
# CP-3
# OWNER/OPERATOR MANUAL

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**Chelsea P.T.O. – Go to following website:**
**http://www.parker.com/chelsea/cat/english/HY25-1380-M1_US.pdf**

**Parker Model V20 Sectional Body Directional Control Valve – Go to following website:**
**http://www.parker.com/hydraulicvalve/serv/Bul%20HY14-2705-M3cvr.pdf**

# Part 1: A Word to Owner, Operator, and Service Personnel about Safety

**⚠ WARNING**

**FAILURE TO READ THIS BOOKLET IS A MISUSE OF THE EQUIPMENT. ANYONE WHO WILL OPERATE, SERVICE OR WORK AROUND THIS LOADER MUST FIRST READ THIS BOOKLET. DEATH OR SERIOUS INJURY MAY RESULT FROM IMPROPER USE OR MAINTENANCE OF THIS LOADER.**

## Introduction

Anyone who will operate, service or work around the loader should first read this manual. It is important that all workers understand the safety, operational, service, and repair requirements of the loader. Death or serious injury can result from improper use or maintenance of the loader.

As an owner or employer, it is your responsibility to know the specific requirements, governmental regulations, precautions, and work hazards that exist. You should make these known to all personnel working with the equipment or in the area. It is your responsibility to instruct the operator in the safe operation of the equipment and to provide the operator with properly maintained equipment.

It is the operator's responsibility to operate the loader with skill, good judgment and caution. Following recognized safety procedures helps to avoid accidents.

Do not allow untrained personnel, even on a temporary basis, to operate this equipment. Operators must be trained by an experienced trash loader operator who is familiar with all aspects of operation, safety, and maintenance of this equipment. Keep children, visitors and untrained personnel away from the equipment.

Modifications to any part of this loader can create a safety hazard and therefore shall not be made without the manufacturer's written approval. Use only factory approved parts to repair or maintain this equipment. If this equipment is rebuilt or remounted, mounting procedures and retesting is required in accordance with factory instructions.

**⚠ WARNING**

**DO NOT OPERATE THE LOADER UNDER ANY CIRCUMSTANCE IF THERE IS REASON TO BELIEVE THE UNIT IS BROKEN OR MALFUNCTIONING. DO NOT ATTEMPT TO PLACE THE BOOM OF A BROKEN OR MALFUNCTIONING UNIT IN THE BODY OF THE LOADER UNIT WITHOUT ASSISTANCE FROM ANOTHER CRANE OR LIFTING DEVICE. ANY ATTEMPT TO USE OR MOVE THE BROKEN OR MALFUNCTIONING UNIT COULD RESULT IN SERIOUS BODILY INJURY OR DEATH.**

# Part 2: Daily Inspections - Before Leaving the Storage Facility

One of the most important factors in the prevention of accidents is a positive attitude towards safety. The habit of anticipating possible problems normally prevents many accidents from occurring.

Each morning, prior to leaving the storage facility or lot, the following loader and vehicle inspections should be made:

1. Check oil level and battery.

2. Check the brakes and backup alarm. The backup alarm must always be sounding prior to backing up. If your unit is equipped with any additional alarms or warning lights, check these items also for proper operation.

3. Check rearview mirrors and adjust if necessary.

4. Check tires for proper inflation, cuts, and loose wheel nuts.

5. Check head and taillights, strobes, and flashers for proper operation.

6. Check the hydraulic system for any unusual conditions such as pools of hydraulic fluid or lubricating oil under the chassis, any outrigger which may have crept down, or any signs of damage or improper maintenance. The hydraulic hoses should be free from cuts and abrasions and there should be no evidence of binding or leakage.

7. Check the structure of the Crab Attachment for any cracks and/or bent parts. Make certain that both legs move freely.

8. Ensure that outriggers are fully retracted, the Crab Attachment is properly stowed for transit and the swing lock is engaged. The Crab Attachment stowing instructions are explained in Part 8 of the Operation section of the manual

Consult the truck manufacturer's manual for vehicle checks recommended by them.

Any insufficiencies found during this inspection must be corrected prior to use of the equipment.

# Part 3: Safety Devices

We will now discuss some of the components designed into the loader system to ensure that safe loader control is maintained. There are hydraulic system flow devices designed into the loader system to control the flow of hydraulic fluid. Loader control and speed are essential to the safe operation of, and longevity of the loader.

To maintain safe loader control you must ensure that proper engine speed is observed, all oil flow restrictors are in place and have not been modified, and all valves are operating properly. You must not remove, or tamper with the manufacturer's recommended settings of oil flow devices.

Excessive operating speed causes erratic operation of the loader. Excessive operating speed decreases operator control and increases the stresses on the loader's supporting structures, which could cause unexpected component failure. The result of unexpected component failure could be damage to the equipment and/or serious bodily injury or death.

## FLOW RESTRICTORS

Swing Actuator Restrictors: - The swing actuator flow restrictors control the swing speed of the loader boom. These restrictors are located on the swing drive motor, one on each port. These restrictors are factory preset and must not be removed or drilled out.

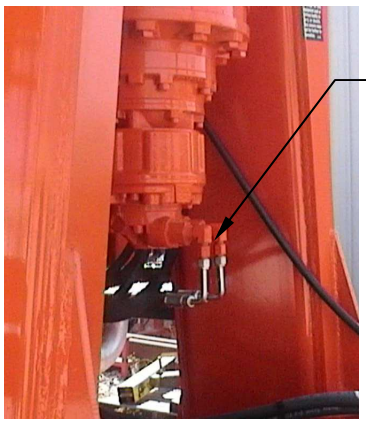
**Dinamic Oil Rotary Actuator, Restrictor Size = 0.110**

Some signs of restrictor removal or modification are:

1. Excessive boom swing speed. Full travel time should be 20 seconds, ±3 seconds, from head stop to head stop.

2. Broken or bent head (swing) stops. Catastrophic actuator damage will result if head stops are damaged or missing.

3. Excessive swing speed causes excessive wear on the main boom/tip boom connecting bolt.



Swing Actuator Restrictors:

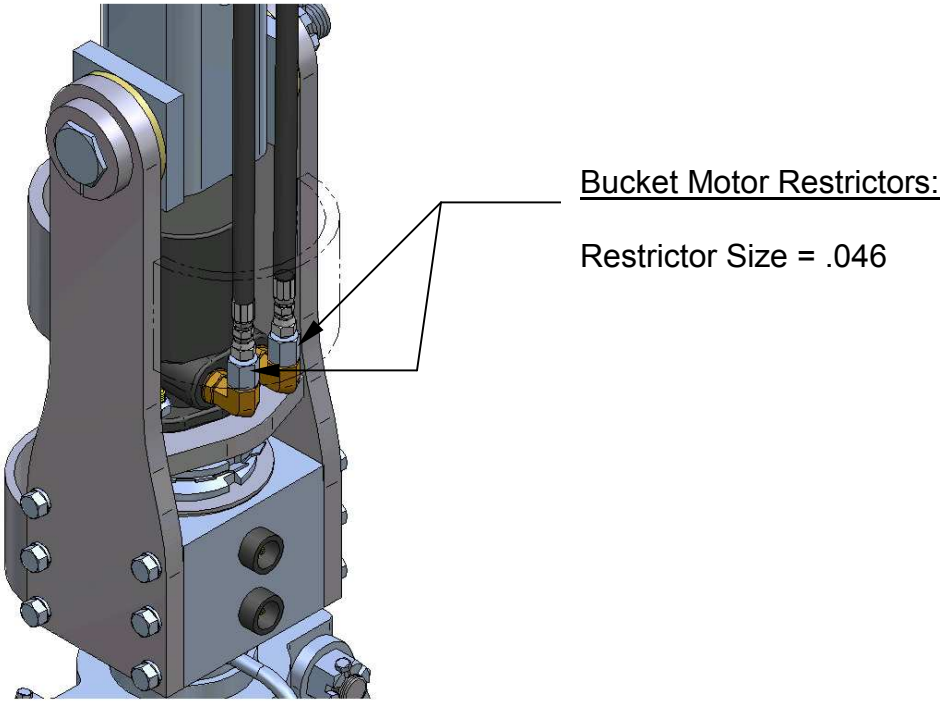
Actuator Restrictor Size = 0.110

Bucket Motor Restrictors: The bucket motor restrictors control the speed of the bucket rotation. These restrictors are located on the motor ports. These restrictors are factory preset and must not be removed or drilled out.

**Restrictor Size: .046**

Some signs of restrictor removal or modification are:

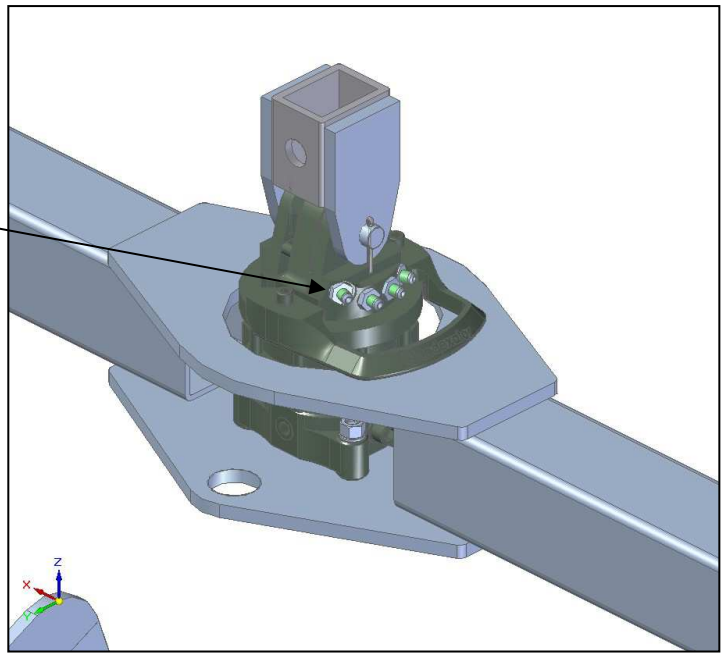
1. Excessive bucket rotation speed. Bucket rotation must not exceed 15 RPM.
2. Broken bucket rotator motor mounting bolts.
3. Broken bucket motor shaft and/or housing.




Crab Motor Restrictors: The Crab motor restrictors control the speed of the Crab rotation. These restrictors are located on the two center motor ports. These restrictors are factory preset and must not be removed or drilled out.

Crab Hook Restrictors: The Crab hook restrictors control the speed of the opening and closing of the hooks. These restrictors are located on the two outer motor ports. These restrictors are factory preset and must not be removed or drilled out.

Crab Hook Restrictors:
Restrictor Size = .046
Typical on outer ports.



## LOAD CONTROL VALVES

The load control valves are either a part of or plumbed directly onto load holding cylinders. These valves are found on the main boom lift cylinder, tip cylinder, tip extension, and the outrigger cylinders.

### Main Boom Lift, Tip, and Tip Extension Cylinders:

Counter-balance Valves: - The counter-balance valve is a cartridge type valve, mounted directly into a housing that is welded to the lift, tip, and tip extension cylinders. These valves hold the load until hydraulic pressure is applied to it causing the valve to open. This ensures the load is held in case of hose rupture, or other hydraulic system failure.

> **Notice to Operators: If load control valve(s) malfunction, do not attempt to adjust valves, and/or continue to use the loader. Return to the maintenance facility for repair.**

Counter-balance valve adjustment is not normally needed after initial installation. However, if adjustment is needed, first release load from valve and rest bucket on ground or floor of body. Turn valve screw far enough out so that valve will hold load when control valve is opened and truck PTO is off. The PTO should be off when adjusting the screw, back on to lift the boom, and off again to test load holding capability of the valve.

If the cartridge valve is replaced, you must first release the load from the valve. This means the boom must be at rest in the floor of the body or on the ground, prior to removing the cartridge valve.

**⚠ WARNING**

**FAILURE TO FOLLOW THE PRECEDING INSTRUCTIONS REGARDING COUNTER-BALANCE VALVE ADJUSTMENT AND/OR REPLACEMENT, COULD RESULT IN THE BOOM FALLING ONCE THE CARTRIDGE VALVE IS REMOVED, WHICH COULD RESULT IN DAMAGE TO THE EQUIPMENT OR SERIOUS PERSONAL INJURY OR DEATH.**

If the operator experiences hydraulic failure while on route, first try to get the hydraulic system working again. If you cannot get the hydraulic system working, we recommend that you call for the assistance of an auxiliary service vehicle that can provide a power source for the loader hydraulic system. The connections from the auxiliary power source should be made at the appropriate loader valve bank. Hydraulic pressure from the power source should go to the **"in"** at the loader valve bank, and return to the power source should come from the **"out"** at the loader valve bank. Using the auxiliary power source to run the hydraulics, replace all loader components to the travel position, and then return the loader to the shop for repair.

**Outrigger Cylinders:**

Pilot Operated Check Valve: - The outrigger cylinders use pilot operated check valves which are part of the cylinders. In the event of hose failure, these valves hold the load until hydraulic pressure is applied, causing the valve to open.

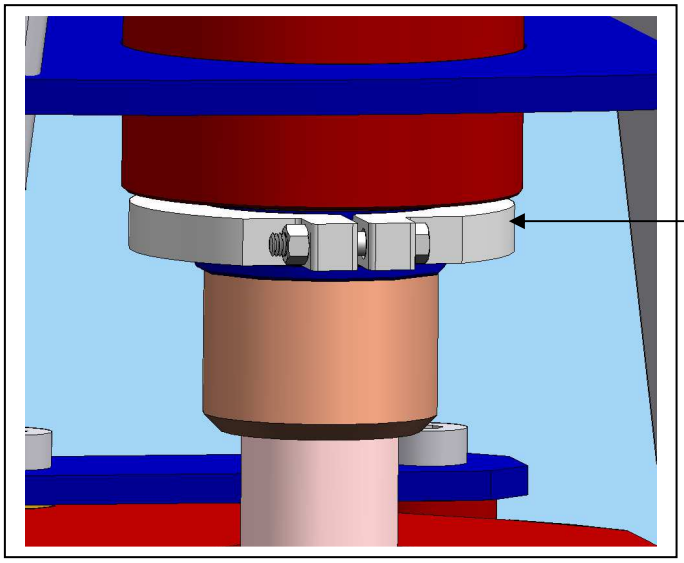
These valves are factory preset and are not serviceable.

If you need to remove this valve, make sure the load is released from the cylinder prior to removing the valve.

## LOCK COLLAR

The lock collar is an integral part of the loader that holds the head and spindle assembly in the pedestal. The lock collar must be in place and the lock collar bolts properly torqued prior to use of the loader. The lock collar must be tight against the bottom of the spindle bearing housing with a maximum gap of one-quarter inch (1/4").

Improper lock collar installation could result in the head assembly being pulled up out of the pedestal assembly. The separation of these two loader components will result in equipment damage, and could result in serious personal injury or death.



Lock Collar

(See Item No. 9 on the Head and Pedestal Assembly drawing found in the "Dia. & Drawings" Section of this manual).

## BACK-UP ALARM

All truck mounted loaders have back-up alarms that must sound any time the gear shift selector is in reverse "R". The back-up alarm is on the daily checklist of items to be checked prior to leaving the storage facility. If the back-up alarm is not working, it must be repaired prior to putting the vehicle in service.

**⚠ WARNING**

**ALARM MUST SOUND WHEN BACKING UP. DO NOT BACK UP WITHOUT HAVING SOMEONE CLEAR BEHIND THIS VEHICLE.**

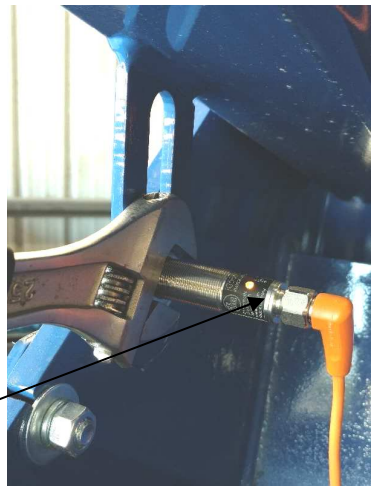
It is the operator's responsibility to make sure that the area behind the loader is clear before backing up.

## “BOOM-UP” ALARM

A warning system that alerts the loader operator when the boom is not stowed properly for travel. A sensor is installed on the boom, and an audible alarm and red light in the truck cab. When the operator enters the truck cab after using the loader, the warning light and audible alarm will alert him if the boom travel height exceeds 13 feet.


The boom up alarm may have a round dial attached to the light that can be turned to adjust the volume of the audible alarm.

The boom up sensor will turn on a light once the sensor passes the head side plate.



Some trucks have a customizable red light and alarm already in the dash that can be used as a boom up alarm. If the truck is equipped with such a light and alarm, the boom up sensor will be wired into this light and alarm to function as a boom up alarm.

This system should be viewed as a tool to help operators measure the height of their boom, but more importantly, to warn the loader operators that their boom is above safe height for travel. It is not intended to replace an operator’s good judgment on safe travel height of their boom.

Operators should always be aware that some routes may have streets, roads, alleys, etc., that do not comply with the legal height requirement of 13’6”, and should conduct their operations accordingly.

The PI factory boom sensors are set to 13’-0” so if you have a low height object you need to travel under you will need to set the sensor to the desired boom height. It therefore, may be necessary for the boom up sensor to be adjusted to a lower setting than the factory setting.

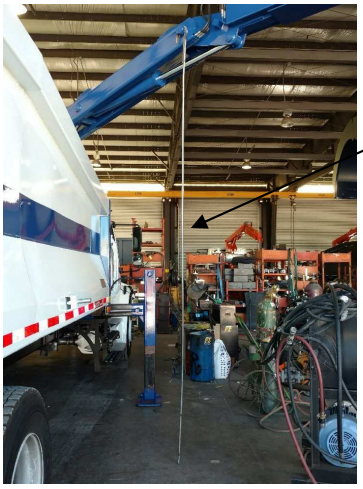
To adjust the boom sensor:

1. Park the truck on a smooth and level paved surface.

2. Set the outriggers out and down to stabilize the truck (Do not lift the truck). Swing the boom over to the side of the truck with the boom fully extended. Lift the main boom to desired height (typically the highest point is at the tip boom stop).

3. Loosen the sensor and slide it up or down as necessary so that the in dash alarm starts to go off at this boom height.

4. Tighten the sensor and put a visible mark at the center of the bracket so that a visual inspection can confirm that the sensor position has not changed. Note: This sensor must be within 1/8" of the head side plate to function properly.



When adjusting or checking boom sensor, use a set gage or measure to desired height (measure to from the ground to the upper most point of the tip boom stop).

Once sensor is set to required setting, mark with paint marker.

**⚠ WARNING**

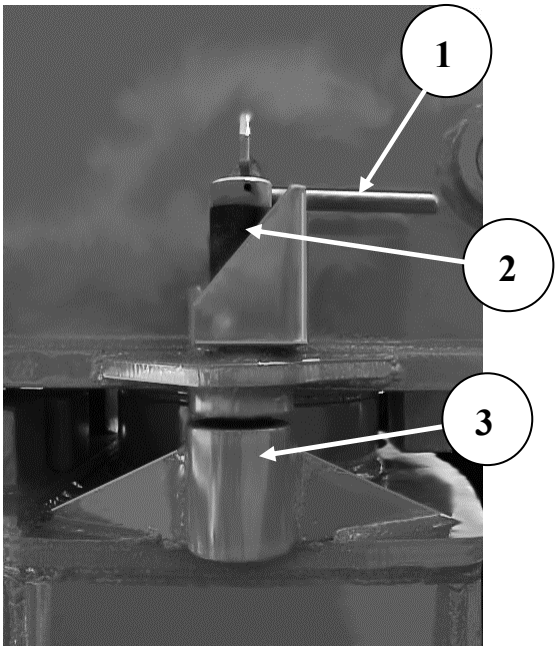
**BEFORE MOVING TRUCK, BOOM MUST BE STOWED TO LOWEST POSSIBLE HEIGHT; MAX. BOOM HEIGHT NOT TO EXCEED 13'6".**

This boom-up warning system became a standard feature of our loader in April, 2002. If you have an older model Lightning Loader® that does not have this boom-up warning system, you can contact our Parts Department and order a retro-fit kit to install this system.

## BOOM SWING LOCK

The loader vehicle can be equipped with either a flatbed or a body that has low body sides to accommodate the loading and unloading of the refuse containers. The low height of the body sides requires that the boom and Crab attachment be properly stowed, and secure, prior to transit. The swing lock mechanism locks the boom in place, once it is properly stowed.

**Failure to properly secure the boom and Crab Attachment as described below could create a safety hazard which could result in property damage and/or death.**




**Swing Lock Disengaged**

**Swing Lock Engaged**

Locking Procedure for Crab Attachment:

1. Center the main boom over the body. Positioning of the boom may require minor adjustments to engage lock.

2. Once proper alignment is made, rotate swing lock handle (1) to engage lock. Allowing the swing lock pin (2) to fully engage the lower locking hub (3).

3. Lower boom and Crab attachment until the legs rest on floor of body. If there is a container in the last rear position of the body, you may leave the hooks engaged in the refuse container pockets and lower the boom to safe travel height.

## SAFETY SYMBOLS

Your loader has required safety decals (see following pages) that alert those operating, working around, or performing maintenance on the loader of certain safety hazards. The safety decals are used to show the consequence of human interaction with a hazard in terms of:

1. The degree of severity.
   (minor injury, severe injury, death)

2. The probability of severity.
   (WILL result in, COULD result in)

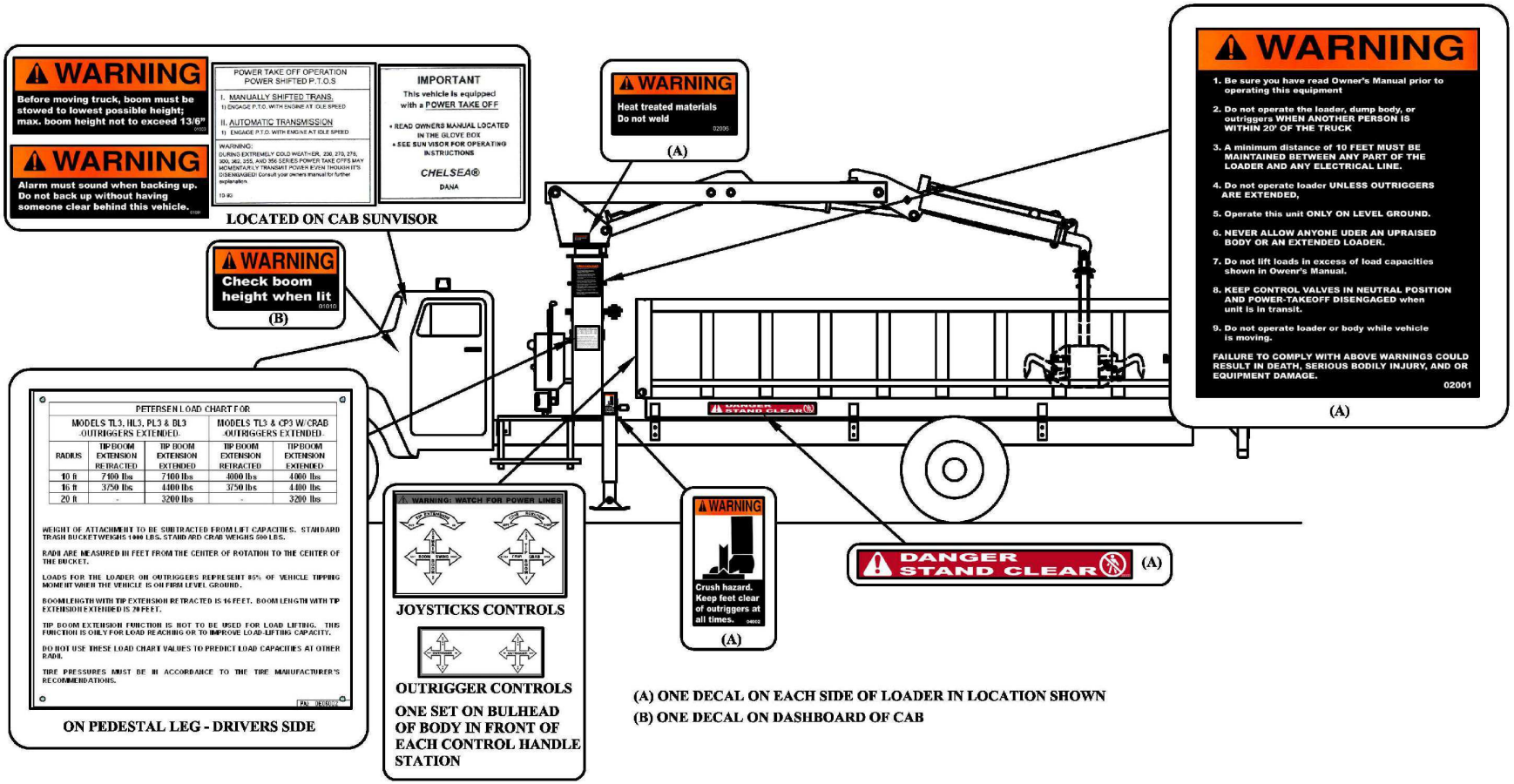
The following definitions for identifying hazard levels are provided with their respective signal words.


**DANGER** Immediate hazards which WILL result in severe personal injury or death.


**WARNING** Hazards or unsafe practices which COULD result in severe personal injury or death.

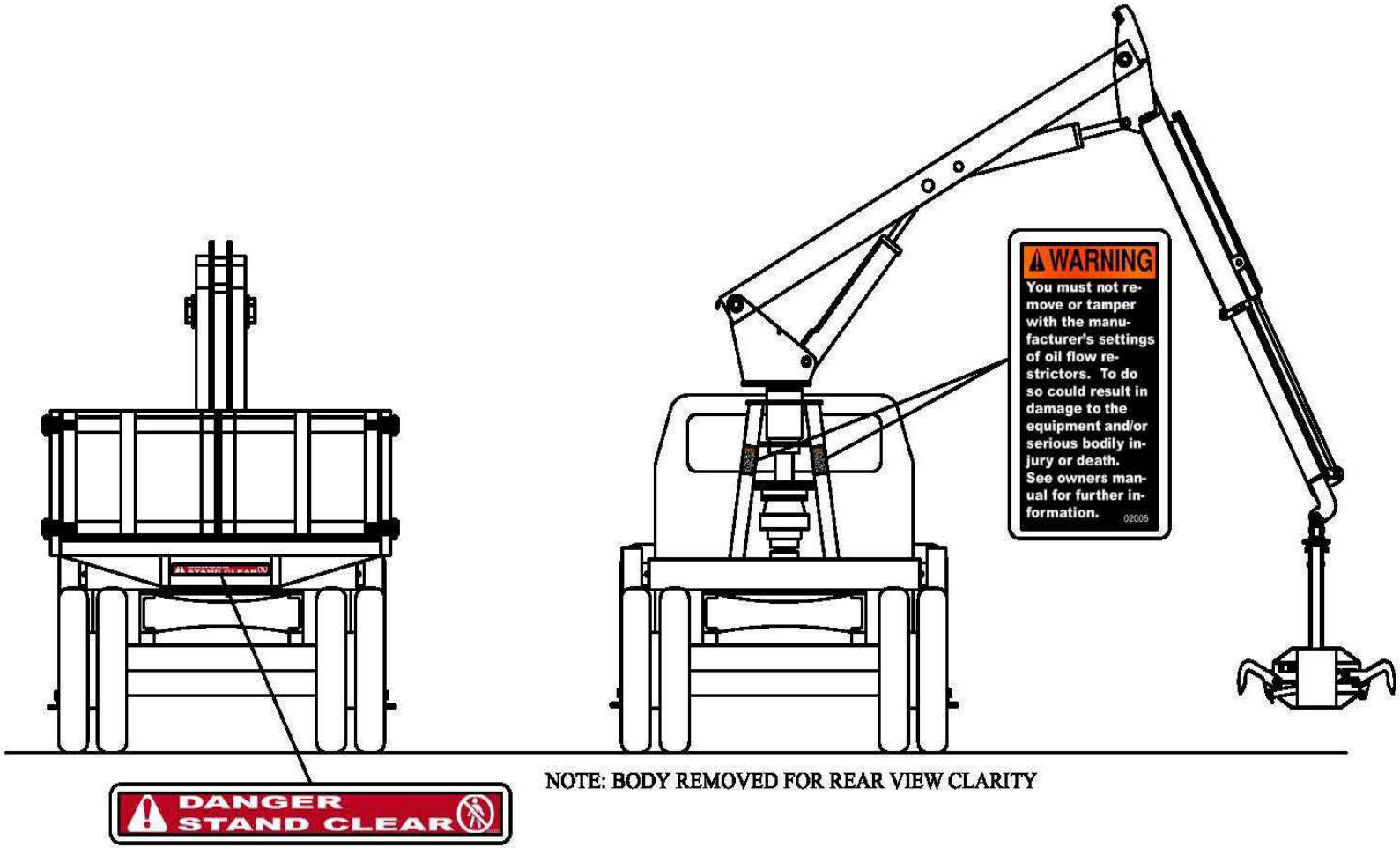

**CAUTION** Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

# MODEL CP-3 CONTAINER LIFTER - REQUIRED SAFETY DECALS




(A) ONE DECAL ON EACH SIDE OF LOADER IN LOCATION SHOWN
(B) ONE DECAL ON DASHBOARD OF CAB

# MODEL CP-3 CONTAINER LOADER - REQUIRE SAFETY DECALS




NOTE: BODY REMOVED FOR REAR VIEW CLARITY

# Part 4: Controls

## THROTTLE CONTROL

Throttle controls are installed for loaders mounted on a truck chassis. For loaders mounted on trucks with mechanical engines, either a manual throttle or a Muncie Hydrothrottle is installed. For loaders mounted on trucks with electronically controlled engines, a manual switch is used to advance the engine speed. The engine speed is advanced to the preset RPM, thus increasing the volume of oil available for loader functions. The hydraulic system is designed for maximum oil flow of 18 gallons per minute.

**Preset RPM = Never to exceed 1400**

Exceeding preset RPM will cause excess oil flow, which may cause unsafe operating speeds, excessive oil temperature, undue wear and tear on the loader and chassis.

Some signs of throttle control mal-adjustment or tampering are:

1. Leaking hydraulic seals caused by excess heat.

2. Prematurely worn loader components caused by excess operating speed.

3. Sticks, bricks, rocks, etc. found in the truck cab may indicate the loader operator has purposely intended to exceed preset engine RPM by jamming the truck accelerator.

## PTO OVER-SPEED CONTROL

The over-speed control is a device that disconnects the PTO or diverts the flow of oil back to tank rather than to the loader valves.

The purpose of this control device is to prevent excess oil flow to the hydraulic system, which could happen if the throttle control device is altered or over-ridden.

**PRESET RPM = NOT TO EXCEED 1600**

<u>Power Take-Off Manual Transmission:</u>

Manual Shift Control – The PTO is engaged when the knob on the dash or floor is pulled out and disengaged when the knob is pushed in. The truck gear shift lever must be in neutral and the clutch depressed whenever the knob is moved.

Air Shift Control – The PTO is engaged when the switch is moved to apply air to PTO, the “On” position. The PTO is disengaged when the switch is in the “Off” position. The truck gear shift lever must be in neutral and the clutch depressed when the switch is moved.

Power Take-Off Automatic Transmission:

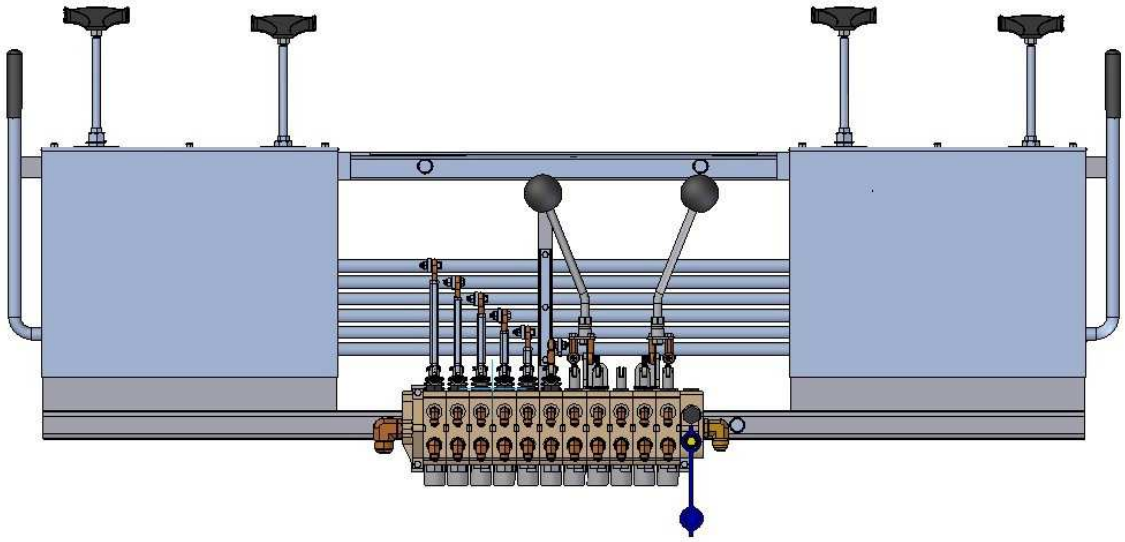
Electrical Shift Control – The recommended procedure is to bring the vehicle to a full stop, place the truck gear shift lever in the neutral position, set the parking brake, and then engages the PTO. At the completion of loading operations, disengage the PTO, apply the service brakes, disengage the parking brake, and then select the appropriate transmission gear.

