



OPERATOR'S & PARTS MANUAL



The Power of Combined Excellence

MODEL TM-7 POWER BOX RAKE®



SERIAL NUMBER: _____

PURCHASE DATE: _____

MANUAL P/N: P999500

NOTES

PREFACE

This manual describes the installation, operation, and maintenance of the Harley Power Box Rake. Read and understand the manual in its entirety before performing installation, operation or maintenance in order to ensure the equipment's optimum level of performance. Read and follow all safety and precautionary notes included in this text.

Throughout this manual, references are made to front, back, right and left directions. These are determined by sitting in the operator's seat of the tractor.

REMINDER: Fill in the warranty card and mail within 10 days of your purchase date. While filling in the card with the correct information, put the date purchased and the serial number on the front cover of this manual. Should you need to call your dealer or Harley Attachments, this information will help them to more quickly provide accurate service for you.

Any questions related to this should be directed to Harley Attachments customer service at **800-456-7100**.

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OWNER ASSISTANCE

Harley Attachments, LLC and your authorized Harley dealer want you to be completely satisfied with your investment. To resolve any problems that may occur, please contact the Service Manager of your local Harley dealer. If your problem has not been handled to your satisfaction, contact:

Customer Service (8:00am – 5:00pm EST)
Harley Attachments, LLC
2800 N. Zeeb Road
Dexter, MI 48130-9499
734-996-9116
800-456-7100
Parts Fax: 734-996-9014

Please be prepared to provide the following information:

- Your name, address, and telephone number
- Machine model and SERIAL NUMBER
- Dealership name and address
- Machine purchase date
- Nature of problem

Local Dealer Information:

Contact: _____
Address: _____
Phone #1: _____
Phone #2: _____
Email: _____

BOLT TORQUE CHART

After every ten (10) hours of operation, check all hardware and tighten where required.

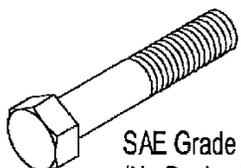
SAE Series Torque Chart

DO NOT use these values if a different torque value or tightening procedure is listed for a specific application. Torque values listed are for general use only.

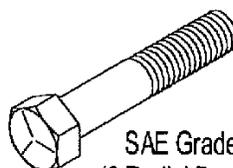
Fasteners should be replaced with the same grade.

Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

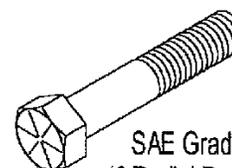
SAE
Bolt Head
Identification



SAE Grade 2
(No Dashes)



SAE Grade 5
(3 Radial Dashes)



SAE Grade 8
(6 Radial Dashes)

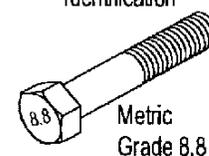
Bolt Diameter "A"	Wrench Size	MARKING ON HEAD					
		SAE 2		SAE 5		SAE 8	
		Lbs.-Ft	(N-m)	Lbs.-Ft	(N-m)	Lbs.-Ft	(N-m)
1/4	7/16	6	(8)	11	(15)	14	(19)
5/16	1/2	13	(18)	21	(28)	25	(34)
3/8	9/16	23	(31)	38	(52)	55	(75)
7/16	5/8	37	(50)	55	(75)	80	(110)
1/2	3/4	57	(77)	85	(115)	120	(165)
9/16	13/16	82	(111)	125	(170)	180	(245)
5/8	15/16	111	(150)	175	(240)	230	(310)
3/4	1 1/8	200	(270)	300	(410)	440	(600)
7/8	15/16	280	(380)	450	(610)	720	(975)
1"	1 1/2	350	(475)	680	(925)	1035	(1400)
1 1/8	1 11/16	450	(610)	885	(1200)		
1 1/4	1 7/8	600	(815)	1255	(1700)		
1 3/8	2 1/16	675	(915)	1620	(2200)		
1 1/2	2 1/4	920	(1250)	2200	(2900)		

Metric Series Torque Chart

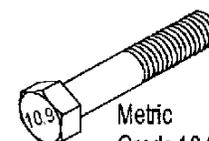
Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.

Bolt Diameter "A"	Wrench Size	MARKING ON HEAD			
		8.8		10.9	
		N-m	(Lbs.-Ft)	N-m	(Lbs.-Ft)
5 mm	8 mm	6	(4.5)	9	(6.5)
6 mm	10 mm	10	(7.5)	15	(11)
8 mm	13 mm	25	(18)	35	(26)
10 mm	16 mm	50	(37)	75	(55)
12 mm	18 mm	85	(63)	130	(97)
14 mm	21 mm	110	(80)	150	(110)
16 mm	24 mm	215	(159)	315	(232)
20 mm	30 mm	435	(321)	620	(457)
24 mm	36 mm	750	(553)	1070	(789)
30 mm	46 mm	1495	(1103)	2130	(1571)

Metric
Bolt Head
Identification



Metric
Grade 8.8



Metric
Grade 10.9

SAFETY STATEMENTS



This statement is used where serious injury or death will result if the instructions are not followed properly.



This statement is used where serious injury or death could result if the instructions are not followed properly.



This statement is used where minor injury could result if the instructions are not followed properly.



This statement is used where equipment or property damage could result if the instructions are not followed properly.



This symbol by itself or used with a safety signal word throughout this manual is used to call your attention to instructions involving your personal safety or the safety of others. Failure to follow these instructions can result in injury or death.

GENERAL SAFETY PRECAUTIONS



READ MANUAL PRIOR TO INSTALL

Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVERS MANUAL.**



READ AND UNDERSTAND ALL SAFETY STATEMENTS

Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing, or operating this equipment.



KNOW YOUR EQUIPMENT

Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to assure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued, or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean and replace them if they become worn and hard to read.

PROTECT AGAINST FLYING DEBRIS

**WARNING**

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out or when any operation causes dust, flying debris, or any other hazardous material.

**WARNING****LOWER OR SUPPORT RAISED EQUIPMENT**

Do not work under raised 3 point lift arms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower lift arms to ground level or onto blocks. Lower lift arms and attachments to the ground before leaving the cab or operator's station.

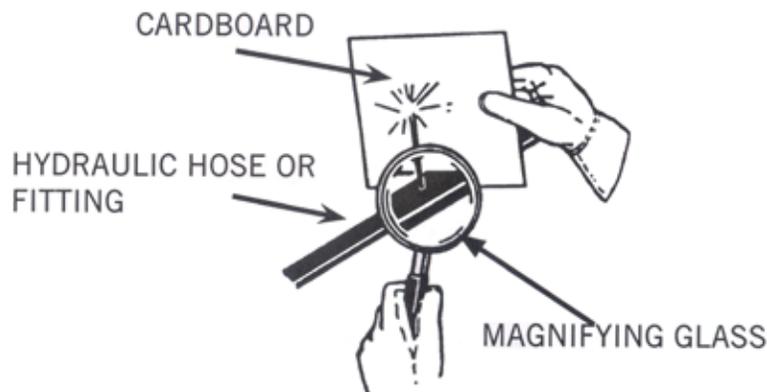
**WARNING****USE CARE WITH HYDRAULIC FLUID PRESSURE**

Hydraulic fluid pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime movers operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.

Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.

If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research immediately to determine proper treatment.

Wear safety glasses, protective clothing, and use a sound piece of cardboard or board or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS! SEE ILLUSTRATION BELOW.**

**WARNING****DO NOT MODIFY MACHINE OR ATTACHMENTS**

Modifications may weaken the integrity of the attachment and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protection System) equipment or device. Any modifications must be authorized in writing by the manufacturer.

 **WARNING**

SAFELY OPERATE EQUIPMENT

Do not operate equipment until you are completely trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your prime movers manual for these instructions.

- Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- Never allow anyone to be around the equipment when it is operating or being serviced.
- Do not allow riders on the attachment or the prime mover.
- Do not operate the equipment from anywhere other than the correct operators position.
- Never leave equipment unattended with the engine running or with this attachment in a raised position.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on any safety issue, contact your supervisor or safety coordinator for an explanation.

 **WARNING**

SAFELY MAINTAIN AND REPAIR EQUIPMENT

- Do not wear loose clothing or any accessories that can catch in moving parts. If you have long hair, cover or secure it so that it does not become entangled in the equipment.
- Work on a level surface in a well lit area.
- Use properly grounded electrical outlets and tools.
- Use the correct tool for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.

EQUIPMENT SAFETY PRECAUTIONS

NOTICE

Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator. In addition, to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of equipment. The designed and tested safety of this equipment depends on it being operated within the limitations as explained in this manual.

 **WARNING**

INITIAL SET-UP AND SYSTEMS CHECK

- Always check with your prime mover manual or dealer for counter weight ballast that may be required for machine stability.
- Air in hydraulic systems can cause erratic operation and allows loads or equipment components to drop unexpectedly.
- Before operating equipment purge any air in the system by engaging all hydraulic functions.
- Check that all control lever positions function as instructed in the

- Operator's Manual. Do not operate until control lever and equipment
- movements are correct.
- Make sure all hydraulic hoses, fittings, and valves are in good condition and not leaking before starting power unit. Check and route hoses care-
- fully to prevent damage.
- Hoses must not be twisted, bent sharply, kinked, frayed, pinched, or come
- into contact with any moving parts.
- Operate moveable components through full operational range to check
- clearances. Replace damaged hoses immediately.
 - Ensure implement is properly attached, adjusted, and in good condition.
 - Tractor must be equipped with ROPS and seat belt/operator restraint.
- Keep seat belt/operator restraint securely fastened/engaged. Falling off tractor can result in death from being run over or crushed. Keep ROPS systems in place at all times.



SAFELY OPERATE EQUIPMENT

Improper operation can cause the machine to tip or roll over and cause

- injury or death.
 - Keep tractor lift arms and attachment as low as possible.
 - Turn on level ground.
 - Go up and down slopes, not across them.
 - Keep the heavy end of the machine uphill.
- Only engage power when equipment is at ground level. Always disengage
- power when equipment is raised off the ground.
 - Do not disconnect hydraulic lines until all system pressure is relieved.
- Never go underneath equipment lowered to the ground or raised.
- Hydraulic system leak down, hydraulic system failures, mechanical failures or movement of control levers can cause equipment to drop or rotate
- unexpectedly and cause severe injury or death.
 - Never direct discharge toward people, animals, or property.
 - Do not operate equipment while under the influence of alcohol or drugs.
 - Operate only in the daylight or good artificial lighting.
 - Always comply with all state and local lighting and marking requirements.
- Ensure equipment is properly attached, adjusted and in good operating
- condition.
- Before starting tractor, check all equipment driveline guards for damage and make sure they rotate freely on all drivelines. Replace any damaged guards. If guards do not rotate freely on drivelines, repair and replace
- bearings before operating.
- Make sure driveline is correct length to prevent bottoming out or pulling
- apart during the full lift range of the hitch.
- Make sure spring-activated locking pin or collar slides freely and is seated
- firmly in tractor PTO splined groove.
- A minimum 20% of tractor and equipment weight must be on tractor front wheels with attachments in "transport" position. Without this weight, tractor could tip over causing personal injury or death. The weight may be attained with a loader, front wheel weights, ballast in tires, or front tractor weights. When attaining wheels, you must not exceed the Roll Over Protection Structure (ROPS) weight certification. Weigh the tractor and equip-

- ment. Do not estimate.
Ensure shields and guards are properly installed and in good condition.
Replace if damaged.



WATCH FOR OPERATING HAZARDS

Look down and to the rear and make sure area is clear before operating

- in reverse.
- Watch for hidden hazards on the terrain during operation.
Use extreme care when working close to fences, ditches, other obstructions, or on hillsides.
- Reduce ground speed on slopes and rough terrain.
- Do not operate on steep slopes.
Do not stop, start, or change directions suddenly on slopes.
Stop tractor and implement immediately upon striking an obstruction. Dismount tractor using proper procedure. Inspect and repair any damage before resuming operation.



MAINTENANCE SAFETY

Your dealer can supply original equipment hydraulic accessories and repair parts. Substitute parts may not meet original equipment specifications and may be dangerous.

- Avoid electrical system hazards. Never work on the electrical system unless you are qualified and thoroughly familiar with system details and the special handling requirements.
Disconnect battery before working on electrical system. Remove “ground” cable first. When reconnecting battery, connect “ground” cable last.
- Never perform service or maintenance with engine running.
Tighten all bolts, nuts, and screws, and check that all cotter pins are installed securely to ensure equipment is in a safe condition before operating.



EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.

It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

SAFETY DECAL AND SERIAL TAG PLACEMENT

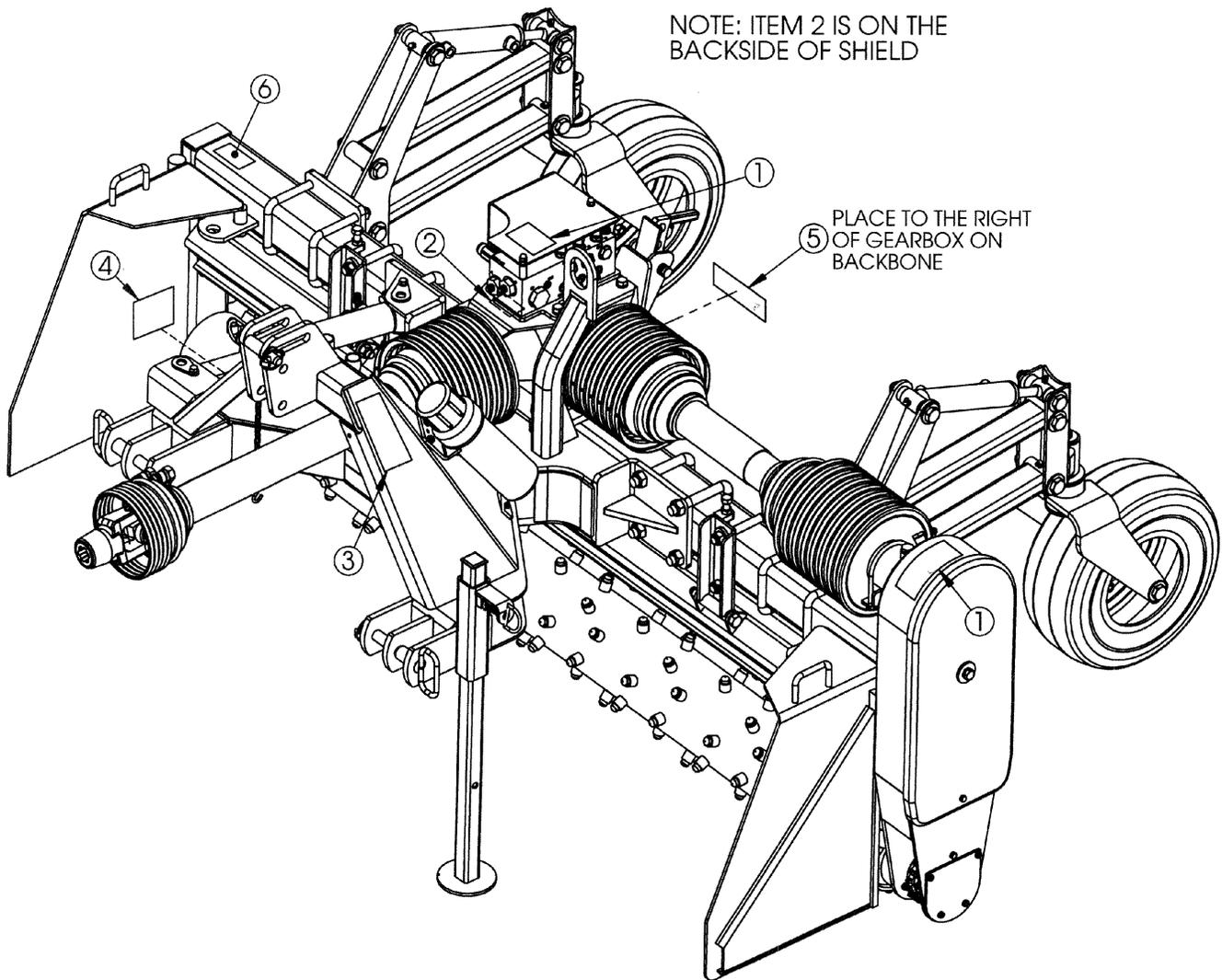


Figure 1. Safety Decals

SAFETY DECALS



#1 - PN: P970300



#2 - PN: P970301



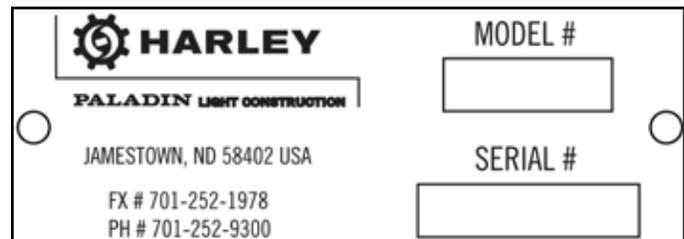
#4 - PN: P970250



#5 - PN: P970251



#3 - PN: P970100



#6 - SERIAL # TAG

OPERATIONAL PROCEDURE

NOTICE

The TM7 Power Box Rake® is designed for removing rock and small debris, and for thatching. This manual contains information for the TM7 standard and flex model. Refer to the information in this manual for specifications, parts, assemblies, and adjustments.

