SOMARAKIS™

- Vacuum Pumps & Compressors -

OPERATING AND REFERENCE MANUAL

SV SERIES LIQUID RING VACUUM PUMPS AND COMPRESSORS

SV-0808	**SV-2023**	**SV-4440**
SV-1211	**SV-2523**	**SV-5348**
SV-1414	**SV-3028**	**SV-5372**
SV-1818	**SV-3633**	**SV-5986**

This manual has been prepared specifically for you, our valued customer:

CUSTOMER NAME	
LOCATION	
PURCHASE DATE	
PURCHASE ORDER #	

VACUUM PUMP OR COMPRESSOR MODEL	SERIAL NUMBER	JOB NUMBER	EQUIPMENT NUMBER

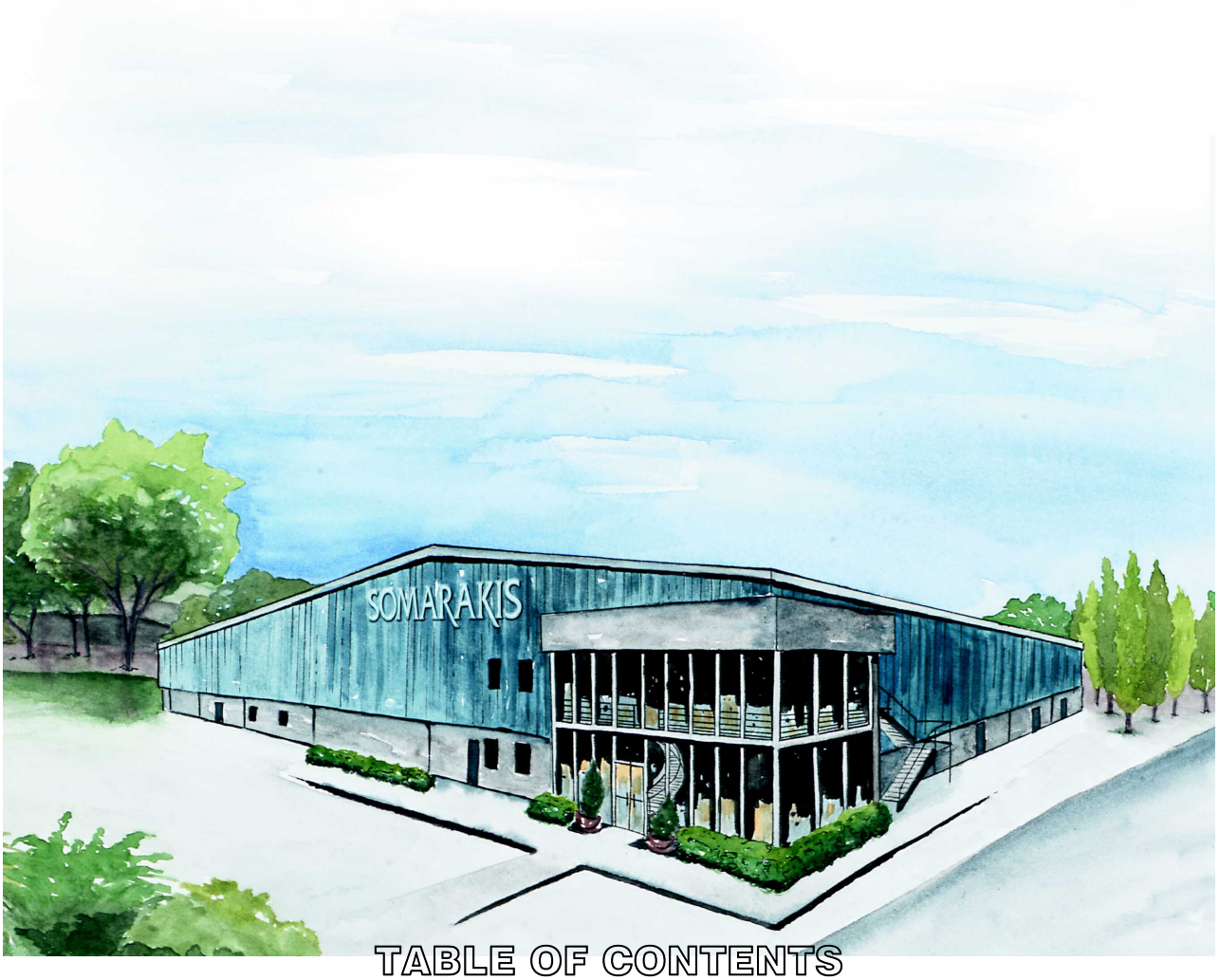


TABLE OF CONTENTS

REFERENCE TABLES

PREFACE

Information contained in this manual has been prepared to assist in the proper installation, operation, and maintenance of equipment manufactured by Somarakis, Inc. If additional information is required it may be obtained from:

SOMARAKIS, INC.
POST OFFICE BOX 430
552 HENDRICKSON DRIVE
KALAMA, WA 98625 - USA

TELEPHONE: 360.574.6722
FAX: 360.673.3978
WEBSITE: WWW.SOMARAKIS.COM
E-MAIL: INFO@SOMARAKIS.COM

A Somarakis field service engineer or representative will typically be available for assistance during initial equipment start-up. Please notify Somarakis, Inc. approximately two weeks before start-up is anticipated so that provisions can be made to have an engineer available.

CAUTION TAGS

The following tags will be installed by Somarakis, at the factory, prior to shipment. If for any reason these tags are missing or have been accidentally removed, the following cautionary measures should be heeded:

FIRST TAG

CAUTION: PUMP WILL BE DAMAGED IF RUN DRY
Do not test motor rotation or operate pump until pump is initially primed and connected to supply of clean, fresh water.

CAUTION: USE LINE STRAINERS
To prevent sand and other abrasive and destructive solids from entering the pump with seal liquid.

CAUTION: PUMP WILL BE DAMAGED BY FREEZING
Do not store in below freezing conditions unless vertical air inlets are closed with blind flanges and pump is drained.

SECOND TAG

DO NOT REMOVE THIS TAG UNTIL TEMPORARY INLET SCREENS ARE REMOVED

Inlet screens are furnished on pump inlets as temporary protection against welding slag, bolts, and other foreign object (+1/16" dia.). If left in place these screens will gradually plug and effect performance. Remove screens shortly after start-up, after inlet lines have cleared.

WARRANTY

Products manufactured by SOMARAKIS, INC. shall be free from defects in material and workmanship, but SOMARAKIS, INC.'s. liability shall be limited to the replacement F.O.B. manufacturing shops of any part found to be defective and as to which SOMARAKIS, INC. receives written notice of such defect thirty-six months from date of shipment or longer if requested in writing and properly stored. Decomposition by chemical action and wear caused by the presence of abrasive materials shall not constitute defects. This obligation does not cover the expense of removal or installation of equipment or parts thereof, or attached piping, supports, drives, accessories or any other related materials. The foregoing warranty does not apply to motors, electrical accessories or electrical accessory component parts, and Purchaser relies solely upon the warranties of such manufacturers, which are assigned insofar as possible, to Purchaser. THIS WARRANTY AND PERFORMANCE GUARANTEE BELOW, IS EXPRESSLY MADE AND ACCEPTED IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF SOMARAKIS, INC. NOT SPECIFICALLY SET FORTH HEREIN ARE EXPRESSLY EXCLUDED. SOMARAKIS, INC. SHALL NOT BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM INSTALLATION, START-UP PROCEDURES, OR OPERATION CONTRARY TO SOMARAKIS, INC. WRITTEN INSTRUCTION, UNLESS PERFORMED BY SOMARAKIS, INC.

PERFORMANCE GUARANTEE

SOMARAKIS, INC. guarantees every SOMARAKIS, INC. product, or system, to do the job for which SOMARAKIS, INC. recommends it (as specified in writing in the foregoing quotation) and, failing in this SOMARAKIS, INC. will either (a) field modify at SOMARAKIS, INC.'s expense so that equipment performs as to meet specifications or (b) refund the purchase price of equipment purchased from SOMARAKIS, INC.. Such refund shall not include installation costs or costs of associated equipment not purchased from SOMARAKIS, INC. or original freight charges. Such refund shall be payable within thirty days following receipt of returned equipment to SOMARAKIS, INC. at a designated facility, when shipped freight collect F.O.B. point of shipment. The choice of (a) or (b) shall be solely ours. The performance guarantee extends to eighteen (18) months following date of shipment from our shops.

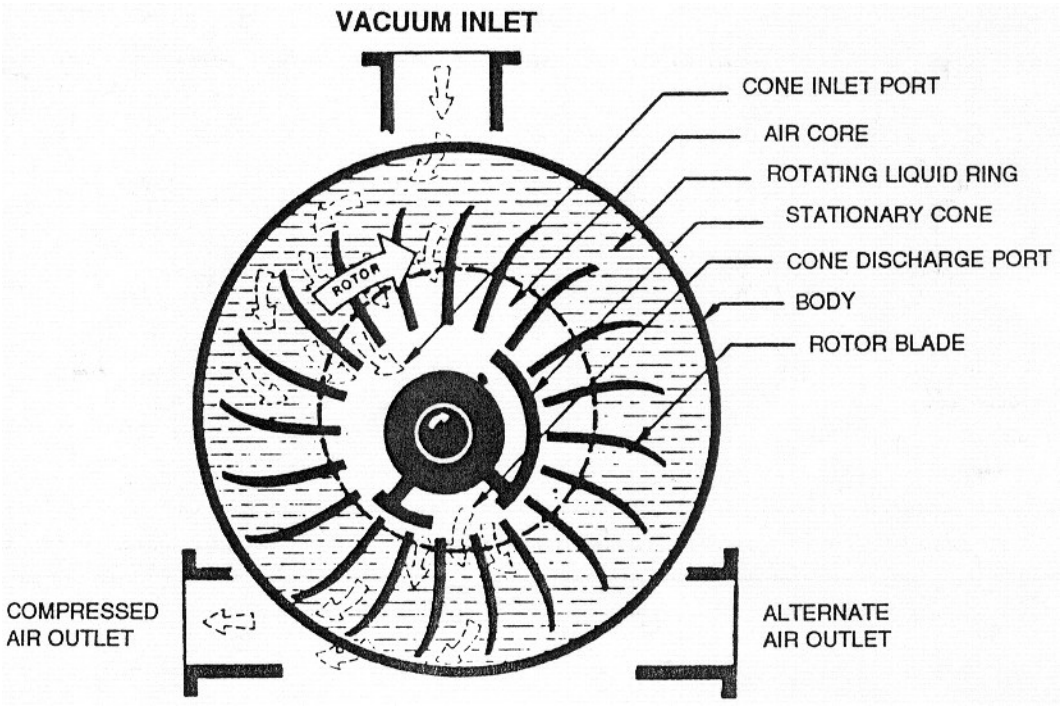
PRINCIPLES OF OPERATION

The SV vacuum pump is of typical "liquid ring" design with only one moving part and no metal-to-metal sliding contact. The illustration shows an offset rotor rotating in a clockwise direction in a cylindrical body partially filled with water. The rotor consists of 20 forward curved, shrouded blades forming chambers with hollow centers and air passage to two stationary valves designated as cones.

The water rotates with the rotor and forms an air core at the centerline of the body but offset from the centerline of the rotor. Water volume in the body is maintained to provide a seat at the tips of the rotor blades isolating, individual chambers. Water fills a rotor chamber, recedes as the chamber advances until the chamber is almost empty of water, and fills the chamber again to complete the cycle in one complete revolution of the rotor.

