



**MODEL 225**

**TWIN ROTARY RAKE  
OPERATOR'S MANUAL**

**DO NOT OPERATE THIS EQUIPMENT UNTIL THIS  
MANUAL HAS BEEN READ AND UNDERSTOOD.**

Part Number: 17.00802.3B  
May 2005



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FAX: (920)-773-1200

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# INTRODUCTION

This Operator's Manual is provided to acquaint the operator with the safety and operation of the Victor 225 Twin Rotary Rake. Complete Assembly, Operation, Lubrication and Maintenance procedures are provided. Following the recommended procedures will help you achieve many years of dependable service. (For single rake operation, refer to 115 Operator's Manual supplied with each rake).

This manual is considered part of your machine and should remain with the machine at all times.

Make sure the operator reads and understands the manual before placing the rake into operation.

Failure to follow the recommended procedures may result in injury and equipment damage, and could void the warranty.

## MACHINE SERIAL NUMBERS

The Swing Frame serial number is located on the side of the frame near the Operator's Manual storage tube. The Rake serial numbers are located on the side of the rake frame near the Operator's Manual storage tube. For your convenience refer to these numbers and your product model numbers when requiring service or parts information. Record the machine serial number, date of purchase and dealership name in the space provided below.

|   |
|---|
| Date Purchased _____<br>225 Swing Frame Serial No. _____<br>115 Rake Serial No. _____<br>115 Rake Serial No. _____<br><br>Dealership: _____ |
|---|

Right and Left Hand sides are determined from a position standing at the rear of the rake looking toward the direction of travel.

A "Right Hand Rake" discharges to the right (swath screen is on the right side). A "Left Hand Rake" discharges to the left. (Swath screen is on the left side).

The Delivery and Warranty Registration Card found in the front of this manual must be completed and signed to validate your warranty protection. You must read and understand the places where you attest to having received instructions as to care, adjustments, safe operation and applicable warranty policy. The terms and conditions of the warranty are specified on the rear cover of this manual.



## WARNING

SOME PHOTOGRAPHS USED HEREIN MAY SHOW DOORS, GUARDS AND SHIELDS OPENED OR REMOVED. BE SURE THAT ALL DOORS, GUARDS AND SHIELDS ARE FASTENED IN THEIR PROPER POSITION BEFORE MACHINE IS OPERATED!

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## OVER ALL MODEL VIEW



Fully assembled 225C (Center discharge)

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## 225 ROTARY RAKE

### PRE-DELIVERY CHECK LIST

After the Rake has been completely set-up, the following inspections **MUST** be made before delivering it to the customer. Check off each item after prescribed action is taken.

- ☐ NO parts of the unit have been damaged in shipment. Check for such things as dents and loose or missing parts; correct or replace components as required.
- ☐ All bolts and fasteners are in place and tightly secured.
- ☐ As applicable, the Cylinders, Hoses and Fittings are NOT damaged, leaking or loosely connected.
- ☐ Gearboxes are filled to proper oil level; All Grease Fittings have been properly lubricated; see Lubrication chapter of this manual.
- ☐ Cam adjusters operate freely and are positioned correctly.
- ☐ Wheels are properly mounted and securely attached and Tires are properly mounted and inflated to the appropriate pressure.
- ☐ All Guards, Shields and Decals are in place and securely attached.
- ☐ Model and Serial Numbers for this unit are recorded in space provided on this page and inside the front cover.

**Hook the rake to the appropriate RPM tractor and test run it while checking that proper operation is exhibited by all components.**

Check that:

- ☐ Transport lights operate properly.
- ☐ All Drives and Mechanisms are operating smoothly and properly adjusted.
- ☐ Hydraulic lift system operates properly.

I acknowledge that pre-delivery service was performed on this unit as outlined.

\_\_\_\_\_  
Dealership's Name

\_\_\_\_\_  
Dealer Representative's Name

\_\_\_\_\_  
Date Checklist Filled Out

\_\_\_\_\_  
Model Number                      Frame Serial Number

Rake # 1 S/N \_\_\_\_\_

Rake # 2 S/N \_\_\_\_\_

### DELIVERY CHECK LIST

The following check list is an important reminder of valuable information that **MUST** be passed on to the customer at the time the unit is delivered. Check off each item as you explain it to the customer.

- ☐ Give the customer their Operator's Manual. Instruct them to be sure to read and completely understand its contents **BEFORE** attempting to operate the unit.
- ☐ Explain the warranty.
- ☐ Direct customer on how to use the Table of Contents of this manual as a quick page number locating guide.
- ☐ Explain and review with customer the Safety information in this manual.
- ☐ Explain and review with customer the Controls and Safety Equipment chapter of this manual.
- ☐ Explain that regular lubrication and proper adjustments are required for continued proper operation and long life. Review with the customer the Lubrication and Maintenance chapters of this manual.
- ☐ Explain and review with customer the PTO Driveline information in the separate manual provided.
- ☐ Completely fill out Owner's Registrations for the swing frame **AND** for each rake, including customer's signature, and return them to the Company. (The cards for each rake can be found in the Operator's Manual supplied with each rake.)

I acknowledge that above points were reviewed with me at the time of delivery.

\_\_\_\_\_  
Customer's Signature

\_\_\_\_\_  
Date Delivered

(Customer Copy)

---

## 225 ROTARY RAKE

### PRE-DELIVERY CHECK LIST

After the Rake has been completely set-up, the following inspections **MUST** be made before delivering it to the customer. Check off each item after prescribed action is taken.

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- ☐ All bolts and fasteners are in place and tightly secured.
- ☐ As applicable, the Cylinders, Hoses and Fittings are NOT damaged, leaking or loosely connected.
- ☐ Gearboxes are filled to proper oil level; All Grease Fittings have been properly lubricated; see Lubrication chapter of this manual.
- ☐ Cam adjusters operate freely and are positioned correctly.
- ☐ Wheels are properly mounted and securely attached and Tires are properly mounted and inflated to the appropriate pressure.
- ☐ All Guards, Shields and Decals are in place and securely attached.
- ☐ Model and Serial Numbers for this unit are recorded in space provided on this page and inside the front cover.

**Hook the rake to the appropriate RPM tractor and test run it while checking that proper operation is exhibited by all components.**

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- ☐ Transport lights operate properly.
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---

Dealership's Name

---

Dealer Representative's Name

---

Date Checklist Filled Out

---

Model Number

Frame Serial Number

Rake # 1 S/N \_\_\_\_\_

Rake # 2 S/N \_\_\_\_\_

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- ☐ Direct customer on how to use the Table of Contents of this manual as a quick page number locating guide.
- ☐ Explain and review with customer the Safety information in this manual.
- ☐ Explain and review with customer the Controls and Safety Equipment chapter of this manual.
- ☐ Explain that regular lubrication and proper adjustments are required for continued proper operation and long life. Review with the customer the Lubrication and Maintenance chapters of this manual.
- ☐ Explain and review with customer the PTO Driveline information in the separate manual provided.
- ☐ Completely fill out Owner's Registrations for the swing frame AND for each rake, including customer's signature, and return them to the Company. (The cards for each rake can be found in the Operator's Manual supplied with each rake).

I acknowledge that above points were reviewed with me at the time of delivery.

---

Customer's Signature

---

Date Delivered

(Dealer Copy)

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## SAFETY PRECAUTIONS



This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions. Take time to be careful!



### **DANGER**

“DANGER” indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



### **WARNING**

“WARNING” indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



### **CAUTION**

“CAUTION” indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also alert against unsafe practices.

**BEFORE** you attempt to operate this machine, read and study the following safety information. In addition, **MAKE SURE** that every individual who operates or works with this equipment, whether family member or employee, is familiar with these safety precautions. Miller-St. Nazianz provides guards for exposed moving parts for the operator’s protection; however, some areas cannot be guarded or shielded in order to assure proper operation. The **OPERATOR’S MANUAL AND DECALS** on the machine itself warn you of dangers and **SHOULD BE READ AND OBSERVED CLOSELY**.

## POWER SOURCE SHUTDOWN PROCEDURE

Before cleaning, unclogging, adjusting, lubricating or servicing this machine:

1. Disengage the tractor PTO.
2. Deactivate tractor hydraulic controls.
3. Shut off the tractor engine, remove the starter key and take it with you.
4. Wait for all machine motion to stop.
5. Remove the PTO Driven Pump and ALL power connections from the tractor.

Failure to follow these precautions could result in death or serious injury.



## **SAFETY PRECAUTIONS**, continued

Some photographs used herein may show doors, guards and shields opened or removed. **BE SURE** that all doors, guards and shields are fastened in their proper position before machine is operated.

Know how to stop rake operation **BEFORE** starting it.

**BE ALERT** for people and/or animals in front of or around machine, when about to start machine.

**KEEP** hands, feet and clothing away from tine arms and PTO when they are moving!

**DO NOT** wear loose or baggy clothing when operating this unit!

**DO NOT** allow people other than a qualified operator near the unit!

**DO NOT** allow minors to be near the machine unless properly supervised.

**KEEP** riders off rake.

**DO NOT** unclog, adjust, lubricate or service your rake until you disengage the tractor PTO and shut off the tractor engine. Failure to follow this procedure may result in serious bodily injury!

**AVOID** high pressure fluids. Escaping fluid under pressure can penetrate skin causing serious injury.

**DO NOT** exceed a maximum towing speed of 20 MPH (32 KPH) while transporting the rake.

**REDUCE** speed on rough or hilly ground.

**BE EXTRA** careful when going through fence gates or nearing confined quarters.

**ALWAYS** follow state and local regulations regarding use of a safety chain, slow moving vehicle signs and transport lighting, when towing farm equipment on public highways.

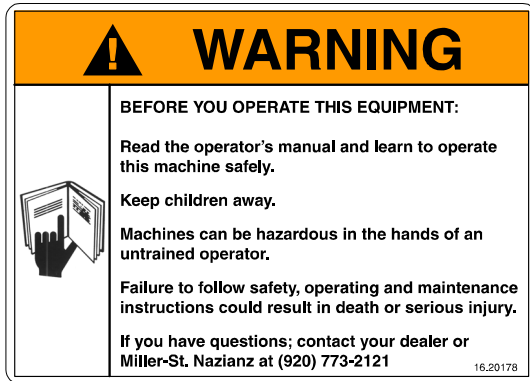
**ALWAYS** engage the tractor parking brake before dismounting.

**BE SURE** the hitchjack locking pin is completely engaged and that the machine is properly blocked and prevented from rolling **BEFORE** disconnecting the rake from the tractor.

