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< 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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i02089184

Analog Sensor Supply Circuit - Test

SMCS - 5574-038

System Operation Description:

The analog sensor supply provides power to all analog sensors. The engine has the following analog sensors:

- Air inlet temperature
- Coolant temperature
- Fuel temperature
- Engine oil pressure
- Turbocharger outlet pressure
- Atmospheric pressure
- Fuel pressure (optional sensor)
- Engine oil temperature (optional sensor)

Additional pressure and temperature sensors may vary depending on your application.

The Electronic Control Module (ECM) supplies 5.0 ± 0.5 VDC from J2/P2:36 (Analog Sensor +5V) to each analog sensor. The analog sensor return connects to J2/P2:30 (Analog Sensor Return).

The analog sensor supply is output short circuit protected. A short circuit to the battery will not damage the circuit inside the ECM.

Note: The analog sensors are not protected from overvoltage. Directly connecting the analog sensor to battery voltage can result in damage.

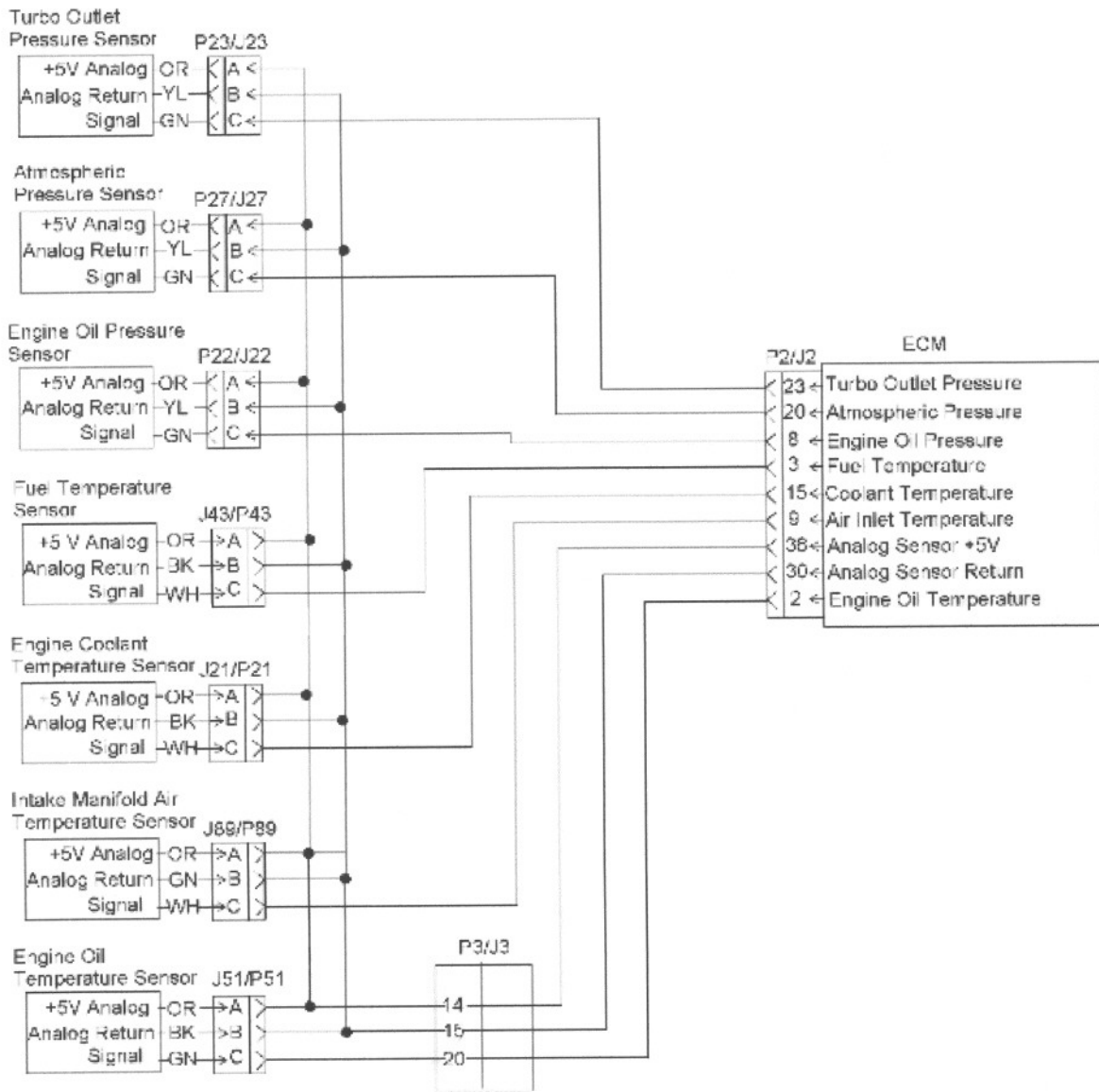
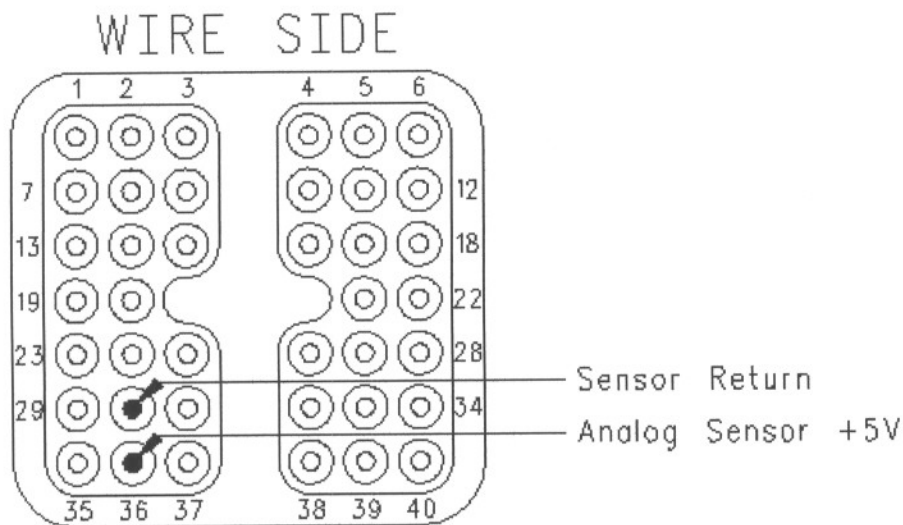


