PRENTICE

HYDRAULIC LOADERS & CRANES

OPERATION & MAINTENANCE INSTRUCTIONS

FOR THE

PRENTICE LOADER

SERIES F, G, H

APPLIES ALSO TO TMS

PRICE $1.00

CAT. NO. TDL 101

Hydraulic Materials Handling Division

OMARK INDUSTRIES

ZEBULON, N. C. 27597

GENERAL INTRODUCTION

This book covers Operation and Maintenance of all PRENTICE A-Frame type machines. It applies to Series F, G, H, and can be used with Series TMS loader. Illustrations show typical units which may not be exactly like your machine, but maintenance procedures are basically the same.

Directional Reference: With this type of unit, the **front** is on the side of the A-frame **facing the working area,** which is generally toward the rear of the vehicle (truck) on which the loader is mounted. **Left** and **right** are therefore the **loader's left and right,** not the left and right of the carrying vehicle.

SERVICE CALL INFORMATION

The best place to go for parts and service on this machine is to your PRENTICE dealer, and he'll be able to help you faster if you have machine information at hand when you call. Fill in the spaces on this page and keep the information handy.

This machine sold and serviced by:

Name of PRENTICE Service Specialist:_____

Name of PRENTICE Salesman: _____

Machine Model: _____

Machine Serial Number: _____

Grapple Serial Number: _____

NOTE: Auxiliary power units are serviced by the trained mechanics at your local engine distributor.

Product Warranty

1. OMARK INDUSTRIES — HYDRAULIC MATERIALS HANDLING DIVISION warrants its products to be free from defects in material and workmanship under normal use and service for a period of 180 days after the date of original sale by the Dealer. The turntable bearing and the swing assembly gear and rack are so warranted for a period of 360 days from date of original sale by the Dealer. Within the warranty time period, the company will repair, replace FOB its factory, or allow credit at the then current Dealer net price for any part that shall be proved to the satisfaction of the Company to be thus defective, provided that upon the Company's request all parts claimed defective be properly identified and returned to the factory with charges prepaid.

   OMARK INDUSTRIES — HYDRAULIC MATERIALS HANDLING DIVISION will honor properly documented and described Warranty claims only on units for which an adequate Validation Form is in the Company's possession at the time when such claim is filed.

2. This warranty is expressly in lieu of any other warranties, express or implied, including any implied warranty of merchantability or fitness for a specific purpose, and of any other obligations or liabilities on the part of OMARK INDUSTRIES — HYDRAULIC MATERIALS HANDLING DIVISION. No one is authorized to assume, for or on behalf of the Company any different or additional obligations in connection with the products. The Company's liability under this warranty is limited to treatment of parts as set forth in paragraph 1, and all other liabilities express or implied, arising understatute, through neglect or otherwise, are hereby expressly waived.

3. This warranty covers only new equipment in the possession of its original owner, which after shipment from the factory has not been manufactured, altered or treated in any manner whatsoever without written consent of the Company. No claim will be honored for a unit that has been abused, misused, or operated under conditions other than those specified by OMARK INDUSTRIES — HYDRAULIC MATERIALS HANDLING DIVISION.

4. Tools, engines, batteries, electrical and similar equipment not manufactured by OMARK INDUSTRIES — HYDRAULIC MATERIALS HANDLING DIVISION are covered only by the standard warranties of the manufacturers of such equipment; such items are not warranted by OMARK INDUSTRIES — HYDRAULIC MATERIALS HANDLING DIVISION.

OMARK INDUSTRIES
HYDRAULIC MATERIALS HANDLING DIVISION

Manufacturers of the ***PRENTICE*** *Loader*

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NOTE: Information in this book is current at the time of approval for printing. PRENTICE reserves the right to make changes and improvements to its products at any time without notice or obligation. This book is for instructional purposes only.

CAT. NO. TDL 101-1171
(replaces LUB 101-467

OPERATION OF THE LOADER

EXPLANATION OF DIAGRAM

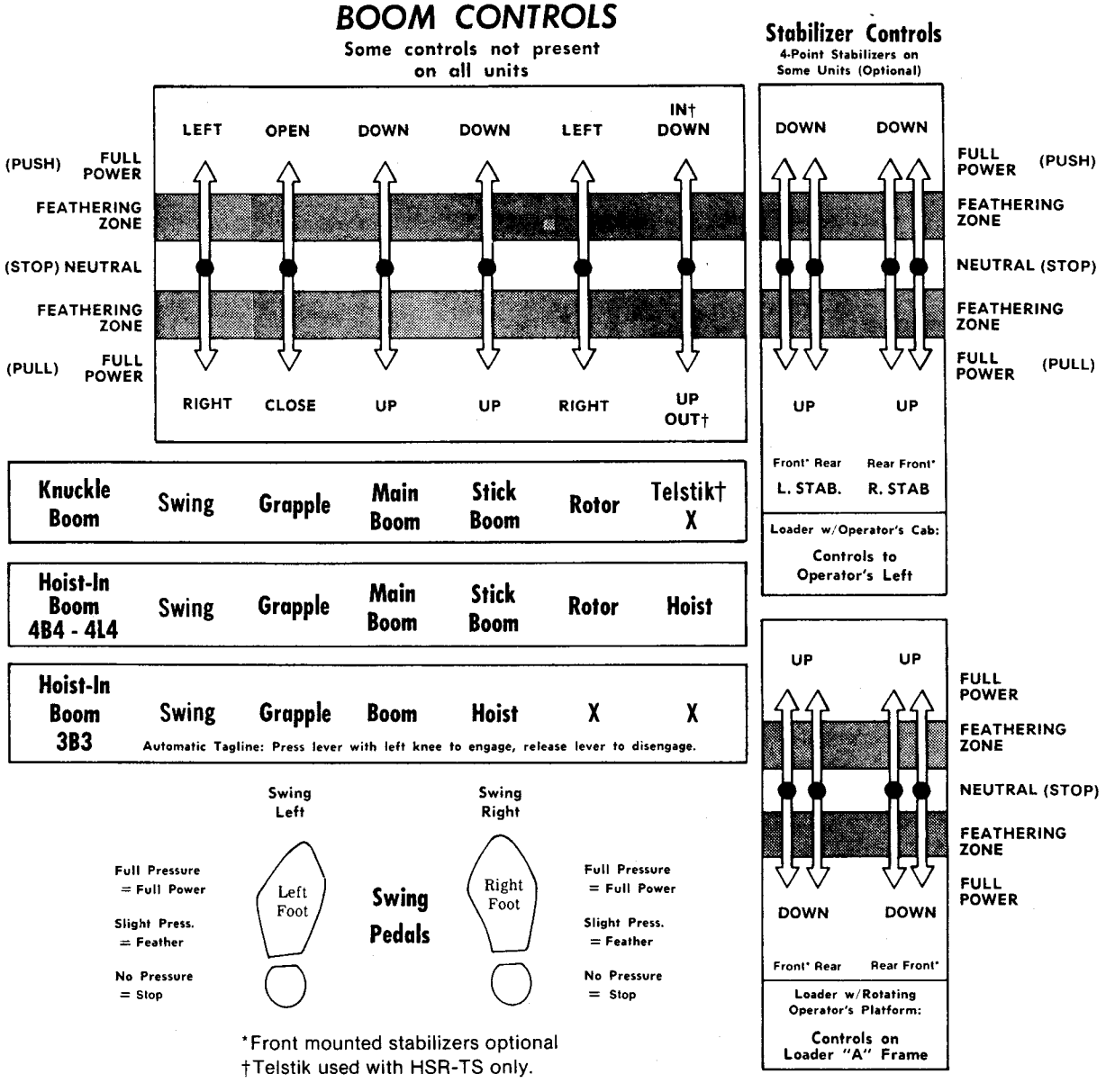
The diagram on this page shows the controls of all standard Prentice Loaders. Loaders and their control functions are listed below the diagram. An X in the row naming the controls of your machine means that the control is not used, and will not be found on your Loader. The diagram itself is intended to show how the controls work. The solid circles indicate valve closed, or "neutral", the double lines with arrowheads stand for control lever travel.

OPERATION TECHNIQUE: FEATHERING CONTROLS

When working the Loader, don't jerk control levers to "full power", or from one extreme to the other. Jerky, "bronc-buster" operation is hard on the machine, tiring to the operator, and in the long run it does not increase production. When starting a motion of the Loader, move the control just a little ways from "neutral" in order to get it started easily, then move the control to the extreme for full power. Do the same when stopping a motion. This method is the one used by experts, and is known as feathering; it works on all hydraulic controls, including SWING. You can actually work faster by feathering controls than by jerking them.

There is no fixed "feathering" position, but you will soon discover how far to move each control for the desired

OPERATION DIAGRAM



*Front mounted stabilizers optional
†Telstik used with HSR-TS only.

effect. Practice with this technique will give you a smooth working cycle, with well-blended, positively controlled motions.

It is especially important to feather SWING and ROTOR controls near extremes of rotation.

FLOAT POSITION CONTROLS

Some machines have float-position control valves, usually on Main Boom and Swing functions. The float-position permits the boom to move freely when it is resting across the pivot area of an articulated carrier such as a pulp forwarder or tractor-trailer rig. To set float-position, rest boom and grapple on the carrier, cut power, and pull control lever all the way toward you until the detent holds it. On valves with control lever pivot **above** valve spool, **push** handle to set float. Normal pivot position is below spool.

> **WARNING:** Never set float position while boom is raised.

CAUTIONS TO OBSERVE WHILE LOADING

(1) Always set truck parking brake or Brake Lock before engaging Power-Take-Off. Lower stabilizers before loading, if your unit is so equipped. Make a test lift before starting work, to check ground condition under stabilizer. Don't spot the machine where ground could give away under stabilizer.

(2) NEVER move truck while operator is on Loader, unless so ordered by operator, for the purpose of spotting. When spotting truck for the operator, PROTECT OPERATOR FROM TREE LIMBS, OVERHEAD WIRES, AND TRESTLES.

(3) Before swinging boom, LOOK AROUND! There may be people or objects standing in its path.

(4) Warn people away from loading area. NEVER let anyone stand under load or raised boom.

(5) Always lower grapple to truck frame or to ground before dismounting. If Loader is to stand idle, disengage Power-Take-Off. NEVER leave a "live" Loader unattended.

(6) When picking up a single log with the grapple, "pinch" it between jaws. Do not try to pick up more wood, or less wood, than the grapple can hold firmly.

(7) Never try to raise a load in such a way that a part of the bundle strikes the boom. The operator who aligns bundle with boom and raises load till boom forces the bundle to slant, is inviting part of the load to come down on his rig, and possibly on himself.

(8) **Cable Machines:** Run cable out to full length once daily, to check it for frays or kinks. Kinks may cause cable to "hang up" in sheaves, delaying work. Frayed cable may break at any time. Keep record of cable inspections. For cable replacement, see "Service Tips". 4L4 maintenance, see page 10.

WHAT TO DO IF YOU GROUND A POWER LINE

(9) LOOK OUT FOR OVERHEAD POWER LINES! Current in a high-voltage line may arc some distance to jump from the wire to a nearby "ground", so **merely not touching power lines is not enough. Keep clear of them.**

If you know the boom has contacted a high wire, try to swing boom away without downing wires. If this is not successful, WARN OTHERS NOT TO TOUCH THE TRUCK OR THE LOADER, and to keep clear of area if wires are downed.

If you must leave the loader, do not touch machine and ground at the same time; jump clear, avoiding any downed lines.

Get in touch with the power company, giving them the number of the nearest numbered pole. If you suspect that the Loader is still grounding current, **don't allow anyone to touch it or the carrier until qualified help arrives.**

Some states require more clearance than shown below. CHECK THE LAW.

RECOMMENDED CLEARANCES Assume all transmission lines to be uninsulated. You'll be safer.	
Local Transmission Lines (750 volts or less): 8'	High Tension Lines (750-7500 volts): 10'
Long Distance Transmission Lines (7500 Volts & Up): 10' + 1/10-foot for each 1000V over 7500.	

CAUTIONS TO OBSERVE ON THE ROAD

(1) When driving between jobs, be sure Power-Take-Off is disengaged. NEVER drive truck while the Loader is "live".

(2) NEVER move truck while operator is on the Loader, unless so ordered by operator, for purpose of spotting. When spotting for the operator, PROTECT HIM FROM TREE LIMBS, OVERHEAD WIRES, AND TRESTLES.

(3) Know the overall height of your rig at all times. NEVER approach a questionable overhead at high speed. Do not drive truck with boom raised.

(4) Always raise stabilizers before moving truck.

SPOTTING

When approaching jobsite, remember not to pull too close. Between 6 and 12 feet is standard, depending upon stabilizer reach. Avoid places where ground could cave away under stabilizer. Align the Loader "A" Frame with the midpoint of the stockpile or loading area, as this will put you in the best position to load more without having to move the truck.

MAINTENANCE

PREVENTIVE MAINTENANCE

There is more to the operation of a machine than knowing which control is which. A good operator doesn't just handle his loader well—he also makes sure that it is properly cared for. A poorly - maintained piece of hoisting equipment may end up costing a lot more than money.

PROCEDURES

1. Before starting the day's work, make a brief inspection of cylinders, tank and pump and look at the ground where the Loader is parked for signs of leakage. Check oil level in Loader reservoir and truck engine after warm-up. (see item 2)
2. In cold weather (below 0°F/-18°C especially), allow time for engine warm-up, then engage the pump drive and run the Loader for a time with all controls in neutral, to warm the hydraulic oil. If oil is too cold for efficient operation, the pump will make more noise than usual; After oil has been warmed to operating temperature, the pump should quiet down. Check oil level before beginning work.
3. Certain parts of the machine should be lubricated daily (see Lubrication Instructions). When greasing pump drive shaft joints, check universals, slip joint, and carrier bearing (if present) for free play. Check pump shaft seal for leakage. In cooler climates especially, we recommend that the Loader be lubricated at midday, to insure that old grease is warm and that new grease is worked into bearings before quitting time. If mid-day is impractical, set aside time for maintenance at end of every operating shift.
4. After the day's work, set down the boom. The Loader should never be left with its boom up. Disengage Pump Drive before shutting off engine. Check oil level in truck and Loader. If there is dirt around the oil tank air breather, clean it away. Wash breather filter in kerosene or nonflammable solvent weekly or as needed.
5. Once a week, carefully inspect hydraulic lines, hoses, and fittings for leakage or signs of damage (refer to "Service Tips").

ADJUSTMENTS

1. **Mounting Bolts:** Check after **first week** of operation, and every 3 months thereafter. On ⅝" mounting bolts, torque wrench reading should be 110 foot pounds; on 1" mounting studs, torque wrench reading should be no more than 500 foot pounds.
2. **Swing Hub Pad & Clamp:** Check after **first week** of operation and every 3 months thereafter. Torque wrench reading should be 690 foot pounds.
3. **Swing Rack Wear Shoe:** Check after **first week** of operation and every 3 months thereafter. Back-off lock nut, tighten lubricator until snug, then back off ½ turn. Tighten lock nut again to secure the adjustment. IMPORTANT: Adjust only with the swing cylinder at end of stroke, and boom resting on ground.
4. **Relief Valves:** Check only when malfunction is suspected. Relief valves should not be adjusted needlessly. Check with your Dealer if you suspect problem. Operate a machine at non-standard relief setting ONLY with **written** permission from **Prentice**
5. **Colorflow Valves** are located on swing cylinders. Turn yellow knob counter-clockwise for faster swing, clockwise for slower swing. ¾-turn from closed is a setting used by many new operators. Experienced operators may prefer higher settings. Earlier model valves (silver knob) have setscrew to keep knob from turning accidentally.
6. Some loaders have colorflow valves on other circuits Adjustment procedure same as above.
   SR: Grapple Rotor; initial setting ½-turn from closed
   SR-TS: Rotor, Fork Cylinder; setting same as above
   Remote Controlled Machines have colorflow valves in all circuits. Initial setting ½ to 1 turn from closed position.

   NEVER CLOSE COLORFLOW VALVE in any work circuit.

SERVICE TIPS (Trouble-shooting)

1. **Loss of Power:** If only one function of the machine seems sluggish, chances are that trouble is in the valve, or in the component. To check condition of component, (if grapple is working normally) hose to the GRAPPLE valve section and check operation GRAPPLE valve section has no port reliefs,* so if any function is sluggish when operated by this valve trouble is probably in the work circuit. If pump malfunction is suspected, check relief pressure at full throttle (no more than 1200 pump r.p.m.) then at idle (about 500 pump r.p.m.). If there is more than 25% difference in pressure readings, pump is either malfunctioning or not getting enough oil. Drain system, clean oil filter, and repeat the above test
2. **Cavitation:** A noisy, sluggish pump may indicate cavitation (air bubbles in oil passing through pump). Cavitation may be caused by (a) clogged oil filter (b) leak in pump intake line; (c) leak in pump shaft seal; (d) pump running overspeed.
   (a) Drain system, clean oil filter.
   (b) Pour hydraulic fluid over suspected leaks in oil line while pump is running at operating speed. If pump quiets down while oil covers suspected leak, the problem can be cleared up by tightening fittings or replacing intake line.
   (c) Replace pump shaft seal.
   (d) Run PTO in lower gear. Recommended Pump Speed is 1200 r.p.m. maximum. Do not exceed without **written** permission from **Prentice.**
3. **Fittings and Hoses:** Usually, a leaky fitting just needs tightening. If repeated tightening is necessary, the fitting may require replacement. Check lines and hoses near a problem fitting for signs of damage. **Re-**

*On TELSTIK units, grapple and rotor have free-flow valve spools. DO NOT plumb any other circuit to these valves. Use stabilizer valve for trouble-shooting circuits.

place damaged lines, hoses, or fittings immediately. A continuous oil leak can cause low oil level, which will damage pump if neglected.

4. **Hydraulic Cylinders:** A good hydraulic cylinder will leave a film of oil on the extended rod; this film is necessary for lubrication. Any other condition indicates packing out of adjustment or damaged. Consult your dealer.

5. **Cable Replacement** (3B3, 4L4, etc.): Do not "spiral" new cable off roll. Reel it off the spool, or if it is coiled, unroll the coil like a hoop. Don't lay new cable where it might be run over, or where it can pick up dirt, shavings or other foreign matter. It is not necessary to let hoist cable out to full length in order to replace it. Just remove cable from grapple, and leave grapple to mark correct length. Cable is anchored by a bolted clamp at base end of boom. Remove bolts and remove cable from clamp. Butt-weld new cable to old at this end. Pull cable through boom until weld reaches grapple. Cut off new cable at base of boom and secure end by fitting it into channel in clamp and bolting clamp together. Break weld and fasten new cable to grapple.

MAINTENANCE OF THE LOADER

SCHEDULED MAINTENANCE SAVES HEADACHES

This chart was prepared in order to help you keep your machine on the job. It has been proved that well-maintained machines do not break down as frequently as machines receiving only occasional care, or no attention at all. The simplest way to be sure that your Prentice Loader is well maintained is to set up a time table on the machine, and use it to keep track of all maintenance work.

It only takes a few minutes to give your Prentice Loader the amount of care it should have. Take the time—your machine will pay you back with many hours of faithful service.

The time intervals given in the Maintenance Schedule stand for the average lengths of time that various parts of the Prentice Loader should go without service. **Maintenance Intervals should be shortened** whenever the machine is faced with extremes in weather, poor working conditions, or multiple shift operation.

MAINTENANCE SCHEDULE

SPECIAL MAINTENANCE (for new machines only): After the intervals mentioned here, regular maintenance intervals should be used.

After **FIRST** 50 hours or first week of operation (new machine)	—Check Mounting Bolts (page 6, Adjustments item 1). —Check Swing Hub Clamp Bolts (page 6, Adjustments item 2). —Check Swing Rack Wear Shoe Adjustment (page 6 Adjustments item 3).
After **FIRST** 300 hours of operation (new machine):	—Drain hydraulic system, clean filter and inside of oil tank. Refill system with new hydraulic oil.

