template. Do the affected gauges work on the template?	Yes	Replace the LBCU.
		No	The engine ECU sensor wiring or the engine ECU itself is faulty. Repair as necessary.
8	Do any of the gauges sweep when the diagnostic menu is used to test the gauges?	Yes	Go to step 9 .
		No	Check the power and ground to the LBCU. If they are okay, the LBCU is faulty. Repair the LBCU as necessary.
9	Are all of the affected gauges in sequence with one another on the daisy chain?	Yes	Go to step 10 .
		No	Replace the LBCU.
10	Locate the faulty gauge that is closest to the LBCU in the daisy chain. Replace the jumper wire between this gauge and the next gauge closest to the LBCU that works (or the LBCU itself). Do the gauges work?	Yes	Replace the jumper wire.
		No	Replace the LBCU.

Table 2, Diagnosis for Multiple Gauges Not Working (datalink-driven gauges)

Inaccurate Gauge Diagnostics			
Step	Test Procedure	Test Result	Action
1	Is the gauge controlled by the J1939/J1587 datalink? See <i>Gauge Overview</i> in Subject 400 to determine gauge control strategy.	Yes	Go to step 2 .
		No	Go to step 3 .
2	Using the monitor template within ServiceLink®, check whether or not the template gauge reads the same as the cluster gauge.	Yes	The gauge is functioning correctly, however, the sensor connected to the engine ECM may be faulty. See the engine operator's manual for troubleshooting information.
		No	Try a gauge that is known to be good. If this does not correct the problem, replace the LBCU.
3	For the fuel sensor gauge, use the input menu to determine if the gauge sensor resistance is within 20 to 261Ω. Check SPN 96 diagnostic trouble code. Does this indicate a short circuit?	Yes	Check the connection; if it is good, replace the sensor.
		No	Go to step 4 .
4	Use the test menu to test the gauge. Does it work as expected? Is the gauge moving?	Yes	Replace the sensor. If that doesn't work, replace the LBCU.
		No	Try a gauge that is known to be good. If the gauge does not move, replace the LBCU.

Table 3, Inaccurate Gauge Diagnostics

Air Pressure Gauge Troubleshooting			
Step	Test Procedure	Test Result	Action
1	Which air pressure gauge is not functioning correctly?	Primary or secondary	Go to step 2 .
		Application	Go to step 3 .
		Suspension	Go to step 4 .
2	Drain the air tanks and connect an accurate pressure gauge to the primary or secondary air tank that corresponds with the problem gauge. Start the engine and build air pressure until the compressor cuts out. Is the air pressure gauge in the cluster within 6 psi (41 kPa) of the test gauge?	Yes	No problem found.
		No	Check for kinked air lines. If the air lines are okay, replace the air pressure gauge.
3	Connect an accurate pressure gauge to a delivery port on the foot valve. Make a 90 psi (620 kPa) brake application while observing the application air pressure gauge in the cluster and the test gauge. Is the air pressure gauge in the cluster within 3 psi (20 kPa) of the test gauge?	Yes	No problem found.
		No	Check for kinked air lines. If the air lines are okay, replace the air pressure gauge.
4	Connect an accurate pressure gauge to the air suspension. Is the air pressure gauge in the cluster within 3 psi (20 kPa) of the test gauge?	Yes	No problem found.
		No	Check for kinked air lines. If the air lines are okay, replace the air pressure gauge.

Table 4, Air Pressure Gauge Troubleshooting

Warning Lamp Troubleshooting			
Step	Test Procedure	Test Result	Action
1	Do the affected warning lamps turn off using the icon diagnostic menu in the LBCU? Does the warning lamp turn on/off when requested? See the <i>Recreational Vehicle Chassis Operator's Manual</i> for directions to access the diagnostic menu in the LBCU and select gauges.	Yes	Go to step 3 .
		No	Replace the LBCU.
2	Do the affected warning lamps turn on using the icon diagnostic menu in the LBCU? Does the warning lamp turn on/off when requested? See the <i>Recreational Vehicle Chassis Operator's Manual</i> for directions to access the diagnostic menu in the LBCU and select gauges.	Yes	Go to step 3 .
		No	Replace the LBCU.
3	Is the warning light driven by a datalink or directly connected to the LBCU?	Yes	Check the sensor and its wiring to the LBCU; repair as needed.
		No	Go to step 4 .

Troubleshooting

Warning Lamp Troubleshooting			
Step	Test Procedure	Test Result	Action
4	Is there any error message regarding the datalink?	Yes	Repair the datalink as required.
		No	Check the sensor and its wiring to the control module; repair as needed.

Table 5, Warning Lamp Troubleshooting

Backlighting Troubleshooting			
Step	Test Procedure	Test Result	Action
1	Does any of the backlighting work?	Yes	Go to step 2 .
		No	Check the panel light dimmer switch, and the panel lighting circuit. Repair as needed.
2	Is all of the cluster backlighting dead (light bar liquid crystal display [LCD] and all gauges)?	Yes	Go to step 3 .
		No	Go to step 5 .
3	Disconnect the LBCU 24-pin connector. Turn the headlights on, and the panel lamp dimmer switch to full bright. Measure the voltage at connector pin A1. It should be approximately +12V. What is the voltage?	12V	Go to step 4 .
		0V	Check backlighting circuit 29A for open between the LBCU and splice to other dash components. Repair as needed.
4	Disconnect the LBCU 24- and 32-pin connectors. Turn the headlights on and the panel lamp dimmer switch to full bright. Measure the voltage between pin A1 (24-pin connector) and pin D3 (32-pin connector). What is the voltage?	12V	Replace the LBCU.
		0V	Check the panel lamp ground circuit. Repair as needed.
5	Is the LBCU LCD the only thing with dead backlighting?	Yes	Replace the LBCU.
		No	Go to step 6 .
6	Is only one gauge backlight dead?	Yes	Go to step 7 .
		No	Go to step 8 .
7	Is the gauge with dead backlighting the last gauge in the daisy-chain (farthest from the LBCU)?	Yes	Try a known good jumper wire to the gauge. If backlighting now works on this gauge, this solved the problem. If the backlighting still does not work, replace the gauge.
		No	Replace the gauge.

