

POWER SOAK SERVICE MANUAL

*MODELS: E-2
B-220-H**

*Some model MX-220-HT Power Soaks were labeled with model B-220-H data plates. On any Power Soak with the pump mounted front to back and labeled as model B-220-H, refer to the MX-220-HT service manual.

**DRAWING NOT AVAILABLE AT THIS
TIME.**

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TROUBLE SHOOTING GUIDE MODELS: E-2 AND B-220-H		
PROBLEM	LOOK FOR	CORRECTION
PUMP AND HEATER WON'T WORK	1 NO WATER IN TANK.	FILL TANK WITH WATER.
	2 WATER SENSOR DIRTY.	CLEAN SENSOR.
	3 NO POWER TO UNIT.	RE-SET BREAKER IN CUSTOMER BREAKER PANEL.
	4 BLOWN FUSES.	REPLACE BLOWN FUSE. REFER TO PARTS LIST FOR CORRECT FUSES.
	5 LOOSE WIRES.	TIGHTEN WIRES.
	6 LIQUID LEVEL CONTROL SENSITIVITY SETTING TO LOW.	SEE PAGE 2.
	7 DEFECTIVE LIQUID LEVEL CONTROL OR SOCKET.	CHECK AND REPLACE IF NECESSARY.
HEATER WORKS- PUMP DOES NOT	1 TRIPPED OVERLOAD.	PUSH BLUE RESET BUTTON IN. OVERLOAD SETTING IS 10.
	2 LOOSE WIRES.	TIGHTEN WIRES.
	3 DEFECTIVE SWITCH.	CHECK AND REPLACE IF NECESSARY.
	4 DEFECTIVE CONTACTOR.	CHECK AND REPLACE IF NECESSARY.
	5 DEFECTIVE OVERLOAD.	CHECK AND REPLACE IF NECESSARY.
	6 DEFECTIVE PUMP MOTOR.	CHECK AND REPLACE IF NECESSARY.
OVERLOAD TRIPS	1 LOW VOLTAGE TO UNIT.	CHECK WITH VOLT METER WHILE RUNNING.
	2 IMPROPER SETTING ON OVERLOAD.	SET ON "10".
	3 DEBRIS IN PUMP INTAKE.	CLEAN.
	4 DEBRIS IN IMPELLER.	REMOVE PUMP AND CLEAN.
	5 DEFECTIVE CONTACTOR.	CHECK AND REPLACE IF NECESSARY.
	6 DEFECTIVE OVERLOAD.	CHECK AND REPLACE IF NECESSARY.
	7 DEFECTIVE PUMP MOTOR.	IF AMP DRAW GREATER THAN 9.5 AND ALL OF THE ABOVE CHECK OUT REPLACE MOTOR.
PUMP WORKS- HEATER DOES NOT	1 LOOSE WIRES.	TIGHTEN WIRES.
	2 DEFECTIVE SWITCH.	CHECK AND REPLACE IF NECESSARY.
	3 DEFECTIVE HEAT ELEMENT.	CHECK AND REPLACE IF NECESSARY.
	4 DEFECTIVE HEAT CONTROLLER.	CHECK AND REPLACE IF NECESSARY.
	5 DEFECTIVE THERMOCOUPLE.	CHECK AND REPLACE IF NECESSARY.
	6 DEFECTIVE CONTACTOR.	CHECK AND REPLACE IF NECESSARY.
INTERMITTENT RUNNING	1 SEE 2, 5, 6, AND 7 UNDER PUMP AND HEATER WON'T RUN.	
PUMP LEAKS	1 PUMP CASING PLUG LOOSE OR DEFECTIVE.	TIGHTEN OR REPLACE.
	2 DEFECTIVE PUMP SEAL.	REPLACE.

THE FOLLOWING CHECKS SHOULD ONLY BE PERFORMED BY QUALIFIED TECHNICIANS USING EXTREME CAUTION. ELECTRICAL HAZARD TO UNTRAINED PERSONNEL MAY RESULT IN ELECTRICAL SHOCK, BURNS OR DEATH.

POWER SHOULD BE TURNED OFF AT BREAKER AT ALL TIMES, UNLESS A VOLTAGE CHECK IS BEING PERFORMED.