## PARK BRAKE

The truck brake must be set before leaving the cab for any reason.

## LOADER CONTROLS

There are two (2) joystick handles on each side of the operator's platform. The operating functions of the two sides are identical, so the operator uses the same movements on either side to control the boom elevation, boom swing, tip boom extension, crab grab, and crab rotation.

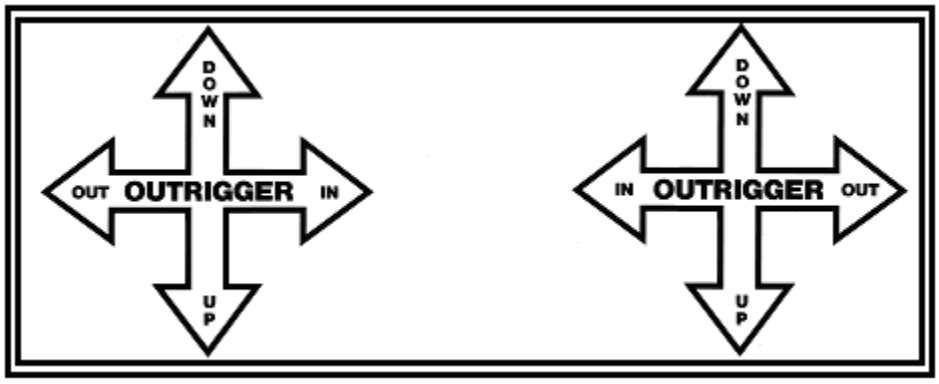


At the center of the work platform are two (2) control handles. These two handles with the round knobs are the outrigger control handles. The round knob on the left controls the left outrigger, and the round knob on the right controls the right outrigger.

The optimum, safe method of operating the controls is by feathering. **Do not jerk the control levers to full speed, or from one extreme to another.** Feather the controls by moving the joystick smoothly from the neutral position to start motion. After a slow, smooth start, move the joystick control to extreme for full speed. Just before stopping movement, move the joystick control smoothly back to the neutral position.

On units equipped with dual controls, always operate the loader on the side closest to the container being loaded. Do not store any collectibles on the operator's platform, as they can create a tripping hazard or become lodged in the controls.

## Outriggers




Left Outrigger Right Outrigger

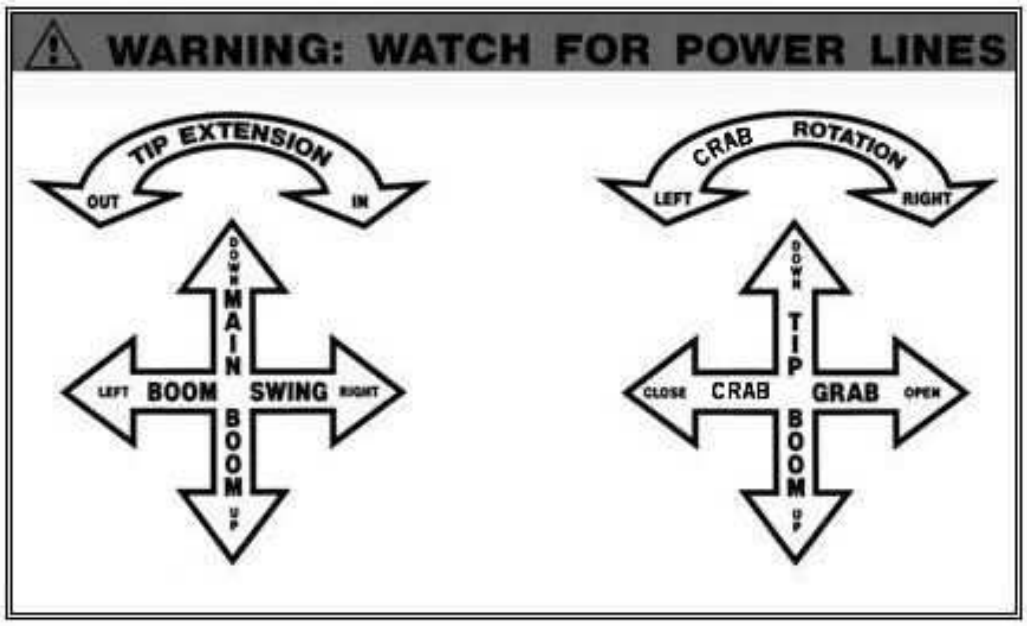
### Left Outrigger Handle:

Move the handle to the left to extend the left horizontal outrigger.
Move the handle to the right to retract the left horizontal outrigger.
Push the handle forward to lower the left vertical outrigger foot.
Pull the handle back to raise the left vertical outrigger foot.

### Right Outrigger Handle:

Move the handle to the right to extend the right horizontal outrigger.
Move the handle to the left to retract the right horizontal outrigger.
Push the handle forward to lower the right vertical outrigger foot.
Pull the handle back to raise the right vertical outrigger foot.

## Loader Controls




### Left Joystick:

**Boom Swing:** Move handle right to make boom swing right.
Move handle left to make boom swing left.

**Main Boom:** Pull handle back to raise boom.
Push handle forward to lower boom.

**Tip Ext.:** Twist handle counter-clockwise to extend tip extension out.
Twist handle clockwise to retract tip extension in.

### Right Joystick:

**Tip Boom:** Pull the handle back to raise tip boom.
Push handle forward to lower tip boom.

**Crab Grab:** Press & hold the button between the joysticks, then move handle to the right to open Crab Attachment.
Move handle left to close Crab Attachment.

**Crab Rotate:** Twist handle clockwise to rotate Crab Attachment right (clockwise).
Twist handle counter-clockwise to rotate Crab Attachment left (counter-clockwise).

# Part 5: Training

All members of the crew must become thoroughly familiar with the operation of controls, the correct operating procedures, maximum lifting capacities, and safety precautions before operating the loader. Operator training is essential. Always be prepared for an emergency. The following pages contain numerous safety precautions, information, and operating instructions that must be observed while performing work operations.

The health, safety and well-being of each member of the crew is of primary importance. Consequently, each member has an obligation to himself, and to his fellow workers, to make sure safe operating procedures are followed. All operating regulations recommended by the manufacturer, the employer and by municipal, state and federal agencies must be observed. The operating procedures set up in this manual are Petersen's recommendations and do not necessarily cover employer and governmental regulations. Each operator must know and observe those regulations.

Become familiar with all equipment checks. You should make daily equipment inspections and be able to spot any abnormality or malfunctions before beginning an assigned task, while working or after completing the task. There is a high degree of reliability built into your equipment, but there is always a possibility of mechanical failure or power failure due to incomplete service or abnormal wear. An operator should never take another's word. He should always thoroughly check the equipment himself.

Each crew member must receive thorough instructions on the care and maintenance of this machine, thus enabling him to identify and anticipate any problems that may occur. Knowing how the equipment operates will help you recognize when it is not operating properly and that repair or adjustments are required.

# Part 6: Setting Up at the Job Site

An important prerequisite to proper setting up at the job site is to thoroughly plan the lift before positioning the vehicle.

Always seek the best possible work site when parking the vehicle. An ideal parking location at a job site is firm, level dry ground or pavement, located in close proximity to the work station. Avoid uneven, rocky or muddy terrain, or steep grades. Location should be selected such that outriggers can be fully extended and the outrigger pad comes down on a firm, level surface. In the event that it is necessary to use the loader on an inclined surface, extreme care should be used. Loader slewing torque, stability, lifting capacity and other loader control functions may be affected adversely. Particular caution must be exercised with the swing function since a “downhill” inclined surface will increase the slewing speed and lengthen the time it takes to stop the motion. Your vehicle should be positioned in an area free from overhead obstructions and to allow performance of the entire task without repositioning, if possible. The operator must be familiar with the swing arc of the loader. The Model CP3 is equipped with a 360° non-continuous swing system that allows for the boom to be rotated over the front of the vehicle in either direction. There are positive stops that control the swing arc and limit it to 360°. Damaged or missing head and pedestal stops poses an unsafe condition by allowing the boom to swing too far resulting in damage to the hydraulic hoses on the back of the head. Once the vehicle is in position for loading, please follow these precautions and procedures for loading:

Precautions and Procedures for Loading:

- Before leaving the cab, engage all safety lights, place the transmission in neutral, and set the truck brake.

- Always be aware of traffic conditions. Extreme caution should be taken when operating extendible outriggers where there is traffic. The operator should consider the possible safety hazard and take necessary precautions, such as using safety cones to mark the outriggers. The operator should also consider using safety cones to mark the vehicle, if the loading position interferes with traffic flow, or other conditions make the vehicle not easily visible.

- Before commencing work, make sure the container you are going to load does not conceal any fixed objects, such as fire hydrants, guy wires, etc.

- The vehicle should be positioned so that it is impossible for any portion of the equipment to come within the minimum required safe distance to any energized power line. Maintain a clearance of at least 10 feet between any part of the loader and any electrical line. Remember, power lines deflect in winds and additional clearances must be allowed. Death or serious injury may result from contact or arcing due to inadequate clearance to anyone working on or around the loader. All overhead wires should be considered energized until the electrical utility authorities verify that they are not and the wires are visibly grounded.

- Do not operate the loader during electrical storms, when high wind conditions exist, or in poorly lighted conditions.

- Your loading area must be clear of people. Do not operate the loader or outriggers if another person is within twenty feet of the equipment.

- Do not allow any person under an extended loader.

- If your loader uses steps for access to the loader station, use provided handholds and steps. Face the steps when getting on and off.
  Never use controls as handholds. Do not mount the machine if handholds or steps are broken or missing. Repair them first.

- Never rotate the boom over your head. If the boom is rotated toward the driver side, operate the loader from the passenger side. If the boom is rotated toward the passenger side, operate the loader from the driver side.

- Allow room for the boom to clear the cab of the vehicle.

- Allow room for the crab attachment to clear the cab of the vehicle.

- If it necessary to move the vehicle that has a container positioned directly over the front of the vehicle proceed with extreme caution. The swing motion of the container caused by sudden starting and stopping may cause the container to collide with the vehicle.

- If it necessary to move the vehicle that has a container positioned directly over the front of the vehicle keep the container as close to the ground as possible.

- Use extreme caution during the operation when picking a container over the front of the vehicle as you are looking in the opposite direction as normal.

**Failure to heed these instructions can result in serious personal injury or death.**

# Part 7: Loading Procedure

Engage the power-take-off. For cold weather operation, allow the loader hydraulic system to reach operating temperature before commencing work.

Before conducting any boom operations, extend all outriggers to level the loader side to side. When extending outriggers out and down, ensure that the vehicle is stabilized. To develop rated load capacity, the outriggers should be fully extended. Provide blocks, if necessary, to level the unit on sloping ground or bearing pads if the outriggers tend to sink into soft terrain. Some concrete surfaces are relatively thin and cannot withstand outrigger loading. Concrete can break through and cause instability.

Remember this safety information regarding the outriggers:

- Keep feet clear of outriggers at all times to avoid serious crushing injury.
- Failure to use the outriggers when loading may create an unstable condition, including the loader overturning that could result in serious personal injury or death.

Do you know the load capacity of the loader? Refer to the "Load Capacity Chart" in this manual for information regarding load capacities. The “Load Capacity Chart” is also riveted to the pedestal of the loader. Do not attempt to lift more than the capacities shown on the load chart for your model loader at the correct radius.

For loaders with manual throttle controls, set the throttle control to desired RPM, depending on loading conditions. Remember; DO NOT exceed the preset throttle control setting of 1400 revolutions per minute.

**Loading and Unloading Procedures:**

**IMPORTANT! –If you are using the Crab attachment with any other brand of loader, be aware that the rated lifting capacities of your loader may be different. Ensure that you have sufficient lift capacity before installing this attachment on other brand loaders.**

The Crab attachment requires that you think about the shape of the refuse container you will be lifting and where you will be positioning that container, whether you are loading it into the body of the truck or placing it on the ground.

Containers must be lifted so as NOT to contact the boom of the loader during movement. This may require a much higher lift of the main boom and more level operation of the tip boom than when the loader is used with a normal grapple attachment. Take this into account when you are planning the lift and positioning the vehicle.

To make a lift from the ground:

1. Raise boom from inside of dump body and swing to container. Use tip extension, if needed, and rotate Crab so that it is aligned with container sides.
2. Open the hooks and lower around container until the bottom slanted surfaces of the crab settle on the top of the container side pockets. Do not jam the Crab down so that the hooks push out beyond the container pockets.
3. Close the hooks slowly. Watch them to ensure both the front and back hooks engage.
4. In many cases, you will be able to see only one side of the container, and you will not know for certain whether the other side is properly engaged. In such a case, slowly start to lift the container and watch the other arm of the crab. If at least one of the hooks has engaged, the container should slowly start to lift evenly off the ground. If this does not happen, lower the boom, open the hooks, and go back to step 3.
5. If step 4 has been successful, once the container is no more than 6 inches off the ground, rotate the container so you can check positively that both hooks on both sides of the container are fully within the pockets of the container. If you do not have clearance to rotate the container and make this check, keep the container within 6 inches of the ground and carefully move it to a place you can safely see both pockets. If this is not possible, you must move yourself to a position that will allow you physically to check that both pockets are fully engaged by both hooks. Once you have confirmed a firm grip on the container, you can start the lift. DO NOT LIFT UNLESS ALL FOUR HOOKS ARE FIRMLY WITHIN THE POCKETS OF THE CONTAINER.
6. Lift and swing the container over the vehicle body. We recommend you load the front of the body first as sudden braking during transit may cause the containers to slide forward.

   **CAUTION! – The Crab attachment rotates freely. The load will tend to rotate more after the rotate control has been released. Consider this difference when operating the controls and moving the load.**

   When loading or unloading a container, make sure that the container does not come into contact with the boom. Again, be aware of the shape of the container. Lift the container so it does NOT come in contact with the boom during movement.
7. Position the container with the pockets oriented side-to-side over the body, not front and back. When positioning the container in the very front (bulkhead) of the body, rotate the container so that the pockets are turned to the rear of the body, not up against the headboard of the body (see photo below). Lower the container into the body. When pockets face back, your lids also face in the correct direction so that the wind does not blow them open during transport. If it is not possible to position the containers with the lids opening to the rear, in most cases the boom over the container during transit will prevent the lids from opening. If there is a situation where a lid will not be prevented from opening by the boom, secure the lid by some other means.

It is not possible to stow a straight 8 container in the front of the body because the main lift cylinder and boom will hit it (See photo below).


Also be aware of lid stops on smaller containers since they add to the overall height of the container.

**Maximum height of containers stowed at front of body is limited to 72” in order to keep the boom below height and avoid contact with the main lift cylinder.**

8. When the container is on the body floor, open the hooks to disengage them and lift the Crab up to clear the container.
9. Continue the loading procedure until all containers are loaded or the body is full.

To make a lift from the body:

1. Raise the boom and position the Crab over the refuse container.
2. Open the hooks and lower around container until the bottom slanted surfaces of the Crab settle on the top of the container pockets. Do not jam the Crab down so that the hooks push out beyond the container pockets.
3. Close the hooks slowly. Watch them to ensure both the front and back hooks engage.
4. Move to each side of the truck so you can observe each side of the container and ensure that both pockets are full engaged by both hooks. Once you have confirmed a firm grip on the container, you can start the lift. DO NOT LIFT UNLESS ALL FOUR HOOKS ARE FIRMLY WITHIN THE POCKETS OF THE CONTAINER.
5. Lift and swing the container out to its final position. Again, be aware of the shape of the can. Lift it so it does NOT come in contact with the boom during movement.
6. When the container is at its final position and firmly on the ground, open the hooks to disengage them and lift the Crab up to clear the container.
7. Continue the unloading procedure until all containers that are to be unloaded are positioned where they are required.

When loading or unloading a container, please follow these precautions:

- Do not use the Crab to push multiple containers around in the bed of the vehicle as you can damage the Crab and other loader components.
- You must have room to stow the Crab within the body sides for travel. See the included photographs for approved methods of stowage.
- Do not leave a container suspended when the operator is away from the control station.
- Only operate the loader from the operator's station. Do not attempt to operate the loader from any position other than the operator's station.
- Never climb on operator controls or other loader components.
- Do not lift a container over a person, car, or other object. Do not operate the loader if people are within 20 feet of the loader.
- Do not sit or stand at operator control station when truck is in motion. The control station is to be manned only when the vehicle has been parked and the procedures we previously discussed have been followed for setting up to load.
- Do not attempt to lift loads exceeding manufacturer's recommended safe working capacity.
- Do not lift full containers.

- Do not impose lateral loads on the boom (push or pull sideways).
- Do not use stability to determine safe working load.
- Do not attempt to load more containers into the body by leaving the rear of the body open.

**Use of Chains for Lifting Containers:**

**NOTE: When using chains for lifting containers, follow OSHA 29 1910.184 at all times. To find this OSHA regulation; go to the OSHA website at:**

**http://www.osha.gov**

Should a container pocket be damaged and the crab hooks cannot be inserted properly, the crab attachment is equipped with four lifting lugs (two per leg). These lugs can be used to connect lifting chains to. The chains can be inserted through the pocket manually to lift the container. These chains can be used to lift empty containers if they can be safely secured to the container or the container pocket. Only use chains when pocket damage or pocket construction does not allow the use of the hydraulic hooks provided.

Each individual lifting chain must be rated at 1 ton (2000 lbs.). No load can exceed this rating. The combined rating of the four chains is therefore greater than the overall capacity of the attachment itself. Never exceed the 5,000 lbs rated capacity of the attachment. As with the attachment itself, the chains are intended to lift only empty containers.

The following describes how to lift containers safely using the chains. Since there are many scenarios that could warrant the use of these chains, follow OSHA 29 CFR 1910.184 at all times regardless of the situation. In all cases, the containers should be lifted as level from side to side as possible. The crab attachment should never tilt from side to side more than 7º when lifting a container.

If one or both pockets are severely damaged, before beginning the lift, attach the lifting chains to the lifting lugs and let them hang freely. Position the crab attachment over the container, as it is normally used, and engage the crab hooks. Both sets of crab hooks will rotate to their engaged position. However, due to the damaged pocket(s), one or both sets of hooks may not properly engage.

With the container sitting firmly on the ground, insert one lifting chain through the damaged pocket and attach it to the second lifting chain. If neither set of hooks can be fully engaged, repeat this procedure for the other side. If the pockets are too long for the chains to reach, you may need to use additional rigging that meets the requirement of OSHA 29 CFR 1910.184. To keep the container level, rig the chains as tightly as possible.

Once the chains needed are securely rigged, slowly lift the container a short distance. If the container is not hanging level, lower it all the way to the ground and reposition the chain/rigging. Once you are able to make a level lift, slowly lift the container into the body and lower it into position until the chain has slack.

Disengage the crab hooks, unrig the chains, and place the chains back into their storage position.

If you are doubt as to the safety of a lift for any reason including damage to a container, do not execute the lift.

## PART 8: Crab and Boom Stowage for Travel

There are two proper ways to stow the Crab and boom for travel:

1. **When there is no container in the last position in the body:** Position the Crab within the body with the sides parallel to the sides of the body. Lower the Crab until the legs rest against the bed of the truck. Engage the boom swing lock (see information in Part 3 of this manual regarding the boom swing lock mechanism.).
2. **When there is a container in the last position in the body:** If you have just lowered a container into the last rear position in the body, you often will be able simply to leave the hooks engaged in the container pockets and lower the boom down to safe travel height. Engage the boom swing lock mechanism. If this is not possible, simply lower the Crab over the outside of the last container and leave the hooks open. To get down to safe travel height, it may be necessary to push the Crab lower on the container than normal by pushing the sides outside and below the pockets of the container.

   Again, once the boom has been lowered to safe travel height, engage the swing lock. See following example of how to properly stow the boom and containers.

- In the preceding photo, the boom is below legal travel height of 13’6”
- The largest container is placed at the bend of the boom.

- All containers are positioned with the lids opening to the rear and pockets to the rear.

- Side loading doors are closed so that wind does not open lid.

**WARNING! - Failure to stow the boom and Crab as instructed could allow the boom to slew (swing) and the Crab to fall outside of the body. Loss of boom control with the Crab outside of the body could result in damage to objects in the vicinity of the grapple truck and/or serious injury or death to people in the vicinity of the grapple truck.**

# Part 1: Safety Procedures and Precautions for Service and Repair

A regular schedule of maintenance is essential to keep your unit at peak operating efficiency. Operators or service personnel responsible for the care of the unit must be completely familiar with the type and frequency of inspections, maintenance, and lubrication operations to be performed.

Always keep the loader free from sand and other foreign particles to ensure trouble-free operation and to avoid excessive wear. Air entering the oil tank carries with it small quantities of impurities and moisture. The hydraulic oil should be drained at least once a year to rid the system of any contamination and condensation.

The hydraulic circuit diagram is included in the "Dia. & Drawings" section of this manual for service or maintenance information.

Make sure you observe the following procedures and precautions when performing maintenance and/or repairs on your equipment.

**Safety Procedures and Precautions for Service and Repair**

- Do not perform any work on the loader unless you are qualified and authorized to do so.
- Loader is placed where it will cause the least interference with other equipment or operations in the area.
- All controls at the off position and all operating features in neutral position.
- Do not attempt to clean, oil or service a loader when the power-take-off is engaged.
- Deactivate means for starting. Use lockout-tagout procedure. See lock-out/tag-out procedures on following page.
- Crab attachment and boom at rest on ground or floor of body.
- Do not disconnect hydraulic connections under pressure. Hot hydraulic fluid can cause serious injury. Stay clear of hydraulic leaks as high pressure and hot hydraulic fluid can cause serious injury.

## Lock-out/Tag-out Procedure (LOTO)

1. With the vehicle parked on level firm ground, set the parking brake and chock the wheels.

2. Place operating equipment at lowest potential energy level or position so as not to be subject to possible free fall, and/or install additional blocking device(s) to prevent this potential for any raised or elevated equipment such as bodies, tail or side gates, booms and crab attachments.

3. If work on the crab attachment is required, place the crab attachment outside the body by first setting the outriggers, second, positioning the crab attachment over the side of the truck and finally, lowering the boom until the crab attachment is on the ground.

4. Disengage the PTO and shut down the truck engine.

5. Remove the key from the ignition.

6. Using a non-reusable fastener, secure a LOTO tag to the steering wheel indicating the vehicle is out of service.

7. Relieve stored energy from the hydraulic components by moving each control handle back and forth several times. Cylinders equipped with either pilot operated check or counterbalance valves will not function unless under hydraulic power.

Modification to any part of the loader can create a safety hazard and therefore shall not be made without the manufacturer's written approval. It is important that you use factory replacement parts to ensure that size and capacity are as the original parts.

It is important that hydraulic components be rated at proper flow and pressure. If your loader is rebuilt or remounted, mounting procedures and retesting is required in accordance with factory instructions.

Disconnecting, removing, or disabling any part or component which controls the speed of the loader is a misuse of the loader.

The following lists inspections and maintenance which are to be conducted on your unit to help assure it is operating properly and safely. These inspections are in addition to any inspections previously listed, such as daily inspections. Check all items at the frequency listed and make necessary repairs prior to operating.

The following are minimum service requirements. Hard use or dirty operating conditions dictate more frequent inspection and maintenance.

After service adjustment, and repairs, the loader shall not be returned to service until all guards have been reinstalled, trapped air removed from the hydraulic system if required, safety devices reactivated, and maintenance equipment removed.

# Part 2: Service:

| EVERY 40 HOURS | |
|---|---|
| Grease all fittings. | See Grease and Maintenance Diagram in the "Dia. & Drawings" section of this manual.<br><br>Grease fittings that are worn and will not hold the grease gun, or those that have a stuck check ball, must be replaced.<br><br>Grease = EP2 (Extreme Pressure) |
| Check hydraulic hoses for cuts or abrasions, or any evidence of binding or leakage. | Replace any damaged hoses. |
| Check all hydraulic fittings to make sure they are in place and do not show signs of leakage. | Replace any missing, damaged or modified fittings. |
| Tighten crab attachment brake pads. | If brake pads show excessive wear, replace. Tighten gimbal rotator bolt and tip boom gimbal bolt, if needed. |
| Check oil level. | All oil levels are to be checked with the loader parked on a level surface in transport position, and while the oil is cold, unless otherwise specified. Oil level should be two to three (2 to 3) inches from top of tank. Planetary Gearbox Oil should be visible on site glass.<br><br>Hydraulic Oil = AW32<br>Gear Oil = 80W Gearlube |
| Check engine overspeed control for proper setting. | Check by reving the engine to exceed 1600 RPM, at which point the PTO light should turn off if the engine overspeed is properly set. Reset if necessary. |
| Check the engine throttle control for proper setting. | 1400 RPM maximum. |

| | |
|---|---|
| Check lock collar for excess clearance. | Lock collar must be tight against bottom of spindle bearing housing with maximum gap of one-quarter inch (1/4"). |
| Check back-up and boom-up alarms to make sure they are working properly. | Repair or replace if needed. |

| **EVERY 80 HOURS**<br>*(These requirements are in addition to the 40 hour service requirements.)* | |
|---|---|
| Re-torque boom swing actuator bolts. | To 250 ft. lbs. - dry threads |

| **EVERY 160 HOURS**<br>*(These requirements are in addition to the 80 hour service requirements.)* | |
|---|---|
| Examine all loader pivot points (head and pedestal, main boom, tip boom, crab attachment) for visible play. | If visible play is observed at pivot points, bushings and/or pins must be replaced as needed. |
| Chassis - Check truck frame for cracks, loose or missing bolts, rivets, damaged springs or loose shackles. | See truck manufacturer's service manual for service and repair instructions. |
| Structural - Visually inspect complete loader including the Crab Attachment for damage, especially cracks in weldments. | It is necessary for your loader to be clean of oil and grease for these inspections to be made.<br><br>The Petersen rotating head assembly has special high strength steel components that are welded together. After welding, the entire assembly receives post-weld heat treatment. **Do not** weld on the rotating head assembly. Welding on the rotating head could reduce its load bearing capacity and fatigue life. |
| Fasteners - Check all pins, sheaves, retainers, bolts and nuts. | Replace damaged or missing parts. |
| Retighten main boom and tip boom connecting bolts. | Replace if needed. |
| Check PTO and pump drive train. | Check for loose or missing bolts. Replace seals if needed. |
| Re-torque loader tie-down bolts. Check position of frame spacer to insure proper position. | To 400 ft. lbs. - dry threads |

| | |
|---|---|
| Clean hydraulic oil filter on suction line, and replace return line filter cartridge. | |
| Decals - Check for presence and legibility. | Check decal listing in “Part 3: Safety Devices – Safety Symbols” of this manual for required operational and safety decals. Replace missing or illegible decals. |
| Re-torque the two Allen headed bolts at base of bucket rotator | 442.5 ft. lbs. |

| **EVERY 3000 HOURS**<br>*(These requirements are in addition to the 160 hour service requirements.)* | |
|---|---|
| Change oil in planetary gearbox | Drain existing oil from swing gearbox and replace with 1.75 quarts of 80W Gearlube |

## How to Find the Serial Number

**The serial number for your unit can be found in two places. The number is stamped on the side of the base plate of the head assembly, and is also stamped on the base plate of the pedestal assembly. You will be asked to provide the serial number any time you order parts from our Parts Department.**

**The serial number listed below is a fictitious number for illustration purposes.**

## TL3-0199-344

**The serial number provides us with three types of information, as shown in the above example.**

- **"TL3" indicates the model of your loader.**
- **"0199" indicates the date it was manufactured. This example indicates that the loader was manufactured in January, 1999.**
- **"0344" is a unit number that is specific to your loader only.**

  **If your head and/or pedestal assembly is or has been changed to a current production model, this number will have an "R" added, which would become "0344R". When a major component such as the head or pedestal assembly receives a replacement, the date of manufacture also gets updated. For example, if the unit listed above were to get a new head assembly in May of 2004, the serial number stamped on the new head assembly would be TL3-0504-0344R.**

| PETERSEN LOAD CHART FOR MODELS TL3, HL3, PL3, BL3 & CP3 -OUTRIGGERS EXTENDED- | | |
|---|---|---|
| **RADIUS** | **TIP BOOM EXTENSION RETRACTED** | **TIP BOOM EXTENSION EXTENDED** |
| 10 ft | 7100 lbs | 7100 lbs |
| 16 ft | 3750 lbs | 4400 lbs |
| 20 ft | - | 3200 lbs |

**WEIGHT OF ATTACHMENT TO BE SUBTRACTED FROM LIFT CAPACITIES. STANDARD TRASH BUCKET WEIGHS 1000 LBS. STANDARD CONTAINER ATTACHMENT WEIGHS 650 LBS.**

**RADII ARE MEASURED IN FEET FROM THE CENTER OF ROTATION TO THE CENTER OF THE BUCKET.**

**LOADS FOR THE LOADER ON OUTRIGGERS LESS THAN 85% OF VEHICLE TIPPING MOMENT WHEN THE VEHICLE IS ON FIRM LEVEL GROUND.**

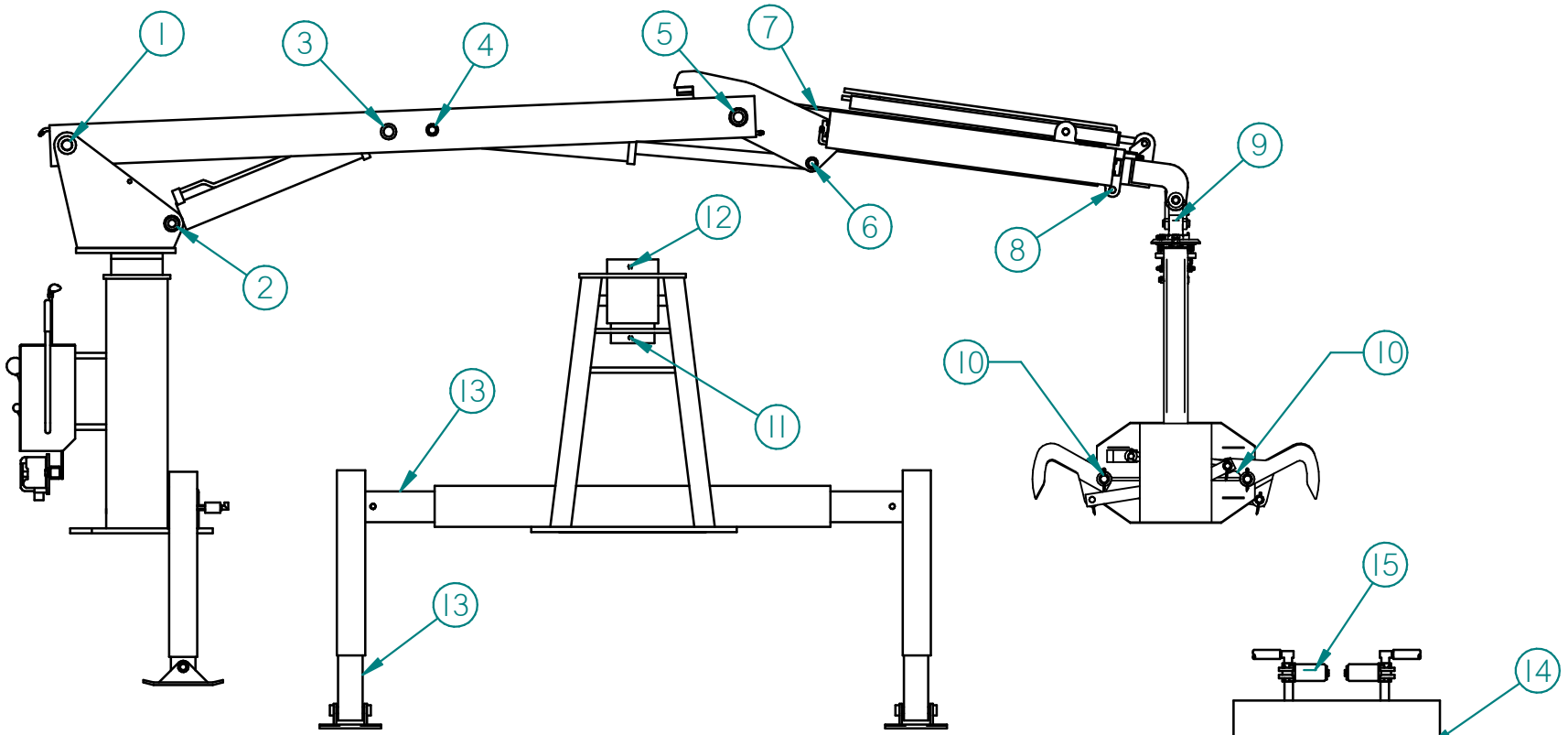
**BOOM LENGTH WITH TIP EXTENSION RETRACTED IS 16 FEET. BOOM LENGTH WITH TIP EXTENSION EXTENDED IS 20 FEET.**

**TIP BOOM EXTENSION FUNCTION IS NOT TO BE USED FOR LOAD LIFTING. THIS FUNCTION IS ONLY FOR LOAD REACHING OR TO IMPROVE LOAD-LIFTING CAPACITY.**

