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Product: INDUSTRIAL ENGINE
 Model: C4.4 INDUSTRIAL ENGINE 444
 Configuration: C4.4 Industrial Engine 44400001-UP

Troubleshooting

C4.4 and C6.6 Industrial Engines and Engines for Caterpillar Built Machines

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i03493427

5 Volt Sensor Supply Circuit - Test

SMCS - 1439-038

System Operation Description:

Use this procedure to troubleshoot the system when one of the following diagnostic codes is active or easily repeated:

- 0262-03 5 Volt Sensor DC Power Supply voltage above normal
- 0262-04 5 Volt Sensor DC Power Supply voltage below normal

The following background information is related to this procedure:

The Engine Control Module (ECM) supplies regulated +5 Volts DC to the following sensors:

- Fuel Rail Pressure Sensor through connector P228
- Intake Manifold Pressure Sensor through connector P200
- Engine Oil Pressure Sensor through connector P201
- Analog Throttle Demand Sensors (if equipped) through P1 connector

The supply for the +5 Volt engine pressure sensor is routed from the ECM through the P2 connector to terminal 1 of each pressure sensor connector. The supply voltage is 5.0 ± 0.16 Volts DC. The +5 Volt supply to the Analog Throttle Demand Sensor is routed from the ECM through the P1 connector to the sensor pins "A".

A diagnostic code can be caused by the following conditions:

- A short circuit in the harness
- An open circuit in the harness
- A suspect sensor
- A suspect ECM

Table 1

P2 Pin Connections			

Sensor Pin	Function	Fuel Rail Pressure Sensor	Intake Manifold Pressure Sensor	Oil Pressure Sensor
1	Volts (5V)	48	46	47
2	Ground	40	38	39
3	Signal	51	55	56

Table 2

P1 OEM Connector			
Sensor Pin	Function	Analog Throttle 1	Analog Throttle 2
A	5 Volt Sensor Supply	41	42
B	Ground	33	34
C	Signal	54	55

