[Previous Screen](#)

< Product: GENERATOR SET  
Model: 3456 GENERATOR SET C4G  
Configuration: 3456 Generator Set C4G00001-UP

## Troubleshooting

### 3406E and 3456 Generator Set Engines

Media Number -REN2227-04

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## Engine Sensor Open/Short Circuit - Test

SMCS - 5574-038

### System Operation Description:

Use this test for troubleshooting opens and/or shorts in any of the analog engine sensor circuits. These sensors provide various signals to the engine Electronic Control Module (ECM). These sensors receive a regulated supply of 5.0 VDC from the ECM.

The ECM performs an automatic calibration of these sensors whenever the ECM is powered and the engine is OFF for at least five seconds. During an automatic calibration, the ECM calibrates pressure sensors against the atmospheric pressure sensor and an acceptable offset pressure range.

**Note:** Refer to Troubleshooting, "Analog Sensor Supply Circuit - Test" if the ECM has detected a problem with the analog sensor supply voltage. Also, refer to troubleshooting, "Digital Sensor Supply Circuit - Test".

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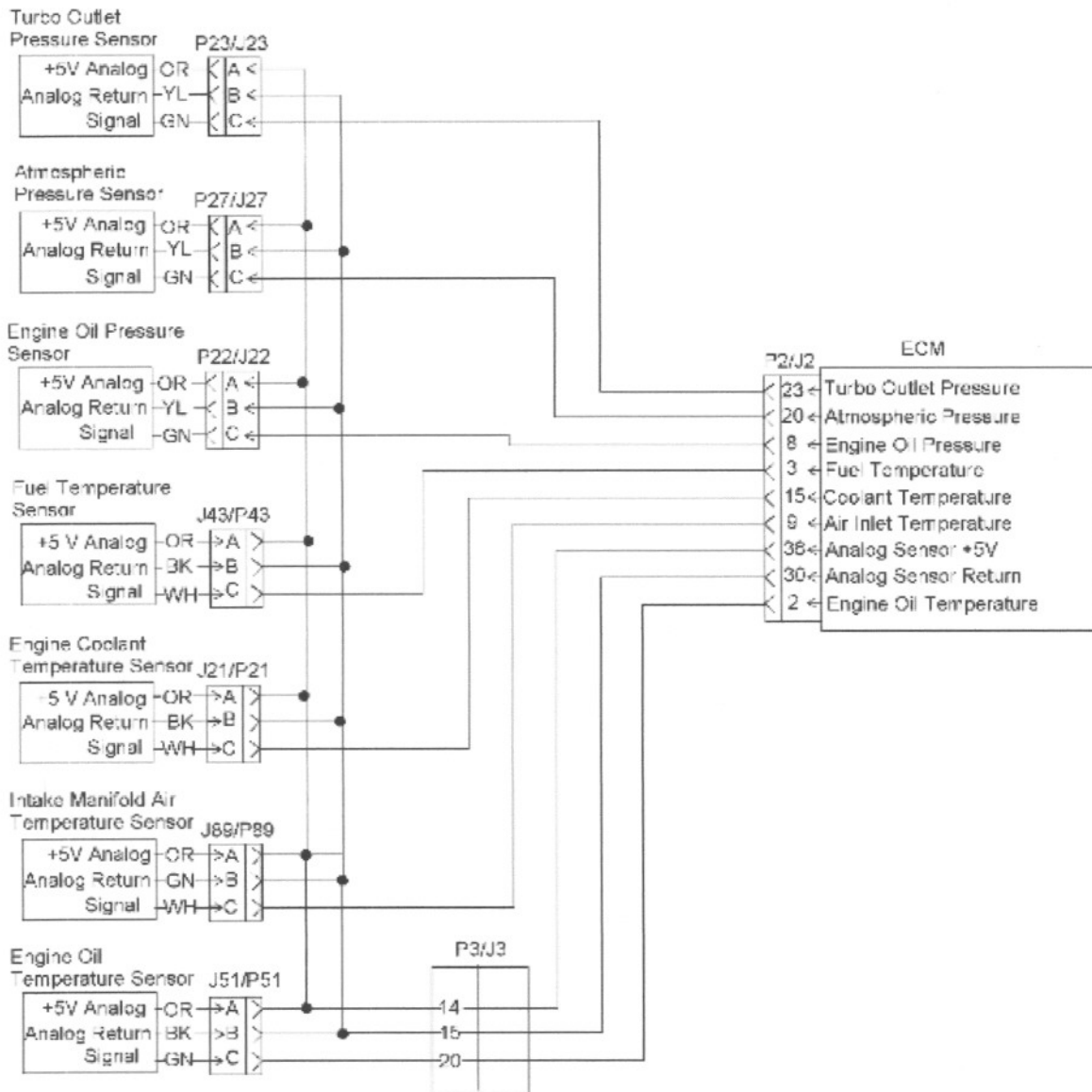


