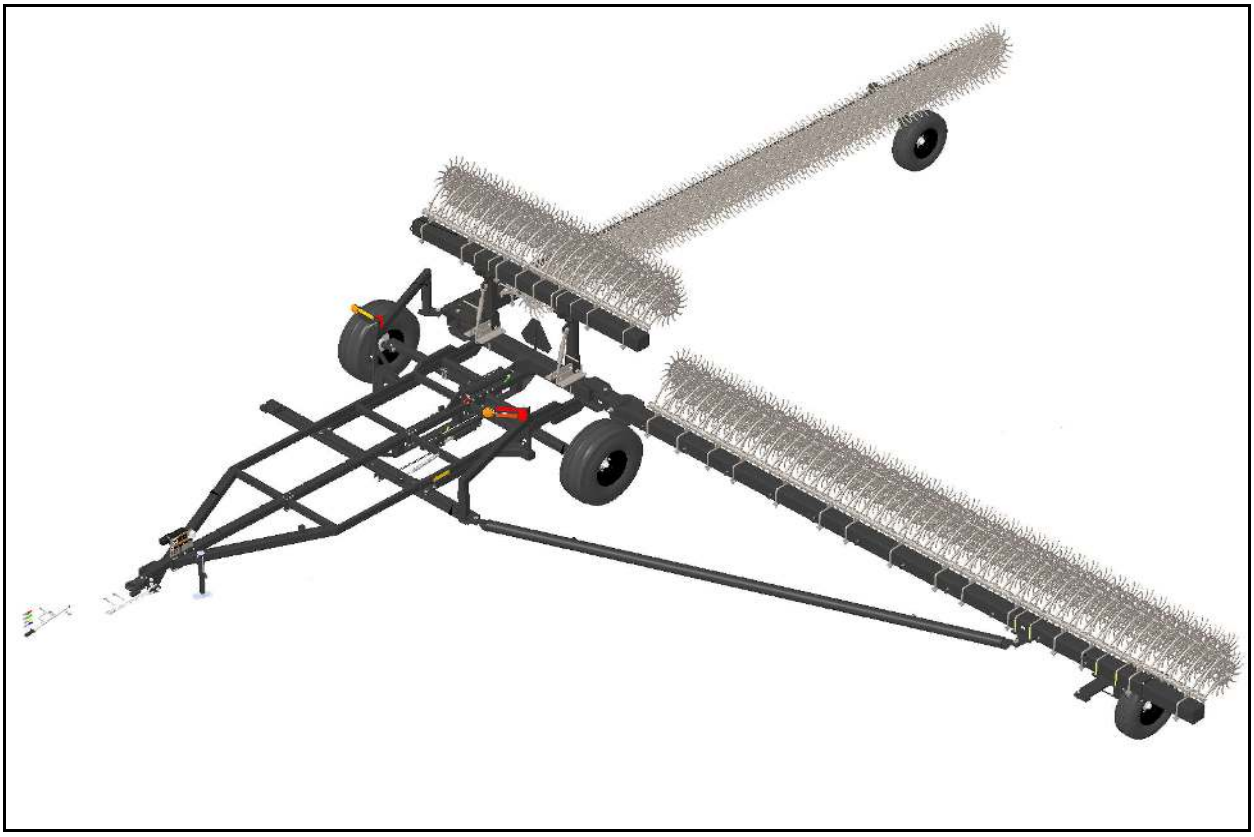
FAST™

AG SOLUTIONS



RH15 / RH18 ROTARY HOE
OPERATOR MANUAL

FAST GLOBAL SOLUTIONS


FAST GLOBAL
SOLUTIONS

Limited Warranty

FAST AG Solutions warrants to the buyer that the new machinery is free from defects in material and workmanship.

This warranty is only effective as to any new machinery which has not been altered, changed, repaired or treated since its delivery to the buyer, other than by FAST AG Solutions or its authorized dealers or employees, and does not apply to accessories, attachments, tools or parts, sold or operated with the new machinery, if they have not been manufactured by FAST AG Solutions.

FAST AG Solutions shall only be liable for defects in the materials or workmanship attributable to faulty material or bad workmanship that can be proved by the buyer, and specifically excludes liability for repairs arising as a result of normal wear and tear of the new machinery or in any other manner whatsoever, and without limiting the generality of the foregoing, excludes application or installation of parts not completed in accordance with this operator's manual, specifications, or printed instructions.

Written notice shall be given by registered mail, to the Manufacturer within seven (7) days after the defect shall have become apparent or the repairs shall have become necessary, addressed as follows:

FAST AG Solutions
4130 Commerce Boulevard
Windom, MN 56101

This warranty shall expire one (1) year after the date of delivery of the new machinery.

If these conditions are fulfilled, FAST AG Solutions shall at its own cost and at its own option either repair or replace any defective parts provided that the buyer shall be responsible for all expenses incurred as a result of repairs, labor, parts, transportation or any other work, unless FAST AG Solutions has authorized such expenses in advance.

The warranty shall not extend to any repairs, changes, alterations, or replacements made to the new equipment other than by FAST AG Solutions or its authorized dealers or employees.

This warranty extends only to the original owner of the new equipment.

Rubber parts (including tires, hoses, grommets) are not warranted.

This warranty is limited to the terms stated herein and is in lieu of any other warranties whether express or implied, and without limiting the generality of the foregoing, excluded all warranties, express or implied or conditions whether statutory or otherwise as to quality and fitness for any purpose of the new equipment. the Manufacturer disclaims all liability for incidental or consequential damages.

This Rotary Hoe is subject to design changes and FAST AG Solutions shall not be required to retrofit or exchange items on previously sold units except at its own option.

Warranty void if not registered.

FAST
RH15 / RH18 Rotary Hoe

Warranty Registration Form & Inspection Report

Warranty Registration

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery.

Customer Name					
Address					
City		State		Zip	
Phone					
Dealer Name					
Address					
City		State		Zip	
Model Number					
Serial Number					
Delivery Date					

DEALER INSPECTION REPORT

____All Fasteners Tight
____Wheel Bolts Torqued
____Hydraulic Hoses and Fittings Free and Tight
____Fertilizer Hoses and Fittings Free and Tight
____Wheel Drive Turns Freely
____Lubricate Machine
____Check Tire Pressure
____Frame and Wings Level
____Monitors and Controllers Function
____Wiring Harness Connected

SAFETY

____ Safety Chain Installed
____ All Guards Installed
____ All Safety Signs Installed
____ Reflectors, SMV and Lights Clean
____ Review Operating and Safety Instructions

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date_____
Dealer's Rep. Signature_____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date_____
Owner's Signature_____

White - FAST
Yellow - Dealer
Pink - Customer

FAST RH15 / RH18 Rotary Hoe

ROTARY HOE SERIAL NUMBER _____

DATE PURCHASED _____/_____/_____

WIDTH _____

TABLE OF CONTENTS

FOREWORD

READ THIS MANUAL carefully to learn how to operate and service your machine correctly. Failure to do so could result in personal injury or equipment damage. This manual and safety signs on your machine may also be available in other languages.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your machine and should remain with the machine when you sell it.

MEASUREMENTS in this manual are given in both metric and customary U.S. unit equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners may require a specific metric or inch wrench.

RIGHT-HAND AND LEFT-HAND sides are determined by facing in direction implement will travel when going forward.

WRITE PRODUCT IDENTIFICATION NUMBERS (P.I.N.) in Specification section. Accurately record all numbers to help in tracing machine should it be stolen. Your dealer also needs these numbers when you order parts. File identification numbers in a safe place off machine.

BEFORE DELIVERING THIS MACHINE, your dealer performed a pre-delivery inspection.

THIS ROTARY HOE IS DESIGNED SOLELY for use in customary agricultural or similar operations for the purpose of removing small weeds and loosening crusted or compacted

soil to aid in crop emergence (“INTENDED USE”). Use in any other way is considered as contrary to the intended use. The manufacturer accepts no liability for damage or injury resulting from this misuse, and these risks must be borne solely by the user. Compliance with and strict adherence to the conditions of operation, service and repair as specified by the manufacturer also constitute essential elements for the intended use.

THIS ROTARY HOE SHOULD BE OPERATED, serviced and repaired only by persons familiar with all its particular characteristics and acquainted with the relevant safety rules (accident prevention). The accident prevention regulations, all other generally recognized regulations on safety and occupational medicine and the road traffic regulations must be observed at all times. Any arbitrary modifications carried out on this ROTARY HOE will relieve the manufacturer of all liability for any resulting damage or injury.

WARRANTY is provided as part of FAST’s support program for customers who operate and maintain their equipment as described in this manual. Warranty is explained on warranty certificate which you should have received from your dealer.

This warranty provides you assurance that FAST will back its products where defects appear within warranty period. In some circumstances, by FAST also provides field improvements, often without charge to customer, even if product is out of warranty. Should equipment be abused, or modified to change its performance beyond original factory specifications, warranty will become void and field improvements may be denied. Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

TIRE MANUFACTURER'S warranty applicable to your machine may not apply outside U.S.

If you are not the original owner of this machine, it is in your interest to contact your local FAST dealer to inform them of this unit's serial number. This will help FAST notify you of any issues or product improvements.

Pre-Delivery

After machine has been completely assembled, inspect to be sure it is in good running order before delivering to customer. The following checklist is a reminder of points to inspect. Check off each item as it is found satisfactory or after proper adjustment is made.

- □ SMV emblem installed; protective shipping tape removed from reflectors and lights are installed.
- □ All grease fittings have been lubricated. (See LUBRICATION AND MAINTENANCE section in this manual.)
- □ Inspect to be sure all nuts have been tightened to proper torque and all cotter pins spread.
- □ Tires are properly inflated. Tighten wheel bolts to specified torque.
- □ Warning lights are properly installed and operational.
- □ Make sure all customer-ordered attachments have been installed or are available for delivery.
- □ Any parts scratched in shipment have been touched up with paint.
- □ Remove all shipping decals.
- □ This machine has been thoroughly checked and to the best of my knowledge is ready for delivery to the customer.
- □ Verify transport pins are inserted in transport hole.

Signed: _____

Date: _____

Delivery

At the time machine is delivered, following checklist is a reminder of information which should be conveyed directly to the customer. Check off each item as it is fully explained to customer.

- □ Instruct the customer to use proper tools.
- □ Explain to customer that life expectancy of this or any other machine depends on regular lubrication as directed in operator's manual.
- □ Give operator's manual to customer and explain all operating adjustments.
- □ Make customer aware of all safety precautions that must be followed while using this machine.
- □ When machine is transported on a road or highway at night or during day, accessory lights and devices should be used for adequate warning to operators of other vehicles. In this regard, tell customer to check local governmental regulations.
- □ To the best of my knowledge, this machine has been delivered ready for field use and customer has been fully informed as to proper care and operation.

Signed: _____

Date: _____

After-Sale

The following is a suggested list of items to be checked at a dealer-customer mutually agreeable time during the first operating season.

- □ Check with customer as to performance of machine. Make certain proper operating adjustments are understood.
- □ If possible, operate machine to see that it is functioning properly.
- □ Acquaint customer with any special attachment which will help do a better job.
- □ Go over entire machine for loose or missing hardware.
- □ Check for broken or damaged parts.
- □ Ask customer if recommended periodic lubrication has been performed.
- □ Review operator's manual with customer and stress importance of proper lubrication and safety precautions.

Signed: _____

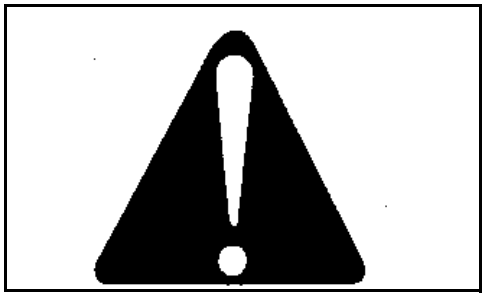
Date: _____

Owner Register

Name		Model Number
Post Office		P.I.N. Number
County	State	Date Purchased

SAFETY

Recognize Safety Information



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

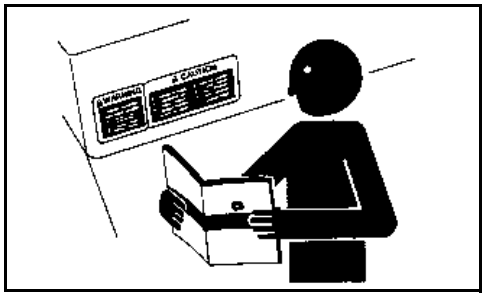
Follow recommended precautions and safe operating practices.

Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

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

Follow Safety Instructions



Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your FAST dealer.

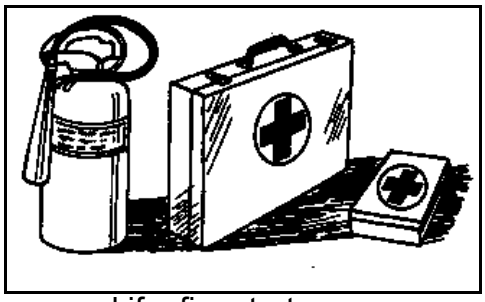
There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your FAST dealer.

