

Farm King

OPERATOR AND PARTS MANUAL

Double Rotary Rake

Model ENO780 (RR7700)

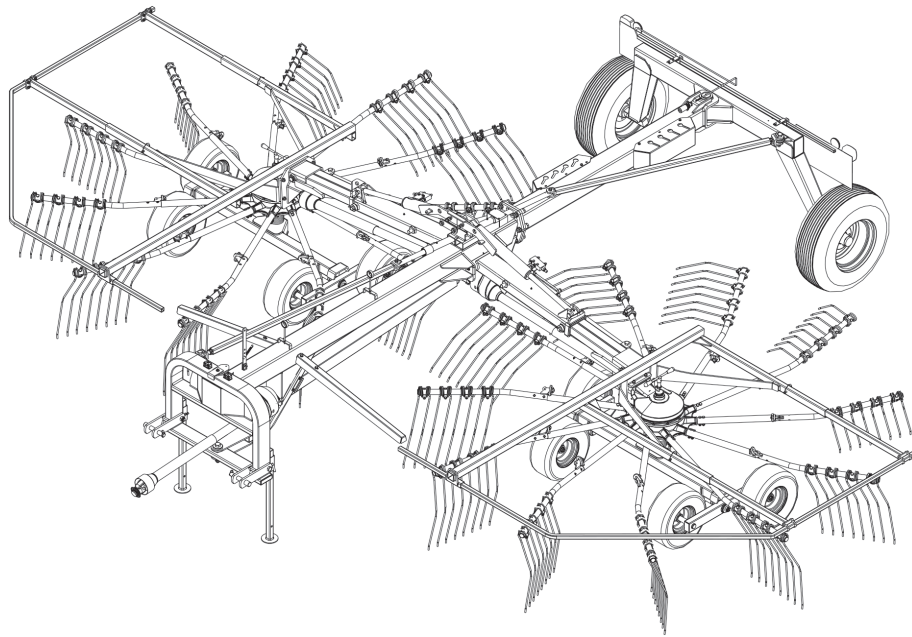


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Manufacturer’s Statement: For technical reasons, Buhler Industries Inc. reserves the right to modify machinery design and specifications provided herein without any preliminary notice. Information provided herein is of descriptive nature. Performance quality may depend on soil fertility, applied agricultural techniques, weather conditions, and other factors.

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Warranty Registration Form

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery.

Customer Name:	
Customer Address:	
City:	Prov / State:
Postal / Zip Code:	Phone:

Dealer Name:	
Dealer Address:	
City:	Prov / State:
Postal / Zip Code:	Phone:

Equipment Model:	Serial Number:	Delivery Date:
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I have thoroughly instructed the buyer on the above described equipment which review included the Operator and Parts Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Dealer Inspection Report

- Wings raise and extend
- Adjust height of rotary groups
- Fasteners tightened
- Grease points lubricated ***Wheel hubs are greased***
- Check gear box oil level
- Check wheel bolt torque and tire pressure
- Tines properly oriented
- Check hydraulic hoses

Safety

- Safety chain on hitch
- All decals installed
- Guards and shields installed and secure
- Review operating and safety instructions

Date:	Dealer Rep. Signature:
-------	------------------------

The above equipment and Operator And Parts Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date:	Customer / Owner Signature:
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Remove this Warranty Registration Form from the Operator And Parts Manual. Make two copies of the form. Send original Warranty Registration Form to Farm King. Give one copy to the customer and the dealer will keep one copy.

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Introduction

This Operator And Parts Manual was written to give the owner / operator instructions on the safe operation, maintenance and part identification of the Farm King equipment. **READ AND UNDERSTAND THIS OPERATOR AND PARTS MANUAL BEFORE OPERATING YOUR FARM KING EQUIPMENT.** If you have any questions, see your Farm King dealer. This manual may illustrate options and accessories not installed on your Farm King equipment.

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Owner's Information

Thank you for your decision to purchase a Farm King Rotary Rake. To ensure maximum performance of your equipment, it is mandatory that you thoroughly study the Operator And Parts Manual and follow the recommendations. Proper operation and maintenance are essential to maximize equipment life and prevent personal injury.

Operate and maintain this equipment in a safe manner and in accordance with all applicable local, state, and federal codes, regulations and / or laws. Follow all on-product labeling and instructions.

Make sure that all personnel have read this Operator And Parts Manual and thoroughly understand safe and correct operating, installation and maintenance procedures.

Farm King is continually working to improve its products. Farm King reserves the right to make any improvements or changes as deemed practical and possible without incurring any responsibility or obligation to make any changes or additions to equipment sold previously.

Although great care has been taken to ensure the accuracy of this publication, Farm King makes no warranty or guarantee of any kind, written or expressed, implied or otherwise with regard to the information contained within this manual. Farm King assumes no responsibility for any errors that may appear in this manual and shall not be liable under any circumstances for incidental, consequential or punitive damages in connection with, or arising from the use of this manual.

Keep this manual available for frequent reference. All new operators or owners must review the manual before using the equipment and annually thereafter. Contact your Farm King Dealer if you need assistance, information, or additional copies of the manual.

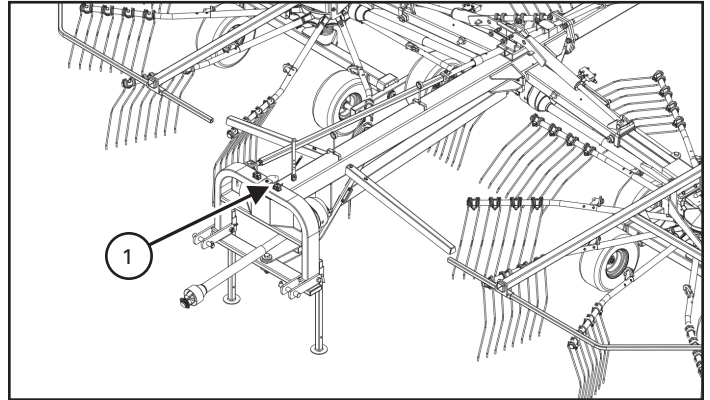
Visit our website at www.farm-king.com for a complete list of dealers in your area.

The directions left, right, front and rear, as mentioned throughout this manual, are as viewed by the operator sitting in the tractor seat while towing the implement.

Serial Number Location

Please enter the model and serial number in the space provided for easy reference.

Figure 1



Model Number: _____

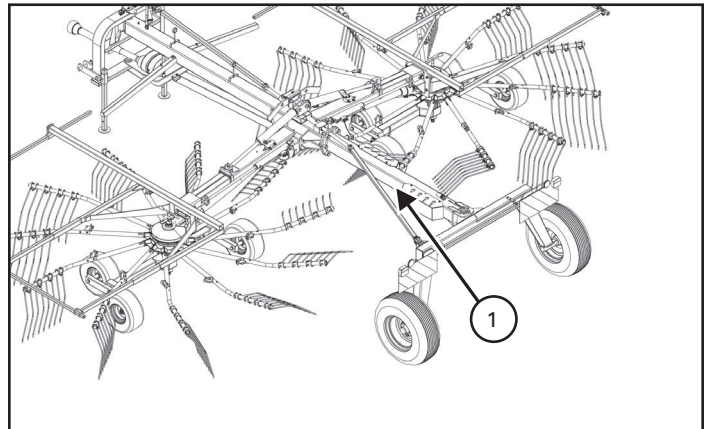
Serial Number: _____

The serial number plate (Item 1) is located on the front of the main frame [Figure 1].

Always use your serial number when requesting information or when ordering parts.

Manual Storage

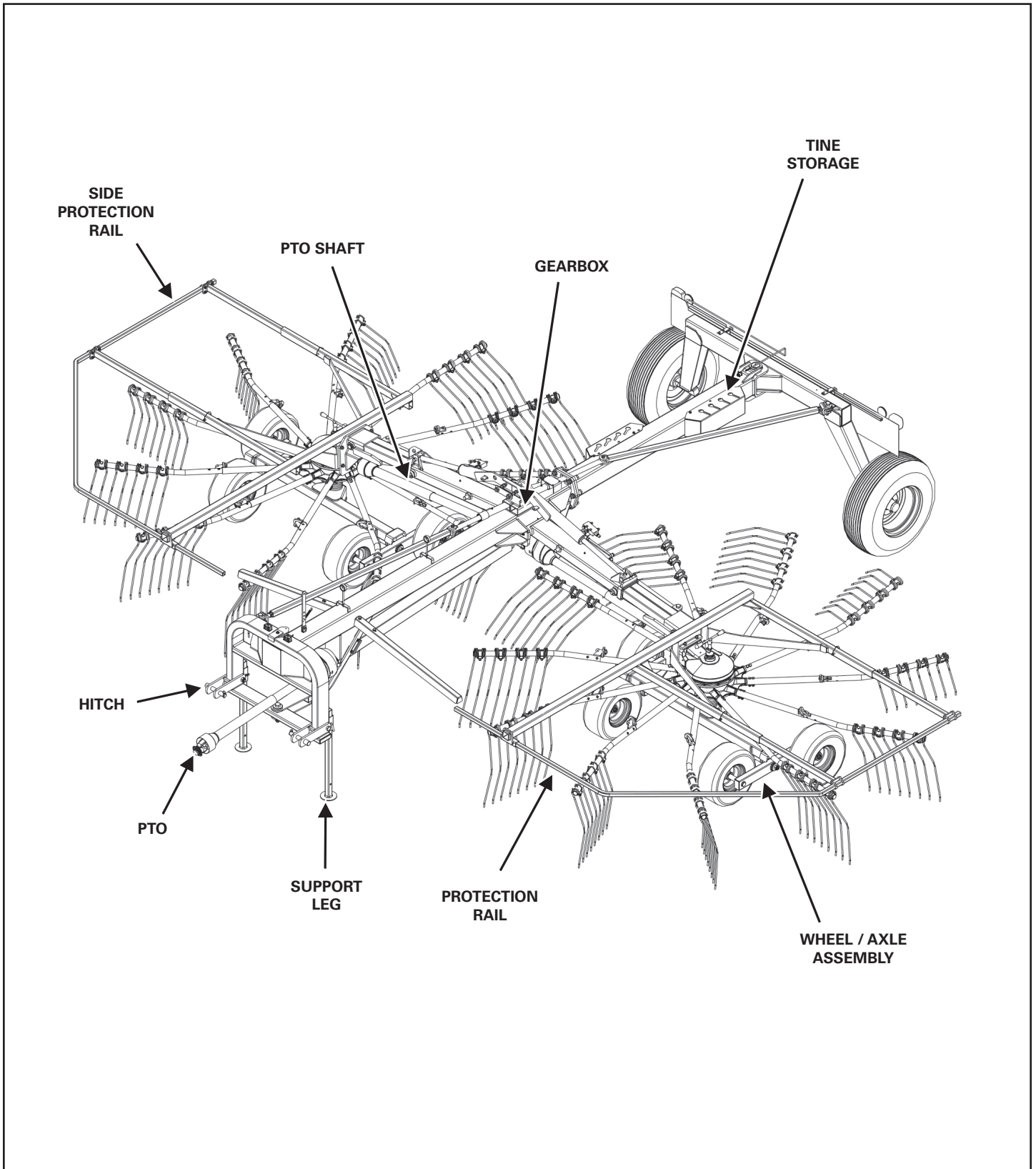
Figure 2



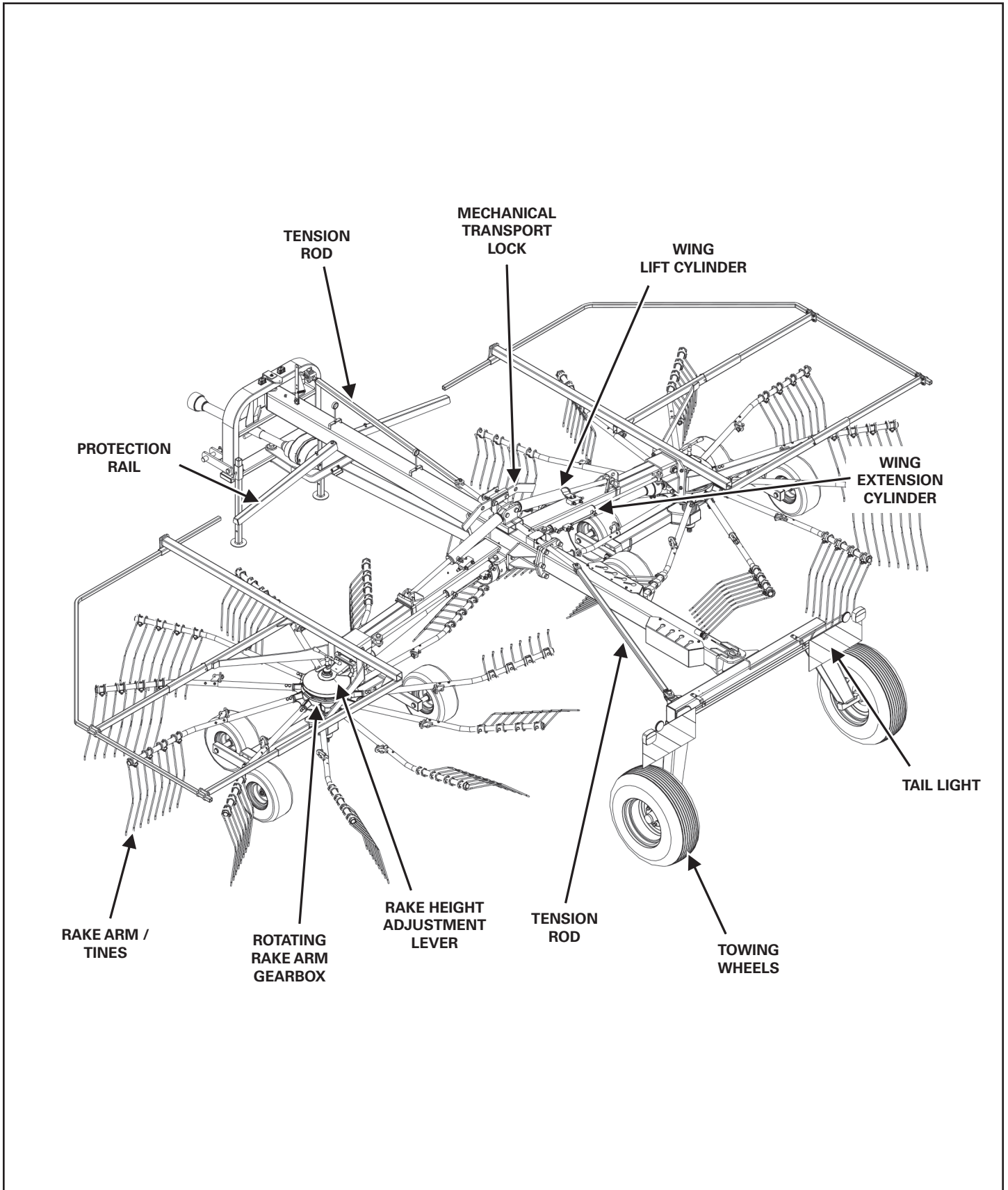
The operator and parts manual and other documents can be stored in the canister (Item 1) located on the rear frame [Figure 2].

Equipment Identification

Component Location - Front View



Component Location - Rear View



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Safety


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Safety Instructions

Safe Operation is The Operator's Responsibility

	Safety Alert Symbol
<p>This symbol with a warning statement means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.</p>	


	CAUTION
<p>The signal word CAUTION on the machine and in the manuals indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.</p>	

	DANGER
<p>The signal word DANGER on the machine and in the manuals indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>	

	WARNING
<p>The signal word WARNING on the machine and in the manuals indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>	

	IMPORTANT
<p>This notice identifies procedures which must be followed to avoid damage to the machine.</p>	

Safe Operation Needs A Qualified Operator

	WARNING
<p>Operators must have instructions before operating the machine. Untrained operators can cause injury or death.</p>	

For an operator to be qualified, he or she must not use drugs or alcohol which impair alertness or coordination while working. An operator who is taking prescription drugs must get medical advice to determine if he or she can safely operate a machine and the equipment.

Understand the written instructions, rules and regulations:

- The written instructions from Farm King include the Warranty Registration, Dealer Inspection Report, Operator And Parts Manual and machine signs (decals).
- Check the rules and regulations at your location. The rules may include an employer's work safety requirements. Regulations may apply to local driving requirements or use of a Slow Moving Vehicle (SMV) emblem. Regulations may identify a hazard such as a utility line.

Have Training with Actual Operation:

- Operator training must consist of a demonstration and verbal instruction. This training is given by the machine owner prior to operation.
- The new operator must start in an area without bystanders and use all the controls until he or she can operate the machine safely under all conditions of the work area. Always fasten seat belt before operating.

Know the Work Conditions:

- Clear working area of all bystanders, especially small children and all obstacles that might be hooked or snagged, causing injury or damage.
- Know the location of any overhead or underground power lines. Call local utilities and have all underground power lines marked prior to operation.
- Wear tight fitting clothing. Always wear safety glasses when doing maintenance or service.

Use Safety Rules

- Read and follow instructions in this manual and the tractor's Operators Manual before operating.
- Under no circumstances should young children be allowed to work with this equipment.
- This equipment is dangerous to children and persons unfamiliar with its operation.
- Check for overhead and / or underground lines before operating equipment (if applicable).
- 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.
- Check that the equipment is securely fastened to the tractor / towing vehicle.
- Make sure all the machine controls are in the NEUTRAL position before starting the machine.
- Operate the equipment only from the operator's position.
- Operate the equipment according to the Operator And Parts Manual.
- When learning to operate the equipment, do it at a slow rate in an area clear of bystanders, especially small children.
- DO NOT permit personnel to be in the work area when operating the equipment.
- The equipment must be used ONLY on approved tractors / transport vehicles.
- DO NOT modify the equipment in any way. Unauthorized modification may impair the function and / or safety and could affect the life of the equipment.
- Stop tractor engine, place all controls in neutral, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing, unplugging or filling.
- DO NOT make any adjustments or repairs on the equipment while the machine is running.
- Keep shields and guards in place. Replace if damaged.
- Keep hands, feet, hair and clothing away from all moving parts.

Safety Rules For Power Take-Off (PTO) Driven Equipment

- Keep PTO shields and all guards in place. Replace damaged or missing shields and guards before operating.
- Follow warnings and instructions on machine signs (decals). Replace damaged or missing decals.
- Do not wear loose or bulky clothing around the PTO or other moving parts.
- Keep bystanders away from PTO driven equipment, and never allow children near machines.
- Read and understand the manuals for the PTO driven equipment and be aware of safe operating procedures and hazards that may not be readily apparent.
- Never operate over 540 rpm.
- Always walk around equipment to avoid coming near a turning PTO driveline. Stepping over, leaning across or crawling under a turning PTO driveline can cause entanglement.
- Position the machine and equipment hitch correctly to prevent driveline stress and separation.
- Use caution when turning. Turning too sharp can cause driveline damage.
- Use caution when raising PTO driven equipment.
- Excessive driveline angle can cause driveline damage. Use stops if needed.

Machine Requirements And Capabilities

- Fasten seat belt securely. If equipped with a foldable Roll-Over Protective Structure (ROPS), only fasten seat belt when ROPS is up and locked. DO NOT wear seat belt if ROPS is down.
- Stop the machine and engage the parking brake. Install blocks in front of and behind the rear tires of the machine. Install blocks underneath and support the equipment securely before working under raised equipment.
- Keep bystanders clear of moving parts and the work area. Keep children away.
- Use increased caution on slopes and near banks and ditches to prevent overturn.
- Make certain that the Slow Moving Vehicle (SMV) emblem is installed so that it is visible and legible. When transporting the equipment, use the flashing warning lights (if equipped) and follow all local regulations.
- Operate this equipment with a machine equipped with an approved Roll-Over Protective Structure (ROPS). Always wear seat belt when the ROPS is up. Serious injury or death could result from falling off the machine.
- Before leaving the operator's position:
 1. Always park on a flat level surface.
 2. Place all controls in neutral.
 3. Engage the parking brake.
 4. Stop engine.
 5. Wait for all moving parts to stop.
- Carry passengers only in designated seating areas. Never allow riders on the machine or equipment. Falling off can result in serious injury or death.
- Start the equipment only when properly seated in the operator's seat. Starting a machine in gear can result in serious injury or death.
- Operate the machine and equipment from the operator's position only.
- The parking brake must be engaged before leaving the operator's seat. Rollaway can occur because the transmission may not prevent machine movement.

