



**ATV SPRAYER  
DIAPHRAGM  
Operator's Manual**

67302803 (7/05)

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Dear Owner,

Thank you for purchasing a HARDI® product and welcome to the ever-increasing family of HARDI® sprayer owners.

Our sprayers and accessories are rapidly becoming a familiar sight on North American farms. We believe that this results from growers becoming increasingly conscious of crop protection input costs and the vital need for cost effective application equipment.

Please take the time to thoroughly read the Operator's Manual before using your equipment. You will find many helpful hints as well as important safety and operation information.

Some of the features on your ATV sprayer were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions. If any portion of this instruction book remains unclear after reading it, contact your HARDI® dealer or service personnel for further explanation before using the equipment.

**For Product, Service or Warranty Information:**

- Please contact your local HARDI® dealer.

**To contact HARDI® directly:**

- Please use the HARDI® Customer Service number: 1-866-770-7063

- Or send your email to [CUSTSERV@hardi-us.com](mailto:CUSTSERV@hardi-us.com)

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Sincerely,

Tom L. Kinzenbaw  
President

# 1.0 INTRODUCTION

We congratulate you for choosing a HARDI® plant protection product. The reliability and efficiency of this product depends on your care. The first step is to carefully **read and pay attention** to this operator's manual. It contains essential information for the efficient use and long life of this quality product.

This manual covers the HARDI® ATV sprayer equipped with gas engine directly coupled to a HARDI® 1203 diaphragm pump. The HARDI® ATV sprayer is available in a 150 gallon (550 L) capacity.

The heart of your sprayer is the diaphragm pump. The design is simple, resulting in low maintenance requirements and guaranteed pump life. The bearings and crankshaft are grease lubricated and are therefore protected from spray solution if any diaphragm fails in service. A drain hole is located in the base of the crank case to facilitate the draining of any foreign matter. The pump is self-priming and can be run dry without damage.

The HARDI® ATV sprayer is equipped with a manual control which features: electrically operated master on/off control, electrically operated boom distribution valves, manual pressure adjustment valve, pump bypass agitation, and a 4" boom pressure gauge.

The tank, made of impact proof and chemical resistant polyethylene, has a purposeful design with rounded contours which allows for efficient cleaning and draining. The tank is designed with a large deep sump, so that it can be completely emptied even when the sprayer is used on slopes. A tank level indicator is molded into the front and side of the tank. A remote operated tank drain valve is fitted for safe and easy draining. Bottom tank suction includes a shut-off valve for easy cleaning of suction filter.

Available options include: 4 gallon (15 L) clean water dispenser, hose wrap with 25' of 3/8" hose and a model 60L HARDI® spray gun, filter basket and SMV sign.

The HARDI® ATV sprayer is available with either the 20', 26', 33' or 40' MB boom. The 40' MB boom features a self-levelling trapeze center. All booms feature ISO flat fan nozzles with 20" spacing.





The frame and boom of your HARDI® ATV sprayer are finished with a powder coat paint which provides maximum protection from chemicals and rust.



*Fig. 1*

*150 GALLON ATV SPRAYER WITH 40' MB BOOM*

## 2.0 SAFETY INFORMATION



### **WARNING!**



**ALWAYS READ OPERATOR'S MANUAL BEFORE  
USING THIS EQUIPMENT**

**DO NOT REMOVE ANY SAFETY DEVICES OR  
SHIELDS. NEVER SERVICE, CLEAN OR REPAIR A  
MACHINE WHILE IT IS OPERATING**

### **WARNING!**



**ALWAYS WATCH FOR THIS SYMBOL TO POINT OUT  
IMPORTANT SAFETY PRECAUTIONS**

**IT MEANS ATTENTION! BECOME ALERT!  
YOUR SAFETY IS INVOLVED!**



## RECOGNIZE SAFETY INFORMATION

**This is the Safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury. Follow recommended precautions and safe operating practices.**

### 2.1 Follow Safety Instructions

1. Carefully read all the safety messages in this manual and the safety labels fitted to the machine. Keep safety labels in good condition. Replace missing or damaged safety labels. Make sure that new equipment components include any current safety labels. Replacement safety labels are available from your authorized HARDI® dealer.
2. Learn how to operate the sprayer and how to use the controls properly. Do not let anyone operate the machine without proper instructions.
3. Keep your sprayer in proper working condition. Unauthorized modifications or use may impair the function and/or safety and affect the machine's life.
4. If you do not understand any part of this manual and need assistance, please contact your authorized HARDI® dealer.

### 2.2 Operating The Sprayer Safely

1. Read the complete manual carefully and become familiar with the operation of the equipment before initial operation in each spraying season. Failure to do so may result in possible over or under-application of spray solution which may drastically affect crop production and may lead to personal injury.
2. Always keep children away from your HARDI® ATV sprayer.
3. Before starting the gas engine on the HARDI® ATV sprayer, make sure that all operating controls are in the off or neutral position (including spray controls).
4. One of the most frequent causes of personal injury or death results from persons falling off or being run over. Do not permit others to ride on or in. Only one person, the operator, should be on the machine when in operation.

5. Slow moving vehicles and spray equipment can create a hazard when on public roads. Avoid personal injury or death resulting from any accidents by using flashing lights. Some local regulations may require installation of flashing warning lights.
6. Check local regulations before transporting the HARDI® ATV sprayer on public roads. It may be necessary to use a trailer.
7. Before leaving the ATV/tractor seat, stop the engine, put all controls in neutral, and put the transmission control lever in the park position or neutral with the brakes locked. Read the ATV/tractor operator's manual for added safety precautions.
8. Understand service procedures before undertaking any maintenance. Never lubricate, service, or adjust the machine while it's moving. Securely support any components before working on them.
9. Keep all parts in good condition and properly installed. Repair damaged parts immediately. Replace worn or broken parts.





## 2.3 Handling Chemical Products Safely

1. Direct exposure to hazardous chemicals can cause serious injury. These chemicals can include lubricants, coolants, paints, adhesives and agricultural chemicals. Material Safety Data Sheets (M.S.D.S.) are available for all hazardous chemicals which inform the user of specific details including, physical and health hazards, safety procedures, and emergency response techniques.
2. Protective clothing such as rubber gloves, goggles, coveralls and respirator must be worn while handling chemicals. All protective clothing should be kept in excellent condition and cleaned regularly or discarded.
3. If chemicals come in contact with any exposed skin areas, wash immediately with clean water and detergent. Never place nozzle tips or any other components that have been exposed to chemicals to lips to blow out obstructions. Use a soft brush to clean spray nozzles.
4. Dedicate an area to fill, flush, calibrate and decontaminate sprayer where chemicals will not drift or run off to contaminate people, animals, vegetation, water supply, etc. Locate this area where there is no chance of children coming in contact with this residue.
5. Decontaminate equipment used in mixing, transferring and applying chemicals after use. Follow the instructions on the chemical label for the correct procedure required. Wash spray residue from outside of the sprayer to prevent corrosion.
6. Extreme care should be taken in measuring spray products. Powders should be used in suitable sized packages or weighed accurately. Liquids should be poured into a suitable graduated container. Keep chemical containers low when pouring. Wear a filtered respirator and let the wind blow away from you to avoid dust and/or splashes contacting the skin or hair.
7. Store chemicals in a separate, plainly marked locked building. Keep the chemical in its original container with the label intact.
8. Dispose all empty containers after rinsing in accordance with local regulations & by-laws. Dispose of all unused chemicals and left over fertilizer in an approved manner
9. Keep a first aid kit and fire extinguisher available at all times when handling chemicals.

## 2.4 Local Poison Information Center

If you live anywhere in the United States, the following toll free number will connect you to your Local Poison Information Center.

**PHONE NO. 1 - 8 0 0 - 2 2 2 - 1 2 2 2**

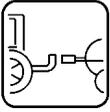
If you live outside the United States, find the number for the poison control center in your phone book and write it in the space below:

**PHONE NO.** \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Keep a list, in the space provided below, of all the chemicals that you have in use.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_





## 3.0 HOOKING UP THE SPRAYER

### 3.1 Tow Vehicle Requirements

ATV or Lawn & Garden tractor equipped with a 2" ball hitch and sufficient horsepower and braking ability to safely control a sprayer with the following specifications:

	Empty*	Loaded**
Total weight	932 lbs (423 kg)	2210 lbs (1002 kg)
Tongue weight	24 lbs (11 kg)	104 lbs (47 kg)

\*Weight with empty tank, 40' MB boom and axle in middle holes.

\*\*Weight with tank full of water, 40' MB boom and axle in middle holes.

**Note:** Actual weight varies depending on boom size, axle position and options. Check your sprayer for accurate results.

### 3.2 Tongue Weight Adjustment

The axle is installed at the factory and should not normally need adjustment. If a different boom is installed, the axle may need to be moved to increase or decrease the tongue weight.

Moving the axle forward will decrease the tongue weight.

Moving the axle rearward will increase the tongue weight.



