

*GPS Shadow Tracker
Operator's Manual*

125-017





INTRODUCTION

Farm Safety

Contrary to the popular image of fresh air and peaceful surroundings, a farm is not a hazard-free work setting. Every year, thousands of farm workers are injured and hundreds more die in farming accidents. According to the National Safety Council, agriculture is the most hazardous industry in the nation.

How You Can Improve Farm Safety

You can start by increasing your awareness of farming hazards and making a conscious effort to prepare for emergency situations including fires, vehicle accidents, electrical shocks from equipment and wires, and chemical exposures. Be especially alert to hazards that may affect children and the elderly. Minimize hazards by carefully selecting the products you buy to ensure that you provide good tools and equipment. Always use seat belts when operating tractors, and establish and maintain good housekeeping practices. Here are some other steps you can take to reduce illnesses and injuries on the farm:

- Read and follow instructions in equipment operator's manuals and on product labels.
- Inspect equipment routinely for problems that may cause accidents.
- Discuss safety hazards and emergency procedures with your workers.
- Install approved rollover protective structures, protective enclosures, or protective frames on tractors.
- Make sure that guards on farm equipment are replaced after maintenance.
- Review and follow instructions in material safety data sheets (MSDSs) and on labels that come with chemical products and communicate information on these hazards to your workers.

Health and Safety Hazards on Farms

Farm workers including farm families and migrant workers are exposed to hazards such as the following:

Danger	Potential Effect or Injury	Prevention
Chemicals/Pesticides	Skin and respiratory injury or death	MSDS and proper Personal Protective Equipment. Review Manufacturers data sheets
Cold	Illness, Frostbite or death	Dress properly for the day.
Dust	Respiratory injury or explosive combinations	Be aware of your surroundings and activity
Electricity	Shock, burns, fire, death	Use a qualified professional for wiring dangerous electrical devices. Never overload a circuit. Replace damaged electrical devices or cords. Electrical tape will not insulate you from injury.
Grain bins, Silos	Entrapment, Suffocation, Explosion from formation of dangerous gases and poisoning.	Make sure the bin is properly ventilated and maintained. Never walk the grain.
Hand tools	Injury including cuts abrasions, electrocution, strains, sprains and death	Make sure you hand tools are in good condition. Never leave a damaged tooling accessible for someone else to use.
Highway traffic	Collisions resulting in injury or death	Follow regulations, stay alert. Avoid alcohol and use of communication devices while driving
Lifting and lifting devices	Back injury, sprains, strains. Falling material resulting in being struck or crushed by heavy material	Use proper lifting technique. Get help when the load is too heavy. Inspect chains, straps or cables routinely to make sure they are in good condition.
Livestock handling	Serious injury or death resulting from being pinned struck or trampled.	Always make sure you have adequate room and an escape route
Machinery/Equipment	Cuts, abrasions, amputations, death.	Thoroughly read and understand your Owners Equipment Manual. Never operate the equipment without guards in place. Make sure the equipment can not be energized or otherwise put into operation while you are working on it.
Manure pits	Explosion from formation of dangerous gases. Suffocation. Poisoning	Proper maintenance.
Mud	Sprains, strains, entrapment and suffocation. Eye injury and skin irritation.	Proper Personal Protective Equipment. In some conditions a "Spotter" may be needed.
Noise	Hearing damage	Personal Protective Equipment.
Ponds	Drowning	Wear a life preserver and make sure help is readily available.
Slips/Trips/Falls	Sprains, strains, back and neck injury, bone breaks or death	Keep work area free from clutter and organized. If working on anything elevated make sure you have appropriate guarding and/or fall protection such as a harness and lanyard.
Sun/Heat	Sun burn, Heat Stroke, shock, death	Use common sense on excessively hot days, use sun screen, wear a hat and stay hydrated.
Toxic gases	Skin and respiratory injury or death. Explosion.	MSDS and proper Personal Protective Equipment. Review Manufacturers data sheets
Tractors	Cuts, abrasions, amputations, death.	Thoroughly read and understand your Owners Equipment Manual. Never operate the equipment without guards in place. Anti-roll over devices.
Wells	Electrocution, amputation, death	Avoid contact with water while working on an electrical device. Always be sure the equipment can/will not be energized during repair or maintenance. Make sure all guarding is in place.
Severe Weather	Electrocution, "struck by" injuries, death	Move to a safe place. Lightning, hail and tornadoes are unpredictable.

Orthman Manufacturing, Inc. does not limit the potential effects or injuries nor prevention measures to those listed above. They are provided solely as a guideline to making your farm life safer. Always consult your Owner/Operators Manual for specific tool and equipment safety requirements.



INTRODUCTION

High Risk Factors on Farms

The following factors may increase risk of injury or illness for farm workers:

- **Age** – Injury rates are highest among children age 15 and under and adults over 65.
- **Equipment and Machinery** – Most farm accidents and fatalities involve machinery. Proper machine guarding and doing equipment maintenance according to manufacturers' recommendations can help prevent accidents.
- **Protective Equipment** – Using protective equipment, such as seat belts on tractors, and personal protective equipment (such as safety gloves, coveralls, boots, hats, aprons, goggles, face shields) could significantly reduce farming injuries.
- Take precautions to prevent entrapment and suffocation caused by unstable surfaces of grain storage bins, silos, or hoppers. Never "walk the grain."
- Be aware that methane gas, carbon dioxide, ammonia, and hydrogen sulfide can form in unventilated grain silos and manure pits and can suffocate or poison workers or explode.
- Take advantage of safety equipment, such as bypass starter covers, power take-off master shields, and slow-moving vehicle emblems.
- **Medical Care** – Hospitals and emergency medical care are typically not readily accessible in rural areas near farms.

The Benefits of Improved Safety and Health Practices

Orthman Manufacturing Provides this document in the hope that everyone that has a job to do, does it SAFELY. Our goal and yours should be to end each day in the best possible health. Better safety and health practices reduce fatalities, injuries, and illnesses as well as associated costs such as workers' compensation insurance premiums, lost production, and medical expenses. A safer and more healthful workplace improves morale and productivity.

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INTRODUCTION

WARRANTY

Orthman Mfg., Inc. warrants the whole goods products it manufactures to be free from defects in material or workmanship for a period of one (1) year from the date of sale of the product(s) to the original user. Products not manufactured, but supplied by Orthman Mfg., Inc. on Orthman products, are subject to, conform with, and are limited to the warranty of our suppliers.

Orthman Mfg., Inc. warrants the parts it manufactures to be free from defects in material or workmanship for a period of ninety (90) days from the date of delivery of the product(s) to the original user. Products not manufactured, but supplied by Orthman Mfg., Inc. on Orthman products, are subject to, conform with, and are limited to the warranty of our suppliers.

Warranty of Orthman whole goods and/or parts applies only to material and workmanship. Misuse, misapplication, neglect, alteration, accident, normal wear, or acts of God affecting Orthman products are not eligible for warranty.

Warranty of serial numbered goods will only be considered if the product has a completed Warranty Registration on file at Orthman. This Warranty Registration must be completed and returned to Orthman within thirty (30) days of the sale of the product(s) to the original user. *No serial numbered goods or related parts and/or labor will be warranted without a Warranty Registration on file.* Warranty issues falling within the first thirty days of a product's use will be handled at the discretion of Orthman. Warranty of parts will not require a Warranty Registration, but proof of date of delivery of the product to the original customer must be provided.

WARRANTY CLAIMS: A warranty claim and request to return defective product(s) must be presented to the Orthman Service Department by the selling dealer describing the defect in material or workmanship of an Orthman product(s) within ten (10) days of its discovery. This claim may be made via phone, e-mail, fax, or written request. Claims for warranty of serial numbered goods must include the Orthman product serial number and model number. Claims for warranty of parts will not require a product serial number or model number, but must be identified by an Orthman part number. Claims for warranty of whole goods or parts must also include proof of date of sale of the product to the original customer by an Orthman dealer.

The Orthman Service Department will proceed in making a preliminary decision as to the eligibility of the claim for warranty consideration. After the Orthman Service Department deems it necessary to proceed with warranty consideration, a Return Goods Authorization (RGA) will be completed by the Orthman Service Department in conjunction with the selling dealer. Upon completion of the RGA, the defective product(s) must be returned to Orthman to ensure warranty consideration. Defective product(s) must be returned to Orthman by either the selling dealer or the customer. Customer delivery of defective product(s) must be approved by Orthman and the selling dealer prior to delivery. The defective product(s) in question must be sent, freight prepaid, within sixty (60) days of the discovery of the product(s) failure and initial warranty claim. Replacement product(s) may be sent to the selling dealer, directly to the customer, or picked up at the Orthman facility. Replacement product(s), sent directly to the customer or picked up must be approved by Orthman and the selling dealer. At the discretion of the Orthman Service Department, replacement product(s) may be sent prior to, or after, the Orthman Service Department receives the defective product(s).

Any variation in the above procedure is at the sole discretion of the Orthman Service Department.

