

BO-04: Replace Robot Wrist Motor (Set Brakes)

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Moving equipment hazard refers to the ability of the gripper slides to move and pinch, cut, or smash fingers. Do not enter the cell with the robot operating.

EQUIPMENT

- Allen wrenches
- Feeler gauge
- basic Maintenance Mechanic hand tools

RESOURCES

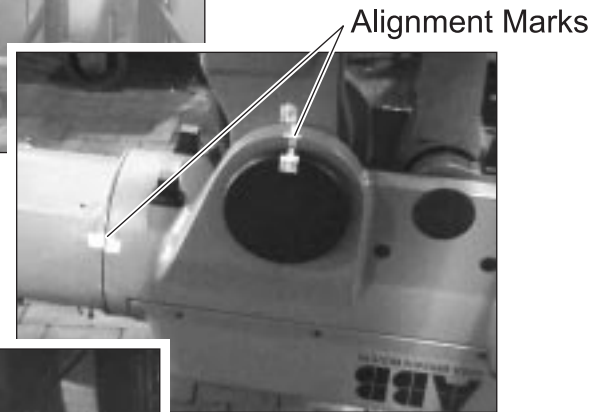
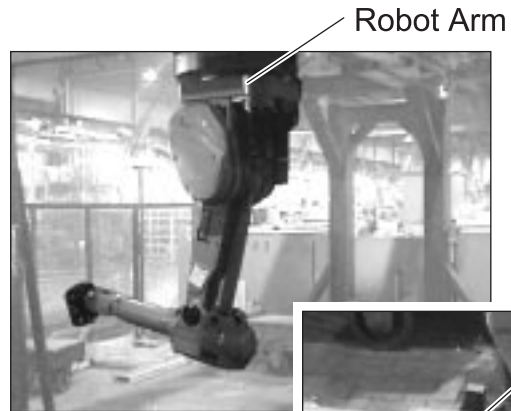
- manufacturer's specifications
- stamped part number on the brake



Replace Robot Wrist Motor (Set Brakes)

1. Ask the Operator to send the robot to the home position.

- Verify that the robot is on the alignment marks.



Alignment Marks



2. Lockout/tagout the robot.

Robot Arm
Operator's Panel

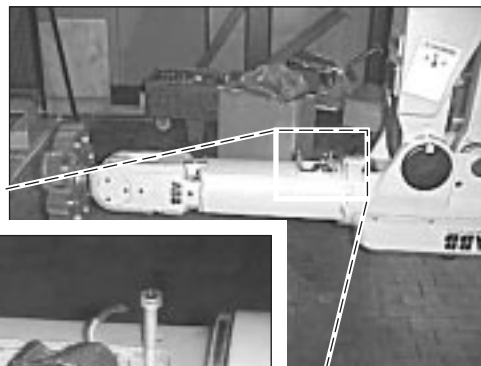


Locked Out
and Tagged

- Remove air supply from the robot.

3. Position the robot for repair.

- Press the brake release buttons (5 and 6) for each wrist axis to position the motor electrical connections access hole up.



Electrical Connections
Access Hole

4. Remove the end effector.

- Remove the gripper or other assembly connected to the robot.
- Use a mobile hoist as needed to carry the weight.



Mobile Hoist



End Affector

5. Disconnect the wrist motor unit.

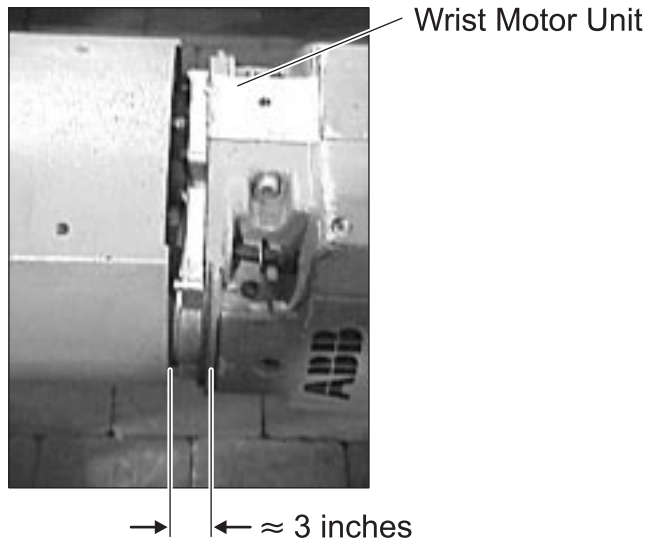
- Remove the four mounting bolts.



