

OPERATING MANUAL

2021
DEFOLIATOR



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AMITY TECHNOLOGY LLC LIMITED WARRANTY TERMS AND CONDITIONS – UNITED STATES

EFFECTIVE FOR EQUIPMENT RETAILED AND DELIVERED AFTER JUNE 1, 2020

WHAT IS WARRANTED Amity Technology warrants its new equipment to be free of defects in material and workmanship at time of delivery to the first retail purchaser, renter, or lessee. Amity Technology warrants any new or unused part which is manufactured by Amity Technology for use in an Amity Technology machine, jointly referred to as “Products”, whether such Product is purchased through an authorized Amity Technology dealer or directly from Amity Technology. Under this Warranty, Amity Technology will repair or replace, as it chooses in its sole discretion, any covered Product, or any component thereof, which Amity determines to be defective. These terms apply to all Amity Technology brands of new equipment originally marketed in the United States.

WARRANTY PERIOD

- 12 Months from the date of delivery to the first retail purchaser, renter or lessee.

EXCEPTIONS FROM THIS WARRANTY

- **Freight Charges** - This warranty does not cover freight charges.
- **Improvements, Changes, or Discontinuance** Amity Technology reserves the right to make changes and improvements in design or changes in specifications at any time to any product without incurring any obligations to owners of products previously sold.
- **Repairs and Maintenance Not Covered Under Warranty** - This warranty does not cover conditions resulting from misuse, natural calamities, use of non-Amity Technology parts, negligence, alteration, accident, use of unapproved attachments, usage which is contrary to the intended purposes, or conditions caused by failure to perform required maintenance. Replacement of Wear or Maintenance items (unless defective) such as but not limited to, filters, hoses, belts, lubricants, light bulbs, wheel alignment, tightening of nuts, belts, bolts, and fittings, service tune-up, computer parameter adjustments and general adjustments which may from time to time be required are not covered.
- **Rubber Tire Warranty** - Rubber tires are warranted directly by the respective manufacturer only and not by Amity Technology.

OWNER'S OBLIGATION

It is the responsibility of the Owner to transport the equipment or parts to the service shop of an authorized Amity Technology Dealer or alternatively to reimburse the Dealer for any travel or transportation expense involved in fulfilling this warranty. This Warranty does NOT cover rental of replacement equipment during the repair period, damage to products which have been declared a total loss and subsequently salvaged, overtime labor charges, freight charges for replacement parts, or special handling requirements (such as, but not limited to, the use of cranes).

EXCLUSIVE EFFECT OF WARRANTY AND LIMITATION OF LIABILITY

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PURPOSE OR OTHER REPRESENTATIONS, WARRANTIES OR CONDITIONS, EXPRESSED OR IMPLIED. The remedies of the Owner set forth herein are exclusive. The Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the sale of covered machines. Correction of defects, in the manner and for applicable period of time provided above, shall constitute fulfillment of all responsibilities of Amity Technology to the Owner, and Amity Technology shall not be liable for negligence under contract or in any manner with respect to such machines. IN NO EVENT SHALL THE OWNER BE ENTITLED TO RECOVER FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES SUCH AS BUT NOT LIMITED TO, LOSS OF CROPS, LOSS OF PROFITS OR REVENUE, OTHER COMMERCIAL LOSSES, INCONVENIENCE OR COST OF RENTAL OR REPLACEMENT EQUIPMENT.

Some States or Provinces do not permit limitations or exclusions of implied warranties or incidental or consequential damages, so the limitations or exclusions in this warranty may not apply.

Additional Warranty Information

New Equipment Warranty - Equipment is eligible for warranty service only if it qualifies under the provisions of the New Equipment Warranty. The selling dealer will deliver this Warranty to the original retail purchaser at the time of sale, and the dealer will register the sale and Warranty with Amity Technology LLC.

Subsequent Owners - This Warranty covers the first retail purchaser and all subsequent owners of the equipment during the specified warranty period. Should the Amity Technology Dealer sell this equipment to a subsequent owner, the Dealer must deliver the warranty document to the subsequent owner so the subsequent owner can register ownership with Amity Technology and obtain the remaining warranty benefits, if available, with no intermission in the Warranty Period. Subsequent Owner Procedure will apply. It is the responsibility of the subsequent owner to transport the equipment to the service shop of an authorized Amity Technology Dealer or alternatively to reimburse the Dealer for any travel or transportation expense involved in fulfilling this warranty. This Warranty does NOT cover charges for rental or replacement equipment during the repair period, products which have been declared a total loss and subsequently salvaged, overtime labor charges, freight charges for replacement parts, or units sold at auction.

Warranty Service - To be covered by Warranty, service must be performed by an authorized Amity Technology Dealer. It is recommended that you obtain warranty service from the Dealer who sold you the equipment because of that Dealer's continued interest in you as a valued customer. In the event this is not possible, warranty service may be performed by any other authorized Amity Technology Dealers in the United States or Canada. It is the responsibility of the Owner to transport the equipment to the service shop of an authorized Amity Technology Dealer or alternatively to reimburse the Dealer for any travel or transportation expense involved in fulfilling this warranty.

Maintenance Service - The Owner's Manual furnished to you with the equipment at the time of delivery contains important maintenance and service information. You must read the manual carefully and follow all the maintenance and service recommendations. Doing so will result in greater satisfaction with your equipment and help avoid service and warranty problems. Please remember that failures due to improper maintenance of your equipment are not covered by warranty.

Maintenance Inspections - To insure the continued best performance from your agricultural equipment, we recommend that you arrange to make your equipment available to your selling Dealer for a maintenance inspection 30 days prior to warranty expiration.

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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 or equipment damage.

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: 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 in the event that it is stolen. Your dealer also needs these numbers for all warranty claims and for 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.

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

Serial Number:

Model Number:

Model Year:

2.0 SAFETY

2.1 Recognizing Safety Information in Manual

Figure 2-1 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 2-1: Safety-Alert Symbol

2.2 General Safety

You are responsible for the safe operation and maintenance of your Amity implement. You and anyone else who will operate, maintain, or work around the machine 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.

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

The most important element of safety for 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 or safety, or both, and could alter the life and warranty of the product.


The following list is a set of safety guidelines to adhere to:

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, or adjusting the machine.
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. Annually review safety guidelines with all operators.
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 machine.
-  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 the machine.
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 machine.
6. Make sure that all guards and shields are properly installed and secured before operating the machine.
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 implement or tractor during field operation or transport.
10. Never operate the machine inside a closed building.
11. Stay away from overhead obstructions and power lines during setup and operation. Electrocution can occur without direct contact.

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's surface.
7. Before applying pressure to the system, make sure all components are tight and that lines, hoses, and couplings are not damaged.
8. On self-contained hydraulic systems, make sure that shut off valves are in open position before engaging PTO.

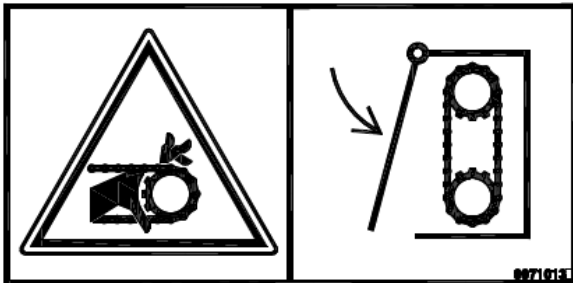
2.5 Transport Safety

1. Read and understand all information in the Operator's Manual regarding procedures and safety when operating the machine 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 machine during either field operation or travel.
4. Attach the machine 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. Always move all parts of the machine to transport position when travelling on a road.
8. Stay away from overhead obstructions, such as power lines.
9. For max transport speed on smooth roads, see section 3.3.

2.6 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.

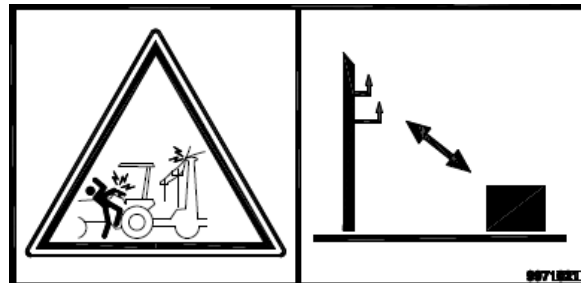
REMEMBER: If safety decals have been damaged or removed, become illegible, or parts are replaced without decals, then new decals must be applied. New decals are available from your authorized dealer.



PN: 9971013

Hazard: Moving Parts

Avoidance: Keep shields and doors in place at all times when operating the machine.



PN: 9971021

Hazard: Electrical Shock

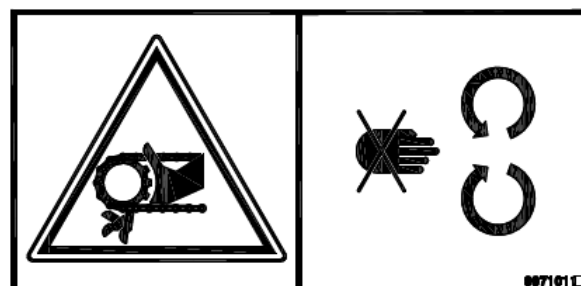
Avoidance: Stay clear of overhead power lines and other obstructions.



PN: 303265

Hazard: Crushing from Above

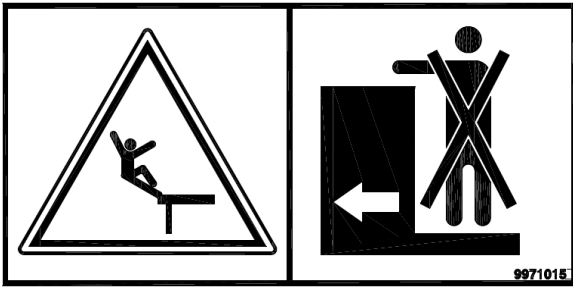
Avoidance: Never crawl or work under machine unless it is properly supported.



PN: 9971011

Hazard: Moving Parts

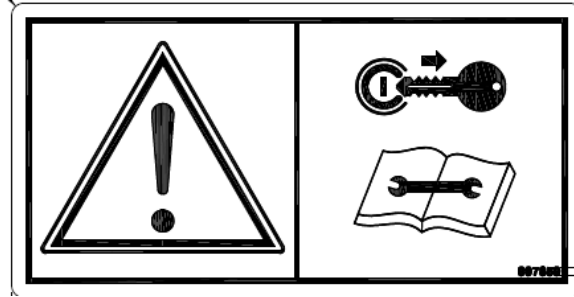
Avoidance: Keep hands, feet, hair, and clothing away from moving parts.



PN: 9971015

Hazard: Falling off Machine

Avoidance: Do not climb on the machine.



PN: 997859

Hazard: General Safety Alert

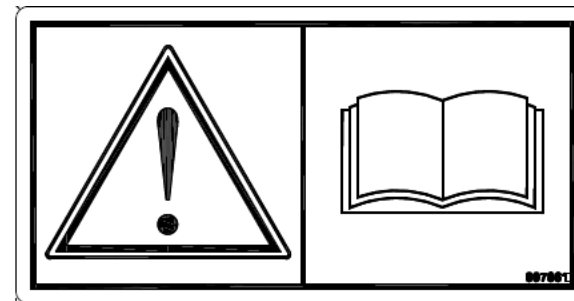
Avoidance: Shut off engine and remove key before performing maintenance or repair work.



PN: 303277

Hazard: Falling off Machine

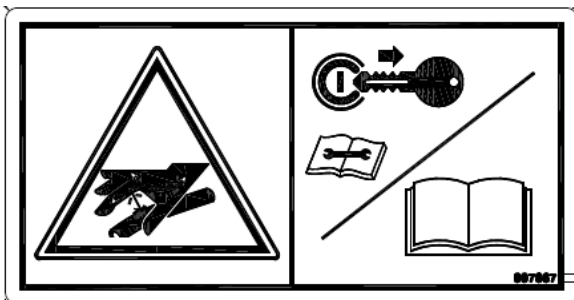
Avoidance: Do not climb on the machine.



PN: 997861

Hazard: General Safety Alert

Avoidance: Read and understand the Operator's Manual before operating the machine.



PN: 997867

Hazard: High Pressure Fluid

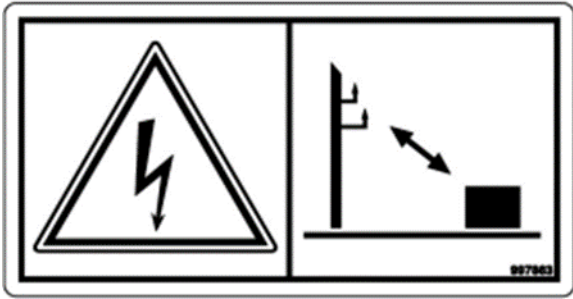
Avoidance: Relieve pressure on system before repairing, adjusting, or disconnecting. Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands. Keep all components in good repair.



PN: 303263

Hazard: Getting Limbs or Clothing Stuck in Machine

Avoidance: Keep hands, feet, hair, and clothing away from moving parts.



PN: 997863

Hazard: Electrical Shock

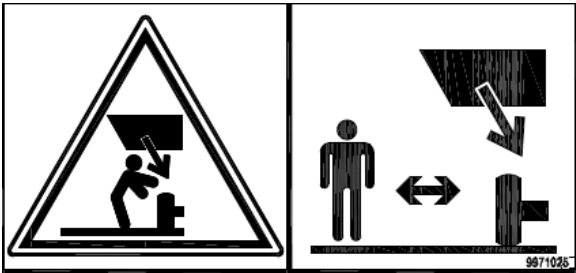
Avoidance: Keep the machine clear of overhead electrical power lines.



PN: 303268

Hazard: Rotating Part

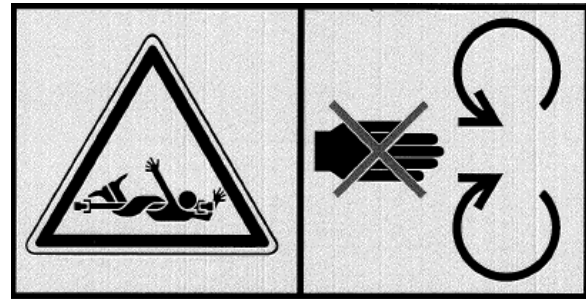
Avoidance: Keep clothing, yourself, and others clear.



PN: 9971025

Hazard: Crushing from Above

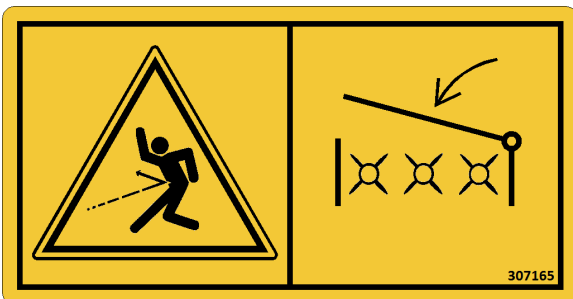
Avoidance: Stay clear of this area while engine and machine are operating.



PN: 311206

Hazard: Whole Body Entanglement

Avoidance: Do not remove safety shield while engine is running.



PN: 307165

Hazard: Flying Debris

Avoidance: Keep top door closed when flails are rotating.



