



# **WIL-RICH.**



**BLUMHARDT  
1000 GALLON  
TRAIL MASTER SPRAYER  
OPERATOR'S MANUAL**

# **WIL-RICH INC.**

## **BLUMHARDT TRAIL MASTER SPRAYER**

Wil-Rich warrants to each original retail purchaser of new Wil-Rich Sprayer Equipment purchased directly from Wil-Rich or an authorized Wil-Rich dealer that, at the date of delivery of such equipment and for a period of twelve (12) months (forty-five [45] days in the case of equipment used commercially) thereafter, such equipment will be free from defects in material and workmanship under normal use if assembled, operated, maintained and serviced in accordance with the instructions and recommendations contained in the Operator's Manual furnished with such equipment.

For the purpose of this Warranty (1) the date of delivery of equipment means the earlier to occur of (a) the date of delivery of such equipment as shown on the Delivery and Warranty Registration form furnished with such equipment and (b) the date of actual delivery of such equipment to the original purchaser of such equipment, and (2) commercial use means (a) the practice of using a piece of equipment for "custom work" or "hire" to an individual other than the owner of the equipment and (b) the practice of using the equipment on more than one crop harvest per year.

**Wil-Rich's obligation under this warranty will be limited to repairing, or at its option, replacing with Wil-Rich replacement parts, parts in equipment which, in Wil-Rich's sole judgement, prove to contain defects in material or workmanship within a period of twelve (12) months (forty-five [45] days in the case of equipment used commercially) after the date of delivery of such equipment.**

This warranty and Wil-Rich's repair and replacement obligation under this Warranty do not extend or apply to (1) normal maintenance, service and adjustments, (2) equipment which has been repaired, altered, modified or used in any way which, in Wil-Rich's sole judgement, directly or indirectly, adversely affects such equipment's stability, operation or safety, or (3) engine, batteries, engine clutches, tires and other trade accessories.

To make a claim under this Warranty, an original retail purchaser of equipment which is claimed to contain defects in material or workmanship must (1) complete and signed Delivery and Warranty Registration form furnished with such equipment and mailed or otherwise delivered such form to Wil-Rich within ten (10) days after the date of delivery of such equipment, (2) make such claim in writing and mail or otherwise deliver claim to Wil-Rich within thirty (30) days after the date such claimed defects in material or workmanship are discovered, and (3) if so requested by Wil-Rich, deliver all parts of such equipment which are claimed to be defective to Wil-Rich, freight prepaid.

**This warranty is in lieu of any and all other warranties, express or implied, including, without limitation, any and all warranties or merchantability and fitness for a particular purpose, and in lieu of any and all other duties, obligations and liabilities for crop damage or loss of crops and other incidental or consequential damages.**

Wil-Rich shall not be liable or responsible for any injury, damage or death resulting directly or indirectly from alteration or modification of equipment, from failure to assemble equipment in accordance with the instructions and recommendations contained in the assembly manual furnished with such equipment, or from failure to operate, maintain or service equipment in accordance with the instructions and recommendations contained in the Operator's Manual furnished with such equipment. Overgreasing sealed bearings, resulting in burst seals, voids the warranty. No warranty is expressed or implied for machine malfunction because of normal wear, careless or reckless operation, lack of maintenance, vandalism, or acts of God.

Wil-Rich reserves the right to make changes in design and specifications of equipment at any time without any duty, obligation or liability to any purchaser of equipment.

Wil-Rich will not recognize any statement, representation, warranty, agreement or understanding, oral or written, whether made by any dealer, representative, agent, employee or other person, which is not contained in this Warranty, and no such statement, representation, warranty, agreement or understanding will be enforceable or binding against Wil-Rich.

**This warranty void unless warranty registration card is completed and signed by both grower and dealer at time of delivery.**

**There is no warranty on used equipment. All used equipment is sold AS IS.**

**WIL-RICH INC.**  
**TRAIL MASTER SPRAYER**

**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, Province, Code \_\_\_\_\_

City, State/Province Code \_\_\_\_\_

Phone Number ( \_\_\_\_ ) \_\_\_\_\_

Sprayer Model \_\_\_\_\_

Serial Number \_\_\_\_\_

Delivery Date \_\_\_\_\_

**DEALER INSPECTION REPORT**

**SAFETY**

- \_\_\_\_ All Fasteners and Wheel Bolts Tight
- \_\_\_\_ Pump Rotates Freely
- \_\_\_\_ Hydraulic Hoses Free and Fittings Tight
- \_\_\_\_ Chemical Lines Free and Connections Tight
- \_\_\_\_ Lubricate Machine
- \_\_\_\_ Check Tire Pressure
- \_\_\_\_ Screen Clean
- \_\_\_\_ Frame Level
- \_\_\_\_ Monitor Functions
- \_\_\_\_ Wiring Harness Connected

- \_\_\_\_ All Safety Signs Installed
- \_\_\_\_ Reflectors, SMV 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
WIL-RICH	DEALER	CUSTOMER

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## SERIAL NUMBER LOCATION

Always give your dealer the serial number of your Wil-Rich Blumhardt Trail Master Sprayer when ordering parts or requesting service or other information.

The serial number plate is located where indicated. Please mark the number in the space provided for easy reference.



**SERIAL NUMBER LOCATION**

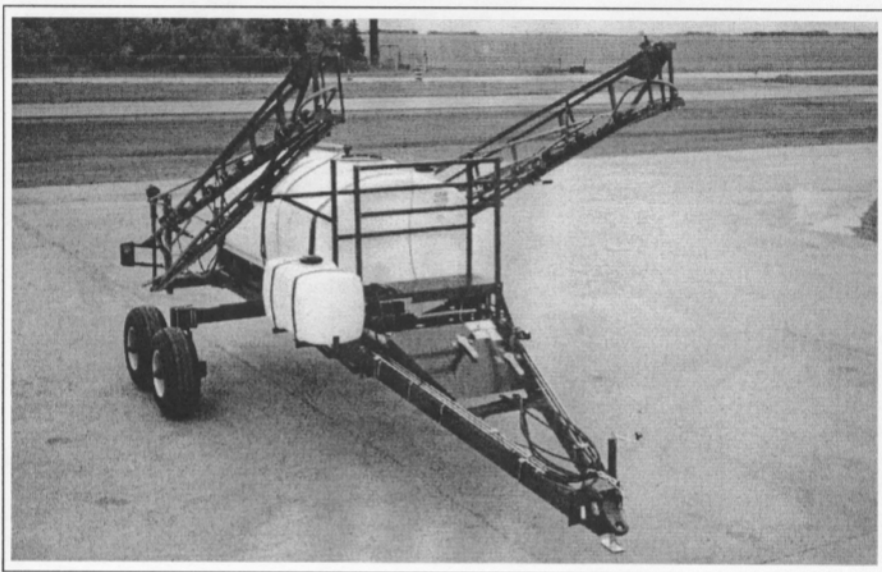
Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

# 1 INTRODUCTION

Congratulations on your choice of a Wil-Rich Blumhardt Trail Master Sprayer to complement your farming operation. This equipment has been designed and manufactured to meet the needs of a discriminating buyer for the efficient spraying of a variety of field crops.

Safe, efficient and trouble free operation of your Trail Master Sprayer requires that you and anyone else who will be operating or maintaining the Sprayer, read and understand the Safety, Operation, Maintenance and Trouble Shooting information contained in the Operator's Manual.



This manual covers the Wil-Rich Blumhardt 1000 gallon Trail Master Sprayer. Use the Table of Contents or Index as a guide when searching for specific information.

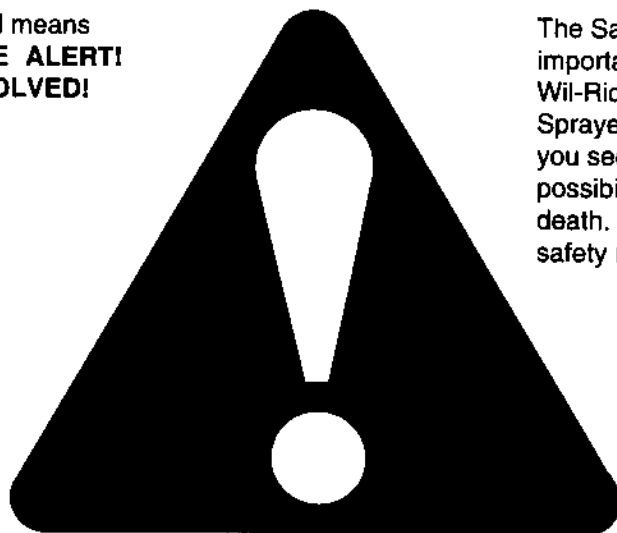
Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Wil-Rich dealer if you need assistance or information.

**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 Wil-Rich Blumhardt Trail Master Sprayer 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.

## SAFETY

**YOU** are responsible for the **SAFE** operation and maintenance of your Wil-Rich Blumhardt Trail Master Sprayer. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Sprayer 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 Sprayer.

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.

- Sprayer owners must give operating instructions to operators or employees before allowing them to operate the Sprayer, and at least annually thereafter per OSHA regulation 1928.57.
- The most important safety feature 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. Most 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!**

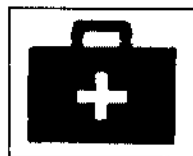
## 2.1 GENERAL SAFETY

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



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

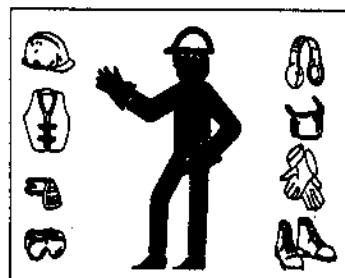
3. Have a first-aid kit available for use should the need arise and know how to use it.



4. Do not allow riders.

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

- A hard hat
- Rubber boots
- Protective goggles
- Neoprene gloves
- Water repellant clothing
- Respirator or filter mask



6. Place all controls in neutral or OFF, stop tractor engine, turn monitor off, set park brake, remove ignition key, wait for nozzles to stop spraying before servicing, adjusting, repairing or unplugging.
7. Read chemical manufacturers warnings, instructions and procedures before starting and follow them exactly.
8. Post Poison Control Emergency telephone number for your area on Sprayer before using Agricultural chemicals.

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

Have container label handy when seeking medical attention.

9. 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. Place all controls in neutral or OFF, stop tractor engine, turn monitor off, set park brake, remove ignition key, wait for nozzles to stop spraying before servicing, adjusting, repairing or unplugging.
3. Before spraying a field, be familiar with all potential hazards: trees, rocks, ditches, gullies, etc. Plan the spraying route to avoid hazards.
4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
5. Do not allow riders on the sprayer or tractor during operation or transporting.
6. Clear the area of all bystanders, especially children, before starting or filling with water or chemical.
7. Stay away from boom pinch points when folding or extending wings. Keep others away.
8. Stay away from power lines when extending or folding outer wings. Electrocution can occur without direct contact.
9. Read chemical manufacturers' warnings, instructions and procedures before starting and follow them exactly.
10. Do not breathe, touch or ingest chemicals. Always wear protective clothing, goggles and a respirator. Follow safe handling procedures.
11. Spray only when potential for chemical drift is at a minimum. Even small amounts can affect neighboring crops or sensitive plants and people.
12. Dispose of chemical containers by triple rinsing them into the sprayer tank, crushing and delivering to regional disposal site.
13. In case of poisoning, get immediate medical attention.
14. Only rinse sprayer while still in the field. Spray the rinse thinly over the crop already sprayed. Never contaminate the farmyard or drainage systems with sprayer rinse.
15. Do not eat in the field when spraying.
16. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.
17. Before applying pressure to chemical system make sure that all connections are tight and that all hoses and fittings are in good condition.
18. Review safety instructions annually.

## 2.3 CHEMICAL SAFETY

1. Some Agricultural chemicals are among the most toxic substances known to man. Minute quantities can contaminate clothing, machinery, the workplace and the environment. Follow the chemical manufacturers' instructions exactly. Death can result from their improper use.
2. Misuse, including excessive rates, uneven application, wind drift, and label violations can cause injury to crops, livestock, persons and the environment.
3. Before applying chemicals to a field, be familiar with all potential hazards: trees, rocks, ditches, gullies, etc. Plan the application route to avoid hazards.
4. Do not breathe, touch or ingest chemicals. Always wear protective clothing, goggles and a respirator. Follow safe handling procedures.
5. Follow the manufacturers' instructions for chemical storage. Avoid unnecessary storage by purchasing only the quantity needed for the crop year.
6. Keep all chemicals out of reach of children and away from livestock and animals.
7. Store chemicals only in their original containers and in a locked area.
8. Check with state/provincial/environment department regarding the disposal of small quantities of chemicals, chemical containers and wash water. Follow their disposal instructions.
9. Do not burn the containers or leave them lying in the field or ditches. Dispose of them by triple rinsing and leaving at a pesticide container disposal site.
10. Wash thoroughly before eating. Use a detergent to remove all chemical residue. Rinse carefully and dry with disposable towels.
11. Do not eat in the field when spraying.
12. In case of chemical poisoning, get immediate medical attention. Have container label handy when seeking medical attention.
13. Post Poison Control Emergency telephone number for your area on sprayer before using Agricultural chemicals.  
  
**Ottawa: (613) 992-5606**  
**Washington DC: (202) 962-4525**
14. Thoroughly wash clothing and equipment contaminated by chemicals.
15. Do not allow children or workers on contaminated sprayer.
16. Rinse sprayer while still in the field. Spray the rinse thinly over the crop already sprayed. Never contaminate the farmyard or drainage systems with sprayer rinse.
17. Do not use the sprayer to transport drinking water.
18. Wash down the Sprayer immediately after field work. Dispose of the wash water in an environmentally safe manner. Wash water can contaminate the soil or a clean water supply.

## 2.4 MAINTENANCE SAFETY

1. Review the Operator's Manual and all safety items before working with, maintaining or operating the Sprayer.
2. Place all controls in neutral or OFF, stop the tractor engine, turn monitor off, set park brake, remove ignition key, wait for nozzles to stop spraying 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.

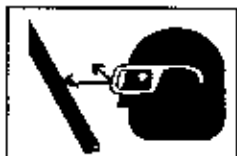


4. Before applying pressure to a hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.
5. Before applying pressure to chemical system make sure that all connections are tight and that all hoses and fittings are in good condition.
6. Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.
7. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.
8. Clear the area of bystanders, especially children, when carrying out any maintenance and repairs or making any adjustments or filling.
9. Place stands or blocks under the frame before working beneath the machine.
10. Wear safety goggles, neoprene gloves and protective clothing when working on the sprayer filled with active chemical.
11. Wash machine to remove all chemical residue before working on unit. Wear appropriate protective gear at all times.
12. Protect yourself from chemical contamination.

## 2.5 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.

## 2.6 TRANSPORT SAFETY

1. Read and understand ALL the information in the Operator's Manual regarding procedures and SAFETY when operating the Sprayer in the field and/or on the road.
2. Check with local authorities regarding sprayer 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. Ensure that the Sprayer is hitched positively to the towing vehicle and a retainer is used through the drawbar pin. Always use a safety chain between the machine and the tractor.
6. Install boom locks before transporting.
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. Never transport with tanks filled with water or chemical.

## 2.7 STORAGE SAFETY

1. Store unit in an area away from human activity.
2. Do not permit children to play on or around the stored sprayer.
3. Unhook and store in the transport configuration.

## 2.8 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.

## 2.9 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 Dealer 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.



## 2.10 SIGN-OFF FORM

Will-Rich Blumhardt 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 Sprayer 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 not qualified 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.

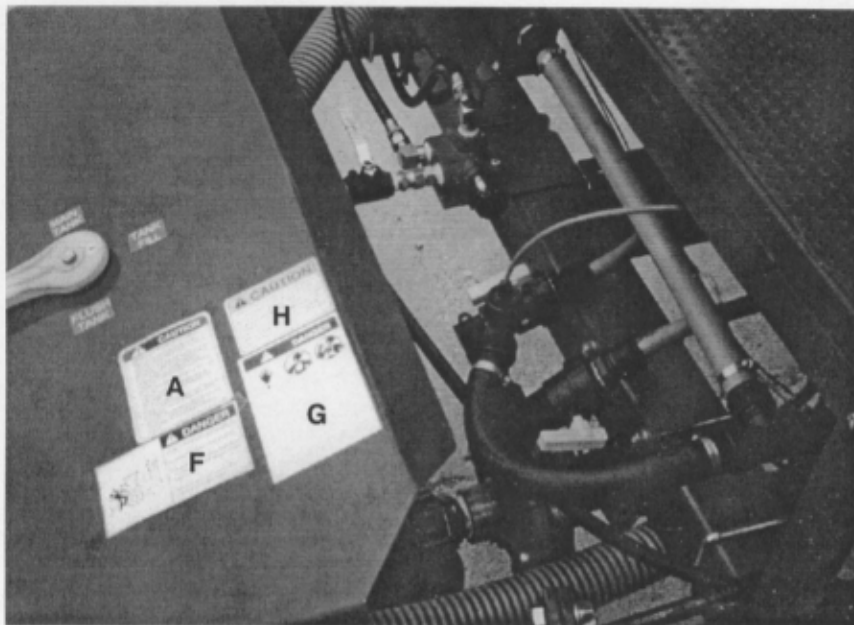
## SIGN-OFF FORM

[illegible]


### 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**



## CAUTION

- Read and understand the Operator's Manual before using.
- Read Chemical manufacturers' WARNINGS, instructions and procedures before starting and follow them exactly.
- 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.
- Always wear proper eye, breathing and clothing protection.
- Stay away from chemicals, spray and drift. Keep others away.
- Install and secure all guards before starting.
- Keep hands, feet, hair and clothing away from moving parts.
- Do not allow riders.
- Secure and lock booms in the support cradle before transporting.
- Keep all chemical and hydraulic lines, fittings and couplers tight and free of leaks before starting and operating.
- Stay away from overhead power lines. Electro-cution can occur without direct contact.
- Review Safety instructions with all operators annually.

222253

**B**



## WARNING



### HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

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

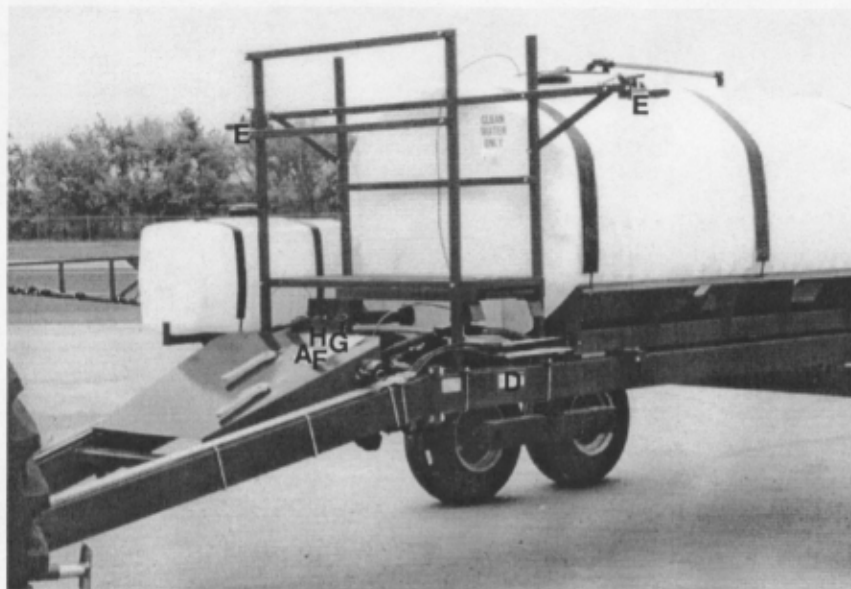
60711

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.

### 3 SAFETY SIGN LOCATIONS (cont'd)

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**

		<b>DANGER</b>
	<b>CRUSHING HAZARD</b>	
To prevent serious injury or death:		
<ul style="list-style-type: none"><li>• Do not stand between implement and moving tractor.</li><li>• Stop tractor engine and set park brake before installing pins.</li></ul>		
<small>222250</small>		

**D**

	<b>WARNING</b>
	<b>FALLING HAZARD</b>
To prevent serious injury or death from falling:	
<ul style="list-style-type: none"><li>• Use care when climbing ladder or working on machine.</li><li>• Keep unauthorized people off machine.</li><li>• Do not allow riders.</li></ul>	
<small>222251</small>	

**E**

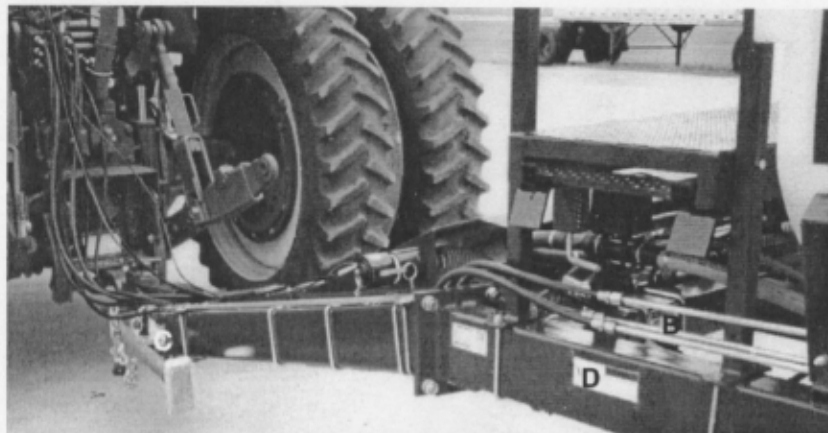
	<b>WARNING</b>
<b>Oncoming Traffic Hazard:</b>	
<ul style="list-style-type: none"><li>• Can cause serious injury or death.</li><li>• Always install boom lock pins before transporting or storing.</li></ul>	
<small>61402</small>	

**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.

### 3 SAFETY SIGN LOCATIONS (cont'd)

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!