Prepare for Emergencies

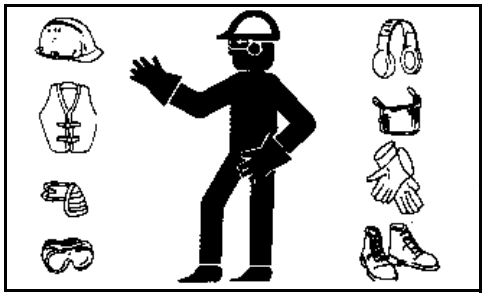


Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for poison control center, doctors, ambulance service, hospital, and fire department near your telephone.

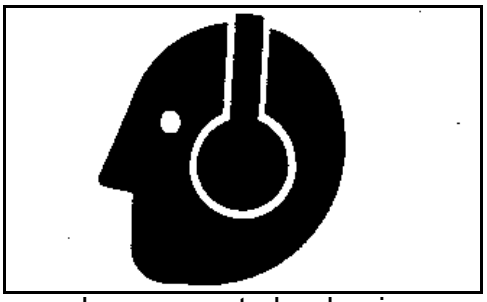
Wear Protective Clothing



Wear close fitting clothing and safety equipment appropriate to the job.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Protect Against Noise



Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Practice Safe Maintenance

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet, and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the

ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

Support Raised Equipment

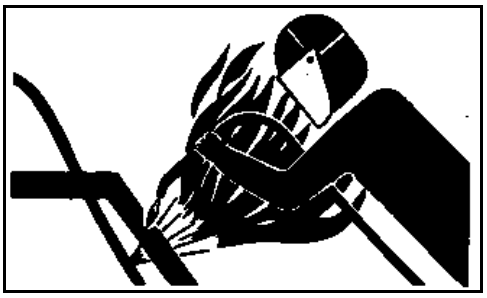
Always use a safety support when working on, under, or around machine. Transport/ Service locks can be used for this purpose.

Shut off tractor engine and remove key when working on machine.

If air has been allowed to enter hydraulic hoses or cylinders, bleed hydraulic system before use. If there is a failure in hydraulic system, unsupported raised equipment could suddenly lower, causing serious personal injury or death.

If support is not available, completely lower wings and frame, relieve hydraulic pressure and disconnect hoses from tractor.

Avoid Heating Near Pressurized Fluid Lines



Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can accidentally burst when heat goes beyond the immediate flame area.

Avoid High-Pressure Fluids

Inspect hydraulic hoses periodically – at least once per year – for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

Replace worn or damaged hose assemblies immediately with FAST approved replacement parts.

Escaping fluid under pressure can penetrate the skin causing serious injury.

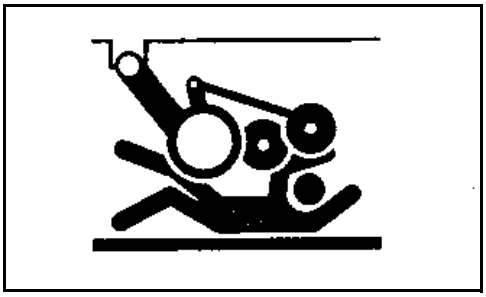
Avoid the hazard by relieving pressure before disconnecting hydraulic or other

lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

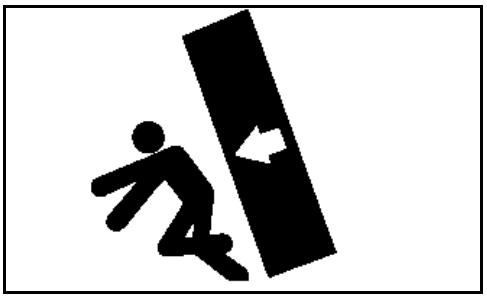
Inspect Lift Circuit Hoses



Avoid serious injury or death while working under a raised implement.

Hydraulic hoses between the lift cylinders and hydraulic lock-up valves should be inspected frequently for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage. Worn or damaged hose assemblies can fail during use and should be replaced immediately. See your Fast dealer for replacement hoses.

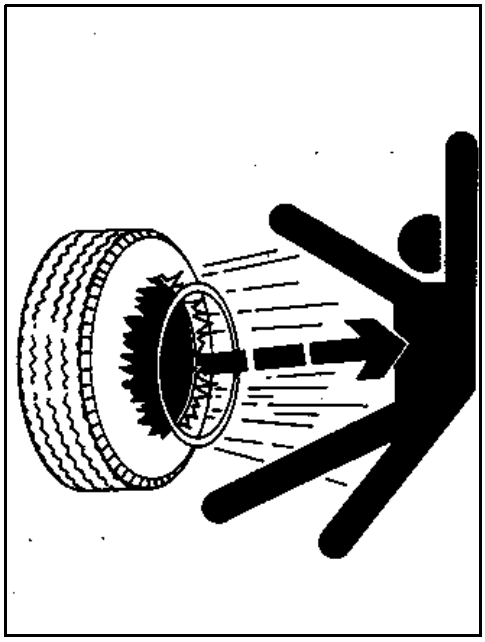
Store Attachments Safely



Stored attachments such as dual wheels can fall and cause serious injury or death.

Securely store attachments and implements to prevent falling. Keep playing children and bystanders away from storage area.

Service Tires Safely



CAUTION: Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

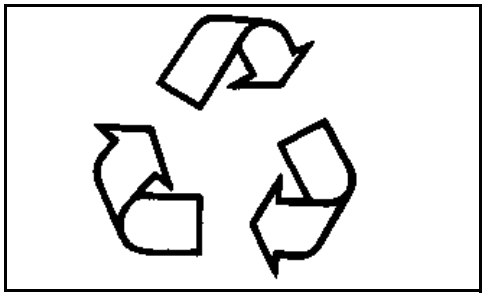
Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure.

Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

Dispose of Waste Properly



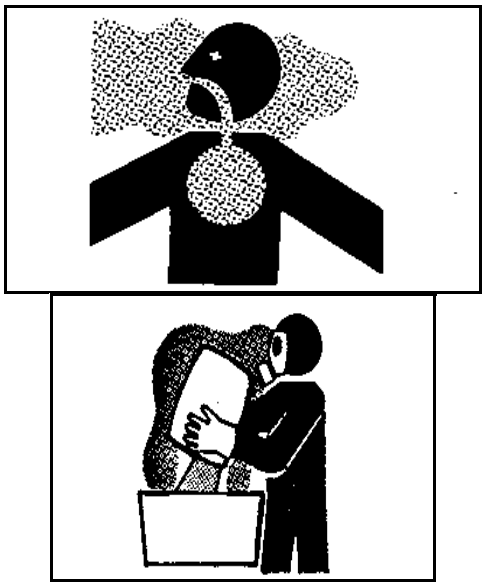
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth’s atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Handle Agricultural Chemicals Safely



Chemicals used in agricultural applications such as fungicides, herbicides, insecticides, pesticides, rodenticides, and fertilizers can be harmful to your health or the environment if not used carefully.

Always follow all label directions for effective, safe, and legal use of agricultural chemicals.

Reduce risk of exposure and injury:

Wear appropriate personal protective equipment as recommended by the manufacturer. In the absence of manufacturer's instructions, follow these general guidelines:

Chemicals labeled 'Danger': Most toxic. Generally require use of goggles, respirator, gloves, and skin protection.

Chemicals labeled 'Warning': Less toxic. Generally require use of goggles, gloves, and skin protections.

Chemicals labeled 'Caution': Least toxic. Generally require use of gloves and skin protection.

Avoid inhaling vapor, aerosol or dust.

Always have soap, water, and towel available when working with chemicals. If chemical contacts skin, hands, or face, wash immediately with soap and water. If chemical gets into eyes, flush immediately with water.

Wash hands and face after using chemicals and before eating, drinking, smoking, or urination.

Do not smoke or eat while applying chemicals.

After handling chemicals, always bathe or shower and change clothes. Wash clothing before wearing again.

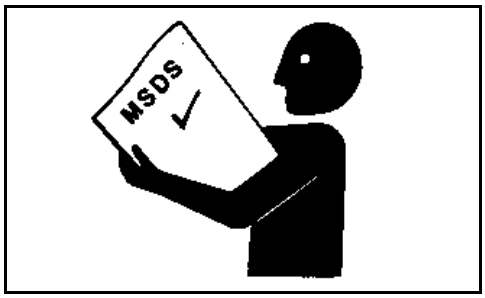
Seek medical attention immediately if illness occurs during or shortly after use of chemicals.

Keep chemicals in original containers. Do not transfer chemicals to unmarked containers or to containers used for food or drink.

Store chemicals in a secure, locked area away from human or livestock food. Keep children away.

Always dispose of containers properly. Triple rinse empty containers and puncture or crush containers and dispose of properly.

Handle Chemical Products Safely

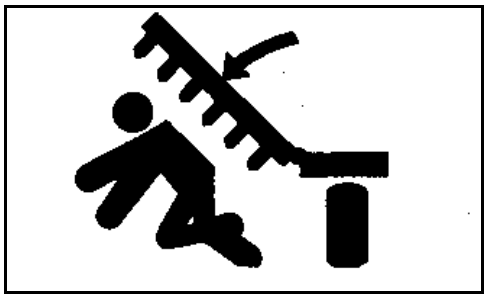


Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with FAST equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (M/SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the M/SDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

Operate Safely



Before operating, make sure air has been bled from wing-fold hydraulic system.

Be sure area around machine is clear before raising or lowering machine frame or wings.

Do not operate with wings folded.

Do not operate close to the edge of a ditch, creek, gully or steep embankment.

Avoid holes, ditches and obstructions which may cause tractor, machine, or towed equipment to roll over, especially on hillsides.

Avoid sharp turns on hillsides.

Slow down when turning or traveling over rough ground, and when turning on inclines.

Always shut off tractor and shift to PARK or set brakes when leaving tractor. Remove key when leaving tractor unattended.

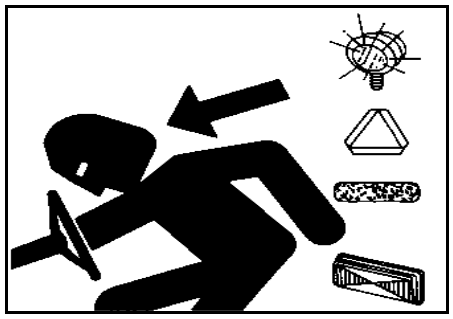
Always have tractor stopped on level ground when raising or lowering wings.

Operate machine from tractor seat only.

If chemicals are used, follow manufacturer's recommendations for handling and storage.

Tow machine behind a properly equipped tractor only.

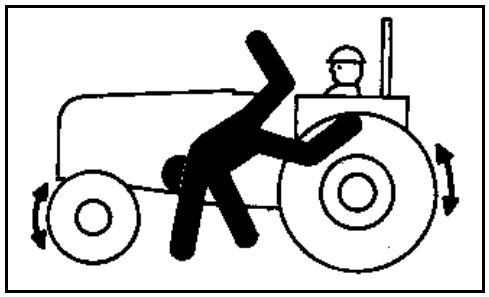
Use Safety Lights and Devices



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

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

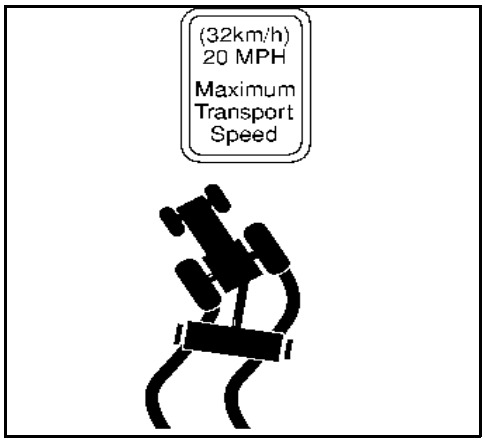
Keep Riders Off Machine



Only allow the operator on the machine. Keep riders off.

Riders on machine are subject to injury such as being struck by foreign objects and being thrown off of the machine. Riders also obstruct the operator’s view resulting in the machine being operated in an unsafe manner.

Observe Maximum Transport Speed



CAUTION: Be sure all bystanders are clear of implement.

This implement is not equipped with service or parking brakes.

The maximum transport speed for this implement is 20 mph (32 km/h).

Some tractors are capable of operating at speeds that exceed the maximum transport speed of this implement. Regardless of the maximum speed capability of the tractor being used to tow this implement, do not exceed the implement's maximum transport speed.

Exceeding the implement's maximum transport speed can result in:

Loss of control of the tractor/implement combination

Reduced or no ability to stop during braking

Implement tire failure

Damage to the implement structure or its components

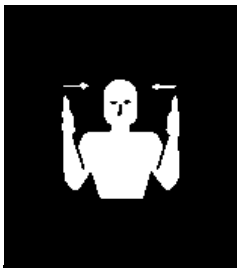
Use additional caution and reduce speed when towing under adverse surface conditions, when turning, and when on inclines.

For transport, the weight of the implement must not be more than 1.5 times the weight of the tractor. Minimum towing tractor weight for the Rotary Hoe is 9,000 lbs (4083 kg).

Never tow this implement with a motor vehicle. Tow only with a properly ballasted tractor.

EC Compliance Notification

Use a Signal Person



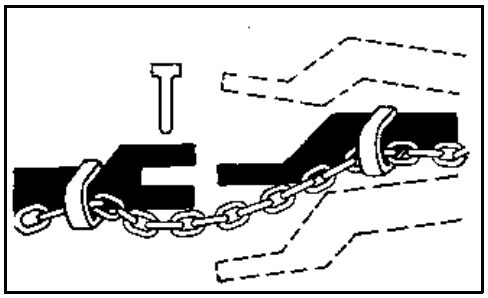
Use a signal person to direct movement of the tractor/fertilizer cart combination, whenever the tractor operator's view is obstructed.