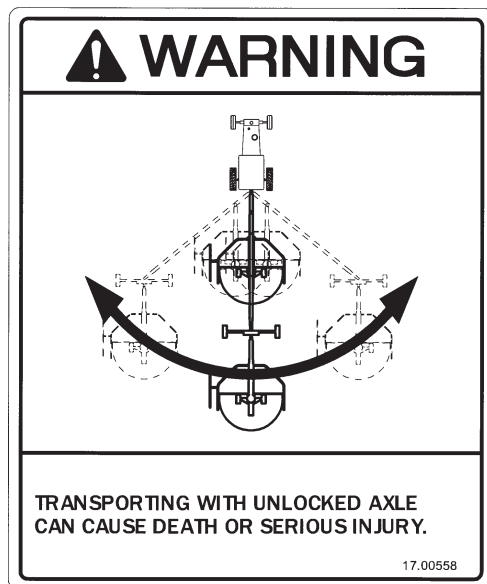


## SAFETY DECALS

THE DECALS ARE FOR YOUR PROTECTION. IF YOUR SAFETY DECALS ARE NOT READABLE OR ARE MISSING, CONTACT YOUR DEALER FOR REPLACEMENTS.



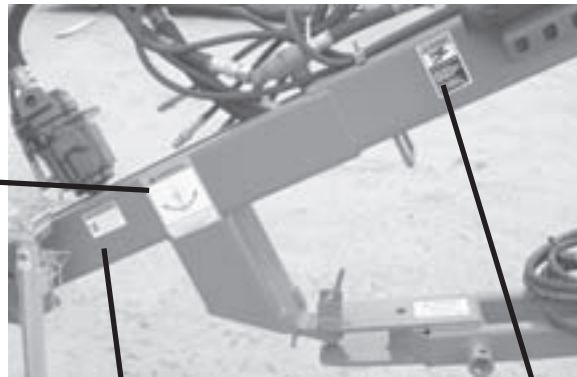
16.20178 Warning



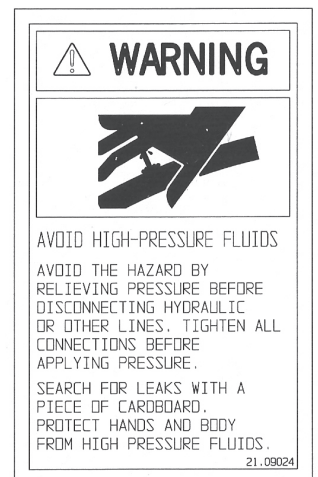
17.00558  
Warning



907220  
Yellow Reflectors  
(Both sides)



17.01155 Warning



21.09024 Warning





## SAFETY DECALS



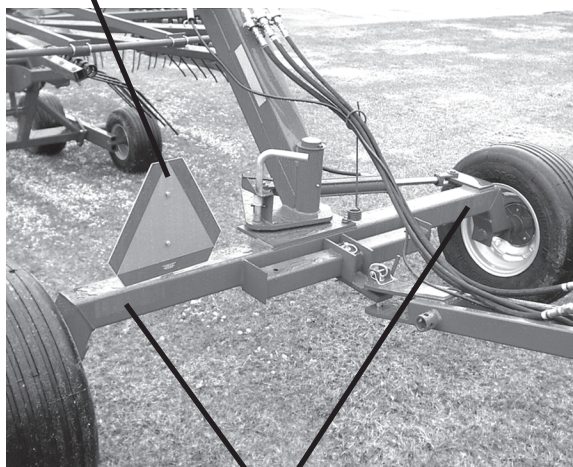
17.00421 Caution (both sides)



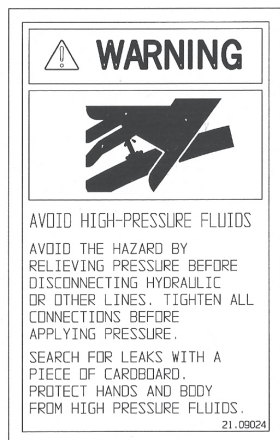
907220  
Yellow Reflector  
(both sides)

907220  
Yellow Reflector

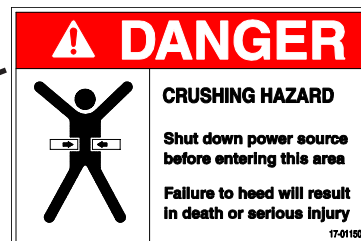
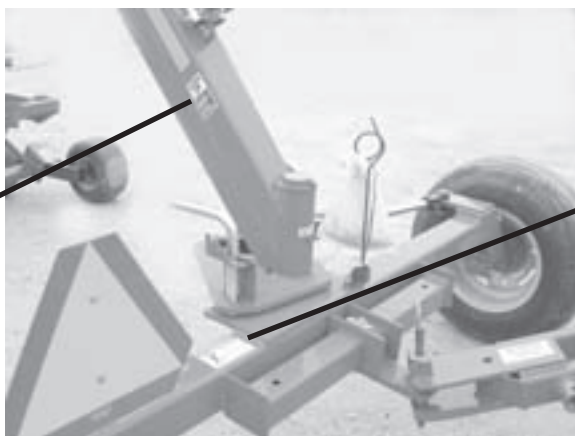
907224 SMV Emblem



907219  
Red Reflector



21.09024 Warning



17.01150 Danger





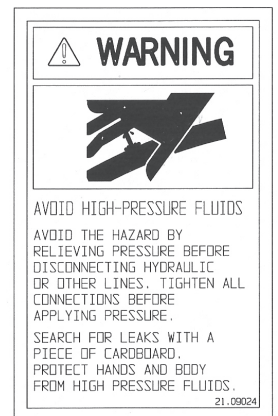
## SAFETY DECALS



16.20177  
Danger



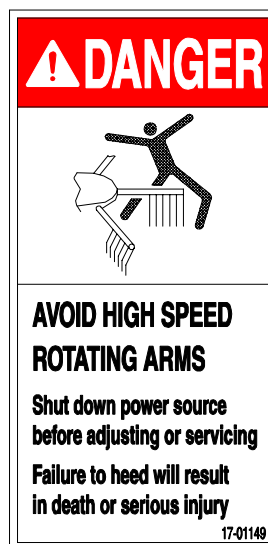
16.20178  
Warning



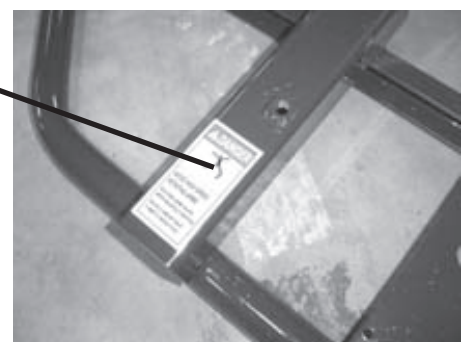
21.09024  
Warning



17.01148  
Important

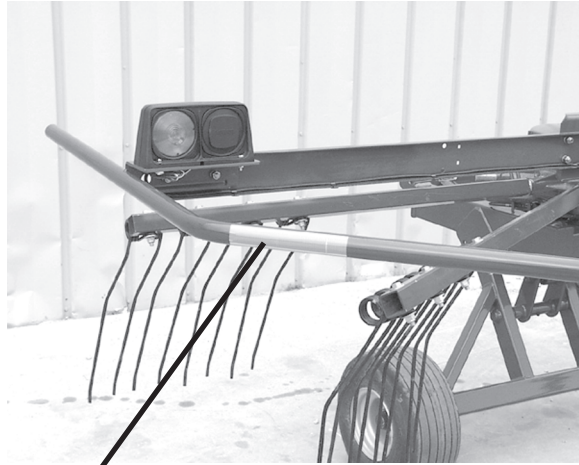
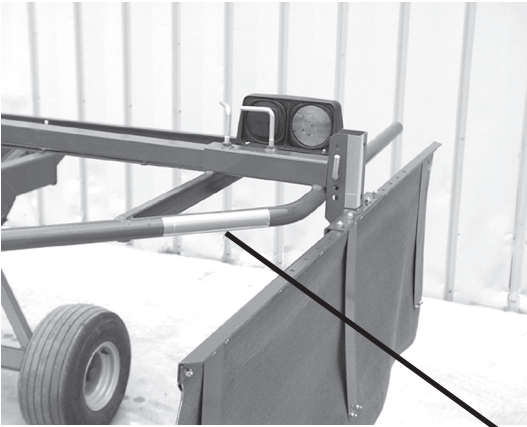


17.01149 Danger





## SAFETY DECALS



907220 Yellow Reflector

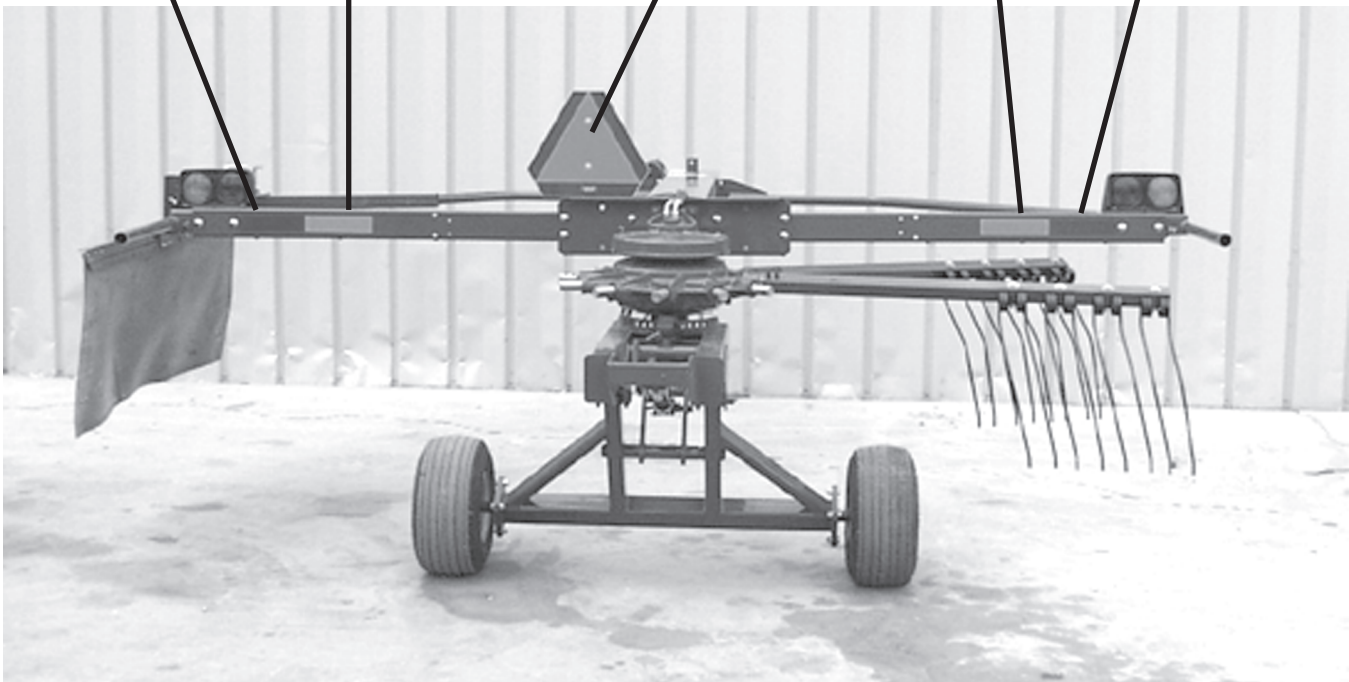
907219 Red Reflector

907221 Fluorescent Orange

907224 SMV Emblem

907221 Fluorescent Orange

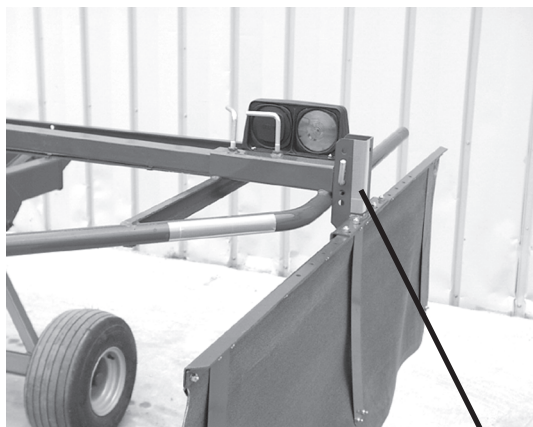
907219 Red Reflector





## SAFETY DECALS

**NOTE:** **Yellow** reflective decals must face toward the front of the machine and the **red** reflective decals must face toward the rear of the machine.



