CH&E

#8976TAQMC
6” Vac-Assist Trash Pump
with Automatic Control and Quiet Package
Operation & Maintenance Manual

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SPECIFICATIONS

Engine:

Make/Model: John Deere 4045DF150
HP @ RPM (Max.): 80 @ 2500
HP @ RPM (Cont.): 72
No Load RPM: 2200
No. of Cylinders: 4
Displacement: 276 cu. in. (4.5L)
Cooling System: Liquid
Flywheel: 10" Over-center Clutch Type
Fan guard
Bell Housing: SAE #3
Electronic Control with digital readout of RPM, Fuel Level, Pump Vacuum, Oil pressure, Water temperature, Battery voltage; includes Automatic Shutdowns of Low Oil Pressure, High Water Temp., Over speed, Under speed,
Records total operating time and time to maintenance
Operate pump in manual mode or automatic (float control) mode

Fuel Tank:

87 gallon capacity
Tank, sound enclosure, and pump/engine are integral unit, and easily removed from the trailer by removal of six bolts.
Tank fill on outside of enclosure.
Run time: Approximately 24-30 hours depending on load

Trailer:

Axle: 6000 lb. capacity, rubber torsion axle w/electric brakes
Wheels: ST225/75-R15 tires; load capacity "D" (2540 lbs.); mounted on 15" rims with 6 bolt on a 5 ½" bolt circle
Fenders: Heavy duty steel fenders
Jacks: (3) side wind; 2000-lb. capacity
Tail Lights: Sealed, rubber grommet mounted; wiring protected in trailer frame
Hitch: 3" I.D. pintle eye or 2 5/16" ball coupler
Storage Box: In 'A' frame with hinged, lockable lid.

Enclosure:

All aluminum construction, fully insulated with baffles at the intake openings and with three lockable access doors.
Three additional bolt on access panels for easy maintenance.
See through panel on access door at location of engine control panel.
Single point lifting eye and 4 point tie down slots for easy hoisting and transport.

Pump:

6" NPT female suction
6" NPT female discharge
Maximum capacity: 1550 gpm (93,000 gph)
Maximum total head: 145 feet
Maximum suction lift: 28 feet
Maximum spherical solids: 3"
Impeller-3 vane, ductile iron
Volute-ductile iron, replaceable

Bearings:

Double row ball bearing
Single row ball bearing

SPECIFICATIONS *(cont.)*

Bearing Lubrication:
NLGI Grade 2 high temperature, lithium complex grease

Shaft:
4340 heat-treated alloy

Seal:
Single mechanical
Faces: Silicon Carbide/Tungsten Carbide
Elastomer: Viton
Steel Parts: Type 304 stainless steel

Seal Lubrication:
Synthetic ISO grade 46 oil

Discharge Check Valve:
Flapper style, Viton elastomer

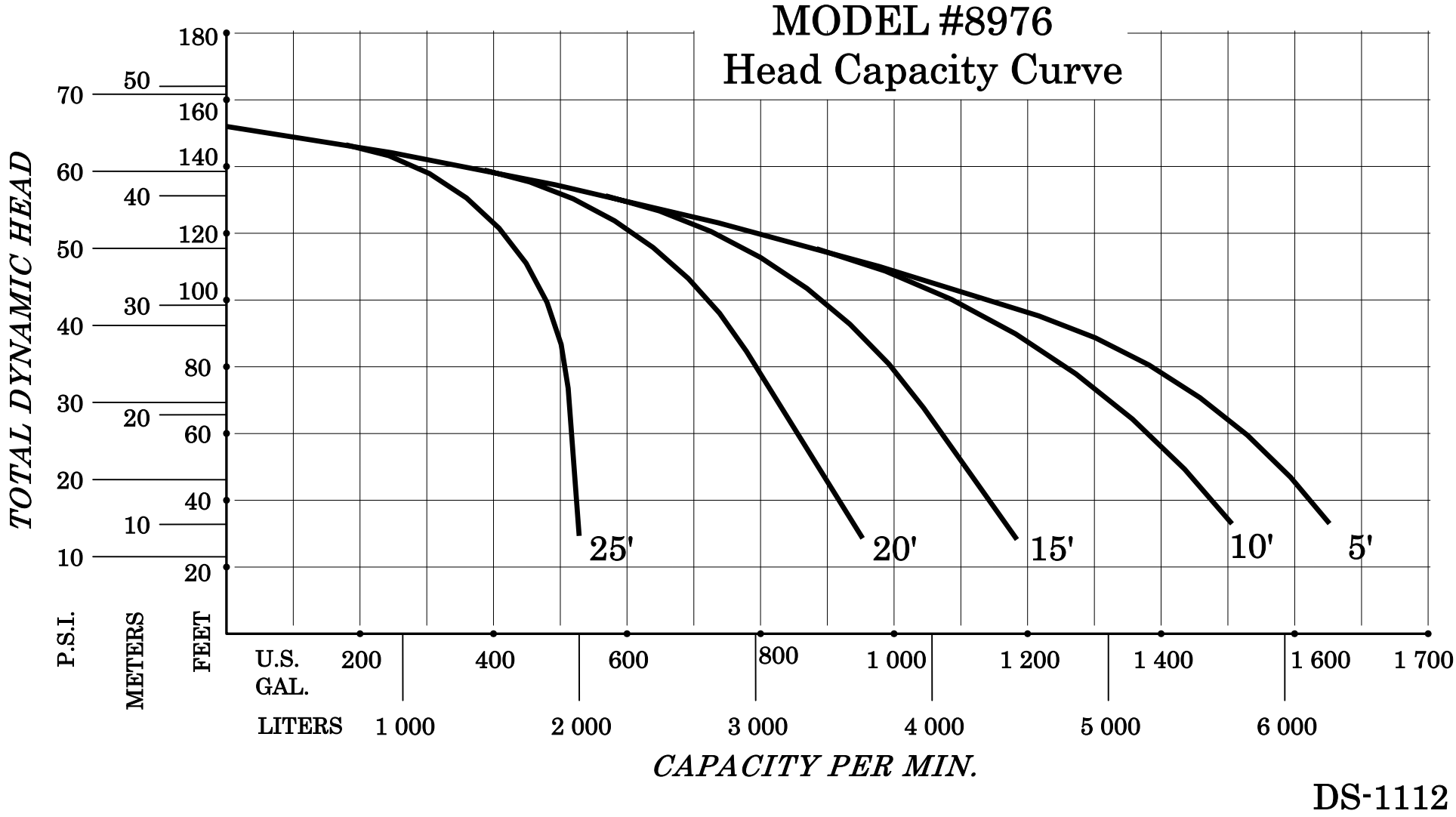
Compressor:
Holset QE296 13 cfm @ 100 psi
Integrally mounted to engine auxiliary drive
Water cooled; Oil lubed from engine

Eductor:
27” hg maximum vacuum @ Input pressure: 60 psi & Air usage: 12.5 scfm
Maximum Induced flow: 6.2 scfm

Priming Valve:
Float actuated shutoff in protected chamber

Priming System Control:
12 VDC electro-mechanical relay/timer with pressure switch activation to open or close solenoid valve
Choice of Automatic or Manual control

Head Capacity Curve



ABS Dewatering

Operation and Maintenance Manual

#8976TAQMC Series 6” Vac-Assist Trash Pump with Automatic (Float) Engine Control

Read engine manual for maintenance instructions.
Read pump safety manual.

Prepare Pump for Operation

CAUTION: Pump unit is shipped with the ‘knife’ switch on the battery neg term in the open position. Before closing the switch to provide power**,** check the position of the ‘ENGINE START’ toggle switch on the control panel. The switch must be in the OFF position until ready to operate. The MANUAL START position will initiate a start and run sequence - i.e. THE ENGINE WILL START!. The engine is controlled by the float positions when the toggle switch is in the REMOTE START position.

1) Level the pump assembly on solid ground. Screw jacks down to ground.
2) Check fluid levels:
    a) Engine oil and coolant
    b) Seal chamber oil (¾ up the sight level glass in the side of the bearing tube)
    c) Fuel (See Control panel operating instructions below)
3) Set up the floats – Plug the low level float in the lower receptacle on the back of the enclosure and plug the high level float in the upper receptacle. (Both floats are Yellow and of the ‘NO’ switch design)
4) Connect hoses (fittings) as required to the suction and discharge ports of the pump. Support hoses/piping so that there is a maximum load on the pump ports of approximately 250 lbs. Make sure good gaskets are in place in the hose fittings. Use pipe joint compound on pipe threads to ensure tight joints. Use the strainer provided for the end of the suction hose.
5) Close drain valves (in pump case and in the bottom of the discharge check valve) and vacuum-break valve (on top of float chamber).
6) Set PRIMING SYSTEM toggle switch on the control panel to the “AUTO” position. (See PRIMING SYSTEM OPERATING INSTRUCTIONS, on page 10, for explanation of other choices for the switch position.)

Warning: Do not run engine indoors or in a confined area where deadly exhaust fumes could accumulate

7) Set ENGINE START toggle switch on the control panel to the MANUAL START position. The engine will start after a few second delay. The priming system will engage after a 15 sec delay after the engine starts. Observe overall operation with the engine idling-look for loose fittings, etc. Bring engine up to speed 2200 rpm max (throttle control knob is mounted under the control panel). Leave throttle in 2200rpm position. Set toggle switch to Automatic position and the pump is ready to operate under control of the floats.

Caution: The compressor, compressor piping, eductor, and eductor exhaust will be very hot-**DO NOT TOUCH!**

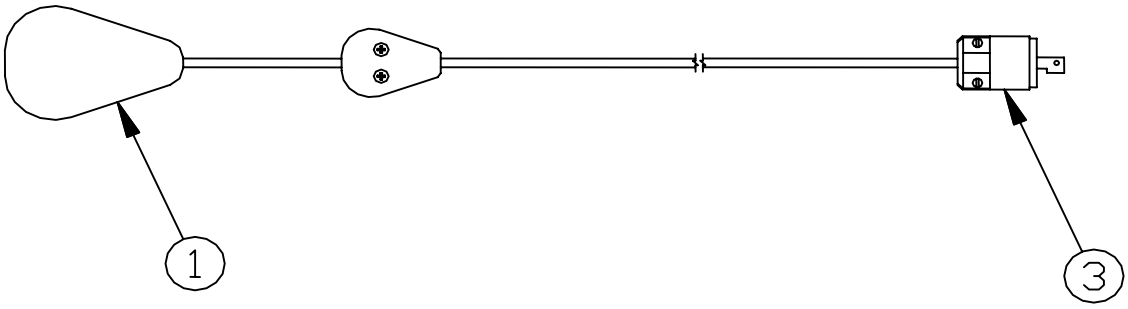
Priming time will depend on suction lift and length of suction hose (pipe). If the pump has not primed within five minutes, and the end of the suction line is known to be in water, shut the engine off and trouble shoot the problem (See TROUBLE SHOOTING, on page 13)

Float control

For automatic control of the pump for 'pump down' situations, two floats with fifty feet of cord have been provided. The floats are normally open switch.

Plug in receptacles are mounted to the back of the sound enclosure. The upper receptacle is for the high level float and the lower receptacle is for the low level float.

REF NO.	PART NUMBER	DESCRIPTION	QTY
1	W133-003	FLOAT SWITCH (YELLOW) N/O SPST	2
3	W90-003	PLUG L2-20P 2 POLE 2 WIRE 20A 250V	1 (PER FLOAT)
4 (not shown)	W90-011	RECEPTACLE L2-20R	1 (PER FLOAT)
5 (not shown)	W100-050	OUTLET BOX, ALUM	1 (PER FLOAT)
6 (not shown)	W100-060	COVER, WEATHERPROOF SINGLE HOLE	1 (PER FLOAT)



Engine control panel operation

Engine/Pump Operation:

Manual Operation

1. Close knife switch on battery negative terminal
2. Set 'Pump System Prime' toggle switch to 'Auto' for automatic operation of the priming system. (The priming system will operate whenever the pressure in the pump case is less than 3psi. To operate the priming system manually, flip the toggle switch to 'Manual' and to 'Off' to shut it off.)
3. Set 'Engine Start' toggle switch to 'Manual Start'. After a few second delay the engine will crank and start. (If the engine does not start, it will go through 3 crank cycles of 15 sec on (cranking) and 15 sec between cranks. Reset toggle switch to continue.)
4. The priming system will come on 15 sec after the engine starts (if the 'Pump System Prime' toggle switch is in the 'Auto' position).
5. Set engine speed manually (2200rpm max) with the throttle control knob mounted below the control panel.
6. Shut engine OFF by flipping the 'Engine Start' toggle switch to the 'OFF' position.

Automatic Operation (Float Control)

1. First set throttle position at desired RPM through Manual Operation (see above) and leave the throttle in that position and shut off engine.
2. Set floats for desired levels of ON/OFF operation (pump down application). The low level float plugs into the lower receptacle on the back of the enclosure and the high level float plugs into the upper receptacle.
3. Set 'Engine Start' toggle switch to 'Remote Start'.

The engine control panel will display the following values whenever the engine is operating:

1. RPM
2. Water Temperature
3. Fuel Level (in percent full)
4. Oil pressure
5. Battery voltage
6. Vacuum in the suction side of the pump (psi – this is a gage pressure and is a negative value)

To check fuel level, battery voltage, engine temperature, total engine run time, and time to service the engine, without starting the engine proceed as follows:

1. Put 'ENGINE START' toggle switch in the OFF position
2. Close knife switch on battery terminal
3. Press and hold MENU pad and flip toggle to REMOTE START
4. Hold MENU pad until 'Software Version –' goes off. '0: Field PSWD' will show on the display for a short period. Then 'UNIT IN AUTO MODE' will display.
5. Hit the 'UP' pad to display the functions described above.

Pump Priming System

The C.H.&E. Series #8900 6" Trash Pumps are equipped with a vacuum assisted priming system. This system not only allows higher lifts (up to 28 feet), but it also eliminates the need for filling the pump case with water in order to prime the pump. Additionally, it automatically reprimes the pump in situations where the pump might lose its prime due to a varying water level. A special oil lubricated hard face seal will operate indefinitely without pumpage flowing through the pump. The auto-priming system and hard face seal allows longer unattended operating times.

How it works

The main components of the priming system are (see, FIGURE 1, on page 8, and FIGURE 2, on page 9):

1) 13 cfm @ 100 psi compressor integrally mounted to the engine
2) 12vdc, ½" solenoid valve to direct airflow though the eductor for priming, or block the airflow to 'shut off' the compressor when the pump is primed
3) Single stage eductor "vacuum pump"
4) Priming valve to prevent water from entering the low pressure eductor line upon pump priming and to allow the pump to operate under positive suction head (up to 20 psig)
5) Check valve in low pressure eductor line
6) Pressure switch
7) Timer (12VDC)
8) Bypass-switch for manual operation

High-pressure air (approximately 60 psig) from the compressor is directed to the eductor inlet. The air flows through a small nozzle, which creates a low-pressure region inside the eductor housing. This low-pressure region of the eductor is connected to the pump casing via a ⅝" hose. The air inside the pump and suction line (the discharge line is blocked with a 6" flap check valve) is drawn into the eductor and blown out to atmosphere with the compressed air through the eductor exhaust. Evacuating the air out of the pump case and suction line creates a low pressure, which allows atmospheric pressure to "push" the water up the suction line into the pump, thus priming the pump. After the pump has primed, pressure in the pump case will increase to the system pressure. The pressure switch trips open with the positive pump case pressure (factory set to 3psi), which signals a timer to shut the solenoid valve after a preset amount of time (approximately 1-3 minutes). With the valve shut, air pressure in the 1 gallon air surge tank in the line between the compressor and the solenoid valve quickly increases. At approximately 125psi, the compressor governor 'unloads' the compressor, allowing it to run freely without any load. The timer is necessary for those situations where the water level is changing (either lowering or rising) and the pump is quickly cycling between negative and positive pressure and where, without the timer, the solenoid valve would be cycling on and off very quickly. The timer allows the solenoid valve to stay open continuously through the unsteady condition until the pump reaches a steady state-either positive pressure, in which case the valve closes, or negative pressure, in which case the valve stays open (priming system working) until the pump primes again.

