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# MILLER PRO

MODEL 1150

## ROTARY RAKE OPERATOR'S MANUAL

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

Part Number: 17.00801C  
May 2005



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St. Nazianz, WI 54232  
(920) 773-2121  
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 Miller Pro 1150 Rotary Rake. Complete Assembly, Operation, Lubrication and Maintenance procedures are provided. Following the recommended procedures will help you achieve many years of dependable service.

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 NUMBER

The machine serial number is located on the side of the rake frame near the operator's manual storage tube. For your convenience refer to this number and your product model number when requiring service or parts information. Record the machine serial number, model number, date of purchase and dealership name in the space provided below.

|                      |                  |
|----------------------|------------------|
| Date Purchased _____ |                  |
| Model No. _____      | Serial No. _____ |
| 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!

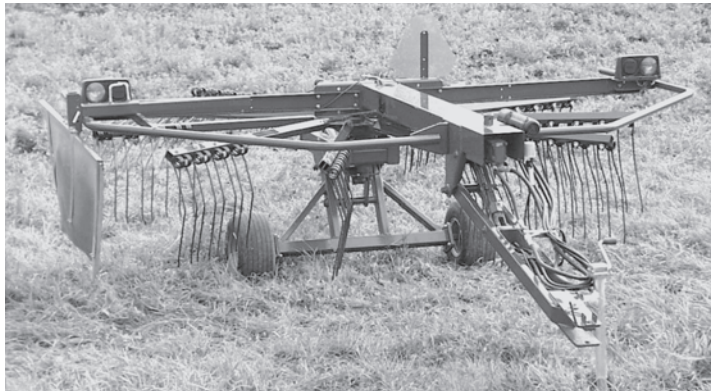
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## OVER ALL MODEL VIEW



Fully assembled left hand rake with PTO drive



Fully assembled right hand rake with hydraulic drive.

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## 1150 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.
- ☐ The Gearbox is filled to proper oil level; All Grease Fittings have been properly lubricated; see Lubrication chapter of this manual.
- ☐ Cam adjuster operates freely and is 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.
- ☐ Rotating PTO Shields turn freely.
- ☐ 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

---

Serial Number

### 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 Tractor/Rake preparation and Operation sections of this manual.
- ☐ Explain and review with customer the PTO Driveline information in the separate manual provided.
- ☐ Completely fill out Owner's Registrations, including customer's signature, and return them to the Company.

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

---

Customer's Signature

---

Date Delivered

(Customer Copy)

---

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- ☐ As applicable, the Cylinders, Hoses and Fittings are **NOT** damaged, leaking or loosely connected.
- ☐ The Gearbox is filled to proper oil level; All Grease Fittings have been properly lubricated; see Lubrication chapter of this manual.
- ☐ Cam adjuster operates freely and is 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.
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I acknowledge that above points were reviewed with me at the time of delivery.

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Customer's Signature

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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 telescoping PTO driveline 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.

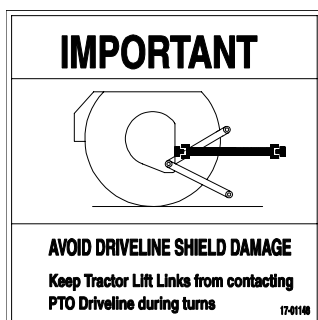
**BE SURE** the hitchjack locking pin is completely engaged and that the machine is properly blocked and prevented from rolling **BEFORE** disconnecting the rake from the tractor.

## SAFETY DECALS

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



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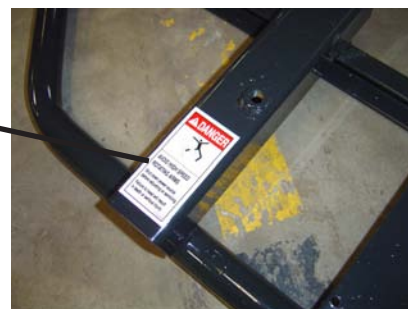
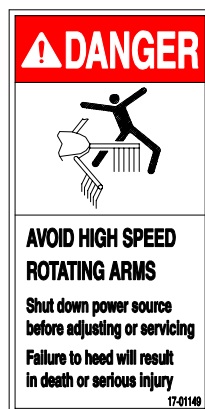
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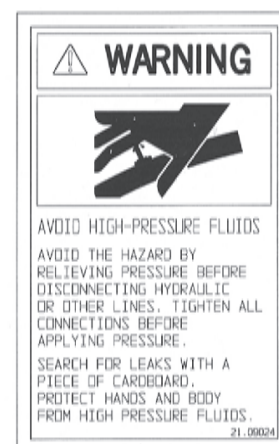
## SAFETY DECALS



