

## BK-01: Replace Bladder

### SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- You will be working inside the machining area; check for overhead clearance.
- Floor surfaces inside the machining area could be slippery due to hydraulic oil and coolant; exercise caution when moving around.
- The machine must be locked and tagged during bladder replacement.
- Engage the Z-axis brake to ensure no unexpected axis movement.

### EQUIPMENT

- 5/16" wrench
- 9/16" Apex
- 3/16", 5/32", 1/8" Allen wrenches
- 1/2" ratchet drive
- needle nose pliers
- socket extensions
- metal file (for cleaning)
- torch wrench
- small tubing cutter
- flat-head screwdriver or blade
- inch indicator
- 5/8" key
- rubber hammer
- replacement set of bladders
- shop towels
- Silicone RTV 135

### RESOURCES

- G & L Lathe General Instructions and Repair Parts Manual



## Replace Bladder

### Part 1: Prepare the Machine

#### 1. Obtain the replacement parts.

- Refer to the G & L Lathe General Instructions and Repair Parts Manual.

#### 2. Empty the tools from the ram and 4-star.

- There are two methods for removing the tools: 1) manually and 2) using the program. Both are performed from the pendant control station.
- If removing the tools in the manual mode, empty the 4-star, then the ram:
  - a. Using the keypad, press T and press 0.
  - b. Press ENTER.
  - c. Press the CYCLE START pushbutton. If there is more than one tool in the 4-star, repeat these steps until the 4-star is empty.
  - d. If a tool is present in the ram, type T0M6.  
Note: M6 is a tool change command.
  - e. Press ENTER.
  - f. Press the CYCLE START push button.
- If removing the tools using the program:
  - a. Using the keypad, type RETTL.
  - b. Press PROGRAM NAME. The program name appears on the top line of the display.
  - c. Press the CYCLE START push button. The program first empties the 4-star, then empties the ram (if a tool is present).
  - d. Press SELECT SOURCE and press S1 to delete the program.

#### 3. Move the position setting to a two-axis position.

- Set the cribbing block in the table.
- Move the Z-axis to within two inches of the cribbing block.

**Warning:** The next step may require a quick response; observe the axis movement closely.



- Shut off the hydraulics. If the Z-axis drops more than .003 inches, a brake problem exists. Immediately start up the hydraulics. Ask a Journeyman for assistance. If the Z-axis does not move, proceed to step 4.

#### 4. Place the machine in NEUTRAL.

- Select TABLE NEUT.
- Press TABLE SHIFT/JOG.
- Place work retention in the down position.
- Type P = Setup, and press ENTER.
- Type 10 for Machine Setup.
- Select S4 "New Page." The SETUP MODE MENU screen displays.
- Select 11. Work Retention.
- Press the softkey for PAGE SELECT, then press the DOWN soft key.

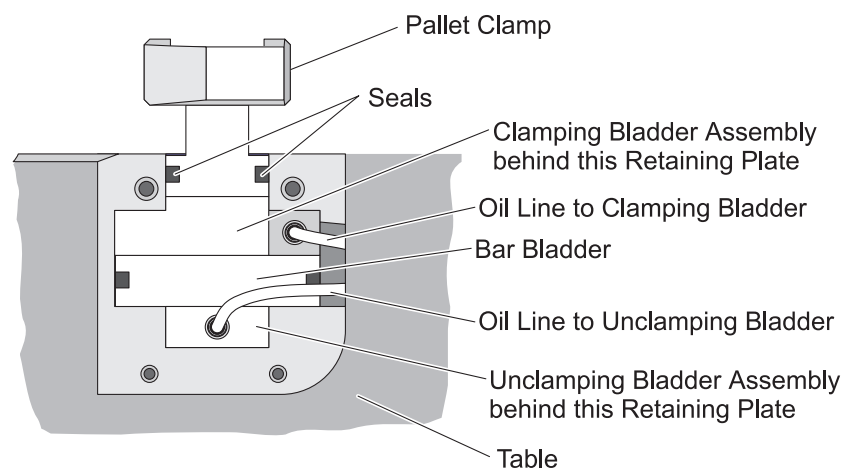
#### 5. Lock out the hydraulic system.