*No products will be accepted at Orthman without all proper paperwork completed including Warranty Registration and RGA(s).
Parts returned to Orthman without proper authorization will be returned to the sender at the sender's expense.*

Orthman agrees to handle all warranty claims in a timely manner and will inform dealers of any revisions or modifications to the Orthman Warranty Policy. Eligible warranty claims will be processed by Orthman within sixty (60) days of receiving failed product(s) or a valid service or repair labor claim. Eligible warranty claims regarding returned product(s) or service and/or repair labor will be paid through a credit memo issued to the appropriate dealer's account as determined by the Orthman Service Department.

If a warranty claim is found to be ineligible for warranty coverage, the Orthman Service Department will be responsible to inform the dealer in order to determine the course of action to be taken. Orthman reserves the right to make changes in specification and design without notice and without incurring any obligations to owners of products previously sold.



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Lexington, Nebraska

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IMPORTANT SAFETY INFORMATION



SAFETY ALERT SYMBOL

The **SAFETY ALERT SYMBOL** warns of potential hazards to personal safety and that extra precautions must be taken. When you see this symbol, carefully read the message(s) that follow. Follow all recommended precautions and safe operating practices in this manual.

Hazard control and accident prevention are dependent upon the safety awareness and proper training of personnel involved in the operation of this implement.

BE AWARE OF SIGNAL WORDS

SIGNAL WORDS designate a degree or level of **HAZARD** seriousness.

These signal words include:



DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury. Danger is limited to extreme situations, typically for machine components which for functional purposes, cannot be guarded.



WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. Warning includes hazards that are exposed when safety guards are removed. Warning may also be used to alert against unsafe practices.



CAUTION indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. Caution may also be used to alert against unsafe practices.

SHUTDOWN AND STORAGE



AVOID CRUSHING. Make sure all personnel are clear of the implement. Lower implement to the ground, place tractor in park, turn off engine, and remove key.



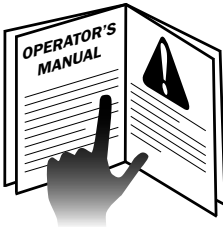
USE BAR STANDS AND CYLINDER STOPS TO SUPPORT THE IMPLEMENT.

Store implement on a clean, dry, and level surface. An uneven surface could cause implement to shift or fall, resulting in injury or death, as well as implement damage. Securely support all implement components that must be raised. Store implement away from human activity.



IMPORTANT SAFETY INFORMATION

CAUTION



⚠ FOR YOUR PROTECTION

READ AND UNDERSTAND THE ENTIRE CONTENT OF THIS MANUAL BEFORE OPERATING OR SERVICING IMPLEMENT. Read and understand all operator manuals for the machinery used in conjunction with the Tracker IV.

Carefully **READ ALL SAFETY DECALS** in this manual as well as on the implement. Keep implement clean so decals are easily visible. Keep all safety decals in good, clean, and legible condition. Immediately replace damaged and/or missing decals. Replacement decals are available from your Orthman dealer.

Learn to operate the implement and all components properly. Do not let others operate implement without proper instruction. Unauthorized implement modifications may impair function and safety. If you do not understand any content in this manual or need assistance, contact your Orthman dealer.

(Orthman Manufacturing Inc. - 75765 Rd. 435 - Lexington, NE 68850 - (308) 324-4654)

⚠ EQUIPMENT SAFETY GUIDELINES

Operator safety is the primary concern when designing an Orthman implement. Orthman integrates as many safety features into the implement as possible. You can avoid many hazards and possible accidents by observing precautions in this safety section.

Insist that yourself and personnel working with and around you follow all safety precautions. Be cautious when working with or around implement to avoid injury.



IMPORTANT SAFETY INFORMATION

SAFE TRANSPORT

Engage transport locking devices and cylinder stops prior to transport.

Plan your route to avoid traffic. Yield to traffic in all situations.

Maximum transport speed is 20 mph (32 kph). Various conditions will require reduced speed. Travel at speeds that allow for adequate control of stopping and steering.



AVOID ELECTROCUTION. Be aware of overhead power lines. Contact or close proximity to power lines can result in injury or death. Use extreme care when operating implement near power lines.

Know implement transport height and gross weight. Avoid overhead obstructions not allowing your transport height. Do not use bridges rated below implement gross weight.



Make sure a slow moving vehicle (SMV) placard is mounted to the implement and is easily visible to other motorists.

Make allowances for implement size when transporting. Sudden braking can cause a towed load to swerve and/or rollover. Never use independent braking with implement in tow as loss of control and/or rollover can result. Reduce speed if towed implement is not equipped with brakes.



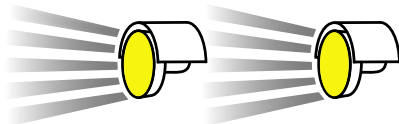
Do not coast. Always keep tractor or towing device in gear to provide engine braking when traveling downhill.

Comply with state and local laws governing implement transport.

WARNING AND SAFETY LIGHTS



Oversized implements and slow moving vehicles create a hazard when transported on public roads.



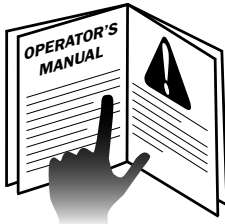
Make sure all warning, safety lights, and turning signals are working and clean. Use safety lighting when using public roads day and night. Replace missing or damaged lights immediately. Comply with state and local laws governing implement safety lighting.



IMPORTANT SAFETY INFORMATION

SAFE OPERATION

CAUTION



READ AND UNDERSTAND THE ENTIRE CONTENT OF THIS MANUAL BEFORE OPERATING OR SERVICING IMPLEMENT. Implement is to be operated by qualified personnel only. Never let children operate implement. A complete understanding of safety precautions, operation, and maintenance is mandatory before implement use.

DANGER



AVOID ELECTROCUTION. Be aware of overhead power lines. Contact or close proximity to power lines can result in injury or death. Use extreme care when operating implement near power lines.

Know implement transport height and gross weight. Avoid overhead obstructions not allowing your transport height. Do not use bridges rated below your gross weight.

DANGER



AVOID ROLLOVER. Do not fold or unfold implement and avoid sharp turns when on a hillside, as shift of weight could cause rollover. Operate implement at a safe distance from terrain irregularities and other obstructions that could cause rollover.

WARNING



AVOID CRUSHING. Make sure all personnel are clear of implement at all times implement is in motion. Be aware of obstructions above, below, and around implement when in operation or transport. Injury or death can result from being struck by the implement.

NO RIDERS

WARNING



NEVER ALLOW RIDERS ON TRACTOR OR IMPLEMENT. Riders hinder operator visibility and can be thrown from the implement and/or be struck by foreign objects resulting in injury or death.



IMPORTANT SAFETY INFORMATION

PRACTICE SAFE MAINTENANCE

Proper maintenance is your responsibility. Maintenance neglect and/or poor maintenance practices can result in injury or death. Always use the proper tools to maintain implement.



AVOID CRUSHING. Make sure all personnel are clear of the implement. Lower implement to the ground, place tractor in park, turn off engine, and remove key.



USE BAR STANDS TO SUPPORT THE IMPLEMENT. Store implement on a clean, dry, and level surface. An uneven surface could cause implement to shift or fall, resulting in injury or death, as well as implement damage. Securely support all implement components that must be raised. Store implement away from human activity.



AVOID ENTANGLEMENT. Never lubricate or service implement in motion. Keep away from power driven parts when in motion. Disengage power sources prior to maintaining implement. Injury or death can result from contact with power driven parts when in motion.



AVOID CRUSHING. Do not stand between the tractor and implement when connecting or disconnecting implement. Injury or death can result from being trapped between the tractor and implement.



Escaping pressurized hydraulic fluid can penetrate skin, resulting in injury or death. Relieve hydraulic system pressure before connecting or disconnecting tractor. Use cardboard or wood, **NOT BODY PARTS**, to check for suspected hydraulic leaks. Wear protective gloves and safety glasses or goggles when working with hydraulic systems. If an accident occurs, see a doctor immediately for proper treatment.



IMPORTANT SAFETY INFORMATION

PRACTICE SAFE MAINTENANCE



Never operate a combustion engine in an enclosed area. Make sure there is adequate ventilation. Exhaust fumes can cause asphyxiation.



Service tires safely. Tire and rim separation can result in serious injury or death. Do not over inflate LAW tires. Tires should never exceed 35 psi. Only mount or dismount tires if you possess the proper equipment, otherwise contact a trained professional. Always maintain correct tire pressure. Inspect tires and wheels daily. Do not operate tires with inadequate pressure, cuts, visible damage, or missing hardware.

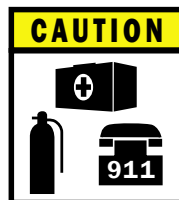


Be extremely careful working around unshielded sharp edges. Injury may result from contact with sharp edges.

Keep all parts in good condition and properly installed. Replace damaged or missing parts immediately.

Remove tools and unused parts prior to implement operation.

PREPARE FOR EMERGENCIES



Be prepared for a fire. Keep a readily accessible fire extinguisher at all times.

Keep a readily accessible stocked first aid kit and emergency phone numbers for your doctor, hospital, ambulance, and fire department.

Wear protective clothing and equipment. Wear clothing appropriate for the situation. Protect your eyes, ears, hands, and feet with the use of protective goggles, ear plugs, gloves, boots, etc.