ATTACHING POWER RAKE TO TRACTOR

Move tractor into position in front of the power rake. Move back slowly and carefully, not allowing anyone to be between the tractor and the rake. Turn off tractor engine. Attach the two lower arms of the 3-point hitch with the two hitch-pin assemblies.

Attach the tractor center link to the upper hitch point of the power rake. Use either the “lock-out” setting or the “float” feature depending on your application.

Attach the front PTO from the power rake to the tractor. Slide the front section of the PTO into the back section and attach to the PTO shaft at the rear of the tractor.

Reattach driveline storage chain in its original position so that it will contact PTO driveline.



- **If the PTO is too long, severe PTO and gearbox damage is possible when hooking up the PTO from the power rake to the tractor. The front PTO is long enough to fit a variety of tractors. It is possible that the front PTO will need to be cut. There will be NO benefit by cutting only one telescoping section. Both sections of the PTO must be cut. DO NOT FORCE THE PTO TO FIT.**
- **WARRANTY IS VOID IF THE PTO IS TOO LONG, resulting in gearbox, PTO, yoke, or cross bearing damage.**

The PTO, when attached to the tractor and gearbox, must not extend so there is less than five inches of overlap within the PTO.

Attach the two hydraulic lines on the rake to the two female hydraulic couplers on the tractor. The hydraulic hose ends on the power rake are ISO male couplers, which are compatible with newer tractors.

Raise jack stand and secure in operating position.

For flex models, mount the control box in a convenient, easy-to-reach location. The control box is magnetic and will attach to any flat steel surface. Connect the power cord to the cable coming from the switch. Be careful when routing the cable that sharp edges or moving parts will not damage the cable.



Always clean connector ends prior to attaching. Dirt could contaminate hydraulic fluid and damage the hydraulic system.

POWER RAKE FUNCTION

The tractor PTO drives the roller, which digs into the ground, cultivating and pulling up rocks, roots, and debris.

OPERATIONAL PROCEDURE

The clean soil goes between the roller and barrier, while the rocks, roots, and debris work to the side in a windrow.

With the endplates mounted in the working position and the rake straight (endplates parallel with tractor tires), material can be moved along, filling in the low spots.

Maximum safe PTO operating speed is 540 rpm.

Before using your new Harley Power Box Rake, the slip clutch assembly must be in RUN-IN. See CLUTCH in the maintenance section, page 21, for the RUN-IN procedure. After you have completed the RUN-IN of the clutch, return to the operating instructions and proceed with start-up. Failure to run the clutch in could result in pre-mature drive line failure and warranty will be voided.

Start tractor engine.

Lower power rake slowly to the ground.

Engage tractor PTO.

Increase engine rpm to give desired rpm at the roller. Normal operating speed must not exceed 540 rpm. If operating in heavy rock, reduce the speed slightly.

Move the tractor forward. Select a slow tractor speed and increase slightly until operation is satisfactory.

Ground Speed

Ground speed should be between 3 and 5 mph under normal conditions. In heavy rock, reduce the ground speed to 1 to 3 mph.

Power Rake Angle Adjustment

The power rake may be angled up to 15 degrees left or right for placing material in a windrow.

For standard models, with the power rake angle cylinder connected to a tractor hydraulic control valve, move tractor control valve to select the desired angle. Return the tractor control to neutral to maintain the selected angle.

For flex models, auxiliary hydraulic circuit must be engaged. Position the angle toggle switch to angle right or left.

Power Roller

The roller should be level with the ground. To level rake from side to side, adjust one of the tractor 3-point lower lift arms.

The power rake should be level front to back. Level the rake using the tractor 3-point top link, the 3-point lift arms, or the gauge wheels.

OPERATIONAL PROCEDURE

On standard models, to allow the roller to penetrate deeper into the ground, loosen the handle and raise the gauge wheels. On flex models, position toggle switch to raise gauge wheels. To achieve the opposite, lower the gauge wheels. Be sure to check the air pressure in each tire regularly so that an even, consistent grade will be maintained.

Barrier

The normal gap between the roller and barrier for average conditions is about 1-1/4". This gap can be adjusted by rotating the barrier and pinning in desired position. A wider opening will allow more dirt and rock to pass through, allowing wet soil to dry for final raking. For finer raking, reduce the gap. Be careful not to let roller hit barrier. The gap should be the same all the way across. Barrier adjustment is shown in **Figure 2 (page 17)**.

OPERATING DEPTH

When power raking, the depth will determine how much dirt is carried ahead of the roller. The ideal depth will vary with conditions and can be anywhere from skimming the surface to about 3 inches deep. See instructions in "Power Roller" on page 13 to set roller depth.

When making the first windrow, the level of dirt may be halfway up on the barrier. When moving the windrow two or three times, the level of the dirt may be to the top of the barrier. However, try to prevent material from flowing over the top.

The power rake allows fast raking of large areas of ground by being able to move windrows several times. Of course, the volume or density of the material being raked will dictate how many times a windrow can be moved.

Soil can be removed from the windrow of rocks by moving it back and forth a few times onto the clean area. If dirt clods are a problem, running the tractor tire over the windrow and then moving it a final time will help to break up and cut down on dirt clods.

Endplates

The function of the endplates is to contain the material in front of the roller while the clean material passes between the roller and barrier.

With the endplates mounted in the operating position and the rake straight (endplates parallel with tractor tires), material can be moved along, filling in the low spots.

By decreasing the gap between the roller and barrier, more material can be pulled along. Barrier adjustment is shown in **Figure 2 (page 17)**.

When not using the endplates for operation, they can be placed in "storage" position, see **Figure 2 (page 17)**.

Make sure the disconnected power rake is stored on a hard, level surface. Use the endplates mounted on attachment side of rake to ensure stability.

OPERATIONAL PROCEDURE

Operator Production

Successful operation of the power rake will come with operator experience. The rake's performance also depends on the type and size of the tractor it's mounted on.

An operator that masters the technique of adjusting the angle of attack of the roller against the soil will also find ideal settings under various conditions to give the desired results.

NOTICE

Do not drop power rake to the ground with the roller turning. Sudden high speed jolts multiply stress to the driveline and can cause extreme damage.

APPLICATION TECHNIQUES

The power rake is capable of many applications. The following are some of the common applications.

See **Figure 2 (page 17)** for adjustment locations.

Pulverizing Topsoil

For breaking up compacted soil or conditioning hardened baseball diamonds, the 3-point top link is set in the "lock-out" positions so that down pressure can be exerted on the tooth roller. The top link is shortened to take the guide wheels off the ground so only the toothed roller is in contact with the ground. The rake can be straight or angled, with the barrier opened up to allow material to flow over the roller.

Debris Removal

Once the surface has been loosened, the process of removing debris can begin. The 3-point hitch top link is mounted in the "float" position holes. This allows the rake to begin the early stages of the final grading process. The 3-point hitch is lowered until the guide wheels control the depth of the toothed roller. The rake can be angled at this time for windrowing debris or the rake can be set straight with both endplates installed to collect debris. Tractor travel speed should be increased for this process.

Finish Grading

For this operation, set the tractor top link in the "float" position and mount both endplates in the "forward" position. The rake is tilted forward until the teeth of the toothed roller are barely touching the soil. Increasing the tractor speed for this operation will collect material from the high spots and leave it in the low areas.

Spreading Fill and Topsoil

Start with tractor top link in "fixed" position and rake tilted on gauge wheels, since depth of cut is not the objective. Endplates can be installed and the windrow angle set as needed to control the material movement.

Changing Grade

Grade modification can be accomplished during finish grading by angling the rake to collect and windrow the maximum amount of material toward targeted areas. With the flex model, grade changes can be made by raising one gauge wheel and lowering the opposite.

OPERATIONAL PROCEDURE

Thatching Existing Grass Areas

This procedure is done with the 3-point top link in the “lock-out” position so accurate depth control can be maintained. The top link should be lengthened to support the rake on the gauge wheels and toothed roller raised so teeth are just grazing the surface. Select and maintain a slow travel speed.

Shutting Down

Stop equipment.

Lower the lift arms and power rake to the ground.

Purge any air in the system. Hydraulic system leakdown, hydraulic system failures, mechanical failures, or movement of control levers can cause equipment to drop or rotate unexpectedly.

Shut off engine, set brake, remove key, and remove seat belt before leaving the tractor operator’s seat.



Do not disconnect hydraulic lines until all system pressure is relieved. Lower unit to ground, stop engine, and operate all hydraulic control levers.

REMOVING POWER RAKE FROM TRACTOR

Install endplates on attachment side of power rake as shown in **Figure 2 (page 17)**.

Lower jack stand to “storage” position.

On a hard level surface, lower attachment to the ground.

Shut off engine, set brake, remove keys, and remove seat belt before leaving the tractor operator’s seat.

Disconnect driveline from tractor PTO shaft and support with storage chain.

Disconnect 3-point upper and lower links from power rake.

Disconnect hydraulic hoses from quick couplers. Install dust plugs for storage.

Move to tractor seat and start engine. Release brake and drive tractor forward until it is disengaged from the attachment. The attachment should rest in a stable position for storage.

STORAGE

Make sure the disconnected power rake is stored on a hard, level surface. Endplates mounted on attachment side of rake increase stability.



WARNING

Block equipment securely for storage.



CAUTION

Keep children and bystanders away from storage area.

OPERATIONAL PROCEDURE

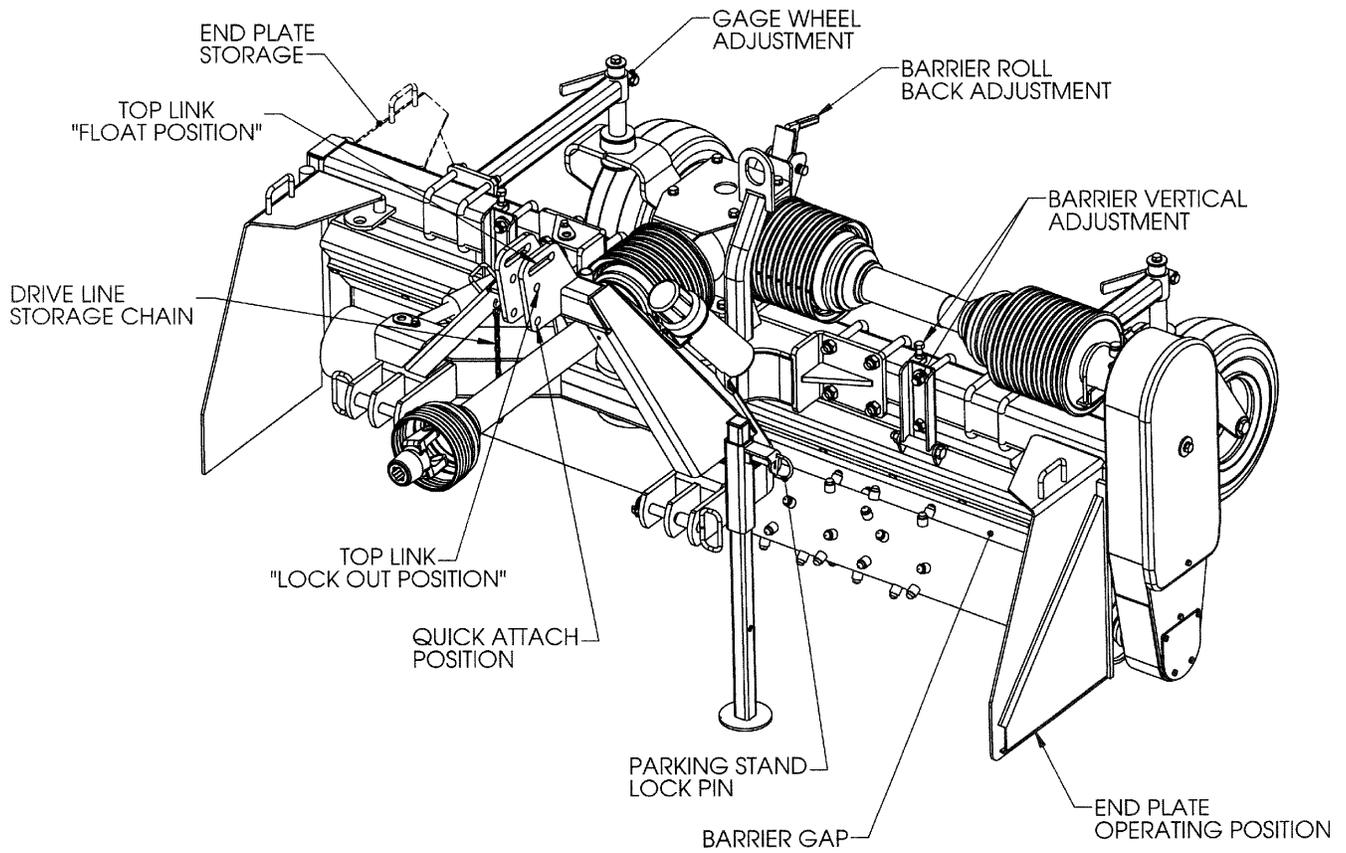


Figure 2. Adjustments

OPERATIONAL PROCEDURE

FLEX MODEL OPERATION

The flex model allows for individual control of each gauge wheel to tilt the roller for creating sloped or contoured areas.

To operate in the flex mode you must first release the slot pins on the tractors 3-point lower arms. See **Figures 3 and 4**.



Figure 3



Figure 4

The control box allows you to control each wheel by activating the corresponding switch as directed on decal. The tractor auxiliary hydraulic circuit must be engaged to operate these functions.

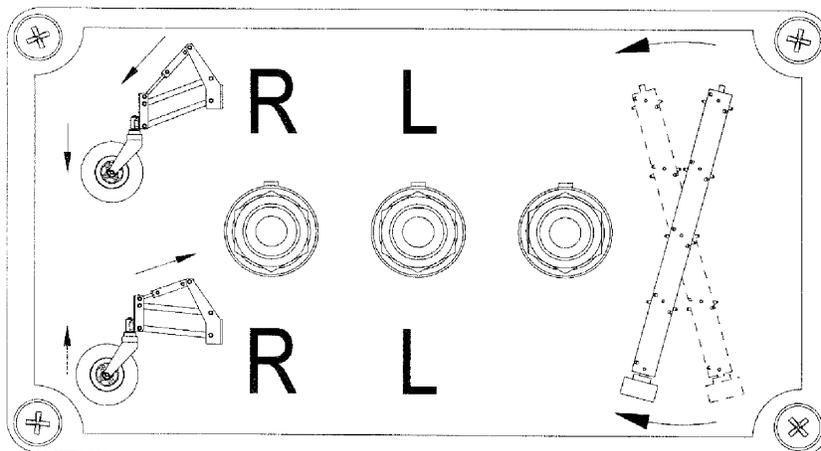


Figure 5. Box Diagram

The angle switch controls the rake angle as indicated on decal.

MAINTENANCE

The information in this section is written for operators who possess basic mechanical skills. Should you need help, your dealer has trained service technicians available. For your protection, read and follow all safety information in this manual.

Regular preventive maintenance and immediate repair of broken or worn parts will ensure maximum efficiency and long life.

Because of the nature of the jobs the power rake does, such as site preparation and rock raking, the power rake is constantly vibrating and shaking. Parts may loosen up as it is used. One of the most important functions an operator can perform is observing and inspecting the equipment for loose or worn parts to prevent further damage or excessive downtime.

