
# LE-SPV

## Operator's Manual

106334 (3/99)

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Dear Owner,

Thank you for purchasing a HARDI® product and welcome to the ever-increasing family of HARDI® equipment 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 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® Mist Blower were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions.

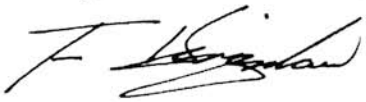
Please address your correspondence to the Service Manager at one of these branches:

HARDI® MIDWEST
1500 West 76th St.
Davenport, Iowa 52806
Phone: (319) 386-1730
Fax: (319) 386-1710

HARDI® GREAT LAKES
290 Sovereign Rd.
London, Ontario N6M 1B3
Phone: (519) 659-2771
Fax: (519) 659-2821

HARDI® CALIFORNIA
5646 W. Barstow, Suite 101
Fresno, California 93722
Phone: (559) 271-3106
Fax: (559) 271-3107

Sincerely,



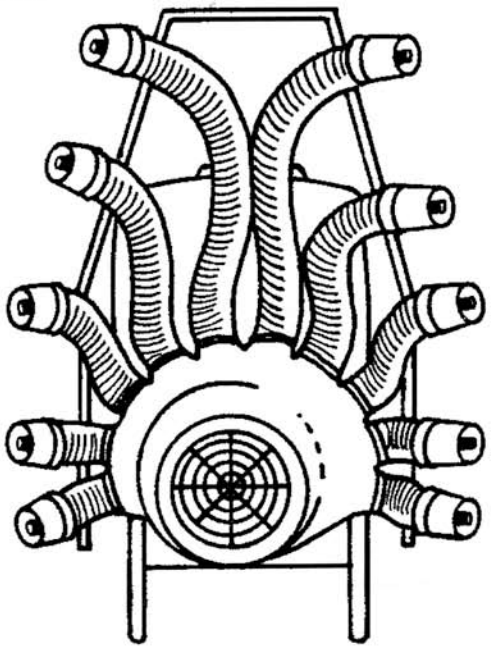
Tom L. Kinzenbaw
President

# 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 operators manual. It contains essential information for the efficient use and long life of this quality product.

As the book covers all options available for the LE-SPV, please pay attention to the paragraphs dealing precisely with your model. This book is to be read in conjunction with the "Mistblowing Technique" book.

LE-SPV



## 1.1 Description

The HARDI® LE-SPV lift mounted sprayers are designed for the application of crop protection chemicals and fertilizers in vineyards, berry bushes and orchards with medium sized trees. They feature diaphragm pumps, easy to use operating units, and a PTO driven centrifugal blower unit with gearbox.

The power is transferred from the tractor via the PTO shaft. The pump on the LE-SPV sprayer is driven with V-belts from the input shaft pulley.

The heart of your sprayer is the diaphragm pump. Because the design is simple, low maintenance requirements and pump life is guaranteed. The bearings and crankshaft are grease lubricated and are therefore protected from spray solution if any diaphragm fails in service. A drain hole is 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 powder coated frame allows for easy access to the pump and allows for category 1 and 2 three point linkage mounting.

The tanks are made of impact proof and chemically resistant polyethylene and purposefully designed with rounded contours which allows for efficient cleaning and draining. A suction filter, incorporating a cut-off valve, is located at the bottom of the tanks. A tank contents indicator is located on the front of the sprayer. Hydraulic venturi nozzles in the tank maintain a homogeneous mixture of the spray liquid. A remote operated drain valve is fitted for efficient draining.

The BK/2 manually operated control unit consists of a pressure control valve with HARDI-MATIC, a main on/off valve, a 2 1/2 (63mm) pressure gauge and 2 manually activated distribution valves. The optional CB/2 control is electrically remotely activated.

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 PTO shaft speed of 300-600 rpm.

The MAXI or MINI centrifugal blower unit has 10 equally sized spouts (SPV) fitted to air hoses each giving a uniform conical air flow. In each hose spout, there is a colour-coded ceramic nozzle. Here the liquid is metered and atomized into the air stream. The spray can be directed precisely to the target area. Non-drip valves are fitted at the cowling outlets.

The gear box has a neutral position so the fan drive can be disengaged. This enables agitation under transport or the use of spray guns.

**Identification plates**
An identification plate fitted on the frame and pump indicates the model, with serial number. If ordering spare parts, inform your dealer of these so the right model and version is described.

# 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 sprayer 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 functions only when seated in the operator's seat.
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 should be working the tractor/sprayer when in operation.

## 2.2 Operating The Sprayer Safely (continued)

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 operation manual for added safety precautions.
6. P.T.O. driven equipment can cause serious injury. Before working on or near the P.T.O. shaft, servicing or cleaning the equipment, put P.T.O. lever in the DISENGAGE position and stop the engine.
7. Keep hands, feet & clothing away from moving parts.
8. Wear relatively tight and belted clothing to prevent from being caught on any part of the sprayer.
9. Always keep children away from your sprayer and/or tractor unit.
10. Before transporting the sprayer ensure all locking devices are fully engaged whether hydraulic or mechanical.
11. 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.
12. 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.
13. 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.
14. Keep all parts in good condition and properly installed. Repair 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 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

**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. _____

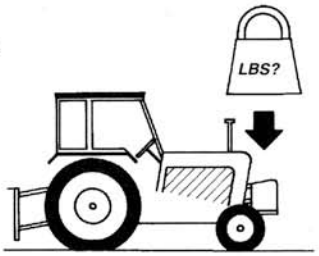
# 3.0 HOOKING UP THE SPRAYER

## 3.1 Connecting the Sprayer

The LE-SPV sprayer is designed for three point mounting on a tractor and will fit category I and II hitch points.

***WARNING:*** **NOTE THE WEIGHT OF THE SPRAYER. REFER TO THE TECHNICAL SPECIFICATIONS SECTION (9.0)**

Generally it is recommended to:




1. Mount the sprayer as close as possible to the tractor.
2. Add ballast weights to front of tractor.
3. Increase tyre pressure, if necessary (see tractor instruction book).
4. Travel at slower speeds when driving with a full tank. (The tractor will have decreased braking effect.)
5. Be careful when filling/lifting the sprayer the first time.
6. Ensure that any part of the sprayer and tractor do not touch.

