fast Sprayers™

Single Bar

Double Bar

LIQUID FERTILIZER APPLICATOR

8100 SERIES

SINGLE AND DOUBLE BAR MODELS

OPERATOR'S MANUAL

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 FAST AG Solutions operator's manual, specifications, or printed instructions.

Written notice shall be given by registered mail, to FAST AG Solutions 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 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 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 or its authorized dealers or employees.

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

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

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. FAST disclaims all liability for incidental or consequential damages.

This Applicator is subject to design changes and FAST AG Solutions shall not be required to retro-fit or exchange items on previously sold units except at its own option.

WARRANTY VOID IF NOT REGISTERED

FAST AG Solutions LIQUID FERTILIZER APPLICATOR

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's Name_____ Dealer Name _____

Address_____ Address _____

City, State, Code_____ City, State, Code _____

Phone Number ( ) _____

Applicator Model _____

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 Controllors 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	YELLOW	PINK
FAST AG Solutions	DEALER	CUSTOMER

TABLE OF CONTENTS

SERIAL NUMBER LOCATION

Always give your dealer the serial number of your FAST AG Solutions Liquid Fertilizer Applicator when ordering parts or requesting service or other information.

The serial number is stamped into the frame where indicated. Please mark the number in the space provided for easy reference.

SERIAL NUMBER LOCATION (TYPICAL)

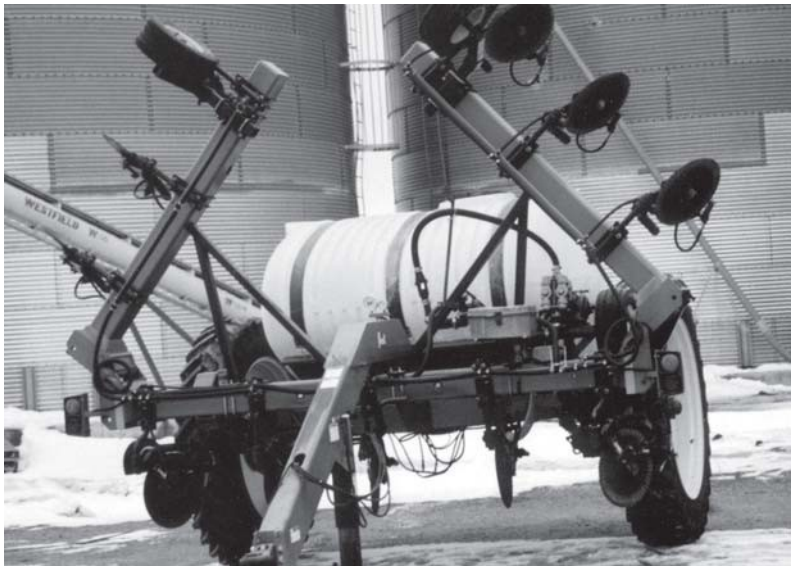
Model Number_____

Applicator Serial Number_____

1 INTRODUCTION

Congratulations on your choice of a FAST AG Solutions Liquid Fertilizer Applicator to complement your operation. This equipment has been designed and manufactured to meet the needs of a discriminating buyer for the efficient application of liquid fertilizer.

Safe, efficient and trouble free operation of your FAST AG Solutions Liquid Fertilizer Applicator requires that you and anyone else who will be operating or maintaining the applicator, read and understand the Safety, Operation, Maintenance and Trouble Shooting information contained in the Operator's Manual.



Single Bar

Double Bar

This manual covers the 8100 Series Liquid Fertilizer Applicators built by FAST AG Solutions. Use the Table of Contents or Index as a guide when searching for specific information.

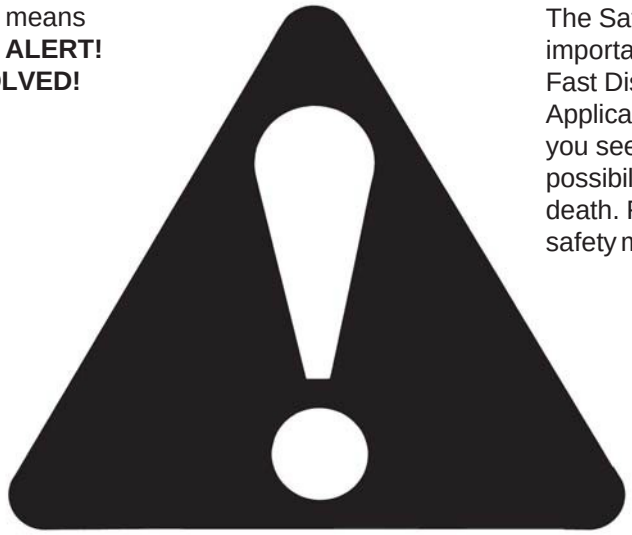
Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your FAST AG Solutions dealer or distributor if you need assistance or information.

OPERATOR ORIENTATION - The directions left, right, front and rear, as mentioned throughout this manual, are as seen from the tractor driver's seat and facing in the direction of travel.

2 SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



The Safety Alert symbol identifies important safety messages on the Fast Distributing Liquid Fertilizer Applicator and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER, WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

DANGER - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

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

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

If you have any questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer or FAST AG Solutions., 4130 Commerce Boulevard, Windom, MN 56101, (Telephone) 507-427-3861, (FAX) 507-427-3030.

SAFETY

YOU are responsible for the **SAFE** operation and maintenance of your Fast Distributing Liquid Fertilizer Applicator. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Liquid Fertilizer Applicator be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the applicator.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Applicator owners must give operating instructions to operators or employees before allowing them to operate the unit, and at least annually thereafter per OSHA regulation 1928.57.

- The most important safety device on this equipment is a **SAFE** operator. It is the operator's responsibility to read and understand **ALL** Safety and Operating instructions in the manual and to follow these. All accidents can be avoided.

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

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

- Think SAFETY! Work SAFELY!

2.1 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining or adjusting the applicator.

2. Only trained competent persons shall operate the applicator. An untrained operator is not qualified to operate the machine.

3. Have a first-aid kit available for use should the need arise and know how to use it.

4. Have a fire extinguisher available for use should the need arise and know how to use it.

5. Do not allow riders.

6. Wear appropriate protective gear. This list includes but is not limited to:

   - A hard hat
   - Protective shoes with slip resistant soles
   - Protective goggles
   - Neoprene gloves
   - Protective clothing
   - Respirator or filter mask

7. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

8. Read chemical manufacturers warnings, instructions and procedures before starting and follow them exactly.

9. Post Poison Control Emergency telephone number for your area on applicator before using Agricultural chemicals.

   Washington: (202) 962-4525
   Ottawa: (613) 992-5606

   Have container label handy when seeking medical attention.

10. Review safety related items with all personnel annually.

2.2 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.

2. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

3. Install and secure all guards and shields before starting or operating.

4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.

5. Do not allow riders on the applicator or tractor during operation or transporting.

6. Clear the area of all bystanders, especially children, before starting or filling with chemical or fertilizer.

7. Read chemical or fertilizer manufacturers warnings, instructions and procedures before starting and follow them exactly.

8. Do not breathe, touch or ingest chemicals or fertilizer. Always wear protective clothing and follow safe handling procedures.

9. Stay away from wings when folding or extending wings. Keep others away.

10. Clean reflectors, SMV and lights before transporting.

11. Attach securely to towing unit using a hardened pin with a retainer and a safety chain.

12. Do not exceed a safe travel speed.

13. Use hazard flasher on tractor when transporting.

14. Stay away from overhead power lines when folding or extending the wings and during transport.

15. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

16. Review safety instructions annually.

2.3 MAINTENANCE SAFETY

1. Review the Operator's Manual and all safety items before working with, maintaining or operating the applicator.

2. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

3. Follow good shop practices:

   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Before applying pressure to a hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

5. Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.

6. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.

7. Clear the area of bystanders, especially children, when carrying out any maintenance and repairs or making any adjustments or filling.

8. Place stands or blocks under the frame before working beneath the machine or when changing tires.

9. Be sure all guards are in place and secured when maintenance work is completed.

10. Use only tools, jacks and hoists of sufficient capacity for the job.

2.4 HYDRAULIC SAFETY

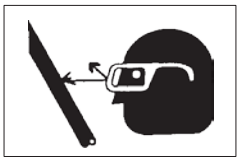
1. Always place all tractor hydraulic controls in neutral before dismounting.

2. Make sure that all components in the hydraulic system are kept in good condition and are clean.

3. Replace any worn, cut, abraded, flattened or crimped hoses and steel lines.

4. Do not attempt any makeshift repairs to the hydraulic lines, fittings or hoses by using tape, clamps or cements. The hydraulic system operates under extremely high-pressure. Such repairs will fail suddenly and create a hazardous and unsafe condition.

5. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.



6. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface.

7. Before applying pressure to the system, make sure all components are tight and that lines, hoses and couplings are in good condition.

2.5 TRANSPORT SAFETY

1. Read and understand ALL the information in the Operator's Manual regarding procedures and SAFETY when operating the applicator in the field and/or on the road.

2. Check with local authorities regarding applicator transport on public roads. Obey all applicable laws and regulations.

3. Always travel at a safe speed. Use caution when making corners or meeting traffic.

4. Make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.

5. Daybreak and dusk are particularly dangerous and pilot vehicles are recommended.

6. Be sure that the applicator is hitched positively to the towing vehicle and a retainer is used through the drawbar pin. Always attach a safety chain between the frame and the towing machine.

7. Keep to the right and yield the right-of-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.

8. Do not exceed 20 mph (32 km/h). Reduce speed on rough roads and surfaces.

9. Always use hazard warning flashers on tractor when transporting unless prohibited by law.

10. Stay away from overhead power lines during transport. Electrocution can occur without direct contact.

2.6 STORAGE SAFETY

1. Store unit in an area away from human activity.

2. Do not permit children to play on or around the stored applicator.

2.7 TIRE SAFETY

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.

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

3. Have a qualified tire dealer or repair service perform required tire maintenance.

2.8 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.

2. Replace safety signs that are missing or have become illegible.

3. Replaced parts that displayed a safety sign should also display the current sign.

4. Safety signs are available from your Distributor or the factory.

How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

2.9 SIGN-OFF FORM

FAST AG Solutions follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the FAST AG Solutions Liquid Fertilizer Applicator must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

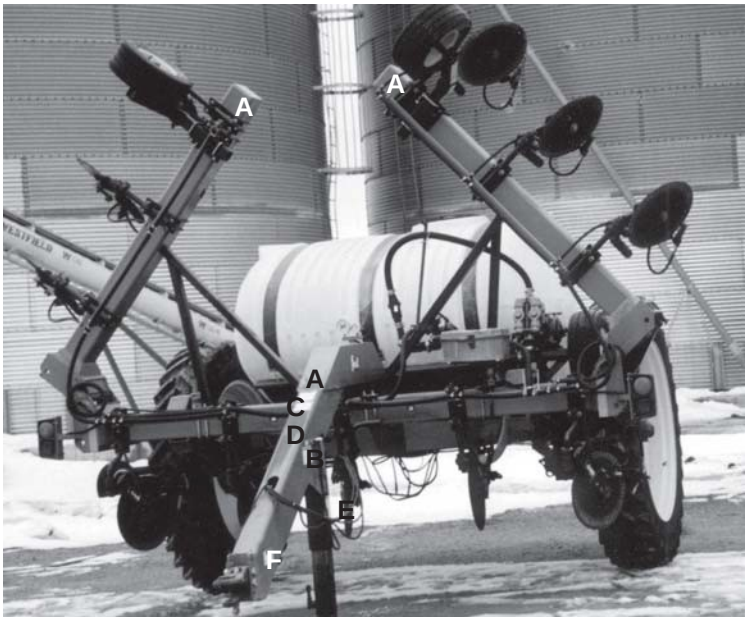
SIGN-OFF FORM

DATE	EMPLOYEES SIGNATURE	EMPLOYERS SIGNATURE

3 SAFETY SIGN LOCATIONS

The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



A

WARNING

OVERHEAD HAZARD

KEEP AWAY

To prevent serious injury or death from overhead hazard:

1. **Stay away from machine when extending or folding wings.**
2. **Keep others away.**
3. **Move wings only from tractor seat.**

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B

CAUTION

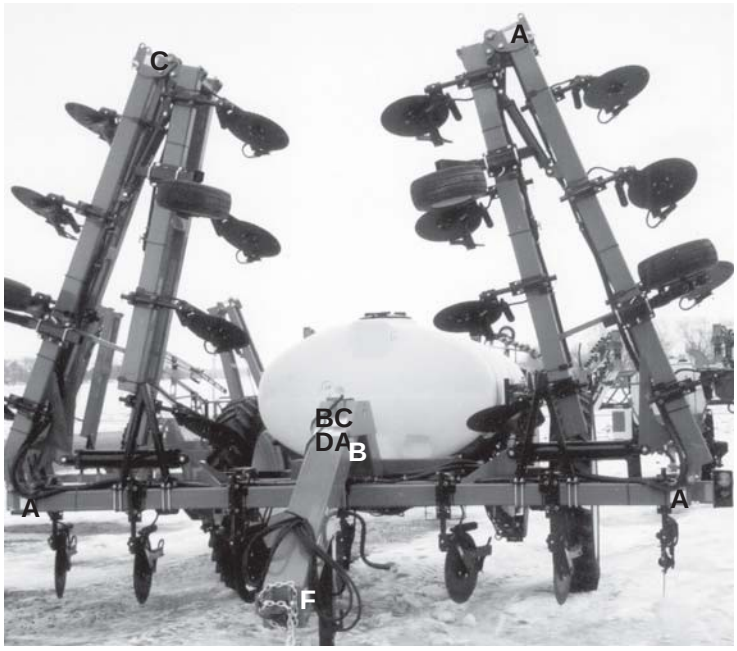
1. Read and Understand the Operator's Manual before using.
2. Read Chemical manufacturers' WARNINGS, Instructions and procedures before starting and follow them exactly.
3. Stop tractor engine, place all controls in neutral, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, unplugging or filling.
4. Always wear proper eye, breathing and clothing protection.
5. Stay away from chemicals, spray and drift. Keep others away.
6. Install and secure all guards before starting.
7. Keep hands, feet, hair and clothing away from moving parts.
8. Do not allow riders.
9. Keep all chemicals and hydraulic lines, fittings and couplers tight and free of leaks before starting and operating.
10. Stay away from overhead power lines.
11. Clear the area of bystanders before extending or folding wings.
12. Release second wing extend switch before first wing.
13. Hitch can upend. Do not stand over hitch when unhooking. Support hitch and sprayer on stands before removing pin.
14. Review safety instructions with all operators annually.

800

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

The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



C

DANGER

ELECTROCUTION HAZARD

KEEP AWAY FROM POWER LINES

To prevent serious injury or death from electrocution:

1. **Stay well away from power lines when folding or extending wings. Electrocution can occur without direct contact.**
2. **Lower wings completely before moving or transporting.**

D

DANGER

CHEMICAL HAZARD

To prevent serious injury or death:

WEAR RUBBER GLOVES	DON'T BREATHE VAPOR	DON'T INGEST CHEMICAL
• Do not allow chemical or solution to touch skin. Some can be absorbed through the skin. • Wear rubber gloves and protective gear at all times.	• Stay away from chemical splash and vapor. Keep others away. • Do not breathe vapor. • Wear proper respirator when working with chemicals.	• Chemicals can be toxic. • If in eyes or mouth, read chemical manufacturers' instructions and follow them exactly. • Seek medical attention immediately. • A poison control number is normally inside the front cover of your telephone book.

