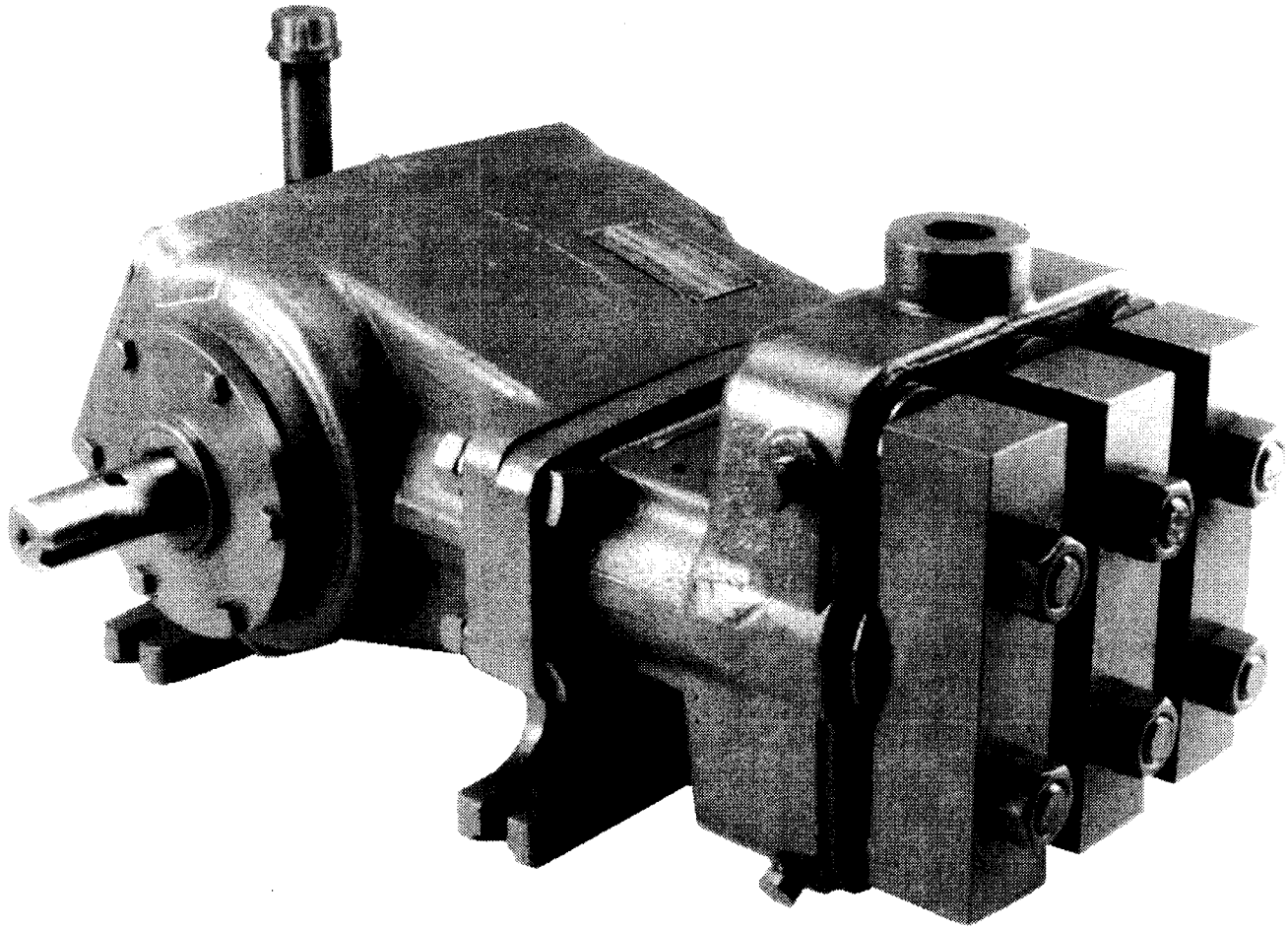
Myers®

Instructions, Service Manual and Parts List for C25-25-DV & C35-20-DV Industrial Pumps



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SPECIFICATIONS

Temp. Rating F° (C°)	Size in Inches (mm)					Wgt. Lbs. (kg)
	Piston Stroke	Suction Size (NPT)	Disch. Size (NPT)	Input Shaft	Keyway	
180	1-3/4	1-1/2	1	1-3/8	5/16 x 5/32	230
(82)	(44.5)	(38.1)	(25.4)	(34.9)	(7.9 x 3.9)	(104)

Suggested Drive for 1750 RPM Motor
Driven Sheave – 1-7/8 Bore, 1/2 x 1/4 Keyway, 7.8 O.D.
Driven Sheave – 1-3/8 Bore, 5/16 x 5/32 Keyway, 20.05 O.D.
Belt – 770XH-400 (4" wide, 77" long, 7/8" pitch) 15.38 Center Distance

MATERIAL SPECIFICATIONS

POWER END	
Crankcase	Cast Iron, Class 30
Crankshaft	4140 Heat Treated Forging
Link	Ductile Iron, ASTM A536
Crosshead	Ductile Iron, ASTM A536
Pony Rod	303 SST
Wrist Pin	CDS C1018 Carburize & Hardened
Crankshaft Main Bearing	Tapered Roller
Crankshaft Journal Bearing	Steel/Babbit Inserts
Wrist Pin Bearing	Bronze Bushing
Bearing Cap	Cast Iron, CL 20
Crankcase Cover	Cast Iron, CL 20
Drain Plug	Magnetic

FLUID END	
Body Fluid End	Ductile Iron, ASTM A536 GR80-55-06
Valve Cap	CDS 1211
Cylinder Cap	CDS 1211
Valve	DELRIN®
Valve Seat	420F SST Hardened
Valve Spring	316 SST
Nylok Cap Screw	303 SST
Packing Spring	316 SST
Cylinder Liner	Ceramic Coated (TECH 23) 416 SST
Piston Stud	316 SST
Piston Packing	Nitrile & Cotton Duck Fabric

SERVICE TOOLS

07294A000	Valve Seat Removal Tool Kit
17123B001	Cylinder Liner Removal Tool Kit

ACCESSORIES

15696C005	Recommended Pressure Regulator
24977B004	Recommended Pulsation Dampener

HORSEPOWER REQUIREMENTS

GPM	RPM	HORSEPOWER REQUIRED FOR: 600 PSI	800 PSI	1000 PSI	1200 PSI	1400 PSI	1600 PSI	1800 PSI	2000 PSI
C25-25-DV									
12.5	325	5.2	6.9	8.6	10.3	12.0	13.8	15.5	17.2
16.4	425	6.7	9.0	11.2	13.5	15.7	18.0	20.2	22.5
20.2	525	8.3	11.1	13.9	16.7	19.4	22.2	25.0	27.8
24.1	625	9.9	13.2	16.5	19.8	23.1	26.4	29.8	33.1
27.9	725	11.5	15.3	19.2	23.0	26.8	30.7	34.5	38.3
C35-20-DV									
19.5	375	8.0	10.7	13.4	16.1	18.7	21.4	24.1	26.8
24.6	475	10.1	13.5	16.9	20.3	23.6	27.0	30.4	33.8
28.8	575	12.3	16.4	20.5	24.5	28.6	32.7	36.8	40.9
35.0	675	14.4	19.2	24.0	28.8	33.6	38.4	43.2	48.0

* Horsepower required is based upon 85% overall efficiency.

* Formula (1) HP required (electric brake) $= \frac{GPM \times PSI}{1457}$ or $KW = \frac{LPM \times BAR}{511}$

(2) Expected GPM = Rated GPM x $\frac{\text{Working RPM}}{\text{Rated RPM}}$ or

Expected LPM = Rated LPM x $\frac{\text{Working RPM}}{\text{Rated RPM}}$

Motor sheave O.D. size = Pump sheave O.D. size x $\frac{\text{Pump RPM}}{\text{Motor RPM}}$

KILOWATT REQUIREMENTS

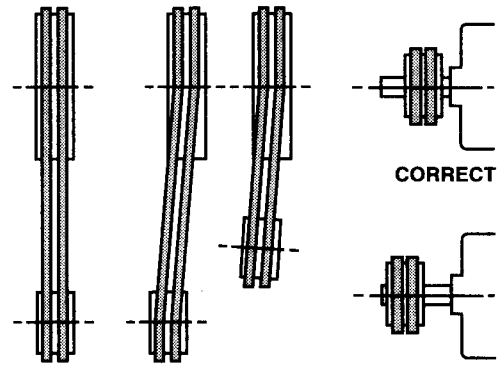
LPM	RPM	KILOWATT REQUIRED FOR: 41.4 BAR	55 BAR	70 BAR	82.7 BAR	96.6 BAR	110.4 BAR	124.2 BAR	138 BAR
C25-25-DV									
47.4	325	3.8	5.1	6.5	7.7	9.0	10.2	11.5	12.8
62.0	425	5.0	6.7	8.5	10.0	11.7	13.4	15.1	16.7
76.6	525	6.2	8.2	10.5	12.4	14.5	16.5	18.6	20.7
91.1	625	7.4	9.8	12.5	14.8	17.2	19.7	22.2	24.6
105.7	725	8.6	11.4	14.5	17.1	20.0	22.8	25.7	28.6
C35-20-DV									
73.8	375	6.0	8.0	10.0	12.0	13.9	16.0	18.0	20.0
93.1	475	7.5	10.1	12.6	15.1	17.6	20.1	22.7	25.2
112.8	575	9.2	12.2	15.3	18.3	21.3	24.4	27.4	30.5
132.5	675	10.7	14.3	17.9	21.5	25.1	28.6	32.2	35.8

NOTE: Horsepower requirements for an internal combustion engine (gas or diesel) may be obtained by multiplying the figures listed by 1.3. Do not exceed 80% of the manufacturers advertised horsepower at operating RPM.

INSTRUCTIONS

CAUTION–Positive Displacement Pumps must have a proper size and operable type of pressure regulating valve or pressure relief valve piped into the discharge line. This is mandatory to prevent damage to pump and piping or possible injury to personnel. Do not install any valves or shut-off devices in the by-pass line from pressure regulator to tank or supply.

It is recommended to install a pulsation dampener in discharge line to smooth out pressure pulse. This can protect pump parts and piping for longer life and quiet operation.



PULLEY LOCATION ON PUMP AND MOTOR SHAFT

BELT DRIVE

With belt drives, pulley on both engine and pump should be located as closely as possible to bearing to reduce bearing and shaft bending loads. Make sure that all bolts, nuts, set screws, and keys are properly tightened.

STARTING PUMP

A. Before Starting:

1. Read all instructions carefully.
2. Fill pump crankcase with recommended oil (SAE 30) to level mark on oil saber.
3. Replace all drain plugs in pump and piping.
4. Inspect tank to be sure that no foreign material is in tank or suction line.
5. Fill tank at least half full or connect suction to water supply. Open valve (if present) in suction line. **Avoid prolonged dry operation which may cause excessive wear on piston packing. Be sure that an operating pressure gauge is located in discharge line. Use heavy duty, liquid filled, pulsation free pressure gauge.**
6. Make sure all valves, including spray gun or nozzles, are open in discharge line. Spray gun may be anchored to discharge back into tank.
7. Completely back off pressure adjusting device on pressure regulating valve.
8. Check pressure rating for pulsation dampener pressure regulator and pipe fitting to make sure working pressure is not over maximum pressure rating.

B. Starting the Unit:

1. After starting, close discharge valve or spray gun slowly while watching pressure gauge to make sure relief valve or unloader is operating properly.
2. Adjust relief valve or unloader to desired pressure. See regulator instructions.
3. Cycle nozzles or gun on and off to be sure that pressure adjustment and regulator operation is satisfactory.

