

Farm King

OPERATOR AND PARTS MANUAL

Rotary Rake

Model 420

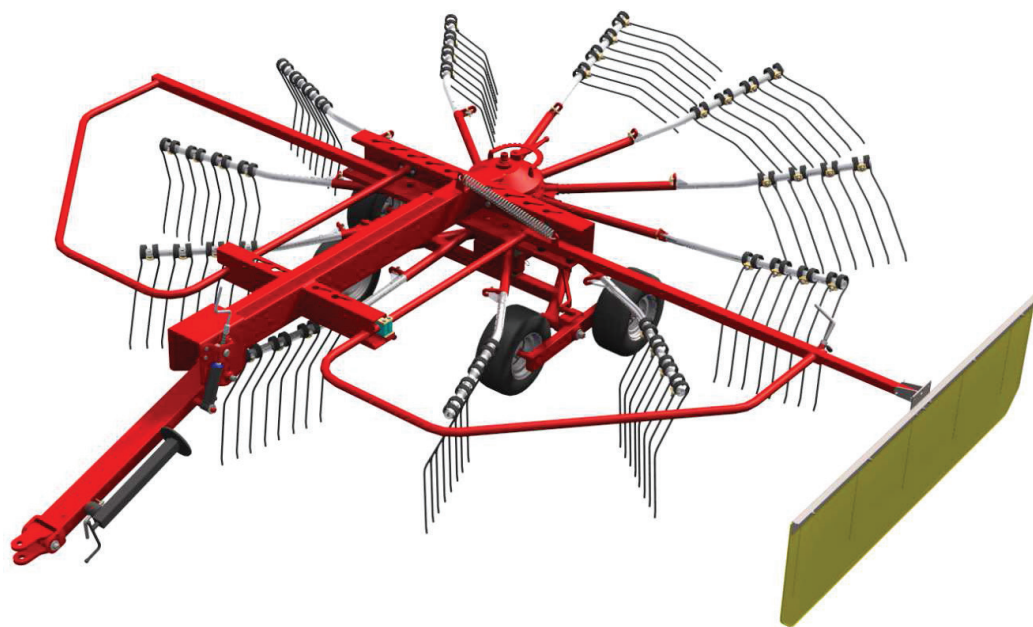


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Manufacturer’s Statement: For technical reasons, Buhler Industries Inc. reserves the right to modify machinery design and specifications provided herein without any preliminary notice. Information provided herein is of descriptive nature. Performance 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:

Rotary Rake 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

- Bearings Turn Freely
- Fasteners Tightened
- Grease Points Lubricated
- Gear Box Oil Level Checked
- Tines Properly Oriented

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.

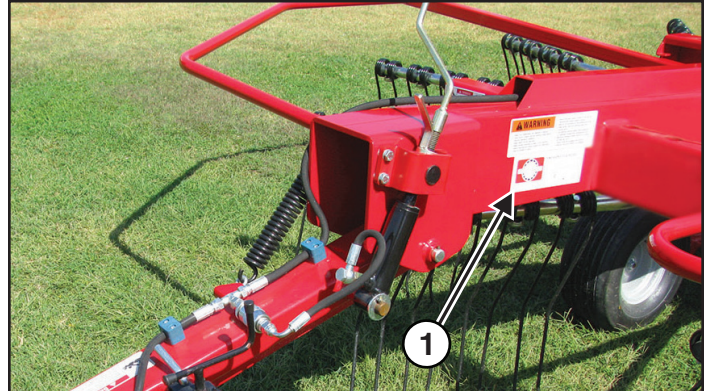
Visit our website at www.farm-king.com for a complete list of dealers in your area.

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: _____

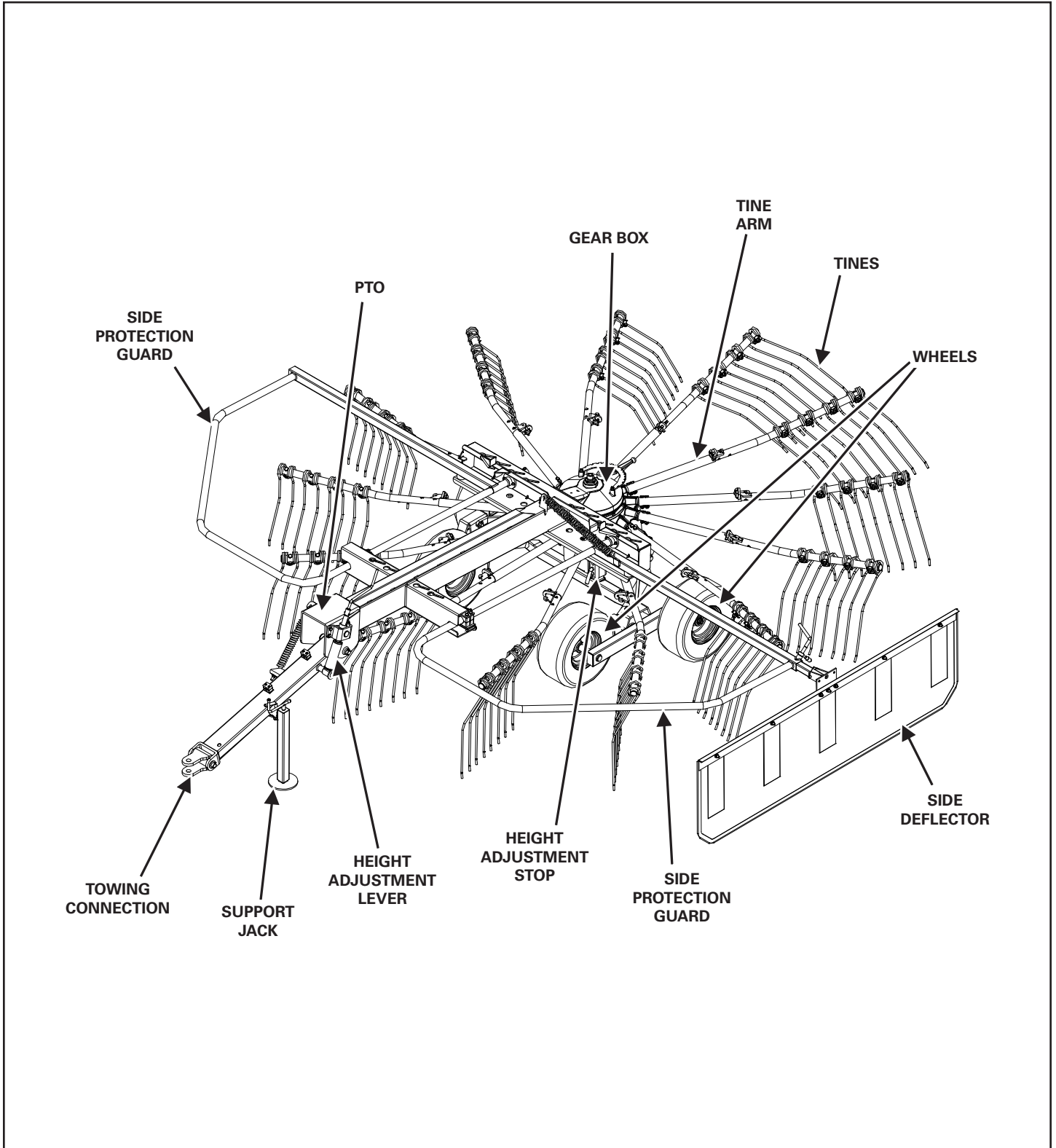
Serial Number: _____

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

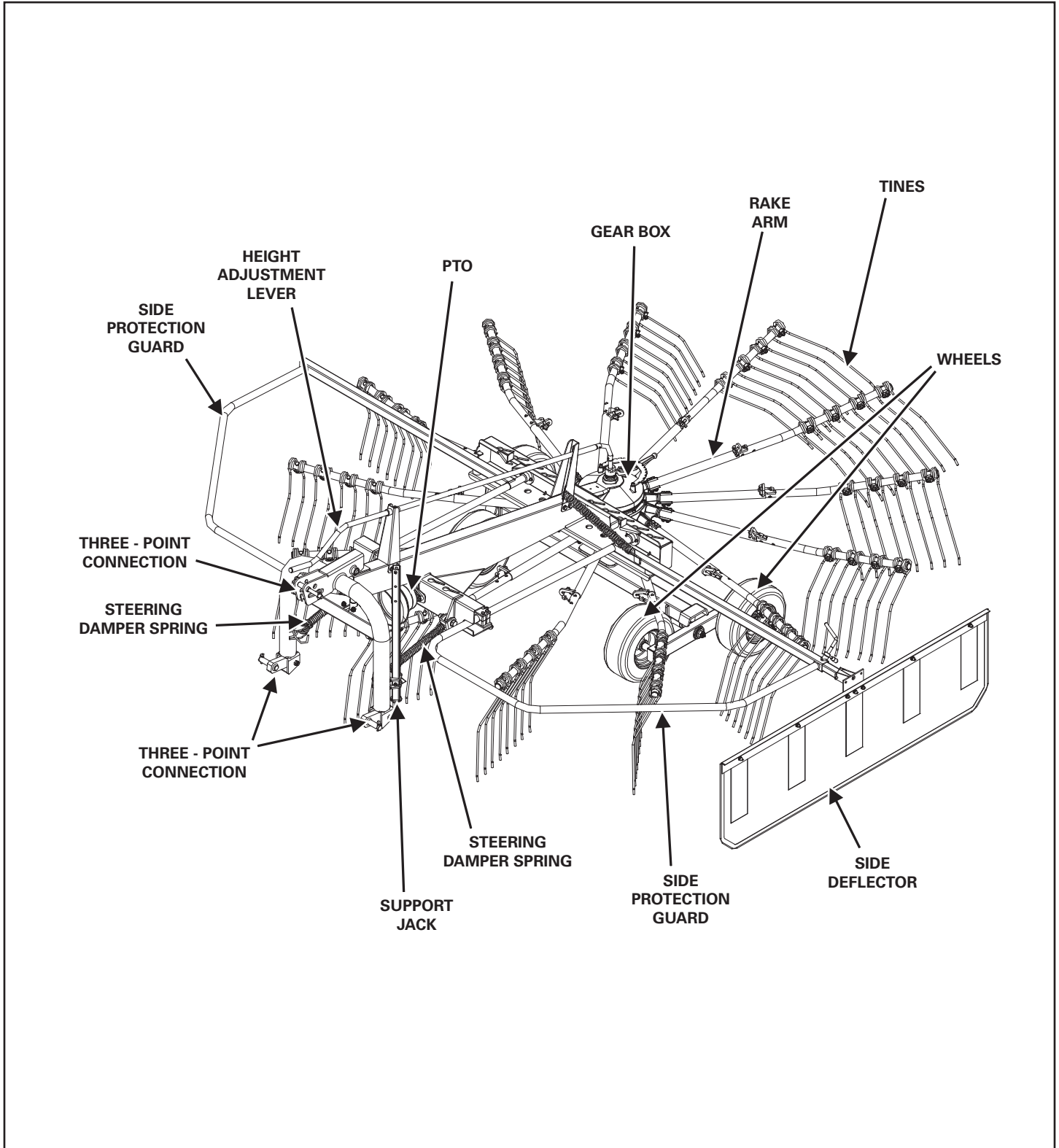
Always use your serial number when requesting information or when ordering parts.

Equipment Identification

Component Location - Pull Type



Component Location - Mounted Type



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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.

Safety Sign-Off Form

	<h1>WARNING</h1>
<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>	

Farm King follows the general Safety Standards specified by the American Society of Agricultural and Biological Engineers (ASABE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and / or maintaining the Rotary Rake must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Annually review this information before the season start-up and make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. An untrained operator is unqualified to operate this machine.

The following sign-off sheet is provided for your record and to show that all personnel who will be working with the equipment have read and understand the information in this Operator And Parts Manual and have been instructed in the operation of the equipment.

SIGN-OFF SHEET		
Date	Employee's Signature	Employer's Signature

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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.

Note: Do not operate with leaks.

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.

	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.

6. Check that all electrical connections are tight.
7. Check the tines. Remove any twine, wire or other material that has become entangled.

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 40-45 HP.

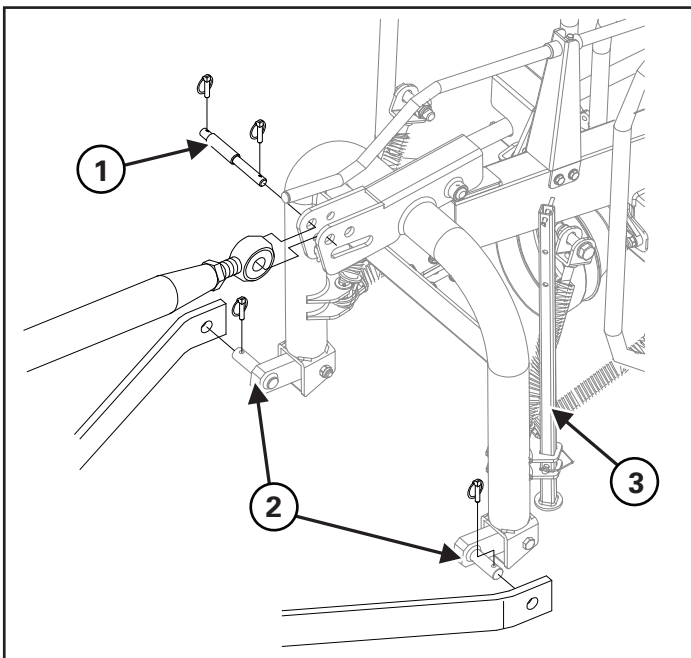
Connecting The Rotary Rake To Tractor

Three-Point Hitch

Always inspect the tractor's three-point hitch and Rotary Rake's three-point 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 2



Remove the top implement mounting pin (Item 1) [Figure 2] and two retaining clips.

Remove the retaining clips from the left and right lower mounts (Item 2) [Figure 2].

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 of the tractor to the Rotary Rake left and right lower mounting pins.

Reinstall the retaining pins.

Note: Always use retaining pins with a locking device.

Lower the top link of the three-point hitch until it aligns with the implement upper mount.

Reinstall the mounting pin and retaining pin.

Note: It may be necessary to lengthen or shorten the top link to align it with the implement mounting hole. (See the tractor's operator's manual for the correct procedure.)

The implement can be leveled front to back by adjusting the top link. (See the tractor's operator's manual for the correct procedure.)

Adjust the lower link sway chains or blocks on the tractor to restrict side movement of the Rotary Rake when operating.

The support jack (Item 3) [Figure 2] must be fully raised when operating.

	WARNING
AVOID INJURY OR DEATH	
<p>Before moving the tractor, look in all directions and make sure no bystanders, especially small children are in the work area.</p> <p>Do not allow anyone between the tractor and the equipment when backing up to the equipment for connecting.</p>	

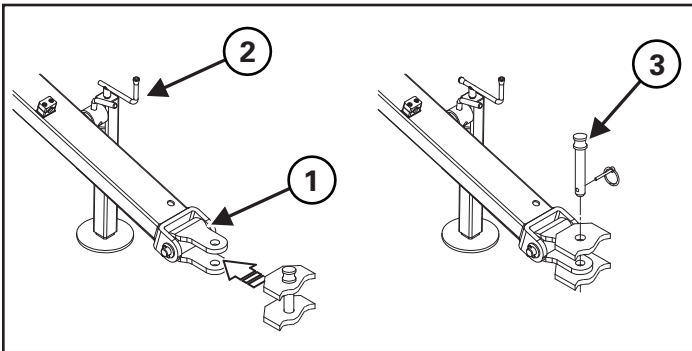
Pull Type Hitch

Always inspect the tractor’s hitch and Rotary Rake’s hitch before connecting. See the tractor’s owner’s manual.

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.

Figure 3



Move the tractor backwards, aligning the drawbar with the Rotary Rake hitch (Item 1) [Figure 3].

Lower or raise the support jack (Item 2) [Figure 3] to properly align the drawbar and hitch.

Move the tractor backwards, aligning pin holes with the Rotary Rake hitch pin holes.

Leave the operator’s position (See “Leaving The Operator’s Position” in Operation section).

Install the hitch pin (Item 3) [Figure 3] and retaining pin to securely fasten the Rotary Rake hitch to the tractor drawbar.

