

LM-4450 SERIES METERING PUMP

PARTS AND INSTRUCTION MANUAL



Price \$10.00

CDS-JOHN BLUE COMPANY

DIVISION OF ADVANCED SYSTEMS TECHNOLOGY, INC.

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SAFETY PRECAUTIONS

- **Equipment should be operated only by responsible people.**
- **A careful operator is the best insurance against an accident.**
- **Fill system with WATER first and check output.**
- **Check all valves, fittings, hose clamps, etc. for wear / leaks before admitting process fluid to the system.**
- **Replace hoses when worn, cracked, or if leaking.**

WARNING: USE OF THIS PRODUCT FOR ANY PURPOSES OTHER THAN ITS ORIGINAL INTENT, ABUSE OF THE PRODUCT, AND/OR MODIFICATION TO THE ORIGINAL PRODUCT IS STRICTLY PROHIBITED BY CDS-JOHN BLUE COMPANY. CDS-JOHN BLUE COMPANY RESERVES THE RIGHT TO DENY WARRANTY OR LIABILITY CLAIMS IN ANY/ALL SITUATIONS INVOLVING MISUSE, ABUSE OR MODIFICATION.

THE ORIGINAL INTENT OF THIS PRODUCT DOES NOT INCLUDE USE WHERE THE MAXIMUM ALLOWED SPEED, PRESSURE, OR TEMPERATURE IS EXCEEDED, AND IT DOES NOT INCLUDE APPLICATIONS UTILIZING FLUIDS THAT ARE NOT COMPATIBLE WITH THE PRODUCT'S COMPONENT MATERIALS. DO NOT USE THIS PRODUCT WITH FLAMMABLE OR COMBUSTIBLE FLUIDS SUCH AS GASOLINE, KEROSENE, DIESEL, ETC..., AND DO NOT USE IN EXPLOSIVE ATMOSPHERE. FAILURE TO FOLLOW THIS NOTICE MAY RESULT IN SERIOUS INJURY AND/OR PROPERTY DAMAGE AND WILL VOID THE PRODUCT WARRANTY. IF IN DOUBT ABOUT YOUR APPLICATION, CONTACT YOUR STOCKING DEALER OR THE CDS-JOHN BLUE TECHNICAL STAFF AT 1-800-253-2583.

Important Message Owners / Operators of Pumps Equipped with Lever Actuated Throw Out Clutches

When using a pump operated by a lever actuated throw out clutch, the rope must be routed by use of eyelet pulleys such that the rope can not become entangled with or come in contact with any moving parts of the tractor or the applicator such as PTO shafts, tractor tires, ground drive units, etc. If eyelet pulleys are not found packed in with the pump, please contact your selling agent or CDS-John Blue Company (1-800-253-2583) immediately before any operations are undertaken.

Verification must be made prior to any operation that the rope is clear of any moving parts while not only driving straight but when making turns either right or left. Verification must be made prior to any operation that the properly routed rope contains no loops, which might become entangled with any part of the equipment or operator.

At no time should the rope be attached to any clothing worn by or to any body parts of the operator such as hands, arms, legs, etc.

We fully understand these are normal precautions owners / operators should take prior to and while operating equipment. However, we wish to remind you that failure to comply with all safety regulations regarding instructing operators in the use of moving equipment and actual operation of the equipment may lead to serious injury and possible death.

To The Owner

This manual has been prepared and illustrated to assist you in the maintenance of your CDS-JOHN BLUE PUMP. Enter your serial number and the date of the purchase in the space provided below for future reference in service information or for ordering parts. Because our engineering department is constantly improving products, we reserve the right to make design and specification changes without notice.

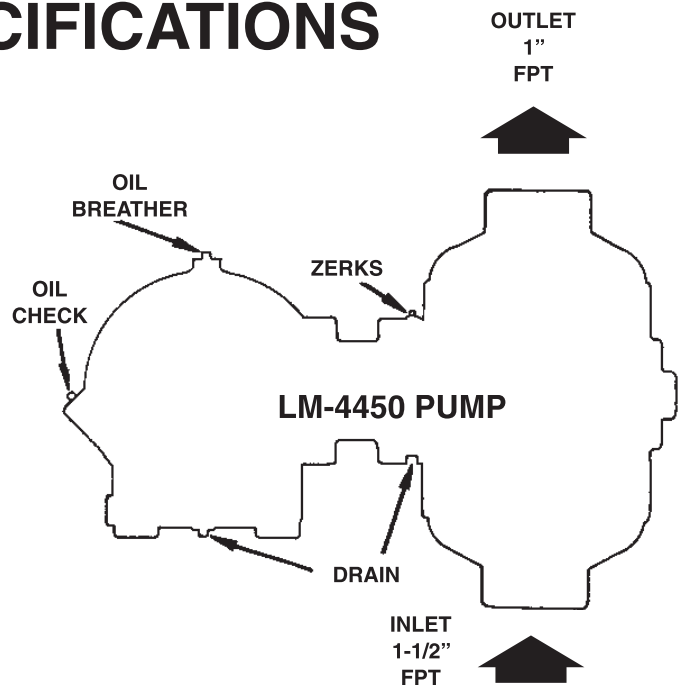
Model Number: _____ Serial Number: _____ Purchase Date: _____

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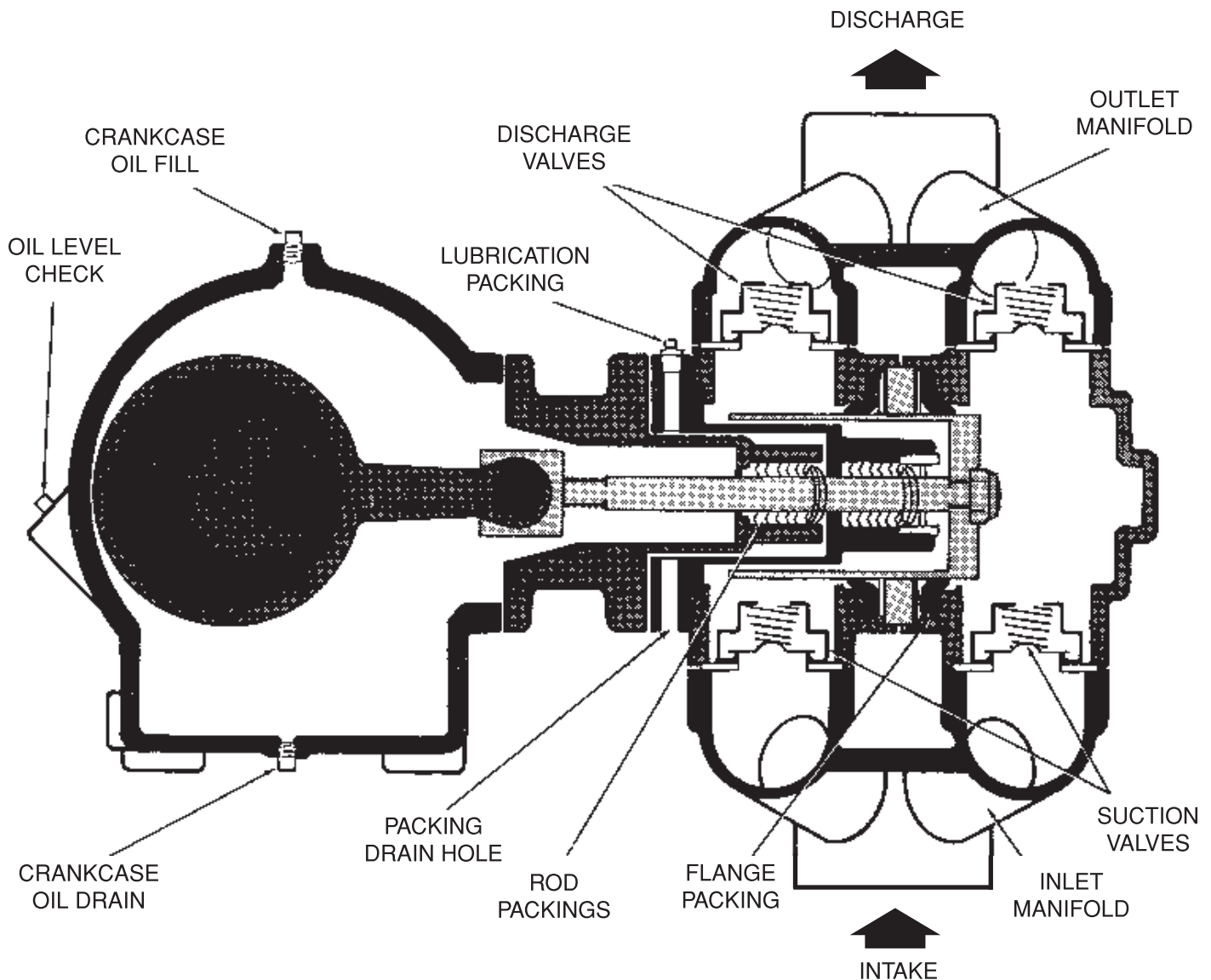
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PUMP SPECIFICATIONS

DISPLACEMENT:	Max 34.2 Gal. Per Minute
	Max .076 Gal. Per Revolution
OPERATING PRESSURE:	Max 120 lb. Min-10 lb. psi
OPERATING SPEED:	Max 450 RPM
ROTATION:	Clockwise or Counter clockwise
REQUIRED HP: (Theoretical)	3.0
PLUMBING:	1 1/2" FPT (female pipe thread) Inlet
	1" FPT Outlet
DRIVE:	No. 50 Roller Chain
PHYSICAL DIMENSIONS:	17"L X 14"W X 9"H
WEIGHT:	98 lbs.
	LUBRICATION
CRANKCASE:	SAE 90 Gear Oil
	24 oz. Capacity
ZERKS:	Multipurpose Grease



PUMP CROSS-SECTION



INTRODUCTION

The **LM-4450** series pump is a **single piston**, variable stroke metering pump. It is specifically designed to accurately meter liquid fertilizer solutions. The pump's cast iron construction has stainless steel working parts with components subject to abrasion are hard chrome plated.

The **LM-4450** functions as a positive displacement, chain driven metering device which operates in direct relation to a ground drive. The output rate can be set (covered under PUMP SETTING) before application begins and the GPA (gallons per acre) application will be accurate regardless of the varying speeds of the drive mechanism.

In many pumping systems the flow rate is controlled by the orifice size. The **LM-4450** pump is designed to function accurately within normal pressure parameters of orifice selection. The only function of an orifice with the CDS-John Blue pump system is to spread material properly over an area. The pump controls the metering of the solution.

