Test 61 – Check Oil Pressure Switch and Wire 86 E-Code 1300)

General Theory

If the engine cranks and starts, then shuts down within about 5 (five) to 10 (ten) seconds with a Shutdown-Alarm Low Oil Pressure, the cause may be one or more of the following:

- Low engine oil level.
- Low oil pressure.
- A defective oil pressure switch.

NOTE: Evolution 1.0 oil pressure switch is Normally N.C.) with no oil pressure. Evolution 2.0 is Normally Open (N.O.) with no oil pressure.

Procedure

1. Navigate to the Digital inputs display screen of the controller being worked on.
   a. See ***Figure 4-74***. Digital Input 2 is Wire 86 from the Low Oil Pressure switch to the board.
   b. Set the controller to MANUAL.
   c. Observe Input 2 for a change from “1” to “0”. A change from “1” to “0” indicates that the control board sensed the LOP switch change states. If the generator still shuts down, replace controller.
   d. If the input did change states, the oil pressure switch is good. An intermittent oil pressure problem may still be present and should be checked with a mechanical gauge as in Step 4.

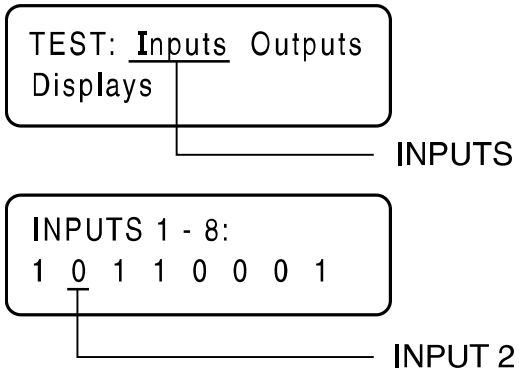

Figure 4-74. The Input Screens

2. Check engine crankcase oil level. If necessary, add the recommended oil to the dipstick FULL mark. DO NOT OVERFILL ABOVE THE FULL MARK.
3. With oil level correct, try starting the engine.
   a. If engine still cranks and starts, but then shuts down, go to Step 4.
   b. If engine cranks and runs normally, discontinue tests.
4. Do the following:
   a. Disconnect Wire 86 and Wire 0 from the oil pressure switch terminals. Remove the switch and install an oil pressure gauge in its place.
   b. Start the engine while observing the oil pressure reading on the gauge.
   c. Note the oil pressure.
      (1) Normal oil pressure is approximately 35-40 psi with engine running. If normal oil pressure is indicated, go to Step 5 of this test.
      (2) If oil pressure is below about 4.5 psi, shut engine down immediately. A problem exists in the engine lubrication system.

NOTE: Note: The oil pressure switch is rated at 10 psi for V-twin engines, and 8 psi for single cylinder engines.

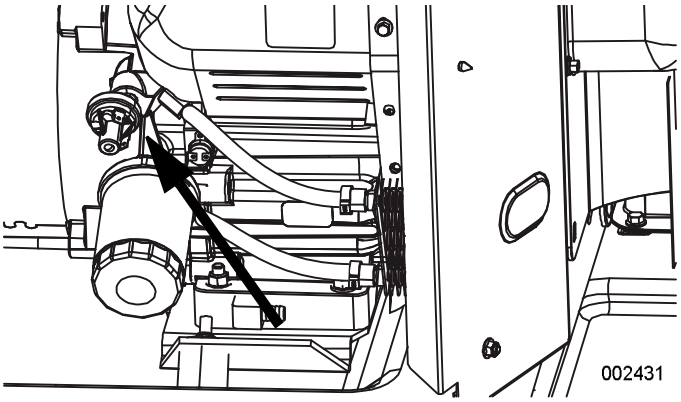

Figure 4-75. Oil Pressure Switch

5. Remove the oil pressure gauge and reinstall the oil pressure switch. Do NOT connect Wire 86 or Wire 0 to the switch terminals.
   a. Set a DMM to measure resistance.
   b. Connect the DMM test lead across the low oil pressure (LOP) switch terminals. With the engine shut down, the DMM should indicate CONTINUITY. If INFINITY was measured, replace the LOP switch.
   c. With the DMM still connected to the LOP switch, set the AUTO-OFF-MANUAL switch MANUAL. The DMM should indicate INFINITY after the engine has had a chance to build pressure.
6. Set the DMM to measure DC voltage.
   a. Disconnect Wire 86 at the low oil pressure switch.
   b. Connect the Black meter test lead to a good ground, and the Red meter test lead to Wire 86. Approximately 3.3 VDC should be measured. If 3.3 VDC is not measured, go to Step 7and check continuity on Wire 86 from the LOP switch back to the J4 connector.
7. Keep the DMM set to measure resistance.
   a. Disconnect the appropriate harness connector from the controller and disconnect Wire 86 and Wire 0 from the LOP switch.
   b. Connect one meter test lead to the disconnected Wire 86 and connect the other

meter test lead to Wire 86. The DMM should indicate CONTINUITY. If CONTINUITY was not measured repair or replace Wire 86 between the LOP switch and the controller harness connector.

