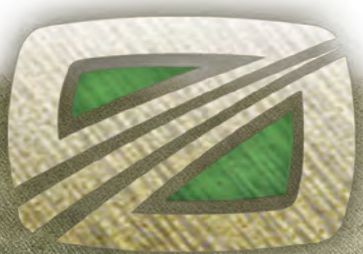
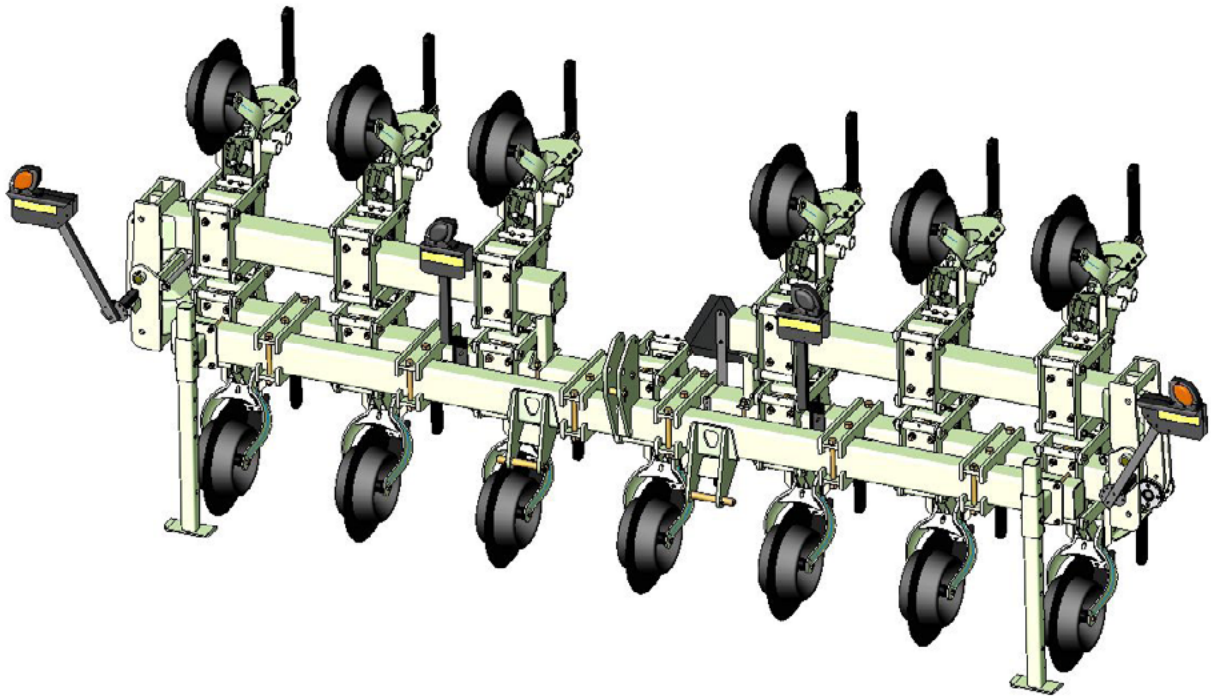
ORTHMAN

Vertical Fold Toolbar
Operators Manual

Part #125-021-01



Orthman's *Vertical Fold Toolbars* are the leading folding toolbars in the row crop industry. The innovative internal fold 4" x 24" cylinders can be set to fold the toolbar to 90°, 115 °, 135°, or 180° making the *Vertical Fold Toolbar* the most versatile bar in agriculture. *Vertical Fold Toolbars* are factory set to fold to the degree specified with the order. *Vertical Fold Toolbars* are available in size configurations up to 16 row 30". The strong construction, utilizing 3/8" wall tubing (1/2" wall tubing center sections on models totaling more than 30' in total length), makes the Orthman *Vertical Fold Toolbar* a durable choice.



8315 Cultivator on Vertical Fold Toolbar

Category 3 or Category 4 three point hitches are available for Orthman *Vertical Fold Toolbars* and are available in multiple lengths and 3 different hitch heights. Hinges are 14" wide and line-bored for smooth hinge movement and superior strength. All bars feature integrated bar stands, wing rests (for toolbar foldings greater than 90°), safety lighting & decals.

This manual is considered to be an integral component of the *Vertical Fold Toolbar* and is designed to educate the owner and/or operator(s) regarding safety, operation, maintenance, troubleshooting, and component identification. All personnel involved in the operation of this implement are responsible for reading and understanding entire manual content. This manual is designed to keep the operator safe and knowledgeable as well as prolong the life of the implement and maximize field efficiency. This manual should accompany the implement if it were ever to be sold.

We would like to thank you for placing your confidence in Orthman Mfg., Inc. Your *Vertical Fold Toolbar* is manufactured to meet the highest standards and is built with precision and strength to increase your agricultural operation's dependability and profitability.

Thank you for choosing Orthman.

To The Dealer:
Inspect the implement thoroughly after assembly to be certain it is functioning properly before delivering it to the customer. The following checklist is a reminder of points to cover. Check off each item as it is found satisfactory or after proper adjustment is made.

Pre-Delivery Checklist

- [ ] 1. All Hardware properly tightened.
- [ ] 2. Lubrication of grease fittings.
- [ ] 3. All decals properly located and readable.
- [ ] 4. All implement tools and options are installed and set.
- [ ] 5. Check overall condition of implement.
- [ ] 6. Make sure Operator's manual is included.

Date Set Up. _____ Signature. _____

Delivery

Review the operator's manual with the customer. Explain the following:

1. Introduce the machine to the customer. Give the customer this manual and encourage them to read it.
2. Make the customer aware of all the safety precautions that must be exercised when using and transporting this machine.
3. Make customer aware of the different tooling options available.
4. This machine does not come set to run in the field from the factory. The Field settings section in this manual is meant to help set the machine for optimal performance. Explain all operating adjustments.
5. Explain to the customer that the life expectancy of this machine depends on regular maintenance as directed in this manual.
6. Tell the customer to use the proper tools for service and make them aware of Orthman parts availability.
7. Write machine model number and serial number in the spaces provided below.

Date delivered. _____ Signature. _____

Model Number. _____

Serial Number. _____

WARRANTY

Orthman warrants each new wholegood product to be free from defects in manufactured components and workmanship. This warranty is applicable only for the normal service life expectancy of the product or components, not to exceed twenty-four (24) consecutive months from date of purchase of the new Orthman product to the original purchaser.

Purchased components installed by Orthman (blades, bearings, controls, hoses, wheels, coulters, cylinders, fittings, etc.) shall be warranted by the respective manufacturer for a period of twelve (12) consecutive months from date of delivery of the new Orthman product to the original purchaser.

A completed online Warranty Registration for the original purchaser must be received by Orthman to activate warranty coverage. Non-receipt of warranty registration may void warranty coverage. The Orthman warranty is non-transferable.

Genuine Orthman replacement parts and components will be warranted for ninety (90) days from date of purchase, or the remainder of the original equipment warranty period, whichever is greater.

All warranty work is to be performed by an authorized Orthman dealer at the repairing dealer's location, unless otherwise approved by Orthman.

Under no circumstances, will this warranty cover any merchandise or component thereof, which, in the opinion of Orthman, has been subjected to misuse, unauthorized modifications or alteration, accident, collision with obstruction/ground, or if repairs have been made with parts other than those obtainable through Orthman.

Orthman warranty policies do not cover travel expenses, after-hours field/service time, overnight expenses, or expenses not related to regular shop labor rates or parts replaced during actual warranty repair. Orthman reserves the right to adjust warranty labor credits to believed normal repair times as directed by state law(s).

This warranty shall be limited to repairing or replacing, free of charge to the purchaser, any part, which Orthman's judgment shows evidence of such defect. Additionally, the defective part(s) shall be returned within thirty (30) days from the date of failure to Orthman through the dealer or distributor from whom the product was purchased or repaired; transportation charges prepaid.

This warranty shall not be interpreted to render Orthman liable for injury or damages of any kind or nature to person or property. This warranty does not extend to the loss of crops, loss of delay in harvesting/planting, or any expense or loss incurred for labor, substitute machinery, rental, or any subsequent reasons thereof.

Except as set forth above, Orthman shall have no obligation or liability of any kind on account of its equipment and shall not be liable for special or consequential damages. **Orthman makes no other warranty, expressed or implied, and, specifically disclaims any implied warranty or merchantability or fitness for a particular purpose**. Some states or provinces do not permit limitations or exclusions of implied warranties or incidental or consequential damages, so the limitations or exclusion in this warranty may not apply. This warranty is subject to any existing conditions of supply, which may directly affect ability to obtain materials or manufacture replacement parts.

Orthman reserves the right to make improvements in design or changes in specifications at any time, without incurring any obligation to owners of units previously sold; to include, but not limit to engineering prototype machines. No one is authorized to alter, modify, or enlarge this warranty nor the exclusions, limitations, and reservations.

Orthman provides this manual without warranty of any kind, expressed or implied. This manual reflects the product at the time of publication. All information within is based upon current information on the publication date. Orthman assumes no responsibility for damages incurred due to the use of the illustrations, information, and specifications within this publication.

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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 & 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. Lightening, 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.

SAFETY INFORMATION

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.

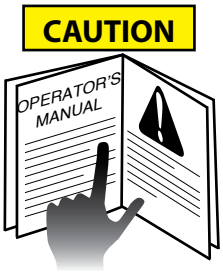
•Take advantage of safety equipment, such as bypass starter covers, power take-off master shields, and slow-moving vehicle emblems.

•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.

⚠ 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 your Orthman equipment.

- 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.

⚠ 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.

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.

NOTE: 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
RED

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
ORANGE

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
YELLOW

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.

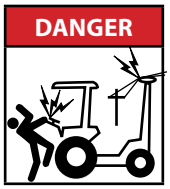
⚠ SHUTDOWN AND STORAGE

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.

⚠ SAFE TRANSPORT

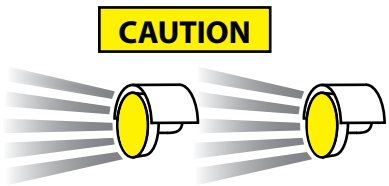


- Engage transport locking devices prior to transport.
- Plan your route to avoid traffic. Yield to traffic in all situations.
- Maximum transport speed is 20 mph (32 kph). Various conditions will require reduced speed. Travel at speeds that allow for adequate control of stopping and steering.

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.

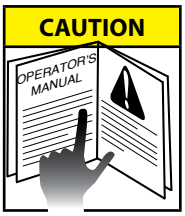
- Know implement transport height and gross weight. Avoid overhead obstructions not allowing your transport height. Do not use bridges rated below combined implement and tractor weight.
- Make sure a slow moving vehicle (SMV) placard is mounted to the implement and is easily visible to other motorists.
- 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.
- A safety lighting package, conforming to implement lighting standard ANSI/ASAE S279.12, if not supplied with, is available for addition to your equipment. Contact your Orthman dealer for safety lighting package information. Refer to toolbar operator's manual for safety lighting package installation and adjustment.

SAFE OPERATION



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.

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 combined implement and tractor weight.

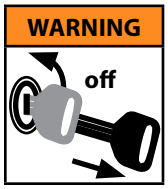
AVOID ROLLOVER. Do not fold or unfold implement and avoid sharp turns when on a hillside, as shift of weight could cause rollover. Operate implement at a safe distance from terrain irregularities and other obstructions that could cause rollover.

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

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.

⚠ 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 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.

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.

AVOID FLUID PENETRATION. 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.

⚠ 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 tires. 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.

⚠ ANHYDROUS AMMONIA - NH_3 LIQUID FERTILIZER

ANHYDROUS AMMONIA (NH_3) AND LIQUID FERTILIZER APPEARS HARMLESS. DIRECT EXPOSURE TO NH_3 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 NH_3 or liquid fertlizer.
- Wear protective goggles and gloves when working with NH_3 or liquid fertilizer. Be sure all persons involved in the operation are properly trained concerning the dangers and precautions involved in the application of NH_3 or liquid fertilizer.
- If you choose to apply NH_3 or liquid fertilizer, it is advisable to consult documented information regarding safe handling and application of NH_3 or liquid fertilizer. Information is available from the following recognized sources:

    1. American National Standards Institute - 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

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.

SAFETY DECALS

DANGER
RED

WARNING
ORANGE

CAUTION
YELLOW

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

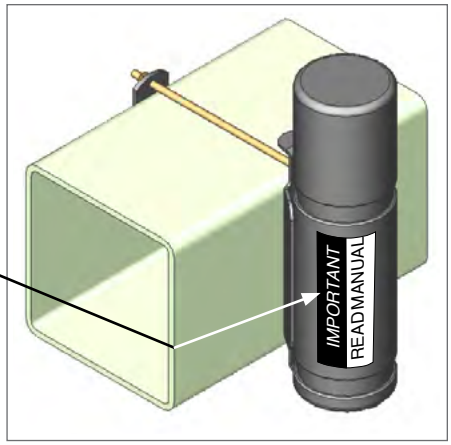
Carefully **READ ALL SAFETY DECALS** in this manual as well as on the implement. Keep implement clean so decals are easily visible. Keep all decals in good and legible condition. Immediately replace damaged and/or missing decals. Replacement decals are available from your Orthman dealer.
To install decals: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

IMPORTANT

Equipment operators should understand the enclosed manual before operating this equipment. Replacement manual, call 308-324-4654

Orthman Mfg., Inc. - 75765 Rd. 435 - Lexington, NE 68850

153-101

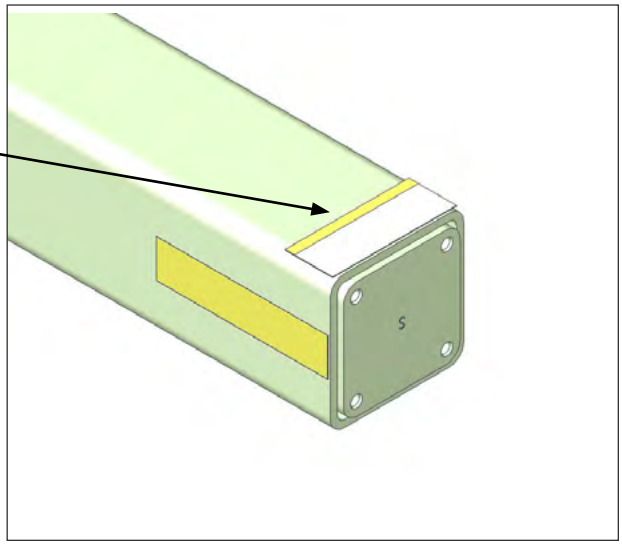


MANUAL STORAGE

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



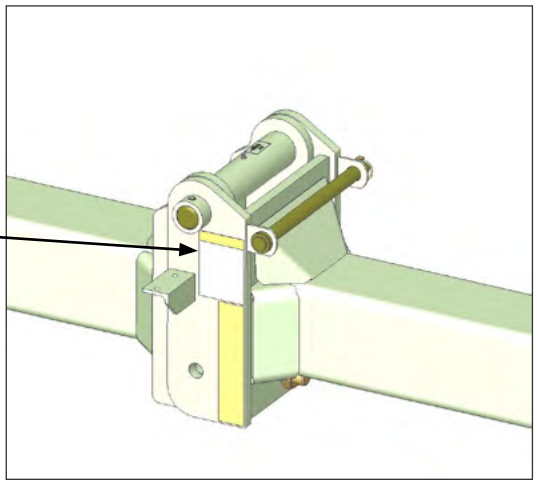
END OF WING

SAFETY DECALS

⚠ WARNING

1. Stay clear of wing sections when raising and lowering.
2. Engage all transport locking devices prior to transport. (see operator's manual)
3. Use extreme caution when in transport. Be aware of overhead power lines and any other obstructions.
4. Reduce speed as raised implement reduces tractor maneuverability.