As water recedes from the rotor chamber it is replaced by air entering through the pump inlet and cone inlet port. As water is forced back into the rotor chamber the air exits through the cone discharger port and pump discharge.

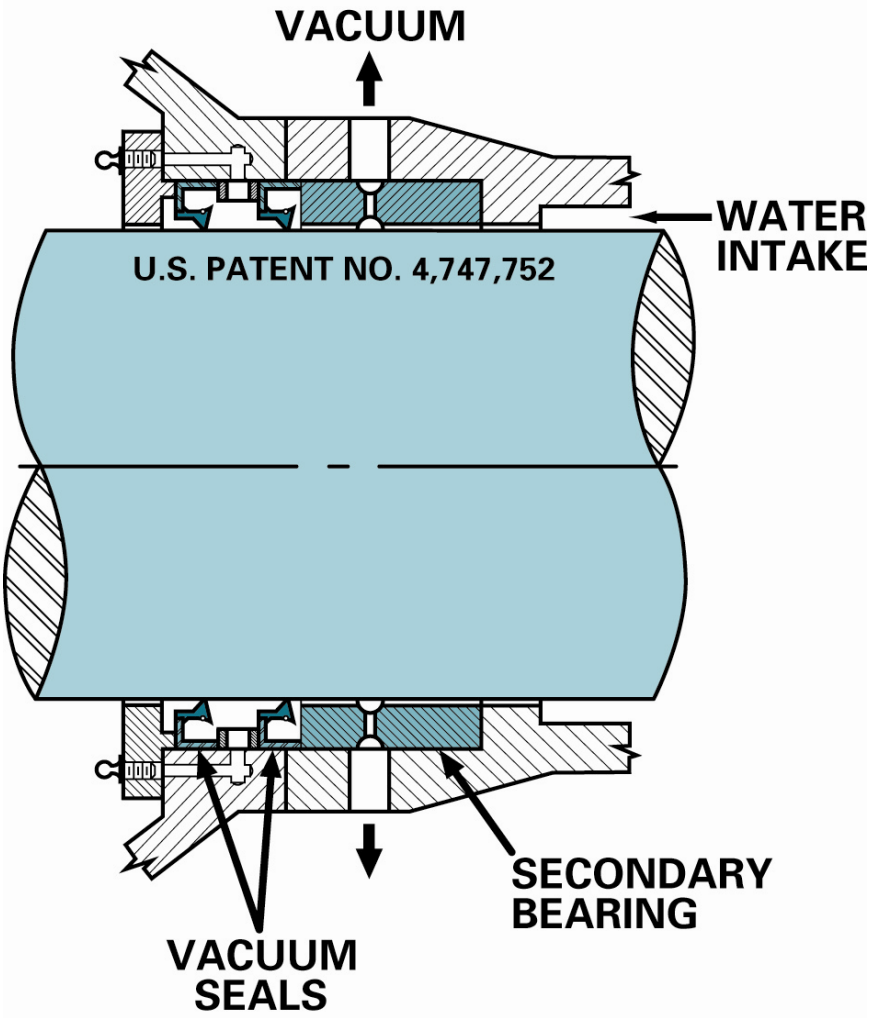
The pump inlet can be utilized as a vacuum source or the pump discharge utilized as a source of pressure. Air is the only produce moved through the pump in great volume. Most of the water is trapped within the pump and any loss is gradually replaced by addition of seal water.



The patented Somarakis Vac-Seal is used with both liquid ring vacuum pumps and compressors. The pump or compressor will operate drop-tight around the shaft with no external leakage of sealant.

A return passage to the inlet (vacuum) portion of each head pulls water from the body through the steady bearings, and a slight amount of atmospheric air inward under the lip seals.

The lip seals and lip seal retainer are split to facilitate installation. To maximize performance and prevent shaft wear, all four lip seals on each pump or compressor should be replaced annually.



Keys, couplings, v-belts, line strainers, spray nozzles, orifice unions and other miscellaneous parts will be shipped in bags or boxes attached to the shipping skid. Check for these items against the packing slip.

Care should be taken when lifting. Lifting weights of complete pump or compressor, cast parts, and common accessories are listed below:

TABLE 1 - SV VACUUM PUMP AND COMPRESSOR WEIGHTS

Part Description	Weight (pounds)											
	SV-0808	SV-1211	SV-1414	SV-1818	SV-2023	SV-2523	SV-3028	SV-3633	SV-4440	SV-5348	SV-5372	SV-5986
Body	67	158	277	307	362	690	1280	1950	3430	5350	8500	10694
Head, ea.	45	125	145	199	356	516	730	1085	2130	2510	2890	3636
Cone, ea.	3	14	24	30	54	64	110	180	390	520	750	944
Rotor	37	72	138	230	478	630	1180	1570	2720	4573	7610	9574
Shaft	13	35	58	107	186	250	425	648	940	1560	2780	3497
Bearing, ea.	1	4	6	9	10	11	16	25	47	60	67	85
Brg. Hsg, ea.	N/A	N/A	N/A	N/A	18	40	40	70	175	180	250	315
Inner Cap, ea.	1	2	6	9	N/A	13	12	13	23	26	30	38
Outer Cap, ea.	1	2	5	8	9	15	24	25	34	41	55	69
Total Weight	250	600	1020	1180	2050	3150	5320	9330	14800	20440	31000	39000
Standard Base	30	50	70	90	110	200	600	1200	1600	2000	2600	3000
Integral Gears	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1660	2045	2687	N/A
Inlet Manifold	30	75	85	130	150	180	380	500	720	920	1440	1600
Disch. Manifold	28	50	70	120	140	160	230	425	550	720	1120	1250
Accessory Kit	10	15	20	25	30	35	40	45	50	55	60	65

STORAGE OF A NEW PUMP OR COMPRESSOR

If the pump will be started up with thirty (30) days, install on the foundation or store in a dry area with all metal or wood blind flanges in place on all inlets and outlets. If the pump will not be put into use for an extended period, remove two body drain plugs and four head drain plugs to drain any accumulated water. Replace plugs. Leave all blind flanges in place. Rotate the shaft every two weeks. Pumps are flushed with soluble oil prior to shipment from the factory.

INSTALLATION OF VACUUM PUMP OR COMPRESSOR

FOUNDATION:
An SV pump is constructed of rugged castings but can be twisted out of alignment if bolted onto a poorly constructed foundation. The most common mechanical pump problem is bearing failure due to an out of plumb or poorly grouted base, or coupling misalignment.

Foundations should be of concrete with four sole plates having a minimum size of 4" x 4" x ½" set in wet concrete or grout. The pump base, which is heavy walled tubing when furnished by Somarakis, will be set on sole plates and shims leveled to within *.003"* per foot with no warp. Fully grout under the tubing base members and also fill the interior area of the base with grout.

COUPLING:
Pump or compressor packages, including motor and/or drive, will have been rough aligned and tested at the factory. However, they must be final aligned in the field. All pumps or compressors with integral gear drives have been aligned at the factory. Alignment should be re-checked prior to initial start-up. Dial in both angular and parallel coupling alignment to within *.003"* TIR.

V-BELTS:
Somarakis furnishes, or recommends the use of 2-belt minimum powerbands for v-belt driven SV pumps. Powerbands cannot roll in the grooves and derail as can single v-belts. It is recommended that matched sets of belts be installed.

CAUTION:
If V-belts or motor-pinion coupling are installed DO NOT check motor rotation unless seal water has been provided for the pump and the pump primed. Operation of a dry pump will seriously damage the cone-rotor fit.

INSTALLATION OF PIPING

AIR PIPING:
Inlet and discharge air piping must be connected to the pump or pump manifolds by use of flexible connections. No rigidly connected air piping is acceptable.

Inlet air piping should contain a Dirt Trap of the same diameter as the air piping. The dirt trap may be installed in a horizontal run or as shown on the installation drawing. Temporary Inlet Screens are shipped with a new pump and must be removed after about two weeks of operation. As the screens form a restriction, even when clean, in the inlet line, they must be removed to allow optimum pump performance.

Inlet air piping should be no smaller than the flanged pump connections. Manifold diameters should have at least the area of connected piping. When inlet piping exceeds 150' in length pipe diameter should be of the next largest size. Discharge piping should be full size and pitched down to the separator. To avoid overfilling the pump with water the discharge air line must not run above pump centerline. Water must discharge by gravity from the separator with air vent piping from the separator to be full size.

WATER PIPING:

Seal water piping is furnished by the user except that the orifice unions will be provided by Somarakis. It is important that a pressure gauge be installed between the line strainer and the pump seal water inlet to indicate water pressure, 10 PSI minimum, at the inlet.

The user will provide piping to the quench nozzles which are provided by Somarakis.

Standard shaft sealing by Somarakis includes lip seals and a steady bearing. No external water lines, as are required for conventional packing, are required for use with the lip seals.

Relief piping connecting each pump head with discharge piping is used on all pumps except those with #1 cone ports. Relief piping will be provided and installed by Somarakis.

Pressure equalizing piping connecting each compressor head is used on all compressors. Pressure equalizing piping will be provided and installed by Somarakis.

WATER SUPPLY

WATER QUALITY

Seal and quench water should be clean and non-abrasive. Cool water is preferable as it condenses vapor out of saturated process air and therefore reduces the volume of air which is to be handled by the pump. Water discharged by the pump will be 20-30°F warmer than water introduced to the pump. Seal water at 60°F is used as the standard in calculating pump performance. Use of seal and quench water warmer than 60°F will affect pump performance negatively as shown by the chart. (The chart is an example; do not use for calculations).

TABLE 2 - SEAL WATER TEMPERATURE / CAPACITY FACTORS

INLET SEAL WATER TEMPERATURE	CFM CAPACITY FACTORS AT 60°F PROCESS AIR		
	15" HG VACUUM	20" HG VACUUM	25" HG VACUUM
60	1.00	1.00	1.00
80	.97	.96	.91
100	.94	.91	.76
120	.88	.84	.58

Pumps of cast iron have less corrosion resistance than do pumps of stainless construction. Cast iron pumps with stainless trim can tolerate corrosive conditions longer before performance is affected. The following are the maximum levels of solubles which seal and quench water should contain when pumps are constructed of cast iron, with outgoing seal water at 100°F or less:

Calcium Carbonate	*300 ppm*
Chlorides	*200 ppm*
Sulphates	*200 ppm*
Total Dissolved Solids	*1000 ppm*

Regardless of materials of construction, hardness of less than 300 ppm calcium carbonate is desirable to prevent excessive build-up of scale.

WATER RATE

Somarakis provides orifice unions to control rate of seal water flow to the pump. Water pressure should be controlled at the quench nozzles to 10 PSI. The same incoming water lines, one required for each end of the pump, are then routed to the pump seal water inlets. Water flows through a line strainer and then through an orifice union. Water pressure before the orifice union should be at 10 PSI, 5 PSI minimum.

The chart indicating flow rates for seal water addition shows total flows, including both ends of the pump, required for pump start-up. With a saturated process air, operating seal water addition can be reduced by as much as 20 percent because of condensate in incoming saturated air. Water can be regulated, with the process operating to produce maximum vacuum with minimum water addition.