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

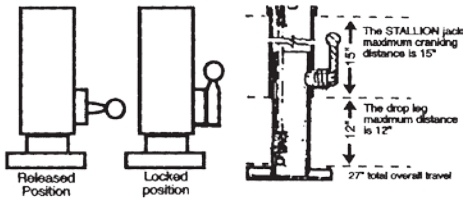
The types of safety signs and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

E

WARNING
READ BEFORE OPERATING

SPRING LOADED DROP LEG JACK



TO LOWER LEG:

1. BREAK OVER LEVER TO RELEASED POSITION.
2. PLACE FOOT ON DROP LEG SHOE, PRESS DOWN TO DESIRED POSITION.
3. PLACE LEVER IN LOCKED POSITION; **LIFT FOOT SLOWLY** (DROP LEG WILL AUTOMATICALLY LOCK IN)
4. ROTATE CRANK TO EXTEND JACK TO DESIRED HEIGHT.

TO RETRACT LEG:

1. ROTATE CRANK TO RETRACT JACK TO MINIMUM RETRACTED POSITION.
2. **CAUTION - DROP LEG HAS HIGH TENSION RETURN SPRING!**
3. PLACE FOOT ON DROP LEG SHOE. BREAK OVER LEVER TO RELEASED POSITION. SLOWLY LIFT FOOT TO RETRACT.
4. RETURN LEVER TO LOCKED POSITION.

CRAIN MFG., INC.

1-888-77HITCH (4-4824) - DURANT, OK 74701

F

DANGER

CRUSHING HAZARD

To prevent serious personal injury or death:

- Read and understand the owners manual before using machine.
- Keep hands and body out of hitch area when attaching towing vehicle.
- Always use the safety chains provided.
- Do not tow over 25 MPH, slower on uneven ground. Allow no riders.

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G

WARNING

HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death from high-pressure fluid:

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

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

4 OPERATION

OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.

2. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

3. Install and secure all guards and shields before starting or operating.

4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.

5. Do not allow riders on the applicator or tractor during operation or transporting.

6. Clear the area of all bystanders, especially children, before starting or filling with chemical or fertilizer.

7. Read chemical or fertilizer manufacturers warnings, instructions and procedures before starting and follow them exactly.

8. Do not breathe, touch or ingest chemicals or fertilizer. Always wear protective clothing and follow safe handling procedures.

9. Stay away from wings when folding or extending wings. Keep others away.

10. Clean reflectors, SMV and lights before transporting.

11. Attach securely to towing unit using a hardened pin with a retainer and a safety chain.

12. Do not exceed a safe travel speed.

13. Use hazard flasher on tractor when transporting.

14. Stay away from overhead power lines when folding or extending the wings and during transport.

15. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

16. Review safety instructions annually.

4.1 TO THE NEW OPERATOR OR OWNER

The FAST AG Solutions Liquid Fertilizer Applicator is designed to meter out and distribute liquid chemical or fertilizer and place them where required.

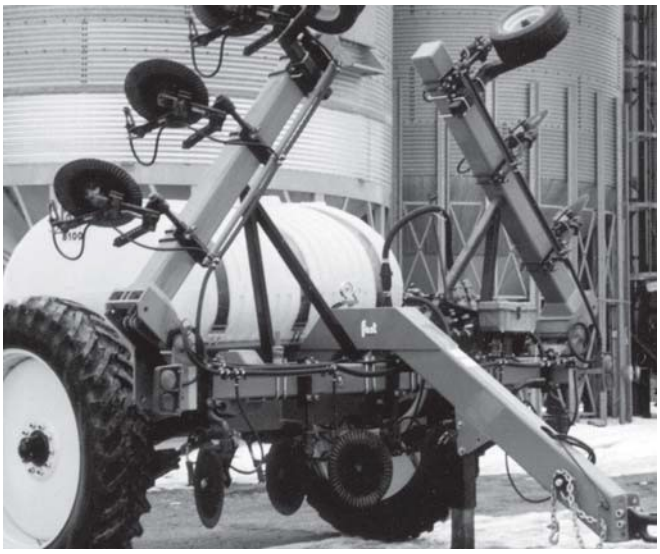
It is the responsibility of the owner or operator to read this manual and to train all other operators before they start working with the machine. Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the work site. Untrained operators are not qualified to operate the machine.

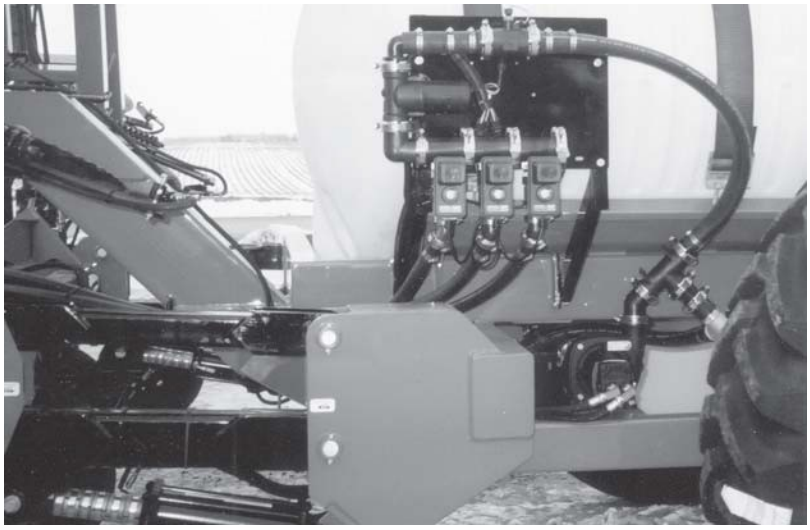
Many features incorporated into this machine are the result of suggestions made by customers like you. Read this manual carefully to learn how to operate the machine safely and how to set it to provide maximum field efficiency. By following the operating instructions in conjunction with a good maintenance program, your applicator will provide many years of trouble-free service.

4.2 MACHINE COMPONENTS

The FAST AG Solutions Liquid Fertilizer Applicator is a transportable tank for moving liquids through the field. It is designed with a wheel-driven or hydrau-lic powered metering pump to send liquid chemi-cals or fertilizer to the distribution lines on the tool bar. Coulters open the ground to receive the liquid. Nozzles mounted to the tool bar spray the fluid into the soil.

A tool bar mounted under the hitch places the material where required. Solid or folding tool bars are used depending on the width.





A Single Folding Tool Bar
B Solid Tool Bar (Not Shown)
C Metering Pump
D Hitch Frame
E Tank
F Wheel Drive Wheel
G Coulter
H Nozzle
J Liquid Line
K Metering Drive System
L Gauge Wheel
M Rinse Tank
N Metering System
O Hydraulic Motor
P System Pump
Q Double Folding Tool Bar

Fig. 1 MACHINE COMPONENTS

4.3 BREAK-IN

Although there are no operational restrictions on the applicator when used for the first time, it is recommended that the following mechanical items be checked:

A. After operating for 1/2 hour

1. Retorque all the wheel bolts.

2. Retorque all other fasteners and hardware.

3. Check that no chemical or hydraulic lines are being pinched or crimped. Re-route as required.

4. Check that all coulters, nozzles and placement components are clean and working properly. Clean as required.

5. Check that the metering pump drive system, chain and metering pump are functioning properly. Adjust as required.

6. Lubricate all grease fittings.

B. After 5 hours and 10 hours of operation

1. Retorque all wheel bolts, fasteners and hardware.

2. Check chemical and hydraulic line routing.

3. Check that all placement components are clean and working properly.

4. Then go to the normal servicing and maintenance schedule as defined in the Maintenance Section.

4.4 PRE-OPERATION CHECKLIST

Efficient and safe operation of the Fast Distributing Liquid Fertilizer Applicator requires that each operator reads and understands the 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 applicator that this checklist be followed.

Before operating the applicator and each time thereafter, the following areas should be checked off:

1. Lubricate the machine per the schedule outlined in the “Maintenance Section”.

2. Use only a tractor of adequate power and weight to operate the applicator. See Section 4.5.1 for recommendations.

3. Be sure that the machine is properly attached to the tractor. Be sure that a mechanical retainer is installed through the drawbar pin and the safety chain is installed.

4. Inspect all hydraulic lines, hoses, fittings and couplers for tightness.

5. Check the tires and ensure that they are inflated to their specified pressure.

6. Calibrate the applicator if it is the start of the season or a new applicator rate is being used.

7. Check the 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.

8. Check the placement components. Remove and replace any that are worn.

9. Remove all entangled material.

10. Raise the tool bar and turn the metering pump slightly. Check that there is liquid coming out of each nozzle. Unplug or connect lines as required. Replace any nozzles that are plugged. Be sure the drive system turns freely.

4.5 EQUIPMENT MATCHING

To insure the safe and reliable operation of the applicator, it is necessary to use a tractor with appropriate specifications. As a guideline, insure that these requirements are met:

1. **Tractor Horsepower:**
   Refer to Table 1 for the minimum recommended horsepower for your machine. Although the recommended tractor horsepower is not required to pull the machine, it does provide the required strength in the drawbar as the hitch is very heavy. This will also insure that the unit has the required stability and control in hilly terrain and during transport.

Table 1 Minimum Horsepower

Model	Width	Horsepower
8100L8	8 Row	90
8100L12	12 Row	110
8100L16	16 Row	130
8100L24	24 Row	150

2. **Front End Weights:**
   By following the recommendations for tractor power, the tractor will have sufficient weight to provide stability for the unit during field operation or when transporting. It is also recommended that each tractor be equipped with a full compliment of suitcase weights on the front of the tractor. This will provide the required weight on the front for turning and extra traction if equipped with front wheel assist.

3. **Hydraulic System:**
   The tractor hydraulic system must be capable of 8 gpm (24 lpm) at 2000 psi (13,800 kPa) to operate lift cylinders and the drive motor. Either closed-center or open-centered systems can be used. However an open centered hydraulic system is limited to 8 gpm maximum.

Fig. 2 FRONT WEIGHT PACKAGE

NOTE

Contact factory for an optional flow control for use with high flow open center system.

Two, three or four remote outlets are required to operate the applicator depending on the model and options.

a. Tool bar lift cylinders.

b. Inner wing extend/fold cylinders (folding tool bar models only).

c. Outer wing extend/fold cylinders (folding tool bar models only) - double bar models.

d. Chemical/fertilizer circuit drive motor (hydraulic drive option only).

NOTE

Always place the hydraulic control lever in detent to provide a constant flow of oil to the motor.

4.6 CONTROLS

It is recommended that all operators review this section of the manual and the metering pump manual to familiarize themselves with the location and function of all machine controls and settings before starting.

1. **Metering Pump:**
   An Operator's Manual and slide rule for the metering pump is supplied with the machine. Review the manual carefully to determine the required scale setting on the pump for your application rate.

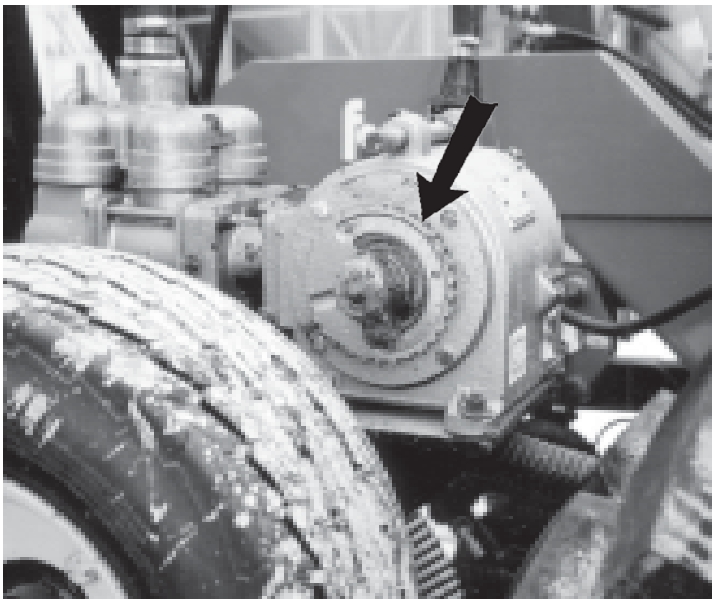
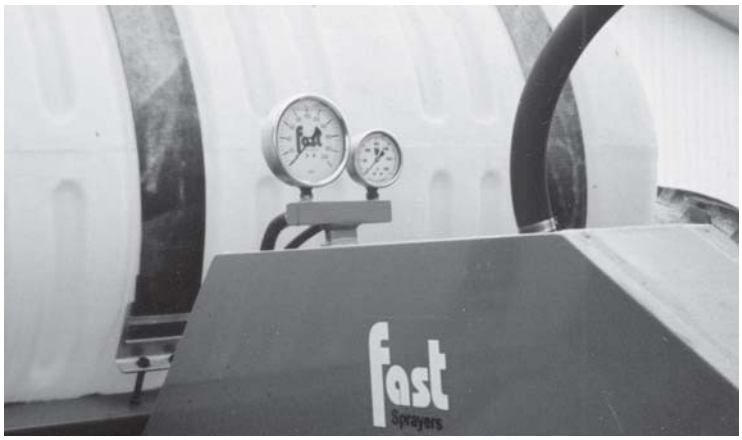
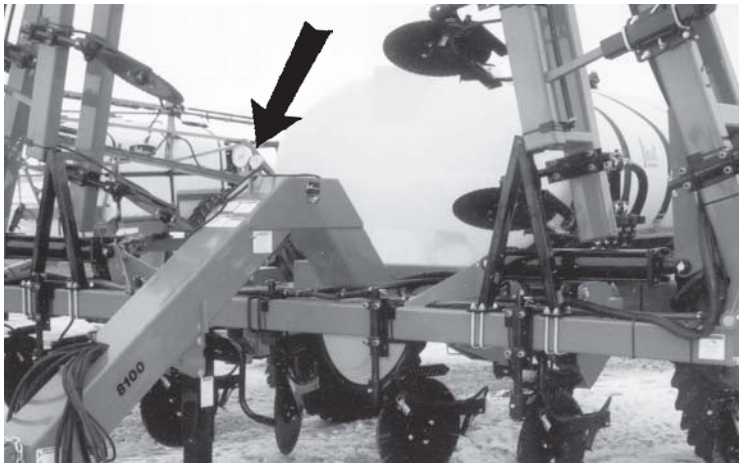


Fig. 3 WHEEL DRIVE METERING PUMP SCALE

2. **Liquid System Pressure Gauge:**
   This gauge monitors the pressure in the liquid circuit providing flow to the injector orfices. It is normally used to determine the pressure in the chemical/fertilizer circuit when setting the system for a specific application rate. Monitor the gauge during operation. Stop and check the system if the pressure changes suddenly.



Single Bar



Double Bar

Fig. 4 PRESSURE GAUGES

3. **Tank Scale:**
The left or back end of the tank has a scale molded into it to assist the operator when filling the tank.

Single Bar

Double Bar

Fig. 5 TANK SCALE

4. **Automatic Controller (Optional):**
This optional automatic controller will monitor, set and control the operation of the applicator. Refer to the operators manuals supplied with the controller for detailed instructions.