153-013

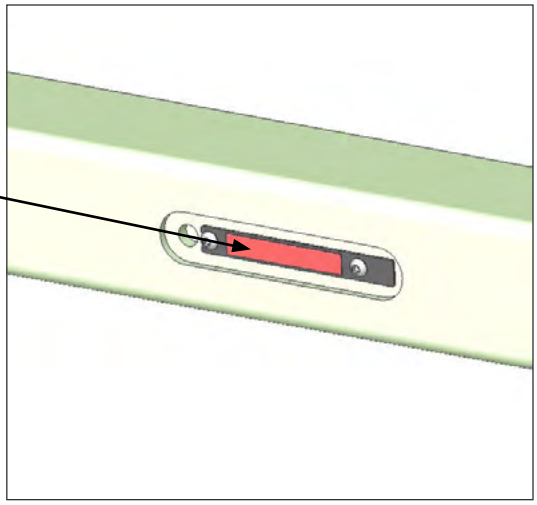


FRONT OF HINGE

⚠ CAUTION

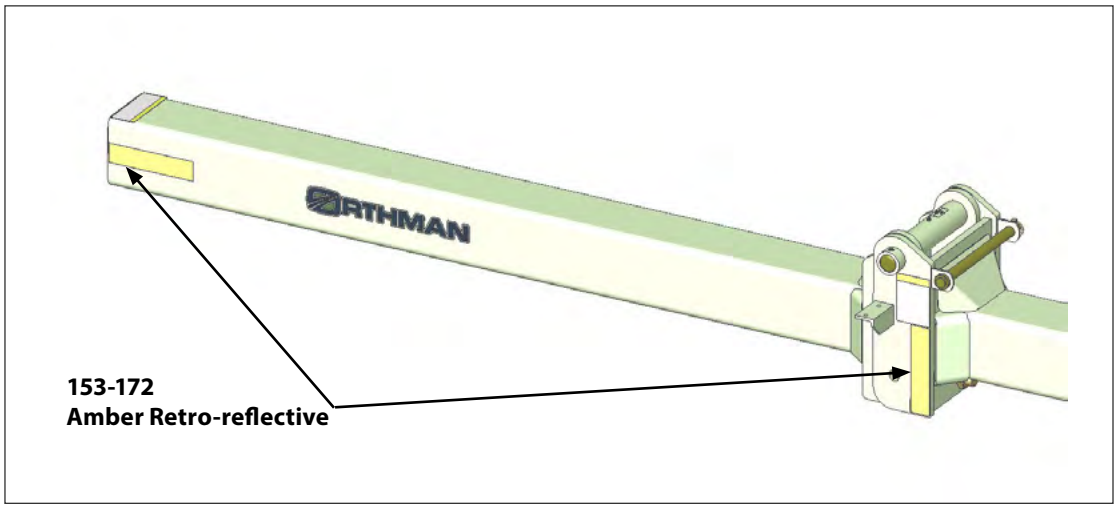
Before relocating cylinder pins, consult technical manual or *Orthman* dealer.

153-180

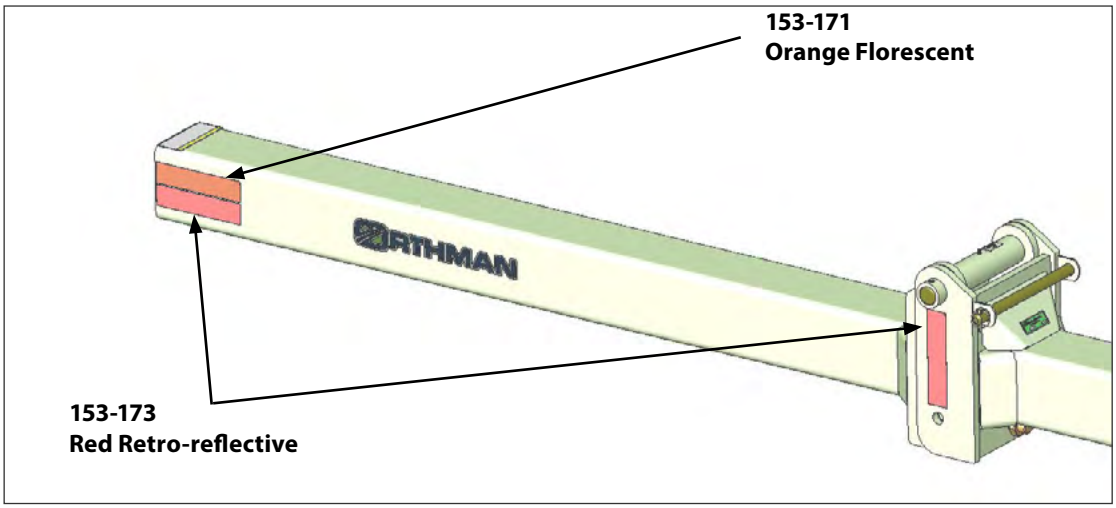


CYLINDER ADJUSTMENT COVER

SAFETY DECALS



FRONT OF TOOLBAR ON END OF WING AND HINGE

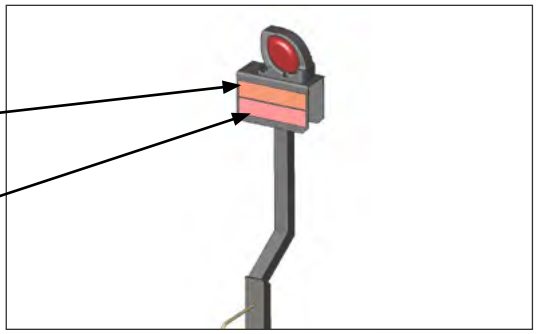


REAR OF TOOLBAR ON END OF WING AND HINGE

SAFETY DECALS

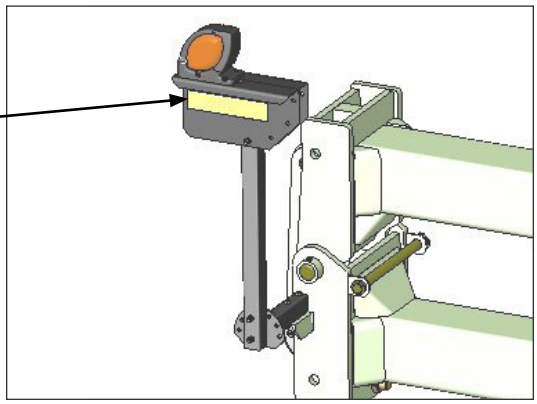
153-171
Orange Florescent
(rear-facing)

153-173
Red Retro-reflective
(rear-facing)



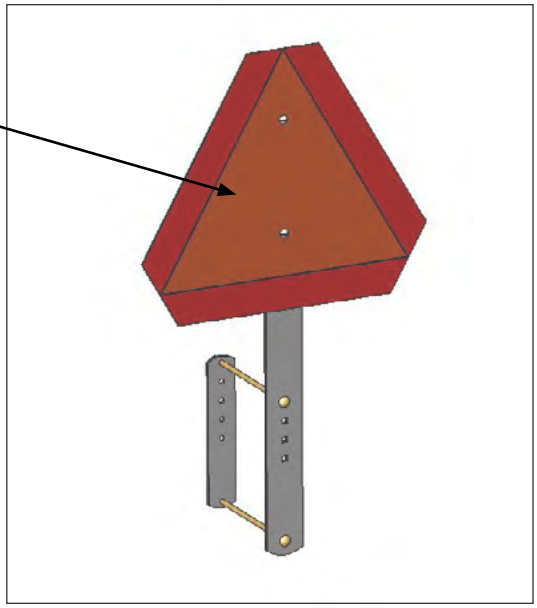
INSIDE RED LIGHT BRACKET

153-172
Amber Retro-reflective



OUTSIDE AMBER LIGHT BRACKET

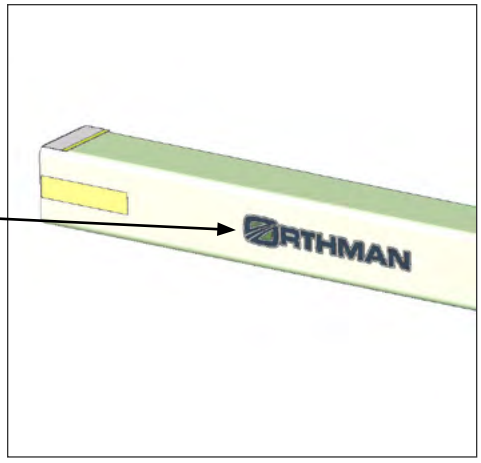
153-173
Red Retro-reflective



SMV SIGN

ORTHMAN DECALS

153-430

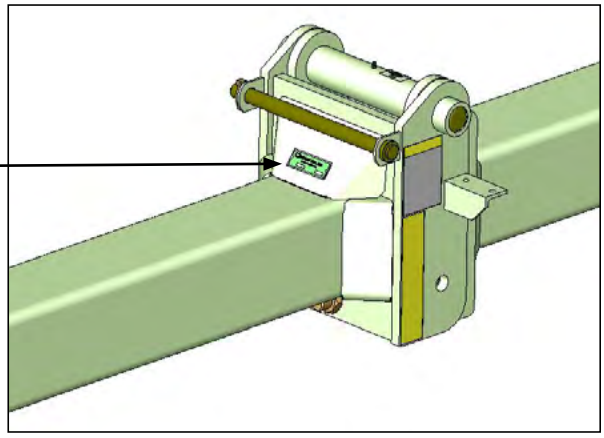


FRONT LEFT AND REAR RIGHT OF TOOLBAR

ORTHMAN SERIAL TAG

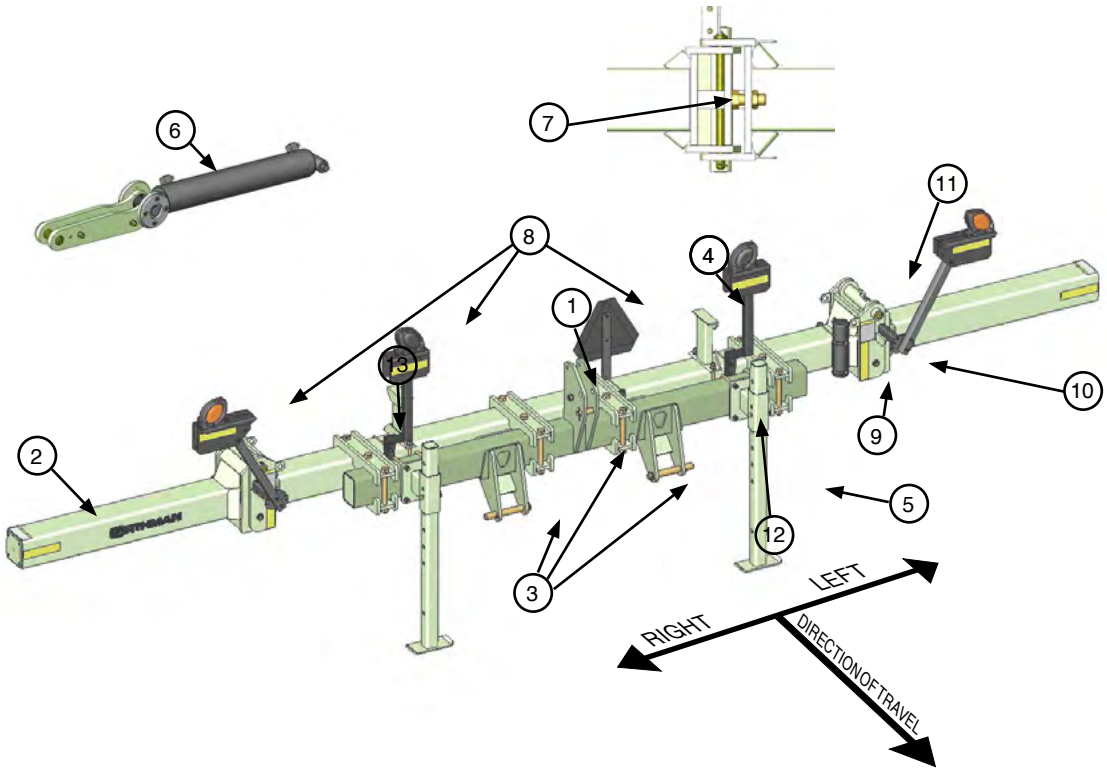
The Orthman serial tag contains valuable information. The model and serial numbers provide Orthman dealers and the Orthman Service Department with the exact specifications of your implement if any warranty or service issues need to be addressed.

153-011



TOOLBAR HINGE

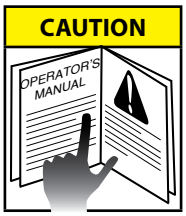
TOOLBAR COMPONENT IDENTIFICATION



NOTE: Right and left as illustrated above and referenced from this point on, is determined by facing the same direction the toolbar will travel while in use.

1. CENTER SECTION. A solid, heavy-duty center section provides a robust toolbar foundation.
2. WINGS. Provide the toolbar with versatility for easier maneuverability around objects and travel.
3. THREE POINT HITCH. Securely welded to the 5" x 7" hitch bar, the three point hitch comes in two options: "CAT 3" (shown above) accommodates ASAE category 3 and 3N quick couplers. The "CAT 4" option will accommodate ASAE category 4 and 4N quick couplers.
4. WING RESTS. 180 degree fold, welded on wing rests for most toolbars. Longer 170 degree fold, welded on rests for toolbars used in certain larger applications. For 115 ° and 135 °, adjustable wing rests are available as a toolbar accessory.
5. BAR STANDS. Support the frontal weight of the toolbar for storage and maintenance.
6. INTERNAL CYLINDER ASSEMBLY. Orthman developed the internal fold cylinder many years ago and it continues to be a trademark feature of our toolbars.
7. WING LEVEL BOLT. This bolt serves as the down-stop for the wing and can be fine-tuned to accurately level the bar when unfolded.
8. SAFETY LIGHTS AND SMV. The safety light and SMV package are boxed up and will need to be assembled prior to use of the toolbar.
9. MANUAL STORAGE TUBE. A place to safely store this manual, and will also house the manual for any row unit that is on the toolbar if you purchased a full machine.
10. RIGID WING LOCK PIN. Use this pin to lock down the toolbar to a rigid machine. When not in use, storage for these pins are at the end of the center section near the hinge pin.
11. TOOLBAR WING HINGE. Orthman's own wing hinge design is built to allow the center section to couple with the wings while not giving up strength and versatility.
12. 5" x 7" HITCH. The 5" x 7" hitch bar is utilized on the *Vertical Fold Tillage Toolbar* to allow for row unit mounting across the center section of the toolbar.
13. HITCH CLAMP. Securely connects the the 5" x 7" hitch bar to the 7" x 7" toolbar.

PREPARING THE TOOLBAR



The standard folding configuration of the *Vertical Fold Tillage Toolbar* is 180°. Therefore, it will be equipped with 180° wing rests and the base end of the internal hydraulic cylinders will be in the 180° position. Please refer to the *Change Degree of Fold* section of this manual for more information.

If 90°, 115°, 135°, or 170° folding configuration is desired, these folding options are illustrated and explained in the *Change Degree of Fold* section of this manual. Field adjustments are illustrated and explained in the field settings section of this manual.

If an Orthman row unit is used in conjunction with the *Vertical Fold Tillage Toolbar*, be sure to consult the row unit operator's manual before attempting to operate the implement. Read and understand operator manuals for machinery used in conjunction with the *Vertical Fold Tillage Toolbar.*

Before each use, check hardware for wear and proper torque. Replace damaged or missing hardware with hardware of an identical grade to restore implement to original specifications.

IMPLEMENT TO TRACTOR CONNECTION

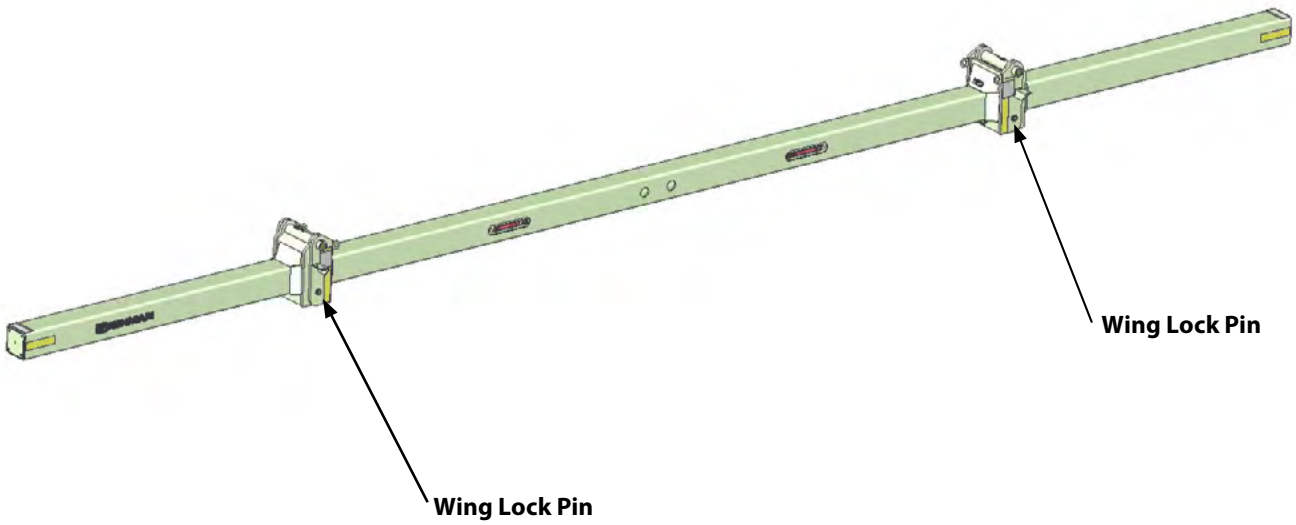
AVOID CRUSHING. Do not stand between tractor and implement when connecting or disconnecting implement. Injury or death can result from being trapped between the tractor and implement.

