



## NGP SERIES METERING PUMP

### PARTS AND INSTRUCTIONAL MANUAL



NGP-6055 Shown

### CDS-JOHN BLUE COMPANY

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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 ATMOSPHERES. 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 to 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 cannot 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: \_\_\_\_\_

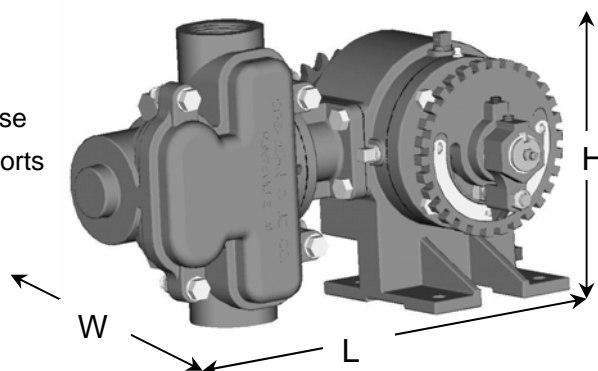
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## PUMP SPECIFICATIONS

### Universal Specifications

|                        |                                     |
|------------------------|-------------------------------------|
| Operating Pressure:    | MAX 120 PSI                         |
| Operating Speed:       | MAX 450 RPM                         |
| Rotation:              | Clockwise or Counter-clockwise      |
| Plumbing:              | 1-1/2" NPT (f) Inlet & Outlet Ports |
| Drive:                 | No. 50 Roller Chain                 |
| Crankcase Lubrication: | SAE 90 Gear Oil                     |
| Grease Zerks:          | Multipurpose Grease                 |



### Unique Specifications

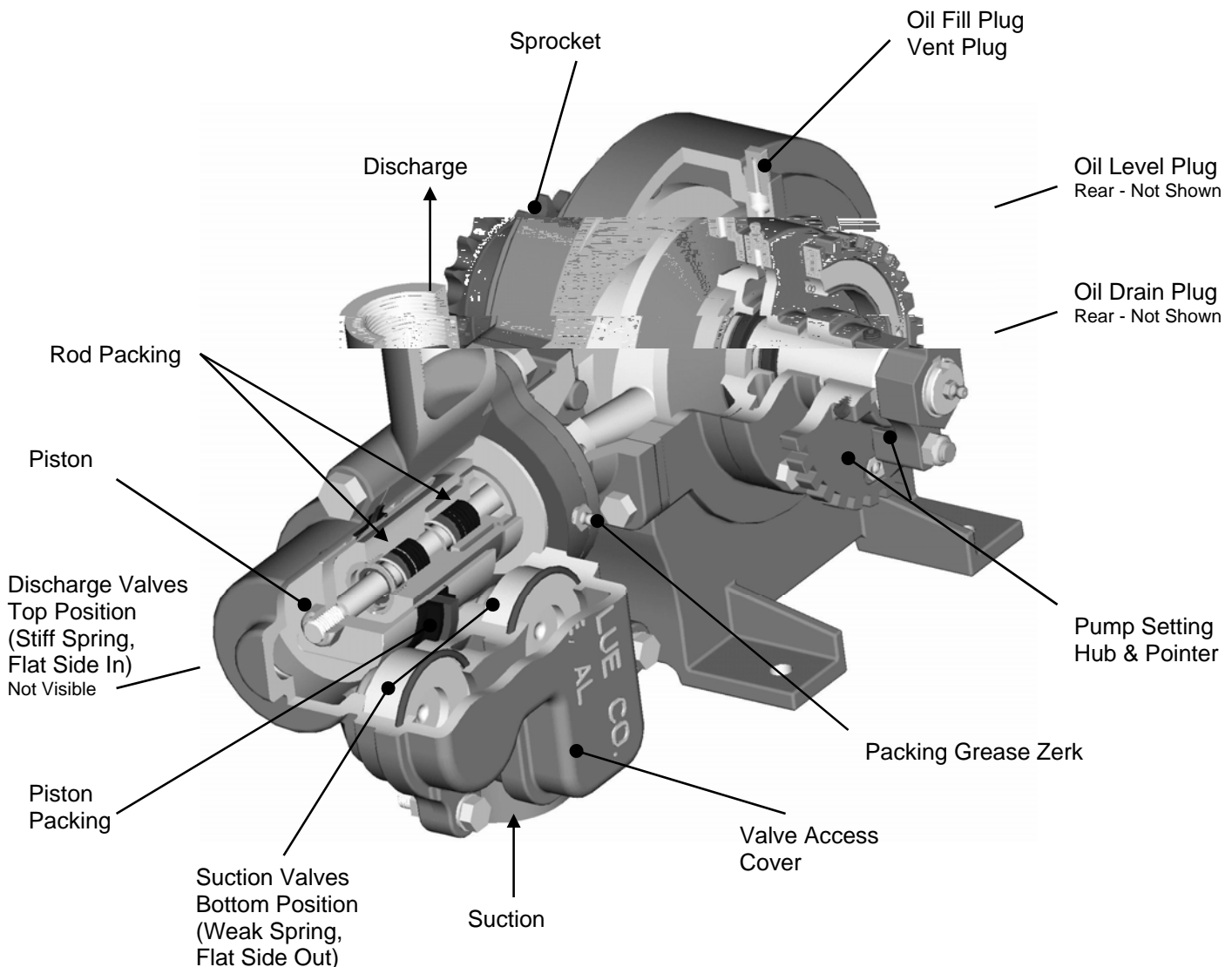
| Pump Series:           | NGP-6050 | NGP-7050 | NGP-8050 | NGP-9050 |                 |
|------------------------|----------|----------|----------|----------|-----------------|
| Output Volume          | 21.0     | 34.2     | 42.0     | 68.4     | Max Gal/Min     |
| Output Displacement    | .047     | .076     | .093     | .152     | Max Gal/Rev     |
| Required H.P.          | 2.25     | 3.00     | 4.50     | 6.00     | Theoretical     |
| Physical Dimensions    | 10x15x9  | 10x19x11 | 14x15x11 | 14x19x13 | W x L x H (in.) |
| Weight                 | 65       | 105      | 125      | 155      | Lbs.            |
| Crankcase Oil Capacity | 0.5      | 1.5      | 2.5      | 5.4      | Pints           |

# PUMP CROSS SECTION

The NGP series pump is a positive displacement, variable stroke metering pump. It is specifically designed to accurately meter liquid fertilizer solutions. The pump's construction is of rigid thick walled cast iron cylinders and manifolds for durability and long life. Stainless steel construction of the dynamic wet-end 'working' components offers corrosion resistance to check valves, pistons, and rods.

The NGP series pump functions as a positive displacement, chain driven metering device which operates in direct relation to the ground speed through the ground drive system. The application 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.

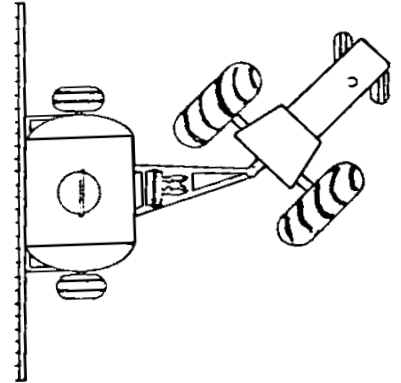
The NGP series pump is designed to control the overall gallons of solution metered over an acre, independent of downstream discharge pressure. The only function of the flow divider or row orifice in a CDS – John Blue pump system is to divide liquid accurately row to row, not to meter the overall application rate.



# INSTALLATION

## MOUNTING

- The NGP pump should be mounted on a rigid base in a horizontal position.
- The mount position should allow for a straight drive chain and proper tightness.
- Chain idlers should be installed on the slack side of the drive chain.
- The supplied rubber washers are installed between the pump and mount.
- Caution should be exercised on implements with wings or folding members to assure that sufficient area is allowed around the pump and plumbing to not cause contact or binding.
- Verify that the rear tractor wheel will clear the pump during sharp turns.
- The oil vent plug should be installed in the oil fill located on top of crankcase.



## SUCTION PLUMBING

- An adequately sized 30 mesh strainer should be installed on the suction side of the pump and should be checked at each tank filling for debris, which could cause suction restriction, starving the pump of flow.
- The NGP pump does produce suction to pull fluid from the tank; however, it is recommended to mount the pump level or below the tank, if possible, to assure the most effective and quickest prime.
- Install the process fluid suction line as straight as possible avoiding restrictions from kinks or extremely sharp turns. This will ensure even flow during maximum pump output.
- Quick connect fittings should be checked and double checked to verify that no leakage is present. Quick connects, although commonly necessary, quite often can produce a suction leak if installed in a bind allowing air to enter the pump, causing loss of prime and / or reduction in pump output.
- It is recommended that suction line hoses be double clamped. Again, this is an area that can produce a suction air leak into the pump, even if no drip from the hose is present.

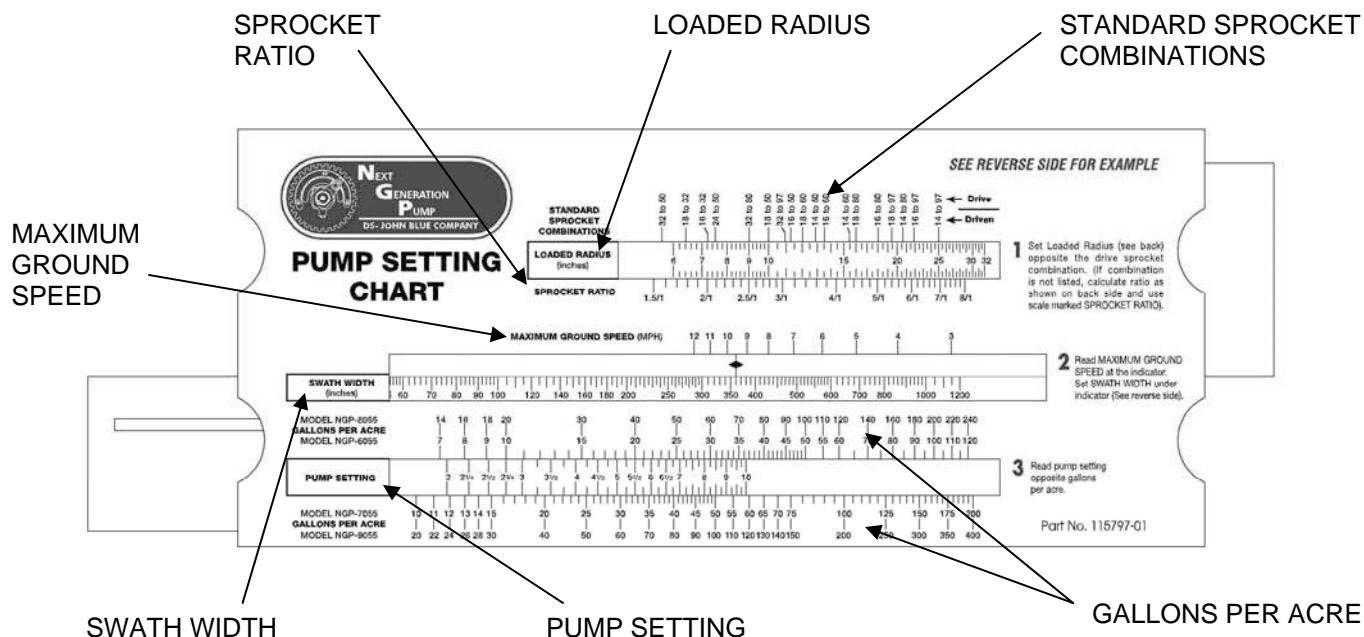
## DISCHARGE PLUMBING

- It is not recommended to install a discharge strainer as these could clog with debris causing significant discharge pressure and possible system damage in positive displacement pump applications.
- Flow dividers may be installed either directly on top of the discharge port or remote mounted.
- Orifice applications must pay particular attention for proper orifice sizing for the specified application rate.
- It is recommend that applications using a double piston pump with two flow dividers remove the common manifold and plumb each flow divider independently to each piston to assure accuracy.
- On – The – Go Variable Rate applications require that a CDS – John Blue Co. flow divider distribution manifold be used that will automatically and accurately adjust for varying on the go rate changes.

