

CROPLANDS

GENERAL SPRAYER OPERATION

WWW.CROPLANDS.COM.AU

STOP

BEFORE COMMENCING
operation, **ENSURE** you read
& understand this manual, its
contents, and any additional
information supplied.



INTRODUCTION

GENERAL MANAGER'S WELCOME



Sean Mulvaney
General Manager

Dear Customer

Congratulations on the purchase of your new Croplands Sprayer. Croplands have been in the business of building sprayer equipment since 1972. For over 49 years we have been supplying sprayers to farmers, contractors, growers and all our customers involved in growing crops and in the control of pests and diseases.

Croplands is a wholly owned subsidiary of Nufarm Ltd, the largest supplier of crop protection chemicals for Australasia, and one of the fastest growing global suppliers world-wide.

At Croplands, we pride ourselves on our commitment to supplying machinery that is at the forefront of the industry's needs. We believe we can back up our products and through

constant research and development, bring to you the best equipment you can find.

We welcome any feedback from you about our equipment.

On the back cover you will find our contact details, and locations where our staff can be reached during business hours. After hours, you can email us and expect a reply the following morning.

Please read this manual in its entirety before you operate your sprayer. This will ensure you have a trouble free start up.

We trust you will get years of good use from your Croplands Sprayer.

Yours Sincerely

Sean Mulvaney
General Manager

Croplands has taken steps to ensure this operator's manual is as current and as accurate as possible. Due to the ever-changing markets of cropping and farming, Croplands is constantly striving to be at the forefront of innovation and technology. While the information in this manual is considered accurate at the time of writing, Croplands reserves the right to change this information without notice. Croplands will not accept liability for any inaccuracy in this publication, or changes forthwith.

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This **GENERAL** manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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SECTION 1

IMPORTANT INFORMATION

ABOUT THIS MANUAL

This GENERAL manual is a generic overview for setting up, operating and maintaining your Croplands sprayer for which there is not a specific manual.

In addition to this manual, the sprayer will be delivered with the General Safety Manual (GP-SAFE-A).

For details not covered by the manuals, please contact Technical Support on 1300 650 724.

Some features and options explained in this manual may not be installed on your sprayer.

Please pass on this manual with the sprayer at the time of resale for usage by the new owner.

This manual, was first published in 2008 as part number, GP-POM001108. This April 2021 issue updates sections 6B and 6H.

Check online as there may be more recent revisions of this manual. www.croplands.com.au

TERMINOLOGY

These terms/symbols used throughout this manual:

NOTE	This Note sign is in place to convey useful information and will help you to identify the best possible way to operate the machine.
CAUTION	This Caution sign shows the potential for incident. An incident may include damage to the machine itself, or possible injury to the operator.
WARNING	This warning sign shows the potential for risk or injury and highlights the need for steps to be taken to protect ones safety.
DANGER	This Danger sign will be used in areas where the highest risk is present. Always read the information on these signs and ensure you are taking steps to prevent risk or injury.

BEFORE OPERATING YOUR SPRAYER

Before attempting to use your sprayer, make sure you read all Operator Manuals for this sprayer including but not limited to:

This Operator's Manual, **and all other supplied manuals** for items such as safety, pumps, PTO, controller, boom etc.

And properly understand:

- All Safety Issues.
- Assembly & Installation instructions.
- Calibration of the sprayer.
- Sprayer Operation.
- Sprayer Maintenance.

NOTE

To convey useful operating information.



CAUTION

To highlight potential injury or machinery damage.



WARNING

To stress potential dangers and the importance of personal safety.



DANGER

Probability of death or serious injury if an accident occurs

SECTION 1

IMPORTANT INFORMATION

WARRANTY POLICY

Each sprayer will be delivered with a Warranty & Pre-Delivery Booklet which includes:

- the Sprayer's unique serial number,
- the Sprayer's specification sheet,
- a pre-delivery checklist and
- outlines the Croplands Warranty policy.

Always contact your Croplands Dealer first and foremost for warranty matters.

NOTE

For full conditions of warranty and warranty policy, please see the Warranty & Pre-Delivery booklet provided with this sprayer.



SECTION 2

SAFETY

SAFETY FIRST

Please read and understand all supplied manuals, guides and safety decals before operating this sprayer. This includes the **Croplands Operators Safety Manual** – as pictured here.

This manual is available on the Croplands Web site, or for printed versions contact Croplands customer support and ask for part number GP-SAFE-A (or later version if available).



SECTION 2

SAFETY

SAFETY SIGNS AND DECALS

All signs and decals for sprayer safety and operation must be maintained in good order and replaced if damaged or missing. Most Croplands labels have a part number printed on the decal to aid identification and replacement.

Some examples are shown below.




WARNING

SAFETY INSTRUCTIONS

1. Read your operators manual thoroughly before operating the sprayer.
2. Inspect hoses, connections and nozzles daily.
3. Clean filters regularly.
4. Always follow correct maintenance schedules outlined in operator's manuals.
5. Always read chemical manufacturers labels before use.
6. Always observe all warnings on chemical products.
7. Regularly check all nuts and bolts are tight.
8. Always wear rubber gloves and wash sprayer down before doing any repair or maintenance work.
9. Do not ride on sprayer when moving.
10. Keep clear of moving parts when sprayer is operating.
11. Always keep guards in place when sprayer is operating.
12. Be sure tank lid is closed before operating basket mixing facility.
13. Stand well clear of sprayer when operating.
14. Do not disconnect hoses, nozzles or filters while sprayer is operating.

FAILURE TO FOLLOW THE ABOVE INSTRUCTIONS MAY RESULT IN SERIOUS INJURY OR DEATH.

Part No: XD - 123



WARNING

OPERATION INSTRUCTIONS

FOR SAFETY PROCEDURES READ THE OPERATORS MANUAL.

STOP THE ENGINE AND REMOVE THE IGNITION KEY BEFORE (AND AFTER) WORKING ON THE MACHINE.

DO NOT START THE MACHINE WITHOUT ENSURING ALL PEOPLE ARE WELL CLEAR OF WORKING PARTS. SOUND THE HORN BEFORE START UP

FAILURE TO OPERATE CORRECTLY MAY RESULT IN SERIOUS INJURY OR DEATH!

Part No: XD - 125V



WARNING

DO NOT FILL THE TANK IN EXCESS OF THE CARRYING CAPACITY OF THE VEHICLE WITH WHICH THE TANK WILL BE USED, AS SPECIFIED BY THE VEHICLE MANUFACTURER.

1 Litre of water = 1 Kg 50 Litres of water = 50 Kg

DO NOT EXCEED THE VEHICLE MANUFACTURERS SPECIFIED SAFE LOAD CARRYING AND TOWING CAPACITIES.

READ THE OPERATORS INSTRUCTION MANUAL AND CHECK UNLADEN WEIGHT BEFORE ATTACHING OR USING THIS PRODUCT.

Part No: XD - 126V



WARNING

Never operate your sprayer with a loose rim, wheel or axle.

Anytime wheel nuts are loosened, retighten to specified torque.

ENSURE ALL WHEEL NUTS ARE TIGHT BEFORE USE.

FAILURE TO DO SO MAY RESULT IN A SERIOUS ACCIDENT.

Part No: XD - 175




WARNING

BEWARE OF MOVING PARTS.

FAILURE TO OPERATE CORRECTLY MAY RESULT IN SERIOUS INJURY OR DEATH!

Part No: XD - 182



WARNING

THIS IS A SPECIAL PURPOSE MACHINE AND IS NOT DESIGNED FOR PROLONGED HIGHWAY USE AT SPEEDS EXCEEDING 25 KPH.

FAILURE TO OPERATE CORRECTLY MAY RESULT IN SERIOUS INJURY OR DEATH!

Part No: XD - 176



CAUTION

WATER ONLY

DO NOT ADD CHEMICAL

Part No: XD - 127V



CAUTION

WATER FOR OPERATOR WASHING ONLY

DO NOT DRINK

Part No: XD - 124V



DANGER

ENTANGLEMENT IN PTO SHAFT CAN SERIOUSLY INJURE OR KILL

FAILURE TO OPERATE CORRECTLY MAY RESULT IN SERIOUS INJURY OR DEATH!

Part No: XD-122V



DANGER

THERE IS A RISK OF ROLLOVER WHEN OPERATING ON SLOPES

FAILURE TO COMPLY WITH THESE PRECAUTIONS MAY RESULT IN DEATH OR INJURY

Part No: XD-194

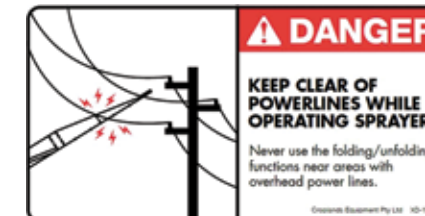


DANGER

KEEP BODY PARTS AND LOOSE OBJECTS AWAY FROM ROTATING FAN

FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY

Part No: XD - 195



DANGER

KEEP CLEAR OF POWERLINES WHILE OPERATING SPRAYER.

FAILURE TO OPERATE CORRECTLY MAY RESULT IN SERIOUS INJURY OR DEATH!

Part No: XD - 181

SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

PRODUCT IDENTIFICATION

Always use the serial number of the Sprayer when requesting service information or when ordering parts.

Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure for specific service operations.

The serial numbers of all controllers, pumps etc should also be recorded for future reference.



Photo 1

SHIPPING INFORMATION

All provided tie down points (and more) should be used to help secure the sprayer for transporting.

Note serial number plate in the attached image.



Photo 2

WEIGHTS & DIMENSIONS

Croplands customer service can provide weights and dimensions details as required.

Freecall 1800 999 162



SECTION 4

PRE-OPERATION

NOTE

This GENERAL manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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SECTION 4

PRE-OPERATION

HOOK UP

Assembly Instructions

Your Sprayer is supplied fully assembled with up to six items requiring assembly after shipping from the factory:

1. Adjustments to the hitch and PTO may be necessary to match tractor drawbar & PTO requirements.
For 3 point linkage, adjust the tractor arms as required.
2. Connect the hitch and PTO shaft to the tractor.
3. Connect any hydraulic hoses to the tractor &/or electric in-cab control for wing-lift (optional).
4. Connect and fit the Controller, if necessary.
5. Connect and fit the Foam Marker Controller (optional) to the Tractor.
6. Connect hydraulic pump drive hoses & adjust (if fitted as an option for centrifugal or diaphragm pumps).



Linkage sprayer with linkage style hitch

1. Connecting a Trailed Sprayer & PTO Shaft to the Tractor

Your Croplands Sprayer must be connected to a suitable tractor, making sure the drawbar hitch and PTO shaft are fitted according to the instructions that follow:

1. Align drawbars of the tractor and sprayer, insert and lock drawbar pin in position ensuring the drawbar pin cannot come out while transporting or operating.
2. Remove the jack supporting the sprayer chassis, and store it on the frame lug provided.
3. Check the machine is level fore and aft. The sprayer should be slightly lower at the front. If not adjust the sprayer drawbars and axle to achieve level position.