Note: Always use a hitch pin of adequate size and strength and a retaining pin with a locking device.

	WARNING
	
AVOID INJURY OR DEATH	
Keep fingers and hands out of pinch points when connecting and disconnecting equipment.	


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.

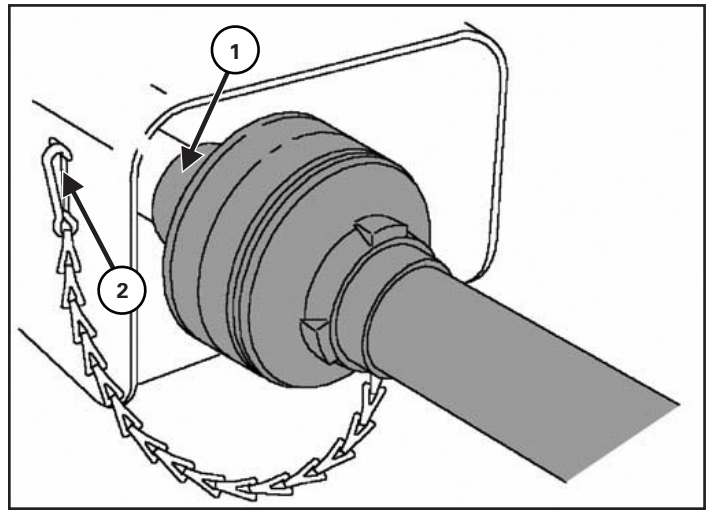
	WARNING
AVOID INJURY OR DEATH	
Warnings on the machine and in the manuals are for your safety. Failure to obey warnings can cause serious injury or death.	

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).


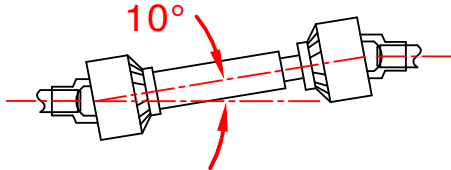
Figure 4



Retract the collar (Item 1) [Figure 4] 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.

Install PTO driveline safety chain (Item 2) [Figure 4].

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.

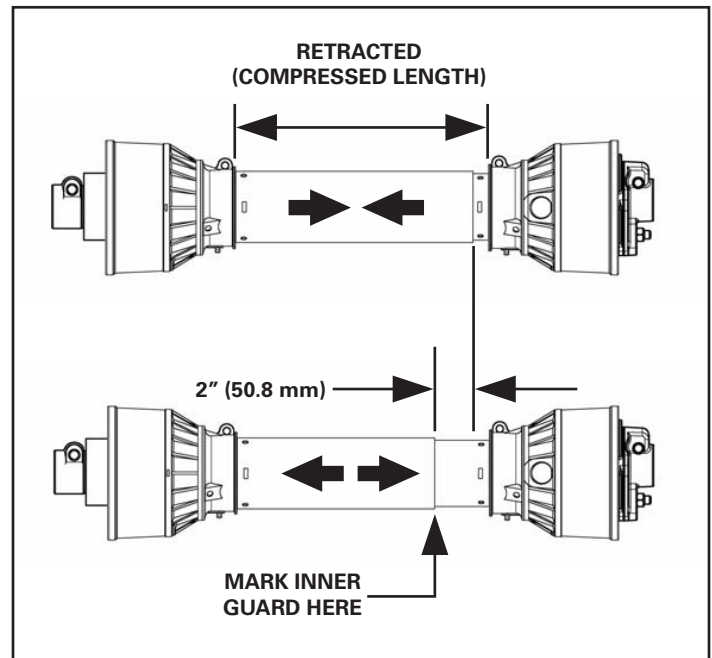
	WARNING
AVOID INJURY OR DEATH	
<ul style="list-style-type: none"> • Do NOT exceed the rated implement PTO speed. • Stay clear of rotating driveline. • Keep bystanders away. • Keep hands, feet, clothing and long hair away. • Keep PTO shields and all guards in place. • Disengage PTO, move the tractor controls 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. 	

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 5



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 5].
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 5].
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. 	

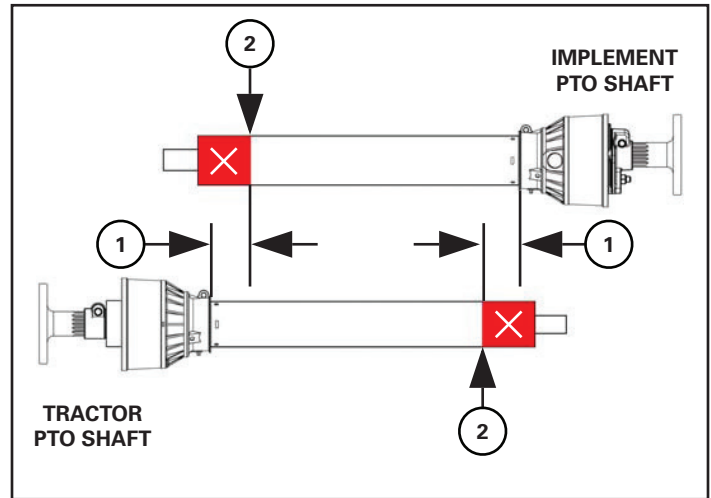
Remove the PTO driveline from the tractor and place in storage position (if equipped).

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.

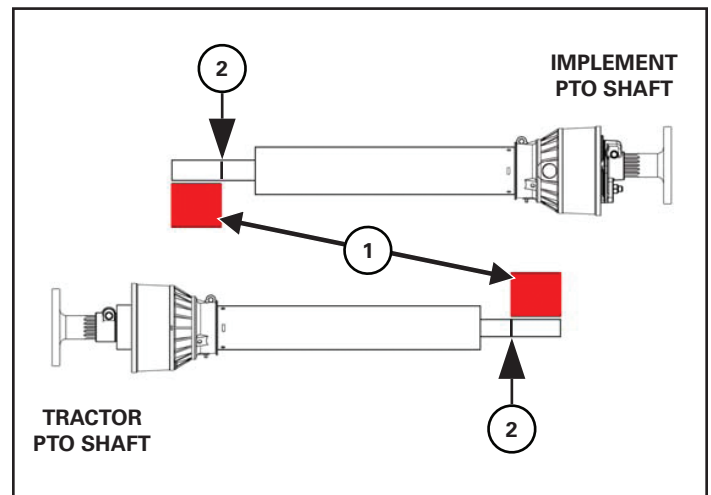
Pull the PTO driveline apart and reinstall each individual section; one half to the tractor PTO shaft and one half to the implement gearbox PTO shaft.

Figure 6



1. Hold PTO driveline sections parallel to one another and measure back 2 in. (50.8 mm) (Item 1) [Figure 6] from the yoke of each section and place mark on opposite section. Cut the plastic shield at this length (Item 2) [Figure 6].

Figure 7




2. Using the plastic guard lengths that were cut off in [Figure 6], align the cut off lengths (Item 1) [Figure 7] with the end of the inner & outer shafts. Place a mark (Item 2) [Figure 7] 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.

	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. 	

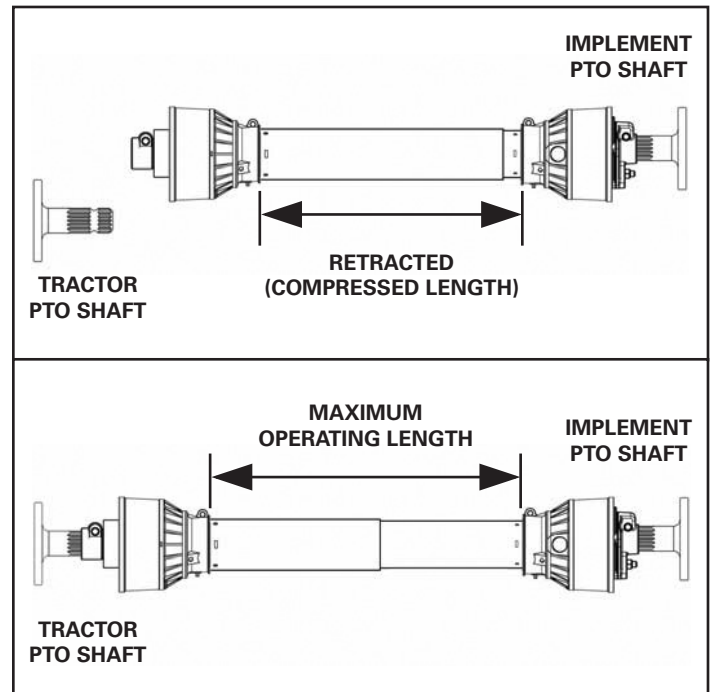
1. Disconnect the PTO driveline from the tractor and fully slide the driveline sections together (retracted).
2. Measure the retracted (compressed) length of the PTO driveline between the bases of the plastic guards [Figure 8].
3. Multiply the retracted driveline length by 1.667 to determine the PTO 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 8] 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 8





Connecting Hydraulic Hoses

Rotary Rakes equipped with a pull type hitch are also equipped with a hydraulic lift system.

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

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.


WARNING



HIGH PRESSURE FLUID HAZARD

To prevent serious injury or death from high pressure fluid:

- 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.



IMPORTANT

Contain and dispose of any oil leakage in an environmentally safe manner.

Thoroughly clean the quick couplers before making connections. Dirt can quickly damage the system.

Disconnecting Hydraulic Hoses

Release pressure and pull the male couplers out to disconnect.


WARNING

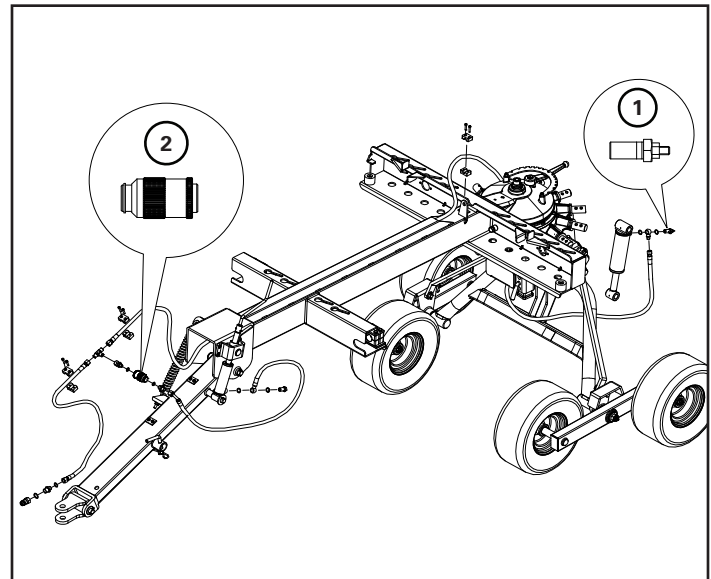
AVOID BURNS

Hydraulic fluid, tubes, fittings and quick couplers can get hot when running equipment. Be careful when connecting and disconnecting quick couplers.

Adjust Hydraulic Flow

There are two adjustment valves on the Rotary Rake.

Figure 9



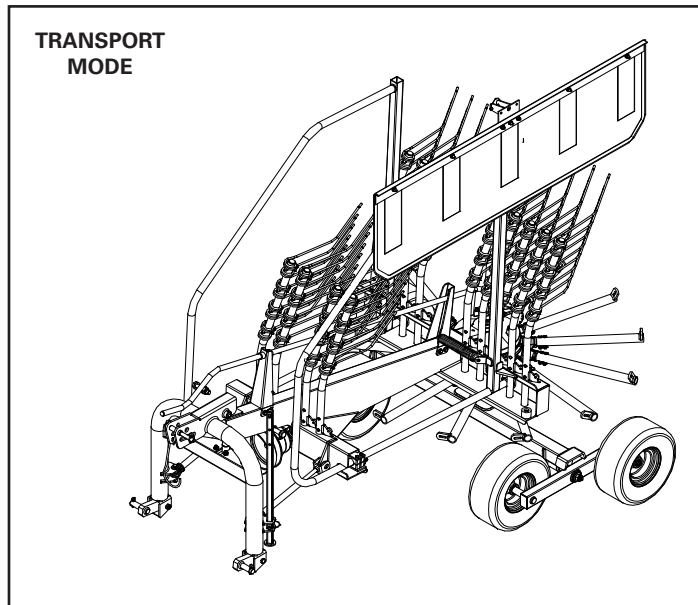
Adjust the throttle valve (Item 1) [Figure 9] on the rear cylinder to increase/decrease how fast the Rotary Rake lifts.

Adjust the throttle valve (Item 2) [Figure 9] on the front hitch if the Rotary Rake lifts unevenly.

Work Configuration

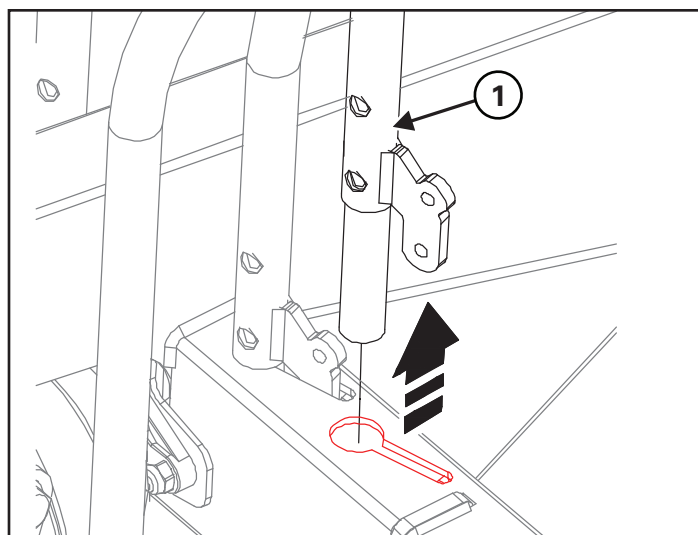
Transport the Rotary Rake to the area of work (See "Transport Mode" in Operation section). Always comply with federal, state, local and provincial laws regarding the transport of farm equipment on public roadways.

Figure 10



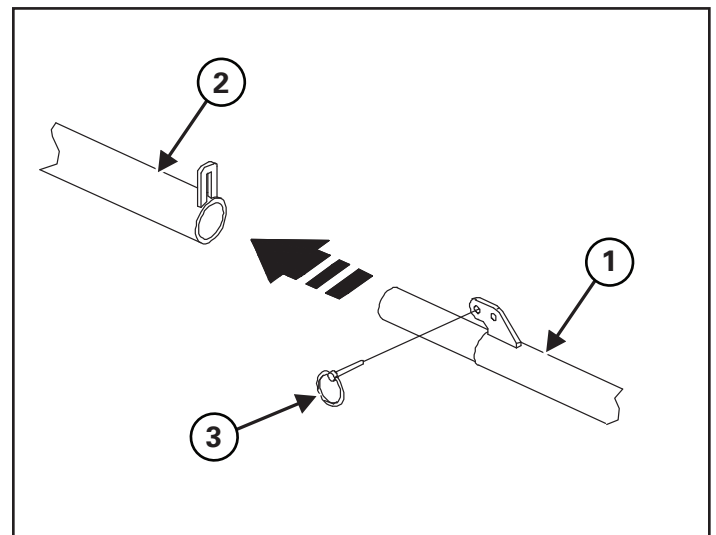
The Rotary Rake must be configured into Work Mode for proper field operation.

Figure 11



Remove the rake arms (Item 1) [Figure 11] from the storage slots on the main frame.

Figure 12



Slide the rake arms (Item 1) [Figure 12] into the housings (Item 2) [Figure 12] on the rotating unit. Attach each arm using a retaining pin (Item 3) [Figure 12].

The rake arms must be angled with the direction of rotation.