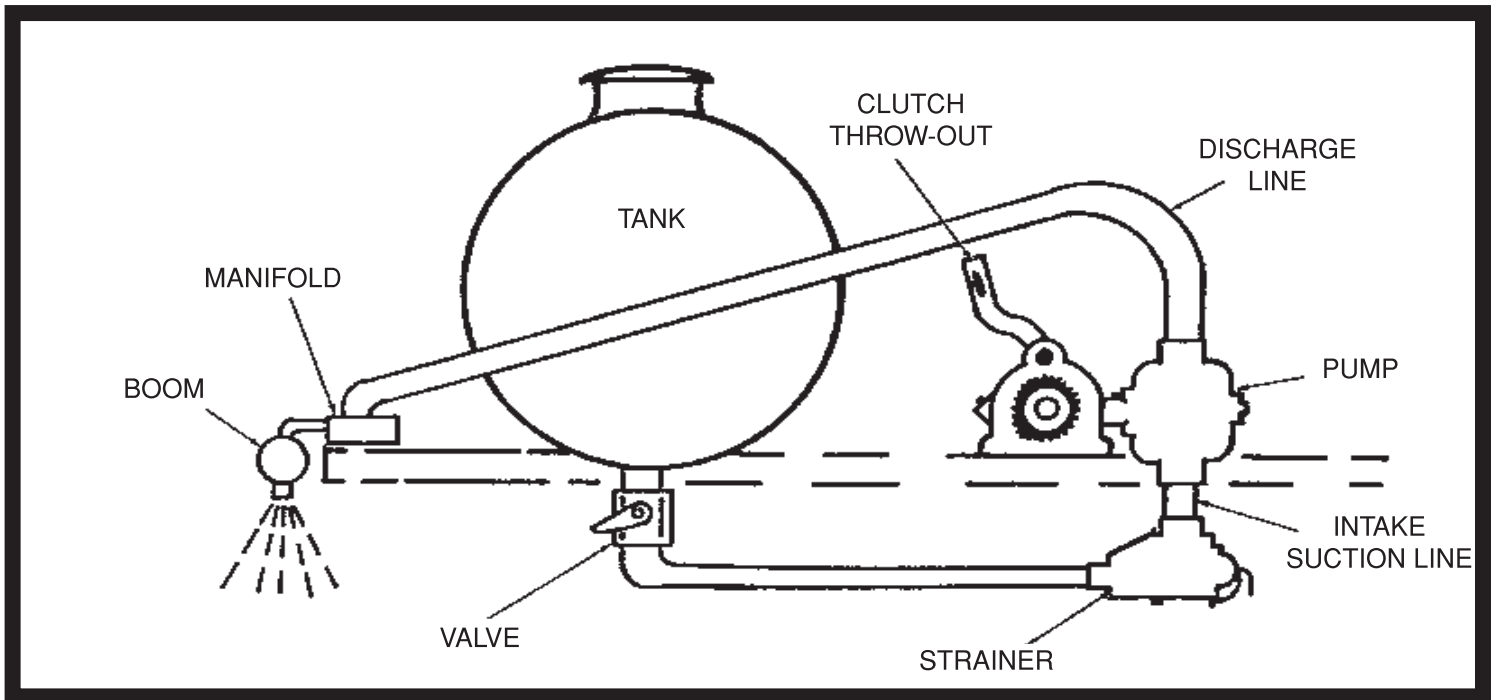
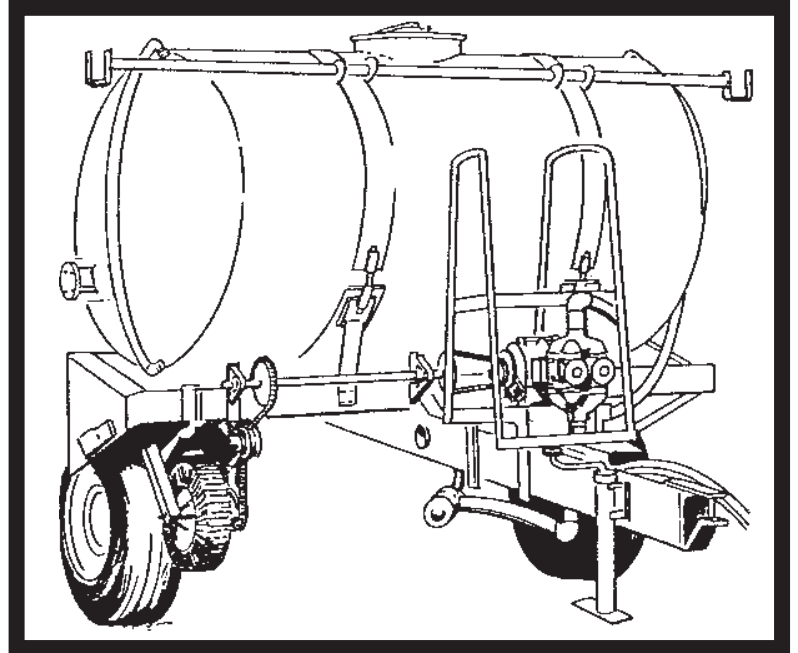
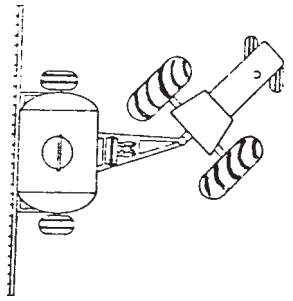
INSTALLATION

The pump should be mounted on a rigid base in a horizontal position in a location which allows drive chain alignment.

Rubber washers are supplied with your pump. Install these between the pump and mounting surface.

Install the chain idler to run on the slack side of the drive chain.

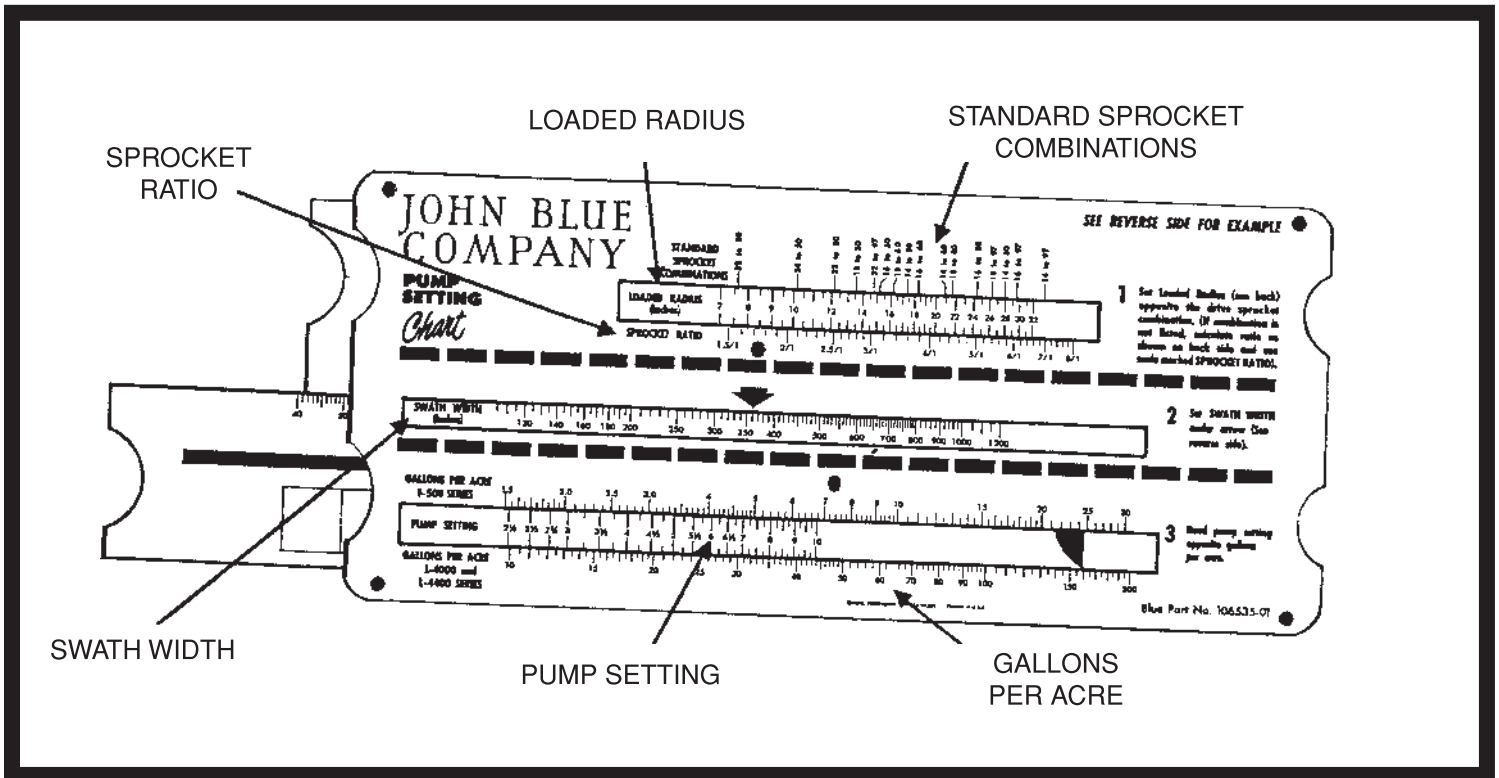
NOTE: Take precaution to ensure that the rear tractor wheel will clear the pump during sharp turns.



PLUMBING ACCESSIBILITY

- Before mounting the pump on any chassis, give special attention to the plumbing arrangement.
- The strainer is to be installed on the suction side of pump.
- We recommend that the pump be mounted below or level with the tank fluid.
- Install the solution intake line as straight as possible without restrictions from kinks or extremely sharp turns. This will ensure even flow during maximum pump output.
- Install drive chain with proper tightness and alignment.
- Check clutch throw-out yoke clearance to avoid premature wear.

PUMP SETTING



Pump output is determined by the drive sprocket ratio and the stroke length. Slide Chart 106534-91 is used to determine the scale setting required to adjust the stroke length for a desired output.

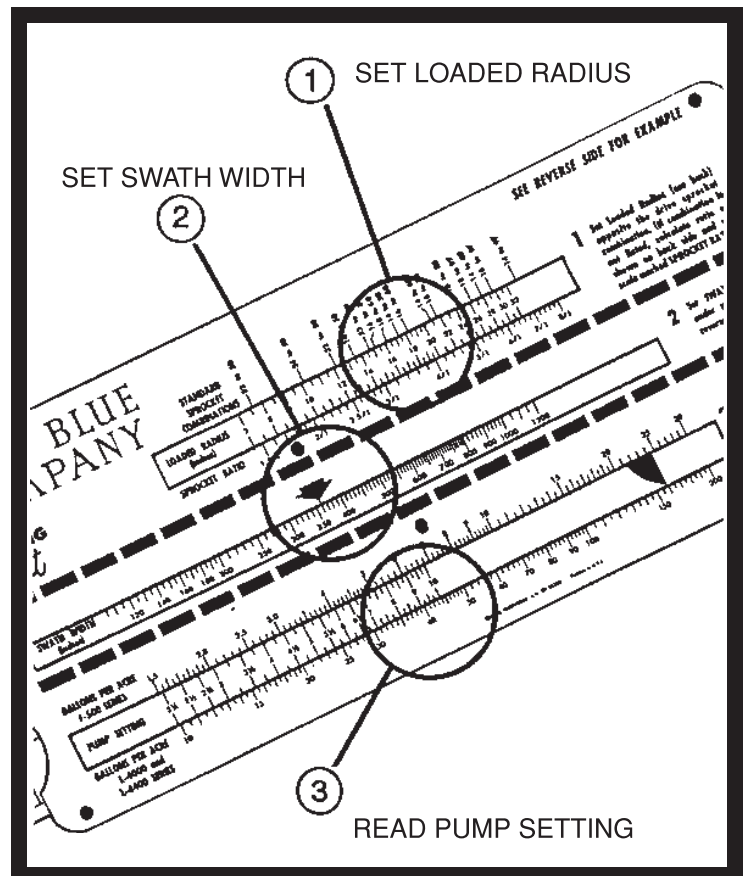
EXAMPLE:

STANDARD SPROCKET COMBINATIONS (As used on CDS-John Blue equipment)

An applicator is equipped with 11L x 15" tires, a 60 tooth drive sprocket, a 16 tooth pump sprocket, and it is desired to apply 36 gallons per acre on a 360" swath. The following steps will determine correct pump setting:

1. Set Loaded Radius of tire (13.5") under the sprocket combination of 16 to 60 in the top window.
2. Set the swath width (360") under the arrow in the middle window.
3. Read the pump setting of 6 above 36 gallons per acre on the bottom scale.

The correct pump setting is 6.