LIQUID LEVEL CONTROL AND SENSOR

The liquid level control sends a trickle current (1/1000 amp) out terminal 5 to the liquid level sensor. If there is water in the wash sink, the current passes through it to the wash sink wall and back to the liquid level sensor to terminal 6. On some machines, the wire from terminal 6 is hooked up to a second probe instead of the wash sink wall. Reversing these 2 wires will not affect the operation. After the circuit is complete, a 10 second time delay is initiated. The purpose of this delay is to prevent rapid cycling of the relay should the water rise and fall below the sensor while the sink is filling. At the end of the time delay, the relay in the liquid level control will close sending current to operate the various components in the control panel. The sensitivity of the liquid level control is adjustable*. To adjust the sensitivity, clean the liquid level sensor, **TURN POWER OFF AT BREAKER PANEL** and check the resistance between the liquid level sensor and the wash sink wall (or second probe). It should be 25,000 to 35,000 ohms. If not, adjust the sensitivity as required. 25,000 to 35,000 ohms is generally between 0 and 1 on the dial. If there is no resistance, the wires from terminal 5 and 6 to the liquid level sensor and sink wall are loose, or the liquid level control or socket is defective.

If adjusting the sensitivity setting does not allow the machine to operate, the liquid level control can be checked as follows:

- 1: Set sensitivity as indicated above.
- 2: Make sure wash sink is filled to the fill line.
- 3: Remove liquid level control from socket.
- 4: Check voltage across terminals 2 and 7 of the socket and 1 and 7 of the socket. It should be 208-230v. If voltage is 208-230v, go to step 5. If not, check the breaker, fuses, and wiring to the socket. Make the necessary repair.
- 5: **TURN POWER OFF AT BREAKER PANEL.** Make sure there is continuity between terminal 3 on the socket and terminal 4 on the pump on/off selector switch. If not, trace the wire and make the necessary repair.
- 6: Reinstall the liquid level control. Turn power on. Wait 10 seconds and check the voltage across terminal 4 on the pump on/off selector switch and L2 incoming power. If voltage is 208-230v, the liquid level control is ok. If no voltage, the liquid level control or socket is defective.

*Replacement liquid level controls may be factory fixed and not adjustable.

THERMAL OVERLOAD

The blue reset button should be in the up position (manual reset). The dial should be set at 10. The trip indicator is located between the dial and the symbols "LR2".

The thermal overload can be checked as follows:

- 1: **TURN POWER OFF AT BREAKER PANEL.** Make sure the connections at terminals 1, 2, 3, 4, 5, 6 are tight and the thermal overload is wired per the wiring diagram on page 7.
- 2: Turn power on.
- 3: Check voltage across terminal 1 and L2 incoming power. It should be 208-230v. If voltage is 208-230v, go to step 4. If not, check the breaker, fuses, and wiring to terminal 1. Make the necessary repair.
- 4: Check voltage across terminal 6 and L2 incoming power. It should be 208-230v. If no voltage is measured, the thermal overload is defective.
- 5: **TURN POWER OFF AT BREAKER PANEL.** Remove the wires from terminals 95 and 96.
- 6: Make sure the thermal overload is not tripped. If the thermal overload is tripped, reset it. If the thermal overload has tripped recently, you may have to wait several minutes for it to cool down before it will reset.
- 7: Check for continuity across terminals 95 and 96. If no continuity, the thermal overload is defective or the reset is tripped.

PUMP CONTACTOR/HEATER CONTACTOR

If there is 208-230v across the coil and the contactor does not pull in, the contactor is defective.

If there is 208-230v across terminals L1 and L2 and the contactor is pulled in, but no voltage across terminals T1 and T2, the contactor is defective.

HEAT CONTROLLER

The wash tank temperature can be adjusted by turning the setting dial on the temperature controller.

The "set" position is the normal setting and is approximately 112 to 115 degrees. A red indicator light next to the words "heater on" will light when the controller is sending current to the heater contactor.

Two different heat controllers have been used. They both function the same way, but the wiring terminals are labeled differently. A cross reference is below.

TERMINAL ON MODEL 365

TERMINAL ON MODEL 102

3	TC+
5	TC-
9	NO
10	COM
11	L-1
12	L-2

The white wire from the thermocouple is connected to terminal 3 (TC+). The red wire from the thermocouple is connected to terminal 5 (TC-). Terminals 10 (COM) and 11 (L-1) receive L1 power from the liquid level control through the heater on/off selector switch. Terminal 12 (L-2) receives L2 power from line 2. Terminal 9 (NO) is connected to the heater contactor. When the heat controller senses that the water is cooler than the set temperature, an internal switch closes between terminal 10 and 9 sending L1 power to the heater contactor. An external contact suppression device (quench arc)

is connected across terminals 9 (NO) and 12 (L2).

