

## K-08: Rebuild Pump (Centrifugal)

### SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- The pump may contain dangerous chemicals. Protect skin and clothing, as necessary.
- Verify ZMS. Remove all pressure on the pump before removal.

### EQUIPMENT

- replacement pump parts
- mounting shims
- specified grease
- bearing puller
- arbor press
- light oil
- drip pan
- sizing and gaging tools
- snap ring pliers
- putty knife
- soft-faced hammer
- small wood block
- cleaning solvent
- soft cloth
- lint-free tissue
- torque wrench
- latex gloves

### RESOURCES

- manufacturer's manual
- IBI manuals



## Rebuild Pump (Centrifugal)

Note: Centrifugal pumps are not fixed displacement. Fluid can “slip by” rotating impeller and wear plate without being pumped into the outlet. These pumps may still work, but not move enough volume to do the job.



1. Remove and inspect the check valve, if applicable.
  - Remove the check valve housing from the pump suction port.
  - Inspect the flapper check valve for damage, obstruction, or wear.
  - Replace the flapper check valve, if necessary.
2. Remove the back cover plate and extract the wear plate assembly.
  - Loosen the clamp handle and remove the clamp bar and/or mounting bolts.
  - Pull the back cover plate from the pump casing. See the figure below.

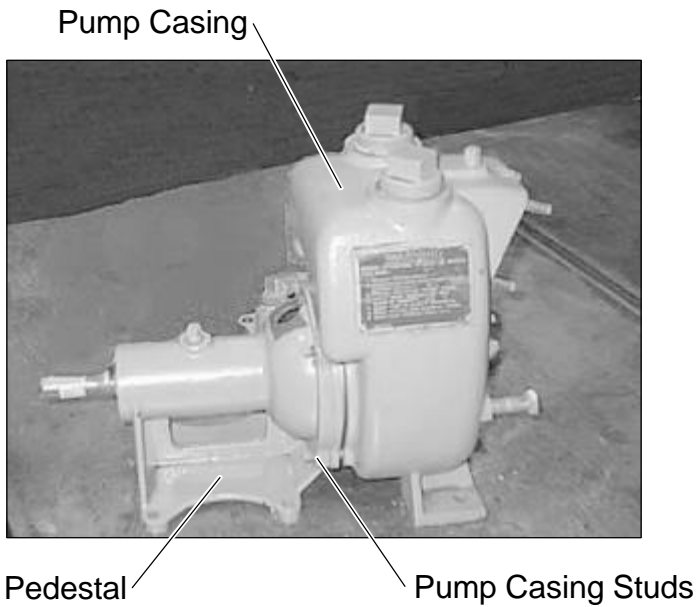
Check Valve Housing

Back Cover Plate



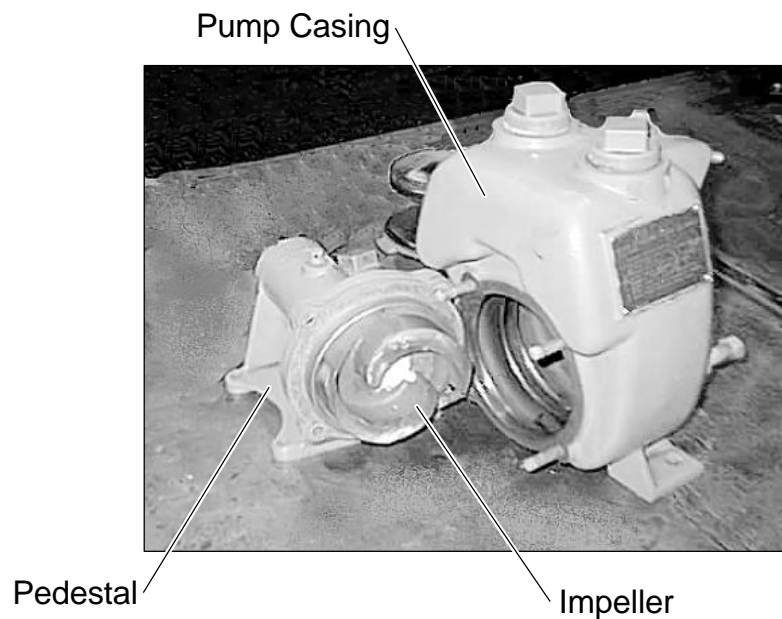
- Carefully remove the back cover plate gasket without damaging the pump casing.
- Slide the wear plate assembly out of the pump casing.
- Inspect the wear plate for damage or excessive wear such as grooves, pitting.
- Clean the mating surfaces on the back cover and the pump casing.