NOTE: Nozzle capacity should not exceed 90% of pump capacity for satisfactory regulator operation. AVOID FREEZING by draining all water from pump and system in cold weather. There is a 3/8 NPT drain plug for each cylinder chamber.

SUGGESTED MAINTENANCE SCHEDULE

OPERATION	INTERVAL
Check oil level	Daily
Drain & change oil (SAE 30)	300 hr. (1)
Inspect piston packing and spacer rings	500 hr. (2)
Inspect valves and springs	500 hr. (3)
Inspect connecting link bearing inserts	1000 hr. (4)
Inspect crankshaft tapered roller bearings	2000 hr.
Inspect piston stud	2000 hr. (5)

1. Drain at operating temperature to prevent contamination from setting.
2. Inspect frequently for leakage; piston packing is allowed to drip in order to cool and lubricate packing. Replace if there is a stream leak.
3. Replace if cracks and heavy wear are present.
4. Replace at first signs of fatigue or wear to prevent damage to crankshaft.
5. Replace if any pitting or rough surface on the seal surface.

LUBRICATION

Pump – Fill crankcase with SAE 30 crankcase oil – 2 quarts. Maintain oil level between the high and the low level marks on bayonet oil gauge inserted through crankcase cover. Add extra quart for crankshaft speeds under 300 RPM.

NOTE – Drain oil from crankcase after first 30 hours of operation. Refill with proper oil as mentioned above. Change oil every 300 hours thereafter. Check oil levels regularly. Change oil immediately if water droplets are found on bayonet gauge.

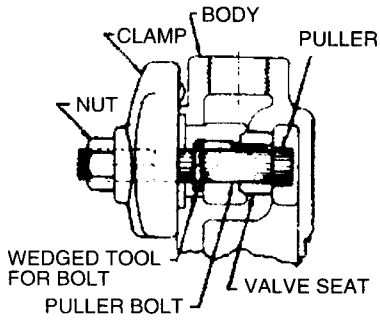
SERVICE

CAUTION: Disconnect electrical leads to motor or remove spark plug leads on engine before proceeding.

REPLACING PISTON PACKING

Loosen cap screw (53) and piston assembly can be removed through cylinder opening. Use waterproof grease to lubricate piston packing and O-ring on cylinder caps.

REPLACING VALVE SEATS



07294A000 VALVE PULLER KIT

FIG. 2

Pass head of puller through hole in valve seat before sliding piece is inserted alongside puller bolt. Place valve cap clamp (2" square bar) on puller bolt along with nut for extracting valve seat. See Figure 2. Place new valve seat in tapered hole in cylinder body and hold a soft brass or hardwood rod against valve set and drive into place with hammer.

CAUTION: Do not use a hand or arbor press to install valve seats. With excessive pressure it is possible to crack cylinder body.

REPLACING CYLINDER LINERS

Removal:

1. First remove piston packing as outlined previously.
2. Rotate crankshaft until piston rod is in rear position.
3. Insert puller (3) through inside of cylinder.
4. Insert disc (4) into slots on puller (3).
5. Slip plate (2) over threads on puller (3) as shown.
6. Screw nut (1) on thread in puller (3) and snug up.
7. Tighten nut (1) until liner breaks loose.
8. Loosen nut (1) and slip disc (4) out of slots.
9. Remove puller (3) and repeat to remove remainder of cylinder liners.

CYLINDER LINER REMOVAL TOOL KIT (17123B001)

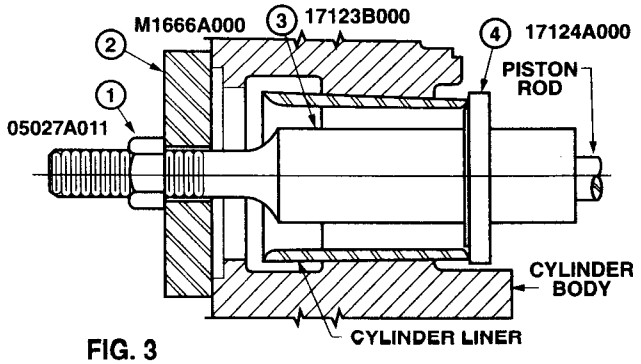


FIG. 3

INSTALLATION

Reasonable care and judgment should be used when installing the new tapered cylinder liner. Clean out any accumulation of loose rust or corrosion in tapered cylinder. Inspect O-ring. Replace it if damaged. Insert liner in position by hand and drive into position firmly (but not excessively) with a wood block and mallet. Never use a hand or hydraulic arbor press to install cylinder liner. It is possible to shrink the liner.

REPLACING PISTON ROD SEALS

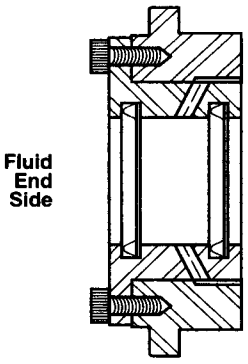


FIG. 4 OIL SEAL HOUSING ASSEMBLY

The rod seal assembly contains two seals, two oil seals with lips facing power end. The oil seal can be replaced without taking the fluid end off by removing the cylinder and piston to allow access for oil seal housing. Unscrew two Allen screws and place into the other two tapped holes. Gradually screw them in to push oil seal housing off the retainer. After assembling new seals in oil seal housing an assembly thimble should be used on end of crosshead rod for sliding oil seal housing back into retainer. Check gasket, replace if damaged.

An assembly thimble should be used on small end of the piston rod to expand sealing edge as it is pushed on. Figure 5 shows a recommended thimble for installation of oil seals. The thimble should be machined from high carbon steel and polished on the exterior to reduce possibility of seal lip damage.

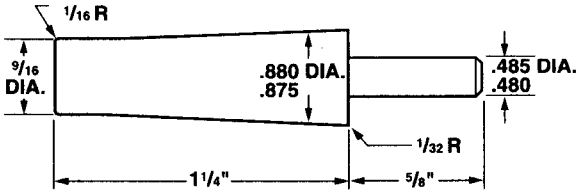


FIG. 5

SERVICING CRANKCASE PARTS

To remove the crankshaft you do not need to remove the cylinder body from the crankcase. Remove the connecting link caps from the connecting links and push the free links toward the cylinder end as far as possible. The crankshaft can then be removed by taking off the bearing caps and pulling the crankshaft through the bearing opening as shown in illustration Figure 6. During this process be sure to note the markings on the connecting links and link caps because these parts are mated to each other and should be reinstalled in the same position they were before taken apart.

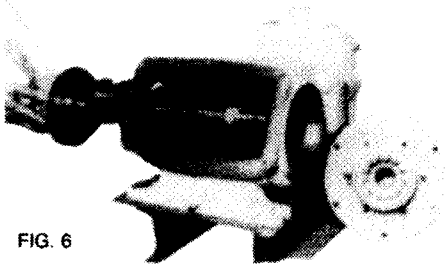


FIG. 6

REPLACING CRANKSHAFT AND SHIMMING BEARINGS

For quiet operation and long life, the crankshaft and bearings must be installed with .003" to .005" preload.

A. Place .045" shim (3 pink shims) on the right crankshaft bearing cap. Tighten the 6 cap screws and torque to 20 ft-lb (240 in-lb). Slide crankshaft from left hand bore. Extreme care should be exercised to avoid damage to oil seal by using tape to cover keyway slot.

B. Install the left cap without shims. Secure with 2 cap screws positioned top and bottom (180° apart), torque the 2 cap screws at 60 in-lb (5 ft-lb). DO NOT USE TORQUE WRENCH WITH LARGE FT-LB SCALE – MAY NOT BE ACCURATE. Do this *three times* to properly seat the tapered roller bearings.

C. Measure (adjacent to the cap screws) the shim gap remaining between the bearing cap and the crankcase.

D. The required shim thickness for this cap is equal to the average gap measurement, plus .005" constant.

E. Insert correct shim thickness under left bearing cap and tighten all 6 cap screws and torque to 20 ft-lbs. (240 in-lb). Ref. – green shim is .003" thick.

F. Rotate crankshaft to ensure no binding as result of shimming.

SERVICING CONNECTING LINKS

When the connecting link bearings are worn but the crankshaft is in good condition, standard replacement bearing inserts can be installed in the connecting links. These bearings should not be tampered with or changed in size in any way at the time of assembly. Do not attempt to change the size of the link by filing or grinding the faces of the link cap where they are clamped together. When reinstalling the links on the crankshaft by sure to place the oil holes upward for proper lubrication.

Bushing Ream Diameter "C"	1.0000" to 1.0005"
Inside Diameter "D" of Standard Bushing	2.3741" to 2.3748"
Bushing Inside Diameter "D" of Undersize Bushing	2.3441" to 2.3448"

NOTE: "D" Bushings are NOT to be reamed after assembly.

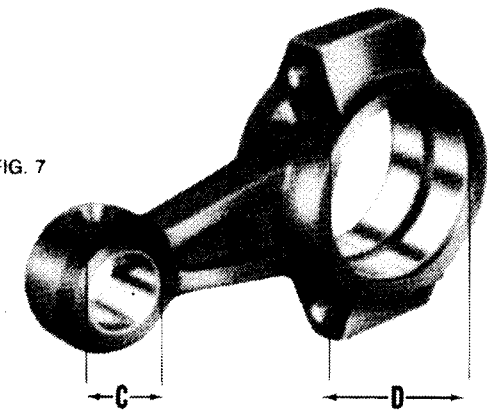


FIG. 7

RECOMMENDED TORQUE	
FASTENER LOCATION	**TORQUE (FOOT-POUNDS)**
Link Bearing Caps	25
Crankshaft End Caps	20
Cap screw Holding Piston Packing Assembly to Piston Rod	20
Valve and Cylinder Cover Clamps	200
Cap screw (Fluid End to Crankcase)	1/2"-50, 5/8"-80

CROSSHEAD AND PISTON RODS

Repair parts for the crosshead and piston rod are supplied only as a complete unit. If either of these parts becomes worn it is necessary to replace both the crosshead and piston rod. Under normal conditions a crosshead will not wear nor will the bore of the crankcase wear to the extent that oversize crossheads will be required. If extreme wear does occur, it will be due to severe damage from the lack of oil or a fairly large metal object scoring the crosshead bore. A clearance of .002" to .004" is standard for the crosshead. The parts can wear until considerably more clearance than this exists before harmful operation will occur.

RECONDITIONING CRANKSHAFTS

When only a very small amount of damage has occurred on the crank pins, such as small surface grooves cut part way around the bearing surface, the crank pins can sometimes be reconditioned for further use. This can be done with emery cloth and polishing until all ridges are completely removed. The final polishing operation should be performed by using a very fine emery cloth. This procedure can only be followed where the amount of sanding does not reduce the normal diameter of the crank pin.

If the crankshaft cannot be refinished by hand in this manner, it will be necessary to regrind and polish the bearing surfaces for special undersize bearings.

Figures 7 and 8 show the crankshaft with the crank pin sizes tabulated for both standard diameter and the undersize diameter that should be maintained. Worn or corroded crank pins can be ground and polished down to .030" under the size when the cranks were new. When this is done the surface should be polished to a good smooth finish. The undersize connecting links are made especially for turned down crankshafts. If the crankshaft has been reground to dimension "D" for reconditioned shafts, the undersize links can be used and will fit properly and operate as well as the original equipment.

If the surface is badly damaged, the crankshaft can often be salvaged by "metalizing" the crank pins and then regrinding and polishing to the original diameter. Consult F.E. Myers Engineering for details.

When installing new bushings for the crosshead pin, these bushings should be reamed to proper size after pressing into the link. The proper size as indicated in illustration No. 7.