Figure 13

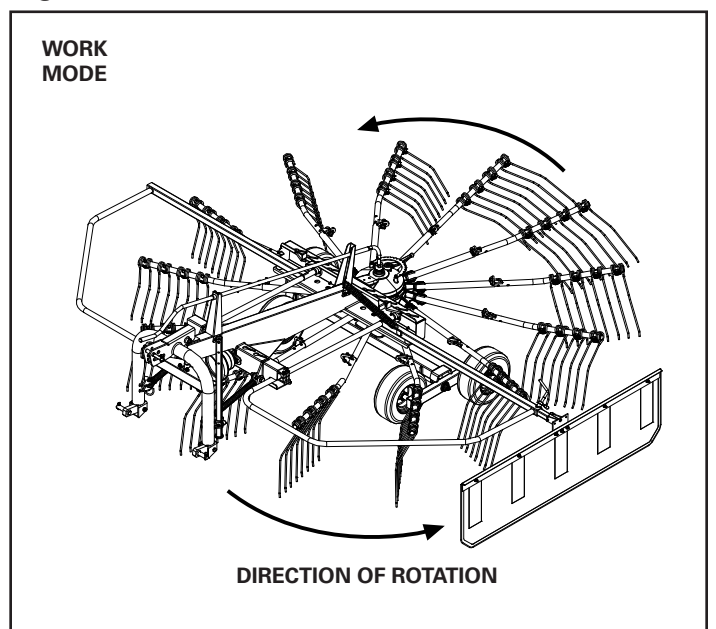
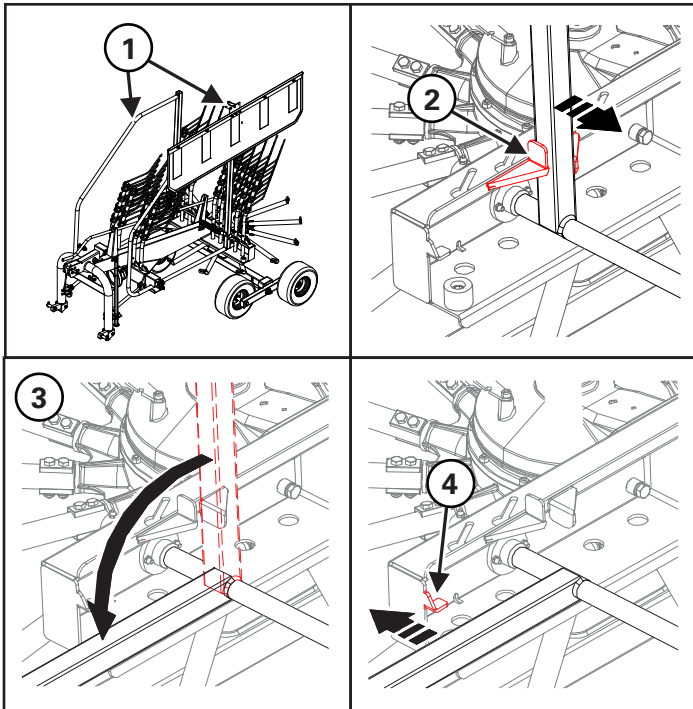


Figure 14



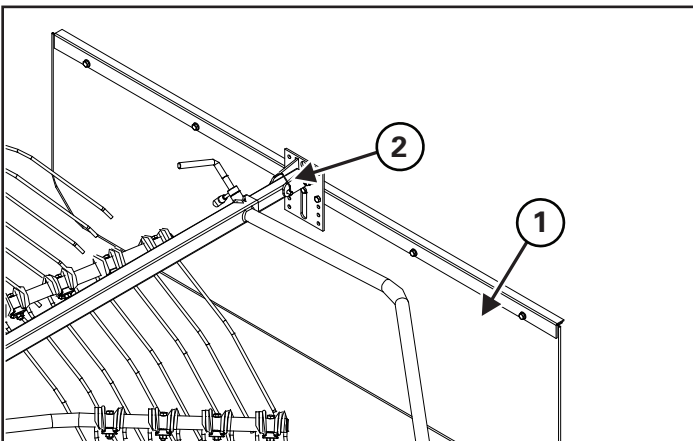
Lower the side guards (Item 1) [Figure 14] into work mode.

Pull the spring-loaded side guards forward out of the transport supports (Item 2) [Figure 14].

Swing the side guards down (Item 3) [Figure 14].

Rest the guards in the work mode supports (Item 4) [Figure 14].

Figure 15



Lock the deflector shield (Item 1) [Figure 15] in place. Attach using the retaining pin (Item 2) [Figure 15].

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.

The Rotary Rake must work parallel to the ground. The rake tines should be 10 to 20 mm from the ground [Figure 16].

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.

Make adjustments for the desired windrow width and verify that the rake is operating parallel to the ground.



CAUTION

- 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.
- Operate only at 540 RPM.
- Operate at a maximum speed of 15 km/h

Figure 16

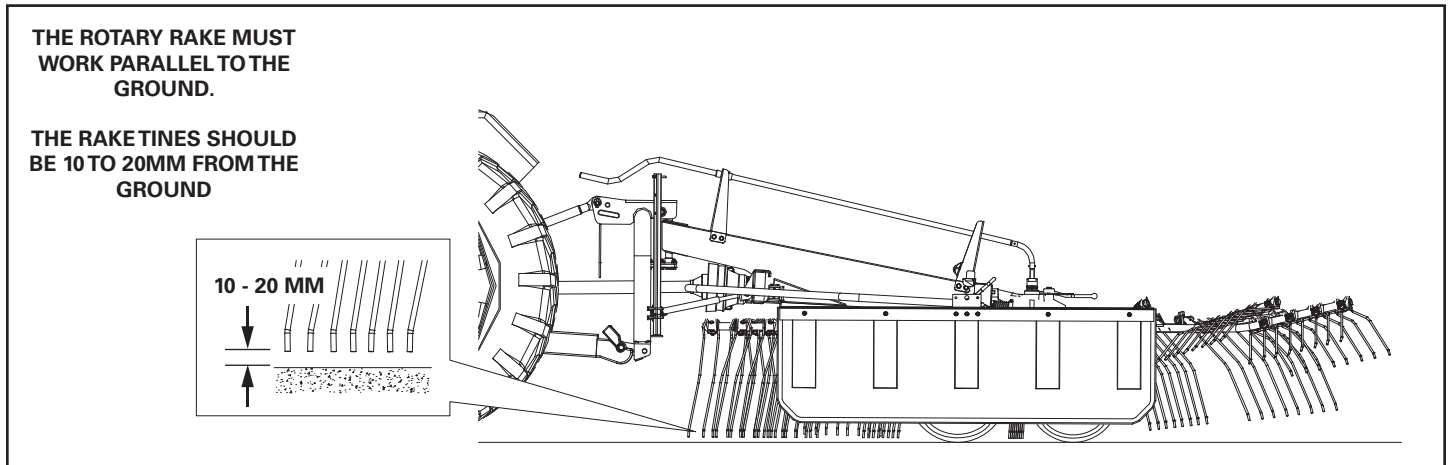


Figure 17

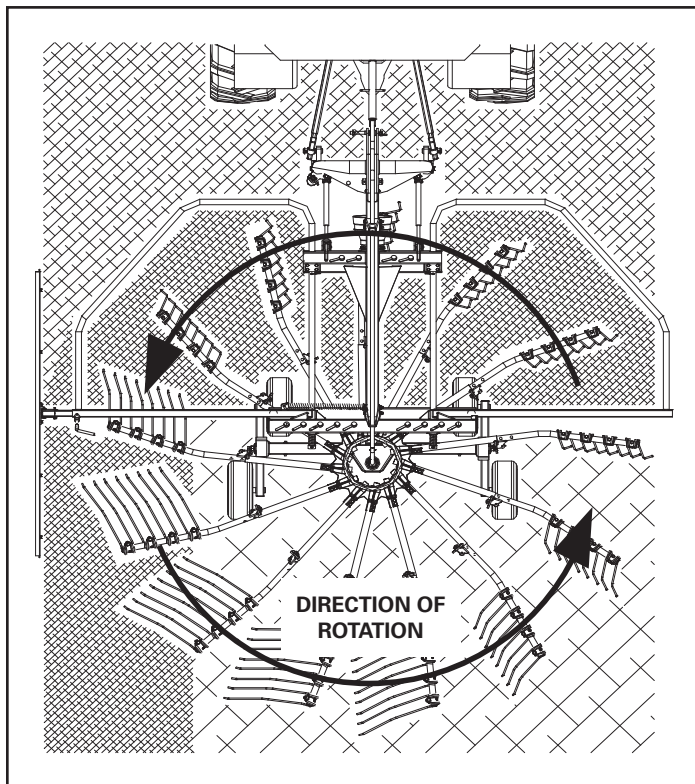
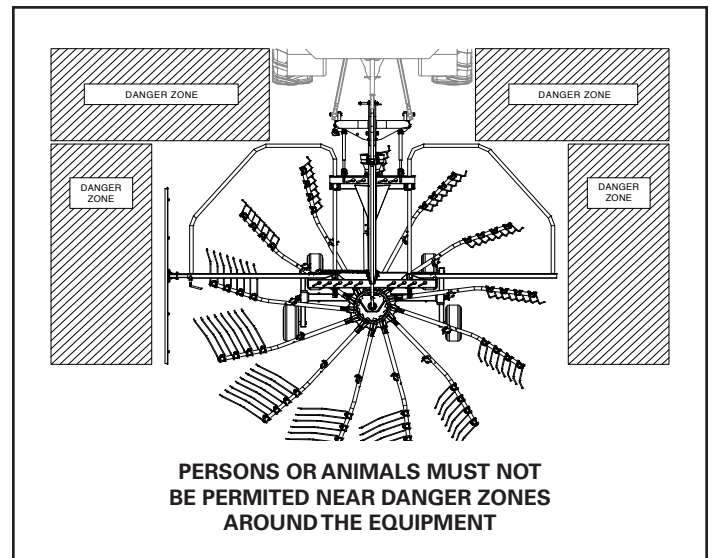
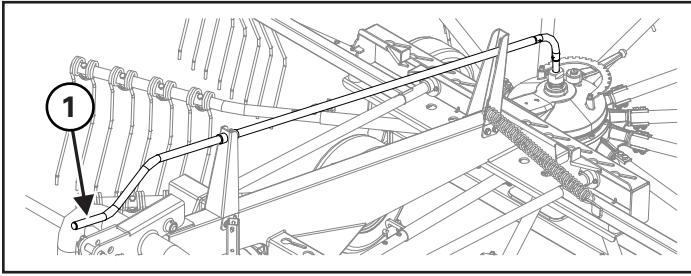


Figure 18





Three-Point Hitch Height Adjustment

Figure 19



Adjust the working height by turning the top handle (Item 1) [Figure 19].

The weight of the Rotary Rake may prevent the handle from moving. In this case, raise the Rotary Rake off the ground using the three-point mount tractor controls. The handle should be free to move.

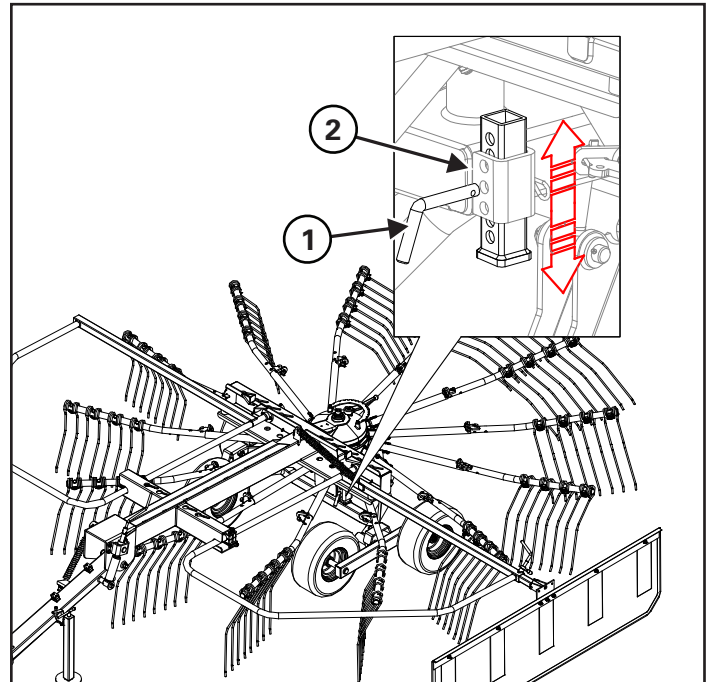
	WARNING
	
AVOID INJURY OR DEATH	
<p>Make sure no bystanders, especially small children, are in the work area when raising the equipment.</p> <p>Make sure equipment is safely secured with jack stands or straps when raising the equipment.</p>	

Pull-Type Hitch Height Adjustment

Adjust the working height by turning the top handle, or acting on the hydraulics, and raising the Rotary Rake to its max height.

Place stands underneath the frame so the Rotary Rake is secure.

Figure 20



Remove the adjustment pin (Item 1) [Figure 20] and retaining pin from the height adjustment stop (Item 2) [Figure 20].

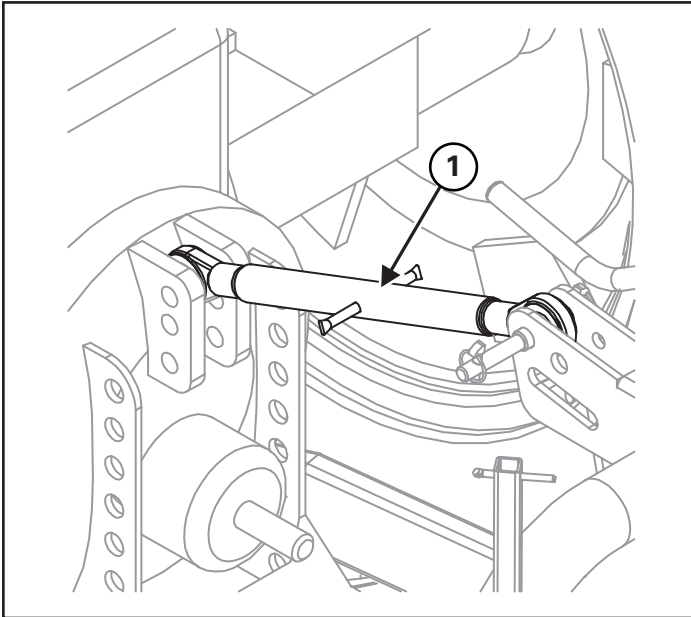
Adjust the stop to the desired height and reinstall the adjustment pin and retaining pin.

Remove the stands and lower the Rotary Rake to rest on the height adjustment stop.

Working Angle Adjustment

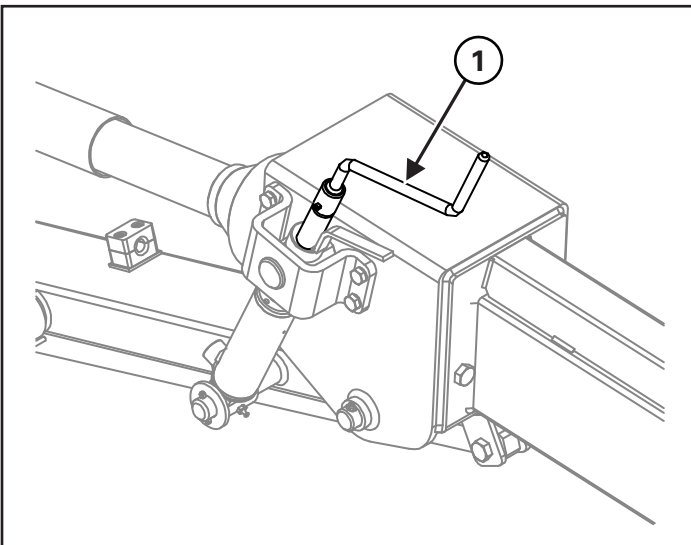
The Rotary Rake must work parallel to the ground. The rake tines should be 10 to 20mm from the ground.

Figure 21



For three-point hitch models, adjust the angle by shortening or extending the upper tie rod (Item 1) [Figure 21] of the three-point mount.

Figure 22



For pull-type hitch models, adjust the angle by turning the front handle (Item 1) [Figure 22] on the hitch.

Changing Directions Or Moving In Reverse

Always move in a straight path when operating the rotating rake arms.

At the end of the field, when changing direction or moving in reverse for a short distance, the tines must be fully raised off the ground.