PROCEDURE	INTERVAL	LUBE
Inspect prime movers hydraulic system to be sure the level of hydraulic oil is adequate.	daily	
Repair hydraulic oil leaks.	daily	
Lubricate all grease fittings.	weekly	#2 lithium w/moly
Lubricate drive line u-joints.	monthly	#2 lithium w/moly
Check tire pressure.	weekly 60 psi cold	
Inspect and clean safety decals. Replace if damaged. (See safety decals section for location.)	monthly	
Inspect drive chain.	monthly	
Check oil level in chain case.	monthly	#00 fluid gear grease
Change lubrication in chain case.	quarterly	#00 fluid gear grease
Check gearbox oil level.	quarterly	80-90 wt. gear lube
Check bearing housing oil level.	quarterly	#00 fluid gear grease

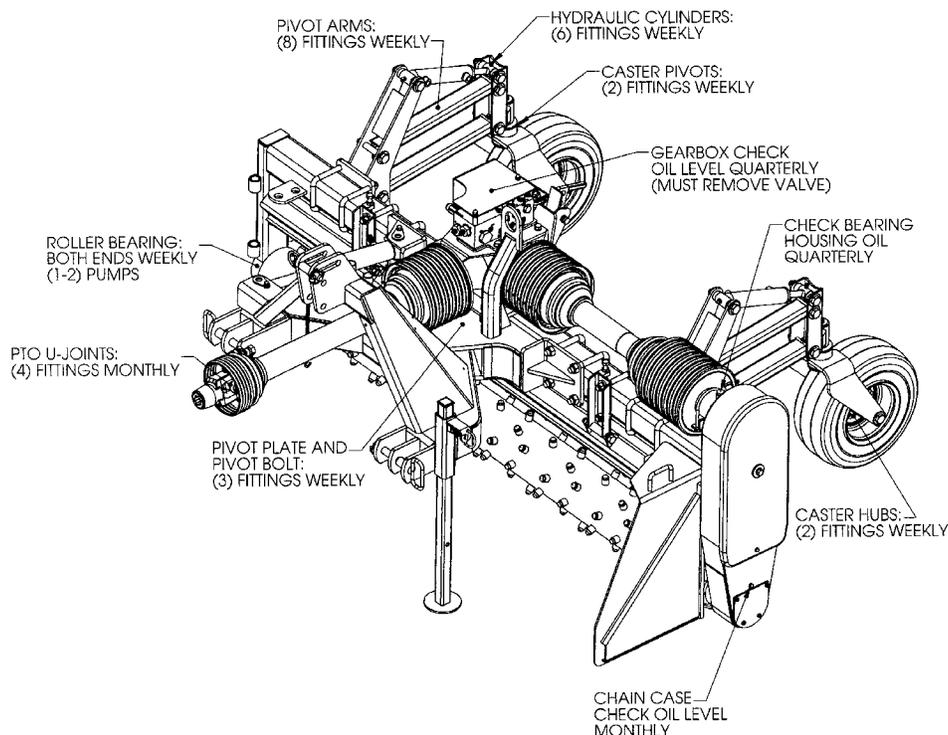


Figure 6. Lubrication Maintenance

MAINTENANCE

CHAIN MAINTENANCE

The drive chain should be inspected monthly. New chain has a tendency to stretch, so it is necessary to check the chain tension to prevent flopping around, thus causing potential problems. Chain tension is preset with the extension spring. If the chain becomes excessively loose, it may be necessary to remove one link (two pitches). If unable to reassemble, add an offset link to lengthen the chain.

NOTICE

Replacement chain should be only high quality original equipment chain for longer life.

When being stored for a long period or at end of season, change the oil, adding #00 fluid gear grease, and rotate the roller several times allowing the chain to be coated with lubricant, enhancing chain life. Rotate the roller periodically to maintain lubrication.

SPROCKETS

Sprockets should be checked to be sure slotted hex nut or hex bolt is tight, the cotter pin is in place, and the sprocket cannot move on shaft.

QUALIFIED TECHNICIAN MAINTENANCE

GEARBOX

The gearbox is almost maintenance-free, but should be checked quarterly to be sure that the oil level is maintained at half full. EP 80-90 wt. gear lube is recommended for use in the gearbox. Oil should be changed after the first 100 hours or 30 days of operating. Then, normal change should be adequate. In the case of seasonal usage, it is best to change the oil at the end of the season to remove moisture and corrosive contaminants.

It should be noted that the gearbox only exceeds its thermal capacity when the oil temperature exceeds 200°F.

BEARINGS

Highest quality bearings are used on the power rake. Only triple-seal bearings are used on the roller which operates down in the dirt. Lubrication of the bearings will vary considerably with conditions. As a rule, bearings should be under-lubricated rather than over-lubricated. Over-lubrication can cause seals to blow out.

NOTICE

Replacement bearings should be only high quality original equipment bearings for longer life.

Install new complete bearing housing if needed or just replace the bearing insert. The shafts should be straight, free of burrs, and up to size. If shaft is worn, replace or have the shaft built up to standard prior to completing assembly.

Protective Collars

The special protective collars protect bearings from vine and wire wrap, and dirt buildup next to the bearing seal. The bearing protector is sandwiched onto the shaft which rotates within a

MAINTENANCE

close clearance from the outer race of the bearing. Grease coming from the bearing oozes into the protecting collar, keeping dust and particles from entering the seal area, increasing the bearing life.

CLUTCH

Run-In

If the rake has not been used or has not been operated for one year, the following run-in procedure is recommended.

The Weasler Torqmaster clutch is a pre-set, nonadjustable friction disc clutch. Follow the directions below for run-in and clutch maintenance. See **Figure 13 (page 44) for Parts Identification**.

TOOLS REQUIRED:

(1) 1/2" box end wrench or socket and torque wrench.

1. Make sure tractor is off and the PTO disengaged.
2. Disconnect the drive line from the tractor.
3. Remove the clutch shield clamp and slide the shield over to expose the clutch.
4. Locate the six (6) bolts (Item 8) on the OD of the clutch pack. Loosen the bolts until they rotate freely, finger tighten each bolt, and then tighten each bolt one-half turn.
5. Replace shield back over the clutch and clamp in place.
6. Attach the driveline to the tractor and start the tractor. Engage the tractor PTO and run for a few seconds, or until the friction clutch visible smokes.
7. Disengage the tractor PTO and shut the tractor off observing the above mentioned precautions.
8. Disconnect the driveline from the tractor.
9. Tighten the six (6) bolts (Item 8) on the OD of the clutch pack until the compression plate (Item 4) is in contact with the housing. Then tighten each bolt to 30 ft. lbs.
10. Locate the four (4) bolts (Item 7) that attach the yoke and hub to the clutch pack and check that each bolt is tightened to 30 ft. lbs.
11. Replace the clutch shield and clamp in place.

FRICION DISC REPLACEMENT

1. Make sure tractor is off and the PTO is disengaged.
2. Disconnect the drive line from the tractor.
3. Remove the clutch shield clamp and slide the shield over to expose the clutch.
4. Remove the 5/8" hex bolts, securing clutch/PTO to the drive shaft and slide clutch off the drive shaft.
5. Remove the six (6) bolts (Item 8) on the OD of the clutch pack. Remove Items 3 through 6. Replace friction discs and reassemble.
6. Position clutch on drive shaft and secure in place with 5/8" hex bolts.
7. Follow procedure for clutch run-in before using rake.

MAINTENANCE

TOP BEARING HOUSING SERVICE

If it is necessary to service the bearing housing because of bearing or shaft failure, please follow these instructions. See **Figure 15 (page 48)**.



We suggest the bearings also be replaced when the shaft is replaced.

Removal

1. Remove chain from top sprocket, cotter pin, slotted nut, and washer.
2. Remove the clutch shield and side PTO.
3. Remove the four bolts holding the bearing housing to the chain case.
4. Remove plug and drain oil.
5. Slide shaft out of tube end of housing, while retaining sleeve and O-ring for reassembly.
6. Remove seals, these must be replaced. This will allow access to the taper bearings, which can now be removed. If races show signs of wear, they must be knocked out and new races pressed in.

Reassembly

1. Place taper bearings into cup.
2. Carefully press new seals in housing, open faces inward.
3. Insert shaft through tube end of housing.
4. Place O-ring over threaded end of shaft, seating O-ring against bearing.
5. Place sleeve over threaded end of shaft, seating O-ring against bearing.
6. Apply a liberal amount of silicone sealer to the inside of the flange. Attach the bearing housing to the chain case with the four bolts and lock nuts.
7. Slide the top sprocket, hub first on the shaft.
8. Replace washer, slotted nut, and cotter pin. Do not over tighten slotted nut. Shaft must turn freely.
9. Install chain, PTO, and clutch guard.

BEARING & ROLLER REPLACEMENT

Left Roller Bearing

1. Remove drive chain. Then remove lower sprocket by removing cotter pin, slotted hex nut, and belleville washer.
2. Remove the two bolts holding the chain case to the frame.

NOTICE

Have roller blocked up or supported and slide chain case and bearing off roller shaft.

NOTICE

The top drive shaft will come off with the chain case.

3. Remove (3) 1/4"-28 bolts from inside chain case that retain lower bearing.
4. Loosen bolt on the bearing tube that holds cartridge bearing in place. Remove bearing and O-ring.

To replace, reverse the procedure. Be sure all parts and wear surfaces are thoroughly clean and in good condition. Be sure O-ring is also in good condition.

MAINTENANCE

When replacing bearing, first put O-ring on bearing. Apply a coat of grease on O-ring. Slide bearing in and install three (3) 1/4"-28 X 3/4" bolts (apply 262 loc-tite and blue permatex) to retain bearing, thus keeping the oil in chain case from escaping through the bearing.

Right Roller Bearing

1. Remove the hex bolt and bearing cap from outside of bearing.
2. Loosen bolt on the bearing tube that holds cartridge bearing in place. Pry bearing tube apart to free bearing assembly.

NOTICE

Have roller blocked up or supported. Pry bearing off of shaft and out of bearing holder.

NOTICE

To Replace, reverse the procedure. Be sure all parts and wear surfaces are thoroughly clean and in good condition.

Roller Replacement

It will be necessary to have a lifting device or additional help while removing and replacing the roller. The roller weighs approximately 190 lbs.

1. Remove upper and lower chain case covers.
2. Remove sprocket tension spring and drive chain.
3. Remove lower sprocket by removing cotter pin, slotted nut, and washers.
4. Remove the sleeve behind the sprocket you just removed.

NOTICE

Have the roller blocked up or supported.

5. Remove the two bolts holding chain case to frame and slide chain case off of roller shaft. The roller bearing will stay in the chain case.

NOTICE

If chain case bearing is also being replaced, see "Left Roller Bearing" on page 22.

6. Loosen the bolt on the bearing tube of the non-drive end, sliding roller and bearing out of frame.
7. Remove hex bolt, bearing cap, bearing, and protective collar from roller.
8. On roller to be installed, place machine bushing and protective collar against end plate of roller.
9. Place bearing and bearing cap on roller.
10. Clamp in place with hex bolt and lock washer into end of roller shaft.
11. Slide roller and bearing into bearing tube on non-drive end of frame. Do not tighten bearing tube at this time.
12. Place machine bushing, protective collar, and O-ring from splined end of removed roller to replacement roller. Check O-ring for cuts or nicks.
13. Apply sealant to bearing area of shaft.
14. Slide chain case back onto roller and bolt to frame.
15. Replace sleeve, sprocket, and Belleville washer, cupped side in on drive shaft.
16. Clamp solid with the 1" slotted nut.

MAINTENANCE

17. Check that roller clears frame on both ends. Adjust, if required.
18. Tighten 3/8" bolt in bearing tube on non drive end of frame.
19. Reinstall chain and tension spring.
20. Replace lower cover, be careful not to pinch the O-ring.
21. Fill the chain case with 1.5 pints of #00 gear grease.
22. Replace upper cover.
23. Run power rake and watch for interference between roller and frame.

TROUBLE SHOOTING

Problem	Possible Cause	Solution
Roller will not turn.	<p>Tractor PTO not engaged.</p> <p>Clutch friction discs worn.</p> <p>Obstruction between roller and barrier.</p> <p>Chain broken.</p> <p>Gearbox damaged.</p>	<p>Check control lever.</p> <p>Check and replace.</p> <p>Check and clear obstruction.</p> <p>Replace chain.</p> <p>Check that output shaft rotates.</p>
Hydraulic cylinder inoperative.	<p>Hydraulic couplers not completely engaged.</p> <p>Insufficient oil in tractor hydraulic system.</p> <p>Air in hydraulic system.</p> <p>Broken hose.</p> <p>Worn, insufficient, or inadequate hydraulic pump.</p>	<p>Check connections.</p> <p>Check fluid level per tractor manual.</p> <p>Cycle lever back and forth several times to purge air.</p> <p>Check for leaks.</p> <p>Check flow and pressure output of tractor hydraulics.</p>
Flex model functions.	Cylinder not activating.	<p>Check 12 volt supply to control box.</p> <p>Check individual signal to each coil on manifold.</p> <p>Check that auxiliary hydraulic lever is activated.</p>
Oil leaks.	<p>Worn or damaged seal.</p> <p>Loose or damaged hoses or connections.</p> <p>Worn or damaged housing.</p>	<p>Inspect and replace.</p> <p>Check for leaks and repair or replace.</p> <p>Inspect and replace if required.</p>

ASSEMBLY/PARTS IDENTIFICATION

SET-UP INSTRUCTIONS

The power rake is shipped partially assembled. Assembly will be easier if components are aligned and loosely assembled before tightening hardware. Recommended torque values for hardware are located on page 4.

Select a suitable working area. Refer to illustrations, accompanying text, parts lists, and exploded view drawings.

For reference, front, back, left and right directions are determined by sitting in the tractor's operator's seat.

It is advisable to have a mechanical lifting device to facilitate uncrating.

UNPACKING CRATE

Be careful of nails in boards when uncrating.

1. Remove top, sides, and ends of crate.
2. Remove attachment plate.
3. Remove gauge wheel assemblies.
4. Remove right and left endplates.
5. Remove rake assembly from crate.
6. Remove loose nails from boards and dispose of crate according to local codes.

STANDARD MODEL ASSEMBLY PROCEDURE (See Figures 7 & 8)

Tools Required

15/16", 1-7/16", 1-1/2" combination wrench

1. Stand rake frame upright and position one endplate on each side of frame to stabilize the rake.
2. Attach the two gauge wheel assemblies to main frame using two 5/8" U-bolts and locking nuts.
3. Slide mast frame between yoke plate on frame, making sure pivot bushing is in place.
4. Install 1" X 6-1/2" bolt with washer on head end (bolt installed from under side of mast).
5. Extend jack stand to help stabilize rake.
6. Slide front PTO over gearbox shaft until hardware mounting holes are aligned with shaft groove. Install supplied 5/8" X 3" GR8 bolts and lock nuts and tighten.
7. Attach angle cylinder to mast frame.

ASSEMBLY/PARTS IDENTIFICATION

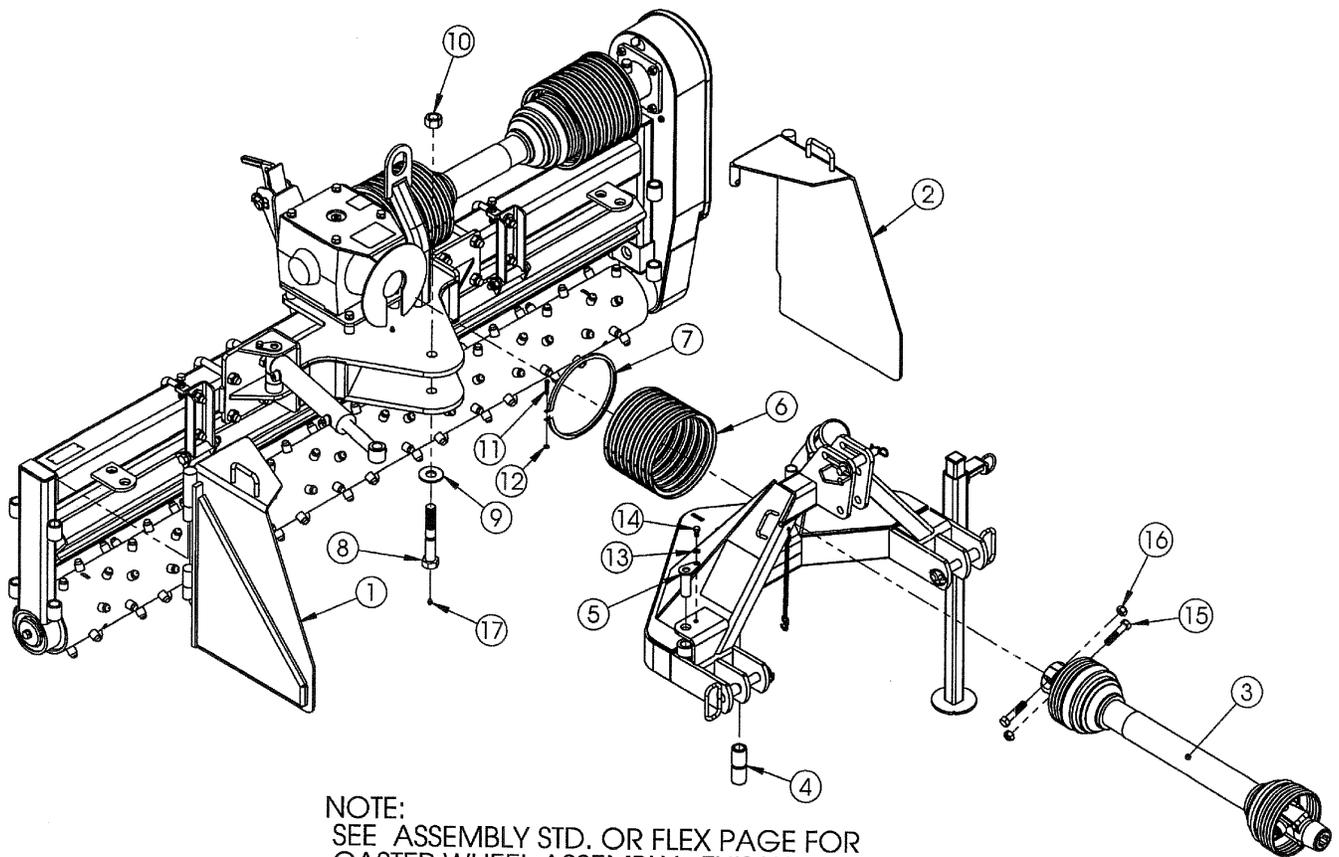
FLEX MODEL ASSEMBLY PROCEDURE (See Figures 7& 9)

Tools Required

15/16", 1-1/16", 1-7/16", 1-1/2" combination wrench

1. Stand rake frame upright and position one endplate on each side of frame to stabilize the rake.
2. Attach the two flex caster assemblies to the main frame using two 5/8" U-bolts and lock nuts.
3. Slide mast frame between yoke plate on frame, making sure pivot bushing is in place.
4. Install 1" X 6-1/2" bolt with washer on head end (bolt installed from under side of mast).
5. Extend jack stand to help stabilize rake.
6. Slide front PTO over gearbox shaft until hardware mounting holes are aligned with shaft groove. Install supplied 5/8" X 3" GR8 bolts and lock nuts and tighten.
7. Attach angle cylinder to mast frame.
8. Install hydraulic cylinders into flex caster arm assemblies using 3/4" bolts, spacers, and lock nuts. Do not over tighten.