Designate one individual as THE signal person. Always have signal person stand in clear view. Be sure signal person stays a safe distance away from the machine when it is moving.

Prior to starting the tractor, discuss hand signals and what each signal means to avoid misunderstandings and confusion which could result in a serious injury or fatal accident for someone.

Keep all bystanders away whenever the machine is moved.

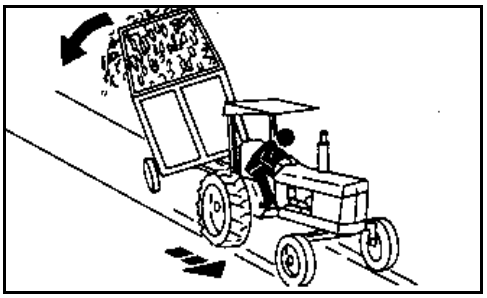
Use a Safety Chain



A safety chain will help control drawn equipment should it accidentally separate from the drawbar.

Using the appropriate adapter parts, attach the chain to the tractor drawbar support or other specified anchor location. Provide only enough slack in the chain to permit turning.

Tow Loads Safely



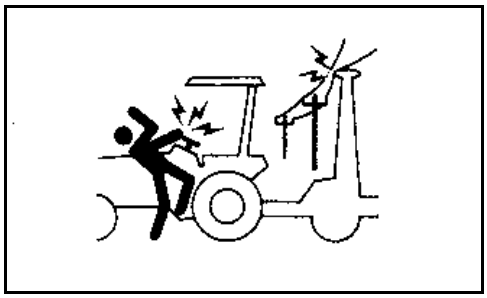
Stopping distance increases with speed and weight of towed loads, and on slopes. Towed loads with or without brakes that are too heavy for the tractor or are towed too fast can cause loss of control. Consider the total weight of the equipment and its load.

Observe these recommended maximum road speeds, or local speed limits which may be lower:

If towed equipment does not have brakes, do not travel more than 32 km/h (20 mph) and do not tow loads more than 1.5 times the tractor weight.

Ensure the load does not exceed the recommended weight ratio. Add ballast to recommended maximum for tractor, lighten the load, or get a heavier towing unit. The tractor must be heavy and powerful enough with adequate braking power for the towed load. Use additional caution when towing loads under adverse surface conditions, when turning, and on inclines.

Avoid Overhead Power Lines



CAUTION: Keep away from overhead power lines. Serious injury or death may result. Proceed cautiously under overhead power lines and around utility poles. Know the transport height of your machine. Electrocution can occur without direct contact with overhead electrical lines.

Prepare for Transport

CAUTION: Avoid serious injury or death to your or others. Never tow machine behind a truck or other motor vehicle. This machine is designed only to be towed with a properly sized and ballasted tractor.

Use a tractor large enough to maintain control. Properly ballast tractor for towing your machine. Refer to tractor operator's manual and this manual to ensure that machine can be safely transported with your tractor.

Be aware of height and width restrictions to avoid collision with overpasses or other road users.

Always fold wings fully. If wing fold cylinders are removed, chain wings together to prevent accidental lowering.

Fully raise frame, close hydraulic lock-up valve (if equipped) and install transport/service locks before transporting.

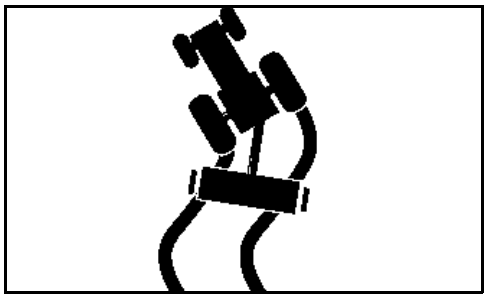
Latch the tractor brakes together.

Attach proper size safety chain for load being towed. Refer to USE A SAFETY CHAIN (in this section).

IMPORTANT: Do not transport on a roadway unless machine is equipped with proper functioning lights and reflective marking/emblems. Ensure that the lights and reflective marking/emblems are clean and visible. Contact your FAST dealer for lights and lighting harnesses.

Always follow local and national regulations for equipment size, lighting and marking before driving on public roadways. You are responsible for understanding and complying with all requirements regarding roadway transport. Refer to USE SAFETY LIGHTS AND DEVICES (in this section).

Transport Safely



IMPORTANT: When transporting, always travel at a reasonable and safe speed which permits adequate control of steering and stopping. Reduce speed considerably when traveling over rough ground. Be certain everyone is clear of machine.

Refer to OBSERVE MAXIMUM TRANSPORT SPEED (in this section).

Do not exceed weight and speed guidelines (in this section).

Towed loads can swerve, upset or cause loss of control. Refer to TOW LOADS SAFELY (in this section).

Shift tractor into a lower gear when transporting down steep slopes or hills; never coast. Stop slowly.

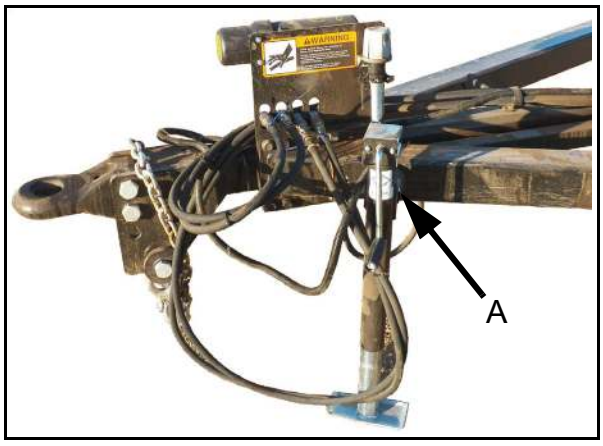
Wide turns may be required with machine in tow. Use caution in traffic and in congested areas.

To improve stability when traveling through the field, wings should be unfolded from transport position as soon as possible after leaving the roadway.

IMPORTANT: When transporting machine on a roadway, ALWAYS USE appropriate lamps and devices for adequate warning to operators of other vehicles.

Refer to USE SAFETY LIGHTS AND DEVICES (in this section).

Park Safely

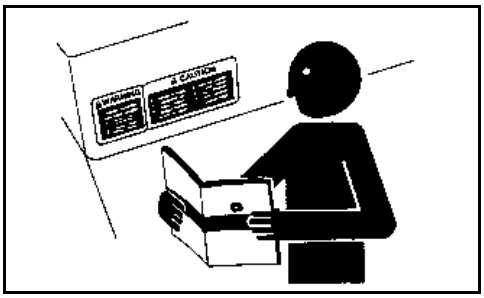


Parked Jack Position

A - Pin

Park machine on a level surface, lower jack, and retain with pin (A). Block implement wheels.

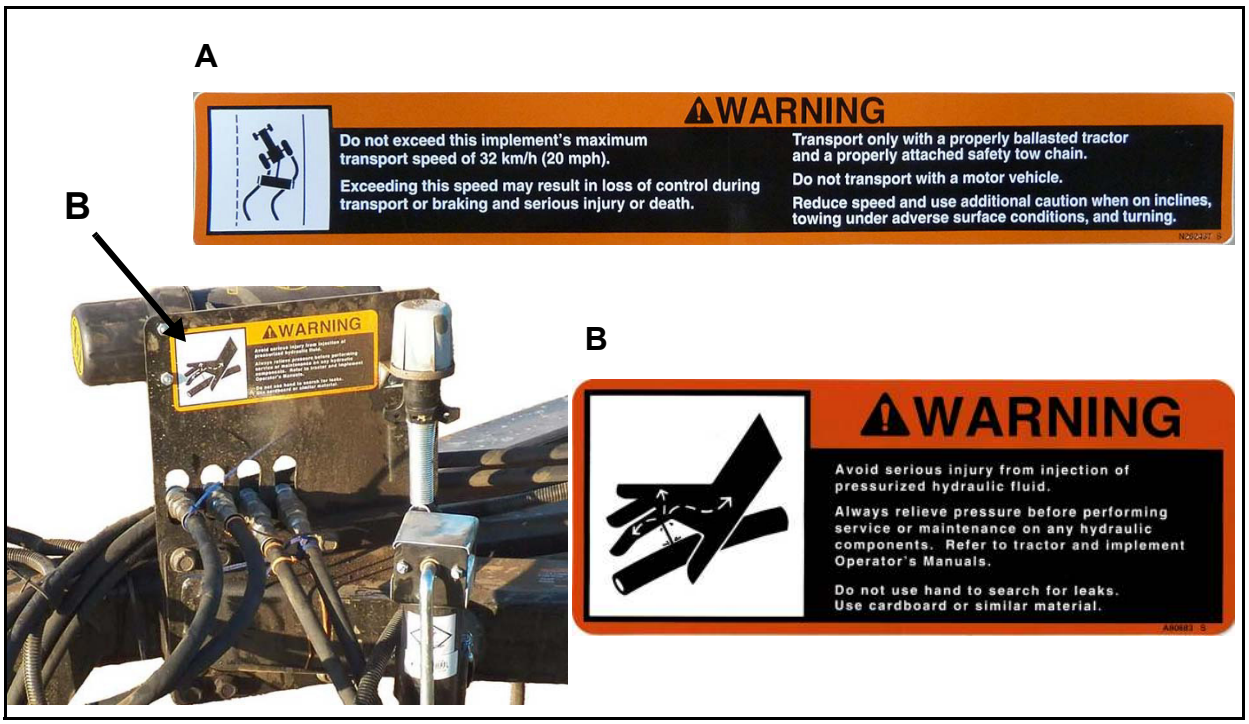
Replace Safety Signs



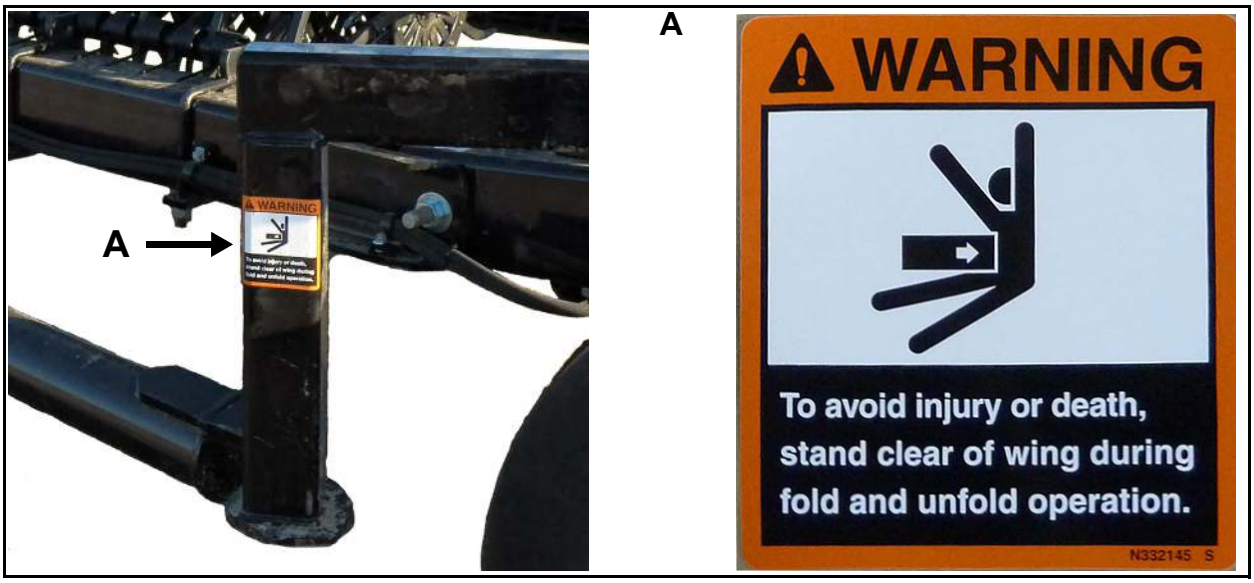
Replace missing or damaged safety signs. Use this operator's manual for correct safety sign placement.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

