Engine Does Not Crank

System Operation Description:

The engine will not crank when the key start switch is in the START position.

Test Step 1. CHECK ARMREST INDICATOR

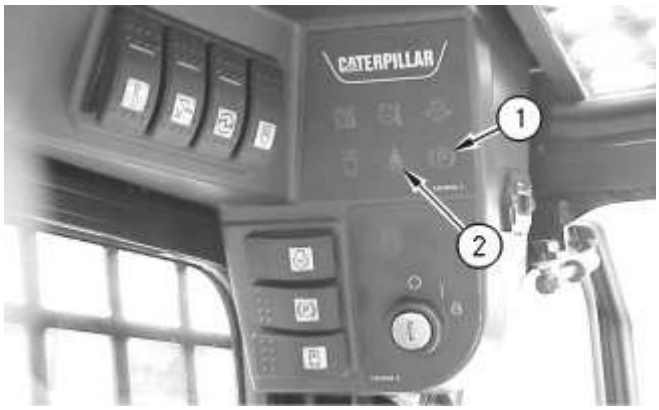

Illustration 1 g00731194

(1) Indicator (parking brake)

(2) Indicator (armrest)

A. Occupy the seat.

B. Lower the armrest.

C. Turn the key start switch to the ON position.

D. Check the status of the armrest indicator and the parking brake indicator.

Expected Result:

The armrest indicator should be off and the parking brake indicator should be on.

Results:

- **OK -** The armrest indicator is not illuminated and the parking brake indicator is illuminated. Proceed to Test Step 3.
- **NOT OK -** The armrest indicator and the parking brake indicator are off. Proceed to Test Step 2.
- **NOT OK -** The armrest indicator is illuminated or flashing.

  Repair: See Troubleshooting, "Armrest Indicator is Flashing".

  Stop.
- **NOT OK -** The parking brake indicator is flashing.

  Repair: See Troubleshooting, "Parking Brake Indicator is Flashing".

  Stop.

Test Step 2. CHECK THE FUSE FOR THE KEY START SWITCH

Illustration 2 g01032879

Fuse panel

A. Locate the fuse for the key start switch. Refer to Illustration 2.

B. Check for a blown fuse.

Expected Result:

The fuse should be good.

Results:

- **OK -** The fuse is good.

  Repair: See Troubleshooting, "Parking Brake Indicator and Armrest Indicator Do Not Function Correctly".

  Stop.

- **NOT OK -** The fuse is bad.

  Repair: Replace the fuse. See Operation and Maintenance Manual, "Circuit Breakers and Fuses - Reset/Replace".

  Stop.

Test Step 3. CHECK FOR VOLTAGE AT THE START RELAY

When the key start switch is in the START position, battery voltage is applied to the interlock ECM. The ECM sends power to the start relay.

A. Locate wire 306-GN and wire 202-BK on the start relay.

   Note: On machines that are equipped with the machine security system (MSS), locate wires A346-BU and M732-OR.

B. Turn the key start switch to the START position.

   Note: Two people will need to perform this procedure. One person will need to sit in the seat with the armrest down holding the key start switch in the START position.

C. Measure the voltage across the start relay coil from wire 306-GN to 202-BK.

   Note: On machines that are equipped with the machine security system (MSS), measure the voltage from wire A346-BU to wire M732-OR.

Expected Result:

The voltage should be equal to or greater than 10 DCV.

Results:

- **OK -** The voltage is equal to or greater than 10 DCV. Proceed to Test Step 4.
- **NOT OK -** The voltage is less than 10 DCV. Proceed to Test Step 8.

Test Step 4. CHECK FOR + BATTERY AT THE START RELAY

A. Measure the voltage at wire 109-RD on the start relay.

Expected Result:

The voltage should be equal to or greater than 10 DCV.

Results:

- **OK -** The voltage is equal to or greater than 10 DCV. Proceed to Test Step 5.

- **NOT OK -** The voltage is less than 10 DCV. Proceed to Test Step 7.

Test Step 5. CHECK THE OUTPUT OF THE START RELAY

A. Turn the key start switch to the START position.

   Note: Two people will need to perform this procedure. One person will need to sit in the seat with the armrest down holding the key start switch in the START position.

B. Measure the voltage at wire 304-WH on the start relay.

Expected Result:

The voltage should be equal to or greater than 10 DCV.

Results:

- **OK -** The voltage is equal to or greater than 10 DCV. Proceed to Test Step 6.
- **NOT OK -** The voltage is less than 10 DCV.

  Repair: The start relay has failed. Replace the start relay.

  Stop.

Test Step 6. CHECK THE VOLTAGE AT THE STARTING MOTOR

A. Locate wire 304-WH on the starting motor.

B. Turn the key start switch to the START position.

   Note: Two people will need to perform this procedure. One person will need to sit in the seat with the armrest down holding the key start switch to the START position.

C. Measure the voltage on wire 304-WH on the starting motor.

Expected Result:

The voltage should be equal to or greater than 10 DCV.

Results:

- **OK -** The voltage is equal to or greater than 10 DCV.

  Repair: The problem is in the starting motor. Check for loose connections. Repair the starting motor or replace the starting motor.

  Stop.

- **NOT OK -** The voltage is less than 10 DCV.

  Repair: The harness or the connectors from the start relay to the starting motor has failed. Repair the starting motor or replace the starting motor.

  Stop.

Test Step 7. CHECK THE CIRCUIT BREAKER

A. Locate the main circuit breaker in the engine compartment on the left side.

B. Check for an open circuit breaker.

C. Check for voltage on both sides of the circuit breaker.

Expected Result:

The circuit breaker should be closed.

Results:

- **OK -** The circuit breaker is closed.

  Repair: There is a problem with battery voltage. See Diagnostic Function, "Electrical System".

  Stop.

- **NOT OK -** The circuit breaker is open.

  Repair: Reset the circuit breaker.

  Stop.

Test Step 8. CHECK THE KEY START SWITCH

A. Access the wiring for the key start switch.

B. Unplug the key start switch.

C. With the switch in the START position, check the resistance from terminal 3 to terminal 4.

Expected Result:

The resistance should be less than 5 Ohms.

Results:

- **OK -** The resistance is less than 5 Ohms. Proceed to Test Step 9.
- **NOT OK -** The resistance is greater than 5 Ohms.

  Repair: The key start switch has failed. Replace the key start switch.

  Stop.

Test Step 9. CHECK THE INPUT TO THE INTERLOCK ECM

A. Turn the key start switch to the OFF position.

B. Locate the interlock ECM.

C. Remove the harness from the interlock ECM.

D. Jumper contact 64 to contact 62 of the wire harness connector.

E. Turn the key start switch to the START position.

Expected Result:

The engine should crank.

Results:

- **OK -** The engine cranks.

  Repair: The ECM is very unlikely to have failed. Reconnect all connections and visually inspect the wire harness. Verify that the diagnostic code still exists. If the diagnostic code still exists perform the Test Steps again.Replace the ECM, if the cause of the diagnostic code was not found after the second attempt. See Testing and Adjusting, "Electronic Control Module (ECM) - Replace".

  Stop.

- **NOT OK -** The engine did not crank.

  Repair: If the machine is equipped with a machine security system (MSS), refer to the manual for the MSS .The wire harness has failed. Repair the wire harness and/or the connector or replace the wire harness and/or the connector.

  Stop.