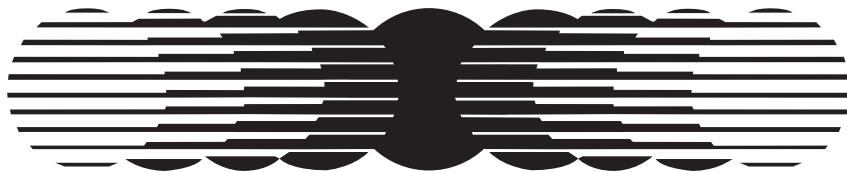


OPERATING

MANUAL

DEFOLIATOR

Amity
TECHNOLOGY



2800 7TH Avenue North
Fargo, ND 58102

Phone: (701) 232-4199
Fax: (701) 234-1716
www.amitytech.com

AMITY TECHNOLOGY, LLC LIMITED WARRANTY FOR NEW PRODUCTS

1. **General Provisions.** This Warranty shall apply to the original purchaser of (1) any new and unused machine manufactured by Amity Technology, LLC ("Amity"), and (2) any new and unused part which is manufactured by Amity for use in an Amity machine, jointly referred to as "Products," whether such Product is purchased through a dealer or directly from Amity. Under this Warranty, Amity will repair or replace, as it chooses in its sole discretion, any covered Product, or any component thereof, which Amity determines to be defective. This Warranty shall be in effect for a period of twelve (12) months ("the Warranty Period"), beginning on the date of delivery of the covered machine or part by the dealer or Amity to the purchaser ("the Warranty Start Date"). The purchaser must pay the cost of transportation of a Product to be repaired or replaced to and from an authorized Amity dealer. This Warranty may not be transferred from the original purchaser of a Product to any other person. This Warranty does not give a purchaser the right to any relief other than repair or replacement of the Product, and it specifically does not allow for consequential or incidental damages, exemplary or punitive damages, or costs and fees.
2. **Scope and Limitations of Warranty.** With respect to machines, this Warranty is void if any part not supplied by Amity is used in assembly or repair of the machine, or if the machine has been altered, abused or neglected, as determined by Amity. With respect to parts, this Warranty is void if the part is used in any manner other than that for which it is intended. This Warranty does not extend in any way to tires and any other component of a Product warranted by another manufacturer, a copy of which warranty is provided herewith ("Third-Party Warranties"). In the event Amity determines that a Product is not defective, or that any other provision of this Paragraph 2 operates to limit the Warranty, this Warranty shall not apply and the purchaser shall be responsible for transporting the Product from the authorized Amity dealer's location within 10 days of notice by Amity.
3. **Procedures for Obtaining Service.** To secure Warranty service, a purchaser must (1) report the defect to an authorized dealer and request repair within 45 days of the failure and within the Warranty Period; (2) present evidence that this Warranty applies to the Product; (3) present evidence of the Warranty Start Date; and (4) bring the Product to an authorized Amity dealer within a reasonable period of time after reporting the defect.
4. **LIMITION OF IMPLIED WARRANTIES AND OTHER REMEDIES.** To the extent allowed by law, neither Amity, its dealers, nor any company affiliated with Amity makes any warranties, representations, or promises as to the quality, performance, or freedom from defect of any Product covered by this Warranty.

AMITY HEREBY WAIVES, TO THE EXTENT APPLICABLE, ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. A PURCHASER'S ONLY REMEDIES IN CONNECTION WITH THIS WARRANTY ARE THOSE SET FORTH ON THIS PAGE. IN NO EVENT WILL AMITY, ITS DEALERS, OR ANY COMPANY AFFILIATED WITH AMITY BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.

Some states do not allow waivers of certain warranties, so the above waivers may not apply to you. You may also have other rights which vary from state to state.

5. **No Dealer Warranty.** This is the exclusive warranty applicable to Amity Products. No dealer has any authority to make any other warranty, modify, limit, or expand the terms of this Warranty in any fashion, or make any representation or promise on behalf of Amity.

6. **Dispute Resolution.** Any controversy or claim arising out of or relating to this Warranty must be settled by arbitration in Fargo, North Dakota, at a time and location designated by the arbitrator, but not exceeding 30 days after a demand for arbitration has been made, and may be conducted by electronic, video, or other technical means. Arbitration will be conducted by the American Arbitration Association in accordance with its Rules of Commercial Arbitration, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The arbitrator will have the authority to order Amity to undertake a repair or replace any Product, at its election, if the arbitrator finds that this Warranty requires Amity to do so. The arbitrator will not have the authority to impose any other remedy against Amity, including without limitation consequential or incidental damages, exemplary or punitive damages, or costs and fees.

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1.0 INTRODUCTION

1.1 General Information

Read this manual carefully to learn how to operate and service your machine correctly. Failure to read this manual can result in personal injury, equipment damage and/or poor equipment performance.

This manual is a permanent part of your machine and should remain with the machine when you sell it.

Measurements in this manual are given in both customary U.S. units and metric equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners require appropriate tools to install.

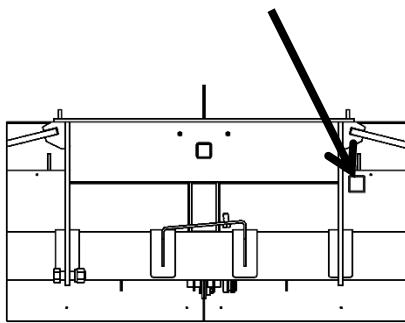
NOTE: Front, rear, right and left-hand sides are determined by facing in the direction the implement will travel when moving forward.

1.2 Serial Number

Record the serial number, model number, and model year of your defoliator to help trace the machine should it be stolen. Your dealer also needs these numbers for all warranty claims and when you order parts.

The defoliator serial number is found on the serial number plate which is located on the front of the machine to the left of the hitch as shown in Figure 1 and Figure 2 depending on model.

Record your serial number, model number, and model year in the space provided below.



Serial Number: _____

Model Number: _____

Model Year: _____

Figure 1: 50 Series Serial Number Plate Location

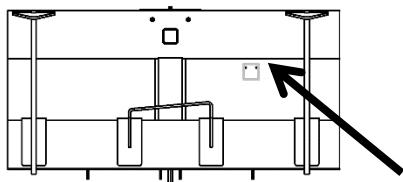


Figure 2: 00 Series Serial Number Plate Location

2.0 SAFETY

2.1 Recognizing Safety Information in Manual

Figure 3 is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.



Figure 3: Safety-Alert Symbol

2.2 General Defoliator Safety

You are responsible for the safe operation and maintenance of your Amity beet defoliator. You and anyone else, who will operate, maintain, or work around the defoliator should be familiar with the operating and maintenance procedures and safety information in this manual.

Safety practices protect you and the people around you, so make them a working part of your safety program.

Defoliator owners must give operating instructions annually to operators or employees before allowing them to operate the defoliator per OSHA regulation 1928.57.

The most important safety device on this equipment is a safe operator. It is the operator's responsibility to read and follow all safety and operating instructions in the manual. All accidents can be avoided.

A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to serious injury or death.

Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could alter the life and warranty of the product.

The following list is a set of safety guide lines to adhere to:

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, or adjusting the defoliator.
2. Install and properly secure all shields and guards before operating.
3. Have a first-aid kit available and know how to use it.
4. Have a fire extinguisher available and know how to use it.
5. Clear the area of people and remove foreign objects from the machine before starting and operating.

6.  Shift to park, disengage PTO, lower machine to ground, relieve hydraulic pressure, stop engine, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or disconnecting.
7. Review safety related items with all operators annually.
8. Wear suitable ear protection for prolonged exposure to excessive noise.

Think **SAFETY!** Work **SAFELY!**

2.3 Maintenance and Operating Safety

1. Read and understand all information contained in the Operator's Manual regarding maintenance, adjustment, and operation of the defoliator.
2.  Shift to park, disengage PTO, lower machine to ground, relieve hydraulic pressure, stop engine, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, or disconnecting.
3. Keep hands, feet, clothing, and hair away from all moving and/or rotating parts.
4. Ensure that all tractor controls are in neutral before starting.
5. Never wear ill-fitting, baggy, or frayed clothing when working on or around the defoliator.
6. Make sure that all guards and shields are properly installed and secured before operating the defoliator.
7. Clear the area of all bystanders, especially children, when carrying out any maintenance or making adjustments on the systems or components.
8. Place stands or blocks under the frame before working beneath the machine.
9. Do not allow riders on the defoliator or tractor during field operation or transport.
10. Never operate the defoliator inside a closed building.
11. Stand clear in front of and behind defoliator during operation as it can pick up and throw rocks and other debris at high velocities.



Figure 4: Maintenance and Operation Safety Symbols

2.4 Hydraulic Safety

1. Always place all tractor hydraulic controls in neutral before dismounting.
2. Make sure that all components in the hydraulic system are kept in good condition and are clean and tight.
3. Replace any worn, cut, abraded, flattened or crimped hoses and metal lines.
4. Do not attempt any makeshift repairs to the hydraulic lines, fittings, or hoses by using tape, clamps, or cements. The hydraulic system operates under extremely high-pressure. Such repairs may fail suddenly, creating a hazardous and unsafe condition.
5. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.
6. If injured by a concentrated high pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface.
7. Before applying pressure to the system, make sure all components are tight and that lines, hoses and couplings are not damaged.



Figure 5: Hydraulic Safety Symbols

2.5 Transport Safety

1. Read and understand all information in the Operator's Manual regarding procedures and safety when operating the defoliator in the field or on the road.
2. Make sure the Slow Moving Vehicle (SMV) emblem and required lights and reflectors are in place, clean, and can be seen clearly by all overtaking and oncoming traffic.
3. Do not allow riders on any part of the defoliator during either field operation or travel.
4. Attach to the tractor using only a drawbar pin with provisions for a mechanical retainer.
5. Always attach a safety chain.

6. Always use hazard warning flashers when transporting unless prohibited by law.
7. Maximum transport speed on smooth roads is 25 mph (40 kph).

2.6 Storage Safety

1. Store the unit away from human activity.
2. Do not permit children to play on or around the stored unit.
3. Make sure the hitch stands are firmly supported. Use blocks of wood to provide a secure base.

2.7 Tire Safety

1. Failure to follow proper procedures when mounted a tire on a wheel or rim can produce an explosion which may result in serious injury or death.
2. Do not attempt to mount a tire unless without the proper equipment and experience for the job.
3. Have a qualified tire dealer or repair service perform the required tire maintenance.

2.8 Understand Signal Words

Signal words- DANGER, WARNING, or CAUTION- are used in conjunction with the safety-alert symbol on Amity safety decals. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

Figure 6 shows the signal words used on your Amity beet defoliator.

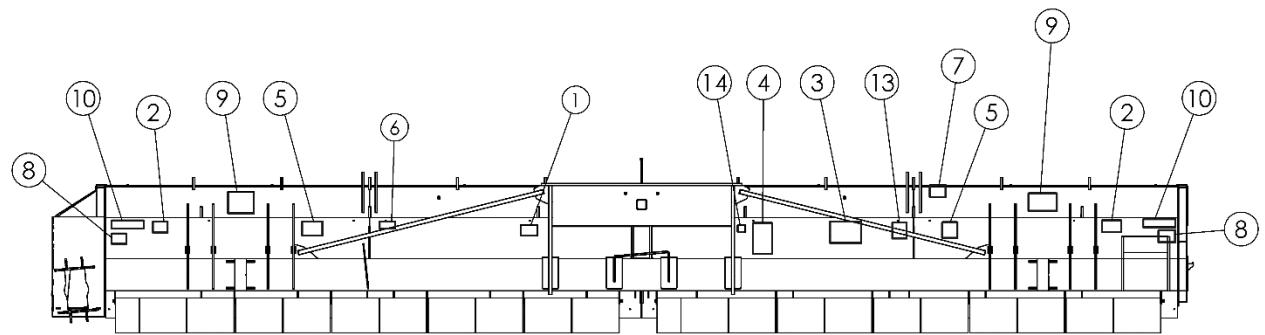


Figure 6: Signal Words

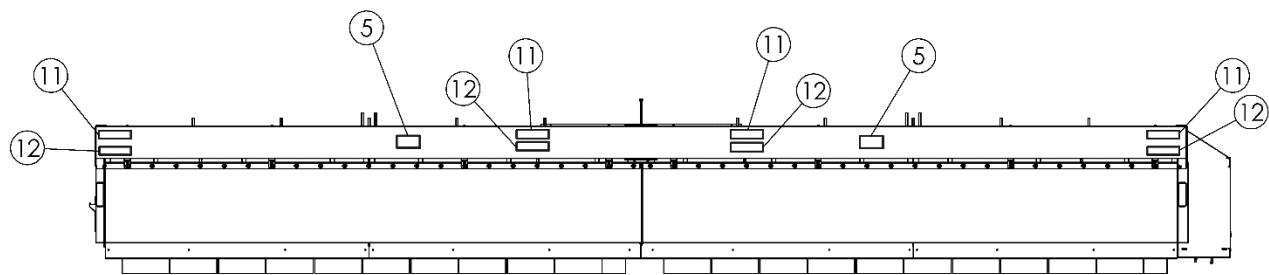
2.9 Safety Decals

The types of decals on the equipment are shown in the illustration below. Proper safety requires that you familiarize yourself with the various safety decals, the type of warning, and the area, or particular function related to that area, that requires your safety awareness.

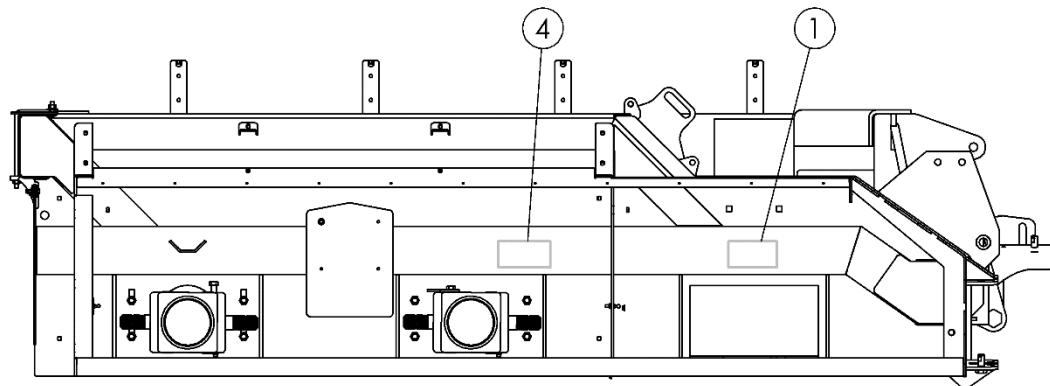
REMEMBER: If safety decals have been damaged, removed, become illegible, or parts are replaced without decals, new decals must be applied. New decals are available from your authorized dealer.



FRONT



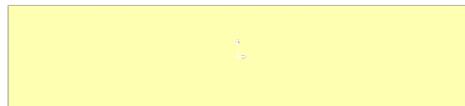
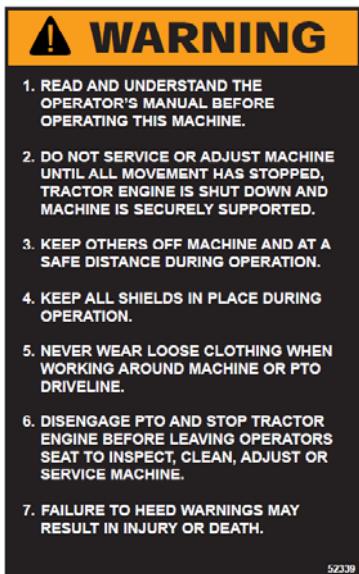
REAR



RH SIDE

DECALS

ITEM	PART NO.	DESCRIPTION	QTY
1	52341	DECAL-WARNING	2
2	52334	DECAL-WARNING	2
3	52329	DECAL-DANGER	1
4	52339	DECAL-WARNING	2
5	52340	DECAL-DANGER	4
6	52338	DECAL DANGER	1
7	306574	DECAL-CAUTION (50 SERIES)	4
	52336	DECAL-CAUTION (00 SERIES)	
8	64617	DECAL-DANGER	2
9	63465	DECAL-LOGO	2
10	65331	DECAL-RETROFLECTIVE-YELLOW	2
11	65330	DECAL-RETROFLECTIVE-RED	4
12	65332	DECAL-RED ORANGE FLUORESCENT	2
13	62964	DECAL-WARNING	1
14	1028371	TAG: SERIAL#/MODEL#/YEAR	1





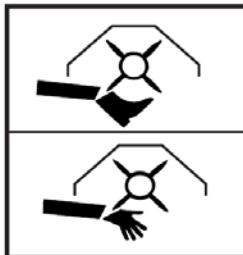
DANGER
ROTATING PART
KEEP CLOTHING,
YOURSELF
AND OTHERS
CLEAR.

52338



DANGER
KEEP SHIELDS AND GUARDS PROPERLY
MAINTAINED AND IN PLACE.
NEVER WEAR LOOSE CLOTHING WHEN
WORKING AROUND MACHINE.
KEEP HANDS AWAY FROM ALL MOVING
PARTS.
DO NOT PERMIT OTHERS TO BE NEAR
MACHINE WHILE IN OPERATION.
DO NOT ATTEMPT TO CLEAN OR ADJUST
MACHINE WHEN PTO IS ENGAGED OR
WHEN TRACTOR ENGINE IS RUNNING.

52329



DANGER
DO NOT
APPROACH
MACHINE UNTIL
FLAIL ROTATION
HAS STOPPED

52340



WARNING
DO NOT
RIDE ON
EQUIPMENT

52334



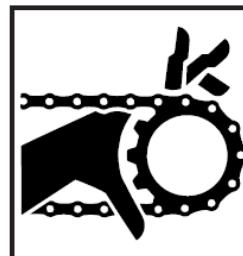
DANGER
KEEP CANVAS IN
PLACE WHILE
FLAILS ARE
ROTATING.

52336



DANGER
KEEP DOORS IN
PLACE WHILE
FLAILS ARE
ROTATING.

306574



WARNING
DO NOT
REMOVE
SHIELDS

52341

3.0 SPECIFICATIONS

3.1 Defoliator Specifications

Table 1: Defoliator Specifications

Model	3750	3550	3450
Weight (Approx.**)	15200 lbs [6895kg]	13200 lbs [5987 kg]	11500 lbs [5216 kg]
Hitch Weight (Approx.**)	6050 lbs [2744kg]	5000 lbs [2268 kg]	4400 lbs [1996 kg]
Recommended Working Speed	3-6 mph [4.8-9.7 kph]	3-6 mph [4.8-9.7 kph]	3-6 mph [4.8-9.7 kph]
Maximum Road Travel Speed	25 mph [40 kph]	25 mph [40 kph]	25 mph [40 kph]
Width	23' 11" [7.29m]	16' 0" [4.88m]	13' 4" [4.06m]
Length (Approx.**)	19'6" [5.94m]	19'6" [5.94m]	19'6" [5.94m]
Height	7'0" [2.13m]	7'0" [2.13m]	7'0" [2.13m]

3700	3500	3300	3200
13600 lbs [6169 kg]	12000 lbs [5443 kg]	10000 lbs [4536 kg]	9800 lbs [4445 kg]
5000 lbs [2268 kg]	4400 lbs [1996 kg]	3800 lbs [1724 kg]	3700 lbs [1678 kg]
2-4 mph [3.2-6.4 kph]			
25 mph [40 kph]			
23' 11" [7.29m]	16' 0" [4.88m]	13' 4" [4.06m]	11' 0" [3.35m]
19'6" [5.94m]	19'6" [5.94m]	17'6" [5.33m]	17'6" [5.33m]
7'0" [2.13m]	7'0" [2.13m]	6'6" [1.98m]	6'6" [1.98m]

**Actual weight and length is dependent on options equipped

Installed Options:	7.6-15 tires	With Scalpers	11.2-24 tires	With Scalpers
Length	17'6" [5.33m]	20'9" [6.32m]	19'6" [5.94m]	23'1" [7.01m]

3.2 Tire Specifications

Table 2: Tire Size, Pressure, and Lug Nut Torque

Model	3750	3700	3550	3500	3450	3300	Bolt Torque
11.2-24 Tires	36 psi [2.48 bar]	32 psi [2.21 bar]	32 psi [2.21 bar]	28 psi [1.93 bar]	26 psi [1.79 bar]	22 psi [1.52 bar]	125 lb-ft [169 Nm]
7.6-15 Tires	30 psi [2.07 bar]	28 psi [1.93 bar]	NA	NA	40 psi [2.76 bar]	38 psi [2.62 bar]	90 lb-ft [122 Nm]

3.3 Hydraulic Flow Rates:

Each hydraulic circuit for the Defoliator has a designated flow rate listed in the table below.