## 3.2 P.T.O. Shaft Operator Safety

***WARNING:*** **ALWAYS STOP ENGINE BEFORE ATTACHING THE TRANSMISSION SHAFT TO TRACTOR P.T.O. MOST TRACTOR P.T.O. SHAFTS CAN BE ROTATED BY HAND TO FACILITATE SPLINE ALIGNMENT, WHEN ENGINE IS STOPPED.**

When attaching the shaft, make sure that the snap lock is FULLY ENGAGED - push and pull shaft until it locks.

***WARNING:*** **ROTATING TRANSMISSION SHAFTS WITHOUT PROTECTION GUARDS ARE FATAL.**

Always keep protection guards and chains intact and make sure that it covers all rotating parts, including CV-joints at each end of the shaft. Do not use without protection guard. Do not touch or stand on the transmission shaft when it is rotating - safety distance: min 5' (1.5 meters).
Prevent protection guards from rotating by attaching the chains.

Make sure that the protection guards around the tractor P.T.O. and implement shaft are intact. Always STOP ENGINE and remove the ignition key before carrying out maintenance or repairs to the transmission shaft or sprayer.

## 3.3 Installation Of P.T.O. Shaft

***WARNING:*** **THE P.T.O. SHAFT ANGLE WILL CHANGE WHEN RAISING AND LOWERING THREE POINT LINKAGE ARMS. TO PREVENT EXCESSIVE LOADING AND BINDING ON THE P.T.O. SHAFT, IT MAY BE ADVISABLE TO LEAVE THE P.T.O. SHAFT DISCONNECTED UNTIL PUMP OPERATION IS REQUIRED. THEN THE P.T.O. SHAFT ADJUSTMENTS CAN BE MADE.**

Initial installation of the shaft is done as follows:

1. Attach the sprayer to tractor and set the sprayer in the position with the **shortest** distance between the tractor and sprayer pump P.T.O. shafts.
2. Stop engine and remove the ignition key.
3. If the P.T.O. shaft must be shortened, the shaft must be pulled apart. Fit the two shaft parts at tractor and sprayer pump and measure how much it is necessary to shorten the shaft. Mark the length on the protection guards.

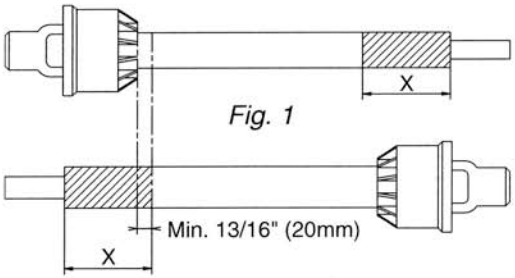



*Fig. 1*

**Note:** The shaft must always have a minimum overlap of 6" (150 mm).

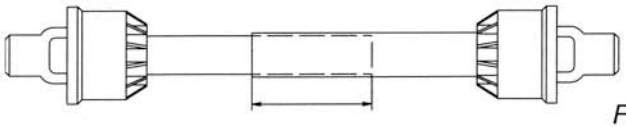
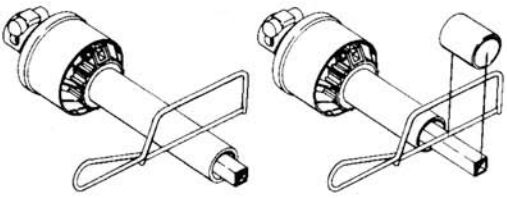


*Fig. 2*

Min. 5 7/8" (150mm)

4. The two parts are shortened equally. Use a saw, and file the profiles afterwards to remove burrs (Fig.3).
5. Grease the profiles, and assemble male and female parts together again.



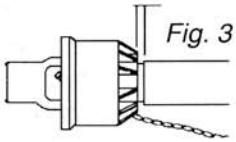



Fig. 3

6. Fit the shaft to tractor and sprayer pump.

**Note:** Female part goes towards the tractor. Fit the chains to prevent the protection guards rotating with the shaft.

7. To ensure long life of the P.T.O. shaft, try to avoid working angles greater than 15° (Fig. 4).

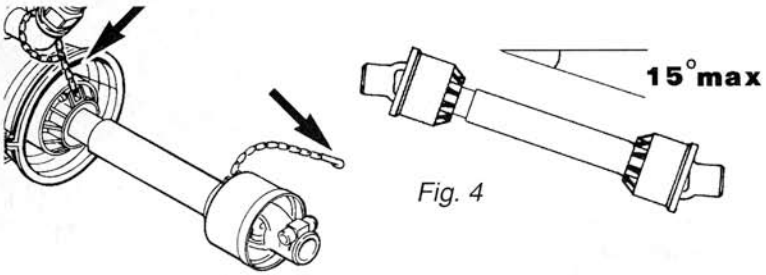
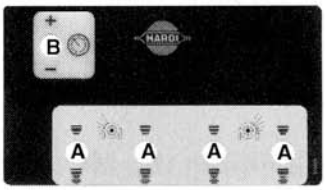



Fig. 4

**CB/2 Control Box (if fitted)**
Power requirement is 12V DC.
**Note polarity!** Brown positive(+),
Blue negative(-).




The Control Box is fitted in the tractor cabin at a convenient place. The wires must have a cross-sectional area of at least 16AWG (1.0mm$^{2)}$ to ensure sufficient power supply.

**Note: It is advisable to protect the control box by installing and inline fuse of no more than 8 amps to the positive (+) brown wire.**

Use the HARDI® Electric distribution box (Ref. no. 817925) if more than one power outlet is required or for a simple connection.

**Transporting the Sprayer**
When driving on public roads and other areas where the highway code appllies, or areas where there are special rules and regulations for marking and lights on implements, you should observe and equip the sprayer accordingly.