Troubleshooting

Backlighting Troubleshooting			
Step	Test Procedure	Test Result	Action
8	Are all of the gauges with dead backlighting in sequence with one another in the daisy-chain?	Yes	Try a good known jumper wire between the gauge with dead backlighting that is closest to the light bar and the next good gauge (one closer to the LBCU). If all backlighting now works, the jumper solved the problem. If not, replace all gauges with dead backlighting.
		No	Go to step 9 .
9	Is one of the dead gauges the last gauge in the daisy-chain?	Yes	Try a known good jumper to the last gauge. If the last gauge now works, the jumper solved the problem to this gauge. Replace all other gauges with dead backlighting. If the jumper did not correct the backlighting to the last gauge in the daisy-chain, replace all gauges with dead backlighting.
		No	Replace all gauges with dead backlighting.

Table 6, Backlighting Troubleshooting

Warning Light Messages in the LBCU		
Displayed As (Actual Text for Display Messages)	Activation Cause	Corrective Action
No J1939 Data	No CAN messages for 1 second	Troubleshoot the CAN bus connection.
Brakes Worn	Input + data conditions	The brakes are worn. Refer to Group 42 in this manual.
Tag Dumped	Input + data conditions	Refer to the <i>Tag-Axle Suspension Dump Switch</i> section in Chapter 3 of the <i>Recreational Vehicle Chassis Operator's Manual</i> .
Lift Open	Input + data conditions	The lift is open.
Coolant Low Level	Diagnostic trouble code (DTC) on J1939	Check the engine coolant fluid; refer to the engine manufacturer's manual.
Transmission High Temp	DTC on J1939/J1587	Refer to the transmission manufacturer's manual.
Fuel Low Level	Fuel sensor value is 1/8 of scale	Fill up the fuel tank.
Throttle Disabled	Input + data conditions	The throttle is disabled. Consult the engine manufacturer's manual.
Check Brake Fuse	Analog Input	Check the brake fuse.
Battery Low Voltage	J1939 data	The battery is low. Take action to ensure that the battery is charging.
No J1587 Data	No J1587 messages for 20 seconds	Troubleshoot the J1587 datalink connection.
Battery High Voltage	J1939 data	Check chassis power.

Troubleshooting

Warning Light Messages in the LBCU		
Displayed As (Actual Text for Display Messages)	Activation Cause	Corrective Action
Auto Idle Sys Voltage ~~~~V Threshold 13.4V	Low battery plus other conditions	The LBCU has entered auto idle mode and will attempt to raise battery voltage using cruise control.
Engine Oil Service Due In ~~~~~	Maintenance menu set warning	Service the oil.
Engine Air Filter Service Due In ~~~~~	Maintenance menu set warning	Replace the air filter.
Engine Fuel Filter Service Due In ~~~~~	Maintenance menu set warning	Replace the fuel filter.
Transmission Oil Service Due In ~~~~~	Maintenance menu set warning	Service the transmission oil.
Generator Oil Service Due In ~~~~~	Maintenance menu set warning	Service the generator oil.
Generator Fuel Filter Service Due In ~~~~~	Maintenance menu set warning	Replace the generator filter.
Coolant High Temp	DTC on J1939/J1587	Check the engine cooling system.
Stop Engine	DTC on J1939/J1587	Stop the engine.
Check Engine	DTC on J1939/J1587	Perform engine troubleshooting.
Water In Fuel	Cummins J1939 datalink signal Caterpillar ground on LBCU pin A9	Troubleshoot the fuel system.
Engine Protect	DTC on J1939	Refer to the engine manufacturer's manual.
Check Transmission	DTC on J1939/J1587	Troubleshoot the transmission.
Self Test Error	Self test error—EE checksum errors	If the battery was removed incorrectly, turn off the ignition and wait 20 seconds. Turn the ignition on. This will load the default value for the affected parameter(s).
J1939 Address Claim Lost	Lost address claim—no J1939 transmission allowed	Do not connect another unit with address 23 on the J1939 datalink.

Warning Light Messages in the LBCU		
Displayed As (Actual Text for Display Messages)	Activation Cause	Corrective Action
Odometer ~~~~~ Menu Navigation Switch Failure	Menu toggle switch is missing or faulty	Replace the toggle switch. If this does not help, replace the LBCU.
Shift Inhibit	J1939 datalink	Refer to the transmission manufacturer's manual.
Oil Low Pressure	DTC on J1939	Refer to the engine manufacturer's manual.
ABS Hydraulic	Signal sent by the ABS module	Check pin B11 for signal from the ABS ECU, then refer to the manufacturer's hydraulic brake manual.
ABS Pneumatic	Signal sent by the ABS module	Check pin D12 for signal from the ABS ECU, then refer to the manufacturer's air ABS manual.