PN: 303267

Hazard: Rotating Flails

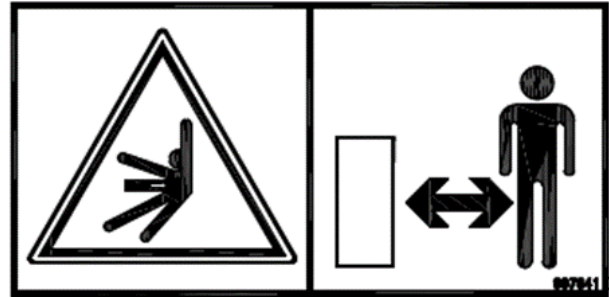
Avoidance: Do not approach machine until flail rotation has stopped.



PN: 311207

Hazard: Pinch Point

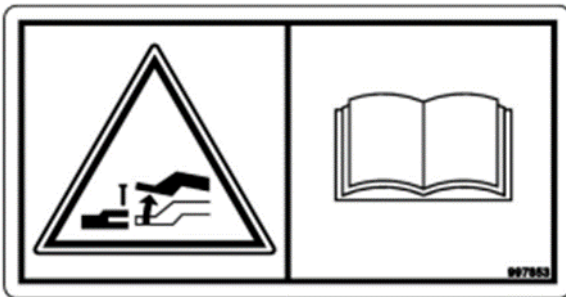
Avoidance: Keep hands clear of any moving parts around the pinch point.



PN: 997841

Hazard: Crushing from Moving Parts

Avoidance: Stay clear of this area while engine and machine are operating.



PN: 997853

Hazard: Negative Tongue Weight

Avoidance: Stay clear of the tongue when disconnecting the implement from the tractor. Read the Operator's Manual or safety information and operating instructions before operating the machine.



PN: 997857

Hazard: Loss of Machine Control

Avoidance: Install the safety chains when attaching the implement to the tractor. Read the Operator's Manual for safety information and operating instructions before operating the machine.

3.0 SPECIFICATIONS

3.1 Defoliator Specifications

Table 3-1: Defoliator Specifications

Model:	3750	3550	3450	3700	3500	3300	3200
Weight (Approx.)**	15,200 lbs [6,895 kg]	13,200 lbs [5,987 kg]	11,500 lbs [5,216 kg]	13,600 lbs [6,169 kg]	12,000 lbs [5,443 kg]	10,000 lbs [4,536 kg]	9,800 lbs [4,445 kg]
Hitch Weight (Approx.)**	6,050 lbs [2,744 kg]	5,000 lbs [2,268 kg]	4,400 lbs [1,996 kg]	5,000 lbs [2,268 kg]	4,400 lbs [1,996 kg]	3,800 lbs [1,724 kg]	3,700 lbs [1,678 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]	2-4 mph [3.2-6.4 kph]	2-4 mph [3.2-6.4 kph]	2-4 mph [3.2-6.4 kph]	2-4 mph [3.2-6.4 kph]
Maximum Road Travel Speed	25 mph [40 kph]	25 mph [40 kph]	25 mph [40 kph]	25 mph [40 kph]	25 mph [40 kph]	25 mph [40 kph]	25 mph [40 kph]
Width	23'11" [7.29 m]	16'0" [4.88 m]	13'4" [4.06 m]	23'11" [7.29 m]	16'0" [4.88 m]	13'4" [4.06 m]	11'0" [3.35 m]
Length (Approx.)**	19'6" [5.94 m]	19'6" [5.94 m]	19'6" [5.94 m]	19'6" [5.94 m]	19'6" [5.94 m]	17'6" [5.33 m]	17'6" [5.33 m]
Height	7'0" [2.13 m]	7'0" [2.13 m]	7'0" [2.13 m]	7'0" [2.13 m]	7'0" [2.13 m]	6'6" [1.98 m]	6'6" [1.98 m]

**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" [5.33 m]	20'9" [6.32 m]	19'6" [5.94 m]	23'1" [7.01 m]

3.2 Tire Specifications

Table 3-2: Tire Size, Pressure, and Lug Nut Torque

Model:	3750	3550	3450	3700	3500	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; approximate values are listed in the table below.

Table 3-3: Hydraulic Flow Rates

Circuit	Standard	Metric
Hitch Lift	10 gpm	37.9 L/m
Rear Strut Lift	7.5 gpm	28.4 L/m
Top Door Lift	5 gpm	18.9 L/m
Row Finder Constant	7.5 gpm	28.4 L/m
Row Finder Override	10 gpm	37.9 L/m
Scalper Lift / RF Lift	7.5 gpm	28.4 L/m
Front Strut	10 gpm	37.9 L/m

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 3-4: Tractor Specifications

Model:	3750	3550	3450	3700	3500	3300	3200
Minimum Horsepower (PTO)	230 hp	160 hp	130 hp	160 hp	130 hp	100 hp	100 hp
PTO Output	1000 rpm	1000 rpm	1000 rpm	1000rpm	1000 rpm	1000 rpm	1000 rpm
Spline Size	1¼" 20 Spline	1¼" 20 Spline	1¼" 20 Spline Or 1½" 21 Spline	1¼" 20 Spline	1¼" 20 Spline Or 1½" 21 Spline	1¼" 20 Spline Or 1½" 21 Spline	1¼" 20 Spline Or 1½" 21 Spline
Vertical Draw-bar Load	6,000 lbs [2,722 kg]	5,000 lbs [2,268 kg]	5,000 lbs [2,268 kg]	5,000 lbs [2,268 kg]	5,000 lbs [2,268 kg]	4,000 lbs [1,814 kg]	4,000 lbs [1,814 kg]
Hydraulic Pressure	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]
Number of Remotes*	5	5	5	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 3-1, 3-2, and Table 3-5 below show drum rotational speeds, directions and configurations for Amity Defoliators.

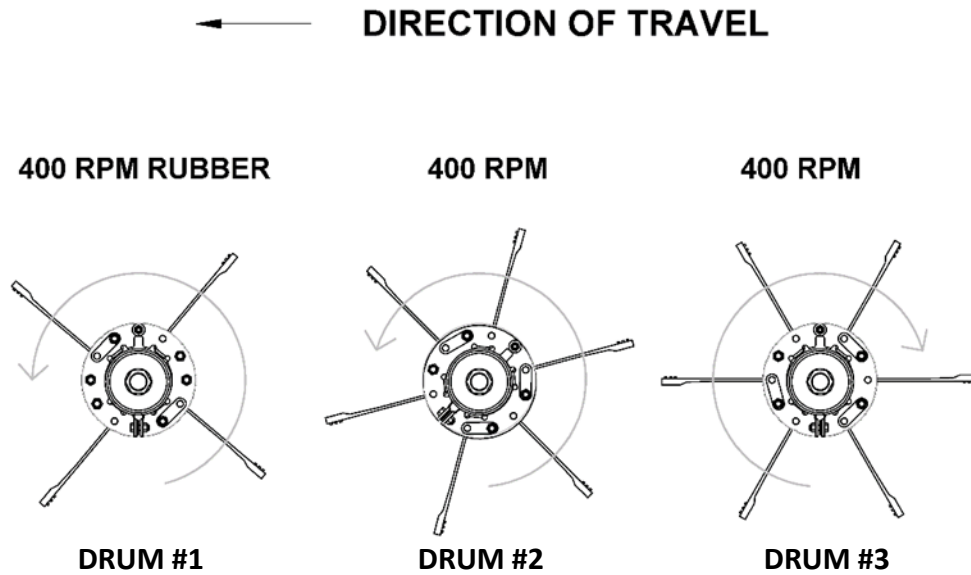


Figure 3-1: Rubber Front Drum

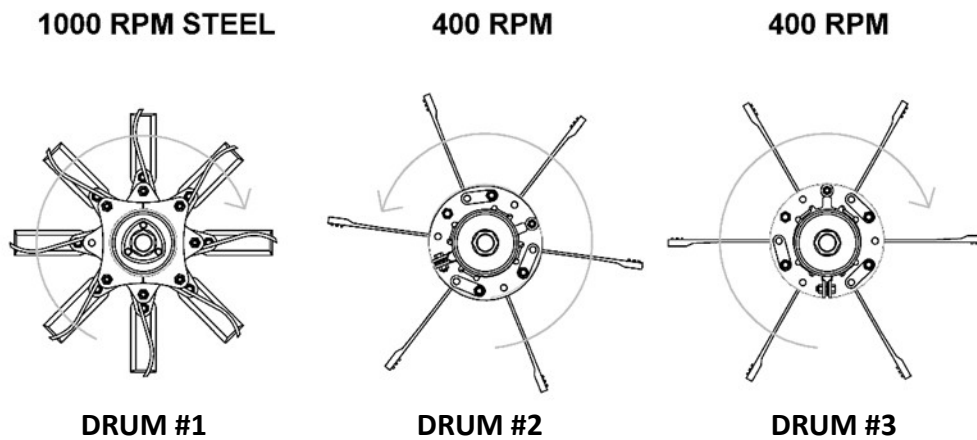


Figure 3-2: Steel Front Drum

Table 3-5: 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: It is recommended that the tractor drawbar be set to the shortest position and be within the given range (in accordance with ANSI/ASABE AD6489-3) to maintain the integrity of the drive system. Dimensions are shown in Figure 4-1.

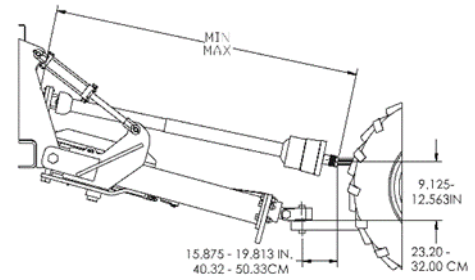


Figure 4-1: Drawbar Range

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 3.3, Traction, for more information. Figure 4-2 shows the appropriate tire spacing.

A = 3 or 4 * B

B = Row Spacing

C = Tire Width; must be as narrow as possible.

IMPORTANT: Tires must be narrow enough not to contact beets when driving down rows while still providing enough traction to pull the harvester.

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

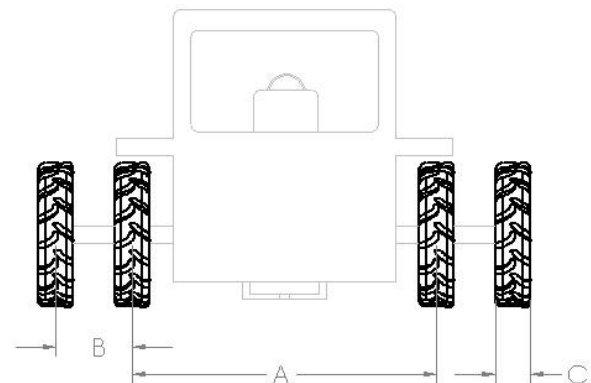


Figure 4-2: Tire Spacing

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

NOTE: Amity recommends removing three-point hitches.

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



Figure 4-3: 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

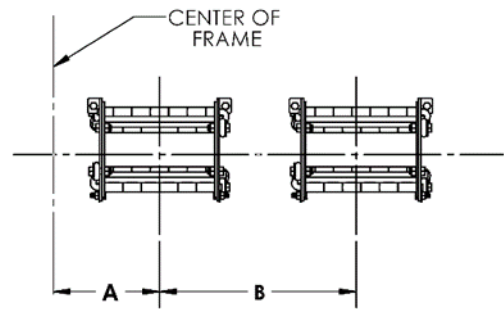


Figure 4-4: Flail Spacing

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.

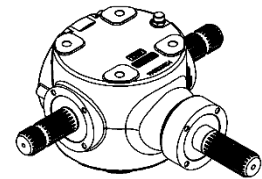


Figure 4-5: Gearbox

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:

Remove the gearbox shield access covers.

Connect the PTO driveline to the gearbox spline shaft.

Lock the PTO in place using 2- $\frac{5}{8}$ in. bolts and nuts installed through the groove in the gearbox shaft.

Replace shield access covers.

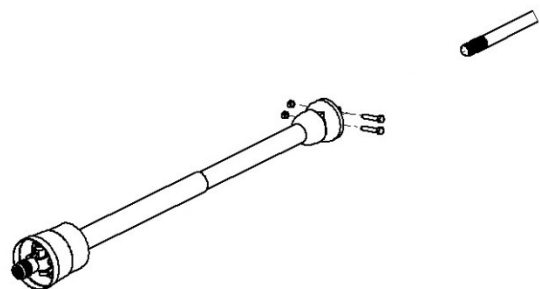


Figure 4-6: Attaching PTO to Defoliator

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. Shift to park, shut off the engine, and remove the ignition key before getting out of tractor.
2. Connect all hydraulic lines to tractor as shown in Figure 5-1.
3. Connect the defoliator warning light harness to the tractor. Make sure the defoliator warning lights operate with the tractor warning lights and turn signals.



Figure 5-1: Attaching Hydraulic Lines

5.2 Attaching Defoliator to Tractor Drawbar

1. Adjust the tractor drawbar (see Tractor Preparation, section 4.1.1).
2. Remove the tractor hitch pin.
3. Install required bushings into pull plate.
4. Adjust the hitch height.
5. Shift to park, shut off the engine, and remove the ignition key before getting out of tractor.
6. Line up the pull plate with the drawbar.
7. Place hardened washer between the drawbar and pull plate, and install shims as necessary.
8. Lubricate and reinstall the hitch pin.
- !** 9. Connect the safety chain to the drawbar supporting structure.



Figure 5-2: Attaching Harvester to Tractor Drawbar

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, relieve hydraulic pressure, stop the engine, and remove the ignition key.
 2. Raise the tractor PTO shield.
 3. Lubricate splines on tractor PTO output shaft.
 4. Pull back on the PTO collar until it latches.
 5. Align the splines between the defoliator driveline and the tractor PTO shaft. Push the driveline onto the shaft until the collar snaps forward on the yoke.
 6. To ensure the PTO is secure, pull back on the shield. Do not pull on the collar, as this will release the latch.
 7. Lower the tractor PTO shield.



Figure 5-3: Attached PTO Driveline

5.4 Using Stands

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

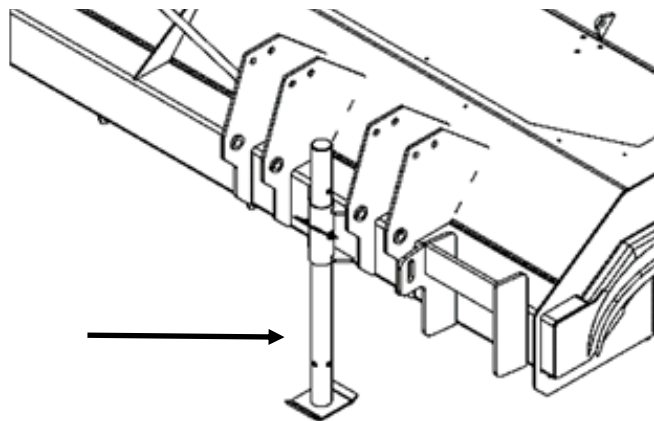


Figure 5-4: Amity Stand

6.0 OPERATING THE DEFOLIATOR

6.1 Startup

1. Lubricate the machine per the schedule outlined in the maintenance section.
2. Perform pre-operation check of the defoliator.
3. Ensure that you, 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 ½" (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 defoliation 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 have 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 equipped 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 ¼" (.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.

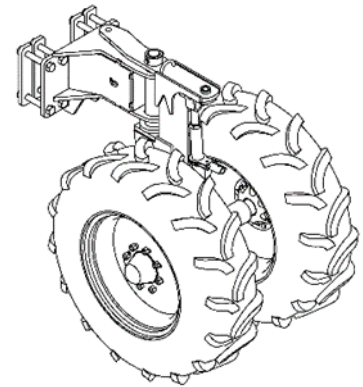


Figure 6-1: Row Finder

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.

