



HC 650M/950M OPERATORS MANUAL

Part No. 105032 10/95

HARDI reserves the right to make changes in design, material, or specification without notice thereof.

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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 accesories 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 spray 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 HARDI sprayer were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions.

Please address your correspondence to the Service Manager at one of these branches:

HARDI MIDWEST
1500 West 76th St.
Davenport, Iowa 52806
Phone: (319) 386-1730

HARDI GREAT LAKES
290 Sovereign Rd.
London, Ontario N6M 1B3
Phone: (519) 659-2771

Sincerely,

A handwritten signature in black ink, appearing to read "Tom L. Kinzenbaw".

Tom L. Kinzenbaw
President



Fig. 1
HC 650M W/ EAGLE BOOM

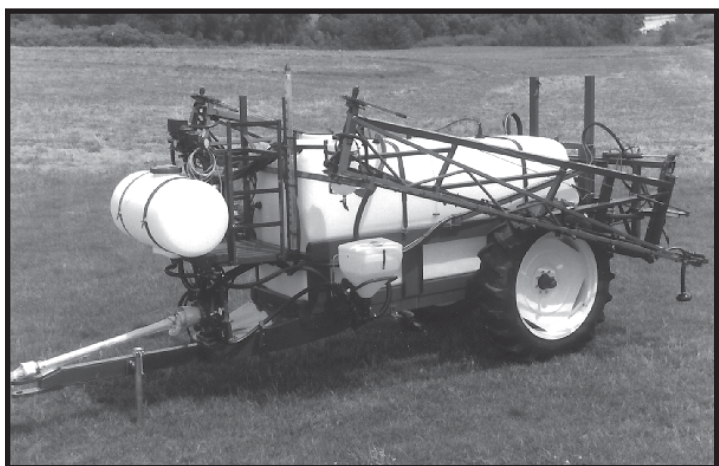


Fig. 2
HC 950M W/ EAGLE BOOM

1.0 INTRODUCTION



The H.C. (High Clearance) models consist of a pump, frame with a tank that has either 650 or 950 gallon capacities, EC-Controls (Electric Control), Manifold system, self cleaning filter and a 45',50',60',66',80',88', or 90' hydraulic folding Eagle series spray booms. Manual fold booms are also available in 42',45', or 50' widths for the 650M Models only.

The heart of your sprayer is the diaphragm pump. Because the design is simple, low maintenance requirements and pump life is guaranteed. Vital parts such as the bearings and crankshaft are separated from the diaphragms and valves and ensures that the spray solution does not make contact. The pump is self priming and it can be run dry without damage. The tanks are made of impact proof and chemical resistant polyethylene. The purposeful design with rounded contours allows efficient cleaning and draining.

The EC (electric control) unit consists of: on/off control valve, pressure regulating valve with built-in HARDI-Matic, pressure gauge, distribution valves with pressure equalization.

HARDI-Matic is a mechanical rate controller that ensures a constant volume of spray solution per acre even at varying speeds in the same gear. Maximum performance of the HARDI-Matic is obtained with a P.T.O. shaft speed of 300-600 rpm.

The "Manifold System" features color coded three way valves on suction and pressure sides of the liquid control system. It allows for safe and simple use of the sprayer and accessories from one position. The self-cleaning filter screens out impurities from the spray solution which are recirculated back to the main tank while clean solution is constantly being supplied to the boom.

The Eagle hydraulic series boom is available with either 3(HY model) or 5 (HZ model) hydraulic cylinders. The base version being the HY model, includes boom height adjustment and fold/unfold features all controlled from the tractor. The HZ model has all the same features as the HY model but also includes individual wing tilt and fold as added features. Both versions require single and double acting hydraulic outlets on the tractor as well as a 12V connection for the HZ model. The MB (manual fold boom) offers hydraulic height adjustment as standard equipment and hydraulic wing tilt as an option.



2.0 SAFETY INFORMATION

WARNING



**ALWAYS READ OPERATORS MANUAL BEFORE
USING 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

- 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. Be sure that new equipment components include any current safety labels. Replacement safety labels are available from your authorized HARDI dealer.
- Learn how to operate the sprayer and how to use the controls properly. Do not let anyone operate the machine without proper instructions.
- Keep your sprayer in proper working condition. Unauthorized modifications or use may impair the function and/or safety and affect the machines life.
- 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 lead to personal injury.
2. Before starting the engine on the tractor unit, be sure all operating controls are in the off or neutral position, including but not limited to the P.T.O. shaft and/or spray controls. Be sure the tractor power train is disengaged.
3. Operate spray and boom functions only when seated in the Operator's seat.





2.2 OPERATING THE SPRAYER SAFELY: Continued

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. Before leaving the 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 tractor operations manual for added safety precautions.
6. PTO driven equipment can cause serious injury. Before working on or near the P.T.O. shaft, servicing or cleaning the equipment, put PTO lever in the DISENGAGE position and stop the engine.
7. Do not fold or unfold boom near overhead wires. Serious injury or death could result if contact is made with electric wires.
8. Keep hands, feet & clothing away from moving parts.
9. Wear relatively tight and belted clothing to prevent from being caught on some part of the machine.
10. Slow down when turning especially with boom extended.
11. Always keep children away from your sprayer and/or tractor unit.
12. Before transporting the sprayer ensure that the boom is fully folded and fully locked into transport position. Ensure all locking devices are fully engaged whether hydraulic or mechanical.
13. Slow moving tractors and spray equipment can create a hazard when on public roads. Avoid personal injury or death resulting from any accidents by using flashing lights. Local regulations may require installation of flashing warning lights.
14. Avoid injuries from high pressure fluids penetrating the skin by relieving system pressure before disconnecting hydraulics or other lines. Ensure all fittings are tight before applying pressure to the system.

2.2 OPERATING THE SPRAYER SAFELY: Continued

15. Understand service procedures before undertaking any maintenance. Never lubricate, service, or adjust the machine while its moving. Securely support any components before working on them.
16. Keep all parts in good condition and properly installed. Fix damaged parts immediately. Replace worn or broken parts. Remove excessive buildup of grease, oil, or debris.



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 virtually no chance of children being 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.



2.3 HANDLING CHEMICAL PRODUCTS SAFELY: Continued

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

PHONE NO. ____ - ____ - ____



Find the phone number for the poison control center in your phone book and write it in the space above.

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 Drawbar

Warning: Trailer frame must be adequately supported and wheels blocked before adjusting drawbar position.

The drawbar is attached to the frame by through bolts **A** which can be adjusted with the extra holes **B** to keep the spray tank level independent of tractor hitch height. The drawbar can be removed and turned 180° to obtain additional height adjustment. (See fig. 3)

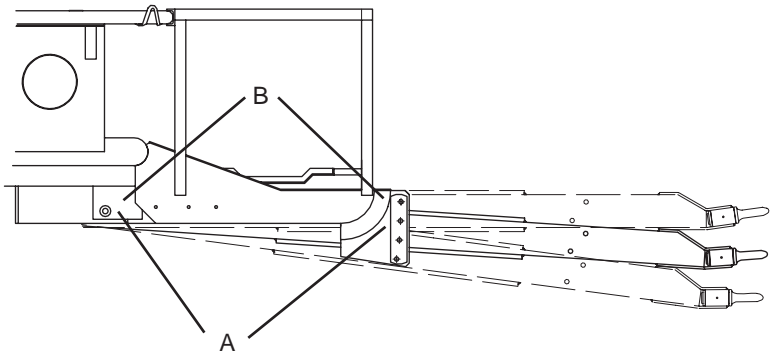


Fig. 3

3.2 Wheel Tread and Ground Clearance Adjustments

WARNING: Securely support the sprayer during axle adjustments. Never attempt to adjust axles with liquid in tank. Always block wheels on side when adjusting axles.

