Troubleshooting Guide for Kenworth Electronic Instrument Panel (before 9/95) 14

Purpose

The purpose of this guide is to locate malfunctions in the:

- wiring.
- connectors.
- sensors.
- dash.

If the wiring, connectors, and sensors are functioning properly, it is reasonable to assume that the malfunction is in the electronic instrument panel.

IMPORTANT: Verify a malfunction in the instrument panel before replacing it. Replacing the instrument panel will not correct the malfunction if the problem is due to open wires, poor connections, or sensors with no (or improper) output signal.

There are no procedures for correcting malfunctions within the electronic instrument panel.

- ***Do not attempt to disassemble the electronic display or the auxiliary control panel. Disassembly will void warranty.***

The panel must remain sealed. If disassembled, irreparable damage may occur to the circuitboard, electronics, and LCD glass.

How To Use This Troubleshooting Guide

Check instrument panel for display of diagnostic codes when the engine is running. (See page 5).

- If codes appear, refer to the Troubleshooting With Diagnostic Codes section to begin troubleshooting.
- If no codes appear but the panel is not working properly, refer to the Troubleshooting Without Diagnostic Codes section.
  1. Turn to the page that applies to the area of the dash that is not working.
  2. Find the symptom in that section and follow the chart to locate the problem in the wiring, connectors or sensors.

Tools For Troubleshooting

- A volt-ohmmeter (YOM) rated at 20,000 ohms per volt. For proper connections, see Figure 14-1.
- Wiring diagram.
- Owner's Manual for the Kenworth Electronic Instrument Panel.

NOTE: Excellent basic troubleshooting procedures are described in the Kenworth Electrical Troubleshooting Manual Form: 150238-88. This manual is useful if you are unfamiliar with how to use an ohmmeter or need suggestions for electrical troubleshooting techniques.

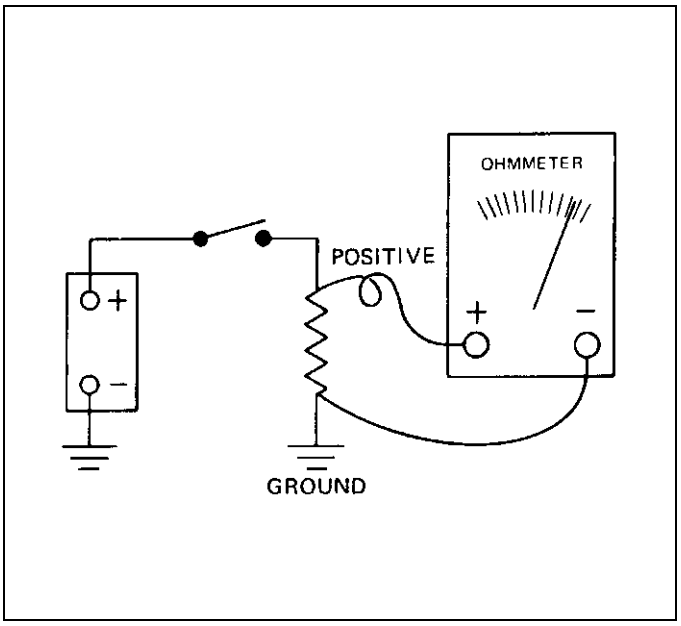
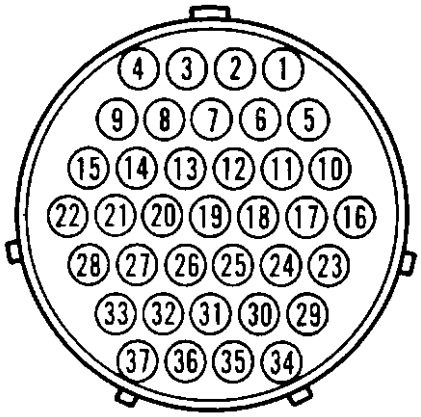


Figure 14-1 Ohmmeter Connections

CAUTION: Before connecting an ohmmeter to a circuit, disconnect the power source.

- ***Then verify that the circuit is without voltage by connecting a voltmeter to the circuit Ohmmeter may be damaged if connected to a voltage source.***

Pinout Information for Harness Connectors

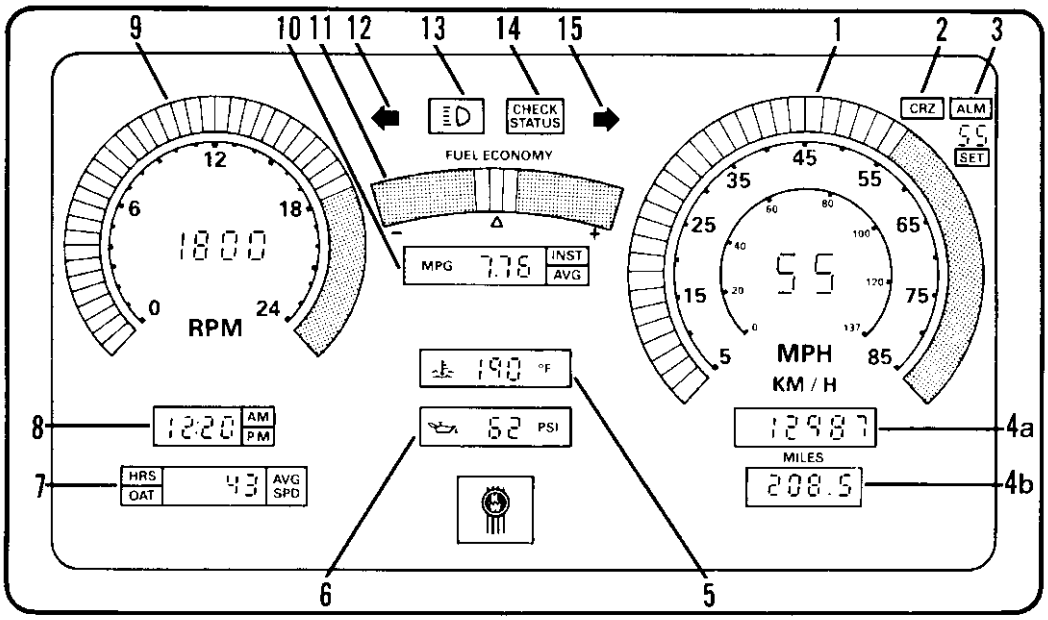


PIN LOCATION	CIRCUIT	DESCRIPTION	COLOR KEY WIRE/STRIPE
1	GND	Ground Electronics	White
2	G57SU	Water Temp Input	Pur/Yel
3	L58HW	Oil / Water Warning Input	Grn/Brn
4	C58GA	Oil Pressure Input	Grn/Brn
5	PCB19	ACC Power	Blk
7	OAT1	Outside Air Temperature #1	Blk
8	OAT2	Outside Air Temperature #2	Blk/Wht
10	L13LI	Panel Light Voltage Input	Gry
1 1	P116CK	Battery Power	Pink/Red
15(1)	C108DB	Data Link +	Blu/Blk
16	GND	Ground Lighting	White
22 (1)	C109DB	Data Link—	Blu/Lt Blu
24	L1PL	Discrete Power Circuit	Brn
25 (2)	L55WL	Check Status Indicator	Blu/Yel
26	L7HB	Hi Beam Input	Blu/Wht
27	L33LT	Left Turn Signal Input	Yel/Blk
28	L34RT	Right Turn Signal Input	Grn/Blk
30	G150SP	Speedo Input	Blu/Red
31	G148SU	Tach Input	Blk/Red
33(3)	BRN	Flow Sensor Input (Return Line)	Brn
34	G150SU	Speedo Input	Blu/Red
35	G148TC	Tach Input	Blk/Red
36	C47SW	2 Speed Rear Axle Input	Yel/Blu
37	BLK	Flow Sensor Input (Supply Line)	Blk

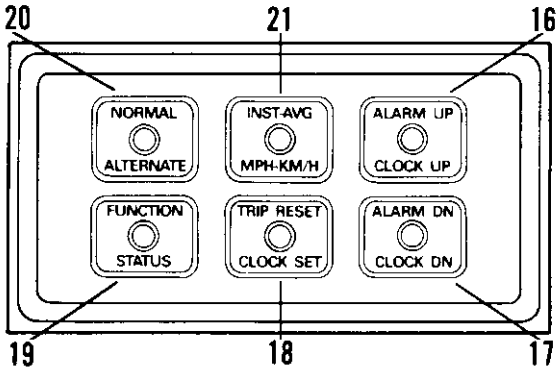
(1) For engines with Electronic Controls

(2) CAT PEEC (until 1 1/88) Cummins PACE & ECI

(3) Not used on Cummins engines.



