

Introduction

Purpose of this Manual

This manual contains information on the installation of the Blackmer® XU2A rebuild kit as used in Gasboy® self-contained products.

This manual is written for Gasboy Authorized Service Contractors (ASCs) who will be installing the kit. It is recommended that only ASCs install this kit.

Important Notice

Blackmer XU2A 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.

All parts and required kits are listed in the Blackmer Parts List at the rear of this document. This manual MUST be kept with the pump.

Required Reading

Before servicing the pump, the technician must read, understand, and follow this manual.

Failure to do so may adversely effect the safe use and operation of the equipment.

Related Documents

Document Number	Document Name	GOLD® Library
035297	Series 9800A Pump/Dispensers Parts List	Gasboy Commercial & Retail Pumps

Note

The "Note" designation indicates within the manual special instructions which are very important and must be followed.

Required Tools

- 5mm Allen® wrench
- 1/4-inch allen wrench
- heavy snap ring pliers
- ratchet wrench
- 16mm socket
- 13mm or 1/2-inch socket
- rubber mallet
- torque wrench

Acronym Table

The following table contains a list of acronyms used in this manual.

Acronym	Definition
ASC	Authorized Service Contractors
cmhg	centimeter of mercury
CW	Clockwise
CCW	Counterclockwise
GDP	Global Dispenser Pump
gpm	gallons per minute
inhg	inch of mercury
lbs	pound-force
lbs-in	pound-inch
lpm	liters per minute
mm	millimeter
N/A	not applicable
Nm	newton-meter
OIML	International Organization of Legal metrology*
Opt.	Optional
PCV	Pressure Control Valve
psi	pounds per square inch
Std	Standard
UHF	Ultra High Flow
*OIML Switch (optional) monitors air to fuel mix and is used primarily in Europe.	

Important Safety Information

This section introduces the hazards and safety precautions associated with installing, inspecting, maintaining or servicing this product. Before performing any task on this product, read this safety information and the applicable sections in this manual, where additional hazards and safety precautions for your task will be found. Fire, explosion, electrical shock or pressure release could occur and cause death or serious injury if these safe service procedures are not followed.

Preliminary Precautions


You are working in a potentially dangerous environment of flammable fuels, vapors, and high voltage or pressures. Only trained or authorized individuals knowledgeable in the related procedures should install, inspect, maintain or service this equipment.

Emergency Total Electrical Shut-Off

The first and most important information you must know is how to stop all fuel flow to the pump and island. Locate the switch or circuit breakers that shut-off all power to all fueling equipment, dispensing devices, and submerged turbine pumps (STPs).

⚠ WARNING

The EMERGENCY STOP, ALL STOP, and PUMP STOP buttons at the cashier's station WILL NOT shut off electrical power to the pump/dispenser.

 This means that even if you activate these stops, fuel may continue to flow uncontrolled.

You must use the TOTAL ELECTRICAL SHUT-OFF in the case of an emergency and not only these cashier station "stops."

Total Electrical Shut-Off Before Access

Any procedure requiring access to electrical components or the electronics of the dispenser requires total electrical shut-off of that unit. Know the function and location of this switch or circuit breaker before inspecting, installing, maintaining, or servicing Gilbarco® equipment.

Evacuation, Barricading and Shut-Off

Any procedures requiring accessing the pump/dispenser or STPs requires the following three actions:



- An evacuation of all unauthorized persons and vehicles
- Using safety tape or cones as barricades to the effected units
- A total electrical shut-off of that unit and any associated STPs.

Read the Manual

Read, understand and follow this manual and any other labels or related materials supplied with this equipment. If you do not understand a procedure, call a Gilbarco Authorized Service Contractor or call the Gilbarco Call Center at 1-800-800-7498. It is imperative to your safety and the safety of others to understand the procedures before beginning work.

Follow the Regulations

There is applicable information in: NFPA 30A: *Automotive and Marine Service Code*; NFPA 70: *National Electrical Code (NEC)*; OSHA regulations; and federal, state, and local codes which must be followed. Failure to install, inspect, maintain or service this equipment in accordance with these codes, regulations and standards may lead to legal citations with penalties or affect the safe use and operation of the equipment.

Replacement Parts

Use only genuine Gilbarco replacement parts and retrofit kits on your pump/dispenser. Using parts other than genuine Gilbarco replacement parts could create a safety hazard and violate local regulations.

Safety Symbols and Warning Words

This section provides important information about warning symbols and boxes.

Alert Symbol



This safety alert symbol is used in this manual and on warning labels to alert you to a precaution which must be followed to prevent potential personal safety hazards. Obey safety directives that follow this symbol to avoid possible injury or death.

Signal Words

These signal words used in this manual and on warning labels tell you the seriousness of particular safety hazards. The precautions that follow must be followed to prevent death, injury or damage to the equipment

- **DANGER** - This signal word is used to alert you to a hazard to unsafe practice which will result in death or serious injury
- **WARNING** - This alerts you to a hazard or unsafe practice that could result in death or serious injury.
- **CAUTION** with Alert symbol - This signal word designates a hazard or unsafe practice which may result in minor injury.
- **CAUTION** without Alert symbol - When used by itself, CAUTION designates a hazard or unsafe practice which may result in property or equipment damage.