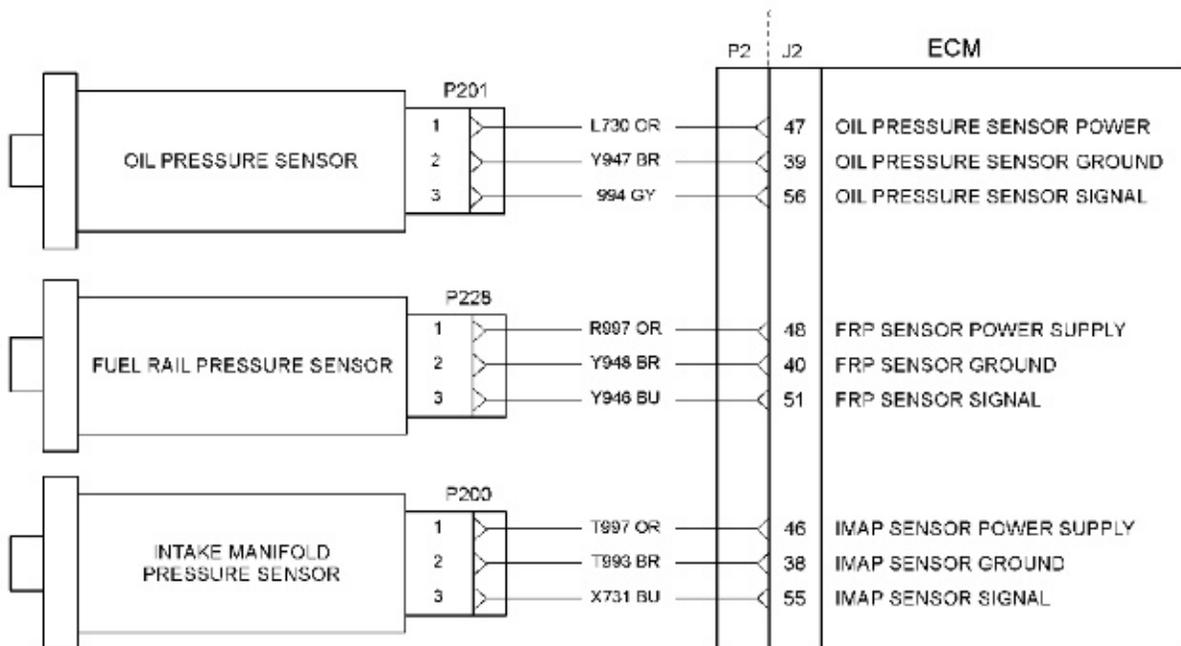


Illustration 1

Typical example of the schematic for the sensors

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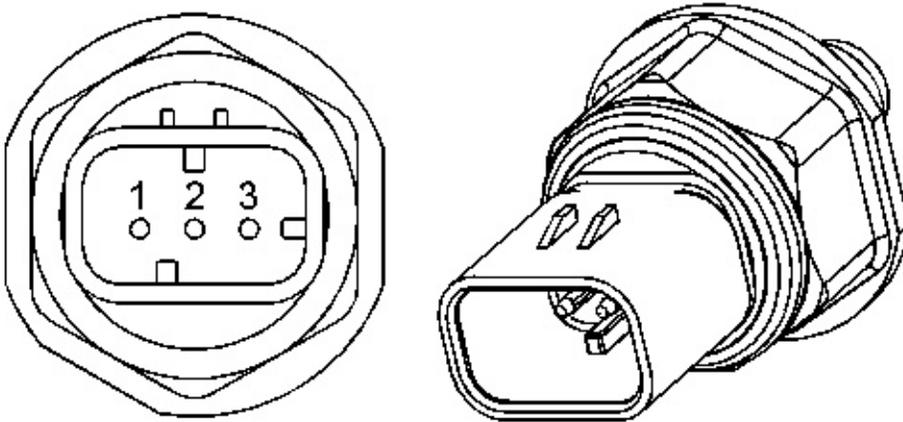


Illustration 2

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Typical example of the fuel rail pressure sensor

(1) Voltage supply (Vs)

(2) Ground (GND)

(3) Signal (SIG)

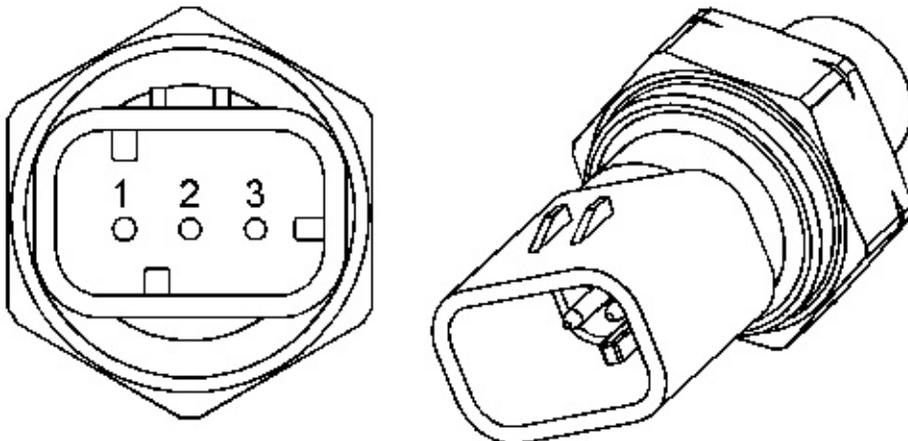


Illustration 3

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Typical example of the intake manifold pressure sensor

(1) Voltage Supply (Vs)

(2) Ground (GND)

(3) Signal (SIG)

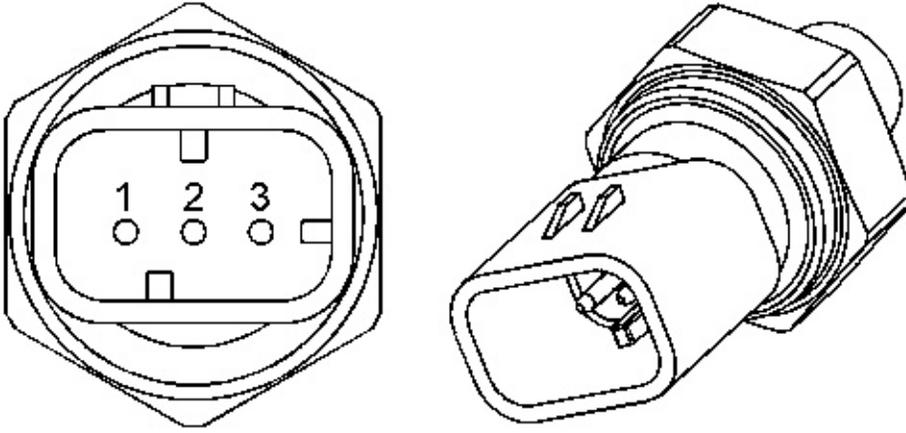


Illustration 4

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Typical example of the oil pressure sensor

(1) Voltage Supply (Vs)

(2) Ground (GND)

(3) Signal (SIG)

