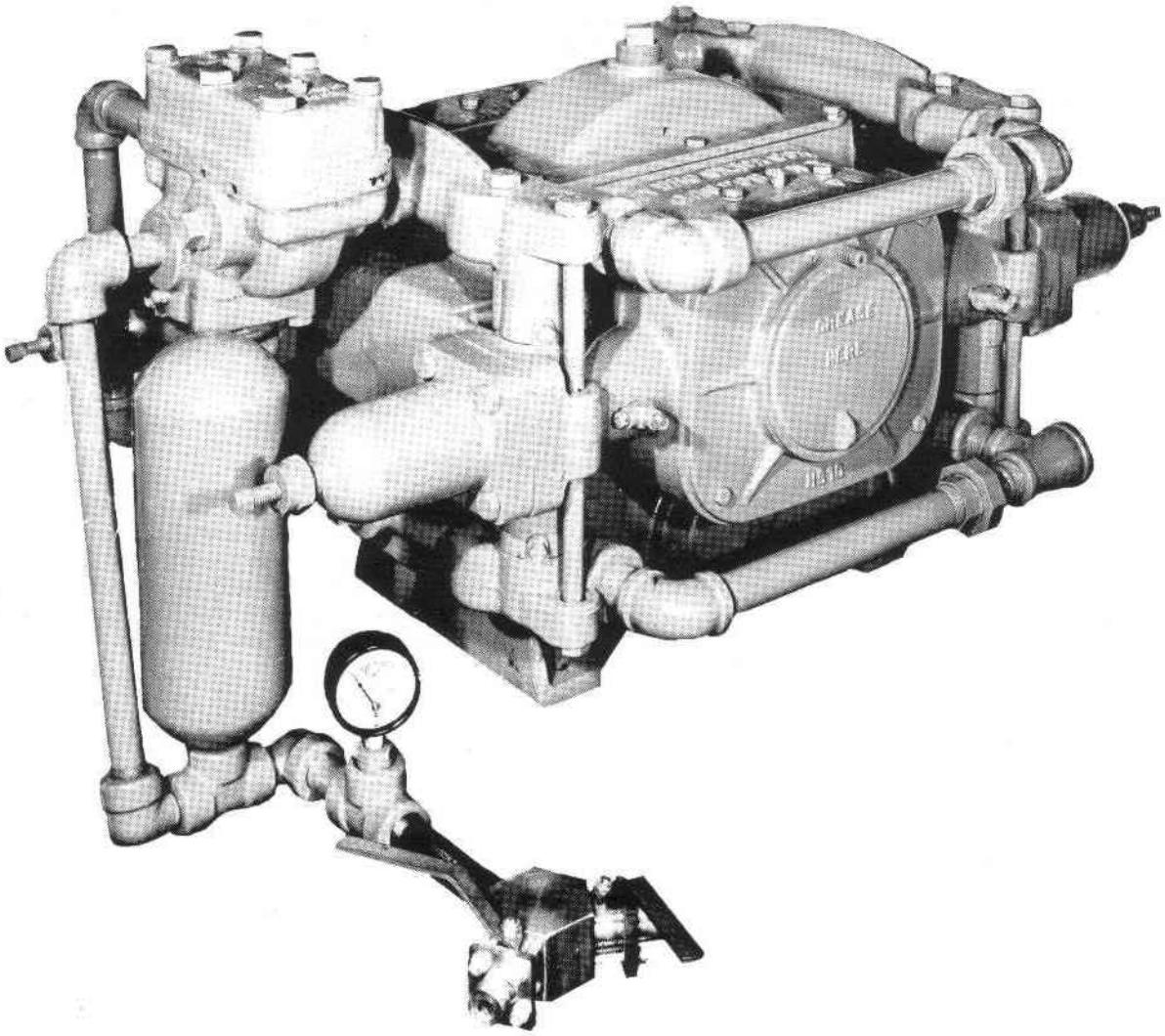
OPERATING INSTRUCTIONS

AND

PARTS LIST



HYDRO SILICA PUMP
MODEL HSC

Capacity: 22 gpm at 135 strokes per minute

HYDRO SILICA CORPORATION
GASPORT, N.Y. 14067
Phone: 716/772-2651
Fax: 716/772-2555

INTRODUCTION

The new model HSC pump has the same overall dimensions as the previous models, FX, HFX and HS with the same capacity and pressure. Most parts on the new pump are identical to the old models, and the improvements are interchangeable with those on the old models. The scotch yoke drive on HSC and HS model pumps is fitted with a larger Timken bearing than the earlier FX and HFX models, increasing the life expectancy by fifty percent. This involves a change in the crank block, crank pin and yoke plates. HSC and HS model pumps feature a major improvement in the pressure and suction manifold castings over those used in previous models so that these are held in position by two cap screws at each end of the casting, thus clamping the pump valve assembly in place. The valve gaskets and cylinder cup gaskets have been replaced with Buna-N o-rings thus eliminating gasket blow out. The plunger tubes at both ends are now also sealed with o-rings helping to eliminate water leakage through the plunger tubes. The air chamber is fabricated to meet A.S.M.E. Boiler and Pressure Vessel Code and marked with Inspectors stamp. It has no seams, no welding, is constructed for working pressure of 1,000 psi with bursting pressure of 5,000 psi.

LIMITED WARRANTY

Our pump is fully guaranteed as to quality of material, workmanship and specified performance for a period of six (6) months from date of shipment, but not to exceed ninety (90) days of service. The obligation under this warranty is limited to the replacement or repair at the Manufacturer's factory, of such part as shall appear to the Manufacturer, upon inspection, to have been defective in material and workmanship.

The warranty does not obligate the Manufacturer to bear the cost of labor or transportation charges in connection with the replacement or repair of defective parts.

The Manufacturer makes no warranty in respect to trade accessories, such being subject to the warranty of their respective Manufacturers.

The Manufacturer shall in no event be liable for consequential damages or contingent liabilities arising out of the failure of any pump or parts to operate properly.

No express, implied, or statutory warranty other than herein set forth is made or authorized by the Manufacturer.

ORDERING REPAIR PARTS

To assure the correct part being furnished, please give the serial and model number that appear on the name plate of your pump. Always give part number and part name of items needed. These are found in Parts List furnished with the pump. The parts which are listed showing a prefix of HSC are common to all pumps bearing serial number HSC 8601 and up. The HSC parts are interchangeable with and, in most cases, replace the HS part numbers. When ordering replacement parts, please indicate the serial number of the pump so our Sales Department will properly interpret the order. When returning broken or worn parts for samples, prepay the charges, and make sure that your name is on the package and on the tag attached to the part.

Specify how you want shipment sent, truck, air freight, UPS, etc.

Billing always made at prices prevailing at the time the order received.

We cannot accept collect telephone messages.

HYDRO SILICA CORPORATION

INSTALLATION OF HYDRO SILICA CLEANING UNIT

CRATING AND PACKING:

Easily damaged parts are removed from the unit for safe transportation. These include pressure gauge, two-way shut-off valve and the various brass pipe plugs removed from the unit when it was drained in preparation for shipping.

The accessory items are in a package fastened to the unit and contain a special alemite grease gun, pump cylinder packing rammer, spare set of gaskets and o-rings, motor sheave, hub and literature.

Other accessories ordered with the unit are also packed in the carton and include such items as hose, pipe cleaning nozzles, guns, transfer fittings.