Table 7, Warning Light Messages in the LBCU

Using the LBCU to Diagnose Problems

Items shown in [Fig. 1](#), [Fig. 2](#), [Fig. 3](#), [Fig. 4](#), [Fig. 5](#), [Fig. 6](#), [Fig. 7](#), and [Fig. 8](#) can be diagnosed with the built-in warnings and test menus of the LBCU.

The LBCU can be used to read diagnostic trouble codes on J1939 from the engine ECU, coolant ECU, and the ABS ECU. The following information applies to [Fig. 8](#).

- The LBCU can read J1587 diagnostic trouble codes from the ABS ECU; other ECUs are not supported at this time.
- The error menu can hold a maximum of 20 error codes.
- The J1939 error menus show suspect parameter number (SPN), failure mode indicator (FMI), and open circuit (OC).
- The J1587 error menu shows parameter identifier (PID), subsystem identifier (SID), failure mode indicator (FMI), and open circuit (OC).
- When a menu shows zero faults, it continues scanning for errors. You can enter the menu and wait for any errors being sent through the LBCU.

The odometer uses high resolution total vehicle distance from the engine controller. The following information applies to the odometer.

- SPN 917 on J1939 or PID 245 on J1587.
- Information is sent to EE prom memory every mile.
- The odometer has a design life of 2 million miles.
- The LBCU odometer is set to follow the engine total vehicle distance.
- If the new value is within -0 to +2 miles of the currently stored odometer, the LBCU odometer is set to the incoming value. See [Fig. 9](#) for a graphic illustration. If the new value is outside that range, the LBCU odometer does not change, but the new value is stored and used as an offset to check the next incoming value.