Table 3: Hydraulic Flow Rates

Circuit	Standard	Metric
Hitch Lift	10 GPM	37.9 LPM
Rear Strut Lift	7.5 GPM	28.4 LPM
Top Door Lift	5 GPM	18.9 LPM
Row Finder Constant	7.5 GPM	28.4 LPM
Row Finder Override	10 GPM	37.9 LPM
Scalper Lift / RF Lift	7.5 GPM	28.4 LPM
Floating Hitch	15 GPM	56.8 LPM

NOTE: Values listed are a good starting point; however, flow rates should be fine-tuned to allow the smallest flow rate possible while still providing enough power to run the defoliator properly.

3.4 Tractor Specifications

Table 4: Tractor Specifications

	3750	3550	3450
Minimum Horsepower (PTO)	215 hp	160 hp	130 hp
PTO Output	1000 rpm	1000 rpm	1000 rpm
Spline Size	1-3/4" 20 Spline	1-3/4" 20 Spline	1-3/4" 20 or 1-3/8" 21 Spline
Vertical Drawbar Load	6000 LBS [2722 KG]	5000 lbs [2268 kg]	5000 lbs [2268 kg]
Min. Hydraulic Cap. (w/Row Finder)	30 gpm [114 lpm]	30 gpm [114 lpm]	30 gpm [114 lpm]
Hydraulic Pressure	2700 psi [186.16 Bar]	2700 psi [186.16 Bar]	2700 psi [186.16 Bar]
Max. Number of Remotes*	5	5	5

3700	3500	3300	3200
160 hp	130 hp	100 hp	100 hp
1000 rpm	1000 rpm	1000 rpm	1000 rpm
1-3/4" 20 Spline	1-3/4" 20 or 1-3/8" 21 Spline	1-3/4" 20 or 1-3/8" 21 Spline	1-3/4" 20 or 1-3/8" 21 Spline
5000 lbs [2268 kg]	5000 lbs [2268 kg]	4000 lbs [1814 kg]	4000 lbs [1814 kg]
30 gpm [114 lpm]	30 gpm [114 lpm]	30 gpm [114 lpm]	30 gpm [114 lpm]
2700 psi [186.16 Bar]	2700 psi [186.16 Bar]	2700 psi [186.16 Bar]	2700 psi [186.16 Bar]
6	6	5	5

The specifications above are estimates and may vary with conditions

*Number of remotes required depends on options equipped

3.5 Rotor Design

Figures 7-8 and Table 5 below show drum rotational speeds, directions and configurations for Amity Defoliators.

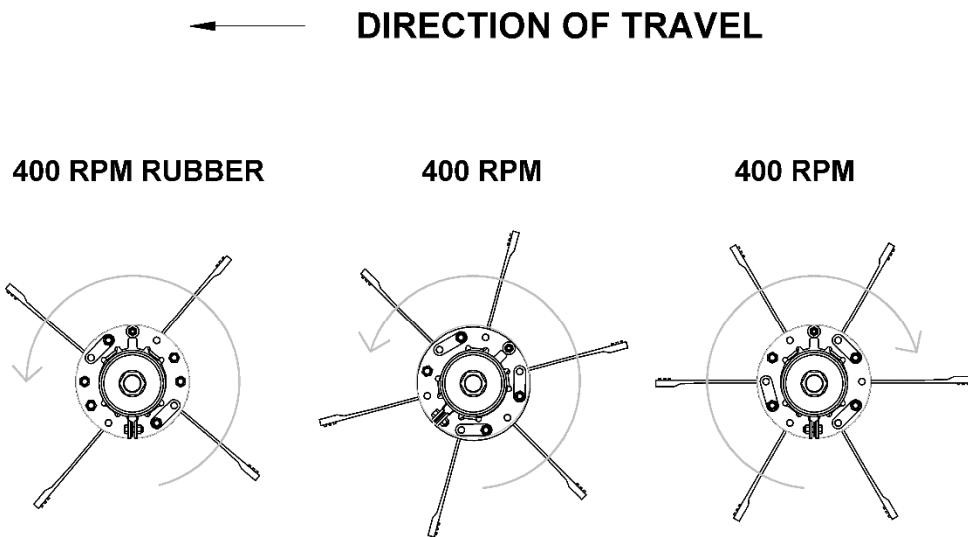


Figure 7: Rubber Front Drum

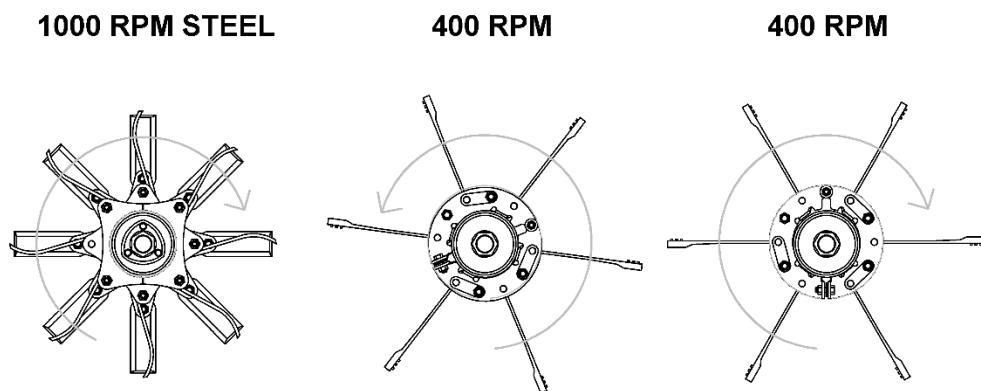


Figure 8: Steel Front Drum

Table 5: Rotor Design

Drum	00 Series	50 Series
Drum 1 (Front)	Steel -OR- 4 Flail rods	Steel Combination
Drum 2 (Center)	6 Flail rods per assembly	10 Flail rods per assembly
Drum 3 (Rear)	6 Flail rods per assembly	6 Flail rods per assembly

4.0 PREPARATION

4.1 Tractor Preparation

4.1.1 Adjusting the Drawbar: The tractor drawbar must be set within the given range to maintain the integrity of the drive system. The range is shown in Table 5.

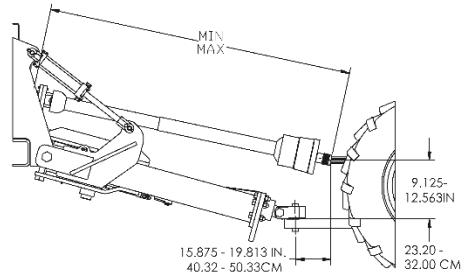


Figure 8: PTO Range

Table 5: PTO Range

PTO PART NUMBER	DESCRIPTION	MINIMUM DISTANCE	MAXIMUM DISTANCE
306403	PTO-STD 1-3/8"-21 (DEF)	54.00in / 137.16cm	76.88in / 195.27cm
306404	PTO-STD 1-3/4"-20 (DEF)	54.00in / 137.16cm	76.88in / 195.27cm
305690	PTO-CV 1-3/4"-20 DEF HEAVY	59.67in / 151.56cm	82.92in / 210.61cm
305691	PTO-STD 1-3/4"-20 DEF HEAVY	57.90in / 147.00cm	82.78in / 210.26cm
69678	PTO-STD 38MM-8 (DEF)	53.82in / 136.70cm	76.50in / 194.31cm
69681	PTO-CV 1-3/8"-21 (DEF)	56.50in / 143.41cm	77.28in / 196.29cm
69682	PTO-CV 1-3/4"-20 (DEF)	57.00in / 144.78cm	77.80in / 197.62cm

IMPORTANT: Ensure the driveline remains within operating range under all conditions.

4.1.2 Tire Spacing and Inflation: Tires should be inflated to the manufacturer's specification. See section Table 2: Tire Size and Pressure on page 7 for more information. Figure 7 shows the appropriate tire spacing.

A = 3 or 4 x B

B = Row Spacing

C = Tire Width**

****IMPORTANT:** Tires must be narrow enough not to contact beets when driving down rows.

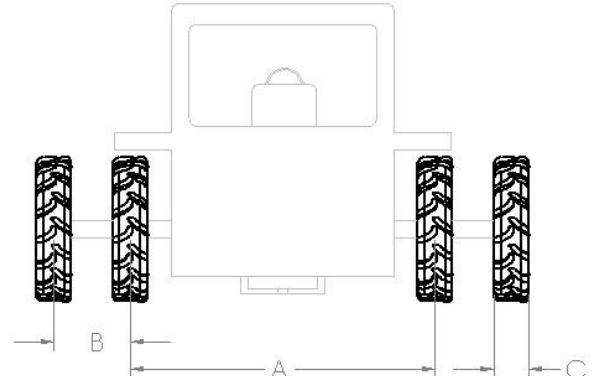


Figure 9: Tire Spacing

NOTE: The Front tires must be aligned with the rear tires.

4.1.3 Three-Point Hitch Position: Three-point hitches cannot be connected to the hitch when using an Amity beet defoliator. It must be fully raised or removed.

NOTE: Amity recommends removing quick hitches.

! **CAUTION:** Ensure the receiver and drawbar support arms clear the PTO driveline under all conditions.



Figure 10: Fully Raised Three-Point Hitch

4.2 Defoliator Preparation

4.2.1 Flail Spacing: Verify the spacing matches the spacing of the planted crop as shown in Figure 11.

A=B/2 Center of frame to center of flail basket

B=Row spacing

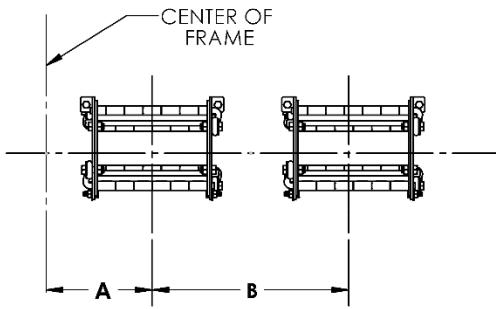


Figure 11: Flail Spacing

4.2.2 Scalpers: In addition to Flail baskets Scalpers also need to be correctly positioned for row spacing and should be adjusted to match if they are not already. For additional adjustment refer to section 7.0 Adjustments, for proper setup of the scalpers including basket height and scalper knife position.

4.2.3 Shield Placement: Before starting, be sure to secure the shields in operating position (closed position).

4.2.4 Gearbox Oil Level: Check all gearbox oil levels before operating. Refer to section 11.0, Lubrication and Maintenance, for oil type and fill level information.

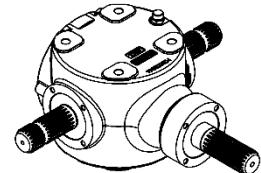


Figure 12: Gearbox

4.2.5 Greasing: Refer to section 11.0, Lubrication and Maintenance, for grease type and frequency requirements. Ensure all components have been greased per guidelines before preliminary start-up.

IMPORTANT: Use only hand held grease guns. Air-powered grease guns can damage your seals. Over greasing may also damage bearing seals. If damage due to over greasing occurs, replace the damaged seals immediately.

4.2.6 Attaching PTO driveline to Defoliator:

1. Remove the gearbox shield access covers.
2. Connect the PTO driveline to the gearbox spline shaft.
3. Lock the PTO in place using 2- $\frac{5}{8}$ in. bolts and nuts installed through the groove in the gearbox shaft.
4. Replace shield access covers.

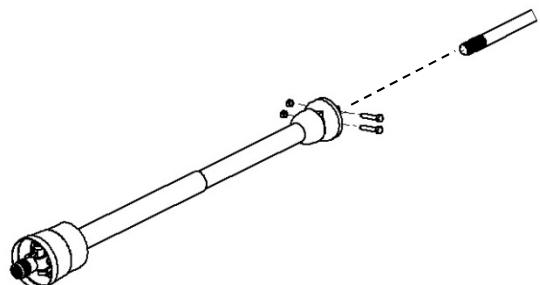


Figure 13: Attaching PTO to Defoliator

5.0 ATTACHING AND DETACHING

5.1 Attaching Hydraulic and Electrical Systems

Defoliators are available with ISO couplers or metric adapters. If the hydraulic attachments on your defoliator do not fit the tractor, contact your Amity dealer.

! **CAUTION:** To avoid injury from escaping fluid under pressure, relieve the pressure in the system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

1. Reverse the tractor in line with the hitch stopping 1 foot (.3m) short of the pull plate.
2. Shift to park, shut off the engine, and remove the ignition key before getting out of tractor.
3. Connect all hydraulic lines to tractor as shown in Figure 14. Ensure hydraulic lines are clear of the PTO shaft to prevent hydraulic hose wear and failure.
4. Connect the defoliator light harness to the tractor. Make sure the defoliator warning lights operate with the tractor warning lights and turn signals.



Figure 14: Attaching Hydraulic Lines

5.2 Attaching Defoliator to Tractor Drawbar

1. Ensure the tractor drawbar is adjusted (see Tractor Preparation, section 4.1.1)
2. With the tractor backed up in line with the defoliator and the hydraulics hooked up.
3. Remove the tractor hitch pin.
4. Using hitch hydraulics adjust the defoliator hitch to correct height.
5. Using a small pin or bolt insert it behind the pull plate to keep it upright.
6. Install bushings if required into pull plate.
7. Reverse the tractor slowly until the hitch and pull plate are lined up.



Figure 15: Attaching the Defoliator to the Tractor Drawbar

- !** 8. Shift to park, shut off the engine, and remove the ignition key before getting out of tractor.

9. Remove small pin that held pull plate up if it has not dislodged already.
10. Place hardened washer (A) between the drawbar and pull plate, and install shims as necessary (B).
11. Reinstall the hitch pin.
12. Connect the safety chain to the drawbar supporting structure.



Figure 16: Attached PTO Driveline

5.3 Attaching PTO Driveline

! **CAUTION:** To avoid bodily injury or death, shut off the tractor and lower the machine to the ground *before attaching the PTO driveline.*

IMPORTANT: Keep the driveline and powershaft splines clean of dirt, paint, and debris.

- !** 1. Shift to park, disengage the PTO, lower the machine to the ground, stop the engine, and remove the ignition key.
- 2. Raise the tractor PTO shield.
- 3. Align the splines between the defoliator driveline and the tractor PTO shaft and start to push the driveline on to the tractor PTO shaft.
- 4. Once started pull back the driveline collar and push the driveline onto the shaft until the collar snaps forward on the yoke.
- 5. To ensure the PTO is secure, pull back on the shield. Do not pull on the collar as this will release the latch.
- 6. Lower the tractor PTO shield.

5.4 Using Stands

! **CAUTION:** Always use stands when working on, near, or underneath the defoliator.

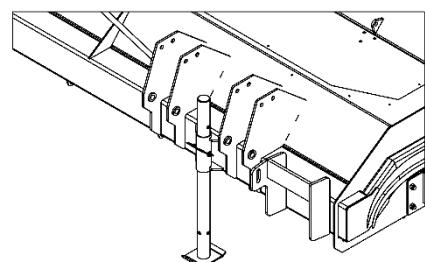


Figure 17: Amity Defoliator Stand

6.0 OPERATING THE DEFOLIATOR

6.1 Start Up

1. Lubricate the machine per the schedule outlined in the maintenance section.
2. Perform pre-operation check of the defoliator.
3. Ensure that operator, bystanders, and all objects are clear of the defoliator before starting.
4. Align the tractor and defoliator with the first set of rows to be defoliated.
5. Lower the defoliator to working position against the cylinder stops and check that flail height from drums #2 and #3 is above of the ground and approximate $\frac{1}{2}$ " (1.2cm) below the crown of your average beet height for a starting position.
6. Partially raise the defoliator ensuring all flails are clear of the ground.
7. Throttle down to low idle.
8. Double check that bystanders are clear and slowly engage the PTO. (On tractors with electronic engagement set to the lowest level.)
9. Smoothly increase to 1000 PTO RPM.
10. Lower the defoliator to the pre-set operating height and proceed down the field.
11. If this is a new field or the conditions have changed, stop the machine after 25-50 feet (7.5-15 m) and check the quality of job being done. If required adjust the defoliator using adjustment guide and reassess defoliation quality after adjustment. Make adjustments until defoliation is satisfactory.
12. Proceed with work; reassess defoliation with field, variety or condition changes.

 **CAUTION:** Never engage the PTO unless the engine is at low idle. Faster speeds may overload drivetrain components or break the shear pin.

6.2 Flail Height

The single biggest factor in quality defoliator is properly setting the flail height of drums #2 and #3 of your Amity defoliator. Flail height will vary with soil and crop conditions. One inch (2.54 cm) below the crown of the average beet is a good starting point. Actual flail height is best determined by checking the defoliation results in several areas after defoliating for 50 feet (15 meters). To maintain even cleaning it is important for the flail height of the 2nd and 3rd drum to be the same; running the defoliator level will ensure this. Raise or lower the flail height as required and recheck by defoliating for another 50 feet. Repeat this process until flail height results in a satisfactory defoliation job.

See section 7.0 for additional detailed adjustment procedures.

IMPORTANT: Defoliation height will change drastically with field conditions and beet variety. Adjusting for changing conditions is necessary for optimal defoliator performance.

IMPORTANT: In situations with loose beets adjust the flail height as high as possible while maintaining a quality defoliator job to minimize knocking beets out of the row.

6.3 Field Operating Speed

Proper travel speed is critical in quality defoliation and changing speed will affect the performance of the machine and needs to be matched to field conditions and machine set-up. The defoliator should be operated at speeds specific to the conditions; typical speeds are 2-4 mph (3.2-6.5 kph) for 00 Series and 3-6 mph (4.8-9.7 kph) for 50 Series.

- Increase speed when beet tops are clean of petioles and flails are beginning to damage tops. To optimize defoliation, continue to increase speed until defoliator begins to leave petioles on beet tops; decrease slightly from that point to maximize speed and cleaning.
**If field conditions, or operator preference dictate a slower operating speed and beet top damage is being incurred, slightly slowing the PTO RPM is a permissible way to mitigate beet damage in place of increasing operating speed.
- Maintain current speed when beet tops are clean of petioles and free of any flail damage.
- Decrease speed when beet tops are not satisfactorily clean of petioles and correct flail height for both #2 and #3 drums has been verified.

IMPORTANT: On beets that are significantly lower than average, not all petioles will be able to be reached by the defoliator flails and will not be 100% free of petioles. Please take this into consideration when determining defoliation quality.

6.4 Turning Radius

Turning at the end of the field while pulling the defoliator requires a wide area. One way to accommodate the large turning radius is to plant headland rows. Amity recommends a minimum of 48 headland rows (22" [56 cm] spacing) on each end of the field.

- Defoliators equipped with a CV PTO driveshaft can remain under power while turning in the headlands.
- Defoliators equipped with a Standard PTO driveshaft need to disengage the PTO before turning to prevent driveline damage.

IMPORTANT: Failure to provide a sufficient turning radius for the tractor and defoliator may lead to damage of the driveshaft, row finder assembly, scalpers, and/or tractor tires.