Transport Safety

- Do not exceed 20 mph (32 kph). Reduce speed on rough roads and surfaces.
- Comply with state and local laws governing highway safety and movement of machinery on public roads.
- 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.
- Always yield to oncoming traffic in all situations and move to the side of the road so any following traffic may pass.
- Always enter curves or drive up or down hills at a low speed and at a gradual steering angle.
- Never allow riders on either tractor or equipment.
- Keep tractor / towing vehicle in a lower gear at all times when traveling down steep grades.
- Maintain proper brake settings at all times (if equipped).

Fire Prevention



Maintenance

- The machine and some equipment have components that are at high temperatures under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.
- Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it can cause a fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential fire hazard. The operator's area, engine compartment and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazards and overheating.
- All fuels, most lubricants and some coolant mixtures are flammable. Flammable fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire.

Operation

- The Farm King machine must be in good operating condition before use.
- Check all of the items listed on the service schedule under the 8 hour column before operation. (See Maintenance section)
- Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.

Starting

- Do not use ether or starting fluids on any engine that has glow plugs. These starting aids can cause explosion and injure you or bystanders.
- Use the procedure in the tractor's operator's manual for connecting the battery and for jump starting.

Electrical



- Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part or wires that are loose or frayed.
- Battery gas can explode and cause serious injury. Do not jump start or charge a frozen or damaged battery. Keep any open flames or sparks away from batteries. Do not smoke in battery charging area.

Hydraulic System

- Check hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Hydraulic tubes and hoses must be properly routed and have adequate support and secure clamps. Tighten or replace any parts that show leakage.
- Always clean fluid spills. Do not use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.

Fueling



- Stop the engine and let it cool before adding fuel. No smoking! Do not refuel a machine near open flames or sparks. Fill the fuel tank outdoors.

Welding And Grinding

- Always clean the machine and equipment, disconnect the battery, and disconnect the wiring from the machine controls before welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the machine when welding.
- Have good ventilation when grinding or welding painted parts. Wear dust mask when grinding painted parts. Toxic dust or gas can be produced.
- Dust generated from repairing nonmetallic parts such as hoods, fenders or covers can be flammable or explosive. Repair such components in a well ventilated area away from open flames or sparks.

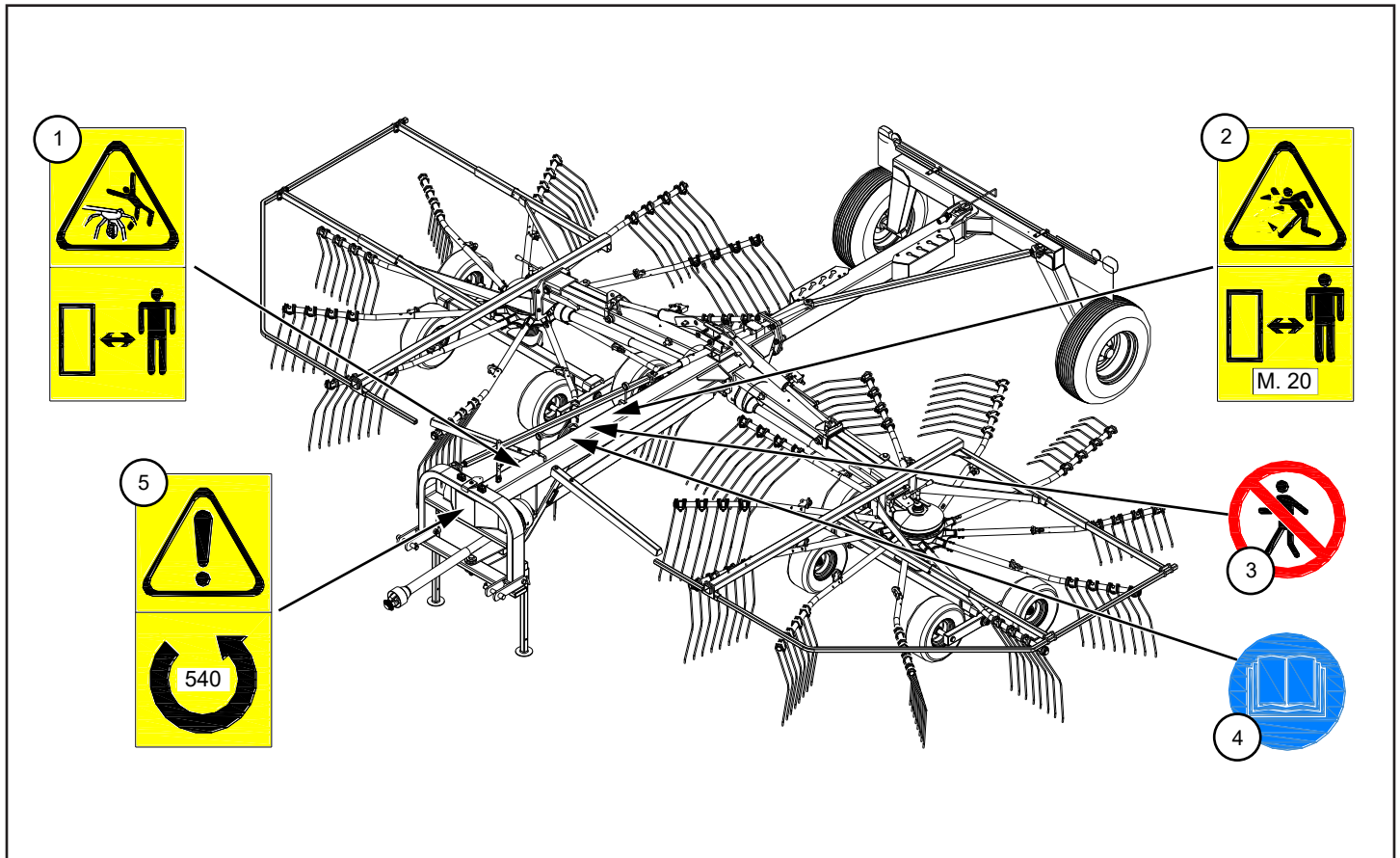
Fire Extinguishers



- Know where fire extinguishers and first aid kits are located and how to use them. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instructions plate.

Equipment and Safety Decals

Figure 3



Item [Figure 3]	Description
1	Danger of hooking or entanglement.
2	Danger of flying objects or debris.
3	Do not enter danger zone. Maintain safe distance of 20 m.
4	Read and use operator's manual.
5	Operate equipment at maximum 540 RPM.

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Pre - Operation Checklist

Before operating the Rotary Rake for the first time and each time thereafter, check the following items:

1. Lubricate the equipment per the schedule outline in the Maintenance Section.
2. Check the Rotary Rake hitch for damaged, loose or missing parts. Repair as needed before operation.
3. Make sure that all guards and shields are in place, secured and functioning as designed.
4. Check condition of all hydraulic components for leaks. Repair as required.
5. Check that all electrical connections are tight.
6. Check the tines. Remove any twine, wire or other material that has become entangled.
7. Check that the rotary rake wheel hubs are properly greased.


	WARNING
	
<p>HIGH PRESSURE FLUID HAZARD</p> <p>Leaking fluids under pressure can enter the skin and cause serious injury or death. Immediate medical attention is required. Wear goggles. Use cardboard to check for leaks.</p>	

Note: Do not operate with hydraulic leaks.

	IMPORTANT
<p>Verify the wheel hubs are properly greased before first time use. Add grease to the hubs until grease is visible.</p>	

Entering The Operator’s Position

Enter the operator’s position, start the engine, and release the parking brake.

	IMPORTANT
<p>Follow the instructions in your tractor’s operation manual for the correct procedure.</p>	

Leaving The Operator’s Position

Always perform the following steps when leaving the operator’s position:

	WARNING
<p>AVOID INJURY OR DEATH</p> <p>Before you leave the operator’s position:</p> <ul style="list-style-type: none"> • Always park on a flat level surface. • Place all controls in NEUTRAL. • Engage the park brake. • Stop the engine and remove the key. • Wait for all moving parts to stop. 	

Tractor Requirements

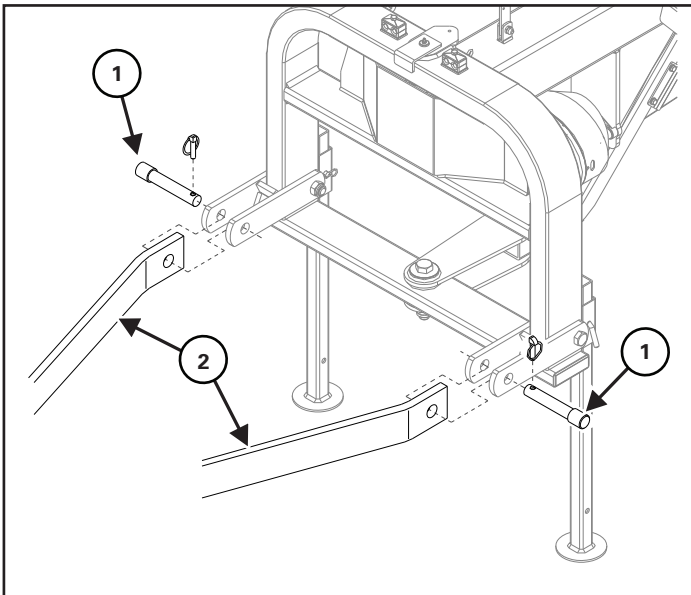
The Rotary Rake requires a tractor with 70—80 HP.

Connecting The Rotary Rake To Tractor

Always inspect the tractor's three-point hitch and Rotary Rake's mounts before connecting. See the tractor's owner's manual.

Move the tractor drawbar into the storage position or remove (if necessary) to prevent interference with Rotary Rake operation. (See the tractor's operator's manual for the correct procedure.)

Figure 4



Remove the two implement mounting pins (Item 1) and two retaining clips [Figure 4].

Enter the operator's position (See "Entering The Operator's Position" in Operation section).

Move the tractor into position in front of the Rotary Rake.

Move the tractor backwards, aligning the tractor's three-point hitch and Rotary Rake three-point mounts.

Leave the operator's position (See "Leaving The Operator's Position" in Operation section).

Install the left and right lower three-point mounts (Item 2) of the tractor to the Rotary Rake left and right lower mounting pins. Reinstall the retaining pins [Figure 4].



WARNING




AVOID INJURY OR DEATH

Before moving the tractor, look in all directions and make sure no bystanders, especially small children are in the work area.

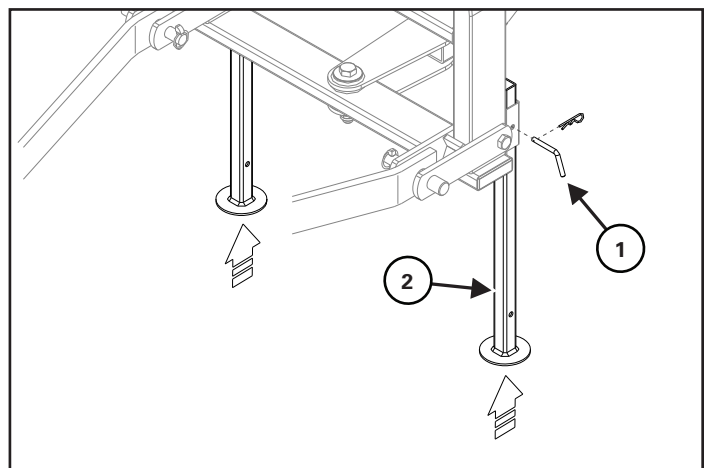
Do not allow anyone between the tractor and the equipment when backing up to the equipment for connecting.

Keep fingers and hands out of pinch points when connecting and disconnecting equipment.

Note: Always use retaining pins with a locking device.

Note: Hydraulic lift may need to be adjusted to align mounts.

Figure 5




Remove the retaining pins and coter pins (Item 1) from the support stands (Item 2). Raise the support stands to the highest position and reinstall retaining pins and coter pins [Figure 5].


Connecting The PTO Driveline

Stop the engine and leave the operator's position (See "Leaving The Operator's Position" in Operator's section).

Note: The PTO shafts are shipped with the slip clutch disengaged. Engage the slip clutch.

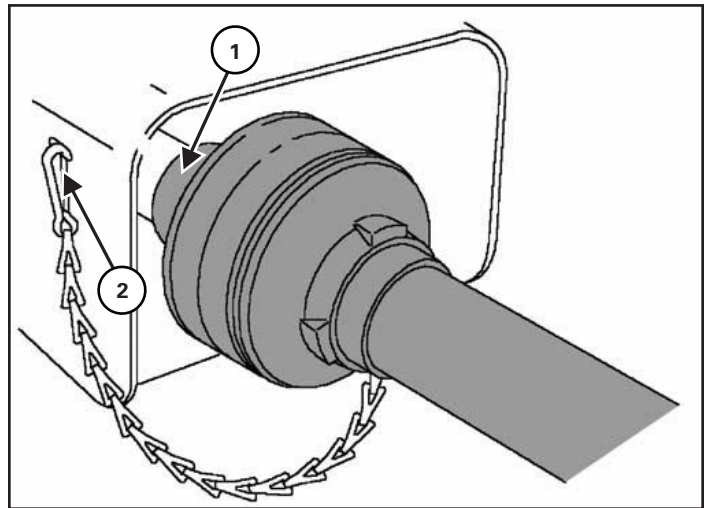
	WARNING
AVOID INJURY OR DEATH	
Warnings on the machine and in the manuals are for your safety. Failure to obey warnings can cause serious injury or death.	

Note: Clean and grease tractor's PTO shaft and PTO driveline coupling each time driveline is connected.

	IMPORTANT
Improper hitch installation can cause PTO driveline damage.	
<ul style="list-style-type: none"> • Do not modify the three point hitch. • Make sure the PTO driveline is of adequate length and that u-joints are in the correct phase. 	

Remove the PTO driveline from the storage position (if applicable).


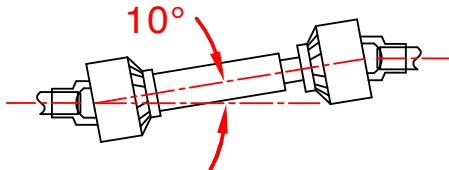
Figure 6



Retract the collar (Item 1) and slide the PTO driveline onto the tractor PTO shaft. Release the collar and the driveline will lock onto the shaft. Push and pull the PTO driveline back and forth several times and make sure it is securely attached to the PTO shaft [Figure 6].

Install PTO driveline safety chain (Item 2) [Figure 6].

Note: The PTO driveline must have a means to retain it to the PTO shaft on the tractor.

	WARNING
<ul style="list-style-type: none"> • Do NOT exceed 540 RPM PTO. • Keep PTO shields and all guards in place. • Keep away from moving parts. • Keep bystanders away. • Do NOT connect the PTO at an angle higher than 10° between the two connections. 	
	

PTO Driveline Length Check

Due to variations in distances between tractor PTO shafts and implement input shafts, drivelines may need to be shortened or a longer shaft may be required.

When fitting the implement to the tractor, the PTO driveline, with telescoping sections, must be inspected. When the sections are at the most compressed operating position, the sections must not "bottom out".

At its shortest length, there must be at least 2 in. (50.8 mm) of clearance between each section end and opposite section end at the most compressed operating position.

When the sections are at the most extended position, there must be sufficient engagement between the sections.

At its farthest operating extension, a minimum section engagement of 33% of shaft length must be maintained.



WARNING

AVOID INJURY OR DEATH

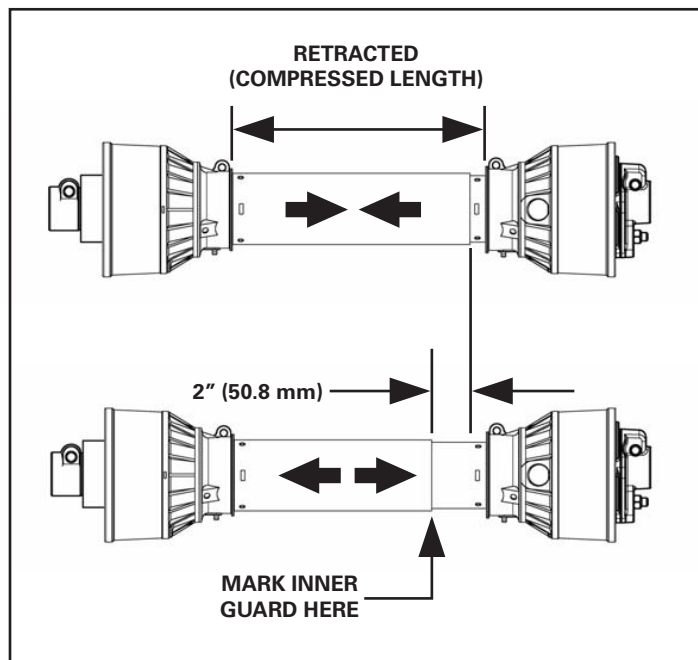
- Do NOT exceed the rated implement PTO speed.
- Stay clear of rotating driveline.
- Keep bystanders away.
- Keep hands, feet, clothing and long hair away.
- Keep PTO shields and all guards in place.
- Disengage PTO, move the tractor controls to the Neutral position, stop the engine and make sure all rotating components are stopped before leaving the operator's position.
- Do NOT service the tractor or implement with the PTO engaged.
- Do NOT service the implement in a raised position unless properly blocked and with all rotating components stopped.
- Disengage PTO for road travel.

PTO Driveline Bottoming Out Check

Stop the engine and leave the operator's position (See "Leaving The Operator's Position" in Operation section).

Make sure the PTO driveline and all rotating components have come to a complete stop before leaving the operator's position (if applicable).


Figure 7



1. Disconnect the PTO driveline from the tractor and slide the PTO driveline together until fully retracted (compressed).
2. Measure the retracted (compressed) length of PTO driveline [Figure 7].
3. Extend the PTO driveline 2 in. (50.8 mm) from the retracted length and place a mark on the inner guard at the end of the outer guard [Figure 7].
4. Reattach the PTO driveline to the tractor PTO shaft.
5. Enter the operator's position. Start the engine.
6. With the rear PTO DISENGAGED, raise and lower the implement and watch the PTO driveline extend and retract.
7. If the outer PTO driveline guard slides in (retracts) over the mark at any point of travel, the PTO driveline needs to be shortened.

Reducing The PTO Driveline Length

Stop the engine and leave the operator’s position (See “Leaving The Operator’s Position” in the Operation section). Make sure the PTO driveline and all rotating components have come to a complete stop before leaving the operator’s position.

	WARNING
AVOID INJURY OR DEATH	
<ul style="list-style-type: none"> • Do NOT exceed the rated implement PTO speed. • Stay clear of rotating driveline. • Keep bystanders away. • Keep hands, feet, clothing and long hair away. • Keep PTO shields and all guards in place. • Disengage PTO, move the tractor controls to the Neutral position, stop the engine and make sure all rotating components are stopped before leaving the operator’s position. • Do NOT service the tractor or implement with the PTO engaged. • Do NOT service the implement in a raised position unless properly blocked and with all rotating components stopped. • Disengage PTO for road travel. 	

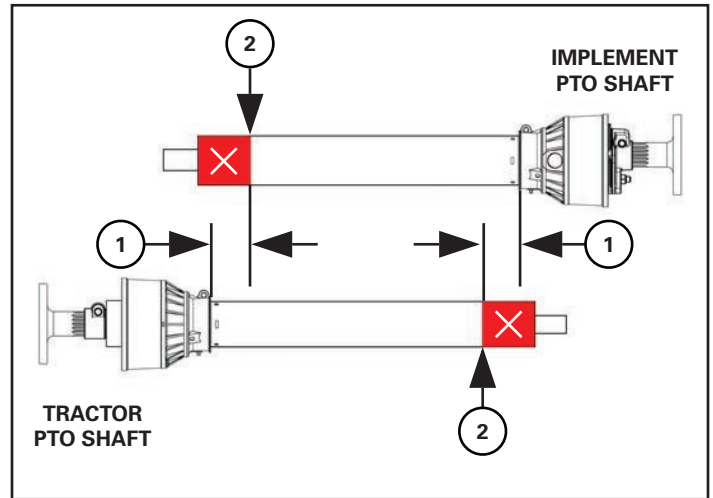
Remove the PTO driveline from the tractor and place in storage position (if equipped).