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. Park 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.

SHIPPING CONFIGURATION

The majority of the *Vertical Fold Tillage Toolbar* is assembled at Orthman Mfg., Inc. The *Vertical Fold Tillage Toolbar* is assembled in an appropriate shipping configuration to ensure transport safety and efficiency from the manufacturer.

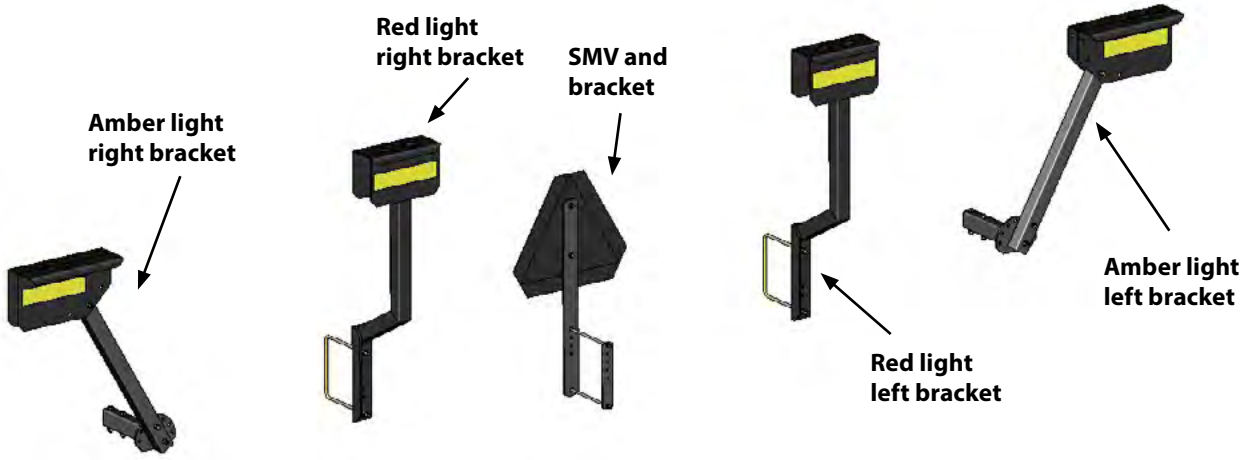


The *Vertical Fold Tillage Toolbar* may ship folded or unfolded, depending on configurations. If the toolbar ships unfolded (shown picture above) it will most likely have the rigid wing lock pins installed. These pins will need to be removed prior to folding the toolbar. (see pg. 4 - 1)

The *Vertical Fold Tillage Toolbar* will also come from the factory without the safety lights, or the SMV installed, due to the potential for damage to those items during shipment. These items will also need to be installed prior to use or transport of the *Vertical Fold Tillage Toolbar.*

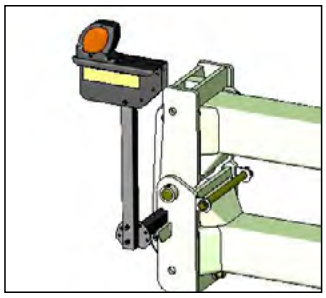
LIGHT KIT COMPONENT IDENTIFICATION

An un-assembled light kit will come with your *Vertical Fold Tillage Toolbar.* The light kit will come in a box that has Orthman manufactured components in it, as well as an ag light kit from Wesbar or Cobo light companies. Orthman mounting and storage brackets will accommodate either brand, however cable and light components are not interchangable between the two brands. Below is an example of what will typically be found in a light kit.

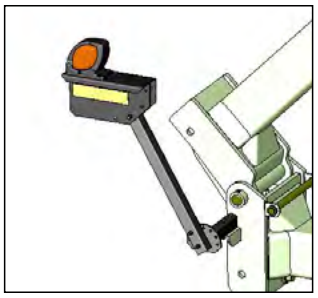


LIGHT & LIGHT BRACKET ASSEMBLY

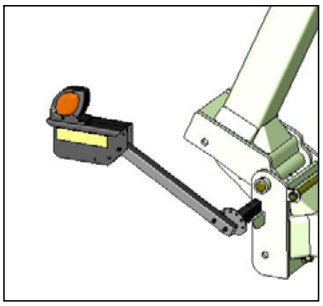
Mount left and right light mounting brackets to light mount tabs located at the end of the center section (shown below). Use the provided 1/4" x 1" carriage bolts and flange nuts to mount each bracket to the toolbar. Mount Amber (orange) colored lights to the bracket with the hardware provided in the light kit. Light bracket is universal and should work with both brands of lights available. Cable lead on light should be able to be strung thru rectangle hole in light brackets. Amber lights will have lenses in front and back and should be visible from the front and back when toolbar is completely folded. Adjust the light bracket according to the degree of fold as shown below.



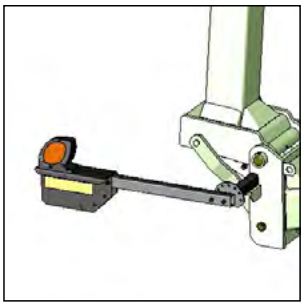
180 DEGREE POSITION



135 DEGREE POSITION

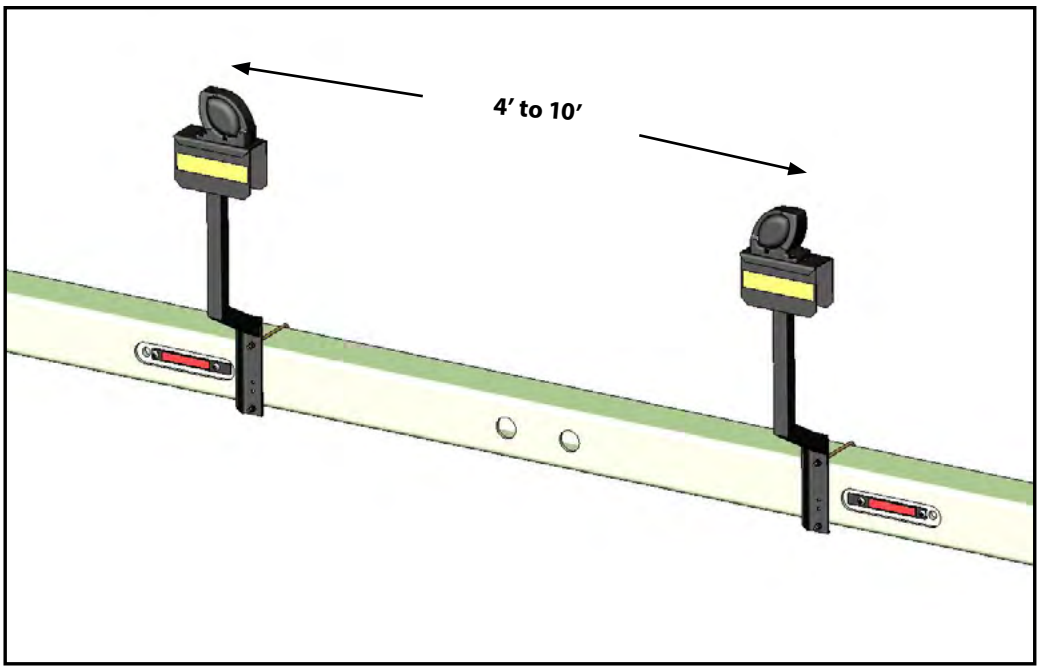


115 DEGREE POSITION



90 DEGREE POSITION

Mount center red light brackets as shown below. Use provided 3/8" 7" x 7" U-bolts and nuts. Lights must each be mounted equally from the center of the bar and be a total distance between 4 feet and 10 feet from each other.
Mount the red lights and string light cable thru rectangle hole in bracket. If lights are Cobo brand, there will be a left and right version of the red light due to the design. Red lights will only have a lense on one side of the light, and it should be visible from the rear of the bar (like tail-lights) and not the front. Use the hardware provided in the ag light kit to mount the lights to the brackets.

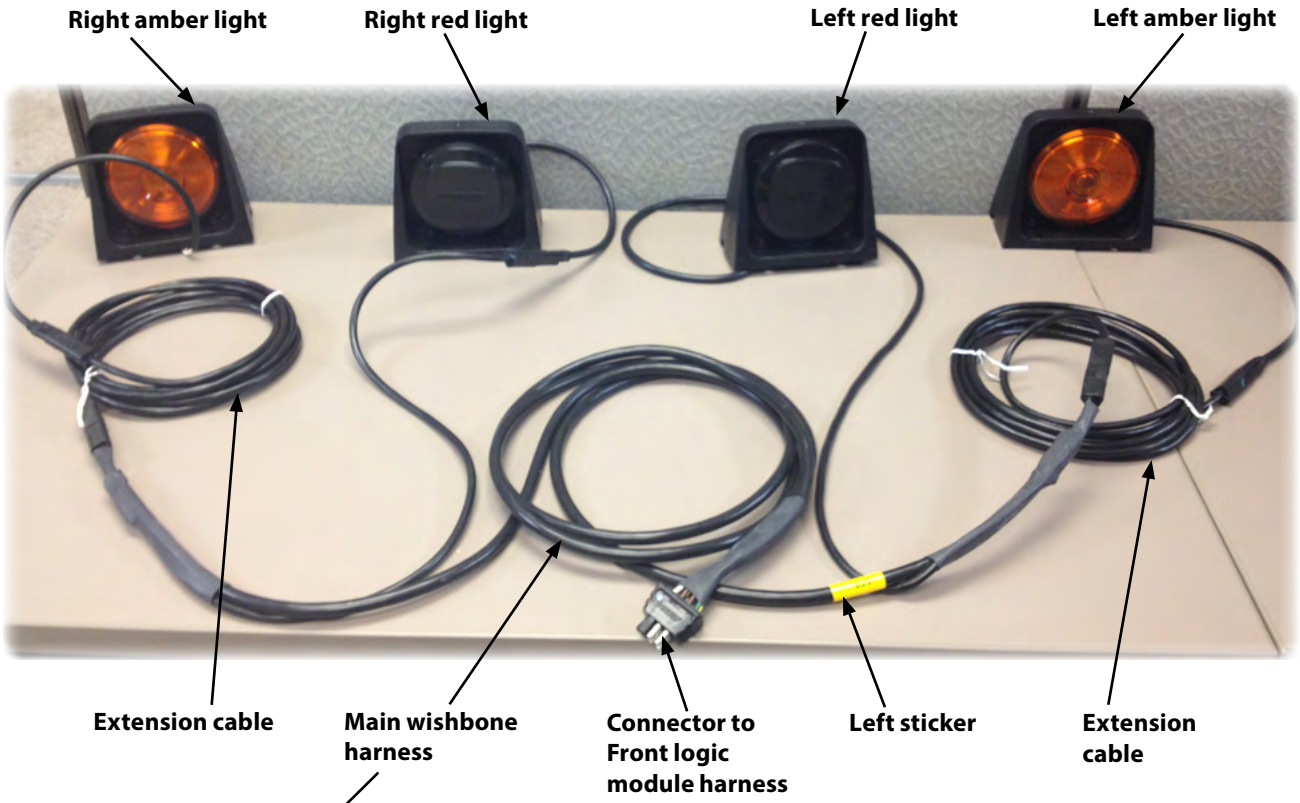


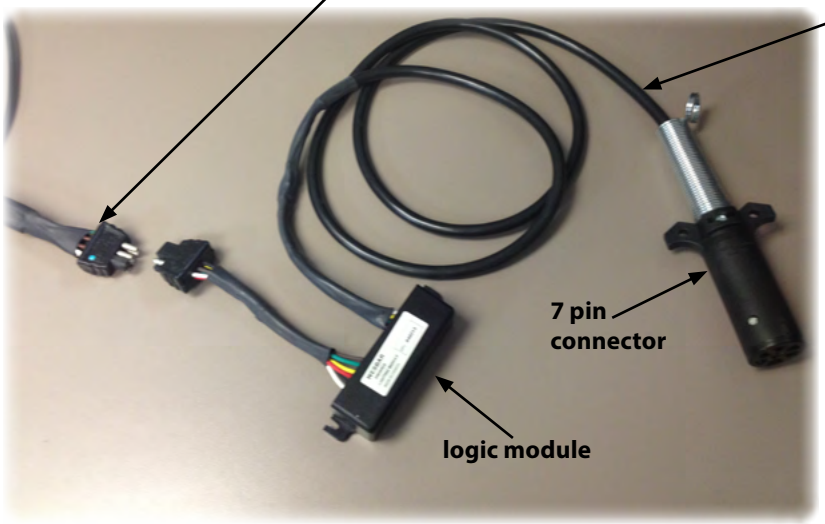
CENTER RED LIGHT BRACKETS

LIGHT CABLE ASSEMBLY

Once lights are mounted, cables can be strung. Start in the center with the main wishbone harness. This cable will have one end that plugs into the front logic module harness, and 4 ends that will lead to the lights. On the Wesbar brand lights the ends with the heat shrink on the main wishbone harness will lead out to the amber lights. Most toolbar configurations will need to utilize the extension cable to be able to reach out to the amber lights. The extension cable will plug into the end of the main wishbone harness and then into the lead at the end of the amber lights. The other 2 leads will go to the left and right red lights.

Cable ties (zip ties) are provided to help secure the cables to the toolbar. It is important to neatly organize cables and securely fasten them all down so they do not catch or become entangled with crops or crop residue and pulled from the toolbar.





The main wishbone harness will have a connector that will then plug into the front logic module harness. The front logic module harness is the cable that will go to the tractor. The 7 pin connector will plug into the tractor. The logic module should be mounted to the top of the hitch bar near the top link center mast plates.

CHANGE DEGREE OF FOLD

The primary feature of the *Vertical Fold Toolbar* is its ability to be folded to various degrees.

Vertical Fold Toolbars can be folded to either 90˚, 115˚, 135°, or 180˚. Modifications may need to be made to the current fold angle due to transportation, storage, and application issues of the particular operation.

NOTE: ALL VERTICAL FOLD TOOLBARS COME STANDARD WITH THE HYDRAULIC CYLINDER IN THE 180 DEGREE POSITION AND 180 DEGREE WING RESTS. IF THE INTERNAL CYLINDER IS TO BE MOVED IN ORDER TO FOLD 115 OR 135 DEGREES, ADJUSTABLE WING STOPS (SOLD SEPERATELY) ARE MANDATORY. (pg. 3 - 8)

CONFIGURATION EXCEPTION: 16 ROW 30" ROW SPACING CONFIGURATIONS COME STANDARD WITH 170° WING FOLDING CONFIGURATION AND THE 16R30 INTERNAL HYDRAULIC CYLINDER. (SEE PARTS I.D. SECTION)

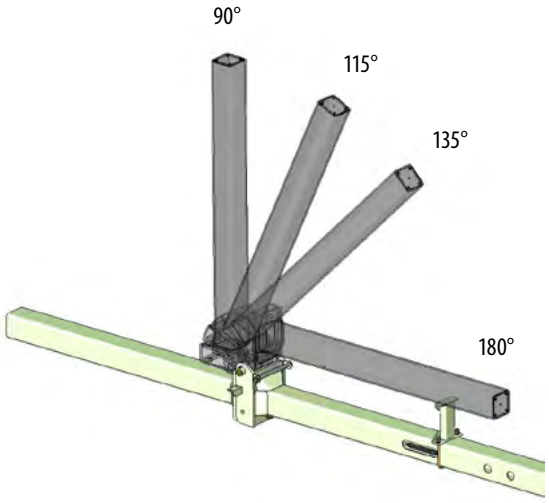
In order to change the degree of fold, the position of the internal cylinder has to be changed. As shown, the four cylinder holes are labeled according to the degree of fold achieved if the base end cylinder pin were to occupy the corresponding hole.