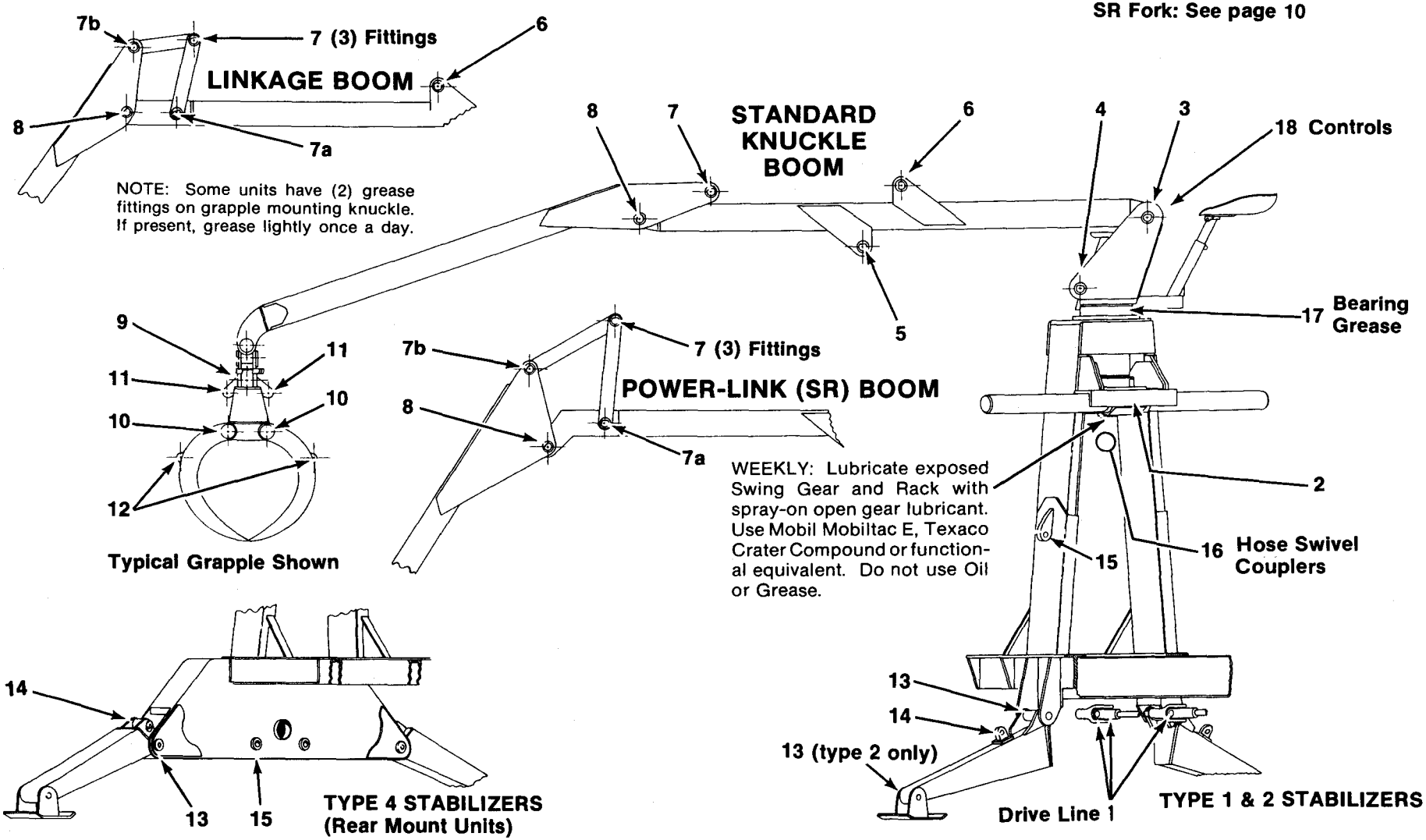
REGULAR MAINTENANCE

Daily or Every 10 Hours:	—Check Hydraulic oil Level —Grease fittings on Boom and Grapple (see lube chart) —Grease fitting on Swing Rack Housing —Lubricate Pump Drive Shaft Fittings.
Twice Weekly or Every 25 Hours:	—Lubricate Swivel Couplings on Hoses leading through Spindle —Grease Stabilizer fittings
Weekly or Every 50 Hours:	—Clean Oil Tank Breather. —(Cab Only) Grease Control Fittings. —Grease Spindle Bearing Fittings, Swing Rack & Pinion —Inspect Hoses for Damage or Abrasion —Check Hydraulic Connections for Leaks
Every 3 Months or 600 Hours:	—Check Mounting Bolts (page 6, Adjustments item 1). —Check Swing Hub Clamp Bolts (page 6, Adjustments item 2). —Check Swing Rack Wear Shoe Adjustment (page 6 Adjustments item 3). —Grease Stinger (TELSTIK units)
Twice a Year or Every 1200 Hours: (preferably Spring and Fall)	—Drain Hydraulic System, clean Filter and inside of Oil Tank. Refill System with new hydraulic oil.

LUBRICATION POINTS

Grease-fitting locations are called out by number in the drawing below. The list gives the number, the time interval, and the location for each fitting; on some, instructions are included.

4L4 & 4B4 Booms: See pages 11
SR Fork: See page 10



If your machine is subject to abrasive or corrosive conditions (Loading lime, cement, compost fertilizer, dredging in salt water, etc.), fittings on end of boom and on grapple should be greased more frequently.

On the Spindle Bearings, use Wheel Bearing Grease, NGLI Grade #2 or equivalent. On all other fittings, use any good grade of gun-Grease, such as you would use on your truck chassis.

Where available, we recommend the use of Mobilgrease 77 or functional equivalent in all bearings. Mobilgrease 77, or its functional equivalent, is one of the new rust-resistant lubricants, which meet the following specifications: (1) Dana Corp. Special Ep Grease, (2) GM Truck Grease Spec. No. 37732R, (3) Caterpillar Multipurpose Grease Spec. No. 1E325.

LUBRICATION PROCEDURES

DAILY MAINTENANCE

1. PTO Shaft Slip Joint & U-joint fittings. Three (3) fittings.

2. Swing Rack Wear Shoe Fitting, located at center of swing cylinder assembly, on opposite side of rack from swing gear. One (1) fitting. INSTRUCTIONS: Rack should be lubricated at three (3) points. Position boom midway between extremes of swing and give fitting three (3) shots. Swing boom 90° to left and to right from midpoint, and give fitting three (3) shots in each position.

BOOM FITTINGS (items 3 thru 8) are for PRENTICE Knuckle, Linkage, and Power-Link booms. For 4L4, see page 11.

3. Main Boom Pivot Pin Fitting, located on bushing, facing to rear; access through hole in base of main boom when lowered. One (1) fitting.

4. Main Boom Cylinder Base End Pin fitting, located on pintube, facing up; lower boom for access. One (1) fitting.

5. Main Boom Cylinder Rod End Pin fitting, located on pintube, facing down; lower boom for access. One (1) fitting.

6. Stick Boom Cylinder Base End Pin fitting, located on pintube, facing down; for access, lower boom to ground. One (1) fitting.

7. Stick Boom Cylinder Rod End Pin fitting, located on pintube, facing down; for access, lower stick boom part way, then lower main boom till grapple touches ground. One (1) fitting. NOTE: On Loader with Linkage Boom, three (3) fittings.

7a. Linkage to Main Boom Pin fitting (Linkage Boom Loader only), located on pintube; access through hole in bottom of main boom. One (1) fitting.

7b. Linkage to Stick Boom Pin fitting (Linkage Boom Loaders only), located on pintube, facing down; for access, lower stick boom part way, then lower main boom till grapple touches ground. One (1) fitting.

8. Stick Boom Pivot Pin fitting, located on pintube, facing down; for access, lower boom to ground. One (1) fitting. NOTE: On TELSTIK units, smear a film of grease on sides and bottom surface of stinger every three (3) months.

ATTACHMENT FITTINGS (items 9 thru 12) are for typical PRENTICE dual-jaw grapples, which all have fittings at points shown, regardless of appearance. For Model 1051 (SR) Fork, see page 10.

9. Grapple Swivel Pin fitting, located on side of grapple head, opposite rotation stop. One (1) fitting.

10. Grapple Jaw Pivot Pin fittings, located on sides of pivot tubes in grapple head. Two (2) fittings.

11. Grapple Cylinder Base End Pin fittings. Two (2) fittings.

12. Grapple Cylinder Rod End Pin fittings. Two (2) fittings.

TWICE WEEKLY

13. Stabilizer Arm Pivot Pin fitting, located on pin tube, facing up; for access, lower stabilizer. One (1) fitting on each stabilizer. Type 2 stabilizers also have one fitting on end of arm for pad hinge pin.

14. Stabilizer Cylinder Rod End Pin fitting, located on pinhead. On Types 2 & 4 stabilizers, fitting is located on cylinder pintube. One (1) fitting on each stabilizer.

15. Stabilizer Cylinder Base End Pin fitting, located on pinhead. On Types 2 & 4 stabilizers, fitting is located on cylinder pintube. One (1) fitting on each stabilizer.

16. Hose Swivel Coupler fittings, located on hydraulic hoses just under spindle. (Not illustrated.) Four (4) fittings on standard unit, single circuit. Five (5) fittings on standard unit, tandem circuit. Eight (8) fittings on unit with cab, single circuit. Nine (9) fittings on unit with cab, tandem circuit. NOTE: These swivels don't require a large amount of grease, but new grease will keep swivels clean. Give each fitting a short shot.

WEEKLY

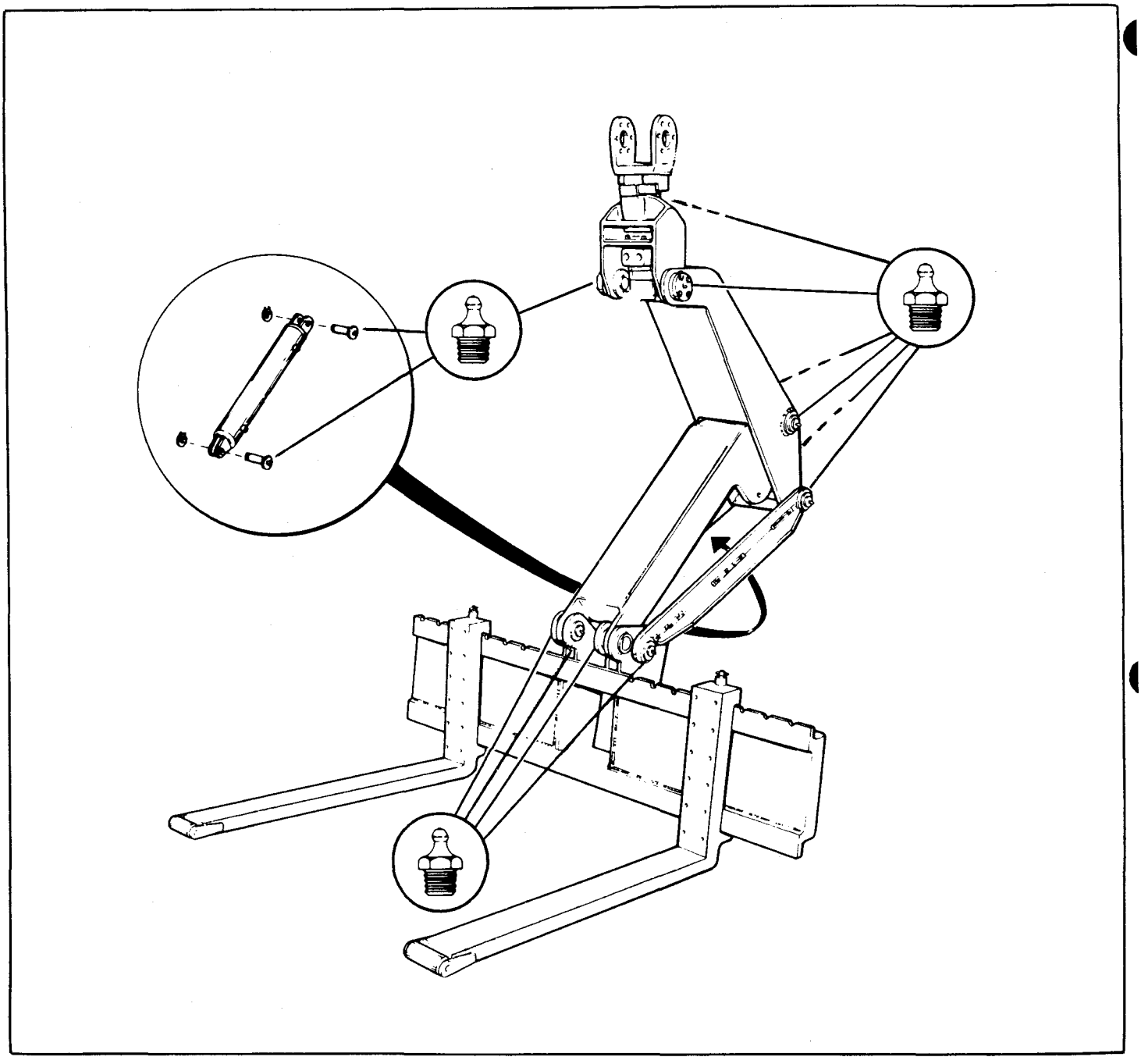
17. Spindle Bearing fittings, located on spindle housing just above "A" frame. Two (2) fittings spaced around housing. Give each fitting five (5) shots of Bearing Grease.

CONTROLS

18. Loaders without Cab: Oil Control handle pivot pins and linkage. Loaders with Cab: Grease Control fittings; access under cab floor. One (1) fitting per lever, three (3) on swing pedal linkage. (Not illustrated.)

LUBRICATION & MAINTENANCE PROCEDURES

Continued



1051 MULTI-PURPOSE FORK

Used on Series GSR and HSR

REGULAR MAINTENANCE

Daily or as required:

Grease: Pivot and linkage pins.
Grease: Swivel pin bushing in fork roto-head casting.
Check: Hydraulic connections for leaks.
Hydraulic hose for damage and wear.
Action of tine rollers and tine adjustment pins—oil lightly if necessary.

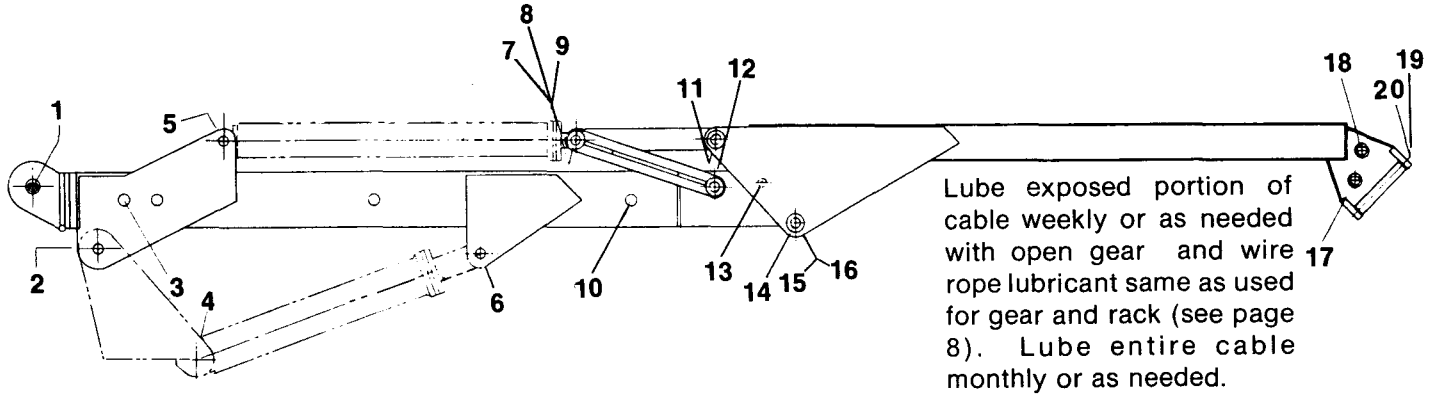
Weekly or oftener, as required:

Check: Orbit motor mounting bolts for tightness.
Friction Knuckle adjusting capscrew for tightness.
Capscrews (4 each) on fork arm support trunnion pins for tightness

LUBRICATION OF CABLE-HOIST BOOMS

All fittings indicated by numbers must be greased daily. There are as many fittings as there are numbers; where two or three numbers lead to a single point, look for two or three fittings. In extremely hot weather, or when working conditions are poor, grease twice daily. Use type of grease recommended on page 8.

4L4 BOOM LUBRICATION POINTS



Lube exposed portion of cable weekly or as needed with open gear and wire rope lubricant same as used for gear and rack (see page 8). Lube entire cable monthly or as needed.

NOTE: This Chart supplements the Chart on page 8. Follow Lube Instructions through Items 1, 2 and 13 thru 18 if applicable. Continue with lube points called out on this sheet. Units with Grapple, see Items 9-12 on Page 9.

REGULAR MAINTENANCE IS THE KEY TO TROUBLE-FREE PERFORMANCE

The maintenance of the Prentice Hoist-in-Boom involves four simple steps:

1. Let hoist out all the way, and inspect and lubricate working end of cable *once a week.*
2. Inspect and lubricate fixed end of cable *monthly.* Removal of hoist cylinder is not necessary; Use the following method:
   (a) Let out cable to full length, inspect it, and remove grapple or attachment (removing attachment makes the job easier).
   (b) Release cable from clamp at base end of boom, and pull at this end until grapple cable clamp reaches fairleads at end of boom. Doing this will expose cable normally hidden inside boom. If cable is very difficult to pull through, you probably have a bad cable and should replace it. If it is OK, reinstall by reversing above procedure.
3. Keep a written record of cable inspections. A kinked or frayed cable may hang up in sheaves, or give way on the job, causing expensive delay and probable damage to persons and property. Replacing worn cable before it breaks is good safety practice and good business; also, it takes less time. The easy way to do this is to let cable out all the way, lower boom, remove grapple and pull cable straight away from machine. Leave a marker so you'll have a reference for proper length of new cable. Butt-weld new cable to old (either end of boom) and pull it through boom until new cable is at proper length (remember the reference mark). Break weld and clamp new cable in place.

   NOTE: Replacement cables from PRENTICE are already cut to correct length.
4. Once a year, or as necessary, remove and inspect hoist assembly. Disconnect hoses and remove capscrews that hold Base-end Plate to Main Boom. Slide cylinder and cable assembly out of boom.

   CAUTION: Don't try this alone—hoist assembly weighs about 500 lbs. USE A HOIST.

   Inspect cylinder for leaks, worn packing, rod seal, etc. Inspect cable, sheaves and bearings for play, wear, or other damage. Overhaul as necessary.

   When re-installing hoist assembly, take care not to let cables become crossed. The hoist chamber in the boom is designed with tight clearances, so that cables inside boom can't become crossed accidentally while operating. If they are crossed during installation, they will stay that way, and will jam when you try to operate.

   KEEP CABLES IN LINE WITH SHEAVES WHILE INSTALLING HOIST ASSEMBLY.

MAINTENANCE OF THE LOADER

HYDRAULIC SYSTEM MAINTENANCE

Check Hydraulic Oil Level Daily

After running the Loader for long enough to warm the oil, straighten the boom and lower it until the grapple touches the ground. Shut off the Loader by stopping engine or disengaging PTO. Oil tank dipstick is on the fill-cap with the breather.

Clean around fill cap before removing. If oil is below "F", add oil until correct level is reached. Refer to Oil Specifications, below. Once a week, Clean Oil Tank Breather in fuel oil or non-flammable solvent.