**DO NOT USE THESE LOAD CHART VALUES TO PREDICT LOAD CAPACITIES AT OTHER RADII.**

**TIRE PRESSURES MUST BE IN ACCORDANCE TO THE TIRE MANUFACTURER'S RECOMMENDATIONS.**

P/N: DE06002




HYD TANK - TOP VIEW

| Point Number | Grease Point | Number of Points | Lubricant | Application Method | Frequency |
|---|---|---|---|---|---|
| 1 | Main Boom Pivot | 1 | Grease | Pressure | 40 Hours |
| 2 | Main Boom Lift Cylinder Base End | 1 | Grease | Pressure | 40 Hours |
| 3 | Main Boom Lift Cylinder Rod End | 1 | Grease | Pressure | 40 Hours |
| 4 | Tip Cylinder Base End | 1 | Grease | Pressure | 40 Hours |
| 5 | Tip Boom Main Pivot | 1 | Grease | Pressure | 40 Hours |
| 6 | Tip Cylinder Rod End | 1 | Grease | Pressure | 40 Hours |
| 7 | Tip Extension | 1 | Grease | Pressure | 40 Hours |
| 8 | Tip Extension Roller | 1 | Grease | Pressure | 40 Hours |
| 9 | Rotator Housing | 1 | Grease | Pressure | 40 Hours |
| 10 | Crab Hook Pivot | 4 | Grease | Pressure | 40 Hours |
| 11 | Spindle Bottom Bearing Housing | 1 | Grease | Pressure | 40 Hours |
| 12 | Spindle Top Bearing Housing | 1 | Grease | Pressure | 40 Hours |
| 13 | Outrigger Inner Tubes | 4 | Grease | Brush | 500 Hours |
| 14 | Hydraulic Tank | 1 | Oil | Fill to Max. Level | 40 Hours |
| 15 | Hydraulic Filters | 2 | - | Replace | 1000 Hours |

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8201
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: CP3 LOADER LUBRICATION POINTS

PART NUMBER: 01 00 00 029 1

SCALE: NA

DRAWN BY: RB

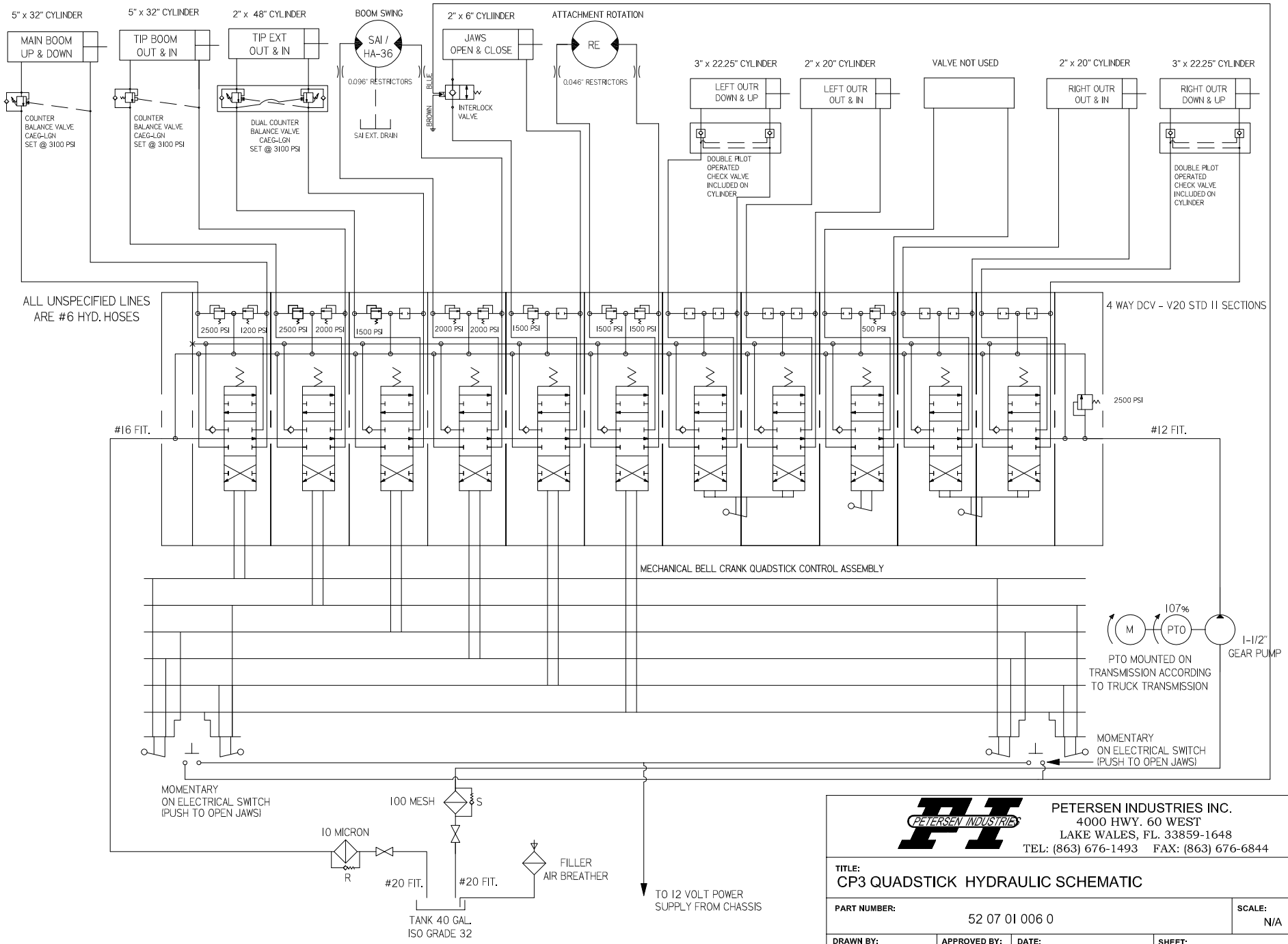
APPROVED BY:

DATE: 05/14/2009

SHEET: 1 OF 1

NOTE:
WHEN USING HA36/SS40 INSTEAD OF SAI, USE .056" RESTRICTORS AND USE 2500 PSI PORT RELIEF VALVES ON THE P-20 VALVES. WORKING PRESSURE IS 2500 PSI

| REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| 0. | - | - | - |





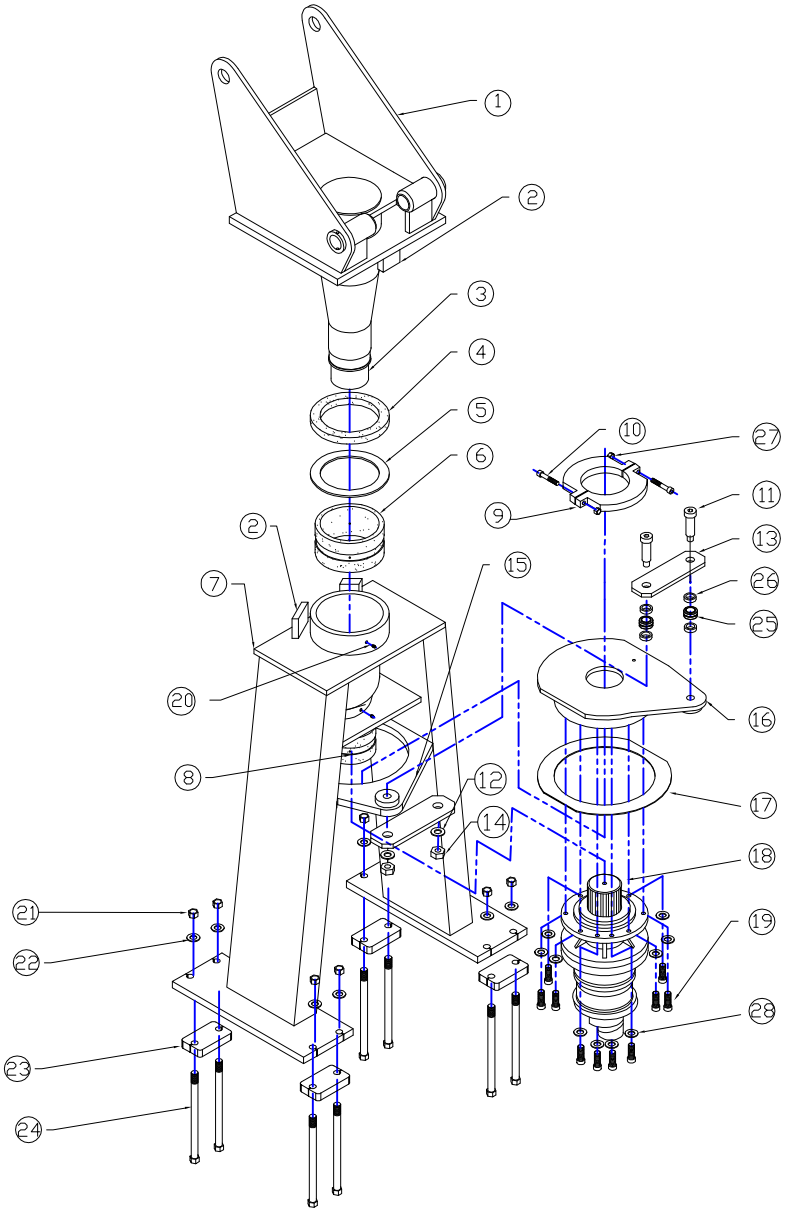
PETERSEN INDUSTRIES INC.
4000 HWY. 60 WEST
LAKE WALES, FL. 33859-1648
TEL: (863) 676-1493 FAX: (863) 676-6844


TITLE:
CP3 QUADSTICK HYDRAULIC SCHEMATIC

| PART NUMBER: | SCALE: |
|---|---|
| 52 07 01 006 0 | N/A |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| JAC | | 2/17/2012 | 1 OF 1 |

| ZONE | REV. | DESCRIPTION | DATE | APPR. |
|---|---|---|---|---|
| N/A | 1 | ADD TWO WASHERS No 12 / CHANGE BOLT No 23 | 2/99 | |
| N/A | 2 | UP DATE SPINDLE LOCK | 6/24/99 | |
| N/A | 3 | ADD TIE DOWN BLOCKS WITH BOLTS. ADD TWIN TORQUE ARM | 5/08/01 | |
| N/A | 4 | ADD SPACERS AND SPHERIAL BEARINGS FOR TWIN TORQUE ARM ASSEMBLY | 7/24/01 | |
| N/A | 5 | ADD ITEMS No. 27 LOCK COLLAR NUT & 28 LOCK WASHER FOR SAI BOLTS | 8/06/01 | |



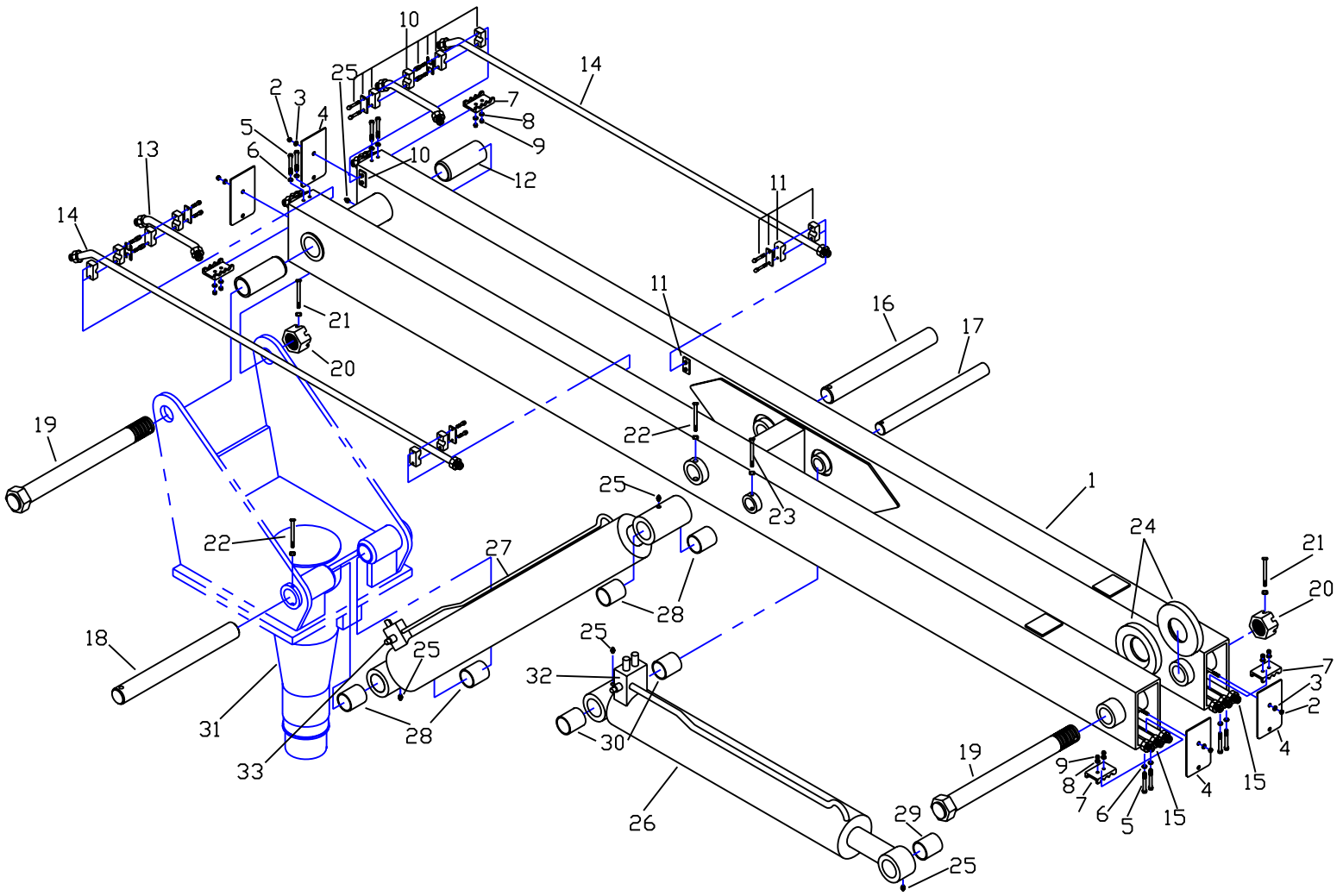

PETERSEN INDUSTRIES INC.
446 US HWY. 27 N.
LAKE WALES,FL.33853
(863) 676 1493 FX (863) 676 6844

TITLE: HEAD AND PEDESTAL

| CAD NO: | DIAGRAM No. | SCALE |
|---|---|---|
| 02 02 13 001 5 | 1300 | N/A |

| DRAWN BY: | APPROVED: | DATE: | SHEET: |
|---|---|---|---|
| E.B. | | 3/3/99 | 1 OF 1 |

| Dia. No. | | Part Name | Order By This Part No. |
|---|---|---|---|
| HEAD AND CP3 PEDESTAL ASSEMBLY WITH DINAMIC OIL ROTARY ACUTATOR (DIAGRAM NO. 1300) | | | |
| | | | |
| 1 | | Head and Spindle Assembly | 107105 |
| 2 | | Head and Pedestal Stop | 107173 |
| 3 | | Spline, Spindle | HC99005 |
| 4 | * | Nylatron Bushing-Thrust Bearing | BU510002 |
| 5 | | Thrust Spacer | 106210 |
| 6 | | Nylatron Bushing-Upper Spindle | BU509002 |
| 7 | | Pedestal Assembly | 106111 |
| 8 | | Nylatron Bushing, Lower Spindle | BU507005 |
| 9 | | Lock Collar, (one side) | 117103 |
| 10 | | Bolt, Lock Collar | BL308048U513 |
| 11 | * | Bolt, Torque Link | BL120056U8 |
| 12 | * | Flat Washer, Torque Link | WAF14S8 |
| 13 | * | Torque Arm Link | 114401 |
| 14 | * | Locknut, 7/8" | NUC14U |
| 15 | * | Support Plate, Torque Arm Assy. | 114302 |
| 16 | * | Rotary Actuator Mt. Plate, Torque Arm Assy. | 114202 |
| 17 | | Wear Pad | BU317002 |
| 18 | * | Dinamic Oil Rotary Actuator | HC01005 |
| 19 | * | Bolt, Rotary Actuator | SCA1032C |
| 20 | | Grease Fitting, 1/8" Straight | HF2002S |
| 21 | | Nut, 1" Nylon Lock | NUN16U |
| 22 | | Washer, 1" Flat, Gr. 8 | WAF16S8 |
| | | | |
| 23 | | Tie Down Block for Single Frame Truck | 125202 |
| | | Tie Down Block for Double Frame Truck | 125203 |
| | | | |
| 24 | | Bolt, Tie Down for Single Frame Truck | BL116224U88 |
| | | Bolt, Tie Down for Double Frame Truck | BL116240U88 |
| | | | |
| 25 | * | Bearing, Torque Link | BE04N12SF20 |
| 26 | * | Spacer, Torque Link | 114454 |
| 27 | | Lock Collar Nut, Stoverlock 1/2" | NUS08U |
| 28 | | Lockwasher, Rotary Actuator Bolt | WAS108 |
| | | | |
| | * | NOTE: Item numbers with an asterisk (*) may have part numbers and prices different than what is shown on this price list. Please consult with the Petersen Parts Department to help correctly identify these parts for your loader. You may reach our Parts Department at 800/930-5623, ext. 229. | |




PETERSEN INDUSTRIES INC.
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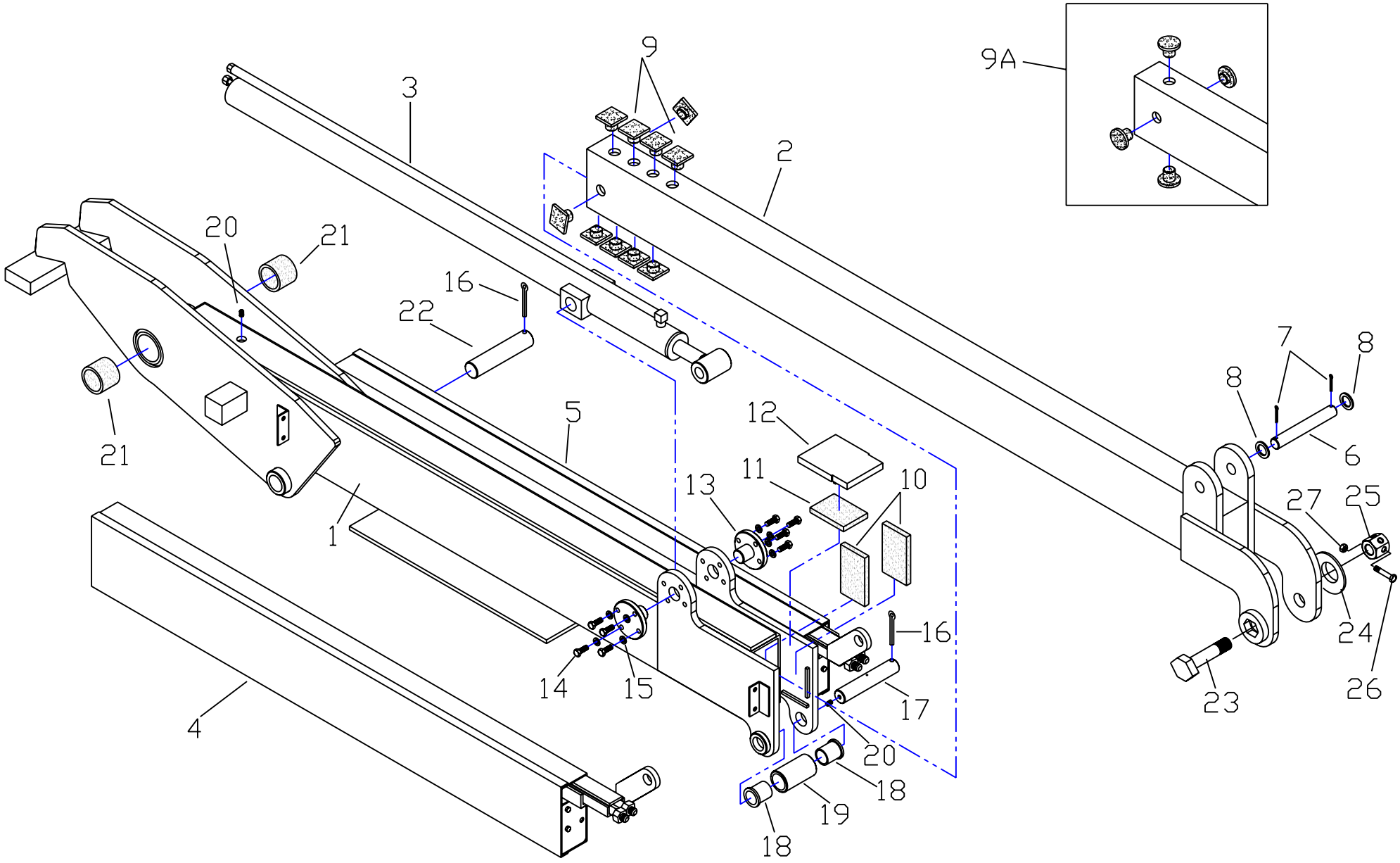
LAKE WALES,FL.33859-8234
(863) 676 1493 FX (863) 676 6844

TITLE: TL3 MAIN BOOM ASSEMBLY

| CAD NO: | DIAGRAM No. | SCALE |
|---|---|---|
| 02 03 04 001 4 | 3100 | N/A |

| DRAWN BY: | APPROVED: | DATE: | SHEET: |
|---|---|---|---|
| E.J.B. | | 06/18/97 | 1 OF 1 |

| Dia. No. | | Part Name | Order By This Part No. |
|---|---|---|---|
| TL3 MAIN BOOM ASSEMBLY: (DIAGRAM #3100) | | | |
| | | | |
| 1 | * | Main Boom Weldment | 108152 |
| 2 | | Nut, 3/8 - 16 | NUA06U |
| 3 | | Lockwasher, 3/8 | WAS065 |
| 4 | | End Cap | 108225 |
| 5 | | Bolt, 5/16 - 18 x 2" | BL305032U518 |
| 6 | | Flat Washer, 5/16 | WAF05U5 |
| 7 | | 3-Hole Pipe Clamp | CLP3C |
| 8 | | Lock Washer, 5/16 | WAS055 |
| 9 | | Nut, 5/16-18 | NUA05U |
| 10 | | 1-Hole Stacking Hose/Pipe Clamp Assembly | CL5G210 |
| 11 | | 1-Hole Hose/Pipe Clamp Assembly | CLH1AP |
| 12 | | Bushing, Main Boom Pivot | BU503004 |
| 13 | | Boom Tube, 12-45 | TU03002 |
| 14 | | Boom Tube, 62-45 | TU02002 |
| 15 | | Boom Tube, 140-45 | TU03006 |
| 16 | | Pin, Lift Cylinder Rod End | PI30274F |
| 17 | * | Pin, Tip Cyl Base End, 2" x 17 1/8" | PI30274F |
| | * | Pin, Tip Cyl Base End, 1 1/2" x 17" | PI22272F |
| 18 | | Pin, Lift Cylinder Base End | PI30302F |
| 19 | * | Bolt, Main/Tip Pivot, 2" x 20" | BL132320U845 |
| | * | Bolt, Main/Tip Pivot, 2" x 20 5/8" | BL132330U845 |
| 20 | | Nut, Main Boom & Tip Boom Pivot | NUB32HU |
| 21 | * | Cotter Pin, 7/16 x 4" | FA020764 |
| | * | Bolt, 7/16" x 4" USS GR8 | BL307064U814 |
| | * | Nut, 7/16" USS Stover Lock Nut | NUS07U |
| 22 | * | Cotter Pin, 1/2 x 4" | FA020864 |
| | * | Bolt, 7/16" x 4" USS GR8 | BL307064U814 |
| | * | Nut, 7/16" USS Stover Lock Nut | NUS07U |
| 23 | * | Cotter Pin, 5/16 x 3" for 1 1/2" Pin | FA020548 |
| | * | Bolt, 5/16" x 4" USS GR5 for 1 1/2" Pin | BL305064U518 |
| | * | Nut, 5/16" USS Stover Lock Nut for 1 1/2" Pin | NUS05U |
| | * | Bolt, 7/16" x 4" USS GR8 for 2" Pin | BL307064U814 |
| | * | Nut, 7/16" USS Stover Lock Nut for 2" Pin | NUS07U |
| 24 | * | Thrust Washer, 7/8" Thick | BU507004 |
| | * | Thrust Washer, 5/8" Thick | BU507008 |
| 25 | | Grease Fitting, 1/8" 90 Degree | HF20029 |
| 26 | * | Cylinder, 5" Tip Boom (Requires 2" Pin) | 121102 |
| | * | Cylinder, 5" Tip Boom (Requires 1 1/2" Pin) | CY02008 |
| 27 | | Cylinder, 5" Main Boom Lift | 121101 |
| 28 | | Bronze Bushing, Lift Cylinder | 121166 |
| 29 | * | Bronze Bushing, Tip Cyl Rod End, 2" | 121167 |
| | * | Bronze Bushing, Tip Cyl Rod End, 1 1/2" | 121168 |
| 30 | * | Bronze Bushing, Tip Cyl Base End, 2" | 121166 |
| | * | Bronze Bushing, Tip Cyl Base End, 1 1/2" | BU402014 |
| 31 | | Head & Spindle Assy for HA36 Actuator | 107104 |
| | | Head & Spindle Assy for SS40 or SAI Actuator | 107105 |
| | | | |
| 32 | * | Cartridge Valve, Tip Boom Cylinder | VA0780T01 |
| | * | Cartridge Valve, Tip Boom Cylinder | VA0780T02 |
| 33 | | Cartridge Valve, Main Boom Cylinder | VA0780T02 |
| | | | |
| | * | Main Boom Assembly Less Pins & Cylinders | 108103 |
| | | | |
| | * | NOTE: Item numbers with an asterisk (*) may have part numbers and prices | |
| | | different than what is shown on this pricelist. Please consult with the Petersen | |
| | | Parts Department to help correctly identify these parts for your loader. You | |
| | | may contact our Parts Department at 800/930-5623, ext. 229. | |



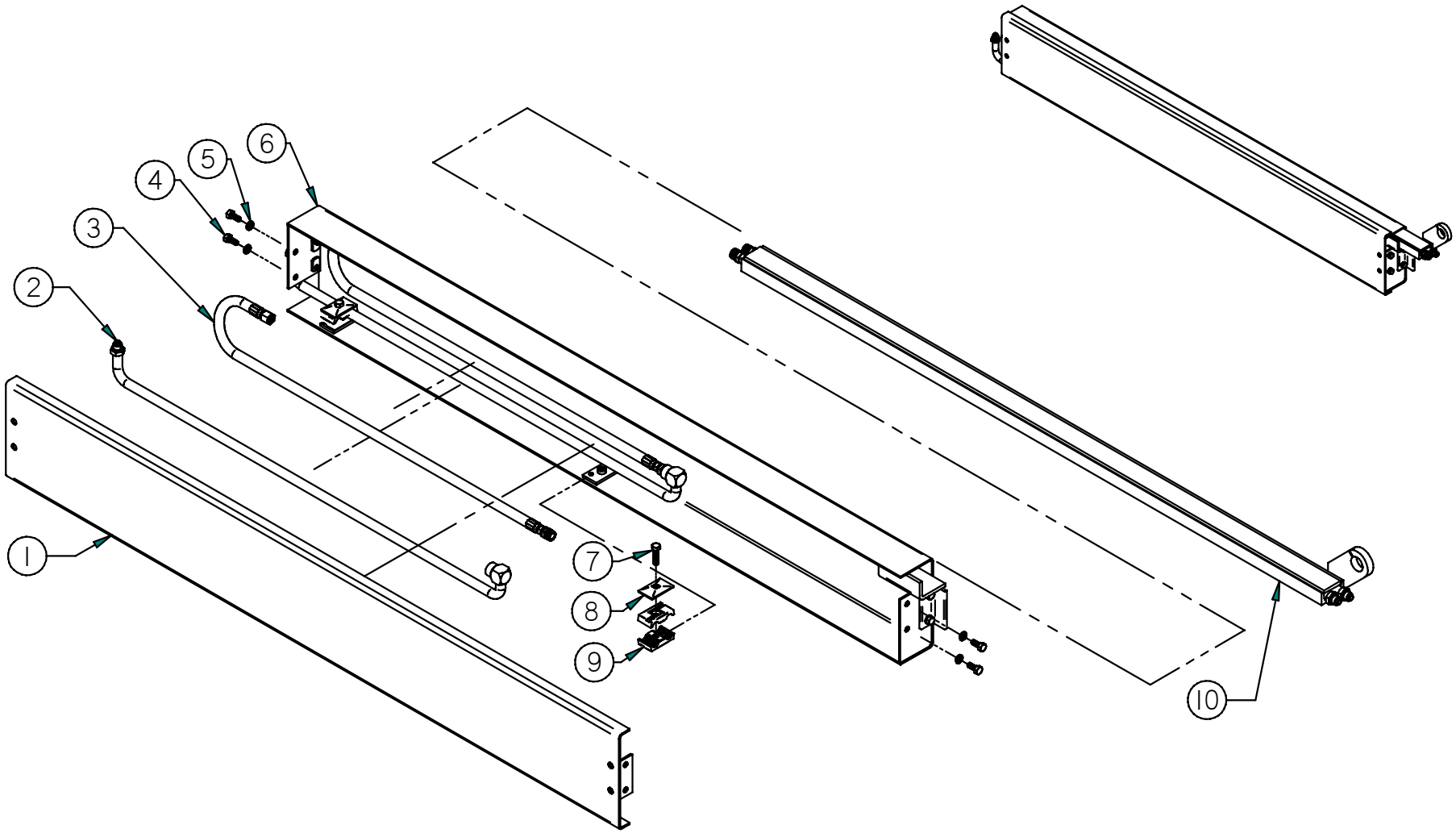

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
(863) 676 1493 FX (863) 676 6844

TITLE: TL 3 TIP BOOM ASSEMBLY

| CAD NO: | DIAGRAM No. | SCALE |
|---|---|---|
| 02 04 04 001 2 | 3202 | N/A |

| DRAWN BY: | APPROVED: | DATE: | SHEET: |
|---|---|---|---|
| E.B. | | 10/5/98 | 1 OF 1 |

| Dia. No. | | Part Name | Order By This Part No. |
|---|---|---|---|
| TL3 TIP BOOM ASSEMBLY (DIAGRAM #3202) | | | 109103 |
| | | | |
| 1 | * | TL3 Tip Boom Outer Weldment | 109152 |
| 2 | * | TL3 Tip Boom Inner Extension Weldment | 109153 |
| 3 | | Tip Extension Cylinder | 121105 |
| 4 | | Hose Recoil Box Assy. - Right Side | 123122 |
| 5 | | Hose Recoil Box Assy. - Left Side | 123121 |
| 6 | | Pin, Tip Extension Cylinder/Recoil Box | PI16112F |
| | | Slide Mount | |
| 7 | | Cotter Pin, Recoil Box Slide Mount Pin | FA020332 |
| 8 | | Washer, Recoil Box Slide Mount Pin | WAB1624 |
| 9 | * | Wear Pad, Tip Ext Weldment (Square) | 109210 |
| 9A | * | Wear Pad, Tip Ext Weldment (Round) | BU202001 |
| 10 | | Wear Pad, Tip Extension Outer Side | BU303003 |
| 11 | | Wear Pad, Tip Extension Outer Top | BU303002 |
| 12 | | Tip Extension Wear Plate Retainer Weldment | 109154 |
| 13 | | Trunnion, Tip Extension Cylinder | 109205 |
| 14 | | Bolt, Trunnion | BL306016U516 |
| 15 | | Lockwasher, Trunnion | WAS065 |
| 16 | | Cotter Pin, Tip Extension Roller/Tip Cylinder | FA020548 |
| | | Rod End | |
| 17 | | Pin, Tip Extension Roller | PI18105F |
| 18 | | Bushing, Tip Extension Roller | BU402007 |
| 19 | | Spool, Tip Extension Roller Support | 115131 |
| 20 | | Grease Fitting, 1/8" Straight | HF2002S |
| 21 | | Bushing, Tip Boom Connecting Spool | BU502008 |
| 22 | * | Pin, Tip Cyl/R Connecting, 2" x 6 3/4" | PI30108F |
| | * | Pin, Tip Cyl/R Connecting, 1 1/2" x 6 3/4" | PI22108F |
| 23 | | Bolt, Tip Boom Gimbal | BL120124U87 |
| 24 | | Spacer, Tip Boom Gimbal | WAB2030 |
| 25 | | Nut, Tip Boom Gimbal | 102454 |
| 26 | | Bolt, 5/16-18 x 2 1/2 USS G5 | BL305040U518 |
| 27 | | Nut, 5/16 USS Stover | NUS05U |
| | | | |
| | * | NOTE: Item numbers with an asterisk (*) may have part numbers and prices | |
| | | different than what is shown on this price list. Please consult with the | |
| | | Petersen Parts Department to help correctly identify these parts for your | |
| | | loader. You may reach our Parts Department at 800/930-5623, ext. 229. | |




| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | HOSE RECOIL, COVER ASSEMBLY | 123127 | 1 |
| 2 | TUBE, TL3 HOSE RECOIL BOX - CURVED | TU04004 | 2 |
| 3 | HOSE CUT 36" #6-S RECOIL BOX | HS10576FS | 2 |
| 4 | HEX BOLT 5/16-18 X 3/4 USS G5 | BL305012U518 | 4 |
| 5 | WASHER LOCK 5/16 SPLIT | WAS055 | 4 |
| 6 | HOSE RECOIL, HOUSING ASSEMBLY - RIGHT | 123126 | 1 |
| 7 | HEX BOLT 5/16-18 X 1-1/4 UNC G5 | BL305020U518 | 2 |
| 8 | CLAMP, TOP PLATE ONLY (2-HOLE) | CL5G225 | 2 |
| 9 | CLAMP, PLASTIC ONLY (2-HOLE) (1 SET) | CLP220 | 2 |
| 10 | HOSE RECOIL, SLIDE ASSEMBLY - RIGHT | 123124 | 1 |

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: HOSE RECOIL BOX ASSEMBLY - RIGHT

PART NUMBER: 21 04 04 012 0 / 123122

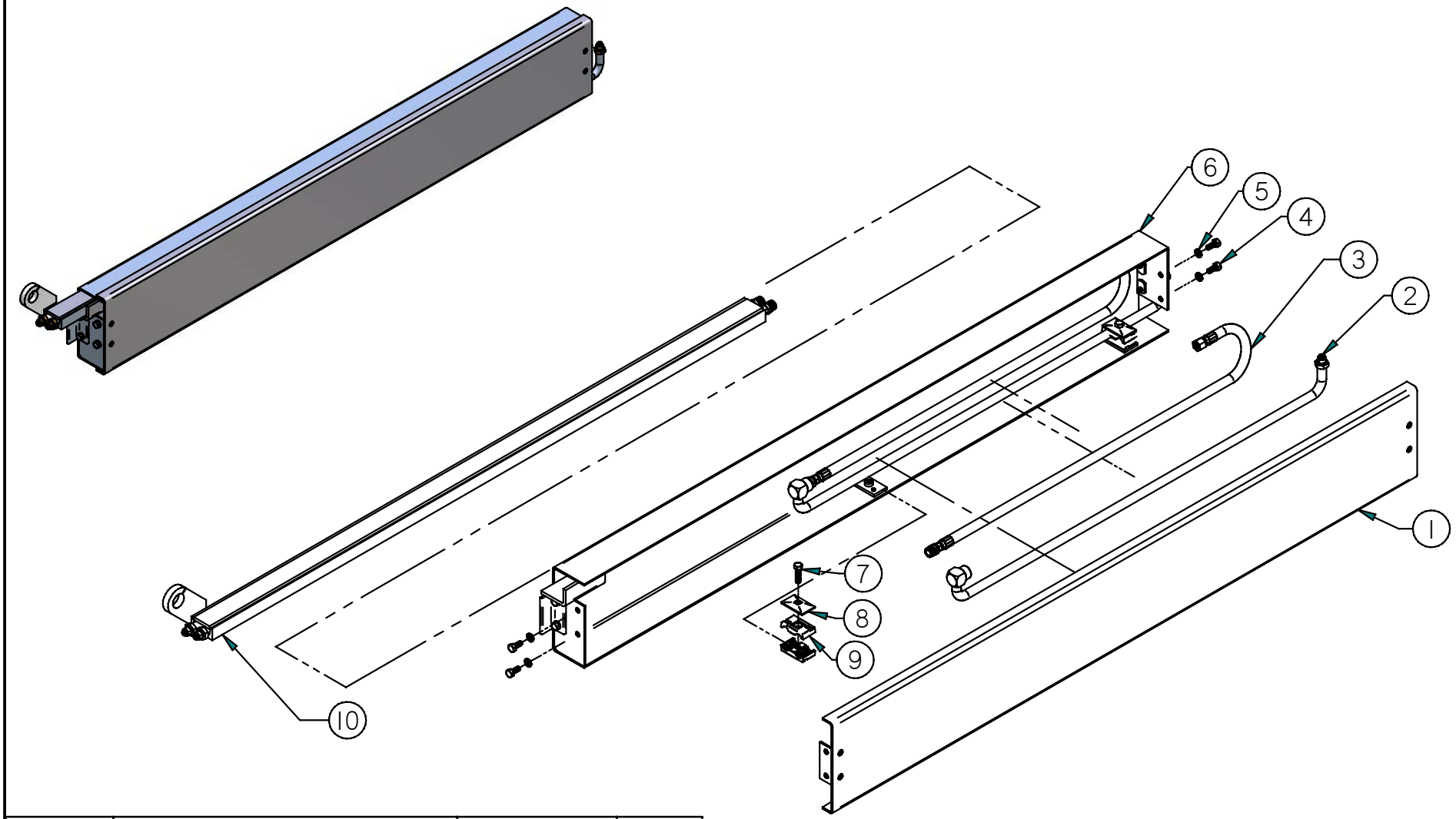
SCALE: N/A

DRAWN BY: Olvera, J.

