TL-2
OWNER/OPERATOR MANUAL

TABLE OF CONTENTS

OPERATION:

MAINTENANCE:

DIAGRAMS AND DRAWINGS:

> ***Note: There are multiple drawings included for some of the components listed below. You will need to identify which drawing matches the components on your loader. Please call our Parts Department at 800/930-5623, Ext. 229, should you need assistance. Please have your loader Serial Number available when calling our Parts Department. See "How to Find the Serial Number" in this section of the manual.***

Diagrams and Parts List for P.I. Self Winding Tarp Roller Assembly

Parts List – Miscellaneous Parts

Notification of Transfer of Ownership

WARRANTY:

VENDOR INSERTS:

Commercial Hydraulics P20 Service Manual

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

Service Bulletin No. 102 – Seal Kit Installation, Rotary Actuator Models HA36 and SS40

Micromatic Repair Procedure for HA36 Rotary Actuator

White RS Series Motors Service Procedures (Bucket Motor) – Go to following website:
http://www.whitehydraulics.com/pdf/parts/RS_200.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 which 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 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 tail lights, 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. Ensure that outriggers are fully retracted and the bucket is open and resting on the floor of the body. If the body contains debris, the bucket should be closed and at rest on the load. Ensure that most of the bucket and boom tip are below top of body.

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 (also known as a “rotary actuator” or “rotac”), one on each port. These restrictors are factory preset and must not be removed or drilled out.

Model HA36 Rotary Actuator, Restrictor Size = .056
Model SS40 Rotary Actuator, Restrictor Size = .056

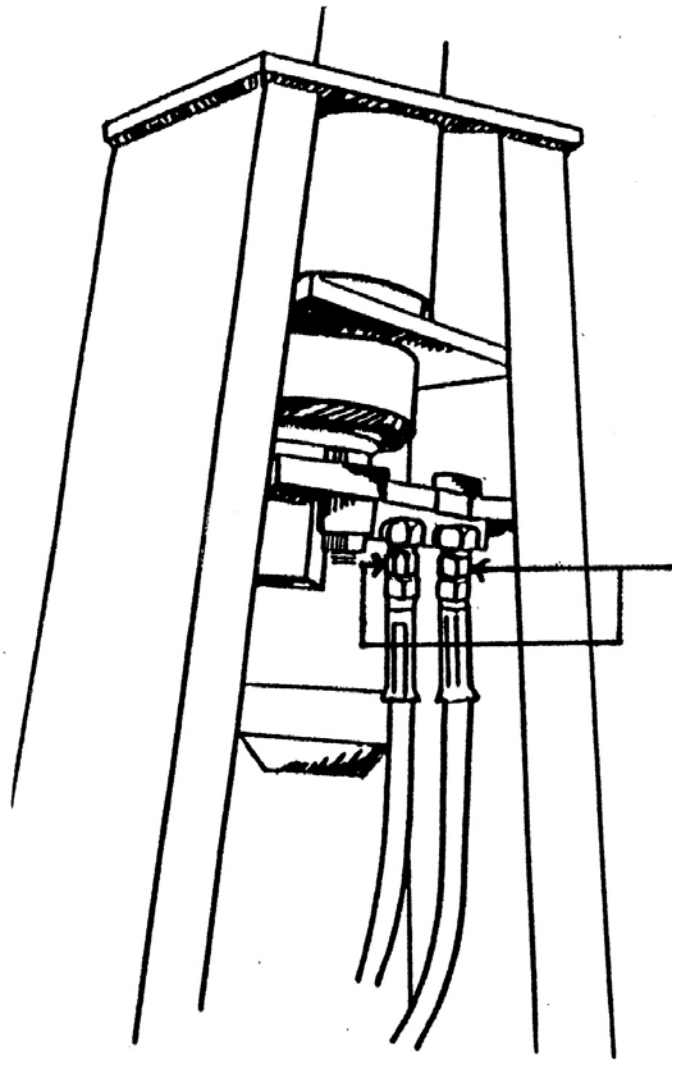
Some signs of restrictor removal or modification are:

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 pin.

See diagram on following page for location of swing actuator 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 (rotary actuator), one on each port. These restrictors are factory preset and must not be removed or drilled out.

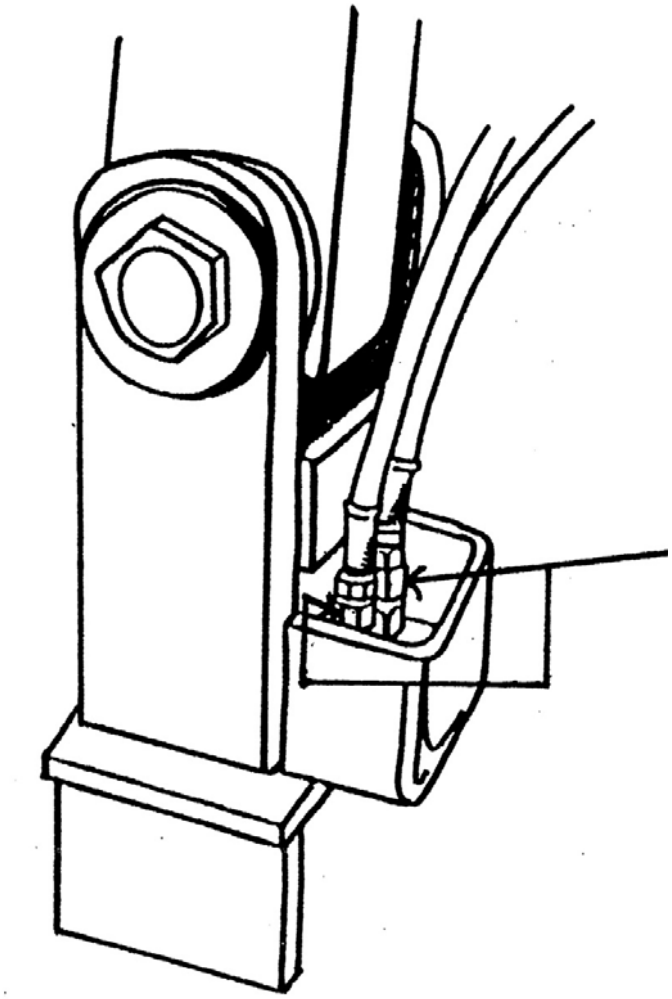
HA36 Actuator, Restrictor Size = .056
SS40 Actuator, Restrictor Size = .056

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.



Bucket Motor Restrictors

LOAD CONTROL VALVES

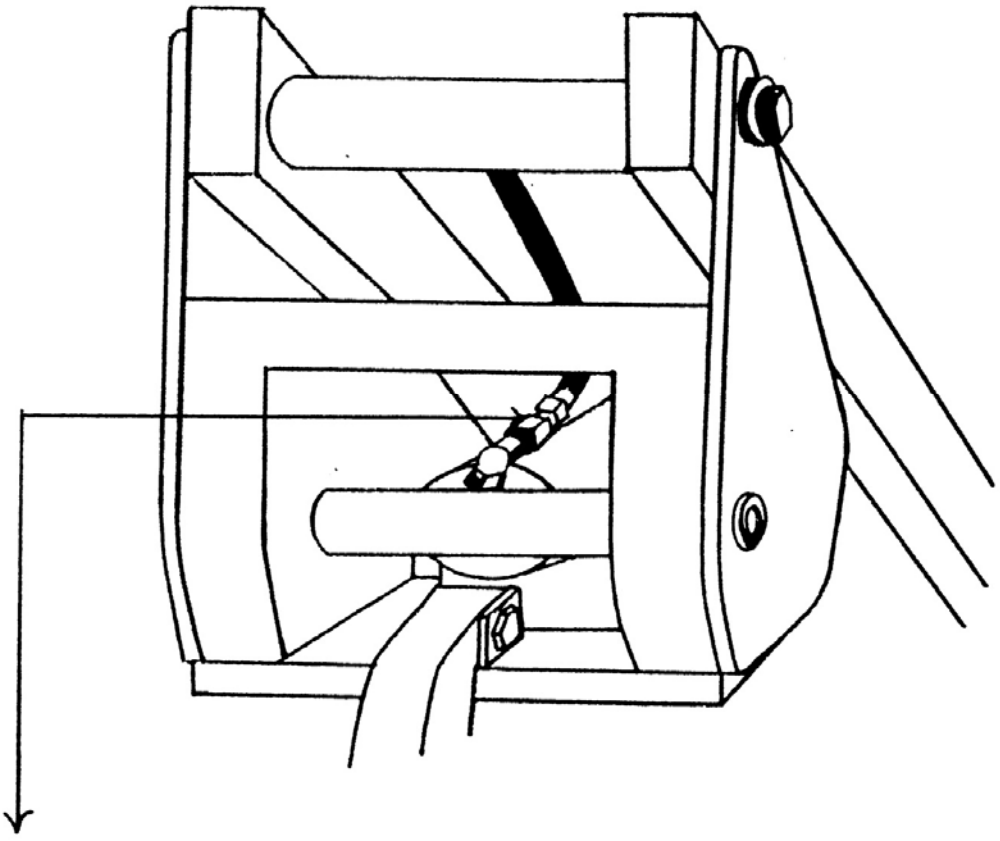
The load control valves are either a part of or plumbed directly onto load holding cylinders. These valves are found on the main boom lift cylinder, tip cylinder, and the outrigger cylinders.

Main Boom Lift and Tip Cylinders:

One-way Restrictors: - Older model loaders use one-way flow restrictors that are plumbed to cylinder ports and have a factory preset orifice. In the event of hydraulic hose rupture, these restrictors control the decent speed of the lift and tip cylinders.

These restrictors are factory preset and must not be removed or drilled out.

Restrictor Size = .187



Lift Cylinder Restrictor

Counter-balance Valves: - Loaders manufactured after February, 1993, have counter-balance valves. The counter-balance valve is a cartridge type valve, mounted directly into a housing that is welded to the lift and tip 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.

The valves control the decent speed of the main boom lift and tip cylinder.

Notice to Operators: If load control valve(s) malfunction, do not attempt to adjust valves. Call your supervisor immediately for instruction.

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. These valves hold the load until hydraulic pressure is applied to it 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 trash 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 trash 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").

Under normal operating conditions, there is very little load applied to the lock collar. However, the following improper operating practices could put excess stress on the lock collar and therefore must be avoided.

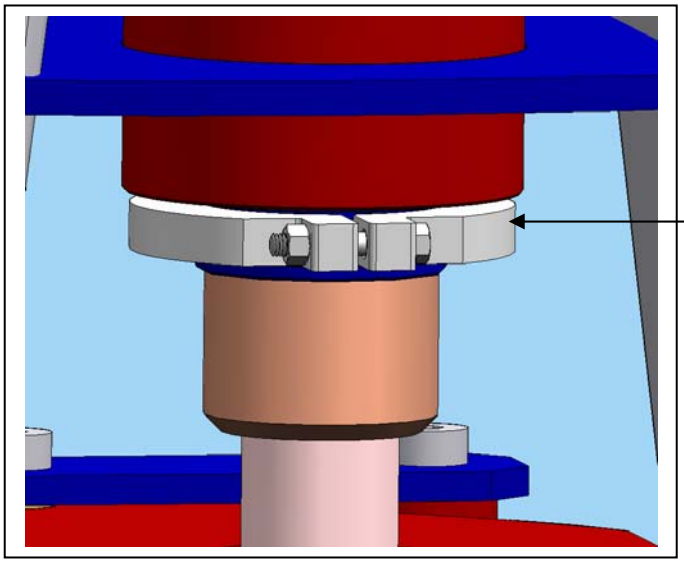
- Excessively packing the load with the boom. Evidence of this may be the bulkhead of the body may be bowed outward.

- Forcing the dump body down with the boom. Evidence of this may be the bulkhead of the body is dented down.

- Improper positioning of the boom prior to raising the dump body. Evidence of this may be the underside of the main boom will be dented and scarred.

Improper lock collar installation and/or the improper operating practices listed above, 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.

Maintenance and shop personnel must continuously check for the above listed signs of abuse, and must report their observations to the person responsible for the operation practices of the trash loader operators. Corrective measures must be taken to stop abusive loading practices.



Lock Collar

(Also shown on the Head and Pedestal Diagram in “Dia. & Drawings” Section of this manual (see Item No. 9).

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 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.

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.

⚠ 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.

SAFETY SYMBOLS

Your loader has required safety decals 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.

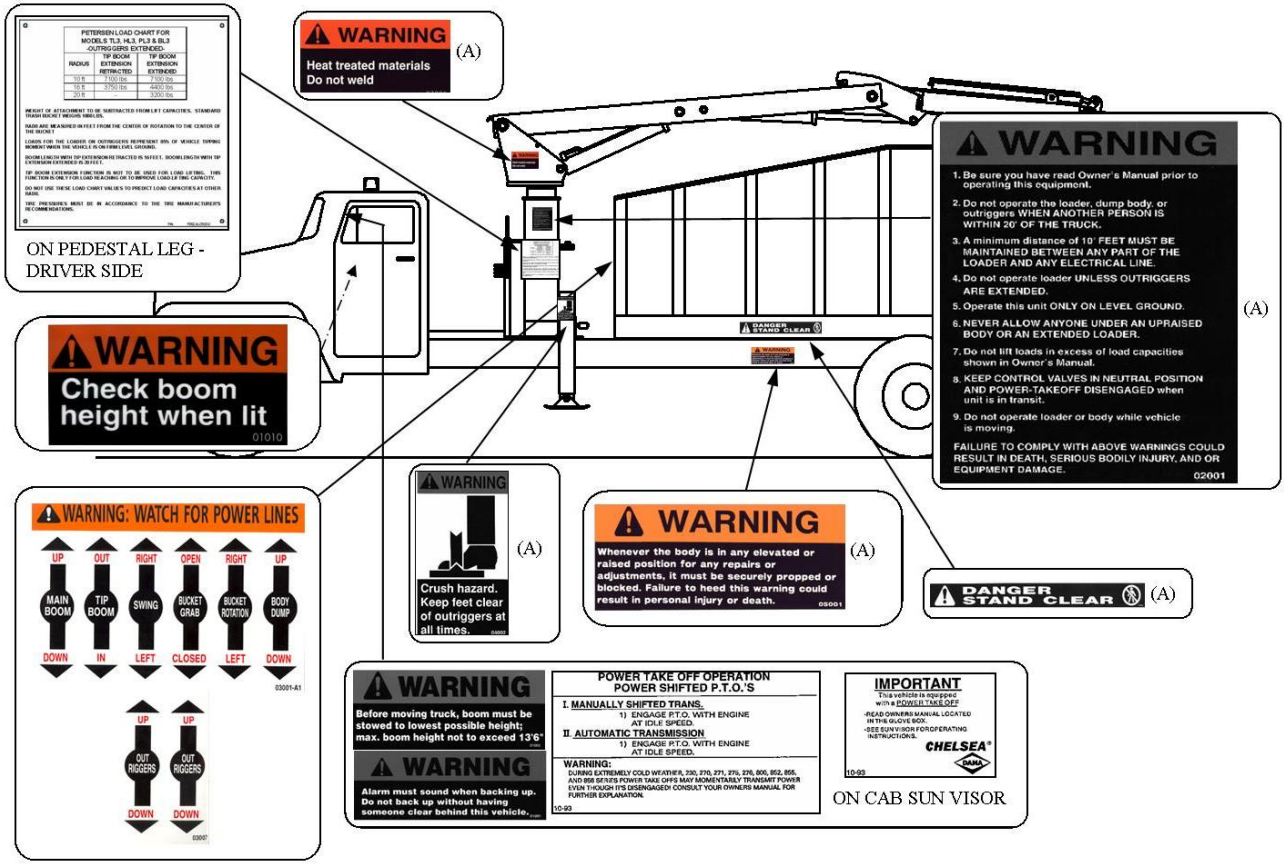
DANGER Immediate hazards which WILL result in severe personal injury or death.

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.

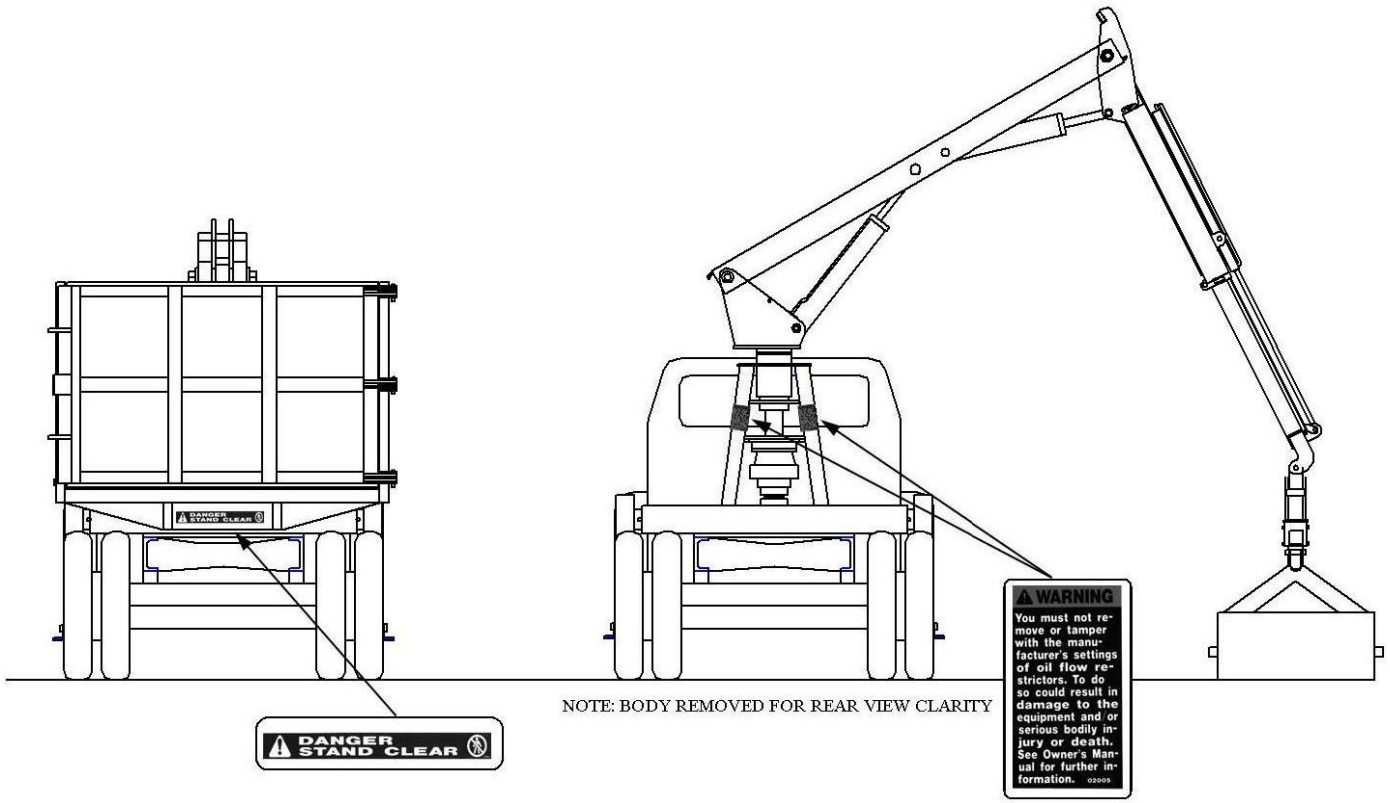
The following pages provide a listing of the required safety decals for your loader, and pictorials of where they are to be placed on the loader.

MODEL TL-2 TRASH LOADER - REQUIRED SAFETY DECALS

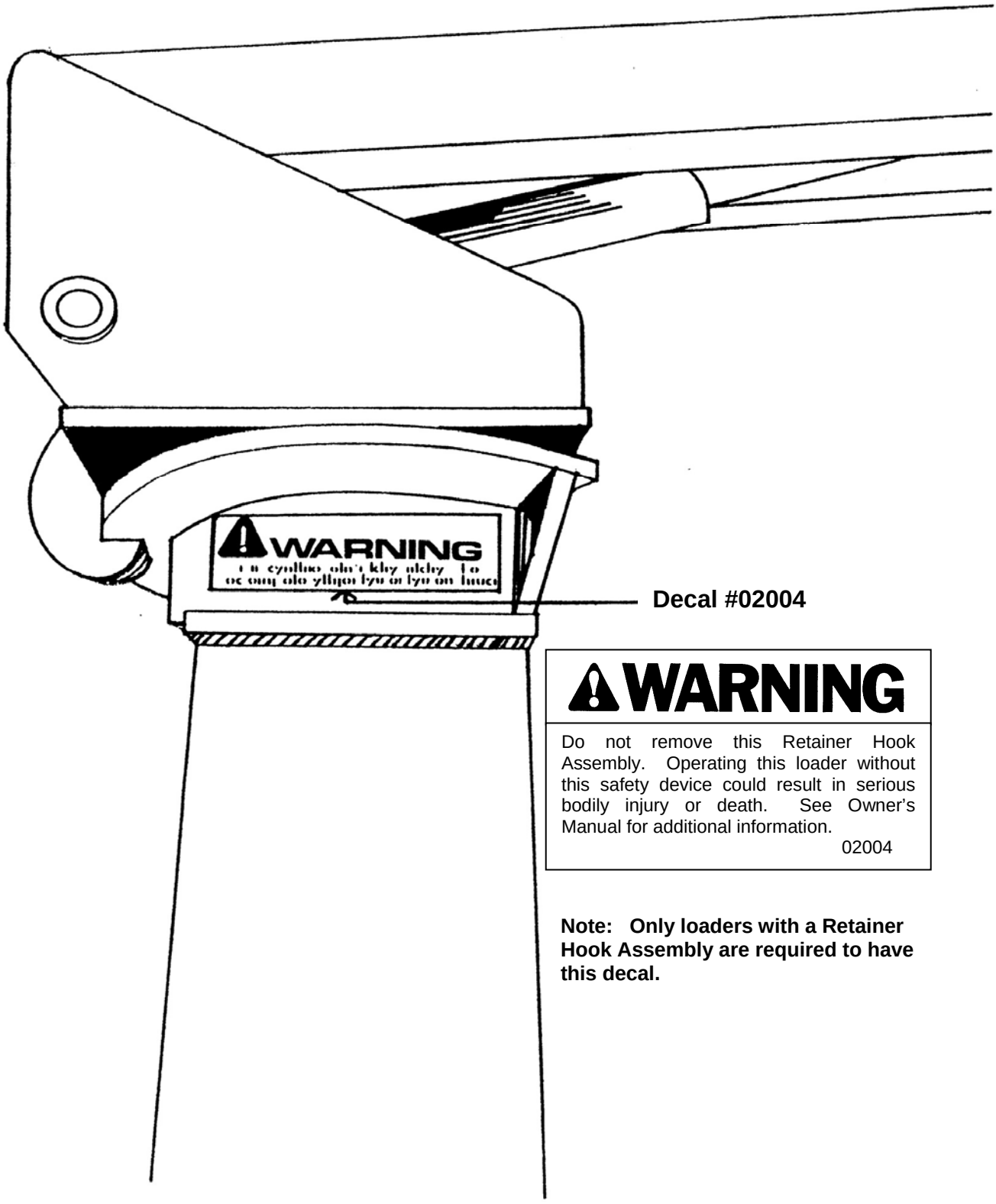


(A) ONE DECAL ON EACH SIDE OF LOADER IN LOCATION SHOWN

MODEL TL-3 TRASH LOADER - REQUIRED SAFETY DECALS



NOTE: BODY REMOVED FOR REAR VIEW CLARITY



Decal #02004

⚠ WARNING

Do not remove this Retainer Hook Assembly. Operating this loader without this safety device could result in serious bodily injury or death. See Owner's Manual for additional information.

02004

Note: Only loaders with a Retainer Hook Assembly are required to have this decal.

RETAINER RING AND HOOK ASSEMBLY

The purpose of the Retainer Ring and Hook Assembly is to hold the boom assembly in position in the event of spindle (torque tube) failure.

In the event of spindle (torque tube) failure, operators must not attempt continued operation of the loader. Do not attempt to place the boom of a broken or malfunctioning unit in the body of the loader without assistance from another crane or lifting device.

Failure to heed these instructions could result in serious bodily injury or death.

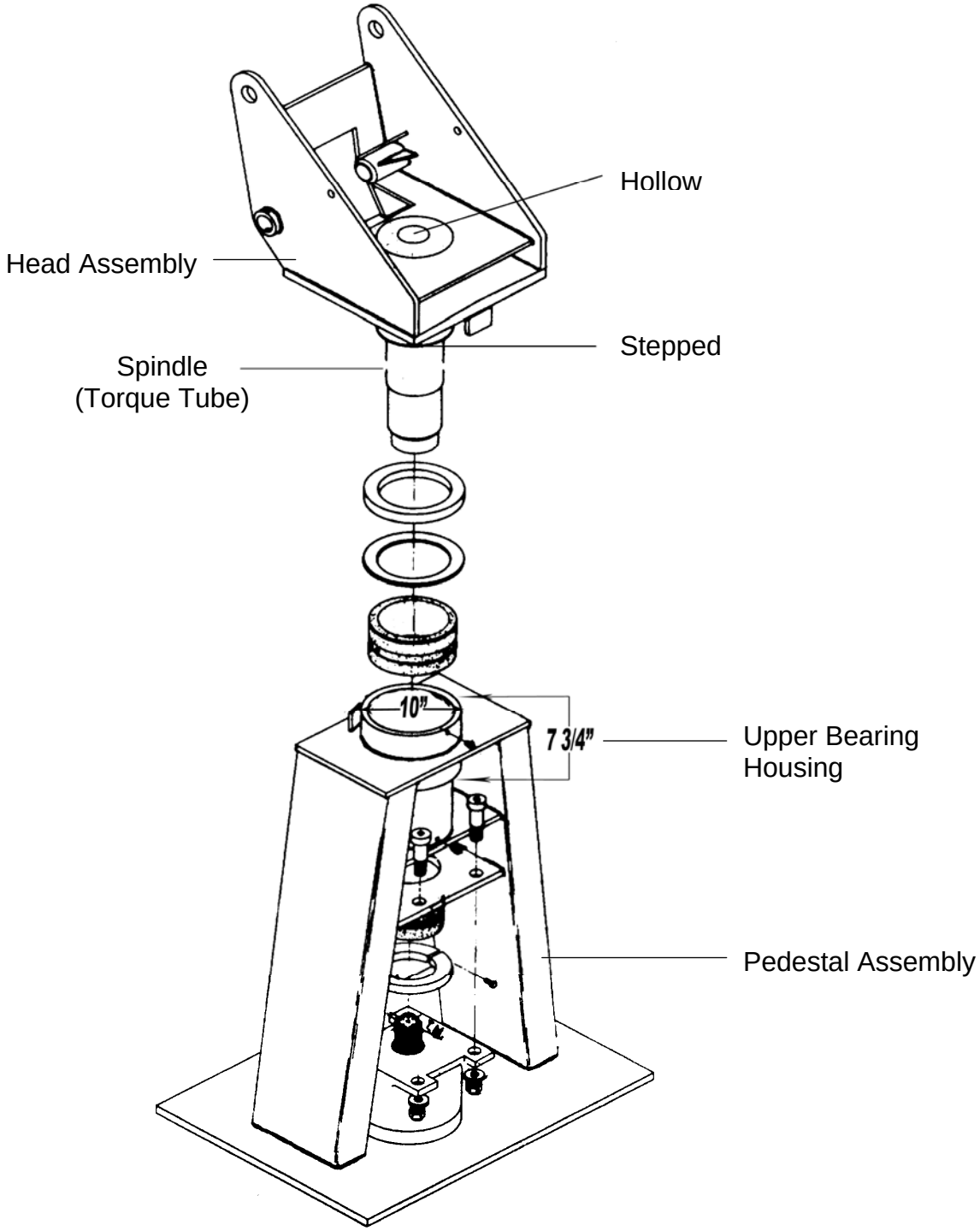
The Retainer Ring and Hook Assembly is a safety device that **must** be on all Petersen trash loaders that do not have a solid tapered "C" Spindle. **Trash loaders that have "A" or "B" Spindles must have this safety device on the head assembly of the trash loader prior to the loader being operated for any reason.**

The following pages have illustrations of loader head and pedestal assemblies that have either an "A", "B", or "C" Spindle, to help you correctly identify the spindle on your loader.

See the "Maintenance " section of this manual for service information regarding the Retainer Ring and Hook Assembly.

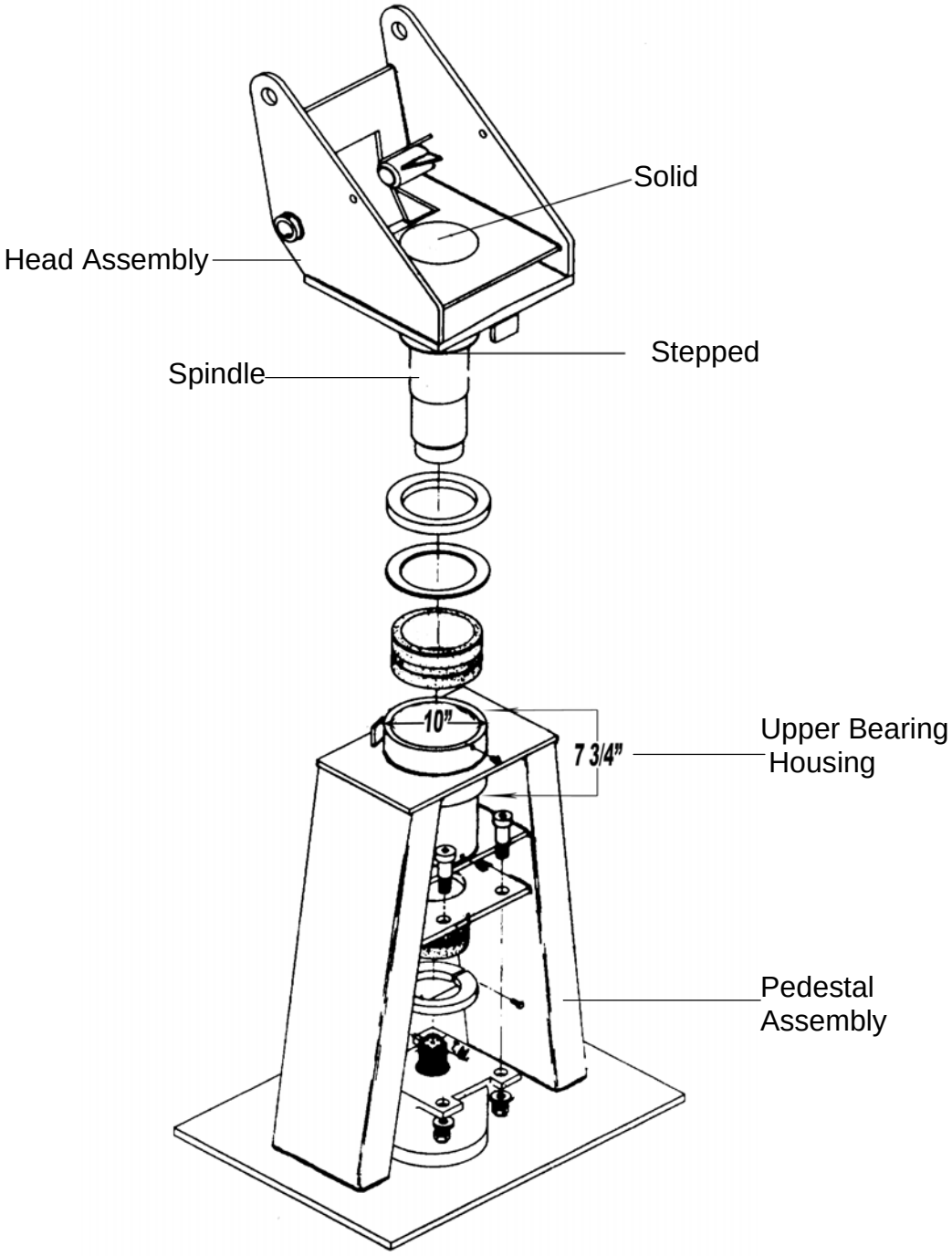
To Identify a Head & Pedestal Assembly with an "A" Spindle:

1) The Spindle in the Head Assembly is hollow and stepped.
2) The Upper Bearing Housing of the Pedestal Assembly measures 10" O.D. X 7 ¾" long.