When assembling bearings on the crankshaft an oil seal expander thimble should be used at the end of the shaft as shown in Illustration No. 8. A thimble of this type will cause the lip of the oil seal to gradually expand up to the shaft diameter allowing it to slip on the shaft without turning or damaging the seal in any way. Extreme care should be taken when pushing oil seals over keyways or holes in a shaft to make sure the sealing lip is not damaged. A slight nick or cut in this lip can damage a seal enough that it will not retain the oil properly.

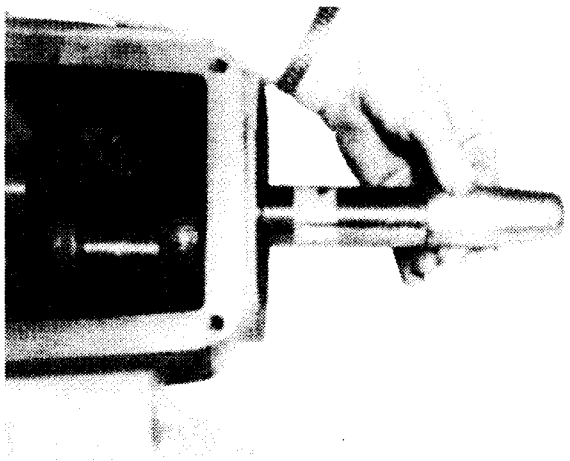


FIG. 8

When re-assembling all parts make sure that all gaskets are replaced exactly as they were originally.

Crank Pin Size "D" Standard – Use Standard Link Bearing	2.3730" to 2.3740"
Size "D" for Reconditioned Shaft – Use Undersize Link Bearing	2.3430" to 2.3440"

TROUBLESHOOTING

SYMPTOMS	POSSIBLE CAUSE OF PROBLEM
Failure of pump to build pressure with discharge closed. See A, B, C, D, E, F, H or I. **Failure to hold pressure with discharge open.** See C, D, E, F, G, H, I, J or K. **Pump is noisy.** See L, N or P. **Pump gets hot.** See M, N, O or W. **Pressure gauge shows abnormal fluctuations.** See P, Q, R, T or U. **Regulator chatter.** See S or U.	**A.** Pump not primed. **B.** Valve closed in suction line. **C.** Suction line or sediment chamber clogged. **D.** Air leak in suction line. **E.** Pressure regulator valve badly worn. **F.** Pressure regulator not properly adjusted. **G.** Pump packing of valves badly worn. **H.** Pressure regulator overflow valve held open by manual control. **I.** Pump cylinder body cracked. **J.** Holes in discs are too large (nozzle worn out). **K.** Small air leak in suction line. **L.** Need vacuum chamber in suction line. **M.** Water in crankcase. **N.** Worn connecting link bearings. **O.** Lack of oil in crankcase or speed reducer case. **P.** Foaming mixture. **Q.** Regulator plunger sticking. **R.** Regulator stuffing box nut too tight. **S.** Regulator stuffing box nut too loose or needs packing. **T.** Foreign matter under pump valve. **U.** Air chamber waterlogged. **V.** Loose piston rod. **W.** Main bearing lock rings out.

WARNING – THIS PUMP MUST BE INSTALLED WITH A PRESSURE RELIEF VALVE IN DISCHARGE LINE.

Explanation of the Service Chart

A. Pump priming is usually not necessary when the pump is installed correctly. However, there are certain unusual conditions which may make it necessary to prime the pump to get the pumping action started. Priming will be required under conditions where it is impossible for the piston to displace the air in the pump and replace it with water. This could be caused by a high suction lift (high from the water supply to the pump), the valves being stuck on the seat, such as after pumping a sticky fluid, or it might be caused by valves sticking due to extreme corrosion of the valves and seats. A pump will not prime readily if someone has tampered with the valve springs causing them to exert undue pressure of the valve plates against the valve seats. When the pump appears to need priming this condition can be checked by pouring water into the cylinder body through one of the valve cap openings or into the pump discharge opening at the same time operating the pump to work the water into the cylinder and valve passages.

B. Frequently a gate valve is installed in the suction line between a tank or pressure line and pump sediment chamber. This valve is usually installed in the line to shut off the supply source for cleaning sediment chamber or for pump repairs.

If this valve is closed or even partially closed it will interfere with the flow of water to the pump suction to such an extent that the pump will not perform to full capacity. If the valve is partially closed it may cause severe knocking and vibration of the pump because the water cannot flow into the cylinder cavities fast enough.

C. A sediment chamber should be installed in the suction line between the gate valve and the pump suction.

The strainers in these sediment chambers are of more than adequate capacity to allow a free flow of the liquid to the pump. However, because of its normal function of collecting sediment, the strainer may become severely clogged and in some cases, it will completely stop the flow of liquid to the pump. The length of time the pump may operate before it is necessary to clean the strainer will depend upon the type of liquid pumped. After the pump has been used a short period the operator will soon become familiar with the amount of running time between strainer cleanings.

D. Any piston pump, when operated at high pressure will not operate satisfactorily or quietly if a mixture of air and water is allowed to enter the pump suction. For this reason, a small air leak in the suction line will cause the pump to knock and vibrate excessively. This holds true only for a small air leak which allows the pump to draw a certain amount of water mixed with air on each stroke of the piston. A large air leak will cause the pump to lose prime after which it can not be reprimed until the air leak is stopped. Air leaks may occur at the joints of the suction line piping, at the gate valve in the suction line, at the gasket sealing the cap on the sediment chamber or by a crack in the suction wall of the cylinder body, such as might be caused by freezing if the pump is not properly drained in freezing weather. There is also a remote possibility of air drawing past the piston packing on the suction stroke if the piston packings are badly worn.

E. Badly worn packing or valves and valve seats will cause a serious drop in pump capacity. This will be indicated by a drop in pressure when guns are turned on. Worn packing is very easy to detect because of the water leakage. The packing should be replaced just as soon as this excessive leakage is noticed. If it is allowed to continue some of the material may work past the piston rod seals into the pump crankcase. Water in the pump crankcase will cause severe corrosion of the bearings causing them to fail. Worn valves can only be detected by visual examination of each valve assembly. The most prevalent cause of valve wear is the use of highly abrasive liquids. This will cause the valve and valve seat to wire cut. The cut starts as a very small groove but increases very rapidly once the valve starts to leak through this groove. Cutting will usually be much more evident on the valve plate in flat valve pumps. If the valve plates are replaced as soon as they start to show this cutting action it will prevent the valve seat from becoming cut in a similar manner and keep the cost of replacement parts to a minimum.

F. Pump cylinder bodies must withstand an extreme amount of shock and pulsation while the pump is in operation. If the pump is allowed to freeze, due to not being drained, the freezing may crack the cylinder body walls in almost any location. If the crack should occur on the suction valve or cylinder portion of the body it may allow a small amount of air to enter on the suction stroke and cause noisy operation or a decrease in pumping capacity. If the crack develops in the walls between the cylinder cavities or discharge valve cavity it may allow the water to flow from one cavity to the adjacent cavity and rob the pump of its effective displacement. This will not cause noisy operation but will reduce the pump capacity and may show up as a drop in pressure when the discharge is open.

G. The holes in gun or nozzle discs are continually subject to wear because of the high velocity of the liquid through the holes. Naturally they wear much faster if there is any abrasive or solid material in the liquid. If the holes become worn too much they may allow a higher rate of discharge than the pump is able to provide and a drop in pressure will be noticed. This can quickly be checked by reducing the number of nozzles or guns and at the same time watching the amount of overflow from the pressure regulator. If there is considerable overflow, even though a drop in pressure has been noticed, it is an indication that the regulator valve is worn rather than the gun or nozzle discs.

H. Suction surge arresters should be installed on the suction line of reciprocating pumps. A rubber bag type of suction surge arrester is preferred by a suitable vacuum chamber can be made by attaching a piece of vertical pipe as close to the pump suction as possible. One and one-half or two inch pipe can be

used. A standing height of 12" to 15" will be sufficient with the top end closed by an ordinary pipe cap.

I. Water may accumulate in the pump crankcase from two sources; the most prevalent being leakage of the packing as explained in Paragraph E. The other means of accumulation being a condensation of moisture inside the crankcase due to changes in weather or the repeated heating and cooling of the pump due to its normal usage. Pumps that are used rather consistently and run for a considerable period of time to heat the oil and other working parts will not normally accumulate water by condensation. If the packing is replaced as soon as it starts to leak it will be impossible for water to enter the crankcase from this cause. In localities or conditions where extremely abrasive liquids must be used, it is always advisable to replace the cylinder shells at the same time the worn packing is replaced. New packing will not give satisfactory service if it is placed in a badly worn and roughened cylinder liner.

J. Worn connecting link bearings will only develop because of unusual or adverse operating conditions. They will, however, be seriously affected by corrosion if water is present in the crankcase and they will wear out from overheating if adequate oil is not provided in the crankcase. For this reason we recommend thorough draining, cleaning and refilling with new oil prior to any storage period. Replace bearings as soon as any damage is discovered to avoid possible damage to crankshaft. (See Lubrication Instructions.)

K. Lack of sufficient oil in crankcase can quickly cause failure of pump power end and result in extensive repairs. Oil level should be checked periodically during normal operation as well as when maintenance work of any nature is performed. Insufficient oil will first be indicated by excessive heat and should be corrected immediately.

L. A foaming mixture will sometimes have the same effect as a small air leak in the suction line. This is because various quantities of the foam is drawn through the suction line into the pump disrupting the normal flow of water.

M. Pressure regulators that are operated by plunger action may become sluggish in action due to the plunger sticking or fitting too tightly in its cylinder. This condition may be caused by an accumulation of chemicals collecting in and around the plunger, or may be due to excessive corrosion of the plunger parts. To check this condition, remove and clean the plunger. After cleaning the plunger, parts should be covered with a waterproof grease before assembling.

N. In some cases there is a tendency for the pressure regulator valves to chatter or vibrate excessively. This is an indication of unstable operation due to nozzling in the high or low capacity range of the regulator. On systems using pressure regulator valves, the nozzling requirements should be at least 50% and not exceed 90% of pump capacity. Due to nozzle disc wear, the system requirements may exceed the 90% limit, resulting in cycling or hammering of the regulator. This can readily be checked by replacing the worn discs with new discs.

If chatter persists with an unloader, there is a possibility that stuffing box nut (on valve lifter stem) is too loose or that additional packing should be placed in the stuffing box gland. By repacking and drawing the stuffing box nut up to the point where it is snug, unloader chatter can be eliminated.

O. If a large piece of foreign matter becomes lodged between a pump valve and valve seat or if something of this kind becomes wedged in so that it prevents the valve from operating normally we can expect drastic drop in capacity and considerable surge or pulsation will be noticed in the discharge line. To correct a condition of this kind it is usually necessary to examine each valve in the pump until the offending condition is located. The use of clean liquid and seeing that the suction strainer is in proper condition will prevent trouble of this kind.

Atmospheric Air Chambers

P. When a pump is used for a long period of time without the source of supply being completely exhausted so that air can enter the pump we sometimes encounter a waterlogged air chamber. This decreases the effectiveness of the air chamber causing undue pulsation at the discharge. If this should happen the suction should be open to atmosphere at some point to allow air to be drawn through the pump to recharge the air chamber. This should be done with the pressure release valve open so the pump operates at no pressure, otherwise it will not pump air into the air chamber.