APPROVED BY:

DATE: 5/25/2006

SHEET: 1 OF 1




| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | HOSE RECOIL, COVER ASSEMBLY | 123127 | 1 |
| 2 | TUBE, TL3 HOSE RECOIL BOX - CURVED | TU04004 | 2 |
| 3 | HOSE CUT 36" #6-S RECOIL BOX | HSI0576FS | 2 |
| 4 | HEX BOLT 5/16-18 X 3/4 USS G5 | BL305012U518 | 4 |
| 5 | WASHER LOCK 5/16 SPLIT | WAS055 | 4 |
| 6 | HOSE RECOIL, HOUSING ASSEMBLY - LEFT | 123125 | 1 |
| 7 | HEX BOLT 5/16-18 X 1-1/4 UNC G5 | BL305020U518 | 2 |
| 8 | CLAMP, TOP PLATE ONLY (2-HOLE) | CL5G225 | 2 |
| 9 | CLAMP, PLASTIC ONLY (2-HOLE) (1 SET) | CLP220 | 2 |
| 10 | HOSE RECOIL, SLIDE ASSEMBLY - LEFT | 123123 | 1 |

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: HOSE RECOIL BOX ASSEMBLY - LEFT

PART NUMBER: 21 04 04 013 0 / 123121

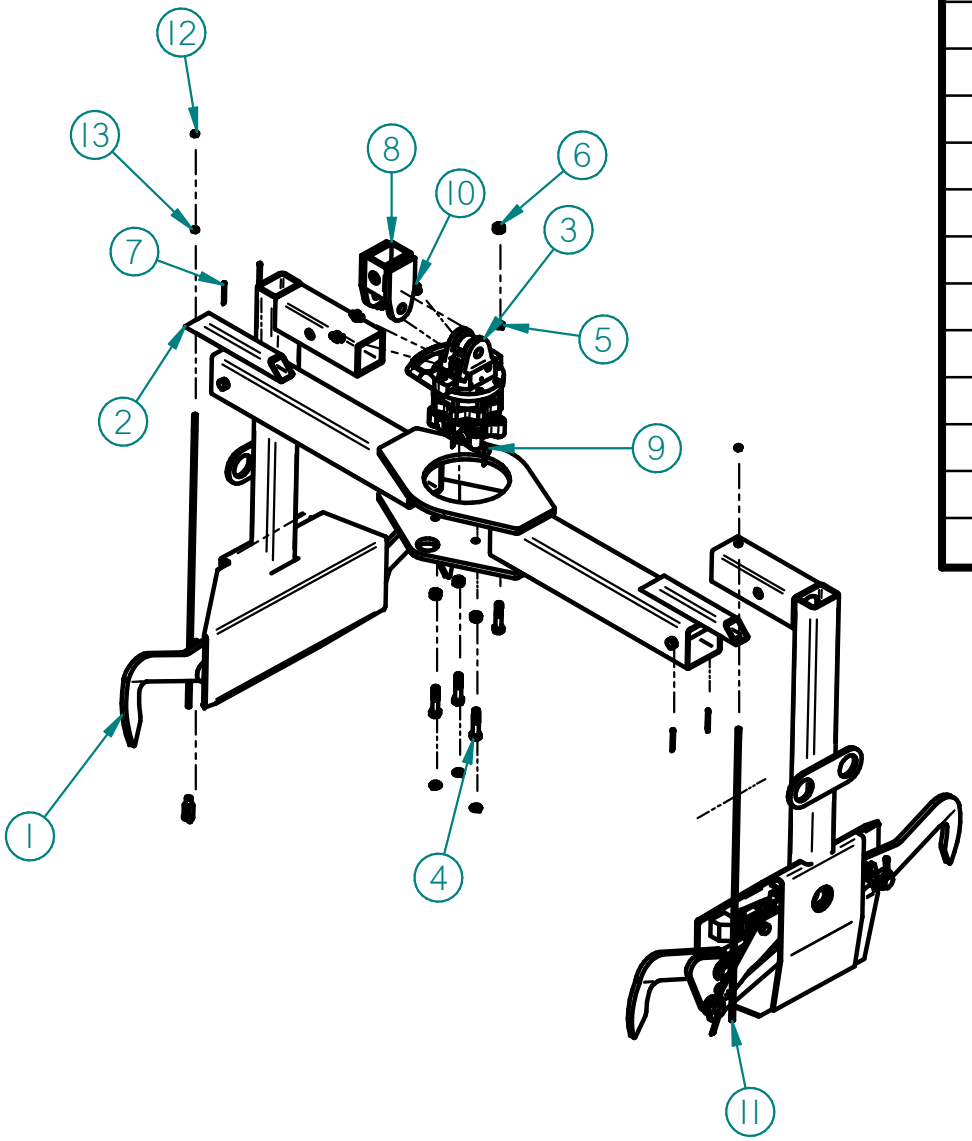
SCALE: N/A

DRAWN BY: Olvera, J.

APPROVED BY:

DATE: 5/30/2006

SHEET: 1 OF 1




| Item Number | Document # | Macola # | Title | Qty |
|---|---|---|---|---|
| 1 | 21 11 10 003 5 | 131103 | DUMPSTER LIFTER LEG ASSEMBLY | 2 |
| 2 | 31 11 11 004 1 | 131160 | DUMPSTER LIFTER CROSSMEMBER WELDMENT | 1 |
| 3 | HC03007 | | HC03007, ROTATOR, GV4 | 1 |
| 4 | BL110048U811 | | BOLT HEX 5/8-11 X 3 USS G8 | 4 |
| 5 | WAS108 | WAS108 | LOCK WASHER 5/8 SPLIT GR8 | 4 |
| 6 | NUA10U | | HEX NUT 5/8-11 | 4 |
| 7 | FA020432 | | COTTER PIN, 1/4" X 2" | 6 |
| 8 | 31 11 11 002 0 | 131180 | DUMPSTER LIFTER GIMBLE WELDMENT | 1 |
| 9 | 41 11 10 051 0 | 131157 | DUMPSTER LIFTER GIMBLE PIN | 1 |
| 10 | HF220606 | | FITTING | 4 |
| 11 | 41 11 10 059 0 | 131187 | CRAB SPREADER ROD | 2 |
| 12 | NUD06U | | NUT, FLEXLOCK THN 3/8 USS, SHEAVE ROLLER | 2 |
| 13 | NUA06U | NUA06U | HEX NUT 3/8 -16 UNC | 2 |
| 14* | BLW06S5166 | BLW06S5166 | 3/8"-16 FEMALE THREADED ROD END | 2 |

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: DUMPSTER LIFTER

PART NUMBER: 11 11 10 001 5

SCALE: 1:20

DRAWN BY: JAC

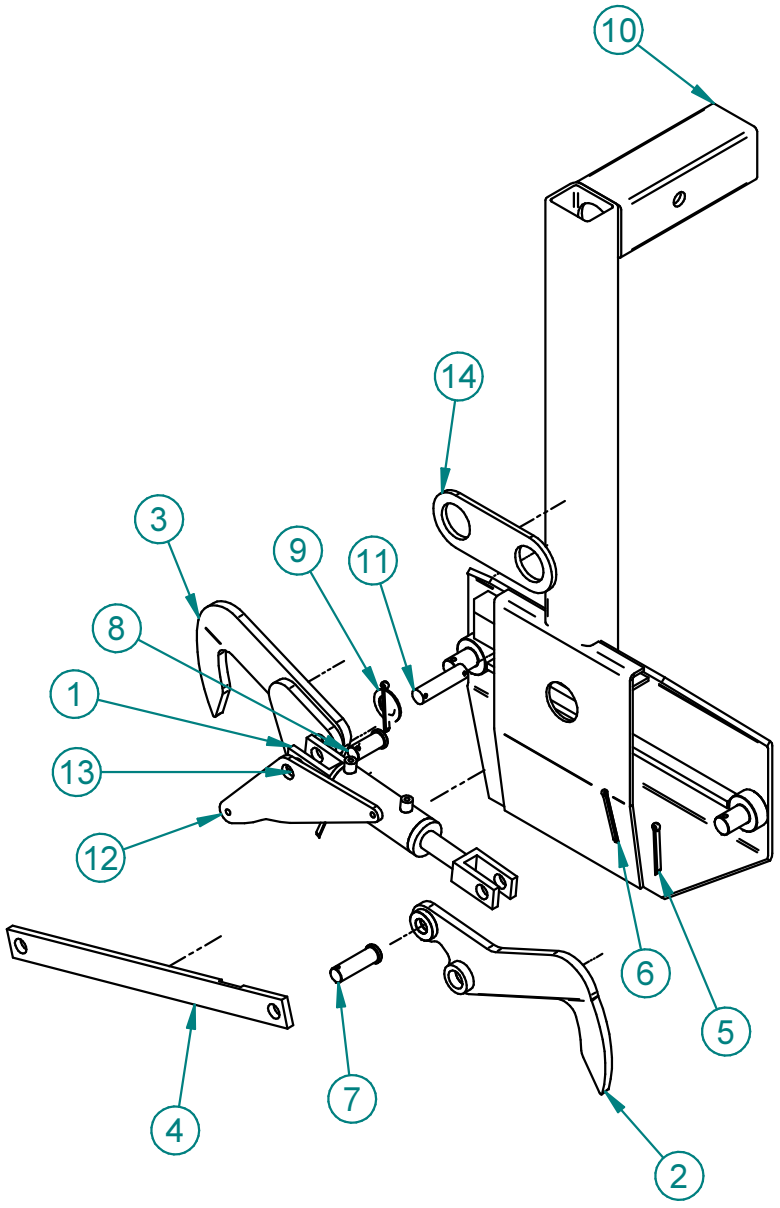
APPROVED BY:

DATE: 5/12/2006

SHEET: 3 OF 3

010 BILL OF MATERIALS

| REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| 1 | MODIFY HINGE AND HOOKS AND ADD BUSHINGS | 5/31/06 | Olvera, J. |
| 2 | UPDATED DWG TO SHOW HOOK KEEPER & CHAIN MOUNTS, ADDED MACOLA #, REMOVED SHT3 | 03/22/07 | KJP |
| 3 | UPDATED DWG TO SHOW NEW HOOKS, CHANGE 48 7/32 (48.234) TO 48 11/32 (48.359), 46 7/32 (46.234) TO 46 11/32 (46.359), REMOVE MATERIAL FROM PARTS LIST | 05/08/07 | KJP |
| 4 | USED BENT HOOKS, USED UPDATED LIFTER LEG WELDMENT | 8/15/11 | JAC |
| 5 | SPREADER ASSEMBLY ADDED | 3/13/2013 | JAC |




| Item # | Document # | Macola # | Title | Qty |
|---|---|---|---|---|
| 1 | CYI0004 | | CYLINDER, HERCULES, 3000 PSI DOUBLE ACTING | 1 |
| 2 | 21 11 10 008 4 | 131134 | DUMPSTER LIFTER RIGHT HOOK WELDMENT | 1 |
| 3 | 21 11 10 009 5 | 131128 | DUMPSTER LIFTER LEFT HOOK WELDMENT | 1 |
| 4 | 41 11 10 015 2 | 131133 | DUMPSTER LIFTER HOOK LINK 1/2 X 2 X 25-3/16 | 1 |
| 5 | FA020548 | | COTTER PIN 5/16 X 3 | 2 |
| 6 | FA020448 | | COTTER PIN 1/4 X 3 | 2 |
| 7 | FA011244 | | SAE CLEVIS PIN | 1 |
| 8 | FA011244 | | SAE CLEVIS PIN | 1 |
| 9 | WAB2436 | | WASHER BUSHING 1 1/2 X 2 1/4 | 1 |
| 10 | 31 11 11 001 1 | 131153 | DUMPSTER LIFTER LEG WELDMENT | 1 |
| 11 | 41 11 10 061 0 | 131189 | CRAB SPREADER LEVER PIN | 1 |
| 12 | 41 11 10 056 0 | 131184 | CRAB, SPREADER LEVER | 1 |
| 13 | BE05NCFISB | | CAM FOLLOWER | 1 |
| 14 | 41 11 10 055 0 | 131183 | CRAB, CHAIN EYELET | 1 |


PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844


TITLE: DUMPSTER LIFTER LEG ASSEMBLY

PART NUMBER: 21 11 10 003 5 / 131103

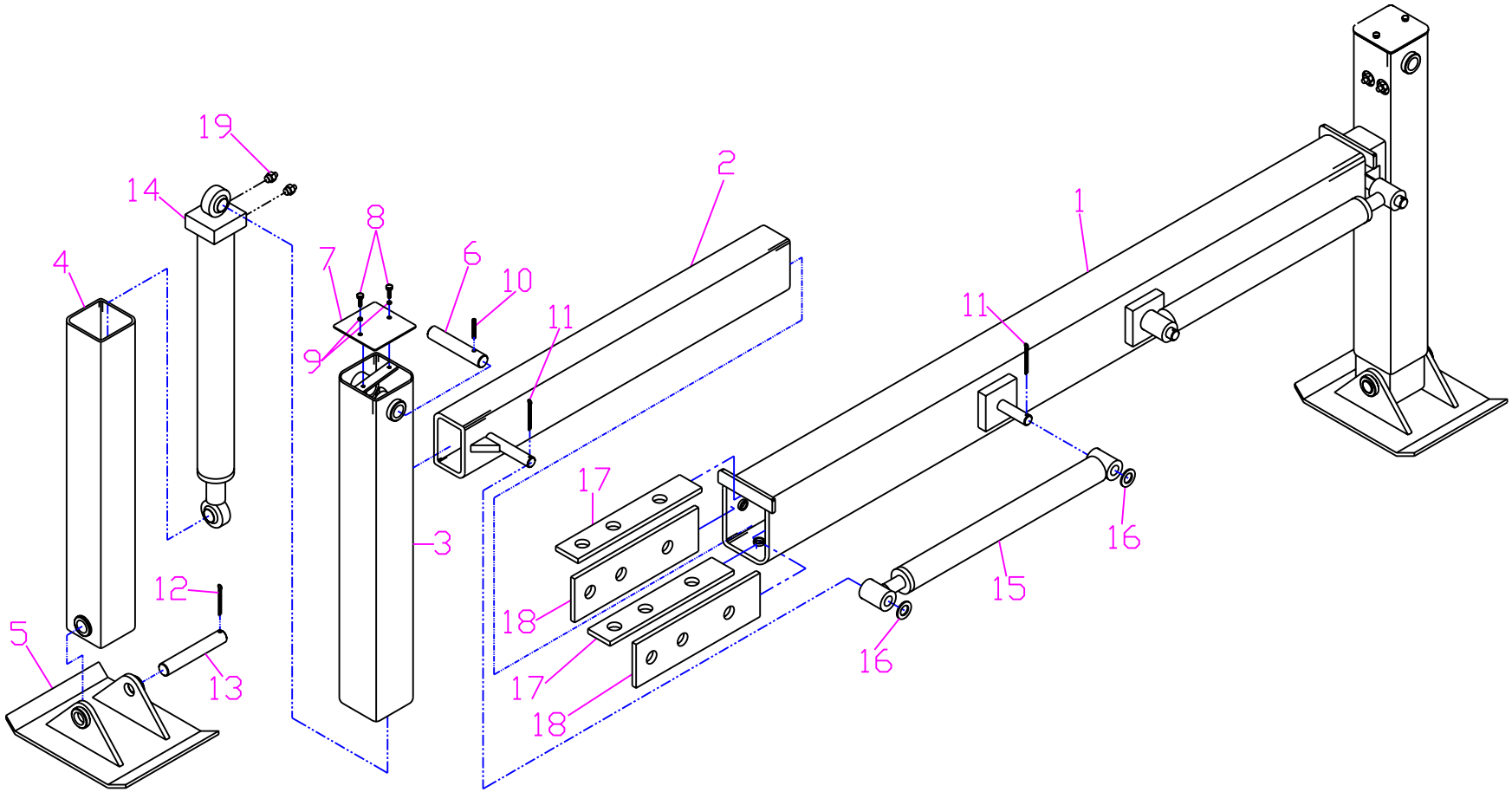
SCALE: 1:12

DRAWN BY: Olvera, J.

APPROVED BY:

DATE: 5/18/2006

SHEET: 2 OF 2




PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES,FL.33859-8201
(863) 676 1493 FX (863) 676 6844

TITLE: MODEL # 3 OUTRIGGER ASSEMBLY

| CAD NO: | PART NO: | SCALE |
|---|---|---|
| 02 06 04 001 1 | | 1:20 |

| DRAWN BY: | APPROVED: | DATE: | SHEET: |
|---|---|---|---|
| E.J.B. | | 5/18/99 | 1 OF 1 |

| Dia. No. | | Part Name | Order By This Part No. |
|---|---|---|---|
| MODEL3A OUTRIGGER ASSEMBLY: (DRAWING #02 06 04 001 0) | | | |
| | | | |
| 1 | | Outer Horizontal Leg Weldment | Not Sold Separately |
| 2 | | Inner Horizontal Leg Weldment | 113114 |
| 3 | | Outer Vertical Leg Weldment | 113104 |
| 4 | | Inner Vertical Leg Weldment | 113105 |
| 5 | | Foot Weldment | 113106 |
| 6 | | Pin, Vertical Cylinder - Base End | PI18106F1 |
| 7 | | Cover Plate, Vertical Leg | 113107 |
| 8 | | Bolt, Cover Plate | BL305016U518 |
| 9 | | Washer, Cover Plate Bolt | WAS055 |
| 10 | | Roll Pin, 5/16" x 2" | FA040532 |
| 11 | | Cotter Pin, 3/16" x 2" | FA020332 |
| 12 | | Cotter Pin, 5/16" x 3" | FA020548 |
| 13 | | Pin, Vertical Cylinder - Rod End | PI18122F |
| 14 | | Cylinder, Vertical Leg Extension | CY05003 |
| 15 | | Cylinder, Horizontal Leg Extension | CY05001 |
| 16 | | Washer | WAB1624 |
| 17 | | Wear Plate | 113602 |
| 18 | | Wear Plate | 113603 |
| 19 | | Hydraulic Fitting, 1/8 90 Degree | HF20029 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | Vertical Leg Assembly (One Side Only) | 113103 |

| Dia. No. | | Part Name | Order By This Part No. |
|---|---|---|---|
| MISCELLANEOUS PARTS: | | | |
| | | | |
| | | Seal Kit - HA36 Hydraulic Actuator | HPKAS395 |
| | | Seal Kit - SS40 Hydraulic Actuator | HPK430308SI |
| | | Pump, Standard Spline | HC02002 |
| | * | 3-Way Valve, 3/4" Port | VA0312160R |
| | * | 4-Way Valve, 3/4" Port | VA0412160R |
| | * | Seal Kit, 5" Lift Cylinder | HPKTH10329B |
| | * | Seal Kit, 5" Tip Cylinder | HPKTH10329B |
| | | Seal Kit, 3" Vertical Outrigger Cylinder, Round | HPK12044X |
| | | Seal Kit, 3" Vertical Outrigger Cylinder, Square | HPKTH16195 |
| | | Seal Kit, 2" Horizontal Outrigger Cylinder | HPKTH10154 |
| | | Seal Kit, 4" Bucket Cylinder | HPKTH10140 |
| | | Suction Filter Assembly | OT01002 |
| | | Suction Filter Element | OT02003 |
| | | Return Filter Assembly | OT03004 |
| | | Return Filter Element | OT03005 |
| | | Seal Kit, 2" Tip Extension Cylinder | HPKTH12570 |
| | | | |
| | * | NOTE: Item numbers with an asterisk (*) may have part numbers and | |
| | | prices different than what is shown on this price list. Please consult with | |
| | | the Petersen Parts Department to help correctly identify these parts for | |
| | | your loader. You may reach our Parts Department at 800/930-5623, | |
| | | ext. 229. | |

## HOSES FOR CP3

| QTY | Description | Placement | Part # |
|---|---|---|---|
| 2 | HOSE, CUT 18" #6 | MAIN BOOM TUBE TIP CYL | HS10288F |
| | | | |
| 10 | HOSE, CUT 30" #6 | 2 - MAIN BOOM TP TIP EXT CYL | HS10480F |
| | | 2 - MAIN BOOM TUBE TO LIFT CYL | |
| | | 4 - MAIN BOOM TO RECOIL BOX | |
| | | 2 - TIP BOOM TO CRAB MOTOR | |
| | | | |
| 2 | HOSE, CUT 36" #6 | TIP BOOM TO CRAB MANIFOLD | HS10576F |
| | | | |
| 4 | HOSE, CUT 36" #6-S | RECOIL BOX (INSIDE) | HS10576FS |
| | | | |
| 2 | HOSE, CUT 57" #6 | VALVE BANK TO HA36 | HS10912F |
| | | | |
| 4 | HOSE, CUT 75" #6 | VALVE BANK TO HORZ. O/R CYL | HS11200F |
| | | | |
| 10 | HOSE, CUT 104" #6 | 6 - VALVE BANK TO MAIN BOOM | HS11664F |
| | | 2 - VALVE BANK TO LIFT CYL TUBE | |
| | | 2 - VALVE BANK TO TIP CYL TUBE | |
| | | | |
| 4 | HOSE, CUT 114" #6 | VALVE BANK TO VERT. O/R CYL | HS11824F |
| | | | |
| 2 | HOSE, HP 3/8 | VALVE BANK TO SAI MOTOR - 38" & | HS206 |
| 2 | HYDRAULIC, #6 CRIMP-ON/F | VALVE BANK CONN. TO SAI MOTOR | HF1106F |
| 2 | HYDRAULIC, #6 CRIMP-ON/F | VALVE BANK TO SAI MOTOR CONN. | HF1106F9S |
| | | | |
| 1 | HOSE, LP 3/8 | SAI HOUSING TOP TO OIL TANK | HS406 |
| 2 | HYDRAULIC, #6 PUSH ON | SAI TOP HOSE CONNECTOR | HF3606 |

# NOTIFICATION OF TRANSFER OF OWNERSHIP

TO: Petersen Industries, Inc.
4000 SR 60 West
Lake Wales, FL 33859
Telephone: 800/930-5623, Ext. 256

FROM: _____

_____

_____

This is to advise you that our organization is no longer the owner of the Petersen loader listed below. We have listed the name and address of the subsequent owner. Would you please change your records accordingly.

Petersen Loader Serial Number: _____

VIN: _____

Name and Address of New Owner:

_____

_____

_____

Phone:_____

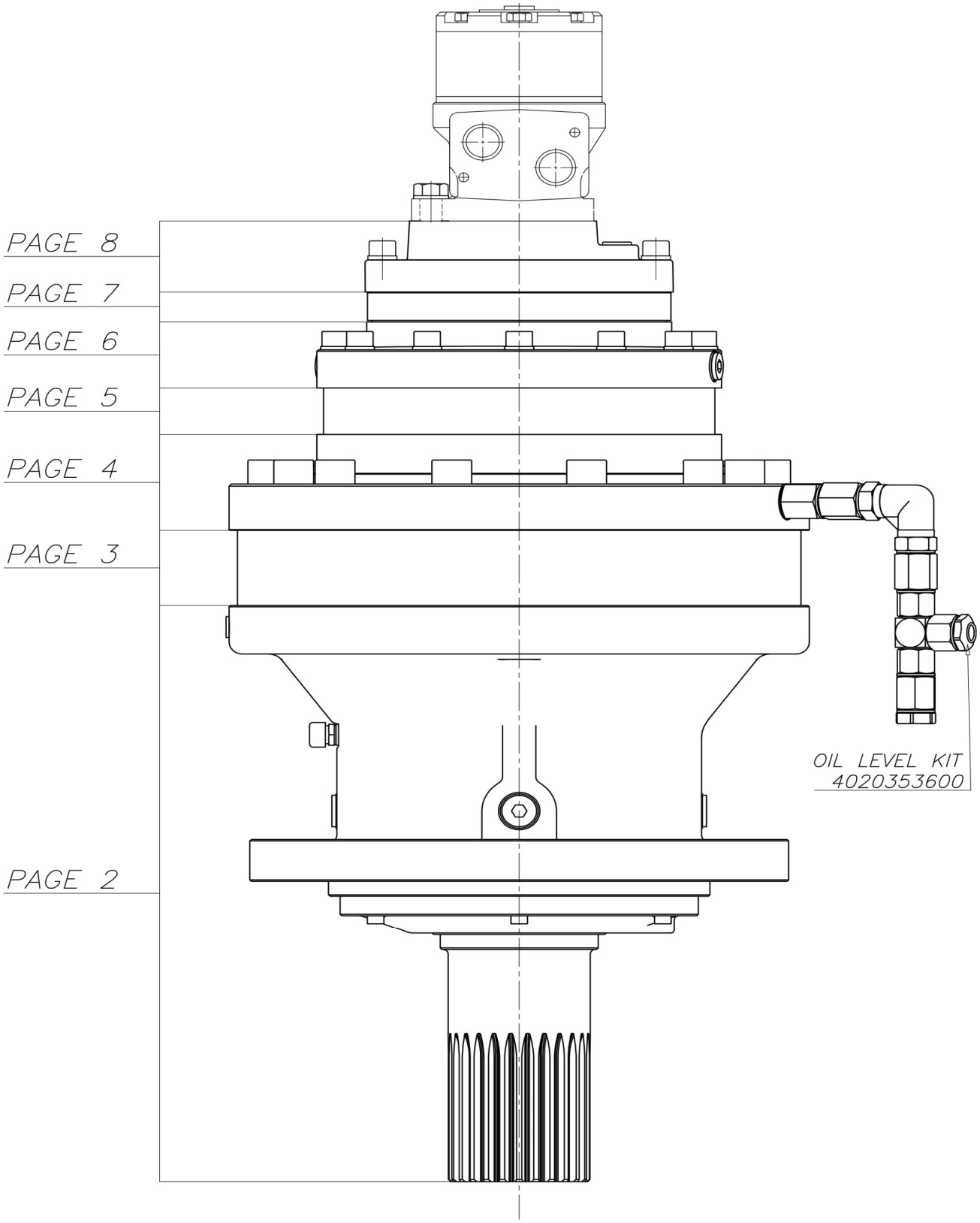
Contact: _____

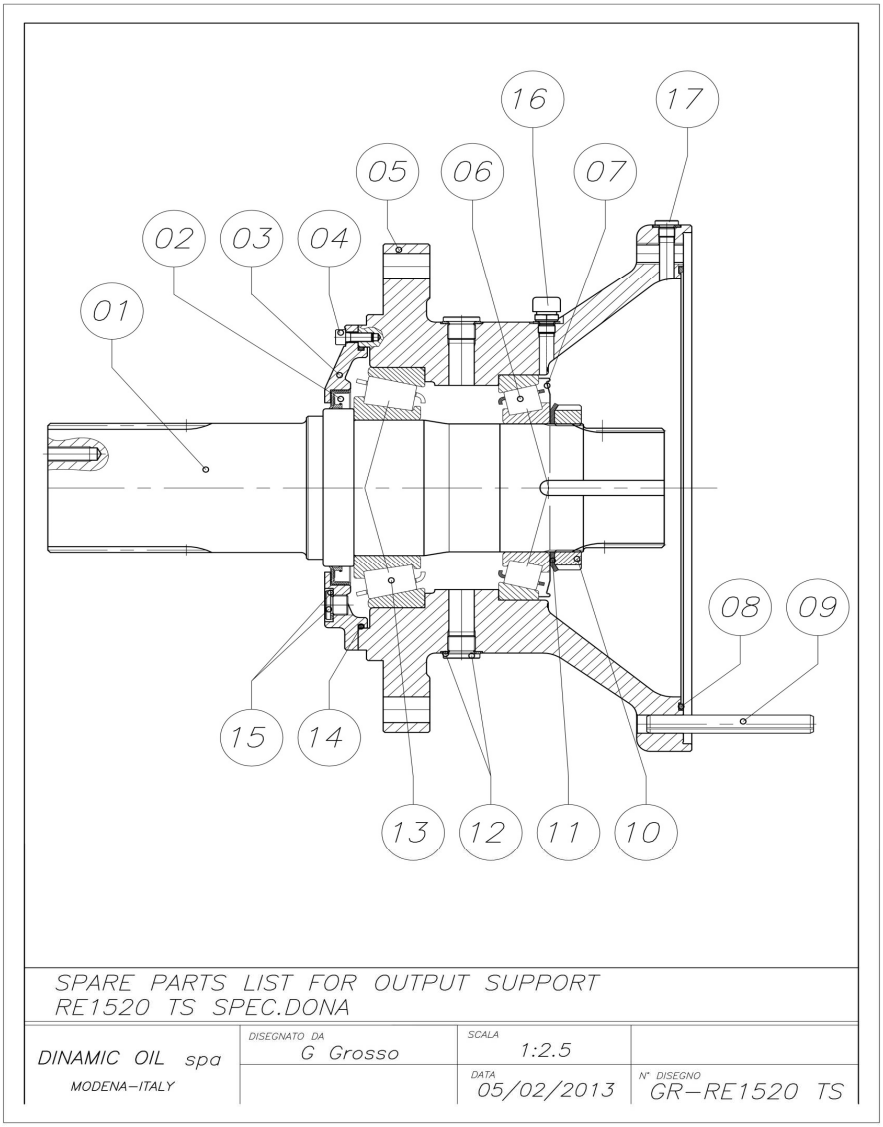
BY: _____
(Name)