**WARNING:** The flow range of a NGP pump far exceeds the flow curve of a single orifice operating below 120 psi. For Example: An orifice application at 30 psi discharge pressure for a rate of 20 GPA @ 4 mph will produce 422 psi when the rate is adjusted to 50 GPA and ground speed increased to 6 mph.

# PUMP SETTING

The NGP pump output is determined by the drive sprocket ratio and the stroke length. Slide Chart 115698-91 is used to determine the scale setting required to adjust the stroke length for a desired output.



## SPROCKET RATIO

### Standard Sprocket Combinations

Standard sprocket combinations may be used for equipment with only one chain from the ground or press wheel sprocket to the pump sprocket. For example: an applicator with a 60 tooth drive sprocket on the tire driving a 16 tooth driven sprocket on the pump can use the 16 to 60 mark on the slide chart.

### Non-Standard Sprocket Combinations

If you are using sprocket combinations with multiple sprockets, such as with a jack shaft, use the following formula to determine sprocket ratio:

$$\frac{\text{Drive Sprocket}}{\text{Driven Sprocket}} = \text{Sprocket Ratio}$$

For example: an applicator with a 50 tooth on the drive wheel, driving to a 24 tooth on the jack shaft, then a 36 tooth on the jack shaft driving up to a 16 tooth pump driven sprocket, would yield a 4.69 drive ratio.

$$\frac{50 \text{ T (@ Drive Wheel)}}{24 \text{ T (@ Driven Shaft)}} \times \frac{36 \text{ T (@ Drive Shaft)}}{16 \text{ T (@ Driven Pump)}} = \frac{50}{24} \times \frac{36}{16} = 4.69 \text{ Sprocket Ratio}$$

Set the sprocket ratio on the slide chart using the 4.69 calculation for the example above.

## LOADED RADIUS

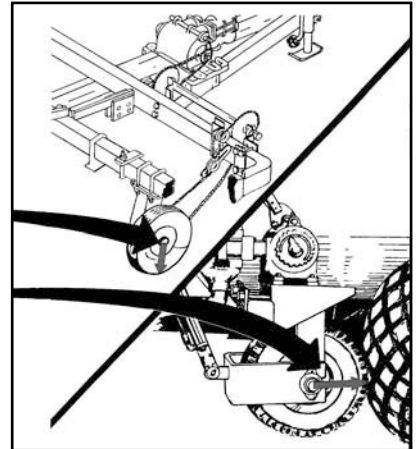
The measurement for the loaded radius must be from the Manufacturer of the tire or be measured under loaded conditions. The loaded radius tire is always the tire that has the first drive sprocket attached to its hub.

### Ground Wheel Drive Arrangement

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

### Press Wheel Drive Arrangement

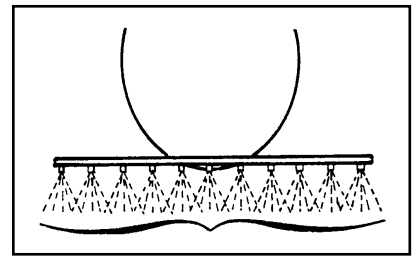
Measure the loaded radius from the center of the press wheel shaft to where the wheel rests against the tire. The press wheel must be engaged for normal operation to give an accurate reading.



## SWATH WIDTH

To determine the swath width, count the number of outlets and multiply by the distance (inches) between any two outlets, nozzles, or shanks. This assumes that all outlets are equally spaced, if outlets are not evenly spaced, figure the entire length of the boom or toolbar from end nozzle to end nozzle and allow for coverage beyond the ends.

For example, an 11 row boom at 30" would have a swath width of 330"



## SETTING THE PUMP

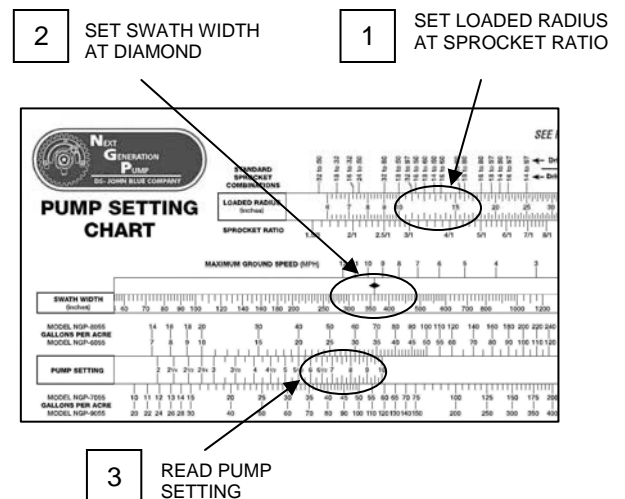
Read the desired pump setting from the bottom scale on the pump setting chart. Loosen the setting pointer nut and rotate the setting hub until the setting pointer is over the desired setting. The 115681-01 setting wrench will facilitate rotation of the setting hub. Once proper pump setting is achieved, tighten the setting pointer nut.

### EXAMPLE:

An applicator is equipped with a NGP-6050 series pump, 11L x 15" tires, a 60 tooth drive sprocket, and a 16 tooth pump driven sprocket. It is desired to apply 33 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 diamond in the middle window.
3. Read that the pump setting is approx. 9 at 33 gallons per acre on the NGP-6055 scale in the bottom window.
4. Set the pump to setting 9 to achieve 33 gallons per acre

Note: The max. ground speed is read above the diamond as approx. 9 mph to avoid exceeding 450 pump rpm.



# INITIAL PUMP START UP

Verify that all installation guidelines have been followed as outlined in the installation section of this manual.

- Fill the tank 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.
- Set the pump to pump setting 10.
- Before installing nozzles or orifices (if used), 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, check for foreign material and clean the screens.
- The CDS – John Blue flow divider is automatic and requires no calibration; however, if nozzles or orifices are used, verify that the orifices are sized properly as to not produce high discharge pressure.
- Pull the machine over known acreage and verify the application accuracy with water prior to field application of chemical. Note that tank level marks can give false readings if read on uneven ground.

## PUMP CALIBRATION

The NGP pump is calibrated from the factory; however, if the setting scale, hub, or pointer is replaced, use the following procedure to calibrate the pump output with scale readings.

- Remove the valve cover and outboard cylinder (see maintenance section).
- Set the pump on pump setting 5 for all pump sizes.
- Rotate the crankshaft until the piston is as far in as it will go. Measure the distance from the end of the piston to the inboard 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 length is the stroke length, which at pump setting 5 should be 9/16" for the NGP-6050 & NGP-8050 or 15/16" for the NGP-7050 & NGP-9050.
- If the distance is less than the required amount, reset the pointer at a higher setting, if it is greater; reset the pointer at a lower setting. Repeat this procedure to obtain the required measurement.
- Once accomplished, loosen the setting scale screws until the 5 is directly under the pointer and secure the scale in position with the three scale screws.
- Replace the outboard cylinder and valve cover, making sure that the valves are in their proper orientation as covered under the maintenance section.

## PUMP ACCURACY

A catch test may be performed to verify accuracy, not as a calibration method, by priming the pump and catching all of the pumped fluid from the discharge for a known number of revolutions. See chart below:

| <u>Pump Series</u> | <u>Pump Setting</u> | <u># of Revolutions</u> | <u>Total Pump Output</u> |
|--------------------|---------------------|-------------------------|--------------------------|
| NGP-6050           | 8                   | 10                      | 3 Pints                  |
| NGP-7050           | 8-1/4               | 10                      | 5 Pints                  |
| NGP-8050           | 8                   | 10                      | 6 Pints                  |
| NGP-9050           | 8-1/4               | 10                      | 10 Pints                 |



# MAINTENANCE

- Check oil daily and fill crankcase with a quality grade SAE 90 weight gear oil. Oil level must be visible at oil level check plug on back of crankcase. The level plug is located at same height as the crankshaft.
- Lubricate all grease zerks on roller chain sprocket spacer, outboard cover plate, crankshaft end, and at stuffing box flange daily. Fill zerks until grease is visibly seen seeping from mating parts. For the stuffing box flange zerk, grease will be seen seeping from the vent on the opposite side of the flange.
- Pump oil should be changed seasonal or in extreme use conditions.
- Visually inspect sprocket and drive chain daily for excessive wear or corrosion. Lubricate chain regularly to reduce corrosion. Chain alignment must be straight.

## STORAGE

### IMPORTANT – KEEP AIR OUT AND KEEP FROM FREEZING

Keep air out of the pump! This is the only way to prevent corrosion. Even for short periods of storage, the entrance of air into the pump causes RAPID and SEVERE CORROSION. Freezing temperatures can cause the fluid or water to freeze internally to the pump, which can cause severe damage to the wet-end castings.

### 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 pumps.
2. Cooling weather: (solution likely to salt out), fill pump with water and leave filled. DO NOT admit air.
3. Freezing temperature: fill pump with RV-antifreeze 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 1-1/2" NPT PVC plugs in the suction and discharge fittings to keep pump full and exclude air.

### WINTER STORAGE

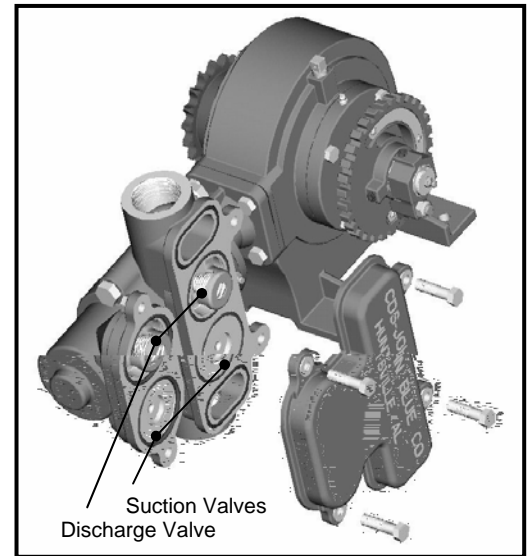
1. Flush pump as detailed above.
2. With pump set on 10, draw in straight RV-antifreeze until the discharge is clean. If system utilizes a flow divider (FD), pump the RV-antifreeze through the FD manifold until it is seen in the discharge lines. Fill pump and plug suction and discharge fittings of pump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

# SERVICE MAINTENANCE

Proper maintenance of the NGP pump will ensure a service life for many years. Rebuilding and / or servicing check valves, piston flange packing, piston rod packing, and crankcase components is an economical way to ensure optimum service. This type of service is simple, and can be done by almost all end users. The parts list and schematic section shows the position of all service kit items, which includes all seals, packing, and gaskets. Gasket kits and component parts can be ordered through any authorized CDS – John Blue distributor.