- Engage the OPERATOR/MAINTENANCE ENABLE/DISABLE LOCK-OUT SWITCH located on the Control Cabinet.
- Attach a lockout tag and lock to the switch.

### Part 2: Remove the Unclamping and Clamping Bladders

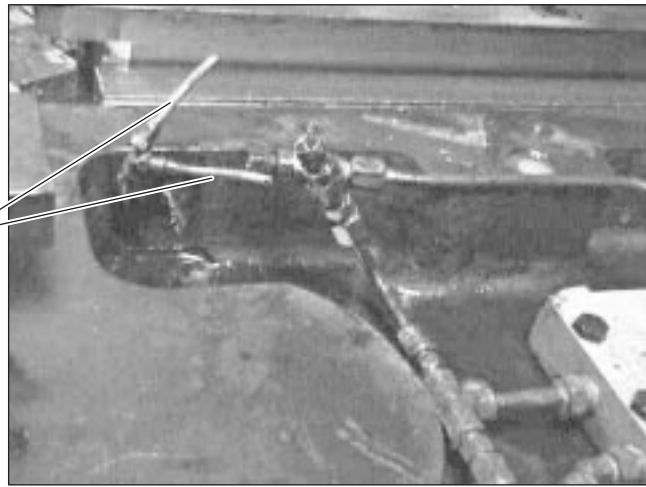
#### 1. Remove the retaining plate to access the bladder assembly.

- Use a 3/16" Allen wrench. The bladders are located behind the retaining plates. See the figure below.



2. **Remove the center plate from the table.**
3. **Disconnect the four bladder lines (two for each bladder set).**
  - Before disconnecting the lines, note which line connects to the clamping bladder and which connects to the unclamping bladder (inside the table area), to ensure proper reconnection.
  - Using a 5/16" open end wrench, disconnect the Bijur fittings and couplings connecting the bladder lines to the hydraulic lines in the table cavity area. There are two connections on each side of the machine See the figure below.

Bladder Lines

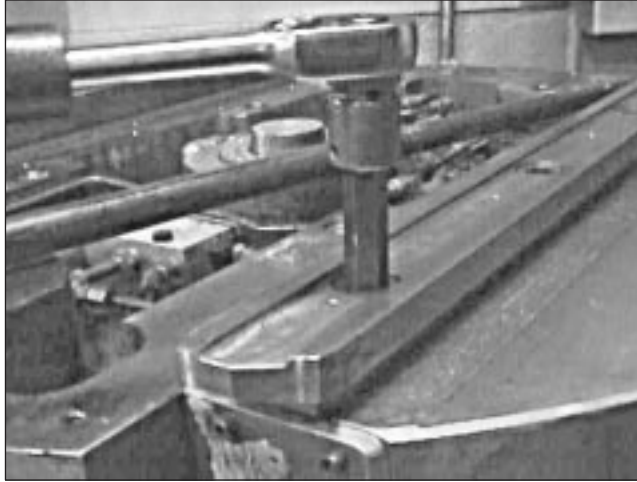


4. **Remove the pallet clamp cover. See the figure below.**



Pallet Clamp Cover

5. Using a socket wrench and extension, break loose for now. See the figure below.



6. Remove the rails and clamping bladder assemblies. See the figure below.

Clamping Bladder  
Assembly with Rail



7. **Remove the unclamping bladders.**
  - Using a flathead screwdriver or blade, pry the bladder clamps apart.
8. **Clean all bladder parts.**
  - Using shop towels, wipe dirt and debris from the surfaces of the bladder components.
  - File burrs and debris off metal surfaces, as necessary.

