Troubleshooting

EMCP 3

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i02464543

Engine Speed Circuit Fault

SMCS - 4490

System Operation Description:

The EMCP 3 performs the following using an independent engine speed sensor that is dedicated to EMCP 3 use only

- Determines the engine speed, in rpm, from the Magnetic Pickup (Engine Speed Sensor) input pins
- Detects diagnostics on the sensor
- Annunciates an engine over/under speed condition

The engine speed sensor is mounted on the flywheel housing of the engine.

The sensor creates a sine wave signal. The signal is created from passing ring gear teeth. The rate of the signal is one pulse per tooth. The sensor sends the sine wave signal to the EMCP 3. The frequency of the signal is directly proportional to the speed of the engine.

Conditions Which Generate This Code:

This code is generated when the EMCP 3 has determined that an incorrect signal from the engine speed sensor has occurred or an overspeed/underspeed condition has occurred.

Refer to the engine Troubleshooting manual to for more information on engine over/under speed conditions for your particular genset.

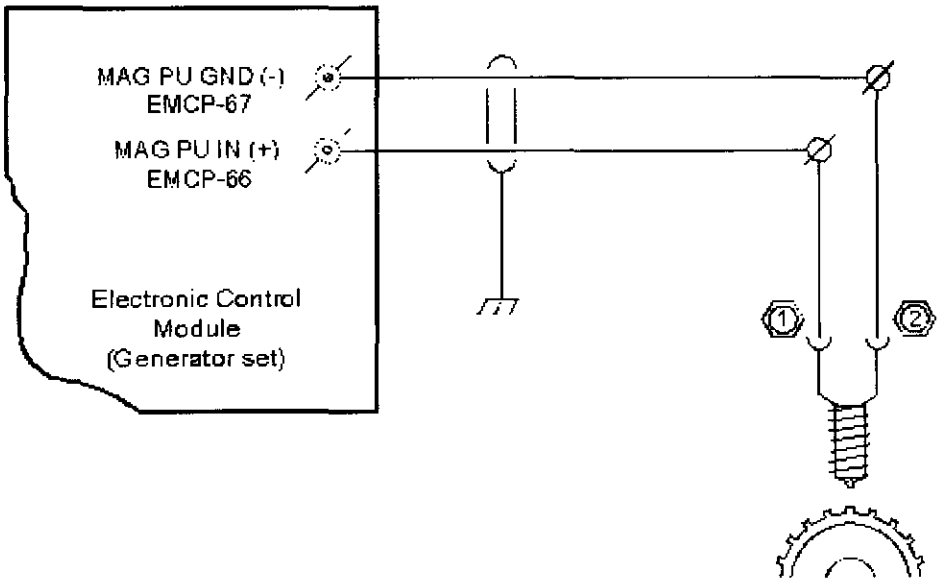

Illustration 1 g01103901

Note: The Engine Speed Sensor is commonly referred to as magnetic pickup.

Test Step 1. PERFORM THE INITIAL CHECK.

A. Check for active diagnostic codes on the engine ECM and the EMCP 3. If any codes are present, correct the diagnostic codes first.

Expected Result:

No other diagnostic codes or indicators are active.

Results:

- **OK** - No other diagnostic codes or indicators are active. Proceed to Test Step 2
- **NOT OK** - Another diagnostic code is active or an indicator is active.

  Repair: Exit this procedure. Troubleshoot the active code or indicator. Resume normal operation and verify that the problem has been corrected.

  STOP

Test Step 2. CHECK THE SETPOINTS.

A. View the Engine Speed Monitor Setpoints. Make a note of all the setpoints. See Testing and Adjusting, "Electronic Control Module (Generator Set) - Configure". Compare the setpoints against the default setpoints of the particular generator set.

Expected Result:

The setpoints are correct.

Results:

- **OK** - The setpoints are correct for your particular genset. Proceed to Test Step 3
- **NOT OK** - The setpoints are NOT correct.

  Repair: Reprogram the setpoints. Reset the genset. Resume normal operation and verify that the problem has been corrected.

  STOP

Test Step 3. CHECK THE HARNESS AND THE SPEED SENSOR.

A. Press the **Stop** key on the EMCP 3 control.

B. Disconnect the harness connector from the EMCP 3.

C. At the EMCP 3 harness connector, measure the resistance from contact "66" to contact "67".

Expected Result:

The resistance should be from 100 to 350 ohms.

Results:

- **OK** - There is probably an intermittent problem. Proceed to Test Step 4.
- **NOT OK** - The harness wiring or the speed sensor has failed. Proceed to Test Step 4.

Test Step 4. CHECK FOR AN INTERMITTENT FAULT.

A. Press the **Stop** key on the EMCP 3 control.

B. Check the EMCP 3 display for a speed sensor diagnostic code.

Expected Result:

A speed sensor diagnostic code should not appear on the upper display.

Results:

- **OK** - A speed sensor diagnostic code does not appear on the EMCP 3 display. This step has corrected the problem.**STOP**
- **NOT OK** - A speed sensor diagnostic code appears on the EMCP 3 display. Proceed to Test Step

5.

Test Step 5. CHECK THE RESISTANCE OF THE ENGINE SPEED SENSOR.