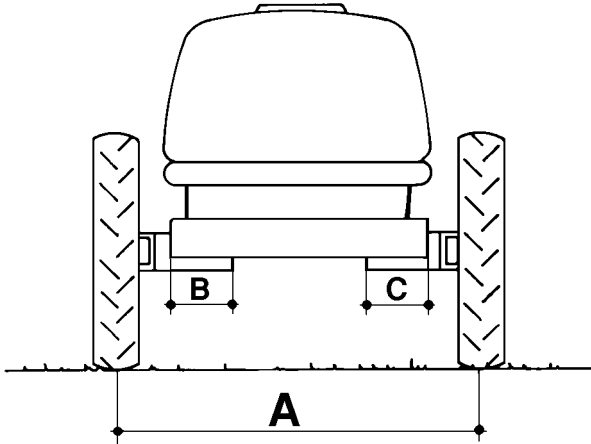


Fig. 4

The wheel tread **A** can be varied from 60" to 66". Loosen the 4 bolts at **B** & **C** and then the axle assembly can be pulled out or pushed in, until the required wheel tread is obtained. Retighten all bolts.

Ground clearance can be changed 7" by removing & rotating the axle assemblies 180°.

Note: Optional wheel tread axles.

An optional axle is available for the HC 950M that adjusts the axle tread from 76" to 88". The method of adjustment for this axle is the same as outlined above. This axle has a reinforcement bar below the axle that is locked in place when the bolts are tightened.

If tread width between 66" and 76" is required these axles will have to be shortened accordingly.

This axle can also be rotated 180° to adjust the ground clearance.





3.3 PTO Shaft

WARNING: Always stop tractor and disengage the P.T.O. while working on tractor or sprayer. Ensure that the P.T.O. safety shield is in place at all times.



When connecting the sprayer to the tractor the length of the transmission shaft should be checked and shortened if necessary. There should be at least 6" (150 mm) free play between the male and female parts when the shaft is horizontal. While connected to the tractor, check the clearance by turning sharply. Do this with caution. There should be at least 3/8" (10 mm) difference in lengths between male and female shafts when the shaft assembly is at its minimum length.

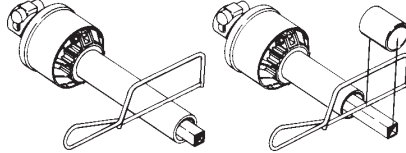


Fig. 5



To ensure long life of the transmission shaft, avoid working angles greater than 15° and turning angles greater than 70°.

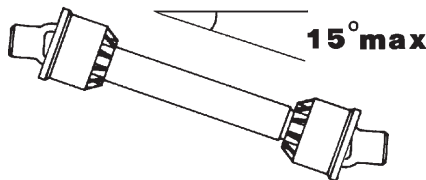


Fig. 6



It is important for the personal safety of the operator that the P.T.O. shaft remains intact. The protection guards must cover the whole shaft. This includes the universal cross covers at each end of the shaft. The chains "C" must connect so that the protection guards do not rotate with the shaft.

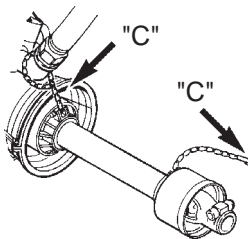


Fig. 7

3.4 Hydraulic Requirements with Eagle Boom

Hydraulic booms need one single outlet for the lift function of the spray boom and one double outlet for the folding function. Note that the hydraulic system requires an oil capacity of approximately 3 litres or .8 GPM and a minimum pressure of 130 bar or 1,950 PSI .

**TURN TRACTOR OFF!
BE SURE TO HOOK-UP HYDRAULIC LINES PROPERLY!
IMPROPER HOOK-UP CAN CAUSE DANGEROUS BOOM
MOVEMENTS AND/OR DAMAGE TO THE SPRAYER HYDRAULICS**

Hydraulic Hook-up

1. Attach the heavier (3/8") hydraulic hose for the boom lift to the tractor's single acting outlet. Note: Required on both MB & Eagle booms.
2. Attach the lighter (1/4") hydraulic hoses for boom folding & HZ tilt to the tractor's double acting outlet.

3.5 Electric Hook-up Eagle (HZ-models only)

1. Connect the control box to the tractor's 12 volt power system.
Note: Check your dealer or tractor's operator manual for the best location to hook-up the 12 volt system.
Try to hook-up as close as possible to the battery or the starter for a power supply.
Brown wire on control box is positive (+)
Blue wire on control box is negative (-)
2. Place control box in a convenient location in the tractor cab.
3. Connect grey cable from sprayer hydraulics to multi-prong outlet on the side of the control box.

NOTE: For control box mounting also see EC control box mounting.
Additional mounting bracket and hardware can be obtained to mount the hydraulic control box by ordering No.728739 or double plate No.728738.





3.6 Control Box for EC-Controls

The control box for EC-Controls should be mounted at a convenient place in the tractor cab. The control box has 4 screw holes in the back cover, which need to be drilled out for mounting on a flat surface, using the mount plate, bracket, and hardware furnished with the sprayer.

Power requirement is 12V DC. Note polarity.

Brown pos. (+), Blue neg. (-)

Use the optional HARDI Electric 12 volt outlet box (No. 817925) if more than one power outlet is required.



Fig. 8

12-volt junction box for 12-volt hook-up for EC controls, foam marker, boom hydraulic controls, etc.

4.0 OPERATING INSTRUCTIONS

4.1 Operating the Boom

Before unfolding the boom it is important to have the sprayer hooked to the tractor to prevent overbalancing the sprayer. Only then lift the boom off the transport brackets which hold it in the transport position. Ensure that booms are in the transport position before unhooking the sprayer from the tractor.

The hydraulic system should be checked very cautiously the first time of operation; there may be air in the system and this could cause violent movements by the boom. Ensure that no persons or objects are in the way while checking the system. For information on boom adjustment see the appropriate Eagle boom operators manual.

For individual wing fold (HZ models 45',50',60',66') on the 650M, wheel centers must be set at no more than 60". For individual wing fold (HZ models 45',50',60',66') on the 950M, wheel centers must be set at no more than 61". For individual wing fold (HZ models 80'-90') on the 950M, wheel centers must be set at no more than 82".

4.2 Standard Sprayer Plumbing Diagram (Shown with optional Chemical filler, Flush & Rinse system and Agitation shut-off valve)

Review and study the following diagram (Fig. 9). Following the flow through the system will help you better understand the various functions of the sprayer system.

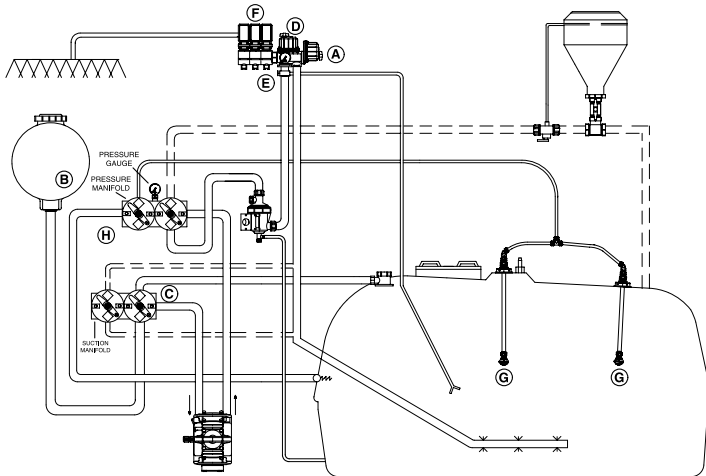
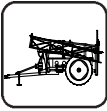