The heat controller can be checked as follows:

- 1: Make sure the heat controller is wired as indicated above.
- 2: **TURN POWER OFF AT BREAKER PANEL.** Check for continuity across terminals 3 (TC+) and 5 (TC-). If no continuity, replace the thermocouple.
- 3: Turn power on. Turn heater on/off selector switch to "on". Turn the dial to 140 degrees. Allow a few minutes for the heat controller to react to the changed dial setting. Make sure the water temperature is less than 135 degrees.
- 4: Check voltage across terminal 10 (COM) and L2 incoming power and terminal 11 (L-1) and L2 incoming power. It should be 208-230v. If voltage is 208-230v, go to step 5. If not, check the breaker, fuses, switch, liquid level control and wiring. Make the necessary repair.
- 5: Check voltage across terminal 12 (L-2) and L1 incoming power. It should be 208-230v. If voltage is 208-230v, go to step 6. If not, check the breaker, fuses and wiring. Make the necessary repair.
- 6: Check voltage across terminal 9 (NO) and L2 incoming power. It should be 208-230v. If no voltage, the heat controller or thermocouple is defective. Note: The red "heater on" indicator light should also be on. If voltage is 208-230v, go to step 7.
- 7: Turn the dial to 100 degrees. Allow a few minutes for the heat controller to react to the changed dial setting. Make sure the water temperature is greater than 105 degrees.
- 8: There should be no voltage across terminal 9 and L2 incoming power. If there is 208-230v, the heat controller or thermocouple is defective. Note: The red "heater on" indicator should be off.

HEAT ELEMENT

Check the heat element as follows:

- 1: **TURN POWER OFF AT BREAKER PANEL.**
- 2: Make sure the connections at terminals T1 and T2 on the heater contactor are tight and the heater contactor is open.
- 3: Check the resistance between terminals T1 and T2 on the heater contactor. Resistance should be 21 to 24 ohms. If not, the heat element is defective. If there is no resistance, check the wiring connections in the heater box before assuming the element is defective.
- 4: If there is no water in wash sink, fill until the heat element is completely submerged.
- 5: Set test meter to read resistance and check for resistance between terminals T1 on the heater contactor and ground and T2 on the heater contactor and ground. If there is measured resistance to ground, the heat element is defective.

ON / OFF SELECTOR SWITCHES

TURN POWER OFF AT BREAKER PANEL. In the "off" position, there should be no continuity across terminals 3 and 4. In the "on" position, there should be continuity between terminals 3 and 4. Remove the wires before checking for continuity.

TRANSFORMER

If there is 208-230v going to the primary there should be 23-25v output from the secondary. If not, the transformer is defective.

PUSH ON / PUSH OFF START AND STOP BUTTONS

TURN POWER OFF AT BREAKER PANEL. The stop button should have continuity at rest and no continuity when pushed in. The start button should have no continuity at rest and continuity when pushed in. Remove the wires before checking for continuity.

PUMP PARTS

23989 MOTOR-BALDOR 2HP
 26572 FAN-BALDOR MOTOR
 26573 FAN-RELIANCE MOTOR
 RS1011 PUMP CLEANOUT PLUG
 22417 PUMP WITH MOTOR, IMPELLER, AND GASKET (BALDOR/WORTHINGTON 1 HP) OBSOLETE - USE 24150
 23154 PUMP WITH MOTOR, IMPELLER, AND GASKET (RELIANCE/WORTHINGTON) OBSOLETE-USE 24150 AND 24221
 24150 PUMP WITH MOTOR, IMPELLER, AND GASKET (BALDOR/WORTHINGTON 2HP)
 24463 SEAL KIT-PUMP (WORTHINGTON)
 21356 FRAME ADAPTOR WITH WEAR RING (WORTHINGTON)
 22446 SHAFT SLEEVE (WORTHINGTON)
 25976 SNAP RING (WORTHINGTON)
 21884 IMPELLER (WORTHINGTON)
 25975 IMPELLER KEY (WORTHINGTON)
 19345 GASKET-PUMP CASING (WORTHINGTON)
 24221 3/4" CONDUIT BOX
 22485 PUMP WITH MOTOR, IMPELLER, AND GASKET (BALDOR/BURKS) OBSOLETE-USE 23989 AND 22462
 23293 PUMP WITH MOTOR, IMPELLER, AND GASKET (RELIANCE/BURKS) OBSOLETE-USE 23989, 24221, AND 22462
 22462 SEAL KIT-PUMP (BURKS)
 22488 GASKET-PUMP CASING (BURKS)