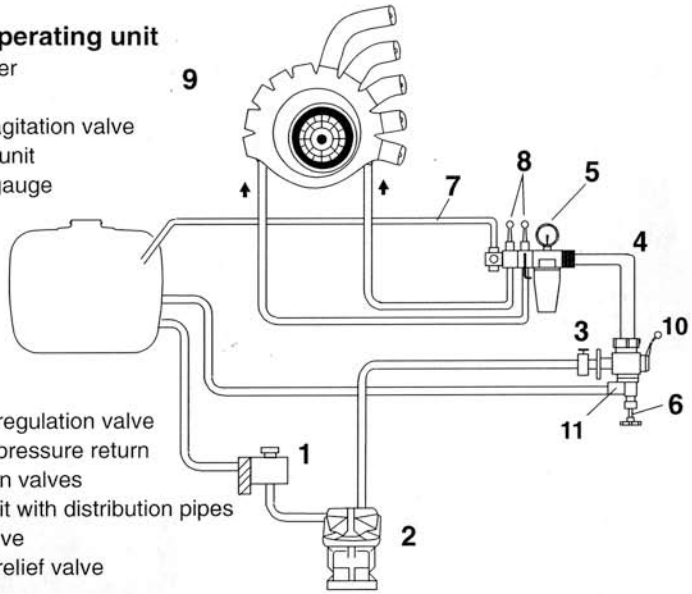
# 4.0 OPERATING INSTRUCTIONS

## 4.1 Function Diagram

Reviewing and studying the diagram below and following the flow through the system will help you better understand the various functions of the sprayer system.

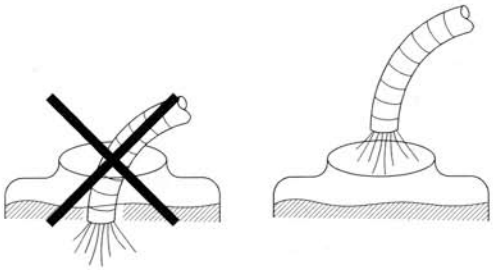
**With BK/2 operating unit**

1. Suction filter
2. Pump
3. Pressure agitation valve
4. Operating unit
5. Pressure gauge
6. Pressure regulation valve
7. Constant pressure return
8. Distribution valves
9. Blower unit with distribution pipes
10. On/Off valve
11. Pressure relief valve




## 4.2 Filling the Main Tank

Water is filled into the tank by removing the tank lid located at the top of the sprayer tank. It is recommended to use as clean water as possible for spraying purposes. Always fill water through the strainer basket to prevent foreign particles from entering the tank.



## 4.3 Adjustment of Controls

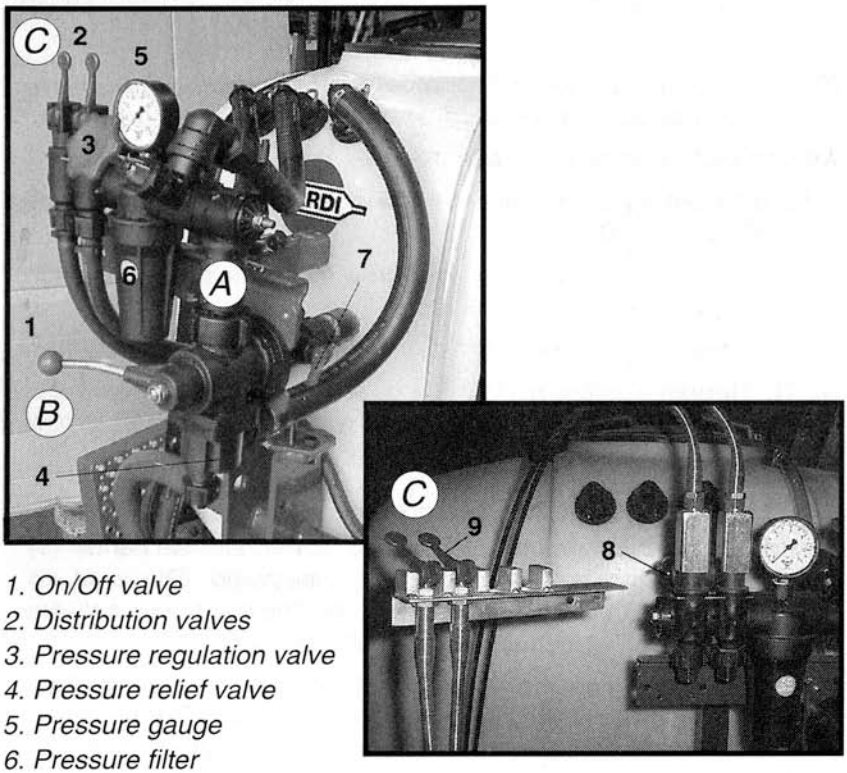
Please see section dealing with your operating unit. Initial adjustment and calibration is done with clean water.
See also the "Mistblowing Technique" book.

**NOTE: To ensure long bearing life, the tractor P.T.O. must not exceed 540 r/min.**

**Pressure recommendations**
When using the centrifugal blower system, the recommended spraying pressure is between 50 to 220psi (3 to 15 bar).

When using spray guns, the recommended spraying pressure is between 150 to 220psi (10 to 15 bar).

## 4.4 BK/2 Operating Unit




*1. On/Off valve*
*2. Distribution valves*
*3. Pressure regulation valve*
*4. Pressure relief valve*
*5. Pressure gauge*
*6. Pressure filter*
*7. Agitation On/Off valve*
*8. Adjust screw for constant pressure*
*9. Remote control for distribution valves (optional)*

1. Open or close flip lever **(7)** depending on whether pressure agitation is required. (remember that agitation takes 5% to 15% of pump output) Turn main ON/OFF handle **(1)** to ON position **A**.
2. Set levers **(2)** on the distribution valve down to ON position.
3. Turn the pressure adjustment valve **(3)** counter-clockwise to minimum pressure setting.
4. Put the tractor in neutral and set the P.T.O. revolutions to 540 rpm. (If maximum blower output is not necessary the revolutions may be set at less than 540 P.T.O. rpm).
5. To take advantage of the HARDI-MATIC mechanical rate controller feature built into the BK/2 operating unit it is important to choose a forward speed in a gear dependant on the spray nozzles choosen and the desired spraying pressure.
6. Adjust the pressure regulation valve **(3)** to the desired spraying pressure.