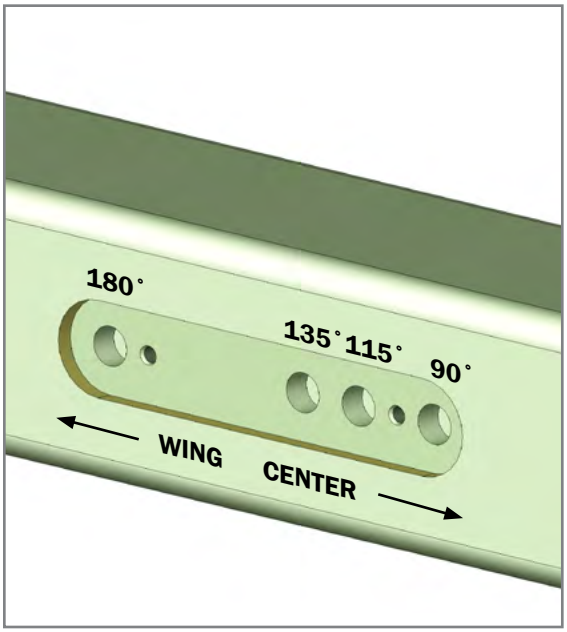
TO CHANGE POSITION OF INTERNAL HYDRAULIC CYLINDER:

1. Unlock wings from rigid position by removing wing lock pin, but leave the wing in the field position.
2. Relieve hydraulic fluid pressure by placing the tractor SCV in the float position.
3. Remove the cover plate, 2 snap rings on both ends of cylinder pin with snap ring pliers.
4. Remove the cylinder pin.

CAUTION! CYLINDER WILL FALL IN TOOLBAR AFTER REMOVAL OF PIN. KEEP CLEAR OF TOOLBAR HOLES TO AVOID CRUSHING.

5. Restore hydraulic pressure and use the tractor SCV to extend or retract the hydraulic cylinder to the desired pin hole. (Extend if reducing the degree of fold; retract of increasing the degree of fold)
6. Once hydraulic cylinder is moved to the desired position, use an alignment punch to lift the cylinder up to the pin hole, and replace the cylinder pin on the opposite side of the punch.
7. Replace snap rings and cover plate.
8. Refer to Adjustable Wing Rest section to make the necessary adjustment to the wing rest.
9. Make necessary adjustments to the safety lighting located on each toolbar hinge. Refer to Light and Light Bracket Assembly section.





NOTE: IF 90 DEGREE FOLD IS DESIRED, REFER TO THE 90 DEGREE FOLDING PROCESS SECTION OF THIS MANUAL, AFTER THE "TO CHANGE POSITION OF INTERNAL HYDRAULIC CYLINDER" STEPS HAVE BEEN FOLLOWED.

ADJUSTABLE WING REST

Vertical Fold Tillage Toolbars are standard with 180° fold configuration. If 115° or 135° fold configuration is desired, adjustable wing rests must be ordered separately (see adjustable wing rest parts page).

The adjustable wing rests aid in relieving stress put on components of the internal hydraulic cylinder while the wings are folded. The adjustable wing rests also prevent guage wheels from contacting the tractor cab.

TO MOUNT ADJUSTABLE WING REST:

1. Mount wing rest in the same location the original 180° fold wing rest was once mounted.

2. Use provided U-bolts to fasten to toolbar.

TO ADJUST WING REST:

1. Before adjusting, be sure the internal hydraulic cylinder is in the correct position for the desired degree of folded wing placement. If internal hydraulic cylinder must be moved, refer to the instructions for "Changing Degree of Fold" on the previous page.

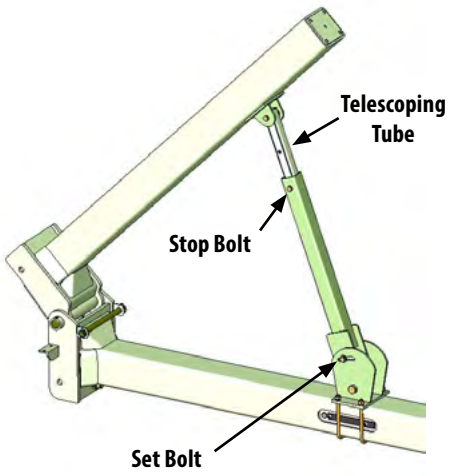
2. Be sure hydraulic hoses are properly connected to the tractor and that there are no leaks in the system.

3. Raise the wing from field position to the desired degree of folded wing placement (fully extend hydraulic cylinder).

4. With the wing in position, extend the telescoping tube of the wing rest to the most extended position setting hole possible and replace the stop bolt and retighten.

5. Adjust the wing rest arm from the base by loosening the set bolt and rotating the the wing rest arm until the wing rest plate becomes flush with a bare space on the wing and retighten.

6. Retract the internal hydraulic cylinder until the wing is fully unfolded and in the rigid position.



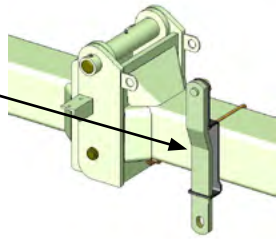
WARNING! AVOID CRUSHING. MAKE SURE ALL PERSONNEL ARE CLEAR OF IMPLEMENT AT ALL TIMES IMPLEMENT IS IN MOTION. BE AWARE OF OBSTRUCTIONS ABOVE, BELOW, AND AROUND IMPLEMENT WHEN IN OPERATION OR TRANSPORT. INJURY OR DEATH CAN RESULT FROM BEING STRUCK BY THE IMPLEMENT.

7. Re-loosen the set bolt for the wing rest arm and slightly rotate the wing rest arm outward so that when wing is in the folded position, the weight of the wing will rest upon the wing rest and not on the internal hydraulic cylinder.

8. Retighten the wing rest arm set bolt.

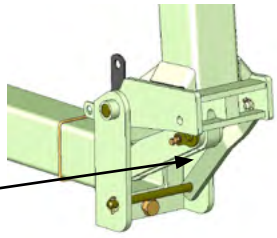
90 DEGREE FOLDING PROCESS

NOTE: THE 90 DEGREE FOLD TRANSPORT LOCK (SOLD SEPERATELY) IS MANDATORY FOR THE 90 DEGREE FOLDING POSITION. (SEE PARTS ID SECTION)



NOTE: BE SURE TO FOLLOW ALL STEPS OF "TO CHANGE POSITION OF INTERNAL HYDRAULIC CYLINDER" BEFORE PROCEEDING.

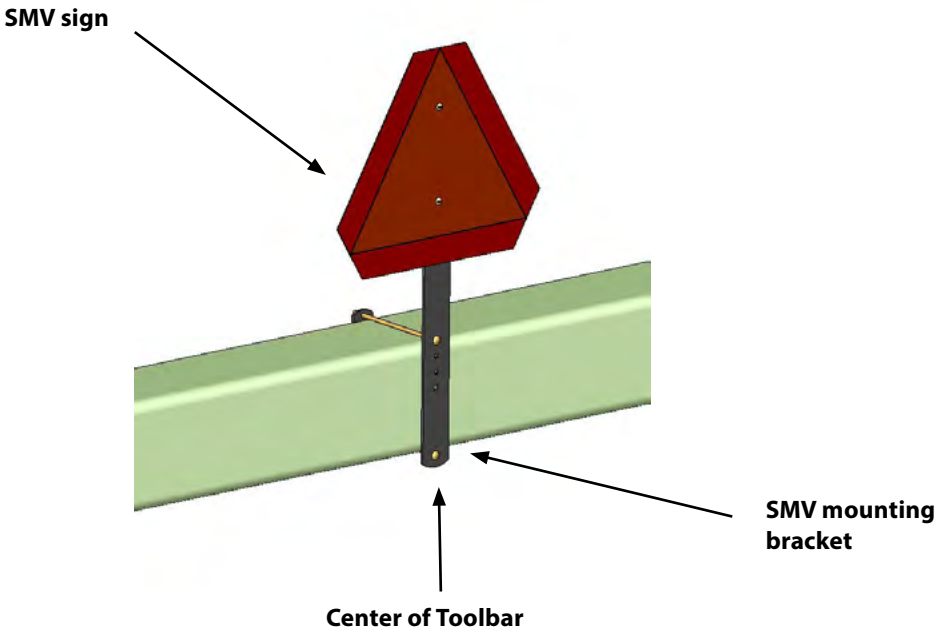
TO INSTALL 90 DEGREE FOLD TRANSPORT LOCK:



1. Remove wing lock pin from rigid position.
2. Raise the wing to the 90 degree position (fully extend the internal hydraulic cylinder).
3. Remove wing lock pin from storage position and install in the wing lock position with the 90 degree transport lock in place as shown.
4. Adjust outer safety light brackets accordingly.

SMV SIGN ASSEMBLY

The final item that the light kit contains is the SMV (slow moving vehicle) mount and sign. The SMV is mounted near the center of the *Vertical Fold Toolbar* with a two bolt mounting bracket. The bracket should face the back and stick upward in-between the third link center mast plates. Next attach the SMV sign to the bracket with the machine screws provided in the kit. The SMV should be visible from the rear and be oriented as shown below when finished.



NOTES

FIELD OPERATION

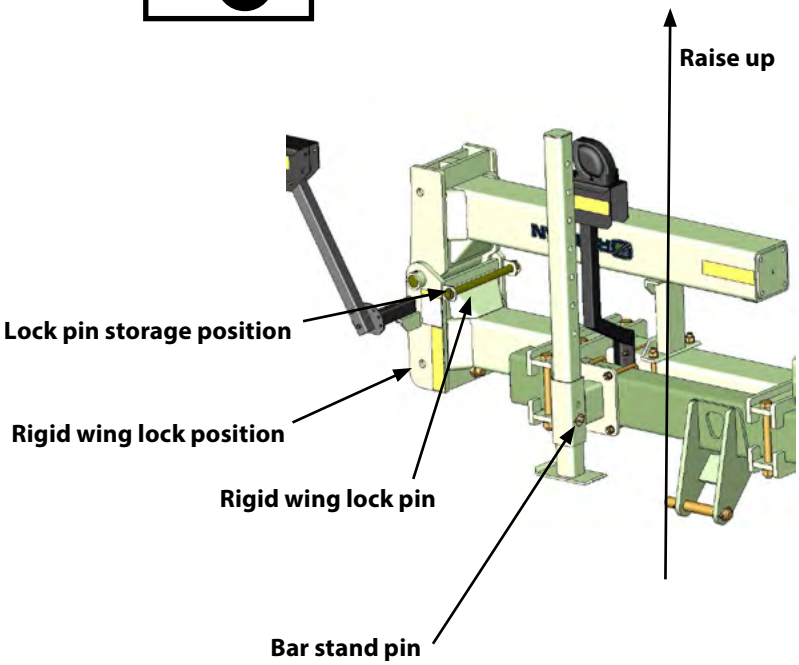
AVOID CRUSHING. Do not stand between tractor and implement when connecting or disconnecting implement. Injury or death can result from being trapped between the tractor and implement.

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. Park 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.

PLACE TRACTOR IN PARK AND REMOVE KEY BEFORE DISMOUNTING TRACTOR TO ADJUST IMPLEMENT.

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.



Make sure three point pins are not excessively worn.

Make sure implement/toolbar is attached securely to three point tractor hitch.

Make sure cab hydraulic control configuration is easily accessible and to the preference of the primary operator.

Make sure tractor is adequately ballasted for safe operation. Refer to tractor owner's manual for proper ballasting instructions.

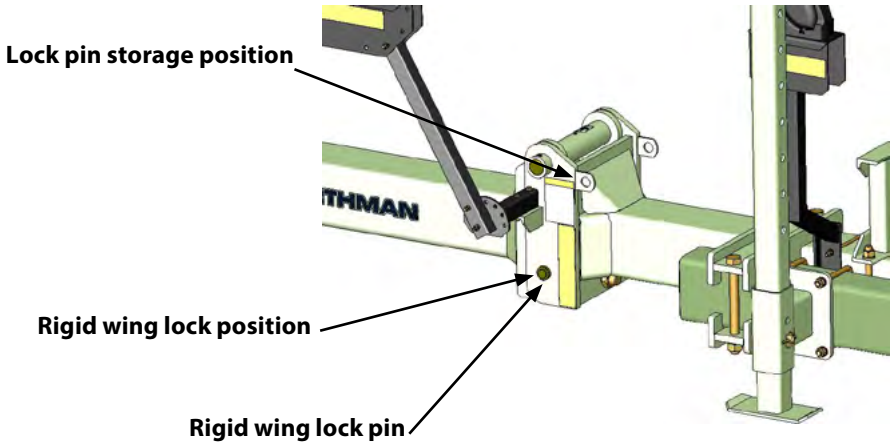
After tractor hook-up raise toolbar and remove Bar stand pin and raise bar stand to raised position, and replace bar stand pin.

Move Rigid wing lock pin from Rigid wing lock position to Lock pin storage position. The toolbar will not fold with the Rigid wing lock pins installed in the Rigid lock position.

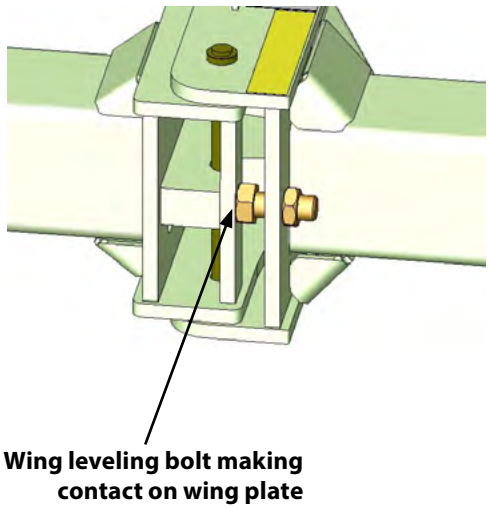
FIELD OPERATION

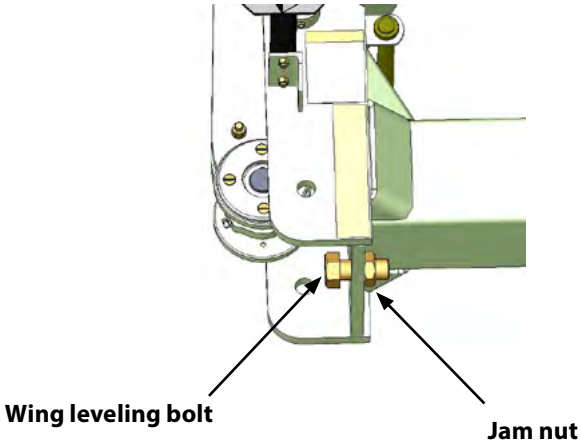
RIGID OPERATION. For Rigid operation in the field: With wings completely unfolded, move Rigid wing lock pin from Lock pin storage position and install into Rigid wing lock position. This will keep wing from floating up.

NOTE: Toolbar will not be able to fold with wings locked down.



WING LEVELING. Factory setting for wing level bolts allows no downward wing position from level. If wings become out of adjustment, these bolts can be moved. Wing leveling bolts can also be adjusted so that wings will float down below factory setting. *Vertical Fold Toolbars* have one wing leveling bolt per wing.





TO ADJUST WING LEVELING BOLTS:

1. Loosen Jam nut. **2.** Adjust bolt. **3.** Tighten Jam nut. Recommended Tools: 1 - 13/16" end wrench.

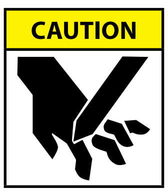
NOTE: Jam nuts are important for protecting the threads in the tapped plate and should not ever be removed from the assembly.

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 BASE STANDS TO SUPPORT THE IMPLEMENT. Park 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. Remove buildup of grease, oil, or debris prior to adjusting implement.

PROBLEM:

Tractor will not hook up to three point hitch.



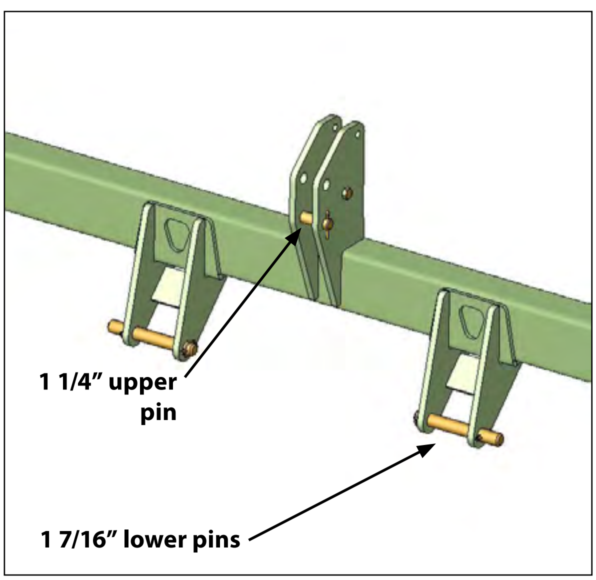
SOLUTION OPTIONS:

CAUTION! BE EXTREMELY CAREFUL WHEN WORKING AROUNG UNSHIELDED SHARP EDGES. INJURY MAY RESULT FROM CONTACT WITH SHARP EDGES.