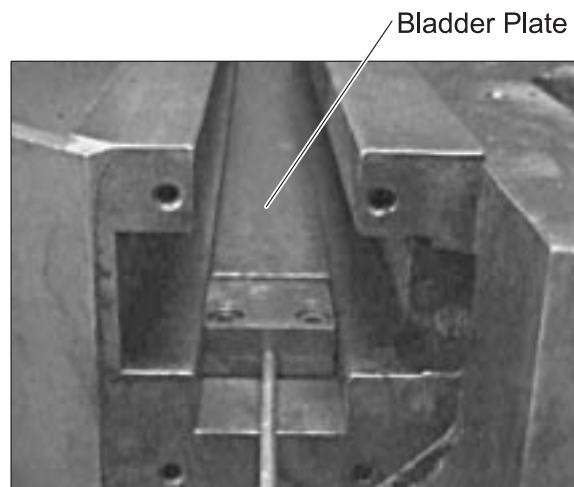


### Part 3: Install Unclamping Bladder

1. **Install the bladder clamp on the unclamping bladder.**

**Note:** A shim, if used, is positioned between the bladder clamp and the unclamping bladder. Check to ensure that the shim remains in position while installing the bolts.

2. **Install the unclamping bladder plate. See the figure below.**



3. **Bend the two bladder lines inside the machine cavity.**
  - Using needle nose pliers, bend the bladder line into the machine cavity. Do not connect the line at this time.
4. **Repeat steps 1-3 for the other side of the table.**

### Part 4: Disassemble the Clamping Bladder

**1. Remove the pallet clamp.**

- Using a 9/16" Allen wrench, remove the four bolts from the pallet clamp.

**2. Remove the rail assembly.**

**3. Remove the clamp from both ends of the bladder.**

- Using a 3/16" Allen wrench, remove the two bolts at each end of the bladder.
- Pry the clamp off the clamping bladder. See the figure below.



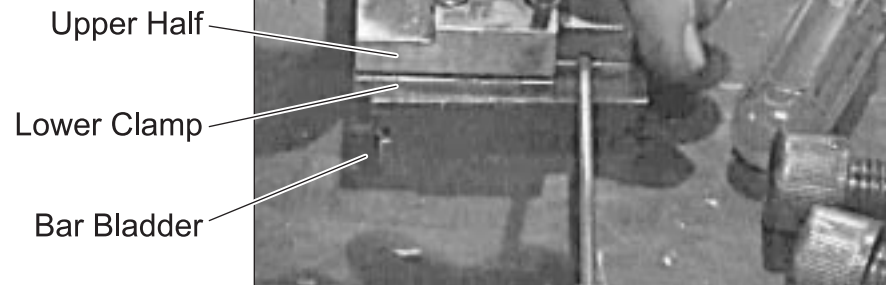
### Part 5: Assemble and Install the Clamping Bladder

**1. Check to ensure that all parts are clean and free of dirt and debris.**

**2. Assemble the clamping bladder.**

- Install the clamp on the new clamping bladder. Check to ensure that shims, if used, are in position.
- Install the clamping bladder on the bar bladder.

- Using a 3/16" Allen wrench, install the two bolts at each end of the clamping bladder. See the figure below.



- Install the plate on the clamping bladder.
- Install the pallet clamp to the clamping bladder.
- Install the four bolts hand-tight. See the figure below.