Left Hand Rake



Right Hand Rake

907220- Yellow Reflector



Left Hand Rake



Right Hand Rake

907219 Red Reflector



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## CONTROLS AND SAFETY EQUIPMENT



### CAUTION

Become familiar with and know how to use all **SAFETY DEVICES** and controls **BEFORE** attempting to operate this equipment. Know how to stop the unit **BEFORE** starting it!



### WARNING

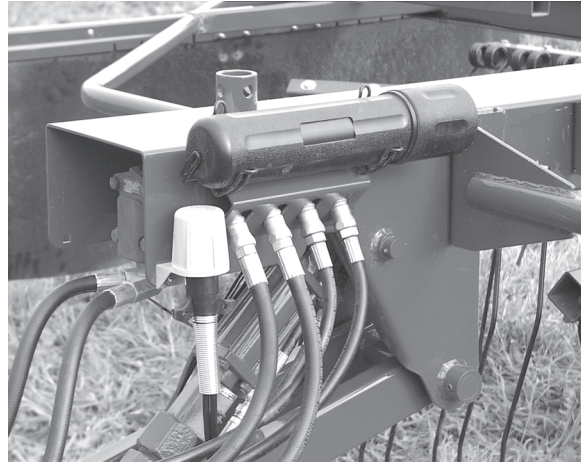
**DO NOT** operate this equipment unless **ALL** shields and guards are properly secured in place!

**DO NOT** lubricate, adjust and/or service unless **POWER SOURCE SHUT DOWN PROCEDURE** (page 5) has been exercised.

Wherever possible and without affecting machine operation, shields and guards have been used on this machine to protect potentially hazardous areas. In many places, decals are also provided to warn of potential dangers as well as to display special operating procedures.

### Operator's Manual Storage

The Operator's Manual for the Twin Rake should be stored in the weatherproof canister attached to the swing frame. The Operator's Manual for each rake should be kept with the rake.



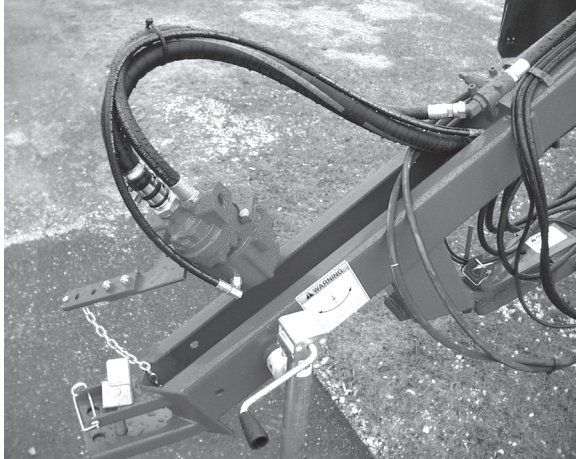
### Hydraulic Hose and Light Cord Storage

Storage locations are provided for the light cord and hydraulic hoses. They are for storage only. When transporting rake, couple cord and hoses to tractor or fasten securely to rake.

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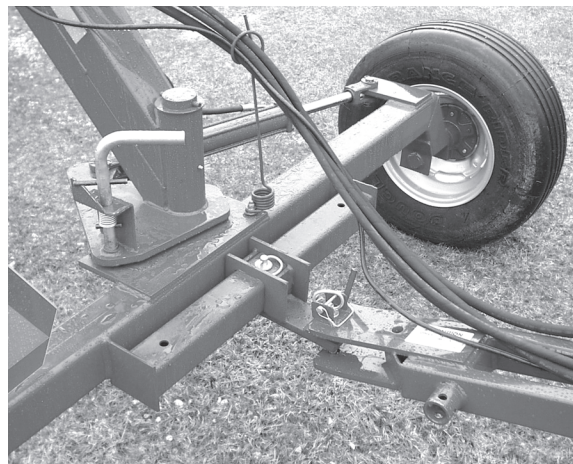
## **Hydraulic Pump and Hitch Jack Storage**

Storage locations are provided for the PTO pump and the hitch jack. The pump storage pin is for storage only. When transporting the twin rake (or swing frame), install pump onto tractor PTO or fasten securely to swing frame.



## **Adjustable Drawbar**

The rear drawbar on the swing frame can be repositioned to the left or right to keep the swing frame tires off the windrow.



## **Transport Lock**

A transport lock is provided to secure the steerable axle during transport.

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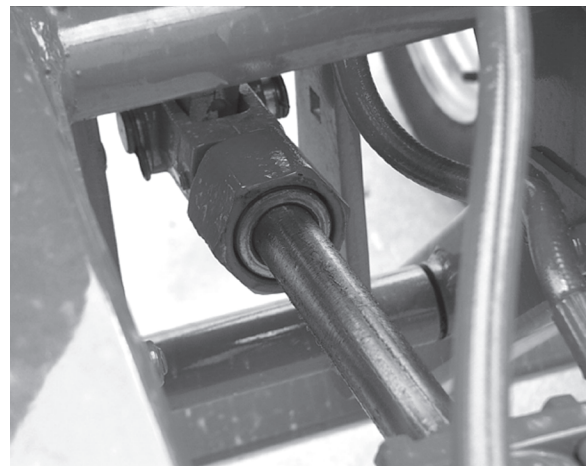
### **Steerable Axle**

The hydraulically steered axle on the swing frame is used to position the rear rake during operation. It is also used to control the rear rake while backing.



### **Hydraulic Lift System**

The hydraulic lift system consists of two 2-way hydraulic cylinders on each rake operated by one tractor remote hydraulic valve. Both cylinders are equipped with adjustable stops which are used to control the working height and to level the rake front to rear. The cylinders work together to keep the rake level while raising and lowering the rake.



### **Hydraulic Drive System**

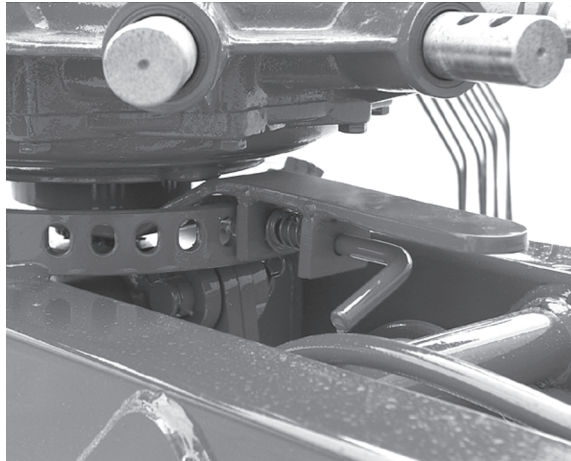
The drive system consists of a PTO driven gear pump, a relief valve, a flow divider valve, a hydraulic motor and check valve at each rake, and a return line oil filter. (The check valves act as overrunning clutches to protect the drive system). The operating speed of the rakes is controlled by the tractor PTO speed.



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## **Adjustable Cam**

The cam in the 115 Rotary Rake gearbox can be adjusted for optimal raking performance and windrow creation. Moving the cam lever left or right rotates the cam inside the enclosed gearbox. Rotating the cam will move the point where the tines release the gathered crop. (It moves the point where the tines begin to lift).



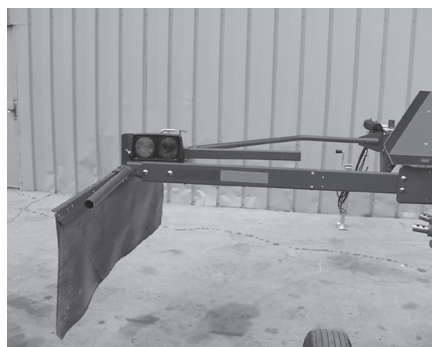
## **Swath Screen**

The swath screen acts as a "back stop" for the windrow. Adjusting the swath screen outward will create wider windrows and adjusting it inward will create narrower (and taller) windrows. The swath screen can also be adjusted forward if the raked crop is being thrown in front of the swath screen. (This can occur when rotor speed is high and ground speed is low).



## **Transport Lights**

Transport lights, for use when towing rake on public highways, are standard on all Model 115 and 225 Rotary Rakes.



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## TRACTOR/RAKE PREPARATION



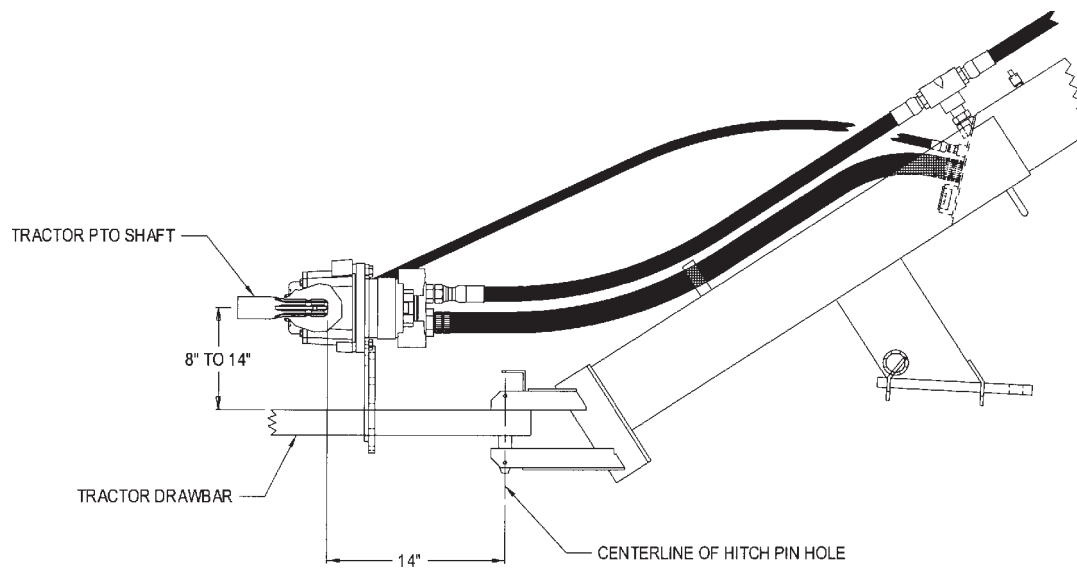
### CAUTION

Use **ONLY** a 540 RPM tractor PTO shaft.  
DO NOT use a 1000 RPM tractor PTO shaft!

