
# PL-3
# OWNER/OPERATOR MANUAL

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***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.***

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

**⚠ WARNING**

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

## Introduction

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

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

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

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

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

## ⚠ WARNING

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

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

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

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

1. Check oil level and battery.

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

3. Check rearview mirrors and adjust if necessary.

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

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

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

7. 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.

8. Ensure that the frame lock hooks are fully engaged into the hook lock receptacles.

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

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

## Part 3: Safety Devices

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

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

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

## FLOW RESTRICTORS

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

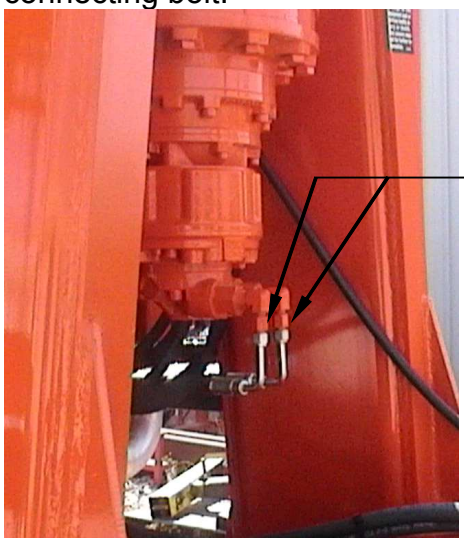
**Model HA36 Rotary Actuator, Restrictor Size = .056”**
**Model SS40 Rotary Actuator, Restrictor Size = .056”**
**Model SAI Rotary Actuator, Restrictor Size = .096”**
**Model Dinamic Oil Actuator, Restrictor Size = 0.110”**

Some signs of restrictor removal or modification are:

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

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

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



Swing Actuator Restrictors:

HA36 Actuator Restrictor Size = .056”

SS40 Actuator Restrictor Size = .056”

SAI Actuator Restrictor Size = .096”

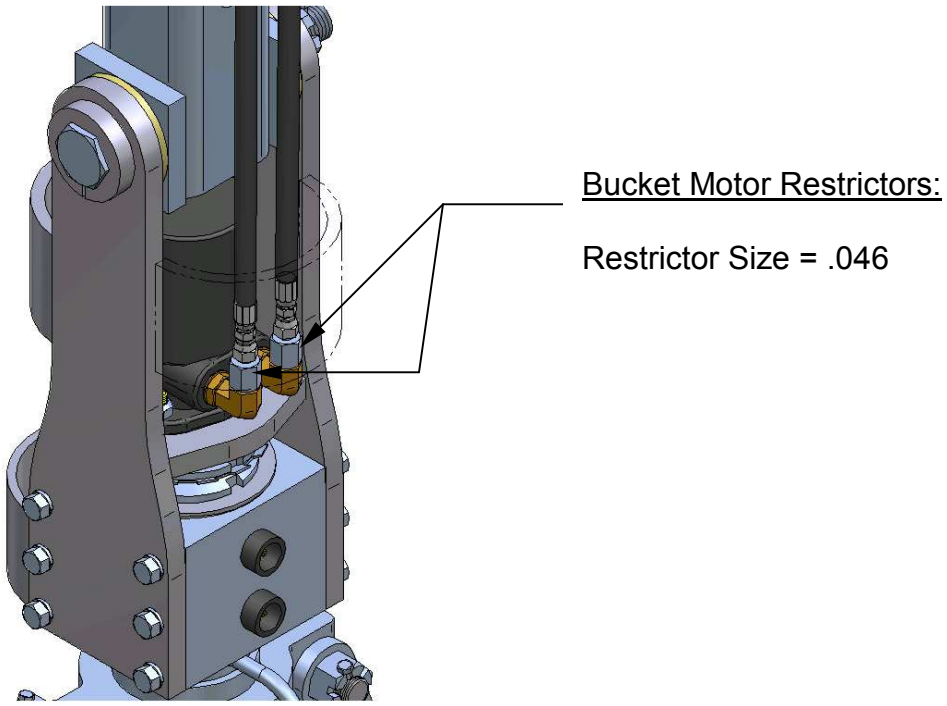
Dinamic Oil Restrictor Size = 0.110”

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

**Restrictor Size: .046**

Some signs of restrictor removal or modification are:

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



## LOAD CONTROL VALVES

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

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

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

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

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

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

**⚠ WARNING**

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

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

**Outrigger Cylinders:**

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

These valves are factory preset and are not serviceable.

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

**LOCK COLLAR**

The lock collar is an integral part of the 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.

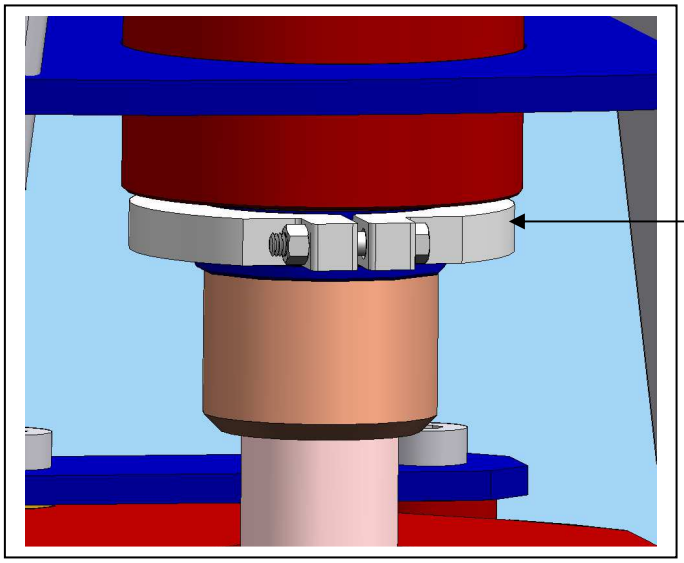
- Excessively packing the load with the boom. Evidence of this may be the bulkhead of the body may be bowed outward.

- 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 & Pedestal Assembly drawing 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.** |

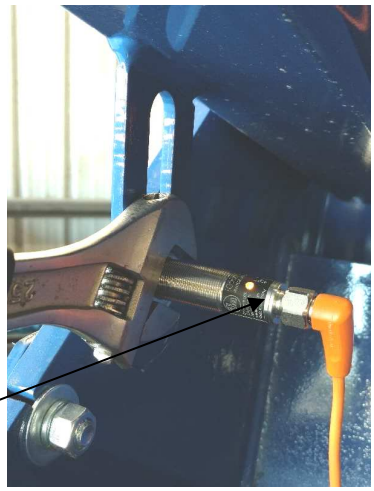
It is the operator’s responsibility to make sure that the area behind the loader is clear before backing up.

## “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 red light in the truck cab. When the operator enters the truck cab after using the loader, the warning light and audible alarm will alert him if the boom travel height exceeds 13 feet.


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

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



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

boom up alarm.

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

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

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

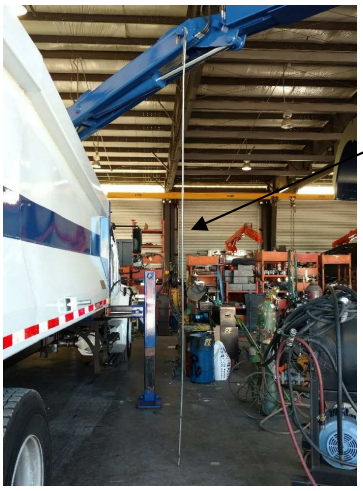
To adjust the boom sensor:

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

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

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

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



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

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

**⚠ WARNING**

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

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

## SAFETY SYMBOLS

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

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

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

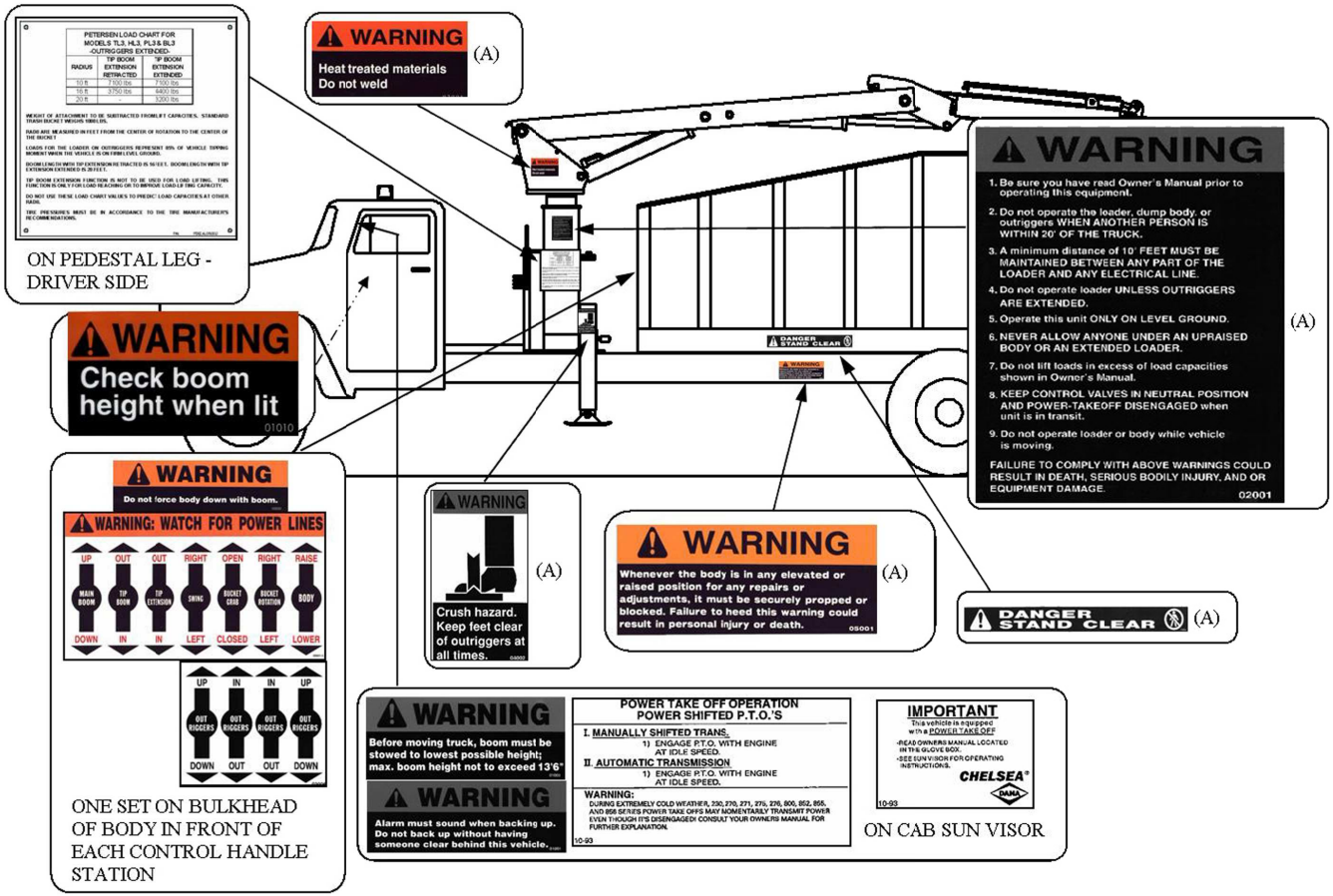
The following definitions for identifying hazard levels are provided with their respective signal words.


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


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

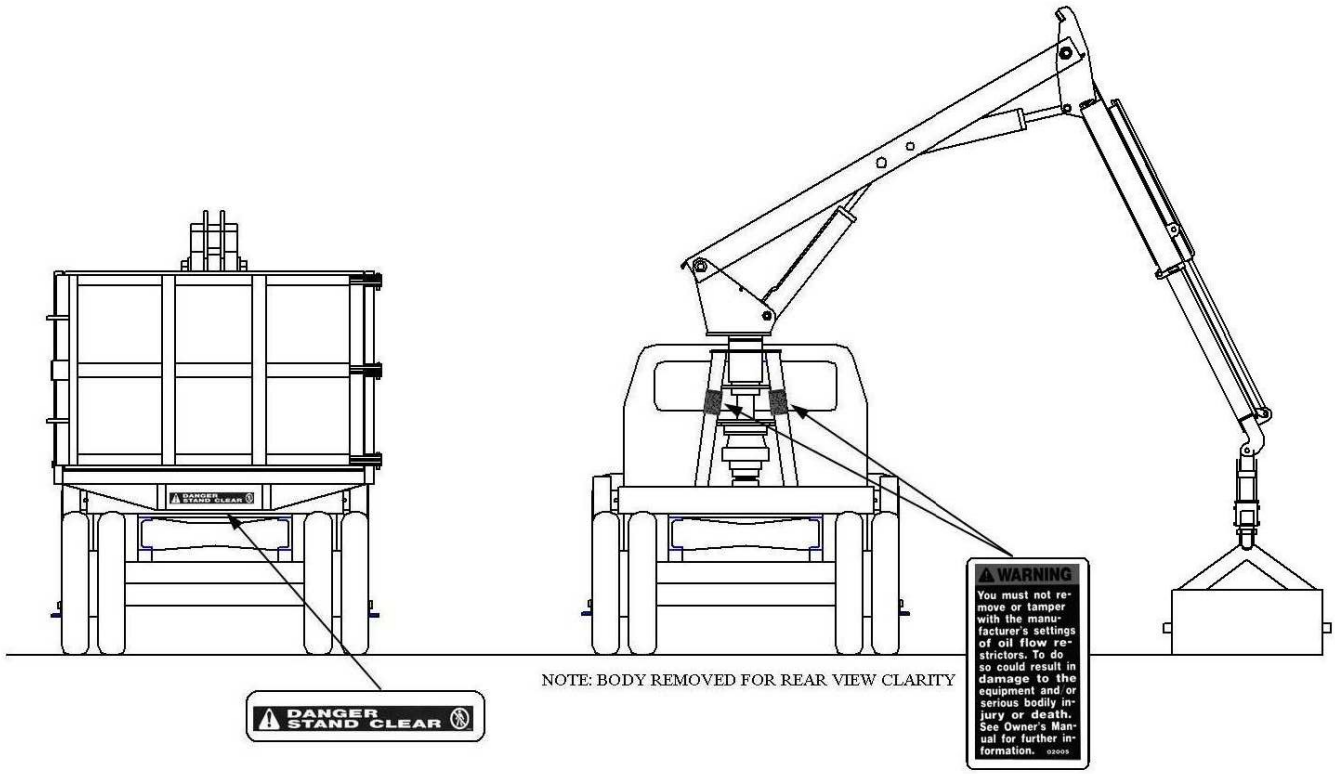

**CAUTION** Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

# MODEL TL-3 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

# 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. Note that some hydraulic systems do not require throttle advance and will generate 18 GPM at idle speed, if your truck doesn't have a throttle advance switch then the loader should only be operated at idle. DO NOT USE SOME OTHER MEANS TO INCREASE RPM'S AS THIS WILL OVERHEAT THE HYDRAUILC SYSTEM.

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.

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

Manual Shift Control – The PTO is engaged when the knob on the dash or

floor is pulled out and disengaged when the knob is pushed in. The truck gear shift lever must be in neutral, parking brake set, 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, the parking brake set, 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.

Hydraulic Tie-in System

This type of system utilizes one of the section valves on the roll off hoist to divert oil to the Petersen Loader valve. With the PTO running a switch on the dash is activated to turn on this valve. This valve is wired thru the TCM to provide an overspeed setting which will act to turn off this valve if the engine rpms go over a certain speed. Since pto ratios and pump displacements are different, this setting can vary. Check with a Petersen representative to determine this setting.

## PARK BRAKE

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

## LOADER CONTROLS

Your loader will be equipped with either standard control handles or joystick controls, that operate the various equipment functions.

The loader control placards indicate the direction to actuate the loader control handles or joystick controls for boom elevation, boom swing, tip boom elevation, tip boom extension, bucket grab, and bucket rotation. The outrigger placard(s) indicates the direction to actuate the outrigger control handles for horizontal outrigger in/out, and vertical outrigger up/down.

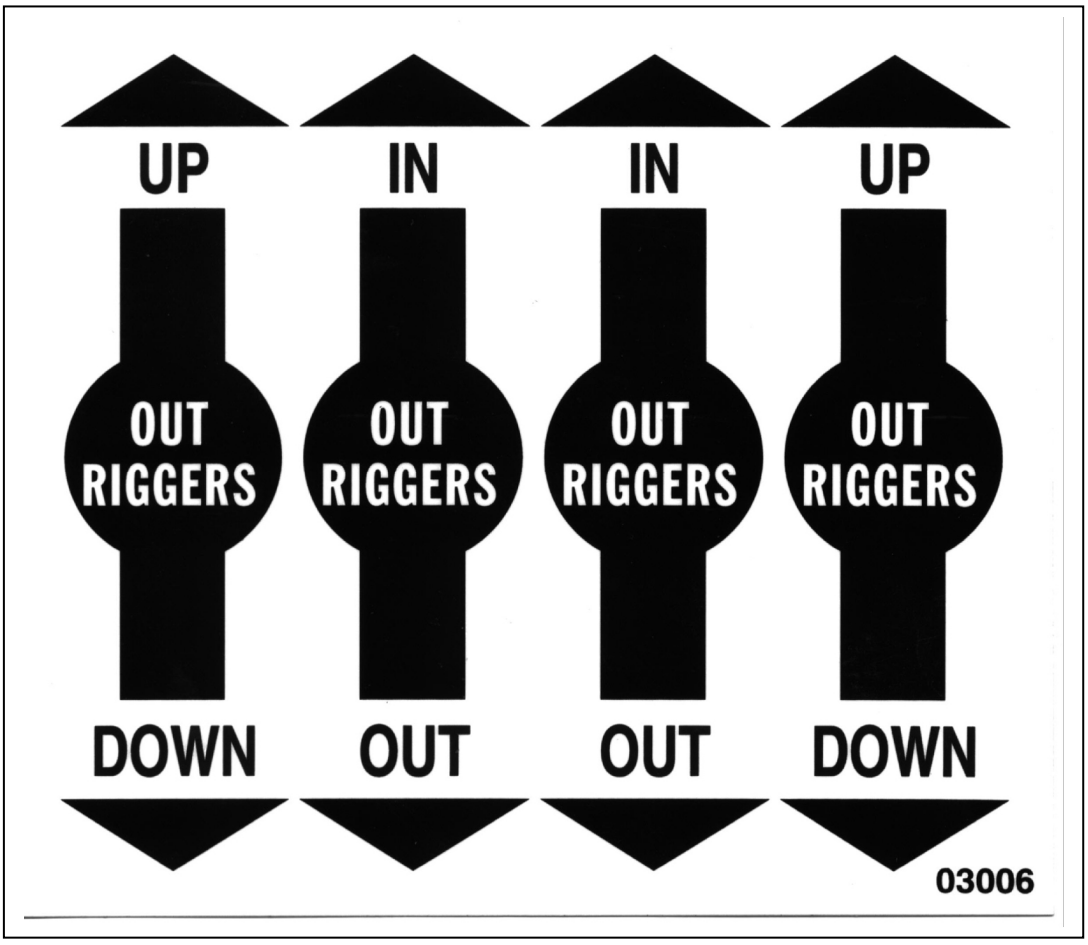
The optimum, safe method of operating the controls is by feathering. **Do not jerk the control levers or joystick to full speed, or from one extreme to another.** Feather the controls by moving the handle or joystick smoothly from the neutral position to start motion. After a slow, smooth start, move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

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.

## Model PL3 with Standard Control Handles:

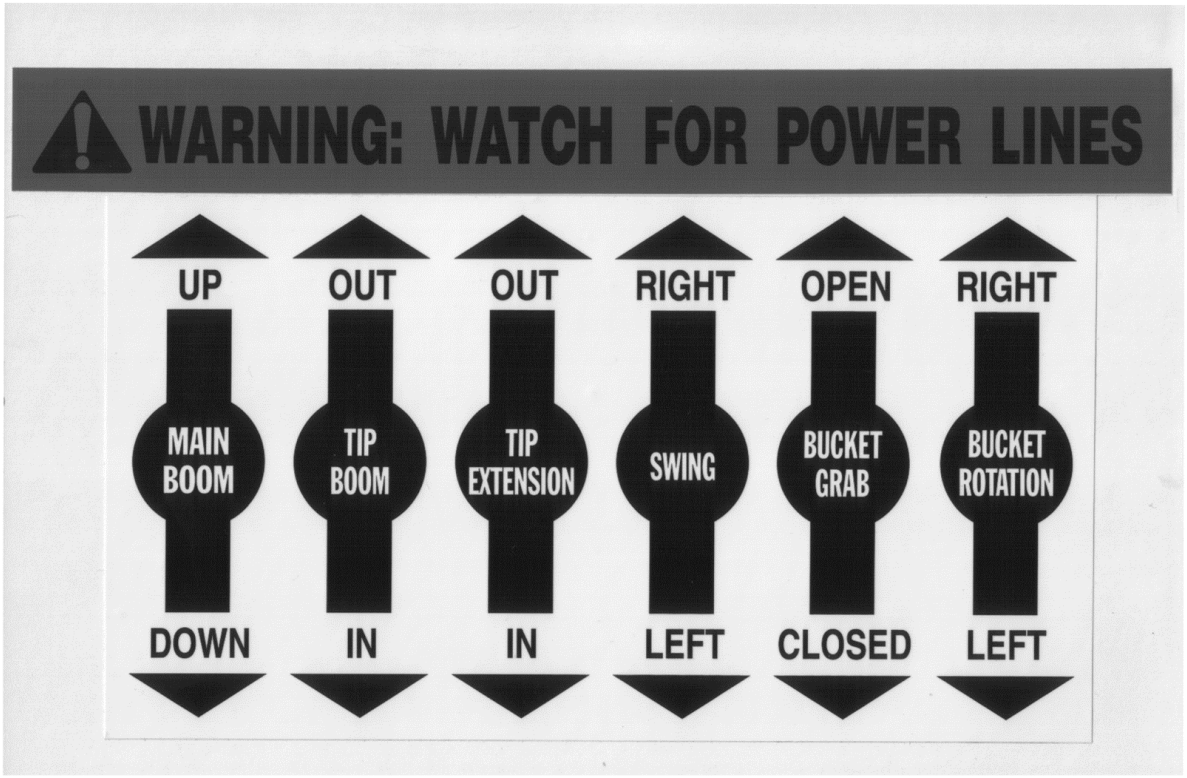
The Model PL3 Loader with standard control handles has outrigger handles mounted below the other control handles. There is a set of four (4) handles on each side of the work platform, and they are configured the same on each side of the platform. In the four (4) handle configuration, the two (2) handles on the right operate the right outrigger, and the two (2) handles on the left operate the left outrigger. The following decal shows the control handle configuration, and the arrows indicate the direction to push or pull the handle for each function.

### Outriggers

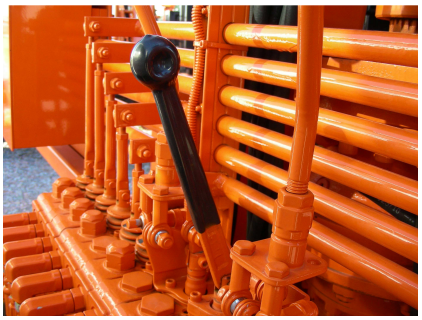


The Model PL3 Loader with standard control handles has a set of six (6) control handles on each side of the work platform that activate the loading operations of the loader. The controls are configured the same on both sides of the work platform. The following decal shows the control handle configuration, and the arrows indicate the direction to push or pull the handle for each function.

## Loader Control Functions



## Frame Lock Control

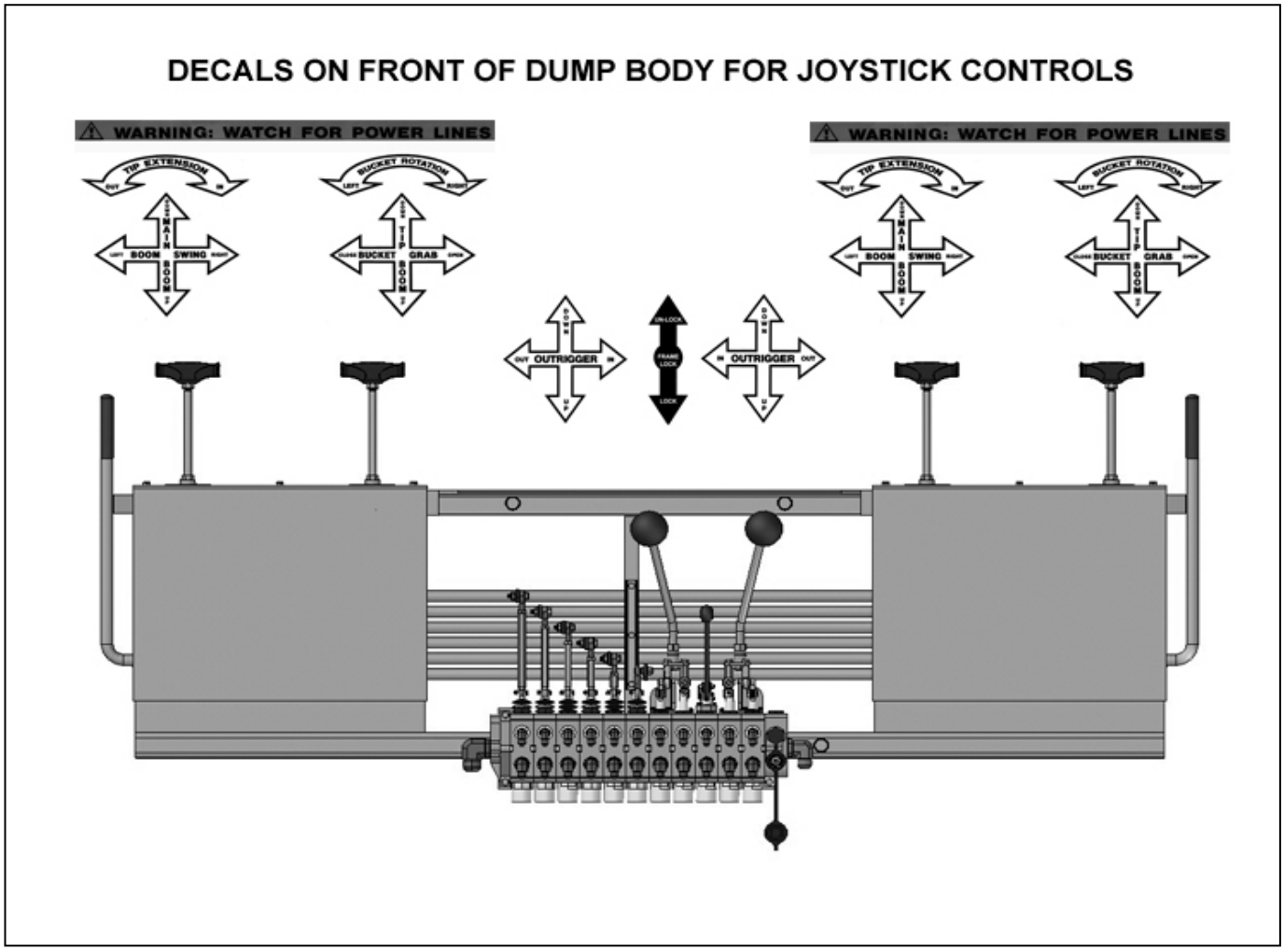
The frame lock control lever is used to engage and disengage the frame lock hooks.

Move the lever down to engage the frame lock hooks.

Move the handle up to disengage the frame lock hooks.

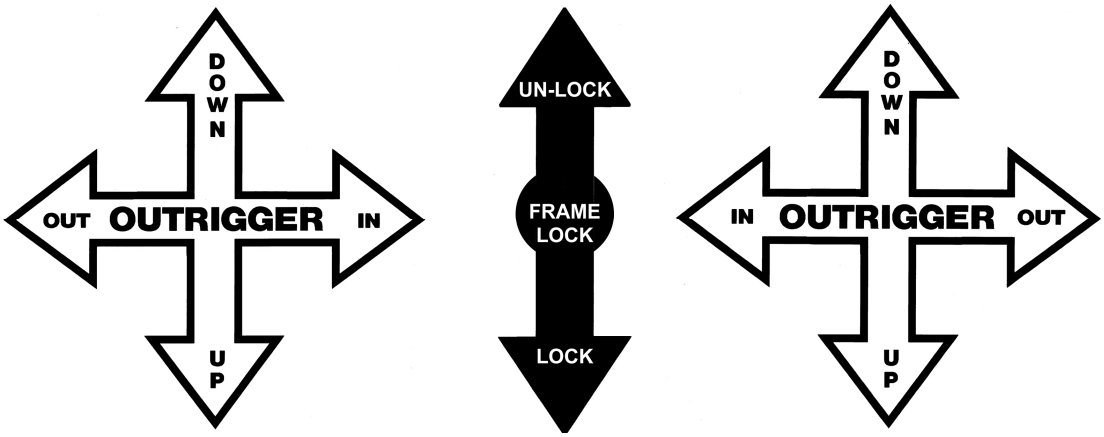
## Model PL3 Loader with Joystick Controls:

There are two (2) joystick handles on each side of the operator's platform that activate the loading operations of the loader. The controls are configured the same on both sides of the work platform.




At the center of the work platform are three (3) control handles. The two handles with the round knobs are the outrigger control handles. The round knob on the left controls the left outrigger, and the round knob on the right controls the right outrigger. The handle between the outrigger control handles is the frame lock handle.

# Outriggers and Frame Lock Hooks




| Left Outrigger | Frame Lock Hooks | Right Outrigger |
|---|---|---|

Left Outrigger Handle:

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

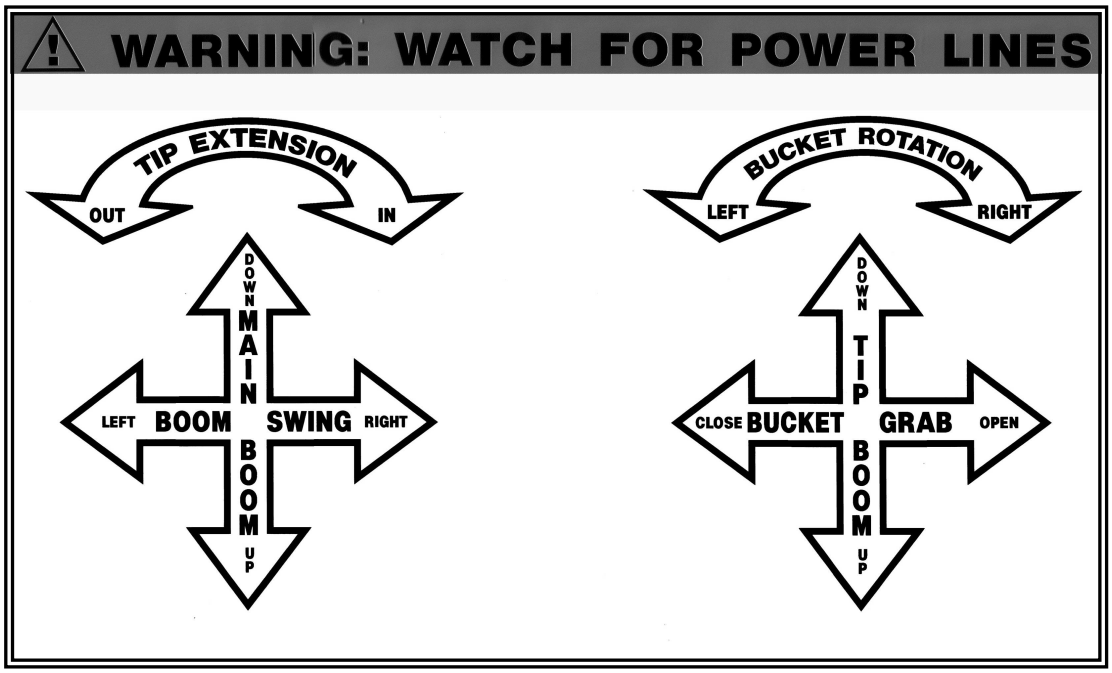
Right Outrigger Handle:

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

Frame Lock Handle:

Move the handle down to engage the frame lock hooks.
Move the handle up to disengage the frame lock hooks.

# Loader Control Functions




Left Joystick:

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

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

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

Right Joystick:

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

**Bucket Grab:** Move handle right to open bucket.
Move handle left to close bucket.

**Bucket Rot.:** Twist handle clockwise to rotate bucket right (clockwise).
Twist handle counter-clockwise to rotate bucket left (counter-clockwise).

# Part 5: Training

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

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

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

Each crew member must receive thorough instructions on the care and maintenance of this machine, thus enabling him to identify and anticipate any problems that may occur. Knowing how the equipment operates will help you recognize when it is not operating properly and that 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. The “Load Capacity Chart” is also riveted to the pedestal of the loader. Do not attempt to lift more than the capacities shown on the load chart for your model loader at the correct radius.

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

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

1. Raise boom from inside of dump body and swing to trash pile. Use tip extension, if needed, and 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. In order to minimize the height and stress on the boom, it is recommended that the tip extension be retracted prior to swinging the load. 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.

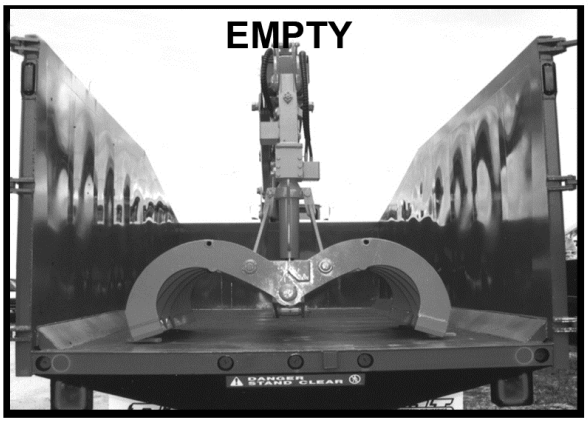
1. Use the control handles on the curb side.
2. Close the bucket and rotate until bucket sides are parallel to body sides.
3. Move the bucket to the curb side rear inside corner of the dump body.
4. Rest the bucket on the load.
5. Simultaneously boom down and swing the boom to the street side until the 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

**Become familiar with the operation of the roll-off system that was installed on the truck by the roll-off manufacturer. It is the roll-off mechanism that dumps the load; therefore, you will follow the instructions provided in the roll-off procedures for dumping the load.**

As you prepare to dump the load, it is imperative that you choose a level, firm area. **Since the entire PL3 Loader is raised for the dumping operation, the resulting high center of gravity decreases stability and increases the risk of overturning, if not on level ground.**

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 horizontal outriggers on both sides, and disengage the PL3 frame lock hooks.

5. If your load is covered with a load cover, retract the load cover.

6. Raise the main boom so bucket is approximately 3 feet above the body sides and keep it centered over the body during the entire dumping procedure. **To minimize overturning hazard, do not swing the boom to either side during the dumping procedure.**

7. Tip extension should remain retracted during the dumping operation.

8. Slowly raise the roll-off frame to empty the contents in the PL3 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. Extreme caution should be used during this procedure.

   This is not a procedure to force debris out of the body. If there is debris stuck in the body, lower the PL3 and dislodge the debris with the loader.

10. When you have finished dumping the load, lower the PL3. Stow the boom and bucket in the body with bucket open and resting on body floor.

11. Retract the outriggers, engage the frame lock hooks.

12. Disengage the PTO.

13. Close and lock body rear doors.

<u>Safety Precautions Regarding Dumping Procedure:</u>

- 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 9: PL3 Loading and Off-Loading Procedures

**Become familiar with the operation of the roll-off unit by reading the roll-off manufacturer's operator's manual before attempting to load or un-load the Petersen PL3 Loader onto or off of the truck.**

To Load the Petersen Loader:

1. With the roll-off cable extended, back the truck to a position where the roll-off rails are in alignment with the front rollers of the PL3 Loader. When backing to the PL3 Loader, use caution not to push the PL3 backwards as you may cause structural damage to the outriggers. Elevate the front of the roll-off unit so that it is approximately at the same angle as the PL3 Loader. Attach the eye of the roll-off cable to the hook on the PL3 Loader. Retract the cable while adjusting the angle of the roll-off as necessary to minimize stresses on the frame of the PL3 Loader. Ensure that the cable is fully retracted, so that front rollers of the PL3 Loader are fully engaged to the front hooks of the roll-off unit. The PL3 Loader frame should now be resting on the rollers of the roll-off.

2. Employ roll-off strap at rear of roll-off frame to secure the PL3.

Roll-Off Strap

3. Locate the hydraulic quick connect fittings at the left rear of the truck and hook up the roll-off hydraulics to the PL3 Loader.