Dash Display



Auxiliary Switch Panel

Item	Description
1.	Speedometer
2.	Cruise Control Set Speed
3.	Alarm Set Speed
4.	a. Odometer b. Trip Odometer
5.	Coolant Temperature
6.	Oil Pressure
7.	Hourmeter / Outside Air Temperature (O.A.T.) Average Speed / Diagnostic Codes
8.	Time Of Day Clock
9.	Tachometer
10.	Average / Instantaneous Fuel Economy

Item	Description
11.	Instantaneous Fuel Economy
12	Left Turn Signal Indicator
13.	Highbeam Indicator
14.	Check Status Indicator
15	Right Turn Signal Indicator
16.	Alarm Up/Clock Up
17.	Alarm Down/Clock Down
18.	Trip Reset / Clock Set
19.	Function/Status. See item 7.
20.	Normal / Alternate
21.	Instantaneous Average / MPH-KM / H

Figure 14-2 Illustrated List of Features

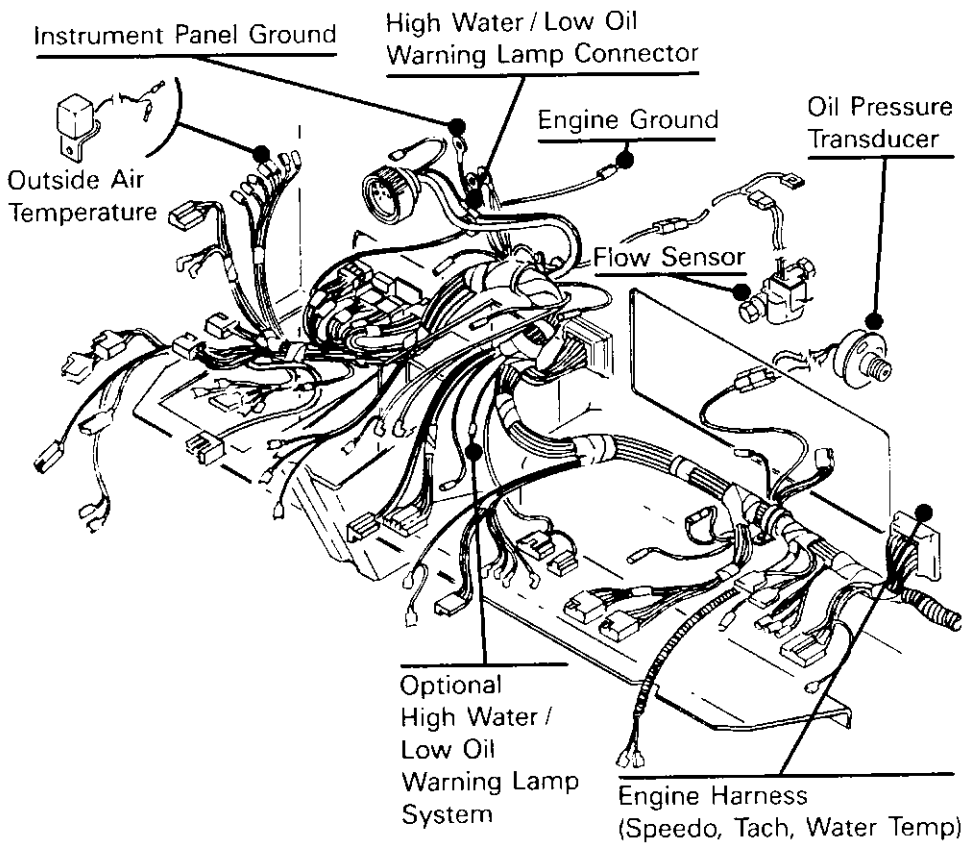


Figure 14-3 Electronic Instrument Panel Harness

Diagnostic Codes

Diagnostic codes aid in troubleshooting and servicing your vehicle. The check status indicator lamp will light if a diagnostic code is active, meaning there is an existing problem. If the problem goes away (an intermittent problem) the check status lamp will not light, but the code will be stored in the dash as long as the dash remains powered up.

To display diagnostic codes:

1. Press NORMAL/ALTERNATE. This puts the panel into the ALTER mode.
2. Press STATUS.

The area that usually displays HRS/O.A.T./AVG SPD should now display diagnostic messages. Codes beginning with “E” are engine codes (see section on engine codes) and codes beginning with a lower case “d” are dash codes. The codes will have letter(s) and a dash preceded by a three-digit code (d-xxx).

Press STATUS repeatedly to display additional codes. The end of the list is indicated by d----.

A stored diagnostic code can be cleared from memory by pressing CLOCK SET when any diagnostic code is displayed. Pressing CLOCK SET at any other time will not erase the stored diagnostics from memory.

Engine Diagnostics

Engine diagnostics are transmitted to the electronic instrument panel over the ATA / SAE data link. Some engine electronic controllers will also send status codes. Status codes are codes sent by electronic engines that tell switch positions, or the status of a specific function. To read these codes, follow the procedure described above for displaying diagnostic codes. Pressing of the STATUS switch will display status codes and/or engine diagnostic codes. These codes are defined in the maintenance literature provided by the engine manufacturer.

Most engine manufacturers provide a reference card identifying code definitions, The reference card should be in the glove compartment of the vehicle.

A panel programmed for a nonelectronic engine will display the prefixes for engine diagnostic and status codes followed by dashes to show that no information is available. This is normal for panels with nonelectronic engines.

Diagnostic Codes

d-134 Internal memory failure
d-135 Internal memory failure
d-136 Internal check of stored data (calibration data, mileage, etc.)
d-137 Failure of internal memory check
d-143 Failure of internal components
d-144 Voltage regulator for oil pressure, engine water temperature, and outside air temperature out of tolerance
d-145 Oil pressure too high to measure
d-146 Open circuit in oil pressure sensor wiring or oil pressure sensor (circuit C58GA) grounded
d-151 Open circuit in tachometer sensor wiring
d-152 Open circuit in speedometer sensor wiring
d-153 Incorrect signal on outside airtemp. wiring
d-1 54 Outside air temperature too high to measure. (circuit OAT1 grounded)
d-1 55 Incorrect signal on water temp. sensor wiring
d-156 Engine water temp. too high to measure. (circuit G57SU grounded)

NOTE: The following codes apply only to vehicles with an electronically controlled engine.

d-010 Datalink data check failure
d-128 Data communication failure
d-131 Insufficient data received over the datalink

Engine Codes

E-xxx Engine Diagnostic Code
EE-xxx Engine electronic controller status code
Eb-xxx Engine brake status code
Ec-xxx Cruise control status code
Ep-xxx Power take off status code

EE-888, Eb-888 Ec-888 Ep-888

Indicates that the particular status code (EE, Eb, Ec, Ep) was not received in the allotted time interval. A dead data link will have the same effect.

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Troubleshooting With Diagnostic Codes

Code: D-010 . . . . . Datalink data check failure.		
Symptoms: Nothing specific.		
Check	**Result**	**Next**
NOTE: If this code appears on non-electronic engines, the dash is programmed for the wrong engine.		
010-1 • No check available.	The dash checks to verify that all the data is coming across the datalink circuits. This code indicates that not all information was received.	If a diagnostic analyzer is available for the engine, use it to determine if the engine is sending out readable data on the datalink. This is not a dash problem.

Code: D-128 . . . . . Datalink communication failure.		
Symptoms: Speedo, tach, and fuel tach may not work correctly.		
Check	**Result**	**Next**
NOTE: If this code appears on non-electronic engines, the dash is programmed for the wrong engine.		
128-1 • No check available.	Code cannot be cleared.	If a diagnostic analyzer is available for the engine, use it to determine if the engine is sending out readable data on the datalink. This is not a dash problem.

Code: D-131 . . . . . Insufficient data received over the datalink.		
Symptoms: Speedo, tach, and fuel tach do not work, and no engine diagnostic codes will register on the dash.		
Check	**Result**	**Next**
NOTE: If this code appears on non-electronic engines, the dash is programmed for the wrong engine.		
131-1 • Verify that the engine control box is receiving power. (See wiring diagram for electronic engine.	Engine control box not receiving power. Engine control box receiving power.	If the electronics for the engine are not working correctly, no data will be sent over the Datalink. This indicates a problem with the engine, not the dash. Troubleshoot engine. Go to **131-2**
131-2 • Visually check all connectors between the dash and the engine control box.	Connector unplugged or corroded. Connector appear OK	Plug in, or clean connectors. Go to **131-3**
131-3 • Unplug the 37-pin connector on back of the electronic dash and connector for the datalink on the electronic engine control box. Using an ohmmeter, check for a broken wire between the engine control box and the dash (pin 15 — circuit C108DB — Datalink (+), pin 22 — circuit C109DB —Datalink (-)).	Resistance less than 3 ohms. Resistance greater than 3 ohms.	If a diagnostic analyzer is available for the engine, use it to determine if the engine is sending out readable data on the datalink. This is not a dash problem. Bad connection or broken wire in wiring harness.
NOTE: This code will appear if the key switch is in the ACC position.		

Code: D-135 . . . . . Internal memory failure.		
Symptoms: Nothing specific.		
Check	**Result**	**Next**
135-1 • Turn key off, then back on.	Code reappears. No code displayed.	Replace the dash. Intermittent occurrence; as long as the code does not come again and the dash is operating correctly, the dash can be left in.