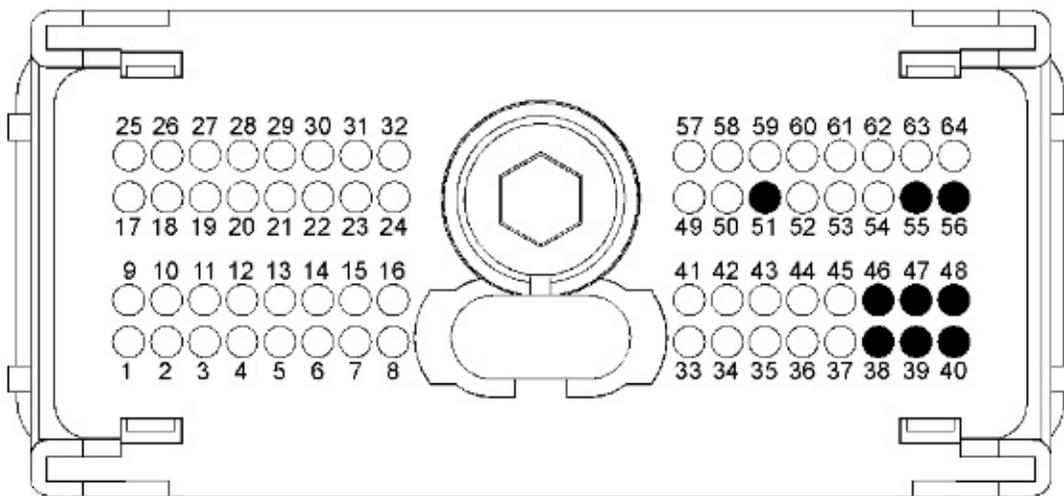


Illustration 5

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Typical example of the P2 pressure sensor pin locations

- (38) Ground (GND) Intake Manifold Pressure Sensor
- (39) Ground (GND) Oil Pressure Sensor
- (40) Ground (GND) Fuel Rail Pressure Sensor
- (46) Voltage supply (5V) Intake Manifold Pressure Sensor
- (47) Voltage supply (5V) Oil Pressure Sensor
- (48) Voltage supply (5V) Fuel Rail Pressure Sensor
- (51) Signal (SIG) Fuel Rail Pressure Sensor
- (55) Signal (SIG) Intake Manifold Pressure Sensor
- (56) Signal (SIG) Oil Pressure Sensor

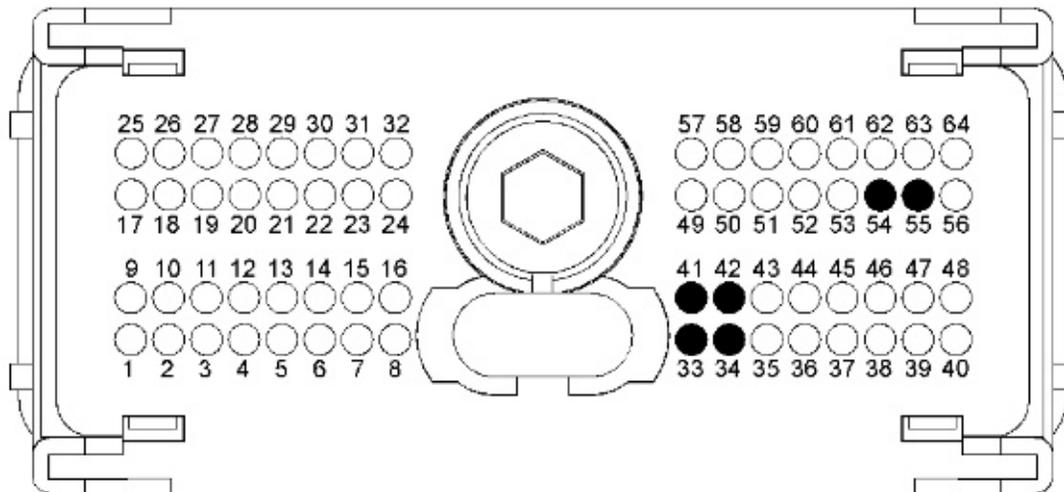


Illustration 6

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Typical example of the P1 pin locations for the analog throttle demand sensor

- (33) Throttle 1 ground (GND)
- (34) Throttle 2 ground (GND)
- (41) Throttle 1 voltage supply (5V)
- (42) Throttle 2 voltage supply (5V)
- (54) Throttle 1 throttle position
- (55) Throttle 2 throttle position