To Identify a Head & Pedestal Assembly with a "B" Spindle:

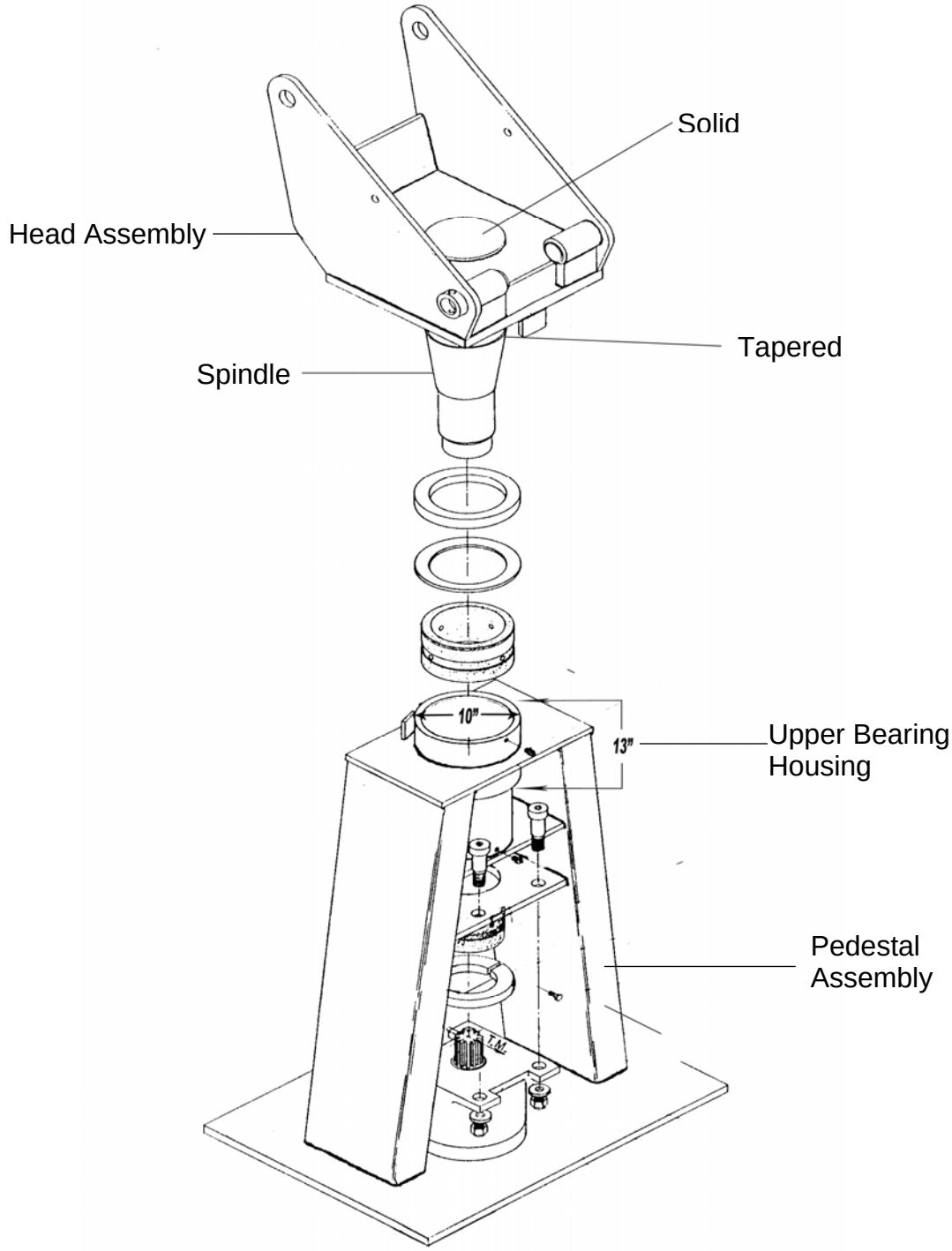
1) The Spindle in the Head Assembly is solid and stepped.
2) The Upper Bearing Housing of the Pedestal Assembly measures 10" O.D. X 7 ¾" long.



To Identify a Head & Pedestal Assembly with a "C" Spindle:

1) The Spindle in the Head Assembly is solid and tapered.

2) The Upper Bearing Housing of the Pedestal Assembly measures 10" O.D. X 13" long.



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

Note: The engine over-speed control is a standard feature on loaders manufactured after November, 1992, that are mounted on trucks with Allison automatic transmissions.

Power Take-Off Manual Transmission:

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 engage 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

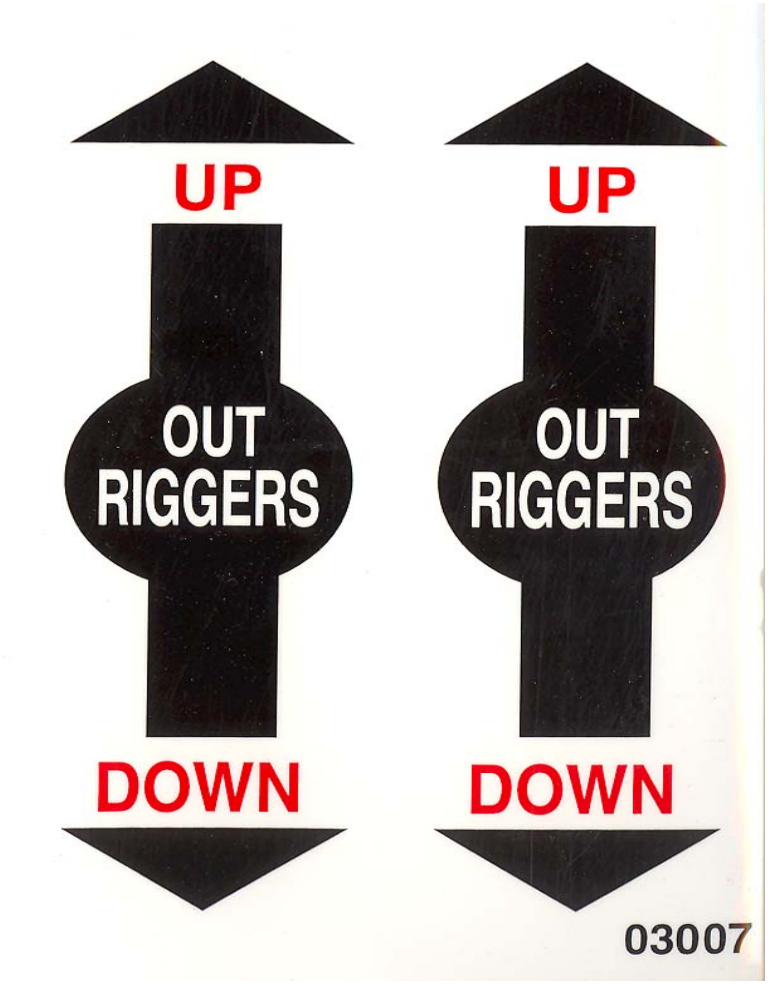
The truck brake must be set before leaving the cab for any reason.

LOADER CONTROLS

The loader control placards indicate the direction to actuate the control handles for various unit functions. The loader placard gives visual instructions for boom elevation, boom swing, tip boom elevation, tip boom extension, bucket grab, bucket rotation, and body dump. The outrigger placard gives visual instructions for horizontal outrigger in/out, and vertical outrigger up/down.

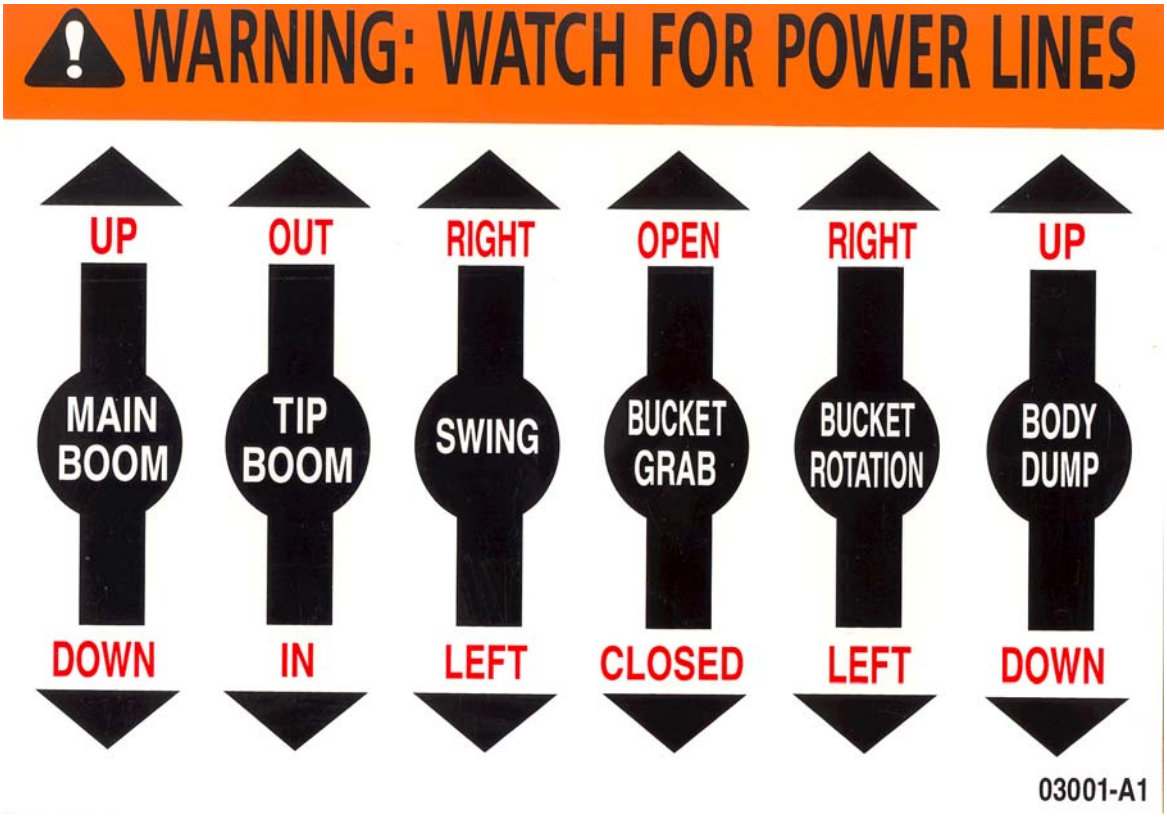
Outriggers:

The Model TL2 Loader has outrigger handles mounted below the other control handles. **(Note: On older model loaders, the outrigger handles are mounted with the other control handles.)** There is a set of two (2) handles on each side of the work platform on loaders with dual walk thru controls, and they are configured the same on each side of the platform. In the two (2) handle configuration, the handle on the right operates the right outrigger, and handle on the left operates the left outrigger. The following decal shows the direction to push or pull the handle for each outrigger up/down function.



Loader and Dump Body:
The standard Model TL2 has six (6) control handles that activate the loading and dumping operations of the loader. The following decal shows the control handle configuration, and the arrows indicate the direction to push or pull the handle for each function.

The control handle configuration is the same at both operator stations on loaders with dual walk thru controls.



On units equipped with dual controls, always operate the loader on the side closest to the debris 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.

During all operations, the controls should be feathered when beginning or terminating a movement to prevent sudden starting or stopping which imposes undue shock loads on the equipment. Feather the controls by moving the valve handle smoothly from the neutral position to start motion. After a slow, smooth start, move the valve handle control to extreme for full speed. Just before stopping movement, move valve handle control smoothly back to the neutral position.

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 repairs 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. You should position your vehicle so that the load is well within this arc. The swing arc is controlled by positive stops. Damaged or missing head and pedestal stops poses an unsafe condition by allowing the boom to swing too far resulting in damage to the swing actuator, which could also result in loss of boom swing control. Once the vehicle is in position for loading, please follow these precautions and procedures for loading:

<u>Precautions and Procedures for Loading:</u>

- 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 debris 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, outriggers, or dump body if another person is within twenty feet of the equipment.

- Do not allow any person under a raised body or extended loader.

- If your model loader uses a ladder 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.

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

Part 7: Loading Procedures

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. Do not attempt to lift more than the capacities shown of the load chart for your model loader.

<u>To make the lift:</u>

1. Raise boom from dump body and swing to trash pile. Rotate bucket so that it is aligned with trash.
2. Open the bucket, lower around trash, and close the bucket so that you have a firm grip on the trash. Raise the boom slightly and activate the bucket grab once again to make sure you have a firm grip on the trash.
3. Lift and swing the load over the dump body. It is recommended to load the front of the body first.

When loading the dump body, please follow these precautions:

- **Do not** use the bucket to crowd the load to the front of the dump body as you can damage the bucket and other loader components.

- **Do not** overload the dump body. You must have room to stow the bucket within the body sides for travel.

- **Do not** allow limbs or other debris to protrude from the dump body.

- **Do not** excessively pack the load. Excess packing could result in dump body floor damage and loader damage.

Continue the loading procedure until all trash is loaded. If it is necessary for the operator to manually rake any remaining trash into a smaller pile, the boom must be stowed in the dump body or on the ground, and the PTO disengaged when the operator leaves the control station.

Please follow these additional loading precautions at all times:

- Do not leave a load 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 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 impose lateral loads on the boom.

- Do not use stability to determine safe working load.

To cover the load:

When using a Petersen manufactured and installed load cover, please follow these procedures:

1. Knuckle the bucket to the front of the dump body.
2. Hook the tarp chain to the hook on the bucket.
3. Extend the boom to cover the debris, and rest the bucket on the load.

To stow the boom and bucket:

There are two proper ways to stow the bucket in the dump body. In each case the bucket sides should be parallel to sides of the dump body. The operator can either stow the bucket in the opened position on the body floor, or roll the closed bucket over on top of the load. In both cases it is necessary for the operator to leave room in the dump body to stow the boom and bucket. Always ensure that at least half of the bucket and tip of the boom are below the top of the body sides before travel.

Bucket Roll Method:

The rear of the dump body must be at least half full in order to use the bucket roll method for stowing the boom and bucket.

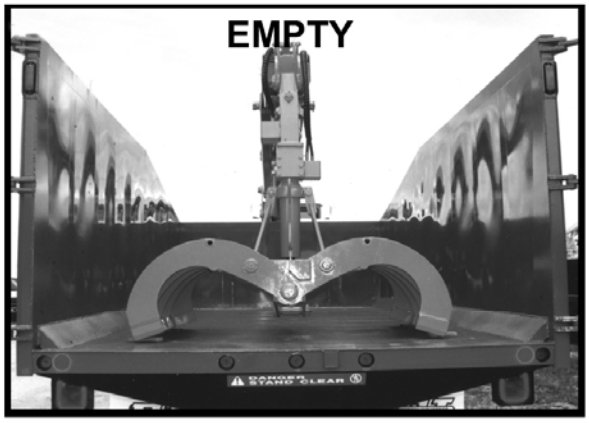
1. Use the control handles on the curb side.
2. Close the bucket and rotate until bucket sides are parallel to body sides.
3. Move the bucket to the curb side rear inside corner of the dump body.
4. Rest the bucket on the load.
5. Simultaneously boom down and swing the boom to the street side until the boom tip and at least half of the bucket are below top of body sides. Ensure that no part of the loader or load is over legal height of 13 ft. 6 in.

Please see illustrations on the following page for examples of correct and incorrect ways to stow the bucket for travel.

WARNING! - Failure to stow the boom and bucket as instructed could allow the boom to slew (swing) and the bucket to fall outside of the body. Loss of boom control with the bucket outside of the dump 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.

Once the bucket has been properly stowed for travel, retract all outriggers, disengage the PTO, and pickup any safety cones or markers that were used. Release the parking brake, and you're ready to travel to the dump site.

CORRECT METHODS OF STOWING THE BOOM & BUCKET



- BUCKET OPEN AND AT REST ON DUMP BODY FLOOR.

NOTE: FOR ILLUSTRATION PURPOSES REAR DUMP BODY DOORS ARE SHOWN OPEN. REAR DUMP BODY DOORS MUST BE CLOSED AND LOCKED EXCEPT WHEN DUMPING THE LOAD

- BUCKET ROLLED OVER WITH JAWS TO RIGHT REAR OF DUMP BODY
- BOOM AT SAFE TRAVEL HEIGHT & BOOM TIP BELOW TOP OF BODY SIDES
- MORE THAN 1/2 OF BUCKET MUST BE BELOW TOP OF BODY SIDES
- LOAD COVER DEPLOYED

INCORRECT METHODS OF STOWING THE BOOM & BUCKET

- BUCKET NOT CONFINED INSIDE OF DUMP BODY
- DEBRIS HANGING OUTSIDE OF DUMP BODY
- BOOM OVER LEGAL HEIGHT OF 13 FT. 6 IN.

- BOOM OVER LEGAL HEIGHT OF 13 FT. 6 IN.
- BUCKET NOT CONFINED INSIDE OF DUMP BODY
- DEBRIS HANGING OUTSIDE OF DUMP BODY

Part 8: Dumping the Load

As you prepare to dump the load, it is important that you choose a level, firm area. Each of the following steps must be followed precisely and in sequence. The procedure must not be done in a hurried manner.

1. Set the parking brake.

2. Open the rear dump body doors and latch them back. Use caution when opening doors, as items placed against doors could fall suddenly when doors are opened and cause injury.

3. Engage the power-take-off.

4. Extend the outrigger on both sides and lower to within six to eight inches of the ground. This allows for emergency stabilization, and movement of the truck.

5. If your load is covered with a tarp, as discussed in "Covering the Load", retract the tarp.

6. Raise the main boom to the maximum elevation and keep it centered over the dump body during the entire dumping procedure.

7. Place the tip boom in a position so that it will not contact the bulkhead of the dump body when the dump body is raised. Do not swing the boom to either side during the dumping procedure, as the outriggers are not fully lowered.

8. Activate the body dump handle. Slowly raise the body to empty the load. Make sure you avoid contact between the main boom and tip boom, and the dump body.

9. If the emptied pile prevents complete dumping of body contents, disengage the PTO. SLOWLY move the truck forward to complete dumping of the body. Remember, the outriggers are partially down and the boom is raised. Extreme caution should be used during this procedure.

   This is not a procedure to force debris out of the dump body. If there is debris stuck in the dump body, lower the dump body and dislodge the debris with the loader.

10. When you have finished dumping the load, lower the dump body. Stow the boom and bucket in the dump body with bucket open and resting on body floor.

11. Raise and retract the outriggers, and disengage the power-take-off.

12. Close and lock body rear doors.

Safety Precautions Regarding Dumping Procedure:

- Do not use the loader boom to force the dump body down when lowering the dump body.
- Do not dump the load until the rear body doors are latched open. The doors and body hinges can be damaged if doors are allowed to swing freely during the dumping procedure.
- Do not travel with rear body doors open. They must be closed and locked for travel.

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.
- Bucket and boom at rest on ground or floor of dump 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.
- Always use dump body prop(s) before servicing or repairing body or hoist. Never leave the body raised or partly raised while vehicle is unattended or while performing maintenance or service under the body, unless the body is braced to prevent accidental lowering.

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, bucket or other attachments.

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

4. If it is necessary to raise the body during LOTO, the body prop must be in place to secure the body from falling.

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

6. Remove the key from the ignition.

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

8. 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. Grease fittings that are worn and will not hold the grease gun, or those that have a stuck check ball, must be replaced. 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 bucket 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. Hydraulic Oil = AW32
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"). See instructions on following pages regarding lock collar installation.
Check retainer ring and hook assembly for proper installation.	See following pages for additional instructions.
Check back-up alarm to make sure it is working properly.	Repair or replace if needed.

LOCK COLLAR INSTALLATION:

Loaders that have “A” and “B” spindles as illustrated on Pages 17 – 33, and 18 - 33 in the “Operation Section” of this manual, use a 1-piece lock collar.

Loaders that have a “C” spindle as illustrated on Page 19 - 33 in the “Operation Section” of this manual, use a 2-piece lock collar.

One-Piece Lock Collar Installation:

1. Lock collar must be set in place before swing drive motor (rotary actuator) is bolted up. If the motor is already installed, it must be lowered before collar will fit between bearing housing and motor spline. Motor mounting bolts need not be removed completely to do this.

2. Remove small set screws from lock collar.

3. After head and spindle assembly are lowered into the bearing housing, and you are sure it is timed properly (head stop hits pedestal stops on both sides before the motor bottoms out internally), slide the lock collar up around the spindle tightly against the bottom of the bearing housing and torque the socket head cap screw to 110 ft. lbs.

4. Using a hand drill and a ¼” bit, drill into spindle through Allen screw hole in the lock collar approximately 3/8”.

5. Install and tighten set screws.

Two-Piece Lock Collar Installation:

1. After head and spindle assembly are lowered into the bearing housing, and you are sure it is timed properly (head stop hits pedestal stops on both sides before the swing motor bottoms out internally), bolt two halves of lock collar together around the spindle. Make sure the lock collar is seated in the groove of the spindle, and tightly against bottom of bearing housing.

2. Tighten both bolts evenly to 110 ft. lbs. of torque.

Remember, the lock collar must be installed properly for the safe operation of the trash loader. Improper installation could result in the head and boom assembly coming out of the pedestal which could result in damage to the equipment and/or serious bodily injury or death.

Service of Retainer Ring and Hook Assembly:

The Retainer Ring and Hook Assembly is installed as part of the rotating head assembly, and is scheduled to be checked after every 40 hours of service for proper installation and signs of wear.

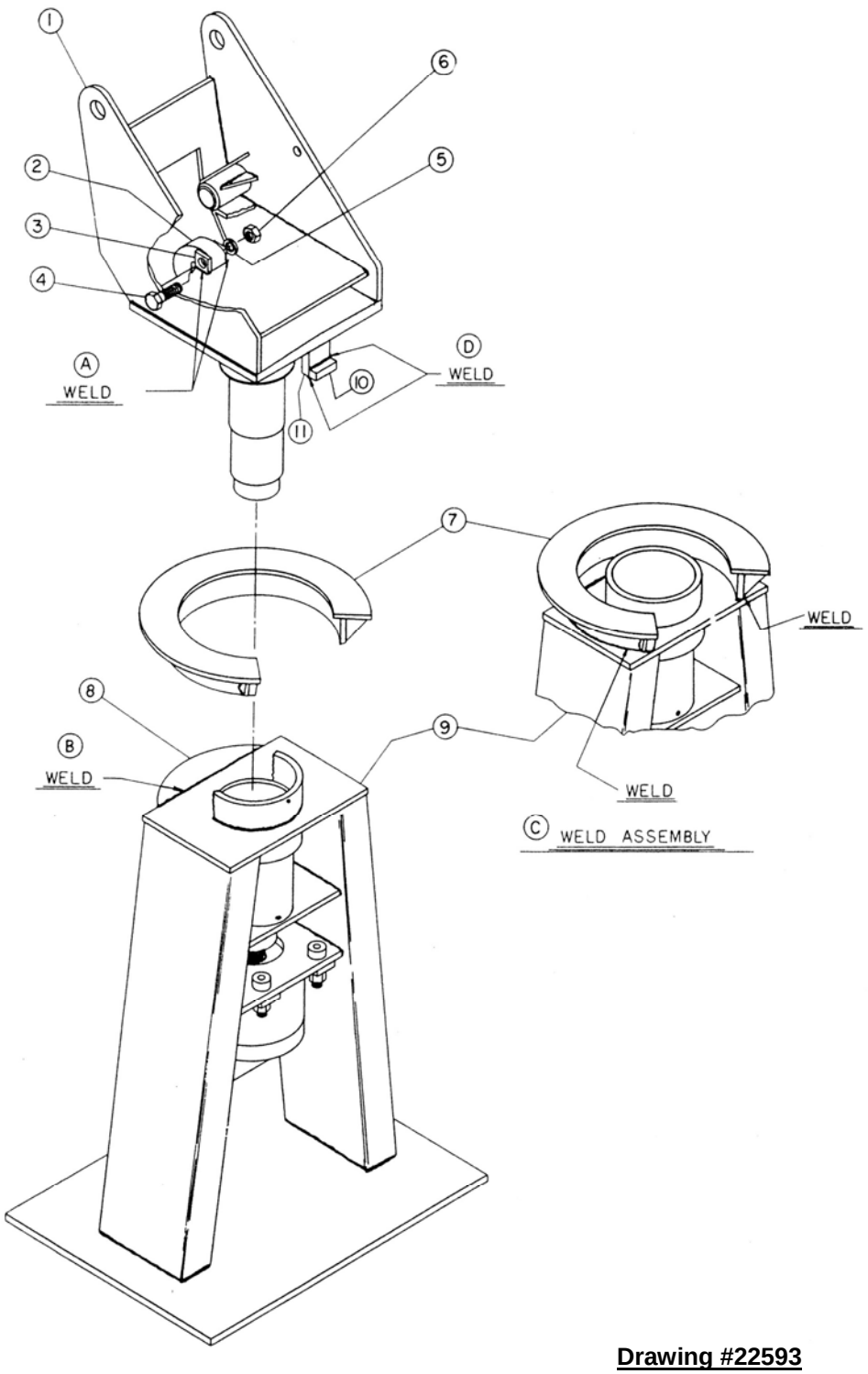
When the Retainer Ring and Hook Assembly is installed properly, there will be approximately ¼" clearance between the hook and the underside of the ring. If the hook or ring shows signs of contact at any point in the swing arc, you must check for the following:

- Check the upper and lower spindle bushings for excessive wear.
- Check the spindle for damage.
- Check the lock collar for proper installation.

Any deficiencies found must be corrected prior to any continued use of the loader.

If the retainer hook shows signs of contact with the ring gussets at the ends of the swing arc, check the boom swing stops for damage. Any damaged stops must be repaired prior to continued use of the loader.

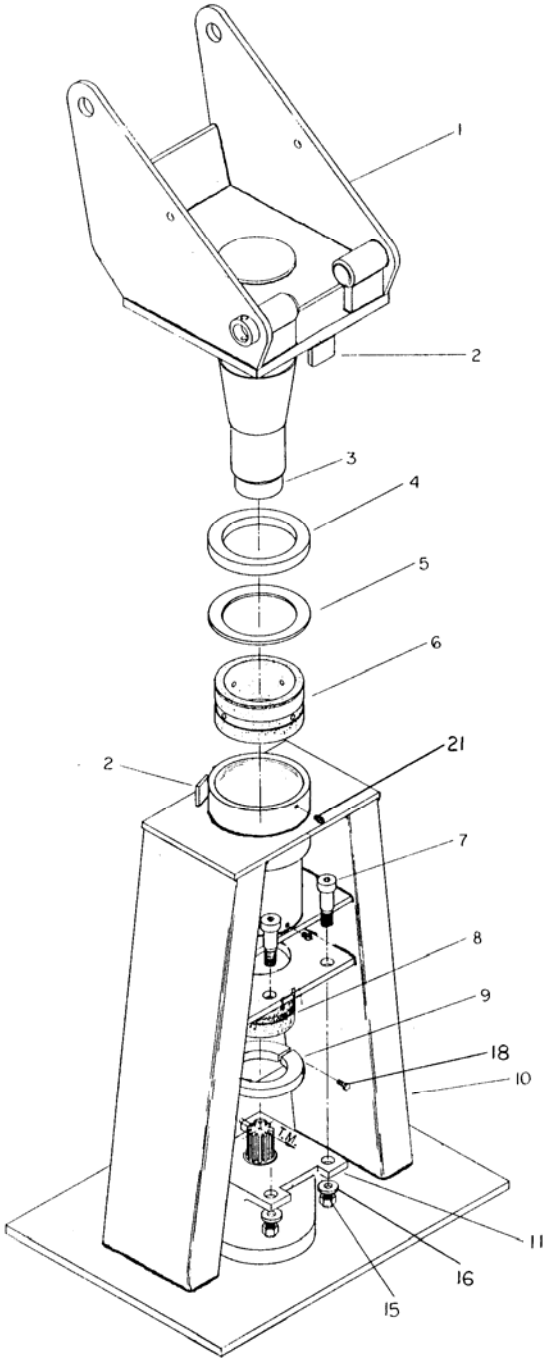
Should you remove the head assembly from the pedestal to service loader components, the retainer hook (See #2 on Drawing #22593) must be unbolted from the head assembly and the lock collar must be loosened. When the head assembly is reinstalled, the retainer hook must be bolted back in place and the lock collar installed according to the instructions on the preceding page.



Drawing #22593

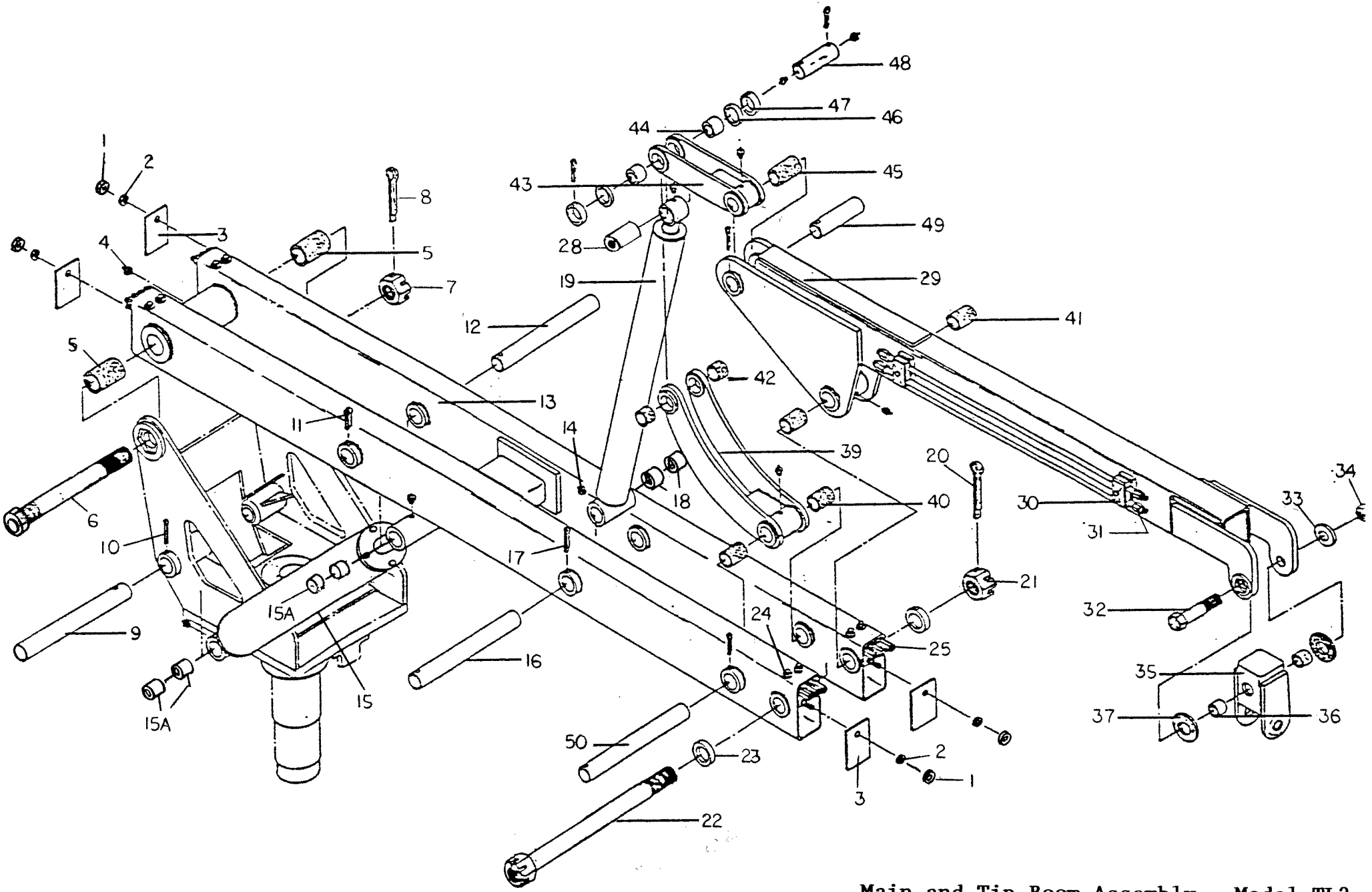
EVERY 80 HOURS *(These requirements are in addition to the 40 hour service requirements.)*	
Re-torque rotary actuator mounting bolts.	To 500 ft. lbs. - dry threads
Re-torque bucket rotator motor mounting bolts.	To 110 ft. lbs. - dry threads

EVERY 160 HOURS *(These requirements are in addition to the 80 hour service requirements.)*	
Examine all loader pivot points (head and pedestal, main boom, tip boom, bucket and body) 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.
Structurals - Visually inspect complete loader for damage, especially cracks in weldments. If damage or cracks are found, replace or repair. Major structural components may require replacement. Contact Petersen Parts and Service for factory recommendation.	It is necessary for your loader to clean of oil and grease for these inspections to be made. 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.	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 found in "Part 3: Safety Devices" of the "Operation" section of this manual. Information regarding required operational and safety decals is found under the "Safety Symbols" sub-heading. Replace missing or illegible decals.