Q. Noisy pump operation will sometimes be caused by a piston rod being loose in the crosshead.

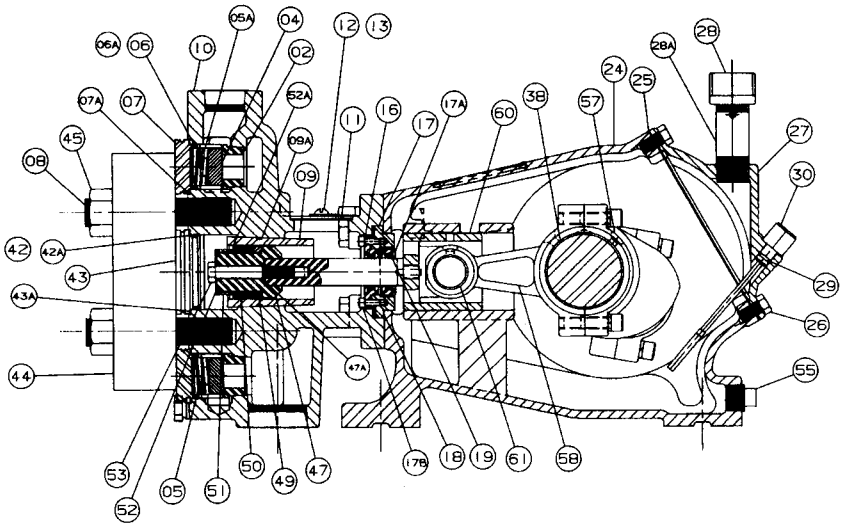
This will only become evident after the rod becomes so extremely loose that some end motion can be found between the piston rod and crosshead. A noise of this kind usually has a regular cadence timed with each stroke of the piston. When this condition occurs it is always necessary to replace both the piston rod and the crosshead because the two parts are threaded and pinned into a single unit.

R. The crankshaft main bearings are held in place by the end bearing caps. If bearing cap retaining bolts should become loosened, the bearing can shift which may cause bearing to run exceptionally hot.

Unusual Conditions Which May Cause Trouble

S. If the V-belts have a tendency to wear rapidly, it may be due to having the belt tightener pulley adjusted too far into the belt, throwing a reverse bend in the belt where is passes over the pulley. If very much reverse angle seems necessary to keep the belt tight, other provisions should be made for tightening, such as placing shims under the pump base or otherwise spreading the drive centers enough to take up the belt length. On multiple V-belt drives, a complete set of belts should be installed when making a replacement. Further, all the belts in one set should be checked for length and accurately matched to avoid placing an undue load on any one belt. The synchronized belt can deliver higher torque with narrower belt. The sprocket is thus narrower which results in less bending movement on main bearing and crankshaft. Also, initial tension is no required.

C25-25-DV & C35-20-DV Piston Pumps Parts List



POWER END

Ref. No.	Description	Qty.	Part No. C35-20-DV	Part No. C25-25-DV
16	Spring, Retainer	3	06120A000	06120A000
17	Retainer, Oil Seal Hsg.	3	24958A001	24958A001
17A	Housing, Oil Seal	3	24959A002	24959A002
17B	Screw, 10-32 UNF x 1/2	6	06106A034	06106A034
18	Gasket, Vellumoid 2-15/16 x 2-1/2 x 1/32	3	05059A052	0509A052
18A	Gasket, Vellumoid 1.8 x 1.5 x 1/32	3	05059A435	05059A435
19	Cup, U, 22 I.D. x 30 C.D. x 5.5 Lg.	6	22835A004	22835A004
24	Crankcase, D.I.	1	06076D000	06076D000
25	Gasket, Vellumoid	1	06089B000	06089B000
26	Cap screw, 3/8-16 x 3/4	6	19101A007	19101A007
27	Lid, C.I.	1	06077C000	06077C000
28	Cap, Pipe	1	05737A021	05737A021
28A	Nipple, Pipe 3/4 NPT	1	17995A001	17995A001
29	O-Ring, 7/16 x 5/16 x 1/16	1	05876A063	05876A063
30	Gauge, Oil Level	1	17360A014	17360A014
31	Bearing, Cone, 1.75 Bore	2	05674A019	05674A019
31A	Bearing, Cup, 4.125 O.D.	2	05675A018	05675A018
32	Gasket, Shim, Green - .003	6	05011A027	05011A027
32A	Gasket, Shim, Pink - .015	4	05011A028	05011A028
33	Cap, Bearing, Open	1	10414B002	10414B002
34	Washer, Seal	12	14946A003	14946A003
37	Seal, Oil, 1-3/8 Dia.	1	05710A004	05710A004
38	Crankshaft	1	06074D011	06074D011
39	Cap, Bearing, Closed	1	10414B001	10414B001
40	Cap screw	12	19101A013	19101A013
55	Plug, Drain, 1/2 NPT	1	17481A001	17481A001
57	Bearing, Steel Backed, 2-3/8	6	06109A000	06109A000
58	Link., Complete	3	06110B004	06110B004
60	Crosshead & Piston Rod	3	17515B001	17515B001
61	Wrist Pin	3	06116A000	06116A000

FLUID END

Ref. No.	Description	Qty.	Part No. C35-20-DV	Part No. C25-25-DV
02	Seat, Valve	6	06125A002	06125A002
04	Valve	6	17714A003	17714A003
05	Spring Valve 31/32 I.D. x 1 Lg. x 6 Coils, Suction	3	06127A002	06127A002
05A	Spring Valve 31/32 I.D. x 1 Lg. x 5 Coils, Disch.	3	06127A003	06127A003
06	O-Ring, 1-7/16 x 1-1/4 x 3/32	6	05876A171	05876A171
06A	Ring, Back-Up, 1-7/16 x 1-1/4	6	18753A008	18753A008
07	Cap, Valve 1.858 Dia.	6	18456A006	18456A006
07A	Gasket, Nylon 1.732 x 1.442 x .025	6	05059A436	05059A436
08	Stud, 7/8-14 UNF x 4-1/2, GR7	6	05659A089	05659A089
09	Liner, Cyl., 1-3/4 I.D., K-Ramic	3	06124A002	–
09	Liner, Cyl., 1-1/2 I.D., K-Ramic	3	–	06124A003
09A	O-Ring, 2-1/4 x 2-1/8 x 1/16	3	05876A172	05876A172
10	Body, Cylinder, C.I.	1	18790E002	18790E002
11	Lid, Cylinder Body	1	06123A000	06123A000
12	Screw, for Lid 1/4-20 x 1/2	2	05028A002	05028A002
13	Washer, for Lid	2	05030A020	05030A020
14	Cap screw, 1/2 x 1-3/4 Lg.	4	19103A008	19103A008
20	Washer, Lock 5/8	4	05454A011	05454A011
21	Bolt, Square, 5/8-11 x 2-1/2 Lg.	4	19108A027	19108A027
22A	Nut, 5/8-11	4	19109A041	19109A041
41	Plug, Pipe 3/8 BR	4	06136A000	06136A000
42	O-Ring, 2-7/16 x 2-1/4 x 3/32	3	05876A173	05876A173
42A	Ring, Back-Up, 2-7/16 x 2-1/4	3	18753A009	18753A009
43	Cap, Cylinder, 2-7/8 Dia.	3	18457A005	18457A005
43A	Gasket, Nylon, 2.750 x 2.450 x .025	3	05059A437	05059A437
44	Clamp, Cylinder & Valve 2" S.Q.	3	20856A001	20856A001
45	Nut, 7/8-14 UNF	6	19109A072	19109A072
47	Stud, Piston 1-3/4	3	20850A001	–
47	Stud, Piston 1-1/2	3	–	20850A003
47A	Washer, Copper .593 x .406 x .031	3	05030A128	05030A128
49	Follower, Phenolic	3	19328A000	19328A001
50	Packing, V-Ring, 1-3/4	3	18922A002	–
50	Packing, V-Ring, 1-1/2	3	–	18922A008
51	Spring, Piston	3	19606A000	19606A001
52	Washer, 316 SST	3	05030A205	05030A247
52A	Washer, 316 SST	3	05030A203	05030A246
53	Cap screw, Nylok	3	17050A004	17050A004
	Fluid End Repair Kits–PKC35FE			

Myers®

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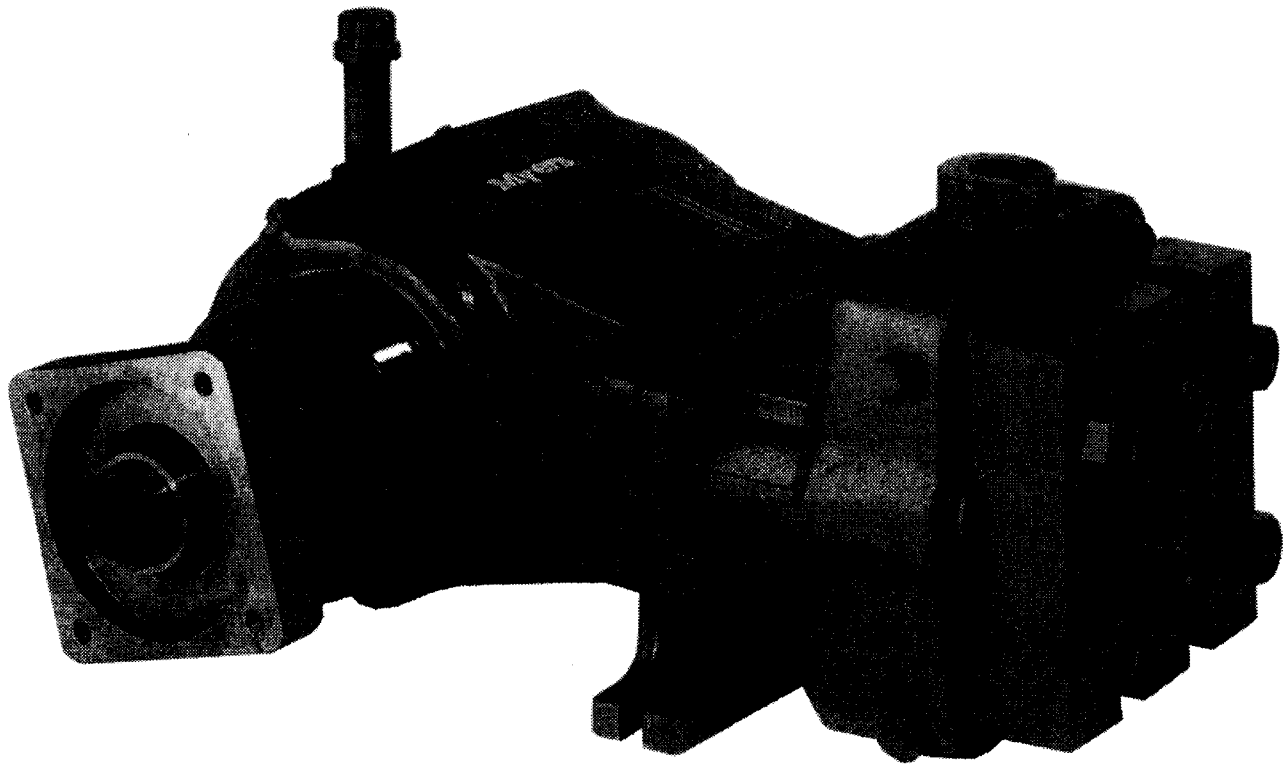
INDUSTRIAL PUMP DIVISION

Instructions, Service Manual and Parts List for C25-25DV-H/D & C35-20DV-H/D Industrial Pumps



26850A005

SPECIFICATIONS

Temp. Rating F° (C°)	Size in Inches (mm)					Wgt. Lbs. (kg)
	Piston Stroke	Suction Size (NPT)	Disch. Size (NPT)	Input Shaft	Keyway	
180	1-3/4	1-1/2	1	1-3/8	5/16 x 5/32	230
(82)	(44.5)	(38.1)	(25.4)	(34.9)	(7.9 x 3.9)	(104)