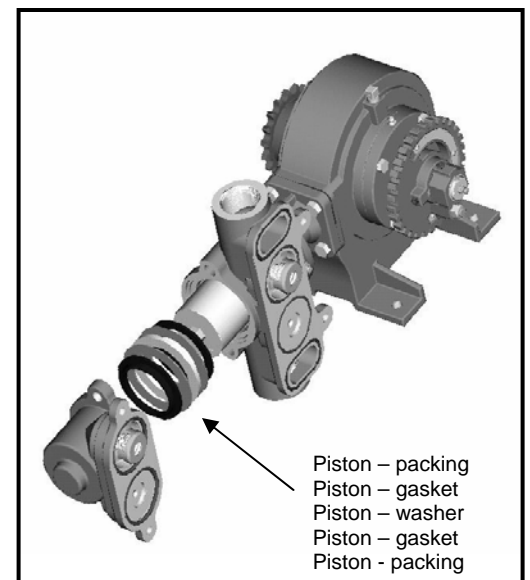
## CLEAN AND INSPECT CHECK VALVES

- Remove the valve cap exposing all 4 check valves. Take care in removal to notice the orientation of the valves. Discharge valves use a tighter spring and are on top, flat side in. Suction valves use a weaker spring and in the bottom, flat side out.
- Valves should be removed by hand, do not use a screw driver or pry-bar as damage can result. Push each valve disc off its o-ring seat ensuring that the spring reseats each disc evenly and that no debris is present. Inspect the o-rings for cuts or cracks which could allow air to enter or cause the discs to not seat properly.
- Check the port o-rings positioned near the top and bottom of the inboard cylinder in an oval shaped groove. This o-ring should not be removed unless visible damage is present. The o-rings should be fully installed in the groove with no cuts or cracks. Once all valves are checked for debris or damage and o-rings are in position, re-install valves in proper orientation, replace the cover, and tighten the bolts evenly.



## PISTON PACKINGS

- With valve cover removed, remove the ½" long bolts securing the outboard cylinder. Remove the outboard cylinder exposing the piston – gaskets, washer, and packing.
- Remove the first piston – packing, gasket, and washer; notice the orientation of the packing lip. Remove the second piston gasket and packing from the inboard cylinder; again noticing the orientation of the packing lip.
- Inspect the packing and replace if necessary, gaskets should always be replaced once removed. The piston - packing should be pliable and without cracks or nicks to perform properly.
- Clean the cavities of both the inboard and outboard cylinder as well as the valve cap while disassembled. Discoloration of the plunger and / or lateral scoring of the piston can be deceiving, but not necessarily detrimental.
- Inspect piston for deep grooves, radial scoring, or severe abrasion. The best method is by feel.
- Assemble in reverse manner taking care for proper orientation of the piston – packing, gaskets, and washer.



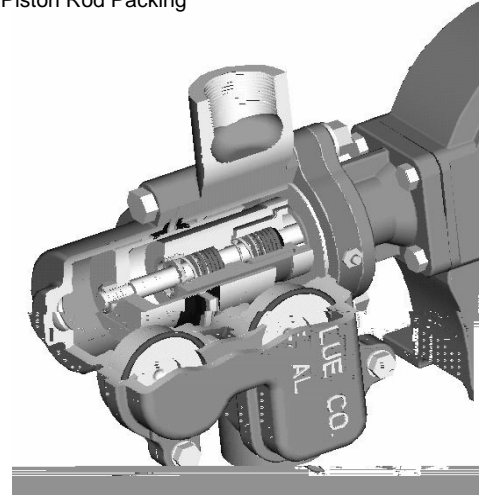
## PISTON ROD PACKINGS

The rod packing consists of 2 sets of self-tightening 'V' rings which seal around the piston rod to prevent pumped fluid from leaking and protect the crankcase from contamination. Virtually any leakage of the *pumped fluid* through the vent in the side of the stuffing box is an indication that these rod packing need replacement. However, it is not uncommon for *oil* to drip from this drain.

### Removal of rod packing:

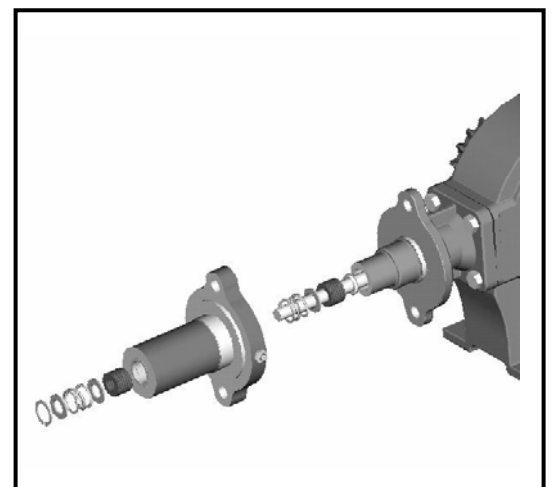
- With the valve cap and cylinders removed, remove the piston nut and piston by rotating piston counter-clockwise, use a belt wrench or cloth nearest to the nut end to prevent damage to the piston.
- Remove the stuffing box and gasket which house the wet-end piston rod packing.
- Remove the snap ring from the end of the stuffing box, allowing the washer, spring, and washer to slip out. The L-1031-2 insert should not be removed from the stuffing box. The rod packing set can be removed with a hook or screwdriver by prying the multi-piece rod packing set out of the cavity. Once removed it must be replaced with a new service rod packing set.
- There is no snap ring on the second set closest to the crankcase located in the crosshead guide. This set may be removed in the same manner as the first set. There is a secondary o-ring rod seal located at the bottom of the set which also should be replaced.
- Inspect the piston rod for any deep scoring and replace if necessary. A polished wear pattern may be evident and is not detrimental; however, deep grooves indicate the piston rod assembly should be replaced.
- The crosshead guide may be removed from crankcase to allow for inspection of the connecting rod bushing. If damaged or slop is present, this should be replaced.

Piston Rod Packing



### Re-assembly and replacement of rod packing:

- Carefully re-install the crosshead guide and gasket and bolt to crankcase, if removed.
- Lubricate piston rod and install o-ring first, then carefully install the first 'V' ring packing set. The set consists of a bottom adapter, 4 rings, and a top adapter. Each component should be inserted one at a time and pressed firmly in place. The 4 rings have a 'V' shape and are oriented so as the 'V' point is pointed towards the crankcase, for both sets. Install the washer and spring.
- Install second set in the stuffing box in a similar manner, there is no secondary o-ring required in this set. Install the washer, spring, then washer and hold in place with snap ring.
- Lubricate piston rod and stuffing box, then slide stuffing box carefully back over rod, being extremely careful to push straight on the piston rod so as the rods threads do not damage the 'V' ring set.
- Re-assemble piston, inboard, and outboard cylinder in reverse manner. Continue with valves in proper orientation, valve cover, and secure all bolts evenly.
- Finally, lubricate the stuffing box grease zerk until grease seeps out of the stuffing box vent hole.

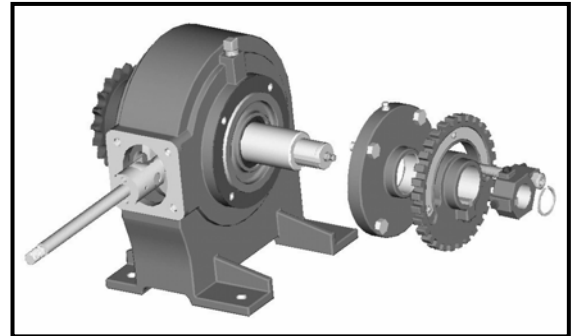


# CRANKCASE DISASSEMBLY

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 best results in major pump repair. Shaft oil seals have been upgraded from previous L & LM series pumps to include a wiper ring. The oil seals are enclosed in a greaseable cavity to flush debris from around the seal, which is a contributing factor to premature oil seal failure. The oil seals may be replaced by following the OUTBOARD & INBOARD COMPONENTS section below. All instruction and visual representation in this section is shown with wet-end components removed which is covered in the maintenance sections preceding this section.

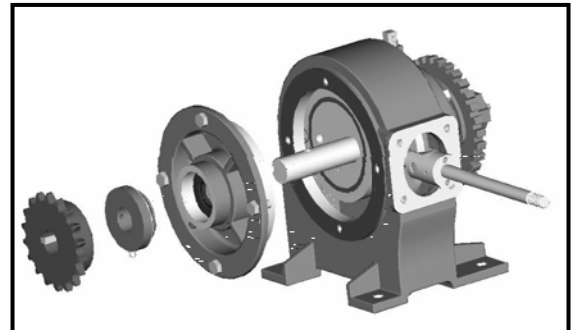
## OUTBOARD COMPONENTS

- Remove the retaining ring, pump setting hub, and pointer.
- Remove the flange cover exposing the oil seal in its cavity.
- Remove the oil seal which may be done with a screw driver, taking care not to scar the internal shaft or housing.
- Inspection of the stroke setting sleeve should be made for wear at the seal location as well as the flange gasket for tears prior to re-assembly.



## INBOARD COMPONENTS

- Remove the sprocket from shaft and sprocket spacer, inspecting the o-ring and thrust washer for wear, cuts, or damage and replace as necessary.
- Remove the cover plate. It may be necessary to remove any marks in the crankshaft from the sprocket / spacer set-screws with a light emery cloth in order for the cover plate to slip off with the bearing.
- Remove the oil seal with a screw driver, taking care not to scar the housing or shaft.
- If only the oil seal is being replaced, the cover plate should be re-installed first, then the oil seal. Inspect the shaft for wear at the seal location, as well as the cover plate gasket for tears, replace as necessary.



## INTERNAL COMPONENTS

The following inspection points should be made prior to disassembly if required:

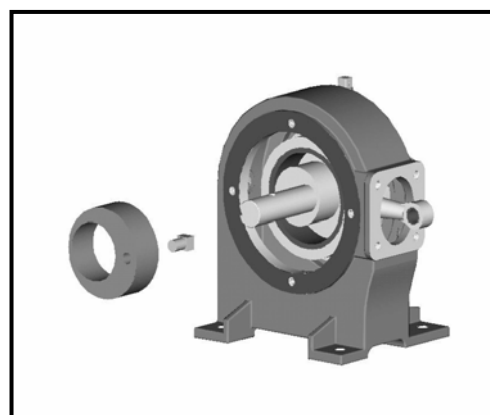
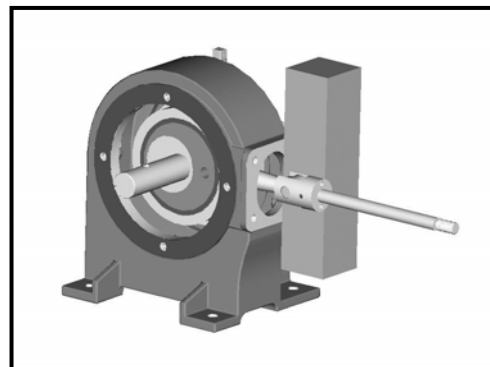
- With inboard and outboard components removed, examine for sediment in the crankcase. A small amount of metal wear and 'grit' in the oil is normal, large sediment may require further disassembly.
- Check for metal and/or fertilizer discoloration to the oil. If fertilizer is present, the crankcase should be disassembled and each component examined for rust pitting or deterioration.
- Holding the crankcase firmly, take hold of the connecting rod and push / pull. If you feel obvious end play, disassemble all components and inspect for wear, particularly the eccentrics and connecting rod.