Fig. 6 OPTIONAL CONTROLLER

5. **Wheel Drive:**
The frame is designed to flex at its hinge points when raising and lowering. As the coulters are lowered into the ground, the pump and drive wheel assembly are moved into the applicator tire. In that way, the circuit pump is engaged only when the machine is in its applying mode and the coulters are in the ground. This also means that the pump speed is directly proportional to the tire/ground speed.

Raised/Not Engaged

Fig. 7 WHEEL DRIVE **Lower/Engaged**

4.7 INSTALLING OPTIONAL CONTROLLERS

An optional automatic control system is available to use with the applicator when operated hydraulically and is mounted in the tractor cab.

1. **Circuit Control Box:**
   The control box is equipped with a "U" bracket secured by knobs on each end of the box. It provides a universal mounting system adaptable to any configuration.

   Use the two holes provided in the bracket to mount to the box to a solid surface. Position the box to face the operator and tighten the knobs to hold the box in position.

   Cut the power cable to the required length. Connect the white wire to ground and the red wire to a 12 volt battery or 12v power port. Refer to Controller Manual.

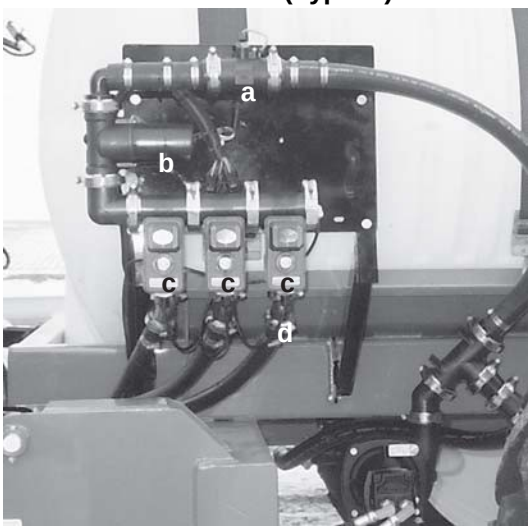
IMPORTANT

Do not connect across a 24 volt system. It will damage internal electrical components.

All circuit control components are part of plumbing on left side of the frame.

a. Flow meter.
b. Flow regulator.
c. Control valves.
d. Pressure line.

Controller (Typical)



Circuit Controls

Fig. 8 AUTOMATIC CONTROL SYSTEM

4.8 ATTACHING/UNHOOKING TRACTOR

Follow this procedure when attaching the applicator to the tractor:

1. Make sure that all bystanders, especially small children, are clear of the working area.

2. Make sure there is enough room and clearance to safely back up to the machine.

3. Slowly back the tractor until the holes on the hitch and drawbar are aligned.

4. Install the drawbar pin and the retainer.

5. Attach the safety chain securely around the tractor drawbar cage to prevent unexpected separation.

6. Check that the applicator hydraulic system is compatible with the tractor hydraulics. Change applicator if required. Do not operate unless tractor and applicator hydraulics are compatible.

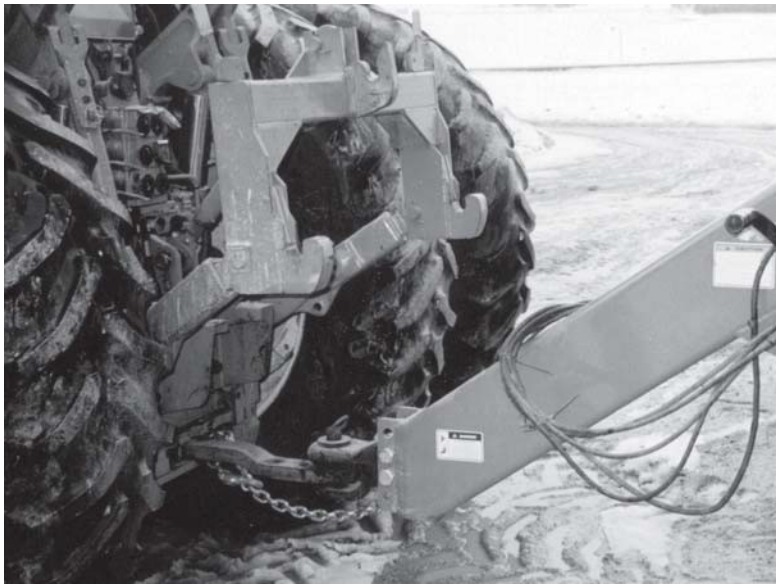


Fig. 9 DRAWBAR PIN/SAFETY CHAIN

⚠ WARNING

The following instructions must be carefully followed to avoid damage to your tractor hydraulic system!

LOAD SENSING	PRESSURE COMPENSATING	OPEN
(John Deere 6000, 7000, 8000 & 9000 Series, CaselH Magnum & Maxxum Series, Ford Genesis)	(John Deere, except 6000, 7000, 8000 & 9000 Series, AGCOWhite)	(Steiger, Cougar and Panther)
Purchase a Flow limiting Valve (Part No. LS206 or LS304) from your dealer and install it on the inlet port of the ACE Pump hydraulic motor.	**Use the Restrictor Orifice that is wire-tied to the ACE pump. Install it in the inlet port of the ACE hydraulic motor.**	**Do NOT use the Flow Limiting Valve or the Restrictor Orifice.**
Follow the detailed instructions found at the beginning of the PUMP section of the Fast catalog.	**Follow the detailed instructions found at the beginning of the PUMP section of the Fast catalog.**	**Follow the detailed instructions found at the beginning of the PUMP section of the Fast catalog.**

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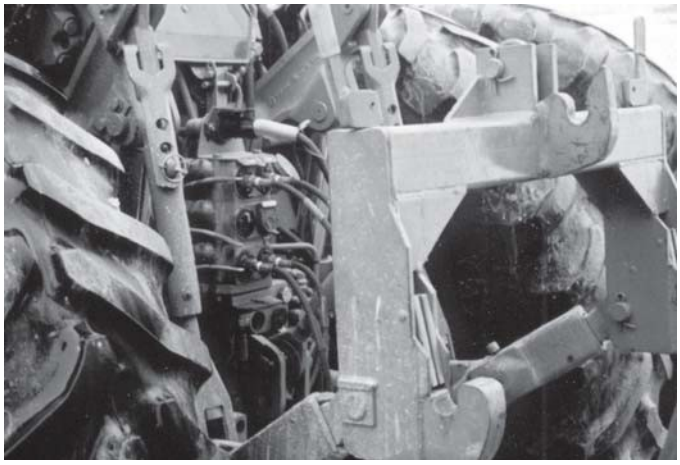
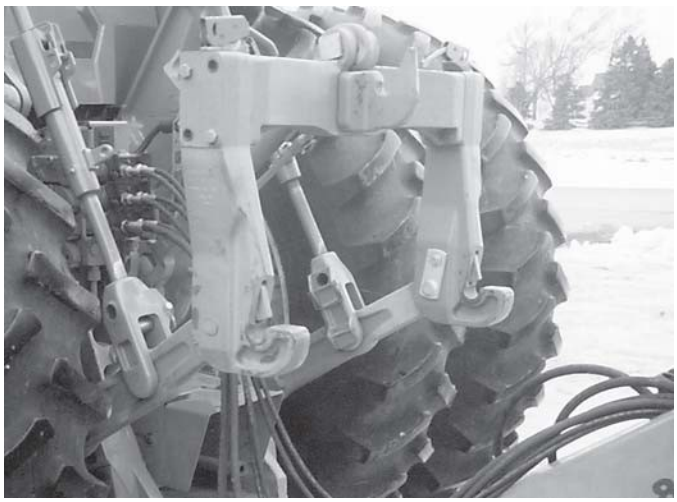
7. **Connect the hydraulics:**
   a. Use a clean rag or paper towel to clean the dirt from couplers on the hose ends and the tractor.

   b. Relieve the pressure in the hydraulic circuit.

   c. Connect the hoses to the tractor couplers. Be sure the couplers are securely seated.



Single Bar



Double Bar

Fig. 10 HOSES

WARNING

HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death from high-pressure fluid:

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

8. Connect the wiring harness.

9. Connect the controller harness if so equipped.

0. Route the hoses and electrical lines over the hitch to prevent snagging. Be sure to provide slack for turning.

Fig. 11 LIGHTS/CONTROLLER

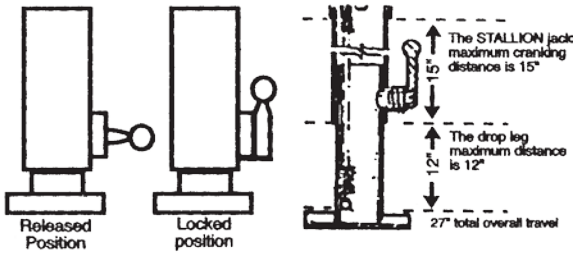
11. Raise the jack. Pull out the pin and place jack frame in its stowed position.

12. Reverse the above procedure when unhooking.

Down

WARNING
READ BEFORE OPERATING

SPRING LOADED DROP LEG JACK



TO LOWER LEG:

1. BREAK OVER LEVER TO RELEASED POSITION.
2. PLACE FOOT ON DROP LEG SHOE, PRESS DOWN TO DESIRED POSITION.
3. PLACE LEVER IN LOCKED POSITION; **LIFT FOOT SLOWLY** (DROP LEG WILL AUTOMATICALLY LOCK IN)
4. ROTATE CRANK TO EXTEND JACK TO DESIRED HEIGHT.

TO RETRACT LEG:

1. ROTATE CRANK TO RETRACT JACK TO MINIMUM RETRACTED POSITION.
2. **CAUTION - DROP LEG HAS HIGH TENSION RETURN SPRING!**
3. PLACE FOOT ON DROP LEG SHOE. BREAK OVER LEVER TO RELEASED POSITION. SLOWLY LIFT FOOT TO RETRACT.
4. RETURN LEVER TO LOCKED POSITION.

CRAIN MFG., INC.
1-888-77HITCH (4-4824) - DURANT, OK 74701

Up

Fig. 12 JACK POSITION

REGULATING HYDRAULIC FLOW TO THE SPRAYER PUMP

Locate your tractor model and follow the appropriate setup instructions.

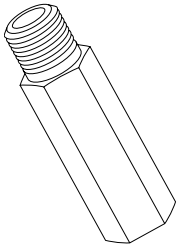
WARNING: FAILURE TO REGULATE OIL FLOW WILL CAUSE MOTOR FAILURE.

WARNING: NOT SUITABLE FOR PUMPING FLAMMABLE LIQUIDS.

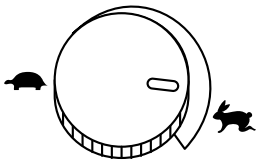
LOAD SENSING CLOSED CENTER SYSTEM (LS CLOSED)

Regulate oil flow with tractor's **FLOW CONTROL** and **FLOW LIMITER**.
(Do not use restrictor orifice.)
Setup Instructions:

1. (Optional) Remove adapter and install flow limiter in motor inlet port (marked **I**).
2. Close motor needle valve: loosen jam nut, screw needle valve clockwise until seated, and lock jam nut. (factory setting)
3. Shut off sprayer boom and agitation valves.
4. Adjust tractor flow control to minimum flow setting (turtle).
5. Move hydraulic lever to "Lower/Retract" position to start pump.
6. Adjust tractor flow control until sprayer shut-off pressure is below maximum shown in table on page 3.
   Note: If the flow limiter stops oil flow to the motor:
   - 6a) Move hydraulic lever to "Float" or "Neutral" to remove oil pressure from the flow limiter.
   - 6b) Adjust tractor flow control to a lower flow position.
   - 6c) Repeat steps 5 and 6.
7. Open the sprayer agitation valve to get desired spraying pressure.



FLOW LIMITER

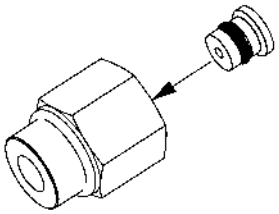


FLOW CONTROL

PRESSURE COMPENSATING CLOSED CENTER SYSTEM (PC CLOSED)

Regulate oil flow by using a **RESTRICTOR ORIFICE**.
(Do not use flow limiter.)
Setup Instructions:

1. Install restrictor orifice insert inside the adapter/restrictor body in the motor inlet port (marked **I**).
2. Close motor needle valve: loosen jam nut, screw needle valve clockwise until seated, and lock jam nut. (factory setting)
3. Set "Rabbit/Turtle" flow control to "Turtle".
4. Move hydraulic lever to the "Lower/Retract" position to start pump.
5. Adjust "Rabbit /Turtle" flow control and sprayer agitation valve to get desired spraying pressure.

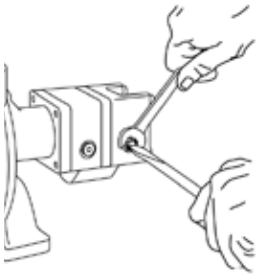


RESTRICTOR ORIFICE

OPEN CENTER SYSTEM (OPEN)

Select motor size closest to tractor's hydraulic system capacity. Regulate oil flow with motor **NEEDLE VALVE**.
(Do not use restrictor orifice or flow limiter.)
Setup Instructions:

1. Shut off sprayer boom and agitation valves.
2. Loosen jam nut on motor and back out needle valve 3 or 4 turns counter clockwise.
3. Set tractor throttle to sprayer operating speed.
4 Move hydraulic lever to "Lower/Retract" position to start pump.
5. Screw needle valve clockwise until sprayer shut-off pressure is below maximum shown in table on page 3 and lock jam nut.
6. Open the sprayer agitation valve to get desired spraying pressure.



NEEDLE VALVE

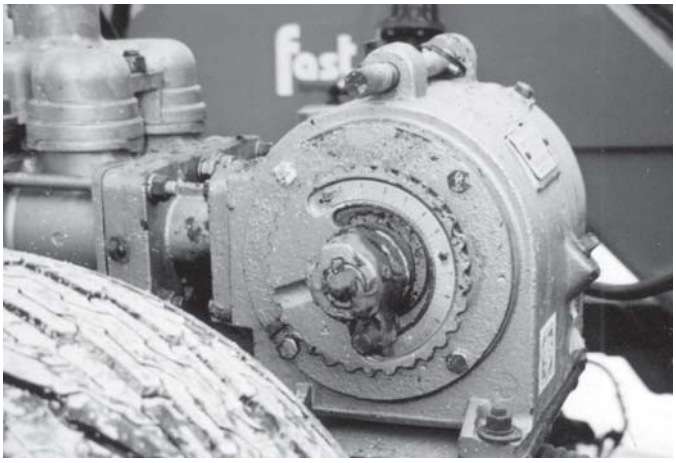
4.9 MACHINE SETTING

A. The Applicator is equipped with a pump that meters out a quantity of fluid and sends it through distribution line to nozzles mounted along the tool bar. The pump is a precision metering system that can be set to give a wide range of application rates. A manual and slide rule is provided that instructs how to set the pump to provide the required application rate.

Always be aware of the size of the field to be covered, the application rate and the amount of liquid in the tank. If there is liquid left over or you run short, check the application rate and pump setting. Reset if required or verify tank volume.

Always check that liquid comes out of each nozzle at the start of the season and each day by turning the drive wheel by hand or by engaging the hydraulic circuit momentarily if equipped with the optional hydraulic drive system. A nozzle that does not work proper will skew your application efficiency.