Suggested Drive for 1750 RPM Motor
Driven Sheave – 1-7/8 Bore, 1/2 x 1/4 Keyway, 7.8 O.D.
Driven Sheave – 1-3/8 Bore, 5/16 x 5/32 Keyway, 20.05 O.D.
Belt – 770XH-400 (4" wide, 77" long, 7/8" pitch) 15.38 Center Distance

MATERIAL SPECIFICATIONS

POWER END	
Crankcase	Cast Iron, Class 30
Crankshaft	4140 Heat Treated Forging
Link	Ductile Iron, ASTM A536
Crosshead	Ductile Iron, ASTM A536
Pony Rod	303 SST
Wrist Pin	CDS C1018 Carburize & Hardened
Crankshaft Main Bearing	Tapered Roller
Crankshaft Journal Bearing	Steel/Babbit Inserts
Wrist Pin Bearing	Bronze Bushing
Bearing Cap	Cast Iron, CL 20
Crankcase Cover	Cast Iron, CL 20
Drain Plug	Magnetic

FLUID END	
Body Fluid End	Ductile Iron, ASTM A536 GR80-55-06
Valve Cap	CDS 1211
Cylinder Cap	CDS 1211
Valve	DELRIN®
Valve Seat	420F SST Hardened
Valve Spring	316 SST
Nylok Cap Screw	303 SST
Packing Spring	316 SST
Cylinder Liner	Ceramic Coated (TECH 23) 416 SST
Piston Stud	316 SST
Piston Packing	Nitrile & Cotton Duck Fabric

SERVICE TOOLS

07294A000	Valve Seat Removal Tool Kit
17123B001	Cylinder Liner Removal Tool Kit

ACCESSORIES

15696C005	Recommended Pressure Regulator
24977B004	Recommended Pulsation Dampener

HORSEPOWER REQUIREMENTS

GPM	RPM	HORSEPOWER REQUIRED FOR: 600 PSI	800 PSI	1000 PSI	1200 PSI	1400 PSI	1600 PSI	1800 PSI	2000 PSI
C25-25-DV									
12.5	325	5.2	6.9	8.6	10.3	12.0	13.8	15.5	17.2
16.4	425	6.7	9.0	11.2	13.5	15.7	18.0	20.2	22.5
20.2	525	8.3	11.1	13.9	16.7	19.4	22.2	25.0	27.8
24.1	625	9.9	13.2	16.5	19.8	23.1	26.4	29.8	33.1
27.9	725	11.5	15.3	19.2	23.0	26.8	30.7	34.5	38.3
C35-20-DV									
19.5	375	8.0	10.7	13.4	16.1	18.7	21.4	24.1	26.8
24.6	475	10.1	13.5	16.9	20.3	23.6	27.0	30.4	33.8
28.8	575	12.3	16.4	20.5	24.5	28.6	32.7	36.8	40.9
35.0	675	14.4	19.2	24.0	28.8	33.6	38.4	43.2	48.0

* Horsepower required is based upon 85% overall efficiency.

* Formula (1) HP required (electric brake) $= \frac{GPM \times PSI}{1457}$ or $KW = \frac{LPM \times BAR}{511}$

(2) Expected GPM = Rated GPM x $\frac{\text{Working RPM}}{\text{Rated RPM}}$ or

Expected LPM = Rated LPM x $\frac{\text{Working RPM}}{\text{Rated RPM}}$

Motor sheave O.D. size = Pump sheave O.D. size x $\frac{\text{Pump RPM}}{\text{Motor RPM}}$

KILOWATT REQUIREMENTS

LPM	RPM	KILOWATT REQUIRED FOR: 41.4 BAR	55 BAR	70 BAR	82.7 BAR	96.6 BAR	110.4 BAR	124.2 BAR	138 BAR
C25-25-DV									
47.4	325	3.8	5.1	6.5	7.7	9.0	10.2	11.5	12.8
62.0	425	5.0	6.7	8.5	10.0	11.7	13.4	15.1	16.7
76.6	525	6.2	8.2	10.5	12.4	14.5	16.5	18.6	20.7
91.1	625	7.4	9.8	12.5	14.8	17.2	19.7	22.2	24.6
105.7	725	8.6	11.4	14.5	17.1	20.0	22.8	25.7	28.6
C35-20-DV									
73.8	375	6.0	8.0	10.0	12.0	13.9	16.0	18.0	20.0
93.1	475	7.5	10.1	12.6	15.1	17.6	20.1	22.7	25.2
112.8	575	9.2	12.2	15.3	18.3	21.3	24.4	27.4	30.5
132.5	675	10.7	14.3	17.9	21.5	25.1	28.6	32.2	35.8

NOTE: Horsepower requirements for an internal combustion engine (gas or diesel) may be obtained by multiplying the figures listed by 1.3. Do not exceed 80% of the manufacturers advertised horsepower at operating RPM.

INSTRUCTIONS

CAUTION - Positive Displacement Pumps must have a proper size and operable type of pressure regulating valve or pressure relief valve piped into the discharge line. This is mandatory to prevent damage to pump and piping or possible injury to personnel. Do not install any valves or shut-off devices in the bypass line from pressure regulator to tank or supply.

It is recommended to install a pulsation dampener in discharge line to smooth out pressure pulse. This can protect pump parts and piping for longer life and quiet operation.

STARTING PUMP

A. Before Starting:

1. Read all instructions carefully.
2. Fill pump crankcase with recommended oil (SAE 30) to level mark on oil saber.
3. Replace all drain plugs in pump and piping.
4. Inspect tank to be sure that no foreign material is in tank or suction line.
5. Fill tank at least half full or connect suction to water supply. Open valve (if present) in suction line. **Avoid prolonged dry operation which may cause excessive wear on piston packing. Be sure that an operating pressure gauge is located in discharge line. Use heavy duty, liquid filled, pulsation free pressure gauge.**
6. Make sure all valves, including spray gun or nozzles, are open in discharge line. Spray gun may be anchored to discharge back into tank.
7. Completely back off pressure adjusting device on pressure regulating valve.
8. Check pressure rating for pulsation dampener pressure regulator and pipe fitting to make sure working pressure is not over maximum pressure rating.

B. Starting the Unit:

1. After starting, close discharge valve or spray gun slowly while watching pressure gauge to make sure relief valve or unloader is operating properly.
2. Adjust relief valve or unloader to desired pressure. See regulator instructions.
3. Cycle nozzles or gun on and off to be sure that pressure adjustment and regulator operation is satisfactory.

NOTE: Nozzle capacity should not exceed 90% of pump capacity for satisfactory regulator operation. AVOID FREEZING by draining all water from pump and system in cold weather. There is a 3/8 NPT drain plug for each cylinder chamber.

SUGGESTED MAINTENANCE SCHEDULE

OPERATION	INTERVAL
Check oil level	Daily
Drain & change oil (SAE 30)	300 hr. (1)
Inspect piston packing and spacer rings	500 hr. (2)
Inspect valves and springs	500 hr. (3)
Inspect connecting link bearing inserts	1000 hr. (4)
Inspect crankshaft tapered roller bearings	2000 hr.
Inspect piston stud	2000 hr. (5)

1. Drain at operating temperature to prevent contamination from setting.
2. Inspect frequently for leakage; piston packing is allowed to drip in order to cool and lubricate packing. Replace if there is a stream leak.
3. Replace if cracks and heavy wear are present.
4. Replace at first signs of fatigue or wear to prevent damage to crank shaft.
5. Replace if any pitting or rough surface on the seal surface.

LUBRICATION

Pump - Fill crankcase with SAE 30 crank case oil - 2 quarts. Maintain oil level between the high and the low level marks on bayonet oil gauge inserted through crankcase cover. Add extra quart for crankshaft speeds under 300 rpm.

NOTE Drain oil from crankcase after first 30 hours of operation. Refill with proper oil as mentioned above. Change oil every 300 hours thereafter. Check oil levels regularly. Change oil immediately if water droplets are found on bayonet gauge.

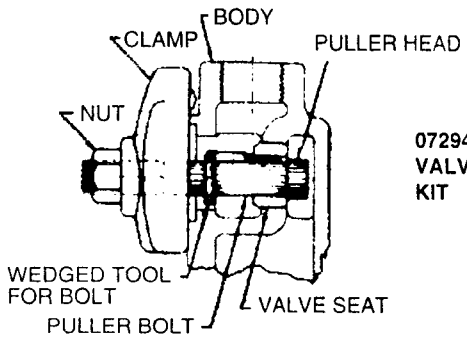
SERVICE

CAUTION: Disconnect electrical leads to motor or remove spark plug leads on engine before proceeding.

REPLACING PISTON PACKING

Loosen cap screw (53) and piston assembly can be removed through cylinder opening. Use waterproof grease to lubricate piston packing and o-ring on cylinder caps.

REPLACING VALVE SEATS



07294A000 VALVE PULLER KIT

FIG. 2

Pass head of puller through hole in valve seat before sliding piece is inserted alongside puller bolt. Place valve cap clamp (2" square bar) on puller bolt along with nut for extracting valve seat. See Figure 2. Place new valve seat in tapered hole in cylinder body and hold a soft brass or hardwood rod against valve set and drive into place with hammer.

CAUTION: Do not use a hand or arbor press to install valve seats. With excessive pressure it is possible to crack cylinder body.

REPLACING CYLINDER LINERS

Removal:

1. First remove piston packing as outlined previously.
2. Rotate crankshaft until piston rod is in rear position.
3. Insert puller (3) through inside of cylinder.
4. Insert disc (4) into slots on puller (3).
5. Slip plate (2) over threads on puller (3) as shown.
6. Screw nut (1) on thread in puller (3) and snug up.
7. Tighten nut (1) until liner breaks loose.
8. Loosen nut (1) and slip disc (4) out of slots.
9. Remove puller (3) and repeat to remove remainder of cylinder liners.

CYLINDER LINER REMOVAL TOOL KIT (17123B001)

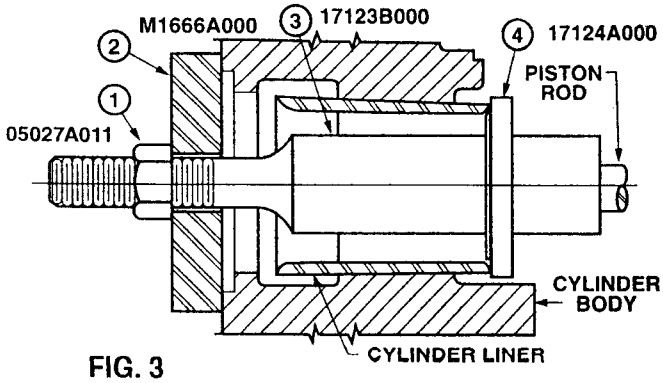


FIG. 3

INSTALLATION

Reasonable care and judgment should be used when installing the new tapered cylinder liner. Clean out any accumulation of loose rust or corrosion in tapered cylinder. Inspect O-ring. Replace it if damaged. Insert liner in position by hand and drive into position firmly (but not excessively) with a wood block and mallet. Never use a hand or hydraulic arbor press to install cylinder liner. It is possible to shrink the liner.