The entrance of the low pressure line of the eductor into the pump case is at the top of a priming valve, which is bolted into a large expansion chamber connected to the suction tee on the front of the pump. The large expansion chamber and priming valve prevent pumpage from being drawn into the eductor. As water rises into the expansion chamber, it also enters the float chamber around a steel baffle plate and through a filter screen to cause the float to rise which in turn moves a plug up against the entrance port of the low pressure eductor line thus effectively blocking pumpage from entering the line.

A check valve is installed in the low pressure line at the eductor to prevent back siphoning of the suction line on pump shut down and to prevent air from being drawn into the suction line during periods of pumping water and with the priming system off. Without the check valve, the low-pressure line is open to atmosphere through the eductor.

A three-position toggle switch allows the timer and pressure switch to be bypassed and the operator can control operation.

Figure 1

Priming System-Major Mechanical Components

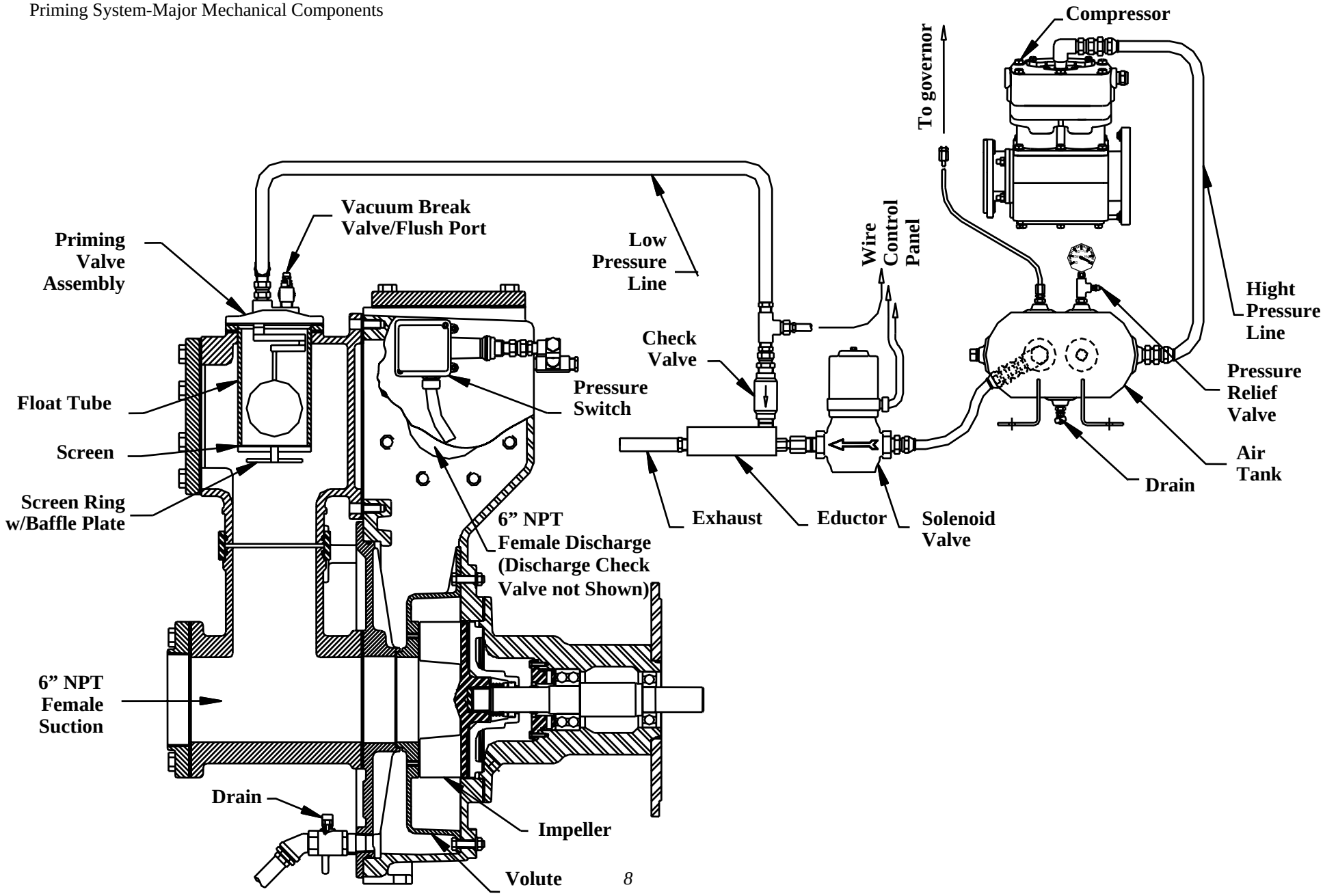
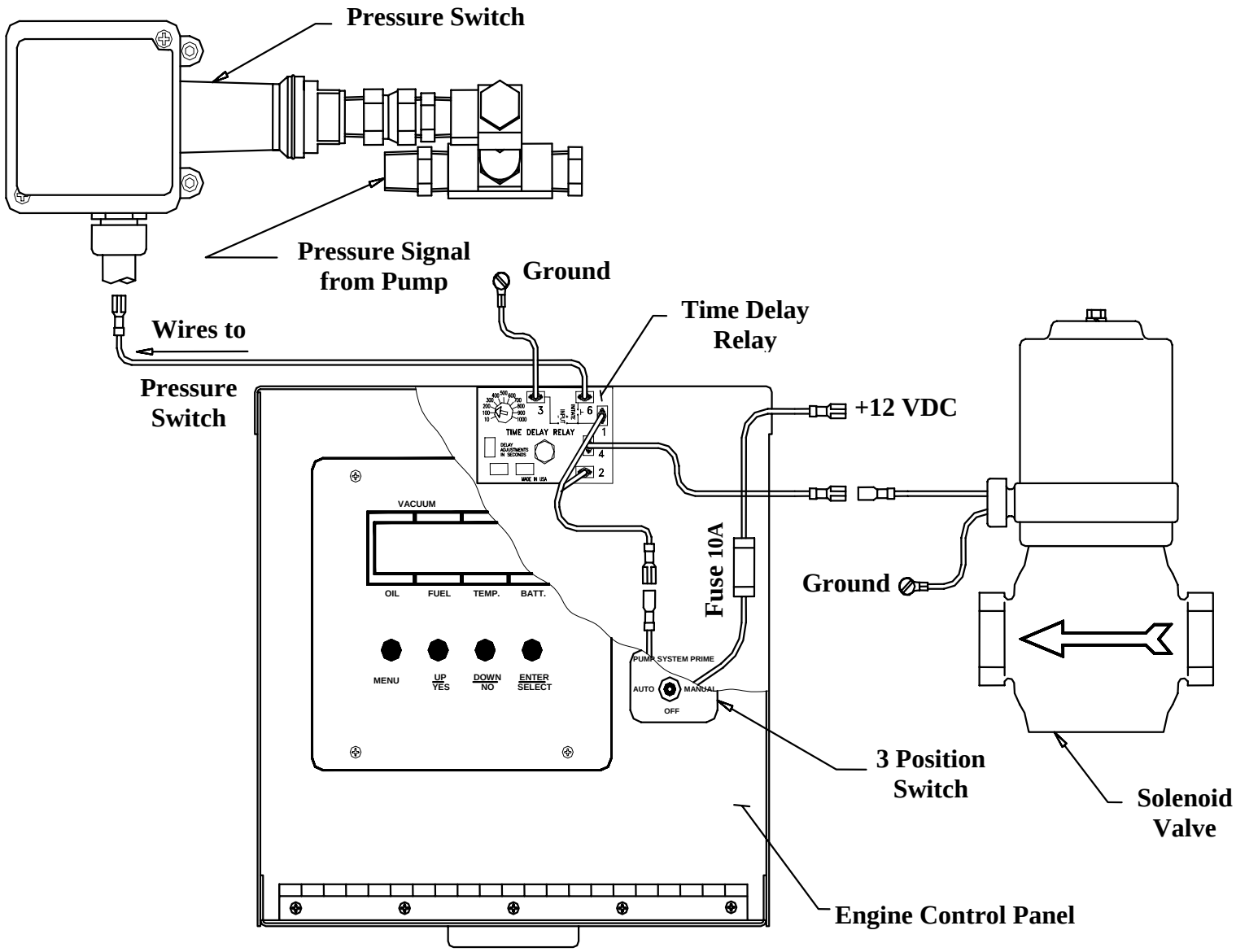


Figure 2

Priming System-Major Electrical Components



Priming System Operating Instructions

Modes of Operation

On the engine electrical control panel is a 'Pump System Prime' three position toggle switch which allows either "Automatic" or "Manual" operation of the vac-assist priming system.

Automatic Mode (AUTO)

This is the "standard" mode of operation. The series of events that automatically take place in priming a "dry" pump are (after the engine is started):

1. The normally closed priming system solenoid valve is energized to open after a 15 sec delay after engine starts and the priming system operates as described above.
2. Pump catches prime and pressure in pump case rises to a level to activate (open) the pressure switch (3 psi set at factory).
3. Timer activates and with steady pressure in the pump case, the solenoid valve is de-energized and shuts off the air to the eductor after a one to three minute delay (set at factory, but field adjustable). Pressure in air tank increases to 125psi and unloads compressor.
4. If the water level goes below the end of the suction hose or low enough that the pump is drawing in enough air to cause a loss of prime, the pressure in the pump case will go negative and the pressure switch will close which will cause the solenoid valve to open and start the priming cycle over again. The timer will keep the solenoid valve on through periods of surging where the pump catches prime and quickly loses it again. Surging will occur when the water level is near the end of the suction hose. The priming system will remain activated until such a time as the pump catches prime and maintains a steady positive pressure on the pump.

Off Mode (OFF)

With the toggle switch in the "OFF" position, the priming system is shut down (solenoid valve closed) and will remain off until such a time as it is when the switch is put in either the "AUTO" mode or "MANUAL" mode. The "OFF" switch position is useful if it is apparent that either the pressure switch or timer has failed to de-energize the solenoid valve after several (10-15) minutes of operation at steady state pumping with sufficient pressure in the pump case to normally activate the pressure switch (3 psig). (Note that it is not unusual to have pumping applications that do not cause the pressure in the pumpcase to rise to 3psi and therefore the solenoid valve will not de-eneregize in the 'Auto' mode.) The "OFF" position can also be used in pumping situations where there is positive suction head.

Manual Mode (MAN)

With the switch in the "MAN" position, the priming system is activated (solenoid valve open) and will remain on until such a time as when the toggle switch is put in either the "OFF" or "AUTO" position. Note that switching to the "AUTO" position will not necessarily shut the solenoid valve off. It will close in the "AUTO" position if the pump is under conditions of positive pump case pressure above 3psi (pumping water) and then only after the time delay period of the timer has expired (1-3 minutes). The "MAN" switch position is useful if for some reason the pressure switch and/or timer has failed to activate the system when the pump is in need of priming.

Pump Maintenance

Engine

Refer to engine manufacturers' manual for maintenance information

Seals

Check the oil level in the pump seal chamber daily. The oil level should be ¾ up the glass of the sight gauge on the right side (when looking at the pump) of the bearing tube. Add oil through the ⅜" pipe tap in the top of the seal chamber (remove chamber breather).
Oil Quantity: 1 ¼ quarts (40 oz) (1.2 L)
Oil Type: C. H. & E. Part No. W115-001, ISO Grade 46 synthetic (PAO) oil, JAX SYNCOMP 46 or equivalent

Bearings

The pump shaft is supported by a double-row ball bearing at the pump end of the shaft and a single-row bearing at the engine end of the shaft. The bearings are grease lubricated.
Lubrication Interval: 500 hours or every 2 months (whichever comes first)
Grease Quantity: Approximately 6 to 8 strokes of a grease gun
Grease Type: NLGI Grade 2, high temperature, and lithium complex grease.
Exxon Ronex MP or equivalent.

Impeller Gap

For optimum pump performance, the gap between the impeller blades and the volute should not exceed .035". This gap can be adjusted with the use of shims inside the threaded bore of the impeller hub. If pump performance has dropped off, check the impeller gap by use of a feeler gauge between the top of the impeller blade and the inside machined surface of the volute. Access this area through the center hole of the volute. The impeller is threaded on the shaft with a right hand thread. Remove by putting a piece of wood on the end of an impeller vane and hammering it such that the impeller is turning counterclockwise (heating the center of the impeller may be required). Set the volute to impeller gap at .015" to .030". Check the impeller gap annually.

Priming Valve

See, FIGURE 1, on page 8

The priming valve is essentially a float check valve wherein as water rises in the large expansion chamber (above the suction tee on the front of the pump) a metal float, inside a tube, rises and activates (through a lever mechanism) an "orifice button" that covers a seat in the port to the low pressure line of the eductor. A screen and baffle plate are attached to the bottom of the float tube to prevent trash from clogging the port to the eductor, or jamming the float mechanism. A ½" NPT flush port with a ½" ball valve is provided in the cover of the priming valve to allow water to be sprayed down on the filter screen to blow off any dirt or debris that might stick to the screen and block it. Blockage of the screen and/or baffle plate is an unlikely occurrence and is dependent on the pumpage and pumping conditions (flush as conditions dictate).

Wearing parts of the priming valve such as the orifice seat, orifice button and lever pivots should be inspected on an annual basis. These parts are attached to the priming valve cover and are easily accessed by removing the cover/float assembly from the expansion chamber. Remove the low-pressure eductor hose by loosening the ½" hose swivel connector and remove the (6) 7/16" cover bolts and lift the assembly straight out. (Inspect the screen at the bottom of the float chamber at this time also.)

Pressure Switch

See, FIGURE 1, on page 8 and FIGURE 2, on page 9

The ½" line to the pressure switch, on top of the pump, should be inspected and cleaned on a schedule determined by the frequency of pump usage and type of pumpage. It is recommended to check the pressure switch line once a month during pump usage. Remove the (2) ½" pipe plugs from the (2) union tees in the line and clean as necessary. Access to the pipe in the base of the pressure switch is easily done by loosening the ½" swivel connector at the pressure switch and moving the line out of the way. Use care when picking any debris out of this area so as not to damage the switch.

Discharge Check Valve

Inspect the flapper and seat area of the discharge check valve after each time the pump is used. Clean the seat and flapper as necessary.

Trouble Shooting

Pump Fails to Prime

Listed below are several areas to check when the pump does not prime.
If the air is exhausting out the eductor but the pump does not prime, it is recommended to first determine if the problem is in the pump or the pump system. This is done by running a vacuum test on the pump. Remove the suction hose, cap off the suction port (airtight), and run the engine. Read the vacuum level on control panel readout. The vacuum level should rise quickly at first and then slow down until after about 3 minutes the gauge will read 12psi or more. If this is the case, then the priming problem is somewhere in the system. If the pump does not draw a vacuum, proceed to trouble shoot per the suggestions below and the trouble shooting charts on the following pages.

General

1. See if the suction strainer is blocked.
2. Check suction lift-should not exceed 28 feet.
3. Linings in suction hoses, if so equipped, may collapse under vacuum. Try new hose.
4. See if the hose is sufficiently submerged in the water.
5. Check if hose coupling seal (gasket in a quick coupler) is breaking its seal as the weight of the water pulls on the hose as it is filling up.

Pump

Air leakage into the pump from any one or combination of sources can prevent or slow pump priming.