NOTE

Be careful not to damage or deform the mesh or gasket while cleaning and refitting the filters and nozzle caps.



Trailed sprayer with stand hitch

Follow the instructions below to fit the PTO shaft onto the your Sprayer after transit:

1. Remove the PTO shaft which is strapped to the sprayer frame.
2. Check the PTO shaft has not been damaged in transit.
3. Measure and fit the PTO to the sprayer ensuring the locking pin is correctly located. Make sure you read and understand "The important factors for fitting the PTO shaft" on the next page.
4. Grease the universal joints and telescoping shafts.
5. Fit the PTO to the machines ensuring the locking pin is correctly located.
6. Before operating the drive shaft, be sure that all safety guards and chains are in place.



Connect the PTO shaft to the machines

NOTE

Incorrect hitching of PTO shaft will result in excessive pump vibration and damage to the pump.

SECTION 4

PRE-OPERATION

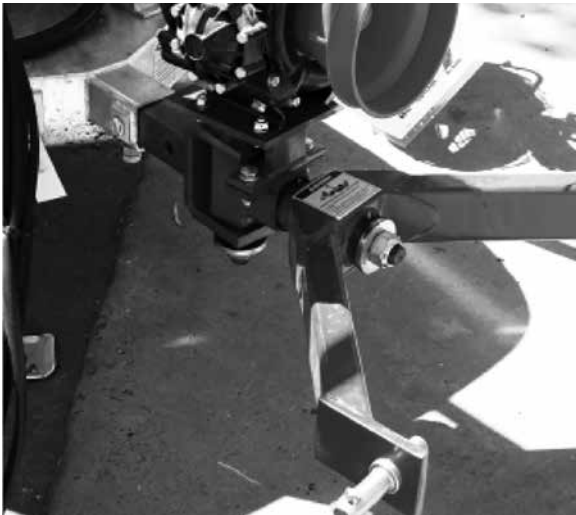
Self-Tracking Drawbar

If your sprayer is fitted with a self-tracking drawbar, ensure the pivot points are greased regularly (every spray-round).

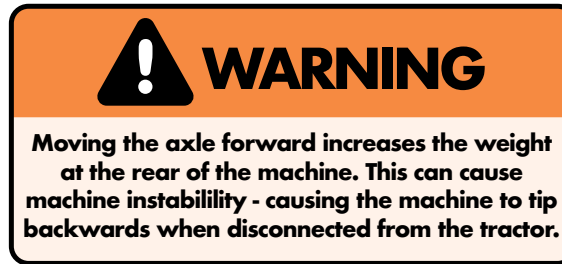
With the pump mounted on the top of the self-tracking drawbar, the PTO shaft will remain unchanged in length & direction during turning.

Ensure the drawbar is cut to the correct length for your tractor prior to operation & that the PTO shaft is greased every 4 hours during operation.

See your dealer about cutting the PTO to the correct length.



Optional self-tracking drawbar.



2. Linkage Hitching

Most Croplands linkage sprayers are equipped to fit tractors with Category I, II or III linkages.

Models 500 & 700 litre have Cat II for the lower linkage arms, and Cat I for the top link with sleeve if your tractor has Cat II.

The 1000 litre linkage sprayer has a clevis type Cat III hitch for the lower arms and Cat II for the top link.

The 1200 litre has Cat III pins on the lower linkage & Cat II on the upper linkage point.

Your Croplands Sprayer must be connected to a suitable tractor, making sure the drawbar hitch and PTO shaft are fitted according to the instructions that follow:



Remove the PTO shaft from the sprayer.

1. Remove the PTO shaft from the sprayer by depressing the locking pin.
2. Lower the tractor linkage and attach it to the sprayer's lower hitch pins of the appropriate category, then connect the upper linkage arm using the tractor's linkage pin.
3. Secure all linkage pins with the lynch pins.
4. Raise the tractor linkage to the desired spraying height and level the sprayer by adjusting the length of the top linkage arm.



Raise and lower the sprayer to check that the telescopic tubes of the PTO overlap by approximately 1/3rd of their length, and not less than 150mm, in all operating positions.

5. Clean and grease the splines on the tractor and sprayer PTO stub shafts and install the PTO shaft making sure that the spring loaded locking pins engage in the interference grooves of both stub shafts.
6. Ensure that the PTO shaft guards and safety chains are attached to the sprayer and tractor.

SECTION 4

PRE-OPERATION

NOTE

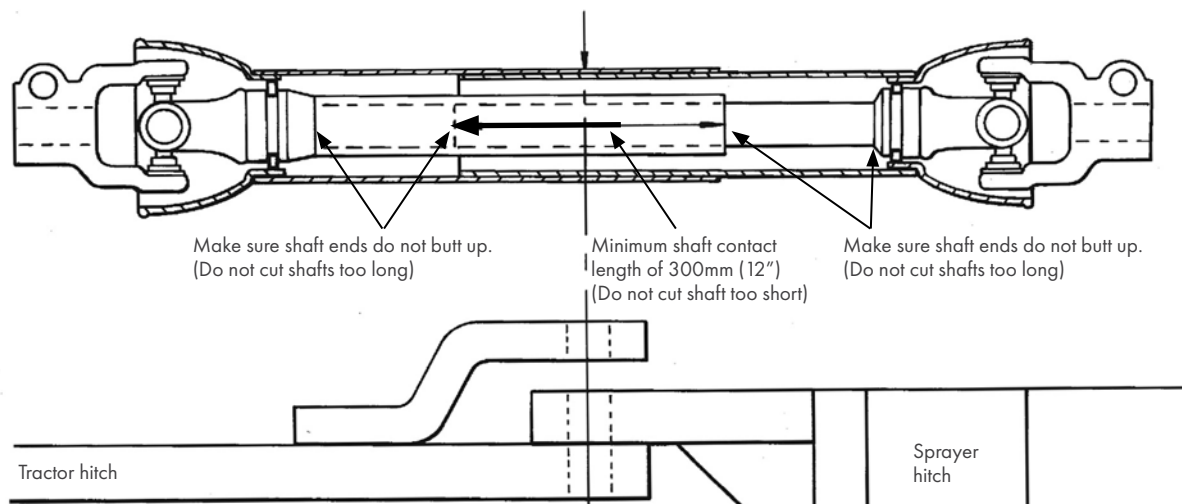
Upon delivery of a new PTO driven sprayer, it is the selling dealer's responsibility to install and set the PTO driveshaft to the correct length, as part of the installation service. The following/above information is provided for reference.

PTO Shaft Length

1. Set the linkage height so that the ends of the two shafts are at their closest distance.
2. Install the PTO shaft making sure that there is at least 25mm of telescopic travel remaining between the male and female sections.
3. Raise and lower the sprayer to check that the telescopic tubes of the PTO overlap by approximately 1/3rd of their length, and not less than 150mm, in all operating positions.

If the PTO shaft must be shortened, cut equal amounts from both male and female shafts and safety covers.

Carefully remove all burrs, swath them clean and re-lubricate before reassembling.



Important Factors when Fitting the PTO Shaft

The following three factors must be correct to avoid pump damage and maximise PTO operating life:

1. When travelling straight ahead, the point at which the sprayer drawbar pin is joined to the tractor should be as close as possible to centre between the universal joints of a Standard PTO shaft, as illustrated.

The tractor is then able to make maximum turns with minimal bending of the universals.

2. When the tractor is towing the sprayer straight ahead, the two telescopic sections of the power take-off shaft are at maximum extension.

When turning or crossing an inversion, the telescopic shaft sections close up.



CAUTION

Ensure that the drive shaft is the correct length to avoid any "butt up" damage to the pump.

NOTE

IMPORTANT: Do not allow more than 10% difference in the two halves of drawbar length. If more than 10% difference occurs, a wide angle shaft must be used.

SECTION 4

PRE-OPERATION

- The height difference between the tractor PTO spline and the PTO spline of the machine should not be more than 100mm.

This ensures PTO joint angles are approx equal and do not exceed limits. If greater than 100mm, a wide angle (constant velocity) PTO should be used.



WARNING

Maximum PTO speed for Croplands diaphragm pumps is 540 RPM.



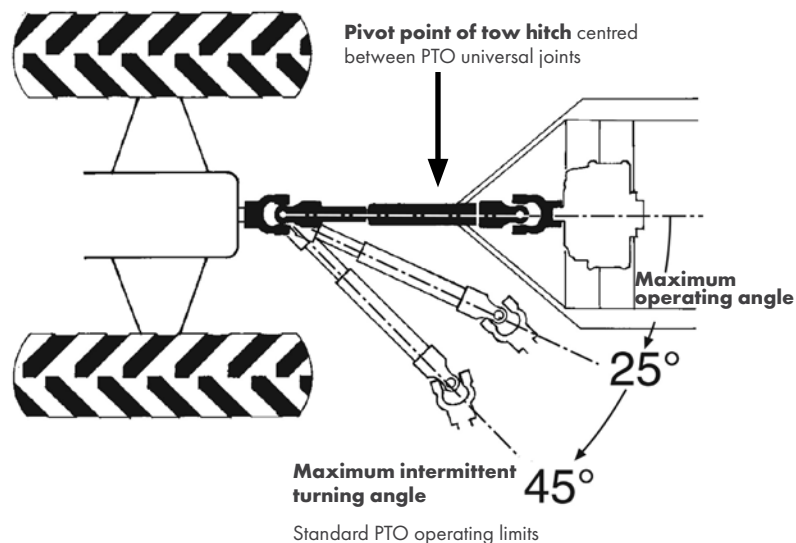
CAUTION

Pump warranty is not valid for damage caused by incorrect PTO shaft mounting.

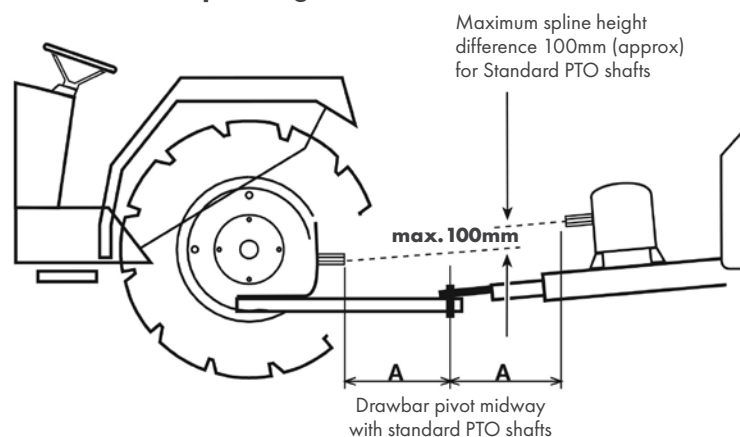
Heed the Operating Limits of the Standard PTO Shaft

The standard sprayer is fitted with a STANDARD PTO shaft. The maximum intermittent turning angles of the Standard PTO shaft is only recommended where should not exceed 45° turning angle of the PTO.