DRIVE RATIO

EXAMPLE: Non-Standard Sprocket Combinations

If you are using sprocket combinations other than the standards given on the pump chart, use the following formula to determine the drive ratio:

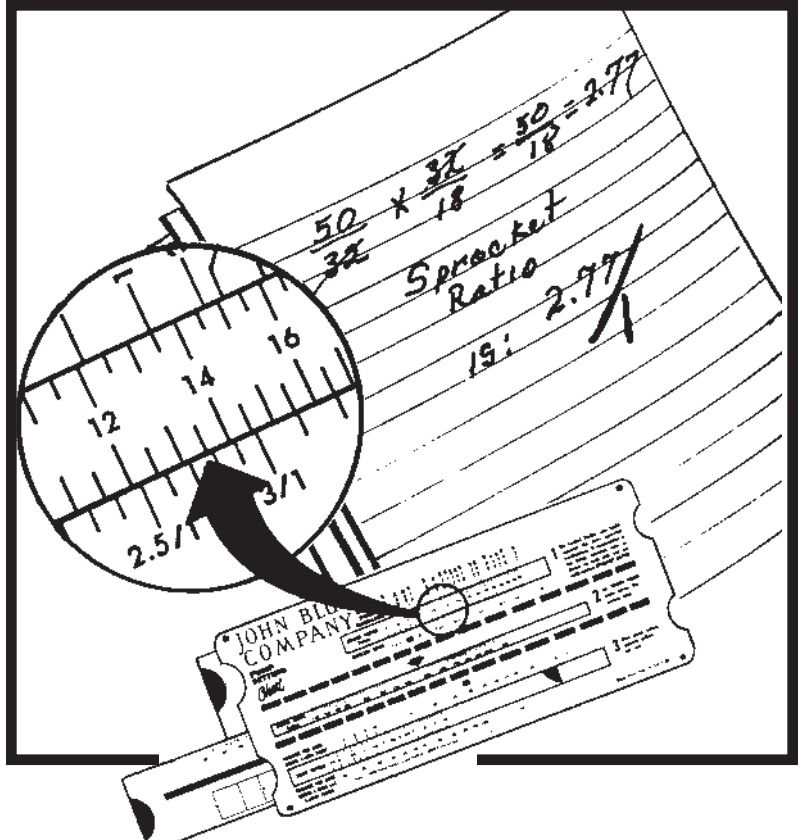
$$\frac{\text{Drive Sprocket}}{\text{Driven Sprocket}} = \text{DRIVE RATIO}$$

$$\frac{50 \text{ T (@ Drive Wheel)}}{32 \text{ T (@ Driven Shaft)}} \times \frac{32 \text{ T (@ Drive Shaft)}}{18 \text{ T (@ Driven Pump)}}$$

The drive ratio is: $\frac{50 \text{ T}}{18 \text{ T}} = 2.77$

The sprocket ratio is shown as the third line of figures on the slide chart and can be used on any drive arrangement.

The 2.77 sprocket ratio is projected across the slide box, it aligns with the 18 to 50 point on the standard sprocket combination. From this point, the calculations are the same for all ground wheel drive units.



LOADED RADIUS

The measurement for the loaded radius must be from the manufacturer of the tire or be measured under loaded conditions.

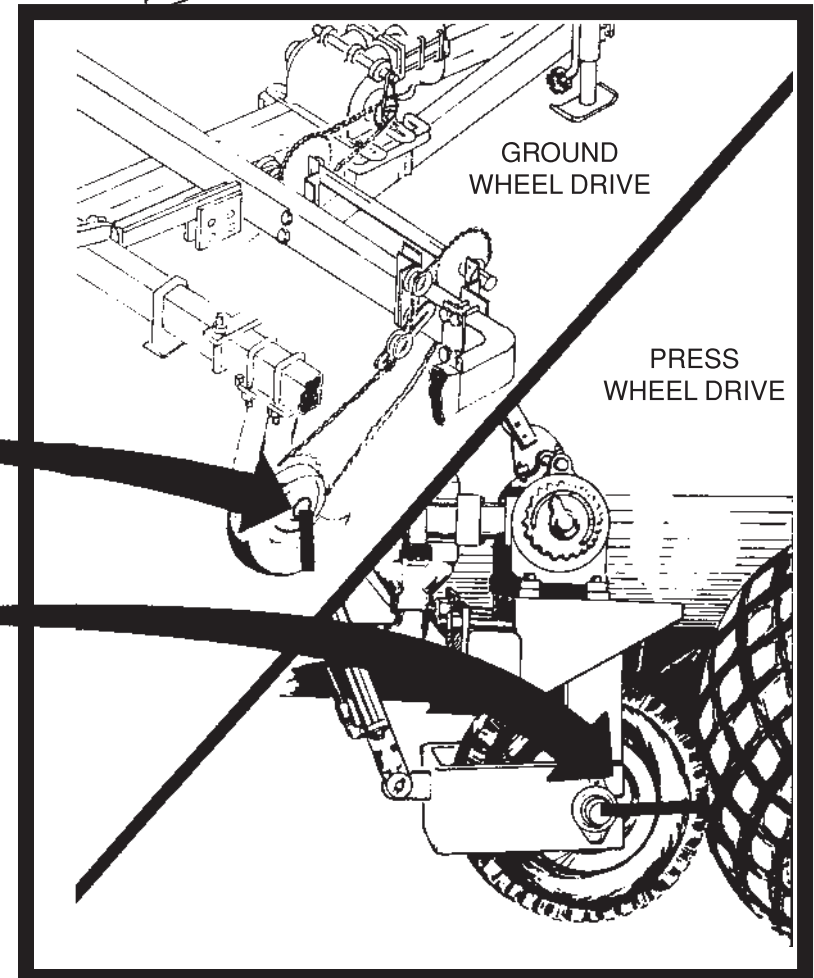
GROUND WHEEL DRIVE ARRANGEMENT

Measure the loaded radius from the center of hub to bottom of tire where it rests on the ground.

PRESS WHEEL DRIVE ARRANGEMENT

Measure the loaded radius from the center of the press wheel shaft to the position where the wheel rests against the tire which carries the unit. The press wheel must be engaged for normal operation to give an accurate reading.

The calculation for sprocket ratio is the same for ground drive or press wheel, once the proper measurement is made for the loaded radius.



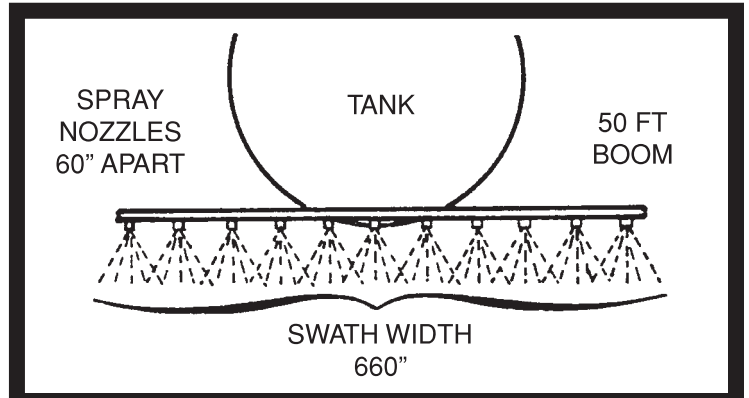
INITIAL START-UP

SWATH WIDTH

To determine the swath width of the applicator, count the number of outlets and multiply times the distance (in inches) between any two outlets, nozzles or shanks.

For example: a boom with 11 nozzles spaced at 60 inches would have a swath width of 660" **NOT** 50 feet.

This assumes that all outlets are equally spaced. If outlets are not evenly spaced, figure the entire length of the boom or tool bar from end nozzle to end nozzle and allow for coverage beyond ends.

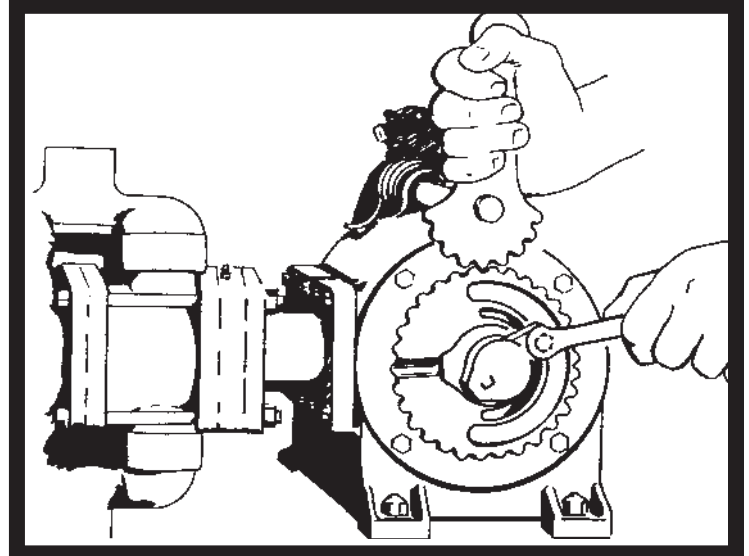


PUMP SETTING

Read the desired pump setting from the bottom scale on the pump setting chart.

Loosen the scale setting nut and rotate the dial disc until the pointer is over the desired setting. The L-3092-AS pump setting wrench will facilitate rotation of the dial disc if it tends to be hard to turn.

Tighten the scale setting nut, being careful not to over-torque it.



INITIAL START-UP OF PUMP

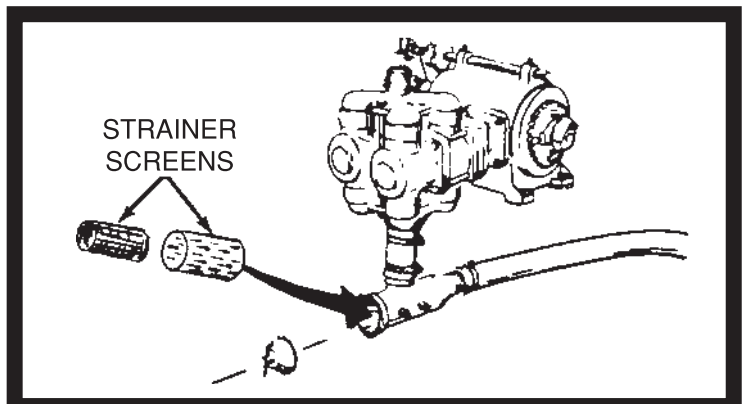
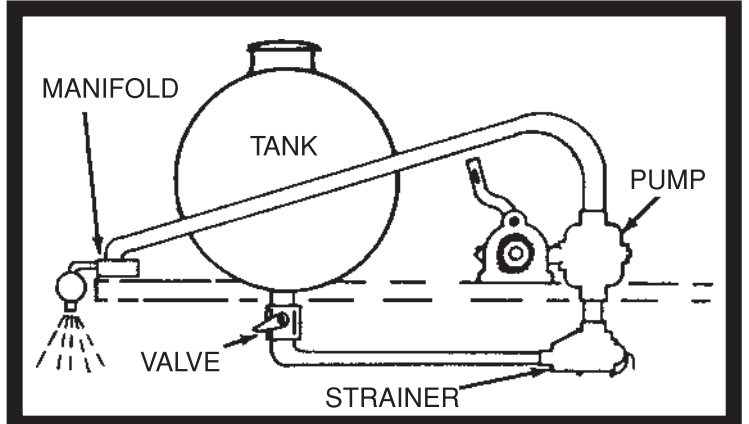
Fill tank one-half full of water to test for leaks in the plumbing system and output of the pump.

Fully open the valve at the tank allowing water to fill the suction line and check for leaks. Your pump is factory set at 10. You will not need to reset it for this test run. If the system includes a flow divider, open this and relieve back pressure or remove hose.

Before installing nozzles or orifices, prime the pump and purge the system of air and foreign material by slowly pulling the applicator 100 to 200 yards.

Turn off the valve at the tank, open strainer and remove screens. Visually check and remove foreign materials. Install proper orifices and set pump.

Pull the machine over known acreage and verify accuracy of application by subtracting amount of water left in tank from amount at the beginning of the test.



PUMP CALIBRATION

If the pump setting scale becomes lost or loose, use the following procedure to calibrate the pump output with dial readings.

Remove the outboard cylinder and replace the bolts and washers to hold the inboard cylinder and stuffing boxes in place.

With the scale attached to the dial disc, loosen the pointer setting nut and move the pointer to 5. Tighten the pointer nut.