Code: D-136 . . . . . Internal check of stored data (calibration data, mileage, etc.). not consistent.		
Symptoms: The odometer on the dash may have unusual mileage or the speedo and/or tach may behave erratically.		
Check	**Result**	**Next**
136-1 • Drive the truck a few miles and shut down the dash, then turn key back on.	Code reappears. No code displayed.	Replace the dash. Intermittent occurrence; as long as the code does not come again and the dash is operating correctly, the dash can be left in.

Code: D-137 . . . . . Failure of internal memory check		
Symptoms: Nothing specific		
Check	**Result**	**Next**
137-1 • No check available	Code cannot be cleared, or the code shows up very often (4 or 5 times during a day). Code can be cleared, it shows up very seldom, and there are no other symptoms.	Replace the dash. Dash OK: Do not replace.

Code: D-143 . . . . . Failure of internal components.		
Symptoms: Outside air temperature, oil pressure, and engine water temperature do not work or they display incorrect values.		
Check	**Result**	**Next**
143-1 • No check available.	Code cannot be cleared, or the code can be cleared but comes back regularly, and the symptoms listed above exist Code can be cleared and all gauges work correctly.	Replace the dash. Dash OK: Do not replace.

Code: D-144 . . . . . Voltage regulator for oil pressure, engine water temperature, and outside air temperature out of tolerance.		
Symptoms: Outside air temperature, oil pressure, and engine water temperature display incorrect values or do not work.		
Check	**Result**	**Next**
144 • No check available	The code cannot be cleared, and the symptoms listed above exist. The code can be cleared though it shows once in a while, and there are no other symptoms.	Replace the dash. Dash OK: Do not replace.

Code: D-145 . . . . . Oil pressure too high to measure.		
Symptoms: Oil pressure registers 120 psi		
Check	**Result**	**Next**
145-1 • Before checking dash for problems, verify that oil pressure is different from what is shown on the dash. One way is to put a “known good” mechanical gauge in the oil pressure line at the firewall.	Oil pressure 120 psi or greater Oil pressure less than 120 psi.	No dash problem. Go to **145-2**.
NOTE: The only way to get this code is to have a voltage greater than 6.5 volts on the sensor wire (circuit C58GA).		
145-2 • Visually check oil pressure sensor connection for shorted wires.	Wires appear shorted. No visible short in wire.	Repair wires. Go to **145-3**.
145-3 • Unplug oil pressure sender.	Code can be cleared. Code cannot be cleared.	Check for good ground on the ground circuit at pressure sensor. Go to **145-4** Go to **145-5**.
145-4 • Using an ohmmeter, check resistance between the ground circuit at the pressure sensor and the main cab ground.	Resistance less than 3 ohms and no wires are shorted. Resistance greater than 3 ohms.	Replace the oil pressure sensor. Run ground wire from sensor to cab ground.
NOTE: Maximum output of sensor should be 5 volts at 100 psi.		

145-5 • Unplug 37-pin connector on back of electronic dash and using a voltmeter, check voltage between (circuit C58GA) and ground.	Voltage less than 1 volt. Voltage 1 volt or greater.	Replace dash. Short in instrument panel harness. Repair the short or cut the wire in the harness. Repair the short or cut the wire in the harness and run a separate wire from pin 4 (circuit C58GA at the oil pressure sensor.

Code: D-146 . . . . . .Open circuit in oil pressure sensor wiring or oil pressure sensor wire (circuit C58GA) grounded)		
Symptoms: Oil pressure registers 0 psi		
Check	**Result**	**Next**
NOTE: This code will appear if the voltage on the oil pressure sensor wire drops below .5 volts. Minimum sensor output should be 1 volt at 0 psi.		
146-1 • Visually check wires at the oil pressure sensor (mounted on the air junction block) for broken wires.	Wires broken. No wires visibly broken.	Repair wires. Go to **146-2**.
146-2 • Unplug oil pressure sensor and check voltage between power and ground circuits from instrument panel harness (circuits PCB19 & GND). With key switch in run position.	Voltage between PCB19 and GND greater than 12 volts. Voltage less than 12 volts.	Go to **146-3** Check for broken wire or bad splice in circuit PCB19.
146-3 • Unplug 37-pin connector at electronic dash. Using an ohmmeter, check resistance between pin 4 (circuit G58GA) and circuit G58GA (sensor wire) at the pressure sensor.	Resistance less than 3 ohms. Resistance greater than 3 ohms.	Replace oil pressure sensor. Broken wire (circuit C58GA) in harness. Repair the wire or cut the wire in the harness and run a separate wire from pin 4 (circuit C58GA) at the 37-pin connector to circuit C58GA at the oil pressure sensor.

Code: D-151 . . . . . Open circuit in tachometer sensor wiring.		
Symptoms: Tachometer does not work.		
Check	**Result**	**Next**
NOTE: On electronically controlled engines, this code is not used. Tachometer information comes over the datalink circuits from the engine controller. If this code appears with electronically controlled engines, the dash is programmed wrong.		
151-1 • Unplug 37-pin connector on back of electronic dash. Using an ohmmeter, check resistance between pin 31 (circuit G148SU) and pin 35 (circuit G148TC).	Resistance between 250 and 2000 ohms. Resistance higher than 2000 ohms.	Check 16-way connector and firewall going to engine harness for intermittent open circuit. Go to **151-2**.
151-2 • Unplug sensor on flywheel housing and check resistance of sensor.	Resistance between 250 & 2000 ohms. Resistance greater than 2000 ohms.	Check for broken wires or poor connection between dash connector and connector for engine speed sensor. Replace sensor.

Code: D-152 . . . . . Open circuit in speedometer sensor wiring.		
Symptoms: Speedometer does not work.		
Check	**Result**	**Next**
NOTE: On electronically controlled engines, this code is not used. Tachometer information comes over the datalink circuits from the engine controller. If this code appears with electronically controlled engines, the dash is programmed wrong.		
152-1 • Unplug 37-pin connector on back of electronic dash. Using an ohmmeter, check resistance between pin 30 (circuit G150SP) and pin 34 (circuit G150SU).	Resistance between 250 and 2000 ohms. Resistance is higher than 2000 ohms.	Check 16-way connector on firewall going to engine harness for intermittent open circuit. Go to **152-2**.
152-2 • Unplug sensor on transmission and check resistance of sensor.	Resistance between 250 and 2000 ohms. Resistance greater than 2000 ohms.	Check for broken wires or poor connection between dash connector for speed sensor. Replace sensor.

Code: D-153 . . . . . .Incorrect signal on outside air temp. wiring.		
Symptoms: Outside air temperature registers -40 degrees.		
Check	**Result**	**Next**
NOTE: The only way for this code to register is to have some voltage (over 2 volts) applied to the outside air temp wiring (circuit OAT2). This only happens if the wire is shorted to another circuit.		
153-1 • Unplug the outside air sensor (connections are located behind the 6-gauge panel.).	Code can be cleared. Code cannot be cleared.	Replace sensor. Go to **153-2**.
153-2 • Unplug 37-pin connector on back of electronic dash. Using an voltmeter, check voltage between pin 8 (circuit OAT2) and ground.	Voltage detected. No voltage detected.	There is a short in the instrument panel harness. Repair the short or cut the wire in the harness and run a separate wire form pin 8 (circuit OAT2) to the outside air sensor. Internal dash problem. Replace dash.

Code: D-154 . . . . . Outside air temperature too high to measure (circuit OAT1 grounded)		
Symptoms: Outside air temperature registers 130 degrees.		
Check	**Result**	**Next**
NOTE: The maximum temperature that the dash can register is 130 degrees. Verify that outside air temperature is within that range. If the temperature sensor is under direct sunlight, temperatures could exceed limits of the dash. This is a temporary condition and does not harm the dash.		
154-1 • Unplug the outside air sensor (connections are located behind the 6-gauge panel.).	Code can be cleared. Code cannot be cleared.	Replace sensor. (This code appears if sensor wires are shorted together or if circuit OAT1 is grounded.) Check wiring harness for a short in the sensor wires or for grounding of circuit OAT1. Go to **154-2**.
154-2 • Unplug 37-pin connector on back of electronic dash. Using an ohmmeter, check resistance between pin 7 (circuit OAT1) and pin8 (circuit OAT2).	Resistance measures over 10,000 ohms for both of these measurements (that is, meter shows open circuit). Resistance less than 10,000 ohms between pin 7 (circuit OAT1) and pin 8 (circuit OAT2). Resistance less than 10,000 ohms between pin 7 (circuit OAT1) and ground.	Replace the dash. Wires shorted together in instrument panel harness. Circuit OAT1 grounded in instrument panel harness. Visually check harness for bare wires.