3. Separate the pedestal from the pump casing.
  - Remove the nuts from the pump casing studs, as shown below.



Pedestal and Pump Casing

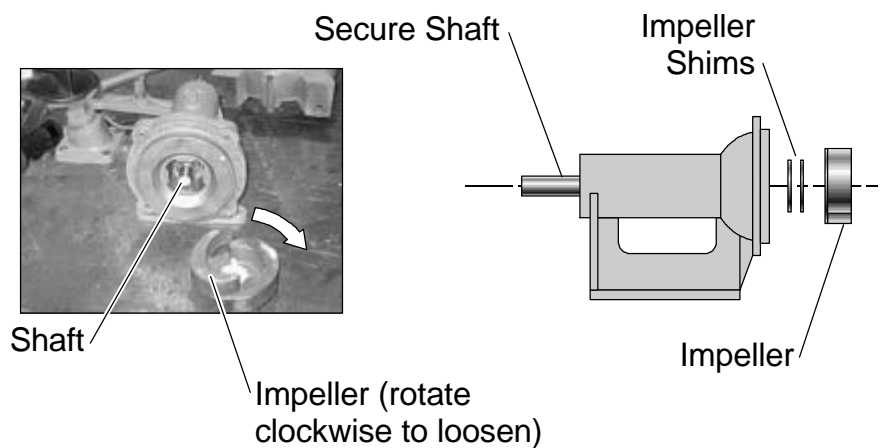
- Slide the pedestal off the pump casing. Have a drip pan available for spillage. See the figure below.



Pedestal Removed From Casing

4. Remove and inspect the pump impeller.
  - Scrape away any thread sealant from the impeller mounting threads on the shaft.
  - Secure the shaft to prevent turning.
  - Rotate the impeller clockwise to unscrew the impeller from the shaft, as shown below.

Note: The impeller may not unscrew, it may be equipped with a key, nut, and washer or it may need to be pressed on and off. The impeller may be molded on.



### Impeller Removal

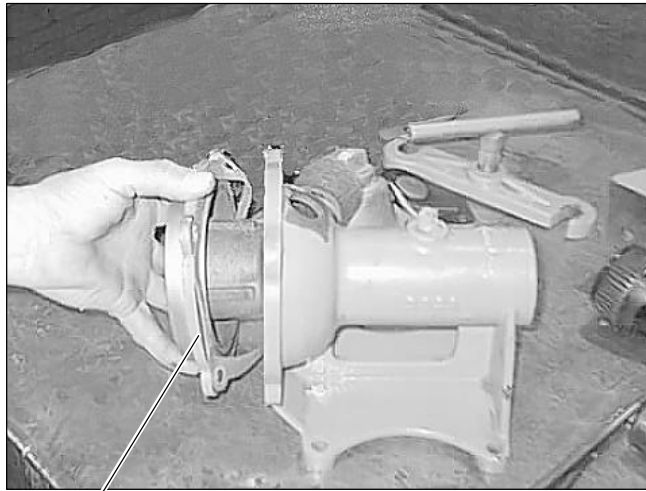
**Caution:** Handle the impeller with care to avoid damaging the impeller blades.

- Remove all impeller shims.
  - Inspect the impeller for damage or wear.
5. Remove and inspect the seal assembly.
    - Remove the seal spring and spring centering washer from the input shaft, if applicable.
    - Slide the shaft sleeve and rotating seal together from the shaft.
    - Inspect the seals and assemblies for damage or wear.
    - Replace components or assemblies as required.

6. Disassemble the shaft and bearing unit (or bushing).

- Remove the seal plate, as shown below.