ASSEMBLY - CRATE



NOTE:
SEE ASSEMBLY STD. OR FLEX PAGE FOR
CASTER WHEEL ASSEMBLY. THIS WILL
DEPEND UPON MACHINE PURCHASED.

Figure 7. Crate Assembly

ASSEMBLY - CRATE PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M8454PG	RIGHT END PLATE W/PIN
2	1	M8455PG	LEFT END PLATE W/PIN
3	1	P403500	MAIN PTO
4	1	M18044	PIVOT BUSHING
5	1	M27106	3" LOCK PIN
6	1	M27107	DRIVE SHIELD
7	1	P128605	SHIELD CLAMP
8	1	M27103	1" X 6-1/2" PIVOT BOLT
9	1	P850116	1" ZINC FLAT WASHER
10	1	P156401	1"-14 TOP LOCK NUT
11	1	P115406	1/4"-20 X 1-1/2" FILLISTER HEAD SCREW
12	1	P158003	1/4"-20 NYLOCK NUT
13	1	P851106	3/8" LOCK WASHER
14	1	P100603	3/8"-16 X 3/4 HEX BOLT
15	2	P102011	5/8"-11 X 2-3/4 HEX BOLT GR8
16	2	P157500	5/8"-11 TOP LOCK NUT
17	1	P620200	1/4"-28 STRAIGHT GREASE FITTING

ASSEMBLY - STANDARD MODEL

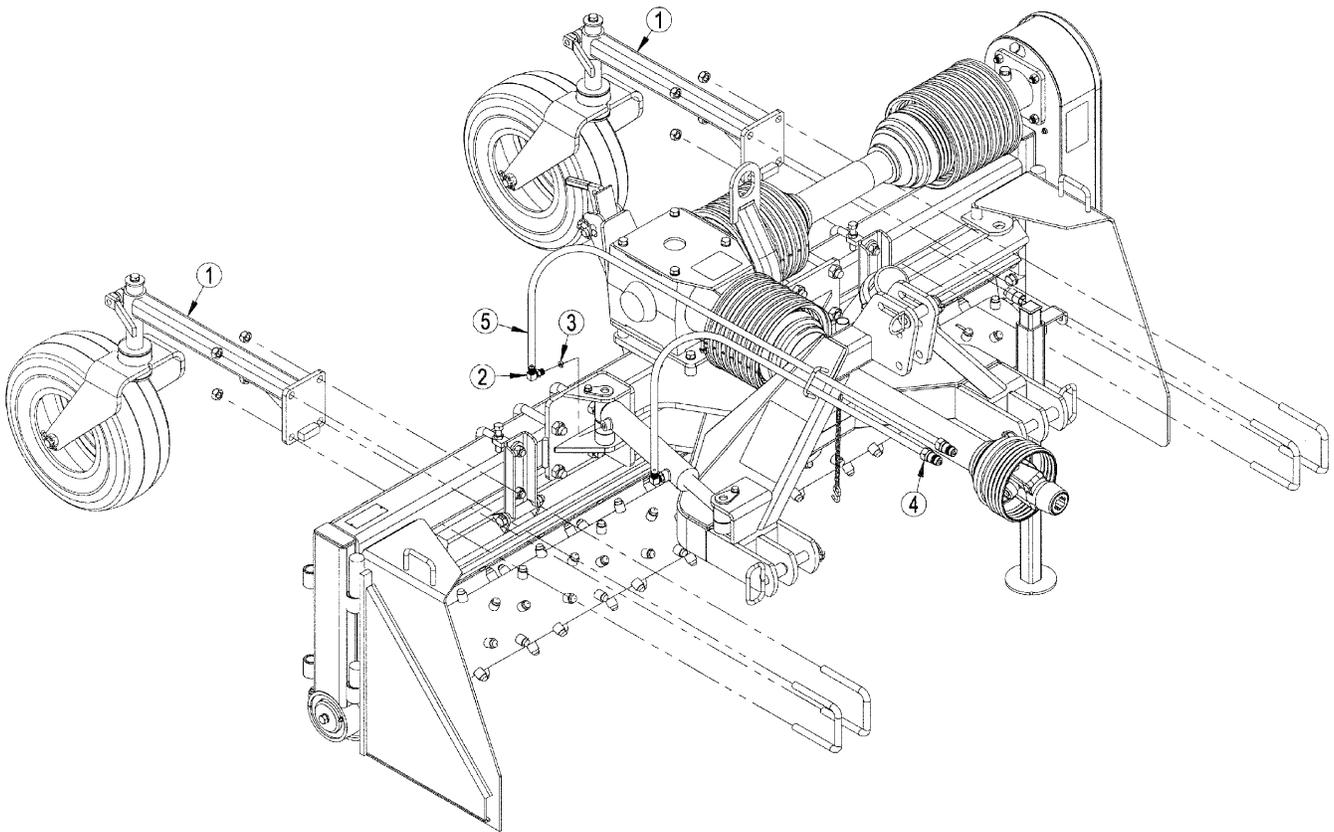


Figure 8. Standard Model Assembly

ASSEMBLY - STANDARD MODEL PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	2	M27022	CASTER WHEEL ASSEMBLY
2	2	P261350	6MJ-6MB90° ELBOW
3	1	P270400	6MB RESTRICTOR PLUG
4	2	P272661	COUPLER: NV12-58SAE-M
5	2	P248072	3/8" HOSE X 72" 10MB-6FJX

ASSEMBLY - FLEX MODEL

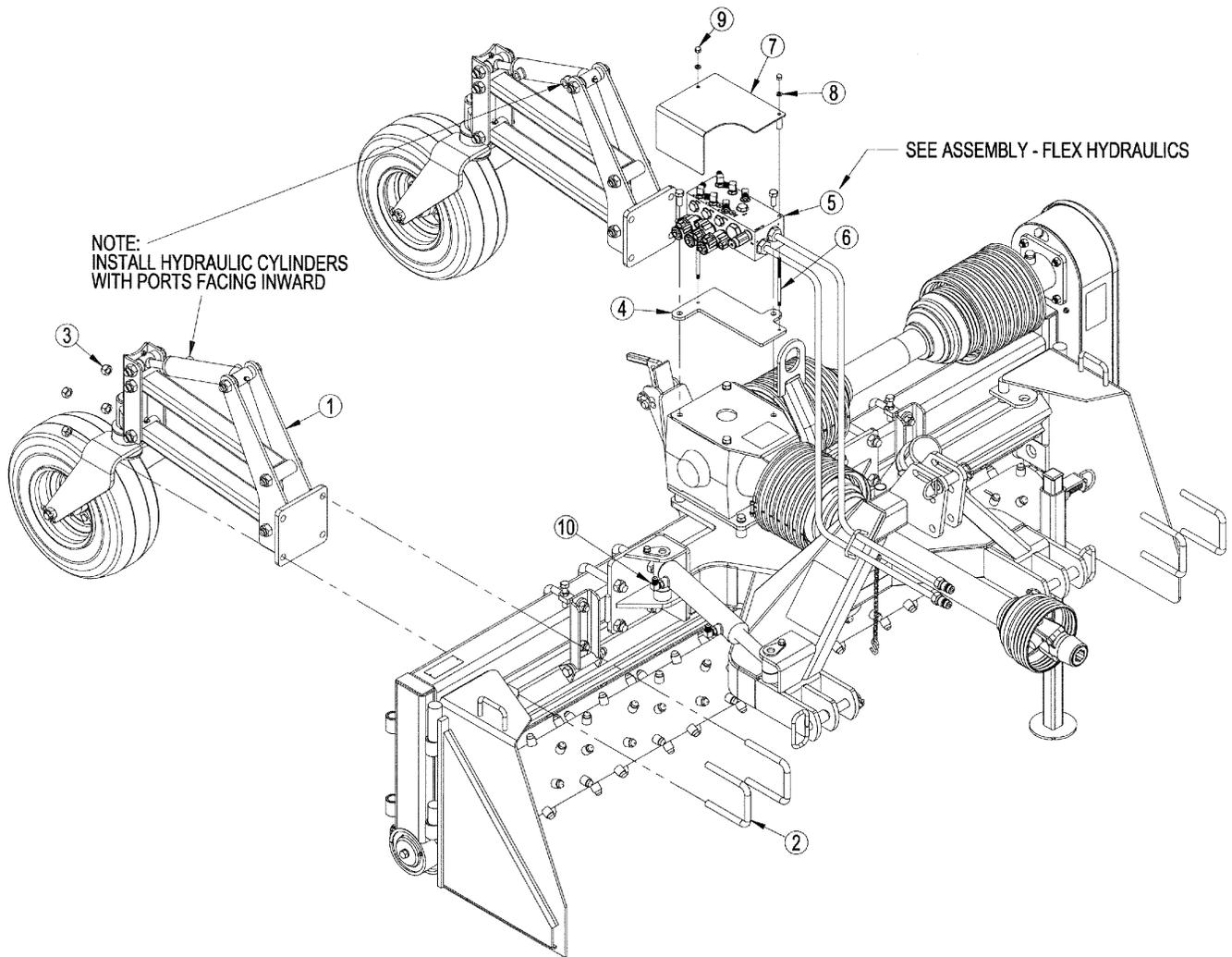


Figure 9. Flex Model Assembly

ASSEMBLY - FLEX MODEL PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	2	M27023	PIVOTING CASTER ASSEMBLY
2	4	P128450	5/8" X 4-5/8" X 5-1/4" U-BOLT
3	8	P157500	5/8"-11 TOP LOCK NUT
4	1	M27111PG	VALVE MOUNT PLATE
5	1	M27110	FLEX HYDRAULIC ASSEMBLY
6	2	M40096	VALVE THREADED ROD
7	1	M27113PG	VALVE GUARD ASSEMBLY
8	2	P851105	5/16" LOCK WASHER
9	2	P155402	5/16" ACORN NUT
10	2	P261350	6MJ-6MB90° ELBOW

ASSEMBLY - GENERAL

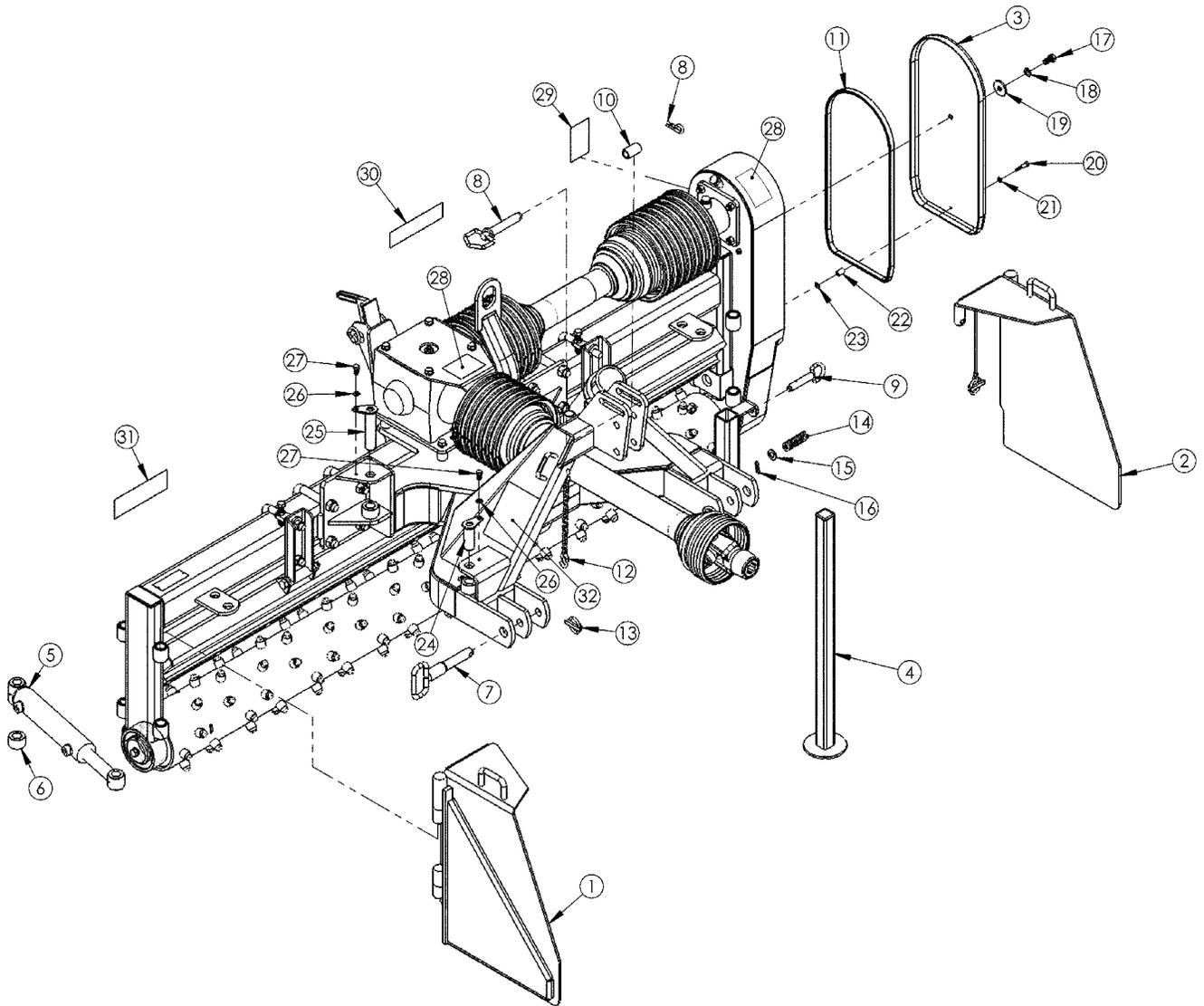


Figure 10. General Assembly

ASSEMBLY - GENERAL PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M8454PG	RIGHT END PLATE W/PIN
2	1	M8455PG	LEFT END PLATE W/PIN
3	1	M8823	COVER
4	1	M8225PG	JACK STAND
5	1	P257600	HYDRAULIC CYLINDER 2" X 8"
6	1	M27100	MAST CYLINDER SPACER
7	2	M27108	CATEGORY 1-2 PIN
8	1	P121200	HITCH PIN
9	1	M8263	JACK PIN
10	1	P126250	CATEGORY 1-2 TOP LINK BUSHING
11	1	M10464	COVER SEAL
12	1	M27109	PTO SUPPORT CHAIN
13	2	P126207	7/16" LYNCH PIN
14	1	P604500	3" COMPRESSION SPRING
15	1	P852001	16MM WASHER
16	1	P116204	1/8" X 1" COTTER PIN
17	1	P100804	1/2" X 1" HEX BOLT
18	11	P851108	1/2" LOCK WASHER
19	1	M5009-5	SPECIAL WASHER
20	1	P100406	1/4" X 1-1/2" HEX BOLT
21	1	P500300	1/4" SEALING WASHER
22	1	P481010	SPACER
23	1	P500302	1/4" RUBBER FACE WASHER
24	1	M27106	3" LOCK PIN
25	1	M27104	5" LOCK PIN
26	2	P851106	3/8" LOCK WASHER
27	2	P100603	3/8"-16 X 3/4" HEX BOLT
28	2	P970300	DECAL: DANGER ROTATE
29	1	P970003	DECAL: LUBRICATION
30	1	P975800	DECAL: HARLEY
31	1	P970251	DECAL: DANGER ROLLER
32	1	P970250	DECAL: DANGER ROLLER

