Results

1. If normal automatic operation is obtained, discontinue tests.
2. If the engine does not crank when Utility power is turned off refer back to the flow chart.

Test 41 – Try a Manual Start

General Theory

The first step in troubleshooting for an “Engine Won’t Crank” condition is to determine if the problem is related to automatic operations only or if the engine will not crank manually either.

Procedure

1. Set the controller to OFF.
2. Set the main line circuit breaker (MLCB) to the “Open” position.
3. Set the controller set to MANUAL.
   a. The engine should crank cyclically through its “crank-rest” cycles until it starts.
   b. Let the engine stabilize and warm up for a few minutes after it starts.

Results

1. If the engine cranks manually, but does not crank automatically, refer back to flow chart.
2. If the engine does not crank manually proceed to **Problem 16**.

Test 42 – Test the Function Of The AUTO-OFF-MANUAL Mode

Procedure

1. See ***Figure 4-40***. Navigate to the Input Screen using the menu system for the controller being worked on.
2. With the Inputs Screen displayed, set the controller to AUTO. If the controller reads the auto input from the switch, Input 7 will change from “0” to “1”. See ***Table 4-5*** in Section 4.1 for a description of the inputs.

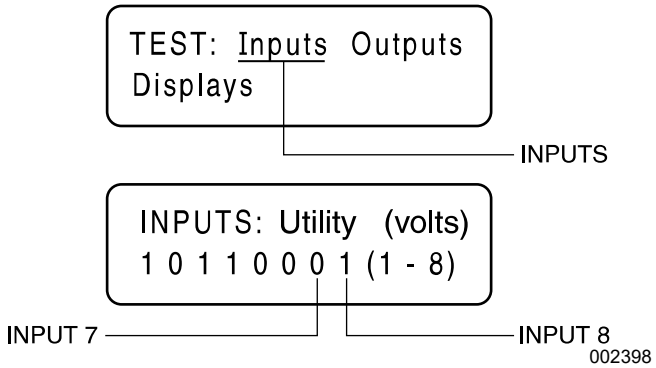

Figure 4-40. The Input Screens

3. With the Inputs Screen displayed place the controller to MANUAL. If the controller reads an input from the Switch, Input 8 will change from “0” to “1”.
4. With the controller set to OFF, both inputs will read zero.

Results

1. If controller failed either Step 2 or Step 3, replace the controller assembly.
2. If the controller passed Step 2 and Step 3, refer back to flow chart.

Test 43 – Test Auto Operations of the Controller

General Theory

Initial Conditions: The generator is in AUTO, ready to run, and voltage is being supplied by Utility. When Utility fails (below 65% of nominal), a 10 second (optionally programmable) line interrupt delay time is started. If the Utility is still gone when the timer expires, the engine will crank and start. Once started a 10 second “engine warm-up timer” will be initiated. When the warm-up timer expires, the controller will transfer the load to the generator. If Utility voltage is restored (75% of nominal) at any time from the initiation of the engine start until the generator is ready to accept a load (5 second warm-up time has not elapsed), the controller will complete the start cycle and run the generator through its normal cool down cycle; however, the voltage will remain on the Utility source.

Procedure

1. Set the generator controller to AUTO.
2. Simulate a power failure by opening the Utility supply breaker. If the generator cranks and starts and the switch transfers, close the Utility supply breaker to return utility power. Within 15 seconds the unit should transfer back to the Utility position and enter into a cool down mode for one minute, then shut down. If the generator performs this sequence of events the test is good; STOP.
3. If the generator does not perform the sequence of events listed in the above discussion, diagnose based on the symptom or Alarms displayed.

Results

Refer back to the flow chart.

Test 44 – Check 7.5 Amp Fuse
(Alarm Code 2400 Firmware 1.11 and Older)

NOTE: Use the Alarm Log in the control panel to help troubleshoot various problems. For instance, if the unit does not crank the control panel will display “Stopped-Alarm RPM Sensor Loss.” If the Fuse is bad and the unit attempts to crank the alarm log will display “Inspect Battery” first, and then “Stopped-Alarm RPM Sense Loss.”

General Theory

The 7.5 amp fuse is located on the generator control console. A blown fuse will prevent battery power from reaching the circuit board with the same result as setting the controller to OFF. The display and menus will remain active but the unit will not be able to crank or run.

Procedure

Remove and inspect the 7.5 amp fuse (F1). Visually inspect the fuse and fuse element. If the fuse element looks good, or if it cannot be visually inspected, test the fuse for an open with a DMM or Continuity Tester.