TABLE 3 - SEAL WATER ADDITION / START-UP

LIQUID RING VACUUM PUMPS					
MODEL	"HGV	GPM	MODEL	"HGV	GPM
SV-0808.1	15	4	SV-3028.1	15	20
SV-0808.2	20	5	SV-3028.2	20	40
SV-0808.3	25	8	SV-3028.3	25	45
SV-1211.1	15	5	SV-3633.1	15	25
SV-1211.2	20	8	SV-3633.2	20	30
SV-1211.3	25	15	SV-3633.3	25	60
SV-1414.1	15	8	SV-4440.1	15	40
SV-1414.2	20	10	SV-4440.2	20	60
SV-1414.3	25	14	SV-4440.3	25	95
SV-1818.1	15	10	SV-5348.1	15	75
SV-1818.2	20	12	SV-5348.2	20	80
SV-1818.3	25	18	SV-5348.3	25	130
SV-2023.1	15	11	SV-5372.1	15	90
SV-2023.2	20	16	SV-5372.2	20	100
SV-2023.2	25	21	SV-5372.3	25	160
SV-2523.1	15	12	SV-5986.1	15	125
SV-2523.2	20	17	SV-5986.2	20	140
SV-2523.3	25	30	SV-5986.3	25	225
LIQUID RING COMPRESSORS					
ALL COMPRESSOR MODELS REQUIRE ¼ GPM PER BHP					

OPERATION

START-UP OF A NEW PUMP

To flush out construction slag and scale, remove the two ¾" inspection plugs at the top of the body and turn on the seal water until water overflows the top of the body. Remove the two body drain plugs and completely drain the body. Remove the four head drain plugs and drain the heads.

Manually rotate the pump shaft; it should turn freely and indicate no obstructions. If an obstruction is felt refill the body with water and flush again.

Replace the body and head drain plugs and the inspection plugs at the top of the body; use pipe tape or thread sealant. Turn on the seal water and prime the pump by filling until water overflows pump by flowing out through the rotor and cone ports and through the pump air outlets.

Make sure that temporary inlet screens are in place and that caution tags are still attached to the screen handles.

Unlock the electrical controls and check motor rotation. CAUTION: Do not check motor rotation when connected to a dry pump.

Turn on seal water again and start pump. Check RPM against name plate specifications. Check amps to determine approximate horsepower draw. Regulate seal water to approximately 10 PSI prior to seal water orifice unions, quench water to 10 PSI at the spray nozzles. Pump should show vacuum at inlet gauges although not as much as nameplate with process equipment not in operation.

Install temperature tape on bearing housings. Bearings are grease lubricated and housing temperature may initially climb to 140°F before dropping to 110°F as excess grease works its way out of bearings. Monitor bearing temperatures closely. Temperatures must not exceed 145°F.

OPERATION OF PUMP WITH PROCESS EQUIPMENT IN OPERATION

Condensate from incoming air and quench water will supplement seal water. Regulate seal water by gradually reducing flow until pump becomes noisy and indicated vacuum drops off. In no case turn off seal water completely; some water should always flow into seal water inlets. Periodically clean line strainers at seal water inlets.

REMOVE TEMPORARY INLET SCREENS

After two weeks or at the first scheduled machine shutdown remove the two inlet screens. These extend downward into the pump inlets so inlet manifolding or piping will have to be lifted to remove the screens.

TROUBLE SHOOTING

LOSS OF VACUUM

INADEQUATE FLOW OF SEAL WATER:
The line strainer may be plugged or the orifice nozzle on the seal water line may be plugged.

HIGH TEMPERATURE OF SEAL WATER:
Remember; pump capacity curves are based on 60°F seal water. If the seal water is appreciably warmer than that specified when your system was engineered, the problem of low vacuum could be due to a high temperature sealing water circuit.

A restriction in the vacuum air line will cause a lack of vacuum at the process equipment but higher than normal vacuum at the pump inlet. Were the temporary inlet screens removed? Excessive cone-rotor clearance due to corrosion will cause low vacuum. Excessive rotor-body clearance due to corrosion or abrasion will also cause low vacuum. Borescope inspection of the pump will indicate whether these fits are within tolerance.

Belt slippage will cause loss of vacuum. Check actual pump speed to make sure that it corresponds to nameplate speed.

HIGH HORSEPOWER

Excessive flow of seal water - reduce flow of seal water to minimum while maintaining vacuum.

Back pressure on air discharge piping - is the separator operating correctly? The discharge piping should be full size or to an unobstructed trench. Attempting to start the pump against an obstructed discharge will overload the motor.

Build-up of scale within a pump may cause a gradual increase in horsepower draw. Running high hardness seal water to a pump for extended periods while the pump is not operating may cause accumulation of scale which will not allow the motor to start the pump.

CAVITATION

High temperature seal water.

Excessive flow of seal water.

Restriction on vacuum side of pump - have the inlet screens been removed? The temporary inlet screens should be removed soon after initial pump start-up.

Restricted discharge air line.

Corrosion and/or erosion of the rotor or pump body will gradually cause a pump to become noisy. Such corrosion will also cause loss of performance.

BEARING FAILURES

Coupling misalignment should be suspected as it is the primary cause of bearing failure. Has the pump base shifted so that it is out of plumb or twisted? Is air piping isolated from the pump by flexible connectors?

Inadequate coupling end play.

Lack of lubrication or excessive lubrication; use of incorrect grease. (Use an EP-2 type, or equivalent, grease.)

Excessive belt tension.

EXTENDED SHUTDOWN

When a pump will be out of service for more than four weeks prepare for storage as follows:

1. Drain all water from the pump by removing two body drain plugs and four head drain plugs.

2. Reinstall drain plugs and fill with clean water until relief piping overflows at pump centerline. Add soluble oil through both inspection holes (located at top of body) and run pump for one minute. Drain all the water from the pump and reinstall drain plugs.

3. Install blind flanges on pump inlets if pump is not connected to mill piping.

4. Spray rust inhibitor into top inlets and turn pump over by hand (not with motor) at fourteen (14) day intervals. Fill pump with R&O inhibitor up to ⅓ body centerline.

MAINTENANCE

LUBRICATION

Pump bearings are grease lubricated and the bearing housings are provided with grease relief holes so that excess grease can work its way out of the bearing assemblies. Pumps are performance tested at the factory and have been greased adequately for initial mill operation. Do not add grease before start-up of the pumps as excess grease will cause elevated bearing temperatures. The other lubrication required, for non-gear pumps, is of the lip seals, two on each end of the pump shaft, which seal around the shaft in the "packing" area. Use bearing grease; excess grease will not damage or unseat the seals. Grease specifications: Premium quality, industrial bearing grease, lithium or lithium base, water resistant; consistency "NLGI #2", viscosity @ 100 F-500 SSU, viscosity at 210°F - 58 SSU.

The following grease types, or equivalent, are acceptable:

AMOCO	*Rykon Premium 2*
Atlantic Richfield (ARCO)	*ARCO Multipurpose*
Chevron Oil	*Chevron SRI-2*
Exxon	*Unirex N2*
Gulf Oil	*Gulfcrown No. 2*
Mobil	*Mobilux 2*
Shell Oil	*Alvania 2 or Dolium R*
Texaco	*Premium RB2*

SHAFT SEALS

Pumps and compressors are not packed with conventional packing. Each end of the shaft is sealed with vacuum evacuated, dual lip seals, both of which seal inward, to seal water within the pump and to allow air to enter the pump around the shaft. The seals are separated by a lantern ring through which grease can be introduced to the seal area.

To replace shaft seals (34), remove the split seal retainer (31) and hook out the seals, which are also split for easy installation and removal. After installation of seals, re-grease through the fittings.

TABLE 4A – PUMP AND COMPRESSOR MAINTENANCE DATA – 1 OF 2

Vacuum Pump or Compressor Component	Vacuum Pump or Compressor Model					
	SV-0808	SV-1211	SV-1414	SV-1818	SV-2023	SV-2523
Rotor Free End Travel and Gasket Requirements						
Rotor End Travel	.060" - .130"	.060" - .130"	.080" - .160"	.080" - .180"	.080" - .180"	.060" - .090"
Index #53, Body Gaskets, Quantity Required	IE = 6, DE = 5	IE = 6, DE = 4	IE = 7, DE = 5	IE = 5, DE = 3	IE = 7, DE = 5	IE = 5, DE = 3
Index #51 and 52, Cone Gaskets, Qty. Required	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1
Shaft Seals (Vac-Seal is standard) or Packing (alternate) Requirements						
Index #34, Vac-Seals (Lip Seals), Quantity Required	(4) JM #19238-RUP	(4) JM #R-0225-17628	(4) JM #R-0262-04268-RPD	(4) JM #10164-LUP	(4) JM #R-0400-09556-RPD	(4) JM #R-0450-05868-RPD
Index #35, Packing (Alternate), Qty. Required	(5) 1/4" x 15-3/4"	(5) 3/8" x 9-3/4"	(5) 3/8" x 11-1/8"	(6) 1/2" x 12-1/8"	(5) 5/8" x 12-9/16"	(5) 1/4" x 15-3/4"
Bearing and Cap Seal Requirements						
Index #44, Bearings, One Required for Idle End and One Required for Drive End	IE = SKF #6307 DE = SKF #307	IE = SKF #6409 DE = SKF #6409	IE = SKF #6311 DE = SKF #6311	IE = SKF #5315 DE = SKF #315	IE = SKF #21316 DE = SKF #21316	SKF #22220-CY
Index #23, Outer Cap Seal, IE and DE, Qty. Required	(1) JM #9080-LUP	(1) JM #9636-LUP	(1) JM #10755-LUP	(1) JM #10526-LUP	(1) JM #5104-LUP	(1) JM #11198-LUP
Index #22, Inner Cap Seal, IE and DE, Qty. Required	(2) JM #7073-LUP	(2) JM #10432-LUP	(2) JM #11017-LUP	(2) JM #9042-LUP	(2) JM #9143-LUP	(2) JM #4168-LUP
Index #45, Locknut	N-07	N-09	N-11	AN-15	AN-16	AN-20
Index #46, Lockwasher	W-07	W-09	W-11	W-15	W-16	W-20

Extra gaskets are used under the idle end head to allow for removal of some for final end travel adjustment. Additional gaskets may be added under the cones if end travel adjustment requires (if most or all of the body gaskets have been removed). Each 0.010" of shimming under the idle end cap, under idle end head, or under cones will affect cone-rotor clearance by 0.0014".