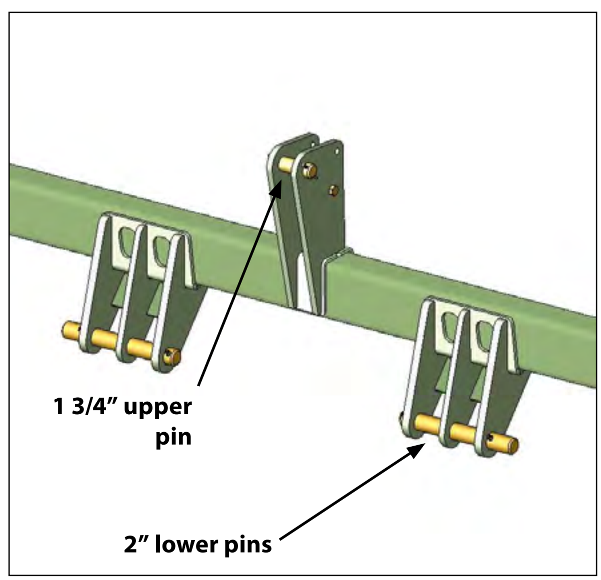
1. Tractor does not match three point hitch category on toolbar.

- Convert quick coupler on tractor to correct category. Refer to tractor operators manual.
- Switch quick coupler on tractor to correct category.

NOTE: Refer to the images below to help determine the hitch category of your vertical fold toolbar.



CATEGORY 3 - FITS CATEGORY 3 AND 3N



CATEGORY 4 - FITS CATEGORY 4 AND 4N

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 BASE STANDS TO SUPPORT THE IMPLEMENT. Park 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. Remove buildup of grease, oil, or debris prior to adjusting implement.

PROBLEM:

Wings do not fold or unfold.

SOLUTION OPTIONS:

CAUTION! BE EXTREMELY CAREFUL WHEN WORKING AROUNG UNSHIELDED SHARP EDGES. INJURY MAY RESULT FROM CONTACT WITH SHARP EDGES.

1. Rigid wing lock pins installed.

- Remove wing lock pins. (see pg 4-1)

2. Hydraulic tips installed incorrectly in tractor SCV.

- Refer to the tractor operator's manual or dealer for tractor hydraulic specifications.

3. Tractor hydraulic pressure is insuffficient.

- Refer to tractor operator's manual or dealer for tractor hydraulic specifications.

NOTE: To avoid foreign objects in hydraulic oil, always clean hydraulic tips and outlets. Foreign material can ruin cylinders and plug restrictors.

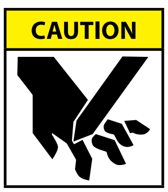
AVOID CRUSHING: Make sure all personnel are clear of the implement. Lower implement to the ground, place tractor in park, turn off engine, and remove key.

USE BASE STANDS TO SUPPORT THE IMPLEMENT. Park 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. Remove buildup of grease, oil, or debris prior to adjusting implement.

PROBLEM:

Wings do not fold or unfold. (cont.)

SOLUTION OPTIONS:



CAUTION! BE EXTREMELY CAREFUL WHEN WORKING AROUNG UNSHIELDED SHARP EDGES. INJURY MAY RESULT FROM CONTACT WITH SHARP EDGES.

4. Hydraulic cylinder restrictors could be plugged.

- Refer to (pg. 5 - 4 & 5 - 5) for removall process of cylinder assembly.
    1. Remove hose from cylinder.
    2. Remove adaptor that goes in-between hose and cylinder port.
    3. Restrictor is located inside the adaptor and can be removed with allen wrench.
    4. Restrictor is made from a set screw with a .055 hole drilled in it.
    5. Check to see if hole is plugged.
    6. Clean and re-install.
- Refer to (pg. 7 - 4 & 7 - 5) for cylinder component identification and replacement parts.

5. Cylinder seal kit is bad.

- Refer to (pg. 5 - 4 & 5 - 5) for removal process of cylinder assembly.

- Refer to (pg. 7 - 7) for cylinder internal component identification and seal kit part number.

NOTE: To avoid foreign objects in hydraulic oil, always clean hydraulic tips and outlets. Foreign material can ruin cylinders and plug restrictors.

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.

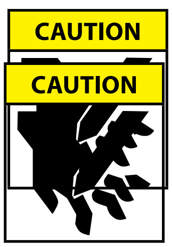
USE BASE STANDS TO SUPPORT THE IMPLEMENT. Park implement on a clean, dry, and level surface. An uneven surface could cause implement to shift or fall, resulting in injury or death, as well as implement damage. Securely support all implement components that must be raised. Remove buildup of grease, oil, or debris prior to adjusting implement.

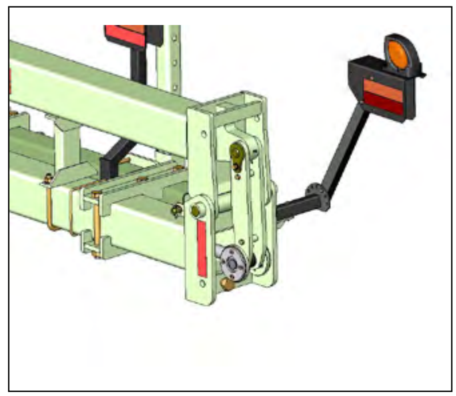
REMOVAL OF INTERNAL CYLINDER

CAUTION

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

153 - 045





FOLD TOOLBAR:

1. Be sure rigid locking pin is in storage position (pg. 4 - 1)

2. Fold wings over until they hit wing stops so weight of wings are on stops.

CAUTION! BE EXTREMELY CAREFUL WHEN WORKING AROUNG UNSHIELDED SHARP EDGES. INJURY MAY RESULT FROM CONTACT WITH SHARP EDGES.

tees

DISCONNECT HYDRAULIC HOSES:

1. Relieve hydraulic system pressure in tractor.

2. Unhook hydraulic hoses and store in a clean area.

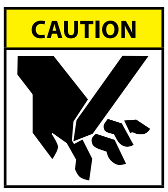
3. Locate hydraulic tees near center of bar. Mark hoses and tees for easy re-assembly. Remove internal hoses from tee. Cover open ends of hoses and tees to protect debris from entering hydraulic system.

DANGER! 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.

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 BASE STANDS TO SUPPORT THE IMPLEMENT. Park 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. Remove buildup of grease, oil, or debris prior to adjusting implement.

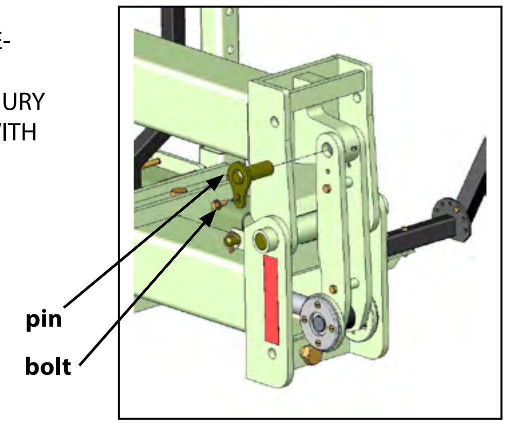
REMOVAL OF INTERNAL CYLINDER



CAUTION! BE EXTREMELY CAREFUL WHEN WORKING AROUNG UNSHIELDED SHARP EDGES. INJURY MAY RESULT FROM CONTACT WITH SHARP EDGES.

DISCONNECT STRAPS:

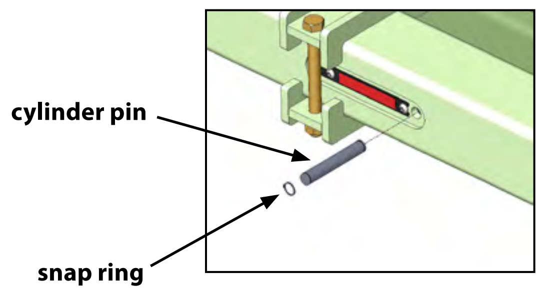
1. Remove bolt that holds pin in.
2. Remove pin. Weight of cylinder assembly may need to be supported to remove pin.



REMOVE CYLINDER PIN:

1. With snap-ring pliers remove snap ring from pin (in-between bars).
2. Remove pin from toolbar. (cylinder should be loose at this point).

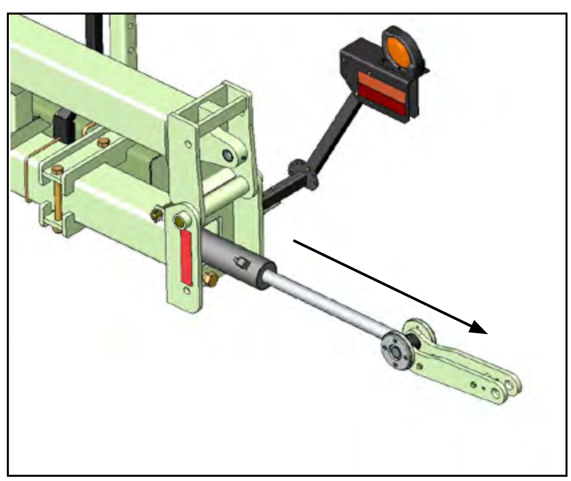
(for re-assembly use alignment punch to align cylinder and pin)



REMOVE CYLINDER:

1. Make sure hose ends are covered.
2. Tie twine or wire to hoses to aid in re-assembly.
3. Pull cylinder out of toolbar tube.

Reverse process for re-assembly.



NOTES

NOTES

⚠ 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 AND CYLINDER STOPS TO SUPPORT THE IMPLEMENT. Park 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. Remove buildup of grease, oil, or debris prior to maintaining implement.

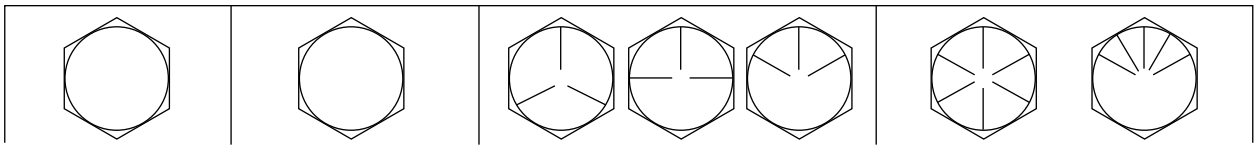
AVOID ENTANGLEMENT. Never lubricate or service implement in motion. Keep away from power driven parts when in motion. Disengage power sources prior to maintaining implement. Injury or death can result from contact with power driven parts when in motion.

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.

AVOID FLUID PENETRATION. 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.

TORQUE SPECIFICATIONS

Unified Inch Bolt and Screw Torque Values



Bolt or Screw Size	SAE Grade 1				SAE Grade 2[a]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]	
	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in
1/4	3.7	33	4.7	42	6	53	7.5	66	9.5	84	12	106	13.5	120	17	150
													N•m	lb-ft	N•m	lb-ft
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
									N•m	lb-ft	N•m	lb-ft				
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
			N•m	lb-ft	N•m	lb-ft	N•m	lb-ft								
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N•m	lb-ft														
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	308	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

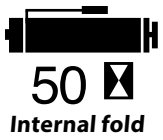
[a] *Grade 2 applies for hex cap screws (not hex bolts) up to 6. in (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.*

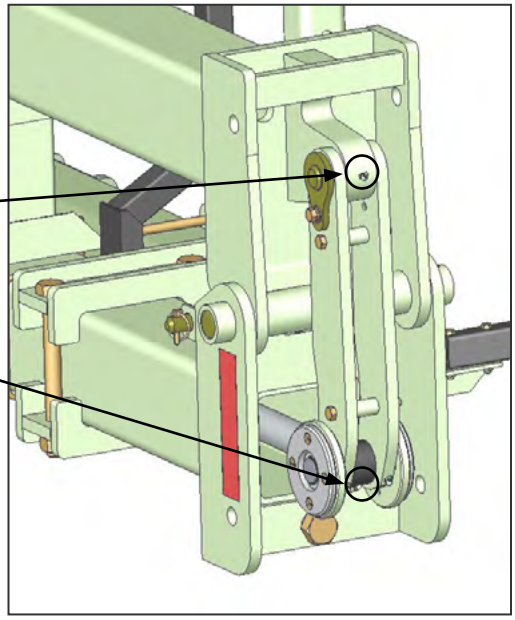
[b] *"Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C zinc flake coating.*

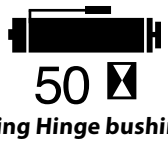
[c] *"Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B zinc flake coating.*

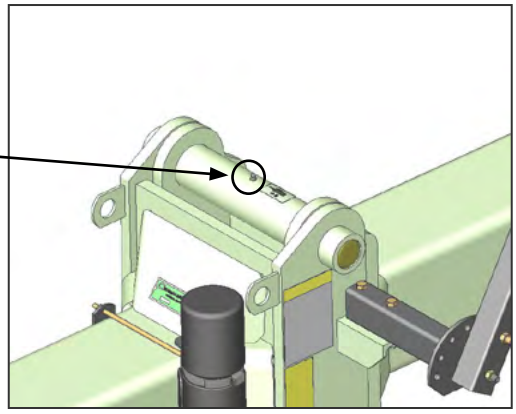
LUBRICATION

- Grease - use high quality multi-purpose grease.
- Follow recommended 50 hour service interval illustrated below.









IMPLEMENT INSPECTION

- When replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore implement to original specifications. Replace broken or worn parts immediately. Contact your Orthman dealer for replacement parts.

- During break-in (40 hours), check hardware for proper torque every 10 to 20 hours. (pg. 6 - 2)

- Before each use, check hardware for wear and proper torque. (pg. 6 - 2) Replace damaged or missing hardware with hardware of an identical grade to restore implement to original specifications.

- Do not allow debris to buildup on any surface of the implement.

- Replace all shields and guards. Be sure all tools, parts, and service equipment are removed prior to transporting equipment.

⚠ IMPLEMENT STORAGE

- Clean and touch up paint seasonally to avoid corrosion and rust. Contact your Orthman dealer for touch up paint.

- Inspect all safety and Orthman decals and replace if missing or damaged. Contact your Orthman dealer for replacement decals. (pg. 2 - 10 thru 2 - 14)

- Grease all zerks regardless of hourly interval prior to storage. (pg. 6 - 3)

- Check all hardware according to torque specifications prior to storage. (pg. 6 - 2)

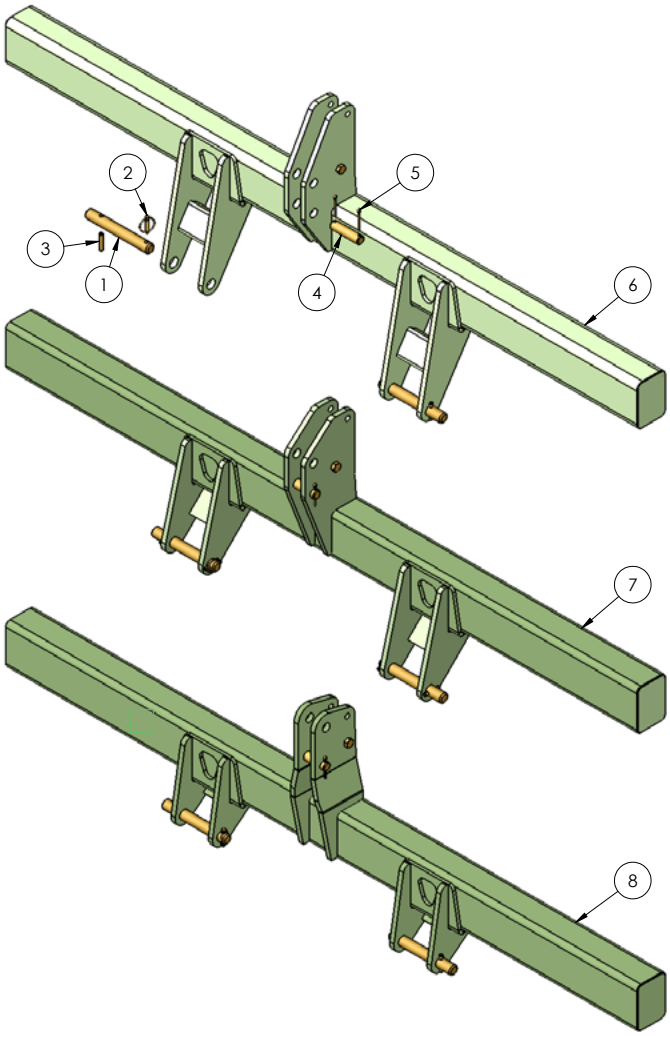
- Replace all worn or damaged parts prior to storage.