B. Optional Raven/Hydraulic Pump System:



Wheel Drive

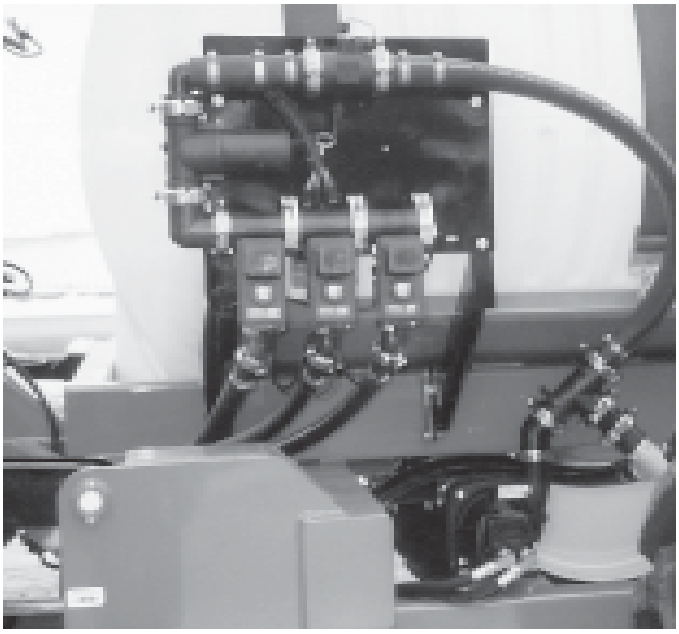


Fig. 13 Optional Raven/Hydraulic Pump Drive System

PUMP SETTING

If your machine is equipped with the optional automatic controller, review the controller manual to become familiar with applicator settings and control.

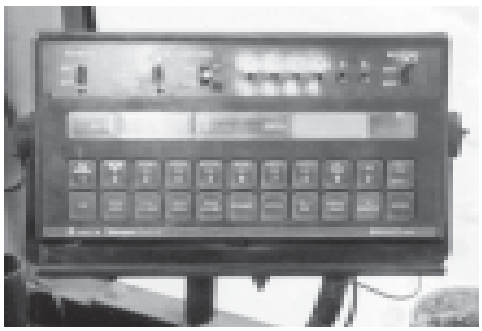


Fig. 14 AUTOMATIC CONTROLLER

Be sure the speed sensor on the left wheel hub is set with a gap of 1/8 inch (3mm) or the thickness of a nickel. It supplies a signal to the controller for determining the ground speed and allows the controller to vary the application rate appropriate for the speed.

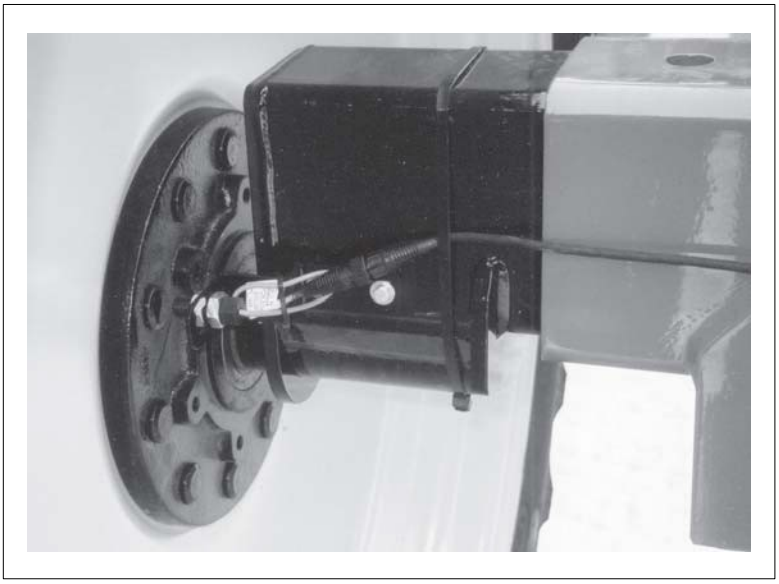


Fig. 15 SPEED SENSOR

Always wear the appropriate protective gear. This list includes but is not limited to:

-A hard hat
-Protective shoes with slip resistant
soles
- Protective goggles
- Neoprene gloves
- Protective clothing
- Respirator or filter mask

Liquid nitrogen fertilizer is one of the most common toxic substances used on the farm. Always wear the appropriate protective gear. Relieve any pressure in the circuit before working on the system. Do not come in contact with the solution.

⚠ WARNING

The following instructions must be carefully followed to avoid damage to your tractor hydraulic system!

LOAD SENSING	PRESSURE COMPENSATING	OPEN
(John Deere 6000, 7000, 8000 & 9000 Series, CaseIH Magnum & Maxxum Series, Ford Genesis)	(John Deere, except 6000, 7000, 8000 & 9000 Series, AGCO White)	(Steiger, Cougar and Panther)
Purchase a Flow limiting Valve (Part No. LS206 or LS304) from your dealer and install it on the inlet port of the ACE Pump hydraulic motor.	**Use the Restrictor Orifice that is wire-tied to the ACE pump. Install it in the inlet port of the ACE hydraulic motor.**	**Do NOT use the Flow Limiting Valve or the Restrictor Orifice.**
Follow the detailed instructions found at the beginning of the PUMP section of the Fast catalog.	**Follow the detailed instructions found at the beginning of the PUMP section of the Fast catalog.**	**Follow the detailed instructions found at the beginning of the PUMP section of the Fast catalog.**

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4.10 FIELD OPERATION

OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.

2. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

3. Install and secure all guards and shields before starting or operating.

4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.

5. Do not allow riders on the applicator or tractor during operation or transporting.

6. Clear the area of all bystanders, especially children, before starting or filling with chemical or fertilizer.

7. Read chemical or fertilizer manufacturers warnings, instructions and procedures before starting and follow them exactly.

8. Do not breathe, touch or ingest chemicals or fertilizer. Always wear protective clothing and follow safe handling procedures.

9. Stay away from wings when folding or extending wings. Keep others away.

10. Clean reflectors, SMV and lights before transporting.

11. Attach securely to towing unit using a hardened pin with a retainer and a safety chain.

12. Do not exceed a safe travel speed.

13. Use hazard flasher on tractor when transporting.

14. Stay away from overhead power lines when folding or extending the wings and during transport.

15. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

16. Review safety instructions annually.

The applicators are designed with the flexibility to be used in any type of crop, row spacing, soil and moisture conditions. Always set the machine and desired application rate for the operating conditions. Time spent setting the machine and the application rate before starting will pay rich dividends in a quality job.

Follow this procedure when using the applicator:

1. Attach applicator to the machine (see Section 4.8).

2. Review and follow the pre-operation checklist (see Section 4.4).

3. Read and follow chemical/fertilizer manufacturers' instructions.

4. Set the applicator so you know exactly how much liquid is being applied (see Section 4.9). Incorrect application rates can dramatically affect seed germination and yields. Setting at the start of the season or when changing application rate is a must.

5. Transport the machine to the working area.

6. Convert into field position (see Step 14).

7. **Starting:**

A. Wheel Drive:

- Start into the field.
- Lower the tool bar into the ground. The metering system drive wheel is mounted to the tool bar and automatically contacts the tire when the tool bar is lowered. It will drive the metering pump as soon as the machine starts to move.

IMPORTANT

Be sure to turn the metering pump momentarily by hand or hydraulically to check that each nozzle is working. This is particularly important at the start of the day when the metering pump could have plugged or material could have got packed around a nozzle.

Engaged

Disengaged

Fig. 16 WHEEL DRIVE

B. Hydraulic Drive (Optional):

- Set the engine RPM at rated speed.
- Start into the field.
- Lower the tool bar into the ground.
- Place the hydraulic motor control lever in detent.

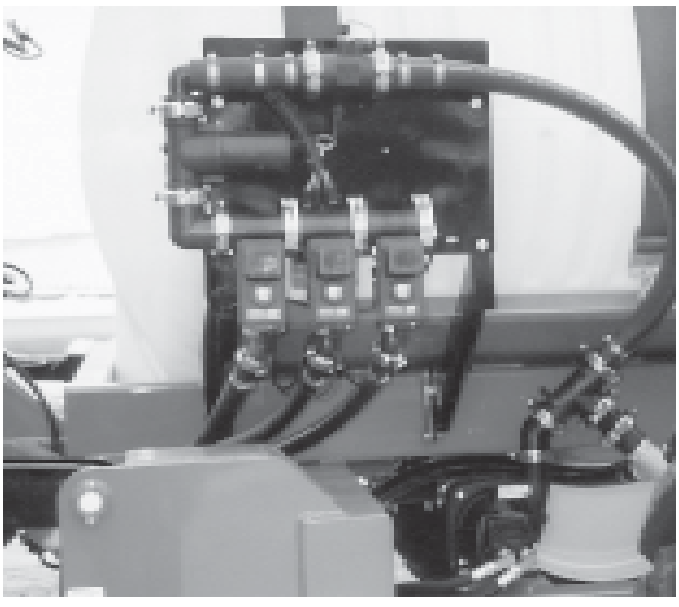


Fig. 17 HYDRAULIC DRIVE

C. Automatic Control (Optional):

- Start into the field.
- Lower the tool bar into the ground. Turn on the correct booms and master switch to ON. The controller will set the system to meter the solution out at a rate proportional to the ground speed.

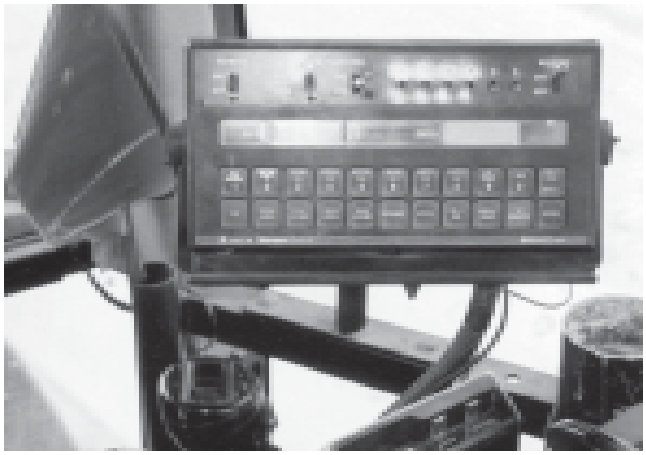


Fig. 18 AUTOMATIC CONTROLLER

8. Stopping:

a. Raising the tool bar out of the ground will stop metering system if operating with the wheel drive option.

b. With the optional hydraulic drive system, turn master boom switch OFF.

c. Stop the forward motion of the machine, place the hydraulic lever in its off position.

d. Reduce the engine RPM to low idle.

9. Emergency stop:
If an emergency arises, shut the engine off to stop the machine or stop the forward motion. Refer to Step 7 when restarting the machine.

10. Pump Settings:
Always refer to the manual supplied for the metering pump to determine the pump setting to provide the desired application rate. Check the settings at the start of each season or when changing the application rate.

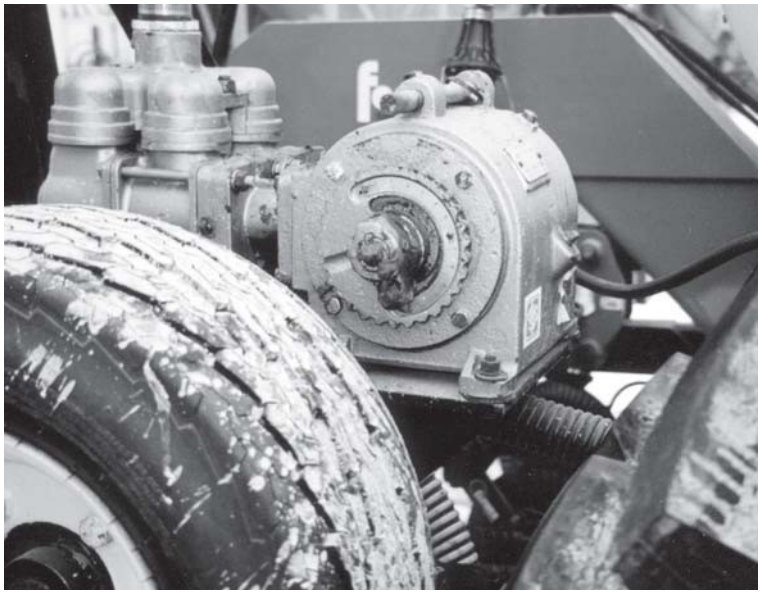


Fig. 19 PUMP SETTINGS

11. **Filling:**

It is recommended that the machine always be filled in the field rather than the yard and transported to the field when full. Transporting across rough roads will cause the liquid to slosh back and forth and will load the tank heavily. Let the tender truck move the liquid.

When filling the machine, follow this procedure:

a. Pull up to the tender truck or drive the truck up to the machine.

b. Lay the transfer hose over to the back of the machine and attach to the bottom fill line.

c. Be sure to use the required safety gear including but not limited to the face mask, neoprene gloves and protective clothing to prevent contact with liquid chemicals or fertilizers.

d. Start pump on tender truck and open valve on input line.

e. Pump until the tank is filled to the desired level.

Do not over-fill.

f. Close input valve and stop pump on tender truck.

g. Remove and stow fill line.

h. Install and secure input line cover.

Single Bar

Double Bar

a. Tank Scale **b. Intake Fitting** **c. Fresh Water Tank**

Fig. 20 FILLING

12. **Fresh Water Rinse Tank:**

Each machine is equipped with a fresh water rinse tank on the rear frame next to the intake valve. Always fill it with clean fresh water at the start of the season or whenever the rinse water has been used. Do not allow the tank to run low on fresh water. Use the water from the tank to clean, rinse or wash anything that has become contaminated.

13. **Ground speed:**

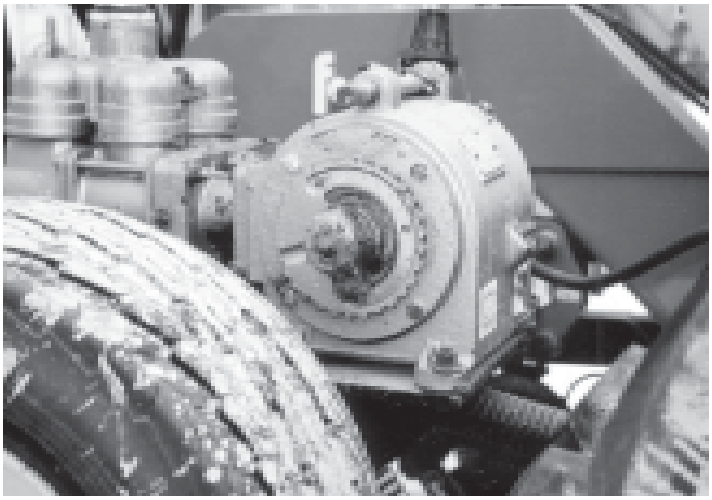
a. With the wheel driven metering system, the pump will be driven at a rate proportional to the ground speed.

b. With a hydraulically driven system, it will be necessary to establish the travel speed and then set the flow to provide fluid at the desired flow to give the desired application rate. Always run in the field at the established travel speed.

c. With the automatic controller system, the pump will be controlled to provide the selected application rate at any ground speed within 20% of nominal. A sensor mounted on the axle or other source provides a signal to the controller to determine ground speed. This speed is used to vary the application rate as appropriate.