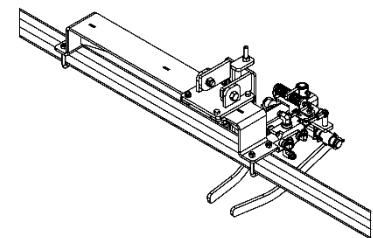


Figure 6-2: Row Finder

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. Scalpers 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.

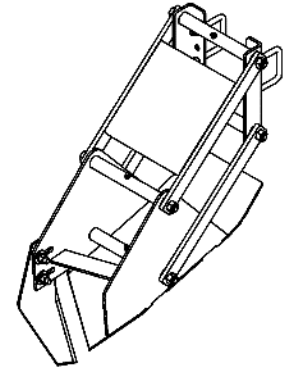


Figure 6-3: Scalpers



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 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 set-up.




Figure 6-4: Floating Hitch Valve

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. (If equipped with AHC, activate end row mode)
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:

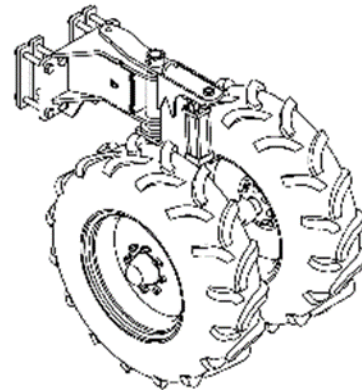


Figure 7-1: Leveling Adjustment

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 level the defoliator, choose the side which is closest to the desired height. Then adjust the ratchet jack on the opposite side until the machine is level.
6. Future height adjustments should be made in equal amounts on both struts to maintain level.

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.



Figure 7-2: Rear Strut Height Adjustment

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.

7.2.2 Field Height adjustment and AHC adjustments

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.
3. Following adjustment safety procedures, stop and raise the defoliator.
4. Once all moving parts have stopped, exit the cab and assess the defoliation performance.
5. Make height adjustments as needed by adding spacers or adjusting the ratchet jacks depending on options equipped. For AHC, adjust heights by using the screen to change the rear height and/or hitch height values on the home screen, or the left/right offset on the advanced options screen. Use the following guidelines:

Flails hitting dirt – raise rear struts/increase rear height value

Front flails cutting top off beets – raise front hitch/increase hitch height value

Beet crown not clean – lower rear struts/decrease rear height value

Front crown of beet not clean while rear is – lower front hitch/decrease hitch height value

Rear crown of beet not clean while front is – lower rear struts & raise front hitch/decrease rear height value & increase hitch height value

Beet crown damaged – increase speed and reassess

Beets being pulled out of ground – raise rear struts/increase rear height value

6. Make adjustments as needed and operate the defoliator for another 25-50 feet (7.5-15 m) until satisfied with defoliation results.
7. Increase speed until defoliation job begins to worsen, then slow down slightly to optimize travel speed and performance.

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.

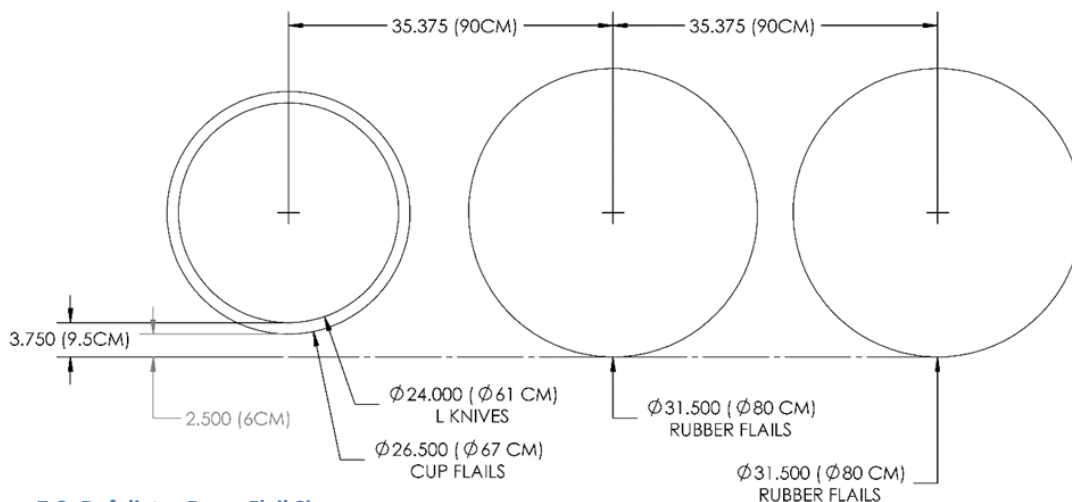


Figure 7-3: Defoliator Drum Flail Size

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.

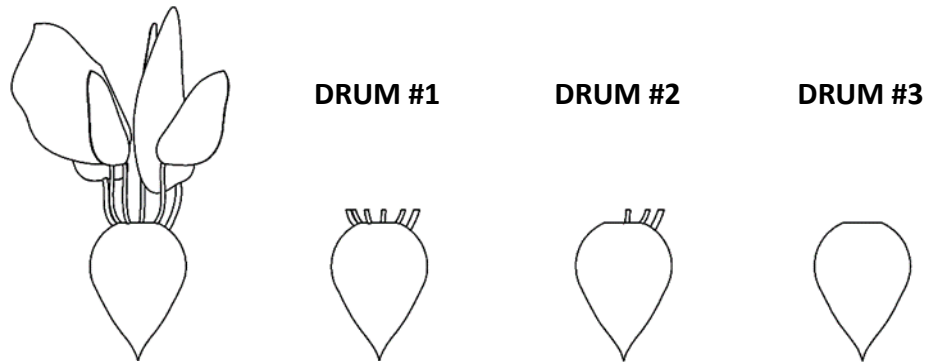


Figure 7-4: Defoliation Process

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 to 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. The best way to minimize this 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 ¼ 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.
11. Using the eyebolts raise the plate until the measurement matches the height the gearbox was raised.



Figure 7-5: Gearbox 3rd Drum Adjustment



Figure 7-6: Center 3rd Drum Adjustment

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 7-7: Outer 3rd Drum Adjustment

7.3 Row Finder

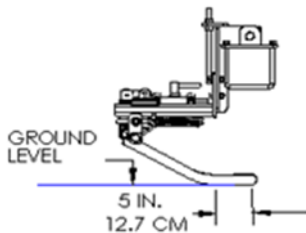


Figure 7-8: Row Finder Wand Placement

When defoliating, the row finder wands should be adjusted like Figure 7-8 such that there is 5 in. (12.7 cm) of contact between the ground and row finder wands. Adjustment spring (B), shown in Figure 7-9, 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 7-9. Dimension (A) can be adjusted using nuts (D).

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).

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.

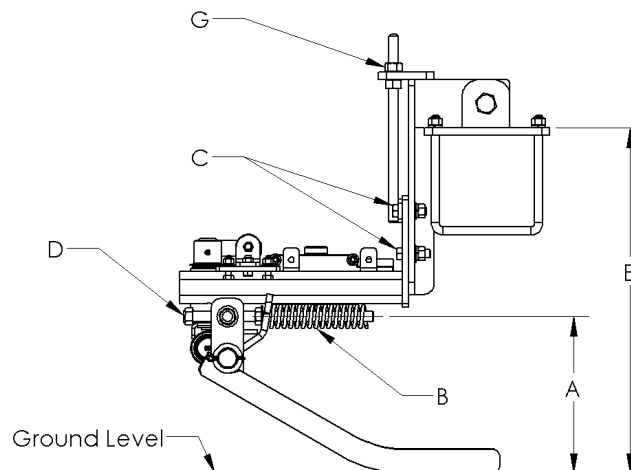


Figure 7-9: Row Finder Adjustment

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

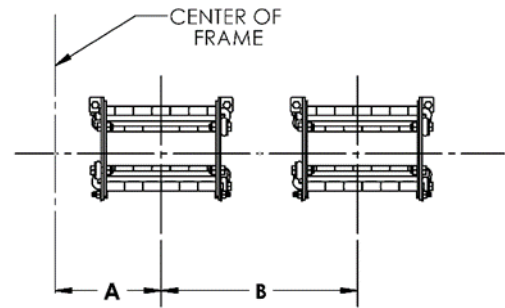


Figure 7-10: Row Spacing

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.

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 position 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.

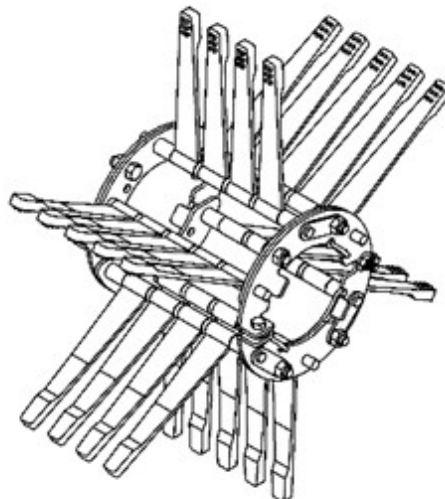


Figure 7-11: Rubber Flail Bas-

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.
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 Tire

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" Tire

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" Tire

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 where 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 achieved re-tighten the nuts locking the tie-rod length.



Figure 7-12: 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 7-13 to the right should be used. The upper set of holes is there for additional mounting flexibility and can be used if desired.

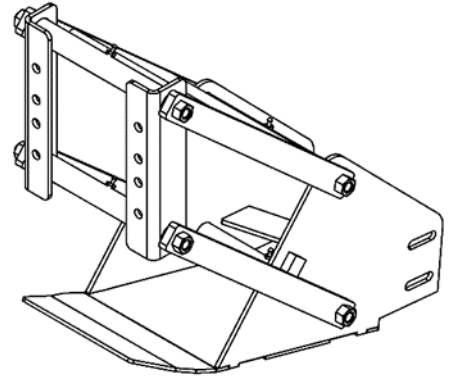


Figure 7-13: Scalper Basket

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



Figure 7-14: Scalper

7.6.1 Knives

Scalper knives should be set so that they remove a slice off the crown on the beet that is 1.5-2 inch (4-5 cm) in diameter. 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 ½ inch (1.2cm) below the trailing edge of the scalper basket. To set this consistently use a ½ 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 ½ 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.
7. 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 central position from factory. Adjust the bar height so it is correct for your conditions according to the diagrams below. Although not typically used the 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.