Troubleshooting

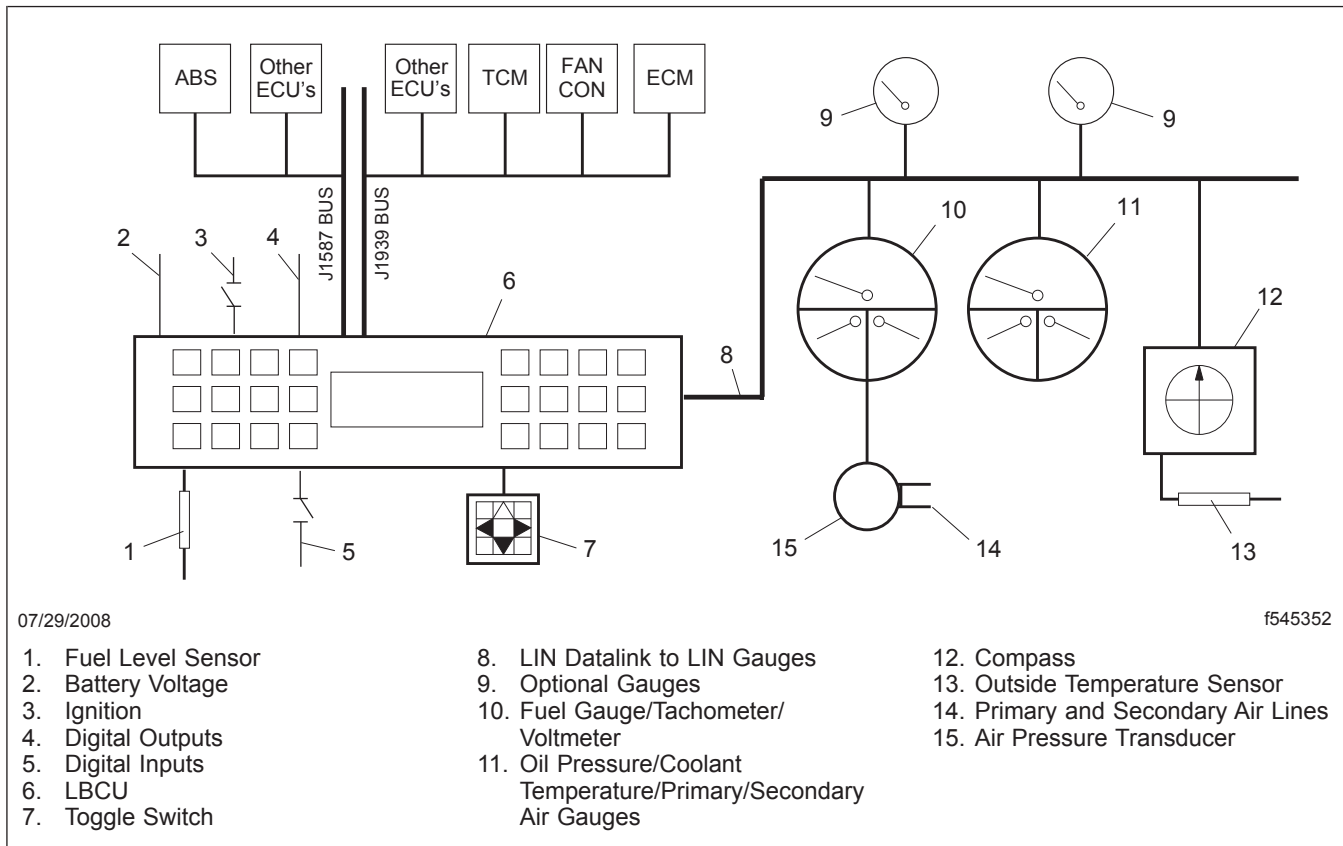


Fig. 1, Problems Diagnosed Through the LBCU

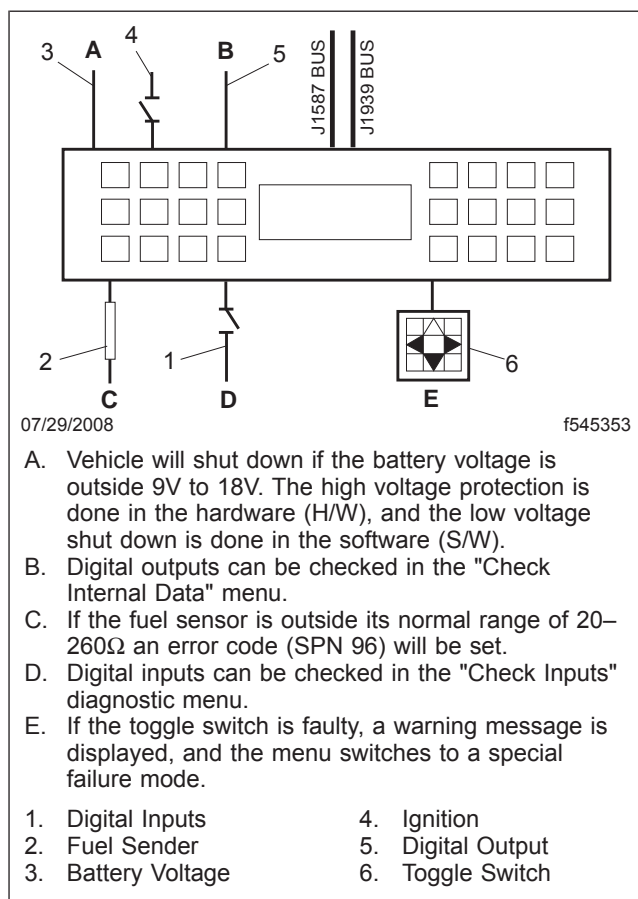


Fig. 2, Possible LBCU Errors

Troubleshooting

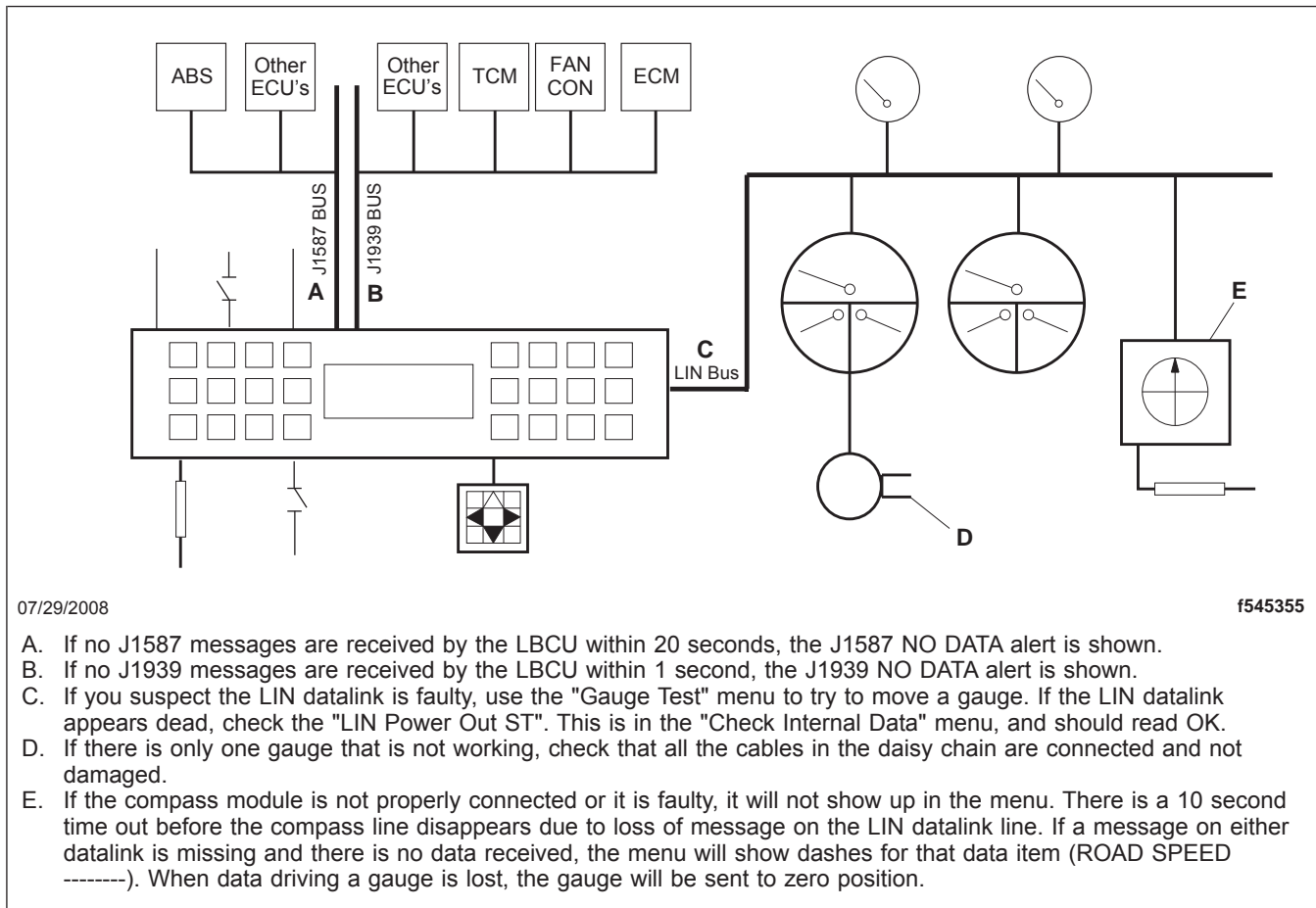


Fig. 3, Datalink Errors

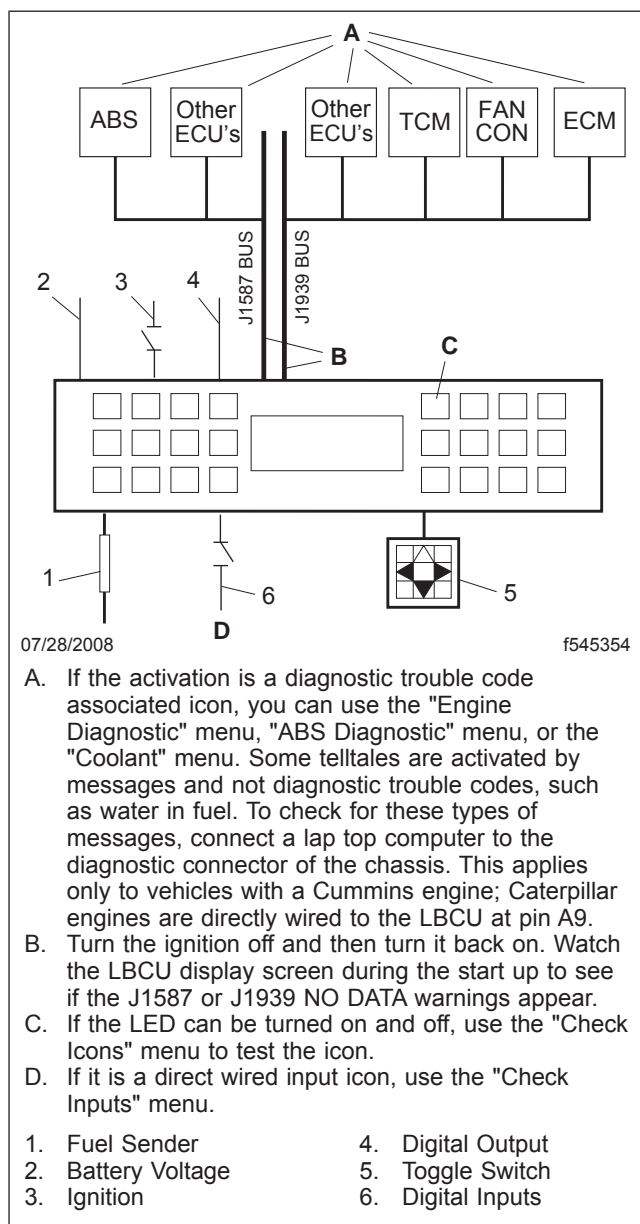


Fig. 4, Icon Will Not Display

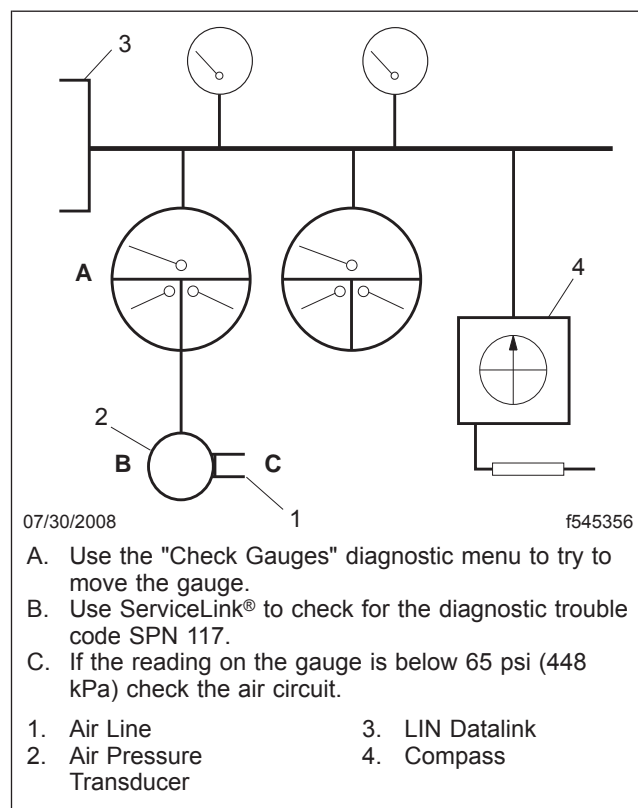


Fig. 5, Air Pressure Gauge Check

Troubleshooting

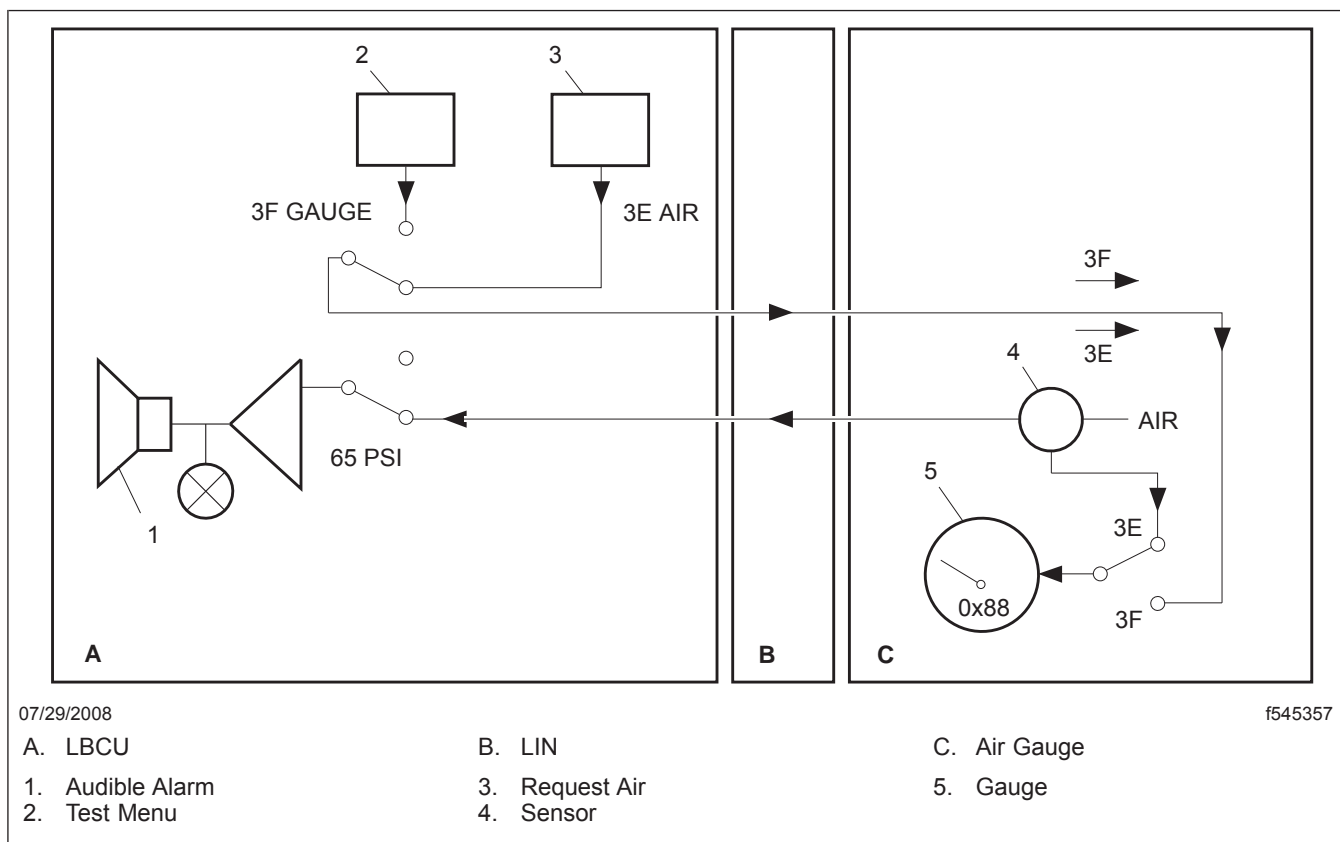


Fig. 6, Air Pressure Message on LIN

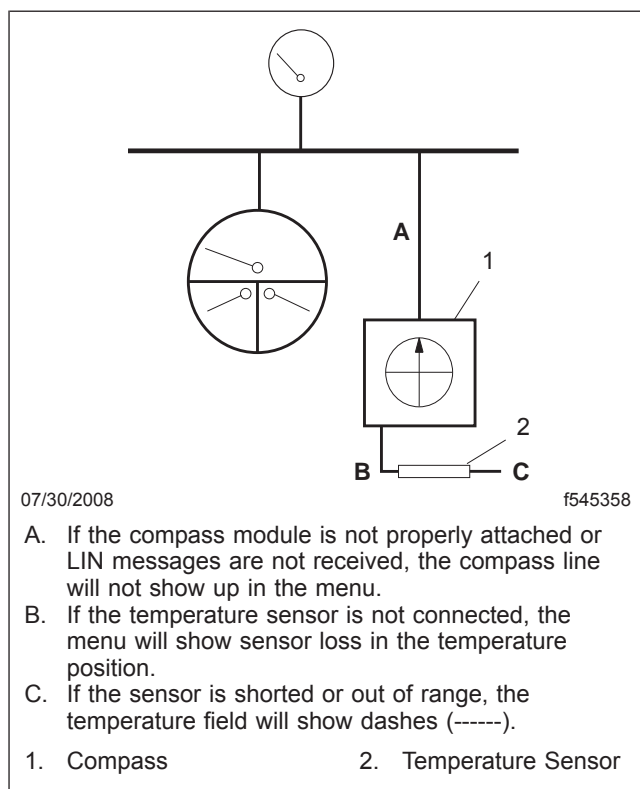


Fig. 7, Compass Diagnostics

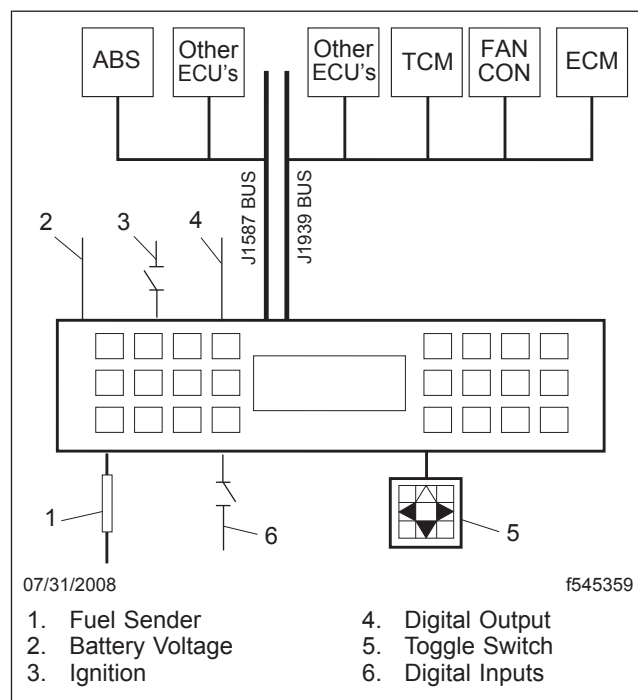


Fig. 8, Using the LBCU to Retrieve Diagnostic Trouble Codes

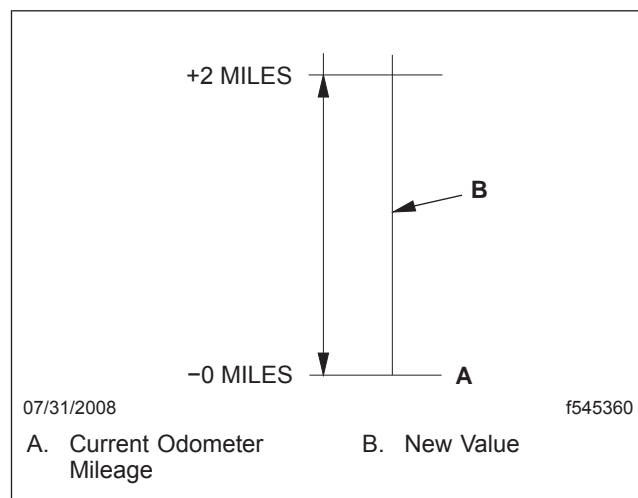


Fig. 9, Odometer Information

24-Pin Light Bar Control Unit Pin Descriptions			
Pin	Description	Pin	Description