### Tractor Set-Up for PTO Pump

The following tractor hookup provisions should be made:

- The hitch point of the tractor drawbar should be 14" behind the end of the PTO shaft.
- The hitch point of the tractor drawbar should be set at least 8" but no more than 14" below the tractor PTO shaft.
- The hitch point of the tractor drawbar should be at least 13" but no more than 22" above the ground.
- Looking from the rear of the tractor, the tractor drawbar should be in line with the tractor PTO shaft (centered).



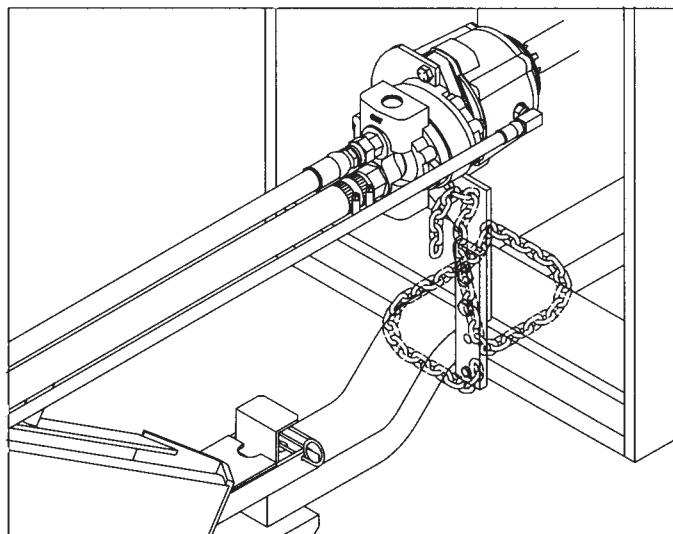


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## **Pump Attachment Procedure**

**NOTE:** It is recommended to lubricate the PTO splines before installing the hydraulic pump.

Slide the hydraulic pump onto the PTO shaft of the tractor. Adjust the torque arm so that it rests on the right side of the tractor drawbar. Route the pump retainer chain under the drawbar and along the left side of the drawbar through the drawbar support. Pass the chain above or below the drawbar to the right side of the drawbar and pass the chain rearward along the right side of the drawbar, through the drawbar support, to the keyhole in the torque arm.



## **Hydraulic Lift Hook-up**

Connect the two hoses for the steering cylinder and the two hoses for the hydraulic lift system to the appropriate remote hydraulic valves on the tractor. Lift hoses are identified with yellow and green to match rake hoses. See tractor Operator's Manual for recommended circuit hook-up.

**IMPORTANT:** If the hydraulic lift system has not been charged with oil, charge the system with oil **BEFORE** removing the cylinder locking channels used for shipping purposes.



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## **Attaching Front Rake To Swing Frame**

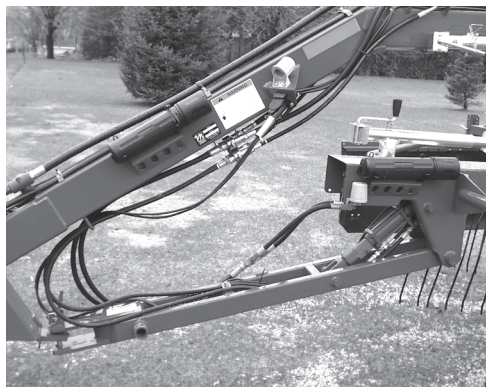
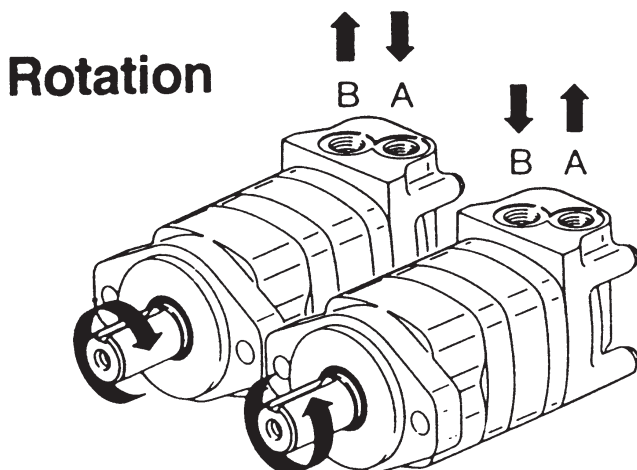
Before attaching the front rake to the swing frame, the rear guard has to be assembled. Refer to the RAKE ASSEMBLY section of this manual and follow the instructions under Step 10 "Install Rear Guard On Front Rake".

## **Connecting Rake Hydraulics to Swing Frame**

Hydraulic hoses on the rakes and swing frame have colored plastic ties installed near the couplers. Connect hoses together according to the colored ties: red to red, blue to blue, yellow to yellow, green to green.

|            |  |
|------------|--|
| Red Tie    | Return line for hydraulic drive        |
| Blue Tie   | Pressure line for hydraulic drive      |
| Yellow Tie | Lift line (pressurize to raise rakes)  |
| Green Tie  | Lower line (pressurize to lower rakes) |

Port A Pressurized -Left Hand Rake  
Port B Pressurized - Right Hand Rake



## **Connecting Rake Lights to Swing Frame**

Electrical sockets are provided on the swing frame to attach light harnesses for both rakes.

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## Rake Height/Level Adjustment



### WARNING

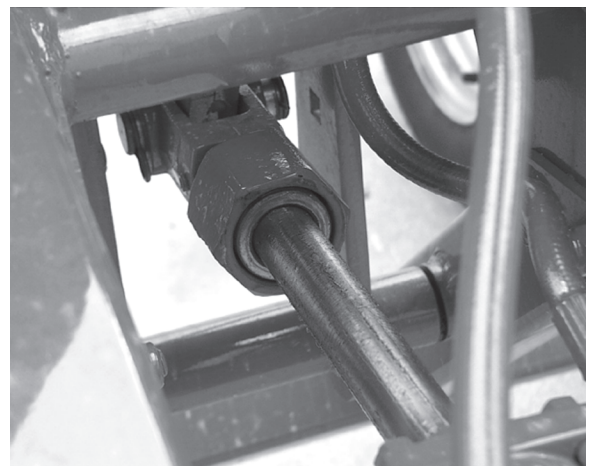
**DO NOT perform any adjustments on this machine unless POWER SOURCE SHUT DOWN PROCEDURE (page 5) has been exercised.**

Working height and leveling the rake is controlled by the adjustable stops on the two hydraulic lift cylinders on each rake.

To adjust (Adjust rakes separately; disconnect hoses on one rake while adjusting the other):

1. Lower rake until tines on far left and right sides of the rake are just touching the top of the crop stubble.
2. Turn the large nut on the rear hydraulic cylinder until it is tight against the cylinder body.
3. Turn the large nut on the front hydraulic cylinder to adjust rake to be level with ground.
  - a. If front of rake is low, operate tractor hydraulics slowly to raise front of rake until rake is level. Turn nut on front cylinder against cylinder body.
  - b. If front of rake is high, turn nut away from cylinder body, operate tractor hydraulics slowly to lower front of rake until rake is level. Turn nut against cylinder body.

**NOTE: Setting the working height near the top of the crop stubble will ensure optimum rake performance and highest quality crop. Some crops, however, will require a much lower working height to gather the windrow completely. Note that operating the rake with the tines continuously digging in the ground will reduce tine life, reduce gearbox life, reduce crop quality, and increase the potential for stones in the windrow.**

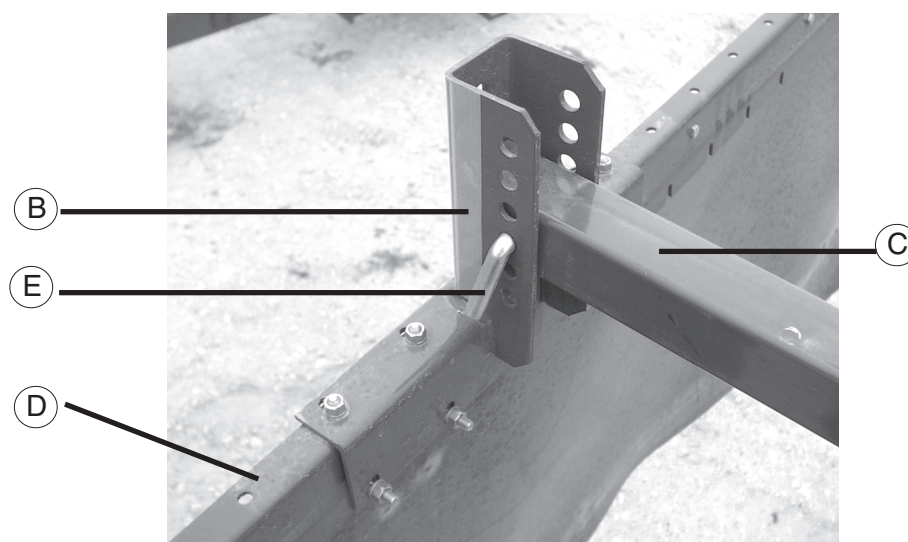
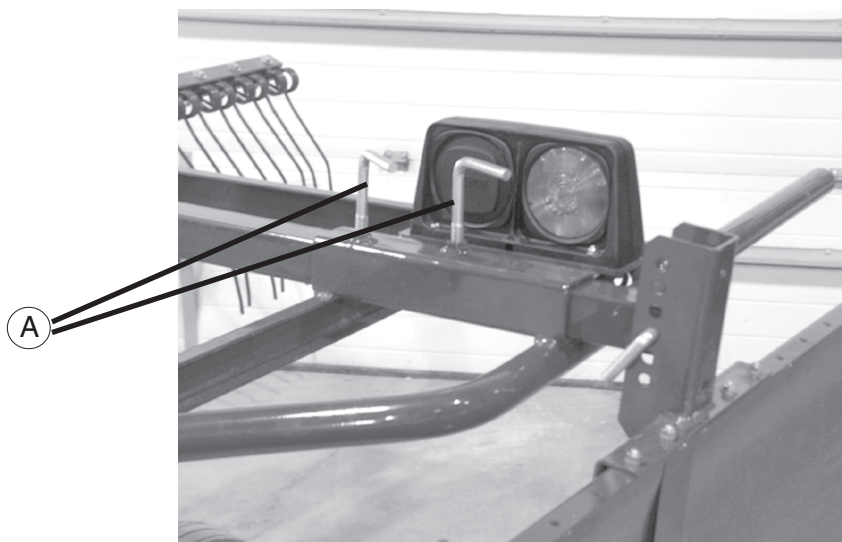


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## **Swath Screen Adjustments**

There are three adjustments that can be made on the swath screen.