Illustration 1  
Schematic

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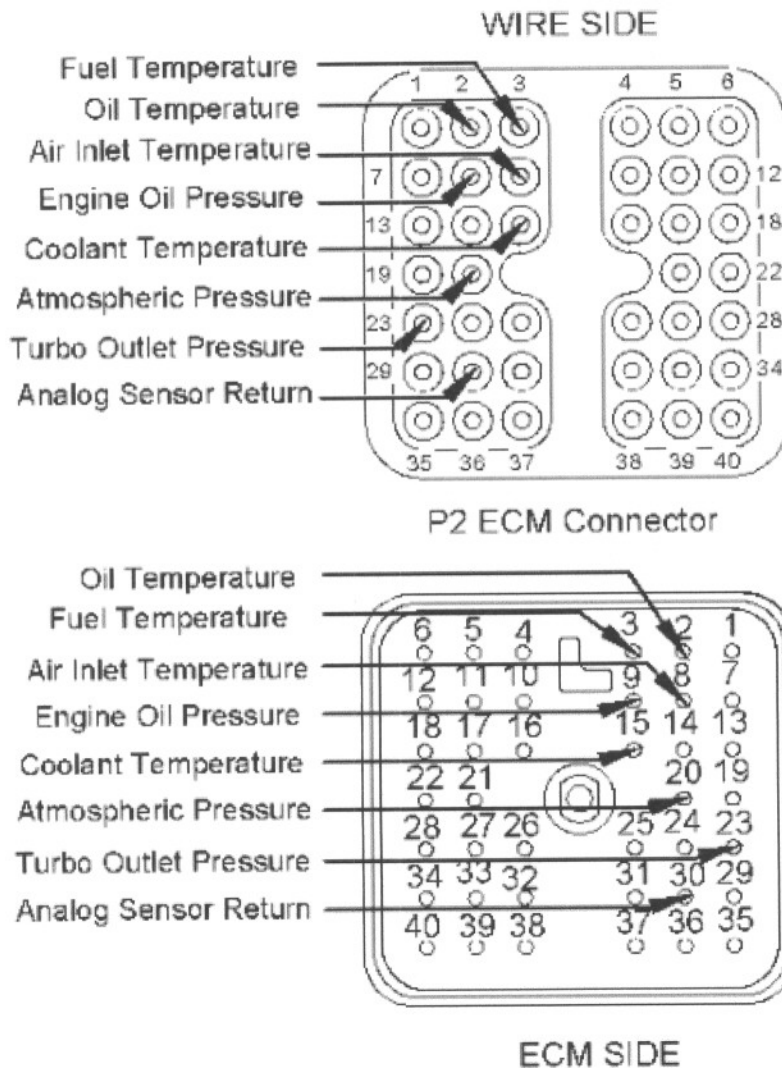


Illustration 2  
P2 ECM connector

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### Test Step 1. Inspect Electrical Connectors and Wiring

- A. Turn the Engine Control Switch (ECS) to the OFF/RESET position.
- B. Thoroughly inspect the J1/P1 ECM connector, the J2/P2 ECM connector, the J3/P3 customer connector, and all other connectors in the wiring harness. Refer to Troubleshooting, "Electrical Connectors - Inspect" for details.