Change Hydraulic Oil Every Spring and Fall.
Hydraulic Oil should be changed after the break-in-period **(first 300 hours of operation),** and **every six (6) months** after that. Use the following method:

To Drain:
Raise the boom all the way and straighten it. Shut off the engine. Remove the drain plug from the bottom of the oil tank and let the oil run out. Catch-basin should hold about 25, 45 or 80 gallons, depending upon tank capacity (20, 31 or 65 gallons).

Push the STICK BOOM control to let stick boom drop, forcing oil from stick boom cylinder.
Push the MAIN BOOM control to let main boom drop, forcing oil from main boom cylinder.

To Clean:
Remove the filter screen from the oil tank by taking out mounting capscrews, removing clean-out cover and unscrewing filter from nipple on tank outlet. **Clean around cover before removing.**

NOTE: Some machines have in-line oil filters. On most models, filter screens are mounted on cleanout cover, deck-mounted tanks have cleanout cover on top; filters must be unscrewed from side of tank after cover is removed.

Clean any shavings, dirt and other sediment from inside of tank. Clean magnetic drain plug. Clean filter by rinsing it in kerosene or non-flammable solvent, and dry it thoroughly with compressed air or by shaking vigorously. Do not strike the screen against a hard surface.

Replace gaskets, if damaged, and re-install filter screen. Put magnetic drain plug back in place.

To Refill:
Refill the hydraulic system with the proper oil for the season to come (see Oil Specifications). Oil should be poured through a clean, fine-mesh screen. **Never use a cloth.**

First fill the tank, then start the Loader and let it run with all valves in neutral until the pump quiets down. Add more oil, then stand by the hydraulic tank with more oil while the operator works all functions of the Loader, in order to work air from the system. Straighten boom, lower it, and check oil level. Add oil as required.

WARNING: DO NOT LET OIL DROP BELOW LEVEL OF PUMP SUPPLY LINE, because this will result in serious damage to the pump.

Put fill caps back in place, run the Loader for a while, then check oil level again. Add oil if necessary.

Hydraulic Oil Requirements

Hydraulic oil used in Prentice Hydraulic Machinery should have a viscosity index of 90 or higher, and an SSU viscosity of 140 or higher at 100° F and 37° C. Aniline point should be 165 or higher. Oil should have anti-foam and anti-oxidation additives.

The Following Oils Meet our Requirements. Use these oils or their functional equivalent. Your lubricant dealer can help you.

In Summer (Average outside temperature above 32° F and 0° C).

MOBIL MOTREX NO. 101
SHELL ROTELLA NO. 54001
SHELL ROTELLA T NO. 54101
TEXACO REGAL B R&O

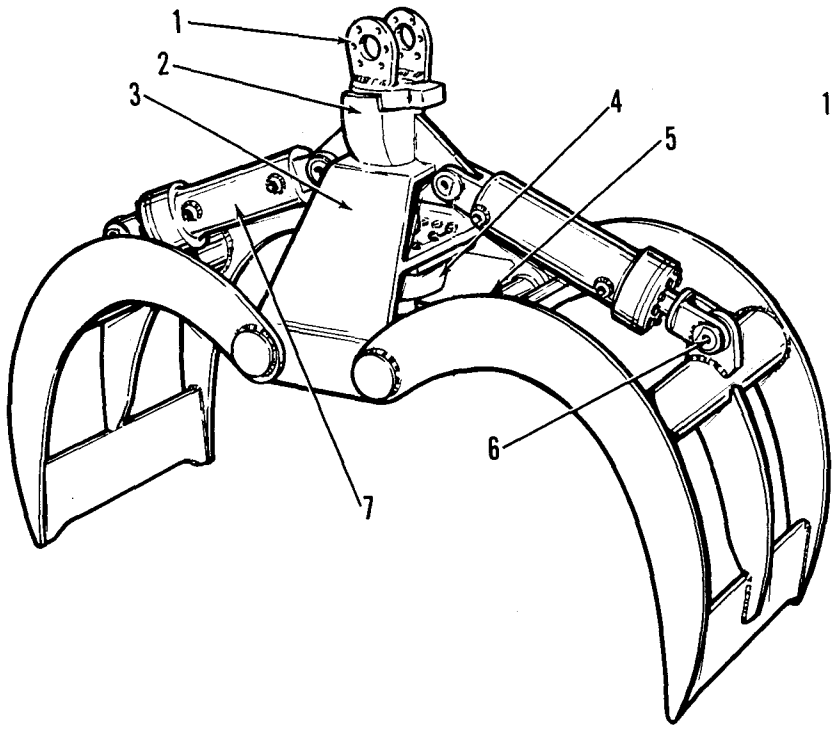
In Winter (Temperature below —20° F and —29° C expected).

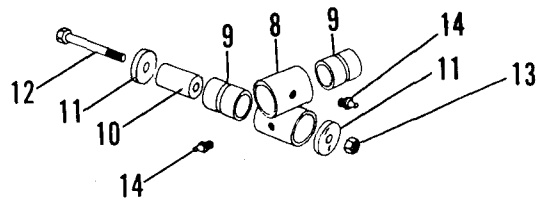
MOBIL MOTREX NO. 119
SHELL DONAX T-6
SHELL DONAX T-5
TEXACO REGAL A R&O

All Season Oil (if outside air temperatures cover a wide range the year round).

MOBIL DTE NO. 23
Pour Point —40° F to +250° F
Pour Point —40° C to +107° C

For further information, consult your Dealer.





DETAIL A

Mounting knuckle in use prior to April 1966. For current assembly refer to PHI 157.

GRAPPLE ASSEMBLY

210, 311 & 411

Item	Qty.	Part No.	Part Name
		166041	Grapple, 210 w/snap-ring head cylinders and 1/2" jaws no. 900633*
		166096	Grapple, 210 w/bolt on head cylinders and 1/2" jaws*
		166098	Grapple, 210 w/bolt on head cylinders and 3/4" jaws no. 900826*
		166105	Grapple, 210 w/bolt on head cylinders and 3/4" jaws and teeth*
		166111	Grapple, 210 w/90 degree stop and 3/4" jaws no. 900826*
		166045	Grapple, 311 w/1/2" jaws*
		166102	Grapple, 311 w/3/4" jaws*
		166046	Grapple, 411 w/1/2" jaws*

*NOTE: Jaw numbers listed in above descriptions refer to single jaw only. Where no jaw number is listed, order by name and grapple part number.

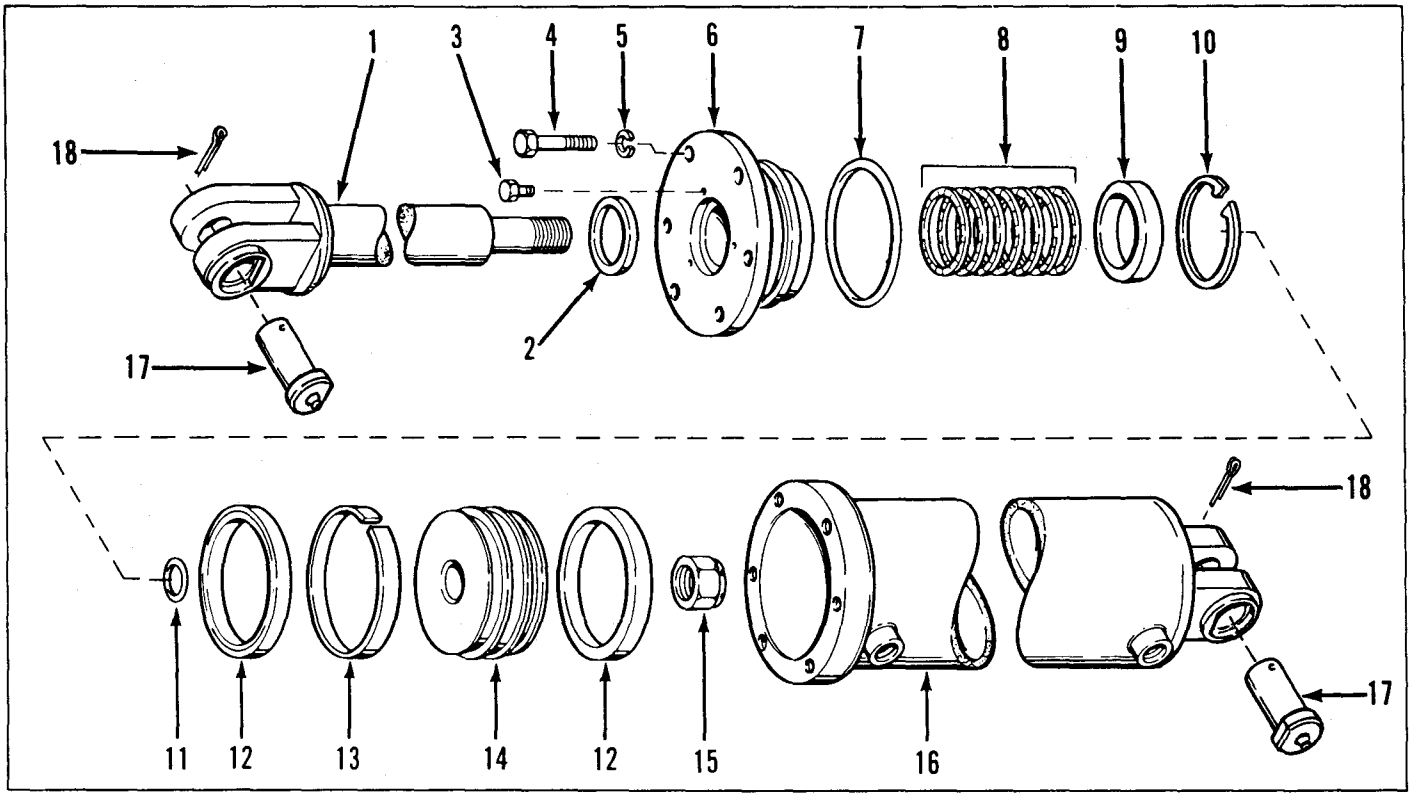
Item	Qty.	Part No.	Part Name
1	1	900227	Head Assembly (w/hub and bushing)
2	1	102508	Bushing, hub (located inside hub)
	1	121005	Fitting, grease - hub bushing
3	1	166057	Swivel Pin - See PHI 149
	1	166091	Swivel Pin w/90 degree stop - for grapple 166111 (See PHI 149)
4	1	146508	Rotor - See PHI 143
	4	302811	Bolt, rotor mounting
	4	305008	Lockwasher, rotor mounting
	4	304208	Nut, rotor mounting
5	2	121004	Fitting, grease - jaw pivot
6	4	136001	Pin, cylinder mounting
	4	309605	Key, cotter - mounting pin retaining
	4	121002	Fitting, grease - cylinder mounting pin
	4	102501	Bushing, cylinder mounting ear
7	2	110002	Cylinder (snap-ring type) for breakdown See PHI 4
	2	110087	Cylinder (bolt-on head type) for breakdown See PHI 155

DETAIL A

Mounting Knuckle in use prior to April 1966. For current assembly refer to PHI 157.

8	1	166013	U-Joint
9	2	102504	Bushing, U-Joint
10	2	136009	Pin, mounting
11	4	136010	Washer, mounting pin
12	2	300821	Bolt
13	2	304008	Nut
14	2	121005	Fitting, grease

Please include loader model and serial number and parts book form number on all orders.



GRAPPLE CYLINDER
(3 1/2" Bore - 1 1/2" Rod - 8" Stroke)

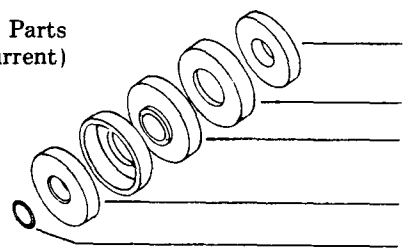
Item	Qty.	Part No.	Part Name
	1	110087	Cylinder, complete (for non-current snap-ring type see PHI 4)
1	1	112002	Rod
2	1	147004	Seal, wiper
3	3	300100	Capscrew, wiper seal retaining
4	6	300406	Capscrew, head retaining
5	6	305004	Lockwasher
6	1	113056	Cap, cylinder head
7	1	135338	Seal, static ("O" ring)
8	1	117001	Packing, chevron (7 "V" rings)
9	1	113057	Spacer, snap ring
10	1	151003	Snap Ring
11	1	135214	Gasket used on piston 114036 ("O" ring)
12	2	117206	Cup, piston (urethane)
13	1	117017	Wear Ring - used on piston 114036
14	1	114036	Piston (replaces 114002)
15	1	304514	Nut, piston retaining (self-locking)
16	1	111096	Barrel, cylinder
17	2	136001	Pin, cylinder w/121002 grease fitting
18	2	309605	Key, cotter - pin retaining

SEAL KIT 147515 consists of items 2, 7, 8 and 11.

SEAL KIT 147819 consists of items 2, 7, 8, 11 and 12.

NOTE: 3-1/2" cylinders built before 1 November 1968 (non-current) take the following parts:

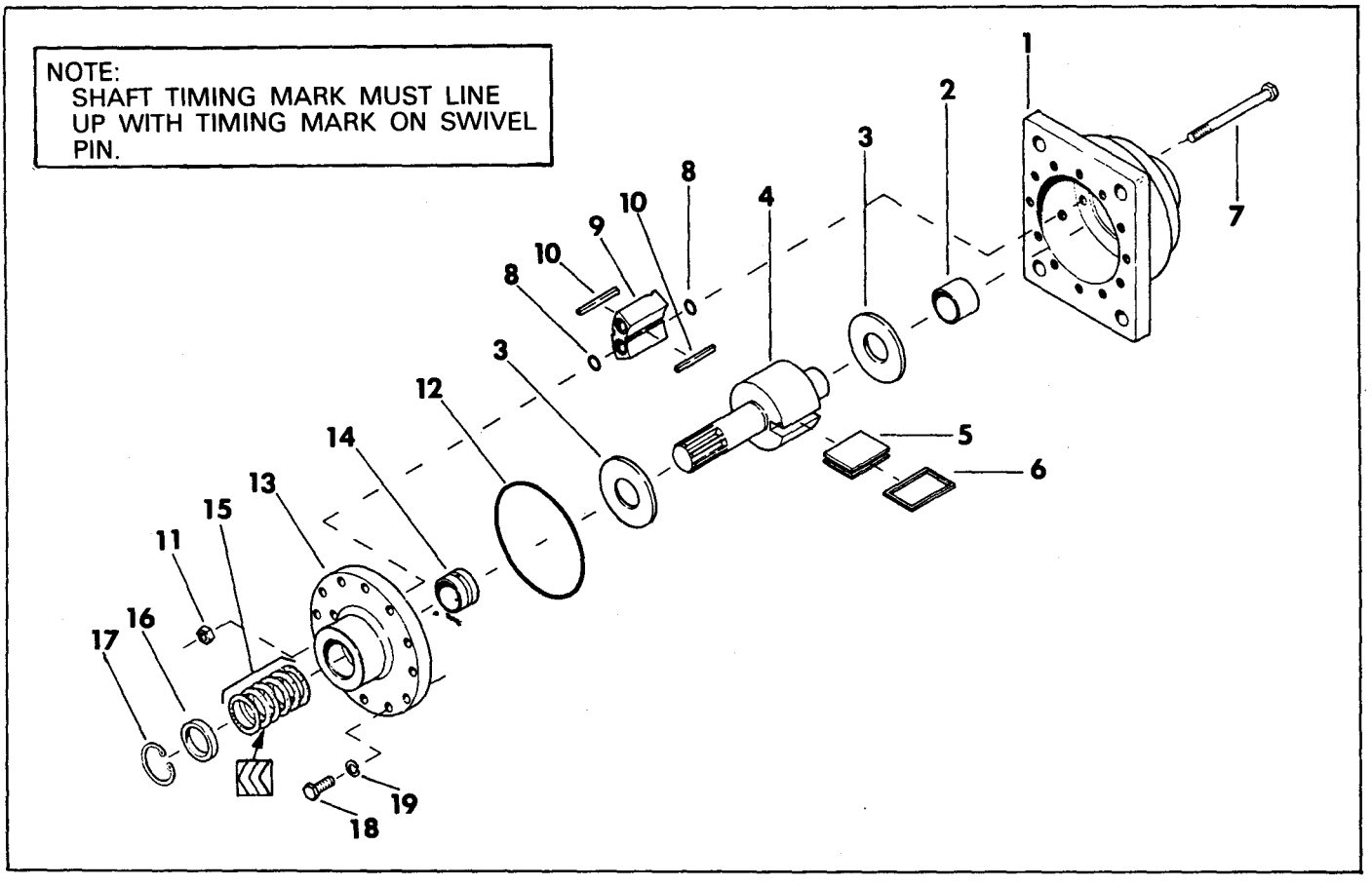
Piston Parts (non-current)



Part No.	Description
115001	Spacer, external
116001	Cup, piston (2 required)
114002	Piston
115002	Spacer, internal
135022	Gasket, piston ("O" ring)

SEAL KIT 147619 consists of items 2, 7, 8, 11 and 116001 piston cups.

Please include loader model and serial number and parts book form number on all orders.



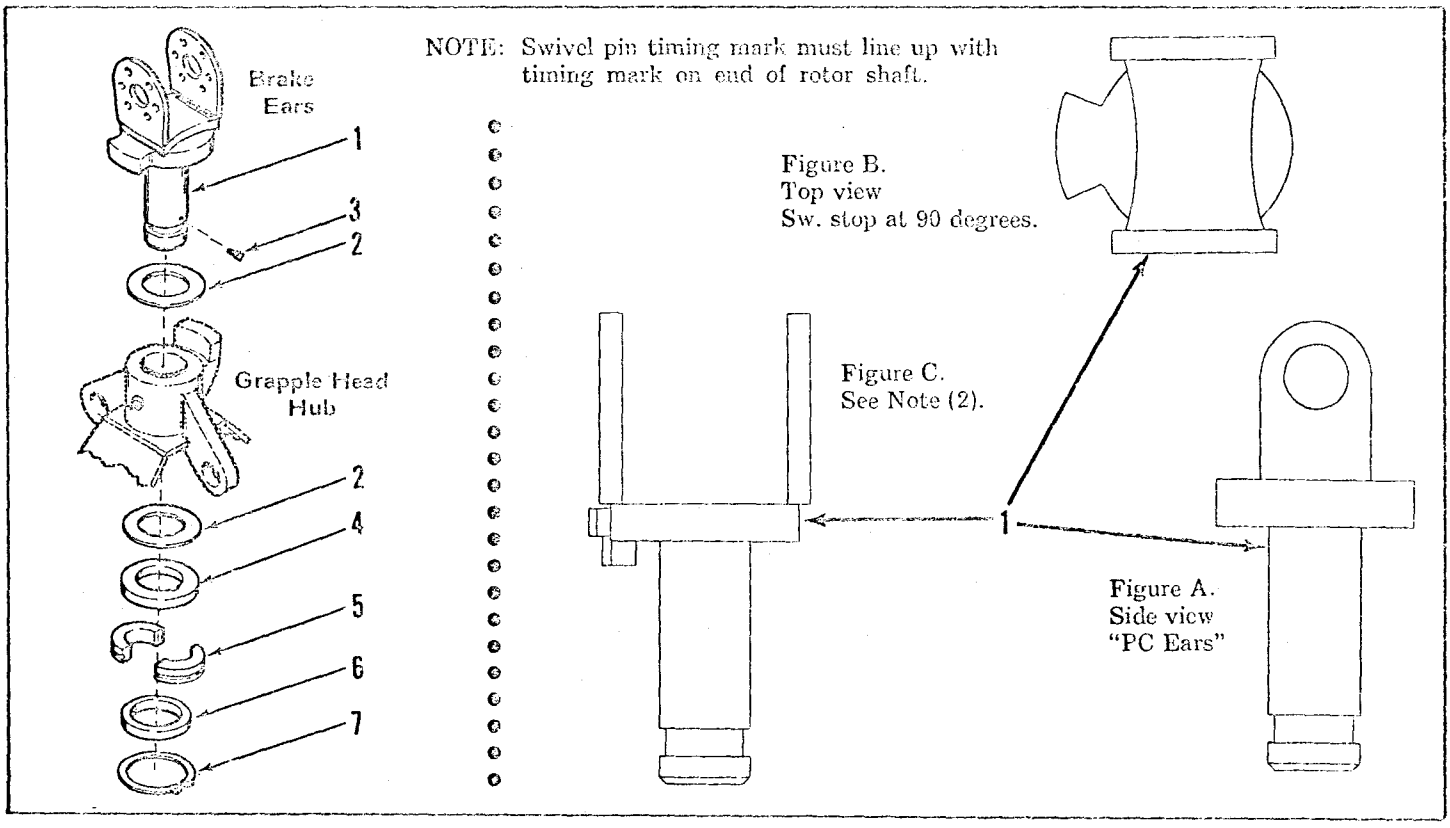
ATTACHMENT (GRAPPLE) ROTOR ASSEMBLY
(CURRENT PRODUCTION AS OF DECEMBER 1965)

Item	Qty.	Part No.	Part Name
	1	146508	Rotor, complete (consists of items 1 thru 19)
1	1	146020	Housing, rotor
2	1	102005	Bushing, housing
3	2	146010	Washer, thrust
4	1	146004	Shaft, rotor
5	1	146023	Vane
6	1	146024	Seal, vane — quad ring
7	2	302419	Capscrew, divider block (7/16-20 x 5 UNF)
8	4	135017	"O" ring, seal — divider block
9	1	146021	Divider Block
10	2	146012	Seal, wiper — divider block
11	2	304519	Nut, lock — Eslok (7/16-20 UNF)
12	1	135255	Seal, rotor cover ("O" ring)
13	1	146025	Cover, rotor
14	1	102509	Bushing, rotor cover
15	1	117022	Packing, chevron (6 "V" rings)
16	1	146026	Adapter, chevron packing (female)
17	1	151002	Snap Ring
18	12	306712	Capscrew, rotor cover mounting (special)
19	12	305004	Lockwasher (7/16)

SEAL KIT 147703 consists of items 6, 8, 10, 12 and 15.