Standard PTO



Standard PTO Operating Limits

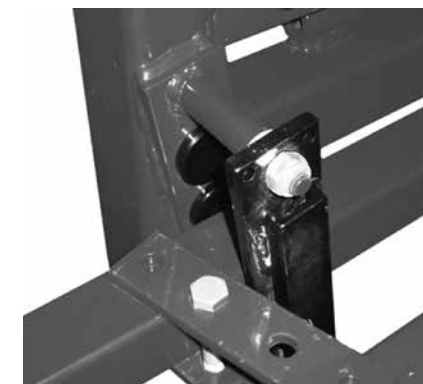


3. Connect Hydraulic Hoses to the Tractor

Boom Fold and Lift

If a standard hydraulic boom is fitted, the boom will provide simultaneous unfolding of boom sections and hydraulic lift adjustment of boom height.

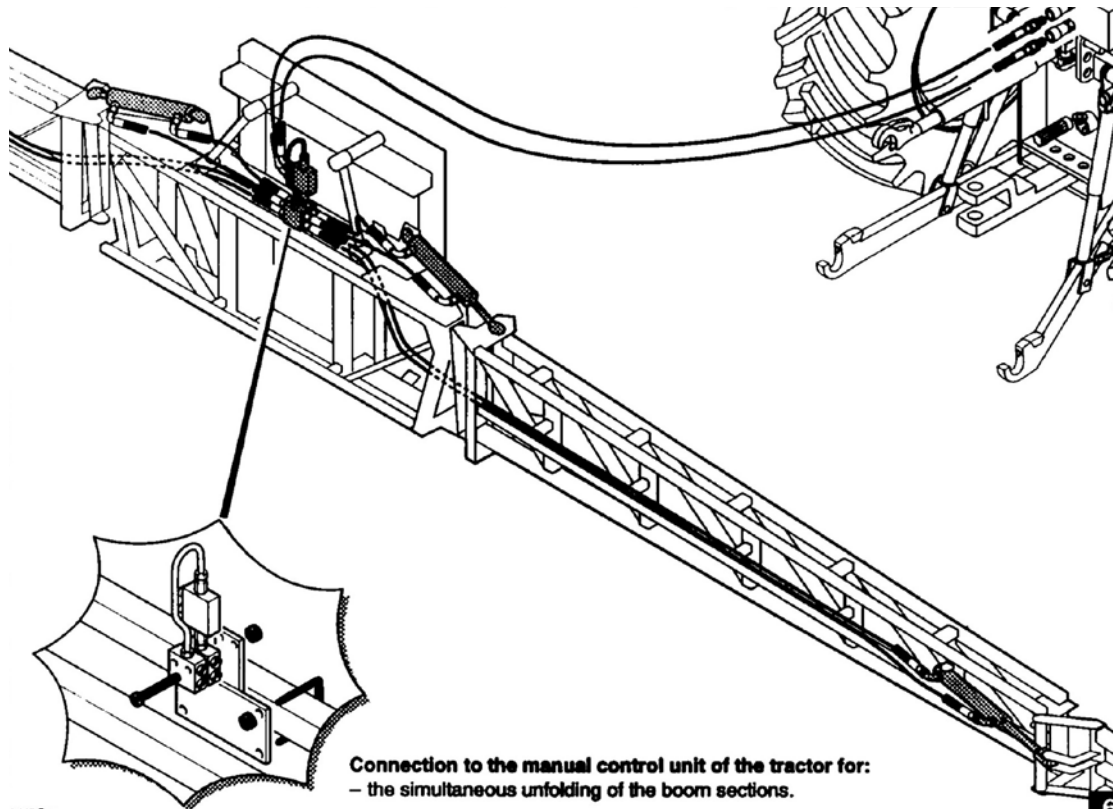
Prior to connecting your boom hydraulic hoses, remove the boom lock-plate (see below). This plate is in place for transport to your dealer from the Croplands' factory.



Remove the boom lock-plate

SECTION 4

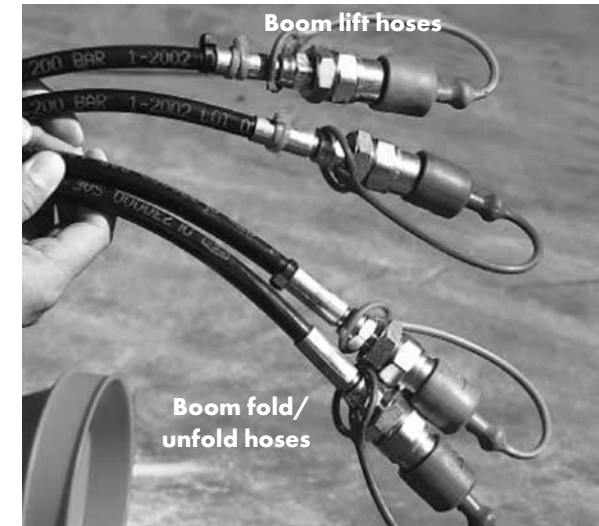
PRE-OPERATION



Boom fold hose connection

Connect the boom hydraulic hoses to the tractor, namely:

- a. Boom fold hoses.
- b. Boom parallelogram lift hoses.
- c. If fitted, connect the hoses for the wing lift (optional) - see following pages.
- d. If fitted, connect the hoses for the hydraulic pump drive (optional) - see following pages.



Standard hose connectors for boom lift and fold

If Quantum Mist Fans Are Fitted

Once the hitch & PTO adjustments are complete, it is important to correctly set up the hydraulic supply for the tractor.

Your dealer will carry out this step to ensure no damage or warranty issues will result from incorrect set up. A small charge may be incurred for this procedure.

A 3/4" return fitting is supplied with your Quantum Mist. This is the DIRECT BACK-TO-TANK fitting required to ensure there is no back-pressure on the oil return from the Quantum Mist sprayer.

On all models, it is important that these steps are done - to make it easy for you to use your sprayer, and to protect the sprayer's hydraulic system:

SECTION 4

PRE-OPERATION



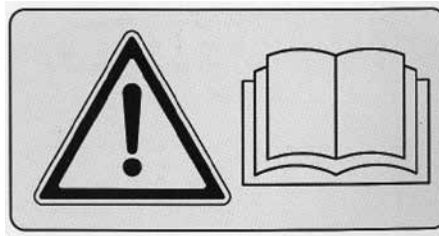
Connect hydraulic hoses to the tractor

1. Ask your dealer to fit the 3/4" female return coupler direct back-to-tank.
2. Decide on the best supply remote on your tractor to use for oil supply for the fan system
3. Plug the 1/2" oil supply line coupling to your selected remote and ensure the hydraulic line does not foul your PTO or any working parts at the rear of the tractor. Allow sufficient slack in the hydraulic line for turning.



3/4" return fitting

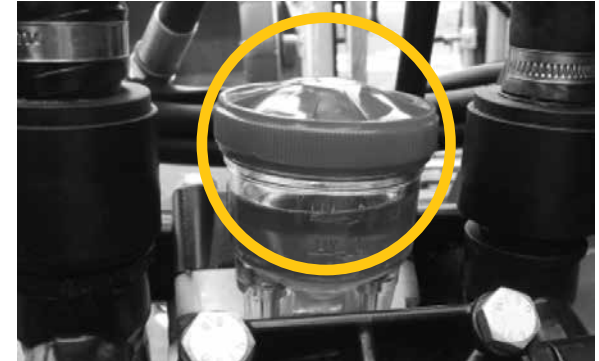
4. Hook up the 3/4" return line to the tractor. As with the pressure line, ensure there is sufficient slack & no interference with tractor working parts.



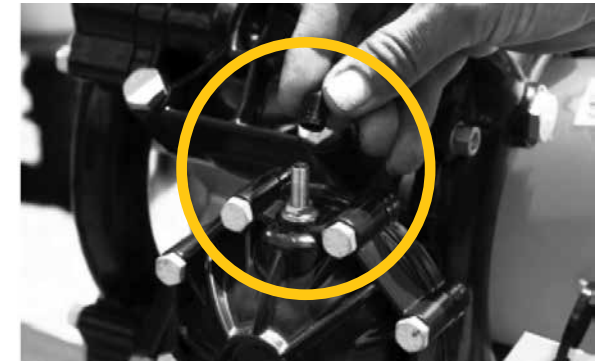
Read Operators' Manuals before operating machine

PRE-OPERATION CHECKLIST

1. Before attempting to use this machine, Read Operator's Manuals thoroughly.
2. Read and follow instructions on chemical manufacturers labels.
3. Always wear applicable protective clothing.
4. Check that all maintenance procedures have been followed.
5. Check all plumbing and fittings to ensure they are tight, not damaged or leaking.
6. Check PTO shaft or hydraulic pump drive is correctly set up.
7. Grease the PTO shaft if necessary.
8. Check diaphragm pump oil level. (Not applicable if fitted with Hypro centrifugal pump).



Check pump oil level



Check pump air chamber pressure

9. Check air pressure in the diaphragm pump air chamber is 70 - 100 kPa (10-15 psi). As a general guideline it should be 10% - 20% of operating pressure. (Not applicable if fitted with Hypro centrifugal pump)

SECTION 4

PRE-OPERATION

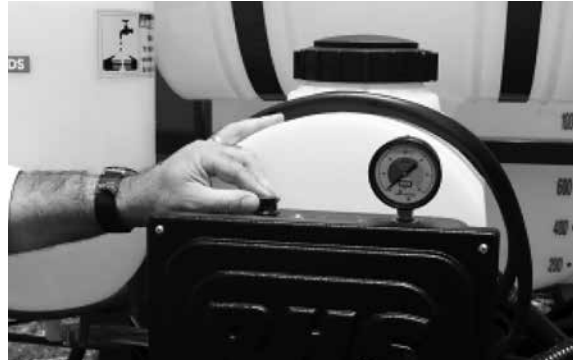
10. Check that the suction and pressure filters are clean.
Clean the suction and pressure filters out after initial use, and nozzles if necessary.



Check suction filter is clean



Check the pressure filters are clean.



Check foam marker operates correctly

11. Check that the foam marker operates correctly if applicable.
12. Check overall spraying functions using our chosen controller.

NOTE

IMPORTANT: Clean the suction filter out after initial use. Whilst all precautions are taken during assembly, it is possible to get filings in the tank and lines.

SECTION 5

SPRAYER OPERATION

NOTE

This GENERAL manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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SECTION 5

SPRAYER OPERATION

FILLING THE TANKS



Open spray tank lid for top-filling

Your Sprayer has up to four tanks which will all require filling. Each tank can be filled via its top lid. The spray tank and flushing tank can be filled via a top/bottom-filling inlet if this option is fitted.

1. Spray Tank

Use clean, fresh water (preferably rainwater), free of suspended organic matter or clay. Some chemicals are deactivated when they contact these materials.

Always calculate the correct water quantity required, and when filling, allow sufficient water quantity for adding and mixing chemicals. If necessary top up the tank to required quantity after adding chemicals.