Illustration 1
Schematic

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P1 ECM Connector

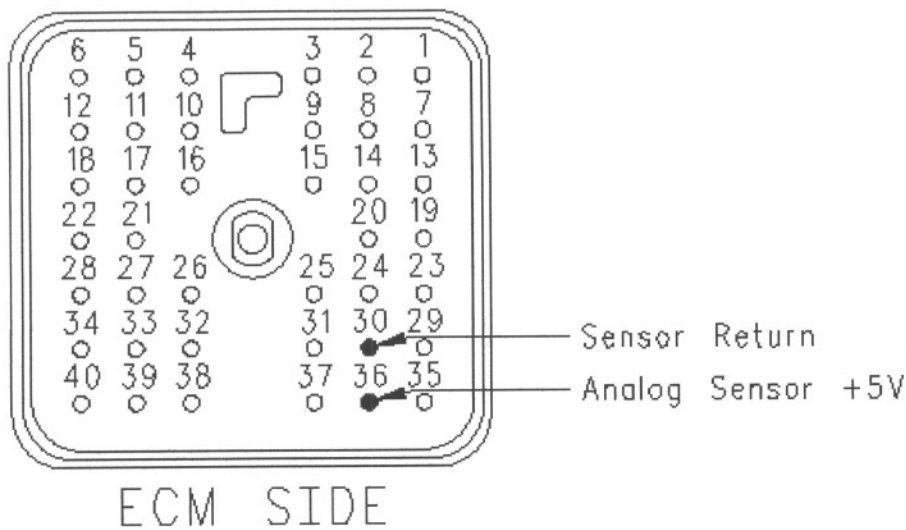


Illustration 2
ECM connector P1

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Test Step 1. Inspect Electrical Connectors and Wiring

- A. Turn the keyswitch to the OFF/RESET position.
- B. Thoroughly inspect J2/P2 ECM connector and J3/P3 customer connector. Also, inspect all other connectors in the wiring harness. Refer to Troubleshooting, "Electrical Connectors - Inspect" for details.
- C. Verify that all wires that are associated with the analog sensors are connected in the correct location.