Code: D-155 . . . . . Incorrect signal on water temp.sensor wiring.		
Symptoms: Water gauge temp registers “cld”.		
Check	**Result**	**Next**
NOTE: The only way for this code to register is to have some voltage (over 1.2 volts) applied to the water temp sensor wiring (circuit C57SU). This only happens if the wire is shorted to a power circuit.		
155-1 • Unplug sensor on engine.	Code can be cleared. Code cannot be cleared.	Check engine ground. Check for a short in the wiring harness. Go to **155-2**.
155-2 • Unplug 37-pin connector on back of electronic dash. Using a voltmeter, check voltage between pin 2 (circuit G57SU) and pin 1 (ground).	Voltage greater than 0. No voltage detected.	Circuit G57SU shorted to another power wire. Check harness for short, or run a separate wire from the water temp sensor to pin 2 (circuit G57SU) at the 37-pin connector. Wiggle wiring harness on engine and behind dash. If no voltage registers, replace the dash.

Code: D-156 . . . . . Engine water temp too high to measure (circuit G57SU grounded).		
Symptoms: Water temp gauge registers 250 degrees		
Check	**Result**	**Next**
NOTE: The maximum water temperature the dash can register is 250 deg. Verify that the engine water temperature is different from what registers on the dash.		
156-1 • Unplug the sensor on the engine.	Code can be cleared. Code cannot be cleared.	Replace sensor. Go to **156-2**.
156-2 • Unplug 37-pin connector on back of electronic dash. Using an ohmmeter, check resistance between pin 2 (circuit G57SU) and pin 1 (ground).	Resistance over 10,000 ohms (meter reads open circuit). Resistance less than 10,000 ohms.	Replace the dash. The sensor circuit (circuit G57SU) is grounded within the harness. Visually check harness for bare wires.

Troubleshooting Without A Diagnostic Code

Outside Air Temperature

Symptoms: Display reads -40 degrees all the time.		
Possible cause: Open circuit in sensor wires (circuits OAT1 & OAT2).		
Check	**Result**	**Next**
26-1 • Unplug the outside air sensor (connections are located behind the 6-gauge panel) and connect circuits OAT1 and OAT2 together.	Dash still reads -40 degrees. Code cannot be cleared.	Go to **26-2**. Replace sensor.
26-2 • Unplug 37-pin connector on back of the dash and using an ohmmeter, check resistance between pin 7 (circuit OAT1) and circuit OAT1 lead at sensor.	Resistance greater than 3 ohms. Resistance less than 3 ohms.	Circuit OAT1 wire broken. Go to **26-3**.
26-3 • Check resistance between pin 8 (circuit OAT2) and circuit OAT2 lead at sensor.	Resistance less than 3 ohms. Resistance greater than 3 ohms.	Replace dash. Circuit OAT2 wire broken.

Symptoms: Display always indicates incorrect temperature.		
Possible cause: Sensor in wring location so incorrect temperature is registered, or the temperature sensor is defective.		
Check	**Result**	**Next**
27-1 • Unplug the outside air sensor and using an ohmmeter, check resistance of temperature sensor.	Resistance varies from chart. Resistance matches with chart.	Replace sensor. Check all dash grounds and check connectors for corrosion.

Temperature	Resistance
40° F	75 K Ω
0° F	19.2 K Ω
10° F	14 K Ω
35° F	6.8 K Ω
65°F	3 K Ω
80° F	2 K Ω
110° F	1 K Ω

High Beam Indicator Light

Symptoms: High beam indicator lamp does not light when high beam headlamps are on.		
Possible cause: Burned out indicator bulb or dash panel not receiving power from the high beam indicator circuit (L7HB).		
Check	**Result**	**Next**
28-1 • Open the center, black, plastic cover on back of dash panel and check light bulb.	Light bulb burned out. Light bulb good.	Replace bulb. Go to **28-2**.
NOTE: Check bulb contacts for corrosion. A good way to clean the contacts is with a clean pencil eraser.		
28-2 • Unplug 37-pin connector from back of the dash panel. Using a voltmeter, check voltage between pin 26 (circuit L7HB) and pin 16 (circuit GND).	Voltmeter reads battery voltage when high beams are on. No voltage when high beams are on.	Go to **28-3**. Using lead (air wiring diagram) check circuit L7HB wiring for broken wire.
28-3 • Using jumper wires, connect pin 16 (GND) of electronic dash to ground and apply battery power (12 volts) to pin 26.	Light does not work. Light works.	Replace dash. Bad connection in 37-pin connector.

Turn Signal Indicator Lamps

Symptoms: Left or right turn signal indicator does not light when turn signal lamps are in operation.		
Possible cause: Burned out indicator bulb or dash panel not receiving power from right-hand (circuit L34RT) or left-hand (circuit L33LT) turn signal circuits.		
Check	**Result**	**Next**
29-1 • Open the center, black, plastic cover on back of dash panel and check light bulb.	Light bulb burned out. Light bulb good.	Replace bulb. Go to **29-2**.
NOTE: Check bulb contacts for corrosion. A good way to clean the contacts is with a clean pencil eraser.		
29-2 • Unplug 37-pin connector from back of dash panel. Using a voltmeter, check voltage between pin 28 (circuit L34RT) and pin 16 (circuit GND) for right turn and pin 27 (circuit L33LT) and pin 16 (circuit GND) for left turn.	Voltmeter reads battery voltage when turn signals are on (voltage will go on and off like indicator lamps should). No voltage on turn signal circuit.	Go to **29-3**. Using stop and turn signal wiring diagram, check for broken wire or bad splice for turn signal indicator lamps.
29-3 • Using jumper wires, connect pin 16 (GND) of electronic dash to ground and apply battery power (12 volts) to pin 28 for right turn, or pin 27 for left turn.	Light does not work. Light works.	Replace dash. Bad connection in 37-pin connector.

Clock

Symptoms: Clock requires setting every time the truck is shut down.		
Possible cause: No battery power getting to dash with the key in the OFF position.		
Check	**Result**	**Next**
30-1 • Check cigar lighter/clock fuse.	Fuse blown or missing. Fuse installed and good.	Replace fuse. Go to **30-2.**
30-2 • Unplug the 37-pin connector on the back of dash, using a voltmeter, check the voltage between pin 11 (circuit P116CK) and pin 1 (circuit GND).	Voltage between 11 and 14 volts with key in the OFF position. Voltage less than 11 volts, but other battery powered circuits work (such as headlamps and dome lamps).	Replace fuse. Using cigar lighter/clock wiring diagram, check for broken clock circuit (P116CK).

Symptoms: Clock requires frequent time settings.		
Possible cause: Intermittent battery power to dash.		
Check	**Result**	**Next**
31-1 • Does the truck have disconnect switches?	Yes No	To keep clock on time with disconnect switches, a separate wire must be run from the battery side of the disconnect switch to pin 11 (circuit P116CK) in the 37-pin connector going to dash. Go to **31-2.**
NOTE: If you run a separate wire from the batteries, cut circuit P116CK from the instrument panel harness so it does not feed back through the power distribution Box and defeat the disconnect switches.		
31-2 • An intermittent open (loss of voltage) in circuit P116CK will cause this problem. Using a voltmeter, check the voltage between pin 11 (circuit P116CK) and pin 1 (circuit GND).	Voltage between 11 and 14 volts with key in the OFF position. Voltage less than 11 volts, but other battery powered circuits work (such as headlamps and dome lamps).	While checking the voltage, gently flex various sections of the instrument panel harness to see if an intermittent open can be discovered. Be sure that the Grey 8-pin connector is securely plugged into the power distribution box. Check under Symptoms of Clock requires setting every time truck is shut down.

Engine Coolant Temperature

Symptoms: Display reads “cld” all the time.		
Possible cause: Open circuit in sensor wire (circuit G57SU).		
Check	**Result**	**Next**
32-1 • Connect the wire at the engine temp sensor directly to ground.	Dash still reads “cid”. Dash reads 250 degrees and the code D-156 appears as a diagnostic code.	Check for a broken wire in the instrument panel harness or engine harness (or for bad connection in pin 2 of 37-pin connector on back of dash). Wiggle the 16-way connector in the middle of the firewall to determine if a bad connection is in that connector. Replace the temp sensor.
NOTE: Thread sealant will prevent the sensor from making proper ground contact with the engine. Do not use thread sealant		

Symptoms: Engine temp readout changes by 4 or more degrees when exterior truck lights are switched on.		
Possible cause: High resistance in ground circuit for temp sensor.		
Check	**Result**	**Next**
33-1 • Turn on all exterior lights.	Engine temp changes by 4 of more degrees.	Cut the ground wires coming from pin 6 and pin 1 of the 37-pin connector on the back of the dash. Run a wire directly from pin 1 to the engine block (ground of sensor).