Prevent Explosions and Fires

Fuels and their vapors will become explosive if ignited. Spilled or leaking fuels cause vapors. Even filling customer tanks will cause explosive vapors in the vicinity of dispenser or island.

No Open Flames



Open flames from matches, lighters, welding torches or other sources can ignite fuels and their vapors.

No Sparks - No Smoking



Sparks from starting vehicles, starting or using power tools, burning cigarettes, cigars or pipes can also ignite fuels and their vapors. Static electricity, including an electrostatic charge on your body, can cause a spark sufficient to ignite fuels and their vapors. After getting out of a vehicle, touch the metal of your vehicle to discharge any electrostatic charge before you approach the dispenser island.

Working Alone

It is highly recommended that someone who is capable of rendering first aid be present during servicing. Be familiar with Cardiopulmonary Resuscitation (CPR) methods if you are working with or around high voltages. This information is available from the American Red Cross. Always advise the station personnel about where you will be working, and caution them not to activate power while you are working on the equipment. Use the OSHA tag out and lock out procedures. If you are not familiar with this requirement, refer to information in the service manual and OSHA documentation.

Working With Fuel Safely

Be sure to follow information in this manual, related materials and approved industry standard practices in handling fuel and fueling equipment.

Protect Your Eyes



Spraying fuel from residual pressure in lines can cause serious eye injuries. Always wear eye protection. Gasoline spilled in eyes may cause burns to eye tissue. Rinse eyes with water for approximately 15 minutes. Seek medical advice immediately. It is not necessary to wear eye protection unless performing hydraulic service.

Use Proper Fuel Handling Techniques

- Be sure breakaways, shear valves and other emergency devices are properly installed. Refer to manufacturer's instructions for proper installation.
- Collect, transport and dispose fuel only in approved containers specifically designed for this purpose.
- Before working with any chemicals or fuels in and around a dispensing facility, read the MSDS pertaining to those chemicals as prescribed in the Occupational Safety and Health Administration Standard, 29 CFR 1910.1200. Refer to the supplier's literature.

Hydraulic Pressure Releases and Fuel Leakage

Working on hydraulic systems can result in leakage of fuel that may also be under pressure.



Turn off all circuit breakers for unit being worked on, all dispensers using the same grades of fuel, and all associated STPs.

Do not allow unauthorized or untrained individuals to service hydraulic equipment.

Shear valves, required by NFPA 30A, are intended to shut-off the flow of fuel at the dispenser base (hydraulics area) during vehicle impact or fires. A single-poppet shear valve prevents fuel from flowing from the underground tank. A double-poppet shear valve prevents fuel from flowing from the underground tank and from the dispenser.

React Quickly to Fuel Spills, Fires or Vehicle Impact



Follow these steps in the event of a fuel spill, fire, or vehicle impact.

- 1 Use station EMERGENCY TOTAL ELECTRICAL SHUT-OFF immediately. Turn off all system circuit breakers to the island. Refer to “Total Electrical Shut-Off Before Access” on page 3 for more information.
- 2 Call emergency numbers for fires, vehicle impact or any significant spills.
- 3 Use safety tape, cones or barricades to block the work area. Do not go near fuel spill or allow anyone else in the area.
- 4 Take precautions to avoid igniting fuel. Do not allow starting of vehicles in the area and immediately stop use of open flames, smoking or power tools in the area.
- 5 Provide emergency and first aid assistance. If any gasoline has been inhaled or spilled on skin, seek emergency help immediately.
- 6 Use approved and safe procedures to clean up all spills with a “fuel or gasoline absorbent” material approved by your local regulatory agencies. (Dispose of fuel and hazardous absorbent material promptly and according to the requirements of the fire department, local EPA, and federal, state or local resources.)

Working With Electricity Safely

Be sure to use safe and established practices in working with electrical devices. Poorly wired devices may cause a fire, explosion or electrical shock.

- Be sure grounding connections are properly made.
- Make sure that sealing devices and compounds are in place.
- Be sure not to pinch wires when replacing covers
- Follow OSHA Lock-Out and Tag-Out requirements. Station employees and service contractors need to understand and comply with this program completely to ensure safety while the equipment is down.

Hazardous Materials

Some materials present inside electronic enclosures may present a health hazard if not handled correctly. Be sure to clean hands after handling equipment. Do not place any equipment in mouth.

WARNING

This area contains a chemical known to the State of California to cause cancer.

WARNING

This area contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Emergency First Aid Information

WARNING



Gasoline ingested may cause unconsciousness and burns to internal organs.
Do not induce vomiting.
Keep airway open.
Oxygen may be needed at scene.
Seek medical advice immediately.

WARNING



Gasoline inhaled may cause unconsciousness and burns to lips, mouth and lungs.
Keep airway open.
Seek medical advice immediately.

WARNING



Gasoline spilled in eyes may cause burns to eye tissue.
Irrigate eyes with water for approximately 15 minutes.
Seek medical advice immediately.