However the best results are obtained when the ground speed is run between 5 and 8 mph. Ground speed variations in the field will automatically be compensated for by the wheel drive and automatic systems. Always operate at a comfortable speeds. Do not operate so fast that the tool bar or tank bounce while going through the field. Effective results require that the liquid be applied at a consistent depth in a consistent manner. Machine bouncing will prevent this required consistency.

Double Bar



Wheel Drive

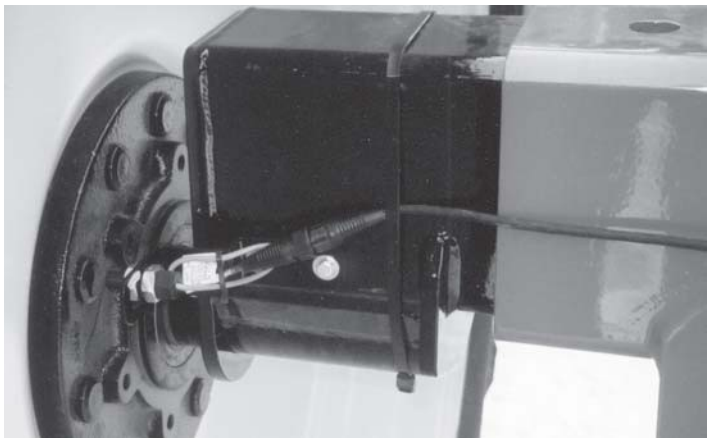
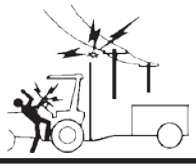


Fig. 21 FIELD Speed Sensor (Automatic System)

14. **Folding/Extending Tool Bar:**
The machine is designed to be easily moved and transported. A single hydraulic circuit is used to fold or extend the wings, the single bar model and 2 circuits required for the dual bar. Feather the circuit when folding or extending the wings, always fold the outer boom first before folding the inner boom. Always rest the tool bar on the center support cradle when folding the wings. Have the tool bar raised out of the ground when extending the wings to eliminate the coulters from contacting the ground as the tool bar extends.

Stay away from overhead power lines when extending/fold tool bar. Electrocution can occur without direct contact.

DANGER



ELECTROCUTION HAZARD

KEEP AWAY FROM POWER LINES

To prevent serious injury or death from electrocution:

1. **Stay well away from power lines when folding or extending wings. Electrocution can occur without direct contact.**
2. **Lower wings completely before moving or transporting.**

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Starting

Inner Wing

Outer Wing

Fig. 22 FOLDING/EXTENDING

Extended

Always install the transport lock spacer over the lift cylinder before working under the tool bar or transporting.

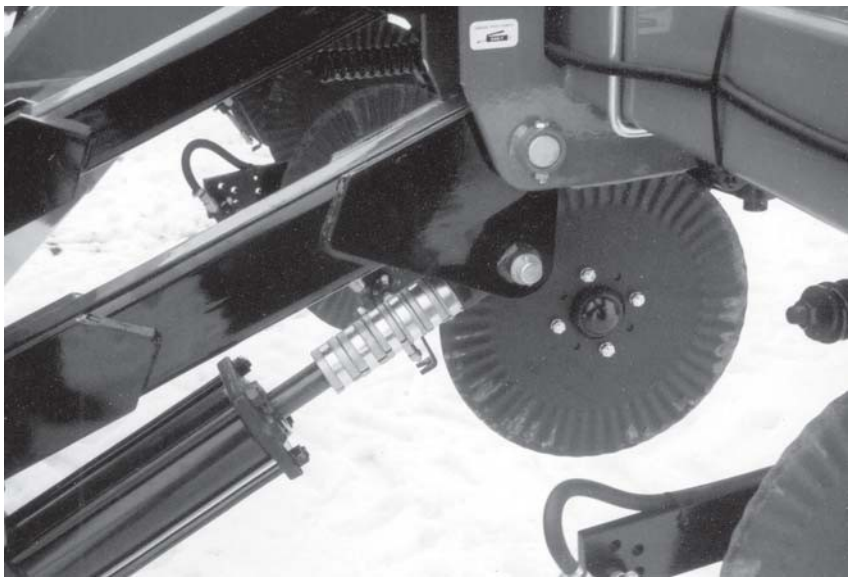
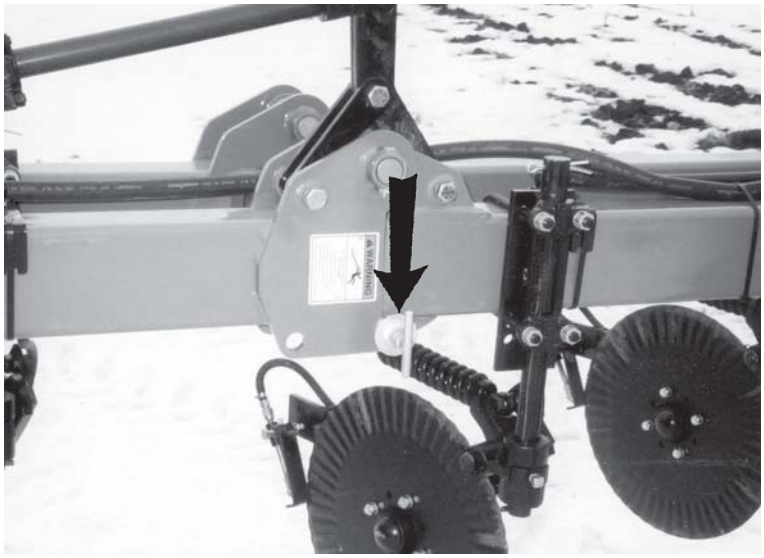


Fig. 23 TRANSPORT LOCK BRACKET

15. **Tool Bar Lock:**
Each outer wing tool bar hinge frame is designed with a lock pin to keep the tool bar level. Install the pin through tool bar with its retainer when the outer wing is extended. Remove the lock pin and stow before folding the wings.

Never move or transport the applicator unless the outer booms are folded.



Locked

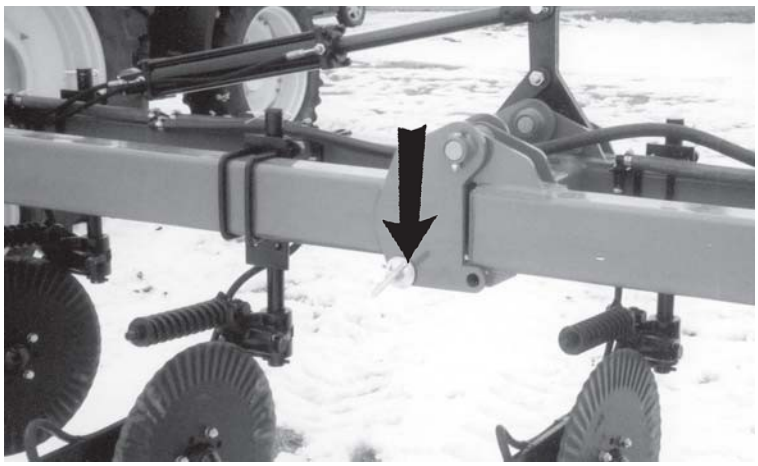
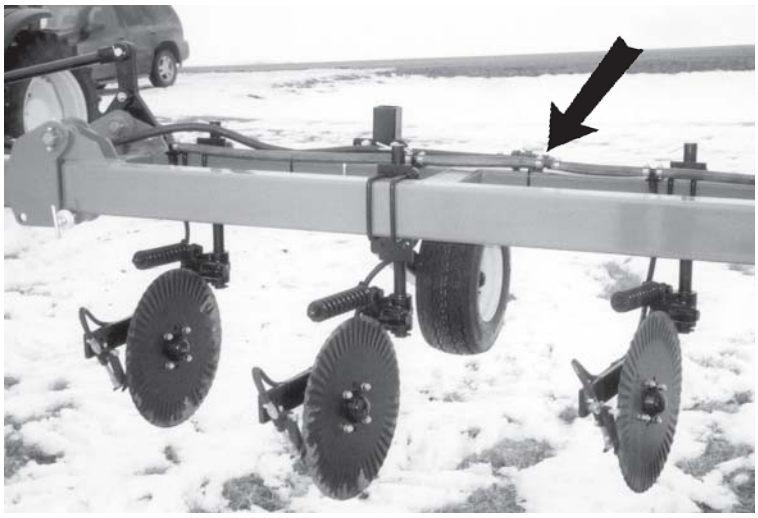


Fig. 24 TOOL BAR LOCK Stowed

16. **Outer Wing Valve:**
The chemical lines to the outer wings are designed with a valve to shut off the flow to the nozzles on this wing. Turn the valve off when finishing up a field to get a narrow application width. Open the valve when the narrow requirements are finished.

Left



Right

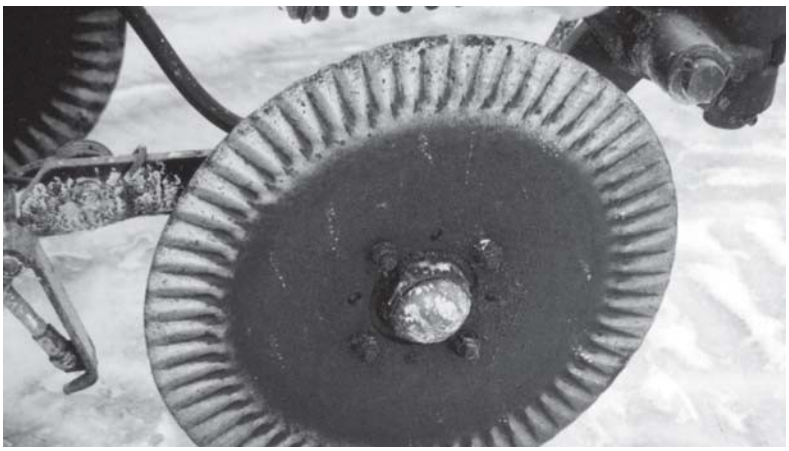
Fig. 25 OUTER WING VALVE (TYPICAL)

17. **Application depth:**
The depth of material placement can vary depending on the type of application. Check with the fertilizer or chemical people for information about the best application depth. Set the tool bar, coulter or nozzle to give the required depth.

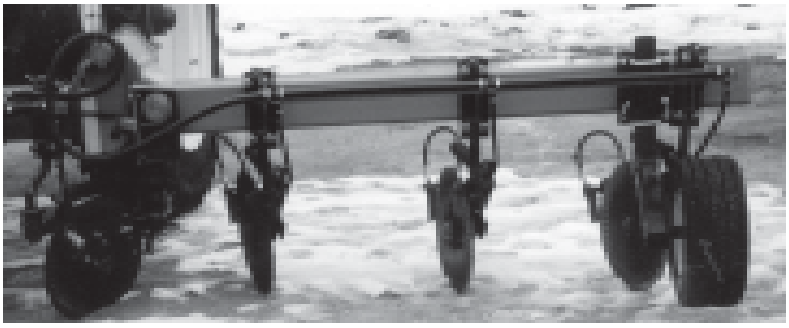
18. **Coulter:**
Coulters are mounted along the tool bar and are used to cut the crop residue on the surface, penetrate the ground and part the soil to accept the liquid from the nozzle. Generally the depth that the coulters penetrate the ground is controlled by spacers around the lift cylinder ram. Inspect coulters frequently if operating in rocky conditions. Bent, chipped or broken coulters will not part the soil properly. Always remove entangled material from any component.

19. **Gauge Wheels:**
Each boom is equipped with a gauge wheel that helps to maintain the application depth. Lower if the soil conditions are soft and raise if hard to obtain the same application depth.

20. **Depth Control:**
Spacers are provided to fit around the tool bar lift cylinder ram. Install as many as necessary to give the required machine depth. In this way the tool bar can be fully lowered and always return to the same depth.



Coulters



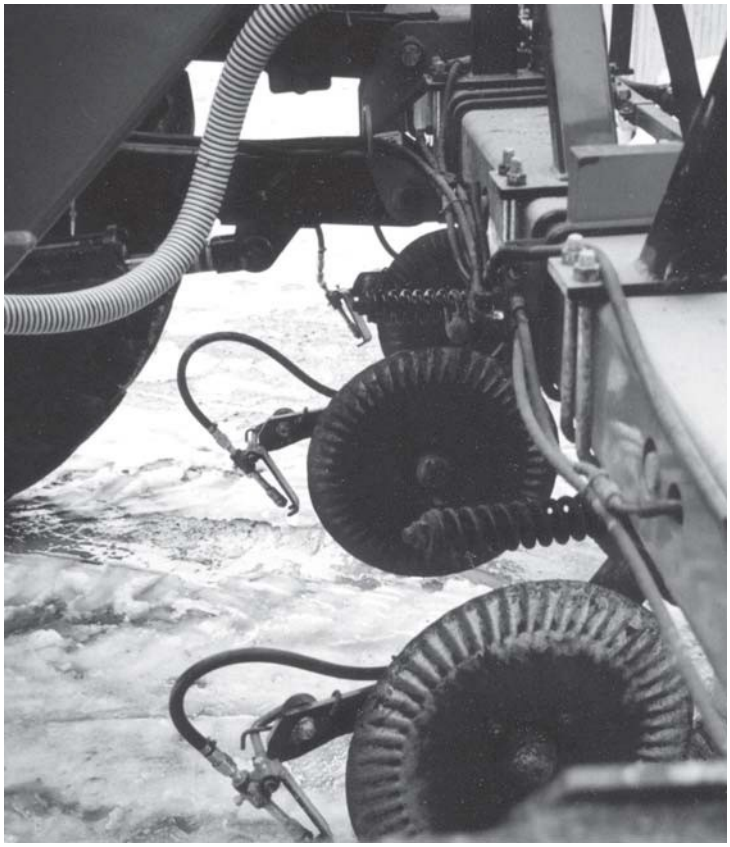
Down

Gauge Wheel Depth

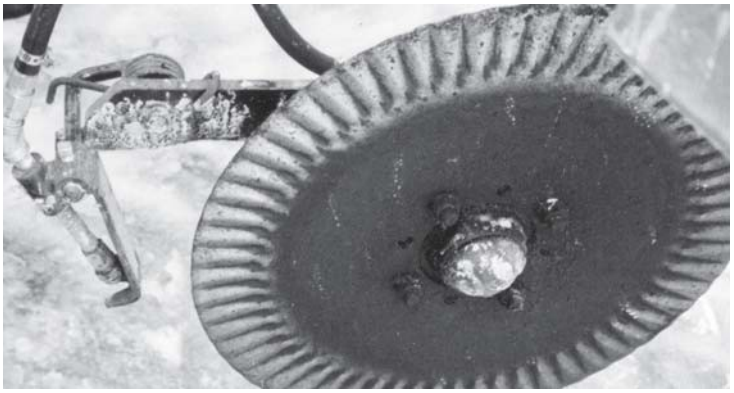
Depth Control

Fig. 26 COULTERS

21. **Nozzles:**
Nozzles are mounted on the tool bar and positioned behind each coulter. They direct the flow of liquid into the furrow of soil opened by the coulter. Refer to the liquid and nozzle manufacturers instructions to determine the correct spacing. As a general guideline, the tip of the nozzle should be slightly above the ground as the unit moves over the field. This will insure that the liquid enters the soil via the furrow created by the coulter and is retained in the soil as the furrow closes.