**Expected Result:**

All connectors, pins, and sockets are completely inserted and coupled. The harness and wiring are free of corrosion, of abrasion, and of pinch points. All connections and grounds are tight and free of corrosion.

**Results:**

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

**Repair:** Repair the circuit. Verify that the repair eliminates the problem.

**Stop.**

**Test Step 2. Check the Sensor Supply Voltage at the Sensor Connector**

- Disconnect the suspect sensor.
- Turn the ECS to the ON position.
- Measure the voltage across terminal A (+5V Analog) and terminal B (Analog Return) at the harness side of the suspect sensor connector.
- Turn the ECS to the OFF/RESET position.

**Expected Result:**

The analog sensor supply voltage is  $5.0 \pm 0.5$  VDC.

**Results:**

- **OK** - The supply voltage is reaching the sensor. Proceed to Test Step 3.
- **Not OK** - The supply voltage is not reaching the sensor.

**Repair:** Refer to Troubleshooting, "Analog Sensor Supply Circuit - Test" for the appropriate troubleshooting procedure.

**Stop.**

**Test Step 3. Short the Sensor Signal at the Sensor Connector**

- Turn the ECS to the OFF/RESET position.
- Connect the Caterpillar Electronic Technician (ET) to the service tool connector.
- Disconnect the suspect sensor from the harness.

- D. Turn the ECS to the ON position.
- E. Check for active diagnostic codes on Cat ET.

**Note:** There is an open circuit diagnostic code for the suspect sensor.

- F. Use a suitable piece of wire to short terminal B (Analog Return) and terminal C (Signal) at the harness side of the suspect sensor connector.
- G. Check for active diagnostic codes on Cat ET.

**Note:** There is a short circuit diagnostic code for the suspect sensor.

### **Expected Result:**

The FMI for the active diagnostic code changes from a "03" (Open/Short to +Battery) to a "04" (Short to Ground) when the terminals are shorted.

### **Results:**

- **OK** - The harness appears to be OK. The problem is with the sensor.

**Repair:** Replace the suspect sensor. Verify that the repair eliminates the problem.

**Stop.**

- **Not OK** - Proceed to Test Step 4.

### **Test Step 4. Measure the Resistance of the Signal Wire**

- A. Disconnect the suspect sensor and the ECM connector for that sensor.
- B. Measure the resistance between terminal C (Signal) at the harness side of the suspect sensor connector and the appropriate terminal for the sensor signal at the ECM connector.

### **Expected Result:**

The resistance through the signal wire is less than 10 Ohms.

### **Results:**

- **OK** - Proceed to Test Step 5.
- **Not OK** - There is an open circuit or excessive resistance in the signal circuit of the harness.

**Repair:** Repair the circuit. Verify that the repair eliminates the problem.

**Stop.**

**Test Step 5. Short the Sensor Signal at the ECM**

- A. Turn the ECS to the OFF/RESET position and install a **7X-1715** Adapter Cable (40 Pin Breakout T) at the J2/P2 ECM connector.
- B. Remove the suspect signal wire from the ECM connector.
- C. Turn the ECS to the ON position.
- D. Check for active diagnostic codes on Cat ET.
- E. Use a suitable piece of wire to short the terminal for the suspect sensor signal to P1:30 (Analog Sensor Return) at the breakout.
- F. Check for active diagnostic codes on Cat ET.

**Expected Result:**

The FMI for the active diagnostic code changes from a "03" (Open/Short to +Battery) to a "04" (Short to Ground) when the terminals are shorted.

**Results:**

- **OK** - There is a problem in the wiring between the suspect sensor and the ECM.

**Repair:** Repair the circuit. Verify that the repair eliminates the problem.

**Stop.**

- **Not OK** - The ECM is not reading the sensor circuit.

**Repair:** Verify your results. Replace the ECM. Refer to Troubleshooting, "Replacing the ECM" before you replace the ECM. Verify that the repair eliminates the problem.

**Stop.**