**NOTE: Maximum pressure for model 1202 pump is 220psi (15 bar). Do not operate the sprayer over the maximum pressure.**

**Adjustment of Constant Pressure**

6. Note the pressure and place the first lever **2** on the distribution valve to OFF position **C**.
7. Turn the corresponding adjusting screw **4** until the pressure gauge again shows the same pressure.
9. Adjust the other section of the distribution valve in the same way.

**NOTE: Hereafter adjustment of pressure equalization will only be needed if you change to nozzles of other capacities.**

## 4.5 Operating the Unit during Spraying

To stop the liquid flow to both sides of the blower, turn the handle **(1)** to position **B**. This takes the pressure from the pump. The liquid will then return to the tank via the return system. The diaphragm anti-drip valves ensure instantaneous closing of all nozzles.

If you want to spray on one side only, set lever **(2)** of the distribution valve to OFF position **C** for the section to be closed. The pressure equalization device ensures that the pressure does not rise in the section which remains open.

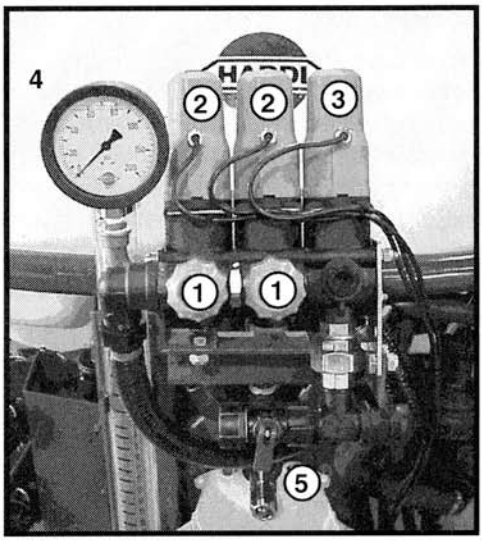
## 4.6 CB/2 Operating Unit (optional)

1. Adjust screw for constant pressure
2. Distribution ON/OFF valves
3. Pressure regulation valve
4. Pressure gauge
5. Agitation On/Off valve


**CB/2 control box**

(A) Operating switches for distribution valves

(B) Pressure regulation switch (to lower or raise)




## 4.7 CB/2 Control Box

1. ON/OFF switches **(A)** is set to ON position.
2. Pressure regulation switch **(B)** is activated until valve is at the minimum setting.
3. Put the tractor in neutral and set the P.T.O. revolutions to 540 r/min. (If maximum blower output is not necessary the revolutions may be set at less than 540 P.T.O. rpm)
4. From a given forward speed in a gear and the nozzles chosen, the desired pressure on the pressure gauge is set by means of the pressure regulation switch **(B)**.

**NOTE: Maximum pressure is 220psi (15 bar). Do not operate over 220psi (15 bar).**

**Adjustment of Constant Pressure**

5. Close the first distribution valve switch **(A)**.
6. Turn the adjusting screw **1** until the pressure gauge again shows the same pressure.
7. Adjust the other section in the same manner.

**NOTE:** Hereafter adjustment of constant pressure will only be needed if you change to nozzles of other capacities.

## 4.8 Agitation Adjustment (Agitation nozzles only)

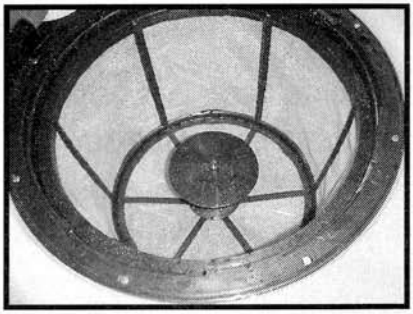
Agitation is necessary to keep the solution in your tank properly mixed. Consult your chemical supplier for the recommended amount of agitation.

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.

Flipping the agitation valve lever will reduce the agitation flow. Flipping the valve the oppostite direction will increase the agitation flow.

## 4.9 Powder Mixer (optional)

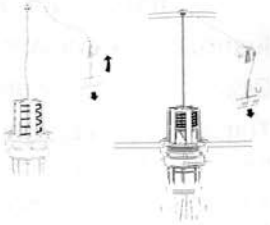
1. Fill the tank at least half full of water.
2. Disengage the fan.
3. Turn the distribution valves to off and valve to the Powder mixer On.
4. Engage the tractor P.T.O. and set the pressure to approx. 75psi(5 bar).



5. Now pour the powder into the tank basket filter. The liquid will then wash the powder into the tank.
6. When all the powder has been washed into the tank, return the valves to the original setting.

## 4.10 Tank Drain Valve

Pull the red handle on the top of the tank to open the drain valve. The valve is spring-loaded, 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 downward and the valve will close automatically.