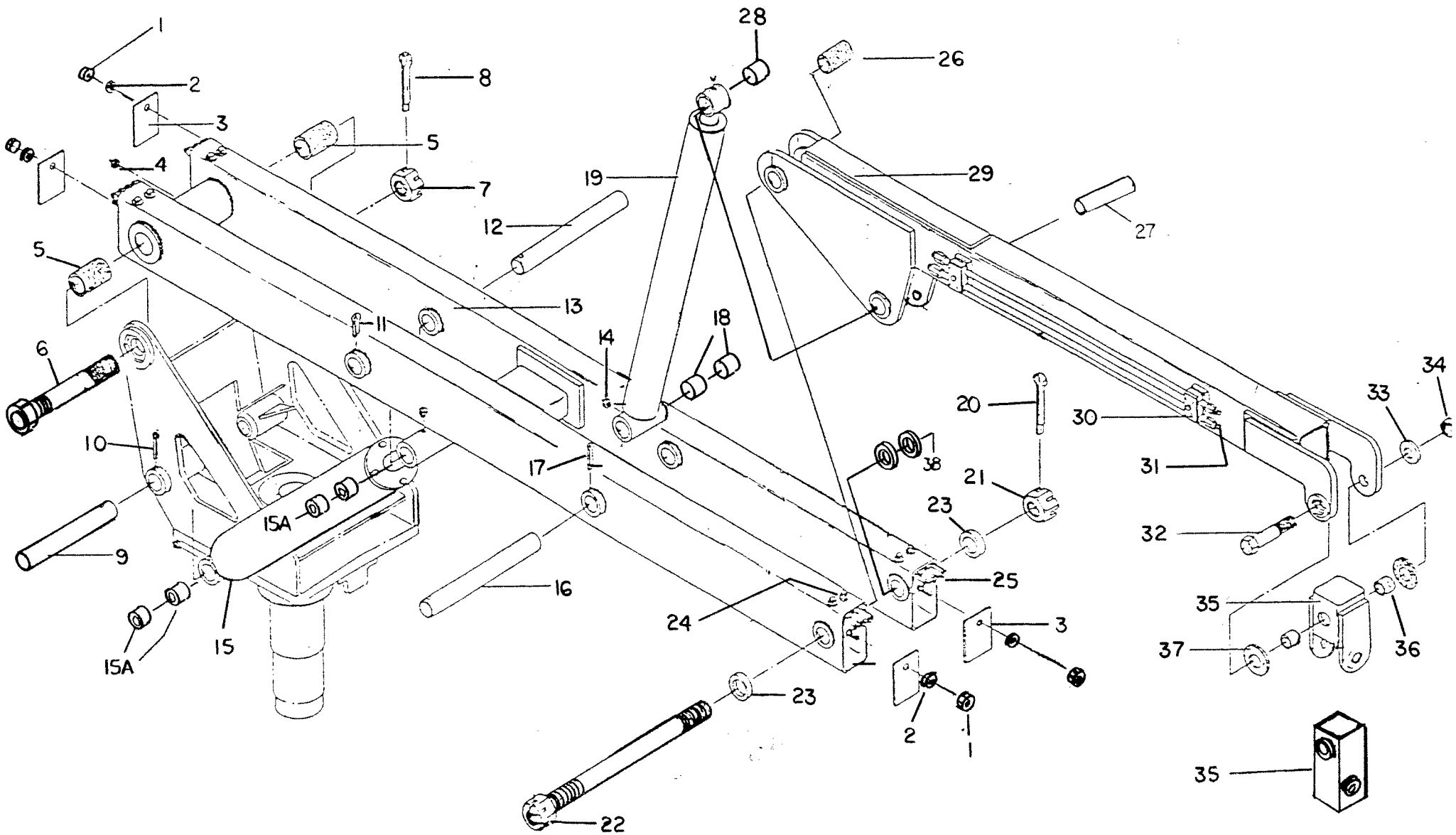
Petersen Industries, Inc. Lake Wales, FL	
Diagram No.: 103	
Description: Head & Pedestal Assembly with HA36 Rotary Actuator	
Drawn by: MS	Date: 08/09/95

Dia. No.		Part Name	Order By This Part No.
HEAD AND PEDESTAL ASSEMBLY WITH HA36 HYDRAULIC ACTUATOR : (DIAGRAM #103)			
1		Head and Spindle Assembly	107104 (See Note A)
2		Head and Pedestal Stop	106216
3		Spline, Spindle	HC99002
4		Nylatron Bushing-Thrust Bearing	BU510003
5		Thrust Spacer	106210
6		Nylatron Bushing-Upper Bearing Housing	BU509002
7		Bolt, Hydraulic Actuator	BL120032U8
8		Nylatron Bushing-Lower Bearing Housing	BU507005
9		Lock Collar (2-Piece, One Side Only)	117103
10		Pedestal Assembly	106103 (See Note A)
11		Hydraulic Actuator-Swing (HA36)	HC01001
--		Hydraulic Actuator - Seal Kit	HPKAS395
12		Not Applicable	
13		Not Applicable	
14		Not Applicable	
15		Nut, Actuator Bolt	NUF14U
16		Flat Washer, Actuator Bolt	WAF14S8
17		Not Applicable	
18		Bolt, Lockcollar	BL308048U513
		Nut, Lockcollar	NUS08U
19		Not Applicable	
20		Not Applicable	
21		Grease Fitting (1/8" Straight)	HF2002S
		Note A: Only current production parts are available. Current	
		production parts may require that other assemblies be changed	
		such as the Main Boom Assembly and/or the Outrigger	
		Assembly.	



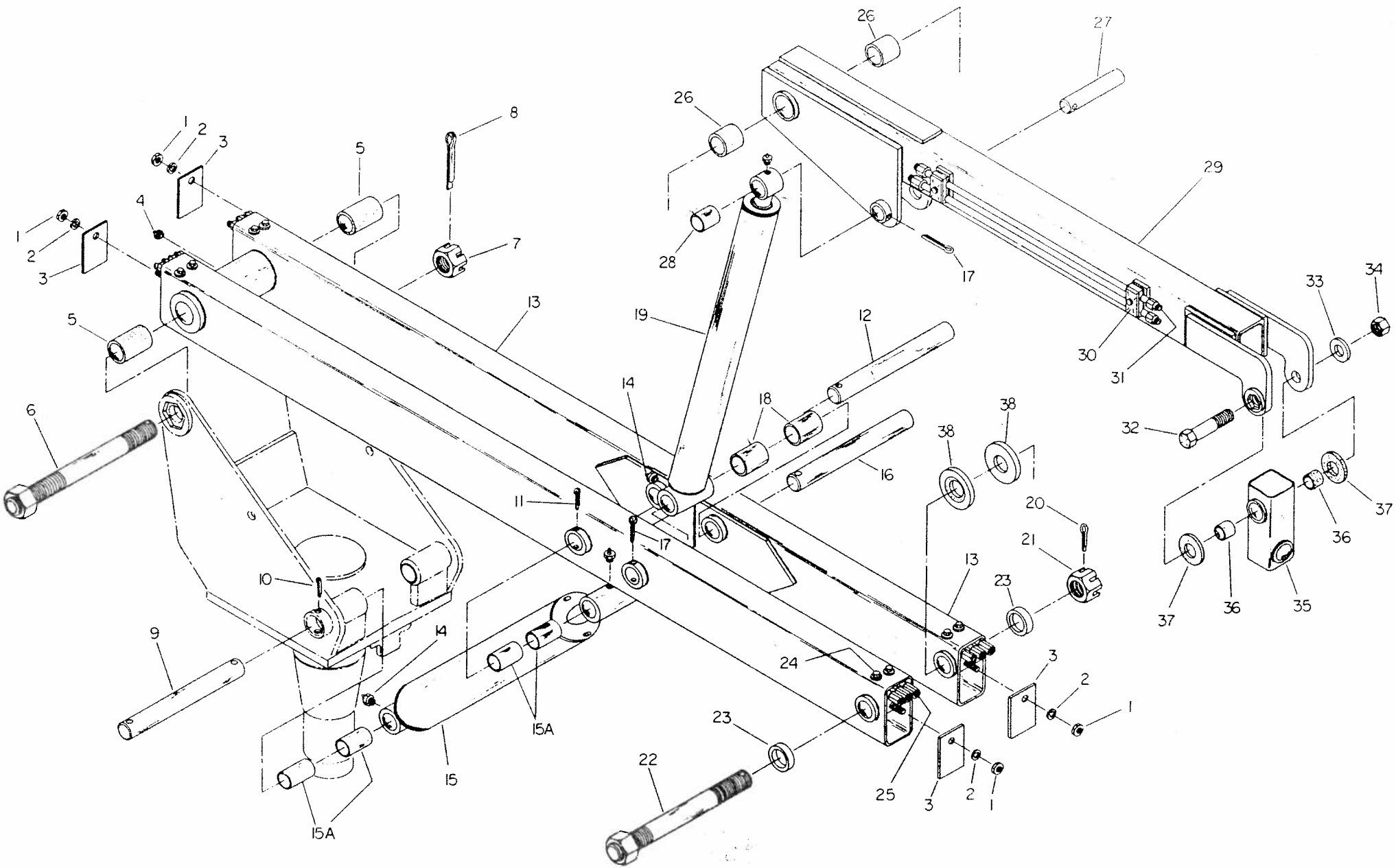
Main and Tip Boom Assembly: Model TL2
Diagram 201

Dia. No.		Part Name	Order By This Part No.
TL2 MAIN AND TIP BOOM ASSEMBLY (DIAGRAM #201)			
1		Nut, End Cap	NUA04U
2		Lock Washer, End Cap	WAS045
3		End Cap	108255
4		Grease Fitting, 1/8" 90 Degree	HF20029
5		Bushing, Main Boom Pivot	BU503001
6		Pin, Main Boom Pivot	BL102016
7		Nut, Main Boom Pivot	NUB32HS
8		Pin, Cotter	FA020764
9		Pin, Lower Lift Cylinder	PI30302F
10		Pin, Cotter	FA020864
11		Pin, Cotter	FA020564
12		Pin, Upper Lift Cylinder	PI30240F
13		Boom, Main Assembly Less Pins	
--		and Cylinders	NOT AVAILABLE
14		Grease Fitting (1/8" Straight)	HF2002S
15		Cylinder, Main Boom Lift	CY01005
15A		Bushing, Lift Cylinder	
--		Upper and Lower	BU402024
16		Pin, Lower Tip Cylinder	PI22272F
17		Pin, Cotter	FA020548
18		Bushing, Lower Tip Cylinder	
--		Bronze (2 required)	BU402014
19		Cylinder, Tip Boom 4"	CY02007
20		Pin, Cotter	FA020548
21		Nut, Tip Boom Pivot	NUB24U
22		Pin, Tip Boom Pivot	PI22280F
23		Spacer, Tip Boom Pivot Bolt	Not Always Required
24		Clamp, Boom Tube	CLP2C
25		Tube, Boom	TU03006
26		N/A	
27		N/A	
28		Bushing, Upper Tip Cylinder Pin Bronze	BU402014
29		Tip Boom	NOT AVAILABLE
30		Clamp, Boom Tube	CLH2AP
31		Boom Tube, Tip Boom	TU03005
32		Bolt, Tip Boom Gimbal	BL120124U87
33		Spacer, Tip Boom Gimbal	WAB2030
34		Nut, Tip Boom Gimbal	NUS20U
35		Gimbal, Tip Boom (340 Rotation)	102120
--		Gimbal, Tip Boom (Continuous Rotation/RS)	102122
36		Bushing, Tip Boom Gimbal	BU502002
37		Brake Washer	WAF642004
38		N/A	
39		Banana Link Weldment with Bushings	108207
40		Bushing, Lower Banana Link	BU502006
41		Bushing, Tip Boom Pivot	BU502006
42		Bushing, Upper Banana Link	BU502005
43		Connecting Link Weldment with Bushings	109230
44		Bushing, Upper Connecting Link Bronze	BU402011
45		Bushing, Lower Connecting Link Nylatron	BU502007
46		Spacer, Upper Tip Cylinder Pin	109244
47		Collar, Upper Tip Cylinder Pin	116110
48		Pin, Upper Tip Cylinder/Upper Banana Link	PI22140F
49		Pin, Lower Connecting Link	PI22108F
50		Pin, Lower Banana Link	PI22240F



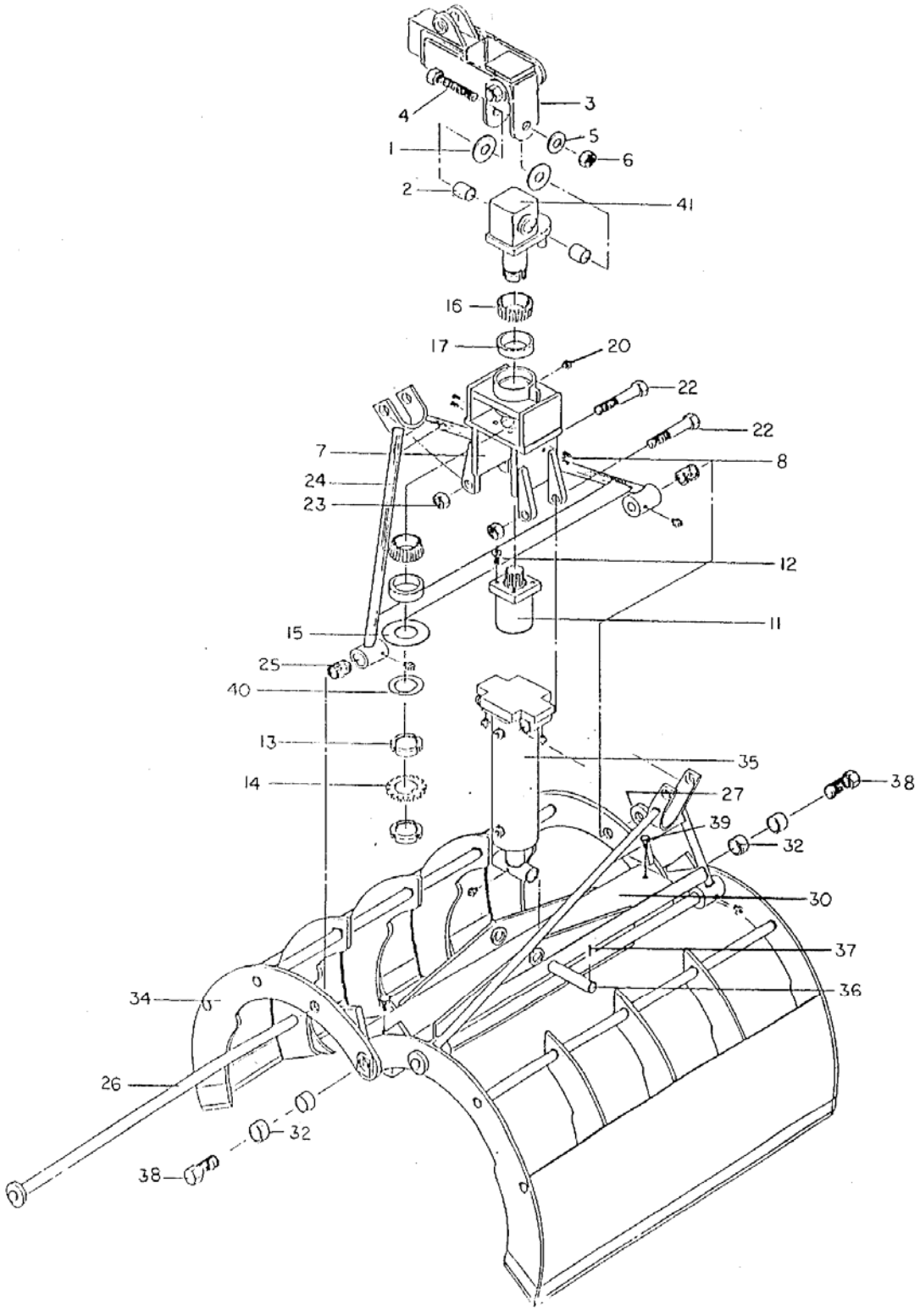
Main and Tip Boom Assembly: Model TL2
Diagram 202

Dia. No.		Part Name	Order By This Part No.
TL2 MAIN AND TIP BOOM ASSEMBLY: (DIAGRAM 202)			
1		Nut, End Cap	NUA04U
2		Lock Washer, End Cap	WAS045
3		End Cap	108225
4		Grease Fitting, 1/8" 90 Degree	HF20029
5		Bushing, Main Boom Pivot	BU503004
6		Bolt, Main Boom Pivot	BL132320U845
7		Nut, Main Boom Pivot	NUB32HU
8		Pin, Cotter	FA020764
9		Pin, Lower Lift Cylinder	PI30802F
10		Pin, Cotter	FA020864
11		Pin, Cotter	FA020864
12		Pin, Upper Lift Cylinder	PI30274F
13		Boom, Main Assembly Less Pins	Not Available
--		and Cylinders	
14		Grease Fitting (1/8" Straight)	HF2002S
15		Cylinder, Main Boom Lift	CY01005
15A		Bushing, Lift Cylinder	
--		Upper and Lower	BU402024
16		Pin, Lower Tip Cylinder	PI22272F
17		Pin, Cotter	FA020548
18		Bushing, Lower Tip Cylinder	
--		Bronze (2 required)	BU402014
19		Cylinder, Tip Boom 5"	CY02008
20		Pin, Cotter	FA020764
21		Nut, Tip Boom Pivot	NUB32HU
22		Bolt, Tip Boom Pivot	BL132320U845
23		Spacer, Tip Boom Pivot Bolt	Not Always Required
24		Clamp, Boom Tube	CLP2C
25		Tube, Boom	TU03006
26		Bushing, Tip Boom Pivot	BU502008
27		Pin, Upper Tip Cylinder	PI22108F
28		Bushing, Upper Tip Cylinder Pin Bronze	BU402016
29		Tip Boom	109102
30		Clamp, Boom Tube	CLH2AP
31		Boom Tube, Tip Boom	TU03005
32		Bolt, Tip Boom Gimbal	BL120124U87
33		Spacer, Tip Boom Gimbal	WAB2030
34		Nut, Tip Boom Gimbal	NUS20U
35		Gimbal, Tip Boom (340 Rotation)	102120
--		Gimbal, Tip Boom (Continuous Rotation/RS	102122
36		Bushing, Tip Boom Gimbal	BU502002
37		Brake Washer	WAF642004
38		Spacer, Main to Tip Boom Bushing	BU507004



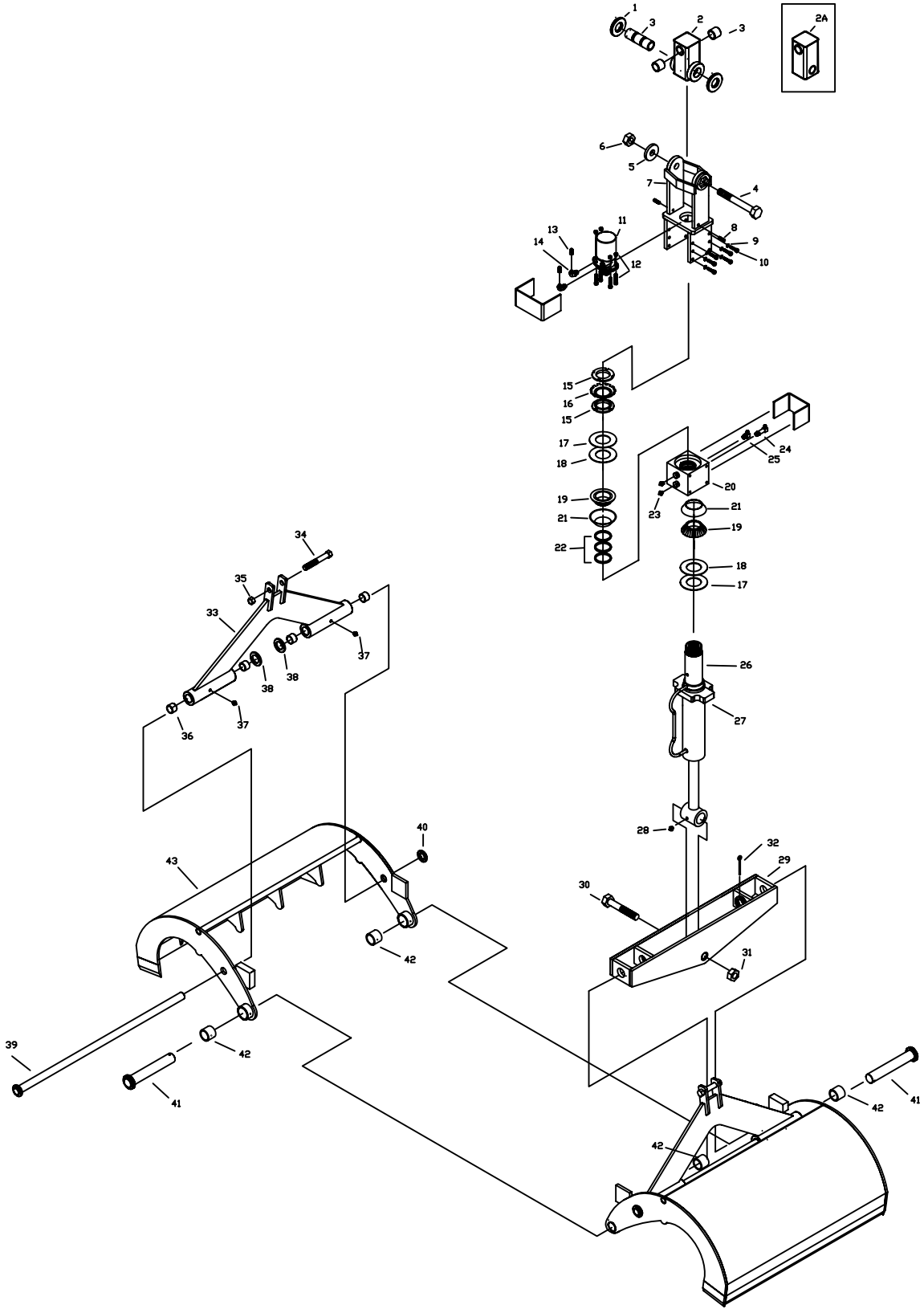
Main and Tip Boom Assembly: Model TL2
Diagram 203

Dia. No.		Part Name	Order By This Part No.
TL2 MAIN AND TIP BOOM ASSEMBLY: (DIAGRAM 203)			
1		Nut, End Cap	NUA04U
2		Lock Washer, End Cap	WAS045
3		End Cap	108225
4		Grease Fitting, 1/8" 90 Degree	HF20029
5		Bushing, Main Boom Pivot	BU503004
6		Bolt, Main Boom Pivot	BL132320U845
7		Nut, Main Boom Pivot	NUB32HU
8		Pin, Cotter	FA020764
9		Pin, Lower Lift Cylinder	PI30302F
10		Pin, Cotter	FA020864
11		Pin, Cotter	FA020864
12		Pin, Upper Lift Cylinder	PI30274F
13		Boom, Main Assembly Less Pins	
--		and Cylinders	108102
14		Grease Fitting (1/8" Straight)	HF2002S
15		Cylinder, Main Boom Lift	121101
15A		Bushing, Lift Cylinder	
--		Upper and Lower	BU402024
16		Pin, Lower Tip Cylinder	PI22272F
17		Pin, Cotter	FA020548
18		Bushing, Lower Tip Cylinder	
--		Bronze (2 required)	BU402014
19		Cylinder, Tip Boom 5"	CY02008
20		Pin, Cotter	FA020764
21		Nut, Tip Boom Pivot	NUB32HU
22		Bolt, Tip Boom Pivot	BL132320U845
23		Spacer, Tip Boom Pivot Bolt	Not Always Required
24		Clamp, Boom Tube	CLP2C
25		Tube, Boom	TU03006
26		Bushing, Tip Boom Pivot	BU502008
27		Pin, Upper Tip Cylinder	PI22108F
28		Bushing, Upper Tip Cylinder Pin Bronze	BU402016
29		Tip Boom	109102
30		Clamp, Boom Tube	CLH2AP
31		Boom Tube, Tip Boom	TU03005
32		Bolt, Tip Boom Gimbal	BL120124U87
33		Spacer, Tip Boom Gimbal	WAB2030
34		Nut, Tip Boom Gimbal	NUS20U
35		Gimbal, Tip Boom (Continuous Rotation/RS	102122
36		Bushing, Tip Boom Gimbal	BU502002
37		Brake Washer	WAF642004
38		Spacer, Main to Tip Boom Bushing	BU507004



Petersen Industries, Inc. Lake Wales, FL
Diagram No.: 401
Description: Bucket Assembly, 340 Rotation

Dia. No.		Part Name	Order By This Part No.
TRASH BUCKET ASSEMBLY - 340 ROTATION DIAGRAM #401			
1		Washer, Brake	WAF642004
2		Bushing, Gimbal	BU502002
3		Gimbal Assembly	102120
4		Bolt, Gimbal Rotator	BL120124U87
5		Spacer, Gimbal Rotator	WAB2030
6		Nut, Gimbal Rotator	NUB20U
7		Bucket Rotator Weldment	See Note A
8		Set Screw, Motor Stabilizer (4 Required)	SCB0824W
9		Not Assigned	
10		Not Assigned	
11		Motor, Bucket Rotator, Charlynn	HC03002
12		Bolt, Motor Mounting	SCA0616C
13		Nut, Support Shaft	Not Available
14		Washer, Support Shaft	Not Available
15		Spacer, Support Shaft	Not Available
16		Bearing, Support Shaft	Not Available
17		Bearing Race, Support Shaft	Not Available
18		Not Assigned	
19		Not Assigned	
20		Grease Fitting, 1/8" Straight	HF2002S
21		Not Assigned	
22		Bolt, Bucket A-Frame Mounting	BL116096S814
23		Nut, Bucket A-Frame Mounting	NUD16S
24		A-Frame Assembly	See Note A
25		Bushing, Bucket A-Frame Pivot	BU402012
26		Shaft, Bucket A-Frame Pivot	102173
27		Collar, Bucket A-Frame Pivot Shaft	116106
28		Not Assigned	
29		Not Assigned	
30		Saddle Assembly	See Note A
31		Not Assigned	
32		Bushing, Bucket Main Pivot	Not Available
33		Not Assigned	
34		Jaw Assembly	See Note A
35		Cylinder, Bucket	See Note A
36		Pin, Bucket Cylinder Saddle Mounting	Not Available
37		Cotter Pin, 5/16" x 3"	FA020548
38		Bolt, Bucket Main Pivot	Not Available
39		Bolt, Bucket Main Pivot Retainer	Not Available
40		Tab Washer, Support Shaft	Not Available
41		Block & Shaft	Not Available
		NOTE A: ONLY CURRENT PRODUCTION PARTS	
		AVAILABLE. PLEASE CONSULT WITH THE PETERSEN	
		PARTS DEPARTMENT WHEN REPLACING THESE PARTS.	



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

TITLE: BUCKET GENERAL EXPLODED ASSEMBLY

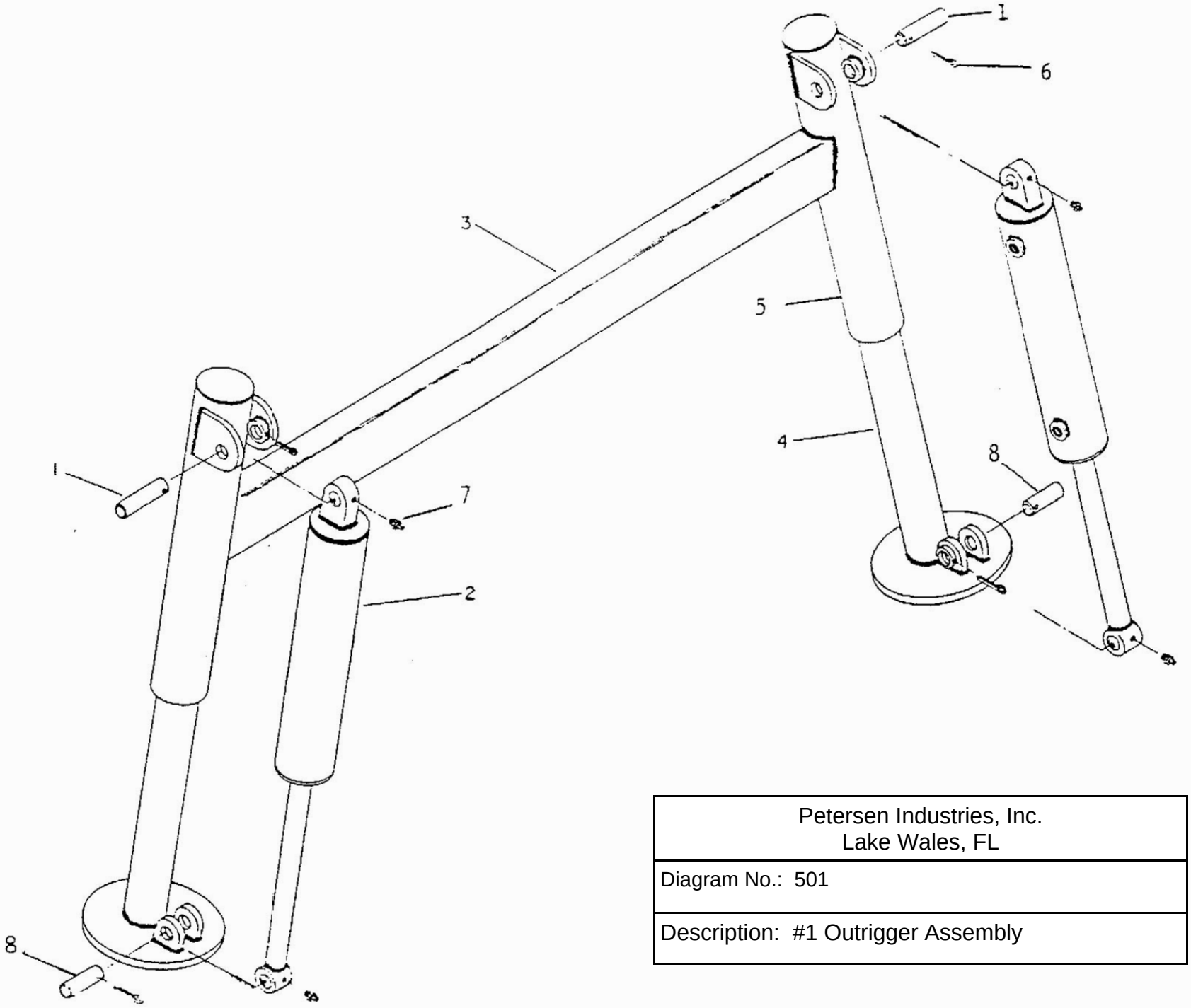
CAD NO:	DIAGRAM No:	SCALE
02 11 09 001 1	701904	N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
E.J.B.		3/10/99	1 OF 1

Dia. No.		Part Name	Order By This Part No.
TRASH BUCKET ASSEMBLY - CONTINUOUS ROTATION DIAGRAM #701904			
1		Washer, Brake	WAF642004
2	*	**Gimbal Assembly with Spacers**	102121
3		Bushing, Gimbal (5 Required)	BU502002
2A	*	**Gimbal Assembly**	102122
3		Bushing, Gimbal (4 Required)	BU502002
	*	**Bucket Rotator Assembly**	
4		Bolt, Gimbal/Rotator - 6 Spline	BL120124U87
		Bolt, Gimbal/Rotator - 14 Spline	BL120152U87
5		Spacer, Gimbal/Rotator	WAB2030
6		Nut, Gimbal/Rotator	NUB20U
7	*	Bucket Rot. Weldment for 6-Spline Motor	102160
		- or -	
	*	Bucket Rot. Weldment for 14-Spline Motor	102159
8		Set Screw, Motor Stabilizer	SCB0824W
9		Lockwasher, Motor Housing	WAS085
10		Bolt, Motor Housing	BL308024U513
11	*	Motor, "RS" Rotator 6-Spline	HC03003
		Packing, Motor 6-Spline	HPKPS222002
		- or -	
	*	Motor, "RE" Rotator 14-Spline	HC03004
		Packing, Motor 14-Spline	HPKPE444002
12	*	Bolt, Motor Mounting for 6-Spline Motor	SCA0616C
	*	Bolt, Motor Mounting for 14-Spline Motor	BL108032U813
		Nut, 14-Spline Motor Mt. Bolt	NUS08U
13		Hydraulic Fitting, .046 Restrictor for 6 & 14	HF906063046FM
		Spline Motors	
14		Hydraulic Fitting, 90 Degree Male for 6	HF806089M
		Spline Motor	
		Hydraulic Fitting, 90 Degree O-Ring for	HF10610JM9
		14 Spline Motor	

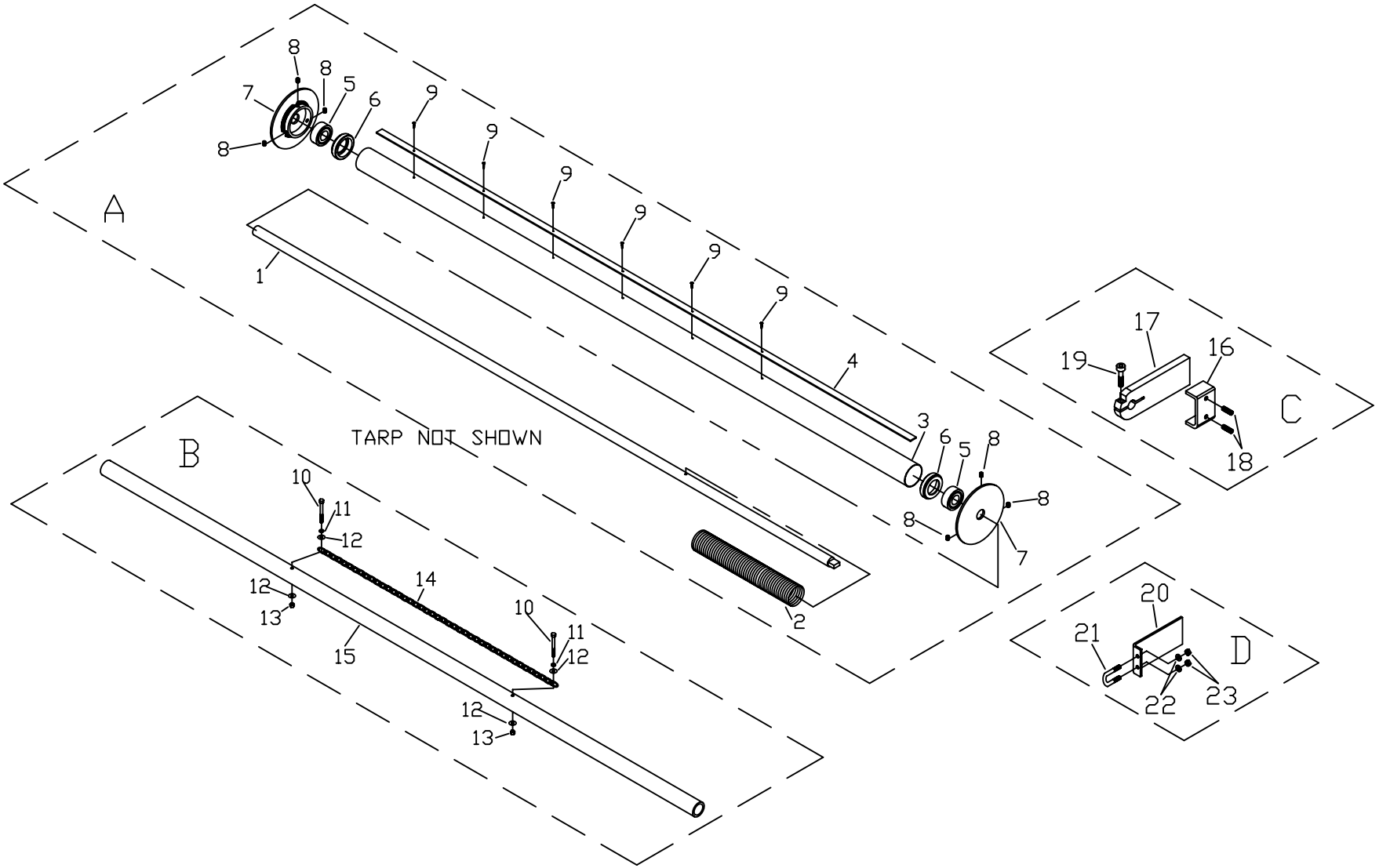
Dia. No.		Part Name	Order By This Part No.
		Bucket Manifold Assembly	102127
15		Nut, Support Shaft	BE03NAN15
16		Washer, Support Shaft	BE03NW15
17		Spacer, Support Shaft	WAF885002
18		Washer	WAL866902
19		Bearing, Support Shaft	BE03N495A
20		**Block Assembly**	102126
21		Bearing Race, Support Shaft	BE03N493
22		Seal Kit, Rotary Manifold (3 required)	HPKTR035
23		Grease Fitting, 1/8" Straight	HF2002S
24		Hydraulic Fitting	HF806069ML
25		Hydraulic Fitting	HF806069M
26	*	**Bucket Cylinder Assembly - 14 Spline**	102400
		- or -	
	*	**Bucket Cylinder Assembly - 6 Spline**	102402
27		Grease Fitting, 1/8" 90 Degree	HF20029
28		Grease Fitting, 1/8" Straight	HF2002S
		Bucket Saddle Assembly	102129
29		Saddle Weldment	102178
30		Bolt, Saddle Mounting	BL120124U87
31		Nut, Saddle Mounting Bolt	NUB20U
32		Bolt, Retainer	BL305036U518
		Nut, Retainer	NUS05U
		Bucket A-Frame Assembly (one side)	102130
33		A-Frame Weldment with Bushings	102172
34		Bolt, A-Frame Mounting	BL116084S8H1400
35		Nut, A-Frame Mounting Bolt	NUB16S5
		Bolt, Retainer	BL304032U520
		Nut, Retainer	NUS04U
36		Bushing, A-Frame Pivot	BU402012
37		Grease Fitting, 1/8" Straight	HF2002S
38		Washer, A-Frame Pivot (2 per shaft)	WAB2436
39		Shaft, A-Frame Pivot	102173
40		Collar, A-Frame Pivot (2 per shaft)	116106
		Collar with hole, A-Frame Pivot	116105
41		Pin, Bucket Main Pivot	PI30204FC
42		Bushing, Bucket Main Pivot (2 per side)	BU502008

Dia. No.		Part Name	Order By This Part No.
43		**Bucket Jaw Assembly (one side)**	102132
		BUCKET ASSEMBLY COMPLETE	102101
	*	**Note: Ordering these parts may require upgrading to current**	
		production parts. Please consult with the Petersen Parts	
		Department when ordering these parts.	