LOCATING THE UNIT:

First consideration should be given to convenience of electric service so that connection can be made to comply with all electrical and safety codes or requirements.

The water supply can be taken from the regular water main using a 1½" to 2" water supply hose. Caution: Do not connect pump to a booster line or water service where the pressure is in excess of 80# per square inch, and if water hammer develops on the suction side, we suggest installing an air chamber in the suction line. The water supply line must NEVER be smaller than 1" or damage to the plungers and cylinder packings will result due to water starvation. The water supply can be taken from a clean 55 gallon drum using 1½" to 2" suction hose with a fine mesh strainer.

As electric and water service are the only items required to operate the unit, these connections can be made either temporary or of a permanent nature.

ASSEMBLING THE UNIT:

The parts removed in shipping should be replaced on the unit. The pressure gauge should be screwed into the opening of the ¼" bushing inserted in the tee of the discharge line.

The two-way shut-off is attached to the ¾" x 5" extra heavy black nipple which should then be screwed into ¾" forged steel tee at the discharge end of the line. Eight hex head ⅛" brass pipe plugs are packaged separately and should be screwed into the pump valve bodies. The ¼" brass pipe plug goes into the controller immediately below the waste or overflow line that connects from the controller to the suction manifold. The 1" square head pipe plugs are used to close off low points of the suction manifolds. These have been removed to drain the pump.

If your unit was ordered less motor, the following procedure is followed. Unbolt guard and motor adjusting rail from the base, attach motor to adjusting rail and fasten back on base, leaving the anchor bolts in base slots slightly loose so that the motor can be moved for V-belt installation. It will be noted that the adjusting screws project through the end of the base and into square nuts pocketed in the motor rail, and by turning these screws the motor is moved in either direction.

To install the V-belt drive, fit the drive sheave to the motor shaft, securing alignment for the belts by use of a straight edge held against the faces of both sheaves, and when aligned, lock sheave in position by tightening set screws in its hub. Next, with motor moved as far as possible towards pump, V-belts can be placed over the sheaves and in the grooves. Adjusting screws are used to pull the motor back for proper operating tension. Turn adjusting screws evenly so that the motor is brought back squarely and all belts have equal tension. Adjust belts to the point where they are snug but not taut. The drive guard now may be replaced and the unit readied for operation.

The 1,000 psi Hydro Silica pressure hose is to be connected to the two-way shut-off valve on the pressure piping at controller end of pump.

SERVICING THE PUMP:

The gear case of the pump requires four quarts of SAE 90 gear oil which will bring the oil level up to the ¼" brass plug on the side of pump base. Make sure that the special magnetic drain plug is tightened in the drain opening at bottom of the gear case. The oil is placed in the gear case through the 1¼" pipe size opening in top of gear case cover. This plug is special in that it has a vent hole drilled through to prevent temperature changes inside the gear case from causing condensation and pressures which could cause the oil to leak past the shaft seals. Occasionally a nail or piece of wire should be run through the vent hole to remove any dirt or debris that might have settled there. (CAUTION: DON'T DO THIS WHILE THE PUMP IS RUNNING.)

All other parts of the pump are lubricated through alemite hydraulic-type grease fittings, using the special relief valve grease gun included with the unit. Points to lubricate are the four plunger packings through fittings on side of pump cylinders, two yoke guide bars through fittings on top of yoke cases, two crank pin bearings through fittings on the end of crank pins, (access to these fittings is through swinging covers on either side of the pump), and the pressure controller packing which is greased at the grease nipple immediately above pressure adjusting spring. THESE NINE GREASE FITTINGS SHOULD BE GREASED ONCE EVERY DAY!

GENERAL INSTRUCTIONS:

Before actual operation is started, it is advised to read the INSTRUCTIONS FOR OPERATING PUMP, the important paragraphs being, STARTING PUMP, PRESSURE, LUBRICATION, PACKING ADJUSTMENT, VALVES, and AUTOMATIC PRESSURE CONTROLLER. This information will enable the operator to spot quickly and remedy any faulty function of the unit.

The V-belts usually require further adjusting after running a short time. The V-belt manufacturer's recommendation is, "while operating under load, adjust belts just beyond the point of slippage, detected by 'belt squeal'. Do not tighten belts more than necessary".

To make sure that there is no mechanical obstruction in any moving parts of the unit, it is advised to pull the pump over by hand before turning on the electric current. Be sure that the water supply valve is turned on and water is reaching the pump inlet.

HIGH PRESSURE PUMP INSTRUCTIONS AND PARTS LIST

STARTING PUMP:

See that gear case has sufficient oil and that all other parts are properly lubricated as outlined in lubrication instructions. Pump is self-priming. Pump can be operated either clockwise or counter-clockwise. If the pump fails to develop pressure, the trouble is probably due to one or more of the following causes:

1. Sticking of pressure or suction valves to seats, grit or dirt between ball and seats. Remove valve assemblies, clean and replace.
2. Sticking of the controller check valve or overflow valve to seats, grit or dirt between ball and seats. Remove controller cover and clean or replace balls and seats.
3. Air leak in suction manifold or suction line.
4. Pump may be air-bound. Open discharge valve to remove trapped air.

THOROUGHLY FLUSH THE PUMP with clean water at the end of each day's operation, if solution other than plain water is being pumped.

PRESSURE:

Low pressure is caused by:

1. Improperly adjusted controller.
2. Badly worn balls or seats (in controller or pump).
3. Grit, dirt or grease between balls and seats (in controller or pump).
4. Sticky suction valves.
5. Air leak in suction.
6. Clogged strainer.
7. Too large discharge orifice in guns.
8. Operating too many guns for capacity of pump.
9. Operating too many pipe cleaning nozzles for capacity of pump.
10. Not enough water to supply pump.

LUBRICATION:

Use Kendall L421 multi-purpose grease, or equal, in the grease gun.

Lubricate at every Alemite fitting as follows:
PLUNGERS: Lubricate moderately about every day. A shot or two of grease is enough. A moderate amount of grease at frequent intervals is of prime importance. Excessive lubrication of the plunger at any one time tends to cause sticking valves.

CAUTION: USE ONLY THE SPECIAL GREASE GUN FURNISHED WITH THE PUMP.
Excessive pressure from a high pressure gun is apt to cause damage.

YOKE GUIDES: Lubricate thoroughly every 24 hours.

CRANK PIN BEARINGS: Lubricate thoroughly every 24 hours.

CONTROLLER: Lubricate sparingly every 24 hours.

GEAR CASE: Keep pump gear case filled to ¼" oil level plug with S.A.E. No. 80/90 gear oil: (Approximately 4 quarts required to fill to ¼" oil level plug.) Drain and refill with fresh clean oil every 200 to 300 hours of operation.

ENGINE: Refer to Manufacturer's Instruction Book sent with your engine.

FREEZING DANGER:

When there is possibility of freezing weather, drain pump thoroughly. Freezing water causes cracked castings. (See paragraph on special drainage instructions.)

REPAIRS:

Make sure when attaching parts that all gasketed surfaces are clean and free from foreign matter and that all bolts, screws, pipe, and hose connections are tight.

PLUNGERS AND PACKING:

Replace plungers and packing only when leaking becomes an annoyance, and when proper adjustment of packing fails to prevent excessive leaking. See detailed instructions for repacking pumps on page 13.