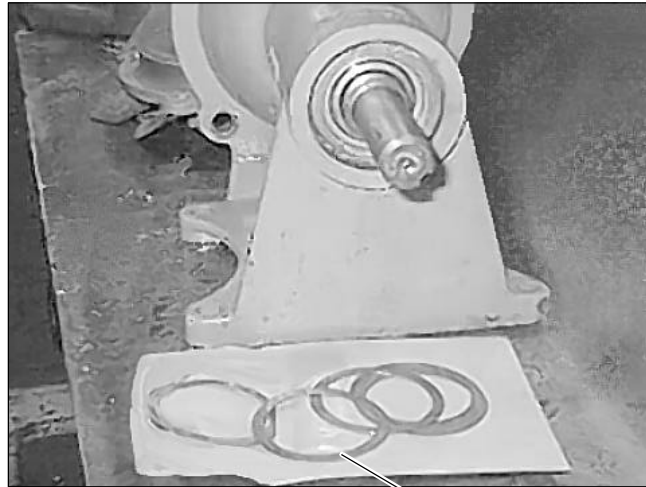
**Caution:** Do not touch the ceramic seal or allow it to become soiled. You could damage the seal or cause leaks in the pump. Be careful not to damage the mating surfaces. Note: Due to the presence of acid in skin, you should wear latex gloves.



Seal Plate

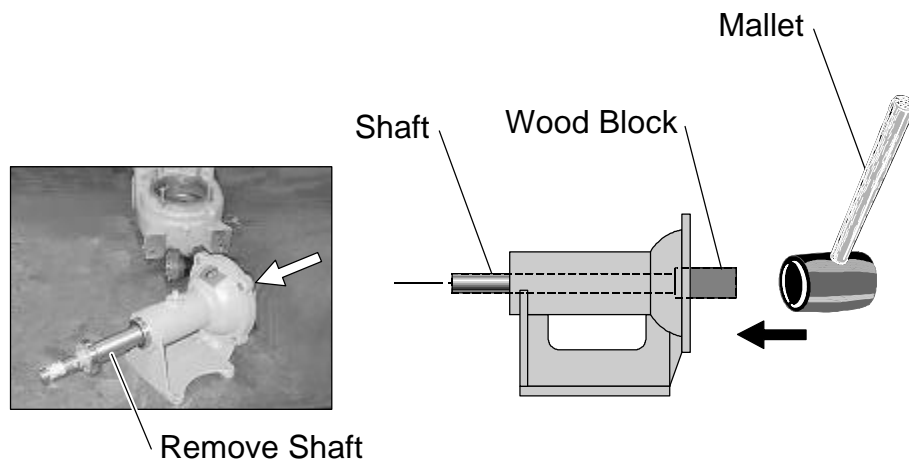
- Remove the slinger ring and shaft key.
- Remove the snap ring on the motor side of the shaft.
- Inspect the snap rings for damage or wear, replacing as necessary.
- Leave the snap ring in place on the impeller end, unless a replacement is necessary.

- Remove the bearing adjustment shims, as shown below.



Bearing  
Adjustment Shims

- Inspect the shims for damage or wear; replace them with the same sized shim if needed.
- Store the shims for reinstallation if new shims are not required.
- Place the drip pan under the assembly to catch excess liquids and lubricants.
- Knock out the input shaft from the impeller end of the pedestal with a soft face mallet and/or wood block, as shown below.



Shaft Removal

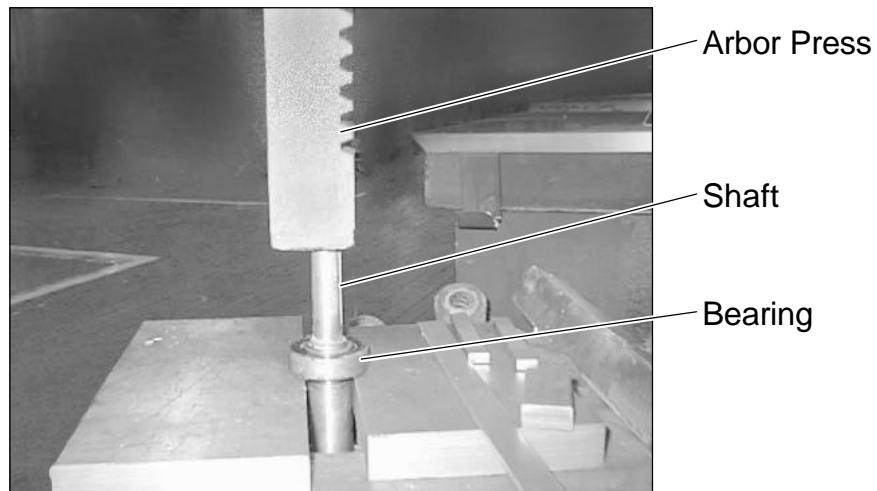
Caution: Be careful not to damage the shaft threads.