Fig. 9





4.3 Operation of the EC controls

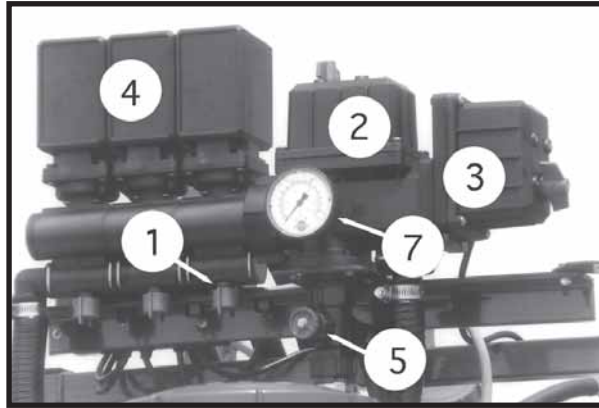


Fig. 10

1. Adjust screw for constant boom pressure
2. On/Off valve
3. Pressure regulating valve
4. Boom Distribution valves
5. Pressure agitation adjustment valve
6. Boom Pressure Gauge
7. System pressure gauge

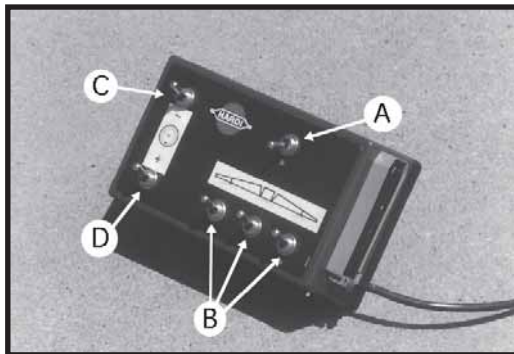


Fig. 10a

- A. Master operating switch for on/off valve (2)
- B. Operating switches for boom distribution valves (4)
- C. Pressure regulating switch (-) lower (3)
- D. Pressure regulating switch (+) raise (3)

4.4 Adjustment of the EC- Controls

(Fig. 10,10a)



1. Put the tractor in neutral and adjust the P.T.O. RPM's until the number of revolutions of the pump corresponds to the intended traveling speed. Remember the number of revolutions on the P.T.O. must be kept between 300-600 rpm.
2. Open or close knob 5 depending on whether pressure agitation is required. (Remember pressure agitation takes 5% to 10% of pump output).
3. On-off switch **A** is "ON" against green dot.
4. All distribution valves switch **B** are also "ON" against green dot.
5. Hold pressure regulating switch **C** to the (-) until handle **3**, stops rotating, this will be the "minimum pressure" setting.
6. Hold pressure regulating switch **D (+)** until desired pressure is shown on the pressure gauge.

Note: Adjust the constant distribution boom pressure one section at a time as follows: (Start with the valve turned closed before adjusting).

7. Shut-off the first boom distribution valve switch **B**. (Fig. 10a)
8. Turn the adjusting screw **1** until the control unit pressure gauge (**7**) again shows the same pressure as set in step 6 above. (Turn the screw clockwise for higher pressure, counterclockwise for lower pressure).
9. Turn the first boom distribution valve switch **B** back on.
10. Repeat steps 7 through 9 for the two remaining boom distribution valves.

Note: Hereafter adjustment of the constant boom pressure will only be needed if you change to nozzles with other capacities, but not required if only changing pressure or application rate using the same nozzles.

11. Operating the control unit while driving: In order to shut off the entire boom activate on-off switch **A** (Fig. 10a). This returns all the pump outputs to the tank through the return system. The diaphragm anti-drip valves ensures instantaneous closing of all nozzles.



In order to shut off one or more sections of the boom, switch one or more unneeded boom distribution valves **B** to off position. The constant pressure device ensures that the pressure does not increase in the sections which are still operating.

In case of electrical failure it is still possible to manually override all functions of the operating unit. To operate manually, disconnect the multiplug from the EC control box first and operate the handles by hand. It is possible to change pressure, shut off boom section, or shut off the complete control unit manually.



When the sprayer is stored, the EC control box and the multiplug must be protected against moisture and dirt. A plastic bag may be used to protect the multiplug. Store the control box in a clean dry place.



4.5 Agitation Adjustment (Agitation nozzles only)

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 **A** clockwise will reduce the agitation flow. Turning the valve counter clockwise will increase the agitation flow.

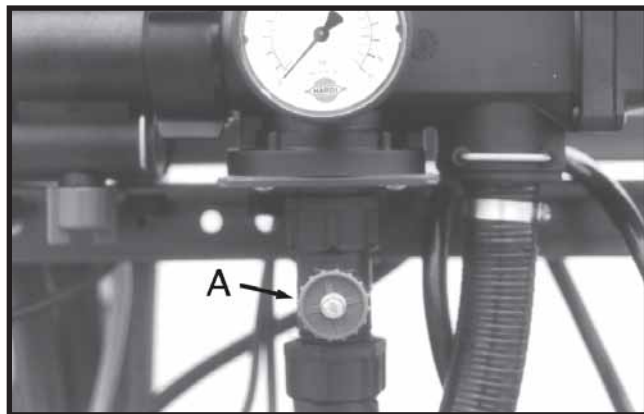


Fig. 11

4.6 Manifold System

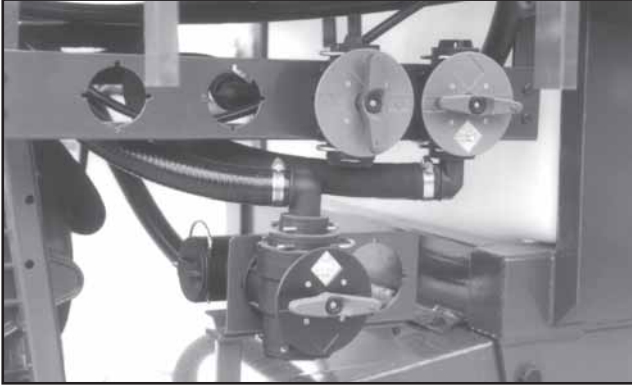


Fig. 12
Standard Manifold Fittings

The "Manifold System" is located at the left hand side of the sprayer under the platform, permitting operation of most of the (fitted) accessories from one position.

The modular design of the Manifold system allows the easy addition of many accessories to the plumbing system of the sprayer. The system can be expanded to a maximum of 4 valves on the pressure side and 2 valves on the suction side. The system can also be fitted with an agitation shut-off valve which ensures more complete drainage of the sprayer before cleaning or refilling.

The Manifold valve faces are colored discs for easy identification. The green face identifies the pressure manifold, the black disc identifies the suction manifold and a blue disc indicates the agitation shut off valve when fitted.

Symbols are fitted to the faces of the 3 way valves indicating direction of flow of the liquid.

An explanation of the symbols is as follows:





4.6 Manifold System (cont'd)



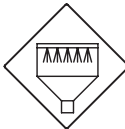
Green Disk= Pressure Valve



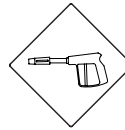
• To Self-Cleaning filter/
E.C. Control



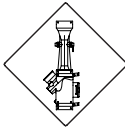
• To Tank Flush
-ing nozzle



• To Chemical Filler



• To Hose reel
/spray gun



• To Fast Filler



Black Disk= Suction Valve



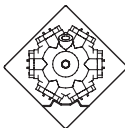
• From Rinsing
tank



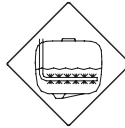
• From Main tank



Blue Disk= Agitation Shut-Off Valve



• Pump



• Return from operating
unit

4.7 Manifold System Operation

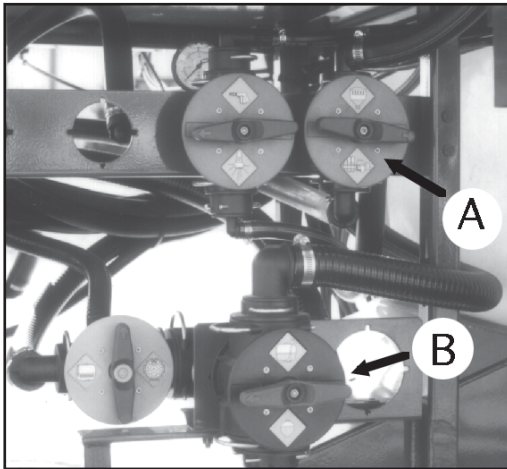
For normal operation of the sprayer the first pressure manifold valve **A** handle is turned toward the E.C. control symbol and the suction manifold valve **B** handle is turned toward the main tank. On a standard Manifold system these will be the only symbols fitted on the valves.