Date: _____

GEARBOX DESCRIPTION **RE 1523 TS SP.8/16 Z26 60.5 MR**

GEARBOX CODE **91V2HS300600**



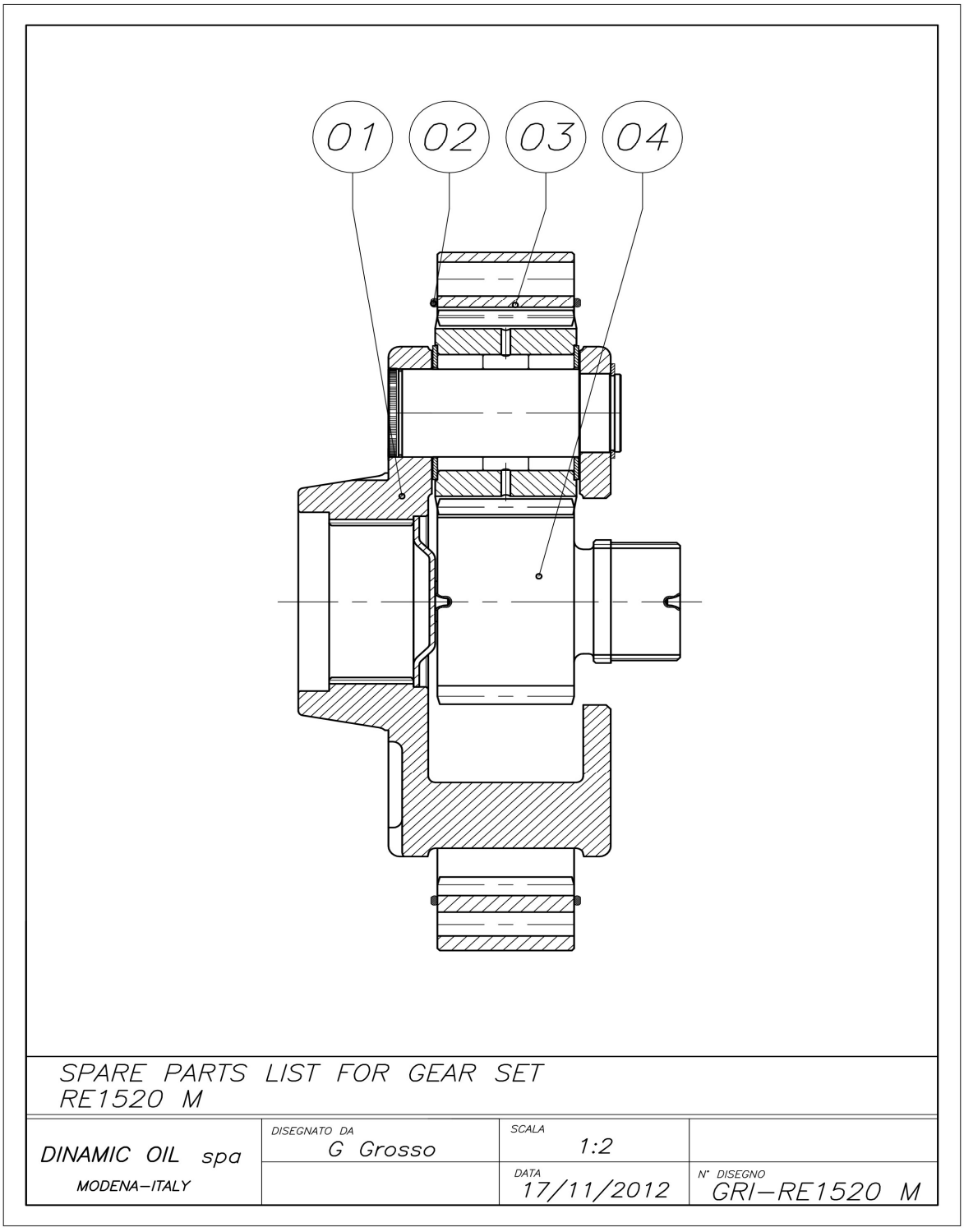



| **SPARE PARTS LIST FOR OUTPUT SUPPORT RE1520 TS SPEC.DONA** | **GRU-1520 TS** |
|---|---|

| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 1 | ALBERO SCANALATO SPEC. 8/16 DP Z26 RE1520 | SHAFT | 1 | 02261309 |
| 2 | ANELLO DI TENUTA 105x130x12 | RING SEAL | 1 | 415003300 |
| 3 | COPERCHIETTO PORTATEN.RE1020/1520 | COVER | 1 | 02251012 |
| 4 | VITE TCEI M6x16 12,9 | SCREW | 6 | 410409400 |
| 5 | CORPO T RE 1520 SPEC.FORI RADDOPPIA | OUTPUT SUPPORT | 1 | 022010139 |
| 6 | CUSCINETTO CR 30217 TIPO A | BEARING | 1 | 401021200 |
| 7 | ANELLO NILOS 32217 AV | NILOS | 1 | 415052600 |
| 10 | GHIERA M85x2 | LOCKNUT | 1 | 430000900 |
| 11 | ROSETTA DI SIC. MBS17 X RE1020/1520 | TAB WASHER | 1 | 423205300 |
| 12 | TAPPO TCEI 3/8"GAS | PLUG | 4 | 419000700 |
| | RONDELLA RAME 3/8"GAS | WASHER | 4 | 423000600 |
| 13 | CUSCINETTO CR 32218 TIPO A | BEARING | 1 | 401018100 |
| 14 | GUARNIZIONE O-RING 2-167 | O-RING SEAL | 1 | 406013100 |
| 15 | RONDELLA RAME 1/4"RICOTTO | WASHER | 1 | 423000300 |
| | TAPPO TCEI 1/4"GAS DIN 908 | PLUG | 1 | 419000600 |
| 16 | TAPPO SFIATO 1/8"GAS CON VALVOLA | BREATHER PLUG | 1 | 419021900 |
| | RONDELLA RAME 1/8"GAS | WASHER | 1 | 423001700 |
| 17 | TAPPO TCEI 1/8"GAS | PLUG | 1 | 419020900 |
| | RONDELLA RAME 1/8"GAS | WASHER | 1 | 423001700 |

**SUB ASSEMBLY CODE: 99371400**

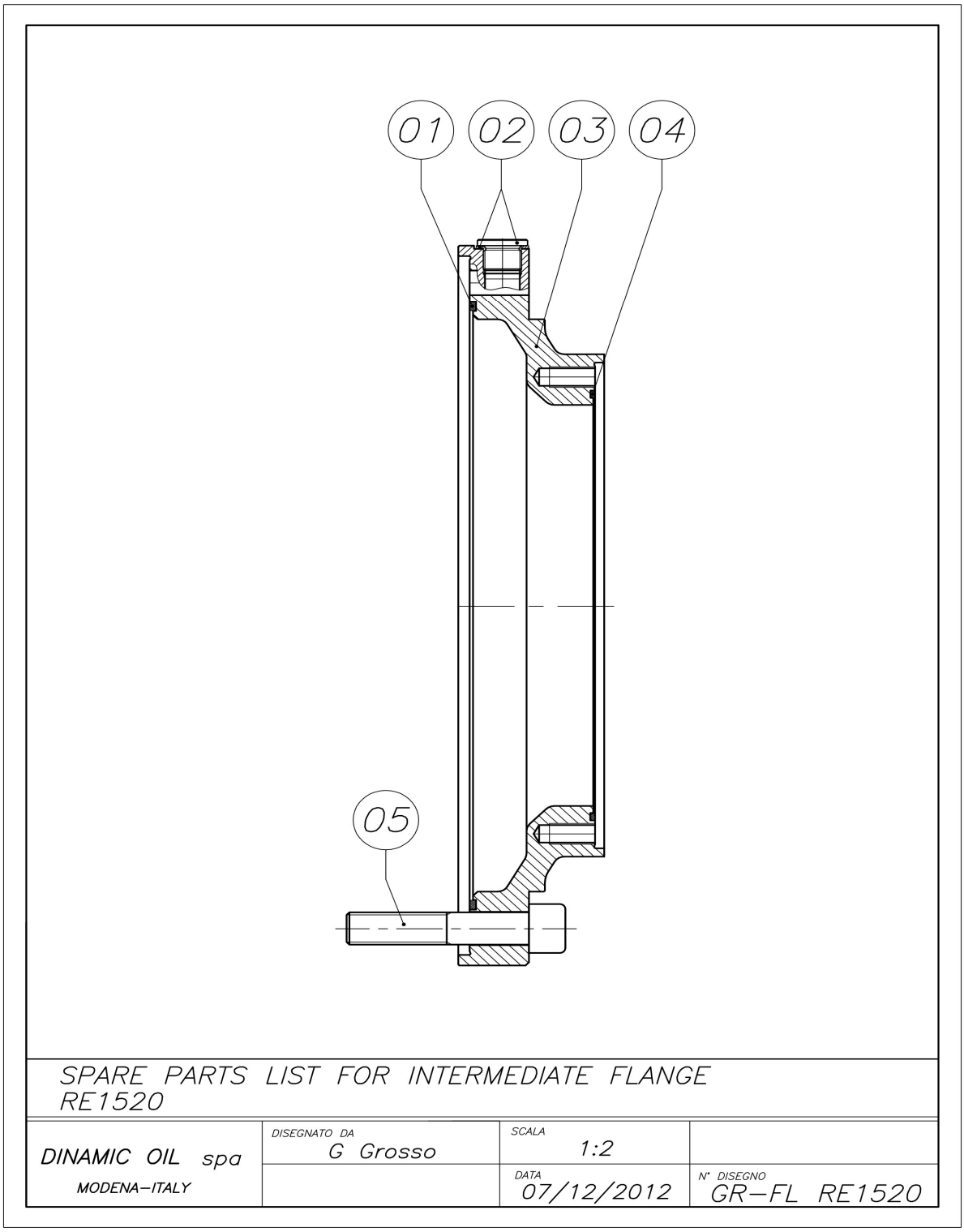
| | | | | |
|---|---|---|---|---|
| 8 | OR 2-277 | O RING SEAL | 1 | 406023400 |
| 9 | SPINA ELASTICA Ø12X100 UNI6873 | ELASTIC PINS | 3 | 434010700 |




| SPARE PARTS LIST FOR GEAR SET RE1520 M R=4.09 | GRI-RE1520 M |
|---|---|

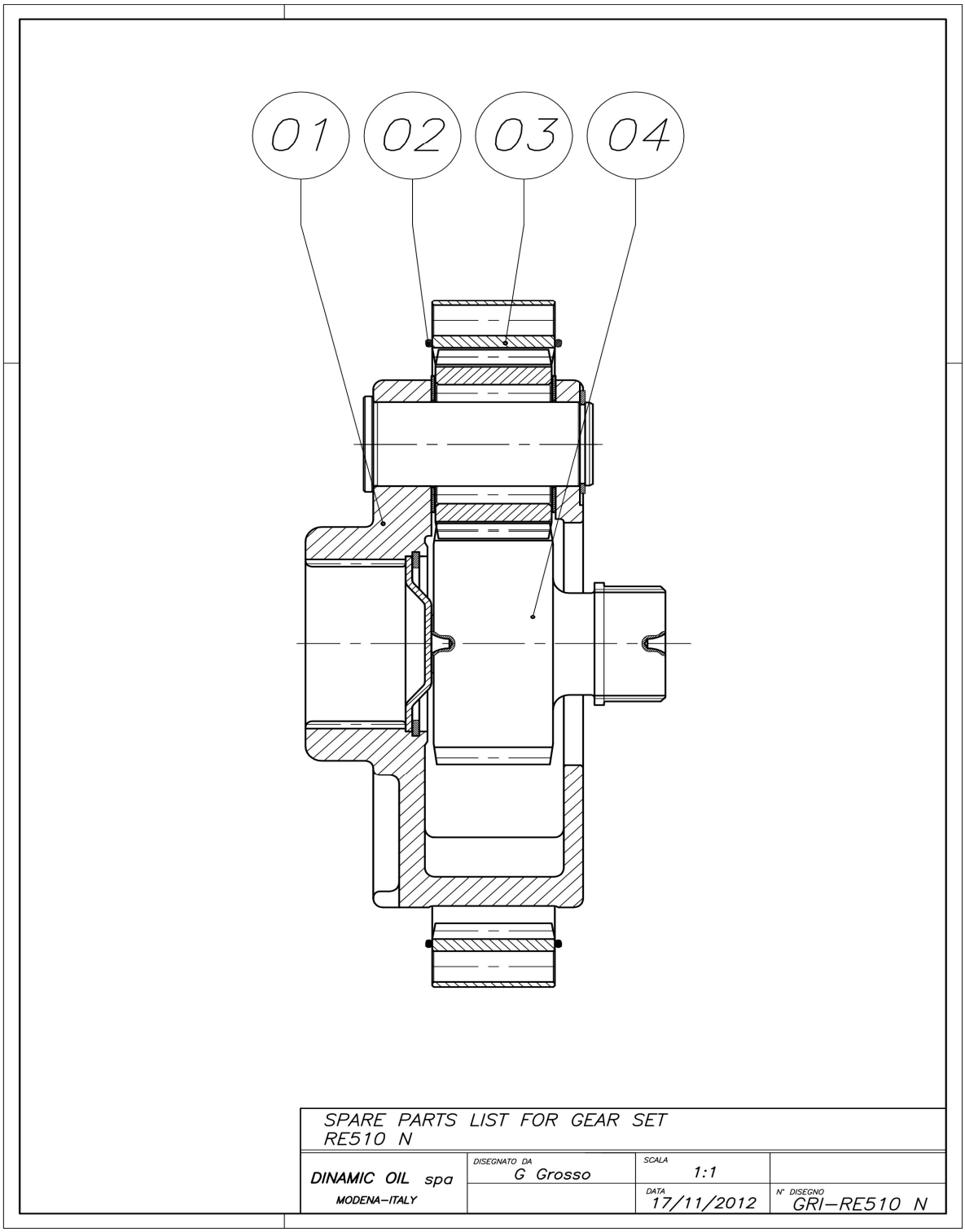
| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 1 | RAGG.INGRANAGGERIA RE1520 R1:4.09 | GEAR SET | 1 | 99130400 |
| 2 | OR 2-277 | O RING SEAL | 2 | 406023400 |
| 3 | CORONA RE1520/2000 | RING GEAR | 1 | 02231027 |
| 4 | SOLARE R=1:4.09 RE 1520 | SUN GEAR | 1 | 02611116 |

**SUB ASSEMBLY CODE: K0500H1A01**




| SPARE PARTS LIST FOR INTERMEDIATE FLANGE RE1520 x SUPPORT "T" | GR-FL RE1520 |
|---|---|

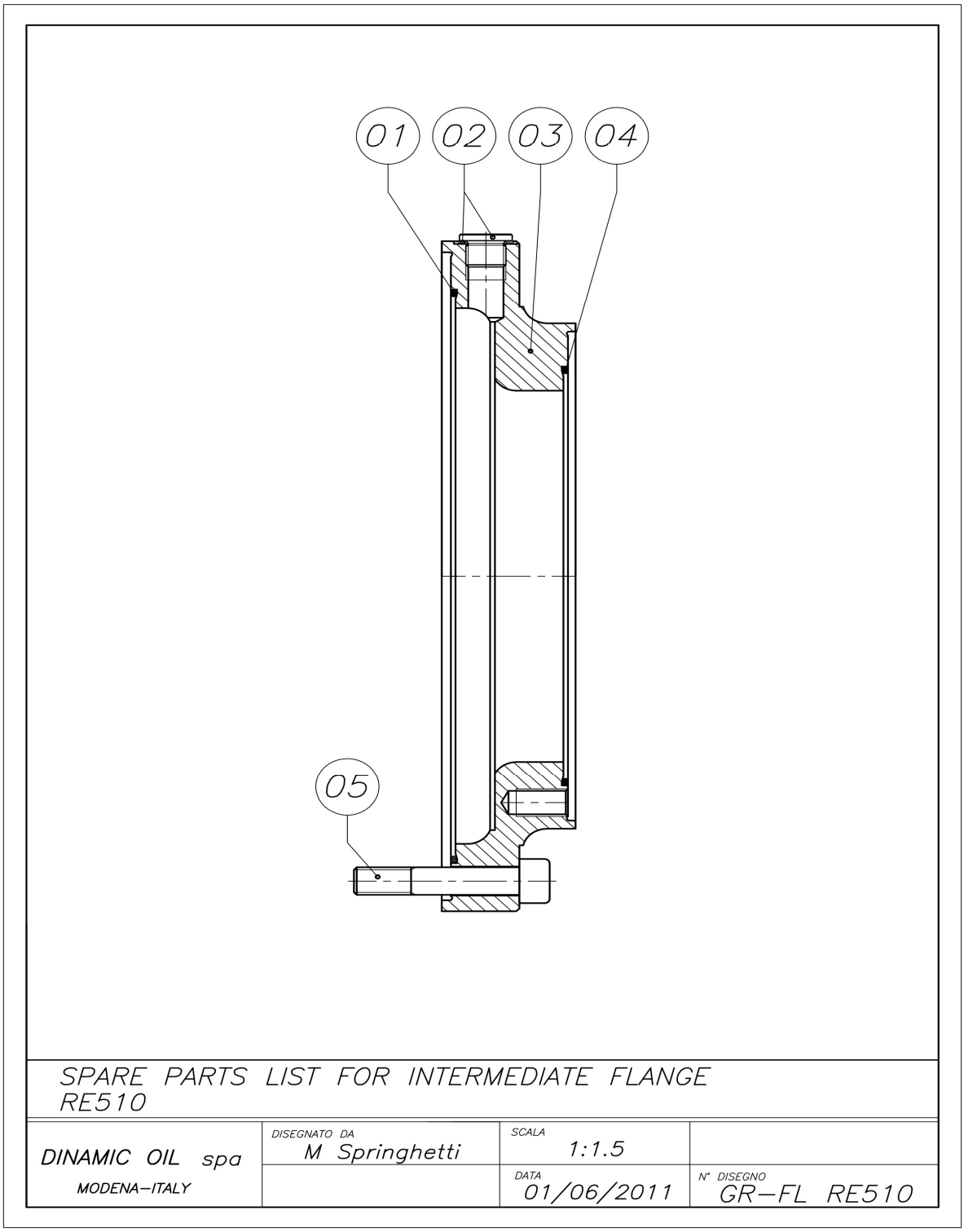
| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 1 | GUARNIZIONE OR 2-277 | OR-RING SEAL | 1 | 406023400 |
| 2 | TAPPO TCEI DIN 908 R 3/8"GAS | PLUG | 2 | 419000700 |
| | RONDELLA 3/8" RAME RICOTTO UNI 6953 | WASHER | 2 | 423000600 |
| 3 | FLANG.INTERM.RE1520 PER RE510 | INTERMEDIATE FLANGE | 1 | 02731044 |
| 4 | GUARNIZIONE OR 2-171 | OR-RING SEAL | 1 | 406015000 |
| 5 | VITE TCEI M16X110 12.9 UNI5931 | SCREW | 16 | 410408400 |




| SPARE PARTS LIST FOR GEAR SET RE510 N R=4.25 | GRI-RE510 N |
|---|---|

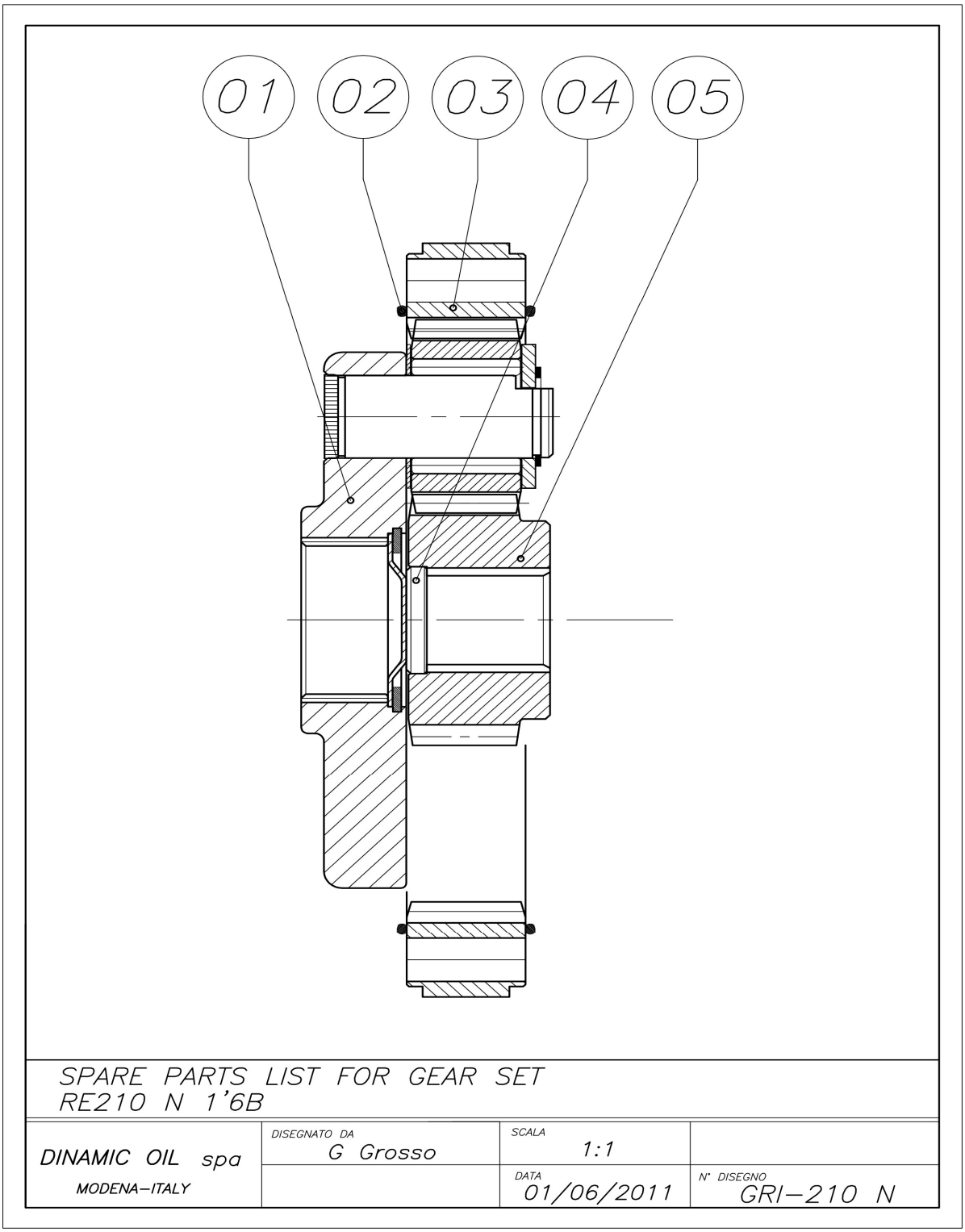
| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 1 | RAGG.INGRANAGGERIA RE 510 4,25 | GEAR SET | 1 | 99121600 |
| 2 | GUARNIZIONE OR 2-171 | O RING SEAL | 2 | 406015000 |
| 3 | CORONA RE500 | RING GEAR | 1 | 2030030600 |
| 4 | SOLARE 2ST R 4,25 RE 510 | SUN GEAR | 1 | 2030031900 |

**SUB ASSEMBLY CODE: K0500E1B01**



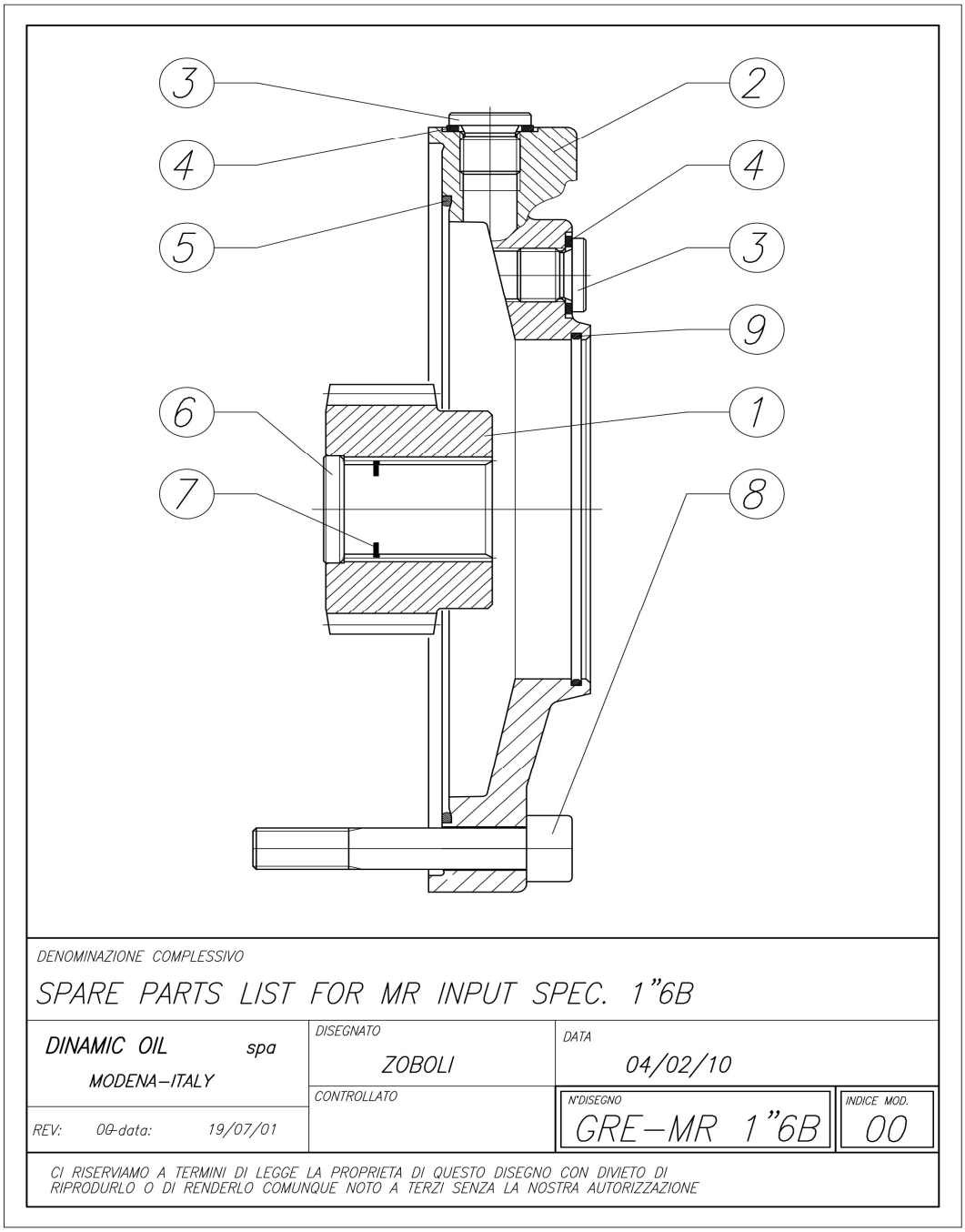

| SPARE PARTS LIST FOR INTERMEDIATE FLANGE RE510 x RE1520 | GR-FL RE510 |
|---|---|

| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 1 | GUARNIZIONE OR 2-171 | OR-RING SEAL | 1 | 406015000 |
| 2 | TAPPO TCEI 1/4"GAS DIN 90 | PLUG | 1 | 419000600 |
| | RONDELLA RAME 1/4" RAME RICOTTO | WASHER | 1 | 423000300 |
| 3 | FLANGIA INTERMEDIA RE300-500 | INTERMEDIATE FLANGE | 1 | 2030022400 |
| 4 | GUARNIZIONE OR 147X2,62 N70-N003 | OR-RING SEAL | 1 | 406018200 |
| 5 | VITE TCEI M10X80 12.9 UNI 5931 | SCREW | 12 | 410407800 |




| SPARE PARTS LIST FOR GEAR SET RE 210 N 1"6B i=3.48 | GRI-210 N |
|---|---|

| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 1 | RAGG.INGRANAGGERIA RE 210 N 3,48 | GEAR SET | 1 | 99103600 |
| 2 | OR 147X2,62 N70-N003 | O-RING SEAL | 2 | 406018200 |
| 3 | CORONA RE210/240 1 ST | RING GEAR | 1 | 02231009 |
| 4 | PASTIGLIA MR 110-210 R.3,48-4,26 | PAD | 1 | 02741011 |
| 5 | SOLARE R.3.48 MOT.ORB.1"6B | SUN GEAR | 1 | 026110274 |




| **SPARE PARTS LIST FOR MR INPUT** | **GRE-MR 1"6B** |
|---|---|

| POS. | DESCRIZIONE | ITEM | Q.TA' | CODICE |
|---|---|---|---|---|
| 2 | FLANGIA MR 110-240 | INPUT MOTOR FLANGE | 1 | 2000080100 |
| 3 | TAPPO TCEI 1/4"GAS DIN 908 | PLUG | 2 | 419000600 |
| 4 | RONDELLA RAME 1/4"RICOTTO 13X19X1.5 | WASHER | 2 | 423000300 |

**SUB ASSEMBLY CODE: K0700AV01**

| | | | | |
|---|---|---|---|---|
| 1 | SOLARE R.3.48 MOT.ORB.1"6B | SUN GEAR | 1 | 026110274 |
| 5 | GUARNIZIONE OR 147x2,62 | O-RING SEAL | 1 | 406018200 |
| 6 | PASTIGLIA MR 110-210 | PAD | 1 | 02741011 |
| 7 | SEEGER FORO Ø22 | INT. SNAP RING | *** | ********* |
| 8 | VITE TCEI M10X60 12.9 | SCREW | 8 | 410410300 |
| 9 | OR 2-042 | O-RING SEAL | 8 | 406002300 |

# 7 LUBRICATION

**All DINAMIC OIL S.p.A. gearboxes are supplied without lubricating oil.**
The user is required to ensure the units are filled with the correct lubricants before putting the machine to use.

## 7.1 TYPE OF LUBRICATION

Gearboxes are oil bath lubricated. Before putting the gearbox to use, fill it with oil, looking through the level cap to see if it is at the correct level. This operation requires special attention, and the level must be checked again after a few minutes of operation.

## 7.2 SELECTING AN OIL

Any mechanical transmission oil with EP additives in viscosity classes ISO VG220 to ISO VG320 under ISO 3448 can be used. In special cases oils with different viscosities may be used. In this case, contact the DINAMIC OIL S.p.A. technical assistance service. The oil viscosity must be chosen to suit the room temperature and the gearbox's real operating temperature. If the gearboxes must operate at very high ambient temperatures or with very large temperature excursions, synthetic oil is recommended. In gearboxes with vertical fitting and continuous operation, oil may suddenly overheat. In these cases it is necessary to provide an external tank (which DINAMIC OIL S.p.A. can supply) to allow the oil to expand as it heats up.

If the delivered gearbox is already filled with oil, the lock cap used for delivery needs to be replaced with the vent cap supplied.

Lubricants are potentially harmful/toxic substances to health: always refer to the manufacturer's safety data sheets.

Do not release used oil into the environment. Collect it and send it to authorised bodies for disposal in accordance with legislative provisions in force.

### Recommended viscosity

| ISO VG 3448 | OPERATING TEMPERATURE [C°] / AMBIENT TEMPERATURE [C°] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | -20° | -10° | 0 | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90 | 100° |
| **220** | | | | | | | | | | | | | |
| **320** | | | | | | | | | | | | | |

### Lubricants for general use:

| Manufacturer | Mineral oil | Synthetic oil | |
|---|---|---|---|
| | | **Polyalphaolefins (PAO)** | **Polyglycols (PG)** |
| **AGIP** | Blasia | Blasia SX | Blasia S |
| **ARAL** | Degol BG | | Degol GS |
| **BP** | Energol GR-XP | Enersyn EPX | Enersyn HTX |
| **CASTROL** | Alpha SP | Alphasyn EP | Alphasyn PG |
| **CHEVRON** | Ultra Gear | Tegra Synthetic | HiPerSYN |
| **DEA** | Falcon CLP | | |
| **ELF** | Reductelf | Elf Syntherma | Elf Syntherma |
| **ESSO** | Spartan EP | Spartan S EP | Glycolube |
| **FINA** | Giran | | |
| **IP** | Mellana | | Telesia Oil |
| **KLÜBER** | Kluberoil GEM 1 | Klubersynt EG4 | Klubersynt GH6 |
| **MOBIL** | Mobilgear XMP | Mobilgear SHC | Glygoile |
| **OPTIMOL** | Ultra | | |
| **Q8** | Goya | El Greco | El Greco |
| **SHELL** | Omala S2 G | Omala S4 GX | Omala S4 WE |
| **TOTAL** | Carter EP | Carter SH | Carter SY |

### Lubricants for the food industry:

| Manufacturer | Gear oil |
|---|---|
| **AGIP** | Rocol Foodlube Hi-Torque |
| **ESSO** | Gear Oil FM |
| **KLÜBER** | Klüberoil 4 HU1 N |
| **MOBIL** | DTE FM |
| **SHELL** | Cassida Fluid GL |

## 7.3 BRAKE LUBRICATION

Negative hydraulic brakes with multiple discs and a lubrication chamber are already lubricated.

## 7.4 OIL FILLING AND LEVEL CHECKING

Every gearbox is equipped with level, vent, filling and draining caps for oil in a configuration that varies depending on the structural form (see point 3).

### 7.4.1. Horizontal fitting

For horizontal fitting, the lubricating oil level is located on the middle section of the gearbox.

### 7.4.2 Vertical fitting

For vertical fitting (both linear and at right angle), the lubricating oil level is located on the “top” section of the gearbox, to ensure the upper bearing is lubricated.