**WARNING:** IF THE SPRAYER IS EQUIPPED WITH A 40' MB BOOM, IT IS NOT RECOMMENDED TO USE THE FRONT AXLE POSITION DUE TO THE LIGHT TONGUE WEIGHT.

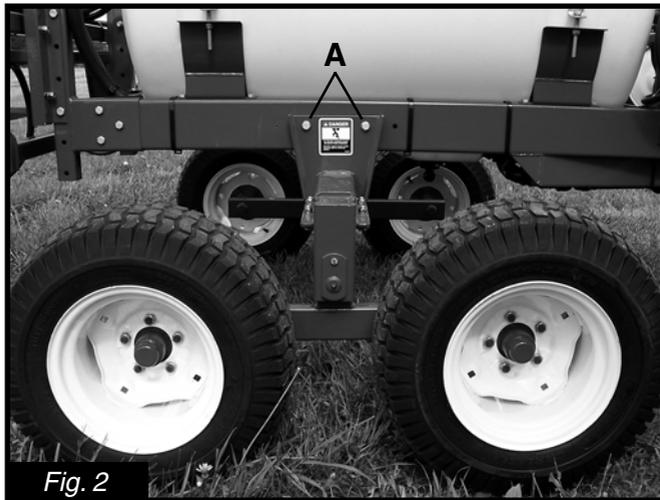


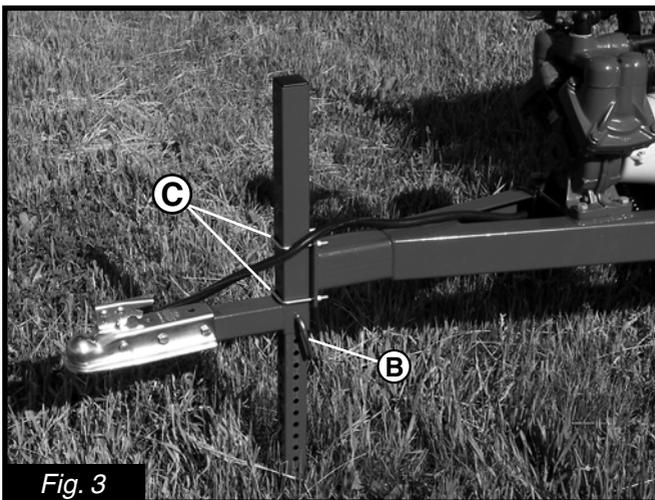
Fig. 2

1. The sprayer should not be attached to any ATV/tractor while adjusting the axle position. Make sure the storage jack is supporting the tongue of the sprayer.
2. Using suitable lifting equipment, lift the rear of the sprayer frame until the wheels just leave the ground.
3. Remove bolts **A** (Fig. 2) from both sides of the sprayer frame.
4. Move the axle to the desired set of holes. Re-install and tighten bolts **A** (Fig. 2).
5. Lower sprayer frame.

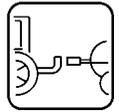
**WARNING: ALWAYS CHECK THE TONGUE WEIGHT AFTER CHANGING THE AXLE POSITION. MAKE SURE THE TONGUE WEIGHT IS NOT TOO HEAVY OR TOO LIGHT FOR SAFE OPERATION WITH YOUR ATV/TRACTOR.**

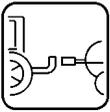
### 3.3 Hitch Height Adjustment

1. Attach sprayer tongue to ball hitch on ATV/tractor.
2. Lock the ball hitch lever and secure with safety pin.
3. Remove storage jack pin **B** (Fig. 3). Raise storage jack to highest position and replace pin.
4. If the sprayer tank is not level, support the front of the sprayer frame with an adjustable jack and loosen the two U-bolts **C** (Fig. 3).
5. Raise or lower the sprayer frame with the adjustable jack until the tank is level.
6. Tighten U-bolts **C** (Fig. 3) and remove adjustable jack.



*Fig. 3*





### 3.4 Wheel Spacing Adjustment

Wheel spacing can be infinitely adjusted from 40" to 80".

**Note:** The tandem beam may need to be removed from the axle insert and reinstalled with the wheels facing the opposite direction to obtain the desired width:



1. Attach sprayer to the ATV/tractor and engage parking brake.
2. Using suitable lifting equipment, jack up the side of the sprayer frame behind the axle you wish to adjust.
3. If the tandem beam does not need to be reversed (see note above), skip to step 4. To reverse tandem beam, remove retaining bolt **A** (Fig. 4) and remove pin **B** (Fig. 4). Remove the tandem beam and reinstall with the wheels on the opposite side. Reinstall pin **B** (Fig. 4) and retaining bolt **A** (Fig. 4).
4. Loosen the four bolts **C** (Fig. 4) and slide the axle insert in or out until the required wheel spacing is obtained (center of tire to center of frame must be equal for both sides). Tighten bolts **C** (Fig. 4).
5. Repeat steps 2 through 4 for opposite side. Measure to confirm correct wheel spacing (center of right tire to center of left tire). Adjust if necessary.

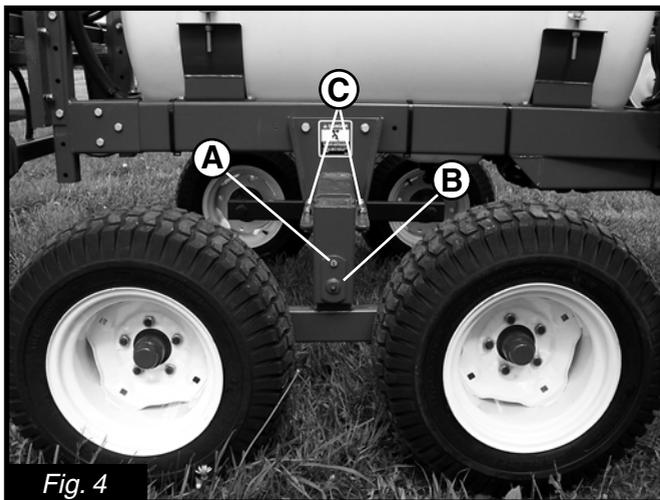


Fig. 4

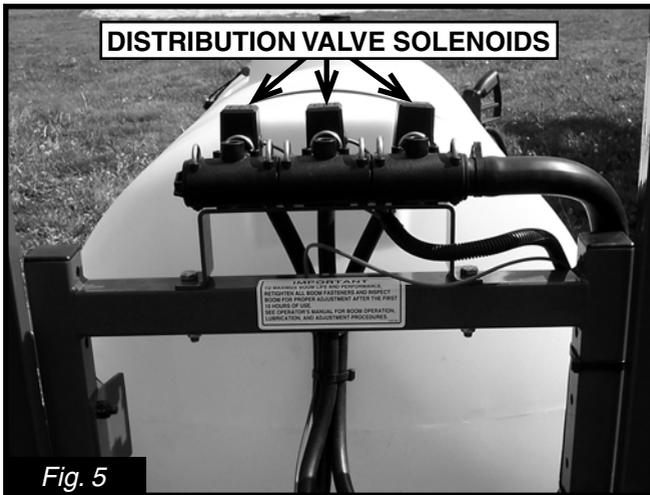
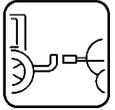
### 3.5 Power Supply

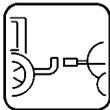
A 12 Volt DC power supply is required to operate the electrical boom distribution valve solenoids (Fig. 5). Connect the power supply wiring harness as follows:

Red wire to positive (+) and Black wire to negative (-).

**IMPORTANT:** *Do not connect to the starter motor or generator/alternator. Warranty is void if this is done.*

The power supply wiring harness is equipped with a 7.5 Amp inline fuse to protect the control box.





### 3.6 Control box

The HARDI® ATV sprayer uses an electrical control box for master on/off control and individual boom section on/off control. An optional rate controller box is also available.

1. Mount the control box in a convenient location near the operator.
2. Route the power supply (installed in section 3.5) to the small plug on the control box.
3. Route the main wiring harness from the sprayer to the large plug on the control box.



Fig. 6

### 3.7 Gas Engine Requirements

**IMPORTANT:** *The gas engine equipped on the HARDI® ATV sprayer is shipped from the factory without oil in the engine crankcase or reduction box.*

1. Before operating the gas engine, you must:
  - A. Check the engine crankcase oil level.
  - B. Check the reduction gearbox oil level.
  - C. Fill the gas tank.
  - D. Make sure the engine air filter is not plugged.
2. Refer to gas engine operating manual for oil change and maintenance information.

## 4.0 OPERATING INSTRUCTIONS

### 4.1 Filling The Main Tank

Water is filled into the tank by removing the tank lid located in the center of the sprayer tank. It is recommended to use water as clean as possible for spraying purposes. Fill water through the strainer basket (optional) to prevent foreign particles from entering the tank.