## INTERNAL DISASSEMBLY

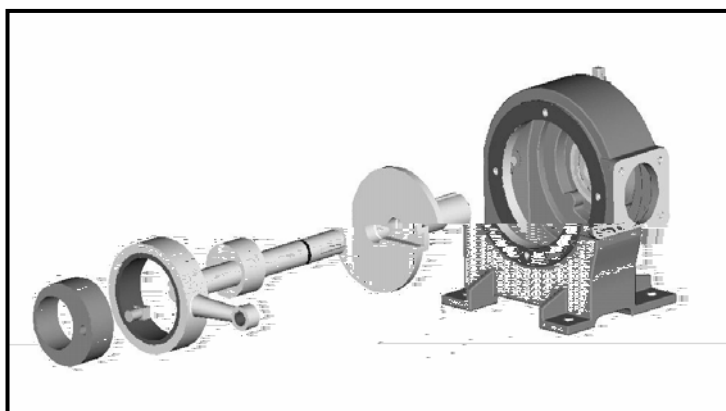
Reference to the schematic section is recommended prior to disassembly of the internal crankcase components to familiarize yourself with components. The wet-end components, inboard, and outboard components should be removed prior to internal disassembly as outlined in previous sections of this manual.

- Supporting the piston rod with a wood block, locate the crosshead pin, which connects the piston rod and connecting rod and carefully drive pin out with a hammer and punch.
- Inspect the connecting rod bushing for damage and replace as necessary during re-assembly.
- Slide the outer eccentric and eccentric pin out of the crankcase.
- The connecting rod can then be removed by carefully sliding it out the side of the pump at an angle.
- The shaft can then be removed as shown with the inner eccentric still in place.

Note: Double piston pumps will require the stroke transfer sleeve to be removed with the shaft exposing the second piston eccentric and connecting rod for removal.



- The stroke setting sleeve is there removed.
- The eccentric pins may slide out during any part of this process and should be accounted for, single pumps utilize 1, double pumps utilize 3 [ref schematic].
- Examine all components, giving more attention to ones showing 'galling' than to ones which are undersize, yet smooth.



## CRANKCASE RE-ASSEMBLY

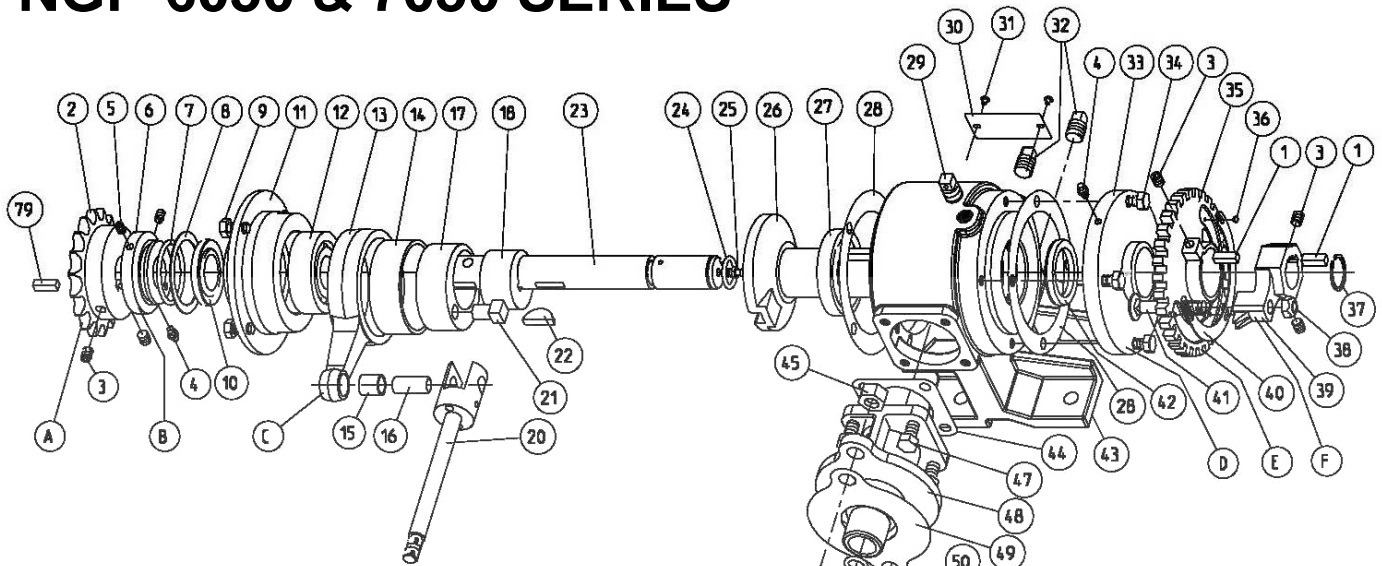
- All components in the gasket kit should be used during re-assembly.
- Reassemble the crankcase in reverse order.
- When assembling the shaft, oil the shaft o-ring and carefully insert into stroke setting sleeve.
- It is extremely important that all eccentric pins engage appropriate mating slots.
- Coat all bolts threads with gasket sealant before installing in crankcase.

# PARTS LISTING – NGP-6050 & NGP-7050 Series

| ITEM | PART DESCRIPTION          | NGP-6050<br>PART # | NGP-7050<br>PART # |
|------|---------------------------|--------------------|--------------------|
| 1    | KEY                       | L-1020             | L-1020             |
| 2    | SPROCKET RC50-18T         | 112661-01          | 112661-01          |
|      | -K NO SPROCKET            | NOT USED           | NOT USED           |
|      | -R SPROCKET RC40-18T      | 113905-01          | 113905-01          |
| 3    | 5/16 X 3/8 SET SCREW      | 90532              | 90532              |
| 4    | GREASE FITTING            | H-28               | H-28               |
| 5    | 5/16 X 3/8 SET SCREW      | 90532              | 90532              |
| 6    | SPROCKET SPACER           | 115625-01          | 115625-01          |
| 7    | O-RING                    | S-316              | S-316              |
| 8    | THRUST WASHER             | 115626-01          | 115626-01          |
| 9    | 5/16 X 1 HEX BOLT         | 90637              | 90637              |
| 10   | OIL SEAL                  | 115621-01          | 115621-01          |
| 11   | COVER PLATE               | 115723-01          | 115623-01          |
| 12   | BEARING                   | L-3019             | L-3019             |
| 13   | CONNECTING ROD            | L-1008-A           | 113630-01          |
| 14   | JOURNAL BEARING           | L-928              | 113629-01          |
| 15   | ROD BUSHING               | 113588-01          | 113588-01          |
| 16   | ROD PIN                   | 105895-01          | 105895-01          |
| 17   | ECCENTRIC - OUTER         | L-1013-A           | 113633-01          |
| 18   | ECCENTRIC - INNER         | L-1015             | L-3017             |
| 19   | TRANSFER SLEEVE           | NOT USED           | NOT USED           |
| 20   | PISTON ROD ASSEMBLY       | 115712-91          | 105900-91          |
| 21   | ECCENTRIC PIN             | L-3004             | L-3004             |
| 22   | WOODRUFF KEY              | 108093-01          | A-4333             |
| 23   | CRANKSHAFT                | 115614-01          | 115614-01          |
| 24   | O-RING                    | L-1022             | L-1022             |
| 25   | GREASE ZERK               | 115647-01          | 115647-01          |
| 26   | SETTING SLEEVE            | 115718-01          | 115618-01          |
| 27   | BEARING                   | L-1007-A           | L-1007-A           |
| 28   | GASKET                    | L-1006             | L-3002             |
| 29   | VENT PLUG                 | S-350              | S-350              |
| 30   | NAME PLATE                | 111958-01          | 111958-01          |
| 31   | DRIVE SCREW               | A-3557             | A-3557             |
| 32   | OIL PLUG                  | C-431-B            | C-431-B            |
| 33   | FLANGE COVER              | 115724-01          | 115724-01          |
| 34   | 5/16 X 1 HEX BOLT         | 90637              | 90637              |
| 35   | SETTING HUB               | 115627-01          | 115627-01          |
| 36   | SETTING SCALE SCREW       | A-368              | A-368              |
| 37   | SNAP RING                 | 115791-01          | 115791-01          |
| 38   | 3/8 SELF-LOCKING NUT      | A-3097             | A-3097             |
| 39   | SETTING POINTER           | 115628-01          | 115628-01          |
| 40   | SETTING SCALE             | 115645-01          | 115645-01          |
| 41   | 3/8 X 2-1/4 CARRIAGE BOLT | 115646-01          | 115646-01          |
| 42   | OIL SEAL                  | 115622-01          | 115622-01          |
| 43   | CRANKCASE                 | 115720-01          | 115620-01          |
| 44   | GASKET - CROSSHEAD        | 115711-01          | 115611-01          |
| 45   | 1/2 HEX NUT               | 92029              | 92029              |
|      | -S STAINLESS              | 92030              | 92030              |
| 46   | NOT USED                  |                    |                    |
| 47   | HEX BOLT                  | 90637              | 90860              |
| 48   | CROSSHEAD GUIDE           | 115700-01          | 115600-01          |
| 49   | GASKET - STUFFING BOX     | 115610-01          | 115610-01          |
|      | -U FUMIGANT               | 104828-01          | 104828-01          |
| 50   | O-RING                    | 111943-01          | 111943-01          |
| 51   | PACKING 'V' SET           | L-1109             | L-1109             |
|      | -U FUMIGANT               | L-1109-U           | L-1109-U           |
| 52   | PACKING WASHER            | L-1041             | L-1041             |
| 53   | PACKING SPRING            | L-1063             | L-1063             |
| 54   | GREASE ZERK               | H-30               | H-30               |