WARNING



Gasoline spilled on skin may cause burns.
Wash area thoroughly with clear/water.
Seek medical advice immediately.

Informing Emergency Personnel

Compile the following information for emergency personnel:

- Location of accident (e.g. address, front/back of building, etc.)
- Nature of accident (e.g. possible heart attack, run over by car, burns, etc.)
- Age of victim (e.g. baby, teenager, middle-age, elderly)
- Whether or not victim has received first aid (e.g. stopped bleeding by pressure, etc.)
- Whether or not victim has vomited (e.g. if swallowed or inhaled something, etc.)

IMPORTANT: Oxygen may be needed at scene if gasoline has been ingested or inhaled. Seek medical advice immediately.

Pump Data

XU Pump Models	Pump Size	
	1.5"	2"
Maximum Pump Speed (RPM)	780	500
Maximum Differential Pressure	50psi (344 kPa)	
Maximum Working Pressure	175 psi (1207 kPa)	

Initial Start Up Information

Model No. _____

Serial No. _____

Date of Installation: _____

Pressure Gauge Reading: _____

Vacuum Gauge Reading: _____

Flow Rate: _____

Installation

Note: Blackmer power pumps must only be installed in systems designed by qualified engineering personnel per NFPA 30 or 30A. system design must conform with all applicable regulations and codes and provide warning of all system hazards.

WARNING

Hazardous voltage can shock, burn or cause death.

- Install, ground and wire to local and National Electrical Code requirements.
- Install an all-leg disconnect switch near the unit motor.
- Disconnect and lockout electrical power before installation or service.
- Electrical supply **MUST** match motor nameplate specifications.
- Motors equipped with thermal protection automatically disconnect motor electrical circuit when overload exists. Motor can start unexpectedly and without warning.

Pre-installation Cleaning

CAUTION

Foreign matter entering the pump will cause extensive damage. Ensure that the supply tank and intake piping have been cleaned and flushed prior to pump installation and operation.

Location and Piping

Pump life and performance will be significantly reduced when installed in an improperly designed system. Before starting the layout and installation of the piping system, review the following suggestions:

- 1 Locate the pump as near as possible to the source of supply to avoid excessive inlet pipe friction.
- 2 The inlet line should be at least as large as the intake port on the pump. It should slope downward to the pump, and should not contain any upward loops. Eliminate restrictions such as sharp bends; globe valves, unnecessary elbows, and undersized strainers.
- 3 A strainer must be installed in the inlet line to protect the pump from foreign matter. The strainer should be located at least 24 inches (0.6m) from the pump, and have a net open area of at least four times the area of the intake piping. Strainers must be cleaned regularly to avoid pump starvation.
- 4 The intake and discharge piping system must be free of all leaks.
- 5 Expansion joints, placed at least 36 inches (0.9m) from the pump, will compensate for expansion and contraction of the pipes. Contact the flexible connector/nose manufacturer for required maintenance/care and design assistance in their use.
- 6 All piping and fittings must be properly supported to prevent any piping loads from being

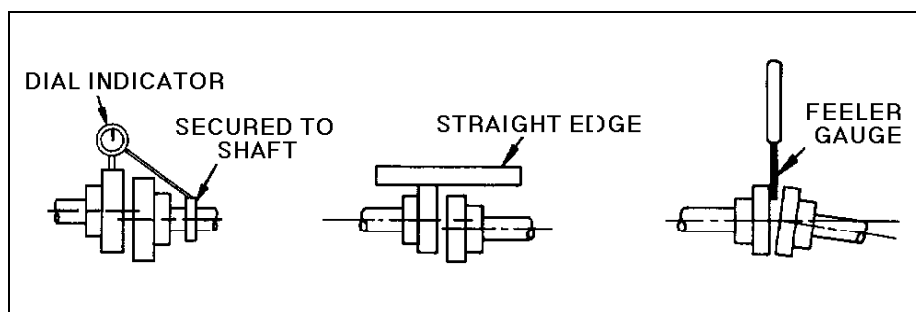
placed on the pump.

- 7 Install pressure gauges in the NPT ports provided in the pump casing to check pump performance at start up.
- 8 Check alignment of pipes to pump to avoid strains, which might later cause misalignment. Unbolt flanges or break union joints. Pipes should not spring away or drop down. After pump has been in operation for a week or two, completely recheck alignment.

Pump Mounting

It is recommended that the unit be permanently mounted by securing the base plate with adequately sized anchor bolts to a level concrete floor following recommended industry standards. A solid foundation will reduce system noise and vibration, and will improve pump performance. Refer to ANSI/HI standards or a suitable pump handbook for information on typical pump mounting and foundations. Check coupling alignment after pump and base assembly is secured to the foundation.

Figure 1: Alignment Check



Couple Alignment

The pump must be directly coupled to a gear reducer and /or driver with a flexible coupling. Both angular and parallel coupling alignment must be maintained between the pump, gear, motor and so on in accordance with manufacture's instructions. See Figure 1:Alignment Check.