Mounted



Position

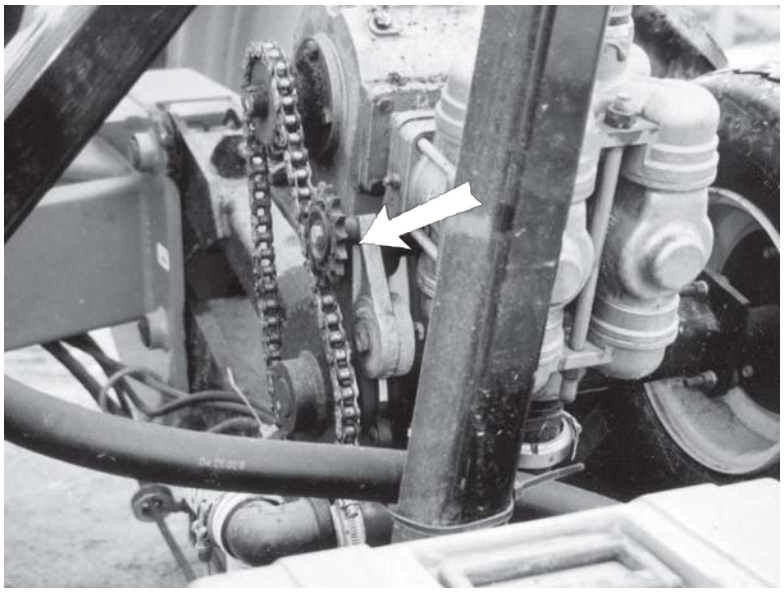
Fig. 27 NOZZLES

22. **System Screen:**
The liquid system is designed with a screen in the suction line to remove all dirt and impurities. Open and wash with clear water on a daily basis. Clean liquid is required to prevent nozzle plugging.

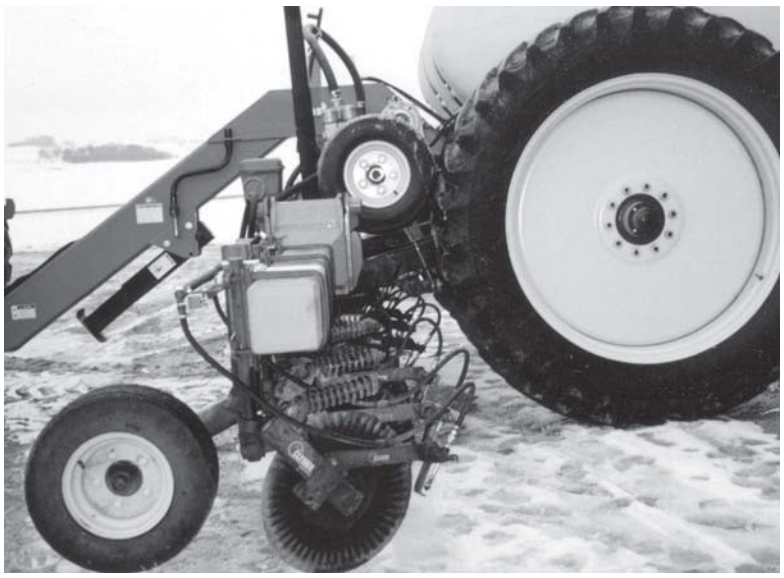
Fig. 28 SCREEN

23. **Wheel Drive:**
The wheel drive is mounted to and moves with the tool bar. It is part of the tool bar lift linkage and the drive tire is moved into the trailer tire when the tool bar is lowered into the ground. A roller chain drive transmits the power to the metering pump.

Use the idler sprocket to maintain the chain at the proper tension. Remove any entangled material from the drive system components.



Roller Chain Idler Sprocket



Drive Tire

Fig. 29 WHEEL DRIVE

24. **Sump:**
Each tank is designed with a sump on bottom of the tank to minimize the effects of hilly, rolling or rough terrain. The liquid will gather in the sump and eliminate skipping or missing.

Remove the screen canister on the bottom of the suction line to drain the tank at the end of the season.

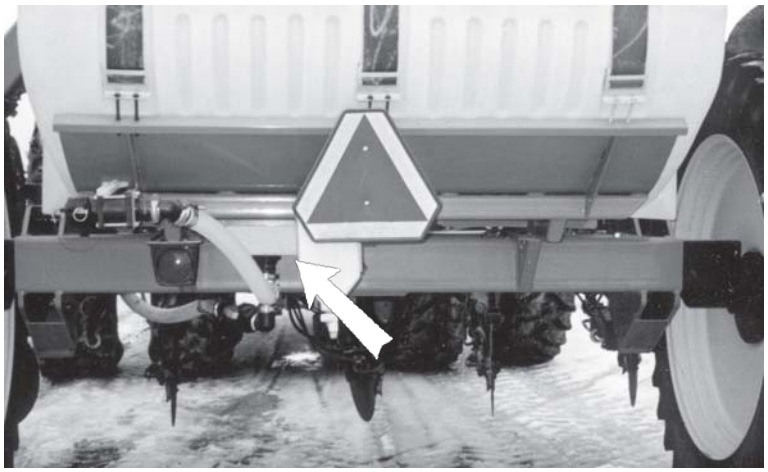


Fig. 30 SUMP

25. **Protective gear:**
Many materials that can be used with this machine contain highly toxic substances. Some fertilizers, or chemicals will contain these substances. Every operator should wear protective gear and clothing whenever they are working with these substances. Toxic chemicals can enter the body by breathing spray or contact with bare skin. Do not take a chance with your health and safety. Protective gear includes but is not limited to neoprene gloves, face shield, respirator, and clothing.

Fig. 31 PROTECTIVE GEAR

26. Wash all protective clothing with a strong detergent to remove all traces of chemicals. Wash thoroughly before eating to prevent contamination. Keep all unauthorized people away from the machine.

27. Add only the amount of liquid to the tank that is required for the job. Excess liquid must be removed from the machine at the end of the season to prevent corrosion of metal parts. Emptying at the end of each day is also recommended to prevent corroding over night. Remove all excess liquid from the ma- chine through the plug on the bottom of the screen canister.

NOTE

Always turn the sump valve off whenever working on the liquid circuit components to isolate the liquid in the tank.

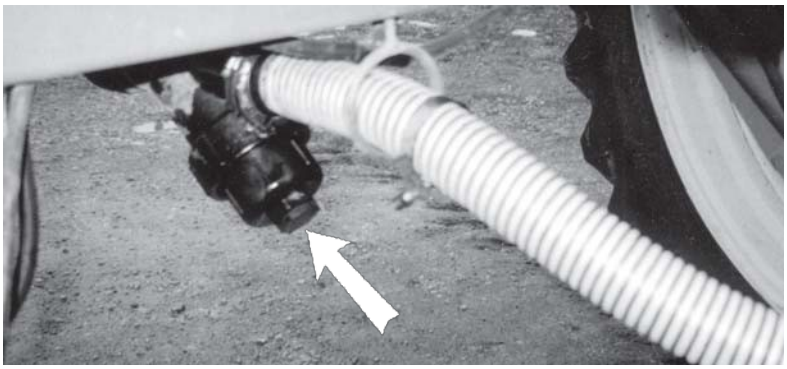


Fig. 32 CANISTER DRAIN VALVE (TYPICAL)

Single Bar

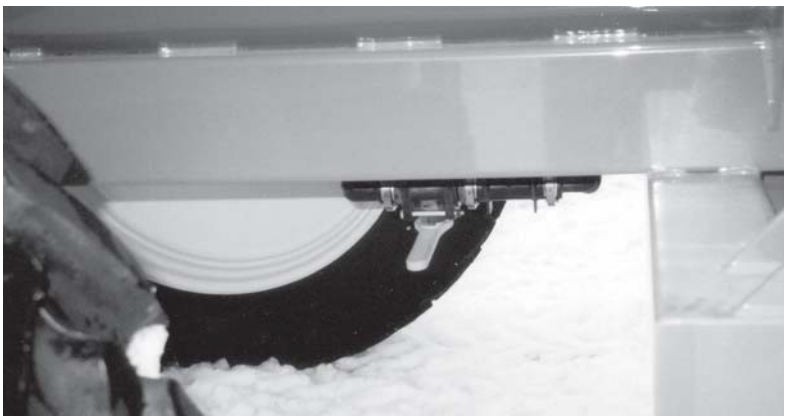


Fig. 33 SUMP VALVE **Double Bar**

28. Drive at a comfortable speed whenever operating in the field. Operating too fast for the conditions can cause the coulter depth to vary and lead to inconsistent application efficiencies.

Fig. 34 WORKING

29. Operating hints:

a. Do not operate the machine unless the machine has been set to give the desired application rate. Review the manual carefully to determine the required scale setting on the pump for your application rate.

b. Do not allow anyone to operate the machine unless they are wearing protective gear. Chemicals and fertilizer can be very toxic. Everyone should protect themselves.

Fig. 35 MACHINE

c. Do not open the top lid to prevent dirt or debris entering the tank. Even small pieces of dirt can plug a nozzle.

d. Install the lock pin through the tool bar on the dual bar model to keep the frame level and the coulters at a consistent depth when operating. Remove and stow the lock pin before moving or transporting.

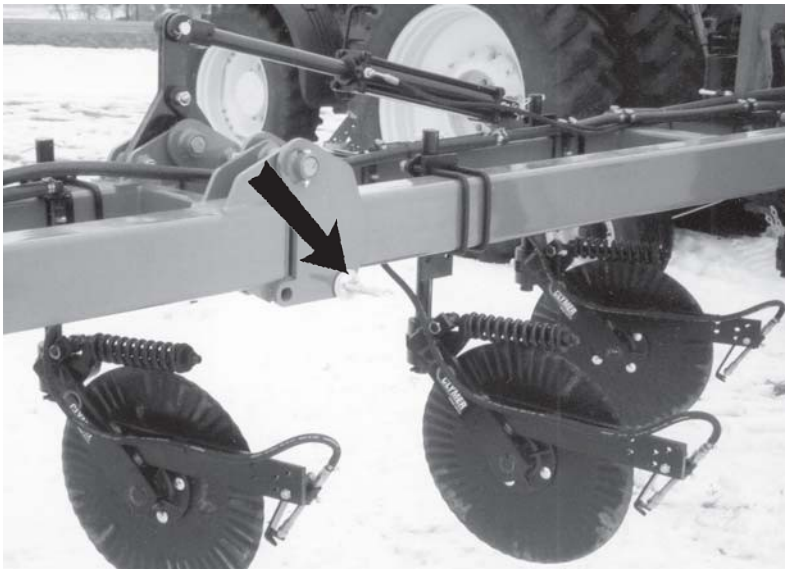


Fig. 36 LOCK PIN

e. Fertilizer and other chemicals are extremely corrosive. Remove all liquid from the tank at the end of each working day and at the end of the season. Wash thoroughly with a pressure washer to remove all liquid at the end of the season. Touch up all paint scratches and nicks to prevent rusting and corrosion. Coat all bare metal surfaces with grease or a heavy oil.

f. Use the spacers over the cylinder ram to set the operating depth. Lowering the tool bar into the ground will always return the coulters to the same depth.

Fig. 37 CYLINDER RAM

4.11 TRANSPORT

TRANSPORT SAFETY

1. Read and understand ALL the information in the Operator's Manual regarding procedures and SAFETY when operating the applicator in the field and/or on the road.

2. Check with local authorities regarding applicator transport on public roads. Obey all applicable laws and regulations.

3. Always travel at a safe speed. Use caution when making corners or meeting traffic.

4. Make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.

5. Daybreak and dusk are particularly dangerous and pilot vehicles are recommended.

6. Be sure that the applicator is hitched positively to the towing vehicle and a retainer is used through the drawbar pin. Always attach a safety chain between the frame and the towing machine.

7. Keep to the right and yield the right-of-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.

8. Do not exceed 20 mph (32 km/h). Reduce speed on rough roads and surfaces.

9. Always use hazard warning flashers on tractor when transporting unless prohibited by law.

10. Stay away from overhead power lines during transport. Electrocution can occur without direct contact.

FAST AG Solutions applicators are designed to be easily and conveniently moved from field to field. When transporting, follow this procedure:

1. Be sure all bystanders are clear of the machine.

2. Be sure that the applicator is hitched positively to the towing vehicle. Always attach the safety chain between the machine and the tractor and install a retainer through the drawbar pin.

3. Install the transport lock spacers over the ram on the lift cylinder before transporting.

NOTE

Add more lock spacers over cylinder ram to prevent the tool bar from dropping during transport.

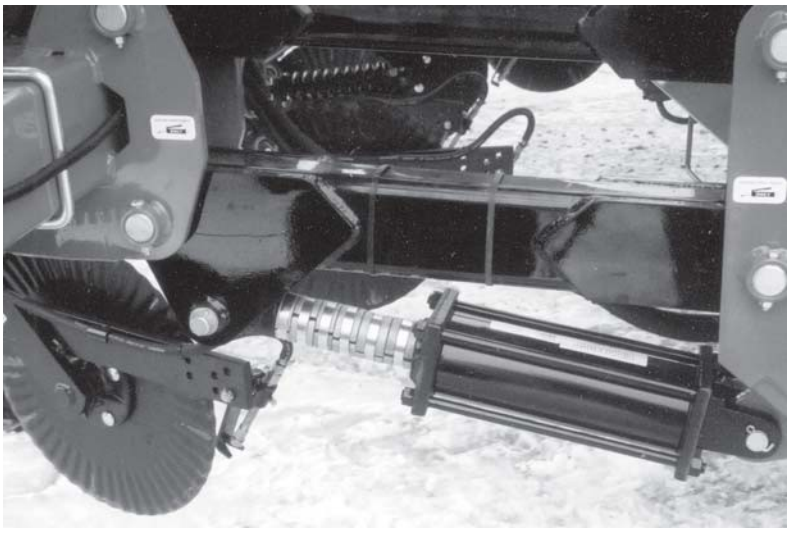


Fig. 38 CYLINDER RAM SPACERS

4. Remove the tool bar lock pin before moving or transporting on the dual bar model.

5. Keep to the right and yield the right-of-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.

6. Make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.

Fig. 38 TOOL BAR LOCK PIN

7. It is not recommended that the machine be transported faster than 20 mph (32 km/hr). Table 2 gives the acceptable transport speed as the ratio of tractor weight to applicator weight.

Table 2 Travel Speed vs Weight Ratio

Road Speed	Weight of fully equipped or loaded implement(s) relative to weight of towing machine
Up to 32 km/h (20 mph)	1 to 1, or less
Up to 16 km/h (10 mph)	2 to 1, or less
Do not tow	More than 2 to 1

8. Do not allow riders on the machine or tractor.

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

10. Always use hazard flashers on the tractor when transporting unless prohibited by law.

11. Stay away from overhead power lines when folding or extending the wings. Electrocution can occur without direct contact.

Fig. 40 TRANSPORTING

4.12 STORAGE

STORAGE SAFETY

1. Store unit in an area away from human activity.

2. Do not permit children to play on or around the stored applicator.

4.12.1 PLACING IN STORAGE

At the end of the season, the machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at the beginning of the next season. Follow this procedure:

1. Empty the tank of any remaining liquid.

2. Open liquid line connections, screen canister and pump. Drain all fluids out of the system.

3. Thoroughly wash the machine and inside of the tank using a pressure washer to remove all dirt, mud, debris or residue to protect against corrosion.