Enter the operator’s position (See “Entering The Operator’s Position” in the Operation section). Start the engine.

Raise or lower the three-point implement to get the shortest distance between the tractor PTO shaft and three-point implement gearbox PTO shaft. Stop the engine and leave the operator’s position.

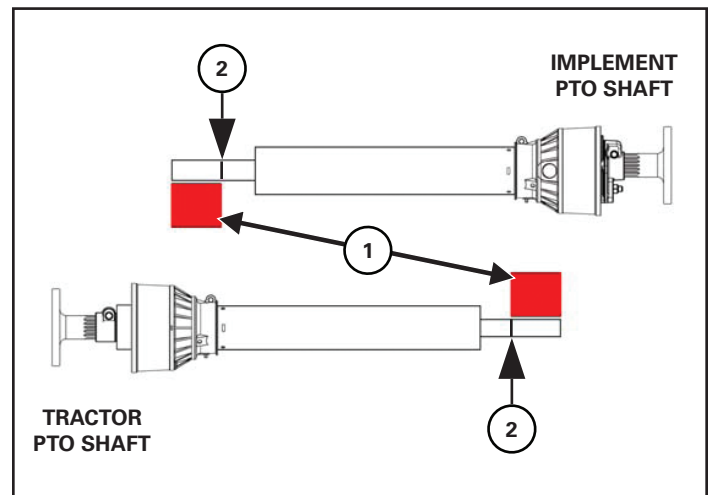
Pull the PTO driveline apart and reinstall each individual section; one half to the tractor PTO shaft and one half to the implement gearbox PTO shaft.

Figure 8



1. Hold PTO driveline sections parallel to one another and measure back 2 in. (50.8 mm) (Item 1) from the yoke of each section and place mark on opposite section. Cut the plastic shield at this length (Item 2) [Figure 8].

Figure 9




2. Using the plastic guard lengths that were cut off in [Figure 8], align the cut off lengths (Item 1) [Figure 9] with the end of the inner & outer shafts. Place a mark (Item 2) [Figure 9] on the inner & outer shafts and cut the inner & outer shafts off at this length.
3. Round off all sharp edges and deburr.
4. Thoroughly grease and install the PTO driveline halves together.
5. Recheck for proper operation.

PTO Driveline Engagement Check

Stop the engine and leave the operator's position (See "Leaving The Operator's Position" in the Operation section).

Make sure the PTO driveline and all rotating components have come to a complete stop before exiting the tractor.

	<h1>WARNING</h1>
<h3>AVOID INJURY OR DEATH</h3>	
<ul style="list-style-type: none"> • Do NOT exceed the rated implement PTO speed. • Stay clear of rotating driveline. • Keep bystanders away. • Keep hands, feet, clothing and long hair away. • Keep PTO shields and all guards in place. • Disengage PTO, move the tractor controls to the Neutral position, stop the engine and make sure all rotating components are stopped before leaving the operator's position. • Do NOT service the tractor or implement with the PTO engaged. • Do NOT service the implement in a raised position unless properly blocked and with all rotating components stopped. • Disengage PTO for road travel. 	

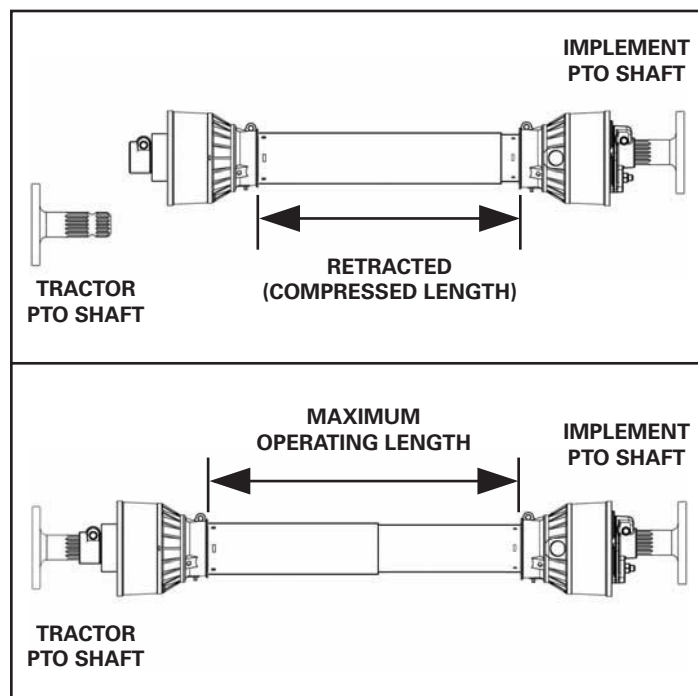
1. Disconnect the PTO driveline from the tractor and fully slide the driveline sections together (retracted).
2. Measure the retracted (compressed) length of the PTO driveline between the bases of the plastic guards [Figure 10].
3. Multiply the retracted driveline length by 1.667 to determine the PTO driveline Maximum Operating Length. (i.e.: 25.5 in. (647.7 mm) x 1.667= 42.5 in. (1079.7 mm) Maximum Operating Length).
4. Attach the PTO driveline to the tractor PTO output shaft.
5. Enter the operator's position. (See "Entering The Operator's Position" in the Operation section)

6. With the PTO driveline attached, position the three-point implement to where the telescoping PTO driveline is at its maximum operating extension.
7. Stop the engine and leave the operator's position. Make sure the PTO driveline and all rotating components have come to a complete stop before leaving the operator's position.
8. Measure the length of the PTO driveline between the bases of the plastic shields [Figure 10] to determine the maximum operating length.

If the measured maximum operating length is less than the Maximum Operating Length calculation (from Step 3), the PTO driveline has adequate engagement

If the measured maximum operating length is equal to or more than the Maximum Operating Length calculation (from Step 3), the PTO driveline does not have adequate engagement and should be replaced with a longer driveline. See your Farm King dealer for available PTO drivelines.

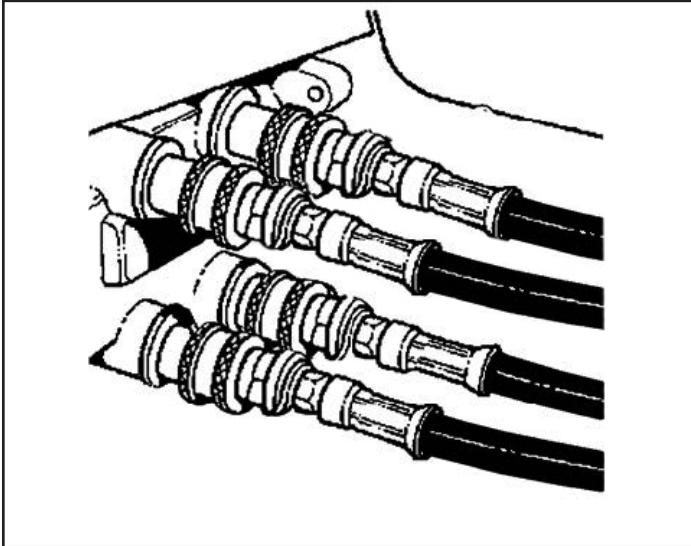
Figure 10



Connecting Hydraulic Hoses

Rotary Rakes are equipped with a hydraulic lift system and adjustable working width system.

Figure 11



Push the male couplers into female couplers on the tractor until they are fully engaged and locked [Figure 11].

Note: Make sure the quick couplers are fully engaged. If the quick couplers do not fully engage, check to see that the couplers are the same size and type.

!	IMPORTANT
<p>Contain and dispose of any oil leakage in an environmentally safe manner.</p> <p>Thoroughly clean the quick couplers before making connections. Dirt can quickly damage the system.</p>	

Release pressure and pull the male couplers out to disconnect.

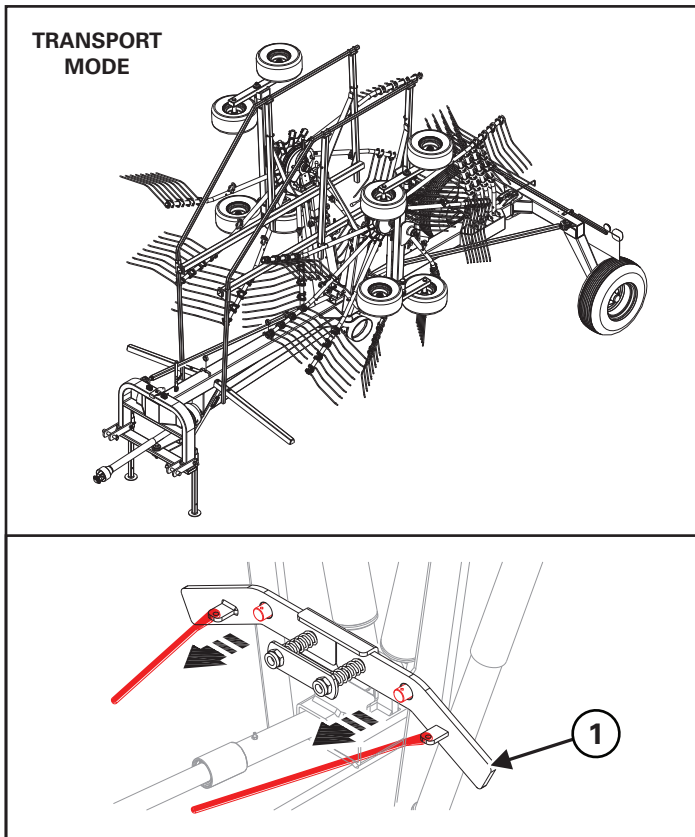
!	WARNING
<p>AVOID BURNS</p> <p>Hydraulic fluid, tubes, fittings and quick couplers can get hot when running equipment. Be careful when connecting and disconnecting quick couplers.</p>	

!	WARNING
<p>HIGH PRESSURE FLUID HAZARD</p> <p>To prevent serious injury or death from high pressure fluid:</p> <ul style="list-style-type: none"> • Relieve pressure on system before repairing or adjusting. • Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands. • Keep all components in good repair. 	

Work Configuration

Transport the Rotary Rake to the area of work (See “Transport Mode” in Operation section). Always comply with federal, state, local and provincial laws regarding the transport of farm equipment on public roadways.

Figure 12

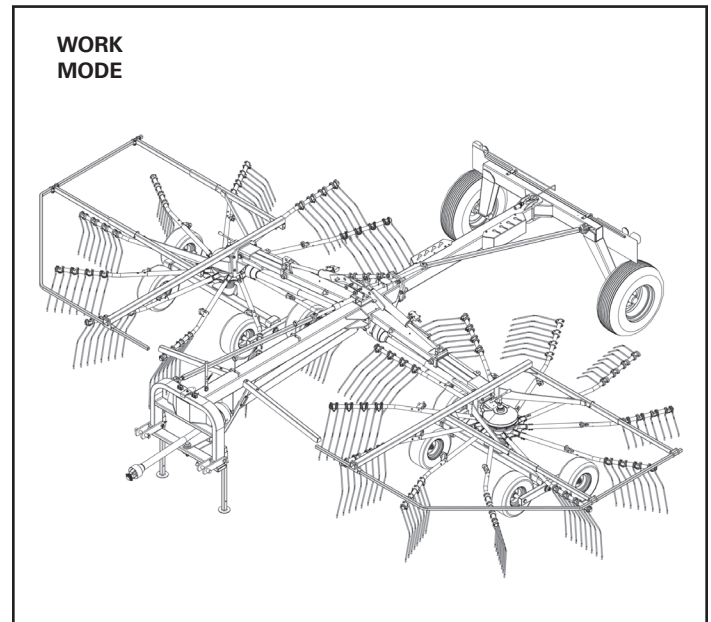


The equipment must be configured into Work Mode for proper field operation.

From the operator’s position, manually and simultaneously pull the strings to unlock the rams from the mechanical locking device (Item 1) [Figure 12].

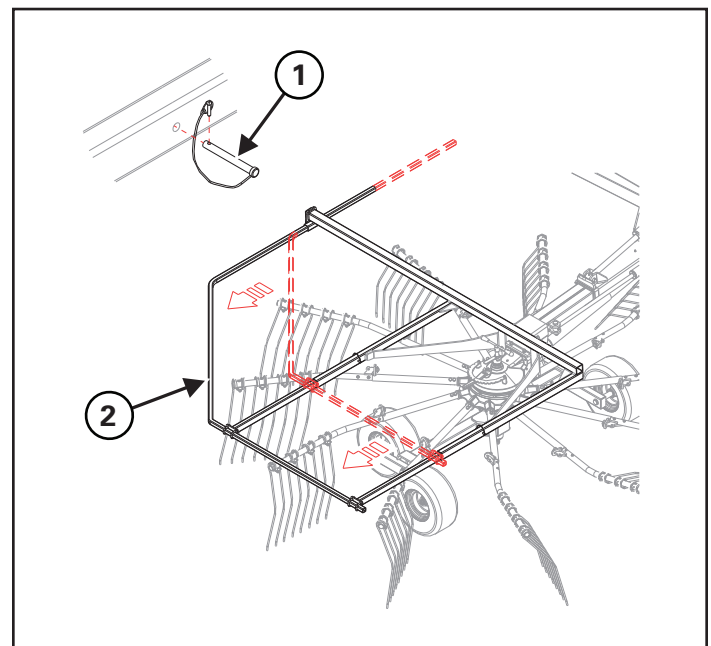
	WARNING
AVOID INJURY OR DEATH	
<p>Before unlocking the wings, look in all directions and make sure no bystanders, especially small children, are in the work area.</p>	

Figure 13



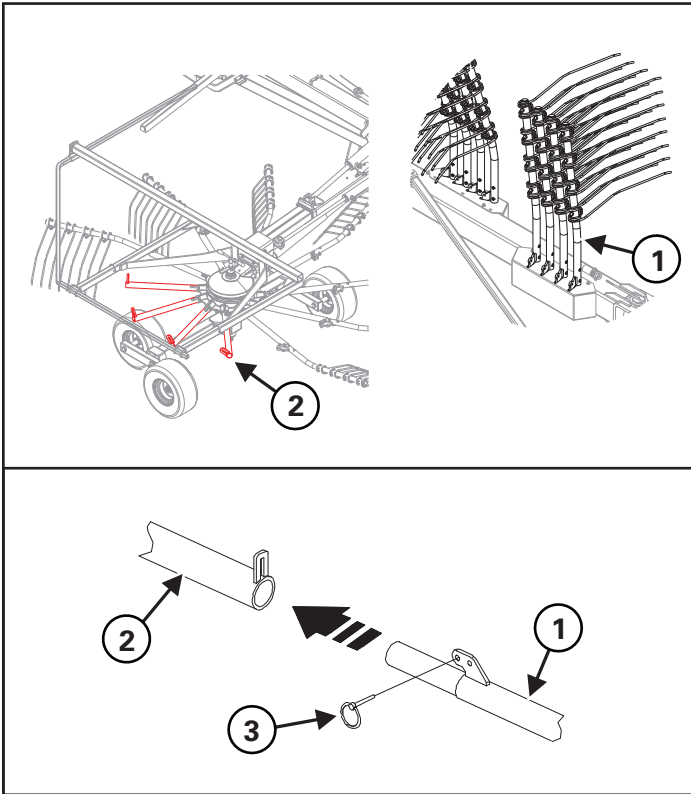
The wings will descend once unlocked [Figure 13].

Figure 14



Remove the retaining pins (Item 1) from the side guards. Extend the side guards (Item 2) into working position and reinstall retaining pins [Figure 14].

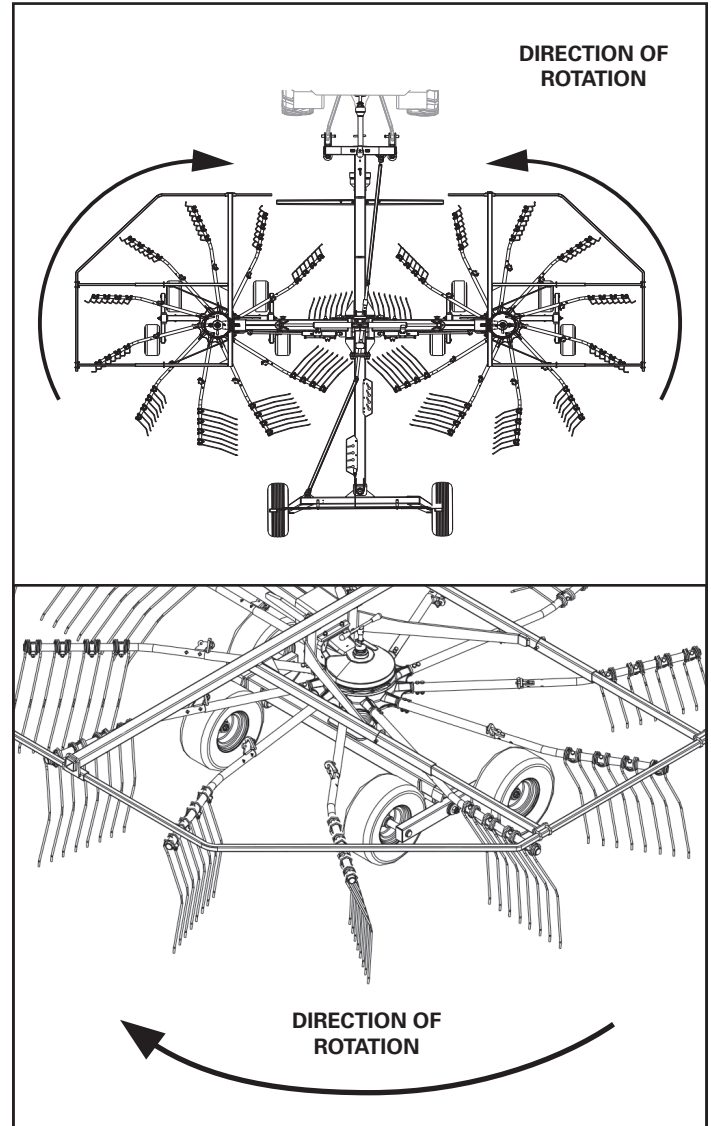
Figure 15



Remove the rake arms (Item 1) from the storage slots on the main frame [Figure 15].

Slide the rake arms into the housings (Item 2) on the rotating unit. Attach each arm using a retaining pin (Item 3) [Figure 15].

Figure 16



The rake tines must be positioned with the direction of rotation as shown [Figure 16].

Field Operation

Make sure the tractor is properly connected to the Rotary Rake.

Enter the operator's position. See "Entering the Operator's Position" in the Operation section.

When starting work, operate the Rotary Rake for a short distance and check the result.

Leave the operator's position. See "Leaving the Operator's Position" in the Operation section.

See "Adjustments" in the Operation section.

Make adjustments for the desired windrow width.

Verify that the rake is operating parallel to the ground.

Verify that the rake tines are 1/2" to 3/4" (10 to 20 mm) from the ground.

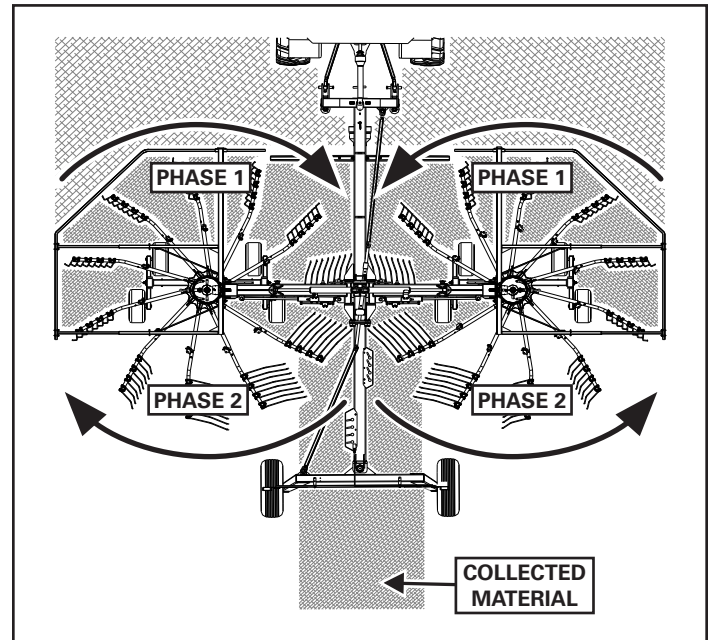
Operate only at 540 RPM.