Symptoms: Display always reads incorrect temperature.		
Possible cause: Defective sensor or corrosion on sensor prevents correct temperature from registering.		
Check	**Result**	**Next**
34-1 • Unplug engine water temp sensor and check resistance between sensor terminal and ground.	Resistance varies from chart. Resistance matches chart.	Replace sensor. Clean all the engine grounds.
NOTE: Thread sealant will prevent the sensor from making proper ground contact with the engine. Do not use thread sealant		

Temperature	Resistance
100° F	600 Ω
155° F	232 Ω
180° F	154 Ω
200° F	114 Ω
230° F	73 Ω

Engine Oil Pressure

Symptoms: Display always indicates incorrect temperature.		
Possible cause: Defective pressure transducer or abd ground at pressure sensor.		
Check	**Result**	**Next**
35-1 • The pressure sensor produces a voltage on the sensor circuit that varies with pressure (about 1 volt at 0 psi, and 5 volts at 100 psi). Using a voltmeter, check the voltage between the oil pressure sensor wire (circuit C58GA) and ground. Determine the proper voltage as follows: V = (applied pressure/25) + 1 Example for 60 psi: V = (60/25) + 1 = 3.4 volts.	Voltage matches calculated voltage. Voltage does not match calculated voltage.	Check all grounds to dash. Replace sensor.
NOTE: Verify that you are using a good ground when you make these voltage checks.		

Speedometer		
Check	**Result**	**Next**
36-1 • Check if engine is electronically controlled.	Non-electronic controlled engine and no error codes (such as D-131) Electronic controlled engine.	Go to **36-2** Go to **36-3**
36-2 • Unplug 37-pin connector on the back of the electronic dash and, using a volt meter, check resistance between pin 30 (circuit G150SP) and pin 34 (circuit G1 50SU).	Resistance between 250 and 2000 ohms. Resistance lower than 250 ohms.	Go to **37-1** Go to **36-4**
36-3 • Check for electronic engine diagnostic and status codes, and check to see if the tachometer is working.	No error codes and the tachometer is not working. Engine diagnostic codes displayed. No error codes and the tachometer is working.	The dash is programmed wrong. Replace the dash. Troubleshoot for diagnostic codes. If a diagnostic analyzer is available for the engine, use it to determine if the engine is sending out readable data on the datalink, this is not a dash problem.
36-4 • Unplug sensor on transmission and check resistance of sensor.	Resistance less than 250 ohms. Resistance between 250 and 2000 ohms.	Replace sensor. Check for a short in the wires between dash connector and connector for speed sensor.

Check	Result	Next
37-1 • Check for AC voltage between pin 30 (circuit G150SP) and pin 34 (circuit G150SU) by running the engine (with the vehicle stationary, park brake set and the drive shaft disconnected from the transmission). The AC voltage should be detected when the transmission is put in gear the clutch is engaged.	The electronic dash requires at least 0.1 volts to pick up the signal. Voltage is less that 0.2 volts. Voltage is greater than .5 volts and the speedometer still doesn't work.	Go to **37-2** Replace dash.
37-2 • Use an ohmmeter to check resistance between pin 30 (circuit G150SP) and GND & between pin 34 (circuit G150SU) and GND.	Ohmmeter shows a resistance of less than 1,000 ohms for either reading. Ohmmeter shows resistance more than 1,000 ohms.	Check for other instruments wired into the speedo wiring. (Many times another instrument is wired into the same sensor. Some instruments will ground one of the wires inside the gauge, which will overload the circuit.) Go to **37-3** Go to **37-4**
37-3 • Unplug the sensor on the transmission and disconnect all other instruments that use the speed signal and retest as in 36-4.	Ohmmeter shows a reading of less than 1 000 ohms. Resistance is more than 1,000 ohms.	Check for grounding of wire in harness. Replace sensor.
NOTE: It may be necessary to sand down the teeth on the exciter wheel in the transmission to remove any burrs that would give the wrong signal.		
37-4 • Remove the speed sensor and make sure that no metal filings are on the sensor. Adjust sensor as follows: screw sensor into transmission until it bottoms out, then unscrew 1/2 to 3/4 turns. Check A/C voltage at the sensor.	Voltage less than 0.2 volts. Voltage greater than 0.5 volts.	Replace sensor. Connect back together and retest.

Symptoms: Speedometer reads incorrect miles per hour.		
Possible cause: Speedometer in dash not calibrated for the tire size and axle ratio on truck.		
Check	**Result**	**Next**
NOTE: Before checking into problems with the speedometer, verify that the actual truck speed is different from what the dash displays.		
38-1 • Adjust speed sensor as follows: Screw sensor into transmission until it bottoms out then unscrew 1/2 to 3/4 turns.	Speedometer still doesn't read correctly. Speedometer works.	Dash needs to be recalibrated. See calibration of speedometer. Job done.

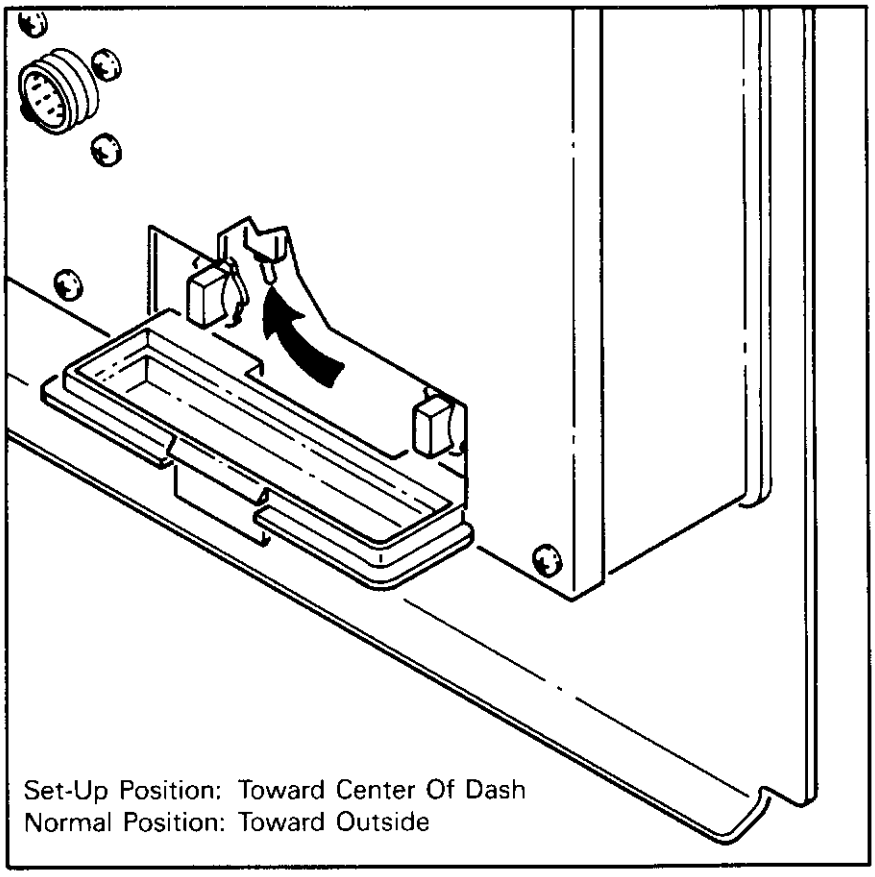

Figure 14-4 Location of Toggle Switch

Calibration Of Speedometer

NOTE: For trucks with electronic engines, calibrate speedometer through the engine control module. See engine manufacturer for procedure.

Recalibrate the dash whenever there is a change in:

- the rear axle drive ratio.
- the tire size on rear axles.

To Recalibrate Electronic Speedometer

Calculate a new pulse-per-mile figure by using this formula:

Pulses/mile = tire revs/mile x 16 x rear axle ratio

Example: If a truck has 501 rev/mile tires and a 3.55 rear axle ratio:

Pulses/mile = 501 x 16 x 3.55 = 28456.8

= 28457

To Enter The Pulses/Mile Figure Into Electronic Instrument Panel

1. Tilt the instrument panel forward from the dash to gain access to the back.
2. Remove the left hand access cover over the halogen bulbs.
3. With the key switch in the Off position, switch the toggle lever from the Normal (as you received it) to the Set Up position. (See Figure 14-4 on page 22.)
4. Power up the instrument panel by turning the key switch to the Run or Acc position. The panel will now appear blank.

NOTE: Make all entries through the Auxiliary Switch Panel as follows.

5. Depress the Normal/Alternate switch twice in succession. The word “speed” will show the current pulses/mile figure and the left most digit of the pulse-per-mile constant will flash.

IMPORTANT: Be sure to press Normal/Alternate twice in succession immediately after powering up the panel with the toggle switch. In the Set Up mode this switch is under the lower right-hand lamp cover (looking at the rear of the unit), and is most easily located with a finger inserted through the opening towards the top of the unit The setup position is reached by moving the handle of the switch towards the small keypad connector. Pressing any other switch disables the calibration function. if this occurs, power down the panel and return it to the Normal mode by switching the toggle switch. Now power it up again. Start again at step 3.

