

PARMA[®]

ROLLAHARROW 3-Point Model OWNERS MANUAL & PARTS BOOK

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Index

| | |
|--|-----------|
| 1 OWNERS MANUAL | 1 |
| 1.1 INTRODUCTION | 1 |
| 1.2 SAFETY PRECAUTIONS | 2 |
| 1.3 CUSTOMER AND DEALER CHECKLIST | 8 |
| 1.4 WARRANTY POLICY | 10 |
| 1.5 MAINTENANCE AND FIELD ADJUSTMENTS | 11 |
| 1.6 LUBRICATION | 11 |
| 1.7 BEARINGS | 12 |
| 1.8 HYDRAULIC COMPONENTS | 12 |
| 1.9 S-TINES | 12 |
| 1.10 ROLLER RINGS | 13 |
| 1.11 LEVELING BAR | 14 |
| 1.12 OPERATING INSTRUCTIONS | 14 |
| 1.13 S-TINE SPACING | 16 |
| 2 PARTS BOOK | 17 |
| 2.1 S-TINE GROUP | 17 |
| 2.2 TINE BAR GROUP 10'-14' | 18 |
| 2.3 TINE BAR GROUP 16'-20' | 19 |
| 2.4 10" ROLLER ASSEMBLIES 10'-16' | 20 |
| 2.5 12" ROLLER ASSEMBLIES 10'-16' | 22 |
| 2.6 10" ROLLER ASSEMBLIES 18'-20' | 24 |
| 2.7 12" ROLLER ASSEMBLIES 18'-20' | 26 |
| 2.8 CROWFOOT ROLLER ASSEMBLIES | 28 |
| 2.9 PIPE ROLLER ASSEMBLIES | 30 |
| 2.10 LEVELING BAR & LIFT GROUP (10'-16') | 31 |
| 2.11 LEVELING BAR & LIFT GROUP (18'-20') | 32 |
| 2.12 LEVELING BAR ROCK PROTECTION KIT | 33 |
| 2.13 HYDRAULIC SCHEMATIC (18'-20') | 35 |
| 2.14 HYDRAULIC TINE BAR CONTROL | 36 |
| 2.15 DECAL GROUP | 37 |

1 OWNERS MANUAL

1.1 INTRODUCTION

This manual has been prepared to acquaint you with the operation and maintenance of your **Parma Rollaharrow**, and to provide important safety information. We urge you to read this manual carefully. The recommendations will help assure the safe and trouble free operation of your machine.

When it comes to service, keep in mind that your dealer knows your Rollaharrow well and is interested in your complete satisfaction. Your dealer invites you to call him for your service needs both during and after the warranty period.

We thank you for choosing a Parma product and want to assure you of our continuing interest in your satisfaction. You have purchased a very good machine and with proper care it will give you good service.



SAFETY: THE MOST IMPORTANT SUBJECT OF ALL. YOU CAN LIVE WITH IT!

The Following safety instructions are provided to help assure that all operators of this equipment are trained in its operation and are familiar with the importance of safety in its use.



WITH OWNERSHIP COMES RESPONSIBILITY!

Many times the owner of this equipment is not the operator. The manufacturer delivers the equipment to a dealer, who in turn sells it to an owner. The owner may then assign another person to operate it. With each of these steps it is the duty of the one in possession of the equipment to be sure that the safe operation of the machine is fully explained to the person, or persons, actually operating it. **Do not allow this machine to be used until the following safety material has been reviewed.**

REMEMBER: One of the most common causes of injury or death around this type of equipment is because the operator does not shut the tractor engine off and remove the key when maintenance, adjustments, or cleaning of the machine is conducted!



SAFETY... YOU CAN LIVE WITH IT!

1.2 SAFETY PRECAUTIONS

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGH OUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



THIS SYMBOL MEANS
-ATTENTION!
-BECOME ALERT!
-YOUR SAFETY IS INVOLVED!

SIGNAL WORDS:

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines.

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components for which functional purposes cannot be guarded.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices, and potential for equipment damage.

If you have questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer.



EQUIPMENT SAFETY GUIDELINES

Safety of the operator is one of the main concerns in designing and developing a new piece of equipment. Designers and manufacturers build in as many safety features as possible. However, every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions in this section. To avoid personal injury, study the following precautions and insist those working with you, or for you, follow them.

In order to provide maximum safety to the operator or other persons around this machine, various shields and covers have been installed. Keep all shields and covers in place. If shield removal becomes necessary for repairs or any other reason, replace the shield prior to use.

Replace any CAUTION, WARNING, DANGER or instruction safety decal that is not readable or is missing. Location of such decals is indicated in this manual.

Do not attempt to operate this equipment under the influence of drugs or alcohol.

Review the safety instructions with all users annually.

This equipment is dangerous to children and persons unfamiliar with its operation. The operator should be a responsible adult familiar with farm machinery and trained in this equipments operations. **Do not allow persons to operate or assemble this unit until they have read this manual and have developed a thorough understanding of the safety precautions and of how it works.**

Do not paint over, remove or deface any safety signs or warning decals on your equipment. Observe all safety signs and practice the instructions on them.

Never exceed the limits of a piece of machinery. If its ability to do a job, or to do so safely is in question **DONT TRY IT.**



LIGHTING AND MARKING

It is the responsibility of the customer to know the lighting and marking requirements of the local highway authorities and to install and maintain the equipment to provide compliance with the regulations. Add extra lights when transporting at night or during periods of limited visibility.

Lighting kits are available from your dealer or from the manufacturer.

SAFETY SIGN LOCATIONS

The types of Safety Sign on the equipment are shown below. Their locations are shown in the parts section of this manual. Good safety requires that you familiarize yourself with the various Safety Signs, the type of warning and the area, or particular function related to that area that requires your SAFETY AWARENESS.



100404



521000



100406



100311



100408



265933



522457

REMEMBER: If Safety Signs have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied. New decals are available from your authorized dealer or manufacturer.



SAFETY SIGN CARE

- Keep safety signs clean and legible at all times.
- Replace safety signs that are missing or have become illegible.
- Replaced parts that displayed a safety sign should also display the current sign.
- Safety signs are available from your Dealer Parts Department or the Manufacturer.

How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of decal backing paper.



REMEMBER!

Your best assurance against accidents is a careful and responsible operator. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or the manufacturer.



BEFORE OPERATING:

- Carefully study and understand this manual.
- Do not wear loose-fitting clothing which may catch in moving parts.
- Always wear protective clothing and substantial shoes.
- Assure that agricultural implement tires are inflated evenly.
- Inspect the unit for any loose bolts, worn parts or cracked welds, and make necessary repairs. Follow the maintenance safety instructions included in this manual.
- Be sure that there are no tools lying on or in the equipment.
- Do not use the unit until you are sure that the area is clear, especially children and animals.
- Don't hurry the learning process or take the unit for granted. Ease into it and become familiar with you new equipment.
- Practice operation of your equipment and its attachments. Completely familiarize yourself and other operators with its operation before using.



DURING OPERATION:

- **NO PASSENGERS ALLOWED** Do not allow any passengers to ride on the equipment at any time.
- Keep hands and clothing clear of moving parts.
- Do not clean, lubricate or adjust your equipment while it is in motion.
- When halting operation, even periodically, disengage the PTO, **shut off the tractor engine and remove the ignition key.**
- Be especially observant of the operating area and terrain watch for holes, rocks or other hidden hazards.
- **DO NOT** work under raised components or attachments unless securely positioned and blocked
- Keep all bystanders, pets and livestock clear of the work area.
- As a precaution, always recheck the hardware on equipment following every 100 hours of operation. Correct all problems. Follow the maintenance safety procedures.



FOLLOWING OPERATION:

- Following operation, or when unhitching, stop the tractor, set the brakes, disengage the PTO, **shut off the engine and remove the ignition key.**
- Store the unit in an area away from human activity.
- Do not permit children to play on or around the stored unit.
- Make sure all parked machines are on a hard, level surface and engage all safety devices.



HIGHWAY AND TRANSPORT OPERATIONS:

- Adopt safe driving practices:
 - Always drive at a safe speed relative to local conditions and ensure that your speed is low enough for an emergency to stop to be safe and secure. Keep speed to a minimum.
 - Reduce speed prior to turns to avoid the risk of overturning.
 - Always keep the tractor in gear to provide engine braking when going downhill. Do not coast.
 - **Do not drink and drive!**
- Comply with state and local laws governing highway safety and movement of farm machinery on public roads.
- Use Transport Locks as provided.
- Use approved accessory lighting flags and necessary warning devices to protect operators of other vehicles on the highway, during daylight and nighttime transport, in accordance with State Department of Transportation specifications. Various safety lights and devices are available from your dealer.
- The use of flashing amber lights is acceptable in most localities. However, some localities prohibit their use. Local laws should be checked for all highway lighting and marking requirements.
- Be a safe and courteous driver. Always yield to oncoming traffic in all situations, including narrow bridges, intersections, etc.

- Be observant of bridge loading ratings. Do not cross bridges rated lower than the gross weight at which you are operating. Be aware of the width of bridge and the width of the machine before crossing.
- Watch for obstructions overhead and to the side while transporting.
- Always operate equipment in a position to provide maximum visibility at all times.



PERFORMING MAINTENANCE:

- Good maintenance is your responsibility. Poor maintenance is an invitation to trouble.
- Before working on this machine, disengage the PTO, **shut off the tractor engine and remove the ignition key.**
- Be certain all moving parts have come to a complete stop before attempting to perform maintenance.
- **Always** use a safety support. Never use a jack to support the machine.
- Always use the proper tools or equipment for the job at hand.
- Use extreme caution when making adjustments.
- Follow the torque chart in this manual when tightening bolts and nuts.
- Never use your hands to locate a hydraulic leak on attachments. Use a small piece of cardboard or wood. Hydraulic fluid escaping under pressure can penetrate the skin.
- When disconnecting hydraulic lines, shut off hydraulic supply and relieve all hydraulic pressure.
- Openings in the skin and minor cuts are susceptible to infection from hydraulic fluid. **If injured by escaping hydraulic fluid, see a doctor at once. Gangrene can result. Without immediate medical treatment, serious infection and reactions can occur.**
- **Replace all shields and guards after servicing and before moving.**
- After servicing, be sure all tools, parts and service equipment are removed.
- Never replace hex bolts with less than grade five bolts unless otherwise specified. Refer to bolt torque chart for head identification marking.
- Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts are recommended to restore your equipment to original specifications. The manufacturer will not claim responsibility for use of unapproved parts and/or accessories and other damages as a result of their use.
- If equipment has been altered in any way from original design, the manufacturer does not accept any liability for injury or warranty.

1.3 CUSTOMER AND DEALER CHECKLIST

After the machine has been completely assembled, inspect it thoroughly to be certain it is in operating condition before delivering it to a customer. The following checklist is a reminder of points to inspect. Check off each item as it is found satisfactory or after proper adjustment is made.

PRE-DELIVERY:

___ Remove all transport locks on cylinders. ___ Check all bolts and nuts to be sure they are tight. Double check the carrier wheel lug bolts.

___ Make sure all bearing lock collars are set correctly and tightened (see pg.12).

___ Inspect and, if necessary, grease at all lubrication points; making sure all bearings are taking grease (see pg.11).

___ Check all moving parts for smooth operation.

___ Check to see that all hydraulic fittings and cylinders are tight and free of leaks (see pg.12).

DELIVERY:

___ Complete the Delivery and Warranty Registration Forms, listing serial numbers of machine.

___ Have the dealer and customer sign the form. Explain warranty policy on the Warranty Registration Form. Return the factory copy of the form to Parma Company.

___ Show the customer how to operate the Rollaharrow. Give the operators manual to him and ask him to familiarize himself with all sections of it.

___ Explain adjustments and the importance of proper lubrication (see pg.11).

___ Give the operator's manual to the customer and ask him to familiarize himself with all sections of it.

___ Explain to the customer that when the equipment is transported on a road or highway at night or during the day, accessory lights and devices should be used for adequate warning to operators of other vehicles per local regulations.

___ Explain and show the customer the transport locks and the removal of them for field use. Remind them the roller bearings are not designed to handle side loads whether turning the machine or working center pivots.

BEFORE EACH SEASON:

___ Check all cast rings for breakage.

___ Check s-tine chisel points for normal wear.

___ Check all adjustable components for correct setting.

___ Perform complete lubrication of machine (see pg.11).

___ With equipment operating, observe operation of moving parts. Watch for faulty operation, overheated bearings, and unusual sounds.

___ Read safety precautions.

___ Read operating instructions.

___ Perform daily checklist.

DAILY CHECKLIST:

- ___ Remove all debris from s-tines, leveling bar, and rollers.
- ___ Lubricate (as instructed) all lubrication points (see pg.11).
- ___ Check for loose or missing bolts or parts (especially on S-Tines).
- ___ Check for undue or excessive wear of parts.