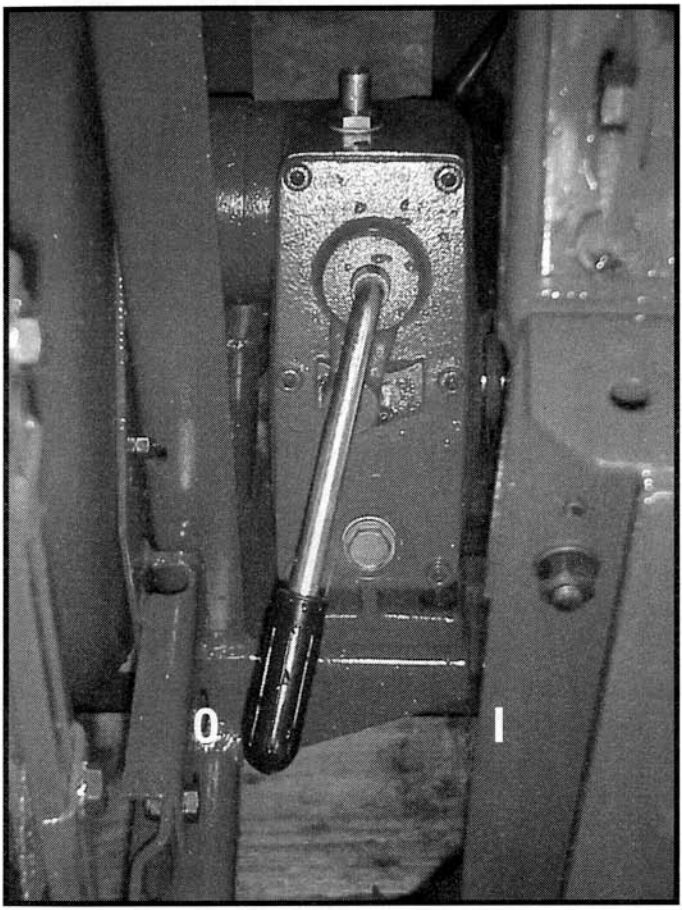


## 4.11 Engaging and Disengaging the Fan

Calibration, spraying with guns, or agitation under transport only needs the pump to operate without the fan and therefore it is more practical to disengage the fan.

On the gearbox behind the tank the handle is set at position **O** to disengage the fan and position **I** to engage the fan.

**O** = neutral, **I** = low gear

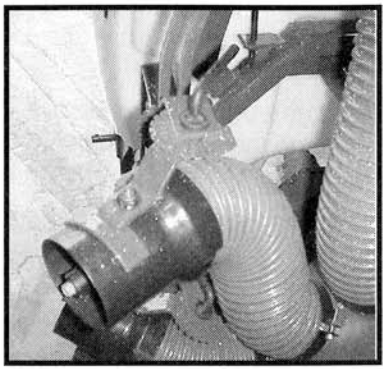



**IMPORTANT:** The PTO must be disengaged and both the pump and the fan must be stationary when engaging/disengaging the fan.

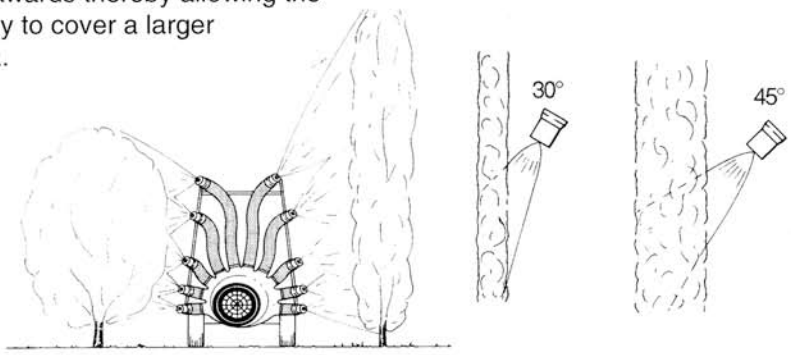
## 4.12 Adjustment of Centrifugal Blower

The hoses and outlet spouts can be adjusted up and down as well as forwards and backwards to direct the spray to the target area. Settings can be recorded for future reference.

Nozzles can be removed and the outlet blanked off with a 3/8" cap (#320272) if not required.

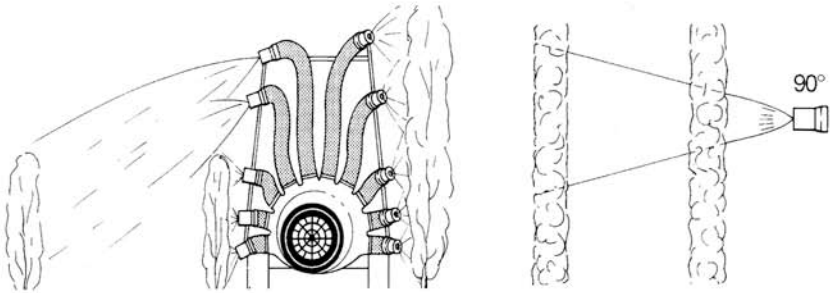


**For narrow rows** - Angle spouts backwards thereby allowing the spray to cover a larger area.




**For bushes in rows** - It may be possible to spray several rows at the same time.

**For grapevines** - If it is difficult to penetrate the vine, angle 2 spouts forwards and 3 backwards on each side.

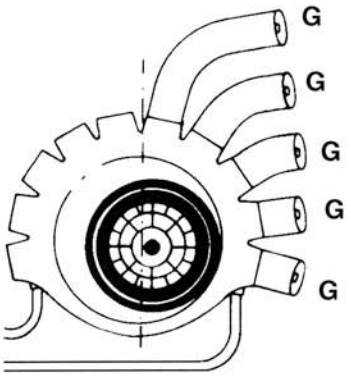


## 4.13 Calibration

A standard set of orange (1299-14) nozzles is supplied with the sprayer.Other nozzles and combination of nozzles can be used so the output and drop size suits the intended spray task.

**Nozzles**

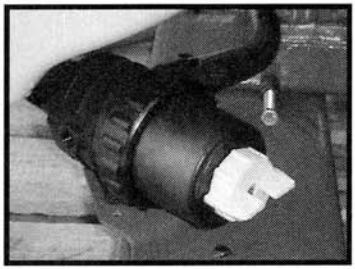
| COLOR | SIZE |
|---|---|
| Purple | 1299-08 |
| Brown | 1299-10 |
| Yellow | 1299-12 |
| Orange | 1299-14 |
| Red | 1299-16 |
| Green | 1299-18 |
| Blue | 1299-20 |




**Standard Spraying examples** and **Nozzle set** tables are given in the "Mistblowing Technique" book and on the back of the Mistblower Calibrator disc.

**Air volume - see Section 9.0 on TECHNICAL SPECIFICATIONS.**

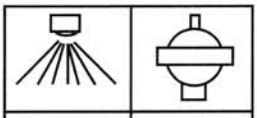
## 4.13 Before Starting



- Check that suction filter is clean.
- Check that the pressure agitation valve is turned on.
- Check the oil level in blower drive gearbox.