- Slide the shaft and bearing assembly from the pedestal.

7. Replace the shaft bearings.

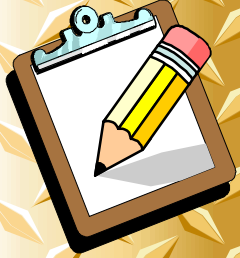
Note: Check the bearing orientation for replacement.

- Inspect the bearings for damage, discoloration, roughness, or binding.
- Check the location of seals and/or shields.
- Remove the worn or damaged bearings from the shaft using a bearing puller or press, as shown below.



### Bearing Removal

- Clean the shaft with a soft cloth and cleaning solvent.
- Inspect the shaft for nicks, distortion, scratches, or thread damage.
- Replace a worn or damaged shaft with a new shaft.
- Remove the inner shields and seals, if needed, from the sides of the new bearings.
- Install the new bearings, facing each other on the shaft, so they match the old bearing orientation.
- Use an arbor press to install the new bearings onto the shaft, until the bearings are seated on the shoulder.



8. Reinstall the shaft and the bearing assembly.
  - Slide the shaft and the bearing assembly into the motor end of the pedestal.
  - The shaft and bearing assembly impeller end bearing must rest on the bearing retainer ring. The ring is located in the impeller end of the pedestal.
  - Install the shims against the motor side bearing face, to keep the shaft and bearing assembly in place.
  - Install the motor end snap ring to secure the shaft into the pedestal.
  - Remove the shims if the snap ring will not fit in place.
  - Check for end play and add shims until within the manufacturer's specifications. Side-to-side movement indicates end play.
  - Reinstall the slinger ring and shaft key.
  - Reinstall the seal plate.
  - Important! Ensure that the shaft will turn freely, with no binding or noise.
  
9. Replace the seal components.
  - Inspect the seals for wear, damage, or scoring; replace as required.
  - Inspect the shaft sleeve for damage or wear; replace if necessary.
  - Unpack and inspect all new seal components.
  - Lubricate new seal components with light oil.
  - Install by pushing or sliding the stationary subassembly into the seat on the seal plate.
  - Clean the seal face with a lint free tissue.
  - Slide the rotating element, bellows and retainer onto the shaft sleeve and against the stationary seal element.
  - Install the seal spring and the spring centering washer.
  
10. Replace the pump impeller, if necessary.
  - Inspect the new impeller for any defects.
  - Install the pump impeller shims onto the threaded end of the shaft.
  - Bolt on or thread the pump impeller onto the threads on the end of the shaft or other mounting procedures.





- Maintain a clearance between the impeller and shaft housing face according to manufacturer's specifications. Verify that the seal plate is tight against the shaft housing when checking clearance. Check using the feeler gauge.
  - Remove/install shims as necessary to achieve manufacturer's specified spacing.
11. Install a new wear plate onto the back cover, if necessary.
- Unbolt the damaged or worn wear plate from the back cover.
  - Inspect the new wear plate for any defects.
  - Bolt the new wear plate to the back cover.
  - Visually inspect to ensure the wear plate is concentric with the back cover plate, to prevent binding.
12. Reassemble the pedestal to the pump casing.
- Remove the gasket on the seal plate and clean the mating surfaces.
  - Install the new gasket and seal, if necessary, onto the seal plate.
  - Maintain the manufacturer's specified clearance between the impeller and the wear plate. Add gaskets on the seal plate until the impeller binds against the wear plate. Add manufacturer's recommended size gaskets to achieve the specified clearance.
  - Secure the pump casing to the pedestal using the removed nuts.
  - Torque the nuts to the manufacturer's specifications.
13. Lubricate the overhauled bearing housing in the pedestal, if applicable.
- Fill the housing from the top fitting with manufacturer's specified amount, and type, of grease.
14. Reinstall the back cover plate.
- Replace the back cover gasket and seal, if necessary.
  - Slide the back cover into the pump casing, aligning the tabs with the grooves on the pump casing face.
  - Secure the back cover with the clamp bar and clamp bar handle, or bolts. Snug the bar to compress the gaskets.
15. Clean up the work area.
16. Document the work history.