

G-06b: Replace DC Motor (Wiring/Change Rotation)

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Motor starter may be explosive when restarted.
- Electrical hazard always exists when working with DC voltage, typically 500 volts DC.
- Failure to wire motor correctly could result in reversing of motor or accessory, causing the motor to “run away” damaging the machine and possibly injuring personnel.

EQUIPMENT

- digital volt-ohmmeter (DVM)
- basic Electrician hand tools
- digital or photo tachometer

RESOURCES

- electrical prints
- motor nameplate data
- manufacturer’s manual



Replace DC Motor (Wiring)

1. Perform lockout/tagout on the motor power.
 - Verify that the armature (A1 and A2) and field (F1 and F2) voltage is not present at the terminal strip in the control panel.
2. Remove the motor wiring cover.

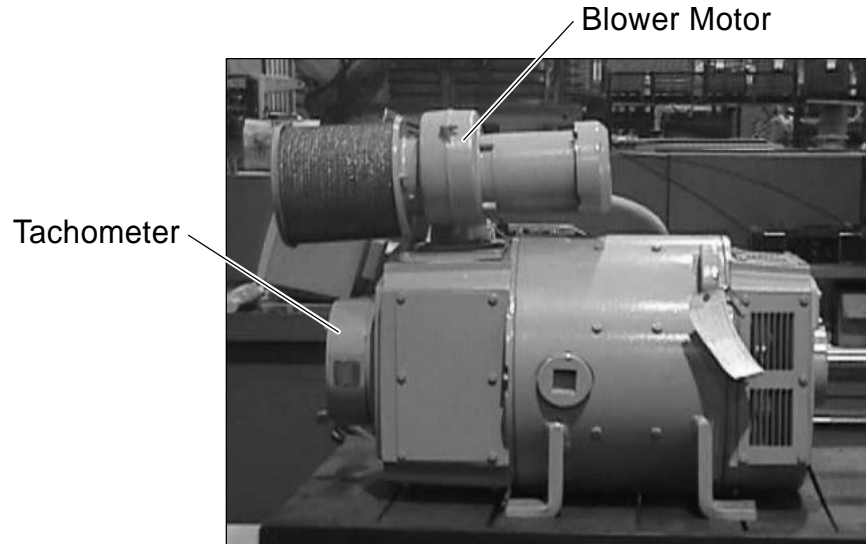


3. Verify that the connected motor wires are clearly marked.
 - Check the motor leads and the incoming power leads at the motor.
 - Mark the wires as needed.
4. Disconnect the motor leads.
 - Remove the tape and disconnect the leads.
 - Also remove any tachometer leads, thermo-switch leads, or brake leads.
5. Pull the incoming power leads out of the motor junction box.
6. Tape the ends of each of the power leads.

Warning: Taping the power leads will prevent electrical shock if an Operator accidentally removes the safety disconnect and tries to start the motor.

7. Disconnect any accessories.

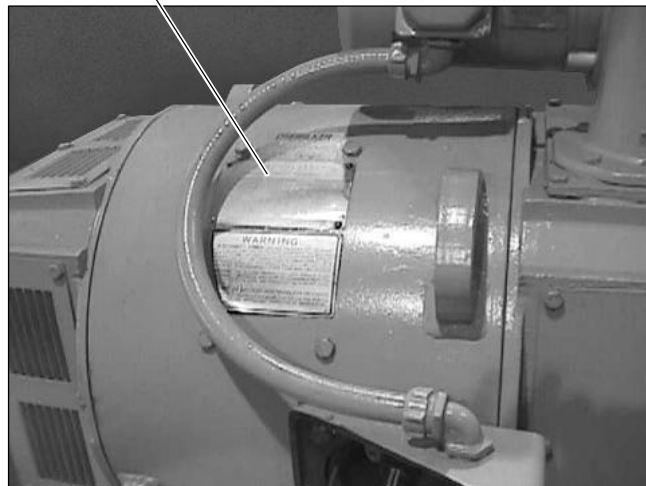
Note: Examples of accessories include feedback control devices and blower motors, as well as the tachometer, brake, or thermo-switch.