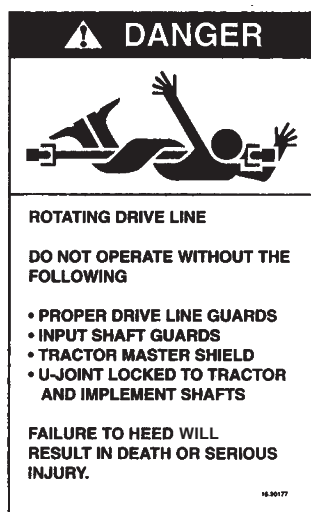
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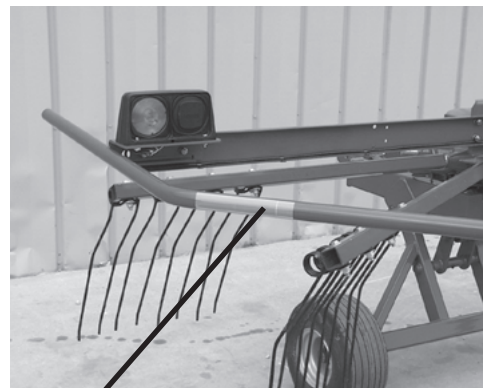
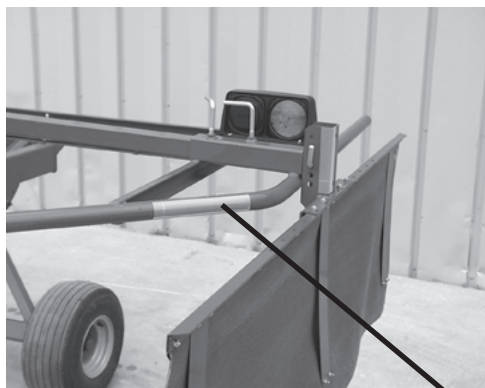
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## SAFETY DECALS

### REFLECTIVE DECALS



907220 Yellow Reflector

907219 Red Reflector

907221 Fluorescent Orange

907224 SMV Emblem

907221 Fluorescent Orange

907219 Red Reflector

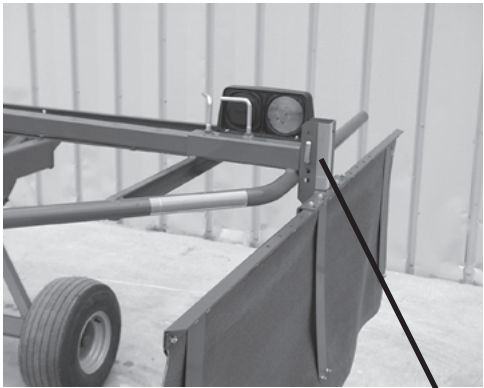




## SAFETY DECALS

### REFLECTIVE DECALS- SWATH SCREEN

**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!



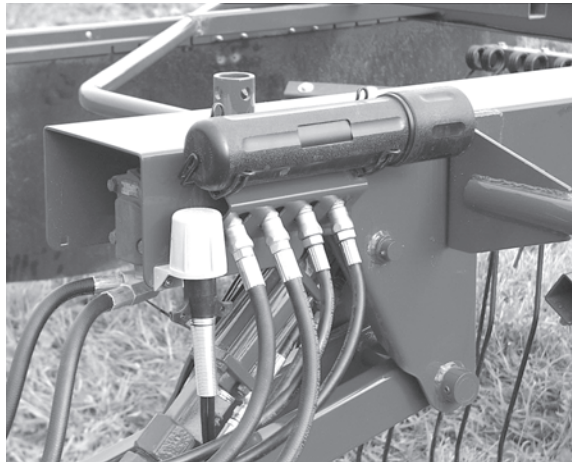
### WARNING

**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 this machine and the PTO Safety Manual should be stored in the weather-proof canister attached to the machine.



### 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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## **Rotating PTO Guard**

The telescoping PTO shaft, between the rake and the tractor, is equipped with rotating shields. If the rotating shield nearest the rake is equipped with a chain, make sure the chain is clipped into the hole in the rake frame.



### **WARNING**

**Be SURE the rotating PTO shield turns freely BEFORE starting the tractor engine!**



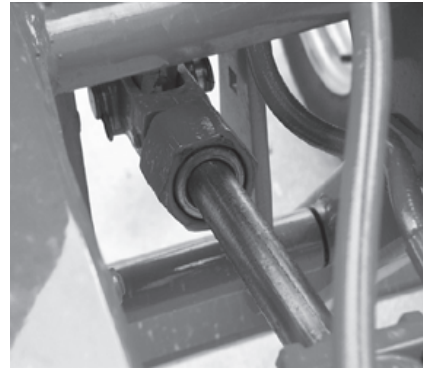
## **Overload Clutch**

The PTO Driveline is equipped with a radial pin overload clutch to protect the drive components should the rake become clogged or obstructed, or if the tractor PTO is engaged or disengaged at too high a RPM. Clutch slippage can be identified by a clicking sound.

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## **Hydraulic Lift System**

The hydraulic lift system consists of two 2-way hydraulic cylinders 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**

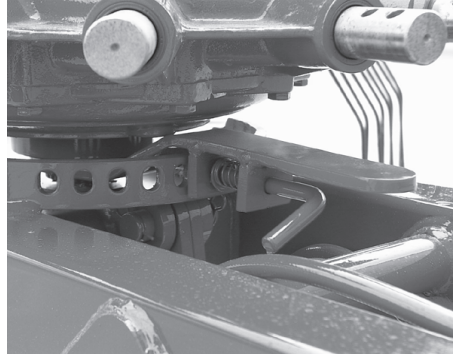
On the hydraulically driven version of the rake, the PTO Driveline is replaced with a hydraulically operated drive system. The system consists of a hydraulic motor, check valve, and hoses. (The check valve acts as an overrunning clutch to protect the drive system). The hydraulic drive system requires one tractor remote hydraulic valve in addition to the valve required for the lift system. The operating speed of the hydraulically driven rake is controlled by the tractor engine speed and the tractor hydraulic flow control.