6.5 Break-in Period

After an initial 4 hours of normal field operation, hand check all fasteners and components. Tighten or adjust any components as required. Do not re-torque gearbox hardware as they have been installed with thread lock compound. If any gearbox hardware is found loose it should be fully removed threads cleaned and reinstalled with thread lock to the torque spec as listed in section 11.0 Lubrication and Maintenance.

6.6 Field Cleaning

The defoliator will build with mud at different rates during operation depending on soil conditions. It is important to fully open all doors, check material build up, and clean the machine if required every two hours or more often if the conditions demand.

IMPORTANT: If left unclean, mud may clog the machine and may cause damage or premature component wear. Frequently clean the machine to avoid potential damage and premature wear.

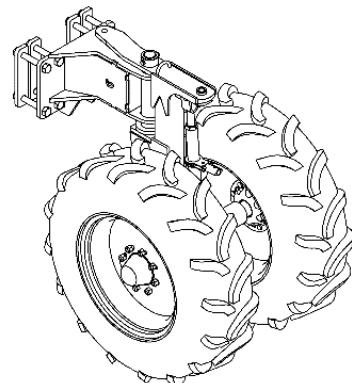
6.7 Flail Tubes

Amity offers many flail styles in row widths ranging from 18 to 36 inches (45 to 90cm). Flails can be set up with all rubber flails (00 series only), or with a steel front drum with rubber flails on drums #2 and #3. Steel flail tubes operate at 1000 rpm and are factory balanced. Rubber equiped flail tubes operate at 400 rpm and do not require balancing due to the lower operating speed. Flails may be specifically matched to each growers needs. Please see your local Amity dealer or refer to your parts manual for different flail options available.

6.7.1 Adjustable 3rd Drum (50 series): The purpose of the adjustable 3rd flail tube in the 50 series defoliator is to be able to run the 1st drum higher specifically designed for crops with poor emergence where the highest beet and lowest beet vary greatly in height. In such a situation running the defoliator level and low enough to clean all beets the 1st drum would cut the tops off many of the higher beets. Typical conditions do not warrant adjustment of the 3rd drum. If they do, adjusting the 3rd drum should be done in $\frac{1}{4}$ " (.6cm) increments and directions can be found in Adjustments section 7.0.

6.8 Leveling

Two things affect a defoliator's field level machine setup and field conditions



6.8.1 Machine Setup

The first thing that impacts the defoliator field level is the actual machine level setup from side to side. This is affected by tire pressure, machine weight and rear strut adjustment. To ensure the machine is level, a onetime level check/setup should be performed on a flat and level floor following the guidelines laid out in section 7.0.

6.8.2 Field Conditions

The second thing that impacts the defoliator field level are the field level conditions. This is affected by planter and sprayer tracks left in the field. It is best to adjust the defoliator wheel locations to avoid running on the same rows as the planter or sprayer tracks. In cases where this cannot be avoided, one tire should be run off the tracks from the planter or sprayer and the rear struts moved out as wide as practical to lessen the impact on machine level.

6.9 Row Finder (option):

Amity defoliators with steerable struts have the option of a hydraulic row finder. The row finder helps keep the defoliator flails directly in line with crop rows. Row finder hydraulic flows should be set to approximate 7 GPM constant and 10 GPM override. The override circuit flow may be adjusted up or down to adjust to desired steering response time. The row finder should be lifted when the defoliator reaches the headland before turning and only lowered once the defoliator is back into the beet rows so the row finder lands onto a row. Lowering too soon may cause the defoliator to miss the row and push the machine off the row instead of keeping it on. If the row finder gets off the row use the manual override to steer back onto the row.

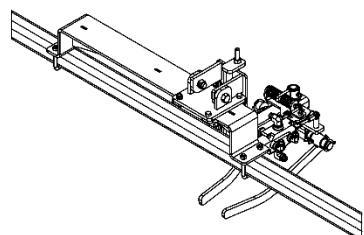


Figure 19: Row Finder

6.10 Scalpers (option):

Scalpers are an option on Amity defoliators that remove the very top of the beet helping to ensure complete petiole removal. Scalper are designed to ride on the crown of the beet to follow its changing height. Because of this they need to be raised in addition to the row finder at the field end just as the beets are ending. They should only be lowered again once the defoliator is turned around and as it starts to defoliate the next set of rows. Not raising or lowering the scalpers at the appropriate time in addition to possibly damaging the scalpers can cause the knives to plug with mud and not function correctly requiring the operator to stop of the defoliator in order to clean them. Finally, it is imperative that scalpers are lifted whenever the defoliator is reversed as this may cause damage to scalper knives, baskets and lift. See section 7.0 Adjustments for setup guide.

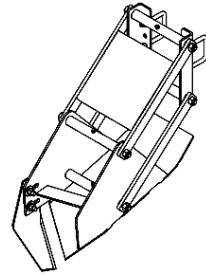


Figure 20: Scalpers

CAUTION: Raise scalpers at headlands. Never back up the defoliator with the scalpers in the lowered position as this may cause damage to scalper lift and or scalper baskets.

IMPORTANT: Properly setting the scalpers is critical to not wasting any sugar beet, or damaging the scalper assembly.

6.11 Floating Hitch (option):

The purpose of the floating hitch is to prevent the defoliator from dropping too far and not allowing the flails to dig into the ground when the tractor and defoliator travel across pivot tracks or similar ruts. Components include an in cab switch which controls a solenoid that activates a pressure relief circuit inside a valve body. When the switch is engaged the valve supplies a constant pressure to the hitch cylinders



Figure 21: Floating Hitch Valve

so that the hitch carries the majority of the weight when the tractor goes through a rut yet at the same time allows the cylinders to extend and the stabilizer wheels to hold the defoliator up while the tractor is in the rut. Once the tractor tires come up out of the rut the defoliator weight is transferred to the cylinder with stops installed as the stabilizer wheels travel over the rut. To turn with the floating hitch at field ends simply turn the switch off and the hitch will fully raise. When starting the next row turn the switch back on and the hitch cylinders will retract back to the stops, no changes to the hydraulic remotes are required for end row turns. With no power supplied to the valve it acts exactly as a traditional hitch allowing the machine to be moved around the yard without having to hook up wiring. Floating Hitch hydraulics should be set to 12-18 GPM (45-68 LPM). Higher flows will result in a faster reaction and preferred flow rate should be set while setting up floating hitch for the specific tractor that will be running it. See section 7.0 Adjustments for setup.

6.12 Machine Shutdown

To ensure maximum life of the machine, follow this procedure when stopping:

1. Raise the defoliator off the beets with the PTO still engaged.
2. While PTO is running at full speed disengage tractor PTO. The corner gearbox on all Amity defoliators has an over-running clutch built in and will allow the defoliator to slowly come to a stop well after the PTO drive on the tractor has stopped.
3. Do not exit the tractor until flails have come to a complete stop.

 **CAUTION:** When shutting down or reducing ground speed, the PTO must remain turning at full RPM until PTO is disengaged. Lowering RPM with PTO still engaged can cause the overrunning clutch to disengage and reengage and can result in failed driveline shear bolts.

7.0 ADJUSTMENTS



Before performing any adjustments first shift to park, disengage PTO, lower machine to ground, relieve hydraulic pressure, stop engine, remove ignition key, and wait for all moving parts to stop before adjusting.

7.1 Leveling

To obtain optimal performance of the defoliator, the machine must be level from left to right while defoliating. Critical to maintaining machine level is rear strut style and location. Selecting a strut style and tire location that do not run in previous tractor and sprayer tracks will greatly help the ease of maintaining field level and increase defoliation quality. Rear struts design is flexible so that they can be located for best performance. Because of your Amity defoliator's unique and low maintenance gearbox drive system, the right side of the defoliator is inherently heavier which will affect side to side level. Amity defoliator's come with weights mounted on the left side to counteract this; however depending on the options equipped an additional 100-300 lbs. (45-135 kg) can be added to the weight bracket on the front left corner to achieve a perfectly balanced machine. Instead of the preferred method adding weights, you may also adjust air pressure in your tires. Starting with all tires at the recommended pressure (see Section 3.0 Specifications) adjust pressure up on the right tires and proportionally down on the left tires until the distance from bottom of the axle tube to the floor is equal on both sides which indicates the static loaded radius of the tires is the same. (Not recommended for defoliators with optional 4 struts) Once the weight bias on your Amity defoliator is accounted for, check flail distances from a flat and level floor. If additional adjustment is required to level the defoliator please follow the procedures laid out below:

7.1.1 Manual: (Rear struts equipped with ratchet jacks for adjustment.)

1. Move the defoliator on to a flat and level floor for accurate measurements.
2. Lower the defoliator front hitch cylinders to approximate operating height.
3. Check tire pressure to ensure both sides are correctly inflated.
4. Measure the distance between the drum 3 flails and ground, or rear frame tube and ground on the very outside of the left and right hand sides of the defoliator.
5. To adjust the level simply pick the side which height is closest to desired and adjust the ratchet jack on the opposite side until the machine is level.
6. Future height adjustments should be made in even amounts on both struts to maintain level.

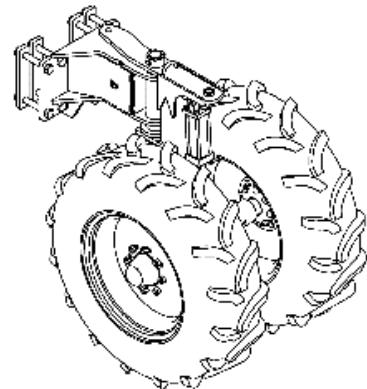


Figure 22: Leveling Adjustment

7.1.2 Hydraulic Strut Lift (option): (Rear struts equipped with rephasing cylinders.)

1. Move the defoliator on to a flat and level floor for accurate measurements.
2. Lower the defoliator front hitch cylinders to approximate operating height.
3. Check tire pressure to ensure both sides are correctly inflated.
4. Measure the distance between the drum 3 flails and ground, or rear frame tube and ground on the very outside of the left and right hand sides of the defoliator and record distance.
5. Jack up the corner of the frame to remove the load from the strut assembly and the tires. Securely block the frame with suitable jack stands or wooden blocks.
6. Remove the lower cylinder pin and loosen the bolt clamping the cylinder clevis end to the rod.
7. Screw in the cylinder clevis end on the side that is high until machine is level.
8. Retighten clevis and replace pin.
9. Lower frame to ground and confirm level. Repeat steps 5-8 if required.

7.2 Height

Follow the guidelines below for initial setup and adjustment of defoliator height.

7.2.1 Initial height set-up

1. Move the defoliator to a flat and level floor.
2. Lower the defoliator front hitch cylinders to approximate operating height.
3. Evenly lower the rear struts to approximate operating height.
4. Start with both 2nd and 3rd drums at the same height with flails approximately 1 inch below the average height of an estimated beet crown.
5. Install as many cylinder depth stops as possible evenly in both front cylinder and rear cylinders if equipped.
6. Lower cylinders onto depth stops and check initial setting.
7. Add additional depth stops to level machine and set height to desired level.



Figure 23: Rear Strut Height Adjustment

7.2.2 Field Height adjustment

1. With defoliator set to initial height estimate follow Section 6.1 Start Up for beginning a new field.
2. Run the defoliator for 25-50 feet (7.5-15 m) at a slow speed to remove from equation.
3. Following adjustment safety procedures stop and raise the defoliator.
4. Once all moving parts have stopped exit the cab and assess the defoliation job.
5. Make height adjustments as needed by added stops or adjusting the ratchet jacks depending on options equipped. Use the following guidelines:
 - a. Flails hitting dirt – raise rear struts

- b. Front flails cutting top off beets – raise front hitch
 - c. Beet crown not clean – lower rear struts
 - d. Front crown of beet not clean while rear is – lower front hitch
 - e. Rear crown of beet not clean while front is – lower rear struts & raise front hitch
 - f. Beet crown damaged – increase speed and reassess
 - g. Beets being pulled out of ground – raise rear struts
6. Make adjustments as needed and defoliator another 25-50 feet (7.5-15 m) until satisfied with defoliation results.
7. Increase speed until defoliation job begins to worsen and slow back down slightly to optimize travel speed.

CAUTION: Never set the flails to hit the ground. Ground contact will damage flails and cause premature wear. Cylinder stops should be used at all times to prevent flail to ground contact. Flails can pick up stones and other debris and expel them out of the machine with enough speed to injure a person. Maintain a safe distance and never stand in front or behind of a running defoliator.

NOTE: A 1 in. (2.5 cm) stop in a rear cylinder provides approximately 1 in. (2.5 cm) of lift. A 1 in. (2.5 cm) stop on the front hitch provides approximately 3.25 in. (8.26 cm) of lift.

IMPORTANT: Properly setting height is the most important factor in the performance of your Amity defoliator. Height should be checked and changed if needed every time field, variety or conditions change.

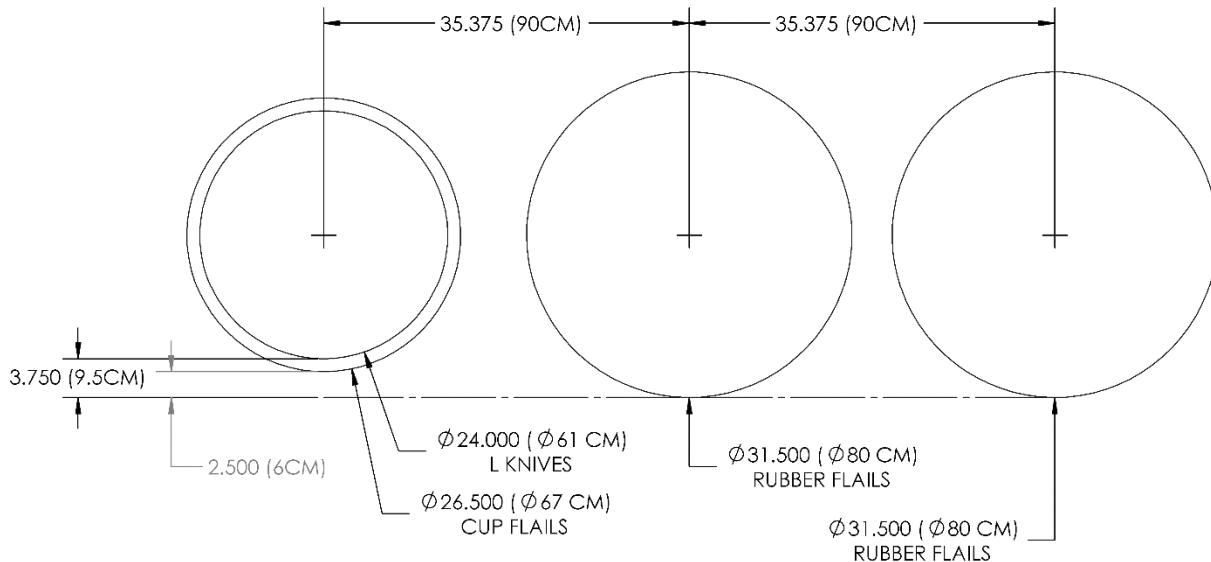


Figure 24: Defoliator Drum Flail Size

7.2.3 Flail Size Drum 1 height as shown in Figure 24 above is designed to run higher than the rear drums 2&3. This is based on its function which is to remove the majority of the beet leaves leaving only a few petioles or leaf stems for the 2nd and 3rd drums to remove from the crown of the beet. The rear two drums which are designed to be run level with each other, counter rotate so the flails hit from different directions to clean the front and back of the beet crown as illustrated in Figure 25 below. This is where the 50 series and 00 series differ significantly and described in the following sections.

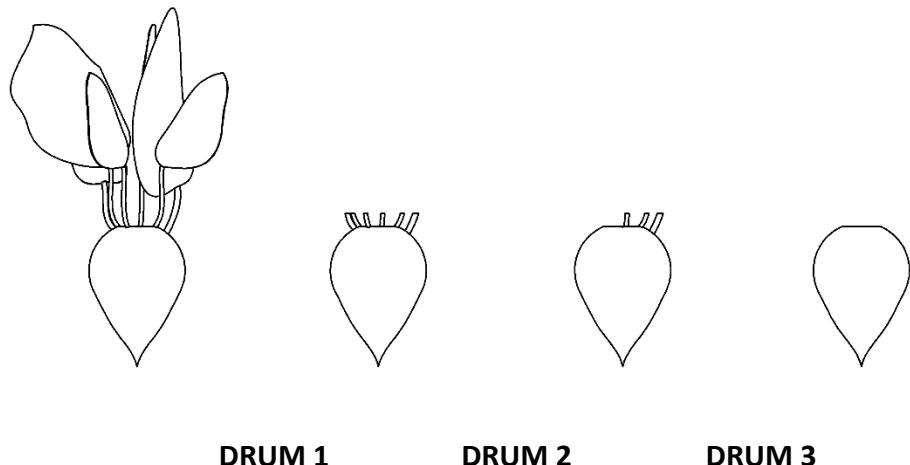


Figure 25: Defoliation Process

7.2.4 50 Series The design feature that enables the 50 series defoliator to do more work faster is the shrouded front steel drum 1. The shrouded drum 1 is able to remove the majority of foliage leaving only a couple of inches of petioles and keeping the rear drums clear of excess leaves allowing them to perform their jobs more effectively. Drum 2 rotates with the direction of travel its job is to clean the front side of the beet as shown in Figure 25. The 2nd drum has 10 sets of flails compared to the 6 of the rear drum because of the rotational direction makes for a less aggressive cleaning action. Drum #3 rotates against the direction of travel used 6 sets of flails and its flails contact the back half of the beet removing the final petioles from the beet crown. By looking to see where the petioles remain will let you know if the 2nd, 3rd or both drums need to be raised or lowered. Lower or raise the hitch to adjust for level and lower rear struts to adjust drum 2 and drum 3 flail height. Both hitch and rear strut adjustments will affect the other drum so double check flail heights for both drums after making any adjustments.

7.2.5 00 Series 00 series defoliators do not have the front shroud that the 50 series have and because of this the front drum doesn't do as much work, leaving more petioles and even some leaves for the 2nd and 3rd drums to clean up. Similar to the 50 series the 00 series defoliator needs to run level with both the 2nd and 3rd drums at the same height; however the 2nd drum (because of the increased petioles) will not be able to clean the front of the beet by itself, and needs the 3rd drum to help. In order to do that travel speed must be decreased so additional strikes are made by the flails to each beet crown to perform the quality of job desired. Adjustments are performed in the same manner with the front hitch adjusting machine level and the rear struts raised or lower to adjust for flail height.

7.2.6 Loose Beets In some conditions beets may be knocked loose from the ground which prevents them from being harvested. In conditions where this is happening, the best way to minimize that is to raise the flail height as high as possible while still removing the petioles. This will provide less aggressive impacts to the beet. Adjusting travel speed doesn't help much and in some cases will be worse for this condition as the tangential velocity of the flails is much greater than any fractional change from reducing travel speed. Instead, if raising flail height doesn't provide enough relief, lowering the PTO rpm in conjunction with reducing travel speeds will provide a less aggressive impact on the beets. This should be done in addition to raising the flail height.

7.2.7 3rd Drum Height (50 series only)

On all 50 series Amity defoliators the 3 drum can be adjusted upwards. With the defoliator run level as intended shown in Figure 24, the front steel drum 1 is 2.5 inches (6cm) (higher than rubber drums 2 and 3; with drum 1 removing the majority of foliage and drums 2 and 3 cleaning the petioles from the crown of the beet. The purpose of drum 3 being adjustable is for beet stands with poor emergence where beet height varies drastically. In this situation when running level the front steel flails would be slicing off the tops of higher beets. Raising the 3rd drum allows the operation to lower the rear of the defoliator and raise the front with the end result of having drum 1 higher. This adjustment may also be used as the flails become worn and the rubber flail's 2.5 inches (6cm) difference in operating height becomes closer to the front steel drum.