Rotate the crankshaft until the exposed piston is as far in the inboard cylinder toward crankcase as it will go.

With a tri-square or straight edge and ruler, measure the distance from the end of the piston to the cylinder flange.

Rotate the crankshaft until the piston is as far out as it will go and measure again to the same place.

The difference in the measurements is the stroke length, which @ 5 should be $15/16$ ". If the distance is less than $15/16$ ", reset the pointer at a higher setting.

If the difference is greater than $15/16$ ", reset the pointer less than 5.

Repeat this procedure as many times as necessary to obtain the $15/16$ " stroke length.

When the $15/16$ " stroke is obtained, tighten the pointer nut, locking it in position.

Loosen the three scale screws and move the setting scale until the 5 is directly under the pointer. Secure the scale in position.

This completes the calibration. Replace the outboard cylinder.

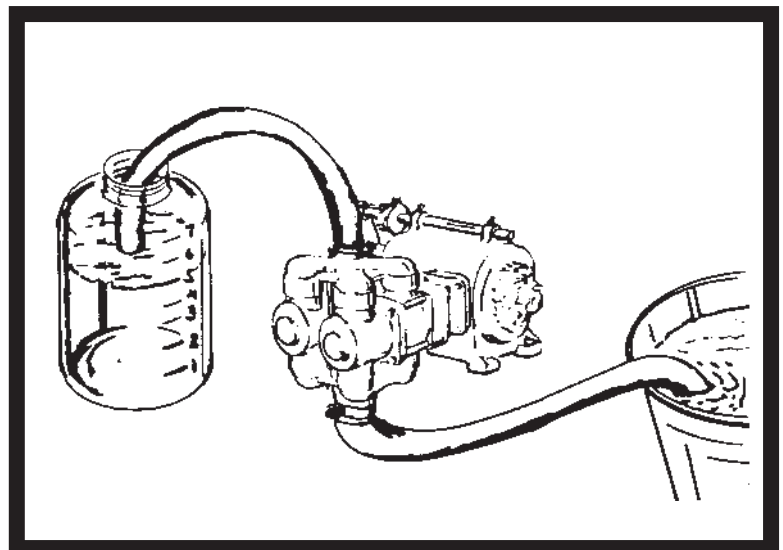
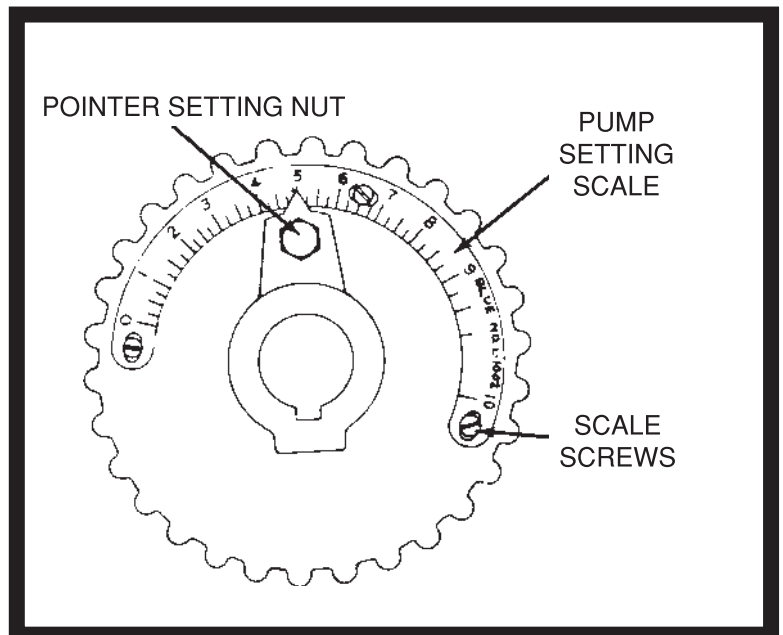
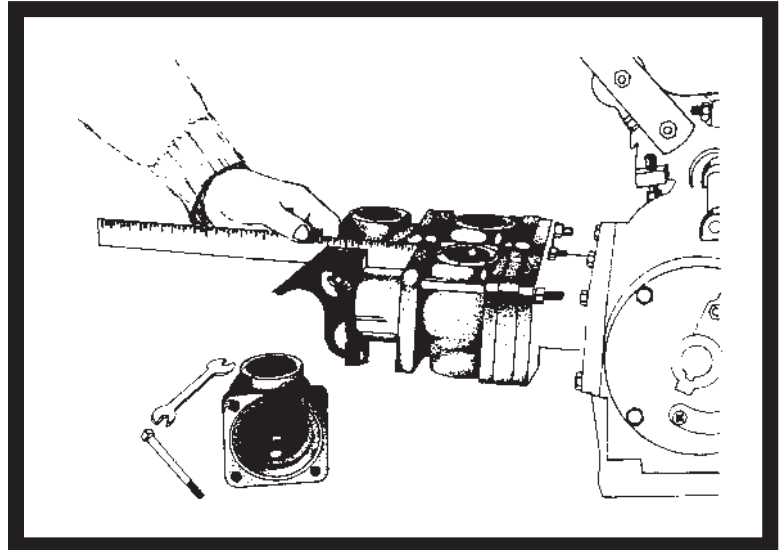
PUMP ACCURACY

Check pump displacement by measuring output of water for a known number of strikes.

Disconnect suction hose and insert in a container of water. Thoroughly flush and prime pump.

Set pump at $8-1/4$ and turn exactly 10 revolutions. The amount of water discharge should be **5 pints**.

This test should be used only to verify pump output, not as a calibration method.



MAINTENANCE

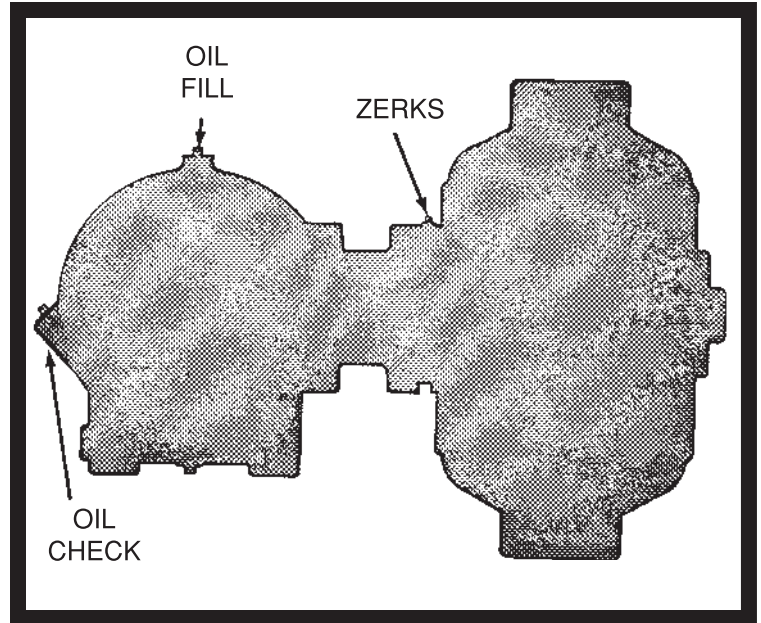
LUBRICATION

Check oil daily and fill crankcase with a good grade 90 weight EP gear oil. Oil level must be visible at oil check on back of crankcase for proper operation of pump.

Lubricate zerks on roller chain sprocket, clutch and throw-out cam daily.

Lubricate daily, the automatically tensioned stuffing boxes between the crankcase and discharge manifold. Fill zerks until packing lubricant seeps out of drain hole in the bottom of the stuffing box.

Visually inspect sprocket, drive chain, clutch and throw-put yoke daily. Lubricate drive chain with oil regularly. Chain alignment and throw-out yoke clearance must remain as originally set.



REVERSING CLUTCH THROW-OUT LEVER

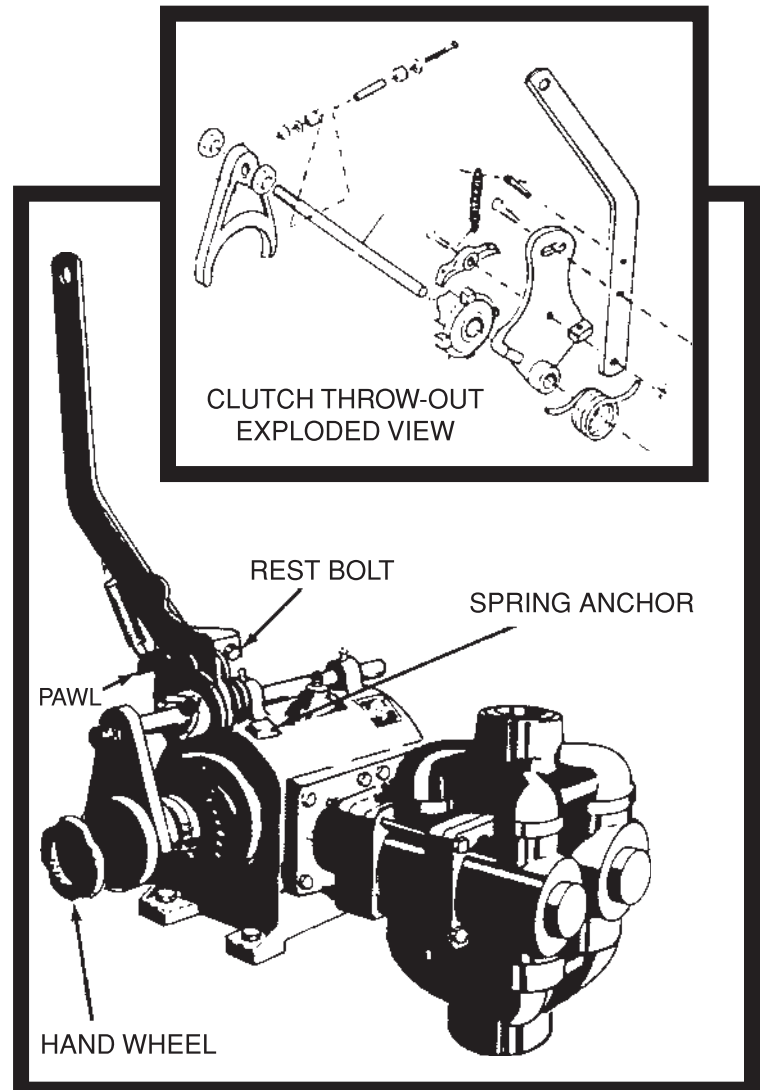
Disengage throw-out lever spring from the pawl. Remove capscrew from handwheel assembly and slide off handwheel and its tension spring.

Relieve tension from the torsion spring and remove clutch throw-out assembly from the throw-out rod.

Remove torsion spring (**114165-01**) and replace with **114164-01** opposite wound spring. (Not supplied with pump, may be ordered).

Relocate the spring anchor block and anchor spring on opposite side of pump. Reassemble clutch and throw-out assembly. Reassemble handwheel assembly.

Reverse direction of the throw-out lever and attach the throw-out lever spring on the opposite end of pawl.



STORAGE

IMPORTANT - KEEP AIR OUT AND KEEP FROM FREEZING

RECOMMENDED STORAGE PROCEDURES

KEEP AIR OUT OF PUMP! This is the only way to prevent corrosion. Even for short periods of storage, the entrance of air into pump, will cause RAPID and SEVERE CORROSION.

OVERNIGHT

Suspension fertilizer must be flushed from the pump for ANY storage period.

FOR CLEAR LIQUIDS:

1. Steady or rising temperatures: leave pump and hoses filled with solution. DO NOT drain nor admit air to the pump.
2. Cooling weather: (solution likely to salt out), fill pump with water and leave filled. DO NOT admit air.