Petersen Industries, Inc. Lake Wales, FL
Diagram No.: 501
Description: #1 Outrigger Assembly

Dia. No.		Part Name	Order By This Part No.
#1 Outrigger Assembly Diagram #501			
1		Pin, Cylinder Connecting, Base End	PI18082F
2		Cylinder, 3"	CY05002
3		Tube, Horizontal	Not Available
4		Tube & Foot Assembly, Inner Vertical	Not Available
5		Tube Assembly, Outer Vertical	Not in Stock
6		Pin, Cotter 5/16" x 3"	FA020548
7		Grease Fitting, 1/8" Straight	HF2002S
8		Pin, Cylinder Connecting, Rod End	PI18062F



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

TITLE: PI SELF WINDING TARP ROLLER ASSEMLBY

CAD NO.	PART NO.	SCALE
12 09 01 001 0		N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
MRC		4/28/98	1 OF 1

Dia. No.		Part Name	Order By This Part No.
TARP ROLLER ASSEMBLY, P. I. SELF WINDING (DIAGRAM NO. 1209010010)			
		A - TARP ROLLER ASSEMBLY	122111
1		Spring Bar	122801
2		Tarp Return Spring	SP02003
3		Tarp Return Pipe, 94" EMT	EL06002
4		Tarp Retainer Bar	122802
5		Roller Bearing	BE04N1654DC
6		Roller Bearing Retainer	122803
7		Bearing Retainer End Plate Assembly	122804
8		Screw, 3/8 - 16 x 1/2 Socket Set Screw	SCC0608
9		Screw, #10 x 3/4 Sheet Metal	SCM0512
		B - TARP PULL BAR ASSEMBLY	122112
10		Bolt, 5/16 - 18 x 3"	BL305048U518
11		Lock Washer, 5/16	WAS055
12		Flat Washer, 5/16	WAF05U5
13		Nut, 5/16 - 18	NUS05U
14		Chain, 3/16 PC x 48" (Qty = 4)	CHP03768
15		Pipe, 102" PVC	122129
		C - TARP ROLLER MT. ASSEMBLY	122809
16		Mounting Bracket	122805
17		Mounting Ear	122806
18		Screw, 1/2 - 13 x 1 1/2" Socket Set w/Patch	SCB0824W
19		Screw, 1/2 - 13 x 2 1/2" Socket Cap	SCA0840W
		D - TARP ROLLER MT. ASSEMBLY	122810
20		Mounting Ear	122808
21		Bolt, 1.25 x 2.25 U	BLU20036U5
22		Lockwasher, 3/8	WAS065
23		Nuts (Comes W/U-Bolts)	N/A
---		Tarp, 7'6" x 18'	AC1701
---		Canvas Roller Hook	CHH07000
---		1/4" Quick Link	CHQ04000

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.	

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: _____

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.

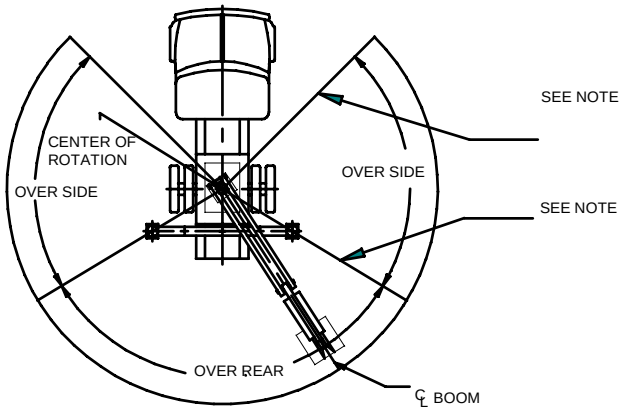
MODEL TL 2		
RADIUS	No. 1 OUTRIGGERS	No. 3 OUTRIGGERS
10 ft	5320 lb *	7100 lb
16 ft	2650 lb *	3750 lb

MODELS TL 3, PL 3, HL 3, BL 3 & DL 3 OUTRIGGERS EXTENDED		
RADIUS	TIP EXTENSION RETRACTED	TIP EXTENSION EXTENDED
10 ft	7100 lb	7100 lb
16 ft	3750 lb	4400 lb
20 ft	-	3200 lb

MODEL RL 2 WITH OUTRIGGERS EXTENDED		
RADIUS	OVER SIDE	OVER REAR
10 ft	5500 lb *	7100 lb
16 ft	3100 lb *	3750 lb

MODEL RL 3 WITH OUTRIGGERS EXTENDED			
RADIUS	OVER SIDE	OVER REAR	
		TIP EXTENSION RETRACTED	TIP EXTENSION EXTENDED
10 ft	5500 lb *	7100 lb	7100 lb
16 ft	3100 lb *	3750 lb	4400 lb
20 ft	1800 lb *	-	3200 lb

RADIUS	MODEL SL 2	MODEL SL 3	
		TIP EXTENSION RETRACTED	TIP EXTENSION EXTENDED
10 ft	7100 lb	7100 lb	7100 lb
16 ft	3750 lb	3750 lb	4400 lb
20 ft	-	-	3200 lb



NOTE: THESE LINES DETERMINE THE LIMITING POSITION OF ANY LOAD FOR OPERATION WITHIN WORKING AREAS INDICATED

LOAD DIAGRAM FOR MODELS RL 2 & RL 3

Weight of attachment to be subtracted from lift capacities. Standard Trash bucket weighs 1000 lbs.

Radii are measured in feet from the center of rotation to the center of the bucket

Loads marked with (*) are limited by the stability of the loader.

Loads for the loader on outriggers represent 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.

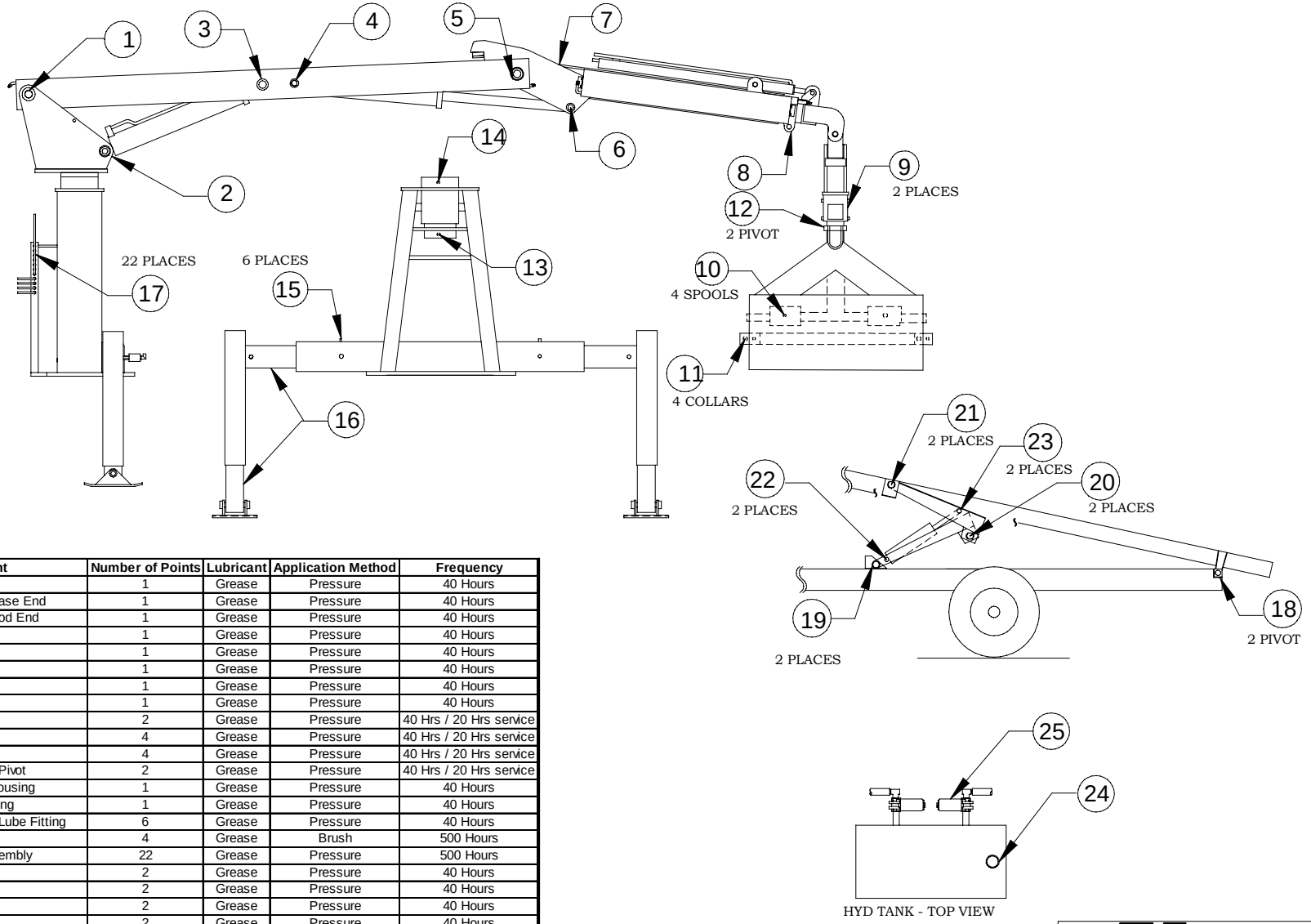
Tip Boom Extension function is not to be used for load lifting. This function is only for load reaching or to improve load-lifting capacity.

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.

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

TITLE:			
LOAD CHART FOR TRASH LOADERS			
CAD NO.: 01 00 00 003 4	PART NO.:		SCALE: N/A
DRAWN BY: EJB	APPROVED:	DATE: 8/31/99	SHEET: 1 OF 1



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 Manifold	2	Grease	Pressure	40 Hrs / 20 Hrs service
10	Bucket A Frame Spools	4	Grease	Pressure	40 Hrs / 20 Hrs service
11	Bucket Main Pivot	4	Grease	Pressure	40 Hrs / 20 Hrs service
12	Bucket A Frame Connect Pivot	2	Grease	Pressure	40 Hrs / 20 Hrs service
13	Spindle Bottom Bearing Housing	1	Grease	Pressure	40 Hours
14	Spindle Top Bearing Housing	1	Grease	Pressure	40 Hours
15	Outrigger Tube Wear Pad Lube Fitting	6	Grease	Pressure	40 Hours
16	Outrigger Inner Tubes	4	Grease	Brush	500 Hours
17	Valve, Control Handle Assembly	22	Grease	Pressure	500 Hours
18	Body, Chassis Pivot	2	Grease	Pressure	40 Hours
19	Hoist Lower Pivot	2	Grease	Pressure	40 Hours
20	Hoist Scissors Pivot	2	Grease	Pressure	40 Hours
21	Hoist Upper Pivot	2	Grease	Pressure	40 Hours
22	Hoist Cylinder Lower Pivot	2	Grease	Pressure	40 Hours
23	Hoist Cylinder Upper Pivot	2	Grease	Pressure	40 Hours
24	Hydraulic Tank	1	Oil	Fill to Max. Level	40 Hours
25	Hydraulic Filters	2	-	Replace	1000 Hours

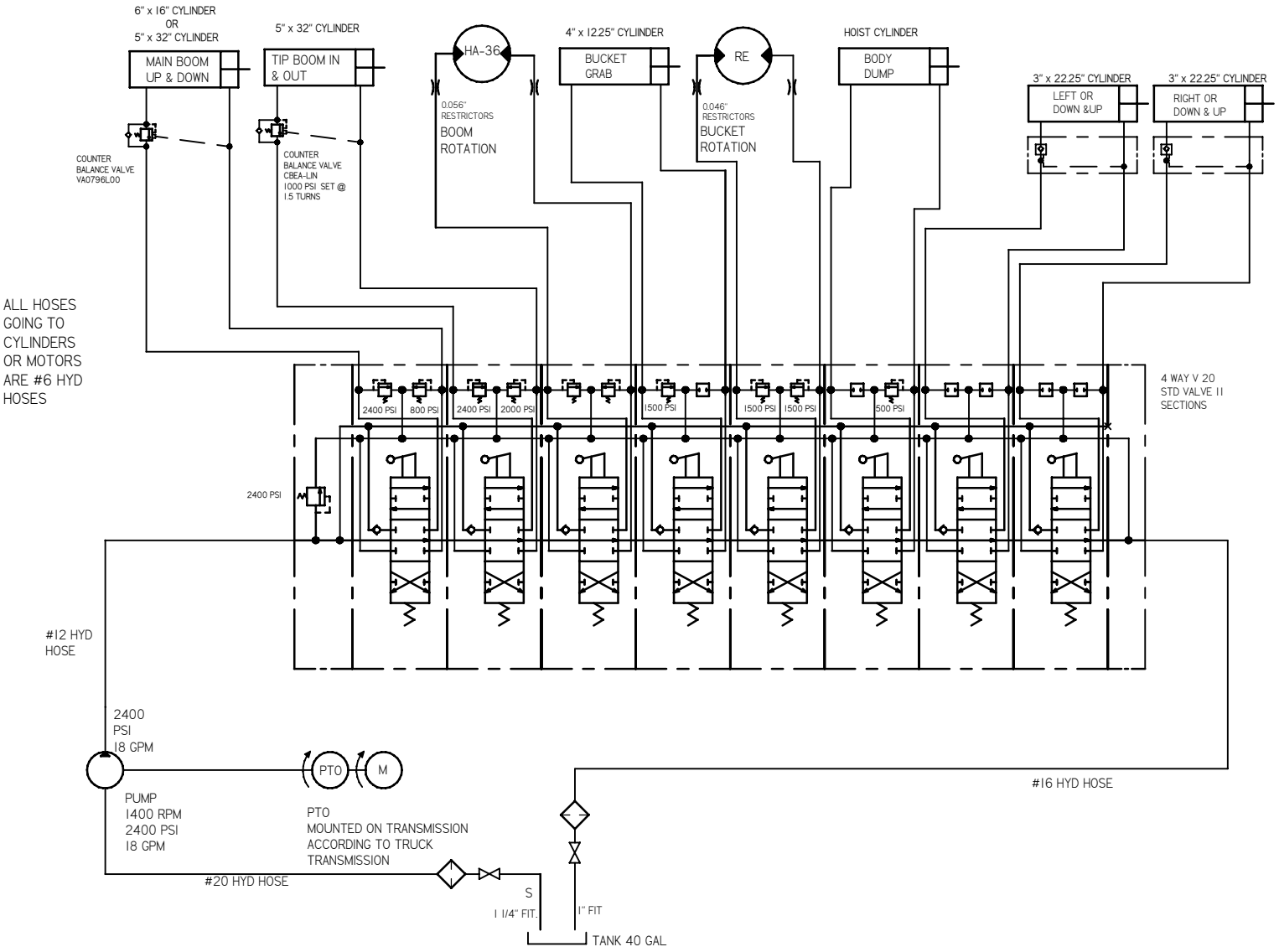
HYD TANK - TOP VIEW

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES,FL.33853
(863) 676 1493 FX (863) 676 6844

TITLE: LOADER LUBRICATION POINTS

CAD NO.	PART NO.	SCALE
01 00 00 001 3	N/A	N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
E.B.		8/06/99	1 OF 1

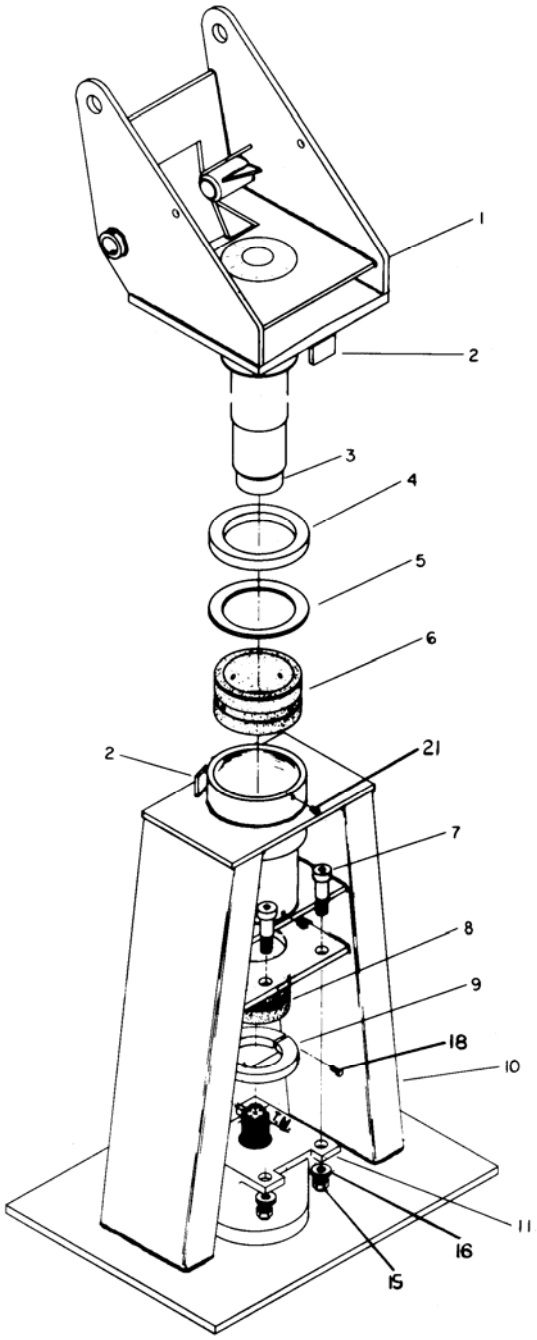


PETERSEN INDUSTRIES INC.
4000 STATE ROAD 60 W
LAKE WALES,FL.33859
(863) 676 1493 FX (863) 676 6844

TITLE: HYDRAULIC CIRCUIT FOR TL - 2

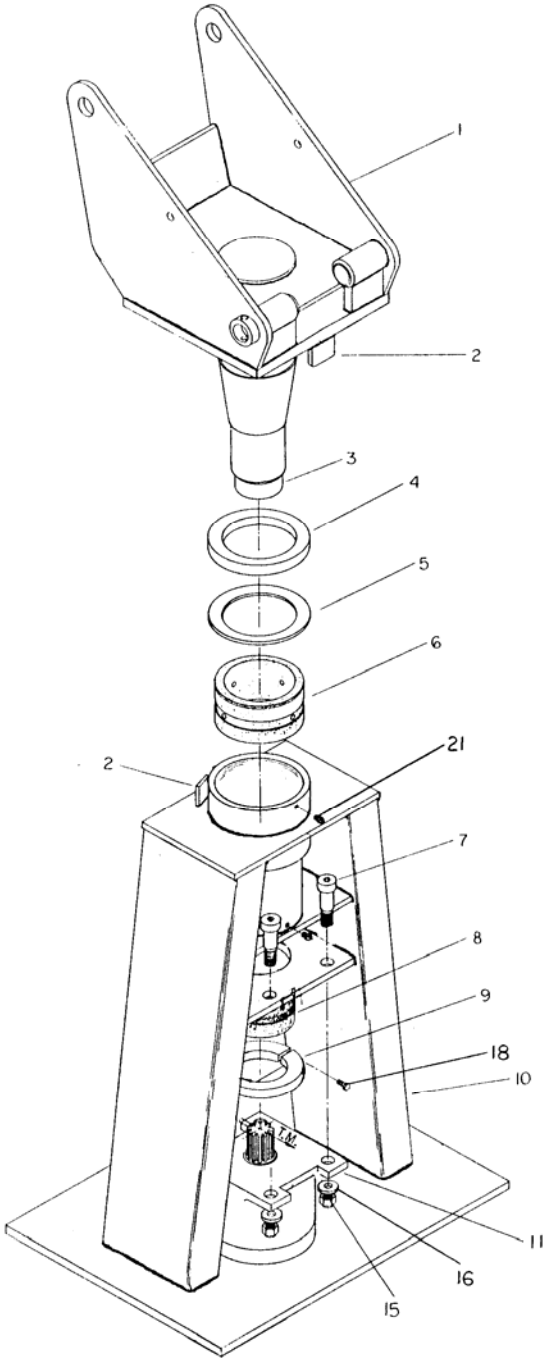
CAD NO.:	PART NO.:	SCALE
52 07 02 0011		N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
		03/30/07	1 OF 1



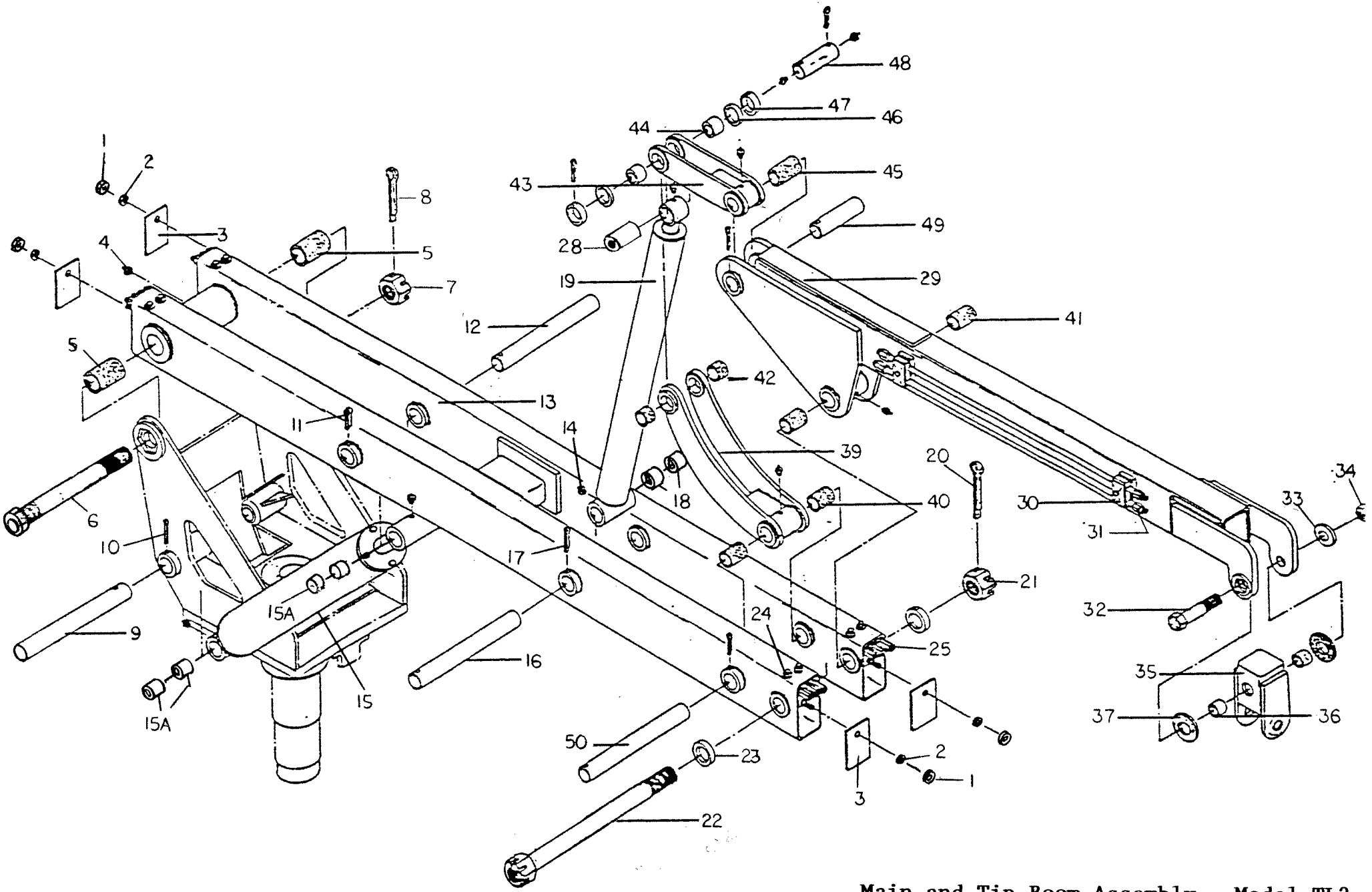
Petersen Industries, Inc. Lake Wales, FL	
Diagram No.: 102	
Description: Head & Pedestal Assembly with HA36 Rotary Actuator	
Drawn by: MS	Date: 08/09/95

Dia. No.		Part Name	Order By This Part No.
HEAD AND PEDESTAL ASSEMBLY WITH HA36 HYDRAULIC ACTUATOR : (DIAGRAM #102)			
1		Head and Spindle Assembly	107104 (See Note A)
2		Head and Pedestal Stop	106216
3		Spline, Spindle	HC99002
4		Nylatron Bushing-Thrust Bearing	BU510003
5		Thrust Spacer	106210
6		Nylatron Bushing-Upper Bearing Housing	BU509002
7		Bolt, Hydraulic Actuator	BL120032U8
8		Nylatron Bushing-Lower Bearing Housing	BU507005
9		Lock Collar, 1-Piece	117104
		Socket Set Screws, 3/8 X 1 Halfdog w/Pat	SCD0616W
10		Pedestal Assembly	106103 (See Note A)
11		Hydraulic Actuator-Swing (HA36)	HC01001
--		Hydraulic Actuator - Seal Kit	HPKAS395
12		Not Applicable	
13		Not Applicable	
14		Not Applicable	
15		Nut, Actuator Bolt	NUF14U
16		Flat Washer, Actuator Bolt	WAF14S8
17		Not Applicable	
18		Screw, Lock Collar 1/2 X 2 Socket Head	SCA0840C
		with Patch	
19		Not Applicable	
20		Not Applicable	
21		Grease Fitting (1/8" Straight)	HF2002S
		Note A: Only current production parts are available. Current production parts may require that other assemblies be changed such as the Main Boom Assembly and/or the Outrigger Assembly.	



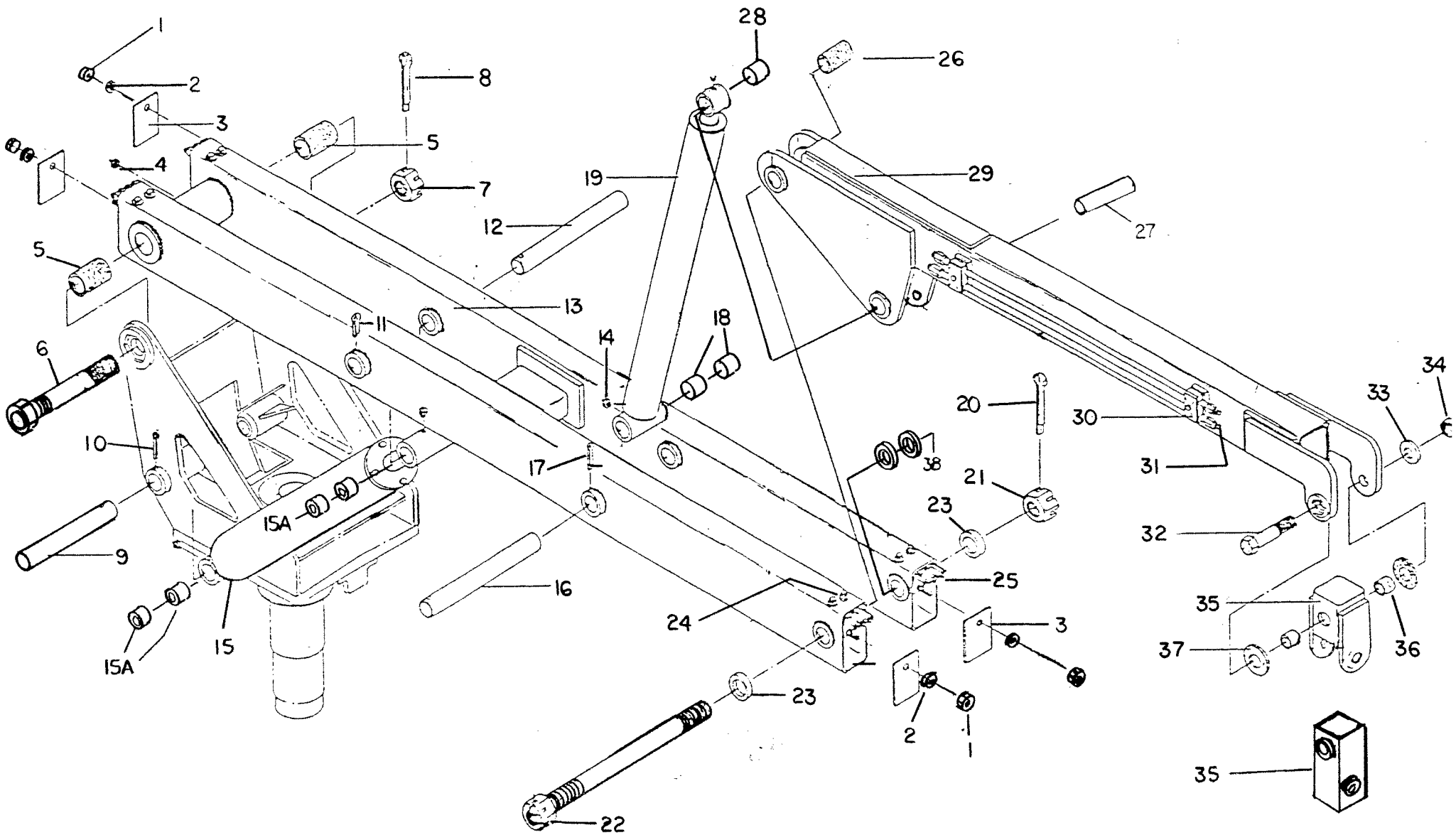
Petersen Industries, Inc. Lake Wales, FL	
Diagram No.: 103	
Description: Head & Pedestal Assembly with HA36 Rotary Actuator	
Drawn by: MS	Date: 08/09/95

Dia. No.		Part Name	Order By This Part No.
HEAD AND PEDESTAL ASSEMBLY WITH HA36 HYDRAULIC ACTUATOR : (DIAGRAM #103)			
1		Head and Spindle Assembly	107104 (See Note A)
2		Head and Pedestal Stop	106216
3		Spline, Spindle	HC99002
4		Nylatron Bushing-Thrust Bearing	BU510003
5		Thrust Spacer	106210
6		Nylatron Bushing-Upper Bearing Housing	BU509002
7		Bolt, Hydraulic Actuator	BL120032U8
8		Nylatron Bushing-Lower Bearing Housing	BU507005
9		Lock Collar (2-Piece, One Side Only)	117103
10		Pedestal Assembly	106103 (See Note A)
11		Hydraulic Actuator-Swing (HA36)	HC01001
--		Hydraulic Actuator - Seal Kit	HPKAS395
12		Not Applicable	
13		Not Applicable	
14		Not Applicable	
15		Nut, Actuator Bolt	NUF14U
16		Flat Washer, Actuator Bolt	WAF14S8
17		Not Applicable	
18		Bolt, Lockcollar	BL308048U513
		Nut, Lockcollar	NUS08U
19		Not Applicable	
20		Not Applicable	
21		Grease Fitting (1/8" Straight)	HF2002S
		Note A: Only current production parts are available. Current	
		production parts may require that other assemblies be changed	
		such as the Main Boom Assembly and/or the Outrigger	
		Assembly.	