Results

1. If the fuse if good, refer back to the Flow Chart.
2. If the fuse is bad, it should be replaced. Use only an identical 7.5 amp replacement fuse.
3. If fuse continues to blow, proceed to **Problem 19** Flow Chart.

Test 45 – Check Battery and Cables

General Theory

Battery power is used to (a) crank the engine and (b) to power the circuit board. Low or no battery voltage can result in failure of the engine to crank, either manually or during automatic operation. The battery charger in the control panel is not designed to recharge a dead battery. As well, if there is a loose connection or corrosion associated with a wire (positive or negative), battery voltage may be present, but because of the high resistance, will not allow current to flow. Electrical voltage drop varies according to current flow. Unless the circuit is operated so current flows through it, voltage drop cannot be measured. To properly measure voltage drop, a crank attempt will need to be performed. This test will determine whether the battery, battery cables, or both are at fault.

Procedure A. Perform Starter Circuit Voltage Drop Test

1. Remove the T1 fuse from the transfer switch.
2. Set a DMM to measure DC voltage.
3. Connect the Red meter test lead to the positive battery post and connect the Black meter test lead to the negative battery post.
   a. If battery voltage is 12.1 VDC or below, or if engine does not crank (turn over), proceed to Procedure C or Procedure D.
   b. If battery voltage is 12.2 VDC or above, proceed to next step. (For this test, battery voltage should be at least 12.2 VDC)
4. Turn off the fuel source and remove Wire 14 from the fuel solenoid to inhibit any possible startup.
5. Refer to battery post and starter connections in ***Figure 4-41*** and ***Figure 4-42*** and perform a voltage drop test as indicated.

NOTE: Single Cylinder units have a bulkhead mounted starter solenoid.

6. Set the controller to MANUAL. Measure and record the voltage.
7. Record readings from test points V1, V2, V3 and V4 as depicted in ***Figure 4-41*** and ***Figure 4-42***. Although resistance-free connections, wires and cables would be ideal, most of them will contain at least some voltage drop. The maximum voltage readings you should see are as follows:
   a. 0.00-0.10 VDC across a connection (V4).
   b. 0.10-0.20 VDC on a ground connection.
   c. 0.20-0.30 VDC across a wire or cable (V1, V2).
   d. 0.20-0.30 VDC across a switch or starter contactor (V3).
   e. 0.40-0.50 VDC across the entire circuit.

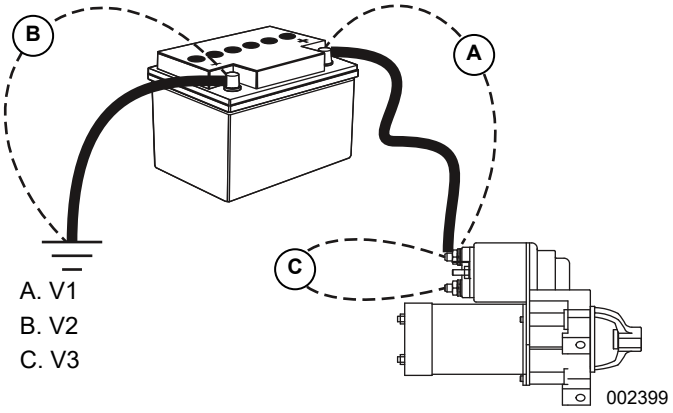

Figure 4-41.

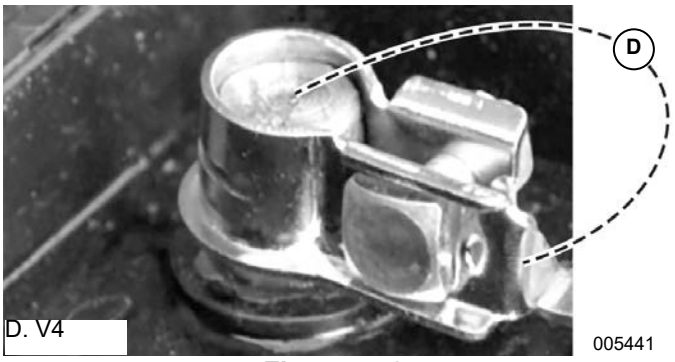

Figure 4-42.

8. If voltage drop is greater than the above, based on the circuit or component, proceed to Procedure B. If voltage drop is within the above, based on the circuit or component, proceed to Procedure C or D.

Procedure B. Inspect Battery Cables, Terminals and Connections

1. Inspect battery cables and battery posts.
2. If cable clamps or terminals are corroded, clean away all corrosion.

NOTE: If corrosion cannot be cleaned or eliminated, replace the component in question.