Main Tank Top-Filling

- Open the spray tank lid and ensure the basket filter is in place.
- Fill the spray tank with the required amount of water.
- Close the spray tank lid.



Top/bottom filling inlet

Top/Bottom-Fill (Optional) (Main & Flushing Tanks)

The bottom-fill facility requires a pressured water source and is used to fill both the spray tank and flushing tank.

Follow the steps outlined:

- Connect the filling hose to the bottom fill inlet connector.
- Select either the main tank or the flushing tank with the 3-way valve.

- Fill the main or flushing tank with the required amount of water.
- Disconnect filling hose and replace the bottom fill inlet cap.



Open flush tank lid for top-filling

2. Flush Tank - Top Filling

Use clean, fresh water (preferably rainwater) in the flush tank. Always fill the flushing tank before spraying.

To top-fill the flush tank:

- Position the machine and open the flush tank lid.
- Fill the flush tank.
- Close the flush tank lid.

SECTION 5

SPRAYER OPERATION



Open flush tank lid for top-filling

3. Foam Marker Tanks (Optional)

If your sprayer is fitted with the optional Arag or RHS foam marker, fill with clean fresh water (preferably rainwater).

Use the tank lid for top-filling and adding foam concentrate.

To fill the foam marker tank:

- Unscrew the tank lid.
- Fill the tank with the required amount of water.
- Replace the lid after filling.



Optional RHS 20 l/min foam marker

4. Fresh Water Tank (Optional)

A 30 litre fresh water tank. Always fill the optional fresh water tank before spraying.

To fill the fresh water tank:

- Unscrew the tank lid.
- Fill the tank using only rainwater.
- Replace the lid after filling.

NOTE

Always add foam concentrate after filling tank with water to minimise foaming when filling.



Open foam marker lid for filling



Fresh water tank for personal safety

SECTION 5

SPRAYER OPERATION

FILTER MAINTENANCE

Clean filters ensure that no solids enter the spraying system to block or damage pump or nozzles.

All filters should be cleaned regularly or after each spraying period.

Suction Filter

The suction filter should be cleaned regularly, or after each spray tank has been emptied.

To clean the suction filter:

1. Completely stop all sprayer functions.
2. Turn the Suction Line valve to "Off" position to shut Off liquid from the spray tank.
3. Remove the outer filter screw and bowl, and then remove the filter and thoroughly clean it before re-assembling the filter.



Remove outer screw and bowl of suction filter

4. Return the Suction Line valve to "Spray" position.



Remove & clean the filter element & components

NOTE

Be careful not to damage or deform the mesh or O-ring while cleaning and refitting the filters.

Pressure Filters (if fitted)

The pressure filters should be cleaned regularly, or after each spray tank has been emptied.



WARNING

Always wear protective clothing when cleaning filters containing toxic chemicals.



Reassemble & tighten outer screw of suction filter..

To clean the pressure line filter:

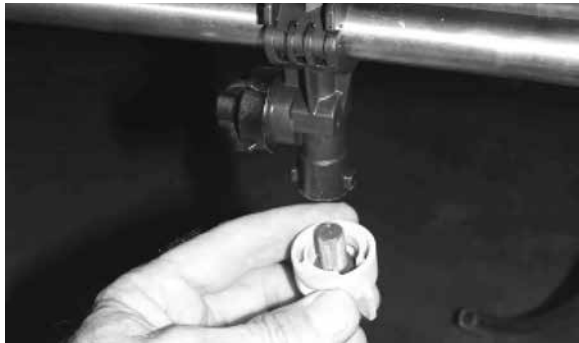
1. Completely stop all sprayer functions.
2. Open the valve at the bottom of the filter to ensure all pressure is removed from the filter.
3. Remove the outer filter bowl, and then remove the filter and thoroughly clean it before re-assembling the filter.

NOTE

In some circumstances you may find the nozzle filters are best not used. If your nozzle filters continuously block, check that your main pressure filter is not torn or that the product you are using is not the cause.

SECTION 5

SPRAYER OPERATION



Regularly check and clean nozzle filters

Nozzle Filters

Nozzle filters should be cleaned regularly to avoid nozzle blockages.

If leaking occurs from the nozzle cap, check caps are correctly fitted with seals &/or the condition of the seals. Replace if necessary.

Foam Marker Filter

The foam marker filter should be cleaned regularly or after each tank of foam has been emptied.

The foam marker is protected by:

- A 50 mesh filter under the cabinet, &
- A 100 mesh filter located in the line before the liquid orifice.



Remove foam marker filter bowl & 50 mesh screen

QUANTUM POINTERS, QM-500

Operating Pointers

While spraying, continually ensure that:

1. Engine and PTO speed are correct.
2. Correct operating pressure is being maintained.
3. Ground speed is correct and constant.
4. Quantum Mist spray heads are operating correctly and aimed toward the target foliage.



Spin mount to move fan closer to canopy, and to allow tilt adjustment

Position the Spray Heads

The Quantum Mist spray heads can be adjusted individually for width & direction.

Each head should be individually adjusted to maximise coverage and penetration into the target foliage.



Adjust mount for tilt (upwards or downwards) in relation to canopy

a. Individual Fan Width & Height Adjustment

To individually adjust each Quantum Mist spray head width and height:

1. Loosen the clamp bolts.
2. Adjust the mast or wing uprights and fan head assemblies up or down & in or out.
3. Retighten the clamp bolts after adjustments have been made.
4. Repeat steps 1 - 3 as necessary for each fan head assembly.

SECTION 5

SPRAYER OPERATION



Adjust mount for forward/rearward fan adjustment

b. Directional Adjustment

To adjust individual Quantum Mist fan head direction:

1. Loosen the cradle-to-upright bolts and adjust the head up or down to suit.
2. Retighten the cradle-to-upright bolts.
3. Loosen the cradle-to-motor bolts and adjust the head fore or aft to suit.
4. Retighten the cradle-to-motor bolts.
5. Repeat steps 1 - 4 as necessary for each fan head.

NOTE

Refer to the Independent Quantum Mist Report to learn about suitable spray head settings for you canopy.

TANK AND EQUIPMENT CLEANING



If a cleaning agent is required (refer to the chemical label), as is often recommended when changing from one chemical group to another or as an end of season clean before storage.

Nufarm's Tank and Equipment Cleaner is a suitable cleaning agent. Note this product is available from ratified Croplands Dealers under part code L-H9704.

Below is a guide procedure, but if in doubt, follow the instructions provided with the cleaner.

1. First, completely flush the sprayer with water as outlined in the previous FLUSHING section. Then ...
2. Fill the spray tank with freshwater.
3. Add cleaning agent into the mixer basket (use according to instructions).

4. Open the Tank Selection Valve to the SPRAY tank
5. Open mixing basket valve.
6. Open the agitator valves.
7. Start the Tractor.
8. Make sure the controller / electric controls or auto rate controller is NOT in Spray mode. Ensure TIER 3 is selected to enable both spray rings to be flushed.
9. Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm.
10. Activate the controller SPRAY mode. This will pressurise the system and operate the tank agitators & basket rinse.
11. Adjust to normal operating pressures.
12. Turn ON all spray sections.
 - a. Make sure the area around the fans is clear of bystanders.
 - b. Make sure the fans are downwind of the operator.
 - c. Check that all spray ring taps were activated.
13. After sufficient flushing, turn OFF the spray sections.
14. If you require the cleaning agent to soak or stand for a period, turn the spray booms OFF and completely shut down the sprayer for the desired period.
15. When soaking is completed, start the machine following steps to flush the tank and spray lines.
16. On completion of flushing, shut down all controls and disengage the PTO/ hydraulic drive.
17. Open spray tank drain valve and allow cleaning mixture to drain from the tank.
18. Delay the final flushing of the sprayer (again) with freshwater as outlined in the previous FLUSHING section, until just before the sprayer is next used – that might be in 1 hour or 6 months away if the sprayer is going into storage for the offseason.
19. Wash/hose down the outside of the sprayer completely.

SECTION 6B

SPRAYING INFORMATION - BROADACRE

NOTE

This GENERAL manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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SECTION 6B

SPRAYING INFORMATION - BROADACRE

CALIBRATION PROCEDURE



Proper calibration considers all spraying variables

Applying the correct amount of chemical to a crop is only possible if:

- the sprayer is calibrated correctly
- the sprayer is operated correctly
- the sprayer is maintained correctly

The variables of spray application (distance, time, working width, liquid and chemical volumes) must be measured and controlled accurately to ensure chemicals are applied at the correct rate.

Automatic spray controllers measure and control the variables of speed and flow rate to give constant application.

However proper nozzle selection, checking calibration of nozzles, speed and flow rate as well as correct mixing of chemicals must be done to ensure the accuracy and performance of the sprayer and its controller.

Accurate calibration is essential to ensure uniform application of the recommended dose of chemical to the target.

Proper calibration involves setting up the sprayer (nozzle selection, pressure, speed), calculating chemical and water rates and measuring the performance of the sprayer itself. Only then can you be totally confident in applying chemical correctly.

Fully Automatic Spray Controllers

Fully automatic spray controllers maintain application rates (set by the operator) when operated in Auto position.

Such controllers monitor speed of travel (speed sensor) and flow rate (flow meter) and automatically adjust flow rate (via a servo valve) to maintain correct application rate irrespective of speed variations within the limits of the nozzles used.

IMPORTANT:

1. It should be remembered that the spray controller does not eliminate the necessity to measure and check the accuracy of nozzle spray patterns and outputs. These must be checked regularly to ensure correct and uniform application rates because nozzles wear with use.
2. Flow meters used by a controller also need to be checked and calibrated on a regular basis.

On the following page, you will see how to maintain and check an dual line model optional Rapid-check flowmeter.

It is recommended you do this regularly during the spraying season.

See the Controller Operator's Manual for detailed information and calibrating procedures specific to the spray controller.

Flow Meters

For accurate spray rate application, follow the calibration procedures outlined.

Calibration Procedure

For accurate spray rate application, follow this calibration procedure:



Rapid Check Flowmeter

Step 1

Ensure Equipment Is In Good Working Order

Tank, pump, boom, filters and nozzles must be clean, free of leakages and functioning properly.

Follow the pre-operation checklist, maintenance and operating instructions in this manual.

Install, calibrate and operate the spray controller according to the spray controller Installation/Operators Manual.

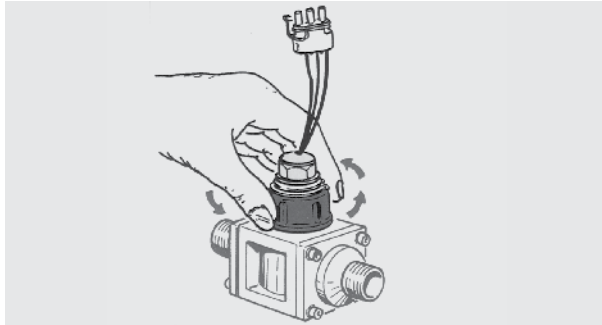
Daily Check & Maintenance of Flowmeter

This is to be performed every day after work is finished:

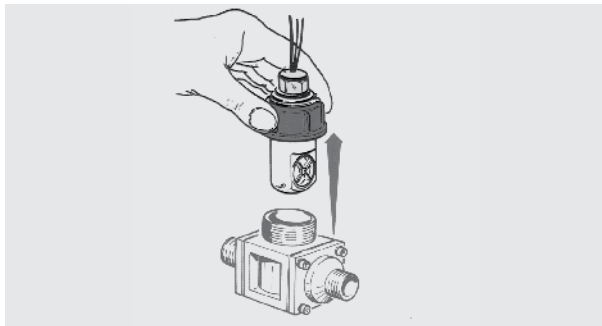
1. Unscrew the assembly that holds the Rapid Check unit in the body.
2. Remove the Rapid Check unit from the body.