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## **Adjustable Cam**

The cam in the 1150 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**

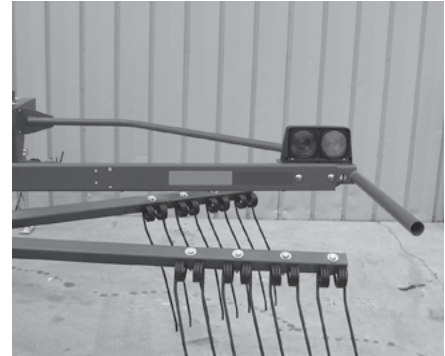
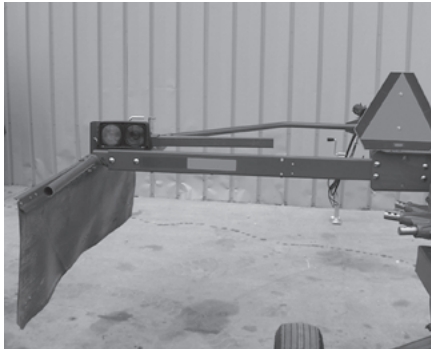
The swath screen acts as a "back stop" for the windrow. Adjusting the swath screen outward will create wider windrows and adjusting it inward will create narrower (and taller) windrows. The swath screen can also be adjusted forward if the raked crop is being thrown in front of the swath screen. (This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



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## **Transport Lights**

Transport lights, for use when towing rake on public highways, are standard on all Model 1150 Rotary Rakes.



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## TRACTOR/RAKE PREPARATION

### Tractor Set-Up for PTO Driven Rake



#### CAUTION

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

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 not more than 14" below the tractor PTO shaft.
- The hitch point of the tractor drawbar should be at least 13" but not more than 22" above the ground.
- Looking from the rear of the tractor, the hitch point of the tractor drawbar and PTO should be in a vertical line with each other.



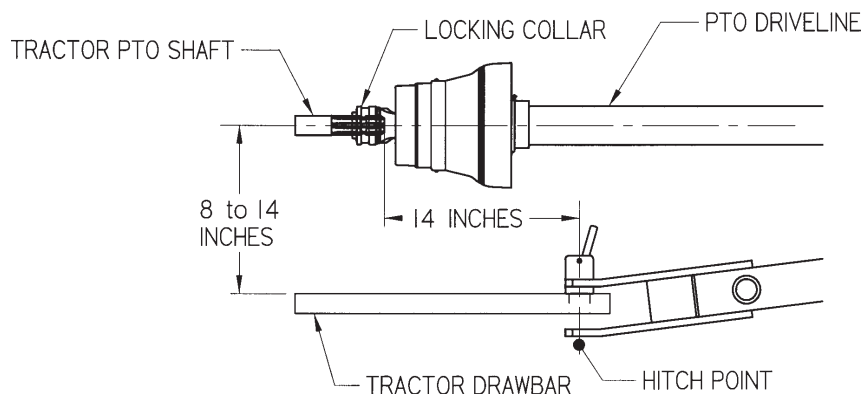
#### WARNING

**The front PTO joint must be guarded by the tractor master PTO shield provided by the tractor manufacturer. To avoid injury BE SURE to have it installed BEFORE operation!**



#### WARNING

**BE SURE the telescoping PTO drive shaft locking device is positively engaged into the tractor PTO shaft BEFORE starting tractor engine!**



### **PTO Attachment Procedure**

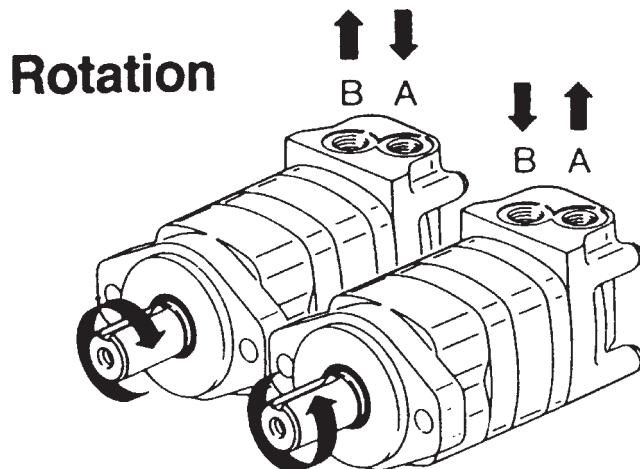
Pull the locking collar on the tractor end (CV end) of the PTO driveline rearward (away from the tractor) and slide the driveline on to the tractor PTO output shaft as far as possible. Release the locking collar. Pull the PTO driveline rearward until the locking collar snaps into the locked position and the PTO driveline cannot be moved forward or rearward.

---

## Hydraulic Drive Hookup

**IMPORTANT:** Excessive hydraulic speed may cause machine damage. Adjust tractor remote hydraulic valves to obtain a flow rate of 8 to 12 GPM. (Refer to tractor Operator's Manual for the correct circuit hook-up and operating procedures for hydraulic motor driven equipment).

Connect the two hydraulic motor hoses to the appropriate remote hydraulic valve on the tractor. See figure for proper motor rotation.



### Rotation

Port A Pressurized - Left Hand Rotary Rake

Port B Pressurized - Right Hand Rotary Rake

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## Hydraulic Lift Hook-up

Connect the two hoses for the hydraulic lift system to the appropriate remote hydraulic valve on the tractor. See tractor Operator's Manual for recommended circuit hook-up.