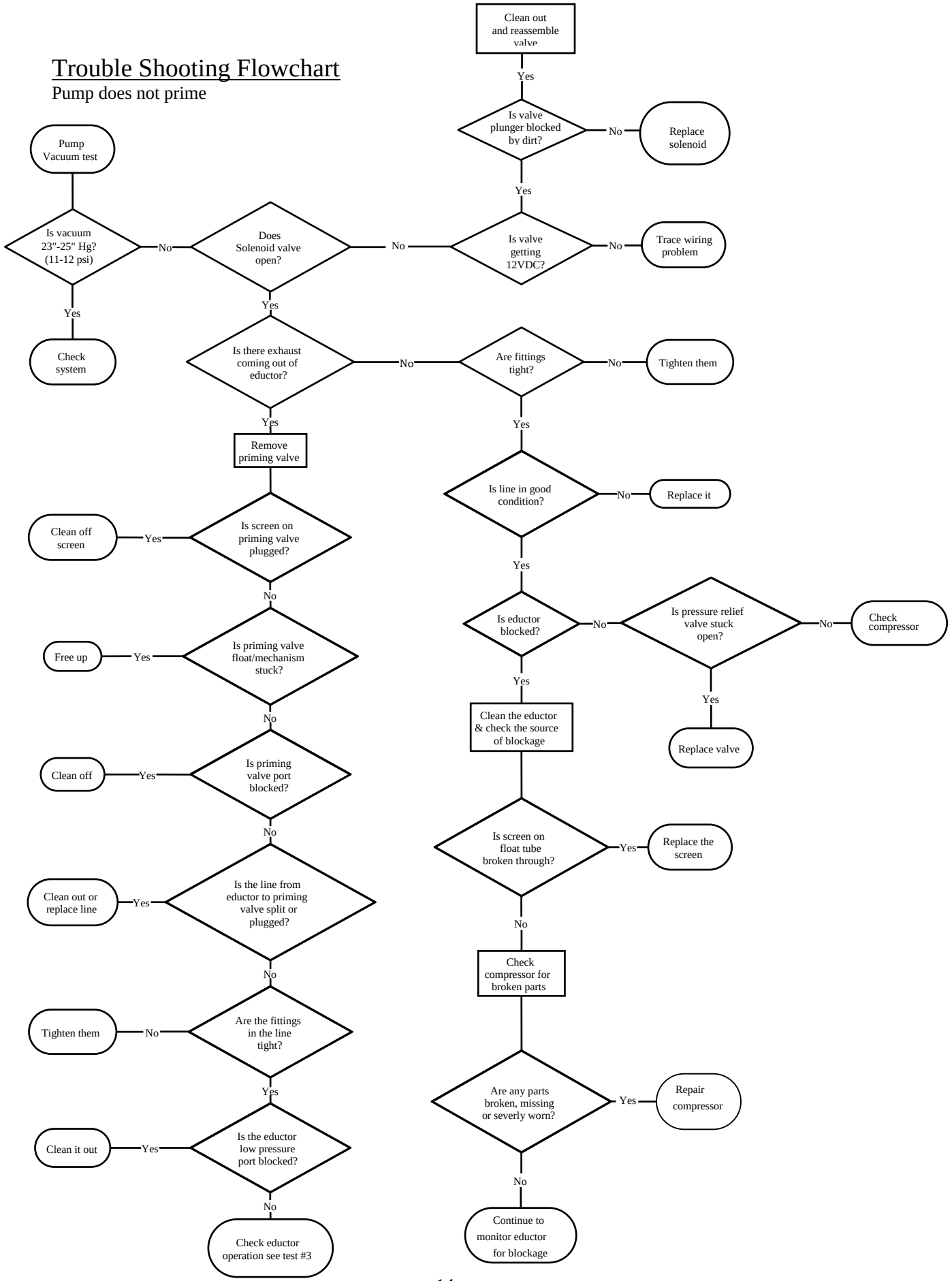
1. Check for good gaskets in the hose fittings and tight threaded joints.
2. Discharge check valve flapper may not be seated. Inspect valve through the discharge opening or by removing the top cover plate.

   To confirm that the check valve is seating properly do the following:
   A. Cap off the pump suction port.
   B. Start engine, run for three minutes, and note the level of vacuum on the Control Panel. A reading of 11 to 12 PSI is very good.
   C. If vacuum level is less, block off the check valve discharge opening (with a blind flange or pipe plug) and re-run test. If vacuum level does come up, the flapper valve is not seating and must be cleaned or repaired.
   D. If the vacuum level does not come up, the problem is somewhere else in the system.

3. Pump mechanical seal may be leaking. Check oil level in seal chamber. A full level indicates the seal is OK. Empty seal chamber indicates a bad seal. Check the drain hole in the bottom of the bearing tube. Seal oil coming out of the hole is a sign of a bad lip seal. No oil coming out the hole but an empty seal chamber indicates a bad mechanical seal.
4. Check all the fasteners on the pump. Gasket joints will allow fasteners to loosen after time due to gasket set.
5. Check to see if any auxiliary valves, that may be attached to the pump, are open (vacuum break valve, drain valve, etc.)
6. Check o-ring joints (suction tee to expansion chamber, cover to case) for a good seal. O-rings should be soft and pliable. Grease lightly when replacing o-rings.