Operate at a maximum speed of 9 mph (14 kph).

	<h1>CAUTION</h1>
---	------------------

- Read operator and parts manual before operating the implement.
- Do not permit riders.
- Keep all guards and shields in place.
- Keep hands, feet, clothing and hair away from moving parts.
- Stop engine, set brake, remove key and wait for all moving parts to stop before servicing, adjusting, repairing and unplugging.
- Remove bystanders, especially children, before starting or while operating.
- Block up before working beneath unit.
- Review safety instructions annually.

Figure 17

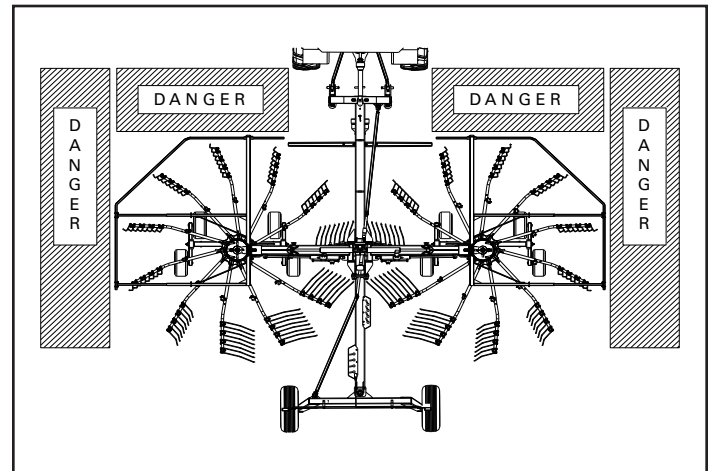


The rake tines work in two phases during rotation [Figure 17].

Phase 1: Tines are lowered. Material is collected and moved toward the center.

Phase 2: Tines are raised. Collected material is formed into the windrow.

Figure 18



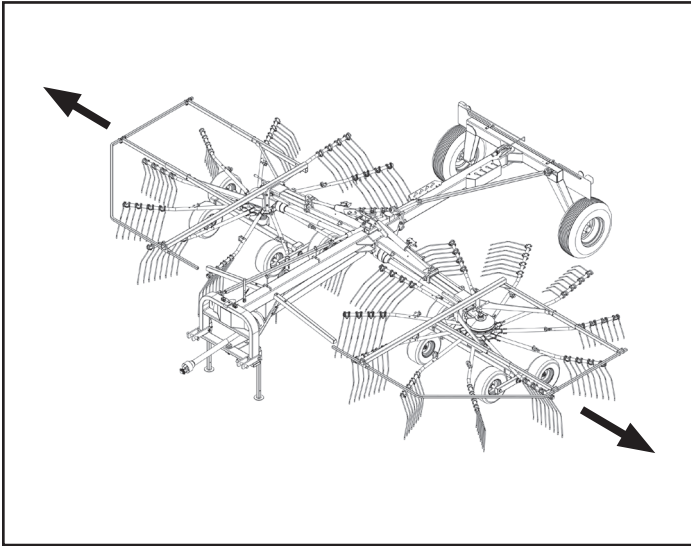
During operation make sure no bystanders, especially small children, are in the work area.

Keep away from all dangerous areas around the machine [Figure 18].

Adjustments

Windrow Width

Figure 19

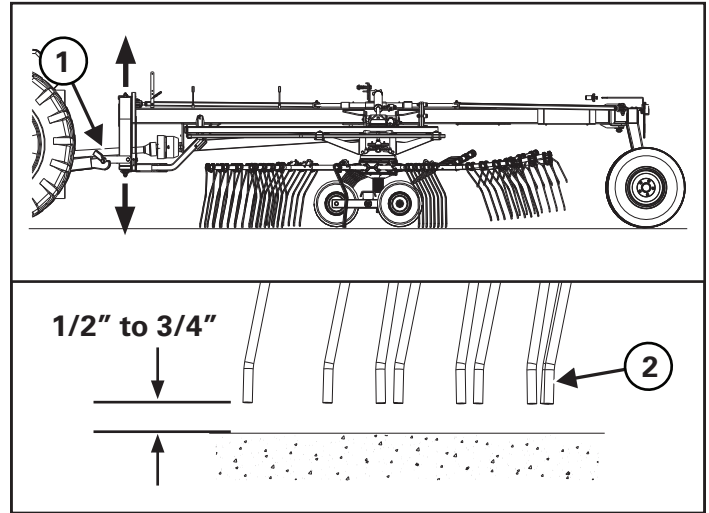


Act on the hydraulic controls to extend the left and right wings [Figure 19].

Adjust the space between the rotary groups to alter the width of the windrow.

Leveling

Figure 20

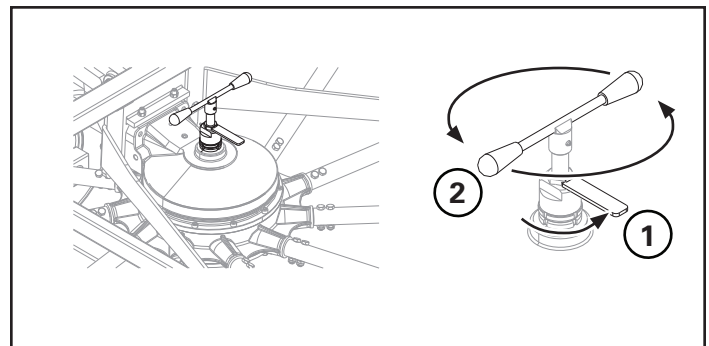


The rake must be parallel to the ground during operation.

Verify that the rake tines (Item 2) are 1/2" to 3/4" (10 to 20 mm) from the ground [Figure 20].

Level the rake front to back by raising or lowering the tractor hitch (Item 1) [Figure 20].

Figure 21



Turn the locking lever (Item 1) to unlock the handle (Item 2). Act on the handle (Item 2) to adjust the height of each rotary group [Figure 21].

Turn the handle clockwise to lower the tines and rotary group.

Turn the handle counterclockwise to raise the tines and rotary group.

Turn back the locking lever to lock the rotary group in place.


Transport Configuration


Always comply with federal, state, local and provincial laws regarding the transport of farm equipment on public roadways.

Verify that the tractor / tow vehicle is approved for transporting the equipment and that the equipment is securely attached to the tractor / tow vehicle.

Verify safety chain is installed and properly connected before transporting equipment.

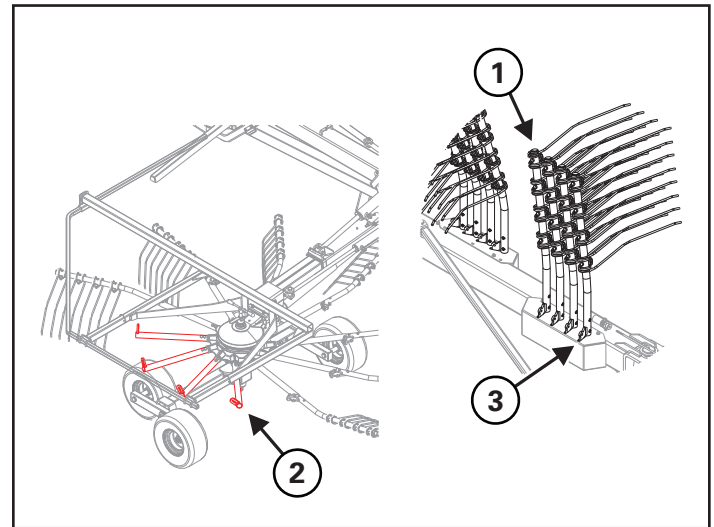
Verify that the SMV (Slow Moving Vehicle) emblem, all lights and reflectors are clean and visible.

	<h1>WARNING</h1>
AVOID INJURY OR DEATH	
<ul style="list-style-type: none"> • Disengage PTO for road travel. • Keep PTO shields and all guards in place • Keep bystanders away. • Do not allow riders. 	

	<h1>IMPORTANT</h1>
Never exceed 20 mph (32 kph) during road travel.	

	<h1>WARNING</h1>
Use of an unapproved hitch or tractor / tow vehicle can result in loss of control, leading to serious injury or death.	
Tractor / tow vehicle and hitch must have the rated capacity to tow equipment.	

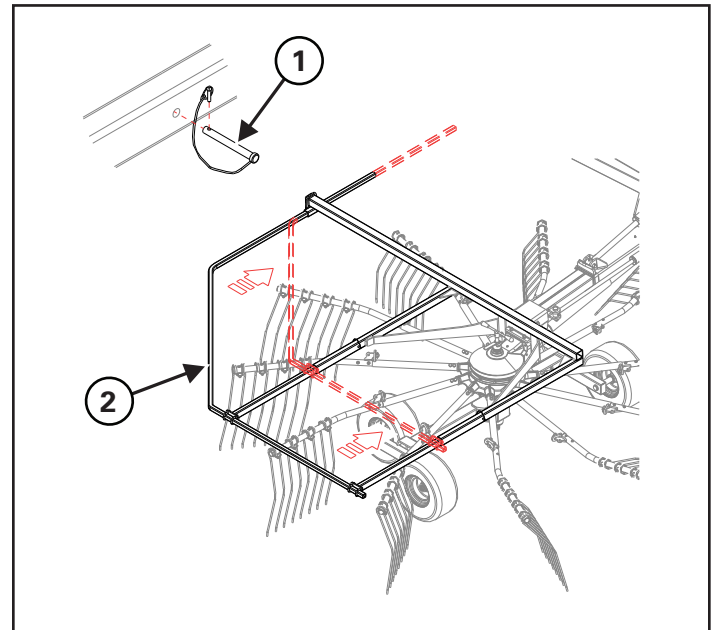
Figure 22



The Rotary Rake must be configured into Transport Mode for proper transportation.

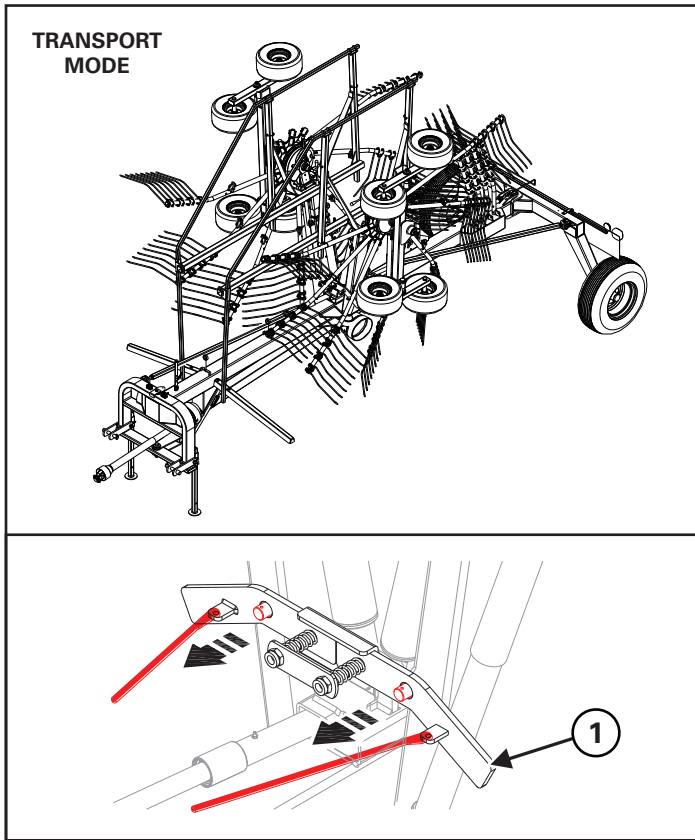
Remove the four rake arms (Item 1) from the outer mounts (Item 2) of each rotary group. Store the rake arms in the slots (Item 3) on top of the frame [Figure 22].

Figure 23



Remove the retaining pins (Item 1) from the side guards. Retract the side guards (Item 2) into transport position and reinstall retaining pins [Figure 23].

Figure 24



From the operator's position, manually and simultaneously pull the strings to open the mechanical locking device (Item 1) [Figure 24].

Act on the hydraulic controls and raise the left and right wings. Once the wings are fully raised, release the strings to close the locking device and lock the wings in place.

!	IMPORTANT
<p>Make sure both wings are securely locked in place in transport configuration, before road travel.</p>	

The ratio of the tractor / tow vehicle weight to the loaded equipment weight plays an important role in defining acceptable travel speed.

TRAVEL SPEED - Acceptable travel speed.

WEIGHT RATIO - Weight of fully equipped or loaded implement(s) relative to weight of tractor / tow vehicle.

Travel Speed	Weight Ratio
20 mph (32 kph)	Less than 1 to 1
10 mph (16 kph)	Less than 2 to 1
DO NOT TOW	More than 2 to 1

Farm King




Maintenance

Service Schedule Chart.....	39
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Safety Sign (Decal) Installation.....	43
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Storage.....	43
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Farm King



Service Schedule Chart

	WARNING
<p>Instructions are necessary before operating or servicing equipment. Read and understand the Operator And Parts Manual and safety signs (decals) on equipment. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.</p>	

Note: If a problem is encountered that is difficult to solve, even after having read through this troubleshooting section, please call your local distributor, dealer or factory. Before you call, please have this Operator And Parts Manual and the serial number of your machine at hand.

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures. The service schedule is a guide for correct maintenance of the Rotary Rake.

	DESCRIPTION	SERVICE PROCEDURES					
		CHECK	CLEAN	LUBE	CHANGE	COVER	DRAIN
Daily Maintenance (or every 8 hours)							
1	PTO Cross and Bearings	✓		✓			
Weekly (or every 50 hours)							
2	PTO Telescoping Tubes			✓			
3	Slip Clutch Connector			✓			
4	PTO Quick Disconnect			✓			
5	Tandem Axles			✓			
6	Hitch / Wings Pivot Points			✓			
Monthly (or every 100 hours)							
7	Gear Boxes	✓		✓			
Annually (or every 500 hours)							
8	Driveline & Gears	✓		✓			
9	Machine	✓	✓				

Lubrication

Recommendations

Always use a good quality multi-purpose / lithium base grease when lubricating the equipment.

- Always use a hand-held grease gun.
- Clean fitting before greasing, to avoid injecting dirt and grit.
- Replace and repair broken fittings immediately.
- If fittings will not take grease, remove and clean thoroughly. Replace fitting if necessary.

WARNING

AVOID INJURY OR DEATH

Stop engine, set brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, or unplugging.

Support the equipment with blocks or safety stands before working beneath it.

Follow good shop practices:

- Keep service area clean and dry
- Be sure electrical outlets and tools are properly grounded
- Use adequate light for the job.

Use only tools, jacks, and hoists of sufficient capacity for the job.

Replace and secure all shields removed during servicing before operating.

Use heavy leather gloves to handle sharp objects.

Check hydraulics regularly for leaks. Use cardboard to look for leaks, and use hand and eye protection.

Relieve pressure on hydraulic system before repairing or adjusting.

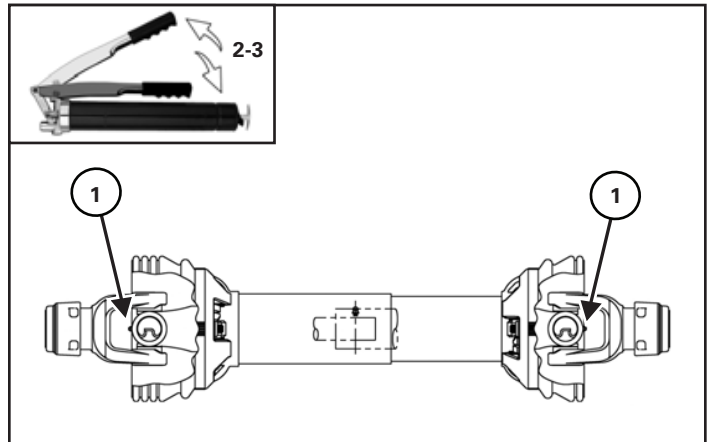
Locations

!

IMPORTANT

Fluid such as engine oil, hydraulic fluid, coolants, grease, etc. must be disposed of in an environmentally safe manner. Some regulations require that certain spills and leaks on the ground must be cleaned in a specific manner. See local, state and federal regulations for the correct disposal.

Figure 25

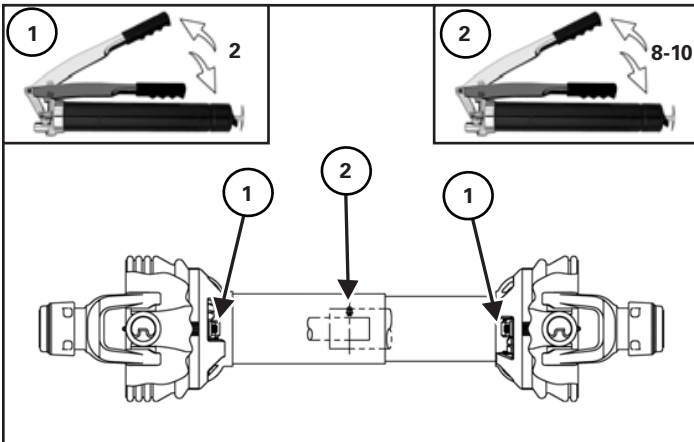


Apply two to three pumps of grease to the cross and bearings (Item 1) on the PTO driveline [Figure 25].

Grease every **8 hours**.

Note: Images may not show your exact PTO driveline but the procedure is correct.

Figure 26

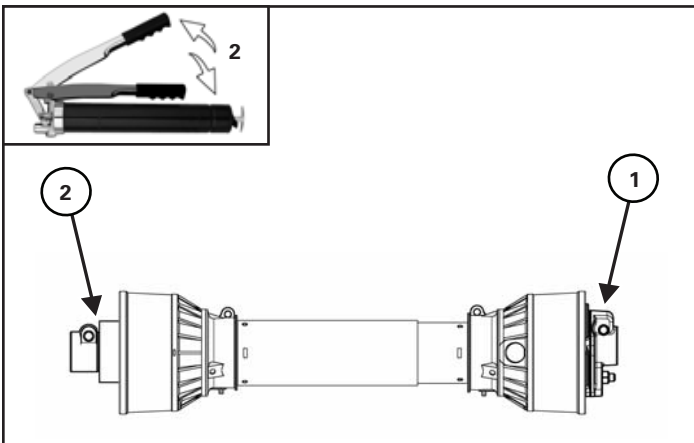


Apply two pumps of grease to the guard bushings (Item 1) [Figure 26].

Apply eight to ten pumps of grease to the telescoping member (Item 2) [Figure 26].

Grease every **50 hours**.

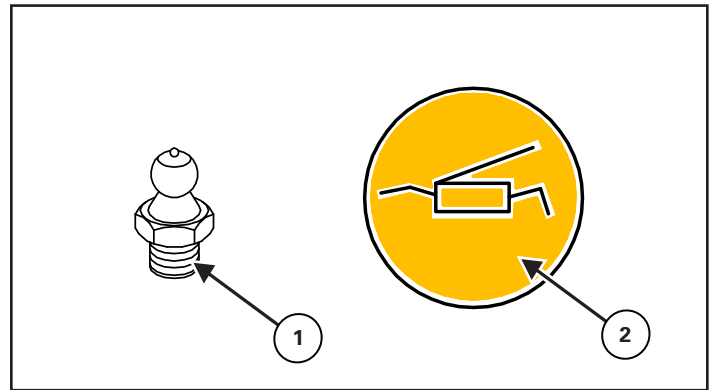
Figure 27



Apply two pumps of grease to the slip clutch (Item 1) and PTO quick disconnect (Item 2) [Figure 27].