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



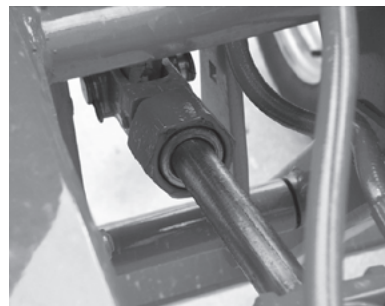
## Rake Height/Level Adjustment

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

To adjust:

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.

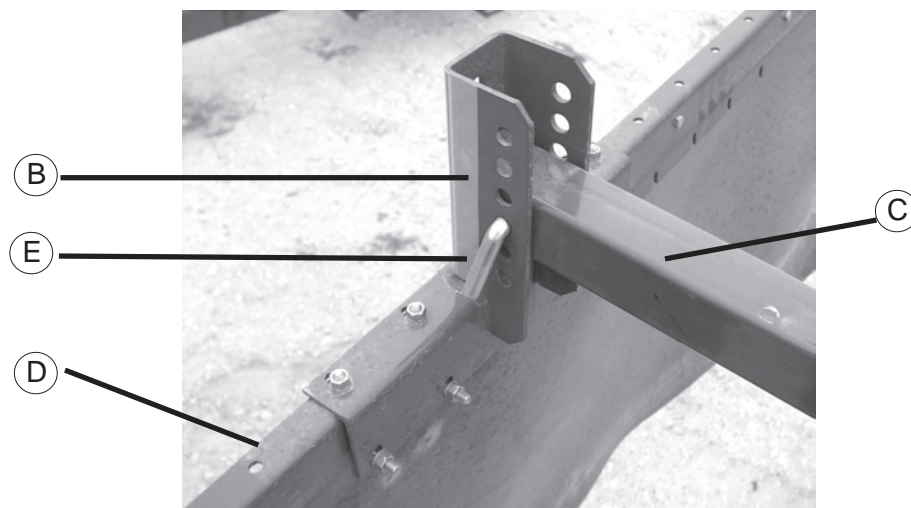
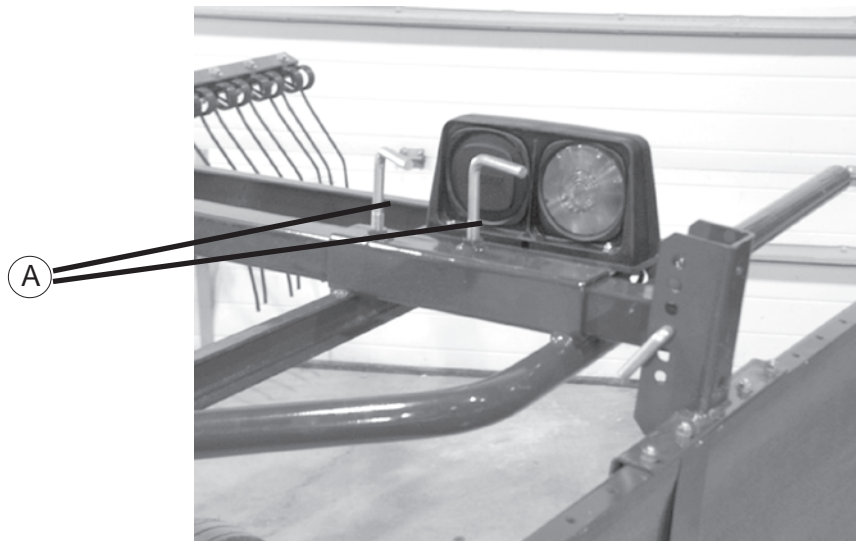


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## **Swath Screen Adjustments**

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**

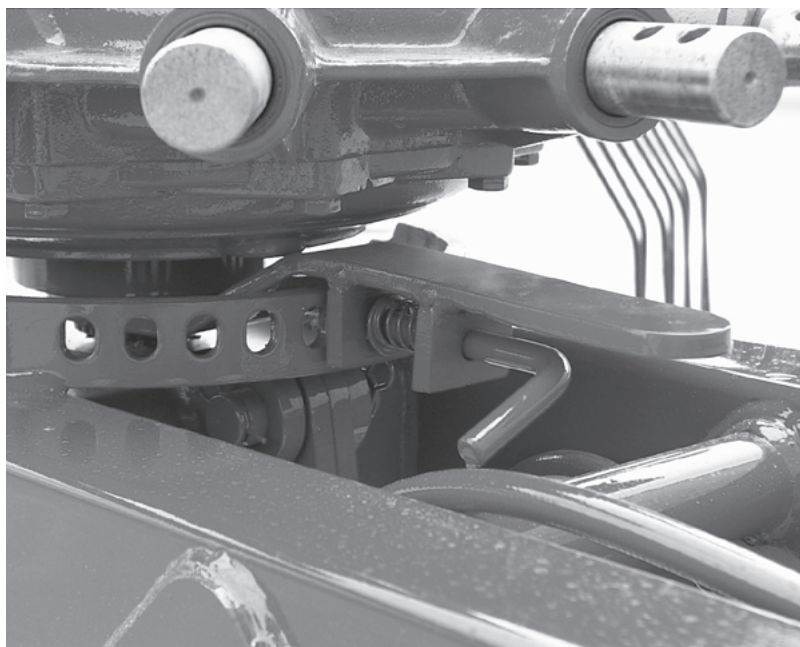
The best cam setting will be determined by crop type, crop density, and swath width. Normally, in short, light crops, the cam should be moved to the right (moved to the left on right hand rakes) causing the tines to release the crop later. This will create a neater windrow without "tails" along the inside 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 1150 Rotary Rakes are equipped with transport lighting for transporting the unit on public highways. The light cord supplied with the rakes has a standard seven prong plug. Contact your tractor dealer if your tractor does not have the appropriate receptacle.