A. Disconnect the sensor from the engine harness. The sensor remains fastened to the engine.

B. At the connector of the sensor, measure the resistance between contact "1" and contact "2".

Expected Result:

The resistance should be between 100 to 350 ohms.

Results:

- **OK** - The resistance of the sensor is correct. Proceed to Test Step 6.
- **NOT OK** - Replace the sensor.

  Repair: Refer to Testing And Adjusting, "Speed Sensor (Engine) - Adjust".

  STOP

Test Step 6. CHECK THE HARNESS FOR AN OPEN OR A SHORT.

A. Press the **Stop** key on the EMCP 3 control.

B. Disconnect the sensor from the engine harness. The sensor remains fastened to the engine.

C. Disconnect the harness connector from the EMCP 3.

D. Check for an open circuit. Check the resistance from contact "1" of the sensor harness connector to contact "66" of the EMCP 3 harness connector. The resistance should be 5 ohms or less.

E. Check for an open circuit. Check the resistance from contact "2" of the sensor harness connector to contact "67" of the EMCP 3 harness connector. The resistance should be 5 ohms or less.

F. Check for a short circuit. Check the resistance from contact "66" to contact "67" of the EMCP 3 harness connector. The resistance should be greater than 5000 ohms.

Expected Result:

When the resistance is measured between contact "1" of the sensor harness connector and contact "66" of the EMCP 3 harness connector, there should be 5 ohms or less.

The resistance from contact "2" of the sensor harness connector to contact "67" of the EMCP 3 harness connector should be 5 ohms or less.

The resistance from contact "66" to contact "67" of the EMCP 3 harness connector should be greater than 5000 ohms.

Results:

- **OK** - The harness functions properly. Proceed to Test Step 7.
- **NOT OK** - The circuit with the incorrect resistance measurement has failed. Replace the failed harness from the sensor to the EMCP 3 connector or repair the failed harness from the sensor to the EMCP 3 connector.**STOP**

Test Step 7. CHECK THE SHIELD AND THE CONNECTORS.

A. Press the **Stop** key on the EMCP 3 control.

B. Disconnect the sensor from the engine harness. The sensor remains fastened to the engine.

C. Disconnect the harness connector from the EMCP 3.

D. The harness has a shield (bare wire) which protects the sensor signal wire from electrical interference. This shield must be securely fastened and the shield must make a good electrical connection to ground.

E. Check that the shield is securely fastened to ground.

F. Check the connection between the sensor and the mating harness connector. Refer to Testing and Adjusting, "Electrical Connector - Inspect".

Expected Result:

The shield should be securely fastened. The connection between the sensor and the mating harness connector should be secure.

Results:

- **OK** - The shield is securely fastened. The connection between the sensor and the mating harness connector is secure. Proceed to Test Step 8.
- **NOT OK** - One of the items is not correct. Repair the harness or replace the harness.**STOP**

Test Step 8. INSPECT THE SENSOR AND ADJUST THE SENSOR.

A. Remove the sensor from the engine flywheel housing.

B. Inspect the sensor for damage and remove any debris from the tip.

Expected Result:

No damage should be present.

Results:

- **OK** - No damage is present. Reinstall the engine speed sensor. Adjust the sensor.

  Repair: For more information, refer to Testing And Adjusting, "Speed Sensor (Engine) - Adjust".

  Proceed to Test Step 9.

- **NOT OK** - Damage is present. Replace the engine speed sensor.

  Repair: Refer to Testing And Adjusting, "Speed Sensor (Engine) - Adjust".

  STOP

Test Step 9. CHECK THE STATUS OF THE FAULT.

A. Reconnect the harness connector to the EMCP 3 and the sensor.

B. Press the **Stop** key on the EMCP 3 control.

C. Check the EMCP 3 display for a sensor diagnostic code.

Expected Result:

A speed sensor diagnostic code should still be active.

Results:

- **OK** - A speed sensor diagnostic code is showing on the EMCP 3 display. The diagnostic code is still active and the engine will not start.

  Repair: It is unlikely that the EMCP 3 has failed. Exit this procedure and perform this procedure again. If the diagnostic code is still present, replace the EMCP 3. Refer to Testing and Adjusting, "Electronic Control (Generator Set) - Replace".

  STOP

- **NOT OK** - A speed sensor diagnostic code is not showing on the upper display. These procedures have corrected the problem. The operator may continue with this procedure. Proceed to Test Step 10.

Test Step 10. CHECK THE SIGNAL VOLTAGE.

A. This is an additional check of the circuit. Make sure that all of the harness connectors are connected.

B. Use a multimeter and **7x-1710** Multimeter Probes in order to measure the AC signal voltage. Measure the AC signal voltage between contact "66" and contact "67" of the EMCP 3 connector.

C. Start the engine and run the engine at the rated speed.

D. Measure the AC signal voltage of the engine speed sensor.

Expected Result:

The voltage should be equal to 2 VAC or greater.

Results:

- **OK -** The voltage is equal to 2 VAC or greater. The speed sensor circuit is correct.**STOP**
- **NOT OK -** The voltage is not equal to 2 VAC or greater. The most likely cause is improper air gap of the pickup.

  Repair: For more information, refer to Testing And Adjusting, "Speed Sensor (Engine) - Adjust".

  STOP