**NOTE: The PTO that operates the PL3 Loader should be disengaged when connecting the quick connects. Your unit may be equipped with two (2) PTO's. One supplied by the roll-off manufacturer and one supplied by Petersen. If so, make sure you disengage the PTO for the PL3 Loader when connecting or disconnecting the hydraulic hoses.**

Hydraulic Quick Connect Fittings

4. Locate the electrical pigtail at the rear of the truck and hook up the PL3 Loader.

   **Caution: Failure to make this electrical connection will result in your boom-up warning system not working.**

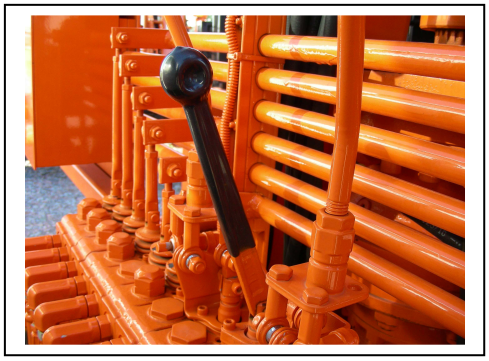
**Electrical Pigtail Connection for Boom-Up Warning System**

5. Engage the PL3 PTO.

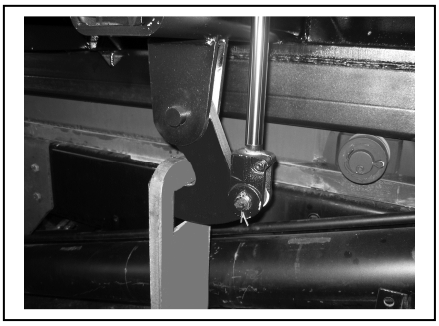
6. Release the pin lock on the loader platform access steps, and fold down.

Pin Lock for Loader Access Steps

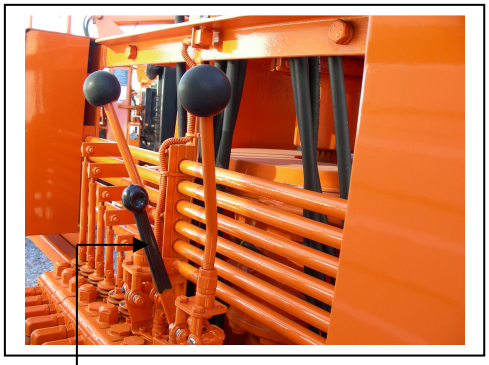
7. At the operator's station of the PL3 Loader, push the frame lock lever down to engage the frame lock hooks. This lever is located just above the valve bank, at the center of the work platform. By visual inspection, ensure that the frame lock hooks are fully engaged into the hook lock receptacles. The frame lock hooks are located underneath the horizontal outrigger tube on each side of the loader.



Frame Lock Lever
(Standard Controls)



Hook Locks
(One on each side of loader)



Frame Lock Lever
(Joystick Controls)

9. At the PL3 Loader operator's platform, actuate the control handles that control the outriggers to retract the outriggers to their transport position.

   **Caution: Failure to retract the outriggers prior to transport, will result in your vehicle being over legal width for travel.**

   Once the outriggers are retracted, you are ready to transport the PL3 Loader.

To Off-Load the Petersen Loader:

Before off-loading the PL3 Loader to the ground, the dump body should be empty before beginning the procedure, and the bucket and boom should be properly stowed in the travel position.

1. At the operator's platform, actuate the control handles that control the outriggers. Fully extend the outriggers horizontally.

   **Note: This procedure is necessary to provide clearance as the PL3 Loader is being off-loaded. Failure to extend the outriggers will result in the outriggers coming in contact with the vehicle components such as tires, fenders, etc., and will result in damage to the loader and truck.**

   **Do not extend outriggers vertically. Increased risk of structural damage to outriggers can occur if vertical outriggers are extended.**

2. Disengage the frame lock hooks by moving the frame lock lever to the up position.

3. Fold-up the loader platform access steps, and lock with pin.

   **Caution: Failure to fold-up steps, and secure in place, will result in steps coming in contact with the vehicle components such as tires, fenders, etc., and will result in damage to the steps and truck.**

4. Disengage the PL3 PTO.

5. Disconnect the electrical pigtail at the rear of the truck.

6. Disconnect the hydraulic quick connect fittings at the rear of the truck and place them securely in the receptacles provided for their storage.

7. Off-load the PL3 Loader in the reverse procedure as was described in the loading procedure.

   **Warning! – Never allow anyone under a PL3 Loader that is being stowed on the ground unless it is securely propped or blocked by some means other than the outriggers. Failure to follow this warning could result in a crush hazard that could cause serious personal injury or death.**

## Part 2: Service:

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.

| AFTER FIRST 40 HOURS OF OPERATION (BREAK IN SERVICE) | |
|---|---|
| Re-torque boom swing actuator bolts. | To 500 ft. lbs (HA36)<br>To 160 ft. lbs (Planetary Gearbox) |
| Replace return filter. | |
| Change oil in planetary gearbox (If applicable) | Drain existing oil from swing gearbox and replace with 1.75 quarts of 80W Gearlube |
| **EVERY 40 HOURS OR WEEKLY** | |
| Grease all fittings. | See Grease and Maintenance Diagram in the “Dia. & Drawings” section of this manual.<br><br>Grease fittings that are worn and will not hold the grease gun, or those that have a stuck check ball, must be replaced.<br><br>Grease = EP2 (Extreme Pressure) |
| Check hydraulic hoses for cuts or abrasions, or any evidence of binding or leakage. | Replace any damaged hoses. |
| Check all hydraulic fittings to make sure they are in place and do not show signs of leakage. | Replace any missing, damaged or modified fittings. |
| Tighten bucket brake pads. | If brake pads show excessive wear, replace. Tighten gimbal rotator bolt and tip boom gimbal bolt, if needed. |

| EVERY 40 HOURS OR WEEKLY | |
|---|---|
| Check oil level. | All oil levels are to be checked with the loader parked on a level surface in transport position, and while the oil is cold, unless otherwise specified. Oil level should be two to three (2 to 3) inches from top of tank. Planetary Gearbox Oil should be visible on site glass.<br><br>Hydraulic Oil = AW32<br>Gear Oil = 80W Gearlube |
| Check engine overspeed control for proper setting. | Check by reving the engine to 350 RPM above the preset rpm on the remote throttle switch, 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. | Refer to the throttle control section of this manual for preset setting |
| Check lock collar for excess clearance. | Lock collar must be tight against bottom of spindle bearing housing with maximum gap of one-quarter inch (1/4"). |
| Check back-up and boom-up alarms to make sure they are working properly. | Repair or replace if needed. |

| EVERY 80 HOURS OR EVERY 2 WEEKS<br>*(These requirements are in addition to the 40 hour service requirements)* | |
|---|---|
| Re-torque boom swing actuator bolts. | To 500 ft. lbs (HA36)<br>To 250 ft. lbs (Planetary Gearbox) |
| Re-torque bucket rotator bolts. | To 110 ft. lbs. - dry threads |

| EVERY 160 HOURS OR MONTHLY<br>*(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. |

| **EVERY 160 HOURS OR MONTHLY**<br>*(These requirements are in addition to the 80 hour service requirements)* | |
|---|---|
| Structural - Visually inspect complete loader for damage, especially cracks in weldments. | It is necessary for your loader to clean of oil and grease for these inspections to be made.<br><br>The Petersen rotating head assembly has special high strength steel components that are welded together. After welding, the entire assembly receives post-weld heat treatment. **Do not** weld on the rotating head assembly. Welding on the rotating head could reduce its load bearing capacity and fatigue life. |
| Fasteners - Check all pins, sheaves, retainers, bolts and nuts. | Replace damaged or missing parts. |
| Retighten main boom and tip boom connecting bolts. | Replace if needed. |

| **EVERY 160 HOURS OR MONTHLY**<br>*(These requirements are in addition to the 80 hour service requirements)* | |
|---|---|
| Decals - Check for presence and legibility. | Check decal listing in "Part 3: Safety Devices – Safety Symbols" of this manual for required operational and safety decals. Replace missing or illegible decals. |

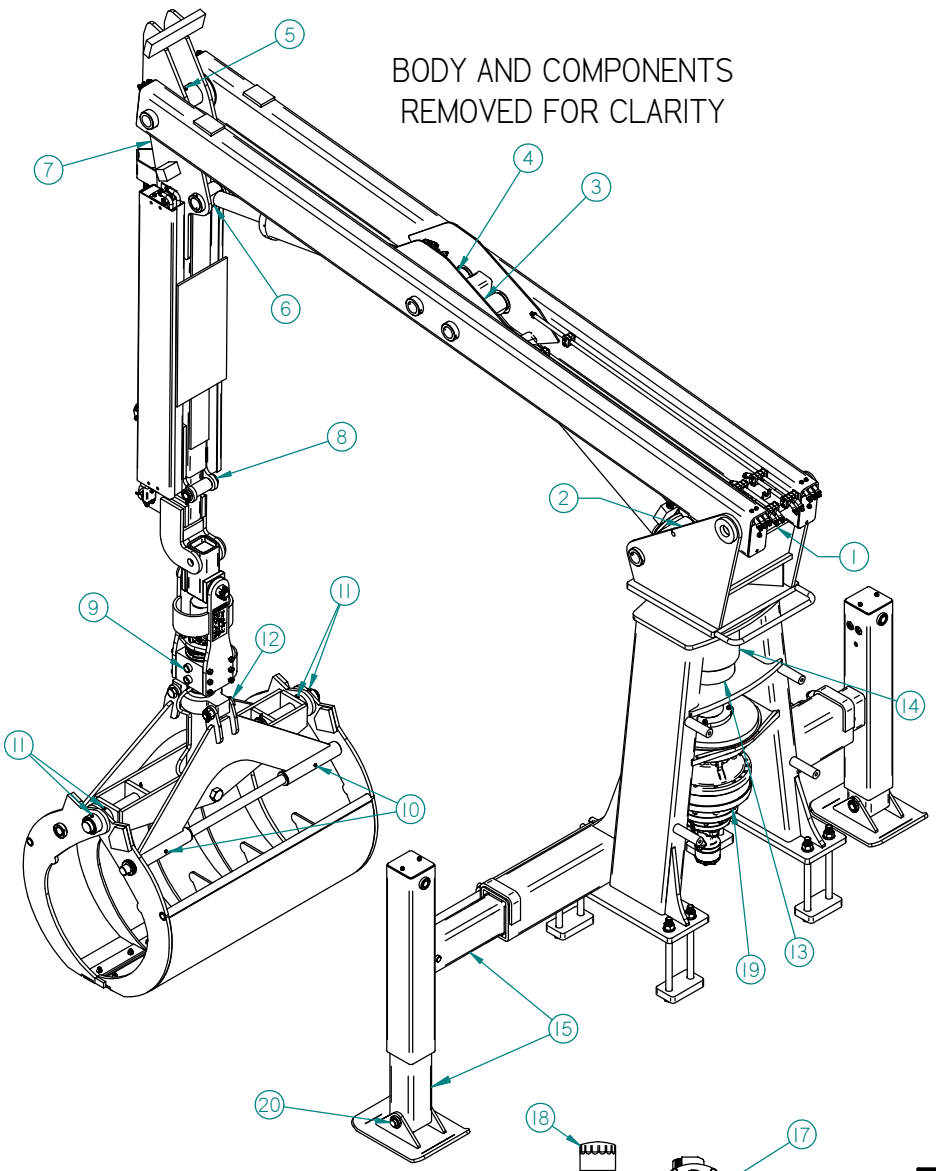
| **EVERY 600 HOURS OR 6 MONTHS**<br>*(These requirements are in addition to the 160 hour service requirements.)* | |
|---|---|
| Replace return line filter, clean suction filter (if applicable) replace breather. Note that breather may be integral with the oil tank cap. | |

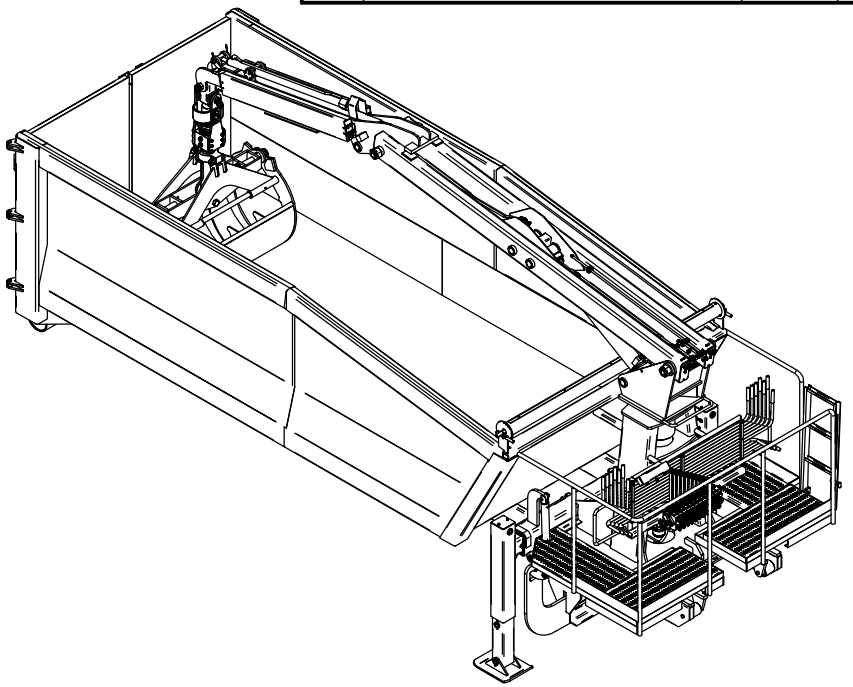
| **EVERY 3000 HOURS OR 12 MONTHS**<br>*(These requirements are in addition to the 600 hour service requirements.)* | |
|---|---|
| Change oil in planetary gearbox (if applicable) | Drain existing oil from swing gearbox and replace with 1.75 quarts of 80W Gearlube |
| Change hydraulic oil | |

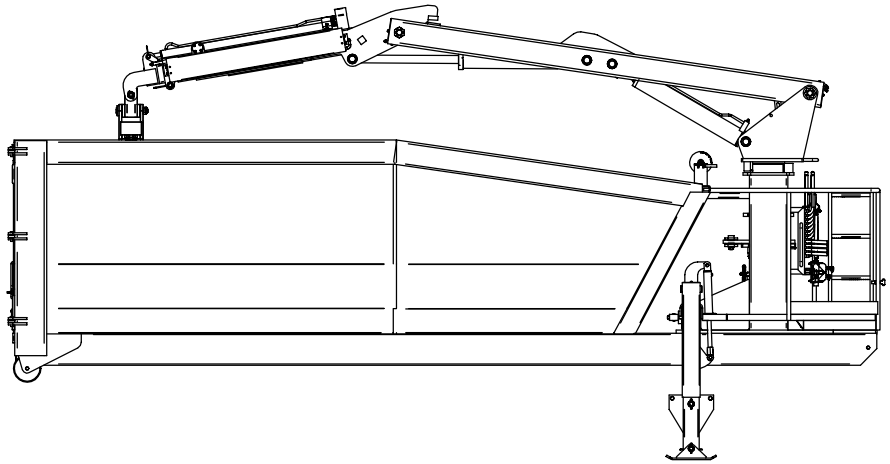
010 LUBRICATION POINTS

| REV | DESCRIPTION | DATE | BY |
|---|---|---|---|
| - | - | - | - |

BODY AND COMPONENTS
REMOVED FOR CLARITY





THIS IS A PI OIL TANK BUT THIS SYSTEM MAY BE TIED INTO THE ROLL OFF HYDRAULIC SYSTEM. IF THE PI SYSTEM IS TIED INTO THE ROLL OFF HYDRAULIC SYSTEM THE SAME REQUIREMENTS APPLY TO THE BREATHER, FLUID AND OIL FILTER BUT WITH THE ROLL OFF SYSTEM TANK.

**TOLERANCES**

| | |
|---|---|
| 1 DEC. | ± 0.100 |
| 2 DEC. | ± 0.025 |
| 3 DEC. | ± 0.005 |
| ANGLE: | ± 1.000° |
| FRACTION: | ± 1/32" |
| DIM. UNITS: | INCHES |
| SURFACE FINISH: | 125/32 |

*UNLESS OTHERWISE SPECIFIED*

DEC. = DECIMAL PLACE(S)


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


TITLE: PL, ASSEMBLY LUBRICATION POINTS

| PART NUMBER: | SCALE: |
|---|---|
| 01 00 00 064 0 | 1:60 |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| SWB | | 07/16/2020 | 1 OF 2 |

| Point Number | Maintenance Description | Number of Points | Lubricant | Application Method | Frequency |
|---|---|---|---|---|---|
| 1 | Main Lift Pivot | 1 | Grease | Pressure | 40 Hours |
| 2 | Main Lift Cylinder Base End | 1 | Grease | Pressure | 40 Hours |
| 3 | Main Lift Cylinder Rod End | 1 | Grease | Pressure | 40 Hours |
| 4 | Tip Cylinder Base End | 1 | Grease | Pressure | 40 Hours |
| 5 | Tip Boom to Main Pivot | 1 | Grease | Pressure | 40 Hours |
| 6 | Tip Cylinder Rod End | 1 | Grease | Pressure | 40 Hours |
| 7 | Tip Extension Tube | 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 Inner Tubes | 4 | Grease | Brush | 80 Hours |
| 16 | Hydraulic Tank | 1 | ISO 32 Hyd Oil | Fill to Max Level | 40 Hours |
| 17 | Hydraulic Filter | 1 | 0T03008 | Replace | 1000 Hours |
| 18 | Hydraulic Tank Breather | 1 | 0T05007 | Replace | 1000 Hours |
| 19 | Gearbox (if applicable) | 1 | 80w Gearlube | Replace | 3000 Hours |
| 20 | Outrigger Foot | 2 | Grease | Pressure | 40 Hours |

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

TITLE: PL, ASSEMBLY LUBRICATION POINTS

PART NUMBER: 01 00 00 064 0

SCALE: NA

DRAWN BY: SWB

APPROVED BY:

DATE: 07/16/2020

SHEET: 2 OF 2

## 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.**

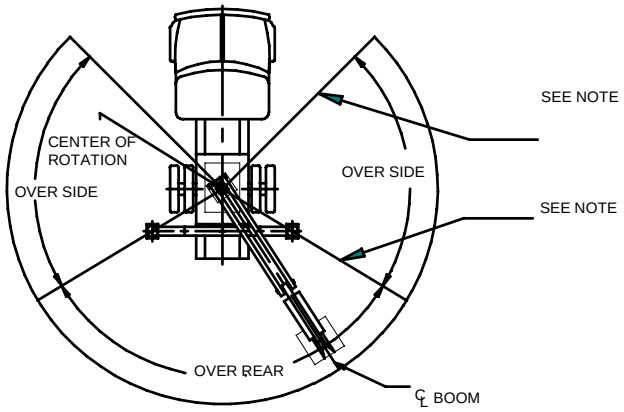
| MODEL TL 2 | | |
|---|---|---|
| RADIUS | No. 1 OUTRIGGERS | No. 3 OUTRIGGERS |
| 10 ft | 5320 lb * | 7100 lb |
| 16 ft | 2650 lb * | 3750 lb |

| 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.**

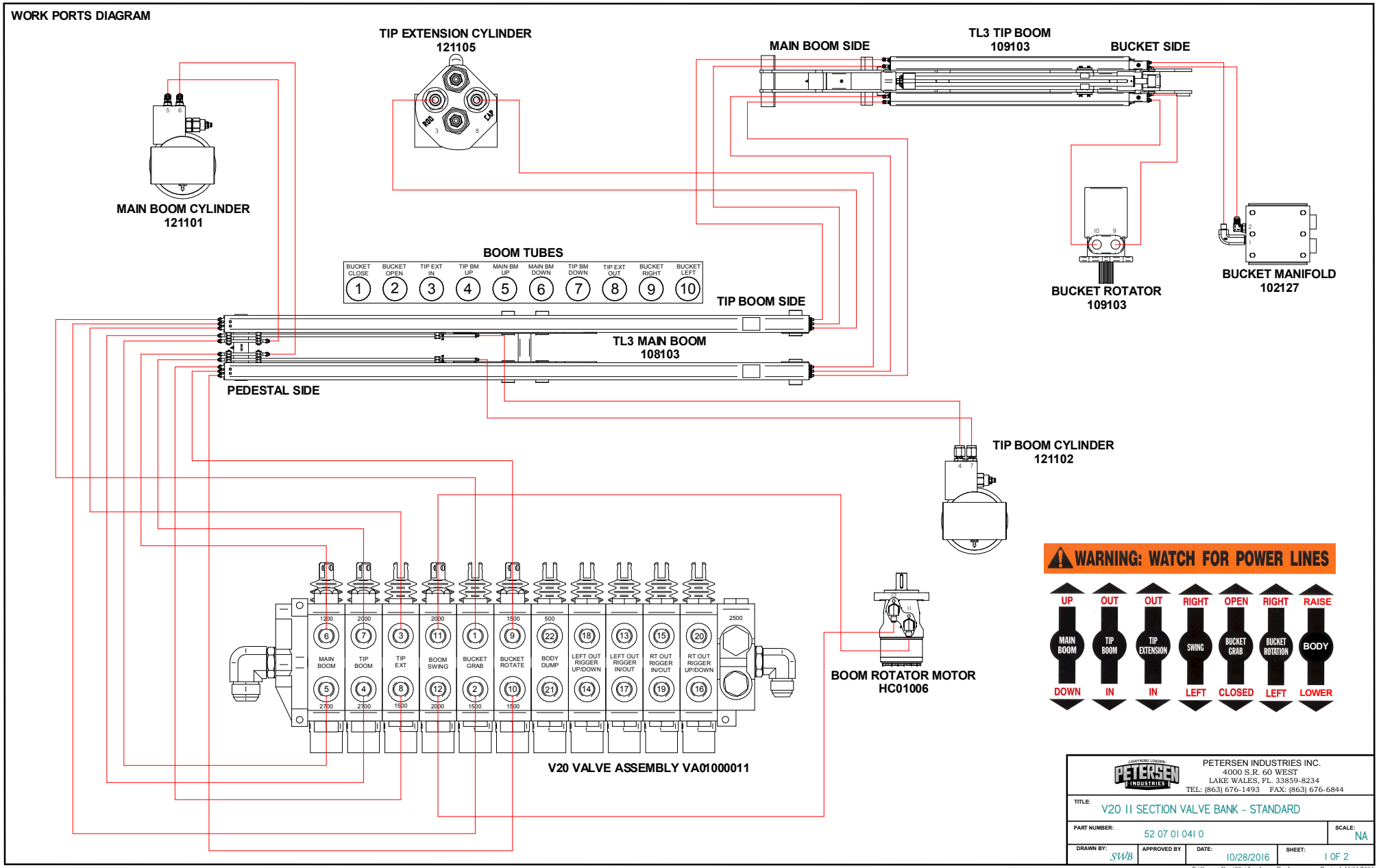
**Do not use these load chart values to predict load capacities at other radii.**

**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

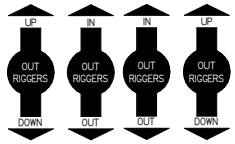
| TITLE: | | | |
|---|---|---|---|
| LOAD CHART FOR TRASH LOADERS | | | |
| CAD NO.: 01 00 00 003 4 | PART NO.: | | SCALE: N/A |
| DRAWN BY: EJB | APPROVED: | DATE: 8/31/99 | SHEET: 1 OF 1 |

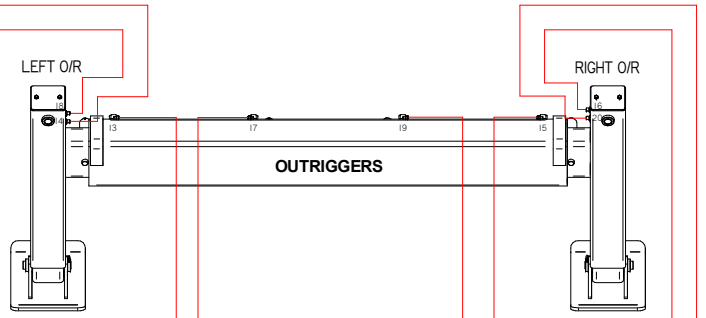
## WORK PORTS DIAGRAM



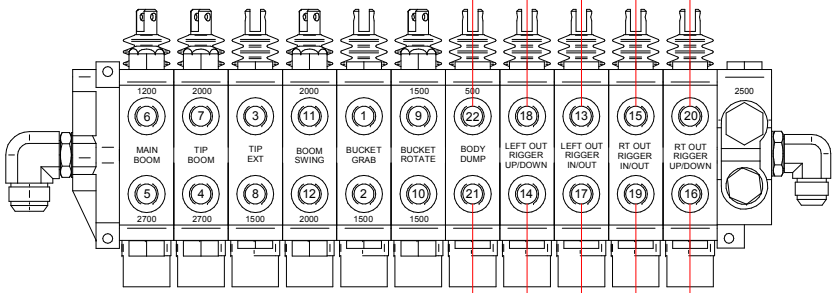

| | |
|---|---|
| PETERSEN INDUSTRIES INC. | 4000 S.R. 60 WEST, LAKE WALES, FL. 33859-8234, TEL: (863) 676-1493 FAX: (863) 676-6844 |
| TITLE: | V20 11 SECTION VALVE BANK - STANDARD |
| PART NUMBER: | 52 07 01 041 0 |
| SCALE: | NA |
| DRAWN BY: | SWB |
| APPROVED BY | |
| DATE: | 10/28/2016 |
| SHEET: | 1 OF 2 |

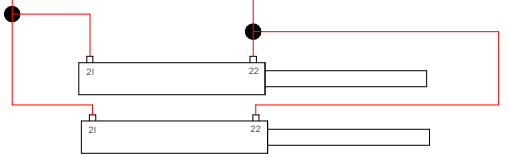
**WORK PORTS DIAGRAM**
**(CONTINUED)**




**V20 VALVE ASSEMBLY VA01000011**



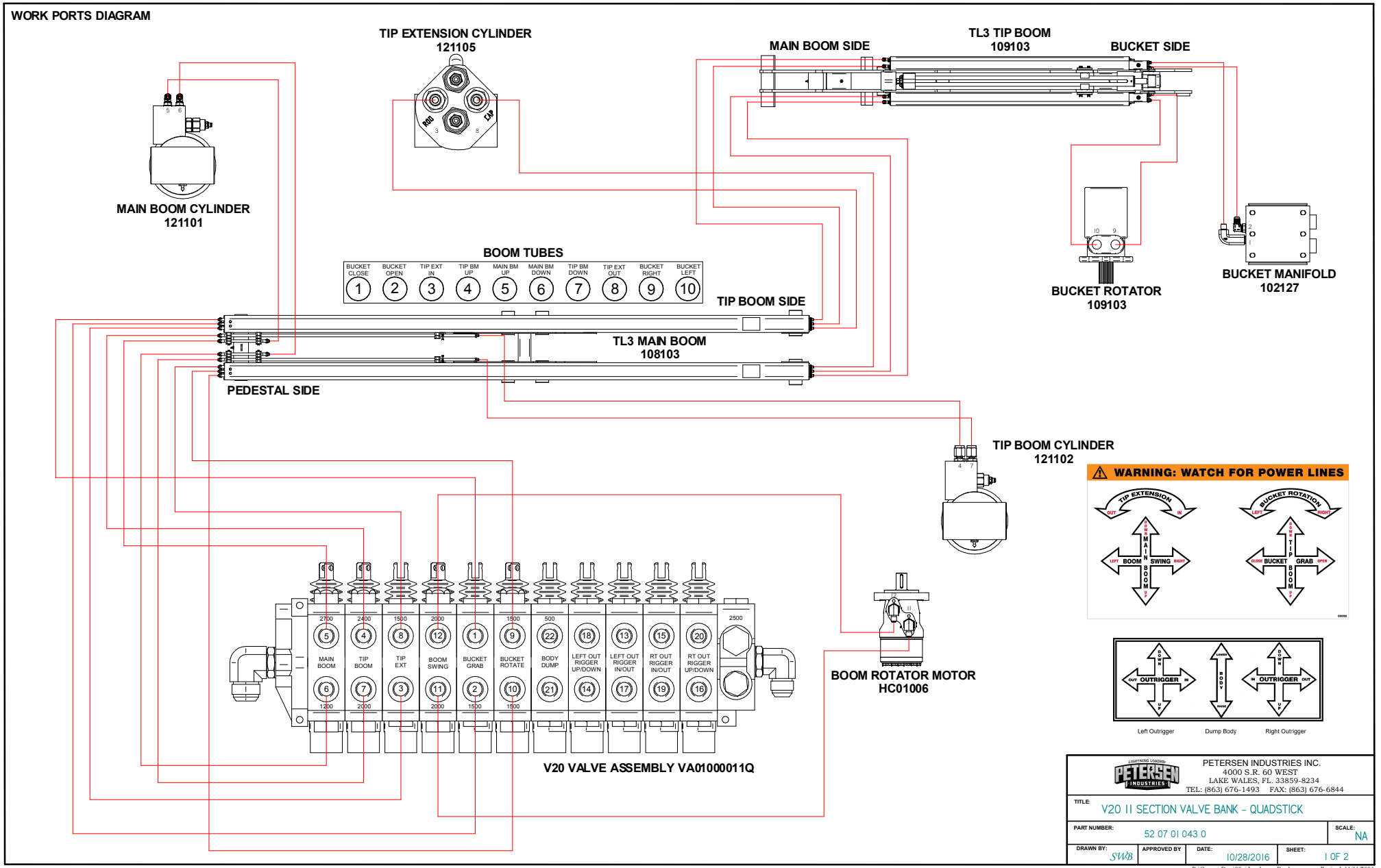

**BODY HOIST CYLINDERS**

NOTE: ON 22' BODIES AND LARGER HOIST IS POWER UP & GRAVITY DOWN. UP PORT RELIEF IS THEN SET TO 3100 PSI AND MAIN RELIEF IS SET TO 3000 PSI. DEPENDING ON CONTROL OPTION BODY HOIST VALVE MAYBE SEPERATE VALVE BANK.


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


| | | | |
|---|---|---|---|
| TITLE: V20 II SECTION VALVE BANK - STANDARD | | | |
| PART NUMBER: 52 07 01 041 0 | | | SCALE: NA |
| DRAWN BY: SWB | APPROVED BY | DATE: 10/28/2016 | SHEET: 2 OF 2 |

## WORK PORTS DIAGRAM

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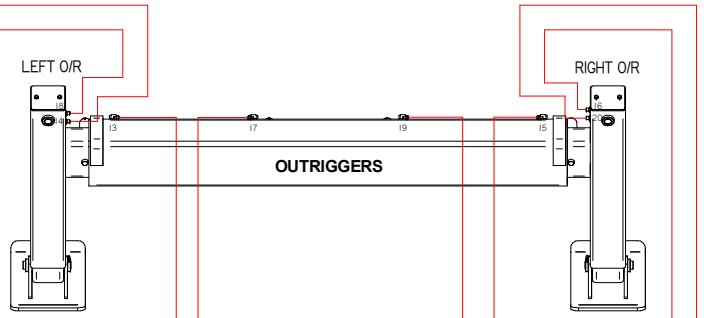
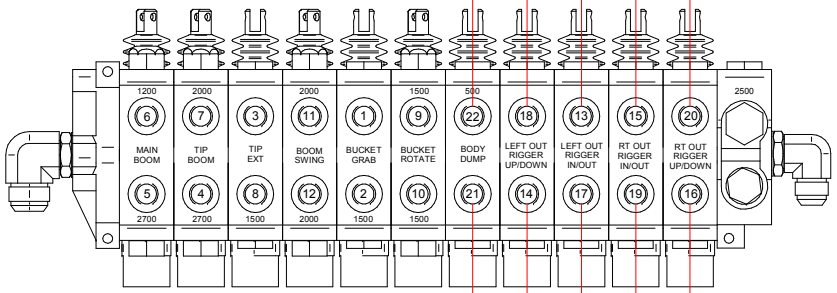
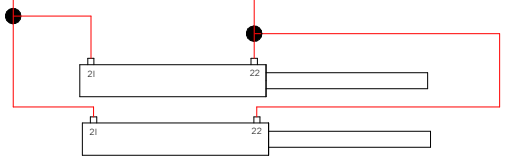
| | | | |
|---|---|---|---|
| TITLE: V20 11 SECTION VALVE BANK - QUADSTICK | | | |
| PART NUMBER: 52 07 01 043 0 | | | SCALE: NA |
| DRAWN BY: SWB | APPROVED BY | DATE: 10/28/2016 | SHEET: 1 OF 2 |

**WORK PORTS DIAGRAM**
**(CONTINUED)**




**V20 VALVE ASSEMBLY VA01000011Q**



**BODY HOIST CYLINDERS**

NOTE: ON 22' BODIES AND LARGER HOIST IS POWER UP & GRAVITY DOWN. UP PORT RELIEF IS THEN SET TO 3100 PSI AND MAIN RELIEF IS SET TO 3000 PSI. DEPENDING ON CONTROL OPTION BODY HOIST VALVE MAYBE SEPERATE VALVE BANK.