- 1 Parallel alignment: The use of a laser alignment tool or dial indicator is preferred. If a laser alignment tool or dial indicator is not available, use a straightedge. Turn both shafts by hand, checking the reading through one complete revolution. Maximum offset should be less than .005 inch (0.127mm).
- 2 Angular alignment: Insert a feeler gauge between the coupling halves. Check the spacing at 90 degree increments around the coupling (four check points). Maximum variation should not exceed 0.005 (0.127mm). Some laser alignment tools will check angular alignment as well.
- 3 Replace the coupling guards after setting alignment.

⚠ WARNING



Operation without guards in place can result in serious personal injury, major property damage, or death.

Pump Rotation

To determine pump rotation:

If the intake port and the relief valve are on the right, with the drive end of the shaft pointing towards the observer, the pump in right-handed, or clockwise rotation.

Note: Confirm correct pump rotation by checking the pump rotation arrows respective to pump driver rotation.

To Change Pump Rotation

To reverse the pump rotation, remove both the inboard head and outboard head (20), and rotate the cylinder (12) 180 degrees. so that the intake port is on the opposite side. Remove and replace the vanes (14) with the relief grooves facing in the direction of pump rotation. Refer to the "Maintenance" Section of this manual for instructions on pump disassembly and assembly.

Operation


Pressure Control Valve Adjustment

Pressure Control Valves (PCV) must be set to the desired single hose operation pressure.


A retaining ring must be in place at all times during pressure control valve adjustment.

⚠ WARNING

⚠ WARNING Operation without guards in place can cause serious personal injury, major property damage or death.



⚠ WARNING Operating pump against a closed valve can cause system component failure, personal injury and property damage.



- 1 Inspect complete piping system and supports to ensure that no piping loads are being placed on the pump.
- 2 Ensure all valves and fittings in piping system are in the start-up or operating positions.
- 3 Jog the pump motor to verify proper pump rotation.


Start Up Procedures

Note: Consult the "Troubleshooting" of this manual if difficulties during start-up occur.

- 1 Start the motor. Priming should occur within one minute.
- 2 Check the vacuum and pressure gauges to ensure the system is operating within expected parameters. Record the gauge readings in the "Initial Start Up Information" section of this manual for future reference.
- 3 Inspect piping, fittings, and associated system equipment for leaks noise, vibration and overheating.
- 4 If possible, check the flow rate to ensure the pump is operating within the expected parameters. Record flow rate in the "Initial Start Up Information" section of this manual.

⚠ WARNING

⚠ WARNING Incorrect settings of the pressure relief valve can cause system component failure, personal injury and property damage.



- 5 Check the pressure setting of the relief valve by momentarily closing a valve in the discharge line and reading the pressure gauge, this pressure should be 10 - 20 psi (69 - 138 kPa) higher than the maximum system operating pressure, or the external bypass valve setting

(If equipped). DO NOT operate the pump against a closed discharge valve for more than 1 minute.

Reverse Rotation

Note: Pump should be operated in reverse rotation for no more than 10 minutes and only when a separate pressure relief valve is installed to protect the pump from excessive pressure.

It may be desirable to run the pump in reverse rotation for system maintenance. The pump will operate satisfactorily in reverse rotation for a LIMITED time, at a reduced performance level.

Flushing the Pump

- 1 To flush the pump, run the pump with the discharge valve open and the intake valve closed. Bleed air into the pump through the intake gauge plug hole or through a larger auxiliary fitting in the intake piping. Pump air for 30 seconds intervals to clean out most of the pumpage.
- 2 Run a system compatible flushing fluid through the pump for one minute to clear out the remainder of the original pumpage.
- 3 To remove the flushing fluid, follow step 1 above.

Note: Some residual fluid will remain in the pump and piping.

Note: Properly dispose of all waste fluids in accordance with the appropriate codes and regulations.

Pump Relief Valve

Note: The pump internal relief valve is designed to protect the pump from excessive pressure and must not be used as a system pressure control valve.

Pumping volatile liquids under suction lift may cause cavitation. Partial closing of the discharge valve will result in internal relief valve chatter and is not recommended. For these applications, install an external system pressure control valve and any necessary bypass piping back to the storage tank.

A system pressure control valve is also recommended when operating for extended periods (more than 1 minute) against a closed discharge valve.

Relief Valve Setting

The factory relief valve pressure setting is marked on a metal tag attached to the valve cover. It is recommended that the relief valve be set at least 10 -20 psi (69 - 138 kPa) higher than the operating pressure or the system pressure control valve setting.

⚠ WARNING

Relief valve cap is exposed to pumpage and will contain some fluid.

⚠ CAUTION

Incorrect settings of the pressure relief valve can cause system component failure, personal injury and property damage.

Relief Valve Adjustment Procedure

Note: Numerical references are included to indicate part identification, reference the exploded assembly drawing under Blackmer Parts List at the end of this manual.