1. Width - Adjusting the swath screen inward or outward controls the width of the windrow. Lock the swath screen in the desired location by tightening the threaded pins (A).
2. Height - Adjust the height of the swath screen by aligning a different hole in the swath screen support (B) with the hole in the adjuster tube (C). With the rake in operating position the bottom of the swath screen should just touch the top of the crop stubble.
3. For/Aft Adjustment - Some crop conditions may require the swath screen to be moved forward or rearward. This is accomplished by relocating the swath screen support (B) on the swath screen angle (D). If the swath screen is adjusted more than 3 inches for or aft, replace the swath screen pin (E) with a 1/2" x 3" bolt and locknut to tighten swath screen support onto adjuster tube. This will reduce swath screen bouncing.





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## **Cam Adjustment**

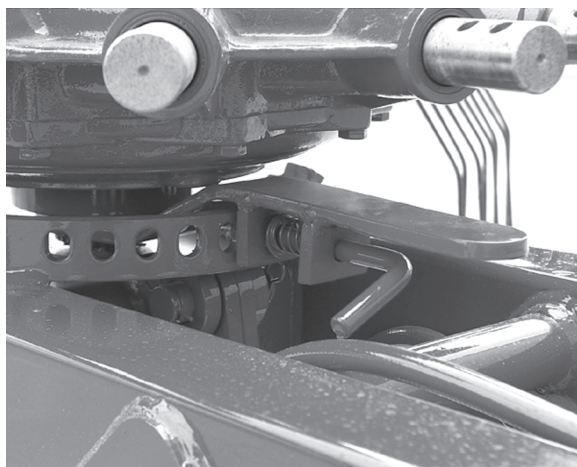
The best cam setting will be determined by crop type, crop density, and swath width. Normally, in short, light crops, the cam should be moved to the right (moved to the left on right hand rakes) causing the tines to release the crop later. This will create a neater windrow without "tails" along the inside edge. In long, heavy crops, the cam lever should be moved to the left (right on right hand rakes) causing the tines to release the crop earlier. This will create a wider, fluffier windrow for better drying. Adjusting the cam also affects the width of crop actually lifted off the ground. Moving the cam lever to the right (releasing the crop later) will increase the width of crop being lifted and the distance the crop is moved to the side.

To adjust the cam, pull out on the spring-loaded cam lever pin and rotate the cam lever to the left or right. Start with the cam lever centered (for most conditions). Move the lever one hole at a time until the optimal setting has been reached. Be sure the pin is locked into one of the holes after adjusting.



### **WARNING**

**DO NOT perform any adjustments on this machine unless POWER SOURCE SHUT DOWN PROCEDURE (page 5) has been exercised.**



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## TRANSPORTING RAKE

### Transport Lighting

Model 115 and 225 Rotary Rakes are equipped with transport lighting for transporting the unit on public highways. The light cords on the rakes and swing frame have standard seven prong plugs. The light cords on both rakes should be plugged into the receptacles provided on the swing frame. The plug on the swing frame should be plugged into the tractor. Contact your tractor dealer if your tractor does not have the appropriate receptacle.

### SMV Emblem and Reflectors

Rakes and swing frame are also provided with reflector strips and slow moving vehicle (SMV) emblems. Unless prohibited, always use a SMV emblem.

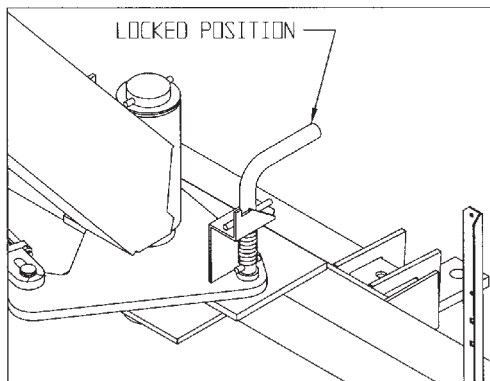
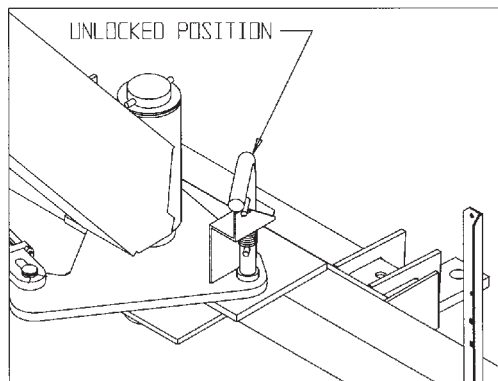
### Safety Chain (Order Part Number 329946B91)

Rakes and swing frame can be equipped with safety chains for travel on public highways. Contact your dealer to order the appropriate size chains. When attaching chains, be sure to allow enough slack for turning.

**IMPORTANT: Never exceed a maximum towing speed of 20 MPH (32 KMH). Reduce speed when turning or traveling on rough or hilly terrain.**

### Swing Frame Transport Lock

Position the steering axle perpendicular to the swing frame. Rotate the pin to the 'locked' position. Be sure the pin is fully engaged into the hole in the steering axle. If not, operate the hydraulic steering control slowly and carefully until pin snaps into place.



### **IMPORTANT: Before leaving the field:**

1. Raise the rakes to the transport position by using the tractor hydraulics to fully extend the lift cylinders. Note: As the lift mechanism moves from the working position through the over center feature to the transport position it will lower the rake slightly after the rake reaches the peak height.
2. Slide the swath screen assemblies completely into the guard tube and tighten the threaded pins.

---

## OPERATION



### CAUTION

**BEFORE** operating the rake, review and understand the Safety Precautions section and the Controls and Safety Equipment section of this manual.

The Operator must become familiar with the tractor remote control levers that control the steering cylinder and the lift cylinder on the rakes. The Operator must **BE AWARE** of what happens when these control levers are activated and how it affects the machine position when the tractor moves forward. **BE CAREFUL** when operating Tractor Remote Controls.

### Pre-operation Checklist

Make sure:

- All guards are in place.
- There are no bystanders around rake .
- All connections are properly made between rakes and swing frame and between swing frame and tractor.
- Tractor 3-point arms are in the fully raised position.
- Hydraulic hoses are not hanging where the rear tractor tire could catch them during turns.

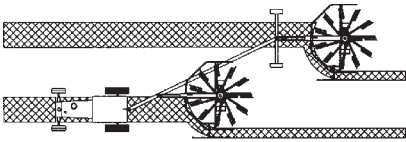
### General

- The tractor PTO on-off lever controls the PTO driven pump and each rake gearbox. Increasing tractor engine speed will increase each rake rotor's RPM's.
  - Do not over speed hydraulic pump. Continuously overspeeding pump will cause excessive wear on pump components.
  - Ground speed and rake RPM should be selected to move the crop with minimal losses. Ground speed may need to be reduced significantly in areas where the crop is denser or higher in moisture content.
  - For ease of operation, turn away from side that the rear rake is on. For example: If the rear rake is swung over to the right, turn to the left.
  - When mowing fields, mow an adequate number of end rows for turning the twin rake.
  - It is usually better to rake, the outside rounds and end rows of a field last.
  - If the swing frame tires are tramping windrows, adjust the rear rake drawbar to a different position on the axle frame.
  - When backing rake steer the front rake with the tractor and steer the rear rake with the swing frame steerable axle.
-

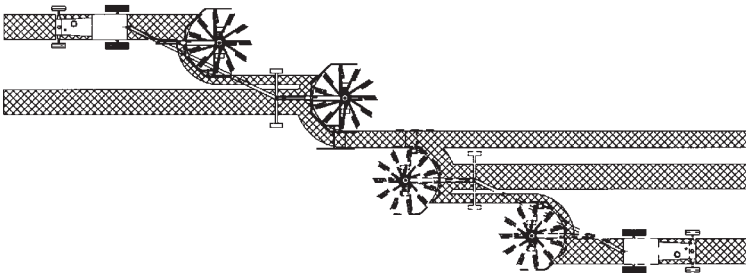
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## Windrow Placement

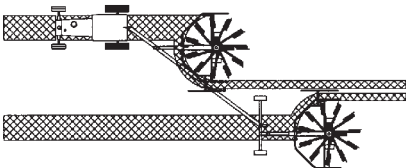
The twin rake can be used to create single windrows or to combine two or more windrows. The size and shape of the windrow(s) is controlled by the ground speed, the PTO speed, the cam setting and the swath screen setting. Several windrow placements are possible with each model (L,R, or C). Crop density, swath width, mower width, and baler or forage harvester pickup width will determine which placement to use.



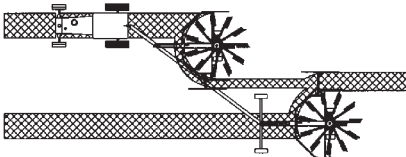
Raking two windrows to the left with rakes to right side of tractor. (225L)



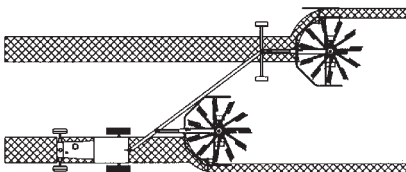
Raking four (or five) windrows into one windrow with rakes to left side of tractor. ( 2 passes required, 225L)



Rakes two windrows inward with rakes to left side of tractor. (225C)



Raking two windrows into one center windrow with rakes to left side of tractor. (225C)



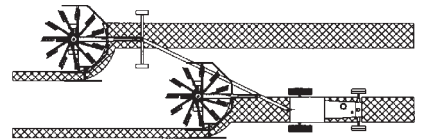
Raking two windrows outward with rakes to right side of tractor. (225C)



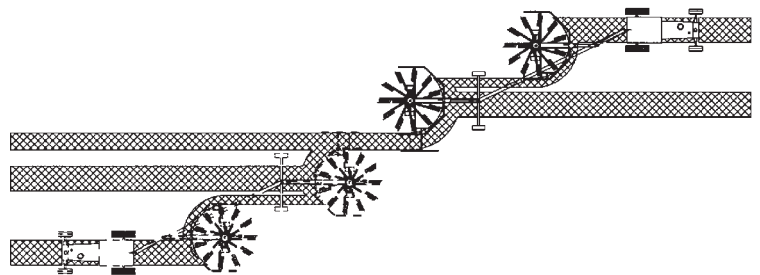
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## Windrow Placement, continued

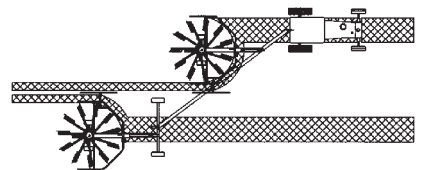
Raking two windrows to the right with rakes to left side of tractor (225R).