SECTION 6B

SPRAYING INFORMATION - BROADACRE

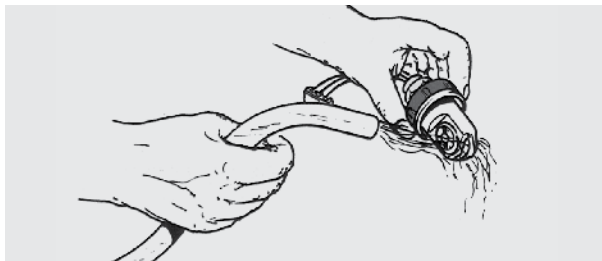


Unscrew the Rapid Check assembly

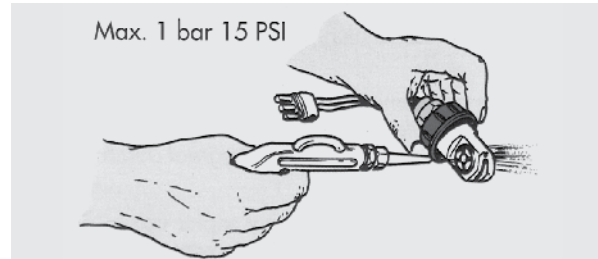


Remove the Rapid Check unit

3. Use clean water to wash any impurities out of the removable turbine unit.



Wash any impurities out of the removable turbine unit



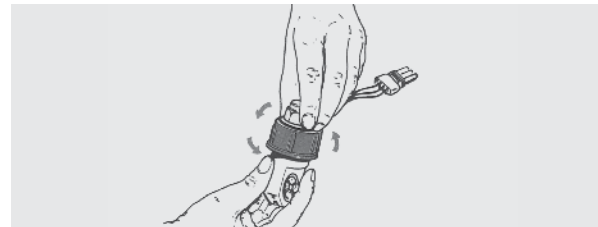
Use compressed air to check that the turbine unit rotates freely

4. Use compressed air to verify that the turbine unit rotates freely (maximum air pressure 1 BAR [15 psi]).

Every 50 Hours

Carry out the following procedure after every 50 hours of operation:

1. Unscrew the sensor.



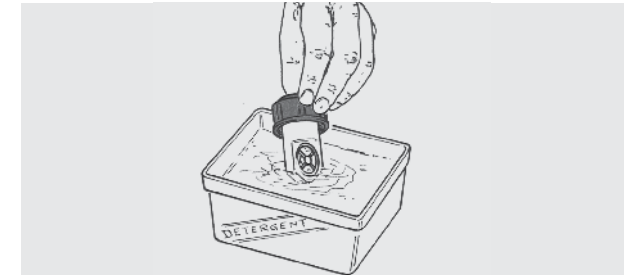
Unscrew the sensor

2. Separate the sensor from the Rapid Check unit.



Separate the sensor from the Rapid Check unit

3. Place the Rapid Check unit in a detergent bath for a few hours.

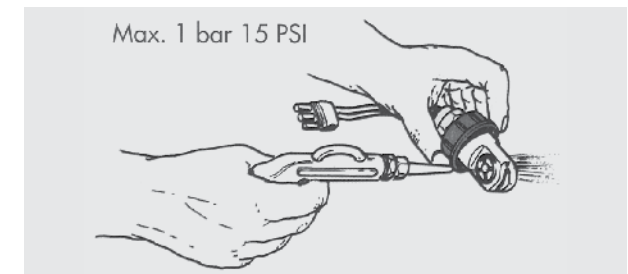


Place the Rapid Check unit in a detergent bath

4. Remove the Rapid Check unit from detergent bath.

Use compressed air to verify that the turbine unit rotates freely (maximum air pressure 1 BAR [15 psi]).

If necessary, replace the Rapid Check unit with a new one.



Use compressed air to check that the turbine unit rotates freely

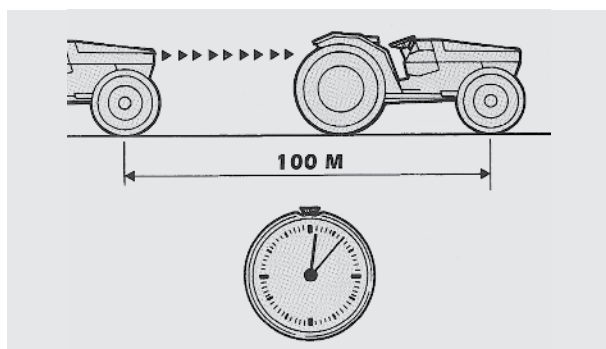
SECTION 6B

SPRAYING INFORMATION - BROADACRE

Step 2

Determining the Actual Speed Of Travel

Your sprayer has been factory set with a calibration number. This should be fine tuned prior to commencement of spraying



Determine actual speed of travel

and checked by your dealer. This is done by traveling a known distance (usually 100 metres) and comparing the distance measured by the Spray Controller to the known distance. If there is a discrepancy, the Spray Controller Manual explains how to easily adjust the calibration number automatically.

Step 3

Measure Swath Width

The spray controller requires the boom width to be entered in 3/4/5/6 parts.

Measure the nozzle spacing and multiply nozzle spacing by the number of nozzles on each boom section to establish the width of each boom section.

eg. $0.5\text{m} \times 12 = 6\text{m}$
 $0.5\text{m} \times 12 = 6\text{m}$
 $0.5\text{m} \times 12 = 6\text{m}$

NOTE

Boom sections may vary on some booms.



Agrotop TDam-110-015 Airmix nozzle

Step 4

Select Nozzle Type & Size

Select Nozzle Type & Size according to:

- Chemical recommendations.
- Application rate required.
- Pressure setting.

- Swath width.
- Chosen speed of travel. (Use actual speed of travel, refer to step 2)



AI nozzle - courtesy of Teejet

Two methods of selecting nozzle output are:

- Use the charts on pages 61-63 or the manufacturer's nozzle chart.
- Calculate Required Nozzle Flow Rate.

NOTE

Boom sections may vary on some booms.

a. Use Your Manual's Chart Or Manufacturer's Nozzle Chart

Using the chart on pages 61-63 or the manufacturer's nozzle rate chart, reference:

- Application rate (eg 50 l/ha),
- Speed of travel (eg 12km/hr), &
- Pressure setting (eg 250kPa),
find the nearest nozzle to suit your requirements.

SECTION 6B

SPRAYING INFORMATION - BROADACRE

Also check to see what speed variations are available for applying the same rate. See pages 61-63.

It is usually best to select mid range pressure as this will allow the spray controller to adjust pressure up or down when speed variations occur.

NOZZLE SELECTION

[illegible]

b. Calculate Required Nozzle Flow Rate

If you know:

- the application rate required (eg 50 l/ha),
- speed of travel (eg 12km/hr),
- swath width (eg 18m), &
- the number of nozzles on the boom (eg 36).

The following formula can be used to establish required flow rate per nozzle:

$$\text{Nozzle Flow Rate (l/min)} = \frac{\text{Speed (km/hr)} \times \text{Swath Width (m)} \times \text{Application Rate (l/ha)} \div 600 \div \text{Number of nozzles}}{}$$

eg. $\frac{[(12 \times 18 \times 50) \div 600] \div 36}{= 0.5 \text{ l/min for each nozzle}}$

An alternative formula is:

$$\text{Nozzle Flow Rate (l/min)} = \frac{\text{Speed (km)} \times \text{Nozzle Spacing (cm)} \times \text{Application Rate (l/ha)} \div 60,000}{}$$

eg.
$$\frac{[12 \times 50 \times 50] \div 60,000}{= 0.5 \text{ l/min}}$$

Now using the nozzle chart look down the nozzle capacity column (l/min) and select a nozzle to suit the output (eg 0.5 l/min). Refer to pages 61-63 for nozzle charts.

L/JMA AT VARIOUS SPEEDS (KM/HR) BASED ON A 50CM NOZZLE SPACING																					
	HR	Use/ha	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
01 Orange	1.0	0.26	84	56	42	38	30	28	36	38	22	21	30	20	19	18					
	1.0	0.32	87	64	48	29	33	33	30	28	36	24	23	21	20						
	1.0	0.40	119	78	29	47	43	40	36	34	13	10	38	26	24						
	1.0	0.56	137	71	48	53	20	20	20	20	20	20	20	20	20						
	1.0	0.71	153	102	77	61	50	51	47	44	41	38	34	34	32						
016 Green	4.0	0.56	167	112	84	67	43	54	52	48	45	40	39	37	35						
	7.0	0.80	189	133	90	72	46	60	56	52	48	45	43	40	38						
	8.0	0.85		178	118		77	70	63	60	53	52	48	46	43						
	1.0	0.45		205	137			68	62	59	56	54	52	50	48						
	1.0	0.60																			
02	1.0	0.76	229	153	102	81	52	59	55	53	47	44	42	39	37						
	4.0	0.84	251	167	126	102	69	69	69	69	61	51	48	46	43						
	5.0	0.84	251	167	126	102	76	71	62	61	57	56	54	53	48						
	6.0	0.91	272	181	136	114	84	77	72	67	63	55	56	54	48						
	7.0	0.96	287	191	144	122	91	84	78	72	71	68	64	60	57						
02	8.0	0.96	287	191	144	122	96	91	84	78	72	71	68	64	60						
	1.0	0.56	167	112	84	67	54	52	48	45	42	39	37	35							
	4.0	0.65	194	129	96	79	63	60	55	52	48	46	43	41							
	5.0	0.65	194	129	96	79	73	66	63	59	56	53	50	48							
	6.0	0.65	194	129	96	79	73	66	63	59	56	53	50	48							
02	4.0	0.76	237	156	100	81	54	76	73	68	64	61	58								
	4.0	0.84	274	185	126	102	69	69	69	69	61	51	48	46	43						

NOTE

Always use Actual Speed of Travel for speed in the above formula.

Step 5

Fit the Selected Nozzles to the Boom

Fit the selected nozzles to the boom as per the nozzle manufacturers specifications.

NOTE

Remember when selecting nozzle outputs that higher pressures and wider spray angles usually give finer droplet sizes than lower pressures and narrower spray angles.