1.4 WARRANTY POLICY

PARMA COMPANY warrants to each purchaser from an authorized dealer of new equipment manufactured by PARMA COMPANY, that such equipment is, at the time of delivery to such purchaser, free from defects in material and workmanship under normal use, if serviced in accordance with the recommendations of the Operators Manual. All PARMA COMPANY'S *harvesting equipment products* are warranted for 120 days from the first day of use or 800 acres, whichever occurs first. All PARMA COMPANY *soil preparation products* are warranted for 120 days from first day of use or 1600 acres, whichever occurs first. All PARMA COMPANY *water and waste pump products* are warranted for one year from date of purchase. Warranty on defective parts purchased by PARMA COMPANY or produced by other manufacturers for PARMA COMPANY may be allowed only after the approval of the vendor or manufacturer.

PARMA COMPANY'S obligation under this warranty is limited to repairing, or at its option, replacing any part, that in PARMA COMPANY'S judgment, proved defective. Under the terms of the warranty, PARMA COMPANY assumes no responsibility for labor or travel costs involved in removal of defective parts, of installation of new parts, or of any shop supplies or service charges.

All warranty claims are to be initiated through the authorized PARMA COMPANY dealer and **must be submitted within 30 days of the date of failure**. PARMA COMPANY may ask for defective parts to be returned to the factory; therefore, hold all warranty claim parts until advised if the parts are needed by your dealer.

To make the warranty effective, the owners **Warranty Registration Form** must be on file at PARMA COMPANY, Parma, Idaho at the time of receipt of the warranty claim.

DISCLAIMER OF ALL OTHER WARRANTIES AND CONSEQUENTIAL DAMAGES

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND THERE ARE NO WARRANTIES, WHICH EXTEND BEYOND THE DESCRIPTION OF THE PRODUCTS. THE LIABILITY OF PARMA COMPANY IS EXPRESSLY LIMITED TO REPAIRING, OR AT ITS OPTION, REPLACING ANY PART THAT IS RETURNED, TRANSPORTATION PREPAID, TO PARMA COMPANY, PARMA, IDAHO, THAT IN PARMA'S JUDGEMENT PROVED DEFECTIVE DURING THE WARRANTY PERIOD. NO REPRESENTATIVE OF PARMA COMPANY, NO DEALER OR DEALERS REPRESENTATIVE OR ANY OTHER PERSON HAS AUTHORITY TO WAIVE, ALTER, VARY OR ADD TO THE TERMS HEREOF WITHOUT PRIOR APPROVAL IN WRITING SIGNED BY AN OFFICER OF PARMA COMPANY. PARMA COMPANY WILL NOT BE LIABLE FOR ANY OTHER EXPENSE, INJURY, LOSS OR DAMAGE WHETHER DIRECT OR CONSEQUENTIAL, ARISING IN CONNECTION WITH THE SALE OR USE OF OR INABILITY TO USE, ANY PRODUCT OF THE COMPANY FOR ANY PURPOSE.

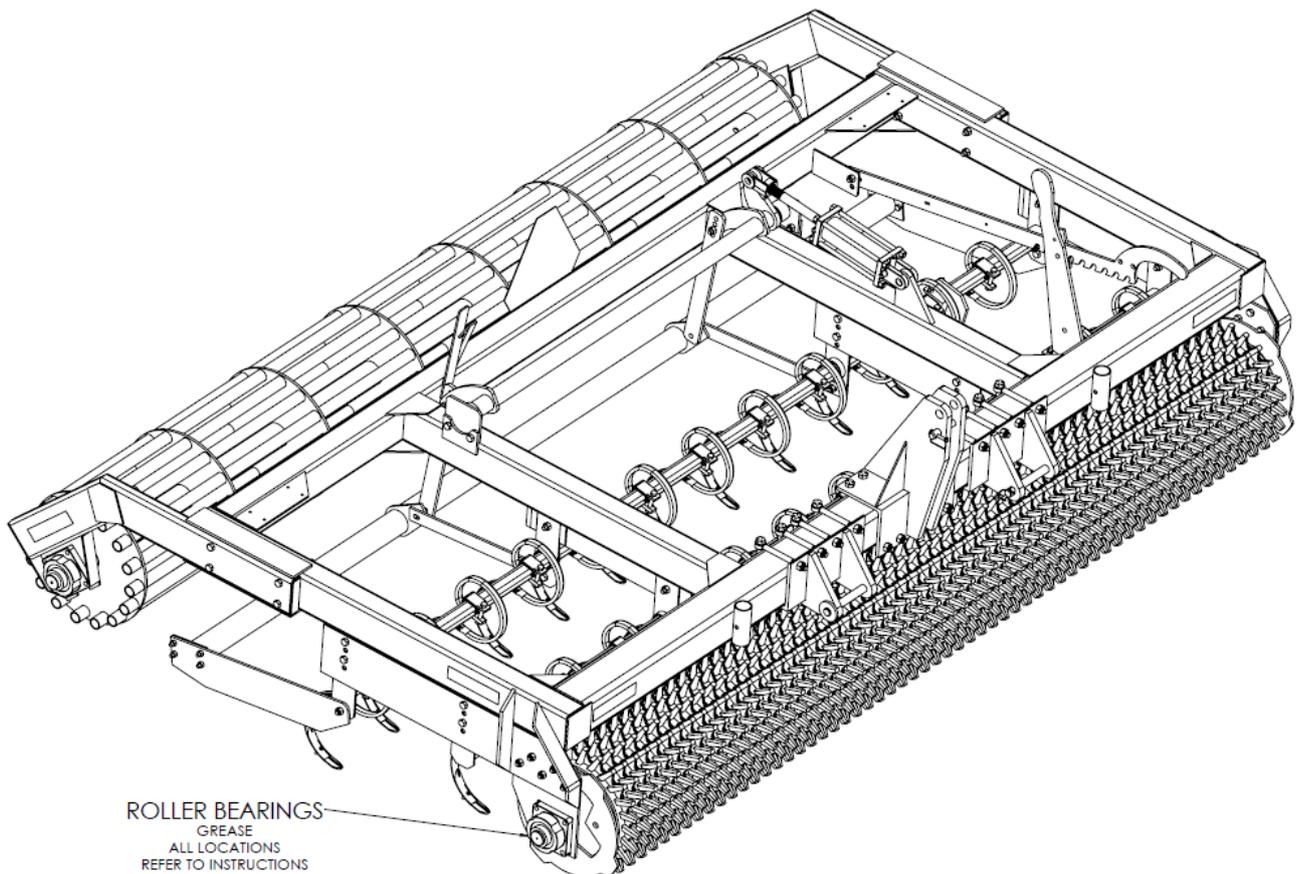
1.5 MAINTENANCE AND FIELD ADJUSTMENTS

1.6 LUBRICATION

The Rollaharrow flanged bearing units are factory pre-lubricated and do not require supplemental grease before service life begins. Re-lubrication, when administered correctly, can increase the life of a bearing substantially. **Bearing manufacturers recommend that all these bearings be greased weekly**, considering the environmental condition that these machines are exposed to. **NOTE: Over lubrication is a major cause of bearing failures. Please re-lubricate conservatively.** When selecting a bearing lubrication use any lithium based NLGI #2 grease. The Dodge Quad seal bearing is designed to purge itself of excess grease. However care must be made to remove the excess grease from the outside once the excess grease begins purging from the seal area. Dirt and other contaminants mixed with excess grease can cause the seal on the bearing to wear prematurely and bearing failure. The following illustration shows the lubrication points on the Rollaharrow.

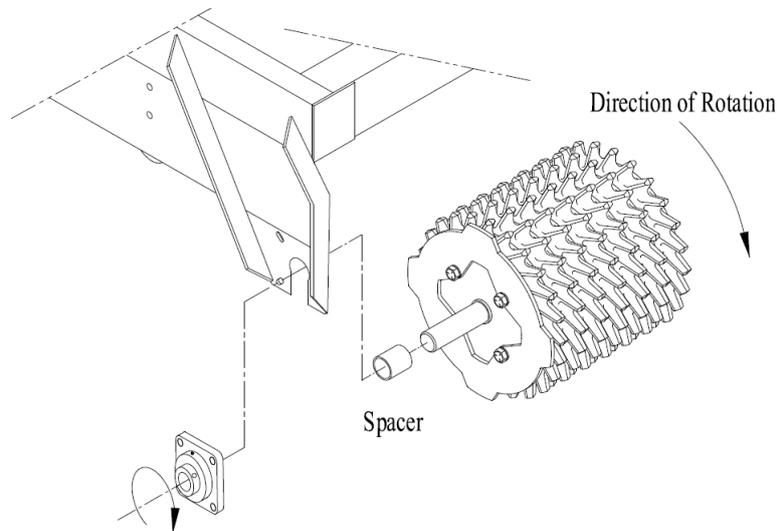


Always perform maintenance with the tractor engine shut off and the ignition key removed!



1.7 BEARINGS

When replacing bearings, make sure all bearing lock collars are set correctly and tightened (see below).



NOTE: To avoid loosening of the lock collar, always set it in the direction of shaft rotation. Be sure the spacer is installed between the roller and the bearing. Ball bearings used on the rollers will not withstand radial or side load, including working around pivot circles. ALWAYS raise the machine before turning, or failure will result.

1.8 HYDRAULIC COMPONENTS

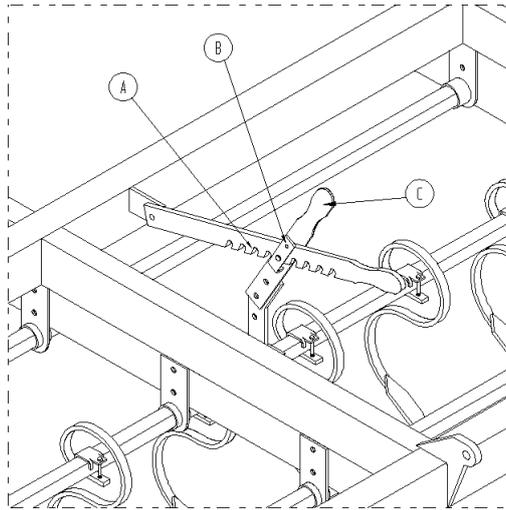
Before operating your PARMA Rollaharrow, check all hydraulic components and connections to make sure they are secure and fitting properly. If for any reason you need to replace a hydraulic cylinder or line, before re-installing the component, make sure the hoses/cylinders are free from any foreign materials. If foreign material is in the line, rinse thoroughly and blow it out.

When you are installing replacement cylinders, check the closed and open dimensions against the other parts on the unit. If, after reinstalling the components, they do not work, recheck to make sure everything is connected properly. If, after checking, the hydraulic components still do not work, you may have air in the hydraulic lines. To release the air, loosen a fitting slightly at a cylinder, send a small amount of fluid through the lines and then re-tighten. You may have to repeat this process several times. If the problem persists, check or replace the Quick Couplers. Before loosening any fittings, be sure all pressure is relieved and the machine cannot drop.

1.9 S-TINES

Under normal usage, the S-Tines may last for several years. Each S-Tine has a removable point that is reversible. Inspect these points regularly to see that they do not wear excessively. Before the worn end reaches the S-Tine, reverse the point for double wear. Always replace the point before damage to the S-Tine occurs. Check bolt tightness regularly to prevent the tines from moving or sliding.

The depth of the S-Tines is set by moving the tool bar control handle (Item C) to the desired notch in the tool bar control ratchet (Item A). **When operating your Rollaharrow in the field, the safety snap pin (Item B) must be removed to prevent damage to the tine bars and linkages in the event the Rollaharrow is backed up with the S-Tines down** (See the illustration on the next page).



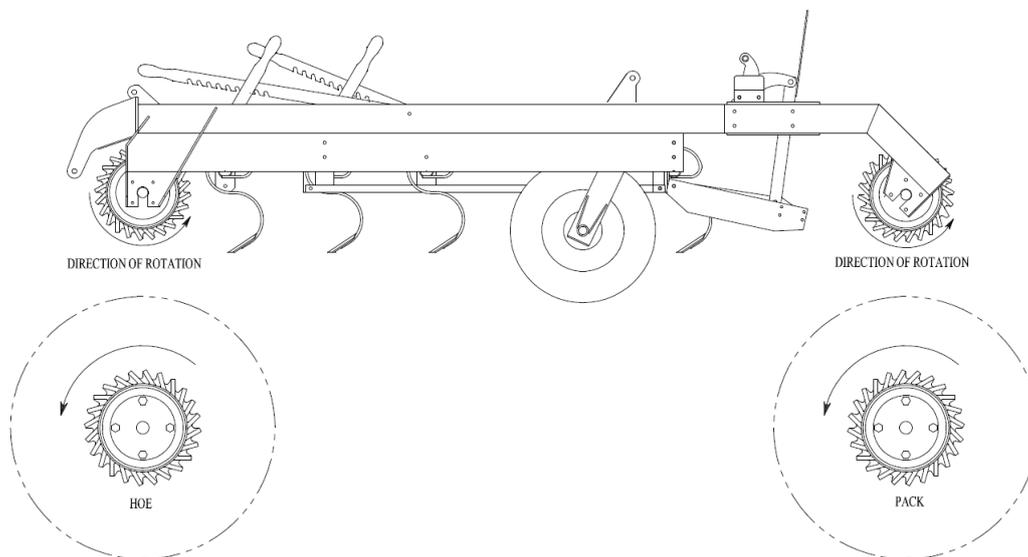
For the correct positioning of the S-Tines on the Rollaharrow, refer to pages 16.