PACKING ADJUSTMENT:

Tighten packing adjusting screws snugly but not too tight, then relieve slightly by backing off screws. Always keep packing adjusted as lightly as possible. A film of water should be seen where plunger enters cylinder. Until this slight oozing becomes a trickle, do not tighten packing. Over-tightening shortens life of packing and plungers and wastes power.

VALVES:

Replace valves only when they fail to operate properly. The surface of both ball and seat must be smooth, clean, free from grooves. The valve cages (body) should be replaced when ball guides are badly worn. Worn guides may cause sticking of ball in top of cage. Excessive vibration can be caused by sticky valve balls.

When replacing valve assembly, be sure to put cage in right side up, with seat under cage. See that valve surfaces are clean and smooth and that o-rings are placed carefully—one below the seat, one between the seat and cage and one above the cage.

AUTOMATIC PRESSURE CONTROLLER:

See Page 14 and 15.

PUMP OIL SEALS:

The primary purpose of the oil seals is to retain oil in the pump gear case. They are found on the jackshaft behind the yokes and on the countershaft. Eventually they may need replacing, especially if bearings on shaft are permitted to get out of adjustment so that there is end and side play which causes needless wear and distortion of the oil seal. Oil leakage around pump shafts is an indication that oil seal may be worn, distorted or broken. Too high an oil level may cause leakage at jackshaft even when seals are in good condition.

When replacing oil seals be sure that shaft is clean and free of burrs. The oil seals should be warm or soaked in warm or hot oil before using to make them pliable, and to prevent cracking or breaking when pushed over the shaft. Press oil seal into bearing retainer plate and install over end of shaft being especially careful to not injure the sharp sealing edge of the oil seal ring.

If there is play in the pump shaft be sure that Timken bearings are properly adjusted, or replaced, before replacing the oil seals.

ADJUSTING TIMKEN BEARINGS:

The Hydro Silica Pump is equipped with Timken bearings throughout. Timkens are tapered bearings and under normal conditions and with proper lubrication, wear is slight. However, when wear does occur, play in the shaft can be corrected by adjustment, provided the bearings have not first become ruined or completely worn out.

It is a good policy to check shafts for play in the bearings once yearly. In the countershaft (drive shaft) housing, excessive oil leak around oil seals often is an indication that the bearings are loose.

For take-up, shims are provided under the bearing retainer plates. One or more shims may be removed until the end play in shaft is reduced until it just turns freely in both directions. Before adjusting the bearings disconnect the pump from engine or electric motor. Generally the Timken equipped jackshaft and countershaft should have from .001 inch to .005 inch end play. The use of a dial-indicator for measuring shaft end play is recommended.

Crank pin bearings are adjusted in a manner similar to wheel bearings on a car. Remove star lock washer, then tighten nut under lock washer. Be careful not to get bearing too tight.

SPECIAL DRAINING INSTRUCTIONS:

1. Flush thoroughly with clean water.
2. Open suction. This admits air and allows pump to discharge as much water as possible by pumping.
3. Remove plug or open valve of suction line.
4. Remove all plugs in overflow line from controller to suction line.
5. Remove plug at side or end of suction and pressure manifolds.
6. Remove plugs in discharge line at or below air chamber level.
7. To drain controller remove plug located directly below overflow connection.
8. Remove valve drain plugs and raise balls in all pump valves with nail or wire (being careful not to injure balls.) This admits air into pump cylinder so water can run out through suction valves.

USE OF HYDRO SILICA GUNS:

1. WARNING: Goggles or face mask should always be worn when operating the Hydro Silica High Pressure Guns. Do not point gun at any part of human body.
2. Operator should always have good footing when using the Hydro Silica guns, especially at moment the gun is turned on. Operator should never stand on a ladder, as the back pressure is too strong for safety sake.
3. The guns may be turned off while the pump is running as the water will recirculate in the pump. However, the pump should not be left running in this manner for over 20 minutes as the water will heat up which is not good for the lubrication and packing. After 20 minutes of the pump running with the guns closed, the pump should either be turned off or a gun opened to discharge the hot water and allow cool water to enter the pump.
4. For applications where sand is mixed with the water stream, the Model 9040A½ gun with trigger shut-off is required.
5. On Models 1130A½ and 4030A½ guns, be sure the packing nut is kept securely tightened.

PUMP YOKE CASE ASSEMBLY

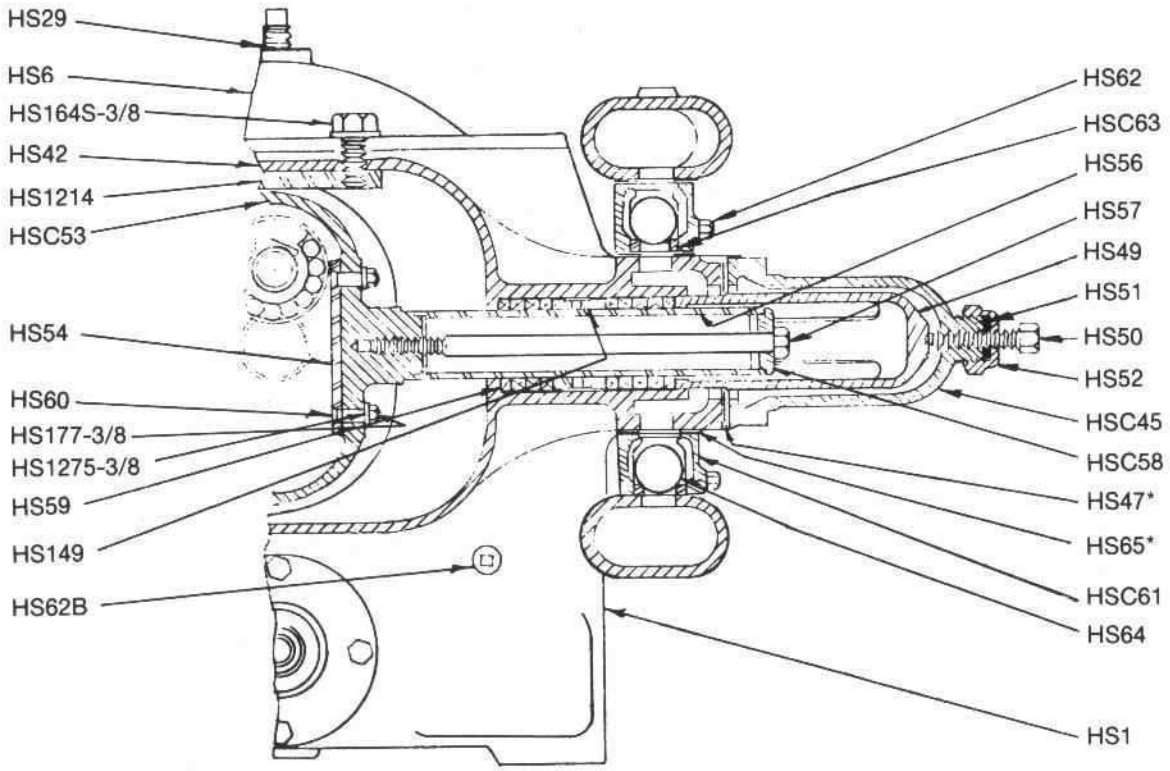


PLATE I

*These parts require HSC prefix when ordering for pumps with HSC serial numbers.