When accessories are fitted (i.e. chemical filler, Flush & Rinse etc.) operation of these accessories is achieved by turning the relevant valve handle to the required symbol. All the other handles on the same manifold must be turned to the off-position (handle placed horizontal).

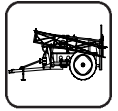
Example:

To operate Chemical Filler

1. Ensure other pressure manifold valves are in the **off** position.
2. Turn handle of pressure manifold valve from E.C. control symbol to Chemical Filler symbol. This directs flow of liquid from Pump to the Chemical Filler.
3. Operate the Chemical Filler as per pages 16 & 17 in the HARDI-Chemical Filler Operators Manual.
4. Return the pressure manifold valve to its previous position on completion of use of Chemical Filler.



*Fig. 13
Manifold System with Fitted Accessories*





4.8 Agitation Shut-Off Valve Operation

The optional agitation shut-off valve is fitted when it is desired to cut the by-pass liquid to the tank at low tank levels and achieve more complete drainage of the tank. The by-passed liquid is directed back to the suction manifold and therefore is recirculated back through the pump.



This valve, when fitted, must have the handle positioned in either the "Tank" position or the "Pump" position. There is no "Off" position indicated on this valve.

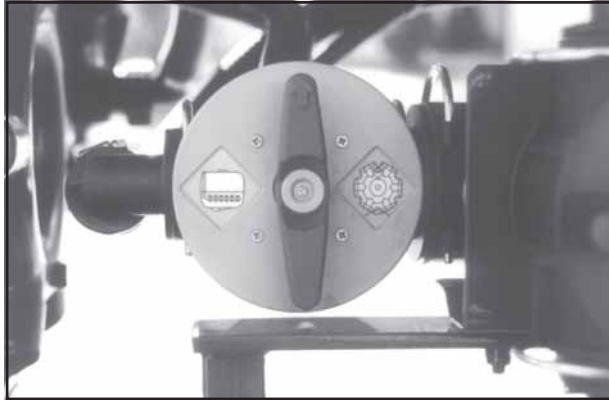


Fig. 14

4.9 Operation of the Tank Drain Valve

Warning: Before using the Top Drain verify that disposal of waste is done according to chemical label instructions and local regulations.

Pull the string at left hand side of the tank to open the drain valve. The valve is spring loaded to close it, but can be kept open by pulling the string out-and upwards in the V-shaped slit.

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

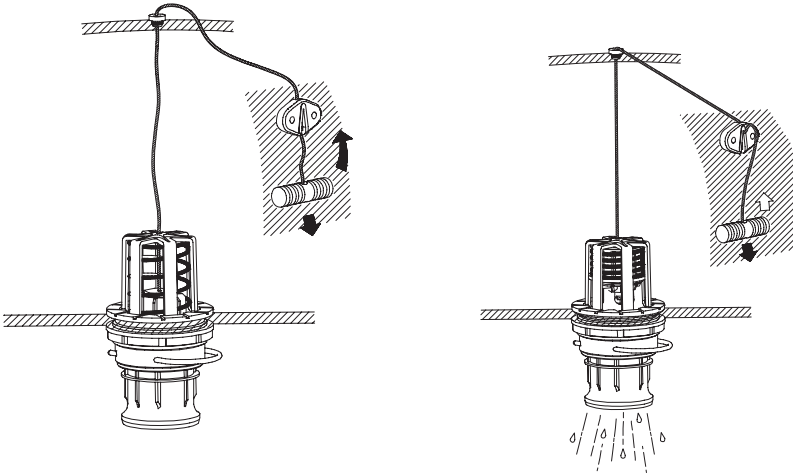


Fig. 15





4.10 Tank Level Indicator

The level indicator reading should be checked regularly. When the tank is empty, the floater should rest on the stop pin on the rod and the O-ring at the indicator should be positioned at the top position line **A**.

If any deviation is found, pull out the plug **B**, and loosen the screws in the yellow indicator and adjust the length of the cord.



Fig. 16

4.11 Self Cleaning Filter

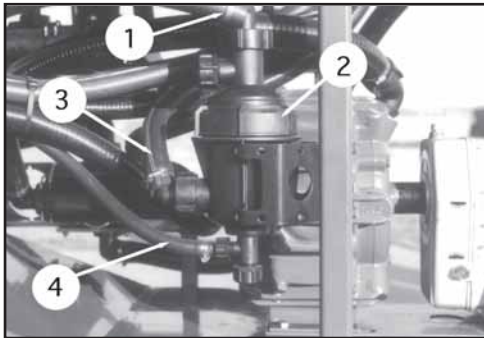


Fig. 17

This filter automatically flushes out particles and chemical deposits, reducing routine maintenance, nozzle plugging and operator exposure.

No adjustment is required but different mesh screens may be installed for various types of products. A good practice is having the necessary new O-rings on hand at the time of changing screens or when performing routine maintenance.

Note: It is advisable to have the sprayer tank empty before carrying out any maintenance on the self-cleaning filter.

Note: To clean or replace filter, loosen nut (3) to remove filter housing cover (3) lift filter screen out. Replace screen and filter housing cover. Press down on cover (3) and turn the cover nut (3) clockwise until snug.

1. From pump
2. Filter housing cover nut
3. To operating unit
4. Return line

4.12 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 Green 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.

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. Refer to the HARDI nozzle catalogue to find the correct nozzle for each spraying application.

| | | |
|--|---|---|
|  | <p>COLOR TIPS™ 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>S4110</p> |
|  | <p>FLAT SPRAY NOZZLES 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 Part # 330013- O-ring</p> |





4.12 Nozzle selection (cont'd)

| | | |
|---|--|---|
|  | <p>FLOOD NOZZLES set at 40" spacing. Designed for high volume application.</p> | <p>4598</p> |
|  | <p>HOLLOW CONE NOZZLES 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>SWIRL PLATE 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>HOLLOW CONE CERAMIC NOZZLES for high pressure and high volume fungicide and insecticide application.</p> | <p>1299</p> |
|  | <p>LARGE DROPLET HOLLOW CONE NOZZLE 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> |

4.12 Nozzle selection (cont'd)



| | | |
|--|--|-----------------------------------|
| | <p>LARGE DROPLET FLAT SPRAY TIP IN 150 DEGREE SPRAY ANGLE. 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>SOLID STREAM NOZZLE 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>3-HOLE NOZZLE-SYNTAL/ CERAMIC this nozzle disperses the spray liquid in three solid streams, thereby reducing the number of plants at risk of scorching by the application of liquid fertilizer.</p> | <p>371537 thru 371543</p> |



4.13 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?

A special calibration kit No. 818103 is available from HARDI.

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.

4.13 Calibration (cont'd)

Select your calibration method- Ounce method or Formula method.

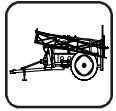
Then follow the steps described below:

Ounce Method

1. Determine how long it takes you 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 GPA applied.
(ounces - GPA)





4.13 Calibration (cont'd)

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.

| Formula: | Speed in MPH | Travel Time (in seconds) | |
|---|--------------|--------------------------|---------|
| | | 200 ft. | 300 ft. |
| $\frac{\text{distance (ft.)} \times 0.68}{\text{seconds}} = \text{MPH}$ | 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 |

2. Calculate the required nozzle output. Use either the nozzle wheel (if nozzle spacing is 20 inches), or this formula:

Formula:

$$\text{GPM} = \frac{\text{GPA} \times \text{MPH} \times \text{W (in.)}}{5940}$$

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.