Step 6 (Recommended)

Check Nozzle Accuracy & Determine Nozzle Output

Test the actual output of the nozzles using the following procedure:

- Ensure there is adequate water in the tank.
IMPORTANT: Do not use mixed pesticides for testing.
- Start the sprayer and set the spray Controller master switch into MANUAL position and adjust the operating pressure.
- Collect and measure the volume of spray from one nozzle and adjust pressure so that the nozzle gives the specified output (eg 0.5 l/min).

SECTION 6B

SPRAYING INFORMATION - BROADCAST



Test the actual output of the nozzles



WARNING

Do not use mixed pesticides for testing. Use only clean water. Use of pesticides when testing is hazardous to your health.

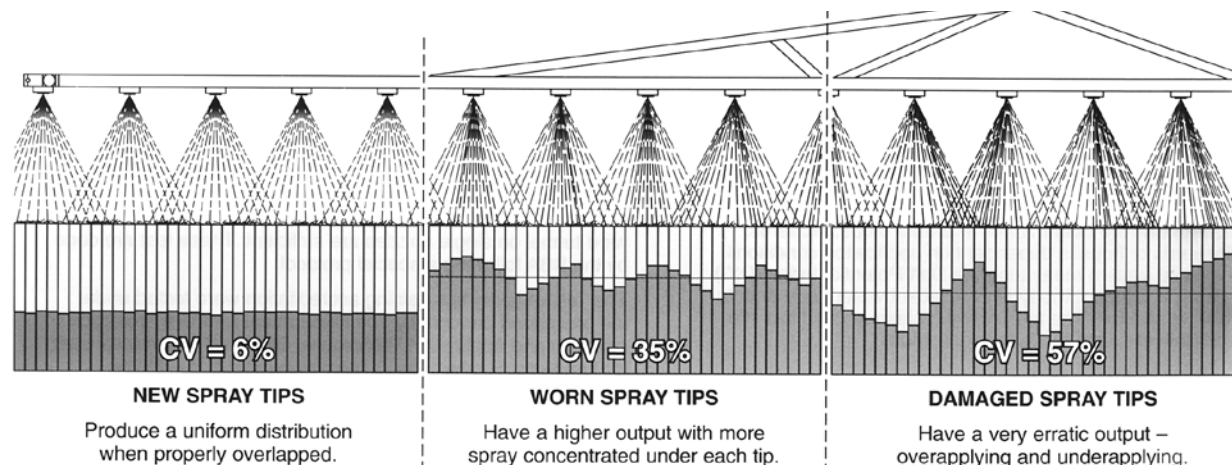
IMPORTANT:

Do not use a worn nozzle to set the pressure setting and nozzle rates.



CAUTION

Do not use a worn nozzles to set the pressure setting and nozzle rates, otherwise inaccurate calibration will occur.



Spray tip wear - courtesy of Teejet

If the boom is not fitted with new nozzles, fit one new nozzle and use it to set the flow rate and pressure setting.

This sets the standard flow rate, pressure setting and spray pattern with which to test the performance of other nozzles.

d. When the pressure is set to give a specified nozzle output (using a new

nozzle), collect and measure the volume of spray from each nozzle for one minute in a collection jar or calibrating jug.

Specially designed nozzle testing equipment such as nozzle calibrating jugs can be used to simplify nozzle calibration.

e. Visually check nozzle spray patterns and spray angle for accuracy and, if necessary, replace any faulty nozzles.

f. Discard and replace any nozzle that deviates more than 10% from the specified output (eg with a 0.5 l/min specification- discard any nozzles 0.45 l/min and under or 0.55 l/min and over).

g. Check replacement nozzles by collecting and measuring output from each replacement.

h. Record the output of each nozzle on the boom. Add the outputs together and divide by the number of nozzles to get the required output of each nozzles in one minute.

eg. Total spray output 18 l/min ÷
36 nozzles = 0.5 l/min per nozzle

Step 7

Calculate Application Rate

When operating the spray controller, the controller automatically calculates and shows the rate of application.

SECTION 6B

SPRAYING INFORMATION - BROADACRE

$$\text{Application Rate (l/ha)} = \frac{\text{Spray Output (l/min)} \times 600}{\text{Speed (km/hr)} \times \text{Swath Width (m)}}$$

eg.
$$\frac{[18 \times 600] \div [12 \times 18]}{= 50 \text{ l/ha}}$$

Step 8

If tested application is not satisfactory:

- a. In Auto mode - if application rate is not being achieved:
- Operating pressure will climb if nozzles are too small or blocked or speed is too slow.

Likewise, if your pressure filter is blocked (even partially), you may experience excessive pressure at the pump.

Make adjustments accordingly.

- Operating pressure will fall if nozzles are too large or speed is too slow. Make adjustments accordingly.
- b. In Manual mode - the Controller application rate can be altered by:
- Adjusting pressure up or down to increase or decrease rate of application (use +/- keys).
 - Adjusting spraying speed up or down to decrease or increase rate of application.
 - Changing to a different nozzle capacity.

Step 9

Add The Correct Amount Of Chemical To The Tank

- a. For land area rates (litres or kg per hectare), use the following formula:

$$\text{Chemical Required (litres)} = \frac{\text{Tank Volume (litres)} \times \text{Recommended Chemical Rate (l/ha)}}{\text{Spray Application Rate (l/ha)}}$$

eg.
$$\frac{[2000 \times 2.0] \div 50}{= 80 \text{ litres}}$$

- b. If chemical recommendation is given in water volume rates use the following formula:

$$\text{Chemical Required (litres)} = \frac{\text{Tank Volume (litres)} \times \text{Recommended Chemical Rate (l/100 litres)}}{100}$$

eg.
$$\frac{[2000 \times 4] \div 100}{= 80 \text{ litres}}$$

- c. For land area covered, use the formula:

$$\text{Area Covered (ha)} = \frac{\text{Tank Volume (litres)}}{\text{Spray Application Rate (l/ha)}}$$

eg.
$$\frac{2000 \div 50}{= 40 \text{ hectares}}$$

- d. For tank volume required, use the formula:

$$\text{Tank Volume Required (litres)} = \frac{\text{Area (ha)} \times \text{Spray Application Rate (l/ha)}}{}$$

eg.
$$\frac{20 \times 50}{= 1000 \text{ litres}}$$

NOTE

Full instructions of controller operation are contained in your separate Controller Manual.

NOTE

All nozzles have a pressure and flow rate range to achieve the best results. Ensure you have selected the nozzle which best suits your application to avoid any problems.

Step 10

Adjust Boom Height


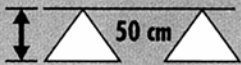
Boom height should be adjusted to suit the type of nozzle used, terrain and crop or soil being sprayed.

Minimum boom height recommendations depend on the nozzle spray angle and nozzle spacing. Refer to Nozzle chart recommendations.

SECTION 6B

SPRAYING INFORMATION - BROADACRE

Optimum Spray Height

	
110°	50 cm

Step 11

Record All Data For Future Reference

Record all your calibration data on the work sheets given at the end of this section.

Photocopy the work sheets to obtain the number of work sheets required.

SECTION 6B

SPRAYING INFORMATION - BROADACRE

AIR-MIX & TURBODROP® NOZZLE CHART

Litres/ha @ 500mm nozzle spacing													
Nozzle	Bar	l/min	5km/h	6km/h	7km/h	8km/h	10km/h	12km/h	16km/h	20km/h	25km/h	30km/h	35km/h
TDAM015 TD015 (Green)	1	0,346	83	69	59	52	42	35	26	21			
	2	0,490	118	98	84	74	59	49	36	29			
	3	0,600	144	120	103	90	72	60	45	36			
	4	0,693	166	139	119	104	83	69	52	42			
	5	0,775	186	155	133	116	93	77	58	47			
	6	0,849	204	170	146	127	102	85	64	51			
	7	0,917	220	183	157	138	110	92	69	55			
	8	0,980	235	196	168	147	118	98	74	59			
	9	1,039	249	208	178	156	125	104	78	63			
	10	1,095	263	219	188	164	132	109	82	66			
TDAM02 TD02 (Yellow)	1	0,462	111	92	79	69	55	46	35	28			
	2	0,653	157	131	112	98	78	65	49	39			
	3	0,800	192	160	137	120	96	80	60	48			
	4	0,924	222	185	159	139	111	92	69	56			
	5	1,033	248	207	177	155	124	103	77	62			
	6	1,131	271	226	194	170	136	113	85	68			
	7	1,222	293	244	209	183	147	122	92	73			
	8	1,306	313	261	224	196	157	131	98	78			
	9	1,386	332	277	237	208	166	139	104	83			
	10	1,460	350	292	250	219	175	146	110	88			
TDAM025 TD025 (Lilac)	1	0,577	138	115	99	87	69	58	43	35			
	2	0,816	196	163	140	122	98	82	61	49			
	3	1,000	240	200	171	150	120	100	75	60			
	4	1,154	278	231	199	174	139	115	86	70			
	5	1,291	310	259	221	194	155	129	96	78			
	6	1,414	339	283	243	213	170	141	106	85			
	7	1,528	366	305	261	229	184	153	115	92			
	8	1,632	391	326	280	245	196	163	122	98			
	9	1,732	415	346	296	260	208	174	130	104			
	10	1,826	438	365	313	274	219	183	138	110			
TDAM03 TD03 (Blue)	1	0,693	166	139	119	104	83	69	52	42			
	2	0,980	234	196	168	147	118	98	74	59			
	3	1,200	288	240	206	180	144	120	90	72			
	4	1,385	333	278	238	208	166	138	104	84			
	5	1,549	372	310	266	232	186	154	116	94			
	6	1,697	408	340	292	254	204	170	128	102			
	7	1,833	440	366	314	276	220	184	138	110			
	8	1,960	460	392	336	294	236	196	148	118			
	9	2,078	498	416	356	312	250	208	156	126			
	10	2,191	526	438	376	328	264	218	164	132			