PUMP GEAR CASE ASSEMBLY

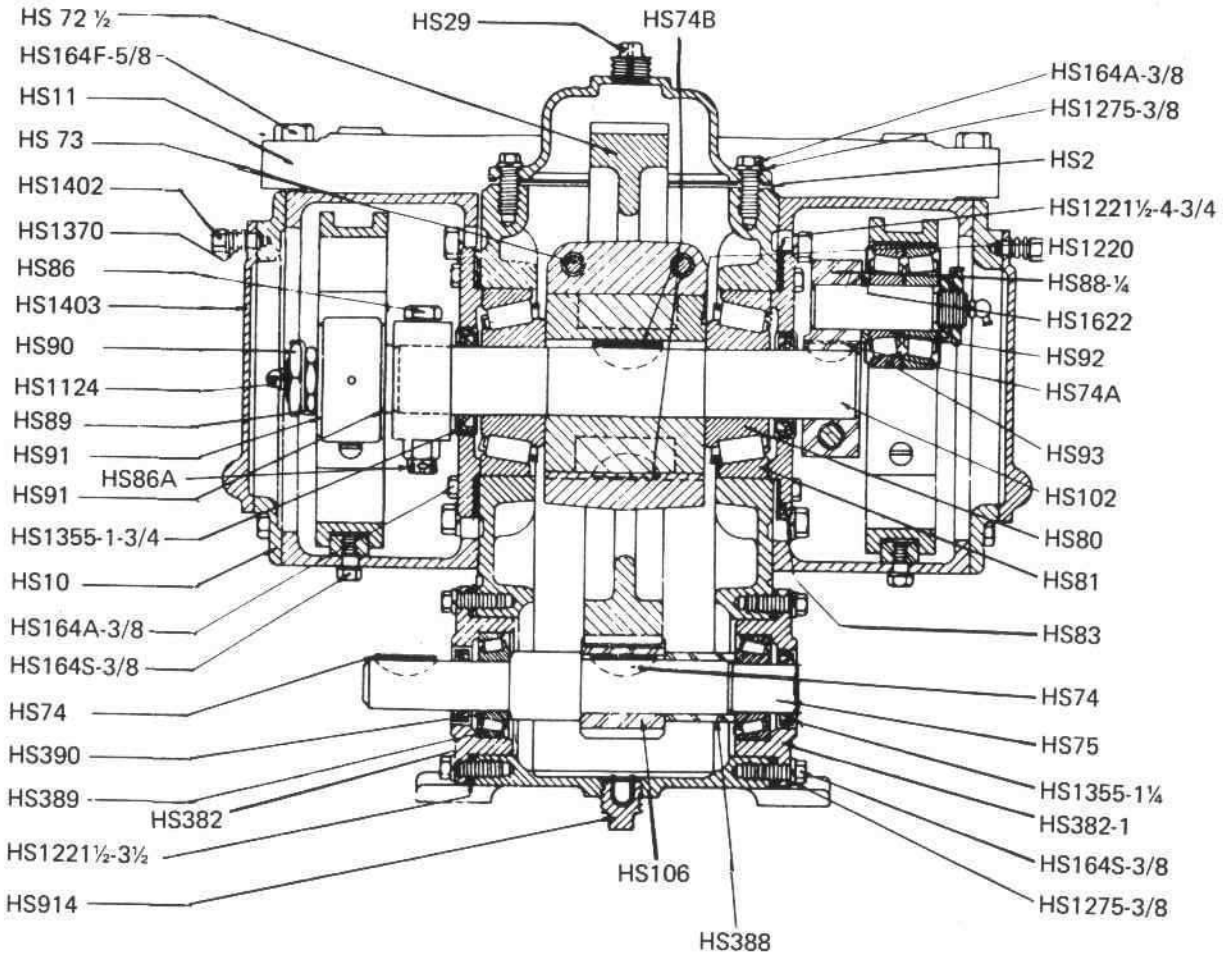


PLATE II

PARTS LIST FOR PUMP

PART NUMBER	SHOWN ON PLATE NO.	
		PUMP BASE GROUP
HS1	1	Pump base
HS2	2	Pump base cover gasket
HS6	1	Pump base cover
HS10	2	Yoke case cover
HS29	1 & 2	Pump base cover, vented filler plug, 1¼" pipe
HS62B	1	Pump base oil level plug, ¼" hex. brass
HS164A-⅜	2	Pump base cover cap screw ⅜"—16 thd. x 1"
HS164S-⅜	1	Guide bar cap screw ⅜"—16 thd. x ⅞"
HS392		Pump cylinder yoke case dowel
HS914	2	Pump base magnetic drain plug, 1¼"
HS137		¾" 1000 Lb. relief valve
HS1402	2	Yoke case cover lid screw—special
HS1403	2	Yoke case cover lid
HS1370	2	Spring for yoke case lid hinge
		MANIFOLD AND PART OF PIPING GROUP
HS11	2	Pressure or suction manifold
HS19	4	Pressure gauge—1500 Lb.
HS38	4	Air Chamber
HS164F-⅝	2	Manifold to cylinder cap screw—⅝"—11 thd. x 6"
HS566½	4	Two-way shutoff—¾" female pipe thread by ¾" male hose threads
HS913		Pressure or suction manifold plug—1" pipe thd.
HS468		Single shutoff ball valve ¼ turn
		PUMP VALVE GROUP
HSC61-½	3	Valve Body Assembly, includes one HS62, three HSC65, one HSC61, one HS64, one HSC63
HSC61	1 & 3	Pump valve body with O'ring
HSC63	1 & 3	Pump valve seat with O'ring
HS64	1 & 3	Pump valve ball, 1¼" dia. stainless
HS65	1	Pump valve gasket (for valves not converted to O'ring)
HSC65	3	Pump valve O'ring
HS62	1 & 3	Pump base oil level plug, ⅛" hex brass
		PUMP CYLINDER GROUP
HS42	1, 5 & 6	Pump cylinder
HSC45	1, 5 & 6	Pump cylinder cup with O'ring
HS47	1	Pump cylinder cup gasket (for cups not converted to O'ring)
HSC47	6	Pump cylinder cup O'ring
HS49	1 & 5	Pump cylinder packing gland
HS50	1 & 5	Pump cylinder packing adjusting screw
HS51	1 & 5	Pump cylinder adjusting screw packing
HS52	1 & 5	Pump cylinder packing adjusting screw nut
HSC53	1, 5 & 6	Pump yoke with O'ring
HSC53½		Pump yoke complete with guide bar—consists of one HSC53, two HS54, four HS55½, one HS1214, one HSC56A
HS54	1 & 5	Pump yoke plate
HS55½	5	Pump yoke plate bolt assembly, includes one HS60, one HS177⅜, one HS1275⅜
HS56	1, 5 & 6	Plunger Tube, 1¾" dia. x 9", Stainless Steel
HSC56A	6	O'ring for pump yoke and plunger tube cap
HS57	1 & 5	Plunger tube bolt with washer, ½" x 10"
HSC58	1 & 5	Plunger Tube Cap with O'ring
HS59	1 & 5	Pump cylinder packing, 13 rings, 1¾" ID x 2⅜" OD
HS149	1 & 5	Pump cylinder packing grease ring
HS164A½		Pump cylinder yoke case to base screw, ½"—13 thd. x 1"
HS164B½		Pump cylinder cup cap screw, ½"—13 thd. x 2"
HS164AM⅝		Pump cylinder foot to base cap screw, ⅝"—11 thd. x 1¼"
HS177⅜		Yoke plate hexagon nut, ⅜"—16 thd.
HS1124½	5	Grease fitting assembly, includes one HS1124 alemite fitting, one HS1126 alemite relief fitting, one HS1126AD adapter
HS1275⅜	1	Yoke plate bolt lock washer, ⅜"
HS1214	1 & 5	Yoke guide bar
		JACK SHAFT GROUP
HS72		Large pump gear
HS72½	2	Large pump gear with bolt, 78 teeth, 2" face, includes one HS72, two HS73, two HS73A, two HS1413½
HS73	2	Large pump gear bolt, nickel steel, ½" x 5" with nut and washer
HS74A	2	Large pump gear to gear bushing key, No. 28 Woodruff
HS74B	2	Large pump gear bushing to shaft key, No. G Woodruff
HS80	2	Jack shaft bearing cone, 1¾" bore, Timken No. 615