ONE TO TWO WEEKS

ACCEPTABLE: Flush pump thoroughly with 5 to 10 gallons of a solution that will neutralize the liquid last pumped (refer to that manufacturer's instructions). Fill with clean water and DO NOT DRAIN. Keep pump sealed to exclude air. If freezing temperatures are remotely possible, the winter storage procedure (see below) must be used to avoid damage to the pump castings.

PREFERRED: Flush pump as detailed above. IMMEDIATELY fill all passages in pump with straight RV-antifreeze which contains a rust inhibitor. Place PVC plugs in the suction and discharge fittings to keep pump full and exclude air.

WINTER STORAGE

1. Flush pump as detailed above.
2. With pump set on 10, draw in straight RV-antifreeze until the discharge is clean. If system utilizes a flow divider (FD), pump the RV-antifreeze through the FD manifold until it is seen in the discharge lines. Fill pump and plug suction and discharge fittings of pump to retain RV-antifreeze.

TROUBLE CHART

TROUBLE	PROBABLE CAUSE	CORRECTION
Pump hard or impossible to prime	a. Valves fouled or in wrong place b. Air leak in suction line c. Pump set too low d. Packings worn out	Page 12 Page 5 Page 8 Page 13
Low metering	e. See a., b., c., above	Page 12 Page 12 Page 12 Page 8
Over meters	f. Broken valve spring g. Broken discharge valve spring h. Trash under valves i. Improper setting	
Leaks through when stopped	j. See g. and h.	
Fertilizer solution leaking under stuffing box	k. Rod packings worn out	
Pump using excessive oil	l. Oil seals or O'ring worn and leaking	Page 12/14
Pump operates noisily	m. Crankcase components worn excessively	Page 14

PUMPING CHAMBER REBUILD

Pumping chamber rebuilding is an economical way to ensure that your pump will give optimum service for several years. This type of rebuilding is simple and can be done by almost all end users. The **LM-4450** pump repair kit includes all seals and gaskets needed for normal rebuilding and can be ordered by stock number **111953**.

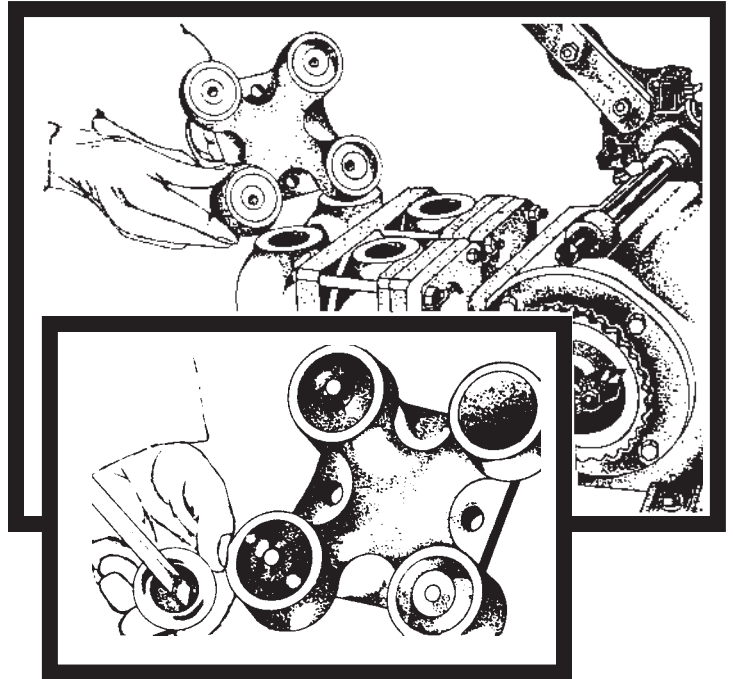
CLEAN AND CHECK VALVES

Remove suction and discharge (top) manifolds and notice that all valve spring cages are turned upward and valves with stronger spring belong in the discharge manifold.

Do not remove valves. Many valves are damaged beyond use be needlessly removing them from the manifold.

Push each valve disc off its seat, check for trash and ensure that the spring reseats each valve disc evenly. Inspect for damage such as cracks or chips in the seating rim of the valve.

Check the condition of the O'rings seals, replace if broken or cracked. An air leak will cause the pump to meter low. Once all valves are checked and O'rings are in position, replace manifolds using care to tighten bolts evenly.



REPLACE PISTON SEAL FLANGE PACKINGS

With both intake and discharge manifolds removed, remove outboard cylinder and remove flange packing from packing recess.

Notice the position of the 2 flange seals and the gaskets as you remove them.

Remove the plastic washer and then remove the other flange packings from the inboard cylinder recess. The flange seal must be pliable and without cracks or nicks to perform properly. Inspect the seals and replace if necessary.

Clean cavities in both the inboard and outboard cylinders.

Inspect each piston for scratches, indentions, or severe abrasion. Discoloration of the plunger can be deceiving. The best way to check is by feel. Indentions around piston may be more detrimental than one running horizontally. Indentions may indicate a need for replacement.

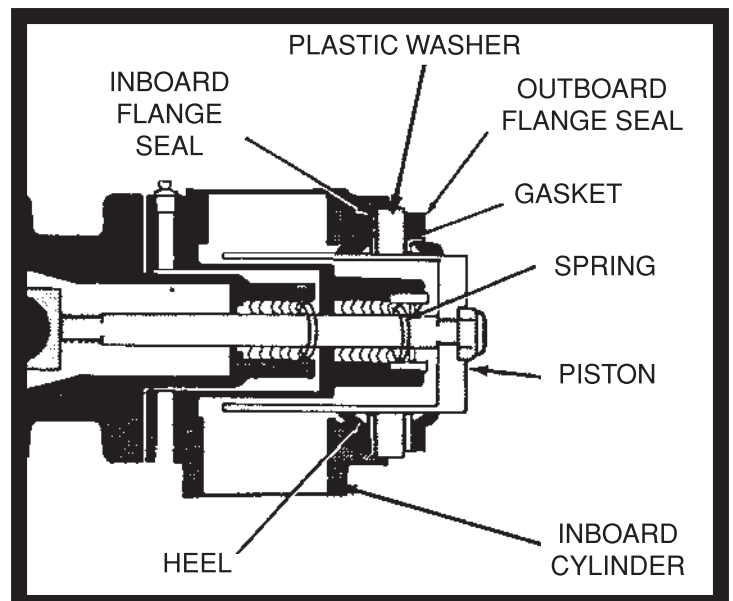
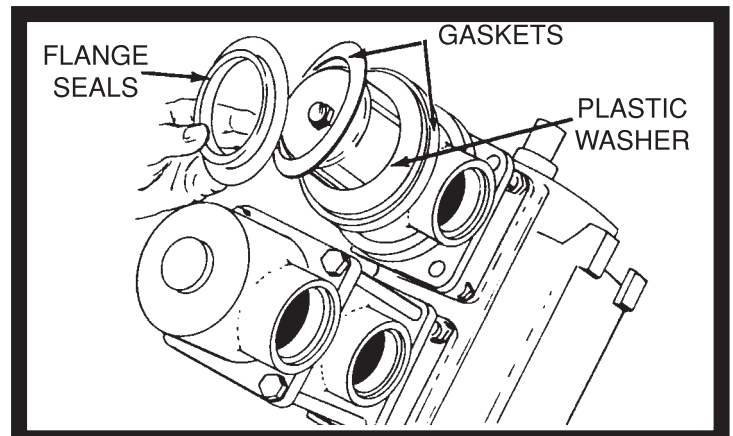
Reinstall the inboard flange seal using one or more gaskets over lip to make packing seat firmly.

These flange seals should have clearance between heel of flange and piston. However, make sure lips seal and fit snugly around piston completely.

Place the plastic washer on the piston and replace outer flange packing as above. Use the same quantity of gaskets as were removed.

Reassemble outboard cylinder ensuring that the inboard and outboard cylinder do not touch without considerable compression. If these parts fit together too easily, disassemble and add more gaskets.

Repeat the process for other cylinder.



REPLACE ROD PACKINGS

The rod packings are 2 sets of self-tightening "vee" rings which seal around the piston rod to prevent contamination of the crankcase. Virtually any leakage of the fertilizer material being pumped, through the drain under stuffing box is an indication that these rod packings need replacement. However, it is not uncommon for oil to drip from this drain.

REPLACE PISTON ROD VEE PACKINGS

With both manifolds removed, remove the outboard and inboard cylinder. Then remove the stainless steel hex nut from piston.

Remove piston by rotating counter-clockwise. If piston is hard to turn, use a belt wrench or pipe wrench over cloth to prevent damage to the piston. Grip the piston as near the end as possible.

Remove the stuffing box and crosshead guide which house the rod and packing set.

Remove the snap-ring from the end of the stuffing box, allowing washer and spring to slip out.

Remove first packing set with a hook or other metal prying instrument.

There is no snap-ring on the second packing set. Remove this in the same manner.

Inspect the rod and bushing at the connecting rod. If bushing replacement is needed, refer to page 16 of this manual for instructions.

Carefully reinstall the crosshead guide and bolt to crankcase.

Lubricate rod and carefully install the first "vee" packing set. (Check drawing for proper orientation of rod "vee" packings.) Install washer and spring.

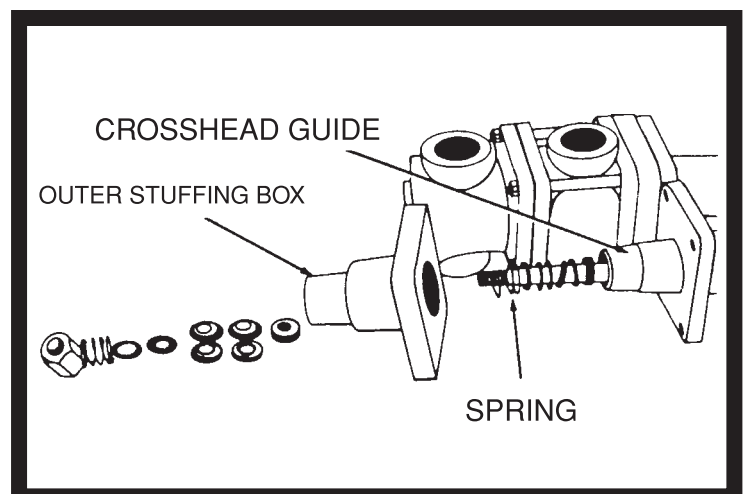
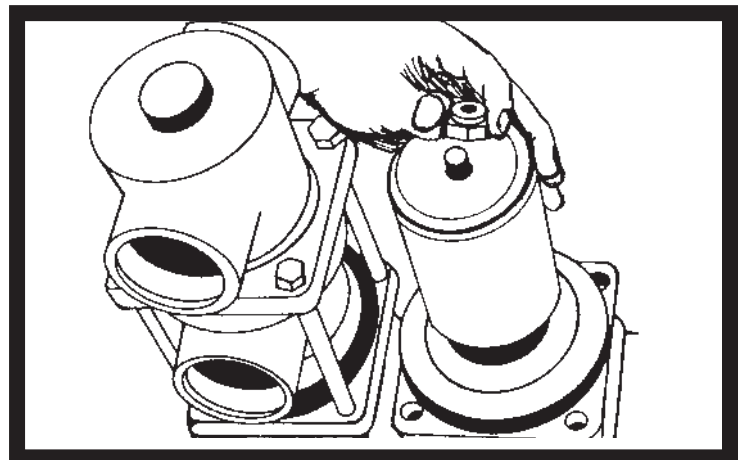
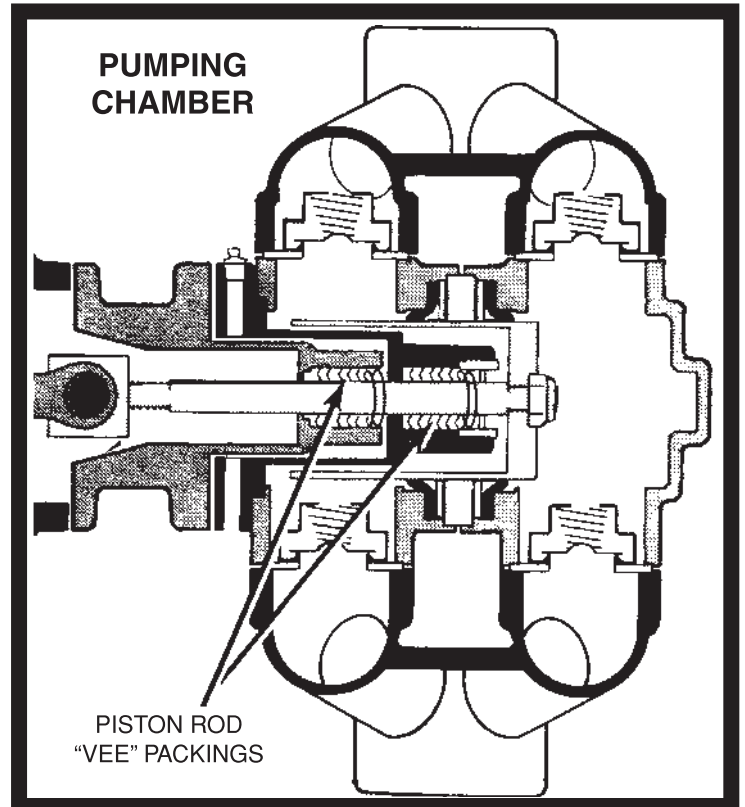
Install second packing set, washer, spring and snap ring retainer in stuffing box. (Check drawing for proper orientation.)