To adjust the 3rd drum upwards:

1. Third drum height may be raised up to 1 inch (2.5 cm). In $\frac{1}{4}$ inch (.6cm) intervals.
2. Determine desired amount to raise the third drum.
3. Loosen bolts on gearbox, center hanger plate and end hanger plate as pictured below.
4. Lift gearbox upwards with eyebolt until it is high enough for desired height.
5. Remove spacers from the storage location on top of drum two.
6. Place the desired spacers underneath gearbox three in from each side.
7. If two or more spacers are used remove the standard bolts and swap them with the longer bolts used to hold the spacers on top of gearbox two.
8. Apply Loctite 243 and torque gearbox bolts to the spec listed in Section 11.6.
9. With gearbox adjustments complete, the center hanger plate and end hanger plate need to be adjusted to match.
10. Starting with the center hanger plate shown in Figure 27 take a measurement of the current position.



Figure 26: Gearbox 3rd Drum Adjustment



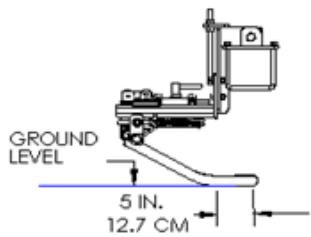
Figure 27: Center 3rd Drum Adjustment

11. Using the eyebolts raise the plate until the measurement matches the height the gearbox was raised.
12. Tighten the 4 5/8" bolts locking the hanger plate into place.
13. Repeat steps 9-12 for the outer plate shown in Figure 28.
14. Run the defoliator with the updated drum 3 height and recheck that bolts are tight after 1 hour of operation.



Figure 28: Outer 3rd Drum Adjustment

7.3 Row Finder



When defoliating, the row finder wands should be adjusted like Figure 29 such that there is 5 in. (12.7 cm) of contact between the ground and row finder wands. Adjustment spring (B), shown in Figure 39, can be adjusted to apply more down pressure to ensure constant contact with the beet row.

Likewise, the row finder wands should be angled down when lifted out of the ground as shown in Figure 30. Dimension (A) can be adjusted using nuts (D):

Figure 29: Row Finder Wand Placement

1. To increase distance (A), adjust nuts (D) along line (F) toward the rear of the machine.
2. To decrease distance (A), adjust nuts (D) along line (F) toward the front of the machine.

Adjusting Height (E):

1. To change height (E) of the row finder, loosen bolts (C).
2. Adjust jam nuts (G) to desired height.
3. After adjusting height (E), retighten bolts (C).

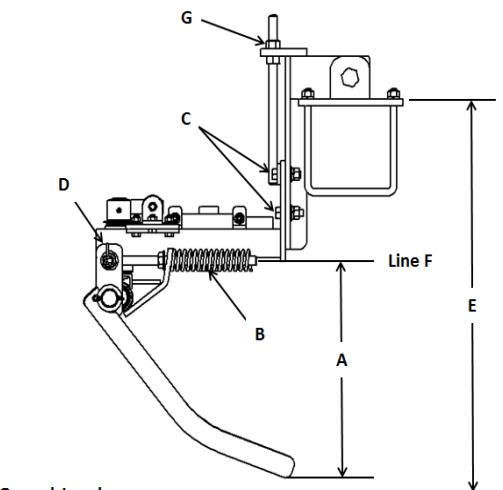


Figure 30: Row Finder Adjustment- Right Side View

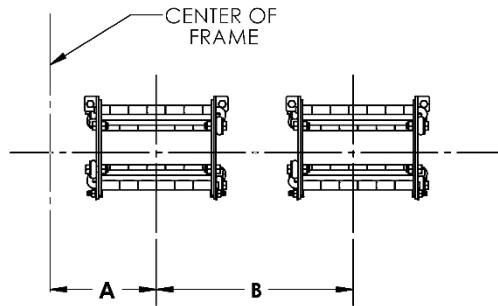
NOTE: The wands should be angled down slightly when the machine is out of the ground. This will create down pressure from spring (B) when the machine is lowered to digging depth.

7.4 Row spacing

Row Spacing: Normally row spacing is set once from the factory and will not need to be changed unless the customer changes crop spacing.

A=B/2 Center of frame to center of flail basket

B=Row Spacing



7.4.1 Flail spacing

Steel Flail adjustment:

Amity Steel flails are used on the front drum only and spin at 1000 RPM and are balanced from the factory. All steel flails are either full width (L-knife and Cup knife) and do not need to be adjusted when changing row spacing or they are welded at a specific row spacing and are not adjustable (50 series and over the row cup flails). Please refer to your Amity parts manual for the appropriate replacement if required.

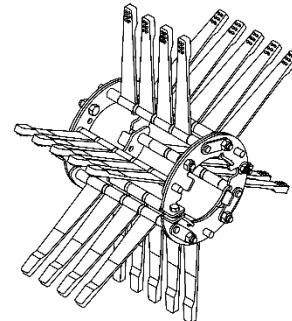


Figure 32: Rubber flail basket

Rubber Flail adjustment: (Refers to Studded, Tapered, Split, Block, and Sweep flails)

1. Open defoliator top doors for access to flails
2. Determine the required flail position by measuring from the center of the machine.
3. Mark the center positon required for each flail basket.
4. Loosen the flail basket bolts clamping the rings onto the drum.
5. Slide the assemblies to the desired position on the drum.
6. Retighten flail ring bolts securing the basket to the drum.

7.4.2 Wheel Spacing

The rear struts spacing are set at the factory and are designed to be adjustable to fit 18 to 44 inch (45 to 112 cm) row spacing depending on the strut style equipped. Minimum row and crop damage will be done if the tires are set to track in the center of the rows. Wheel spacing adjustments are made by moving the spindle in or out utilizing different cross-holes in the rear strut, or by reversing the switch the tires which changes the offset in or out. Any wheel adjustments need to be made in conjunction with the strut assembly as a whole from the machine center. Always space the tires first as some spacing widths will end up offset from the center of the strut.

Set up wheel spacing as follows:

1. Measure the current wheel spacing and determine how far in or out the wheels need to be adjusted.
2. Jack up the corner of the frame to remove the load from the strut assembly and the tires. Securely block the frame with suitable jack stands or wooden blocks.
3. Remove wheels and cross bolts as necessary.
4. Use chart below to set desired wheel spacing.
5. Torque wheels to 125 foot pounds and re-torque after 1 hour of field use. Lug bolts should be checked periodically and tightened if needed.

7.6-15 Strut

18" Wheel offset in; Inner strut holes, Outer spindle holes
20" Wheel offset in; Inner strut holes, Inner spindle holes
22" Wheel offset in; Middle strut holes, Inner spindle holes
24" Wheel offset in; Outer strut holes, Inner spindle holes

11.2-24 22" Strut

22" Wheel offset in; Inner spindle holes
24" Wheel offset in; Outer spindle holes
*26" Outer tire wheel offset out / Inner tire wheel offset in; Inner spindle holes
*28" Outer tire wheel offset out / Inner tire wheel offset in; Outer spindle holes
30" Wheel offset out; Inner spindle holes
32" Wheel offset out; Outer spindle holes

11.2-24 44" Strut

44" Wheel offset in

*Wheel setting results in a wheel spacing which center is 2" (5 cm) out from the center of the strut which needs to be taken into account when setting strut spacing. In addition to maintain the proper tire lug orientation if switching to 26" or 28" (66 or 71cm) spacing one tire from the left hand strut needs to be switched with one tire from the right hand strut.

7.4.3 Strut Spacing

Strut spacing is set at the factory but can be adjusted to avoid planter or sprayer tracks in your fields, or if your operation changes row widths. Rear struts should be spaced to avoid running in planter tracks when possible. Often it is not possible to avoid planter or sprayer tracks in which case at least one tire should be off the tracks from the planter or sprayer and the rear struts moved out as wide as practical. Having one strut follow were a previous wheel track has been made can make it very difficult to maintain a level defoliator which can result in a poor defoliation job.

Set up Strut spacing as follows:

1. Measure from the center of the frame to determine new strut spacing and mark the rear tube.
2. Jack up the corner of the frame to remove the load from the strut assembly and the tires.
Securely block the frame with suitable jack stands or wooden blocks.
3. Loosen one inch strut bolts securing the rear struts to the rear frame tubing.
4. If struts are steerable loosen the bolts attaching the steering cylinder to the rear frame tube. In addition the tie rod clamp will need to be loosened and cross bolt removed.
5. Slide the assembly along the frame until the correct strut spacing is achieved.
6. Tighten the mounting bolts evenly.
7. Repeat with the other side
8. On Steerable strut units after both struts have been adjusted reinstall the tie-rod cross bolt in the appropriate hole and tighten the tie-rod clamp in place. Tie rod length may need to be adjusted with the end links to ensure both struts are straight, see section 7.5.

7.5 Steerable Struts

To adjust your steerable struts so they are tracking straight:

1. Start with the strut that is attached to the steering cylinder, typically the right strut.
2. Check for straightness by setting a straight edge against the steering weldment and check for alignment with the frame mounted weldment.
3. If they are not aligned, loosen the jam nuts on the eyebolt locating the cylinder and adjust the eyebolt in or out until they are properly aligned.
4. For defoliator models not equipped with an eyebolt for adjustment the bolts affixing the cylinder plate to the rear tube will have to be loosen and retightened after the strut is aligned.
5. With that complete check for alignment on the other strut in the same manner.
6. To adjust the other side loosen the locking nuts on both sides of the tie-rod.
7. Turn the tie rod to adjust in or out.
8. Once proper alignment is achieve re-tighten the nuts locking the tie-rod length.



Figure 33: Steerable Struts

7.6 Scalpers

Scalpers are designed to remove the last of the petioles from the beet and a small portion of the crown reducing impurities in beet piles. Properly setting up scalpers is critical in their performance. Baskets should be set so that they do not hit either the top or bottom limit of their operational range while defoliating. The stop at the bottom of the range purpose is only for holding the scalper basket up when the scalper bar is lifted. To maximize adjustment range the lower set of holes shown in Figure 34 to the right should be used. The upper set of holes is there for additional mounting flexibility and can be used if desired.

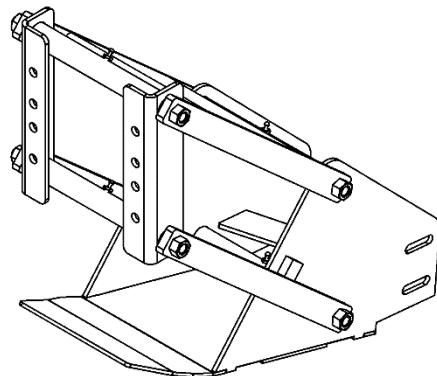


Figure 34: Scalper Basket



CAUTION: Never back up or turn defoliator with the scalper bar down. This will result in damaging scalper components.



Figure 35: Scalper

7.6.1 Knives

Scalper knives should be set so that they remove a 1.5-2 inch (4-5 cm) slice off the crown on the beet. Excess of this amount will result in lower tons per acre yields. Properly setting scalpers is critical in optimizing your defoliation job.

Set up scalper knives as follows:

1. Start with the defoliator at level operating height on a flat and level surface and lower the scalper bar to the ground.
2. Loosen scalper knife bolts so the knife can be moved.
3. A good starting point is with the knives $\frac{1}{2}$ inch (1.2cm) below the trailing edge of the scalper basket. To set this consistently use a $\frac{1}{2}$ inch (1.2 m) shim under the trailing edge of the scalper basket.
4. Adjust the knife so that it is flat on the ground and $\frac{1}{2}$ inch (1.2cm) back from the trailing edge of the basket for a starting point.
5. Tighten scalper knife bolts and move to the next knife.
6. Final adjustments are to be made in field.

Scalper knives field adjustment.

1. With all knives at the initial set point begin defoliating.
2. First set defoliator height so the flails are doing a proper job before setting knives.
3. With defoliator height set, lower scalper to operating position and travel 50 feet (15 m) down the field.
4. Evaluate scalper performance including slice size and angle of cut.
5. Raise or lower scalper knives to increase or decrease amount removed.
6. Angle the scalper knives forwards or backward to achieve a level cut from scalpers.

- Once set scalpers shouldn't have to be reset, but should be periodically sharpened to maintain a quality cut.

7.6.2 Bar height

The Amity scalper bar has two standard mounting positions as shown in the figures below. The bar height should be set to ensure the scalper baskets cannot reach the maximum or minimum stops and instead operate smoothly in the range between them. The scalper bar is set in the higher position from factory. Adjust the bar height so it is correct for your conditions according to the diagrams below. Although not typically used the third inner cylinder hole may be used to lower the scalper bar further if needed. When the lowest setting is used or the defoliator is not being operated level front to back, the slotted hole on the bar weldment shown below is required to level the scalper bar.

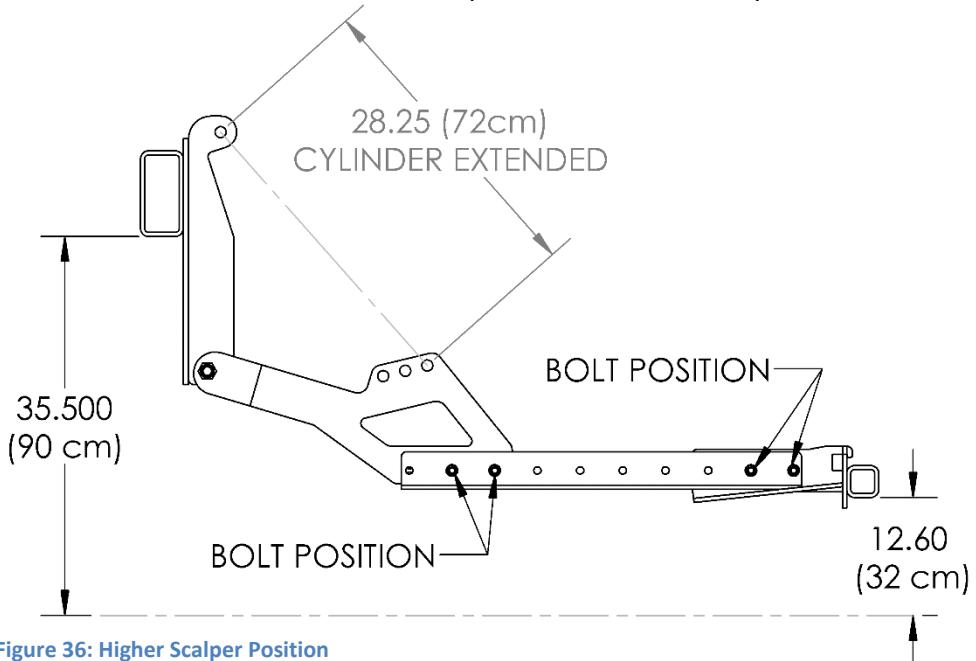


Figure 36: Higher Scalper Position

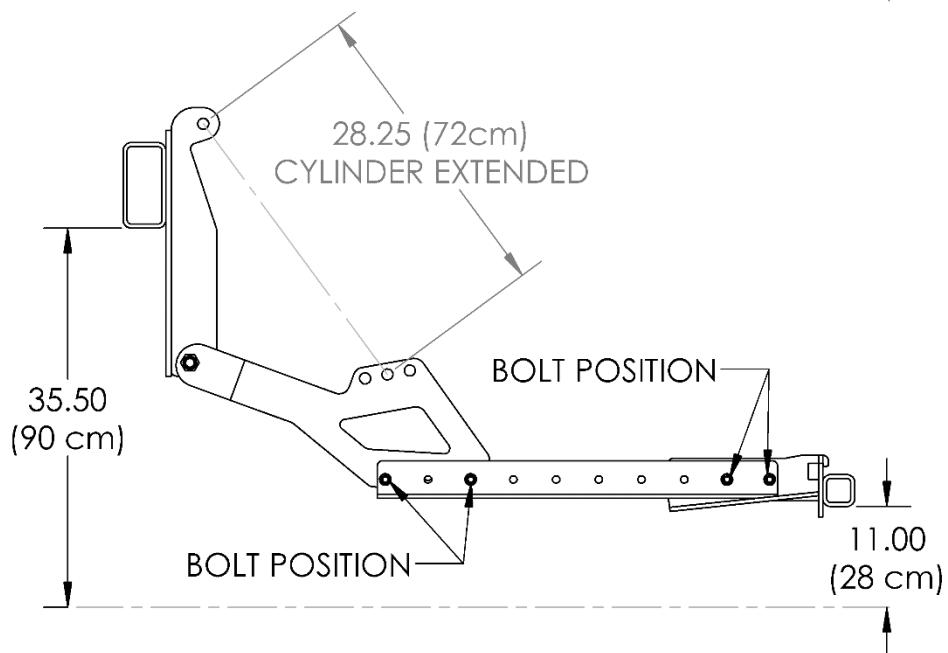


Figure 37: Lower Scalper Position

7.7 Floating Hitch

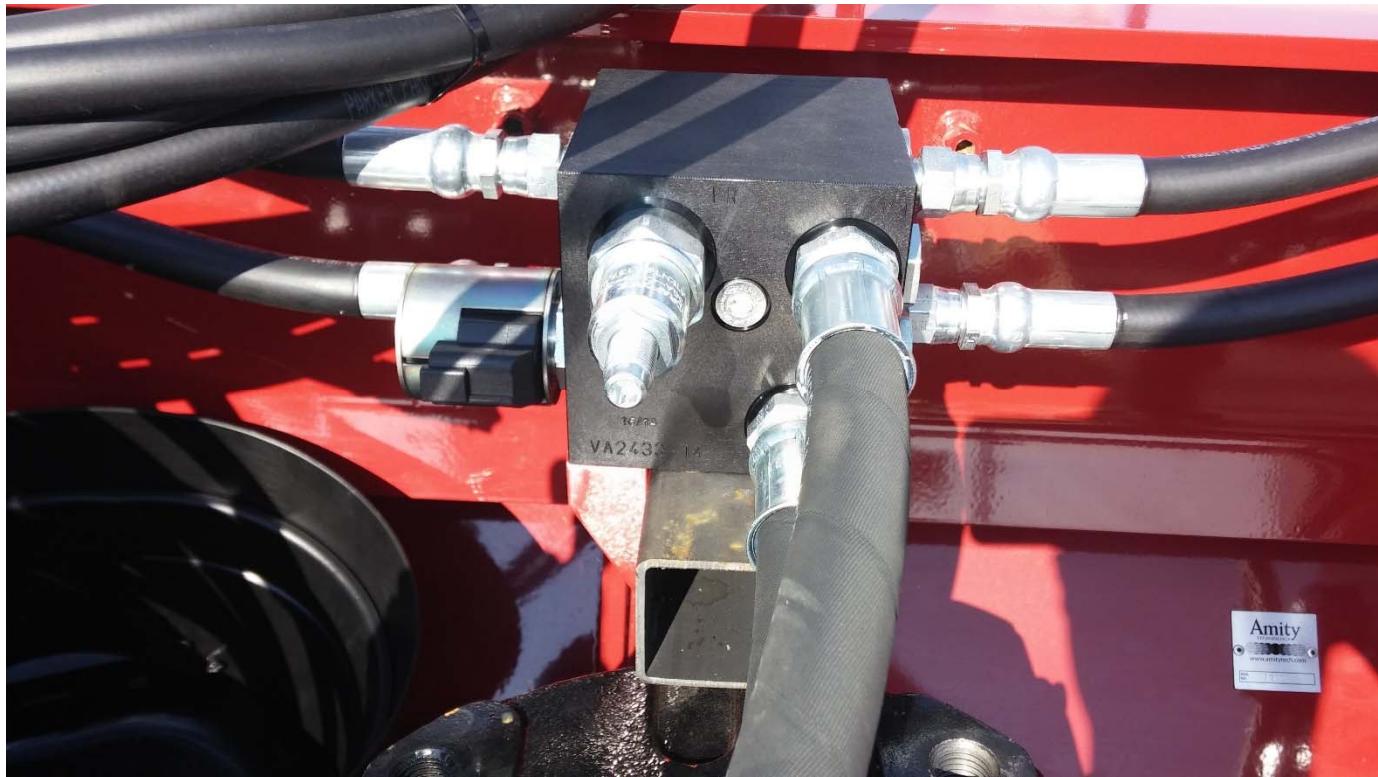


Figure 38: Floating Hitch Valve Block

Proper setup is critical for the Floating Hitch to function properly. Because every tractor model's hydraulics vary between brands and models a one-time initial set-up must be done with the tractor model it will be operated with.

