

G-05: Troubleshoot DC Motor (Permanent Magnet)

SAFETY FIRST

- Follow all Caterpillar Facility Safety Standards when performing this task.
- Wear safety glasses and hearing protection in production and assembly areas.
- Use caution when working inside the control cabinet; 480 volts may be present.
- Exercise caution when working around moving or rotating equipment; testing the motor could result in unexpected machine movement.
- A flashlight may be required if you are working in an area with low lighting or when checking the inside of the motor housing.

EQUIPMENT

- DVM
- megger
- commutator stone
- Electrician's hand tools
- flashlight

RESOURCES

- electrical prints
- manufacturer's manual for the motor
- ERS



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Note: If a permanent magnet motor is being used, it is being used as an axis control. Not all axis motors are permanent magnet motors.



1. Ask the Operator for information about the problem.
 - Listen for their observations about what occurred, such as where in the cycle the problem occurred.
2. Look at the screen for an alarm message or code.
 - The message or code may indicate a blown fuse or tripped servo breaker.
3. Check for a blown fuse.
 - o A blown fuse is a typical problem. Replace the fuse, if blown. If the fuse blows a second time, do the following:
 - a. Using the print, locate the armature connections. Check to see if there is a parallel path that you can read through, if so disconnect the armature.

Note: For safety purposes, always disconnect the leads.

- b. Using the Troubleshooting Table following step 4, check the armature.
 - c. Using the same Troubleshooting Table, check the ground.
4. If these steps do not resolve the problem, ask a Maintenance mechanic to check for a locked motor or possible bearing problem.

Warning: High voltage may be present in the control cabinet, exercise caution. Lock and tag the motor before working on motor components.

Based on your initial observations, use the Troubleshooting Chart on the following page to check the motor components.



ITEM:	POSSIBLE PROBLEM:	RECOMMENDED ACTION:
Armature	Resistance: Check for continuity across the leads. Motor size may determine acceptable reading limits. Typically, an acceptable reading is 0 to 8 ohms.	If the resistance reading is infinity, check the armature, brushes, wiring, and connections. If the problem is not identified and the reading is still infinity, the armature is open. Replace the motor. If the reading is higher than anticipated, use the commutator stone to clean the commutator and brushes.
	Ground: Using a meggar, check each lead to ground. Check for a high resistance. A reading of less than 1 megohm is not acceptable.	Remove the brushes. If possible, clean or remove carbon dust from the brush holders and commutators. Refer to the brush section.
		Check the associated wiring for a ground or for short circuits. If the ground is still present, replace the motor.
Main electrical connections	Loose connections at the housing	Tighten the connections, as necessary.
Brushes	Carbon buildup	Blow out the carbon dust.
	Burned or pitted brushes	If the brushes are worn to 50% of the length of a new brush, replace the brushes using the specified part number.
	Brushes not touching the commutator	Check the brush holder for damage.
Bearings	Worn, broken, or pitted bearings causing shaft rotation noise or vibration	Replace the motor, if necessary.