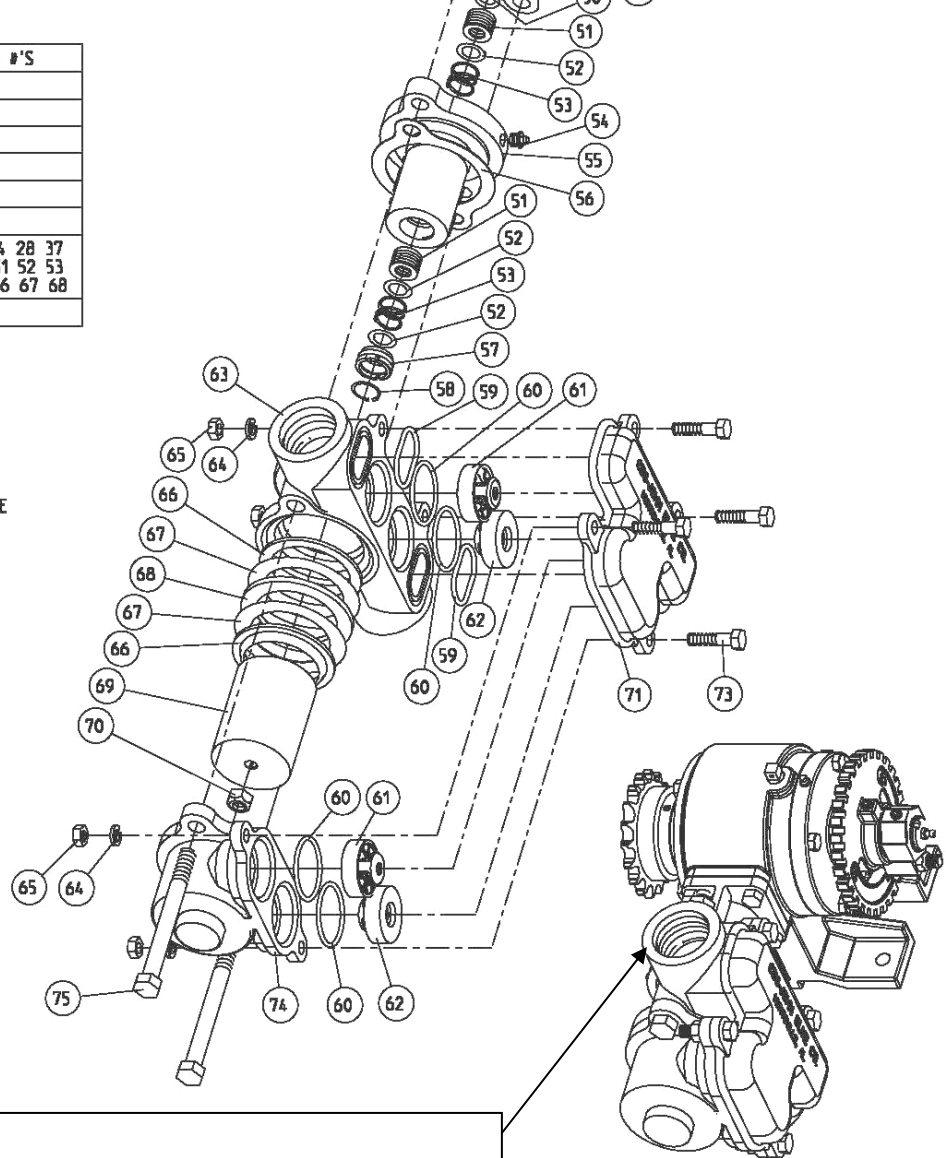
| ITEM | PART DESCRIPTION             | NGP-6050<br>PART # | NGP-7050<br>PART # |
|------|------------------------------|--------------------|--------------------|
| 55   | STUFFING BOX                 | 115790-01          | 115690-01          |
|      | -S STAINLESS                 | 115790-01S         | 115690-01S         |
| 56   | GASKET - INBOARD CYL.        | 115710-01          | 115710-01          |
|      | -U FUMIGANT                  | 104826-02          | 104826-02          |
| 57   | STUFFING BOX INSERT          | L-1031-2           | L-1031-2           |
|      | -S STAINLESS                 | NOT USED           | NOT USED           |
| 58   | PACKING - SNAP RING          | L-1042             | L-1042             |
| 59   | O-RING                       | S-316              | 115604-01          |
|      | -S STAINLESS                 | 104824-01          | 115612-01          |
|      | -U FUMIGANT                  | 104824-01          | 115612-01          |
| 60   | O-RING                       | L-3031             | A-2848             |
|      | -S STAINLESS                 | 114768-01          | 114870-01          |
|      | -U FUMIGANT                  | 114768-01          | 114870-01          |
| 61   | DISCHARGE VALVE              | 115707-91          | 115607-91          |
| 62   | SUCTION VALVE                | 115706-91          | 115606-91          |
| 63   | INBOARD CYLINDER             | 115701-02          | 115601-02          |
|      | -FLG FLANGED INBOARD CYL 220 | 115701-02FLG       | 115601-02FLG       |
|      | -S STAINLESS                 | 115701-02S         | 115601-02S         |
| 64   | 3/8 LOCK WASHER              | 93024              | 93024              |
|      | -S STAINLESS                 | 93025              | 93025              |
| 65   | 3/8 HEX NUT                  | 92024              | 92024              |
| 66   | PLUNGER – PACKING            | L-1045-V           | L-1045-V           |
|      | -B PLUNGER – PACKING BUNA    | L-1045-A           | L-1045-A           |
| 67   | PLUNGER – GASKET             | L-1098             | L-1098             |
|      | -U FUMIGANT                  | 114769-01          | 114769-01          |
| 68   | PLUNGER – WASHER             | L-1044-A           | L-1044-A           |
| 69   | PLUNGER                      | 103290-91          | 112816-91          |
| 70   | PLUNGER - LOCKING NUT        | L-1047             | L-1047             |
| 71   | VALVE COVER                  | 115703-01          | 115603-01          |
|      | -S STAINLESS                 | 115703-01S         | 115603-01S         |
| 72   | 1/2 FLAT WASHER              | NOT USED           | NOT USED           |
|      | -DR NOT USED                 | NOT USED           | NOT USED           |
| 73   | 3/8 X 1-1/2 HEX BOLT         | 90911              | 90911              |
|      | -S STAINLESS                 | 90654              | 90654              |
| 74   | OUTBOARD CYLINDER            | 115702-01          | 115602-01          |
|      | -S STAINLESS                 | 115702-01S         | 115602-01S         |
| 75   | 1/2 HEX BOLT                 | 90704              | 90705              |
|      | -S STAINLESS (2 BOLTS USED)  | 90693/90687        | 90693/90687        |
| 76   | GASKET – MANIFOLD            | NOT USED           | NOT USED           |
|      | -DR NOT USED                 | NOT USED           | NOT USED           |
| 77   | MANIFOLD – COMMON            | NOT USED           | NOT USED           |
|      | -S NOT USED                  | NOT USED           | NOT USED           |
|      | -DR NOT USED                 | NOT USED           | NOT USED           |
| 78   | 1/2 HEX BOLT                 | NOT USED           | NOT USED           |
|      | -DR NOT USED                 | NOT USED           | NOT USED           |
| 79   | SPROCKET KEY                 | 106493-01          | 106493-01          |
| A    | SPROCKET ASSY. RC50-18T      | 106532-01          | 106532-01          |
|      | -K NO SPROCKET               | NOT USED           | NOT USED           |
|      | -R SPROCKET ASSY. RC40-18T   | 113907-01          | 113907-01          |
| B    | SPROCKET SPACER ASSY.        | 115624-91          | 115624-91          |
| C    | CONNECTING ROD ASSY.         | L-1008-B           | 113645-91          |
| D    | FLANGE COVER ASSY.           | 115725-91          | 115725-91          |
| E    | SETTING HUB ASSY.            | 115629-91          | 115629-91          |
| F    | SETTING POINTER ASSY.        | 115630-91          | 115630-91          |
| G    | GASKET KIT                   | 115788             | 115688             |
|      | -S GASKET KIT - STAINLESS    | 115788-S           | 115688-S           |
|      | -U GASKET KIT - FUMIGANT     | 115788-U           | 115688-U           |
| H    | OPERATORS KIT                | 115787             | 115787             |
| N/S  | SLIDE CHART                  | 115698-91          | 115698-91          |
| N/S  | SETTING WRENCH               | 115631-01          | 115631-01          |

# NGP-6050 & 7050 SERIES



| ITEM | DESCRIPTION     | INCLUDES ITEM #'S  |
|------|-----------------|--|
| A    | SPROCKET        | 2 3  |
| B    | SPACER          | 4 5 6 7 8  |
| C    | CONNECTING ROD  | 13 14 15   |
| D    | FLANGE COVER    | 4 33   |
| E    | SETTING HUB     | 3 35 36 40   |
| F    | SETTING POINTER | 3 39   |
| G    | GASKET KIT      | 7 8 10 15 24 28 37<br>42 44 49 50 51 52 53<br>56 58 59 60 66 67 68 |
| H    | OPERATORS KIT   | NOT SHOWN  |

- G — GASKET KIT
- H — OPERATORS KIT  
 - MANUAL  
 - WRENCH  
 - SLIDE CHART  
 - MOUNTING HARDWARE



## 220 FLANGE ADAPTERS:

- CAST IRON PUMPS USE 115701-02FLG OR 115601-02FLG
- STAINLESS USE 116083-01S ADAPTERS

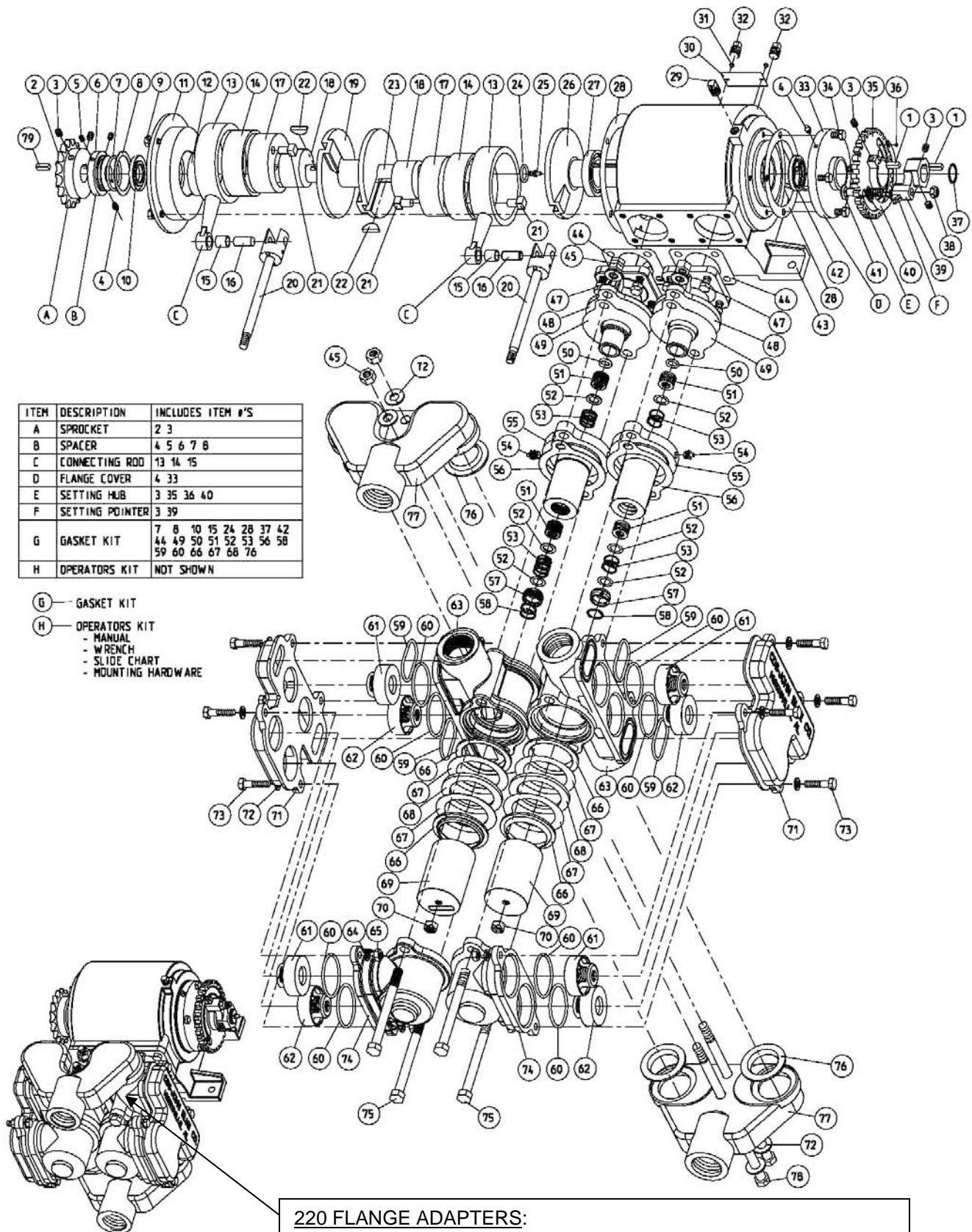
# PARTS LISTING – NGP-8050 & NGP-9050 SERIES