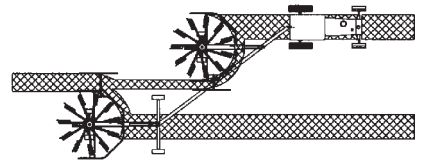
Rakes four (or five) windrows into one windrow with rakes to right side of tractor. (2 passes required, 225R)



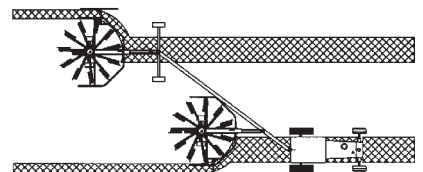
Raking two windrows inward with rakes to right side of tractor (225C).



Raking two windrows into one center windrow with rakes to right side of tractor (225C).



Raking two windrows outward with rakes to left side of tractor (225C).



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## LUBRICATION AND MAINTENANCE

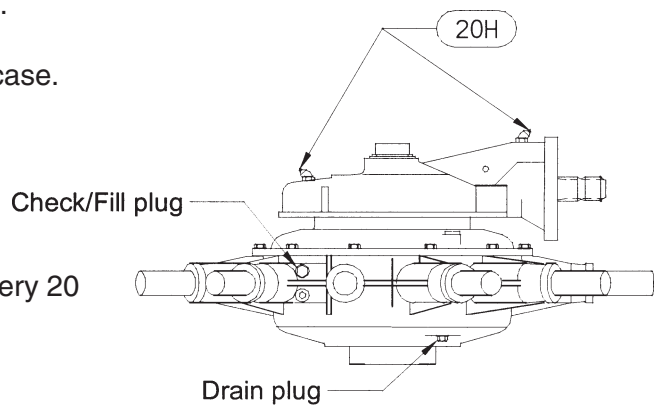


### WARNING

**NEVER attempt to service the rake unless the POWER SOURCE SHUT DOWN PROCEDURE (page 5) has been exercised.**

### Gearbox

- Drain Interval: First oil change after first 50 hours (or first year) thereafter every 1000 acres or annually.
- Fill level: Check/fill plug on side of gearbox.
- Drain Plug: Magnetic plug on bottom of gearcase.
- Oil Type: EP80/90 Gear Lube
- Oil Capacity: 6.5 Qts (6.2L)
- Grease: Ring gear and pinion bearings every 20 hours.



### Hydraulic Reservoir

- Change oil filter after first 20 hours of operation and annually thereafter. (Part # 17.00392)



### CAUTION

Always check the hydraulic reservoir oil level when the machine is cold. Operating the machine causes the oil temperature to increase which pressurizes the reservoir. This pressure can cause oil to spray out of the filler cap if removed.

- Maintain the hydraulic reservoir oil level between the add and full marks on the dipstick (Be sure to never overfill). The level should be checked with the front hitch approximately 16" above the ground. Use Amoco 1000 or compatible hydraulic oil.
- Drain Interval: Annually
- Fill level: Fill to Full mark on dipstick
- Drain Plug: Located at front of frame
- Oil Type: Amoco 1000 or compatible hydraulic oil
- Oil Capacity: Approximately 27 gallons (102.2 L)



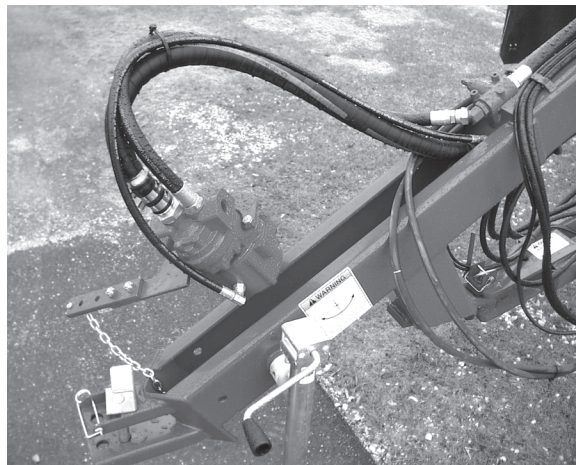
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## **Greasing**

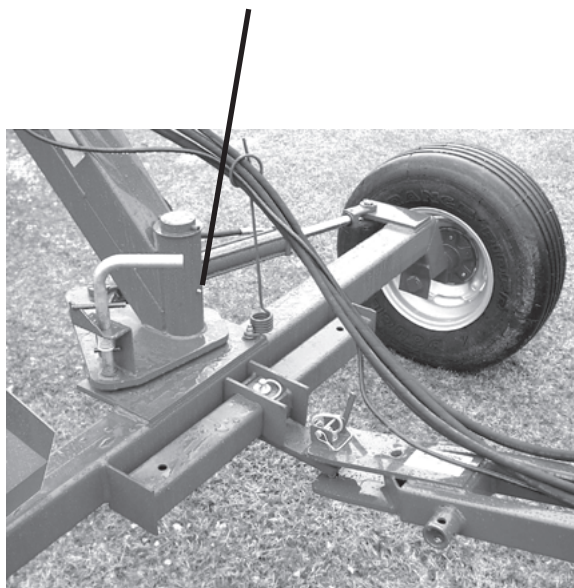
- Use a good grade of lithium base grease.
- Wipe dirt from the grease fittings before greasing.
- Replace any missing or damaged fittings.
- Lubricate all fittings daily for the first week of operation.

## **Swing Frame**

- Every 20 hours lubricate PTO pump splines.



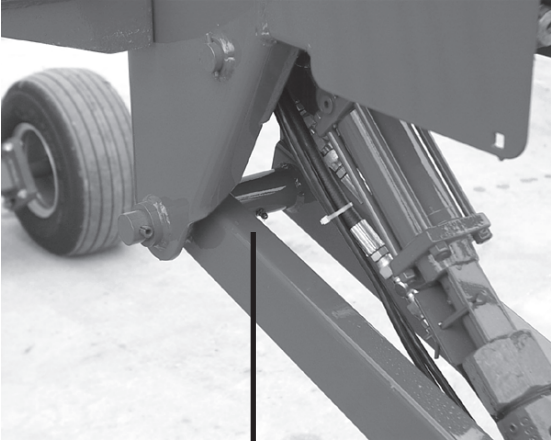
- Every 20 hours lubricate steerable axle pivot.



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## **Rake Frame**

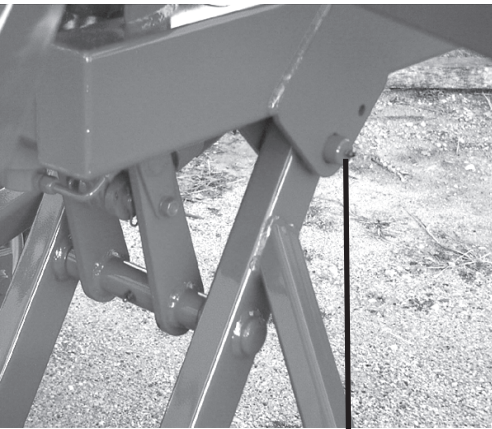
- Lubricate every 20 hours



Hitch Pivot



Lift Linkage



Axle Pivot



Tandems

## **Tires and Wheels**

- Clean and repack wheel bearings annually.
- Maintain rake tire pressure at 15-20 psi.
- Maintain swing frame tire pressure at 28-32 psi.
- Tighten wheel lug bolts to 85 ft-lb.

---

## **General Maintenance**

After the first hour of use check all fasteners and tighten any that are loose. Thereafter, check all fasteners every 20 hours of operation.

- Repair or replace any broken or damaged parts immediately.
- Replace missing safety and operating decals.

## **Storage**

- Clean the rake of dirt, and plant material.
- Apply a coating of oil or grease to the cylinder rods to prevent rusting.
- Repaint surfaces where paint has worn off.
- Store in the transport position.
- Store in a dry, protected place.
- If required for storage, the overall size of the rakes may be reduced as follows:
  - Remove the swath screen.
  - Remove the guards by unbolting them from the frame.
  - Remove the tine arms as required by driving out the roll pins attaching the tine arms to the gearbox. Use new roll pins when reinstalling tine arms. 7mm Part #907341 and 12mm Part #907342. Refer to the RAKE ASSEMBLY section of this manual following the instructions under "Install the tine arm assemblies onto the gear box".

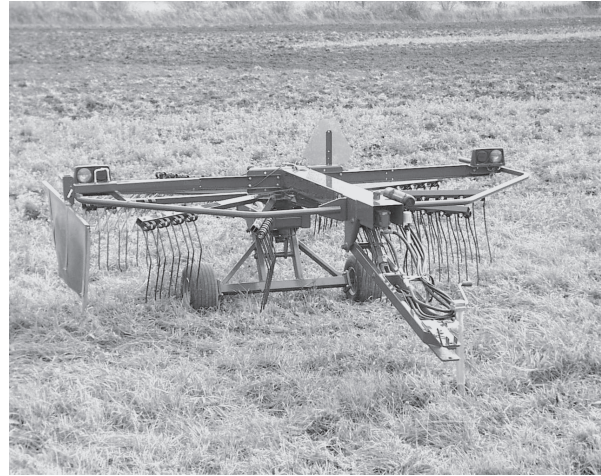


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## RAKE ASSEMBLY



Fully assembled left hand rake with PTO drive



Fully assembled right hand rake with hydraulic drive.



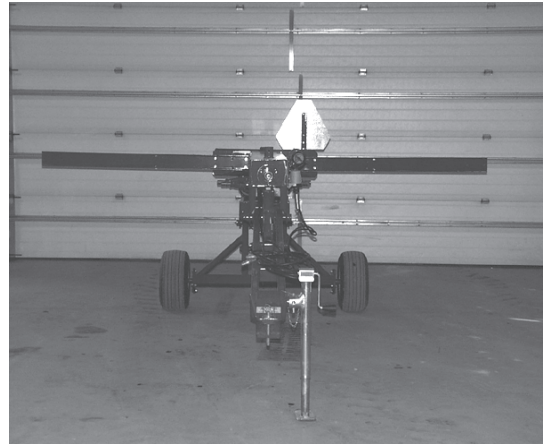
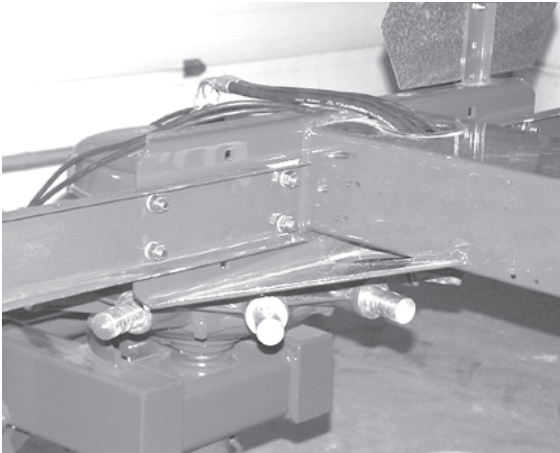
Fully assembled 225C (Center discharge)

Rotary Rakes are shipped in various stages of assembly, ranging from palletized rakes to completely assembled. Be sure to read through each step of the assembly instructions to make sure your rake is properly assembled and ready for operation.