1. Wire in the supplied harness and switch to in-cab 12V accessory power and plug into the floating hitch valve solenoid. This switches the valve between floating mode (POWER ON) and standard hitch mode (POWER OFF).
2. Hook up the hydraulic hoses to the tractor and set an approximate working height for the front hitch using depth stops. Then set the hydraulic flow to a constant 12-18 GPM (45-68LPM). This constant flow is required to have oil available to extend to retract the cylinders when the tractor goes in and out of ruts.
3. With the hydraulics turned on it is time to adjust the constant pressure supplied to the hitch cylinders. To adjust the pressure loosen the jam nut and with an Allen wrench adjust the pressure setting. Clockwise raises the pressure and Counter-Clockwise lowers it. With the harness plugged in and switched on engaging the float mode, raise the hydraulic pressure until the cylinders fully extend, if they don't already. Then lower the pressure until the cylinders retracts back onto the cylinder stops. Turn the switch off, which will extend the cylinders and then back on again noting the speed which with the cylinders retract. Continue to adjust the pressure incrementally lower checking the speed each time until you are happy with the speed the hitch retracts and tighten the jam nut locking the setting in place.

Note: When setting field height it is important to have the stabilizer wheels firmly on the ground and not just skimming the ground, so they are able to hold the defoliator height when the tractor goes through a rut. Also it is important to ensure the floating hitch power is on, otherwise with the hitch locked in place this will place too much weight on the stabilizer struts possibly damaging them.

7.8 Torque Chart

Torque values listed are for coarse thread bolts, in general use only. Do not use these values if a different torque value or tightening procedure is listed for a specific application. Check the tightness of cap screws periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with the identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, they should only be tightened to the strength of the original fastener.

Make sure fastener threads are clean and dry, and thread engagement is properly started. This will prevent them from failing when tightened.

Tighten cap screws with a plastic insert or crimped steel-type lock nuts to approximately 50% of the torque shown in Table 8. Tighten toothed or serrated-type lock nuts to the full torque value.

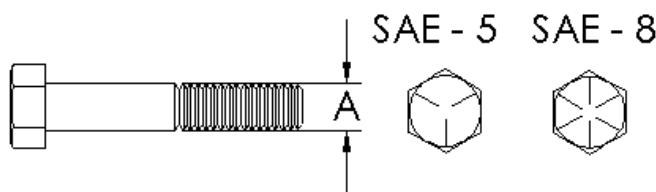


Figure 39: Bolt Grade Identification

Table 6: Torque Chart

Size (A)		Grade 5		Grade 8	
Standard	Metric	N*m	lb-ft	N*m	lb-ft
$\frac{1}{4}''$	.635 cm	12	9	17	12.5
$\frac{5}{16}''$	.794 cm	25	18	35	26
$\frac{3}{8}''$	.953 cm	44	33	63	46
$\frac{7}{16}''$	1.11 cm	70	52	100	75
$\frac{1}{2}''$	1.27 cm	110	80	150	115
$\frac{9}{16}''$	1.43 cm	155	115	225	160
$\frac{5}{8}''$	1.59 cm	215	160	300	225
$\frac{3}{4}''$	1.91 cm	375	280	550	400
$\frac{7}{8}''$	2.22 cm	625	450	875	650
1"	2.54 cm	925	675	1300	975
$1\frac{1}{8}''$	2.86 cm	1150	850	1850	1350
$1\frac{1}{4}''$	3.18 cm	1650	1200	2600	1950
$1\frac{3}{8}''$	3.49 cm	2150	1550	3400	2550
$1\frac{1}{2}''$	3.81 cm	2850	2100	4550	3350

8.0 TRANSPORTATION

8.1 Warning Lights

! **CAUTION:** Prevent collisions between other road users, slow moving tractors with attachments or towed equipment, and self-propelled machines on public roads. Frequently check for traffic from the rear, especially in turns.

Use headlights, flashing warning lights, and turn signals day and night. Follow local regulations for equipment and marking. Keep lighting and marking visible and in good working order. Replace or repair lighting and marking that has been damaged or lost.

8.2 Preparing for Transport

1. Turn off PTO and any constant hydraulics for transport.
2. Clean all soil and debris off the machine.
3. Raise the front hitch lifting all flails of the ground.
4. Lower the rear struts against the stops. If drum 3 flails are too close to the ground add an additional stop for transport
5. Make sure all safety decals and lights are clean and visible and all tail lights and turn signals function properly.

! **CAUTION:** Always use warning lights when transporting. Braking distance is greatly increased when towing a defoliator.

NOTE: Maximum speed when transporting the defoliator is 25 mph (40 kph).

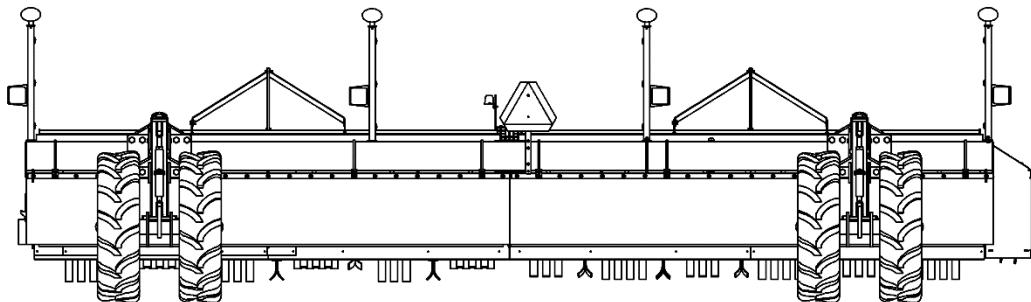


Figure 40: Rear Defoliator

9.0 CLEANING

Cleaning is an important part of defoliator maintenance. This section illustrates a few points where mud will routinely build up and need to be cleaned.

9.1 Row Finder

Row finder wands (A) and springs (B) must be cleaned routinely in order for the row finder to correctly locate beets.

Also, clean the area around the hydraulic valve spool and all other moving components to prevent seal failure.

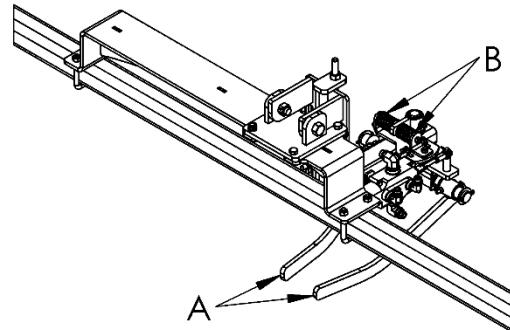


Figure 41: Row Finder Cleaning

9.2 Scalpers

Scalpers can plug with mud and leaves between the knife and basket. Keeping scalper knives sharp and properly setting knives can help alleviate plugging along with lifting the scalper bar slightly before beets end at headlands so they are not pulled through the dirt.

Despite these steps scalpers will plug occasionally and will need to be cleared at the field end if they do not unplug themselves. There is no set schedule for cleaning.



Figure 42: Scalper Cleaning

9.3 Top Doors & Interior Walls

Mud under top doors and on interior walls is the largest place for buildup on the defoliator. Allowing mud to build too far will cause premature wear of flails and needs to be cleaned regularly to prevent this. Inspect and clean your Amity defoliator every 2 hours. Cleaning can be required more or less often depending on field conditions and it is up to the operator to make the final determination.



Figure 43: Interior cleaning

9.4 Gearbox Enclosure

The gearbox enclosure should be cleared of dirt and debris whenever driveline maintenance or inspection is performed. This will keep material clear of driveline seals and gearbox breather vents prolonging component life.



Figure 44: Gearbox Enclosure

10.0 STORAGE

10.1 End of Season

1. Thoroughly clean the defoliator inside and out. Debris and dirt will draw moisture and cause rust.
2. Inspect the defoliator for any damaged or worn components; repair or replace as required.
3. Lubricate all grease fittings and run machine for 5 minutes to distribute lubricant.
4. Touch up paint on all parts from which paint has been worn to prevent rusting. (optional)
5. Move the defoliator to a level, dry, and clean area. Inside a building is ideal.
6. Put blocking material under the front support stands to prevent sinking and under the rear struts to take load off the tires.

10.2 Beginning of Season

1. Attach the defoliator to the tractor (see section 5.0).
2. Remove all support blocks from the front support stands and rear struts.
3. Lubricate the entire machine (see Lubrication and Maintenance, section 11.0). This will force any collected moisture out of the bearings. Replace the gearbox oil (see Lubrication and Maintenance, section 11.0).
4. Run the defoliator to ensure proper function.
5. Tighten any loose components including guards and shields.
6. Review the operator's manual prior to operation.

IMPORTANT: All components that are damaged or worn must be repaired or replaced before operating your Amity defoliator (see parts book for part numbers).

11.0 LUBRICATION AND MAINTENANCE

11.1 General Maintenance Information

Inspect all maintenance items at the beginning and end of each season and replace worn components. It is important to only use clean lubricants; ensure that all containers used to handle lubricants are clean and store lubricants protected from dust moisture and other contaminants.

IMPORTANT: Before any Maintenance or Inspection is done please review and follow safety guidelines laid out in section 2.0.

IMPORTANT: The period for recommended lubrication and maintenance is based on normal conditions. Severe or unusual conditions may require more frequent lubrication or oil changes.

IMPORTANT: These items must be well maintained and checked routinely to maximize their lifespan.

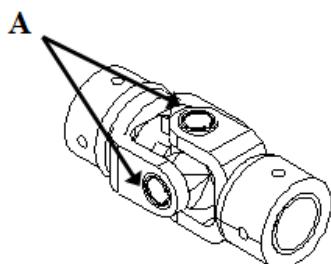
11.1.1 Grease:

Clean grease fittings before using a grease gun to prevent injecting contaminates. Replace any lost or broken fittings immediately. If a new fitting fails to take grease, remove it and check for failure of adjoining parts.

SAE multipurpose high temperature extreme pressure (EP) grease with less than 1% molybdenum disulfide grease should be used for most grease points, NLGI #2 lithium base is recommended.

Moly Grease EP - 3% molybdenum disulfide NLGI #2 is specified strictly for drive couplers to extend component wear life.

11.2 U Joints



IMPORTANT: On needle bearings (A), use of grease with more than 1% molybdenum disulfide content may lead to premature U joint failure.

Figure 87: Needle Bearings

11.3 Gearbox Oil Level

Gearbox oil levels should be checked routinely and filled to line (A) shown in Figure 45.

Side plugs (B) can be found on all gearboxes and the lower side plug is used to measure the correct fill level.

When gearboxes are filled with the proper amount of oil, the level should be just below the threads of side plug (B). Excess oil can be drained from the gearbox using side plug (B).

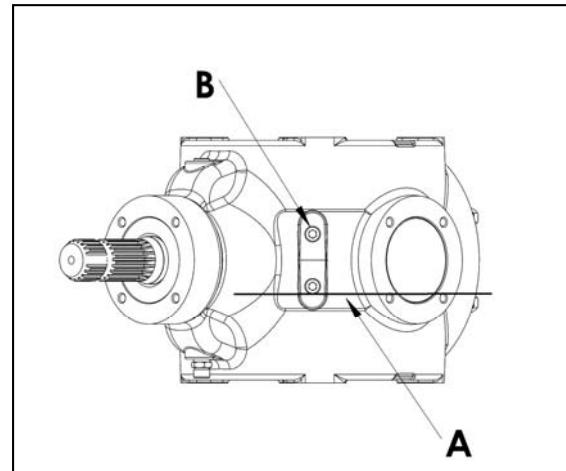


Figure 45: Gearbox Oil Level

Under filling the gearbox will cause a buildup of heat which when it reaches a critical level will cause seal failure which will cause gearbox failure.

11.4 Changing Gearbox Oil

Gearbox Oil service interval is every 250 hours or annually. Although the oil will not break down in this time period dust, dirt and moisture can enter through the breather when the oil warms and cools during operation. These contaminants must be removed on a regular basis to ensure long life for working components. Access holes are located underneath the drain plug on all gearboxes allowing oil to be changed without removing the gearboxes from the defoliator frame. To change the oil:

1. Before beginning to change oil it is important to clean around the fill (breather), level, and drain ports to prevent contamination.
2. Place an oil catch pan under each gearbox remove the drain, level and fill (breather) plugs. While breather is out clean following section 11.5 Breather Cleaning.
3. Allow each gearbox to drain for 10 minutes
4. Install the drain plugs and dispose of used oil in an approved manner.
5. Fill with SAE 80W90 EP (extreme pressure) until oil just starts to seep out of the lower oil level plug. Refer to Table 8 for approximate fill quantities.
6. Install the level and fill plug.

11.5 Breather Cleaning

The breather must be able to vent atmospheric conditions during heating and cooling cycles of operation. If it cannot vent, oil will seep out seals and run low. Prolonged operation with low oil levels will damage the internal components. To clean the breather:

1. Clean Gearbox surface around breather to prevent contamination.
2. Remove breather (A).
3. Stop up the breather opening using a plastic plug or a clean rag to prevent contaminants from entering the gearbox.
4. Soak the breather in solvent for one hour.
5. Use a pointed instrument or wire to remove any residue from breather passages.
6. Blow out the breather with high pressure air.
7. Blow through the breather to ensure the passages are clear.
8. Reinstall and tighten breather (A) in the gearbox.

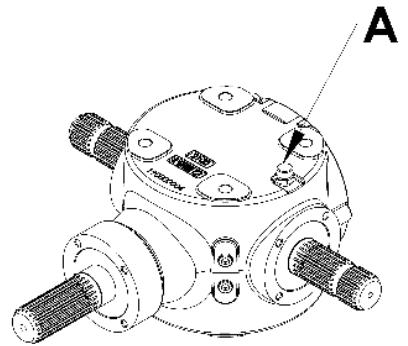


Figure 46: Gearbox Breather

11.6 Gearbox Torque

Check all gearbox hardware when performing yearly maintenance if hardware is loose remove and reinstall with new hardware torque to the appropriate spec listing in Table 7.

If gearbox is replaced, in a star pattern torque the hardware to roughly half the torque spec, then fully tighten to torque spec using Loctite 243 or equivalent.

Table 8: Gearbox Capacity and Torque

Gearbox Series	Approx. Oil Capacity*	Fastener	Torque Spec.**
2100	57 oz / 1.69 Liters	5/8" grade 5 Hex Bolt	170 lb-ft(231 N-m)
2125	95 oz / 2.81 Liters	M16 class 8.8 Hex Bolt	183 lb-ft(248 N-m)
		M16 class 10.9 Flange Bolt	253 lb-ft(343 N-m)
2155	135 oz / 4 Liters	M20 class 8.8 Hex Bolt	325 lb-ft(441 N-m)

*Oil capacity varies with gearset installed final, oil level should be filled to lower oil level plug.

**All fasteners should be installed with Loctite 243 and torqued to spec. do not retighten after installing.

11.7 Flails

The position and condition of the rotation flails is crucial to the quality of the defoliator job done by the machine. The flails must be positioned exactly over the rows to optimally clean the foliage and tailing from the beets. All flails must be in good condition. Any missing flails could affect the balance of the rotor and lead to severe vibration.

Steel Flails:

1. Row spacing: Steel flails row spacing is not adjustable. If row spacing must be changed a genuine pre-balanced replacement drum(s) is available for your Amity defoliator. Please see your parts manual for the appropriate part number(s).

2. Flail replacement:
 - a. Open defoliator top doors for access to flails
 - b. Inspect all flail and determine which ones need to be replaced.
 - c. Cup – Remove flail rod bolt
L-Knife – Remove mounting bolt
 - d. Remove flail tube with flails and spacers.
 - e. Inspect and replace missing or damaged components using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
 - f. Reinstall flail rod/bolt through flail tube with flails and spacers preassembled.
 - g. Tighten flail rod/bolt.
 - h. Close doors and run machine up to operating speed to check drum balance. If unbalanced, ensure flails opposite of replaced components are also new. If still unbalanced, tubes may need to be removed and rebalanced.

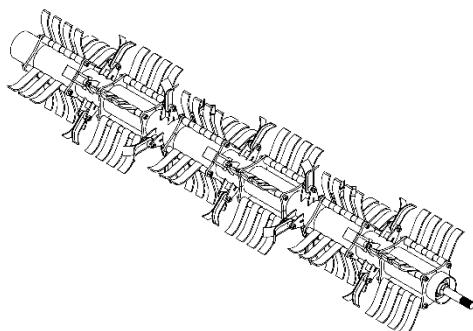


Figure 47: Steel Flail

NOTE: When individual steel flails are replaced the flails on the opposite side should also be replaced to maintain the drum balance.

NOTE: Steel drums on defoliators rotate at approximately 1000 RPMs; if all new flails are installed on the drum it should be balanced to prevent excess vibration.

Rubber Flails:

1. Row Spacing: Normally row spacing is set once from the factory and will not need to be changed unless the customer changes crop spacing. To set spacing:
 - a. Open defoliator top doors for access to flails.
 - b. Determine the required flail position by measuring from the center of the machine.
 - c. Mark the center positon required for each flail basket.
 - d. Loosen the flail basket bolts clamping the rings onto the drum.
 - e. Slide the assemblies to the desired position on the drum.
 - f. Retighten flail ring bolts securing the basket to the drum.
2. Flail Replacement:
 - a. Open defoliator top doors for access to flails.
 - b. Inspect all flails and determine which ones need to be replaced.
 - c. Remove flail rod mounting bolt.
 - d. Remove flail rod.
 - e. Replace missing or damaged flails using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
 - f. Reinstall hinge rod threading on spacers and flails in the appropriate sequence.
 - g. Tighten flail rod mounting bolt.

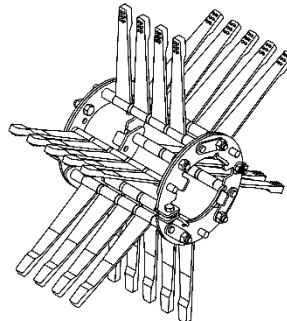


Figure 48: Rubber Flail

NOTE: When replacing all the rubber flails, use a soap and water solution to lubricate flail mounting hole making it easier to slide the new flails onto the flail rod.

NOTE: Rubber flail drums on the Amity defoliators rotate at approximately 400 RPMs are not balanced from the factory and do not require to be rebalanced when flails are replaced.