G

DANGER

CHEMICAL HAZARD

To prevent serious injury or death:

WEAR RUBBER GLOVES	DON'T BREATHE VAPOR	DON'T INGEST CHEMICAL
1. Do not allow chemical or solution to touch skin. Some can be absorbed through the skin.  2. Wear rubber gloves and protective gear at all times.	1. Stay away from chemical splash and vapor. Keep others away.  2. Do not breathe vapor.  3. Wear proper respirator when working with chemicals.	1. Chemicals can be toxic.  2. If in eyes or mouth, read chemical manufacturers' instructions and follow them exactly.  3. Seek medical attention immediately.  4. A poison control number is normally inside the front cover of your telephone book.

61403

F

DANGER

ELECTROCUTION HAZARD  
 KEEP AWAY FROM  
 POWER LINES

To prevent serious injury or death from electrocution:

- Stay away from overhead power lines when transporting or raising/lowering frame/boom.
- This machine is not grounded. Electrocution can occur without direct contact.

222252

H

WARNING

TOXIC CHEMICAL HAZARD

Agricultural chemicals can be dangerous. Improper selection or use can seriously injure persons, animals, plants, soil or other property. BE SAFE: Select the right chemical for the job. Handle it with care. Follow the instructions on the container label and instructions from the equipment manufacturer.

56005

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.

### 3 SAFETY SIGN LOCATIONS (cont'd)

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!



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. Place all controls in neutral or OFF, stop tractor engine, turn monitor off, set park brake, remove ignition key, wait for nozzles to stop spraying before servicing, adjusting, repairing or unplugging.
3. Before spraying a field, be familiar with all potential hazards: trees, rocks, ditches, gullies, etc. Plan the spraying route to avoid hazards.
4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
5. Do not allow riders on the sprayer or tractor during operation or transporting.
6. Clear the area of all bystanders, especially children, before starting or filling with water or chemical.
7. Stay away from boom pinch points when folding or extending wings. Keep others away.
8. Stay away from power lines when extending or folding outer wings. Electrocution can occur without direct contact.
9. Read chemical manufacturers' warnings, instructions and procedures before starting and follow them exactly.
10. Do not breathe, touch or ingest chemicals. Always wear protective clothing, goggles and a respirator. Follow safe handling procedures.
11. Spray only when potential for chemical drift is at a minimum. Even small amounts can affect neighboring crops or sensitive plants and people.
12. Dispose of chemical containers by triple rinsing them into the sprayer tank, crushing and delivering to regional disposal site.
13. In case of poisoning, get immediate medical attention.
14. Only rinse sprayer while still in the field. Spray the rinse thinly over the crop already sprayed. Never contaminate the farmyard or drainage systems with sprayer rinse.
15. Do not eat in the field when spraying.
16. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.
17. Before applying pressure to chemical system make sure that all connections are tight and that all hoses and fittings are in good condition.
18. Review safety instructions annually.

### 4.1 TO THE NEW OPERATOR OR OWNER

Today's Agricultural industry works closely with the chemical industry to develop and use the appropriate compound for control of insects, weeds and fungus. Effective results are closely related to application methods and techniques. Wil-Rich Blumhardt has designed a trailer type sprayer that will place the chemicals exactly where they are needed and at the proper concentrations.

**It is the responsibility of the owner or operator to read this manual and the chemical container label before starting. 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 environment.**

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 Sprayer will provide many years of trouble-free service.

## 4.2 MACHINE COMPONENTS

The Wil-Rich Blumhardt Trailer Sprayer is a large transportable tank with spray booms to distribute chemicals over a wide area. Chemicals can be added directly into the tank through the top tank lid.

The chemical system is pressurized by a hydraulically powered centrifugal pump (or an optional PTO drive) that provides flow for tank agitation, washing and boom pressure.

A solenoid to each boom controls the flow to the wings and a butterfly valve and pressure sensor maintains the system pressure. Nozzles along the wings, distribute the chemical solution over the field. A screen in the suction line removes

contaminants from the system. A chemical circuit control box is mounted in the cab to assist in the monitoring and controlling of the machine.

The booms swing forward parallel to the frame for transport and swing back at right angles to the machine for field operation. The boom is manually folded or extended while standing on the ground.

A 50 gallon chemical circuit flush tank is mounted on the front frame for washing the machine. A 5 gallon clean water tank is molded into the main tank and is used to wash chemicals from hands, eyes, faces or body parts as required.

- A Main Tank
- B Clean Water Tank
- C Flush Tank
- D Selector Valve
- E Centrifugal Pump
- F Inner Boom
- G Outer Boom
- H Center Boom
- J Butterfly Valve
- K Solenoids
- L Bottom Fill
- M Boom Controller

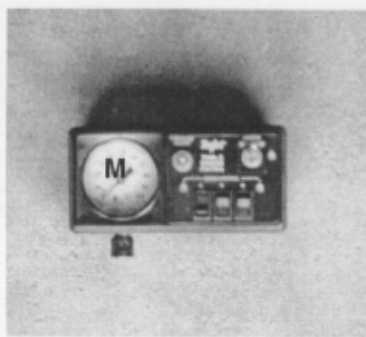


Fig. 1 MACHINE COMPONENTS

## 4.3 BREAK-IN

Although there are no operational restrictions on the sprayer 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 the wheel bolts and all other fasteners and hardware.
2. Check that all electrical connections are tight.
3. Check that no chemical or hydraulic lines are being pinched or crimped. Re-align as required.
4. Check that all nozzles are working properly. Clean or replace as required.
5. 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 nozzles are working properly.
4. Then go to the normal servicing and maintenance schedule as defined in the Maintenance Section.

Before operating the Sprayer 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 Sprayer. See Section 4.5 for recommendations.
3. Ensure 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. Check the hydraulic system. Ensure that the hydraulic reservoir in the tractor is filled to the required specifications.
5. Inspect all hydraulic lines, hoses, fittings and couplers for tightness. Use a clean cloth to wipe any accumulated dirt from the couplers before connecting to the hydraulic system of the tractor.
6. Check the tires and ensure that they are inflated to the specified pressure.
7. Calibrate the sprayer if it is the start of the season or a new chemical is being used.
8. Check the condition and routing of all chemical hoses and lines. Replace any that are damaged. Re-route those that are rubbing, pinched or crimped.
9. Check the spray pattern of each nozzle. Remove and clean or replace any that have an unusual pattern.
10. Remove the screen filter and wash with clean water. Reinstall.
11. Check that all connections in the electrical system are connected and tight.

## 4.4 PRE-OPERATION CHECKLIST

Efficient and safe operation of the Wil-Rich Blumhardt Trailer Sprayer 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 Sprayer that this checklist be followed.



## 4.5 EQUIPMENT MATCHING

To insure the safe and reliable operation of the Sprayer, 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 recommended horsepower for your machine. Although the power is not required to pull the machine, it will insure that the tractor/sprayer combination has sufficient power to maintain a constant forward speed under all conditions and stability during all operating and transporting conditions. Increase the power by a minimum of 25% if operating in soft field or hilly conditions.

### 2. Hydraulic System:

The tractor hydraulic system must be capable of 8 gpm (30 lpm) at 2000 psi (13,800 kPa) to operate the chemical circuit centrifugal pump. A 5 gpm (19 lpm) at 2000 psi (13,800 kPa) is also required to operate the boom height or tilt functions. Either closed-center or open-centered systems can be used. Adjust the flow divider or install the appropriate orifice to give the desired boom raise or tilt speeds.

### 3. Electrical:

A 12 volt 10 amp power source in the cab must be provided to operate the chemical circuit controller.

### 4. Drawbar (Optional PTO):

The tractor drawbar must be set to provide 14 inches (356 mm) for the 540 RPM model and 16 inches (406 mm) for the 1000 RPM model between the end the PTO shaft and the center of the drawbar pin. Refer to your tractor manual for the adjustment procedure.

### 5. PTO Shaft (Optional):

The tractor must be equipped with a 6 spline or a 21 spline 1000 RPM PTO shaft to fit the driveline shaft supplied with the machine. Do not use shaft adapters or operate at any other speed.

Table 1 Horsepower Recommendations

T E R R A I N	Model Size		
	750 Gal.		1000 Gal.
	Level	80	100
	Hilly	100	125

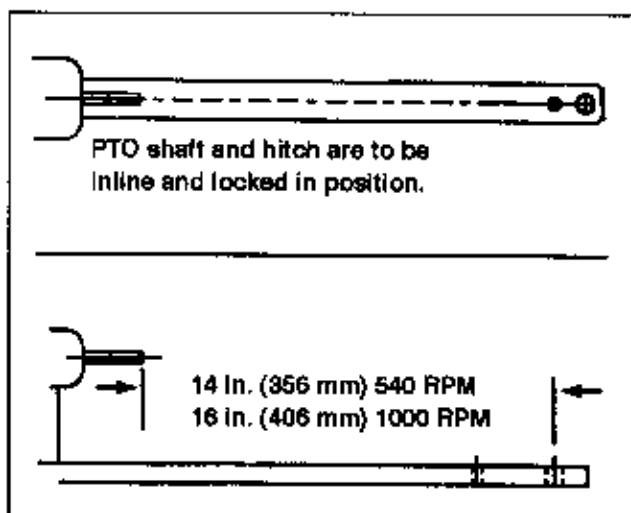


Fig. 2 DRAWBAR DIMENSION

## 4.6 CONTROLS

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

### 1. Chemical Circuit Controller:

This system controls the chemical circuit functions. Review the operator's manual supplied with the controller for installation, operating and maintenance instructions.

#### A. Front Panel:

- a. **Pressure Gauge:**  
Displays the pressure in the chemical circuit.
- b. **Boom Switch:**  
Controls the ON/OFF function for the Left, Center or Right boom. Depress the upper portion of the switch to turn OFF and depress the bottom to turn ON.
- c. **Adjust Switch:**  
Used to increase or decrease the chemical circuit pressure. Depress the top portion of the switch up to increase and down to decrease.
- d. **Master ON/OFF Switch:**  
This switch controls the power to the controller box. Move the switch up to turn the power ON and down for OFF.

#### B. Rear Panel:

- a. **Output Cable Connector:**  
Provides connection to the boom section, regulating valve and Master ON/OFF. Make sure the terminals are securely connected.
- b. **Pressure Gauge Inlet Connector:**  
The connection for the nylon pressure line.
- c. **Power Input Cable Connector:**  
This is the power input connector for the controller and power for controller light.
- d. **Fuse Holder:**  
Provides electrical protection to the controller with a 15 amp fuse.

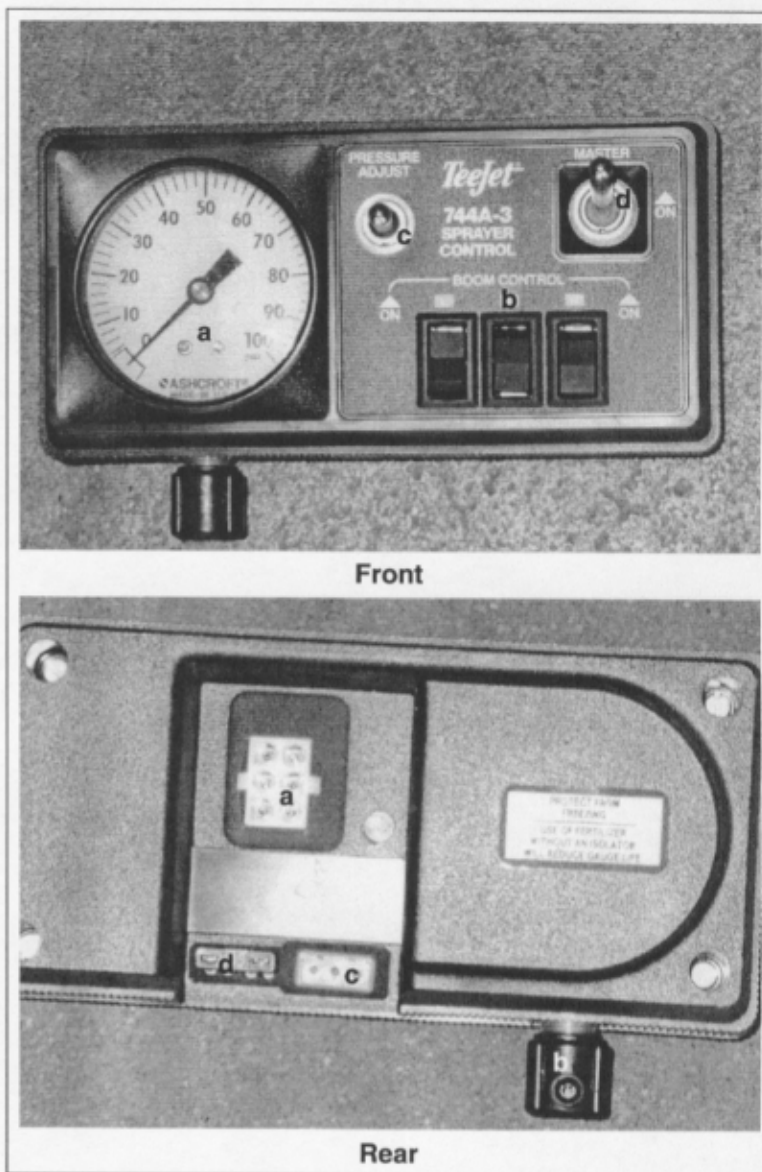


Fig. 3 CHEMICAL CONTROLLER (TYPICAL)

## 4.6 CONTROLS (cont.)

### 2. Hydraulic System Valves:

The machine is designed with 2 types of valves in the hydraulic circuit and function as follows:

#### a. Selector Valve:

This 2 position valve selects the routing of the oil through the circuit. Push the plunger in to direct the oil to the boom tilt circuit. Pull the plunger out to direct the oil to the boom raise circuit. Be sure the shut off valve is open to allow the oil into the circuit.

#### b. Shut Off Valve:

This gate valve controls the flow of oil to the boom raise and lower circuit. Move the handle parallel to the line to open the circuit and allow oil to pass. Move the handle at right angles to the line to close the valve and stop the flow of oil.

### 3. Hydraulic Controls:

The hydraulic controls are located inside the tractor cab and convenient to the operator. Engage the circuit connected to the chemical circuit centrifugal pump or the boom position system by moving the appropriate control lever. Place the pump drive lever in detent to provide a continuous flow of oil.

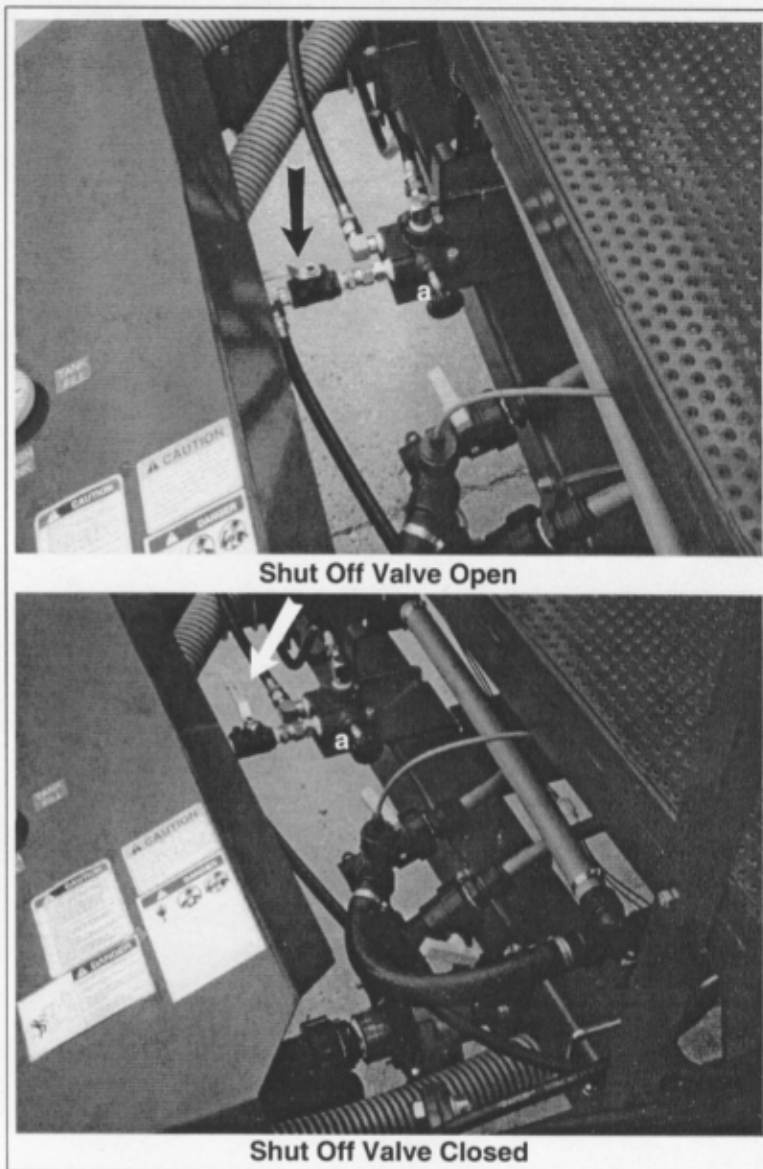


Fig. 4 HYDRAULIC SYSTEM VALVES

#### 4. Chemical Circuit Valves:

The circuit is designed with ball valves that can be opened or closed appropriate for the circuit requirement. When the handle covers the label and the arrow points in that direction, it selects the function:

##### A. Tank Fill:

###### a. Main Tank:

Cover this label with the handle (pointing to the right) for the arrow to point in that direction and the main tank to be filled.

###### b. Off:

Cover this label with the handle (pointing forward) for the arrow to point in that direction and the filling circuit to be off.

###### c. Flush Tank:

Cover this label with the handle (point to the left) for the arrow to point flush tank label to fill flush tank.

##### B. Pump Intake:

###### a. Flush Tank:

Cover this label with the handle (pointing to the right) for the arrow to the flush tank label to draw water from the flush tank.

###### b. Off:

Cover this label with the handle (forward) for the arrow to point in that direction and intake to the chemical circuit pump is off (closed).

###### c. Main Tank:

Covers this label with the handle (pointing to the left) for the arrow to point in that direction and direct the water from the main tank into the pump. This is the setting during normal operation.

###### d. Wash Valve:

This valve controls the flow of solution through the wash circuit. Turn the handle at right angles to the line to turn the wash circuit off and parallel for on.

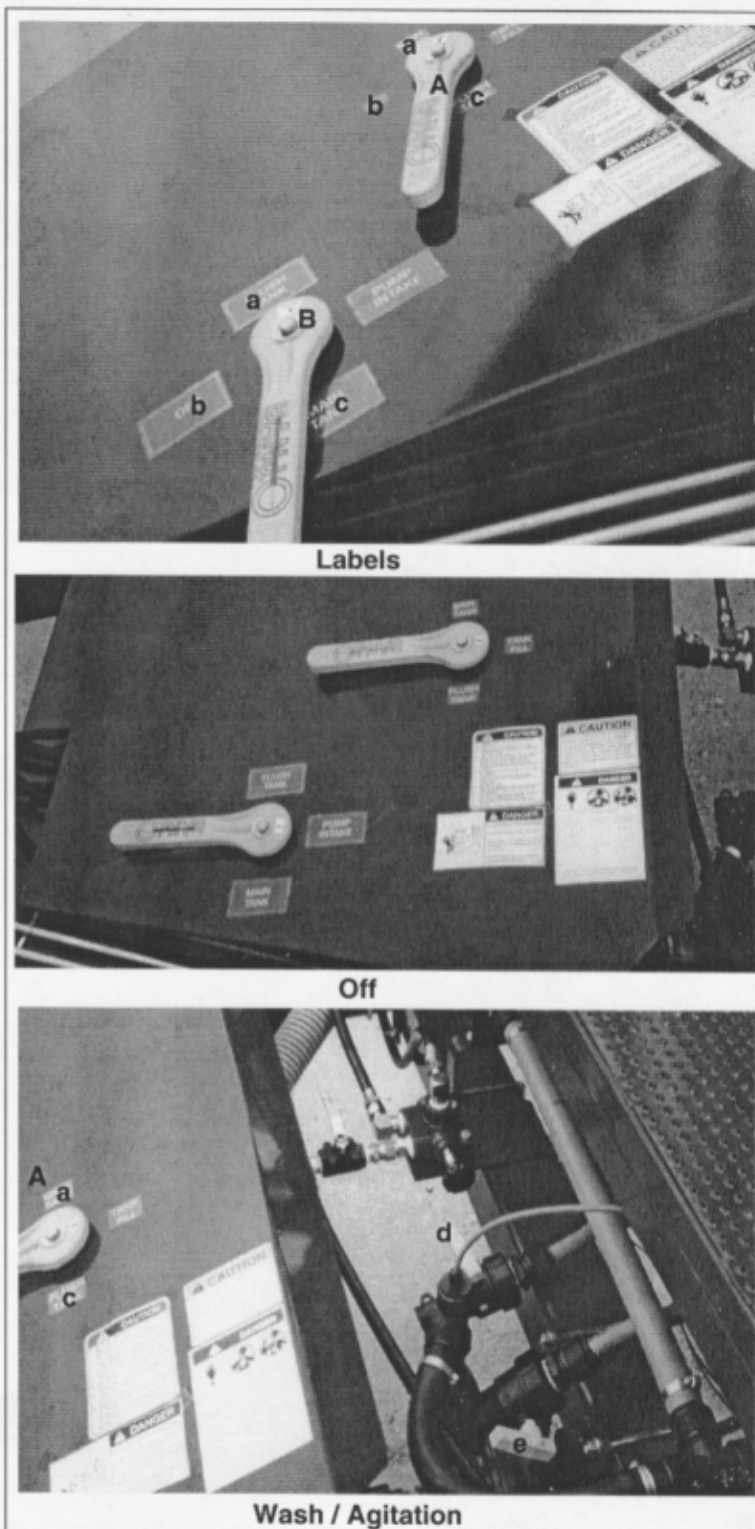


Fig. 5 CHEMICAL CIRCUIT VALVES

###### e. Agitation / Throttling Valve:

This valve controls the flow of solution through the agitation circuit and can be used to control the pressure in the chemical circuit. Normally the valve is set partially open to always provide flow for agitation. Close slightly to increase circuit pressure and open to decrease.