Lubricate piston rod and stuffing box, then slide stuffing box carefully back over rod.

Reassemble piston, inboard and outboard cylinders and manifolds in reverse order. Install bolts.

Lubricate stuffing box until lubricant seeps out of drain hole in the bottom.

Repeat the process for the other cylinder.



CRANKSHAFT OIL SEAL REPLACEMENT

REPLACING OIL SEALS AND CRANKSHAFT O’RING

From the setting end of the crankcase, remove stroke setting arm and stroke setting flange.

Remove cover plate and replace grease seal with new seal from 111953 seal kit.

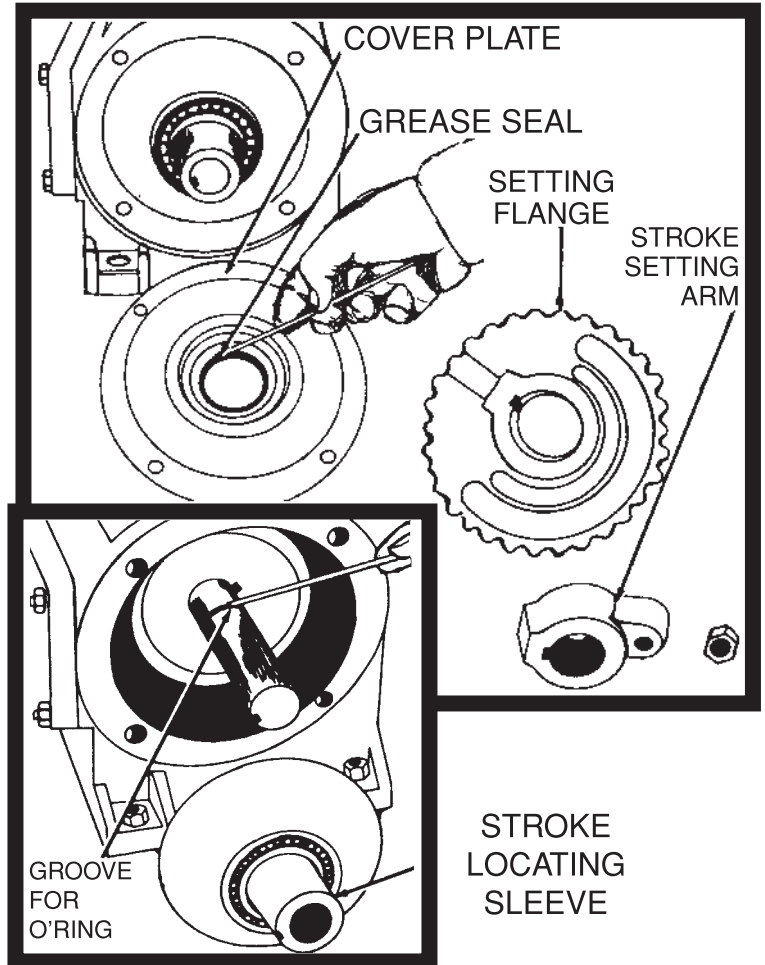
Inspect gasket for breaks and tears on coverplate and replace if necessary.

Remove stroke setting sleeve and inspect for obvious wear or “nicks” which might cause seal failure.

Lubricate O’ring and place it back on the crankshaft.

Replace stroke setting sleeve, making sure that the eccentric pin slips into the groove of sleeve.

Reassemble coverplate, stroke setting flange and stroke setting arm in reverse order of disassembly.



REPLACE SEAL AT THROW-OUT END OF CRANKCASE

Disengage throw-out lever spring from the pawl.

Remove capscrew from handwheel assembly and slide the handwheel and its tension spring off the crankshaft.

Relieve tension from the torsion spring and remove clutch throw-out assembly from the throw-out rod.

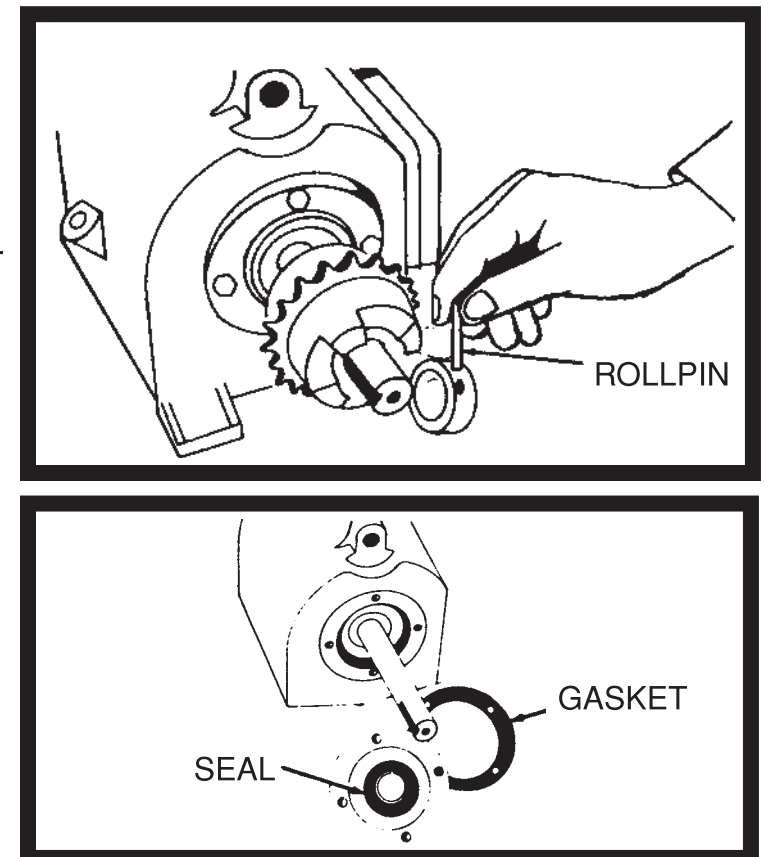
Remove rollpin from collar, and remove collar and sprocket from crankshaft.

Remove bearing housing and seal from crankshaft and replace seal.

Inspect crankshaft for obvious wear or nicks which might cause seal failure.

Inspect bearing housing gasket and replace if it show wear, breaks or tears.

Reassemble in reverse order.



CRANKCASE DISASSEMBLY

Major pump repair requires some in-depth knowledge on working tolerances for internal parts. We recommend that you contact your nearest CDS-John Blue Sales and Service dealer for the best results in major pump repair.

With pumps which have been in service for several years, a history or use is helpful. If a pump has been in use by a farmer for 5 to 10 years without any repair, a slight wear on internal parts will probably give another 5 years of good service before wear would justify other parts replacement.

However, if a pump is being used by a dealer using suspension fertilizers, one more year may result in additional parts failing and replacement of drive line components would be justified.

CRANKCASE DISASSEMBLY

Remove pumping chamber components in the following order;

1. Upper and lower Manifolds
2. Outboard cylinder
3. Cylinder packing
4. Inboard cylinder
5. Piston assembly
6. Rod packing
7. Outboard stuffing box
8. Crosshead guide,
9. Crosshead pin, bushing and rod

Examine sediment in the crankcase. There will always be a small amount of metal wear and "grit" in the oil. Check for metal and/or fertilizer discoloration to the oil.

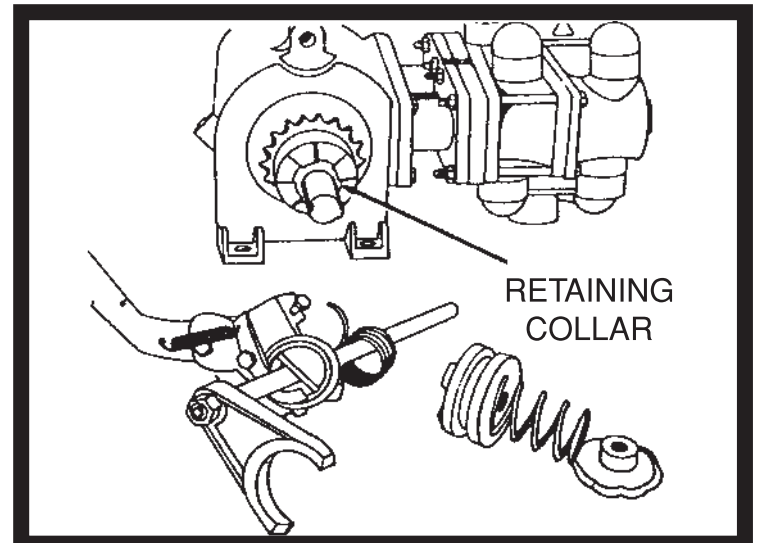
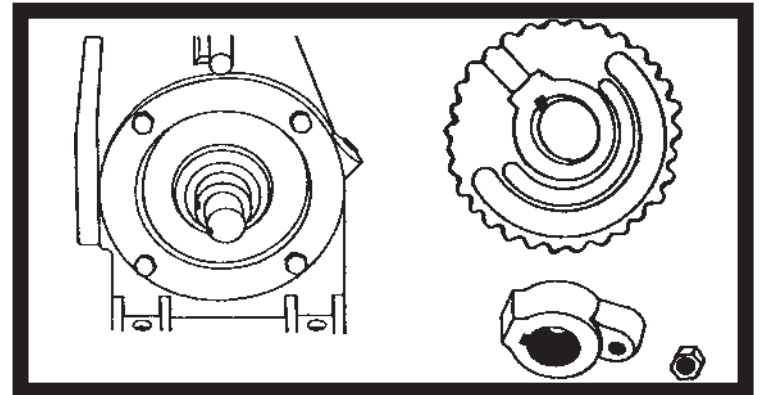
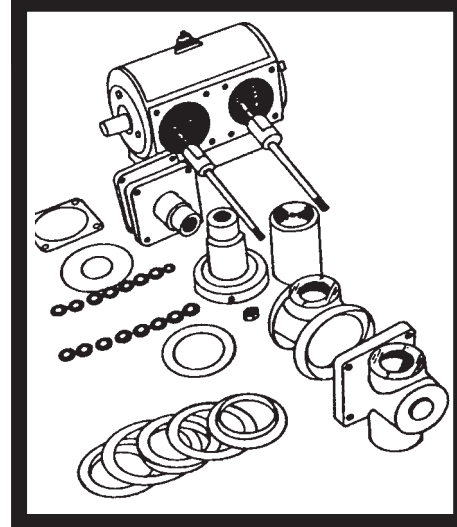
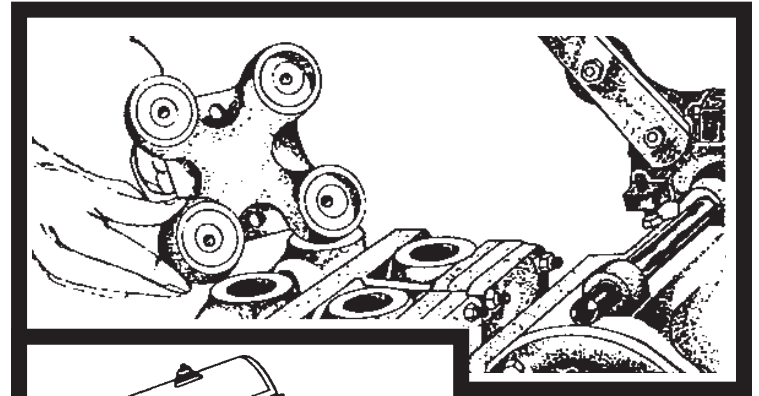
If oil shows fertilizer present, the crankcase should be disassembled and each component examined for rust pitting or deterioration.