- Store inside if possible. Storing implement inside will prolong the life of the components.

⚠ **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.

Storing implement on the ground will relieve the tractor three point hitch of hydraulic pressure.
Hydraulic systems tend to settle, endangering anything underneath the implement.

⚠ **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.



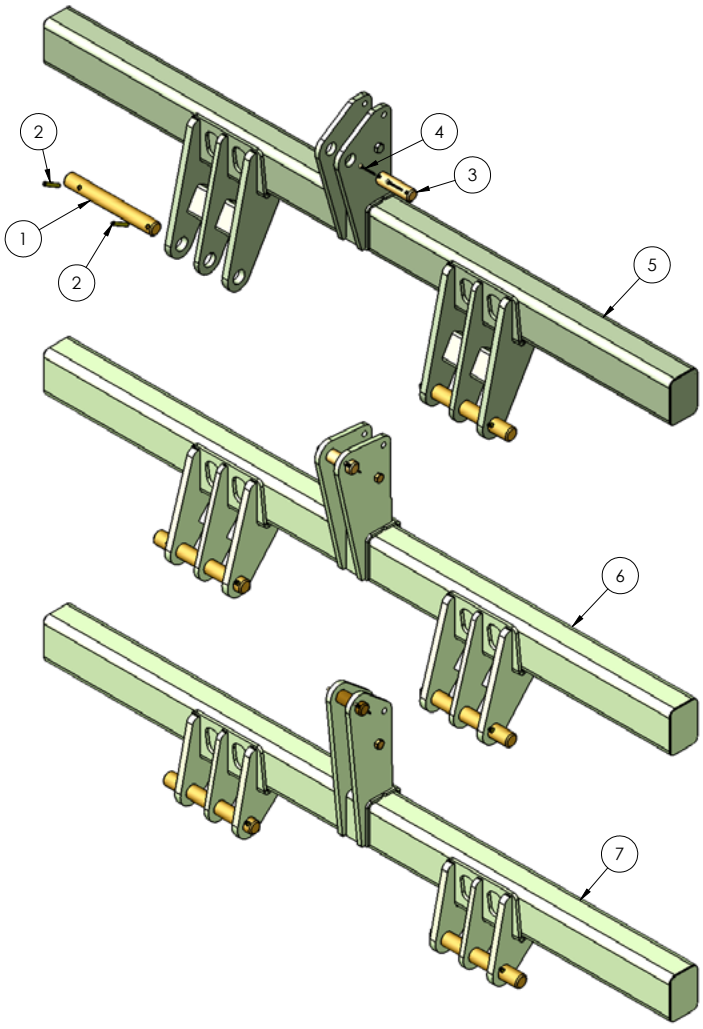
HITCH OPTIONS AND ASSEMBLY - CATEGORY 3/3N

Key	Part #	Description	Qty	Notes
1	302-592	Lower hitch tug pin	2	1 7/16" x 10 7/8" long
2	104-036	Lynch pin	2	7/16" x 2"
3	104-102	Roll pln	2	1/2" x 2 1/2"
4	302-591	Upper hitch pin	1	1 1/4" x 4 7/8" long
5	104-022	Cotter pin	2	1/4" x 2 1/2"
6	601-141*	High lift hitch	1	5" x 7" 110" length
	601-153*	High lift hitch	1	5" x 7" 144" length
	601-142*	High lift hitch	1	5" x 7" 168" length
	601-176*	High lift hitch	1	5" x 7" 192" length
	601-178*	High lift hitch	1	5" x 7" 240" length

Key	Part #	Description	Qty	Notes
7	601-971*	Med-lift hitch	1	5" x 7" 110" length
	601-972*	Med-lift hitch	1	5" x 7" 144" length
	601-973*	Med-lift hitch	1	5" x 7" 168" length
	601-974*	Med-lift hitch	1	5" x 7" 192" length
	601-976*	Med-lift hitch	1	5" x 7" 240" length
8	601-140*	Low lift hitch	1	5" x 7" 90" length
	601-151*	Low lift hitch	1	5" x 7" 110" length
	601-152*	Low lift hitch	1	5" x 7" 144" length
	601-154*	Low lift hitch	1	5" x 7" 168" length
	601-179*	Low lift hitch	1	5" x 7" 192" length

** Hitch package. Includes items 1-5 above.*

PARTS IDENTIFICATION

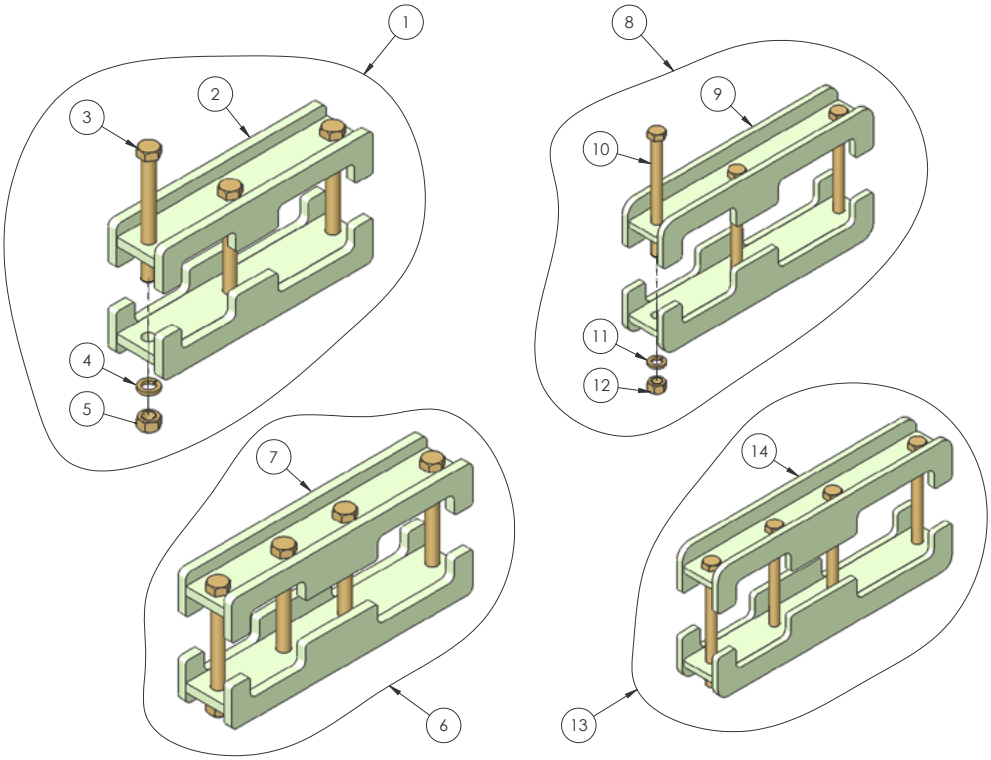


HITCH OPTIONS AND ASSEMBLY - CATEGORY 4/4N

Key	Part #	Description	Qty	Notes
1	321-513	Lower hitch tug pin	2	---------
2	104-091	Roll pin	4	1/2″ x 3″
3	321-514	Upper hitch pin	1	--------
4	104-184	Cotter pin	2	1/4″ x 3″
5	601-430*	High lift hitch	1	5″ x 7″ 110″ length
	601-431*	High lift hitch	1	5″ x 7″ 144″ length
	601-433*	High lift hitch	1	5″ x 7″ 168″ length
	601-444*	High lift hitch	1	5″ x 7″ 192″ length
	601-447*	High lift hitch	1	5″ x 7″ 240″ length

Key	Part #	Description	Qty	Notes
6	601-420*	Med-lift hitch	1	5″ x 7″ 110″ length
	601-421*	Med-lift hitch	1	5″ x 7″ 144″ length
	601-422*	Med-lift hitch	1	5″ x 7″ 168″ length
	601-423*	Med-lift hitch	1	5″ x 7″ 192″ length
	601-425*	Med-lift hitch	1	5″ x 7″ 240″ length
7	601-412*	Low lift hitch	1	5″ x 7″ 110″ length
	601-413*	Low lift hitch	1	5″ x 7″ 144″ length
	601-414*	Low lift hitch	1	5″ x 7″ 168″ length
	601-415*	Low lift hitch	1	5″ x 7″ 192″ length

** Hitch package. Includes items 1-4 above.*



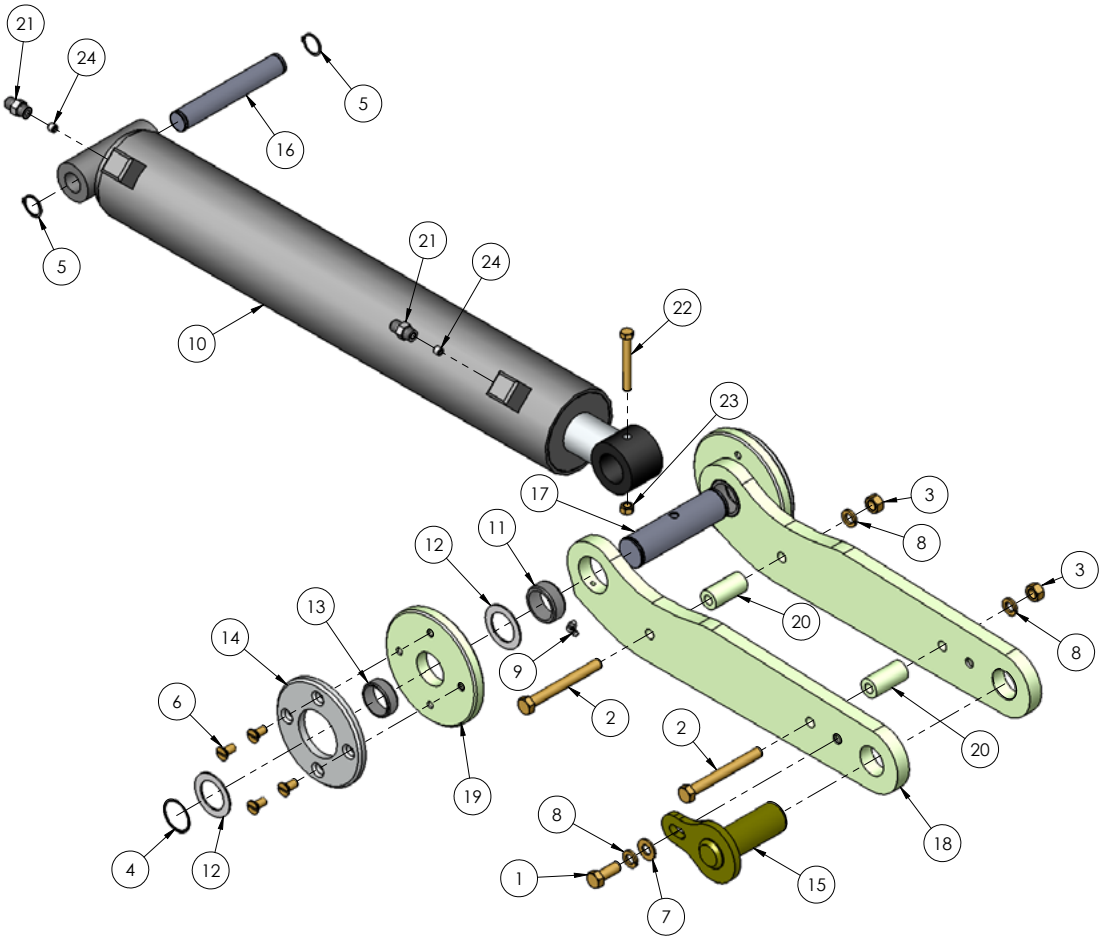
HITCH CLAMP ASSEMBLY

Key	Part #	Description	Qty	Notes
1	601-360	Clamp assembly	1	Heavy Duty - Med., **4"
2	302-571	Clamp	2	Top and Bottom
3	100-199	Bolt	3 or 4*	1" x 10" GRD 8
4	108-025	Lock washer	3 or 4*	1"
5	102-111	Nut	3 or 4*	1"
6	601-362	Clamp assembly	1	Heavy Duty - Long, **6 3/4"
7	302-572	Clamp	2	Top and Bottom

Key	Part #	Description	Qty	Notes
8	601-380	Clamp assembly	1	Regular Duty - Med., **4"
9	302-595	Clamp	2	Top and Bottom
10	100-274	Bolt	3 or 4*	3/4" x 9 1/2", GRD 8
11	108-022	Lock washer	3 or 4*	3/4"
12	102-009	Nut	3 or 4*	3/4"
13	301-378	Clamp assembly	1	Regular Duty - Long, **6 3/4
14	302-601	Clamp	2	Top and Bottom

** 3 bolts, lock washers, and nuts are required for medium length clamp assembly. 4 bolts, lock washers, and nuts are required for long length clamps.*
*** Denotes spacing between 5" x 7" hitch bar and 7" x 7" toolbar.*

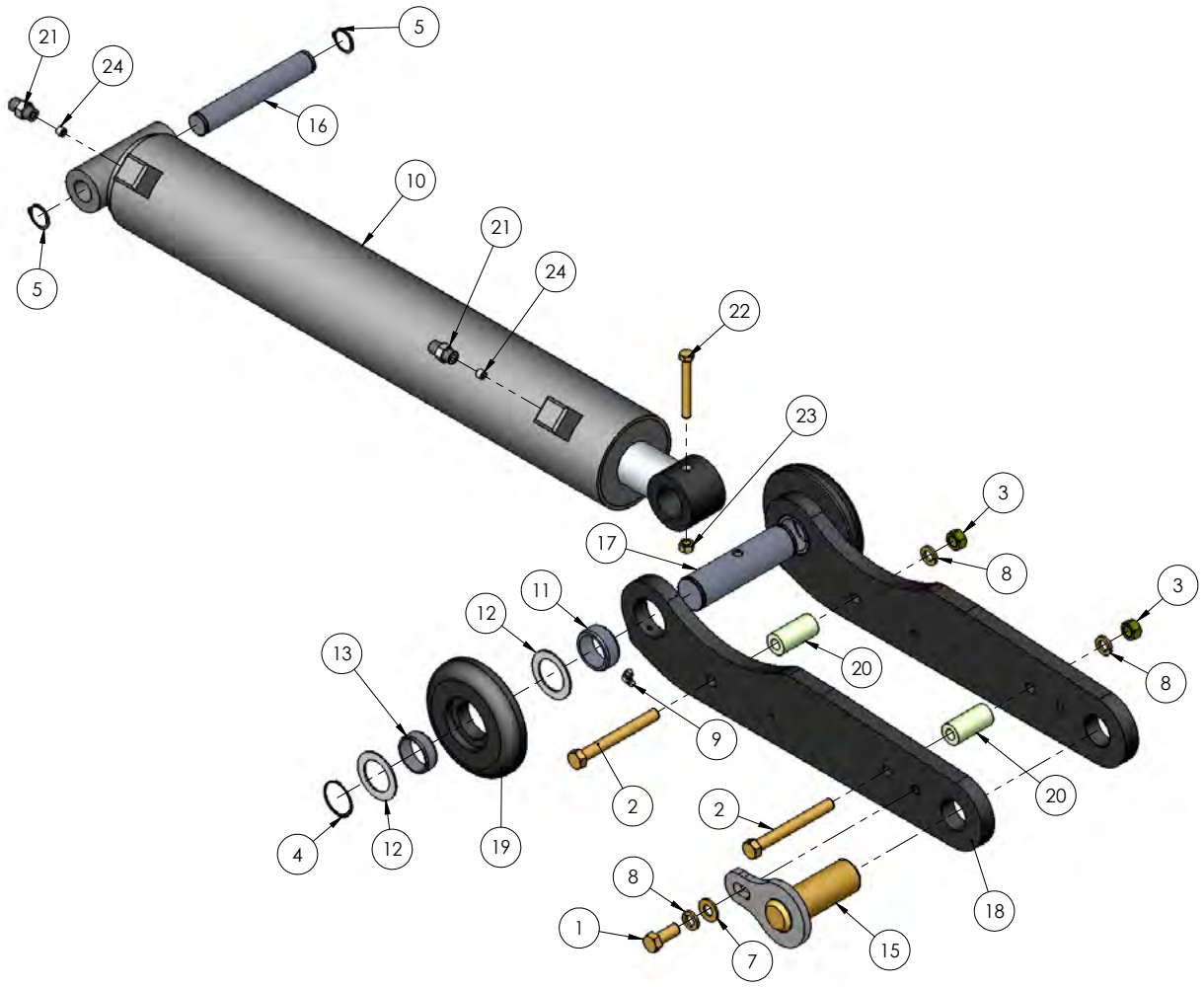
PARTS IDENTIFICATION



INTERNAL FOLD ASSEMBLY - 180 DEGREE

Key	Part #	Description	Qty	Notes
1	100-115	Bolt	1	1/2" x 1 1/4", Grade 5
2	100-125	Bolt	2	1/2" x 4 1/4", Grade 5
3	102-007	Nut	2	1/2"
4	104-052	Snap ring	2	1 1/2" external
5	104-053	Snap ring	2	1" external
6	106-107	Screw	4	3/8" x 3/4"
7	108-001	Flat washer	1	1/2"
8	108-020	Lock washer	3	1/2"
9	110-008	Grease fittings	2	1/4" x 90 degree
10	194-499	Cylinder	1	4" x 24"
11	134-040	Bushing, split	2	1 7/8" x 1 1/2" x 3/4"
12	134-041	Machined washer	4	2 1/4" x 1 1/2" x 14 ga.
13	134-040	Bushing, split	2	1 7/8" x 1 1/2" x 3/4"
	134-047	Bushing, split	2	1 3/4" x 1 1/2" x 5/8"