**WARNING: DO NOT LET THE FILLING HOSE ENTER THE TANK. KEEP IT OUTSIDE THE TANK, POINTING TOWARDS THE FILLING HOLE. IF THE END OF THE HOSE IS BENEATH THE SURFACE OF THE TANK CONTENTS AND THE WATER SUPPLY STOPS, CHEMICALS MAY BE SIPHONED BACK AND CONTAMINATE THE WATER SUPPLY SOURCE AND LINES.**

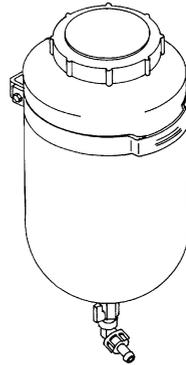


### 4.2 Filling The Handwash (Clean Water) Tank

Unscrew the clean water tank lid and fill with clean water only.

**IMPORTANT:** *The water from this tank is only for hand washing, cleaning blocked nozzles, etc.*

**WARNING: ALTHOUGH THE HANDWASH TANK IS ONLY FILLED WITH CLEAN WATER, THE WATER MUST NEVER BE USED FOR DRINKING, DUE TO THE SMALL RISK OF CONTAMINATION WHILE FILLING, ETC.**





### 4.3 Standard Plumbing Diagram

Review and study the following diagram. By following the flow through the diagram, you will better understand the various functions of your sprayer system.

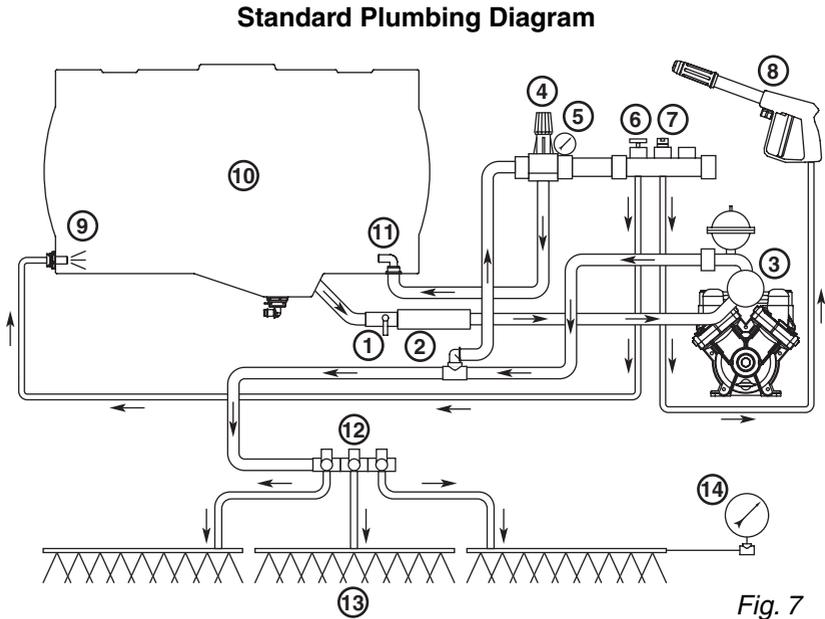


Fig. 7

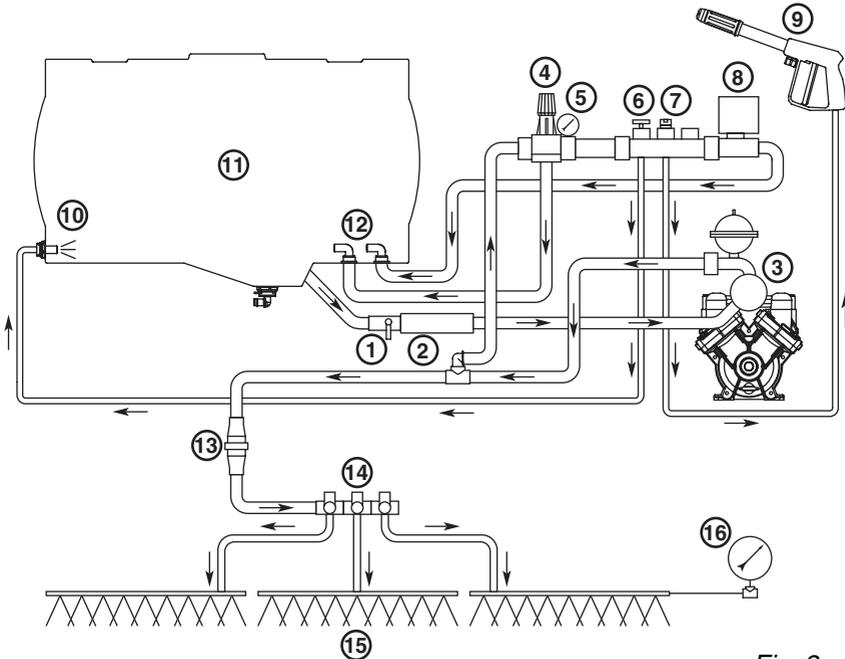
- |                              |                              |
|------------------------------|------------------------------|
| 1. Bottom Suction Valve      | 8. Spraygun (optional)       |
| 2. Suction Filter            | 9. Agitation                 |
| 3. Diaphragm Pump            | 10. Tank                     |
| 4. Pressure Control Valve    | 11. Bypass Return            |
| 5. Manifold Pressure Gauge   | 12. Boom Distribution Valves |
| 6. Agitation Valve           | 13. Boom                     |
| 7. Spraygun Valve (optional) | 14. Boom Pressure Gauge      |

## 4.4 Plumbing Diagram with optional Rate Controller

Review and study the following diagram. By following the flow through the diagram, you will better understand the various functions of your sprayer system.



**Rate Controller Plumbing Diagram**



*Fig. 8*

- |                              |                              |
|------------------------------|------------------------------|
| 1. Bottom Suction Valve      | 9. Spraygun (optional)       |
| 2. Suction Filter            | 10. Agitation                |
| 3. Diaphragm Pump            | 11. Tank                     |
| 4. Pressure Relief Valve*    | 12. Bypass Returns           |
| 5. Manifold Pressure Gauge   | 13. Flowmeter                |
| 6. Agitation Valve           | 14. Boom Distribution Valves |
| 7. Spraygun Valve (optional) | 15. Boom                     |
| 8. Pressure Regulator        | 16. Boom Pressure Gauge      |

\* Turn Pressure Relief Valve clockwise all the way in when used with the optional Rate Controller.



## 4.5 Adjustment Of The Sprayer Controls

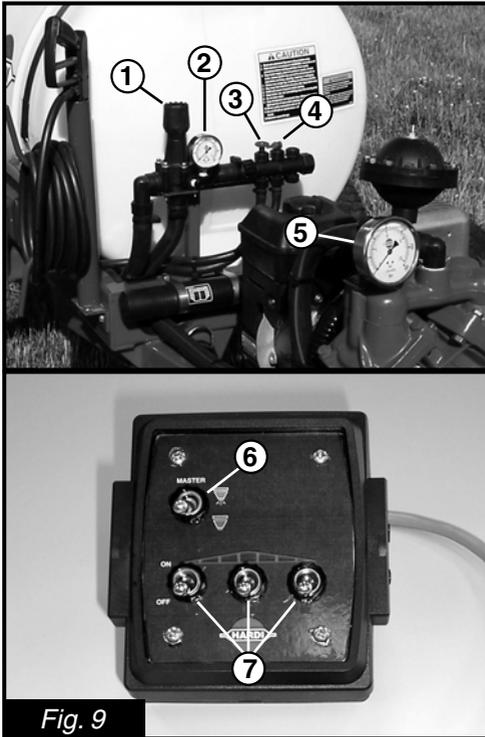


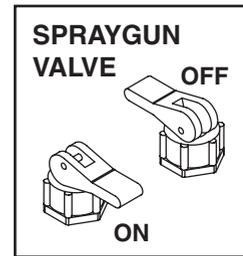
Fig. 9

### **SPRAYER CONTROLS:**

1. Pressure control valve
2. Manifold Pressure gauge
3. Agitation valve
4. Spraygun valve (optional)
5. Boom Pressure gauge

### **CONTROL BOX:**

6. Master On/Off Switch
7. Distribution Switches



### **Boom Operation**

1. Locate your sprayer in a suitable location to spray water from the boom.
2. Fill the tank with clean water.
3. Turn the Pressure Control Valve 1 (Fig. 9) counter clockwise all the way out.
4. Set Master On/Off boom switch 6 and individual boom switches 7 (Fig. 9) "ON". Set spraygun valve 4 (Fig. 9) "OFF".
5. Start the engine.
6. Increase pressure by turning Pressure Control Valve 1 (Fig. 9) clockwise. Watch the boom pressure gauge 5 (Fig. 9) until the desired pressure is reached (turn Pressure Control Valve 1 (Fig. 9) counter clockwise to decrease pressure).

**Note:** Always use Boom Pressure Gauge (not Manifold Pressure Gauge) for nozzle calibration. Refer to Section 5.0 for nozzle selection and calibration.