11.8 Servicing Intervals

Before 1st Use:

1. Grease hitch, row finder, scalper baskets, U joints, and PTO driveline
2. Check all gearbox oil levels.

2 Hours:

1. Inspect Defoliator and clean mud if necessary.

12 Hours:

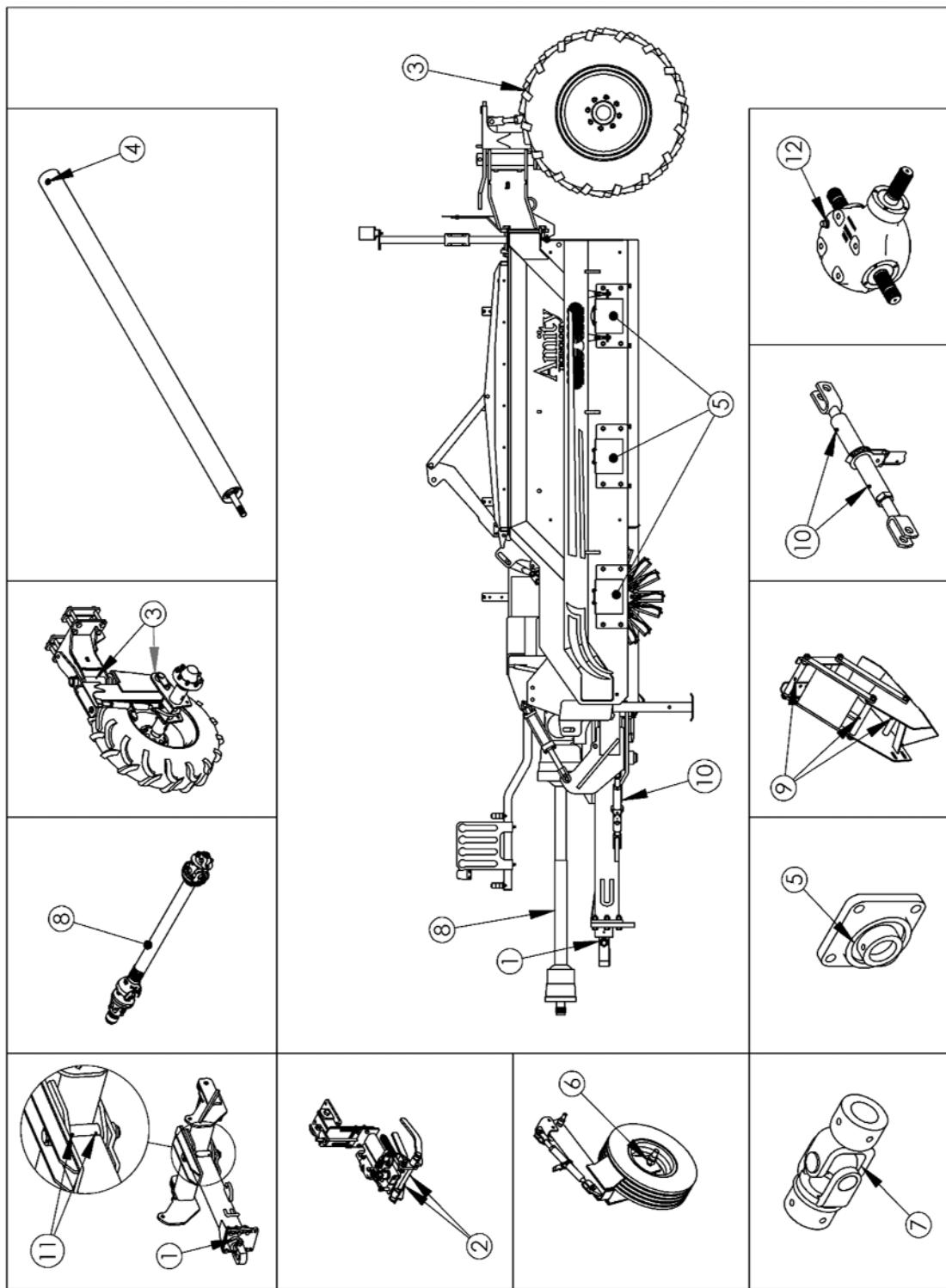
1. Grease front hitch pivot, row finder and lift, steerable struts, drive couplers, hanger bearings.
2. Inspect all drums for missing or damaged flails.
3. Check Scalper knives and sharpen if needed.

50 Hours:

1. Check oil level in gearboxes. Fill to proper level if low. Check more often if leaks are noticed.
2. Grease all U joints and driveshaft, scalper pivot points, front hitch rear pivot, ratchet jacks and stabilizer wheels.

250 Hours or Annually:

1. Clean defoliator and inspect all wear components.
2. Change oil in gearboxes 80W90 EP (ISO VG 150 EP).
3. Clean gearbox breathers.
4. Purge rear wheel bearings.



11.9 Lubrication Chart

Ref #	Description	Lubrication Type	Frequency	Quantity	Number of Instances
1	Front Hitch Pivot	Multi-Purpose Grease	12 Hours	3-5 pumps	1
2	Rowfinder & RF Lift	Multi-Purpose Grease	12 Hours	1-2 pumps	3 to 5
3	Rear Struts	Multi-Purpose Grease	12 Hours	2-3 pumps	2 to 4
4	Drive Couplers	Moly EP Grease NLGI #2	12 Hours	1-2 pumps	3 to 6
5	Sealed Ball Bearings	Multi-Purpose Grease	12 Hours	1-2 pumps	3 to 6
6	Stabilizer Wheels	Multi-Purpose Grease	50 Hours	2-3 pumps	2 to 4
7	U-Joint	Multi-Purpose Grease	50 Hours	3-5 pumps	8
8	Driveshaft	Multi-Purpose Grease	50 Hours	See Guide	3 to 5
9	Scalper Pivot Points	Multi-Purpose Grease	50 Hours	3-5 pumps	24 to 48
10	Ratchet Jacks	Multi-Purpose Grease	50 Hours	1-2 pumps	1 to 5
11	Rear Hitch Pivot	Multi-Purpose Grease	50 Hours	1-2 pumps	2
12	Gearbox	EP 80W90 (ISO VG 150 EP)	250 Hours/Annually	See Guide	5
13	Rear Wheel Hubs	Multi-Purpose EP Grease	250 Hours/Annually	Purge Hub	4 to 8

11.10 PTO Driveline Servicing

The first lubrication interval should be 16 to 24 hours of operation after initial start-up. Then follow the schedule outlined in Table 8.

NOTE: Lubricate all fittings with a good quality lithium soap compatible E.P. grease meeting the NLGI #2 specifications and containing no more than 1% molybdenum disulfide

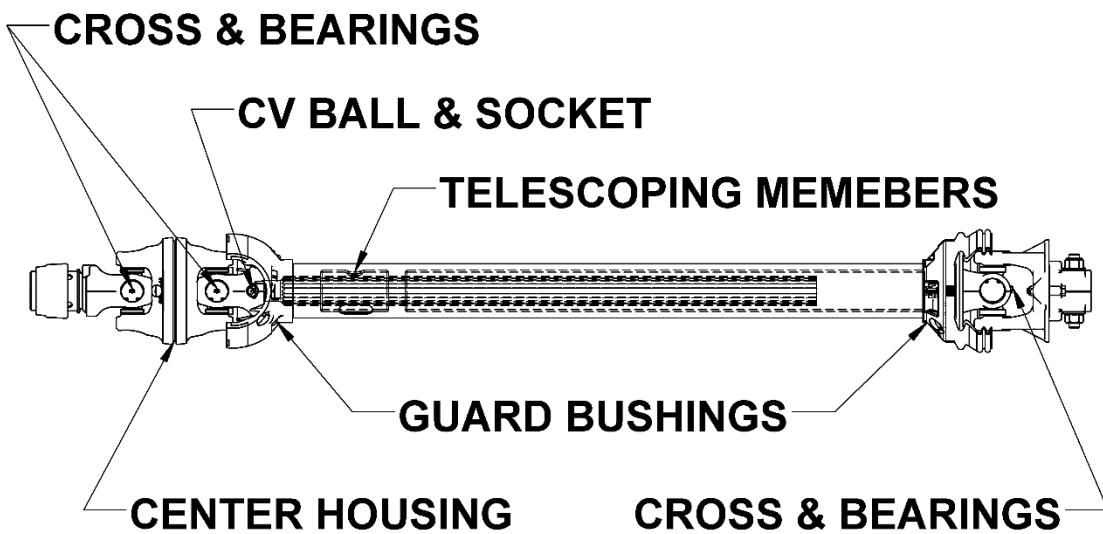


Figure 49: PTO CV Shaft

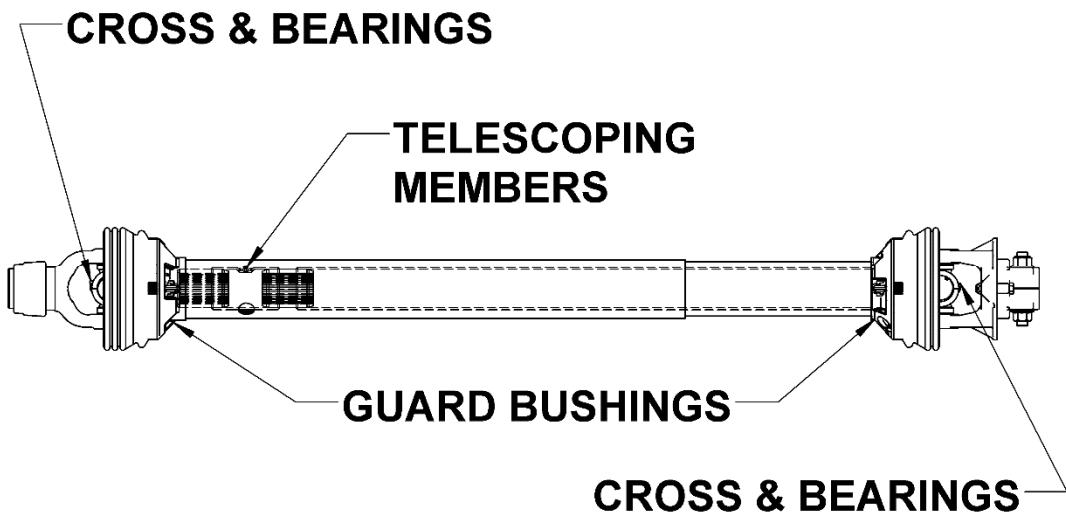


Figure 50: PTO STD Shaft

NOTE: Replacement parts are not lubricated. They must be lubricated at the time of assembly. Use amounts listed above per location. Then, follow the above recommendations.

Table 9: PTO Driveline Servicing

DESCRIPTION	FREQUENCY	QUANTITY
Cross and Bearings	50 Hours	5 pumps
Telescoping Members	50 Hours	8-10 pumps
CV Ball and Socket	50 Hours	5 pumps
CV Center Housing	50 Hours	30 pumps
Non Rotating Guard Bushings (1000 RPM MAX.)	50 Hours	5 pumps

12.0 TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Beets tops not clean.	Defoliator height not properly set	Verify defoliator height is correctly set; see section 7.0. This should be done every time field, variety or conditions change.
	Traveling too quickly	Reduce travel speed until beets satisfactorily clean.
	Worn / Broken flails	Replace flails.
Beet tops damaged.	Defoliator height not properly set	Verify defoliator height is correctly set; see section 7.0. This should be done every time field, variety or conditions change.
	Traveling too slowly	Increase travel speed until damage is reduced and beet tops are still clean.
	Flail style	In some conditions studded flails may cause beet damage over other styles. This is a tradeoff for increased performance in tough conditions, it is up to the grower to decide what is wanted for their operation.
Knocking beets out of the ground.	Defoliator height and travel speed not properly set	Set defoliator height per section 7.0. Increase travel speed if greens are all removed.
	Beets not firmly rooted	Set defoliator as high as possible while still defoliating well without reducing speed; if issue persists slow PTO speed and travel speed to make flail impacts less aggressive.
Machine swaying from side to side.	Stabilizer struts not properly set	Lower Stabilizer struts so they lightly, but constantly, contact the ground when hitch is lowered to stops.
	Traveling too fast for field conditions	Decrease travel speed; if decreased travel speed causes damage to beet tops you may decrease PTO speed.
	Rear struts too far inboard	Move rear struts outwards on frame to increase stability if location works with prior planter / sprayer tracks.

PROBLEM	CAUSE	SOLUTION
Scalper does not properly top beets.	Knives dull	Sharpen knives or replace if worn.
	Knife not properly set	Adjust knife height and cut angle to have the correct depth and cut flat.
	Basket not properly set	Adjust scalper bar height so basket has proper travel range for defoliator height.
	Excessive petiole left before scalpers	Excessive petiole can hold the scalper up away from the beet resulting in inconsistent and poor scalper performance; reset defoliator height or reduce travel speed depending on cause.
Row Finder not working.	Hydraulics not properly set up	Ensure correct hoses are hooked up for both the constant and override functions. Also check that tractor hydraulic setting for the row finder constant function are on continuous and do not time out.
	Hydraulic flow rates not properly set	Set row finder constant rate to approx. 7 GPM continuous flow; row finder over-ride to 10 GPM cycle time should be 3-4 seconds.
	Row finder height not properly adjusted	Refer to section 7.0 and set row finder height per instructions.
	Operating on side hills	Install close center plug into top of row finder valve body with .090" orifice drilled through it to slow response time back to center.

PROBLEM	CAUSE	SOLUTION
Row finder leaking	Fittings loose	Tighten if you find any loose fittings.
	Spool seals worn	Rebuild or replace row finder valve.
Rear lift cylinders leaking down	External oil leak	Find the source of the leak and repair or replace leaking component.
	Strut lift tied to row finder circuit	Strut lift cylinders connected to the row finder circuit will leak down if the row finder valve has an oil leak; either separate the strut lift from the row finder circuit or rebuild/replace the row finder valve.
Defoliator not running level	Running in planter/sprayer tracks	Evaluate if it is possible to move rear struts in or out on the defoliator frame so they are not operating in wheel tracks.
	Low/uneven tire pressure	Check to make sure all tire pressures are set per Section 3.0.
	Weight not balanced side to side	Add weight to the corner of the defoliator on the weight mount.
	Defoliator not level	Reset defoliator level per Section 7.0.
Machine vibrates	Unbalanced drums	Check for missing flails on both steel and rubber drums. Replace missing or broken rubber flails. For steel flails replace damaged or missing components; for any flails being replaced also replace the same components on the other side of the drum to maintain balance. If vibration continues, remove steel drum(s) and have them balanced.
	Damaged or worn driveshaft	Inspect all driveshaft and U-joints for worn or damaged components; repair or replace as necessary.

PROBLEM	CAUSE	SOLUTION
Breaking shear bolts	Front drum contacts ground	Ensure hitch cylinder stops are correctly set and/or slow down and lift front while traveling deep ditches or ruts.
	Engaging too quickly	For tractors equipped with an automatic PTO clutch set to lowest engagement setting.
	Shear pin too small	After fully checking the full drivetrain and determining that there are no issues the shear bolt may be upgraded to a 7/16" GR 8 bolt to replace the 7/16" GR 5 that is standard (3750 only).
Mud build-up under top doors	Operating conditions	Tough conditions will require additional cleaning.
	Running defoliator on headlands	Shut off defoliator on headlands or raise up front and or rear to prevent flails from churning up dirt and dust.

13.0 Appendices

13.1 Conversions

1 acre= .404 hectares	1 mph= 1.609 kph
1 acre= 43,560 square feet	1 mile= 1.609 km
1 inch= 2.54 cm	1 psi= 6.895 kPa
1 foot= 0.3048 m	1 GPM= 3.785 LPM
1 lb= .45359 kg	1 hp= .746 kw
1 lb= 16 oz	1 ft-lb= 1.356 N·m

13.2 Trantorque Installation Procedures

Shaft and bore diameters along with surface finishes are critical for the proper installation of a Trantorque bushing. These specifications are held at the factory during manufacturing. If it is necessary to disassemble and reassemble a Trantorque application that is undamaged and intact the following procedures will insure a positive installation. If it is necessary to replace a unit in which the Trantorque or shaft may have come loose, rotated or been damaged, a thorough inspection of the components is necessary to insure the failure will not reoccur.

 **CAUTION:** Do not use lubricants in this installation. The use of any lubricant on the contact surfaces may result in bushing failure and will void all warranties

1. Both the shaft and component bore must be completely free of paint, grease, oil, dirt, and burrs. Clean the surfaces with a non-petroleum based solvent such as isopropyl alcohol.
2. Insert the Trantorque into the bore making sure the mating hub is flush against the shoulder at the hex flats.
3. Insert the shaft fully and hand-tighten the nut until the assembly becomes snug on the shaft.

IMPORTANT: The shaft must fully engage the gripping area of the Trantorque.

4. Using a torque wrench, tighten the nut to the proper torque shown in Table 9.

IMPORTANT: A torque wrench must be used! An impact wrench will not yield the proper torque and the installation will fail. Minimal under-tightening will allow the Trantorque or shaft to spin in the bore. Over-tightening will damage or crack the Trantorque. Do not use an impact wrench during installation.

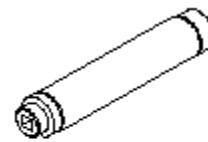
Table 10: Trantorque Installation Torque

Part #	Description	Torque
58459	Hub-Trantorque 1.75 in.	270 ft-lb (366 N·m)
59259	Hub-Trantorque 2.25 in.	510 ft-lb, (691 N·m)

13.3 Tools

Amity has the following tools available:

Trantorque sockets
(#59107, #59108, #64820)



Trantorque wrench (#64320)

#64320

#59107 (1 $\frac{3}{4}$ in., 4.45 cm)
#59108 (2 in., 5.08 cm)
#64820 (2 $\frac{1}{4}$ in., 5.7 cm)

13.4 PTO Driveshaft Friction Clutch Setting

To set the friction clutch to the correct setting after rebuilding simple torque the clutch plate down evenly in a star pattern until the spacer collar is just able to move, but not loose. The collar holds a set distance which sets the clutch level. There are no torque spec for the bolts.

13.5 Easy Lock Assembly and Removal

Removal:

1. Remove the EASY LOCK® tab with a screwdriver Figure 51.
2. If the guard is chained, remove or hold back the chain to prevent it from blocking the bearing.
3. Turn the bearing in the direction as indicated in Figure 52. Then, slide guard off the bearing.

Assembly:

1. Align the bearing tabs with the guard bell slots.
2. Slide the bell onto the bearing.
3. Turn the bearing to lock it in place.
4. Snap the EASY LOCK tab into the bell.

