

X-01: Troubleshoot Grounds (Induction Melt)

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Explosive and ventilation hazards come from the combustion gases.

EQUIPMENT

- Electrician hand tools
- flashlight
- analog voltmeter
- radio

RESOURCES

- none

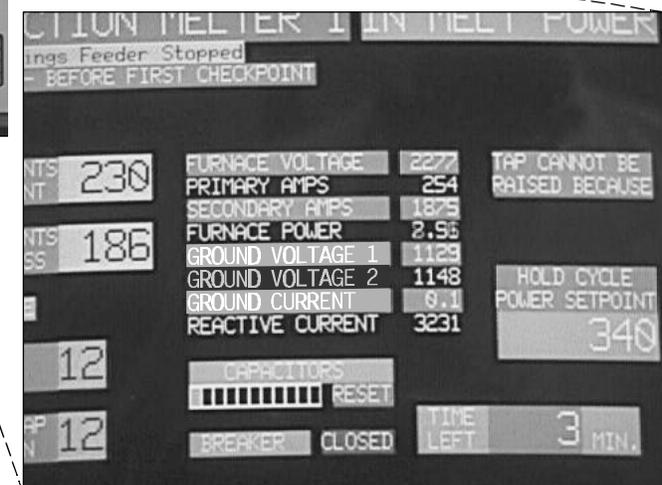
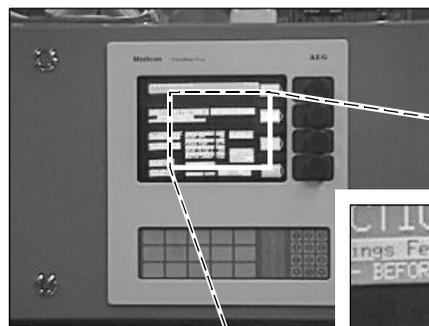


Troubleshoot Grounds (Induction Melt)

1. Upon notification from the Melt Controller that there is a ground fault, investigate the symptoms in the control tower.
 - Observe the Ground Resistance Monitor located above the PanelMate operator display.



- Isolate the furnace ground in percentage with furnace power on and off.
- Observe Ground Voltage 1, Ground Voltage 2, and Ground Current on the PanelMate screen.



2. Determine the type of ground fault.

Note: There are four types of ground faults: penetration, arcing, moisture, and foreign object.

Penetration Ground Fault

Warning: Do not apply power to the furnace if a Penetration Ground Fault is identified. Injury to personnel or damage to the machine could result.

Note: The symptoms of a Penetration Ground Fault include:

- (1) Iron eating its way through the lining and is touching the furnace coil.
- (2) The ground resistance monitor indicates a dead zero ground and the needle stays in this position.

1. Follow the procedures for preparing the furnace for entry.
2. Disconnect the ground wire at the bottom of the furnace.
3. Clean the iron from the top of the furnace.
4. Go to the tower and observe the Ground Resistance Monitor with the furnace power off.
 - Record the indication of the needle while the ground wire is disconnected.
5. Follow the procedure to troubleshoot for a Foreign Object Ground Fault, if the Ground Resistance Monitor reading is zero.
6. Reconnect the ground wire in the furnace, if the Ground Resistance Monitor reading is above zero.
 - Check the needle on the Ground Resistance Monitor; if it returns to zero, then it is a Penetration Ground Fault.
 - Empty the iron out of the furnace and ask production to reline the furnace, if penetration is detected.

Arcing Ground Fault

Note: The symptoms of a Arcing Ground Fault are:

- (1) Quick back and forth movement of the needle to zero on the Ground Resistance Monitor, with power on.
- (2) There is little or no ground current, approximately zero, indicated on the PanelMate display.
- (3) The ground voltage for both 1 and 2 will vary.

1. Follow the procedures for preparing the furnace for entry.
2. Using a flashlight, closely examine the furnace coil, bus tubing, and capacitor room for fresh copper splatters or black and burned insulation.
 - Locate and re-insulate the area, if there is evidence of copper splatters or burned insulation.

Moisture Ground Fault (Carbon Path Ground Fault)

Note: The symptoms of a Moisture Ground Fault are:

- (1) The needle moves in a wave movement on the Ground Resistance Monitor that gradually deteriorates to zero.
- (2) The Ground Current is less than one amp as indicated on the PanelMate display.

1. Check the outside of the furnace for water leaks.
2. Follow the procedures for preparing the furnace for entry.
3. Repair the water leak.

Note: Until the furnace is dry, a moisture ground fault will still show up on the indicators.

4. Raise the water temperature to 140 degrees Fahrenheit to speed the drying.

Note: The furnace should run at no more than 50 percent power.



5. Bypass the Ground Resistance Monitor, at the PanelMate, if the Ground resistance monitor shuts down the furnace.
6. Monitor the ground resistance for the next eight hours.
7. Reset the Ground Resistance Monitor if improvement occurs.
8. Repeat the steps to locate a Moisture Ground Fault if no improvements are found.



Foreign Object Ground Fault

Note: The symptoms of a Foreign Object Ground Fault are:

- (1) The needle is erratic on the Ground Resistance Monitor.
 - (2) On the PanelMate display the Ground Current is high, five amps or above.
 - (3) The Ground Voltage for both 1 and 2 indicate a couple hundred volts apart.
1. Use either the penetration or the arcing fault test.
 2. Follow the procedures for preparing the furnace for entry.
 3. Eliminate the penetration fault.
 4. Search the furnace carefully for the foreign object.
 5. Remove the object if found. If the object is not found and the ground resistance is greater than 10 percent, bypass the ground resistance monitor.
 6. Operate the furnace with no more than 50 percent power until the ground resistance is ten percent or less.
 7. Follow the procedures for preparing the furnace for entry, when ground resistance is less than 10 percent.
 8. Locate the ground panels in the knife switch room.

9. Remove all 16 yoke grounding wires off ground.
10. Measure the resistance from each grounding wire to the furnace coil using an analog voltmeter.

Caution: Do not use a digital voltmeter. Digital voltmeters are not accurate on large voltage systems.

11. Record the resistance readings.
 - Any reading over 5000 ohms is good.
 - For any reading under 5000 ohms, go to the yoke end (on the furnace side) of the grounding wire, and examine the area for the foreign object.
 - Pull the yoke away from the furnace coil to locate the foreign object, if necessary.
12. Remove the object and restore power.