## Operating the Spraygun (optional)

1. Locate your sprayer in a suitable location to spray water from the spraygun.
2. Fill the tank with clean water.
3. Turn the Pressure Control Valve **1** (Fig. 9) counter clockwise all the way out.
4. Set spraygun valve **4** (Fig. 9) "ON" and set Master On/Off boom switch **6** (Fig. 9) "OFF".
5. Start the engine.
6. Increase pressure by turning Pressure Control Valve **1** (Fig. 9) clockwise. Watch the manifold pressure gauge **2** (Fig. 9) until the desired pressure is reached (turn Pressure Control Valve **1** (Fig. 9) counter clockwise to decrease pressure).
7. Then depress the red handle **A** (Fig. 10) to spray fluid from the spraygun. Check the pressure on the manifold pressure gauge **2** (Fig. 9) and follow step **6** to adjust.
8. To adjust the spray pattern, turn the black handle **B** (Fig. 10) OUT for a narrow spray pattern for long distances and IN for a wide pattern for more coverage at close distances.

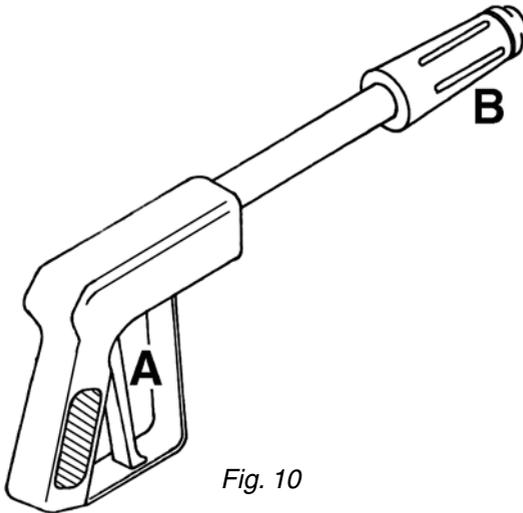


Fig. 10



## 4.6 Agitation Adjustment

Agitation is necessary to keep the solution in your tank properly mixed. Consult your chemical supplier for the recommended amount of agitation.

In general, maximum agitation is required but some products tend to foam easily. To reduce foaming in some instances anti-foaming agents may be added to the tank (Refer to chemical label). When running low liquid levels in the tank, agitation may be reduced to facilitate pump priming and avoid pressure fluctuations. Make sure that you have adjusted the agitation properly before sprayer calibration.

Turning the agitation valve **3** (Fig. 9) clockwise will reduce the agitation flow. Turning the valve counter-clockwise will increase the agitation flow.

## 4.7 Operation Of The Tank Drain Valve



**WARNING: BEFORE USING THE TANK DRAIN, VERIFY THAT DISPOSAL OF WASTE IS DONE ACCORDING TO CHEMICAL LABEL INSTRUCTIONS AND LOCAL REGULATIONS.**

The HARDI® ATV Sprayer is equipped with a remote operated tank drain. Pull the string at the left hand side of the tank to open the drain valve. The valve is spring loaded to close, but can be kept open by pulling the string out and upwards into the V-shaped slot (Fig. 11).

To release and close the drain valve again, pull the string downwards and the valve will close automatically.

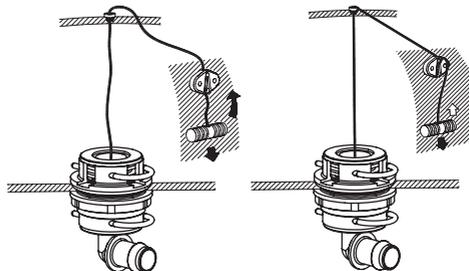


Fig. 11

## 4.8 Adjustment Of Air Pressure In Pressure Damper

The air pressure in the damper on the 1203 pump is factory preset at 30 psi (2 bar). This is suitable for nozzle spray pressures between 45 psi (3 bar) and 225 psi (15 bar). If different nozzle pressures are required, set pressure damper at pressures indicated.

	
PSI (BAR)	PSI (BAR)
20-45 (1-3)	0-15 (0-1)
45-255 (3-15)	15-45 (1-3)



## 4.9 Unfolding/Folding Boom

### Unfolding Boom into operating position

1. Remove transport lock pins **A** (Fig. 12) and swing boom into operating position. Store transport lock pins in original locations so they don't get lost.
2. Lift outer boom sections up and over to horizontal position (not necessary for 20' MB boom). Carefully check that feed hoses do not interfere with spray pattern.
3. Remove trapeze lock pin **B** (Fig. 12) to allow for self-levelling boom feature (40' MB boom only).

**Note:** The trapeze lock pin may also be used to lock the boom in a tilted position (40' MB boom only).

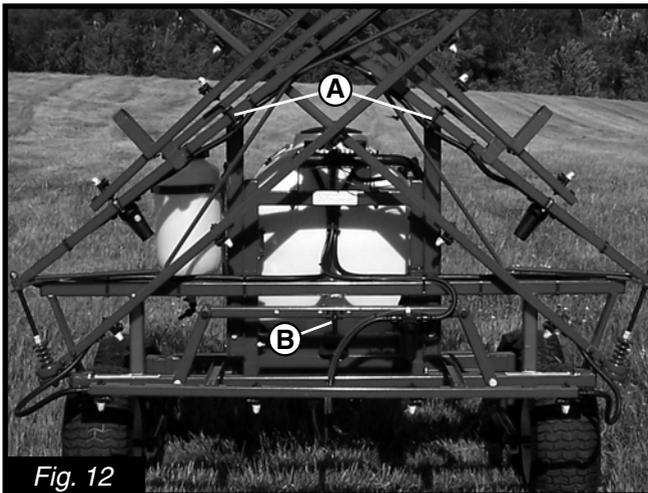


Fig. 12



### Folding Boom into transport position

1. Replace trapeze lock pin **B** (Fig. 12) in center position (40' MB boom only).
2. Fold outer boom section over to rest on inner boom section (not necessary for 20' MB boom).
3. Remove transport lock pins **A** (Fig. 12) and fold boom into transport position. Secure with transport lock pins **A** (Fig. 12).



**WARNING: MAKE ABSOLUTELY CERTAIN BOOM TRANSPORT LOCK PINS ARE INSTALLED AND SECURED WITH CLIP PINS BEFORE TRANSPORTING THE SPRAYER.**

## 4.10 Boom Height Adjustment

Correct boom height is important to ensure even spray distribution. For the best distribution with HARDI® ISO F-110 standard flat fan nozzles, HARDI® recommends a boom height of 20" above the target surface. Consult your HARDI® NOZZLES product guide for recommended boom height for other nozzles.

The boom height for the MB booms on the ATV sprayer is adjusted manually as follows:

1. Support boom with appropriate lifting device.
2. Loosen bolts **A** and remove bolts **B** (Fig. 13) on both sides of sprayer frame.
3. Raise or lower boom to desired hole setting.
4. Reinstall bolts **B** and tighten bolts **A** (Fig. 13).

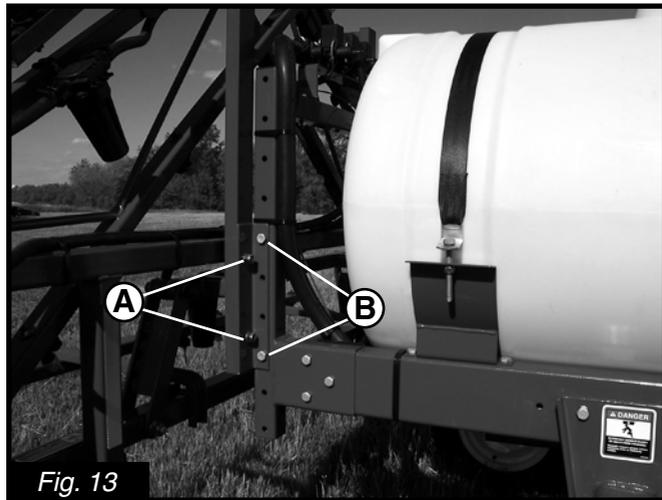


Fig. 13

# 5.0 NOZZLE SELECTION

Correct selection of nozzle and calibration of the sprayer are critical to achieve accurate and cost effective use of farm crop protection products.

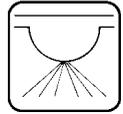
Your HARDI® sprayer has been supplied with 110° flat spray Red ISO Color Tips™ that will apply approximately 20 U.S. GPA at 30 PSI and 5 MPH.

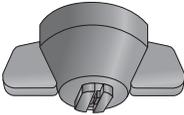
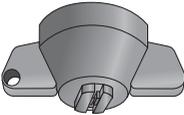
The 110° flat spray nozzle was chosen rather than the 80 degree nozzle for two reasons: 1- It may be used at a lower minimum height which reduces the risk of wind drift; 2- it's greater overlap permits better uniformity of spray distribution, particularly if boom height varies on rough ground. Normal boom height setting with 110° nozzles is 18" to 20" above the crop or weeds, whichever is taller.

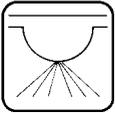
Should you wish a different application rate or different type of nozzle, HARDI® manufactures a nozzle for virtually every need.