5. **Chemical Circuit Solenoids and Butterfly Valve:**

All solenoids and valves used to control the chemical circuit are mounted on the front frame.

- a. **Solenoids**
- b. **Butterfly Valve.**



Fig. 6 CHEMICAL SOLENOIDS AND BUTTERFLY VALVE

6. **Wash Tank:**

A wash tank is molded into the front of the main tank. Open the spigot to access the clean water.



Fig. 7 WASH TANK

7. **Circuit Diagram:**

Be sure you are familiar with the chemical circuit and location and function of all valves before starting.

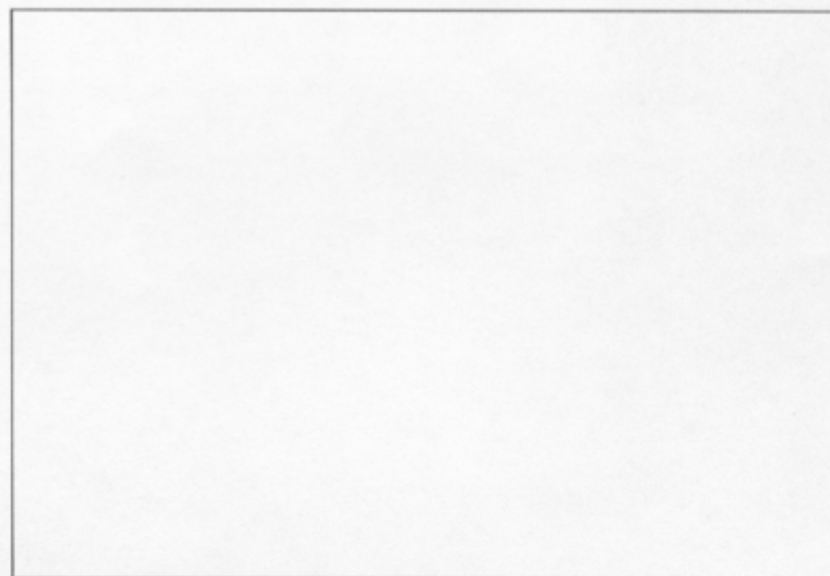


Fig. 8 CIRCUIT DIAGRAM



## 4.7 INSTALLING CONTROLLER

The controller 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.

The controller must be mounted in the tractor cab within easy reach. Always place it so it can be easily read and actuated while operating.

Route the harness components across the hitch and through a window or other opening to attach to the box. Provide sufficient slack for turning without binding and keep away from moving parts.

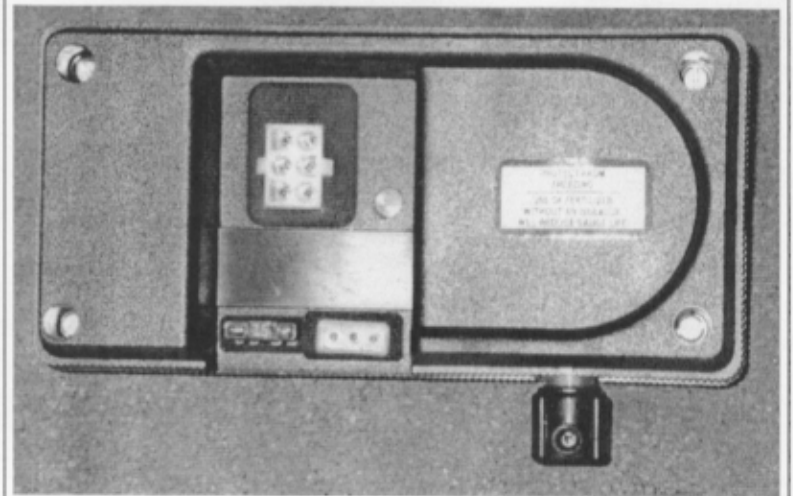
Connect the power wires to a 12 volt power source in the cab. Be sure to attach to a good ground.

### IMPORTANT

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



Mounted (Typical)



Connections (Rear View)

Fig. 9 CONTROLLER

## 4.8 PTO DRIVE SYSTEM (OPTIONAL)

The sprayer can be equipped with a PTO driveline to provide power to the chemical circuit pump. The customer must specify the required PTO speed which will determine the appropriate pump for the application.

Follow these instructions when assembling and operating the machine:

### 1. Assembly:

- a. Mount the pump on the front frame to provide the spacing between the pump shaft end and the drawbar pin.  
540 RPM            14 inches (356 mm)  
1000 RPM        16 inches (408 mm)

### NOTE

Best installation is attained when the distance from the tractor PTO to the hitch point is as close as possible to the above settings.

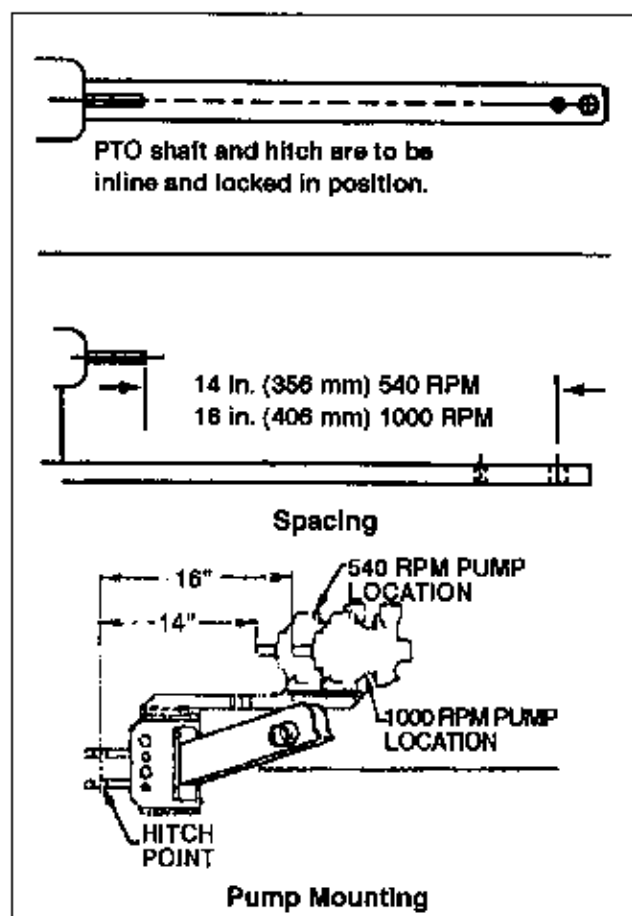


Fig. 10 SHAFT DIMENSION

2. The best results are obtained when the pump is mounted to provide:
  - a. The drive shaft is level.
  - b. The hitch pin is in the center between the ends of the shafts of the pump and tractor.

### IMPORTANT

Unequal shaft lengths will require pump to speed up and slow down as the shaft rotates during turns. These speed changes adversely affect the life of the pump. Centering the pin reduces the size of the speed changes and increases pump life.

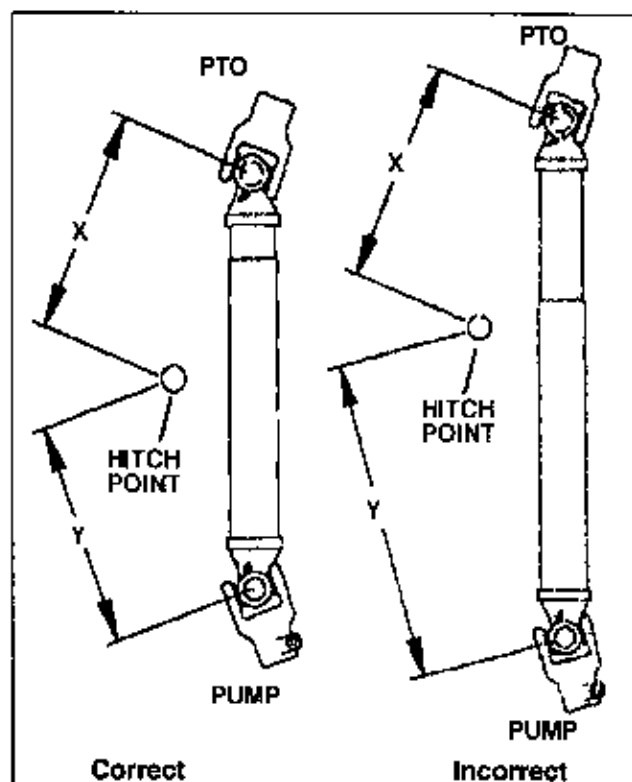


Fig. 11 PUMP MOUNTING

### 3. Shaft Length:

It is important that the PTO shaft is the correct length with the appropriate overlap when the shaft extends and short enough to prevent bottoming out when compressing. Either condition will damage the shaft, tractor or pump and lead to early failures. Follow this procedure when measuring and cutting the appropriate driveline length for your application:

- Position the tractor and sprayer on level ground with the tractor aligned straight ahead of the sprayer.
- Pull PTO shaft apart and attach the respective ends to the tractor and the pump shafts.
- Hold mounted half shafts side by side and mark off exact length plus  $\frac{3}{4}$  inch.

#### IMPORTANT

The shaft must be capable of being compressed  $\frac{3}{4}$  inch to provide for a shorter shaft when the tractor turns a corner.

- Cut off guard tube and shaft. Be sure that the shaft tube extends beyond the end of the guard tube.
- Use a file to deburr the ends of the guard and the shaft.
- Assemble the two ends of the shaft.
- Make sure that the shaft can telescope freely. If it does not, separate the two parts and inspect for burrs or cuttings on the shaft ends. Be sure it telescopes freely before installing.
- Make sure the plastic covering shield is free to rotate on the shaft before installing on the machine.

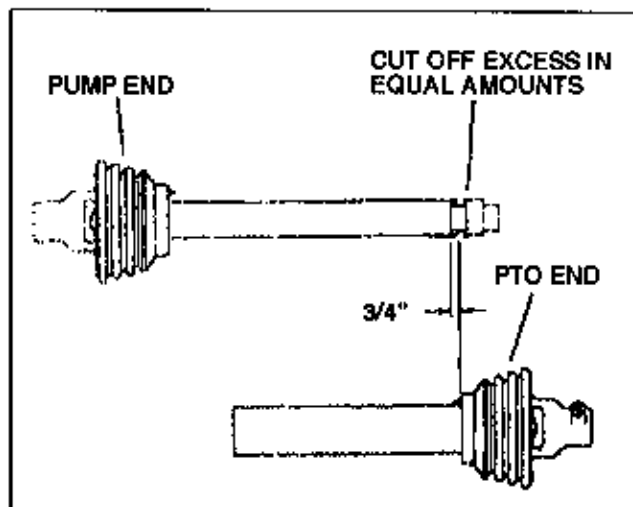


Fig. 12 SHAFT MEASUREMENT

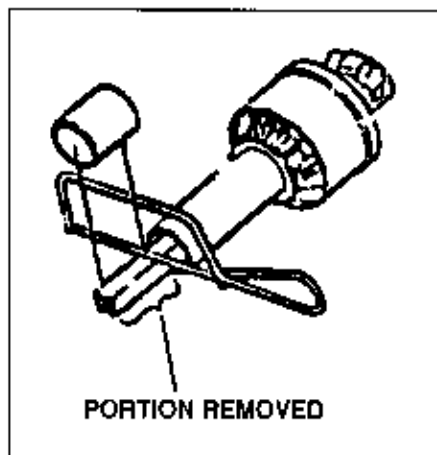


Fig. 13 CUTTING



#### 4. Shaft Installation:

- Clean the tractor and pump shafts.
- Install the key in the pump shaft keyway.
- Slide the yoke over the key and pump shaft.
- Stop when the yoke has reached the same position where the shaft measurements were taken.
- Apply Lock-Tite to the locking set screw.
- Tighten set screw to its specified torque.
- Depress lock pin in tractor end yoke and slide over tractor shaft. Pull on shaft to be sure lock pin is seated in the groove on the shaft.

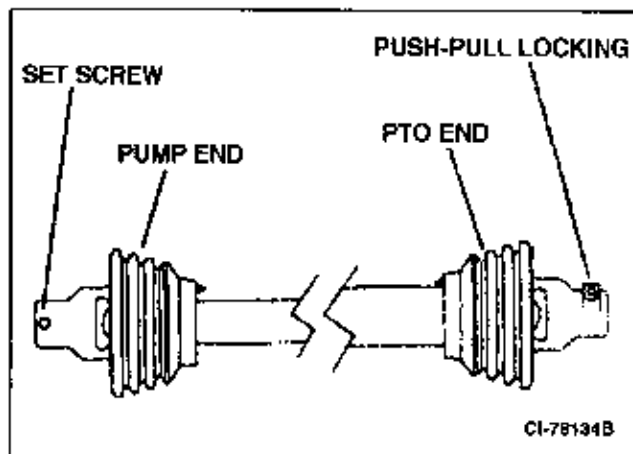


Fig. 14 SHAFT INSTALLATION

#### 5. Universal Joint Angles:

Universal joints in drivelines are designed to allow a change in angles between each side of the shaft. However, the shafts for 540 or 1000 RPM are limited to  $+15^\circ$  or  $+7^\circ$  angles respectively. Exceeding these angles, either turning (side-to-side) or going through ditches (up and down), will create high loads into the driveline and reduce the life of the shaft.

Specific operating conditions of sharp turns or severe ditch crossing can exceed the recommended operating angles for a driveline. In those applications, it is recommended that the PTO be disengaged when making these manoeuvres to eliminate the high load factors on the driveline.

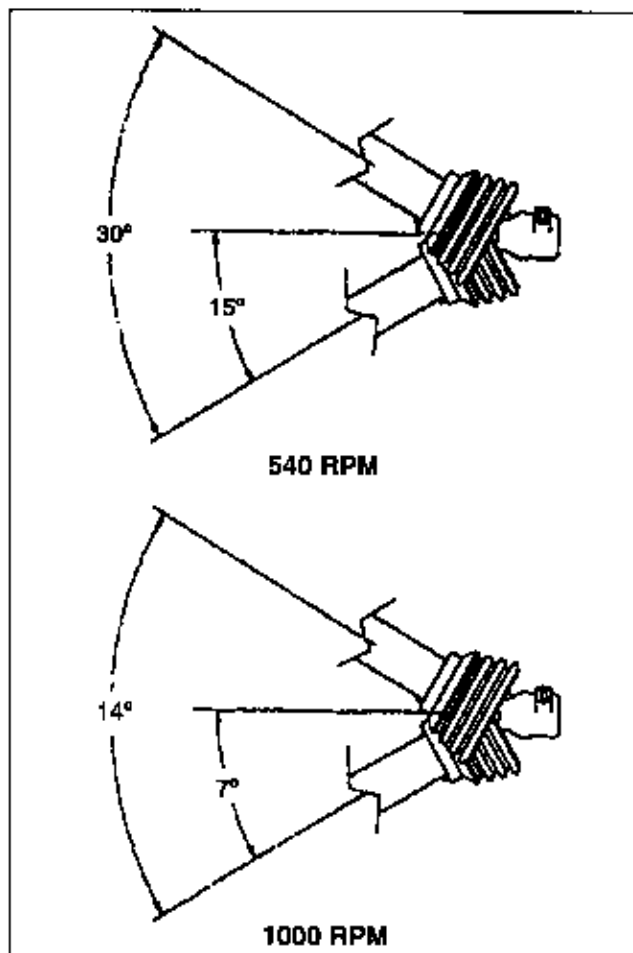


Fig. 15 DRIVELINE ANGLES

## 4.9 BOOM INSTALLATION

The machine is generally shipped from the factory in a partially disassembled configuration to reduce the physical size to manageable dimensions appropriate for shipping. As a result, the boom components must be assembled to the frame and set/adjusted for field operation. Review this section when assembling or adjusting the boom.

### 4.9.1 BOOM FRAME ASSEMBLY

Main boom arms and outrigger assemblies of 21 or 33 feet are available with the 1000 gallon Crop Care sprayers. Although a boom extension is available, it is not included in the basic width. Both booms are designed with parallel floatation.

When assembling the booms, follow this procedure:

1. Position the trailer frame in an open area that will allow access from all sides with the booms and lifting machines.
2. Block the trailer wheels to prevent movement.
3. Back off the anchor set screws from the 4 inch square tube of the center frame.
4. Use a forklift, A frame or hoist with sufficient capacity to lift the booms into position.
5. Insert the 3 1/2 inch square tube stub of the boom post assembly into the 4 inch square tube of the center frame until it butts against the stop welded on the side of the 3 1/2 inch tube.
6. Tighten set screw and jam nuts to their specified torques.

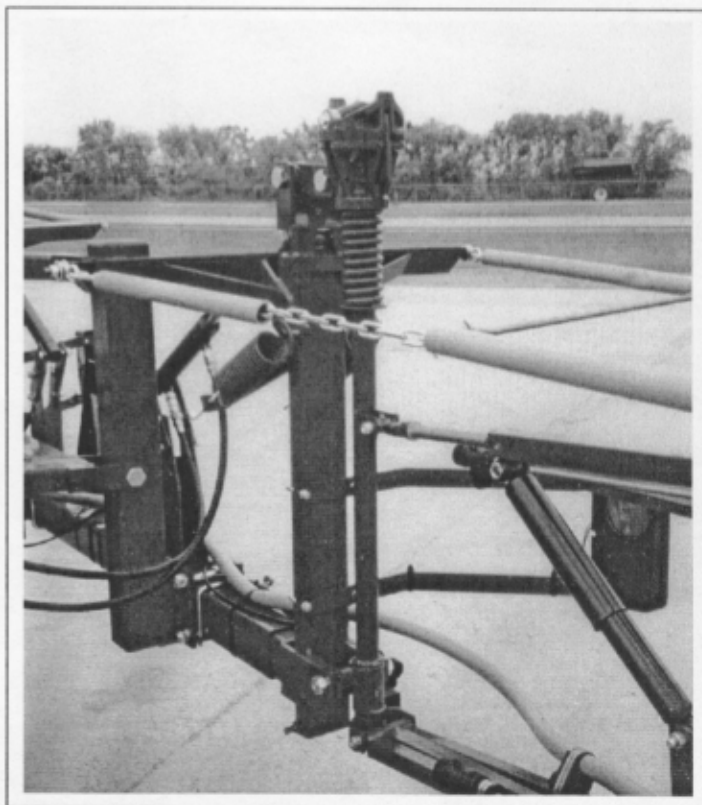


Fig. 16 FRAME TUBE

7. Install the straight brace or hydraulic cylinder and lower lift bracket.

### IMPORTANT

If booms are assembled at the factory with hydraulic cylinders, the standard straight brace is also installed to prevent movement. Extend booms into working position, remove straight brace and charge with oil by cycling the system several times.

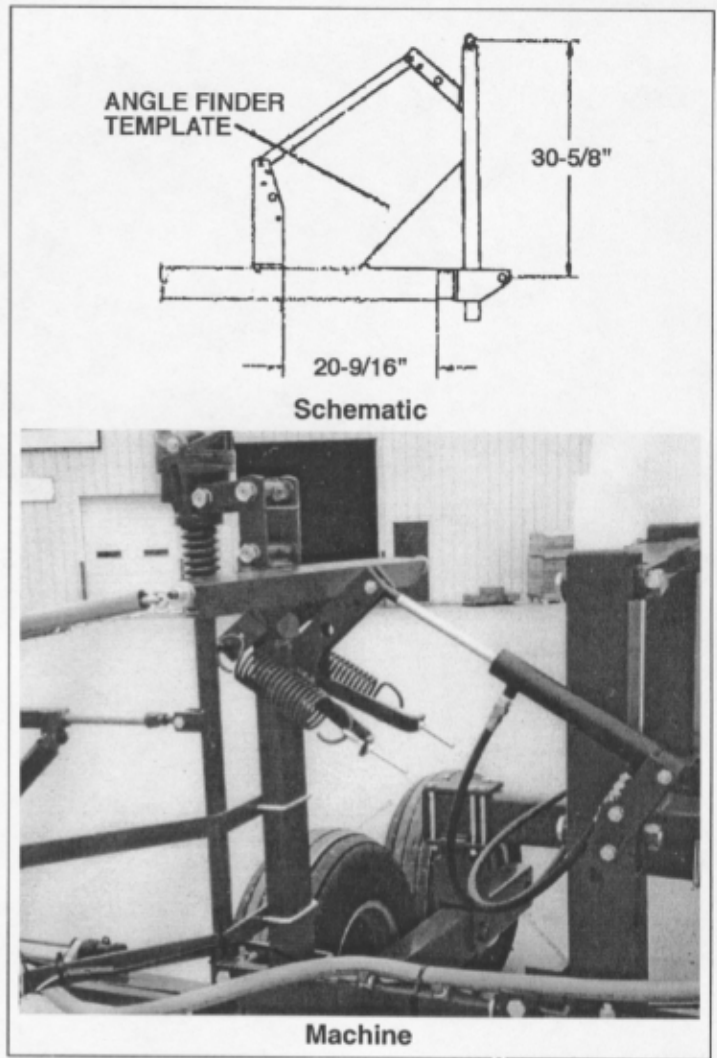


Fig. 17 CYLINDERS

8. Position the lower lift bracket so the boom upright is angled slightly inward at the top.
9. Use the angle finder template provided with the set-up kit, to set the angle between the center tube and the boom upright.
10. Tilt the boom upright inward until it matches the angle finder template.
11. Tighten the U-bolts on the lower lift bracket to secure the assembly into position.