## 7.5 FILLING PROCEDURE

When being filled, the gearbox must be in the exact position that it will be in when operating.

Ensure the power supply is disconnected when filling.

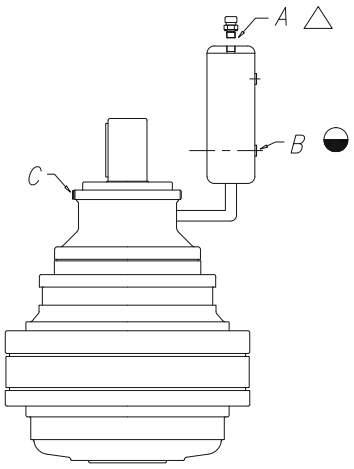
- Unscrew and remove the loading and level caps (see point 3.5).
- Feed the oil through the loading hole until it flows out of the level hole.
- Refit the caps using the appropriate tightening torques (see Annex 2).

### 7.5.1 Filling procedure with expansion chamber

In vertical fitting and cases where the gearbox needs to be completely filled, use of an expansion chamber is recommended.
This accessory ensures that all the gearbox’s components are lubricated, as well as serving as a reservoir for the oil, which increases in volume as the temperature rises.

- Unscrew cap “C”, located on the upper part of the gearbox, to prevent an air bubble from forming at the upper rotary seal.
- Unscrew loading cap “A” and start filling. When the oil flows out of the hole in cap “C”, close it using the appropriate tightening torques (see Annex 2) and fill up to level “B”.

- Refit cap “A” using the appropriate tightening torques (see Annex 2).




## 7.6 AMOUNT OF OIL

Indicative oil amounts are given in Annex 1 of this manual. These values are only indicative, and the level cap on the middle section of the gearbox itself must therefore be referred to.

# 8 SUPPORT AND SERVICING

Servicing must be performed by expert, authorised personnel adhering to the work and environmental safety standards in force.

Servicing on the gearbox must be performed with the power supply disconnected and the gearbox taken “out of service” to prevent it from being switched on accidentally. The oil temperature must be at a safe level so as not to burn the operators.

The instructions given in this paragraph must be followed, ensuring the gearbox is operational and that required levels of safety are met:

- Only use original spare parts. (Refer to the Spare Parts List for the gearbox in question).
- Use lubricants that are recommended by the manufacturer.
- After any servicing work, always replace the seal washers and any lubricating oil.
- Carry out the routine servicing work as set out by the manufacturer.
- Use additional lighting if carrying out servicing work in dimly lit areas, to ensure that it is performed safely.
- Take relevant precautions if carrying out servicing work in enclosed spaces, to ensure that it is performed safely.

DINAMIC OIL S.p.A. will not be held liable for damage caused to persons, animals or objects if non-original spare parts are used.

## 8.1 ROUTINE SERVICING

Scheduled routine servicing work is carried out on DINAMIC OIL S.p.A. gearboxes by the operator:

Proper servicing improves performance, longevity and safety.

**After the first 150 hours of operation:**

- Check there are no metal residues of abnormal size in the magnetic caps on the gearboxes.
- Clean the surfaces of the gearbox body and the air ventilation pathways to ensure correct

heat dispersal.
- Change the lubricating oil (see point 8.3).
- Check the screws are all tight, and tighten them where required.

**After every 500 hours of operation:**

- Check the oil levels with the relevant caps.
- Check for any leaks in the seals.
- Check the screws are all tight, and tighten them where required.

**After every 2000 hours of operation or at least every 12 months:**

- Clean the surfaces of the gearbox body and the air ventilation pathways to ensure correct heat dispersal.
- Check the screws are all tight, and tighten them where required.

It is worth checking for the vibration, noise and temperature of the gearbox while it is in operation.
When repaired, the right amount of oil must be restored.

## 8.2 SUPPLEMENTARY SERVICING

If agreed with the customer, DINAMIC OIL S.p.A. can supply suitable servicing procedures on a case by case basis.

**DINAMIC OIL S.p.A. prohibits the gearbox from being opened for any operations which are not defined as “routine” servicing.**

**DINAMIC OIL S.p.A. will accept no liability for harm to objects or persons caused by operations carried out which do not fall within routine servicing and have not been agreed with the customer.**

If in need of assistance, contact the DINAMIC OIL S.p.A. technical sales office.

## 8.3 OIL REPLACEMENT

Replace the lubricating oil according to the schedule set out in the following table, or at least every 2 years.

**Average operating duration according to oil type:**

| Operating temperture | Oil type | | |
|---|---|---|---|
| | Mineral oil | Synthetic oil | |
| | | Polyalphaolefins (PAO) | Polyglycols (PG) |
| **70° C** | 7000 hours | 15000 hours | 16000 hours |
| **80° C** | 5000 hours | 10000 hours | 12000 hours |
| **90° C** | 3000 hours | 7500 hours | 9000 hours |

To make it easier to empty the gearbox, it is recommended that oil be changed when the gearbox is warm. Internal parts must be washed with a suitable liquid before filling with new oil. Oils with different viscosity or different brands of oil should not be mixed. In particular, synthetic and mineral oils must never be mixed together.
Once the machine is in operation, periodically check lubricant level and top up if necessary.

Do not release used oil into the environment. Collect it and send it to authorised bodies for disposal in accordance with legislative provisions in force.

Empty the oil when the gearbox is warm, but at a temperature not exceeding 40-45 °C to prevent the risk of burns.

### 8.3.1 Oil replacement procedure

- Place a receptacle of sufficient size underneath the draining cap.
- Unscrew the gearbox's loading and draining caps and allow the oil to completely drain.
- Wash internal parts with a suitable liquid.
- Refill the gearbox with oil (see point 7.5).

## 8.4 GREASE REPLACEMENT

The bearings of some gearboxes are lubricated with grease (performed in the factory). Replace the lubricating grease according to the schedule set out in the following table:

**Average operating duration according to grease type:**

| Grease type | |
|---|---|
| Mineral | Synthetic |
| 5000 hours | 10000 hours |

DINAMIC OIL S.p.A. recommends replacement at every oil change.
For the type and quantity, refer to the gearbox data sheet.

GB

# ROTATOR GV 4 GV 4E

The Rotator for piece-goods cranes and smaller forest loaders

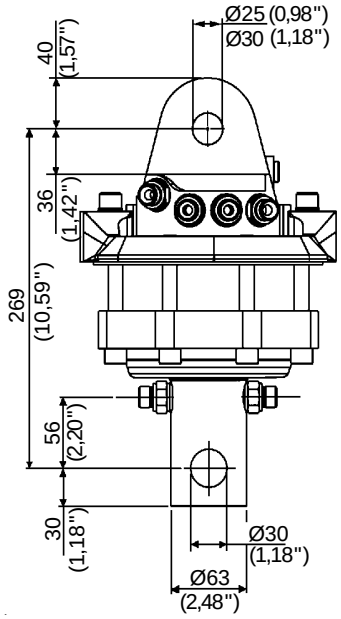
The GV 4 is a light, compact and strong vane rotator, highly suitable for piece goods cranes as well as small forest loaders.

- Different upper stator configurations provides a variety of different link- and swingdamper options.
- Reliable bearings and hydraulically balanced for long service life
- High-grade steel alloy spindle
- Lower linkage completely free from play
- Powerful torque and accurate action.

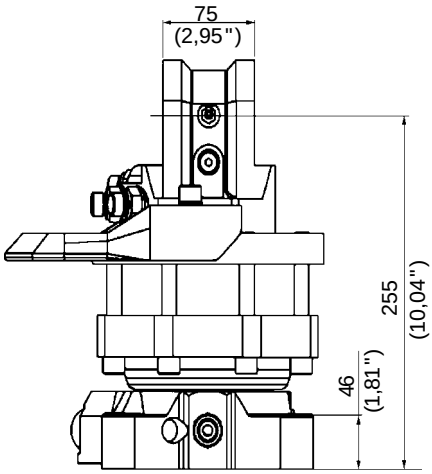
Indexator

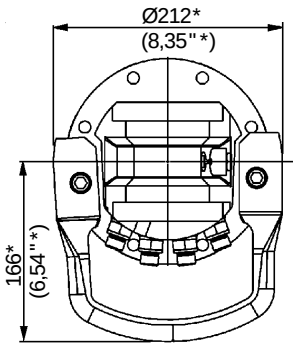
# ROTATOR GV 4 GV 4E

## GV 4

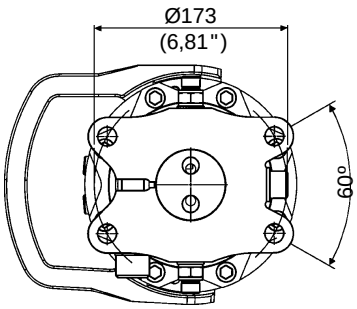



## GV 4FI / GV 4FK




## GV 4FI / GV 4EFI

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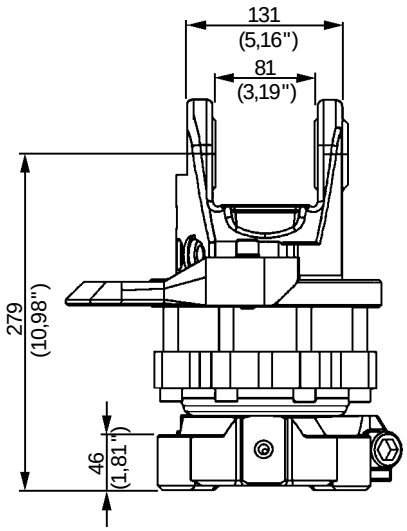
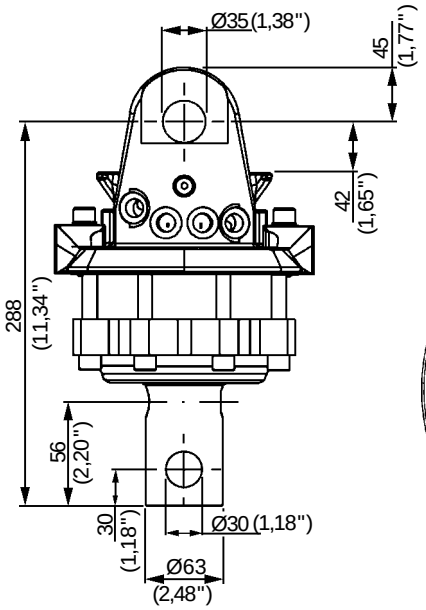
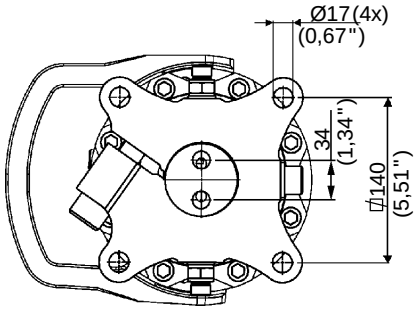



## GV 4E




## GV 4FK / GV 4EFK




**Technical data**

| | GV 4 / GV 4E | GV 4FI / GV 4E FI | GV 4FK / GV 4E FK |
|---|---|---|---|
| | 5002 538 / 5002 638 | 5002 537 / 5002 637 | 5002 535 / 5002 635 |
| Rotation | unlimited | unlimited | unlimited |
| Weight, kg (lb) | 27 (60) | 34 (75) | 34 (75) |
| Max axial load static, kN (lbf) | 45 (10 115) | 45 (10 115) | 45 (10 115) |
| Max axial load dynamic, kN (lbf) | 25 (5 620) | 25 (5 620) | 25 (5 620) |
| Torque at 25 MPa (3 625 psi), Nm (lb·ft) | 1 150 (850) | 1 150 (850) | 1 150 (850) |
| Rec oilflow, l/min (GPM**) | 12 (3,2) | 12 (3,2) | 12 (3,2) |

(**US Gallon)

Max working pressure:

| | | |
|---|---|---|
| Rotator | 25 MPa (3 625 psi) | R |
| Grapple/Tool open | 30 Mpa (4 350 psi) | GO |
| Grapple/Tool close | 30 MPa (4 350 psi) | G |

Connections:
BSP 3/8"
BSP 3/8"
BSP 3/8"
We supply adapter sets for alternative connections

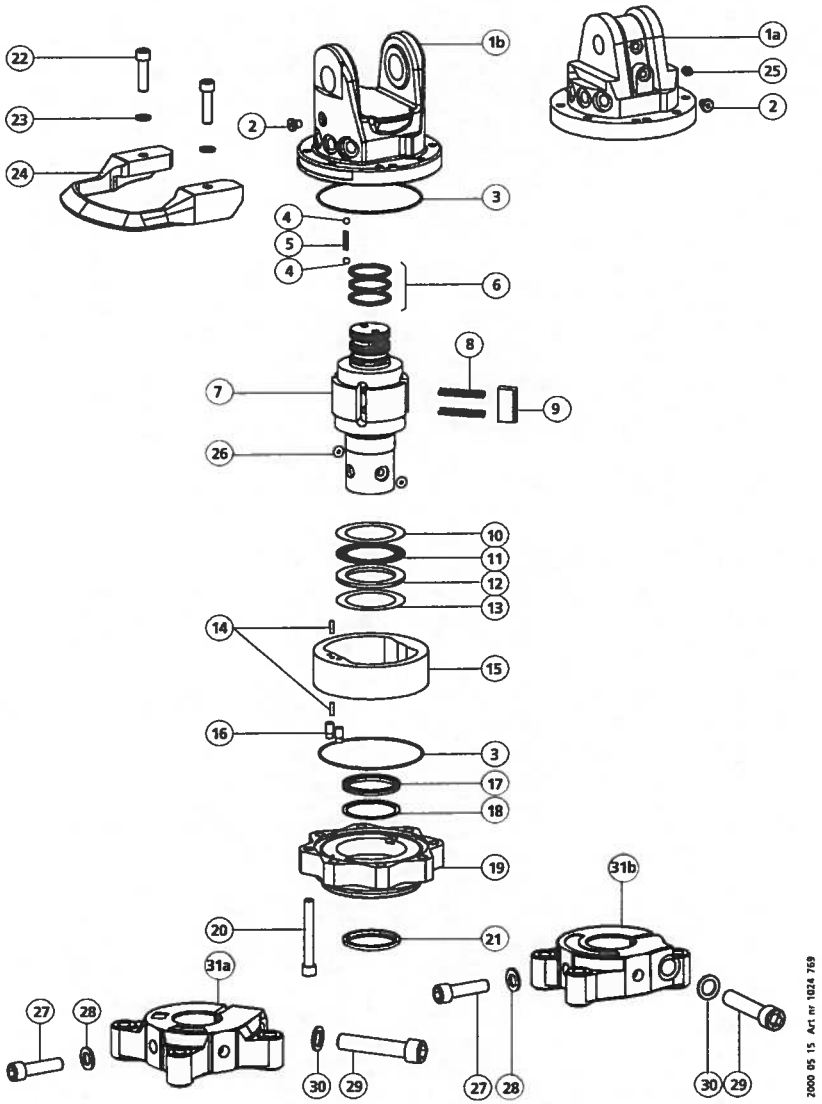
Sales and service:


Indexator AB, Box 11, S-922 21 Vindeln, Sweden
Tel + 46 933 109 45, Fax + 46 933 108 57
E-mail: sales@indexator.se



Art no 1025055
1999 06 08

# GV 4FK, GV 4FI, GV 4EFK, GV 4EFI




2000 05 15 Art nr 1024 769

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E-mail: sales@indexator.se

# GV 4FK, GV 4FI, GV 4EFK, GV 4EFI

| Pos<br>Fig | Detalj nr<br>Part no | Ant<br>Qty | Benämning | Description | Sats<br>Kit | Anm<br>Notes |
|---|---|---|---|---|---|---|
| | 5002 535 | | Rotator GV 4FK | Rotator GV4FK | | Pos. 1a-31a |
| | 5002 537 | | Rotator GV 4FI | Rotator GV 4FI | | Pos. 1a-31b |
| | 5002 635 | | Rotator GV 4EFK | Rotator GV 4EFK | | Pos. 1b-24, 26-31a |
| | 5002 637 | | Rotator GV 4EFI | Rotator GV 4EFI | | Pos. 1b-24, 26-31b |
| 1 a | 5002 508 | 1 | Övre statorhalva | Stator plate, upper | | |
| 1 b | 5002 603 | 1 | Övre statorhalva E | Stator plate, upper E | | |
| 2 | 5001 381 | 1 | Propp | Plug | | |
| 3 | 1024 025 | 2 | O-ring | O-ring | * | |
| 4 | 1005 545 | 2 | Kula | Ball | | |
| 5 | 1020 536 | 1 | Fjäder | Spring | | |
| 6 | 1024 082 | 3 | Glid-o-ring | Glide ring | * | |
| 7 | 5002 513 | 1 | Rotatoraxel | Rotator shaft | | |
| 8 | 5006 030 | 8 | Fjäder | Spring | | |
| 9 | 5002 525 | 4 | Vinge | Vane | | |
| 10 | 1024 058 | 1 | Axialbricka | Washer | | |
| 11 | 1024 041 | 1 | Axialnålrullkrans | Axial needle bearing | | |
| 12 | 1024 033 | 1 | Löpbricka | Washer | | |
| 13 | 5002 575 | 1 | Shimssats | Shim set | | |
| | 5002 546 | 1 | Shims | Shim | | 0,100mm |
| | 5002 547 | 1 | Shims | Shim | | 0,125mm |
| | 5002 548 | 1 | Shims | Shim | | 0,150mm |
| | 5002 549 | 1 | Shims | Shim | | 0,178mm |
| 14 | 1013 580 | 2 | Spiralspännstift | Roll pin | | |
| 15 | 5002 512 | 1 | Statorring | Stator frame | | |
| 16 | 5011 105 | 2 | Kägla | Valve | | |
| 17 | 1024 066 | 1 | Tätning | Seal | * | |
| 18 | 1024 074 | 1 | Stödring | Support ring | * | |
| 19 | 5002 514 | 1 | Undre statorhalva | Stator plate, lower | | |
| 20 | 1022 649 | 8 | Skruv | Screw | | |
| 21 | 1024 090 | 1 | Avstrykare | Wiper seal | * | |
| 22 | 1014 950 | 2 | Skruv | Screw | | |
| 23 | 1015 304 | 2 | Bricka | Washer | | |
| 24 | 5002 502 | 1 | Nippelskydd | Hoseguard | | |
| 25 | 1001 825 | 1 | Smörjnippel | Grease nipple | | |
| 26 | 1024 017 | 2 | O-ring | O-ring | * | |
| 27 | 1002 153 | 1 | Skruv | Screw | | |
| 28 | 1020 890 | 1 | Bricka | Washer | | |
| 29 | 1019 488 | 1 | Skruv | Screw | | |
| 30 | 1019 496 | 1 | Bricka | Washer | | |
| 31 a | 5002 523 | 1 | Nedre länk FK | Lower link FK | | |
| 31 b | 5002 524 | 1 | Nedre länk FI | Lower link FI | | |
| * | 5002 522 | | Tätningssats | Seal kit | | |
| A-C | | | Nippelsats<br>se förteckning nästa sida | Adapterset<br>see spec list next page | | |

2000 05 15 Art nr 1024 769

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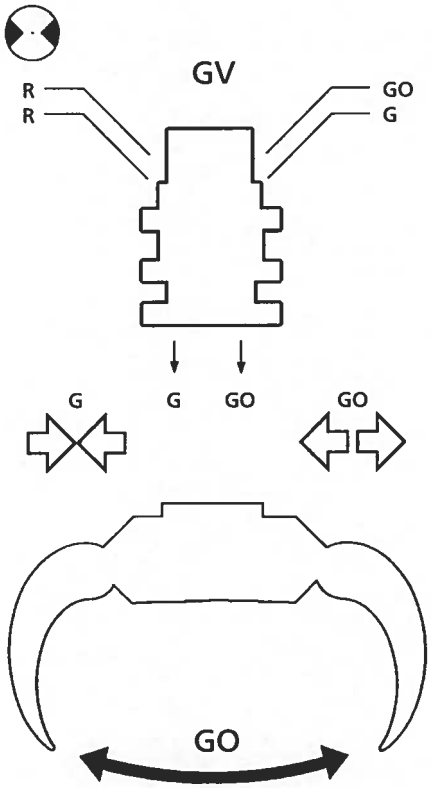
# GV 4FK, GV 4FI
# GV 4EFK, GV 4EFI




2000 05 15 Art nr 1024 769

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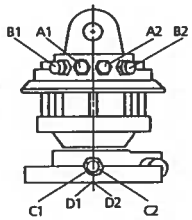
## NIPPELSATSER
## ADAPTER SETS GV 4FK, GV 4FI, GV 4EFK, GV 4EFI

A1 Rotator, höger
A2 Rotator,vänster
B1 Grip, öppna
B2 Grip, stäng
C1 Grip öppna, radiellt
C2 Grip stäng, radiellt
D1 Grip öppna, axiellt
D2 Grip stäng, axiellt




A1 Rotator, right
A2 Rotator, left
B1 Grappel, open
B2 Grappel, close
C1 Grappel open, radial
C2 Grappel close, radial
D1 Grapple open, axial
D2 Grapple close, axial

| Pos Fig | Detalj nr Part no | Ant Qty | Benämning | Description |
|---|---|---|---|---|
| | **5002560** | | **Nippelsats, R3/8"** | **Adapter set, R3/8"** |
| A1, A2 | 5001011 | 2 | Nippel R3/8" | Nipple R3/8" |
| B1, B2 | 5001011 | 2 | Nippel R3/8" | Nipple R3/8" |
| C1, C2 | 5001011 | 2 | Nippel R3/8" | Nipple R3/8" |
| D1, D2 | 1018142 | 2 | Propp 3/8" | Plug 3/8" |
| A, B, C | 1005347 | 6 | Gummistålbricka R3/8" | Bonded seal R3/8" |
| A, B, C | 1010974 | 6 | Plasthuv | Plastic cup |
| | **5002563** | | **Nippelsats, UNF3/4"-16** | **Adapter set, UNF3/4"-16** |
| A1, A2 | 5001371 | 2 | Nippel R3/8" x UNF 3/4"-16 | Nipple R3/8" x UNF 3/4"-16 |
| B1, B2 | 5001371 | 2 | Nippel R3/8" x UNF 3/4"-16 | Nipple R3/8" x UNF 3/4"-16 |
| C1, C2 | 5001371 | 2 | Nippel R3/8" x UNF 3/4"-16 | Nipple R3/8" x UNF 3/4"-16 |
| D1, D2 | 1018142 | 2 | Propp 3/8" | Plug 3/8" |
| A, B, C | 1005347 | 6 | Gummistålbricka R3/8" | Bonded seal R3/8" |
| A, B, C | 1014711 | 6 | Plasthuv | Plastic cup |
| | **5002564** | | **Nippelsats, UNF9/16"-18** | **Adapter set, UNF9/16"-18** |
| A1, A2 | 5001128 | 2 | Nippel R3/8" x UNF 9/16"-18 | Nipple R3/8" x UNF 9/16"-18 |
| B1, B2 | 5001128 | 2 | Nippel R3/8" x UNF 9/16"-18 | Nipple R3/8" x UNF 9/16"-18 |
| C1, C2 | 5001128 | 2 | Nippel R3/8" x UNF 9/16"-18 | Nipple R3/8" x UNF 9/16"-18 |
| D1, D2 | 1018142 | 2 | Propp 3/8" | Plug 3/8" |
| A, B, C | 1005347 | 6 | Gummistålbricka R3/8" | Bonded seal R3/8" |
| A, B, C | 1019892 | 6 | Plasthuv | Plastic cup |
| | **5002561** | | **Nippelsats, M18x1,5** | **Adapter set, M18x1,5** |
| A1, A2 | 5002260 | 2 | Nippel R3/8" x M18x1,5 | Nipple R3/8" x M18x1,5 |
| B1, B2 | 5002260 | 2 | Nippel R3/8" x M18x1,5 | Nipple R3/8" x M18x1,5 |
| C1, C2 | 5002260 | 2 | Nippel R3/8" x M18x1,5 | Nipple R3/8" x M18x1,5 |
| D1, D2 | 1018142 | 2 | Propp 3/8" | Plug 3/8" |
| A, B, C | 1005347 | 6 | Gummistålbricka R3/8" | Bonded seal R3/8" |
| A, B, C | 1020346 | 6 | Plasthuv | Plastic cup |
| | **5002562** | | **Nippelsats, M20x1,5** | **Adapter set, M20x1,5** |
| A1, A2 | 5002267 | 2 | Nippel R3/8" x M20x1,5 | Nipple R3/8" x M20x1,5 |
| B1, B2 | 5002267 | 2 | Nippel R3/8" x M20x1,5 | Nipple R3/8" x M20x1,5 |
| C1, C2 | 5002267 | 2 | Nippel R3/8" x M20x1,5 | Nipple R3/8" x M20x1,5 |
| D1, D2 | 1018142 | 2 | Propp 3/8" | Plug 3/8" |
| A, B, C | 1005347 | 6 | Gummistålbricka R3/8" | Bonded seal R3/8" |
| A, B, C | 1020353 | 6 | Plasthuv | Plastic cup |

2000 05 15 Art nr 1024 769

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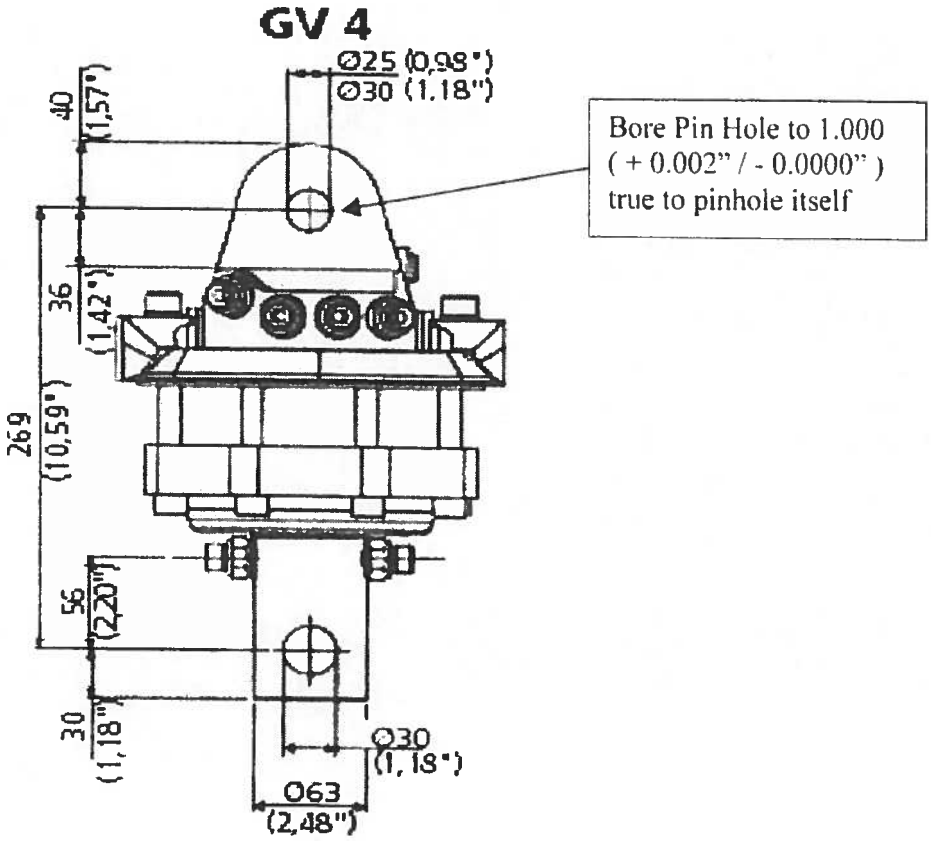
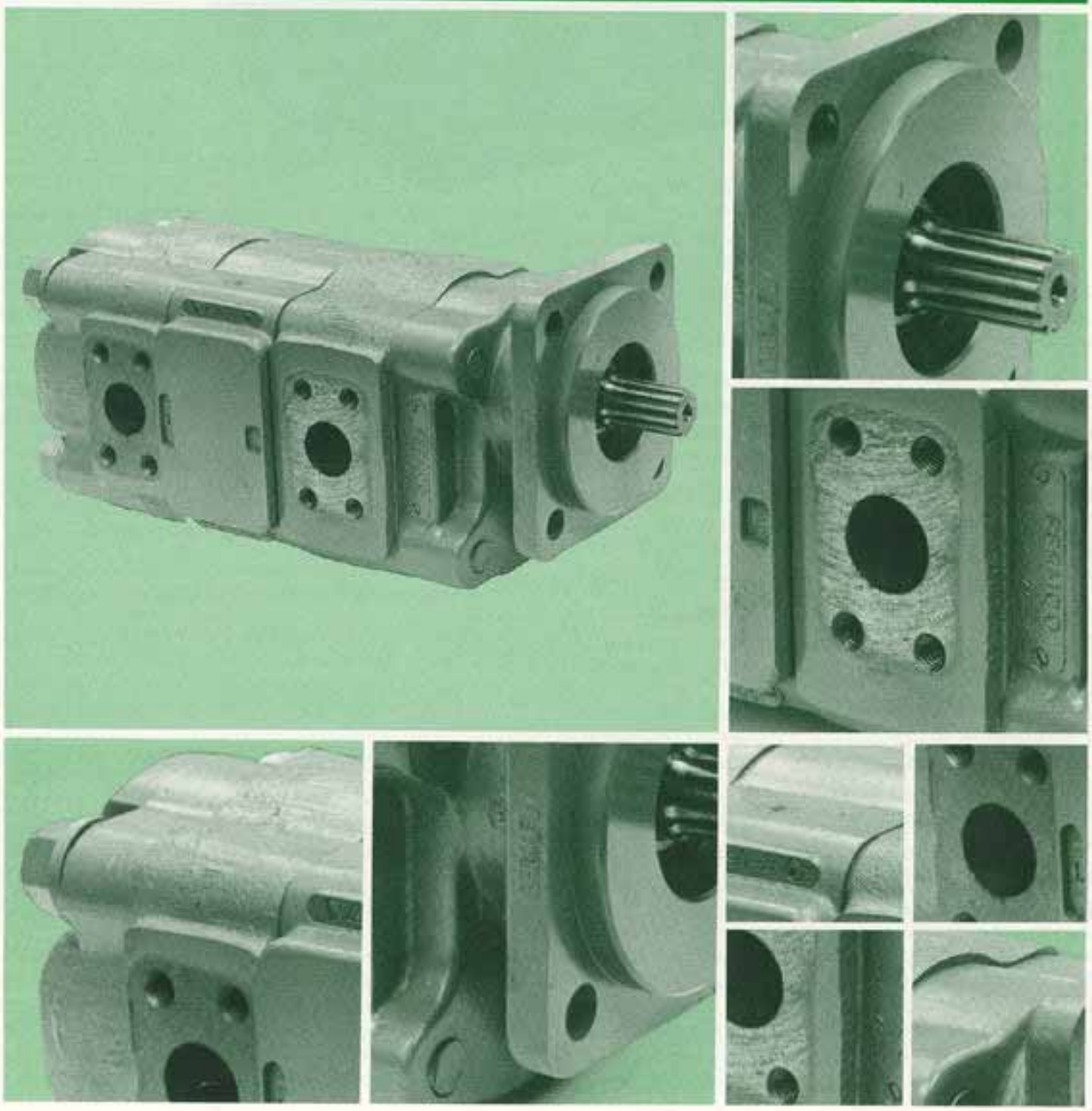
Drawing #: M5002-537-US
Customer: Morbark Inc.



# SERIES P3000, P5000, P7500
# GEAR PUMPS

PERMCO

# SERVICE MANUAL



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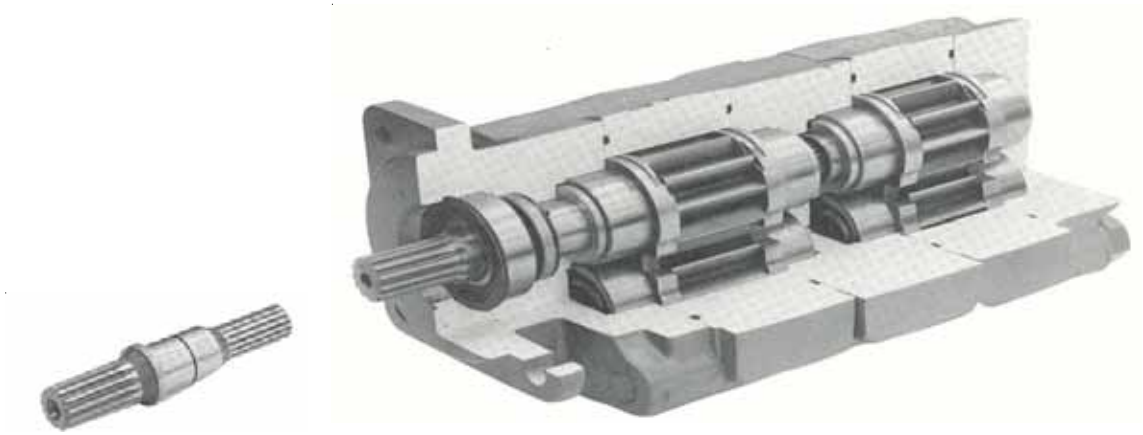


If you intend to rebuild a pump that has thrust plates and you wish to replace the thrust plates with Permco diverter plates, inspect the original port end cover, shaft end cover, gear housing and bearing carriers very carefully. To obtain the maximum performance from diverter plates, all of the above components must be in good condition with minimal amount of wear. The following areas of wear are the most critical. . and often overlooked:

1. Shaft end covers, port end covers, and bearing carriers. . .Check bearing bores for out-of roundness or elliptical shape. If more than 0.003" out-of-round, **do not use**.