HEATER BOX PARTS

RS1487 GASKET HEATER BOX
 19156 HEATER BOX RIGHT HAND UNITS
 19155 HEATER BOX LEFT HAND UNITS
 CB1327 CAP NUT (4)
 21203 VENT PLUG
 18797 TERMINAL BLOCK
 17257 SENSOR PROBE TWO PRONG (BEFORE 6-1-96)
 17265 GASKET-SENSOR PROBE (BEFORE 6-1-96)
 23987 SENSOR PROBE SINGLE PRONG (AFTER 6-1-96)
 23988 GASKET-SENSOR PROBE (AFTER 6-1-96)
 24030 THERMOCOUPLE
 19443 GASKET-THERMOCOUPLE
 19296 QUENCH ARC
 20175 HEAT CONTROL
 17263 SINK HEATER
 17137 GASKET-HEATER

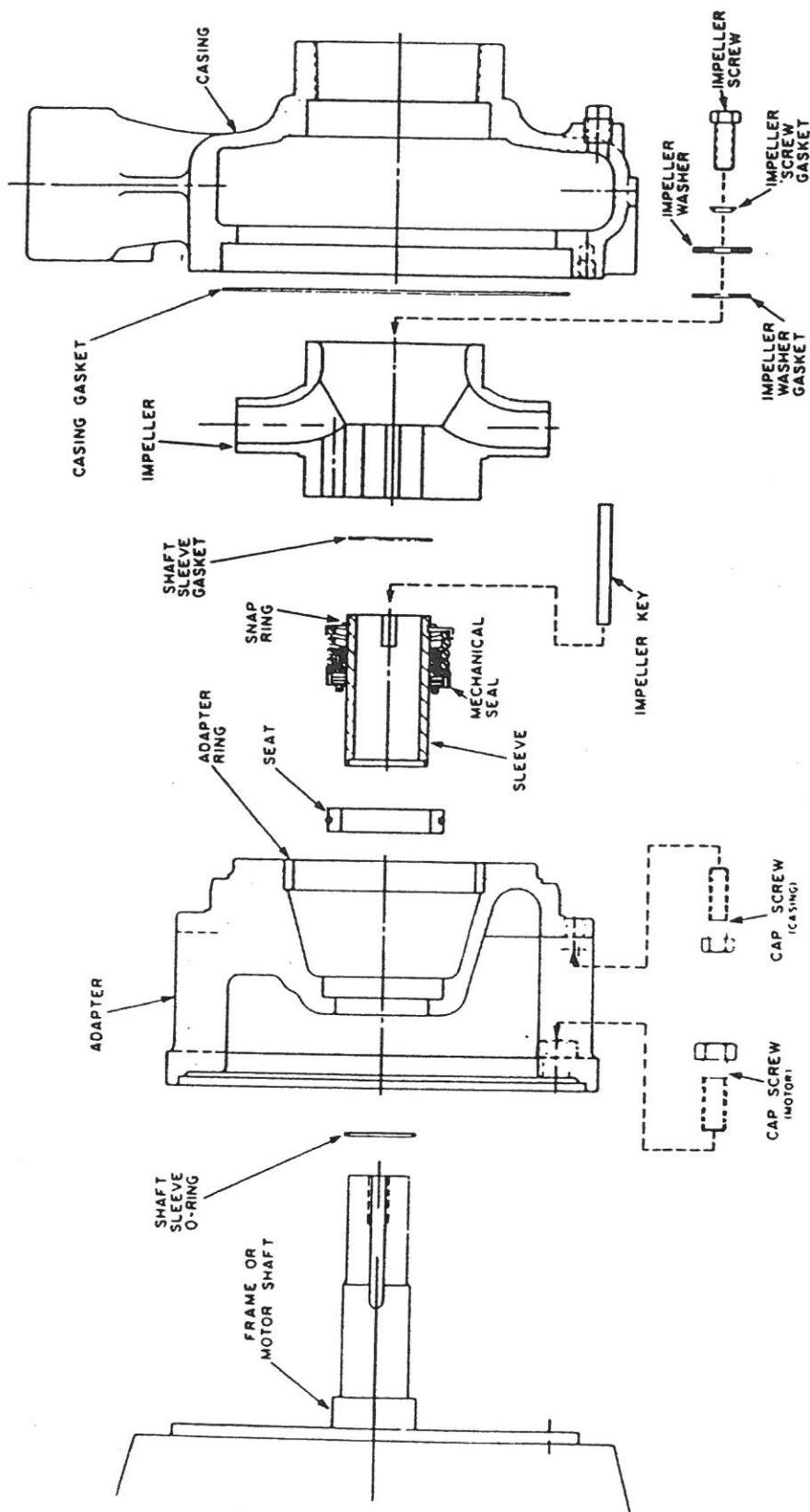
CONTROL PANEL PARTS

103-052 SCREW-CONTROL PANEL (2)
 RS1485 GASKET-CONTROL PANEL
 21475 SWITCH-OPERATOR-ILLUMINATED (2) BEFORE 10-1-97
 21482 SWITCH-MODULE- ILLUMINATED (2) BEFORE 10-1-97
 21481 LIGHT BULB (2) BEFORE 10-1-97
 21457 SWITCH OPERATOR-SOLID (2) AFTER 10-1-97
 23727 SWITCH MODULE-SOLID (2) AFTER 10-1-97
 17394 CONTACTOR-PUMP & HEATER
 17394 CONTACTOR-HEATER
 19885 LIQUID LEVEL CONTROL
 21473 SOCKET-LIQUID LEVEL CONTROL
 21472 HOLD DOWN CLIP-LIQUID LEVEL CONTROL (2)
 47395 FUSE 1 BUSSMAN FNQ-30 OBSOLETE USE 20637 LP-CC-30
 17395 FUSE 2 BUSSMAN FNQ-30 OBSOLETE USE 20637 LP-CC-30
 20280 FUSE 3 BUSSMAN ABC 2
 17376 FUSE BLOCK-MAIN (2) OBSOLETE-USE (1) 23579 AND (1) 23580
 23579 FUSE BLOCK-MAIN
 23580 MOUNT-FUSE BLOCK
 RS1471 GROUNDING BLOCK
 20281 FUSE BLOCK-CONTROL CIRCUIT
 17396 OVERLOAD
 19458 OVERLOAD ADAPTOR PLATE
 19112 POWER CORD (OBSOLETE)

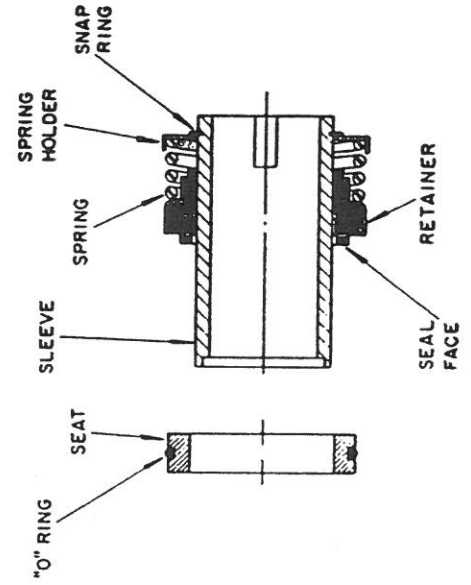
MISC PARTS

RS1492 REMOVABLE BAFFLE 3"