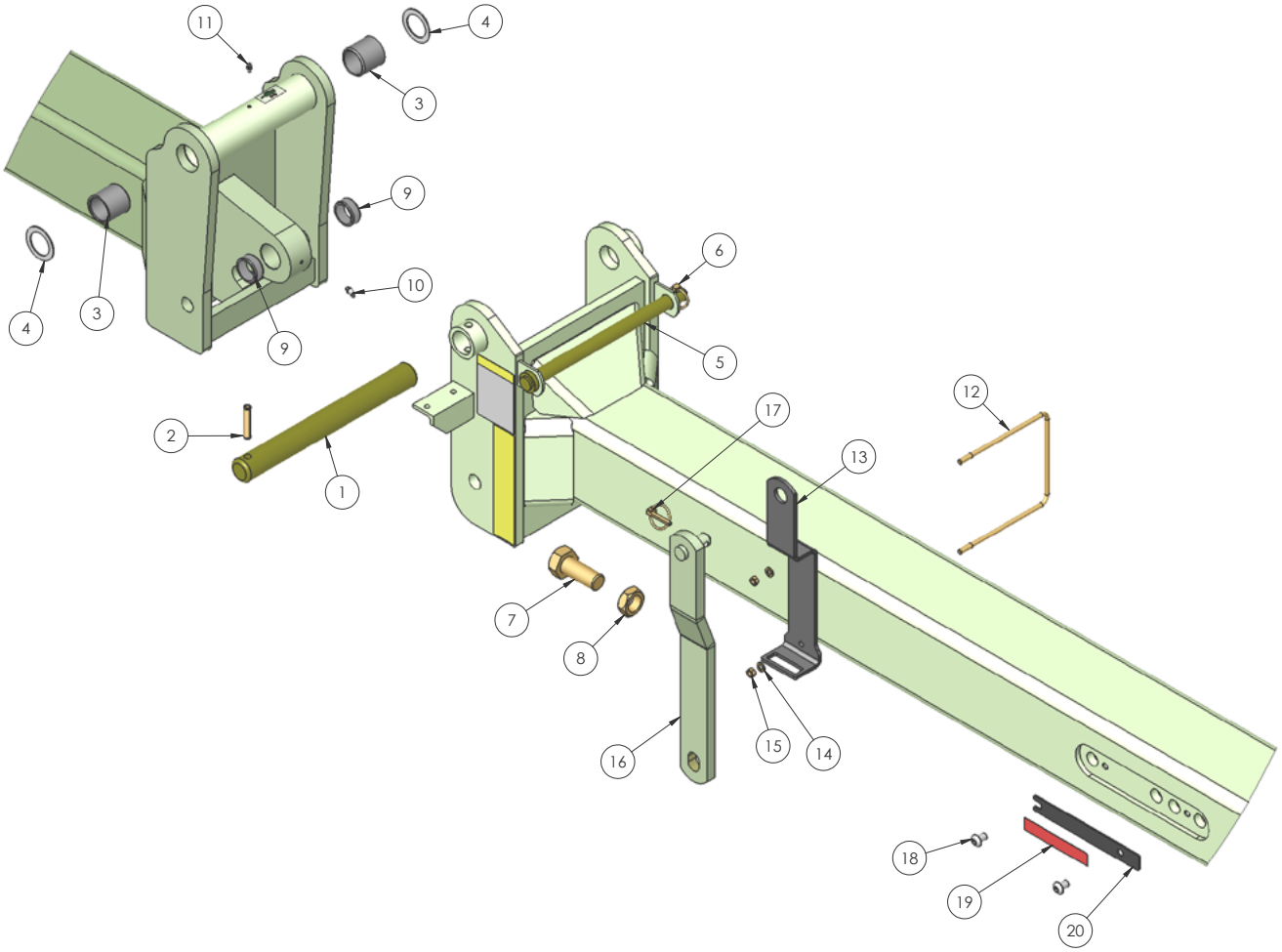
Key	Part #	Description	Qty	Notes
14	301-512	Friction plate	2	---
15	301-548	Linkage pin	1	---
16	301-500	Pin	1	6 7/8" long (for 3/8" wall bars)
	301-800	Pin	1	6 9/16" long (for 1/2" wall bars)
17	321-139	Pin pkg. (3/8" wall bars)	1	Inc. pin and items 22, 23, and 4
	321-151	Pin pkg. (1/2" wall bars)	1	Inc. pin and items 22, 23, and 4
18	301-980	Connecting strap	2	---
19	301-511	Guide wheel	2	3/4" thick (for 3/8" wall bars)
	301-802	Guide wheel	2	5/8" thick (for 1/2" wall bars)
20	317-714	Spacer	2	---
21	340-078	Adaptor	2	9/16" MB x 9/16 MJ
22	100-098	Bolt	1	3/8" x 3", Grade 5
23	102-027	Lock nut	1	3/8"
24	340-057	Restrictor	2	3/8" x 3/8" with .055 hole



INTERNAL FOLD ASSEMBLY - 16R30

Key	Part #	Description	Qty	Notes
1	100-115	Bolt	1	1/2" x 1 1/4", Grade 5
2	100-125	Bolt	2	1/2" x 4 1/4", Grade 5
3	102-007	Nut	2	1/2"
4	104-052	Snap ring	2	1 1/2" external
5	104-053	Snap ring	2	1" external
6	106-107	Screw	4	3/8" x 3/4"
7	108-001	Flat washer	1	1/2"
8	108-020	Lock washer	3	1/2"
9	110-008	Grease fitting	2	1/4" x 90 degrees
10	194-499	Cylinder	1	4" x 24"
11	134-040	Bushing, split	2	1 7/8" x 1 1/2" x 3/4"
12	134-041	Machined washer	4	2 1/4" x 1 1/2" x 14 ga.

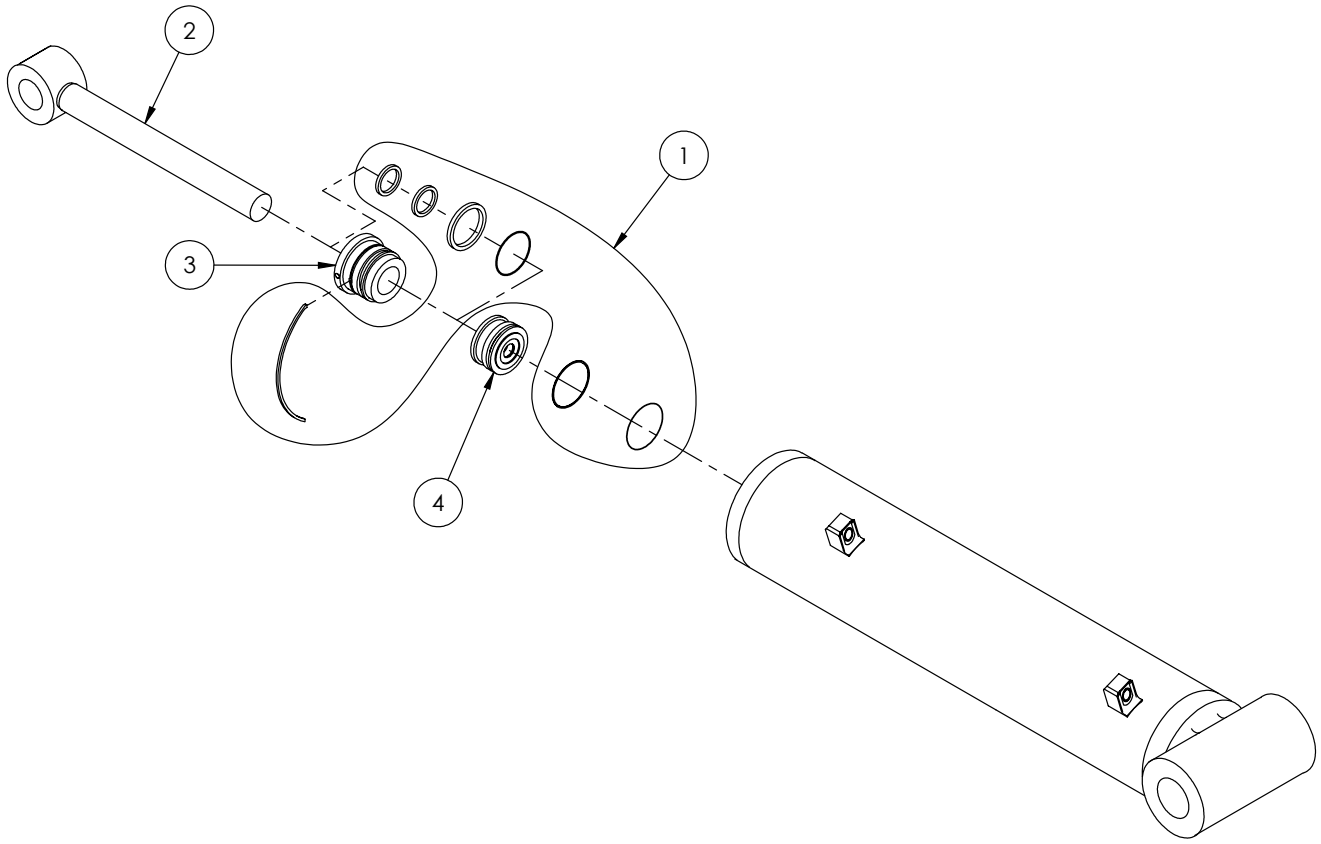
Key	Part #	Description	Qty	Notes
13	134-047	Bushing, split	2	1 3/4" x 1 1/2" x 5/8"
14	301-512	Friction plate	2	---
15	301-548	Linkage pin	1	---
16	301-800	Pin	1	6 9/16" long (for 1/2" wall bars)
17	321-151	Pin pkg. (1/2" bar)	1	Inc. pin and items 22, 23, and 4
18	301-502	Connecting strap	2	black
19	301-802	Guide wheel	2	1" thick (for 1/2" wall bars)
20	317-714	Spacer	2	---
21	340-078	Adaptor	2	9/16" MB x 9/16 MJ
22	100-098	Bolt	1	3/8" x 3", Grade 5
23	102-027	Lock nut	1	3/8"
24	340-057	Restrictor	2	3/8" x 3/8" with .055 hole



TOOLBAR HINGE ASSEMBLY

Key	Part #	Description	Qty	Notes
1	301-146	Hinge pin	1	1 3/4" x 16 1/4"
2	104-005	Roll pin	1	1/2" x 2 1/2"
3	134-005	Bushing	2	2.125" OD x 1.754" ID x 2"
4	134-023	Bushing	2	2 1/2" x 1 3/4" x 14 GA
5	301-156	Wing lock pin	1	1" x 14 1/2"
6	104-065	Linch pin	1	5/16" x 1 11/16"
7	100-257	Wing level bolt	1	1 1/4" x 2 1/2", 12UNF, GR8
8	102-077	Jam nut	1	1 1/4" - 12UNF
9	134-040	Split bushing	2	1.875" OD x 1.51" ID x .75"
10	110-002	Grease fitting	1	1/4" - 28, 45°

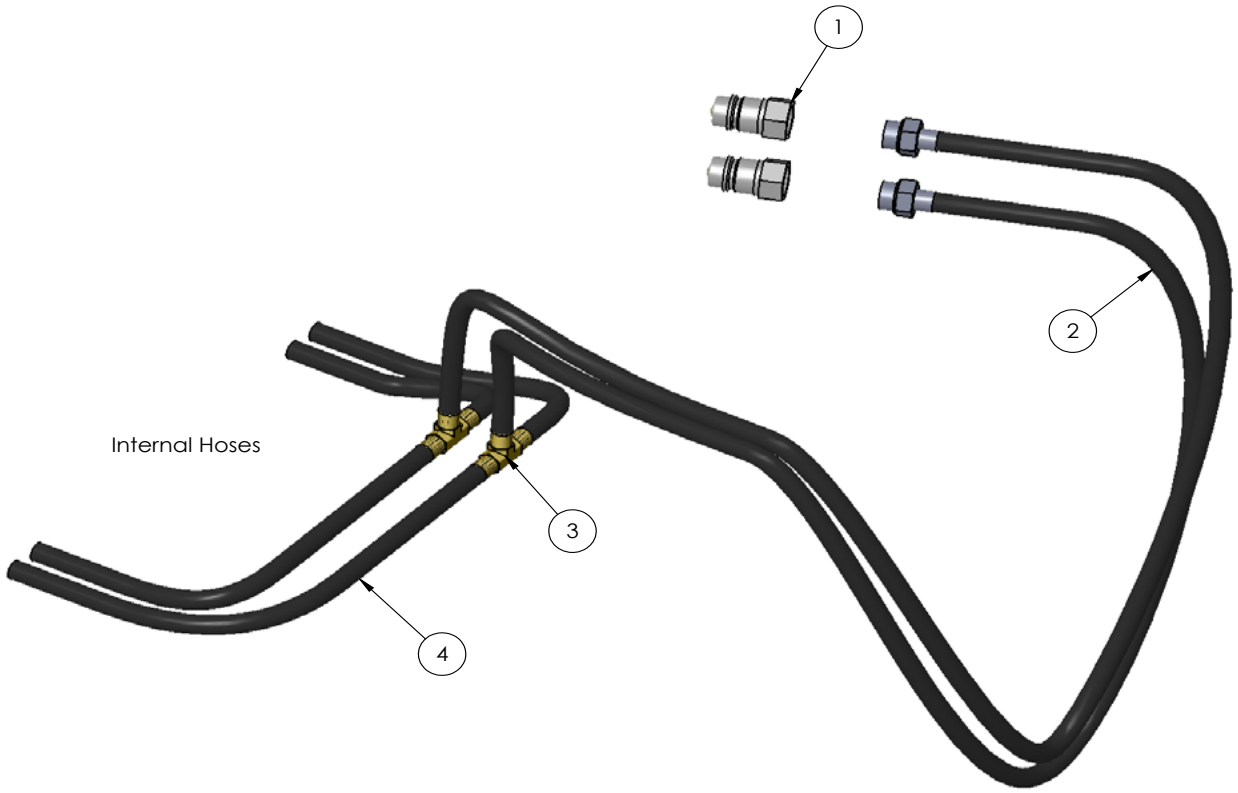
Key	Part #	Description	Qty	Notes
11	110-001	Grease fitting	1	1/4" - 28, straight
12	315-026	U-bolt	1	3/8"; 7" x 7" bar
13	385-593	Storage bracket	1	Storage for wing lock
14	108-018	Lock washer	1	3/8"
15	102-005	Nut	1	3/8"
16	301-707	90° wing lock	1	-----
17	104-065	Linch pin	1	5/16" x 1 11/16"
18	100-456	Bolt, screw	1	1/2" x 3/4"
19	153-180	Decal	2	------
20	301-200	Cover plate	1	------



HYDRAULIC CYLINDER INTERNAL

Key	Part #	Description	Qty	Notes
1	194-440	Seal kit	1	for 194-499 cylinder
2	194-406	Cylinder rod	1	---
3	194-288	Gland	1	---
4	194-293	Piston	1	---