6. Depress Alarm Up/Clock Up to increase or Alarm Dn/Clock Dn to decrease the value of the flashing digit. If the flashing digit is the desired number, make no adjustment.
7. Depress Trip Reset/Clock Set to cause the next digit to the right to flash.
8. Depress Alarm Up/Clock Up or Alarm Dn/Clock Dn to adjust this digit as described in Step 6.
9. Depress Trip Reset/Clock Set to cause the next digit to the right to flash. Adjust the digit as described in step 6 until the desired figure is in the Odometer area of the display.

   NOTE: For the example, the Odometer display would be 028457.

10. To store this figure, press and hold for at least **3 seconds** both the Normal/Alternate and the Inst-Avg/MPH-KM/H switches. Release the switches when the word “store” appears in the Trip Odometer display area.
11. Turn Off the key switch and return the Set Up toggle switch to the Normal position.

The panel is now calibrated and ready to return to service.

Symptoms: On truck with 2-speed rear axle, speedometer reads correctly when rear axle is in high range but not in low range.		
Possible cause: Pressure switch not properly grounded, or a wire to the dash is broken (circuit C47SW).		
Check	**Result**	**Next**
NOTE: When pin 36 on dash is grounded, the dash adjusts the speedometer for low-speed axle.		
40-1 • Unplug 37-pin connector on back of electronic dash and use an ohmmeter to check the resistance between pin 36 (circuit C47SW) and pin 1 (GND). With the axle speed switch in low-speed position (with air supply pressure up).	Ohmmeter reads less than 5 ohms. Ohmmeter reads greater than 5 ohms.	Go to **40-2** Go to **40-3**
40-2 • Check 37-pin connector for bad connection.	Connector is making good connection.	Replace dash.
40-3 • Use an ohmmeter to check resistance from cab ground to ground terminal on switch.	Resistance less than 2 ohms. Resistance greater than 2 ohms.	Go to **40-4** Repair or clean ground
40-4 • Connect the ohmmeter across the switch and flip m the axle speed switch (with air supply pressure up).	Resistance changes but ohmmeter reads more than 3 ohms, Resistance doesn‘t change,	Replace the switch. Remove switch and verify that air pressure is present when the axle speed switch is in the low-speed position before replacing switch.

Symptoms: Speedometer always reads low, even after calibrating.		
Possible cause: Circuit C47SW grounded in harness or truck with 2-speed rear axle has defective switch.		
Check	**Result**	**Next**
41-1 • Unplug 37-pin connector on back of electronic dash and use an ohmmeter to check the resistance between pin 36 (circuit C47SW) and pin 1 (GND).	Resistance is greater than 10,000 ohms and pulses/mile correct (see page 23). Resistance is lower than 10,000 ohms.	Replace the dash. Circuit C47SW is grounded, causing the dash to adjust the speedometer for low-speed axle. Go to **41-2**
41-2 • Check for 2-speed rear axle.	Truck is equipped with a 2-speed rear axle. Truck is not equipped with a 2-speed rear axle.	Check if axle speed switch is shorted. Go to **41-3**. Cut the wire coming from pin 36 of the 37-pin connector. Tape back the loose end and insulate. Then re-check the speedometer.
41-3 • Disconnect wiring from the axle speed switch and use an ohmmeter to check the resistance across the terminals of the switch.	The ohmmeter should read less than 3 ohms when in low-speed and more than 10,000 ohms when in high-speed. If the resistance changes with a change in axle speed switch position but the ohmmeter always reads less than 10,000 ohms. If resistance doesn't change.	Replace the switch. Remove the switch and verify that air pressure is not present when the axle speed switch is in the high-speed position before replacing the switch.

Tachometer

Symptoms: Tachometer always shows 0 rpm.		
Possible cause: Tachometer sensor not adjusted properly or not working.		
Check	**Result**	**Next**
42-1 • Check if engine is electronically controlled.	Non-electronic controlled engine, and no error codes (such as D-131). Electronic controlled engine.	Go to **42-2** Go to **42-3**
42-2 • Unplug 37-pin connector on the back of the electronic dash and, using a voltmeter, check resistance between pin 31 (circuit G148SU) and pin 35 (circuit G148TC).	Resistance between 250 and 2000 ohms. Resistance lower than 250 ohms.	Go to **43-1** Go to **42-4**
42-3 • Check for electronic engine diagnostic or status codes. Check to see if the speedometer is working.	No diagnostic or status codes and the speedometer Engine diagnostic codes displayed. No diagnostic codes and the speedometer is working.	The dash is programmed wrong. Replace the dash. Troubleshoot for diagnostic codes. If a diagnostic analyzer is available for the engine, use it to determine if the engine is sending out readable data on the datalink. This is not a dash problem.
42-4 • Unplug sensor on engine and check resistance of sensor.	Resistance less than 250 ohms. Resistance between 250 and 2000 ohms.	Replace sensor. Check for a short in the wires between dash connector and connector for speed sensor.

Check	Result	Next
43-1 • Check for AC voltage between pin 31 (circuit G148SU) and pin 35 (circuit G148TC) with the engine running.	The electronic dash requires at least 0.1 volts to pick up the signal. Voltage is less than 0.2 volts. Voltage is greater than .5 volts and the tachometer still doesn't work.	Go to **43-2** Replace dash.
43-2 • Use an ohmmeter to check resistance between pin 31 (circuit G148SU) and GND and between pin 35 (circuit G148TC) and GND.	Ohmmeter shows a resistance of less than 1,000 ohms for either reading. Ohmmeter shows resistance more than 1,000 ohms.	Check for other instruments wired into the tach wiring. (Many times another instrument is wired into the same sensor. Some instruments will ground one of the wires inside the gauge, which will overload the circuit.) Go to **43-3** Go to **43-4**
43-3 • Unplug the sensor on the engine and disconnect all other instruments that use the tach signal and retest as in 43-2.	Ohmmeter shows a reading of less than 1,000 ohms. Resistance is more than 1,000 ohms.	Check for grounding of wire in harness. Replace sensor.
NOTE: It may be necessary to sand down the teeth on the flywheel to remove any burrs that would give the wrong signal.		
43-4 • Remove the tach sensor and make sure that no metal filings are on the sensor. Adjust sensor as follows: screw sensor into engine until it bottoms out, then unscrew 1/2 to 3/4 turns. Check A/C voltage at the sensor.	Voltage less than 0.2 volts. Voltage greater than 0.5 volts.	Replace sensor. Connect back together and retest.

Symptoms: Tachometer reads incorrect rpm.		
Possible Cause: Teeth missing on flywheel, or dash not calibrated for correct number of teeth on the flywheel.		
Check	**Result**	**Next**
NOTE: Before checking into problems with the tachometer; verify that the actual engine RPM's are different from what the tachometer displays.		
44-1 • Visually check flywheel to determine if any teeth are missing.	Teeth missing. No teeth missing.	Repair flywheel. Go to **44-2**
44-2 • Adjust tach sensor as follows: screw sensor into flywheel housing until it bottoms out, then unscrew 1/2 to 3/4 turns.	Tachometer still doesn't read correctly. Tachometer reads correctly.	Dash needs to be re-calibrated. No calibration is available out in the field at this time. Reprogram dash through PACCAR parts. Job done.

Electronic Dash Panel Lighting

Symptoms: Electronic dash does not light up when key switch is in the RUN or ACC position.		
Possible cause: Dash is not receiving power or is not grounded.		
Check	**Result**	**Next**
NOTE: Before checking for a problem with the dash, check lights in back of dash to make sure they are not all burned out.		
45-1 • Unplug 37-pin connector from back of electronic dash and, using a voltmeter, check voltage between pin 5 (circuit PCB19) and pin 1 (GND for electronics) and between pin 5 and pin 16 (GND for lighting). With the key switch on.	Voltage between 11 and 14 volts. Voltage less than 11 volts.	Look under symptoms of dim or uneven lighting. (page 29). Check in power distribution box to make sure that a fuse is in position -19 and that it is not blown. Go to **45-2**
45-2 • Visually check to make sure that the connector (single bullet connector about one foot from the 37-pin connector) plugging into the spare circuit breaker harness has not become disconnected. Using a voltmeter, check voltage between pin 5 (circuit PCB19) and cab ground.	Voltage less than 11 volts. Voltage between 11 and 14 volts.	There is a broken wire in the harness or a bad connector on the power distribution box. Go to **45-3**
45-3 • Use an ohmmeter to check the resistance between pin 1 (ground for electronics) and pin 16 (ground for lighting) and cab ground.	Resistance is greater than 3 ohms. Resistance is less than 3 ohms.	There is a bad connection between the electronic dash and ground. Go to **45-4** Go back to **45-1**
NOTE: There is a jumper wire that runs the ground for the electronics [pin 11 out to the engine.		
45-4 • Check the connector in the ground wire to the engine (single weatherpack connector).	Connector disconnected or corroded.	Clean and reconnect or run a separate wire from pin 1 (GND) to the engine block.
NOTE: High resistance in lighting ground: This ground splices to the other grounds in the cab right at the point where the wiring for the 37-pin connector goes into the main harness Check for good splice in the harness because a problem with this splice may be just the beginning of other ground problems on the truck.		