4.13 Calibration (cont'd)

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 .934

For conversion to liters per acre, multiply U.S. GPA by 3.87

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





5.0 MAINTENANCE

5.1 Recommended Tire Pressure

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

| <u>Tire size:</u> | <u>Maximum pressure:</u> |
|-------------------|--------------------------|
| 11.2L x 38" | 3.0 bar (43 psi) |
| 13.6x38" | 3.0 bar (43 psi) |

The pressure is specified for a fully loaded trailer. When traveling on hard road surfaces with a maximum load, do not exceed 15 mph. Remember it is easier to let off a little pressure for a specific use than to re-inflate a tire in mid-field.

5.2 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. (See Fig. 18)

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 cottter 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.

5.2 Wheel Nuts and Bearings Adjustment (cont'd)

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

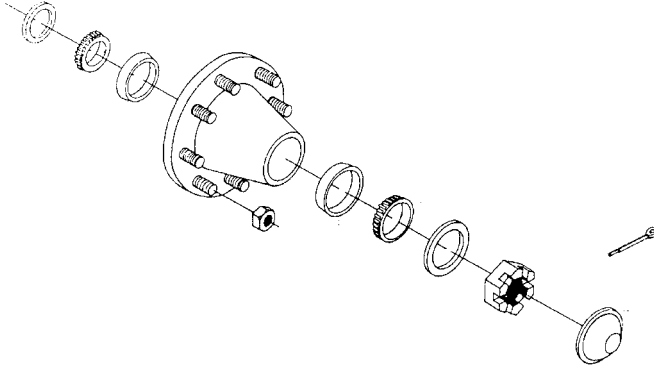


Fig. 18

5.3 Filters

WARNING: Wear protective clothing when servicing and handling components that have been in contact with spray liquid.

Clean filters will ensure the following:

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

The main filter protecting sprayer components is the suction filter at the top of the tank. Check it regularly. Ensure the O-ring **A** (Fig. 19,20) on the filter housing is in good condition and lubricated.





5.3 Filters (cont'd)

Suction filter

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

To service the suction filter:

1. Pull the steel clip **A** out.
2. Lift the suction hose fitting **B** from housing.
3. Filter guide and filter **C** can now be removed.

To reassemble:

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

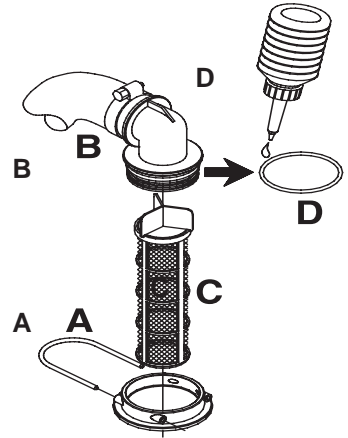


Fig. 19

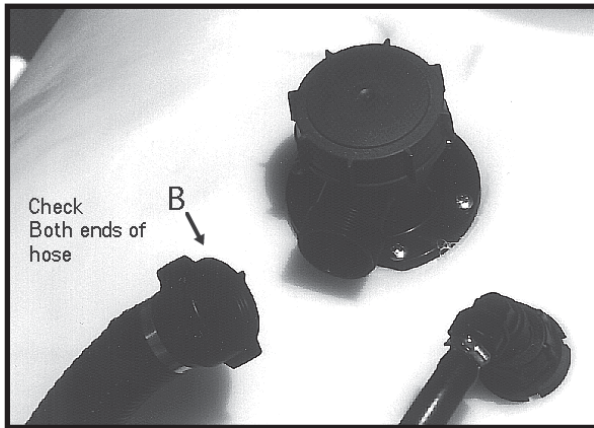


Fig. 20

Check seal rings **B** on both ends of Suction hose for possible leaks, or damaged hose if problems are encountered with hose pulsation, or losing pump prime.

5.4 Self Cleaning Filter

The Self Cleaning Filter should not require daily maintenance but it is strongly recommended that it be checked at the beginning of each season. A good practice is having new O-rings on hand before opening the filter. The O-rings will normally swell when removed from the function position. A 50 mesh screen is standard but 80 and 100 mesh are available for some types of applications.



Fig. 21
Self Cleaning Filter

5.5 Nozzle Filters

Each nozzle assembly is equipped with a 50 mesh filter screen as standard on units equipped with 20 GPA green Color Tips™. Properly maintained Suction Filter and Self Cleaning Filter will eliminate the plugging of the screens and nozzles.




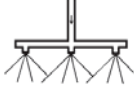


Fig. 22





5.5 Nozzle Filters (cont'd)

| Nozzle Size  | Suction Filter  | Self Cleaning Filter  | Nozzle Screen  |
|--|---|---|---|
| Lilac (08) Brown (10) Yellow (12) Orange (14) | 50 | 100 | 100 |
| Red (16) White (18) | 50 | 80 | 80 |
| Green (20) & Larger | 30* | 50* | 50* |

* Standard Equipment

5.6 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. 23). Disassemble, check condition and position of O-ring or gasket, clean, lubricate and reassemble.

For **radial** connections (Fig. 23) only hand tighten them.

5.6 Nozzle Tubes and Fittings (cont'd)

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

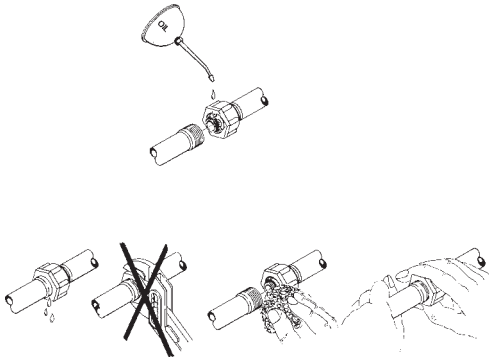


Fig. 23

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

5.7 Checking Ball Seat in EC-Controls

If problems with on/off valve occurs (dripping nozzles when on/off valve is closed), the ball and ball seat should be checked.

Remove the 2 bolts attaching the on/off-pressure valve unit to the bracket, unscrew the union nut **(A)** (refer to fig. 24) and pull the on/off-pressure valve away from the distribution valves.

Check the ball for sharp edges and scratches and check the ball seat for cracks and wear. Replace if necessary.

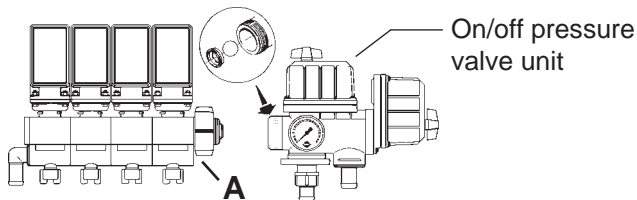


Fig. 24



5.8 Checking the Valve Cone in Distribution Valves

Periodically check the distribution valves for proper sealing.

Flush the sprayer with clean water and open master on/off and all distribution valves. (Shut sprayer off)

Remove clip **A** (Refer to fig. 25) and remove hose **B** for the constant pressure device. When the housing is drained make sure everything is clear from part **B** then start sprayer, there should not be any flow of liquid through the constant pressure passage. If there is any leakage, the valve cone **E** must be changed. (Shut sprayer off.)

Remove clip **C**, and pull the EC-motor off the valve housing. Then remove **D** screw and replace the valve cone **E**. Reassemble in opposite sequence.

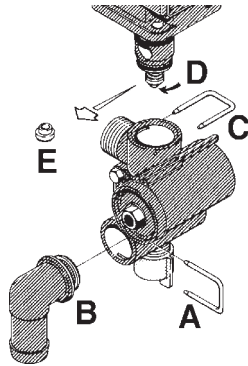


Fig. 25

5.9 Changing the Valves and Diaphragms in a 361/462 Pump

Valves

Remove valve cover **(1)**. (Refer to fig. 26) Before changing the valves **(2)** note the orientation of the valves so that they are replaced correctly.