SECTION 6B

SPRAYING INFORMATION - BROADACRE

AIR-MIX & TURBODROP® NOZZLE CHART

			Application Rate (l/ha with km/h @ 50cm nozzle spacing)														
Nozzle Type	Pressure Bar	Flow Rate l/min	4	6	8	10	12	14	16	18	20	22	24	26	28	30	35
110-015	1	0.231	46.2	46.2	34.7	27.7	23.1	19.8	17.3	15.4	13.9	12.6	11.6	10.7	9.9	9.24	7.92
	1.5	0.283	84.9	56.6	42.5	34	28.3	24.3	21.2	18.9	17	15.4	14.2	13.1	12.1	11.3	9.7
	2	0.327	98.1	65.4	49.1	39.2	32.7	28	24.5	21.8	19.6	17.8	16.4	15.1	14	13.1	11.2
	3	0.4	120	80	60	48	40	34.3	30	26.7	24	21.8	20	18.5	17.1	16	13.7
	4	0.462	139	92.4	69.3	55.4	46.2	39.6	34.7	30.8	27.7	25.2	23.1	21.3	19.8	18.5	15.8
	5	0.517	155	103	77.6	62	51.7	44.3	38.8	34.5	31	28.2	25.9	23.9	22.2	20.7	17.7
	6	0.566	170	113	84.9	67.9	56.6	48.5	42.5	37.7	34	30.9	28.3	26.1	24.3	22.6	19.4
110-015	1	0.346	69.2	69.2	51.9	41.5	34.6	29.7	26	23.1	20.8	18.9	17.3	16	14.8	13.8	11.9
	1.5	0.424	127	84.8	63.6	50.9	42.4	36.3	31.8	28.3	25.4	23.1	21.2	19.6	18.2	17	14.5
	2	0.49	147	98	73.5	58.8	49	42	36.8	32.7	29.4	26.7	24.5	22.6	21	19.6	16.8
	3	0.6	180	120	90	72	60	51.4	45	40	36	32.7	30	27.7	25.7	24	20.6
	4	0.693	208	139	104	83.2	69.3	59.4	52	46.2	41.6	37.8	34.7	32	29.7	27.7	23.8
	5	0.775	233	155	116	93	77.5	66.4	58.1	51.7	46.5	42.3	38.8	35.8	33.2	31	26.6
	6	0.849	255	170	127	102	84.9	72.8	63.7	56.6	50.9	46.3	42.5	39.2	36.4	34	29.1
110-02	1	0.462	92.4	92.4	69.3	55.4	46.2	39.6	34.7	30.8	27.7	25.2	23.1	21.3	19.8	18.5	15.8
	1.5	0.566	170	113	84.9	67.9	56.6	48.5	42.5	37.7	34	30.9	28.3	26.1	24.3	22.6	19.4
	2	0.653	196	131	98	78.4	65.3	56	49	43.5	39.2	35.6	32.7	30.1	28	26.1	22.4
	3	0.8	240	160	120	96	80	68.6	60	53.3	48	43.6	40	36.9	34.3	32	27.4
	4	0.924	277	185	139	111	92.4	79.2	69.3	61.6	55.4	50.4	46.2	42.6	39.6	37	31.7
	5	1.033	310	207	155	124	103	88.5	77.5	68.9	62	56.3	51.7	47.7	44.3	41.3	35.4
	6	1.131	339	226	170	136	113	96.9	84.8	75.4	67.9	61.7	56.6	52.2	48.5	45.2	38.8
110-025	1	0.577	115	115	86.6	69.2	57.7	49.5	43.3	38.5	34.6	31.5	28.9	26.6	24.7	23.1	19.8
	1.5	0.707	212	141	106	84.8	70.7	60.6	53	47.1	42.4	38.6	35.4	32.6	30.3	28.3	24.2
	2	0.816	245	163	122	97.9	81.6	69.9	61.2	54.4	49	44.5	40.8	37.7	35	32.6	28
	3	1	300	200	150	120	100	85.7	75	66.7	60	54.5	50	46.2	42.9	40	34.3
	4	1.154	346	231	173	138	115	98.9	86.6	76.9	69.2	62.9	57.7	53.3	49.5	46.2	39.6
	5	1.291	387	258	194	155	129	111	96.8	86.1	77.5	70.4	64.6	59.6	55.3	51.6	44.3
	6	1.414	424	283	212	170	141	121	106	94.3	84.8	77.1	70.7	65.3	60.6	56.6	48.5

SECTION 6B

SPRAYING INFORMATION - BROADACRE

AIR-MIX & TURBODROP® NOZZLE CHART

Application Rate (l/ha with km/h @ 50cm nozzle spacing)																	
Nozzle Type	Pressure Bar	Flow Rate l/min	4	6	8	10	12	14	16	18	20	22	24	26	28	30	35
110-03	1	0.693	139	139	104	83.2	69.3	59.4	52	46.2	41.6	37.8	34.7	32	29.7	27.7	23.8
	1.5	0.849	255	170	127	102	84.9	72.8	63.7	56.6	50.9	46.3	42.5	39.2	36.4	34	29.1
	2	0.98	294	196	147	118	98	84	73.5	65.3	58.8	53.5	49	45.2	42	39.2	33.6
	3	1.2	360	240	180	144	120	103	90	80	72	65.5	60	55.4	51.4	48	41.1
	4	1.386	416	277	208	166	139	119	104	92.4	83.2	75.6	69.3	64	59.4	55.4	47.5
	5	1.549	465	310	232	186	155	133	116	103	92.9	84.5	77.5	71.5	66.4	62	53.1
	6	1.697	509	339	255	204	170	145	127	113	102	92.6	84.9	78.3	72.7	67.9	58.2
110-04	1	0.924	185	185	139	111	92.4	79.2	69.3	61.6	55.4	50.4	46.2	42.6	39.6	37	31.7
	1.5	1.113	334	223	167	134	111	95.4	83.5	74.2	66.8	60.7	55.7	51.4	47.7	44.5	38.2
	2	1.306	392	261	196	157	131	112	98	87.1	78.4	71.2	65.3	60.3	56	52.2	44.8
	3	1.6	480	320	240	192	160	137	120	107	96	87.3	80	73.8	68.6	64	54.9
	4	1.848	554	370	277	222	185	158	139	123	111	101	92.4	85.3	79.2	73.9	63.4
	5	2.066	620	413	310	248	207	177	155	138	124	113	103	95.4	88.5	82.6	70.8
	6	2.263	679	453	339	272	226	194	170	151	136	123	113	104	97	90.5	77.6
110-05	1	1.155	231	231	173	139	116	99	86.6	77	69.3	63	57.8	53.3	49.5	46.2	39.6
	1.5	1.414	424	283	212	170	141	121	106	94.3	84.8	77.1	70.7	65.3	60.6	56.6	48.5
	2	1.633	490	327	245	196	163	140	122	109	98	89.1	81.7	75.4	70	65.3	56
	3	2	600	400	300	240	200	171	150	133	120	109	100	92.3	85.7	80	68.6
	4	2.309	693	462	346	277	231	198	173	154	139	126	115	107	99	92.4	79.2
	5	2.582	775	516	387	310	258	221	194	172	155	141	129	119	111	103	88.5
	6	2.828	848	566	424	339	283	242	212	189	170	154	141	131	121	113	97
110-06	1	1.386	277	277	208	166	139	119	104	92.4	83.2	75.6	69.3	64	59.4	55.4	47.5
	1.5	1.697	509	339	255	204	170	145	127	113	102	92.6	84.9	78.3	72.7	67.9	58.2
	2	1.96	588	392	294	235	196	168	147	131	118	107	98	90.5	84	78.4	67.2
	3	2.4	720	480	360	288	240	206	180	160	144	131	120	111	103	96	82.3
	4	2.771	831	554	416	333	277	238	208	185	166	151	139	128	119	111	95
	5	3.098	929	620	465	372	310	266	232	207	186	169	155	143	133	124	106
	6	3.394	1018	679	509	407	339	291	255	226	204	185	170	157	145	136	116

SECTION 6B

SPRAYING INFORMATION - BROADACRE

CALIBRATION WORK SHEET

Step 1

Check the Sprayer is in Good Working Order

Step 2

Determine Actual Speed of Travel

Follow Instructions on page 6.4 (Speed Calibration).

Tractor model	
Gear	
Range	
Dual power	
Engine RPM	
Speed in Km/h	

Step 3

Measure Boom Widths

Boom section 1:	
Boom section 2:	
Boom section 3:	
Boom section 4:	
Boom section 5:	
Boom section 6:	
Boom section 7:	

Step 4

Select Nozzle Type & Size

Chemical:	
Type of Nozzle:	
Pressure Setting:	
Travel speed (km/hr):	
Total number of nozzles to be used:	

Nozzle Flow Rate (l/min) =
Speed (km/hr) x Swath Width (m) x Application
Rate (l/ha) ÷ 600 ÷ Number of nozzles

$$\boxed{} \times \boxed{} \times \boxed{} \div 600 \div \boxed{} \\ = \boxed{} \text{ l/min for each nozzle}$$

Step 5

Fit Selected Nozzles to Boom

Nozzle Type:	
Nozzle Size:	
Nozzle Colour:	

Step 6

Check Nozzle Accuracy & Determine Nozzle Output

Thoroughly check nozzles & test the actual output of each nozzle.

Pressure Setting:	
Individual Nozzle Outputs:	
Sum of Nozzle Outputs:	

Step 7

Calculate Application Rate

The spray Controller automatically calculates and shows the rate of application.

Application Rate (l/ha) =
Spray Output (l/min) x 600 ÷ Speed (km/hr)
x Swath Width (m)

$$[\boxed{} \times 600] \div [\boxed{} \times \boxed{}] \\ = \boxed{}$$

Step 8

If Tested Application is Not Satisfactory - Make Changes & Repeat Procedure

Step 9

Add Correct Amount of Chemical

Chemical:	
Water Quantity:	
Chemical Added:	

Step 10

Boom Height

Step 11

Record Data

Date	
Farm location	
Crop to be sprayed	
Spray Volume litres/ha	
Nozzle type	
Nozzle size & colour	
No. of nozzles used	
Nozzle pressure	
Tested Output in l/min	
Actual Litres/Hectare	

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

NOTE

This GENERAL manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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FLOWMETER CALIBRATION	37
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SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

Spraying should be done in conjunction with an agronomist / spray manager / someone skilled in the art of spraying. The best setup might vary significantly from crop to crop, season to season etc.

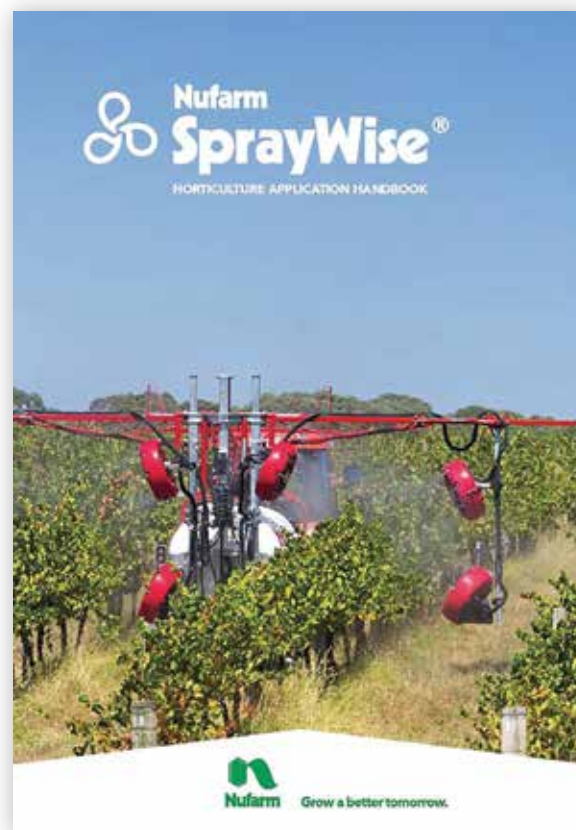
SPRAYWISE

It's highly recommended that all operators of this sprayer and spray program managers should be fully conversant with the information supplied in the **Nufarm SprayWise Horticultural Application Handbook** (refer photo) before undertaking spray operations.