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4000 S.R. 60 WEST
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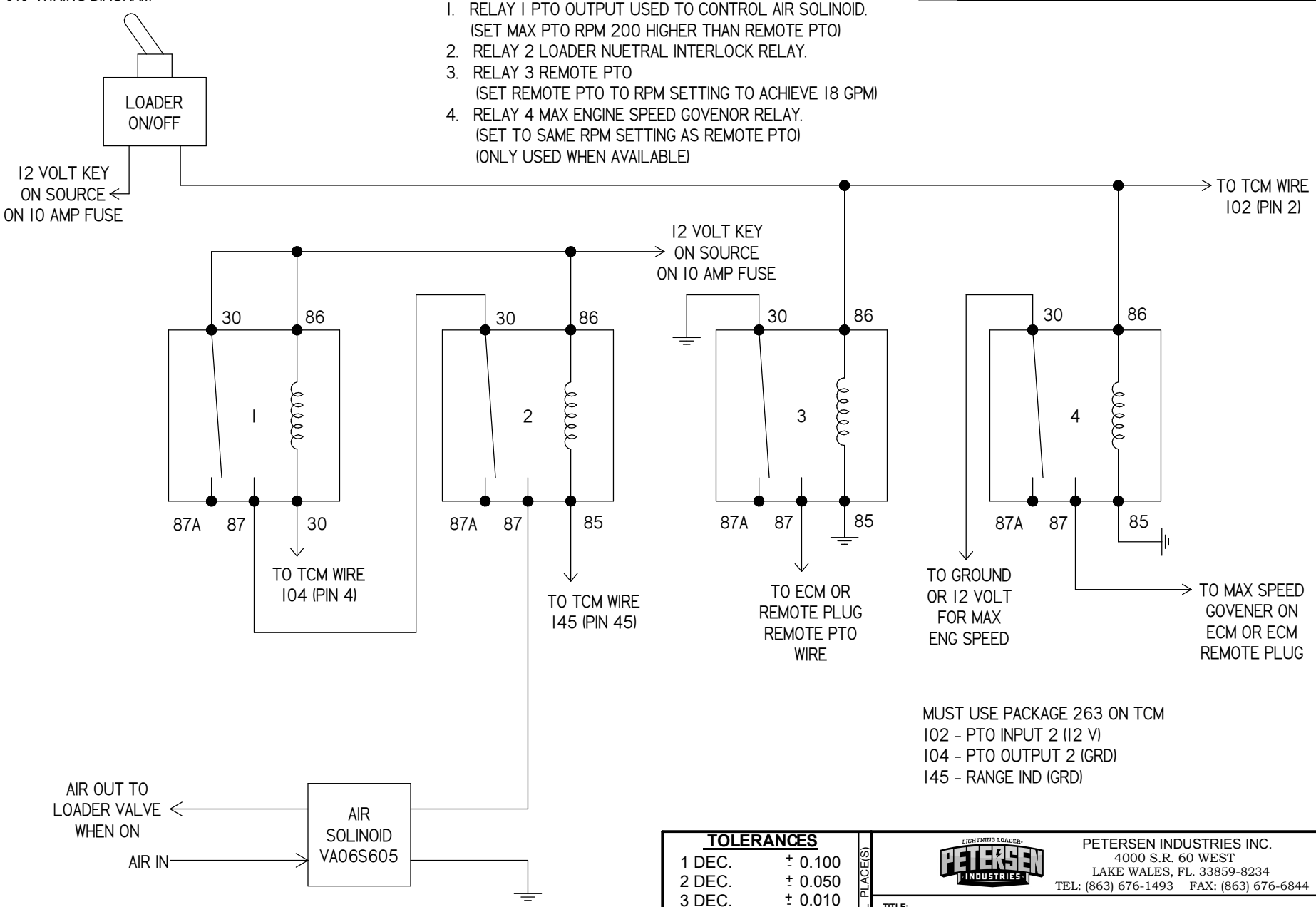
TEL: (863) 676-1493 FAX: (863) 676-6844

| | | | |
|---|---|---|---|
| TITLE: V20 11 SECTION VALVE BANK - QUADSTICK | | | |
| PART NUMBER: 52 07 01 043 0 | | | SCALE: NA |
| DRAWN BY: SWB | APPROVED BY | DATE: 10/28/2016 | SHEET: 2 OF 2 |

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

010 WIRING DIAGRAM

1. RELAY 1 PTO OUTPUT USED TO CONTROL AIR SOLINOID.
   (SET MAX PTO RPM 200 HIGHER THAN REMOTE PTO)
2. RELAY 2 LOADER NUETRAL INTERLOCK RELAY.
3. RELAY 3 REMOTE PTO
   (SET REMOTE PTO TO RPM SETTING TO ACHIEVE 18 GPM)
4. RELAY 4 MAX ENGINE SPEED GOVENOR RELAY.
   (SET TO SAME RPM SETTING AS REMOTE PTO)
   (ONLY USED WHEN AVAILABLE)




MUST USE PACKAGE 263 ON TCM
102 - PTO INPUT 2 (12 V)
104 - PTO OUTPUT 2 (GRD)
145 - RANGE IND (GRD)

**TOLERANCES**

| | |
|---|---|
| 1 DEC. | ± 0.100 |
| 2 DEC. | ± 0.050 |
| 3 DEC. | ± 0.010 |
| ANGLE: | ± 1.000° |
| FRACTION: | ± 1/32" |
| DIM. UNITS: | INCHES |
| SURFACE FINISH: | 125/32 |

*UNLESS OTHERWISE SPECIFIED*

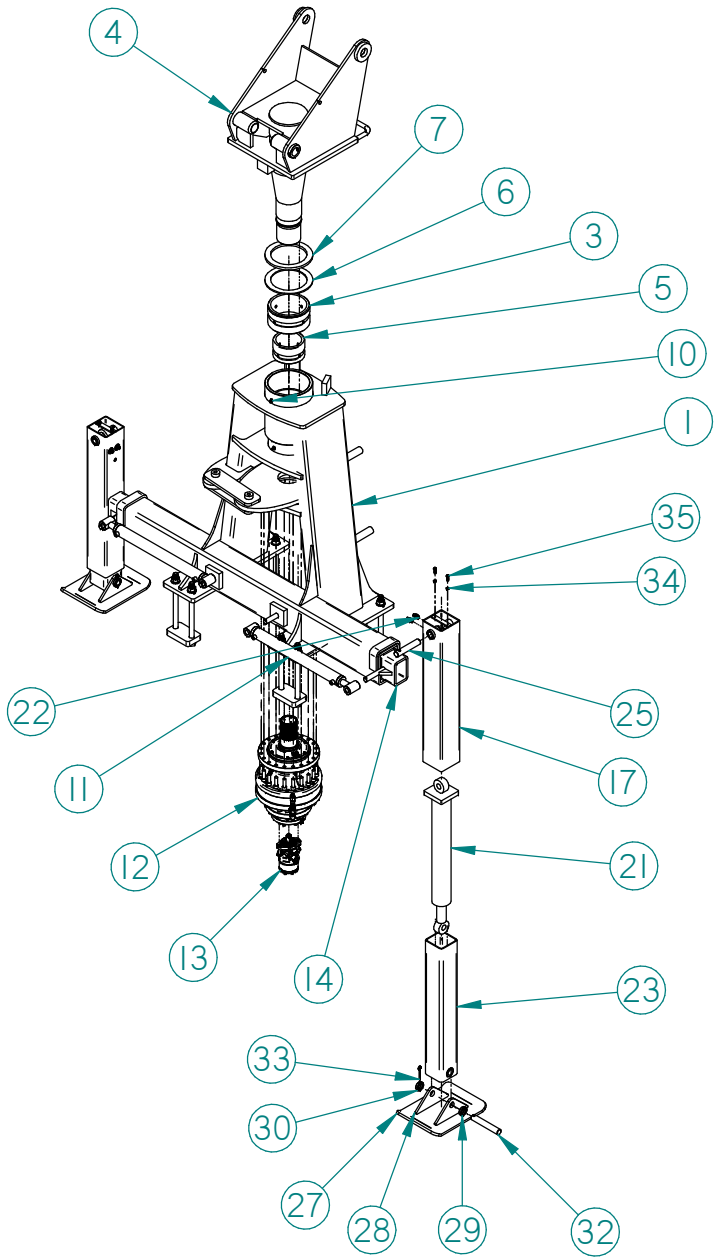
DEC. = DECIMAL PLACE(S)


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


TITLE: PL3, HL3 & BL3 LOADER CONTROL SWITCH WIRING

| PART NUMBER: | SCALE: |
|---|---|
| 62 07 10 002 0 | NA |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| SWB | | 01/12/2017 | 1 OF 1 |




NOTE: FOR HA36 12 INCH
EXTENDED PEDESTAL
SEE PART NUMBER 106116

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

TITLE: TL GEARBOX HEAD PEDESTAL AND O_R ASSEMBLY

| PART NUMBER: | | | SCALE: |
|---|---|---|---|
| 02 02 13 001 6 / NA | | | 1:40 |
| DRAWN BY: SWB | APPROVED BY: | DATE: 1/13/2016 | SHEET: 1 OF 2 |

| Item # | Part Name | Order by this # | Quantity |
|---|---|---|---|
| 1 | PEDESTAL, TL GEARBOX WELDMENT | 106104 | 1 |
| 2* | GEARBOX TORQUE ARM ASSEMBLY - INLINE | 114101 | 1 |
| 3 | PEDESTAL BEARING HOUSING UPPER BUSHING | BU509002 | 1 |
| 4 | HEAD WELDMENT FOR GEARBOX | 107105 | 1 |
| 5 | PEDESTAL BEARING HOUSING LOWER BUSHING | BU507005 | 1 |
| 6 | TRASH HEAD-PEDESTAL SPACER | 106210 | 1 |
| 7 | TRASH HEAD PEDESTAL NYLATRON SPACER | BU510002 | 1 |
| 8* | TRASH HEAD LOCK - COLLAR | 107167 | 2 |
| 9* | BOLT HEX 1/2-13 X 3.00 USS G5 | BL308048U513 | 2 |
| 10 | 1/8" STRAIGHT GREASE FITTING | HF2002S | 2 |
| 11 | OUTRIGGER IN/OUT CYLINDER | CY05001 | 2 |
| 12 | DINAMIC OIL SLEWING GEARBOX | HC01005 | 1 |
| 13 | HYDRAULIC MOTOR | HC01006 | 1 |
| 14 | OUTRIGGER, #3A INNER HORIZONTAL TUBE | 113115 | 2 |
| 15* | OUTRIGGER PIN, 10" LONG | PI16160F | 2 |
| 16* | OUTRIGGER, #3A HORIZONTAL TUBE PIN GUSSET | 113116 | 2 |
| 17 | OUTRIGGER, LEG OUTER TUBING | 113111 | 2 |
| 18* | SPOOL, OUTRIGGER LEG CYLINDER UPPER w_HOLE | 115107 | 2 |
| 19* | SPOOL, OUTRIGGER LEG CYLINDER UPPER | 115106 | 2 |
| 20* | OUTRIGGER COVER PLATE BRACKET | 113110 | 2 |

| Item # | Part Name | Order by this # | Quantity |
|---|---|---|---|
| 21 | CYLINDER, OUTRIGGER, VERTICAL LEG EXTENSION RL AND RS | CY05006 | 2 |
| 22 | HYDRAULIC, FITTING #6-6 MALE CONNECTOR | HF060606 | 4 |
| 23 | OUTRIGGER LEG, INNER TUBING | 113112 | 2 |
| 24* | SPOOL, OUTRIGGER LEG CYLINDER LOWER | 115108 | 4 |
| 25 | PIN, VERTICAL CYLINDER, BASE END | PI18106F1 | 2 |
| 26* | ROLL PIN, .3125 X 2 | FA040532 | 2 |
| 27 | OUTRIGGER, FOOT PLATE | 113109 | 2 |
| 28 | OUTRIGGER FOOT MOUNTING EAR | 113108 | 4 |
| 29 | COLLAR - 42 | 116102 | 2 |
| 30 | COLLAR # 42 WITH HOLE | 116103 | 2 |
| 32 | PIN - OUTRIGGER LEG CYLINDER LOWER (MODEL #3A) | PI18122F | 2 |
| 33 | COTTER PIN, 5/16 X 3 | FA020548 | 2 |
| 34 | WASHER LOCK 5/16 SPLIT | WAS055 | 4 |
| 35 | HEX BOLT 5/16-18 X 1 USS G5 | BL305016U518 | 4 |
| 36* | OUTRIGGER COVER PLATE | 113107 | 2 |

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

TITLE: TL GEARBOX HEAD PEDESTAL AND O_R ASSEMBLY

PART NUMBER: 02 02 13 001 6 / NA

SCALE:

DRAWN BY: SWB

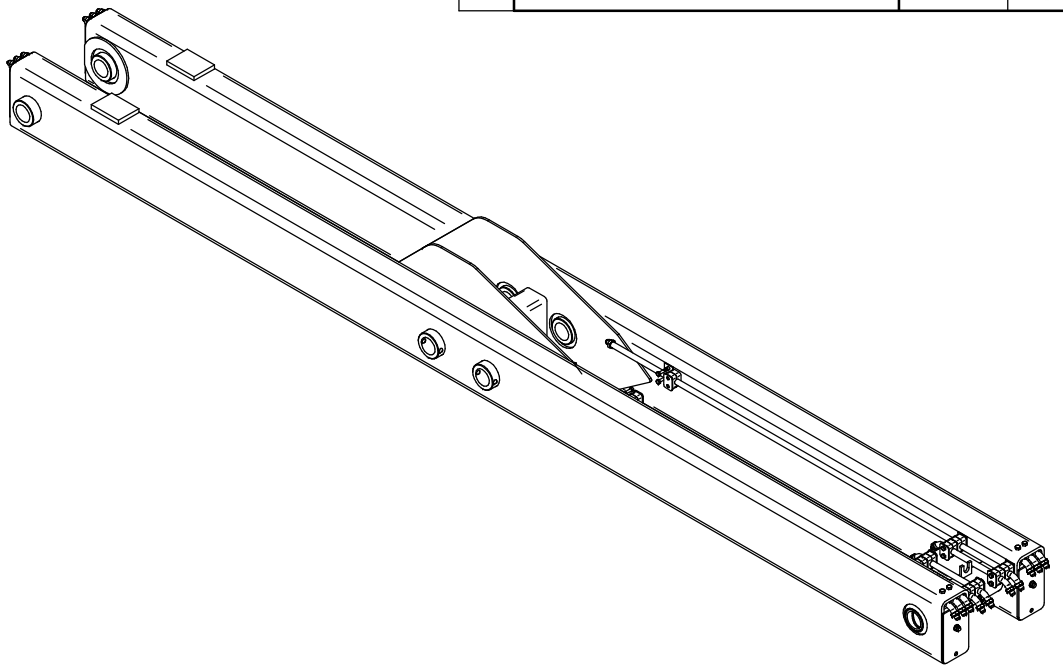
APPROVED BY:

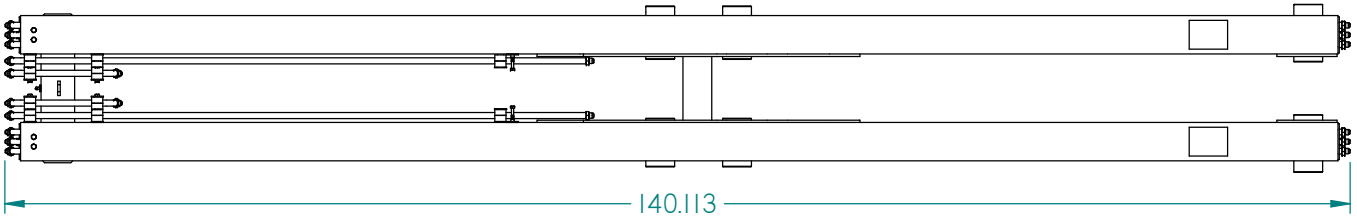
DATE: 1/13/2016

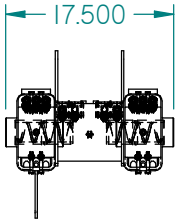
SHEET: 2 OF 2

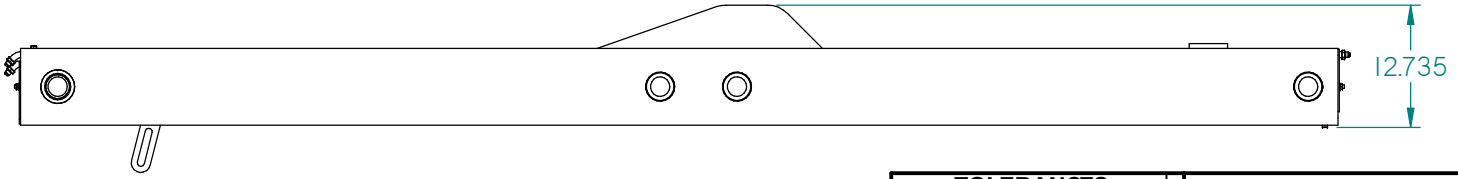
| REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| - | - | - | - |

010 ASSEMBLY






**TOLERANCES**

| | |
|---|---|
| 1 DEC. | ± 0.100 |
| 2 DEC. | ± 0.050 |
| 3 DEC. | ± 0.010 |
| ANGLE: | ± 1.000° |
| FRACTION: | ± 1/32" |
| DIM. UNITS: | INCHES |
| SURFACE FINISH: | 125/32 |

*UNLESS OTHERWISE SPECIFIED*

DEC. = DECIMAL PLACE(S)


LIGHTNING LOADER PETERSEN INDUSTRIES

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

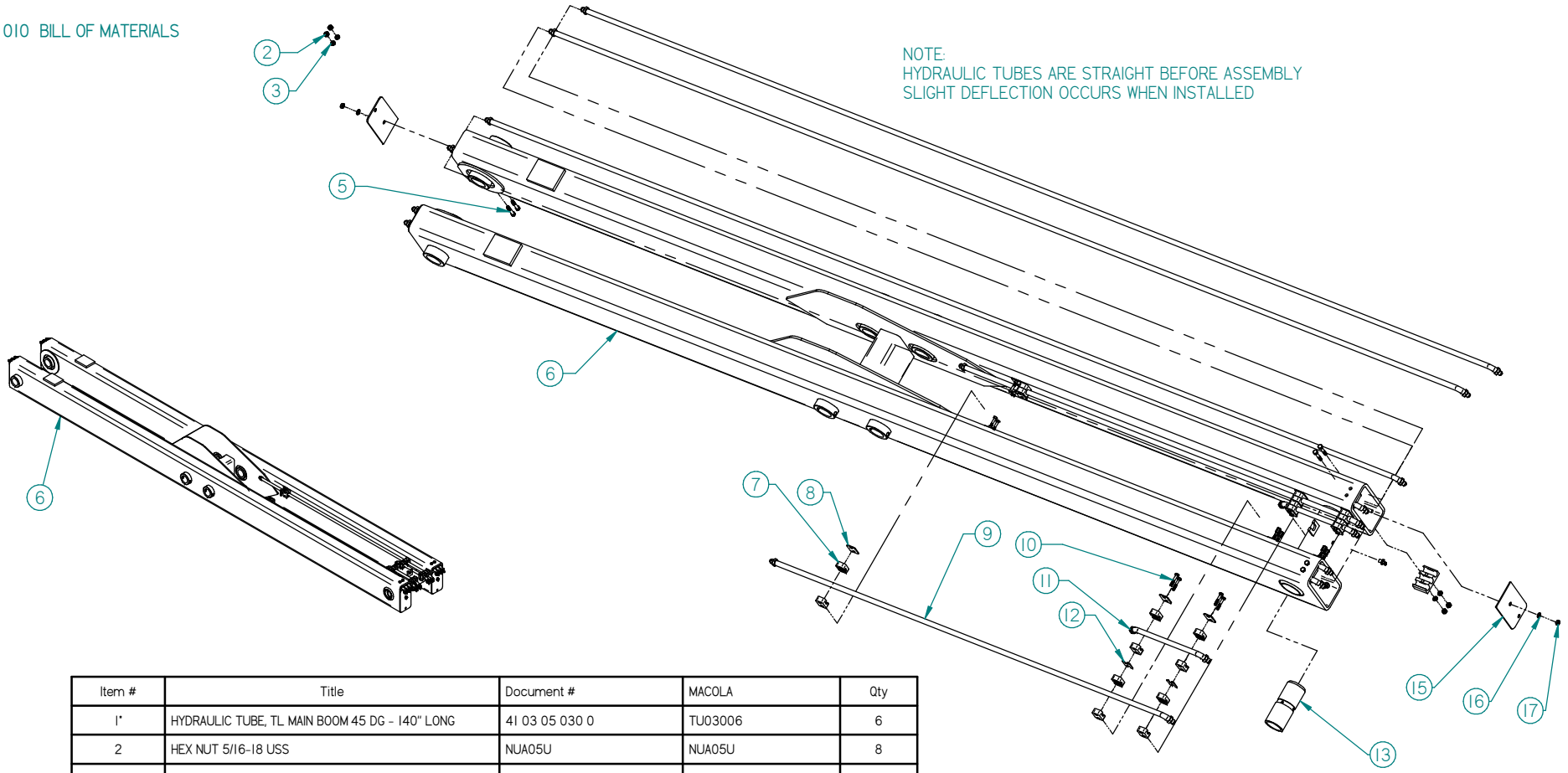

TITLE: MAIN BOOM TL3 ASSEMBLY

| PART NUMBER: | SCALE: |
|---|---|
| 12 03 04 001 0 / 108103 | 1:20 |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| OJ | | 08/04/2006 | 1 OF 2 |

## 010 BILL OF MATERIALS

NOTE:
HYDRAULIC TUBES ARE STRAIGHT BEFORE ASSEMBLY
SLIGHT DEFLECTION OCCURS WHEN INSTALLED




| Item # | Title | Document # | MACOLA | Qty |
|---|---|---|---|---|
| 1* | HYDRAULIC TUBE, TL MAIN BOOM 45 DG - 140" LONG | 41 03 05 030 0 | TU03006 | 6 |
| 2 | HEX NUT 5/16-18 USS | NUA05U | NUA05U | 8 |
| 3 | WASHER LOCK 5/16 SPLIT | WAS055 | WAS055 | 8 |
| 4* | 3 HOLE CLAMP NYLATRON | 40 00 00 066 0 | CLT3N | 4 |
| 5 | HEX BOLT 5/16-18 X 2 UNC G5 | BL305032U518 | BL305032U518 | 8 |
| 6 | TL MAIN BOOM WELDMENT | 21 03 05 002 2 | 108152 | 1 |
| 7 | CLAMP, PLASTIC (1-HOLE) (1 SET) | CLP210 | CLP210 | 10 |
| 8 | CLAMP, TOP PLATE ONLY (1-HOLE) | CL5G215 | CL5G215 | 6 |
| 9 | HYDRAULIC TUBE, TL MAIN BOOM 45 DG - 62" LONG | 41 03 05 029 0 | TU02002 | 2 |
| 10 | BOLT HEX 1/4-20 X 1-1/2 UNC G5 | BL304024U520 | BL304024U520 | 8 |
| 11 | HYDRAULIC TUBE, TL MAIN BOOM45 DG - 12" LONG | 41 03 05 020 0 | TU03002 | 2 |
| 12 | CLAMP SAFETY PLATE | CL5G211 | CL5G211 | 4 |
| 13 | BUSHING, 2-1/2" X 2" X 6" NYLATRON | 41 03 05 028 2 | BU503004 | 2 |
| 14* | 1/8" STRAIGHT GREASE FITTING | HF2002S | HF2002S | 1 |
| 15 | TL MAIN BOOM END CAP | 41 03 05 007 2 | 108225 | 4 |
| 16 | WASHER LOCK 3/8 SPLIT | WAS065 | WAS065 | 4 |
| 17 | HEX NUT 3/8 -16 USS | NUA06U | NUA06U | 4 |


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

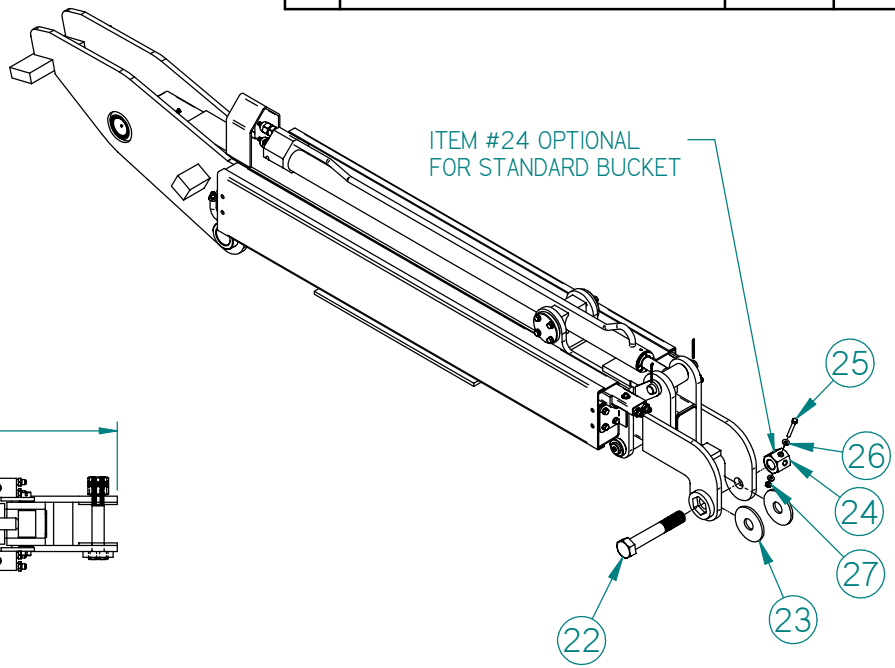

TITLE: MAIN BOOM TL3 ASSEMBLY

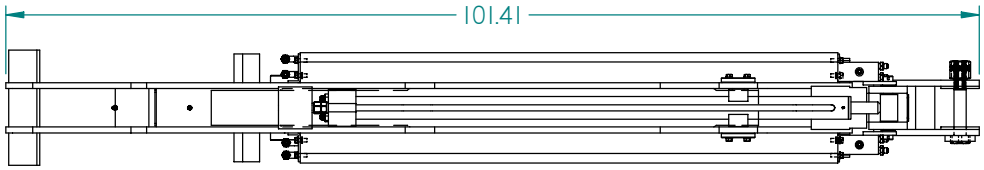
| PART NUMBER: | SCALE: |
|---|---|
| 12 03 04 001 0 / 108103 | 1:20 |

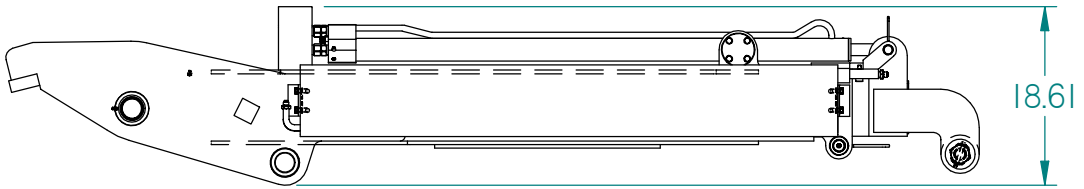
| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| OJ | | 08/04/2006 | 2 OF 2 |

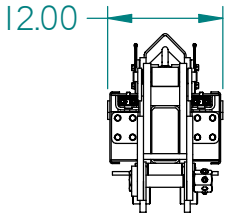
010 ASSEMBLY

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




**TOLERANCES**

| | |
|---|---|
| 1 DEC. | ± 0.100 |
| 2 DEC. | ± 0.050 |
| 3 DEC. | ± 0.010 |
| ANGLE: | ± 1.000° |
| FRACTION: | ± 1/32" |
| DIM. UNITS: | INCHES |
| SURFACE FINISH: | 125/32 |

*UNLESS OTHERWISE SPECIFIED*

DEC. = DECIMAL PLACE(S)


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


TITLE: TL3 TIP BOOM ASSEMBLY

PART NUMBER: 12 04 04 002 1 / 109103

SCALE: 1:20

DRAWN BY: BRB

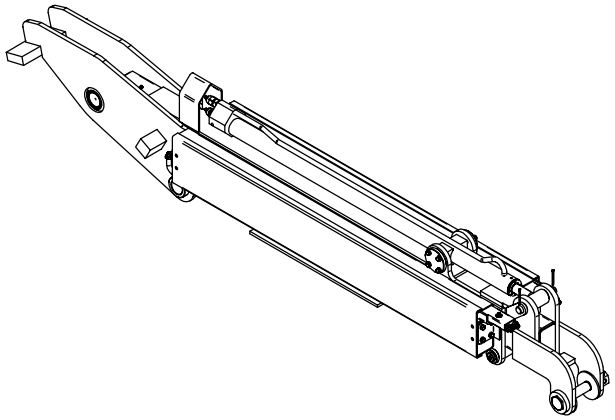
APPROVED BY:

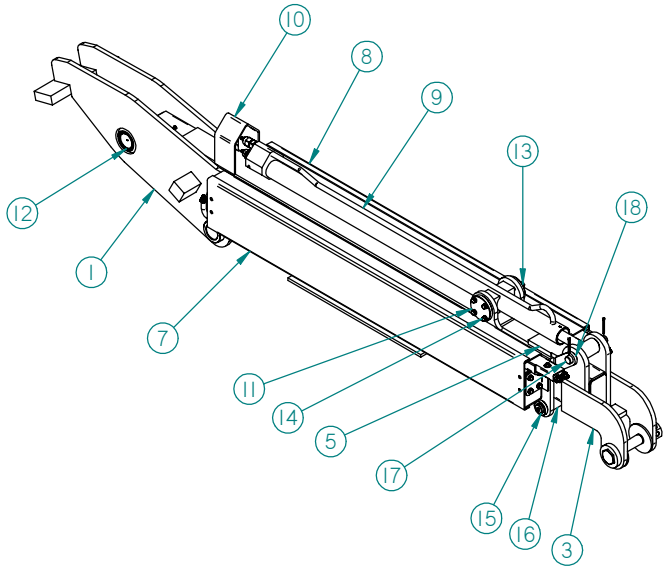
DATE: 10/26/2016

SHEET: 1 OF 2

## 010 BILL OF MATERIALS

| Item # | Title | Document # | MACOLA | QTY |
|---|---|---|---|---|
| 1 | TL3 TIP BOOM OUTER WELDMENT | 21 04 04 011 1 | 109152 | 1 |
| 2* | TL3 TIP BOOM SIDE WEAR PAD 2-7/8 X 5 | 41 04 04 041 0 | BU303003 | 2 |
| 3 | TL3 TIP EXTENSION INNER TUBE WELDMENT | 21 04 04 010 3 | 109153 | 1 |
| 4* | TIP EXTENSION SQUARE WEAR PUCK | 41 04 04 028 1 | 109210 | 10 |
| 5 | TIP EXTENSION WEAR PLT RTNR / RTRCT STOP PLT ASSEMBLY | 21 04 04 009 0 | 109154 | 1 |
| 6* | TL3 TIP BOOM TOP WEAR PAD 2-7/8 X 4 | 41 04 04 040 0 | BU303002 | 1 |
| 7 | HOSE RECOIL BOX ASSEMBLY - RIGHT | 21 04 04 012 1 | 123122 | 1 |
| 8 | HOSE RECOIL BOX ASSEMBLY - LEFT | 21 04 04 013 1 | 123121 | 1 |
| 9 | TIP EXTENSION CYLINDER SHAFT ASSEMBLY | 22 14 01 010 2 | 121105 | 1 |
| 10 | TIP BOOM TIP EXTENSION GUARD | 41 04 04 027 1 | 109238 | 1 |
| 11 | TRUNION TIP EXTENSION CYLINDER MOUNT | 41 04 04 004 1 | 109205 | 2 |
| 12 | BUSHING, 2 1/2 X 2 X 2 NYLATRON | 41 11 09 022 5 | BU502008 | 2 |
| 13 | WASHER LOCK 3/8 SPLIT | WAS065 | WAS065 | 8 |
| 14 | HEX BOLT 3/8-16 X 1.00 USS G5 | BL306016U516 | BL306016U516 | 8 |
| 15 | PIN, CONNECT | 41 04 04 018 0 | PI18105F | 1 |
| 16 | TIP BOOM, SUPPORT ROLLER WITH BUSHINGS | 31 04 04 008 0 | 109235 | 1 |
| 17 | PIN, CONNECT | 41 04 04 012 0 | PI16112F | 1 |
| 18 | WASHER, BUSHING 1.00 X 1.50 | WAB1624 | WAB1624 | 2 |
| 19* | PIN, COTTER .187 X 2 | FA020332 | FA020332 | 2 |
| 20* | COTTER PIN 5/16 X 3 | FA020548 | FA020548 | 1 |
| 21* | HYDRAULIC, .125 STRAIGHT GREASE FITTING | HF2002S | HF2002S | 3 |
| 22 | HEX BOLT 1-1/4-7 X 7-3/4 GR8 | BL120124U87 | BL120124U87 | 1 |
| 23 | BUCKET BRAKE WASHER 4 X 1-5/16 X 1/4 | WAF642004 | WAF642004 | 2 |
| 24 | BUCKET BOLT NUT | 40 00 00 053 1 | 102454 | 1 |
| 25 | HEX BOLT 5/16-18 X 2.50 USS G5 | BL305040U518 | BL305040U518 | 1 |
| 26 | WASHER FLAT 5/16 USS | WAF05U5 | WAF05U5 | 2 |
| 27 | HEX NUT 5/16-24 SAE STOVERLOCK | NUS05S | NUS05S | 1 |






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

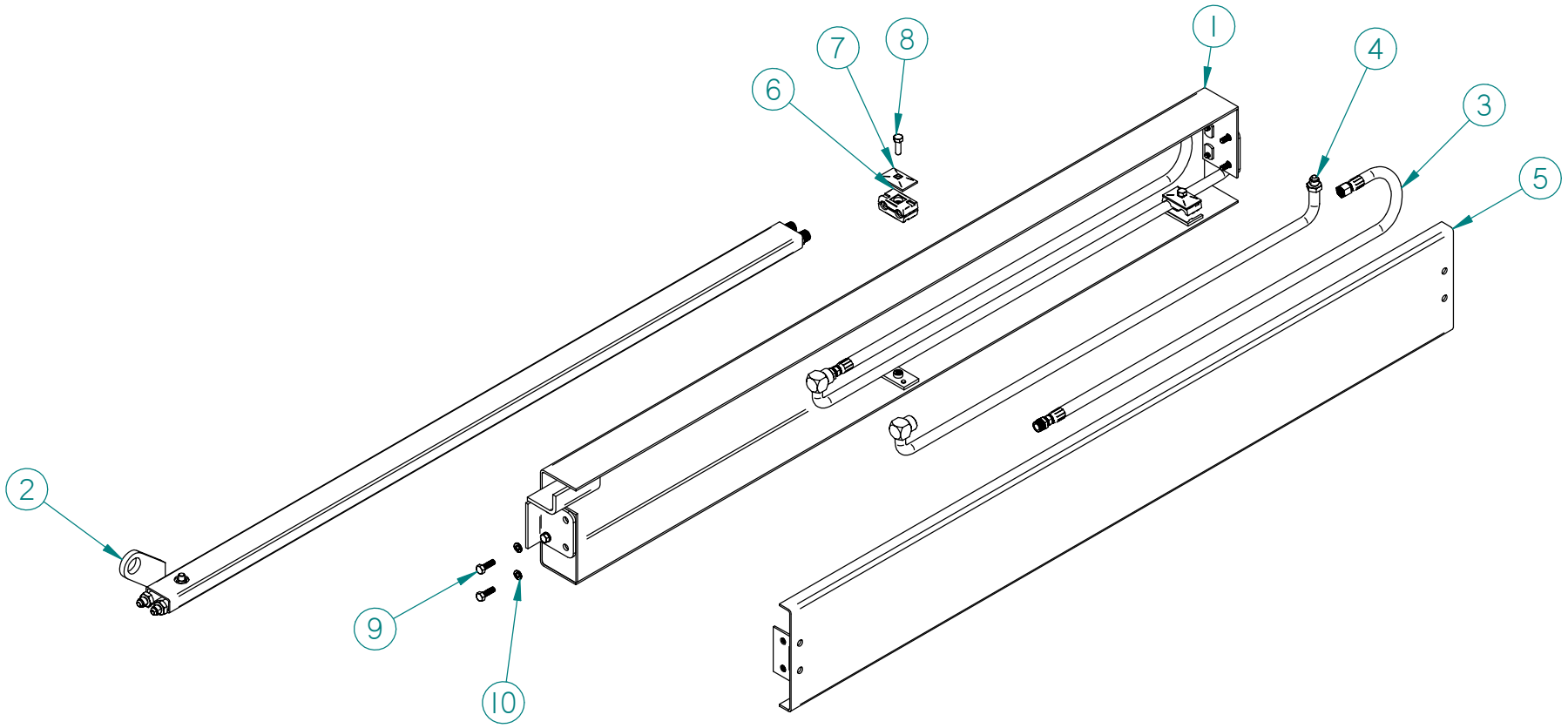
TITLE: TL3 TIP BOOM ASSEMBLY

| PART NUMBER: | SCALE: |
|---|---|
| 12 04 04 002 1 / 109103 | 1:24 |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| BRB | | 10/26/2016 | 2 OF 2 |

010 ASSEMBLY

| REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| 1 | CHANGED RECOIL SLIDE TO TUBING FROM CHANNEL | 07/30/2008 | RB |




| Item # | Title | Document # | MACOLA | Qty |
|---|---|---|---|---|
| 1 | HOSE RECOIL, HOUSING ASSEMBLY - LEFT | 21 04 04 017 0 | 123125 | 1 |
| 2 | TIP BOOM, HOSE RECOIL SLIDE ASSY LH | 21 04 04 015 1 | 123123 | 1 |
| 3 | HOSE CUT 36" #6-S RECOIL BOX | HS10576FS | HS10576FS | 2 |
| 4 | TUBE, TL3 HOSE RECOIL BOX - CURVED | 41 04 04 043 0 | TU04004 | 2 |
| 5 | HOSE RECOIL, COVER ASSEMBLY | 21 04 04 018 0 | 123127 | 1 |
| 6 | CLAMP, PLASTIC ONLY (2-HOLE) (1 SET) | CLP220 | CLP220 | 2 |
| 7 | CLAMP, TOP PLATE ONLY (2-HOLE) | CL5G225 | CL5G225 | 2 |
| 8 | BOLT, HEX HD, 5/16 - 18 UNC 1.250 LG | BL305012U518 | BL305012U518 | 2 |
| 9 | HEX BOLT 5/16-18 X 1 USS G5 | BL305016U518 | BL305016U518 | 4 |
| 10 | WASHER LOCK 5/16 SPLIT | WAS055 | WAS055 | 4 |

**TOLERANCES**

| | |
|---|---|
| 1 DEC. | ± 0.100 |
| 2 DEC. | ± 0.050 |
| 3 DEC. | ± 0.010 |
| ANGLE: | ± 1.000° |
| FRACTION: | ± 1/32" |
| DIM. UNITS: | INCHES |
| SURFACE FINISH: | 125/32 |

*UNLESS OTHERWISE SPECIFIED*

DEC. = DECIMAL PLACE(S)