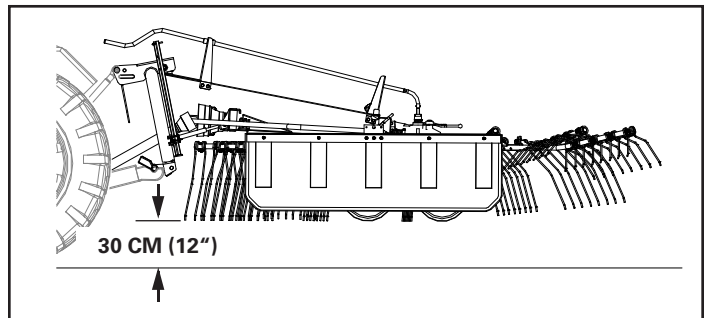
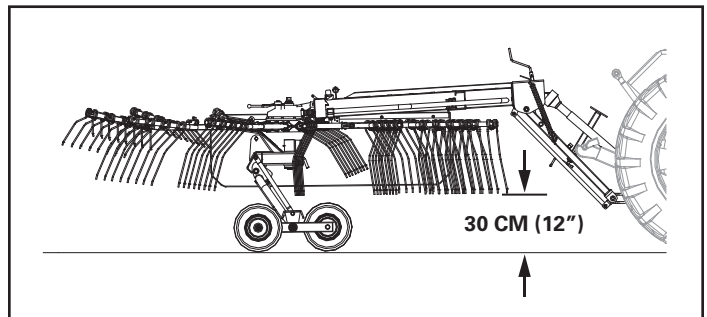
	WARNING
AVOID DAMAGE TO EQUIPMENT	
The Rotary Rake tines must be fully raised off the ground when changing direction or moving in reverse.	

Figure 23



For three-point hitch models, the entire Rotary Rake must be lifted off the ground using the tractor hydraulic controls [Figure 23].

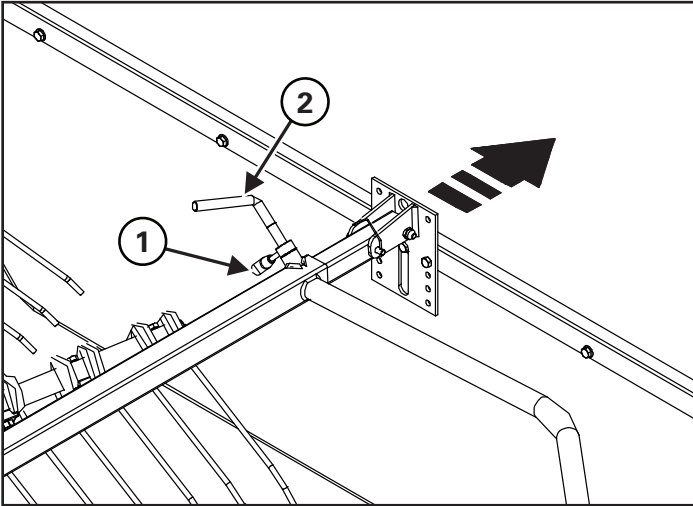
Figure 24



For pull-type hitch models, the frame must be raised using the hydraulic lift [Figure 24].

Side Deflector Adjustment

Figure 25

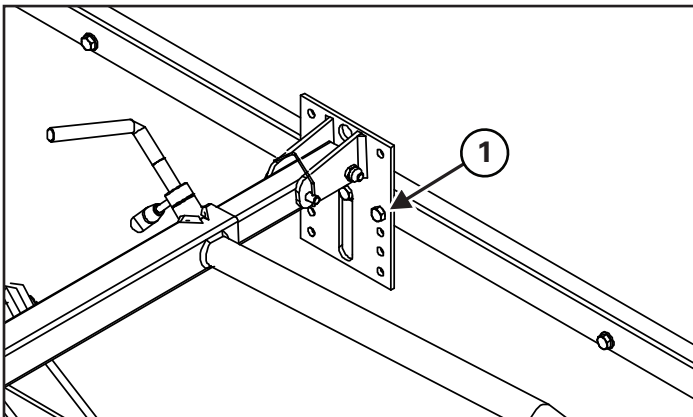


Adjust windrow width by extending the side deflector.

Loosen the jam nut (Item 1) [Figure 25]. Act on the handle (Item 2) [Figure 25] and slide the deflector to the desired windrow width.

Tighten the jam nut.

Figure 26



Adjust the side deflector distance from the ground.

Remove the two bolts (Item 1) [Figure 26] and move the deflector to the desired height.

Reattach the two bolts.

Transport Configuration

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



WARNING

AVOID INJURY OR DEATH

- Disengage PTO for road travel.
- Keep PTO shields and all guards in place
- Keep bystanders away.
- Do not allow riders.
- Always use hazard flashers on the tractor when transporting unless prohibited by law.
- Always follow local regulations when transporting on public roadways. Check with your local authorities.



IMPORTANT

Never exceed 20 mph (32 kph) during road travel.

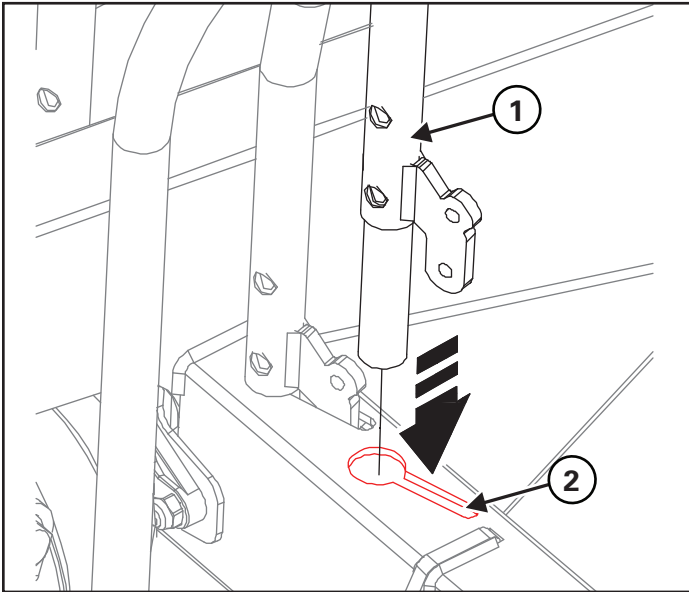


WARNING

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 27

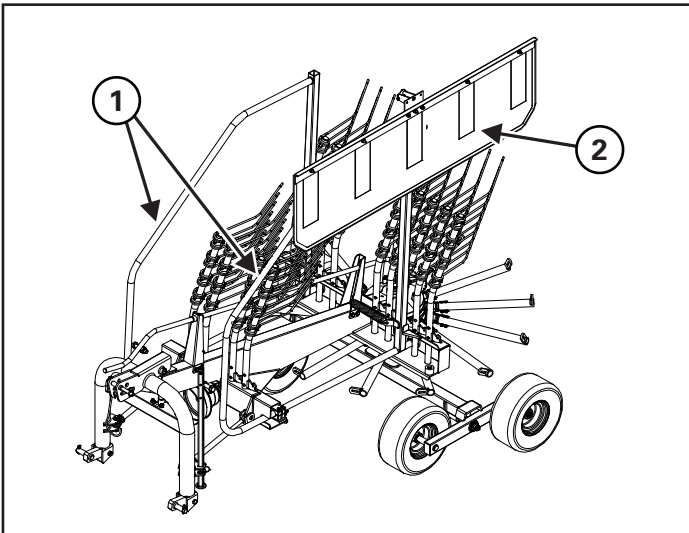


The Rotary Rake must be configured into Transport Mode for proper transportation.

Remove the rake arms (Item 1) [Figure 27] from the rotating unit.

Store the rake arms in the slots (Item 2) [Figure 27] on top of the frame.

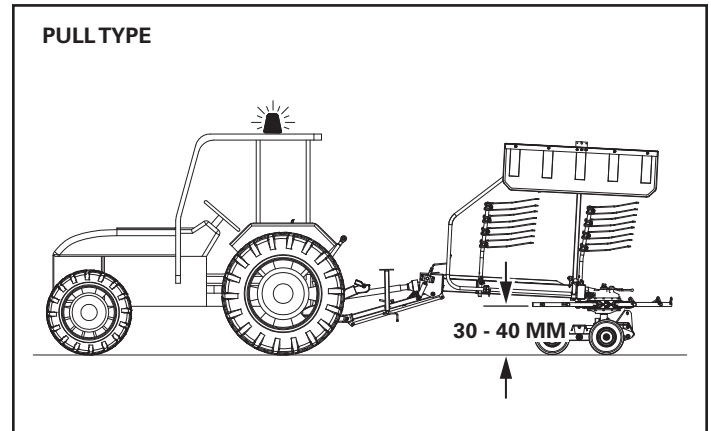
Figure 28



Raise the spring-loaded side arms (Item 1) [Figure 28] and snap into the transport supports.

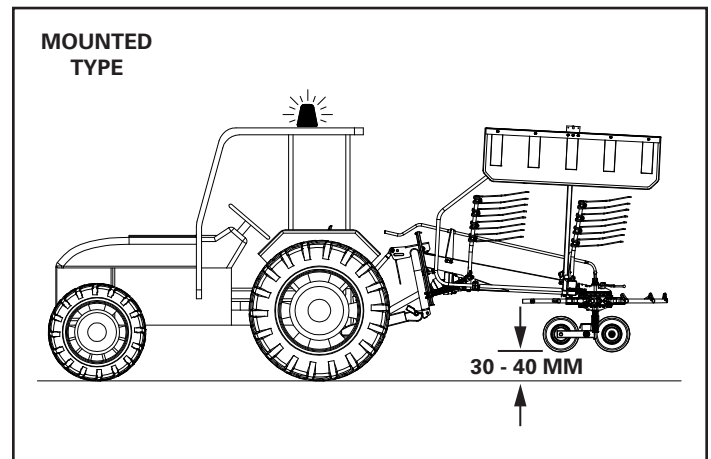
Lower and secure the side deflector (Item 2) [Figure 28].

Figure 29



When transporting pull-type hitch models, raise the frame 30 to 40 mm (12" to 16") using the hydraulic lift.

Figure 30



When transporting three-point hitch models, the entire Rotary Rake must be lifted off the ground 30 to 40mm (12" to 16") using the tractor hydraulic controls.

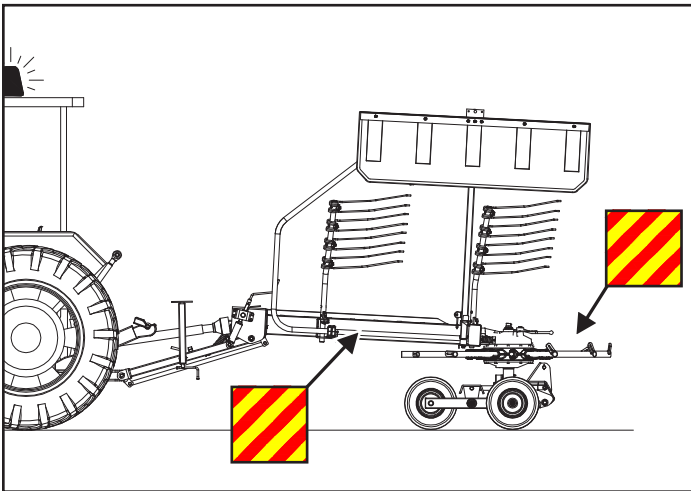
Verify that the tractor / tow vehicle is approved for transporting the equipment and that the equipment is securely attached to the tractor / tow vehicle.

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.

Reflective transport panels must be installed on all three visible sides of the Rotary Rake [Figure 31].

Figure 31



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


Maintenance

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Storage.....	43
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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 Pivot Points			✓			
Annually (or every 500 hours)							
5	Driveline & Gears	✓		✓			
7	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.

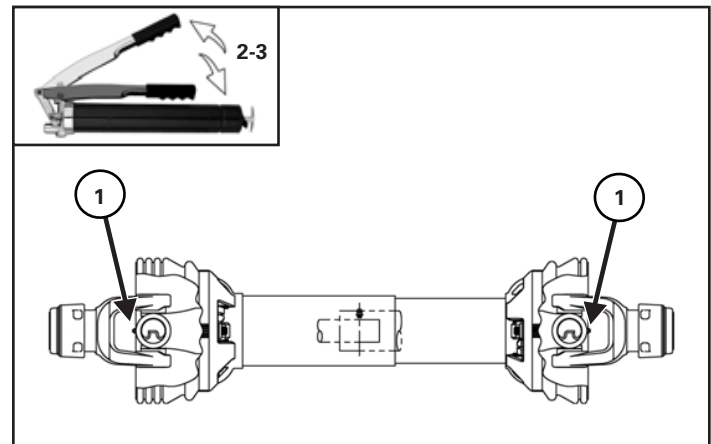
Relieve pressure on hydraulic system before repairing or adjusting.

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.

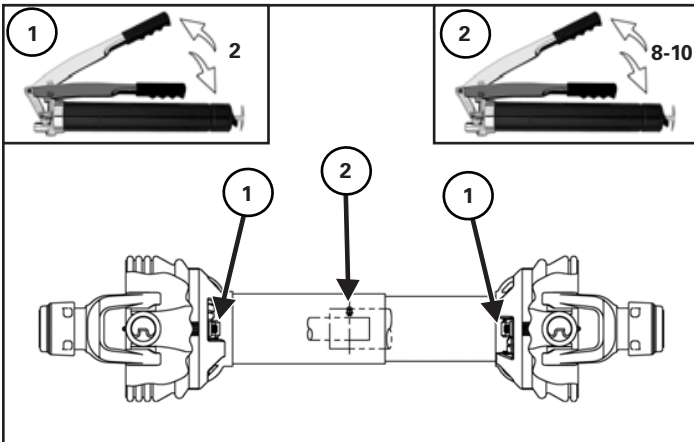
Figure 32



Apply two to three pumps of grease to the cross and bearings (Item 1) [Figure 32] on the PTO driveline. Grease every **8 hours**.

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

Figure 33

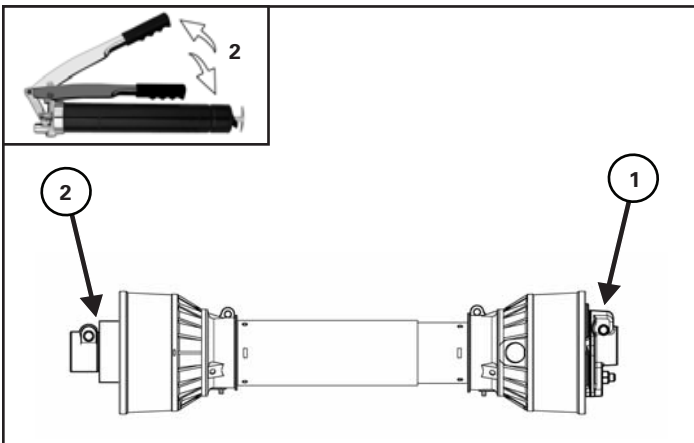


Apply two pumps of grease to the guard bushings (Item 1) [Figure 33].

Apply eight to ten pumps of grease to the telescoping member (Item 2) [Figure 33].

Grease every **10 - 20 hours**.

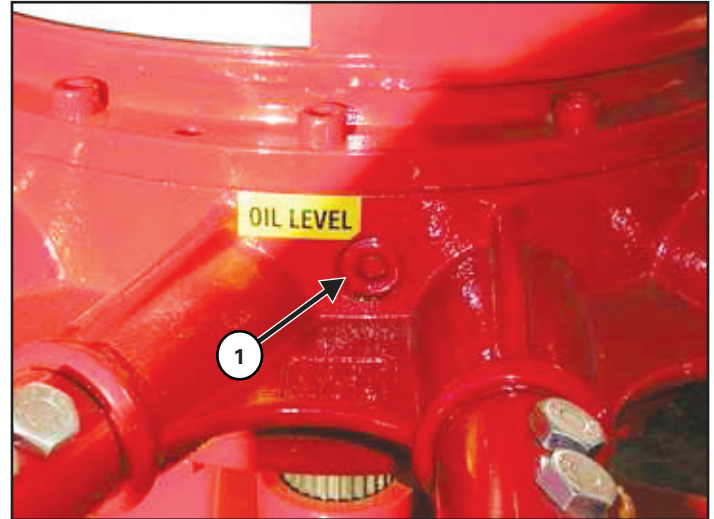
Figure 34



Apply two pumps of grease to the slip clutch (Item 1) [Figure 34] and PTO quick disconnect (Item 2) [Figure 34].

Grease every **10 - 20 hours**.