4. Apply a coating of heavy oil to roller chain in the drive system.

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

6. Inspect all the hydraulic hoses, couplers and fittings. Tighten any loose fittings. Replace any hose that is badly cut, nicked, abraded or is separating from the crimped end of a fitting.

7. Inspect all the liquid lines and connections. Tighten any loose fittings. Replace any line that is badly cut, nicked or abraded.

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

9. Move the machine to a storage position.

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

11. Raise the wings into the transport configuration.

12. Install the spacers over the ram of the lift cylinder.

Fig. 41 SCREEN CANISTER (TYPICAL)

13. Place planks under the jack for added support if required.

14. Unhook the machine from the tractor (Refer to Section 4.8).

Fig. 42 STORED

4.12.2 REMOVING FROM STORAGE

When removing from storage and preparing to use, follow this procedure:

1. Clear the area of bystanders, especially small children, and remove foreign objects from the machine and the working area.

2. Attach the tractor to the applicator by following the procedure in Section 4.8.

3. Check

    a. Attach and secure all liquid lines.

    b. Coulters and nozzles.

    c. All hardware. Tighten as required.

    d. Tire pressure.

    e. All hydraulic lines, fittings and connections. Tighten as required.

4. Lubricate all grease fittings.

5. Replace any defective parts.

6. Turn the metering system by hand or momentarily. Make sure it turns freely.

7. Add a small amount of liquid to the tank. Turn the metering system by hand or momentarily and check that liquid comes out of each nozzle.

8. Go through the pre-operation checklist (Section 4.4) before using.

5 SERVICE AND MAINTENANCE

MAINTENANCE SAFETY

1. Review the Operator's Manual and all safety items before working with, maintaining or operating the applicator.

2. Lower machine to the ground, place all controls in neutral, stop engine, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.

3. Follow good shop practices:

   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Before applying pressure to a hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.

5. Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.

6. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.

7. Clear the area of bystanders, especially children, when carrying out any maintenance and repairs or making any adjustments or filling.

8. Place stands or blocks under the frame before working beneath the machine or when changing tires.

9. Be sure all guards are in place and secured when maintenance work is completed.

10. Use only tools, jacks and hoists of sufficient capacity for the job.

5.1 SERVICE

5.1.1 FLUIDS AND LUBRICANTS

1. **Grease:**
   Use an SAE multi-purpose high temperature grease with extreme pressure (EP) performance. Also acceptable is an SAE multi-purpose lithium base grease.

2. **Storing Lubricants:**
   Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, dirt, moisture and other contaminants.

5.1.2 GREASING

Refer to Section 5.1.1 for recommended grease. Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use only a hand-held grease gun for all greasing.

2. Wipe grease fitting with a clean cloth before greasing, to avoid injecting dirt and grit.

3. Replace and repair broken fittings immediately.

4. If a fitting will not take grease, remove and clean thoroughly. Also clean and lubricant passageway. Replace fitting if necessary.

5.1.3 SERVICING INTERVALS

8 Hours or Daily

1. Use an oil can or brush to apply a coat of oil to the drive chain.

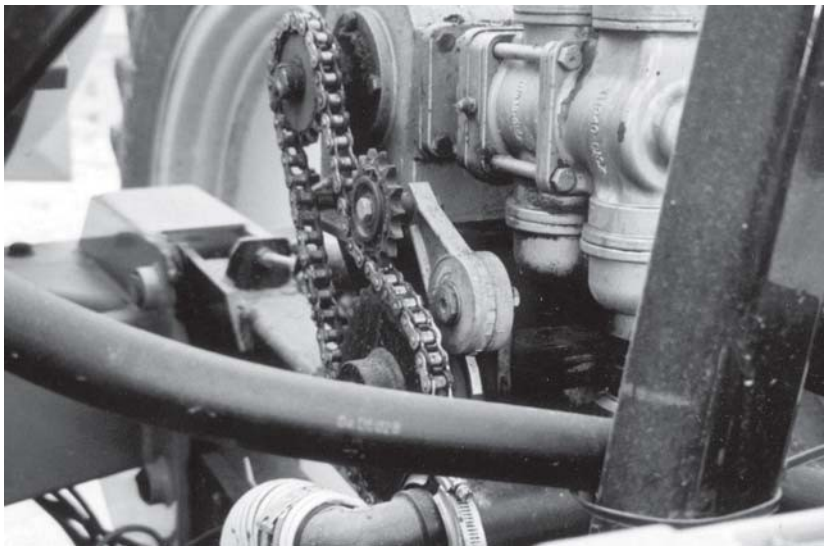


Fig. 43 DRIVE CHAIN (GROUND DRIVE SYSTEM)

2. Grease the inner wing tool bar hinges for the single bar model (2 locations each hinge).

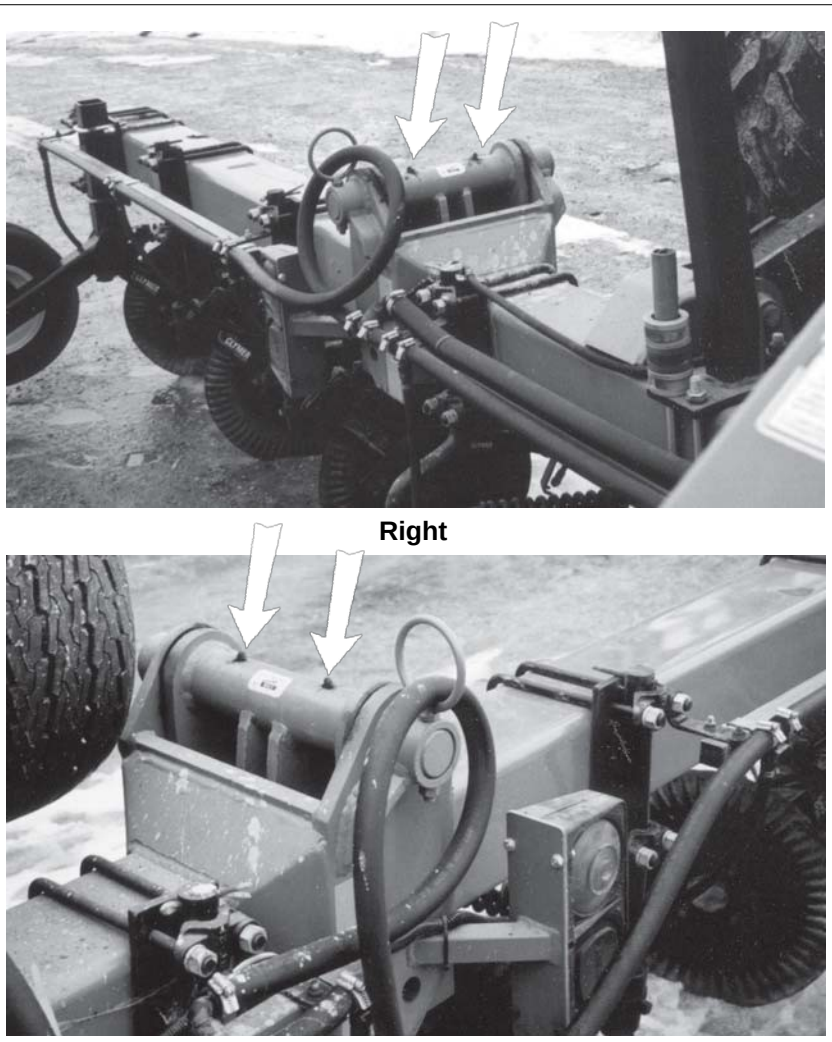


Fig. 44 TOOL BAR HINGE (SINGLE BAR MODEL)

3. Grease the inner wing tool bar hinges for the double bar model (2 locations each hinge).

Right

Fig. 45 INNER WING HINGE (DOUBLE BAR MODEL)
Left

4. Grease the outer wing hinge (2 locations each hinge).

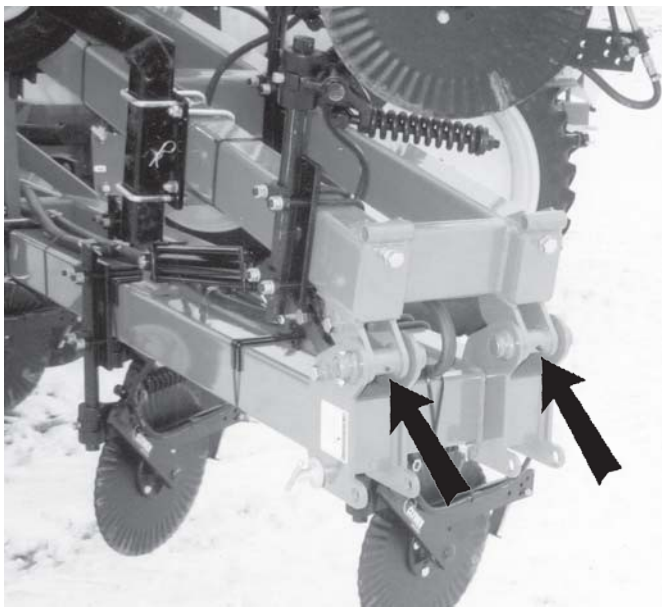
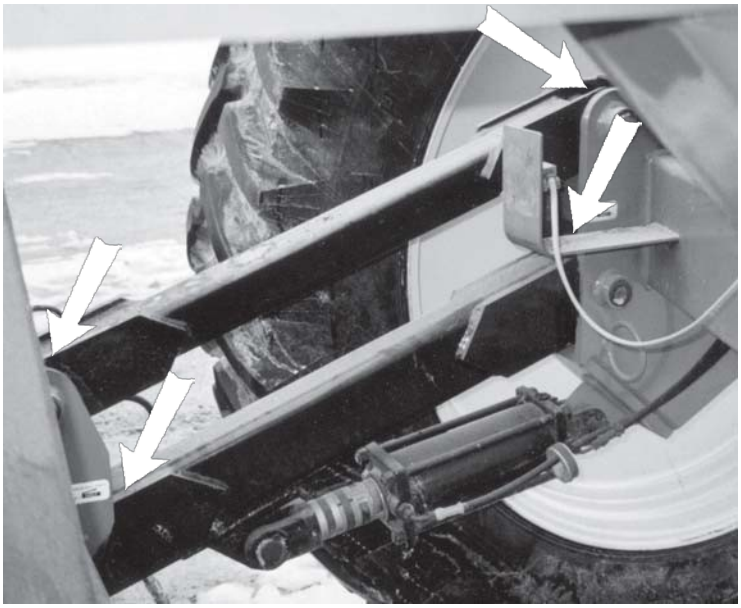


Fig. 46 OUTER WING HINGE (DOUBLE BAR MODEL)

5. Wash the screen using clean water.

Fig. 47 SCREEN

6. Grease tool bar parallel linkage (4 locations per side - 8 total).



Single Bar

Fig. 48 PARALLEL LINKAGE **Double Bar**

Annually

1. Grease wheel bearing or repack.

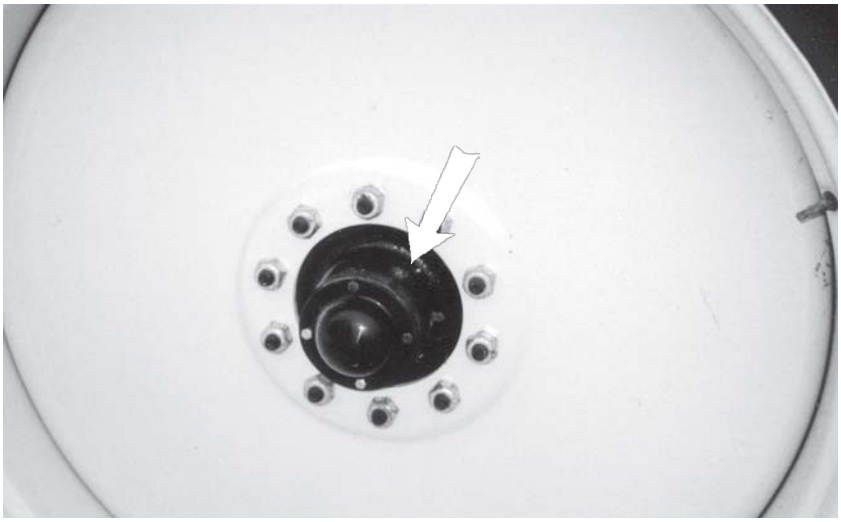
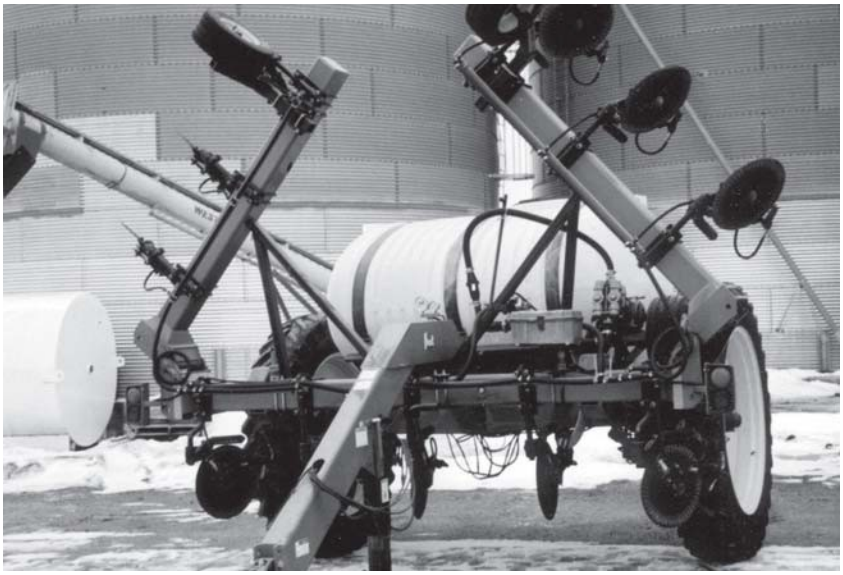


Fig. 49 WHEEL BEARING

2. Clean and wash machine.



Single Bar

Double Bar

Fig. 50 MACHINE

5.1.4 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

ACTION CODE: CL CLEAN L LUBRICATE

MAINTENANCE / HOURS / SERVICED BY																		
8 Hours or Daily																		
L Drive Chains																		
L Inner Wing Tool Bar Hinges (2)																		
L Outer Wing Hinges (2)																		
CL Screen																		
L Tool Bar Parallel Linkage (8)																		
Annually																		
L Wheel Bearing or Repack																		
CL Machine																		

5.2 MAINTENANCE

By following a careful service and maintenance program for your machine, you will enjoy many years of trouble-free operation.