NOTE (1): Each rotor assembly takes (2) rotor port swivel fittings part no. 125027.
NOTE (2): Rotor mounting hardware: (4) 302811 capscrew, (4) 305008 lockwasher and (4) 304208 nut.

Please include loader model and serial number and parts book form number on all orders.



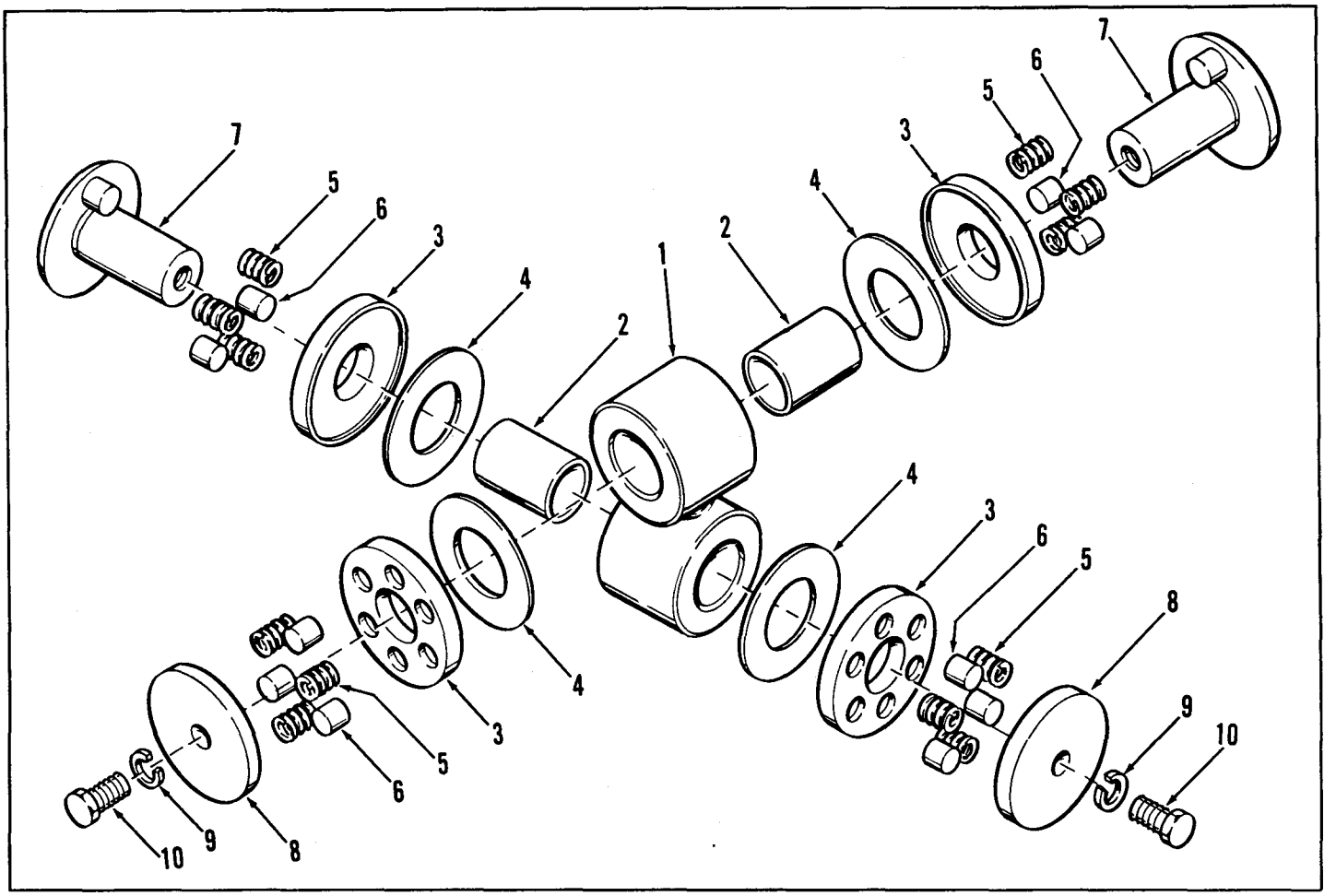
SWIVEL PIN ASSEMBLY - Grapple with Rotor

Item	Qty.	Part No.	Part Name
1	1	166056	Swivel pin (see figure A)
1	1	166057	Swivel pin with brake ears
1	1	166058	Swivel pin - early 1010 grapple (see figures A & B)
1	1	166059	Swivel pin with brake ears, 1010 and 5010 grapple (see figure B)
1	1	166060	Swivel pin (see figures A & B)
1	1	166091	Swivel pin with brake ears (see figure B)
1	1	166064	Swivel pin with brake ears (see figure C & NOTE 2)
2	2	166005	Washer, thrust
3	1	306502	Set Screw, thrust collar (square head)
4	1	166004	Collar, thrust (w/keyway for setscrew)
5	1 pr.	166061	Ring, split (pair)
6	1	166062	Ring, lock - split ring retaining
7	1	151110	Snap Ring, lock ring retaining

NOTE (1): Swivel pin shown on this page recommended as replacement for swivel pin with dual snapring retainer as shown on Form PHI 142. Retaining hardware items 2, 3 and 4 interchangeable.

NOTE (2): See Figure C. Swivel pin 166064 recommended as replacement for 166035 swivel pin with dual snapring retainer as shown on Form PHI 142. Available with PC ears under part no. 166063 to replace 166003 on older units. Retaining hardware items 2, 3 and 4 interchangeable.

Please include loader model and serial number and parts book form number on all orders.



PRENTICE FRICTION KNUCKLE

Grapple Mounting U-Joint

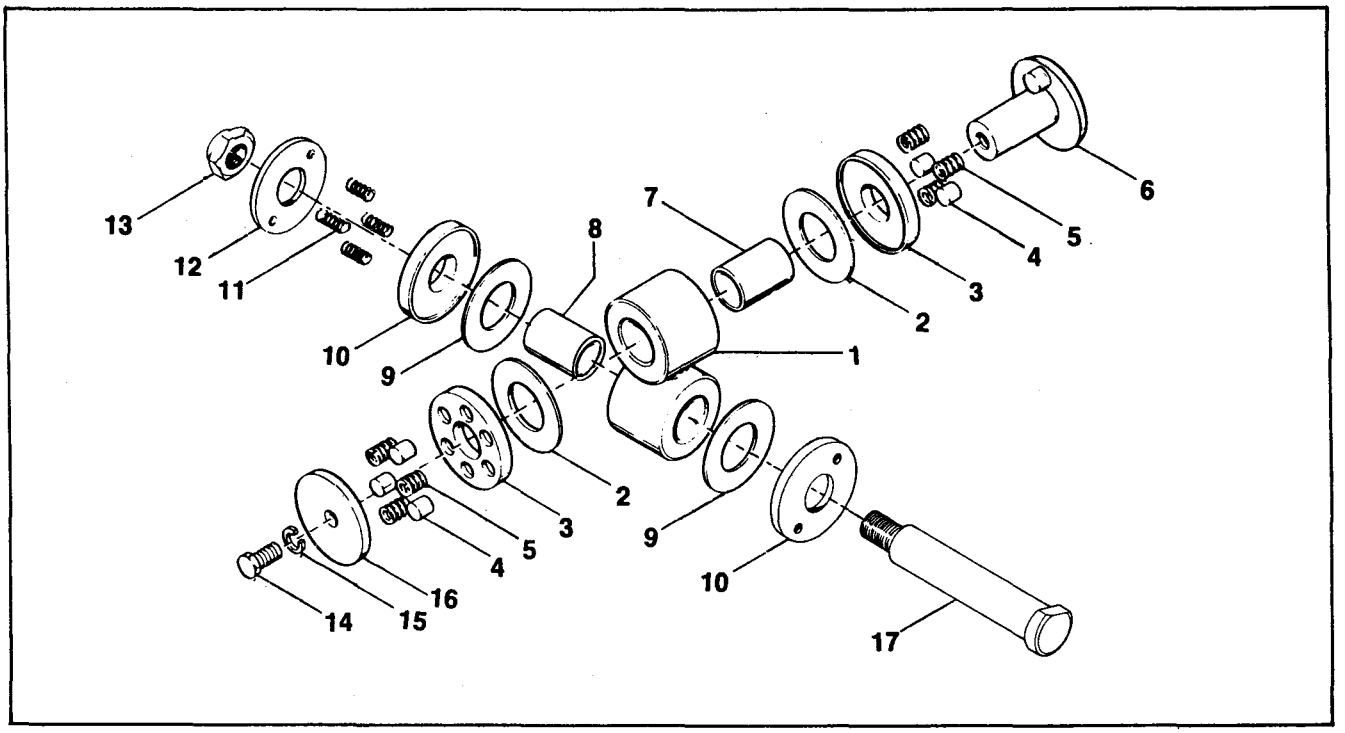
CURRENT AS OF 28 MARCH 1966

Item	Qty.	Part No.	Part Name
		166800	Knuckle, brake — complete (consists of items 1 thru 10)
1	1	166822	Casting, brake knuckle w/102264 nylon bearings
2	2	102264	Bearing, plain — nylon (self-lubricating)
3	4	166805	Plate, pressure
4	4	101308	Lining, brake
5	12	000922	Spring, pressure plate
6	10	166806	Pin, pressure plate
7	2	136084	Pin, mounting
8	2	136056	Washer, mounting pin
9	2	305008	Lockwasher
10	2	300809	Capscrew

NOTE: 166800 Brake Knuckles manufactured between 28 March 1966 and 12 May 1969 were equipped with hardened steel bushings.

If replacement of bushings is required, we recommend use of 102264 self-lubricating bearings and removal of grease fittings from knuckle casting.

Please include loader model and serial number and parts book form number on all orders.



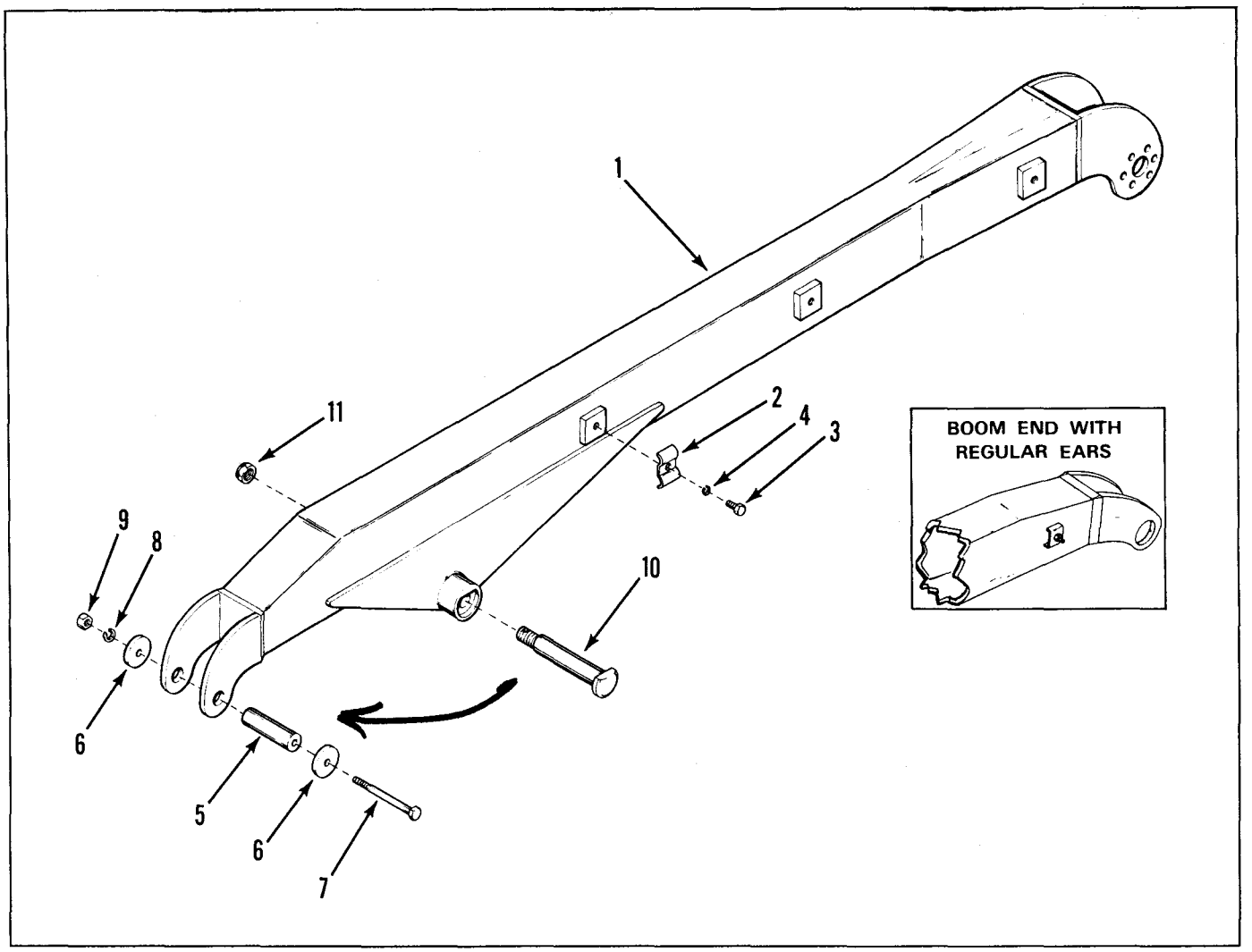
PRENTICE FRICTION KNUCKLE

Grapple Mounting U-Joint

(ADAPTER KNUCKLE FOR 2011 GRAPPLE)

Item	Qty	Part No.	Part Name
-	1	507290	KNUCKLE, brake - complete - (consists of items 1 thru 17)
1	1	507365	KNUCKLE, adapter
2	2	101308	BRAKE LINING, upper
3	2	166805	PLATE, pressure - upper
4	5	166806	PIN, pressure plate
5	6	000922	SPRING, pressure - upper
6	1	136084	PIN, mounting - upper
7	1	102264	BUSHING, plain - upper
8	1	102281	BUSHING, plain - lower
9	2	101310	DISK, friction brake - lower
10	2	507009	PLATE, pressure - lower
11	4	152013	SPRING, knuckle - lower
12	1	507008	DISK, spring retainer
13	1	304515	NUT, self locking - 1-1/2"-12 UNF
14	1	300809	CAPSCREW - 3/4" x 1-3/4" UNC
15	1	305008	LOCKWASHER
16	1	136056	WASHER, mounting pin
17	1	136228	PIN, lower - 2-1/16" x 8-1/16"

Please include loader model and serial number and parts book form number on all orders.

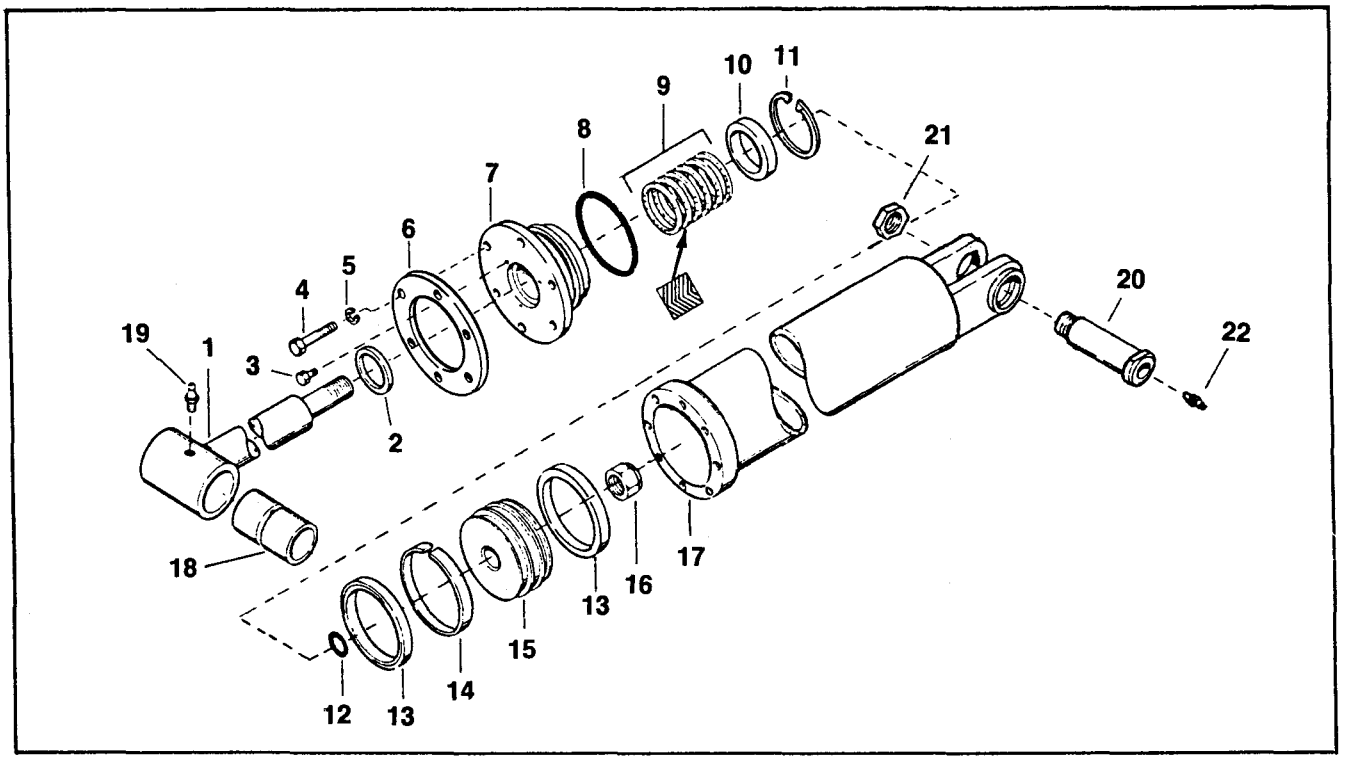


STICK BOOM
for TMS and 2S1 Loaders

Item	Qty.	Part No.	Description
1	1	180007	Stick Boom, w/reg. ears (66" spar — 53 1/2" pin to pin)
1	1	180012	Stick Boom, w/reg. ears (81" spar — 68 7/8" pin to pin)
1	1	180025	Stick Boom, w/reg. ears (72" spar — 60 3/4" pin to pin)
1	1	180059	Stick Boom, w/brake ears (66" spar — 56 1/8" pin to pin)
451061 1	1	~~180057~~	Stick Boom, w/brake ears (81" spar — 71 1/2" pin to pin)
1	1	180058	Stick Boom, w/brake ears (72" spar — 62 1/2" pin to pin)
2	6	130016	Holder, hose
3	6	300306	Capscrew, 3/8 x 1 1/4 NC
4	6	300503	Lockwasher
5	~~1~~	~~136009~~	Pin, stick boom cylinder
136162 6	~~2~~	~~136010~~	~~Washer, special~~
7	~~1~~	~~300821~~	~~Bolt, 3/4 x 6 NC~~
8	~~1~~	~~305008~~	~~Lockwasher~~
9	~~1~~	~~304008~~	~~Nut~~
10	1	136157	Pin, pivot
11	2	304515	Nut, self-locking

NOTE (1): For pin to pin distance measure from center of stick boom pivot pin hole to center grapple pin hole.
NOTE (2): "Brake Ears" for grapple are standard in current production, specify with or without brake ears when ordering.
NOTE (3): For grapple mounting knuckle see FORM NO. PHI 157.