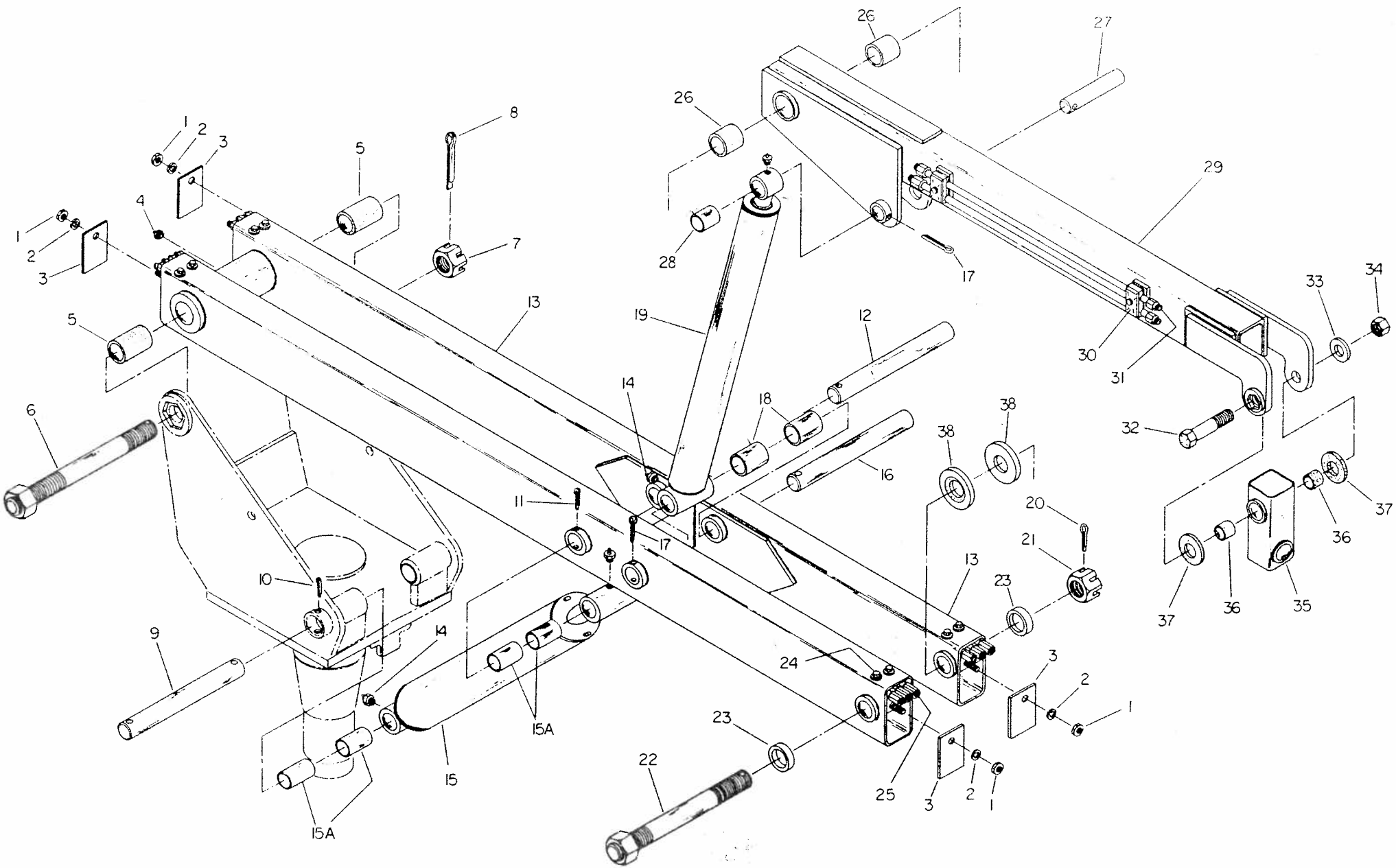
Main and Tip Boom Assembly: Model TL2
Diagram 201

Dia. No.		Part Name	Order By This Part No.
TL2 MAIN AND TIP BOOM ASSEMBLY (DIAGRAM #201)			
1		Nut, End Cap	NUA04U
2		Lock Washer, End Cap	WAS045
3		End Cap	108255
4		Grease Fitting, 1/8" 90 Degree	HF20029
5		Bushing, Main Boom Pivot	BU503001
6		Pin, Main Boom Pivot	BL102016
7		Nut, Main Boom Pivot	NUB32HS
8		Pin, Cotter	FA020764
9		Pin, Lower Lift Cylinder	PI30302F
10		Pin, Cotter	FA020864
11		Pin, Cotter	FA020564
12		Pin, Upper Lift Cylinder	PI30240F
13		Boom, Main Assembly Less Pins	
--		and Cylinders	NOT AVAILABLE
14		Grease Fitting (1/8" Straight)	HF2002S
15		Cylinder, Main Boom Lift	CY01005
15A		Bushing, Lift Cylinder	
--		Upper and Lower	BU402024
16		Pin, Lower Tip Cylinder	PI22272F
17		Pin, Cotter	FA020548
18		Bushing, Lower Tip Cylinder	
--		Bronze (2 required)	BU402014
19		Cylinder, Tip Boom 4"	CY02007
20		Pin, Cotter	FA020548
21		Nut, Tip Boom Pivot	NUB24U
22		Pin, Tip Boom Pivot	PI22280F
23		Spacer, Tip Boom Pivot Bolt	Not Always Required
24		Clamp, Boom Tube	CLP2C
25		Tube, Boom	TU03006
26		N/A	
27		N/A	
28		Bushing, Upper Tip Cylinder Pin Bronze	BU402014
29		Tip Boom	NOT AVAILABLE
30		Clamp, Boom Tube	CLH2AP
31		Boom Tube, Tip Boom	TU03005
32		Bolt, Tip Boom Gimbal	BL120124U87
33		Spacer, Tip Boom Gimbal	WAB2030
34		Nut, Tip Boom Gimbal	NUS20U
35		Gimbal, Tip Boom (340 Rotation)	102120
--		Gimbal, Tip Boom (Continuous Rotation/RS)	102122
36		Bushing, Tip Boom Gimbal	BU502002
37		Brake Washer	WAF642004
38		N/A	
39		Banana Link Weldment with Bushings	108207
40		Bushing, Lower Banana Link	BU502006
41		Bushing, Tip Boom Pivot	BU502006
42		Bushing, Upper Banana Link	BU502005
43		Connecting Link Weldment with Bushings	109230
44		Bushing, Upper Connecting Link Bronze	BU402011
45		Bushing, Lower Connecting Link Nylatron	BU502007
46		Spacer, Upper Tip Cylinder Pin	109244
47		Collar, Upper Tip Cylinder Pin	116110
48		Pin, Upper Tip Cylinder/Upper Banana Link	PI22140F
49		Pin, Lower Connecting Link	PI22108F
50		Pin, Lower Banana Link	PI22240F



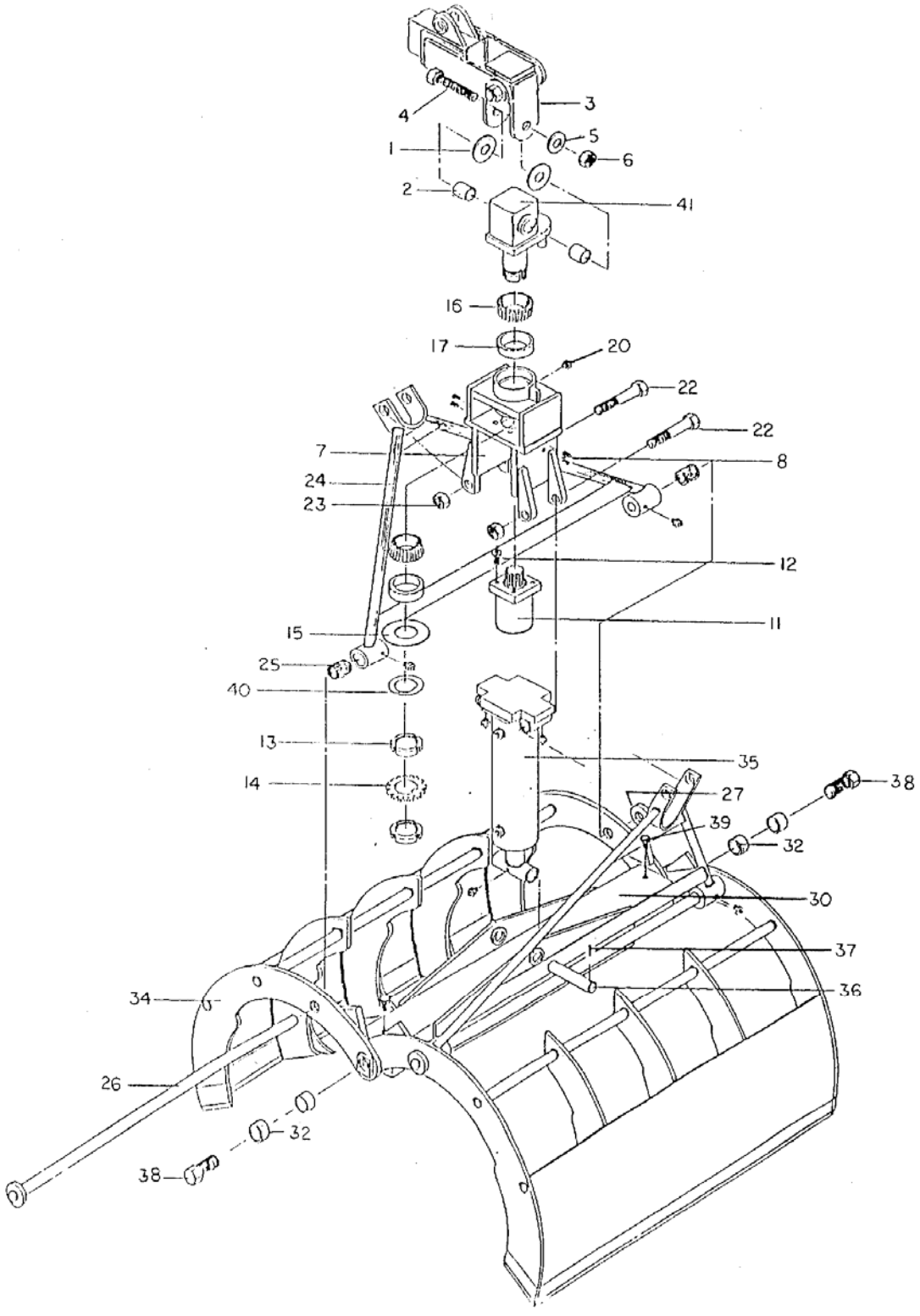
Main and Tip Boom Assembly: Model TL2
Diagram 202

Dia. No.		Part Name	Order By This Part No.
TL2 MAIN AND TIP BOOM ASSEMBLY: (DIAGRAM 202)			
1		Nut, End Cap	NUA04U
2		Lock Washer, End Cap	WAS045
3		End Cap	108225
4		Grease Fitting, 1/8" 90 Degree	HF20029
5		Bushing, Main Boom Pivot	BU503004
6		Bolt, Main Boom Pivot	BL132320U845
7		Nut, Main Boom Pivot	NUB32HU
8		Pin, Cotter	FA020764
9		Pin, Lower Lift Cylinder	PI30802F
10		Pin, Cotter	FA020864
11		Pin, Cotter	FA020864
12		Pin, Upper Lift Cylinder	PI30274F
13		Boom, Main Assembly Less Pins	Not Available
--		and Cylinders	
14		Grease Fitting (1/8" Straight)	HF2002S
15		Cylinder, Main Boom Lift	CY01005
15A		Bushing, Lift Cylinder	
--		Upper and Lower	BU402024
16		Pin, Lower Tip Cylinder	PI22272F
17		Pin, Cotter	FA020548
18		Bushing, Lower Tip Cylinder	
--		Bronze (2 required)	BU402014
19		Cylinder, Tip Boom 5"	CY02008
20		Pin, Cotter	FA020764
21		Nut, Tip Boom Pivot	NUB32HU
22		Bolt, Tip Boom Pivot	BL132320U845
23		Spacer, Tip Boom Pivot Bolt	Not Always Required
24		Clamp, Boom Tube	CLP2C
25		Tube, Boom	TU03006
26		Bushing, Tip Boom Pivot	BU502008
27		Pin, Upper Tip Cylinder	PI22108F
28		Bushing, Upper Tip Cylinder Pin Bronze	BU402016
29		Tip Boom	109102
30		Clamp, Boom Tube	CLH2AP
31		Boom Tube, Tip Boom	TU03005
32		Bolt, Tip Boom Gimbal	BL120124U87
33		Spacer, Tip Boom Gimbal	WAB2030
34		Nut, Tip Boom Gimbal	NUS20U
35		Gimbal, Tip Boom (340 Rotation)	102120
--		Gimbal, Tip Boom (Continuous Rotation/RS	102122
36		Bushing, Tip Boom Gimbal	BU502002
37		Brake Washer	WAF642004
38		Spacer, Main to Tip Boom Bushing	BU507004



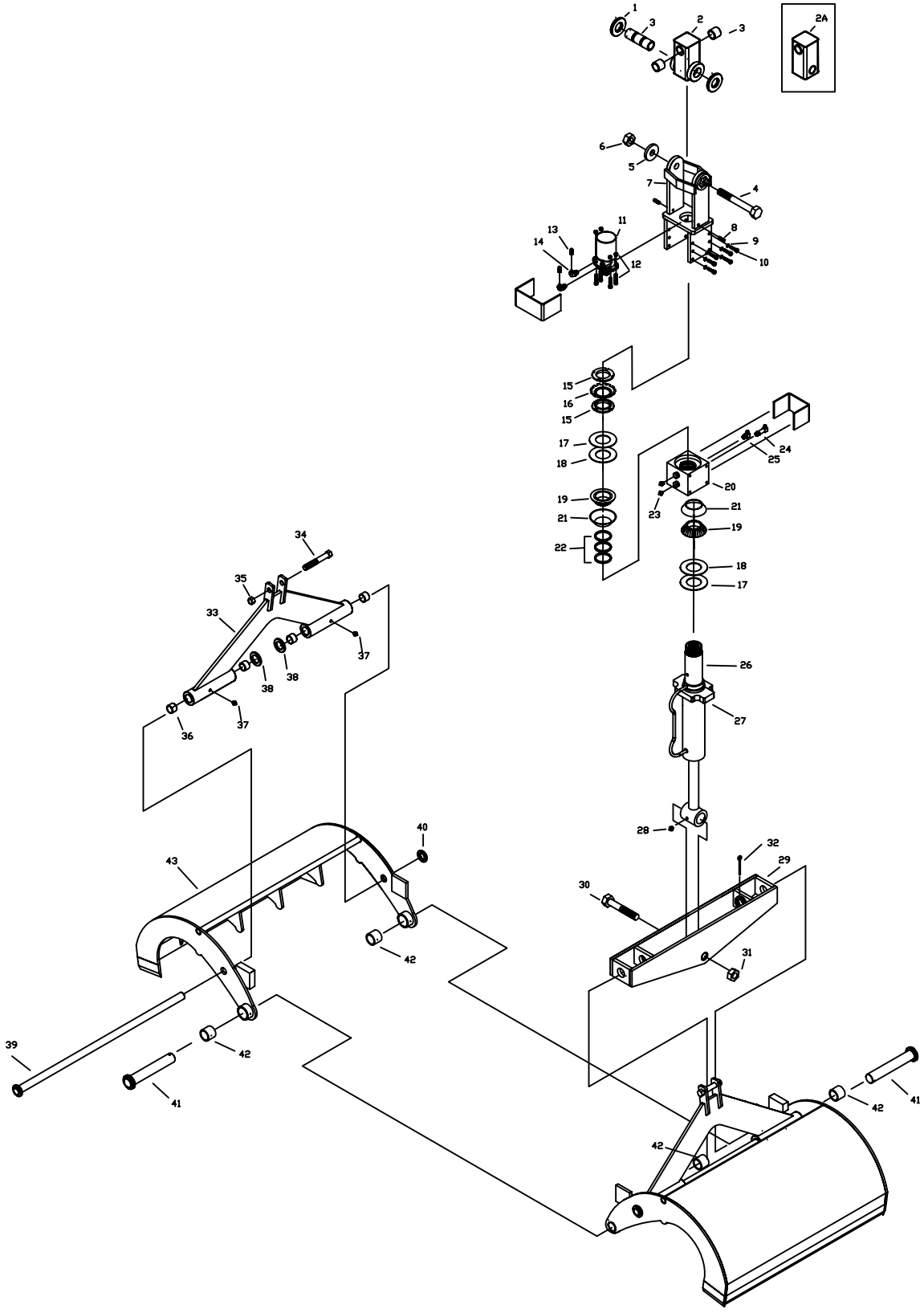
Main and Tip Boom Assembly: Model TL2
Diagram 203

Dia. No.		Part Name	Order By This Part No.
TL2 MAIN AND TIP BOOM ASSEMBLY: (DIAGRAM 203)			
1		Nut, End Cap	NUA04U
2		Lock Washer, End Cap	WAS045
3		End Cap	108225
4		Grease Fitting, 1/8" 90 Degree	HF20029
5		Bushing, Main Boom Pivot	BU503004
6		Bolt, Main Boom Pivot	BL132320U845
7		Nut, Main Boom Pivot	NUB32HU
8		Pin, Cotter	FA020764
9		Pin, Lower Lift Cylinder	PI30302F
10		Pin, Cotter	FA020864
11		Pin, Cotter	FA020864
12		Pin, Upper Lift Cylinder	PI30274F
13		Boom, Main Assembly Less Pins	
--		and Cylinders	108102
14		Grease Fitting (1/8" Straight)	HF2002S
15		Cylinder, Main Boom Lift	121101
15A		Bushing, Lift Cylinder	
--		Upper and Lower	BU402024
16		Pin, Lower Tip Cylinder	PI22272F
17		Pin, Cotter	FA020548
18		Bushing, Lower Tip Cylinder	
--		Bronze (2 required)	BU402014
19		Cylinder, Tip Boom 5"	CY02008
20		Pin, Cotter	FA020764
21		Nut, Tip Boom Pivot	NUB32HU
22		Bolt, Tip Boom Pivot	BL132320U845
23		Spacer, Tip Boom Pivot Bolt	Not Always Required
24		Clamp, Boom Tube	CLP2C
25		Tube, Boom	TU03006
26		Bushing, Tip Boom Pivot	BU502008
27		Pin, Upper Tip Cylinder	PI22108F
28		Bushing, Upper Tip Cylinder Pin Bronze	BU402016
29		Tip Boom	109102
30		Clamp, Boom Tube	CLH2AP
31		Boom Tube, Tip Boom	TU03005
32		Bolt, Tip Boom Gimbal	BL120124U87
33		Spacer, Tip Boom Gimbal	WAB2030
34		Nut, Tip Boom Gimbal	NUS20U
35		Gimbal, Tip Boom (Continuous Rotation/RS	102122
36		Bushing, Tip Boom Gimbal	BU502002
37		Brake Washer	WAF642004
38		Spacer, Main to Tip Boom Bushing	BU507004



Petersen Industries, Inc. Lake Wales, FL
Diagram No.: 401
Description: Bucket Assembly, 340 Rotation

Dia. No.		Part Name	Order By This Part No.
TRASH BUCKET ASSEMBLY - 340 ROTATION DIAGRAM #401			
1		Washer, Brake	WAF642004
2		Bushing, Gimbal	BU502002
3		Gimbal Assembly	102120
4		Bolt, Gimbal Rotator	BL120124U87
5		Spacer, Gimbal Rotator	WAB2030
6		Nut, Gimbal Rotator	NUB20U
7		Bucket Rotator Weldment	See Note A
8		Set Screw, Motor Stabilizer (4 Required)	SCB0824W
9		Not Assigned	
10		Not Assigned	
11		Motor, Bucket Rotator, Charlynn	HC03002
12		Bolt, Motor Mounting	SCA0616C
13		Nut, Support Shaft	Not Available
14		Washer, Support Shaft	Not Available
15		Spacer, Support Shaft	Not Available
16		Bearing, Support Shaft	Not Available
17		Bearing Race, Support Shaft	Not Available
18		Not Assigned	
19		Not Assigned	
20		Grease Fitting, 1/8" Straight	HF2002S
21		Not Assigned	
22		Bolt, Bucket A-Frame Mounting	BL116096S814
23		Nut, Bucket A-Frame Mounting	NUD16S
24		A-Frame Assembly	See Note A
25		Bushing, Bucket A-Frame Pivot	BU402012
26		Shaft, Bucket A-Frame Pivot	102173
27		Collar, Bucket A-Frame Pivot Shaft	116106
28		Not Assigned	
29		Not Assigned	
30		Saddle Assembly	See Note A
31		Not Assigned	
32		Bushing, Bucket Main Pivot	Not Available
33		Not Assigned	
34		Jaw Assembly	See Note A
35		Cylinder, Bucket	See Note A
36		Pin, Bucket Cylinder Saddle Mounting	Not Available
37		Cotter Pin, 5/16" x 3"	FA020548
38		Bolt, Bucket Main Pivot	Not Available
39		Bolt, Bucket Main Pivot Retainer	Not Available
40		Tab Washer, Support Shaft	Not Available
41		Block & Shaft	Not Available
		NOTE A: ONLY CURRENT PRODUCTION PARTS	
		AVAILABLE. PLEASE CONSULT WITH THE PETERSEN	
		PARTS DEPARTMENT WHEN REPLACING THESE PARTS.	



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

TITLE: BUCKET GENERAL EXPLODED ASSEMBLY

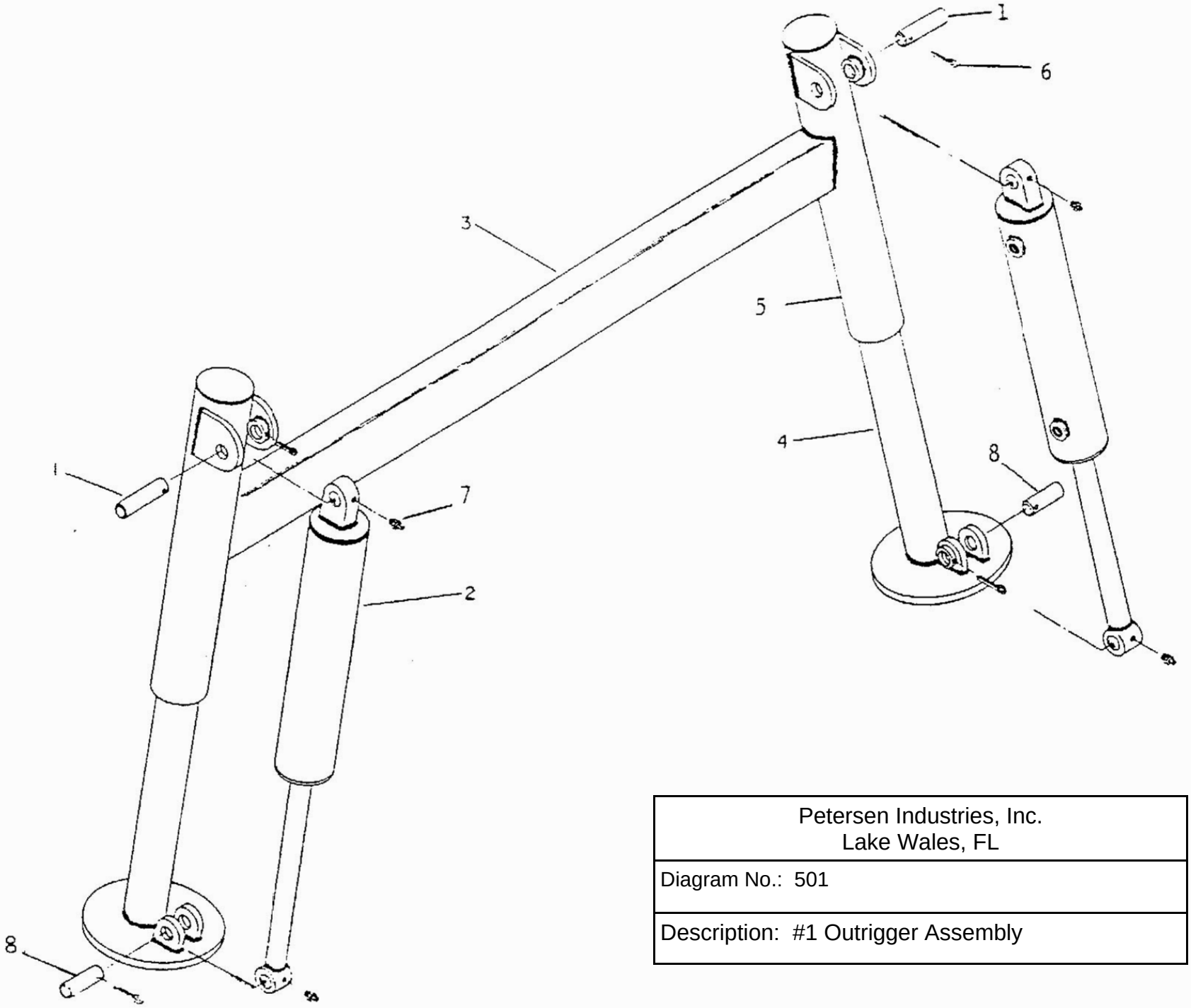
CAD NO:	DIAGRAM No:	SCALE
02 11 09 001 1	701904	N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
E.J.B.		3/10/99	1 OF 1

Dia. No.		Part Name	Order By This Part No.
TRASH BUCKET ASSEMBLY - CONTINUOUS ROTATION DIAGRAM #701904			
1		Washer, Brake	WAF642004
2	*	**Gimbal Assembly with Spacers**	102121
3		Bushing, Gimbal (5 Required)	BU502002
2A	*	**Gimbal Assembly**	102122
3		Bushing, Gimbal (4 Required)	BU502002
	*	**Bucket Rotator Assembly**	
4		Bolt, Gimbal/Rotator - 6 Spline	BL120124U87
		Bolt, Gimbal/Rotator - 14 Spline	BL120152U87
5		Spacer, Gimbal/Rotator	WAB2030
6		Nut, Gimbal/Rotator	NUB20U
7	*	Bucket Rot. Weldment for 6-Spline Motor	102160
		- or -	
	*	Bucket Rot. Weldment for 14-Spline Motor	102159
8		Set Screw, Motor Stabilizer	SCB0824W
9		Lockwasher, Motor Housing	WAS085
10		Bolt, Motor Housing	BL308024U513
11	*	Motor, "RS" Rotator 6-Spline	HC03003
		Packing, Motor 6-Spline	HPKPS222002
		- or -	
	*	Motor, "RE" Rotator 14-Spline	HC03004
		Packing, Motor 14-Spline	HPKPE444002
12	*	Bolt, Motor Mounting for 6-Spline Motor	SCA0616C
	*	Bolt, Motor Mounting for 14-Spline Motor	BL108032U813
		Nut, 14-Spline Motor Mt. Bolt	NUS08U
13		Hydraulic Fitting, .046 Restrictor for 6 & 14	HF906063046FM
		Spline Motors	
14		Hydraulic Fitting, 90 Degree Male for 6	HF806089M
		Spline Motor	
		Hydraulic Fitting, 90 Degree O-Ring for	HF10610JM9
		14 Spline Motor	

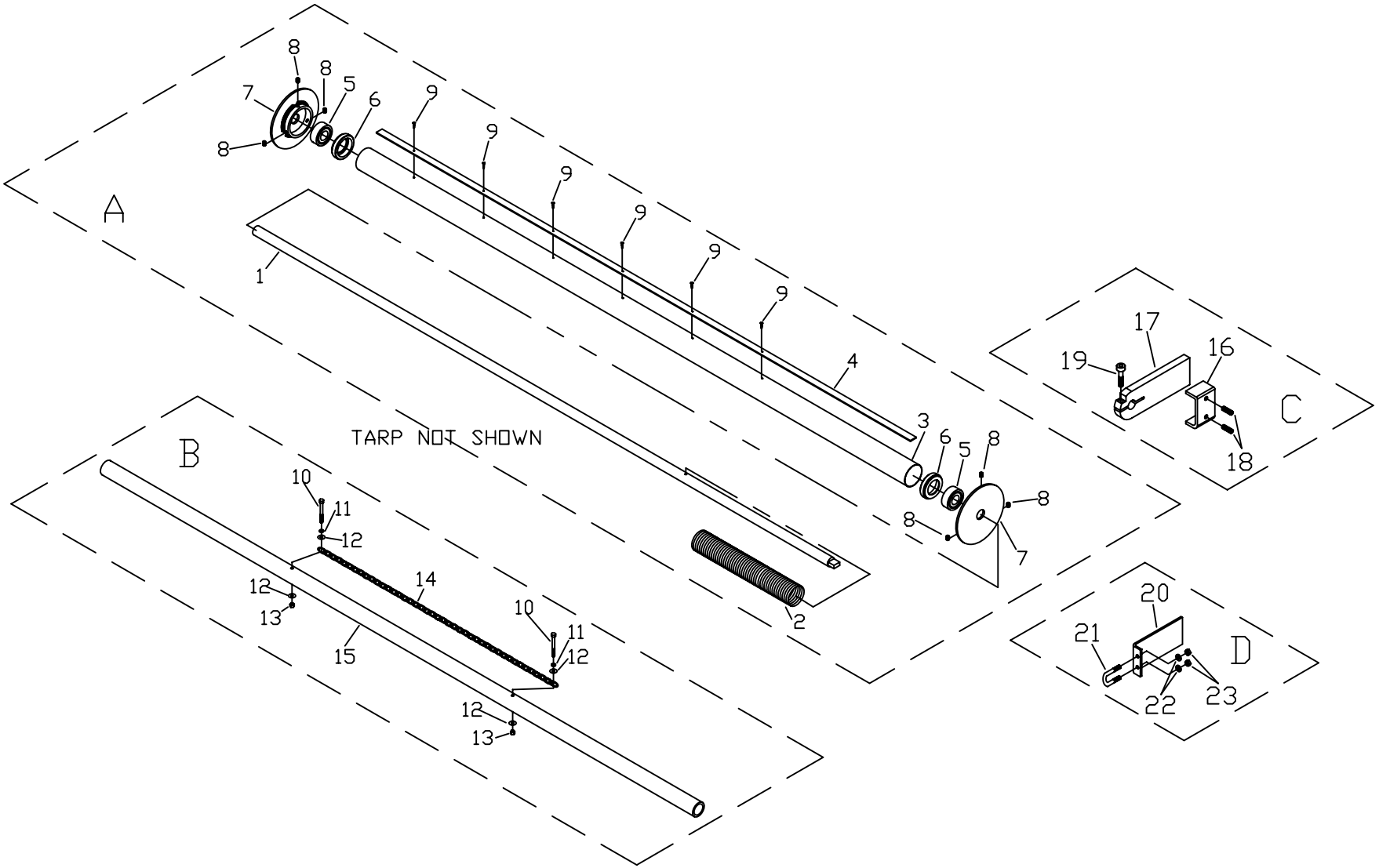
Dia. No.		Part Name	Order By This Part No.
		Bucket Manifold Assembly	102127
15		Nut, Support Shaft	BE03NAN15
16		Washer, Support Shaft	BE03NW15
17		Spacer, Support Shaft	WAF885002
18		Washer	WAL866902
19		Bearing, Support Shaft	BE03N495A
20		**Block Assembly**	102126
21		Bearing Race, Support Shaft	BE03N493
22		Seal Kit, Rotary Manifold (3 required)	HPKTR035
23		Grease Fitting, 1/8" Straight	HF2002S
24		Hydraulic Fitting	HF806069ML
25		Hydraulic Fitting	HF806069M
26	*	**Bucket Cylinder Assembly - 14 Spline**	102400
		- or -	
	*	**Bucket Cylinder Assembly - 6 Spline**	102402
27		Grease Fitting, 1/8" 90 Degree	HF20029
28		Grease Fitting, 1/8" Straight	HF2002S
		Bucket Saddle Assembly	102129
29		Saddle Weldment	102178
30		Bolt, Saddle Mounting	BL120124U87
31		Nut, Saddle Mounting Bolt	NUB20U
32		Bolt, Retainer	BL305036U518
		Nut, Retainer	NUS05U
		Bucket A-Frame Assembly (one side)	102130
33		A-Frame Weldment with Bushings	102172
34		Bolt, A-Frame Mounting	BL116084S8H1400
35		Nut, A-Frame Mounting Bolt	NUB16S5
		Bolt, Retainer	BL304032U520
		Nut, Retainer	NUS04U
36		Bushing, A-Frame Pivot	BU402012
37		Grease Fitting, 1/8" Straight	HF2002S
38		Washer, A-Frame Pivot (2 per shaft)	WAB2436
39		Shaft, A-Frame Pivot	102173
40		Collar, A-Frame Pivot (2 per shaft)	116106
		Collar with hole, A-Frame Pivot	116105
41		Pin, Bucket Main Pivot	PI30204FC
42		Bushing, Bucket Main Pivot (2 per side)	BU502008

Dia. No.		Part Name	Order By This Part No.
43		**Bucket Jaw Assembly (one side)**	102132
		BUCKET ASSEMBLY COMPLETE	102101
	*	**Note: Ordering these parts may require upgrading to current**	
		production parts. Please consult with the Petersen Parts	
		Department when ordering these parts.	