**3. Install one of the clamping bladders on the machine table.**

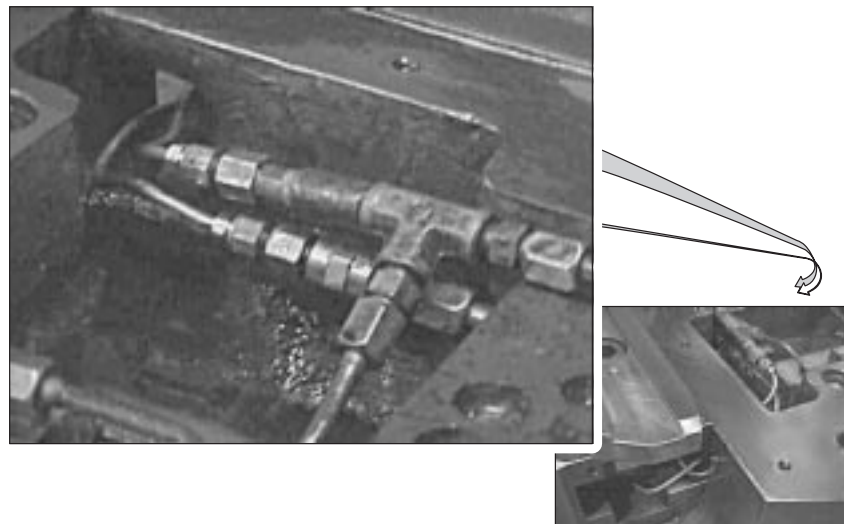
- Slide the assembly into the bladder slot. As you slide the assembly into the machine, bend the bladder lines into the machine cavity. See the figure below.



Clamping Bladder

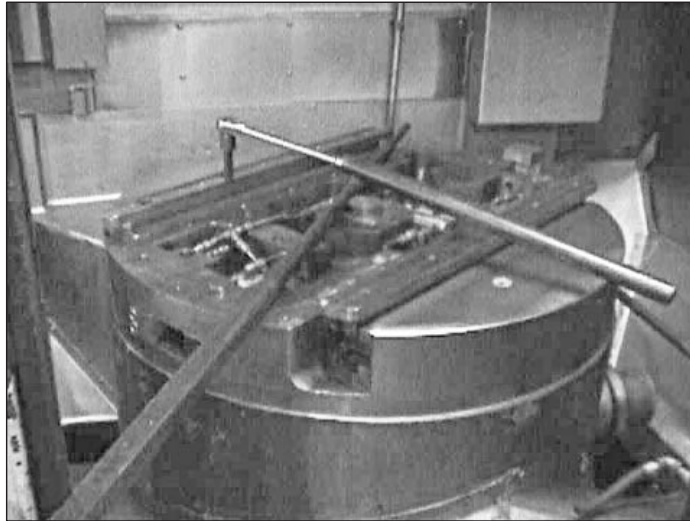


- Align the rail ends flush with the retaining plate.
- Connect the bladder lines to the hydraulic line connections inside the machine cavity. See the figure below.



- Align the rail ends flush with the retaining plate.
- Install the four bolts wrench-tight to secure the retaining plate. When the bolts are tightened, the clamping plate automatically centers.

- Install the pallet clamp bolts. You may need to brace the table to prevent it from moving as you tighten the pallet clamp bolts. See the figure below.



- Torque to 100 ft. lbs.
- Place the pallet clamp cover on the pallet. Install the four countersink screws to secure the cover.
- Repeat step 3 for the other clamping bladder.

#### **4. Install the center plate on the machine table.**

- Install the centerplate on the table.

### **Part 6: Test the Machine**

- 1. Disengage the OPERATOR/MAINTENANCE ENABLE/DISABLE LOCK-OUT SWITCH on the Control Cabinet. Remove the tag from the switch.**
- 2. Test the bladder operation.**
  - Press MACHINE START to start the machine hydraulics.
  - Press the UP/DOWN key to circulate the oil into the bladder.
  - Check the area around the table to ensure that there are no oil leaks.
  - Observe the rails for up/down positioning. Observe to see if the center post moves first.



- If the bladders are not positioning the rails, check to ensure that oil is getting to the bladders. If oil is not getting to the bladders, check the control valve.
- Position the T-bar in the unclamped position.
- Slip a piece of 5/8" keystone under the T-bar.
- Remove the keystone.
- Mount an inch indicator on the table so that the plunger rests on top of the T-bar with .100" press.
- Activate the machine to clamp and unclamp the bladder. The indicator should move .060" on all four corners.

**3. Clean up the work area.**

**4. Document the work history.**