- 1** To increase the pressure setting, remove the relief valve cap (1) and gasket (88) if equipped. Turn the adjusting screw (2) inward, or clockwise. Inspect R/V cap gasket (88) and replace as required. Reattach R/V cap gasket (88) and replace as required. Reattach R/V cap gasket and R/V cap if equipped.
- 2** To decrease the pressure setting, remove the relief valve cap (1) and gasket (88) if equipped. Turn the adjusting screw (2) outward, or counter clockwise. Inspect R/V cap gasket (88) and replace as required. Reattach R/V cap gasket (88) and replace as required. Reattach R/V cap gasket and R/V cap if equipped.

Refer to corresponding Blackmer Parts List for relief valve spring pressure ranges.

Pump Maintenance

DANGER

 WARNING



Failure to disconnect and lockout electrical power before attempting maintenance can cause serious personal injury or death.

WARNING



If pumping hazardous or toxic fluids, system must be flushed and decontaminated, inside and out, prior to performing maintenance.

WARNING



Failure to relieve system pressure prior to performing pump service or maintenance can cause personal injury or property damage

DANGER



When pump is running disconnecting any part of the liquid system, pipe, strainer, hose, nozzle, etc. can cause serious personal injury, death or major property damage.

Note: Maintenance shall be performed by qualified technicians only following the appropriate procedures and warnings as presented in this manual.

Scheduled Maintenance

Strainers:

Strainers must be cleaned regularly to avoid pump starvation. Schedule will depend upon the application and operating conditions.

Pump Lubrication

The pump's ball bearings must be lubricated every three months at minimum. More frequent lubrication may be required, depending on the application and the operating conditions.

Recommended Grease:

Exxon® - Ronnex MP Grease

Mobile® - Mobilith AW-2 (64353-6) Grease, or equivalent.

Greasing Procedure:

- 1 Remove the grease relief fittings (76A) from the bearing covers (27, 27A).
- 2 Slowly apply grease with a hand gun until the grease begins to escape from the grease relief fitting port. Discard excess grease in accordance with the proper codes and regulations.
- 3 Replace the grease relief fittings (76A).

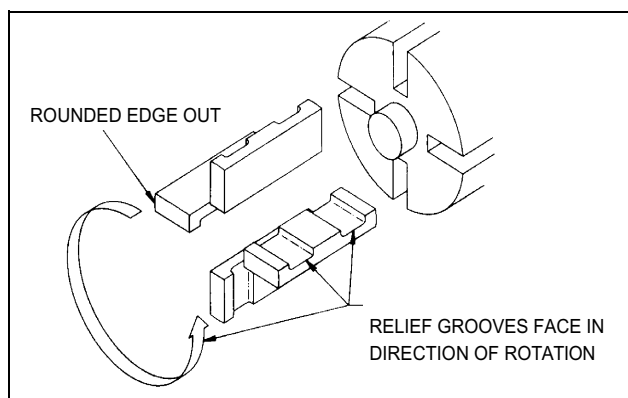
Do not over grease pump bearings. While it is normal for some grease to escape from the grease tell-tail hole after lubrication, excessive grease on pumps equipped with mechanical seals can cause seal failure. The tell-tail hole is located in the head between the bearing and the seal.

Vane Replacement

Note: Follow all hazard warnings and instructions provided in the "Pump Maintenance" section of this manual.

- 1 Drain the pump and system as required.
- 2 Remove the head assembly from the outboard (non-driven) side of the pump according to steps 5 - 8 in the "Pump Disassembly" section of this manual.
- 3 Turn the shaft by hand until a van (14) comes to the top (12 o'clock) position of the rotor. Remove the vane.
- 4 Install a new van, ensuring that the rounded edge is up, and the relief grooves are facing towards the direction of rotation. See Figure 2: Vane Installation.
- 5 Repeat steps 2 and 3 until all vanes have been replaced.
- 6 Reassemble the pump according to steps 2 - 6 and 10 - 13 of the "Pump Assembly" section of this manual.

Figure 2: Vane Installation

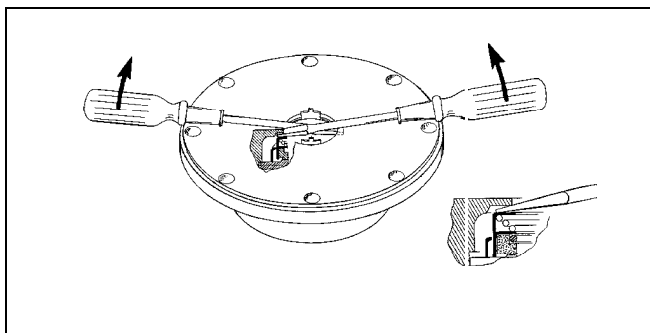


Note: Follow all hazard Warnings and Instructions provided in the "Pump Maintenance"

section of this manual.