TABLE 4B – PUMP AND COMPRESSOR MAINTENANCE DATA – 2 OF 2

Vacuum Pump or Compressor Component	Vacuum Pump or Compressor Model					
	SV-3028	SV-3633	SV-4440	SV-5348	SV-5372	SV-5986
Rotor Free End Travel and Gasket Requirements						
Rotor End Travel	.070" - .140"	.080" - .160"	.080" - .190"	.100" - .250"	.225" - .275"	.250" - .350"
Index #53, Body Gaskets, Quantity Required	IE = 8, DE = 6	IE = 8, DE = 6	IE = 6, DE = 4	IE = 7, DE = 5	IE = 10, DE = 10	IE = 6, DE = 6
Index #51 and 52, Cone Gaskets, Qty. Required	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1	IE = 1, DE = 1
Shaft Seals (Vac-Seal is standard) or Packing (alternate) Requirements						
Index #34, Vac-Seals (Lip Seals), Quantity Required	(4) JM #R-0562-04286-RPD	(4) JM #R-0625-05679-RPD	(4) JM #R-0775-08847-RUP	(4) JM #R-0837-04118-RUP	(4) JM #R-1025-03689-RUP	(4) JM #1125-10697-LUP
Index #35, Packing (alternate), Qty. Required	(6) 5/8" x 19-5/8"	(5) 3/4" x 23"	(6) 3/4" x 29"	(6) 3/4" x 30"	(6) 3/4" x 35"	N/A
Bearing and Cap Seal Requirements						
Index #44, Bearings, One Required for Idle End and One Required for Drive End	SKF #22222-CJW33	Timken Set (1) 74851-D Cup (2) 74550 Cones (1) 74550-9-220 Spacer	Timken Set (1) 67720-D Cup (2) 67790 Cones (1) 67790-9-232 Spacer	Timken Set (1) 67820-D Cup (2) 67885 Cones (1) 67885-9-241 Spacer	Timken Set (1) 244210D Cup (2) 244249 Cones (1) M244249-9-114 Spacer	TIMKEN #LM451345
Index #23, Outer Cap Seal, IE and DE, Qty. Required	(1) JM #7199-LUP	(2) JM #7042-LUP	(2) GARLOCK #53X-3917	(2) JM #12094-LUP	(2) JM #825-16220-LUP	(2) JM #975-13809-LUP
Index #22, Inner Cap Seal, IE and DE, Qty. Required	(2) JM #10152-LUP	(2) JM #10439-LUP	(2) JM #9595-LUP	(2) JM #6718-LUP	(2) JM #975-13809-LUP	(2) JM #1125-10697-LUP
Index #45, Locknut	AN-21	AN-28	AN-34	AN-38	AN-44	AN-52
Index #46, Lockwasher	W-21	W-28	W-34	W-38	W-44	W-52

Extra gaskets are used under the idle end head to allow for removal of some for final end travel adjustment. Additional gaskets may be added under the cones if end travel adjustment requires (if most or all of the body gaskets have been removed). Each 0.010" of shimming under the idle end cap, under idle end head, or under cones will affect cone-rotor clearance by 0.0014".

SECONDARY BEARINGS

Secondary bearings are located at both ends of the shaft inboard of the shaft seals. For a limited period of time, in the event of a primary bearing failure, the secondary bearings will prevent cone-rotor contact by providing additional support for the shaft before the rotor comes in contact with the cone.

Secondary bearings (36) are not split; removal and replacement will involve removing the replaceable bearing housings (16). The secondary bearings are provided with puller holes for removal. When installing, notice that the bearing is keyed at the bottom of the housing to prevent rotation of the bearing within the housing.

BORESCOPE INSPECTION OF PUMP INTERNALS

Two inspection holes are provided at the top of the pump body through which a borescope can be inserted and pump internals inspected. Borescope access is also possible through the two drain holes in the bottom of the pump body.

Obvious wear and damage can be assessed as well as cone-rotor clearance estimated. Body wear can be viewed and the pump taken out of service before leaks occur. The borescope is a useful tool which permits quick appraisal of the life remaining in a pump and estimation of the percentage of efficiency at which the pump is operating. Precise operating efficiency can only be determined by (the more time consuming) orifice testing of the pump in place.

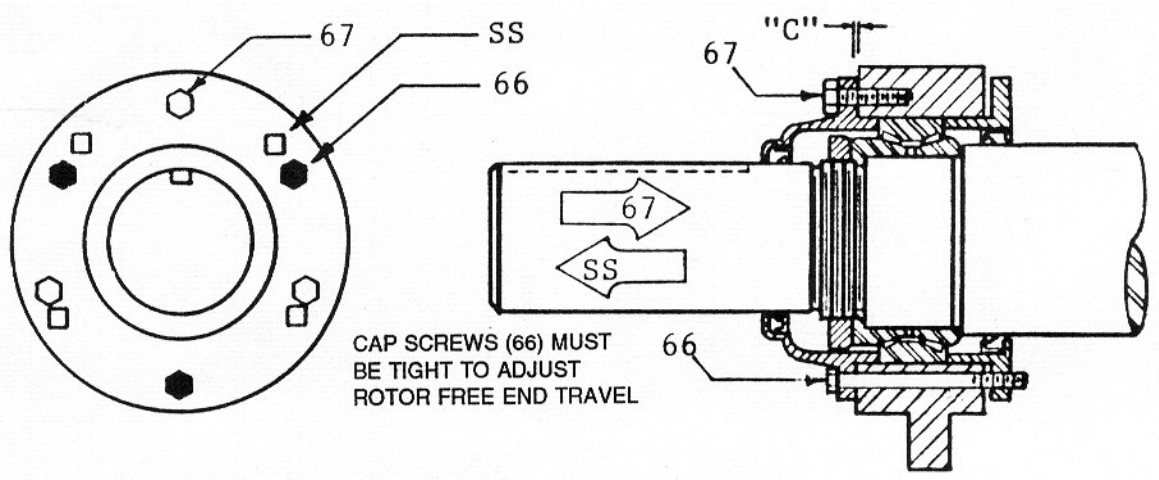
ORIFICE TESTING

Orifice testing of a pump by a qualified technician permits accurate measurement of actual pump performance. Orifice plates and accurate vacuum gauges are required to perform the test. Call Somarakis, Inc. for orifice testing service or for written instructions of testing procedures.

CHECKING ROTOR FREE END TRAVEL

Pump efficiency will decrease as the clearance between rotor and cones increases due to corrosion or wear. It is possible to determine rotor free end travel without complete disassembly of the pump. If travel is found to be within .030" of the specifications noted in Tables 4A and 4B (pages 17-18), the pump can be considered to be in good condition. If rotor travel is excessive, and assuming that cone-rotor wear is relatively uniform, the pump can be disassembled to reduce cone-rotor clearance by adding cone gaskets or removing head gaskets.

To check rotor free end travel, remove the idle end bearing cap (19) and adjusting shims (57), leaving the bearing cap gaskets (55) in place. Reinstall the bearing cap using the three thru cap screws (66); tighten. Move the rotor toward the pump drive end by tightening cap screws (67) uniformly. Rotate the shaft by hand and move the rotor until light contact is made between the rotor and drive end cone. Measure the gap "C", between the bearing cap and bearing housing, with a feeler gauge.



Loosen the cap screws and move the rotor toward the idle end by using the four set screws (SS) in the bearing cap. When the rotor touches the idle end cone measure the gap "C" again between the bearing cap and bearing housing. Rotor free end travel is equivalent to the difference between the two measurements.

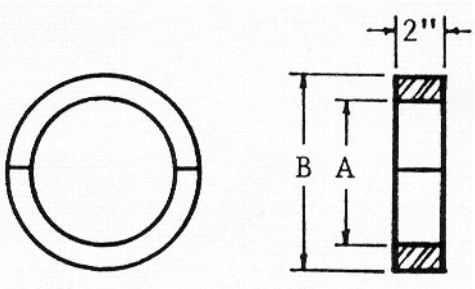
If travel is within .020"-.030" of specifications and the pump will not be further disassembled, center the rotor by installing shims to the first feeler gauge measurement plus one-half the free end travel.

DISASSEMBLY OF PUMP OR COMPRESSOR

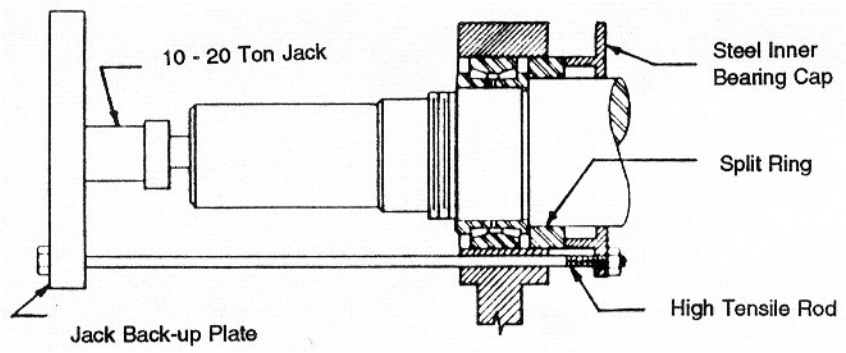
There should be a level floor or base under the pump. Mark all parts while disassembling; this is especially true of head, cone and body relationships. Cones are not interchangeable. Make up a split ring, as illustrated on the following page, for removal of the idle end bearing. More than one split ring may be required on larger pump models.

TABLE 5 – DISASSEMBLY OF PUMP OR COMPRESSOR - SPLIT RINGS

MODEL	A $^{+.005"}/_{-.000"}$	B $^{+.005"}/_{-.010"}$	ROD DIA.
SV-0808	1.630”	3.145”	5/16”
SV-1211	2.255”	4.718”	3/8”
SV-1414	2.630”	4.718”	3/8”
SV-1818	3.380”	6.293”	3/8”
SV-2023	N/A	N/A	N/A
SV-2523	3.942”	7.080”	1/2”
SV-3028	4.335”	7.870”	1/2”
SV-3633	6.255”	8.495”	1/2”
SV-4440	7.755”	9.745”	5/8”
SV-5348	8.380”	10.495”	5/8”
SV-5372	9.755”	12.370”	5/8”
SV-5986	11.255”	13.995”	5/8”



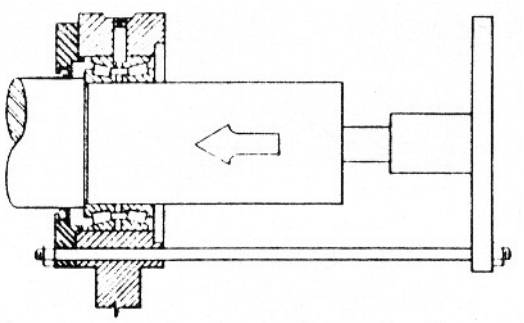
Remove the six cap screws holding the idle end bearing cap (19). Remove cap and adjusting shims (57) and alternating gaskets (55). Remove shaft nut and lock ring (45, 46). The steel inner bearing cap (17) will serve as a bearing pusher when set up with the split ring as show below.



It is not necessary to remove the steel bearing housing (16) unless it has been damaged and requires weld repair and machining; leave it fastened to the head. The bearing housing requires no shims if removed and reinstalled.

Block up the pump body (15) and unbolt the idle end head (14). Slide the head off the shaft using lifting eyes in the head inlet flange.

Go to the drive end of the pump and remove the outer bearing cap (21) and the shaft nut and lock ring (45, 46). Using the setup shown, push the shaft out of the bearing housing (16) toward the idle end of the pump; the bearing will stay with the bearing housing. Support the drive end of the shaft with a sling to get the weight of the rotor off of the bearing. Remove the bearing, which has a "floating" fit in the bearing housing, from the housing and shaft.



Using two slings and a pipe extension, work the shaft and rotor assembly out of the body through the idle end of the pump.

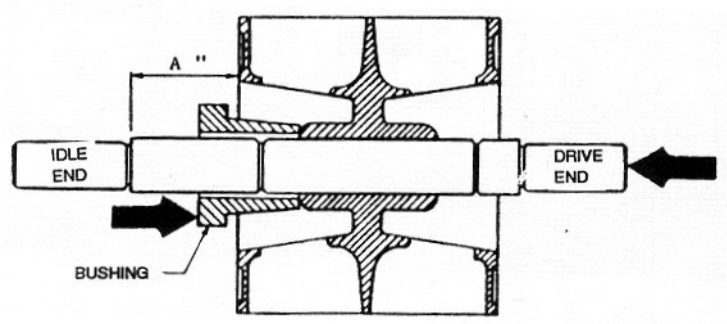
Remove the body from the drive end head. Support the drive end head and cone assembly by the head inlet flange to prevent the head from tipping over when the body is removed.