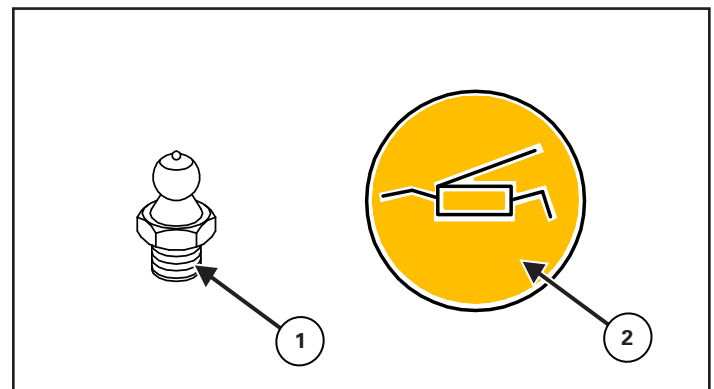
Figure 35



Check the oil in the rotary gearbox. Remove the fill plug (Item 1) [Figure 35]. The oil level should be at the lower part of the fill plug. Use SAE90 type oil.

Check/fill oil in rotary gearbox every **50 hours**.

Figure 36



Lubrication point locations (Item 1) [Figure 36] are identified with a sticker (Item 2) [Figure 36].

Grease every **50 hours**.

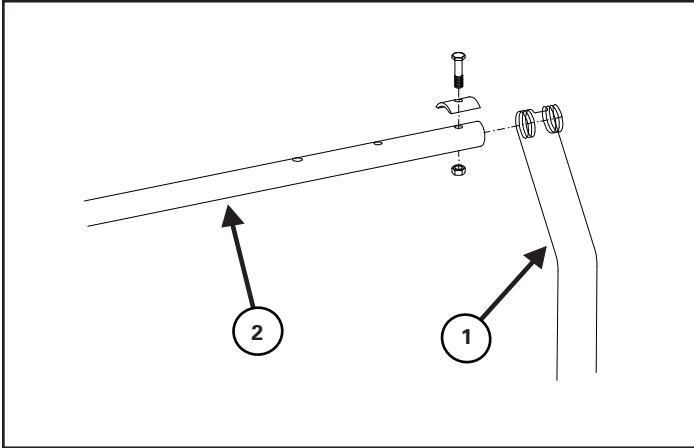
Lubrication points include:

- Tandem axle pivot points
- Driveline mounts
- Hitch pivot points
- Adjustment handle mounts

Rake Tine Replacement

Periodically check all rake tines for wear or damage.

Figure 37



Replace the rake tines (Item 1) [Figure 37] by removing the bolt, nut, and retaining plate.

Slide off rake tine off of the rake arm (Item 2) [Figure 37].

Replace tine and attach with the bolt, nut, and retaining plate.

Safety Sign (Decal) Installation



IMPORTANT

When replacing safety signs (decals), the temperature must be above 10° C (50° F).

- 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.

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Parts Identification

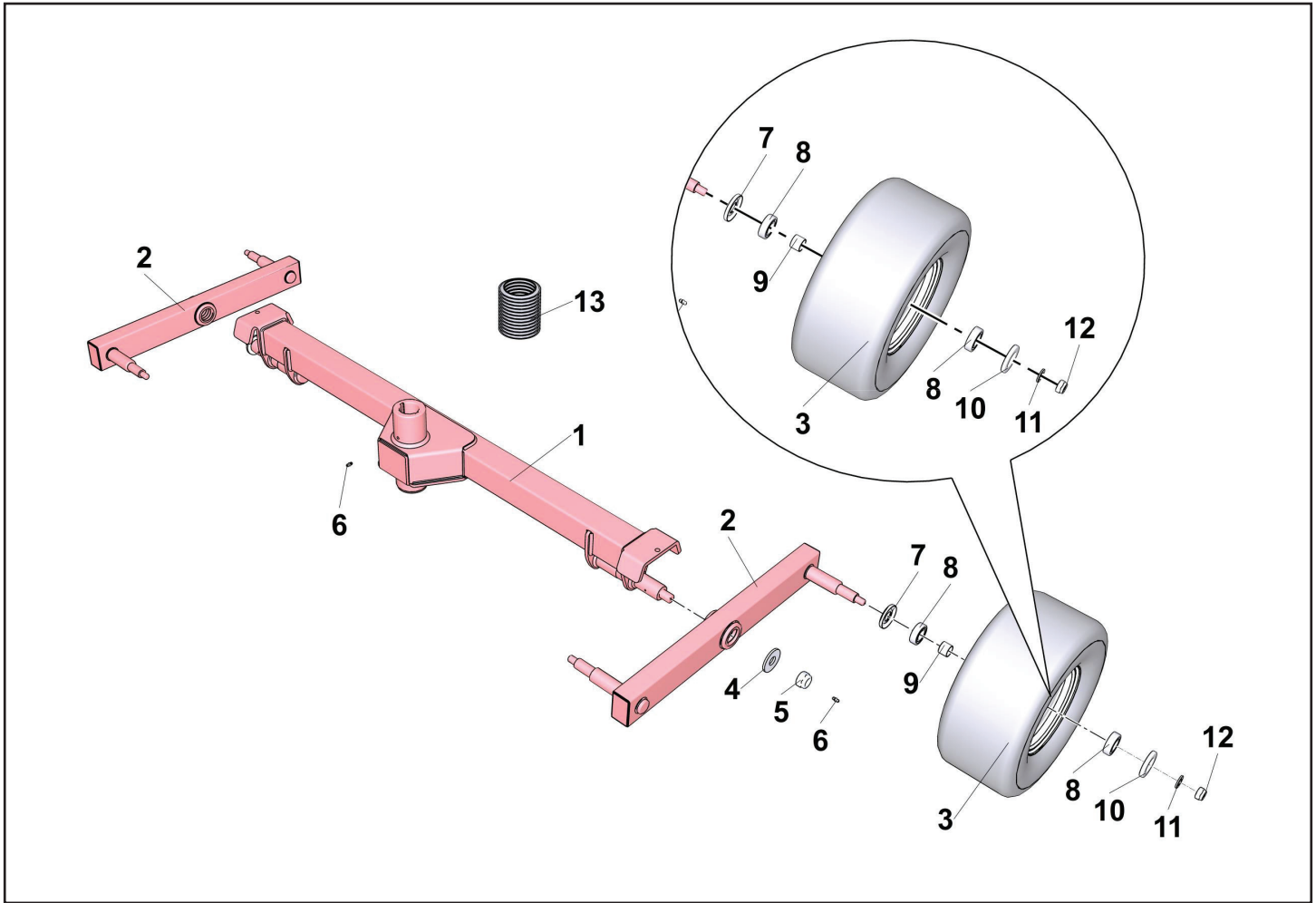
Three-Point Tandem Axle & Wheels.....	47
Three-Point Main Frame.....	48
Three-Point Hitch Frame.....	50
Guards & Deflector.....	52
Rotating Gearbox & Rake Arms.....	54
Pull-Type Hitch & Frame.....	56
Transport Panels.....	60
Support Wheel.....	62
Rotating Gearbox Components.....	64
Hydraulic Cylinder Ø60.....	66
Hydraulic Cylinder Ø40.....	67
Hydraulic Hoses.....	67

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.

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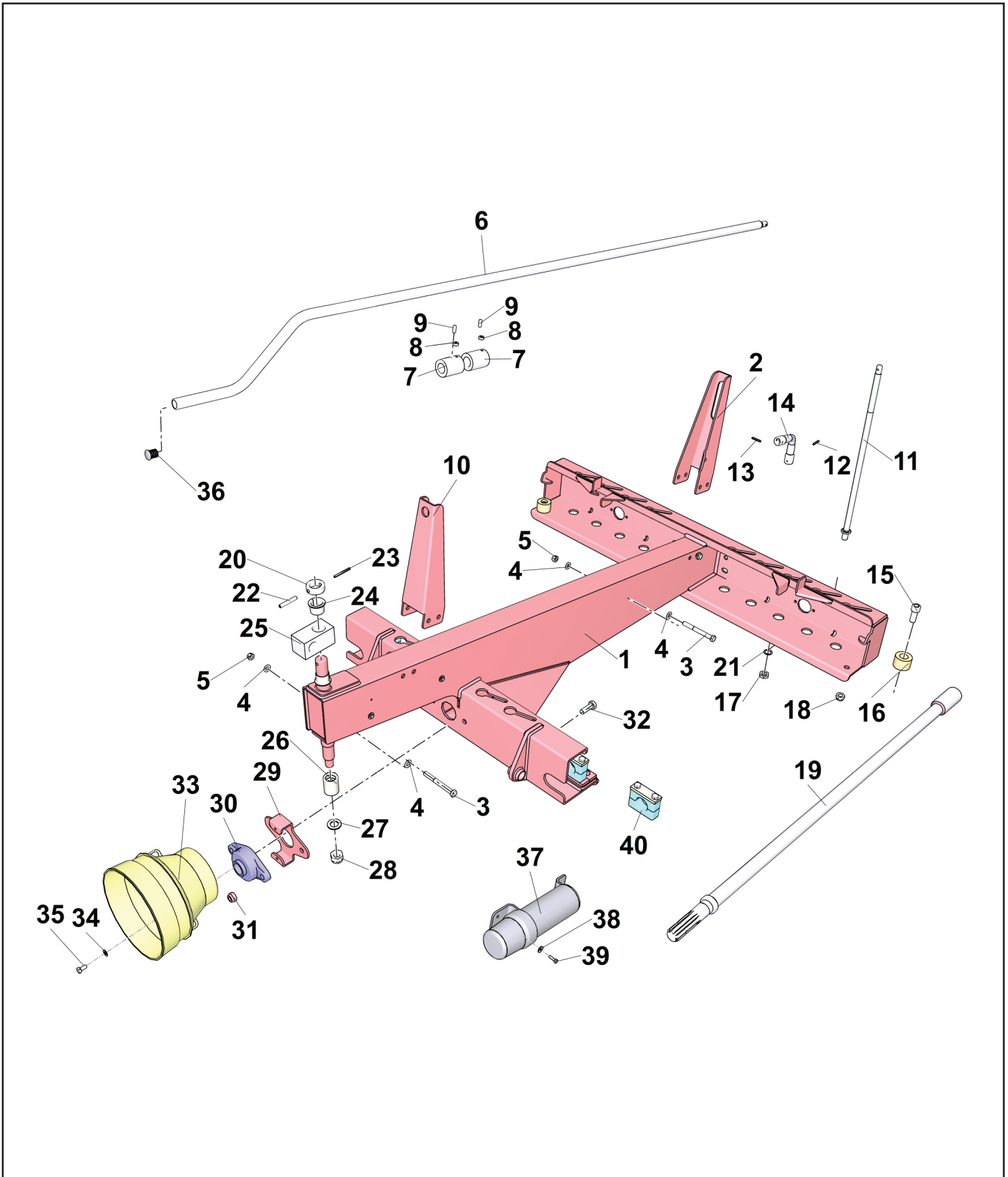


Three-Point Tandem Axle & Wheels



ITEM	PART NUMBER	DESCRIPTION
1	18033340	FRAME TANDEM
2	18032239	TANDEM
3	12170111	WHEEL
4	18032281	WASHER 60X23X5
5	3020222	SELF LOCKING NUT M22
6	3090102	GREASE ZERK M6X1
7	-	INTERNAL SHIELD
8	-	BEARING 6205 2RS
9	-	SPACER
10	-	EXTERNAL SHIELD
11	3030175	WASHER 30X17X3 ZN
12	3020204	SELF LOCKING NUT M16
13	9070107	BELLOWS

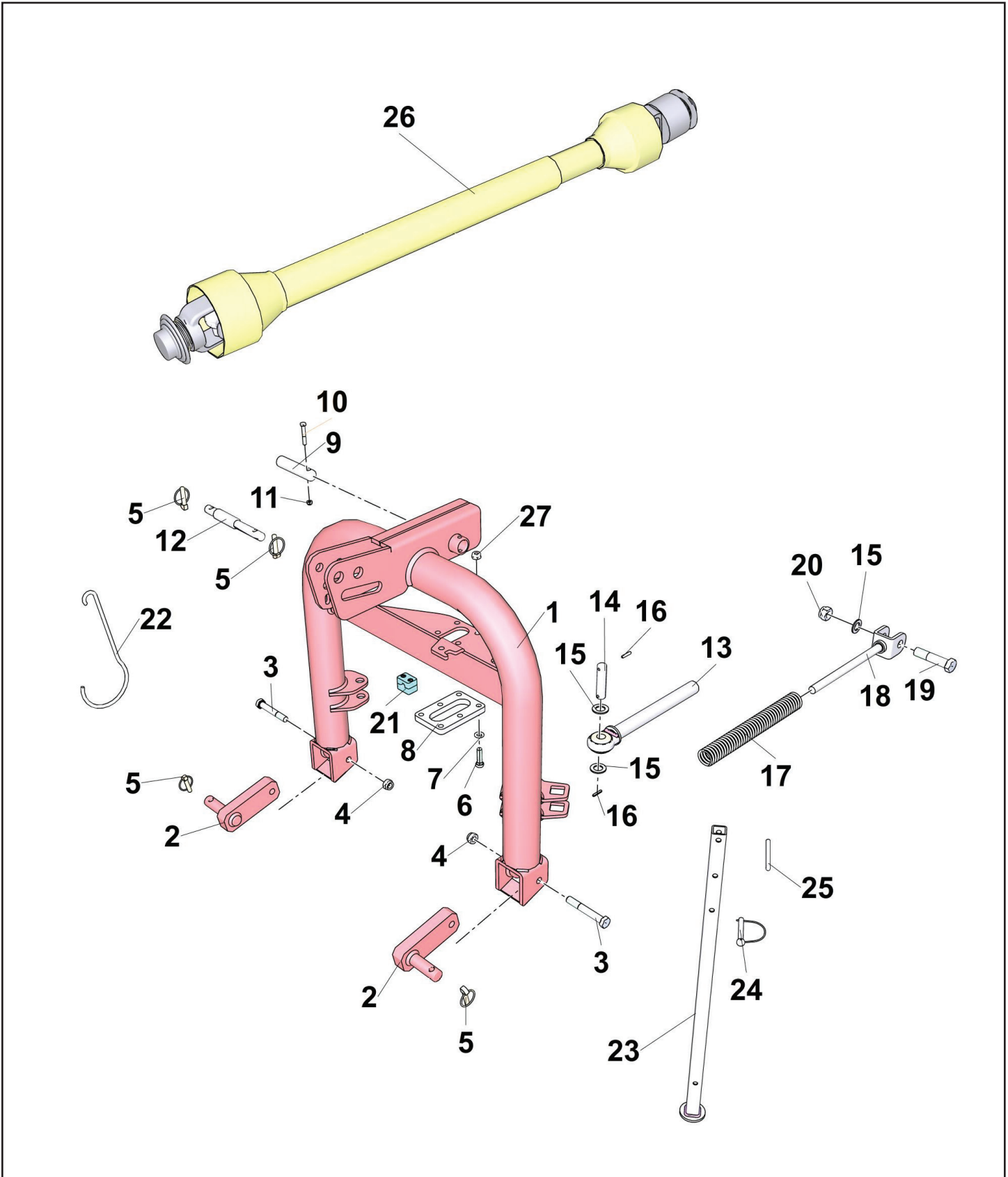
Three-Point Main Frame



Main Frame

ITEM	PART NUMBER	DESCRIPTION
1	18032370	FRAME
2	18032263	RISING BACK
3	3011313	SCREWTE M12X110 ZN
4	3030162	WASHER M12 ZN
5	3020202	SELF LOCKING NUT M12
6	18032261	AXLE
7	18032361	STOP
8	3020329	NUT M8 ZN
9	3050107	SCREWTSPEI M8X20
10	18032267	RISING FRONT
11	18032262	SCREW REGULATION
12	3080102	ELASTIC PIN 6X36
13	3080102	ELASTIC PIN 6X36
14	18033975	ENDS
15	3010660	SCREWTC EI M16X40 ZN
16	18032232	SPRING
17	3020358	NUT M22X1,5 ZN
18	3020204	SELF LOCKING NUT M16
19	18032265	SHAFT TRANSMISSION
20	18032266	BUSH
21	12280006	SPACER PS 32X22X0,5
22	3080105	ELASTIC PIN 8X50
23	3080157	ELASTIC PIN 5X50
24	12240237	BUSH GLYCODUR 303426
25	18032257	SUPPORT
26	12071212	BUSH
27	3030176	WASHER M22 ZN
28	3020222	SELF LOCKING NUT M22
29	18033338	SUPPORT CAP
30	12250027	SUPPORT UCFL 207
31	3020203	SELF LOCKING NUT M10
32	3011632	SCREWTE M14X45 ZN
33	18033339	MASTER SHIELD
34	3030156	WASHER M8 ZN
35	3011221	SCREWTE M8X16
36	9190012	RUBBER CAP Ø26
37	9080022	MANUAL OLDER
38	3030160	WASHER M6 EXL ZN
39	3011617	SCREWTE M6X20 ZN
40	18033306	COLLAR