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


TITLE: HOSE RECOIL BOX ASSEMBLY - LEFT

PART NUMBER: 21 04 04 013 1 / 123121

SCALE: 1:10

DRAWN BY: RB

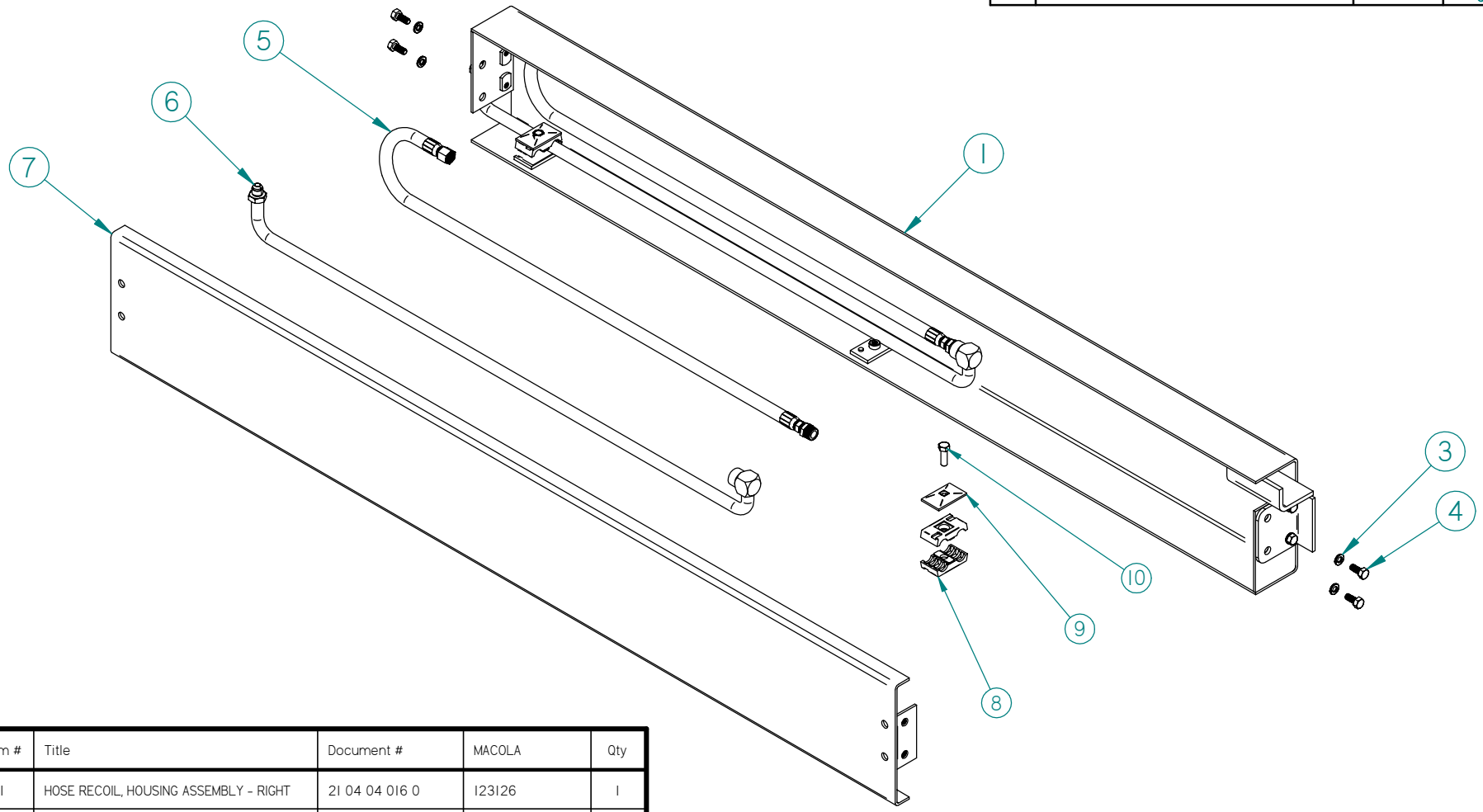
APPROVED BY:

DATE: 07/30/2008

SHEET: 1 OF 1

010 ASSEMBLY

| REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| 1 | CHANGED RECOIL SLIDE TO TUBING FROM CHANNEL | 07/30/2008 | RB |




| Item # | Title | Document # | MACOLA | Qty |
|---|---|---|---|---|
| 1 | HOSE RECOIL, HOUSING ASSEMBLY - RIGHT | 21 04 04 016 0 | 123126 | 1 |
| 2* | TIP BOOM, HOSE RECOIL SLIDE ASSY RH | 21 04 04 014 1 | 123124 | 1 |
| 3 | WASHER LOCK 5/16 SPLIT | WAS055 | WAS055 | 4 |
| 4 | HEX BOLT 5/16-18 X 3/4 USS G5 | BL305012U518 | BL305012U518 | 4 |
| 5 | HOSE CUT 36" #6-S RECOIL BOX | HSI0576FS | HSI0576FS | 2 |
| 6 | TUBE, TL3 HOSE RECOIL BOX - CURVED | 41 04 04 043 0 | TU04004 | 2 |
| 7 | HOSE RECOIL, COVER ASSEMBLY | 21 04 04 018 0 | 123127 | 1 |
| 8 | CLAMP, PLASTIC ONLY (2-HOLE) (1 SET) | CLP220 | CLP220 | 2 |
| 9 | CLAMP, TOP PLATE ONLY (2-HOLE) | CL5G225 | CL5G225 | 2 |
| 10 | BOLT, HEX HD, 5/16 - 18 UNC 1.250 LG | BL305012U518 | BL305012U518 | 2 |

**TOLERANCES**

| | |
|---|---|
| 1 DEC. | ± 0.100 |
| 2 DEC. | ± 0.050 |
| 3 DEC. | ± 0.010 |
| ANGLE: | ± 1.000° |
| FRACTION: | ± 1/32" |
| DIM. UNITS: | INCHES |
| SURFACE FINISH: | 125/32 |

*UNLESS OTHERWISE SPECIFIED*

DEC. = DECIMAL PLACE(S)


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


TITLE: HOSE RECOIL BOX ASSEMBLY - RIGHT

PART NUMBER: 21 04 04 012 1 / 123122

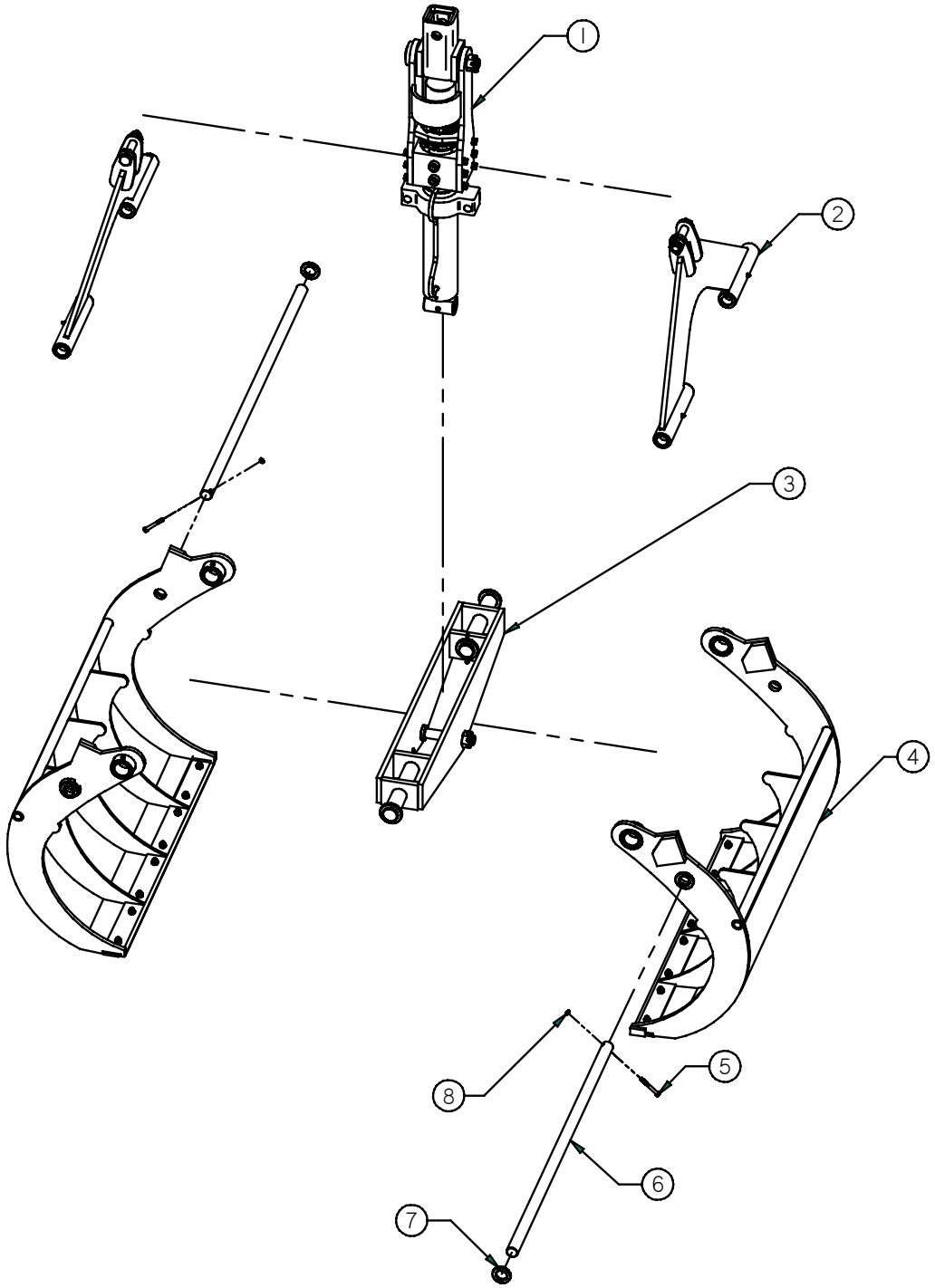
SCALE: 1:8

DRAWN BY: RB

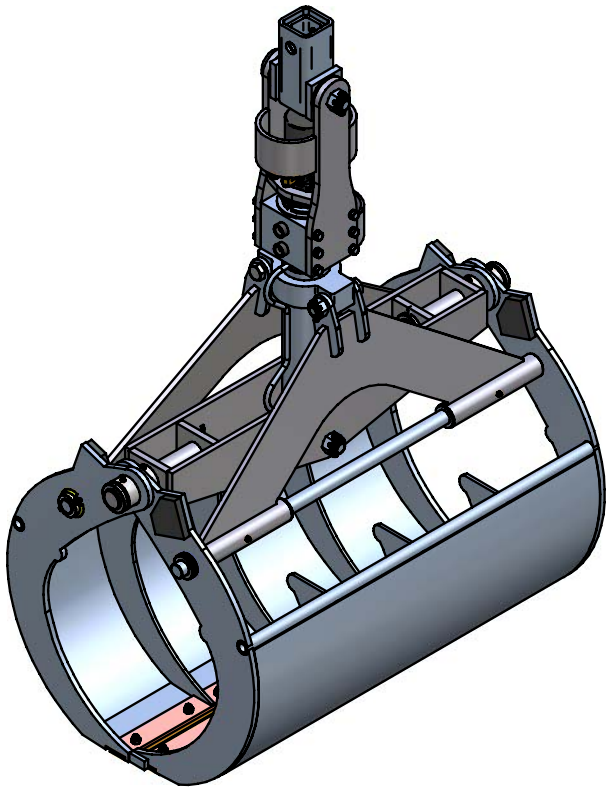
APPROVED BY:

DATE: 07/30/2008

SHEET: 1 OF 1




| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | BUCKET CYLINDER ROTATOR ASSEMBLY (RE MOTOR) | 102124 | 1 |
| 2 | STANDARD BUCKET A FRAME ASSEMBLY | 102130 | 2 |
| 3 | BUCKET SADDLE ASSEMBLY | 102129 | 1 |
| 4 | TRASH BUCKET JAW ASSEMBLY | 102132 | 2 |
| 5 | BOLT HEX 3/8-16 UNC X 3 G8 | BL108048U816 | 2 |
| 6 | STD BUCKET A FRAME SHAFT | 102173 | 2 |
| 7 | COLLAR SPACER 1 1/2 X 2 1/2 X 1/2_3/8 | 116106 | 2 |
| 8 | NUT HEX 3/8 -16 UNC STOVERLOCK | NUS06U | 2 |

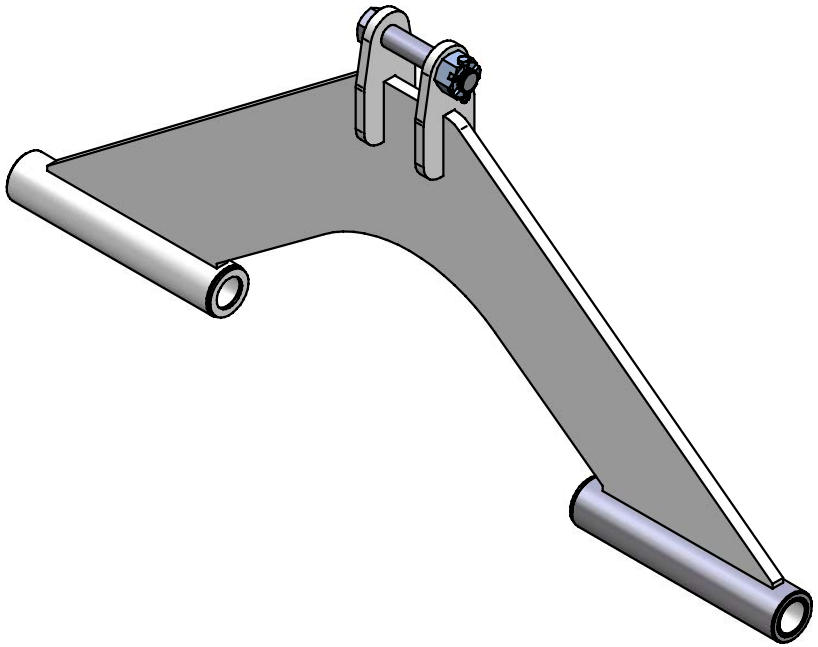


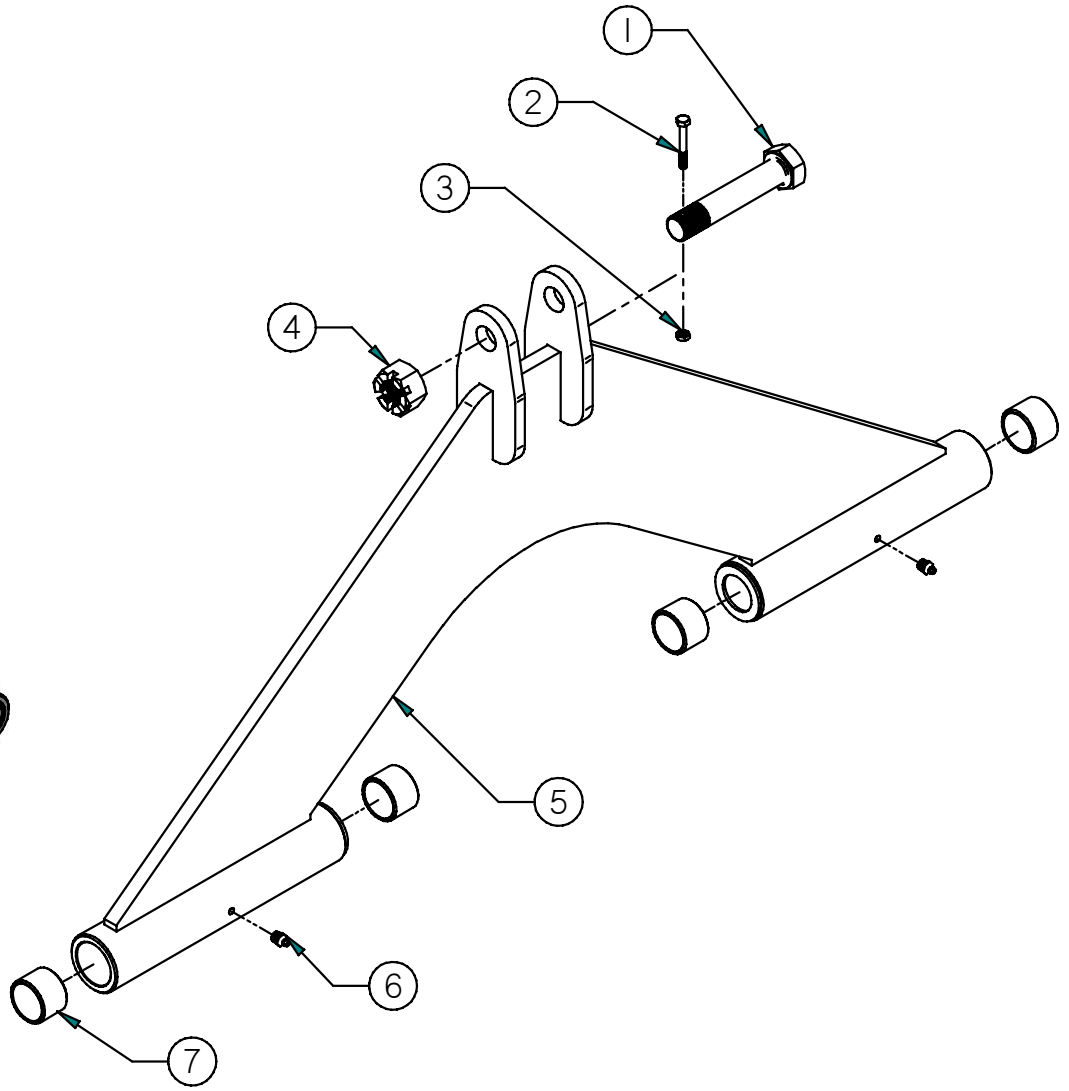
PETERSEN INDUSTRIES INC.
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: STANDARD TRASH BUCKET ASSEMBLY

| PART NUMBER: | SCALE: |
|---|---|
| 11 11 01 0011 / 102101 | N/A |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| E. B. | | 12/20/2000 | 1 OF 1 |






| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | BOLT HEX 1-14 X 5 1/4 SAE HOLE | BL116084S8H1400 | 1 |
| 2 | BOLT HEX 1/4-20 X 2 USS G5 | BL304032U520 | 1 |
| 3 | NUT STOVERLOCK 1/4 USS | NUS04U | 1 |
| 4 | NUT SLOTTED 1-14 SAE GR5 | NUB16S5 | 1 |
| 5 | STANDARD BUCKET A FRAME WELDMENT | 102172 | 1 |
| 6 | GREASE NIPPLE 1/8" STRAIGHT | HF2002S | 2 |
| 7 | A FRAME BUCKET SPOOL BUSHING | BU402012 | 4 |

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4000 S.R. 60 WEST
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TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: STANDARD BUCKET A FRAME ASSEMBLY

PART NUMBER: 22 11 01 001 2 / 102130

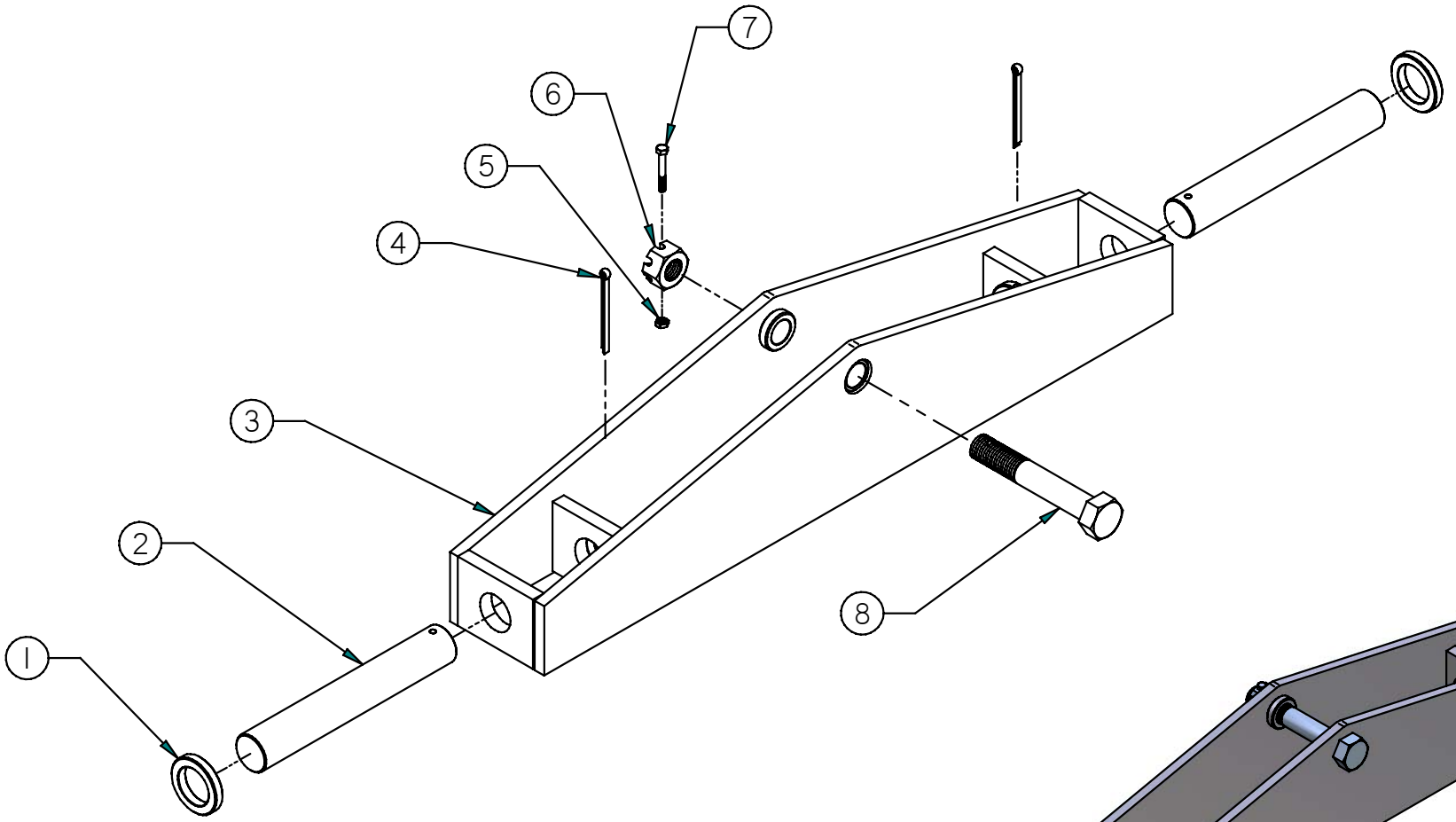
SCALE: N/A

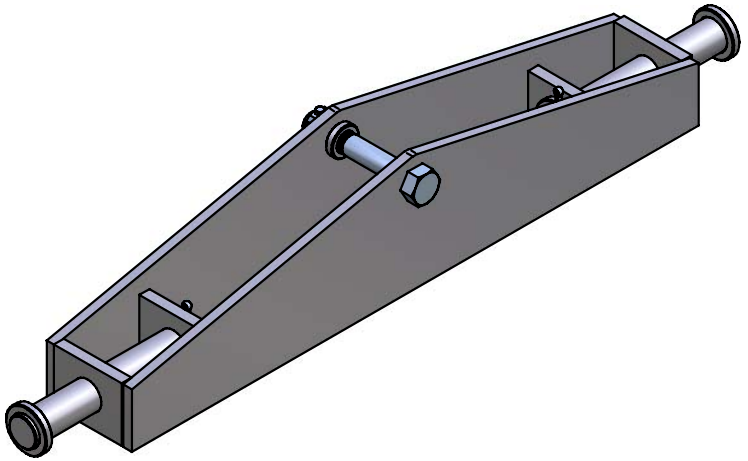
DRAWN BY: E.B.

APPROVED BY:

DATE: 2/23/99

SHEET: 1 OF 1



| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | BUCKET SADDLE PIVOT COLLAR | 116107 | 2 |
| 2 | BUCKET SADDLE PIVOT PIN | PI30204FC | 2 |
| 3 | BUCKET SADDLE WELDMENT | 102178 | 1 |
| 4 | COTTER PIN 5/16 X 4 | FA020564 | 2 |
| 5 | HEX NUT 5/16-18 USS STOVERLOCK | NUS05U | 1 |
| 6 | SLOTTED NUT 1-1/4 UNC GR5 | NUB20U | 1 |
| 7 | HEX BOLT 5/16-18 X 2-1/4 UNC GR5 | BL305036U518 | 1 |
| 8 | HEX BOLT 1-1/4-7 X 7-3/4 GR8 | BLI20124U87 | 1 |

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TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: BUCKET SADDLE ASSEMBLY

PART NUMBER: 22 11 01 003 0 / 102129

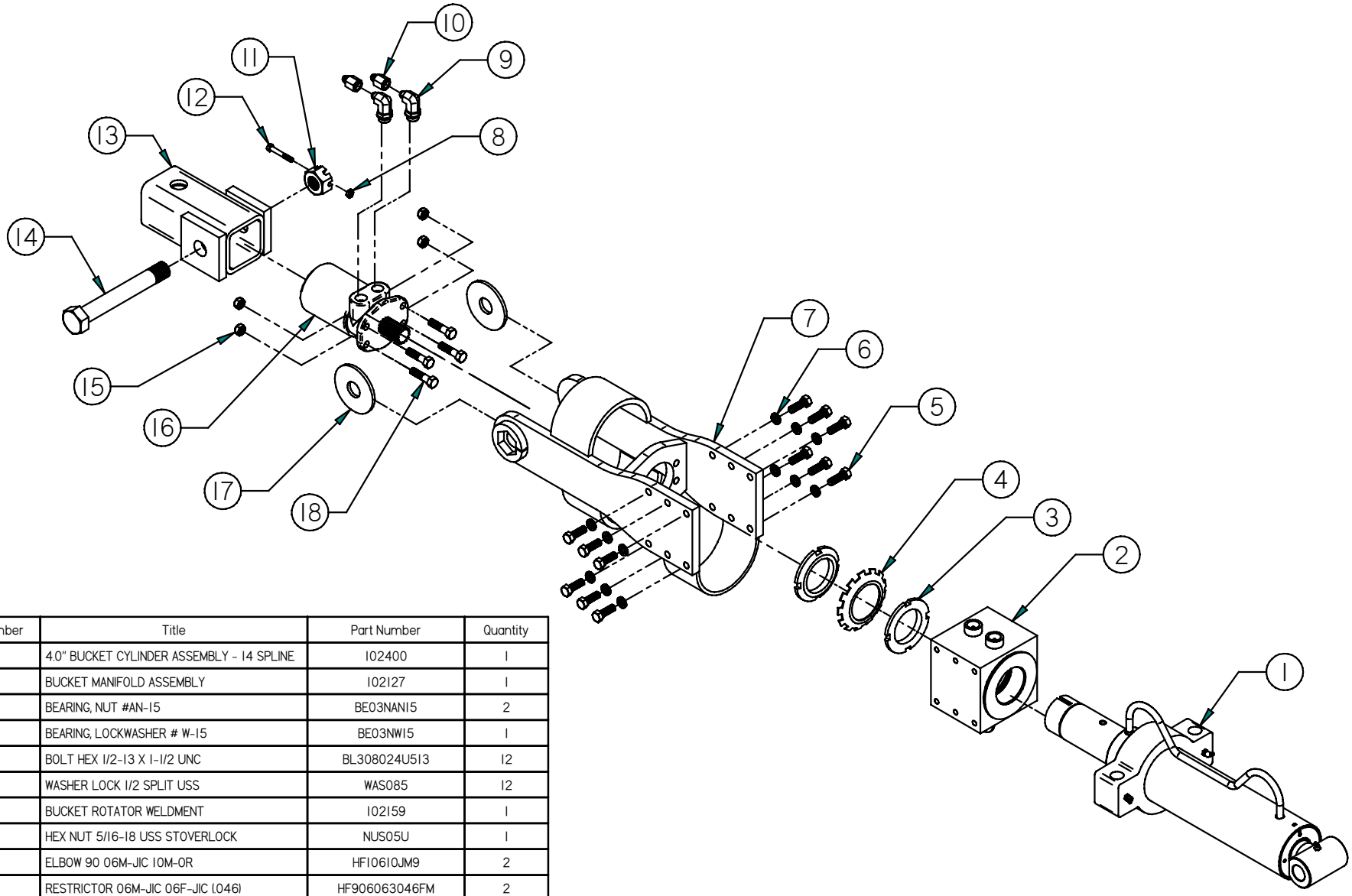
SCALE: N/A

DRAWN BY: E.B.

APPROVED BY:

DATE: 11/13/2000

SHEET: 1 OF 1




| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | 4.0" BUCKET CYLINDER ASSEMBLY - 14 SPLINE | 102400 | 1 |
| 2 | BUCKET MANIFOLD ASSEMBLY | 102127 | 1 |
| 3 | BEARING, NUT #AN-15 | BE03NAN15 | 2 |
| 4 | BEARING, LOCKWASHER # W-15 | BE03NW15 | 1 |
| 5 | BOLT HEX 1/2-13 X 1-1/2 UNC | BL308024U513 | 12 |
| 6 | WASHER LOCK 1/2 SPLIT USS | WAS085 | 12 |
| 7 | BUCKET ROTATOR WELDMENT | 102159 | 1 |
| 8 | HEX NUT 5/16-18 USS STOVERLOCK | NUS05U | 1 |
| 9 | ELBOW 90 06M-JIC 10M-OR | HF10610JM9 | 2 |
| 10 | RESTRICTOR 06M-JIC 06F-JIC (046) | HF906063046FM | 2 |
| 11 | SLOTTED NUT 1-1/4 UNC GR5 | NUB20U | 1 |
| 12 | HEX BOLT 5/16-18 X 2-1/4 UNC GR5 | BL305036U518 | 1 |
| 13 | GIMBAL WELDMENT 4 X 5-1/2 | 102119 | 1 |
| 14 | BOLT - ROTATOR GIMBAL, TRASH | 102158 | 1 |
| 15 | HEX NUT 1/2-13 STOVERLOCK | NUS08U | 4 |
| 16 | HYD MOTOR RE-32-08-05-0 (14 SPLINE) | HC03004 | 1 |
| 17 | BUCKET BRAKE WASHER 4 X 1-5/16 X 1/4 | WAF642004 | 2 |
| 18 | BOLT HEX 1/2-13 X 2 UNC GR8 | BL108032U813 | 4 |

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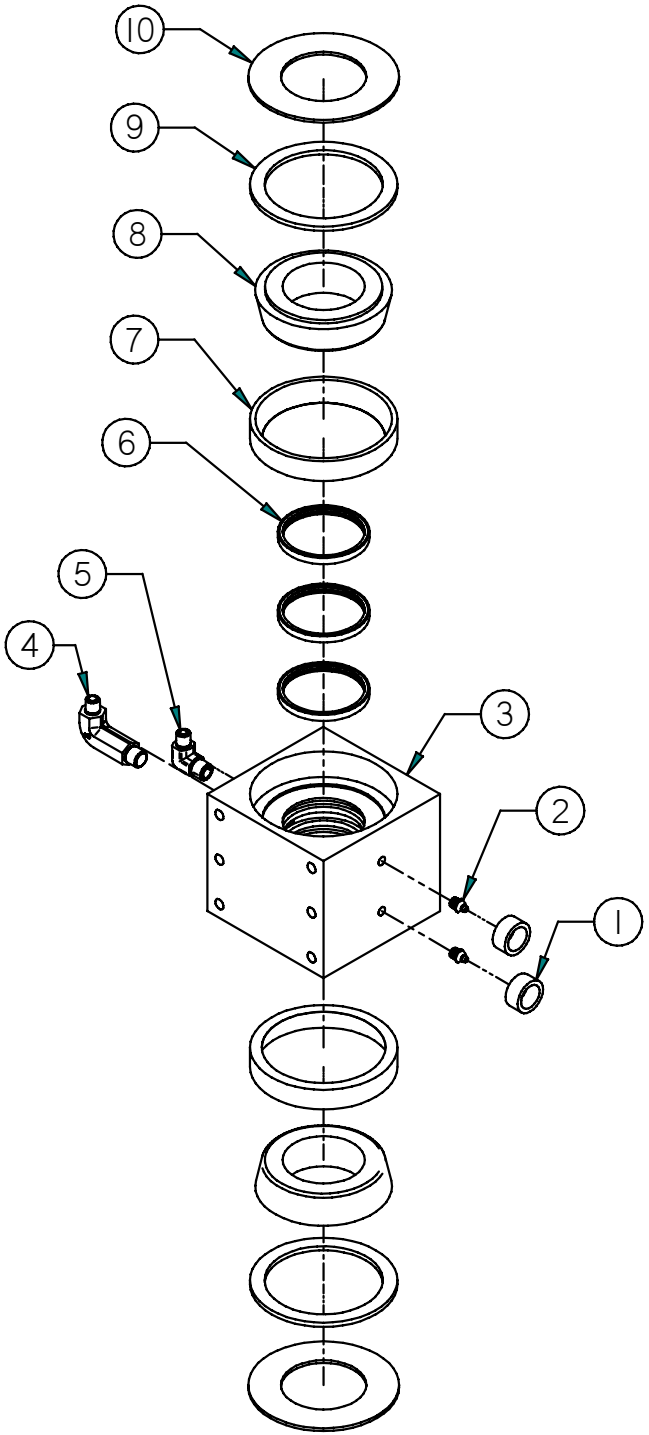
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: BUCKET CYLINDER ROTATOR ASSEMBLY (RE MOTOR)

| PART NUMBER: | SCALE: |
|---|---|
| 22 11 01 010 0 / 102124 | N/A |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| Olvera, J. | | 11/9/2005 | 1 OF 1 |




| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | BUCKET MANIFOLD GREASE FITTING COVER | 102151 | 2 |
| 2 | GREASE NIPPLE 1/8" STRAIGHT | HF2002S | 2 |
| 3 | BUCKET MANIFOLD HOUSING | 102443 | 1 |
| 4 | ELBOW 90 06M-JIC 06M-JIC LONG | HF806069ML | 1 |
| 5 | ELBOW 90 06M-JIC 06M-JIC | HF806069M | 1 |
| 6 | SEAL KIT TR-035 | HPKTR035 | 3 |
| 7 | BEARING RACE #493 | BE03N493 | 2 |
| 8 | TIMKEN ROLLER BEARING #495-A | BE03N495A | 2 |
| 9 | ROTATOR FELT WASHER | WAL866902 | 2 |
| 10 | CONTINUOUS ROTATOR THRUST WASHER | WAF885002 | 2 |

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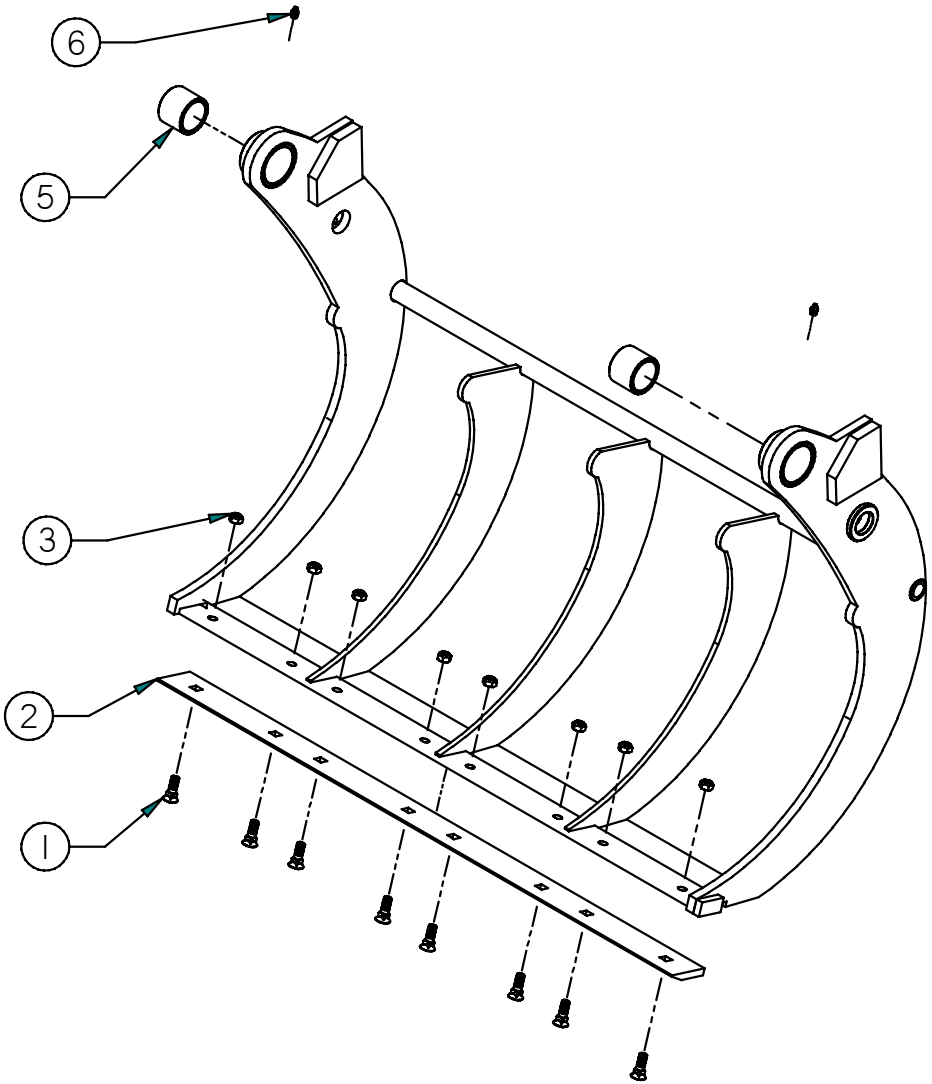
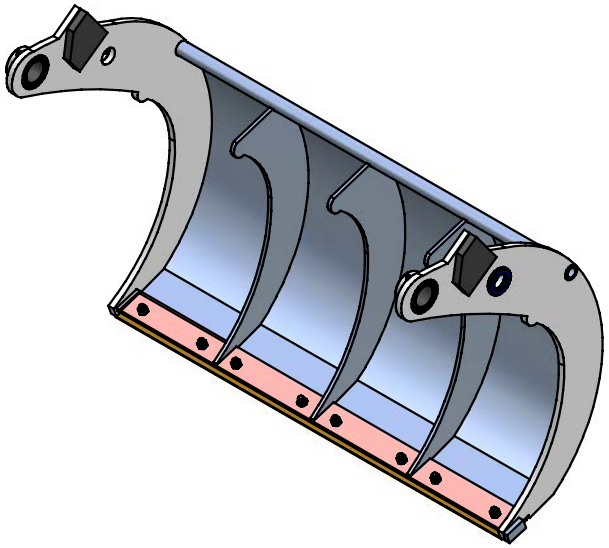
4000 S.R. 60 WEST
LAKE WALES, FL. 33859-8234
TEL: (863) 676-1493 FAX: (863) 676-6844