PARTS LIST FOR PUMP

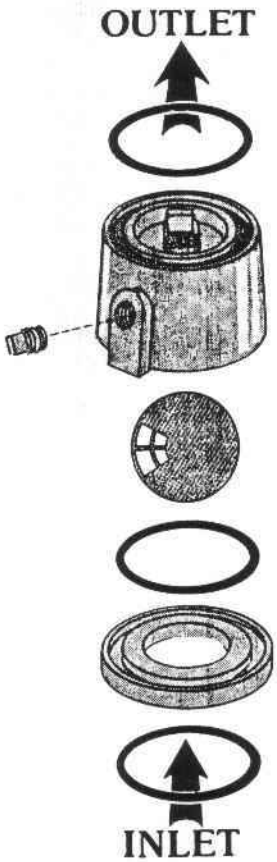
PART NUMBER	SHOWN ON PLATE NO.	
		JACK SHAFT GROUP (Cont.)
HS81	2	Jack shaft bearing cup, 4¾" O.D., Timken No. 612
HS81½		Jack shaft Timken bearing complete, includes one HS80, one HS81
HS83	2	Jack shaft bearing retainer
HS102	2	Jack shaft
HS102¼	2	Jack shaft sub-assembly, includes one HS102, one HS74A, one HS1220
HS102½		Jack shaft assembly, includes one HS102¼, two HS81½
HS164A⅜	2	Bearing retainer cap screw, ⅜"—16 thd. x 1"
HS1220	2	Large pump gear bushing
HS1221½-4¾	2	Jack shaft bearing adjusting shims, set includes three .005", three .007", one .020"
HS1275⅜	2	Bearing retainer screw lock washer, ⅜"
HS1355-1¾	2	Jack shaft bearing oil seal, 1¾" shaft size
HS1413½		Gear bolt washer ½" S.A.E. plain
		PUMP CRANK GROUP
HS74	2	Pump crank key, No. 128 Woodruff
HS86½	2	Pump crank bolt, ⅝" x 4" nickel steel, with nylon stop nut, includes one HS86, one HS86A
HS88¼	2	Crank pin and block, 4" stroke, consists of one HS85, one HS88
HS88¾		Crank assembly, 4" stroke, consists of one HS86½, one HS88¼, one HS89, two HS90, two HS91, one HS93½, one HS1124, one HS1622
HS89	2	Crank pin bearing star lock washer No. 5
HS90	2	Crank pin bearing adjusting nut
HS91	2	Crank pin bearing grease retainer, outer and inner
HS92	2	Crank pin bearing cone, 1¼" bore, Timken No. 02875
HS93	2	Crank pin bearing double cup, Timken No. 02823D
HS93½		Crank pin bearing, Timken, includes two HS92, one HS93
HS1124	2	Grease fitting ⅛" pipe thd., 67½ deg.
HS1622	2	Crank pin bearing spacer
		COUNTERSHAFT GROUP
HS74	2	Small pump gear key, No. 128 Woodruff
HS75	2	Pump countershaft
HS75½		Pump countershaft complete, includes two HS74, one HS75, one HS106, one HS388, two HS389½
HS106		Small pump gear, 14 teeth, 2⅛" face, 1⅜" bore
HS164S⅜	2	Cup carrier cap screw, ⅜"—16 thd. x ⅞"
HS382	2	Countershaft bearing cup carrier—open
HS382-1	2	Countershaft bearing cup carrier—SOLID CENTER
HS388		Countershaft gear to bearing spacer (Collar)
HS389	2	Countershaft bearing cup, 2-23/32" O.D., Timken No. 14276
HS389½		Countershaft Timken bearing complete, includes one HS389, one HS390
HS390	2	Countershaft bearing cone, 1¼" bore, Timken No. 14125A
HS1221½-3½	2	Countershaft bearing adjusting shims, set includes three .005", three .007", one .020"
HS1355-1¼	2	Countershaft bearing oil seal, 1¼" shaft size
		AUTOMATIC PRESSURE CONTROLLER
HS136½		Automatic pressure controller (see separate list for parts on page 15)
		FRAME AND DRIVE GROUP
For 15 H.P., 1800 R.P.M. Electric Motors Built in Standard N.E.M.A., Frame No. 254T		
HS74		Pump spider key, No. 128 Woodruff
HS74B		Extension shaft coupling key, No. G Woodruff
HS108		Pillow block, 1-7/16" bore
HS375½		Roller chain coupling complete, includes one HS375A½ coupling w/chain, one HS375C pump bushing, one HS375B motor bushing, one HS375E coupling cover
HS375BBC		Roller replacement chain
HS1412		Extension drive shaft, 1-7/16" dia. x 13"
HS1667		Pump sheave key, ⅜" x ⅜" x 2¾" long, plain
HS2041		Pump sheave, 4-groove, 12.4" pitch diameter, 1-7/16" bore for "B" Section belts
HS2042		Motor sheave, 4-groove, 5.2" pitch diameter, 1⅝" bore for "B" Section belts
HS2043B85		"V" belts, matched set of 4, "B" section, 85" long
For VG4D Wisconsin Gasoline Engine Drive		
HS377½		Chain coupling complete, includes one HS375A½ coupling w/chain, one HS375C pump bushing, one HS375H engine bushing
HS375BBC		Roller replacement chain

ACCESSORY PARTS LIST FOR PUMP

PART NUMBER	
	ACCESSORIES AND HOSE FITTINGS
HS1130A½	Hydro Silica OS Gun
HS4030A½	Pistol Grip Gun
HS9040A½	Trigger Shut-off Pistol Grip Gun
HS1278E	No. 1 Pipe cleaning nozzle
HS1278C	No. 2 Pipe cleaning nozzle
HS1278F	No. 3 Pipe cleaning nozzle
HS1278D	No. 4 Pipe cleaning nozzle
HS1278G	No. 5 Pipe cleaning nozzle
HS467	Transfer fitting, ¾" female hose thd. x ½" male pipe thd.
HS1530	Hose swivel
HS394	½" Hose coupling—M + Fe w/steel clamps & bolts
HS399	½" Hose coupling—M + Fe w/Band-it Jr. clamps
HS396	Male end of ½" hose coupling
HS397	Female end of ½" hose coupling
HS398	½" Steel hose clamps & bolts
HS398A	Band-it Jr. Hose clamps
HS371	Hose gasket—leather
	TOOLS
HS360	Pump cylinder packing rammer
HS1408	Alemite grease gun