When ordering parts please show model and serial number of loader and parts book form number.



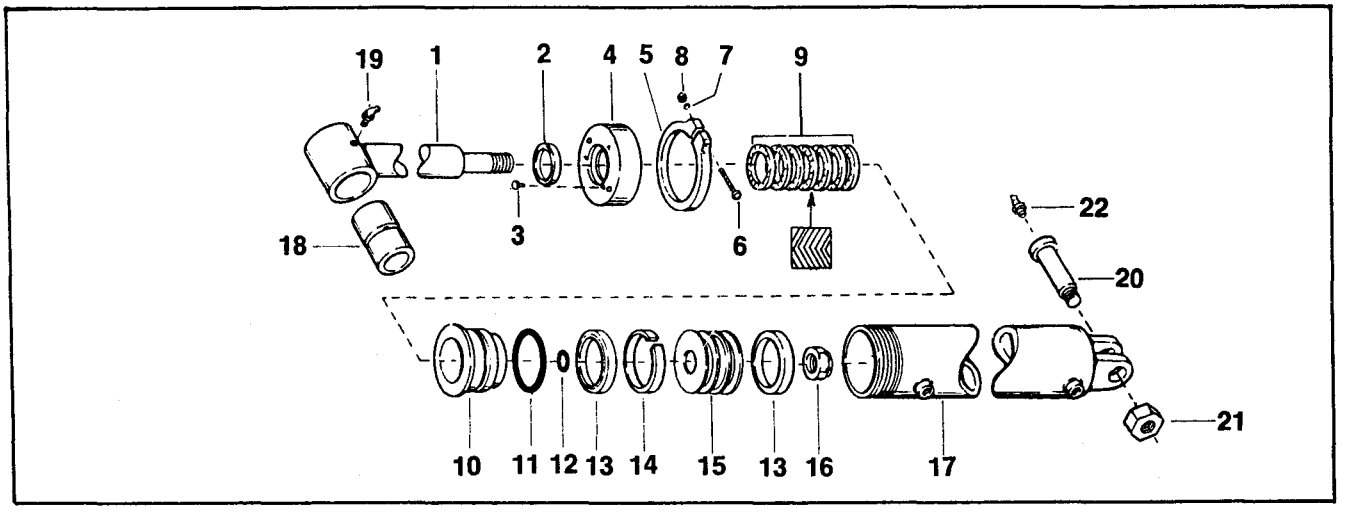
TMS STICK BOOM CYLINDER

3-1/2" BORE x 36" STROKE — 1-3/4" ROD

Item	Qty	Part No.	Part Name
-	1	110150	CYLINDER - complete - (consists of items 1 thru 19) - for screw-cap type see opposite page
1	1	112006	ROD - (includes item 18)
2	2	147006	SEAL, wiper
3	3	300100	CAPSCREW - 1/4"-20 UNC x 3/8"
4	6	300406	CAPSCREW - 7/16"-14 UNC x 1-1/4"
5	6	305004	LOCKWASHER - 7/16"
6	1	507084	RING, back up
7	1	113061	CAP, cylinder head
8	1	135236	SEAL, static - ("O" ring) - 3-1/4" ID x 3-1/2" OD
9	1	117002	PACKING, chevron - (6 "V" rings)
10	1	113062	SPACER
11	1	151008	RING, snap
12	1	135214	GASKET - ("O" ring) - 1" ID x 1-1/4" OD
13	2	117206	CUP, piston - (urethane)
14	1	117017	RING, wear
15	1	114036	PISTON
16	1	304514	NUT, self-locking - 1"-12 UNF
17	1	111148	BARREL, cylinder
18	1	102510	BUSHING, rod end
19	1	121004	FITTING, grease - 1/8" NPT x 45°
20	1	136020	PIN, base end
21	1	304210	NUT - 1"-12 UNF
22	1	121005	FITTING, grease - 1/8" NPT (straight)

--	1	147516	SEAL KIT - (consists of items 2, 8, 9 and 12)
--	1	147820	SEAL KIT - (consists of items 2, 8, 9, 12 and 13)

Please include loader model and serial number and parts book form number on all orders.



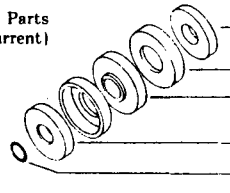
TMS STICK BOOMCYLINDER

3-1/2" BORE x 36" STROKE — 1-3/4" ROD

Item	Qty	Part No.	Part Name
-	1	110008	CYLINDER - complete - (consists of items 1 thru 18) - for bolt-on cap type see opposite side
1	1	112006	ROD - (includes item 18)
2	1	147006	SEAL, wiper
3	3	300100	CAPSCREW - 1/4"-20 UNC x 3/8"
4	1	113004	CAP, cylinder head
5	1	113050	CLAMP, cylinder head cap
6	1	302311	CAPSCREW - 3/8"-24 UNF x 2-1/2"
7	1	305003	LOCKWASHER - 3/8"
8	1	304203	NUT - 3/8"-24 UNF
9	1	117010	PACKING, chevron - (7 "V" rings)
10	1	113005	SLEEVE, cylinder head
11	1	135236	SEAL, static - ("O" ring) - 3-1/4" ID x 3-1/2" OD
12	1	135214	GASKET - ("O" ring) - 1" ID x 1-1/4" OD
13	2	117206	CUP, piston - (urethane)
14	1	117017	RING, wear
15	1	114036	PISTON - (replaces 114002)
16	1	304514	NUT, self-locking - 1"-12 UNF
17	1	111006	BARREL, cylinder
18	1	102504	BUSHING, rod end
19	1	121004	FITTING, grease - 1/8" NPT x 45°
20	1	136020	PIN, cylinder mounting
21	1	304210	NUT - 1"-12 UNF
22	1	121005	FITTING, grease - 1/8" NPT (straight)
--	1	147507	SEAL KIT - (consists of items 2, 9, 11 and 12)
--	1	147810	SEAL KIT - (consists of items 2, 9, 11, 12 and 13)

NOTE: 3-1/2" cylinders built before 1 November 1968 (non-current) take the following parts:

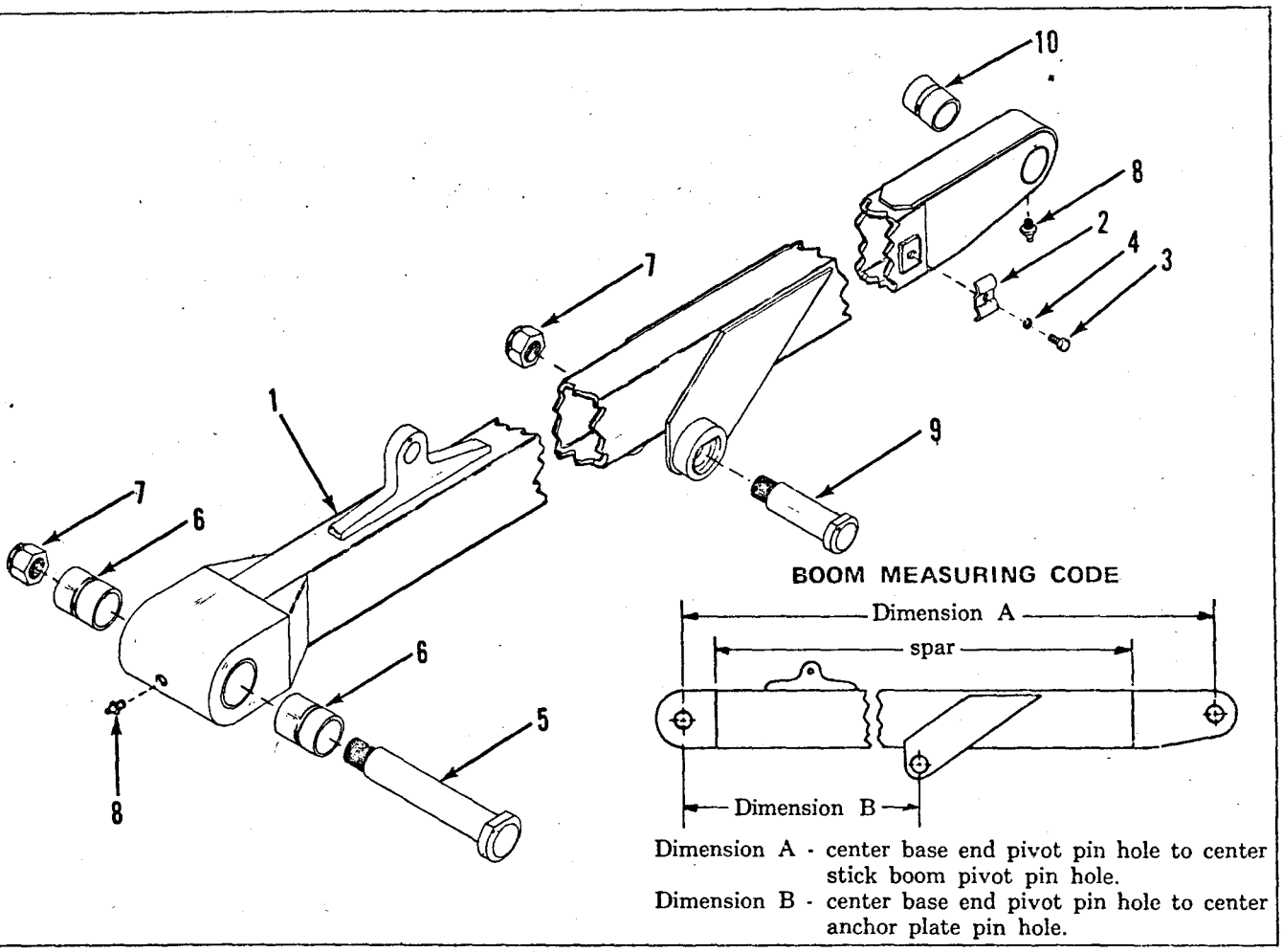
Piston Parts (non-current)



Part No.	Description
115001	Spacer, external
116001	Cup, piston (2 required)
114002	Piston
115002	Spacer, internal
135022	Gasket, piston ("O" ring)

SEAL KIT 147607 consists of items 2, 9, 11, 12 and 116001 piston cups.

Please include loader model and serial number and parts book form number on all orders.

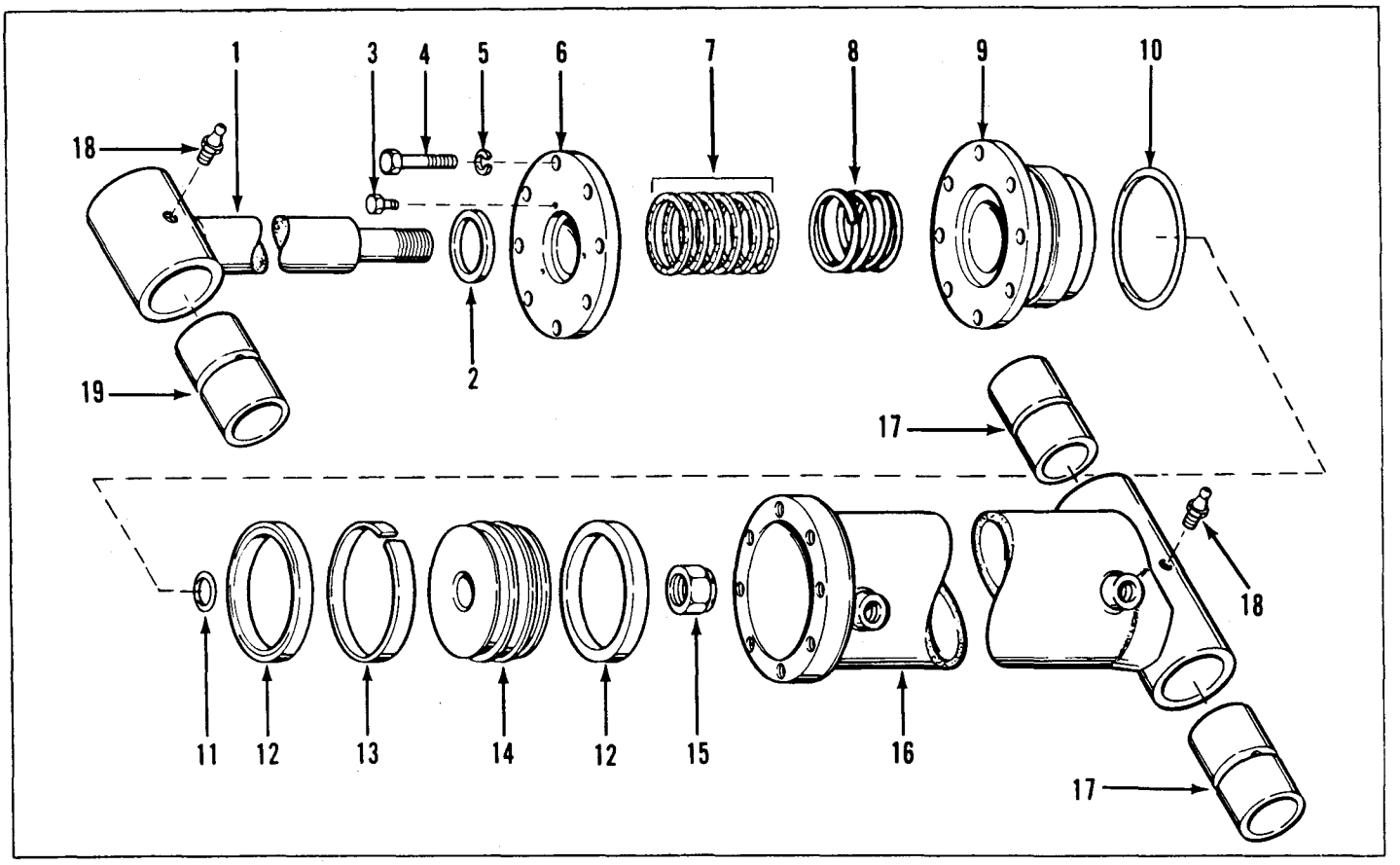


Dimension A - center base end pivot pin hole to center stick boom pivot pin hole.
Dimension B - center base end pivot pin hole to center anchor plate pin hole.

MAIN BOOM ASSEMBLY
for Series TM Loaders

	Item	Qty.	Part No.	Description
	1	1	180006	Main Boom (68" spar — 81 3/4" Dimension A)
	1	1	180017	Main Boom w/174 degree swing (80" spar — 93 3/4" Dimension A)
508115	1	1	~~180021~~	Main Boom (83" spar — 96 3/4" Dimension A)
	1	1	180024	Main Boom (80" spar — 93 3/4" Dimension A)
506855	1	1	~~180043~~	Main Boom w/34" stroke cylinder (83" spar — 93 3/4" Dimension A)
	1	1	180051	Main Boom (80" spar — 93 3/4" Dimension A — 54" Dimension B)
	1	1	180052	Main Boom (92" spar — 105 3/4" Dimension A)
	1	1	180053	Main Boom w/34" stroke cylinder (92" spar — 105 3/4" Dimension A)
	1	1	180054	Main Boom, pallet loading (80" spar — 93 3/4" Dimension A)
508222	1	1	~~180055~~	Main Boom (83" spar — 96 3/4" Dimension A — 64 1/8" Dimension B)
951060	1	1	~~180076~~	Main Boom, TMA only (83" spar — 96 3/4" Dimension A — 65 3/8" Dimension B)
	1	1	180056	Main Boom (92" spar — 105 3/4" Dimension A — 64 1/8" Dimension B)
	2	6	130016	Holder, hose
	3	6	300306	Capscrew, 3/8 x 1 1/4 NC
	4	6	300503	Lockwasher
	5	1	136145	Pin, base end
	6	2	102504	Bushing, pivot — base end
	7	2	304515	Nut, self-locking
	8	2	121005	Fitting, grease
	9	1	136157 & 2	Pin, rod end main boom cylinder
	10	1	102505	Bushing, pivot — stick boom

When ordering parts please show model and serial number of loader and parts book form number.



TMS MAIN BOOM CYLINDER

(4-1/2" Bore - 2" Rod - 34" Stroke)

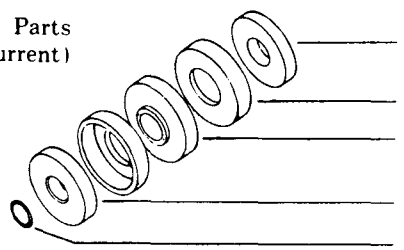
Item	Qty.	Part No.	Part Name
	1	110027	Cylinder, complete (consists of items 1 thru 19)
1	1	112018	Rod
2	1	147005	Seal, wiper
3	3	300100	Capscrew, wiper seal retaining (1/4 x 3/8 NC)
4	8	300408	Capscrew, head retaining (7/16 x 1-3/4 NC)
5	8	305004	Lockwasher (7/16)
6	1	113016	Cap, cylinder head
7	1	117003	Packing, chevron (6 "V" rings)
8	1	152003	Spring, conical
9	1	113055	Sleeve, cylinder head
10	1	135346	Seal, static ("O" ring)
11	1	135220	Gasket ("O" ring) used on piston 114040
12	2	117204	Cup, piston (urethane)
13	1	117013	Wear Ring — used on piston 114040
14	1	114040	Piston
15	1	304518	Nut, piston retaining (self-locking)
16	1	111023	Barrel, cylinder
17	2	102504	Bushing, base end
18	2	121005	Fitting, grease — base and rod end bushing (straight 1/8 NPT)
19	1	102505	Bushing, rod end

SEAL KIT 147503 consists of items 2, 7, 10 and 11.

SEAL KIT 147808 consists of items 2, 7, 10 11 and 12.