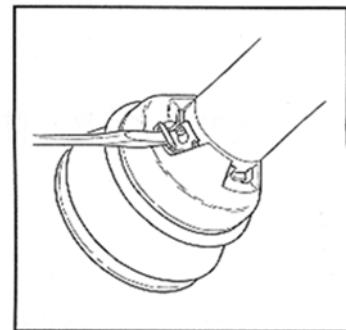
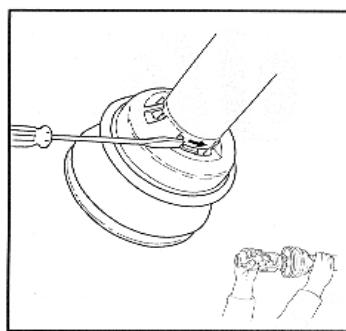
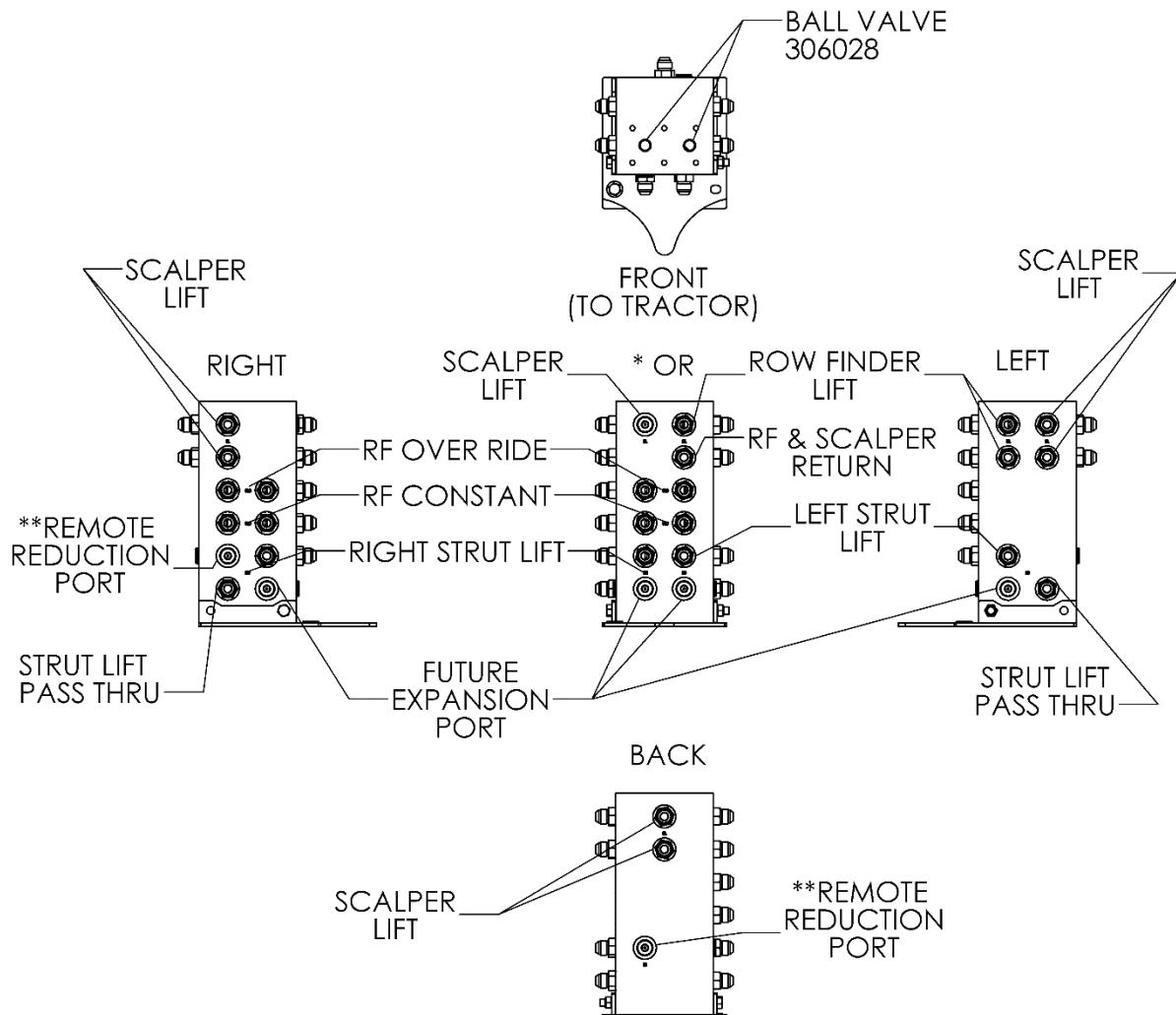


Figure 51: Remove Tab

Figure 52: Turning Bearing



* EITHER THE SCALPER LIFT OR ROW FINDER LIFT PORT IS USED AND THE OTHER IS PLUGGED.

- IF A FRAME MOUNTED ROW FINDER IS USED, WITH OR WITHOUT SCALPER, THE ROW FINDER LIFT PORT IS USED IN CONJUNCTION WITH A BALL VALVE. ENABELING USE OF BOTH THE SCALPER (IF EQUIPPED) AND ROW FINDER OR ROW FINDER.
- IF A SCALPER WITHOUT FRAME MOUNTED ROW FINDER IS EQUIPPED THE SCALPER LIFT PORT IS USED AND NO BALL VALVE IS INSTALLED.

** REMOTE REDUCTION PORT ALLOWS THE ROW FINDER CONSTANT FUNCTION TO BE TIED INTO THE STRUT LIFT FUNCTION TO ELIMINATE THE NEED FOR ONE ADDITIONAL HYDRAULIC REMOTE ON THE TRACTOR. IN THIS CONFIGURATION RETRACTING OR LOWERING THE STRUTS ALSO POWERS THE ROWFINDER CONSTANT FUNCTION. WHEN EXTENDING THE STRUTS A CHECK VALVE INSTALLED ON THE ROW FINDER PROHIBITS BACKWARDS OIL FLOW.

** AN ALTERNATE OPTION TO REDUCE HYDRAULIC REMOTES REQUIRED WOULD BE TO HOOK UP THE ROW FINDER CONSTANT TO THE TRACTOR'S POWER BEYOND USING AN EXTERNAL FLOW CONTROL SET TO APPROXIMATELY 7 GPM.

TECHNICAL INFORMATION

**BONDIOLI
& PAVESI** 

No.	Date	Description	Related No.	Page
183	4/26/06	2125 & 2155 w/OVERRUNNING CLUTCH R&R		1 of 9

Description: This is a description of the steps required to completely disassemble and reassemble gearbox code S2100100033, which is a three-way S2100 with overrunning clutch on the Z-axis. Other S2000 gearboxes, with or without overrunning clutches, will use a similar procedure.

Tools required:

Drain pan

Pry bar

Seal puller

Snap ring pliers (straight, internal and external or convertible)

Ball peen hammer

Soft face hammer (bronze, copper, brass or similar)

Steel tubes (to fit loosely inside bores of casting and/or outside shafts – see diagrams)

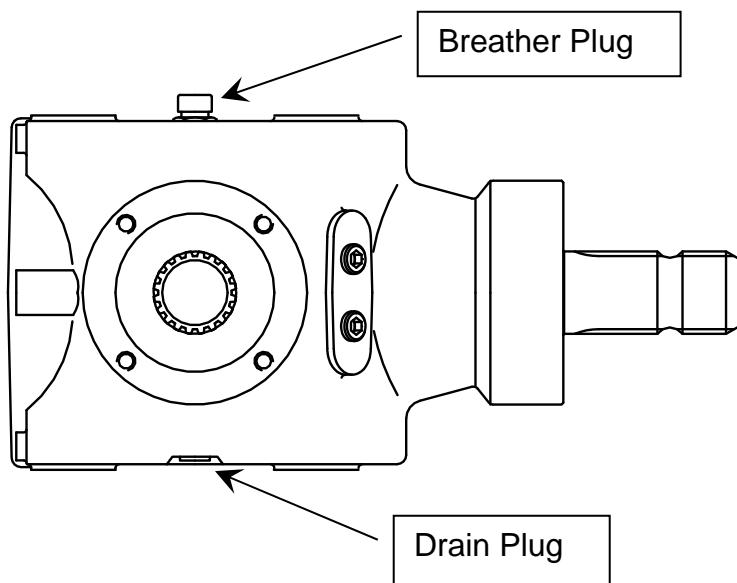
Small punch ($\varnothing 8$ or $\varnothing 10$ mm)

Gear oil (SAE 90 EP recommended)

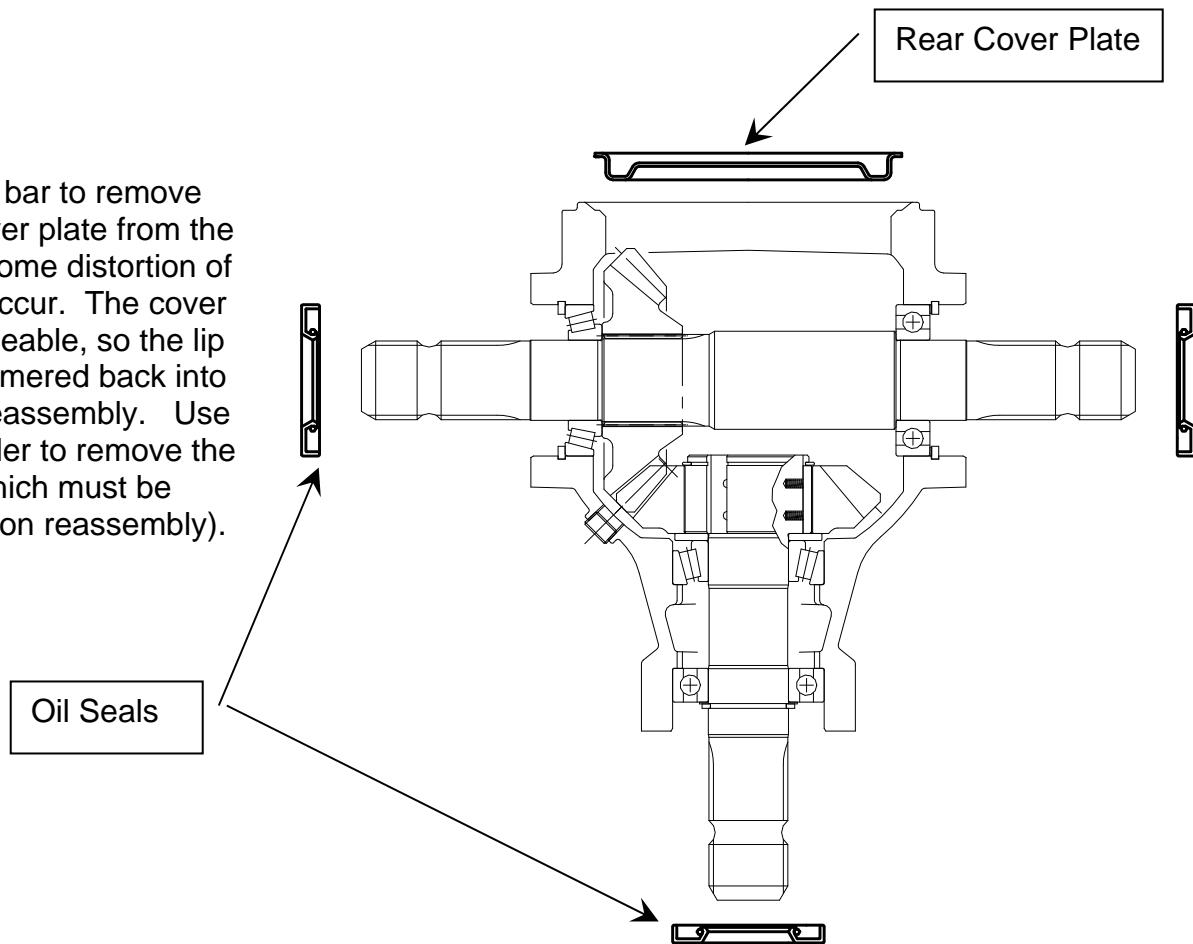
A press can be used for several steps of the disassembly / assembly process, but is not absolutely required.

Disassembly

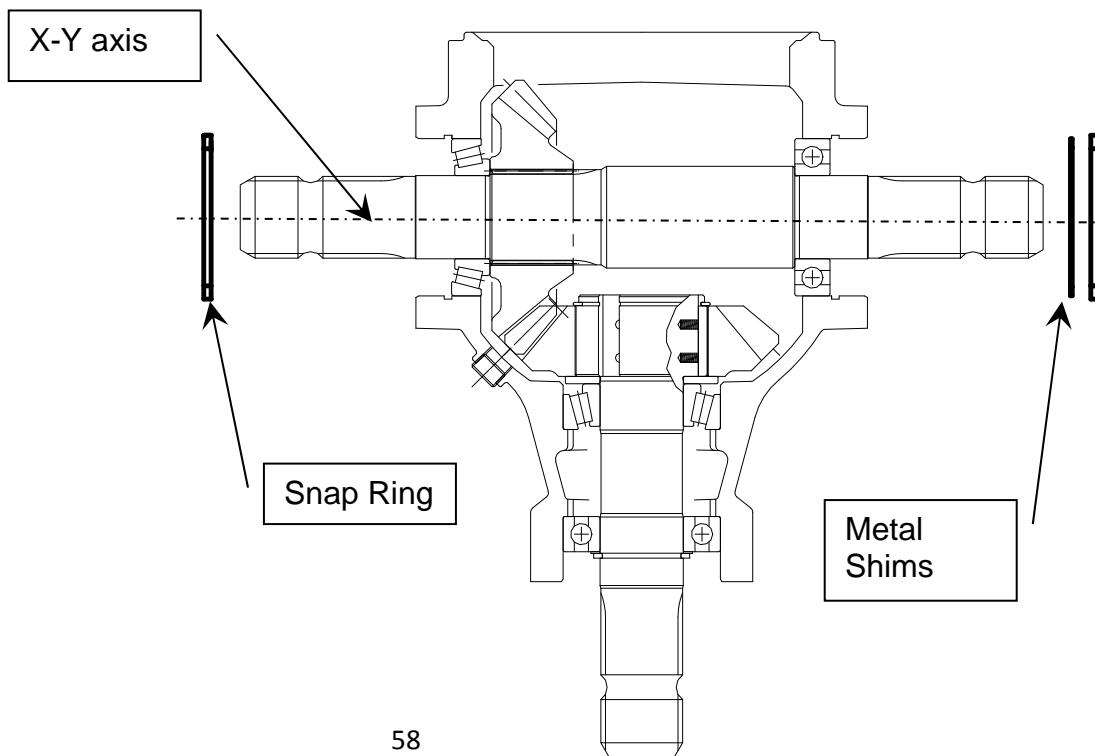
Position the drain pan under the drain plug. Remove the drain plug and let the oil flow into the pan (remove the breather plug to release vacuum and speed flow of oil). Dispose of used gear oil according to local regulations.



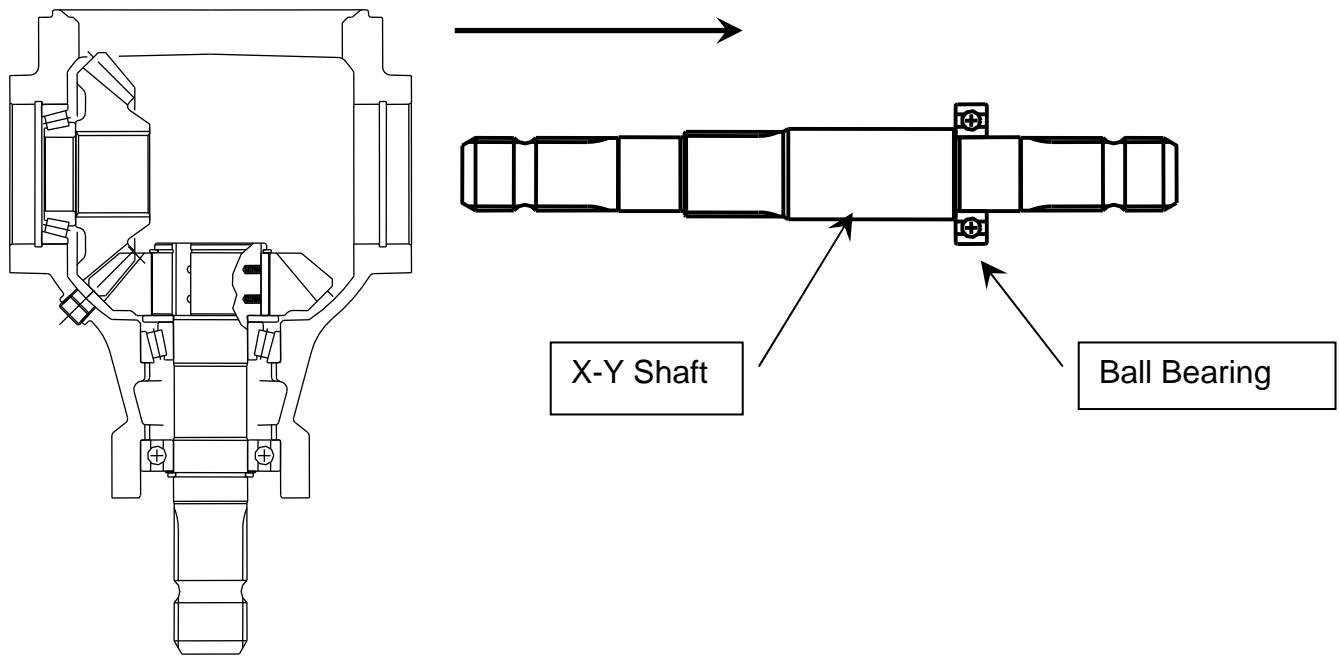
Use the pry bar to remove the rear cover plate from the gearbox. Some distortion of the lip will occur. The cover plate is malleable, so the lip can be hammered back into shape for reassembly. Use the seal puller to remove the oil seals (which must be replaced upon reassembly).



Remove the snap rings from the casting on the X-Y axis. Behind one of the snap rings, you should find one or more thin metal shims – remove these as well.



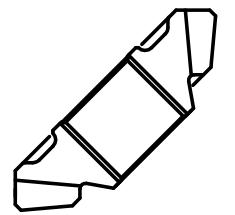
Press (or use soft face hammer if a press is unavailable) the X-Y shaft out of the gearbox, in the direction shown. This will also remove the ball bearing from the gearbox casting.



The ball bearing may be removed from the X-Y shaft in several different ways. Note that pressure applied to the outer race may damage the balls and raceways. The following methods are suggested:

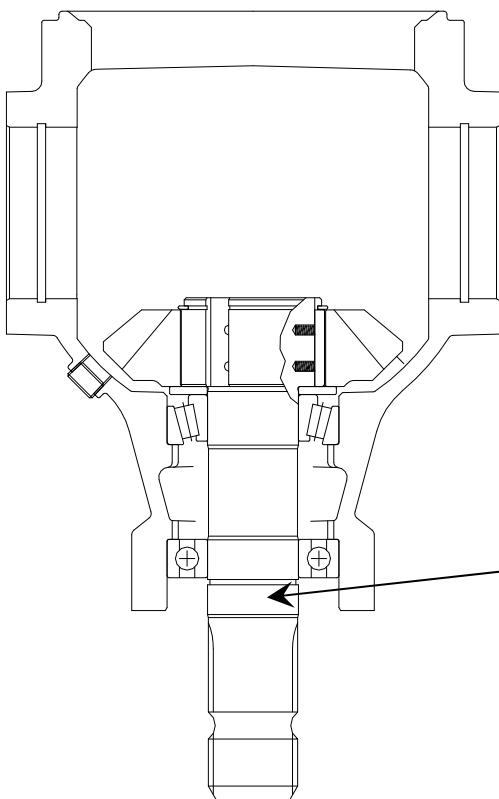
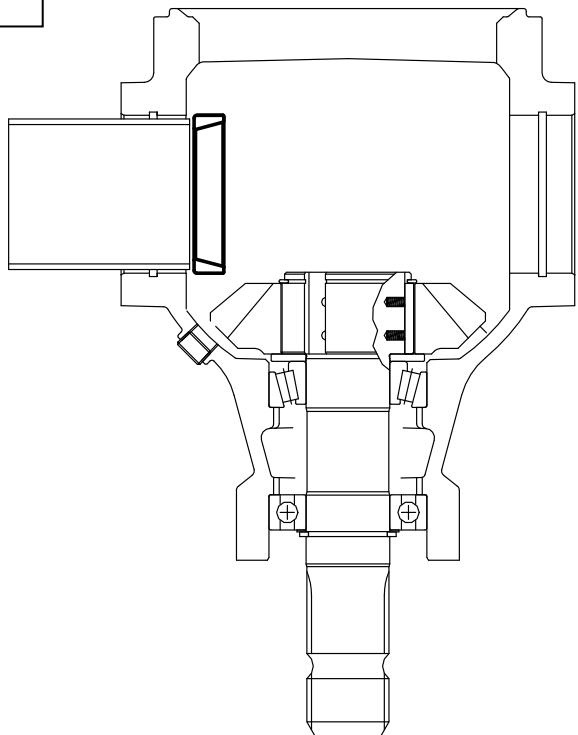
- a) A metal tube that fits over the shaft and contacts the inner raceway may be used to press the bearing off the shaft.
- b) Hammer the end of the shaft against a soft surface (i.e. wood). The inertia will often dislodge the bearing from its seat.
- c) A bearing separator may be inserted under the bearing, and a 2-jaw puller used to press the separator and bearing from its seat.
- d) Deep groove ball bearing pullers designed for this specific task (if available).

Remove the gear and inner race of the taper roller bearing. Press the outer race out of the casting, using a short piece of metal tube that fits loosely inside the bore.