Important: Note valve with red flap **(2A)** is placed in the valve opening shown.

It is recommended to use new O-rings **(3)** #330024 when changing or checking the valves.

5.9 Changing the Valves and Diaphragms (cont'd)

Diaphragms

Remove the diaphragm bolt (4) (fig. 26) after having dismantled the valve cover as indicated above. The diaphragm (5) may then be changed. If fluids have reached the crankcase, regrease the pump thoroughly.

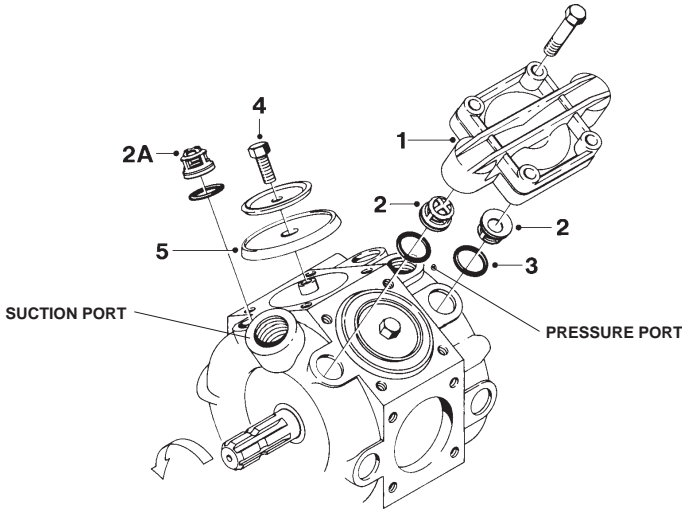


Fig. 26
Model 361 Pump shown
462 Similar

5.9 Changing the Valves and Diaphragms in a 1302 Pump

Valves

Remove valve covers (1). (Refer to fig. 27) Before changing the valves (2) note the orientation of the valves so that they are replaced correctly.

It is recommended to use new O-rings (3) part no. 330072 when changing or checking the valves.

Remove diaphragm covers (4) to gain access to the diaphragms.





5.9 Changing the Valves and Diaphragms (cont'd)

Remove the diaphragm bolt (5) after having dismantled the valve cover as indicated above. The diaphragm (6) may then be changed. If fluids have reached the crankcase, regrease the pump thoroughly.

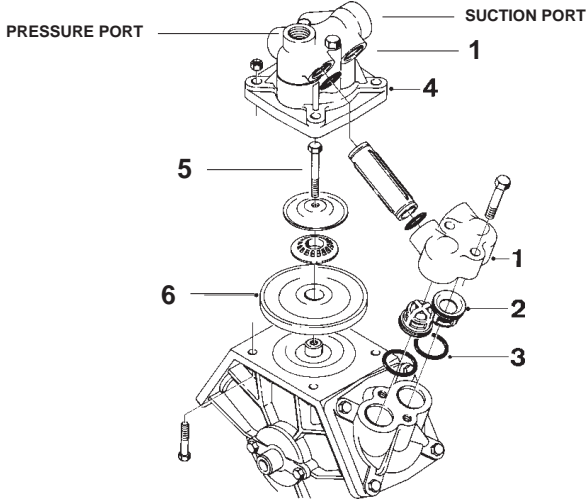


Fig. 27
Model 1302 Pump shown

5.10 1000 RPM Gearbox Drive (Optional)

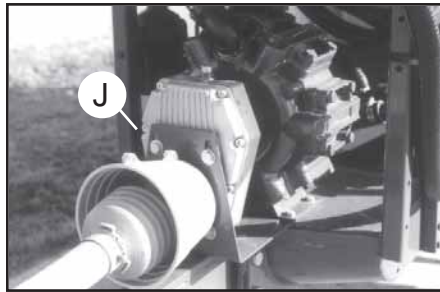


Fig. 28

The oil should be changed after the first 25 hours of use, and thereafter every 100 hours.






Use 1 pint of SAE 90 gear oil.

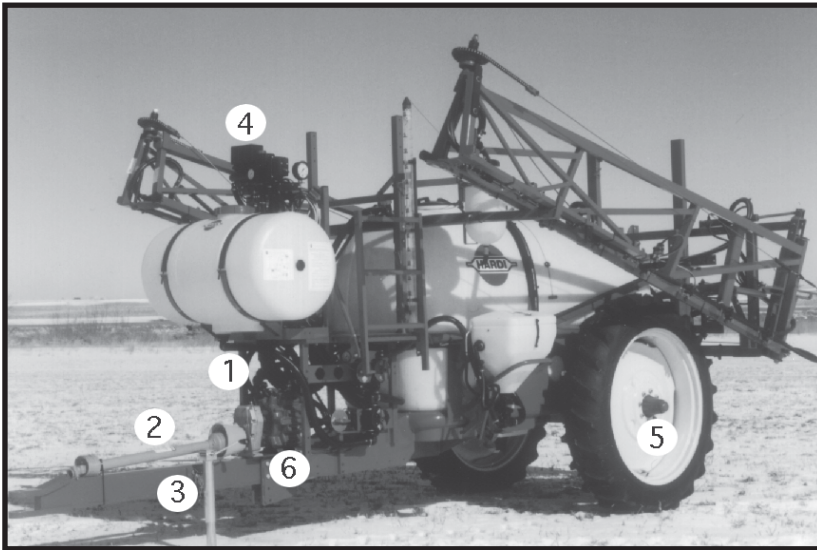
The oil level should be checked every 5-10 hours. The oil must at all times be above the sight glass **J**. If the oil level goes below the top of the sight glass, oil must be added immediately.

5.11 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. See Eagle manual for boom greasing.





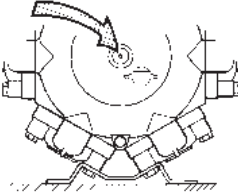
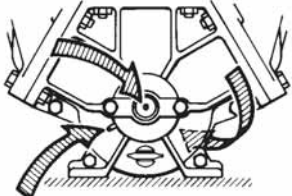
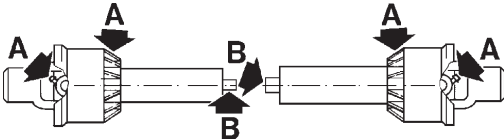
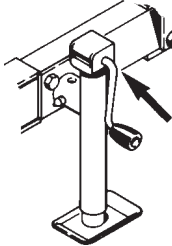
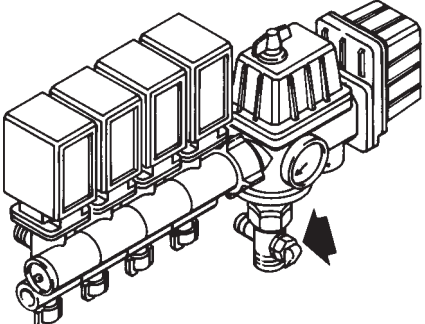
| | | | | | |
|--|---------------------|---|-----------------|---|---|
| POS. | Position on sprayer |  | Grease |  | Page to find more information |
|  | Oil |  | Operation hours |  | Winter protection or off-season storage |







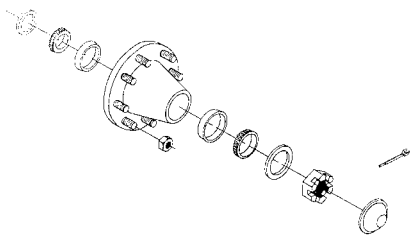
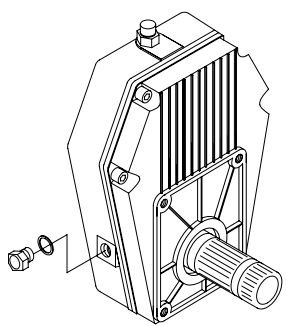
1. Pump
2. PTO Shaft
3. Hitch Jack
4. EC Controls
5. Wheel Bearings
6. Optional 1000 RPM Gearbox

Fig. 29
HC 650M



| POS. |  |  |  | |  |
|------|---|---|---|---|---|
| 1 | | X | 40 |  | 39 |
| 1 | | X | 40 |  | 40 |
| 2 | | X | 12 |  | 12 |
| A | | X | 40 | | 12 |
| B | | X | 40 | | |
| 3 | | X | 40 |  | |
| 4 | | X | 40 |  | 16 |

| POS. |  |  |  |  |
|------|---|---|---|---|
| 6 | X | | 25 | 40 |
| 5 | | | | 32 |



5.12 Winter Storage

When the spraying season is over you should devote some extra time to cleaning and preparing the sprayer for storage.