 23511 REMOVALBE BAFFLE 4"
 RS1439 INSIDE HEATER COVER
 RS1199 WING NUT (3)
 23930 KFC-SIGN PACK
 100-343 "O" RING - LEVER DRAIN

POWER SLURRY PUMP



RW-177898



Power Soak Seal Repair Kit

DISASSEMBLY PROCEDURE

1. Remove casing cap screws, which hold adapter to casing.
2. Pry adapter from casing with pry bar or large screwdriver and remove adapter and motor from casing.
3. Using a suitable holder to keep impeller from turning, remove impeller cap screw washer and gaskets. Be careful not to damage precision surfaces of impeller.
4. Remove impeller and impeller key from shaft.
5. With impeller and key removed, the shaft sleeve and the mechanical seal assembly can be removed as a unit.
6. Remove adapter cap screws, which hold adapter to motor.
7. Remove adapter from motor by prying with pry bar or screwdriver.
8. With adapter removed, the seal and seat ring can be pushed out with the fingers.

INSPECTION AND REPAIR OF COMPONENTS

With pump liquid end disassembled, clean all parts and check for worn and damaged areas. It is seldom economical on these pumps to repair damaged or worn parts. Therefore, when a part is found to be unusable, it should be replaced.

CASING

Clean and inspect gasket surfaces for damaged areas that would cause leaks. Check wearing ring surfaces for excessive wear.

IMPELLER

Check wearing ring surfaces for excess wear and gasket surfaces of impeller hub for damage. If excessively worn or eroded, the impeller should be replaced.