Petersen Industries, Inc. Lake Wales, FL
Diagram No.: 501
Description: #1 Outrigger Assembly

Dia. No.		Part Name	Order By This Part No.
#1 Outrigger Assembly Diagram #501			
1		Pin, Cylinder Connecting, Base End	PI18082F
2		Cylinder, 3"	CY05002
3		Tube, Horizontal	Not Available
4		Tube & Foot Assembly, Inner Vertical	Not Available
5		Tube Assembly, Outer Vertical	Not in Stock
6		Pin, Cotter 5/16" x 3"	FA020548
7		Grease Fitting, 1/8" Straight	HF2002S
8		Pin, Cylinder Connecting, Rod End	PI18062F



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

TITLE: PI SELF WINDING TARP ROLLER ASSEMLBY

CAD NO.	PART NO.	SCALE
12 09 01 001 0		N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
MRC		4/28/98	1 OF 1

Dia. No.		Part Name	Order By This Part No.
TARP ROLLER ASSEMBLY, P. I. SELF WINDING (DIAGRAM NO. 1209010010)			
		A - TARP ROLLER ASSEMBLY	122111
1		Spring Bar	122801
2		Tarp Return Spring	SP02003
3		Tarp Return Pipe, 94" EMT	EL06002
4		Tarp Retainer Bar	122802
5		Roller Bearing	BE04N1654DC
6		Roller Bearing Retainer	122803
7		Bearing Retainer End Plate Assembly	122804
8		Screw, 3/8 - 16 x 1/2 Socket Set Screw	SCC0608
9		Screw, #10 x 3/4 Sheet Metal	SCM0512
		B - TARP PULL BAR ASSEMBLY	122112
10		Bolt, 5/16 - 18 x 3"	BL305048U518
11		Lock Washer, 5/16	WAS055
12		Flat Washer, 5/16	WAF05U5
13		Nut, 5/16 - 18	NUS05U
14		Chain, 3/16 PC x 48" (Qty = 4)	CHP03768
15		Pipe, 102" PVC	122129
		C - TARP ROLLER MT. ASSEMBLY	122809
16		Mounting Bracket	122805
17		Mounting Ear	122806
18		Screw, 1/2 - 13 x 1 1/2" Socket Set w/Patch	SCB0824W
19		Screw, 1/2 - 13 x 2 1/2" Socket Cap	SCA0840W
		D - TARP ROLLER MT. ASSEMBLY	122810
20		Mounting Ear	122808
21		Bolt, 1.25 x 2.25 U	BLU20036U5
22		Lockwasher, 3/8	WAS065
23		Nuts (Comes W/U-Bolts)	N/A
---		Tarp, 7'6" x 18'	AC1701
---		Canvas Roller Hook	CHH07000
---		1/4" Quick Link	CHQ04000

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.	

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: _____

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.

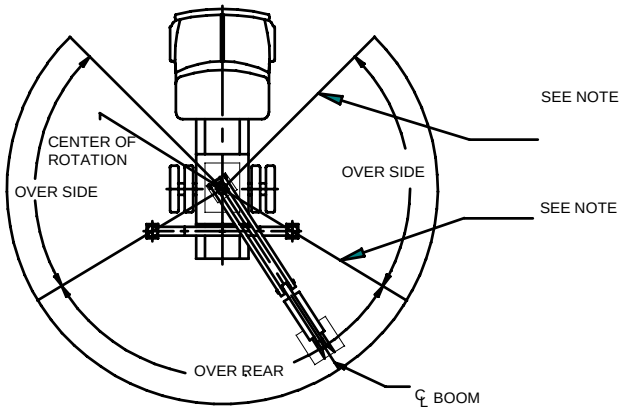
MODEL TL 2		
RADIUS	No. 1 OUTRIGGERS	No. 3 OUTRIGGERS
10 ft	5320 lb *	7100 lb
16 ft	2650 lb *	3750 lb

MODELS TL 3, PL 3, HL 3, BL 3 & DL 3 OUTRIGGERS EXTENDED		
RADIUS	TIP EXTENSION RETRACTED	TIP EXTENSION EXTENDED
10 ft	7100 lb	7100 lb
16 ft	3750 lb	4400 lb
20 ft	-	3200 lb

MODEL RL 2 WITH OUTRIGGERS EXTENDED		
RADIUS	OVER SIDE	OVER REAR
10 ft	5500 lb *	7100 lb
16 ft	3100 lb *	3750 lb

MODEL RL 3 WITH OUTRIGGERS EXTENDED			
RADIUS	OVER SIDE	OVER REAR	
		TIP EXTENSION RETRACTED	TIP EXTENSION EXTENDED
10 ft	5500 lb *	7100 lb	7100 lb
16 ft	3100 lb *	3750 lb	4400 lb
20 ft	1800 lb *	-	3200 lb

RADIUS	MODEL SL 2	MODEL SL 3	
		TIP EXTENSION RETRACTED	TIP EXTENSION EXTENDED
10 ft	7100 lb	7100 lb	7100 lb
16 ft	3750 lb	3750 lb	4400 lb
20 ft	-	-	3200 lb



NOTE: THESE LINES DETERMINE THE LIMITING POSITION OF ANY LOAD FOR OPERATION WITHIN WORKING AREAS INDICATED

LOAD DIAGRAM FOR MODELS RL 2 & RL 3

Weight of attachment to be subtracted from lift capacities. Standard Trash bucket weighs 1000 lbs.

Radii are measured in feet from the center of rotation to the center of the bucket

Loads marked with (*) are limited by the stability of the loader.

Loads for the loader on outriggers represent 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.

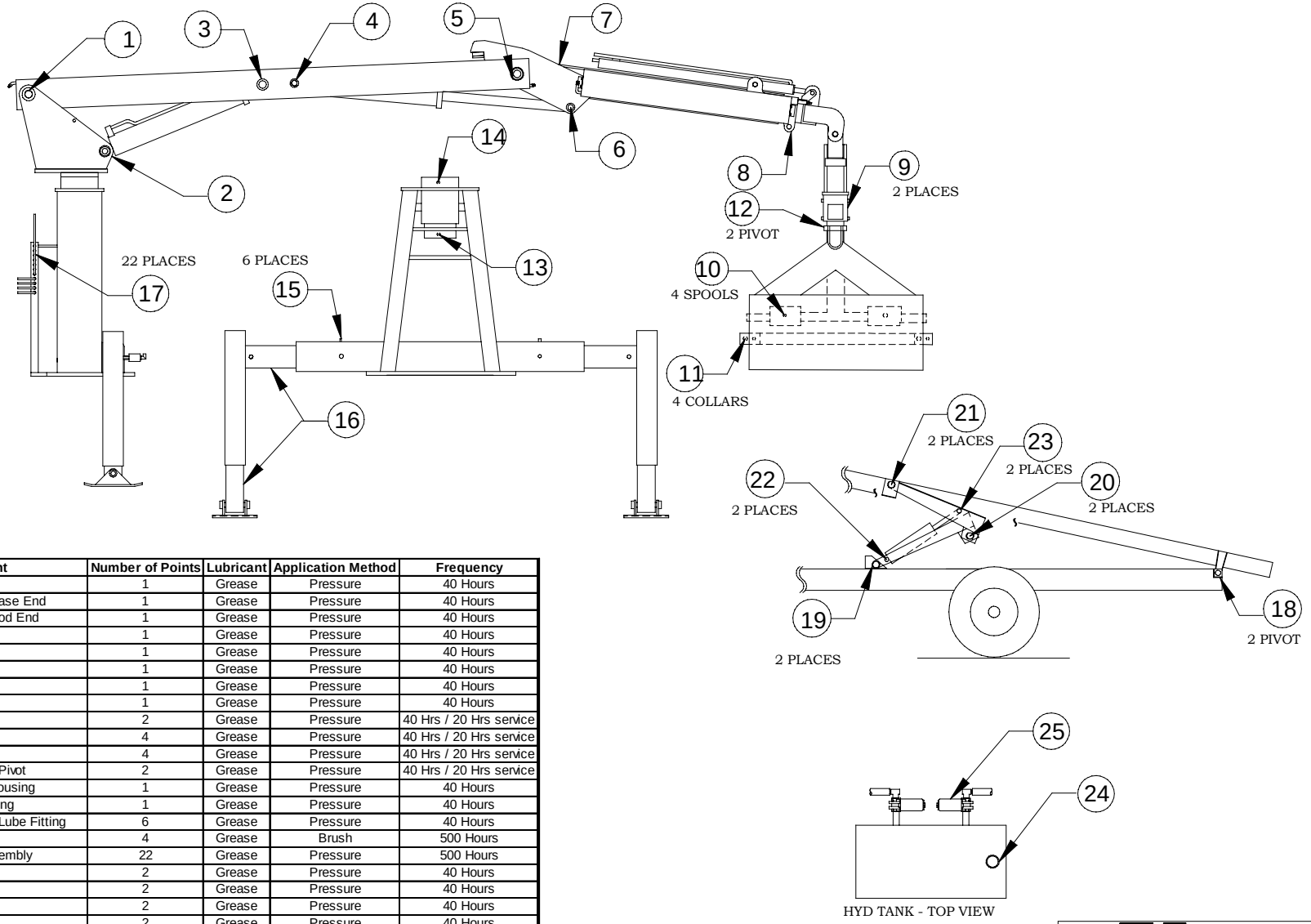
Tip Boom Extension function is not to be used for load lifting. This function is only for load reaching or to improve load-lifting capacity.

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.

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

TITLE:			
LOAD CHART FOR TRASH LOADERS			
CAD NO.: 01 00 00 003 4	PART NO.:		SCALE: N/A
DRAWN BY: EJB	APPROVED:	DATE: 8/31/99	SHEET: 1 OF 1



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 Manifold	2	Grease	Pressure	40 Hrs / 20 Hrs service
10	Bucket A Frame Spools	4	Grease	Pressure	40 Hrs / 20 Hrs service
11	Bucket Main Pivot	4	Grease	Pressure	40 Hrs / 20 Hrs service
12	Bucket A Frame Connect Pivot	2	Grease	Pressure	40 Hrs / 20 Hrs service
13	Spindle Bottom Bearing Housing	1	Grease	Pressure	40 Hours
14	Spindle Top Bearing Housing	1	Grease	Pressure	40 Hours
15	Outrigger Tube Wear Pad Lube Fitting	6	Grease	Pressure	40 Hours
16	Outrigger Inner Tubes	4	Grease	Brush	500 Hours
17	Valve, Control Handle Assembly	22	Grease	Pressure	500 Hours
18	Body, Chassis Pivot	2	Grease	Pressure	40 Hours
19	Hoist Lower Pivot	2	Grease	Pressure	40 Hours
20	Hoist Scissors Pivot	2	Grease	Pressure	40 Hours
21	Hoist Upper Pivot	2	Grease	Pressure	40 Hours
22	Hoist Cylinder Lower Pivot	2	Grease	Pressure	40 Hours
23	Hoist Cylinder Upper Pivot	2	Grease	Pressure	40 Hours
24	Hydraulic Tank	1	Oil	Fill to Max. Level	40 Hours
25	Hydraulic Filters	2	-	Replace	1000 Hours

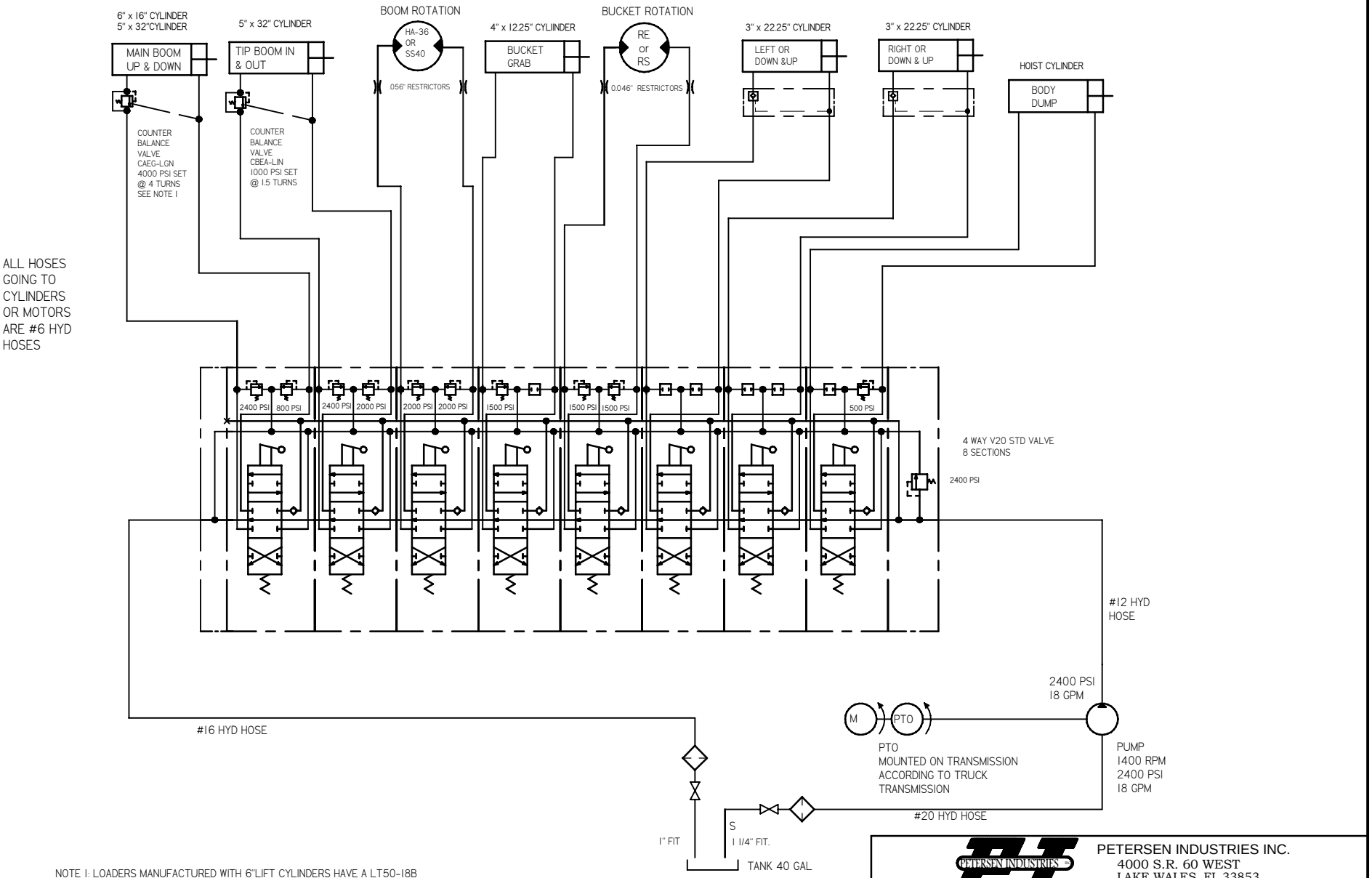
HYD TANK - TOP VIEW

PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES,FL.33853
(863) 676 1493 FX (863) 676 6844

TITLE: LOADER LUBRICATION POINTS

CAD NO.	PART NO.	SCALE
01 00 00 001 3	N/A	N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
E.B.		8/06/99	1 OF 1

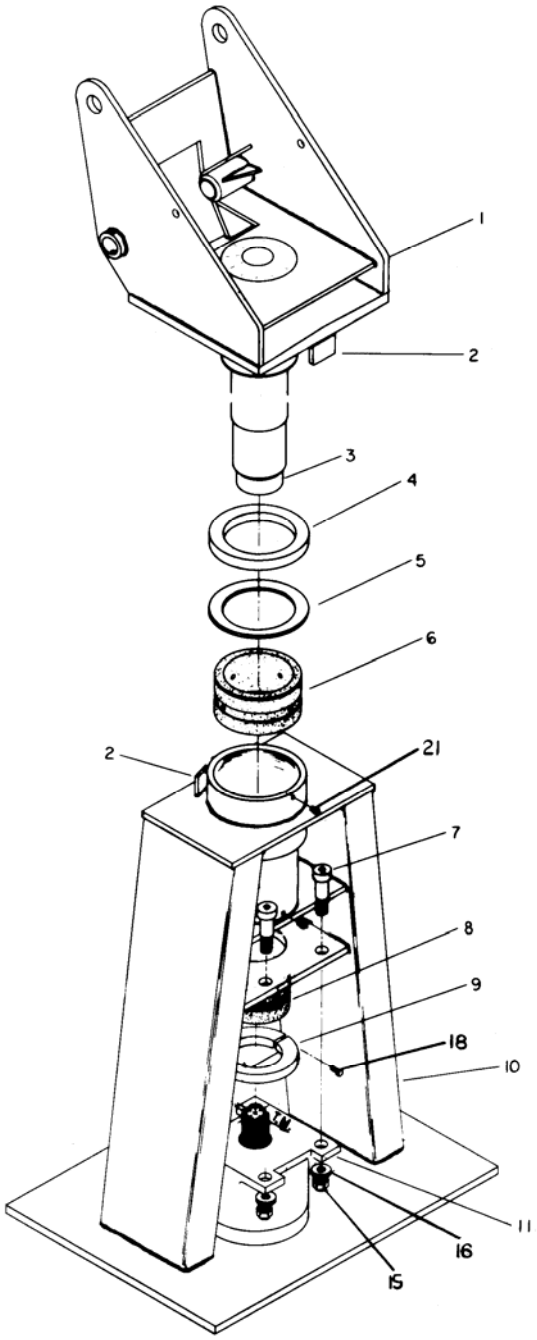


PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL 33853
(863) 676 1493 FX (863) 676 6844

TITLE: HYDRAULIC CIRCUIT FOR TL - 2 (B3)

CAD NO.:	PART NO.:	SCALE
52 07 01 002 3 B3		N/A

DRAWN BY:	APPROVED:	DATE:	SHEET:
		5/14/99	1 OF 1



Petersen Industries, Inc. Lake Wales, FL	
Diagram No.: 102	
Description: Head & Pedestal Assembly with HA36 Rotary Actuator	
Drawn by: MS	Date: 08/09/95

Dia. No.		Part Name	Order By This Part No.
HEAD AND PEDESTAL ASSEMBLY WITH HA36 HYDRAULIC ACTUATOR : (DIAGRAM #102)			
1		Head and Spindle Assembly	107104 (See Note A)
2		Head and Pedestal Stop	106216
3		Spline, Spindle	HC99002
4		Nylatron Bushing-Thrust Bearing	BU510003
5		Thrust Spacer	106210
6		Nylatron Bushing-Upper Bearing Housing	BU509002
7		Bolt, Hydraulic Actuator	BL120032U8
8		Nylatron Bushing-Lower Bearing Housing	BU507005
9		Lock Collar, 1-Piece	117104
		Socket Set Screws, 3/8 X 1 Halfdog w/Pat	SCD0616W
10		Pedestal Assembly	106103 (See Note A)
11		Hydraulic Actuator-Swing (HA36)	HC01001
--		Hydraulic Actuator - Seal Kit	HPKAS395
12		Not Applicable	
13		Not Applicable	
14		Not Applicable	
15		Nut, Actuator Bolt	NUF14U
16		Flat Washer, Actuator Bolt	WAF14S8
17		Not Applicable	
18		Screw, Lock Collar 1/2 X 2 Socket Head	SCA0840C
		with Patch	
19		Not Applicable	
20		Not Applicable	
21		Grease Fitting (1/8" Straight)	HF2002S
		Note A: Only current production parts are available. Current production parts may require that other assemblies be changed such as the Main Boom Assembly and/or the Outrigger Assembly.	

4000 SR 60 West
Lake Wales, Florida 33859
(863) 676-1493
www.petersenind.com

Trash Lightning Loader® Warranty

Petersen Industries, Inc. ("Petersen") warrants each new Lightning Loader® and/or Trash Body it manufactures and each new part and component sold by Petersen (except those excluded by Section 5 below) to be free from defects in material and workmanship, provided the Lightning Loader® parts and components are operated and maintained in accordance with Petersen's published operating and maintenance instructions applicable thereto. This warranty is subject to the terms and conditions stated below.

1. Warrantor: This warranty is granted by Petersen Industries, Inc. 4000 SR 60 West, Lake Wales, Florida 33859. All warranty work must be accomplished by Petersen Industries, Inc. at its factory in Lake Wales, Florida or by such other facility specifically authorized by Petersen. All warranty work performed by a facility other than Petersen must be approved by Petersen in writing prior to commencement of said work.

2. Parties to Whom Warranty is Extended: This warranty shall be extended to any buyer and to any person to whom this product is transferred during the duration of this warranty.

3. Duration of Warranty: The time periods applicable to the warranty of the specified component parts of this Lightning Loader® are as follows:
   a) Lightning Loader® Major Structural Component Parts - 3 years
   b) Non-hydraulic Replacement Parts - 1 year
   c) Hydraulic Components - 1 year
   d) Dynamic Oil Heavy Duty Rotary Actuator * - 2 years *Does not apply to SAI or HA36*

4. Parts and component parts installed by Petersen are covered by this warranty except those parts and component parts excluded by Section 5 below.

5. Parts and Components Not Covered: The following parts and components are not covered by the warranty:
   a) any part or component not installed by Petersen Industries, Inc.;
   b) any part of the vehicle cab, chassis, tires or engine (any warranty of these parts and components is provided by the original manufacturer);
   c) any part or component that shall have been subject to misuse, negligence, or accident;
   d) any part or component that shall have deteriorated from extraordinary wear or exposure;
   e) expendable items that would normally be replaced within the warranty period (e.g. hydraulic hoses on end of boom, brake washers between bucket and boom, oil, filters, light bulbs).

6. Procedure for Obtaining Performance Under this Warranty: In order to qualify under this warranty, the owner must notify Petersen Industries, Inc. within thirty (30) days of discovery of the defect and promptly deliver the Lightning Loader® or defective part to Petersen Industries, Inc. at its factory in Lake Wales, Florida, or if requested by Petersen to such other authorized facility designated by Petersen.

Upon receipt of such Lightning Loader®, part or component, if it is found not to be defective in material or workmanship, Petersen shall notify the owner of such fact and request instructions for the return of such Lightning Loader®, part or component to the owner.

All costs of transporting Lightning Loader®(s) to and from Petersen Industries, Inc. or such other authorized facility designated by Petersen shall be paid by owner.

7. Remedy: If, within the duration of this warranty, a part or component covered by this warranty proves to be defective in material or workmanship, then the sole and exclusive remedy and Petersen's sole responsibility shall be at Petersen's option, the repairing of the defective part or component or replacing of the same. Parts and labor shall be at the expense of Petersen. The replacement part or component supplied pursuant to this warranty shall be warranted only for the remainder of the warranty period applicable to the defective part or component.

8. Design Changes: Petersen reserves the right to make changes in the design or material of its products without incurring any obligation to incorporate such changes in any product previously manufactured.

9. Exclusion and Disclaimers: This warranty does not extend to normal maintenance services such as cleaning, greasing, mechanical adjustments and maintenance inspections or to any defect due to the negligence of others, failure to operate or maintain the Lightning Loader® in accordance with the published operating and maintenance instructions furnished by Petersen, unreasonable use, accidents, alteration or wear and tear.

[NO OTHER WARRANTY WHETHER OF MERCHANTABILITY, FITNESS OR OTHERWISE, EXPRESS OR IMPLIED IN FACT OR BY LAW, IS GIVEN BY PETERSEN WITH RESPECT TO ANY NEW LIGHTNING LOADER®, PART OR COMPONENT, OR WITH RESPECT TO ANY WORK, AND NO OTHER OR FURTHER OBLIGATION OR LIABILITY SHALL BE INCURRED BY PETERSEN BY REASON OF THE MANUFACTURE, SALE, OR LEASE OF ANY LIGHTNING LOADER®, PART, OR COMPONENT OR OF ITS USE, WHETHER FOR BREACH OF WARRANTY, NEGLIGENCE OF MANUFACTURE OR OTHERWISE.]

In the event that the provision relieving Petersen of liability for negligence should for any reason be held ineffective, the remainder of this paragraph shall remain in full force and effect.

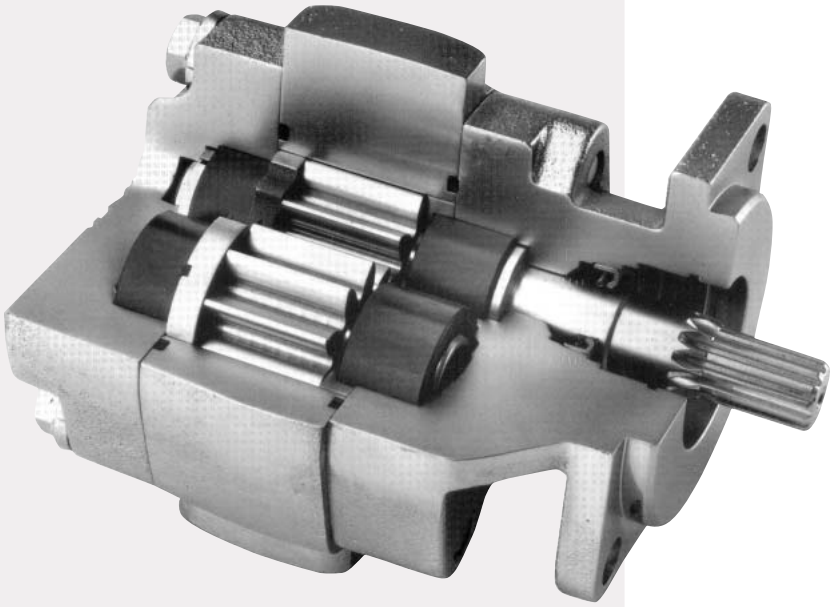
The obligation of Petersen set forth in Section 7 above shall be the exclusive remedy for any breach of warranty. In no event shall Petersen be liable for any general, consequential, or incidental damages relating to property damages or economic loss, including without limitation any damages for loss of use or loss of profits. No distributor, dealer, agent or employee of Petersen is authorized to extend any other or further warranty or incur any additional obligation on Petersen's behalf in connection with the sale of its products.

Service Manual HY09-SM020/US

Service Manual
PGP020™

Effective: July 1, 2006
Supersedes: All Others

PGP020 Series



The Parker Hannifin Gear Pump Division Assures:

- Consistent quality
- Technical innovation
- Premier customer service

Worldwide Sales and Service

Parker operates sales and service centers in major industrial areas worldwide. Call 1-800-C-PARKER for more information, or for a synopsis of the Gear Pump Division, contact a Parker representative.

The Gear Pump Division's ability to engineer specialty products for unique applications has kept us at the forefront of technology, and ensured our position as the industry leader. Our success has come from providing a quality product with excellent sales and service support.

We manufacture hydraulic components for a wide range of industries including:

- Construction
- Refuse/dump truck
- Material handling
- Forestry
- Agriculture
- Industrial

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

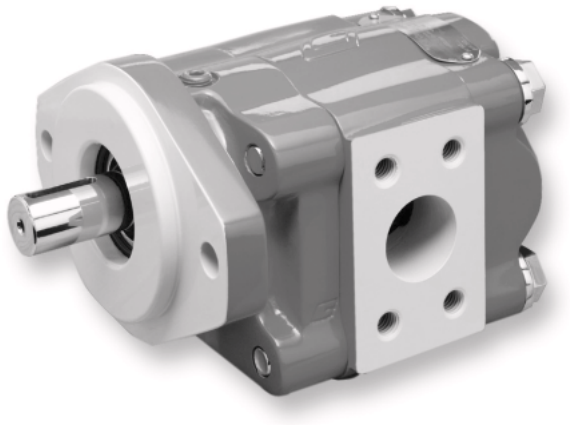
The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale".

Parker Hannifin Corporation
Gear Pump Division
Youngstown, Ohio USA

Index



Pump Service Instructions

General Instructions

These service instructions will:

- familiarize you with the PGP020 series roller bearing pump, its component parts and their relative position;
- show the proper methods for disassembly and assembly;
- advise appropriate care and use of this hydraulic pump.

Following these instructions can prolong the life of your pump, and help achieve optimal performance.

We recommend you read this entire set of instructions before attempting any repair.

To ensure damage did not occur during shipment, check all replacement parts closely before installation.

Cleanliness

Dirt is the enemy of any hydraulic system, so keeping equipment clean is a crucial maintenance requirement.

MAKE SURE YOU DISASSEMBLE AND ASSEMBLE YOUR HYDRAULIC EQUIPMENT IN A CLEAN AREA.

TO PREVENT PERSONAL INJURY, SAFETY GLASSES AND STEEL TOE SHOES SHOULD BE WORN.

Cautions

1) Parker replacement parts are made to original equipment standards. For assured quality of material and workmanship and for compatibility in assembly, **USE ONLY GENUINE Parker REPLACEMENT PARTS**.

2) If it becomes necessary to pry apart castings, use extreme caution not to mar or damage the machined surfaces. Excessive force while prying can result in misalignment and seriously damage parts.

3) If component assembly is difficult, do not force items and never employ an iron hammer. For a complete list of recommended tools, see Page 11.

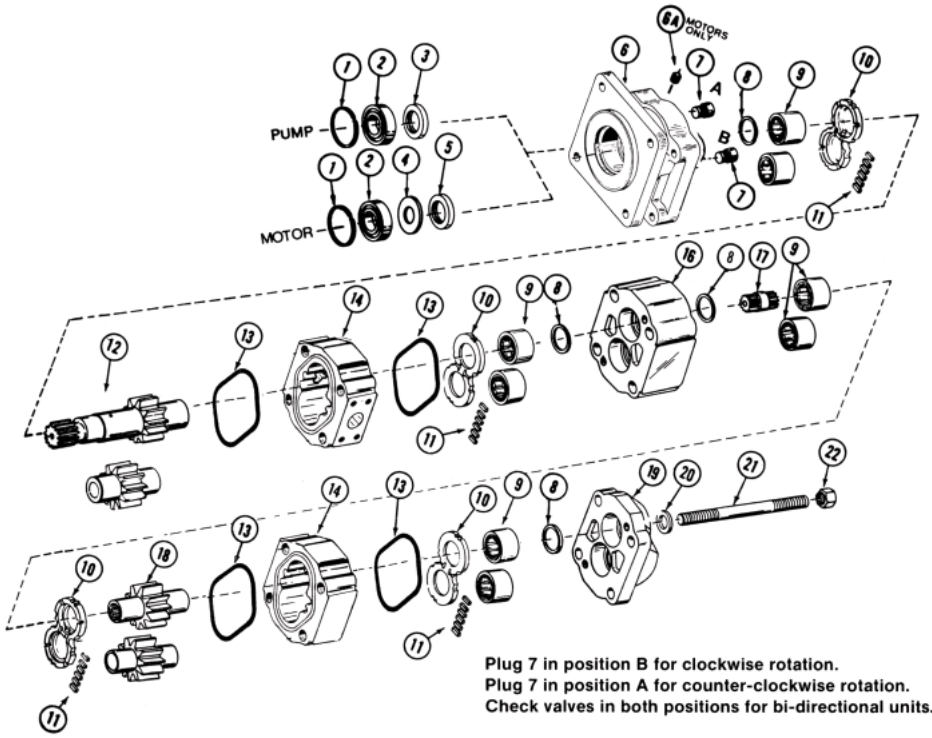
4) Gears are closely matched, therefore, they must be kept together as a set when removed from the unit. Handle with care to avoid damage to the journals, faces and teeth.

5) Never hammer roller bearings into bores. Use only an arbor press or other suitable tool.

6) It is important to airblast all parts and wipe them with a clean, lint-free cloth before assembly.

Exploded View and Parts List

Item No.	Description	Required	Ten Digit No. (TDN)
1	Snap Ring	1	391-2686-063
2	Outboard Bearing	1	391-0381-040
	Outboard Spacer	1	391-3383-069
3	Lip Seal (pump)	1	391-2883-058
4	Seal Retainer (motor)	1	391-3381-040
5	Lip Seal (motor)	1	391-2883-119
6	Shaft End Cover	1	308-50XX-XXX
6A	Drain Plug (motor)	1	391-2282-XXX
7	Check Assemblies for Motors & Bi-Rotational Pumps	2	391-3681-001
	Plugs (pumps only)	1	391-2286-004
8	Ring Seals (per gear section)	2	391-2585-006
9	Roller Bearings (per gear section)	4	391-0381-906
10	Thrust plates (motor) (per gear section)	2	391-2185-913
	Thrust plates (pump) (per gear section)	2	391-2185-913
11	Pocket Seals (per gear section)	1 strip	391-2882-022 (Viton) 391-2882-051 (Buna)
12	Drive Shaft Gear Set	1 Set	312-29XX-XXX
13	Gasket Seals (per gear section)	2	391-2884-019
14	Gear Housing	1	308-8XXX-XXX
16	Bearing Carrier	-	308-7XXX-XXX
17	Connecting Shaft	-	312-1133-001
18	Gear Set	set	312-28XX-XXX
19	Port End Cover	1	308-3XXX-XXX
20	Washers	4	391-3782-146
21	Cap Screws (single units)	4	391-1401-XXX
	Studs (multiple units)	4	391-1425-XXX
22	Nuts (multiple units)	4	391-1451-115



Plug 7 in position B for clockwise rotation.
Plug 7 in position A for counter-clockwise rotation.
Check valves in both positions for bi-directional units.

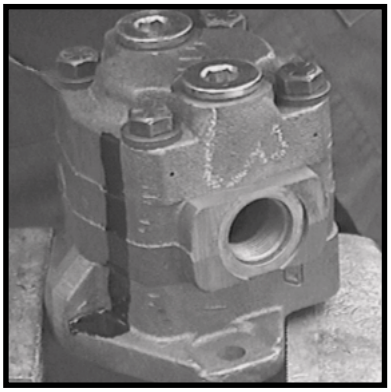
Parker Hannifin Corporation
Gear Pump Division
Youngstown, Ohio USA

PGP020™ Disassembly Instructions

STEP 1

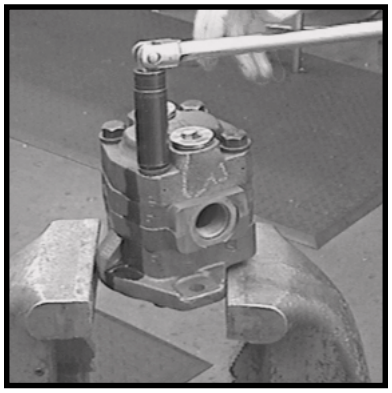
Place the pump in a vise with the drive shaft pointing down. Clamp unit on the sides of the mounting flange. Do not clamp on the pilot diameter as it may damage the sealing surface.