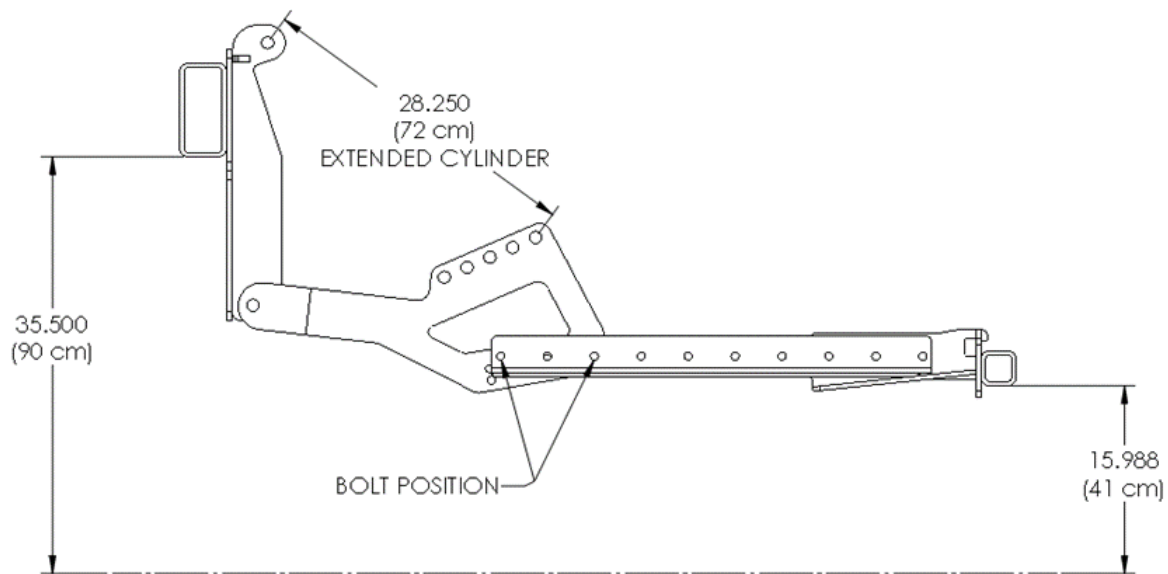


Figure 7-15: Highest Scalper Position

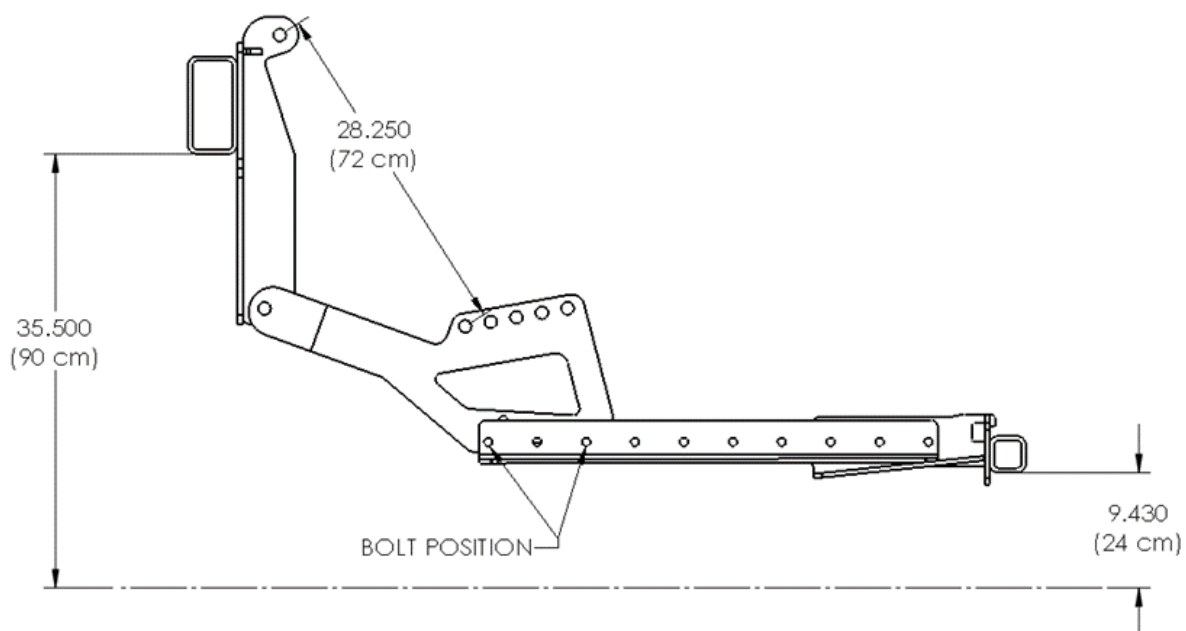


Figure 7-16: Lower Scalper Position

PAIR EACH CYLINDER PIN HOLE POSITION WITH EACH RESPECTIVE SCALPER ARM BOLT HOLE PLACEMENTS AS LABELED BELOW

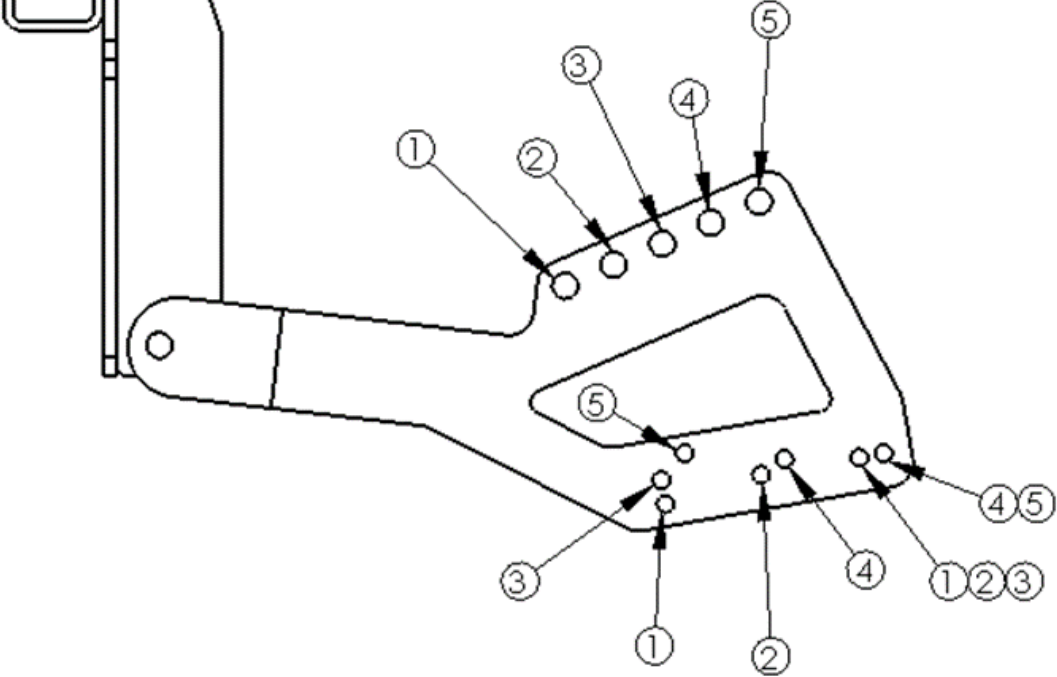


Figure 7-17: Corresponding Bolting Locations to Keep Scalpers Level

7.7 Floating Hitch

Proper setup is critical for the Floating Hitch or Floating Struts 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). *Floating Hitch Only*
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) for the Floating Hitch or 7.5 GPM (28.4 LPM) for the Floating Struts. 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 or strut 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 retract 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: Adjust your relieve valve pressure settings and flow to desired increments. More pressure translates to more load carried by these front wheels. More flow translates to faster response time when going in and out of divots. Set these settings to the least pressure and flow required to meet your needs.

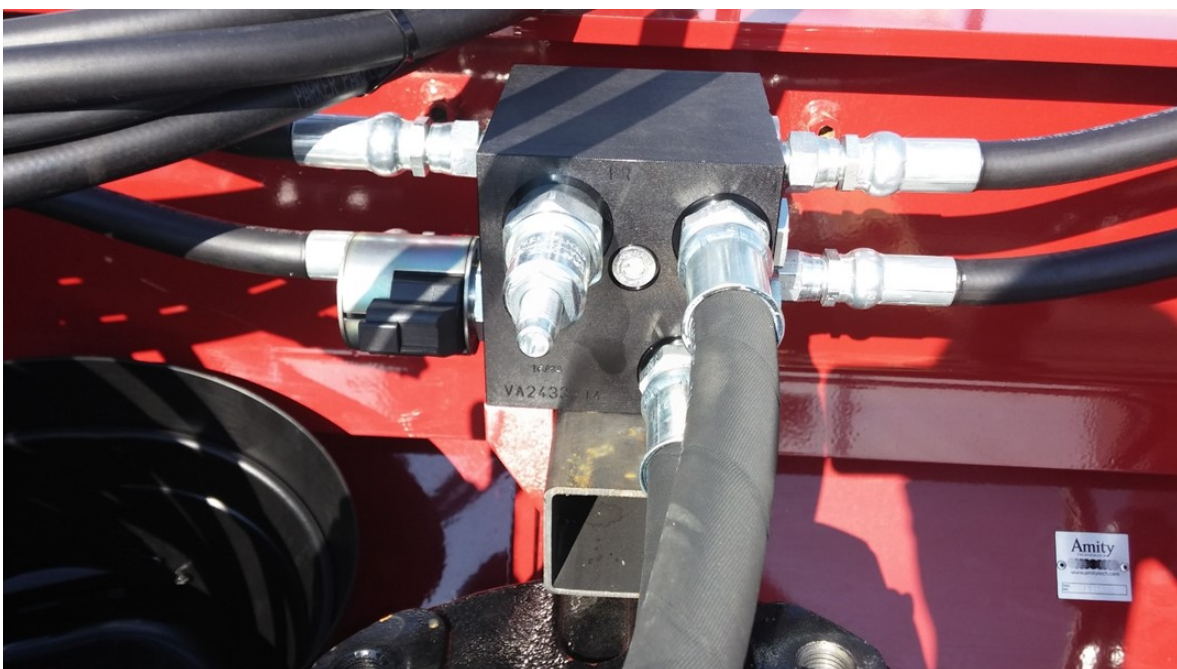


Figure 7-18: Floating Struts Valve Block

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.

Table 7-1: Torque Chart

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

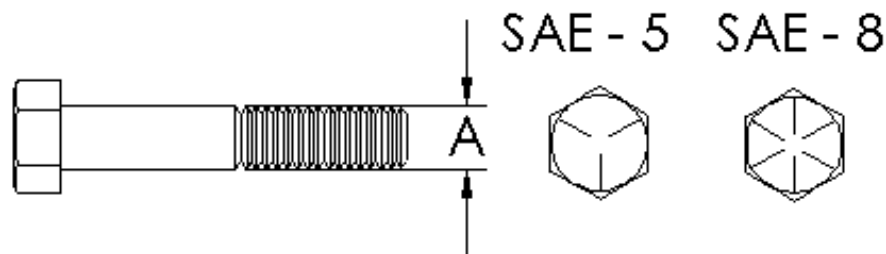


Figure 7-19: Bolt Grade Identification

7.9 Active Height Control (AHC)

Active Height Control is available on 00 or 50 series 12 row defoliators. When used properly and set correctly for varying conditions, AHC can automatically level the defoliator by using rear sensor baskets to measure the average heights of the beets during the AutoLevel functionality.

7.9.1 Setting up AHC

Before operating AHC, follow these steps while observing the aforementioned safety instructions in section 2:

1. Ensure flow is running to the AHC hydraulic block in the proper direction. Set to 7 GPM initially and adjust higher or lower based on preferred response timing of adjustment changes in the hydraulic cylinders.
2. Ensure your screen has power and is connected to the main harness.
3. Pressing “End Row” on the home screen should now raise hitch cylinders to 75% full stroke and raise rear cylinders completely. If “End Row” does not raise the cylinders, try reversing the flow and/or ensuring hydraulics are plumbed correctly.
4. Raise the rear AHC baskets. These can be plumbed by itself, plumbed in parallel with the rear row finder, or connected to the scalper bar.
5. Once rear baskets are fully raised, press “Calibrate System” on the options screen (wrench symbol). This should set the “Calibration” sensor on the home screen to be green.
6. If your desired settings are unknown, good settings to start with are 50 for the “Rear Height”, 60 for the “Hitch Height”, and 0 for the left/right offset found in advanced options (wrench & gear symbol). These settings are typically higher than usual and will allow you to lower or raise your defoliator into the proper position.

7.9.2 Operating and Adjusting AHC

When running AHC, you have the choice of two different modes: AutoLevel or Manual. AutoLevel will automatically adjust your rear cylinders based on reading from the rear baskets. Manual will allow you to set each cylinder to a locked in position. Details for each are below

AutoLevel mode:

1. Ensure you have run the necessary steps in 7.9.1 before operating. “Calibration” sensor should be green.
2. Press the “AutoLevel” button on the options screen so it remains suppressed and green.
3. Engage the pto so the “Pto Sensor” on the home page turns green.
4. Lower rear sensor baskets so they are in the fully down position. This will activate the “Workswitch” sensor and it will turn green.
5. Press “Begin Row” when you are ready to start defoliating. Defoliator will now start autoleveling based on readings from rear baskets and in accordance with your home page screen settings.

NOTE: All 4 sensors (Auto Level, Calibration, Workswitch, Pto Sensor) must be green in order for the autoleveling feature to function

6. Adjust “Hitch Height” and “Rear Height” to desired levels for proper defoliation of beets, refer to section 7.2.2.
7. Offset adjustments are available under the advanced options screen. This should only need to be set once per season OR under difficult field condition. Initially set to “0” offset. Wait at least 60 seconds before changing each value. The system takes an average of the measured beet height and needs time to adjust properly. Each number “left down” or “right down” will slightly lower that side and raise the other. E.g. “1 Right Down” will lower the right side ~1/16” and raise the left side ~1/16”
8. After defoliating each row, press “End Row” and raise rear sensor baskets before turning.

WARNING: Not pressing “End Row” and/or not lifting sensor baskets after a row or while turning can result in damage to the machine. Follow all safety precautions when operating AHC in AutoLevel

9. Return to step 4 and repeat process on each row as needed.

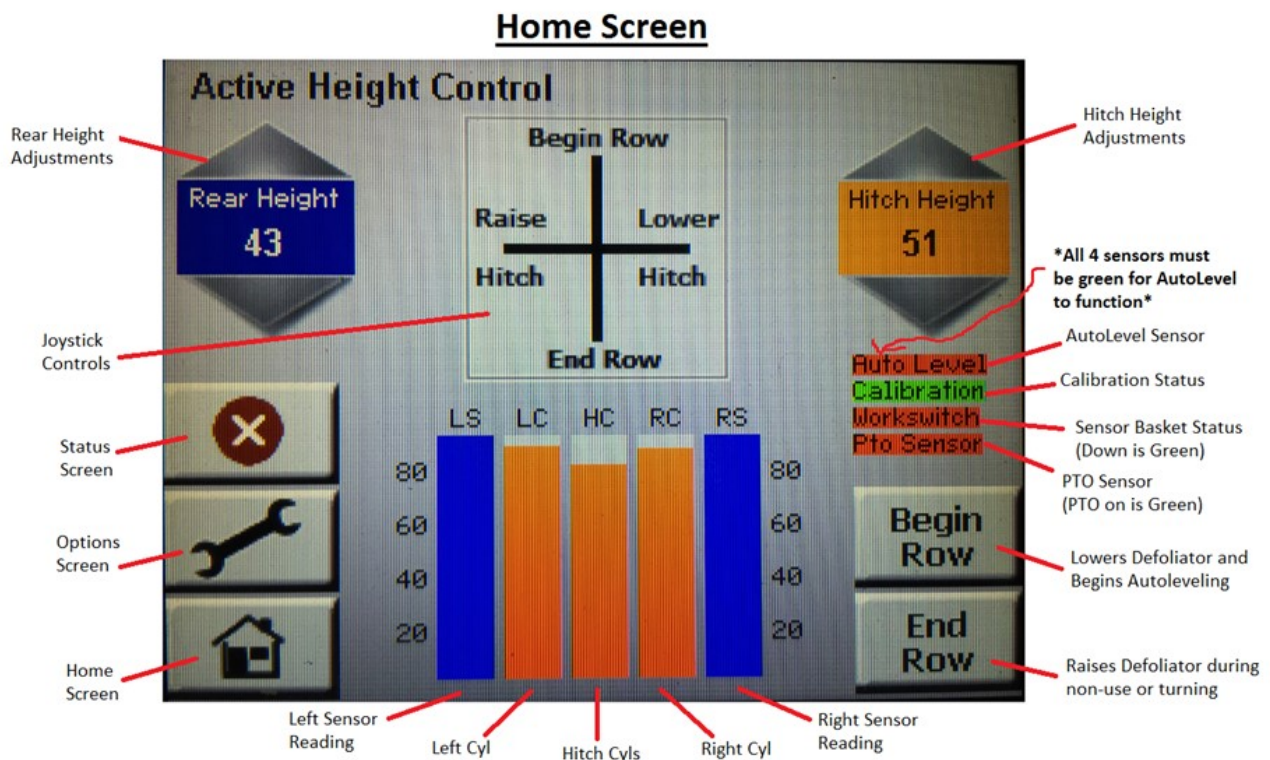
Manual mode:

1. Ensure you have run the necessary steps in 7.9.1 before operating.
2. Deselect the "AutoLevel" button on the options. It should appear as unsuppressed and gray.
3. Raise the rear sensor baskets if you are not scalping. Sensor baskets should remain raised when in Manual mode.
4. Engage the pto so the "Pto Sensor" on the home page turns green.
5. Press "Begin Row" when you are ready to start defoliating. Defoliator will set the hitch cylinders to the "Hitch Height" setting on the home page, and the rear left and right cylinders to their respective "Left" and "Right" values on the options page.
6. Adjust "Hitch Height", "Left", and "Right" to desired levels for proper defoliation of beets, refer to section 7.2.2.
7. After defoliating each row, press "End Row" before turning.

WARNING: Not pressing "End Row" and/or not lifting sensor baskets after a row or while turning can result in damage to the machine. Follow all safety precautions when operating AHC in Manual mode

8. Return to step 5 and repeat process on each row as needed.

Pictures for reference included below:



Options Screen

Options Screen

Left Cylinder Adjustment (Manual Mode Only): **Left 37**

Right Cylinder Adjustment (Manual Mode Only): **Right 44**

Scalper bar must be up for cal

Calibrate System

Info:
 LS = Left Sensor
 LC = Left Cylinder
 HC = Hitch Cylinder
 RC = Right Cylinder
 RS = Right Sensor

Left Cyl position: **LC** (80, 60, 40, 20)

Right Cyl position: **RC** (80, 60, 40, 20)

Buttons: **Auto Level**, Status Screen (X), Options Screen (Wrench), Home Screen (House)

Advanced Options Screen (Gear icon)

Annotations:
 - Left Cylinder Adjustment (Manual Mode Only)
 - Auto Level Mode (suppressed and green) Manual Mode (unsuppressed and gray)
 - Status Screen
 - Options Screen
 - Home Screen
 - Advanced Options Screen
 - Right Cylinder Adjustment (Manual Mode Only)
 - Press to Calibrate system; sensor baskets must be raised for correct calibration

Advanced Options Screen

Advanced Options Screen
Read Operator's Manual

Turns PTO Sensor On or Off. Only turn Off if needed in diagnostics

Override PTO Sensor

1 LEFT DOWN

Hardware Offset Cal: Only Set ONCE During Initial Leveling Setup

Adjusts Left or Right Offset. Only set once per initial setup. Each number reflects approx. 1/16" change in difference between left and right rear height cylinders.

Options Screen (Wrench icon)

Home Screen (House icon)

Sliding Scale: Backlight

Sliding Scale: Volume

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, and use turn signal lights or hand signals.

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 to the highest position for maximum ground clearance.
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: See section 3.1 for maximum transport speeds.