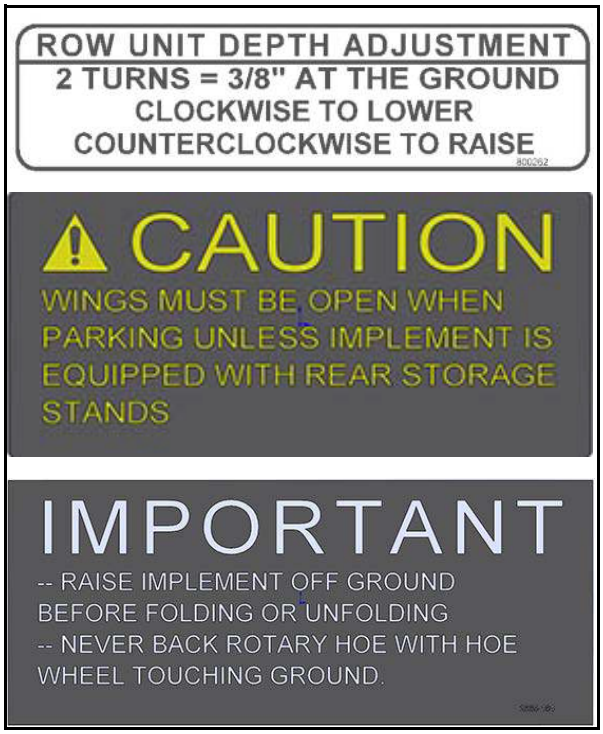
Hitch



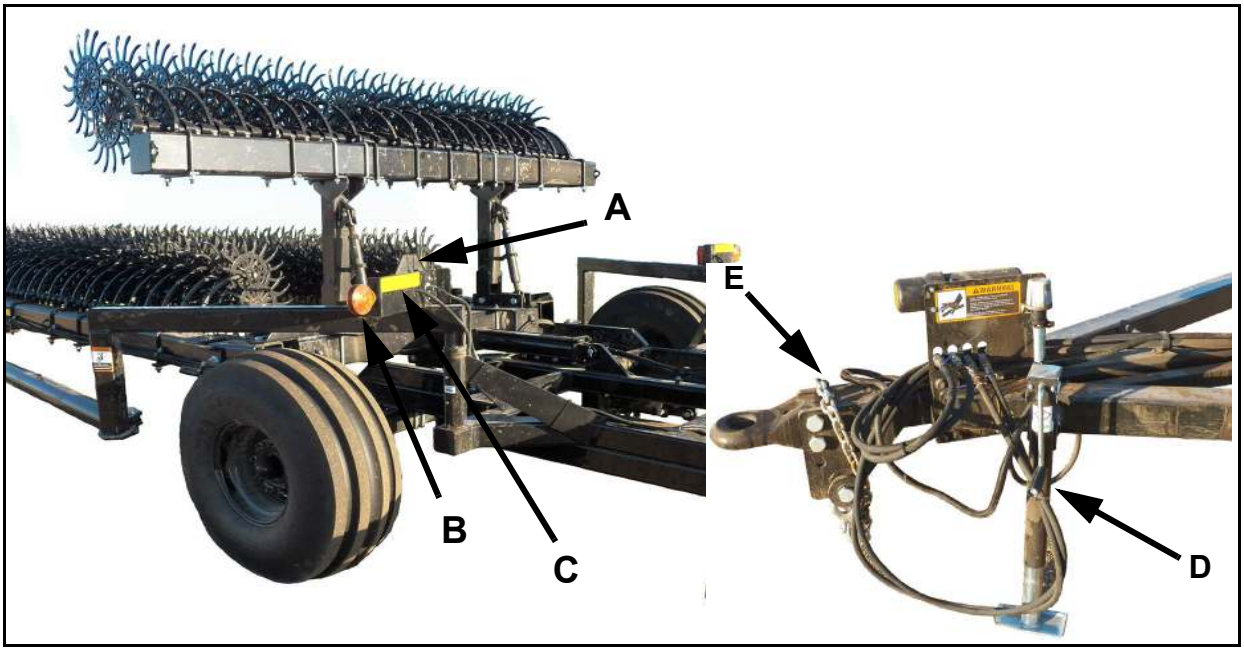
Wing



Main Frame



Safety Features



A - SMV Emblem

B - Warning Lights

C - Reflectors

D - Jack

E - Safety Chain

In addition to the safety features shown here, other components, systems, safety signs on the machine, safety messages and instructions in the Operator's Manual contribute to the safe operation of this machine when combined with the care and concern of a capable operator.

The construction of this implement may not meet all local or national requirements for transport on a public roadway. In regions or countries that have national certification requirements for roadway transport, it may be impossible for this implement to be approved for such roadway transport. The customer is responsible for understanding and complying with all local, regional, and national requirements regarding roadway transport.

A—SMV Emblem identifies slow-moving equipment and alerts traffic approaching from rear.

B and C—REFLECTORS and WARNING LIGHTS alert other drivers to presence and width of slow-moving machinery on roadways and signal turns.

D—Jack prevents machine from falling when in storage.

E—Safety Chain will help control machine should it accidentally separate from tractor drawbar.

PREPARING MACHINE

Use Tractor Operator's Manual

Always refer to tractor operator's manual for specific detailed information regarding operation of equipment.

Pre-Operation Checklist

Efficient and safe operation of the machine requires that each operator reads and understands operating procedures and all related safety precautions outlined in this section. A pre-operational checklist is provided for the operator. It is important for both personal safety and maintaining the good mechanical condition of the implement that this checklist be followed.

Before operating rotary hoe, check the following items:

1. Lubricate machine per schedule outlined in LUBRICATION AND MAINTENANCE section.
2. Use only a tractor of adequate power and weight to operate implement. See SPECIFICATIONS section for recommendations.
3. Be sure that machine is properly attached to tractor. Be sure that a mechanical retainer is installed through drawbar pin and safety chain is installed.
4. Inspect all hydraulic lines, hoses, fittings and couplers for tightness.
5. Check tires and verify they are inflated to specified pressure.
6. Check condition and routing of all fluid hoses and lines. Be sure that all lines are routed in large arcs. Replace any that are damaged. Re-route those that are rubbing, pinched or crimped.
7. Check placement components. Remove and replace any that are worn.
8. Remove all entangled material.
9. Adjust turnbuckles for level frame in field operation.
10. Check for loose or missing components.
11. Bent hoe teeth straightened or replaced.
12. Check all hoe wheels for straightness, Replace if necessary. **NOTE**: 1/4” of RUNOUT” is acceptable.
13. Hitch pins fastened and correct spacers used.
14. Quick couplers locked.
15. Adequate ballast added to front of tractor.

SPECIFICATIONS

Tractor Horsepower, Size Recommendation

Use machine with tractors providing drawbar power in following ranges.

Machine Size	kW (hp.)
15 Meter	89 - 119 (120 - 160)
18 Meter	112 - 130 (150 - 175)

Model	RH15 / RH18 Rotary Hoe
Transport Height	8 ft 4 in
Shipping Transport Width	11.5 ft / 3.5m
Working Transport Width	11 ft 5 in
Transport Length	43 ft 9 in (15m), 53 ft 9 in (18 m)
Empty Weight (lbs.)	11,000 (15m), 12,000 (18m)
Hitch Pin-to-Axle Length	16 ft 6.5 in
Toolbar Size(s)	15m / 18m
Standard Tires	9.5L 15 SL (Gauge Wheels) 14L 16.1 SL (Main Frame Wheels)
Toolbar Tube Size	7 in x 7 in Single Bar

Hydraulic System Requirements

Tractor hydraulic system with ISO hydraulic couplers is required.
Four tractor control valves at the listed flow and pressure rates are required for following:

SCV Function	Flow Rate	Pressure
Field Latch / Wing Wheels	30 lpm (8 gpm)	20,684 kPa (206.8 bar) (3000 psi)
Toolbar Raise/Lower	38 lpm (10 gpm)	20,684 kPa (206.8 bar) (3000 psi)

Checking and Lubricating Machine

Check tire pressure and inflate as necessary. (See CHECKING TIRE PRESSURE in this section.)

Perform required lubrication. (See Lubrication section.)

Inspect for loose, damaged or missing parts. Repair or replace parts before entering field.

Make sure hydraulic hoses and harnesses do not interfere with moving parts. Relocate hoses and harnesses, and retain with clamps.

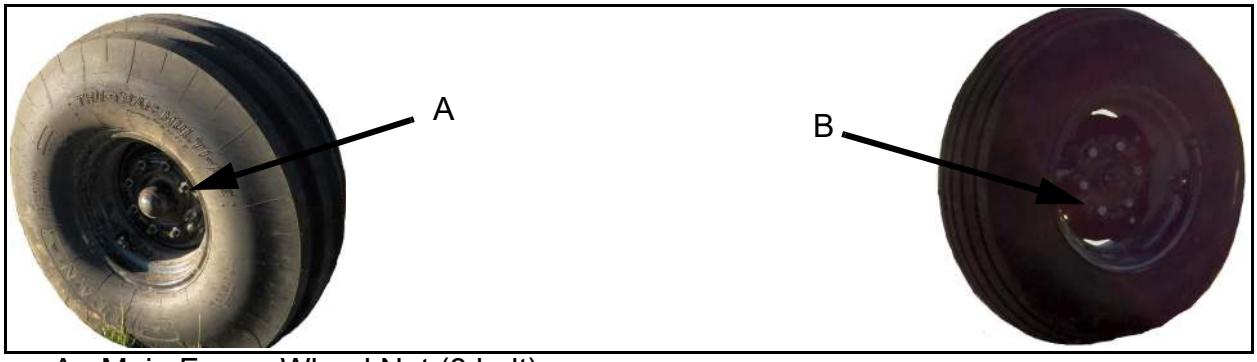
Checking Tire Pressure

CAUTION: Avoid loss of vehicle control during transport from failure of overloaded tires, which could cause serious injury or death to you or others.

Equal pressure in all tires is necessary for even penetration. A low tire will cause deeper penetration on one side than other. Increased penetration on one side will result in side draft of machine. Inflate tires to shown specification.

Tire Size	Pressure
95L 15 SL (Wing Wheel 2019)	331 kPa (3.30 bar) (48 psi)
11L 15 SL (Wing Wheel 2020)	248 kPa (2.48 bar) (36 psi)
14 L 16.1 SL (Main Frame Wheel)	221 kPa (2.21 bar) (32 psi)

Checking Wheel Nuts



A - Main Frame Wheel Nut (8 bolt)
B - Gauge Wheel Nut (6 bolt)

Check tightness of all wheel nuts (A) and (B) during first week of operation and periodically after that.

Tighten all wheel bolts to specification.

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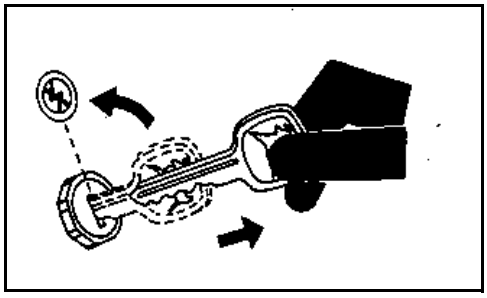
Item	Specification
(A) Main Frame Wheel Nut	175 N-m (130 ft-lbs)
(B) Wing Wheel Bolt	135 N-m (100 ft-lbs)

ATTACHING and DETACHING

Attach Machine Safely



CAUTION: Prevent personal injury caused by unexpected movement of machine. Engage parking brake and/or place transmission in PARK, shut off engine, and remove key before working around hitch.

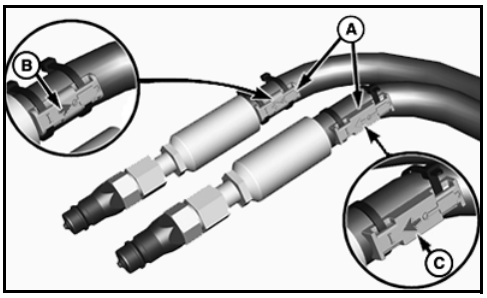
Making Proper Hose Connections

CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected in skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

CAUTION: Hydraulic hoses can fail due to physical damage, kinks, age and exposure. Check hoses regularly. Replace damaged hoses.

IMPORTANT: All hydraulic couplers must be clear of debris, dust, and sand. Use protective caps on fluid openings until ready to make connection. Foreign material can damage hydraulic system.

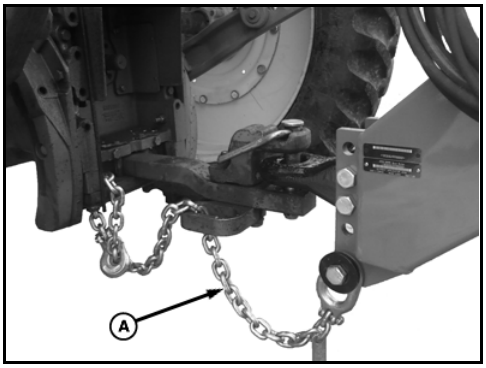


A - SCV Marker
B - Pressure Marking
C - Return Marking

Identify SCV marker (A) color, then use pressure (B) and return (C) arrows to connect to correct SCV outlet. (See SCV Identification chart.)

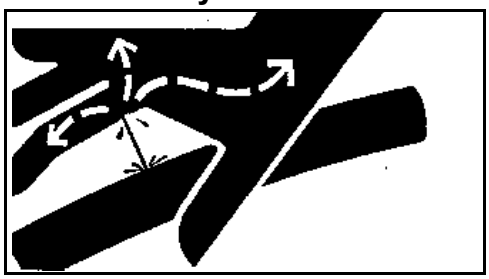
Attach Machine to Tractor

CAUTION: Make sure that all bystanders are clear of working area.



1. Make sure there is enough room and clearance to safely back up to machine.
2. Slowly back tractor until holes on hitch and drawbar are aligned.
3. Install drawbar pin and retainer.
4. Attach safety chain (A) securely around tractor drawbar cage to prevent unexpected separation.
5. Check that implement hydraulic system is compatible with tractor hydraulics. Change implement if required. Do not operate unless tractor and implement hydraulics are compatible

6.. **Connect Hydraulics**



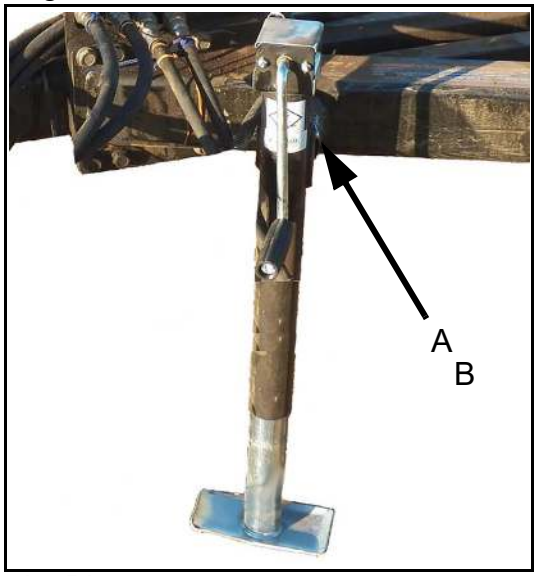
CAUTION: Prevent serious injury or death. Relieve hydraulic system pressure before connecting hydraulic hoses.