**1202 diaphragm pump**

The air pressure in the pulsation damper is factory preset at 30psi (2 bar) to cover spray working pressures between 45-220psi ( 3 and 15 bar). When using spray pressures outside this range, the air pressure should be adjusted as shown in the diagram. The diagram is also embossed on the damper cover.



| PSI (BAR) | PSI (BAR) |
|---|---|
| 20-45 (1-3) | 0-15 (0-1) |
| 45-220 (3-15) | 15-45 (1-3) |

# 5.0 MAINTENANCE

**IMPORTANT:** Always clean the sprayer 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 few but important practices and rules should be kept:

## 5.1 Cleaning the Sprayer

### Guidelines

Read the whole label of the chemical. 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 body, eg. Dept of Agriculture.

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, eg. 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

1. Dilute remaining spray liquid in the tank with at least 10 parts water and spray the liquid out in the orchard you have just sprayed.

**NOTE: It is advisable to increase the forward speed (double if possible) and reduce the pressure.**

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 suction filter and clean it. Be careful not to damage the mesh. Reassemble the filter housing without the filter. Replace filter 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. If pressure filters are fitted with a drain valve, open valve and flush filter.
6. After spraying the liquid out, 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.

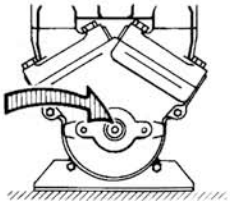
**NOTE: If a cleaning procedure is given on the chemical label, follow it closely.**

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. Drain the tank and let pump run dry. Rinse inside of tank, again letting the pump run dry.
9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them now.
10. Replace all the filters and nozzles and store the sprayer. If, from previous experiences, it is noted that the solvents in the pesticide 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.**

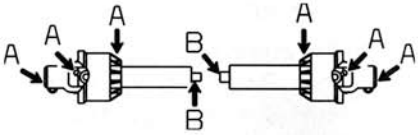
## 5.2 Lubrication

It is recommended to use ball bearing grease (lithium grease No. 2)



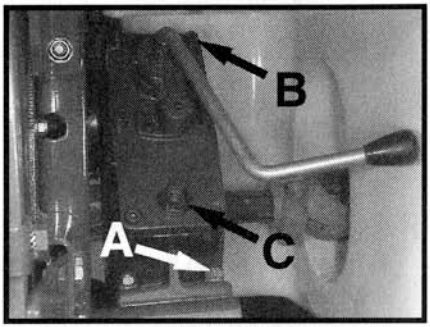
**NOTE: If the sprayer is cleaned with a high pressure cleaner or it has been used to spray fertilizer, we recommend lubrication of the entire machine.**

**Diaphragm pump**
Grease every 40 hours.




**Transmission shaft**
Lubricate the cross journals and bearings with ball bearing grease **A** every 10th working hour and tubes and pins **B** every 40 working hours.

**Gear box**
The gear box is filled with oil from the factory. Regularly check oil level. The oil level must come to the indicator glass.




**A** - Drain plug
**B** - Level indicator
**C** - Filling hole

| | Oil cap. qts/litre | Oil type SAE | Initial change hours | There after hours |
|---|---|---|---|---|
| Gearbox | 0.8/0.8 | EP 90 | 200 | 400 |

## 5.3 Filters

***WARNING:*** **WEAR PROTECTIVE CLOTHING WHEN SERVICING AND HANDLING COMPONENTS THAT HAVE BEEN IN CONTACT WITH SPRAY LIQUID.**

Clean filters ensure that the;

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

The main filter protecting sprayer components is the suction filter. Check it daily when spraying.
**See section on Operating Instructions - before starting.**

## 5.4 BK/2 Pressure Filter

The BK/2 operating unit has an in-built pressure filter. Unscrew the filter bowl to inspect and clean the filter. Standard mesh is 50 mesh. 80 & 100 mesh screens are also available.

***WARNING:* ENSURE SYSTEM IS NOT PRESSURIZED AND PUMP IS DISENGAGED BEFORE UNSCREWING FILTER BOWL.**

## 5.5 Adjustment of V-belts

Correct belt tension is important for efficient power transfer from the input shaft to the pump. Under tensioned belts will slip and overheat reducing belt life whilst over tensioned belts will reduce belt and bearing life.

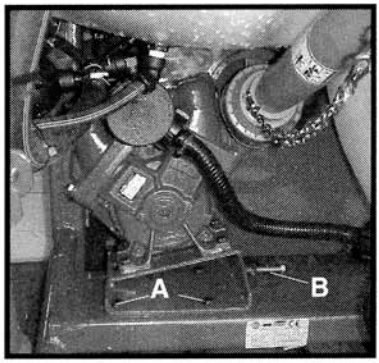
Check the V-belts regularly within the first 24 working hours as they need to be run in. Tighten if necessary. Thereafter check the belts every 40 hours.

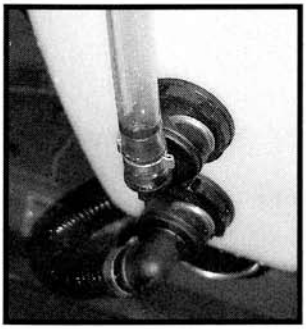
A visual check can be done by running the transmission for a few minutes and then noting the "bow" of the V-belts on the slack side. A faint "bow" should be noted.

**LE-SPV pump drive**

The pump drive V-belts are adjusted by loosening the bolts **A** at the base of the pump, loosening counter nut and adjusting bolt **B** at the foot of the pump. Adjust tension so that at midway between pulleys, a force of 2lbs (1 kg) should deflect the V-belt 1/8" (2 to 3 mm). Do not over-tighten the V-belts.

V-belts MINI/MAXI #249032



## 5.6 Tank Contents Indicator

Depending on products used, it can become difficult to see the red sphere inside the level indicator tube. Note that the tube and float can be replaced when necessary.