REPAIR OF CONES AND ROTOR BORE

If scored or corroded, these 8" tapers can be re-machined and the parts reused. A maximum of *.200"* of spacers and gaskets can be used in the head-cone rabbet to make up for metal lost in machining. The total amount of material removed from the diameter of cone or rotor tapers must be made up 3.5:1 (gasket dimension : machining dimension) with gaskets under the cones.

ROTOR-SHAFT ASSEMBLY - TO DISASSEMBLE AND REASSEMBLE

If the rotor is an alloy other than cast iron, there usually will be a shaft key held in place by set screws located on each side of the hub. Remove the set screws before attempting to press the shaft out of the rotor. The maximum force which should be used when pressing the shaft out cold is 20 tons for pumps up to size SV-2523, and 50 tons for larger sizes. If this must be exceeded, heat the rotor hub uniformly to 200°F and try again.



Make up a bushing, with a groove so as to miss the shaft key, for pressing against the rotor hub. Do not apply force other than at rotor hub. Do not attempt to remove the key from the shaft. Check dimension "A" before removing shaft:

TABLE 6 – MINIMUM FORCE FOR ASSEMBLY OF ROTOR ON SHAFT

Model	Dim. "A"	Tons	Model	Dim. "A"	Tons
SV-0808	5.16"	1.5	SV-3028	9.44"	20
SV-1211	7.31"	3	SV-3633	11.12"	25
SV-1414	8.19"	5	SV-4440	11.12"	40
SV-1818	9.03"	10	SV-5348	8.94"	60
SV-2023	9.22"	12	SV-5372	13.34"	70
SV-2523	10.03"	15	SV-5986	20.19"	90

Use heat on the rotor hub if the shaft and rotor cannot be assembled at the above forces when cold. Use Molykote, or similar product to prevent galling.

HEAD-CONE ASSEMBLY

The IE cone and IE head must be installed together; the DE cone and DE head must be installed together. Assemble with one 0.010" gasket. Final rotor free end travel will be set by using body-head gaskets to locate the two cones further apart, additional head-cone gaskets to locate the cones closer together. If there is any play in the head-cone rabbet fit, locate the cone toward the top of the head.

TEMPORARY ASSEMBLY - DETERMINE GASKETS FOR ROTOR END TRAVEL

At this point the cones are assembled to the heads; the heads have no secondary bearings or seals installed, the bearing housings have no primary bearings or seals installed. The shaft is installed in the rotor with the shaft ends, threads and fits protected with heavy tape.

Temporarily assemble the two heads and rotor by stacking vertically, or assemble on a flat surface, leaving out the body, pulling the three units together uniformly on both sides with come-alongs. This will force the cones into the rotor tapers, a condition of zero rotor end travel. Measure the distance between the two head fits. Measure the length of the body, which should be as follows:

TABLE 7 – TEMPORARY ASSEMBLY DIMENSIONS

Model	Measurement	Model	Measurement	Model	Measurement
SV-0808	8.875"	SV-2023	21.102"	SV-4440	44.190"
SV-1211	12.937"	SV-2523	25.500"	SV-5348	50.000"
SV-1414	15.625"	SV-3028	30.625"	SV-5372	77.375"
SV-1818	18.280"	SV-3633	35.875"	SV-5986	85.125"

All dimensions shown should be $^{+.000"}/_{-.015"}$.

Determine the specified rotor end travel, and calculate the number of .010" head-body gaskets (53) required to allow proper rotor end travel. Install the required number of head gaskets, half on each end of body, using grease to hold them in place.

FINAL ASSEMBLY OF HEADS TO BODY

Install the secondary bearing (36) in the drive end head; align the notch in the bottom of the secondary bearing with the pin in the bottom of the housing. If the bearing housing has been removed from the head, reinstall it using no shims but cleaning all surfaces and filing out any nicks.

Assemble the body to the drive end head, on a flat surface, orienting the body rotational arrow to the head rotational arrow. Bolt up tight.

Insert the rotor and drive end of the shaft into the body using a snug pipe extension on the shaft. As the shaft comes through the drive end head slip the following parts over the shaft in sequence: lip seal spacer (331), retainer O-ring (311l), retainer (31), slinger and spring (37), inner drive end bearing cap (18) with lip seal (22) installed, and cap gasket (58). Work the shaft on through the bearing housing.

Install the secondary bearing and bearing housing into the idle end head. Install the head on the body making sure, as the shaft comes through the head and before it enters the bearing housing, that the following parts are installed in sequence; lip seal spacer (331), retainer O-ring (311), retainer (31), slinger and spring (37), and bearing cap (17) with lip seal (22) and O-ring (24) installed. Bolt head to body.

EXTREMELY IMPORTANT

The final loosening of all body-head bolts and subsequent re-tightening, must be done on a FLAT surface to insure that the heads are in alignment.

ASSEMBLE BEARINGS IN HOUSINGS (Sizes SV-808 to SV-2023)

Push the rotor and shaft toward the drive end until the cone comes firmly in contact with the rotor; this will center the shaft within the bearing housing. The drive end bearing cap should not be bolted to the bearing housing at this time.

Slide drive end ball bearing onto shaft. Select pipe as specified below of suitable length to fit over shaft and bear against inner race of ball bearing. Machine one end of the pipe square and install a pipe cap on the other end.

TABLE 8 – ASSEMBLE BEARINGS IN HOUSINGS

PUMP OF COMPRESSOR MODEL	PIPE SIZE
SV-0808	1-1/2”
SV-1211	2”
SV-1414	3”
SV-1818	3”
SV-2023	3” PIPE WITH 3” COUPLING

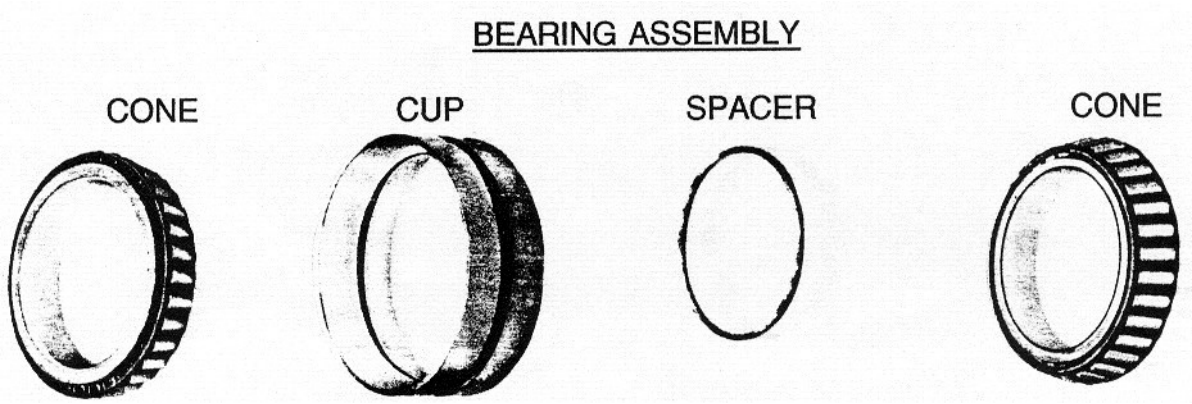
Using the above prepared pipe and a mallet, tap ball bearing onto shaft until bearing is seated against shaft shoulder.

Push the rotor and shaft toward the idle end until the rotor and cone come in contact, centering the shaft within the bearing housing. Install the bearings same as on drive end.

When the bearing is fully seated on the idle end install the lockwasher and locknut and tighten with a spanner wrench. Align notch of locknut with tab on lockwasher after tightening locknut, and bend tab into notch.

ASSEMBLE BEARINGS IN HOUSINGS (Sizes SV-2523 to SV-5372):

Timken Bearings are to be installed as a set. Do not interchange any bearings parts with other bearings. If installed as a set, it is not possible to accidentally pre-load and damage the bearings.



Push the rotor and shaft toward the drive end until the cone comes firmly in contact with the rotor; this will center the shaft within the bearing housing. The drive end bearing cap (18) should not be bolted to the bearing housing at this time. Heat the two bearing tapered cones (not the cup or spacer) to bearing in sequence on the shaft. The tapered cone of the bearing must seat firmly against the shaft shoulder. While the bearing outer cone is still hot install the lockwasher (46) and locknut (45) and tighten with a spanner wrench. When the bearing cools, check bearing roller-cup clearance at the top of the bearing; clearance should be a maximum of .004", preferably .0015" to .002".

Push the rotor and shaft toward the idle end until the rotor and cone come in contact, centering the shaft within the bearing housing. Install the bearings same as on drive end.

COMPLETE THE ASSEMBLY OF BEARINGS (All Pump Sizes)

Finish bearing assembly by installing the drive end outer bearing cap (21) with gasket (59) and lip seal (21) in place. The inner bearing cap (18) with gasket (58) and lip seal (22) in place, will be assembled to housing at this same time.

Finish assembly of the idle end bearing arrangement. Check rotor free end travel (see Tables 4A-4B) and center the rotor as described on pages 19-20. Lock rotor in place. GREASE BEARINGS!

INSTALL LIPS SEALS IN PACKING AREA

Apply light coat of petroleum jelly to outside diameter and sealing lip of lip seals. Install one split lip seal (34) with lip facing toward center of pump. Install second lip seal with lip also facing toward inside of pump. Install retainer (31). Install seals on other end of pump. GREASE SEALS!