Grease every **50 hours**.

Figure 28



Lubrication point locations (Item 1) are identified with a sticker (Item 2) [Figure 28].


Lubrication points include:

- Wheel hubs
- Driveline mounts
- Hitch pivot points
- Wing pivot points

Grease every **50 hours**.

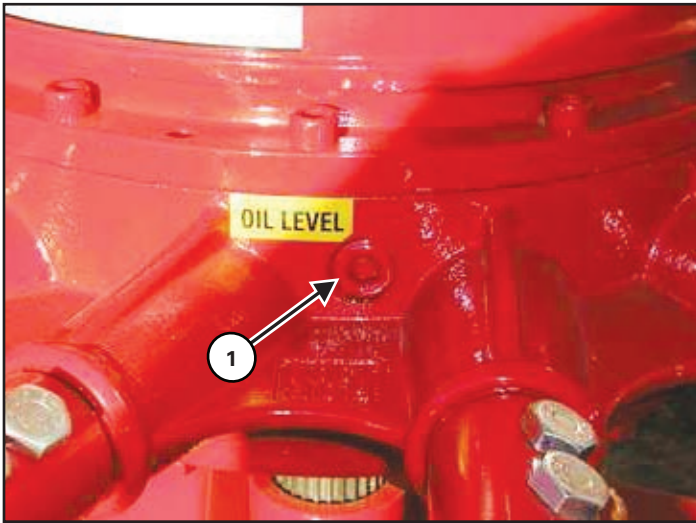
!

IMPORTANT



Verify the wheel hubs are properly greased before first time use. Add grease to the hubs until grease is visible.

Figure 30



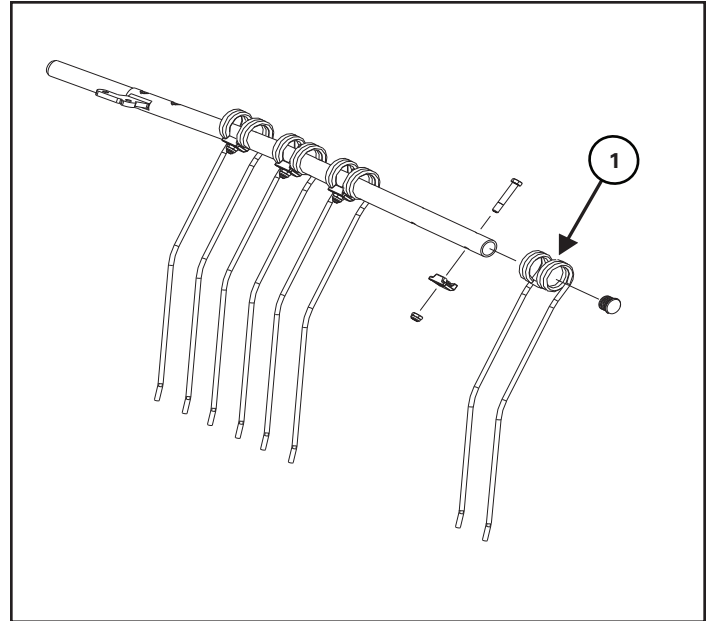
Check the oil in each rotary gearbox. Remove the fill plug (Item 1). The oil level should be at the lower part of the fill plug. Use SAE90 type oil [Figure 30].

Check/fill oil in rotary gearbox every **100 hours**.

Rake Tine Replacement

Periodically check all rake tines for wear or damage.

Figure 29



Replace the rake tines (Item 1) by removing the bolt, nut, and retaining plate [Figure 29].

Slide off rake tine off of the rake arm.

Replace tine and reattach with bolt, nut, and retaining plate.

Safety Sign (Decal) Installation



- Remove all portions of the damaged safety sign (decal).
- Thoroughly clean the area with adhesive remover and glass cleaner. Remove all adhesive residue.
- Allow the area to dry completely before installing the new safety sign (decal).
- Position the safety sign (decal) in the correct location.
- Remove a small portion of the backing paper on the safety sign (decal).
- Press on the safety sign (decal) where the backing paper has been removed.
- Slowly remove the remaining backing paper, pressing on the safety sign (decal) as the backing paper is removed.
- Using the backing paper, pressing firmly, move the backing paper over the entire safety sign (decal) area.

Note: Small air pockets can be pierced with a pin and smoothed out using the piece of the backing paper.

Storage And Return To Service

Storage

Sometimes it may be necessary to store the Rotary Rake for an extended period of time. Below is a list of items to perform before storage.



- Thoroughly wash the machine with a pressure washer or water hose to remove all dirt, mud, debris or residue.
- Lubricate all bushings to remove any water residue from washing.
- Remove any material that has become entangled around any moving part.
- Place hydraulic hoses or electrical connector (if applicable) in the storage brackets.
- Inspect the hitch and all welds on the equipment for wear and damage.
- Check for loose hardware, missing guards, rake tines, or damaged parts.
- Check for damaged or missing safety signs (decals). Replace if necessary.
- Replace worn or damaged parts.
- Touch up all paint nicks and scratches to prevent rusting.
- Place the equipment in a dry protected shelter.

Note: If a dry protected shelter is not available, cover with a waterproof tarp and tie down securely.

- Place the equipment flat on the ground.
- Support the jack / frame with planks if required.

Return To Service

After the equipment has been in storage, it is necessary to follow a list of items to return the equipment to service.

- Be sure all shields and guards are in place.
- Lubricate the equipment.
- Connect to a tractor and operate equipment, verify all functions operate correctly.
- Repair as needed.

Parts Identification

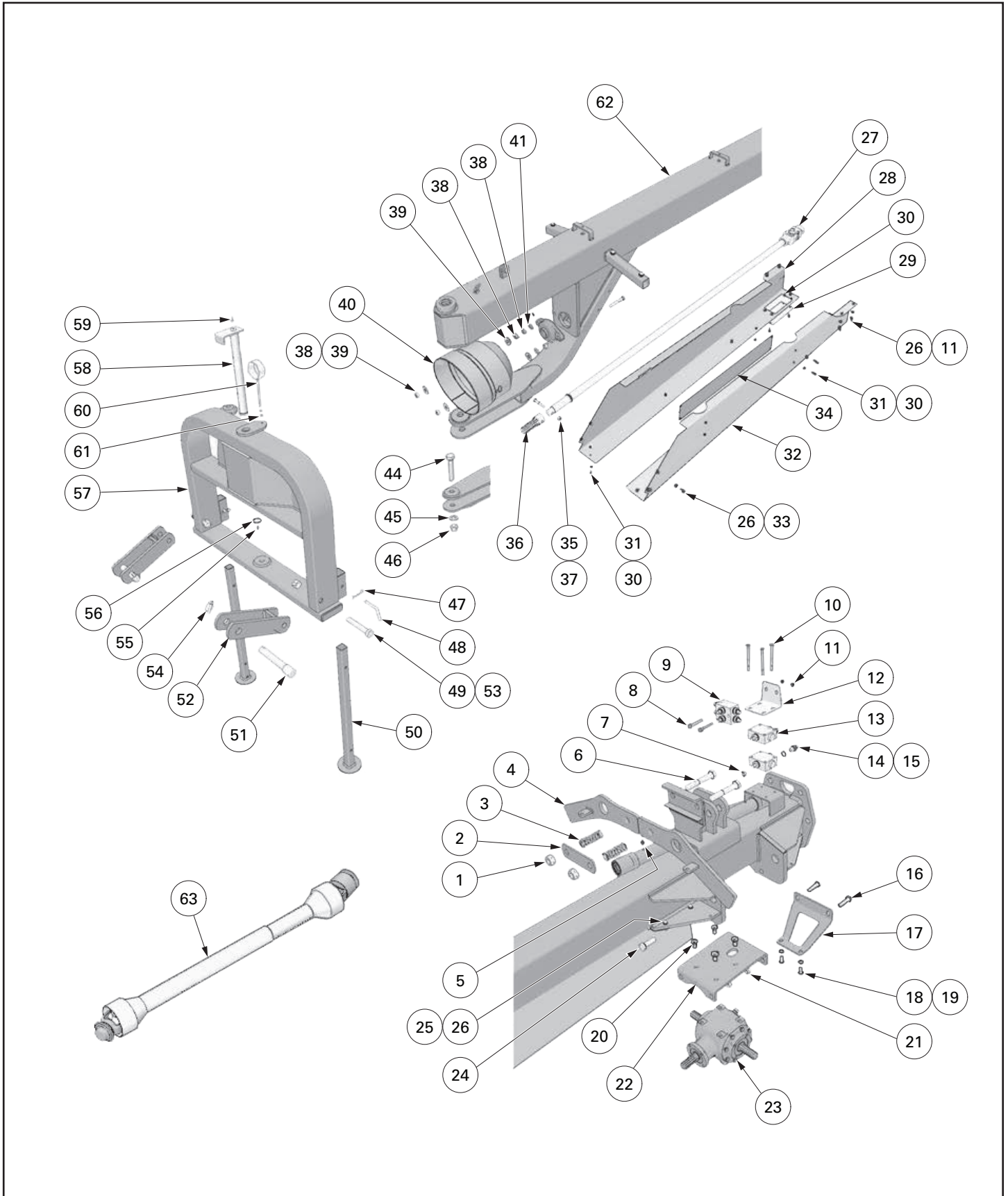
Always give your dealer the Model, Color and Serial Number of your machine to assist them in ordering and obtaining the correct parts. Use the exploded view and tabular listing of the area of interest to exactly identify the required part.

Front Frame.....	47
Rear Frame.....	50
Wheel Hub.....	52
Arms.....	54
Axle, Rotors.....	56
Hydraulic Hoses, Electrical Plug.....	58
Frame Covers, Tail Lights, Rope Lock.....	60
Rake Arms.....	62
Hydraulic Cylinders.....	64
Gearbox - Comer 11B DX.....	66
Gearbox - Comer 11B SX.....	68
PTO Shaft - Arm / Rotors - R8020446.....	70
PTO Shaft - To Tractor - R8020435.....	71

Farm King



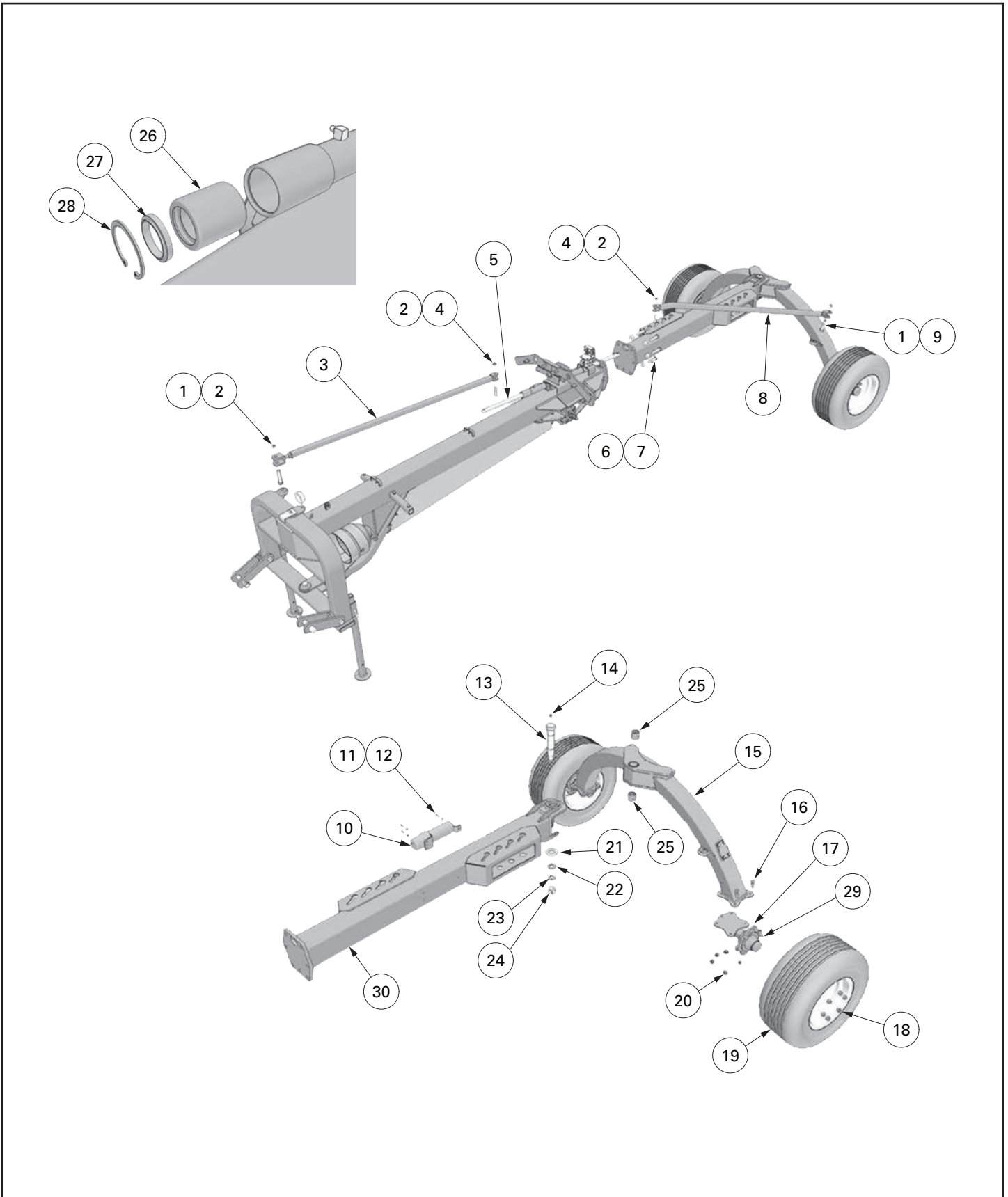
Front Frame



ITEM	PART NUMBER	DESCRIPTION
1	R3020216	SELF LOCKING NUT M20
2	R18032293	SPACER
3	R11010610	SPRING
4	R18032295	R ROTOR MOUNTING PLATE
	R18036296	L ROTOR MOUNTING PLATE
5	R3090115	GREASE M8X1 90°
6	R3010311	H.H. SCREW M20X110
7	R3090115	GREASE M8X1 90°
8	R3010781	H.H. SCREW M8X55
9	R18055152	CONNECTION BLOCK SIXWAY
10	R3011249	H.H. SCREW M6X90
11	R3020209	SELF LOCKING NUT M8
12	R18055153	CONNECTION VALVES
13	R4020143	FLOW DIVIDER
14	R4010224	NIPPLE 3/8-1/4
15	R3030403	COPPER WASHER 3/8
16	R3011271	H.H. SCREW M16X60
17	R18055148	GEARBOX SUPPORT PLATE
18	R3030162	WASHER M 12
19	R3011255	H.H. SCREW M12X25
20	R3010901	SCREWTSPEI M12X30
21	R3020204	SELF LOCKING NUT M16
22	R18055147	GEARBOX COUPLING PLATE
23	R18036248, R8010515	REDUCER
24	R3010313	H.H. SCREW M16X50
25	R3010780	H.H. SCREW M8X30
26	R3030156	WASHER M8
27	R18055173	SHAFT PTO
28	R18036378	R PROTECTION CARTER
29	R18055146	INSPECTION PLATE
30	R3011672	H.H. SCREW M6X16
31	R3030158	WASHER M6
32	R18036389	L PROTECTION CARTER
33	R3010306	H.H. SCREW M8X14
34	R18036379	METAL SHEET
35	R3020201	SELF LOCKING NUT M14
36	R12881009	PTO
37	R3011238	H.H. SCREW M10X60
38	R3020333	NUT M 12
39	R3030179	WASHER M12
40	R18032579	PROTECTION GUARD

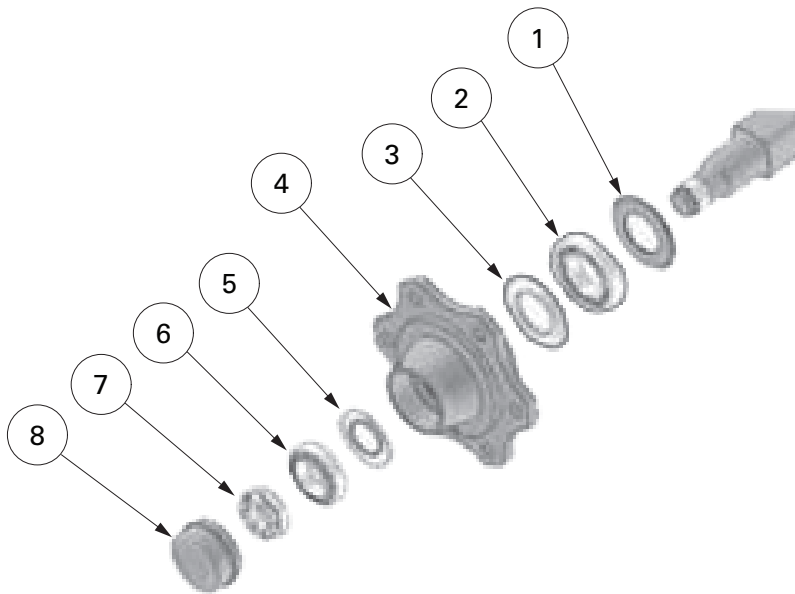
ITEM	PART NUMBER	DESCRIPTION
41	R3030162	WASHER M 12
42	R12250027	SUPPORT
43	R3011686	H.H. SCREW M 12X80
44	R3011714	H.H. SCREW M24X140
45	R3030174	WASHER M24
46	R3020223	SELF LOCKING NUT M24
47	R3040201	SPLIT PIN R 3X60
48	R18033247	PIN
49	R3010318	H.H. SCREW M22X120
50	R18055132	JACK
51	R18055122	PIN
52	R18055133	MOBILE ATTACK
53	R3020222	SELF LOCKING NUT M22
54	R3080202	PIN Ø10
55	R3090101	GREASE ZERK M8X1
56	R3120146	SPRING PIN E35
57	R18055134	FRONT CONNECTION
58	R18051123	PIN
59	R3090101	GREASE ZERK M8X1
60	R18055172	HYDRAULIC HOSE PASSAGE
61	R3020330	NUT M8
62	R18032289	FRONT FRAME
63	R8020435	CARDAN SHAFT