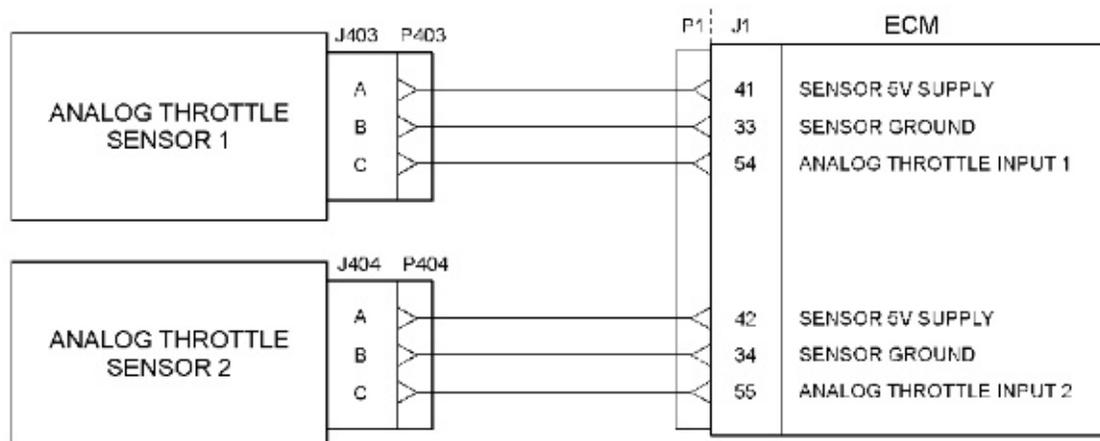


Illustration 7

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Typical example of the schematic for the P1 connections for the analog throttle demand sensors

Test Step 1. Check for Connector Damage

- A. Turn the keyswitch to the OFF position.
- B. Check the connectors and the harness for the following faults:
 - Damage
 - Abrasion
 - Corrosion
 - Incorrect attachment
- C. Refer to Troubleshooting, "Electrical Connectors - Inspect".
- D. Perform a 45 N (10 lb) pull test on each of the wires in the harness that are associated with the throttle demand sensor. Check the wire connectors at the following positions:
 - ECM
 - Pressure sensors
 - Throttle sensor

The wire connectors are shown in Table 1 and Table 2.

- E. Check the screws for the ECM connectors for the correct torque of 5.0 N·m (44 lb in).

Expected Result:

The connectors and the harness should be free of the following faults: damage, abrasion, corrosion and incorrect attachment.

Results:

- **OK** - Proceed to Test Step 2.
- **Not OK** -

Repair: Repair the connectors or the harness and/or replace the connectors or the harness. Use the electronic service tool in order to clear all logged diagnostic codes and then verify that the repair eliminates the fault.

STOP

Test Step 2. Check for Active Diagnostic Codes

- A. Connect the electronic service tool to the diagnostic connector.
- B. Turn the keyswitch to the ON position.
- C. Use the electronic service tool in order to monitor the diagnostic codes. Check and record any active diagnostic codes.

Note: Wait at least 15 seconds in order for the diagnostic codes to become active.

Expected Result:

One of the following diagnostic codes is active:

- 0262-03 5 Volt Sensor DC Power Supply voltage above normal
- 0262-04 5 Volt Sensor DC Power Supply voltage below normal

Results:

- **OK** - Diagnostic code 0262-04 is active. Proceed to Test Step 3.
- **OK** - Diagnostic code 0262-03 is active. Proceed to Test Step 6.
- **Not OK** - Diagnostic codes 0262-04 and 0262-03 are not active. Proceed to Test Step 4.

Test Step 3. Disconnect the Sensors

- A. Turn the keyswitch to the ON position.
- B. Use the electronic service tool in order to monitor the diagnostic codes.
- C. Disconnect the pressure sensors one at a time. If an analog throttle demand sensor is installed, then disconnect the throttle sensor. Wait for 30 seconds after the sensor is disconnected.

Note: Diagnostic code 0262-04 will become inactive when the sensor that caused the 5 Volt diagnostic code is disconnected.

- D. Ensure that all the pressure sensors and the throttle demand sensors (if equipped) are disconnected.

Expected Result:

The 5 Volt diagnostic code is not active when all of the sensors are disconnected.

Results:

- **OK** - Diagnostic code 0262-04 is not active when all of the sensors are disconnected.

Repair: Reconnect all of the sensors except the suspect sensor.

Proceed to Test Step 4.

- **Not OK** - Diagnostic code 0262-04 is still active.

Repair: Leave all of the sensors disconnected.

Proceed to Test Step 5.

Test Step 4. Install a New Sensor

- Install the connector on a replacement sensor. Do not install the replacement sensor on the engine.
- Use the electronic service tool in order to monitor the diagnostic codes.