TITLE: BUCKET MANIFOLD ASSEMBLY

| PART NUMBER: | SCALE: |
|---|---|
| 21 11 09 002 2 / 102127 | N/A |

| DRAWN BY: | APPROVED BY: | DATE: | SHEET: |
|---|---|---|---|
| E. B. | | 12/14/2000 | 1 OF 1 |



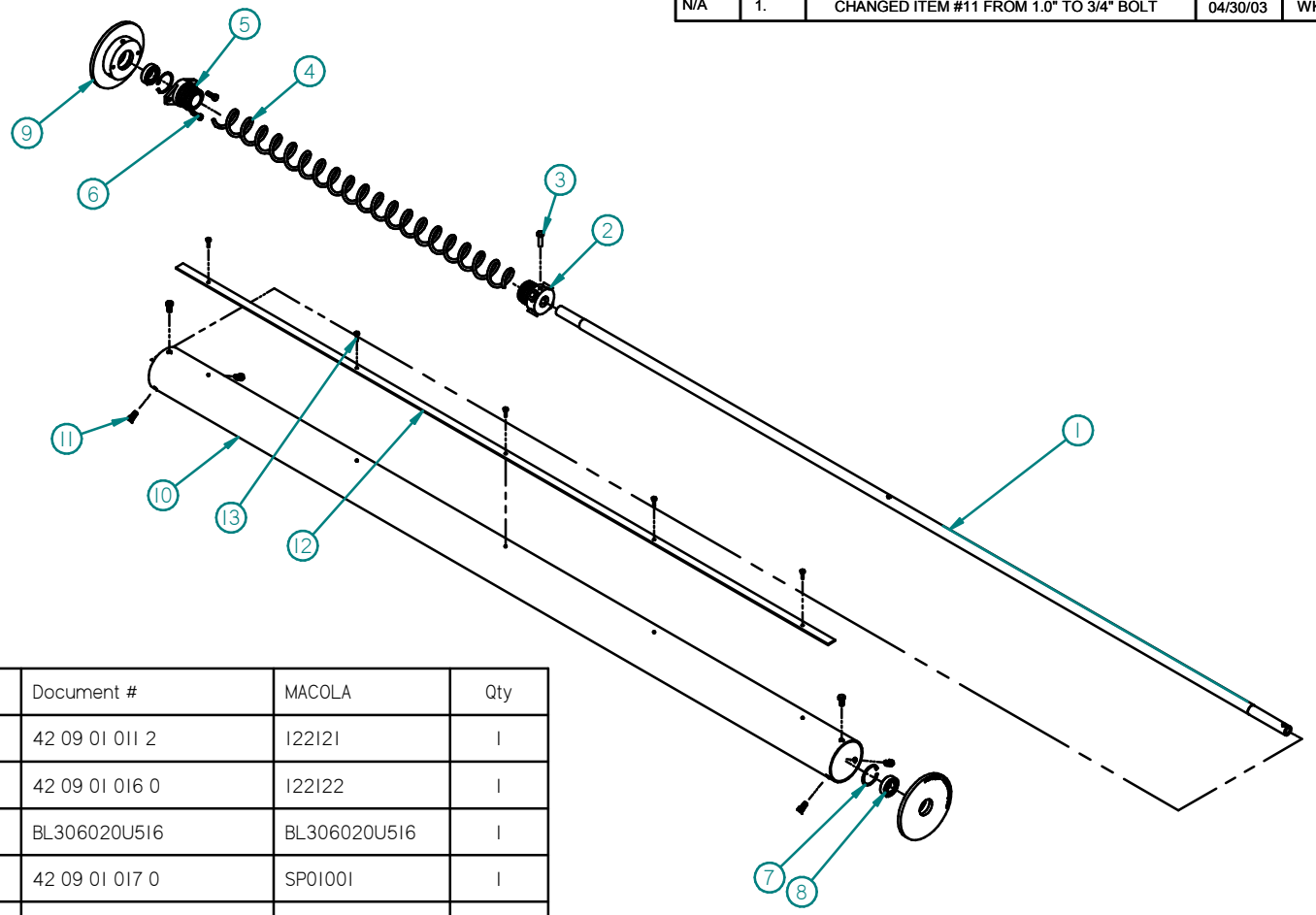



| Item Number | Title | Part Number | Quantity |
|---|---|---|---|
| 1 | FLAT HEAD PLOW BOLT 1/2-13 X 1-1/2 #3 G5 | BL6080243513 | 8 |
| 2 | BUCKET, TL JAW BLADE | 102171 | 1 |
| 3 | HEX NUT 1/2-13 STOVERLOCK | NUS08U | 8 |
| 5 | BUSHING, 2 1/2 X 2 X 2 NYLATRON | BU502008 | 2 |
| 6 | GREASE NIPPLE 1/8" STRAIGHT | HF2002S | 2 |

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

| | | | |
|---|---|---|---|
| TITLE: TRASH BUCKET JAW ASSEMBLY | | | |
| PART NUMBER: 22 11 01 002 5 / 102132 | | | SCALE: N/A |
| DRAWN BY: E.B. | APPROVED BY: | DATE: 8/28/00 | SHEET: 1 OF 1 |

| ZONE | REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|---|
| N/A | 1. | CHANGED ITEM #11 FROM 1.0" TO 3/4" BOLT | 04/30/03 | WKB |




| Item # | Title | Document # | MACOLA | Qty |
|---|---|---|---|---|
| 1 | LOAD COVER SHAFT | 42 09 01 011 2 | 122121 | 1 |
| 2 | LOAD COVER SPRING CONE, SHAFT SIDE | 42 09 01 016 0 | 122122 | 1 |
| 3 | HEX BOLT 3/8-16 X 1.25 USS G5 | BL306020U516 | BL306020U516 | 1 |
| 4 | 2001 LOAD COVER SPRING | 42 09 01 017 0 | SP01001 | 1 |
| 5 | LOAD COVER SPRING CONE, PLATE SIDE | 42 09 01 015 0 | 122123 | 1 |
| 6 | HEX BOLT 5/16-18 X 1 USS G5 | BL305016U518 | BL305016U518 | 2 |
| 7 | 2.1875" RETAINER RING, 1/16" THICK | FA093200 | FA093200 | 2 |
| 8 | BEARING 1.0" ID, 2.0" OD, .56" THICK | BE04N164IDC | BE04N164IDC | 2 |
| 9 | 2001 LOAD COVER END PLATE | 42 09 01 010 2 | CA3002 | 2 |
| 10 | 2001 LOAD COVER TUBING | 42 09 01 013 2 | 122126 | 1 |
| 11 | HEX BOLT 3/8-16 X .750 USS G5 | BL306012U516 | BL306012U516 | 6 |
| 12 | LOAD COVER STRAP | 42 09 01 012 0 | 122127 | 1 |
| 13 | # 14 SCREW, 3/4" LONG | BL306020U516 | BL306020U516 | 5 |

PART OF: LOAD COVER ASSEMBLY

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

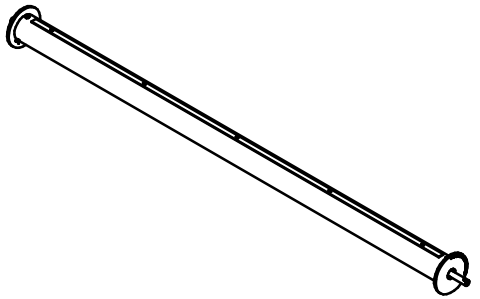
TITLE: 2001 LOAD COVER ASSEMBLY

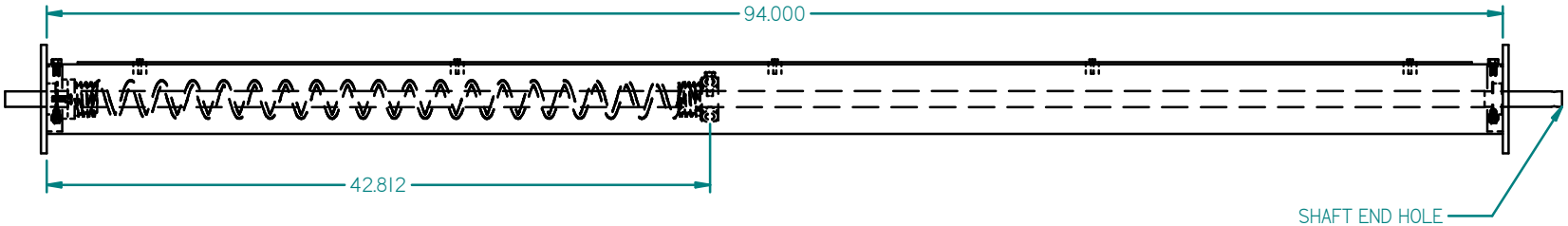
| CAD NO.: | PART NO.: | SCALE |
|---|---|---|
| 22 09 01 001 1 | 122101 | N/A |

| DRAWN BY: | APPROVED: | DATE: | SHEET: |
|---|---|---|---|
| E.B. | | 10/29/01 | 1 OF 2 |

010 ASSEMBLE END PLATE, BEARING AND RETAINING RING WITH SPRING CONE.
020 ATTACH SPRING AND SHAFT CONE TO CONE ASSEMBLED END PLATE.
030 SLIDE SHAFT THROUGH SUB ASSEMBLY. SPRING MUST BE ON OPPOSITE SIDE OF SHAFT END HOLE. PULL SHAFT CONE AND SECURE IT TO THE SHAFT WITH BOLT.
040 INSERT SUB ASSEMBLY INTO TUBING. ATTACH TUBING TO END PLATE SUB ASSEMBLY WITH BOLTS
050 ASSEMBLE END PLATE, BEARING AND RETAINING RING.
060 INSERT END PLATE SUB ASSEMBLY AT ASSEMBLY OPEN END AND ATTACH IT WITH BOLTS.
070 INSTALL COVER AND SECURE IT TO TUBING WITH STRAP AND SCREWS

| ZONE | REV. | DESCRIPTION | DATE | BY |
|---|---|---|---|---|
| N/A | 1. | CHANGED ITEM #11 FROM 1.0" TO 3/4" BOLT | 04/30/03 | WKB |






PART OF: 2001 LOAD COVER ASSEMBLY,

| DET. | REQ'D | MATERIAL |
|---|---|---|
| N/A | 1 | N/A |

TOLERANCES
1 DEC.: ± .100
2 DEC.: ± .050
3 DEC.: ± .010
ANGLE: ± 2.00
FRACTIONAL: ± 1/32"
MACHINING: 125
DIM UNITS: INCHES
UNLESS OTHERWISE SPECIFIED

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

TITLE: 2001 LOAD COVER ASSEMBLY

| CAD NO.: | PART NO.: | SCALE |
|---|---|---|
| 22 09 01 001 1 | | N/A |

| DRAWN BY: | APPROVED: | DATE: | SHEET: |
|---|---|---|---|
| E.B. | | 10/29/01 | 2 OF 2 |

# 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:

_____

_____

_____

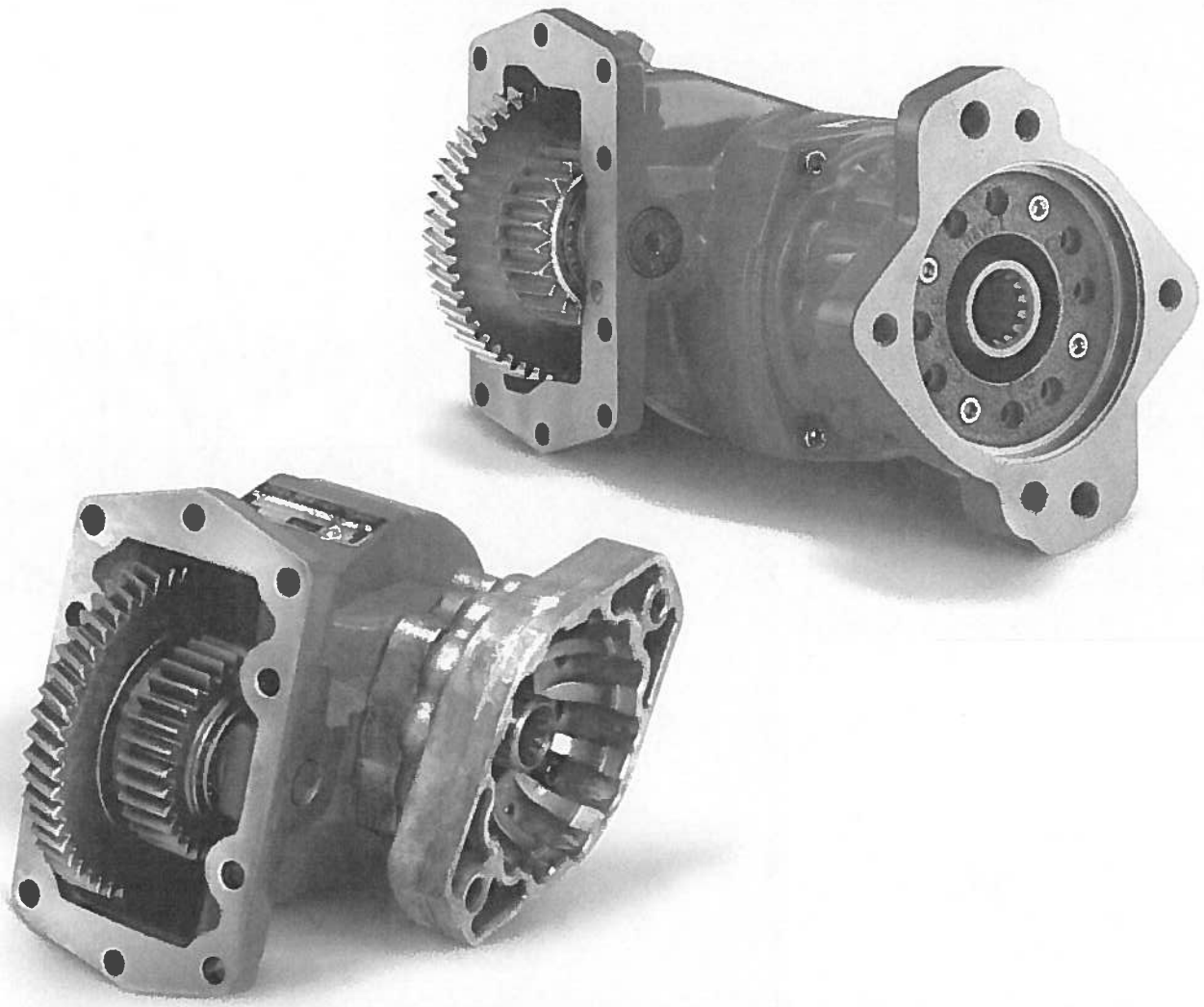
Phone:_____

Contact: _____

BY: _____
(Name)

Date: _____

Effective: September 2017
Supersedes: HY25-1380-M1/US June 2017



# Power Take-Offs Owner's Manual

267, 277, 278, 280, 287, 859, 870, 877 Series

Parker | Chelsea

ENGINEERING YOUR SUCCESS.

## ⚠ WARNING — User Responsibility

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS 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 or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

## 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".

## Patent Information

The Chelsea® Power Take-Off or its components shipped with this owner's manual may be manufactured under one or more of the following U.S. patents:
7,159,701 7,007,565 6,962,093 1,326,036 60,321,840.7 9494227 B2
Other patents pending.





**Parker Hannifin Corporation**
Chelsea Products Division
Olive Branch, MS 38654 USA

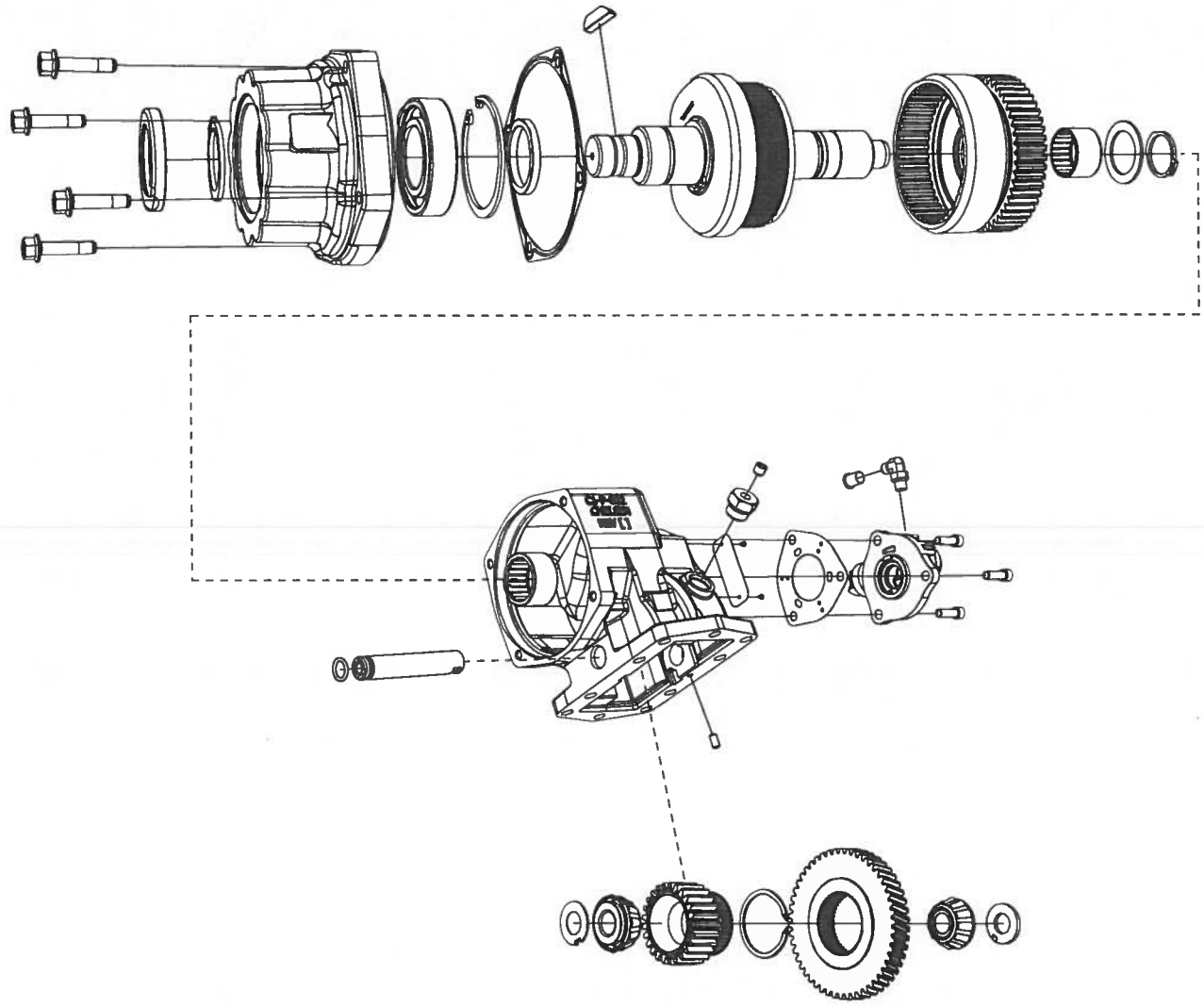
## Foreword

Since our major objective is to show you how to get additional and more profitable miles from truck, tractor and trailer components, we want to provide you with information on the installation of Chelsea Power Take-Offs.

We all realize that an inadequate transmission will overwork any Power Take-Off in a very short period of time. In addition, a mismatched transmission/PTO combination can result in unsatisfactory performance of the equipment right from the start.

Before you order new trucks, be sure you're getting the right transmission/PTO combination. It is of vital importance for efficient performance to have adequate power. To help you select the proper type, size and design of PTO it is advisable to discuss your specific requirements with Chelsea PTO specialists. They know their products and have easy access to manufacturers of equipment, transmissions and Power Take-Offs. They can inform you about everything you need to know about power, at the right time, before you specify components.

## Exploded View of a Typical PowerShift PTO



⚠ **This symbol warns of possible personal injury.**



Parker Chelsea

**Parker Hannifin Corporation**
Chelsea Products Division
Olive Branch, MS 38654 USA

## Safety Information

These instructions are intended for the safety of the installer, operator & supporting personnel. Read them carefully until you understand them.

### General Safety Information

**To prevent injury to yourself and/or damage to the equipment:**

- Read carefully all owner's manuals, service manuals, and/or other instructions.
- Always follow proper procedures, and use proper tools and safety equipment.
- Be sure to receive proper training.
- Never work alone while under a vehicle or while repairing or maintaining equipment.
- Always use proper components in applications for which they are approved.
- Be sure to assemble components properly.
- Never use worn-out or damaged components.
- Always block any raised or moving device that may injure a person working on or under a vehicle.
- Never operate the controls of the Power Take-Off or other driven equipment from any position that could result in getting caught in the moving machinery.

### Proper Matching of PTO

**WARNING:** A Power Take-Off must be properly matched to the vehicle transmission and to the auxiliary equipment being powered. An improperly matched Power Take-Off could cause severe damage to the vehicle transmission, the auxiliary driveshaft, and/or to the auxiliary equipment being powered. **Damaged components or equipment could malfunction causing serious personal injury to the vehicle operator or to others nearby.**

**To avoid personal injury and/or equipment damage:**

- Always refer to Chelsea catalogs, literature, and owner's manuals and follow Chelsea recommendations when selecting, installing, repairing, or operating a Power Take-Off.
- Never attempt to use a Power Take-Off not specifically recommended by Chelsea for the vehicle transmission.
- Always match the Power Take-Off's specified output capabilities to the requirements of the equipment to be powered.
- Never use a Power Take-Off whose range of speed could exceed the maximum.

### Cold Weather Operation of PowerShift PTO

**WARNING:** During extreme cold weather operation [32°F (0°C) and lower], a disengaged PowerShift Power Take-Off can momentarily transmit high torque that will cause unexpected output shaft rotation. This is caused by the high viscosity of the transmission oil when it is extremely cold. As slippage occurs between the Power Take-Off clutch plates, the oil will rapidly heat up and the viscous drag will quickly decrease.

The Power Take-Off output shaft rotation could cause unexpected movement of the driven equipment resulting in serious personal injury, death, or equipment damage.

**To avoid personal injury or equipment damage:**

- Driven equipment must have separate controls.
- The driven equipment must be left in the disengaged position when not in operation.
- Do not operate the driven equipment until the vehicle is allowed to warm up.

## Safety Information (Continued)

### Rotating Auxiliary Driveshafts

**WARNING:** 

- Rotating auxiliary driveshafts are dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death.
- Do not go under the vehicle when the engine is running.
- Do not work on or near an exposed shaft when the engine is running.
- Shut off the engine before working on the Power Take-Off or driven equipment.
- Exposed rotating driveshafts must be guarded.

### Guarding Auxiliary Driveshafts

**WARNING:** We strongly recommend that a Power Take-Off and a directly mounted pump be used to eliminate the auxiliary driveshaft whenever possible. If an auxiliary driveshaft is used and remains exposed after installation, it is the responsibility of the vehicle designer and PTO installer to install a guard.

### Using Set Screws

**WARNING:** Auxiliary driveshafts may be installed with either recessed or protruding set screws. If you choose a square head set screw, you should be aware that it will protrude above the hub of the yoke and may be a point where clothes, skin, hair, hands, etc. could be snagged. A socket head set screw, which may not protrude above the hub of the yoke, does not permit the same amount of torquing as does a square head set screw. Also, a square head set screw, if used with a lock wire, will prevent loosening of the screw caused by vibration. Regardless of the choice made with respect to a set screw, an exposed rotating auxiliary driveshaft must be guarded.

### Important: Safety Information and Owner's Manual

Chelsea Power Take-Offs are packaged with safety information decals, instructions, and an owner's manual. These items are located in the envelope with the PTO mounting gaskets. Also, safety information and installation instructions are packaged with some individual parts and kits. **Be sure to read the owner's manual before installing or operating the PTO** Always install the safety information decals according to the instructions provided. Place the owner's manual in the vehicle glove compartment.

### WARNING: Operating the PTO with the Vehicle in Motion

Some Power Take-Offs may be operated when the vehicle is in motion. To do so, the PTO must have been properly selected to operate at highway speeds and correctly matched to the vehicle transmission and the requirements of the driven equipment.

If in doubt about the PTO specifications and capabilities, avoid operating the PTO when the vehicle is in motion. Improper application and/or operation can cause serious personal injury or premature failure of the vehicle, the driven equipment, and/or the PTO.

Always remember to disengage the PTO when the driven equipment is not in operation.

**This symbol warns of possible personal injury.**



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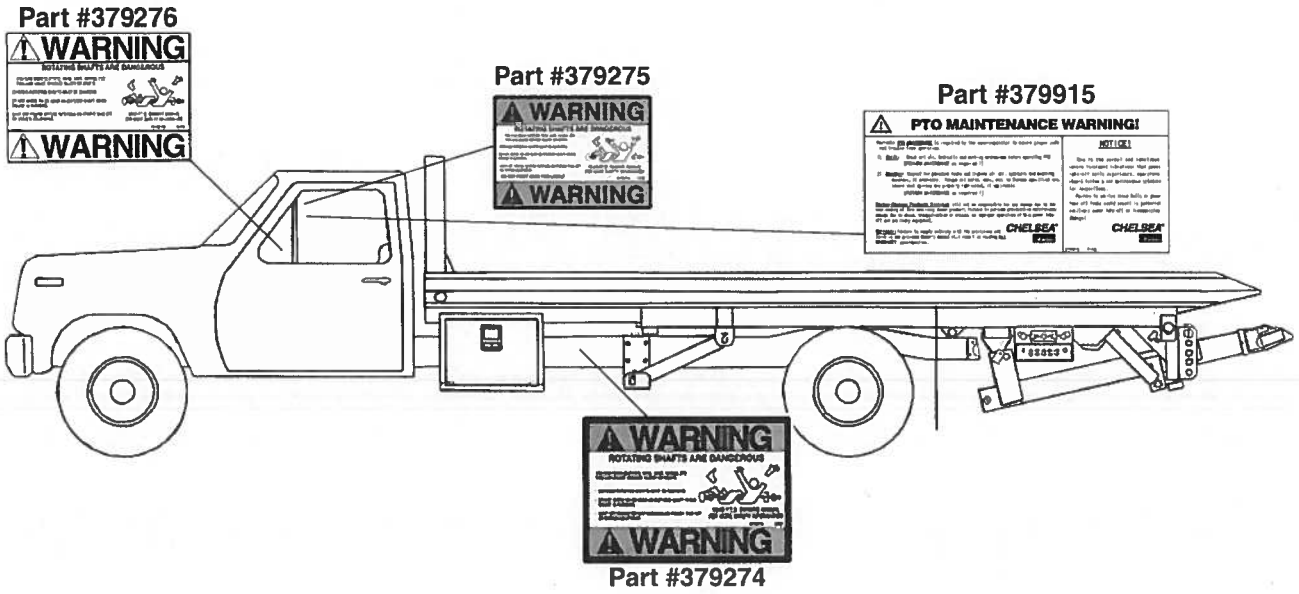
## Chelsea PTO Safety Label Instructions

1. The two black and orange on white 5" x 7" pressure sensitive vinyl labels, part number 379274, must be placed on the vehicle frame rails (one (1) on each side), in a position that would be **HIGHLY** visible to anyone that would go under the truck near the PTO rotating shaft. If the vehicle is to be painted after these labels are installed, cover them with two (2) blank masking covers. Remove the masking covers after painting.
2. Place the one (1) black and orange on white 3.5" x 5" pressure sensitive vinyl label, part number 379275, on the visor nearest the operator of the vehicle, this must be placed near the PTO visor label.
3. Place the one (1) red and white with black lettering 3.5" x 7.5" pressure sensitive vinyl label, part number 379915, on the opposite side of the visor from the above label part number 379275.
4. Place the one (1) white and black heavy duty card, part number 379276, in the vehicle glove box in a position highly visible to the operator. For example, try to place this card on top of whatever may be in the glove box.

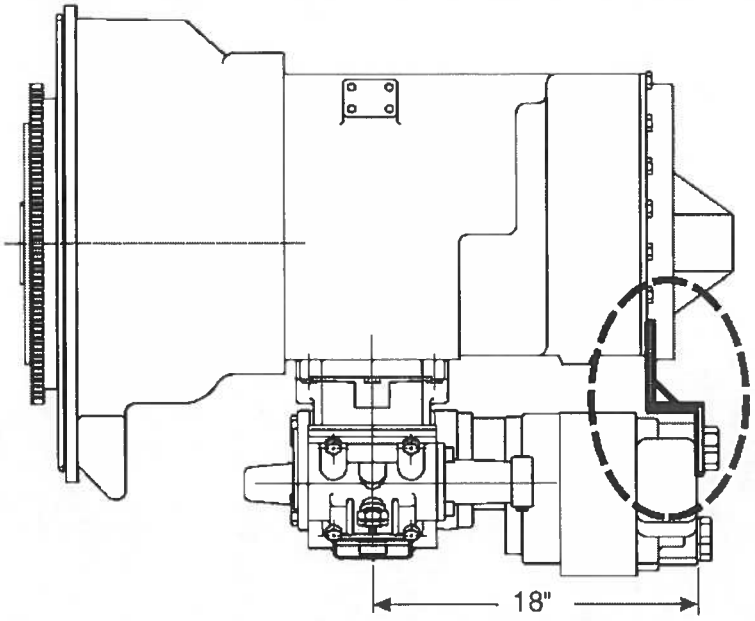
If you require labels, please order part number 328946X at no charge from your local Chelsea Warehouse or send request direct to:

Parker Hannifin Corporation
**Chelsea Products Division**
8225 Hacks Cross Road
Olive Branch, MS 38654
Customer Service: (662) 895-1011

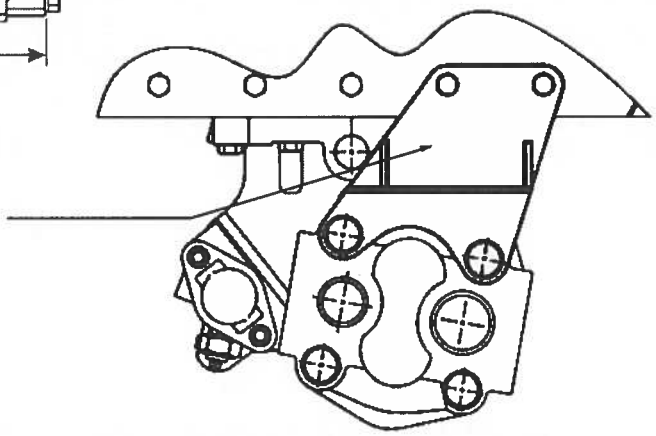



**This symbol warns of possible personal injury.**

## Direct Mount Pump Support Requirements (Universal)




**NOTE:**
For Proper Bracketing, Attach at 2 or More Transmission Bolt Locations and 2 or More Pump Locations. Contact Transmission Manufacturer for Proper Bracket Mounting Locations.



**⚠ Use CAUTION to ensure the support bracket does not pre-load pump / PTO mounting. When mounting the pump, it should be fully supported by a jack until the support bracket is secured in place, then the jack can be released. This will make sure the PTO is not being stressed by the bracket.**

Chelsea requires the use of pump supports (Support Brackets) in all applications to ensure the Maximum Bending Moment (MBM) of the PTO / Pump assembly is not exceeded. Exceeding the MBM can result in damage to PTO, transmission, driven equipment, and / or personnel. It is the responsibility of the installer to ensure that adequate support is implemented. All applications are unique and it is important to consider all parameters in designing a proper support bracket.

PTO warranty will be void if a pump bracket is not used when one of the following conditions are present:

1. The combined weight of pump, fittings and hose exceed 40 pounds [18.14 kg].

2. The combined length of the PTO and pump is 18 inches [45.72 cm] or more from the PTO centerline to the end of the pump.

**ALSO:** Remember to pack the female PTO shaft with grease before installing the pump on the PTO (reference Chelsea grease pack 379688).

**⚠ This symbol warns of possible personal injury.**



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## Function of Auxiliary Power Shafts

**An auxiliary power shaft transmits torque from the power source to the driven accessory. The shaft must be capable of transmitting the maximum torque and RPM required of the accessory, plus any shock loads that develop.**

**An auxiliary power shaft operates through constantly relative angles between the power source and the driven accessory. Therefore, the length of the auxiliary power shaft must be capable of changing while transmitting torque. This length change, commonly called slip movement , is caused by movement of the power train due to torque reactions and chassis deflections.**

**Joint operating angles are very important in an auxiliary power joint application. In many cases, the longevity of a joint is dependent on the operating angles. (See chart below)**

This information is limited to 1000 through 1310 series applications. For applications requiring a series larger than 1310, contact your local Chelsea distributor.