IMPORTANT SAFETY INFORMATION

ANHYDROUS AMMONIA - LIQUID FERTILIZER

Lift assist wheels can be accessorized with cross tube packages often utilized to pull nurse tanks in order to incorporate fertilization within the particular application.



ANHYDROUS AMMONIA (NH₃) AND LIQUID FERTILIZER APPEARS HARMLESS. DIRECT EXPOSURE TO NH₃ OR LIQUID FERTILIZER IS EXTREMELY DANGEROUS AND CAN RESULT IN INJURY AND/OR DEATH.

Keep a clean supply of water readily accessible in case of exposure to NH₃ or liquid fertilizer.

Wear protective goggles and gloves when working with NH₃ or liquid fertilizer. Be sure all persons involved in the operation are properly trained concerning the dangers and precautions involved in the application of NH₃ or liquid fertilizer.

If you choose to apply NH₃ or liquid fertilizer, it is advisable to consult documented information regarding safe handling and application of NH₃ or liquid fertilizer.

Information is available from the following recognized sources:

1. American National Standards Institute - ANSI - www.ansi.org - (212) 642-4900
2. Material Safety Data Sheets - MSDS - www.msdsonline.com
3. National Safety Council - www.nsc.org/necas
4. The Fertilizer Institute - www.tfi.org
5. United States Department of Transportation - D.O.T. - www.dot.gov
6. Compressed Gas Association - www.cganet.com

SAFETY NEVER HURTS

CAUTION



READ AND UNDERSTAND THE ENTIRE CONTENT OF THIS MANUAL BEFORE OPERATING OR SERVICING IMPLEMENT.

Understand all implement functions.

Never stand between tractor and implement when connecting or disconnecting implement.

Be aware of all surroundings before moving implement.

Operate implement from operator's seat only.

Never mount or dismount a moving tractor.

Never leave engine running when implement is unattended.

Keep away from power driven parts when in motion.

Make sure all personnel are clear before lowering implement to the ground.



IMPORTANT SAFETY INFORMATION

SAFETY DECALS

DANGER

WARNING

CAUTION

Safety decals promote awareness and knowledge concerning safe operation and maintenance of the implement.

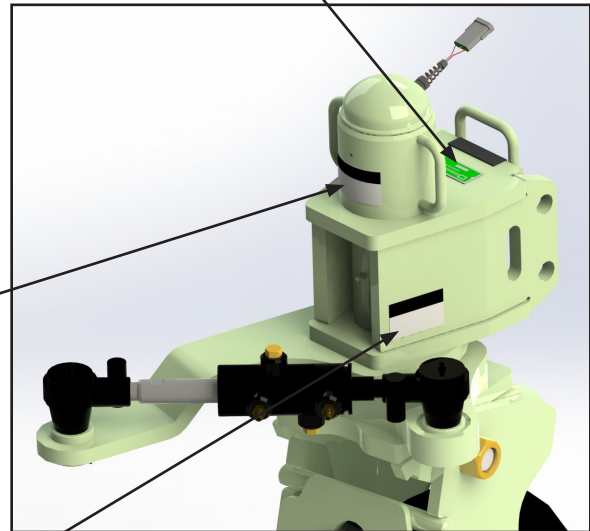
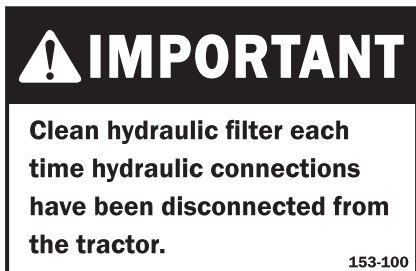
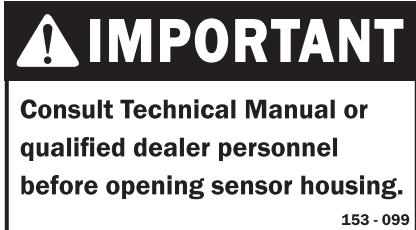
Carefully **READ ALL SAFETY DECALS** in this manual as well as on the implement. Keep implement clean so decals are easily visible. Keep all decals in good and legible condition. Immediately replace damaged and/or missing decals. Replacement decals are available from your Orthman dealer.

NOTE: To install decals: Thoroughly clean area where decal is to be placed and attach decal void of bubbles. Refer to this safety information section for proper decal placement.

NOTE: Decal placement for both drawbar and three point Caddies are illustrated below. Common (drawbar and three point) Caddy decals with common locations are illustrated once.



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IMPORTANT SAFETY INFORMATION

SAFETY DECALS

DANGER

WARNING

CAUTION

Safety decals promote awareness and knowledge concerning safe operation and maintenance of the implement.

Carefully **READ ALL SAFETY DECALS** in this manual as well as on the implement. Keep implement clean so decals are easily visible. Keep all decals in good and legible condition. Immediately replace damaged and/or missing decals. Replacement decals are available from your Orthman dealer.

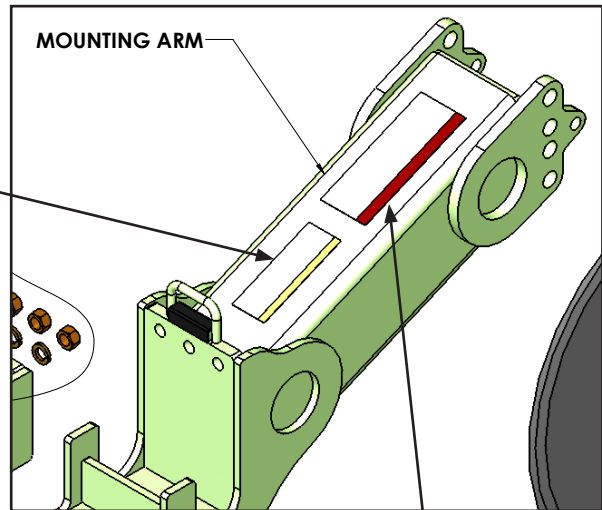
NOTE: To install decals: Thoroughly clean area where decal is to be placed and attach decal void of bubbles. Refer to this safety information section for proper decal placement.

NOTE: Decal placement for both drawbar and three point Caddies are illustrated below. Common (drawbar and three point) Caddy decals with common locations are illustrated once.

CAUTION

1. Read and understand all operator manuals before implement use.
2. Follow all tractor or towing device operating procedures and safety guidelines.
3. Do not allow riders on implement.
4. Lower implement to the ground, place tractor in park, turn off engine, and remove key. Wait for all moving parts to come to a complete stop before working on implement.
5. Be extremely careful working around unshielded sharp edges.
6. Make sure all safety lighting and decals are clean. Use hazard lights when in transport.
7. Engage all safety devices before transporting or working beneath implement.
8. Contact or close proximity to power lines can result in electrocution.
9. Review all safety instructions with all operators on a frequent basis.

153-044



DANGER

HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

- Relieve pressure on hydraulic system before servicing or disconnecting hoses.
- Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.
- Keep all components in good repair.

153-528



IMPORTANT SAFETY INFORMATION

SAFETY DECALS

DANGER

WARNING

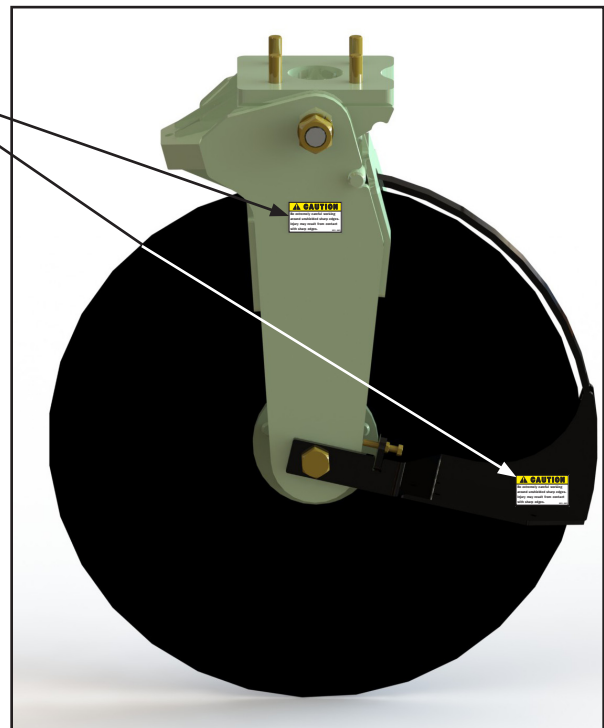
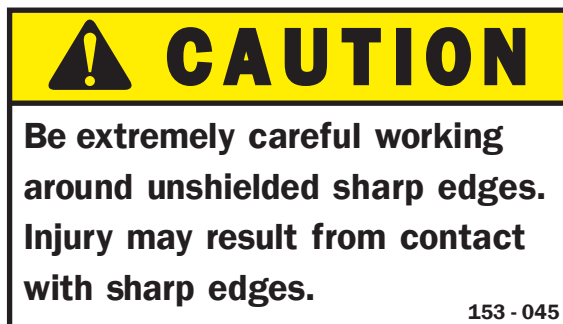
CAUTION

Safety decals promote awareness and knowledge concerning safe operation and maintenance of the implement.