****Never lower and park the Rollaharrow on the S-Tines. Damage to the curl of the S-Tine will occur.**

1.10 ROLLER RINGS

After some usage of your machine, the side of roller rings will wear, creating a gap between the rings on the roller tube. When this occurs, simply add enough new rings to fill this gap. Leave 3 to 4 of total gap when adding new rings. **When adding the rings, leave some gap so the rings can move freely.**

The roller rings can be positioned to mulch (hoe) the soil or to pack the soil. The front roller is normally set to mulch (hoe) the soil and the rear ring roller is normally set to pack the soil, however, this can be changed to accommodate different needs. See illustration below.



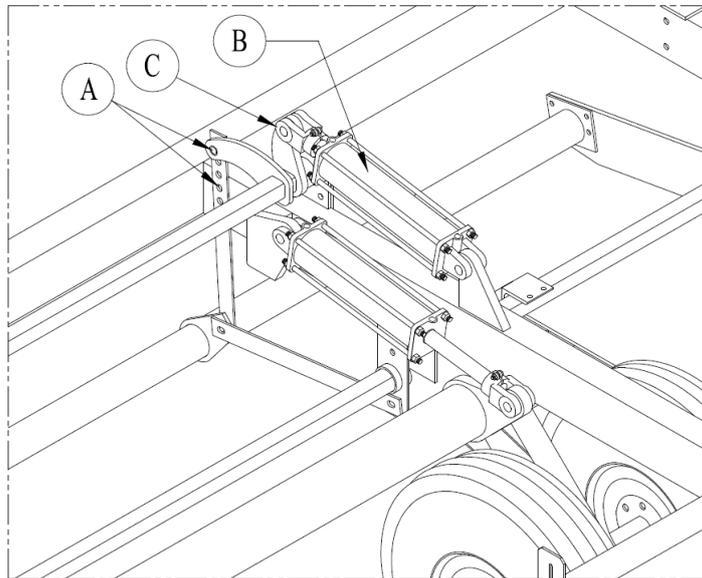
The front roller shows the rings in the hoe position (the teeth are facing the direction of travel). The rear roller shows the rings in the pack position (the teeth are facing opposite the direction of travel).



AVOID SERIOUS INJURY EXERCISE CARE WHEN LIFTING HEAVY PARTS

1.11 LEVELING BAR

During operation, the leveling bar height should be set to smooth out ridges and carry enough dirt to fill low spots only. NEVER dig below the soil surface or damage to the bar and linkage may occur, and we will leave piles of dirt upon lifting the unit. See the illustration below.



LEVELING BAR ADJUSTMENT

To adjust the leveling bar height, position the lift arm (Item A) to the desired hole by activating the hydraulic cylinder (Item B).

1.12 OPERATING INSTRUCTIONS

Under normal conditions (after plowing or disking) you can pull your PARMA Rollaharrow through the field at speeds up to 6mph. Recommended minimum air pressure is 70 PSI in the bias ply tires and 50 PSI in the Radial Tires.

Do not use the tires and wheels on your Rollaharrow as gauge wheels while operating the machine in the field. They are designed for transporting the machine only.

Always lift your Rollaharrow before turning. **Failure to lift the machine while turning causes excessive side thrust on rollers and bearings, resulting in the breakage of parts. Bearing failures will result!!!**

Always lift your Rollaharrow before backing up. **Failure to do so can result in the damage of the s-tine bars and control linkages.**

Always transport your Rollaharrow at speeds less than 20 mph. **The implement rated tires are for minimal transportation use only. Not doing so can result in premature tire failure.**

Always remember to remove the transport lock bars from the axle and flip tongue cylinder locks over when done transporting the machine. Failure to do this will damage the axles and cylinders when they are activated.

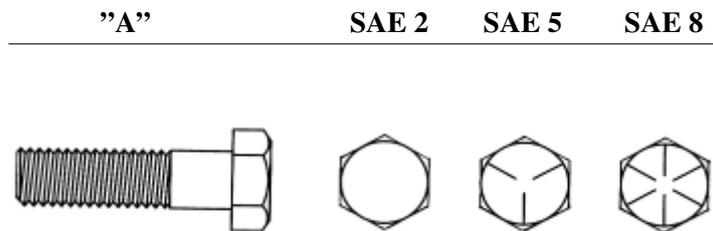
BOLT TORQUE

Checking Bolt Torque

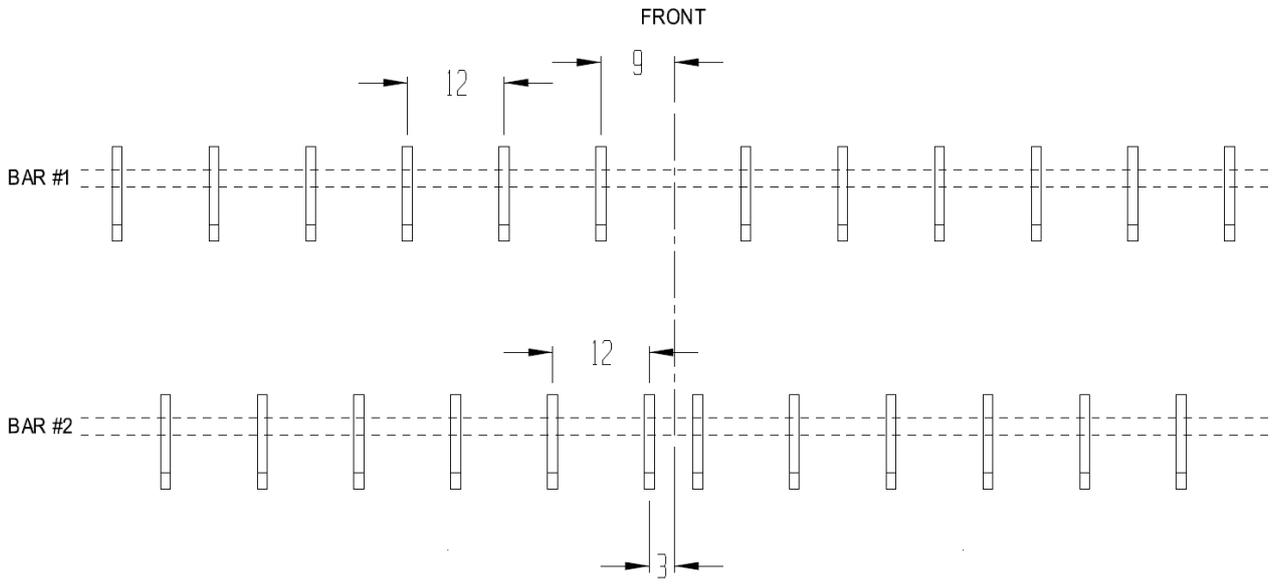
The table shown below gives correct torque values for various bolts and cap screws. Tighten all bolts to the torques specified in the chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt

| Bolt Size | SAE 2 | SAE 5 | SAE 8 |
|-----------|----------------|----------------|----------------|
| "A" | Torque (ft-lb) | Torque (ft-lb) | Torque (ft-lb) |
| 1/4" | 6 | 9 | 12 |
| 5/16" | 10 | 19 | 27 |
| 3/8" | 20 | 33 | 45 |
| 7/16" | 30 | 53 | 75 |
| 1/2" | 45 | 80 | 115 |
| 9/16" | 70 | 115 | 150 |
| 5/8" | 95 | 160 | 220 |
| 3/4" | 165 | 290 | 400 |
| 7/8" | 170 | 410 | 650 |
| 1" | 225 | 630 | 970 |

Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual. When using locking elements, increase torque values by 5%