PARTS IDENTIFICATION



HYDRAULIC HOSE ASSEMBLY

Key	Part #	Description	Qty	Notes
1	140-092	Hydraulic tip	2	3/4" O-ring - Pioneer
2	196-563	Hyd hose - 60"	2	1/2" x 9/16" FJX x 3/4" MORB
3	198-203	Tee	2	9/16" x 9/16" x 9/16"
4	302-897	Hyd. hose - 36"	4	1/4" - 9/16 FJX x 9/16 FJX
	301-464	Hyd. hose - 48"		1/4" - 9/16 FJX x 9/16 FJX
	196-111	Hyd. hose - 60"		1/4" - 9/16 FJX x 9/16 FJX
	196-112	Hyd. hose - 72"		1/4" - 9/16 FJX x 9/16 FJX
	196-140	Hyd. hose - 84"		1/4" - 9/16 FJX x 9/16 FJX

Key	Part #	Description	Qty	Notes
	196-113	Hyd. hose - 96"		1/4" - 9/16 FJX x 9/16 FJX
	196-141	Hyd. hose - 108"		1/4" - 9/16 FJX x 9/16 FJX
	196-114	Hyd.hose - 120"		1/4" - 9/16 FJX x 9/16 FJX
	196-118	Hyd. hose - 132"		1/4" - 9/16 FJX x 9/16 FJX
	196-119	Hyd. hose - 144"		1/4" - 9/16 FJX x 9/16 FJX
	196-454	Hyd. hose - 156"		1/4" - 9/16 FJX x 9/16 FJX
	196-165	Hyd. hose - 168"		1/4" - 9/16 FJX x 9/16 FJX
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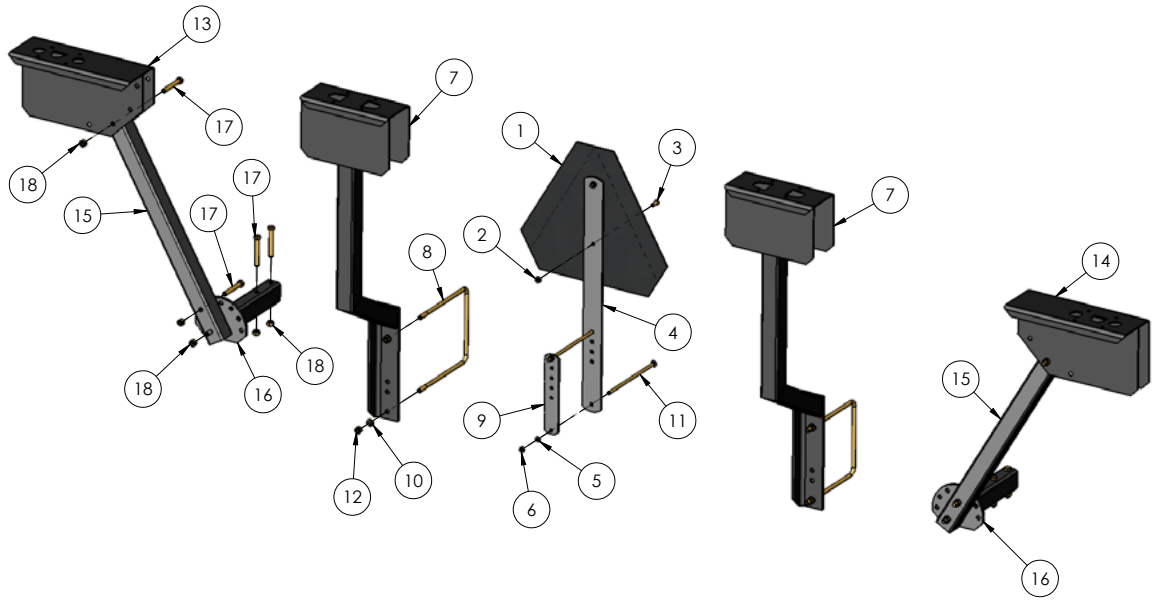


LIGHT MOUNTS AND SMV ASSEMBLY

Key	Part #	Description	Qty	Notes
1	153-109	SMV sign	1	---
2	102-085	Flanged lock nut	2	1/4"
3	106-077	Screw	2	1/2" x 1"
4	385-183	SMV bracket	1	---
5	108-027	Lock washer	2	1/4"
6	102-002	Nut	2	1/4"
7	301-574	Inner light bracket	2	Both left and right
8	315-026	U-bolt	2	3/8" 7 x 7
9	333-499	SMV bracket	1	---

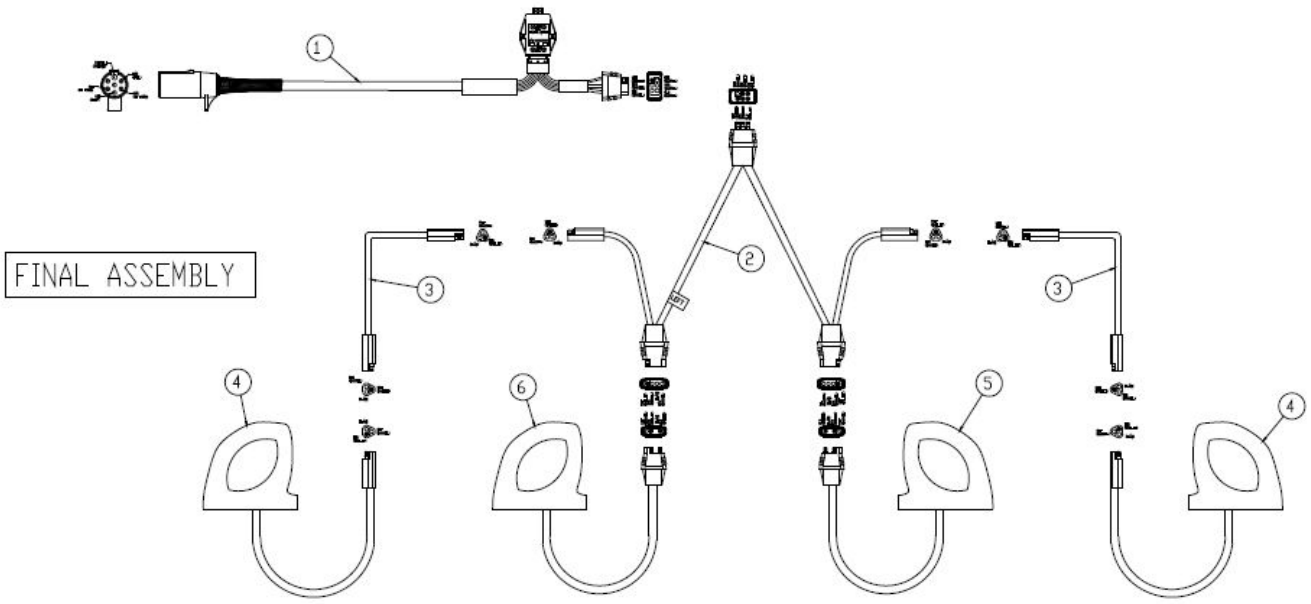
Key	Part #	Description	Qty	Notes
10	108-018	Lock Washer	4	3/8"
11	100-575	Bolt	2	1/4" x 8"
12	102-005	Hex Nut	4	3/8"
13	301-567	Adj. light bracket	1	Right side
14	301-568	Adj. light bracket	1	Left side
15	301-563	Adj. light arm	2	Left and right side
16	321-713	Adj. ligth mount	2	Left and right side
17	100-113	Hex Bolt	8	3/8" x 2 3/4" GRD 5
18	102-056	Lock Nut	8	3/8"

PARTS IDENTIFICATION

LIGHT KIT ASSEMBLY - WESBAR

Key	Part #	Description	Qty	Notes
1	154-629	Harness - 84″	1	7 pin with logic module
2	154-630	Harness - 74″	1	Main wishbone cable
3	154-631	Cable - 13′	2	Amber light extension
4	152-875	Light	2	Amber light
5	152-874	Light	2	Red light
6	154-832	7 pin storage	1	protective boot

Key	Part #	Description	Qty	Notes
7	152-055	cable ties	12	11 7/8″
8	152-023	cable ties	8	28″
n/a	154-682	Harness - 192″		7 pin with logic module
n/a	154-655	Extension cable - 13′		red light extension
n/a	154-833	Extension cable - 10′		front harness extension
	154-599	Wesbar ag light pack		Includes item# 1 thru 8

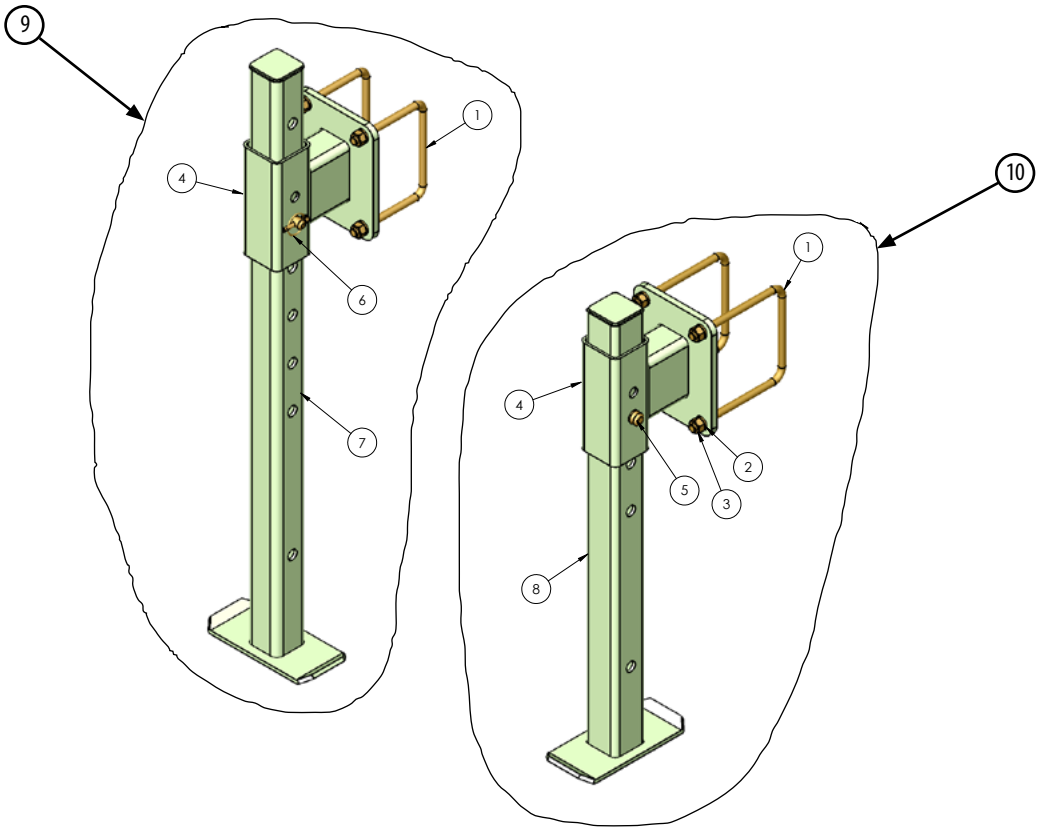


LIGHT KIT ASSEMBLY - COBO

Key	Part #	Description	Qty	Notes
1	154-829	Harness - 84"	1	7 pin with logic module
2	154-830	Harness - 74"	1	Main wishbone cable
3	154-831	Cable - 13'	2	Amber light extension
4	152-950	Light	2	Amber light
	152-704	Lens	2	Amber lens only
	152-055	cable ties	12	11 7/8"
	152-023	cable ties	8	28"

Key	Part #	Description	Qty	Notes
5	152-951	Light	2	Red light (right)
	152-705	lens	1	Red lens
	152-951	lens cover	1	blank black lens cover
6	152-952	Light	2	Red light (left)
	154-832	7 pin storage	1	protective boot
	154-855	Extension cable		Red light extension
	154-831	logic module		replacement module

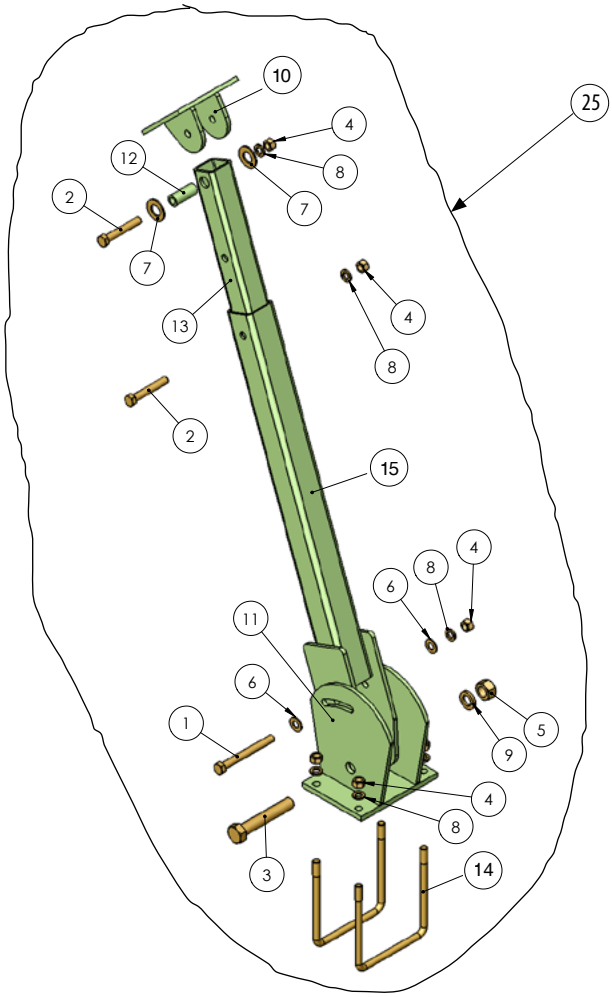
PARTS IDENTIFICATION

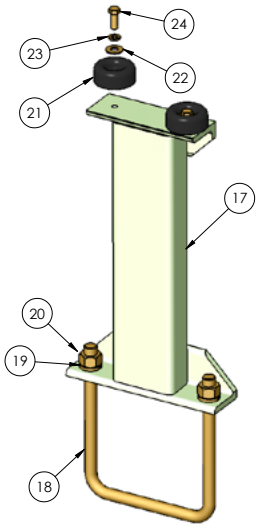


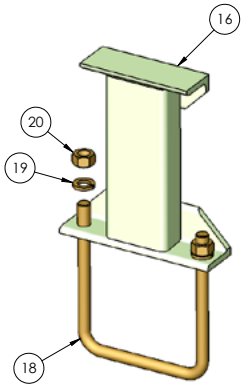
BAR STAND ASSEMBLY

Key	Part #	Description	Qty	Notes
1	315-027	U - bolt	2	5/8", 5"x 7"
2	108-021	Lock washer	4	5/8"
3	102-008	Nut	4	5/8"
4	301-030	Stand Mount	2	4" x 4" tube and plate
5	303-846	Pin	1	-----

Key	Part #	Description	Qty	Notes
6	104-065	Linch pin	1	5/16" x 1 11/16"
7	303-744	Stand tube	1	48"
8	303-840	Stand tube	1	36"
9	600-354	Bar stand pkg.	2	48" bar stands (pair)
10	600-356	Bar stand pkg.	2	36" bar stands (pair)







ADJUSTABLE/180°/170° WING REST ASSEMBLY

Key	Part #	Description	Qty	Notes
1	100-154	Set Bolt	1	5/8" x 6"; GR. 5
2	100-219	Bolt	2	5/8" x 4"; GR. 5
3	100-290	Bolt	1	1" x 6"; GR. 5
4	102-008	Nut	4	5/8"
5	102-111	Nut	1	1"
6	108-002	Flat washer	2	5/8"
7	108-004	Flat washer	2	1"
8	108-021	Lock washer	4	5/8"
9	108-025	Lock washer	1	1"
10	300-068	Rest Plate	1	----
11	300-065	Mount bracket	1	----
12	300-066	Pivot rest bushing	1	----
13	300-067	Extension tube	1	----

Key	Part #	Description	Qty	Notes
14	315-030	U-bolt	2	5/8"; 7"x 7"
15	300-071	Receiver tube	1	----
16	301-545	180° wing rest	1	----
17	301-524	170° wing rest	1	----
18	315-031	U-bolt	2	3/4" ; 7" x 7"
19	108-022	Lock washer	1	3/4"
20	102-009	Nut	2	3/4"
21	146-008	Rubber bumper	2	170° rest only
22	108-007	Flat washer	2	3/8"
23	108-018	Lock washer	2	3/8"
24	100-107	Bolt	2	3/8" x 1"
25	600-074	Wing rest pkg.	2	Includes items 1-15
	600-101	Wing rest pkg.	2	Short model

NOTES