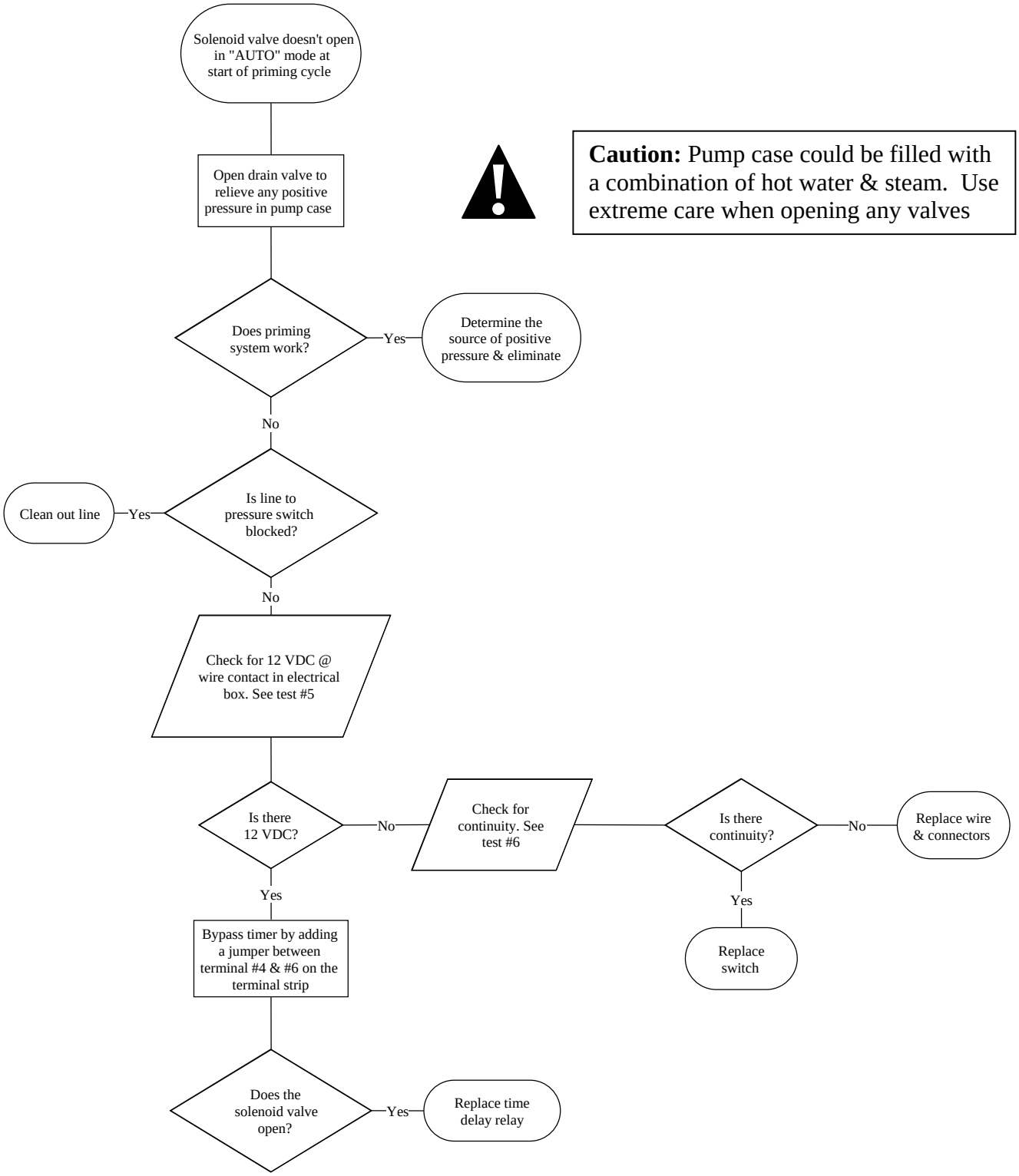
Trouble Shooting Flowchart

Pump does not prime



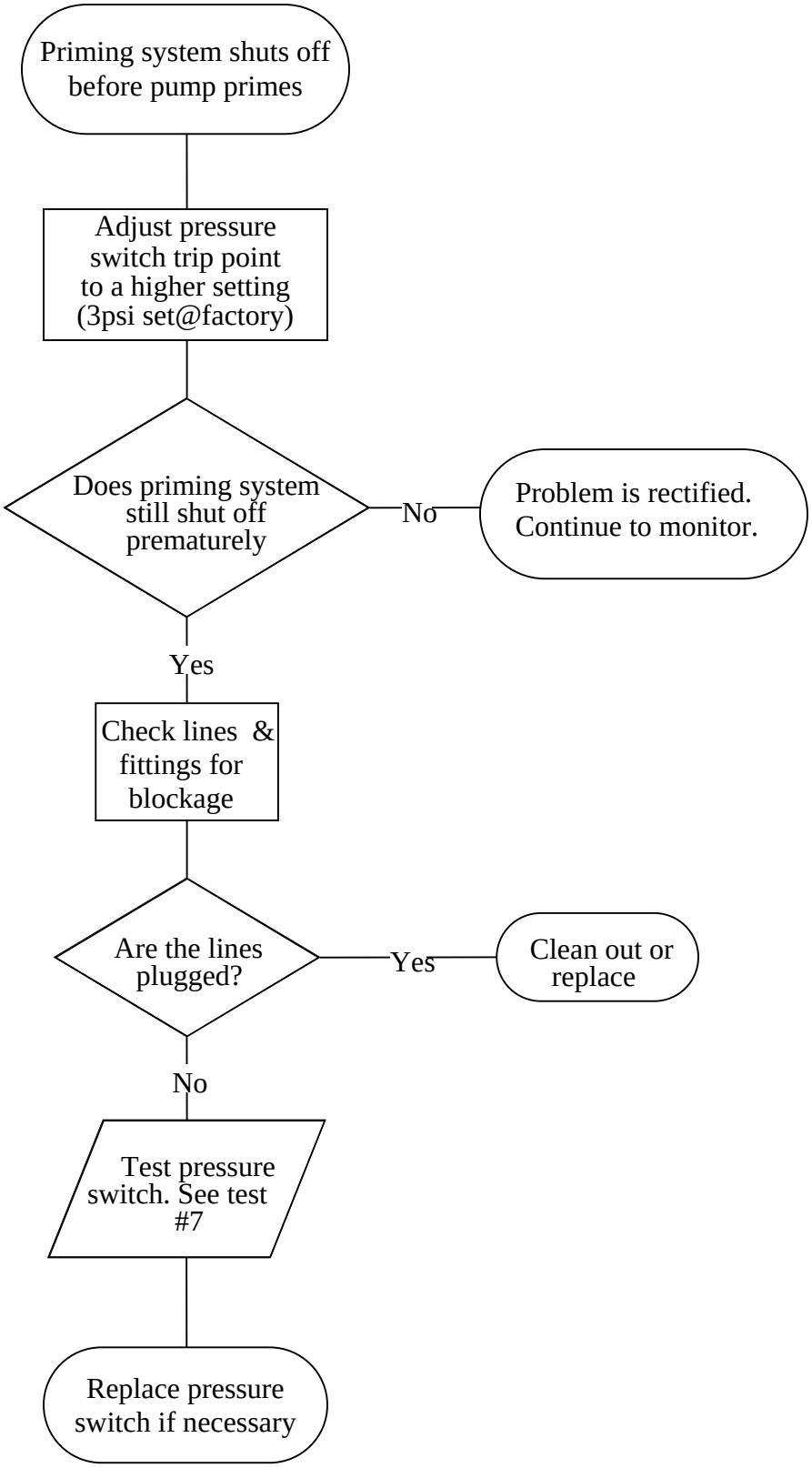
Automatic Priming System Flowchart

Priming system works in manual (MAN) mode but not in automatic (AUTO) mode



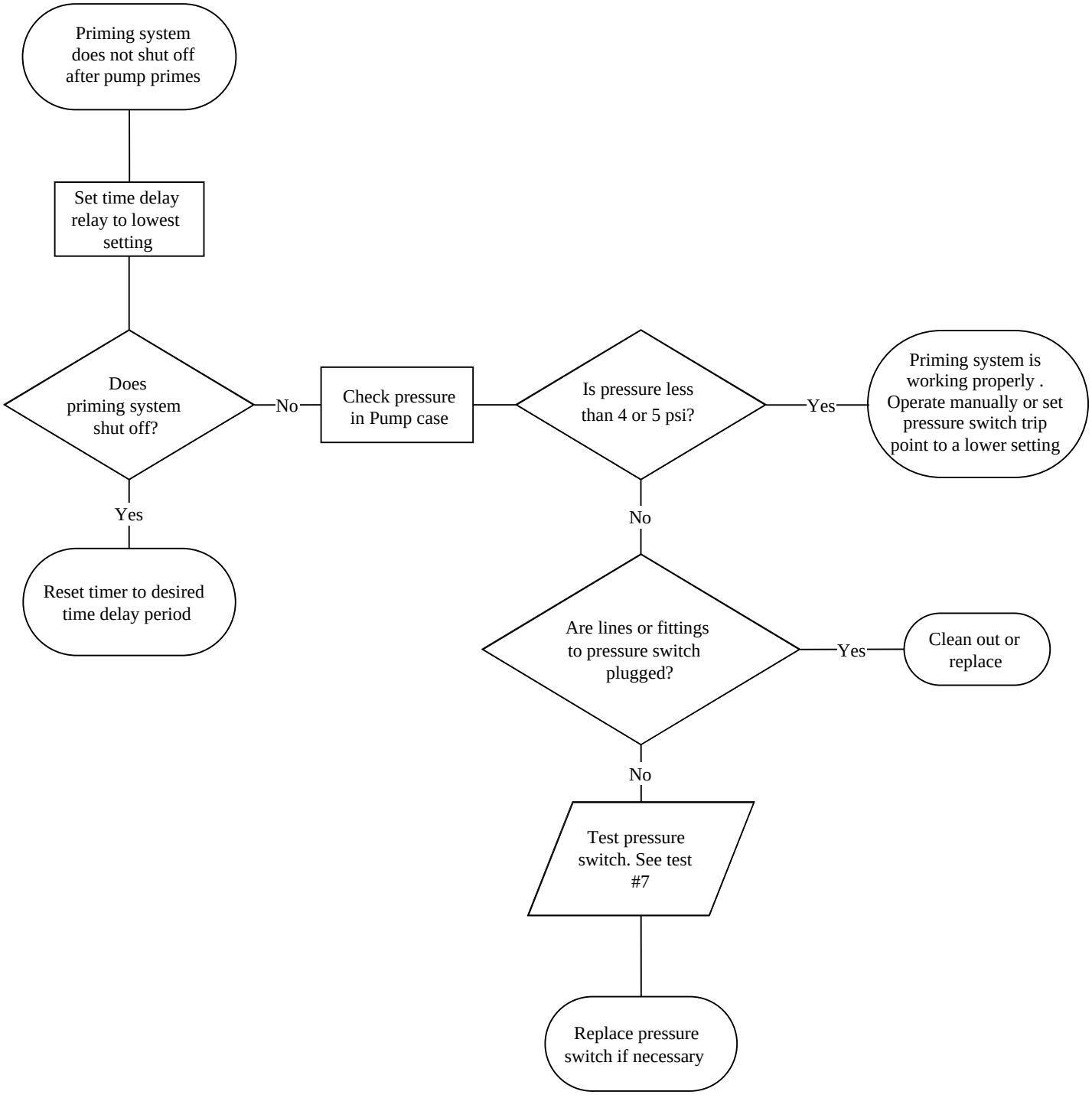
Flowchart

Priming System shutting off early

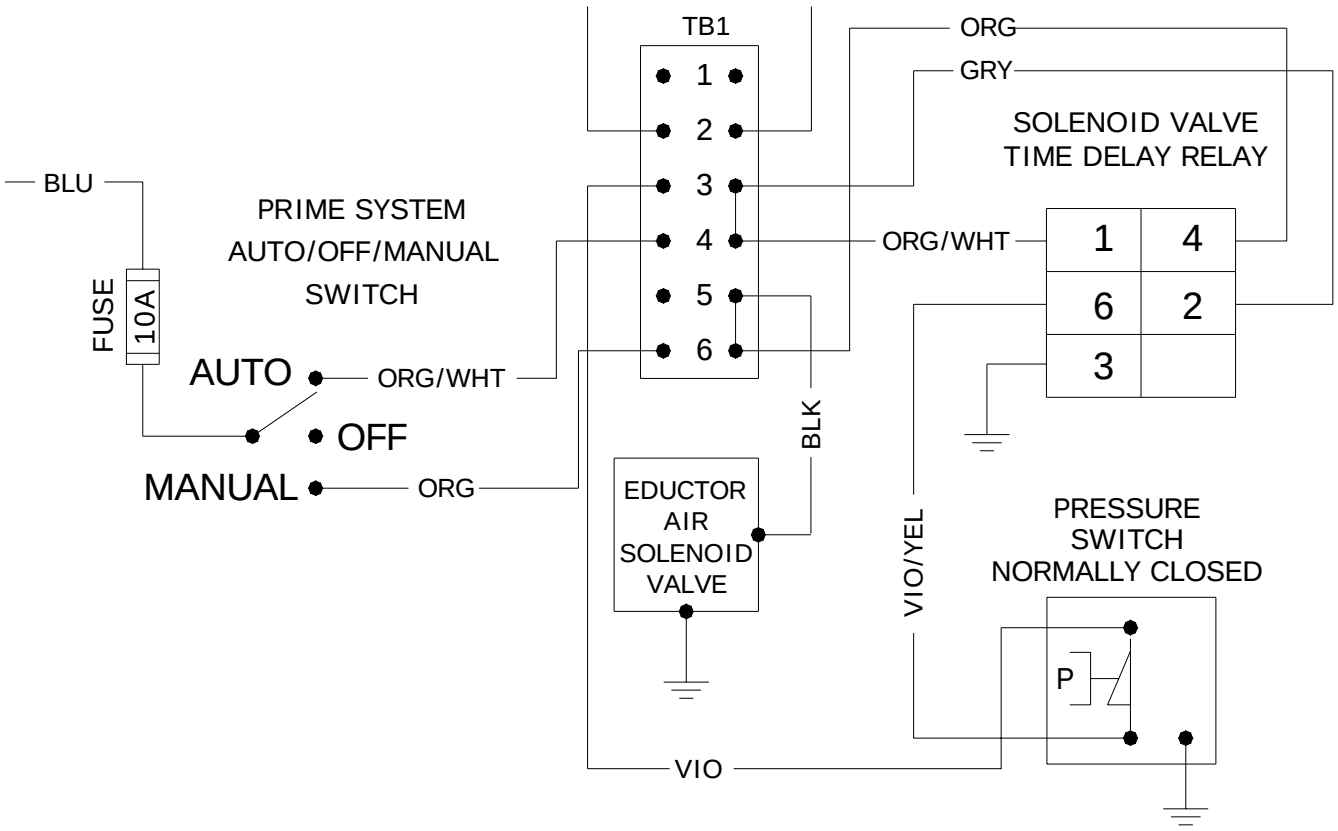


Flowchart

Priming system does not shut off



Priming System



Testing Procedures

#1 Solenoid Valve Test

- Check 10A fuse.
- Put "Engine Start" and "Prime System Prime" toggle switches in "OFF" position.
- Hook up continuity tester between orange wire terminal on priming system switch and solenoid valve not wire at the solenoid.
- Put Pump System Prime toggle switch to "MAN" position and check for continuity.

#2 Solenoid Valve Test

- Put "Engine Start" and "Prime System Prime" toggle switches in "OFF" position.
- Open Control Panel (support control panel front).
- Put "Engine Start" toggle switch in "MANUAL START" position and start the engine.
- After 20-30 seconds. Put "Pump System Prime" toggle switch in the "MANUAL" position and check for voltage on terminal strip at Terminal #6

#3 Eductor Vacuum Test

- Loosen swivel above the check valve which is above eductor
- Remove hose barb that is connected above union tee
- Thread a ½" pipe plug into port
- Tighten ½" nipple back into swivel
- Start engine and throttle up to 2200 rpm
- Note vacuum reading (located in engine control panel)
- Replace eductor if less than 11psi

#4 Continuity Test

- Check continuity from terminal #6 on terminal strip to "MAN" position on switch

#5 Voltage Test

- Put "Engine Start" and " Pump System Prime" toggle switches in "OFF" position
- Open Control Panel (support the control panel Front in the open position)
- Put "Engine Start" toggle switch in the "MANUAL START" position and start engine
- After 20-30 seconds. Put "Pump Prime System" in the "AUTO" mode
- Check for voltage at #3 on terminal strip-Note reading
- Check for voltage at #6 on time delay relay-Note reading

#6 Continuity Test

- Check continuity from terminal #3 on terminal strip to "AUTO" position on switch

#7 Pressure Switch Test

- Loosen ½" swivel leading to pressure switch
- Remove swivel
- Remove pressure switch from side of pump
- Connect continuity tester to the pressure switch (common and normally closed)
- With an accurate pressure gauge (0-5 psi) and a low pressure air source (bicycle pump) energize the pressure switch
- Note the reading on pressure gauge when switch opens and closes
- Adjust if necessary

Automatic Priming System Adjustments

Following are a few suggestions for fine tuning the Automatic Priming System to particular pumping operation requirements:

The basic operation of the Automatic Priming System is:

1) Engine starts.
2) Pump automatically primes.
3) Positive pressure in the pump case (3 psig-set at the factory but adjustable) trips open a pressure switch.
4) Switch activates a timer to delay de-activating the solenoid valve (delay set at approximately 1 to 3 minutes at the factory but field adjustable)
5) Solenoid valve closes, air pressure in surge tank increases to 125psi and compressor unloads.
6) Pump continues pumping until water supply level falls to the end of the suction hose and the pump loses its prime. The pressure in the pump case falls to atmospheric or below.
7) Pressure switch closes and activates the priming system (i.e. solenoid valve opens and air flows through eductor drawing a vacuum).
8) Cycle repeats.

If the solenoid valve closes before the pump has reprimed or does not energize (open) after loss of prime, there may be a slight positive pressure in the pump from the churning of the impeller in some amount of residual water left in the pump case creating enough vapor to make a high enough positive pressure to not allow the pressure switch to reset. Adjust the 'pressure switch setting' higher by a couple psi (see pressure switch manual). Do not set the trip point too high or in low head systems the pump case pressure may not get high enough to open the switch to shut down the priming system.

If the solenoid valve does not de-energize (i.e. close) after 5-10 minutes of pumping and the pump case pressure is known to be high enough to activate the pressure switch (more than 3psi), do the following.

1) Set the timer to as low as it goes and retry.
2) Set pressure switch to a lower trip point (2-psi).
3) Check (test) the pressure switch.

Note that in applications of very little static and dynamic head, pressure in the pump case may not reach 3 psi, the pressure switch trip point, and the solenoid valve would not de-energize (with the "Prime System" toggle switch in the "AUTO" mode) and the priming system will continue to operate even though the pump is primed. This is not detrimental to the equipment except to say that the compressor is loaded unnecessarily.

Figure 3
Exploded View of Pump Assembly

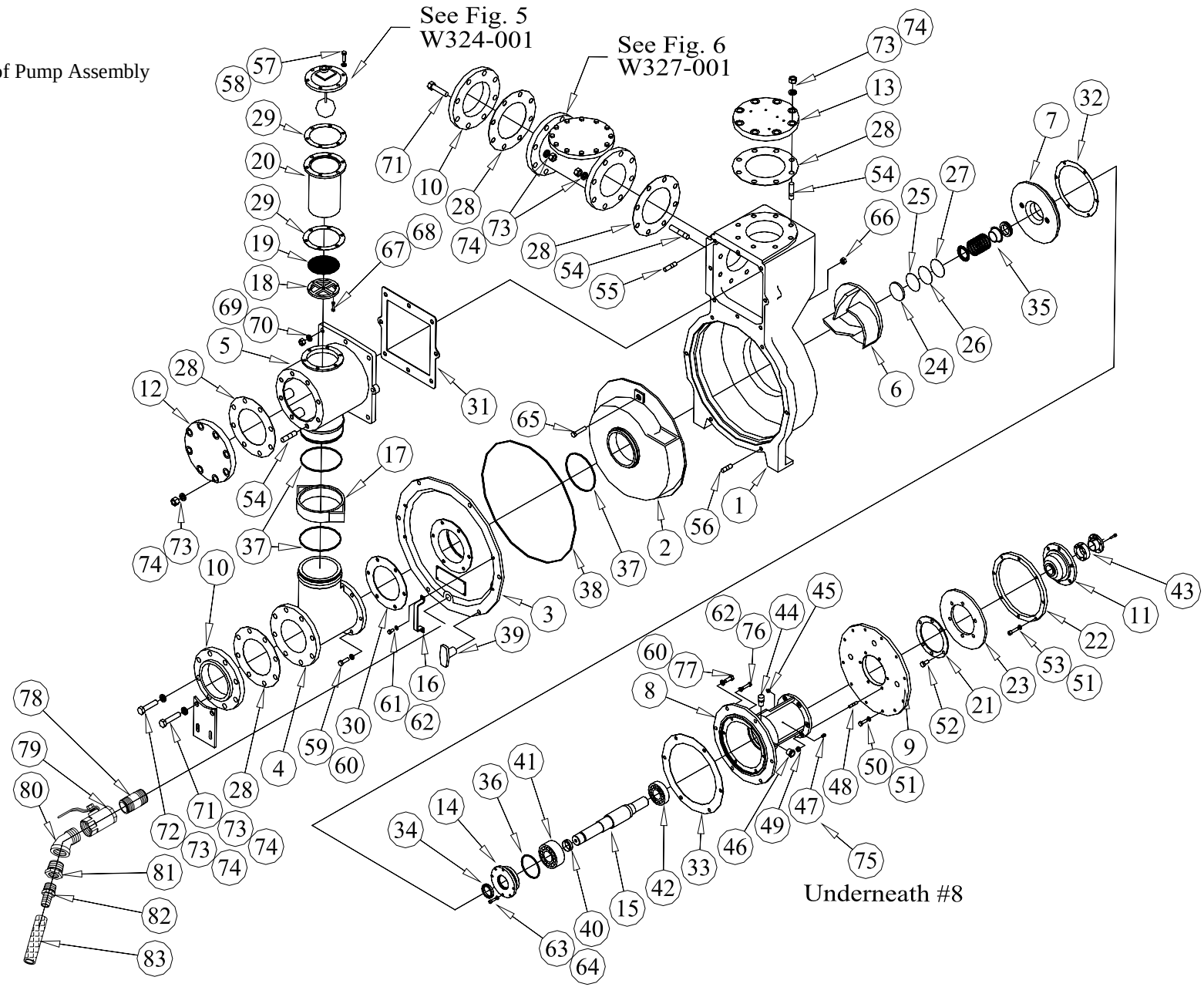
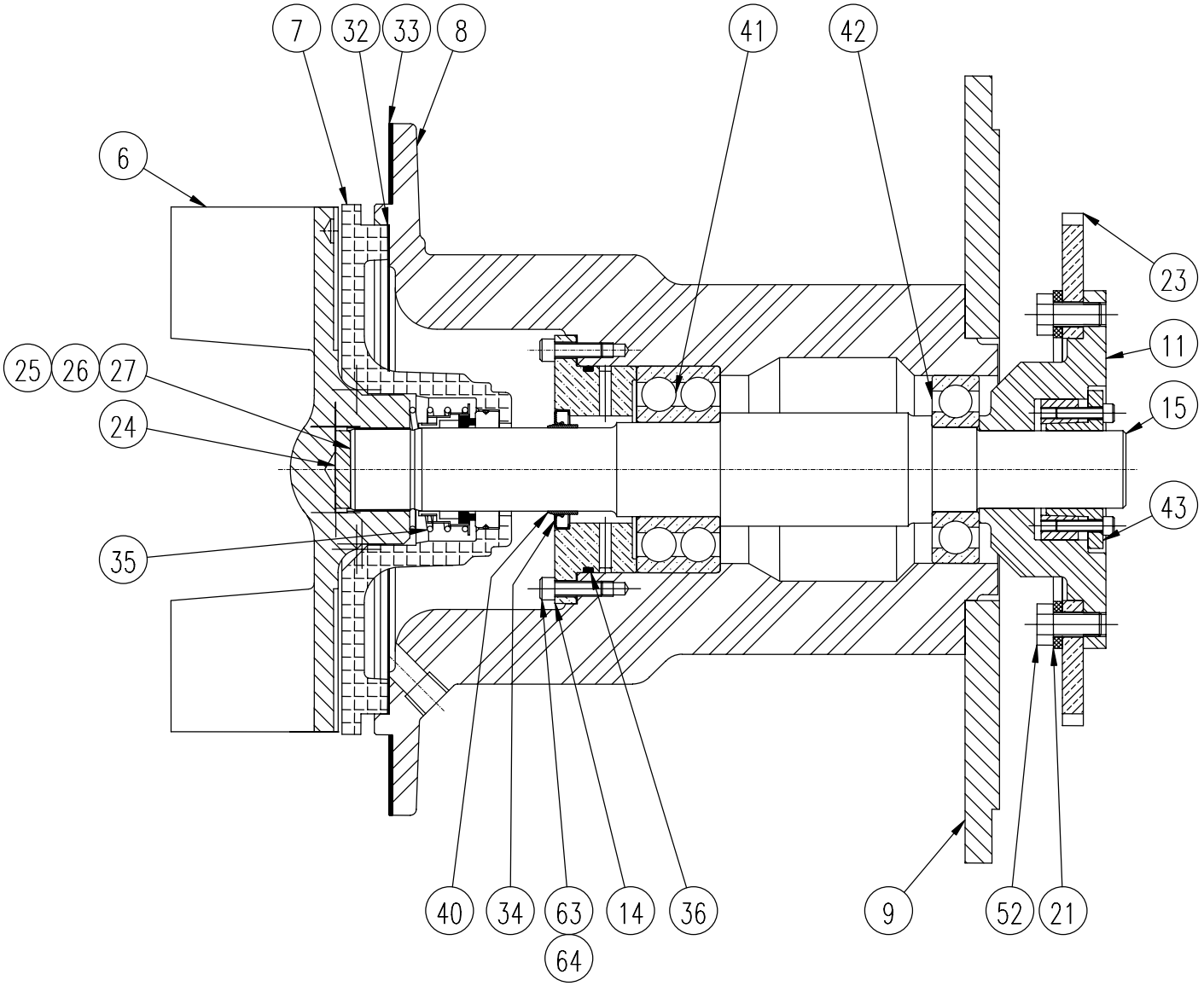


Figure 4
Bearing Support Cross-Section



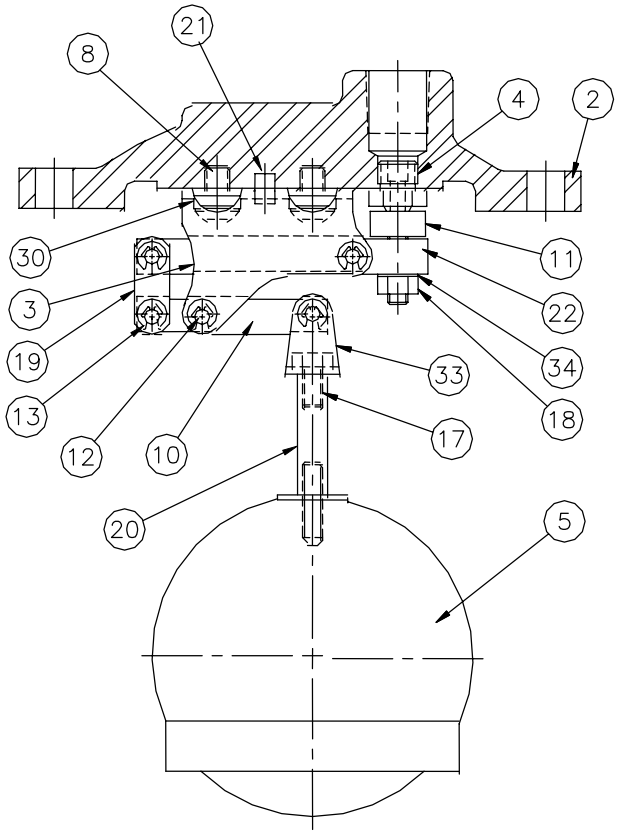
Parts List – Figure 3

Ref. No.	Part No.	Description	Qty.
1	P3850A	Pump Case	1
2	P3860	Volute	1
3	P3851	Cover	1
4	P5681	6” Suction Tee	1
5	P5682	Expansion Chamber	1
6	P3862	Impeller	1
7	P5680	Seal Seat Support	1
8	P5770	Bearing Tube Housing	1
9	P4627	Adapter Plate #4 Bell Housing	1
10	P3965	6” Companion Flange	2
11	P5771	Coupling Hub	1
12	0106-0840	6” Flat Faced Blind Flange	1
13	P5725	Blind Flange	1
14	P5655	Lip Seal Holder	1
15	P5744-ASSY	Impeller Shaft (with J1105-wear sleeve)	1
16	P3721	Handle	2
17	P3854	Slip Ring	1
18	P5692	Screen Ring w/ Baffle Plate	1
19	P5693	Screen	1
20	P5701	Float Tube	1
21	P1843	Bolt Ring	1
22	W4-6187A	Driving Ring	1
23	P1842	Driving Plate	1
24	P3863	Impeller Plug	1
25	P3872	Impeller Shim .005” Th’k	2
26	P3873	Impeller Shim .010” Th’k	2
27	P3874	Impeller Shim .015” Th’k	2
28	P3880	Companion Flange Gasket	5
29	P5729	Float Tube Gasket	2
30	P3853	Suction Tee Gasket	1
31	P3856	Expansion Chamber Gasket	1
32	P3865	Seal Seat Support Gasket	1
33	P3871	Bearing Support Housing Gasket	1
34	W35-N473454N	Lip Seal	1
35	W105-14B	Single Face Seal Ass’y	1
36	P5782	O-Ring (3.98” ID x .139” Th’k)	1
37	P3876	O-Ring (6 ¾” ID x 3/16” Th’k)	3
38	P3875	O-Ring (22” ID x 3/16” Th’k)	1
39	P3717	Clamp Handle	6
40	J1105	Wear Sleeve	1
41	W16-3310Z	Double Row Ball Bearing	1
42	W16-309KD	Single Row Ball Bearing	1
43	W14-001	Keyless Drive Ass’y	1
44	1633-037801	Breather 3/8”-18 NPT	1