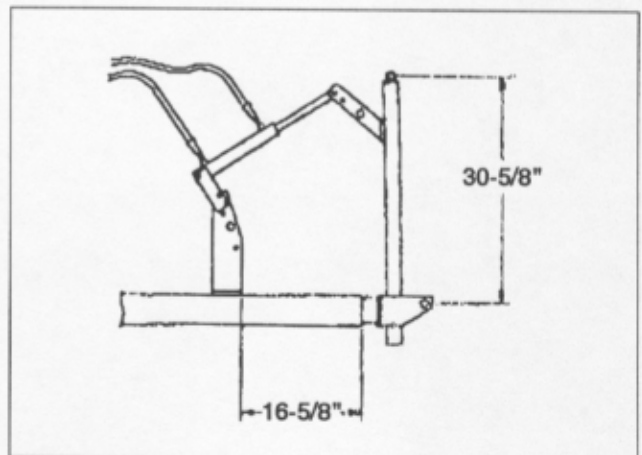


Fig. 18 POSITION

## 4.9.2 BOOM RIGGING ASSEMBLY

1. Lubricate all boom fittings and joints. Be sure all joints move freely before starting to attach the rigging.
2. Check that the boom post is properly set (refer to section 4.9.1).
3. Place stands under the main boom and outrigger to support the frame components.
4. Attach the chain assemblies from the rocking chair mechanism to the boom outrigger.
  - a. Set the stands so the main boom is level or slightly down to establish the initial chain length.
  - b. Loosen turnbuckles in the chain so no threads are showing in the turnbuckle body.
  - c. Connect the chain so it holds the boom in its resting position.
5. Use the adjustment nut on the upper main boom to set the boom outrigger so it is parallel to the first section of the main boom.
6. Adjust the equalizer so there is approximately 1/8 inch gap between the rocking chair and the post.
7. Check the boom flotation.
  - a. Remove the stands from under the main boom and outrigger.
  - b. Push down at the main-to-outrigger hinge joint. The boom should float back to its level position.
  - c. Tighten the equalizer spring as required until the boom floats back up to its level position.
8. Adjust the front turnbuckle so the main boom and outrigger are perpendicular to the main frame or 6 inches forward.

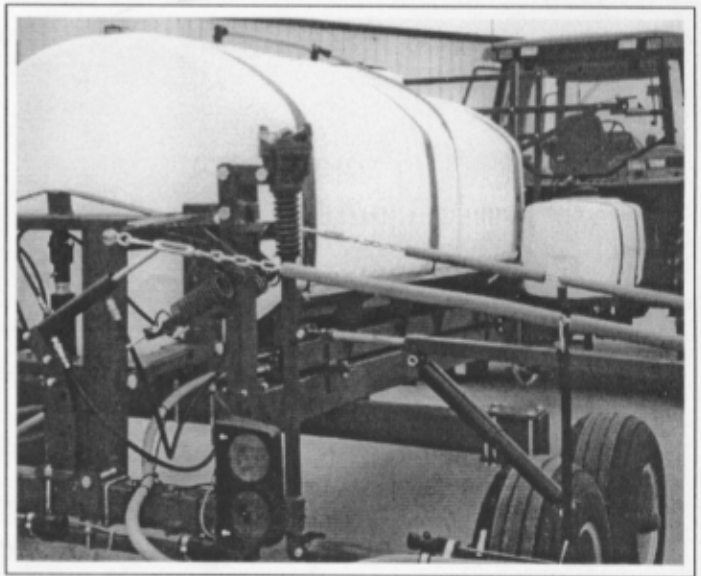


Fig. 19 BOOMS

9. Use the back turnbuckle to adjust the levelness of the boom/outrigger frame. The boom/outrigger frame should be level to 3 inches above the level of the main frame.

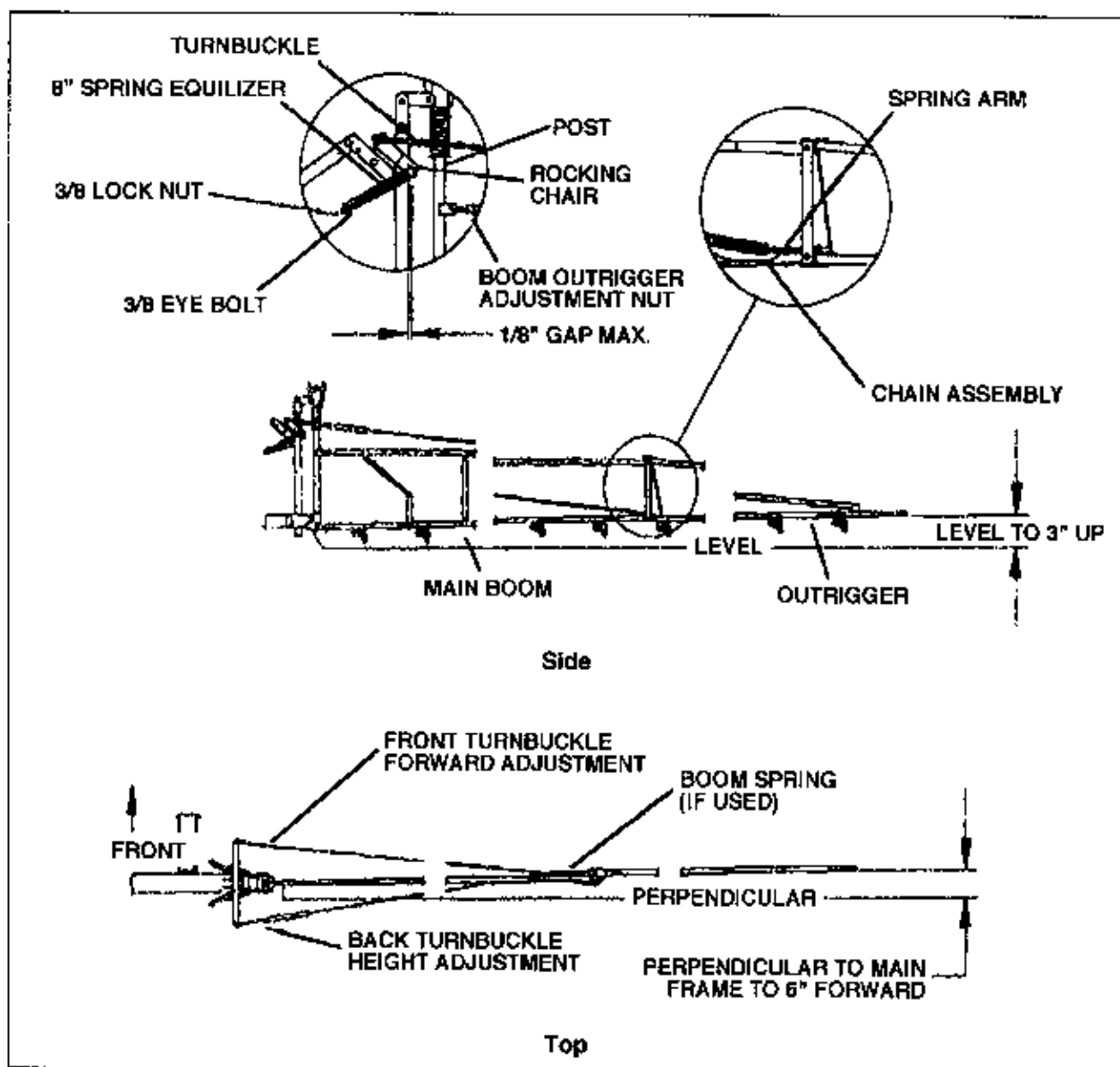


Fig. 20 BOOM VIEWS

### 4.9.3 BOOM HYDRAULIC ASSEMBLY

1. Review the hydraulic schematic on this page and the components in the parts book before assembling.
2. Route the hoses between the steel lines and the cylinders.
3. Connect hoses and tighten to their specified torque.
4. Secure hoses with the plastic ties. Be sure to provide slack for lifting and folding boom.
5. Cycle all hydraulic functions fully on the sprayer to remove all air from the system.

#### NOTE

Neither the system nor the lines are charged with oil at the factory. Be sure to check the oil level in the tractor reservoirs after cycling/bleeding the system and refill as required.

6. Check all fittings for leaks. Tighten all leaking fittings.
7. Tie up all hoses to prevent pinching or rubbing.

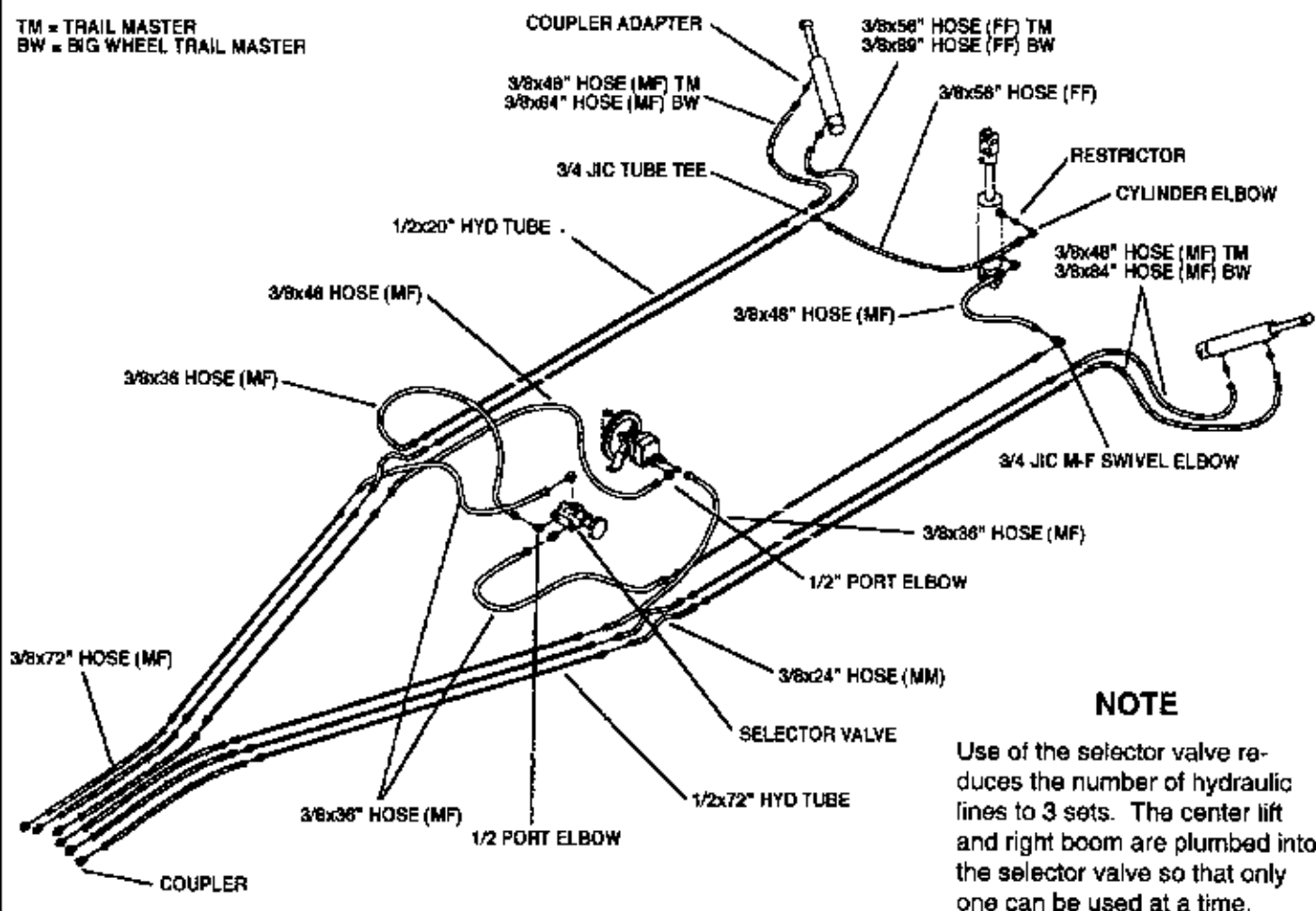


Fig. 21 HYDRAULIC SYSTEM



## 4.10 ATTACHING/UNHOOKING TRACTOR

Follow this procedure when attaching the sprayer 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 sprayer.
3. Use the jack on the frame to raise the frame to align the hitch with the tractor drawbar.
4. Slowly back the tractor until the holes on the hitch and drawbar are aligned.
5. Install the drawbar pin and the retainer. Be sure to use the proper insert in the sprayer hitch to provide sufficient clearance for the drawbar pin.
6. Attach the safety chain securely around the tractor drawbar cage to prevent unexpected separation.
7. Raise the jack and mount in its transport position.
8. **Attaching the PTO Driveline (Optional):**
  - a. Check that the driveline telescopes easily and that the shield rotates freely.

### IMPORTANT

If the driveline does not telescope easily, pull it apart and clean the splines. Apply a light coat of grease to splines and re-insert ends.

**Be sure the yokes are phased and the splines mate properly.**

- b. Attach the driveline to the tractor by sliding the collar back to retract the locking pin and slide the yoke over the tractor shaft until the lock pin clicks into position. Be sure the yoke is locked in position.
- c. Attach the PTO driveline shield anchor chain to a stationary component.

### IMPORTANT

Refer to previous section and be sure the drawbar pin is located at the center of the shaft.

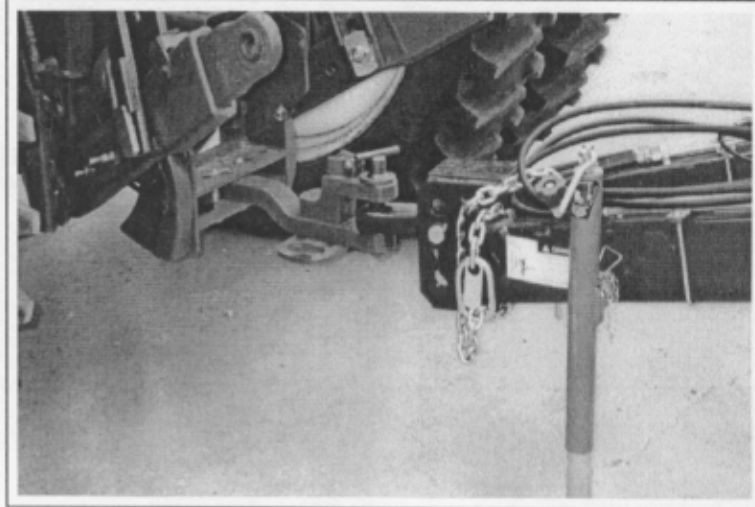


Fig. 22 DRAWBAR PIN

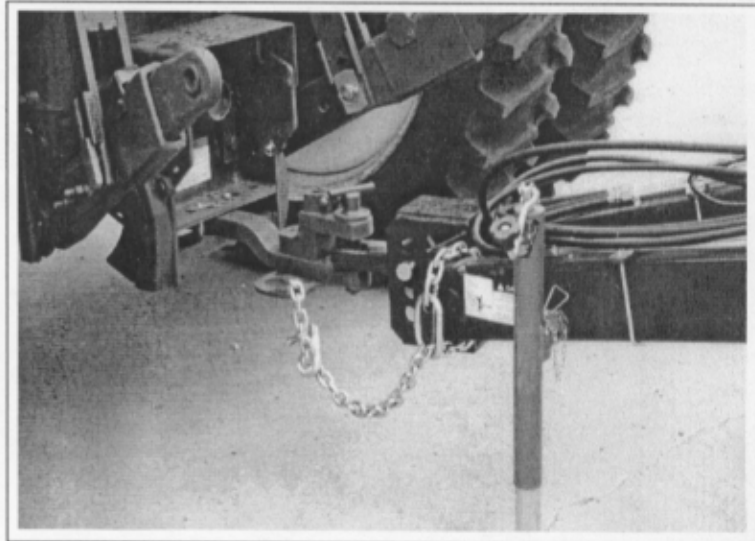


Fig. 23 SAFETY CHAIN / JACK

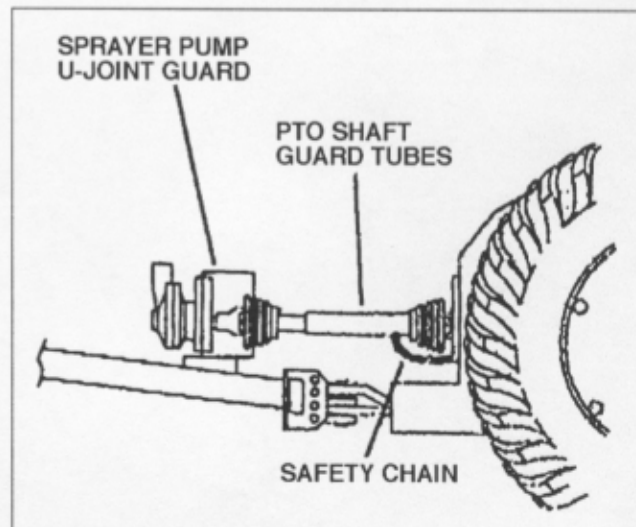


Fig. 24 PTO SHAFT

9. **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. Connect the hoses to the tractor couplers. Be sure the couplers are securely seated.
- c. Route and secure the hoses along the hitch with clips, tape or plastic ties to prevent binding and pinching. Be sure to provide slack for turning.

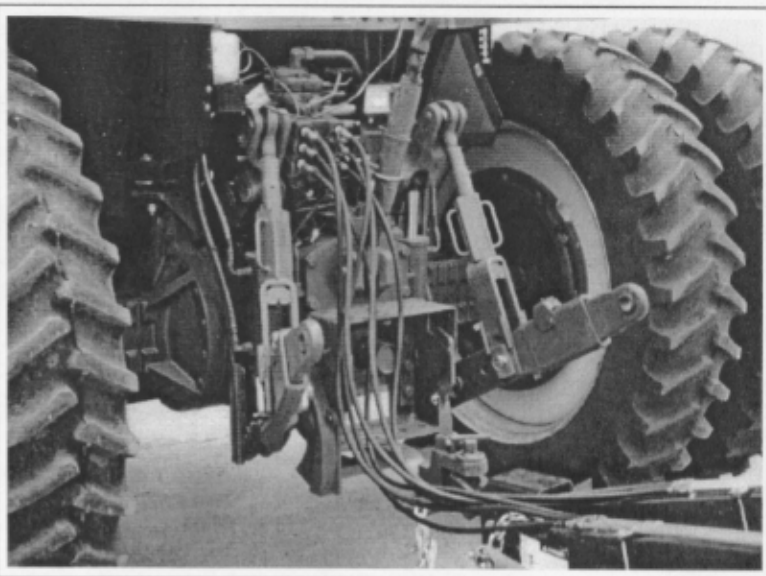


Fig. 25 HYDRAULIC LINES

**WARNING**



Use extreme care when working around a high-pressure hydraulic system. Make sure all connections are tight and all components are in good repair. Wear hand and eye protection when searching for suspected leaks.



Fig. 26 ELECTRICAL

10. Connect the wiring harnesses and liquid pressure line between tractor and the sprayer. Route the harness along the hitch to prevent snagging. Be sure to provide slack for turning.
11. Adjust the hitch clevis as required to position the frame as level as possible.
12. Reverse the above procedure when unhooking tractor. Be sure to place blocks under the jack if on soft ground.



Fig. 27 CLEVIS



## 4.11 SPRAYER CALIBRATION

A sprayer can only apply the proper amount of chemicals when each component in the system is functioning properly. Chemical action in the field is dependent upon the accurate application of minute amounts of the spray compound. A complete calibration of the machine is required at the start of each season or when changing chemicals during the spray season.

**It is the responsibility of the customer to determine the amount of chemical that they want to apply for their particular application. Many factors affect how much chemical is applied such as: nozzle flow rate, chemical circuit pressure and ground speed to name a few. In this section, instructions are given on how to accurately determine flow rates or application rates and how to change them. It is recommended that this procedure be followed carefully so you know exactly how much chemical is being applied.**

### 4.11.1 ENGINE RPM

Although the exact value of the engine speed is not particularly important to sprayer function on a hydraulically powered machine, it is recommended that it always be set at 2/3 or more throttle position. This will insure that there will be sufficient oil flow through the hydraulic system and sufficient power to maintain the ground speed.

Select the desired engine RPM and always perform the calibration and run in the field at the same setting.

## 4.11.2 NOZZLE CALIBRATION

Consult your dealer or the factory to determine the type of nozzles on your machine and their specific nominal flow rates. To determine or set the application rate, the flow rate of solution through the nozzles must be known. Operate the tractor at the same RPM and hydraulic setting as if running in the field. Start with the chemical circuit pressure at 15 psi. Increase or decrease pressure as required to obtain desired flow rate.

1. Remove all the nozzles from the sprayer.
2. Use clean water to wash each nozzle and clean the internal screen and check valve.
3. Reinstall nozzles on the booms.

### IMPORTANT

Never calibrate nozzles with active chemical in the tank. The solution can contaminate workers, the workplace and the environment.

4. Add clean water until the tank is 1/2 full.
5. Place a calibration cup under all the nozzles on each boom.

### NOTE

Calibration cups are available from most agricultural offices or weed supervisors.

6. Run the tractor at the RPM selected in Section 4.9.1. Operate the chemical circuit pump at the desired pressure and measure the time that it takes to spray a quart or liter through each nozzle.

Use Table 2 to determine flow rate for the nozzle.

### IMPORTANT

If the Controller cannot produce the required pressure in the chemical circuit, use the agitation valve to reset the system and try again.