ASSEMBLY - GENERAL PARTS LIST

LIST 1 OF 2

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M27017	Mast Weldment
2	1	M27018	Pivot Mount Weldment
3	1	P205100	Gearbox
4	1	P403500	Main PTO Drive
5	1	P403550	Side PTO W/Clutch
6	1	M27032PG	Gearbox Mount
7	1	M6555PG	Barrier Adjustment Bar
8	1	M27038PG	Gearbox Shield Assembly
9	1	M18044	Pivot Bushing
10	1	M27036PG	Manual Barrier Mount
11	1	M17008	Barrier
12	1	M17009PG	Barrier Strap
13	2	M27041PG	Barrier Pivot Guide
14	1	M27103	1" X 6-1/2" Pivot Bolt
15	2	M18188PG	U-Bolt Strap
16	1	P136000	Manual Tube
17	3	P128605	Shield Clamp
18	1	M27042	Shield Mount
19	1	M6262	Clutch Shield
20	2	M27107	Drive Shield
21	1	P121200	Hitch Pin
22	1	P126250	Category 1-2 Top Link Bushing
23	1	M6556	Barrier Pin Assembly
24	1	P120150	3/4" X 3" Clevis Pin
25	1	P622610	3/4" Ring Rue Cotter
26	2	P128450	5/8"-11 X 4-5/8" X 5-1/4" U-Bolt
27	4	P129500	3/4"-10 X 4-3/4" X 5-1/2" U-Bolt
28	1	P128510	5/16" U-Bolt
29	1	P102012	5/8"-11 X 3 " Hex Bolt GR8
30	2	P102011	5/8"-11 X 2-3/4" Hex Bolt
31	6	P100805	1/2"-13 X 1-1/4" Hex Bolt
32	2	P100806	1/2"-13 X 1-1/2" Hex Bolt
33	2	P098810	1/2"-13 X 2-1/2" Hex Bolt
34	2	P100813	1/2"-13 X 3-1/4" Hex Bolt
35	1	P850116	1" Zinc Flat Washer
36	9	P157500	5/8"-11 Top Lock Nut
37	11	P851108	1/2" Lock Washer
38	8	P157120	3/4"-10 Top Lock Nut
39	1	P156401	1"-14 Top Lock Nut
40	2	P157200	1/2"-13 Hex Jam Nut

ASSEMBLY - GENERAL PARTS LIST

LIST 2 OF 2

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
41	1	P955850	Square Cap 1/2" X 3"
42	2	P101020	5/8"-11 X 5" Hex Bolt
43	3	P102403	1/4"-28 X 3/4" Hex Bolt
44	3	P850104	1/4" Flat Washer
45	2	P278001	Breather Plug
46	14	P155350	5/16"-18 Top Lock Nut
47	3	P115406	1/4"-20 X 1-1/2" Fillister Head Bolt
48	3	P158003	1/4"-20 Nylock Nut
49	1	P620000	1/4"-28 X 45° Grease Fitting
50	2	P620200	1/4"-28 Straight Grease Fitting
51	12	P104506	5/16"-18 X 1-1/2" Carriage Bolt
52	1	P970100	Decal: Tractor Warning
53	1	P975960	Decal: TM-7 Cover
54	1	P970301	Decal: Danger Rotate

ASSEMBLY - ROLLER FRAME

DIAGRAM 1 OF 2

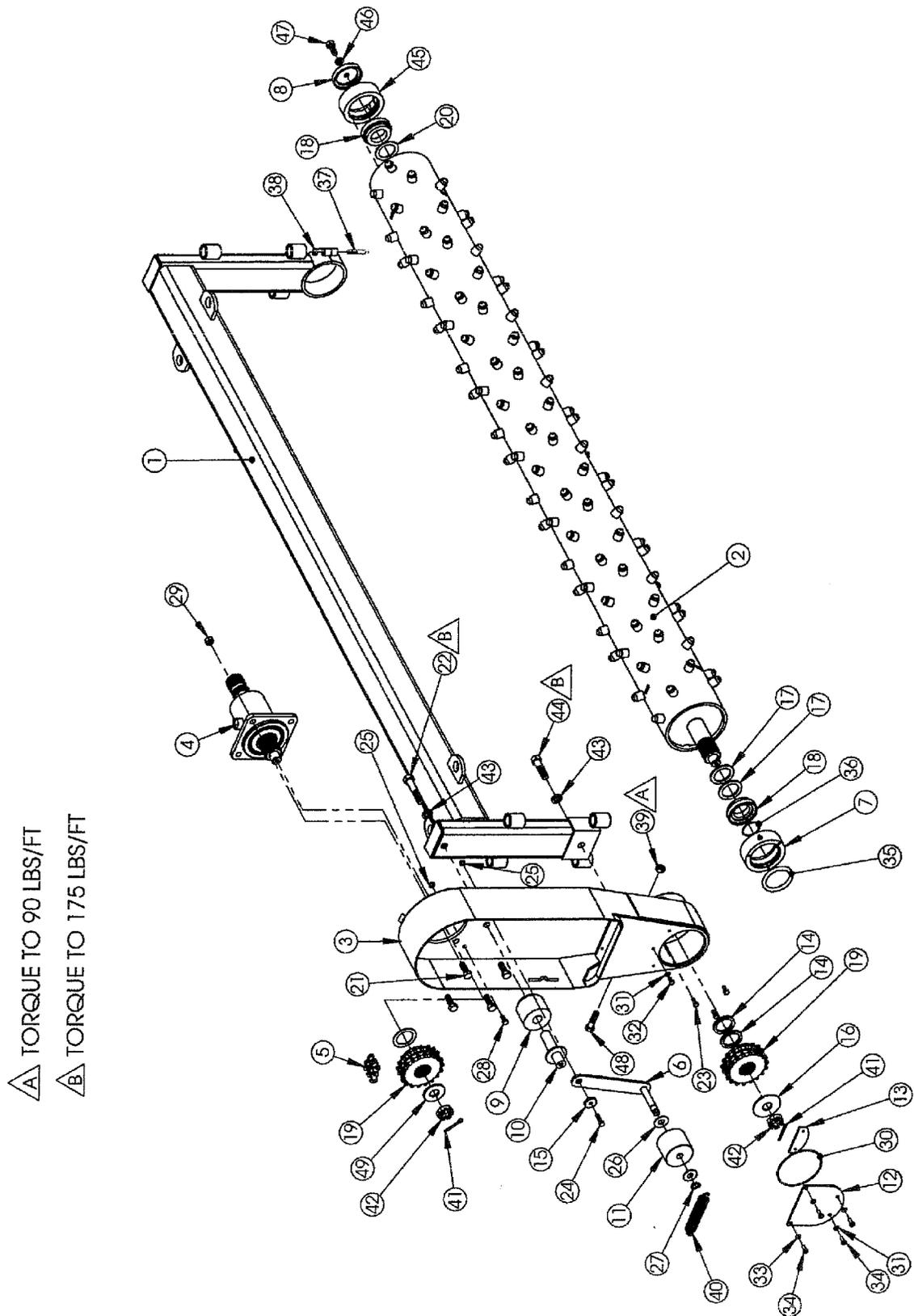


Figure 12. Roller Frame Assembly

ASSEMBLY - ROLLER FRAME PARTS LIST

LIST 1 OF 2

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M27019	MAIN FRAME
2	1	M27020	CARBIDE TOOTH ROLLER
3	1	M27025	CHAIN CASE
4	1	M27027	BEARING HOUSING ASSEMBLY
5	2	M27105	#60-2 HEAVY CHAIN
6	1	M18120	TENSION ARM
7	1	M27137	1-3/4" CYLINDER BEARING ASSEMBLY
7A	1	M27094	1-3/4" BEARING HOUSING
7B	1	P012201	1-3/4" BEARING
8	1	M27093	1-3/4" BEARING CAP
9	1	M8816	CENTER IDLER
10	1	M8817	CENTER BOSS
11	1	M8812	TENSION IDLER
12	1	M8241PG	LOWER COVER ASSEMBLY
13	1	M8272	COVER TAB
14	2	M16056	.218" X 1-3/4" X 2-1/4" SPACER
15	1	M6630	PIVOT BUSHING
16	1	P858000	1" ID X 3" OD BELLEVILLE WASHER
17	2	P855128	10" GA X 1-3/4" MACHINE BUSHING
18	2	P015309	1-3/4" NON-LOCKING COLLAR
19	2	P661810	18T .75P SPROCKET
20	1	P855328	14" GA X 1-3/4" MACHINE BUSHING
21	4	P100806	1/2" X 1-1/2" HEX BOLT
22	1	P101013	5/8" X 3-1/4" HEX BOLT
23	3	P102403	1/4"-28 X 3/4" HEX BOLT
24	1	P100505	5/16"-18 X 1-1/4" HEX BOLT
25	2	P155350	5/16" TOP LOCK NUT
26	1	P850609	9/16" FLAT WASHER
27	1	P952224	5/8" HEAVY SNAP RING
28	1	P100503	5/16"-18 X 3/4" HEX BOLT
29	4	P155850	1/2"-13 TOP LOCK NUT
30	1	P500202	3/32" X 4-3/4" O-RING
31	3	P500300	1/4" SEALING WASHER
32	1	P100402	1/4" X 1/2" HEX BOLT
33	2	P851104	1/4" LOCK WASHER
34	4	P110901	1/4" X 3/4" BUTTON HEAD SCREW
35	1	P500203	3/8" X 2-5/8" O-RING
36	1	P500175	1/16" X 1-3/4" O-RING
37	1	P100608	3/8" X 2" HEX BOLT
38	1	P155450	3/8" TOP LOCK NUT

ASSEMBLY - ROLLER FRAME

DIAGRAM 2 OF 2

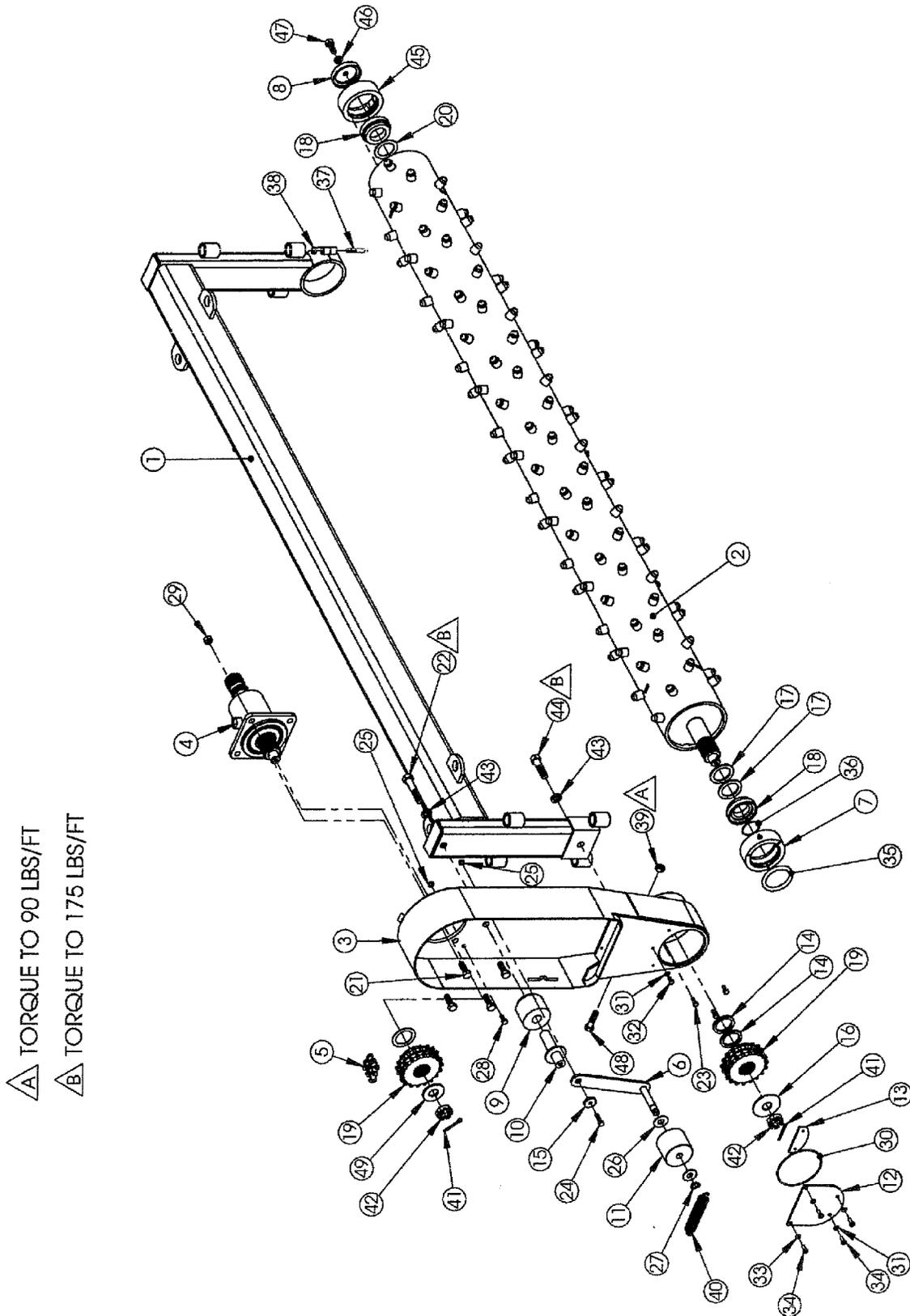


Figure 12. Roller Frame Assembly

ASSEMBLY - ROLLER FRAME PARTS LIST

LIST 2 OF 2

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
39	1	P155852	1/2"-20 TOP LOCK NUT
40	1	P604900	EXTENSION SPRING
41	2	P116306	3/16" X 1-1/2" COTTER PIN
42	2	P156402	1"-14 SLOTTED HEX JAM NUT
43	2	P851110	5/8" LOCK WASHER
44	1	P101010	5/8"-11 X 2-1/2" HEX BOLT
45	1	M27136	1-3/4" CYLINDRICAL BEARING ASSEMBLY
45A	1	P015215	1-3/4" BEARING HOUSING
45B	1	P012201	1-3/4" BEARING
46	1	P851108	1/2" LOCK WASHER
47	1	P102805	1/2"-20 X 1-1/4" FINE THREAD HEX BOLT
48	1	P102808	1/2" X 2" FINE THREAD HEX BOLT
49	1	M5464	1" HEAVY WASHER

ASSEMBLY - CLUTCH

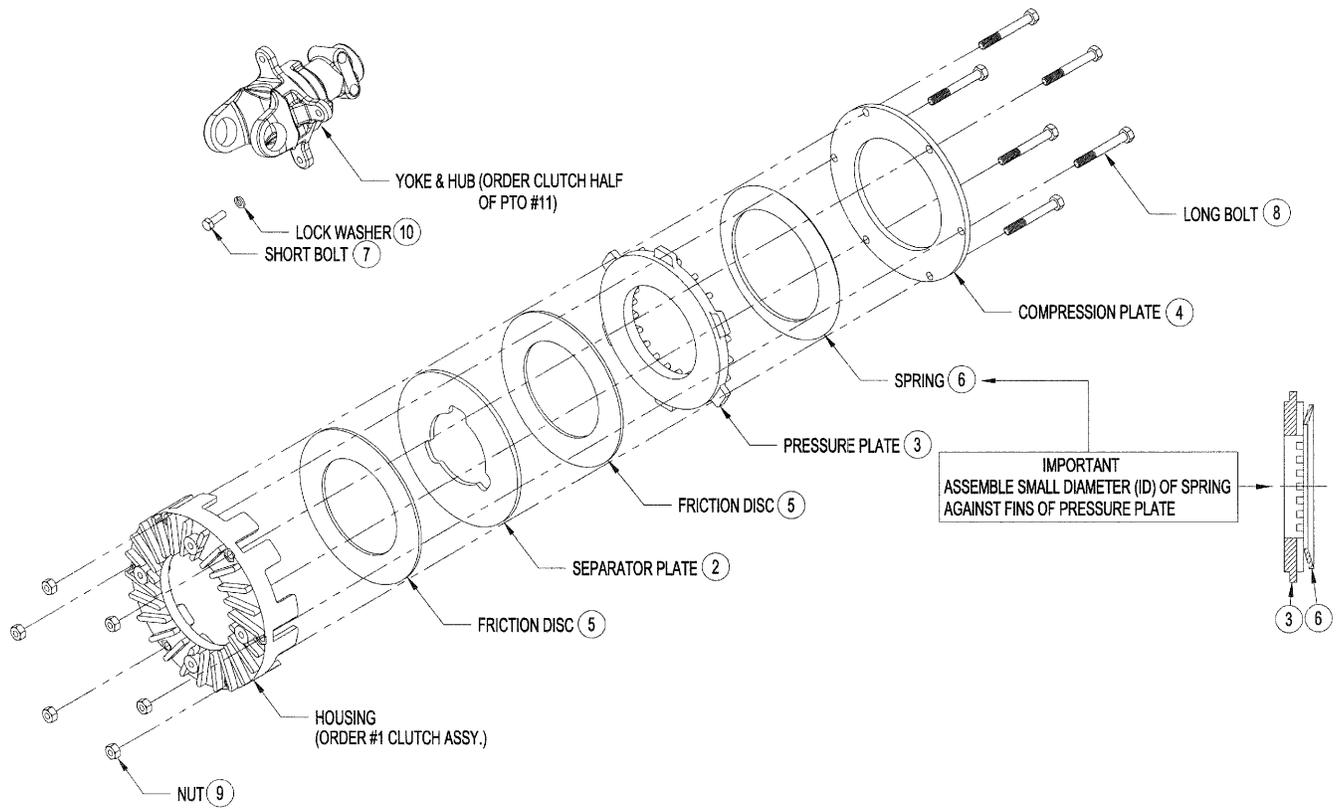


Figure 13. Clutch Assembly

ASSEMBLY - CLUTCH PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	P403555	CLUTCH ASSEMBLY W/O HUB
2	1	P400752	SEPARATOR
3	1	P400753	PRESSURE PLATE
4	1	P400754	COMPRESSION PLATE
5	2	P400755	FRICTION DISC
6	1	P400757	SPRING (15.000)
7	4	P400760	5/16" X 1" HEX BOLT GR8
8	6	P400761	5/16" X 2-1/2" HEX BOLT GR8
9	6	P150500	5/16" HEX NUT
10	4	P851105	5/16" LOCK WASHER
11	1	P403550-1	SIDE PTO CLUTCH HALF