REPLACING PISTON ROD SEALS

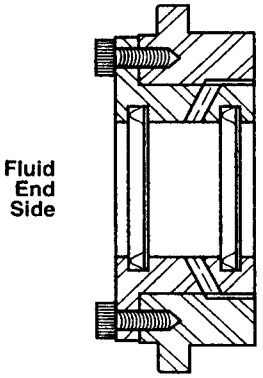


FIG. 4 OIL SEAL HOUSING ASSEMBLY

The rod seal assembly contains two seals, two oil seals with lips facing power end. The oil seal can be replaced without taking the fluid end off by removing the cylinder and piston to allow access for oil seal housing. Unscrew two Allen screws and place into the other two tapped holes. Gradually screw them in to push oil seal housing off the retainer. After assembling new seals in oil seal housing an assembly thimble should be used on end of crosshead rod for sliding oil seal housing back into retainer. Check gasket, replace if damaged.

An assembly thimble should be used on small end of the piston rod to expand sealing edge as it is pushed on. Figure 5 shows a recommended thimble for installation of oil seals. The thimble should be machined from high carbon steel and polished on the exterior to reduce possibility of seal lip damage.

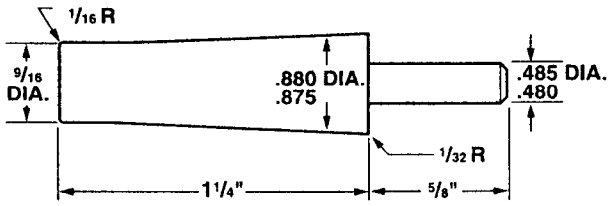


FIG. 5

SERVICING CRANKCASE PARTS

To remove the crankshaft you do not need to remove the cylinder body from the crankcase. Remove the connecting link caps from the connecting links and push the free links toward the cylinder end as far as possible. The crankshaft can then be removed by taking off the bearing caps and pulling the crankshaft through the bearing opening as shown in illustration Figure 6. During this process be sure to note the markings on the connecting links and link caps because these parts are mated to each other and should be reinstalled in the same position they were before taken apart.

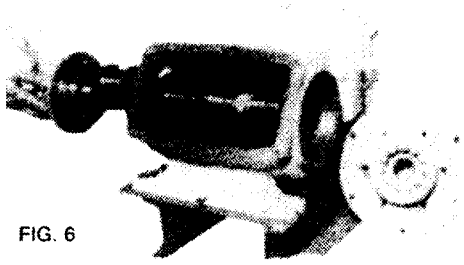


FIG. 6

REPLACING CRANKSHAFT AND SHIMMING BEARINGS

For quiet operation and long life, the crankshaft and bearings must be installed with .003" to .005" preload.

A. Place .045" shim (3 pink shims) on the right crankshaft bearing cap. Tighten the 6 cap screws and torque to 20 ft-lb (240 in-lb). Slide crankshaft from left hand bore. Extreme care should be exercised to avoid damage to oil seal by using tape to cover keyway slot.

B. Install the left cap without shims. Secure with 2 cap screws positioned top and bottom (180° apart), torque the 2 cap screws at 60 in-lb (5 ft-lb). DO NOT USE TORQUE WRENCH WITH LARGE FT-LB SCALE – MAY NOT BE ACCURATE. Do this *three times* to properly seat the tapered roller bearings.

C. Measure (adjacent to the cap screws) the shim gap remaining between the bearing cap and the crankcase.

D. The required shim thickness for this cap is equal to the average gap measurement, plus .005" constant.

E. Insert correct shim thickness under left bearing cap and tighten all 6 cap screws and torque to 20 ft-lbs. (240 in-lb). Ref. – green shim is .003" thick.

F. Rotate crankshaft to ensure no binding as result of shimming.

SERVICING CONNECTING LINKS

When the connecting link bearings are worn but the crankshaft is in good condition, standard replacement bearing inserts can be installed in the connecting links. These bearings should not be tampered with or changed in size in any way at the time of assembly. Do not attempt to change the size of the link by filing or grinding the faces of the link cap where they are clamped together. When reinstalling the links on the crankshaft by sure to place the oil holes upward for proper lubrication.

Bushing Ream Diameter "C"	1.0000" to 1.0005"
Inside Diameter "D" of Standard Bushing	2.3741" to 2.3748"
Bushing Inside Diameter "D" of Undersize Bushing	2.3441" to 2.3448"

NOTE: "D" Bushings are NOT to be reamed after assembly.

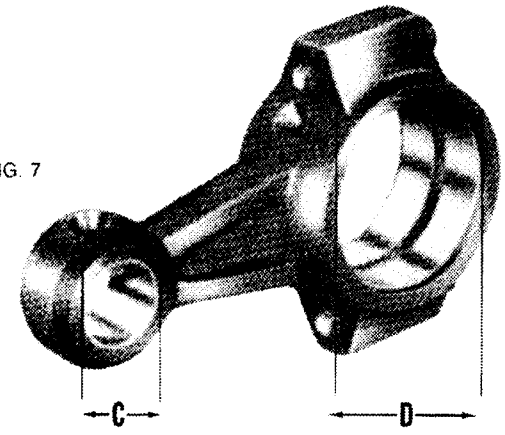


FIG. 7

RECOMMENDED TORQUE	
FASTENER LOCATION	**TORQUE (FOOT-POUNDS)**
Link Bearing Caps	25
Crankshaft End Caps	20
Cap screw Holding Piston Packing Assembly to Piston Rod	20
Valve and Cylinder Cover Clamps	200
Cap screw (Fluid End to Crankcase)	1/2"-50, 5/8"-80

CROSSHEAD AND PISTON RODS

Repair parts for the crosshead and piston rod are supplied only as a complete unit. If either of these parts becomes worn it is necessary to replace both the crosshead and piston rod. Under normal conditions a crosshead will not wear nor will the bore of the crankcase wear to the extent that oversize crossheads will be required. If extreme wear does occur, it will be due to severe damage from the lack of oil or a fairly large metal object scoring the crosshead bore. A clearance of .002" to .004" is standard for the crosshead. The parts can wear until considerably more clearance than this exists before harmful operation will occur.

RECONDITIONING CRANKSHAFTS

When only a very small amount of damage has occurred on the crank pins, such as small surface grooves cut part way around the bearing surface, the crank pins can sometimes be reconditioned for further use. This can be done with emery cloth and polishing until all ridges are completely removed. The final polishing operation should be performed by using a very fine emery cloth. This procedure can only be followed where the amount of sanding does not reduce the normal diameter of the crank pin.

If the crankshaft cannot be refinished by hand in this manner, it will be necessary to regrind and polish the bearing surfaces for special undersize bearings.

Figures 7 and 8 show the crankshaft with the crank pin sizes tabulated for both standard diameter and the undersize diameter that should be maintained. Worn or corroded crank pins can be ground and polished down to .030" under the size when the cranks were new. When this is done the surface should be polished to a good smooth finish. The undersize connecting links are made especially for turned down crankshafts. If the crankshaft has been reground to dimension "D" for reconditioned shafts, the undersize links can be used and will fit properly and operate as well as the original equipment.

If the surface is badly damaged, the crankshaft can often be salvaged by "metalizing" the crank pins and then regrinding and polishing to the original diameter. Consult F.E. Myers Engineering for details.

When installing new bushings for the crosshead pin, these bushings should be reamed to proper size after pressing into the link. The proper size as indicated in illustration No. 7.

When assembling bearings on the crankshaft an oil seal expander thimble should be used at the end of the shaft as shown in Illustration No. 8. A thimble of this type will cause the lip of the oil seal to gradually expand up to the shaft diameter allowing it to slip on the shaft without turning or damaging the seal in any way. Extreme care should be taken when pushing oil seals over keyways or holes in a shaft to make sure the sealing lip is not damaged. A slight nick or cut in this lip can damage a seal enough that it will not retain the oil properly.

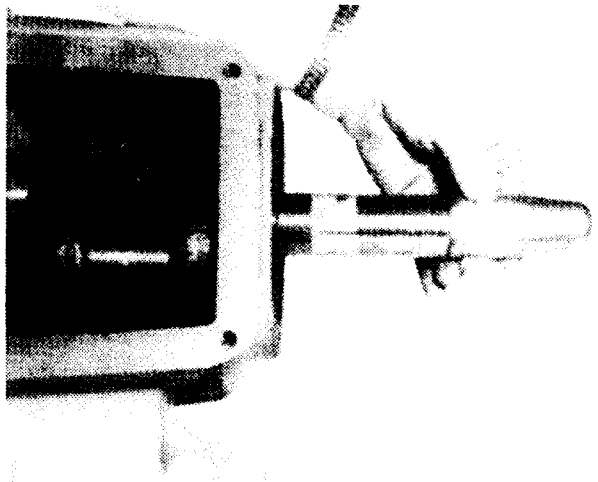


FIG. 8

When re-assembling all parts make sure that all gaskets are replaced exactly as they were originally.

Crank Pin Size "D" Standard –
Use Standard Link Bearing 2.3730" to 2.3740"

Size "D" for Reconditioned Shaft –
Use Undersize Link Bearing 2.3430" to 2.3440"

TROUBLESHOOTING

SYMPTOMS	POSSIBLE CAUSE OF PROBLEM	
Failure of pump to build pressure with discharge closed. See A, B, C, D, E, F, H or I. **Failure to hold pressure with discharge open.** See C, D, E, F, G, H, I, J or K. **Pump is noisy.** See L, N or P. **Pump gets hot.** See M, N, O or W. **Pressure gauge shows abnormal fluctuations.** See P, Q, R, T or U. **Regulator chatter.** See S or U.	**A.** Pump not primed. **B.** Valve closed in suction line. **C.** Suction line or sediment chamber clogged. **D.** Air leak in suction line. **E.** Pressure regulator valve badly worn. **F.** Pressure regulator not properly adjusted. **G.** Pump packing of valves badly worn. **H.** Pressure regulator overflow valve held open by manual control. **I.** Pump cylinder body cracked. **J.** Holes in discs are too large (nozzle worn out). **K.** Small air leak in suction line.	**L.** Need vacuum chamber in suction line. **M.** Water in crankcase. **N.** Worn connecting link bearings. **O.** Lack of oil in crankcase or speed reducer case. **P.** Foaming mixture. **Q.** Regulator plunger sticking. **R.** Regulator stuffing box nut too tight. **S.** Regulator stuffing box nut too loose or needs packing. **T.** Foreign matter under pump valve. **U.** Air chamber waterlogged. **V.** Loose piston rod. **W.** Main bearing lock rings out.

WARNING – THIS PUMP MUST BE INSTALLED WITH A PRESSURE RELIEF VALVE IN DISCHARGE LINE.

Explanation of the Service Chart

A. Pump priming is usually not necessary when the pump is installed correctly. However, there are certain unusual conditions which may make it necessary to prime the pump to get the pumping action started. Priming will be required under conditions where it is impossible for the piston to displace the air in the pump and replace it with water. This could be caused by a high suction lift (high from the water supply to the pump), the valves being stuck on the seat, such as after pumping a sticky fluid, or it might be caused by valves sticking due to extreme corrosion of the valves and seats. A pump will not prime readily if someone has tampered with the valve springs causing them to exert undue pressure of the valve plates against the valve seats. When the pump appears to need priming this condition can be checked by pouring water into the cylinder body through one of the valve cap openings or into the pump discharge opening at the same time operating the pump to work the water into the cylinder and valve passages.

B. Frequently a gate valve is installed in the suction line between a tank or pressure line and pump sediment chamber. This valve is usually installed in the line to shut off the supply source for cleaning sediment chamber or for pump repairs.

If this valve is closed or even partially closed it will interfere with the flow of water to the pump suction to such an extent that the pump will not perform to full capacity. If the valve is partially closed it may cause severe knocking and vibration of the pump because the water cannot flow into the cylinder cavities fast enough.