NEW IMPROVED PUMP VALVE WITH O'RINGS ELIMINATE COMMON GASKET LEAKS

HSC61½ COMPLETE VALVE ASSEMBLY



HSC65 O'RING (3 REQUIRED)

HSC61 VALVE BODY & HS 62 PLUG

HS64 STAINLESS STEEL BALL

HSC63 BRASS SEAT

NOTE (INTERCHANGEABLE WITH PREVIOUS VALVE ASSEMBLY HS61½)

PLATE III

PIPING AND FITTINGS FOR PRESSURE AND BY-PASS PIPING FOR MODEL HSC—HYDRO SILICA PUMP

PRESSURE PIPING

A	Tee ¾", 3000 Lb.
B	Elbow ¾", 3000 Lb.
C	Street Elbow ¾", 3000 Lb.
D	Bushing ¾" x ¼", 3000 Lb.
F	Close Nipple ¾", EXTRA HEAVY (not shown)
G	Nipple ¾" x 2½", EXTRA HEAVY
H	Nipple ¾" x 5½", EXTRA HEAVY
J	Pipe ¾" x 14", EXTRA HEAVY

BY-PASS PIPING

I	Nipple 1" x 10" Standard
K	Elbow 1", Standard (2 not shown)
L	Union 1", Standard (not shown)
M	Nipple 1" x 2", Standard (2 not shown)
P	Nipple 1" x 4½", Standard (1 not shown)
Q	Nipple 1" x 6", Standard

RECOMMENDED SPARE PARTS LIST FOR HYDRO SILICA UNIT

1	HSC45	Pump Cylinder
2	HS54	Pump Yoke Plate
2	HS56	Plunger Tube
1	HSC61½	Complete Valve Assembly
1	HS88¾	Crank Assembly 4"
1	HS122½	Valve Seat and Valve Seat Holder for Pressure Controller
1	HS2500BA	50' Length of High Pressure Hose with ¾" GHT M + FE Fittings
1	HSC9500	Gasket, O'ring and Packing Set for Complete Pump
1	HYDRO SILICA	Spray Gun, See Accessories for Different Models Available

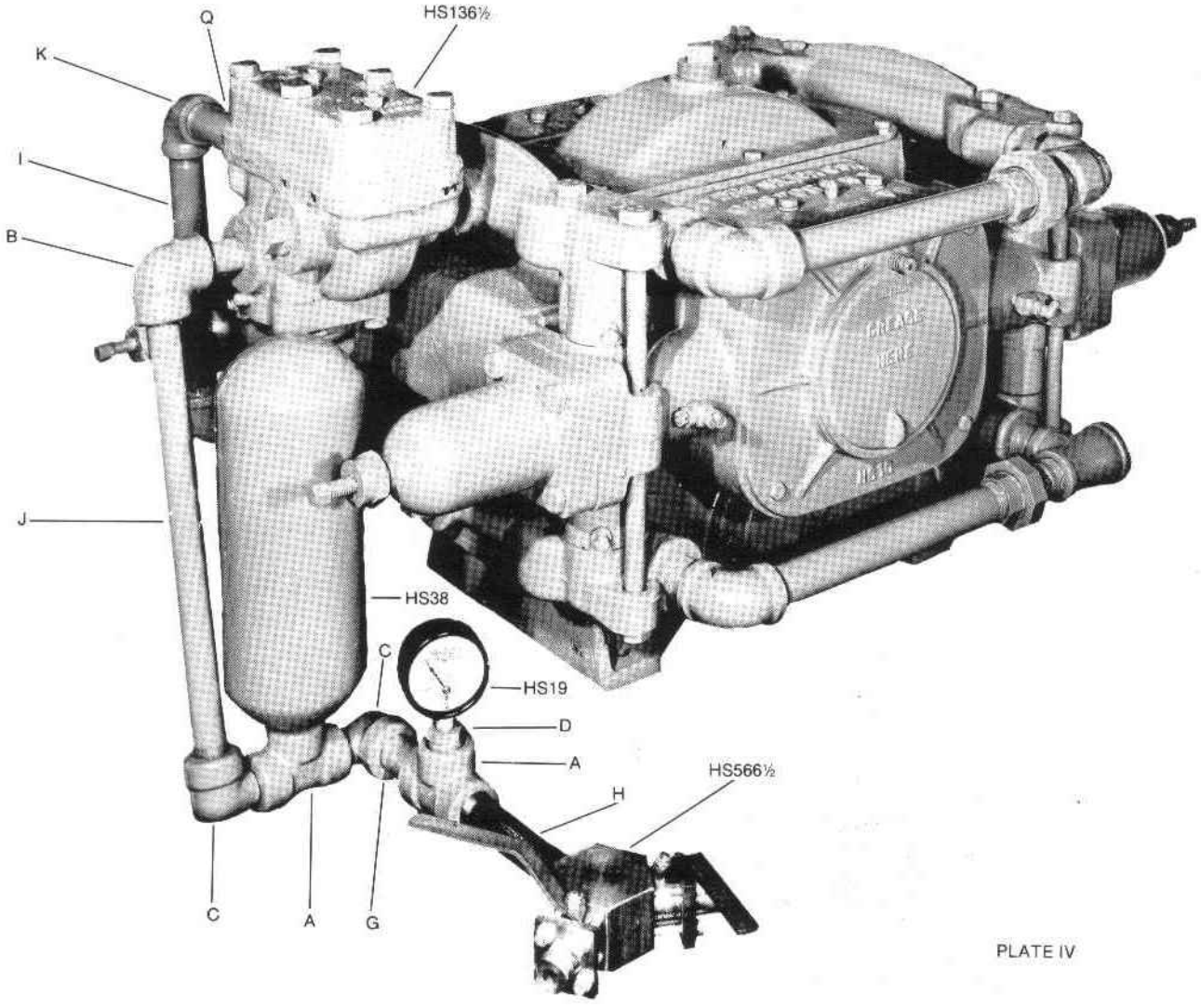


PLATE IV

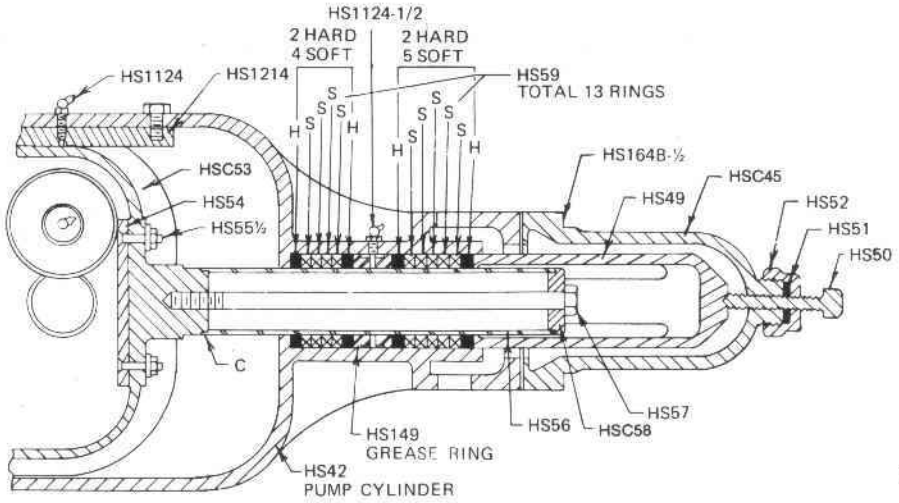
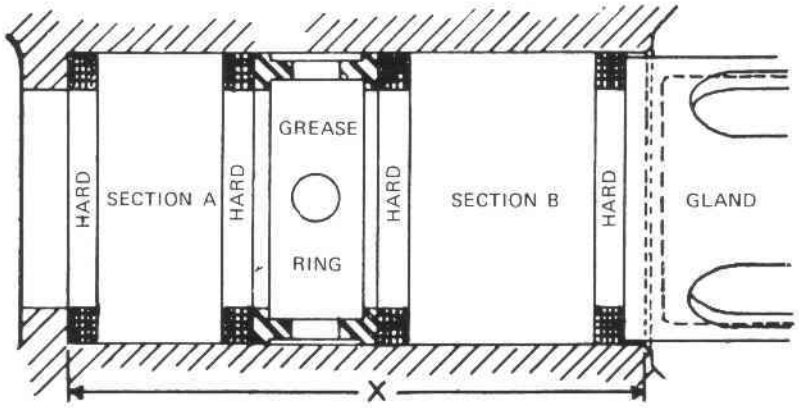