Examples of Accessories

- Open the accessory conduit or motor junction box.
 - Mark any accessory voltage wires as needed.
 - Disconnect the wires.
8. Ask a Maintenance Mechanic to remove the motor.
 - Note the nameplate data to compare with the replacement motor.

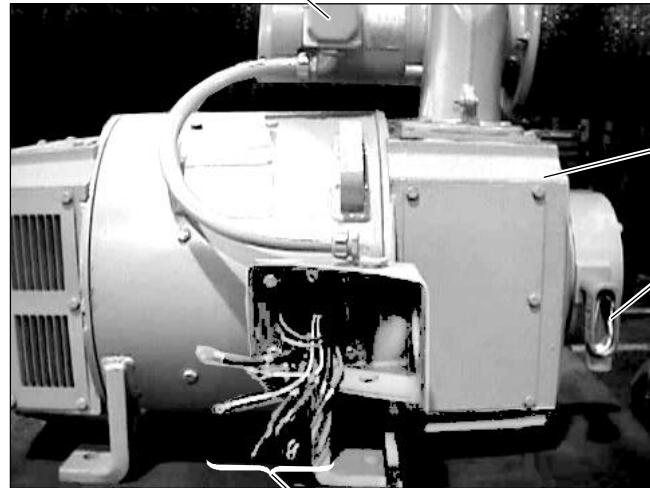
Motor Nameplate Data



9. Inspect the replacement motor.
 - Verify the nameplate data with the motor.
10. Measure resistance on the new DC motor.



Blower Motor Wiring

New Motor
with Accessories

Tachometer Wiring

Motor Windings and
Over-Temperature Device

- Measure the resistance of the field windings (F1 and F2), readings must match the nameplate data.
 - Measure the resistance of the armature windings (A1 and A2), readings must read near zero (0) ohms (not open).
 - Check the over-temperature device for proper state.
 - Measure resistance of the windings to ground with a megger. Field resistance to ground should read 20 megohms or better. Armature resistance to ground should read 5K ohms or better (Less may indicate dust on the winding)
 - Measure resistance of the tachometer. Shorted or open windings indicate a bad tachometer (compare readings to a new tachometer).
11. Ask the Maintenance Mechanic to install the replacement motor.
 12. Connect the motor and accessory wires.
 - Pull the incoming armature winding leads into the motor wiring cover from the conduit.

- Verify that the leads match (i.e., A1 to A1).
- Use lugs and machine screws to connect the leads.



Connected Leads

- Tape the leads using at least one wrap per 100 volts.



Properly Taped Leads

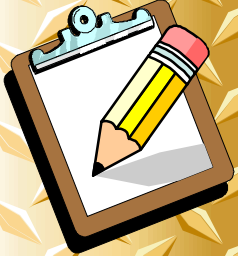
- Repeat the first four bullets for the field wires (F1 and F2), temperature wires (P1 and P2), if applicable, and accessories (tachometers, blower fans, etc.).

13. Replace the motor junction box and conduit covers.
14. Remove lockout/tagout.
15. Jog the motor to verify proper motor operation.

Warning: The motor may “run away” (stick like an accelerator) if the tachometer wires are reversed. Verify correct tachometer wiring.

Warning: Be prepared to press the E-Stop button when jogging the motor in case of “run away.”

- Verify that the motor rotates according to machine requirements, follow the procedures at the end of these steps to change rotation, if needed.
- Check the motor rpm at the Operator’s panel or with a photo or digital tachometer.



Replace DC Motor (Change Rotation)

1. Determine why there is a request for a changed rotation.
2. Perform lockout/tagout on the motor power.
3. Remove the motor leads marked A1 and A2 (or F1 and F2) from the terminal strip on the control panel or at the motor if necessary.
4. Switch the A1 and A2 (or F1 and F2) leads on the terminal strip to change rotation.
5. Switch the tachometer leads on the terminal strip to prevent “run away” of the motor.
6. Remove lockout/tagout.

Warning: The next step requires starting the motor. To avoid injury, alert the Operator and any others in the work area that you are starting the motor. Work with the Operator to remove any jams in the machine.

7. Jog the motor to verify the rotation has changed.