2. Gear housings... If the wear pattern on the inlet side is in excess of 0.003" depth, **do not use**.

3. Gears... Inspect very carefully. If you have scored, scuffed or pitted journals, scratched or scuffed tooth faces, deep nicks on tooth edges, **do not use**; install new drive and driven gear.
4. Bearings... A loose fit between gear hub and bearing ID may not mean a bad bearing. The misalignment it can cause is detrimental to good pump performance. We recommend installing a **complete set** of new bearings at each rebuild.

5. Seals. . .It is recommended that **all seals** be replaced on any rebuild job.

Putting Permco diverter plates into a pump and reusing the old worn parts will not necessarily restore the pump to the high efficiency and performance of a new Permco pump. Merely installing new Permco diverter plates cannot restore the pump to its original performance. Permco's high efficiency, performance, and life expectancy are based on using all new **PERMCO** parts.

If you are rebuilding a Permco gear pump, you **must not** install thrust plates of another make. Tolerances and finishes on Permco parts are held closer than those of other manufacturers of pump parts. For warranty repairs under any circumstances, you **must not** substitute other makes of parts in a Permco pumps. **USE ONLY GENUINE PERMCO PARTS**.

You can successfully use Permco diverter plates to rebuild other makes of pumps to obtain increased operating pressures and pump life. However, read the above paragraphs carefully.

If you have any questions about rebuilding Permco pumps or about using Permco parts to upgrade other makes of pumps, call your local Permco pump and parts distributor.

## TWO TYPES OF PUMPS

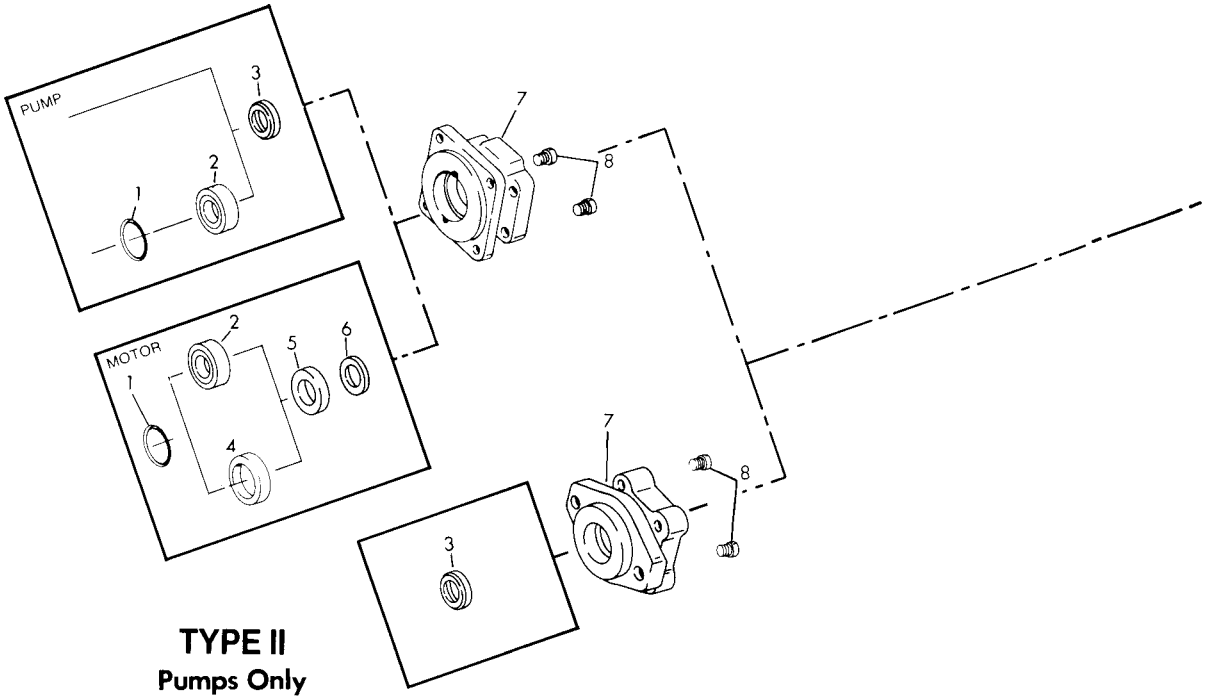
There are two types of Permco pumps as determined by the configuration of the shaft end covers... Type I & Type II. There are slight differences in disassembly and reassembly procedures, according to each shaft end cover. Also Type II is normally shorter from front to back than Type I. This is because no outboard bearing is used. Be sure you know which type you are working on.

## CLEANLINESS IS HIGHLY IMPORTANT

**WARNING.** Before you start disassembling the pump, clean up your work bench. This will avoid the headaches and danger of getting dirt, metal fragments, and foreign objects into the fine-finished cavities and threads of the pump and components, and eventually into the entire hydraulic system. In pump maintenance, extreme cleanliness is most important.

# 3000/5000 SERIES

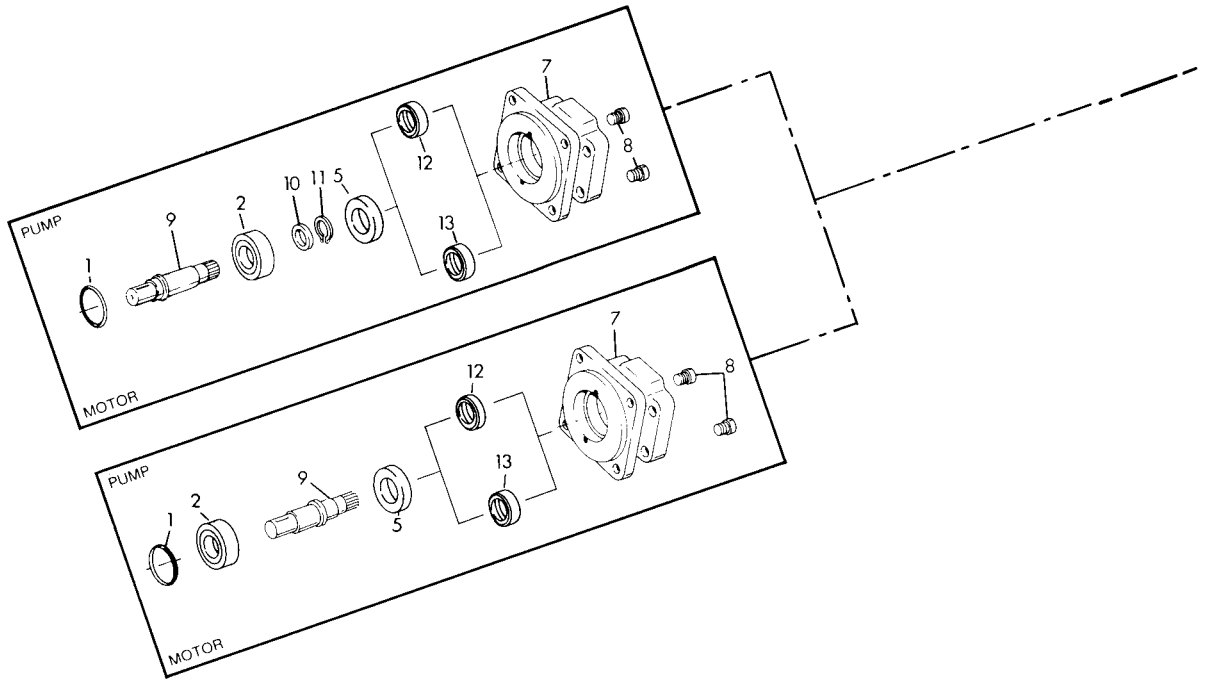
**TYPE I**




**TYPE II**
**Pumps Only**

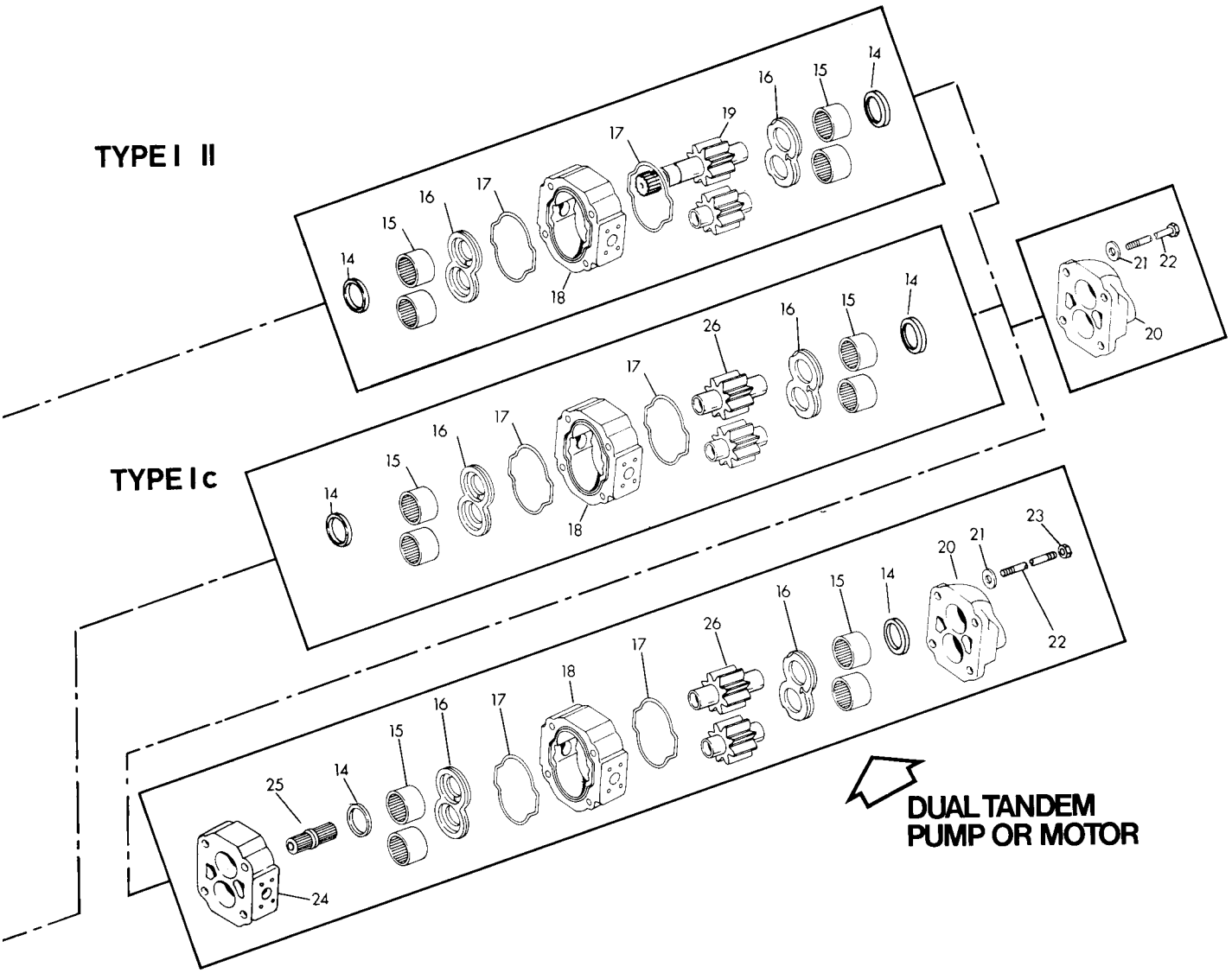
**TYPE I c**
**3000**

**TYPE I c**
**5000**

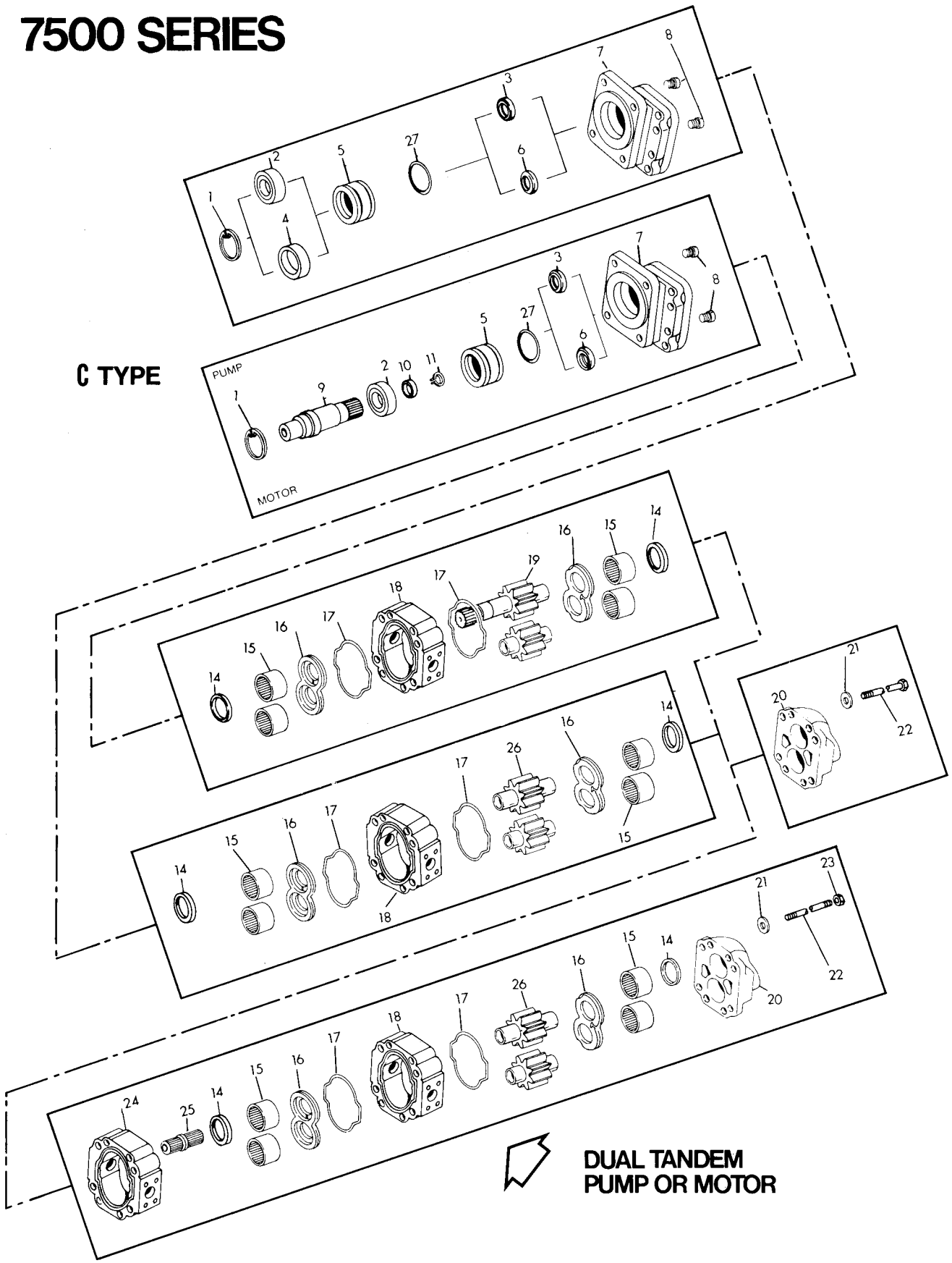





PERMCO


TYPE I II
TYPE Ic
DUAL TANDEM
PUMP OR MOTOR

# 7500 SERIES






PERMCO

# PARTS LIST

### 3000 SERIES PUMPS/MOTORS

| Item No. On Drawing | Description | Part Number |
|---|---|---|
| 1 | Snap Ring | W023-206 |
| 2 | Outboard Bearing | W58-39 |
| 3 | Double Lip Seal | W62-26-16 |
| 4 | Bearing Carrier | UA-0558-2 |
| 5 | Seal Retainer | ZD-0558 |
| 6 | High Pressure Seal | W62-49-9 |
| 7 | Shaft End Cover (SEC) | ** - 0574- * |
| 8 | Check Valve Assembly | L-0280-K |
| 9 | Continental Shaft | ** -0024 |
| 10 | Spacer | SA-0558 |
| 11 | Snap Ring | W86-100 |
| 12 | Pump Shaft Seal | W62-26-18 |
| 13 | Motor Shaft Seal | W62-49-11 |
| 14 | Ring Seal | KA-0558-1XS |
| 15 | Crowned Roller Bearing | X-0921 |
| 16 | Thrust Plate (TP) | ZZ-0947 |
| | Teflon Coated Thrust Plate | ZZ-0947-TC |
| | Diverter Plate | ZZ-0947-DS |
| 17 | Gasket Seal | TA-2995-242 |
| 18 | Housing | QZ-0577- ** - ** |
| 19 | Drive Shaft & Gear Set | ** -0024L- * - ** |
| 20 | Port End Cover | WZ-0592- * |
| 21 | 5/8" Grade 8 Washers | W033-2 |
| 22 | 5/8-11 Grade 8 Threaded Rod | ZD-0391- *** |
| 23 | 5/8-11 Grade 8 Hex Nut | W3-65 |
| 24 | Bearing Carrier | ** -0576- ** - *** |
| 25 | Connecting Shaft | YZ-0022 |
| 26 | Gear Set | U-0996L- ** |
| 28 | Grade 8 Hex Head Cap Screw | W1- ** |

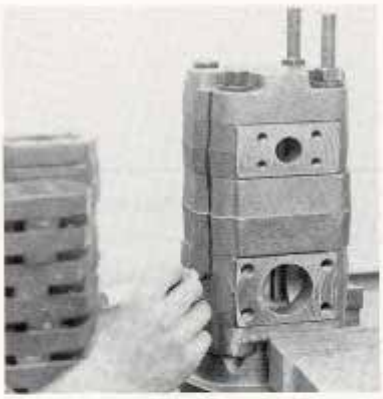
### 5000 SERIES PUMPS/MOTORS

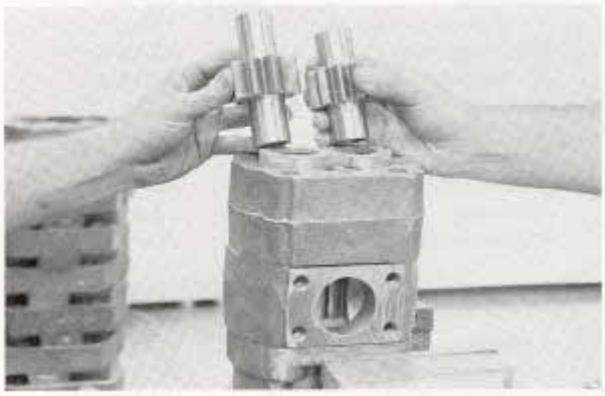
| Item No. On Drawing | Description | Part Number |
|---|---|---|
| 1 | Snap Ring | W023-283 |
| 2 | Outboard Bearing | W58-47 |
| 3 | Double Lip Shaft Seal | W62-26-17 |
| 4 | Bearing Spacer | UA-0558-1 |
| 5 | Seal Retainer | ZB-0558 |
| 6 | High Pressure Seal | W62-49-8 |
| 7 | Shaft End Cover (SEC) | ** -0574- * |
| 8 | Check Valve Assembly | L-0280-K |
| 9 | Continental Shaft | ** -0024 |
| 12 | Pump Shaft Seal | W62-26-17 |
| 13 | Motor Shaft Seal | W62-49-8 |
| 14 | Ring Seal | MA-0558-1XS |
| 15 | Crowned Roller Bearing | R-0921 |
| 16 | Thrust Plate (TP) | X-0947 |
| | Teflon Coated Thrust Plate | X-0947-TC |
| | Diverter Plate | X-0947-DS |
| | Bi-Rotational Diverter Plate | X-0947-BRD |
| 17 | Gasket Seal | TA-2995-244 |
| 18 | Housing | LZ-0577- ** - ** |
| 19 | Drive Shaft & Gear Set | ** -0024L- * - ** |
| 20 | Port End Cover (PEC) | YZ-0592- * |
| 21 | 5/8" Grade 8 Washers | W033-2 |
| 22 | 5/8-11 Grade 8 Threaded Rod | ZD-0391- *** |
| 23 | 5/8-11 Grade 8 Hex Nut | W3-65 |
| 24 | Bearing Carrier | ** -0576- ** - *** |
| 25 | Connecting Shaft | XZ-0022 |
| 26 | Gear Set | LZ-0995L- ** |
| 28 | Grade 8 Hex Head Cap Screw | W1- ** |

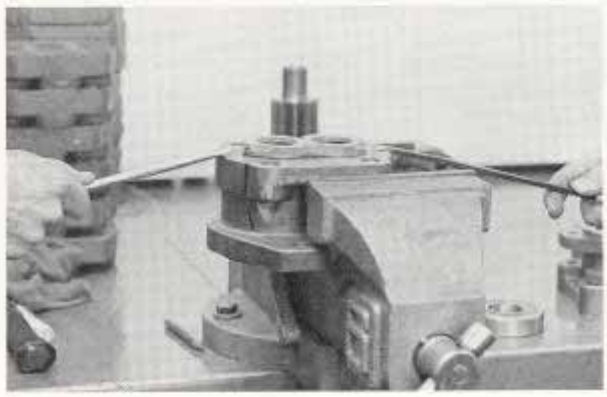
### 7500 SERIES PUMPS/MOTORS

| Item No. On Drawing | Description | Part Number |
|---|---|---|
| 1 | Snap Ring | W85-315 |
| 2 | Outboard Bearing | W58-48 |
| 3 | Double Lip Seal | W62-26-10 |
| 4 | Bearing Spacer | UA-0558 |
| 5 | Seal Retainer | QZ-0961 |
| 6 | High Pressure Seal | W62-49-1 |
| 7 | Shaft End Cover (SEC) | ** -0574- * |
| 8 | Check Valve Assembly | L-0280-K |
| 9 | Continental Shaft | ** -0024 |
| 10 | Spacer | ZE-0558 |
| 11 | Snap Ring | W86-137 |
| 14 | Ring Seal | VA-0558-1XS |
| 15 | Crowned Roller Bearing | Q-0921 |
| 16 | Teflon Coated Thrust Plate | AZ-0947 |
| | Diverter Plate | AZ-0947-DS |
| | Bi-Rotational Diverter Plate | AZ-0947-BRD |
| 17 | Gasket Seal | TA-2995-252 |
| 18 | Housing | RZ-0577- ** - ** |
| 19 | Drive Shaft & Gear Set | ** -0024L- * - ** |
| 20 | Port End Cover (PEC) | XZ-0592- * |
| 21 | 5/8" Grade 8 Washers | W033-2 |
| 22 | 5/8-11 Grade 8 Threaded Rod | ZD-0391- *** |
| 23 | 5/8-11 Grade 8 Hex Nut | W3-65 |
| 24 | Bearing Carrier | ** -0576- ** - *** |
| 25 | Connecting Shaft | ZA-0022 |
| 26 | Gear Set | OZ-0995L- ** |
| 27 | O-Ring | K-2995-164 |
| 28 | Grade 8 Hex Head Cap Screw | W1- ** |

# DISASSEMBLY







## All Series:

1. With a sharp metal scribing tool, grease pencil, Magic Marker, or paint, make an indexing mark that runs straight across a surface of the port end cover (20), gear housing (18), and shaft end cover (7). This will enable you to reas-semble these parts into the same position when you put the unit back together.
2. Clamp the unit in a vise, shaft end down.
3. Remove the cap screws or threaded rod (22) and washers (21) at the rear of the unit that hold the port end cover (20) and the gear housing (18) together. Remove the port end cover (20) and diverter plate (16) **or** thrust plate (16).

   The roller bearings (15) will remain with the port end cover (20). On those units with thrust plates, the pocket seals will come out easily. (Permco pumps having diverter plates do not require pocket seals.)
4. Remove the pump drive gear, the driven gear, and the gear housing (18) from the shaft end cover (7). **BE CAREFUL** to keep the drive gear and the driven gear together; you must reassemble them as the original pair, since they have been worked-in together.

## 3000/5000 Series Pumps, Types I and II.

### Disassembly of Shaft End Cover

1. If unit is equipped with a shaft bearing (2) or spacer (4), set the partially disassembled unit (shaft end cover (7)) from which the gear housing was separated in a vise with the pilot end up.

   If unit is a Type II, it cannot befitted with a shaft bearing (2) or spacer (4). Skip Step 2 below, and proceed to Step 3.
2. Remove the snap ring (1) from the shaft end cover (7). If a bearing is present, pull it out with a bearing puller; (this is not a press fit.) In units used as motors, a bearing (2) or bearing spacer (4) should be removed. Then remove the seal retainer (5).
3. Turn the shaft end cover into pilot-down position to make diverter plate (16) accessible.
4. Using a knife blade or thin-blade screwdriver pry the diverter plate (16) **very gently** off the bearings of the shaft end cover (7). Bearings should remain in cover. If they don't, or can be removed by hand, discard cover. If working on another make of pump to be refitted with **PERMCO** diverter plates, remove the pocket seals and throw away; on **PERMCO** Pumps, no pocket seals are required.

5. If you plan to replace the bearings, use a bearing puller to pull the roller bearings (15) out of the shaft end cover.
   If you do pull the bearings, check the bores for out-of round and elliptical shape. If out-of-round is over 0.003", **DO NOT RE-USE**.
6. Examine ring seal (14); if worn, replace. Do this by pulling the drive gear bearing.
7. Remove lip seal (3, if pump; 6, if motor) by inserting a curved tool between the seal and shaft end cover (7). Tap out seal and discard.

## Disassembly of Type 1"C" (Continental) Shaft End Cover

The Type 1"C" unit has a separate shaft and gear set.

Disassembly will follow the same steps as described above. Tap the drive shaft assembly out of the shaft end cover. The shaft (9) must then be pressed out with the bearing (2).

Bearing (2) will be removed from shaft (9) as follows:

**For 3000 Series, all "C" shafts**

1. Remove snap ring (11) and spacer (10) from gear end of shaft (9).
2. Press the bearing (2) off the **GEAR** end of the shaft (9).

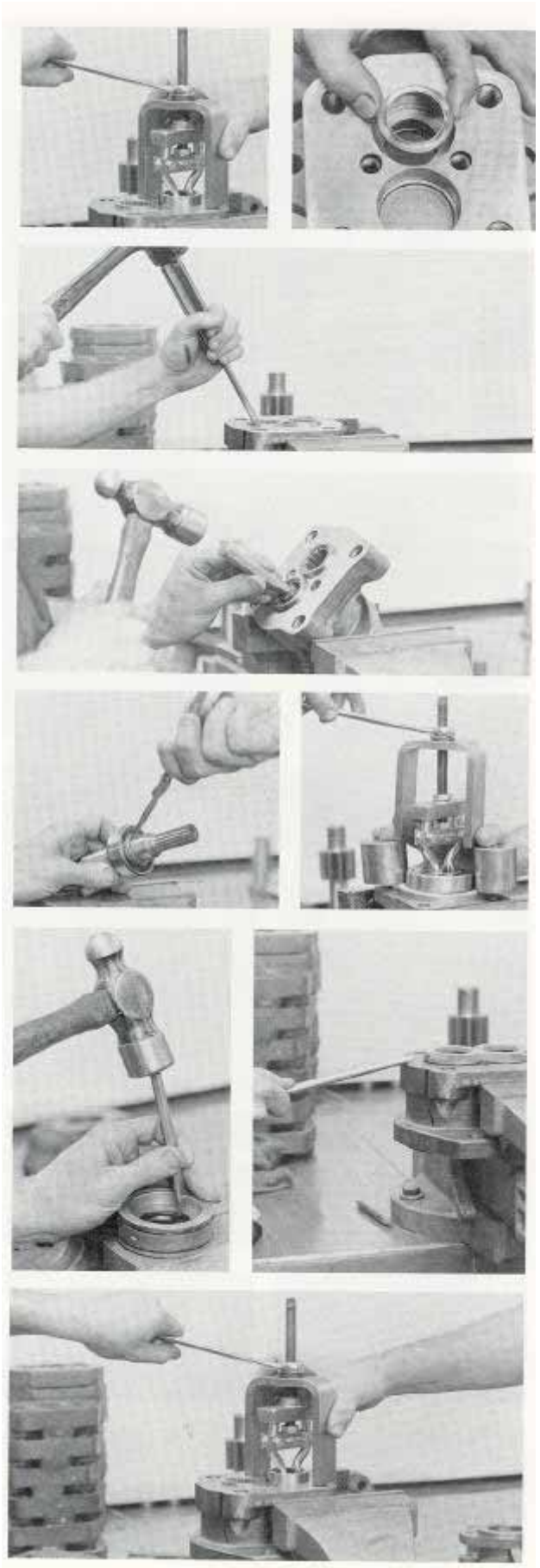
**For 5000 Series**

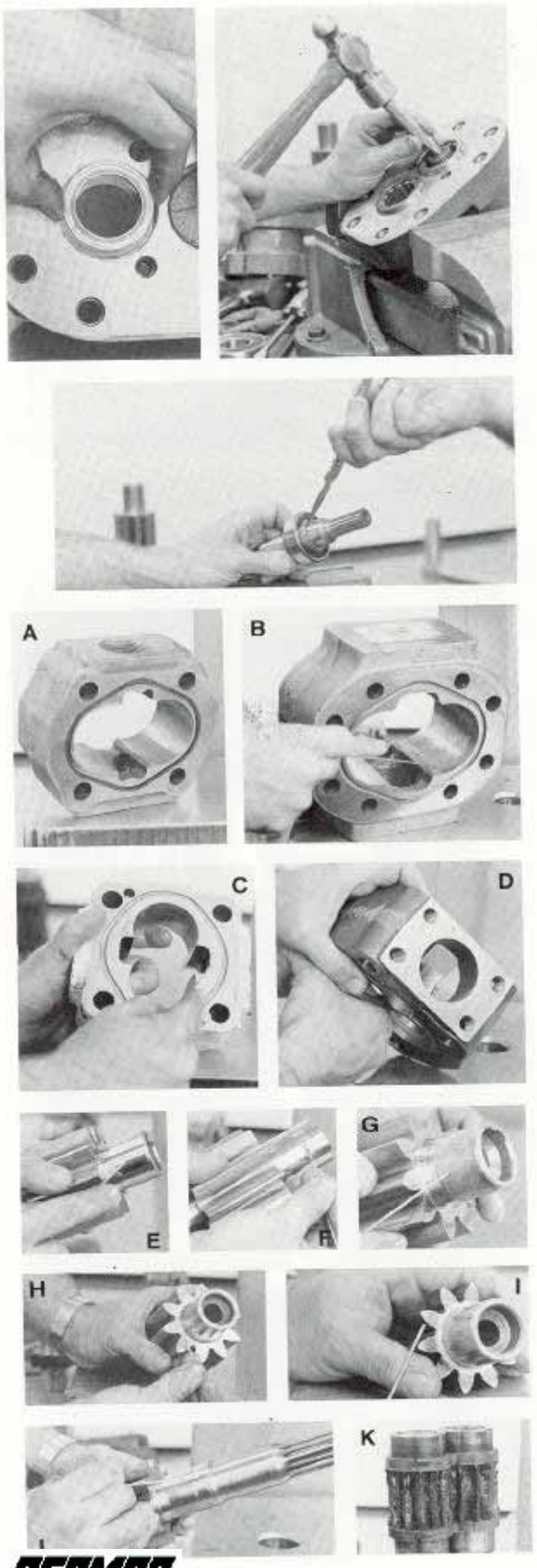
Press the bearing (2) off the **DRIVE** end of the shaft (9).

# 7500 Series Pumps

## Disassembly of Shaft End Cover

1. Set the partially-disassembled unit (shaft end cover 7) from which the gear housing has been separated in the vise, pilot-end up.
2. Remove the snap ring (1) from the shaft end cover (7). The bearing (2) or bearing spacer (4) can now be removed. It is a slip fit. A bearing puller can be used, if necessary.
3. Remove the seal retainer (5). Discard the O-ring (27).
4. Remove the seal by inserting a curved tool between seal and seal retainer (5), tapping it out, and discarding.
5. Turn shaft end cover (7) pilot-end down in vise. Diverter plate will now be accessible.
6. With a knife blade or thin-blade screwdriver, Very Gently pry diverter plate (16) off the bearings of the shaft end cover (7). If working on another make of pump to be refitted with **PERMCO** diverter plates, remove the pocket seals and throw away. **PERMCO** pumps and diverter plates require no pocket seals.
7. Use a bearing puller to pull the roller bearings






of the shaft end cover (7), if you plan to replace bearings. If you pull the bearings, check bores for out-of-round condi-tion and elliptical shape. If more than 0.003" out-of-round, **do not** use again.

8. Examine the ring seal (14). Replace if worn by pulling the drive gear bearing.

Type “C” pump has a separate shaft-and-gear set.

**Disassembly of Type “C” (Continental) Shaft End Cover**

Follow the steps described above for the standard shaft end cover. However, on the Type “C” unit, the shaft (9) will be pressed out of the cover (7) along with the bearing (2).

Separate the shaft (9) from the bearing (2) as follows:

1. Remove snap ring (11) and spacer (10) from **gear** end of shaft (9).
2. Press bearing (2) off **gear** end of shaft (9).

# Disassembly of All Series

## Gear Housing; Single Units and Multiple Units

1. Remove square gasket seals (17) from gear housing (18), and discard. Have identical replacements at hand for reas-sembly. **DO NOT USE “O” RINGS**. Check for depth of wear in gear housing at this time; use a telescoping gage and a micrometer. If wear pattern on gear housing exceeds 0.003", discard housing and replace with a new one.