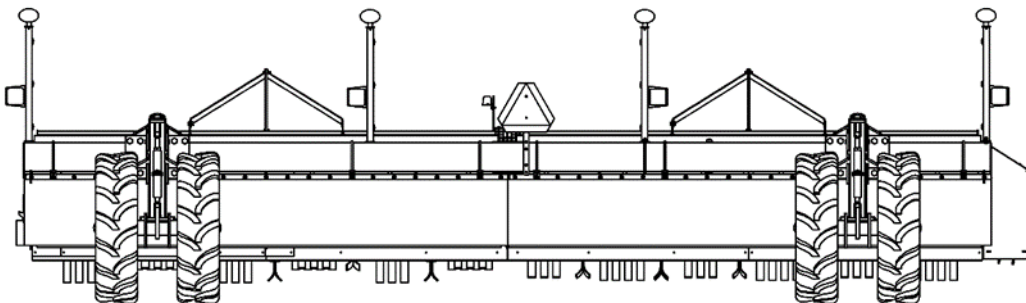


Figure 8-1: Rear Defoliator

9.0 CLEANING

Cleaning is an important part of harvester maintenance. This section illustrates a few locations 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.

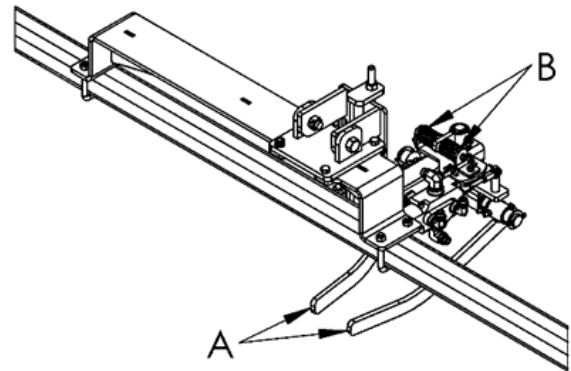


Figure 9-1: Row Finder Cleaning

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 good cleaning practices, scalpers will plug occasionally and will need to be cleared at the field end if they do not unplug themselves. Clean as needed.



Figure 9-2: 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 two 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

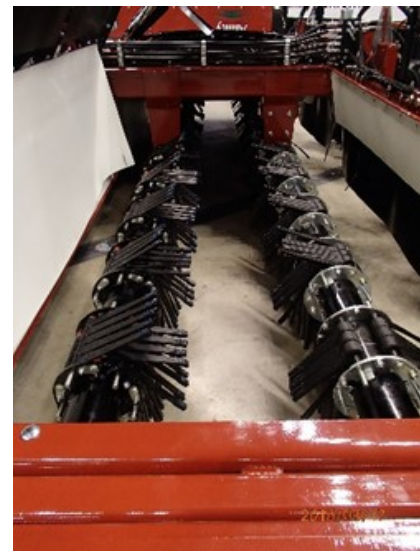


Figure 9-3: Interior Cleaning

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 9-4: 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 needed.
3. Lubricate all grease fittings and run machine for five minutes to distribute lubricant.
4. Touch up paint on all parts from which paint has been worn to prevent rusting.
5. Move the defoliator to a level, dry, and clean area.
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 section 11.0, Lubrication and Maintenance). This will force any collected moisture out of the bearings. Replace the gearbox oil (see section 11.0, Lubrication and Maintenance).
4. Run the harvester 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 the defoliator. (See parts book for part numbers.)

11.0 LUBRICATION AND MAINTENANCE

11.1 General Maintenance Information

Perform each lubrication and service illustrated in this section at the beginning and end of each season.

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: The items listed separately from the lubrication chart and the servicing interval pages are of extra importance. 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 contaminants. 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.

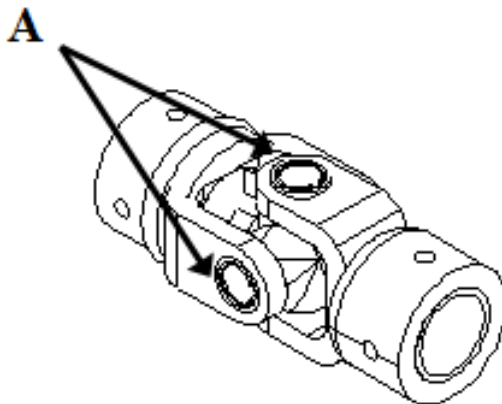


Figure 11-1: Needle Bearings

11.3 Gearbox Oil Level

Gearbox oil levels should be checked routinely and filled to line (A) shown in Figure 11-2.

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 (A).

Excess oil can be drained from the gearbox using side plug (B).

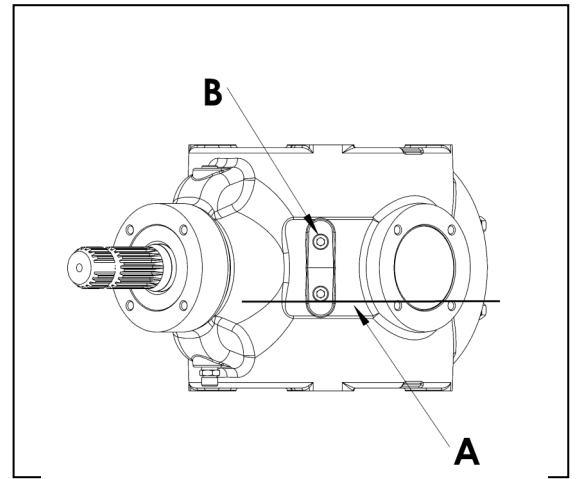


Figure 11-2: Gearbox Oil Level

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:

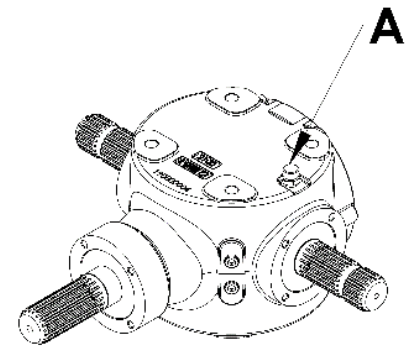


Figure 11-3: Gearbox Breather

1. Clean Gearbox surface around breather to prevent contamination.
2. Remove breather (A), shown in figure 46.
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.

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 11-1.

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 11-1: 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.

11.7.1 Steel Flails:

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).

Flail replacement:

1. Open defoliator top doors for access to flails
2. Inspect all flail and determine which ones need to be replaced.
3. Cup – Remove flail rod bolt, L-Knife – Remove mounting bolt
4. Remove flail tube with flails and spacers.
5. Inspect and replace missing or damaged components using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
6. Reinstall flail rod/bolt through flail tube with flails and spacers preassembled.
7. Tighten flail rod/bolt.
8. 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.

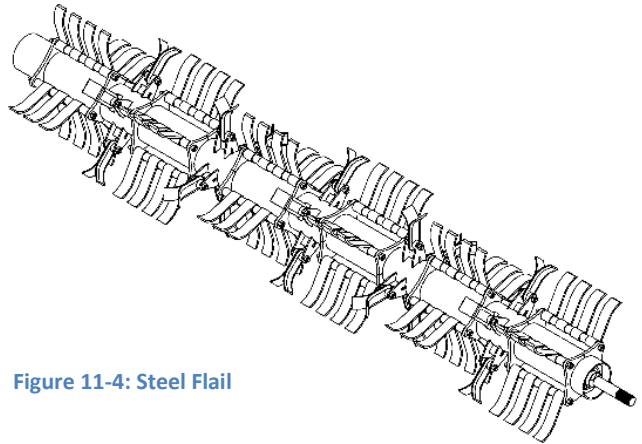


Figure 11-4: Steel Flail

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.

11.7.2 Rubber Flails:

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:

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 position 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.

Flail Replacement:

1. Open defoliator top doors for access to flails.
2. Inspect all flails and determine which ones need to be replaced.
3. Remove flail rod mounting bolt.
4. Remove flail rod.
5. Replace missing or damaged flails using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
6. Reinstall hinge rod threading on spacers and flails in the appropriate sequence.
7. Tighten flail rod mounting bolt.

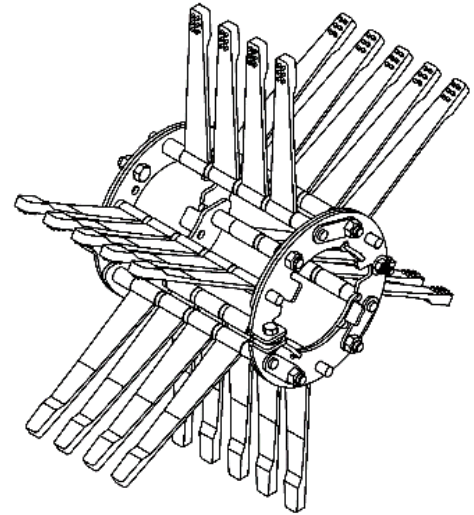


Figure 11-5: Rubber Flail

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:

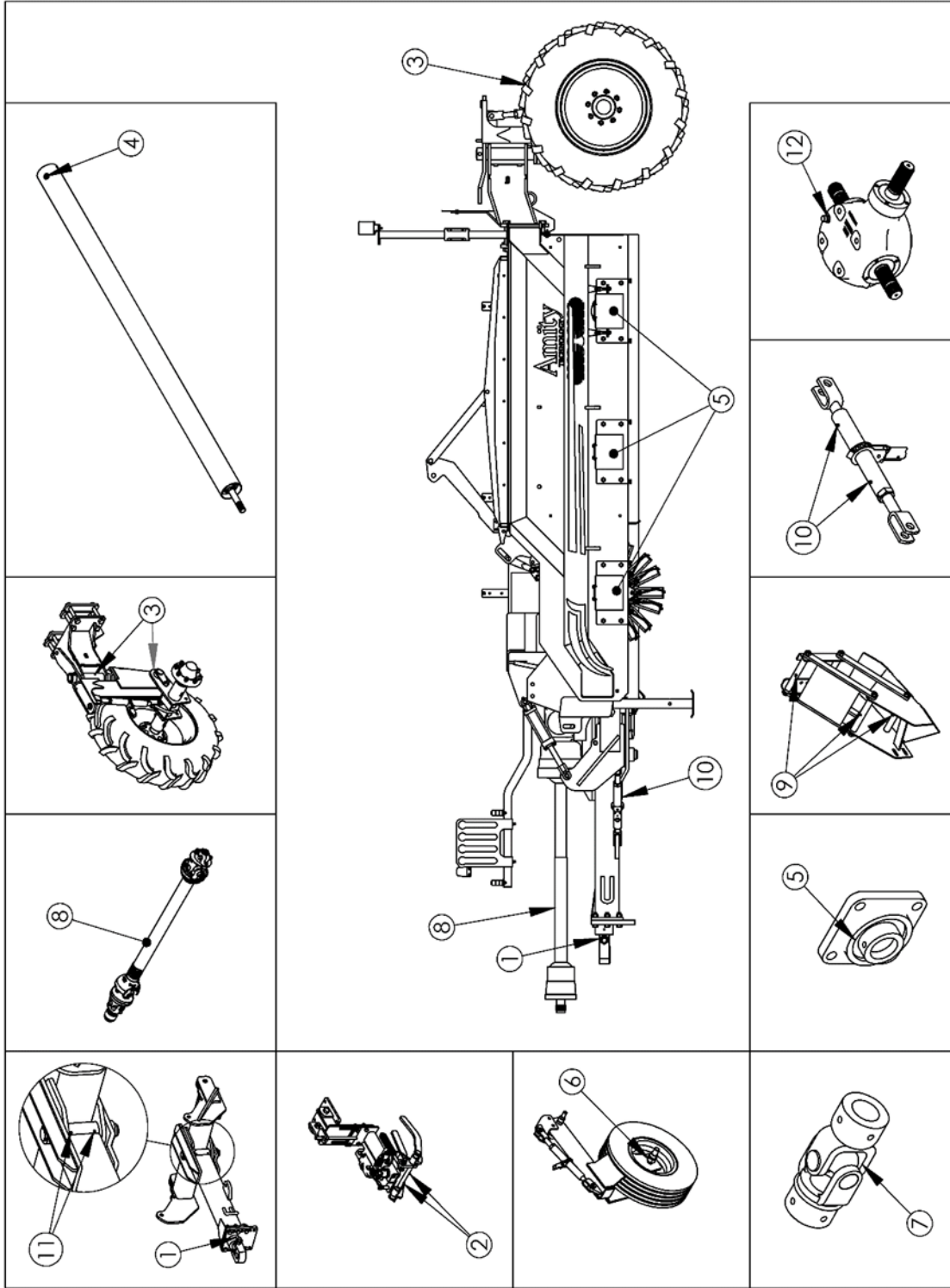
1. Grease front hitch pivot, row finder and lift, steerable struts, drive couplers, hanger bearings.
2. Inspect all drums for missing or damaged flails.
3. Check Scalper knives and sharpen if needed.

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.



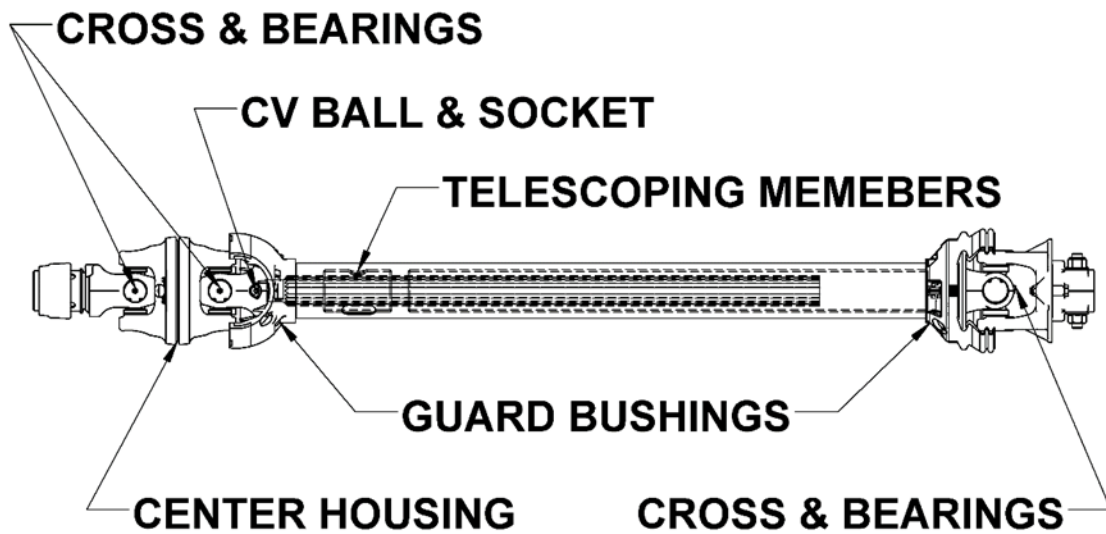
11.9 Lubrication Chart

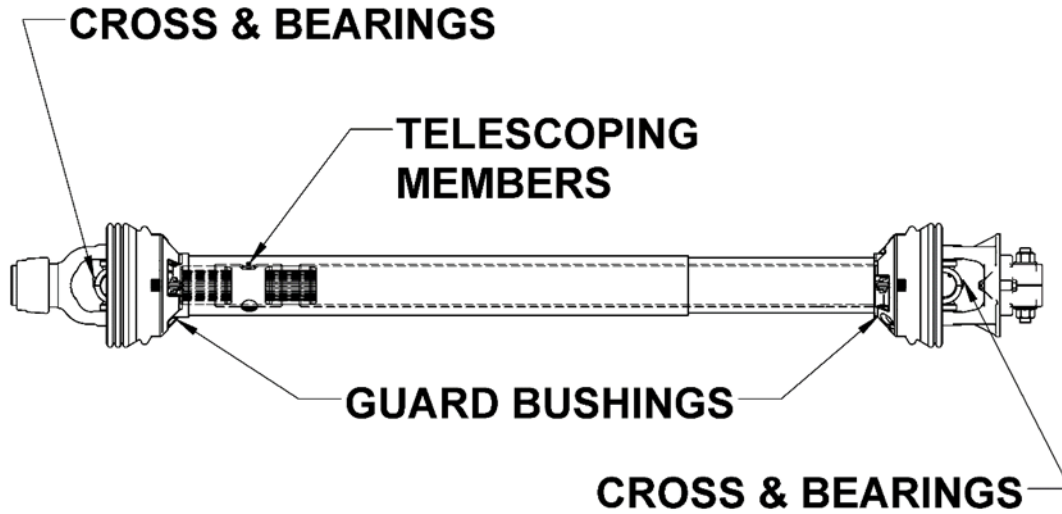
Ref #	Description	Lubrication Type	Frequency	Quantity	Number of Instances
1	Front Hitch Pivot	Multi-Purpose Grease	12 Hours	3-5 pumps	1
2	Rowfinder & RF Lift	Multi-Purpose Grease	12 Hours	1-2 pumps	3 to 5
3	Rear Struts	Multi-Purpose Grease	12 Hours	2-3 pumps	2 to 4
4	Drive Couplers	Moly EP Grease NLGI #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