**Table 2 Nozzle Flow Rates**

U.S. Gallons		Imperial Gallons		Metric	
Time Time/qt min:sec	Flow Rate fl. oz./min	Time Time/qt min:sec	Flow Rate fl. oz./min	Time Time/liter min:sec	Flow Rate m Liter/min
6:24	5.0	8:00	5.0	7:00	143
6:40	4.8	8:20	4.8	7:18	137
6:57	4.6	8:42	4.6	7:38	131
		8:53	4.5	7:45	129
7:07	4.5			7:56	126
7:16	4.4	9:05	4.4		
7:37	4.2	9:31	4.2	8:20	120
				8:46	114
8:00	4.0	10:00	4.0		
8:25	3.8	10:32	3.8	9:10	109
8:53	3.6			9:43	103
		11:07	3.6		
9:09	3.5	11:26	3.5	10:00	100
9:25	3.4	11:46	3.4	10:19	97
				10:59	91
10:00	3.2	12:30	3.2		
10:40	3.0			11:38	86
		13:20	3.0		
11:26	2.8			12:30	80
		14:17	2.8		
12:18	2.6			13:31	74
12:48	2.5	15:23	2.6		
				14:05	71
13:20	2.4	16:00	2.5		
		16:40	2.4	15:30	69
14:32	2.2			15:52	63
		18:11	2.2		
16:00	2.0			16:33	57
		20:00	2.0		

- Replace all nozzles giving more than 5% above the normal flow rate.
- Reclean all nozzle components from nozzles 5% below the flow rate and then recheck.

#### **NOTE**

Measuring the flow rate for each nozzle will insure a consistent and uniform spray pattern across the entire machine.

### 4.11.3 MACHINE YARD CALIBRATION

After the nozzles have been calibrated, it is recommended that the entire system be calibrated. A yard run is the simplest method to determine total volume delivered. To calibrate in the yard, follow this procedure:

1. Fill the tank full of water (no chemicals).
2. Check that the filter is clean.
3. Set the system and boom pressure to the desired value and run the tractor at the selected engine RPM.
4. Spray in a stationary position for a known period of time.
5. Refill the tank and measure accurately the amount of water used.
6. This will give the amount of spray used per time.

The total volume can be changed by increasing or decreasing the chemical system pressure. However if a change is made, it is recommended that the entire system be calibrated again to determine the new volumes.

### 4.11.4 GROUND SPEED CALIBRATION

For optimum spraying results, it is important to maintain a known constant speed to spray the required chemical over a given area. Because of wheel slippage, the operator cannot rely on the tractor speedometer reading to give the value of true ground speed. The unit must be timed over a known distance to determine true ground speed. To calibrate, follow this procedure:

1. Mark off distance of 100, 200 or 300 feet in the field to be sprayed (longer distances provide greater accuracy).
2. Place the tractor in the gear to give a speed between 6 and 8 mph (9.5 and 13 kph) and at the selected engine RPM.
3. With the tank 1/2 full of water, drive the tractor and sprayer through the measured distance.
4. Record the time required to travel the measured distance.
5. From Table 3 determine the actual tractor speed. You can shift gears to change speed but it is recommended that you go through the measured distances again to determine true ground speed.

#### IMPORTANT

Always operate at the engine RPM determined in Section 4.9.1.

**Table 3 Ground Speed Calibration**

Speed mph	Time In Seconds To Travel			Time To Travel 1/2 mile minutes:seconds
	100 ft.	200 ft.	300 ft.	
5.0	13.6	27.3	40.9	6:00
5.4	12.6	25.3	37.8	5:33
5.6	12.2	24.4	36.5	5:21
5.8	11.8	23.5	35.3	5:10
6.0	11.4	22.7	34.1	5:00
6.2	11.0	22.0	33.0	4:50
6.4	10.7	21.3	32.0	4:41
6.6	10.3	20.7	31.0	4:33
6.8	10.0	20.1	30.1	4:23
7.0	9.7	19.5	29.2	4:17
7.2	9.5	18.9	28.4	4:10
7.4	9.2	18.4	27.6	4:03
7.6	9.0	17.9	26.9	3:57
7.8	8.8	17.5	26.3	3:52
8.0	8.5	17.0	25.6	3:45
8.2	8.3	16.6	24.9	3:40
8.4	8.1	16.2	24.4	3:34
8.6	7.9	15.8	23.7	3:29
8.8	7.7	15.5	23.2	3:25
9.0	7.6	15.2	22.7	3:20
9.2	7.4	14.8	22.2	3:16
9.4	7.3	14.5	21.8	3:11
9.6	7.1	14.2	21.3	3:08
10.0	6.8	13.6	20.5	3:00

Speed km/h	Time In Seconds To Travel			Time To Travel 1 kilometer minutes:seconds
	30.5 m	61.0 m	91.4 m	
7.0	15.9	31.7	47.6	8:44
7.5	14.8	29.5	43.2	8:08
8.0	13.6	27.3	40.9	7:30
8.5	12.9	25.9	38.7	7:05
9.0	12.2	24.4	36.5	6:41
9.5	11.6	23.2	34.7	6:21
10.0	11.0	22.0	33.0	6:02
10.5	10.5	21.0	31.5	5:46
11.0	10.0	20.1	30.1	5:29
11.5	9.6	19.2	29.2	5:21
12.0	9.1	18.2	27.3	5:00
12.5	8.7	17.5	26.3	4:49
13.0	8.4	16.8	25.3	4:38
13.5	8.1	16.2	24.4	4:27
14.0	7.8	15.7	23.5	4:19
14.5	7.6	15.2	22.7	4:10
15.0	7.3	14.7	22.0	4:02
15.5	7.1	14.0	21.3	3:55
16.0	6.9	13.8	20.7	3:47

#### 4.11.5 AREA COVERED

To determine application rates, it is necessary to know the area covered by the sprayer during one pass. Table 4 gives the area for the three widths:

**Table 4 Actual Sprayer Coverage**

Sprayer Width	Acres		Hectares	
	1/2 mile	1/4 mile	1/2 km	1/4 km
60'	3.84	1.82	1.45	0.73
72'	4.36	2.18	1.75	0.87
80'	4.85	2.42	1.94	0.97

#### 4.11.6 APPLICATION RATES

From previous work and data, the operator can select an application rate based on the area covered from Table 4 and a ground speed from Table 3. The yard calibration will tell the how much water is applied per unit of time. A sample calculation would be:

$$\text{gal/acre} = \frac{\text{water used (gal/min)} \times \text{time to travel field (min)}}{\text{acres per pass (acres/pass)}}$$

Selecting 1/2 mile field  
80 ft. sprayer  
16 gallons sprayer/min  
12 mph (2.5 minutes)

$$\text{gal/acre} = \frac{16 \text{ gal/min} \times 2.5 \text{ minutes}}{4.85 \text{ acres per pass}} = 8.25 \text{ gal/acre}$$

The operator can adjust the rate of spray delivery by raising or lowering the system pressure. The spray time can be changed by increasing or decreasing the ground speed.

#### 4.11.7 FIELD CALIBRATION

To verify the application rates in the field, follow this procedure:

1. Fill the tank to the neck with water and mark the level of water.
2. Check that all screens are clean.
3. Set the chemical system pressure to the desired value and run the tractor at the selected engine RPM in the selected gear.
4. Drive through the measured distance while spraying.
5. Refill the tank to the same mark and measure the amount required.
6. Divide the amount of liquid sprayed by the area covered to determine the application rate.

$$\text{Appl. Rate} = \frac{\text{Volume sprayed}}{\text{Area covered}} = \frac{\text{gals (liters)}}{\text{acre (hectare)}}$$

**Table 5 Conversions**

1 km	0.62 mile
1 ha	2.5 acres
1 g	0.035 oz.
1 kg	2.2 lbs.
1 g/ha	0.014 oz/acre
1 kg/ha	0.88 lb/acre
1 ml	0.035 fl. oz.
1 L	0.264 gal (US)
1 L	0.22 gal (Imp.)
1 L/s	15.85 gpm (US)
1 L/s	13.20 gpm (Imp.)
1 kPa	0.145 psi
1 mm	0.04 in.
1 m	3.28 ft.
1 L/ha	0.106 gal (US)/acre
1 L/ha	0.088 gal (Imp.)/acre



# OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before using.
2. Place all controls in neutral or OFF, stop tractor engine, turn monitor off, set park brake, remove ignition key, wait for nozzles to stop spraying before servicing, adjusting, repairing or unplugging.
3. Before spraying a field, be familiar with all potential hazards: trees, rocks, ditches, gullies, etc. Plan the spraying route to avoid hazards.
4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
5. Do not allow riders on the sprayer or tractor during operation or transporting.
6. Clear the area of all bystanders, especially children, before starting or filling with water or chemical.
7. Stay away from boom pinch points when folding or extending wings. Keep others away.
8. Stay away from power lines when extending or folding outer wings. Electrocution can occur without direct contact.
9. Read chemical manufacturers' warnings, instructions and procedures before starting and follow them exactly.
10. Do not breathe, touch or ingest chemicals. Always wear protective clothing, goggles and a respirator. Follow safe handling procedures.
11. Spray only when potential for chemical drift is at a minimum. Even small amounts can affect neighboring crops or sensitive plants and people.
12. Dispose of chemical containers by triple rinsing them into the sprayer tank, crushing and delivering to regional disposal site.
13. In case of poisoning, get immediate medical attention.
14. Only rinse sprayer while still in the field. Spray the rinse thinly over the crop already sprayed. Never contaminate the farmyard or drainage systems with sprayer rinse.
15. Do not eat in the field when spraying.
16. Before applying pressure to the hydraulic system, make sure all components are tight and that steel lines, hoses and couplings are in good condition.
17. Before applying pressure to chemical system make sure that all connections are tight and that all hoses and fittings are in good condition.
18. Review safety instructions annually.

Follow this procedure when using the sprayer:

1. Attach sprayer to the machine (see Section 4.8).
2. Review and follow the pre-operation checklist (see Section 4.4).
3. Review the location and function of all controls (see Section 4.6).
4. Read and follow chemical manufacturers' instructions.
5. Calibrate the sprayer so you know exactly how much chemical is being applied. The application of excess chemicals, even in small amounts, can have detrimental affects. Recalibration at the start of the season or when changing chemicals is a must.
6. Transport the sprayer to the working area (See Section 4.11).
7. Convert into field configuration.



8. After arriving at the field, fill the tank on the sprayer.
9. Extend the hose from the supply vehicle or pump to the sprayer. Water can be added through the top lid or bottom fill fitting.

### IMPORTANT

It is recommended that the water supply system be equipped with a pump for transferring water.

#### 10. Filling with Water:

- a. Place the water hose into the top lid or attach to the bottom fitting, turn the tank valve to required setting (refer to Section 4.6 Controls), start the pump on the supply vehicle and run until the tank is full. Stop the pump, remove hose and close the lid or secure plug to bottom fitting.

### IMPORTANT

Be sure the water is clean. Clean water is necessary to prevent nozzle plugging.

- b. Add the liquid chemical through the top lid while the tank is filling with water. Be sure to triple rinse the container when empty.
- c. Turn pump intake valve to "Main Tank".
- d. Do not run pump until the tank is 1/4 full of water. Water is required in the pump to cool the seals. A head of water is required to keep the pump primed. Be sure the booms are turned off.
- e. Circulate for at least 5 minutes to thoroughly mix the solution before starting.

### IMPORTANT

If pump is not primed, stop immediately and bleed the air out of the pump using the upper bleed valve.



a. Top Fill

b. Bottom Fill

Fig. 28 FILLING

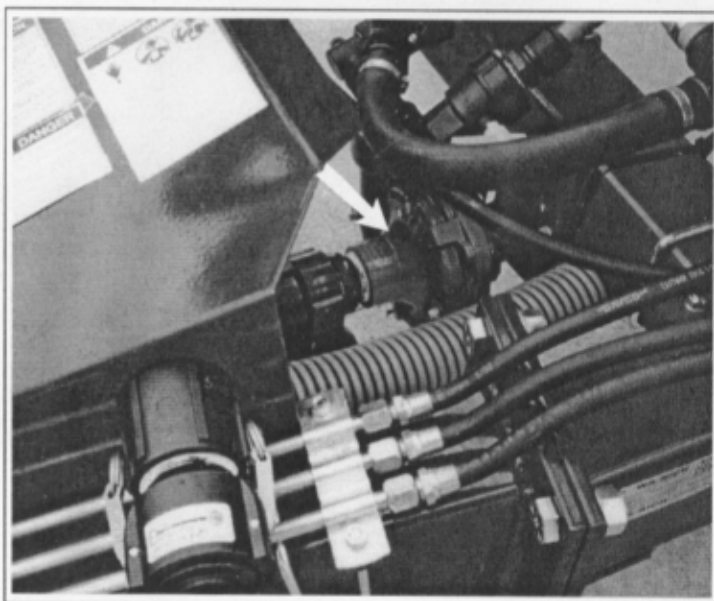


Fig. 29 BLEED VALVE



## DANGER

1. Wear rubber gloves, eye protection and protective clothing whenever handling chemicals.
2. Do not breathe vapor or ingest chemicals and avoid contact with exposed skin.
3. Follow chemical manufacturers' instructions.

#### 11. Adding Chemicals To Tank:

- a. Open the lid on the tank.

#### IMPORTANT

Refer to and follow the mixing instructions supplied by the chemical manufacturer. Some powdered chemicals should be pre-mixed in a mixing tank before adding to the main tank to prevent clumping and component plugging. Always run the pump to provide sufficient agitation to the tank.

- b. Pour the chemical into the tank.



Fig. 30 MAIN TANK



#### DANGER

1. Wear rubber gloves, eye protection and protective clothing whenever handling chemicals.
2. Do not breathe vapor or ingest chemicals and avoid contact with exposed skin.
3. Follow chemical manufacturers' instructions.

- c. Rinse to remove all chemical residue from the container.
- d. Repeat with the next container until all the chemical has been added.
- e. Discard used containers at your nearest container disposal site.



#### WARNING

1. Do not burn chemical containers as toxic fumes could contaminate the area.
  2. Do not discard chemical containers in ditches.
  3. Do not place containers in landfills.
  4. Dispose at nearest container disposal site.
- f. Run the pump until the chemical is completely mixed and in suspension.
  - g. Agitate main tank for a few minutes to be sure the chemical is completely mixed.
  - h. Move the supply vehicle out of the way.

12. Fill the auxiliary tanks as required.
  - a. Flush.
  - b. Wash.
13. Although well water is recommended, surface water can be used if it is thoroughly filtered. Be sure to keep the filter clean when using this method.
14. If foaming occurs, add an anti-foaming additive to the tank.

**15. Starting Machine:**

- a. Be sure everyone is clear of the machine.
- b. Start the tractor engine and run at low idle.
- c. Turn all booms OFF.
- d. Turn the chemical circuit control box ON.
- e. Place the hydraulic lever in detent that powers the chemical circuit pump.
- f. Slowly increase engine speed to the selected RPM.

**16. Stopping Machine:**

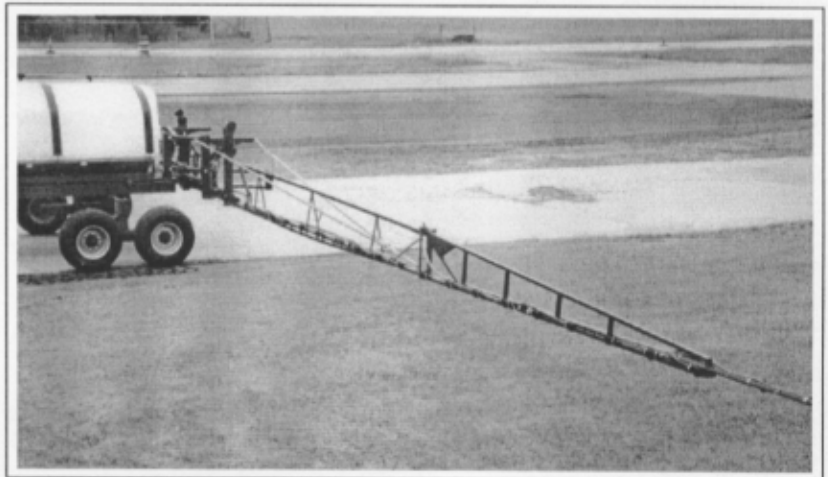
- a. Turn all booms OFF.
- b. Decrease engine speed to low idle.
- d. Place hydraulic lever for pump in neutral.
- e. Stop engine.

**17. Emergency Stopping:**

In the event of an emergency, slow engine speed, stop forward motion and place hydraulic lever in neutral to stop the machine.



**Fig. 31 AUXILIARY TANKS**



**Fig. 32 STARTING/STOPPING**

18. If using wettable powders, remove the top tank lid and slowly add the powder. Be sure the tank is at least 1/2 full of water and the pump is running.

If the powder is not added slowly, clumps of powder will be drawn into the suction line and plug the screen in the filter.

### IMPORTANT

It is recommended that the wettable powder be pre-mixed in hot water before adding to the sprayer. This prevents clumps from plugging the filters. Triple rinse the mixing container when it is empty.

19. **Unplugging:**

Some chemicals (usually the powered type) require extensive agitation to keep them in suspension in the tank and in the chemical lines/nozzles. The chemicals can settle out and plug the lines and nozzles if it sits too long without being flushed out.

Watch the spray pattern from each nozzle when operating. Any nozzle without a spray pattern may be plugged. If a nozzle needs unplugging, disassemble the components and wash with clear water.

Always run the pump to provide sufficient agitation.

20. **Boom Height:**

The boom is adjustable from 20.0 to 44 inches (500 to 1100 mm). Set the height so the spray pattern from the nozzles overlap a couple of inches above the crop canopy or plants.

21. **Travel Speed:**

Crop and plant type will determine the travel speed for spraying.

a. **Cereal Crops - Broadcast Planting:**

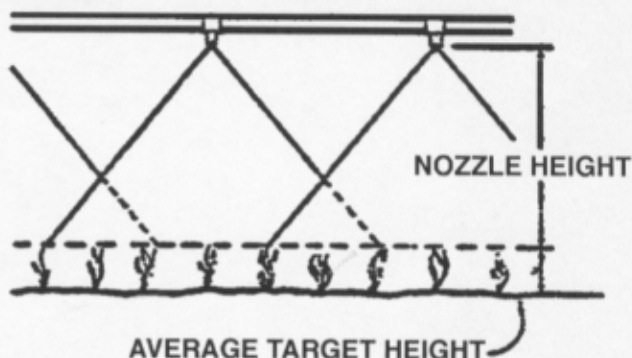
A travel speed of 6 to 12 mph (9.7 to 19 km/hr) is recommended for most operating conditions. However operate at a speed that is appropriate for the conditions.

b. **Row Crops:**

A travel speed of 5 to 10 mph (8.1 to 16 km/hr) is recommended in row crops. For crops that have a dense foliage canopy, a slower speed gives more time for the spray to open the plant canopy and allow the chemical to get inside and coat the underside of the leaves. However operate at a speed that is appropriate for the conditions.



SPRAYER



DIAGRAM

Fig. 33 NOZZLE HEIGHT



**22. For broadcast spraying:**

It is recommended that the operator make one pass around a field to start and then spray back and forth to obtain the best results. Using a marker system helps to prevent skips or overlap.

If your field has headlands, be sure to allow sufficient space for turning.

**23.** For row crop spraying, start at one edge of the field and go back and forth until the field is completed.

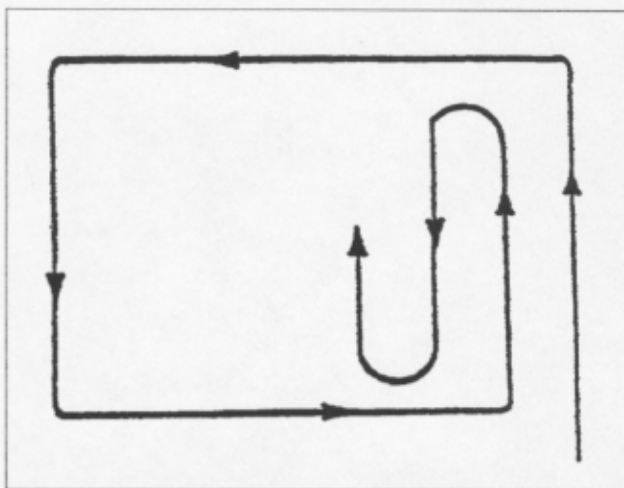
**24.** Be sure the sprayer is calibrated, the boom height and pressure are known and the tractor gear and RPM are determined before starting to spray (see Section 4.9).

**25.** Proceed down the field at a constant speed. Use the selected gear, engine RPM and ground speed determined during the calibration of the machine application rate.

**26.** Place the Master Boom switch in the OFF position and the appropriate Boom switches in the ON position.

**27.** Turn the booms ON with the Boom Master switch as the nozzles pass over the edge of the already sprayed headland and come to the area to be sprayed. Use the individual boom switches as appropriate when finishing a field.

**28.** When completing a pass and approaching the sprayed headland, maintain the tractor RPM and ground speed until the nozzles have covered all the plants. This will insure a consistent application rate at the ends of the field.



**Fig. 34 TRAVEL PATTERN (BROADCAST)**



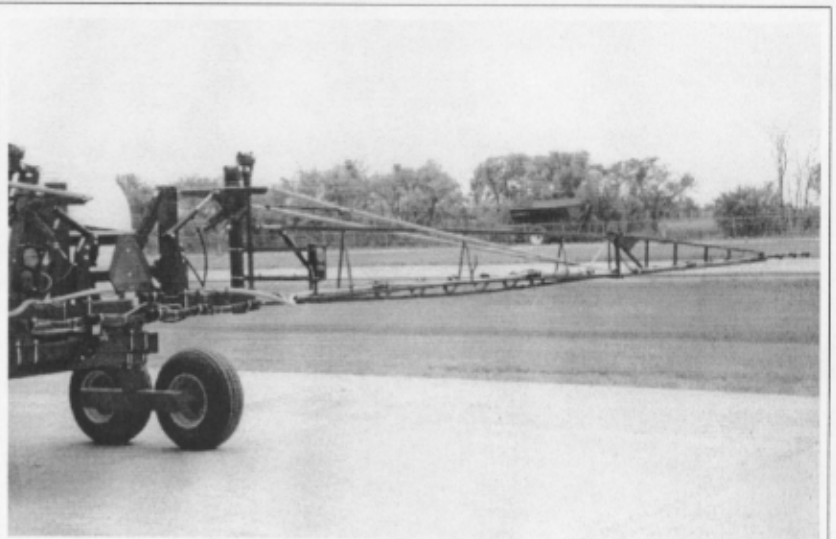
**Fig. 35 CONTROL BOX**



**Fig. 36 SPRAYING (SIMULATED)**

29. **Boom Tilt:**

Each side of the boom is equipped with a tilt cylinder that allows the operator to tilt the individual boom up at the ends of the field or whenever required to clear obstacles.