Holding the crankcase firmly, take hold of the connecting rod and push and pull. If you feel obvious end play, disassemble all components and examine for wear.

When examining components, give more attention to ones showing "galling" than to ones which are undersize, yet smooth.

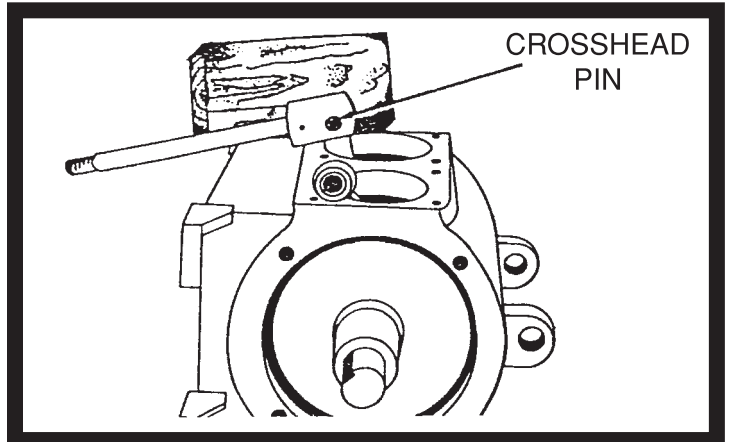
Remove stroke setting arm and flange.

Remove clutch and throw-out assembly in the following order: 3/8" bolts, handwheel and spring, clutch throw-out assembly, including rod.

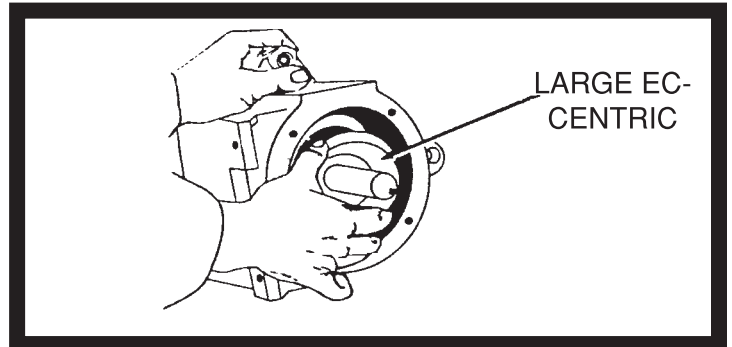


CRANKSHAFT DISASSEMBLY

Supporting the piston rod with a wood block, locate crosshead pin which connects piston rod and connecting rod and carefully drive pin out with a hammer and punch.

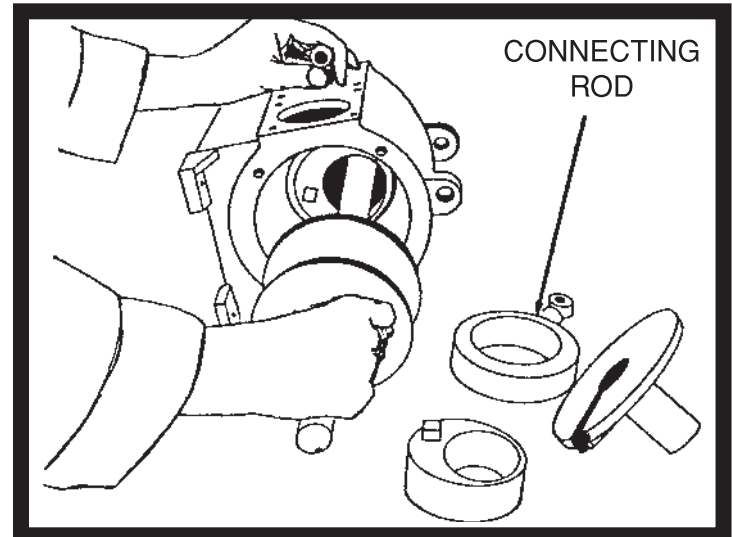


Unbolt end plate from crankcase, slide stroke locating sleeve out and pull large eccentric out of connecting rod and off small eccentric.



Remove connecting rod and pull crankshaft out.

Examine all components, giving more attention to ones showing "galling" than to ones which are undersize, yet smooth.

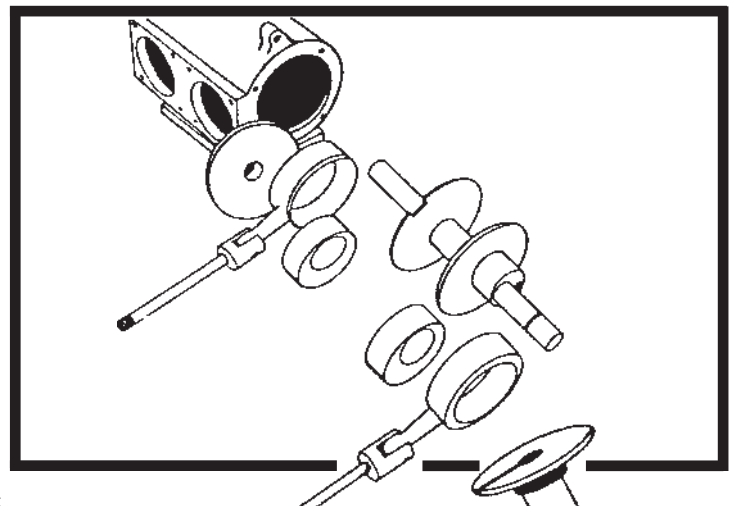


CRANKCASE REASSEMBLY

Reassemble the crankcase in reverse order. When assembling the stroke locating sleeve, oil the O-ring and twist sleeve onto crankshaft to prevent damage to O-ring.

During reassembly, coat all bolts with permatex before installing on crankcase.

IMPORTANT: In reassembly of stuffing boxes, cylinders and manifolds, leave all bolts loose until assembly is complete. Then turn pump over one cycle with the handwheel. If any binding is noted, adjust stuffing boxes until pump will turn freely, then tighten all bolts securely.