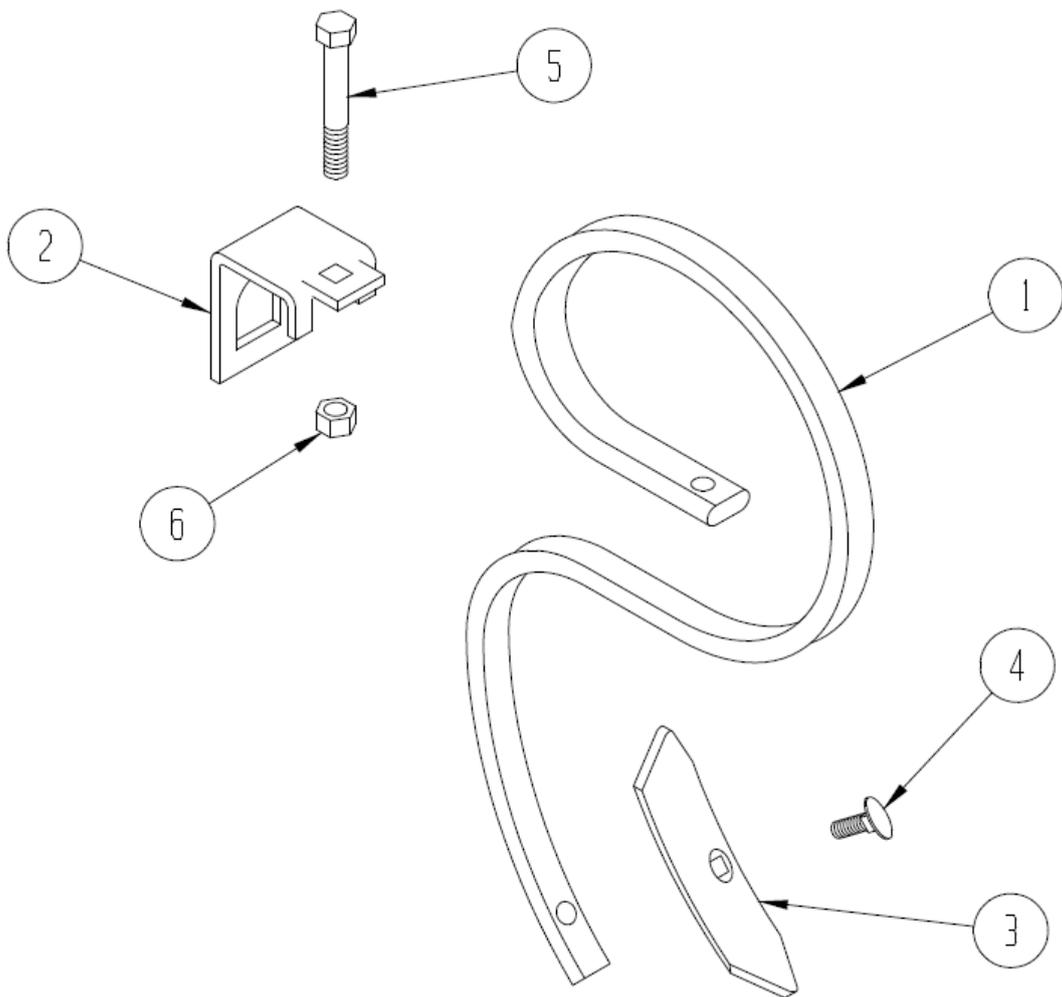
1.13 S-TINE SPCING



2 PARTS BOOK

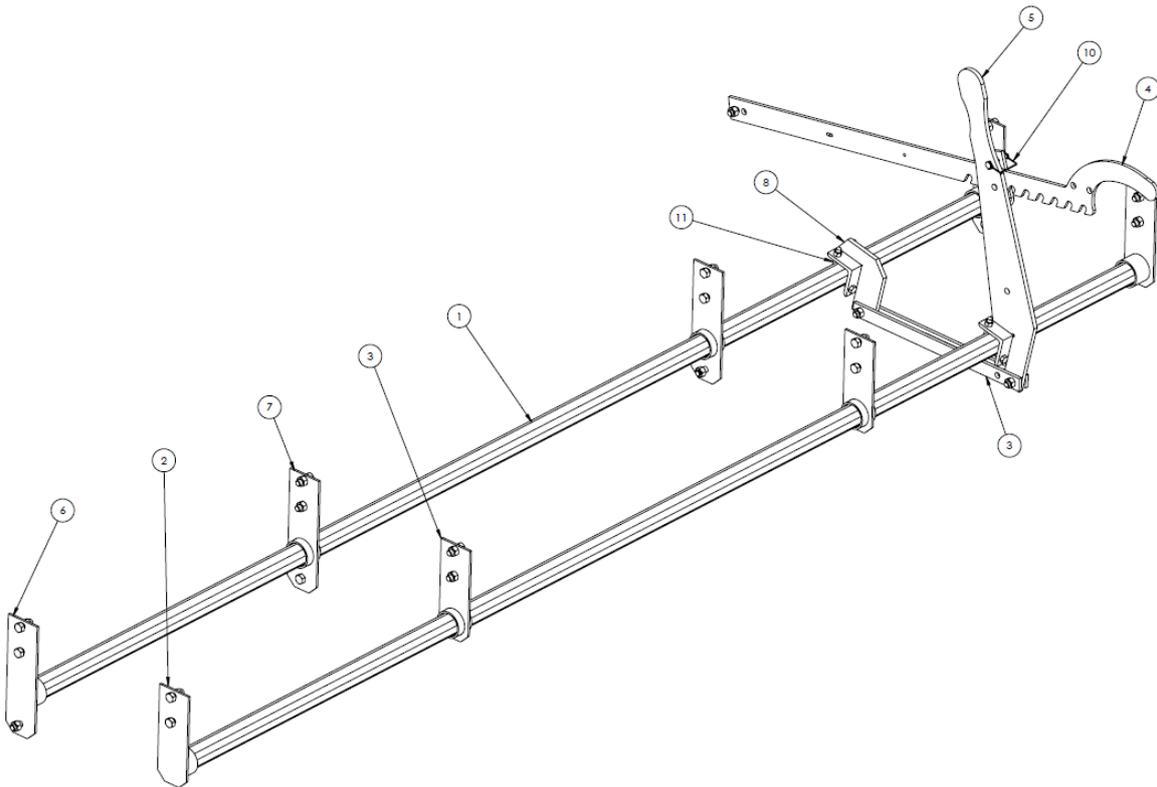
2.1 S-TINE GROUP

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|-------------------------------------|
| 1 | 1 | 521483 | S-tine, HD |
| 2 | 1 | 521485 | S-tine Clamp |
| 3 | 1 | 521484 | Chisel Point |
| | | 521560 | Chisel Point, Heavy Duty (Optional) |
| 4 | 1 | 530052 | Cultivator Bolt, 3/8 x 1 |
| 5 | 1 | — | Hex Bolt, 1/2 x 3 1/2 |
| 6 | 1 | — | Hex Locknut, 1/2 |



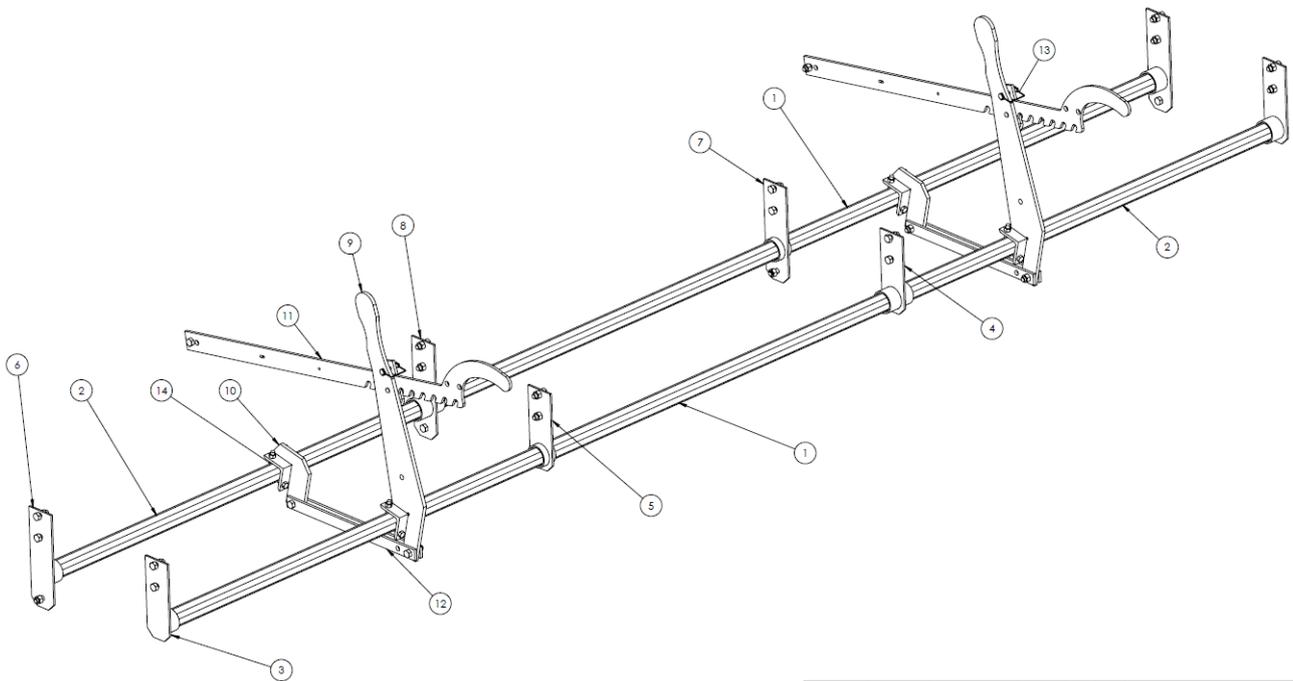
2.2 TINE BAR GROUP 10'-14'

| ITEM NO. | QTY 10' | QTY 12' | QTY 14' | PART NO. | DESCRIPTION |
|----------|---------|---------|---------|----------|---------------------------------|
| 1 | 2 | — | — | 525968 | Tine Bar, 122 3/4 in. |
| | — | 2 | — | 522329 | Tine Bar, 146 3/4 in. |
| | — | — | 2 | 521571 | Tine Bar, 170 3/4 in. |
| 2 | | 6 | 6 | 524536 | Mounting Bracket, Outer |
| 3 | | 6 | 6 | 524535 | Mounting Bracket, Inner |
| 4 | | 1 | 1 | 524554 | Ratchet Handle, Long |
| 5 | | 2 | 2 | 522038 | Control Handle |
| 6 | | 2 | 2 | 524538 | Mounting Bracket, Outer |
| 7 | | 2 | 2 | 524537 | Mounting Bracket, Inner |
| 8 | | 1 | 1 | 521513 | Control Clamp |
| 9 | | 1 | 1 | 521260 | Control Linkage, 23 in. Overall |
| 10 | | 2 | 2 | 521442 | Safety Snap Pin |
| 11 | | 4 | 4 | 521099 | Eye Bolt, 1/2 x 3 1/2 |



2.3 TINE BAR GROUP 16'-20'

| ITEM NO. | QTY 16' | QTY 18' | QTY 20' | PART NO. | DESCRIPTION |
|----------|---------|---------|---------|----------|---------------------------------|
| 1 | 2 | — | — | 522082 | Tine Bar, 128 1/8 in. |
| | — | 2 | — | 522092 | Tine Bar, 140 1/8 in. |
| | — | — | 2 | 522125 | Tine Bar, 152 1/8 in. |
| 2 | 2 | — | — | 522083 | Tine Bar, 66 5/8 in. |
| | — | 2 | — | 522093 | Tine Bar, 78 5/8 in. |
| | — | — | 2 | 522126 | Tine Bar, 90 5/8 in. |
| 3 | 2 | 2 | 2 | 524536 | Mounting Bracket, Outer |
| 4 | 1 | 1 | 1 | 524539 | Mounting Bracket, Inner |
| 5 | 1 | 1 | 1 | 524535 | Mounting Bracket, Inner |
| 6 | 2 | 2 | 2 | 524538 | Mounting Bracket, Outer |
| 7 | 1 | 1 | 1 | 524537 | Mounting Bracket, Inner |
| 8 | 1 | 1 | 1 | 524540 | Mounting Bracket, Inner |
| 9 | 2 | 2 | 2 | 522038 | Control Handle |
| 10 | 2 | 2 | 2 | 521513 | Control Clamp |
| 11 | 2 | 2 | 2 | 524554 | Ratchet Handle, Long |
| 12 | 2 | 2 | 2 | 521260 | Control Linkage, 23 in. Overall |
| 13 | 2 | 2 | 2 | 521442 | Safety Snap Pin |
| 14 | 8 | 8 | 8 | 521099 | Eye Bolt, 1/2 x 3 1/2 |



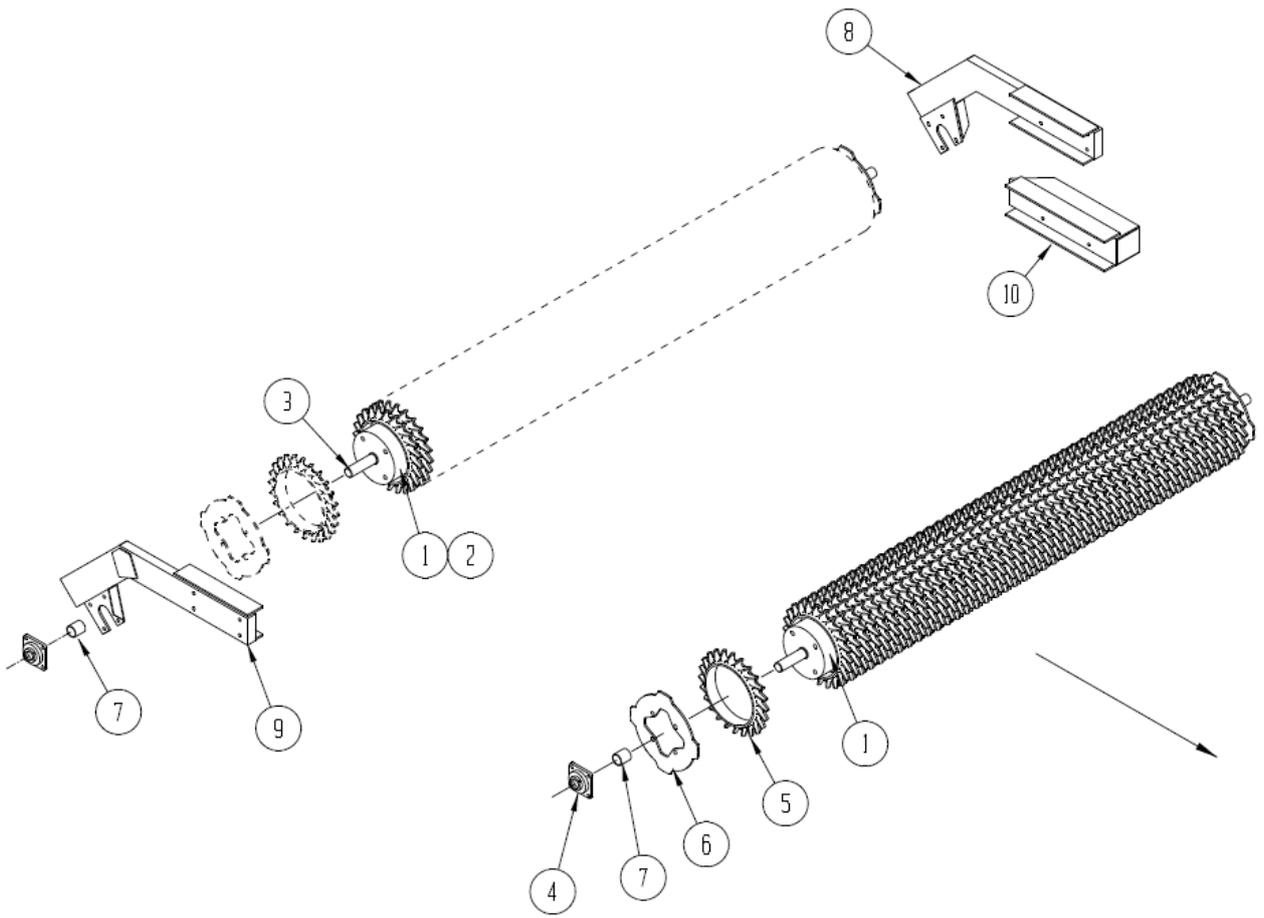
2.4 10” ROLLER ASSEMBLIES 10’-16’

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|---|
| 1 | As Req | 4 523341 | Roller Weldment, 10 ft. Standard |
| | As Req | 523343 | Roller Weldment, 12 ft. Standard |
| | As Req | 523345 | Roller Weldment, 14 ft. Standard |
| | As Req | 523347 | Roller Weldment, 16 ft. Standard |
| 2 | As Req | 523342 | Roller Weldment, 11 ft. (With Extensions) |
| | As Req | 523344 | Roller Weldment, 13 ft. (With Extensions) |
| | As Req | 523346 | Roller Weldment, 15 ft. (With Extensions) |
| | As Req | 523348 | Roller Weldment, 17 ft. (With Extensions) |
| 3 | (REF) | 523327 | Stub Shaft, Long (Weld In) |
| 4 | 4 | 524884 | Bearing, Double Roller, 2 3/16 in. |
| 5 | ** | 521566 | Cast Ring, 10-12-16 Standard |
| | ** | 521639 | Cast Ring, 10-12-16 Ductile |
| | ** | 521640 | Cast Ring, 10-12-16 Domestic |
| | ** | 521590 | Cast Ring, 10-12-17 Standard |
| | ** | 521641 | Cast Ring, 10-12-17 Ductile |
| | ** | 521642 | Cast Ring, 10-12-17 Domestic |
| 6 | 12 | 521496 | Roller End Plate |
| 7 | 4 | 523896 | Spacer, Roller |
| 8 | 1 | 523803 | Roller Arm, LH |
| 9 | 1 | 523804 | Roller Arm, RH |
| 10 | 2 | 522071 | Frame Extension (Optional) |

** See table for approximate quantities due to rough castings

| QUANTITY | CAST RING QUANTITY |
|----------|--------------------|
| 10’ | 48 |
| 12’ | 56 |
| 13’ | 61 |
| 14’ | 66 |
| 15’ | 71 |

DO NOT PACK ROLLERS TIGHT!