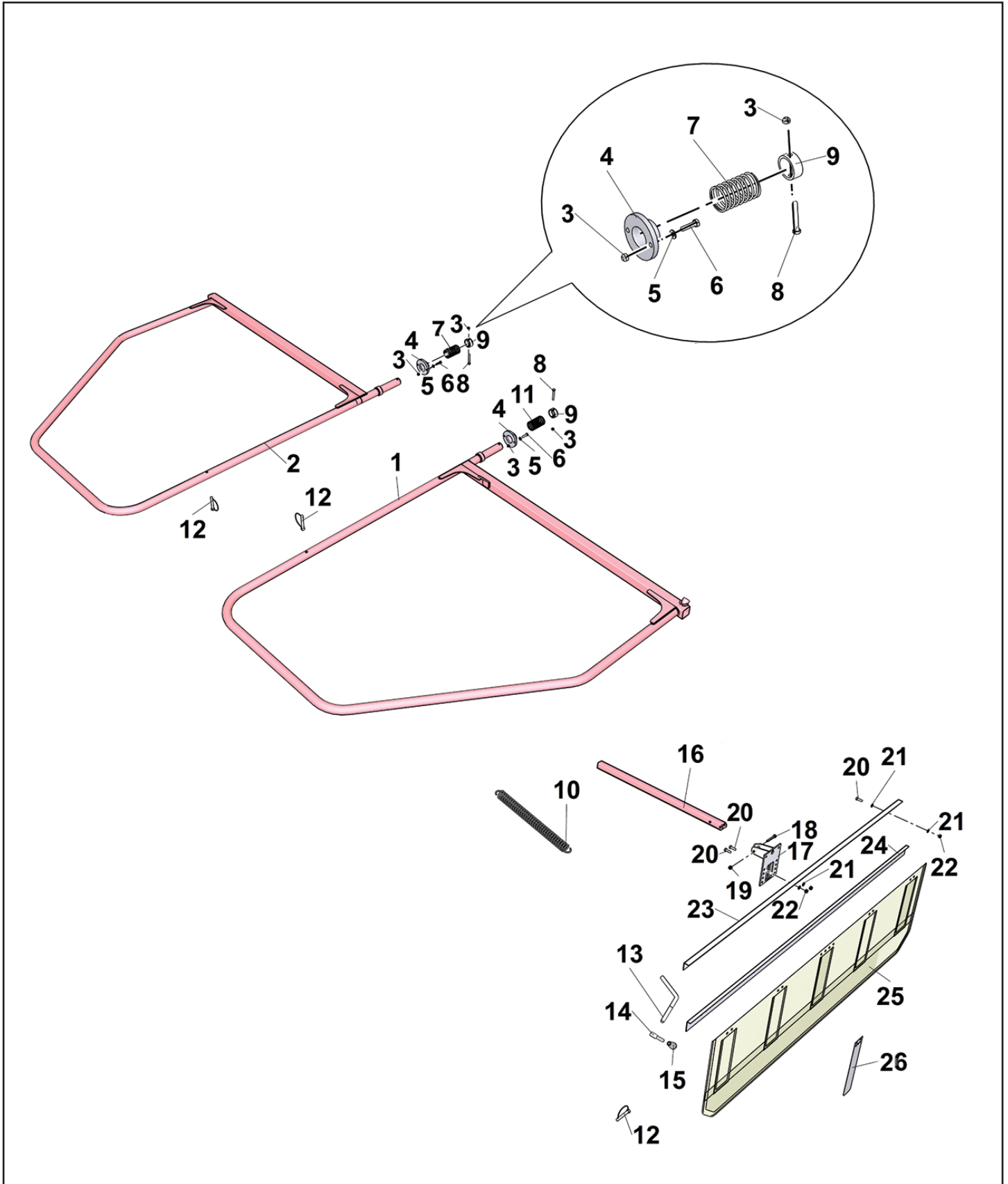
Three-Point Hitch Frame



Three-Point Hitch Frame

ITEM	PART NUMBER	DESCRIPTION
1	18032254	FRAME 3P
2	18031422	PIN WITH BRACKET
3	3010408	SCREWTE M16X110 ZN
4	3020204	SELF LOCKING NUT M16
5	3080202	PIN D.10
6	3011707	SCREWTE M12L45 10.9 ZN
7	3030162	WASHER M12 ZN
8	18032255	PLATE
9	18032256	PIN Ø28 L.135
10	3011210	SCREWTE M8X50
11	3020209	SELF LOCKING NUT M8
12	12310115	PIN 3POINT
13	18032259	AUCTION
14	18032362	PIN Ø22 L.89
15	3030176	WASHER M22 ZN
16	3080102	ELASTIC PIN 6X36
17	11010536	SPRING
18	18032258	AUCTION WITH BRACKET
19	18032363	SCREW
20	3020222	SELF LOCKING NUT M22
21	18033216	COLLAR C3
22	18032512	HOOK PTO
23	18032260	STAND
24	3080204	PIN D.10
25	3040117	ELASTIC PIN 8X80
26	8020443	PTO SHAFT 600 NM 2 NOTT.
27	3020202	SELF LOCKING NUT M12

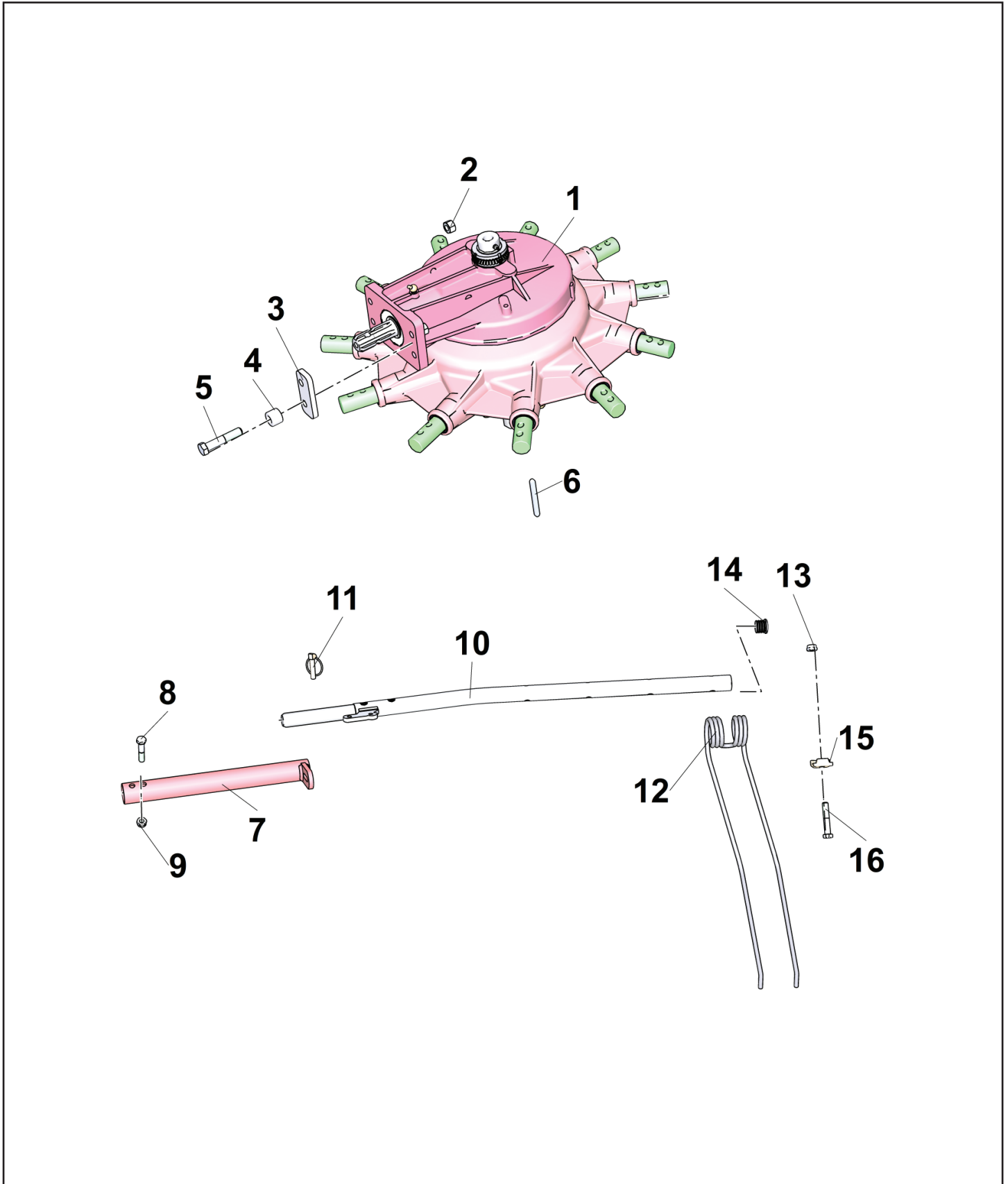
Guards & Deflector



Guards & Deflector

ITEM	PART NUMBER	DESCRIPTION
1	18032273	PROTECTION LEFT
2	18032270	PROTECTION RIGHT
3	3020209	SELF LOCKING NUT M8
4	18032271	BUSH
5	3030156	WASHER M8 ZN
6	3010780	SCREWTE M8X30 ZN
7	11010537	SPRING
8	3011616	SCREWTE M8X60 ZN
9	18032286	SPRING STOP
10	11010534	SPRING
11	11010537	SPRING
12	3080204	PIN D.10
13	18032285	HANDLE
14	18033168	HANDLE REGULATION
15	3140001	KNOB
16	18032275	PROTECTION DEFLECTOR
17	18032366	HINGE
18	3010756	SCREWTE M10X70 ZN
19	3020201	SELF LOCKING NUT M10
20	3011206	SCREWTE M10X30 ZN
21	3030159	WASHER M10 ZN
22	3020201	SELF LOCKING NUT M10
23	18032367	DEFLECTOR FRAME
24	18032368	DEFLECTOR FRAME EST.
25	12881029	DEFLECTOR
26	18032365	DEFLECTOR

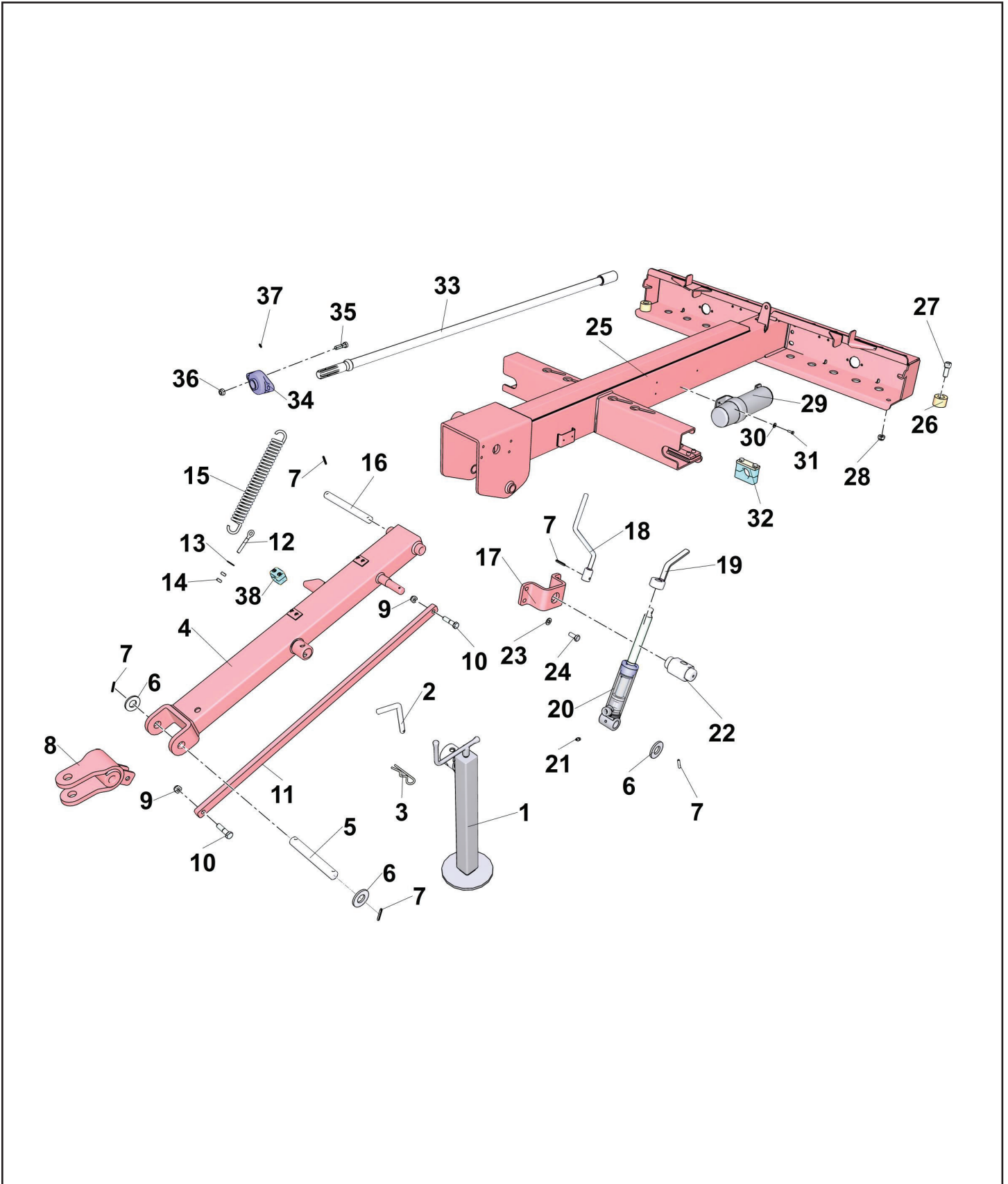
Rotating Gearbox & Rake Arms



Rotating Gearbox & Rake Arms

ITEM	PART NUMBER	DESCRIPTION
1	8010517	GEARBOX ROTARY -11
2	3020332	NUT M14 ZN
3	18033315	PLATE FIX. ROTOR
4	18033390	SPACER Ø28 L.20
5	3011631	SCREWTE M14X70 ZN
6	3110029	TAB 10X8X110 A
7	18032280	QUILL
8	3011207	SCREWTE M12X60 ZN
9	3020202	SELF LOCKING NUT M12
10	18032279	ARM
11	3080202	PIN
12	18030584	SPRING
13	3020202	SELF LOCKING NUT M12
14	9190013	RUBBER CAP Ø35
15	12881075	SPRING CLAMP
16	3011288	SCREWTE M12X70 ZN