Expected Result:

All connectors, pins, and sockets are completely inserted and coupled. The harness and wiring are free of corrosion, of abrasions, 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 Power Supply to the ECM

- A. Connect the Caterpillar Electronic Technician (ET) to the service tool connector.
- B. Turn the keyswitch to the ON position.
- C. Monitor "Battery Voltage" on the status screen of Cat ET.

Expected Result:

The ECM is receiving the correct voltage from the battery.

Results:

- **OK** - The ECM is receiving the correct voltage from the battery. Proceed to Test Step 3.

- **Not OK** - The ECM is not receiving the correct voltage from the battery.

Repair: Troubleshoot the ECM power supply before continuing with this test.

Stop.

Test Step 3. Check the Analog Sensors for Internal Shorts

- A. Turn the keyswitch to the OFF/RESET position and install a **7X-1715** Adapter Cable (40-PIN BREAKOUT) at the J1/P1 ECM connector.
- B. Turn the keyswitch to the ON position.
- C. Measure the voltage across terminal 36 (Analog Sensor +5V) and terminal 30 (Sensor Return) of the breakout T.
- D. Monitor the voltage while you disconnect each analog sensor.

Expected Result:

The analog sensor supply voltage increases to 5 ± 0.5 VDC when the suspect sensor is disconnected.

Results:

- **OK** - One of the sensors appear to be internally shorted.

Repair: Temporarily connect a new sensor. Verify that the replacement sensor solves the problem before you permanently install the new sensor.

Stop.

- **Not OK** - None of the analog sensors are internally shorted. Leave the sensors disconnected. Proceed to Test Step 4.

Test Step 4. Check the Analog Sensor Supply Voltage at the Sensor Connectors

- A. Turn the keyswitch to the OFF/RESET position.
- B. Reconnect the J1/P1 ECM connector.
- C. Turn the keyswitch to the ON position.
- D. Measure the voltage across terminal A (+5V Analog) and terminal B (Sensor Return) on the harness side of each sensor connector.

Expected Result:

The analog sensor supply voltage is 5.0 ± 0.5 VDC at each sensor connector.

Results:

- **OK** - The supply voltage is reaching the sensors. The circuit appears to be working correctly at this time.

Repair: If the problem is intermittent refer to Troubleshooting, "Electrical Connectors - Inspect".

Stop.

- **Not OK** - The supply voltage is not reaching the sensors. Leave the sensors disconnected. Proceed to Test Step 5.

Test Step 5. Check for Shorts in the Harness

- A. Turn the keyswitch to the OFF/RESET position.
- B. Disconnect the J1/P1 ECM connector and all of the analog sensors.

- C. Measure the resistance between P1:36 (Analog Sensor +5V) and engine ground.
- D. Measure the resistance between P1:36 (Analog Sensor +5V) and all the other pins on the P1 connector.
- E. Measure the resistance between P1:30 Analog Sensor return and engine ground.
- F. Measure the resistance between P1:30 Analog Sensor return and all other pins on the P1 connector.

Expected Result:

The resistance is greater than 20,000 Ohms.

Results:

- **OK** - Proceed to Test Step 6.
- **Not OK** - There is a short between the ECM and the analog sensors.

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

Stop.

Test Step 6. Check the Analog Sensor Supply Voltage at the ECM

- A. Turn the keyswitch to the OFF/RESET position.
- B. Remove the wires from P1:36 (Analog Sensor +5V) and P1:30 (Sensor Return).
- C. Turn the keyswitch to the ON position.
- D. Measure the voltage across P1:36 (Analog Sensor +5V) and P1:30 (Sensor Return) at the P1 ECM connector.

Expected Result:

The supply voltage is 5.0 ± 0.5 VDC.

Results:

- **OK** - The ECM is supplying the correct voltage, but there is an open in the harness between the ECM and the analog sensors.

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

Stop.

- **Not OK** - The ECM is not supplying the correct voltage.

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

Stop.

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