•Use a clean rag or paper towel to clean dirt from couplers on hose ends and tractor couplers.

•Relieve pressure in hydraulic system.

•Route hoses over hitch and connect hoses to tractor couplers. Verify couplers are securely seated. Be sure to provide slack for turning.

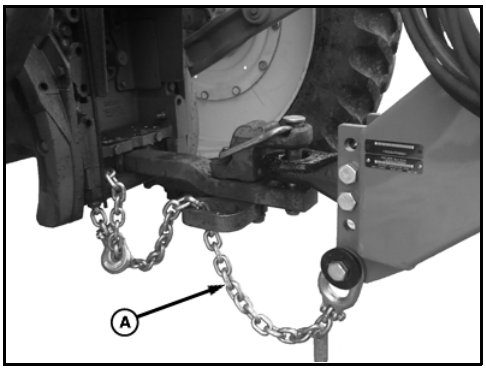
Route electrical lines over hitch and connect to tractor electrical connectors. Be sure to provide slack for turning.



A - Pin
B - Hole

7. Turn crank handle to raise jack. Pull pin (A) out and pivot jack frame forward into its stowed position. Insert pin in hole (B) to secure jack.

Attach Safety Chain to Tractor



A - Safety Chain

CAUTION: A safety chain (A) will help control drawn equipment should it accidentally separate from drawbar while transporting. A runaway machine can cause serious injury or death to you or others. Using appropriate adapter parts, attach chain to tractor drawbar support. Provide only enough slack in chain to permit turning. See your FAST dealer for a chain with a strength rating equal to or greater than gross weight of towed machine.

Prior to operating implement, insure all electrical harnesses, hydraulic hoses and safety chain are routed properly to avoid damage.

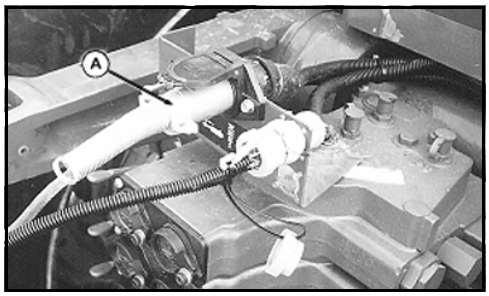
When storing machine, keep safety chain up off ground and hook to machine support assembly on hitch.

Always replace a safety chain if one or more links or end fittings are broken, stretched or otherwise damaged.

Verify all chains for towed implements are adequately sized for safe transport.

Attach Warning Light Plug

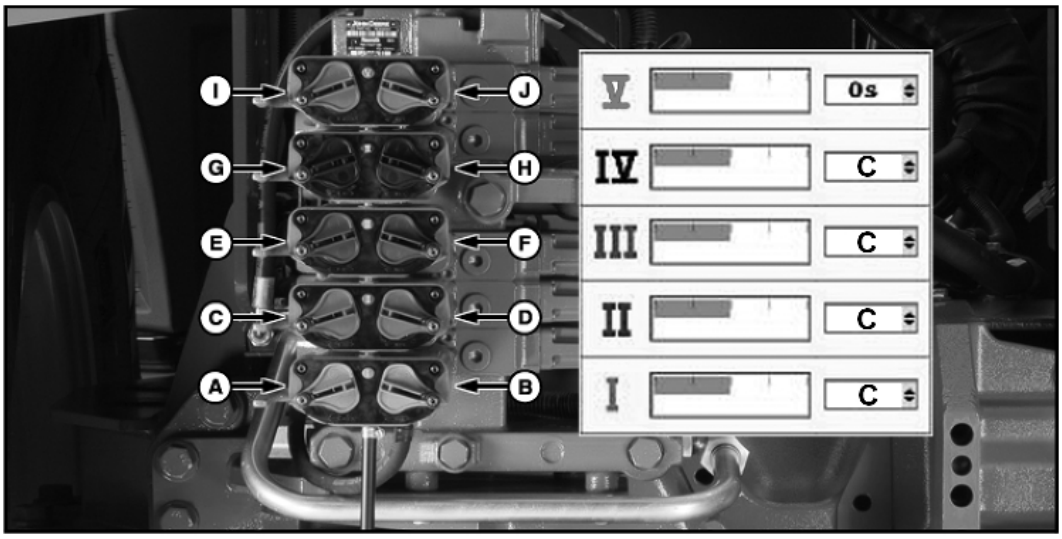
CAUTION: When transporting machine on a road or highway at night or during day, use warning lights and devices for adequate warning to operators of other vehicles. In this regard, check local governmental regulations. Various safety lights and devices are available from your FAST dealer.



A - 7-Pin Connector Warning Light Plug

Attach warning light plug (A) to tractor outlet socket.

Be sure warning lights, reflectors, and SMV emblem are clean.



Legend	SCV Identifier	Flow Type	Hose Color	SCV Usage
A	I	Pressure	Purple	Toolbar Raise/Lower Pressure
B	I	Return	Brown	Toolbar Raise/Lower Return
C	II	Pressure	Grey	Field Latch / Wing Wheels Pressure
D	II	Return	Orange	Field Latch / Wing Wheels Return

IMPORTANT: Hose colors do not match SCV color

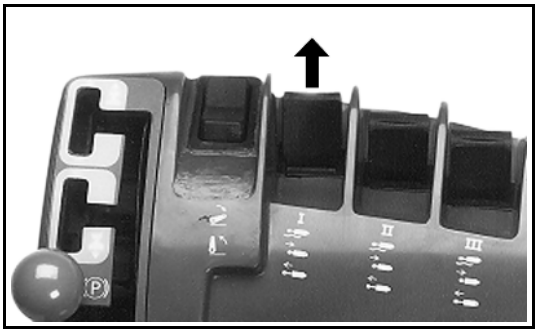
Hydraulic System Requirements

Tractor hydraulic system with ISO hydraulic couplers is required.
Four tractor control valves at the listed flow and pressure rates are required for following:

SCV Function	Flow Rate	Pressure
Field Latch / Wing Wheels	30 lpm (8 gpm)	20,684 kPa (206.8 bar) (3000 psi)
Toolbar Raise/Lower	38 lpm (10 gpm)	20,684 kPa (206.8 bar) (3000 psi)

HYDRAULIC HOSE KEY	
COLOR	DESCRIPTION OF USE
Purple	Toolbar Raise / Lower Pressure
Brown	Toolbar Raise / Lower Return
Grey	Field Latch / Wing Wheels Pressure
Orange	Field Latch / Wing Wheels Return

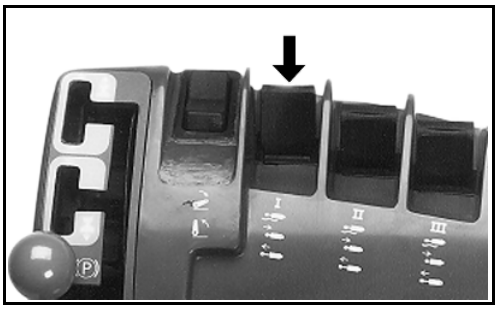
Quick Reference for Tractor SCV Functions



SCV I Pushed Forward

When tractor SCV I is pushed forward, the following functions are enabled:

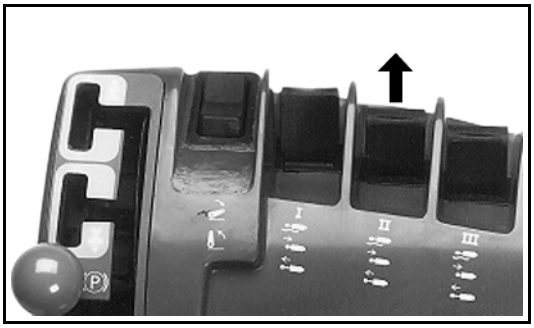
1. Supplies hydraulic oil flow to toolbar raise / lower functions.
2. Supplies hydraulic oil flow to the main toolbar cylinder.
3. Once folding is complete, tractor SCV I may be returned to neutral position.



SCV I Pulled Backward

When tractor SCV I is pulled backward, the following functions are enabled:

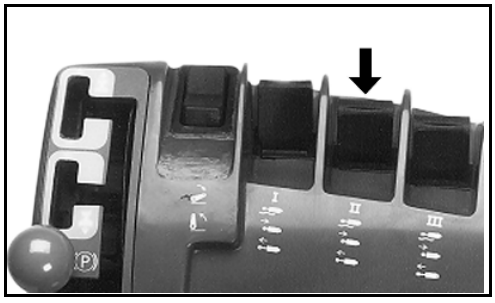
1. Supplies hydraulic oil flow to lower toolbar.
2. Supplies hydraulic oil flow to the main toolbar cylinder.
3. Once unfolding is complete, tractor SCV I may be returned to neutral position.



SCV II Pushed Forward

When tractor SCV II is pushed forward, the following functions are enabled:

1. Closes field latches
2. Rotates toolbar wheels



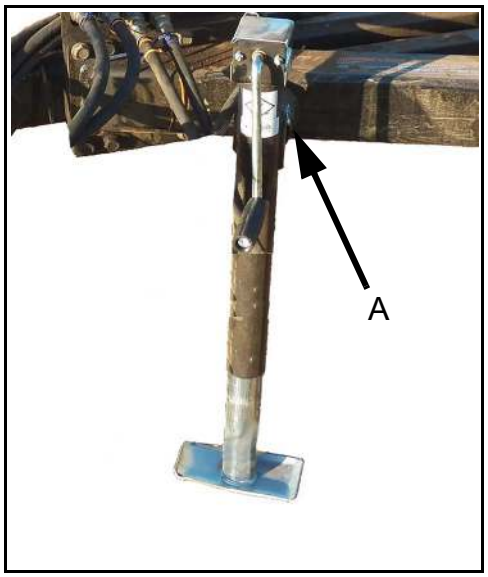
SCV II Pulled Backward

When tractor SCV II is pulled backward, the following functions are enabled:

1. Opens field latches
2. Rotates toolbar wheels

https://www.youtube.com/watch?v=-8l_EfO9xwY

Detach Machine from Tractor



A - Pin

1. Secure jack as shown using pin (A). Remove weight from hitch by turning crank handle to lower jack.

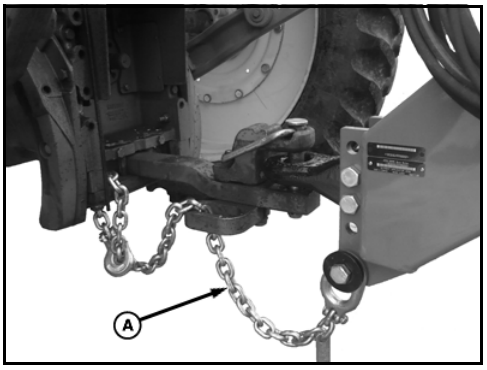
Wiring Harness and Hoses in Storage Position

2. Disconnect wiring harness and place in storage position.

CAUTION: Prevent serious injury or death.

Relieve hydraulic system pressure before disconnecting hydraulic hoses.

3. Disconnect hydraulic hoses and place in storage position.

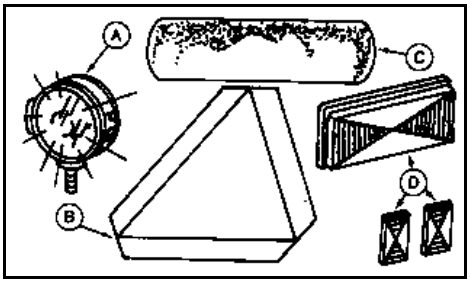


A - Safety Chain

4. Disconnect safety chain (A).

TRANSPORTING

Following Safe Transport Procedures



A - Lights
B - SMV Emblem
C - Reflector Tape
D - Reflectors

CAUTION: When transporting machine on a road or highway at night or during day, use warning lights and devices for adequate warning to operators of other vehicles.

Check local governmental regulations. Various safety devices are available from your FAST dealer. Keep safety items in good condition. Replace missing or damaged items.

Upward force on hitch may cause instability when transporting. Add ballast to tractor as required.

BEWARE of overhead wires and narrow gates. KNOW transport height and width of your machine. (See SPECIFICATIONS section.)

Travel at a reasonable and safe speed; REDUCE speed over rough or uneven terrain, slopes, and when turning.

BE SURE SMV emblem, reflectors, and warning lights are clean, visible, and in good condition.

BE SURE your safety chain has a strength rating greater than gross weight of machine.

