This is a SAFETY ALERT SYMBOL. When you see this symbol on the product, or in the manual, look for one of the following signal words and be alert to the potential for personal injury, death or major property damage.

**DANGER**

Wars of hazards that WILL cause serious personal injury, death or major property damage.

**WARNING**

Wars of hazards that CAN cause serious personal injury, death or major property damage.

**CAUTION**

Wars of hazards that CAN cause personal injury or property damage.

**NOTICE:**

Indicates special instructions which are very important and must be followed.

**NOTICE:**

Blackmer pumps MUST only be installed in systems which have been designed by qualified engineering personnel. The system MUST conform to all applicable local and national regulations and safety standards.

This manual is intended to assist in the installation and operation of the Blackmer pumps, and MUST be kept with the pump.

Blackmer pump service shall be performed by qualified technicians **ONLY**. Service shall conform to all applicable local and national regulations and safety standards.

Thoroughly review this manual, all instructions and hazard warnings, **BEFORE** performing any work on the pump.

Maintain **ALL** system and Blackmer pump operation and hazard warning decals.

**WARNING**

DISCONNECTING FLUID OR PRESSURE CONTAINMENT COMPONENTS DURING PUMP OPERATION CAN CAUSE SERIOUS PERSONAL INJURY, DEATH OR MAJOR PROPERTY DAMAGE

**WARNING**

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH

**WARNING**

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER OR ENGINE DRIVE BEFORE ATTEMPTING MAINTENANCE CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

**WARNING**

FAILURE TO RELIEVE SYSTEM PRESSURE PRIOR TO PERFORMING PUMP SERVICE OR MAINTENANCE CAN CAUSE SERIOUS PERSONAL INJURY OR PROPERTY DAMAGE

**WARNING**

FAILURE TO SET THE VEHICLE EMERGENCY BRAKE AND CHOCK WHEELS BEFORE PERFORMING SERVICE CAN CAUSE SEVERE PERSONAL INJURY OR PROPERTY DAMAGE.

**WARNING**

IF PUMPING HAZARDOUS FLUIDS, SYSTEM MUST BE FLUSHED, PRIOR TO PERFORMING SERVICE OR MAINTENANCE

**WARNING**

Hazardous pressure can cause personal injury or property damage.

**WARNING**

Hazardous voltage. Can shock, burn or cause death.

**WARNING**

Hazardous machinery can cause serious personal injury.

**WARNING**

Hazardous pressure can cause serious personal injury or property damage.

**WARNING**

Hazardous machinery can cause severe personal injury or property damage.

**WARNING**

Hazardous or toxic fluids can cause serious injury.
SAFETY RULES

NOTICE:
THE APPROPRIATE BLACKMER PUMP MANUAL AND PARTS LIST MAY BE OBTAINED FROM THE BLACKMER WEBSITE (WWW.BLACKMER.COM) OR BY CONTACTING BLACKMER CUSTOMER SERVICE.

NOTICE:
MAINTENANCE AND TROUBLE SHOOTING MUST BE DONE BY AN INDIVIDUAL EXPERIENCED WITH PUMP MAINTENANCE AND THE TYPE OF SYSTEM INVOLVED.

NOTICE:
The following instructions include only the steps necessary to remove and replace the Blackmer Triple-Lip Cartridge Seal. Before proceeding, read and follow all mechanical seal related instructions and hazard warnings provided in the appropriate Pump "Installation, Operation and Maintenance" manual.

INSTALLATION INSTRUCTIONS FOR A TRIPLE-LIP CARTRIDGE SEAL

Satisfactory sealing is achieved only when shaft/sleeve, bore and surrounding machine parts are in good mechanical condition. Shaft misalignment, runout and other operating factors also have an important bearing on performance.

1. Clean shaft (13) and the face of the inboard head (20) in and around the packing area (stuffing box).
2. Check shaft (13) for sharp corners, burrs, nicks or other imperfections. Use a file or sandpaper to remove any burrs or raised surface. Also, file sharp edges to prevent cutting O-ring. Keyways should be covered or filled with a suitable filler to protect the O-rings from damage during installation.
3. Check shaft alignment. Runout must not exceed .005 (.13 mm) T.I.R.
4. The enclosed lubricant should be applied to the O-rings on the inside of the sleeve. This will assist the cartridge seal to slide freely over the shaft during installation.
5. Be sure to place the gasket (222) between the cartridge seal (223) & inboard head (20), then ease the cartridge seal over the shaft (13) up to the face of the inboard head.
6. Use flat washers (234) under the gland capscrews (233) and lightly snug the cartridge seal & gasket to the face of the inboard head (20) at the packing area (stuffing box).
7. Insure that the sleeve/drive collar (221) is pressed forward and nested against the clip wings. (See Figure 1)
8. Check to insure all clip wings are positioned at 90° to the shaft and providing absolute centering of the drive collar. (221) (See Figure 2)
9. Set the set screws to the shaft as follows:
   Run each setscrew in until it just touches the shaft. Tighten each setscrew in an opposing pattern to avoid pulling the sleeve off center.
10. Insure that the clip wings are at 90° to the shaft and while rotating the shaft (by hand) insure that the drive collar is not rubbing or binding against one or two of the centering clips more than the rest. Use .001" or .002" (.03-.05 mm) feeler gauge and test the gap between the clips and drive collar. (See Figure 1).

Note: The feeler gauge should not pass between the clip(s) and the drive collar at any location. If it appears that a clip wing or two are tipped away from the drive collar, it indicates that the gland bolting is uneven. Tighten the bolt(s) on the opposite side from the tilted clip wing/gap and watch as the clip wing squares to the drive collar shoulder.

11. If an adjustment is required, loosen the gland capscrews (233) and move the seal slightly to achieve centering and retighten the gland capscrews (233).
12. Repeat the process until the seal is centered on the shaft.
13. Evenly tighten the gland capscrews (233) in a criss-cross pattern.
14. Rotate the clip wings 90° (See Figure 2)
15. Rotate shaft (13) to ensure the seal is in proper working order.
16. Install environmental controls or plug the flush ports. (See Figure 4)

REPAIR KIT INSTRUCTIONS FOR A TRIPLE-LIP CARTRIDGE SEAL

Satisfactory sealing is achieved only when all existing components are in good mechanical condition. Seal rebuild kits contain the only those component parts listed

Before rebuilding the cartridge seal, remove the cartridge seal from pump, disassemble & clean those components NOT provided in the Seal Rebuild Kit. Discard the used components that will be replaced with components in the Seal Rebuild Kit.

NOTE: Examine the sleeve's (221) coated surface carefully. It should be free from scratches and other noticeable damage.

1. Place items into the gland bore as shown as in Figure 3. Be sure to align the flush spacer (227) correctly. Once the snap ring (230) is in place, carefully slide the sleeve (221) with O-rings (220) and set screws (231) installed through the gland area (stuffing box).
2. Follow the installation instructions to install the rebuilt seal
## TRIPLE-LIP CARTRIDGE SEAL – STRAIGHT SHAFT

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<th>Part Name</th>
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X= Component included in Seal Rebuild Kit

## TRIPLE-LIP CARTRIDGE SEAL – STEPPED SHAFT

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X= Component included in Seal Rebuild Kit
Environmental Control Options

Consult Factory for Specific Information.

Figure 4

No Flush

Flush

Barrier Fluid System