NOTE: 4-1/2" cylinders built before 1 November 1968 (non-current) take the following parts:

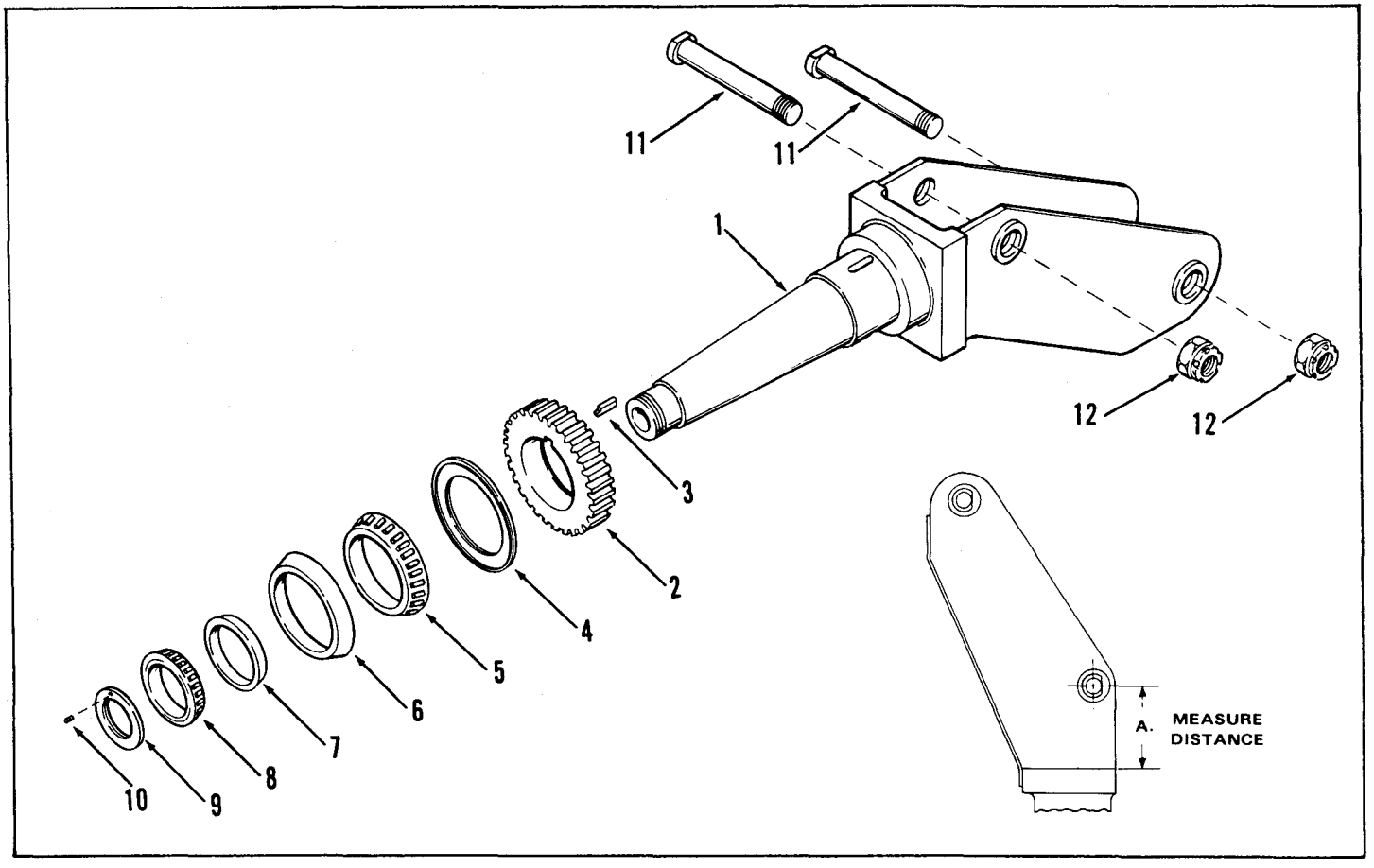
Piston Parts (non-current)



Part No.	Description
115009	Spacer, external
116007	Cup, piston (2 required)
114009	Piston
115010	Spacer, internal
135028	Gasket, piston ("O" ring)

SEAL KIT 147603 consists of items 2, 7, 10, 11 and 116007 piston cups.

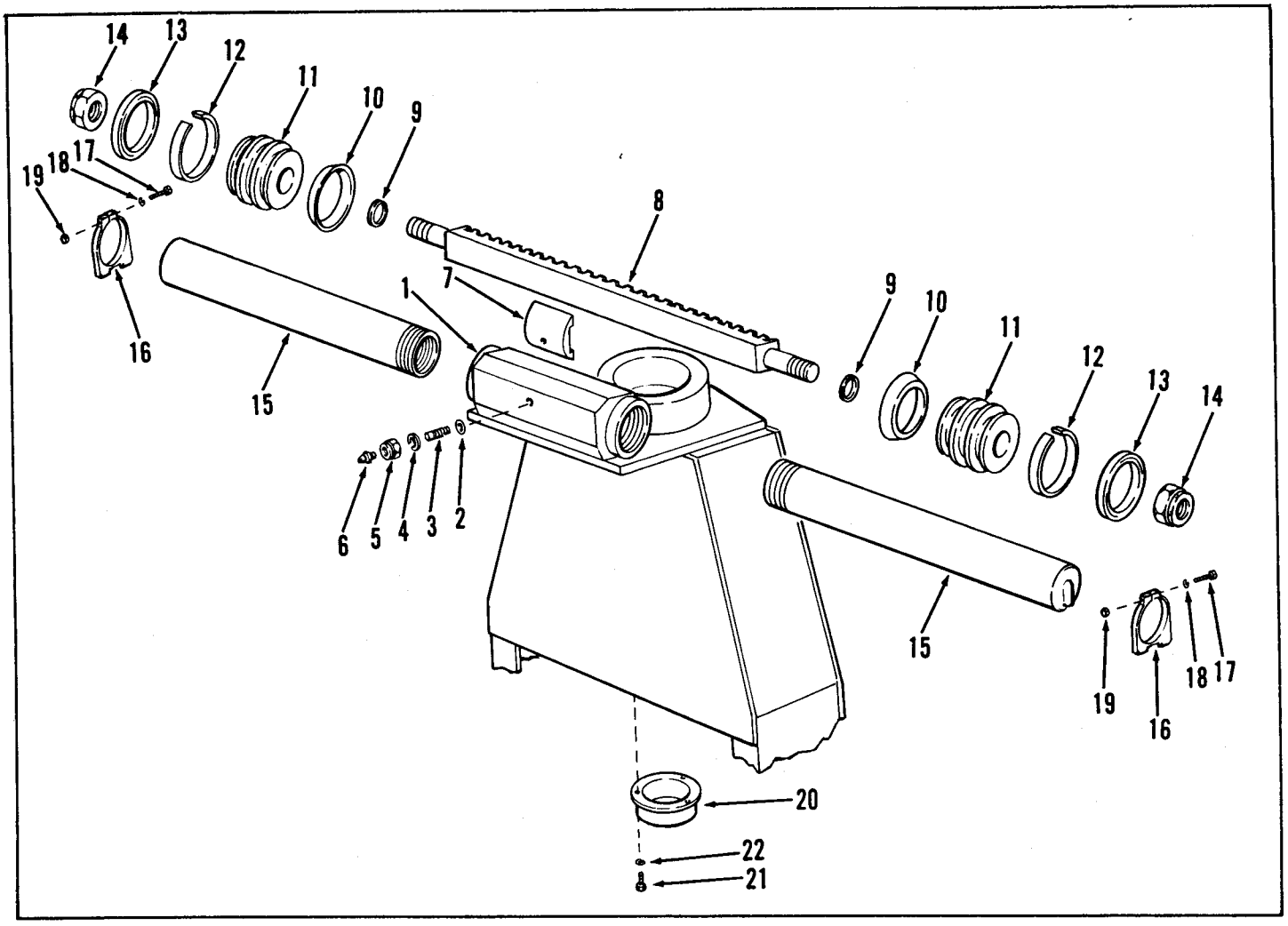
Please include loader model and serial number and parts book form number on all orders.



TMS SPINDLE ASSEMBLY

Item	Qty.	Part No.	Part Name
1	1	180022	Spindle — 3-1/2" Dimension A
	1	180073	Spindle — 8" Dimension A
2	1	180044	Gear
3	1	180067	Key, gear
4	1	180009	Shield, dust
5	1	100018	Cone, upper] Sold Together Only
6	1	100017	Cup, upper]
7	1	100013	Cup, lower] Sold Together Only
8	1	100014	Cone, lower]
9	1	169020	Lock Ring (adjusting nut)
10	1	306001	Lock Screw (lock ring)
11	2	136145	Pin, main boom pivot and main boom cylinder base end
12	2	304515	Nut, pin retaining (self-locking)

Please include loader model and serial number and parts book form number on all orders.



TMS SWING ASSEMBLY

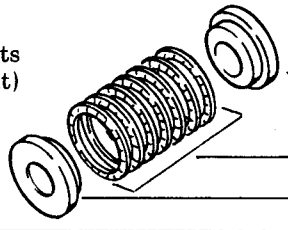
4" Bore

Item	Qty.	Part No.	Part Name
		180071	Assembly, swing (consists of items 1 thru 22)
1	1	NSS	Housing, center
2	1	135113	"O" ring
3	1	144006	Lubricator, rack shoe
4	1	305009	Lockwasher
5	1	304524	Nut, self-locking
6	1	121005	Fitting, grease — 1/8 NPT
7	1	144005	Shoe, rack
8	1	144023	Gear, rack — 270 degrees
9	2	135222	Gasket, piston ("O" ring)
10	2	147024	Seal, wiper
11	2	114038	Piston (replaces 114006 and 114007)
12	2	117020	Wear Ring — used on piston 114038
13	2	117209	Cup, piston (urethane)
14	2	304513	Nut, piston retaining (self-locking)
15	2	111033	Barrel, cylinder — 270 degrees
16	2	204028	Clamp, cylinder barrel
17	2	300311	Capscrew, cylinder clamp
18	2	305003	Lockwasher
19	2	304003	Nut
20	1	180005	Cap, dust
21	3	308008	Capscrew, dust cap
22	3	305001	Lockwasher

NSS — Not Serviced Separately

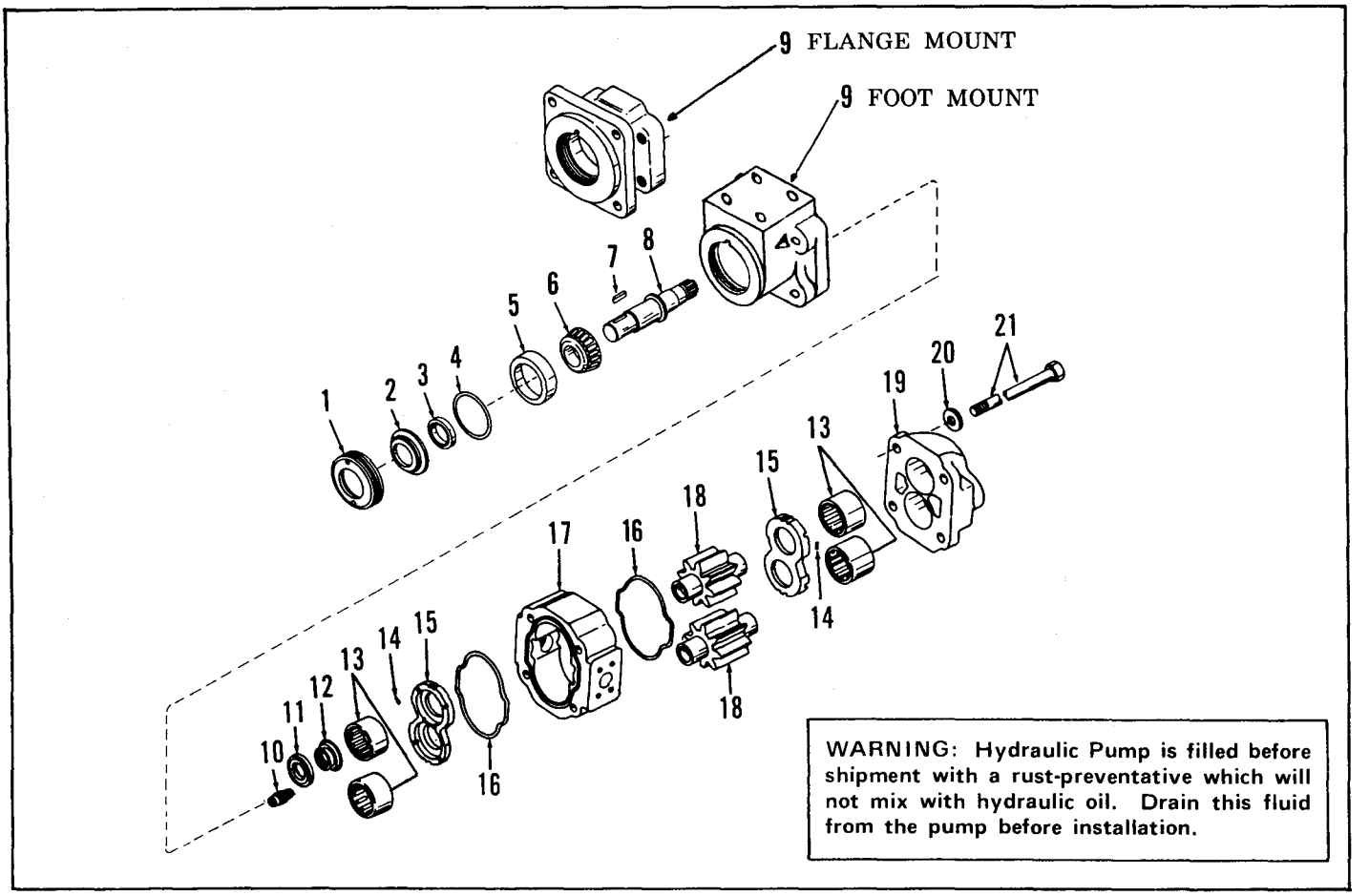
NOTE: 4" Swing Cylinders built before 1 November 1968 (non-current) take the following parts:

Piston Parts (non-current)



Description	Part No.
Piston, external	114007
Packing, chevron	117009
Piston, internal	114006

Please include loader model and serial number and parts book form number on all orders.



25X SINGLE PUMP

NOTE: Gears and housings available for non-standard (under 1 3/4") pumps — See Items 17 and 18.

Item	Qty.	Part No.	Part Name
		142021	Pump (foot mount w/1 3/4" gears)
		142022	Pump (foot mount w/2" gears)
		142023	Pump (foot mount w/2 1/2" gears)
		142027	Pump (flange mount w/1 3/4" gears)
		142028	Pump (flange mount w/2" gears)
		142034	Pump (flange mount w/2 1/2" gears)
1	1	143581	Ring, retainer
2	1	143582	Seal, retainer
3	1	143583	Seal, double lip
4	1	143584	"O" ring
5	1	143585	Cup, bearing } Order as a set
6	1	143586	Cone, bearing } Order as a set
7	1	143511	Key, shaft
8	1	143587	Shaft, drive (1")
	1	143619	Shaft, drive (1 1/8") for 2 1/2" gear
9	1	143588	Cover, shaft end (foot mount)
	1	143649	Cover, shaft end (flange mount)
10	2	143589	Valve, check
11	1	143590	Bushing, shaft — bronze
12	1	143591	Spring, conical
13	2	143592	Bearing, roller
14	2	143593	Seal, pocket (strip)
15	2	143594	Plate, thrust
16	2	143595	Gasket, housing ("O" ring)
17	1	143620	Housing for 3/4" gears
	1	143621	Housing for 1" gears
	1	143622	Housing for 1 1/4" gears
	1	143628	Housing for 1 1/2" gears
	1	143596	Housing for 1 3/4" gears
	1	143597	Housing for 2" gears
	1	143598	Housing for 2 1/2" gears
18	2	143624	Gears, set 3/4"
	2	143625	Gears, set 1"
	2	143626	Gears, set 1 1/4"
	2	143627	Gears, set 1 1/2"
	2	143599	Gears, set 1 3/4"
	2	143600	Gears, set 2"
	2	143601	Gears, set 2 1/2"
19	1	143602	Cover, port end
20	4	143603	Washer
21	4	143604	Capscrew (Specify gear size)

Please include loader model and serial number and parts book form number on all orders.

PRENTICE

HYDRAULIC HOSE, Non-Skive — Bulk

REFERENCE LIST

Except where indicated otherwise, numbers on this sheet cover BULK HOSE ONLY. SPECIFY LENGTH when ordering. Hydraulic fittings are not included with bulk hose.

HIGH-PRESSURE HOSE

Old No.	New No.	Description
950	124022	1/4" diam. two-wire braid non-skive
952	124016	3/8" diam. two-wire braid non-skive
954	124017	1/2" diam. two-wire braid non-skive
956	124018	3/4" diam. two-wire braid non-skive
958	124019	1" diam. two-wire braid non-skive
	124025	1" diam. four-wire braid non-skive (Series 100 & 600 only)

PUMP INTAKE HOSE

	124020	1" diam. x 48" pump intake hose w/one male fitting, 1" NPT
928	124028	1" diam. single-wire, low pressure
	124026	1 1/4" diam. single-wire, low pressure
	124027	1 1/2" diam. single-wire, low pressure (Series 600)

NOTE: High pressure hose should never be used for pump intake.
Low pressure (pump intake) hose should never be used in place of high pressure hose.

HEATER HOSE (Series 100 & 600)

124014	5/8" diam., fabric-braid core (heater only)

8/69
(Replaces old "Hose Category" sheet)
Rev. 2/71

FORM NO. PHI 18

INSTRUCTIONS FOR REPLACING SPOOL SEALS IN GRESEN 25P CONTROL VALVE

REQUIREMENT: One Special T-273 Tool.

NOTE: For the purpose of these instructions, we shall consider the control handle side of the valve as the front end, and the opposite end as the back end.

* * * * * * *

1. At the back of the valve, remove the #1611 die cast Bonnet Assy. This assembly is fastened to the valve housing by four (4) #2673 Bonnet Screws with four (4) #563 Lockwashers.

2. Remove #1618 Spool Assembly Screw, #1610 Spool Collar, #1291 Spool Assembly Lockwasher, #1609 Stop Collar, and #1625 Centering Spring. Be sure to observe the order in which these parts are removed to insure proper reinstallation.

3. Disconnect handle from spool by removing #085 Handle Pin. Let handle swing free of spool.

4. Pull spool towards front end of valve just far enough to expose the back seal in housing.

5. Remove back seal (#1616).

6. Push spool in opposite direction (towards back end) until front seal is fully exposed.

7. Remove front seal (#1616) from housing.

8. BE SURE THAT BODY SEAL GROOVES ARE THOROUGHLY AND CAREFULLY CLEANED.

9. Insert new #1616 Seal in front groove, being very careful that the open end (end with wiping edges) of the seal is placed towards the center of the valve body. It will be very helpful to pinch one side of the seal, causing the seal to bend into a shape slightly smaller than the seal groove in the valve. When the seal has been properly placed in seal groove, straighten the seal by running a smooth rod around the exposed surface of the seal until you have it well seated. To check this, run your finger around the exposed edge of the seal. You should have a smooth perfect ridge with no kinks.

10. Apply a small amount of grease or heavy oil on the #1616 Seal to prevent it from tearing during assembly.

(Continued on Reverse Side)

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Form #43 3/6/61

PRINTED IN U. S. A.