Hoses

Check that none of the hoses are caught or have sharp bends.

A leaky hose can give an annoying delay in the middle of the spraying job. Therefore check all the hoses and change if there is any doubt about the durability.

Paint

Some chemicals are very hard on paints. It is therefore recommended to remove rust, if any, and then touch up the paint.





5.12 Winter Storage (cont'd)

Tank



Check that no chemical residues are left from the last spraying. Chemical residues must not be left in the tank for a long time. It will reduce the life of the tank.

EC-Controls

When storing the sprayer, the control box and the multi-plug must be protected against moisture and dirt. Possibly use a plastic bag.

Transmission Shaft

Check that the transmission shaft is in good working condition, e.g. that shield and protective tubes are in place and in good condition.

Anti-freeze Precaution

Drain as much water as possible from sprayer. Pour in a mixture of ethylene glycol base anti-freeze and water at the ratio for the desired temperature protection. (Volume of mixture should be about 1% of tank volume) Run the sprayer and circulate the anti-freeze in the pump, controls and boom lines.

Never use oil or diesel fuel in a sprayer.

Remove nozzles and screens. Clean and store in a safe, dry location.

Turn pressure regulator valve counter-clockwise until all spring tension is released. Turn boom section valves off.

Store sprayer in a safe dry location away from children and animals. Protect from direct sunlight.

Remove pressure gauges and store upright in a warm dry location.

6.0 ACCESSORIES

6.1 Clean Water Dispenser (Standard- 1994 or Newer)



Fig. 30

Clean Water Dispenser & Mounting Bracket

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.

6.2 Chemical Filler



Fig. 31

Chemical Filler Installed

Will inject all types of chemical formulations, liquid, powder or granules, into the bottom of the tank near the agitation flow. A cleaning ring ensures that chemical residue is removed from the tank.



6.3 Chemical Filler Rinse Kit



Fig. 32
Chemical-Filler Rinse Kit

A container rinse kit for liquid containers or plastic bags is also available for installation into the chemical filler hopper. Refer to the Chemical Filler Operators Manual for instructions.

6.4 Nurse Tank Quick Fill

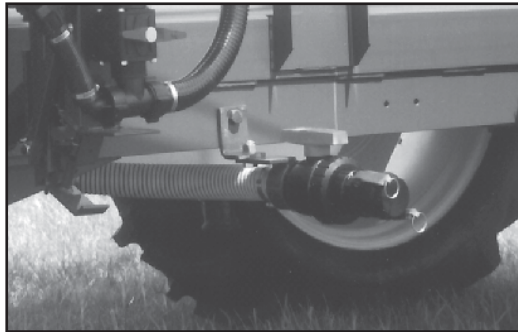


Fig. 33
Nurse Tank Quick Fill

A quick attach hook-up for filling the sprayer tank from a nurse tank. Liquid is fed into the bottom of the tank through a one-way valve providing a better mix of water and chemical. The quick fill is equipped with a handy 1/4 turn shut-off valve.

6.5 Foam Marker System



Fig. 34
Foam Marker Tank & Compressor



Fig. 35
Foam Marker Drop Assembly

The Foam Marker helps prevent skipping or over lapping during spray application of solution, both which can be costly. HARDI Foam Marker features a trailer mounted compressor, poly tank, extruded foamer hoses and in-cab electrical controls providing right or left drop selection and the rate of foam droplets.



6.6 4" Boom Pressure Gauge



Fig. 36
4" Boom Pressure Gauge

A large and easy to read 4" Boom Pressure Gauge to replace the standard 2-1/2" gauge. This gauge is to be mounted near the tractor cab allowing the operator to monitor the boom pressure for more accurate control of the application rate.

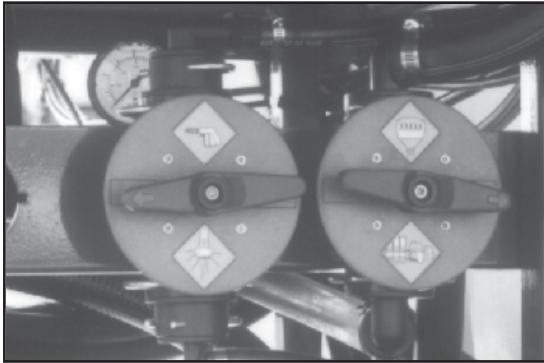
6.7 Flush System



Fig. 37
Flush & Rinse Tank (80 gal.)

Flush system provides a means to be able to flush the pump, controls, boom feed lines and complete boom and nozzles with clean water from an 80 gal. tank. Refer to the Flush & Rinse System™ Operators Manual for complete operational instructions.

6.8 Tank Rinse System



*Fig. 38
Rinse Valve & Gauge*



*Fig. 39
Rinse Nozzle on Top of Tank*

The Rinse system can be added to the flush system which provides a means to rinse the main tank using pressurized water to spray the inside of the tank through specially designed spinning nozzles. See the Flush & Rinse™ System Operator Manual for complete operational instructions.



6.9 1000 RPM Drive Gearbox (For 361/462 Diaphragm Pumps)

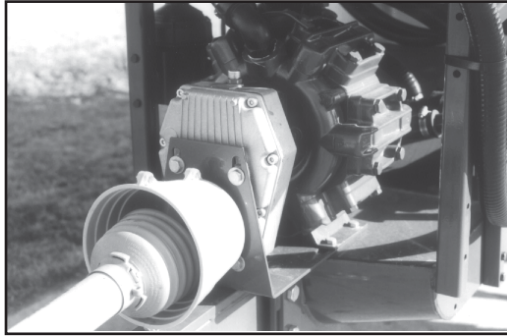


Fig. 40
1000 RPM Drive Gearbox

1000 RPM Gearbox Drive provides a means to use larger tractors having only 1000 RPM PTO system. Available for the model 361 and 462 pumps only. The gearbox has an oil filled case to provide long life and service.

6.10 Handgun & Hose Wrap

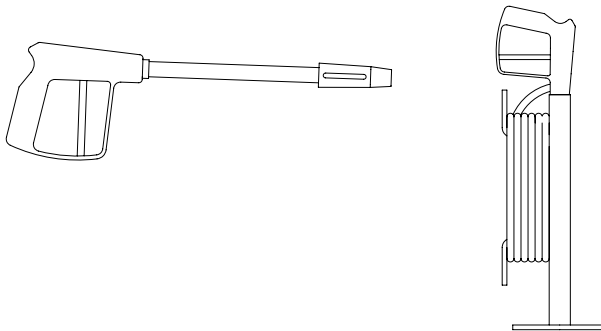


Fig. 41
Handgun

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

6.11 Agitation Shut-Off Valve

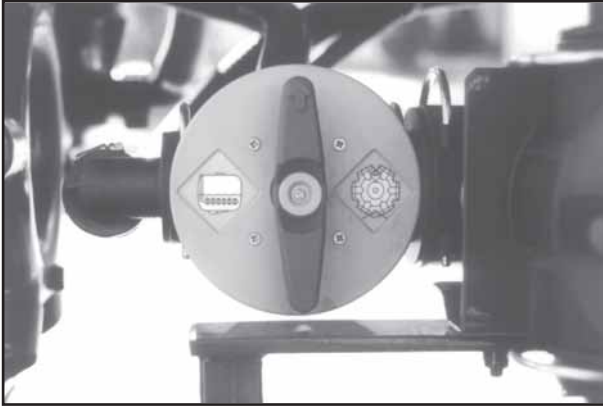


Fig. 42
Agitation Shut-Off Valve

This valve directs either return liquid from the E.C. control to the sparge (agitation) tube in the tank or back to the pump allowing for more complete draining of the tank before cleaning.