MODELS SV-808, 1211, 1414, 1818, 2023

INDEX NO.	PART DESCRIPTION	QUAN PER	PART NO.	INDEX NO.	PART DESCRIPTION	QUAN PER	PART NO.
11	CONE, I.E. (NOTES 1 & 2)	1	11 - 00-				
12	CONE, D.E. (NOTES 1 & 2)	1	12 - 00-	66	THRU-BOLT, BEARING CAP	6	66 -000-26
13	ROTOR	1	13 -000-	67	CAP SCREW, BEARING CAP	6	67 -000-26
13-1	KEY, ROTOR	1	13 -100-26	68-1	CAP SCREW, BEARING HOUSING	6	68 -100-26
14-8	HEAD I.E.	1	14 -800-	68-2	CAP SCREW, BEARING CARTRIDGE	6	68 -200-26
14-9	HEAD D.E.	1	15 -900-	69-1	STUD, BODY		69 -100-26
15	BODY	1	15 -000-	69-2	NUT, BODY STUD		69 -200-26
16-4	BEARING CARTRIDGE (SV-2023)	2	165-400-16	69-7	JACKSCREW, HEAD	4	69 -700-26
17	BEARING CAP, INNER I.E.	1	17 -000-16	74	CAP SCREW, CONE		74 -000-
18	BEARING CAP, INNER D.E.	1	18 -000-16	75	CAP SCREW, RETAINER		75 -000-26
19	BEARING CAP, OUTER I.E.	1	19 -000-11	77	NUT, BEARING CAP THRU-BOLT	6	77 -000-26
21	BEARING CAP, OUTER D.E.	1	21 -000-11	78-1	TAPER DOWEL, HEAD	4	78 -100-
22	LIP SEAL, BEARING INNER	2	22 -000-34	81-1	FITTING, GREASE	4	81 -100-26
23	LIP SEAL, BEARING OUTER	2	23 -000-34	81-2	PLUG, DRAIN	2	81 -200-26
24	O-RING, INNER BRG. CAP, I.E.	1	24 -000-33	81-3	PLUG, SPRAY NOZZLE		81 -300-26
31	RETAINER		31 -000-26	81-4	PLUG, GAUGE		81 -400-26
32	GLAND ASSEMBLY (NOTE 3)		32 -000-11	81-5	PLUG, INSPECTION	2	81 -500-26
33	LANTERN RING		33 -000-	81-6	PLUG, WATER INLET		81 -600-26
34	LIP SEAL, PACKING AREA		34 -00 -34	81-7	PLUG, HEAD DRAIN	4	81 -700-26
35	PACKING		35 -00 -	81-8	PLUG, RELIEF		81 -800-26
36	STEADY BEARING		36 -000-	81-9	SPM TAP		81 -900-26
37	SLINGER AND SPRING	2	37 -000-32	83-1	VALVE, CHECK		83 -100-26
41	SHAFT, SINGLE EXTENDED		41 -000-26	83-2	NIPPLE, CLOSE		83 -200-26
42	SHAFT, DOUBLE EXTENDED		42 -000-26	83-3	ELL, 90°		83 -300-26
43	KEY, SHAFT		43 -000-26	83-4	NIPPLE, TOE POE		83 -400-26
44-1	BEARING, I.E.	1	44 -100-10	83-5	TUBING		83 -500-35
44-2	BEARING, D.E.	1	44 -200-10	83-6	CLAMP, HOSE		83 -600-22
45	LOCKNUT, BEARING	1	45 -000-26	83-7	ORIFICE UNION		83 -700-26
46	LOCKWASHER, BEARING	1	46 -000-26	83-8	LINE STRAINER		83 -800-19
51	GASKET, CONE I.E. (NOTE 4)	1	51 -010-51	83-9	NIPPLE, ORIFICE UNION		83 -900-
52	GASKET, CONE D.E.	1	52 -010-51	86	BASE, INSTALLATION, METAL		86 -000-26
53	GASKET, BODY		53 -010-51	91	SPRAY NOZZLE		91 -000-
57	SHIM		57 -000-56	96	SCREEN, TEMPORARY INLET	2	96 -00 -22
58	GASKET, INNER CAP D.E.	1	58 -010-51	97	FLANGE, WOOD SHIPPING		97 -000-46
59	GASKET, OUTER CAP D.E.	1	59 -010-51				

NOTE 1: WHEN ORDERING, CONE PORT SIZE (1, 2, OR 3) MUST BE INCLUDED IN THE PART NO. A PUMP MODEL SV-1818-2 IDLE END CONE OF CAST IRON WITH A NO. 2 PORT WOULD BE DESIGNATED: 111-200-11.

NOTE 2: "I.E." - IDLE END ; "D.E." - DRIVE END.

NOTE 3: GLAND ASSEMBLY 32, LANTERN RING 33, AND PACKING 35 ARE ALTERNATIVES TO STANDARD PARTS RETAINER 31, LIP SEALS 34 AND STEADY BEARING 36.

NOTE 4: ALL GASKETS ARE .010" PAPER AS STANDARD.

Rev: 5-21-92 JV

MATERIALS OF CONSTRUCTION

METALS
- 09 410 Stainless
- 11 Cast Iron, A48, CL30
- 12 Cast Iron, A48, CL40
- 14 Ductile Iron
- 15 Nodular Iron
- 16 Cast Steel
- 17 Niresist (22% NI)
- 18 3% Nickel
- 19 Bronze (660)
- 20 316L Stainless
- 21 303 Stainless
- 22 304 Stainless
- 23 316 Stainless
- 24 317 Stainless
- 25 Ferralium 255
- 26 Structural Steel
- 27 8-1/2% Nickel
- 28 Hastelloy
- 29 329 Stainless

ELASTOMERS AND PLASTICS
- 31 Rubber
- 32 Neoprene
- 33 Buna N
- 34 Viton
- 35 PVC
- 36 Plasticized PVC
- 37 UHMW Polyethylene
- 38 Urethane
- 39 Teflon
- 41 Tygon
- 42 Nylon
- 43 Micarta (Orkote-TLM)
- 44 Fiberglass
- 46 Wood

SHIMS AND GASKETS
- 51 Paper
- 52 Asbestos
- 53 Vellumoid
- 54 Cork
- 55 Brass
- 56 Steel
- 57 Plastic

COATINGS
- 61 Urethane on A48,CL30 Iron
- 62 Urethane on A48,CL40 Iron
- 63 Urethane on Ductile Iron
- 65 Teflon
- 66 Epoxy
- 67 Ciba-Geigy
- 69 Stellite
- 70 Metco
- 71 Hard Chrome
- 72 Hastelloy
- 73 Nickel
- 74 Ceramic
- 77 Paint

PACKING MATERIALS
- 81 Graphite - Asbestos
- 82 Teflon - Asbestos
- 83 Graphite - Cotton
- 84 Teflon - Cotton
- 85 Teflon
- 86 Garfite
- 87 Rains-Flo
- 88 88 RM-943

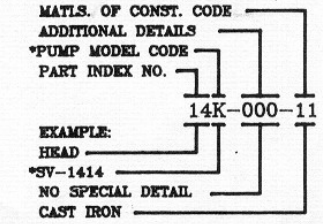
BEARINGS
- 10 Bearing

THIS PARTS LIST REFERS TO DRAWING NO. SV-686PL-1 AND PERTAINS TO PUMP MODELS SV-808, 1211, 1414, 1818, and 2023.

COMPLETE PUMP MODEL DESIGNATION FOR A SPECIFIC PUMP WILL INCLUDE CONE PORT SIZES. EXAMPLE: MODEL SV-1818-2 WILL HAVE NO. 2 CONE PORTS.

WHEN ORDERING PARTS SPECIFY PUMP SIZE, SERIAL NUMBER, PART DESCRIPTION, COMPLETE EIGHT DIGIT PART NUMBER (NOT INDEX NO.) AND MATERIAL OF CONSTRUCTION.

EIGHT DIGIT PART NUMBER, EXAMPLE:



*PUMP MODEL AND EQUIVALENT CODE NO.

SV-808	- E	SV-1818	- 1
SV-1211	- F	SV-2023	- 5
SV-1414	- K		

PARTS LIST SV-686-1

MODELS SV-2523, 3028, 3633, 4440, 5348, 5372			
INDEX NO.	PART DESCRIPTION	QUAN PER	PART NO.
11	CONE, I.E. (NOTES 1 & 2)	1	11 -00 -
12	CONE, D.E. (NOTES 1 & 2)	1	12 -00 -
13	ROTOR	1	13 -000-
14	HEAD	2	14 -00 -
15	BODY	1	15 -00 -
16	BEARING HOUSING	2	16 -000-16
17	BEARING CAP, INNER I.E.	1	17 -000-16
18	BEARING CAP, INNER D.E.	1	18 -000-16
19	BEARING CAP, OUTER I.E.	1	19 -000-11
21	BEARING CAP, OUTER D.E.	1	21 -000-11
22	LIP SEAL, BEARING INNER	2	22 -000-34
23	LIP SEAL, BEARING OUTER	2	23 -000-34
24	O-RING, INNER BRG. CAP, I.E.	1	24 -000-33
31	RETAINER		31 -000-26
32	GLAND ASSEMBLY (NOTE 3)		32 -000-11
33	LANTERN RING		33 -000-
34	LIP SEAL, PACKING AREA		34 -00 -34
35	PACKING		35 -00 -
36	STEADY BEARING		36 -000-
37	SLINGER AND SPRING	2	37 -000-32
41	SHAFT, SINGLE EXTENDED		41 -000-26
42	SHAFT, DOUBLE EXTENDED		42 -000-26
43	KEY, SHAFT		43 -000-26
44	BEARING	2	44 -000-91
45	LOCKNUT, BEARING	2	45 -000-26
46	LOCKWASHER, BEARING	2	46 -000-26
51	GASKET, CONE I.E. (NOTE 4)	1	51 -010-51
52	GASKET, CONE D.E.	1	52 -010-51
53	GASKET, BODY		53 -010-51
54	GASKET, STUD		54 -010-51
55	GASKET, SHIM		55 -010-51
56	GASKET, DISCHARGE FLANGE		56 - -
57	SHIM		57 -000-56
58	GASKET, INNER CAP D.E.	1	58 -010-51
59	GASKET, OUTER CAP D.E.	1	59 -010-51
66	THRU-BOLT, BEARING CAP	6	66 -000-26
67	CAP SCREW, BEARING CAP	6	67 -000-26
68	CAP SCREW, BEARING HOUSING	12	68 -000-26
69-1	STUD, BODY		69 -100-26
69-2	STUD NUT, BODY		69 -200-26
69-3	STUD, HEAD	6	69 -300-26
69-4	STUD NUT, HEAD	6	69 -400-26
69-5	STUD, CONE	4	69 -500-26
69-6	NUT, CONE STUD	4	69 -600-26
69-7	JACKSCREW, HEAD	4	69 -700-26
74	CAP SCREW, CONE		74 -000-
75	CAP SCREW, RETAINER		75 -000-26
76	CAP SCREW, TRADEMARK COVER		76 -000-26
77	NUT, BEARING CAP THRU-BOLT	6	77 -000-26
78-1	TAPER DOWEL, HEAD	4	78 -100-
78-2	TAPER DOWEL, BEARING HOUSING	4	78 -200-
79	BUSHING, ECCENTRIC	4	79 -00 -
81-1	FITTING, GREASE	4	81 -100-26
81-2	PLUG, DRAIN	2	81 -200-26
81-3	PLUG, SPRAY NOZZLE		81 -300-26
81-4	PLUG, GAUGE		81 -400-26
81-5	PLUG, INSPECTION	2	81 -500-26
81-6	PLUG, WATER INLET		81 -600-26
81-7	PLUG, HEAD DRAIN	4	81 -700-26
81-8	PLUG, RELIEF		81 -800-26
81-9	SPM TAP		81 -900-26
83-1	VALVE, CHECK		83 -100-26
83-2	NIPPLE, CLOSE		83 -200-26
83-3	ELL, 90°		83 -300-26
83-4	NIPPLE, TOE POE		83 -400-26
83-5	TUBING		83 -500-35
83-6	CLAMPS, HOSE		83 -600-22
83-7	ORIFICE UNION		83 -700-26
83-8	LINE STRAINER		83 -800-19
83-9	NIPPLE, ORIFICE UNION		83 -900-
86	BASE, INSTALLATION, METAL		86 -000-26
91	SPRAY NOZZLE		91 -000-
96	SCREEN, TEMPORARY INLET	2	96 -00 -22
97	FLANGE, WOOD SHIPPING		97 -000-46
98	FLANGE, BLIND OUTLET, METAL		98 -000-
99	COVER, TRADEMARK		99 -000-11