Symptoms: Dim or uneven lighting of dash display.		
Possible cause: One or more of the halogen bulbs (GE 882) in the dash burnt out.		
Check	**Result**	**Next**
46-1 Tilt the panel forward to gain access to the back of the dash. Open two black plastic covers on the bottom of the dash and turn the key switch on.	Look into the opening on the dash and determine which bulbs are not lit. ** NOTE: WHEN HANDLING THESE BULBS DO NOT TOUCH GLASS PORTION OF BULB WITH FINGERS! ** Bulb life is severely shortened if oil from fingers gets on the bulb. For this reason, bulb and holder are sold together.	Clean bulb contacts with a clean pencil eraser. If the bulb still does not work, replace the bulb.
NOTE: Bulb #194 may be installed in emergencies. but it will degrade the panel's appearance.		

Symptoms: Electronic dash remains very dim all the time. All other gauge lights on the truck work and dim properly.		
Possible cause: Continuous low voltage on the panel lamp wiring (circuit L13LI).		
Check	**Result**	**Next**
47-1 • Unplug the 37-pin connector on the back of the electronic dash and using a voltmeter check voltage between pin 10 (circuit L13LI) and pin 1 (ground).	Voltage less than 1 volt, regardless of rheostat position. Voltage varies from 1 to 14 volts depending on rheostat position.	This could indicate some dirt or corrosion at a connector allowing a small voltage to appear without affecting other panel lamps. Look at park lamp wiring diagram and troubleshoot circuit L13LI. Wiggling connectors may be a good way to locate where the problem is coming from. Go to **47-2**
47-2 • If all the bulbs are burned out in the back of the dash, it will appear as if the dash is dim all the time. Open two black plastic covers on the bottom of the dash and, using a voltmeter, check the voltage on the contact pads for the lamps.	Voltage varies from 1 to 14 volts depending on rheostat position. No voltage detected regardless of rheostat position.	Clean contacts with a clean pencil eraser and replace the bulbs. Replace dash.

Symptoms: Electronic dash does not dim with the rest of the gauges.		
Possible cause: Panel lamp power wire (circuit L13LI) is broken.		
Check	**Result**	**Next**
48-1 • Unplug the 37-pin connector on the back of electronic dash and using a voltmeter check voltage between pin 10 (circuit L13LI) and pin 1 (ground). Voltage should vary from about 14 volts (panel lamps bright) to 1 volt (panel lamps completely dimmed), depending on the position of the dimmer rheostat.	No voltage detected. Voltage is always 11 to 14 volts. Voltage varies properly.	Panel lamp wire (circuit L13LI) is broken somewhere in the harness. See park lamp wiring diagram and troubleshoot L13LI circuit. Check for a short in the harness between the panel lamp wire and another power wire. See park lamp wiring diagram and troubleshoot L13LI circuit. Replace the dash.

Switch Panel

Symptoms: Switch panel has no lighting but other gauge lights work.		
NOTE: Before testing switch panel lamps, make sure that the dash dims with the dimmer control.		
Possible cause: Switch panel bulb burnt out.		
Check	**Result**	**Next**
49-1 • Tilt auxiliary switch panel forward to gain access to the back of the panel and check bulb.	Bulb is good but light still does not work. Bulb burned out.	Clean contacts with a clean pencil eraser. If bulb still doesn't light, go to **49-2**. Replace bulb.
49-2 • Unplug switch panel from the back of the dash. Ground pin 7 (ground) of auxiliary switch panel and apply battery power (12 volts) to pin 4 (lamp circuit).	If the lamp does not light. If the lamp does light.	Replace switch panel. Go to **49-3**
49-3 • Using a voltmeter check voltage between pin 7 (ground) and pin 4 (lamp circuit) coming from the dash. When gauge lamps are on, voltage should vary between 1 and 12 volts, depending on the position of the dimmer rheostat.	No voltage reading but dash dims properly. Voltage varies correctly.	Replace dash. Bad connector between auxiliary switch panel and dash.

Symptoms: Alarm doesn‘t work for speed alarm or any other alarm.		
Possible cause: Broken wire between dash and switch panel or bad alarm in switch panel.		
Check	**Result**	**Next**
50-1 • Unplug the auxiliary switch panel from the back of the dash. Ground pin 7 (ground) of switch panel and apply battery power (12 volts) to pin 2 (alarm circuit).	Alarm doesn't sound. Alarm sounds.	Replace switch panel. Go to **50-2**
50-2 • Use a voltmeter to check voltage between pin 7 (ground) and pin 2 (alarm circuit) coming from the dash. Turn the key on and adjust the speed alarm down to 0 MPH.	Voltmeter shows a pulsed battery power (12 volts) about every 2 seconds. No voltage shown.	Bad connection between auxiliary switch panel and dash. Replace the dash.

Symptoms: One or more of the switches on the switch panel do not work.		
Possible cause: Defective switch or poor connection between switch panel and electronic dash.		
Check	**Result**	**Next**
NOTE: The switch panel is a group of switches that grounds certain pins on the switch panel connector To get certain functions to operate.		
51-1 • Unplug the auxiliary switch panel from the back of the dash. Using ohmmeter connect one lead of the meter to pin 7 (ground) and the other lead to the pin corresponding to the switch you want to check per the chart.	Resistance less than 5 ohms when button is pressed. Resistance greater than 5 ohms, with switch pushed.	Go to **51-2** Replace the switch panel.
51 -2 • Connect one side of a jumper to pin 7 (ground) on the dash, and connect the other end of the jumper to the pin corresponding to the switch you want to check (see table below).	Dash does not respond to the jumper across the pins. Dash responds to the jumper but not to the switches when the switch panel is connected to the dash.	Replace the dash. The problem is in the connector between the auxiliary switch panel and the dash.

Pin #	Switch
1	NORMAL / ALTERNATE
3	INST-AVG / MPH-KM/M
5	FUNCTION / STATUS
6	ALARM UP / CLOCK UP
8	ALARM DN / CLOCK DN
9	TRIP RESET / CLOCK SET

Check Status Indicator Lamp

Symptom: The check status indicator lamp does not light when a diagnostic code is active. (Note: a code is active if there is a problem at that time. When a code is stored, but the problem does not exist any more (history record), it is an inactive code and will not light the check status lamp.)		
Possible cause: Burnt out indicator bulb.		
Check	**Result**	**Next**
NOTE: Check bulb contacts for corrosion, a good way to clean the contacts is with a clean pencil eraser:		
52-1 • Press the ALTERNATE switch then the STATUS switch on the switch panel.	Check status lamp does not light when diagnostic codes displayed. Check status lamp does not light, and no diagnostic codes appear. (Dash doesn‘t respond to switch.)	Open the center, black, plastic cover on back of dash panel and check light bulb. See switch panel checks (page 33).

High Water / Low Oil Warning Lamp (Alarm)

Symptoms: High water / low oil warning lamp does not work. When the key switch is in RUN position and the engine is not running, the warning lamp does not light.

Possible cause: Broken wire from dash to warning lamp.

NOTE: For trucks with optional shutdown and/or warning systems, the dash works independently of the optional systems. Troubleshoot the optional systems not the dash.

Check	Result	Next
53-1 • Swing the dash panel out and look down the harness about 8" and find a single bullet connector on a green wire with a brown stripe (circuit L58HW) with a paper tag. The dash grounds this circuit to activate the warning lamp. Visually inspect the connector for corrosion or improper fit.	Connector plugged in and there is no corrosion. Connector unplugged or there is corrosion.	Unplug circuit L58HW, and go to **53-2**. Clean corrosion and plug together.

NOTE: The bullet connector on circuit L58HW has an alternate connection that is used sometimes Follow the instrument panel harness toward the glove box. About one foot from the connector from the dash there is a male bullet connector with a paper tag labeled "connect Kysor shtdn / warn" This connection is used to connect the warning lamp to standard switches on the engine, instead of using the dash for warning.

53-2 • Use a voltmeter to check voltage between a power wire (any good battery power source) and circuit L58HW (pin 3) coming from the dash. With the key on and the engine not running (0 oil pressure).	Voltmeter shows battery voltage (circuit L58HW grounded). No voltage is detected.	Dash is working properly. First check for burnt out bulb in warning lamp module, then use lamp modular wiring diagrams to troubleshoot the warning lamps. Make sure that the meter is connected to a good power source, then go to **53-2**.
53-3 • Unplug the 37-pin connector from the back of the dash and use an ohmmeter to check resistance from pin 3 (circuit L58HW) to the bullet connector in the harness.	Resistance is less than 2 ohms. Resistance is greater than 2 ohms.	Either replace the dash or install a standard oil pressure switch and water temp switch on the engine and connect circuit L58HW to the optional connector. Circuit L58HW wire broken in instrument panel harness.