### Determining Shaft Type

1) Solid or tubular?
   a) In applications requiring more than 1000 RPM or where the application necessitates a highly balanced auxiliary power shaft, a tubular shaft should be used.
   b) Spicer's solid shafting auxiliary power joints are designed for 1000 or less RPM intermittent service such as:
      Driving small hydraulic pumps
      Driving winches
      Driving low speed product pumps
2) Joint Series should be determined using the chart on the following page.

| SPICER® UNIVERSAL JOINT OPERATING ANGLES | | | |
|---|---|---|---|
| **Prop. Shaft RPM** | **Max. Normal Operating Angle** | **Prop. Shaft RPM** | **Max. Normal Operating Angle** |
| 3000 | 5° 50' | 1500 | 11° 30' |
| 2500 | 7° 00' | 1000 | 11° 30' |
| 2000 | 8° 40' | 500 | 11° 30' |
| Above based on angular acceleration of 100 RAD/SEC² | | | |



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## Spicer® Universal Joint Engineering Data

| **Joint Series** | **1000** | **1100** | **1280** | **1310** |
|---|---|---|---|---|
| **Torque Rating** | | | | |
| Automotive (Gas or Diesel Engine) lbs-ft Continuous | 50 | 54 | 95 | 130 |
| **Tubing** | | | | |
| Diameter | 1.750" | 1.250" | 2.500" | 3.00" |
| Wall Thickness | .065" | .095" | .083" | .083' |
| W = Welded S = Seamless | W | S | W | W |
| **Flange Diameter** (Swing Diameter) | | | | |
| Rectangular Type | 3.500" | 3.500" | 3.875" | 3.875" |
| **Bolt Holes** - Flange Yoke | | | | |
| Circle | 2.750" | 2.750" | 3.125" | 3.125" |
| Diameter | .312" | .312" | .375" | .375" |
| Number | 4 | 4 | 4 | 4 |
| Male Pilot Dia. | 2.250" | 2.250" | 2.375" | 2.375" |
| **Distance Across Lugs** | | | | |
| Snap Ring | 2.188" | 2.656" | 3.469" | 3.469" |
| Construction | 2.188" | 2.656" | 3.469" | 3.469" |
| **Bearing Diameter** | .938" | .938" | 1.062" | 1.062" |

| **Maximum Operating Speed * By Tube Size, Solid Shaft Size, and Length<br>*(For speed below 500 RPM or over 2500 RPM, contact your Chelsea Distributor)** | | | | | |
|---|---|---|---|---|---|
| Tubing Dia. & Wall Thickness Joint & Shaft (W=Welded S=Seamless) | Max. Installed Length in Inches for Given RPM<br>Centerline to Centerline of Joints for a Two Joint Assembly<br>or<br>Centerline of Joint to Centerline of Center Bearing for a Joint & Shaft<br>RPM - Revolutions per Minute | | | | |
| | **500** | **1000** | **1500** | **2000** | **2500** |
| 1.750" x .065" W | 117" | 82" | 67" | 58" | 52" |
| 1.250" x .095" S | 91" | 64" | 52" | 45" | 40" |
| 2.500" x .083" W | 122" | 87" | 70" | 62" | 55" |
| 3.000" x .083" W | - | - | - | 85" | 76" |
| Solid Shaft Diameter | | | | | |
| .750" | 60" | 42" | 35" | 30" | 27" |
| .812" | 62" | 44" | 36" | 31" | 28" |
| .875" | 65" | 46" | 37" | 32" | 29" |
| 1.000" | 69" | 49" | 40" | 35" | 31" |
| 1.250" | 77" | 55" | 45" | 39" | 35" |



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## Notes



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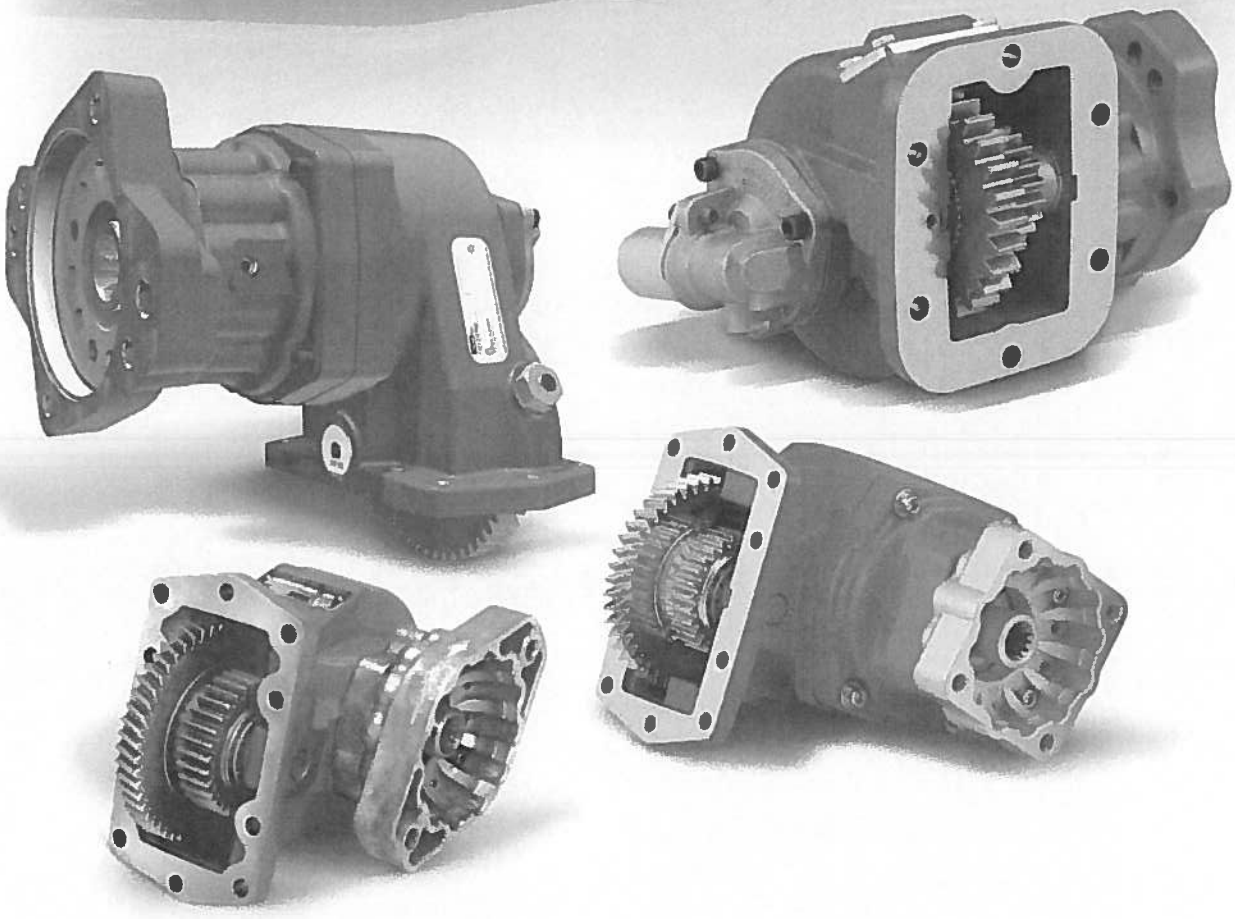
# ALLISON





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## Recommended Tools

### Drivers
Although not necessary, a compact drill/impact driver can help run in bolts to reduce muscle fatigue (**Fig 1**).

Fig. 1

**Caution:** Be careful not to cross-thread or damage threads with this tool. It is recommended to start bolts by hand for a few threads before using cordless driver.

### Wrenches
Standard 3/8" Torque Wrench – 35-50 ft-lbs (**Fig 2**).

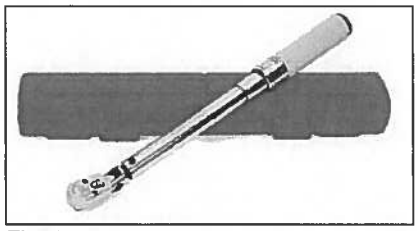


Fig. 2

Ratcheting Flex-Head – 10MM, 12 PT (**Fig 3**).

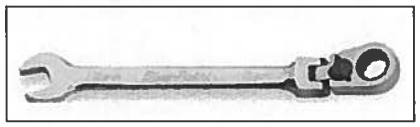


Fig. 3

### Extension
3/8" Extension 6" Long (**Fig 4**).

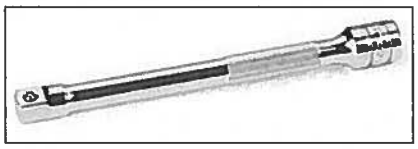


Fig. 4

### Sockets
Flank Drive Swivel 3/8" Socket – 12 PT (**Fig 5**).


Fig. 5

### Adapter
Torque Adapter – 10MM, 12 PT (**Fig 6**). Extremely necessary for difficult to reach bolts.

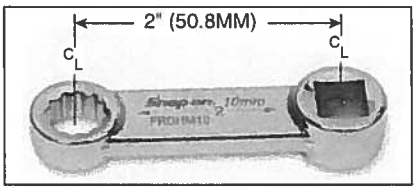


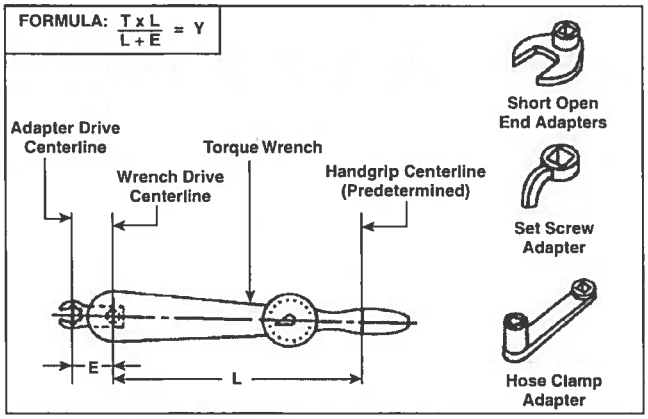

Fig. 6

## Corrected Torque

When using a torque wrench adapter, which changes the distance from the torque drive to the adapter drive, apply the following formula to obtain torque rating.

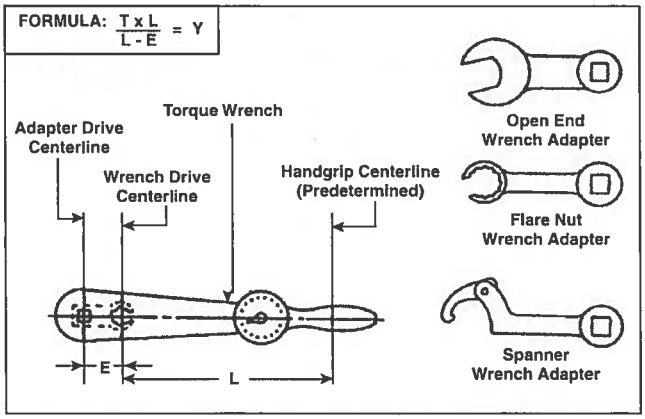
### With a Plus Dimension

$$\frac{50 \text{ ft-lbs} \times 1}{1 + .167} = 42.84 \text{ ft-lbs}$$




### With a Minus Dimension

$$\frac{50 \text{ ft-lbs} \times 1}{1 - .167} = 60.02 \text{ ft-lbs}$$




T = Actual (desired) torque
Y = Apparent (indicated) torque
L = Effective length lever
E = Effective length of extension



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## Pre Installation of PTO

1. Install PTO pressure switch, part #379502, into port on Hydraulic Valve Cap. Torque between 120-140 In-lbs [14-16 Nm] (**Fig 7**).

2. If unit has a wetspline output option, install tee fitting (379627) into output bearing cap (**Fig 8**).

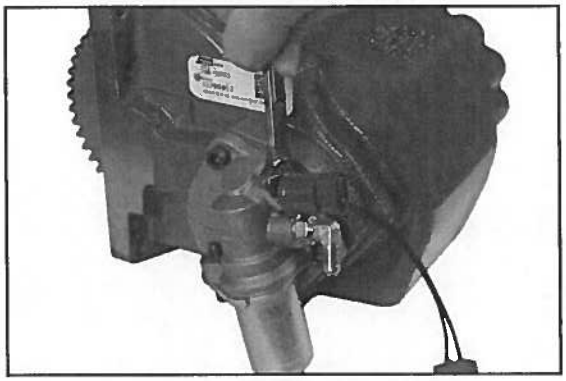

Fig. 7

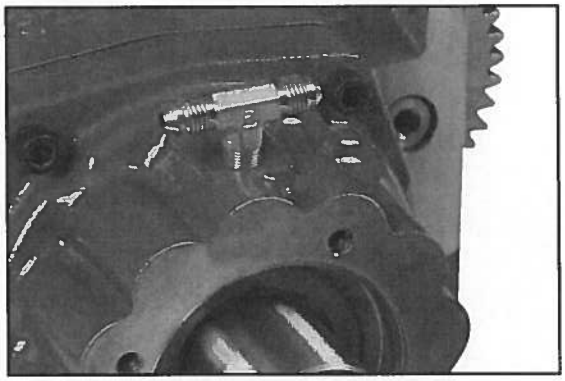

Fig. 8

## PTO Installation

When installing a PTO, always wear protective clothing and safety glasses.

1. Begin by draining the oil from the transmission. Use caution, since the oil may be hot (**Fig. 9**).

**NOTE:** Installation shown is for Left Side (Street Side) of transmission.

2. Remove the PTO aperture plate with a 15mm socket (**Fig. 10**).

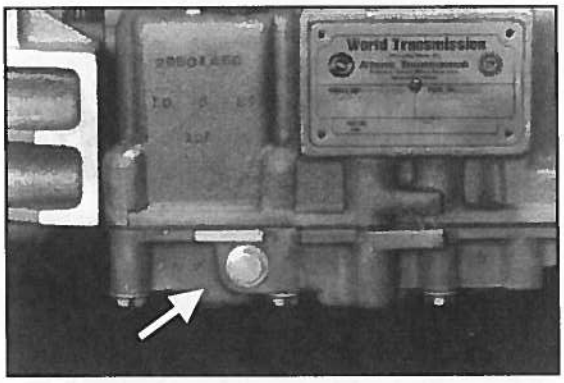


Fig. 9

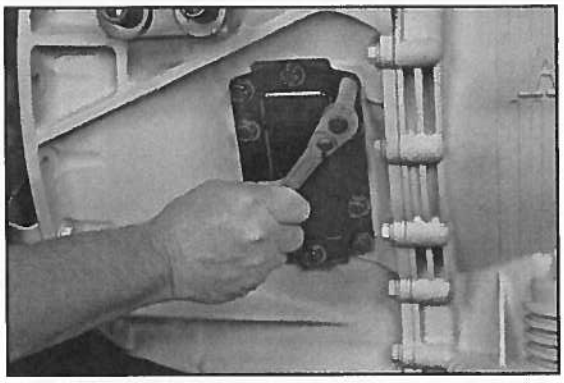

Fig. 10



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## PTO Installation (Continued)

3. Remove the gasket and clean the aperture surface (**Fig. 11**).

**NOTE:** Do not reuse the gasket that comes with the transmission.

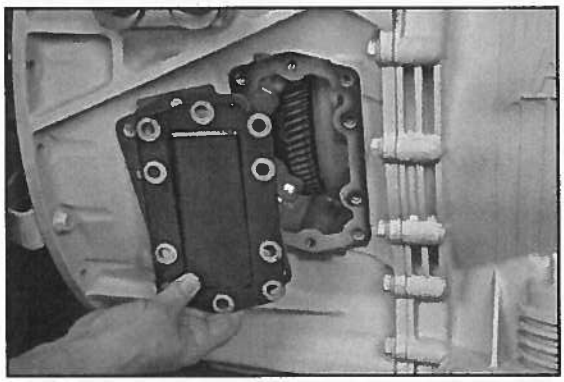


Fig. 11

4. Using a screwdriver, install the guide pins until they bottom out (**Fig. 12**).

**NOTE:** See page 35 for dowel pin locations.

**NOTE**: Do not use sealing compounds because they are generally incompatible with automatic transmission fluid.

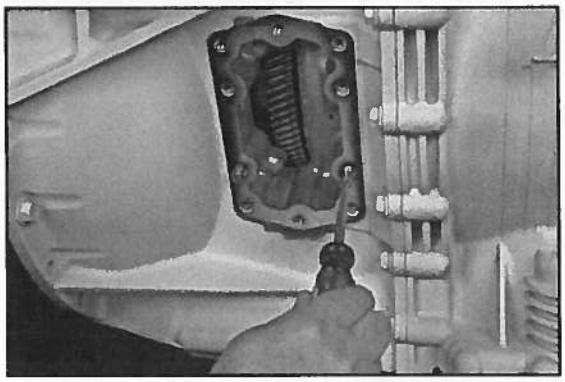


Fig. 12

5. Install the special gasket over the guide pins. The ribbed surface should face outward, toward the installer (**Fig. 13**).

**NOTE:** To ensure proper backlash and sealing of PTO to transmission, only use gasket furnished with the PTO.

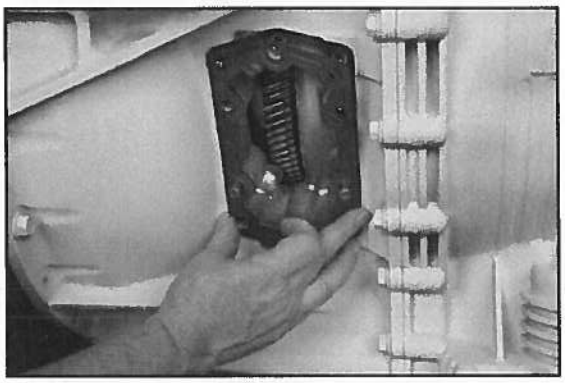


Fig. 13

6. Position the PTO and secure it with the top capscrew (**Fig. 14**).

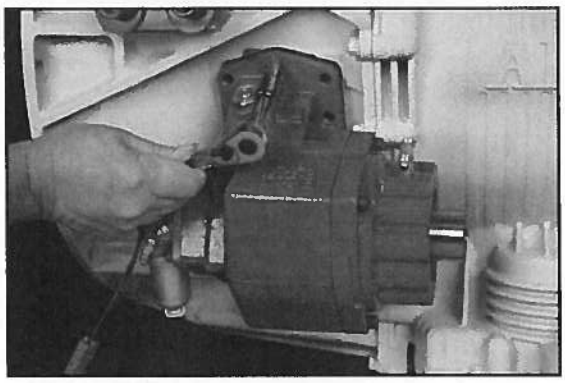


Fig. 14

## PTO Installation (Continued)

7. Install the remaining capscrews. Torque all to 40-50 lbs-ft [54-68 Nm] (**Fig. 15**).

**NOTE:** Always use a crossing pattern with tightening capscrews.

A list of recommended tools can be found on: www.phtruck.com/Chelsea/Catalogs/Recommended Tools

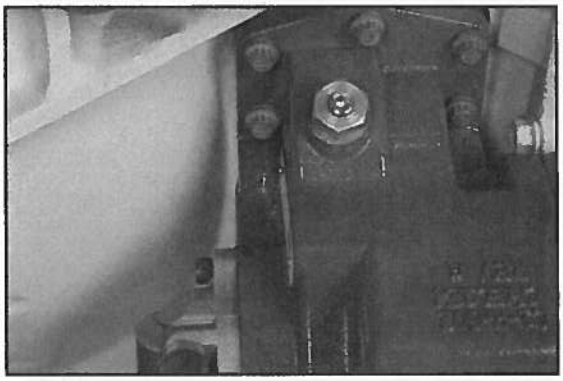


Fig. 15

8. If installing a wet spline output, attach hose to tee fitting on output flange. If Non-Wet Spline Option, attach hose to fitting at PTO valve (**Fig. 16**).

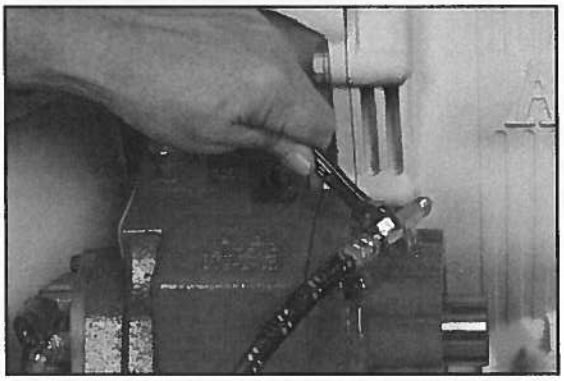


Fig. 16

9. Remove the Transmission High Pressure port plug and securely install the 90° elbow fitting (379486) supplied with the PTO (**Fig. 17**). See page 15 for pressure port locations on Allison transmissions.

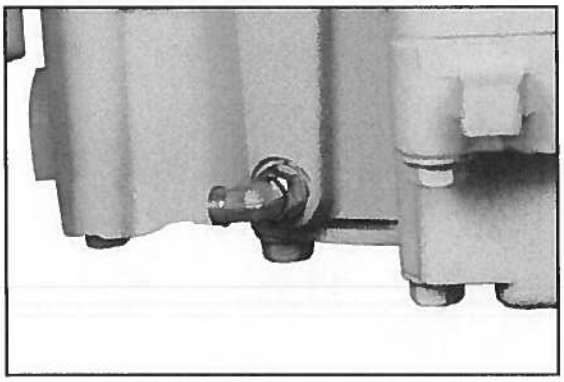


Fig. 17 (Left side shown)

10. Wet Spline Option - Connect the pressure hose between the tee fitting on the output bearing cap and high pressure port on the transmission. Non-Wet Spline Option - Attach hose between PTO valve fitting and High Pressure Port on the transmission (**Fig. 18**).

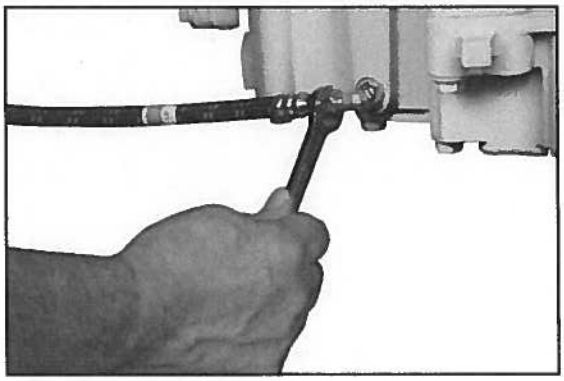


Fig. 18

## PTO Installation (Continued)

11. After determining the position of the rotatable flange/pump, install the flange with the gasket and capscrews supplied with the PTO (**Fig. 19**).

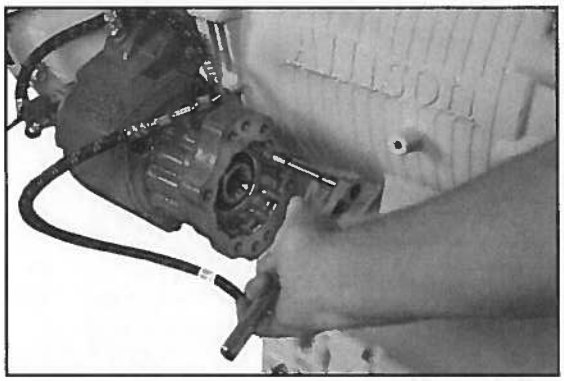


Fig. 19

**Installing Rotatable Flanges**
The rotatable flange is shipped loose with the PTO units for ease of installation. After determining the flange position, attach the flange to the PTO bearing cap using the capscrews provided in the bag kit. After installing the capscrews make sure to torque the screws to 24-28 lbs-ft [33-39 Nm]. Consideration should be taken on the size and weight of the pump being installed. (see page 5)

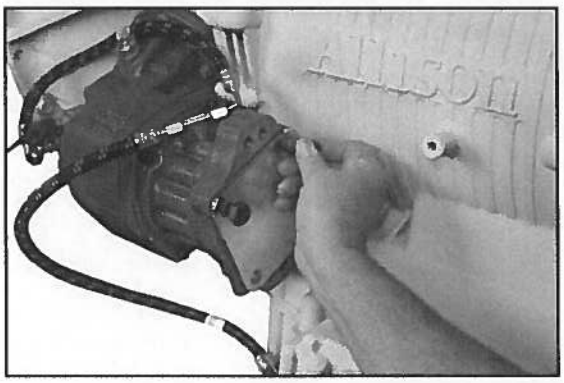


Fig. 20

**CAUTION:** If not installing direct mount pump at this time, install gasket, cover plate, and bolts to Wet Spline Output Option to prevent transmission fluid from leaking out of PTO flange if truck engine is turned "ON" (**Fig. 20**).

**NOTE:** Also see pages 30-34 for Wet Spline information.

12. Complete the assembly by installing the electrical connection to the valve assembly (**Fig. 21**) and the pressure switch (379502) (**Fig. 22**). Not available for the 287 Series Installations.

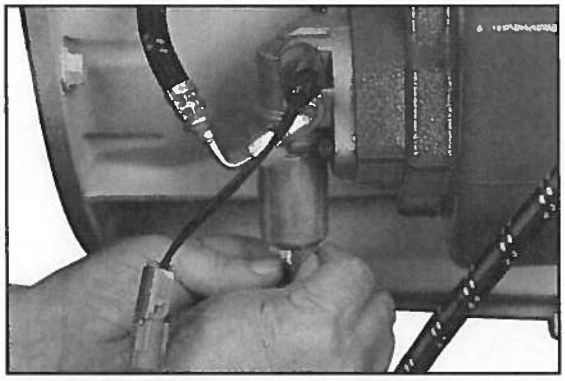


Fig. 21

13. Reference SK-Drawings in this book for complete installation information.

**NOTE:** After installation is complete, refill transmission with oil as per manufacturer recommendation. Run PTO for approximately 5-10 minutes. Check for any unusual noise or vibration. Also check for leaks and/or loose fittings or fasteners. Disengage PTO and shut vehicle engine off. Repair any discrepancies found.

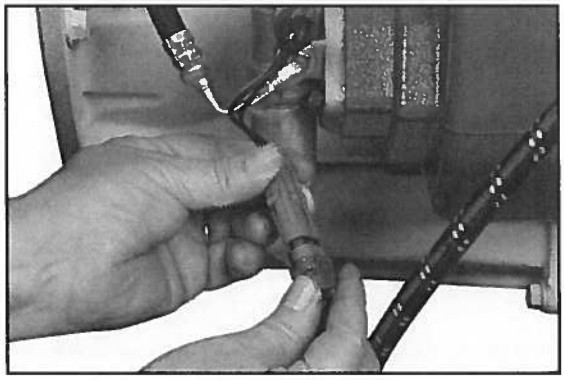
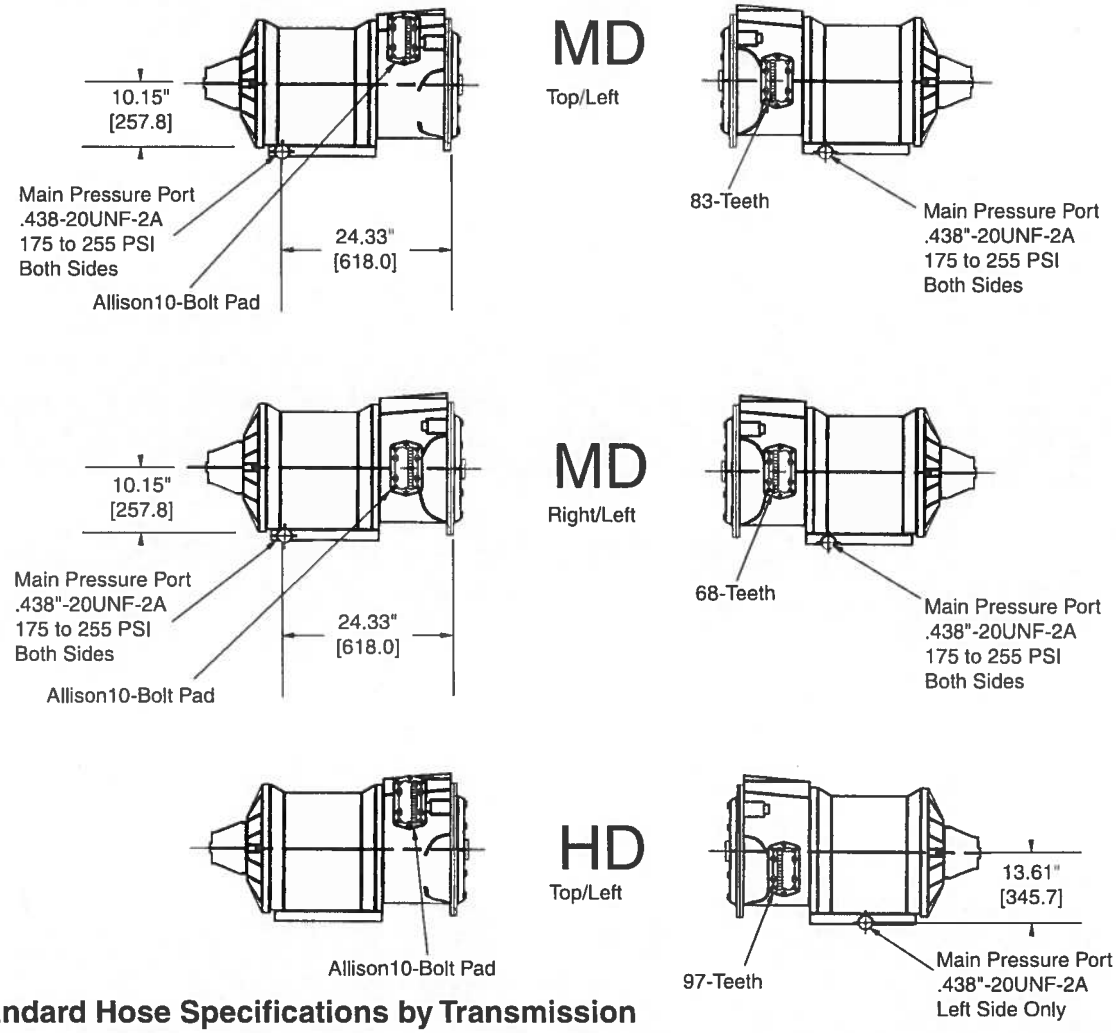


Fig. 22

## Pressure Port and Aperture Opening Identification

These drawings represent left and right views of the MD and HD pressure ports on the transmission.




## Standard Hose Specifications by Transmission

| TRANS. | LUBE OPTION | LOCATION | 267 Series | 277/278 Series | 859 Series | 280/287, 870/877 Series |
|---|---|---|---|---|---|---|
| MD | P | Top Right (Right Press. Port) | 329130-6X | 329130-2X | 329075-2X | 329141-1X |
| MD | P | LH Side (Left Press. Port) | 329130-1X | 329130-5X | 329130-5X | 329141-1X |
| MD | P | RH Side (Right Press. Port) | 329130-4X | 329075-1X | 329075-1X | 329141-1X |
| HD | P | Top Right (Left Press. Port) | 329130-6X | 329075-2X | 329075-2X | 329141-1X |
| HD | P | LH Side (Left Press. Port) | 329130-1X | 329130-4X | 329130-4X | 329141-1X |
| HD[1,2] | R , S | LH Side (Left Press. Port) | – | 329130-5X | 329130-5X | 329141-1X |
| HD[1,2] | R , S | Top Right (Left Press. Port) | – | 329130-4X | 329075-4X | 329141-1X |
| MD[1,2] | R , S | LH Side (Left Press. Port) | – | 329130-5X | 329130-5X | 329141-1X |
| MD[1,2] | R , S | RH Side (Right Press. Port) | – | 329075-1X | 329075-1X | 329141-1X |

An HD with 2 PTOs requires a 379556 T fitting and a 379703 swivel nut 90 degree elbow to attach 2 hoses to the single port on the left side.

1 Lubrication Option R , S shifter Options G and H for 277 and 870 Series

2 Lubrication Option R , S for 278 Series



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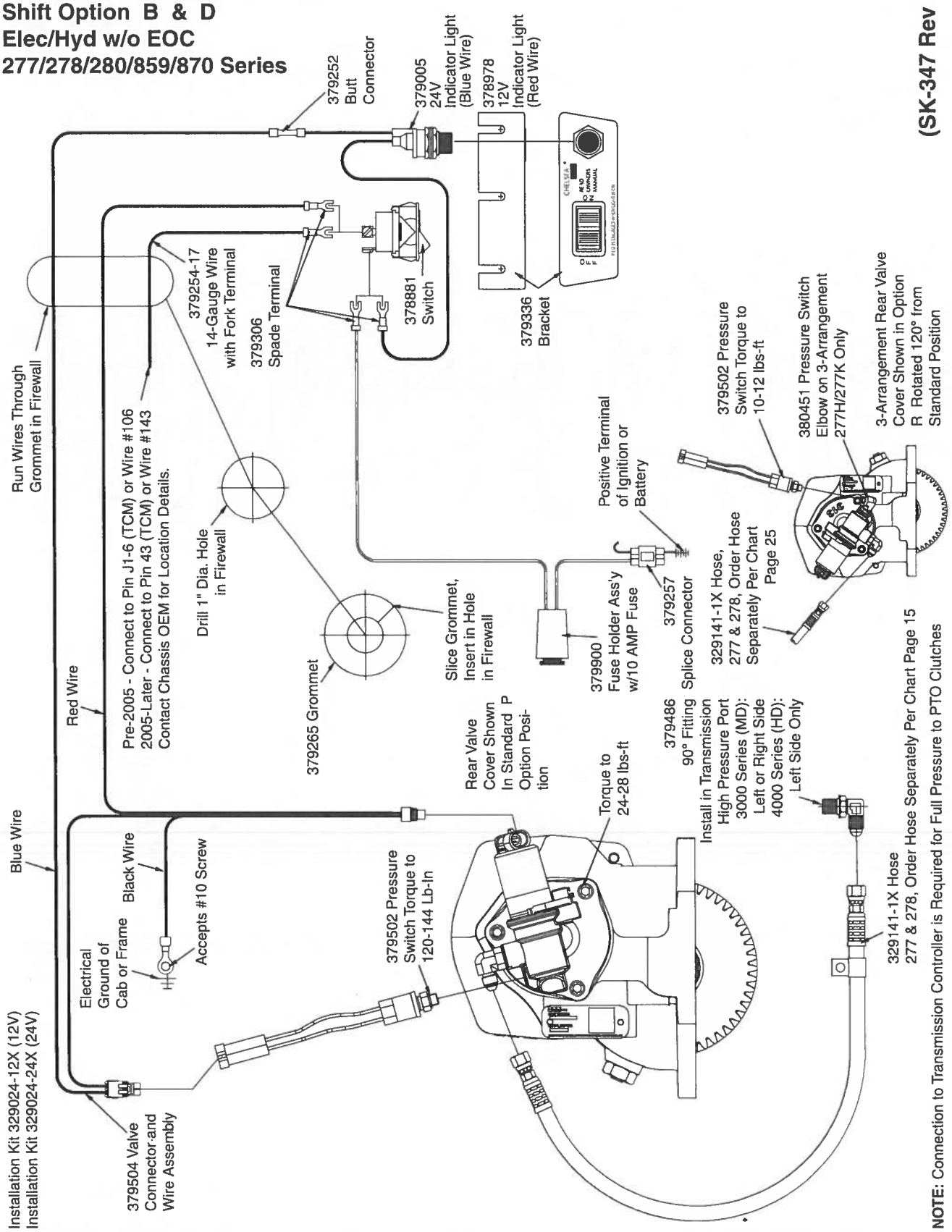
## Allison Transmission 3000/4000
## Shift Option B & D
## Elec/Hyd w/o EOC
## 277/278/280/859/870 Series

(SK-347 Rev G)




**NOTE:** Connection to Transmission Controller is Required for Full Pressure to PTO Clutches



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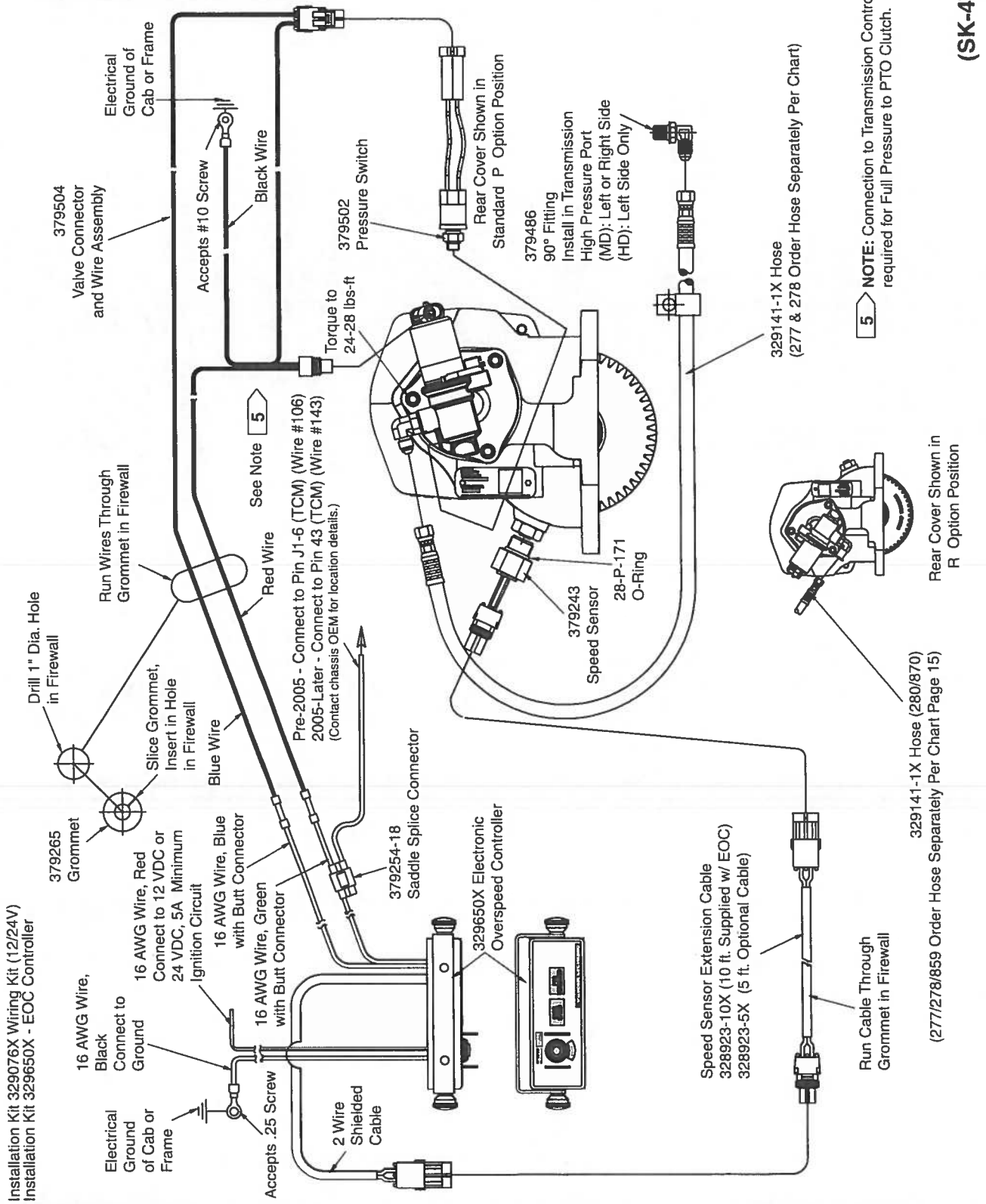
## Allison Transmission 3000/4000
## Shift Option K & L
## Elec/Hyd w/ EOC
## 277/278/280/859/870 Series

(SK-472 Rev C)