PARTS LIST FOR SVG GEAR PUMP ADDITIONS			
INDEX NO.	PART DESCRIPTION	QUAN PER	PART NO.
14	HEAD	1	14 -000-
26	PINION	1	26 -000-26
26-1	KEY, PINION	1	26 -100-26
26-2	SPINNER, OIL	1	26 -200-26
27	GEAR	1	27 -000-16
27-1	PLATE, GEAR RETAINING	1	27 -100-11
28	BRACKET, PINION	1	28 -000-11
29	CASING, GEAR	1	29 -000-44
29-1	PLATE, GEAR CASING	1	29 -100-26
29-2	COVER, INSPECTION	1	29 -200-26
29-3	COVER, INSPECTION/FILLER	1	29 -300-26
39	SLEEVE, SHAFT	1	39 -000-26
41	SHAFT, SINGLE EXTENDED	1	41 -000-26
42	SHAFT, DOUBLE EXTENDED	1	42 -000-26
43	KEY, SHAFT	1	43 -000-26
47	BEARING, PINION	2	47 -000-92
47-1	RING, BEARING RETAINING	2	47 -100-26
47-2	COVER, BEARING	1	47 -200-11
48	CAP, BEARING	1	48 -000-11
48-1	PLATE, BEARING CAP	1	48 -100-26
50-1	GASKET, HEAD	1	50 -100-54
50-2	GASKET, HEAD	1	50 -200-54
50-3	GASKET, GEAR CASING	1	50 -300-54
50-4	GASKET, INSPECTION COVER	2	50 -400-54
50-5	GASKET, BEARING CAP	1	50 -500-54
64-1	STUD, HEAD	2	64 -100-26
64-2	STUD, HEAD	22	64 -200-26
64-3	BOLT, GEAR CASING PLATE	16	64 -300-26
64-4	BOLT, GEAR CASING PLATE	6	64 -400-26
64-5	NUT, HEAD STUD	22	64 -500-26
64-6	CAP SCREW, SPINNER	3	64 -600-26
64-7	CAP SCREW, BEARING COVER	4	64 -700-26
64-8	CAP SCREW, PINION BRACKET	8	64 -800-26
64-9	PIN, PINION BRACKET	1	64 -900-26
65-1	CAP SCREW, RETAINING PLATE	3	65 -100-26
65-2	NUT, GEAR CASING	8	65 -200-26
65-3	NUT, GEAR CASING PLATE	8	65 -300-26
65-4	CAP SCREW, INSPECTION COVER	24	65 -400-26
65-5	CAP SCREW, BEARING CAP	8	65 -500-26
65-6	CAP SCREW, BEARING CAP PLATE	6	65 -600-26
92-1	CAP, FILLER/STRAINER	1	92 -100-26
92-2	PLUG, DRAIN	2	92 -200-26

NOTE 1: WHEN ORDERING, CONE PORT SIZE (1, 2, OR 3) MUST BE INCLUDED IN THE PART NO. A PUMP MODEL SV-4440-2 IDLE END CONE OF CAST IRON WITH A NO. 2 PORT WOULD BE DESIGNATED: 116-002-11.

NOTE 2: "I.E." - IDLE END; "D.E." - DRIVE END.

NOTE 3: GLAND ASSEMBLY 32, LANTERN RING 33, AND PACKING 35 ARE ALTERNATIVES TO STANDARD PARTS RETAINER 31, LIP SEALS 34 AND STEADY BEARING 36.

NOTE 4: ALL GASKETS ARE .010" PAPER AS STANDARD.

MATERIALS OF CONSTRUCTION

METALS
- 11 Cast Iron, Cl. 30
- 12 Cast Iron, Cl. 40
- 14 Ductile Iron
- 15 Nodular Iron
- 16 Cast Steel
- 17 Ni-resist 2A
- 18 3% Nickel
- 19 Bronze
- 21 303 Stainless
- 22 304 Stainless
- 23 316 Stainless
- 24 317 Stainless
- 26 Structural Steel
- 27 8-1/2% Nickel
- 29 329 Stainless

ELASTOMERS AND PLASTICS
- 31 Rubber
- 32 Neoprene
- 33 Buna N
- 34 Viton
- 35 PVC
- 36 Plasticized PVC
- 37 UHMW Polyethylene
- 38 Urethane
- 39 Teflon
- 41 Tygon
- 42 Nylon
- 43 Micarta
- 44 Fiberglass
- 46 Wood

SHIMS AND GASKETS
- 51 Paper
- 52 Asbestos
- 53 Vellumoid
- 54 Cork
- 55 Brass
- 56 Steel

COATINGS
- 61 Urethane on Cl. 30 Iron
- 62 Urethane on Cl. 40 Iron
- 63 Urethane on Ductile Iron
- 65 Teflon
- 66 Epoxy
- 69 Stellite
- 70 Metco
- 71 Hard Chrome
- 72 Hastelloy
- 73 Nickel
- 74 Ceramic
- 77 Paint

PACKING MATERIALS
- 81 Graphite - Asbestos
- 82 Teflon - Asbestos
- 83 Graphite - Cotton
- 84 Teflon - Cotton
- 85 Teflon
- 86 Garflte
- 87 Rains-Flo

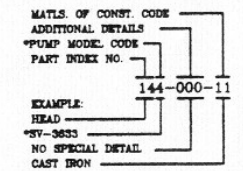
BEARINGS
- 91 Roller, Tapered
- 92 Roller, Spherical
- 93 Ball

THIS PARTS LIST REFERS TO DRAWING NO. SV-686PL-4 AND PERTAINS TO PUMP MODELS SV-2523, 3028 3633, 4440, 5348 and 5372.

COMPLETE PUMP MODEL DESIGNATION FOR A SPECIFIC PUMP WILL INCLUDE CONE PORT SIZES. EXAMPLE: MODEL SV-4440-2 WILL HAVE NO. 2 CONE PORTS.

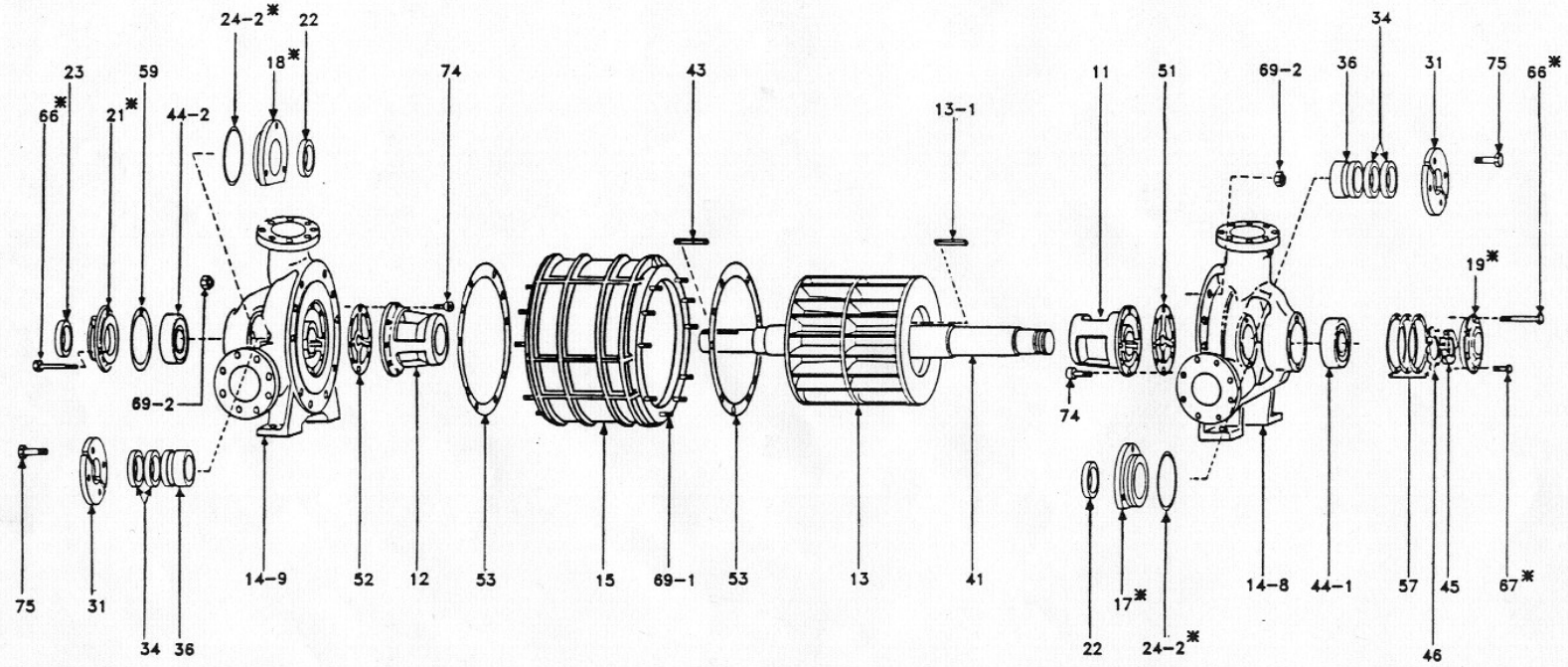
WHEN ORDERING PARTS SPECIFY PUMP SIZE, SERIAL NUMBER, PART DESCRIPTION, COMPLETE EIGHT DIGIT PART NUMBER (NOT INDEX NO.) AND MATERIAL OF CONSTRUCTION.

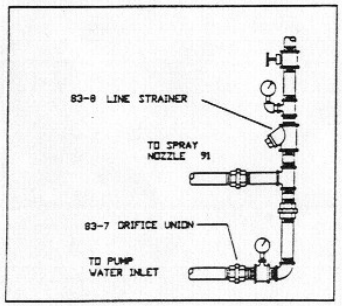
EIGHT DIGIT PART NUMBER EXAMPLE:

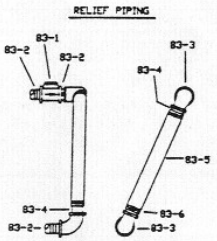


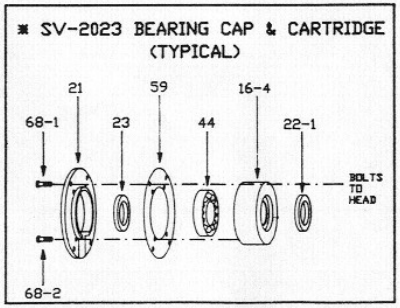
*PUMP MODEL AND EQUIVALENT CODE NO.