All hardware required to assemble rake is contained in the hardware bag shipped with each rake. Refer to Torque Specifications Section of this manual for proper fastener torques.

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**Step 1:**     **Install the guard supports** to the base of the front frame at the gearbox using 1/2 x 1 1/4 carriage bolts, lockwashers and nuts. Hold the outer end of the guard supports up so that they are level and tighten the nuts.



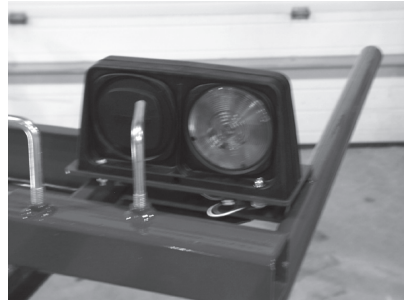
**Step 2 :**     **Install the Left and Right Guards** to the sides of the front frame near the hitch and to the ends of the Guard Supports. Use 1/2 x 1 1/4 carriage bolts, lockwashers and nuts at the guard supports. Use 1/2 x 1 1/4 hex bolts and lockwashers in the top holes at the front frame and 1/2 x 1 1/4 hex bolts, lockwashers and nuts in the lower holes.



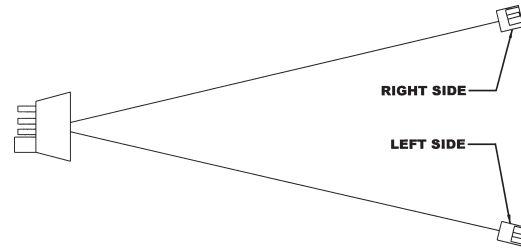
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**Step 3: Install transport lights and harness.**

A. Install light assemblies to light brackets using 1/4 x 1 1/2 bolts and locknuts. (Do not install front-outside bolt until harness and clamp are installed). Red lights must be to inside and facing rearward.

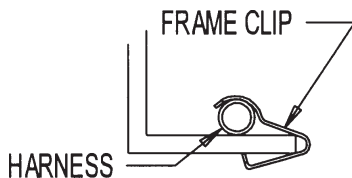


B. Remove and discard cap from front light harness (already installed into front frame). Connect the wishbone harness to the front harness and route the wishbone harness along the guard supports and through the hole in the light brackets and connect to light plugs. DO NOT FASTEN IN PLACE YET.



C. Using a tractor with the proper 7-pin outlet, check for proper connections. Be sure left and right turn signals, flashers, and tail lights all operate properly.

D. Fasten light harness in place using a clamp, 1/4 x 1 1/2 bolt, flatwasher and locknut at the light assembly plug and four frame clips spaced along each guard support.



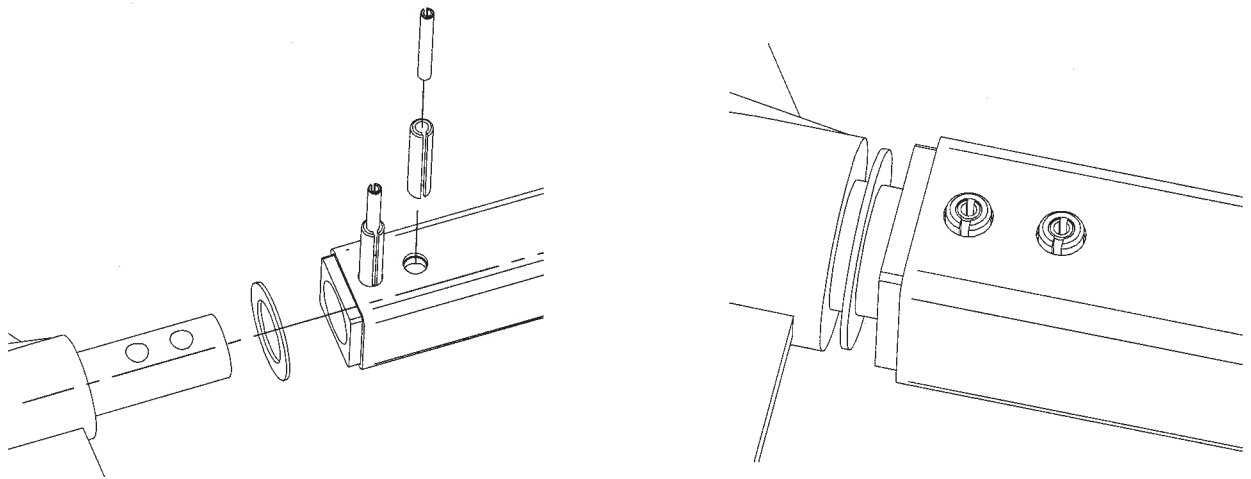
E. Secure the connection between the front harness and the wishbone harness by wrapping the connectors with electrical tape. Pull excess harness into front frame by pulling on front harness from the front of the rake. Be sure wire harness cannot contact drive shaft inside rake frame during operation.



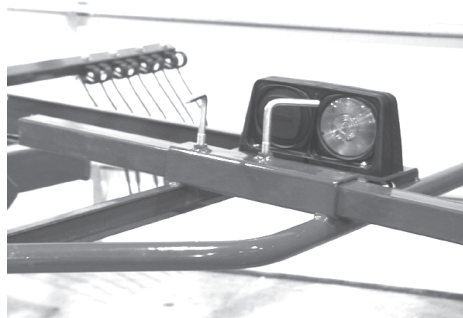
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**Step 4:**     **Install the tine arm assemblies onto the gearbox.** Place one 1 3/8 flatwasher onto each tine arm shaft and lubricate shafts and tine arm bores with anti-seize. Slide tine arms onto tine arm shafts. Align the holes in the tine arm with the holes in the gearbox shaft. Insert the 12mm pin into the hole with the slot oriented as shown (90° from shaft centerline) and drive the 12mm pin approximately 1/2" into the hole. Drive the 7mm pin into the 12mm pin. (Orient the slots as shown-180° apart). Drive both pins through the tine arm together. The pins should protrude evenly on each side of the tine arm after installation. Note: Check fit between tine arm and tine arm shaft before applying anti-seize. If rust or paint are present, remove carefully. A loose fit will lead to roll pin failure.

**DO NOT POUND TINE ARMS ONTO SHAFTS! This will damage internal gearbox components.**



**Step 5:**     **Install swath screen.** Slide the swath screen adjuster into the adjuster base. Lock in place with the bent threaded pins. Fasten the swath screen to the adjuster using the pin and clip provided.



**Step 6:**     **Install the reflective decals** as shown in the Safety Decals section of this manual.

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**Step 7:**      **Charge hydraulic system with oil.** The rake hydraulic system is NOT charged with oil at the factory. Charge the lift system with oil prior to removing cylinder locks used for shipping.



**Step 8:**      **Level Rake (side to side)** Park on level ground. Use tractor hydraulics to lower the rake to the field position. Measure distance from tine tip to ground on left & right side. Jack up one side of the rake & support it. (Place jack under rake axle). Loosen 4 fastening bolts and slide spindle mount half the difference in vertical distance of tine tip to ground between left & right side of rake. Tighten hardware.



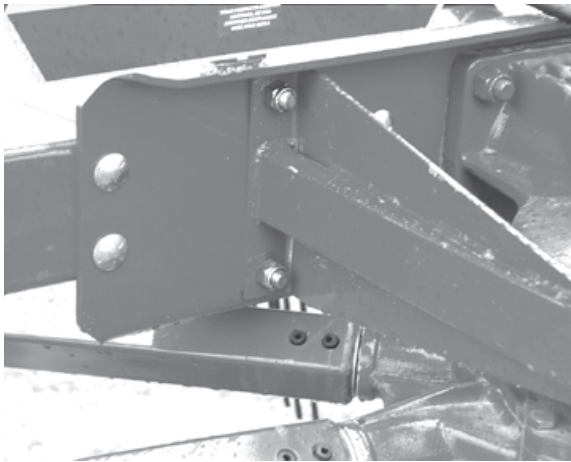
**Step 9:**      **Install hitch pin and clip.**



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**Step 10:     Install Rear Guard on Front Rake.**

- A.     Install support brackets to the front frame using 1/2 inch hardware.
- B.     Insert rear guard tube into left and right guard tubes. Fasten rear guard to support brackets using 1/4 inch u-bolts.
- C.     Drill 13/32 inch diameter cross holes through guards (approximately 6 inches from ends of left and right guard tubes). Install 3/8 bolts and locknuts.



Step A



Fully installed rear guard



Step B



Step C

**Step 11:** See tractor and rake preparation section of this manual for hooking rakes to swing frame.

---

## OPTIONS AND ACCESSORIES

| ITEM NO. | DESCRIPTION                             |
|----------|---|
| 17.00943 | Tine Saver Kit (44 Total)- 2 kits req'd |
| 17.00945 | Tine Saver (single)                     |
| 17.00908 | 10 Ply Tire & Wheel Assembly            |
| 17.00940 | 10 Ply Tube & Tire                      |

## SPECIFICATIONS

| 225 Twin Rotary Rakes       |   |                                  |
|-----------------------------|---|----------------------------------|
|                             | 225L (2 Left Hand Rakes)<br>225R (2 Right Hand Rakes) | 225C (1Left & 1 Right Hand Rake) |
| Working Width Per Rotor     | 14' per rotor creating two separate windrows          |                                  |
| Working Width Combined      | 21'6" plus windrow                                    | 22' plus windrow                 |
| Raking Width Per Rotor      | 11'   |                                  |
| Raking Width Combined       | 21'6"   | 22'                              |
| Transport Width & Length    | 11'9" wide & 40' long                                 |                                  |
| Gearbox Oil Capacity        | 6.5 qts (6.2L)  |                                  |
| Number of Tine Arms         | 11 per rotor  |                                  |
| Number of Tines             | 44 double teeth per rotor                             |                                  |
| Tractor Requirements        | 60 HP with 540 RPM PTO                                |                                  |
| Tractor Hydraulics Required | Two sets of remotes with minimum of 1800 psi          |                                  |
| Weight                      | Approximately 4600 pounds                             |                                  |
| Tires (Rakes)               | 18 x 9.5 x 8 10 ply flotation                         |                                  |
| Tires (Swing frame)         | 11L x 15 recaps                                       |                                  |
| Reservoir Oil Capacity      | Approximately 27 gallons (102.2L)                     |                                  |
| Pump Capacity               | 3000 PSI 22 G.P.M.                                    |                                  |

Miller-St. Nazianz, Inc. reserves the right to change its products or this description at any time without notice or obligation.