### SMV Emblem and Reflectors

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

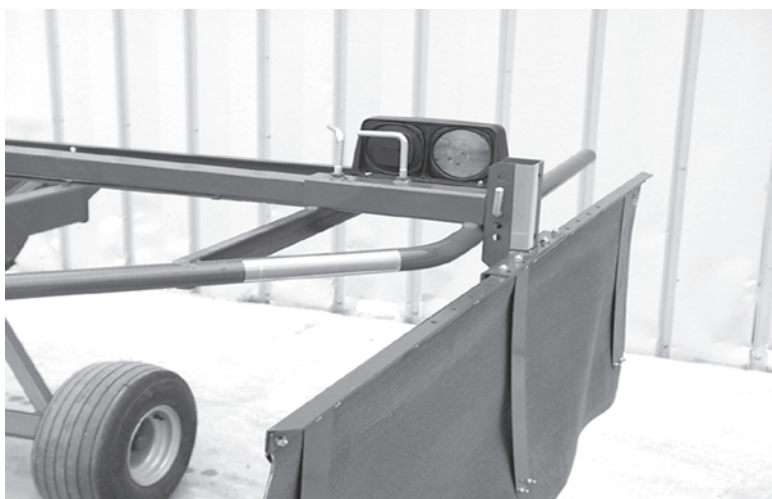
### Safety Chain (Order Part Number 329946B91)

Rakes can be equipped with a safety chain for travel on public highways. Contact your dealer to order the appropriate size chain. When attaching chain, 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.**

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

1. Raise the rake 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 assembly completely into the guard tube and tighten the threaded pins.



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## OPERATION



### CAUTION

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

### Pre-operation Checklist

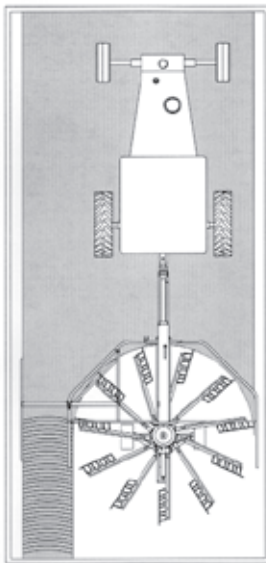
Make sure:

- All guards are in place.
- PTO Driveline shields rotate freely.
- There are no bystanders around rake .

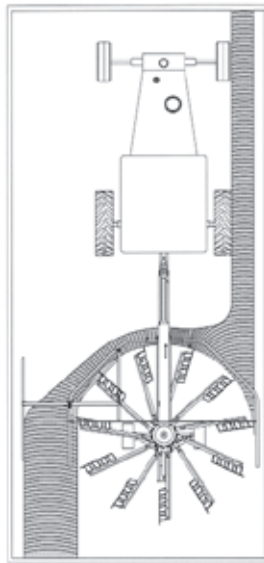
### General

The Miller Pro rotary rake is designed to create fluffy windrows from the crop as it lays behind your cutting implement or a previously formed windrow. It can also be used to combine two or more windrows. The size and shape of the windrow is controlled by the ground speed, the PTO speed, the cam setting and the swath screen setting.

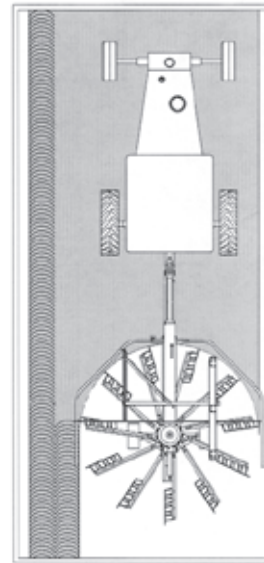
Ground speed and rake RPM should be selected to move the crop with minimal losses. In dry crops, begin raking with PTO speed at 250-300 RPM (approximately 1/2 tractor throttle) and increase ground speed as long as rake is clearing the crop. Ground speed may need to be reduced significantly and RPM slightly increased in areas where the crop is denser or higher in moisture content.



Raking A Single Windrow



Turning A Windrow



Raking A Double Windrow

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### **PTO Driven Rake**

Engage the PTO slowly at a low RPM and adjust rake to the desired PTO speed before proceeding forward. When making turns, do not to create an angle of 80 degrees or more in the front CV-joint of the PTO driveline. **Angles greater than 80 degrees will damage the CV-joint.** When finished, reduce the PTO speed before disengaging the PTO.

NOTE: The PTO Driveline of the rake is equipped with an overload clutch to protect the drive components should the rake become clogged or obstructed, or if the PTO is engaged or disengaged at too high a RPM. Clutch slippage can be identified by a clicking sound.

**IMPORTANT: Always engage PTO (or hydraulic drive) slowly at a low RPM to prevent driveline damage.**



### **WARNING**

**If the rake becomes clogged or obstructed, stop operation IMMEDIATELY and exercise the POWER SOURCE SHUTDOWN PROCEDURE (Page 5) before removing the blockage.**

### **Hydraulic Driven Rake**

Engage the tractor remote hydraulic valve slowly at a low RPM and adjust rake to the desired speed before proceeding forward. When finished, reduce tractor engine speed before disengaging remote hydraulic valve.