SV-2523 - 2	SV-4440 - 6
SV-3028 - 3	SV-5348 - 9
SV-3633 - 4	SV-5372 - 7

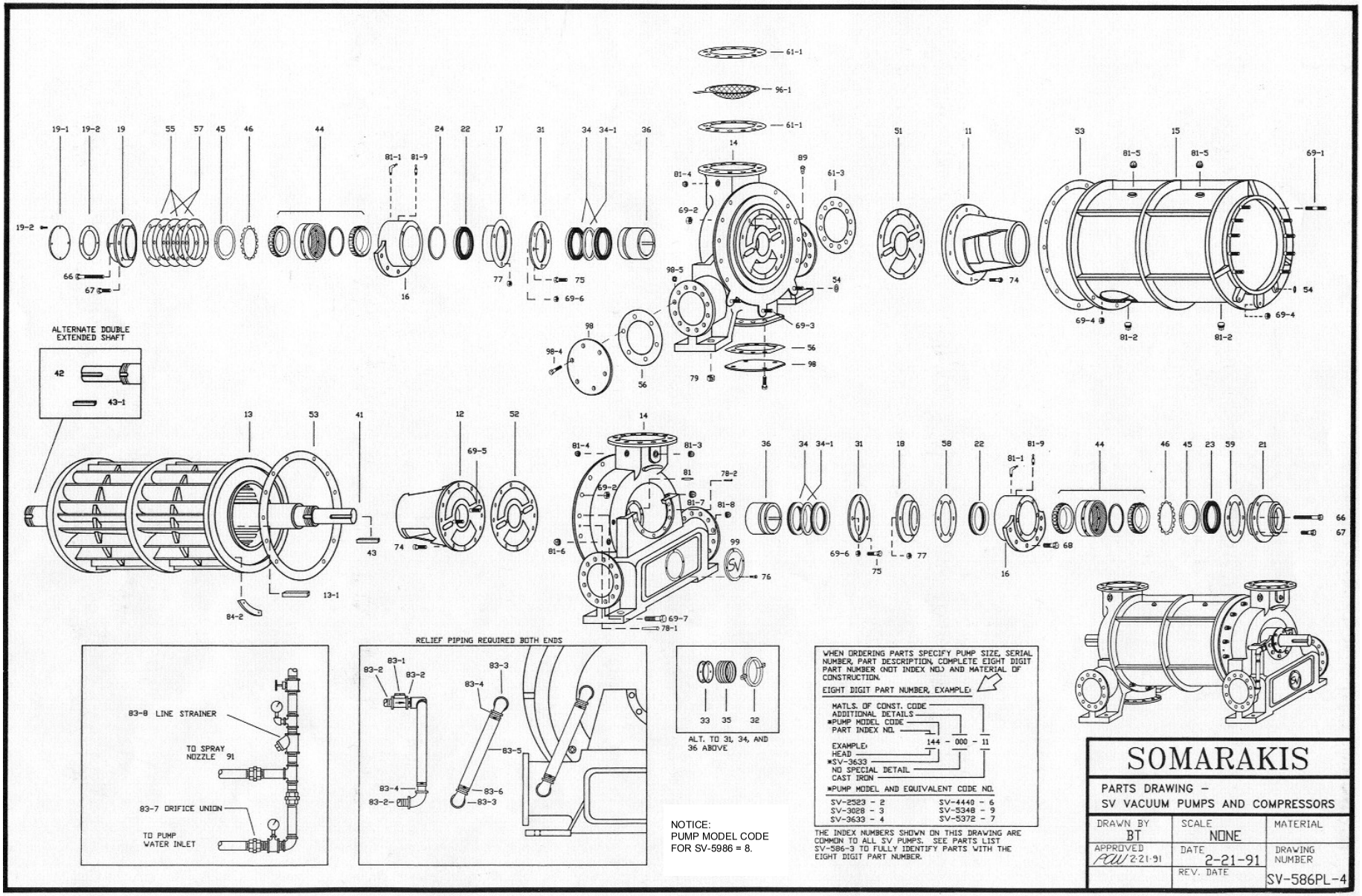




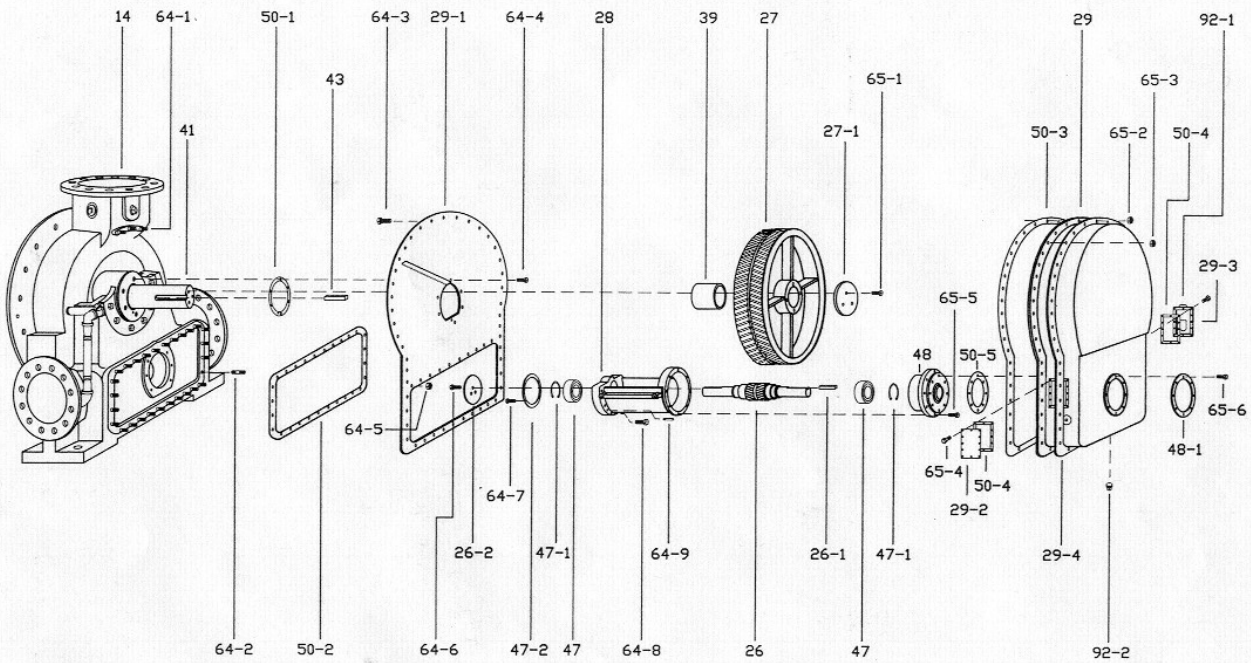


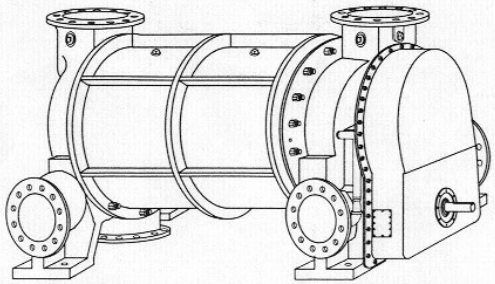


TOLERANCES (EXCEPT AS NOTED)	SOMARAKIS		
DECIMAL ±	SV-808, 1211, 1414, 1818, 2023 PARTS DRAWING		
FRACTIONAL ±	DRAWN BY JTV	SCALE	MATERIAL
ANGULAR ±	APPROVED 8-26-91	DATE 8-21-91	DRAWING NUMBER SV-686-1
		REVISED 5-21-92 JV	


ALTERNATE DOUBLE EXTENDED SHAFT
RELIEF PIPING REQUIRED BOTH ENDS
83-8 LINE STRAINER
TO SPRAY NOZZLE 91
83-7 ORIFICE UNION
TO PUMP WATER INLET
ALT. TO 31, 34, AND 36 ABOVE
NOTICE:
PUMP MODEL CODE
FOR SV-5986 = 8.
WHEN ORDERING PARTS SPECIFY PUMP SIZE, SERIAL NUMBER, PART DESCRIPTION, COMPLETE EIGHT DIGIT PART NUMBER (NOT INDEX NO.) AND MATERIAL OF CONSTRUCTION.
EIGHT DIGIT PART NUMBER, EXAMPLE:
MATLS. OF CONST. CODE
ADDITIONAL DETAILS
*PUMP MODEL CODE
PART INDEX NO.
144 - 000 - 11
EXAMPLE:
HEAD
*SV-3633
NO SPECIAL DETAIL
CAST IRON
*PUMP MODEL AND EQUIVALENT CODE NO.
SV-2523 - 2
SV-3028 - 3
SV-3633 - 4
SV-4440 - 6
SV-5348 - 9
SV-5372 - 7
THE INDEX NUMBERS SHOWN ON THIS DRAWING ARE COMMON TO ALL SV PUMPS. SEE PARTS LIST SV-586-3 TO FULLY IDENTIFY PARTS WITH THE EIGHT DIGIT PART NUMBER.
SOMARAKIS
PARTS DRAWING –
SV VACUUM PUMPS AND COMPRESSORS
DRAWN BY BT
SCALE NONE
MATERIAL
APPROVED AW 2-21-91
DATE 2-21-91
REV. DATE
DRAWING NUMBER SV-586PL-4

PARTS LIST SVG-586-1 FOR PARTS DRAWING SVG-586PL-1			
INDEX NO.	PART DESCRIPTION	QTY PER	PART NUMBER
14	HEAD	1	14 -000-
26	PINION	1	26 -000-26
26-1	KEY, PINION	1	26 -100-26
26-2	SPINNER, OIL	1	26 -200-26
27	GEAR	1	27 -000-16
27-1	PLATE, GEAR RETAINING	1	27 -100-11
28	BRACKET, PINION	1	28 -000-11
29	CASING, GEAR	1	29 -000-44
29-1	PLATE, GEAR CASING	1	29 -100-26
29-2	COVER, INSPECTION	1	29 -200-26
29-3	COVER, INSPECTION/FILLER	1	29 -300-26
39	SLEEVE, SHAFT	1	39 -000-26
41	SHAFT, SINGLE EXTENDED	1	41 -000-26
42	SHAFT, DOUBLE EXTENDED	1	42 -000-26
43	KEY, SHAFT	1	43 -000-26
47	BEARING, PINION	2	47 -000-92
47-1	RING, BEARING RETAINING	2	47 -100-26
47-2	COVER, BEARING	1	47 -200-11
48	CAP, BEARING	1	48 -000-11
48-1	PLATE, BEARING CAP	1	48 -100-26
50-1	GASKET, HEAD	1	50 -100-54
50-2	GASKET, HEAD	1	50 -200-54
50-3	GASKET, GEAR CASING	1	50 -300-54
50-4	GASKET, INSPECTION COVER	2	50 -400-54
50-5	GASKET, BEARING CAP	1	50 -500-54
64-1	STUD, HEAD	2	64 -100-26
64-2	STUD, HEAD	22	64 -200-26
64-3	BOLT, GEAR CASING PLATE	16	64 -300-26
64-4	BOLT, GEAR CASING PLATE	6	64 -400-26
64-5	NUT, HEAD STUD	22	64 -500-26
64-6	CAP SCREW, SPINNER	3	64 -600-26
64-7	CAP SCREW, BEARING COVER	4	64 -700-26
64-8	CAP SCREW, PINION BRACKET	8	64 -800-26
64-9	PIN, PINION BRACKET	1	64 -900-26
65-1	CAP SCREW, RETAINING PLATE	3	65 -100-26
65-2	NUT, GEAR CASING	8	65 -200-26
65-3	NUT, GEAR CASING PLATE	8	65 -300-26
65-4	CAP SCREW, INSPECTION COVER	24	65 -400-26
65-5	CAP SCREW, BEARING CAP	8	65 -500-26
65-6	CAP SCREW, BEARING CAP PLATE	8	65 -600-26
92-1	CAP, FILLER/STRAINER	1	92 -100-26
92-2	PLUG, DRAIN	2	92 -200-26





SOMARAKIS		
PARTS DRAWING FOR SVG GEAR PUMP PARTS LIST SVG-586-1		
DRAWN BY BT	SCALE NONE	MATERIAL
APPROVED	DATE 3-1-91	DRAWING NUMBER
	REV. DATE	SVG-586PL-1

SOMARAKIS™

- Quality Built Equipment -

SOMARAKIS, INC.
POST OFFICE BOX 430
552 HENDRICKSON DRIVE
KALAMA, WA 98624 – USA

TELEPHONE: 360.574.6722
FAX: 360.673.3978
WEBSITE: WWW.SOMARAKIS.COM
E-MAIL: INFO@SOMARAKIS.COM