# TROUBLE SHOOTING

## PTO PUMP TROUBLE SHOOTING







| <u>Problem</u>                                    | <u>Possible Cause</u>   | <u>Correction</u>   |
|---|---|---|
| 1. Noisy pump caused by cavitation.               | a. Low hydraulic fluid.<br>b. Suction line plugged.<br>c. Cold weather/cold oil   | a. Check & add fluid as necessary.<br>b. Clean line.<br>c. Operate at reduced RPM until oil is warm.                              |
| 2. Oil heating                                    | a. Oil supply low or too full.<br>b. Contaminated oil.<br>c. Dirty filter.  | a. Check & adjust fluid level as necessary.<br>b. Drain reservoir and refill with clean oil.<br>c. Replace.                       |
| 3. Shaft seal leakage                             | a. Worn shaft seal.<br>b. Excessive internal wear.  | a. Replace shaft seal.<br>b. Inspect parts and replace as needed.   |
| 4. Foaming oil                                    | a. Low oil level.<br>b. Air leaking into suction line.  | a. Check & add fluid as necessary.<br>b. Tighten fittings.  |
| 5. Oil leaking by filler cap, or by suction hose. | a. Gasket in filler cap torn.<br>b. Oil level in reservoir too high.  | a. Replace filler cap gasket.<br>b. Adjust oil level to specifications.   |
| 6. Rake does not rotate when PTO engaged.         | Motor drive hoses reversed.   | Reverse motor drive hoses at quick disconnects.   |
| 7. Rakes are slowing down or stalling.            | a. Ground speed too fast.<br>b. Material too wet or heavy.<br>c. Relief valve setting too low.<br>d. Relief valve not seating properly. | a. Reduce ground speed.<br>b. Reduce ground speed.<br>c. See dealer (Do not exceed 2800 psi)<br>d. Clean or replace relief valve. |



# TORQUE SPECIFICATIONS

**NOTE:** Use these torque values when tightening hardware (excluding: locknuts and self tapping, thread forming and sheet metal screws) unless specified otherwise.

All torque values are in lb-ft except those marked with an (\*) which are lb-in (for metric torque value Nm, multiply lb-ft value by 1.355 or for lb-in multiply by 0.113).

| Unified<br>National Thread | Grade 2      |       | Grade 5       |       | Grade 8       |       |
|----------------------------|---|-------|---|-------|--|-------|
|                            | Dry   | Lubed | Dry   | Lubed | Dry  | Lubed |
| 8-32                       | 19*   | 14*   | 30*   | 22*   | 41*  | 31*   |
| 8-36                       | 20*   | 15*   | 31*   | 23*   | 43*  | 32*   |
| 10-24                      | 27*   | 21*   | 43*   | 32*   | 60*  | 45*   |
| 10-32                      | 31*   | 23*   | 49*   | 36*   | 68*  | 51*   |
| 1/4-20                     | 66*   | 50*   | 9   | 75*   | 12   | 9     |
| 1/4-28                     | 76*   | 56*   | 10  | 86*   | 14   | 10    |
| 5/16-18                    | 11  | 9     | 17  | 13    | 25   | 18    |
| 5/16-24                    | 12  | 9     | 19  | 14    | 25   | 20    |
| 3/8-16                     | 20  | 15    | 30  | 23    | 45   | 35    |
| 3/8-24                     | 23  | 17    | 35  | 25    | 50   | 35    |
| 7/16-14                    | 32  | 24    | 50  | 35    | 70   | 55    |
| 7/16-20                    | 36  | 27    | 55  | 40    | 80   | 60    |
| 1/2-13                     | 50  | 35    | 75  | 55    | 110  | 80    |
| 1/2-20                     | 55  | 40    | 90  | 65    | 120  | 90    |
| 9/16-12                    | 70  | 55    | 110   | 80    | 150  | 110   |
| 9/16-18                    | 80  | 60    | 120   | 90    | 170  | 130   |
| 5/8-11                     | 100   | 75    | 150   | 110   | 220  | 170   |
| 5/8-18                     | 110   | 85    | 180   | 130   | 240  | 180   |
| 3/4-10                     | 175   | 130   | 260   | 200   | 380  | 280   |
| 3/4-16                     | 200   | 150   | 300   | 220   | 420  | 320   |
| 7/8-9                      | 170   | 125   | 430   | 320   | 600  | 460   |
| 7/8-14                     | 180   | 140   | 470   | 360   | 660  | 500   |
| 1-8                        | 250   | 190   | 640   | 480   | 900  | 680   |
| 1-14                       | 270   | 210   | 710   | 530   | 1000   | 740   |
| Metric<br>Course Thread    | Grade 8.8  |       | Grade 10.9  |       | Grade 12.9  |       |
|                            | Dry   | Lubed | Dry   | Lubed | Dry  | Lubed |
| M6-1                       | 8   | 6     | 11  | 8     | 13.5   | 10    |
| M8-1.25                    | 19  | 14    | 27  | 20    | 32.5   | 24    |
| M10-1.5                    | 37.5  | 28    | 53  | 39    | 64   | 47    |
| M12-1.75                   | 65  | 48    | 91.5  | 67.5  | 111.5  | 82    |
| M14-2                      | 103.5   | 76.5  | 145.5   | 108   | 176.5  | 131   |
| M16-2                      | 158.5   | 117.5 | 223.5   | 165.5 | 271  | 200   |

## TIGHTENING HYDRAULIC FITTINGS



**CAUTION:** *Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.*

### Tightening O-Ring Fittings\*

1. Inspect O-ring and seat for dirt or obvious defects.
2. On angle fittings, back the locknut off until washer bottoms out at top of groove.
3. Hand tighten fitting until backup washer or washer face (if straight fitting) bottoms on face and O-ring is seated.
4. Position angle fittings by unscrewing no more than one turn.
5. Tighten straight fittings to torque shown.

\* Torque values shown are based on lubricated connections as in reassembly.

| Thread Size | Nut Size Across Flats | Torque Value* |         | Recommended Turns To Tighten (After Finger Tightening) |         |
|-------------|-----------------------|---------------|---------|--|---------|
|             |                       | (Nm)          | (lb-ft) | (Flats)  | (Turns) |
| 3/8         | 1/2                   | 8             | 6       | 2  | 1/3     |
| 7/16        | 9/16                  | 12            | 9       | 2  | 1/3     |
| 1/2         | 5/8                   | 16            | 12      | 2  | 1/3     |
| 9/16        | 11/16                 | 24            | 18      | 2  | 1/3     |
| 3/4         | 7/8                   | 46            | 34      | 2  | 1/3     |
| 7/8         | 1                     | 62            | 46      | 1-1/2  | 1/4     |
| 1-1/16      | 1-1/4                 | 102           | 75      | 1  | 1/6     |
| 1-3/16      | 1-3/8                 | 122           | 90      | 1  | 1/6     |
| 1-5/16      | 1-1/2                 | 142           | 105     | 3/4  | 1/8     |
| 1-5/8       | 1-7/8                 | 190           | 140     | 3/4  | 1/8     |
| 1-7/8       | 2-1/8                 | 217           | 160     | 1/2  | 1/12    |

### Tightening Flare Type Fittings\*

1. Check flare and flare seat for defects that might cause leakage.
2. Align hose end with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the hose, use two wrenches. Place one wrench on the hose end body and with the second wrench, tighten the swivel nut to the torque shown in this chart.

\* Torque values shown are based on lubricated connections as in reassembly.

| Tube Size OD | Nut Size Across Flats | Torque Value* |         | Recommended Turns To Tighten (After Finger Tightening) |         |
|--------------|-----------------------|---------------|---------|--|---------|
|              |                       | (Nm)          | (lb-ft) | (Flats)  | (Turns) |
| 3/16         | 7/16                  | 8             | 6       | 1  | 1/6     |
| 1/4          | 9/16                  | 12            | 9       | 1  | 1/6     |
| 5/16         | 5/8                   | 16            | 12      | 1  | 1/6     |
| 3/8          | 11/16                 | 24            | 18      | 1  | 1/6     |
| 1/2          | 7/8                   | 46            | 34      | 1  | 1/6     |
| 5/8          | 1                     | 62            | 46      | 1  | 1/6     |
| 3/4          | 1-1/4                 | 102           | 75      | 3/4  | 1/8     |
| 7/8          | 1-3/8                 | 122           | 90      | 3/4  | 1/8     |



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## WARRANTY

MILLER-ST. NAZIANZ, INC. warrants each new Victor Rotary Rake to be free from defects in material and workmanship under recommended use and service, as stated in the Operator's Manual, as follows:

- Warranty:** Miller will replace, F.O.B. St. Nazianz, Wisconsin, or repair, as Miller elects, any part of a new Victor Rotary Rake which is defective in material or workmanship:
- (a) without charge for either parts or labor during the first year following delivery to the original retail customer; and
  - (b) without charge for parts only (not labor) during the second year following delivery to the original retail customer.
  - (c) Notwithstanding the above, Miller does not warrant teeth against wear and breakage as this item is expected to wear and extent of wear or breakage depends on field conditions and operating practices.

The warranty period for equipment used for commercial, industrial, lease, rental and custom operation or any non agricultural use is limited to 90 days from date of delivery to the first retail purchaser.

All warranties on the new Victor Rotary Rake shall apply only to the original retail purchaser from an authorized Miller dealer.

### **Repair Parts**

Miller warrants that it will replace, F.O.B. St. Nazianz, Wisconsin, or repair, as Miller elects, without charge, any genuine Victor spare part purchased after the expiration of the new Rotary Rake warranty, or to any subsequent owners, that is defective in material or workmanship, within ninety (90) days of the installation date.

### **Misuse**

The provisions of this warranty shall not apply to any Victor Rotary Rake which has been subject to misuse, negligence, alteration or accident, or which shall have been repaired with parts other than those obtainable through Miller.

### **Authorized Dealer**

Repairs eligible for labor warranty must be made by Miller or an authorized Victor dealer. The purchaser is responsible for transportation of the equipment to the dealership for warranty service or for any service call expense.

### **Exclusive Effect of Warranty and Limitation of Liability**

The remedies of the customer set forth herein are exclusive. Miller neither assumes nor authorizes any person to assume any other obligation or liability in connection with the sale of covered equipment. Correction of defects and malfunctions in the manner and for the applicable period of time provided above, shall constitute fulfillment of all responsibilities of Miller to the customer and Miller shall not be liable for negligence, under contract, or in any other manner with respect to such equipment. IN NO EVENT SHALL THE OWNER BE ENTITLED TO RECOVER FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES SUCH AS BUT NOT LIMITED TO: LOSS OF CROPS, LOSS OF PROFITS OR REVENUE, OTHER COMMERCIAL LOSSES, INCONVENIENCE OR COST OF RENTAL OF REPLACEMENT EQUIPMENT.

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PURPOSE OR OTHER WARRANTIES, EXPRESS OR IMPLIED.

### **Warranty Requirements**

To be covered by warranty, each machine must be properly registered with Miller within 30 days of date of original retail delivery.

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