| ITEM | PART DESCRIPTION          | NGP-8050<br>PART # | NGP-9050<br>PART # |
|------|---------------------------|--------------------|--------------------|
| 1    | KEY                       | L-1020             | L-1020             |
| 2    | SPROCKET RC50-18T         | 112661-01          | 112661-01          |
|      | -K NO SPROCKET            | NOT USED           | NOT USED           |
|      | -R SPROCKET RC40-18T      | 113905-01          | 113905-01          |
| 3    | 5/16 X 3/8 SET SCREW      | 90532              | 90532              |
| 4    | GREASE FITTING            | H-28               | H-28               |
| 5    | 5/16 X 3/8 SET SCREW      | 90532              | 90532              |
| 6    | SPROCKET SPACER           | 115625-01          | 115625-01          |
| 7    | O-RING                    | S-316              | S-316              |
| 8    | THRUST WASHER             | 115626-01          | 115626-01          |
| 9    | 5/16 X 1 HEX BOLT         | 90637              | 90637              |
| 10   | OIL SEAL                  | 115621-01          | 115621-01          |
| 11   | COVER PLATE               | 115723-01          | 115623-01          |
| 12   | BEARING                   | L-3019             | L-3019             |
| 13   | CONNECTING ROD            | L-1008-A           | 113630-01          |
| 14   | JOURNAL BEARING           | L-928              | 113629-01          |
| 15   | ROD BUSHING               | 113588-01          | 113588-01          |
| 16   | ROD PIN                   | 105895-01          | 105895-01          |
| 17   | ECCENTRIC - OUTER         | L-1013-A           | 113633-01          |
| 18   | ECCENTRIC - INNER         | L-1015             | L-3017             |
| 19   | TRANSFER SLEEVE           | 115783-01          | 115683-01          |
| 20   | PISTON ROD ASSEMBLY       | 115712-91          | 105900-91          |
| 21   | ECCENTRIC PIN             | 112686-01          | L-3004             |
| 22   | WOODRUFF KEY              | 108093-01          | A-4333             |
| 23   | CRANKSHAFT                | 115681-01          | 115681-01          |
| 24   | O-RING                    | L-1022             | L-1022             |
| 25   | GREASE ZERK               | 115647-01          | 115647-01          |
| 26   | SETTING SLEEVE            | 115718-01          | 115618-01          |
| 27   | BEARING                   | L-1007-A           | L-1007-A           |
| 28   | GASKET                    | L-1006             | L-3002             |
| 29   | VENT PLUG                 | S-350              | S-350              |
| 30   | NAME PLATE                | 111958-01          | 111958-01          |
| 31   | DRIVE SCREW               | A-3557             | A-3557             |
| 32   | OIL PLUG                  | C-431-B            | C-431-B            |
| 33   | FLANGE COVER              | 115724-01          | 115724-01          |
| 34   | 5/16 X 1 HEX BOLT         | 90637              | 90637              |
| 35   | SETTING HUB               | 115627-01          | 115627-01          |
| 36   | SETTING SCALE SCREW       | A-368              | A-368              |
| 37   | SNAP RING                 | 115791-01          | 115791-01          |
| 38   | 3/8 SELF-LOCKING NUT      | A-3097             | A-3097             |
| 39   | SETTING POINTER           | 115628-01          | 115628-01          |
| 40   | SETTING SCALE             | 115645-01          | 115645-01          |
| 41   | 3/8 X 2-1/4 CARRIAGE BOLT | 115646-01          | 115646-01          |
| 42   | OIL SEAL                  | 115622-01          | 115622-01          |
| 43   | CRANKCASE                 | 115780-01          | 115680-01          |
| 44   | GASKET - CROSSHEAD        | 115711-01          | 115611-01          |
| 45   | 1/2 HEX NUT               | 92029              | 92029              |
|      | -S STAINLESS              | 92030              | 92030              |
| 46   | NOT USED                  |                    |                    |
| 47   | HEX BOLT                  | 90637              | 90860              |
| 48   | CROSSHEAD GUIDE           | 115700-01          | 115600-01          |
| 49   | GASKET - STUFFING BOX     | 115610-01          | 115610-01          |
|      | -U FUMIGANT               | 104828-02          | 104828-02          |
| 50   | O-RING                    | 111943-01          | 111943-01          |
| 51   | PACKING 'V' SET           | L-1109             | L-1109             |
|      | -U FUMIGANT               | L-1109-U           | L-1109-U           |
| 52   | PACKING WASHER            | L-1041             | L-1041             |
| 53   | PACKING SPRING            | L-1063             | L-1063             |
| 54   | GREASE ZERK               | H-30               | H-30               |

| ITEM | PART DESCRIPTION             | NGP-8050<br>PART # | NGP-9050<br>PART # |
|------|------------------------------|--------------------|--------------------|
| 55   | STUFFING BOX                 | 115790-01          | 115690-01          |
|      | -S STAINLESS                 | 115790-01S         | 115690-01S         |
| 56   | GASKET - INBOARD CYL.        | 115710-01          | 115710-01          |
|      | -U FUMIGANT                  | 104826-02          | 104826-02          |
| 57   | STUFFING BOX INSERT          | L-1031-2           | L-1031-2           |
|      | -S STAINLESS                 | NOT USED           | NOT USED           |
| 58   | PACKING - SNAP RING          | L-1042             | L-1042             |
| 59   | O-RING                       | S-316              | 115604-01          |
|      | -S STAINLESS                 | 104824-01          | 115612-01          |
|      | -U FUMIGANT                  | 104824-01          | 115612-01          |
| 60   | O-RING                       | L-3031             | A-2848             |
|      | -S STAINLESS                 | 114768-01          | 114870-01          |
|      | -U FUMIGANT                  | 114768-01          | 114870-01          |
| 61   | DISCHARGE VALVE              | 115707-91          | 115607-91          |
| 62   | SUCTION VALVE                | 115706-91          | 115606-91          |
| 63   | INBOARD CYLINDER             | 115701-02          | 115601-02          |
|      | -FLG FLANGED INBOARD CYL 220 | 115701-02FLG       | 115601-02FLG       |
|      | -S STAINLESS                 | 115701-02S         | 115601-02S         |
| 64   | 3/8 LOCK WASHER              | 93024              | 93024              |
|      | -S STAINLESS                 | 93025              | 93025              |
| 65   | 3/8 HEX NUT                  | 92024              | 92024              |
| 66   | PLUNGER – PACKING            | L-1045-V           | L-1045-V           |
|      | -B PLUNGER – PACKING BUNA    | L-1045-A           | L-1045-A           |
| 67   | PLUNGER – GASKET             | L-1098             | L-1098             |
|      | -U FUMIGANT                  | 114769-01          | 114769-01          |
| 68   | PLUNGER – WASHER             | L-1044-A           | L-1044-A           |
| 69   | PLUNGER                      | 103290-91          | 112816-91          |
| 70   | PLUNGER - LOCKING NUT        | L-1047             | L-1047             |
| 71   | VALVE COVER                  | 115703-01          | 115603-01          |
|      | -S STAINLESS                 | 115703-01S         | 115603-01S         |
| 72   | 1/2 FLAT WASHER              | 93013              | 93013              |
|      | -DR DUAL RATE [CYLINDERS]    | NOT USED           | NOT USED           |
| 73   | 3/8 X 1-1/2 HEX BOLT         | 90911              | 90911              |
|      | -S STAINLESS                 | 90654              | 90654              |
| 74   | OUTBOARD CYLINDER            | 115702-01          | 115602-01          |
|      | -S STAINLESS                 | 115702-01S         | 115602-01S         |
| 75   | 1/2 HEX BOLT                 | 90704              | 90705              |
|      | -S STAINLESS (2 BOLTS USED)  | 90693/90687        | 90693/90687        |
| 76   | GASKET – MANIFOLD            | 112696-01          | 112696-01          |
|      | -DR DUAL RATE [CYLINDERS]    | NOT USED           | NOT USED           |
| 77   | MANIFOLD – COMMON            | 115796-01          | 115696-01          |
|      | -S STAINLESS                 | 115796-01S         | 115696-01S         |
|      | -DR DUAL RATE [CYLINDERS]    | NOT USED           | NOT USED           |
| 78   | 1/2 HEX BOLT                 | 115793-01          | 115693-01          |
|      | -DR DUAL RATE [CYLINDERS]    | NOT USED           | NOT USED           |
| 79   | SPROCKET KEY                 | 106493-01          | 106493-01          |
| A    | SPROCKET ASSY. RC50-18T      | 106532-01          | 106532-01          |
|      | -K NO SPROCKET               | NOT USED           | NOT USED           |
|      | -R SPROCKET ASSY. RC40-18T   | 113907-01          | 113907-01          |
| B    | SPROCKET SPACER ASSY.        | 115624-91          | 115624-91          |
| C    | CONNECTING ROD ASSY.         | L-1008-B           | 113645-91          |
| D    | FLANGE COVER ASSY.           | 115725-91          | 115725-91          |
| E    | SETTING HUB ASSY.            | 115629-91          | 115629-91          |
| F    | SETTING POINTER ASSY.        | 115630-91          | 115630-91          |
| G    | GASKET KIT                   | 115789             | 115689             |
|      | -S GASKET KIT - STAINLESS    | 115789-S           | 115689-S           |
|      | -U GASKET KIT - FUMIGANT     | 115789-U           | 115689-U           |
| H    | OPERATORS KIT                | 115787             | 115787             |
| N/S  | SLIDE CHART                  | 115698-91          | 115698-91          |
| N/S  | SETTING WRENCH               | 115631-01          | 115631-01          |