Level



Tilted

Fig. 37 BOOM TILT

30. **Boom Break-Away:**

Each boom is designed with a spring-loaded break-away hinge between the outer and inner booms. Each of these hinges will break-away when the boom strikes an obstruction to prevent damaging the boom. Be sure that the outer boom swings freely away from the hinge.

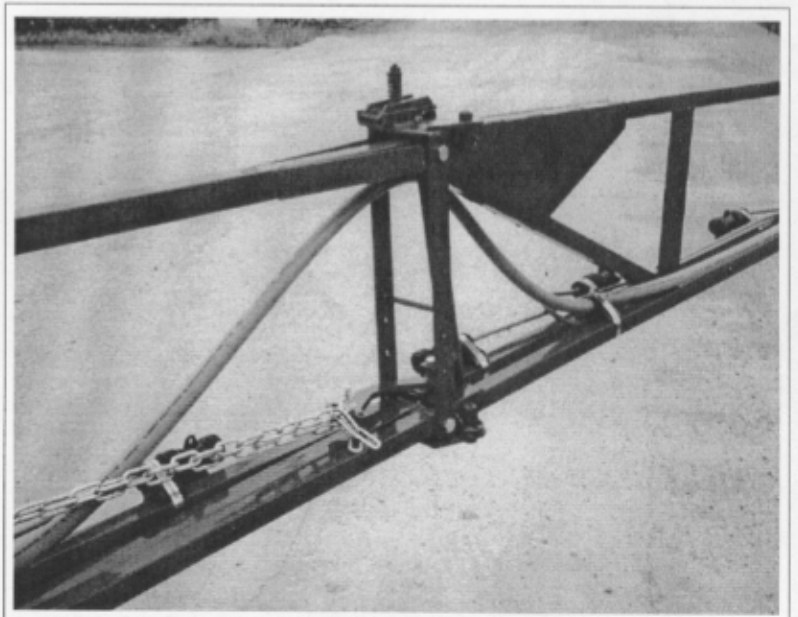
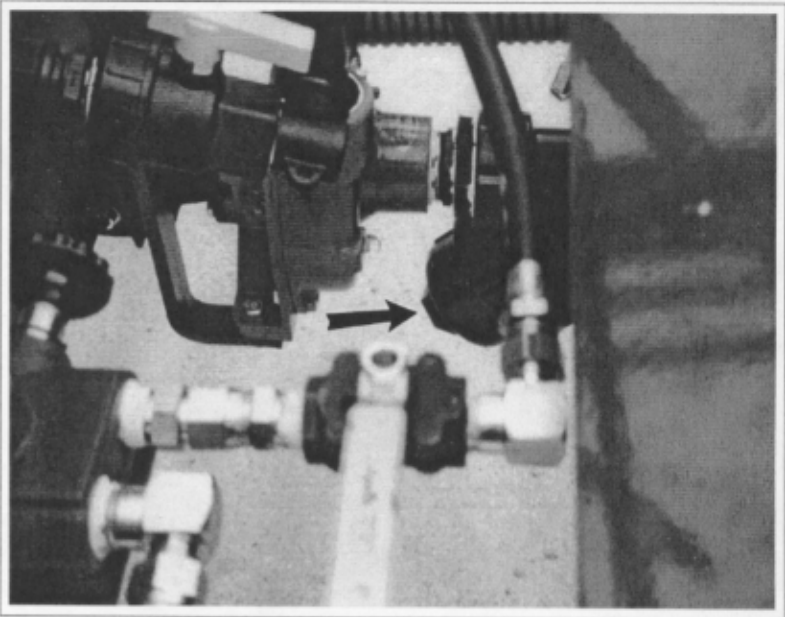


Fig. 38 BOOM BREAK-AWAY



**31. Filter Screen:**

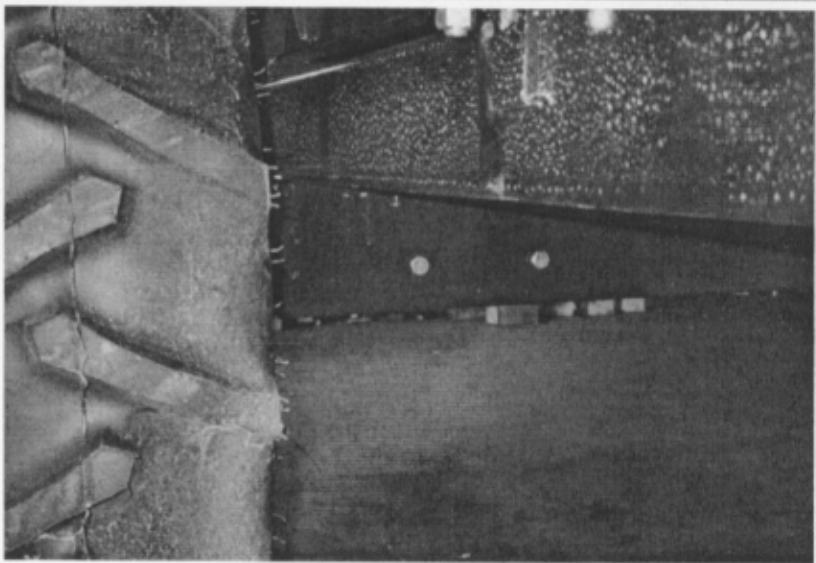
The chemical circuit is designed with a screen in the suction line to remove contaminants. Check daily and wash with clean water.



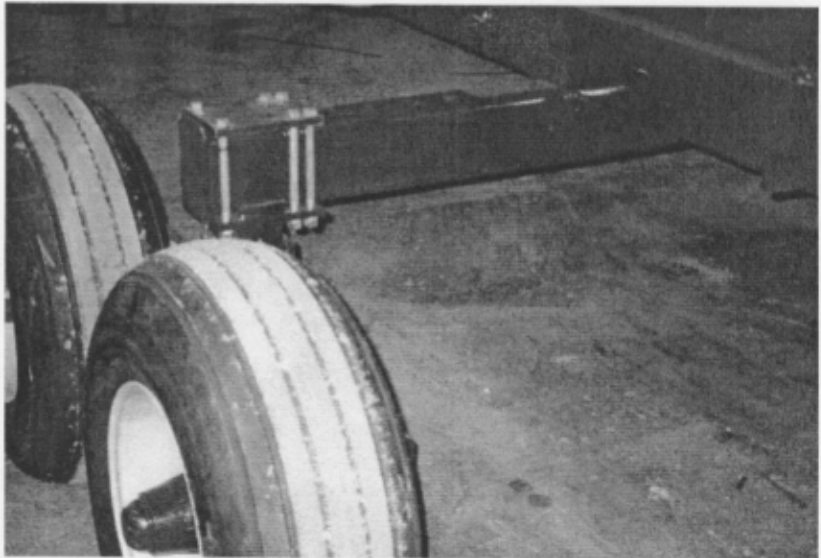
**Fig. 39 SUCTION SCREEN**

**32. Wheel Spacing:**

The machine is equipped with telescoping axles with flotation tires or moveable anchor pads with tandem axles.



**Telescoping Axle (In)**

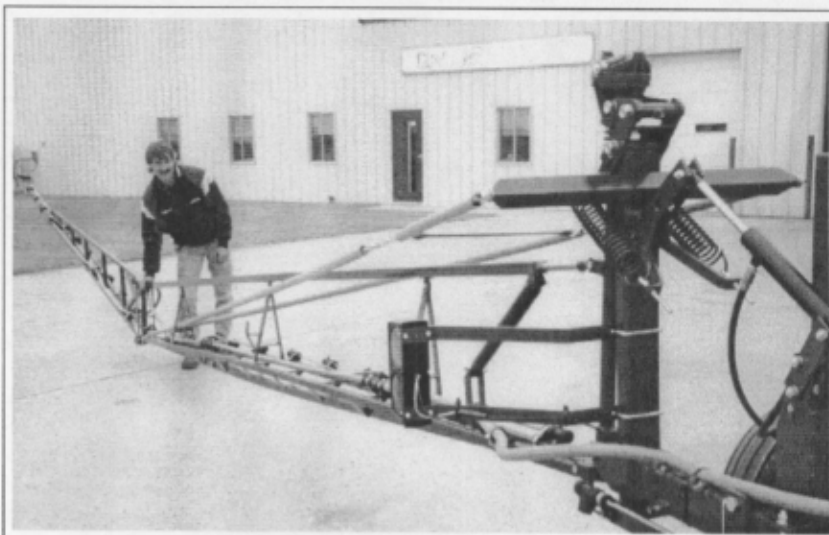


**Moveable Anchor Pads (Out)**

**Fig. 40 ADJUSTABLE AXLE**

**33. Boom Knee Action:**

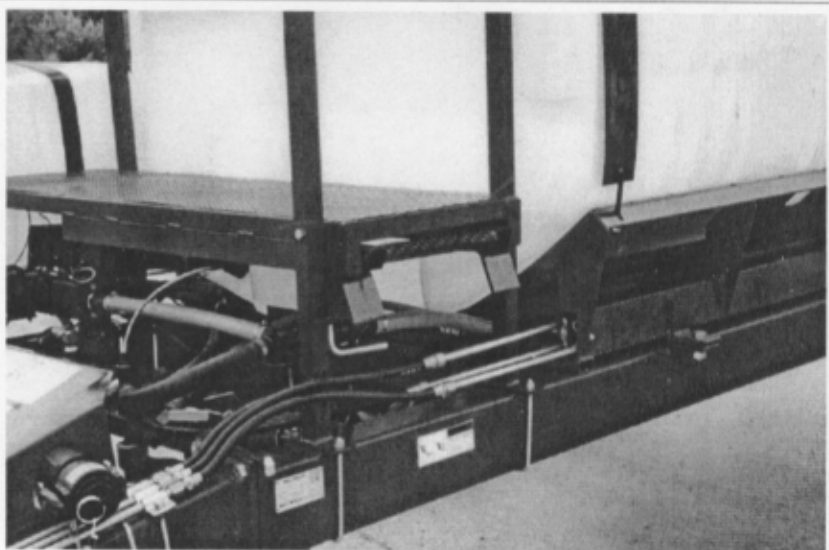
Each boom is designed with the ability to flex in the middle to help prevent the boom tip from contacting the ground as the boom moves on its suspension. Push down at the outer boom hinge to flex the frame. Refer to section 4.9.2 Boom Rigging Assembly for adjustment procedure.



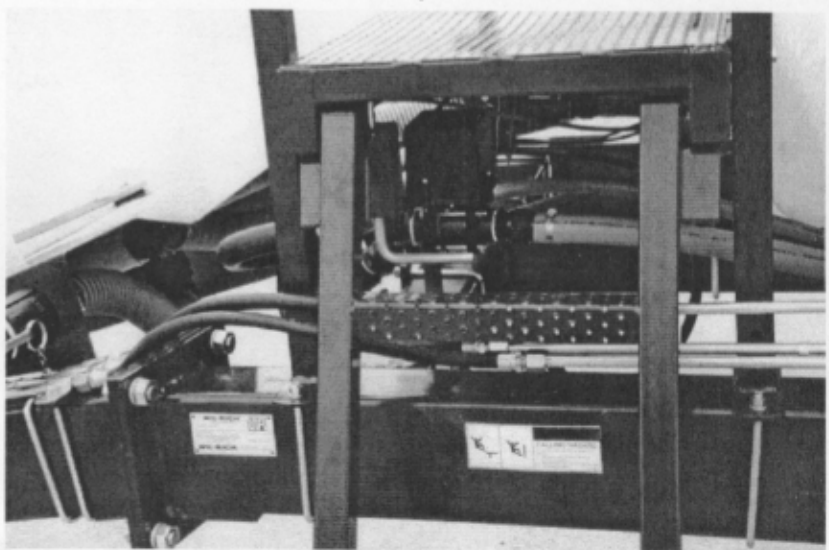
**Fig. 41 KNEE FLEX ACTION**

**34. Ladder:**

The frame is designed with a platform that extends across the front with an access ladder on the left side. The ladder can be raised or lowered as required for filling the tank or operating in the field. Pull the latch down to release the ladder and pull out to place in the access position. Be sure the ladder is anchored securely with the latch. Position the ladder in the up position whenever the sprayer will be moved.



**Up**



**Down**

**Fig. 42 PLATFORM LADDER**

### 35. Pesticide Hazards:

Extreme care must be taken when working around chemicals. Be familiar with the toxicity levels of the chemicals you are using and recommended protective gear that each operator should use before starting.

#### A. Toxicity Levels:

Every pesticide container has a label on it that designates its level of toxicity. This toxicity level then requires the operator to use specific protective gear whenever working with this chemical.

Toxicity Level	Protective Gear
DANGER POISON	Goggles, Respirator, Gloves and Skin Protection. Avoid Fumes.
WARNING POISON	Goggles, Gloves and Skin Protection. Avoid Fumes.
CAUTION POISON	Gloves and Skin Protection. Avoid Fumes.



High - DANGER



Medium - WARNING



Low - CAUTION

Fig. 43 TOXICITY LEVELS

**B. Personal Protection:**

To reduce or eliminate contact with herbicides, it is necessary to wear adequate protective clothing, respirators, boots, goggles and gloves. The use of this equipment is essential for good health especially when applying some of the more toxic herbicides.

- a. **Respirators** - Protection against inhalation (but no skin contact) is provided quite economically by the use of face mask respirators. Choose a mask that will fit your face and check with the company about the details of filters and chemical cartridges used in the respirator model. Note that full and half face masks cannot be worn securely by men with beards, whiskers, sideburns and moustaches. Instructions on the operational life and performance of filters and cartridges generally accompany the products. However, when carrying out spray operations, it is wise to change the filters each day and the cartridges should be replaced when chemical odour is noticed. Wash the face mask with warm water and soap before installing a new cartridge and filter. Do not store cartridge and filters in the chemical storage area, as they can absorb the chemical even when not in use.
- b. **Goggles** - When a full mask is not worn, the use of protective goggles is necessary and is recommended to protect the eyes from pesticide vapour, solids, and accidental splashes particularly. Safety supply companies offer a range of goggles. Many goggles are resistant to chemicals, some have specially treated lenses to reduce fogging, others have anti-fogging ventilation. Prescription type glasses are also available to which side shields can be attached.

- c. **Gloves** - Non-absorbent gloves should be worn at all times when handling, mixing and applying pesticides. Neoprene has been found to be superior to rubber in resisting the penetration of pesticides. Other factors to be considered in selecting suitable gloves include sense of touch, wet grip, and cut and abrasion resistance. Gloves should not have fabric wristbands or lining and should fit properly. Always wash the glove inside and out after use. Leather gloves are not suitable.
- d. **Footwear** - Non-absorbent footwear should be worn when applying pesticides. It is suggested that the most suitable boot is one that is knee length, acid and solvent resistant and ribbed to prevent slippage. Neoprene is considered much superior to rubber. Leather boots are not suitable.
- e. **Clothing** - For general protection coveralls should be worn, along with gloves and a hat to minimize the hazard of the skin absorbing pesticides. Clothing should be changed and washed regularly following spraying. You can now purchase disposable clothing that provides protection against exposure resulting from pesticide drift, splashing or spills. These garments (overalls, shirts and pants, head cover, and aprons) are light weight and cooler than rubber articles. Protective equipment and clothing are available from safety supply companies. Never use leather garments e.g. jackets, gloves, or shoes during the handling or applications of pesticides. Leather can absorb the chemical and it is very difficult to decontaminate leather articles.

### 36. Chemical Application:

- a. **Dilution:** Pest control is dependent upon the application of minute amounts of a toxic substance. This process starts with the proper mixing of the toxic material with water. It is very important that the operator read the mixing and dilution instructions on the chemical container before starting. Combine the chemical and water in the proportions recommended on the container only. Improper mixing can damage the crops or not affect the pests.
- b. **Wettable Powders:** It is recommended that wettable powders be pre-mixed in the mixing tank before drawing into the main tank or added very slowly through the top cover. Be sure to allow at least 5 minutes of circulation and agitation before starting to spray. Any clumps or sludge can clog the suction screen or nozzles. Unless you stop and clean the machine, skipping and poor coverage will occur.

37. Mix only the quantity of spray required for the job. Excess chemicals are difficult to store and dispose of. Do not dispose of them in the farmyard or your drainage system. They will contaminate these areas.
38. Store chemicals only in their original containers under lock and key to prevent children or animals from touching them.
39. Be very careful to wear the proper protective gear such as rubber gloves and goggles to protect yourself. Thoroughly wash all protective gear with a good detergent after use to remove all chemicals.
40. Never allow chemicals or solutions to touch the skin. Some can be absorbed through the skin. Should such a contact occur, flush the affected area immediately with clear water. Wash the area thoroughly with detergent to remove any residue.

41. When spraying is done, the machine should always be rinsed. Follow this procedure:

- a. Add 25 to 50 gallons of water to the tank.
- b. Run the pump to agitate for 5 minutes to circulate and rinse the inside of the tank.
- c. Spray the rinse thinly over the previously sprayed crop.



Fig. 44 FIELD CONFIGURATION



## WARNING

Do not dispose of it in the farmyard or in drainage ditches.

36. When spraying is finished for the season or when switching chemicals, wash the sprayer using the method described in the Maintenance Section.



## 4.13 FIELD/TRANSPORT/FIELD CONVERSION

The sprayer is designed to convert easily from field to transport or transport to field.

When converting from field to transport configuration, follow this procedure:

1. Clear the area of bystanders, especially children, before starting.
2. Place all controls in neutral, stop engine, set park brake and remove ignition key before dismounting.
3. Be sure there is sufficient space to swing the booms into their new position.
4. Move anti-swing clutch handle to its horizontal unlocked position.
5. Remove lock pin from spring-loaded boom clamp.
6. Pull boom clamp down to release boom and slide boom off support bracket.

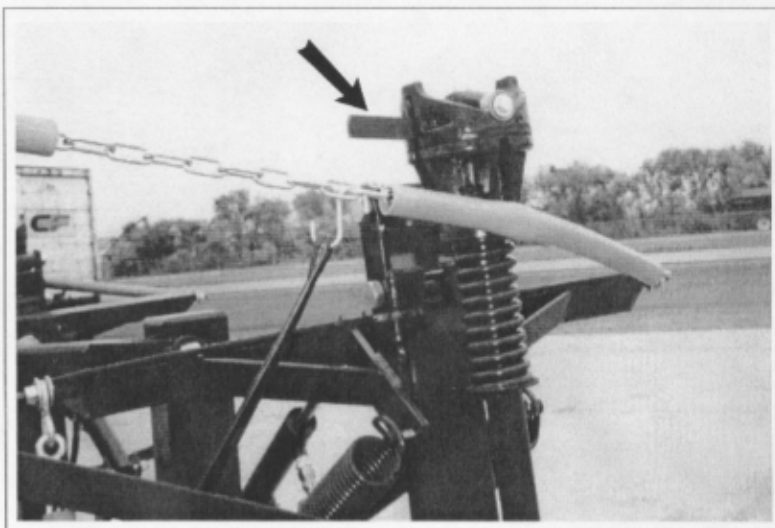


Fig. 45 CLUTCH HANDLE

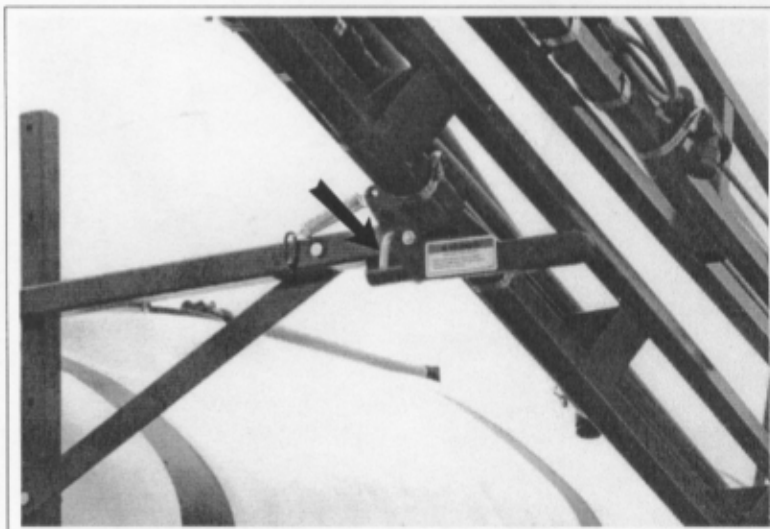


Fig. 46 LOCK PIN

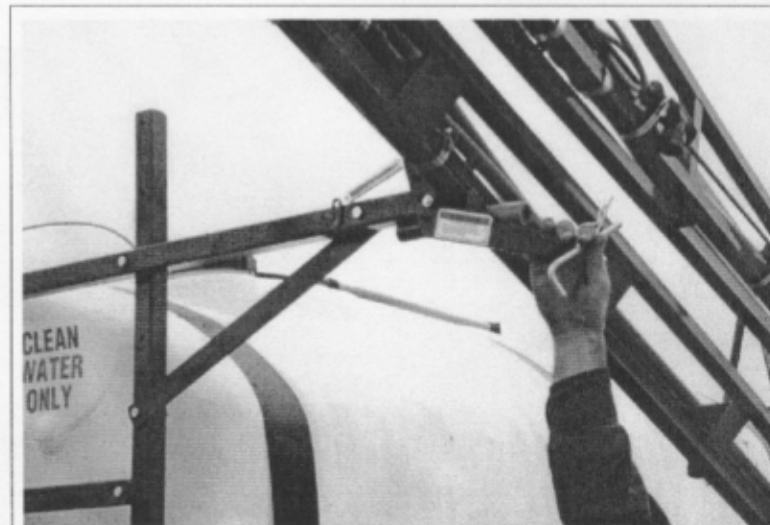
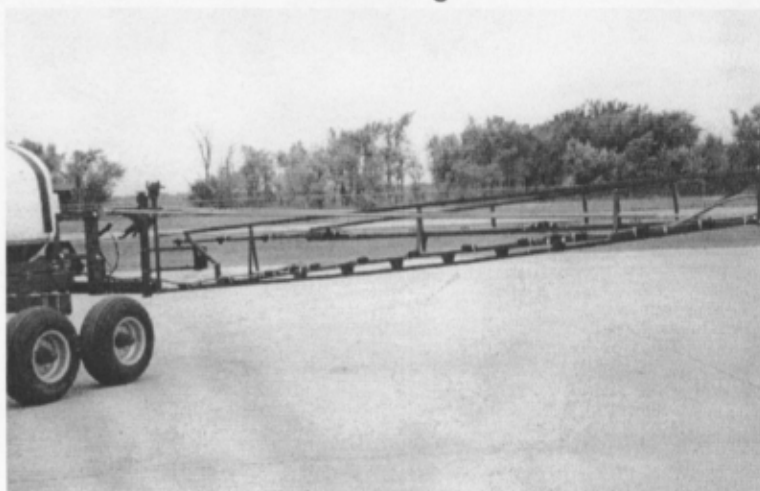