Carefully **READ ALL SAFETY DECALS** in this manual as well as on the implement. Keep implement clean so decals are easily visible. Keep all decals in good and legible condition. Immediately replace damaged and/or missing decals. Replacement decals are available from your Orthman dealer.

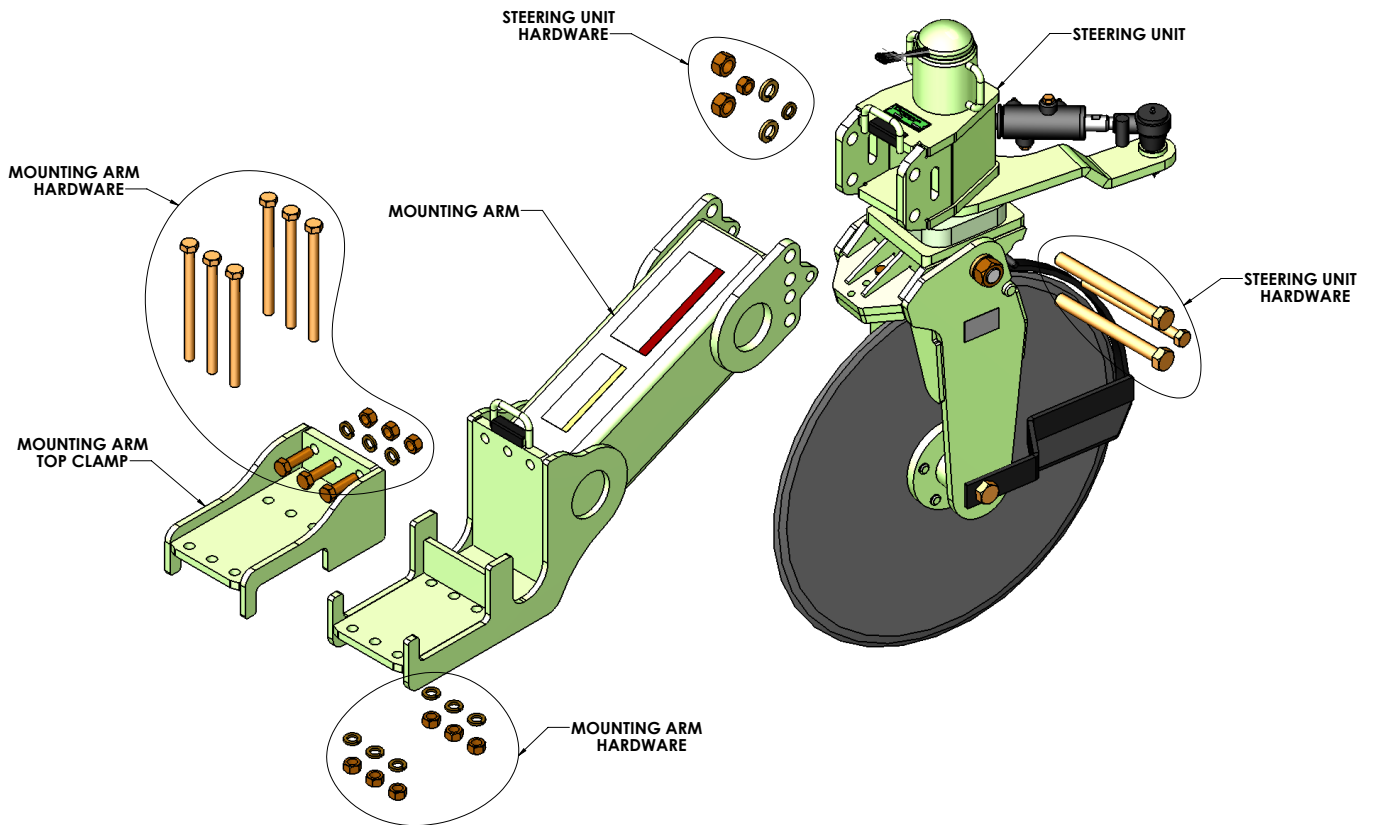
NOTE: To install decals: Thoroughly clean area where decal is to be placed and attach decal void of bubbles. Refer to this safety information section for proper decal placement.

NOTE: Decal placement for both drawbar and three point Caddies are illustrated below. Common (drawbar and three point) Caddy decals with common locations are illustrated once.





MAJOR COMPONENT IDENTIFICATION



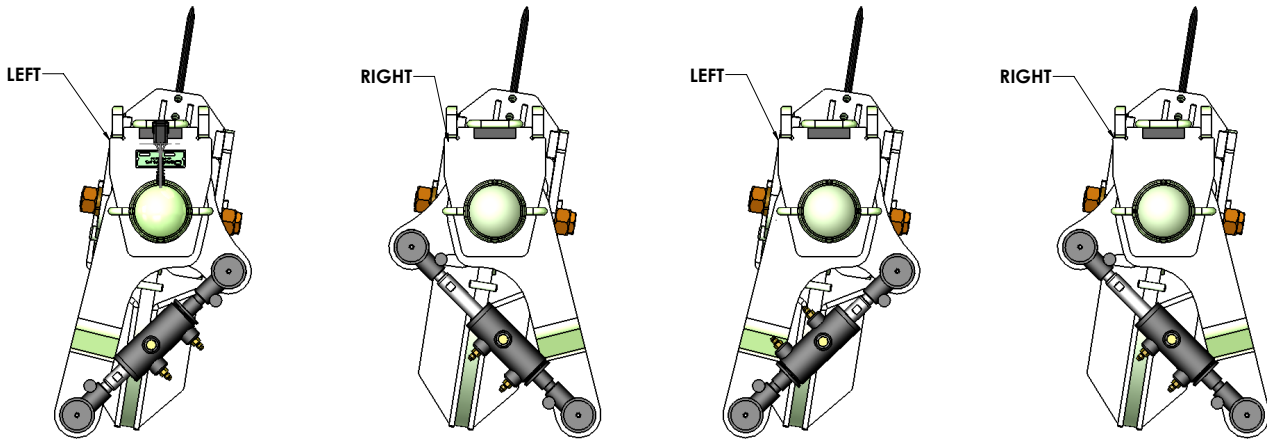


INSTALLATION



1. Shadow Machine Mounting Positions

Shadow Units need to be in the below configuration installed on the toolbar. From left to right the units will have left and right configurations that need to be alternated.



For example: When standing behind the machine, facing the same direction as the tractor will travel the units from left to right must follow the configurations below.

1. Single Blade Shadow: Left
2. 2 Blade Shadow: Left, Right
3. 3 Blade Shadow: Left, Right, Left
4. 4 Blade Shadow: Left, Right, Left, Right
5. 5 Blade Shadow: Left, Right, Left, Right, Left
6. 6 Blade Shadow: Left, Right, Left, Right, Left, Right

Scenarios 1, 3 and 5 are very atypical. Attempt to mount the center Shadow module as closely as possible to the center of the implement.

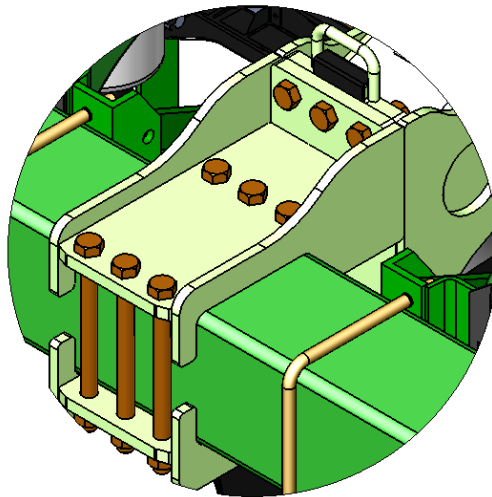


INSTALLATION



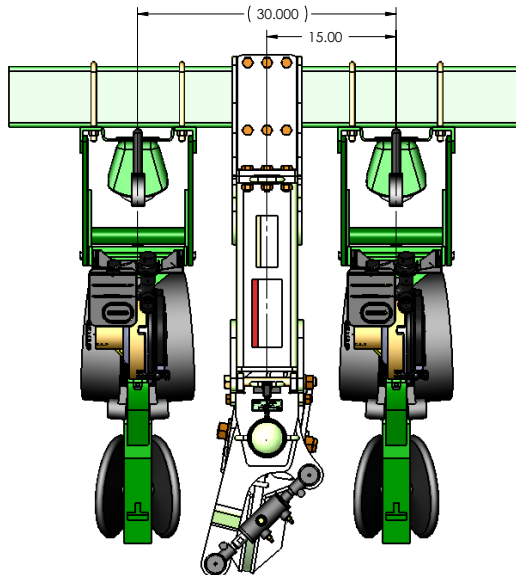
2. Shadow Mounting Arm Installation

Install mounting arms in desired positions on toolbar, using the hardware shown in Detail A below.



DETAIL A
SCALE 1 : 5

Make sure that the Shadow Mounting Arm is centered between the planter row units before tightening hardware shown in the image below.