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 11-2: 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
Beet tops not clean	Defoliator height not properly set Traveling too quickly Worn/broken flails	Verify defoliator height is correctly set; see section 7.0. This should be done every time a field, variety, or conditions change. Reduce travel speed until beets are satisfactorily clean. Replace flails.
Beet tops damaged	Defoliator height not properly set Traveling too slowly Flail style	Verify defoliator height is correctly set; see section 7.0. This should be done every time a field, variety, or conditions change. Increase travel speed until damage is reduced and beet tops are still clean. 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 Beets not firmly rooted	Set defoliator height per section 7.0. Increase travel speed if greens are all removed. 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 Traveling too fast for field conditions Rear Struts too far inboard	Lower stabilizer struts so they lightly, but constantly, contact the ground when hitch is lowered to stops. Decrease travel speed; if decreased travel speed causes damage to beet tops you may decrease PTO speed. 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 Knife not properly set Basket not properly set Excessive petiole left before scalpers	Sharpen knives or replace if worn. Adjust knife height and cut angle to have the correct depth and cut flat. Adjust scalper bar height so basket has proper travel range for defoliator height. 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 setup Hydraulic flow rates not properly set Row finder height not properly adjusted Operating on side hills	Ensure correct hoses are hooked up for both the constant and override functions. Also, check that the tractor hydraulic setting for the row finder constant function are on continuous and do not time out. Set row finder constant rate to approx. 7 GPM continuous flow, row finder override to 10 GPM with a cycle time of 3-4 seconds Refer to section 7.0 and set row finder height per instructions. Install close center plug into top of row finder valve body with 0.090" orifice drilled through it to slow response time back to center.

PROBLEM	CAUSE	SOLUTION
Row finder leaking	Fittings loose Spool seals worn	Tighten any loose fittings. Rebuild or replace row finder valve.
Rear lift cylinders leaking down	External oil leak Strut lift tied to row finder circuit	Find the source of the leak and repair or replace leaking equipment. 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 Low/uneven tire pressure Weight not balanced side-to-side Defoliator not level	Evaluate if it is possible to move rear struts in or out on the defoliator frame so they are not operating in wheel tracks. Check to make sure all tire pressures are set according to section 3.0. Add wight to the corner of the defoliator on the weight mount. Reset defoliator level per section 7.0.
Machine vibrates	Unbalanced drums Damaged or worn drive shaft	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 the vibration continues, remove steel drum(s) and have them balanced. Inspect all drive shaft and U-joints for worn or damaged components; repair or replace as necessary.

PROBLEM	CAUSE	SOLUTION
Breaking shear bolts	<p>Front drum contacts ground</p> <p>Engaging too quickly</p> <p>Shear pin too small</p>	<p>Ensure hitch cylinder stops are correctly set and/or slow down and lift front while traveling in deep ditches or ruts.</p> <p>For tractors equipped with an automatic PTO clutch, set to lowest engagement setting.</p> <p>After checking the entire drivetrain and determining that there are not 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).</p>
Mud build-up under top doors	<p>Operating conditions</p> <p>Running defoliator on headlands</p>	<p>Tough conditions will require additional cleaning.</p> <p>Shut off defoliator on headlands or raise up front and/or rear to prevent flails from churning up dirt and dust</p>

13.0 Appendices

13.1 Conversions

1 acre = 0.404 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 = 0.45359 kg	1 hp = 0.746 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 13-1.

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 13-1: 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

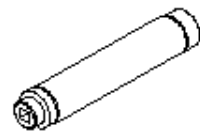
Amity has the following tools available:

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

Trantorque wrench (#64320)



#64320



#59107 (1 ¼ in., 4.45 cm)
#59108 (2 in., 5.08 cm)
#64820 (2 ¼ 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 13-2.
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 13-3. 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.

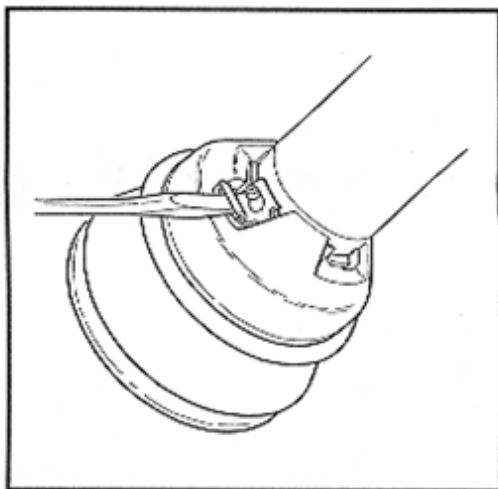


Figure 13-2: Remove Tab

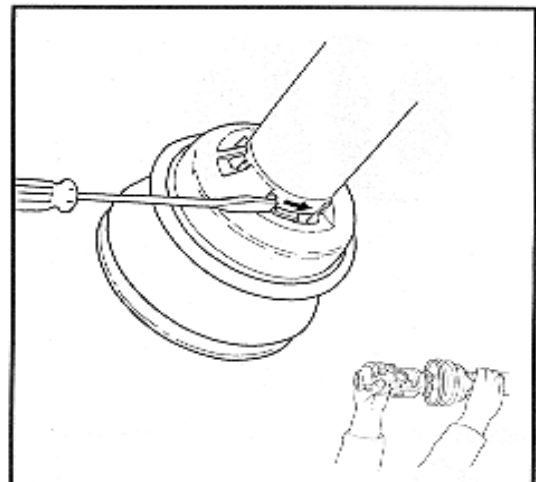


Figure 13-3: Turn Bearing

13.6 Flail Tube to Gearbox Assembly and Removal

Flail tubes include a rubber spacer to properly align gear depth when using the drive coupler. This rubber spacer ensures the flail tube is aligned properly on the mating gears of the gearbox shaft, drive coupler, and drive sleeve.

During assembly, make sure all parts are included as shown in the Parts Manual, and then slide the drive coupler to all the way back to press on the rubber spacer. This centers the mating gears as shown below so they engage properly. Only one snap ring will be needed on the gearbox shaft towards the side nearest the gearbox body as illustrated in the Parts Manual. This should also assist in ease of disassembly of the flail tube from the gearbox shaft.

Cross-sectional of gearbox to flail tube connection

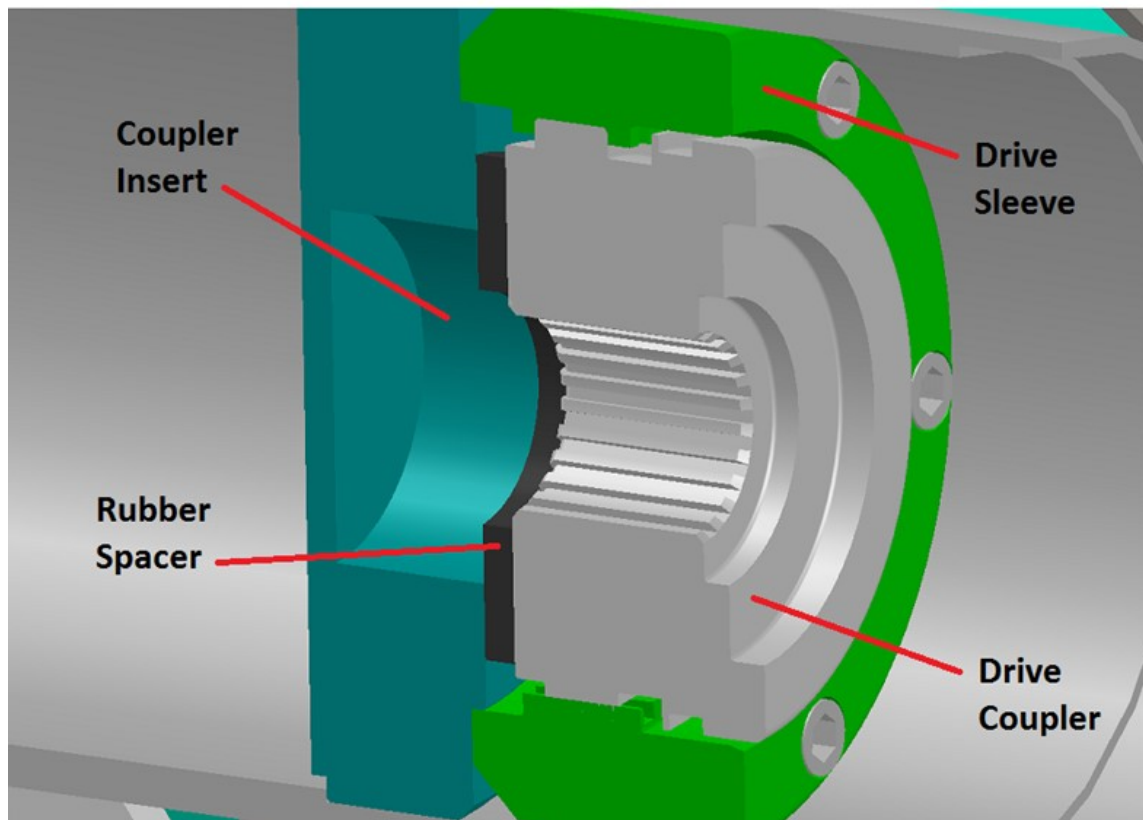
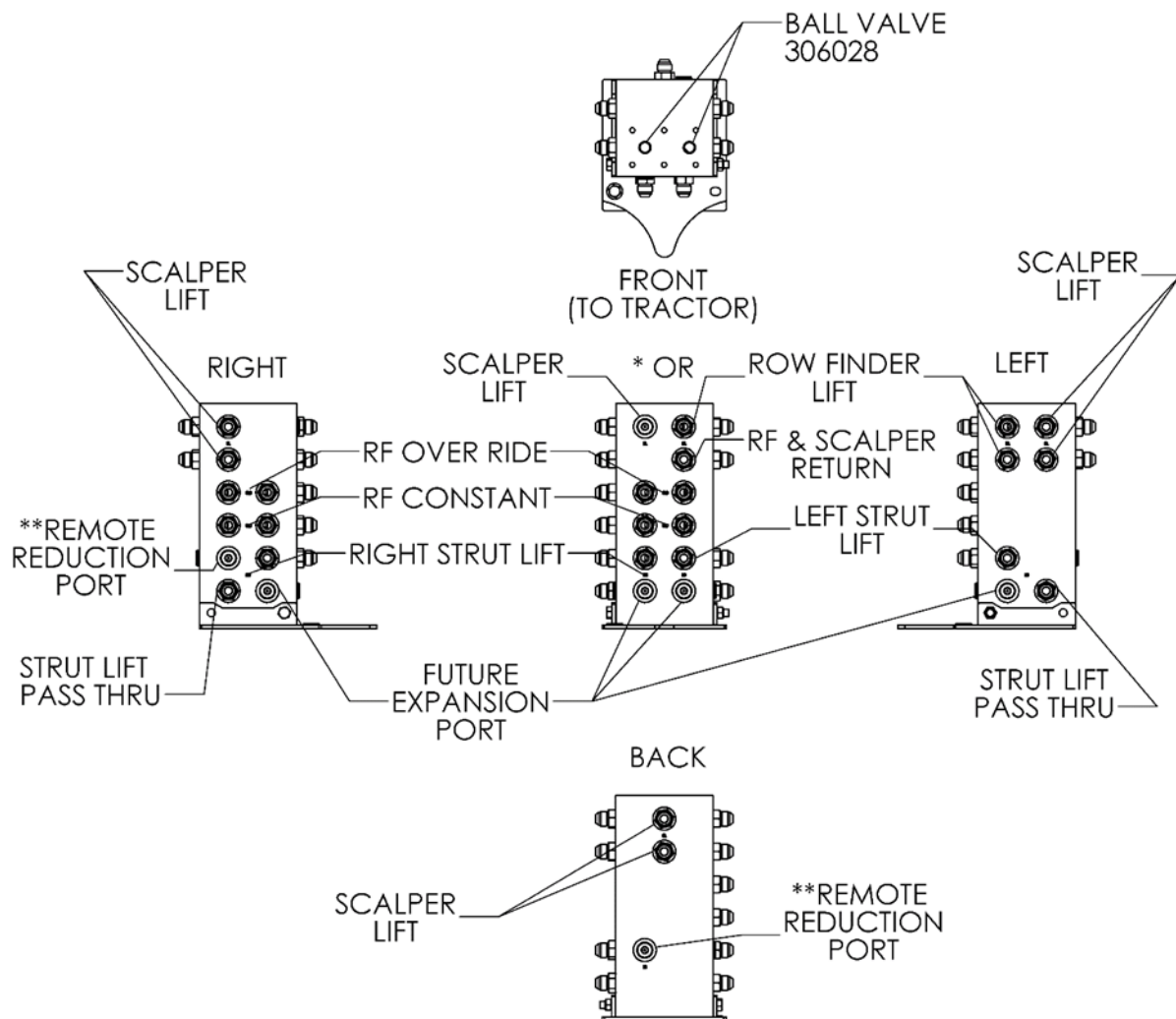


Figure 13-4: Cross-section of flail tube to gearbox assembly



- * 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. ENABLING 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.