STEP 2



Mark each casting in the assembly with machinist ink or a prick punch to orient the castings, so that the unit can be reassembled later in the proper position.

STEP 3



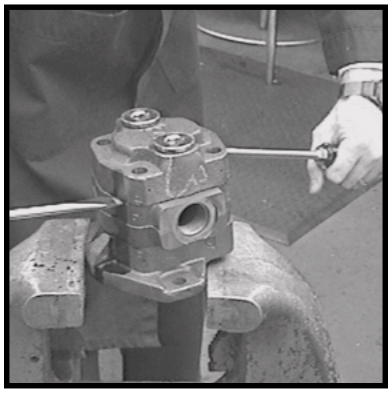
Loosen and remove the four, cap screws and washers with a 13/16” socket and wrench.

STEP 4.1

Remove the port end cover subassembly using steps 4.1 - 4.3:

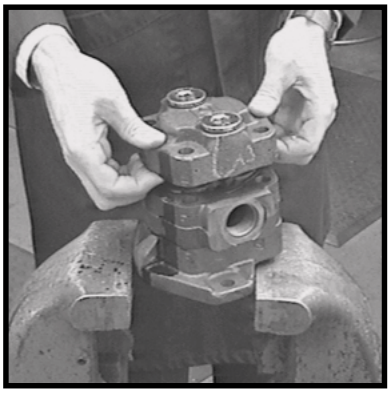
4.1 Place the point of a large, screwdriver or a chisel on the parting line between the port end cover casting and the gear housing casting. Gently tap until a slight separation between the castings is detected.

STEP 4.2



4.2 Place two, large, flat-bladed screwdrivers into the separation notches and pry up the port end cover until loose. BE CAREFUL not to nick, mar or scratch the machined casting faces.

STEP 4.3

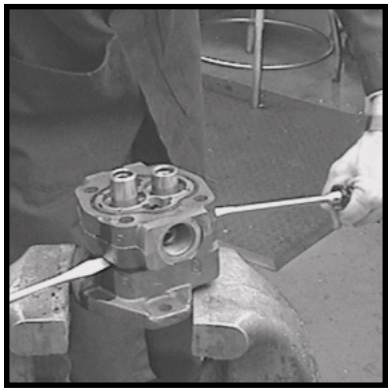


4.3 Lift off the port end cover subassembly.

Parker Hannifin Corporation
Gear Pump Division
Youngstown, Ohio USA

PGP020™ Disassembly Instructions

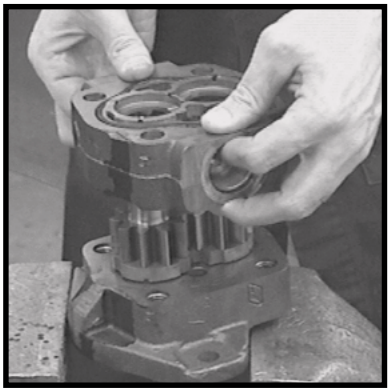
STEP 5.1



Remove the gear housing subassembly using steps 5.1 - 5.3:

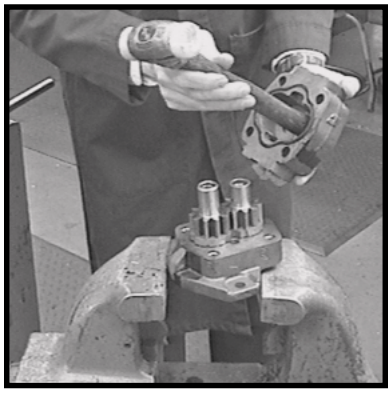
5.1 Place the two, large, flat-bladed screwdrivers into the separation notches and pry up the gear housing until loose. BE CAREFUL not to nick, mar or scratch the machined casting faces.

STEP 5.2



5.2 Lift off the gear housing subassembly.

STEP 5.3

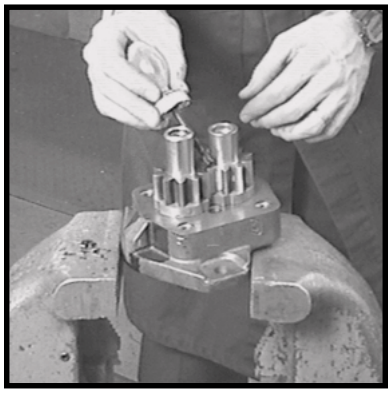


5.3 Remove the thrust plate from the housing. It may be necessary to gently tap the thrust plate with the handle of a hammer or screwdriver. Be careful not to bend or score the thrust plate. Remove and discard the six, small, rubber pocket seals from the thrust plate.

STEP 6

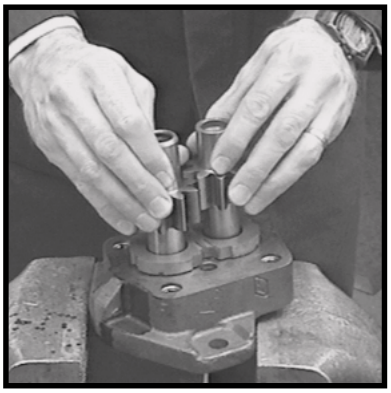
Remove and discard the rubber section seals from the top and bottom gear housing faces.

STEP 7



Wipe the gear face surface dry with a clean, lint-free cloth. Mark the teeth of the drive and driven gears (the gear set) at their mesh point with machinist ink or quick-dry marker. This is to index the gear set for proper orientation during reassembly.

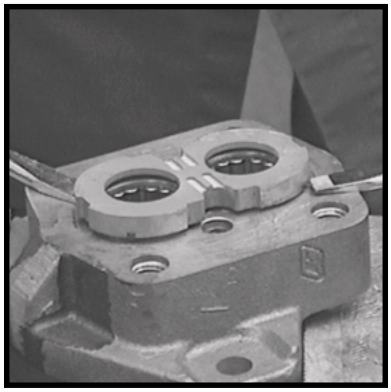
STEP 8



Remove the idler gear and the gear shaft. Keep them together as they are a matched set. Handle with care to avoid damage to the journals, faces and teeth.

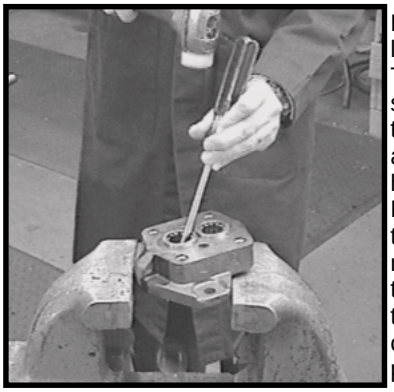
PGP020™ Disassembly Instructions

STEP 9



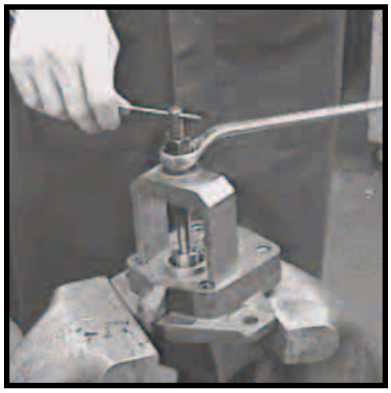
Gently lift off the thrust plate. Be careful not to bend or score the plate and mating surface of the casting. Remove and discard the six, rubber pocket seals from the back of the thrust plate.

STEP 10



Remove lip seal. Place a lip seal removal tool (see Tool List P11) or a screwdriver tip against the inside of the lip seal and tap the screwdriver handle with a hammer. Be careful not to damage the roller bearing or the ring seal with screwdriver tip. Note: If bearings are to be removed from the casting, then step can be performed after Step 12.

STEP 11

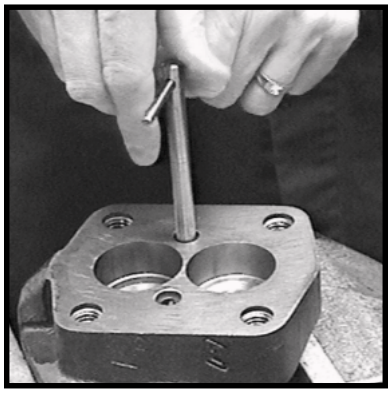


Use a bearing puller to remove the roller bearings. Note: This step is optional depending on the condition of the bearings.

STEP 12

Remove the bronze ring seal from the gear shaft bearing bore in the shaft end cover and the port end cover castings.

STEP 13



Remove the checks from the shaft end cover casting with the check tool (see Tool List on Page 11).

CAUTION: Failure to follow the recommended assembly instructions can result in poor performance or failure of the product. Product should be thoroughly tested to ensure proper operation before the unit is put back into service.

Parker Hannifin Corporation
Gear Pump Division
Youngstown, Ohio USA

PGP020™ Assembly Instructions

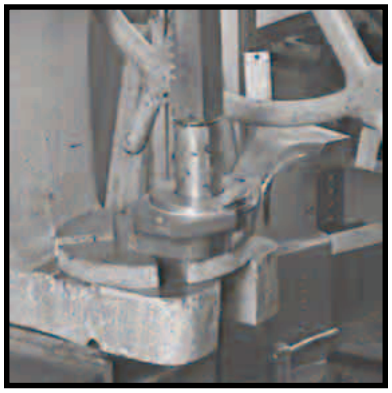
STEP 1

Stone all machined casting surfaces with a medium-grit carborundum stone. If the bearings were removed, deburr the bearing bore using a deburring tool. Rinse all parts in a solvent fluid. Air blast all parts and wipe them with a clean, lint-free cloth before starting the assembly.

STEP 2

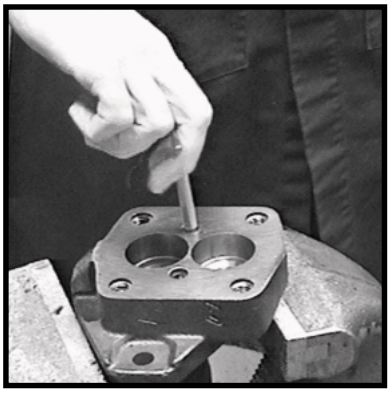
Coat the outside diameter of the lip seal with Permatex Aviation Form-A-Gasket No.3 Non-Hardening Sealant or equivalent. Be careful not to get Permatex on the inner lip of the seal as it will cause a lip seal leak.

STEP 3



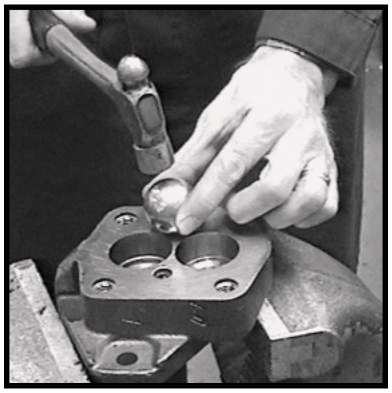
Place the shaft end cover on an arbor press with the pilot facing up. Place lip seal with the shoulder of the seal up, at the top of the seal bore. Press the lip seal into the shaft end cover with a lip seal installation bar (see Tool List on Page 11). The seal should be pressed in so it is flush with the recessed face in the shaft end cover casting.

STEP 4



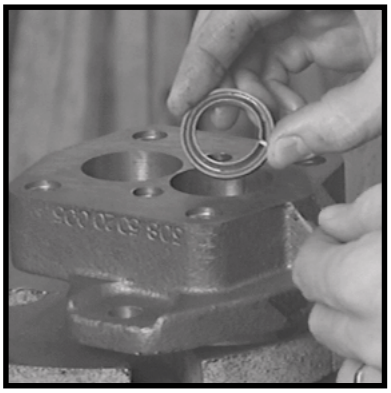
Apply Loctite® No.262 to the threaded check holes in the shaft end casting. Install the checks in the shaft end cover using the check tool (see Tool List on Page 11). The checks must bottom out in the casting.

STEP 5



Peen over the check holes in the shaft end cover with a 1½" steel ball and a hammer. This will insure the checks do not back out of the check holes during operation.

STEP 6



If the ring seals were removed from the shaft end cover or the port end cover, they should be replaced at this time. Place the ring seals in the bottom of the drive gear bearing bores. Be sure that the flat side of the ring seal is against the mating surface in the casting. Ring seals are placed behind the drive gear bearings only.

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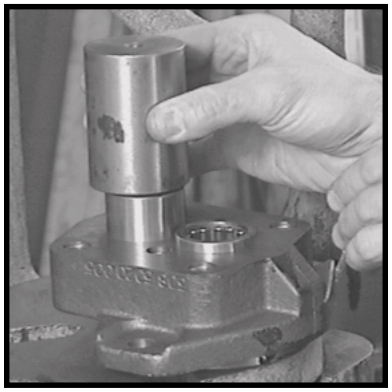
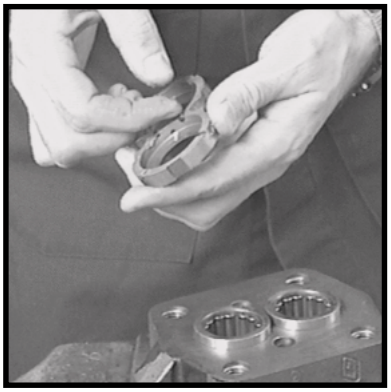
STEP 7



Install the bearings in the shaft end cover and the port end cover. Use an arbor press to press the bearings into the bottom of the bearing bores. Check to make sure the ring seals move freely under the drive gear bearings.

STEP 8

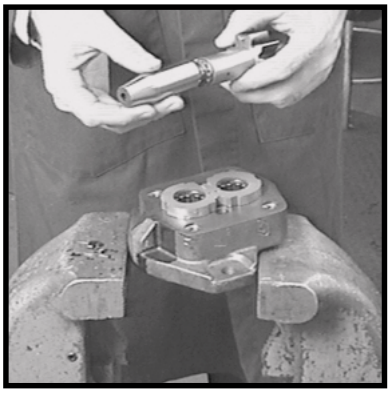


Grip the shaft end cover in a vise with the mounting face down. Cut two, pocket seals 7/32” long from the pocket seal strip. Grease the seals well and insert them into the center slots on the reverse side of the thrust plate.

STEP 9

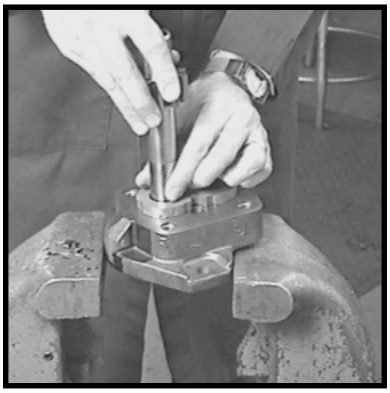
With the pocket seals facing down, place thrust plate over the bearings. Tap the thrust plate with a soft-faced hammer around the edge until the thrust plate is about 1/32” from the casting surface. Do not tap the center of the plate. Cut four pocket seals 1/4” long from the seal strip. Push a pocket seal into each of the remaining slots in the thrust plate until it touches the bearing wall. Use a razor blade to trim the exposed portion of the pocket seals. The pocket seals should be flush with the outside diameter of the plate.

STEP 10



Insert the external drive end of the gear shaft into the shaft installation sleeve (see Tool List on Page 11). Lightly grease the gear shaft and sleeve.

STEP 11



Insert the gear shaft with the shaft installation sleeve into the shaft end cover using a twisting motion. Be careful not to damage the lip seal. Push down carefully until the gear rests against the thrust plate face. Remove the shaft installation sleeve. Insert the idler gear into its bearing bore, matching the orientation marks on the teeth of the gear set as previously marked (see Step 7 on Page 5).

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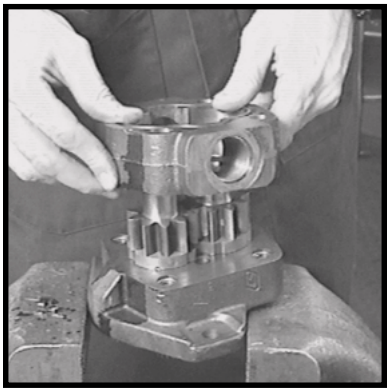
STEP 12

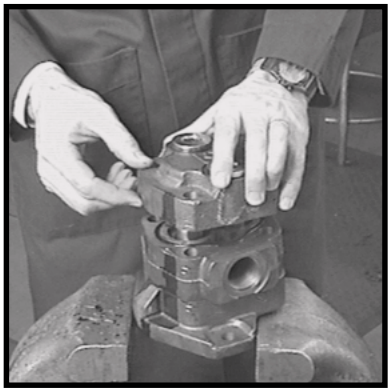
Apply a light coating of grease to the new section seals and place them into the machined grooves on both sides of the gear housing. Check the section seals for proper fit.

STEP 13



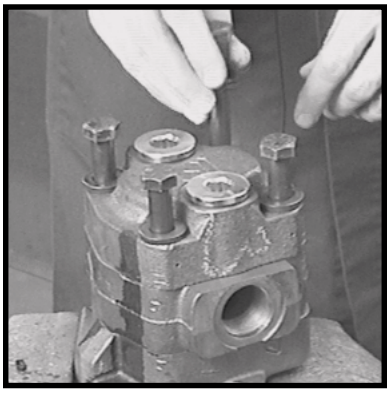
Locate the orientation mark on the gear housing and line it up with the mark on the shaft end cover. Slide the gear housing over gear set. Make sure the gear housing rests tightly against shaft end cover. Be careful not to pinch the section seal. Squirt clean, hydraulic oil over the gear shaft and the idler gear to provide initial lubrication when the pump is started.

STEP 14



Insert the pocket seals into the thrust plate and install onto the port end cover following the previous instructions in steps 8 & 9. Then place port end cover over the gear journals. The orientation mark on port end cover must line up with the mark on the gear housing. Also, be sure bearing bore holding the ring seal goes over the drive gear journal. Apply pressure to the casting with your hand or tap lightly with a soft-faced hammer until the port end cover rests tightly against the gear housing.

STEP 15

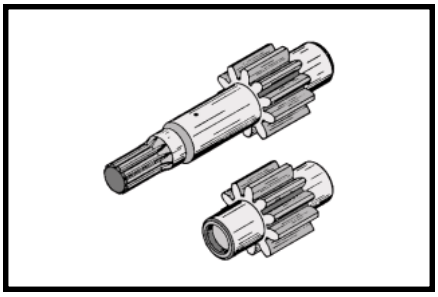


Thread the four, cap screws with the washers into the shaft end cover and tighten them in a cross-corner pattern. Rotate the gear shaft of the pump with a 6” wrench to make certain there is no binding in the pump.

STEP 16

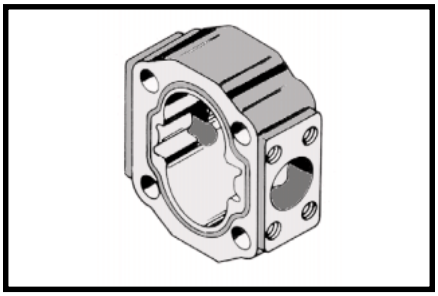
After the cap screws are tightened, make certain there is no internal binding of the gear set by rotating the gear shaft, then tighten the cap screws in a cross-corner pattern to a final torque of 2400 in. lbs. (200 ft. lbs.).

Part Replacement Guide



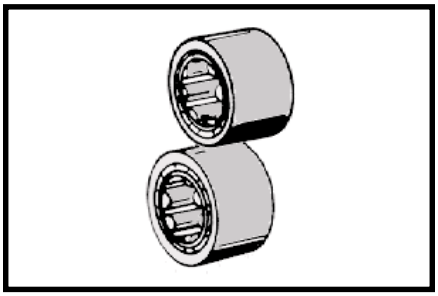
If the gear set contains any of the following defects, it should be replaced:

- Wear on the hubs or in the seal areas detectable by touch or in excess of .002”.
- Score marks, grooves or burrs on the outside diameter of the teeth.
- Nicks, grooves or fretting of the teeth surfaces.
- Wear or damage to the drive spline, key or keyway.

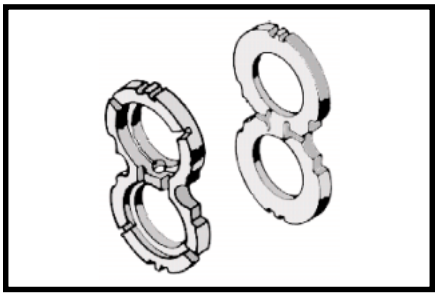


Wear in excess of .005” cut-out necessitates replacement of the gear housing. Place a straight-edge across the bore. If you can slip a .005” feeler gage in the cut-out area, replace the gear housing.

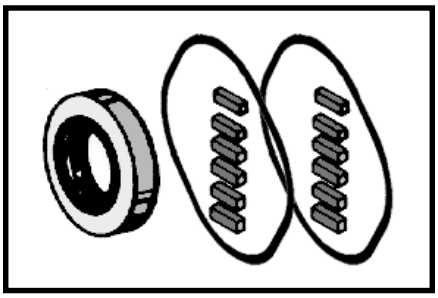
Where the cut-out is moderate, .005” or less, the gear housing is still in good condition. If the housing has equal size ports or no ports, the housing may be rotated 180°, exchanging ports, and reused.



If the gears are replaced, then the bearings must be replaced also. Bearings should fit into the bores with a light press fit.



Any scratches, grooves, erosion or pitting on the thrust plate face, which is the area that comes in contact with the gear faces, requires the replacement of the thrust plates.



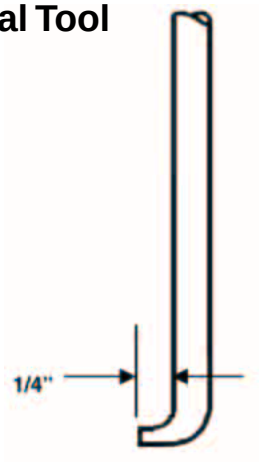
Replace all rubber and polymer seals whenever reassembling the pump. This includes lip seal, pocket seal strips and section seals.

Tool List

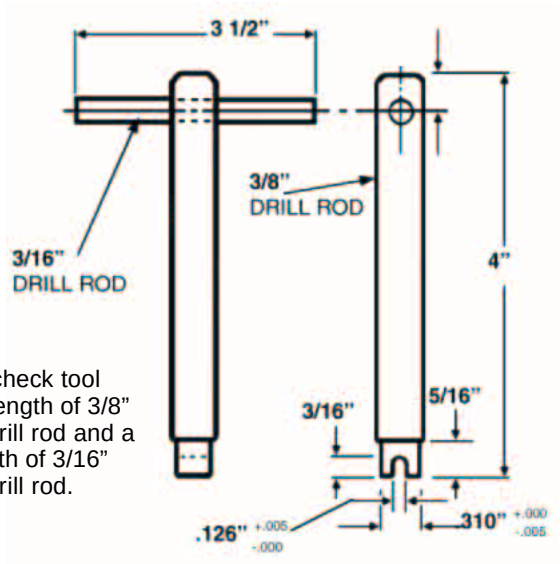
- Arbor press
- Permanent marker or an awl
- Bearing puller (Owatonna Tool Co. MD-956 or equivalent)
- Clean, lint-free cloths
- Deburring tool (a file with the cutting teeth ground off)
- Machinist hammer
- Soft-faced hammer
- Permatex Aviation Form-A-Gasket No.3 Non-hardening Sealant or equivalent
- Medium-grit carborundum stone
- Hydraulic oil and grease
- Prick punch or machinists ink
- Sharp, razor blade
- Scale (1/32” or 1/64” graduations)
- Feeler gauges
- Small, flat-head screwdriver
- Large, flat-headed screwdrivers
- Torque wrench
- 13/16” socket
- 1½” steel ball
- Loctite® No.262
- Vise with a 6” minimum open spread
- Lip seal installation bar (1 3/4” X 2”)
- Shaft installation sleeve (steel)
- Lip seal removal tool
- Check tool
- 6” wrench

Lip Seal Removal Tool

A seal removal tool can be made easily from an old screwdriver. Heat the tip and bend as shown. Grind off the tip to fit the notch behind the lip seal.

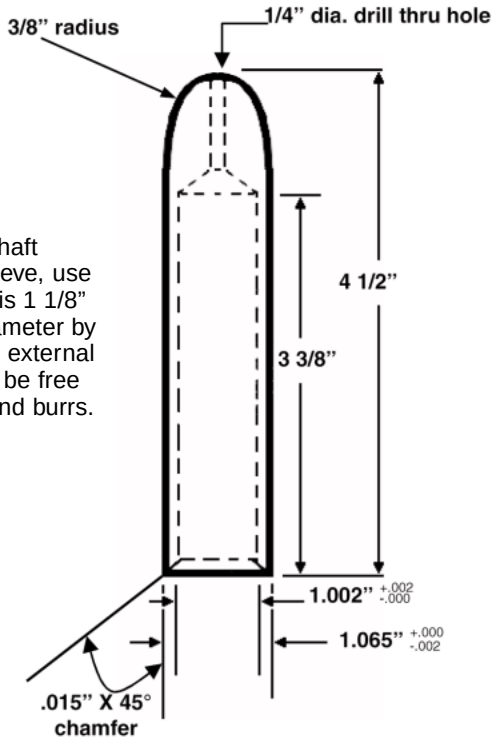


Check Tool



Make the check tool from a 4” length of 3/8” diameter drill rod and a 3 1/2” length of 3/16” diameter drill rod.

Shaft Installation Sleeve (Steel)



To make the shaft installation sleeve, use bar stock that is 1 1/8” or 1 1/4” in diameter by 4 5/8” long. All external surfaces must be free of scratches and burrs.

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Gear Pump Division
Youngstown, Ohio USA

Lubrication and Oil Recommendations

All parts, with the exception of the outboard bearing, are lubricated by the hydraulic oil in the circuit. Particular attention must be paid to keep the oil in the system clean. Whenever there is a pump or motor failure and there is reason to suspect that metal particles may be in the system, the oil must be drained, the entire system flushed clean and any filter screens thoroughly cleaned or replaced. New oil should be supplied for the entire system. Oil suitable and recommended for use in circuits involving Commercial Hydraulics' pumps and motors should meet the following specifications:

Viscosity:
- 50 SSU minimum @ operating temperature
  7500 SSU maximum @ starting temperature
- 150 to 225 SSU @ 100º F (37.8º C) (generally)
  44 to 48 SSU @ 210º F (98.9º C) (generally)

Approximate SSU at . . .		
Oil Grade	**100 F (37. 8° C)**	**210° F (98.9° C)**
SAE 10	150	43
SAE 20	330	51

Viscosity Index: 90 minimum

Aniline Point: 175 minimum

Recommended Additives: Foam Depressant
Rust and Oxidation Inhibitors

Other Desirable Characteristics:
- Stability of physical and chemical characteristics.
- High demulsibility (low emulsibility) for separation of water, air and contaminants.
- Resistant to the formation of gums, sludges, acids, tars and varnishes.
- High lubricity and film strength.

General Recommendations:

A good-quality, hydraulic oil conforming to the characteristics listed above is essential to the satisfactory performance and long life of any hydraulic system.

Oil should be changed on a regular schedule in accordance with the equipment manufacturer's recommendations, and the system should be periodically flushed.

Oil temperature in reservoir must not exceed 200º F (93.3º C) with a maximum temperature of 180º F (82.2º C) recommended. Higher temperatures will result in rapid oil deterioration.

Reservoir capacity should equal in gallons the pump output in gpm or the total gpm of all pumps where there is more than one in the system.

Normal Temperatures: 0º F (-18º C) to 100º F (37.8º C) Ambient
100º F (37.8º C) to 180º F (82.2º C) System
Be sure your oil is suitable for the temperatures you expect to encounter.

Cold Weather Operation:

Oils for use in cold weather should have a viscosity that does not exceed 7500 SSU at the minimum start-up temperature. A pour point of at least 20º F below start-up temperature is recommended. Start-up procedures should allow for a gradual warm-up until the oil reaches a reasonably fluid state.

Lubrication and Oil Recommendations

The Use of Other Oils:

- Diesel Fuel or Kerosene (Coal Oil): These are sometimes used as dilutants for cold weather operations but are not recommended as they are not sufficiently refined products.
- Fire-Resistant Fluids: Of the several different types, only the inverted emulsion types may be used without switching to a special seal, packing, gasket, hose, etc., compositions. Their use may substantially reduce pump life. Experience indicates that the use of fire-resistant fluids can be disastrous unless certain precautions are followed. **DO NOT USE ANY FIRE RESISTANT FLUIDS OR NON-PETROLEUM OILS WITHOUT CONSULTING OUR PRODUCT SUPPORT DEPARTMENT.**
- These suggestions are intended as a guide only. **OBTAIN YOUR FINAL OIL RECOMMENDATIONS FROM YOUR OIL SUPPLIER.**

Recommended Start-up Procedure for New or Rebuilt Pump or Motor

Before installing a new or a rebuilt pump or motor, back out the main relief valve until the spring tension on the adjusting screw is relaxed. This will avoid the possibility of immediate damage to the replacement unit in the event that the relief valve setting had been increased beyond the recommended operating pressure prior to removing the old unit.

Before connecting any lines to the pump or to the motor, fill all ports with clean oil to provide initial lubrication. This is particularly important when the unit is located above the oil reservoir.

After connecting the lines and mounting the replacement unit, operate the pump or the motor for at least two minutes at zero pressure at the lowest possible rpm. During this break-in period, the unit should run free and not develop an excessive amount of heat. If the unit operates properly, the speed and the pressure can then be increased to the normal operating settings.

Reset the main relief valve to its proper setting while the pump is running at the maximum operating engine (motor) speed for the vehicle.

ALWAYS USE AN ACCURATE GAGE WHEN ADJUSTING THE RELIEF VALVE PRESSURE SETTING.

Test Procedure Recommended

Be sure there is an adequate supply of oil for the pump; at least one gallon of oil for each gpm of pump capacity.

If one section of a tandem pump is being tested, make sure all other sections which are not being tested, are adequately supplied with oil. If any of the other sections run dry or if plugs are left in ports, serious and permanent damage will result.

The oil should be a good-quality, hydraulic oil rated at 150 SSU at 100º F with the oil temperature held at 120º F plus or minus 5º F. (Test procedures are described in detail in SAE handbooks; see Hydraulic Power Pump Test Procedure SAE J745c.)

The inlet line must be an adequate size with no more than 5" mercury vacuum adjacent to the pump inlet. As a rule, the inlet line must provide an inlet flow velocity that is not in excess of 8 feet per second.

Hot oil drawn into a cold pump could cause it to seize. Switching the pump on and off in short bursts could help prevent seizure.

Operate the pump at least two minutes at zero pressure and at moderate speed (not over 1500 rpm).

If pump becomes hot to touch, it is binding and could seize. This rarely occurs, but if it does, the pump will have to be disassembled and be rebuilt, taking extra care to remove burrs and to assure freedom from binding.

Gradually increase the pressure on a pump until the desired test pressure has been reached. This should take about five minutes.

Delivery should run close to the rated, catalog performance figures which are averaged from the testing of several pumps. A 5% lower reading may be used as a rated minimum, if new or relatively new parts have been used. When rebuilding the pump, reuse only those parts which appear to be in satisfactory condition. A 10% or 15% lower reading is permitted for the rebuilt pump, depending upon the performance expected from the equipment. Your individual experience is the best guide.

Many repairmen measure the output at the normal operating speed, at zero pressure, then at 1000 psi (or the operating pressure of the equipment), and allow a volume decrease approximating the listing below. The table listing shows the drop off in flow that can be expected at various operating pressures for a pump rebuilt with used parts.

PGP020 pumps are generally tested to 2000 psi.

GPM Delivery at 1800rpm	**GPM Drop Off At...**			
100 psi	**1000 psi/70 bar**	**1500 psi/105 bar**	**2000 psi/140 bar**	**2500 psi/175 bar**
5 - 14	2 to 3	21/2 - 31/2	3 to 4	31/2 - 41/2
15 - 25	21/2 to 31/2	3 - 4	31/2 to 5	4 - 51/2
26 - 50	3 to 4	4 - 5	4 to 6	41/2 - 61/2

At test speeds other than 1800 rpm, gpm delivery will vary almost proportionately, but the same (drop-off) figures should be used.

Be sure to run the pump in the direction for which it was designed and built. Driving the pump in the wrong direction will build up pressure behind the lip seal, causing damage to the pump and necessitating its replacement.

Since it is rarely feasible to test motors on dynamometers, the practical procedure is to test them as pumps, running complete testing procedures in each direction.

After completing the testing procedures, the pump is ready for installation and immediate duty operation on equipment. It must be reinforced that to prevent seizure, hot oil must not be drawn into a cold pump.

Instructions for Change of Rotation

The PGP020 series pump can be assembled for clockwise (CW), counterclockwise (CCW), or bi-rotational operation. The direction of rotation is determined by looking at the pump with the drive shaft facing you and the idler gear down. If the pump has unequal porting and the larger port is on the left side, then the pump is set up for CW operation. If the larger port is on the right side of the pump, then it is set up for CCW operation. Bi-rotational pumps that can be run in either direction, will have equal size ports.

DISASSEMBLY

1 If the unit has a keyed shaft, remove the key.

2) Clamp the unit in a vise on the outside diameter of the mounting flange with the drive shaft down.

3) Remove the cap screws on single units or hex nuts and studs on multiple units.

4) Remove the port (rear) end cover.