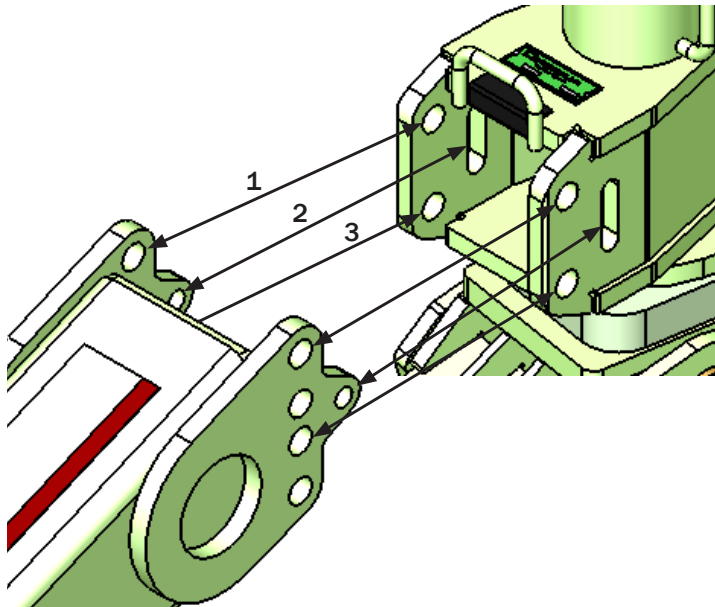


INSTALLATION



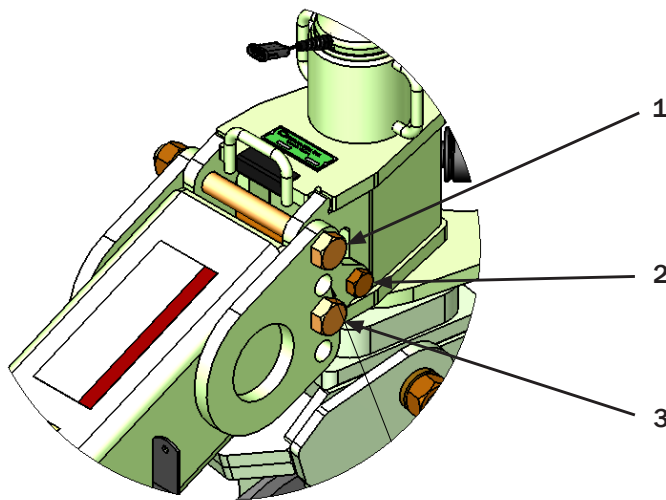
3. Shadow Steering Unit Installation

Align mounting holes with one another. Matching holes are pointed out below.



Holes labeled 1 and 3 above utilize (2) 100-999 bolts, (2) 108-025 lock washers and (2) 102-111 nuts.

Holes labeled 2 above, one round hole and one slotted, utilize (1) 100-175 bolt, (1) 108-022 lock washer and (1) 102-009 nut.



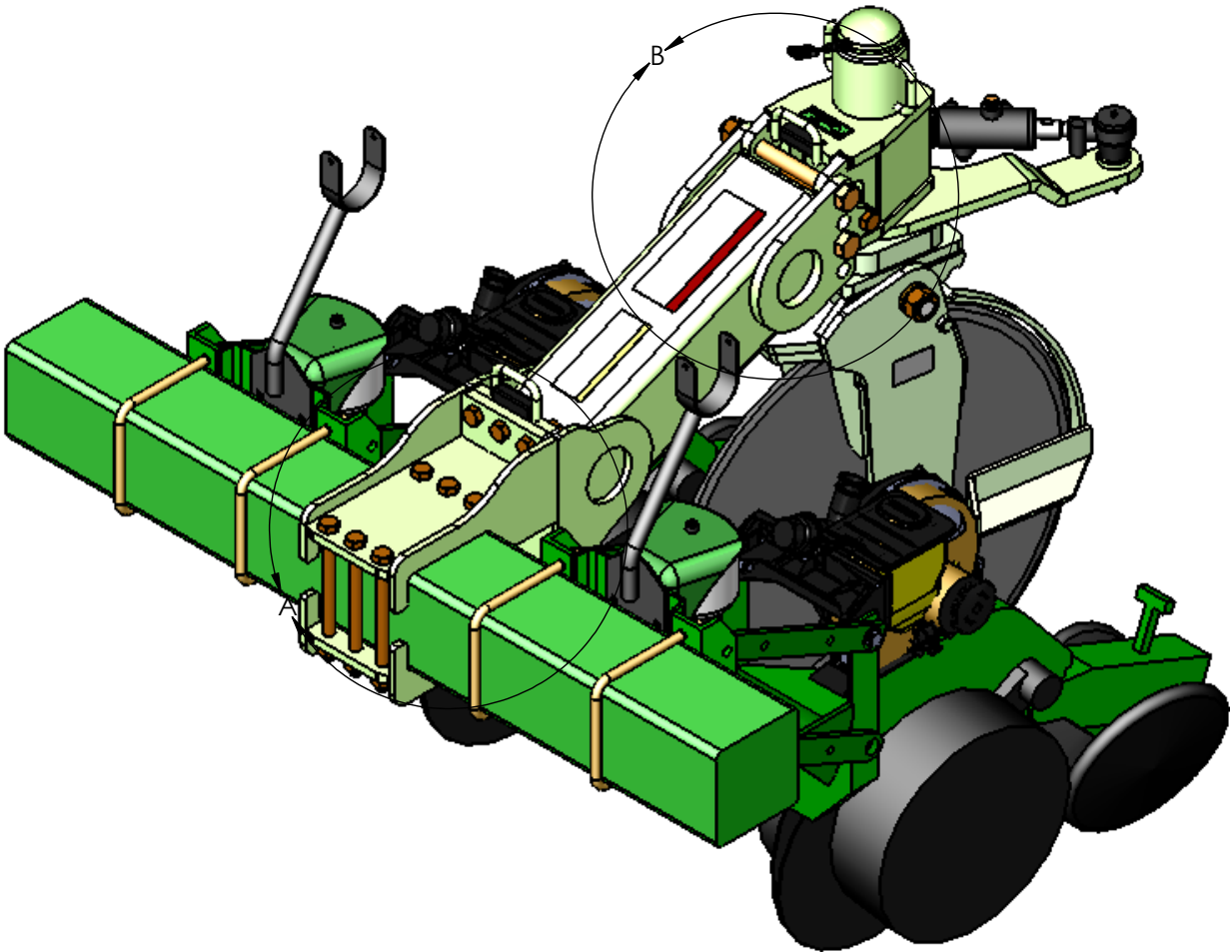
DETAIL B
SCALE 1 : 5



INSTALLATION



4. Tighten and secure all hardware. Each Shadow module should appear as below with all hardware secure before proceeding to the Hydraulic Routing and Installation Section.

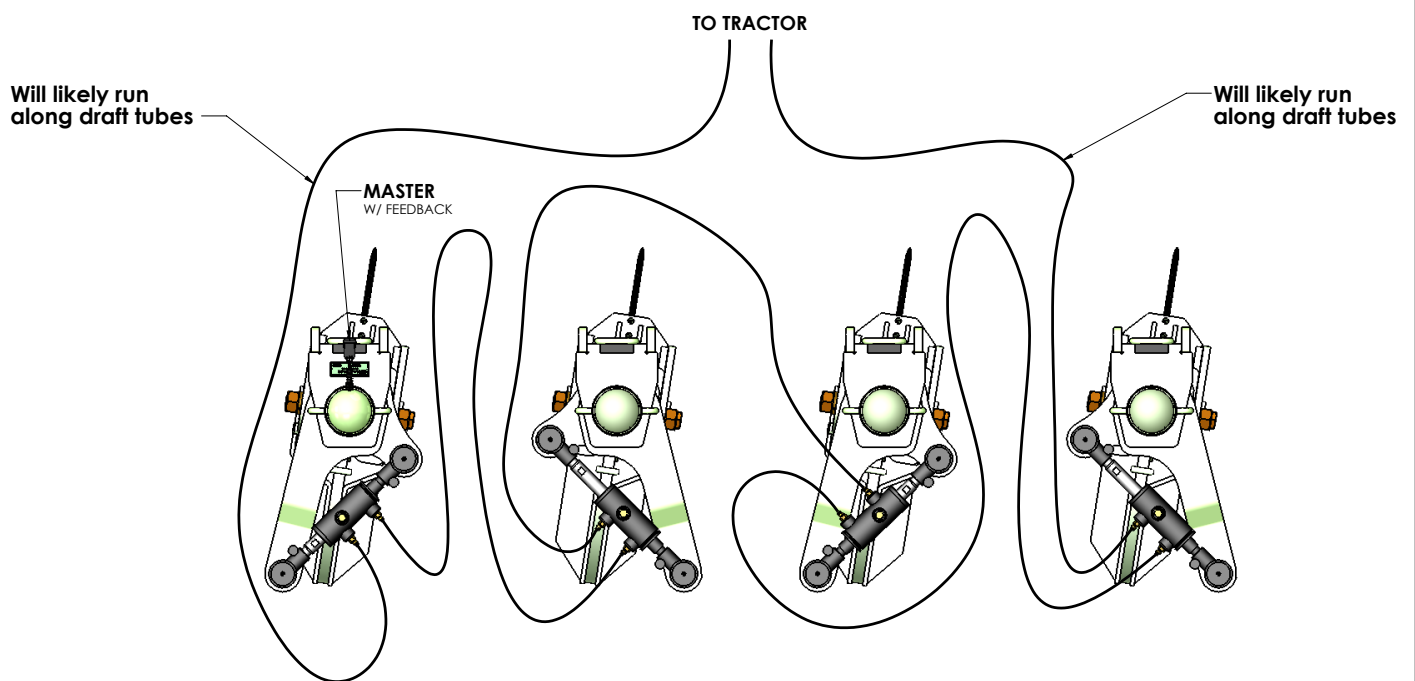




HYDRAULIC INSTALLATION

1. The hydraulic system requires that the output (rod/base) end of the first cylinder match the input (rod/base) end of the next cylinder and so on.
NOTE: It is important to route hoses to the rod end first coming from the tractor or valve. Pressure magnification could occur between cylinders if first connection is on the base end.