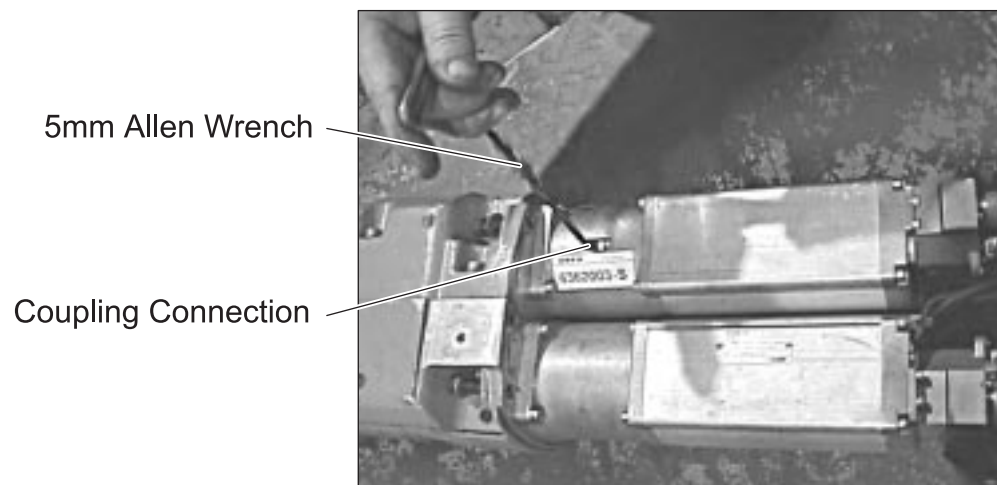
Mounting Bolts

**Wrist Motor Unit Disconnection**

- Slide the wrist motor unit out about three inches.



- Loosen the coupling connection.



- Ask an Electrician to disconnect the motors from all electrical connections.

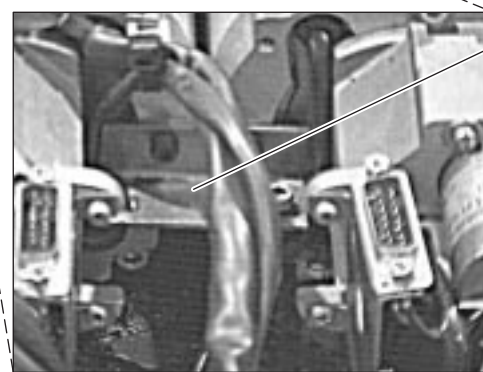
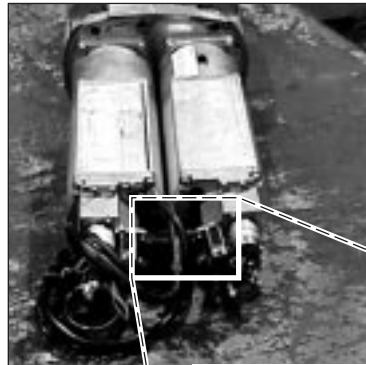
6. Remove the wrist motor unit.

Caution: The wrist motor unit weighs in excess of 50 pounds; use any needed lifting devices.

- Take the wrist motor unit to the shop.

7. Remove the damaged wrist motor from the wrist motor unit.

- Remove the end plate bracket.



End Plate Bracket

- Remove the four mounting bolts.

Allen Wrench

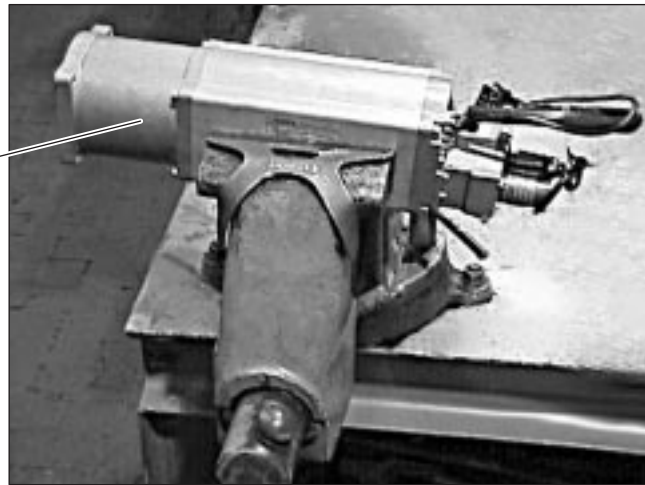
Mounting Bolt



Caution: Handle the motor with care. The electronics on the motor are extremely delicate.