ASSEMBLY - PTO DRIVELINE

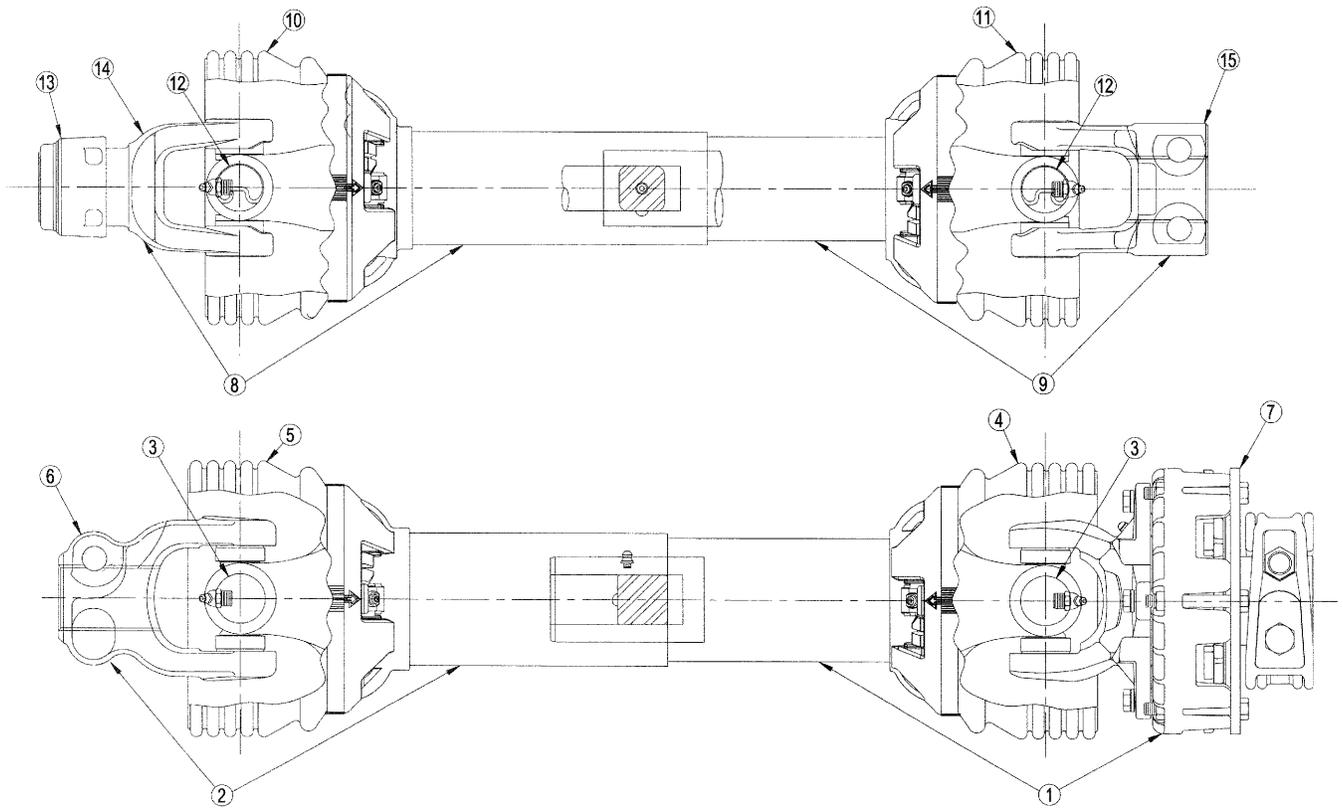


Figure 14. PTO Driveline Assembly

ASSEMBLY - PTO DRIVELINE PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	P403550-1	SIDE PTO CLUTCH HALF
2	1	P403550-2	SIDE PTO GEARBOX HALF
3	2	P403552	44E REPAIR KIT
4	1	P403554	INNER GUARD
5	1	P403553	OUTER GUARD
6	1	P403551	SIDE GEARBOX YOKE
7	1	P403555	CLUTCH ASSEMBLY W/O HUB
8	1	P403500-1	FRONT PTO TRACTOR HALF
9	1	P403500-2	FRONT PTO GEARBOX HALF
10	1	P403504	OUTER GUARD
11	1	P403505	INNER GUARD
12	2	P403503	35E REPAIR KIT
13	1	P403501	SSL/AUTO-LOK REPAIR KIT
14	1	P403502	LOCK YOKE ASSEMBLY
15	1	P403506	GEARBOX YOKE

ASSEMBLY - BEARING HOUSING

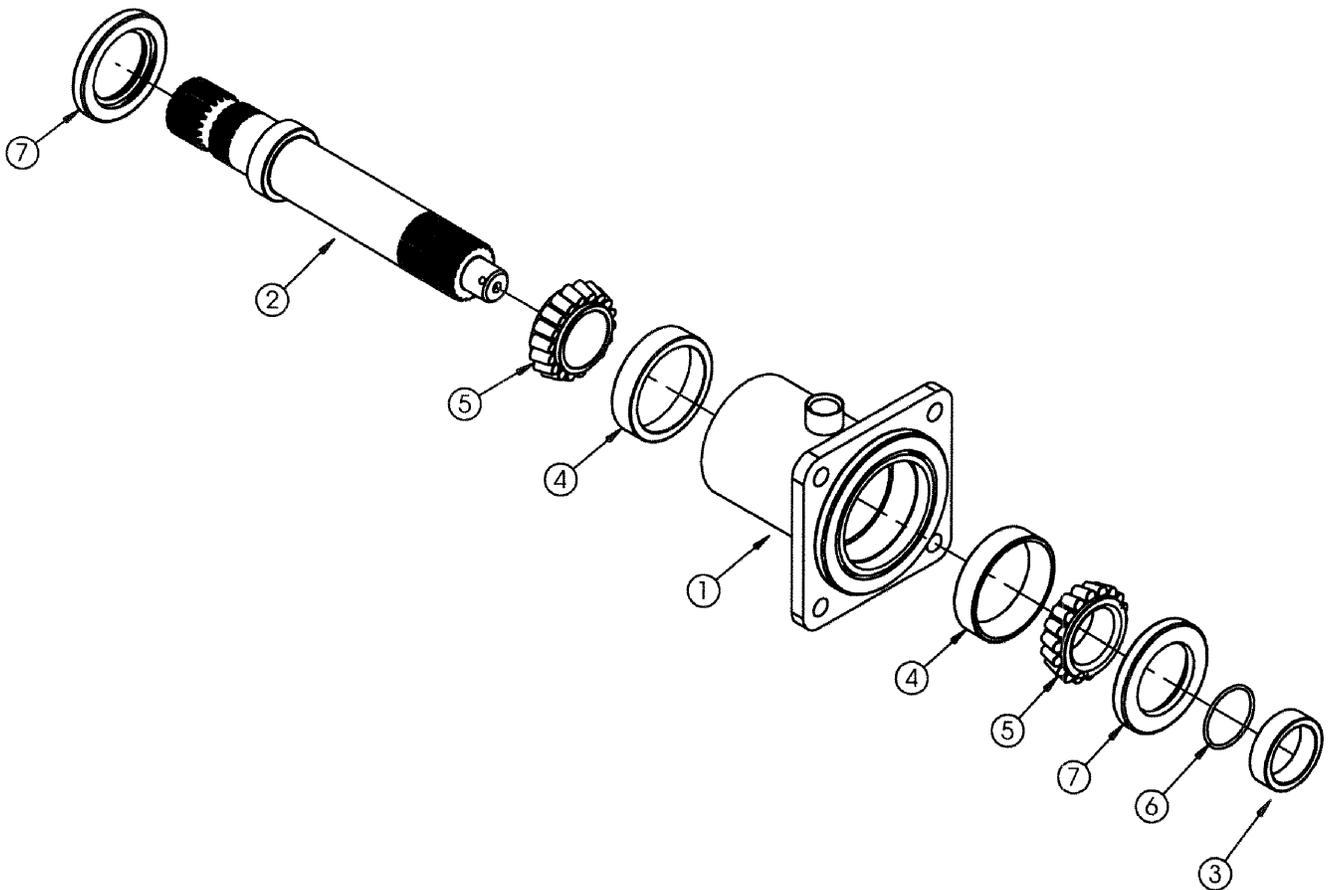


Figure 15. Bearing Housing Assembly

ASSEMBLY - BEARING HOUSING PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M27037	BEARING HOUSING
2	1	M27090	DRIVE SHAFT 1-3/4" OD 20T 12-24P
3	1	M27101	SPACER TOP SHAFT
4	2	P761900	BEARING CUP
5	2	P761800	BEARING CONE
6	1	P500210	1-3/4" ID X 3/32" O-RING
7	2	P756162	SEAL

ASSEMBLY - STANDARD CASTER WHEEL

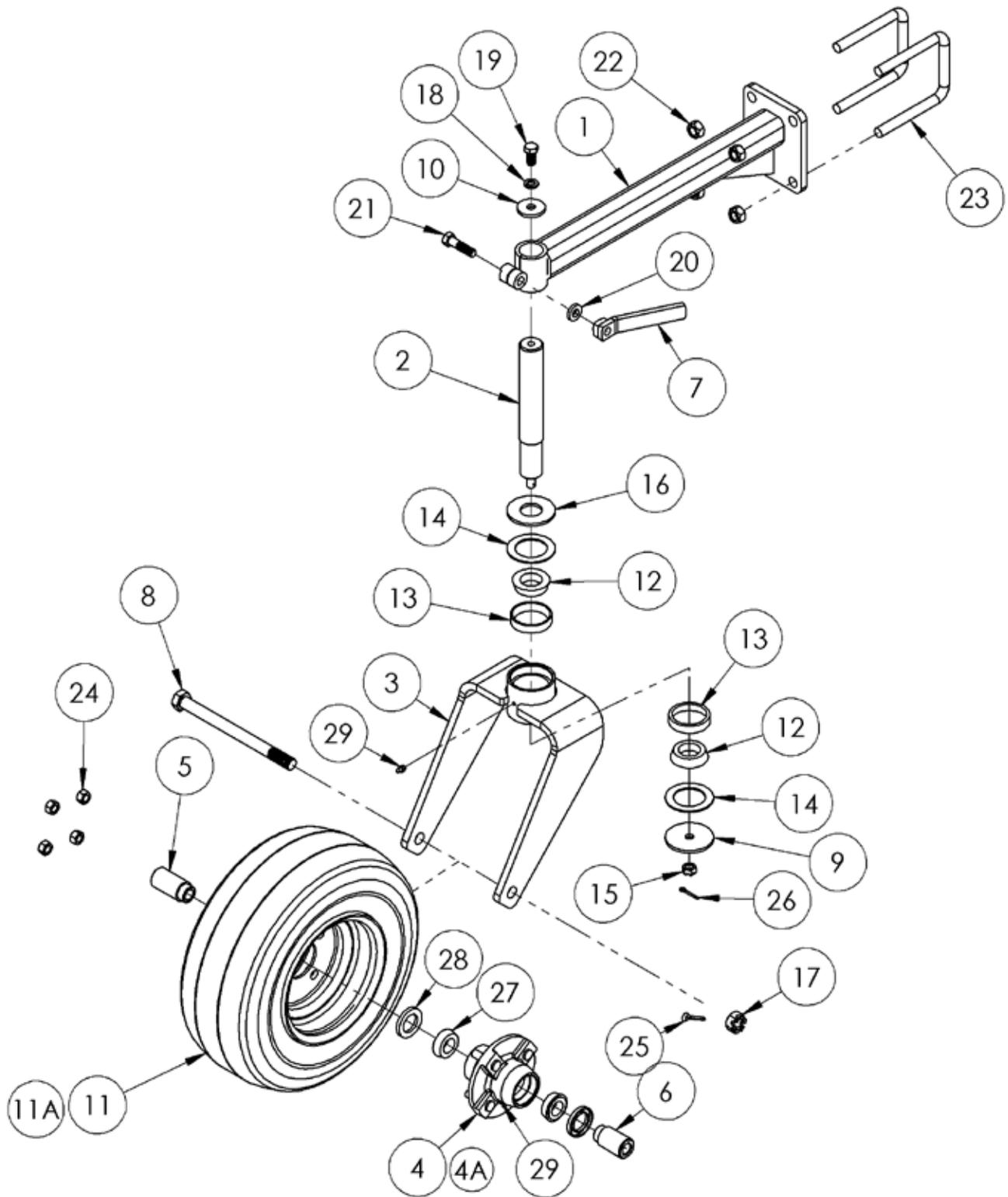


Figure 16. Standard Caster Wheel Assembly

ASSEMBLY - STANDARD CASTER WHEEL PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M27040PG	CASTER SUPPORT ARM
2	1	M16011	CASTER SHAFT
3	1	M6817PG	CASTER FORK WELDMENT
4	1	M16158	CASTER HUB W/STUDS
4A	1	M16120	CASTER HUB ASSEMBLY COMPLETE
5	1	M16108	AXLE SPACER LONG
6	1	M16109	AXLE SPACER SHORT
7	1	M6415PG	CASTER HANDLE
8	1	M10463	3/4"-16 X 9-1/2" FINE THREAD HEX BOLT
9	1	M6223	3/16" X 1/2" ID X 3" OD WASHER
10	1	M5009-5	SPECIAL WASHER
11	1	P756160	WHEEL & TIRE
11A	1	M16107	WHEEL, TIRE, & HUB
12	2	P760300	BEARING CONE
13	2	P760500	BEARING CUP
14	2	P852200	3/32" X 2" ID X 3" OD FELT WASHER
15	1	P158006	1/2"-13 SLOTTED HEX NUT
16	1	P850620	1-1/4" FLAT ZINC WASHER
17	1	P158000	3/4"-16 SLOTTED HEX NUT
18	1	P851108	1/2" LOCK WASHER
19	1	P100804	1/2" X 1" HEX BOLT
20	1	P852608	1/2" HARD WASHER
21	1	P102808	1/2" X 2" FINE THREAD HEX BOLT
22	4	P157500	5/8"-11 TOP LOCK NUT
23	2	P128450	5/8" X 4-5/8" X 5-1/4" U-BOLT
24	4	P756165	1/2"-20 WHEEL NUT
25	1	P116256	5/32" X 1-1/2" COTTER PIN
26	1	P116204	1/8" X 1" COTTER PIN
27	2	P762200	1" BEARING CONE
27A	2	P762100	INNER WHEEL CUP
28	2	P756163	GREASE SEAL
29	2	P620200	1/4"-28 STRAIGHT GREASE FITTING