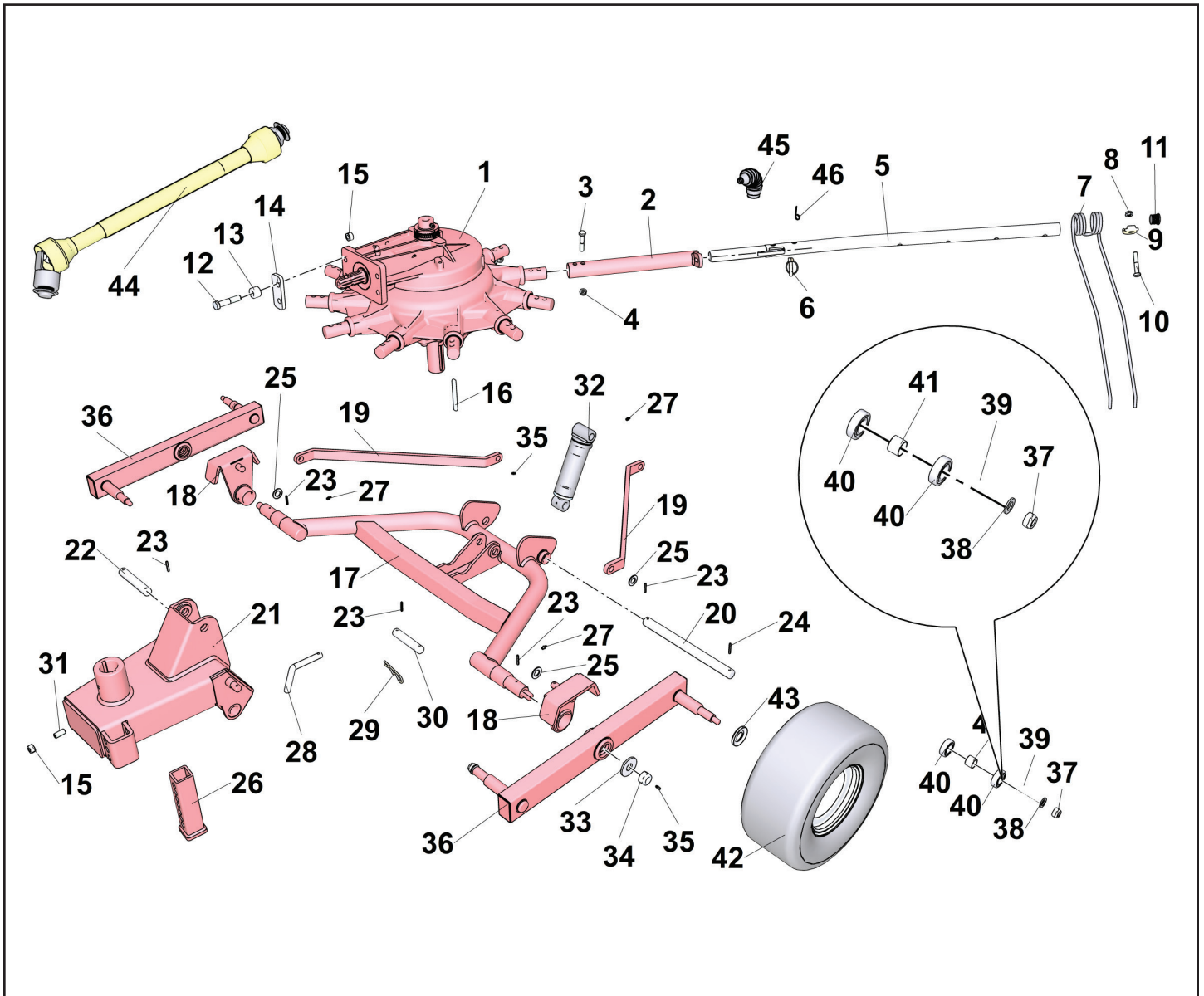
Pull-Type Hitch & Frame



Pull-Type Hitch

ITEM	PART NUMBER	DESCRIPTION
1	18032774	STAND
2	18033195	PIN
3	3040202	PIN
4	18032229	PULL BAR
5	18032228	PIN
6	3030186	WASHER 56X26X5 ZN
7	3080102	ELASTIC PIN 6X36
8	18032227	HOOK
9	3020203	SELF LOCKING NUT M14
10	3011202	SCREWTE M14X60 ZN
11	18032226	ROD
12	3220201	TENSIONER RING
13	3030169	WASHER M10 ZN
14	3020328	NUT M10 ZN
15	11010501	SPRING
16	18032238	PIN
17	18032235	BRACKET CYLINDER
18	18032233	SCREW HANDLE
19	18032234	RING
20	18032236	CYLINDER HYDRAULIC
21	3090101	GREASE ZERK M8X1
22	18032237	SNAIL
23	3030159	WASHER M10 ZN
24	3011211	SCREWTE M10X25 ZN
25	18032231	FRAME
26	18032232	SPRING
27	3010660	SCREWTEI M16X40 ZN
28	3020204	SELF LOCKING NUT M16
29	9080022	MANUAL OLDER
30	3030160	WASHER M6 EXL ZN
31	3011617	SCREWTE M6X20 ZN
32	18033306	COLLAR DOUBLE
33	18032230	TRANSMISSION SHAFT
34	12250027	SUPPORT UCFL 207
35	3011265	SCREWTE M14X50 ZN
36	3020203	SELF LOCKING NUT M10
37	3090101	GREASE ZERK M8X1
38	18033216	COLLAR C3

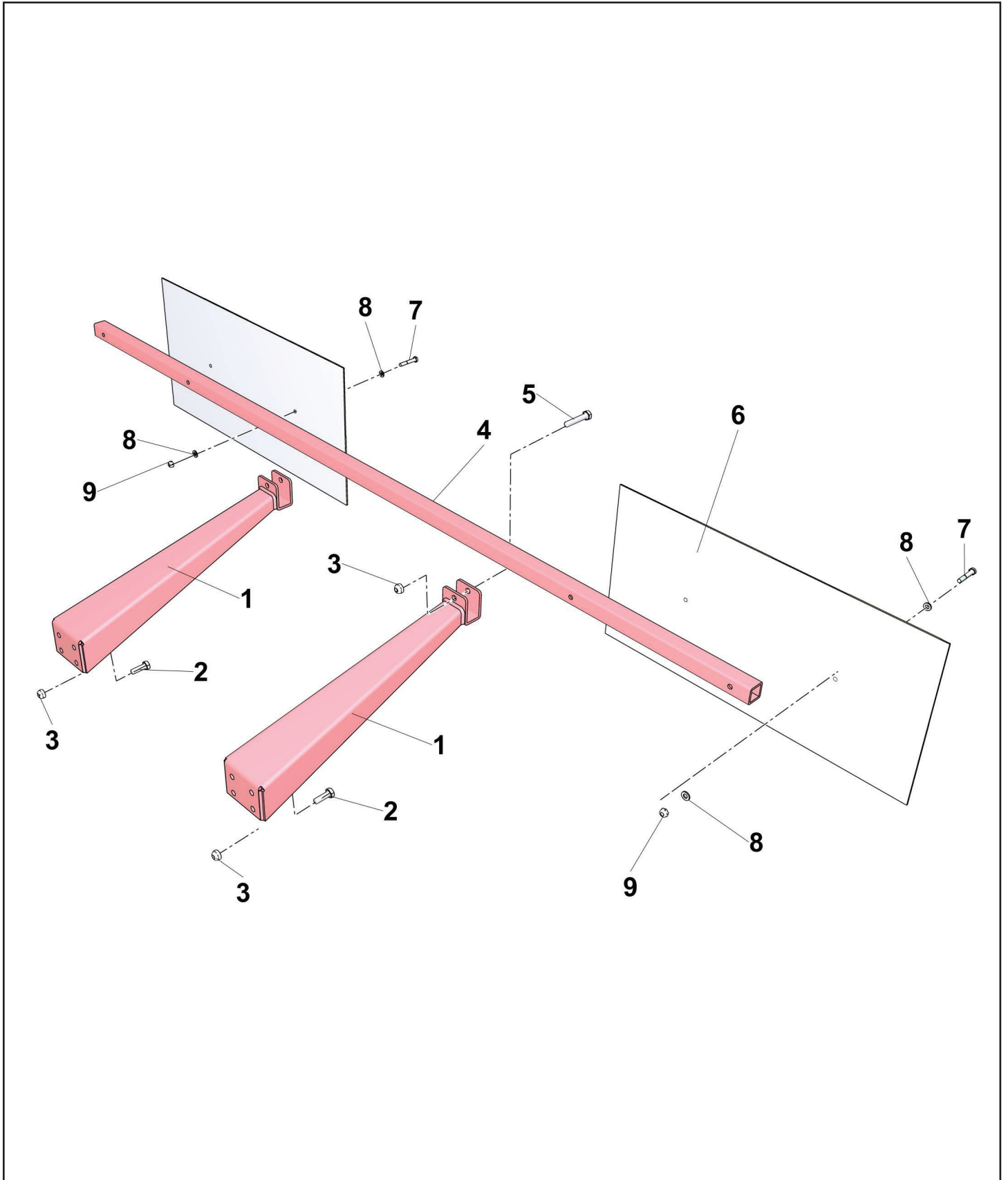
Pull-Type Tandem Axle & Rotating Gearbox



ITEM	PART NUMBER	DESCRIPTION
1	8010517	GEARBOX ROTARY -11
2	18032280	QUILL
3	3011207	SCREWTE M12X60 ZN
4	3020202	SELF LOCKING NUT M12
5	18032279	ARM
6	3080202	PIN D.10
7	18030584	SPRING
8	3020202	SELF LOCKING NUT M12
9	12881075	SPRING CLAMP

10	3011288	SCREW TE M12X70 ZN
11	9190013	RUBBER CAP D.35
12	3011631	SCREW TE M14X70 ZN
13	18033390	SPACER Ø28 L.20
14	18033315	PLATE FIX. ROTOR
15	3020363	NUT B. M14 ZN
16	3110029	TAB 10X8X110 A
17	18032360	AXLE TANDEM
18	18032240	TANDEM BLOCK
19	18032241	ARM TANDEM
20	18032247	PIN Ø30 L.370
21	18033308	SUPPORT GEARBOX
22	18032244	PIN Ø25 L.150
23	3080102	ELASTIC PIN 6X36
24	3080103	ELASTIC PIN 6X40
25	3030168	WASHER M20 ZN
26	18032242	AXLE BLOCK
27	3090101	GREASE ZERK M8X1
28	18032284	PIN Ø18
29	3040202	PIN
30	18032283	PIN Ø25 L.130
31	3011146	SCREW N. HEAD M14X30
32	18032245	CYLINDER HYDRAULIC
33	18032281	WASHER 60X23X5
34	3020222	SELF LOCKING NUT M22
35	3090102	GREASE ZERK M6X1
36	18032239	TANDEM
37	3020204	SELF LOCKING NUT M16
38	3030175	WASHER 30X17X3 ZN
39	-	DUST COVER CAP E.
40	-	BEARING 6205 2RS
41	-	SPACER
42	12170111	WHEEL
43	-	DUST COVER CAP I.
44	8020435	PTO SHAFT
45	9070105	SHIELD
46	4010707	CLAMP

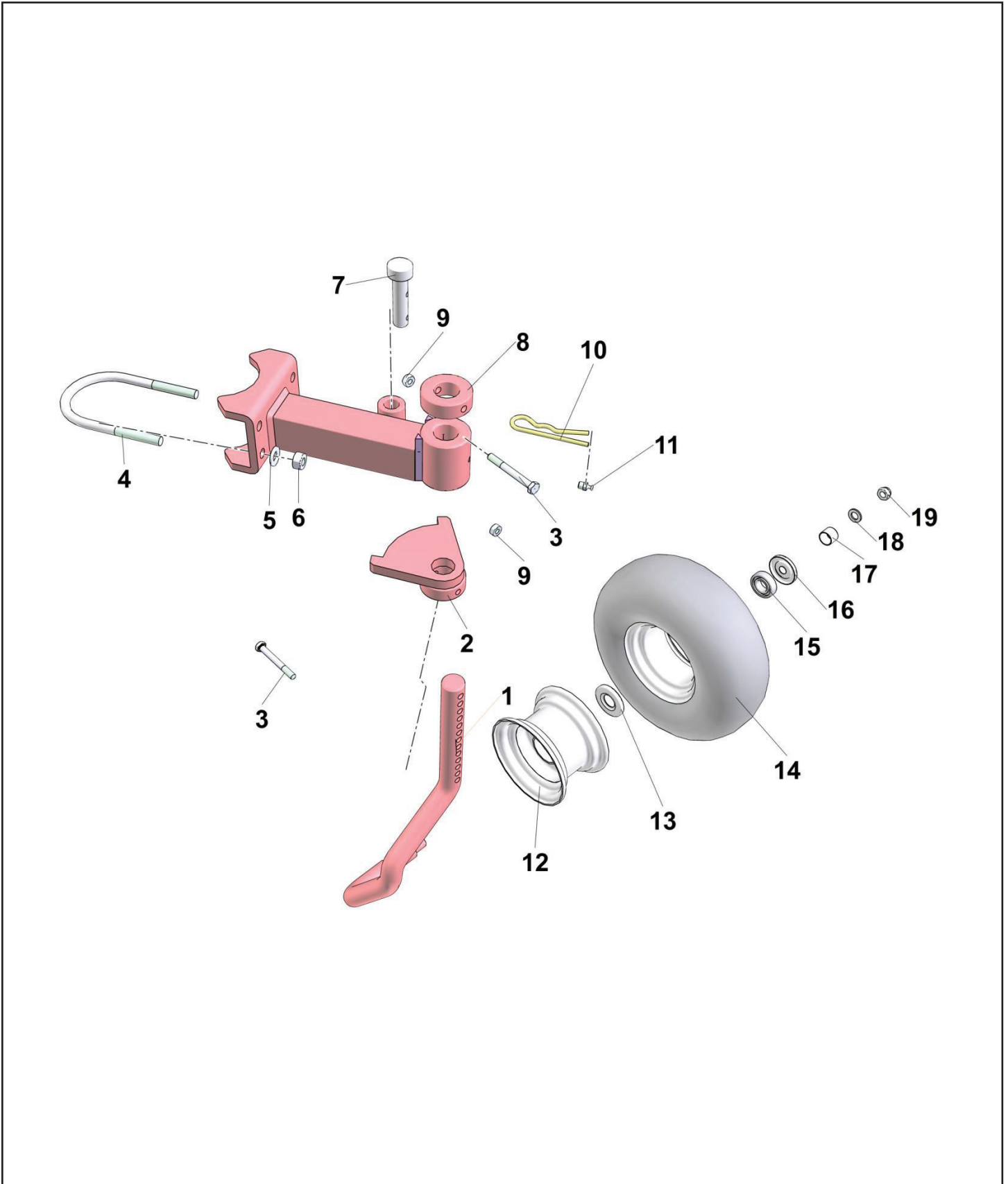
Transport Panels



Transport Panels

ITEM	PART NUMBER	DESCRIPTION
1	18032379	SUPPORT
2	3011242	SCREWTE M8X25 ZN
3	3020209	SELF LOCKING NUT M8
4	18033545	FRAME
5	3011258	SCREWTE M8X45 ZN
6	12880416	PANEL
7	3011610	SCREWTE M6X40 ZN
8	3030158	WASHER M6 ZN
9	3020213	SELF LOCKING NUT M6