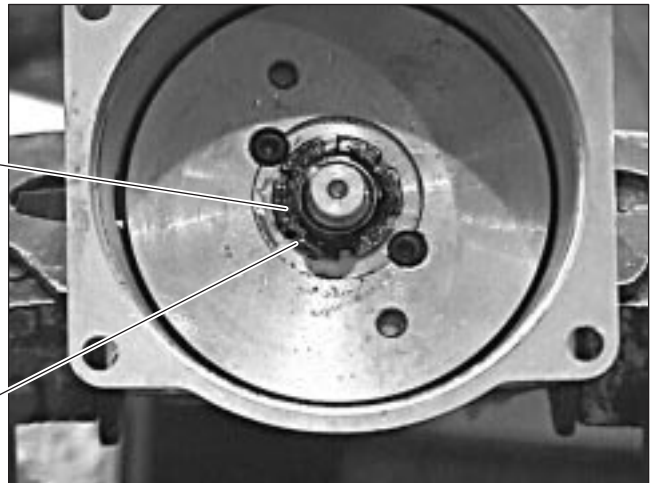
8. Secure the motor in a vise.

Wrist Motor

**9. Remove the brake disc.**

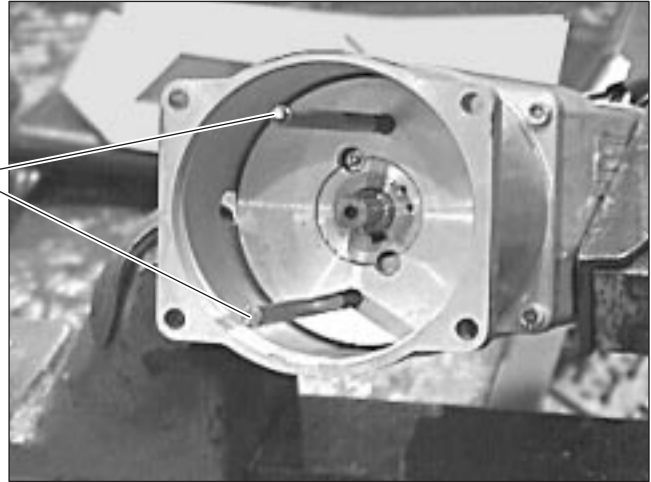
- Remove the brake nut lock screw with an Allen wrench.
- Remove the brake retaining nut.

Brake Retaining Nut

Brake Retaining
Nut Lock Screw

- Install the 6mmX70mm disc removal bolts.

Disk Removal Bolts



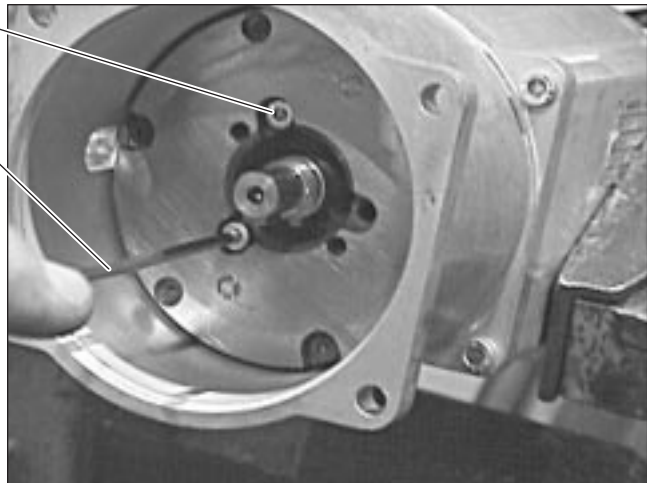
- Thread the disc removal bolts until the disc pulls out of the motor housing.

10. Remove the brake.

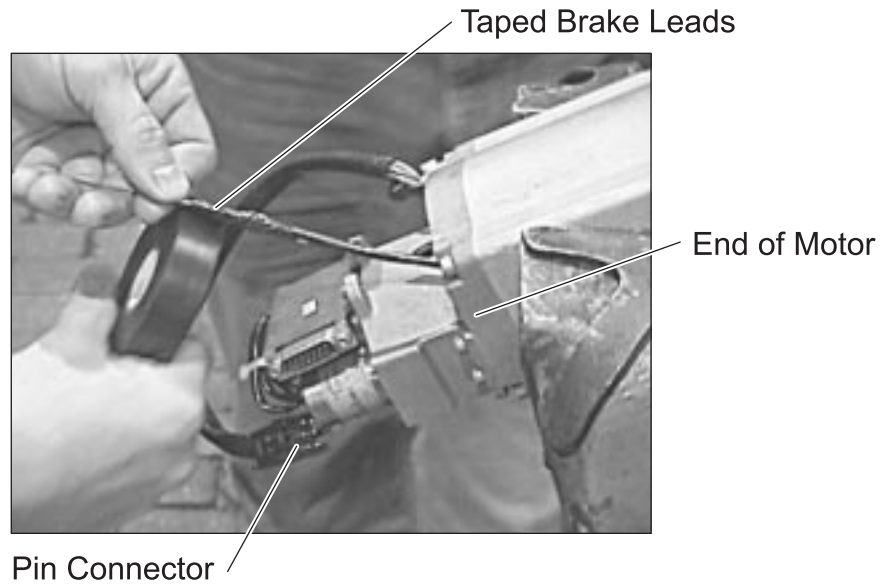
- Remove the three inside mounting bolts.