NOTE: It is possible to hook up the dash and an optional warning system together at the same time, as long as the optional system works by grounding the warning lamp (or a relay to ground the warning lamp). Whichever alarm is triggered first will operate the warning lamp. The dash will not be damaged by an external circuit grounding pin 3.

Fuel Economy Gauge

NOTES:Electronically controlled engines (DDECI, DDEC II, ECI PEEC, and CAT3176) provide information on fuel use over the datalink (circuits C108DB and C109DB).

For non-electronic engines, this is how the fuel economy display works.

- Sensors in the fuel line send information to the electronic dash on how much fuel is used. Inside the sensor a light shines on a photo sensor which records if a light is shining or not. A spoked wheel turns with the flow of fuel. The spokes of the wheel block the light from the photo sensor. This causes the photo sensor to send a pulsed signal that shows fuel usage. The electronic dash uses the speed of the truck to calculate the amount of fuel used per mile.

Fuel Economy—Calibration

The fuel economy display has been calibrated at the Kenworth factory. Recalibration is required when the flow sensors have been replaced, or with Cummins engines, when work on the fuel pump has altered the fuel bypass ratio.

It is possible for the operator to recalibrate the display if it is found that actual fuel economy deviates from that which is displayed by the panel. The average mileage can only be adjusted 20% from the readings on the dash. (That means an average reading of 8 mpg can only be adjusted down to 6.4 mpg or up to 9.6 mpg.) The procedure is as follows:

- Before recalibration, be sure that the vehicle has a current realistic average. This may be achieved by resetting the trip odometer to zero. This clears the Miles Per Gallon average. Then drive the vehicle ten to fifteen miles to accumulate a current average. Do not idle the vehicle excessively before completing the following steps.

1. Depress the NORMAL/ALTERNATE switch.
2. Depress ALARM UP/CLOCK UP and ALARM DN/CLOCK DN switches simultaneously. The current AVERAGE fuel economy figure will appear and the AVG annunciator light will flash.
3. Now depress ALARM UP or ALARM DN switches to adjust the AVERAGE MPG figure up or down to that which was actually observed.
4. The procedure is completed by depressing the TRIP RESET/CLOCK SET switch for at least 3 seconds. The panel will return to the NORMAL mode.

   NOTE: It is possible to negate the above procedure during steps 1, 2 or 3 by depressing the NORMAL/ALTERNATE switch. The panel will return to the NORMAL mode without being recalibrated.

Symptom: With the engine running and the truck's speed greater than 3 MPH, only the center segment lights up on bar graph.		
Possible cause: Instrument panel not receiving speed signal.		
Check	**Result**	**Next**
55-1 • Drive truck and observe speedometer.	Speedometer not working. Speedometer is working correctly.	See speedometer section. Replace the dash.

Symptom: With the engine running and the truck's speed greater than 3 MPH, instantaneous MPG always reads high.		
Possible cause: Forward flow sensor not working, or instrument panel not receiving a signal from the forward flow sensor.		
Check	**Result**	**Next**
56-1 • Test forward fuel flow sensor. See page 38.	If the speedometer is working correctly and the flow sensors are working per the test procedures.	Replace the dash.

Symptom: With the engine running and the truck's speed greater than 3 MPH, instantaneous MPG always read low.		
Possible cause: Return flow sensor (Cat and DDA engines only) not working, or instrument panel not receiving a signal from the return flow sensor.		
Check	**Result**	**Next**
57-1 • Test return fuel flow sensor. See page 38.	If the speedometer is working correctly and the flow sensors are working per the test procedures.	Replace the dash.

Symptoms: Instantaneous MPG always high (near 99.9) and average MPG very low (about .2).		
Possible cause: Air in return fuel line (Cat and DDA engines only).		
Check	**Result**	**Next**
58-1 • If air is in the return fuel line, the fuel clouds and blocks the light of the sensor creating a signal that the dash cannot use. Place a clear tube in the return fuel line as close to the sensor as possible.	Fuel is clouded. Fuel not clouded.	Check the fuel system for air leaks. (Remember that even after you find the air leak, it takes about 20 minutes to clear the fuel.) Go to **58-2**
58-2 • Check both forward and return fuel flow sensors. See page 38.	If sensors are working correctly per the test procedures.	Replace the dash.

Symptoms: Fuel tech works fine until certain options are turned on (such as the heater blower) in the cab.		
Possible cause: Induced noise from power wiring is causing false signals on unused (spare circuit) return sensor wiring (Cummins engine only because return sensor is not used).		
Check	**Result**	**Next**
59-1 • At the firewall there is a 4-way weatherpack connector with 3 wires going to the flow sensor on the engine. In that connector there is one pin plugged (brown wire from the cab).		Attach a jumper wire to the brown wire (the one that isn't used) and connect to ground.

Testing Fuel Flow Sensors

Check	Result	Next
NOTE: Install sensors so the plastic plug points downward or sideways to prevent water from collecting around the wires		
60-1 • Before checking flow sensors for electrical problems, verify that the proper sensor is on the engine. An easy way to verify this is to check the color of the plastic plug holding the wires on the sensor. (See chart page 39).	Correct sensors installed per chart Wrong sensor installed.	Go to **60-2** Replace sensor.
NOTE: When replacing of sensor on a two-sensor system, make sure that the calibration numbers (see figure on page 39*) are the same. On a single-sensor system, make sure that the new sensor has the same calibration number as the old sensor (the dash is calibrated for that number).*		
60-2 • Unplug the fuel flow sensor on the engine and, using a voltmeter, check voltage between the red wire tPCB19 power from spare fuse #19) and black wire (GND) coming from the cab. With the key on.	Meter reads 12-14 volts. Meter reads less than 11 volts.	Go to **60-4** Go to **60-3**
60-3 • Check voltage between red wire (PCB19) and engine ground to determine if ground to sensor is good.	Voltage less than 11 volts. Voltage 12-14 volts (battery voltage).	Check fuse in power distribution box and check power circuit connector and wiring for corrosion or broken wire. Check ground circuit from cab for corrosion or broken wire
60-4 • Using a voltmeter check voltage between white wire (flow sensor wire) and black wire (GND) coming from the dash.	Meter reads 9.5 to 10.5 volts. Meter reads less than 9.5 volts, or more than 10.5 volts.	Go to **61-1** Go to **60-5**
60-5 • Unplug 37-pin connector and use an ohmmeter between the sensor wire at the sensor, and pin 37 (black wire) for the forward sensor or pin 33 (brown wire) for the return sensor (depending On which sensor does not get 10 volts).	Resistance greater than 2 ohms. Resistance less than 2 ohms.	Check for corroded connector broken wire between dash and sensor. Replace dash.

Check	Result	Next
61-1 • Connect sensor to harness with jumpers so a voltmeter can read voltage between sensor circuit (white wire) and power (red wire). Voltage should read either 0 volts or 9 to 10 volts depending on where the wheel in the sensor is located. Turn the engine slightly.	Voltage changes to the other setting (that is, if the voltmeter reads 9 volts first, then when the engine is turned slightly the meter will show 0 volts). With any slight turning of the engine the sensor voltage remains the same.	Go to **61-2** Replace sensor.
NOTE: Crankcase oil mixed in diesel coats the optical parts in the fuel flow sensor preventing the sensor from working. After removing the fuel lines and looking inside, the sensor may look black (sat engines can get this black coating even without mixing oil and diesel). To clean, flush the sensor with carburetor cleaner or solvent		
61-2 • Start the engine.	Voltmeter reads 4 to 6 volts. Voltmeter reads less than 4 volts or greater than 6 volts.	Sensor working correctly. Replace sensor.

Engine	Forward Flow Cap Color	Return Flow Cap Color
Cummins	yellow	none
Caterpillar	brown	black
Detroit Diesel	yellow	yellow

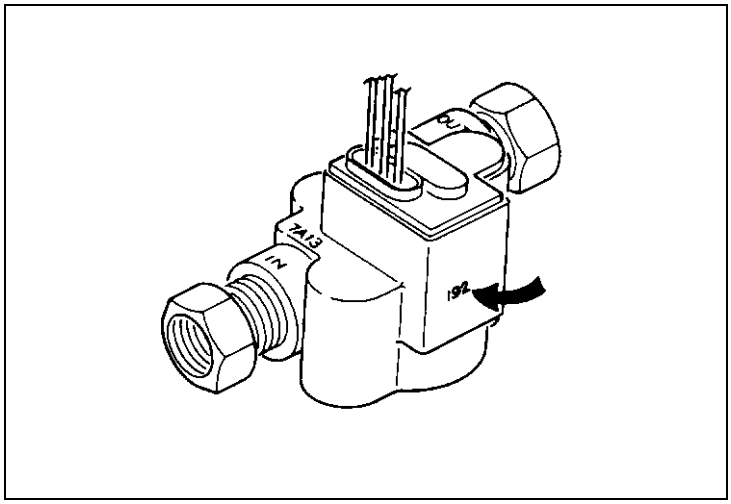

Figure 14-5 3-Digit Calibration Number

Technical Advisor: Mark Marten