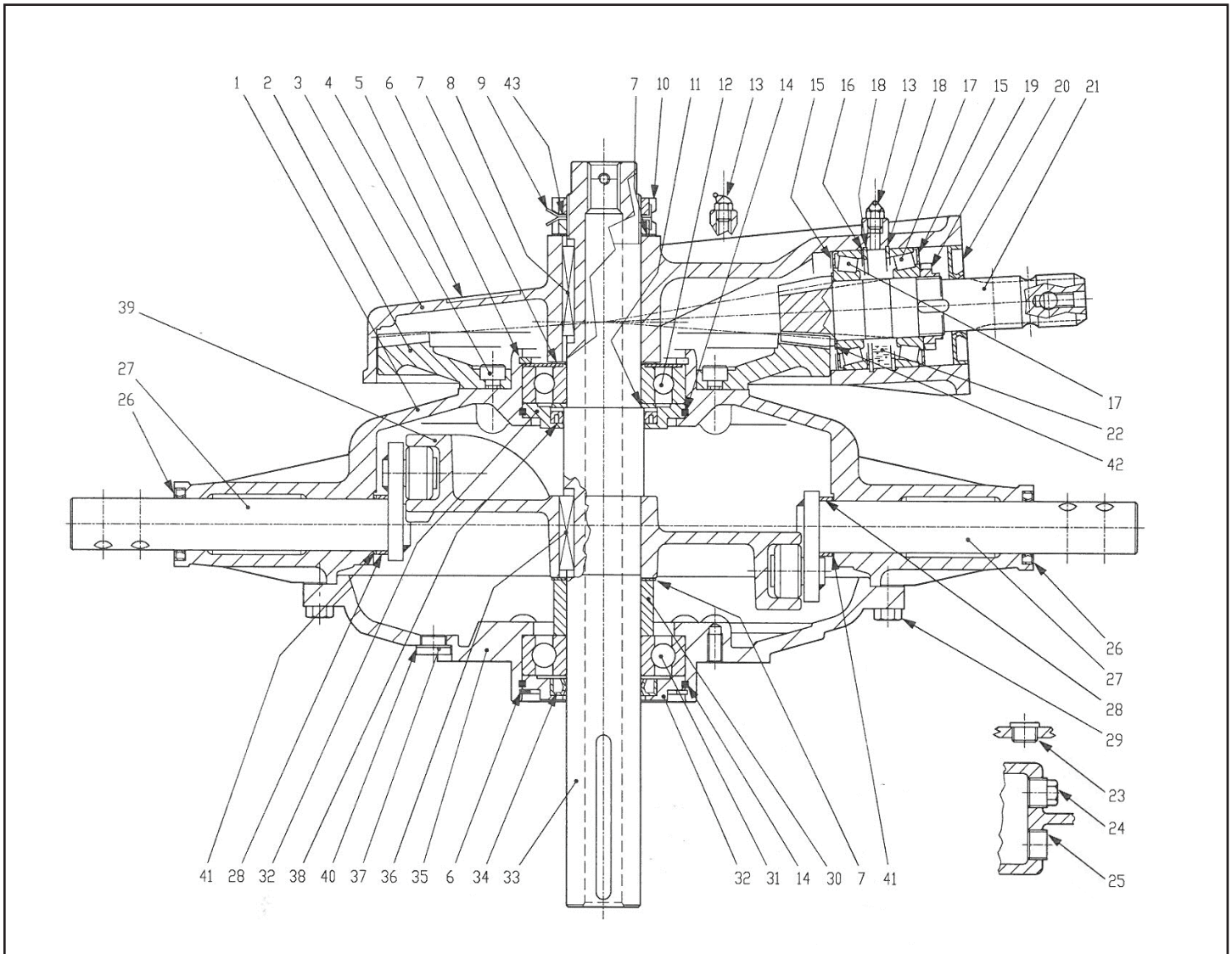
Support Wheel



Support Wheel

ITEM	PART NUMBER	DESCRIPTION
1	18033035	AXLE
2	18033034	SECTOR
3	3011612	SCREW TE M8X70 ZN
4	3170119	U BOLT M12
5	3030162	WASHER M12 ZN
6	3020333	NUT M12 ZN
7	18032340	PIN
8	12070103	BUSH
9	3020329	NUT M8 ZN
10	3040202	ELASTIC PIN
11	3090101	GREASE ZERK M8X1
12	-	RIM
13	12070314	INTERNAL SHIELD
14	-	TIRE
15	12240313	BEARING 6205 2RS
16	12070315	EXTERNAL SHIELD
17	12070307	SPACER D.25
18	3030175	WASHER 30X17X3 ZN
19	3020204	SELF LOCKING NUT M16

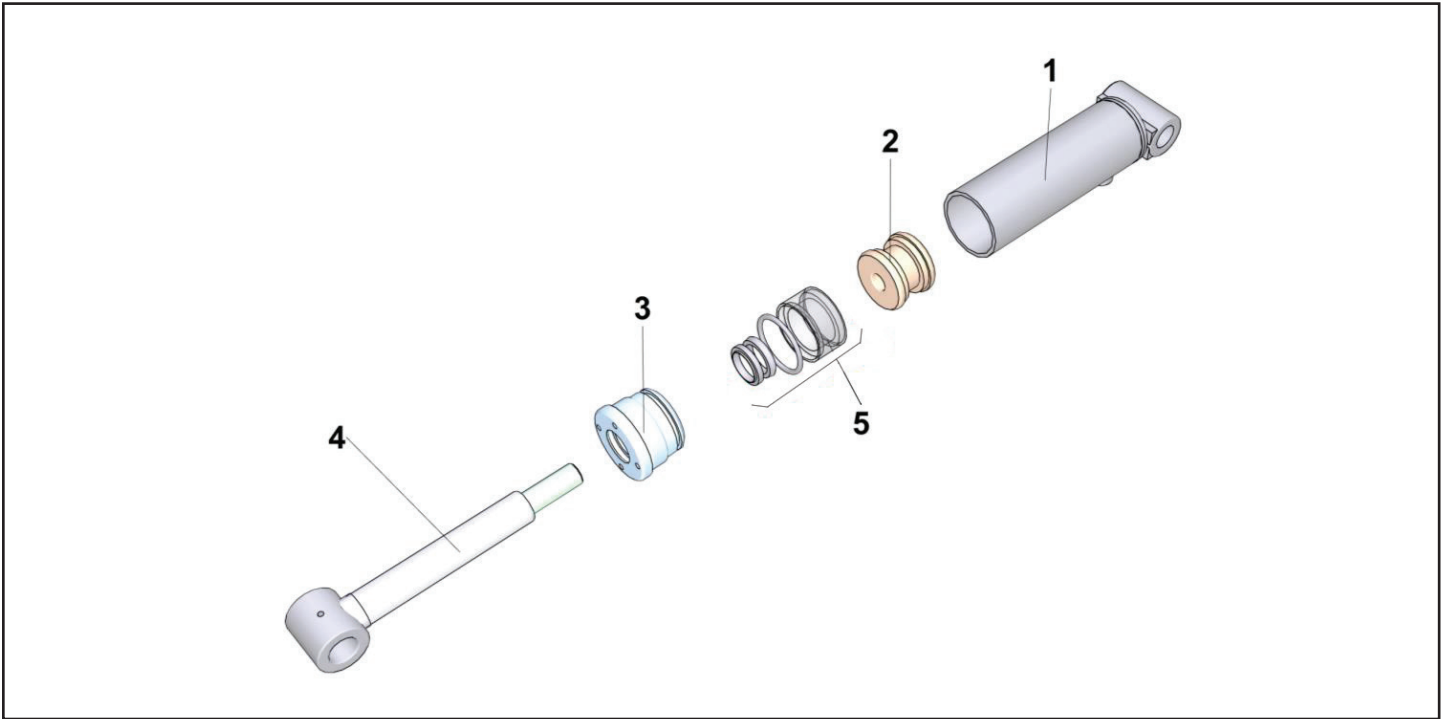
Rotating Gearbox Components



ITEM	PART NUMBER	DESCRIPTION
1	18034017	MAIN BODY
2	18034018	CROWN Z82 M3,75
3	18034019	UPPER COVER
4	3010816	SCREWTCEI 5931 M10X22
5	18034020	SERIAL PLATE
6	3120139	RING 110 UNI 7437
7	18034021	SHIM 50,3X70,3
8	3110028	KEI 10X8X60 UNI6604
9	3030187	WASHER 50X74X1,25
10	3180008	FASTENING GEAR M50X1,5
11	18034022	SHIM 70,2X50,2X2,5

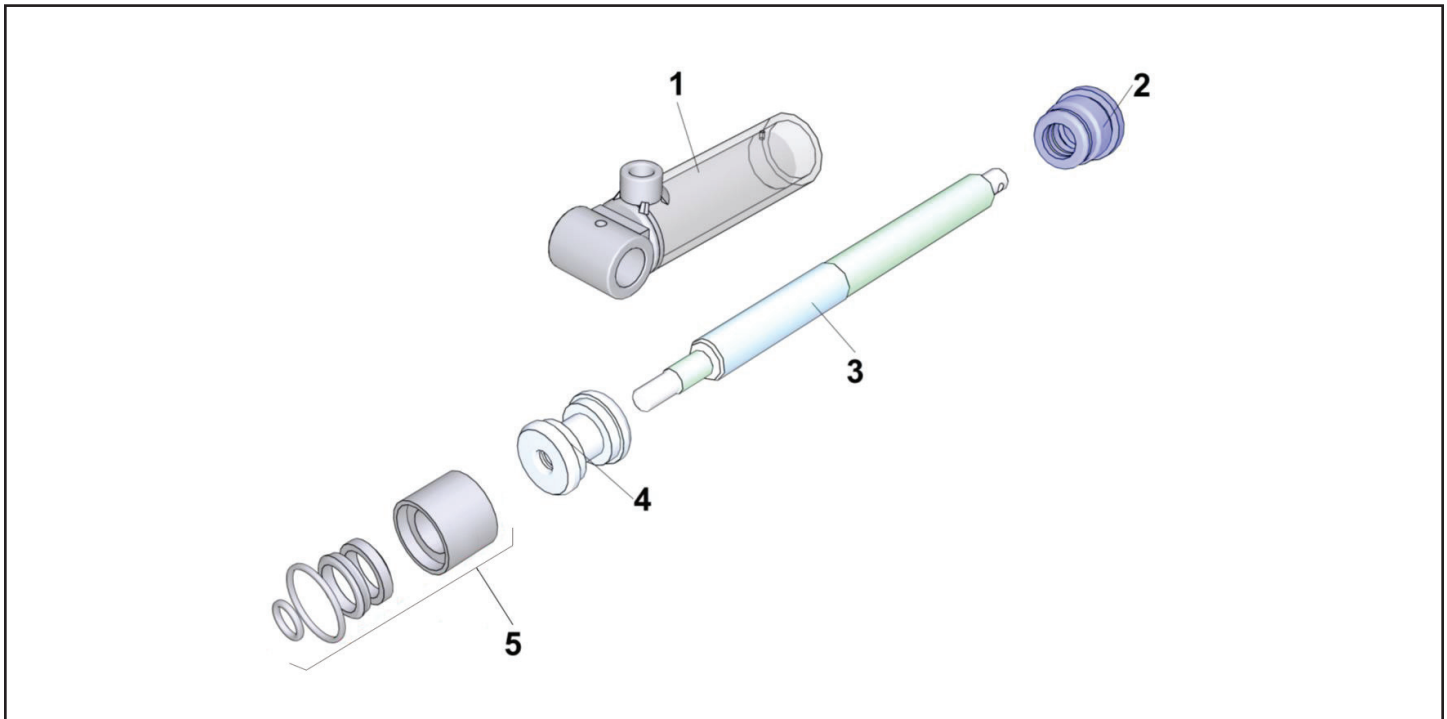
12	12240256	BALL BEARING 6310 Z
13	3090111	GREASE NIPPLE 45G M10X1
14	18034023	SEAL 2-155
15	10011350	SEAL RING 30206 AV
16	18034024	SHIM 69X79,9
17	12240244	ROLLER BEARING 30208
18	3120147	RING 80 UNI 7437
19	18034025	NUT M40X1,5
20	12260097	RING 35X80X10
21	18034026	PINION Z10 M3.75
22	-	GREASE SHELL RETINAX WB2
23	18034027	HEX CAP 3/8" GAS
24	18034028	HEX CAP 1/2" GAS
25	18034029	HEX CAP 1/2" GAS
26	12260031	RING 35X45X7
27	18034030	ARM
28	18034035	BUSHING 35,3X43,5X9
29	3010281	SCREW 5739 M10X30
30	18034031	BUSHING 50,2X67X27,7
31	18034032	BALL BEARING 6310
32	18034033	SEAL COVER
33	18034034	CENTRAL SHAFT
34	18034036	RING 50X72X8
35	18034037	LOWER COVER
36	3110019	KEI 10X8X50 UNI6604
37	18034038	HEX CAP 3/8" GAS
38	18034039	RING 55X72X10
39	18034040	CAM
40	18034041	WASHER 17X22X1,5
41	18034042	SHIM 35,2X43,8X1
42	18034043	SHIM 51,5X43,3X1
43	18034044	SHIM 50,2X57,5X0,5

Hydraulic Cylinder Ø60



ITEM	PART NUMBER	DESCRIPTION
1	18032245	COMPLETE CYLINDER Ø60 C.107
2	-	GUIDE
3	-	SHAFT
4	-	PISTON
5	18032249	KIT SEALS Ø60

Hydraulic Cylinder Ø40



ITEM	PART NUMBER	DESCRIPTION
1	18032236	COMPLETE CYLINDER Ø40 C.45
2	-	GUIDE
3	-	SHAFT
4	-	PISTON
5	18032253	KIT SEALS Ø40

Hydraulic Hoses

ITEM	PART NUMBER	DESCRIPTION
1	12760606	HOSE HYDRAULIC L.2000
2	12760607	HOSE HYDRAULIC L.300
3	12660608	HOSE HYDRAULIC L.3600

Farm King



Specifications And Shipping Kit Numbers

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Farm King



Specifications

MODEL	RR 420 PULL TYPE	RR 420 THREE-PT
Working Width w/ Windrow	4.2 m (13.8')	4.2 m (13.8')
Working Width Actual	3.3 m (11')	3.3 m (11')
Windrow Width	0.8 m (2.5')	0.8 m (2.5')
Transport Width	1.7 m (5.5')	1.7 m (5.5')
Rake Arms	11	11
PTO Speed	540 rpm	540 rpm
Required Horsepower	40-45 HP	40-45 HP
Maximum Working Speed	15 km/h (9 mph)	15 km/h (9 mph)
Tires	4 tires, 18 x 8.5 x 8	4 tires, 18 x 8.5 x 8
Windrow Deposit	Left	Left
Weight	625 kg (1378 lbs)	600 kg (1323 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
4 pneumatic 18x8.5x8 tires w/ standard tandem axles and PTO shaft with slip clutch. 11 arms with 4 removable tines per arm, sealed oil bath gearbox, hydraulic lift system.		
1	RR420FK	14' Rotary Rake, Pull-Type

Hardware Torque Values

Metric Chart

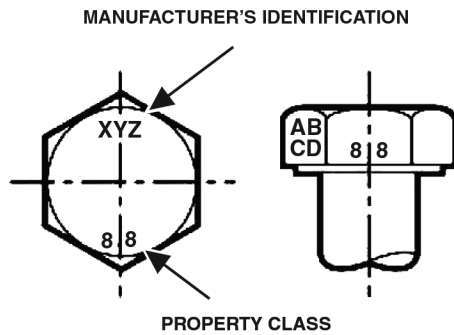
NOTE: Do not use the values listed in the charts if a different torque value or tightening procedure is specified in this manual for a specific application. Torque values listed are for general use only.

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.**

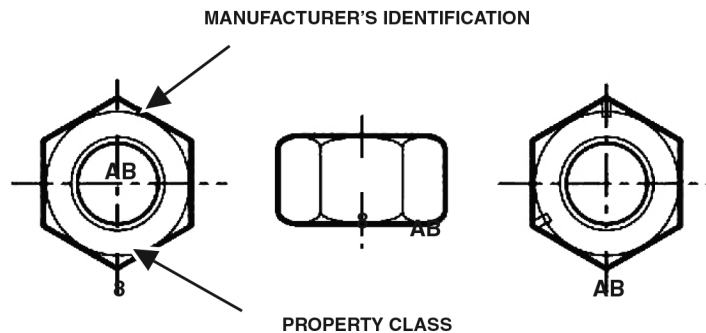
Nominal Size	Class 5.8		Class 8.8		Class 10.9		Lock nuts
	Unplated	Plated W / ZnCr	Unplated	Plated W / ZnCr	Unplated	Plated W / ZnCr	CL.8 w/ CL. 8.8 Bolt
M4	1.7 (15*)	2.2 (19*)	2.6 (23*)	3.4 (30*)	3.7 (33*)	4.8 (42*)	1.8 (16*)
M6	5.8 (51*)	7.6 (67*)	8.9 (79*)	12 (102*)	13 (115*)	17 (150*)	6.3 (56*)
M8	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



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



SAE GRADE 2 BOLTS



SAE GRADE 5 BOLTS



SAE GRADE 8 BOLTS



SAE GRADE 2 NUTS

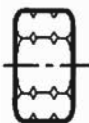


SAE GRADE 2 NUTS



SAE GRADE 2 NUTS

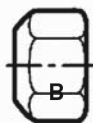
Identification of Hex Nuts and Lock Nuts



Grade A - No Notches

Grade B - One Circumferential Notch

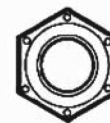
Grade C - One Circumferential Notches



Grade A - No Mark

Grade B - Letter B

Grade C - Letter C



Grade A - No Marks

Grade B - Three Marks

Grade C - Six Marks

(Marks not always 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 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.

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