Expected Result:

Diagnostic codes 0262-03 and 0262-04 are not active.

Results:

- **OK** - The 5 Volt diagnostic code is not active.

Repair: Use the electronic service tool in order to clear all logged diagnostic codes. Remove the suspect sensor and then install the replacement sensor. Install the connector on the sensor. Verify that the repair eliminates the fault.

STOP

- **Not OK** - The 5 Volt diagnostic code is still active.

Repair: Do not use the new sensor.

Proceed to Test Step 5.

Test Step 5. Disconnect the ECM Connector and Check for Active Diagnostic Codes

- Turn the keyswitch to the OFF position.
- Connect the electronic service tool to the diagnostic connector.
- Check the ECM connectors for corrosion and moisture.
- Disconnect the P2 connector from the ECM.
- If P1:41 is installed, then temporarily disconnect the pin. If P1:42 is installed, then temporarily disconnect the pin.
- Reconnect connector P1 to the ECM.
- Turn the keyswitch to the ON position.
- Check for active diagnostic codes on the electronic service tool.

Note: A "Voltage High" diagnostic code (open circuit) should be active for all of the following sensors:

- Engine pressure sensors

- Engine temperature sensors
- Analog throttle demand sensors (if equipped)

Expected Result:

Diagnostic code 0262-04 is not active. A "Voltage High" diagnostic code (open circuit) is active for all of the engine pressure sensors, temperature sensors and throttle demand sensors (if equipped).

Results:

- **OK** - Diagnostic code 0262-04 is not active.

Repair: Replace all wires to the original configuration.

Proceed to Test Step 6.

- **Not OK** - The 5 Volt diagnostic codes are still active.

Repair: Perform the following repair:

1. Make sure that the latest flash file for the application is installed in the ECM. Refer to Troubleshooting, "Flash Programming".
2. Contact the Technical Communicator.

Note: This consultation can greatly reduce the repair time.

3. If the Technical Communicator recommends the use of a test ECM, install a test ECM. Refer to Troubleshooting, "Replacing the ECM".
4. Use the electronic service tool to recheck the system for active diagnostic codes.
5. If the fault is resolved with the test ECM, reconnect the suspect ECM.
6. If the fault returns with the suspect ECM, replace the ECM.
7. Use the electronic service tool in order to clear all logged diagnostic codes and then verify that the repair eliminates the fault.

STOP**Test Step 6. Measure the +5 Volt Supply to the Sensor**

- A. Turn the keyswitch to the ON position.

Note: Disconnect all the pressure sensors and the analog throttle demand sensors (if equipped).

- B. Measure the voltage between terminal 1 (Pressure sensor +5 Volts) and the engine ground for each of the pressure sensors.
- C. Measure the voltage between terminal A (analog throttle demand sensors +5 Volts) and the engine ground for each of the analog throttle demand sensors.

Expected Result:

The voltage is 5.0 ± 0.16 Volts DC.

Results:

- **OK** - The +5 Volt DC supply is within the expected range. Proceed to Test Step 7.
- **Not OK** - The voltage is greater than 5.16 Volts DC.

Repair: Check the +5 Volt DC supply wire for a short to a higher voltage source. Repair the +5 Volt DC supply wire and/or replace the +5 Volt DC supply wire. Use the electronic service tool in order to clear all logged diagnostic codes and then verify that the repair eliminates the fault.

STOP

- **Not OK** - The voltage is less than 4.84 Volts DC.

Repair: Check the +5 Volt DC supply wire for a short to ground. Repair the +5 Volt DC supply wire and/or replace the +5 Volt DC supply wire. Use the electronic service tool in order to clear all logged diagnostic codes and then verify that the repair eliminates the fault.

STOP**Test Step 7. Perform the "Wiggle Test" on the Electronic Service Tool**

- A. Select the "Wiggle Test" from the diagnostic tests on the electronic service tool.
- B. Choose the appropriate group of parameters to monitor.
- C. Press the "Start" button. Wiggle the wiring harness in order to reproduce intermittent faults.

If an intermittent fault exists, the status will be highlighted and an audible beep will be heard.

Expected Result:

No intermittent faults were indicated during the "Wiggle Test".

Results:

- **OK** - No intermittent faults were found. The harness and connectors appear to be OK. If you were sent from another procedure, return to the procedure and continue testing. If this test has resolved the fault, return the engine to service. **STOP**
- **Not OK** - At least one intermittent fault was indicated.

Repair: Repair the harness or the connector. Use the electronic service tool in order to clear all logged diagnostic codes and then verify that the repair eliminates the fault.

STOP