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## LUBRICATION AND MAINTENANCE

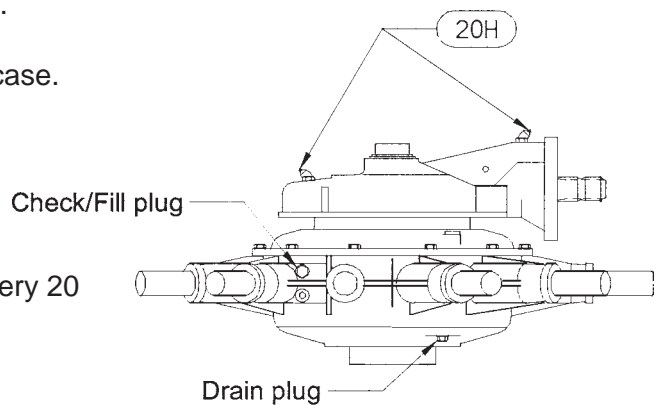


### WARNING

**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 500 hours 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.

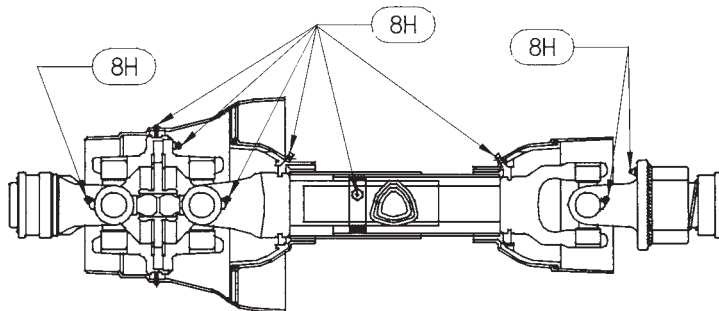


### Greasing

- Use a good grade of lithium base grease.
- Wipe dirt from the grease fittings before greasing.
- Replace any missing or damaged fittings.
- DO NOT over grease flange type bearings. Overgreasing will force out the seals and damage the bearings.
- Lubricate all fittings daily for the first week of operation.

### PTO Driveline

- Grease the 9 lubrication points on the PTO Driveline every 8 hours (or daily).



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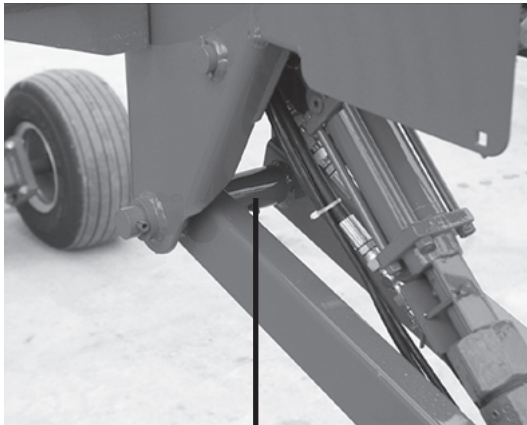
### **Drive Shaft Bearing**

- Grease front driveshaft bearing every 8 hours (or daily) (PTO Driven rakes only).



### **Rake Frame**

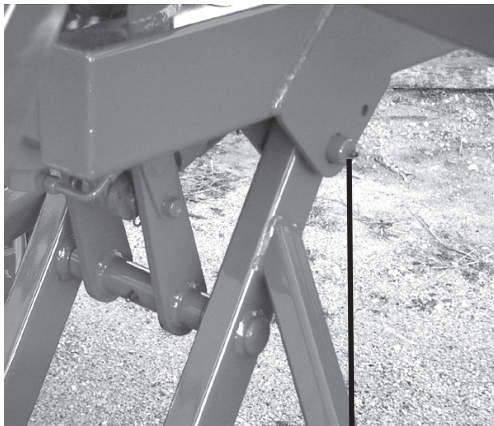
- Lubricate every 20 hours



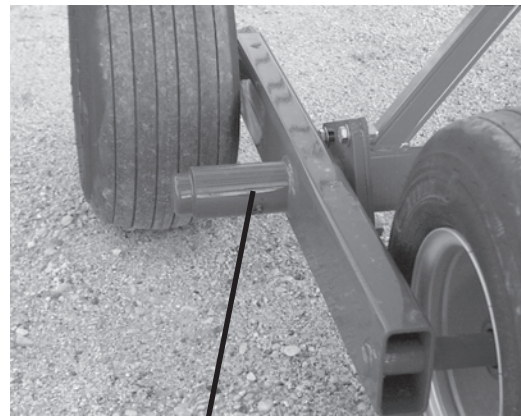
Hitch Pivot



Lift Linkage



Axle Pivot



Tandems

### **Tires and Wheels**

- Clean and repack wheel bearings annually.
- Maintain Tire pressure at 15-20 psi.
- Tighten wheel lug bolts to 85 ft-lb.

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## **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 rake 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.

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## Notes

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## RAKE ASSEMBLY



Fully assembled left hand rake with PTO drive



Fully assembled right hand rake with hydraulic drive.