Parts List (cont.) – Figure 3

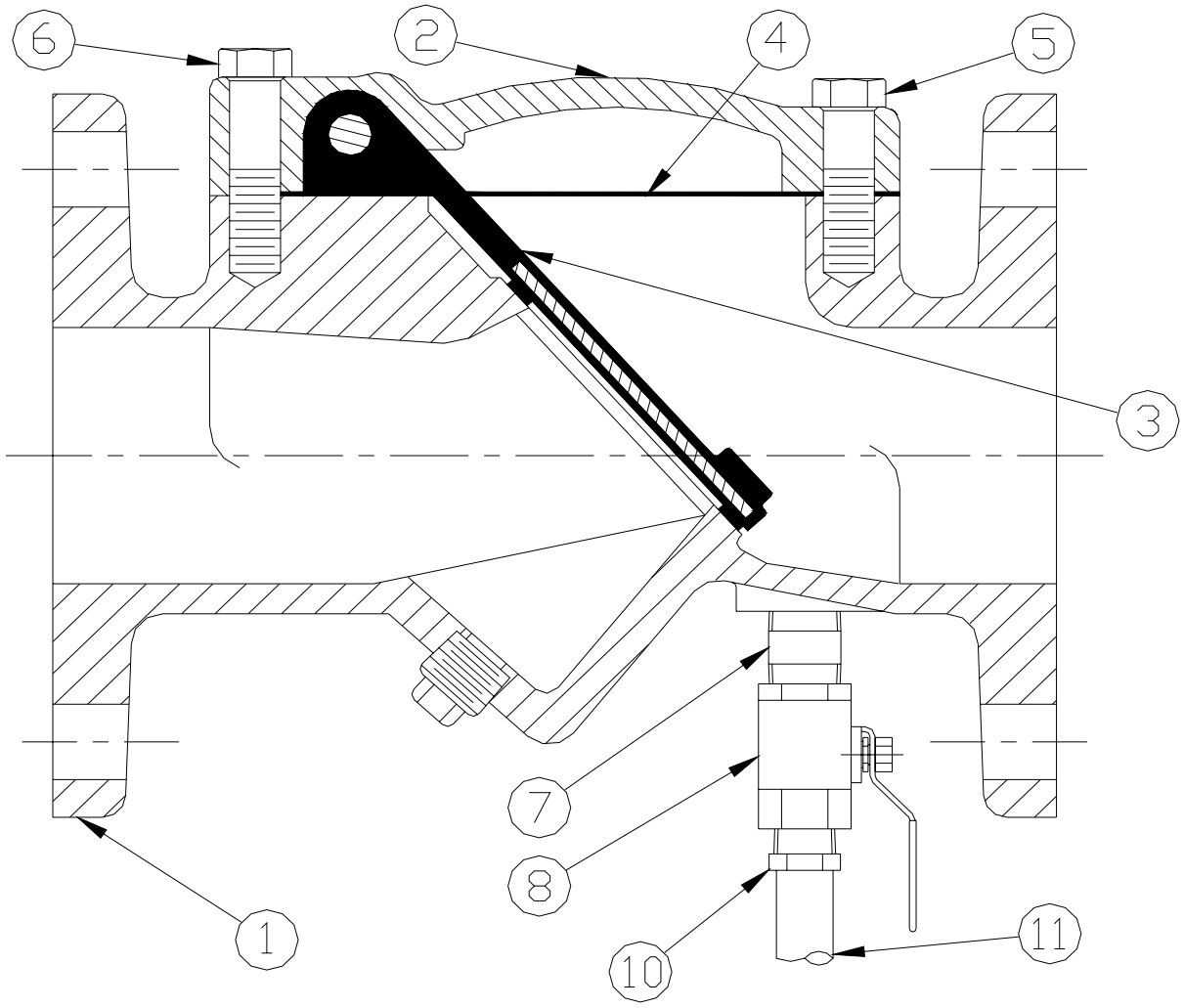
Ref. No.	Part No.	Description	Qty.
45	W33-1/8	1/8” NPT Zerk Fitting	1
46	A2890-4	Oil Level Sight Glass	1
47	0002-1603	1/8” NPT Sq. Hd. Pipe Plug	1
48	P5607	Stud (3/8”-16 x 1 ¾” Lg.)	6
49	E6GX	3/8”-16 Hex Hd. Flange Lock Nut	6
50	GC010.10.10030Z	M10 x 1.5 x 30mm Lg. Hex Hd. Screw	12
51	G620.10.100	M10 Lock Washer STD STL/PL	24
52	P5491	½”-13 x 1” Lg. Hex Hd. Lock Screw	6
53	GC070.10.10040Z	M10 x 1.5 x 40mm Lg. Hex Hd. Screw	8
54	P3843	Stud (3/4”-10 x 3” Lg.)	24
55	P3844	Stud (5/8”-11 x 2 ¾” Lg.)	8
56	P3728	Stud (5/8”-11 x 2” Lg.)	6
57	A010.043.0150	7/16”-14 x 1 ½” Lg. Hex Hd. Cap Screw	6
58	F620.043	7/16” Lock Washer	6
59	A010.050.0150	½”-13 x 1 ½” Lg. Hex Hd. Cap Screw	6
60	F620.050	½” Lock Washer	12
61	A010.037.0075	3/8”-16 x ¾” Lg. Hex Hd. Cap Screw	4
62	F620.037	3/8” Lock Washer	10
63	BC070.031.0100	5/16”-18 x 1” Lg. Soc. Hd. Cap Screw	4
64	F620.031	5/16” Lock Washer	4
65	P5958	Stud, ½”-13 x 2 ½” CD1215	2
66	0813NUS	½”-13 Hydra Lock Nut	2
67	CC005.025.0087	¼”-20 x 7/8” Lg. Hex Hd. Cap Screw (S.S.)	6
68	C620.025	¼” Lock Washer (S.S.)	6
69	EC400.062	5/8”-11 Hex Nut	8
70	F620.062	5/8” Lock Washer	8
71	A010.075.0325	¾”-10 x 3 ¼” Lg. Hex Hd. Cap Screw	14
72	A010.075.0350	¾”-10 x 3 ½” Lg. Hex Hd. Cap Screw	2
73	EC400.075	¾”-10 Hex Nut	40
74	F620.075	¾” Lock Washer	40
75	50925K392	3/8” NPTF Hex Hd. Plug	1
76	A010.037.0150	3/8”-16 x 1 ½” Lg. Hex Hd. Cap Screw	6
77	A010.050.0125	½”-13 x 1 ¼” Lg. Hex Hd. Cap Screw	6
78	W300-1 x 2	Nipple 1 x 2 SCH40 BLK	1
79	W323-001	Valve Ball 1” NPT FXF BRZ	1
80	W302-1 x 45	Elbow ST45 1” CL150 BLK	1
81	W307-1 x 3/4	Reducing Bushing 1” x ¾” CL150 BLK	1
82	125HBL-12-12	Hose Barb ¾” STR MP12 Brass	1
83	W43-015-019	Hose ¾” x 1.03” x 19” LG (Water)	1

Figure 5
W324-001-ASSM (Priming Valve Assembly)



Ref. No.	Part No.	Description	Qty.
2	W324-001-02	Cover	1
3	W324-001-03	Leverage Frame	1
4	W324-001-04	Seat	1
5	W324-001-05	Float	1
8	W324-001-08	Retaining Screw	2
10	W324-001-10	Float Arm	1
11	W324-001-11	Orifice Button	1
12	W324-001-12	Pivot Pin	5
13	W324-001-13	Retaining Ring	10
17	W324-001-17	Float Retainer	1
18	W324-001-18	Lock Nut	1
19	W324-001-19	Link	2
20	W324-001-20	Guide Shaft	1
21	W324-001-21	Locating Pin	1
22	W324-001-22	Orifice Button Arm	1
30	W324-001-30	Washer	2
33	W324-001-33	Clevis	1
34	W324-001-34	Lock Washer	1

Figure 6
W327-001 (Discharge Flapper Valve)



Ref. No.	Part No.	Description	Qty.
1	W327-001-01	Body	1
2	W327-001-02	Cover	1
3	W327-001-03	Disc	1
4	W327-001-04	Gasket	1
5	W327-001-05	7/16”-14 x 2” Lg. Hex Hd. Cap Scr.	10
6	W327-001-06	7/16”-14 x 1 ½” Lg. Hex Hd. Cap Scr.	2
7	W300-¾” x 2	Nipple ¾” x 2 SCH40 BLK	1
8	W323-003	Valve Ball ¾” NPT FXF BRZ	1
10	125HBL-12-12	Hose Barb ¾” STR MP12 Brass	1
11	W43-015-036	Hose ¾” x 1.03” x 36” LG (Water)	1

Figure 7
Plumbing Layout

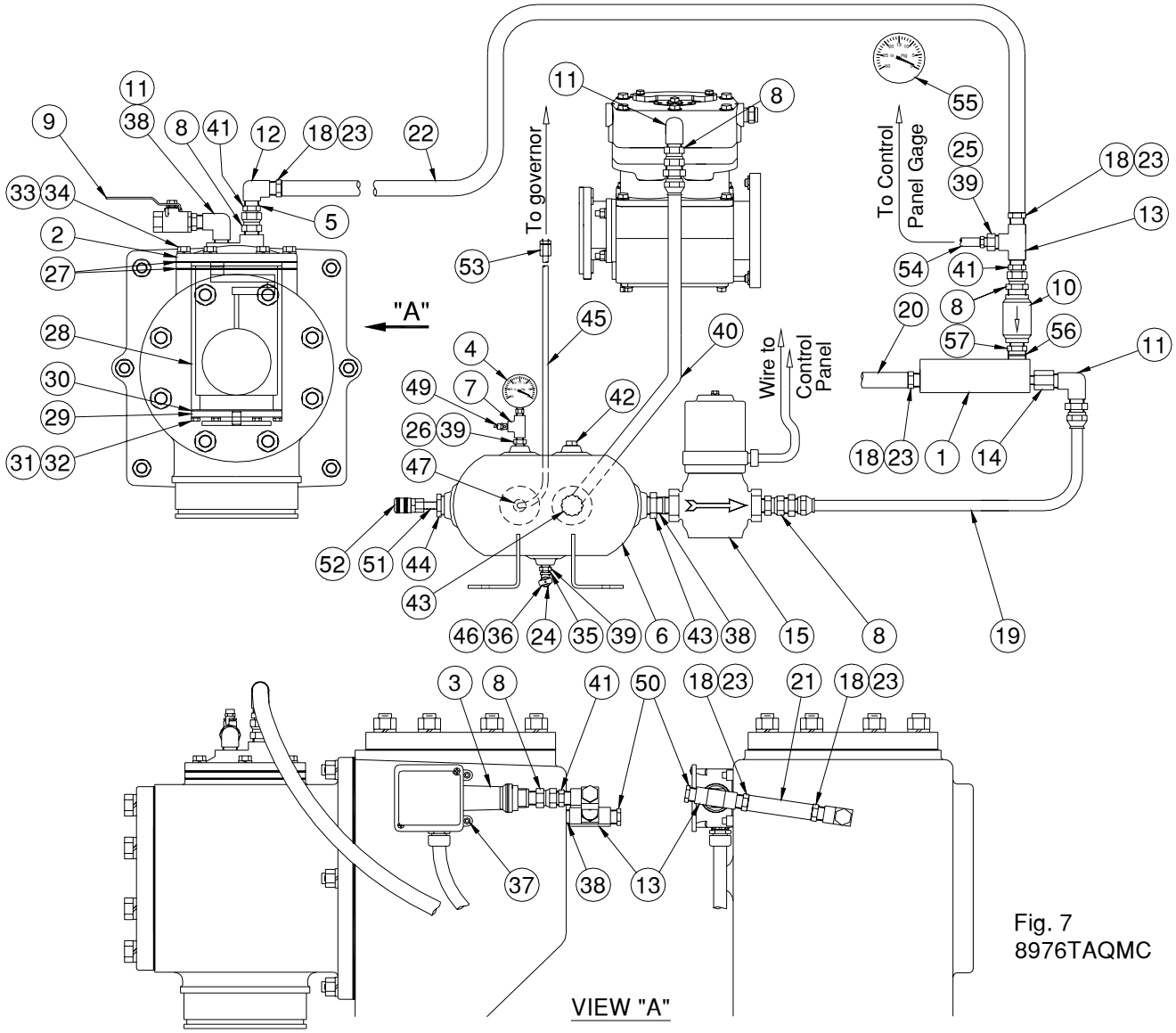


Fig. 7
8976TAQMC

Parts List – Figure 7

Ref. #	Part No.	Description	Qty.
1	W150-002	Eductor	1
2	W324-001	Priming Valve	1
3	W133-001	Pressure Switch	1
4	W72-07	Gage Pressure 0-200 PSI ¼"	1
5	216P-8	½" Hex Nipple	1
6	W202-001	Air Tank 1-Gal. 6" Dia. x 11" 200 PSI	1
7	44605K152	Tee ¼" NPT Female	1
8	0107-8-8	Adapter ½" Male x ½" Female	5
9	W323-002	Bronze Ball Valve ½" Female Ports	1
10	W327-009	Brass Check Valve ½" Female Ports	1
11	W302-½ x 90	½" x 90° Street Elbow (Brass)	3
12	2200P-8-8	½" x 90° Union Elbow (Brass)	1
13	2203P-8	½" Union Tee	3
14	222P-8-4	Adapter ½" Female x ¼" Male	1
15	W322-001	Solenoid Valve-12 VDC	1
16	W307-¾ x ¼	Red. Bushing ¾" Male x ¼" Female CL150 BLK	1
18	125HBL-10-8	Hose Barb 5/8" I.D. Hose x ½" Male NPT	5
19	P6034-001	Teflon Hose w/ Stainless Steel Cover	1
20	W43-013-063	High Temperature Push-Lock Hose (Blue)	1
21	W43-012-003.7	Vacuum Push-Lock Hose	1
22	W43-012-042	Vacuum Push-Lock Hose	1
23	W47-012	Hose Clamp 1 ¼" Dia.	5
24	4921K2	Cock Drain ¼"	1
25	125HBL-4-4	Hose Barb ¼" ID x Hose to ¼" Male NPT	1
26	W300-¼ x 1 ½	Nipple ¼" x 1 ½" SCH40 BLK	1
27	P5729	Float Tube Gasket	2
28	P5701	Float Tube	1
29	P5692	Screen Ring w/ Baffle Plate	1
30	P5693	Screen	1
31	C620.025	¼" Stainless Steel Lock Washer	6
32	CC005.025.0087	¼"-20 x 7/8" Lg. Stainless Steel Hex. Head Screw	6
33	F620.043	7/16" Lock Washer	5
34	A010.043.0150	7/16"-14 x 1 ½" Lg. Hex. Head Screw	6
35	W302-¼ x 90	Elbow Street ¼" x 90° SCH40 BLK	1
36	W300-¼ x 2 ½	¼" x 2 ½" Lg. Nipple SCH40 BLK	1
37	BC070.025.0075	¼"-20 x ¾" Lg. Soc. Head Screw	2
38	215PN-8	½" Close Nipple	5
39	W307-½ x ¼	Bushing ½" Male x ¼" Female CL150 BLK	3
40	P6034-003	Teflon Hose with Stainless Steel Cover	1
41	127HB-8-8	Ball End Joint Adapter x ½" Male	3
42	0002-1607	Plug ¾" CL150 BLK SQ Head	1
43	W307-¾ x ½	Red. Bushing ¾" Male x ½" Female CL150 BLK	2
44	W307-1 x ¼	Red. Bushing 1" Male x ¼" Female	1
45	P6035-001	Teflon Hose 3/16" ID. x 50" Lg. with SS Cover	1
46	W305-¼	Coupling ¼" CL1510 BLK	1
47	W307-½ x 1/8	Red. Bushing ½" Male x 1/8" Female CL150 BLK	1
49	W201-002	Valve Safety Pop-Off ¼" NPT	1
50	218P-8	Plug ½" Brass	2
51	W300-¼ x 1	Nipple ¼" x 1" Lg. SCH40 BLK	1
52	6536K28	Coupler – ¼" Air Type "A" Female	1
53	0107-2-2	Adapter 1/8" Male x 1/8" Female	1
54	W43-002-036	Hose ¼" ID. x ½" OD.	1
55	W73-02	Vacuum Gage 30"-0" in Hg-2" Dial	1
56	W300-⅜ x 2	Nipple ⅜" x 2" Lg. SCH40 BLK	1
57	W307-½ x ⅜	Red. Bushing ½" Male x ⅜" Female CL150 BLK	1