Fig. 47 BOOM CLAMP

7. Swing the inner boom back until it is at 90° to the transport direction.



**Extending**



**Extended**

**Fig. 48 INNER BOOM EXTEND**

8. Push anti-swing clutch handle in and lower it to lock boom in field configuration.

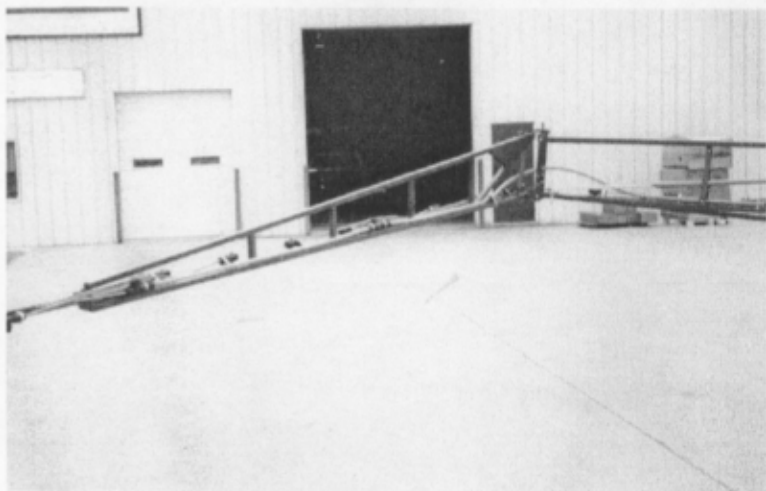


**Fig. 49 ANTI-SWING CLUTCH**

9. Lift outer boom out of its cradle and swing out at 90° to travel direction.



**Cradle**



**Extending**

**Fig. 50 OUTER BOOM**

10. Repeat with other boom.



**Inner**



**Outer**

**Fig. 51 OTHER BOOM**

11. Reverse the above procedure when converting from field to transport configuration.



**Fig. 52 FIELD**

## 4.14 TRANSPORT



### TRANSPORT SAFETY

1. Read and understand ALL the information in the Operator's Manual regarding procedures and SAFETY when operating the Sprayer in the field and/or on the road.
2. Check with local authorities regarding sprayer 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. Ensure that the Sprayer is hitched positively to the towing vehicle and a retainer is used through the drawbar pin. Always use a safety chain between the machine and the tractor.
6. Install boom locks before transporting.
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. Never transport with tanks filled with water or chemical.

Wil-Rich Blumhardt sprayers 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 Sprayer is hitched positively to the towing vehicle. Always use a safety chain between the machine and the tractor and a retainer on the drawbar pin.
3. 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.
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. It is not recommended that the machine be transported faster than 20 mph (32 km/hr). Table 6 gives the acceptable transport speed as the ratio of tractor weight to sprayer weight.

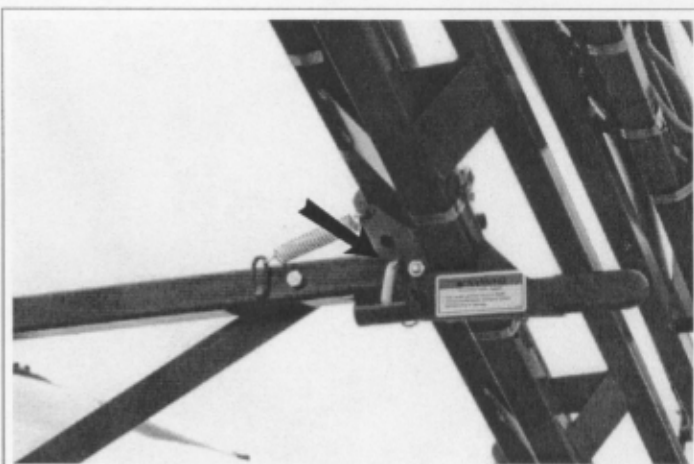
**Table 6 Travel Speed vs Weight Ratio**

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



6. **Prepare Transport Locks:**

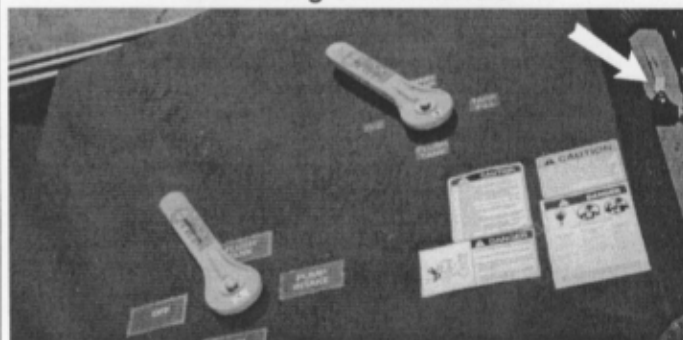
- a. Swing booms on transport support brackets and secure with spring-loaded latch. Secure latch with lock pin.
- b. Move anti-swing clutch handle down to lock position.
- c. Move hydraulic system lift valve to the off position.



Latch



Anti-Swing Clutch Handle



Lift Valve Off

Fig. 53 TRANSPORT PREPARATION

7. Do not allow riders on the machine or tractor.
8. Always use hazard flashers on the tractor when transporting unless prohibited by law.
9. During periods of limited visibility, use pilot vehicles or add extra lights to the sprayer.

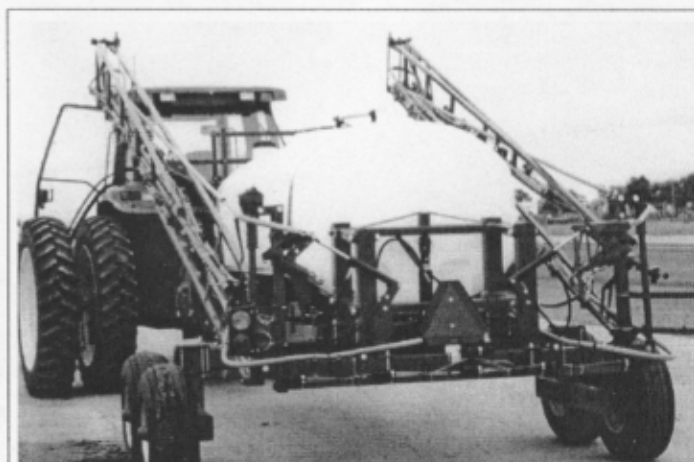


Fig. 54 TRANSPORTING



## 4.15 STORAGE

### 4.15.1 PLACING IN STORAGE

At the end of the spray 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. Thoroughly wash the machine using a hose or a pressure washer to remove all dirt, mud, debris or residue.
2. Be sure the sprayer has been rinsed and washed using the Daily Wash procedure described in the Maintenance Section.
3. Thoroughly wash the inside of the tank to remove all chemical residue using the salt and amine method described in the Maintenance Section.

4. In climates that encounter freezing temperatures during the storage period, the following preparation should be done:

- a. Add 10 gallons (40 liters) of a 50:50 mixture of potable RV antifreeze to the tank.
- b. Run unit for 5 minutes in the wash and spray cycles to circulate solution to all parts of the circuit.
- c. While circulating the fluid, open and close all the valves in the chemical circuit several times to flush all the water from the system.

- d. Flush the solution out the booms.
- e. Draw the solution out of the chemical tank.
- f. Open all disconnects and drain hoses.

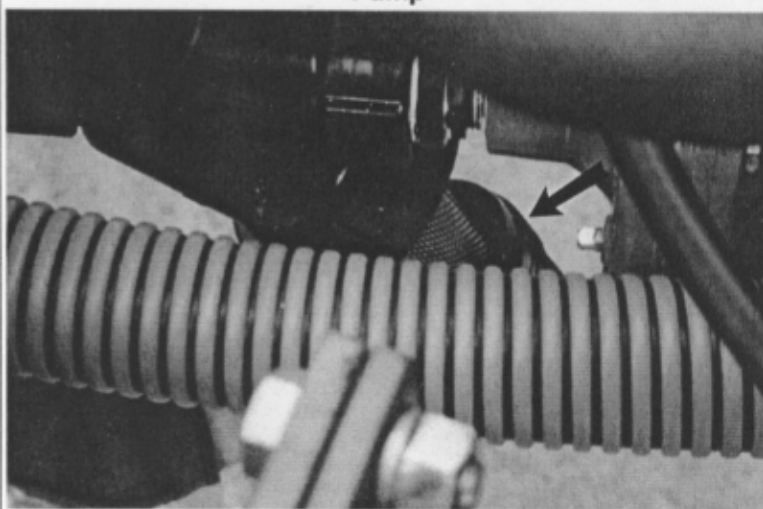


### STORAGE SAFETY

1. Store unit in an area away from human activity.
2. Do not permit children to play on or around the stored sprayer.
3. Unhook and store in the transport configuration.



Pump



Suction Screen

Fig. 55 COMPONENT DRAINING

- g. Drain tank, pump and suction screen.
  - h. Drain boom chemical lines.
  - i. Use WD 40 spray to lubricate pump and to prevent rusting.
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 chemical hoses and fittings. Tighten any loose fittings. Replace any hose that is badly cut, nicked, abraded or is separating from a fitting.
  8. Touch up all paint nicks and scratches to prevent rusting.
  9. Move the machine to its storage position.
  10. Select an area that is dry, level and free of debris.
  11. Place planks under the jack for added support if required.
  12. Unhook the machine from the tractor (Refer to Section 4.8).
  13. Remove the control box from the machine and store inside.
  14. If the machine cannot be stored inside, cover the machine with a tarpaulin and tie it down securely.

## 4.15.2 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. Remove the tarpaulin if it was used for storage.
3. Attach the tractor to the sprayer by following the procedure in Section 4.8.
4. Check
  - a. Tank anchor hardware.
  - b. All hardware. Tighten as required.
  - c. Tire pressure.
  - d. All chemical and hydraulic lines, fittings and connections. Tighten as required.
5. Lubricate all grease fittings.
6. Replace any defective parts.
7. Fill the tank with 20 gallons (75 liters) of clean water and run for 5 minutes. Open and close all valves several times. Flush water through the booms.
8. Repeat step 7.
9. Calibrate the pump, nozzles and sprayer before using.
10. 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 Sprayer.
2. Place all controls in neutral or OFF, stop the tractor engine, turn monitor off, set park brake, remove ignition key, wait for nozzles to stop spraying 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. Before applying pressure to chemical system make sure that all connections are tight and that all hoses and fittings are in good condition.
6. Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.
7. Keep hands, feet, clothing and hair away from all moving and/or rotating parts.
8. Clear the area of bystanders, especially children, when carrying out any maintenance and repairs or making any adjustments or filling.
9. Place stands or blocks under the frame before working beneath the machine.
10. Wear safety goggles, neoprene gloves and protective clothing when working on the sprayer filled with active chemical.
11. Wash machine to remove all chemical residue before working on unit. Wear appropriate protective gear at all times.
12. Protect yourself from chemical contamination.

## 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 provide 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 lubricant passageway. Replace fitting if necessary.

### 5.1.3 SERVICING INTERVALS

#### 10 Hours or Daily

1. Grease inner boom hinge post bushings (3 locations each post).



Fig. 56 HINGE POST BUSHINGS

2. Grease inner boom flex linkage pivots (3 locations each pivot).

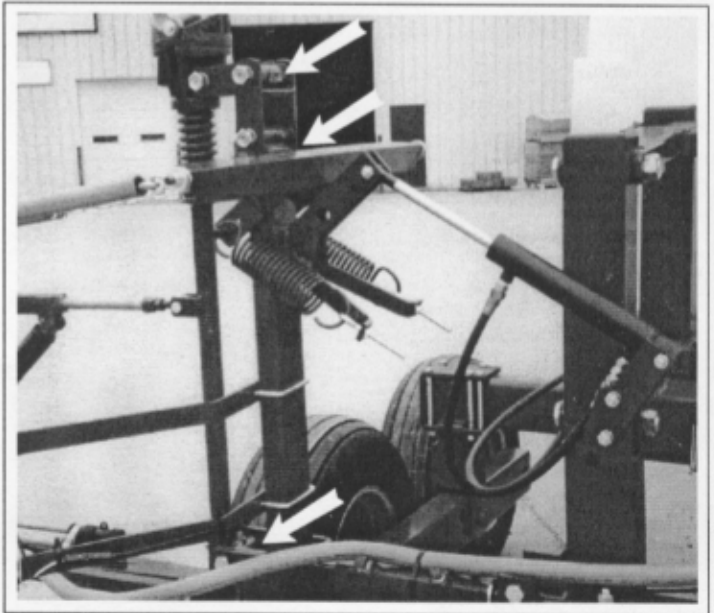
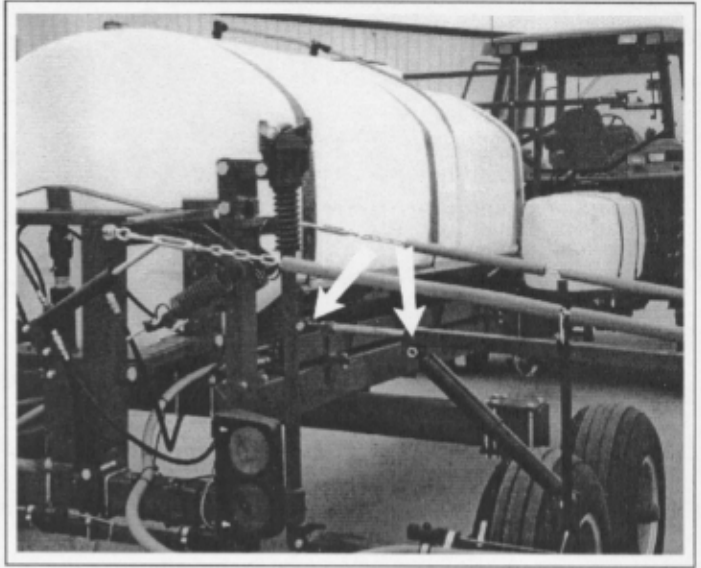


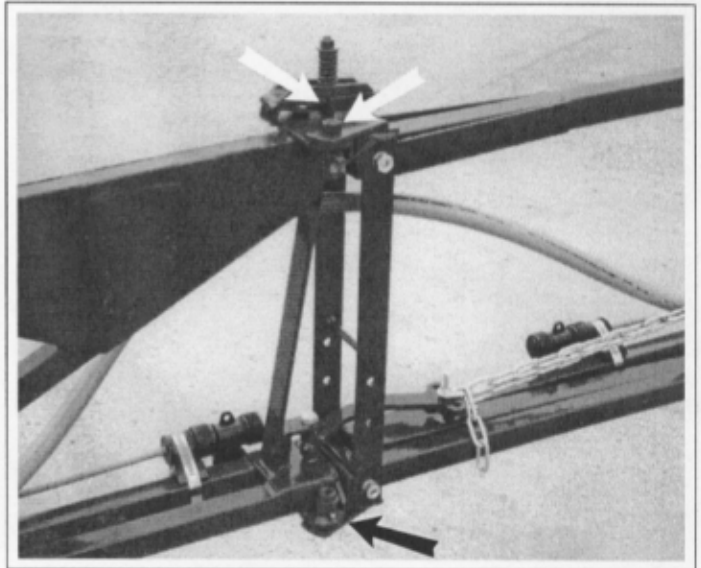
Fig. 57 FLEX LINKAGE PIVOT

3. Grease tie rod fittings (3 locations each post).



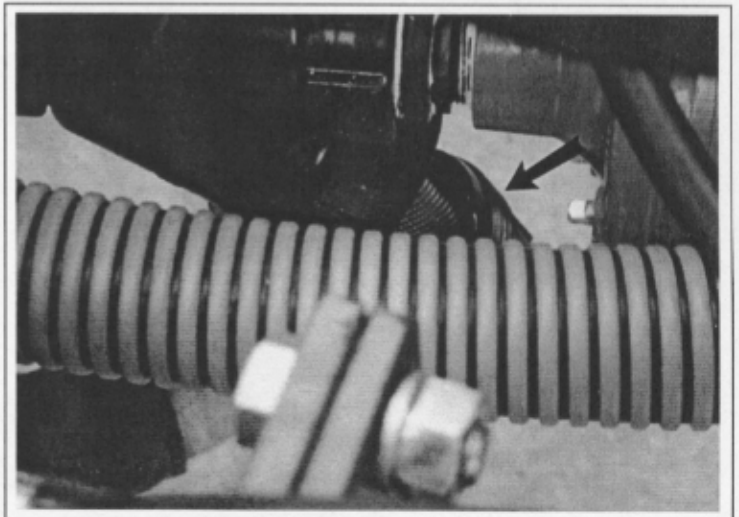
**Fig. 58 TIE RODS**

4. Grease outer boom pivot (3 locations each pivot).



**Fig. 59 OUTER BOOM PIVOT**

5. Remove and clean suction screen (1 location).



**Fig. 60 SUCTION SCREEN**



### Weekly or 50 Hours

1. Grease wheel hubs (1 location each hub).



Hubs

2. Grease tandem axle (1 location each axle).



Axle

Fig. 61 TANDEM AXLES

### Annually

1. Wash the machine inside and out.

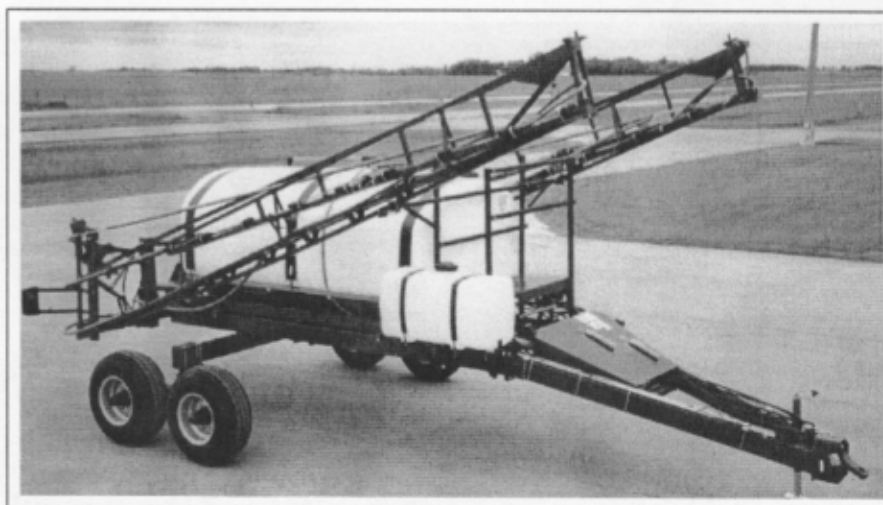


Fig. 62 MACHINE

#### 5.1.4 SERVICE RECORD

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

ACTION CODE: CL CLEAN  
✓ GREASE

```
R  REMOVE
RE  REPACK
```

[illegible]



## 5.2 MAINTENANCE

### 5.2.1 SCREEN CLEANING

The fluid in the sprayer is continually being filtered through a screen in the suction line. The sprayer must have clean water to prevent clogging of the screen and nozzles when in use. This screen must be cleaned daily or more often as required. To clean, follow this procedure:

1. At the start of each day before the water and chemicals are added, the screen should be checked and cleaned.
2. Loosen the filter body by hand. Do not use a wrench as this could damage the filter body.
3. Remove the screen and inspect it for dirt.
4. Wash it using clean water.
5. Inspect for holes or tears. If there is damage, replace it.
6. Install the screen and body to the filter head and tighten by hand. Do not use a wrench as this might damage the body. Do not overtighten and crack the head.
7. Drain the screen before storage to avoid freezing.

Schematic



Suction Screen

Fig. 63 SCREEN

## 5.2.2 TANK CLEANING

### A. Daily Cleaning

At the end of the working day, clean the system using this procedure:

1. After the chemical solution has been completely sprayed out through the booms, add 20 gallons (75 liters) of clean water to the tank.
2. Run at rated speed to force the solution through the agitator jets. Run for 5 minutes.
3. Spray the rinse lightly over previously sprayed crop.
4. Add another 50 gallons (200 liters) of clean water and agitate for 5 minutes.
5. Flush the rinse solution out of the booms to clean the hoses and plumbing.
6. Rinse the system again with clean water.
7. Clean the screen and nozzles.
8. Drain tank and let dry.