## 5.7 Seal Renewal Main Tank, Drain Valve

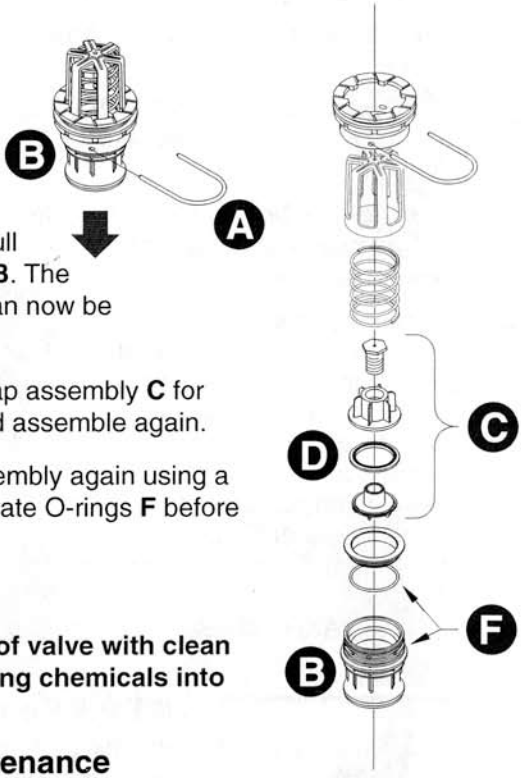
If the main tank drain valve leaks, the seal and seat can be changed the following way.

**WARNING: DO NOT ATTEMPT TO ENTER THE TANK - THE PARTS CAN BE CHANGED FROM UNDERNEATH THE TANK.**

**WARNING: USE EYE / FACE PROTECTION MASK WHEN DISMANTLING THE TANK DRAIN VALVE.**

1. Make sure the tank is empty and clean.
2. The valve must be closed and the string loose
3. Pull out the clip **A** and pull down connecting piece **B**. The entire valve assembly can now be pulled out.
4. Check cord and valve flap assembly **C** for wear, replace seal **D** and assemble again.
5. Assemble the valve assembly again using a new valve seat **E**. Lubricate O-rings **F** before assembly.
6. Fit clip **A** again.

**Note: Check function of valve with clean water before filling chemicals into the tank.**




## 5.8 P.T.O. Shaft Maintenance

**Every 40 hours:**

Inspection of protection guards, function and condition. Replace possible damaged parts.

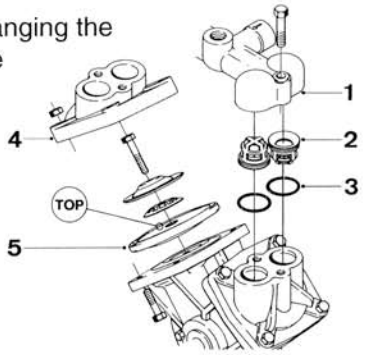
**Every 1000 hours:**

Check condition of protection guards and replace nylon bearings. Check general condition of cross journals and push-pin/quick release - replace if necessary.

## 5.9 Changing of Valves and Diaphragms in a 1202 Pump

**Valves**

Remove valve cover **(1)**. Before changing the valves **(2)** note the orientation of the valves so that they are replaced correctly.
It is recommended to use new gaskets **(3)** when changing or checking the valves.




**Diaphragms**

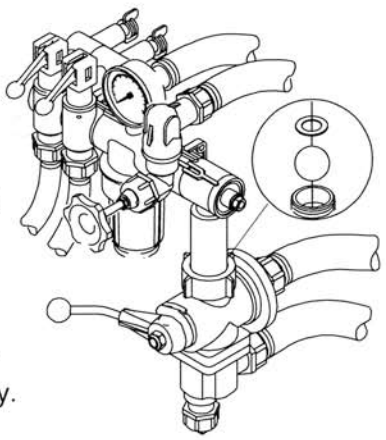
Remove the diaphragm cover **(4)** after having dismantled the valve cover. The diaphragm **(5)** may then be changed. If fluids have reached the crankcase, re-grease the pump thoroughly. Check also the drain hole at the bottom of the pump is not blocked.Reassemble pump with the following torque settings.

| Pump Model | Valve cover Ft/Lbs(Nm) | Diaphragm cover Ft/Lbs(Nm) | Diaphragm bolt Ft/Lbs(Nm) |
|---|---|---|---|
| 1202 | 52(70) | 52(70) | 45(60) |

1 Nm = 0.74 ft-lb

## 5.10 Changing the ball seat in BK/2 Control

If the main ON/OFF valve does not seal properly (dripping nozzles when main ON/OFF valve is closed), the ball and seat should be checked.



Remove the 2 bolts fixing the main ON/OFF pressure valve unit to the bracket, unscrew the union nut A and pull the 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.

# 6.0 OPERATIONAL PROBLEMS

In cases where breakdowns have occurred the same factors always seem to come into play:

Minor leaks on the suction side of the pump will reduce the pump capacity or stop the suction completely.

A clogged suction filter will hinder or prevent suction so that the pump does not operate satisfactorily.

Clogged up pressure filters will result in increasing pressure at the pressure gauge but lower pressure at the nozzles.

Foreign bodies stuck in the pump valves with the result that these cannot close tightly against the valve seat. This reduces pump efficiency.

Poorly reassembled pumps will allow the pump to suck air resulting in reduced or no capacity.

Electrical components that are contaminated with dirt result in poor connections.

**Therefore ALWAYS check:**

1. Suction and pressure filters are clean.
2. Hoses for leaks and cracks, paying particular attention to suction hoses.
3. Gaskets and O-rings are present and in good condition.
4. Pressure gauge is in good working order. Correct dosage depends on it.
5. Operating unit functions properly. Use clean water to check.
6. Electrical components are maintained clean.