Remove gear and inner race/rollers

Press inner bearing race from housing using a short piece of tube



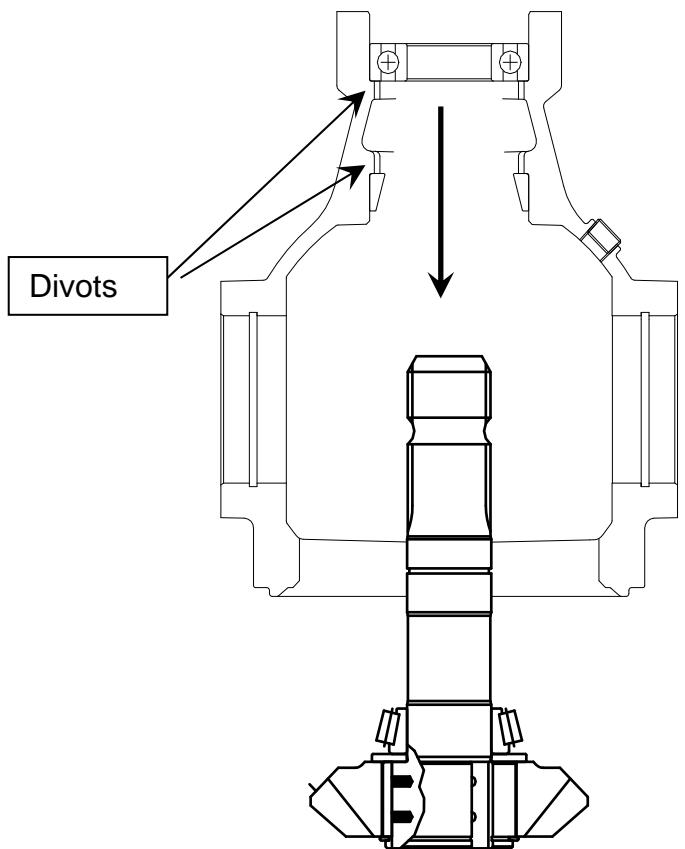
Remove the snap ring from the Z-shaft.

Z-shaft

Press (or use soft face hammer if press is unavailable) the Z-shaft out of the back of the gearbox.

There are a couple of divots on either side of the casting. Use a punch to drive out the ball bearing and outer race of the taper roller bearing via these divots.

Clean any old oil, debris, or metal filings out of the inside of the casting.



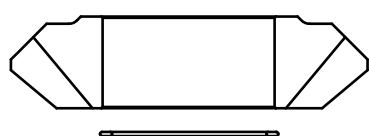
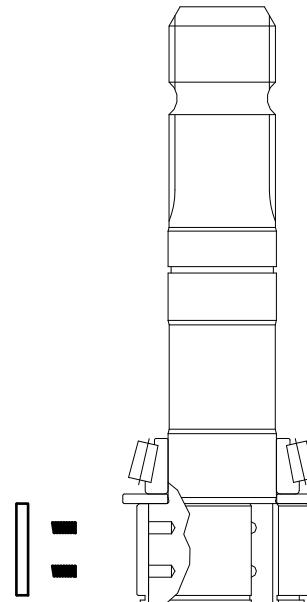
Remove the snap ring from the end of the Z shaft.

Slide the gear off the shaft.

Remove the three (3) pawls from the overrunning clutch mechanism. Remove the six (6) small springs located under the pawls (two per pawl).

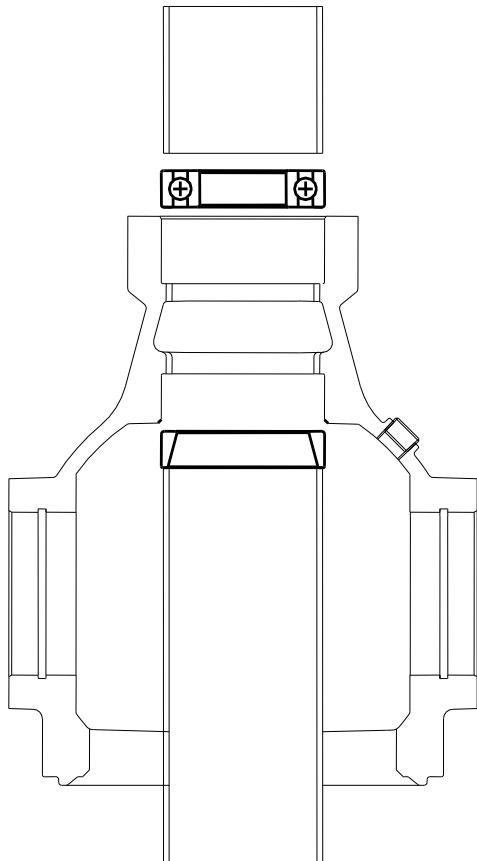
Remove the spacer (if included), and remove the inner race and rollers as described before for the X-Y shaft.

This completes the disassembly process. Thoroughly clean all components, and inspect for wear or damage. Replace any excessively worn or damaged components with genuine OEM components.



Assembly

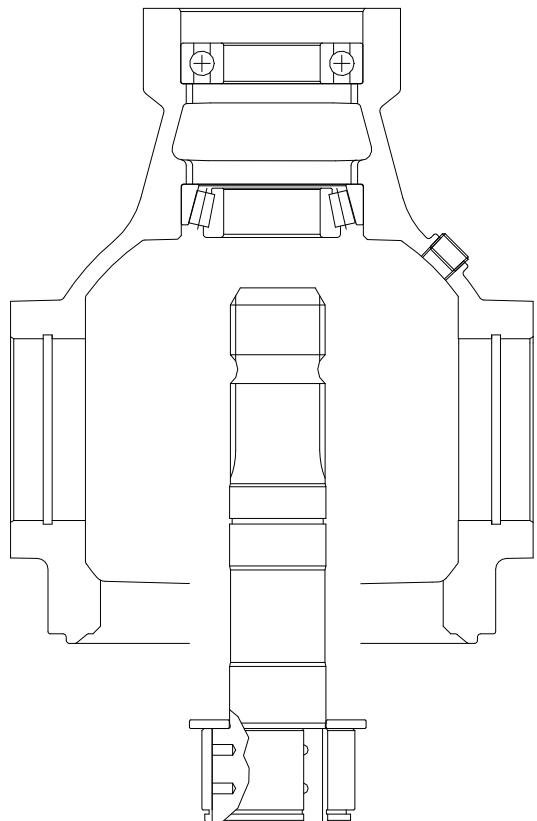
Press the ball bearing into place, using a piece of tube that contacts the outer race only (pressure on the inner race may damage the bearing). Press the outer outer race of the taper roller bearing through the back side of the casting. Note the orientation of the race.



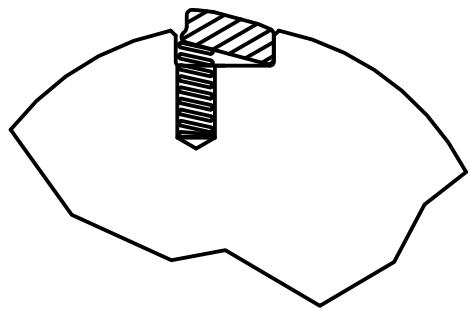
Place the inner race and rollers of the taper roller bearing in position. Slide the spacer onto the Z-shaft (if equipped), and press the shaft into place.

Adjust the preload on the bearings by adding or deducting shims under the Z-shaft snap ring. Proper adjustment is achieved when there is zero “play” in the shaft (i.e. no movement in or out), but the bearings rotate freely.

Make sure the snap ring is fully seated in its groove on the Z-shaft.

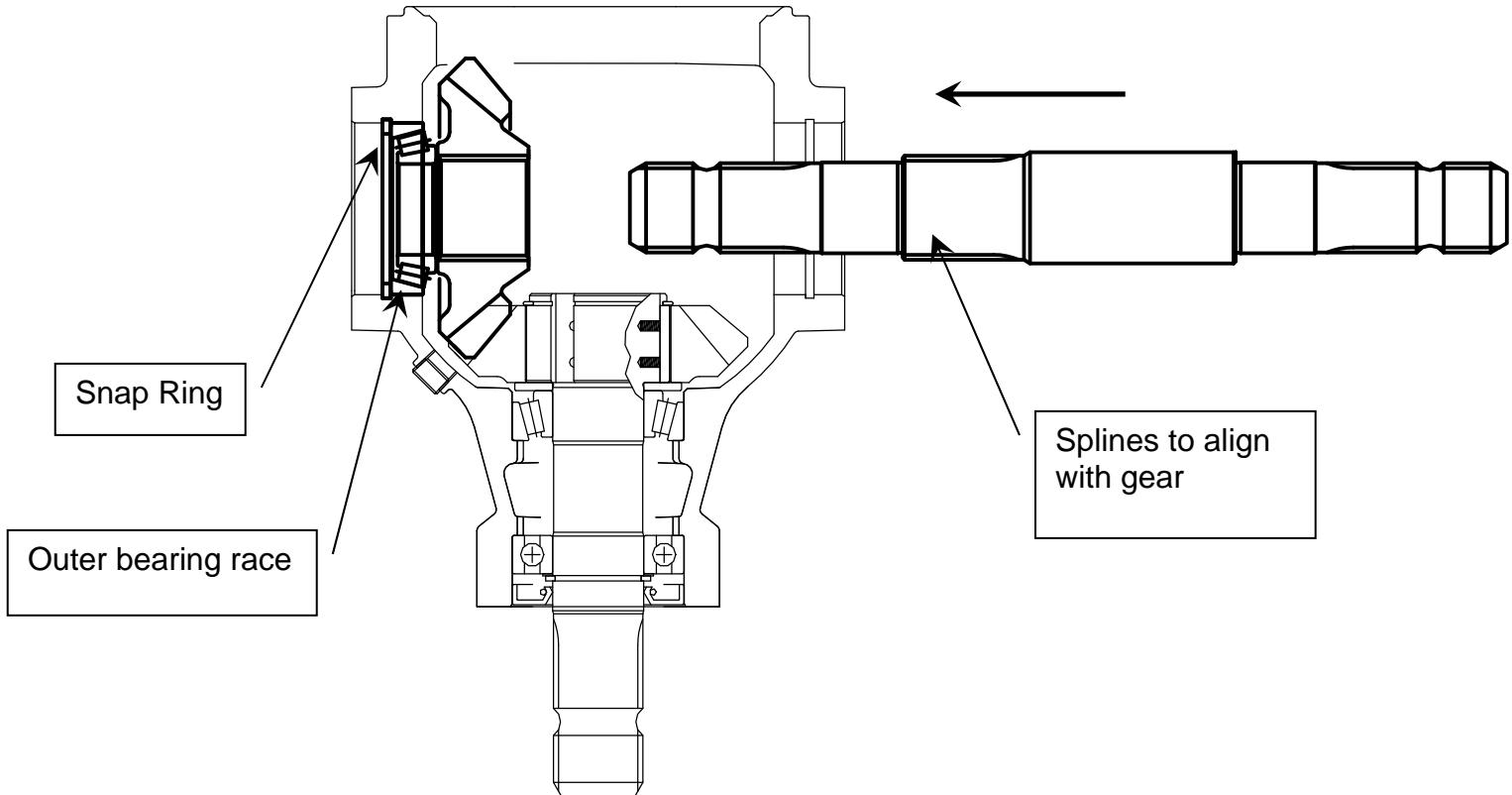


Insert one spring into each hole in the Z-shaft. Place the three (3) pawls into the grooves in the Z-shaft, with the shaped edge oriented as shown:

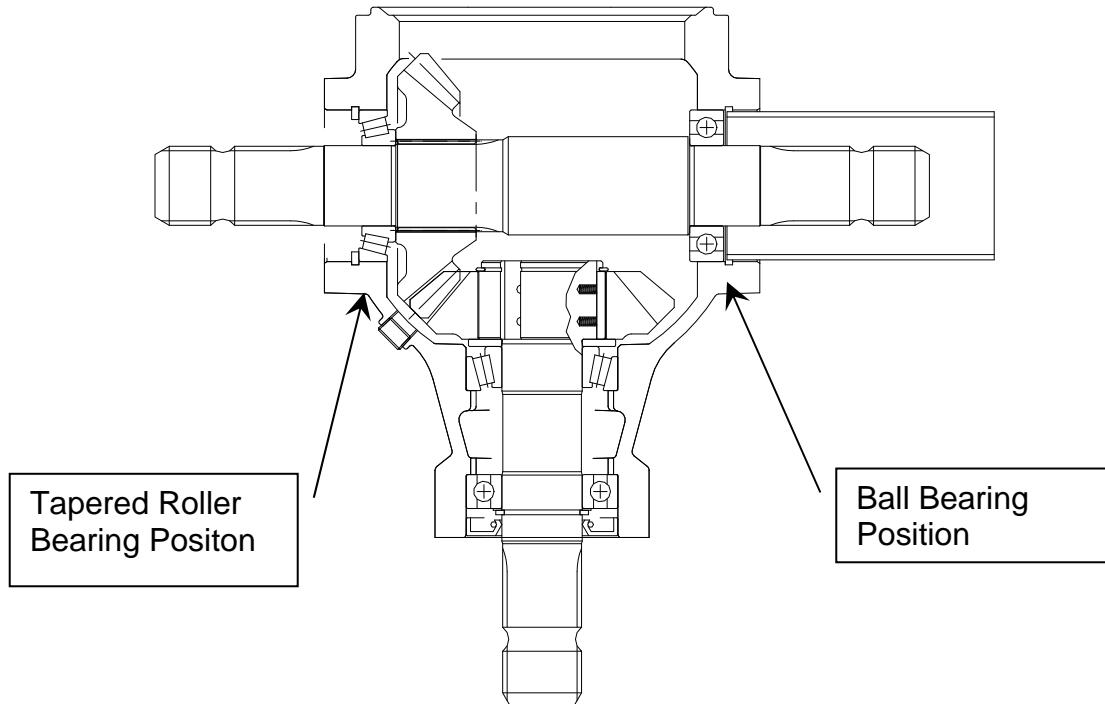


While holding the three pawls compressed on top of their springs, slide the pinion gear over the top of the shaft in position. Rotate forward and backward to check the function of the overrunning mechanism. Install snap ring.

Install the snap ring in the position shown below. Press the outer race of the tapered roller bearing into place until it seats against this snap ring (note orientation). Put the inner race and rollers in the proper position, and then position the gear on top of this bearing. Align the splines of the X-Y shaft with those in the gear, then press the X-Y shaft into place.



Press the ball bearing into position on the opposite side of the shaft.



Adjusting Preload and Backlash

Add shims between the ball bearing and snap ring until there is no freeplay in the shaft (i.e. movement in or out), but the bearings rotate smoothly. This sets the proper preload on the bearings.

The backlash (clearance between gear teeth) must be adjusted to proper levels.

S2100 series, 1:1, 1.57:1, and 1:1.57 ratios – backlash 0.20 – 0.25 mm (0.008 – 0.010 in)
 S2125 series, 1:1.35, 1.35:1, and 1:1.93 ratios – backlash 0.20 – 0.25 mm (0.008 – 0.010 in)

The backlash can be measured with a dial indicator positioned on the pitch diameter of the gear (approximate center of contact patch), and measuring the free rotation of the crown gear (X-Y axis) as the pinion gear is held stationary (Z-axis).

To reduce backlash, take one of the shims from under the ball bearing position (above), and insert between the snap ring and bearing on the tapered roller bearing position. To increase backlash, reposition shims from the taper roller side to the ball bearing side.

When adjusted properly, the shafts should rotate smoothly without binding, and a slight “click-clack” sound can be heard when one of the shafts is rotated one way and then the other. Operation without sufficient backlash will lead to excessive noise, rapid heat generation, and premature failure of the gearbox.

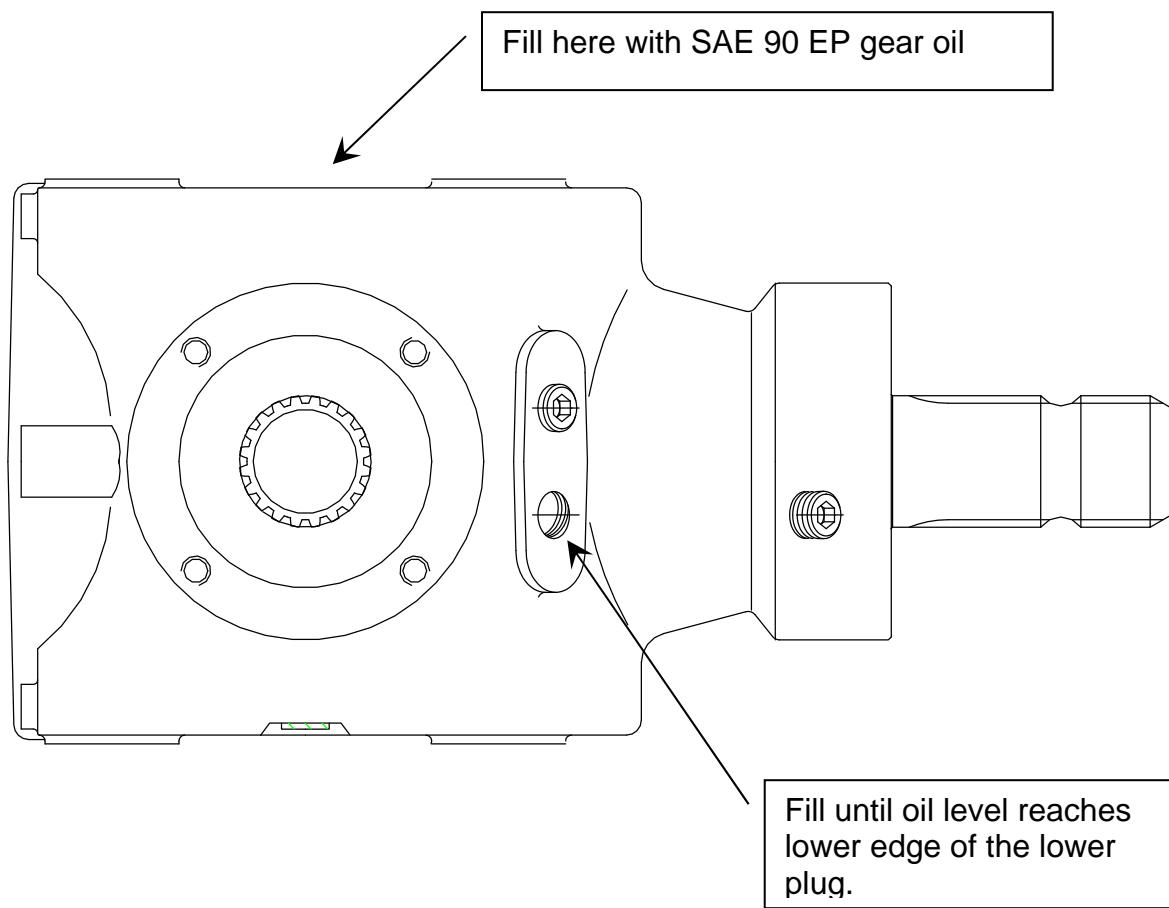
Completing Assembly

Check that all snap rings are fully engaged in their grooves.

Clean the shafts and bores of the casting of any debris. Coat the inside lip of the oil seals with gear oil. Press the oil seals into their bores, paying attention to not damage the sealing lip while it passes over the shaft.

Hammer the back plate into the housing.

Wrap the drain plug threads with Teflon® tape or pipe dope and reinstall into the gearbox. Set the gearbox on a level surface, and remove the LOWER drain plug. Fill with good quality SAE 90 EP gear oil until it reaches the level of the lower plug hole. Wrap the level plug and breather plug threads with Teflon® tape or pipe dope and reinstall.



Check the operation of the gearbox on initial startup. Drain and refill with fresh lubricant after the first 50 hours of use, and every 500 hours of use thereafter.