The physical routing of the hoses on the implement is left to the discretion of the owner. When routing hydraulic hoses keep moving parts, pinch points etc. in mind to protect your system.



NOTE: All of the cylinders have a 7/16 JIC fitting, and Orthman recommends using 1/4" hydraulic hoses.

	<p>! DANGER</p>
	<p style="text-align: center;">HIGH-PRESSURE FLUID HAZARD</p> <p>To prevent serious injury or death:</p> <ul style="list-style-type: none"> • Relieve pressure on hydraulic system before servicing or disconnecting hoses. • Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands. • Keep all components in good repair. <p style="text-align: right; font-size: small;">153-528</p>



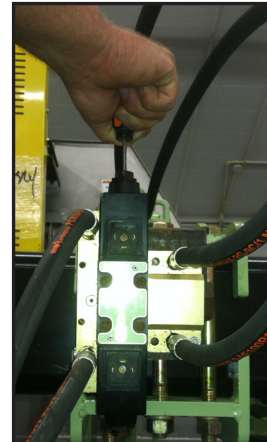
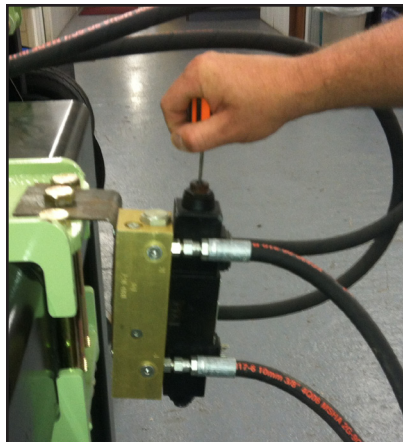
SHADOW BLADE ALIGNMENT



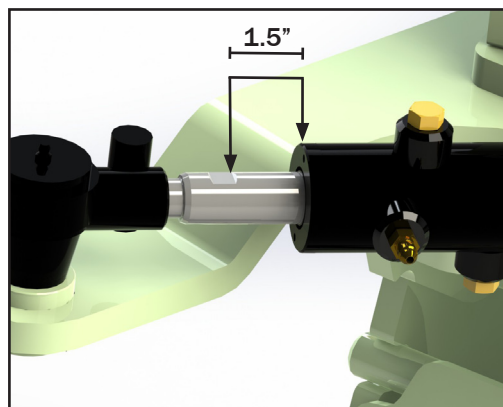
1. Cycle the units left and right several times using hydraulic power. This is necessary to get all of the air out of the hydraulic lines and to get the units in sync with each other.

A. John Deere guided units can be cycled by holding the SCV lever in one direction for 5-10 seconds and then repeating the opposite direction for 5-10 seconds. Perform several times.

B. Trimble guided units can be cycled by engaging SCV and then manually steering the system using the external valve. Push the buttons on either end of the valve using a small screwdriver and holding for 5-10 seconds. Repeat in the opposite direction for 5-10 seconds. Perform several times. (pictured below)



2. Manually steer the system so that the cylinder on the unit containing the sensor is exactly at 1/2 stroke. Half stroke is achieved by measuring 1.5 inches from the inside flat edge on the rod to where the rod enters the barrel of the cylinder. (pictured below)



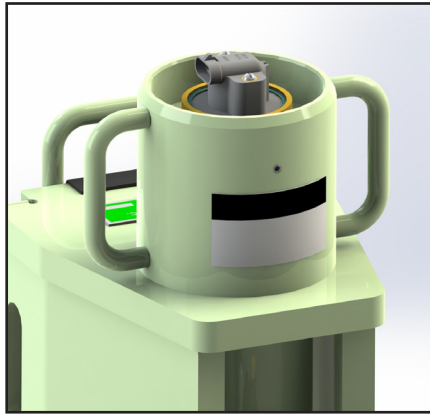


SHADOW BLADE ALIGNMENT

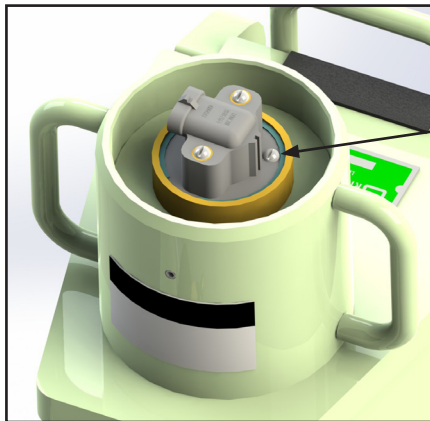
	⚠ DANGER HIGH-PRESSURE FLUID HAZARD To prevent serious injury or death: <ul style="list-style-type: none">• Relieve pressure on hydraulic system before servicing or disconnecting hoses.• Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.• Keep all components in good repair.
	<small>353-528</small>

3. While maintaining the 1.5 inches in step 2, navigate to the screen that shows voltage read out for sensor. Check the controller owner's manual for more information. Electronic center is achieved when the read out is 2.5 volts. Follow the steps below if the controller is not at 2.5 volts.

A. Pop off sensor cap. (pictured below)



B. Loosen set screw. (pictured below)

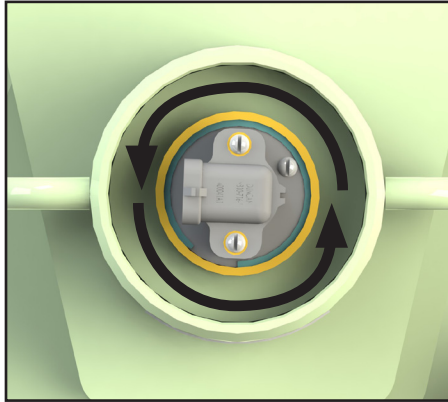




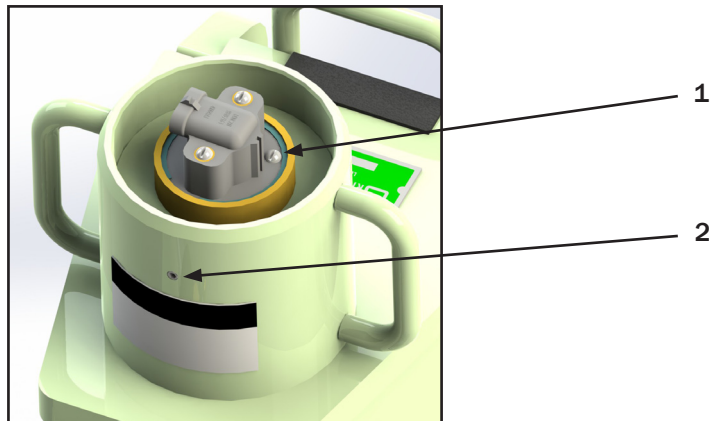
SHADOW BLADE ALIGNMENT

	⚠ DANGER HIGH-PRESSURE FLUID HAZARD To prevent serious injury or death: <ul style="list-style-type: none">• Relieve pressure on hydraulic system before servicing or disconnecting hoses.• Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.• Keep all components in good repair.
	<small>533-528</small>

C. Rotate sensor until 2.5 volts on the controller is achieved. (picture below)



D. Tighten set screw. (pictured below - arrow 1)



E. Replace sensor cap.

4. Ensure that set screw hardware is secure. (pictured above - arrow 2)

5. Calibrate sensor in accordance with instructions four in the controller operator/owner manual.



SHADOW BLADE ALIGNMENT

	⚠ DANGER HIGH-PRESSURE FLUID HAZARD To prevent serious injury or death: <ul style="list-style-type: none">• Relieve pressure on hydraulic system before servicing or disconnecting hoses.• Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.• Keep all components in good repair.
	<small>353-528</small>

5. While maintaining the 1.5 inches in step 2, ensure the sensor unit blade is straight forward by standing in front of the machine and visually comparing the angle of the blade to the center of the mount. If it appears that the unit is not straight forward it will need to be adjusted.