## 6.1 Trouble Shooting

| Fault | Possible cause | Control / remedy |
|---|---|---|
| No liquid flow from pump | Suction obstructed. | Suction cut-off open. |
| | Air leak on suction. | Missing O-rings.<br>Defect hoses. |
| | Valves obstructed or worn. | Replace. |
| No pressure | Worn control unit. | Check spring strength. |
| | Valves obstructed or worn.. | Replace. |
| Fluctuating pressure | Valves obstructed or worn. | Replace. |
| | Air leak on suction. | Missing O-rings.<br>Defect hoses. |
| | Suction obstructed. | Replace. |
| Pump noisy | Worn bearings.<br>Valves worn. | Replace. |
| | Air leak on suction. | Missing O-rings.<br>Defect hoses. |
| CB2 Control will not work | Fuses blown | Replace fuses<br>1 amp - #269019<br>2 amp - #269039 |
| | Bad plug connection | Check for dirt, corrosion, loose, wires on plugs |

# 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". 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. Renew 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 nozzles. Remember to drain the flush tank also.
4. Pour appr. 5 Imp.gal (20 litre) antifreeze mixture consisting of 1/3 automotive antifreeze and 2/3 water into the tank.
5. Engage the pump and operate all valves and functions on the sprayer and control. allowing the antifreeze mixture to be distributed around the entire circuit. Open the main on/off valve and distribution valves so the antifreeze is sprayed through the nozzles as well. The anti-freeze 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 gauges and store them in a vertical position in frost free conditions.
9. Apply a thin layer of anti-corrosive oil (e.g. SHELL ENSIS FLUID, CASTROL RUSTILLO or similar) on all metal parts. Avoid oil on rubber parts, hoses and tires.
10. Remove all the control boxes (if fitted) and store them in a clean and dry area.
11. 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:

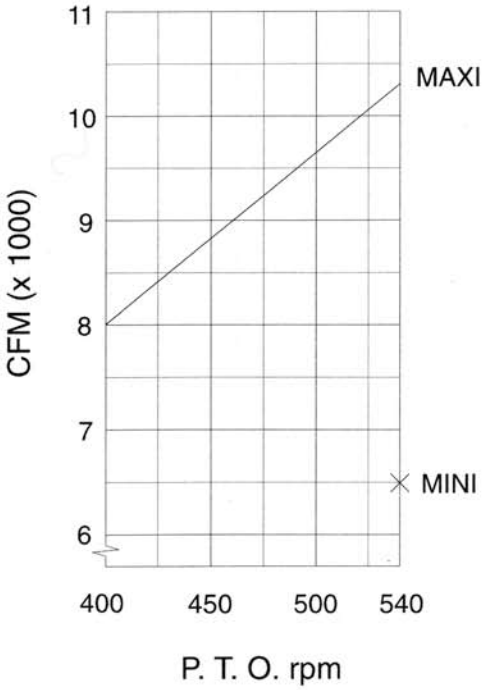
1. Remove the cover. (If fitted)
2. Fit the pressure gauges again. Seal with Teflon tape.
3. Connect the sprayer to the tractor including electric's.
4. Check all electric functions.
5. Empty the tank of remaining antifreeze.
6. Rinse the entire liquid circuit on the sprayer with clean water.
7. Fill with clean water and check all functions.

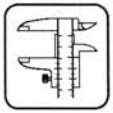
# 8.0 TECHNICAL SPECIFICATIONS

## 8.1 Pump Power Consumption and Capacity

| 1202/9.0 | rpm 300 | | 400 | | 500 | | 540 | | 600 | |
|---|---|---|---|---|---|---|---|---|---|---|
| psi | gpm | HP | gpm | HP | gpm | HP | gpm | HP | gpm | HP |
| 0 | 14.0 | 0.3 | 17.7 | 0.5 | 21.1 | 0.7 | 22.0 | 0.8 | 24.8 | 0.9 |
| 35 | 10.8 | 0.5 | 14.8 | 0.7 | 18.2 | 1.0 | 19.5 | 1.1 | 21.1 | 1.3 |
| 75 | 10.6 | 0.8 | 14.0 | 1.1 | 17.4 | 1.4 | 18.8 | 1.5 | 20.1 | 1.7 |
| 110 | 10.6 | 1.0 | 13.7 | 1.4 | 16.9 | 1.8 | 18.0 | 2.0 | 19.3 | 2.3 |
| 150 | 10.6 | 1.2 | 13.7 | 1.7 | 16.4 | 2.2 | 17.2 | 2.3 | 18.5 | 2.6 |
| Rotation per min. | | rpm | Capacity | | | gpm | Weight | | | 53 lbs |
| Power consumption | | HP | Max. pressure | | | psi | | | | |

**MINI / MAXI) Ratio 1 : 7.04**





| Model | Tank gallons (litres) | Blower Dia. in(mm) | Air volume CFM ($m^3/h$) | Air speed average mph(m/s) | Pump model | Power consumption HP(kW)* | Dimensions L x W x H IN(cm) | Weight lbs(kg) |
|---|---|---|---|---|---|---|---|---|
| LE-SPV 100 MINI | 100(400) | 12.5(320) | 6500(11000) | 105(47) | 1202 | 17(13)* | 51 x 43 x 70 (128 x 110 x 175) | 433(197) |
| LE-SPV 150 MINI | 150(600) | 12.5(320) | 6500(11000) | 105(47) | 1202 | 17(13)* | 51 x 50 x 70 (128 x 127 x 175) | 453(206) |
| LE-SPV 100 MAXI | 100(400) | 16(400) | 10533(18000) | 110(50) | 1202 | 25(18)* | 54 x 53 x 77 (138 x 135 x 195) | 510(232) |
| LE-SPV 150 MAXI | 150(600) | 16(400) | 10533(18000) | 110(50) | 1202 | 25(18)* | 54 x 53 x 77 (138 x 135 x 195) | 520(236) |

* Stated at 540 r/min
Pump pressure at 220psi (15 bar)
High gear

# 9.0 WARRANTY POLICY AND CONDITIONS

HARDI® INC. , 1500 West 76th Street, Davenport, Iowa USA; 5646 W. Barstow, Fresno, California, 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 not manufactured by HARDI®, (i.e. engines, tires, tubes, electronic controls, and other components or trade accesories, 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 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 and conditions, HARDI® extends the warranty on polyethylene tanks on mistblower sprayers with axial or centrifugal fans (excluding fittings, lids and gaskets) to TEN 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 plants in Davenport, IA, USA; Fresno, CA, USA, and London, Ontario, Canada at no cost to the purchaser during the first ten years. This ten 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 plants in Davenport, IA, USA; Fresno, CA, USA, and 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 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 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.

# 10.0 NOTES