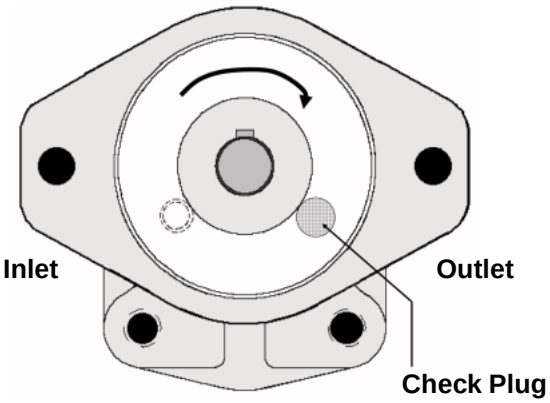
5) Remove the gear housing and the gear set. Keep the gears together because they are a matched set.

   For multiple units: Remove the bearing carrier and the next gear housing and gear set until all that remains is the shaft end cover.

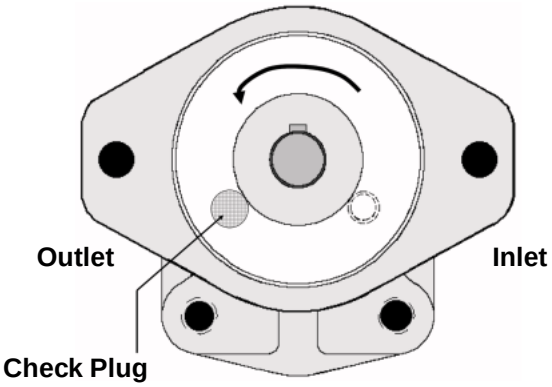
Note: Care should be taken to avoid losing the small, rubber pocket seals fitted in the thrust plate pocket seal grooves.

6) Lift the thrust plate off of the shaft end cover. Do not lose the pocket seals.

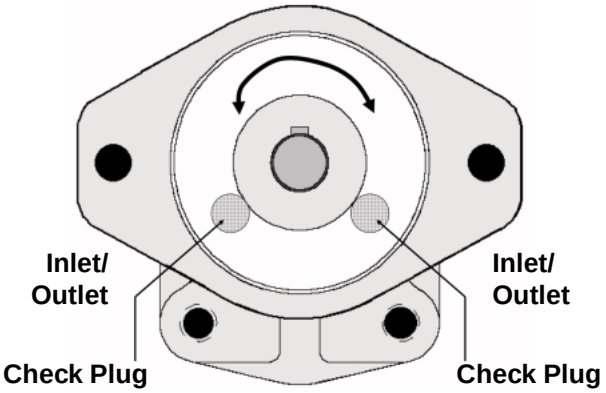
7) Remove the check plug in the shaft end cover with a screwdriver and then install it in the opposite drain hole. Screw in tightly and stake the check plug with a punch at both edges of the screwdriver slot. For a single-rotation pump, the check plug is always located on the high pressure (outlet) side of the pump. If the shaft end cover has two check plugs, the pump is already set-up for double rotation.



CW



CCW



Bi-rotational

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ASSEMBLY

1) Before assembling the unit, stone off the machined surfaces. This will remove any nicks or burrs that may have resulted from the disassembly.

2) Air blast all parts and wipe them with a clean, lint-free cloth before starting the assembly.

Note: PGP020 series thrust plates are designed for bi-rotational operation and do not have to be rotated.

3) Place one thrust plate with pocket seals over the shaft end cover bearings. Be sure the pocket seals are properly fitted in the thrust plate pocket seal grooves.

4) Insert the gear shaft with the shaft installation sleeve into the shaft end cover with a twisting motion. Insert the idler gear.

5) Rotate the gear housing 180° and carefully slide over the gear set. Make sure both section seals stay in the seal grooves during assembly. Keep the drive gear and idler gear in the same gear bore as previously marked.

6) For multiple units: Place the thrust plates with pocket seals over the bearings on both sides of the bearing carrier. Be sure the pocket seals are properly fitted in the thrust plate pocket seal grooves.

7) Rotate the bearing carrier 180° and install over the gear set and gear housing.

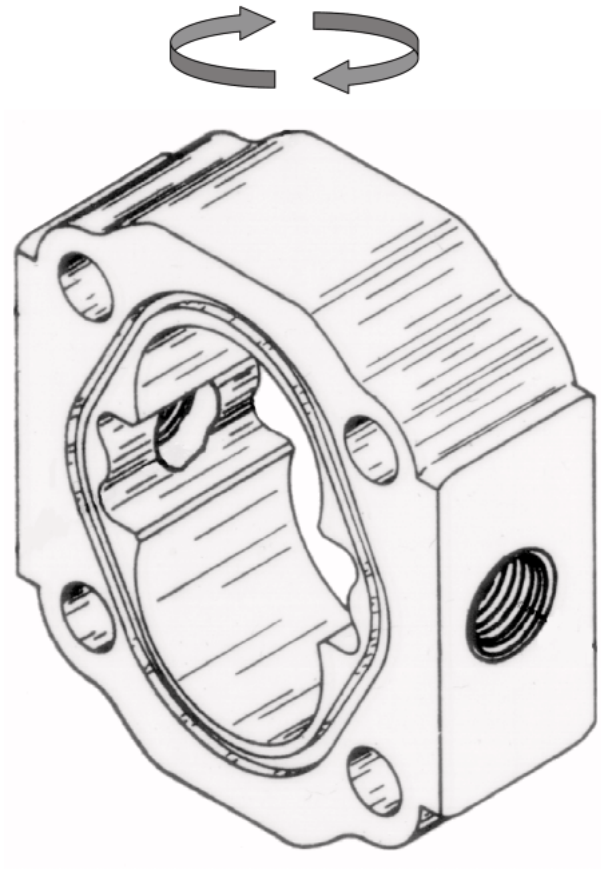
Note: If the bearing carrier has an L-shaped porting configuration, it cannot be used. A new bearing carrier will have to be machined with the proper configuration.

8) Insert the gears into the bearing carrier.

9) Rotate the gear housing 180° and carefully slide over the gear set. Make sure both section seals stay in the seal grooves during assembly.

10) Place the port end cover with the thrust plate over the gear set. If the port end cover is ported, it must be inverted.

11) Insert the cap screws or the studs into the unit and torque in a cross-corner pattern to 2400 in. lbs (200 ft. lbs).



Gear Housing

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Notes

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Notes

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2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

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Parker Hannifin Corporation
6035 Parkland Blvd.
Cleveland, Ohio 44124-4141
Telephone: (216) 896-3000
Fax: (216) 896-4000
Web site: www.parker.com

Parker Hannifin Corporation

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Parker Hannifin Corporation
Gear Pump Division
1775 Logan Avenue
Youngstown, OH 44501 USA
Tel: (330) 746-8011
Fax: (330) 746-1148
http://www.parker.com/gearpump

Service Manual
HY09-SM020/US
2.5M, 07/06, T&M

Service Bulletin No. 102

Subject: **Seal Kit Installation, Rotary Actuator Models HA36 & SS40**

Problem: **Inadequate service life for replacement seal kit installation in rotary actuator.**

BEFORE attempting to install a seal kit in the swing actuator, please review this information:

After examining the cause of leaks and poor replacement seal performance, we have found that replacing the seal kit may only provide a temporary solution. In most cases the machined surfaces need to be repaired and returned to the original size. Also check end cap and bottom surface for any scoring. If this is not repaired the hydraulic oil bypass may be excessive and result in poor performance.

1. Check all surfaces for wear, including the Teflon bearings.

2. Read and study the service manual for the HA36 & SS40 provided by Micro-Precision, and follow instructions closely. Note the special tools, or the recommended substitute in the service manual.

3. Note the position of the vane on the wing shaft; the vane should be 180° from the abutment blocks before installing actuator. The head and boom also need to be centered. After installation, check the full rotation and ensure that the external head stops limit the rotation and not the abutment block in the actuator. Failure to have the stops work properly will result in damage to the actuator.

4. Port reliefs and flow restrictors are extremely important for extended rotary actuator and loader life. All loaders are equipped with port reliefs and flow restrictors for the actuator. Please review the "Flow Restrictors" section in the Petersen Operator's Manual, and the Hydraulic Circuit Diagram found in the manual for additional information regarding settings for the port reliefs and flow restrictors.

Please contact our Parts and Service Department should you have any questions regarding repair or replacement of your actuator.

Petersen Industries, Inc.
4000 S. R. 60, West
Lake Wales, FL 33859
Telephone: 800/930-5623

August 26, 2000

Repair of Hyd-ro-ac Actuators

HA Model
OVERHAUL INSTRUCTIONS

HA-36

Read the entire contents of these instructions before installing the actuator and before making any connections to the actuator. These instructions must be followed in all respects to avoid damage to the actuator and associated components and/or injury to personnel.

For further information contact:

Micro-Precision TEXTRON

Micro-Precision Operations Inc./Subsidiary of Textron Inc.
525 Berne Street
Berne, Indiana 46711

Phone: 260-589-2136
Fax: 260-589-8966
email: actuators@tac.textron.com
web address: www.rotachydroac.com

INTRODUCTION.

This technical manual provides overhaul instructions with an illustrated parts list for standard HA-36 Hyd-ro-ac Rotary Actuators. Do not attempt to overhaul an actuator without having a seal kit on hand. Refer to the applicable parts List for information regarding seal kits. The Parts List should also be used as a specific guide in determining the parts used in a particular assembly.

SPECIAL TOOLS.

The following special tools are recommended for use during reassembly of a HA Series Actuator. Alternate procedures, for use when the tools are not available, are provided herein but are not recommended. See figure 2 also.

PART NUMBER	NOMENCLATURE
220038-HA	Shaft Seal Protector
220039-HA	Abutment Seal Protector
220041-HA	Vane Seal Protector

NOTE- The procedures. herein apply to all HA Series Actuators. The differences in construction between the various units do not affect the overhaul instructions unless a notation restricts the instruction to a particular HA Series Actuator.

DISASSEMBLY.

Disassembly is in the same order as the key index numbers assigned to the exploded view illustration, figure S. Complete instructions are listed in the following steps.

a. Use a holding fixture that simulates normal actuator mounting to hold the actuator during disassembly. Do not hold the actuator in a vise unless special precautions are taken to avoid marring or distorting the end or body.

b. Pull V-ring (1) from end of the wingshaft. Unscrew and remove cap screws (2). Tap around the periphery of end & bushing assembly (3) until the end is loose, then remove it from body & bushing assembly (19).

c. Remove hub seal (5), hub wavy ring (6), and hub seal spring (7) from end (3). Take shaft seal (b) and shaft seal ring (9) out of the groove in end (3). If necessary, remove dowels (4) from end (3) or body (19).

d. Bushing(10)in end(3)is a "DX" type and replacement should be governed by the following criteria.

1. Bushings should not be replaced unless worn or damaged.

2. If replacement is required, Bushings must be machined Out of the end. Care must be taken to avoid damaging the end.

3 "DX" bushings are normally installed at the factory as they are a press fit in the ends and must be machined after installation to match the wingshaft diameter with a diametrical clearance of 0.0005 to 0.0020 inches. Figure 1.

4 End (3) supplied as a spare part contains a "DX" bushing and is machined to match the wingshaft diameter.

Remove end seal 0-ring(11)from body(19).

Important. Do not allow the wingshaft to cock as it may nick the sharp edges on the body. abutment or wingshaft.

e. Use a-straight, even pull and remove the wingshaft (12) from the body (19). Take vane seal (13). vane seal 0-ring (14), and vane seal spacer (14a) out of the groove in the wingshaft vane.

f. Pull abutment (15) out of body (19). It is not necessary remove abutment dowels (16). The dowel pins are usually a light press fit in the abutments and a clearance fit in the ends.

Important: Do not nick the sharp edges on the body cavity and hub seal bores as this may cause internal leakage after reassemble.

g. Remove abutment seal (17) and abutment seal 0-ring

h. Take hub seal (5). hub seal ring (6). and hub seal spring (7) out of body (19). Remove shaft seal (8) and shaft seal 0-ring (9) from body (19).

i. Removal of bushing (10) from body (19) should be governed by the replacement criteria listed under step d.

j. It is not necessary to remove nameplate(21)unless it is damaged and requires replacement. To remove the nameplate. pull out drive screws (20).

k. On all standard HA. Series Actuators, ports are contained in body (19). Ports should always contain shipping plugs to prevent the entry of foreign material.

CLEANING

Clean all parts by degreasing in a suitable solvent and dry thoroughly.

INSPEC'TION.

a. Visually inspect wingshaft (12), end (3). body (19). and abutment (IS) for cracks. nicks or scratches.

b. Visually inspect bushings (10) in end (3) and body (19) or scoring or wear.

c. Inspect the inner diameter of abutment (15). the inner faces and diameters of end (3) and body (19), and the outer diameters of wingshaft (12) for evidence of scratches. scoring, or galling.

d. Inspect all threads for condition and cleanliness.

REPAIR OR REPLACEMENT.

a. Minor scratches may be removed by hand stoning the affected areas. Stone just enough to remove rough edges or bum. If the scratches are deep enough to form leakage paths. the affected parts should be replaced.

b. Replace all parts in the seal kit: V-rings (1), 0-rings (9), (11). (14), (18), hub seals (5), shaft seals (8), vane seal (13). and abutment seal (17).

c. Replace all broken or damaged parts.

LUBRICATION.

Lubricate all 0-rings sparingly with petroleum jelly or other suitable lubricant compatible with the 0-ring material. and with hydraulic fluid being used.

REASSEMBLY.

NOTE: Special tools should be used to prevent damage to seals during reassembly. Alternate methods for use when the tools are not available are listed herein. The alternate methods are not recommended and are listed only for convenience in the event of an emergency.

a. If bushings (10) were removed, press new "DX" bushings into the end and/or body and then machine to match the wingshaft diameter with a diametrical clearance of 0.0005 to 0.0020 inches and concentric with the shaft bore within 0.001. If facilities are not available for machining, procure an end (3) and body (19) with installed bushings (see Parts List).

NOTE: Bushings must be fully seated and must not protrude into the hub seal area.

b. Install body (19) on a holding fixture. Lubricate shaft -ring (9) sparingly with lubricant and install it and seal 0 shaft seal (8) in body (19). Avoid ripples or wrinkles in the installed shaft seal. Place hub seal spring (7) and hub seal ring (6) in body (19). Install hub seal (5). The hub seal should fit snuggly. Note that the hub seal is free to move in an axial direction under pressure of hub seal spring (7).

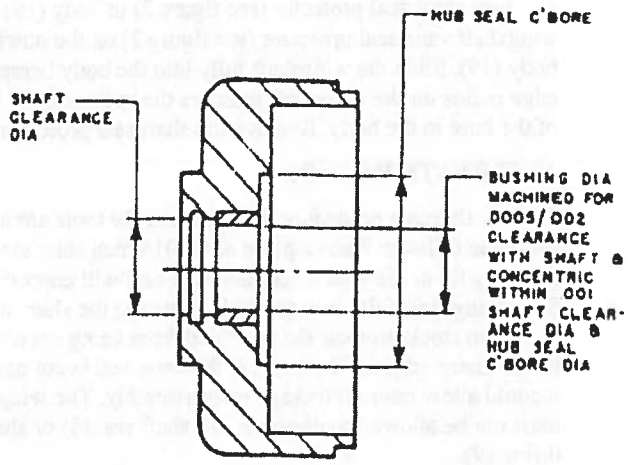

Figure 1. Bushing Machining Requirements

Caution : Abutment (15), abutment seal wingshaft (12). and wingshaft vane seal (13) must be installed so that the edge radius on the parts matches the radius on the bottom of the body bore.

c. Assemble the vane seal 0-ring (14) on to the vane seal spacer (14a) followed by the vane seal (13). This is best accomplished while holding the vane seal spacer against a clean flat surface. Install this vane seal assembly in the groove in wingshaft (12) noting that the edge radius on seal (13) and wingshaft (12) are on the same side. Coat seal (13) liberally with lubricant.

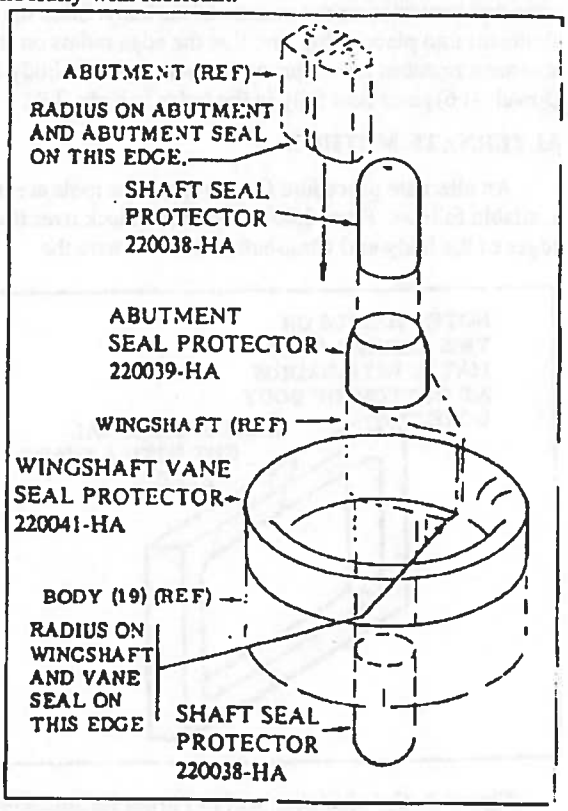

Figure 2. Special Assembly Tools Used to Protect Seals

d lace shaft seal protector (see figure 2) in body (19) and wingshaft vane seal protector (see figure 2) on the outside of body (19). Slide the wingshaft fully into the body being sure the edge radius on the wingshaft matches the radius on the bottom of the bore in the body. Remove the shaft seal protector.

ALTERNATE METHOD

d-1. An alternate procedure for use when the tools are not available follows: Place a piece of 0.0015 inch shim stock over the body lip in the area where the vane seal will enter the body. Slide wingshaft fully into the body. Remove the shim stock. The shim stock protects the vane seal from being cut or abraded by the sharp edge on the body. If the vane seal is cut or abraded it could allow internal leakage after assembly. The wingshaft must not be allowed to distort or tell shaft seal (8) or shaft seal 0-ring (9).

Caution: Sharp edges on shim stock can be dangerous. Use extreme care when handling.

e If removed. install dowels (I 6) in abutment (I 5). Stretch 0-ring (I 8) around the abutment and seat in the seal groove. Make a centrally located diagonal cut through the side of abutment seal (I 7) that contacts the body (see figure 3). Use a razor blade to make the cut. Place the abutment seal (17) in position on abutment (151 The diagonal cut must be on the side of the abutment next to the body. and the edge radius on the abutment seal and abutments must coincide. Apply a liberal coating of lubricant to the abutment seal. Place abutment vane seal protector (see figure 2) on the wingshaft and wingshaft vane seal protector on the outside of the body. Slide the abutment into place being sure that the edge radius on the abutment matches the radius on the bottom of the body bore. Dowels (I 6) must seat fully in the holes in body (I 9).

ALTERNATE METHOD.

e- 1. An alternate procedure for use when the tools are not available follows: Place 0.0015 'rich shim stock over the sharp edges of the body and wingshaft hub area where the abutment seal will enter. Slide the abutment into position and remove the shim stock. The shim stock protects the abutment seal from cuts or scratches that would allow internal leakage.

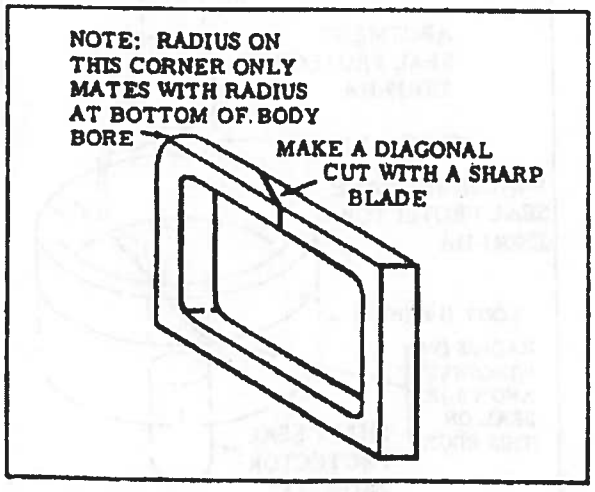

Figure 3. Cut abutment seal to Permit installation on abutment.

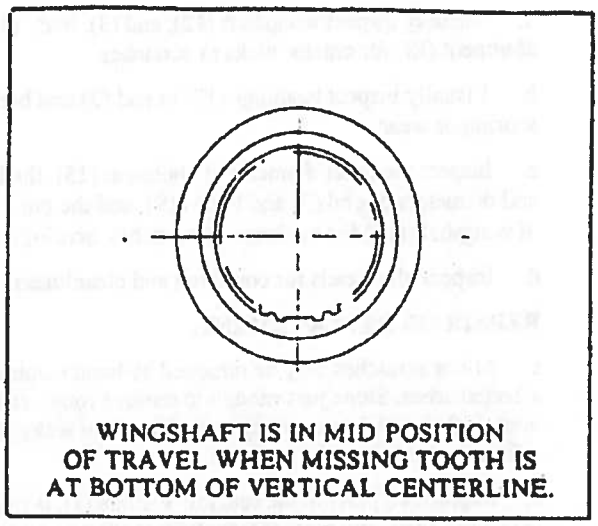

figure 4. Wingshaft and body assembly relationship.

f Install end seal 0-ring (I 1) on the outer lip of body (I 9) and lubricate sparingly.

g Install shaft seal 0-ring (9) and shaft seal (8) in end (3).

h Place hub seal spring (7). hub seal ring (6). and hub seal (5) in end (3) being sure that hub seal (5) fits snuggly and that it is free to move axially under the pressure of hub seal spring (7). Apply a heavy coating of lubricant around hub seal (5). The lubricant must keep the hub seal correctly positioned when end (3) is turned over to install it on body) (19). Place shaft seal protector (see figure 2) on the end of wingshaft (12). Position end (3) over body (19) and h ft (12) and press it onto the body being sure the wings a capscrew and dowel pin holes are aligned. Remove the shaft seal protector from the wingshaft. If the shaft seal protector is not available. use caution to avoid tearing or distorting shaft seal (8) by the wingshaft.

i Apply a small amount of Loctite to the first three threads of capscrew (2), install capscrews in end (3). tighten all capscrews lightly. Using a 'star pattern' tighten -of 120 foot pounds. Install capscrews evenly to a torque dowels (4). If either body or end are new and if necessary, ream the dowel holes .6250/.6245 diameter by 2'Z, inches deep to permit insulation of the dowels.

j If removed, replace nameplate (21) and secure to body (I 9) with drive screws (20).

k Install V-ring (1) on end of the wingshaft, work the V-ring onto the wingshaft being careful to avoid cutting the inner diameter with the sharp edges on the wingshaft.

Table 1. -Trouble Shooting Chart

□TROUBLE	PROBABLE CAUSE	'REMEDY
External Leakage at Shaft -	Defective shaft seal S) (8) or 0-ringf., (9).	Replace defective parts.
	Wingshaft (12) scored or worn. Bushings (10) defective	Repair wingshaft or replace. defective parts.
External Leakage at Joint Between End (3) and Body (19).	defective 0-ring (11), or damaged sealing. surface on end (3) or body (19).	Replace defective 0-ring Repair or replace damaged parts
Wingshaft Binds'	Foreign material in actuator working chambers.	Disassemble and clean thoroughly
	Improperly seated abutment seal (17), vane seal (13) and/or hub seal(s) (5).	Disassemble and replace improperly seated seal making sure it seals property at assembly.
Excessive Internal Leakage	Defective abutment seal (17), vane seal (13), . 0-ring (18) and/or vane seal 0-ring (14).	Replace defective parts
	Defective hub seal (5), hub seal ring (6), or hub seal spring (7).	Replace defective parts.
	Worn or scratched end faces in end (3) or body(19).	Repair or replace.
	Deep scratches in body (19).	Repair or replace.
	Worn bushings (10).	Replace bushings.
	Cap screws (2) not tightened sufficiently.	Tighten to recommended torque.
	Vane seal not seated properly (applicable to units immediately after overhaul only).	Operate through full cycles for a few □minutes to attempt to seat seals. L

TEST PROCEDURE.

a Apply 50 psi air or hydraulic pressure (normal operating fluid) to one of the inlet ports. The applied pressure should move the wingshaft until it is stopped by the abutment. If the actuator fails to move under the applied pressure it indicates that the wingshaft is binding.

b . Lock the wingshaft in the center of its angular travel and pressurize one of the ports with hydraulic fluid at operating pressure. Check- for internal leakage by measuring the flow 'out of the opposite port. Leakage should not exceed the value shown in Table 11. Reverse the hydraulic connections and check leakage at the opposite port. Leakage should not exceed the value listed in Table 11. Pressurize both ports simultaneously to operating pressure and check for external leakage. No external leakage is allowed

Table 11. Maximum Allowable Internal Leakage Values

MODEL	Maximum Breakaway Torque required in PSI	Test Pressure in PSI	Maximum Bypass Leakage per min.	
			Cubic Inches	cc
HA-36	50	2200 PSI	37	600

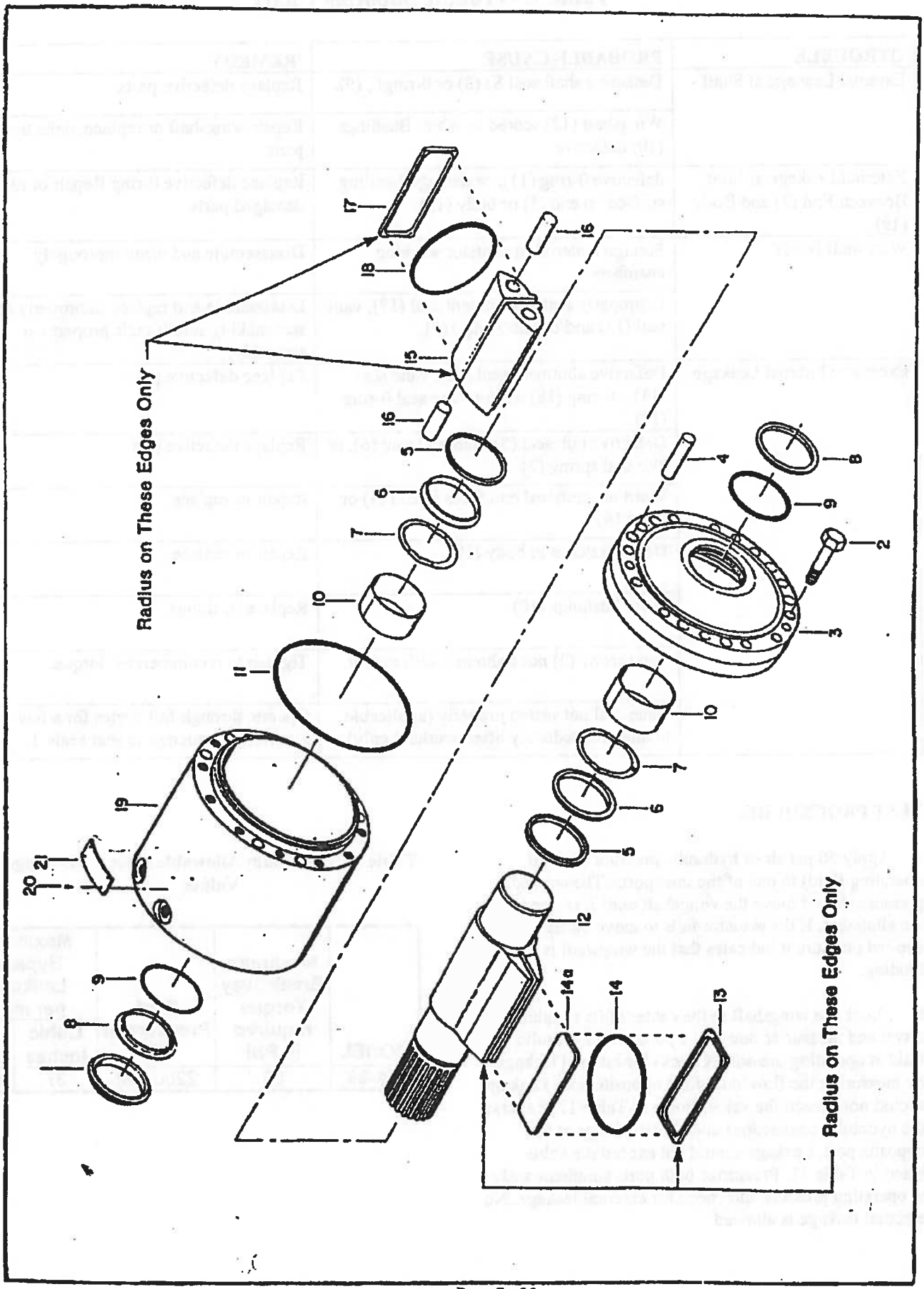

Figure 5. HA 36 Rotary Actuator Assembly, Exploded View

INSTALLATION INSTRUCTIONS

Important Hydraulic Features

1. The standard unit is designed to operate in the temperature range of -40 to +225 degrees F when filled with any filtered petroleum or mineral base fluid that has viscosity value of 70-250 SSU at 150 degrees F.

2. Standard units are fitted with Nitrile (Buna N) seals. Fluorocarbon rubber (viton) and ethylene propylene seals are available for special fluids and high temperature applications. Filtered and lubricated air may also be used; however, the temperature should not exceed 150 degrees F.

3. THE FLUID PRESSURE APPLIED TO THE HYD-RO-AC MUST NOT EXCEED THE RATED MAXIMUM PRESSURE GIVEN ON THE NAMEPLATE ("MAX. P.S.I"). IN NO CASE IS THE RATED PRESSURE PERMITTED TO BE GREATER THAN 3000 P.S.I. A relief valve must be installed in the supply line to restrict system pressure. The hydraulic system must be designed to eliminate pressure surges that could exceed the actuator design pressure. Relief valves must be installed between the control valve and the HYD-RO-AC to eliminate the surge pressure in the actuator which may be caused by attempting to stop a high inertial load. These valves must be adequately sized and installed as close as possible to the actuator and between any control or shutoff valve and the actuator.

Important Installation Considerations

1. It is essential that no end loads be transmitted to the output shaft of the actuator. To insure maximum life for any installation, side loading and bending movements caused by improper alignment should be eliminated by use of shims. If side loads cannot be avoided, consideration should be given to provide outboard pillow blocks and/or flexible couplings. However, where side loads cannot be avoided, recommendations should be obtained from the factory.

2. In the installation of an END MOUNT actuator it is essential that the two untapped holes in the mounting flange be reamed and fitted with press fit dowels to take the torque. Do not try to carry the torque load on the threads of the four mounting bolts or the friction under the heads of these mounting bolts alone. In the installation of a foot mount actuator, it is essential that fasteners be used in each of the four mounting holes.

3. All mounting bolts must be tight and of sufficient strength. The actuator must be aligned properly and attached to sufficiently rigid structure to assure that there are no unrecognized side loads applied to the HYD-RO-AC shaft or bearings. Use shims where necessary to maintain alignment.

4. The adapter connecting the HYD-RO-AC output shaft to the mechanism should be machined for a slip fit with minimum backlash, and all linkages must be snug to assure proper response. No end loads should be transmitted to the actuator.

5. Hydraulic lines must be at least as large as the ports of the HYD-RO-AC and as short as possible to minimize hydraulic pressure drop problems.

6. If the actuator is mounted with ports other than at the top of the unit, or if only a small portion of the stroke is utilized, a method for bleeding air out of the system must be provided.

CAUTION: THE INTERNAL STOPS IN THE ACTUATORS ARE NOT DESIGNED TO ABSORB DYNAMIC LOADS. EXTERNAL STOPS MUST BE USED TO LIMIT OUTPUT SHAFT TRAVEL. VANES STRIKING ABUTMENTS WILL RESULT IN PREMATURE ACTUATOR FAILURE.

7. Angular travel. Total shaft travel for a standard unit is 280 degrees +/- 5 degrees for single vane and 100 degrees +/- 5 degrees for double vane. Position the output shaft correctly prior to connecting it to the mechanism to insure full angular rotation.

8. The mid-position of travel of each HYD-RO-AC equipped with a standard spline is readily obtainable by positioning the missing tooth area of the spline 180 degrees opposite the centerline of the hydraulic connecting ports for single vane units, and 90 degrees clockwise from a centerline between the two ports for double vane units. These positions are located while facing the splined end of the actuator. The mid-travel position for each HYD-RO-AC with a standard keyway is readily obtainable by positioning the keyway between the hydraulic connection ports.

HYD-RO-AC WARRANTY

The Company warrants, to the original purchaser, that this product is free from defects in materials and workmanship if properly installed, serviced and operated under normal conditions according to the Company's instructions. The Company's obligation under said warranty and its total legal obligation under this contract is expressly limited to correcting, without charge at its factory, any unit or parts thereof returned to its factory, transportation charges prepaid, for a defect which occurred during the first 6 months of operation or 12 months from date of shipment to the original purchaser, whichever occurs first; and which upon examination shall disclose to the company's satisfaction to have been originally defective. Corrections of such defects by repair to, or supplying of replacements for defective parts, shall constitute fulfillment of all obligations to the original purchaser. This warranty shall not apply to any of the Company's products which must be replaced because of normal wear, which have been subject to misuse, negligence or accident or which shall have been repaired or altered outside the Company's factory unless authorized in writing by the Company. The Company assumes no liability for injury, loss, damage, or expense directly or indirectly resulting form the use of this product or from any other cause. THIS WARRANTY SUPERSEDES, AND IS IN LIEU OF, ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND OF ALL OTHER LIABILITIES OR OBLIGATIONS ON THE PART OF THE COMPANY. No distributor, agent, or dealer is authorized to give any other warranties on behalf of the Company nor to assume for the Company any other liability in connection with any of its products. UNDER NO CIRCUMSTANCE WILL THE COMPANY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR ANY OTHER DAMAGE IN CONNECTION WITH THE USE OF ANY INFORMATION OR MATERIAL CONTAINED HEREIN. THE COMPANY DISCLAIMS ALL WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.