A. Loosen the tie rod retention bolt and the nut on the rod end of the cylinder. (pictured below)



B. Rotate the rod of the cylinder using a 1" wrench until the blade is visually straight in comparing with the Shadow mount. (pictured below)





SHADOW BLADE ALIGNMENT

	⚠ DANGER HIGH-PRESSURE FLUID HAZARD To prevent serious injury or death: <ul style="list-style-type: none">• Relieve pressure on hydraulic system before servicing or disconnecting hoses.• Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.• Keep all components in good repair.
	<small>353-528</small>

C. Tighten the tie rod retention bolt and the nut on the rod end of the cylinder. (pictured below)



D. Continue to adjust Shadow units using steps A, B and C until all Shadow blades visually are pointing perfectly forward.

Note: It is not necessary to measure 1.5" on each cylinder as they should be synched together.

E. Step 5 may need to be repeated (after accomplishing a re-phase) in the field as a fine tune adjustment if blades are not running together.



FIELD SETTINGS

CAUTION
Be extremely careful working around unshielded sharp edges. Injury may result from contact with sharp edges. 153-045



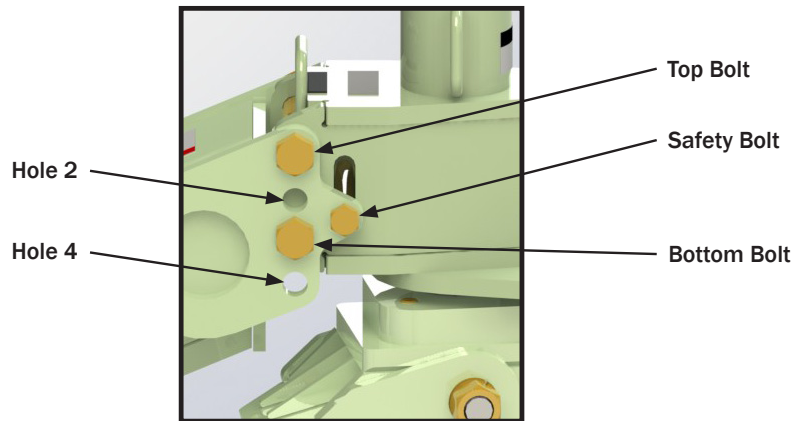
Depth Adjustment

The Shadow unit operating depth can be only slightly adjusted with the manipulation of the hardware that secures the Shadow arm to the Shadow steering unit.

In the installation section of the manual it was suggested that the shallower of the two depth settings initially be used. (figure 1 below). Following the procedure below will provide 2" of added depth.

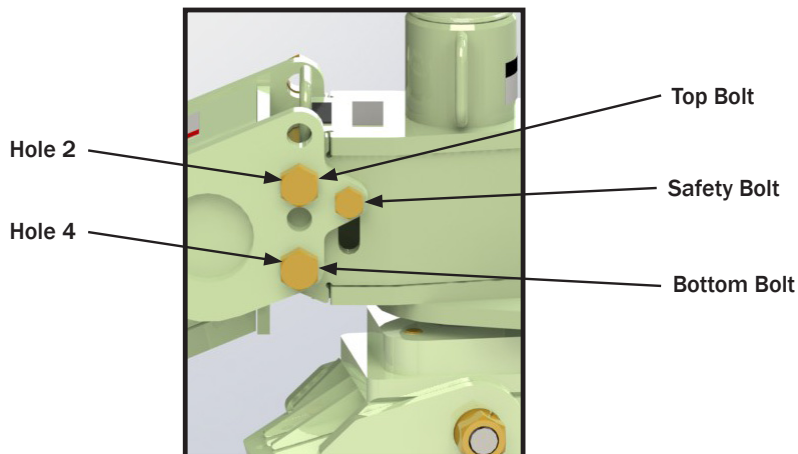
1. Slightly loosen Safety Bolt. **DO NOT REMOVE SAFETY BOLT!** Remove Top Bolt and Bottom Bolt and the steering unit will be able to slide downward. (figure 1)

Figure 1



2. Align Hole 2 and insert Top Bolt. Align Hole 4 and insert Bottom Bolt. Tighten Top, Safety and Bottom hardware. (figure 2)

Figure 2





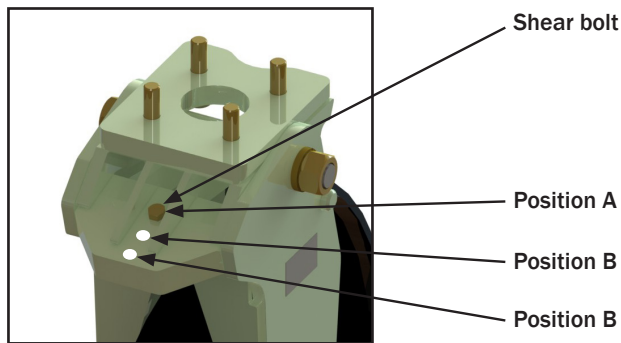
FIELD SETTINGS

CAUTION
Be extremely careful working around unshielded sharp edges. Injury may result from contact with sharp edges. 153 - 045

Shear Bolt Protection

The Shadow units are protected with a shear bolt to protect the steering unit should the blade encounter foreign objects in the soil. When the Shadow unit shear bolt shears the fork will pivot to the rear allowing the blade to rotate back and disengage the soil.

There are three positions for the shear bolt. A, B and C (pictured below), Position A takes the least amount of force to shear. Position C takes the most amount of force to shear.



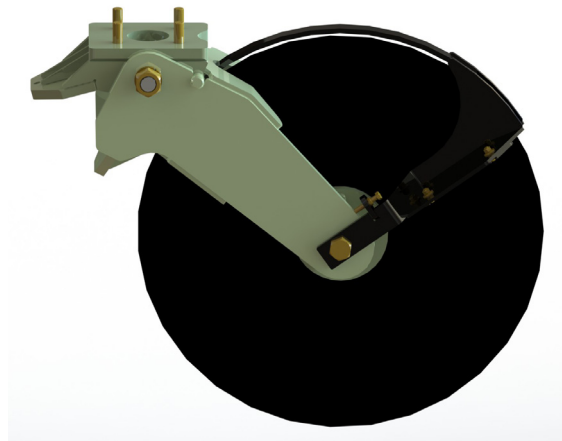
If a unit were to shear, the forks are balanced to return to normal operating position when the machine is raised (pictured below) and then the shear bolt can easily be replaced.

CAUTION: Use only a Grade 5 shear bolt.

Operating Position



Tripped Position



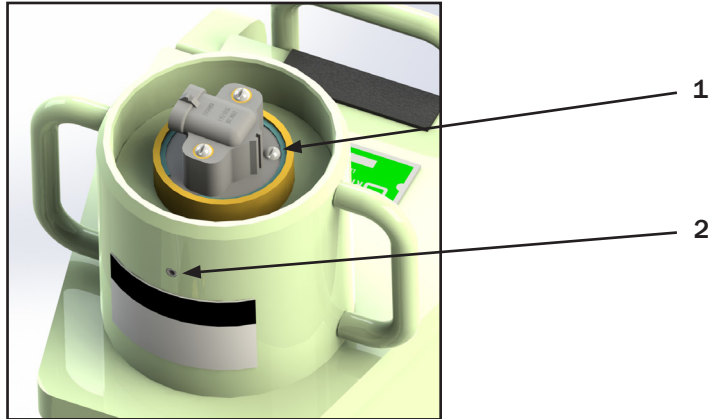


TROUBLESHOOTING

1. Units steering machine off of AB line.

A. Sensor has lost center. Perform steps 2 through 4 in the Shadow Blade Alignment.

1. Tighten set screws. (pictured below)



B. Ensure physical offset for antennae matches offset keyed into display.

C. Check controller manual to adjust settings.

2. Units are trying to steer machine but not able to stay on AB line.

A. Lower units to bottom adjustment to increase blade area engaging with the soil.



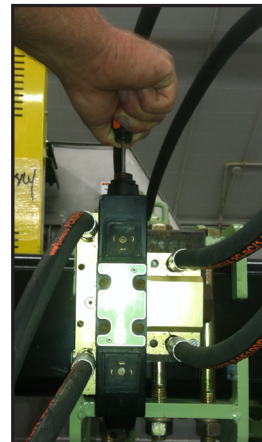
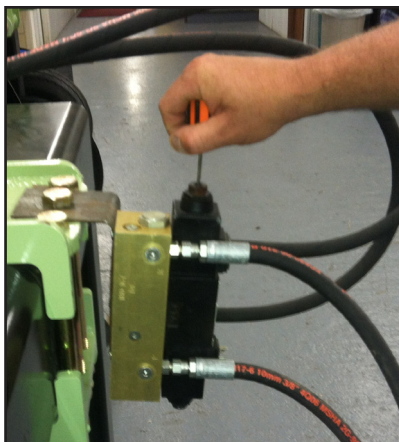
TROUBLESHOOTING

3. Units are steering at same angles.

A. Re-phase system.

1. John Deere guided units can be cycled by holding the SCV lever in one direction for 5 seconds.

2. Trimble guided units can be cycled by engaging SCV and then manually steering the system using the external valve. Activate by pushing buttons on either end of the valve using a small screwdriver and holding for 5 seconds.
(pictured below)



B. Not aligned properly.

1. Re-phase system.

2. While maintaining the 1.5 inches in step 2 of Shadow Blade Alignment, ensure the sensor unit blade is straight forward by standing in front of the machine and visually comparing the angle of the blade to the center of the mount. If it appears that the unit is not perfectly straight forward it will need adjustment.