   Figure A shows a satisfactory housing with little wear. Figure B shows a housing with excessive wear; notice large cavities that indicate cavitation was present.

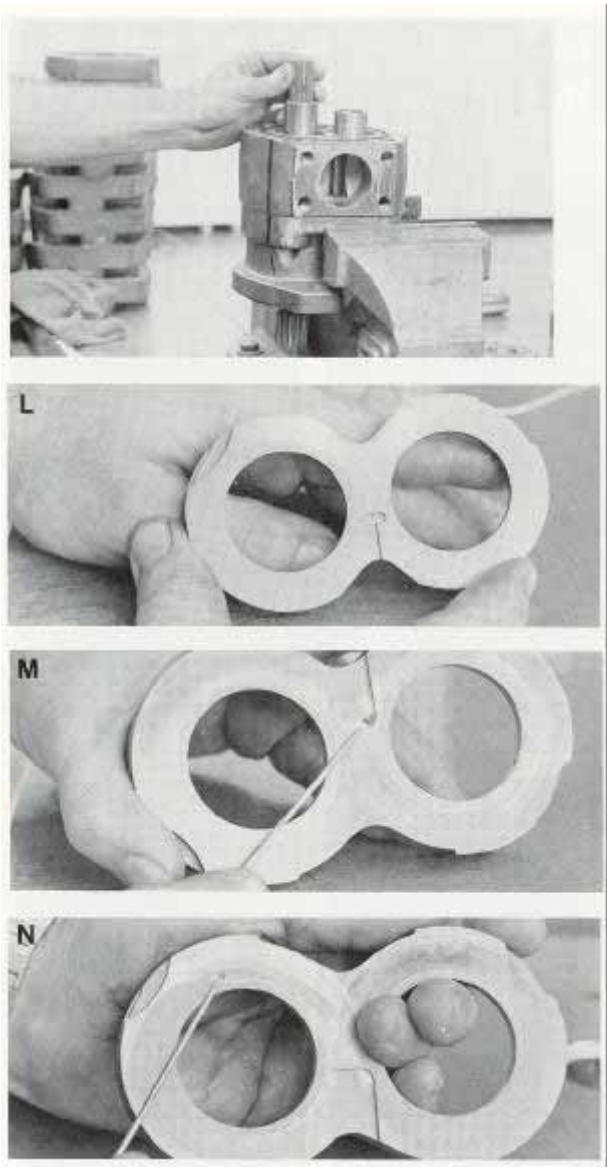
   Examine the housing for cracks (Figure C). This-is caused by overpressure or by possible over tightening of an **NPT** thread.

   If a new gear housing is required and a large port is present, step-drill the housing (Figure D) if **PERMCO** diverter plates are to be installed.

2. Examine gears for wear, scuffed or pitted journals, scratched or scuffed tooth faces, or deep nick on tooth edges. If any of these defects are present, install new drive and driven gears. Figure E shows a satisfactory gear hub, with no nicks. Figures F and G show gear hubs that are breaking down from contamination, over-pressurization, pressure shock, or bearing failure. On examination of gear faces, some scratches may be found; if they can be removed by stoning, the set can be reused (see Figures H and I).

   Also examine the ring seal surface (Figure J) for wear.

   Figure K shows a rotating group that ran without oil.




**For Multiple units:**

3. Remove the connecting shaft (25).
4. Remove the bearing carrier (24), diverter plate (16) or thrust plate, bearings (15), and ring seals (14), using procedure described previously for disassembly.

## Port End Cover

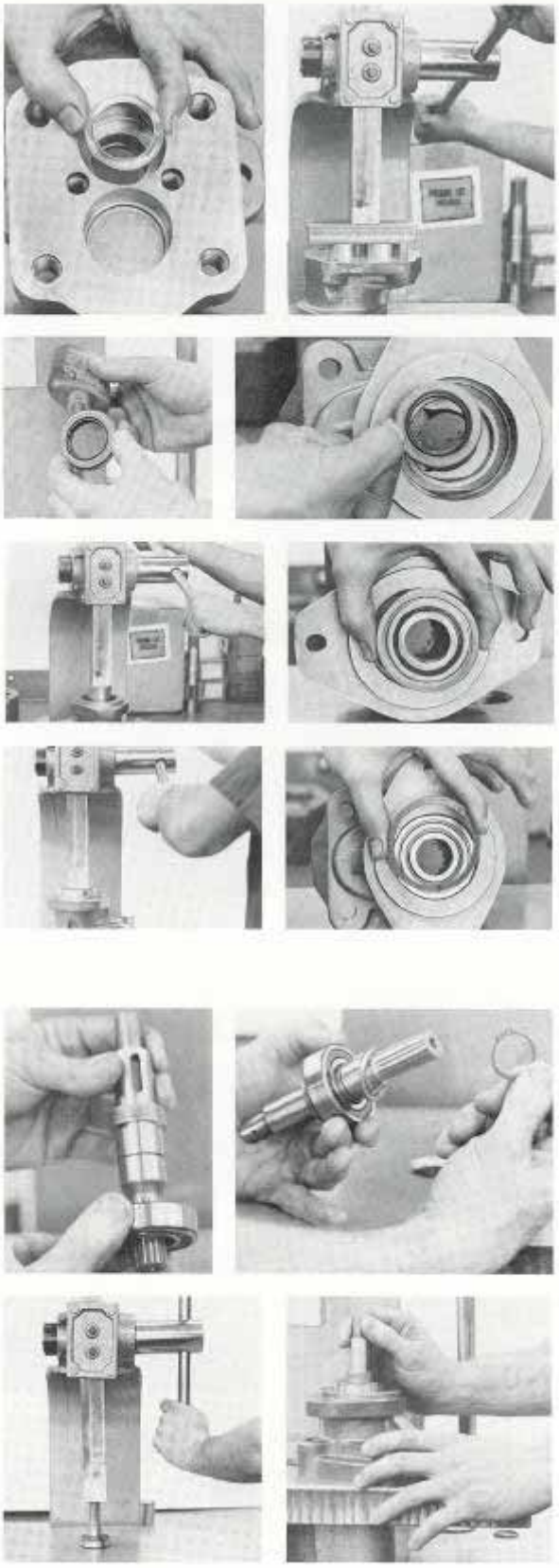
1. Use a knife blade or thin-blade screwdriver to gently pry the diverter plate (16) or the thrust plate off the bearings (15) of the port end cover (20).
2. When working on pumps other than **PERMCO** Pumps, remove and discard the pocket seals. When installing **PERMCO** diverter plates, you do not install replacement pocket seals; **PERMCO** Diverter Plates do not require pocket seals.
3. If you plan to replace the two shaft roller bearings (15) with new ones, pull the bearings (15) out of the port end cover (20) with a bearing puller.
4. Examine the ring seal (14). If worn, replace by pulling the drive gear bearing (15) out, leaving the driven gear bearing (15) in place.

Examine all diverter or thrust plates. Some wear will always appear, because of gear flexing. Figure L indicates very slight wear, with some scratches because of contamination. Figure M shows wear in the trapping area caused by contamination.

In bi-rotational units where there are two trapping grooves, a diagonal groove may develop connecting the two slots. This is caused by contamination.

Figure N shows the effect of cavitation... the rapid forma-tion and collapse of vapor cavities within a fluid. This effect is caused by high-vacuum inlet conditions or by air enter-ing the pump inlet.

# REASSEMBLY



## 3000/5000 Series Pumps:

### Reassembly of Shaft End Cover:

1. Grip shaft end cover (7) gear end up. Place ring seal (14) in bearing bore of shaft end cover (7) with the flat side down.
2. Replace the two roller bearings (15) in the bores of the shaft end cover (7). Take care that the bearings do not cock or wedge between ring seal (14) and bottom of bearing counter-bore.
3. Place shaft end cover (7) in a soft-jaw vise. Turn cover (7) end-for-end, and clamp with flange end up.
4. Apply Loctite Adhesive Sealant No. 271 to outside of seal (3, 6, 12, or 13). Press seal into shaft end cover (7) until seal is flush with counter-bore. If working on a Type I pump, which has no outboard bearing, or a Type II pump, assem-bly of shaft end cover is now complete.

If working on Type I unit having bearing or bearing spacer and integral gear shaft continue as follows:

5. In motors only, insert the seal retainer (5) into the shaft end cover (7).
6. Guide the bearing (2) or bearing spacer (4) into the shaft end cover (7). This is NOT a press fit.
7. Install snap ring (1) into the groove. Reassembly of shaft end cover (7) is now complete.

## 3000/5000 Continental Shafts

For Type I pumps with “C”-type shafts, follow the above Steps 1 through 5. Then proceed as follows:

### For 3000 Series: All “C” Shafts

6. Press the outboard bearing (2) on the drive shaft (9), from the gear end.
7. Push the spacer (10) over the end of the shaft (9). Install the snap ring (11) in the groove on the shaft (9).
8. Press the bearing (2) and spacer (10) tightly against the snap ring (11).
9. Lubricate the drive shaft (9), and put this assembly into the shaft end cover (7). Be careful not to damage seal (12 or 13).
10. Install the snap ring (1) into the groove of shaft end cover Assembly of shaft end cover is now completed.

## For 5000 Series: “C” shafts

Follow Steps 1 through 5 from previous page then proceed as follows:

6. Press the outboard bearing (2) onto the drive shaft (9) from the drive shaft end.
7. Lubricate the drive shaft (9), and put this assembly into the shaft end cover (7). Be careful not to damage seal (12 or 13).
8. Install snap ring (1) into the shaft end cover groove. Assembly of shaft end cover is now completed.

# 7500 Series

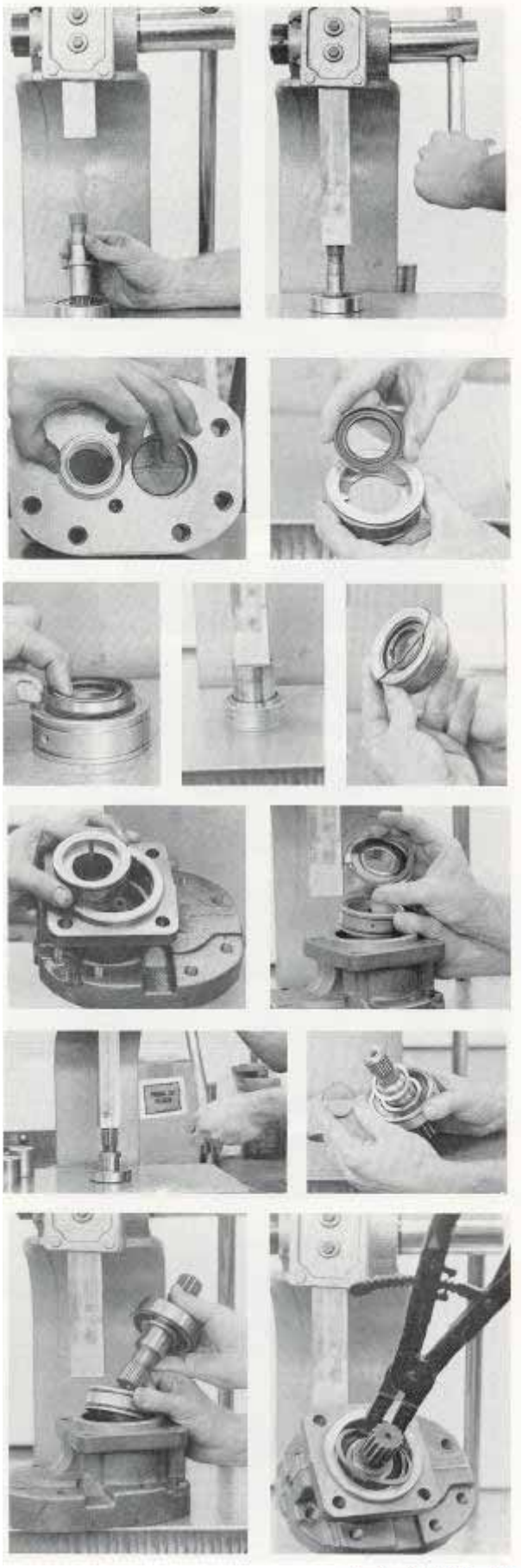
## Reassembly of Shaft End Cover:

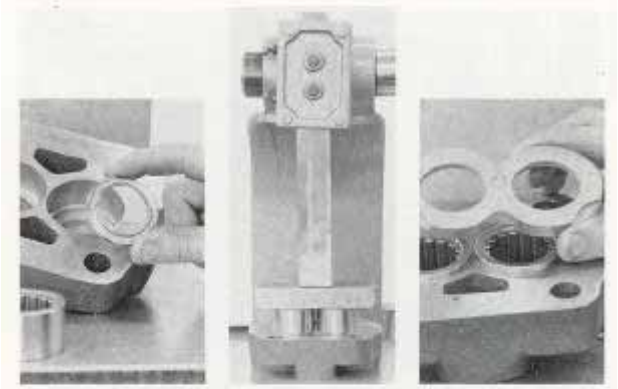
1. Grip shaft end cover (7), gear end up. Place ring seal (14) in the bearing bore of the shaft end cover (7) with flat side down.
2. Replace the two roller bearings (15) in the bores of the shaft end cover (7). Take care that the drive bearing (15) does not cock or wedge between the ring seal and bottom of bearing counter-bore.
3. Place shaft end cover (7) in a soft jaw vise. Turn cover end--for-end, and clamp with flange end up.
4. Apply Loctite Adhesive Sealant No. 271 to outside of seal (3 or 6). Press seal into seal retainer (5) metal side down. Be careful not to damage seal. Install O-ring (27) on outside of seal retainer (5).
5. Push this assembly into shaft end cover (7), with seal on inboard side. You can install bearing or bearing spacer and snap ring now, or at the end of assembly.

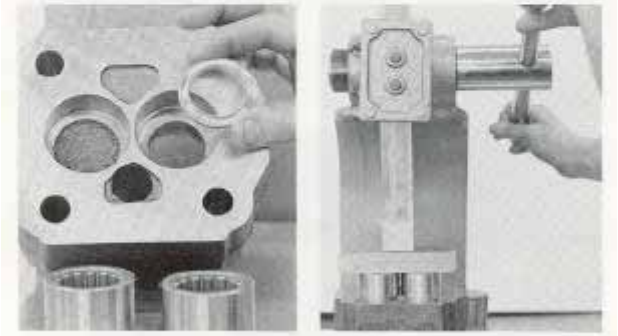
## Continental Shafts

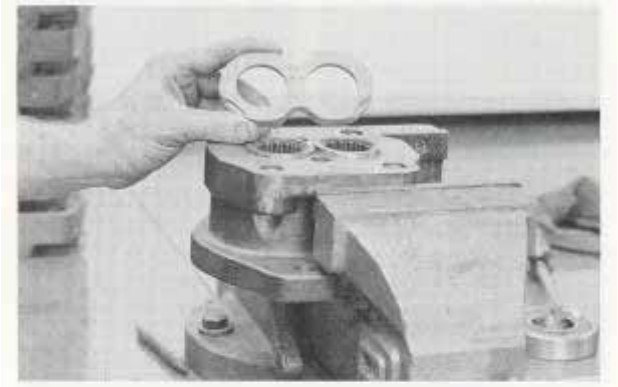
For Type I pumps with “C” Type shafts, follow the above steps 1 through 4; then proceed as follows:

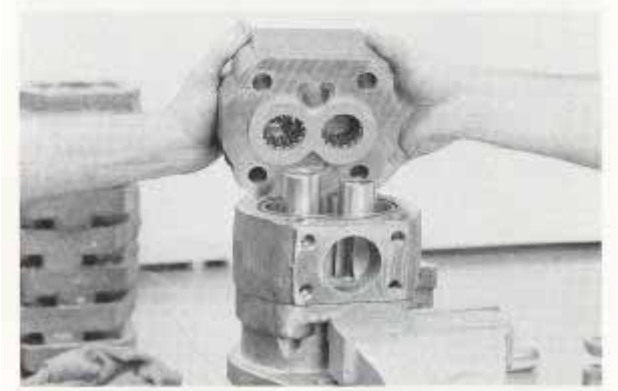
5. Push seal assembly into shaft end cover (7) with seal on inboard side.
6. Press the outboard bearing (2) on the drive shaft (9) from the gear end.
7. Push spacer (10) over the end of the shaft (9). Install snap ring (11) in the groove on shaft (9).
8. Press the bearing (2) and spacer (10) tightly against the snap ring (11).
9. Lubricate the drive shaft (9), and put this assembly into the shaft end cover (7). Be careful not to damage the seal.
10. Install the snap ring (1) in the groove. The shaft end cover reassembly is now complete.











# All Series

## Reassembly of Port End Covers:

1. If you removed the two roller bearings (15) or the ring seal (14) during disassembly, install new bearings (15) and ring seal (14) in the portend cover (20). Place the ring flat side down in the drive gear bearing bore, and make a medium press fit.
2. Place the diverter plate (16) over the two roller bearings (15). The counter-bored side of the diverter plate (16) should be placed over the bearings (15) with the high-pressure crescent recesses toward the pump inlet side. Double-check the placement of the diverter plate (16) for correct positioning.

## Reassembly of Bearing Carrier:

1. If you removed the four roller bearings (15) or ring seals (14) during disassembly, install new bearings (15) and ring seals (14) in the bearing carrier (24). Place the ring seals (14) flat side down in the drive gear bearing bore and press bearing with a medium press fit.
2. Place the diverter plate (16) over the two roller bearings (15). The counter-bored side of the diverter plate (16) should be placed over the bearings (15) with the high-pressure crescent recesses on the pump inlet side. Double- check the placement of the diverter plate (16) for correct positioning.

## Final Reassembly:

1. Clamp the shaft end cover (7) assembly in a soft jaw vise, gear end up.
2. Place the diverter plate (16) over the two roller bearings (15). The counter-bored side of the diverter plate (16) should be placed over the bearings (15) with the high-pressure crescent recesses on the pump inlet side. Double -check the placement of the diverter plate (16) for correct positioning.
3. Pour a little hydraulic, “STP” or a compatible fluid over face of diverter plate (16) to lubricate gears immediately on start-up. Gently stone the sides of each gear (119 and 26) to remove any burrs. Dip entire gear into cleaning solvent to remove all dirt and metal dust. Install drive gear first, then the driven gear. Be sure both gears are firmly in contact with diverter plate.
4. Lightly grease square gasket seals (17) and carefully install them in the grooves in the two faces of the gear housing (18). Be sure they are fully seated.
5. Carefully place the gear housing subassembly over the gears, on top of the shaft end cover (7). Make sure the square gasket (17) is not pinched or cocked, then tap the gear housing (18) down on the shaft end cover (7) with a

soft mallet. Pour a little fluid over the gears while rotating the drive shaft. This will provide immediate lubrication when starting up pump.

(If the unit is a **single** one, skip Step 6 and go to Step 7.)

6. Position the assembled bearing carrier over the gear jour-nals and gently tap it into place. Be sure the high-pressure crescents of the diverter plate (16) are positioned towards the pump low-pressure side. Install the connecting shaft. (25) Repeat Steps 3 through 7, above, until you attach the final gear housing (18). Then pick up at Step 7, below.
7. Place the port end cover (20) over the gear hubs (19) and place in gear housing (18), face down. The drive gear has longer bearing hubs to engage the ring seal. Tap the port end cover (20) assembly gently down on the housing (18) with a soft mallet. Be sure the square gasket (17) is not pinched or cocked.
8. Put flat washers (21) over cap screws (22), or use Grade 8 threaded rod. Place screws or threaded rod in holes in port end cover (20). Tighten evenly and alternately with a torque wrench to recommended torque shown in table.

**Recommended torque for pumps and motors**

| Series | Size | No. Req. | Torque Lb.ft. |
|---|---|---|---|
| 3000/5000 | 5/8-11 UNC-2A Thread | 4 | 200 |
| 7500 | 5/8-11 UNC-2A Thread | 8 | 200 |

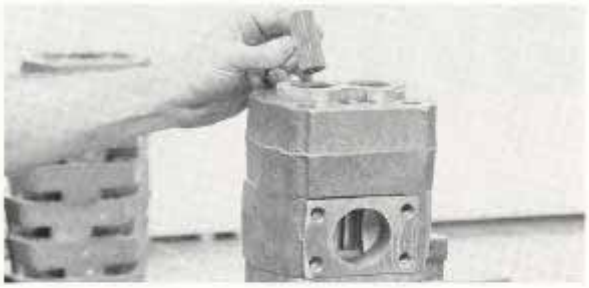
**Note**: All bolts or tie rods must beSAE Class 8, with 150,000 PSI minimum tensile strength.

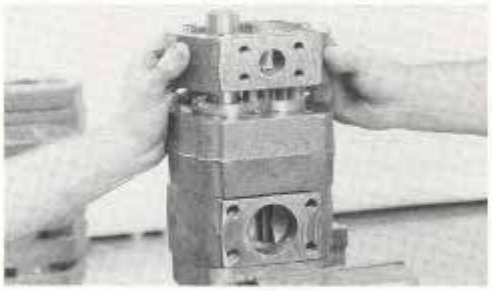
9. Test the assembled pump for free rotation by turning drive shaft by hand, using a wrench for leverage. **Caution:** Wrap several layers of cloth around shaft ends before applying wrench. The shaft should turn with slight effort, NO hard spots and NO rubbing noises.

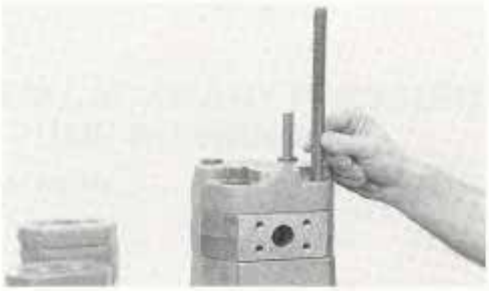
If your pump or motor is a 3000/5000 or 7500-"C" series, it is ready to put back in service.

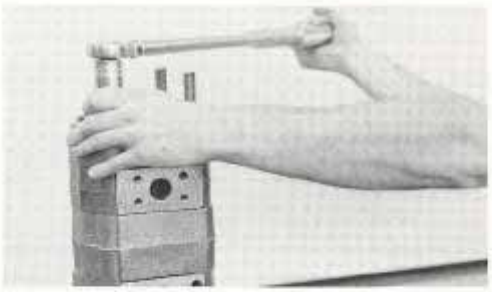
But if it is a **standard** 7500 series unit, and you did not install the bearing and snap ring earlier, proceed to the following steps before putting it in service:

10. Release the unit from the vise and turn end-for-end so that the shaft end is facing up. Re-clamp unit in vise.
11. Install bearing (2) or bearing spacer (4). This is a slip fit over the shaft (9) and into shaft end cover (7).
12. Install the snap ring (11) into groove. Your **standard** 7500 series unit is now ready to put back in service.









# START-UP INSTRUCTIONS FOR PERMCO PUMPS

FOLLOW THESE **INSTRUCTIONS CAREFULLY. If you don't, you can instantly ruin your pump if the relief pressure setting is too high.**

1. Before you operate the pump, unscrew the main relief valve adjusting screw on the main hydraulic system. **OR** remove adjusting shims or spacers.
2. Run the pump about five minutes under **ZERO PRESSURE**, with all control valves in neutral position. If the test system has a throttling valve, set it at 100 psi. above user's expected operating pressure.
3. If everything seems to function properly and no unusual noises are heard, back-off the throttling valve to zero. Shut down the system.
4. Adjust the relief valve pressure to the setting your hydrau-lic system requires.

# LUBRICATION OF PERMCO PUMPS

1. The hydraulic oil used in the entire circuit provides the lubrication for all parts of the pump. **KEEP THIS OIL CLEAN AND FREE OF DIRT**. **PERMCO** recommends a 25-micron return filter and a 149-micron (100-mesh screen) suction filter to fully protect the pump and system from excessive wear and damage from dirt.
2. If the pump fails and you think metal particles have gotten in the circuit:

   a. Drain **ALL** oil from the whole system,
   b. Flush the system with kerosene,
   c. Refill the system with fresh oil of correct grade,
   (These are correct oils:
   Viscosity index at 100°F (37°C): 90 or higher;
   Viscosity SUS at 100° F (37° C): 150 to 300 (32-65 CST);
   Aniline point: 165 or higher;
   Anti-foam and anti-oxidant additives.)

3. Temperature of oil should never exceed 185°F (85˚C.)
4. **NEVER** use low-viscosity naphtha-base oils, aircraft hydraulic fluids, or automotive brake fluids without con-sulting **PERMCO, INC**. or a Permco distributor.
5. For extended operation at temperatures below 20° F (-7° C) always use a low-pour-point oil of top quality.

# TROUBLE SHOOTING

| PROBLEM | REMEDY |
|---|---|
| **EXCESSIVE NOISE IN PUMP:** | |
| Insufficient Fluid | Replenish fluid to proper level, with proper grade |
| Fluid is too heavy | Drain system and refill with specified grade of fluid |
| Oil filter is dirty | Clean or replace filter element |
| Suction line too small | Install larger suction line |
| Clogged suction line | Clean line thoroughly |
| Pump over-speeding | Check pump maximum speed; Slow down pump driver; Or install larger pump |
| Air vent on fluid reservoir clogged | Clean or replace breather on reservoir |
| Air bubbles in fluid | Drain system and refill with non-foaming hydraulic fluid |
| Filter too small | Replace with larger filter |
| Coupling misalignment | Realign flexible coupling between pump and driver |
| Air leaks at pump intake on pump shaft packing or inlet pipe | Drip oil over suspected joint; listen for change in sound of pump; tighten joints |
| Worn or broken pump parts | Replace parts as necessary |
| **FOAMING FLUID:** | |
| Improper fluid | Drain system and refill to correct level with proper grade of anti-foaming fluid |
| Low fluid level | Top off with proper grade of anti-foaming fluid |
| Inadequate baffling in tank | Install correct baffling |
| Air leaking into suction line between reservoir and pump | Tighten all connections |
| **OIL LEVEL IN TANK CONTINUES TO DROP** | |
| Oil level in tank continues to drop | Indicates a broken pipe line or a pipe left out between a bulkhead coupling and the bottom of the tank after cleaning tank. Replace pipe. |

| PROBLEM | REMEDY |
|---|---|
| Pump rotating in wrong direction | **IMMEDIATELY STOP PUMP DRIVER** to prevent damaging pump. Then reverse direction of pump rotation |
| Pump fails to prime itself<br>a. Air leak into suction line<br>b. Oil is too heavy | Tighten up joints. Drain system and replace fluid with proper grade of anti-foaming fluid |
| c. System not in Neutral | Open valve on pressure side of pump, or install air bleed valve |
| **SYSTEM LACKS ANY PRESSURE WITH PUMP RUNNING:** | |
| Relief valve not set correctly | Use pressure gauge and reset valve to specified pressure |
| Relief valve leaking | Check relief valve seat for score marks. Reseat by grinding. Or replace. |
| Broken relief valve spring | Replace spring; reset relief valve |
| Flow of fluid to tank is unrestricted | Check for control valve in “Neutral” or for open return line |
| Internal leakage in control valve or power cylinder | Repair or replace leaking valve or cylinder |
| **EXCESSIVE WEAR IN PUMP:** | |
| Abrasive contaminants in fluid | Drain and flush entire system. Install new filter. Fill system with fresh oil of proper grade or filter con-taminated oil through a 10-micron filter before refilling. Operate pump an hour. Drain system again. Install new filter element and fluid. |
| Fluid too light for pump service | Drain and replace with anti-foaming fluid of proper grade. |
| Sustained pressure above pump maximum rating | Check and reset relief valve pressure, using pressure gauge. |

| PROBLEM | REMEDY |
|---|---|
| Sustained excessive speed at pressure above pump maximum rating | Recheck pump rated speed. Slow down driver to produce this speed. |
| Drive misalignment; Tight belt; weight of pump supported by its drive shaft | Check pump/driver coupling or belt alignment. Install adequate support for pump. |
| Entrapped air in hydraulic system | Bleed air from hydraulic system |

## OVERHEATED FLUID:

| | |
|---|---|
| Fluid too heavy | Drain system and refill with lighter grade of anti-foaming fluid. |
| Fluid too light for high temperature pump location | Drain system and refill with heavier weight anti-foaming fluid. |
| Dirty fluid | Drain and flush system; refill with proper grade of anti-foaming fluid; replace filter element. |
| Dirt or chip caught between plunger and seat of relief valve | Disassemble relief valve and remove contaminant. Check condition of filter to prevent recurrence. |
| Incorrect setting on relief valve | Use gauge and adjust relief valve setting to cor-rect pressure |
| Worn pump permits oil to bypass internally | Repair worn pump parts or replace pump. |
| Relief valve leaks or not operating | Repair or replace relief valve |
| Excessive friction caused by pump components over-torqued | Disassemble pump and back off over-torqued component to tightness specified in this maintenance manual |
| Undersize hoses and valves in system | Replace with proper size hose and valves |
| Restrictions and excessive bends in lines | Re-plumb system to eliminate restrictions |
| Inadequate reservoir prevents adequate cooling of fluid | Install larger reservoir or add fluid radiator |
| Internal leaks not in pump | Locate and repair leaks |

## PUMP NOT EFFICIENT:

| | |
|---|---|
| Worn pump parts reduce pump efficiency | Repair or replace pump |
| Air in system | Bleed air from system; check line connections for air leaks |

| PROBLEM | REMEDY |
|---|---|
| Internal leak in control valve or cylinder. | Repair or replace control valve. Replace cylinder packing. Check cylinder walls for scoring and replace if necessary. |
| Erratic pump performance: a. If pump runs slow on startup, and speeds up after fluid is warm, fluid fluid grade is too heavy. | a. Drain system and refill with lighter grade anti-foaming fluid. |
| b. If pump slows down after fluid has heated up, fluid is too light | b. Drain system and refill with heavier grade anti-foaming fluid. |

## MOTOR DOESN'T DEVELOP PROPER TORQUE OR SPEED

### (when pump is used as a motor)

| | |
|---|---|
| Relief valve incorrectly adjusted | Use a pressure gauge and increase relief valve pressure setting to proper level |
| Relief valve sticking open | Disassemble relief valve and remove dirt from under ball or piston. Check condition of filter to prevent recurrence. |
| Flow of fluid to tank is unrestricted | Check for control valve in "Neutral" or for open return line. |
| Insufficient pump pressure or volume | Use pressure and flow gauges to check pump out-put and pressure. |
| Misalignment of pump/driver | Realign belt drive or coupling, recheck torque requirements of pump for maximum input. |

## MOTOR SUBJECTED TO OVERPRESSURE.

### (when pump is used as hydraulic motor)

If you have used a standard control valve to control a hydraulic motor, serious and catastrophic harm can result. When the standard control valve is returned to "Neutral", to start or stop the motor sudden excessive pressure develops. This pressure can burst seals, fracture drive shafts, burst housings, and rupture hoses.

# HOW TO ORDER PARTS

**ALWAYS GIVE US THE SERIES NUMBER**, please. It instantly tells us what PERMCO Pump or Motor you want parts for. You will find this Series Number on the nameplate.

**IF YOU CANNOT SUPPLY THE SERIES NUMBER**, Please answer these questions:

1. Is the unit a pump or a hydraulic motor?
2. If a pump, which way does it rotate when you look at it from the shaft end? Clockwise? Or Counter-Clockwise?
3. How many gear housing sections does the unit have?
4. Check "Series Identification Table" below to determine series.

**STEPS IN IDENTIFICATION:**

1. Shaft end cover:
   Mounting flange: Is it pad mounting or foot mounting? How many bolts, 2, 4, 6, 8? If round flange, measure pilot diameter, center diameter, and bolt-hole diameters.
2. Bearing arrangement:
   With or without outboard bearings? Double outboard bearings? Bearing measurements? Any drains or grease fittings?
3. Drive shaft:
   Diameter of shaft end? Keyed or not? Length of spline? Number of spline teeth O.D.? Total length of shaft?
4. Housing:
   Width of housing? Inside diameter of ports?
5. Port end cover:
   Inside diameter of ports?
6. Bearing carrier:
   Inside diameter of ports? Direction of flow thru internal passage or coring?
7. Gears:
   Gear tooth width? Gear O.D. measured over teeth? If gears are integral, describe drive end of drive gear, as in Paragraph 3 above.

## SERIES IDENTIFICATION

| SERIES | STUD HOLES No. and Dia. | STUD DIA. | CONTINENTAL (Two-Piece Drive Shaft & Gear Set) | INTEGRAL (One-Piece Drive Shaft & Gear Set) | HOUSING Height | HOUSING WIDTH= GEAR WIDTH, + |
|---|---|---|---|---|---|---|
| 1200 | 10-9/16" | 1/2" | X | | 7" | 1/2" |
| 1500 | 4-9/16" | 1/2" | X | | 5-1/4" | 3/4" |
| 2500 | 4-11/16" | 5/8" | X | | 6" | 3/4" |
| 3700 | 8-9/16" | 1/2" | X | | 7-5/16" | 1" |
| 3000<br>3100 (Doweled) | 4-11/16" | 5/8" | * | X | 5-3/8" | 3/4" |
| 5000<br>5100 (Doweled) | 4-11/16" | 5/8" | * | X | 6" | 3/4" |
| 7500<br>7600 (Doweled) | 8-11/16" | 5/8" | * | X | 7-7/8" | 1" |

* Continental (Two-Piece Drive Shaft & Gear Set) available on Series 3000, 5000 and 7500 as specials; consult factory.