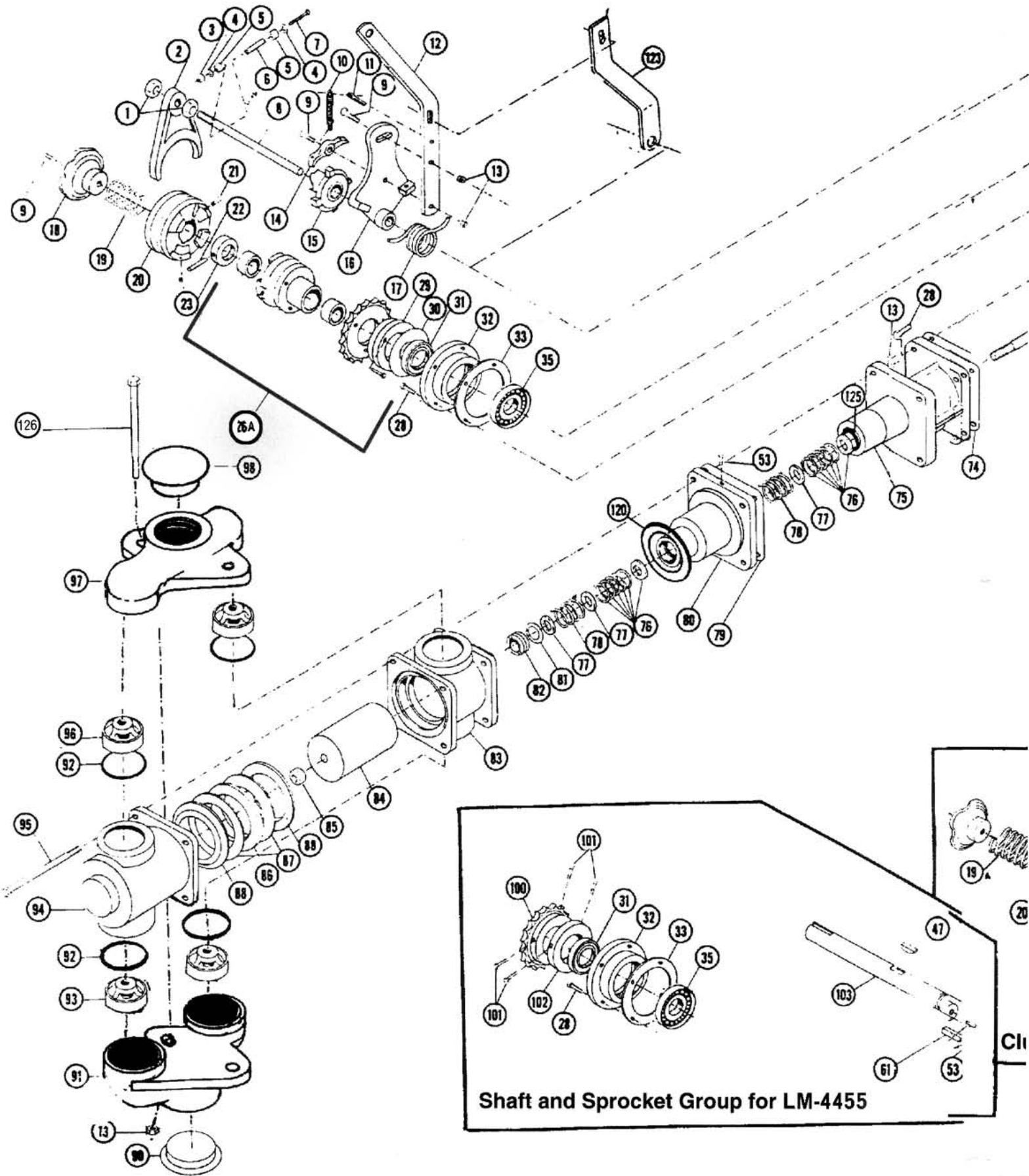


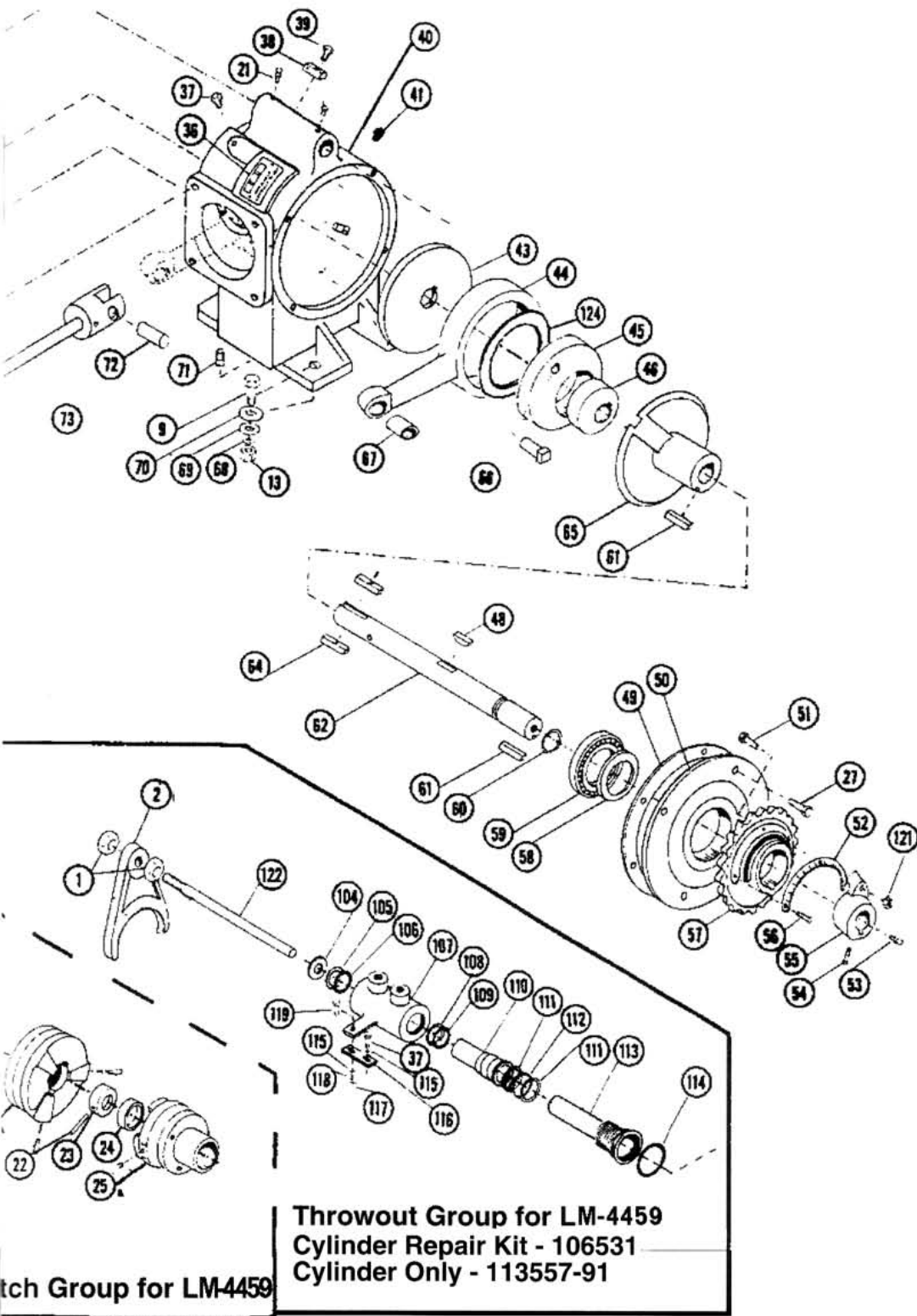
LM-4450 SERIES PUMP PARTS LIST

REF. NO.	PART NO.	ITEM DESCRIPTION	4450 QTY.	4455 QTY.	4459 QTY.	REF. NO.	PART NO.	ITEM DESCRIPTION	4450 QTY.	4455 QTY.	4459 QTY.
1	92037	5/8" JAM NUT	2	0	2	65	L-3056	STROKE LOCATING SLV.	1	1	1
2	113628-01	THROW-OUT YOKE	1	0	1	66	L-3004	ECCENTRIC PIN	1	1	1
3	92014	#10 SQUARE NUT	1	0	0	*67	113588-01	CONNECTOR ROD BUSHING	1	1	1
4	A-697	WASHER	2	0	0	68	93024	3/8 LOCK WASHER	4	4	4
5	A-2762	CAM ROLLER	2	0	0	69	93011	3/8 FLAT WASHER	4	4	4
6	A-2763	ROLL PIN	1	0	0	70	A-147	LEG MOUNTING PAD	4	4	4
7	90953	2 1/4 RD HD SCREW	1	0	0	71	C-431-B	PLUG	3	3	3
8	L-4011	THROW-OUT ROD	1	0	1	72	105895-01	CROSSHEAD PIN	1	1	1
9	90655	3/8 X 1 1/2 HEX BOLT	6	4	5	73	105900-91	PISTON ROD ASSEMBLY	1	1	1
10	F-48	THROW-OUT LEVER SPRING	1	0	0	*74	L-3052	CROSSHEAD GDE. GASKET	1	1	1
11	94010	5/32 X 1 COTTER PIN	1	0	0	75	111935-01	CROSSHEAD GUIDE	1	1	1
12	L-3064	THROW-OUT LEVER	1	0	0	*76	L-1109	ROD VEE PACKING SET	2	2	2
13	92024	3/8 HEX NUT	10	8	8	77	L-1041	WASHER	3	3	3
**13	T-2010	3/8 NUT - STAINLESS	6	6	6	78	L-1063	PACKING SPRING	2	2	2
14	A-2758-A	PAWL	1	0	0	*79	L-3074	STUFFING BOX GASKET	1	1	1
15	A-2757-A	THROW-OUT CAM	1	0	0	80	111937-01	OUTBOARD STUFFING	1	1	1
16	L-3007	THROW-OUT BRACKET	1	0	0	**80	111937-01S	OUTBOARD STUFFING BOX-S	1	1	1
17	114165-01	R H TORSION SPRING	1	0	1	81	L-1042	RETAINING RING	1	1	1
18	A-50	HANDWHEEL	1	0	1	82	L-1031-2	STUFFING BOX INSERT	1	1	1
19	HA-57	SAFETY CLUTCH SPRING	1	0	0	83	111938-01	INBOARD CYLINDER	1	1	1
19A	108907-01	SAFETY CLUTCH SPRING	1	0	1	**83	111938-01S	INBOARD CYLINDER-S	1	1	1
20	A-260	CLUTCH	1	0	0	84	112816-91	PISTON PLUNGER ASSY	1	1	1
20A	108905-91	CLUTCH	0	0	1	85	L-1047	SELF-LOCKING NUT	1	1	1
21	H-28	GREASE FITTING	5	2	5	86	L-1044-A	FLANGE PACKING WASHER	1	1	1
22	L-4249	DRIVE PIN	1	0	1	*87	L-1098	PACKING ADJ. GASKET	2	2	2
23	105373-01	CLUTCH COLLAR	1	0	1	*88	L-1045-V	FLANGE PLUNGER PACKING	2	2	2
24	A-116	OILITE BUSHING	2	0	2	90	L-3115	1/2 PLASTIC PLUG	1	1	1
25	L-4008-A	CARRIER	1	0	0	91	111945-01	SUCTION MANIFOLD	1	1	1
25A	108906-01	CARRIER	0	0	1	**91	111945-01S	SUCTION MANIFOLD-S	1	1	1
26	L-4006	16T SPROCKET (OR)				*92	A-2848	VALVE O'RING	4	4	4
	L-4007	18T SPROCKET	1	0	1	93	109112-92	SUCTION VALVE ASSEMBLY	2	2	2
26A	L-4004	16T SPROCKET ASSY (OR)				94	111940-01	OUTBOARD CYLINDER	1	1	1
	L-4005	18T SPROCKET ASSY	1	0	0	**94	111940-01S	OUTBOARD CYLINDER	1	1	1
27	90993	1/4 X 1 1/2 BOLT	3	0	3	95	91051	3/8 X 8 HEX BOLT	4	4	4
28	90637	5/16 X 1 HEX BOLT	12	12	12	**95	91072	3/8 X 5 1/2 HEX BOLT SS	4	4	4
29	L-4009	TAINING COLLAR	1	0	1	96	109113-92	DISCHARGE VALVE AS'MBLY	2	2	2
*30	110155-01	WASHER	1	1	1	97	111944-01	DISCHARGE MANIFOLD	1	1	1
*31	L-1018	OIL SEAL	1	1	1	**97	111944-01S	DISCHARGE MANIFOLD-S	1	1	1
32	L-3023	BEARING HOUSING	1	1	1	98	C-3517	PLASTIC PLUG	1	1	1
*33	L-3021	BEARING HOUSING GASKET	1	1	1	100	106532-01	SPROCKET	0	1	0
35	L-3019	CRANKSHAFT BEARING	1	1	1	101	90986	3/8 X 5/8 SCREW	0	4	0
36	111958-01	NAME PLATE	1	1	1	102	110147-01	SPACER	0	1	0
37	90634	5/16 X 1/2 HEX BOLT	1	2	1	103	103453-02	CRANKSHAFT	0	1	0
38	L-4014	SPRING ANCHOR	1	0	0	104	93016	SAE FLAT WASHER	0	0	1
39	90636	5/16 X 3/4 HEX BOLT	1	0	1	105	105448-01	BACK-UP-RING	0	0	1
40	113632-01	CRANKCASE ASSEMBLY	1	1	1	106	A-3776	O'RING	0	0	1
41	S-350	VENT PLUG	1	1	1	107	105447-01	BODY	0	0	1
43	L-3020	CRANKSHAFT DISC	1	1	1	108	105452-01	BACK-UP-RING	0	0	1
44	113645-91	CONNECTING ROD	1	1	1	109	105461-01	PISTON ROD O'RING	0	0	1
45	113633-01	LARGE ECCENTRIC	1	1	1	110	105449-01	PISTON	0	0	1
46	L-3017	SMALL ECCENTRIC	1	1	1	111	105462-01	BACK-UP-RING	0	0	2
48	A-4333	#808 WOODRUFF KEY	1	1	1	112	A-2849	O'RING	0	0	1
*49	L-3002	COVER PLATE GASKET	1	1	1	113	105463-01	CYLINDER	0	0	1
50	L-3001	COVER PLATE	1	1	1	114	105500-01	BODY O'RING	0	0	1
51	91017	3/8 X 1 3/4 SQ. HEAD BOLT	1	1	1	115	93010	5/16 FLAT WASHER	0	0	2
52	114763-01	PUMP SETTING SCALE	1	1	1	116	105501-01	STRAP	0	0	2
53	H-30	GREASE FITTING	2	2	2	117	92020	5/16 HEX NUT	0	0	2
54	90532	5/16 X 3/8 SET SCREW	3	3	3	118	93023	5/16 LOCK WASHER	0	0	4
55	115630-91	SETTING POINTER ASSY.	1	1	1	119	90636	HEX HEAD BOLT	1	0	1
56	A-368	SETTING SCALE SCREW	3	3	3	*120	L-3035	GASKET	1	1	1
57	105932-91	STROKE SETTING FLANGE	1	1	1	121	A-3097	3/8 LOCK NUT	1	1	1
*58	L-1021	OIL SEAL	1	1	1	122	114705-91	ROD THROW-OUT ASSY	0	0	1
59	L-1007-A	CRANKSHAFT BEARING	1	1	1	123	L-4025	SUPPORT HANDLE	1	0	0
*60	L-1022	CRANKSHAFT O'RING	1	1	1	124	113629-01	BEARING, CRANK PIN	1	1	1
61	L-1020	SETTING ARM KEY	2	3	2	*125	111943-01	O'RING	1	1	1
62	L-4012	CRANKSHAFT	1	0	1	126	91063	BOLT 3/8 X 8 1/2	2	2	2
64	A-261	SQUARE KEY	2	0	2	**126	91073	3/8 X 7 HEX BOLT SS	2	2	2

* Parts contained in 111953 Repair Kit
 ** Parts Unique to the LM-4450-S Series Only

ALL DESIGNS SUBJECT TO CHANGE WITHOUT NOTICE





PUMP REPAIR KIT -111953
PUMP SETTING WRENCH - L-3092-AS
PUMP SETTING SCALE - 106534-91

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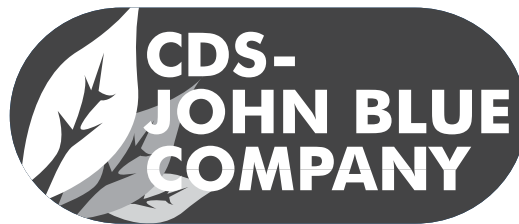
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