- 1 Drain the pump and system as required.
- 2 Starting on the inboard (driven) end of the pump, clean the pump shaft thoroughly, making sure the shaft is free of nicks and burrs. This will prevent damage to the mechanical seal when the inboard head assembly is removed.
- 3 Remove the inboard bearing cover capscrews (28) and slide the inboard bearing cover (27A) and gasket (26) off the shaft. Discard the gasket. The dirt shield will come off with the bearing cover. Inspect dirt shield and replace as required.
- 4 Remove the outboard bearing cover capscrews (28) and bearing cover gasket (26). Discard the bearing cover gasket.
- 5 Remove the head capscrews (21) and carefully pry the head (20) away from the cylinder (12).
- 6 Slide the head off the shaft. The head O-ring (72), bearing (24), and mechanical seal (153) will come off with the head assembly. Remove and discard the head O-ring.
 - a. Pull the bearing (24) from the housing in the head.
 - b. To remove the mechanical seal, use two screw drivers against the backside of the seal jacket to gently push the seal from the head (see Figure 3: Mechanical Seal Removal). Use care when placing the screw drivers to prevent damage to the seal faces. Remove and discard the seal O-rings.

Figure 3: Mechanical Seal Removal



- 7 Pull the rotor and shaft (13) from the cylinder. While one hand is pulling the shaft, the other hand should be cupped underneath the rotor to prevent the vanes (14) and pushrod (77) from falling out. Carefully set the rotor and shaft aside for future vane replacement and reassembly.
- 8 Remove the remaining components from the outboard side of the pump as instructed in steps 7 and 8 above.

Pump Assembly

Before reassembling the pump, inspect all component parts for wear or damage and replace as required. Wash out the bearing/seal races of the head and remove any burrs or nicks from the

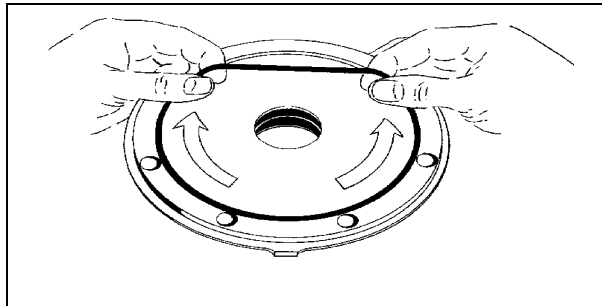
rotor and shaft.

- 1 Reassemble the outboard side of the pump first.
 - a. For a clockwise rotation pump, position the pump cylinder with the intake port to the left.
 - b. For a counterclockwise rotation pump, position the pump cylinder with the intake port to the right.
- 2 Apply a small amount of quality O-ring lubricant in the head recess. With new O-rings installed, push the mechanical seal assembly (153) into the recess of the head with the seal jacket drive tangs inward. The pin in the seal stationary seat must be between the lugs in the back of the head recess.
- 3 Apply a small amount of quality O-ring lubricant to the O-ring groove on the inside face of the head to facilitate installation. Install a new head O-ring (72) in the groove by laying the O-ring flat and starting in on one side of the groove, stretching ahead with the fingers as shown in Figure 4: Head O-Ring Installation.
- 4 Install the head (20) on the outboard side of the cylinder. Install and snug up four head capscrews (21) 90° apart.
- 5 Hand pack the ball bearing (24) with grease. Refer to "Lubrication" in the Pump Maintenance Section for the recommended grease.
- 6 Install the bearing into the head recess. The bearing balls should face outward with the grease shield inward. Ensure that bearing is fully and squarely seated against the mechanical seal.
- 7 Turn the pump cylinder around and begin assembly on the opposite inboard end.
- 8 Remove the vanes (14) and push rods (77) from the rotor and shaft assembly. Inspect for wear and damage and replace as follows:
 - a. Partially install the non-driven end of the rotor and shaft (13) into the open side of the pump cylinder.
 - b. Leave part of the rotor outside of the cylinder so that the bottom vanes can be installed and held in place as the push rods are installed in the push rod holes of the rotor. Insert the new vanes into the rotor slots with the rounded edges outward and the vane relief grooves facing towards the direction of rotation. Refer to Figure 2: Vane Installation.
 - c. After the bottom vanes and push rods are installed, insert the rotor and shaft fully into the cylinder.
 - d. Install the remaining vanes into the top positions of the rotor. Rotate the shaft by hand to engage the drive tangs of the mechanical seal jacket in the rotor slots.
- 9 Apply a thin coating of quality O-ring lubricant on the inboard shaft to aid installation. Install the inboard head, mechanical seal, and bearing as instructed in steps 2 through 6.
- 10 Rotate the shaft by hand to engage the seal drive tangs, and to test for binding or tight spots. If the rotor does not turn freely lightly tap the rims of the heads with a soft faced mallet until the correct position is found. Install all of the remaining head capscrews for each head and uniformly tighten, torquing to 25lbs ft (34 Nm).
- 11 Inspect the grease seal for wear or damage and replace as required. Grease the outside

diameter of the grease seal (104) and push it into the inboard bearing cover (27A) with the lip inward. The lip will face outward when the bearing cover is installed on the head. Attach a new bearing cover gasket (26) and bearing cover (27A) to the inboard head. Install and torque the bearing cover capscrews (28) to 15 lbs ft (20 Nm).

- 12** Attach a new bearing cover gasket (26) and the outboard bearing cover (27) to the outboard head. Install and torque the bearing cover capscrews (28) to 15 lbs ft (20 Nm).
- 13** Push the dirt shield (123A) over the inboard shaft and firmly against the bearing cover.