ASSEMBLY - FLEX CASTER

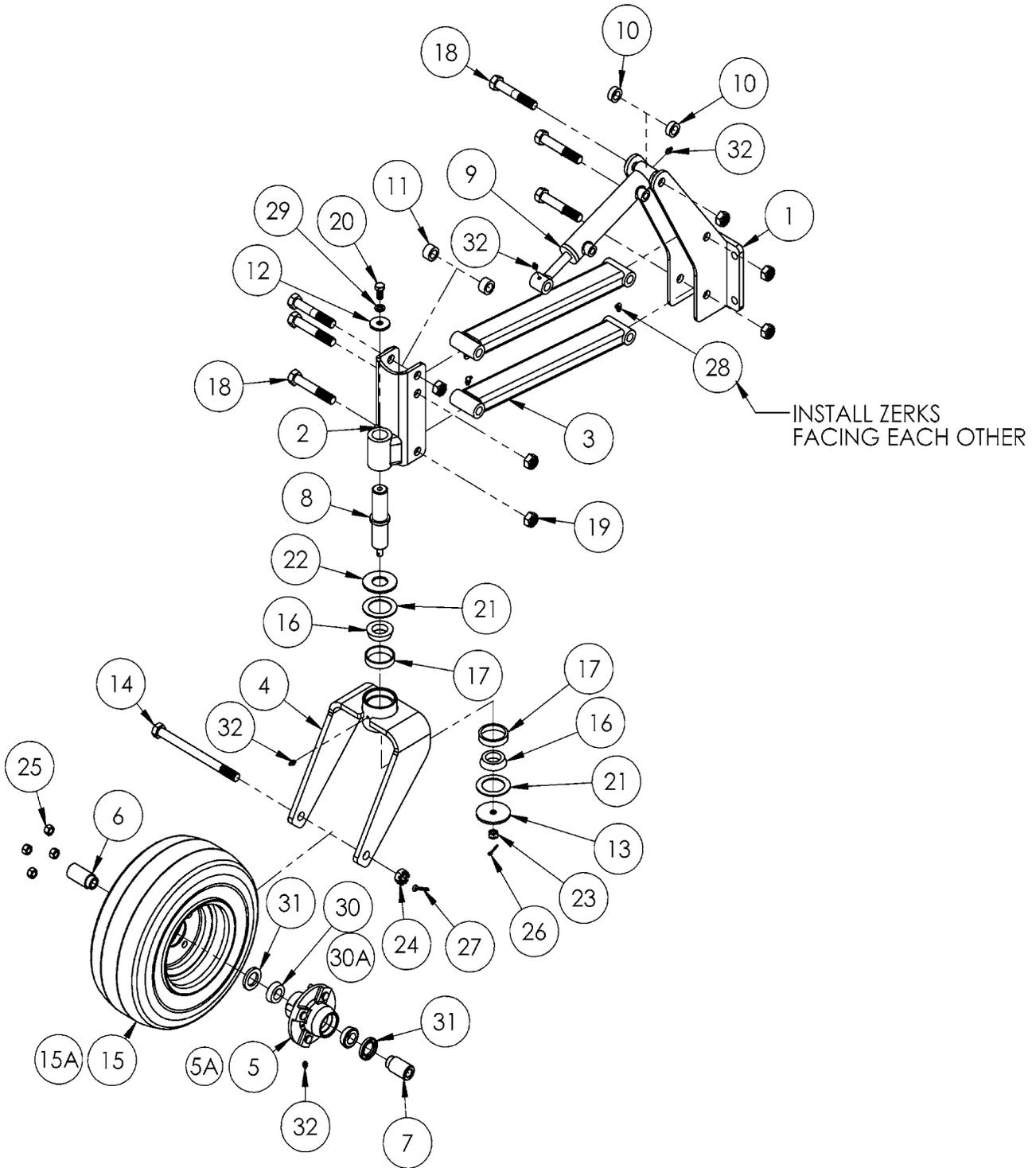


Figure 17. Flex Caster Assembly

ASSEMBLY - FLEX CASTER PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M27033PG	CASTER ARM MOUNT ASSEMBLY
2	1	M27035PG	CASTER ARM END ASSEMBLY
3	2	M27034PG	CASTER ARM
4	1	M6817PG	CASTER FORK WELDMENT
5	1	M16158	CASTER HUB W/STUDS
5A	1	M16120	CASTER HUB ASSEMBLY
6	1	M16108	AXLE SPACER LONG
7	1	M16109	AXLE SPACER SHORT
8	1	M27087	PIVOTING CASTER SHAFT
9	1	P256250	HYDRAULIC CYLINDER
10	2	M27096	CASTER CYLINDER SPACER
11	2	M27097	CASTER CYLINDER SPACER
12	1	M5009-5	SPECIAL WASHER
13	1	M6223	3/16" X 1/2" ID X 3" OD WASHER
14	1	M10463	3/4"-16 X 9-1/2" FINE THREAD HEX BOLT
15	1	P756160	WHEEL & TIRE
15A	1	M16107	WHEEL, TIRE, & HUB
16	2	P760300	BEARING CONE
17	2	P760500	BEARING CUP
18	6	P101218	3/4"-10 X 4-1/2" HEX BOLT
19	6	P157120	3/4"-10 TOP LOCK NUT
20	1	P100804	1/2" X 1" HEX BOLT
21	2	P852200	3/32" X 2" ID X 3" OD FELT WASHER
22	1	P850620	1-1/4" FLAT ZINC WASHER
23	1	P158006	1/2"-13 SLOTTED HEX NUT
24	1	P158000	3/4"-16 SLOTTED HEX NUT
25	4	P756165	1/2"-20 WHEEL NUT
26	1	P116204	1/8" X 1" COTTER PIN
27	1	P116256	5/32" X 1-1/2" COTTER PIN
28	4	P620100	1/4"-28 GREASE FITTING 90°
29	1	P851108	1/2" LOCK WASHER
30	2	P762200	1" BEARING CONE
30A	2	P762100	INNER WHEEL CUP
31	2	P756163	GREASE SEAL
32	4	P620200	1/4"-28 STRAIGHT GREASE FITTING

ASSEMBLY - FLEX HYDRAULIC

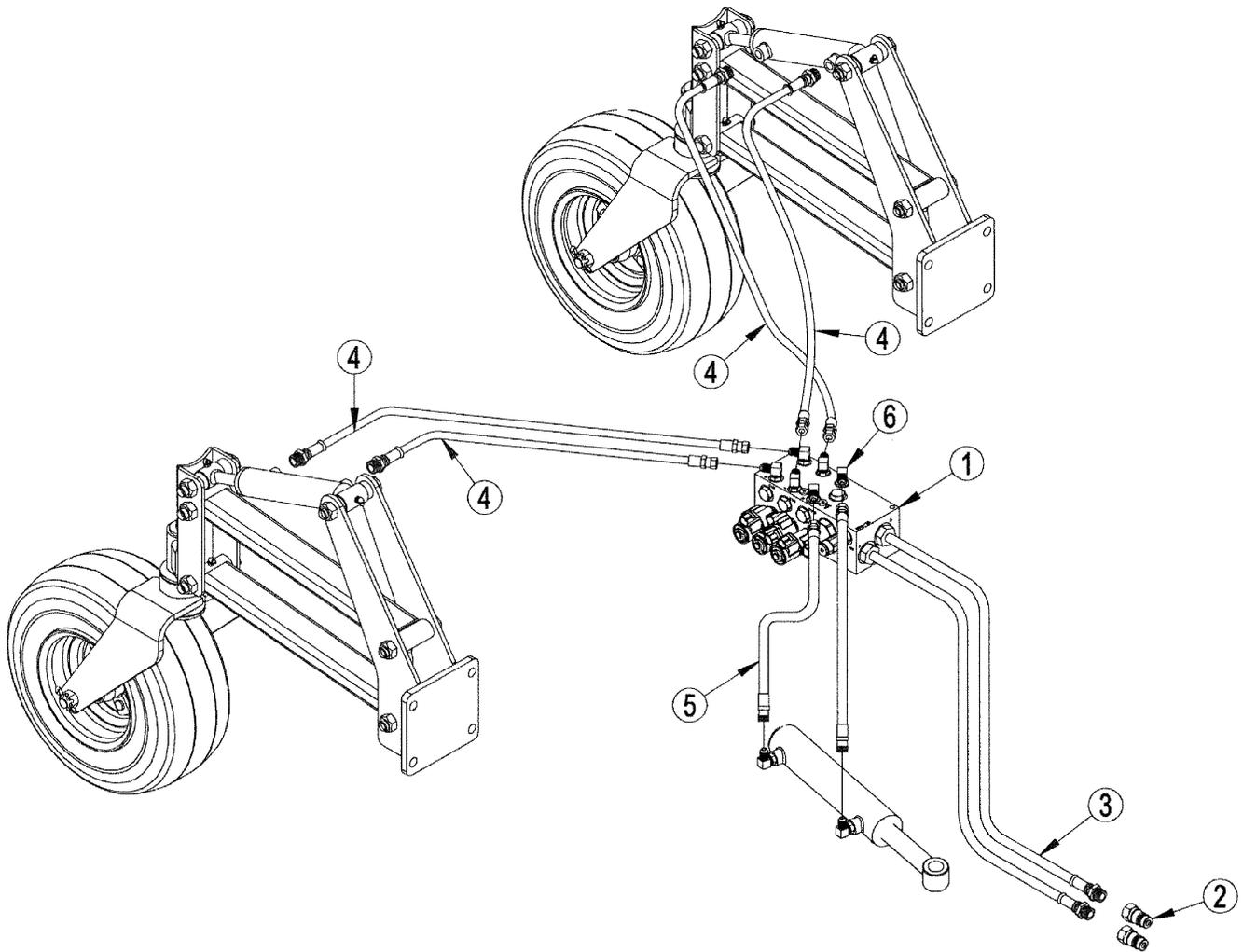


Figure 18. Flex Hydraulic Assembly

ASSEMBLY - FLEX HYDRAULIC PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	P292000	VALVE: POWER SYSTEM 06-0103
2	2	P272661	COUPLER NV12-58SAE-M
3	2	P252566	1/2" HOSE: 12MB-10MB (66")
4	4	P246240	1/4" HOSE: 6MB-6FJX (40")
5	2	P246150	1/4" HOSE: 6FJX-6FJX (36")
6	6	P261350	6MJ-6MB90° ELBOW

ASSEMBLY - FLEX HYDRAULIC

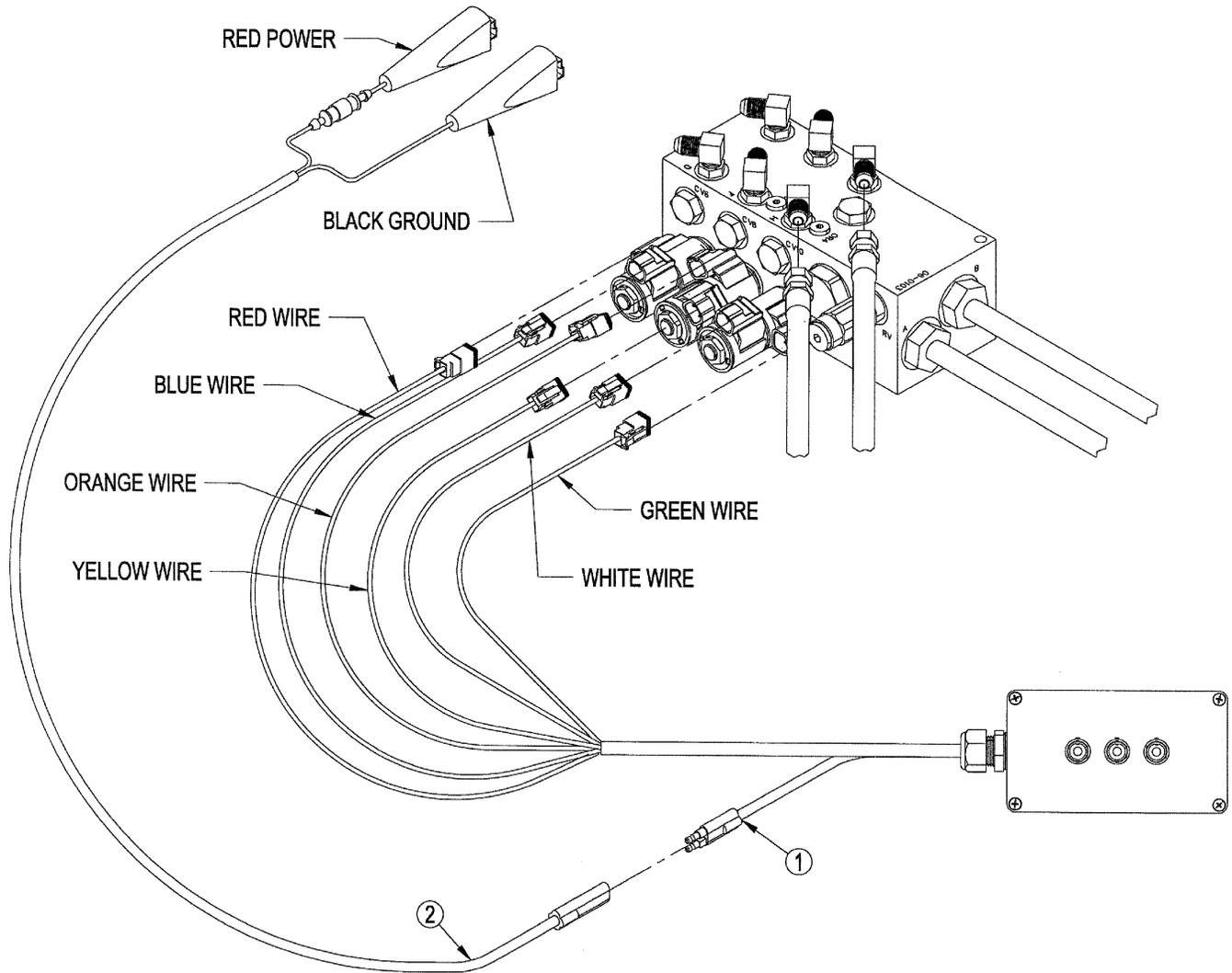


Figure 19. Flex Hydraulic Assembly

ASSEMBLY - FLEX HYDRAULIC PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	M27112	WIRE HARNESS
2	1	M40010	POWER CABLE 120"