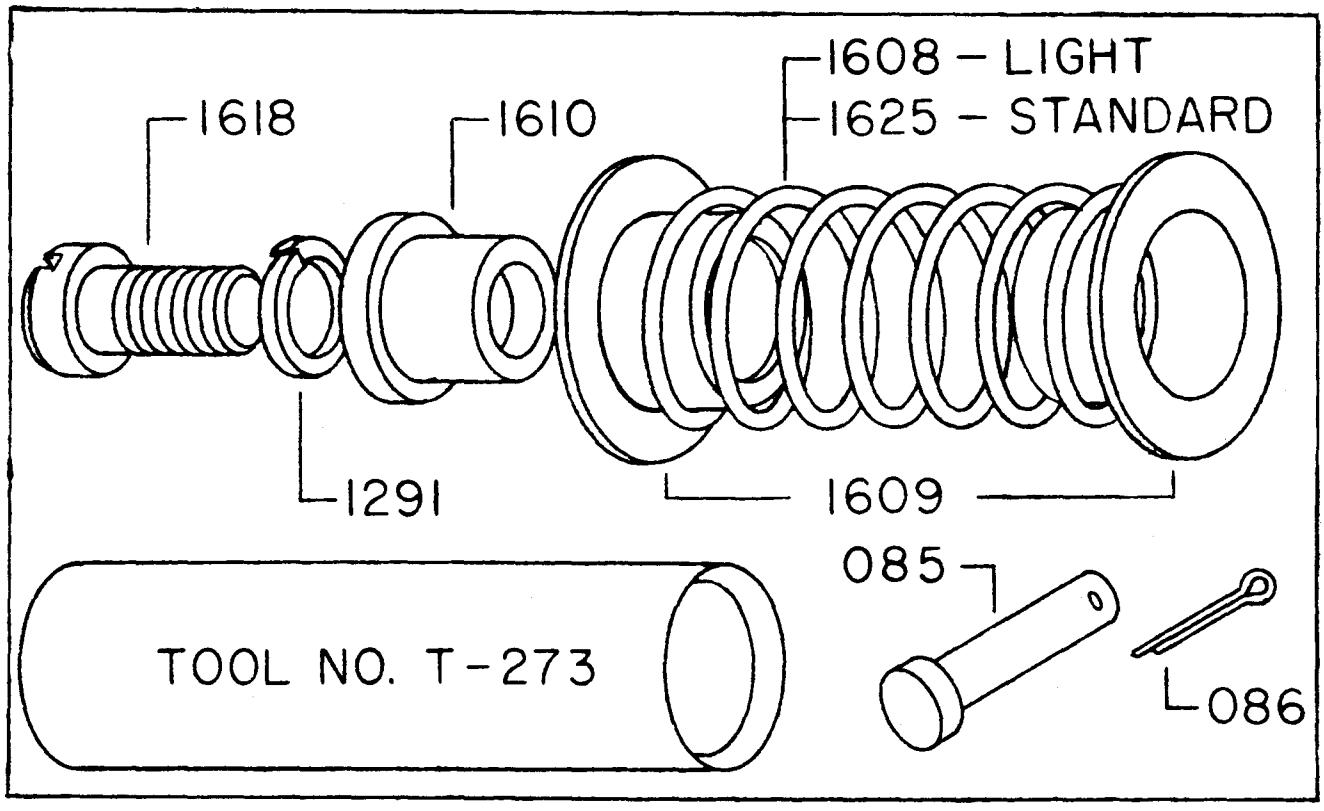
11. Insert the internal-chamfered end of the T-273 Special Tool into the spool bore of the valve housing from the front side of the valve and through the new seal. Push spool forward until the spool and tool make contact. Push spool further forward against tool until rear seal groove is completely exposed, but no further.

12. Install new #1616 Seal in back groove and apply grease or heavy oil. Insert T-273 Special Tool (internal-chamfered end first) carefully into back bore through seal until it makes contact with spool. From front side, push spool back approximately 3/4".

13. Reinstall complete handle assembly, installing the #085 Handle Pin and #086 Cotter Pin.

14. Reinstall the complete spring assembly on back of spool. Be sure the #1618 Spool Assembly Screw is securely tightened. (20 Ft. Lbs. Torque)

15. Reinstall #1611 Bonnet Assembly.



INSTRUCTIONS FOR REPLACING, ADDING OR REMOVING #1614 OR #1664 CENTER SECTION ASSEMBLIES IN THE 25P AND 25PK STACK VALVE

NOTE: For the purpose of these instructions, we shall consider the section containing the main relief valve as the left side of the valve.

1. If the valve is to be reassembled in the same order, it is suggested that before disassembling, each section be marked numerically so that they may be returned to the same sequence when reassembled.

2. If valve has been removed from equipment, it is advisable to mount valve vertically in a vise to facilitate disassembly and assembly.

3. On the right end of the valve there may be a power beyond sleeve, conversion plug or closed center plug installed. These must be removed before the valve can be disassembled.

4. Remove the four assembly stud nuts or bolts from right end section.

5. Next, valve sections may be disassembled by sliding the sections along the Assembly studs.

6. If sections are to be removed or added to a valve, remove the four (4) assembly studs from the left end section of the valve. Install four proper length studs for the valve size desired. (See list below for correct studs to be used).

1670 Assembly Bolt - Two Section 934 Assembly Bolt - Three Section	Use #1039 Lockwasher with Assembly Bolts.
1672 Assembly Stud - Four Section 1673 Assembly Stud - Five Section 1674 Assembly Stud - Six Section 1675 Assembly Stud - Seven Section 1755 Assembly Stud - Eight Section 1756 Assembly Stud - Nine Section	Use #1665 Assembly Stud Nuts with all Studs. (No Lockwasher)

NOTE: For Valve Assemblies using more than Nine Sections, contact Gresen Engineering Department.

7. Thoroughly clean the O-ring counterbores and the ground surface of each section. Place new O-ring seals, two Part #1621 and one Part #1622, in proper counterbores. For better sealing, it is suggested that all O-rings used in the counterbores be replaced with new parts.

8. Replace the sections on assembly studs with the O-ring counterbores facing right end of valve. Use care in replacing sections so the section O-rings are not dislodged from the counterbores.

9. When all sections are assembled on assembly studs, tighten the assembly stud nuts or bolts evenly to 20 ft. lbs. torque, NO MORE, NO LESS, otherwise spools may bind or stick.

25P DIRECTIONAL CONTROL VALVE

4-WAY 3-POSITION SECTION

SPOOL SPRING–CENTERED
OPEN CENTER IN NEUTRAL WITH WORK PORTS BLOCKED
PARALLEL CIRCUIT
Max. Pressure – 2500 PSI

FOR CONTROL OF DOUBLE-ACTING CYLINDERS: OR START, STOP AND REVERSE OF HYDRAULIC MOTORS WHERE "FREE-WHEELING" OF MOTOR IS NOT REQUIRED.

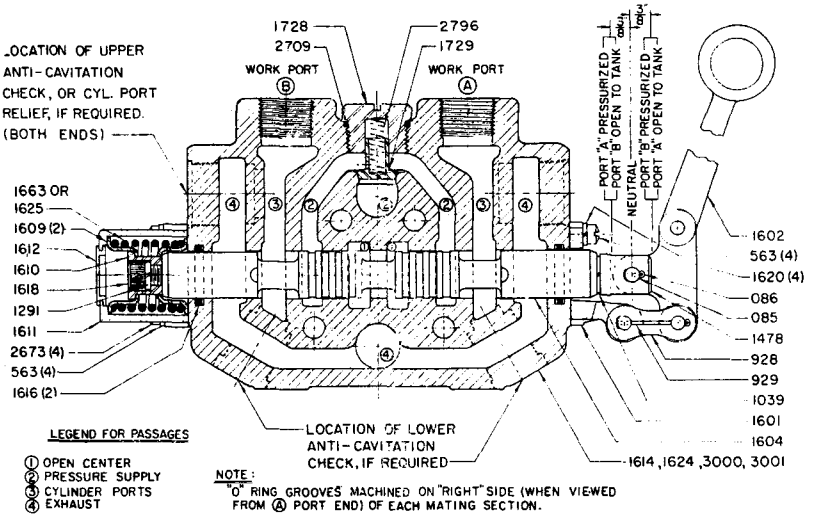
- Handle Provisions Available on Either "A" or "B" Port End. ("A" Port End is Standard.)
- Individual Load-Check. (Spring-Loaded)
- Spring-Centered Spool.
- Two Work Ports.
- Cylinder Port Relief (Pilot or Poppet) and/or Anti-Cavitation Checks Available in Either Work Port. (Refer to Forms #435 and 436.)
- 3-Position Detent (Optional) (See Form #433.)
- Free Flow (F) Spool (Optional) for Free-Wheeling of Motor.

NOTE

For Available Port Sizes, see page 4 of Form #428.

APPROXIMATE WEIGHTS (LESS HANDLES)

Center Section #1614 – 13¾ lbs.
Right End Section #1624 – 16½ lbs.
Left End Section #3001 – 22½ lbs.
Left End Section #3000 – 21¼ lbs.



Dwg. 301 Misc.

PARTS LIST

(Effective on all valves manufactured after July 1, 1965)

PART NO.	DESCRIPTION	QTY. PER SECTION
085	Handle Pin	1
086	Handle Pin Cotter	1
563	Lockwasher (Bonnet Screw & Handle Bracket Screw)	8
928	Handle Link	1
929	Handle Link Cotter	1
1039	Handle Adapter Lockwasher	1
1291	Spool Assembly Lockwasher	1
1478	Handle Adapter	1
1601	Handle Bracket	1
1602	Handle	1
*1604	4-Way Spool	1
*1606	4-Way Free Flow Spool (Opt.)	(1)
1609	Stop Collar	2
1610	Spool Collar	1
1611	Bonnet	1
1612	Bonnet Diaphram	1
*1614	Center Section Valve Hsg.	(1)
1616	Spool Seal	2
1618	Spool Assembly Screw	1
1620	Handle Bracket Screw	4
*1624	Integral Turn-Around Sec. (Right Hand End)	(1)
1625	Standard Centering Spring	1
1663	Heavy Centering Spring (Opt.)	(1)
*3000	Left Hand End W/End "In" & "Out" Section Valve Hsg.	(1)
*3001	Left Hand End W/Top "In" & "Out" Section Valve Hsg.	(1)
1728	Check Plug	1
1729	Check Poppet	1
2673	Bonnet Screw	4
2709	Check Plug O-Ring Seal	1
2796	Check Spring	1

ASSEMBLY PARTS

934	Assy. Bolt (3 Section)	4
1039	Lockwasher (Used Only With Assy. Bolts #934, #1670, & #1676)	4
1621	Section Seal (Small) (Not Used On #1624 Sec.)	2
1622	Section Seal (Large) (Not Used on #1624 Sec.)	1
1665	Assy. Stud Nut (Used Only With Studs.)	4
1676	Assy. Bolt (1 Section)	4
1670	Assy. Bolt (2 Section)	4
1672	Assy. Stud (4 Section)	4
1673	Assy. Stud (5 Section)	4
1674	Assy. Stud (6 Section)	4
1675	Assy. Stud (7 Section)	4
1755	Assy. Stud (8 Section)	4
1756	Assy. Stud (9 Section)	4
1754	Rubber Grommet for Bottom Outlet (Opt.)	(1)

Housings and Spools Cannot be Ordered as Separate Items. All Spools are Fitted to Individual Housings by Select Hone Process at Factory.

25P DIRECTIONAL CONTROL VALVE

3-WAY 3-POSITION SECTION

SPOOL SPRING–CENTERED
OPEN CENTER IN NEUTRAL WITH WORK PORT BLOCKED
PARALLEL CIRCUIT
Max. Pressure – 2500 PSI

FOR CONTROL OF SINGLE-ACTING CYLINDERS; OR START, STOP OF NON-REVERSIBLE HYDRAULIC MOTORS WHERE "FREE-WHEELING" OF MOTOR IS NOT REQUIRED.
NOTE: AVAILABLE WITH EITHER CYLINDER PORT "A" OR "B" AS WORKING PORT.

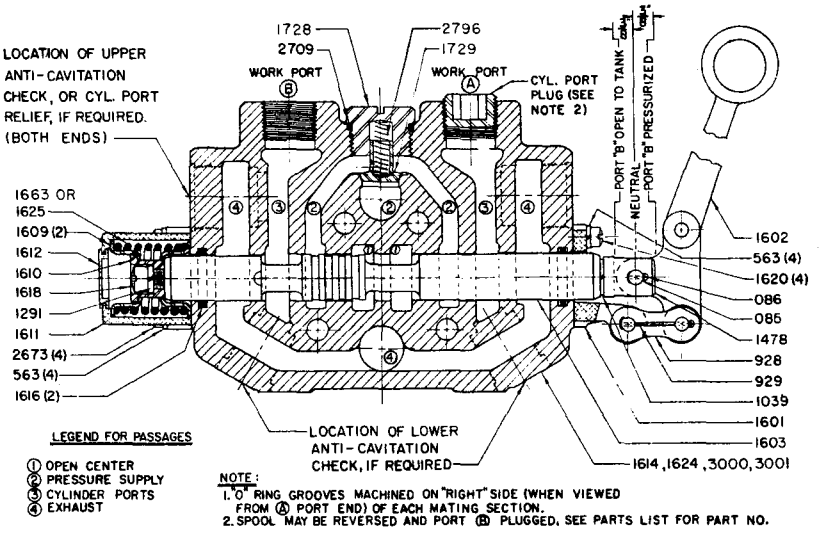
- Handle Provisions Available on Either "A" or "B" Port End. ("A" Port End is Standard).
- Individual Load-Check. (Spring-Loaded)
- Spring-Centered Spool.
- One Work Port.
- Cylinder Port Relief (Pilot or Poppet) and/or Anti-Cavitation Checks Available in One or Both Work Ports. (Refer to Forms #435 and 436.)
- 3-Position Detent (Optional) (See Form #433.)
- Free Flow (F) Spool (Optional) for Free-Wheeling of Motor.

NOTE

For Available Port Sizes, see page 4 of Form #428.

APPROXIMATE WEIGHTS (LESS HANDLES)

Center Section #1614 – 13¾ lbs.
Right End Section #1624 – 16½ lbs.
Left End Section #3001 – 22½ lbs.
Left End Section #3000 – 21¼ lbs.



Dwg. 302 Misc.

PARTS LIST

(Effective on all valves manufactured after July 1, 1965)

PART NO.	DESCRIPTION	QTY. PER SECTION
085	Handle Pin	1
086	Handle Pin Cotter	1
563	Lockwasher (Bonnet Screw & Handle Bracket Screw)	8
928	Handle Link	1
929	Handle Link Cotter	1
1039	Handle Adapter Lockwasher	1
1291	Spool Assembly Lockwasher	1
1478	Handle Adapter	1
1601	Handle Bracket	1
1602	Handle	1
*1603	3-Way Spool	1
*1653	3-Way Free Flow Spool	(1)
1609	Stop Collar	2
1610	Spool Collar	1
1611	Bonnet	1
1612	Bonnet Diaphram	1
*1614	Center Section Valve Hsg.	(1)
1616	Spool Seal	2
1618	Spool Assembly Screw	1
1620	Handle Bracket Screw	4
*1624	Integral Turn-Around Sec. (Right Hand End)	(1)
1625	Standard Centering Spring	1
1663	Heavy Centering Spring (Opt.)	(1)

PART NO.	DESCRIPTION	QTY. PER SECTION
*3000	Left Hand End W/End "In" & "Out" Section Valve Hsg.	(1)
*3001	Left Hand End W/Top "In" & "Out" Section Valve Hsg.	(1)
1728	Check Plug	1
1729	Check Poppet	1
2673	Bonnet Screw	4
2709	Check Plug O-Ring Seal	1
947	Cylinder Port Plug (½" NPTF)	1
1282	Cylinder Port Plug (¾" NPTF)	1
1288	Cylinder Port Plug (1" NPTF)	1
1726	Cylinder Port Plug (SAE #12)	1
1727	Cylinder Port Plug (SAE #14)	1
2684	Cylinder Port Plug (SAE #8)	1
1458	Cylinder Port Plug (SAE #10)	1
1629	Cylinder Port Plug (SAE #16)	1
2706	Cylinder Port Plug O-Ring For SAE #8 Plug	1
2707	Cylinder Port Plug O-Ring For SAE #10 Plug	1
2708	Cylinder Port Plug O-Ring For SAE #12 Plug	1
2709	Cylinder Port Plug O-Ring For SAE #14 Plug	1
2710	Cylinder Port Plug O-Ring For SAE #16 Plug	
2796	Check Spring	

(SEE REVERSE SIDE FOR ASSEMBLY PARTS)

Housings and Spools Cannot be Ordered as Separate Items. All Spools are Fitted to Individual Housings by Select Hone Process at Factory.

MODEL 25P & 25PK DIRECTIONAL CONTROL VALVE

ANTI-CAVITATION CHECKS

(For use in any Working Cylinder Port)

Purpose

For use with double-acting cylinders. Allows oil from the "exhaust or tank" passage of valve to supplement pump flow to "powered" end of cylinder when it is being moved by an external force. Installation of anti-cavitation checks reduces operating time, lag, and sponginess caused by cylinder cavitation.

Function

The anti-cavitation check is unseated only when "pump" pressure falls below "exhaust or tank" pressure, and allows the "exhaust or tank" flow to supplement "pump" flow until such time that "pump" flow pressure exceeds "exhaust or tank" pressure at which time the check ball reseats.

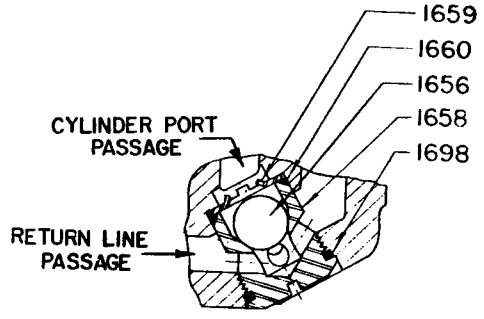
LOWER ANTI-CAVITATION CHECK

(Weight – 2½ oz.)

Used when cylinder port relief valve also required in same cylinder port. If no cylinder port relief is required, then upper anti-cavitation check is used.

PERFORMANCE

Will Pass 6.3 GPM at 10 PSI Pressure Differential.
Will Pass 9 GPM at 20 PSI Pressure Differential.
Will Pass 14.6 GPM at 40 PSI Pressure Differential.



PARTS LIST

Part No.	Description	No. Req'd. Per Assembly
1656	Lower Anti-Cav. Ball (9/16" Dia.)	1
1658	Lower Anti-Cav. Body	1
1659	Lower Anti-Cav. Ball Retainer	1
1660	Lower Anti-Cav. Body Seal (Inner)	1
1667	Lower Anti-Cav. Plug	(Opt.)
1698	Lower Anti-Cav. Body Seal (Outer)	1

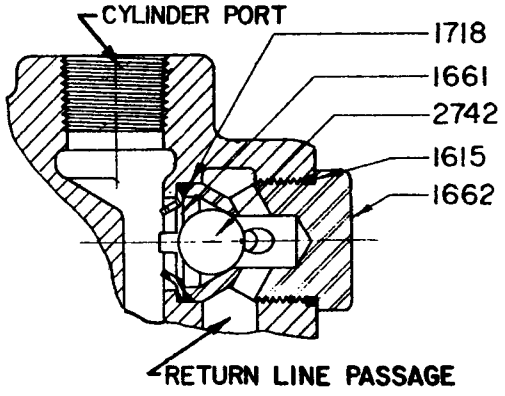
UPPER ANTI-CAVITATION CHECK

(Weight – 5½ oz.)

Used when cylinder port relief valve is not used. If cylinder port relief is required, then lower anti-cavitation check is used.

PERFORMANCE

Will Pass 8.7 GPM at 10 PSI Pressure Differential.
Will Pass 14 GPM at 20 PSI Pressure Differential.
Will Pass 25 GPM at 40 PSI Pressure Differential.



PARTS LIST

Part No.	Description	No. Req'd. Per Assembly
1615	Seal O-Ring (Outer)	1
1661	Upper Anti-Cav. Ball Retainer	1
1662	Upper Anti-Cav. Body	1
1668	Upper Anti-Cav. Plug	(Opt.)
1718	Seal O-Ring (Outer)	1
2742	Upper Anti-Cav. Ball (5/8" Dia.)	1

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Form #435 (Rev. 12/14/62)

PRINTED IN U. S. A.