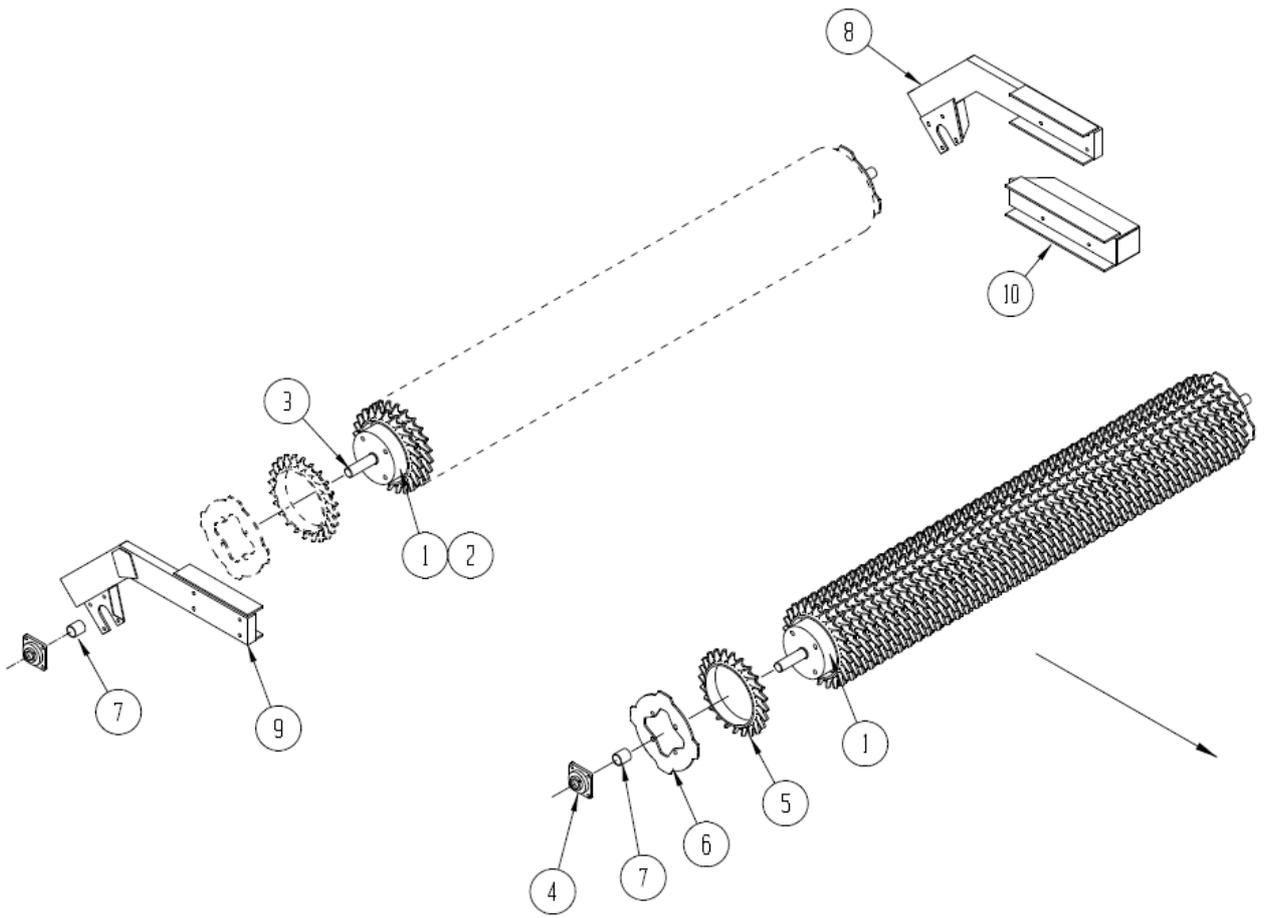
2.5 12" ROLLER ASSEMBLIES 10'-16'

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|---|
| 1 | As Req'd | 523376 | Roller Weldment, 10 ft. Standard |
| | As Req'd | 523378 | Roller Weldment, 12 ft. Standard |
| | As Req'd | 523380 | Roller Weldment, 14 ft. Standard |
| | As Req'd | 523382 | Roller Weldment, 16 ft. Standard |
| 2 | As Req'd | 523377 | Roller Weldment, 11 ft. (With Extensions) |
| | As Req'd | 523379 | Roller Weldment, 13 ft. (With Extensions) |
| | As Req'd | 523381 | Roller Weldment, 15 ft. (With Extensions) |
| | As Req'd | 523383 | Roller Weldment, 17 ft. (With Extensions) |
| 3 | (REF) | 523364 | Stub Shaft, Long (Weld In) |
| 4 | 4 | 524884 | Bearing, Double Roller, 2 3/16 in. |
| 5 | ** | 521592 | Cast Ring, 12-14-20 Standard |
| | ** | 521643 | Cast Ring, 12-14-20 Ductile |
| | ** | 521644 | Cast Ring, 12-14-20 Domestic |
| 6 | 12 | 521447 | Roller End Plate |
| 7 | 4 | 523896 | Spacer, Roller |
| 8 | 1 | 523803 | Roller Arm, LH |
| 9 | 1 | 523804 | Roller Arm, RH |
| 10 | 2 | 522071 | Frame Extension (Optional) |

** See table for approximate quantities due to rough castings

| QUANTITY | CAST RING QUANTITY |
|----------|--------------------|
| 10' | 48 |
| 12' | 56 |
| 13' | 61 |
| 14' | 66 |
| 15' | 71 |

DO NOT PACK ROLLERS TIGHT!



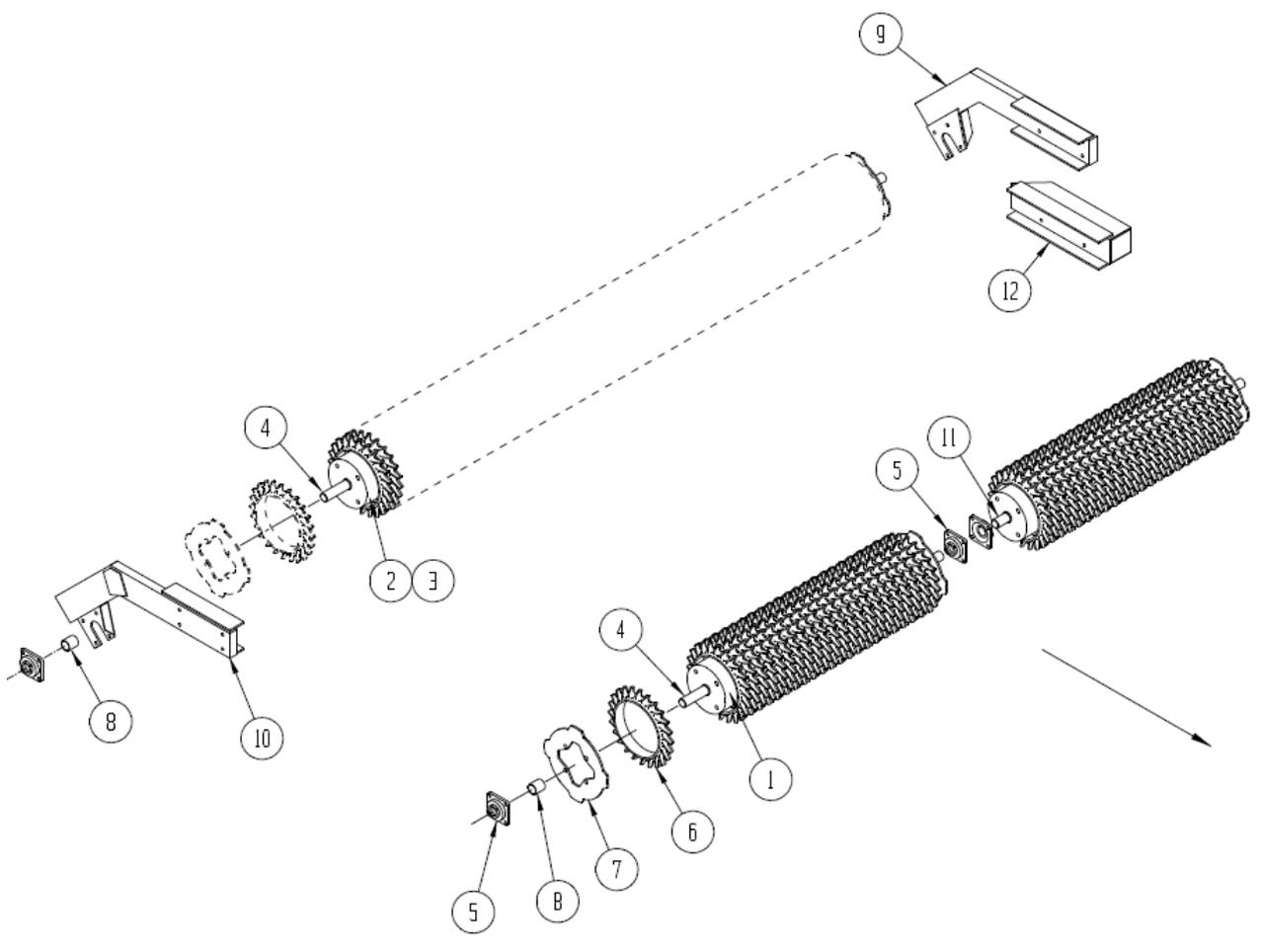
2.6 10” ROLLER ASSEMBLIES 18’-20’

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|---|
| 1 | As Reqd | 523356 | Split Roller Weldment, 18 ft. |
| | As Reqd | 523358 | Split Roller Weldment, 20 ft. |
| 2 | As Reqd | 523349 | Roller Weldment, 18 ft. (Standard) |
| | As Reqd | 523351 | Roller Weldment, 20 ft. (Standard) |
| 3 | As Reqd | 523350 | Roller Weldment, 19 ft. (With Extensions) |
| | As Reqd | 523352 | Roller Weldment, 21 ft. (With Extensions) |
| 4 | (REF) | 523327 | Stub Shaft, Long (Weld In) |
| 5 | 6 | 524884 | Bearing, Double Roller, 2 3/16 in. |
| 6 | ** | 521566 | Cast Ring, 10-12-16 Standard |
| | ** | 521639 | Cast Ring, 10-12-16 Ductile |
| | ** | 521640 | Cast Ring, 10-12-16 Domestic |
| | ** | 521590 | Cast Ring, 10-12-17 Standard |
| | ** | 521641 | Cast Ring, 10-12-17 Ductile |
| | ** | 521642 | Cast Ring, 10-12-17 Domestic |
| 7 | 12 | 521496 | Roller End Plate |
| 8 | 4 | 523896 | Spacer, Roller |
| 9 | 1 | 523803 | Roller Arm, LH |
| 10 | 1 | 523804 | Roller Arm, RH |
| 11 | (REF) | 523357 | Stub Shaft, Short (Weld In) |
| 12 | 2 | 522071 | Frame Extension (Optional) |

** See table for approximate quantities due to rough castings

| QUANTITY | CAST RING QUANTITY |
|-----------|--------------------|
| 18’ Split | 82 |
| 20’ Split | 90 |
| 18’ | 85 |
| 19’ | 90 |
| 20’ | 95 |
| 21’ | 99 |

DO NOT PACK ROLLERS TIGHT!