# NGP-8050 & 9050 SERIES

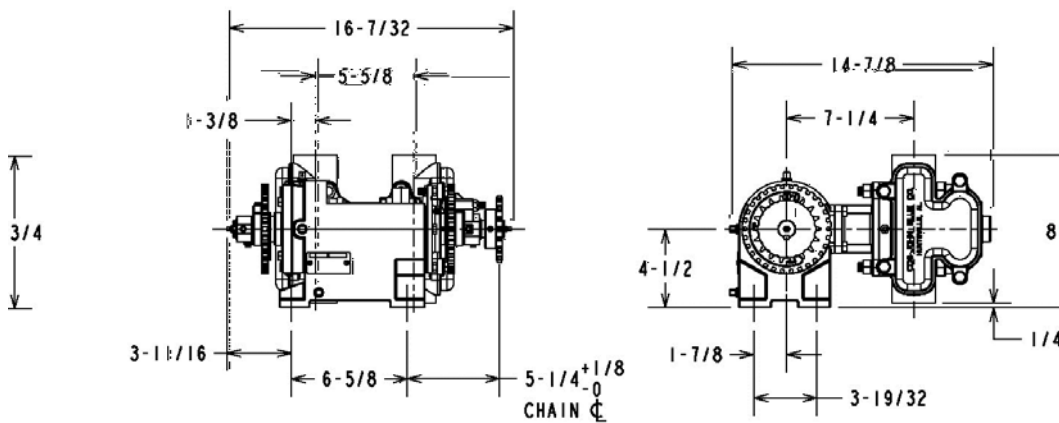
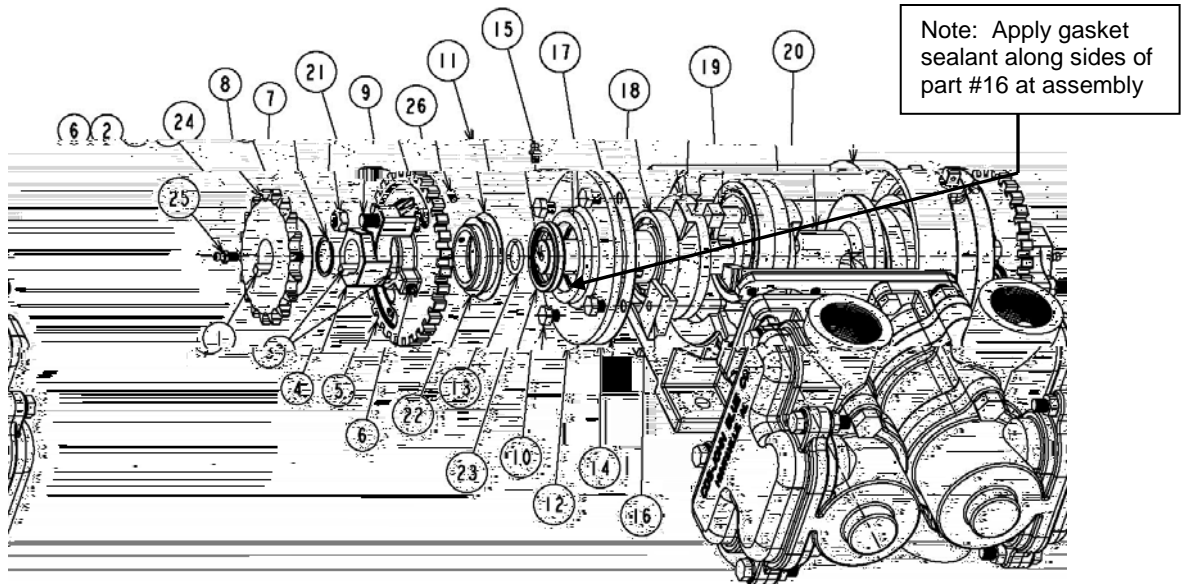


# PARTS LISTING – NGP-8055-AR

- Parts unique to the NGP-8055-AR assembly  
(refer to the NGP-8050/9050 chart for common/shared parts)

| ITEM | PART DESCRIPTION          | PART #    |
|------|---------------------------|-----------|
| 1    | SPROCKET KEY              | 106493-01 |
| 2    | SPROCKET                  | 116055-01 |
| 3    | KEY                       | L-1020    |
| 4    | SETTING POINTER           | 115628-01 |
| 5    | SETTING SCALE             | 115646-01 |
| 6    | 5/16 X 3/8 SET SCREW      | 90532     |
| 7    | 3/8 X 2-1/4 CARRIAGE BOLT | 115646-01 |
| 8    | 3/8 SELF LOCKING NUT      | A-3097    |
| 9    | THRUST WASHER             | 115626-01 |
| 10   | 5/16" X 1 BOLT            | 90637     |
| 11   | GREASE FITTING            | H-28      |
| 12   | COVER PLATE               | 116053-01 |
| 13   | O-RING                    | S-316     |
| 14   | GASKET                    | L-1006    |

| ITEM | PART DESCRIPTION       | PART #    |
|------|------------------------|-----------|
| 15   | BEARING                | L-1007-A  |
| 16   | CRANKCASE INSERT BLOCK | 116049-01 |
| 17   | SHORT SETTING SLEEVE   | 116052-01 |
| 18   | ECCENTRIC PIN          | L-3004    |
| 19   | SPACER SLEEVE          | 116051-01 |
| 20   | CRANKCASE              | 116048-01 |
| 21   | #10-32 X 1/4 SET SCREW | 90502     |
| 22   | SEAL COVER             | 116054-01 |
| 23   | OIL SEAL               | 115622-01 |
| 24   | SNAP RING              | 115791-01 |
| 25   | GREASE ZERK            | 115647-01 |
| 26   | MAIN SHAFT             | 116050-01 |



# NGP Clutch Kit Assembly (optional)

## Universal Clutch Components

- Assemble as shown in the first schematic figure, and ensure that the clutch yoke<sup>21</sup> is installed against the clutch jaw<sup>19</sup> according to the schematic for each assembly (either tight or with a 5/16" gap).
- It may be necessary to loosen the set screws on the pump's stroke adjustment pointer to slide the main shaft over to allow clutch spacer<sup>4</sup> to fit correctly. Be sure to re-tighten the set screws.
- Grease all fittings<sup>3</sup> daily during seasonal usage.

## Manual Clutch: NGP-xxxx-050

### **Conversion Kit # 115670**

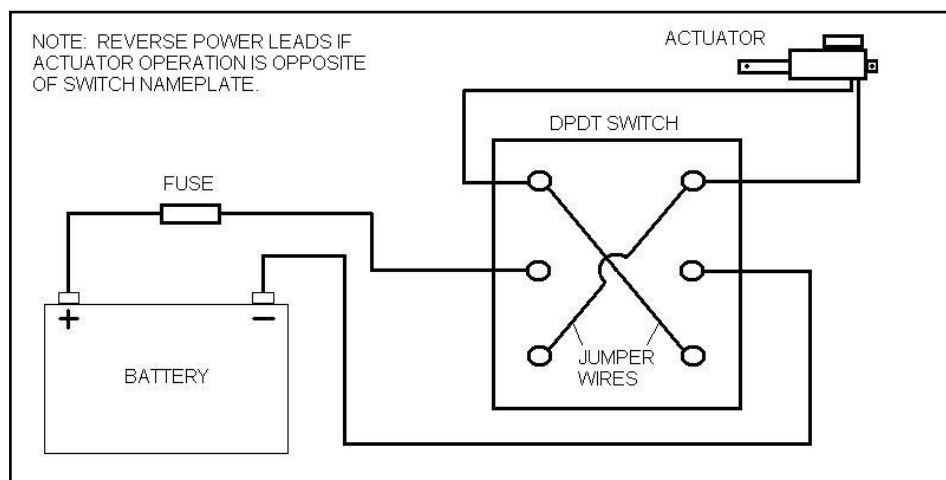
- Assemble as shown in the second schematic figure, and ensure that the shift rod<sup>23</sup> and pin assembly<sup>34-38</sup> are aligned with throw out cam<sup>29</sup> so that the clutch is smoothly engaged/disengaged.
- Place one end of the torsion spring<sup>27</sup> over the 5/16" x 1-1/2" bolt<sup>57</sup> after assembling the bolts to the mounting plate<sup>27</sup> and the other end against the ear on the throw out bracket<sup>28</sup>.

## Electric Clutch: NGP-xxxx-058

### **Conversion Kit # 115672**

- Assemble as shown in the third schematic figure – be sure to note the required 5/16" gap between the yoke and clutch jaw when retracted.
- A double pole / double throw (DPDT) switch must be obtained and wired to the actuator<sup>48</sup>. The switch should be rated for 10A min., and can be either a sustaining or a momentary centering type.
- A 10 Amp fuse must be installed before the switch – see the diagram below for connecting the switch and actuator.

### Electric Actuator/Switch Wiring Diagram:



## Hydraulic Clutch: NGP-xxxx-059

### **Conversion Kit # 115671**

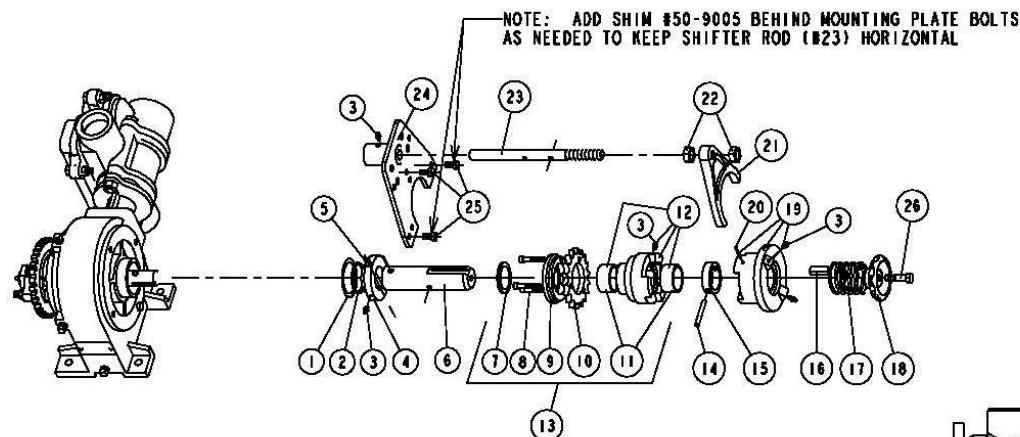
- Assemble as shown in the fourth schematic figure, and ensure that the jam nut<sup>22</sup> is fully threaded onto the shifter rod<sup>23</sup>.