Preparing Machine For Transport

Fold Toolbar For Transport

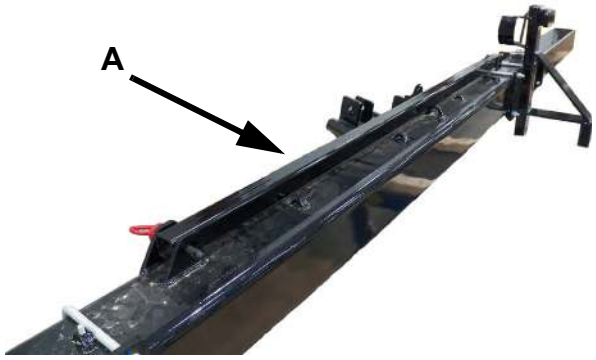
CAUTION: Be sure all bystanders are clear of rotary hoe.

CAUTION: See “Observe Maximum Transport Speed” in the Safety section for towing information.

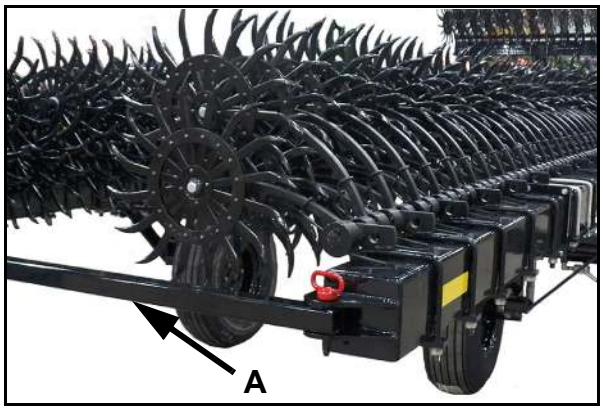
IMPORTANT:

Raise implement off ground before folding or unfolding.

Never back rotary hoe with hoe wheel touching ground.



Storage Position



Installed for backing up only.

Lock the wings together with the cross bar tube (A) for BACKING UP ONLY. Do not use the lock bar tube for transporting in the forward direction.

Be sure that the rotary hoe is properly connected to the tractor. Always attach safety chain between the rotary hoe and the tractor and install a retainer through drawbar pin.

Ensure the transport latches are fully engaged. If not fully engaged, pull SCV II backwards to ensure the wings are fully folded. Then push the SCV I switch until transport latches are fully engaged.

1. Push SCV I forward to raise toolbar and fold toolbar in.
2. While backing up, Hold SCV I until wings are fully folded.
3. While backing up, push SCV I and SCV II until transport latches fully engage and toolbar wheels rotate fully.
4. Disengage SCV I and SCV II.

Using Warning Lights

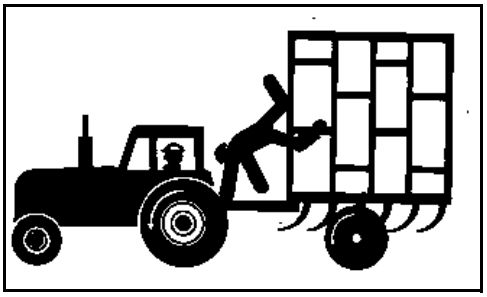
CAUTION: When transporting machine on a road or highway at night or during day, use accessory lights and devices for adequate warning to operators of other vehicles. Check local governmental regulations. Various safety lights and devices are available from FAST dealer. Keep safety items in good condition. Replace missing or damaged items.

During periods of limited visibility, use pilot vehicles and use extra lights on machine.

During normal transport, both amber warning lights will flash in unison at high intensity and both red lamps will illuminate steady at low intensity.

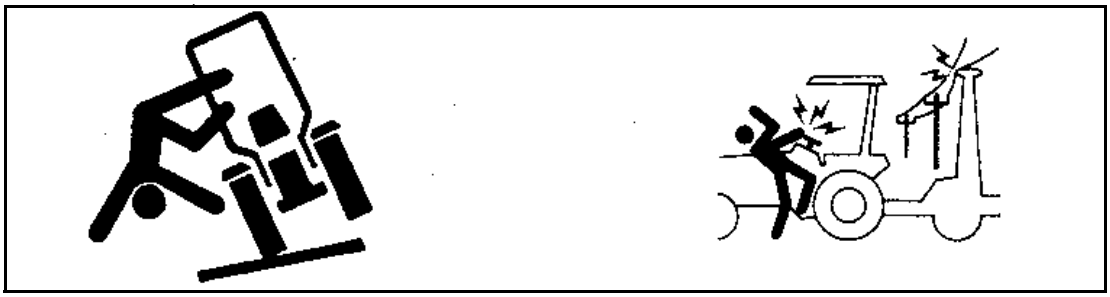
When a turn is signaled, red and amber tail lamps in direction of turn will flash at high intensity and in unison. Opposite side amber and red lamps will illuminate steady at high intensity.

Keep Riders Off Machine



CAUTION: Keep riders off. Riders are subject to injury such as being struck by foreign objects and being thrown off machine. Riders obstruct operator's view resulting in machine being operated in an unsafe manner.

Transporting Machine



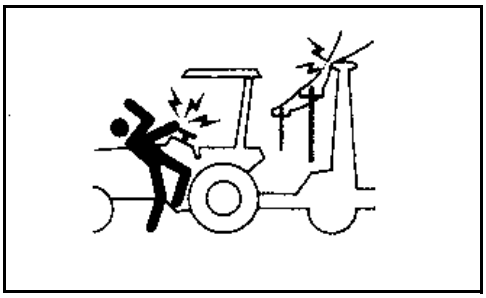
CAUTION: ALL MACHINES —When transporting machine on a smooth surface road, do not exceed maximum transport speed of 20 mph (32 km/h). Reduce speed considerably when traveling over rough ground.

Reduce speed when turning. Do not uncouple tractor brake pedals and apply individually in an attempt to make a tighter turn.

Serious injury or death can result from contact with electric lines. Use care when moving or operating this machine near electric lines to avoid contact. Know transport height and width of machine. Check local regulations before transporting. (See SPECIFICATION section for transport height and width of machine.)

Transport with wings fully folded. Never fold wings when transporting. After folding, ALWAYS place the fold valve SCV I and SCV II in the neutral position for transport.

Unfolding/Extending Tool Bar



CAUTION: Prevent serious injury or death. Machine coming near or contacting power lines can cause electrocution. Electrocution can occur without contact.

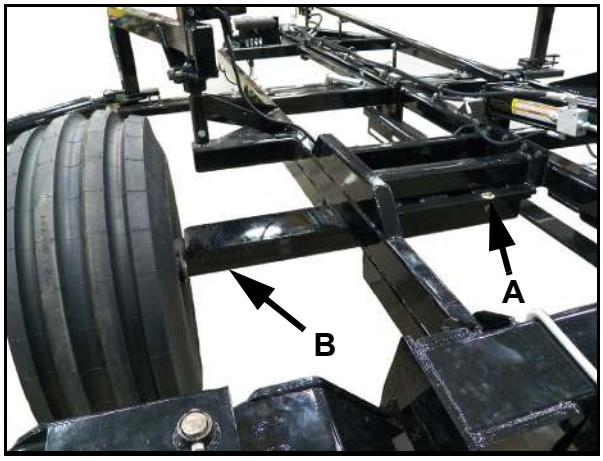
IMPORTANT:
Raise implement off ground before folding or unfolding.
Never back rotary hoe with hoe wheel touching ground.

1..Remove cross bar from rear of wings and place in storage position.
2. Pull SCV II backward to release field latches. Stop before the wing wheels begin to turn.
3. While backing up, pull backward SCV I and SCV II and hold until wings are unfolded. Stop when wings are fully extended and latched and wheels are straight
4. Disengage SCV I and SCV II.

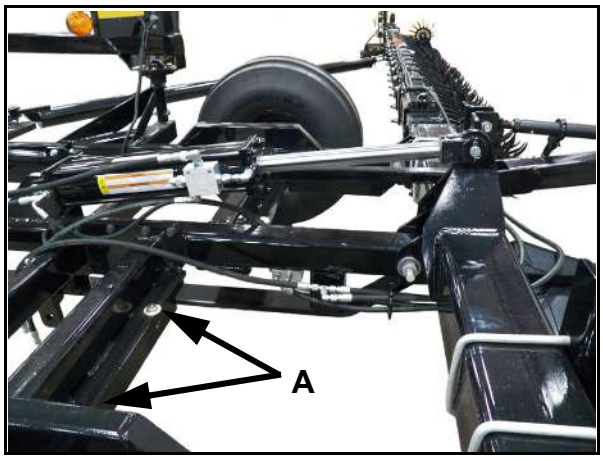
Extend Axles

IMPORTANT : Adjust axles out of the ship-ping position before transporting or operating machine.

1. Properly raise and support the frame with jack stands.



2. Remove bolts (A) and move the axle (B) to the desired axle width to match row width. Axles (B) must be moved out from shipping position for machine stability. Set both axles the same width.



3. Reinstall the axle hardware (A).

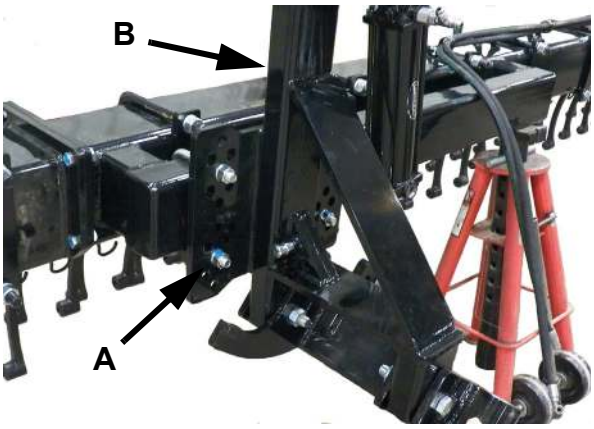
4. Torque to 216 N-m (159 ft-lbs).

5. Repeat for other side.

Adjusting Wing Wheels

IMPORTANT : Adjust Wing Wheels to match row width before operating machine to minimize crop damage.

1. Properly raise and support the wings with jack stands.

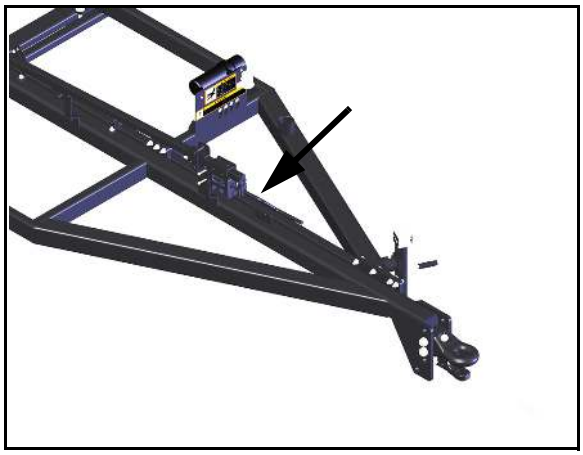


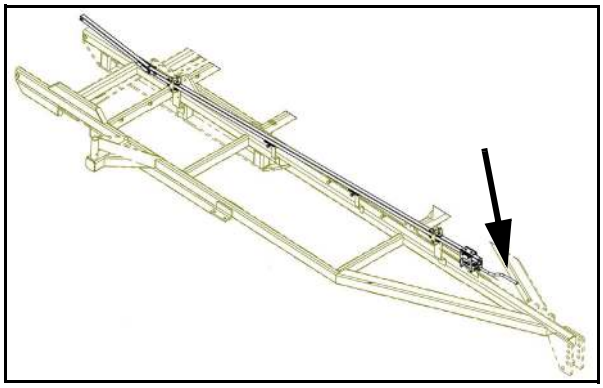
2. Loosen bolts (A) and move the wing wheel assembly (B) to the desired axle width to match row width. Set both wing wheels to the same width.

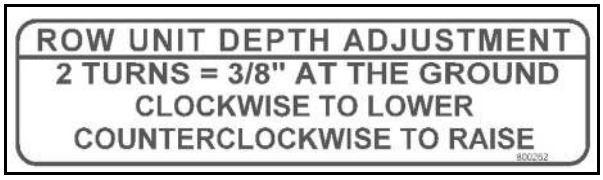
3. Torque to 150 N-m (110 ft-lbs).

4. Repeat for other side.

ROW DEPTH ADJUSTMENT





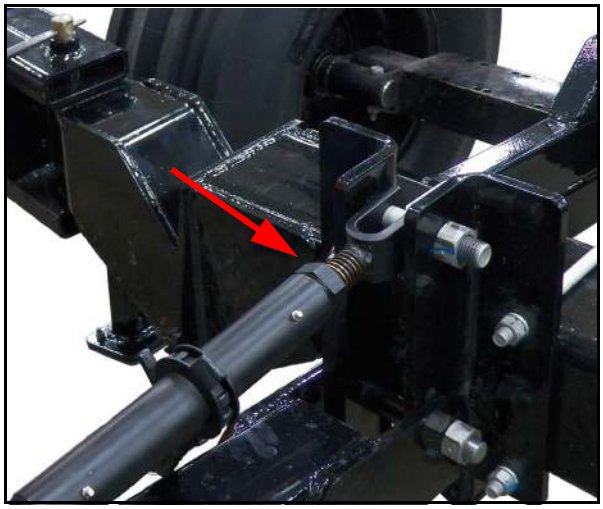


2 TURNS - 9.53mm (3/8”) AT THE GROUND.

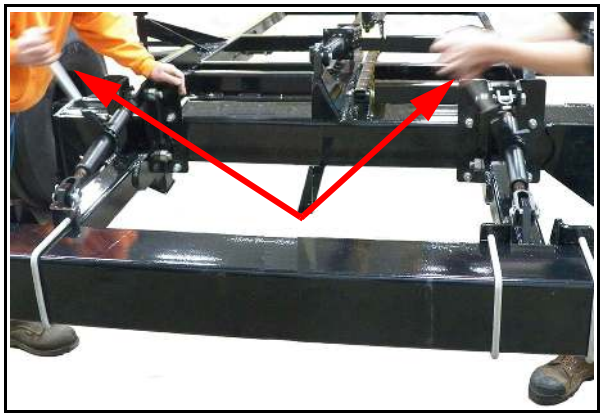
TURN CLOCKWISE TO LOWER.