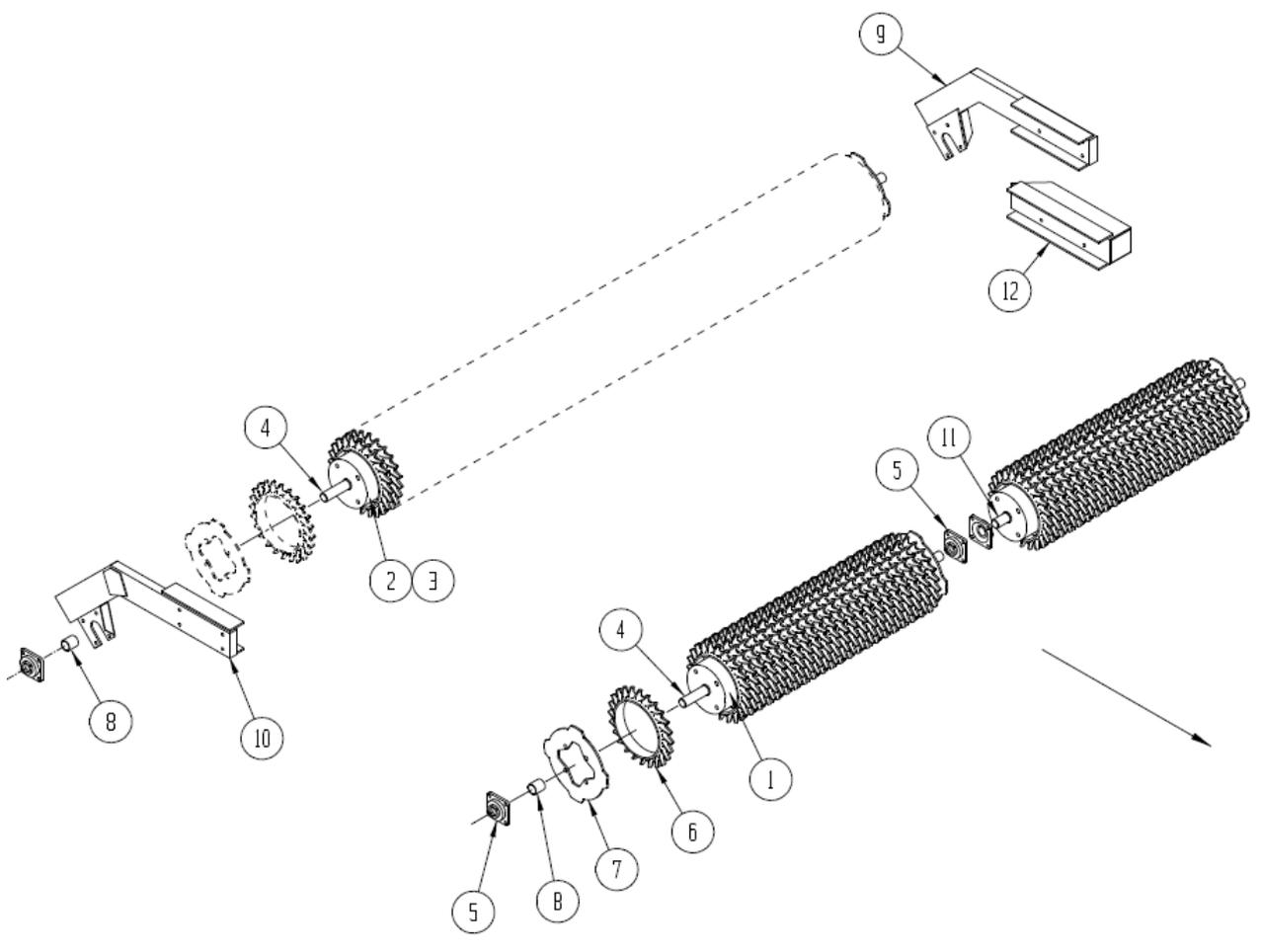
2.7 12" ROLLER ASSEMBLIES 18'-20'

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|---|
| 1 | As Reqd | 523391 | Split Roller Weldment, 18 ft. |
| | As Reqd | 523393 | Split Roller Weldment, 20 ft. |
| 2 | As Reqd | 523384 | Roller Weldment, 18 ft. (Standard) |
| | As Reqd | 523386 | Roller Weldment, 20 ft. (Standard) |
| 3 | As Reqd | 523385 | Roller Weldment, 19 ft. (With Extensions) |
| | As Reqd | 523387 | Roller Weldment, 21 ft. (With Extensions) |
| 4 | (REF) | 523364 | Stub Shaft, Long (Weld In) |
| 5 | 6 | 524884 | Bearing, Double Roller, 2 3/16 in. |
| 6 | ** | 521592 | Cast Ring, 12-14-20 Standard |
| | ** | 521643 | Cast Ring, 12-14-20 Ductile |
| | ** | 521644 | Cast Ring, 12-14-20 Domestic |
| 7 | 12 | 521447 | Roller End Plate |
| 8 | 4 | 523896 | Spacer, Roller |
| 9 | 1 | 523803 | Roller Arm, LH |
| 10 | 1 | 523804 | Roller Arm, RH |
| 11 | (REF) | 523392 | Stub Shaft, Short (Weld In) |
| 12 | 2 | 522071 | Frame Extension (Optional) |

** See table for approximate quantities due to rough castings

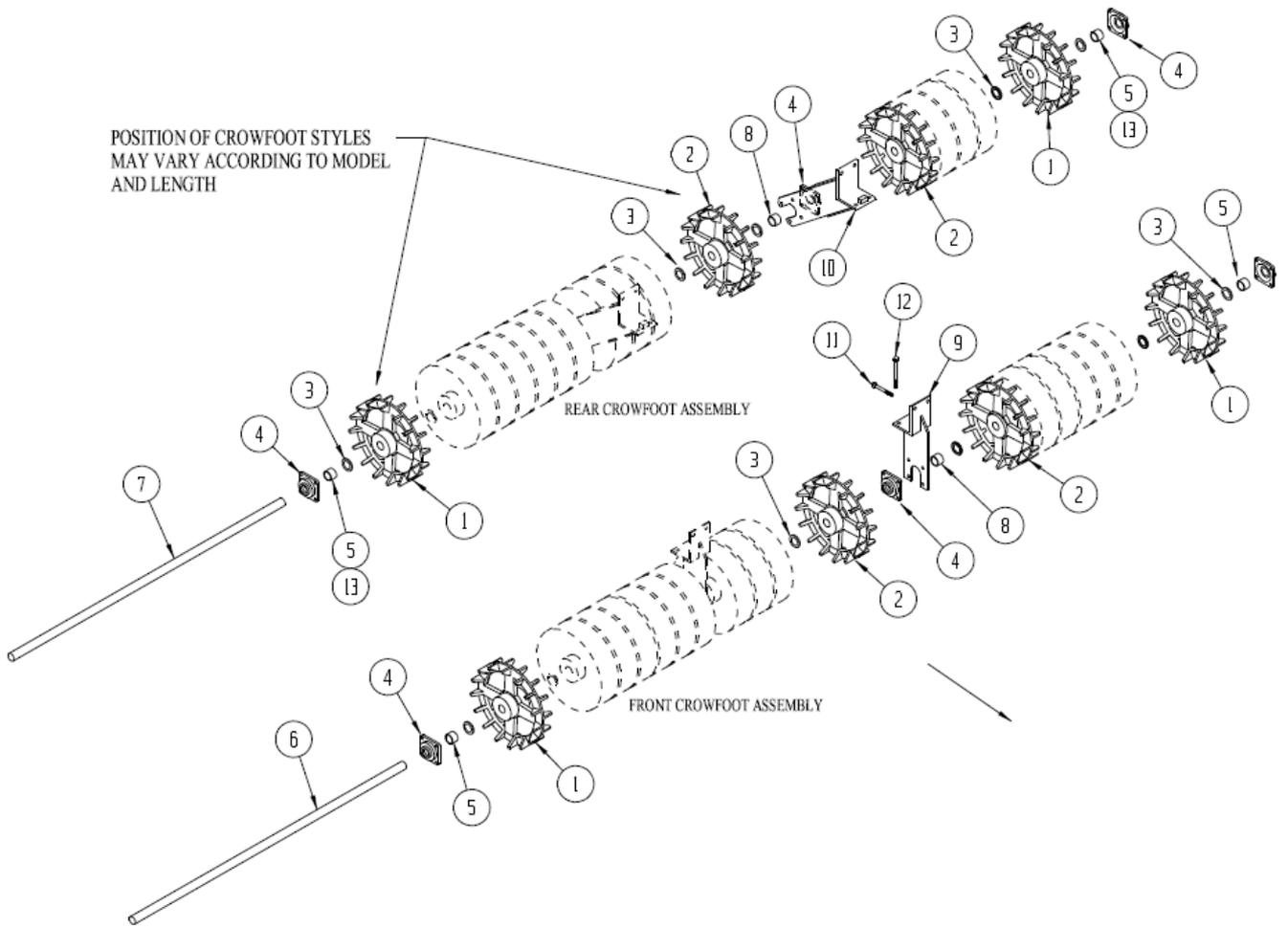
| QUANTITY | CAST RING QUANTITY |
|-----------|--------------------|
| 18' Split | 82 |
| 20' Split | 90 |
| 18' | 85 |
| 19' | 90 |
| 20' | 95 |
| 21' | 99 |

DO NOT PACK ROLLERS TIGHT!