**IMPORTANT: Always consult your chemical supplier for recommended chemical rate and water application rate. Always wear protective gloves when handling nozzles.**

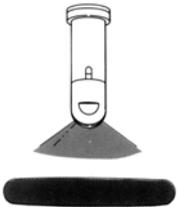
The following tables show what types of spray nozzles are suitable for different applications. It is important to use the correct nozzle.

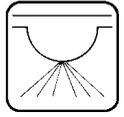


	<p><b>HARDI® ISO COLOR TIPS™</b> 110 degree flat fan, one piece cap and nozzle; color coded for flow rate selection. For herbicides, insecticides, and fertilizer applications. 50, 80, and 100 mesh screens are normally used.</p>	<p>F110</p>
	<p><b>HARDI® ISO LowDrift COLOR TIPS™</b> 110 degree flat fan, one piece cap and nozzle, 1553 solid stream nozzle; color coded for flow rate selection. In-Line Filters will normally be used.</p>	<p>LD110</p>



	<p><b>HARDI® INJET™ NOZZLES;</b> air inclusion nozzles with removable restrictor. Color coded for flow rate selection. In-Line Filters will normally be used.</p>	
	<p><b>FLAT SPRAY NOZZLES</b> in 65 degree, 80 degree, and 110 degree spray angles. For herbicides, insecticides, and fertilizer applications. 50, 80, and 100 mesh screens are normally used.</p>	<p>4665-65 degree 2080-80 degree 4110-110 degree</p> <p>Part # 330013- O-ring</p>
	<p><b>FLOOD NOZZLES</b> set at 40° spacing. Designed for high volume application.</p>	<p>4598</p>
	<p><b>HOLLOW CONE NOZZLES</b> for high pressure and high volume insecticide application in row crops. 1553 nozzles are ALWAYS used with swirl plates shown below EXCEPT when used as solid stream nozzles. 50, 80, or 100 mesh screens are normally used with these nozzles</p>	<p>1553 Must add swirl to produce hollow cone pattern</p>
	<p><b>SWIRL PLATE</b> used in conjunction with cone nozzle to create desired spray pattern. These swirls work with 1553 series cone nozzles. Grey, blue, or black swirls are used to create hollow cone effect. White swirls are used to create full cone effect.</p>	<p>Grey Blue Black White</p>

	<p><b>HOLLOW CONE CERAMIC NOZZLES</b> for high pressure and high volume fungicide and insecticide application.</p>	<p>1299</p>
	<p><b>LARGE DROPLET HOLLOW CONE NOZZLE</b> for use where drift must be kept to a minimum. These nozzles must always be fitted with 1553 nozzles and grey swirl plates. 50, 80 or 100 mesh screens are normally used with these nozzles.</p>	<p>371077</p>
	<p><b>LARGE DROPLET FLAT SPRAY TIP IN 150 DEGREE SPRAY ANGLE.</b> Always used in conjunction with 1553-14-16-18 or 20 cone nozzle. 50, 80 or 100 mesh screens are normally used with these nozzles.</p>	<p>371551</p>
	<p><b>SOLID STREAM NOZZLE</b> for high volume liquid fertilizer application. In this application, the 1553 nozzle is always used with 330013 o-ring and 50, 80 or 100 mesh screens.</p>	<p>1553 less swirl</p>
	<p><b>HARDI® QUINTASTREAM 5 HOLE LIQUID FERTILIZER NOZZLE</b> Five streams of liquid are distributed at different angles and flows. Highest flow is from the middle stream and lowest in the outer; overlapping streams. This allows for boom movements that do not influence distribution. Boom heights of 20" can be used as safely as 30".</p>	<p>372011 thru 372019</p>





## 5.1 Calibration

**WARNING: ALWAYS CALIBRATE YOUR SPRAYER WITH CLEAN WATER ONLY! IN ADDITION, WEAR PROTECTIVE CLOTHING WHEN CALIBRATING YOUR SPRAYER!**



### Why must you calibrate a sprayer?

A nozzle selection chart will tell you what application rate you should expect. Variations due to nozzle wear, errors in pressure adjustment, and tractor speedometer can result in a possible error in application rate.

### How do you calibrate a sprayer?

Calibration kits are available from HARDI®, #818493 for US gallons & #818492 for metric calibration.

Following are some tips to remember when using the calibration kit method:

- When determining the length of time required to drive the recommended distance, drive in actual field conditions with a half-full tank.
- Repeat the test several times, each time avoiding the tracks from the previous test. Take the average of the times recorded.
- Calibration of the sprayer should be completed at the beginning of the season and repeated after every 2 to 3 full days of spraying, and every time you change volume rate or use new nozzles.
- Before you calibrate, check the flow of each nozzle. If it puts out more than 10% of its original volume, replace it.

Select your calibration method: Ounce method or Formula method. Then follow the steps described in the corresponding section(s):

## Ounce Method



1. Determine how long it takes to cover the test strip. Use the following chart to determine the length of your test strip. Row width for broadcast application is equal to your nozzle spacing. For your drop nozzle or band application, use row spacing.

<u>Row width or nozzle spacing (in.)</u>	<u>Distance (ft.)</u>
40	102
38	107
36	113
34	120
32	127
30	136
28	146
26	157
24	170
22	185
20	204
18	227
16	255
14	291

2. Measure the amount of time it takes you to travel the test strip when throttle is set at spraying speed.
3. In a container (with oz. measurements), catch the spray from one nozzle for that amount of time. For drop or band nozzles, catch the spray from all nozzles for the row.
4. Read the ounces in the container. That is the actual U.S. GPA applied. (ounces = GPA)



## Formula Method

1. Check your spraying speed. Measure a test strip of at least 200 feet (300 feet is ideal). Travel the distance at the speed you plan on spraying and record the time it takes to travel the distance. Read from the chart or use the formula to find your exact travel speed.

### Travel Time (in seconds)

	<u>Speed in MPH</u>	<u>200 ft.</u>	<u>300 ft.</u>
	3.0	45	68
	3.5	39	58
	4.0	34	51
	4.5	30	45
	5.0	27	41
	6.0	23	34
	7.0	19	29
	7.5	18	27
	8.0	17	26
	9.0	15	23

#### **Formula:**

$$\frac{\text{distance (ft.)} \times 0.68}{\text{seconds}} = \text{MPH}$$

#### **Formula:**

$$\text{GPM} = \frac{10 \times 7 \times 20}{5940} = .24 \text{ GPM}$$

- Note:** W=
- Nozzle spacing (in inches) for broadcast application.
  - Row spacing (in inches) divided by number of nozzles per row for drop nozzle application.
  - Sprayed band width or swath width (in inches) for band application divided by number of nozzles per band.
  - Note that on the nozzle wheel, W = 20 inches.

3. Set correct pressure. Read the required pressure from the nozzle table in the nozzle catalogue or nozzle wheel. With clean water in the tank and line, turn on the sprayer and set the target pressure. Collect the spray from one nozzle for one minute in a container. Adjust pressure until you collect the precise GPM called for.

## Calibration For Carriers Other Than Water

Use the following water rate conversion chart to determine the right conversion factor. When you've determined the new converted GPM or GPA, you can follow the steps on either the pressure or ounce method of calibration.



<u>Weight of solution</u>	<u>Specific Gravity</u>	<u>Conversion Factors</u>
7.00 lbs/gal	.84	.92
8.00 lbs/gal	.96	.98
8.34 lbs/gal-water	1.00	1.00
9.00 lbs/gal	1.08	1.04
10.00 lbs/gal	1.20	1.10
10.65 lbs/gal-28% N	1.28	1.13
11.00 lbs/gal	1.32	1.15
12.00 lbs/gal	1.44	1.20
14.00 lbs/gal	1.68	1.30

Example: 20 GPA of 28% N  
Then GPA (solution) x conversion factor = GPA (water)  
20 GPA (28% N) x 1.13 = 22.6 GPA (water)  
Calibrate for 22.6 GPA of water

For conversion to Imperial gallons per acre, multiply U.S. GPA by .833

For conversion to liters per hectare, multiply U.S. GPA by 9.34

For conversion to liters per acre, multiply U.S. GPA by 3.78

Formula for tractor speed:  $\frac{\text{Distance (in feet)}}{\text{Second}} \times .682 = \text{MPH}$



## 6.0 MAINTENANCE

**IMPORTANT:** *Always clean the boom at the end of your workday or before servicing is done to avoid unnecessary contact with chemicals.*

In order to derive full benefit from the sprayer for many years, the following service and maintenance program should be followed.

### 6.1 Cleaning The Sprayer

#### Guidelines

Read the whole chemical label. Take note of any particular instructions regarding recommended protective clothing, deactivating agents, etc. Read the detergent and deactivating agent labels. If cleaning procedures are given, follow them closely.

Be familiar with local legislation regarding disposal of pesticides washings, mandatory decontamination methods, etc. Contact the appropriate department, e.g. Dept. of Agriculture.

