

G-08: Troubleshoot Three-Phase AC Induction Motor

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Explosive hazards exist when restarting the motor starter, it may explode when restarted.
- Electrical hazards always exist when working with 480 volts.
- Moving equipment and rotating machine hazards exist when troubleshooting with the power on.

EQUIPMENT

- lockout/tagout equipment
- digital volt-ohmmeter (DVM)
- amp probe
- megger
- basic Electrician hand tools

RESOURCES

- electrical prints
- motor nameplate data

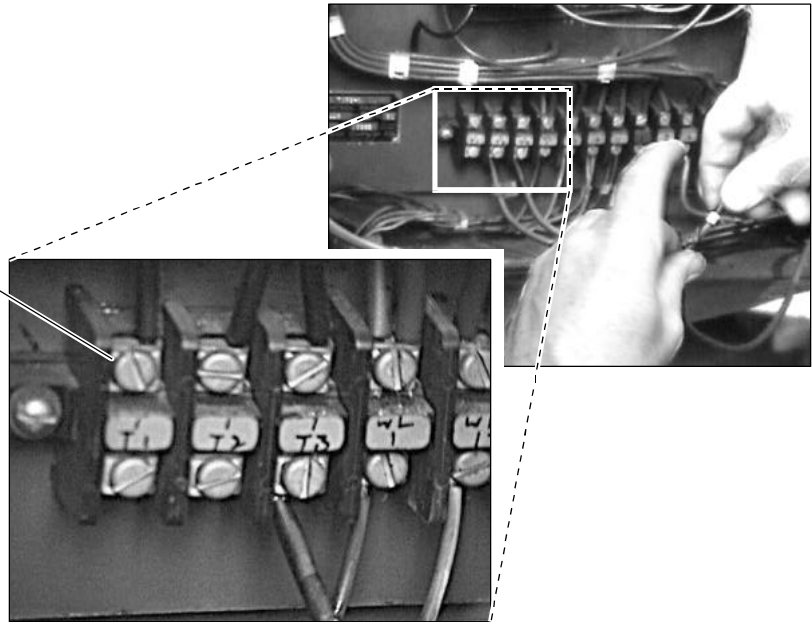


Troubleshoot Three Phase AC Induction Motor

1. Examine the electrical print.
 - Identify the faulty motor on the print.
2. Verify power between the motor line leads (T1, T2, and T3) at the motor overload or bottom side of the starter.