C. A sediment chamber should be installed in the suction line between the gate valve and the pump suction.

The strainers in these sediment chambers are of more than adequate capacity to allow a free flow of the liquid to the pump. However, because of its normal function of collecting sediment, the strainer may become severely clogged and in some cases, it will completely stop the flow of liquid to the pump. The length of time the pump may operate before it is necessary to clean the strainer will depend upon the type of liquid pumped. After the pump has been used a short period the operator will soon become familiar with the amount of running time between strainer cleanings.

D. Any piston pump, when operated at high pressure will not operate satisfactorily or quietly if a mixture of air and water is allowed to enter the pump suction. For this reason, a small air leak in the suction line will cause the pump to knock and vibrate excessively. This holds true only for a small air leak which allows the pump to draw a certain amount of water mixed with air on each stroke of the piston. A large air leak will cause the pump to lose prime after which it can not be reprimed until the air leak is stopped. Air leaks may occur at the joints of the suction line piping, at the gate valve in the suction line, at the gasket sealing the cap on the sediment chamber or by a crack in the suction wall of the cylinder body, such as might be caused by freezing if the pump is not properly drained in freezing weather. There is also a remote possibility of air drawing past the piston packing on the suction stroke if the piston packings are badly worn.

E. Badly worn packing or valves and valve seats will cause a serious drop in pump capacity. This will be indicated by a drop in pressure when guns are turned on. Worn packing is very easy to detect because of the water leakage. The packing should be replaced just as soon as this excessive leakage is noticed. If it is allowed to continue some of the material may work past the piston rod seals into the pump crankcase. Water in the pump crankcase will cause severe corrosion of the bearings causing them to fail. Worn valves can only be detected by visual examination of each valve assembly. The most prevalent cause of valve wear is the use of highly abrasive liquids. This will cause the valve and valve seat to wire cut. The cut starts as a very small groove but increases very rapidly once the valve starts to leak through this groove. Cutting will usually be much more evident on the valve plate in flat valve pumps. If the valve plates are replaced as soon as they start to show this cutting action it will prevent the valve seat from becoming cut in a similar manner and keep the cost of replacement parts to a minimum.

F. Pump cylinder bodies must withstand an extreme amount of shock and pulsation while the pump is in operation. If the pump is allowed to freeze, due to not being drained, the freezing may crack the cylinder body walls in almost any location. If the crack should occur on the suction valve or cylinder portion of the body it may allow a small amount of air to enter on the suction stroke and cause noisy operation or a decrease in pumping capacity. If the crack develops in the walls between the cylinder cavities or discharge valve cavity it may allow the water to flow from one cavity to the adjacent cavity and rob the pump of its effective displacement. This will not cause noisy operation but will reduce the pump capacity and may show up as a drop in pressure when the discharge is open.

G. The holes in gun or nozzle discs are continually subject to wear because of the high velocity of the liquid through the holes. Naturally they wear much faster if there is any abrasive or solid material in the liquid. If the holes become worn too much they may allow a higher rate of discharge than the pump is able to provide and a drop in pressure will be noticed. This can quickly be checked by reducing the number of nozzles or guns and at the same time watching the amount of overflow from the pressure regulator. If there is considerable overflow, even though a drop in pressure has been noticed, it is an indication that the regulator valve is worn rather than the gun or nozzle discs.

H. Suction surge arresters should be installed on the suction line of reciprocating pumps. A rubber bag type of suction surge arrester is preferred by a suitable vacuum chamber can be made by attaching a piece of vertical pipe as close to the pump suction as possible. One and one-half or two inch pipe can be

used. A standing height of 12" to 15" will be sufficient with the top end closed by an ordinary pipe cap.

I. Water may accumulate in the pump crankcase from two sources; the most prevalent being leakage of the packing as explained in Paragraph E. The other means of accumulation being a condensation of moisture inside the crankcase due to changes in weather or the repeated heating and cooling of the pump due to its normal usage. Pumps that are used rather consistently and run for a considerable period of time to heat the oil and other working parts will not normally accumulate water by condensation. If the packing is replaced as soon as it starts to leak it will be impossible for water to enter the crankcase from this cause. In localities or conditions where extremely abrasive liquids must be used, it is always advisable to replace the cylinder shells at the same time the worn packing is replaced. New packing will not give satisfactory service if it is placed in a badly worn and roughened cylinder liner.

J. Worn connecting link bearings will only develop because of unusual or adverse operating conditions. They will, however, be seriously affected by corrosion if water is present in the crankcase and they will wear out from overheating if adequate oil is not provided in the crankcase. For this reason we recommend thorough draining, cleaning and refilling with new oil prior to any storage period. Replace bearings as soon as any damage is discovered to avoid possible damage to crankshaft. (See Lubrication Instructions.)

K. Lack of sufficient oil in crankcase can quickly cause failure of pump power end and result in extensive repairs. Oil level should be checked periodically during normal operation as well as when maintenance work of any nature is performed. Insufficient oil will first be indicated by excessive heat and should be corrected immediately.

L. A foaming mixture will sometimes have the same effect as a small air leak in the suction line. This is because various quantities of the foam is drawn through the suction line into the pump disrupting the normal flow of water.

M. Pressure regulators that are operated by plunger action may become sluggish in action due to the plunger sticking or fitting too tightly in its cylinder. This condition may be caused by an accumulation of chemicals collecting in and around the plunger, or may be due to excessive corrosion of the plunger parts. To check this condition, remove and clean the plunger. After cleaning the plunger, parts should be covered with a waterproof grease before assembling.

N. In some cases there is a tendency for the pressure regulator valves to chatter or vibrate excessively. This is an indication of unstable operation due to nozzling in the high or low capacity range of the regulator. On systems using pressure regulator valves, the nozzling requirements should be at least 50% and not exceed 90% of pump capacity. Due to nozzle disc wear, the system requirements may exceed the 90% limit, resulting in cycling or hammering of the regulator. This can readily be checked by replacing the worn discs with new discs.

If chatter persists with an unloader, there is a possibility that stuffing box nut (on valve lifter stem) is too loose or that additional packing should be placed in the stuffing box gland. By repacking and drawing the stuffing box nut up to the point where it is snug, unloader chatter can be eliminated.

O. If a large piece of foreign matter becomes lodged between a pump valve and valve seat or if something of this kind becomes wedged in so that it prevents the valve from operating normally we can expect drastic drop in capacity and considerable surge or pulsation will be noticed in the discharge line. To correct a condition of this kind it is usually necessary to examine each valve in the pump until the offending condition is located. The use of clean liquid and seeing that the suction strainer is in proper condition will prevent trouble of this kind.

Atmospheric Air Chambers

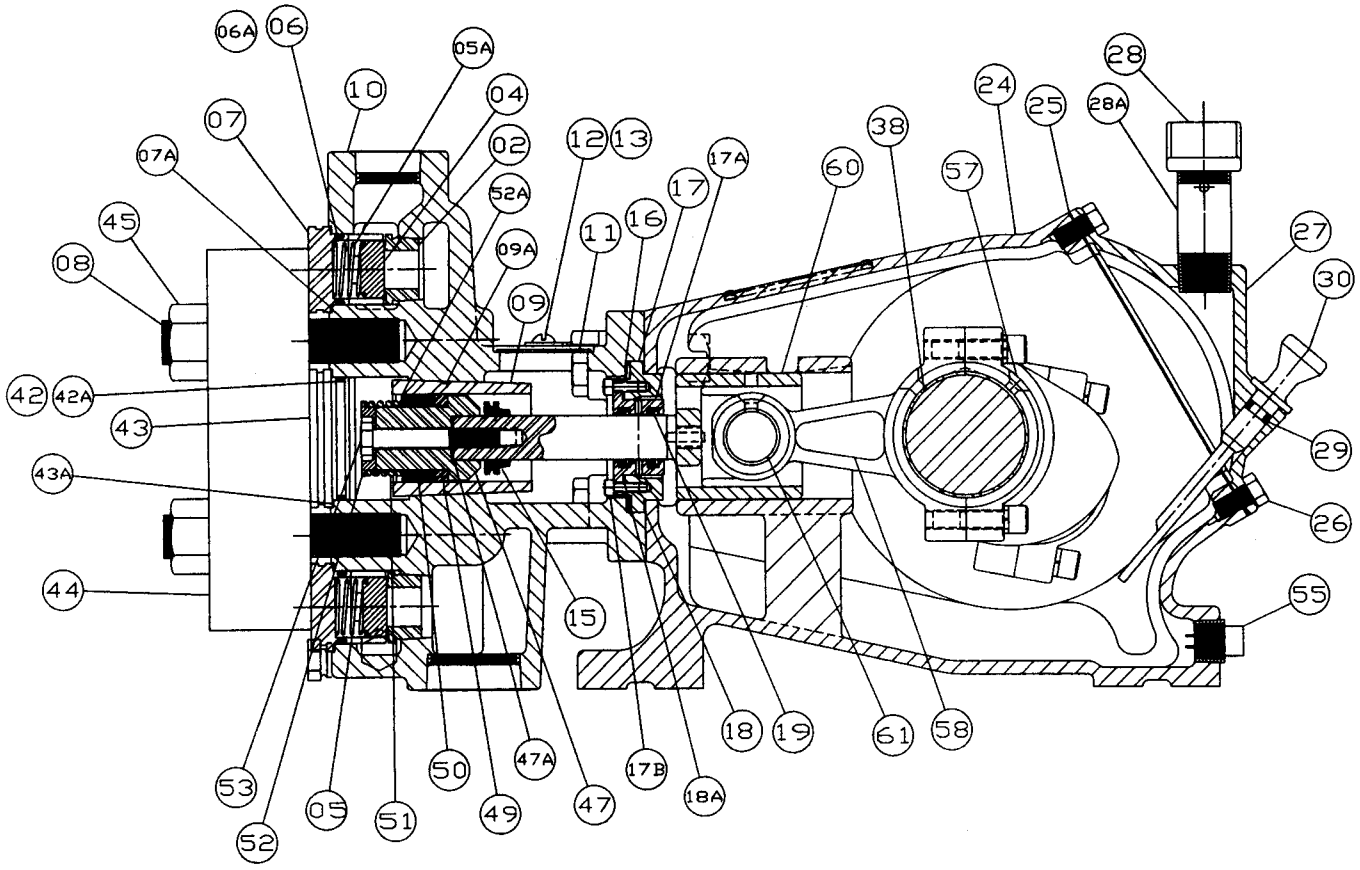
P. When a pump is used for a long period of time without the source of supply being completely exhausted so that air can enter the pump we sometimes encounter a waterlogged air chamber. This decreases the effectiveness of the air chamber causing undue pulsation at the discharge. If this should happen the suction should be open to atmosphere at some point to allow air to be drawn through the pump to recharge the air chamber. This should be done with the pressure release valve open so the pump operates at no pressure, otherwise it will not pump air into the air chamber.