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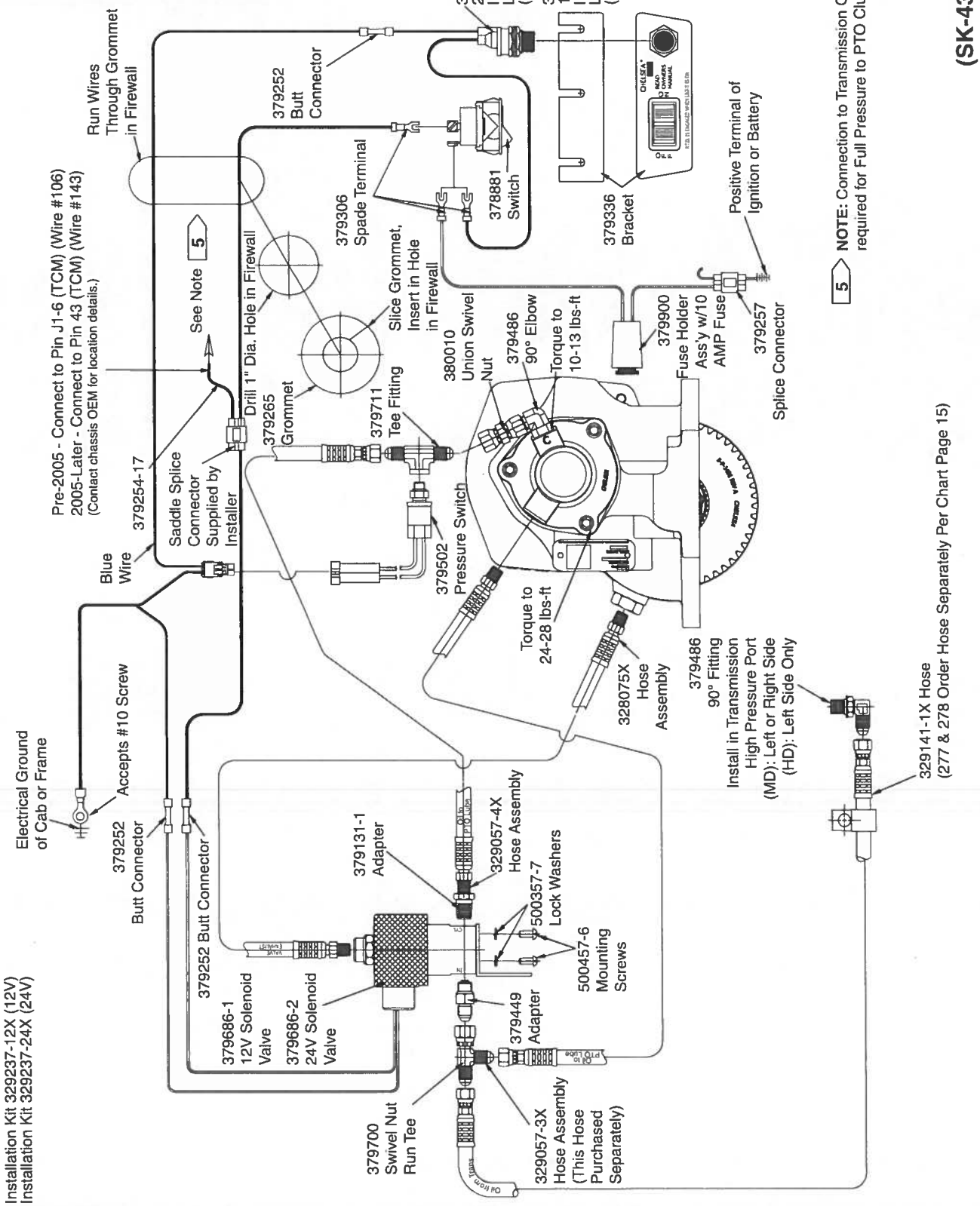
## Allison Transmission 3000/4000
## Shift Option G & H
## Elec/Hyd w/ Remote Mount Solenoid
## 277/278/280/859/870 Series

(SK-432 Rev F)



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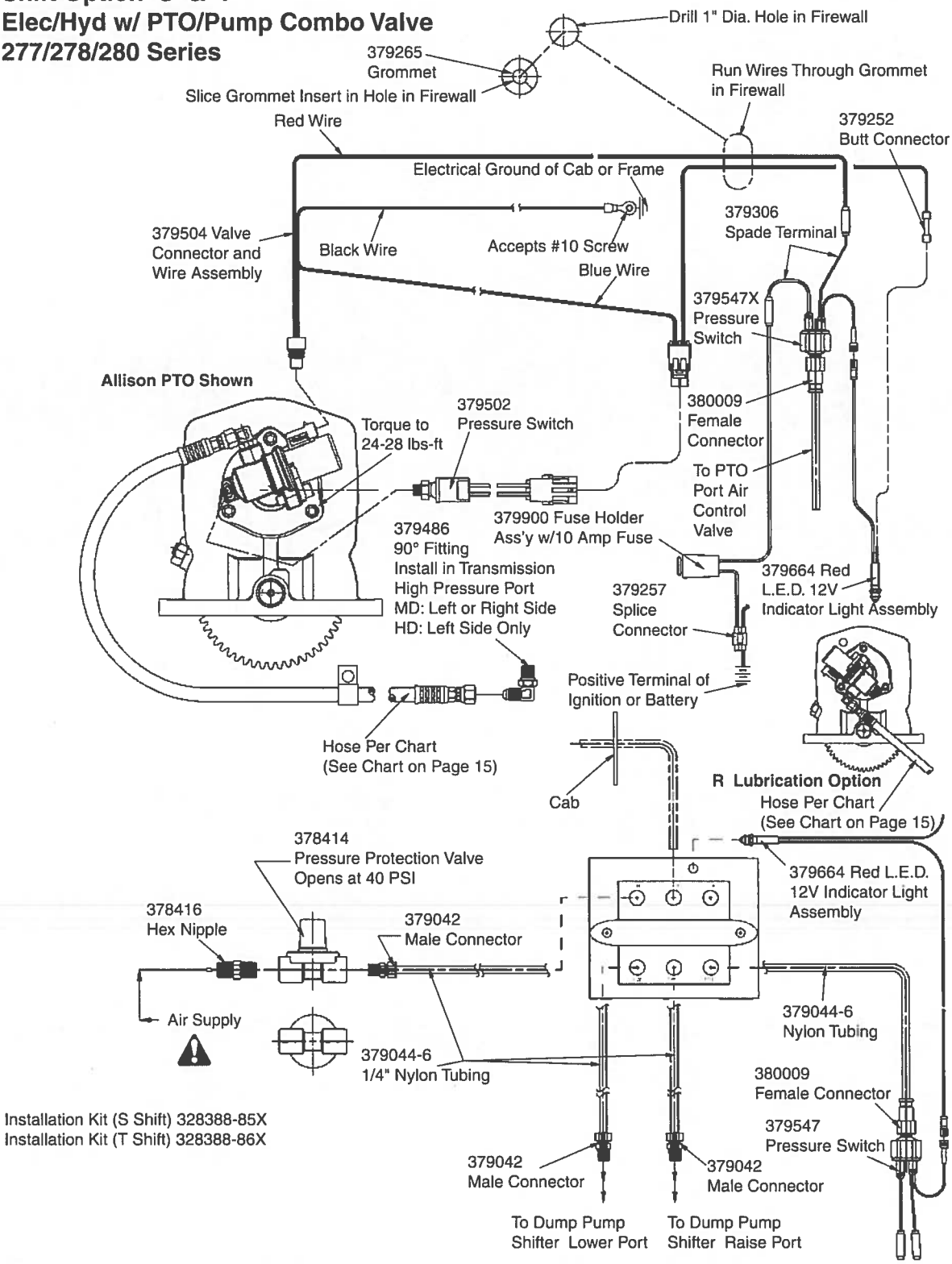
## Allison Transmission 3000/4000 Shift Option S & T Elec/Hyd w/ PTO/Pump Combo Valve 277/278/280 Series

**(SK-427 Rev C)**




Installation Kit (S Shift) 328388-85X
Installation Kit (T Shift) 328388-86X

**NOTE:** Air control valve must be fitted inside a waterproof housing when installed outside the driver's cab

**WARNING:** Connect directly to air supply. Do not use tubing between air supply and pressure protection valve.

**Caution:** When installing nylon tubing avoid sharp angles, exhaust and manifold systems.



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## GM C Series Wiring Harness

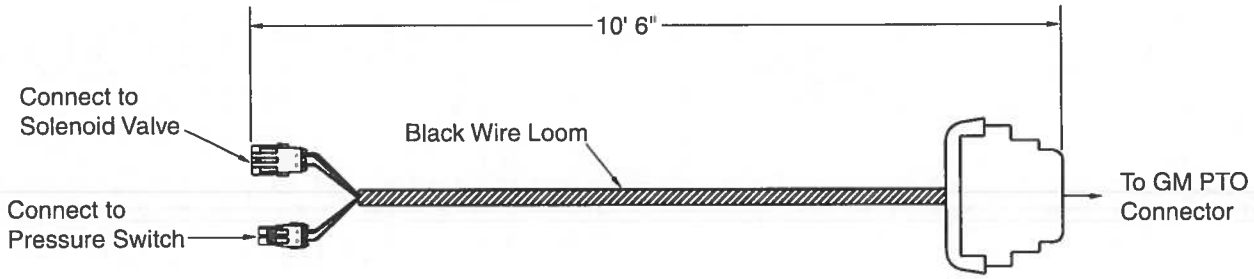
For model year 2003 GM C Series 4500, 5500, 6500, 7500 and 8500 trucks may be equipped with the Allison World (MD) transmission. In these vehicles, GM Truck has integrated a PTO connector located in the right hand engine compartment area. A Power Take-Off switch has also been incorporated into the GM dash panel to control PTO operation. With the PTO option ordered on the truck, the PTO connector and in-dash switch simplify the interface for the body builder.

In order for the customer to utilize the full capability of the PTO/transmission, Chelsea has designed a wiring harness that must be used between the GM PTO connector and the Chelsea Power Take-Off. These are for Non-EOC PTO applications only.

On the Allison World (MD) transmission the PTO drive gear is engine driven. The wiring harness is not required for the Power Take-Offs listed on the chart, but must be used if the GM supplied in-dash PTO switch is to be utilized.

See wiring harness part number 379926 for the 277/278/280/859 Series Power Take-Offs.

2003 GM C Series Wiring Harness for 277/278/280/859 Series
Part Number 379926



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# CATERPILLAR




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## PTO Installation

When installing a PTO, always wear protective clothing and safety glasses.

1. Remove the PTO aperture plate with a 16mm socket (**Fig. 23**).

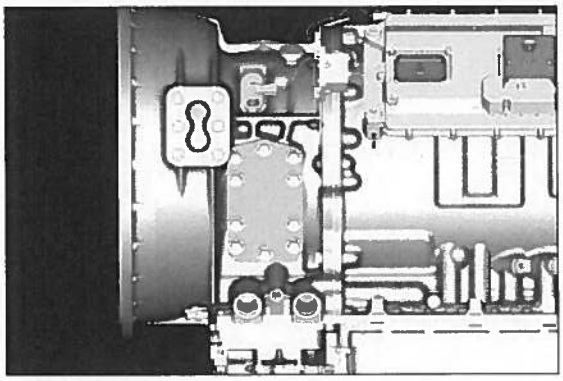
Fig. 23

2. Remove the gasket and clean the aperture surface (**Fig. 24**).

**NOTE:** Do not reuse the gasket that comes with the transmission.

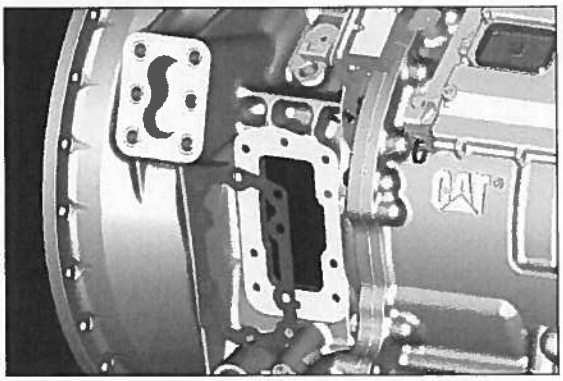
Fig. 24

3. Using a screwdriver, install the guide pins until they bottom out (**Fig. 25**) (see Page 35).

**NOTE**: Do not use sealing compounds because they are generally incompatible with automatic transmission fluid.

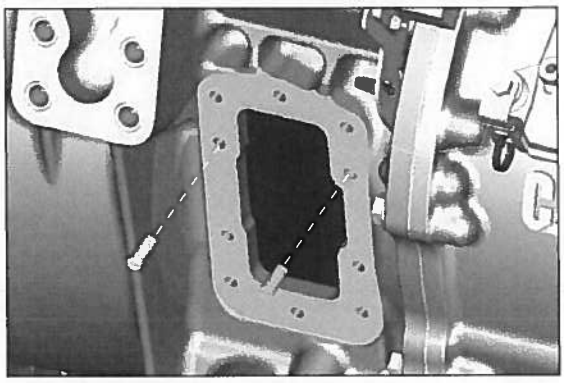
Fig. 25

4. Install the special gasket over the guide pins. The ribbed surface should face outward, toward the installer (**Fig. 26**).

**NOTE:** To ensure proper backlash and sealing of the PTO to the transmission, only use Gasket furnished with the PTO.

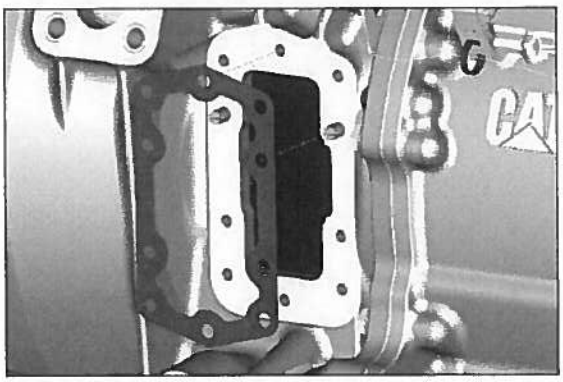
Fig. 26



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## PTO Installation (Continued)

5. Position the PTO and secure it with the top capscrew provided (**Fig. 27**).

**NOTE**: Refer to page 35 for proper capscrew installation for the 278 Series.

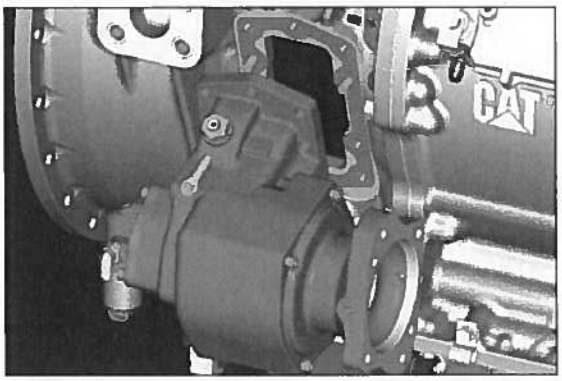

Fig. 27

6. Install the remaining capscrews. Torque them to 37-44 lbs-ft [50-60 Nm] (**Fig. 28**).

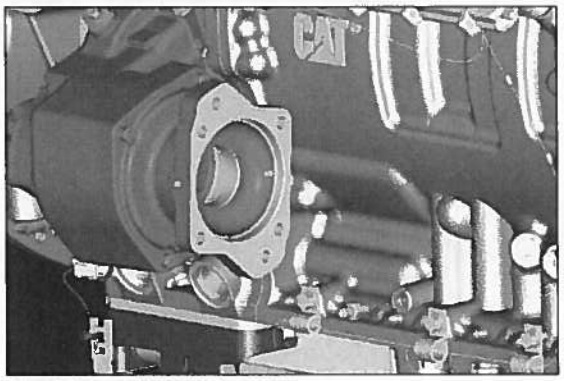

Fig. 28

### Installing Rotatable Flanges

The rotatable flange is shipped loose with the PTO units for ease of installation. After determining the flange position, attach the flange to the PTO bearing cap using the capscrews provided in the bag kit. After installing the capscrews make sure to torque the screws to 24-28 lbs-ft [33-39 Nm]. Consideration should be taken on the size and weight of the pump being installed (see page 5).

7. If installing a wet spline output, attach hose to tee fitting on output flange. If non wet spline option attach hose to fitting at PTO valve (2 flats from finger tight).

**NOTE:** Also see pages 30-34 for Wet Spline information.

**CAUTION:** If not installing direct mount pump at this time install gasket, cover plate and bolts to wetspline output option to prevent transmission fluid from leaking out of PTO flange if truck engine is turned ON See Fig. 14 on page 14).

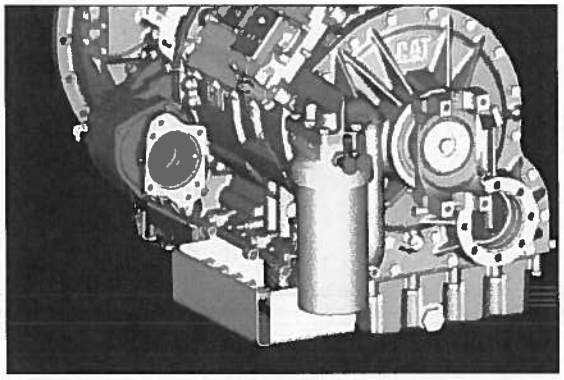

Fig. 29

**NOTE:** There are two (2) high pressure ports available. Use the port located on the driver's side of the transmission unless there is an interference issue with a pump or driven object (**Fig. 293**).

8. Using the special fitting (379812) to securely attach the high pressure line to the transmission. This fitting is included with the PTO Tighten to 8-10 lbs-ft [11.0-13.5 Nm] (**Fig. 30**).

   Tighten hose end fitting 2 flats from finger tight.

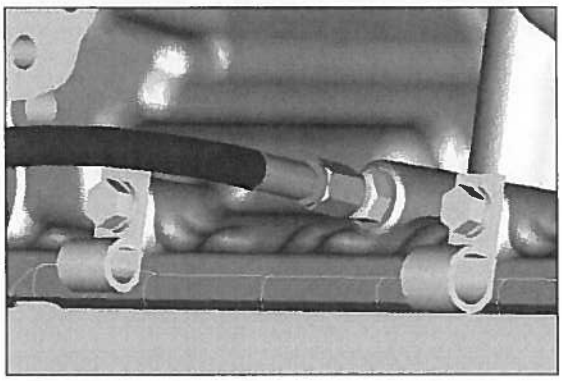
Fig. 30

## PTO Installation (Continued)

9. Securely attach the high pressure line to the valve. Tighten hose end fitting 2 flats from finger tight (**Fig. 31**). If wet spline option connect hose to tee fitting on the flange. Not available for the 287 Series Installations.

**NOTE:** See pages 26-28 for electrical connection drawings.

10. Complete the assembly by installing the electrical connection to the valve assembly (**Fig. 32**) and the pressure switch (**Fig. 33**).

11. Reference SK-Drawings in this book for complete installation information.

**NOTE:** After installation is complete refill transmission with oil as per manufacture recommendation. Run PTO for approximately 5-10 minutes. Check for any unusual noise or vibration also check for leaks and/or loose fittings or fasteners. Disengage PTO and shut vehicle engine off. Repair any discrepancies found.

**NOTE:** If using a rotatable flange, see page 35 for bolt torque.

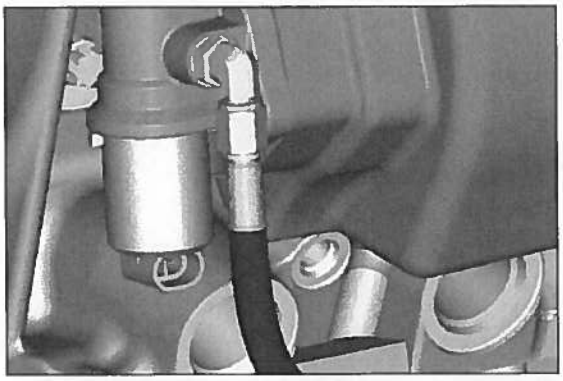
Fig. 31

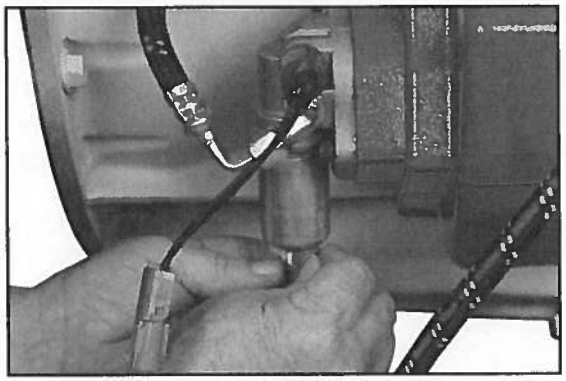
Fig. 32

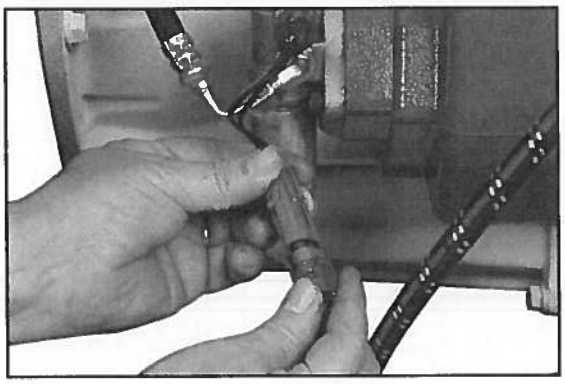
Fig. 33



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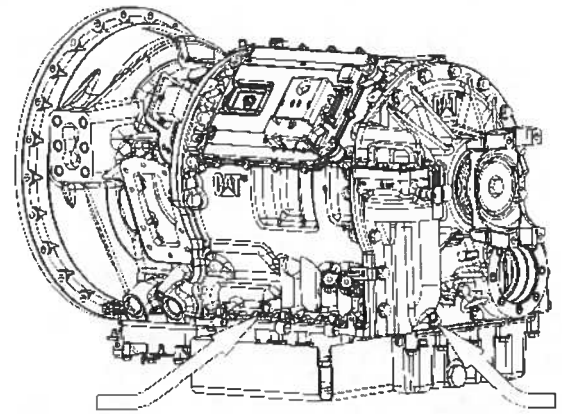
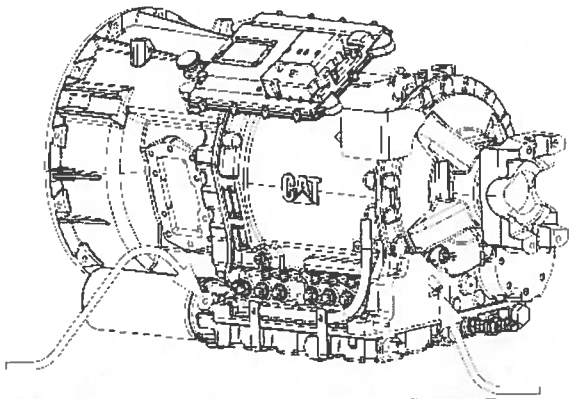
## Pressure Port Locations & Hose Chart (SK-414 Rev B)



Left Side Port Rear Port

**CX31**
(Filter Removed for Clarity)



Left Side Port Rear Port

**CX28**

**Both High Pressure Connections are -4 O-Ring Boss**

| HOSE CHART | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Trans.** | **PTO** | **PTO Location** | **High Oil Pressure Location** | **PTO Valve Location** | **PTO Fitting** | **Trans. Fitting** | **Trans.-PTO Valve Hose #** |
| CX31 CX28 | 280, 287, 277, 278, 859, 870 | Driver (LHS) | LHS | Attached | 379486 | 379812 | 329075-1X |
| | | Driver (LHS) | Rear | | | | 329075-5X |
| | | Pass. (RHS) | LHS | | | | 329075-2X |
| | | Pass. (RHS) | Rear | | | 379486 | 329075-5X |
| | | Driver (LHS) | LHS | Remote | 379486 | 379812 | 329130-6X |
| | | Driver (LHS) | Rear | | | | 329130-6X |
| | | Pass. (RHS) | LHS | | | | 329130-6X |
| | | Pass. (RHS) | Rear | | | | 329130-6X |
| | 267 | Driver (LHS) | LHS | N/A | 379486 | 379812 | 329130-3X |
| | | Driver (LHS) | Rear | | | 379486 | 329075-5X |
| | | Pass. (RHS) | LHS | | | 379812 | 329075-2X |
| | | Pass. (RHS) | Rear | | | 379812 | 329075-5X |
| | 877 | Driver (LHS) | LHS | N/A | 379486 | 379812 | 329130-3X |
| | | Driver (LHS) | Rear | | | | 329075-5X |
| | | Pass. (RHS) | LHS | | | | 329075-2X |
| | | Pass. (RHS) | Rear | | | 379486 | 329075-5X |

LHS = Left Hand Side of Transmission, 8 o'clock position
RHS = Right Hand Side of Transmission, 1 o'clock position

**NOTES:**

1. One PTO Fitting 379486 and one transmission fitting 379812 are included with the PTO unit. If using 379486 in transmission it must be purchased separately.
2. Hoses to be purchased separately, except for 280/287, 870/877 Series.
3. 379486 elbow will not install on left hand (driver) side oil port due to transmission interference.
4. If 379486 is listed as transmission fitting for rear location, route hose along right hand (passenger) side of transmission and under transmission output yoke.



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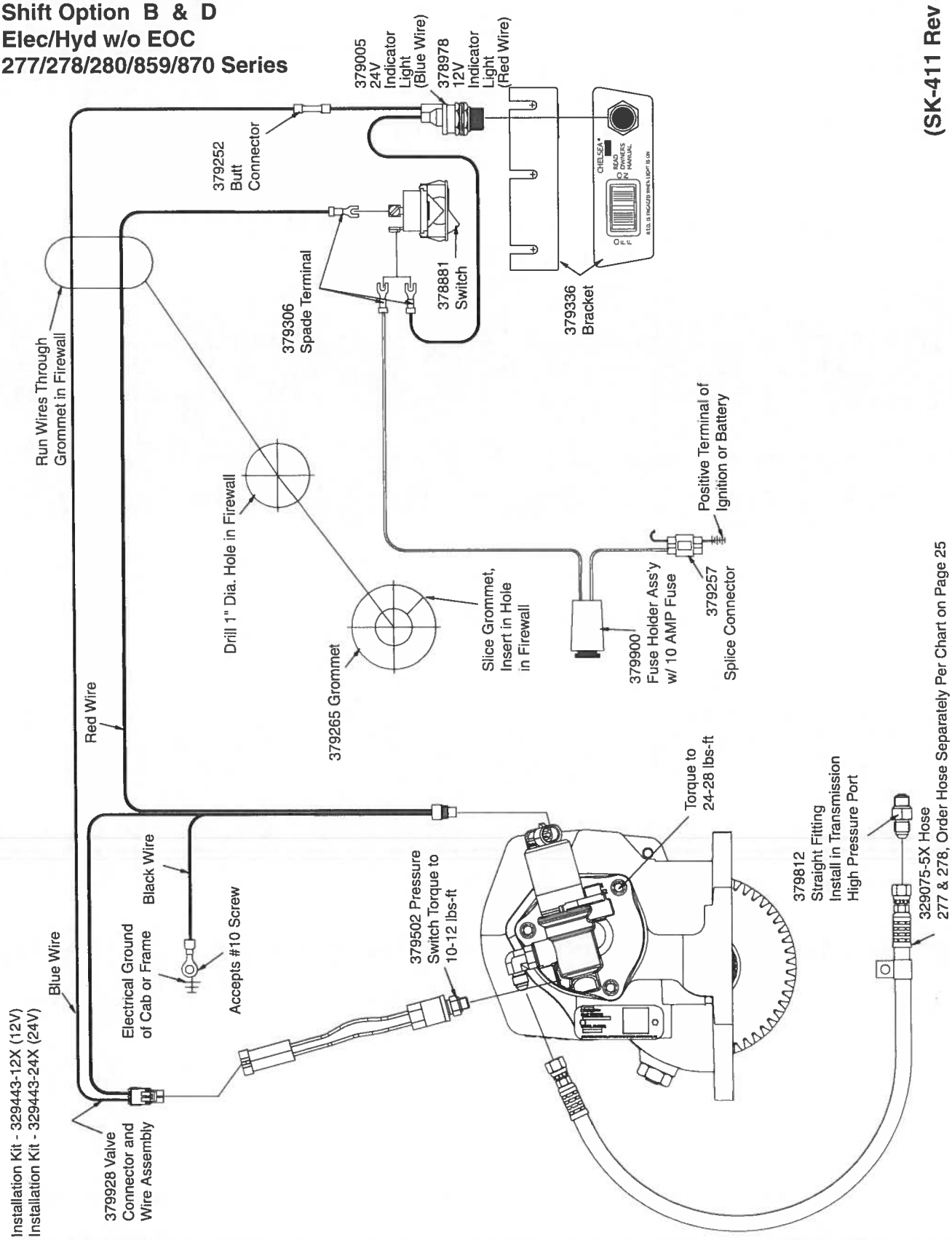
## Caterpillar Transmission
## Shift Option B & D
## Elec/Hyd w/o EOC
## 277/278/280/859/870 Series

(SK-411 Rev C)



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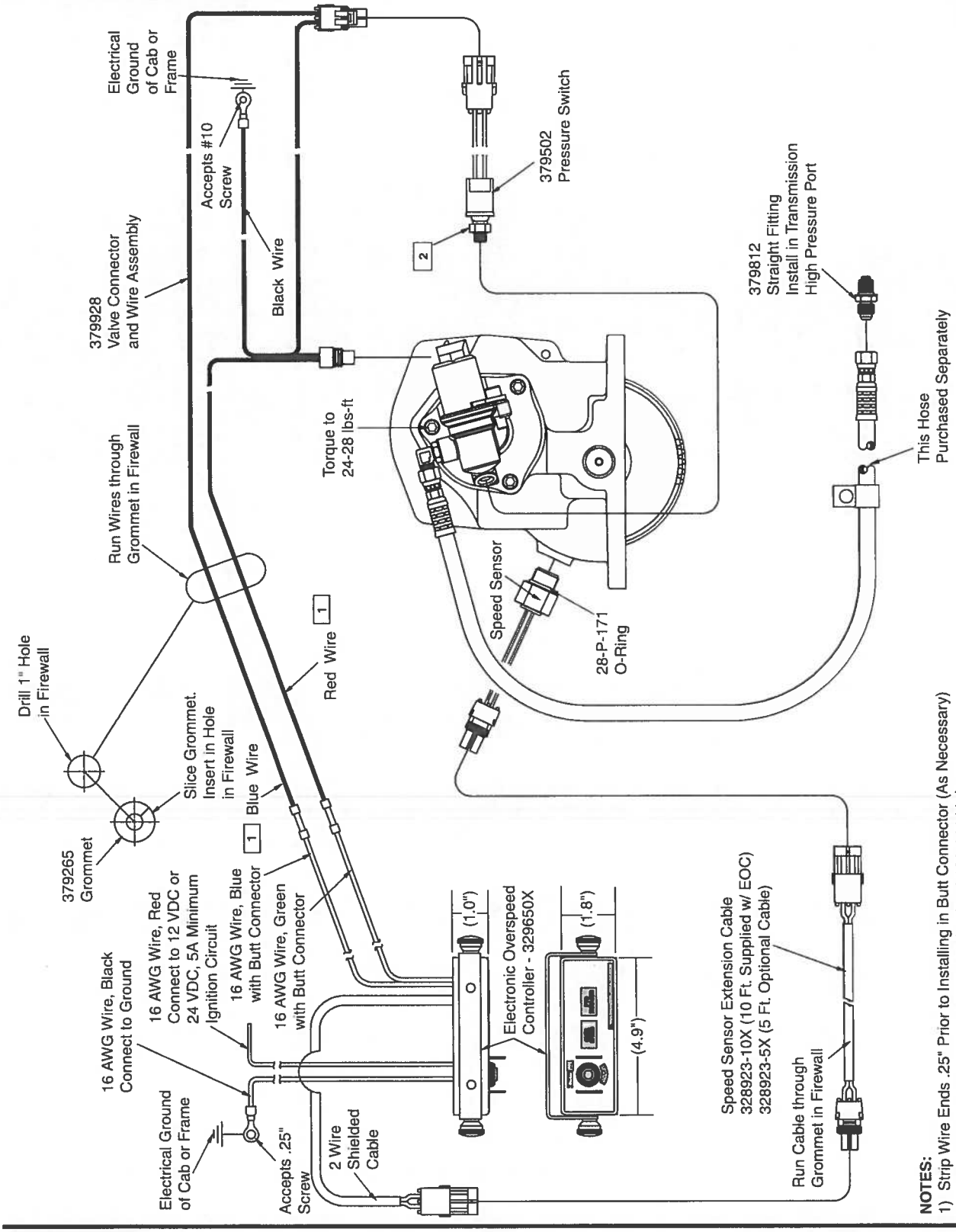
## Caterpillar Transmission
## Shift Option K & L
## Elec/Hyd w/ EOC
## 277/278/280/859/870 Series

**(SK-473 Rev B)**




**NOTES:**
1) Strip Wire Ends .25" Prior to Installing in Butt Connector (As Necessary)
2) **Caution:** Torque Values Must Be Maintained 120-144 Lb In
3) Reference Kit: 329444X Installation Kit



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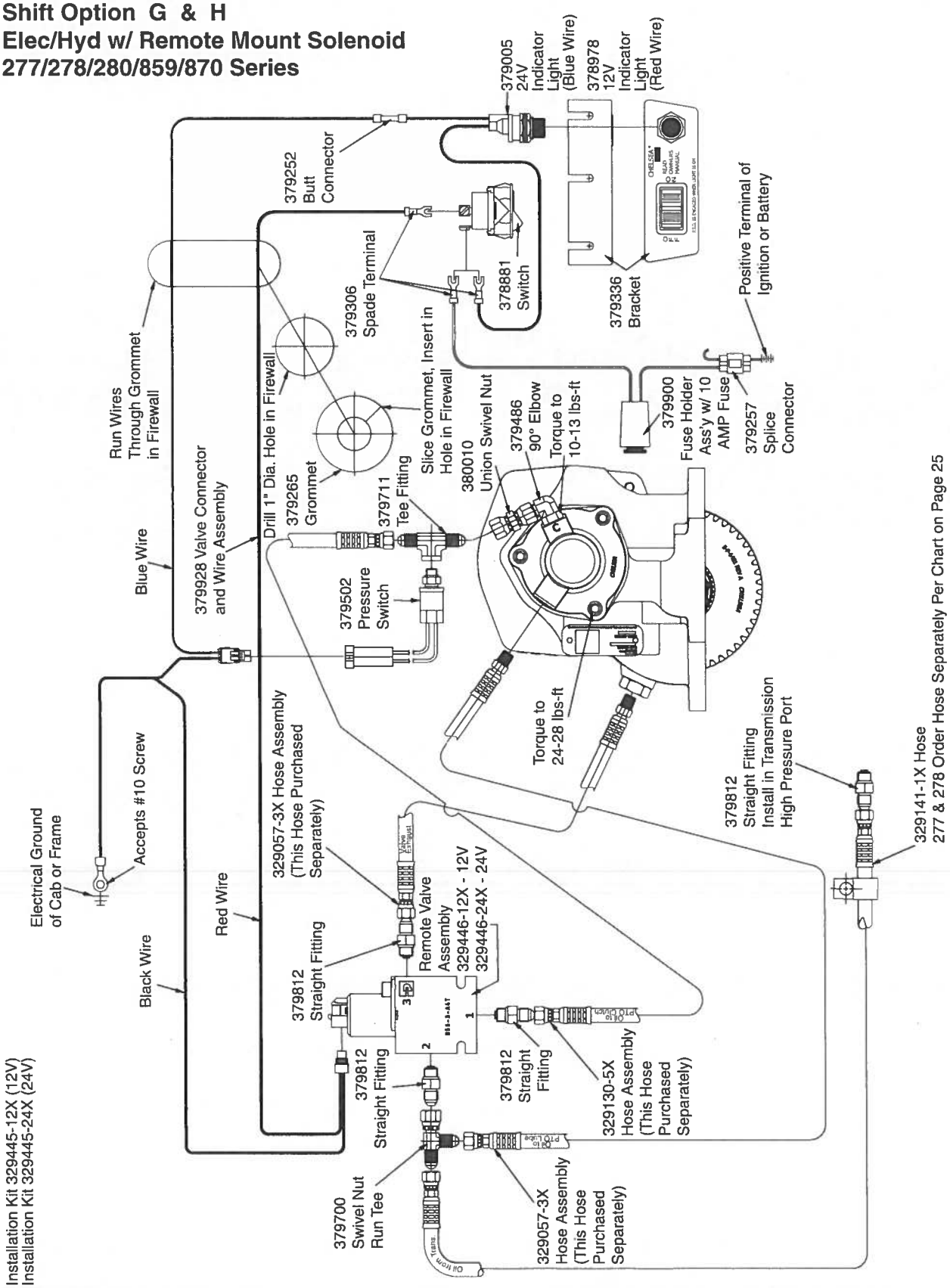
## Caterpillar Transmission
## Shift Option G & H
## Elec/Hyd w/ Remote Mount Solenoid
## 277/278/280/859/870 Series