Service Instructions

Mechanical Seal

The impeller shaft seal is a 1 ¾" diameter spring loaded single mechanical seal, located directly behind the impeller. The seal mating surfaces are lubricated and cooled by oil contained in a chamber in the bearing support housing which is sealed with a radial lip seal (see, FIGURE 4, on page 22).

Indications that the mechanical seal may be bad are:

1. Water (pumpage) mixed with the oil and it flows out the breather vent on top of the oil chamber or drains out the hole in the underside of the bearing support housing.

2. Pump does not prime and/or the pump does not hold a good vacuum level. (There could be other causes for this symptom but a bad seal is a possibility.)

3. Oil level in seal chamber cannot be maintained. (This could be the result of a worn out or damaged radial lip seal as well. The oil will come out the drain hole in the underside of the bearing support housing if the radial lip seal is damaged.)

Mechanical Seal Removal

Use the following steps as a guideline when removing mechanical seals:

1. Drain the pump (using the 1" ball valves).

2. Remove the suction tee (six ½"-13 x 1 ½" lg. hex head cap screws) and cover (six handles) from the pump.

3. Drain the oil from the seal chamber by removing the ¼" pipe plug in the boss on the underside of the bearing support housing.

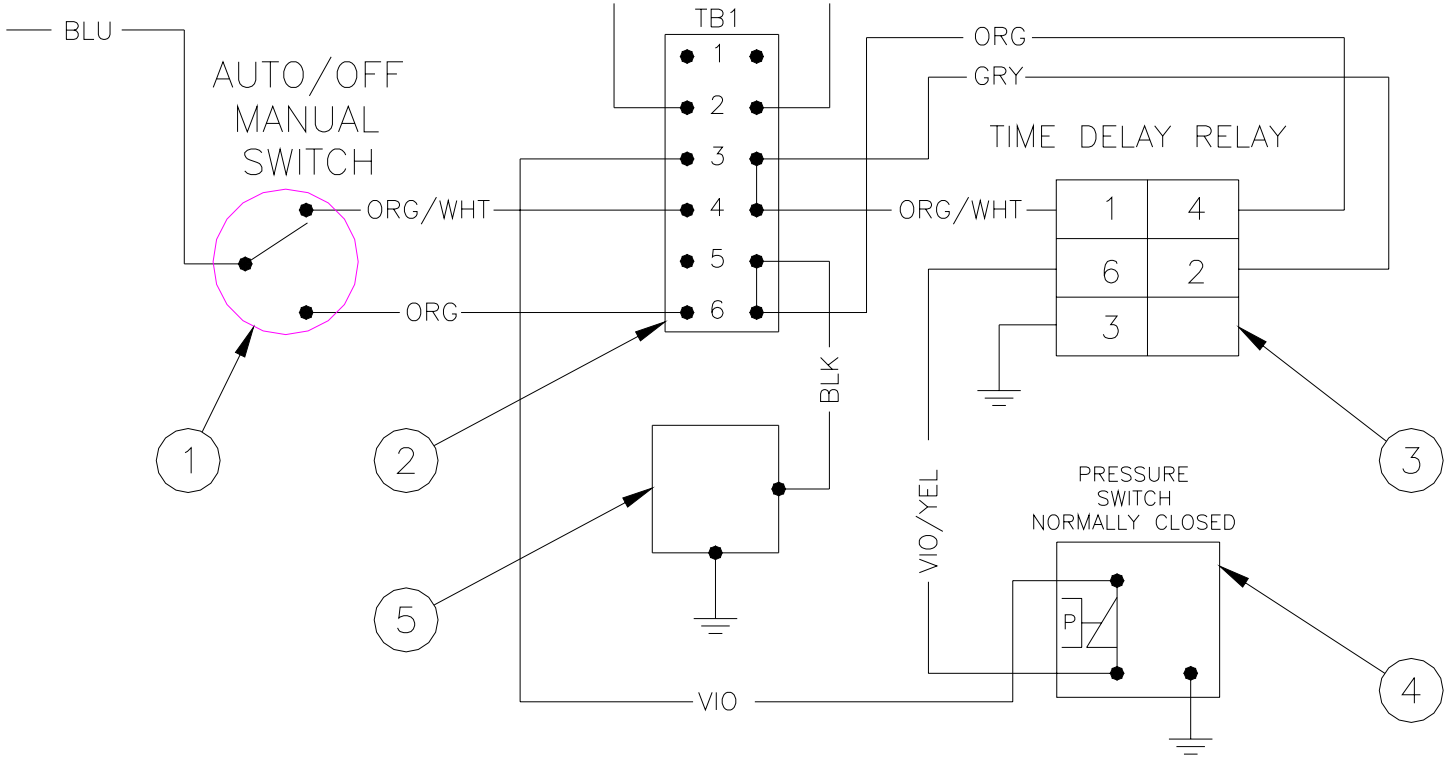
4. Remove the volute (two ½"-13 x 2 ¼" lg. hex head cap screws) from the pump case.

5. Remove the impeller by striking the tips of the vanes with a lead mallet (or by striking a piece of wood that is held against an impeller vane tip) such that the impeller rotates in a counter-clockwise direction. (The impeller is threaded onto the impeller shaft with a standard right hand thread.) Heating the center of the impeller may be required if the impeller does not come loose by striking it "cold".

6. Remove the seal with the seal seat support casting. Remove the seal seat support (six 3/8"-16 x 1 ½" lg. hex head cap screws) by loosening the screws which are the inner bolt circle on the large flange of the bearing support housing on the backside of the pump case. The seal seat support can be removed with the aid of a puller bar (see FIGURE 10, on page 33 or order part number X3004 from CH&E A Division of ABS Pumps). Secure the puller bar to the seal seat support (two 3/8"-16 x 1" lg. hex head cap screws) using the tapped holes in the face of the seal seat support. Thread a 3/8"-16 x 2" lg. square head setscrew into the center hole of the puller bar. Put a steel spacer between the setscrew and the end of the shaft to prevent damage. As the setscrew is tightened, the seal and seal seat support will come loose.

7. Remove the stationary seal seat from the seal seat support by tapping on it from the backside with a hammer and punch. Clean up the seal seat bore, in the casting, with fine emery cloth or steel wool.

Figure 8
Priming system (Electrical parts)



Parts List – Figure 8

Ref. #.	Part No.	Description	Qty.
1	W133-002	Toggle switch	1
2	7527K43	Terminal Block	1
3	W135-001	Time Delay Relay	1
4	W133-001	Pressure Switch	1
5	W322-001	Solenoid Valve-12 VDC	1

Mechanical Seal Installation

Handle Seal with care!

(After mechanical seal installation it is a wise idea to replace the radial lip seal, since disassembly gives access to rear of seal oil chamber.)

(For installation tool see, FIGURE 11, on page 33 or order part X2176 from CH&E A Division of ABS PUMPS)

1. Cut a 2 ¼" to 2 3/8" diameter disc out of clean tag board or rubber (skip if X2176 is used).
2. Lubricate o-ring of the stationary seat with a rubber lubricant (P-80 from International Products Corp., Trenton, NJ).
3. With the shiny face up, place seal into the bore of the seal seat support (it will go in as far as the o-ring).
4. Place the tag board or rubber on the face (being careful not to mar face of seal).
5. Take a 2" x 2" piece of wood (don't need if X2176 is used) and evenly press seal into the bore of the seal seat support.
6. Turn seal seat support over to check that the seal is seated against the bottom of the bore.

Radial Lip Seal Replacement

Use steps 1-6 of MECHANICAL SEAL REMOVAL, on page 29 to gain access to area.

7. Remove the four 5/16"-18 x 1" lg. socket head cap screws that hold the lip seal holder in place.
8. Thread two of the screws into the tapped holes in the flange of the lip seal holder. Tighten the screws evenly (this will "push" the lip seal holder out of its seat).
9. Remove the radial lip seal from the lip seal holder by tapping on it from the backside with a hammer and punch.
10. Set the new seal on the bore with the "open" side or garter spring side of the seal up or to the outside.
11. Set a 2" pipe (2 3/8" OD) or steel plate on the seal and tap the seal until it bottoms in the bore.
12. Inspect the sleeve on the impeller shaft, where the lip seal seats. Clean it with solvent. If the sleeve is deeply grooved or heavily damaged, it will have to be replaced.
13. To remove the wear sleeve from the impeller shaft, grind an axial groove in it about 75% through the thickness (sleeve thickness is approximately .060").
14. Split the wear sleeve the rest of the way with a hammer and cold chisel. **(Do not damage the impeller shaft.)**
15. Install a new wear sleeve using tool X3005 (See FIGURE 12, on page 34) or equivalent (Note the position of the long chamfer on the wear sleeve on the outside diameter is towards the

threaded end of the impeller shaft (see FIGURE below). Either press the wear sleeve on using an arbor press or tap the sleeve in place using a hammer. The front edge of the wear sleeve must be 4 1/8" from the threaded end of the impeller shaft.

To install the lip seal holder with a new radial lip seal into the bearing support housing:

A. Tap the impeller shaft, by the threaded end, with a lead mallet to be sure the double-row ball bearing is seated against the shoulder.

B. Use rubber lubricant (P-80 or equivalent), to lubricate the o-ring on the outside diameter of the lip seal holder and the lip of the radial lip seal.

C. Thread two of the 5/16"-18 socket head cap screws into the tapped holes in the face of the lip seal holder in order to maneuver it into position.

D. Line up the holes in the lip seal holder with the tapped holes in the bearing support housing and push it into position.

E. Install the screws using blue Loc-Tite (a medium strength thread locking compound) on the threads and tighten in a crossing pattern. Torque the screws to 25-30 lb.-ft.