(continued on the following page)



TROUBLESHOOTING

3. Loosen the tie rod retention bolt and nut on the rod end of the cylinder. (picture below)



4. Rotate the rod of the cylinder using a 1" wrench until the blade is visually straight in comparing with the Shadow mount. (pictured below)



5. Tighten the tie rod retention bolt and the nut on the rod end of the cylinder. (pictured below)



6. Continue to adjust Shadow units using steps 3, 4 and 5 until all Shadow blades visually are pointing perfectly forward.

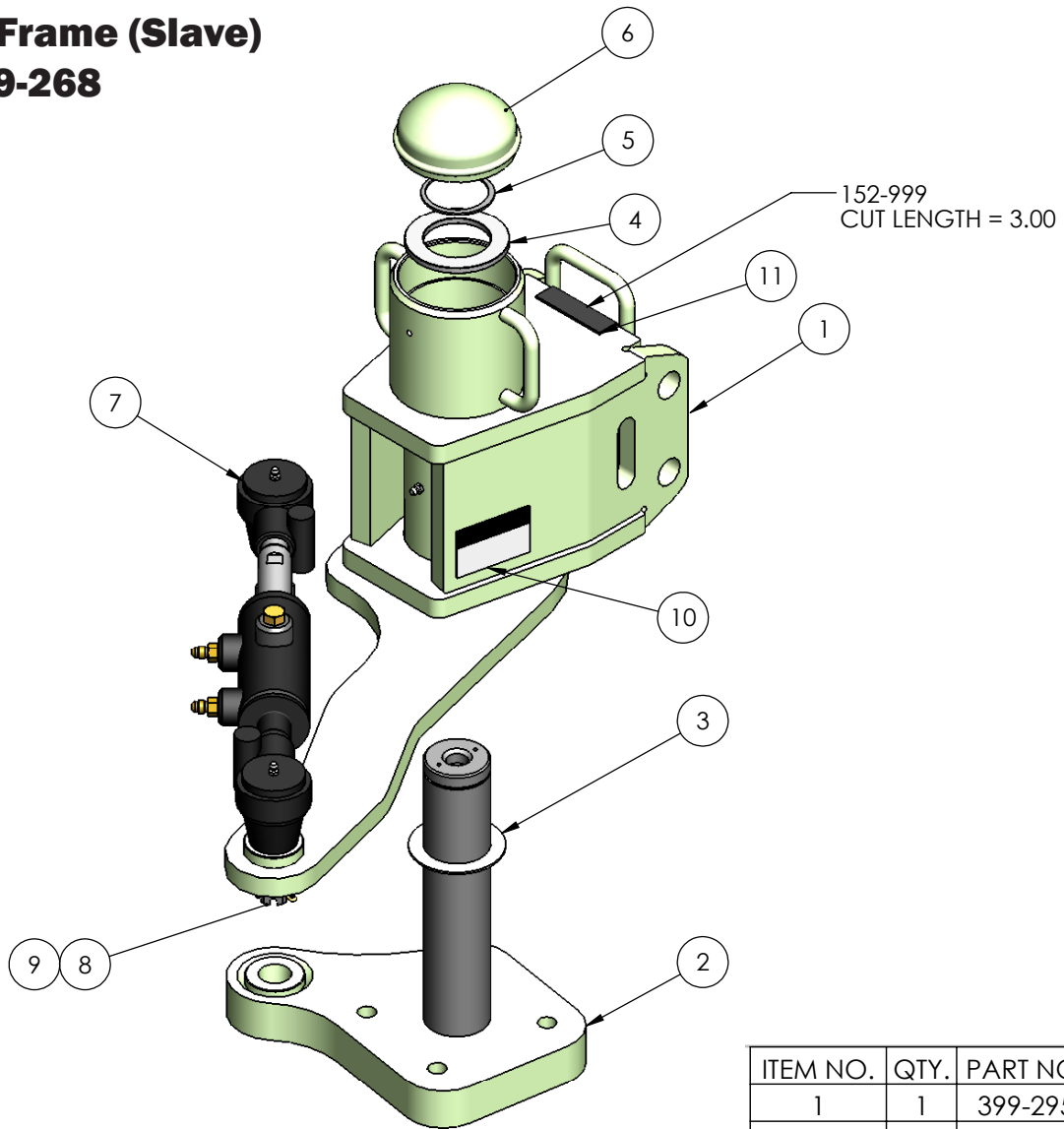
Note: It is not necessary to measure 1.5" on each cylinder as they should be synched together.



PARTS IDENTIFICATION

Steering Frame (Slave)

Assy: 399-268

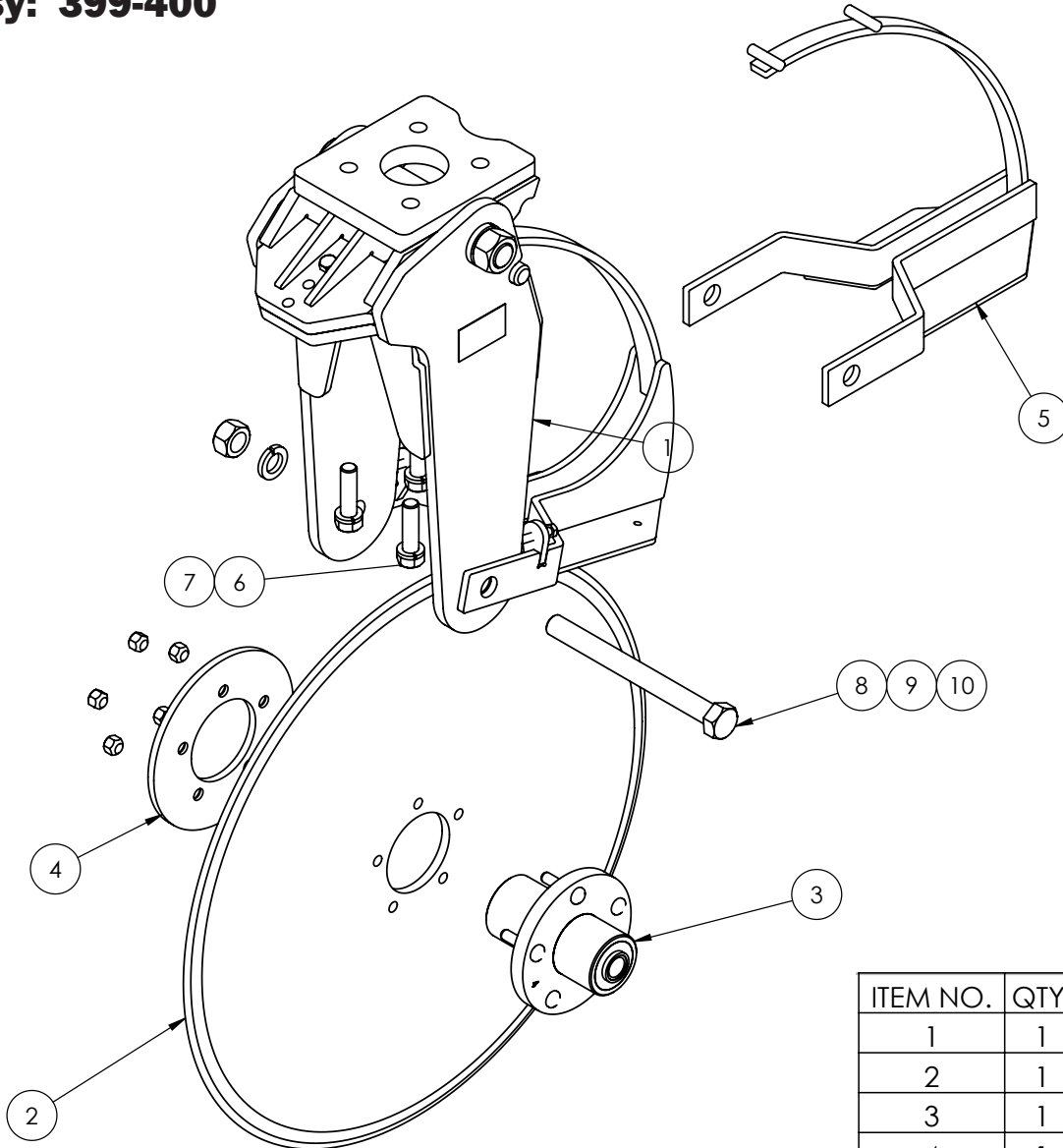


ITEM NO.	QTY.	PART NO.
1	1	399-295
2	1	399-297
3	1	134-096
4	1	333-638
5	1	104-197
6	1	333-655
7	1	399-610
8	2	102-044
9	2	104-107
10	1	153-100
11	1	152-999



PARTS IDENTIFICATION

**Rock Trip Yoke
Assy: 399-400**



ITEM NO.	QTY.	PART NO.
1	1	399-401
2	1	166-047
3	1	331-901
4	1	333-533
5	1	333-475
6	4	100-159
7	4	108-022
8	1	100-198
9	1	102-011
10	1	108-025
11	1	399-721



NOTES

A large, empty rectangular area intended for handwritten notes, framed by a thin black border.



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