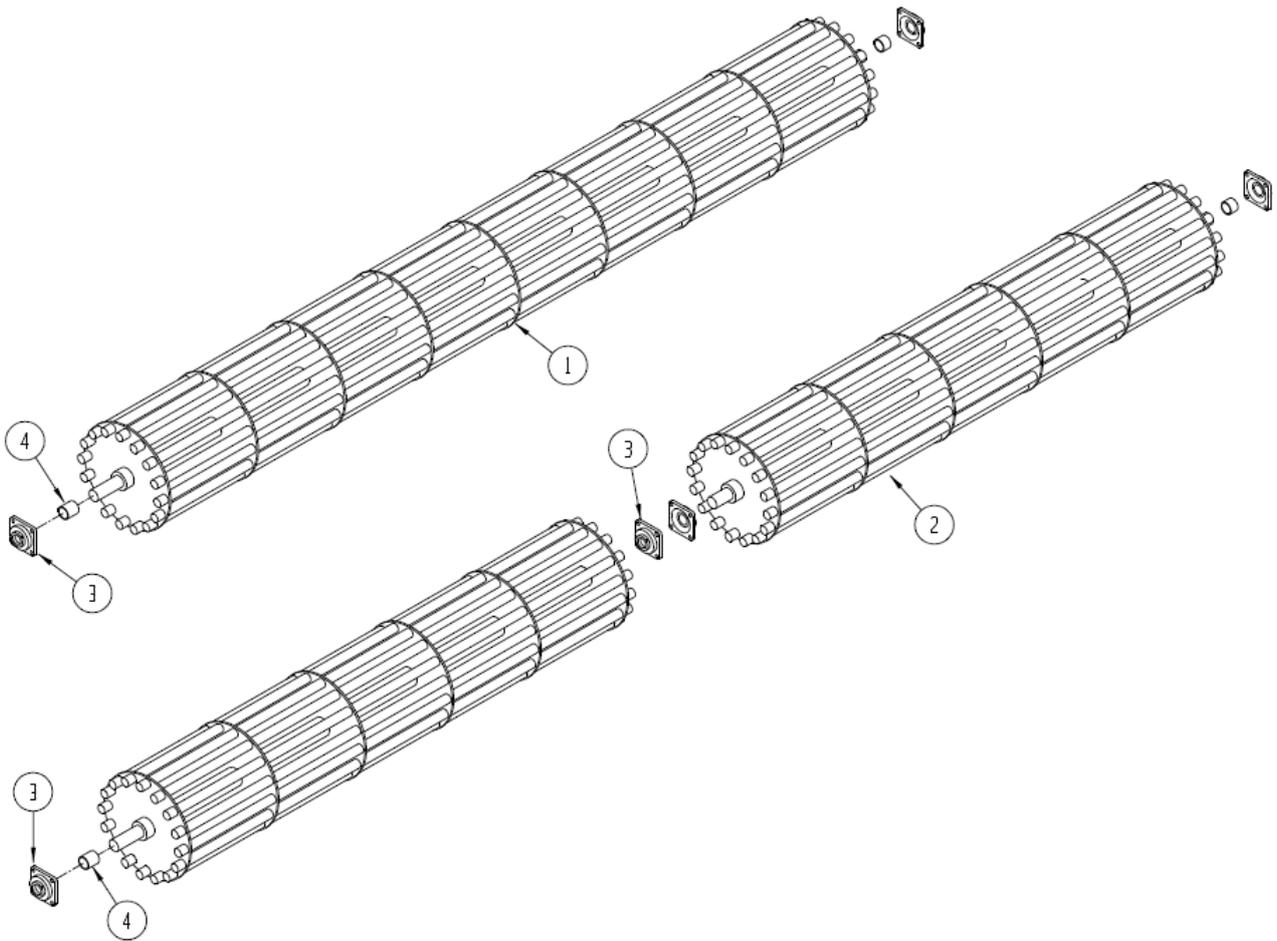
2.8 CROWFOOT ROLLER ASSEMBLIES

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|--|
| 1 | As Req'd | 524242 | Crowfoot, 20 in. x 5 5/8 in. Hub Length |
| 2 | As Req'd | 524243 | Crowfoot, 20 in. x 4 in. Hub Length |
| 3 | As Req'd | 524452 | Spacer |
| 4 | As Req'd | 980827 | Bearing, 2 3/16 in., 4-Hole Flanged |
| 5 | 4 | 524451 | Spacer (12 ft. Frame, Front & Rear) |
| | 2 | 524468 | Spacer (20 ft. Frame, Front Only) |
| | 4 | 524458 | Spacer (14 ft. & 16 ft. Frame, Front & Rear) |
| | 2 | 524463 | Spacer (18 ft. Frame, Front Only) |
| 6 | 2 | 524453 | Shaft (12 ft. Frame, Front & Rear) |
| | 2 | 524459 | Shaft (14 ft. Frame, Front Only) |
| | 2 | 524464 | Shaft (16 ft. Frame, Front Only) |
| | 2 | 524465 | Shaft (18 ft. Frame, Front Only) |
| | 2 | 524468 | Shaft (20 ft. Frame, Front Only) |
| 7 | 1 | 524456 | Shaft, LH Rear (14 ft. Frame) |
| | 1 | 524457 | Shaft, RH Rear (14 ft. Frame) |
| | 1 | 524461 | Shaft, LH Rear (16 ft. Frame) |
| | 1 | 524462 | Shaft, RH Rear (16 ft. Frame) |
| | 1 | 524466 | Shaft, LH Rear (18 ft. Frame) |
| | 1 | 524467 | Shaft, RH Rear (18 ft. Frame) |
| | 1 | 524469 | Shaft, LH Rear (20 ft. Frame) |
| | 1 | 524470 | Shaft, RH Rear (20 ft. Frame) |
| 8 | 4 | 524450 | Spacer, Inside (12 ft., 14 ft., 16 ft., & 18 ft. Frames) |
| | 8 | 524471 | Spacer, Inside (20 ft. Frame) |
| 9 | 2 | 524448 | Shaft Support, Front (12 ft. & 18 ft. Frames) |
| | 3 | 524448 | Shaft Support, Front (14 ft. & 16 ft. Frames) |
| | 4 | 524448 | Shaft Support, Front (20 ft. Frame) |
| 10 | 2 | 524454 | Shaft Support, Rear (12 ft. Frame) |
| | 3 | 524454 | Shaft Support, Rear (14 ft., 16 ft. & 18 ft. Frames) |
| | 5 | 524454 | Shaft Support, Rear (20 ft. Frame) |
| 11 | As Req'd | 997903 | Eye Bolt, 3/4 x 6 1/2 |
| 12 | As Req'd | — | Hex Bolt, 3/4 x 8 1/2 |
| 13 | 2 | 524473 | Spacer (18 ft. & 20 ft. Frames, Rear Only) |



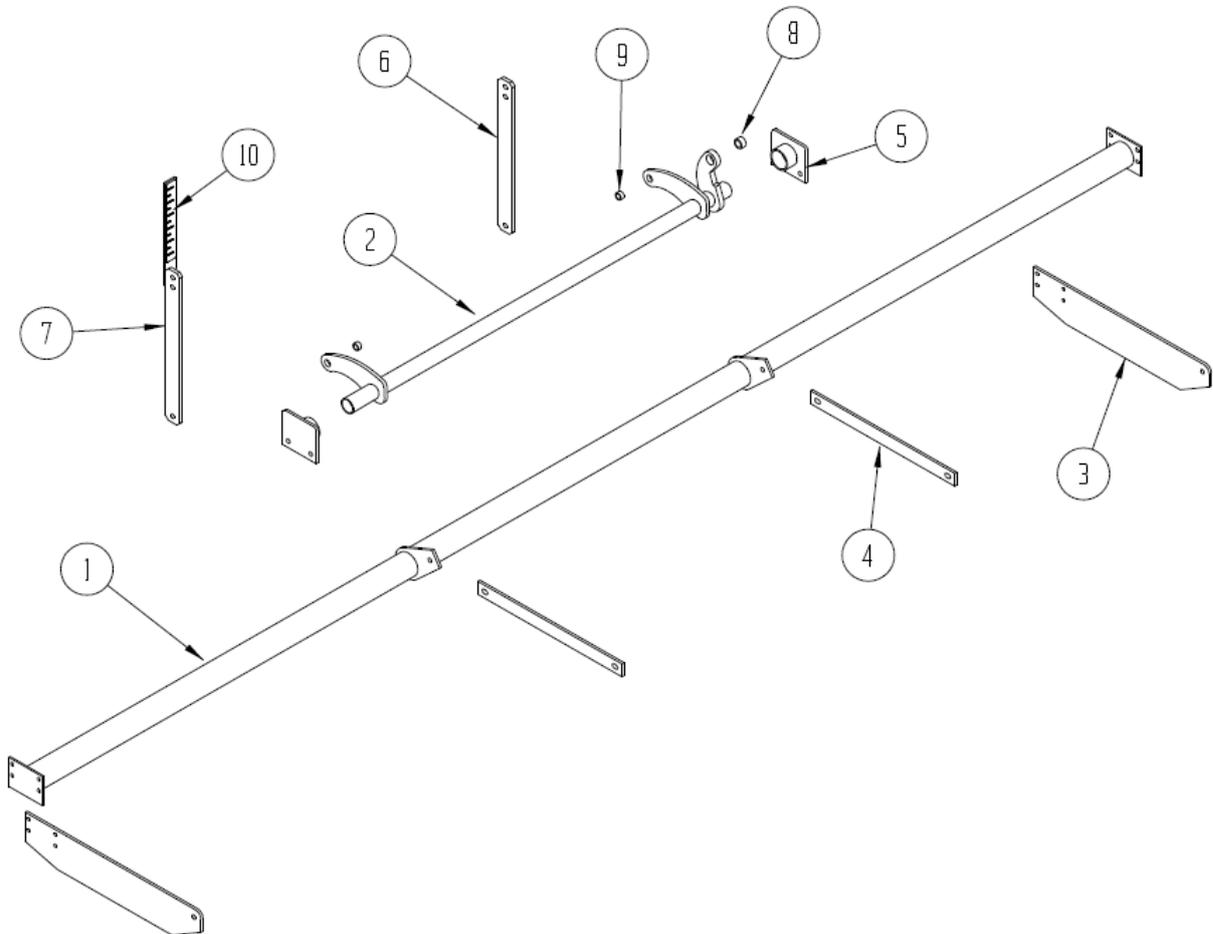
2.9 PIPE ROLLER ASSEMBLIES

| ITEM NO. | QUANTITY | PART NO. 16" | PART NO. 20" | DESCRIPTION | |
|----------|----------|--------------|--------------|------------------------------------|---------------------------|
| 1 | As Req'd | 525987 | 525249 | Pipe Roller, 10 ft. | |
| | As Req'd | 525989 | 525168 | Pipe Roller, 11 ft. | |
| | As Req'd | 523808 | 523818 | Pipe Roller, 12 ft. | |
| | As Req'd | 523872 | 523882 | Pipe Roller, 13 ft. | |
| | As Req'd | 523809 | 523819 | Pipe Roller, 14 ft. | |
| | As Req'd | 523873 | 523883 | Pipe Roller, 15 ft. | |
| | As Req'd | 523810 | 523820 | Pipe Roller, 16 ft. | |
| | As Req'd | 523874 | 523884 | Pipe Roller, 17 ft. | |
| | As Req'd | 523811 | 523821 | Pipe Roller, 18 ft. | |
| | As Req'd | 523875 | 523885 | Pipe Roller, 19 ft. | |
| | As Req'd | 523812 | 523822 | Pipe Roller, 20 ft. | |
| | As Req'd | 523876 | 523886 | Pipe Roller, 21 ft. | |
| | 2 | As Req'd | 524021 | 524022 | Split Pipe Roller, 18 ft. |
| | | As Req'd | 523985 | 523986 | Split Pipe Roller, 20 ft. |
| 3 | As Req'd | 524884 | 524884 | Bearing, Double Roller, 2 3/16 in. | |
| 4 | 4 | 523807 | 523807 | Spacer | |



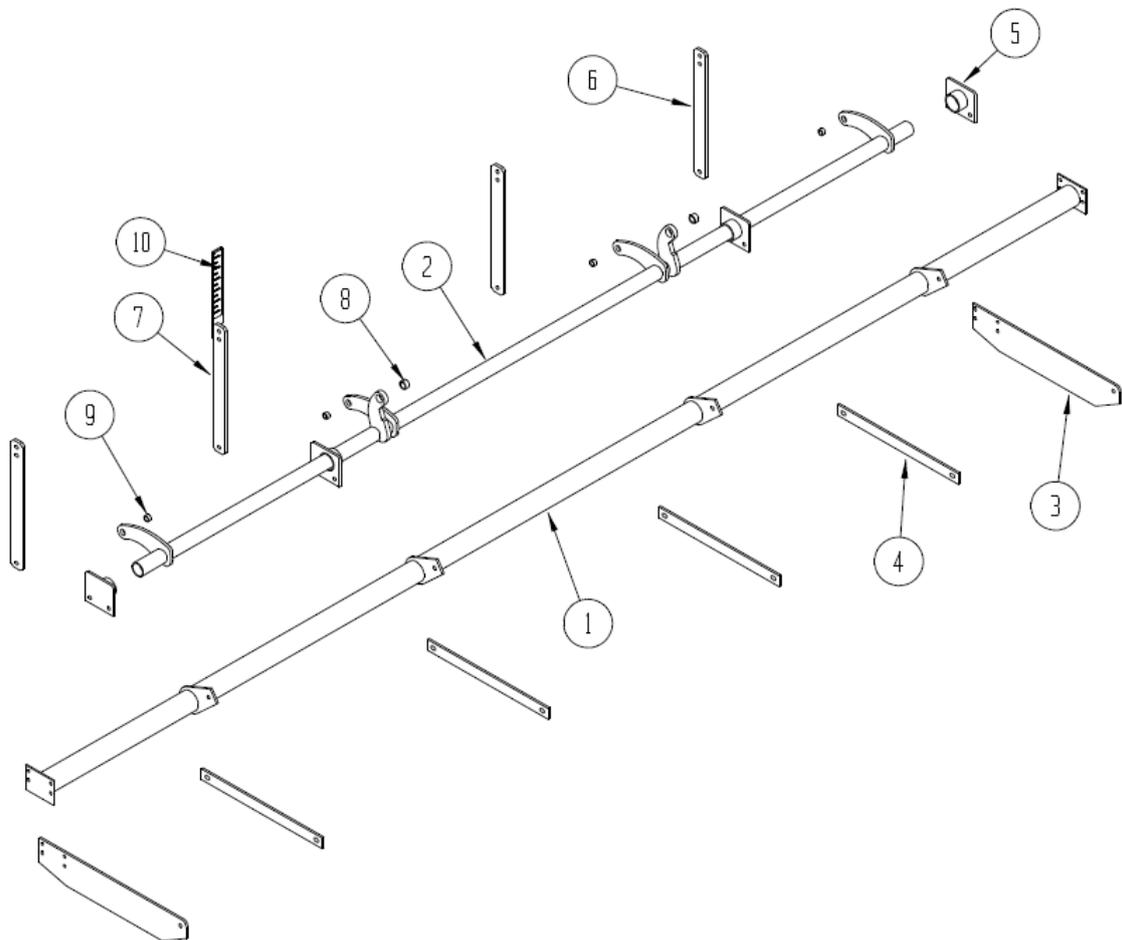
2.10 LEVELING BAR & LIFT GROUP (10'-16')

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|--|
| 1 | 1 | 525969 | Leveling Bar (10 ft.) |
| | 1 | 522046 | Leveling Bar (12 ft.) |
| | 1 | 522052 | Leveling Bar (14 ft.) |
| | 1 | 522079 | Leveling Bar (16 ft.) |
| 2 | 1 | 524761 | Lifting Bar Weldment (Includes Bushings) |
| 3 | 2 | 521375 | Side Link |
| 4 | 2 | 521374 | Pull Link, Inner |
| 5 | 2 | 524764 | Lift Bar Bracket |
| 6 | 1 | 521488 | Lift Link |
| 7 | 1 | 522029 | Lift Link Weldment |
| 8 | 1 | 521391 | Hardened Bushing |
| 9 | 2 | 360098 | Spacer Bushing |
| 10 | 1 | 522301 | Depth Indicator Decal |