Figure 9
Wear-Sleeve Installation

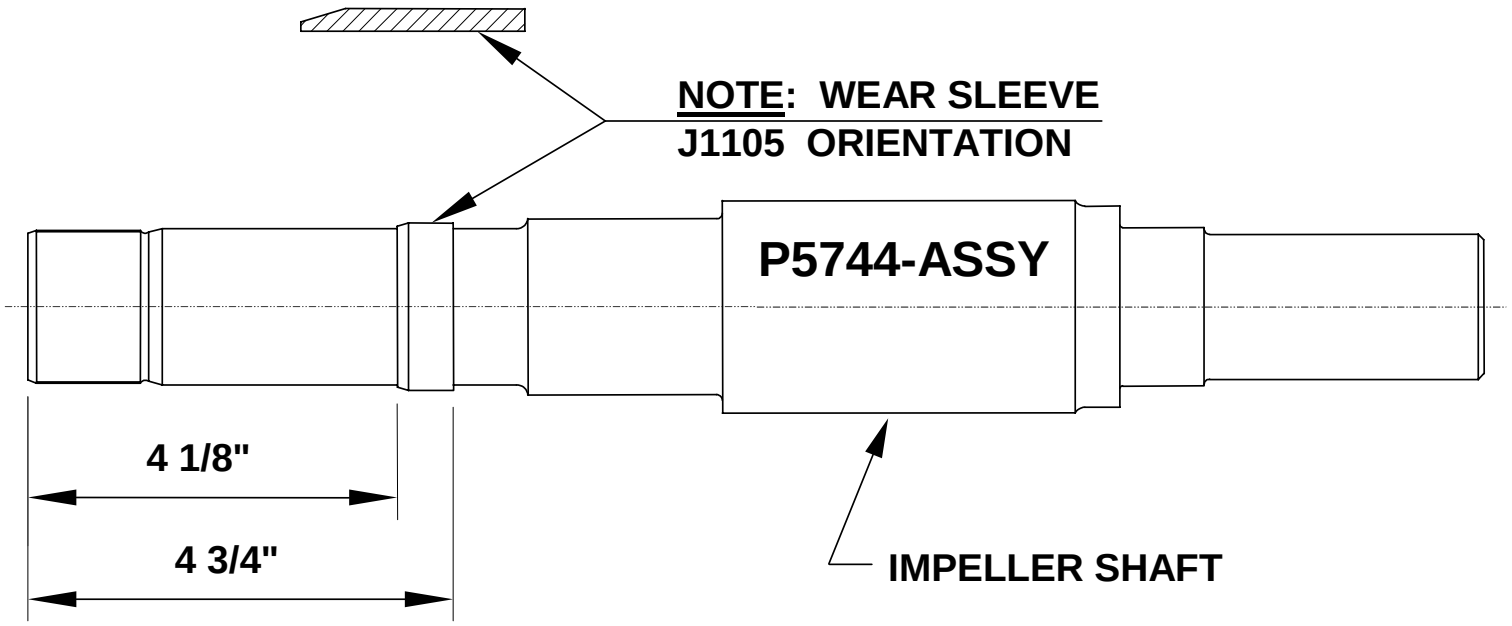


Figure 10
Tool No. X3004

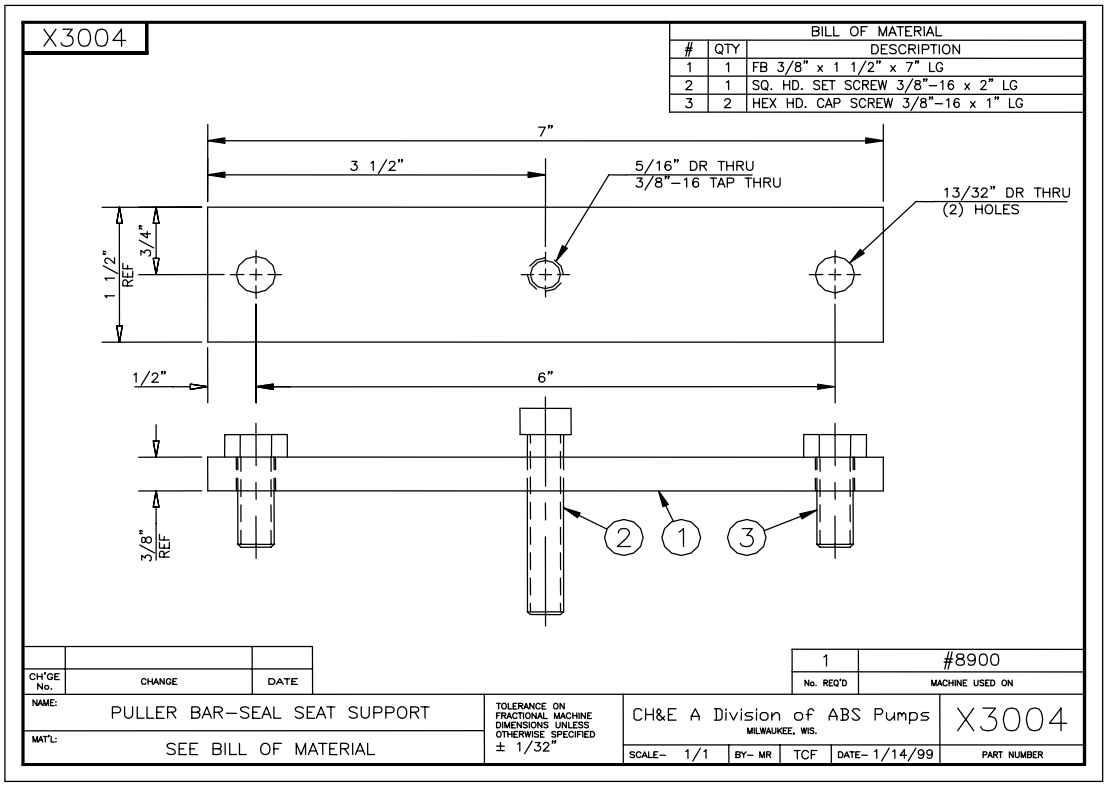


Figure 11
Tool No. X2176

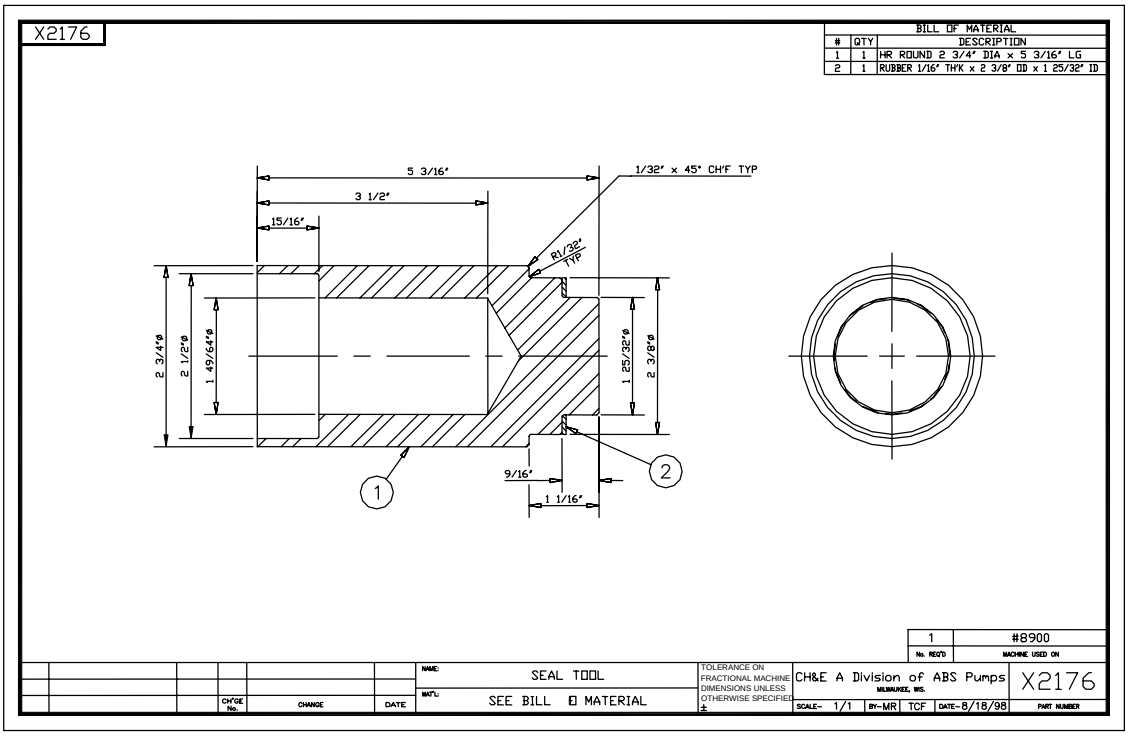
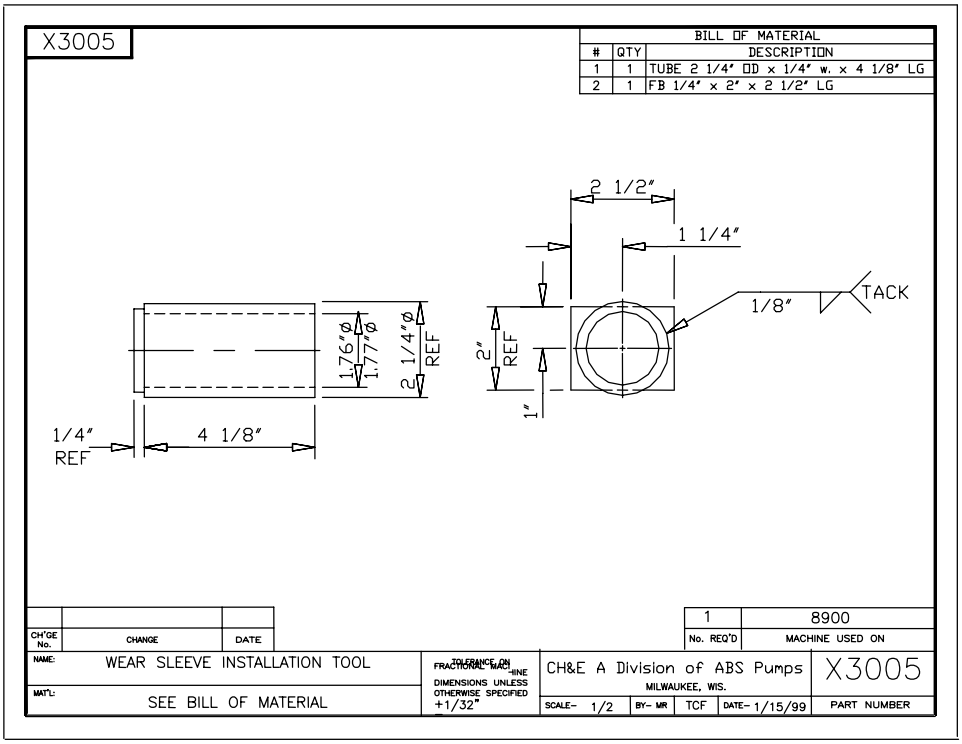


Figure 12
Tool No. X3005



Bearing Replacement

1. The pump case can be detached from the bearing support assembly while it is still attached to the engine. Attach slings to the pump case such that it will be safely supported after it has been removed from the bearing support housing. Note that the pump case alone weighs 300 lbs. (136 Kg) and depending on the number of parts still attached (discharge check valve, expansion chamber, suction tee, etc.) could weigh as much as 800 lbs. (363 Kg). Remove the two ¾"-10 x 2 ½" lg. hex head bolts in the pump feet and the six ½"-13 x 1 ¼" lg. hex head cap screws that hold the pump case to the bearing support housing. Pull the pump case away from the bearing support housing. **Be sure the pump case is properly supported.**

2. Remove the impeller, mechanical seal, seal seat support and lip seal holder from the bearing support housing. (See MECHANICAL SEAL REMOVAL, on page 29)

3. Support the bearing support housing/shaft assembly with a sling and proceed to remove it from the engine by removing the twelve M10 x 1.5 x 30mm lg. hex head cap screws that attach it to the engine bell housing. Pull the bearing support housing straight back until it clears the engine.

4. To remove the drive hub/drive plate assembly from the shaft:

- Relax all locking screws by at least two turns and transfer screws to all push-off threads provided in face of inner ring.
- Release connection by progressively tightening all push-off screws in a diametrically opposite sequence except for screws adjacent to slit in inner ring, which should be tightened one after the other.

5. Pull the shaft bearing assembly out of the bearing support housing toward the threaded end of the shaft.

6. Pull the bearings off the shaft with a bearing puller. The ID of the front (double row) bearing will clear the OD of the wear sleeve used as a lip seal seat. If the sleeve has to replaced, see RADIAL LIP SEAL REPLACEMENT, on page 31.
7. Inspect the impeller shaft for any damage and replace if necessary.

8. Thoroughly clean all parts.

9. Press new bearings onto the shaft with the seal of the rear (single row) bearing towards the outside. Press only on the inner race of the bearing. It is not necessary to heat the bearings to install them on the impeller shaft.

10. Install the impeller shaft with bearings into the bearing support housing from the large flange end. The front (double row) bearing will stop on a step in the bearing support housing. The bearings OD is a slip fit in the bore and heavy pressure is not necessary when putting the impeller shaft into the bearing support housing.

11. See RADIAL LIP SEAL REPLACEMENT, on page 31, for lip seal holder installation.

12. Fill the bearing tube with grease (NLGI Grade 2 high temperature, lithium complex grease - Exxon Ronex MP or equivalent) through the zerk fitting on top of the bearing support housing. Also, remove the 1/8" pipe plug on top of the bearing support housing to vent the grease chamber during filling. Replace the pipe plug when grease starts coming out the hole. The chamber will be full at that point.

13. If the engine adapter plate has been removed from the bearing support housing, reattach it at this time. Use six 3/8"-16 flange hex lock nuts on the studs of the adapter plate. Torque to 16-20 lb.-ft.

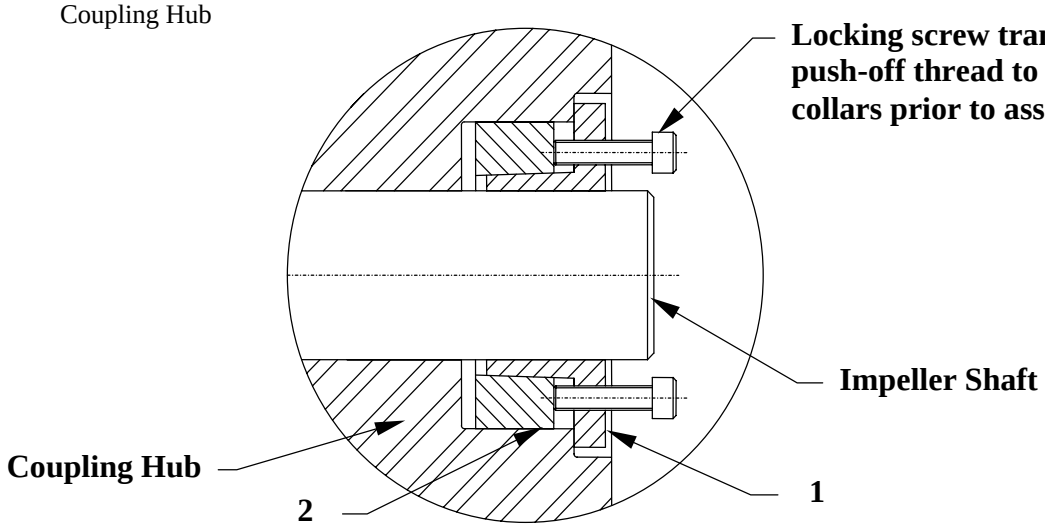
14. Install the drive hub with drive plate onto the impeller shaft such that the small end of the hub butts up against the inner race of the single row bearing.

15. The following pertains to the installation of the hub locking assembly (see FIGURE 13, below).

16. The frictional torque capacity of these devices is based on lightly oiled screw, taper, shaft and bore contact areas with a coefficient of friction μ=0.12.

Therefore, it is important not to use Molybdenum Disulfide, e.g., Molykote, Never-Seeze or similar lubricants in any locking assembly installation.

Figure 13
Coupling Hub



A. Loosen all locking screws by a minimum of two turns and transfer at least three equally spaced screws to the clamp flange push-off threads in order to keep parts 1 and 2 spaced apart for easy insertion of locking assembly as illustrated in figure.

B. Relocate locking screws used for separating parts 1 and 2.

C. Tighten locking screws in several stages to 30 lb.-ft. torque using a diametrically opposite tightening sequence. This applies to all locking screws except those adjacent to slit in inner ring part 1, which should be torqued one after the other.

Note:
To compensate for setting of screws adjacent to a screw just being torque, a slightly higher torque than specified is recommended for the final pass.

D. After completing installation, check locking screws again in a clockwise or counter-clockwise sequence and make sure none of the bolts can be turned at specified torque.

It is not necessary to recheck tightening torque after equipment has been in operation.

17. See MECHANICAL SEAL INSTALLATION (on page 31) for installing seal seat support and mechanical seal.

18. Bolt the bearing support housing/shaft assembly on to the engine bell housing. Use caution not to break any teeth on the drive plate. The drive plate can be aligned with the gear teeth of the drive ring on the flywheel by inserting a screw driver through one of the holes in the adapter plate and rotate the drive plate until the gear teeth of both parts mesh properly. Tighten the twelve M10 x 1.5 x 30mm lg. hex head cap screws to 25-30 lb-ft

19. Lightly grease the bearing support housing gasket and put it on the large flange of the bearing support housing.

20. Bolt the pump case to the bearing support housing with six ½"-13 x 1 ¼" lg. hex head cap screws. Torque to 25-30 lb.-ft.

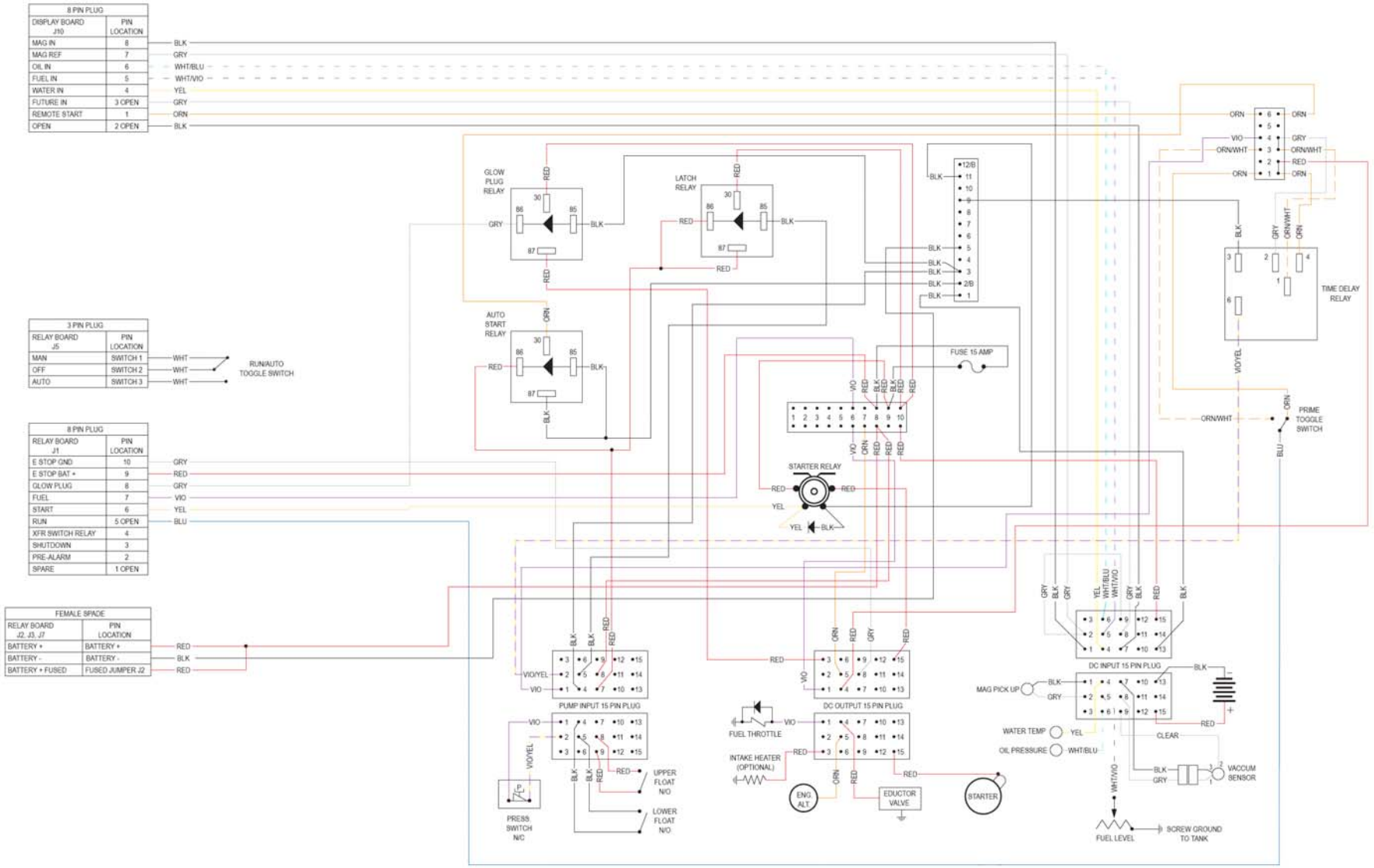
21. With the pump case supported, shim under the two pump feet. There should be no gap between the bottom of the pump foot and the pump support angle, of the skid, before tightening the pump foot bolt.