5.2.1 TOOL BAR LEVELING

When leveling the tool bar, follow this procedure:

1. Move the machine to a hard level surface.

2. Clear the area of bystanders, especially small children, before starting.

3. Extend the wings and remove the transport lock spacers.

4. Lower the machine until the coulters are just above the hard surface but not touching.

5. Sight along the tool bar. Be sure the outer wing lock pin is installed.

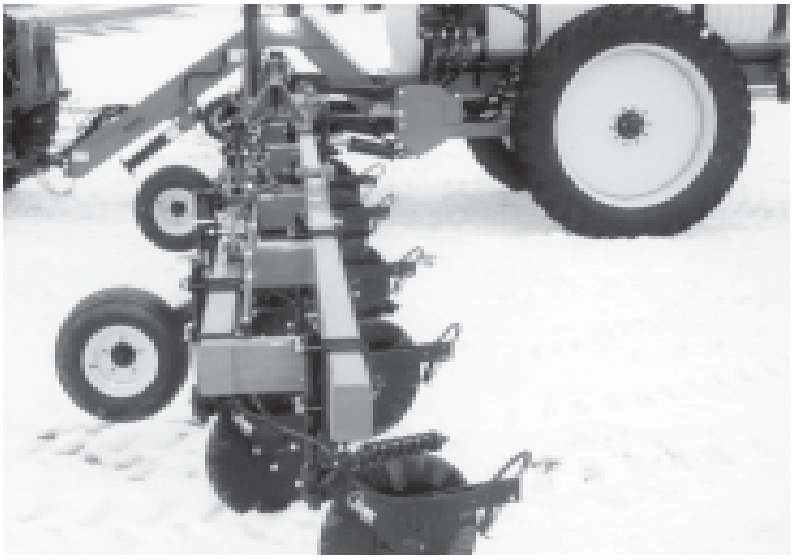
6. Use the adjusting bolt at each hinge to adjust the hinge angle.

   a. Loosen adjusting bolt jam nut.

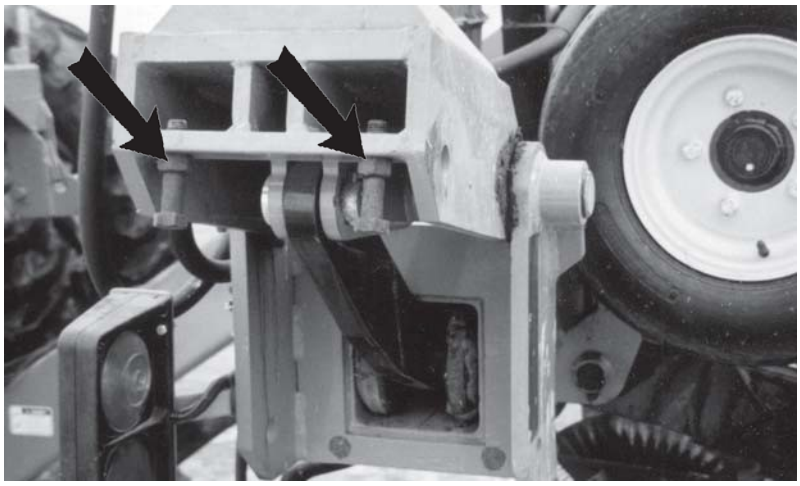
   b. Turn adjusting bolts to required position.

   c. Tighten jam nut to its specified torque.

7. A level tool bar will insure that the coulters will all penetrate the soil the same amount.



Sighting



Adjusting Bolt (Single Bar)

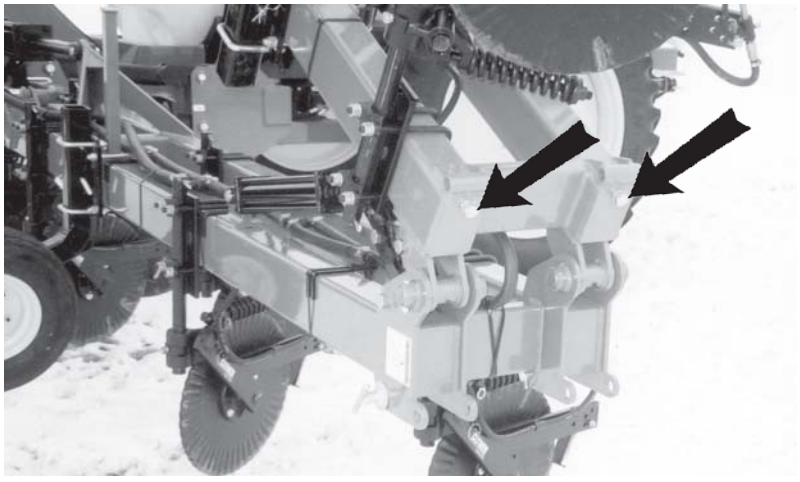


Fig. 51 LEVELING

5.2.2 WHEEL DRIVE SYSTEM

The liquid metering system is powered by a machine-driven tire through a roller chain to the metering pump. Although this system requires minumal maintenance, the roller chain must be set at the correct tension to function properly. To maintain the drive, follow this procedure:

1. Lower the tool bar into the ground.

2. Check the tension of the roller chain when the drive is in full contact with the tire.

3. Push in the center of the chain span. It should be almost snug but not taut.

4. Move the idler sprocket to set the chain tension:

   a. Loosen sprocket arm anchor bolt.

   b. Slide or tap idler into position.

   c. Tighten anchor bolt to its specified torque.

NOTE

Always check the chain tension when the tool bar is fully down. This is the position where chain is fully extended. The chain can break if it is tightened in any other position.

Wheel Engaged

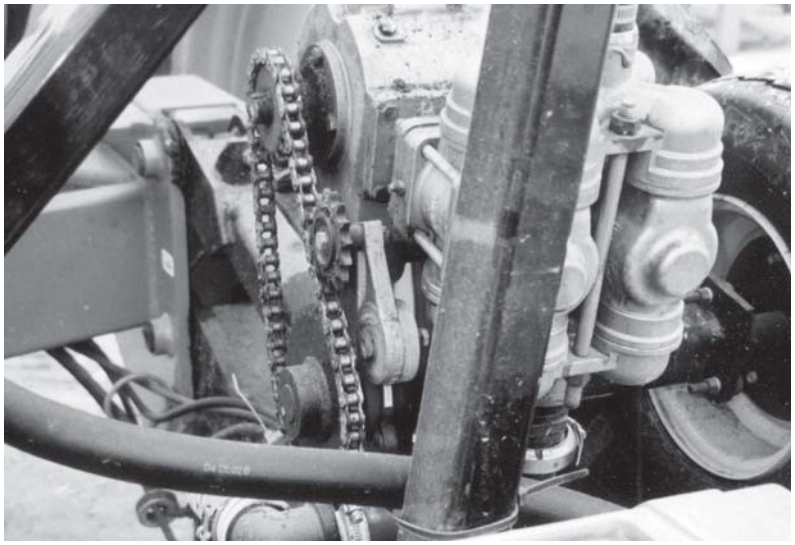


Fig. 52 WHEEL DRIVE SYSTEM Idler Sprocket

5.2.3 NOZZLES

Nozzles are used to direct the liquid into the furrow in the soil that is created as the coulter moves across the field. The nozzles are spring loaded to allow folding back if an obstacle is encountered. To set and maintain nozzles, follow this procedure:

1. Clear the area of by-standers, especially small children.

2. Extend the wings and raise the tool bar to its fully up position.

3. Place safety stands under the center tool bar or install the transport lock spacers over the lift cylinder ram.

4. **Nozzle Angle:**

   a. The best results are obtained when the nozzle directs the liquid approximately 1 inch (25 mm) behind the coulter.

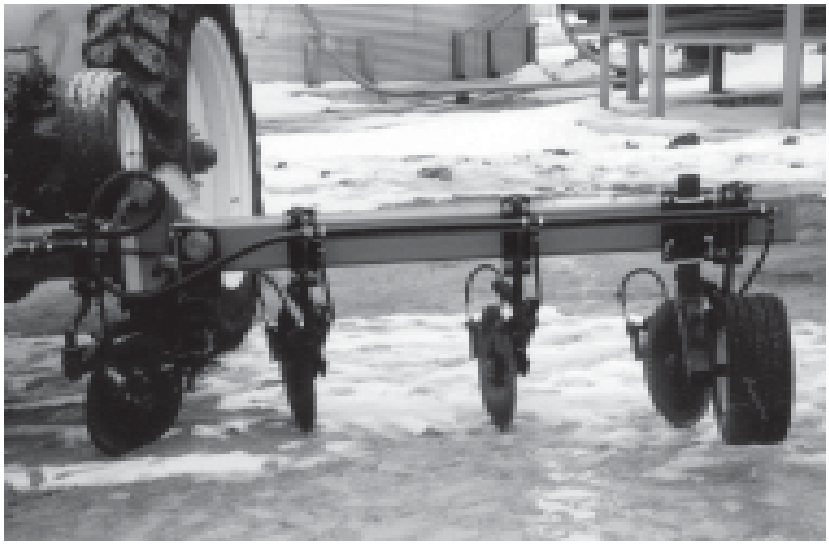
   b. Use the nozzle mounting arm anchor bolts to set the nozzle(s) at the required angle.

5. **Nozzle Tracking:**

   a. Sight along the nozzle and coulter. The nozzle should direct the liquid immediately behind the coulter.

   b. Use the nozzle mounting arm anchor bolts to set the nozzle(s) at the required position.

Angle



Tracking

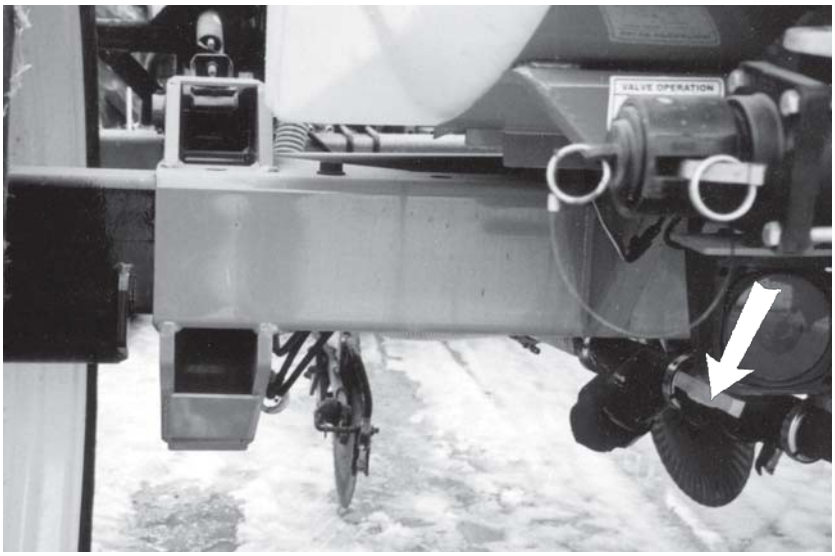
Fig. 53 NOZZLES

5.2.4 FILTER

Each machine is designed with a screen in the suction line to remove any dirt, trash or debris from the fluid prior to entering the metering pump. Clean the filter at the start of each day when the tank is empty or dirt is detected in the system.

When cleaning the filter, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Put on your safety gear including but not limited to neoprene gloves, rubber boots, protective clothing and a face mask.
3. Close the sump valve if there is liquid in tank.
4. Relieve pressure in liquid circuit.
5. Open the cannister to access the screen.
6. Use clear water to clean the screen.
7. Install the screen in the cannister and tighten it on the head by hand. Do not over tighten cannister and crack the head.
8. Open the sump valve if there is liquid in the tank.



Valve

Canister

Fig. 54 FILTER

6 TROUBLESHOOTING

The Fast Distributing Applicator uses a wheel driven by the machine tire or a hydraulic motor to power a metering pump and distribute liquid to nozzles mounted to the tool bar. It is a simple and reliable system that requires minimal maintenance.

In the following section, we have listed two of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this troubleshooting section, please call your local Fast Distributing dealer or the factory. Before you call, please have this Operator's Manual and the serial number from your machine ready.

PROBLEM	CAUSE	SOLUTION
Running out of liquid.	Application rate too high.	Reset application rate. Refer to manual for pump.
Liquid remaining.	Application rate too slow.	Check line strainers for blockage. Reset application rate. Refer to manual for pump.
	Intermittent speed signal.	Check and set speed sensor on the hub.

7 SPECIFICATIONS

7.1 MECHANICAL

DIMENSIONS	8 Row	12 Row	16 Row	24 Row
Length:	15'	15'	15'	15'
Width: Field:	20'	27'	37'	57'
Transport:	20'	13'	13'	20' 6"
Height: Transport:	7'	9'	9'	15'
Tank Capacity:	1000 gal.	1000 gal.	1000 gal.	1600 gal.
Main Wheel Lug Nut Torque:	265#	265#	265#	265#
Tires: Pump Drive:	20.8 x 8 x 10	20.8 x 8 x 10	20.8 x 8 x 10	20.8 x 8 x 10
Lug Bolt Torque:	75#	75#	75#	75#
Tire Pressure:	70 psi	70 psi	70 psi	70 psi

Tire	Size Pressure
380/90R46 **LR168** (Singles)	338 kPa (3.38 bar) (49 psi)
380/90R46 **LR149** (Duals)	255 kPa (2.55 bar) (37 psi) Inner 227 kPa (2.28 bar) (33 psi) Outer
380/90R54 **LR170** (Singles)	400 kPa (4.00 bar) (58 psi)
380/90R54 **LR152** (Duals)	255 kPa (2.55 bar) (37 psi) Inner 227 kPa (2.28 bar) (33 psi) Outer
480/80R50 **LR176**	545 kPa (5.00 bar) (73 psi)
20.5 x 8-10	621 kPa (6.21 bar) (90 psi)
6.7R15	303 kPa (3.03 bar) (44 psi)

NOTE: Tire pressure is directly linked to LRXXX (bold italic). Make sure of the load rating of the tire before adding any air to the tire.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

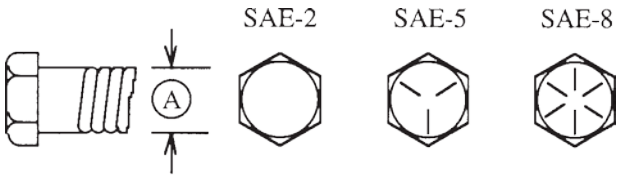
7.2 BOLT TORQUE

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque * SAE 2 N.m	(lb-ft)	SAE 5 N.m	(lb-ft)	SAE 8 N.m	(lb-ft)
1/4"	8	(6)	12	(9)	17	(12)
5/16"	13	(10)	25	(19)	36	(27)
3/8"	27	(20)	45	(33)	63	(45)
7/16"	41	(30)	72	(53)	100	(75)
1/2"	61	(45)	110	(80)	155	(115)
9/16"	95	(70)	155	(115)	220	(165)
5/8"	128	(95)	215	(160)	305	(220)
3/4"	225	(165)	390	(290)	540	(400)
7/8"	230	(170)	570	(420)	880	(650)
1"	345	(225)	850	(630)	1320	(970)



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and capscrews are identified by their head markings.

7.3 HYDRAULIC FITTING TORQUE

TIGHTENING FLARE TYPE TUBE FITTINGS *

1. Check flare and flare seat for defects that might cause leakage.
2. Align tube with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second tighten the swivel nut to the torque shown.

* The torque values shown are based on lubricated connections as in reassembly.

Tube Size OD	Nut Size Across Flats	Torque Value*		Recommended Turns to Tighten (After Finger Tightening)	
(in.)	(in.)	(N.m)	(lb-ft)	(Flats)	(Turns)
3/16	7/16	8	6	1	1/6
1/4	9/16	12	9	1	1/6
5/16	5/8	16	12	1	1/6
3/8	11/16	24	18	1	1/6
1/2	7/8	46	34	1	1/6
5/8	1	62	46	1	1/6
3/4	1-1/4	102	75	3/4	1/8
7/8	1-3/8	122	90	3/4	1/8

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