Rear Frame



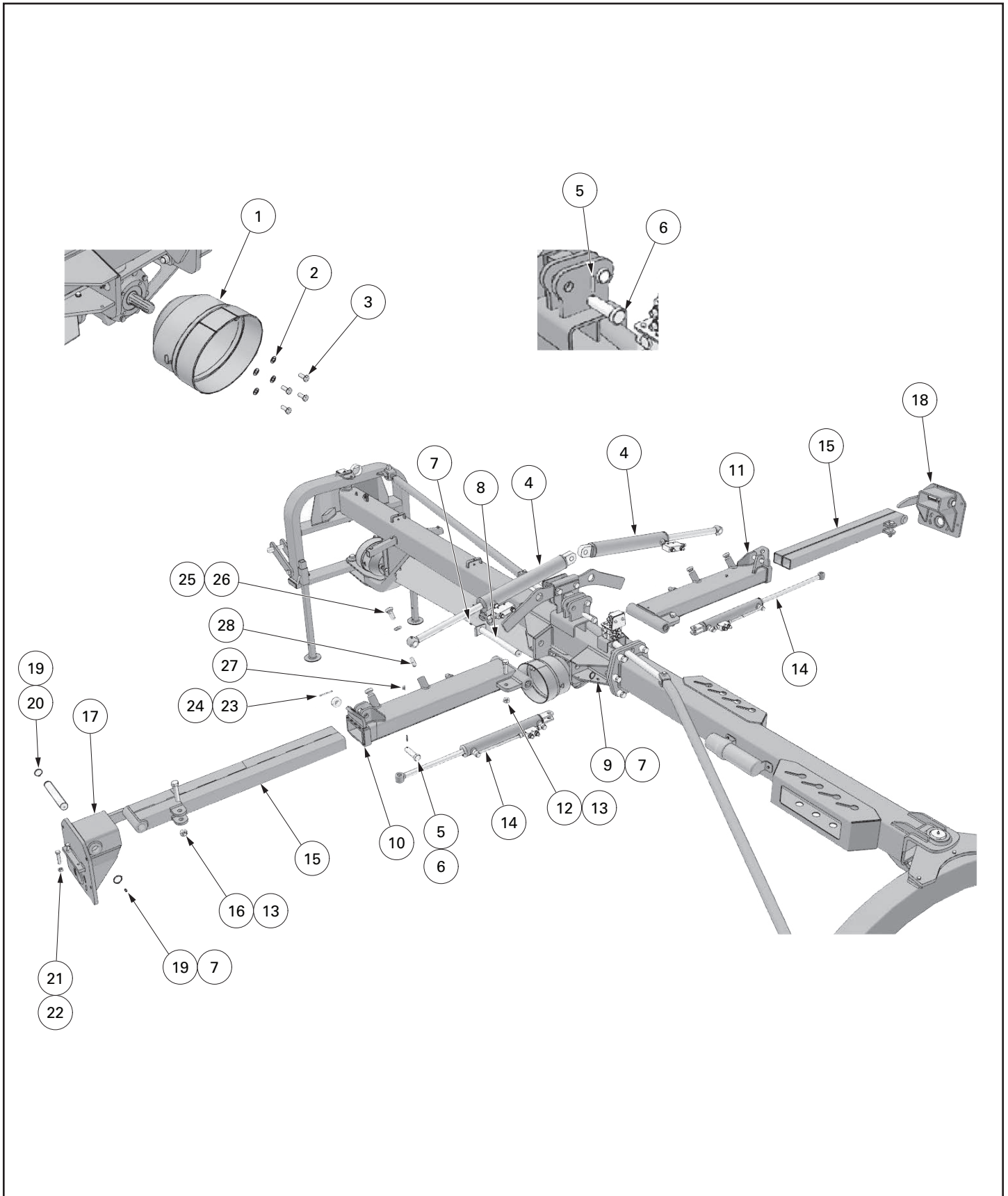
ITEM	PART NUMBER	DESCRIPTION
1	R18032363	HH SCREW M22X95
2	R3020222	SELF LOCKING NUT M22
3	R18032292	TENSION ARM
4	R3010929	SCREW TSPEI M14X70
5	R18032294	SWIVEL
6	R18055119	SPACER
7	R3010808	H.H. SCREW M20X90
8	R18036377	SWIVEL
9	R3020222	SELF LOCKING NUT M22
10	R9080022	MANUAL HOLDER
11	R3011680	HH SCREW M6X18 ZN
12	R3030158	WASHER M6 ZN
13	R18055121	PIN Ø 65X270
14	R3090101	GREASER
15	R18036875	REAR CROSS FRAME
16	R3011215	HH SCREW M12X40 ZN
17	R18036371	HUB COMPLETE
18	R3020271	NUT 18MB FOR WHEEL
19	R12170118	COMPLETE WHEEL
20	R3020202	SELF LOCKING NUT M12
21	R14013630	WASHER Ø80
22	R3030155	WASHER M33 ZN
23	R3030323	GROWER WASHER M 33
24	R3020407	NUT 33MA
25	R12071214	BUSHING
26	R18032297	BUSHING
27	R10010659	SCRAPER
28	R3120150	SPRING RING E50
29	R18037775	WHEEL SCREW M18X15
30	R18032298	REAR CHASSIS

Wheel Hub



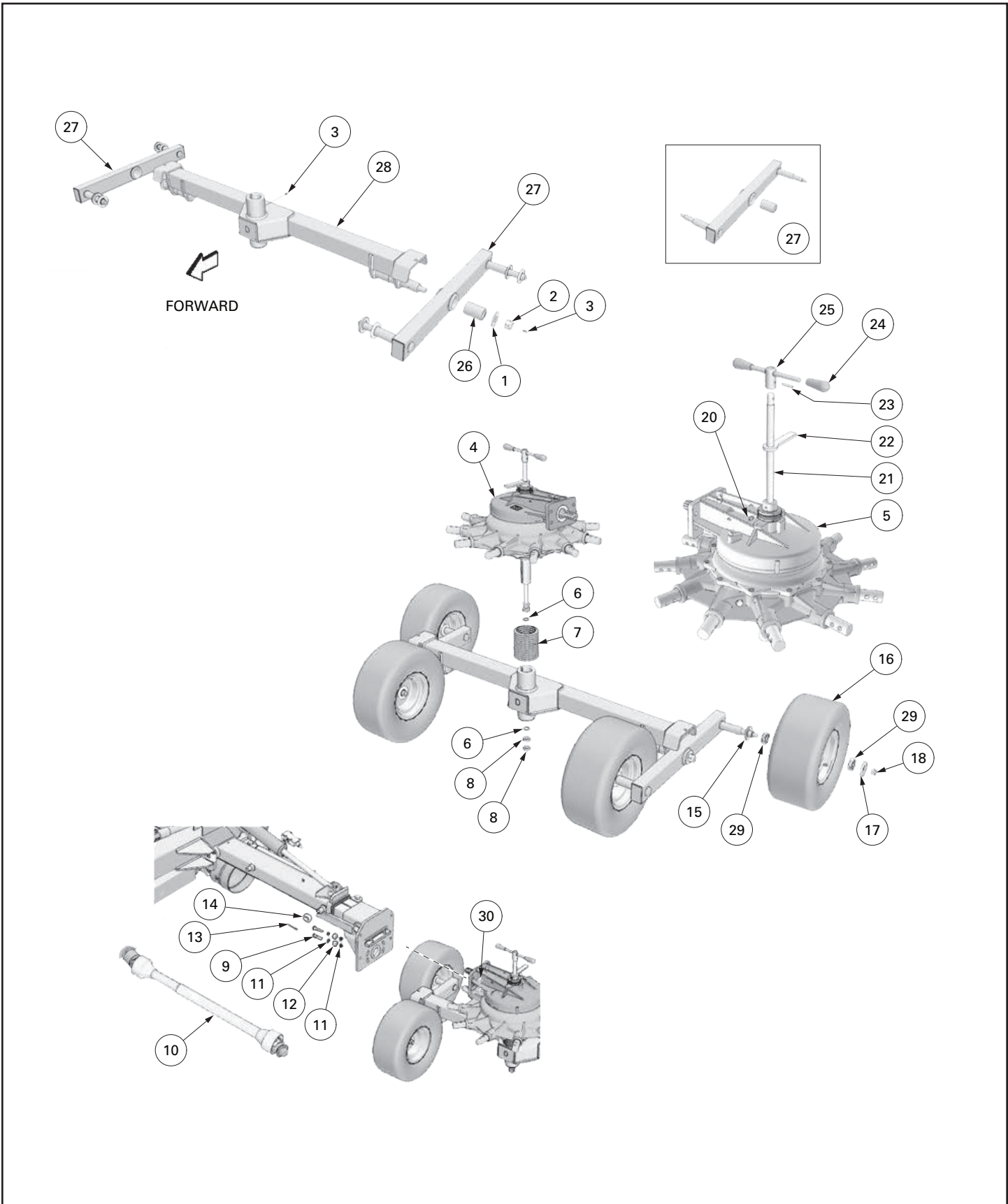
ITEM	PART NUMBER	DESCRIPTION
1	R18037743	SEALING RING
2	R12240302	TAPERED ROLLER BEARING
3	R10011356	SEALING RING
4	R18037742	WHEEL HUB
5	R10011357	SEALING RING
6	R12240244	TAPERED ROLLER BEARING
7	R3020249	NUT M39X1,5
8	R12360005	CAP

Arms



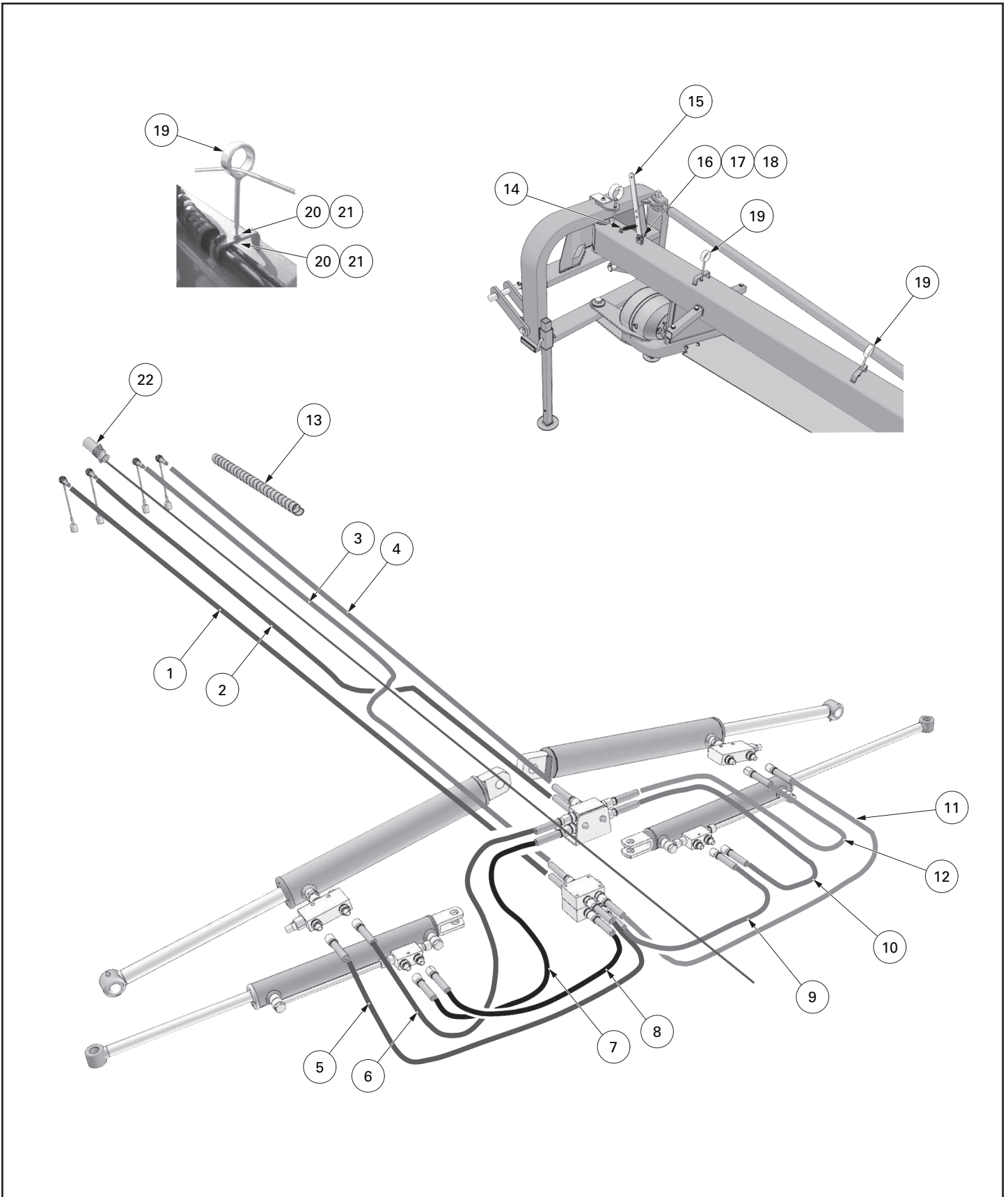
ITEM	PART NUMBER	DESCRIPTION
1	R18032579	PROTECTION GUARD
2	R3030159	WASHER M10
3	R3011256	H.H. SCREW M10X20
4	R18032299	HYDRAULIC CYLINDER
5	R3080102	SPRING PIN Ø6X36
6	R18055129	CYLINDER PIN
7	R3090101	GREASE ZERK M8X1
8	R18055131	PIN
9	R3120102	SPRING RING E35 7435
10	R18055135	LEFT ARM MOBILE
11	R18055136	RIGHT ARM MOBILE
12	R3011693	H.H. SCREW M20X65
13	R3020216	SELF LOCKING NUT M20
14	R18055137, R12770911	HYDRAULIC CYLINDER
15	R18055138	ARM
16	R3010808	H.H. SCREW M20X90
17	R18033443	L ROTOR SUPPORT GROUP
18	R18033439	L ROTOR SUPPORT GROUP
19	R3120146	SPRING RING E35 7436
20	R18055130	PIN
21	R3011708	H.H. SCREW M12X60
22	R3020333	NUT MA12
23	R18055128	WASHER Ø50X23
24	R3040106	COTTER PIN 6X60
25	R3010316	H.H. SCREW M24X50
26	R3020361	NUT MA24
27	R3090109	GREASE ZERK M8 45°
28	R18036395	ANTIPLAY PIN

Axle, Rotors



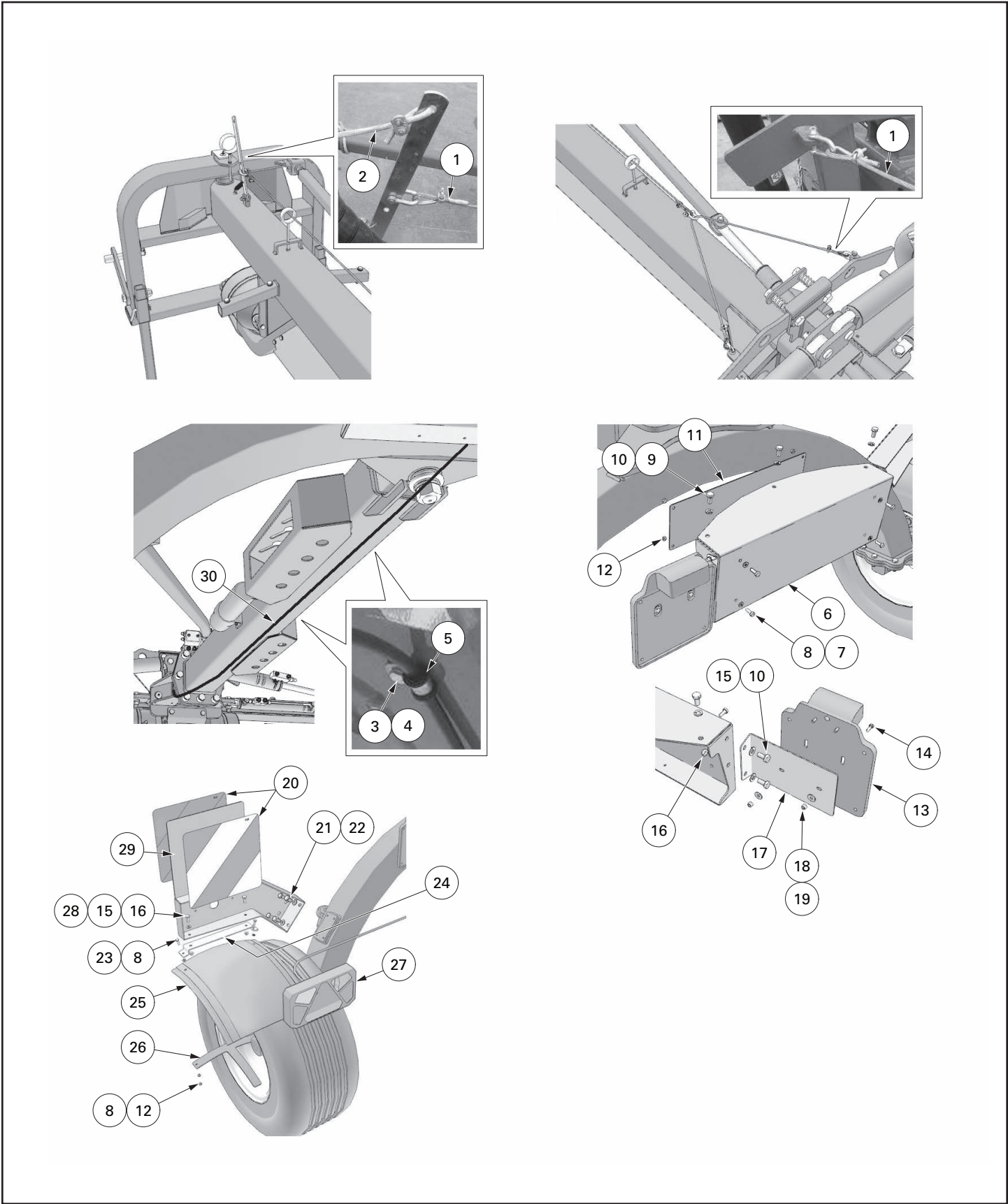
ITEM	PART NUMBER	DESCRIPTION
1	R18032281	WASHER Ø60 – 50/10
2	R3020222	SELF LOCKING NUT M22
3	R3090101	GREASE ZERK M8X1
4	R18035802	RIGHT ROTOR
5	R18035803	LEFT ROTOR
6	R12280006	WASHER 22-32-0.5
7	R9070107	PROTECTION RUBBER
8	R3020358	NUT M22
9	R3011631	H.H. SCREW M14X70
10	R8020446	CARDAN SHAFT
11	R3030161	WASHER M14 ZN
12	R18033390	SPACER Ø28XØ15X20
13	R18055128	WASHER Ø50
14	R3040106	CLIP PIN 5X100
15	R12070314	WHEEL WASHER (INTERNAL)
16	R12170111	COMPLETE WHEEL
17	R12070315	WHEEL WASHER (EXTERNAL)
18	R3030175	WASHER M16
19	R3020204	SELF LOCKING NUT M16
20	R3090101	GREASE M8X1
21	R18032262	SCREW
22	R18055149	RING NUT CATCH
23	R3080102	SPRING PIN Ø6X36
24	R3140001	BALL KNOB
25	R18030555	REGULATION
26	R12071211	TANDEM JOINT BUSH
27	R18032239	TANDEM
28	R18033340	DOUBLE TANDEM FRAME
29	R12240128	BALL BEARING – 6205 2RS
30	R3020363	NUT M14