Pesticide washings can usually be sprayed out on a soakaway. This is an area of ground that is not used for cropping. You must avoid seepage or runoff of residue into streams, water courses, ditches, wells, springs, etc. The washings from the cleaning area must not enter sewers. Drainage must lead to an approved soakaway.

Cleaning starts with the calibration, as a well calibrated sprayer will ensure the minimal amount of remaining spray liquid.

It is good practice to clean the sprayer immediately after use, thereby rendering the sprayer safe and ready for the next pesticide application. This also prolongs the life of the components.

It is sometimes necessary to leave spray liquid in the tank for short periods, e.g. overnight, or until the weather becomes suitable for spraying again. Unauthorized persons and animals must not have access to the sprayer under these circumstances.

If the product applied is corrosive, it is recommended to coat all metal parts of the sprayer before and after use with a suitable rust inhibitor.

Remember: Clean sprayers are safe sprayers.

Clean sprayers are ready for action.

Clean sprayers can not be damaged by pesticides and their solvents.

## Cleaning the tank

1. Dilute remaining spray liquid in the tank with at least 10 parts of water and spray the liquid out in the field you have just sprayed.  
**Note:** It is advisable to increase the forward speed (double if possible) and reduce the pressure. For ISO F110 nozzles, pressure may be reduced to 22psi (1.5 bar).
2. Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
3. Rinse and clean sprayer and tractor externally. Use detergent if necessary.
4. Remove and clean tank filters and suction filters. Be careful not to damage the mesh. Replace suction filter lid. Replace filters when the sprayer is completely clean.
5. With the pump running, rinse the inside of the tank. Remember the tank roof. Rinse and operate all components and any equipment that has been in contact with the chemical.
6. After spraying the liquid out again in the field, stop the pump and fill at least 1/5 of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent, eg. Washing soda or Triple ammonia.  
**Note:** If a cleaning procedure is given on the chemical label, follow it closely.
7. Start the pump and operate all controls enabling the liquid to come in contact with all the components. Leave the distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label.
8. The Self-Cleaning Filter can be flushed by removing the bypass hose from the bottom of the filter. Stop the pump and remove the hose. Start the pump for a few seconds to flush the filter. Be careful not to lose the restrictor nozzle.
9. Drain the tank and let pump run dry. Rinse inside of tank, again letting the pump run dry.
10. Stop the pump. If the chemicals used have a tendency to block nozzles and filters, remove and clean them now. Check also for sediment on the pressure side of the safety valve for the Self-Cleaning Filter.
11. Replace all the filters and nozzles and store the sprayer. If, from previous experiences, it is noted that the solvents in the chemicals are particularly aggressive, store the sprayer with the tank lid open.  
**Note:** If the sprayer is cleaned with a high pressure cleaner we recommend lubrication of the entire machine.





## 6.2 Filters

**IMPORTANT:** *Wear protective clothing when servicing & handling components that have been in contact with spray liquid.*

Clean filters ensure :

- Sprayer components such as valves, diaphragms and operating unit are not hindered or damaged during operation.
- Nozzle blockages do not occur while spraying.
- Long life of pump. A blocked suction filter will result in pump cavitation.

### Suction filter

The main filter protecting sprayer components is the suction filter at the bottom of the tank. Check it regularly.

To service the suction filter:

1. Pull the steel clip **(A)** (Fig. 14) out.
2. Remove the suction hose fitting **(B)** (Fig. 14) from housing.
3. Remove filter guide and filter **(C)** (Fig. 14).

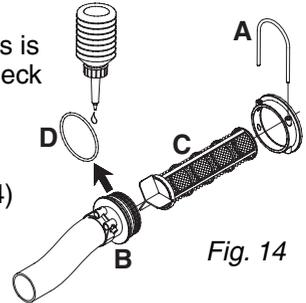
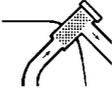
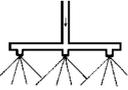


Fig. 14

To reassemble:

4. Press the guide onto filter end.
5. Place the filter into housing with guide facing to the front.
6. Ensure the O-ring **(D)** (Fig. 14) on the hose fitting is in good condition and lubricated.
7. Refit the suction hose **(B)** (Fig. 14) and steel clip **(A)** (Fig. 14).

ISO Nozzle Size	Suction Filter	Nozzle Screen (optional)	Inline Filters
			
Pink (075) Orange (01) Green (015) Yellow (02)	50	100	100
Lilac (025) Blue (03)	50	80	80
Red (04) & Larger	30*	50*	50*

\*Standard mesh

## 6.3 Nozzle Tubes And Fittings

Poor seals are usually caused by:

- Missing O-rings or gaskets
- Damaged or incorrectly seated O-rings
- Dry or deformed O-rings or gaskets
- Foreign materials

Therefore, in case of leaks; **DO NOT** overtighten (Fig. 15). Disassemble, check condition and position of O-ring or gasket, clean, lubricate and reassemble. For **radial** type seals (O-ring)(Fig.15) hand tighten only, do not use pliers.

The O-rings need to be lubricated **ALL THE WAY AROUND** before fitting on to the nozzle tube.

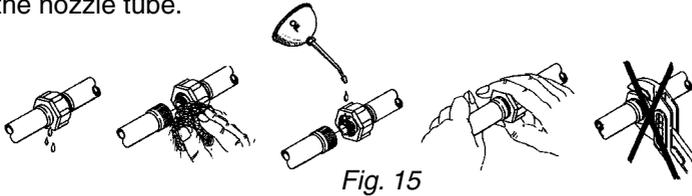


Fig. 15

HARDI® recommends using a vegetable based oil to prolong the life of the O-ring.

## 6.4 Wheel Nuts And Bearings Adjustment

**WARNING: BLOCK WHEELS ON TRAILER TO PREVENT ROLLING.**

Check wheel bolt tension after the first 8 working hours, hereafter every 50 hours. Torque wheel nuts to 85 ft. lbs. maximum.

Check bearing for slack after the first 8 hours of operation and again after 50 hours of operation. Thereafter every 100 hours. (Fig. 16)

If necessary, adjust as follows:

1. Jack sprayer up. It is best to remove the wheel. (Make sure to adequately support the sprayer and completely drain tank.)
2. Remove hub cap and cotter pin.
3. Axle nut is tightened until slight rotation resistance of hub is noted.
4. Now loosen axle nut until first split pin hole is visible.
5. Insert cotter pin, fold and replace hub cap.

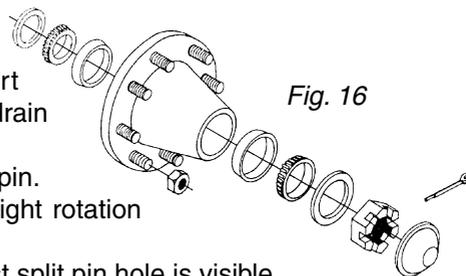


Fig. 16

After 1000 hours or once a year, the axle bearings should be repacked with new grease.





## 6.5 Recommended Tire Pressure

The tires should not run under-inflated. This only promotes instability and rapid wear.

Tire size	Maximum pressure
23 x 10.5 - 12	20 psi (1.5 bar)

Do not exceed 15 mph.

## 6.6 Changing The Valves And Diaphragms (1203 Pump)

**Note:** It is recommended that if one or more diaphragms and or valves need replacing, they should all be replaced (HARDI® Complete rebuild kit for 1203 diaphragm pump - #750696).

1. Remove the valve cover **1** (Fig. 17). Before changing the valves **2** (Fig. 17), note the orientation of the valves so that they are replaced correctly.
2. It is recommended to use new O-rings **3** (Fig. 17) (part #330072) when changing or checking valves.
3. Remove diaphragm covers **4** (Fig. 17) to gain access to the diaphragms.
4. Remove the diaphragm bolts **5** (Fig. 17). The diaphragms **6** (Fig. 17) may now be changed.
5. If fluids have reached the crankcase, regrease the pump thoroughly. Also make sure the drain hole at the bottom of the pump is not blocked.
6. Reassemble with torque settings shown below.