PLATE V



Packing Part No.	Packing for Pump Model	SOFT RINGS IN		Total Rings in Set
		Section "A"	Section "B"	
HS59	HSC	Four	Five	Thirteen

PLUNGER TUBE CYLINDER CUP NEW O'RINGS

1. O'RINGS (HSC56A) NOW SEAL THE PLUNGER TUBE ON BOTH ENDS PREVENTING WATER LEAKAGE.

2. O'RINGS (HSC47) REPLACE FLAT GASKET (HS47) SEALING CYLINDER CUP TO PUMP CYLINDER.

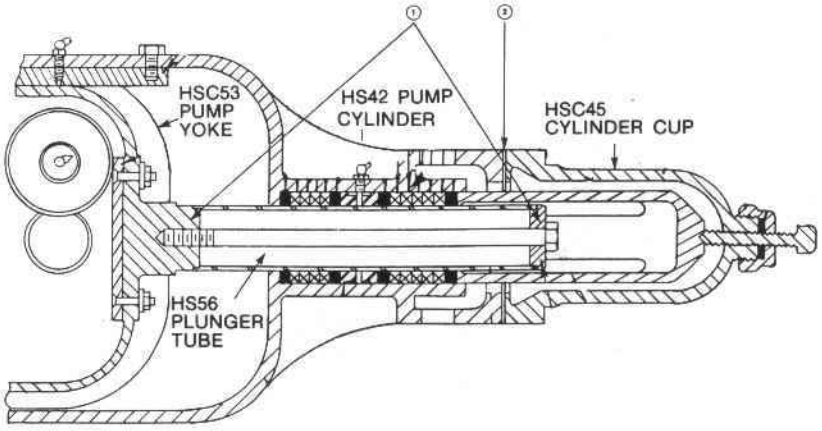


PLATE VI

PACKING INSTRUCTIONS FOR HS59

SPECIAL HIGH PRESSURE PACKING

To maintain efficiency—reduce replacement parts cost, repack your Hydro Silica Pump when head of pump cylinder packing adjusting screw, HS-50, is within two threads of being tight against nut HS-52.

Use only Special High Pressure Packing—
HS-59—For water up to 180° F.

Manufactured exclusively for the Hydro Silica Pump. Do NOT try to use rope packing. BROKEN CYLINDERS ARE CAUSED BY NOT PACKING PUMP WHEN NEEDED.

HS—59—HYDRO SILICA HIGH PRESSURE PACKING

Each carton of packing repacks one end of a cylinder. Order two cartons for each of two cylinders to repack your pump completely; a total of four cartons.

REPACK ONE CYLINDER AT A TIME

Step 1. Dismantling A Cylinder—Back off the packing adjusting screw (HS50), remove screws (HS164B½) holding cup (HSC45) and gland (HS49). Rotate pump drive so that plunger bolt (HS57) is outside the cylinder. Remove plunger bolt cap (HSC58), plunger bolt (HS57) and plunger tube (HS56). Pull out old packing, grease ring and packing back of grease ring.

Step 2. Clean Parts—Much depends on thorough cleaning. Grit may cause plungers to score. Clean grease ring (HS149) thoroughly; scrape and wash out packing chamber. Clean ends of plunger tube, mating surface on yoke (HSC53) and plunger cap, and underside of head of plunger bolt.

Note: If the plunger tube is worn, we recommend that it be replaced.

Step 3. Replace Plunger—Make sure the lip on the plunger tube (HS56) and the yoke (HSC53) are matched, see point C, plate 5.

Step 4. Repacking—Oil each ring before placing in cylinder. Dip each ring of packing in oil before packing in cylinder. When repacking pump, follow sketch (plate 5) and check the position of grease ring with relation to alemite fitting. First put in a hard ring, pushing it carefully to the bottom of the packing box, then follow with four soft rings—as indicated on drawing—and then another hard ring.

Next push in the grease ring, follow with another hard ring, then the five soft rings, and the remaining hard ring. Push each piece in snugly. Use care not to injure any packing or twist it out of its natural position.

The joints of the soft rings should be staggered so that no two will line up. Do not place joints at bottom or top of cylinder, but at the sides.

Step 5. Reassemble Cylinder—Back off the adjusting screw in cup so that gland will go back against the inside of the cup. Place O'ring in groove on cup surface. With cylinder cup screws in the cup, place assembly over plunger, making sure that gland enters the packing box. Tighten cup screws into cylinder flanges drawing each one snug. Finish the tightening by giving each screw a partial turn at a time to bring uniform pressure on the O'ring. Turn up adjusting screw snugly—then back off slightly.

Step 6. Starting the Pump—After all cylinders are packed, the pump is ready to be put back in service. Start the pump and then lubricate the packing and plungers. Use the grease gun furnished with your Hydro to force the lubricant into the grease ring through the pressure fitting on each cylinder.When resistance can be felt through the grease gun, the packing is sufficiently lubricated.

Lubricate moderately about every day. A shot or two of grease is enough. A MODERATE AMOUNT OF GREASE AT FREQUENT INTERVALS IS OF PRIME IMPORTANCE. Excessive lubrication of the plunger at any time tends to cause sticking valves. Use Kendall No. L421 multi-purpose grease, or equal. **Do not use** soda, soap or metallic soap grease.

Note: Always keep packing adjusted as lightly as possible. A film of water should be seen where plunger enters cylinder. Until this slight oozing becomes a trickle, do not tighten packing. Over-tightening shortens life of packing and plungers and wastes power.