Hydraulic Hoses, Electrical Plug



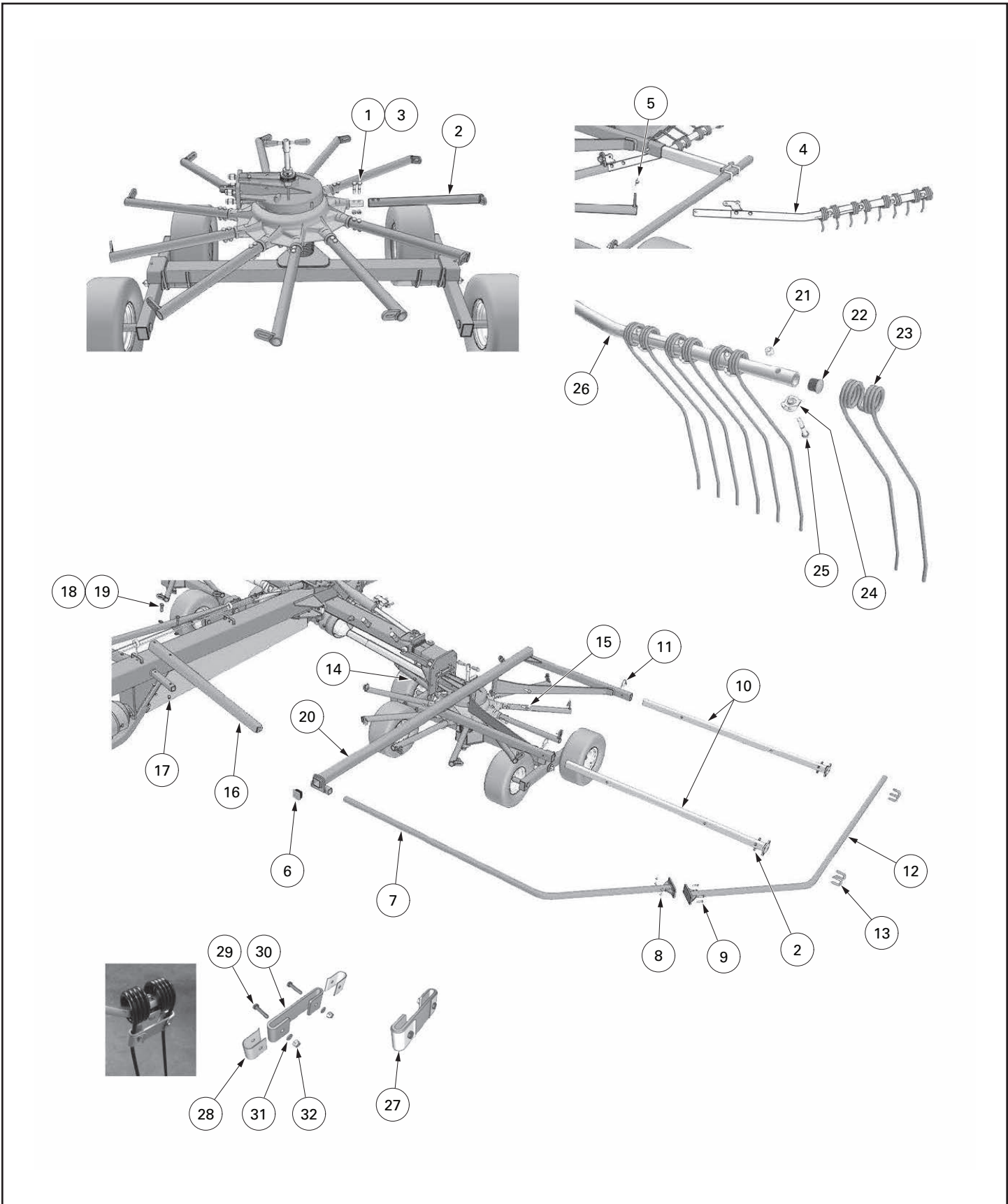
ITEM	PART NUMBER	DESCRIPTION
1	R12760502	HYDRAULIC HOSE L.4200 MM
2	R12760502	HYDRAULIC HOSE L.4200 MM
3	R12760502	HYDRAULIC HOSE L.4200 MM
4	R12760502	HYDRAULIC HOSE L.4200 MM
5	R12760503	HYDRAULIC HOSE L.980 MM
6	R12760503	HYDRAULIC HOSE L.980 MM
7	R12760503	HYDRAULIC HOSE L.980 MM
8	R12760503	HYDRAULIC HOSE L.980 MM
9	R12760503	HYDRAULIC HOSE L.980 MM
10	R12760503	HYDRAULIC HOSE L.980 MM
11	R12760503	HYDRAULIC HOSE L.980 MM
12	R12760503	HYDRAULIC HOSE L.980 MM
13	R18033180	PROTECTIVE SLEEVE 44X50
14	R11010529	SPRING
15	R18055125	LEVER
16	R3011260	HH SCREW M10X35
17	R3030159	WASHER M10
18	R3020331	NUT M10
19	R18055124	FAIRLEAD
20	R3030156	WASHER M8
21	R3020330	NUT M8
22	R7010832	ELECTRICAL PLUG 7P 12V

Frame Covers, Tail Lights, Rope Lock



ITEM	PART NUMBER	DESCRIPTION
1	R18032797	KIT ROPE
2	R18032797	KIT ROPE
3	R3011672	HH SCREW M6X16
4	R3030158	WASHER M6
5	R12980212	COLLAR FS Ø10
6	R18036888	REAR CROSS MEMBER COVER
7	R3011672	HH SCREW M6X16
8	R3030158	WASHER M6
9	R3030325	GROWER WASHER M8
10	R3011221	HH SCREW M8X16
11	R18037003	SHEET METAL CASING BACKGROUND
12	R3020213	SELF LOCKING NUT M6
13	R12890110	LICENSE PLATE
14	R3011682	HH SCREW M5X16
15	R3030156	WASHER M8
16	R3020209	SELF LOCKING NUT MA8
17	R18036999	LICENSE PLATE HOLDER
18	R3020243	SELF LOCKING NUT MA5
19	R3030147	WASHER M5
20	R12880428	R ADHESIVE PANEL (R/W)
	R12880429	L ADHESIVE PANEL (R/W)
21	R3011256	HH SCREW M10X20
22	R3030159	WASHER M10
23	R3011617	HH SCREW M6X20
24	R18036374	FENDER SUPPORT BRAKET
25	R18036376	FENDER
26	R18036375	FENDER SUPPORT
27	R7270033	L TAIL LIGHT
	R7270032	R TAIL LIGHT
28	R3011251	HH SCREW M8X20
29	R18036892	L LIGHT SUPPORT
	R18036889	R LIGHT SUPPORT
30	R7010846	ELECTRICAL CABLE – 10 M

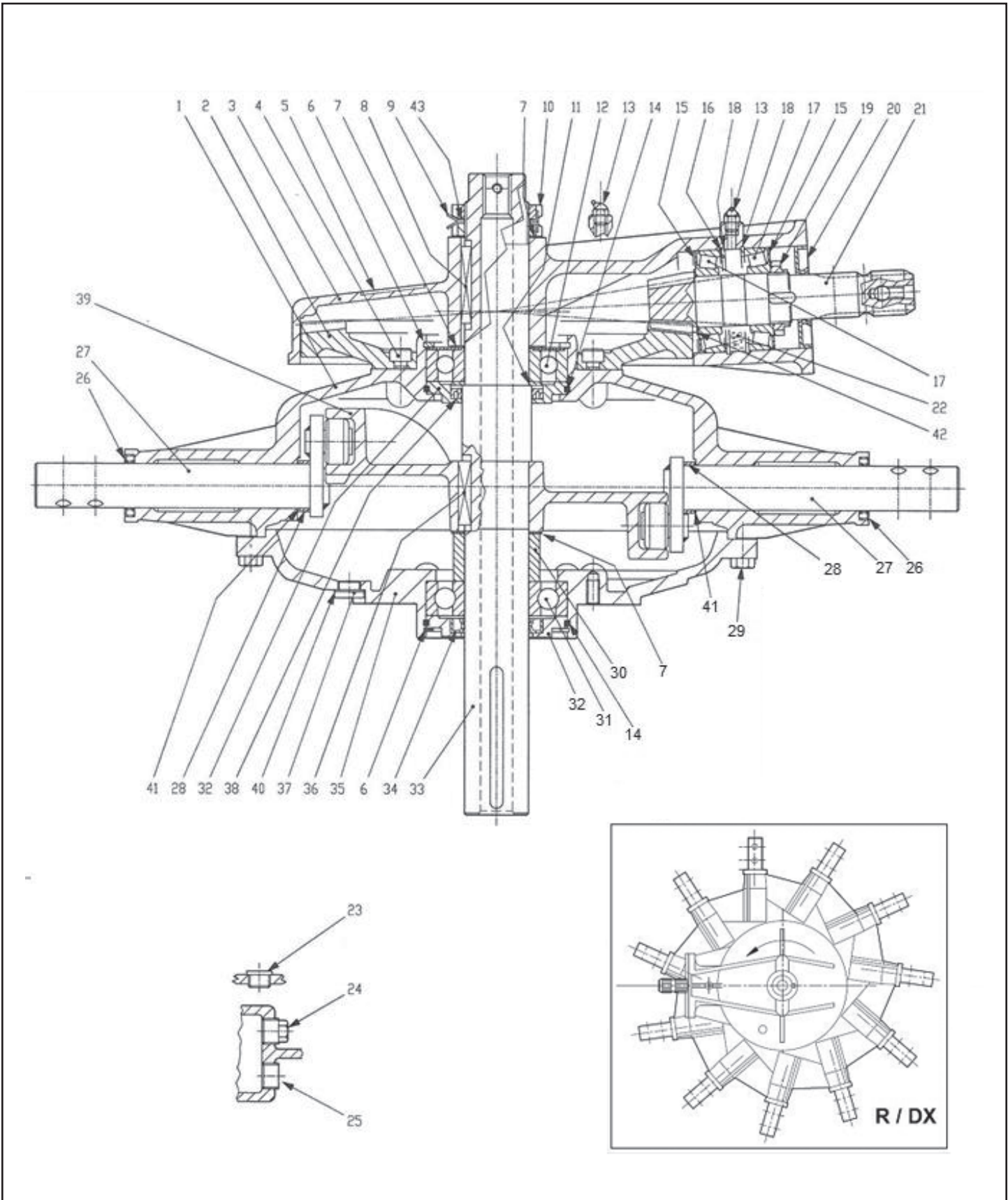
Rake Arms



ITEM	PART NUMBER	DESCRIPTION
1	R3011207	H.H. SCREW M12X60
2	R18032278	ARM CARRIER
3	R3020202	SELF LOCKING NUT M12
4	R18034788	LEFT ARM
	R18032279	RIGHT ARM
5	R3080202	SNAP PIN Ø10
6	R9190017	SQUARE RUBBERT CAP 60X60
7	R18055142	PROTECTION ARM
8	R3020209	SELF LOCKING NUT M8
9	R3010780	H.H. SCREW M8X30
10	R18055141	PROTECTION ARM
11	R3080210	PIN Ø10
12	R18055142	PROTECTION ARM
13	R3170112	U-BOLT M10
14	R3020203	SELF LOCKING NUT M14
15	R3011632	H.H. SCREW M14X45
16	R18032290	PROTECTION EXTENSION
17	R3020201	SELF LOCKING NUT M10
18	R3030159	WASHER M10
19	R3011238	H.H. SCREW M10X60
20	R18055139	L PROTECTION FRAME
	R18055140	R PROTECTION FRAME
21	R3020202	SELF LOCKING NUT M12
22	R9190013	POST
23	R18030584	TINE DX
	R18032287	TINE SX
24	R12881075	SPRING CLAMP
25	R3011288	H.H. SCREW M12X70
26	R43903268	LEFT COMPLETE ARM
	R43903234	RIGHT COMPLETE ARM
27	R18030644	COMPLETE TINE LOCK
28	R18037842	METALLICTIE
29	R3011638	HH SCREW M6X30 ZN
30	R9260001	PVCTIE
31	R3030158	WASHER M6 ZN
32	R3020213	SELF LOCKING NUT M6

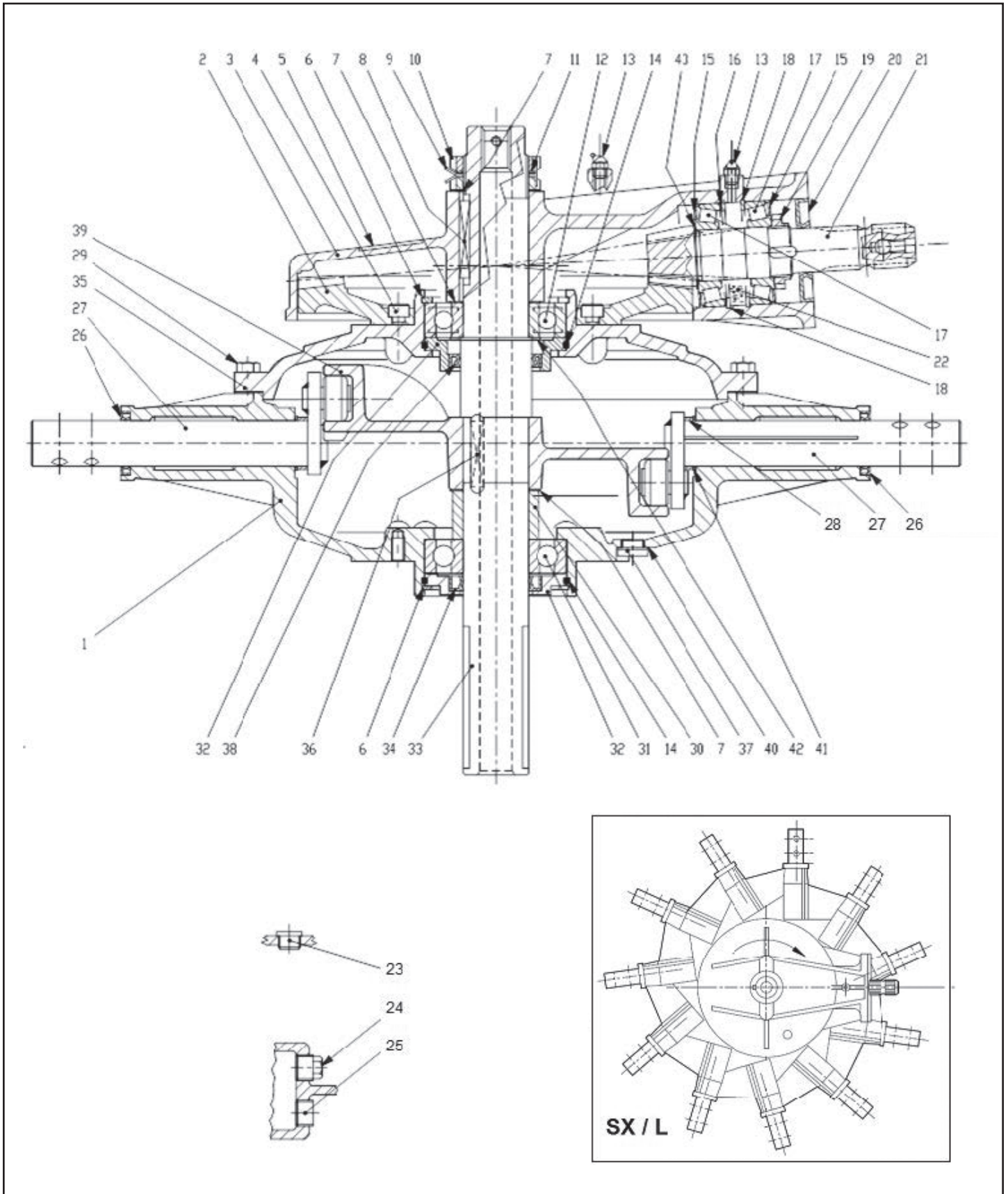
ITEM	PART NUMBER	DESCRIPTION
1	R18032299	HYDRAULIC CYLINDER
2	R3030403	COPPER WASHER 3/8
3	R4010946	REDUCTION 3/8
4	R4010207	NIPPLE 3/8
5	R4010811	PLUG 3/8
6	R4020138	VALVE
7	R4010224	NIPPLE 3/8-1/4
8	R18055137, R12770911	HYDRAULIC CYLINDER
9	R3030403	COPPER WASHER 3/8
10	R4010912	THREADED BANJO 3/8
11	R3011605	SCREW 3/8
12	R4021205	VALVE
13	R4010224	NIPPLE 3/8-1/4
14	R4010945	THREADED BANJO 3/8
15	R18037079	SEAL KIT
16	R18037080	SEAL KIT

Gearbox - Comer 11B DX



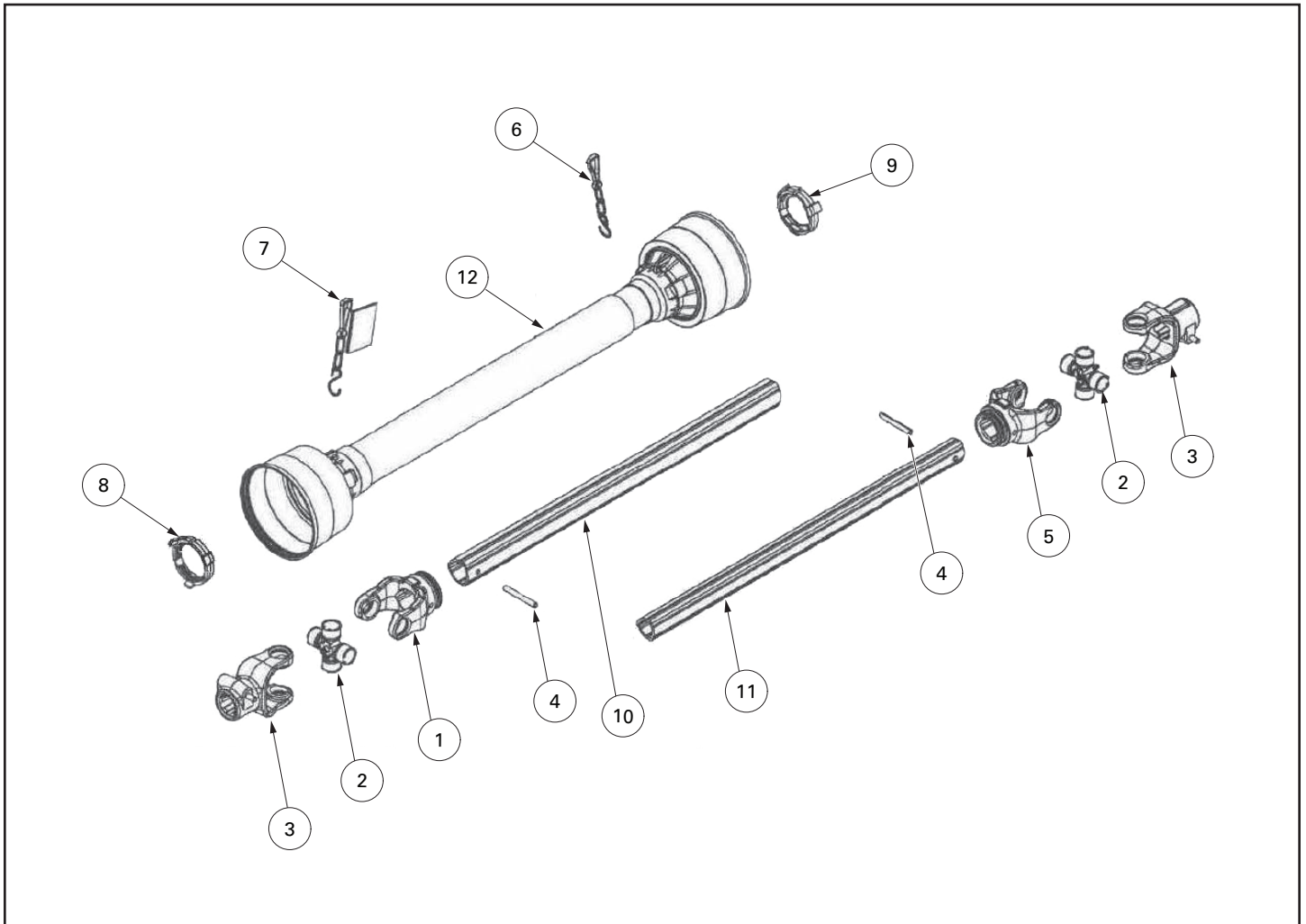
ITEM	PART NUMBER	DESCRIPTION
1	R18034017	MAIN BODY
2	R18034018	CROWN Z82 M3,75
3	R18037158	UPPER COVER
4	R3010816	SCREWTCEI 5931 M10X22
5	R18034020	SERIAL PLATE
6	R3120139	RING 110 UNI 7437
7	R18034021	SHIM 50,3X70,3
8	R3110028	KEI 10X8X60 UNI6604
9	R18037157	WASHER 50X74X1,25
10	R3180008	FASTENING GEAR M50X1,5
11	R18034022	SHIM 70,2X50,3X2,5
12	R12240256	BALL BEARING 6310 Z
13	R3090111	GREASE NIPPLE 45° M10X1
14	R18034023	SEAL 2-155
15	R18037156	SEAL RING 30208 AV
16	R18034024	SHIM 69X79,9
17	R12240244	ROLLER BEARING 30208
18	R3120147	RING 80 UNI 7437
19	R18034025	NUT M40X1,5
20	R12260097	OIL SEAL 35X80X10
21	R18034026	PINION Z10 M3.75
22	-	GREASE SHELL RETINAX WB2
23	R18034027	HEX CAP 3/8" GAS
24	R18034028	HEX CAP 1/2" GAS
25	R18034029	HEX CAP 1/2" GAS
26	R12260031	OIL SEAL 35X45X7
27	R18034030	CONNECTING ROD
28	R18034035	BUSHING 35,3X43,5X9
29	R3010281	SCREW 5739 M10X30
30	R18034031	BUSHING 50,2X67X27,7
31	R18034032	BALL BEARING 6310
32	R18034033	SEAL COVER
33	R18037159	CENTRAL SHAFT
34	R18034036	RING 50X72X8
35	R18034037	LOWER COVER
36	R3110019	KEI 10X8X50 UNI6604
37	R18034038	OIL DRAIN PLUG 3/8" GAS
38	R18034039	DOUBLE LIP SEAL 55X72X10
39	R18034040	CAM
40	R18034041	WASHER 17X22X1,5
41	R18034042	SHIM 35,2X43,8X1
42	R18034043	SHIM 51,5X40,3X1
43	R18034044	SHIM 50,2X57,5X0,5