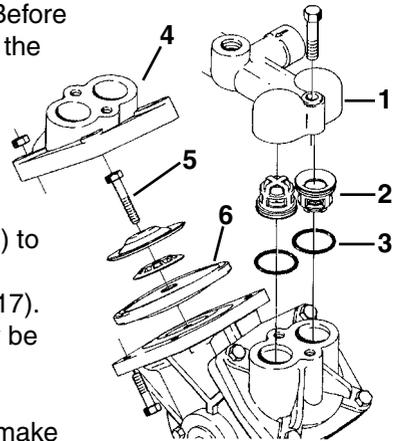


Fig. 17

Valve Cover Ft/lb(Nm)	Diaphragm Bolt Ft/lb(Nm)	Diaphragm Cover Ft/lb(Nm)
45 (60)	45 (60)	50 (70)

## 6.7 Breakaway Clutch Adjustment

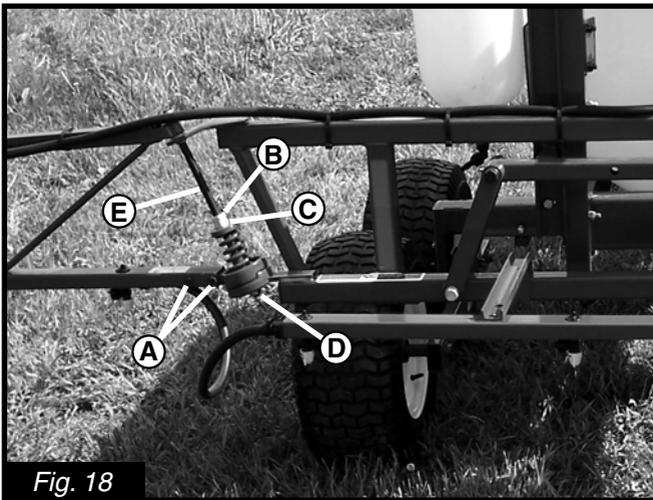
**WARNING: NEVER PLACE FINGERS INTO OPEN BREAKAWAY CLUTCH OR YOU MAY BE INJURED SHOULD CLUTCH SNAP CLOSED! DO NOT TIGHTEN THE BREAKAWAY CLUTCH MORE THAN WHAT IS NECESSARY! OVER TIGHTENING CAN CAUSE DAMAGE TO THE BOOM!**



**IMPORTANT: Properly lubricate clutch assembly before adjusting the tension. Breakaway clutch cap screws (A) (Fig. 18) must be torqued to 40 Ft/lb (55 N-m) every week (40 hours) to prevent boom damage. Lubricate every day (8 hours) to ensure maximum performance and life.**

The tension on the clutch for the breakaway wing section can be adjusted by loosening or tightening nut **C** (Fig. 18).

1. Check that the lower nut **D** (Fig. 18) is fully tightened.
2. The breakaway wing section should pivot around the axle shaft **E** (Fig. 18). Make sure wing section is free to move.
3. Loosen jam nut **B** (Fig. 18).
4. If the breakaway clutch releases too easily, tighten nut **C** (Fig. 18). If the breakaway clutch releases too stiffly, loosen nut **C** (Fig. 18). Clutch is properly tensioned when breakaway wing section returns to alignment with center section after breaking away.
5. Tighten jam nut **B** (Fig. 18) after adjustment.



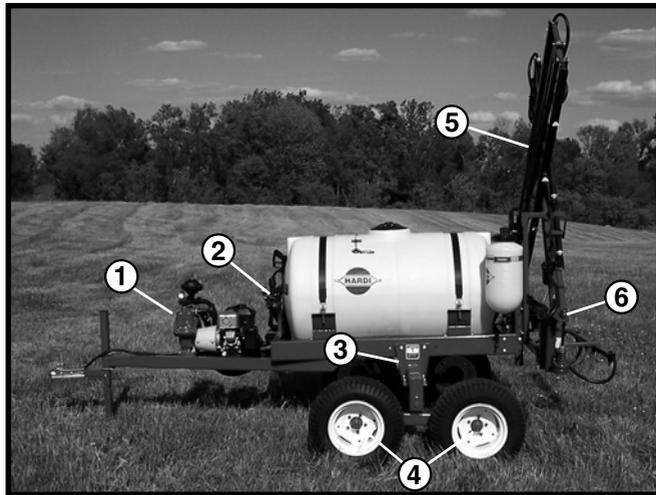


## 6.8 Lubrication

Recommended lubrication is shown in following tables.  
Use ball bearing grease (lithium grease No. 2)

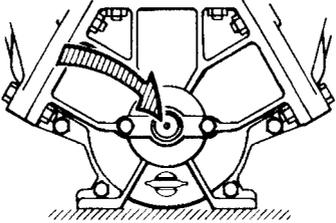
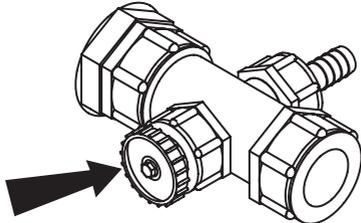
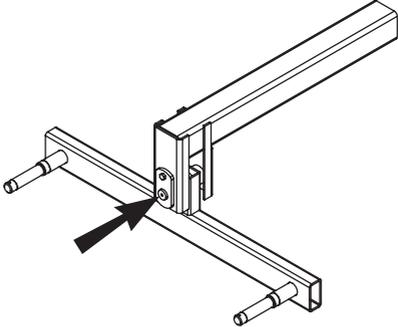
**Note:** If the sprayer is cleaned with a high pressure cleaner or fertilizer has been used, we recommend lubrication of all sections.

<b>POS.</b>	Position on sprayer		Grease		Page to find more information
	Oil		Operation hours		Winter protection or off-season storage



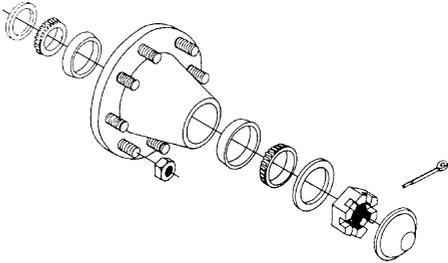
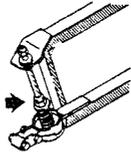
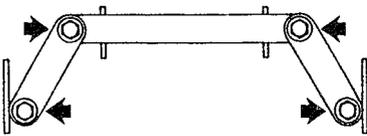
*150 GALLON ATV SPRAYER*

1. Pump
2. Agitation Control
3. Axle
4. Wheel Bearings
5. MB Boom
6. Trapeze (40' MB only)

POS.					
1		X	40		36
2	X		50		
3		X	8		14





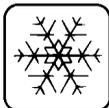
POS.					
<b>4</b>		<b>X</b>	<b>1000</b>		<b>35</b>
<b>5</b>		<b>X</b>	<b>8</b>		<b>37</b>
<b>6</b>		<b>X</b>	<b>8</b>		

## 7.0 Off-Season Storage

When the spraying season is over, you should devote some extra time to the Sprayer. If chemical residues are left over in the sprayer for long periods, it can reduce the life of the individual components. To preserve the sprayer and protect the components, carry out the following off-season storage program:



1. Clean the sprayer completely - inside and outside - as described under "Cleaning The Sprayer" (section 5.1). Make sure that all valves, hoses and auxiliary equipment have been cleaned with detergent and flushed with clean water afterwards, so no chemical residues are left in the sprayer.
2. Replace any damaged seals and repair any leaks.
3. Empty the sprayer completely and let the pump work for a few minutes. Operate all valves and handles to drain as much water out of the spraying circuit as possible. Let the pump run until air is coming out of all the nozzles.
4. Pour in a mixture of ethylene glycol base antifreeze and water at the ratio for the desired temperature protection (there will be a small amount of water left in the hoses, pump and bottom of tank). The volume of the mixture needs to be enough to keep the tank sump full while the pump is running fluid through the entire circuit.
5. Engage the pump and operate all valves and functions of the plumbing system. Spray the spraygun (optional) into the tank until antifreeze sprays out to make sure the line is full of antifreeze. Open the distribution valves so the antifreeze is sprayed through the nozzles as well. The antifreeze will also prevent O-rings, seals, diaphragms etc. from drying out.
6. When the sprayer is dry, remove rust from any scratches or damages in the paint and touch up the paint.
7. Lubricate all lubricating points according to the lubricating scheme regardless of intervals stated.
8. Remove the glycerine-filled pressure gauge and store in a vertical position in frost free conditions.
9. Apply a thin layer of anticorrosive oil (e.g. SHELL ENSIS FLUID, CASTROL RUSTILLO or similar) on all metal parts. Avoid oil on rubber parts, hoses and tires.



## **Off-Season Storage (continued)**

10. All electric plugs and sockets are to be stored in a dry plastic bag to protect them against moisture, dirt, and corrosion.
11. Remove all the control boxes (including any rate controller control box) from the ATV/tractor and store them in a dry and clean place.
12. Jack up the axle and place wooden blocks under the wheels to prevent moisture damage and deformation of the tires. Tire black can be applied to the tire side walls to preserve the rubber.
13. To protect against dust, the sprayer can be covered by a tarpaulin. Ensure ventilation to prevent condensation.

### **7.1 Preparation After Off-Season Storage**

After a storage period, the sprayer should be prepared for the next season the following way:

1. Remove the cover. (If fitted)
2. Remove the blocks from under the wheels and adjust the tire pressure.
3. Replace the pressure gauge. Seal with Teflon tape.
4. Connect the sprayer to the ATV/tractor, including electrics.
5. Empty the tank of remaining antifreeze.
6. Rinse the entire liquid circuit on the sprayer with clean water.
7. Fill with clean water and check all functions.