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)

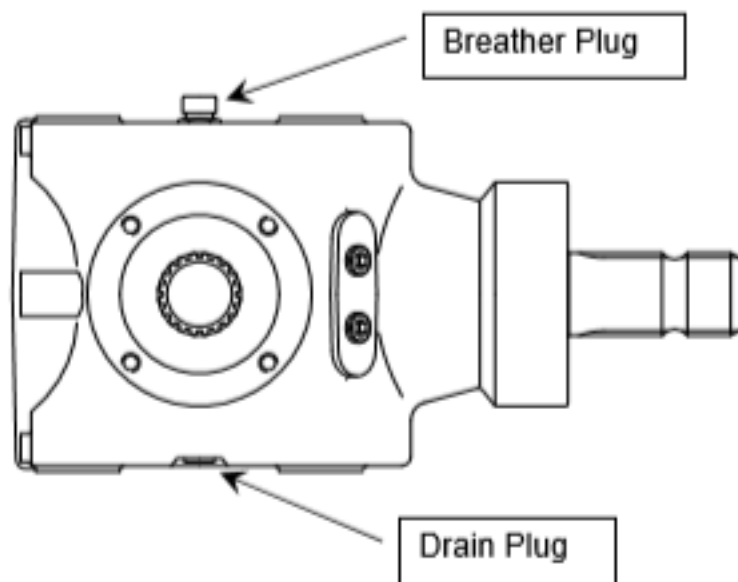
Small punch (Ø8 or Ø10 mm)

Gear oil (SAE 90 EP recommended)

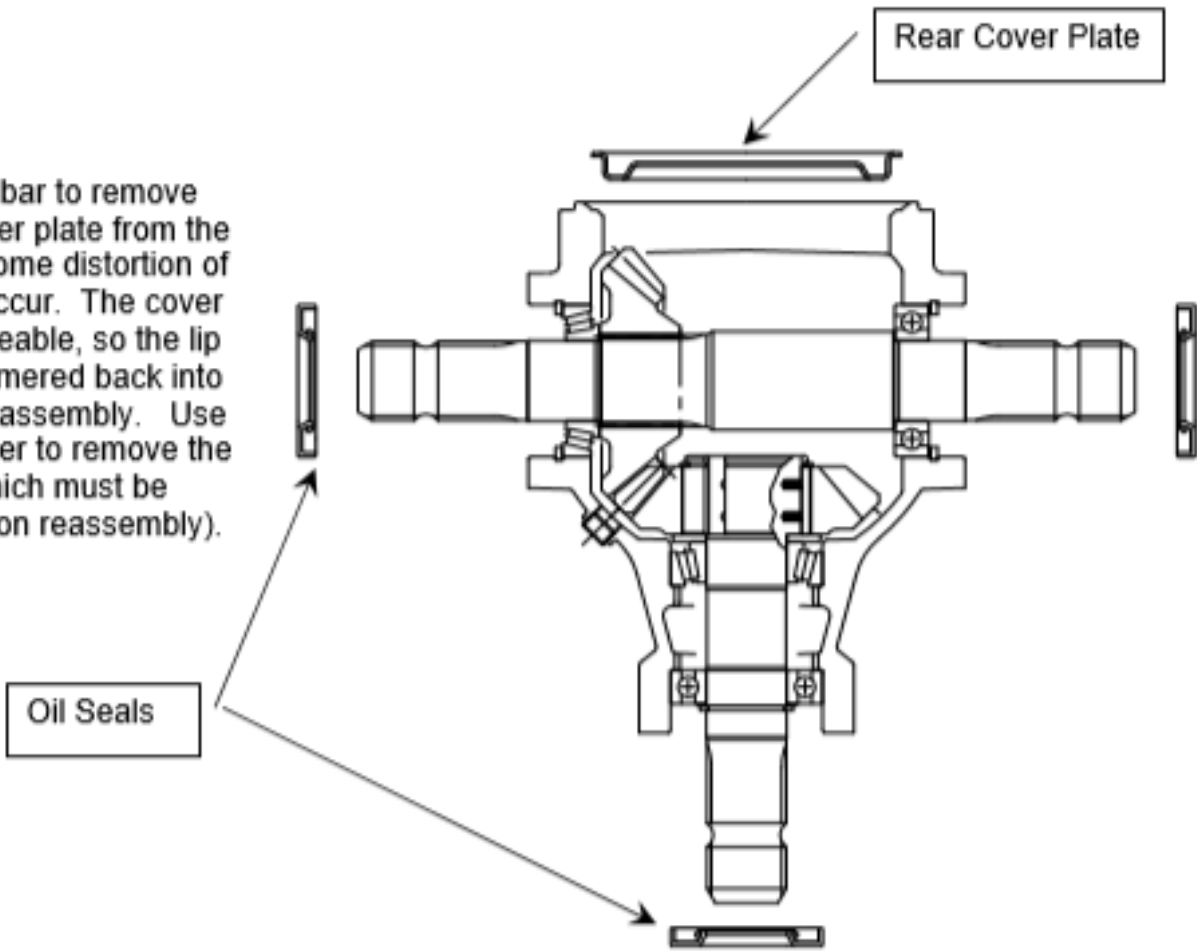
A press can be used for several steps of the disassembly / assembly process, but is not absolutely required.

Disassembly

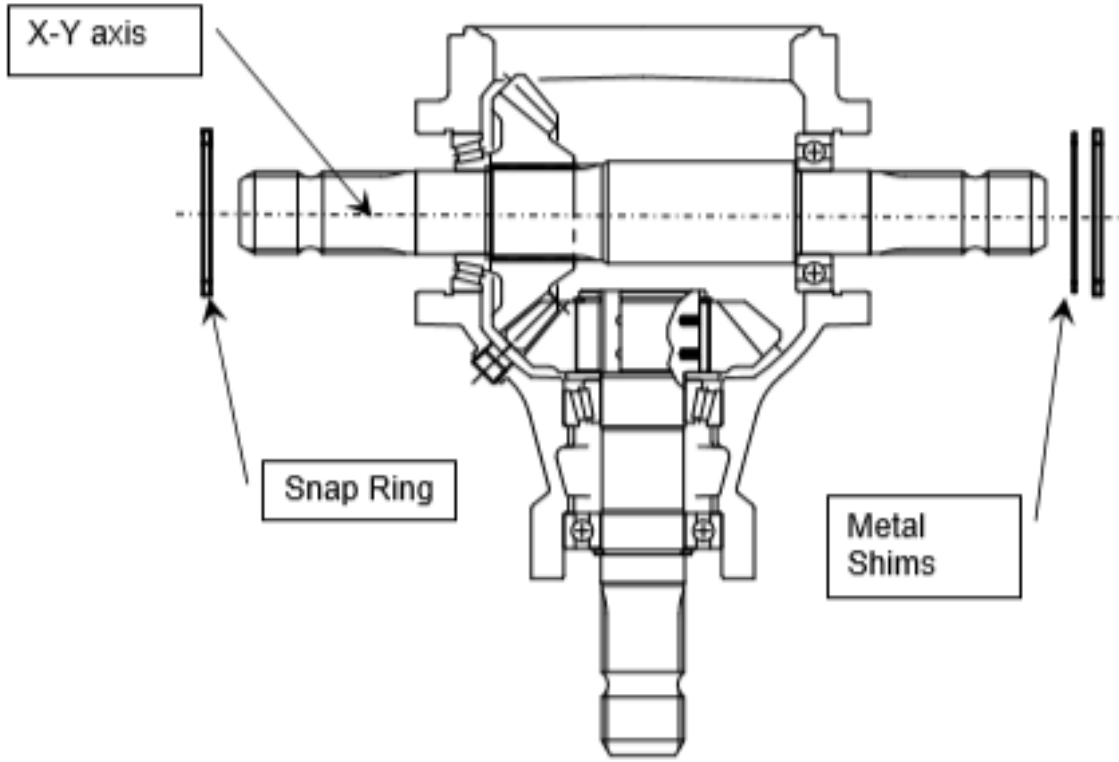
Position the drain pan under the drain plug. Remove the drain plug and let the oil flow into the pan (remove the breather plug to release vacuum and speed flow of oil). Dispose of used gear oil according to local regulations.



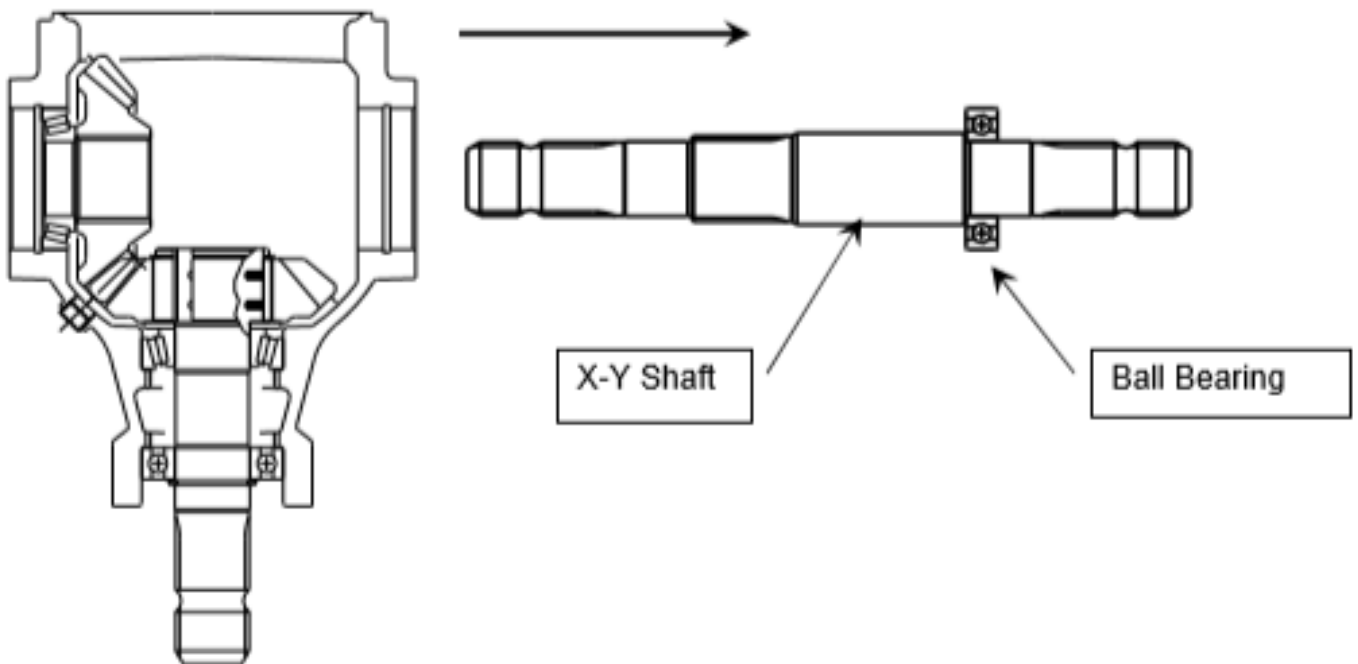
Use the pry bar to remove the rear cover plate from the gearbox. Some distortion of the lip will occur. The cover plate is malleable, so the lip can be hammered back into shape for reassembly. Use the seal puller to remove the oil seals (which must be replaced upon reassembly).



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.



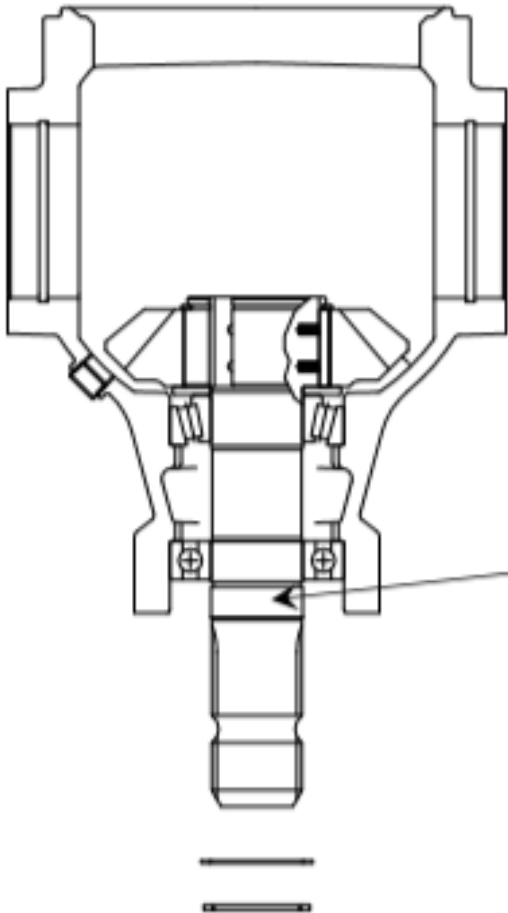
The ball bearing may be removed from the X-Y shaft in several different ways. Note that pressure applied to the outer race may damage the balls and raceways. The following methods are suggested:

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

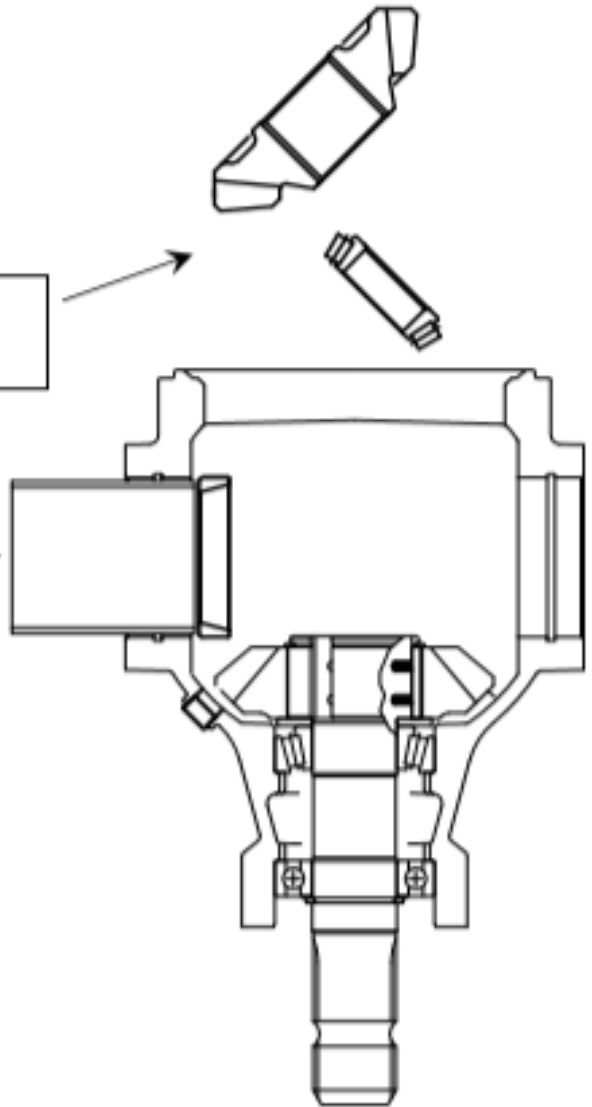
Remove the gear and inner race of the taper roller bearing. Press the outer race out of the casting, using a short piece of metal tube that fits loosely inside the bore.

Remove gear and inner race/rollers

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



Z-shaft

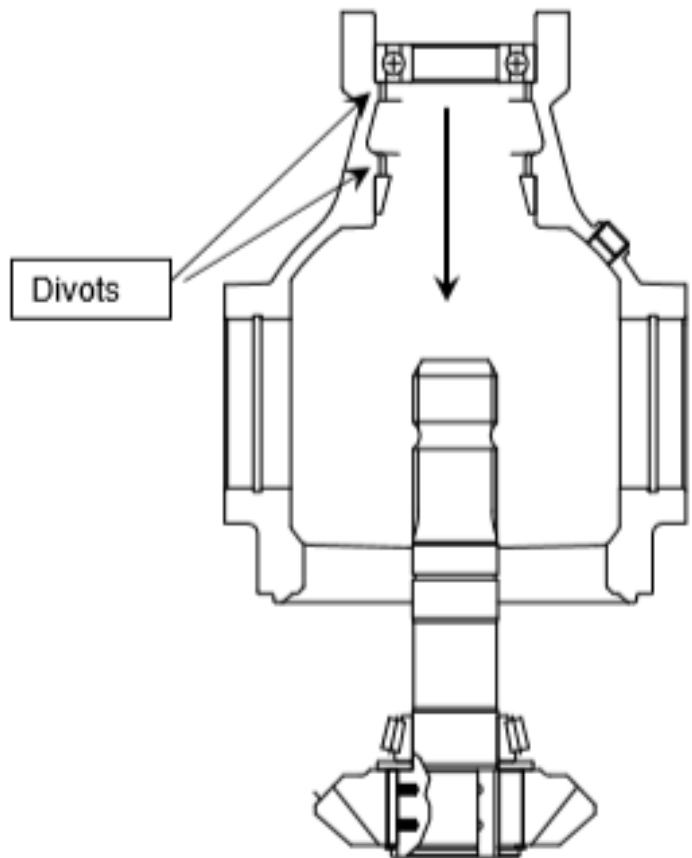


Remove the snap ring from the Z-shaft.