Gearbox - Comer 11B SX



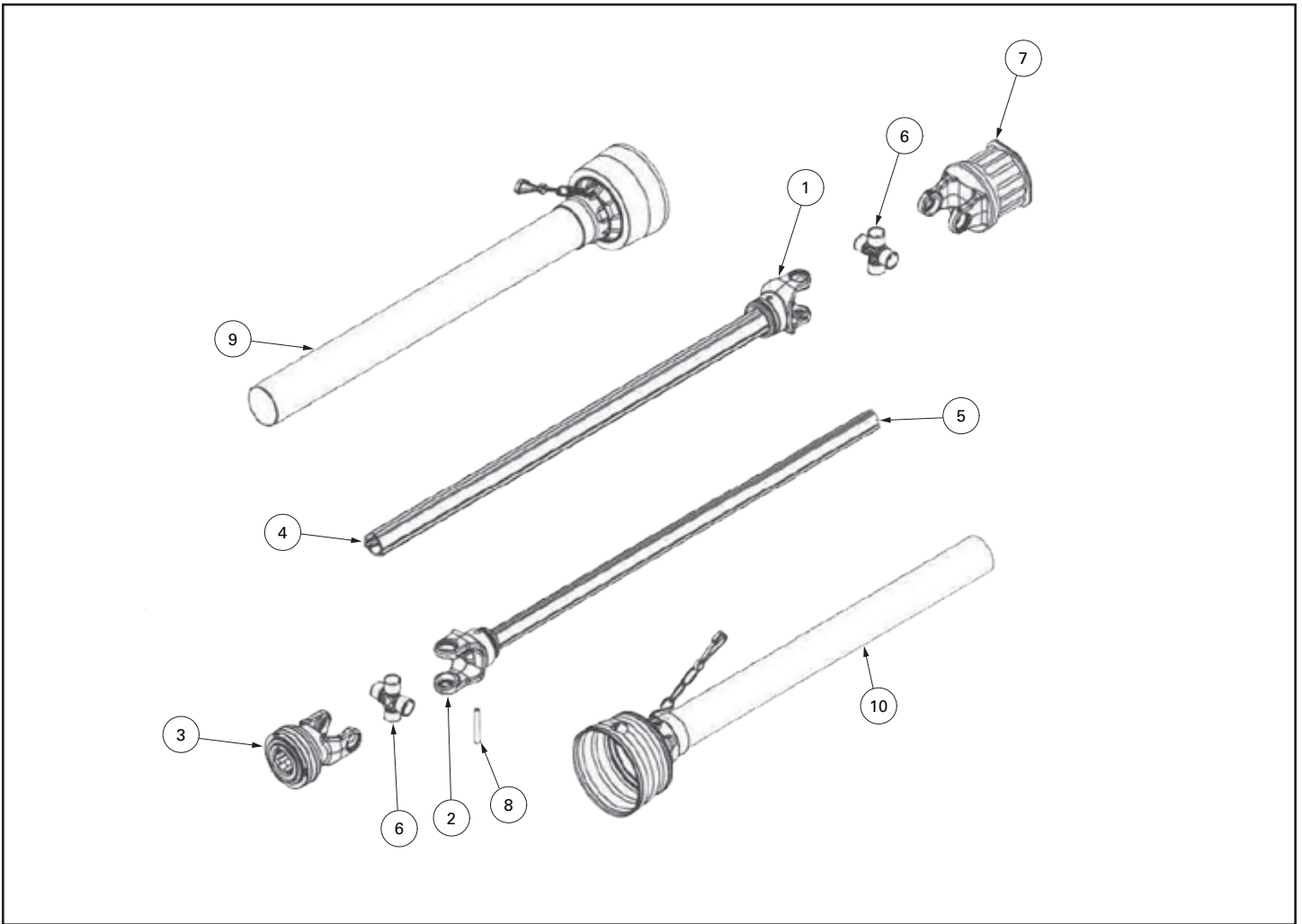
ITEM	PART NUMBER	DESCRIPTION
1	R18034017	MAIN BODY
2	R18034018	CROWN Z82 M3,75
3	R18037158	UPPER COVER
4	R3010816	SCREWTCEI 5931 M10X22
5	R18034020	SERIAL PLATE
6	R3120139	RING 110 UNI 7437
7	R18034021	SHIM 50,3X70,3
8	R3110028	KEI 10X8X60 UNI6604
9	R18037157	WASHER 50X74X1,25
10	R3180008	FASTENING GEAR M50X1,5
11	R18034044	SHIM 50,2X57,5X0,5
12	R12240256	BALL BEARING 6310 Z
13	R3090111	GREASE NIPPLE 45° M10X1
14	R18034023	SEAL 2-155
15	R18037156	SEAL RING 30208 AV
16	R18034024	SHIM 69X79,9
17	R12240244	ROLLER BEARING 30208
18	R3120147	RING 80 UNI 7437
19	R18034025	NUT M40X1,5
20	R12260097	OIL SEAL 35X80X10
21	R18034026	PINION Z10 M3.75
22	-	GREASE SHELL RETINAX WB2
23	R18034027	HEX CAP 3/8" GAS
24	R18034028	HEX CAP 1/2" GAS
25	R18034029	HEX CAP 1/2" GAS
26	R12260031	OIL SEAL 35X45X7
27	R18037160	CONNECTING ROD
28	R18034035	BUSHING 35,3X43,5X9
29	R3010281	SCREW 5739 M10X30
30	R18034031	BUSHING 50,2X67X27,7
31	R18034032	BALL BEARING 6310
32	R18034033	SEAL COVER
33	R18037161	CENTRAL SHAFT
34	R18034036	RING 50X72X8
35	R18034037	LOWER COVER
36	R3110019	KEI 10X8X50 UNI6604
37	R18034038	OIL DRAIN PLUG 3/8" GAS
38	R18034039	DOUBLE LIP SEAL 55X72X10
39	R18034040	CAM
40	R18034041	WASHER 17X22X1,5
41	R18034042	SHIM 35,2X43,8X1
42	R18034043	SHIM 51,5X40,3X1
43	R18034022	SHIM 70,2X50,3X2,5

PTO Shaft - Arm / Rotors - R8020446



ITEM	PART NUMBER	DESCRIPTION
1	R12881466	INTERNAL TRIANGULAR FORK
2	R12881467	COMPLETE CROSS
3	R12881552	FORK SPLINED 1.3/8" Z6
4	R12881473	ELASTIC PIN 8X65 DIN 1481
5	R12881471	EXTERNAL TRIANGULAR FORK
6	R12880392	CHAIN
7	R12881553	CHAIN + INSTRUCTION MANUAL
8	R12880390	RETAINER
9	R12880391	RETAINER
10	R12881554	TUBE EXT.
11	R12881555	TUBE INT.
12	R12881556	SHAFT SHIELD

PTO Shaft - To Tractor - R8020435



ITEM	PART NUMBER	DESCRIPTION
1	R12881545	EXTERNAL TRIANGULAR FORK
2	R12881546	INTERNAL TRIANGULAR FORK
3	R12881478	FORK SPLINED 1.3/8" Z6
4	R12881547	TUBE EXT.
5	R12881548	TUBE INT.
6	R12881549	COMPLETE CROSS
7	R12881527	LIMITING 2 G. 1.3/8" Z6
8	R12881483	ELASTIC PIN 8X55 DIN 1481
9	R12881550	EXTERNAL PROTECTION - 1/2
10	R12881551	INTERNAL PROTECTION - 1/2

Farm King



Specifications And Shipping Kit Numbers

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Farm King



Specifications

MODEL	7700
Transport Width	8.2 ft.
Working Width	23—26 ft.
Rake Arm Quantity	11 per rotary group
Driveshaft RPM	540 RPM
Rotary Group Tires	18-8.5"x8"
Rear Towing Tires	10.075"x8"
HP Requirement	70—80 HP
Working Speed	9 MPH
Weight	4409.245 lbs.

Note: Dimensions are approximate measurements.

Shipping Kit And Bundle Numbers

The following is a list of Kit Numbers for this product and the Bundle Numbers, Descriptions, and Quantities for each Kit.

Qty.	Bundle	Description
ENO780 (RR7700) Model Double Rotary Rake		
1	RR7700FK	Body Assembly

Hardware Torque Values

Metric Chart

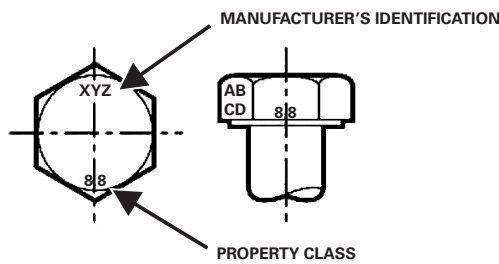
NOTE: Do not use the values listed in the charts if a different torque value or tightening procedure is specified in this manual for a specific application. Torque values listed are for general use only.

Use the following charts to determine the correct torque when checking, adjusting or replacing hardware. **Torque values are listed in newton-meters (inch* or foot pounds) for normal assembly applications.**

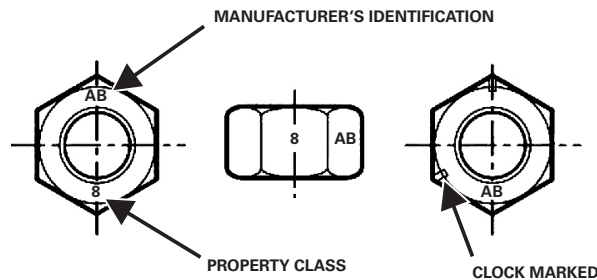
Nominal Size	Class 5.8		Class 8.8		Class 10.9		Lock nuts
	Unplated	Plated W / ZnCr	Unplated	Plated W / ZnCr	Unplated	Plated W / ZnCr	CL.8 W/ CL. 8.8 Bolt
M4	1.7 (15*)	2.2 (19*)	2.6 (23*)	3.4 (30*)	3.7 (33*)	4.8 (42*)	1.8 (16*)
M6	5.8 (51*)	7.6 (67*)	8.9 (79*)	12 (102*)	13 (115*)	17 (150*)	6.3 (56*)
M8	14 (124*)	18 (159*)	22 (195*)	28 (248*)	31 (274*)	40 (354*)	15 (133*)
M10	28 (21)	36 (27)	43 (32)	56 (41)	61 (45)	79 (58)	30 (22)
M12	49 (36)	63 (46)	75 (55)	97 (72)	107 (79)	138 (102)	53 (39)
M16	121 (89)	158 (117)	186 (137)	240 (177)	266 (196)	344 (254)	131 (97)
M20	237 (175)	307 (226)	375 (277)	485 (358)	519 (383)	671 (495)	265 (195)
M24	411 (303)	531 (392)	648 (478)	839 (619)	897 (662)	1160 (855)	458 (338)

NOTE: Torque values shown with * are inch pounds.

Identification of Hex Cap Screws and Carriage Bolts - Classes 5 and up



Identification of Hex Nuts and Lock Nuts - Classes 5 and up



Hardware Torque Values (Cont'd)

Imperial Chart

NOTE: Do not use the values listed in the charts if a different torque value or tightening procedure is specified in this manual for a specific application. Torque values listed are for general use only.

Use the following charts to determine the correct torque when checking, adjusting or replacing hardware. Torque values are listed in newton-meters (inch* or foot pounds) for normal assembly applications.

Nominal Size	SAE Grade 5		SAE Grade 8		LOCK NUTS			
	Unplated or Plated Silver	Plated W / ZnCr Gold"	Unplated or Plated Silver	Plated W / ZnCr Gold"	Unplated or Plated Silver	Plated W / ZnCr Gold"	Grade W / Gr. 5 Bolt	Grade W / Gr. 8 Bolt
1/4	6.2 (55*)	8.1 (72*)	9.7 (86*)	12.6 (112*)	13.6 (121*)	17.7 (157*)	6.9 (61*)	9.8 (86*)
5/16	13 (115*)	17 (149*)	20 (178*)	26 (229*)	28 (250*)	37 (324*)	14 (125*)	20 (176*)
3/8	23 (17)	30 (22)	35 (26)	46 (34)	50 (37)	65 (48)	26 (19)	35 (26)
7/16	37 (27)	47 (35)	57 (42)	73 (54)	80 (59)	104 (77)	41 (30)	57 (42)
1/2	57 (42)	73 (54)	87 (64)	113 (83)	123 (91)	159 (117)	61 (45)	88 (64)
9/16	81 (60)	104 (77)	125 (92)	163 (120)	176 (130)	229 (169)	88 (65)	125 (92)
5/8	112 (83)	145 (107)	174 (128)	224 (165)	244 (180)	316 (233)	122 (90)	172 (127)
3/4	198 (146)	256 (189)	306 (226)	397 (293)	432 (319)	560 (413)	217 (160)	306 (226)
7/8	193 (142)	248 (183)	495 (365)	641 (473)	698 (515)	904 (667)	350 (258)	494 (364)
1	289 (213)	373 (275)	742 (547)	960 (708)	1048 (773)	1356 (1000)	523 (386)	739 (545)

NOTE: Torque values shown with * are inch pounds.

Identification of Hex Cap Screws and Carriage Bolts



GRADE 2 SAE BOLT



GRADE 5 SAE BOLTS



GRADE 8 SAE BOLTS



GRADE 2 SAE HEX NUTS

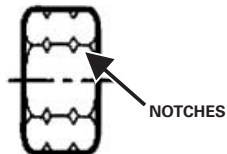


GRADE 5 SAE HEX NUTS



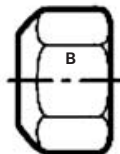
GRADE 8 SAE HEX NUTS

Identification of Hex Nuts and Lock Nuts

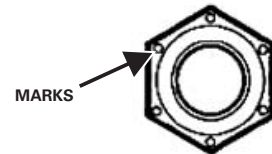


NOTCHES

GRADE IDENTIFICATION
GRADE A: NO NOTCHES
GRADE B: ONE CIRCUMFERENTIAL NOTCH
GRADE C: TWO CIRCUMFERENTIAL NOTCHES



GRADE IDENTIFICATION
GRADE A: NO MARK
GRADE B: LETTER B
GRADE C: LETTER C



MARKS

GRADE IDENTIFICATION
GRADE A: NO MARKS
GRADE B: THREE MARKS
GRADE C: SIX MARKS
MARKS NEED NOT BE LOCATED AT CORNERS

Farm King



Warranty

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Farm King



Farm King Base Limited Warranty

Farm King provides this warranty only to original retail purchasers of its products. Farm King warrants to such purchasers that all Farm King manufactured parts and components used and serviced as provided for in the Operator's Manual shall be free from defects in materials and workmanship for a period following delivery to the original retail purchaser of one (1) year. This limited warranty applies only to those parts and components manufactured by Farm King. Parts and components manufactured by others are subject to their manufacturer's warranties, if any.

Farm King will fulfill this limited warranty by, at its option, repairing or replacing any covered part that is defective or is the result of improper workmanship, provided that the part is returned to Farm King within thirty (30) days of the date that such defect or improper workmanship is, or should have been, discovered. Parts must be returned through the selling representative and the buyer must prepay transportation charges.

Farm King will not be responsible for repairs or replacements that are necessitated, in whole or part, by the use of parts not manufactured by or obtained from Farm King. Under no circumstances are component parts warranted against normal wear and tear. There is no warranty on product pump seals, product pump bearings, rubber product hoses, pressure gauges, or other components that require replacement as part of normal maintenance.

Repair Parts Limited Warranty

Farm King warrants genuine Farm King replacement parts purchased after the expiration of the Farm King Limited Warranty, and used and serviced as provided for in the Operator's Manual, to be free from defects in materials or workmanship for a period of thirty (30) days from the invoice date for the parts. Farm King will fulfill this limited warranty by, at its option, repairing or replacing any covered part that is defective or is the result of improper workmanship, provided that the part is returned to Farm King within thirty (30) days of the date that such defect or improper workmanship is, or should have been, discovered. Such parts must be shipped to the Farm King factory at the purchaser's expense.

What Is Not Covered

Under no circumstances does this limited warranty cover any components or parts that have been subject to the following: negligence; alteration or modification not approved by Farm King; misuse; improper storage; lack of reasonable and proper maintenance, service, or repair; normal wear; damage from failure to follow operating instructions; accident; and/or repairs that have been made with parts other than those manufactured, supplied, and or authorized by Farm King.

Authorized Dealer And Labor Costs

Repairs eligible for labor under this limited warranty must be made by Farm King or an authorized Farm King dealer. Farm King retains the exclusive discretion to determine whether it will pay labor costs for warranty repairs or replacements, and the amount of such costs that it will pay and the time in which the repairs will be made. If Farm King determines that it will pay labor costs for warranty work, it will do so by issuing a credit to the dealer's or distributor's account. Farm King will not approve or pay invoices sent for repairs that Farm King has not previously approved. Warranty service does not extend the original term of this limited warranty.

Warranty Requirements

To be covered by warranty, each new product must be registered with Farm King within thirty (30) days of delivery to original retail purchaser. If the customer decides to purchase replacement components before the warranty disposition of such components is determined, Farm King will bill the customer for such components and then credit the replacement invoice for those components later determined to be covered by this limited warranty. Any such replacement components that are determined not to be covered by this limited warranty will be subject to the terms of the invoice and shall be paid for by the purchaser.

EXCLUSIVE EFFECT OF WARRANTY AND LIMITATION OF LIABILITY

TO THE EXTENT PERMITTED BY LAW, FARM KING DISCLAIMS ANY WARRANTIES, REPRESENTATIONS, OR PROMISES, EXPRESS OR IMPLIED, AS TO THE QUALITY, PERFORMANCE, OR FREEDOM FROM DEFECT OF THE COMPONENTS AND PARTS COVERED BY THIS WARRANTY AND NOT SPECIFICALLY PROVIDED FOR HEREIN.

TO THE EXTENT PERMITTED BY LAW, FARM KING DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ON ITS PRODUCTS COVERED HEREIN, AND DISCLAIMS ANY RELIANCE BY THE PURCHASER ON FARM KING'S SKILL OR JUDGMENT TO SELECT OR FURNISH GOODS FOR ANY PARTICULAR PURPOSE. THE PURCHASER'S ONLY AND EXCLUSIVE REMEDIES IN CONNECTION WITH THE BREACH OR PERFORMANCE OF ANY WARRANTY ON FARM KING'S PRODUCTS ARE THOSE SET FORTH HEREIN. IN NO EVENT SHALL FARM KING BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BY WAY OF EXAMPLE ONLY AND NOT LIMITATION, LOSS OF CROPS, LOSS OF PROFITS OR REVENUE, OTHER COMMERCIAL LOSSES, INCONVENIENCE, OR COST OF REPLACEMENT OF RENTAL EQUIPMENT). IN NO EVENT SHALL FARM KING'S CONTRACT OR WARRANTY LIABILITY EXCEED THE PURCHASE PRICE OF THE PRODUCT. (Note that some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusion may not apply to you.) This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.

Farm King neither assumes nor authorizes any person or entity, including its selling representatives, to assume any other obligations or liability in connections with the sale of covered equipment, or to make any other warranties, representations, or promises, express or implied, as to the quality, performance, or freedom from defect of the components and parts covered herein. No one is authorized to alter, modify, or enlarge this limited warranty, or its exclusions, limitations and reservations.

Corrections of defects and improper workmanship in the manner, and for the applicable time periods, provided for herein shall constitute fulfillment of all responsibilities of Farm King to the purchaser, and Farm King shall not be liable in negligence, contract, or on any other basis with respect to the subject equipment.

This limited warranty is subject to any existing conditions of supply which may directly affect Farm King's ability to obtain materials or manufacturer replacement parts.

Buhler Industries Inc. reserves the right to make improvements in design or changes in specifications to its products at anytime, without incurring any obligation to owners of units previously sold.

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