A1	(+) Panel Backlight Power (PWM)*	B1	Optional Indicator #5—ground activated
A2	Future CAN (not connected to LBCU)	B2	Engine Brake Active Output—12V activated
A3	Engine Brake Level Input—ground activated	B3	J1708/J1587 datalink (–)
A4	Generator Engaged Input—12V activated	B4	Engine Brake Level Input—ground activated
A5	Optional Brake Wear Switch—ground activated	B5	Future CAN (not connected to LBCU)
A6	Optional Indicator #2—ground activated	B6	Future CAN (not connected to LBCU)
A7	Optional Indicator #3—ground activated	B7	Future CAN (not connected to LBCU)
A8	Optional Indicator #4—ground activated	B8	Optional Indicator #6—ground activated
A9	Water in Fuel Input—ground activated	B9	Cruise On/Off Input—ground activated
A10	(+) High Side Resistive Ladder—Display Control Switch Input	B10	J1708/J1587 datalink (+)
A11	(–) Low Side Resistive Ladder—Display Control Switch Input	B11	Hydraulic ABS Indicator—ground activated
A12	High Beam Warning Lamp—12V activated	B12	Optional Buzzer Input—ground activated

* PWM = Pulse Width Modulation

Table 1, 24-Pin Light Bar Control Unit Pin Descriptions

32-Pin Light Bar Control Unit Pin Descriptions			
Pin	Description	Pin	Description
C1	Cruise Set/Decelerate Switch—ground activated	D1	(+) Fuel Level Sensor
C2	Optional Low Current Output (ground)—Starter Lockout	D2	(–) Fuel Level Sensor
C3	Optional Low Current Output (ground)—Vehicle Charging	D3	(–) Panel Backlight Ground
C4	Optional Tag Axle Input—12V activated	D4	Optional Indicator #8—12V activated
C5	Park Brake Warning Lamp—ground activated	D5	J1939 (+)
C6	Optional 12V Input	D6	Optional Low Current Output—ground activated
C7	Optional 12V Input	D7	Optional Input—ground activated
C8	Left Turn Indicator—12V activated	D8	Right Turn Indicator—12V activated
C9	—	D9	J1939 (–)
C10	—	D10	Rain Sensor Input
C11	Optional Indicator #7—ground activated	D11	Service Brake Switch Input
C12	Cruise Resume/Accelerate Switch—ground activated	D12	Pneumatic ABS Indicator—ground deactivated
C13	Brake Fuse—normally >12V	D13	Printed Circuit Board—ground
C14	Optional Indicator #1—ground activated	D14	(+) Battery Power
C15	Future J1850 Input (not connected to LBCU)	D15	(+) Ignition Power

Specifications

32-Pin Light Bar Control Unit Pin Descriptions			
Pin	Description	Pin	Description
C16	Spare Analog Input	D16	(+) Headlamp Power Input 12V—used to control LCD brightness

Table 2, 32-Pin Light Bar Control Unit Pin Descriptions

See Table 3 and Fig. 1 for a description and illustration of the daisy chain/local interconnect network (LIN) line and pin connection priority. An example of the daisy chain routing is shown in Fig. 2.