Check for
Voltage Here



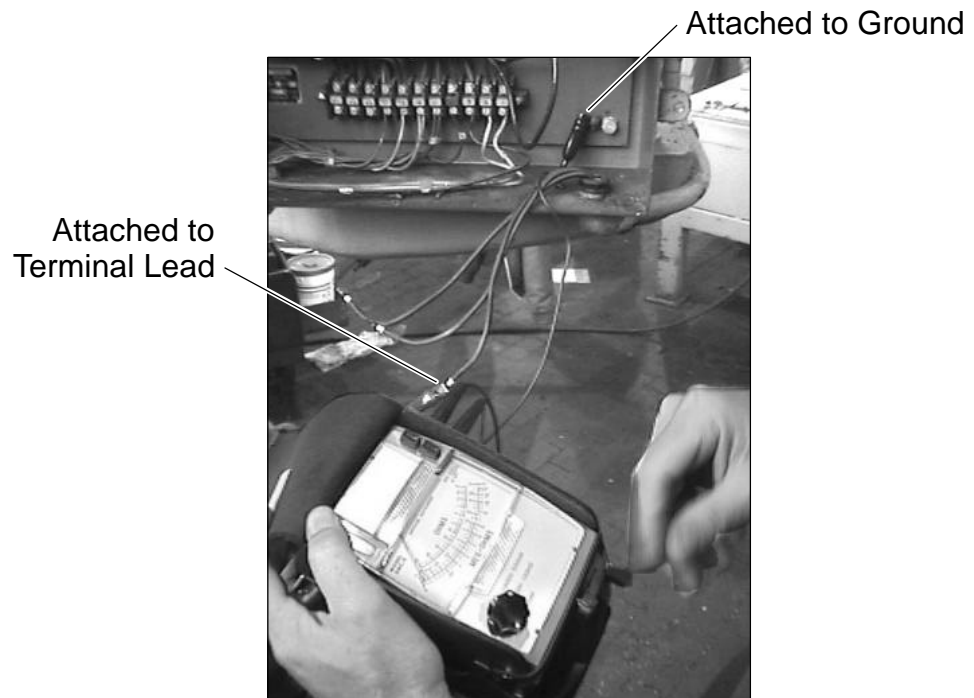
Motor Line Leads Location

- Perform step 3 if the specified voltage is found.
- Perform step 4 if the specified voltage is not found.

Warning: Do not jog the motor until you verify that the machine is not hung up.

3. Perform lockout/tagout.
4. Perform the Electrician procedures to Troubleshoot the Motor Starter.
 - Verify that the contacts are good and the overloads are not tripped.

5. Read resistance on the motor leads.
- Verify that the motor leads are properly marked.
 - Remove the motor leads from the terminal strip (or from the motor starter).
 - Set the DVM to read resistance (Ω).
 - Read resistance between each phase (T1-T2, T2-T3, and T1-T3) and from each phase to ground.



Resistance Readings to Ground

- Resistance readings must be the same between all phases.
 - Resistance to ground must be infinite.
6. Verify incorrect resistance readings, at the motor.
- Disconnect the motor leads at the motor.
 - Read resistance of the motor windings.
 - If the resistance readings are okay, check the wiring from the motor to the control panel. Replace wiring as needed.
 - Recheck resistance to ground with a megger if the problem is not obvious.

- Replace the motor according to documented Electrician procedures, if resistance readings are still incorrect.

Note: Resistance readings of less than 20 megohms between T1 and Ground, T2 and Ground, and T3 and Ground indicate insulation failure.

7. Jog the motor to verify motor operation.

- Remove the lockout/tagout.

Warning: Stand to the side of the control panel when energizing. Electrical explosion could occur.

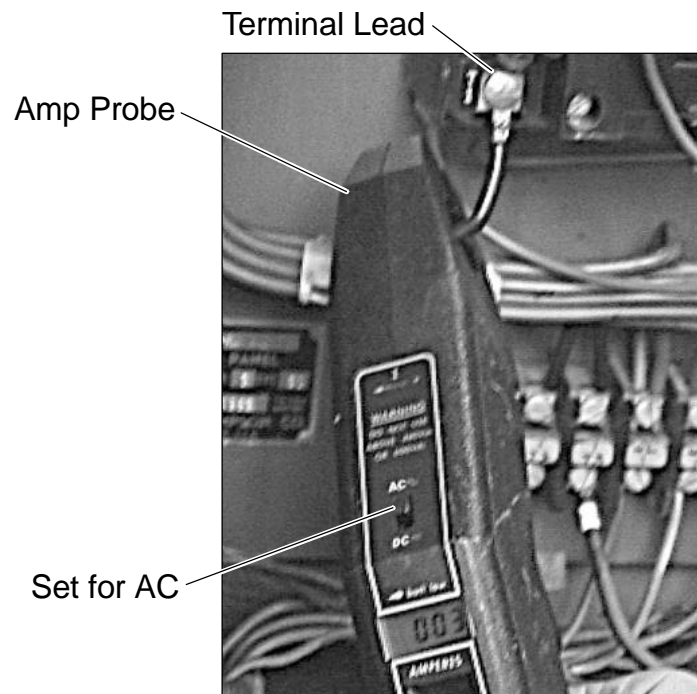
- Energize the motor.

8. Read voltage between each motor lead.

- Voltage readings must be within the expected range and consistent across each phase.

9. Read current on each motor lead.

- Verify that the amp probe is set for AC.
- Read current on each phase.



Current Check

- Current readings must be consistent between each phase.
- Any current reading above full load amperage (FLA), as listed on the motor nameplate, indicates that the winding is bad and the motor needs to be replaced or the machine has a mechanical problem.

10. Perform any corrective action according to documented Electrician procedures.