(SK-413 Rev D)



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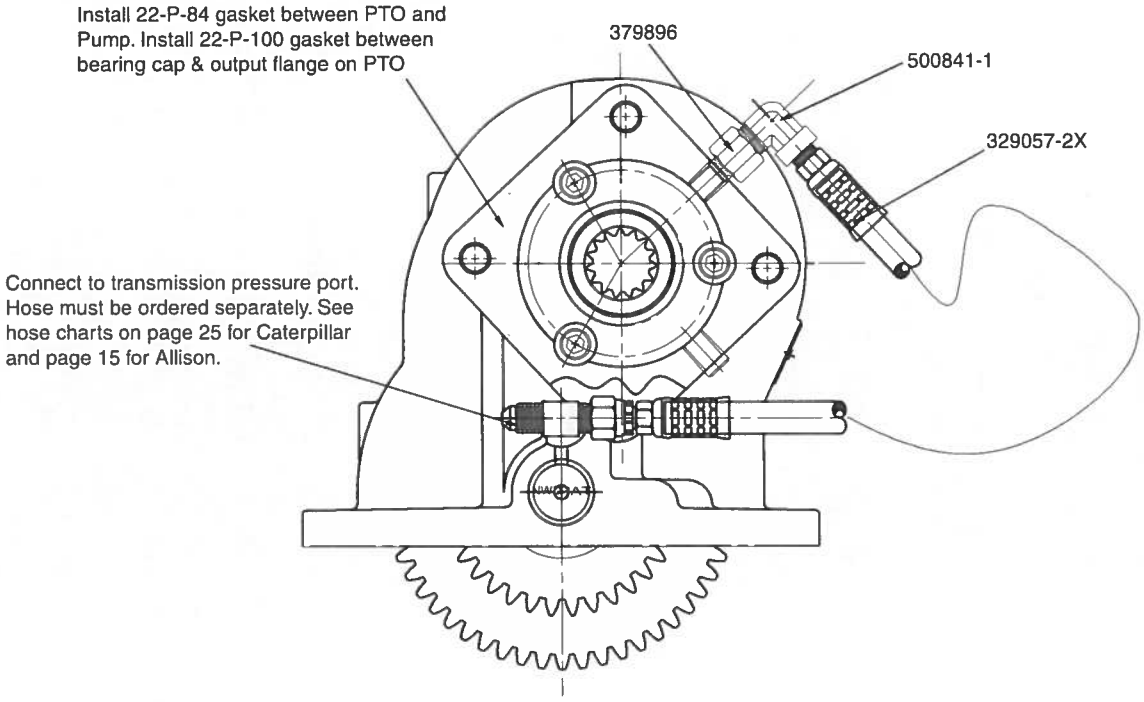
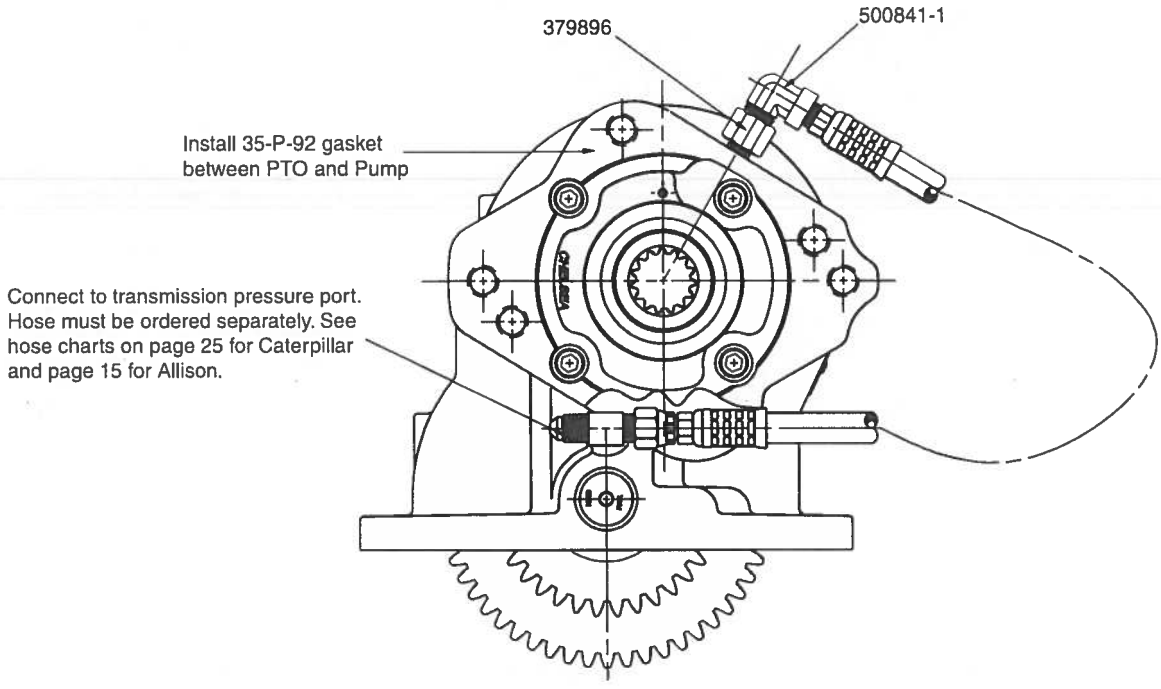
**CAUTION:** WET SPLINE options must be used with a pump that has a contiguous sealing surface to ensure a proper seal between pump and PTO.

## Wet Spline Installation – 267 Series RY (SK-351 Rev C)




## Wet Spline Installation – 267 Series AF (SK-350 Rev C)



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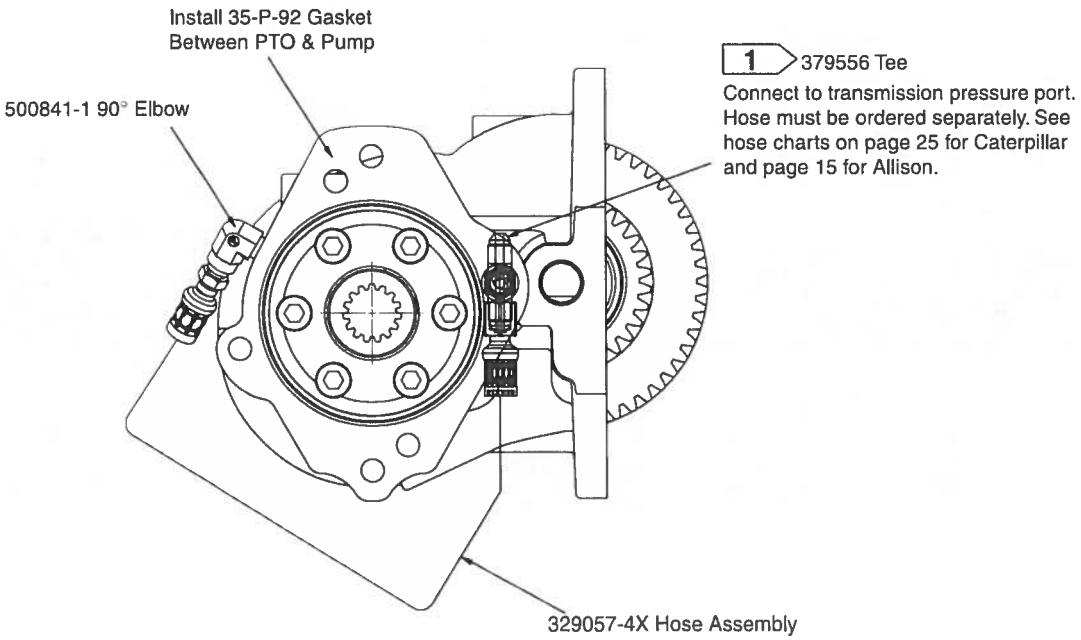
Olive Branch, MS 38654 USA

## Wet Spline Installation – 267 Series RJ (SK-465 Rev A)

**NOTES:**

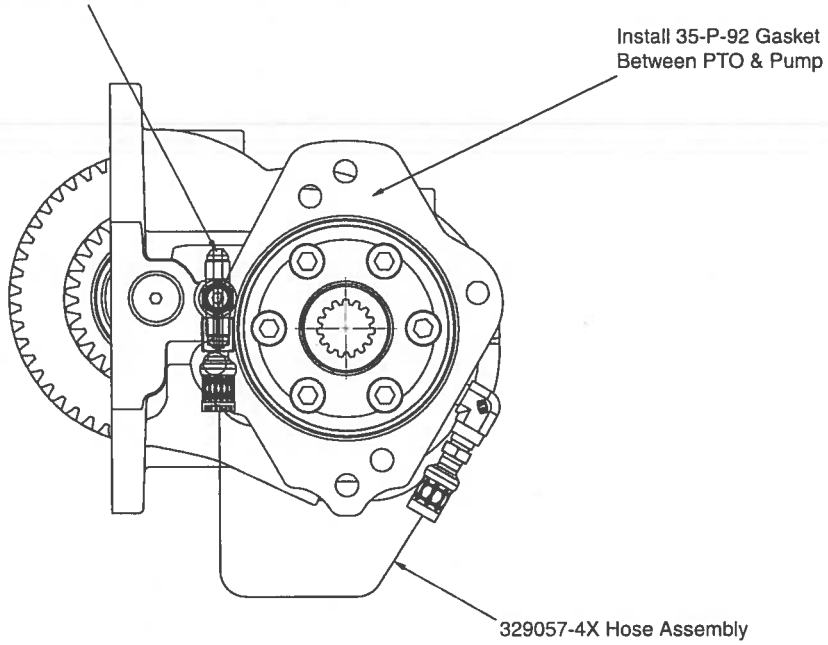
1 Connect to Transmission Pressure Port

**5 Ass'y View**




1 379556 Tee
Connect to transmission pressure port.
Hose must be ordered separately. See
hose charts on page 25 for Caterpillar
and page 15 for Allison.

**3 Ass'y View**




**NOTES:** Install Hose and Fittings Prior to Installing PTO on Transmission



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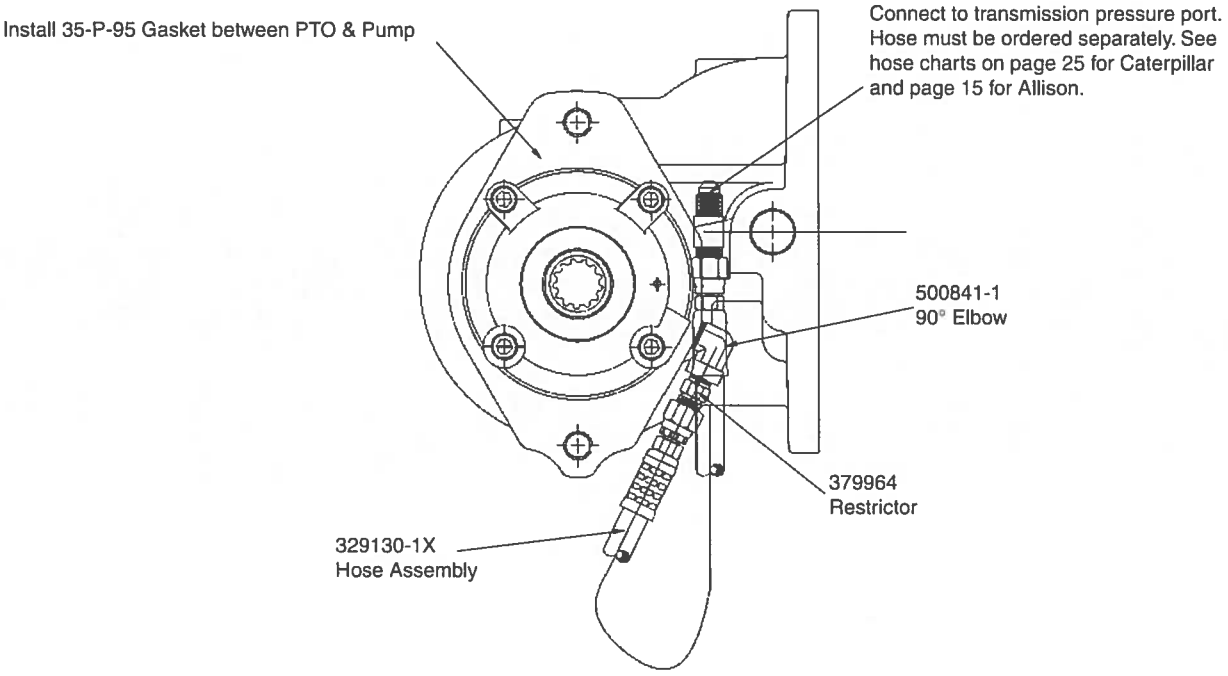
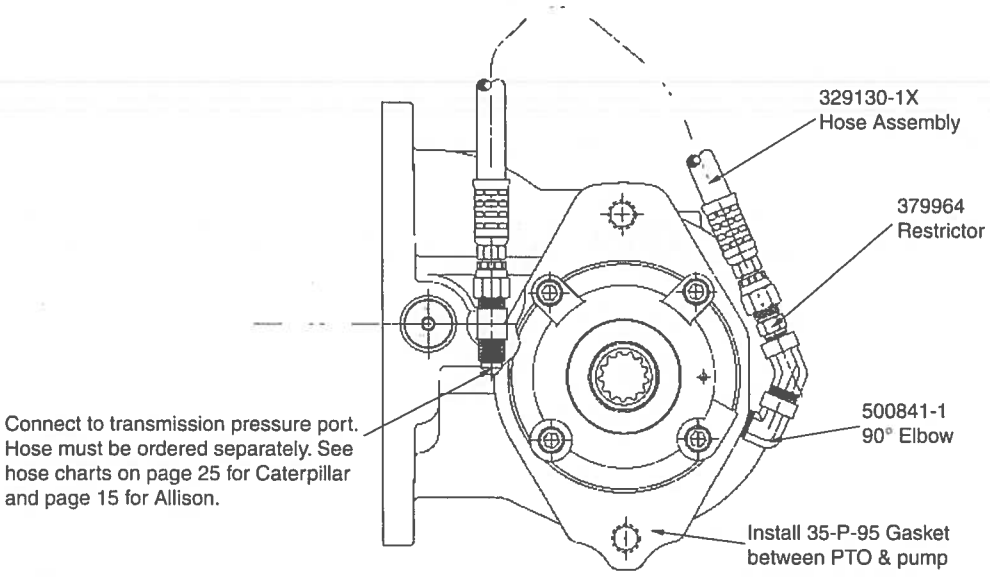
## Wet Spline Installation – 267 Series AK (SK-378 Rev A)

Wet Spline Installation Components Kit – 329406X

**5 Ass'y View**




**3 Ass'y View**



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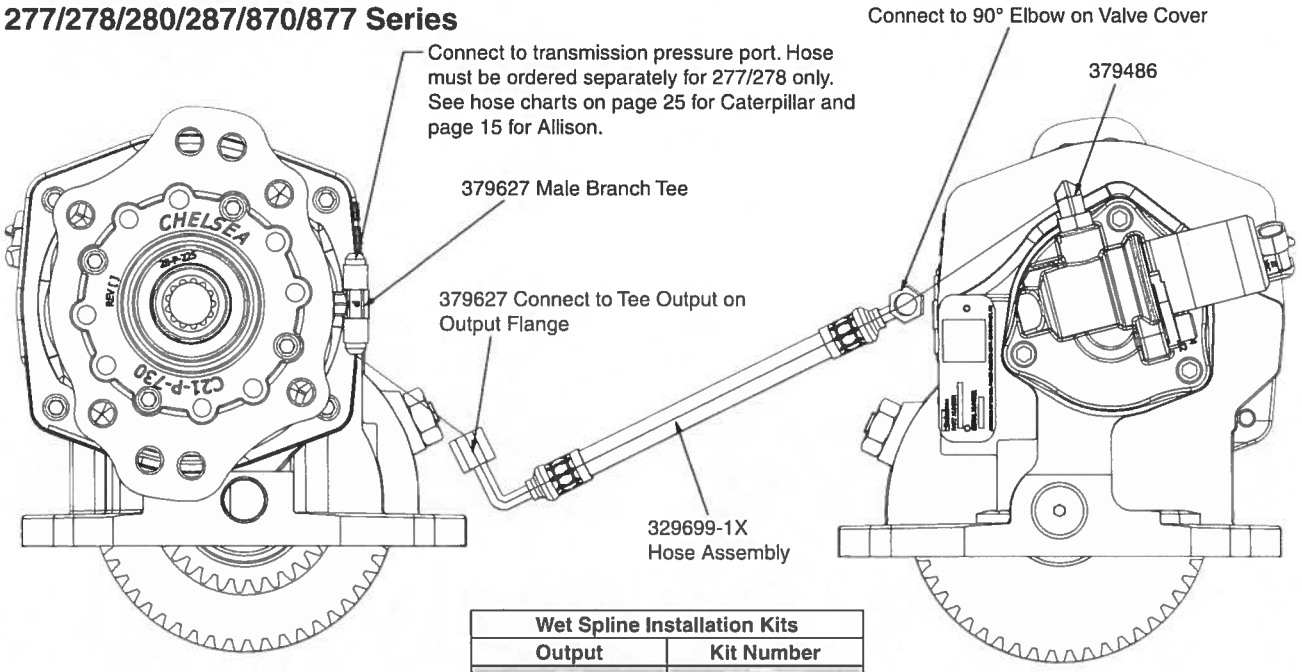
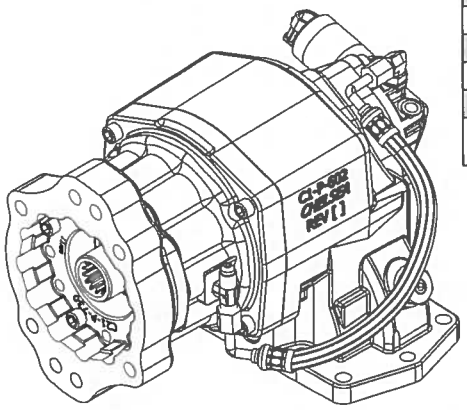
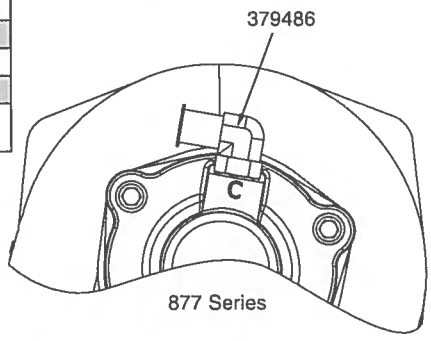
## Wet Spline Installation
## RF, RK, RS, RY & RZ
## 277/278/280/287/870/877 Series

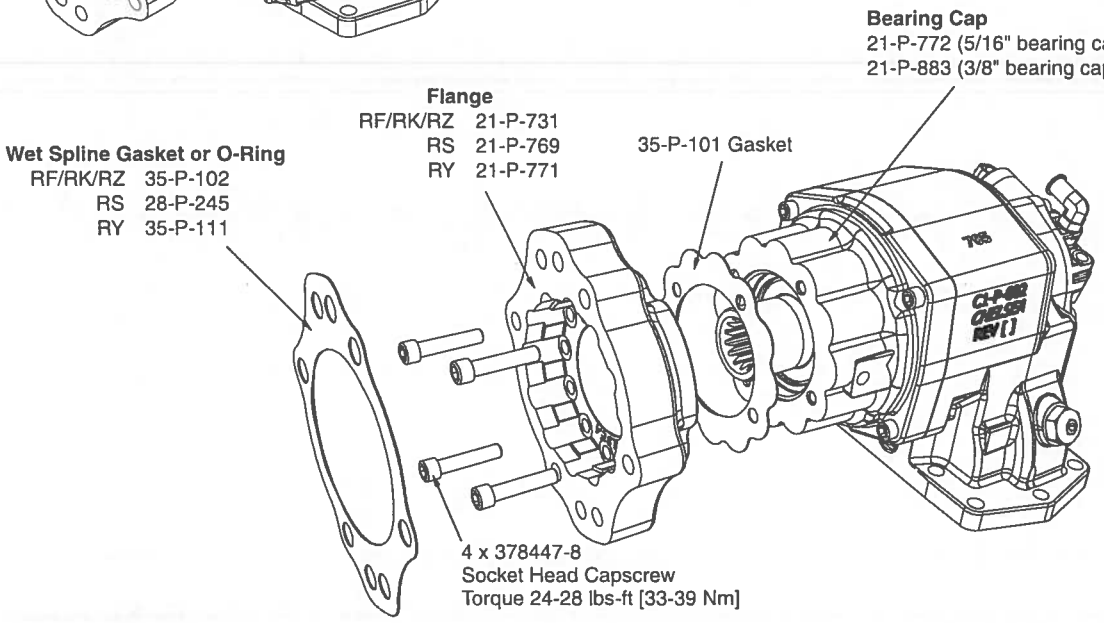
**(SK-508 Rev B)**




| Wet Spline Installation Kits | |
|---|---|
| **Output** | **Kit Number** |
| RK | 329700X |
| RF | 329700X |
| RS | 329744X |
| RY | 329742X |
| RZ | 329700X |
| **NOTE:** Not all output options may be available on Series listed above | |





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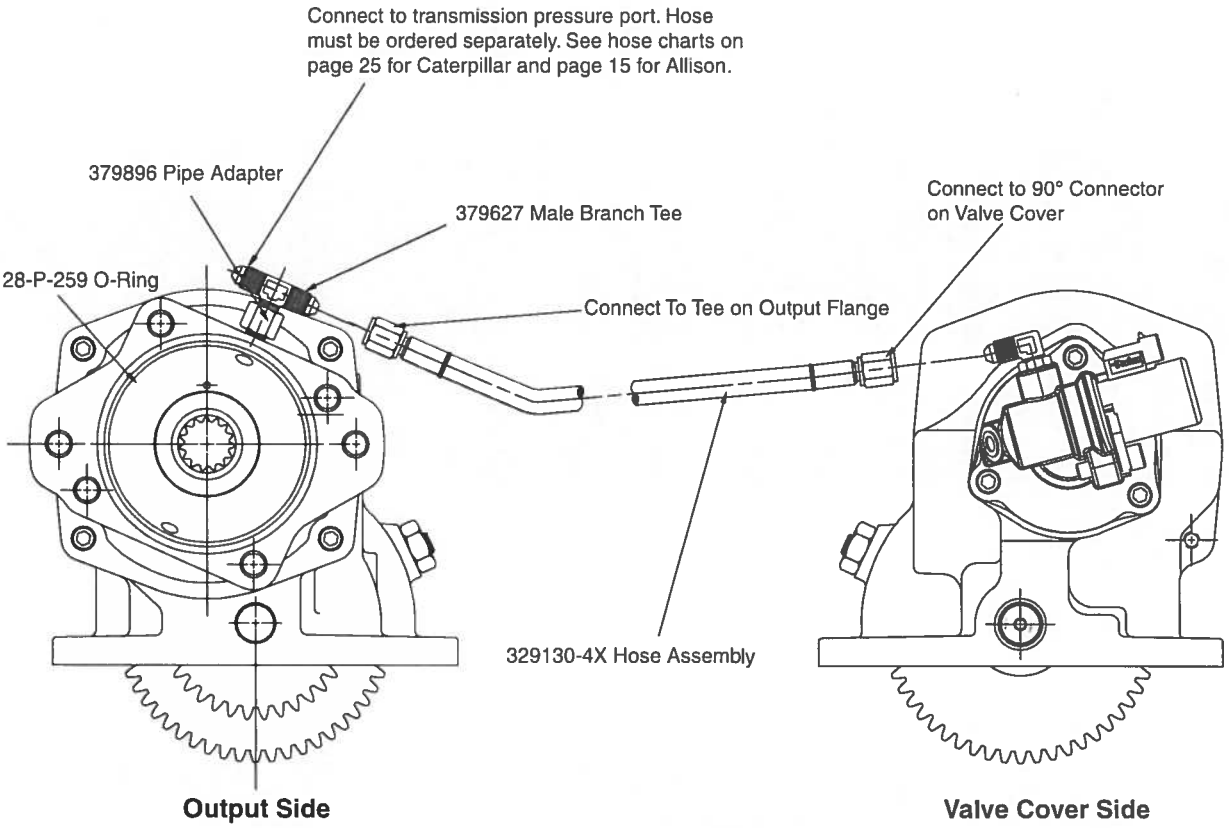
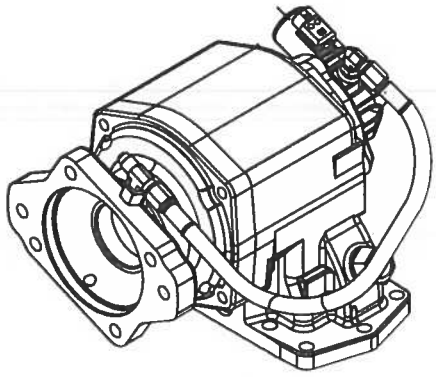
## Wet Spline Installation – 277/278 Series AF & XK (SK-383 Rev E)

Wet Spline Installation Kit – 329337-6X





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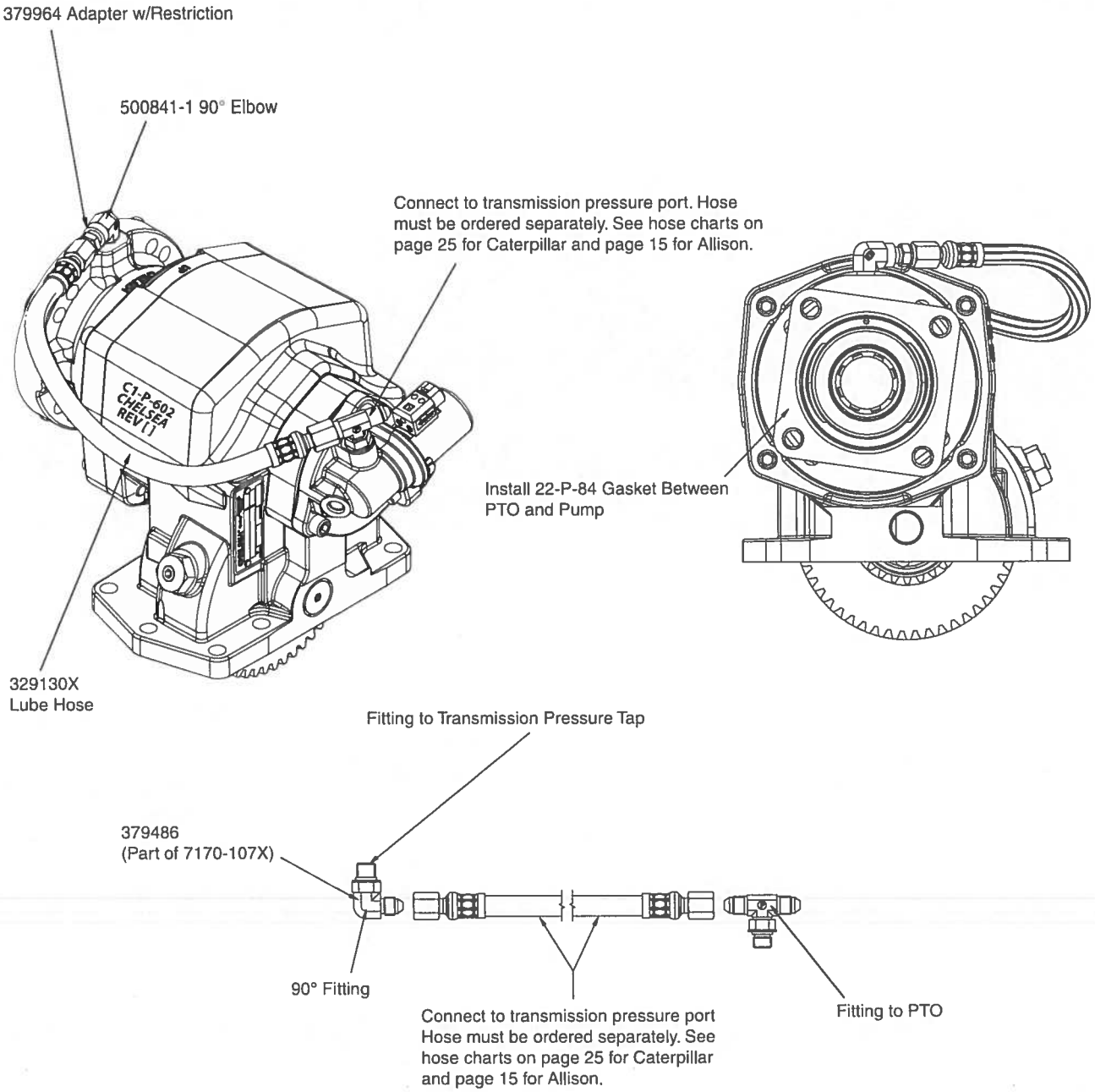
## Wet Spline Installation – 277/278 Series ZY (SK-454 Rev A)



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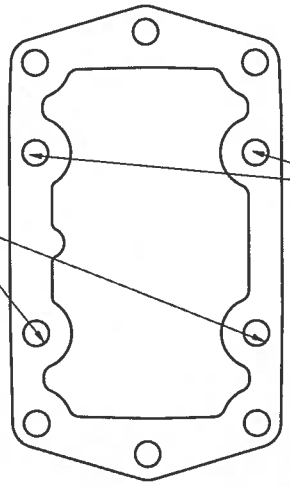
## Installation Mounting Kit Instructions (SK-355 Rev C)
## 277/278/280/287/870/877 Series



**LEFT SIDE**
Dowel Pin Locations if installing PTO on Left Side of Transmission.

**RIGHT SIDE**
Dowel Pin Location if installing PTO on Right Side of Transmission.

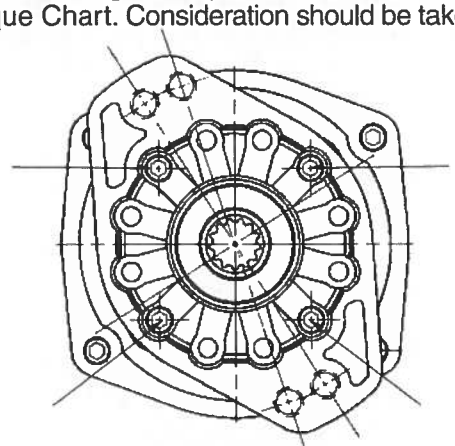
**NOTE:** PTO Models 278 Guide pins 379451 may be removed after assembly and replaced with 379453-10 capscrews.

**NOTE:** Models 267, 277, & 859 guide pins cannot be removed.

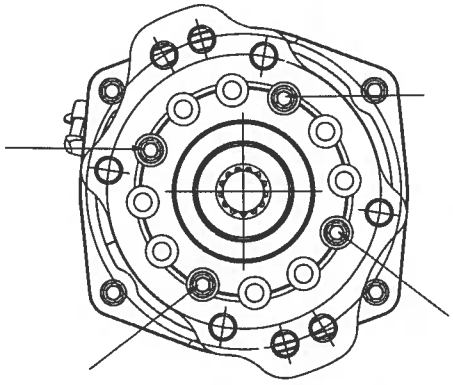
**NOTE:** If included, install two shorter 379453-8 capscrews under barrel of PTO housing in either hole depending on housing orientation.

### Installing Rotatable Flanges

The rotatable flange is shipped loose with the PTO units for ease of installation. After determining the flange position, attach the flange to the PTO bearing cap using the capscrews provided in the bag kit. After installing the capscrews make sure to torque the screws to the correct torque values stated in the Torque Chart. Consideration should be taken on the size and weight of the pump being installed.



**RA Flange Shown**
**267/277/278**



**RK Flange Shown**
**280/287/870/877**

| Outputs | PTO Series | Output Flange to Bearing Cap Capscrew P/N | Qty. | Size Capscrew | Capscrew Bag Kit | Recommended Capscrew Torque |
|---|---|---|---|---|---|---|
| PA, PF, RA, RB, RF, RG | 277/278 280/287 | 378447-6 | 4 | 0.312"-18 x 1.000" | 328170-208X | 24-28 lbs-ft [33-39 Nm] |
| RK, RM, RS, RY, RZ | 277/278 280/287 870/877 | 378447-8 | 4 | 0.312"-18 x 1.500" | 328170-216X | 24-28 lbs-ft [33-39 Nm] |
| RJ | 267 | 379740-6 | 6 | M10-1.50" x 0.984" | | 35-40 lbs-ft [47-54 Nm] |

**NOTE:** Reinstalling or tightening of a rotatable flange after it has become loose is not recommended. If a PTO has run for a length of time after the flange has become loose, the flange and/or bearing cap may not be to manufacturing tolerances and could cause PTO failure.



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**CAUTION:** This vehicle is equipped with a Power Take-Off. Shut engine off before working on the Power Take-Off or getting below the vehicle. Consult the operating instructions before using the PTO (See sun visor).

POWER TAKE-OFF OPERATION — VEHICLE STATIONARY

**Automatic Transmission with PowerShift PTOs**

Engage the PTO with the engine at idle speed.

**NOTE:** PowerShift PTOs: The engine must be at idle or below 1000 RPM when the PTO is engaged. See the transmission manufacturer's instructions for special procedures.

**IMPORTANT:**

**Failure to follow the proper shifting or operating sequences will result in premature PTO failure with possible damage to other equipment.**

⚠ **WARNING:** Cold Weather Operation of PowerShift PTOs

During extreme cold weather operation [32° F (0° C) and lower], a disengaged PowerShift Power Take-Off can momentarily transmit high torque that will cause unexpected output shaft rotation. This is caused by the high viscosity of the transmission oil when it is extremely cold. As slippage occurs between the Power Take-Off clutch plates, the oil will rapidly heat up and the viscous drag quickly decreases.

The Power Take-Off output shaft rotation could cause unexpected movement of the driven equipment, resulting in serious personal injury, death, or equipment damage.

**To avoid personal injury or equipment damage:**

- Driven equipment must have separate controls.
- Driven equipment must be left in the disengaged position when not in operation.
- Driven equipment must not be operated until the vehicle is allowed to warm up.

Due to the normal and sometime severe torsional vibrations that Power Take-Off units experience, operators should follow a set maintenance schedule for inspections. Failure to service loose bolts or Power Take-Off leaks could result in potential auxiliary Power Take-Off or transmission damage.

Periodic PTO MAINTENANCE is required by the owner/operator to ensure proper, safe and trouble free operation.

**Daily**: Check all air, hydraulic and working mechanisms before operating PTO Perform maintenance as required.

**Monthly**: Inspect for possible leaks and tighten all air, hydraulic and mounting hardware, if necessary. Torque all bolts, nuts, etc. to Chelsea specifications. Ensure that splines are properly lubricated, if applicable. Perform maintenance as required.

With regards to the direct mounted pump splines, the PTO requires the application of a specially formulated anti-fretting, high pressure, high temperature grease. The addition of the grease has been proven to reduce the effects of the torsional vibrations, which result in fretting corrosion on the PTO internal splines as well as the pump external splines. Fretting corrosion appears as a rusting and wearing of the pump shaft splines. Severe duty applications, which require long PTO running times and high torque may require more frequent regreasing. applications such as Utility Trucks that run continuously and are lightly loaded also require frequent regreasing due to the sheer hours of running time. It is important to note that service intervals will vary for each and every application and are the responsibility of the end user of the product. Chelsea also recommends that you consult your pump owners manuals and technical services for their maintenance guidelines. Fretting corrosion is caused by many factors and without proper maintenance the anti-fretting grease can only reduce its effects on components.

Chelsea offers the grease to our customers in two packages. The first is a 5/8 fluid ounce tube (379688), which is included with every applicable PTO, and the second is a 14-ounce grease cartridge (379831).

**Warranty: Failure to comply entirely with the provisions set forth in the appropriate Owner's Manual will result in voiding of ALL Warranty consideration.**

## Notes

# Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products".

**1. Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.

**2. Price Adjustments; Payments.** Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

**3. Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

**4. Warranty.** Seller warrants that all products sold, other than the 590 Series, conform to the applicable Parker Chelsea standard specification for the lesser period of 2 years (24 Months) from date of service or 2-1/2 years (30 Months) from date of build (as marked on the product name plate). Seller warrants that the 590 Series will conform to the applicable Seller standard specification for the lesser period of 2 years (24 Months) from date of service or 2000 hours of usage. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

**5. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.

**6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

**7. User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

**8. Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**10. Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

**11. Improper use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

**12. Cancellations and Changes.** Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

**13. Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

**14. Force Majeure.** Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

**15. Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

**16. Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

**17. Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

**18. Indemnity for Infringement of Intellectual Property Rights.** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

**19. Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

**20. Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act.** Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

07/14



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