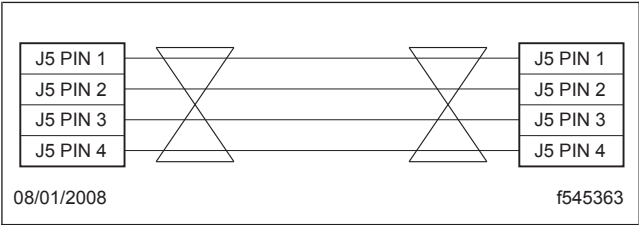


Fig. 1, Daisy Chain/LIN Datalink Connection Priority

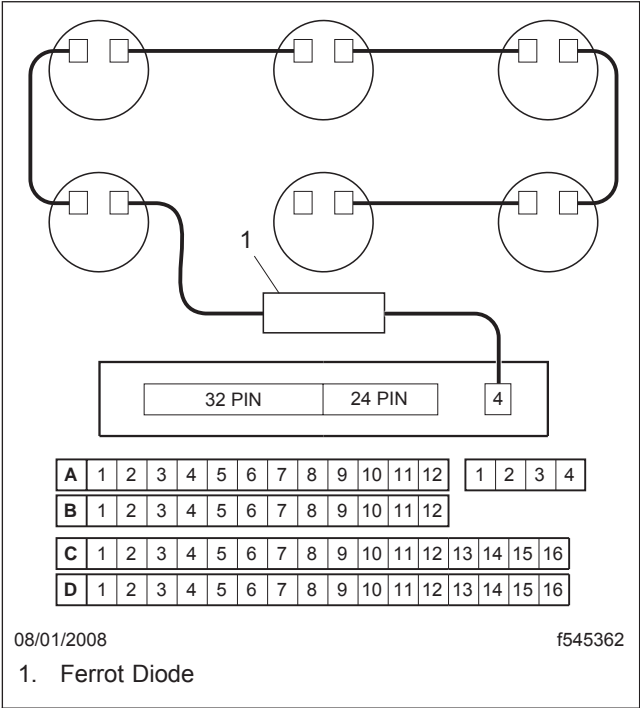


Fig. 2, Daisy Chain Routing

Daisy Chain/LIN Datalink Pin Description		
Pin	Designation	Description
J5/1	Gauge Power	5V protected to gauges
J5/2	Ground	Ground for gauges and backlighting
J5/3	LIN Datalink	—
J5/4	Gauges—Dimmed Light	Dimmer output to the gauges

Table 3, Daisy Chain/LIN Datalink Pin Description

Gauge Overview				
Gauge	Data Source	Optional	Range/Scale	Unit
Speedometer	SPN84 from Engine	No	0–85	mph
Fuel Level	Stewart Warner Sensor Analog Input	No	E–F	N/A

Gauge Overview				
Gauge	Data Source	Optional	Range/Scale	Unit
Transmission Oil Temperature	SPN 177 from Transmission	Yes	125–300	Fahrenheit
Primary Air System Pressure	Pressure Transducer over LIN	Yes	0–150	psi
Secondary Air System Pressure	Pressure Transducer over LIN	Yes	0–150	psi
Turbo Boost Air Pressure	SPN 102 from Engine	Yes	0–50	psi
Application Air Pressure	Pressure Transducer over LIN	Yes	0–150	psi
Suspension Air Pressure	Pressure Transducer over LIN	Yes	0–150	psi
Battery Voltage	SPN 158/SPN 168 from Engine	Yes	10–16	Volts
Engine Coolant Temperature	SPN 110 from Engine	Yes	100 (cold)–250 (hot)	Fahrenheit
Engine Oil Pressure	SPN 100 from Engine	Yes	0–100	psi
Tachometer	SPN 190 from Engine	Yes	0–35	rpm x 100

Table 4, Gauge Overview

24-Pin Description, Pins A1 Through A12			
Pin	Designation	Description	Cleaning Current
A1	Panel Backlight Power (+)	Panel Backlight Power From Pulse Width Modulator (PDM) Dimmer Switch	No
A2	TBD CAN 1 (+)	Future CAN (not connected)	N/A
A3	Ground Input	Engine Brake Level Input	Yes
A4	Generator Engaged Input	12V Activated Input	Yes
A5	Optional Ground Input	Ground Activated Input, Brake Wear Switch Input	Yes
A6	Optional Indicator #2	Optional Ground Activated Telltale Indicator	Yes
A7	Optional Indicator #3	Optional Ground Activated Telltale Indicator	Yes
A8	Optional Indicator #4	Optional Ground Activated Telltale Indicator	Yes
A9	Optional Ground Input	Ground Activated Input, Water-In-Fuel Input	Yes
A10	Display Control Switch Input (+)	High Slide Resistive Ladder Input From Switch Bank	N/A
A11	Display Control Switch Input (–)	Low Slide Resistive Ladder Input From Switch Bank	N/A
A12	High Beam Lamp	12V and Micro Activated Telltale Indicator	Yes

Table 5, 24-Pin Description, Pins A1 Through A12

Specifications

24-Pin Description, Pins B1 Through B12			
Pin	Designation	Description	Cleaning Current
B1	Optional Indicator #5	Optional Ground Activated Telltale Indicator	Yes
B2	12V Output	Engine Brake Active Output; Sourcing Per Section	N/A
B3	J1708/J1587 Network (-)	Low Side; Tri-State Transceiver Controlled	N/A
B4	Ground Input	Engine Brake Level Input	Yes
B5	TBD CAN 1 (-)	Future CAN (not connected)	N/A
B6	TBD CAN 2 (+)	Future CAN (not connected)	N/A
B7	TBD CAN 2 (-)	Future CAN (not connected)	N/A
B8	Optional Indicator #6	Optional Ground Activated Telltale Indicator	Yes
B9	Ground Input	Cruise Control Switch Input	Yes
B10	J1708/J1587 Network (+)	High Side; Tri-State Transceiver Controlled	N/A
B11	Hydraulic ABS Indicator	Ground and Micro Activated Telltale Indicator	N/A
B12	Optional Ground Buzzer Input	Optional Ground Activated Buzzer	Yes

Table 6, 24-Pin Description, Pins B1 Through B12