Inside Mounting Bolts

Allen Wrench



- Ask an Electrician to remove the brake leads from the pin connector.
- Tape the brake leads to a pull wire.



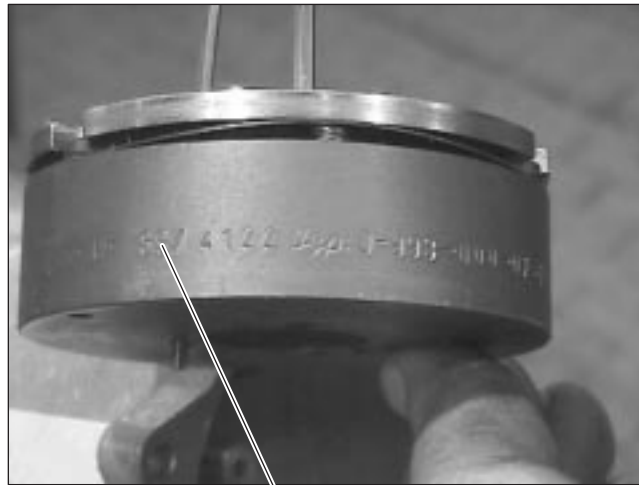
- Work the brake out of the motor housing while fishing out the brake leads.



11. Obtain the replacement brake.

- Make sure the replacement brake matches the damaged brake.

Note: If not installing a new brake, install the 4mmX10mm shipping bolts to compress the brake.



Brake Manufacturer's Specifications

12. Install the new brake.

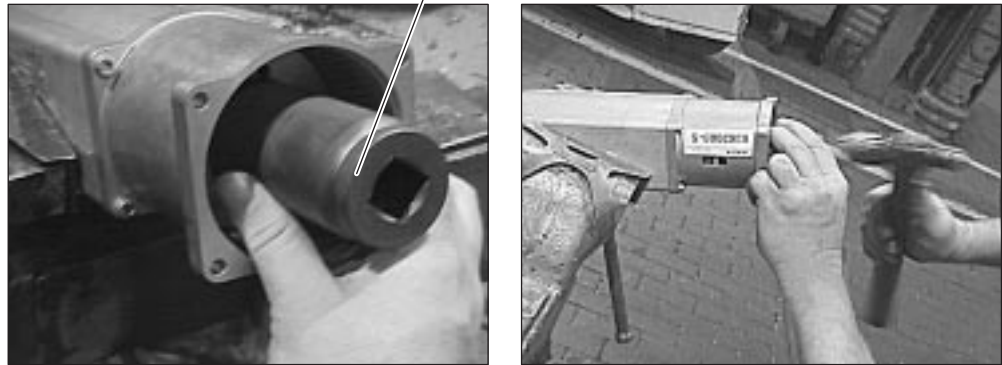
- Attach the brake leads to the pull wire.
- Slide the brake leads and the new brake into the housing. The new brake must set evenly on the counter bore.
- Install the inside mounting bolts.

13. Install the brake disc plate.

- Press the disc plate over the shaft and key.
- Use a hammer and an old socket to evenly set the brake.
- Stop with about 1 mm left to set the brake clearance.



Socket Used to Install Brake Evenly



- When the brake is close to being set, position a piece of .25 mm (.01") feeler gauge to set the brake clearance.

Brake Clearance
Access Hole

.25 mm Feeler Gauge

- Install the nut on the shaft.
- Slowly tap the brake into place until the feeler gauge is felt.
- Tighten the nut and install the lock screw.

14. Remove the shipping screws to engage the brake.**15. Ask an Electrician to attach the brake leads to the pin connector.**

16. Manually test the robot wrist operation.

- Verify that the drive shaft moves freely on each wrist axis.

17. Reassemble the wrist motor to the wrist motor unit.

- Install the brake disengaging bolts to position the key to match the keyhole.
- Install the motor to the wrist motor unit with the four mounting bolts.
- Tighten the coupling bolt.
- Reattach the endplate bracket.

18. Reinstall the wrist motor unit to the robot.

- Partially install the wrist motor unit to allow the wiring connection.
- Ask an Electrician to reconnect the electrical connections to the wrist motor unit.
- Tighten the four mounting bolts.

19. Reconnect the gripper (affector) to the robot.**20. Clean up the work area.****21. Remove lockout/tagout.****22. Ask the Operator or an Electrician to cycle the robot to verify proper operation.**