HS136-1/2

AUTOMATIC PRESSURE CONTROLLER

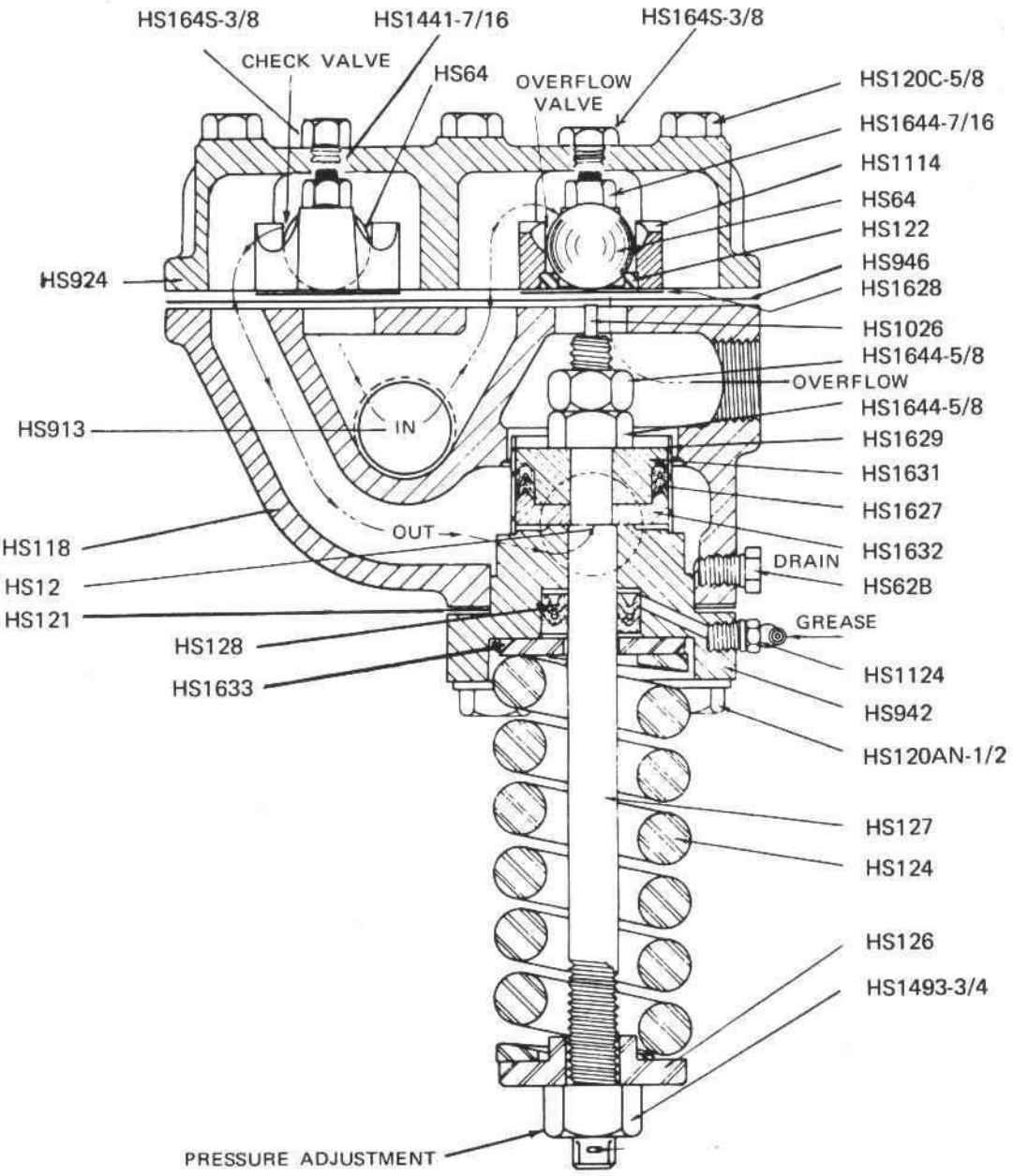


PLATE VII

AUTOMATIC PRESSURE CONTROLLER
HS136½

Before making any adjustment of controller be sure the pump is operating freely—all cylinders working at their full capacity, unobstructed by clogged or inactive valves. If there is any debris between balls and seats, pump will not develop pressure.

Adjust pressure by spring adjustment nut HS1493¾ while guns are closed. Screwing the nut up tighter (clockwise) increases the pressure, turning it in the opposite direction (counter-clockwise) reduces the pressure. Place wrench on flats at lower end of piston rod to prevent its turning while adjustment is being made. If the pressure drops when the gun is opened wide, it shows that either the gun has too large an orifice or that all the pump valves are not functioning properly or perhaps the overflow valve may be leaking due to a faulty seat.

In order to relieve the pump pressure when starting, open Hydro Silica Gun—or discharge valve—then when the motor is started close gun or discharge valve. When pump is working perfectly, open gun and proceed.

Both controller valves are on one deck and easy to get at by taking out six cap screws and removing cover HS924. The valve balls can be removed for inspection of valve seats by inserting a nail or wire inside of valve cage raising the ball to a point where it can be picked up by the fingers. Care should be exercised not to damage the balls.

To remove valve seat holder assembly HS1114, unscrew the two hex nuts HS1644 7/16 and lift valve cage off over the studs. When replacing these parts, make sure all gasket surfaces are clean and that gaskets are not injured. It is good practice to use new gaskets whenever possible.

To replace piston packing HS1627, remove packing box cap screws HS120AN½. This will permit removal of the complete piston rod assembly from the controller. Grip flats on opposite end of piston rod in vise or hold with wrench while unscrewing jam nut and regular nut. Piston rod can now be withdrawn from piston. When replacing the packing rings HS1627, be sure to install in the same manner as the old rings were, i.e., grooved side toward the spring. See Plate 7—also make sure the packing retainers are in their proper place to fit the shape of the packing.

To replace piston rod packing HS128, remove piston parts as outlined in paragraph above and withdraw piston rod from packing box HS942. When installing new packing be sure to place grooved side into packing box first—See Plate 7. With new packing in box, replace piston rod by pushing it up through the packing box, replace piston and tighten nuts securely. Do not attempt to make installation from lower end of piston rod because the diameter is greater and the threads will injure packing.

To thoroughly drain the controller remove the HS62B hex head pipe plug and the HS12 square head pipe plug on the side of the controller body. Also remove pipe plugs in the overflow and discharge lines and pressure manifold, then open hose valve.

Lubrication of controller is provided by an Alemite fitting on the piston rod packing box, HS942. Only a small amount of grease is needed at this point to keep packing in best operating condition. A shot of grease once a day is ample for average conditions.

When replacing gaskets, draw bolts up evenly, a turn at a time.

PARTS LIST

PART NO.	DESCRIPTION
HS12	Pipe plug ¾"
HS62B	Drain plug, ¼" pipe thd.
HS64	Valve ball, 1¼", stainless steel
HS118	Body
HS120AN½	Packing box cap screw, ½"—20 thd. x 1¾"
HS120C⅝	Cover cap screw, ⅝"—18 thd. x 3"
HS121	Piston rod packing box gasket
HS122½	Valve seat and holder assembly, one HS122, one HS1114
HS122	Valve seat (check or overflow)
HS124	Pressure adjusting spring
HS127	Piston rod
HS128	Piston rod packing (four rings)
HS924	Valve cover
HS942	Piston rod packing box

PART NO.	DESCRIPTION
HS946	Valve cover gasket
HS1026	Valve lifter stem
HS1124	Piston rod grease fitting, ⅛" pipe thd., 67½ deg.
HS1114	Valve seat holder
HS1441-7/16	Valve stud
HS1493¾	Pressure adjusting nut, ¾"—16 thd. hex.
HS1627	Piston packing (two rings)
HS1628	Valve gasket
HS1629	Cylinder tube
HS1631	Piston packing retainer, upper
HS1632	Piston packing retainer, lower
HS1633	Packing box washer
HS1644-7/16	Valve stud nut, 7/16"—20 thd. hex
HS1644⅝	Piston rod nut, ⅝"—18 thd. hex
HS913	Pipe plug 1"
HS164S⅜	Hex Hd. cap screw ⅜"—16 thd. x ⅞