Figure 4: Head O-Ring Installation



Troubleshooting

This section provides troubleshooting and maintenance information for pumps.

NOTICE

Maintenance shall be performed by qualified technicians only. Follow the appropriate procedures and warnings as presented in this manual.

Troubleshooting Table

The following table contains a list of troubleshooting symptoms and probable causes.

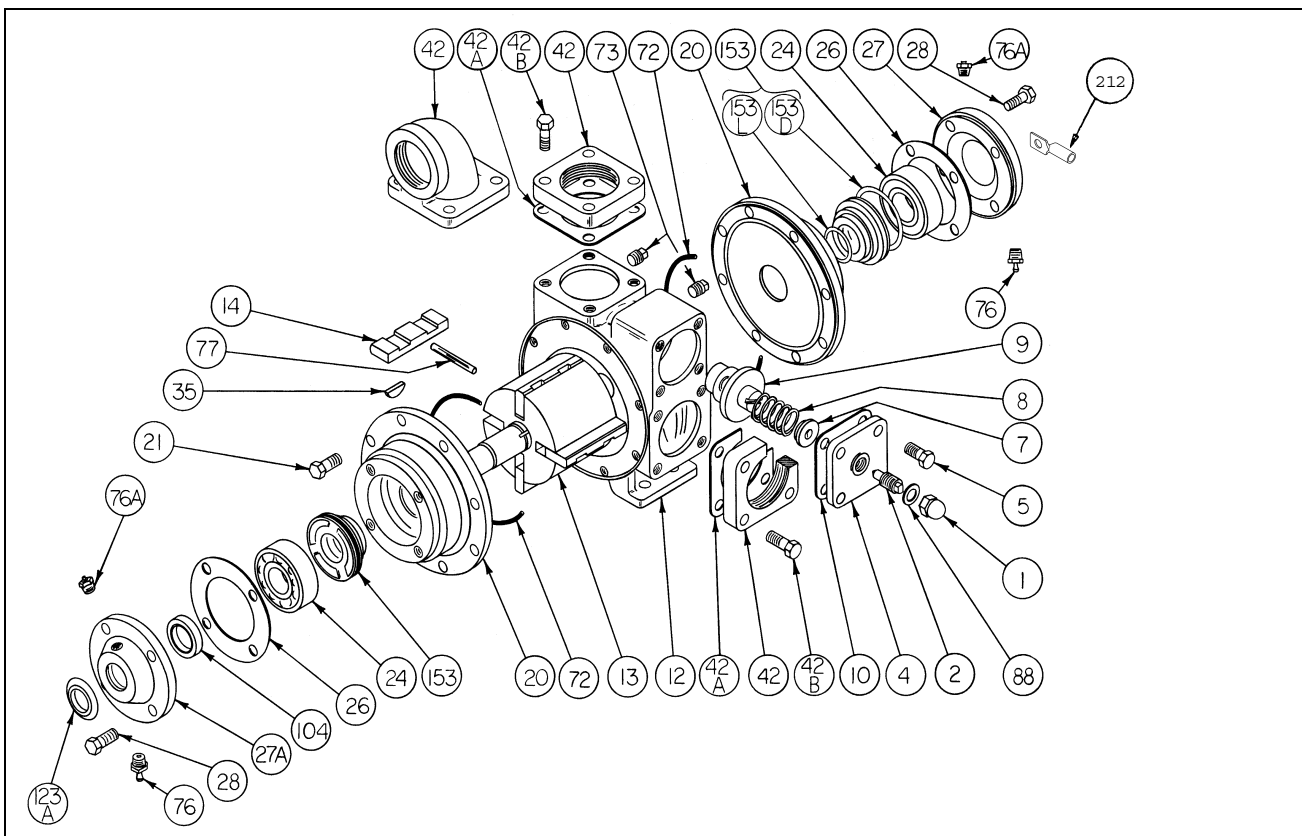
Symptom	Probable Cause
Pump not priming	<ul style="list-style-type: none"> • Pump not wetting. • Worn vanes • Suction valve closed • Air leaks in the suction line • Strainer clogged • Suction line or valves clogged or too restrictive • Pump vapor-locked • Pump speed too low for priming • Relief valve partially open, worn or not seating properly
Reduced Capacity (Flow)	<ul style="list-style-type: none"> • Pump speed too low. • Suction valves not fully open • Air leak in suction lines. • Restriction in suction lines. • Excessive restriction in the suction line (ie.: undersized piping) • Excessive system pressure (flow loss to pressure control valve) • Relief valve worn, set too low, or not seating properly • Worn or damaged parts.
Noise	<ul style="list-style-type: none"> • Excessive vacuum on the pump due to: <ol style="list-style-type: none"> a. Undersized or restricted fittings in the suction line. b. Pump speed too fast for the viscosity or volatility of the liquid. c. Pump too far from fluid source • Running the pump for extended periods with a closed discharge line. • Pump not securely mounted • bearings worn or damaged • Vibration from improperly anchored piping • Bent shaft or drive coupling misaligned • Excessively worn rotor • Malfunctioning valve in the system • Relief valve setting too low • Damaged vanes (see following category) • Vanes installed incorrectly (see "Vane Replacement")