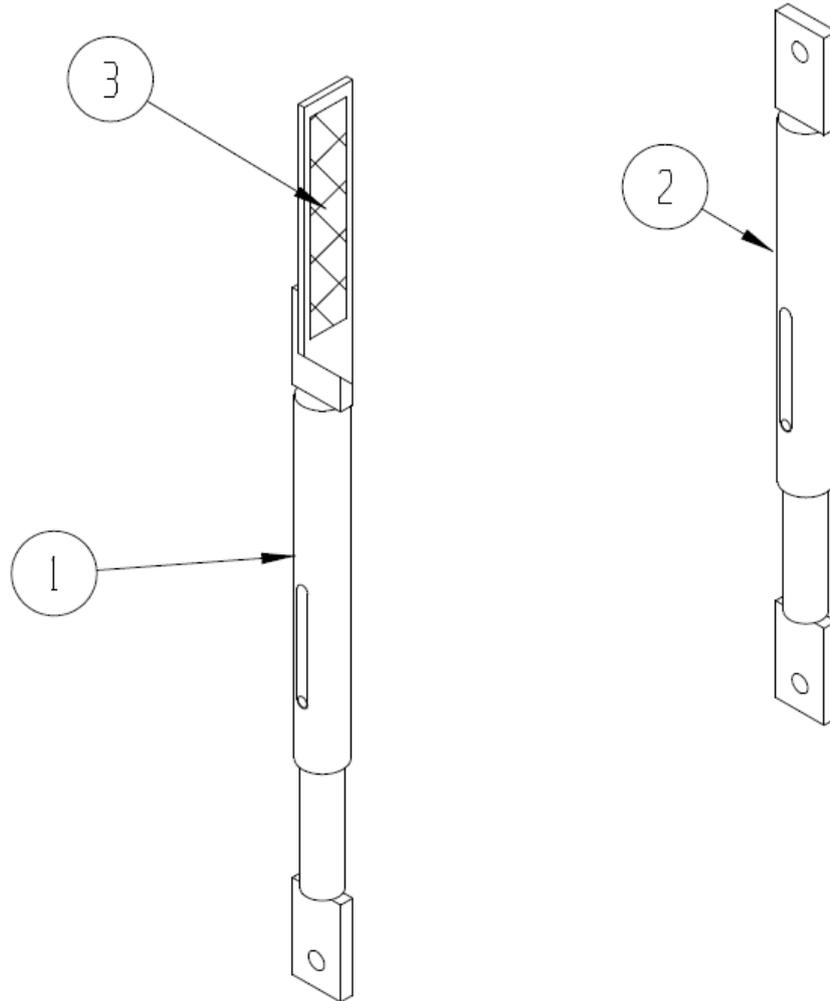
2.11 LEVELING BAR & LIFT GROUP (18'-20')

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|--|
| 1 | 1 | 522089 | Leveling Bar (18) |
| | 1 | 522129 | Leveling Bar (20) |
| 2 | 1 | 524765 | Lifting Bar Weldment (Includes Bushings) |
| 3 | 2 | 521375 | Side Link |
| 4 | 4 | 521374 | Pull Link, Inner |
| 5 | 2 | 524764 | Lift Bar Bracket |
| 6 | 3 | 521488 | Lift Link |
| 7 | 1 | 522029 | Lift Link Weldment |
| 8 | 2 | 521391 | Hardened Bushing |
| 9 | 4 | 360098 | Spacer Bushing |
| 10 | 1 | 522301 | Depth Indicator Decal |



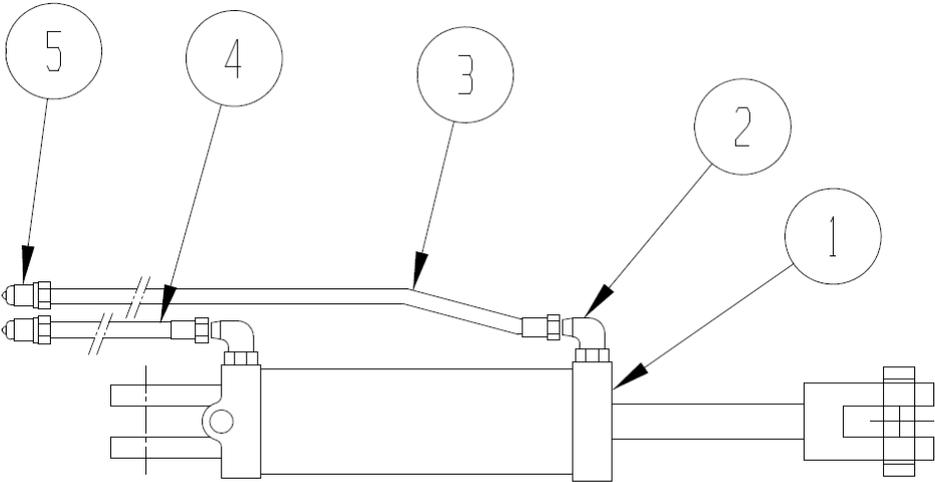
2.12 LEVELING BAR ROCK PROTECTION KIT

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|----------------------------------|
| 1 | 3 | 521300 | Link Assembly w/ Depth Indicator |
| 2 | 3 | 521291 | Link Assembly |
| 3 | 3 | 522301 | Decal Indicator Decal |



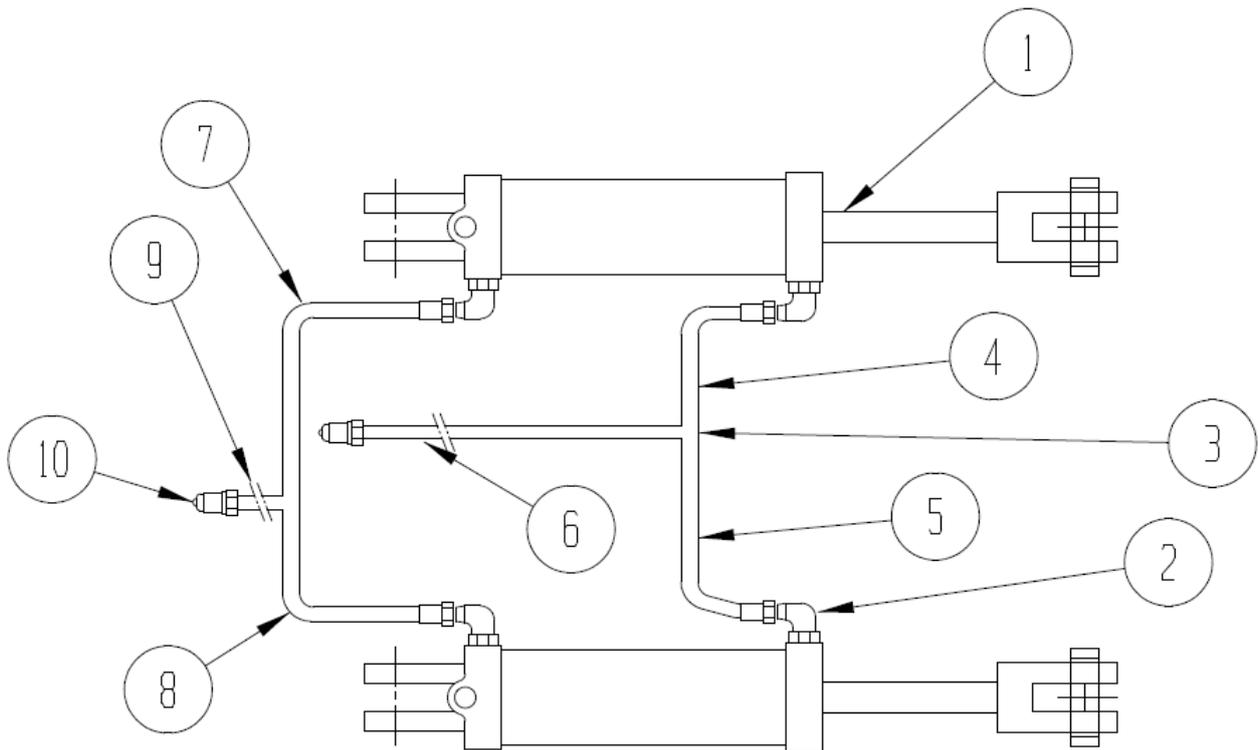
HYDRAULIC SCHEMATIC (10'-16')

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|---|
| 1 | 1 | 267835 | Hydraulic Cylinder, 3 x 8 w/ Hrdnd Clevis |
| 2 | 2 | 2503-8-8 | Straight Thread Elbow, 1/2 x 1/2 O-Ring |
| 3 | 1 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 MNPT & 1/2 JIC Female End |
| 4 | 1 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 MNPT & 1/2 JIC Female End |
| 5 | 2 | 291027 | Quick Coupler, Male End |
| | (REF) | 267837 | Austempered Hardened Rod Clevis |
| | (REF) | 998389 | Rod End Clevis w/ Hardened Bushing |
| | (REF) | 264704 | Hydraulic Tube Clamps, Dbl |



2.13 HYDRAULIC SCHEMATIC (18'-20')

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|----------|----------|---|
| 1 | 2 | 267835 | Hydraulic Cylinder, 3 x 8 w/ Hrdnd Clevis |
| 2 | 4 | 2503-8-8 | Straight Thread Elbow, 1/2 x 1/2 O-Ring |
| 3 | 2 | 033T-8-8 | Union Tee, 1/2 JIC |
| 4 | 2 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 MNPT & 1/2 JIC Female End |
| 5 | 2 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 MNPT & 1/2 JIC Female End |
| 6 | 2 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 JIC Female End |
| 7 | 1 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 MNPT & 1/2 JIC Female End |
| 8 | 1 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 MNPT & 1/2 JIC Female End |
| 9 | 1 | — | Hydraulic Hose, 1/2 x ?? w/ 1/2 JIC Female End |
| 10 | 2 | 291027 | Quick Coupler, Male End |
| | (REF) | 267837 | Austempered Hardened Rod Clevis |
| | (REF) | 998389 | Rod End Clevis w/ Hardened Bushing |
| | (REF) | 264704 | Hydraulic Tube Clamps, Dbl |



2.14 HYDRAULIC TINE BAR CONTROL

| ITEM NO. | QTY (12' & 14') | QTY (16'-20') | PART NO. | DESCRIPTION |
|----------|-----------------|---------------|----------|---|
| 1 | 2 | 4 | 998165 | Hydraulic Cylinder, 3 x 10 |
| 2 | 1 | 2 | 524559 | Cylinder Bracket |
| 3 | 1 | 2 | 521260 | Control Linkage |
| 4 | 1 | 2 | 521495 | Control Clamp |
| 5 | 1 | 2 | 523157 | Control Linkage |
| 6 | 1 | 2 | 525262 | Cylinder Bracket |
| 7 | 2 | 4 | 523000 | Cylinder Ear |
| 8 | 1 | 2 | 521513 | Control Clamp |
| 9 | 2 | 4 | 295050 | Branch Tee, 1/2 JIC x 1/2 O-Ring |
| 10 | 2 | 4 | 522012 | Stroke Control Kit |
| 11 | 2 | 2 | ———— | Hydraulic Tube Asm, 5/8 x 70 |
| 12 | 2 | 2 | ———— | Hydraulic Hose, 1/2 x 192 w/ 3/8 MPT & 5/8 JIC Female Ends |
| 13 | 12 | 24 | ———— | Eye Bolt, 1/2 x 3 1/2 |
| 14 | 2 | 4 | 295043 | Straight Thread Elbow, 1/2 x 1/2 O-Ring |
| 15 | 2 | 4 | 295035 | Union Elbow, 5/8 |
| 16 | 4 | 8 | 522012 | Eye Bolt, 3/4 x 6 |
| 17 | 4 | 8 | ———— | Hex Bolt, 3/4 x 8 1/2 |
| 18 | 2 | 2 | 291027 | Quick Coupler, Male End |
| | (REF) | (REF) | 264704 | Hydraulic Tube Clamp, Dbl |

2.15 DECAL GROUP

| ITEM NO. | QUANTITY | PART NO. | DESCRIPTION |
|----------|-----------|----------|-------------------------------|
| 1 | 4 | 264797 | Decal, Parma |
| 2 | 1 | 100406 | Decal, General Caution |
| 3 | 4 | 100404 | Decal, Block Machine |
| 4 | 2 | 100311 | Decal, Rotating Parts |
| 5 | 1 | 100423 | Decal, FEMA |
| 6 | 4 | 100408 | Decal, Hydraulics Pressurized |
| 7 | 6* | 264515 | Reflector, Yellow |
| 8 | As Req'd* | 264516 | Reflector, Red |
| 9 | As Req'd* | 525948 | Decal, Fluorescent Orange |
| 10 | 1 | 522301 | Decal, Depth Indicator |
| 11 | 1 | 521000 | Decal, Lift |
| 12 | 4 | 265933 | Decal, Do Not Ride |
| 13 | 1 | 521268 | Warning Light Kit |
| 14 | 1* | 282210 | SMV Sign |

*** Yellow reflectors, red reflectors, non-reflective fluorescent orange decals, and SMV signs must be placed as specified by ANSI/SAE S279.17 and ANSI/SAE S276.**

Yellow reflectors must be placed:

- Visible to the front and positioned to indicate, as nearly as practicable; the extreme left and right projections of the equipment.
- Visible from the left and ride sides, positioned to indicate, as nearly as practicable; the front and rear of the machine.

Red reflectors and non-reflective fluorescent orange decals must be placed:

- Visible to the rear and positioned to indicate, as nearly as practicable; the extreme left and right projections of the equipment.
- At a horizontal distance between red reflective/fluorescent orange decals no greater than 6 ft. The non-reflective fluorescent orange and red reflective material on the SMV sign may be included to meet these requirements.

SMV Signs must be placed:

- Visible to the rear.
- Triangle point facing upward.
- In the center of the machine, or as near left-center as practicable.