c. With Wire 86 still disconnected from the LOP switch and the controller harness connector, connect one meter test lead to disconnected Wire 86 and the other meter test lead to an engine ground. The DMM should indicate INFINITY. If CONTINUITY was measured a short to ground exists on Wire 86. Repair or replace as needed.

Results

1. If the switch operated properly and proper oil pressure was measured, and Wires 86 and 0 tested good, and/or the Input would not change on the controller, replace the controller.

Test 62 – Check High Oil Temperature Switch (E-Code 1400)

General Theory

If the temperature switch contacts have failed in a closed position, the engine will fault out on “OVERTEMP”. If the unit is in an overheated condition, the switch contacts will close at 310 °F (154 °C) This is normally caused by inadequate airflow through the generator.

NOTE: Evolution 1.0 high oil temperature switch is Normally Open (N.O.) with no high oil temperature condition. Evolution 2.0 is Normally Closed (N.C.) with no high oil temperature condition.

Procedure

1. Verify that the engine has cooled down (engine block is cool to the touch). This will allow the contacts in the High Oil Temperature Switch to open.
2. Check the installation and area surrounding the generator. There should be at least three feet of clear area around the entire unit. Make sure that there are no obstructions preventing cooling air from entering or exiting the enclosure.
3. Disconnect Wire 85 and Wire 0 from the High Oil Temperature Switch.
4. Set a DMM to measure resistance. Connect the test leads across the switch terminals. The meter should read INFINITY (0L).
5. If the switch tested good in Step 4, and a true overtemperature condition has not occurred, proceed to step 6.
6. Remove harness connector from the controller.
7. Set the DMM to measure resistance.
8. Connect one test lead to Wire 85 (disconnected from High Oil Temperature Switch). Connect the other test lead to an engine ground. INFINITY should be measured.

Testing High Oil Temperature Switch

9. Remove the High Oil Temperature Switch.
10. See *Figure 4-76*. Immerse the sensing tip of the switch in oil, along with a suitable thermometer.
11. Set a DMM to measure resistance. Then, connect the DMM test leads across the switch terminal and the switch body. The meter should read INFINITY.
12. Heat the oil in the container. When the thermometer reads approximately 299-321 °F (148-160 °C), the DMM should indicate CONTINUITY.

Results

1. If the switch fails Step 4, or Steps 11-12, replace the switch.
2. If INFINITY was not measured in Step 8, repair or replace Wire 85 between the Circuit Board and the High Oil Temperature Switch.

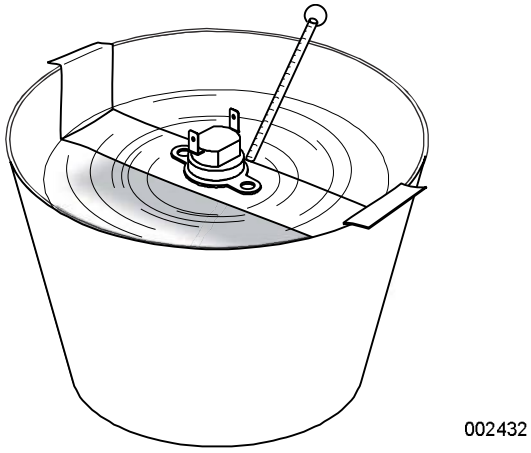

Figure 4-76. Testing the Oil Temperature Switch

Test 63 – Check and Adjust Valves

General Theory

Improperly adjusted valves can cause various engine related problems including, but not limited to, hard starting, rough running and lack of power. The valve adjustment procedures for single cylinder and V-twin engines are different and vary according to engine displacement.

Check Valve Clearance

⚠DANGER

Automatic start-up. Disconnect utility power and render unit inoperable before working on unit. Failure to do so will result in death or serious injury.

(000191)

NOTE: The engine should be cool before checking the valve clearance. Adjustment is not needed if valve clearance is within the dimensions provided in Section 1.1 *Specifications*.