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.



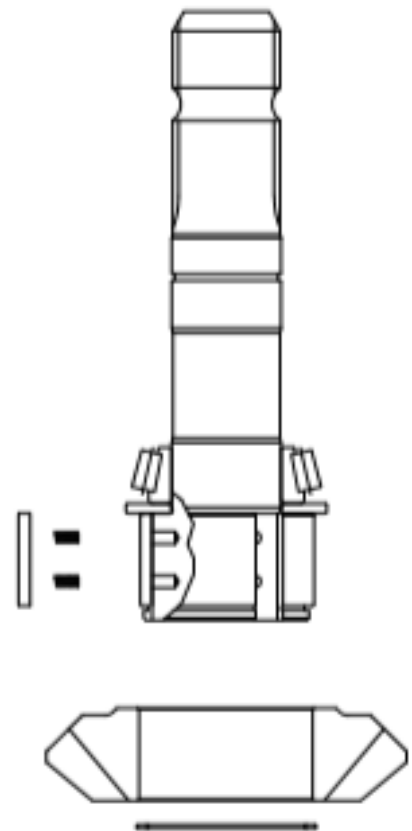
Remove the snap ring from the end of the Z shaft.

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).

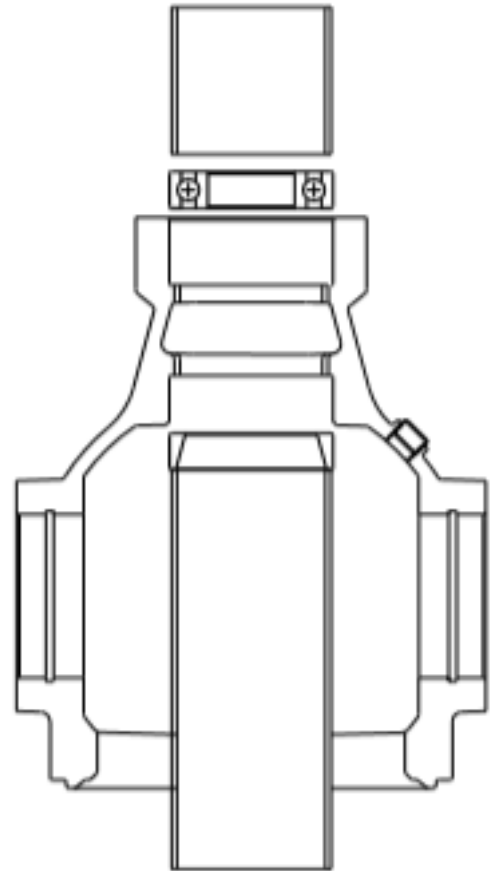
Remove the spacer (if included), and remove the inner race and rollers as described before for the X-Y shaft.

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

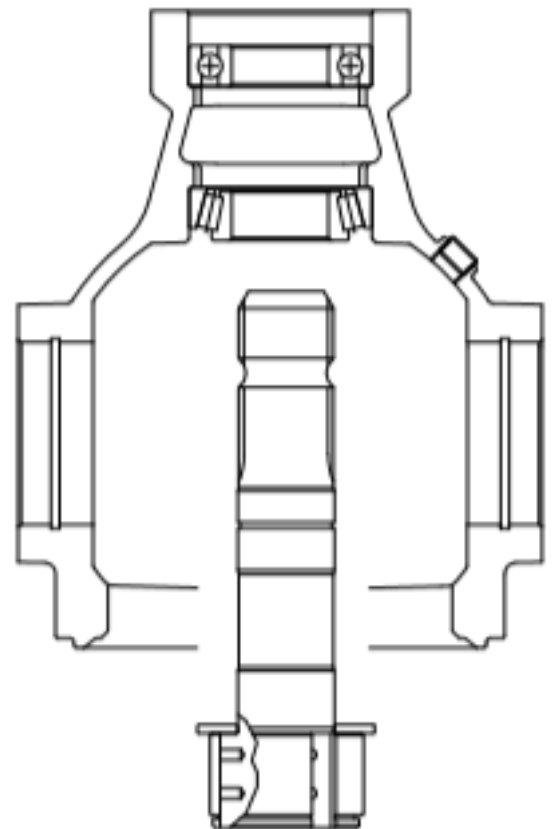
Press the ball bearing into place, using a piece of tube that contacts the outer race only (pressure on the inner race may damage the bearing). Press the outer race of the taper roller bearing through the back side of the casting. Note the orientation of the race.



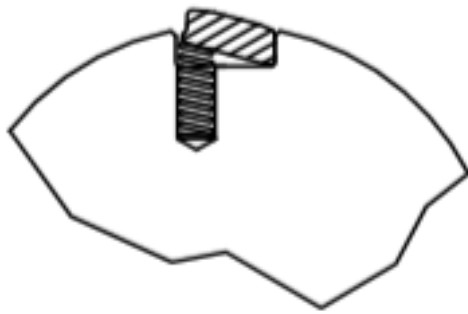
Place the inner race and rollers of the taper roller bearing in position. Slide the spacer onto the Z-shaft (if equipped), and press the shaft into place.

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.

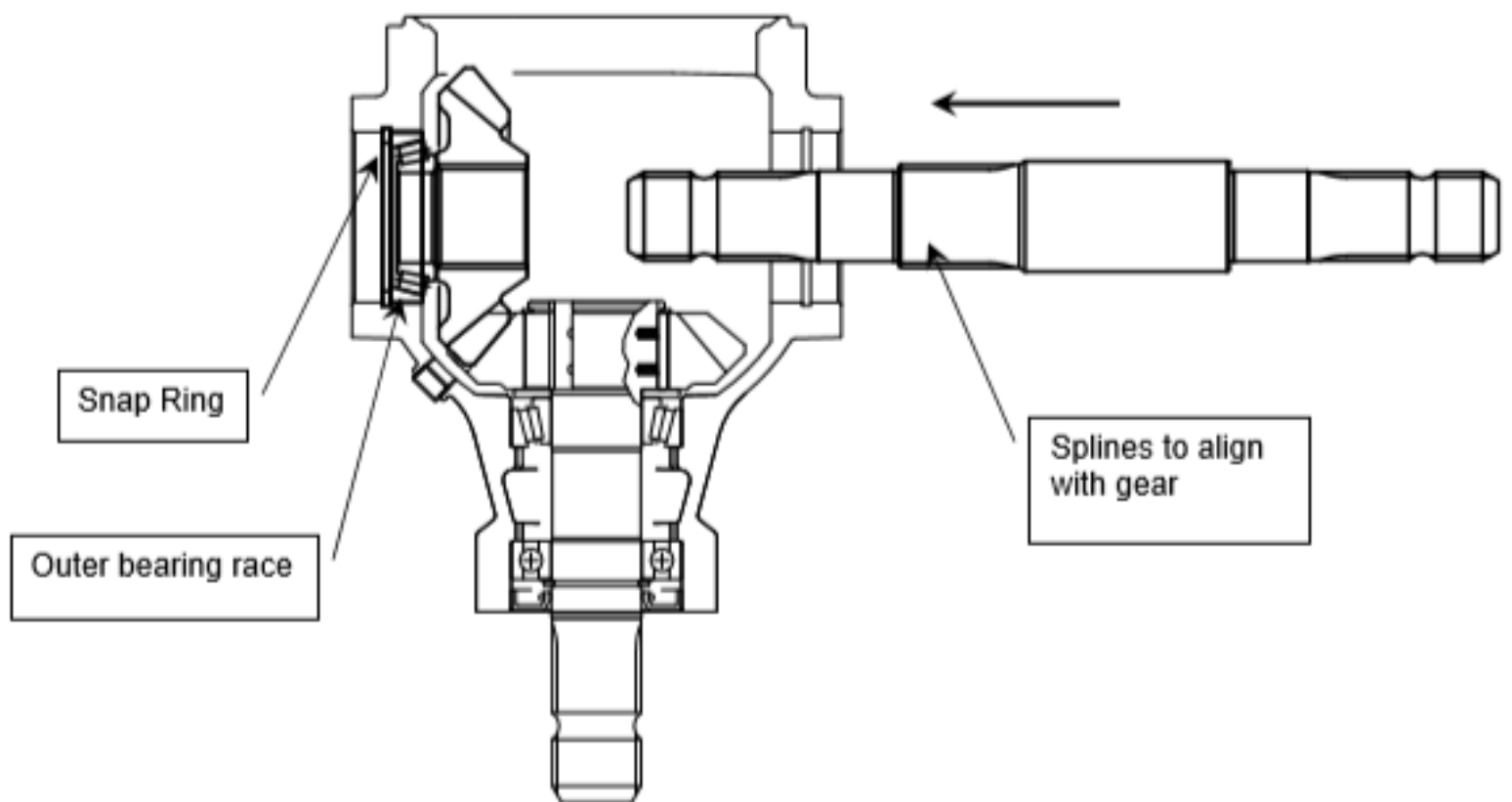


Insert one spring into each hole in the Z-shaft. Place the three (3) pawls into the grooves in the Z-shaft, with the shaped edge oriented as shown:

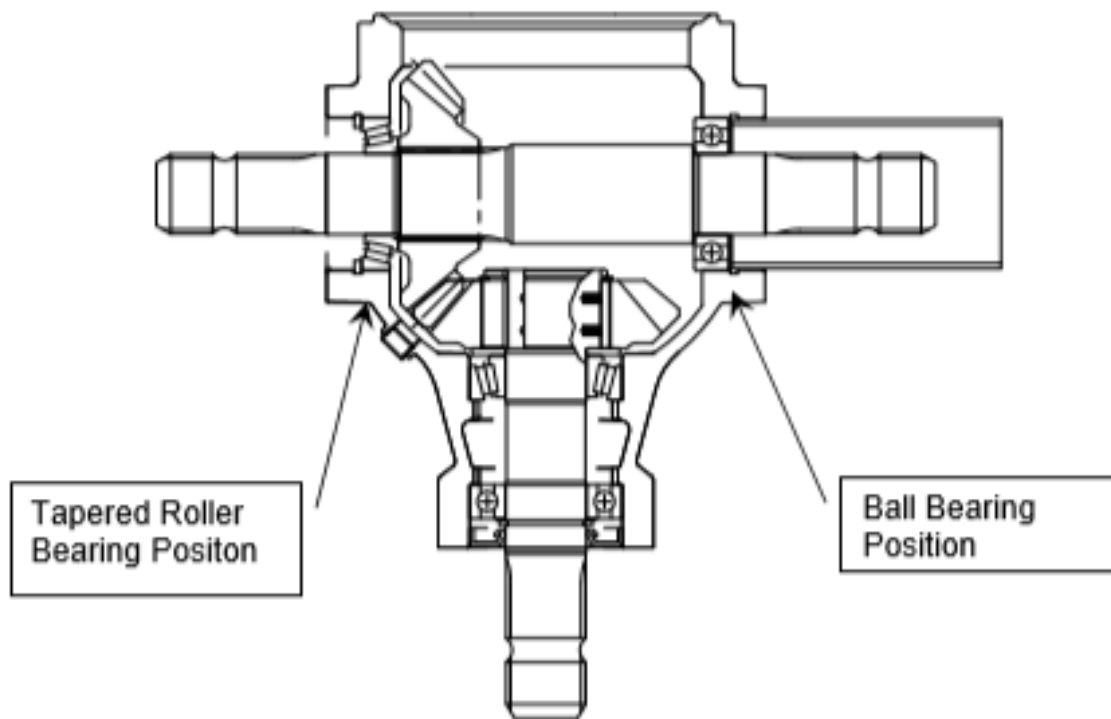


While holding the three pawls compressed on top of their springs, slide the pinion gear over the top of the shaft in position. Rotate forward and backward to check the function of the overrunning mechanism. Install snap ring.

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.

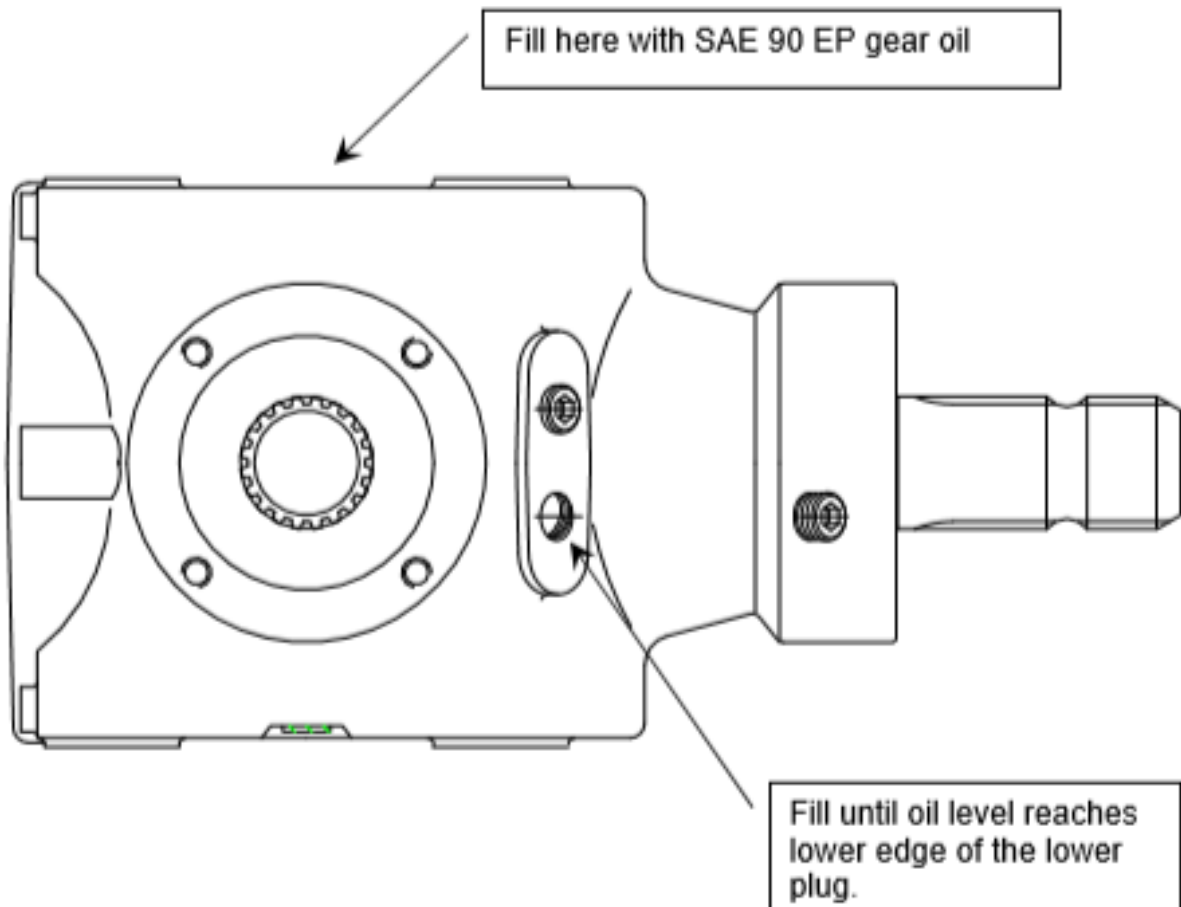
Completing Assembly

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.