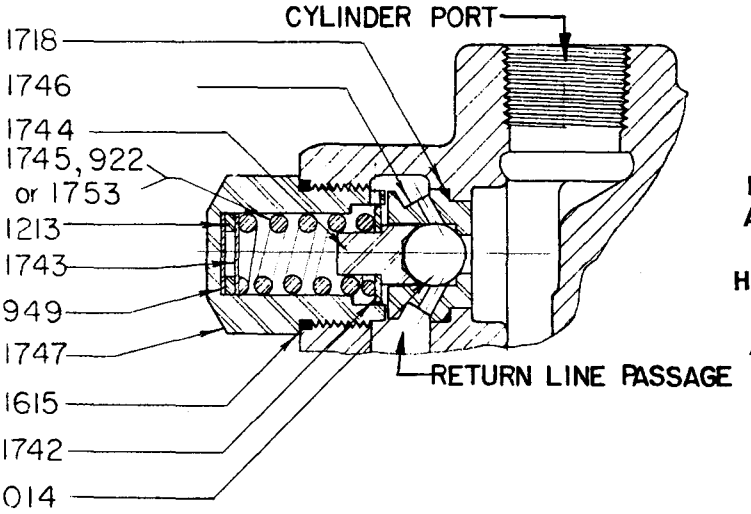
25P & 25PK DIRECTIONAL CONTROL VALVE

CYLINDER PORT "POPPET" RELIEF

For Use in any Working Cylinder Port

(Pressure Range – (300 To 3000 PSI Crack)

IDEAL FOR "LIMITING" CYLINDERS WITH RIGID LINKAGE OR VANE TYPE CYLINDERS HAVING INERTIA LOADS.



USED TO LIMIT PRESSURE (OR FORCE) IN BOTH ENDS OF A DOUBLE-ACTING CYLINDER OR HYDRAULIC MOTOR, OR ONE END OF A SINGLE-ACTING CYLINDER.

FACTORY SET TO CUSTOMERS SPECIFICATIONS
(ADJUSTABLE WITH SHIMS.)
PRESSURE SETTING STAMPED ON CAP.

WGT. – 8 OZ.

Function

This relief valve may be installed as an option, in any cylinder port of the 25P or 25 PK control valve. It is a high quality, inexpensive device for limiting pressure, or cushioning in the work port, line, cylinder, or motor supplied by this particular work port.

Performance

THIS RELIEF WILL PASS 35 GPM.

Parts List

Part No.	Description	No. Req'd. Per Assembly
014	POPPET RELIEF BALL (½" DIA. STEEL)	1
922	RELIEF SPRING (1501–3000 PSI*)	(1)
949	POPPET RELIEF SHIM (.010")	As Req'd.
1213	POPPET RELIEF SHIM (.105")	As Req'd.
1615	SEAL O-RING (OUTER)	1
1668	RELIEF CAVITY PLUG	(Opt.)
1718	SEAL O-RING (INNER)	1
1742	POPPET RELIEF SPRING SPACER	1
1743	POPPET RELIEF SHIM (.006")	As Req'd.
1744	RELIEF BALL FOLLOWER	1
1745	RELIEF SPRING (1001–1500 PSI*)	(1)
1746	RELIEF SEAT	(1)
1747	POPPET RELIEF BODY	1
1753	LOW PRESSURE SPRING (500–1000 PSI*)	(1)

* PRESSURES FULL FLOW @ 35 GPM.

GRESEN MANUFACTURING COMPANY

405 - 35TH AVENUE N. E. MINNEAPOLIS 18, MINNESOTA

MANUFACTURERS OF
• HYDRAULIC COMPONENTS
MOBILE - INDUSTRIAL
AGRICULTURAL

Form #436 Rev. 8/68 PRINTED IN U. S. A.

25P & 25PK DIRECTIONAL CONTROL VALVE
MAIN SYSTEM RELIEF VALVES

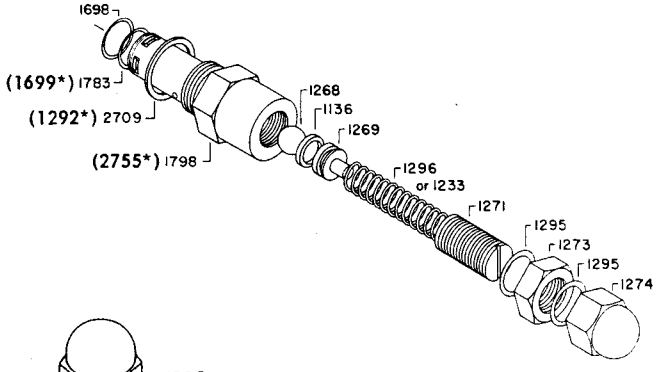
(USED TO CONTROL SYSTEM HYDRAULIC PRESSURE)

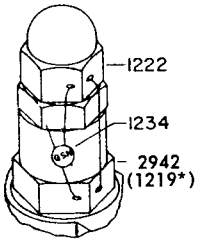
(NOTE: These Main System Relief Valves also used on Model WP & WPK Control Valves.)

MODEL "KC"

(High-Lift Ball-Spring Type) (Adjustable)

Shipping Weight . . . . . 1 lb. 12 oz. (Cartridge Only)
Pressure Range . . . . . 400-2000 PSI
Capacity. . . . . Up to 38 GPM
(See Form #407 for Performance Characteristics.)



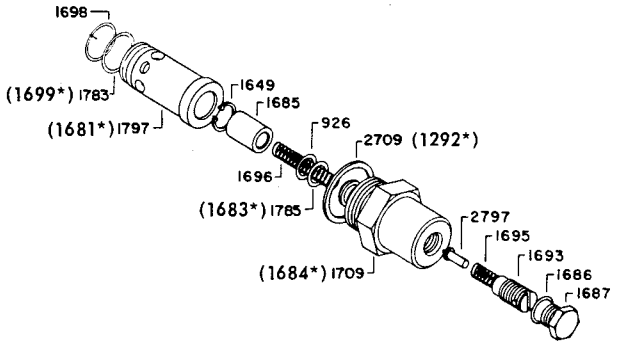


MODEL "KC" (NJ) NON-ADJUSTABLE MODEL

MODEL "PKC"

(Pilot-Operated Type) (Adjustable)

Shipping Weight . . . . . 1 lb. 4 oz. (Cartridge Only)
Pressure Range . . . . . 200-2500 PSI
Capacity. . . . . Up to 40 GPM
(See Form #407 for Performance Characteristics.)



Note: Due to the close tolerances held on the working parts of a pilot-operated relief valve, it is important that the system be kept free of all foreign matter. We strongly recommend that a filter be installed in any system incorporating pilot-operated reliefs. (Refer to Form #450 covering Gresen F-200 Series Filters, and Form #470 for the F-100 Series Filters.

PARTS LIST

*NOTE: Numbers not shown in parenthesis apply only to Inlet Sections #3000, 3001, 3002 and 1704; and Mid-Inlet Sections #3003 and 3004. Numbers in parenthesis apply to Sections #1714, 1724, 1734, 1740 and 1748.

MODEL "KC"

Part No.	No. Req'd.	Description
1136	1	Ball Guide Seal
1233	(1)	H.P. Relief Spring (Opt.)
1268	1	Ball
1269	1	Ball Guide
1271	1	Adjusting Screw
1273	1	Jam Nut
1274	1	Acorn Nut
2709 (1292*)	1	Body Gasket
1295	2	Screw Seal Washer
1296	1	Relief Spring (Std.)
1698	1	O-Ring Seal
1783 (1699*)	1	Back-Up Ring
1798 (2755*)	1	Relief Body
SPECIAL PARTS FOR NON-ADJUSTABLE (NJ) OPTION		
2942 (1219*)	1	NJ Relief Body
1222	1	NJ Acorn Nut
1234	1	NJ Lead Seal

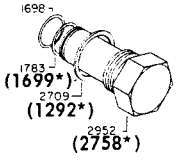
MODEL "PKC"

Part No.	No. Req'd.	Description
926	1	O-Ring Seal
2709 (1292*)	1	Gasket
1649	1	Retaining Ring
•1797 (1681*)	1	Pilot Rel. Cylinder
1785 (1683*)	1	Back-Up Washer
1709 (1684*)	1	Pilot Rel. Body
•1685	1	Pilot Rel. Piston
1686	1	Gasket
1687	1	Relief Cap
1693	1	Adjusting Screw
1695	1	Pilot Spring
1696	1	Piston Spring
1698	1	O-Ring
1783 (1699*)	1	Seal
2797	1	Poppet

•NOTE: Sold Only in Matched Sets

NO RELIEF OPTION (N.R.)

Part No.	No. Req'd.	Description
2952 (2758*)	1	No Relief Cap.
2709 (1292*)	1	Body Gasket
1698	1	O-Ring Seal
1783 (1699*)	1	Back-Up Ring



GRESEN MANUFACTURING COMPANY

a subsidiary of Tonka Corporation

405 35TH AVENUE N. E. MINNEAPOLIS, MINNESOTA 55418

MANUFACTURERS OF
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MOBILE - INDUSTRIAL
AGRICULTURAL

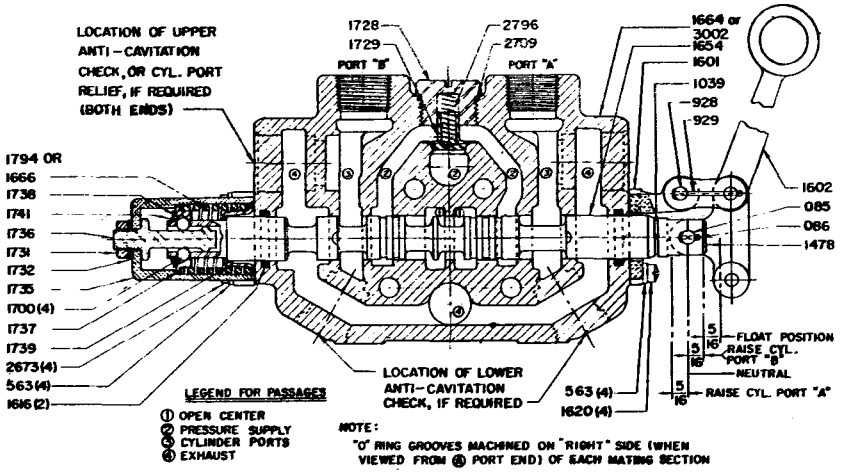
25PK DIRECTIONAL CONTROL VALVE

4-WAY 4-POSITION (FLOAT) SECTION

SPRING CENTERED TO NEUTRAL THREE POSITIONS – WORK PORTS BLOCKED.
DETENTED FOURTH POSITION – WORK PORTS AND PUMP OPEN TO TANK
PARALLEL CIRCUIT

FOR CONTROL OF DOUBLE-ACTING CYLINDERS REQUIRING FLOAT ACTION, i.e. LOADERS, DOZERS, SNOW PLOWS, DUMP TRUCKS, ETC.

- Handles on "A" Port End Only.
- Individual Load-Check. (Spring-Loaded)
- Spring Centered Spool (3 Positions) Detent on 4th position.
- Two Work Ports.
- Cylinder Port Relief (Pilot or Poppet) and/or Anti-Cavitation Checks Available in Either Work Port. (Refer to Forms #435 and 436.)



Dwg. 315 Misc.

NOTE

For Available Port Sizes, see page 4 of Form #428.

APPROXIMATE WEIGHTS (LESS HANDLES)

Left End Section #3002 – 23 lbs.
Center Section #1664 – 15 lbs.

PARTS PRICE LIST

(Effective on all valves manufactured after July 1, 1965)

PART NO.	DESCRIPTION	QTY. PER SECTION	LIST PRICE
085	Handle Pin	1	.10
086	Handle Pin Cotter	1	.05
563	Lockwasher (Bonnet Screw & Handle Bracket Screw)	8	.05
928	Handle Link	1	.80
929	Handle Link Cotter	1	.05
1039	Handle Adapter Lockwasher	1	.05
1478	Handle Adapter	1	1.40
1601	Handle Bracket	1	.75
1602	Handle	1	1.50
1616	Spool Seal	2	.35
1620	Handle Bracket Screw	4	.05
*1654	4-Way Float Spool	1	13.50
*1664	Float – 4-Way Center Valve Housing	(1)	25.00
1666	Float Centering Sprg.	1	.85
1700	Float Detent Ball	4	.10
1728	Check Plug	1	1.20
1729	Check Poppet	1	1.25
1731	Float Adapter Nut	1	.10
1732	Float Adapter Lockwasher	1	.05
*3002	Float 4-Way with Top "In" & "Out" Valve Hsg.	(1)	31.50
1735	Float Bonnet	1	1.50
1736	Float Detent Adapter	1	2.00
1737	Float Det. Stop Collar	1	1.50
1738	Retainer (Det. Ball)	1	1.10
1739	Float Stop Collar	1	.50
1741	Spool Ret. Ring	1	.15
1794	Heavy Float Centering Sprg.	(Opt.)	.85
2673	Bonnet Screw	4	.05
2709	Check Plug O-Ring Seal	1	.30
2796	Check Spring	1	.25

(See Form #430 for Assembly Parts)

Housings and Spools Cannot be Ordered as Separate Items. All Spools are Fitted to Individual Housings by Select Hone Process at Factory.

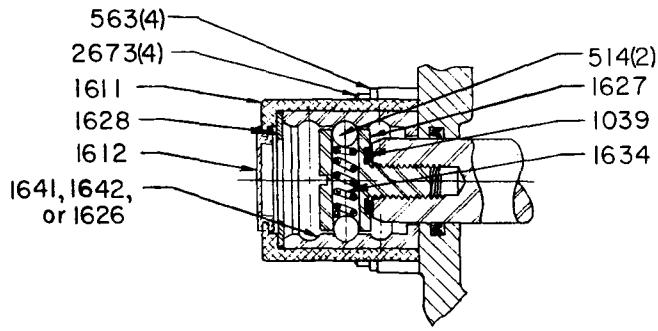
GRESEN HYDRAULICS®

25P DIRECTIONAL CONTROL VALVE

SPOOL DETENT - 1, 2 or 3 POSITION

For Use on 4-Way, 3-Way, and Free-Flow Spools Only

NO SPRING CENTERING



With this option the valve spool will remain in any of the three positions in which it is placed manually. There is no "spring-return to neutral" provision when this option is installed.

PARTS LIST

PART NO.	DESCRIPTION	NO. REQ'D PER ASSEMBLY
514	DETENT BALL	2
*563	LOCKWASHER, BONNET SCREW	4
1039	LOCKWASHER, DETENT ADAPTER	1
*1611	BONNET	1
*1612	BONNET DIAPHRAM	1
1626	3-POSITION DETENT SLEEVE	1
1627	DETENT HOLDER	1
1628	DETENT STOP WASHER	1
1634	DETENT SPRING (STANDARD)	1
*2673	BONNET SCREW	4
1642	2-POSITION DETENT SLEEVE (OPTIONAL)	(1)
1641	1-POSITION DETENT SLEEVE (OPTIONAL)	(1)
1757	FORWARD POSITION DETENT TRAVEL STOP (OPTIONAL)	

*THESE PARTS ARE COMMON WITH THOSE USED ON STD. SPRING CENTERED SPOOLS.

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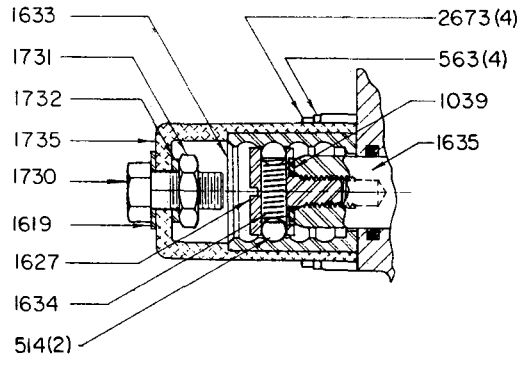
Form #433 Rev. 3/13/63

Model 25P & 25PK Control Valve
SPOOL ACTION OPTIONS

MODEL 25PK (Float)
4-Position Detent Option

This feature is especially well suited for controlling and directing flow to Start, Stop, Reverse and "Free-Wheel" Hydraulic Motors. Neutral Position provides hydraulic "brake" for motor. (No Spring-Return to Neutral.)

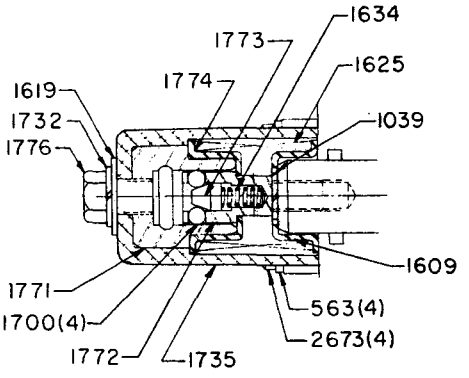


Special Parts Required
PARTS LIST

Part No.	Description	No. Req'd.
514	Steel Ball	2
1619	Washer	1
1627	Detent Holder	1
1633	4-Position Detent Sleeve	1
1634	Detent Spring	1
1635	4-Way Float Spool	1
1730	Cap Screw	1
1731	Jam Nut	1
1732	Lockwasher	1
1735	Float Bonnet	1

MODEL 25P
"R" Detent Option

This feature allows spring-centering to neutral with a Detent for the spool "IN" Position Only. It is very desirable for operation of hydraulic motors, especially where it is necessary to have detent in one direction and spring-centering in the other.

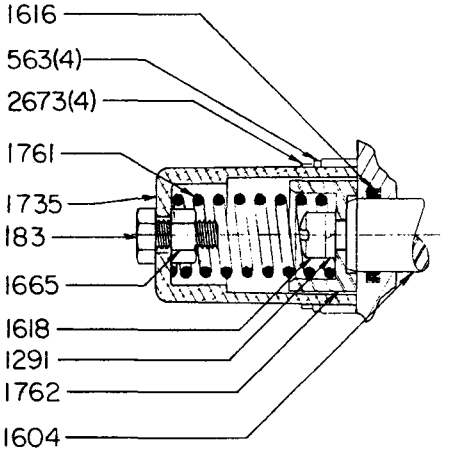


Special Parts Required
PARTS LIST

Part No.	Description	No. Req'd.
1619	Washer	1
1634	Detent Spring	1
1700	Steel Ball	4
1732	Lockwasher	1
1735	Float Bonnet	1
1771	Detent Sleeve	1
1772	Detent Holder	1
1773	Detent Ball Follower	1
1774	Detent Collar	1
1776	Cap Screw	1

MODEL 25P
"A" Spring-Extended Spool Option

This feature eliminates spring-return to neutral, and spring loads the spool to the "OUT" Position Only. Usually used for "Cam-Operation" of spool. Customer must supply cam-follower mechanism.

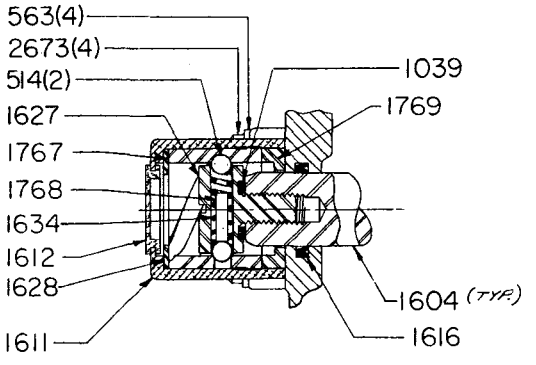


Special Parts Required
PARTS LIST

Part No.	Description	No. Req'd.
183	Cap Screw	1
1665	Stud Nut	1
1735	Float Bonnet	1
1761	Return Spring	1
1762	Stop Collar	1

MODEL 25P
"W" Rotary Spool Option

With this option the spool is pulled or pushed by rotary movement of the spool. Allows for 90° rotation of the spool each direction from center, making a 180° total handle rotation with detent position in neutral. There is no spring-centering, therefore the spool will stay in any position placed. (No Handle is supplied - customer must furnish his own handle mechanism.)



Special Parts Required
PARTS LIST

Part No.	Description	No. Req'd.
514	Steel Ball	2
1627	Detent Holder	1
1628	Detent Stop Washer	1
1634	Detent Spring	1
1767	Rotary Actuator	1
1768	Ball Stop Pin	1
1769	Stop Collar	1