# Clutch Kit Parts List

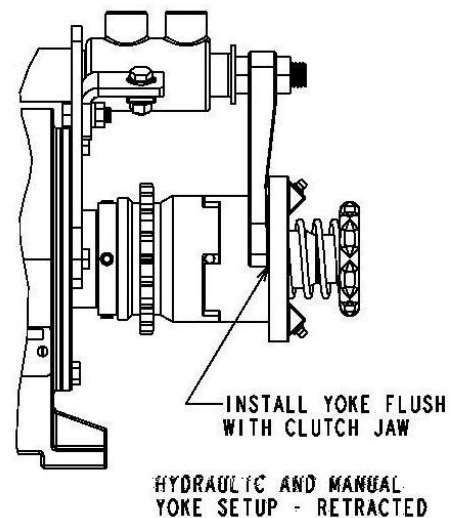
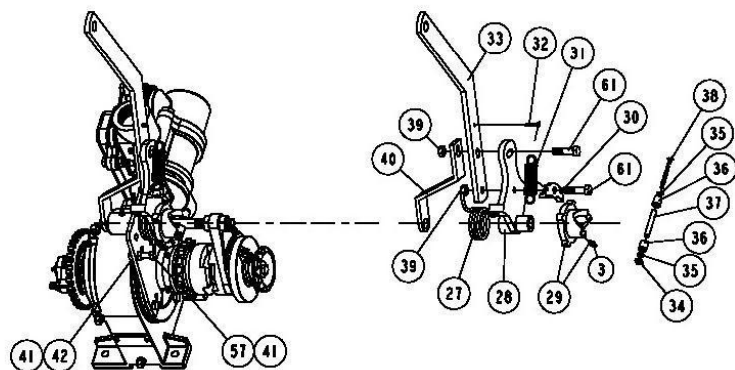
| ITEM | PART DESCRIPTION           | PART #    | -X050<br>MANUAL | -X058<br>ELEC. | -X059<br>HYD. |
|------|----------------------------|-----------|-----------------|----------------|---------------|
| 1    | WASHER                     | 115626-01 | X               | X              | X             |
| 2    | O-RING                     | S-316     | X               | X              | X             |
| 3    | GREASE FITTING             | H-28      | X               | X              | X             |
| 4    | CLUTCH SPACER              | 115639-01 | X               | X              | X             |
| 5    | 3" DOWEL PIN               | 115640-01 | X               | X              | X             |
| 6    | SHAFT EXTENSION            | 115638-01 | X               | X              | X             |
| 7    | THRUST WASHER              | 115651-01 | X               | X              | X             |
| 8    | ¼-20 X 1" SOCKET CAP SCREW | 90512     | X               | X              | X             |
| 9    | SPROCKET RETAINER          | 115632-01 | X               | X              | X             |
| 10   | CLUTCH SPROCKET 18T-RC50   | 115637-01 | X               | X              | X             |
| 11   | CLUTCH BEARING             | 115650-01 | X               | X              | X             |
| 12   | CLUTCH CARRIER ASSY        | 115663-91 | X               | X              | X             |
| 13   | SPROCKET CARRIER ASSEMBLY  | 115664-91 | X               | X              | X             |
| 14   | 2" DOWELL PIN              | 115194-01 | X               | X              | X             |
| 15   | CLUTCH COLLAR              | 115641-01 | X               | X              | X             |
| 16   | 3/8" SQ KEY                | 115642-01 | X               | X              | X             |
| 17   | CLUTCH SPRING              | 108907-01 | X               | X              | X             |
| 18   | HAND WHEEL                 | A-50      | X               | X              | X             |
| 19   | CLUTCH JAW ASSEMBLY        | 115662-91 | X               | X              | X             |
| 20   | KEY RETAINER – ROLL PIN    | S-4248    | X               | X              | X             |
| 21   | CLUTCH YOKE                | 115635-01 | X               | X              | X             |
| 22   | 5/8" JAM NUT               | 92037     | X               | X              | X             |
| 23   | SHIFTER ROD                | 115643-01 | X               | X              | X             |
| 24   | CLUTCH MOUNTING PLATE      | 115993-91 | X               | X              | X             |
| 25   | 5/16 X 1 HEX BOLT          | 90637     | X               | X              | X             |
| 26   | 3/8 X 1-1/4 HEX BOLT       | 90653     | X               | X              | X             |
| 27   | TORSION SPRING             | 114165-01 | X               | X              | X             |
| 28   | BRACKET - THROW OUT        | L-3007    | X               |                |               |
| 29   | CAM - THROW OUT            | A-2757-A  | X               |                |               |
| 30   | PAWL - THROW OUT           | A-2758-A  | X               |                |               |
| 31   | SPRING – THROW OUT         | F-48      | X               |                |               |
| 32   | COTTER PIN 5/32" X 1"      | 94010     | X               |                |               |
| 33   | LEVER - THROW OUT          | L-3064    | X               |                |               |
| 34   | # 10 SQ NUT                | 92014     | X               |                |               |
| 35   | WASHER                     | A-697     | X               |                |               |
| 36   | CAM ROLLER                 | A-2762    | X               |                |               |
| 37   | ROLL PIN                   | A-2763    | X               |                |               |
| 38   | 2-1/4 RD HEAD SCREW        | 90953     | X               |                |               |
| 39   | 3/8 NUT                    | 92024     | X               |                |               |
| 40   | HANDLE SUPPORT             | 115661-01 | X               |                |               |
| 41   | 5/16 – 18 HEX NUT          | 92020     | X               | X              | X             |
| 42   | 5/16 LOCK WASHER           | 93023     | X               | X              | X             |
| 43   | 5/16 FLAT WASHER           | 93010     |                 |                | X             |
| 44   | MOUNT - ACTUATOR           | 115995-91 |                 | X              |               |
| 45   | 1-3/4" PIN                 | 114002-01 |                 | X              |               |
| 46   | COTTER PIN 1/16 X ½"       | 94002     |                 | X              |               |
| 47   | BRACKET - SHIFTER          | 114001-01 |                 | X              |               |
| 48   | ELECTRIC ACTUATOR          | 114003-01 |                 | X              |               |
| 49   | 2" PIN                     | 114594-01 |                 | X              |               |
| 50   | BRACKET - CYLINDER         | 115998-01 |                 |                | X             |
| 51   | 5/8 SAE FLAT WASHER        | 93016     |                 |                | X             |
| 52   | PISTON                     | 105463-01 |                 |                | X             |
| 53   | CYLINDER                   | 105449-01 |                 |                | X             |
| 54   | HOUSING                    | 105447-01 |                 |                | X             |
| 55   | HYD CYLINDER REPAIR KIT    | 106531    |                 |                | KIT           |
| 56   | HYD CYLINDER ASSEMBLY      | 113557-91 |                 |                | KIT           |
| 57   | 5/16 X 1-1/2 HEX BOLT      | 115158-01 | X               |                |               |
| 58   | 3/8 X 1 HEX BOLT           | 90860     |                 |                | X             |
| 59   | 3/8 LOCK WASHER            | 93024     |                 | X              | X             |
| 60   | 3/8 X 4-1/2 HEX BOLT       | 90667     |                 | X              |               |
| 61   | 3/8 X 1-1/2 HEX BOLT       | 90655     | X               |                |               |
| 62   | 5/16 X 1-3/4 SQ. HD BOLT   | 90554     |                 | X              |               |
| N/S  | PULLEY                     | A-2765    | X               |                |               |
| N/S  | ROPE – 12'                 | A-2766    | X               |                |               |

# Clutch Kit Schematics

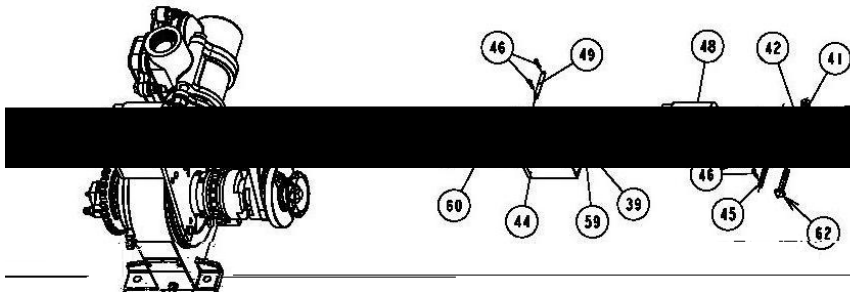
UNIVERSAL COMPONENTS: (FOR ALL KITS)



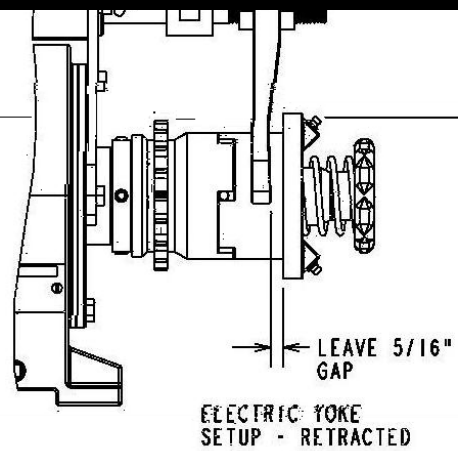
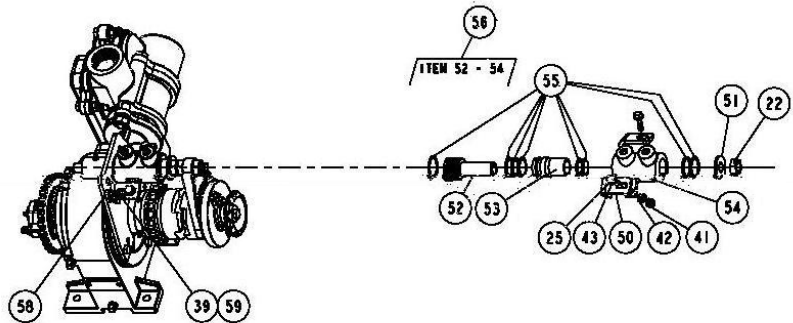
NGP-x050      MANUAL SHIFT COMPONENTS

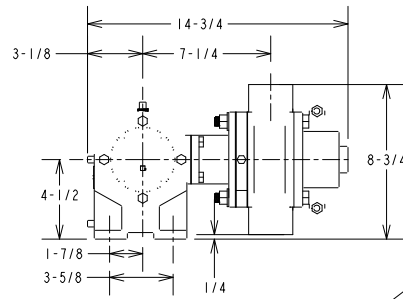
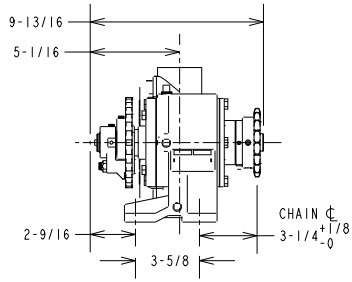


NGP-x058      ELECTRIC SHIFT COMPONENTS



NGP-x059      HYDRAULIC SHIFT COMPONENTS





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< 4-7/8 >

< 13-15/16 >  
< 7-7/8 >

3-11/16 < > CHAIN 3-1/4 (+1/8, -0)  
< 6-5/8 >

< 13-15/16 >  
< 7-7/8 >

3 < > CHAIN 1-11/16 (+1/8, -0)  
< 8-7/8 >

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4-3/8 >  
8-3/4 >  
5-3/8  
3-1/16 < >  
5-13/16 < >  
7/16  
10-5/16  
V

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13  
4-1/2  
5-1/4  
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3-5/8 < >  
2  
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V  
V

18-3/8 >  
4-3/8 < >  
11-7/8  
14-3/8  
5-3/8  
5-15/16  
3-1/16 < >  
5-13/16 < >  
1-13/16  
V  
V  
V

# TROUBLE SHOOTING

| ISSUE                                       | PROBABLE CAUSE                      |
|---|-------------------------------------|
| Pump hard or impossible to prime            | Valves damaged or in wrong place    |
|   | Debris lodged in valves             |
|   | Suction line leaks or restriction   |
|   | Pump set too low                    |
|   | Packing worn                        |
|   | Tank Valve Closed                   |
|   | Clogged suction strainer            |
| Pump building too much pressure             | Boom orifices / nozzles wrong size  |
|   | Debris lodged in discharge lines    |
|   | Excessive ground speed              |
| Low / Under Metering                        | Valves damaged or in wrong place    |
|   | Debris lodged in valves             |
|   | Suction line leaks or restriction   |
|   | Pump set too low                    |
|   | Excessive tire slippage             |
|   | Clogged suction strainer            |
| High / Over Metering                        | Valves damaged or in wrong place    |
|   | Debris lodged in valves             |
|   | Excessive suction head pressure     |
|   | Pump set too high                   |
| Fluid leaks through when stopped            | Valves damaged                      |
|   | Excessive suction head pressure     |
|   | Debris lodged in valves             |
| Fertilizer leaks out stuffing box vent hole | Rod packing worn out                |
| Pump using excessive oil                    | Oil seals or o-rings worn / leaking |
| Pump leaking oil around oil seals           | Vent plug not installed or plugged  |
| Pump turns hard or skids ground tire        | Excessive pressure or speed         |

## Clutch Models

| ISSUE                                      | PROBABLE CAUSE                                      |
|--|---|
| Clutch face contact showing excessive wear | Yoke position on shifter rod is too far out         |
| Clutch won't disengage                     | Yoke position on shifter rod is too far in          |
| Clutch won't engage                        | Check main spring for breakage                      |
|  | Check jaws for severe wear / non-engagement         |
| Clutch doesn't engage / disengage          | Manual – Check all manual components for operation  |
|  | Electric – Check all wiring & actuator operation    |
|  | Hydraulic – Check hydraulics and cylinder operation |

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