ASSEMBLY - FLEX ELECTRICAL

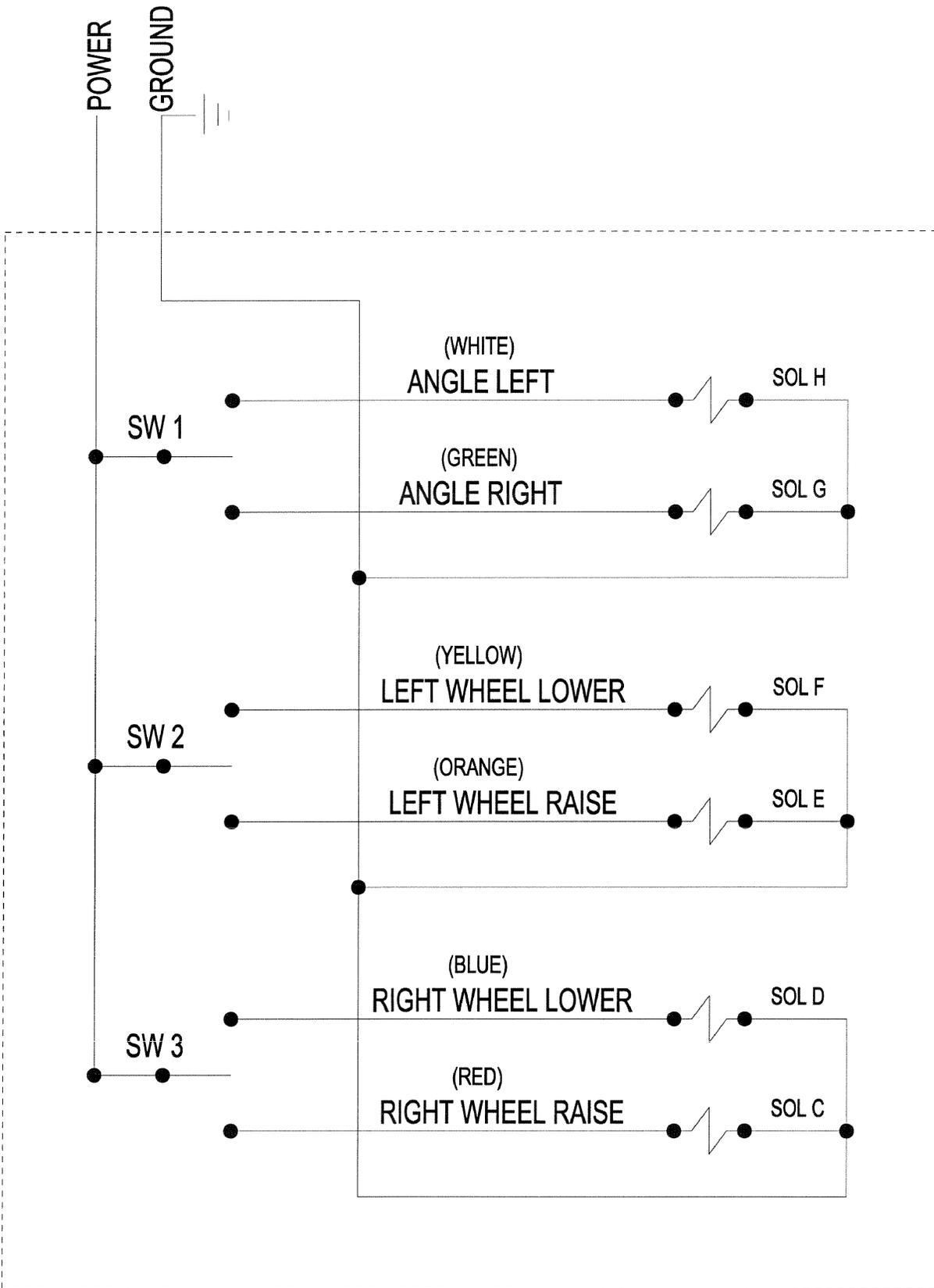


Figure 20. Flex Electrical Assembly

ASSEMBLY - HYDRAULIC SCHEMATIC

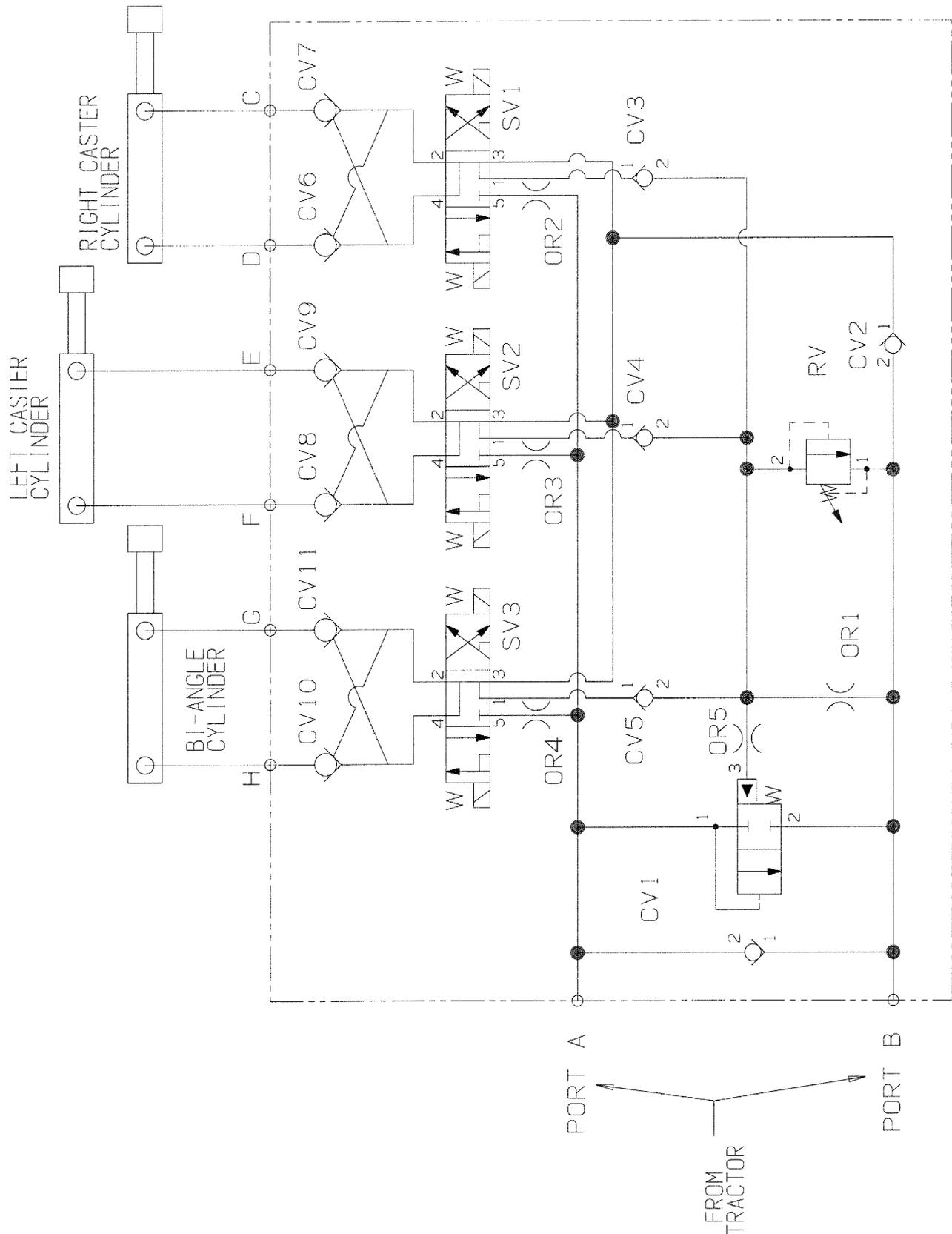


Figure 21. Hydraulic Schematic Assembly

ASSEMBLY - VALVE COMPONENTS

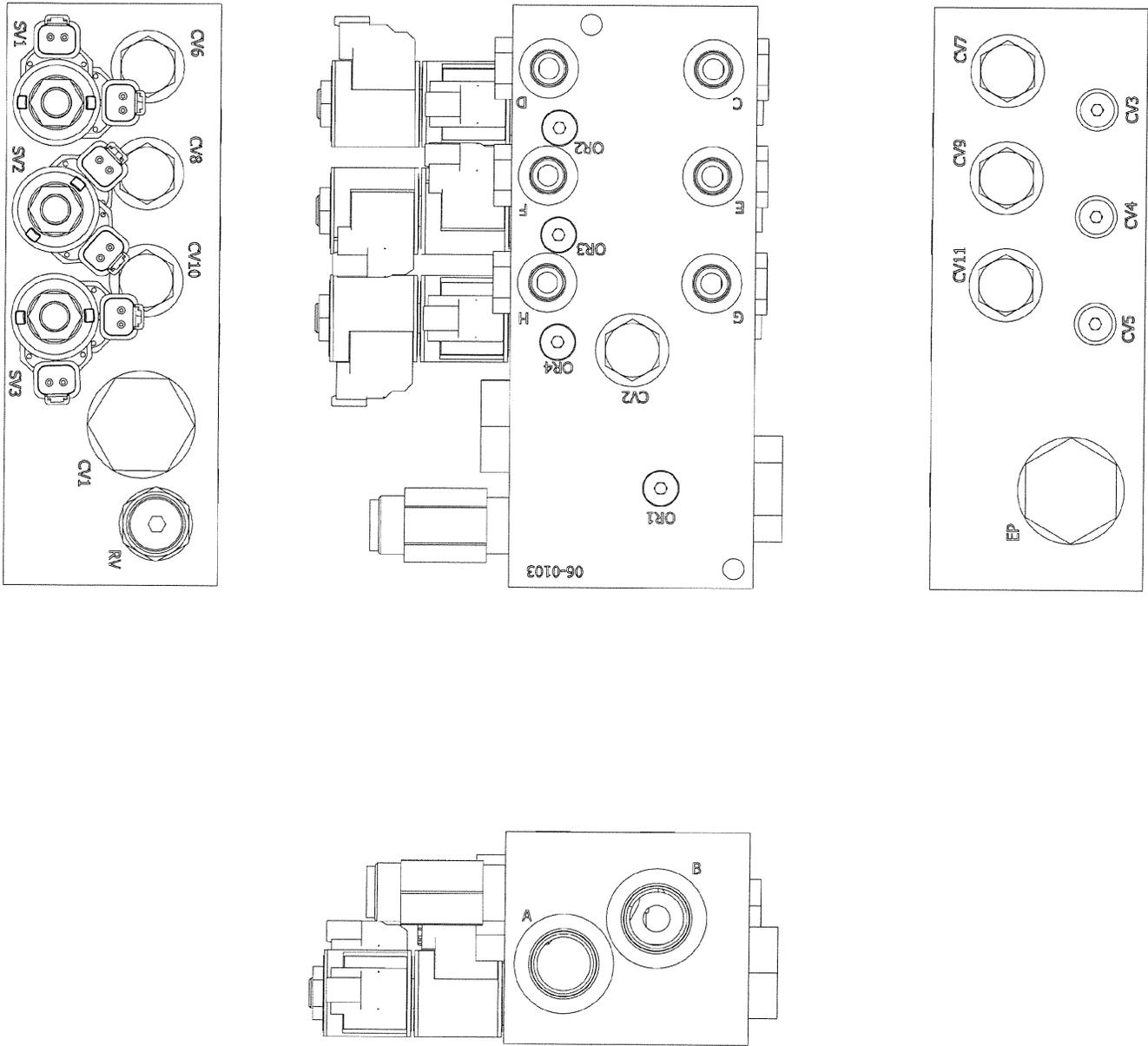


Figure 22. Valve Components Assembly

ASSEMBLY - VALVE COMPONENTS PARTS LIST

<u>CAV</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>SERVICE SEAL KIT</u>
CV1	1	P292001	#16 Check Valve	PP292003
CV2	1	P292002	#08 Check Valve	PP292004
CV3-CV5	3	P292006	#04 SAE Plug	-----
CV6-CV11	6	P292005	#08 Check Valve	PP292004
SV1-SV3	3	P292007	#08 E-Coil Spacer	-----
SV1-SV3	6	P292008	#08 E-Coil, 12 VDC, Deutsche Connector	-----
SV1-SV3	3	P292009	#08 Solenoid, Spool, 5W3P	PP292010

ASSEMBLY - GEARBOX

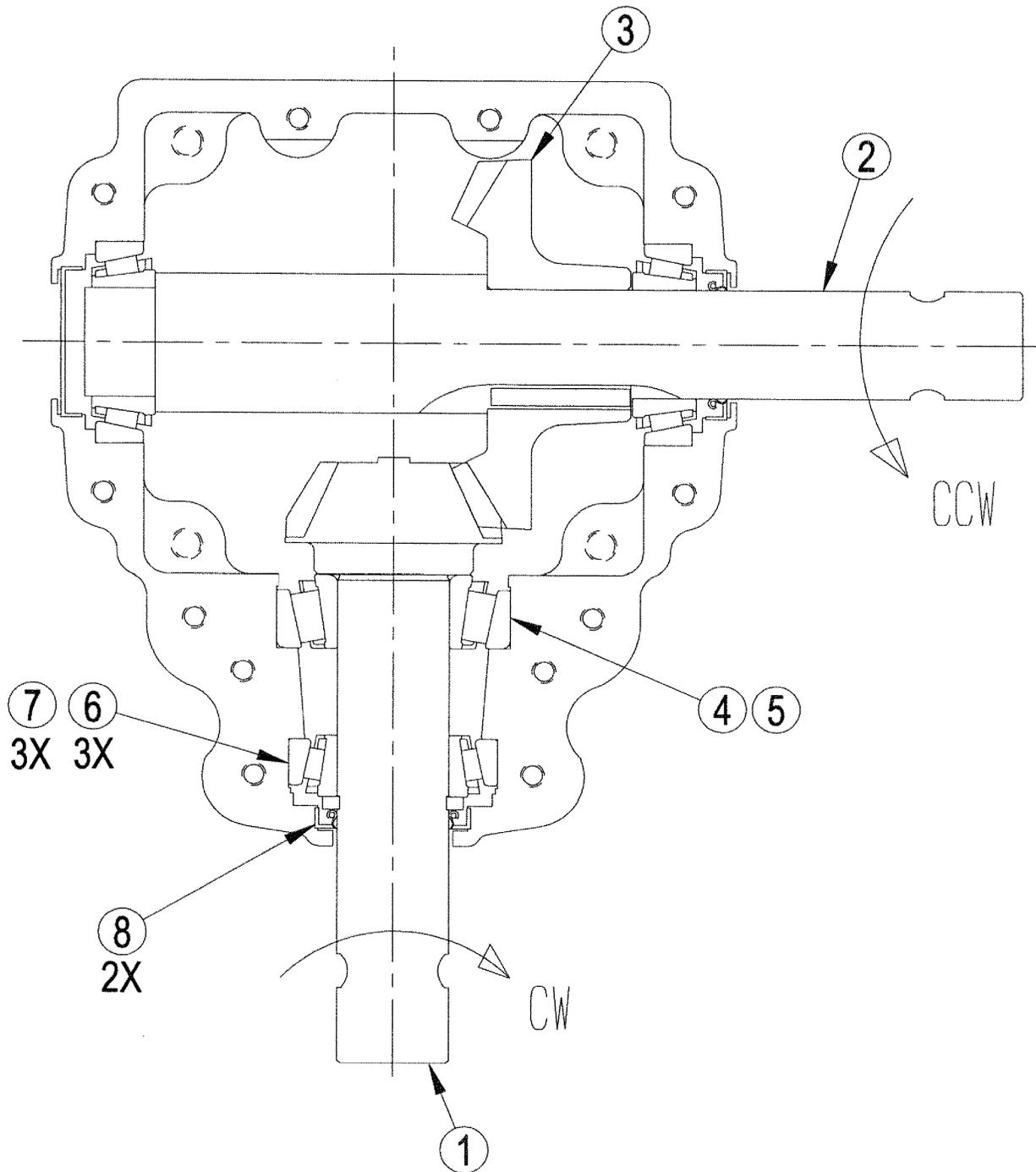


Figure 23. Gearbox Assembly

ASSEMBLY - GEARBOX PARTS LIST

<u>ITEMS</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	P205101	INPUT SHAFT 1-3/4" 20T
2	1	P205102	OUTPUT SHAFT 1-3/4" 20T
3	1	P205103	GEAR R6 2:1 36T
4	1	P205104	BEARING CUP #3720
5	1	P205105	BEARING CONE #3782
6	3	P205106	BEARING CONE #25581
7	3	P761900	BEARING CUP #25520
8	2	P205107	SEAL #17285

Limited Warranty

Except for the Excluded Products as described below, all new products are warranted to be free from defects in material and/or workmanship during the Warranty Period, in accordance with and subject to the terms and conditions of this Limited Warranty.

1. Excluded Products. The following products are excluded from this Limited Warranty:

(a) Any cable, part that engages with the ground (i.e. sprockets), digging chain, bearing, teeth, tamping and/or demolition head, blade cutting edge, pilot bit, auger teeth and broom brush that either constitutes or is part of a product.

(b) Any product, merchandise or component that, in the opinion of Paladin Light Construction¹, has been (i) misused; (ii) modified in any unauthorized manner; (iii) altered; (iv) damaged; (v) involved in an accident; or (vi) repaired using parts not obtained through Paladin Light Construction.

2. Warranty Period. The Limited Warranty is provided only to those defects that occur during the Warranty Period, which is the period that begins on the first to occur of: (i) the date of initial purchase by an end-user, (ii) the date the product is first leased or rented, or (iii) the date that is six (6) months after the date of shipment by Paladin Light Construction as evidenced by the invoiced shipment date (the "Commencement Date") and ends on the date that is twelve (12) months after the Commencement Date.

3. Terms and Conditions of Limited Warranty. The following terms and conditions apply to the Limited Warranty hereby provided:

(a) Option to Repair or Replace. Paladin Light Construction shall have the option to repair or replace the product.

(b) Timely Repair and Notice. In order to obtain the Limited Warranty, (i) the product must be repaired within thirty (30) days from the date of failure, and (ii) a claim under the warranty must be submitted to Paladin Light Construction in writing within thirty (30) days from the date of repair.

(c) Return of Defective Part or Product. If requested by Paladin Light Construction, the alleged defective part or product shall be shipped to Paladin Light Construction at its manufacturing facility or other location specified by Paladin Light Construction, with freight PRE-PAID by the claimant, to allow Paladin Light Construction to inspect the part or product.

Claims that fail to comply with any of the above terms and conditions shall be denied.

LIMITATIONS AND EXCLUSIONS.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY BASED ON A COURSE OF DEALING OR USAGE OF TRADE.

IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR ANY LOSS OR CLAIM IN AN AMOUNT IN EXCESS OF THE PURCHASE PRICE, OR, AT THE OPTION OF PALADIN LIGHT CONSTRUCTION, THE REPAIR OR REPLACEMENT, OF THE PARTICULAR PRODUCT ON WHICH ANY CLAIM OF LOSS OR DAMAGE IS BASED. THIS LIMITATION OF LIABILITY APPLIES IRRESPECTIVE OF WHETHER THE CLAIM IS BASED ON BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE OR OTHER CAUSE AND WHETHER THE ALLEGED DEFECT IS DISCOVERABLE OR LATENT.

¹Attachment Technologies Inc., a subsidiary of Paladin Brands Holding, Inc. (PBHI) is referred to herein as Paladin Light Construction.

February 10, 2010



The Power of Combined Excellence