TURN COUNTERCLOCKWISE TO RAISE.

Center section depth adjustment.



1. Loosen jam nut.



2. Using turnbuckle ratchets, adjust the center section height so all row wheels are penetrating the ground equally.

3. Torque the jam nuts against the adjustment sleeves to 340 N-m (250 ft-lbs).

INSPECT HOE TEETH

Rotary Hoe Wheel

Rotary Hoe Wheels are used for removing small weeds and loosening crusted or compacted soil to aid in crop emergence.

Rotary hoe wheel depth is controlled by the depth adjust assembly.

Inspect hoe teeth frequently if operating in rocky conditions. Bent, chipped or broken hoe teeth will not penetrate soil properly.

Always remove entangled material from any component.

Set Tractor Wheel Spacing

Set the tractor wheels for the desired row spacing so the wheels are centered between the rows.

The distance from center of tractor to the center of the tire should be the same on each side.

Refer to your tractor operator's manual for correct inflation and ballast information of the tractor.

ADJUST GROUND SPEED

It will be necessary to establish travel speed that gives desired effectiveness. Always run at established travel speed.

However, best results are obtained ground speed is 12 - 16 kph (7 - 10 mph). Ground speed variations in the field will automatically be compensated. Higher speeds tend to increase the teeth penetration.

Always operate at a comfortable speed. Do not operate so fast that tool bar bounces while going through field.

Effective results require that the rotary hoe wheel teeth are applied at a consistent depth in a consistent manner. Machine bouncing will prevent this required consistency.

OPERATING MACHINE

Keep Riders Off Machine

CAUTION: Only allow operator on machine. Keep riders off. Riders are subject to serious injury or death such as being struck by foreign objects and being thrown off machine. Riders obstruct operator's view resulting in machine being operated in an unsafe manner.

CAUTION: Stand clear of folding wing!

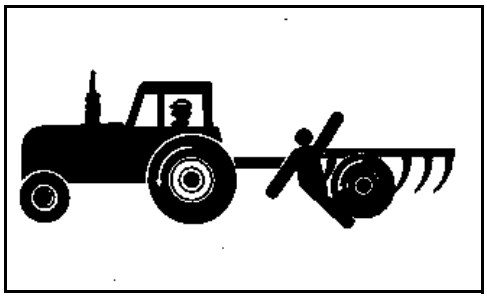
IMPORTANT: Never back up with Rotary Hoe in the ground.

IMPORTANT: Never turn with the Rotary Hoe in its down position.

IMPORTANT: When turning on the headlands, only raise the toolbar enough to clear the soil surface and crops. Excessive gauge wheel scrubbing and soil berming will occur if the toolbar is raised too high when turning on headlands.

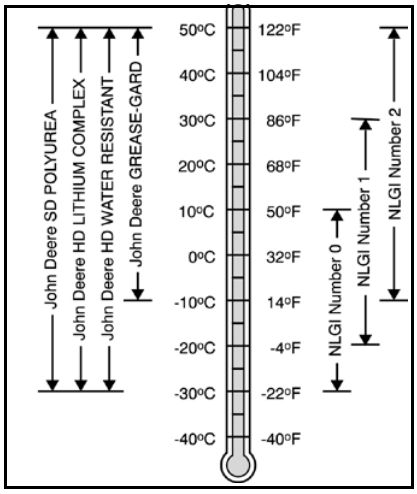
LUBRICATION AND MAINTENANCE

Lubricating and Maintaining Machine Safely



CAUTION: To help prevent serious injury or death to you or others caused by unexpected movement, be sure to service machine on a level surface. If machine is connected to tractor, engage parking brake and place transmission in PARK, shut off engine and remove key. If machine is detached from tractor, block wheels and use safety stands to prevent movement.

Grease



Greases for Air Temperature Ranges

Use grease based on NLGI consistency numbers and the expected air temperature range during the service interval.

IMPORTANT: Some types of grease thickeners are not compatible with others. Consult your grease supplier before mixing different types of grease.

Alternative and Synthetic Lubricants

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual.

Synthetic lubricants may be used if they meet the performance requirements as shown in this manual.

The temperature limits and service intervals shown in this manual apply to both conventional and synthetic lubricants.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

Lubricant Storage

Equipment can operate at top efficiency only when clean lubricants are used.

Use clean containers to handle all lubricants.

Whenever possible, store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

Lubrication and Maintenance Intervals

Beginning and End of Season

Perform each lubrication and service illustrated in this section.

10 Hours - Daily

- Wing Fold Joints
- Flex Joints
- Wing Fold Cylinder
- Bump Adjust

50 Hours - Weekly

- Wing Wheel pivot
- Fold Latch

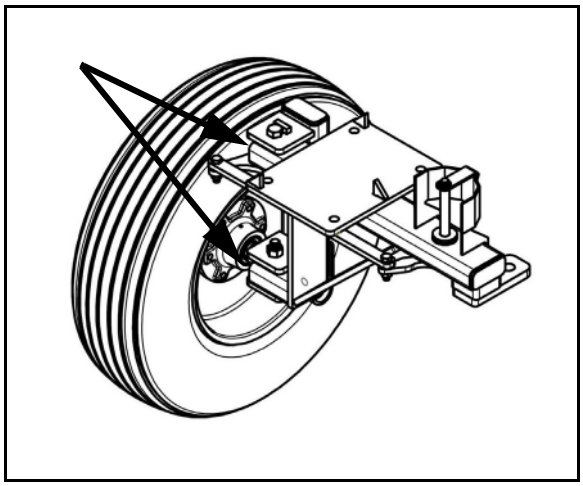
Annually

- Main Wheel Bearings
- Wing Wheel Bearings
- Turnbuckles
- Pivot Joints

Pivot joints

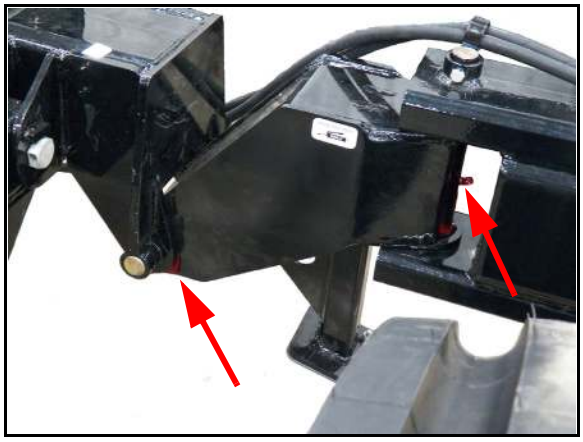
Grease pivot joints annualy.

Wing Wheel



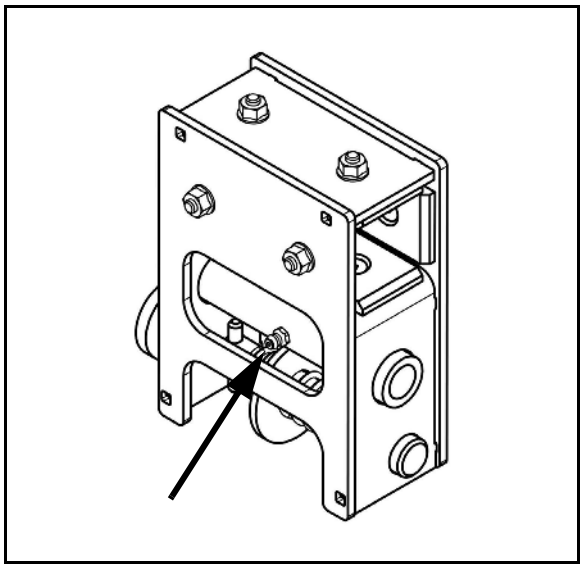
Grease Wing Wheel Pivot Weekly.

Flex Joint



Grease Flex Joints daily.

Bump Adjust

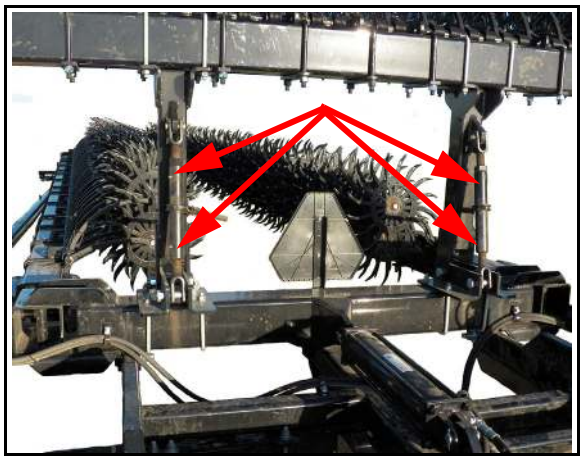


Grease bump adjust weekly.

Main Wheel Bearing

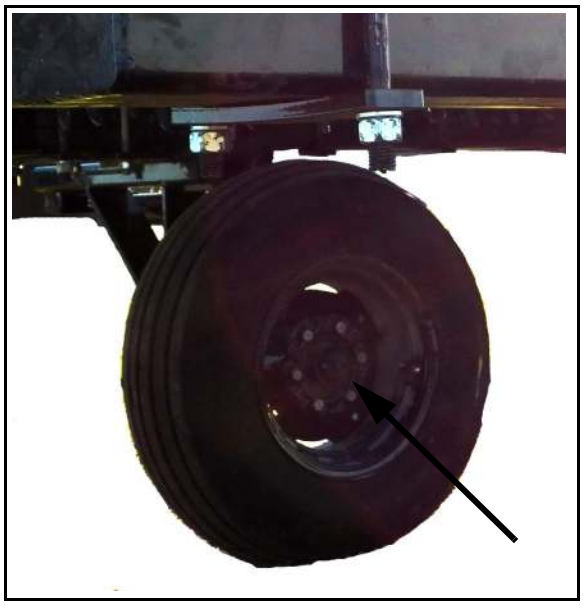
Grease main wheel bearing annually.

Turnbuckles



Grease turnbuckles annually.

Wing Wheel Bearing



Grease wing wheel bearings annually.

SERVICE

Practice Safe Maintenance

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet, and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

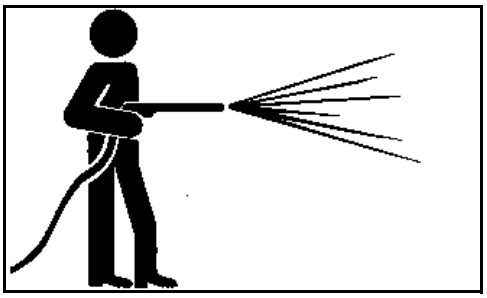
Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

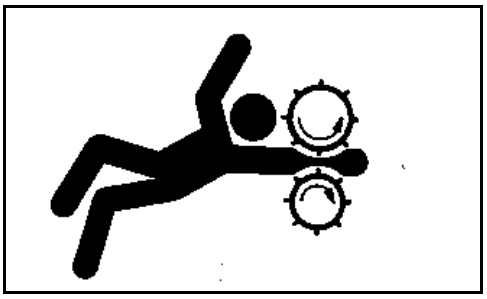
Work in Clean Area



Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.

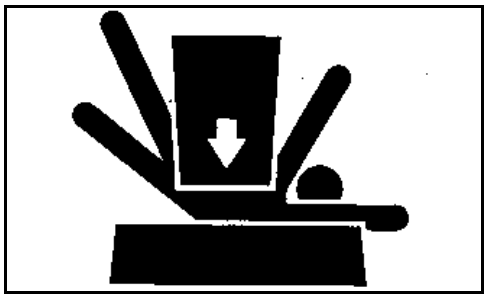
Service Machines Safely



Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Support Machine Properly



Always lower the attachment or implement to the ground before you work on the machine. If the work requires that the machine or attachment be lifted, provide secure support for them. If left in a raised position, hydraulically supported devices can settle or leak down.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

When implements or attachments are used with a machine, always follow safety precautions listed in the implement or attachment operator's manual.

Avoid High-Pressure Fluids

Inspect hydraulic hoses periodically – at least once per year – for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

Replace worn or damaged hose assemblies immediately with FAST approved replacement parts.

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

Replace Hydraulic Hoses

CAUTION: Avoid hazards due to escaping fluid under pressure. See AVOID HIGH PRESSURE FLUIDS in this manual.

Hydraulic hoses between the lift cylinders and hydraulic lock-up valve should be inspected frequently for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

Worn or damaged hose assemblies can fail during use and should be replaced immediately.

See your FAST Dealer for replacement hoses.

CAUTION: If incorrectly rated hose is used, machine damage, injury or death could occur.