## 8.0 ACCESSORIES

### 8.1 Clean Water Dispenser

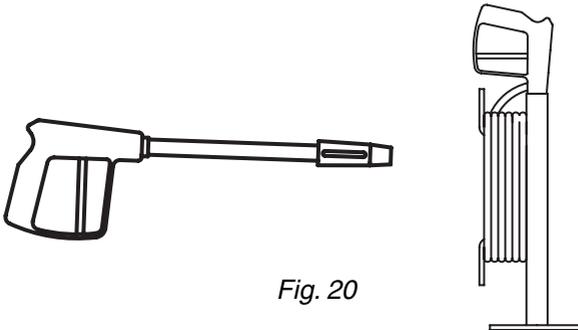


*Fig. 19*

*Clean Water Dispenser*

A handy source of fresh water on the sprayer to clean up plugged nozzles and for rinsing gloves and hands after performing service or maintenance.

### 8.2 Spraygun And Hose Wrap (optional)



*Fig. 20*

A spraygun with adjustable spray pattern and 25 ft. of 3/8" hose for spraying fence row or spot spraying a small area can be installed onto your sprayer. A handy hose wrap and spraygun holder can be conveniently located on the sprayer to transport the spraygun.





### 8.3 Maverick Rate Controller (optional)



Fig. 21

The Maverick Rate Controller offers precise rate control regardless of field conditions. It is equipped with a Master control switch and built-in boom switches. It features on-the-go rate adjustment, push button auto/manual control for spot treatment, as well as a minimum flow feature to ensure proper application pattern as ground speed slows to extremes.

### 8.4 SMV Sign Kit (optional)

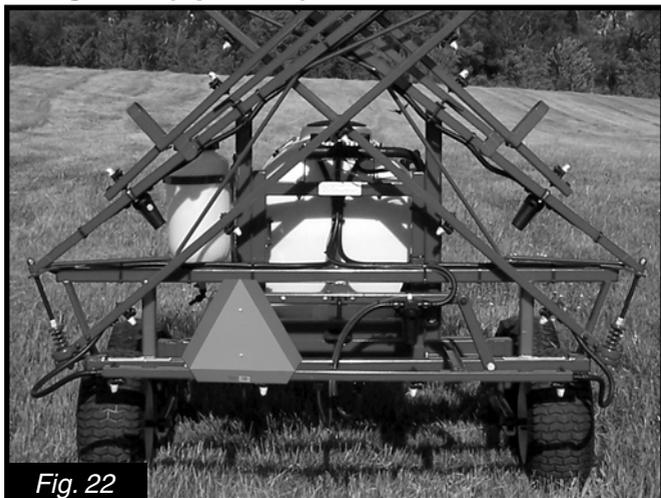


Fig. 22

A kit is available to mount an SMV Sign to the ATV Sprayer.

# 9.0 TROUBLESHOOTING

## 9.1 General Spray Systems

<b>Problem</b>	<b>Cause</b>
1. No liquid getting to the pump.	A. Suction filter plugged. B. Suction valve off.
2. Lack of pressure	A. Suction filter plugged. B. Suction side air leak. C. Check pump valves for obstructions and wear. Replace valves if necessary. (Section 6.6) D. Check pressure gauge.
3. Pressure jumping	A. Small tear or pin hole in suction hose. B. Suction filter partially plugged. C. Check pressure gauge.
4. Control box not operating one or more boom sections	A. Check connections at battery. B. Check for blown inline fuse on power supply wiring harness. (7.5 Amp - Section 3.5) C. Check electrical wiring for bad connection. D. Check for 12 Volts at boom distribution valve solenoids.
5. Liquid leaking from pump	A. Replace diaphragms. (Section 6.6)
6. Poor agitation	A. Agitation valve not open. B. Agitation nozzle plugged. C. Agitation nozzle missing.
7. Can't get tank empty.	A. Small tear or pin hole in suction hose. B. Tank is not level (change angle of tongue).





## 10.0 WARRANTY POLICY AND CONDITIONS

HARDI® INC., 1500 West 76th Street, Davenport, Iowa USA: 5646 W. Barstow, Fresno, CA, USA; and 290 Sovereign Road, London, Ontario, Canada hereinafter called "HARDI®", offers the following limited warranty in accordance with the provisions below to each original retail purchaser of HARDI® new equipment of its own manufacturer, from an authorized HARDI® dealer, that such equipment is at the time of delivery to such purchaser, free from defects in material and workmanship and that such equipment will be warranted for a period of one year from the date of delivery to the end user providing the machine is used and serviced in accordance with the recommendations in the Operator's Manual and is operated under normal farm conditions.

1. This limited warranty is subject to the following exceptions:
  - a) Parts of the machine not manufactured by HARDI®, (i.e. engines, tires, tubes, electronic controls, and other components or trade accessories, etc.) are not covered by this warranty but are subject to the warranty of the original manufacturer. Any claim falling into this category will be taken up with the manufacturer concerned.
  - b) This warranty will be withdrawn if any equipment has been used for purposes other than for which it was intended or if it has been misused, neglected, or damaged by accident, let out on hire or furnished by a rental agency. Nor can claims be accepted if parts other than those manufactured by HARDI® have been incorporated in any of our equipment. Further, HARDI® shall not be responsible for damage in transit or handling by any common carrier and under no circumstances within or without the warranty period will HARDI® be liable for damages of loss of use, or damages resulting from delay or any consequential damage.
2. We cannot be held responsible for loss of livestock, loss of crops, loss because of delays in harvesting or any expense or loss incurred for labor, supplies, substitute machinery, rental for any other reason, or for injuries either to the owner or to a third party, nor can we be called upon to be responsible for labor charges, other than originally agreed, incurred in the removal or replacement of components.
3. The customer will be responsible for and bear the costs of:
  - a) Normal maintenance such as greasing, maintenance of oil levels, minor adjustments, etc.
  - b) Transportation of any HARDI® product to and from where the warranty work is performed.
  - c) Dealer travel time to and from the machine or to deliver and return the machine from the service workshop for repair.
  - d) Dealer traveling costs.
4. Parts defined as normal wearing items, (i.e. tires and V-belts) are not in any way covered under this warranty.
5. This warranty will not apply to any product which is altered or modified without the express written permission of HARDI® and/or repaired by anyone other than an Authorized Service Dealer.
6. Warranty is dependent upon the strict observance by the purchaser of the following provisions:
  - a) That this warranty may not be assigned or transferred to anyone.
  - b) That the Warranty Registration Certificate has been correctly completed by dealer and purchaser with their names and addresses, dated, signed and returned to the appropriate address as given on the Warranty Registration Certificate.
  - c) That all safety instructions in the operator's manual shall be followed and all safety guards regularly inspected and replaced where necessary.
7. No warranty is given on second-hand products and none is to be implied.

# WARRANTY POLICY AND CONDITIONS



8. Subject to the following terms, conditions and contributions, HARDI® extends the warranty on polyethylene tanks (excluding fittings, lids and gaskets) to FIVE YEARS. To qualify for this extended warranty, the tank must be drained and flushed with fresh water after each day of use. HARDI®'s liability is limited to replacement of the tank, FOB our plant at no cost to the purchaser during the first twelve months; at 20% of the then current price during the second year ; at 40% during the third year ; at 60% during the fourth year ; and at 80% during the fifth year. This five year extended warranty is subject, in each instance, to the tank being inspected and approved for replacement or repair by HARDI® personnel before HARDI® will accept any liability hereunder.
9. Subject to the following terms, conditions and contributions, HARDI® extends the warranty on HARDI® diaphragm pumps (excluding wearing parts such as diaphragms, valves, etc.) to FIVE YEARS. To qualify for this extended warranty, the pump must be drained and flushed with fresh water after each day of use. HARDI®'s liability is limited to replacement of defective parts, FOB our plant at no cost to the purchaser during the first twelve months after date of purchase, at 20% of the then current retail price during the second year ; at 40% during the third year ; at 60% during the fourth year ; and at 80% during the fifth year. This five year extended warranty is subject, in each instance, to the pump being inspected and approved for replacement or repair by HARDI® personnel before HARDI® will accept any liability hereunder.
10. HARDI® reserves the right to incorporate any change in design in its products without obligation to make such changes on units previously manufactured.
11. The judgement of HARDI® in all cases of claims under this warranty shall be final and conclusive and the purchaser agrees to accept its decisions on all questions as to defect and to the exchange of any part or parts.
12. No employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of HARDI® at it's head office.
13. Any warranty work performed which will exceed \$400.00 MUST be approved IN ADVANCE by the Service Manager.
14. Claims under this policy must be filled with HARDI® within thirty (30) days of work performed or warranty shall be void.
15. Parts requested must be returned prepaid within thirty (30) days for warranty settlement.
16. Warranty claims must be COMPLETELY filled out properly or will be returned.

## DISCLAIMER OF FURTHER WARRANTY

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT AS SET FORTH ABOVE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE PRODUCT CONTAINED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES (SUCH AS LOSS OF ANTICIPATED PROFITS) IN CONNECTION WITH THE RETAIL PURCHASER'S USE OF THE PRODUCT.