Symptom	Probable Cause
Damaged Vanes	<ul style="list-style-type: none">• Foreign objects entering the pump• Running the pump dry for extended periods of time• Cavitation• Viscosity too high for the vanes and /or the pump speed• Incompatibility with the liquids pumped• Excessive heat• Worn or bent push rods or worn push rod holes• Settled or solidified material in the pump at start-up• Hydraulic hammer - pressure spikes• Vanes installed incorrectly (see "Vane Replacement").
Broken Shaft	<ul style="list-style-type: none">• Foreign objects entering the pump• Viscosity too high for the pump speed - EC Rotor & Shaft required for fluid viscosities over 20,000 SSU• Relief valve not opening• Hydraulic hammer - pressure spikes• Pump/driver misalignment• Excessively worn vanes or vane slots• Settled or solidified material in the pump at start-up
Mechanical Seal Leakage	<ul style="list-style-type: none">• O-rings not compatible with the liquids pumped• O-rings nicked, cut or twisted• Shaft at seal area damaged, worn or dirty• Ball bearings over greased• Excessive cavitation• Mechanical seal faces cracked, scratched, pitted or dirty

Blackmer Parts List

Kits covered in this document are as follows:

- M04731K001 Kit, Relief Valve for Blackmer XU2A UHF Pump
- M04731K002 Kit, Vanes for Blackmer XU2A UHF Pump
- M04731K003 Kit, Rebuild for Blackmer XU2A UHF Pump
- M04731K004 Kit, Master Seals for Blackmer XU2A UHF Pump



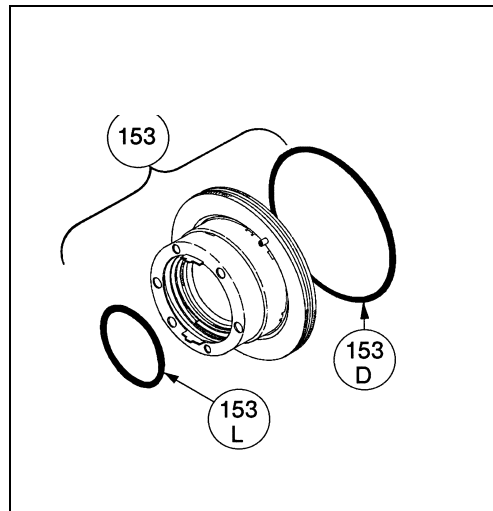
Ref. No.	Description	Kit Parts	Parts Per Pump	Part No.	Ref. No.	Description	Kit Parts	Parts Per Pump	Part No.
1	R/V Cap		1	411452	27a	Bearing Cover - Inboard		1	041431
2	Adjuster - R/V		1	431407	28	Capscrews - Bearing Cover		8	920285
4	Cover - R/V		1	411401	35	Key - Shaft	K003	1	909130
5	Capscrew - R/V Cover		4	920316	42	Flange - 1.5" NPT Flange - 2" NPT Flange Elbow - 2" NPT			651412 651411 651415
7	Spring Guide - R/V	K001	1	423955	42A	Gasket - Flange	K004 K003	2	381422
8	Spring - R/V (36 - 50 psi)	K001	1	471417	42B	Capscrew - Flange Capscrew - Flange Elbow		8	920351 920331

Blackmer Parts List

Ref. No.	Description	Kit Parts	Parts Per Pump	Part No.	Ref. No.	Description	Kit Parts	Parts Per Pump	Part No.
9	Valve - R/V	K001	1	451417	72	O-Ring - Head (Buna-N)	K002 K003	2	702054
10	Gasket - R/V	K001 K004 K003	1	531422	73	Gage Plug		2	908195
12	Cylinder		1	021403	76	Grease Fitting		2	317815
13	Rotor & Shaft XU2A XU2		1	261410 221455	76A	Grease Relief Fitting		2	701992
14	Vane - Duravane	K002 K003	4	091419	77	Push Rod	K003	2	123905
20	Head		2	031425	88	Gasket R/V Cap	K001 K004 K003	1	701981
21	Capscrews - Head		16	920331	104	Grease Seal	K004 K003	1	331918
24	Ball Bearing	K003	2	903156 903158	123A	Dirt Shield		1	701480
26	Gasket - Bearing Cover	K002 K003	2	383940	153	Mechanical Seal	K004 K003	2	331405
27	Bearing Cover - Outboard		1	041433	212	Ground Lug		1	927016

Mechanical Seal

Ref. No.	Description	Parts Per Pump	Part No.	Kit Parts
153	Mechanical Seal Complete Cast Iron Stationary Seal, Carbon SEalFace, Buna-NO-Rings. (INCN) XU2A XU2	2	331405 331403	K004
153D	O-Ring - Stationary (Buna-N)	2	702053	K002 K004
153L	O-Ring - Rotating (Buna-N) XU2A XU2	2	702162 702052	K002, K004



Blackmer Parts List

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