### B. Changing Chemicals and/or Annual Wash to Remove Salt and Amine Formations

1. Do the rinse procedure outlined for Daily Cleaning.
2. Add 50 gallons (200 liters) of clean water to the tank.
3. Remove nozzles and screen and wash separately.
4. Add 1/2 gallon (2 liters) of household ammonia to the tank (1 part ammonia to 100 parts water).
5. Agitate solution for 5 minutes.
6. Wash the inside of the tank with a long handled mop or scrub brush. Do not enter tank.



**WARNING**

Do not enter tank at any time.

7. Spray half the solution out the booms.
8. Let the balance sit for a minimum of 8 hours, overnight is best.
9. Agitate solution for 10 minutes and spray out the booms.
10. Rinse the system thoroughly with clean water and flush out the booms.
11. Drain the entire system and let dry.

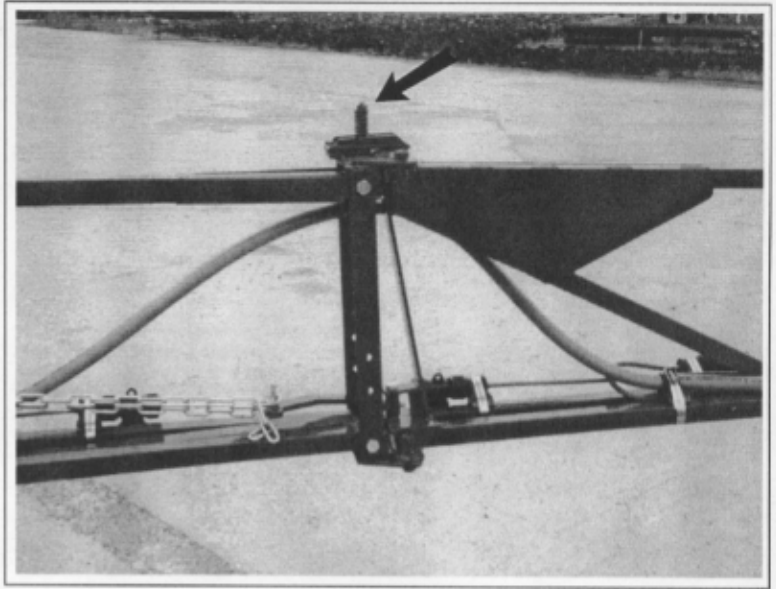
### C. Changing Chemicals and/or Annual Wash To Remove Esters of 2, 4-D and MCPA Formations

1. Do the wash and rinse procedure outlined for Daily Cleaning.
2. Add 50 gallons (200 liters) of clean water to the tank.
3. Remove nozzles and screen and wash separately.
4. Add dishwasher detergent to the tank (2 lbs./ 50 gal or 1 kg/300 l of water).
5. Agitate solution for 5 minutes.
6. Wash the inside of the tank with along handled mop or scrub brush. Do not enter tank.
7. Spray the solution out the booms and drain thoroughly.
8. Add 50 gal (200 l) of clean water to the tank.
9. Add 1/2 gal (2 l) of household ammonia to the tank (1 part ammonia to 100 parts of water).
10. Agitate solution for 5 minutes.
11. Wash out the inside of the tank with a long handled mop or scrub brush. Do not enter tank.
12. Spray 1/2 the solution out the booms.
13. Let the balance sit for a minimum of 8 hours, overnight is best.
14. Agitate solution for 10 minutes and spray out the booms.
15. Rinse the system thoroughly with clean water and flush out the booms.
16. Drain the entire system and let dry.

### 5.2.3 BOOM BREAK-AWAY TENSION

Each boom is designed with a spring-loaded clamping hinge that allows it to swing backward as required when encountering an obstruction. This will prevent mechanical damage from the obstruction. To adjust the break-away tension, follow this procedure:

1. Clear the area of bystanders, especially small children, before starting.
2. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.
3. Use the bolt to compress or relax the clamping force of the break-away spring as required.
4. The proper tension will require one person pulling hard on the end of the boom to break it away.



**Fig. 64 BOOM BREAK-AWAY TENSION**

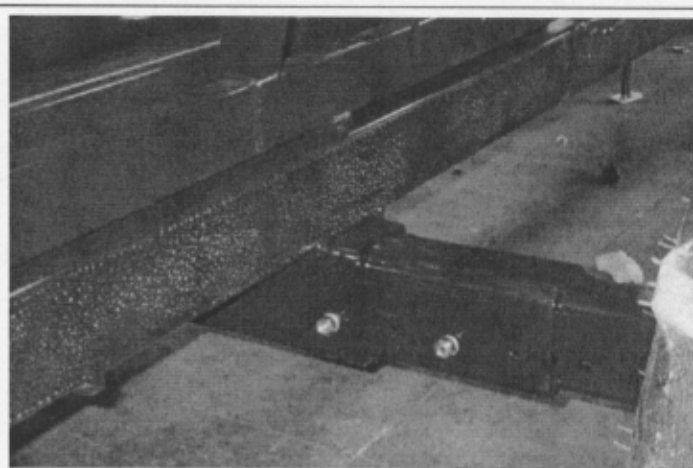
## 5.2.4 WHEEL SPACING

### Wheel Axle Spacing:

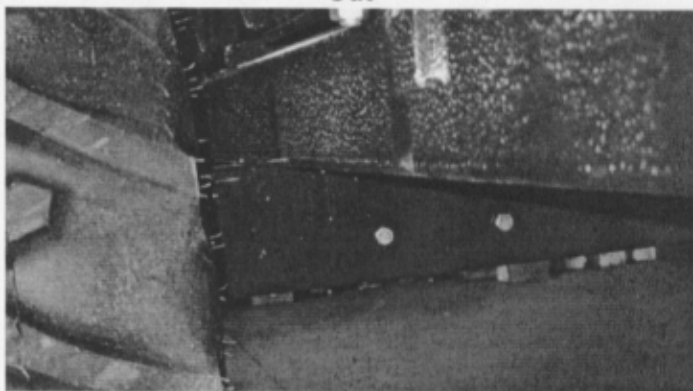
The machine is designed with an adjustable axle to allow it to fit a variety of row spacings. Always set so the tires run between the rows of plants in a row crop application to minimize plant damage and to go where there are fewer bumps.

To change wheel spacing, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Place all controls in neutral and set park brake before dismounting.
3. Place all controls in neutral and set park brake before dismounting.
4. Loosen axle mount clamping bolts on tandem model.
5. Use a jack or hoist to raise axle or frame so the tires just clear the ground.
6. Remove axle anchor bolts on telescoping model.
7. Slide or tap wheels to their desired position.
8. Measure from the center of the tire to be sure it is at the required position.
9. Install anchor bolts and tighten to their specified torque.
10. Tighten clamping bolts to their specified torque.
11. Repeat on the other axle.

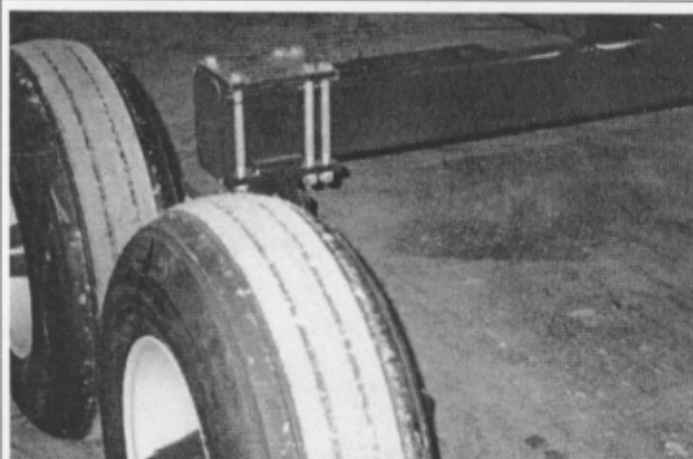


Out



In

Fig. 65 FLOTATION TIRES



Out



In

Fig. 66 TANDEM AXLES

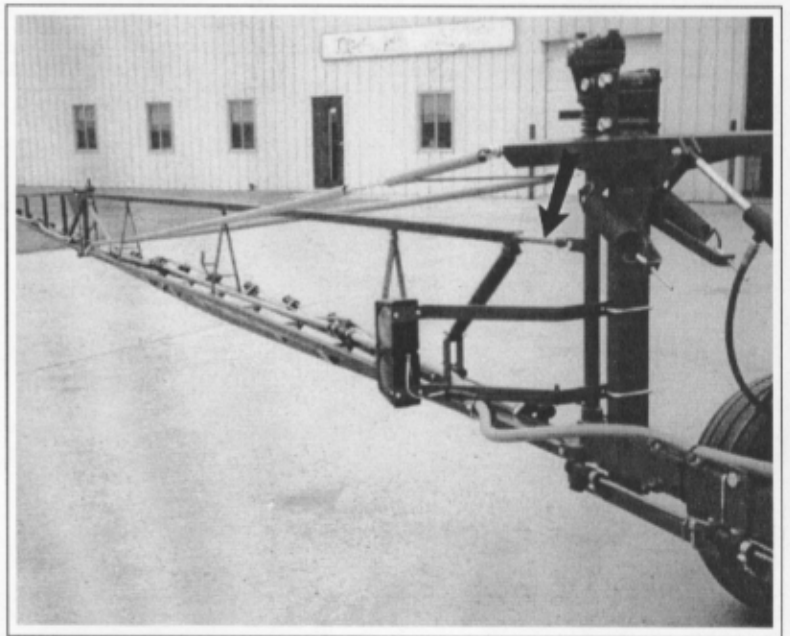
## 5.2.5 BOOM STRAIGHTNESS

The boom on the sprayer must be set and maintained straight and at right angles to the direction of travel to be sure that the nozzles are at a uniform distance from the ground/crop. To check and adjust the boom, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Place all controls in neutral and set park brake before dismounting.
3. Sight along the boom to be sure that it is straight and at a uniform height from the ground.
4. Use the tie rod at the inner pivot to set the angle of the outer boom.



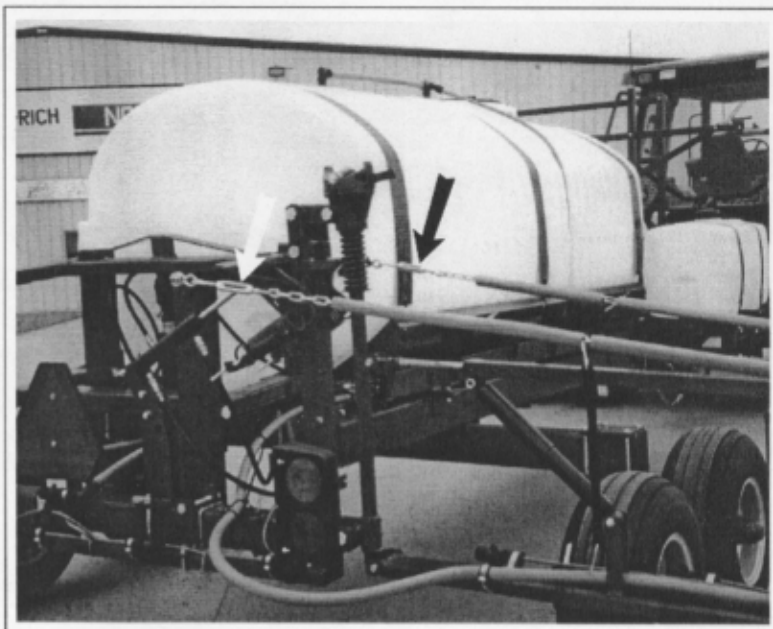
**Fig. 67 BOOM SIGHTING**



**Fig. 68 TIE ROD**

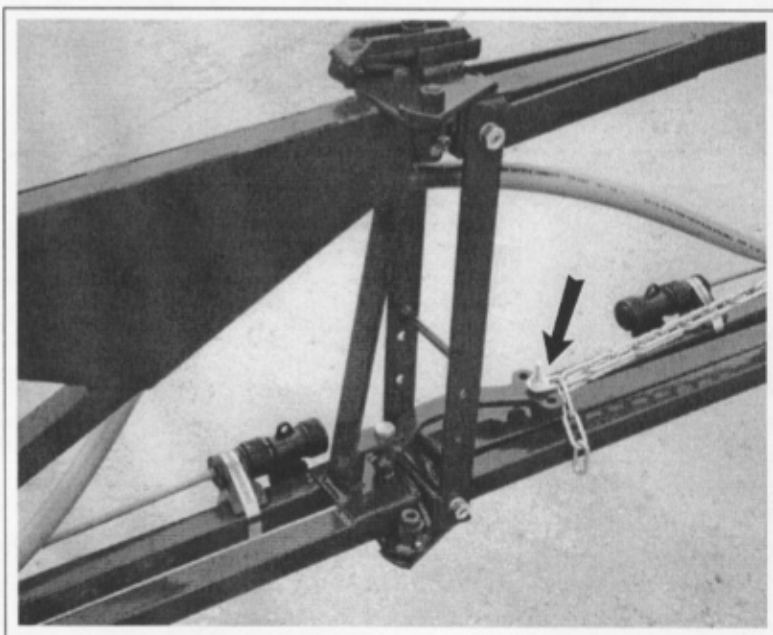


5. Use the turnbuckles at the inner pivot to set the angle of the boom versus the direction of travel.
6. Extend or contract the turnbuckles the same amount to raise or lower the boom.



**Fig. 69 TURNBUCKLES**

7. Change chain length by moving a link on the turnbuckle anchor chains if the turnbuckles are out of adjustment.



**Fig. 70 CHAIN ANCHOR**

5. Use the turnbuckles at the inner pivot to set the angle of the boom versus the direction of travel.
6. Extend or contract the turnbuckles the same amount to raise or lower the boom.
7. Change chain length by moving a link on the turnbuckle anchor chains if the turnbuckles are out of adjustment.

## 6 TROUBLE SHOOTING

The Wil-Rich Blumhardt Trail Master Sprayer uses a pressure circuit to deliver a chemical compound in solution to a series of pressurized nozzles on a boom for application to crops. It is a simple and reliable system that requires minimal maintenance.

In the following section, we have listed many 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 trouble shooting section, please call your local Wil-Rich dealer. Before you call, please have this Operator's Manual and the serial number from your machine ready.

PROBLEM	CAUSE	SOLUTION
Sprayer is not stable. Moves from side-to-side.	Low tire pressure.	Add air to tires.
	Loose wheel bolts.	Tighten wheel bolts.
System loses pressure.	Suction screen plugged.	Clean suction line screen.
	Pump worn.	Check and repair or replace pump.
	Faulty suction hose.	Check for collapsed suction hose. Replace hose.
	Faulty regulator.	Replace regulator.
	Hose leaking.	Tighten hose or replace hose.
Sprayer pressure too high.	Return hose plugged.	Clean or replace hose.
	Faulty pressure sensor.	Calibrate sensor. Replace as required.
	Faulty regulator.	Repair or replace valve.



<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
Sprayer pressure too low.	Return hose plugged.	Clean or replace hose.
	Faulty pressure sensor.	Calibrate sensor. Replace as required.
	Faulty regulator.	Repair or replace valve.
	Wrong agitation valve setting.	Adjust agitation valve setting.
<hr/>		
Nozzles plugging.	Dirty water.	Flush and clean the system. Use clean water.
	Poorly mixed chemicals.	Mix chemicals slower. Follow mixing instructions.
<hr/>		
High spray drift.	Boom set too high.	Lower boom.
	Too windy.	Wait until wind dies down.
<hr/>		
The pump does not draw water.	Pump is airlocked.	Bleed air from pump.
	Suction line is plugged or collapsed.	Examine suction line. Replace as required.
	Pump faulty.	Replace pump.
<hr/>		
Pressure reading fluctuates.	The pump is sucking in air through the intake or air has not been entirely evacuated from the pump.	Examine the suction hose and make sure it is firmly secured. Run the pump with the bleed valve open to evacuate air from pump.
	Regulator broken.	Replace regulator.
<hr/>		
The spray flow is irregular.	Screen plugged.	Clean screen.
	Nozzles plugged.	Clean nozzles.
<hr/>		

<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
Can't develop enough pressure.	Broken pressure regulator.	Replace pressure regulator.
	Worn pump.	Repair or replace pump.
	Leaking hose or fitting.	Replace hose or tighten fitting.
	Pump running too slow.	Speed up engine to rated PTO RPM.
No pressure reading.	Poor connection.	Clean connection. Push firmly together.
	Defective sensor.	Replace sensor.
	Defective monitor gauge.	Replace monitor or gauge.
Spray won't shut off.	Defective switch in monitor.	Replace switch.
	Solenoid valve doesn't close.	Replace defective parts.
Monitor doesn't control sprayer.	Blown fuse.	Replace fuse.
	Poor connection.	Pull connections apart. Clean terminals. Reconnect.
	No power.	Connect power wire.
Boom bouncing.	Traveling too fast.	Slow down.
Skipping.	Too windy.	Wait until wind dies down.
	Booms set too close to canopy.	Raise booms.
	Plugged nozzles.	Clean nozzles.

## 7 SPECIFICATIONS

### 7.1 MECHANICAL

	1000 Gal.
Length:	
Width: (Field, Max.)	
Width: (Transport)	
Height (Max.)	
Weight: (Empty)	
Weight: (Full)	
Capacities:	
Wash Tank:	
Rinse Tank:	
Main Tank:	
Pumps:	
Centrifugal:	
Diaphragm:	
Tank Agitator:	
Tires:	
Controller:	
Power Source (Req'd):	

**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		SAE 5		SAE 8	
	N.m	(lb-ft)	N.m	(lb-ft)	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 \*

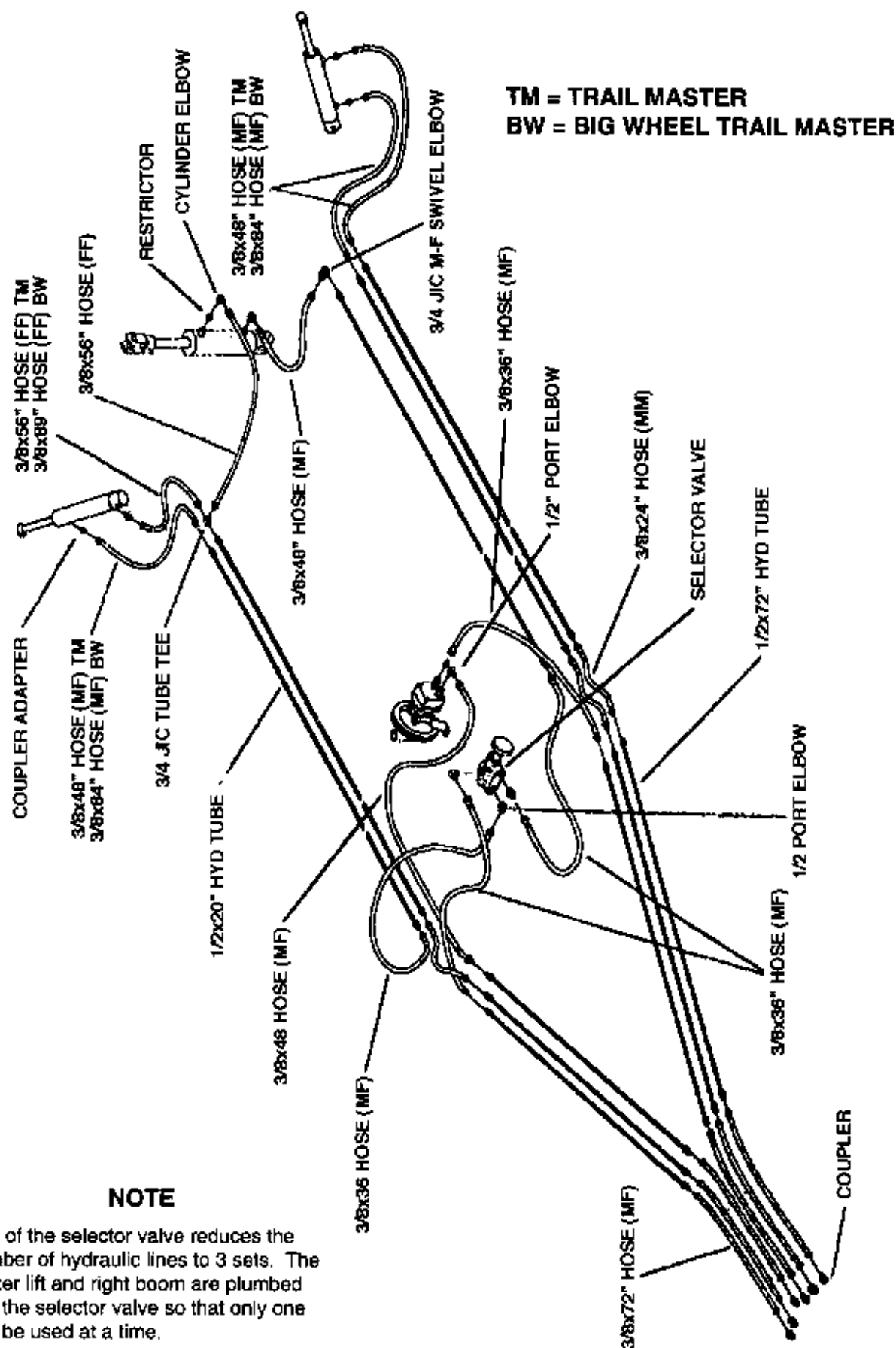
1. Check flare and flare seat for defects that might cause leakage.
2. Align tube with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second tighten the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

## 7.4 CHEMICAL CIRCUIT SCHEMATIC

## 7.5 HYDRAULIC CIRCUIT





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