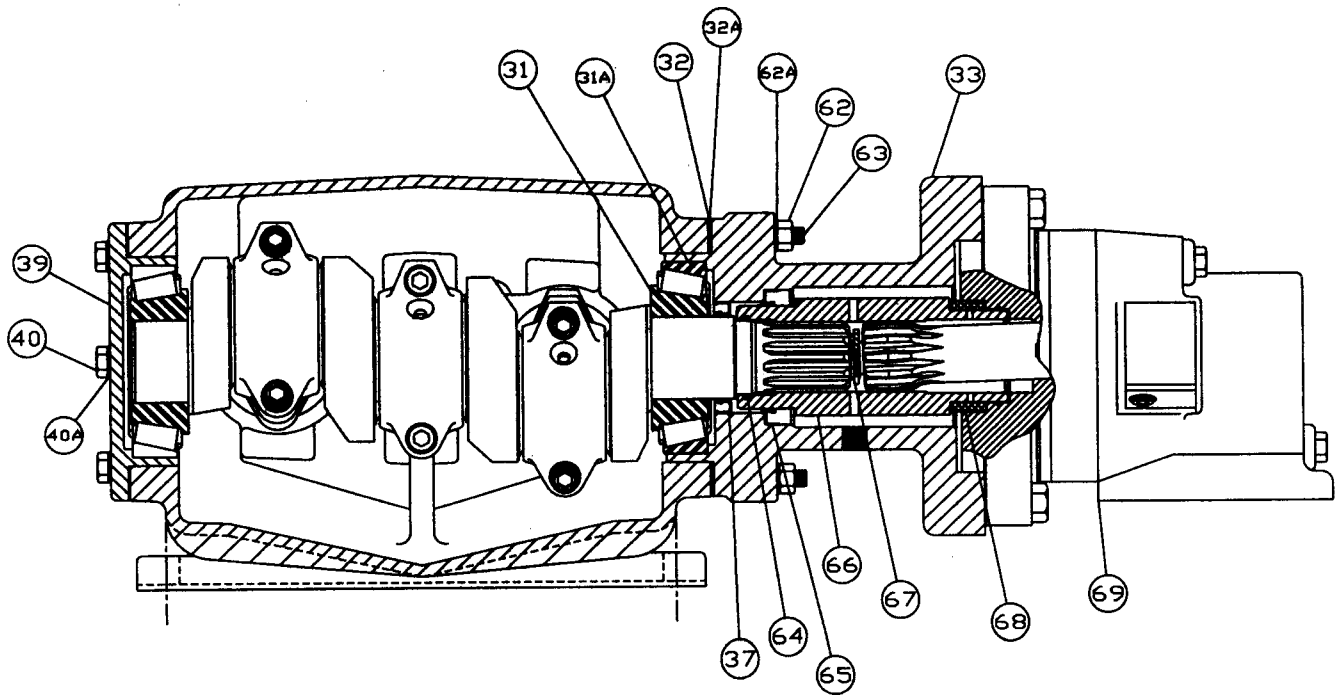
Q. Noisy pump operation will sometimes be caused by a piston rod being loose in the crosshead.

This will only become evident after the rod becomes so extremely loose that some end motion can be found between the piston rod and crosshead. A noise of this kind usually has a regular cadence timed with each stroke of the piston. When this condition occurs it is always necessary to replace both the piston rod and the crosshead because the two parts are threaded and pinned into a single unit.

R. The crankshaft main bearings are held in place by the end bearing caps. If bearing cap retaining bolts should become loosened, the bearing can shift which may cause bearing to run exceptionally hot.

C25-25DV-H/D & C35-20DV-H/D PARTS LIST





FLUID END

Ref. No.	Description	Qty	Part Number
02	Seat, Valve	6	06125A002
04	Valve	6	17714A003
05	Spring Valve 31/32 I.D. x 1 Lg. x 6 Coils, Suction	3	06127A002
05A	Spring Valve 31/32 I.D. x 1 Lg. x 5 Coils, Disch.	3	06127A003
06	O-Ring, 1-7/16 x 1-1/4 x 3/32	6	05876A171
06A	Ring, Back-Up, 1-7/16 x 1-1/4	6	18753A008
07	Cap, Valve 1.858 Dia.	6	18456A006
07A	Gasket, Nylon 1.732 x 1.442 x .025	6	05059A436
08	Stud, 7/8-14 UNF x 4-1/2, GR7	6	05659A089
09	Liner, Cyl., 1-3/4 I.D., K-Ramic (C35-20DV-H/D)	3	06124A002
	Liner, Cyl., 1-1/2 I.D., K-Ramic (C25-25DV-H/D)	3	06124A003
09A	O-Ring, 2-1/4 x 2-1/8 x 1/16	3	05876A172
10	Body, Cylinder, C.I.	1	18790E002
11	Lid, Cylinder Body	1	06123A000
12	Screw, for Lid 1/4-20 x 1/2	2	05028A002
13	Washer, for Lid	2	05030A020
14	Cap Screw, 1/2 x 1-3/4 Lg.	4	19103A008
15	Deflector, Pony Rod	3	27006A000
20	Nut, 5/8-11 UNC	4	19109A041
20A	Washer, Lock	4	05454A011
21	Bolt, Square, 5/8-11 x 2-12 Lg.	4	19108A027
41	Plug, Pipe 3/8 BR	4	06136A000
42	O-Ring, 2-7/16 x 2-1/4 x 3/32	3	05876A173
42A	Ring, Back-Up, 2-7/16 x 2-1/4	3	18753A009
43	Cap, Cylinder, 2-7/8 Dia.	3	18457A005
43A	Gasket, Nylon, 2.750 x 2.450 x .025	3	05059A437
44	Clamp, Cylinder 7 Valve 2" S.Q.	3	20856A001
45	Nut, 7/8-14 UNF	6	19109A072
47	Stud, Piston 1-3/4 (C35-20DV-H/D)	3	20850A001
	Stud, Piston 1-1/2 (C25-25DV-H/D)	3	20850A003
47A	Washer, Copper .593 x .406 x .031	3	05030A128
49	Follower, Aluminum Bronze (C35-20DV-H/D)	3	19328A000
	Follower, Aluminum Bronze (C25-25DV-H/D)	3	19328A001
50	Packing, V-Ring, 1-3/4 (C35-20DV-H/D)	3	18922A002
	Packing, V-Ring, 1-1/2 (C25-25DV-H/D)	3	18922A008
51	Spring, Piston (C35-20DV-H/D)	3	19606A000
	Spring, Piston (C25-25DV-H/D)	3	19606A001
52	Retainer, Spring	3	27125A000
52A	Washer, 316 SST (C35-20DV-H/D)	3	05030A203
	Washer, 316 SST (C25-25DV-H/D)	3	05030A246
53	Cap Screw, Nylon	3	17050A004
	Fluid End Repair Kits - PKC35FE		

POWER END

Ref. No.	Description	Qty.	Part Number
16	Spring, Retainer	3	06120A000
17	Retainer, Oil Seal Housing	3	24958A001
17A	Housing, Oil Seal	3	24959A002
17B	Screw, 10-32 UNF x 1/2	6	06106A034
18	Gasket, Vellumoid 2-15/16 x 2-1/2 x 1/32	3	05059A052
18A	Gasket, Vellumoid 1.8 x 1.5 x 1/32	3	05059A435
19	Cup, U, 22 I.D. x 30 C.D. x 5.5 Lg.	6	22835A004
21A	Washer, Wedge	2	26709A000
24	Crankcase, D.I.	1	06076D000
25	Gasket, Vellumoid	1	06089B000
26	Cap Screw, 3/8-16 x 3/4	6	19101A007
27	Lid, C.I.	1	06077C000
28	Cap, Pipe	1	05737A021
28A	Nipple, Pipe 3/4 NPT	1	17995A001
29	O-Ring, .574 x .296 x .139	1	05876A235
30	Gauge, Oil Level	1	17360A014
31	Bearing, Cone, 1.75 Bore	2	05674A019
31A	Bearing, Cup, 4.125 O.D.	2	05675A018
32	Gasket, Shim, Green - .003	6	05011A027
32A	Gasket, Shim, Pink - .015	4	05011A028
33	Adapter, Hyd. Drive	1	26599D000
37	Seal, Oil, 1-3/4 Dia.	1	05710A045
38	Crankshaft	1	06074D014
39	Cap, Bearing, Closed	1	10414B001
40	Cap Screw	12	19101A013
40A	Washer, Seal	6	14946A003
55	Plug, Drain, 1/2 NPT	1	17481A001
57	Bearing, Steel Backed, 2-3/8	5	06109A000
58	Link., Complete	3	06110B004
60	Crosshead & Piston Rod	3	17515B001
60A	Bushing	3	06108A000
60B	Screw, Cap	6	06106A040
60C	Washer, Lock	6	05454A025
61	Wrist Pin	3	06116A000
62	Nut, 3/8-16 UNC	6	19109A017
62A	Washer, Lock 3/8	6	05454A007
63	Stud, 3/8-16UNC x 2-5/8	6	05659A128
64	O-Ring, 1-3/4 O.D. x 1-9/16 I.D.	1	05876A232
65	Seal, Oil 2-3/16 Dia.	1	05710A048
66	Coupling, Hyd. Drive	1	26602B000
67	Valve, 1-3/8 Dia.	1	17714A004
68	Bearing, Sleeve, Bronze	1	05806A042
69	Eaton Motor (optional)	1	7203-0404-00A

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MYERS/APLEX
LIMITED WARRANTY
INDUSTRIAL PRODUCTS
CENTRIFUGAL AND RECIPROCATING PUMPS

MYERS/APLEX warrants that its products are free from defects in material and workmanship for a period of twelve (12) months from the date of purchase or eighteen (18) months from the date of manufacture.

During the warranty period and subject to the conditions hereinafter set forth, **MYERS/APLEX**, will repair or replace to the original user or consumer parts which prove defective due to defective materials or workmanship of **MYERS/APLEX**. Contact your nearest authorized **MYERS/APLEX** distributor or **MYERS/APLEX** for warranty service. At all times, **MYERS/APLEX** shall have and possess the sole right and option to determine whether to repair or replace defective equipment, parts or components..

WARRANTY EXCEPTIONS: Seals, piston cups, packing, plungers, liners, valves are covered for a period of ninety (90) days for ambient temperature water service. All other applications are for a period of thirty (30) days unless specific written guarantee for that specific application is made by **MYERS/APLEX** . All engines, motors, auxiliary equipment are warranted only to the extent of the warranty given by the respective manufacturer.

LABOR, ETC. COSTS: MYERS/APLEX shall IN NO EVENT be responsible or liable for the cost of field labor or other charges incurred by any customer in removing and/or reaffixing any **MYERS/APLEX** product, part or component thereof.

THIS WARRANTY WILL NOT APPLY: (a) to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with printed instructions provided; (b) to failures resulting from abuse, accident or negligence; (c) to normal maintenance services and the parts used in connection with such service; (d) to units which are not installed in accordance with applicable local codes, ordinances and good trade practices; or (e) if the unit is moved from its original installation location and (f) unit is used for purposes other than for what it was designed and manufactured.

RETURN OR REPLACED COMPONENTS: any item to be replaced under this Warranty must be returned to **MYERS/APLEX** in Ashland, Ohio, or such other place as **MYERS/APLEX** may designate, freight prepaid.

PRODUCT IMPROVEMENTS: MYERS/APLEX reserves the right to change or improve its products or any portions thereof without being obligated to provide such a change or improvement for units sold and/or shipped prior to such a change or improvement.

WARRANTY EXCLUSIONS: MYERS/APLEX MAKES NO EXPRESS OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. MYERS/APLEX SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE.

Some states do not permit some or all of the above warranty limitations and, therefore, such limitations may not apply to you. No warranties or representations at any time made by any representatives of Myers/Aplex shall vary or expand the provision hereof.

LIABILITY LIMITATION: IN NO EVENT SHALL **MYERS/APLEX** BE LIABLE OR RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES RESULTING FROM OR RELATED IN ANY MANNER TO ANY **MYERS/APLEX** PRODUCT OR PARTS THEREOF. PERSONAL INJURY AND/OR PROPERTY DAMAGE MAY RESULT FROM IMPROPER INSTALLATION. **MYERS/APLEX** DISCLAIMS ALL LIABILITY, INCLUDING LIABILITY UNDER THIS WARRANTY, FOR IMPROPER INSTALLATION -- **MYERS/APLEX** RECOMMENDS INSTALLATION BY PROFESSIONALS.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

In the absence of suitable proof of this purchase date, the effective date of this warranty will be based upon the date of manufacture.

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