

## G-02: Troubleshoot DC Wound Field

### SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- High voltage - 480 volts may be present behind the cabinet door.
- Exercise caution when locking and tagging out power. Stand to the side of the disconnect switch to protect from arcing and shorting of 3-phase 480V. If the motor has been stalled for a period of time, the motor housing could be extremely hot. Note: Some procedures are performed with the power on, such as cleaning the commutator.
- Place motor guards so they are not a tripping hazard for personnel in the area.
- Conduct ohm readings while the motor is disconnected to avoid false readings and damage to the drive.

### EQUIPMENT

- DVM
- meggar
- commutator cleaner
- motor
- flashlight
- spring scale
- commutator stone
- Electrician's hand tools
- air line

### RESOURCES

- electrical prints
- manufacturer's manual
- ERS



## Troubleshoot DC Wound Field

Note: The troubleshooting chart referred to in the steps is located at the end of this procedure.



1. Communicate with the Operator about the problem.
  - Ask what the Operator observed: is the motor condition erratic or is there no motion at all?
  - Listen carefully to the Operator's observations.
2. Perform a visual inspection.
  - Compare your observations with the Operator's observations.
3. Lock out and tag the motor.
4. Check for blown fuses and overloads.
5. Check the brushes.
  - Remove inspection covers.
  - Double check with DVM to ensure motor is locked out.
  - Refer to the chart to see what needs to be checked.
  - Replace parts as necessary.
6. Remove the carbon dust buildup on the commutator.
  - Visually check the commutator.
  - Turn the motor back on.

Caution: Voltage is present at the brush holder, do not touch the holder.

Note: You will need a flashlight for the next step.

- Hold the commutator stone against the commutator while the motor is running. The carbon just buildup is removed when the commutator is shiny.

Caution: Do not make contact with the air nozzle to motor components.

- Using plant air, remove the carbon dust from inside of the motor.

7. Check the armature, field, and thermal overload.

- Lock out and tag the motor before performing a check on motor components.
- Put wire numbers on motor wires to be disconnected.
- Ensure that the motor wiring is disconnected from the drive to get an accurate reading and prevent possible damage to the drive.
- See the chart for the items to be checked.

Note: This is easier to perform from the control cabinets.

- Place the cover(s) back on the motor.

8. Check the bearings.

- Call for mechanical assistance, as necessary to disconnect the motor from the gear box.
- Reconnect the motor wiring.
- Refer to the chart to see what needs to be checked.

9. Run the motor.

- Have the mechanical assistant clamp down the motor. The motor could possible flip if not secured.

10. Document the work history.



## Troubleshooting Chart

Item:	Check For:	Action:
Brushes and Commutator <i>Note: Always double check with a DVM to make sure the motor is locked out. Disconnecting motor wiring is not required.</i>	Burned or pitted brushes <i>Note: Brushes must be reassembled in the correct direction.</i>	If the brushes are worn to 50% of the length of a new brush, replace all of the brushes. Use the specified part number.
	Brushes not contacting the commutator	Check brush holder for damage. Using spring scale or by hand, check brush pressure against commutator.
	Slightly pitted or dirty commutator	Clean using commutator cleaner. <i>Caution: carbon dust mixed with oil is sticky. Do not allow solvent residue to drain into the motor.</i>
	Worn or pitted commutator segments	Replace the motor.
Armature <i>Note: Check the print. Wires will be numbered A1 or A2.</i>	Continuity: Using a DVM, check the armature windings. Resistance should be low compared to the field windings. If a problem exists, it is necessary to disconnect the motor wiring and check to see if the problem is in the wiring or in the motor. <i>Note: When checking from the drive, the motor and related wiring is being checked.</i>	If a continuity problem exists, replace the motor. If the problem exists with the related wiring, repair or replaced the wiring as needed.
	Ground: Measure resistance from armature to ground using a meggar.	If resistance is less than one megohm, replace the motor.



## Troubleshooting Chart (continued)

Item:	Check For:	Action:
Field <i>Note: Check the print. Wires will be numbered F1 or F2.</i>	Continuity: Disconnect the motor wiring at the control cabinets, then check the field windings using a DVM. Resistance should be high compared to the armature windings. <i>Note: see nameplate data for field ratings.</i>	If continuity problem exists, replace the motor.
	Ground: Measure resistance from field to ground using a meggar.	If resistance is less than one megohm, replace the motor.
Thermal overload <i>Note: Check the print. This is located on the terminal strip.</i>	Resistance: Disconnect the motor wiring at the control cabinets, then check the resistance. Resistance must be approximately 0 ohms.	Replace the motor.
Bearings	Worn, broken, or pitted bearings causing shaft rotation noise or vibration. Disconnect the motor from the load. Spin the shaft. Listen and feel for grinding noises.	If motor does not spin easily, or if grinding noises associated with bad bearings are heard or felt, replace the motor.