7.0 TROUBLESHOOTING

General Spray Systems

| Problem | Cause |
|-----------------------------------|--|
| 1. No liquid getting to the pump. | A. Bottom of Suction Tube plugged. B. PTO shaft slipping on pump crank shaft. C. Valve on Suction Manifold not in correct position. |
| 2. Lack of pressure | A. Bottom of suction tube plugged. B. Self Cleaning Filter inner cone filled with liquid. C. Self Cleaning Filter Bottom support broke off inner cone. D. Self Cleaning Filter Safety valve stuck open or valve spring weak or broke. E. No restrictor plate in self cleaning filter. F. Cracked Internal Housing or bad seal on HARDI-matic valve. G. Motor shaft coupling loose or fork pin missing. H. Bad seat on spool valve for boom section control. I. PTO speed not fast enough. J. Valve on Suction Manifold not in correct position. K. Bad suction valve or suction side air leak. L. PTO not engaged. M. Valves on Pressure Manifold not in correct position. |
| 3. Pressure jumping | A. Output from by-pass lines causing a disturbance around suction hose. B. Small tear or pin hole in suction hose. |

7.0 TROUBLESHOOTING

General Spray Systems Problem

Cause

- | | |
|-------------------------------------|---|
| 3. Pressure jumping (con't) | A. Pump valve broke or seat missing. B. PTO shaft slipping on pump crankshaft. C. Safety Valve in tank stuck open or valve spring weak or broke. D. Bad suction valve or suction side air leak. E. Valves on Pressure Manifold not in correct position. |
| 4. Pressure dropping | A. Output from By-pass Lines causing a disturbance around suction tube. B. Suction filter plugging. C. Pump valve broke or seat missing. D. PTO shaft slipping on pump crankshaft. E. Cracked internal housing or bad seal on HARDI-matic valve. F. Bad seat on spool valve for boom section control. G. Bad Suction Manifold valve or suction side air leak. |
| 5. Liquid leaking from pump | A. Damaged pump diaphragm. |
| 6. Electric control not functioning | A. Motor bad or micro-switch plate loose. B. Bad seat on spool valve. C. Bad switch or plug on control box. D. Print board at back of control corroded or damaged. |





General Spray Systems (continued)

| Problem | Cause |
|--|--|
| 7. Less spray out of one boom section than others. | A. Bad seat on spool valve for Boom Section Control. |
| 8. Poor agitation | A. Self Cleaning Filter inner cone filled with liquid. B. Self Cleaning Filter Bottom support broke off inner cone. C. Agitation valve not open. D. Agitation nozzle plugged. E. Agitation nozzle missing. |
| 9. Excessive vibrations in hoses | A. Bottom of suction tube plugged. B. Pump valve broke or seat missing. C. PTO shaft slipping on pump crank shaft. D. Restrictor cone not the right size. E. Bad Suction Mainfold valve or suction side air leak. F. Valves on Pressure Manifold not in correct position. |
| 10. Can't get tank empty. | A. Output from by-pass lines causing a disturbance around suction tube. B. Crack or pin hole in suction tube. C. Tank is not level (change angle of tongue). |
| 11. Boom nozzle leaking. | A. Seat on master shut-off valve worn or cracked. B. Bad seat on spool valve. |
| 12. Pressure hose blowing off. | A. Restrictor cone in Chem-Filler not the correct size. (Units equipped with chemical filler option) Black- 1302,361 pumps White- 462 pump. |

Foam Marker Problem

Cause



- | | |
|--|--|
| 1. Compressor will not run. | A. Short in electrical system or bad compressor. B. 12 volt supply not connected. C. Bad printboard. D. Defective switch in control box. |
| 2. Compressor runs but will not make foam. | A. Bad Printboard B. Not enough Foam Concentrate C. Solenoid valve plugged. D. Solenoid not working |
| 3. Will not make enough foam. | A. Line leak or line pinched B. Solenoid valve plugged C. Weak Foam Concentrate mixture. D. Water too hard (add water softener). |
| 4. Foam drops will not last. | A. Not enough foam concentrate. B. Frequency valve not opened enough. C. Weak Foam Concentrate. D. Water too hard (Add water softener) |
| 5. Keeps blowing fuses. | A. Short in electrical system or bad compressor. B. Bad relay on printboard. C. Air filter plugged (Low air output) D. Tank filter plugged. |

Flush & Rinse™

- | | |
|--|---|
| 1. System will not flush (pump, control, and boom) | A. Suction Manifold valve not in correct position. B. PTO not engaged. |
|--|---|



Flush & Rinse™ (cont'd)

Problem

Cause

- | | |
|------------------------------------|--|
| 2. System will flush but not rinse | A. Pressure Manifold valve not in correct position. Arrow on handle should point towards rinse nozzle symbol. |
| 3. Rinse nozzle has poor output. | A. Bad Suction Manifold valve or suction side air leak. B. Pressure Manifold valve not in correct position. C. Chemical filler Pressure Manifold valve in correct position. (if so equipped) |

Chemical Filler

- | | |
|---|---|
| 1. Filler tank will not empty. | A. Pressure Manifold valve not in correct position. B. Sprayer pump not running. |
| 2. Filler tank empties too slow. | A. Bottom tank discharge valve not open all the way. B. Restrictor cone from pump supply not the correct size. Black-1302 & 361 Pump White-462 Pump |
| 3. Filler tank backfills when bottom tank discharge valve open. | A. Restrictor cone from pump supply line not the correct size (Black-1302 & 361 Pump, White - 462 Pump). B. Restrictor cone missing. C. Restrictor cone on wrong side of the valve. |

8.0 WARRANTY POLICY AND CONDITIONS



HARDI INC. , 1500 West 76th Street, Davenport, Iowa 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 Operators Manual and is operated under normal farm conditions.

1. This limited warranty is subject to the following exceptions:
 - a) Parts of the machine are 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.



8.0 Warranty Policy and Conditions (continued)

- c) That all safety instructions in the operators 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.
 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, 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 in London, Ontario, Canada 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 tank 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 and 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 its head office.
 13. Any warranty work performed which will exceed \$400.00 MUST be approved IN ADVANCE by the Service Manager.
 14. Any pump replacement must be approved in advance by the Service Manager.
 15. Claims under this policy must be filled with HARDI within thirty (30) days of work performed or warranty shall be void.
 16. Parts requested must be returned prepaid within thirty (30) days for warranty settlement.
 17. 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 IS NO WARRANTY OR MERCHANTABILITY. 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.

WARRANTY REGISTRATION CERTIFICATE



In order to qualify for HARDI warranty, this certificate MUST be completely filled in, signed and mailed to HARDI INC. within 30 days of delivery of the sprayer.

SPRAYER MODEL: _____
(Full Description)

SPRAYER ORDER NO. _____ **SERIAL NO.** _____

We, the undersigned dealer and purchaser, hereby certify that the above machine was purchased on the date indicated below.

DEALER NAME _____
ADDRESS _____ **PHONE:** _____

CITY _____ **STATE** _____ **ZIP CODE** _____

PURCHASER NAME _____
ADDRESS _____ **PHONE:** _____

CITY _____ **STATE** _____ **ZIP CODE** _____

NO. OF ACRES FARMED _____ **MAJOR CROPS** _____

PURCHASER SIGNATURE _____

DEALER SIGNATURE _____

DATE OF PURCHASE _____

FOR OFFICE USE:
REGISTRATION DATE: _____
CERTIFICATE # _____