If hoses are to be fabricated, ensure hoses are rated at no less than 82,737 kPa (827 bar) (12,000 psi) burst pressure according to SAE standard J517, 100R17 hose specification.

Incorrect hose length or routing can increase chance of hose wear or damage. Use old hose as guide for length and hose routing.

Incorrect fittings can damage mating parts or cause leaks. Make sure to use steel fittings approved for use with hose manufacturer. Use correct size and thread type as replaced hose.

Tightening Hardware

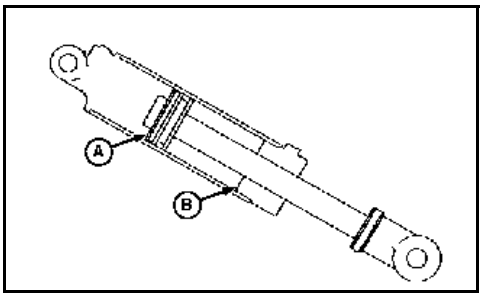
Check tightness of ALL BOLTS, U-BOLTS and CAP SCREWS after first 10-15 hours of operation and again at end of first week (50 hours) of operation.

Tighten all bolts to torques specified in Service section unless otherwise noted.

Check tightness of hardware periodically.

ADJUST HITCH HEIGHT

1. Verify machine is parked safely before performing hitch adjustment to avoid injury or death caused by uncontrolled machine movement.
2. Remove and retain caps screws.
3. Lower hitch assembly and retain using existing caps screws in holes shown.
4. Tighten cap screws to 873 N-m (644 ft-lbs).
5. Remove and retain caps screws.



A - Piston
B - Rod Guide

Preventing Hydraulic System Contamination

IMPORTANT: Cleanliness is very important when working on hydraulic system. Prevent contamination by assembling cylinders, hoses, couplers, and valves in a clean area of shop.

Leave protective caps on fluid openings until ready to make connection. When charging system, use a tractor or other source that contains clean oil, free of abrasive materials. Keep couplers clean. Abrasive particles, like sand or metal fragments, can damage seals, barrels, and pistons causing internal leakage.

NOTE: In order to help keep couplers clean, always place in storage position when not attached to tractor.

IMPORTANT: To prevent contaminants from entering hydraulic system, filters must be installed at tip of supply hose (cylinder depth stop systems). Additional filters are not recommended as they will restrict oil flow and adversely affect lift time due to pressure drop.

Without filter, large dirt particles can enter cylinder and settle against top side of piston (A) where they can cut piston seal as cylinder retracts.

No filter is needed on rod end port because dirt particles entering cylinder from here will settle harmlessly against rod guide (B), away from piston seal.

PREPARING FOR STORAGE

CAUTION: Store unit in an area away from human activity. Do not permit children to play on or around stored implement.

At end of season, thoroughly inspect and prepare rotary hoe for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at beginning of next season.

1. Thoroughly wash machine using a pressure washer to remove all dirt, mud, debris or residue to protect against corrosion.

2. Lubricate all grease points. Make sure all grease cavities have been filled with grease to remove any water residue from washing.

3. Inspect all hydraulic hoses, couplers and fittings. Tighten any loose fittings. Replace any hose that is damaged or separating from crimped end of a fitting.

4. Touch up all paint nicks and scratches to prevent rusting.

5. Fold inner and outer wings to transport configuration.

6. Install spacers on lift cylinder rams.

7. Move machine to a storage position.

8. Select an area that is dry, level and free of debris.

9. Place planks under jack for added support if required.

9. Unhook rotary hoe from tractor.

Removing from Storage

1. Clear area of bystanders, especially small children, and remove foreign objects from machine and working area.
2. Attach tractor to implement.
3. Check:
   - □ Hoe tooth wheels.
   - □ All hardware. Tighten as required.
   - □ Tire pressure.
   - □ All hydraulic lines, fittings and connections. Tighten as required
4. Lubricate all grease fittings.
5. Replace any defective parts.
6. Follow pre-operation checklist before using.

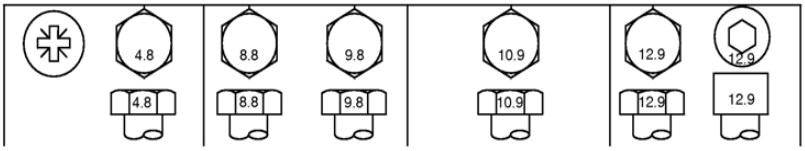
TROUBLESHOOTING

Problem:	Cause:	Solution:
Premature bearing failure.	Excessive strain on the hoe wheel bearings.	Don't turn with rotary hoe wheels on the ground.
		Store the rotary hoe inside to help protect the bearings from freezing weather, moisture, blowing sand, and dirt.
		Keep all wheel bolts tight. Check rotary hoe wheels for loose rivets and bent teeth. Check for bent arm castings.
Rotary hoe arm bending or breaking.	Excessive strain on the arms and wheels.	Don't turn with the rotary hoe wheels on the ground.
		Don't back the rotary hoe with wheels on the ground.
Wings float up.	Air in system.	Check for air in hydraulic system and purge system.
	Gauge wheels not properly adjusted.	Check proper adjustment of wing gauge wheels.
	Wing deflection not properly adjusted.	Maintain center tool bar height above or parallel with outer wings.
	Hinge levers not properly installed.	Check assembly of hinge levers.
Hydraulic cylinders fail to operate properly.	Hydraulic system improperly installed.	Check for correct assembly of the hydraulic system.
	Air in system.	Check for air in the hydraulic system and purge system.
	Blocked restrictors.	Check restrictors for malfunctions.
Rotary hoe wheels plug with trash materials.	Excessive trash conditions.	Decrease operating depth of hoe wheels and increase ground speed to create momentum so the hoe wheels may clean themselves.
		On softer, mellow soils, decrease operating depth so that hoe wheels do not pickup trash material.
Hoe wheels won't penetrate.	Hard soil conditions.	Lower tool bar to maximize aggressiveness of rotary hoe.
		Lengthen center link on tractor to tilt tool bar back to increase spring tension.
Rotary hoe wheels are too aggressive.	Rotary hoe wheels running too fast.	Slow tractor ground speed.
	Rotary hoe wheels running too deep.	Decrease operating depth of rotary hoe wheels.

TIGHTENING HARDWARE

Check tightness of ALL BOLTS, U-BOLTS and CAP SCREWS after first 10-15 hours of operation and again at end of first week (50 hours) of operation. Tighten all bolts to torques specified in Service section unless otherwise noted. Check tightness of hardware periodically.

Metric Bolt and Screw Torque Values



Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[1]		Dry[2]		Lubricated[1]		Dry[2]		Lubricated[1]		Dry[3]		Lubricated[1]		Dry[2]	
	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.
M6	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
									N˙m	lb.-ft.	N˙m	lb.-ft.	N˙m	lb.-ft.	N˙m	lb.-ft.
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
			N˙m	lb.-ft.	N˙m	lb.-ft.	N˙m	lb.-ft.								
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
	N˙m	lb.-ft.														
M12	40	29.5	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	46	80	59	120	88	150	110	175	130	220	165	205	150	260	190
M16	100	74	125	92	190	140	240	175	275	200	350	255	320	235	400	300
M18	135	100	170	125	265	195	330	245	375	275	475	350	440	325	560	410
M20	190	140	245	180	375	275	475	350	530	390	675	500	625	460	790	580
M22	265	195	330	245	510	375	650	480	725	535	920	680	850	625	1080	800
M24	330	245	425	315	650	480	820	600	920	680	1150	850	1080	800	1350	1000
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	2000	1475
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1580	2700	2000
M33	900	665	1150	850	1750	1300	2200	1625	2500	1850	3150	2325	2900	2150	3700	2730
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2770	4750	3500

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 stainless steel fasteners or for nuts on U-bolts, see the tightening instructions for the specific application. Tighten plastic insert or crimped steel type lock nuts by turning the nut to the dry torque shown in the chart, unless different instructions are given for the specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class. Replace fasteners with the same or higher property class. If higher property class 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.

[1] *"Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.*
[2] *"Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.*
[3] *"Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.*

Unified Inch Bolt and Screw Torque Values

Bolt or Screw Size	SAE Grade 1				SAE Grade 2[1]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated[2]		Dry[3]		Lubricated[2]		Dry[3]		Lubricated[4]		Dry[3]		Lubricated[2]		Dry[3]	
	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	305	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.

[1] *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.*

[2] *"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, F13F or F13J zinc flake coating.*

[3] *"Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.*

[4] *"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, F13F or F13J zinc flake coating.*

Face Seal Fittings Assembly and Installation—All Pressure Applications

Face Seal O-Ring to Stud End Installation

1. Inspect the fitting surfaces. They must be free of dirt and/or defects.
2. Inspect the O-ring. It must be free of damage and/or defects.
3. Lubricate O-rings and install into groove using petroleum jelly to hold in place.
4. Push O-ring into groove with petroleum jelly so O-ring is not displaced during assembly.
5. Index angle fittings and tighten by hand pressing joint together to insure O-ring remains in place.
6. Tighten fitting or nut to torque value shown on the chart per dash size stamped on the fitting. DO NOT allow hoses to twist when tightening fittings.

Face Seal Adjustable Stud End O-Ring Installation

1. Back off lock nut (jam nut) and washer to full exposed turned down section of the fitting.
2. Install a thimble over the fitting threads to protect the O-ring from nicks.
3. Slide the O-ring over the thimble into the turned down section of the fitting.
4. Remove thimble.

Face Seal Straight Stud End O-Ring Installation

1. Install a thimble over the fitting threads to protect the O-ring from nicks.
2. Slide the O-ring over the thimble into the turned down section of the fitting.
3. Remove thimble.

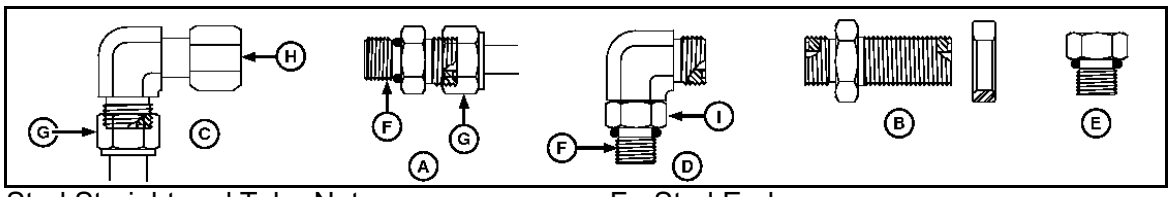
Fitting Installation

1. Install fitting by hand until snug.
2. Position adjustable fittings by unscrewing the fitting no more than one turn.
3. Apply assembly torque per table.

Assembly Torque

1. Use one wrench to hold the connector body and one wrench to tighten nut.
2. For a hydraulic hose, it may be necessary to use three wrenches to prevent twist; one on the connector body, one on the nut, and one on the body of the hose fitting.

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressures



A - Stud Straight and Tube Nut
B - Bulkhead Union and Bulkhead Lock Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Lock Nut

SAE Face Seal and O-Ring Stud End Fitting Torque Chart

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressure-Below 27.6 MPA (4,000 PSI)																
Nominal Tube OD Hose ID				O-Ring Face Seal/ Tube Swivel Nut				Bulkhead Jam Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]					
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut Swivel Nut Torque		Jam Nut Hex Size	Jam Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque		Aluminum or Brass Torque[C]	
mm	Dash Size	in.	mm	in.	in.	N˙m	lb-ft		N˙m	lb-ft	in.	in.	in.	N·m	lb-ft	N˙m	lb-ft
5	-3	0.188	4.78	—	—	—	—	—	—	—	3/8-24	5/8	9/16	12	9	8	6
6	-4	0.250	6.35	9/16-18	11/16	16	12	13/16	32	24	7/16-20	5/8	5/8	16	12	11	8
8	-5	0.312	7.92	—	—	—	—	—	—	—	1/2-20	3/4	11/16	24	18	16	12
10	-6	0.375	9.53	11/16-16	13/16	24	18	1	42	31	9/16-18	3/4	3/4	37	27	25	18
12	-8	0.500	12.70	13/16-16	15/16	50	37	1-1/8	93	69	3/4-16	7/8	15/16	50	37	33	25
16	-10	0.625	15.88	1-14	1-1/8	69	51	1-5/16	118	87	7/8-14	1-1/16	1-1/16	69	51	46	34
20	-12	0.750	19.05	1-3/16-12	1-3/8	102	75	1-1/2	175	129	1-1/16-12	1-1/4	1-3/8	102	75	68	50
22	-14	0.875	22.23	1-3/16-12	—	102	75	—	175	129	1-3/16-12	1-3/8	1-1/2	122	90	81	60
25	-16	1.000	25.40	1-7/16-12	1-5/8	142	105	1-3/4	247	182	1-5/16-12	1-1/2	1-5/8	142	105	95	70
32	-20	1.25	31.75	1-11/16-12	1-7/8	190	140	2	328	242	1-5/8-12	1-3/4	1-7/8	190	140	127	93
38	-24	1.50	38.10	2-12	2-1/4	217	160	2-3/8	374	276	1-7/8-12	2-1/8	2-1/8	217	160	145	107
50.8	-32	2.000	50.80	—	—	—	—	—	—	—	2-1/2-12	2-3/4	2-3/4	311	229	207	153

[A] Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B] The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

[C] These torques were established using steel plated connectors in aluminum and brass.

NOTES

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