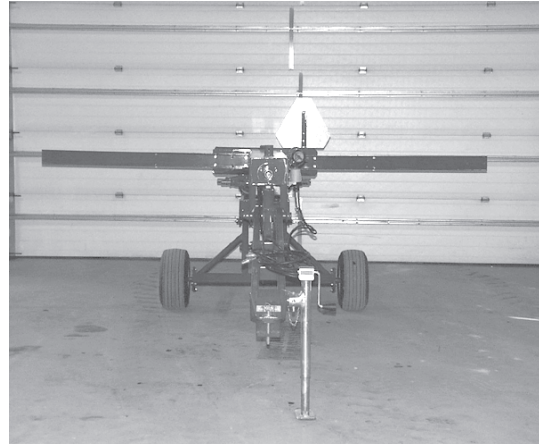
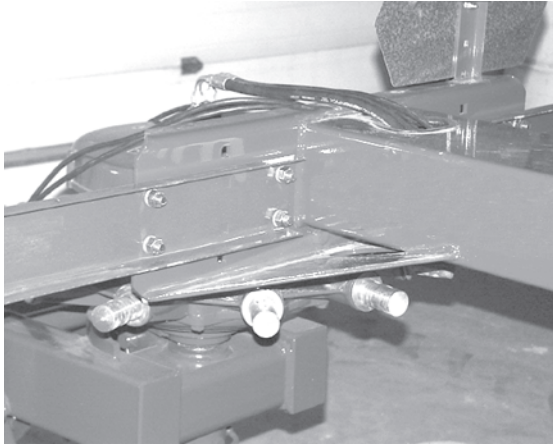
Rakes are shipped in various stages of assembly, ranging from palletized rakes to completely assembled. Be sure to read through each step of the assembly instructions to make sure your rake is properly assembled and ready for operation.

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.



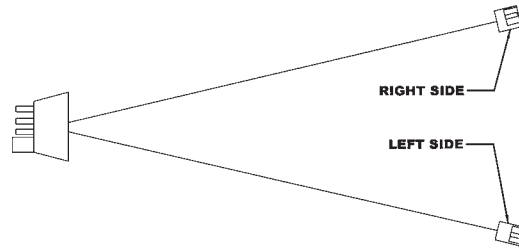
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**Step 3: Install transport lights and harness.**

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.

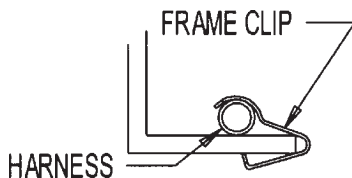


B. Remove and discard cap from front light harness (already installed into front frame). Connect the wishbone harness to the front harness and route the wishbone harness along the guard supports and through the hole in the light brackets and connect to light plugs. **DO NOT FASTEN IN PLACE YET.**



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.

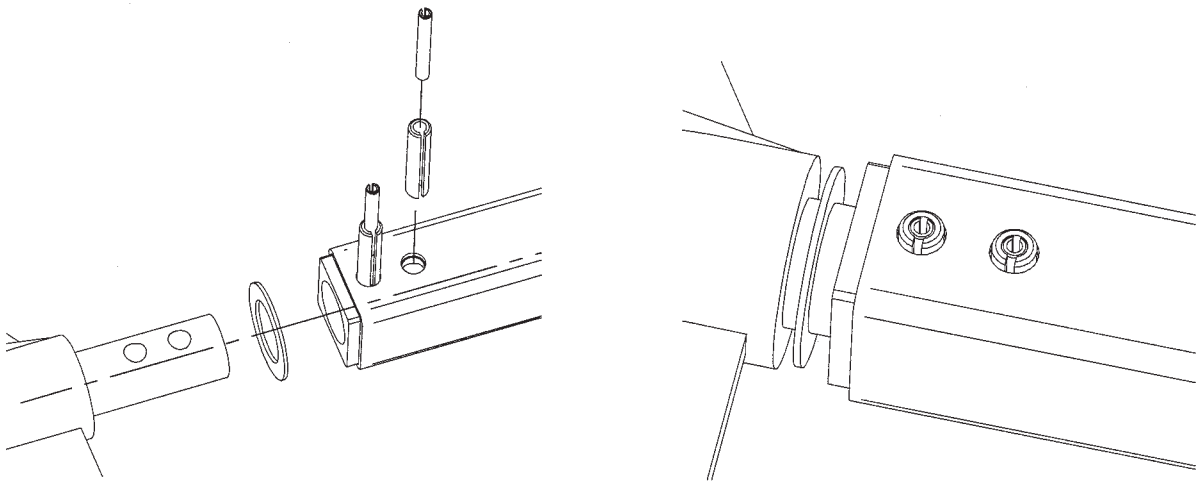


E. Secure the connection between the front harness and the wishbone harness by wrapping the connectors with electrical tape. Pull excess harness into front frame by pulling on front harness from the front of the rake. Be sure wire harness cannot contact drive shaft inside rake frame during operation.

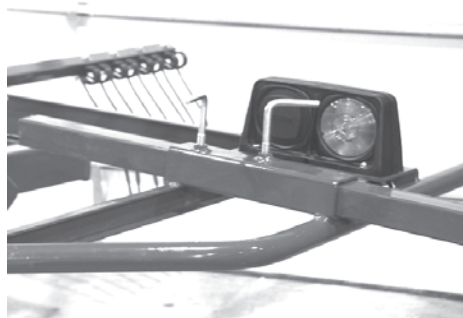
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**Step 4:**     **Install the tine arm assemblies onto the gearbox.** Place one 1 3/8 flatwasher onto each tine arm shaft and lubricate shafts and tine arm bores with anti-seize. Slide tine arms onto tine arm shafts. Align the holes in the tine arm with the holes in the gearbox shaft. Insert the 12mm pin into the hole with the slot oriented as shown (90° to 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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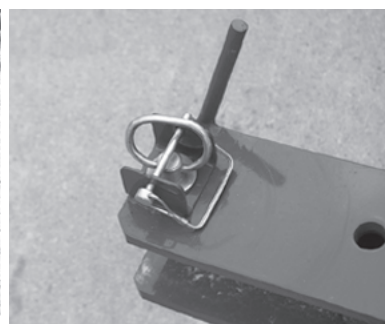
**Step 7:**      **Charge hydraulic system with oil.** The rake hydraulic system is NOT charged with oil at the factory. Charge the lift system with oil prior to removing cylinder locks used for shipping.