ADAPTER

Clean and inspect gasket surfaces. Remove any dirt or scale from mechanical seal cavity. Check adapter ring for wear and excess clearance.

SHAFT SLEEVE

Check for any damage to gasket surface on impeller end, O-ring groove on motor end, or outside diameter where rubber bellow of mechanical seal contacts.

MECHANICAL SEAL

It is not recommended that the mechanical seal be reused unless the pump has never been run. A mechanical seal is like a gasket in this respect. Using an old one leaves too much chance of failure to make the gamble worthwhile, considering the usual cost of installing and removing a pump from its system.

MOTOR OR FRAME SHAFT

Check the shaft for any bent condition by installing the shaft sleeve, clamping a dial indicator to the motor face and reading runout at center of sleeve while turning shaft by hand. Maximum allowable runout is .002 inches for proper performance of mechanical seal. Anything beyond this will require repairs to the motor, which are beyond the scope of these instructions. Check motor fan and shroud for damage and clean, if necessary.

ASSEMBLY PROCEDURE

The Power Soak pumps are easy to put together. The hardest part, requiring the most care, is installation of the mechanical seal parts

Study the exploded diagram and become familiar with the name of each part. The diagram shows the relative order of assembly, but also **READ THE FOLLOWING INSTRUCTIONS.**

1. *Make sure all of the parts are clean and ready for assembly.* This means no dirt or pieces of old gasket in the joints between the motor, adapter and casing. Make sure the parts around mechanical seal are clean. Dirt and misalignment will ruin a mechanical seal.
2. *Install the shaft sleeve o-ring* in the place against the motor shaft shoulder. Don't let it be cut by the sharp edges of the keyway.
3. *Push the mechanical seal seat squarely in the adapter.* Use fingers only. A little oil can be wiped on the outside of the seat ring to make it slip easily into position. Don't let it be cut by the edges of the adapter. Don't install the adapter on the motor face yet.
4. *Check the shaft sleeve fit on the motor shaft.* It should slide easily into place. If it doesn't, find out why. Do not try to drive the shaft sleeve onto the shaft with a hammer. Check to make sure there are no score marks or scratches on the sleeve.
5. *Install the adapter* and tighten the cap screws, which hold it to the motor face.
6. *Remove any dirt particles and coat the lapped face of the mechanical seal with clean SAE 10 or SAE 20 oil. DO NOT USE GREASE.*
7. *Slide the shaft sleeve on the shaft* so that it covers the shaft sleeve o-ring and butts against the shoulder.
8. *Coat the shaft sleeve lightly with clean oil or grease.*
9. Carefully remove any particles from the lapped face of the carbon washer (part of the mechanical seal) and coat it with clean SAE 10 or SAE 20 oil. DO NOT USE GREASE
10. *Install the mechanical seal on the shaft sleeve by hand.* A twisting motion may be needed to make it ride smoothly over the shoulders on the sleeve. Push it by hand until it contacts the seat, make sure the spring and spring holder line up properly.
*(see note)
11. *Install the snap ring* using one hand to hold the snap ring pliers and the other hand to compress the spring. When the spring pressure is released, the spring will push the shaft sleeve outward, exposing the shaft sleeve o-ring to view temporarily.
12. *Install the impeller key*, first twisting the shaft sleeve on the shaft until the keyways line up.
13. *Install the shaft sleeve gasket.*
14. *Place the impeller on the shaft* engaging the key.
15. Put the impeller screw gasket, impeller washer and impeller washer gasket together on the impeller screw as an assembly.
16. *Install the impeller screw subassemblies.* With one hand, push the impeller back against the mechanical seal spring and with the other hand turn the impeller screw in *hand tight*.
17. *Now check to see if the shaft sleeve has moved to its final position covering most of the shaft sleeve o-ring.*
18. *Tighten the impeller screw 15 lb.ft. Torque.*
19. *Install the casing gasket* on the shoulder of the adapter.
20. *Install the casing and tighten all the casing cap screws.*
21. *Turn the motor shaft and check for any bindings or rubs caused by such things as damaged or mis-aligned parts. Re-check all casing bolts for tightness. Tighten casing bolts one at a time, turning the motor shaft, until rub disappears.*

***NOTE:**

An optional procedure for assembly of the mechanical seal consists of mounting the mechanical seal and the snap ring on the sleeve as a subassembly, which is then placed in position on the motor shaft. Experienced pump mechanics may find that this is more convenient as long as they recognize that this way introduces some additional hazards of damaging or improper assembly of precision seal parts.