Figure 14

Engine Electronic Control

PROGRAMMING INSTRUCTIONS	FIRST LEVEL	SECOND LEVEL	THIRD LEVEL				Application :	8976TAQM
							Engine	4045DF250
							Pump	
							Control #	
Entering Programming With the unit in the **OFF** mode press and *HOLD* the **MENU** key pad then switch unit to **AUTO**, *HOLD* **MENU** key down until Software Version display times out.	**USER ID** **0: Field PSWD** **Password:** UP, MENU, DOWN (ENTER)	**OPTION 1: SET-UP**	**SET-UP PARAMETERS**	**VALUE**	**PARAMETER**	**Field Change**		
First Level Use the **UP** or **DOWN** key pad to select desired User ID. Press the **ENTER** key pad and enter the password by pressing the proper sequence key pads, then press **ENTER** key pad ***To Back out of programming Press and HOLD the MENU key then press ENTER key pad***		**0: RPM Set-up**	0: Number Gear Teeth	#	0-255	No		142
			1: Engine Crank Duration	ss	1sec -20sec	No	UNDEFINED	15 sec
			2: Time Between Engine Cranks	mm:ss	0sec - 120sec	No		15 sec
			3: Crank Cycles	#	1-5	No		3
			4: Start Speed in RPM	#	300-800	No		500
			5: Hard OverSpd in RPM	#	0-9000	No		2500
			6: Soft OverSpd in RPM	#	0-9000	No		2300
			7: Delay for OverSpd Check	ss	0-25sec	No		10 sec
			8: OverSpd Palarm Duration	ss	0-25sec	No		25 sec
			9: Hard UnderSpd in RPM	#	0-4000	No		600
			10: Soft UnderSpd in RPM	#	0-4000	No		800
			11: Delay for UnderSpd Check	ss	0-30sec	No		25 sec
			12 UnderSpd Palarm Duration	ss	0-30sec	No		10 sec
Second Level								
Option 1 The display will read... **0: Select System Function** Press the **ENTER** key pad to access **SET-UP** Pressing the **UP** key pad will scroll through: **0: RPM Setup** **1: Engine Setup** **2: Misc Set-up**	**DISPLAY READS:** **0: SELECT SYSTEM FUNCTION**	**1: Engine Set-up**	0: Temperature Units	*F*C	*F / *C	Yes		*F
			1: Max Water Temp in (F/C)	#*	150-300*F	No		237*F
			2: Delay for Water Check	mm:ss	0-120sec	No		2 min
			3: Water PreAlarm Temp in (F/C)	#*	150-250*F	No		210*F
			4: Water PreAlarm Duration	mm:ss	0-600sec	No		30 sec
			5: Pressure Units	KPA/PSI	Pound Per square inc	Yes		PSI
			6: Min Oil Pressure in (psi/kpa)	#	0-100PSI	No		20
			7: Delay for Oil Press Check	ss	0-25sec	No		5 sec
			8: Eng Stablilize Duration (RUN Rela	mm:ss	0-120sec	No		15
			9: Fuel Alarm in percent	%	0-100%	No		20%
			10: Fuel ShutDown in percent	%	0-100%	No		5%
			11: CoolDwn En	on/off	On or Off	No		on
			12: Eng Cooldown Duration	mm:ss	0-120sec	No		0 sec
			13: Pre-Heat En	on/off	On or Off	No		off
			14: Fixed Pre-Heat Duration	mm:ss	0-60sec	No		20sec
			15: Engine Warm-up Duration	mm:ss	0-1800sec	No		5 min
			16: Fixed Pre-Ht	yes/no	yes/no	No		yes
			17: Fuel Switch	yes/no	yes/no	No		no
			18: Fuel Switch Trip Low N.O. / N.C	yes/no	yes/N.O. no/N.C.	No		no
			19: Oil Switch	yes/no	no / gauge yes / light	No		no
			20: Water Switch	yes/no	no / gauge yes / light	No		no
			21: Nissan Sender Used	yes/no	yes/no	No		no
			22: Mag Used	yes/no	yes/no	No		yes
Option 2 The display will read... **0: Select System Function** Press the **Up** key pad to access **1: Outputs** **2: Inputs** **3: Initiate, Reset, Clear** ***To Back out of programming Press and HOLD the MENU key then press ENTER key pad***		**2: Misc Set-up**	0: Time before Service	hr:mm	1sec 72million	Yes		250 hr.
			1: Battery High Value	#	10-16V	No		15 VDC
			2: Battery Low Value	#	10-16V	No		12 VDC
			3: Battery Low Duration	mm:ss	1-3600sec	No		10 min
Third Level Press the **ENTER** key pad and select the Option you want by using the **UP** or **DOWN** key pad. The **ENTER** key pad will allow access to that option if your password allows. **UP** and **DOWN** key pads allow you to change option values The **ENTER** key pad will load the new value and scroll to the next option. ***To Back out of programming Press and HOLD the MENU key then press ENTER key pad***		**OPTION 2:**						
		1: Outputs	Individually control relays		Press ENTER then UP to actua	No		
		2: Inputs	Status of inputs can be viewed.		Select relay to view setting	No		
		3: Reload, Clear and Misc	0: Software Version					
			1: Time before Service		[MENU] + [DOWN] reloads	Yes		
			2: Engine Run-Time		[MENU] + [DOWN] clears	No		
			5: Faults		[MENU] + [DOWN] clears	Yes		

Figure 15
Electrical Schematic
Engine-Priming System



We know how water works

Operating and Maintenance Manual
Self-Priming Trash Pumps

7600 Series

Keep this information guide or a copy of it with the pump. Contact CH&E, A Division of ABS Pumps for additional copies if this manual should become lost. If you have any questions regarding operating or servicing this pump please contact CH&E, A Division of ABS Pumps at (414) 964-3400.

3489 North Palmer St
Milwaukee, WI 53212

Tel (414) 964.3400
Fax (414) 964.0677
Sales (800) 236.0666

Operating Manual Contents:

- Model Number/Serial Number Pg. 1
- Safety Information Pg. 2
- Operating Instructions Pg. 3
- Maintenance Requirements Pg. 3
- Maintenance Requirements (Con't) Pg. 4
- Troubleshooting Guide Pg. 5

Serial Number / Model Number:

A nameplate listing the Model Number and Serial Number is located on each pump. **The Model Number and Serial Number are necessary for ordering parts or requesting service; it is important that you document these numbers.**

Record Model Number and Serial Number Here:

Serial Number

Model Number

Safety Information:

DANGER! INDICATES AN IMMENENTLY HAZARDOUS SITUATION, FAILURE TO ABIDE BY SAFETY PRECAUTIONS WILL RESULT IN DEATH OR SERIOUS INJURY.

Engine Power:

DO NOT: Operate in an enclosed area, as exhaust fumes are lethal.
DO NOT: Smoke while operating the pump.
DO NOT: Smoke when refueling the engine.

DO NOT: Spill fuel when refueling.
DO NOT: Refuel or operate the engine near an open flame.
DO: Replace the fuel cap after refueling.

WARNING! INDICATES A POTENTIALLY HAZARDOUS SITUATION; FAILURE TO FOLLOW INSTRUCTIONS MAY RESULT IN DEATH OR SERIOUS INJURY.

Engine Power:

DO NOT: Touch hot surfaces, particularly the muffler; doing so may cause serious burns.
DO NOT: Operate without the guards in place.

DO: Read and understand the engine operator manual.

Pump Safety:

DO NOT: Pump flammable liquids.
DO NOT: Pump corrosive liquids. Contact local authorities for assistance.
DO NOT: Remove hoses, drain plug, fill plug or any access covers if the pump has not primed in ten minutes. Water in the pump will be hot and could be under high pressure. Allow pump to cool completely before attempting maintenance.

DO NOT: Operate this equipment without understanding the operating procedures.
DO NOT: Attempt to clear blockages or clean the pump while the pump is operating; rotating parts can cause serious injury.
DO: Read, understand, and follow pump and operation manual procedures.
DO: Be sure pump is on a firm, level surface and will not tip, roll or fall while in operation.
DO: operate only when guards are in place.

CAUTION! INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, MAY RESULT IN PROPERTY DAMAGE.

DO NOT: Run pump against a closed discharge.
DO NOT: Run the pump dry.
DO: Drain the pump in freezing weather.

DO: Flush the pump with clean water after each use.
DO: Store equipment properly when it is not in use.

Operating Instructions:

1. Read the “Pump Safety” pamphlet in its entirety before operating the pump and observe safe pump operating procedures at all times.
2. Read the engine operator manual in order to understand proper starting and stopping techniques. **Always start and stop the engine in accordance with the engine manufacturer’s instructions.**
3. Examine the pump carefully and read all instructions thoroughly before beginning pump operation.
    a. Notify the transportation company at once of any damage or loss that may have occurred during transit.
4. Install the appropriate nipple or quick coupling to the pump suction inlet.
    a. The inlet and discharge are female pipe threads.
    b. When using male and female couplings, the hose gasket must be in place and sealed properly.
5. Use grease or thread sealer on threaded connections to make them airtight.
6. Make sure that the hose does not leak and that the hose lining is not loose or it will collapse under suction pressure and block the hose.
    a. A hose guard should be used on the end of the suction line to prevent pumping solids too large for the pump to handle.
7. A hose or pipe can be attached to the discharge connection at the top of the pump to lead water away.
    a. To pump at maximum capacity, use a hose or pipe of the same size or larger than the pump discharge.
8. Fill the pump case with water through the filler plug at the top of the flap valve housing.
    a. Do not run the pump without liquid in the pump case.
    b. If the pump must be run for short periods of time to check the motor, fill the case with water to keep the rotating seal lubricated.
9. All gaskets and joints must be airtight.
10. Check that the automatic grease cup is in the run position.
    a. The T-Bar should be turned counterclockwise to the end of the stem.
    b. If the stem recedes into the grease cup, refill the cup with soft, easy flowing lithium complex grease such as Exxon Ronex MP.
    c. Do not allow the grease cup to run dry; the seal must be lubricated at all times.
11. Priming time depends on the height of the vertical suction lift, the length of the hose between the pump and the water level, and the speed of the pump.
    a. Maximum practical suction lift is approximately 25ft vertically from the surface of the water to the pump suction.
    b. Suction lines running long, horizontal distances from the water will reduce capacity due to the increased loss of friction.
    c. Fastest priming and greatest capacity are achieved at low suction lifts.
    d. For optimum performance, locate the pump close to water.
    e. The pump primes faster at higher speeds.
12. When shutting down the pump, screw the T-Bar of the automatic grease cup down to the top of the cup plus one turn.
    a. Drain the pump through the drain plug located in the bottom of the cover.
    b. Flush the pump with clean water after each use.

Maintenance Requirements:

- Keep the suction hose connection airtight.
    - Check the suction hose for leaks and/or a loose lining frequently.
- Check all of the bolts on the pump frequently, keeping them drawn up tightly.
- Replace “O” Rings after long periods of disuse as they will become dry and lose resiliency.
- If the impeller and/or volute are badly worn, they should be replaced to regain the best pump performance.
- Check the impeller gap annually; it should be set at .015” to .030”.
- Flush out the pump after each use.
- Drain the pump after each use.
- Block the suction and discharge openings before storing the pump.

Servicing the Pump:

Disassembling the Pump:

1. Drive the slip ring upwards until it clears the suction elbow.
2. Remove the two clamp handles that hold the cover to the pump case. Loosen clamp handles so that they still remain on the studs by two or three threads so that the cover does not fall off when removing the pump case.
3. To remove the cover, insert two ½" hex screws into the tapped holes located in the cover flange and tighten until the cover is loose.
4. To remove the volute, loosen and remove the thread sealing lock nuts and lift the volute out.
5. It is necessary to unscrew the impeller from the shaft to remove the seal. Hammer on a piece of wood held on the edge of the impeller vane to remove the impeller. Heating the center of the impeller may be required in order to loosen it.

Impeller Gap Adjustment:

1. Disassemble the pump according to steps 1-3 above.
2. With a feeler gauge, check the gap between the impeller and volute through the center hole of the volute. The gap is set in the factory at .015" to .030". Re-shim when this gap opens up to .040" or more.
3. Remove the impeller and volute per steps 4 & 5 above.
4. Add the required shims into the thread bore of the impeller to adjust the impeller gap to .015" to .030".

Seal Replacement:

Removing the Seal

1. If the seal becomes worn and needs to be replaced, begin by disassembling the pump as described above.
2. Remove the four hex screws that hold the seal seat support in place.
3. Remove the stationary seal ring from the seal seat support.
4. Using pliers, remove the rotating portion of the seal from the shaft.
5. Remove the seal seat holder by removing the four hex screws.
6. Remove the seal stationary seat from the seal seat holder.

Installing the New Seal

* When replacing the seal, the shaft and seal surface must be clean and smooth.
* DO NOT damage the seal parts when handling.
* Both the rotating and stationary portions of the seal must be replaced when installing a new seal.

1. Clean the seal chamber and all associated parts thoroughly.
2. Push the stationary seal portions into the seats in the seal seat holder and the seal seat support.
    a. Lubricate the outside of the rubber boot only with a light oil or rubber lubricant and push squarely until the seal rings are fully seated. Do not scratch the sealing surface in any way.
3. Reinstall the seal seat holder and the seal seat holder gasket into the bearing support housing.
4. Lubricate the inside diameter of the rubber boots of the rotating portion of the seal with rubber lubricant or soapy water and install onto the shaft.
5. Put the seal seat support gasket in place and carefully install the seal seat support.
6. Tighten the hex screws in a crossing pattern to pull the seal seat support evenly into position.
7. Reinstall impeller shims and impeller.
8. Reinstall the volute – Check the impeller-volute clearance, it should be .015" to .030".
9. Grease the "O" Ring in the cover and reinstall the cover.
10. Refill the seal chamber with grease.
    a. Remove the pipe plug to vent the chamber while filling.
    b. Use a Grade 2 lithium-based Exxon™ Ronex MP or equivalent.

c. Replace the pipe plug when grease comes out of the hole.
d. Continue filling with grease until the grease comes out of the small hole on the side of the automatic grease cup near the top.
e. Screw the T-Bar on the automatic grease cup stem down to the top of the cup and then one more turn to take the pressure off of the grease chamber when the pump is not in use.

11. Run a vacuum test.
    a. Install a 0-30” Hg Vacuum Gauge in an appropriate fitting to block the pump suction.
    b. Fill the pump case with water and run the pump for approximately two minutes.
    c. The pump should pull 25”-28” Hg vacuum.

Troubleshooting Guide:

Pump fails to prime	• Check that there is water in the pump case. • Check lift – maximum 25ft. • Check the strainer and line for blockage. • Check the hose and hose fittings for leaks. • Check pumpage for “flowability” • Check that the pump is not air-bound – air evacuated from the pump during priming must be able to move out of the discharge.
Vacuum is low or absent at the suction fitting	• Check tightness of fitting in the suction connection • On electric pumps, check for impeller rotation – counterclockwise when looking at the back of the motor • Check all pump “O” Ring and gasket joints • Check the impeller gap – factory setting is .015” to .030” – as parts wear, the vacuum level will go down • Check for impeller rotation – no rotation, the pump shaft is broken or the drive coupling has failed • Check the seal, if the grease cup stem retracts into the cup at a fast rate then the seal is cracked • Check for blockage • Check the pump speed
Pump fails to develop rated discharge head	• Check pump speed – need maximum speed for maximum head • Check for air leaks on the suction side of the pump • Check for blockages in the pump and impeller • Check for blockages in the suction and discharge lines • Check for impeller/volute wear