**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 PTO driveline (PTO driven rakes)** Attach the clutch end of the PTO driveline to the rake input shaft. Pull the locking collar on the clutch forward (away from rake) and slide the clutch onto the rake input shaft as far as possible. Release the collar, pull the clutch forward until the collar snaps into the locked position and the clutch will not move forward or rearward relative to the input shaft. Clip the chain into the hole in the right side of the front frame. Slide the yoke on the tractor (CV) end of the driveline onto the storage pin at the front of the hitch.



**Step 10:**      **Install hitch pin and clip.**

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## OPTIONS AND ACCESSORIES

| ITEM NO. | DESCRIPTION                            |
|----------|--|
| 17.00943 | Tine Saver Kit (44 Total)              |
| 17.00945 | Tine Saver                             |
| 17.00862 | 8 Ft Swath Screen Assembly             |
| 17.00908 | 10 Ply Tire & Wheel Assembly           |
| 17.00940 | 10 Ply Tube & Tire - fit standard rims |

## SPECIFICATIONS

| Rake Specifications: |                               |
|----------------------|-------------------------------|
| Working Width        | Up to 14 Ft                   |
| Raking Width         | 11 Ft                         |
| Transport Width      | 11Ft - 9 in.                  |
| Gearbox Oil Capacity | 6.5 Qts. (6.2L)               |
| Number of Tine Arms  | 11                            |
| Number of Tines      | 44 Double Tooth               |
| Weight with Tandems  | 1450 Lbs.                     |
| Tires                | 18 x 9.5 x 8-10 ply Flotation |

| Tractor Requirements:     |                |                 |
|---------------------------|----------------|-----------------|
|                           | PTO Driven     | Hyd Driven      |
| Power Requirement         | 40 HP          | 40 HP           |
| PTO Speed                 | 540 RPM        | N/A             |
| Hydraulic Capacity System | 8 GPM@1800 PSI | 10 GPM@2500 PSI |







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

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## TORQUE SPECIFICATIONS

**NOTE:** Use these torque values when tightening hardware (excluding: locknuts and self-tapping, thread forming and sheet metal screw) 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 lb-in value by 0.113).

| Unified<br>National Thread | Grade 2      |            | Grade 5       |            | Grade 8       |            |
|----------------------------|---|------------|---|------------|--|------------|
|                            | Dry   | Lubed      | Dry   | Lubed      | Dry  | Lubed      |
| 8-32<br>8-36               | 19*<br>20*  | 14*<br>15* | 30*<br>31*  | 22*<br>23* | 41*<br>43*   | 31*<br>32* |
| 10-24<br>10-32             | 27*<br>31*  | 21*<br>23* | 43*<br>49*  | 32*<br>36* | 60*<br>68*   | 45*<br>51* |
| 1/4-20<br>1/4-28           | 66*<br>76*  | 50*<br>56* | 9<br>10   | 75*<br>86* | 12<br>14   | 9<br>10    |
| 5/16-18<br>5/16-24         | 11<br>12  | 9          | 17<br>19  | 13<br>14   | 25   | 18<br>20   |
| 3/8-16<br>3/8-24           | 20<br>23  | 15<br>17   | 30<br>35  | 23<br>25   | 45<br>50   | 35         |
| 7/16-14<br>7/16-20         | 32<br>36  | 24<br>27   | 50<br>55  | 35<br>40   | 70<br>80   | 55<br>60   |
| 1/2-13<br>1/2-20           | 50<br>55  | 35<br>40   | 75<br>90  | 55<br>65   | 110<br>120   | 80<br>90   |
| 9/16-12<br>9/16-18         | 70<br>80  | 55<br>60   | 110<br>120  | 80<br>90   | 150<br>170   | 110<br>130 |
| 5/8-11<br>5/8-18           | 100<br>110  | 75<br>85   | 150<br>180  | 110<br>130 | 220<br>240   | 170<br>180 |
| 3/4-10<br>3/4-16           | 175<br>200  | 130<br>150 | 260<br>300  | 200<br>220 | 380<br>420   | 280<br>320 |
| 7/8-9<br>7/8-14            | 170<br>180  | 125<br>140 | 430<br>470  | 320<br>360 | 600<br>660   | 460<br>500 |
| 1-8<br>1-14                | 250<br>270  | 190<br>210 | 640<br>710  | 480<br>530 | 900<br>1000  | 680<br>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 lock nut 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.

| Thread Size | Nut Size Across Flats | Torque Value* |         | Recommended Turns To Tighten (After Finger Tightening) |         |
|-------------|-----------------------|---------------|---------|--|---------|
|             |                       | (N-m)         | (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, 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) |         |
|--------------|-----------------------|---------------|---------|--|---------|
|              |                       | (N-m)         | (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 Miller 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 Miller 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 Miller 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 Miller 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 Miller 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 Miller 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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