The book includes chapters discussing re;

- Droplet Size
- Nozzle Types
- Dilute Spraying
- Concentrate Spraying
- Coverage & Assessment
- Selecting Nozzles
- Drift
- Weather
- Adjuvants
- Formulations & Mixing Order
- Cleaning
- Calibration
- Record Keeping
- And more

This book is supplied with every QM-420 Sprayer, and is available from Croplands dealers, under the part number: SPRAYWISEHK.



CALIBRATION

Applying the correct amount of chemical to a crop is only possible if **the sprayer is calibrated, operated and maintained correctly.**

The variables of spray application (distance, time, working width, liquid, and chemical volumes) must be measured and controlled accurately to ensure chemicals are applied at the correct rate.

Proper calibration involves setting up the sprayer (nozzle selection, pressure, speed), calculating chemical and water rates, and measuring the performance of the sprayer itself. Only then can you be totally confident in applying chemicals correctly.

Fully Automatic Spray Controller (HV4000/ Bravo 180)

Automatic spray controllers maintain the application rate (as set by the operator) when operated in the Auto position.

The controller monitors speed of travel (speed sensor) and flow rate (flow meter) and automatically adjusts flow rate (via a pressure regulating or servo valve) to maintain the correct application rate irrespective of speed variations within the limits of the nozzles used.

IMPORTANT:

- It should be remembered that the spray controller does not eliminate the necessity to measure and check the accuracy of nozzle spray patterns and outputs. These must be checked regularly to ensure correct and uniform application rates because nozzles wear with use.

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

- Flow meters used by the Quantum Mist QM-420 Sprayer need to be checked and calibrated on a regular basis.

The following page demonstrates how to maintain and check your Rapid-check flowmeter. It is recommended this is done regularly during the spraying season.



FLOWMETER CALIBRATION

If optioned with auto rate controller, as a part of the initial factory testing / calibration, a value (pulses per litre) will have been recorded and written on the body of the flow meter see example on page 30.

To check / improve the resolution of the flow meter calibration use the below method after having sprayed out a reasonable volume of liquid (the more sprayed the better the resolution);

- The current flow meter calibration number in the controller = X
- Take the total volume the controller says was sprayed and divided by the actual volume sprayed = Your new flow meter calibration.

- Then manually enter this number into the controller settings.

For example;

Current flow cal number (X) = 250. Controller says we have sprayed 4400L after having put 4000L in the tank.

$$250 \times 4400 = 1100000$$

$$1100000 / 4000 = 275 \text{ (new flow cal number)}$$

STEP 1 - ENSURE EQUIPMENT IS IN GOOD WORKING ORDER

Tank, pump, boom, filters and nozzles must be clean, free of leakages and functioning properly.

Follow the pre-operation checklist, maintenance and operating instructions in this manual.

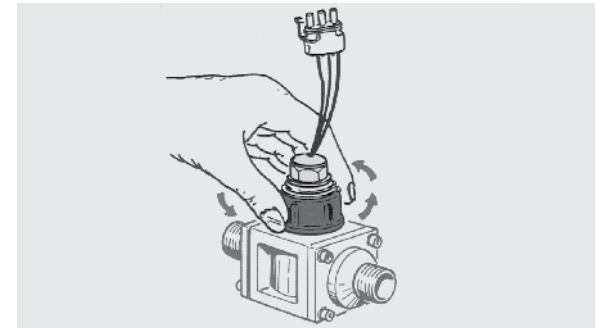
Install, calibrate and operate the spray controller according to the spray controller operators manual.

Inspections of the Flowmeter should be performed regularly.

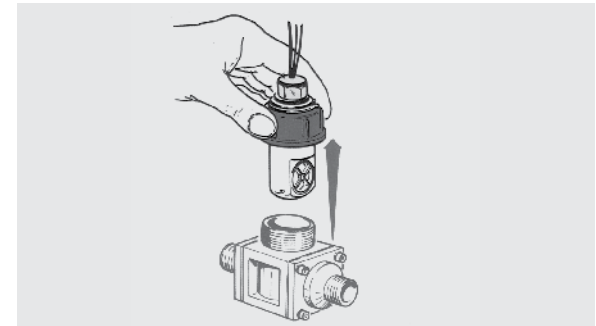
Daily Check & Maintenance of Flowmeter

This is to be performed every day after work is finished:

- Unscrew the assembly that holds the Rapid Check unit in the body.
- Remove the Rapid Check unit from the body.

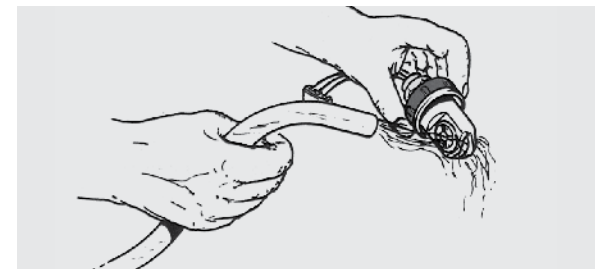


Unscrew the Rapid Check assembly



Remove the Rapid Check unit

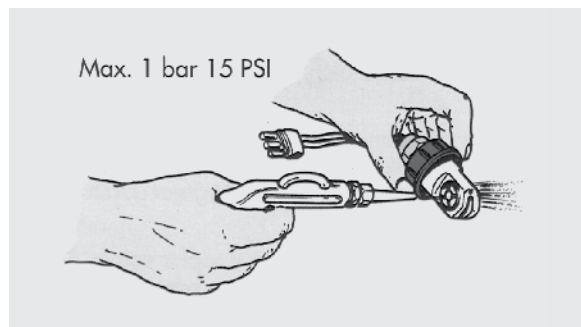
- Use clean water to wash any impurities out of the removable turbine unit.



Wash any impurities out of the removable turbine unit

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE



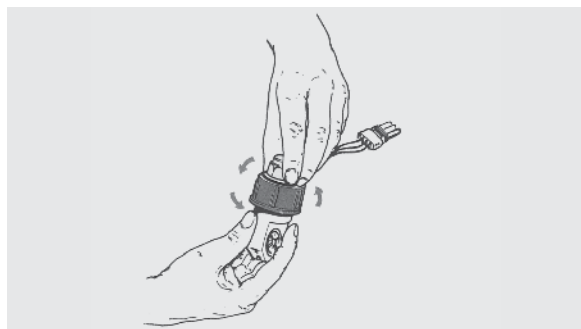
Use compressed air to check that the turbine unit rotates freely

4. Use compressed air to verify that the turbine unit rotates freely (maximum air pressure 1 BAR [15 psi]).

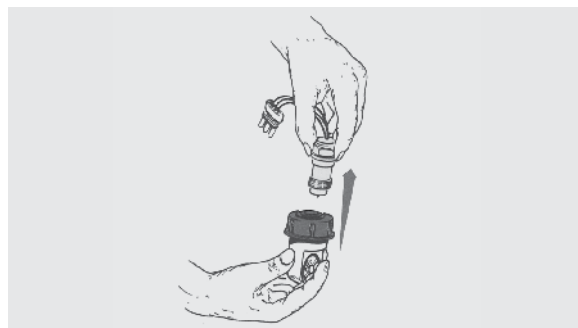
Every 50 Hours

Carry out the following procedure after every 50 hours of operation:

1. Unscrew the sensor.



2. Separate the sensor from the Rapid Check unit.



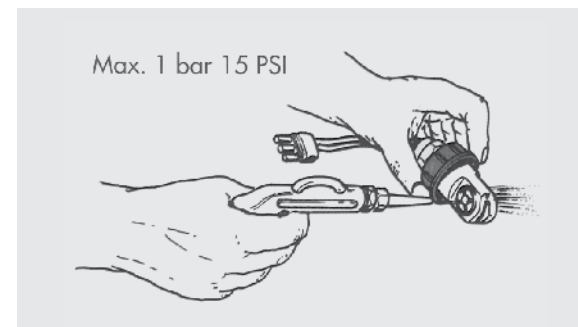
Separate the sensor from the Rapid Check unit

3. Place the Rapid Check unit in a detergent bath for a few hours.



Place the Rapid Check unit in a detergent bath

4. Remove the Rapid Check unit from detergent bath.
Use compressed air to verify that the turbine unit rotates freely (maximum air pressure 1 BAR [15 psi]).
If necessary, replace the Rapid Check unit with a new one.



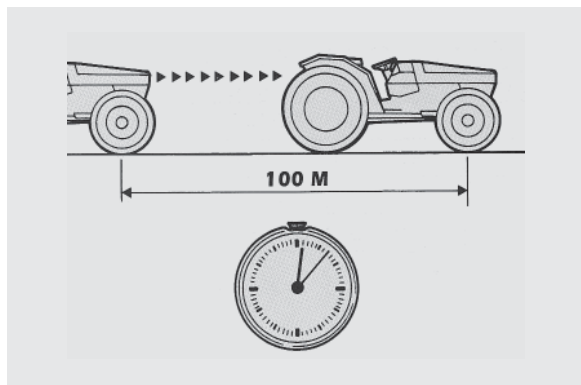
Use compressed air to check that the turbine unit rotates freely

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

STEP 2 - DETERMINING THE ACTUAL SPEED OF TRAVEL

If optioned with auto rate controller, your sprayer has been factory set with a calibration number. This should be fine tuned prior to commencement of spraying and checked by your dealer. This is done by traveling a known distance (usually 100 metres) and comparing the distance measured by the Spray Controller to the known distance. If there is a discrepancy, the Spray Controller Manual explains how to easily adjust the calibration number automatically.



To manually check the speed...

- Half fill the sprayer tank with water and mark out a test strip of 100 metres (simulating spraying conditions).
- Set the sprayer operating and record the time taken to travel 100 metres at your required spraying speed.

c) Calculate the actual speed of travel using the formula:

For SPEED, km/hr = using the following formula:

$$\frac{\text{Distance (m)} \times 3.6}{\text{Time (sec)}}$$

eg. $100(\text{m}) \times 3.6 \div 48(\text{seconds})$
 $= 7.5 \text{ km/hr travel speed}$

An alternative formula is:

$$\text{km/hr} = \text{Metres travelled in 1 minute}$$

STEP 3 - DETERMINE SPRAYING VOLUME REQUIRED

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

The spray volume requirement should be determined by / in conjunction with an agronomist / spray manager / someone skilled in the art of spraying.

The term "litres per hectare" must be related to foliage and not just to land area. The amount of liquid needed to effectively spray any given crop will vary greatly with:

- The type of crop
- Row spacing
- Width of canopy
- Height of canopy
- Stage of growth
- Density of foliage

- Type of leaf surface
- Type of fruit (single or bunched)
- Type of sprayer used

STEP 4 - DETERMINE SPRAYER CONFIGURATION

Once the volume of required spray volume per hectare is established, the next step in setting up the sprayer is to determine:

- The **number of row(s)** to be sprayed in one pass, and
- The **total number of nozzles** to be used on the sprayer. Don't forget Tier 1, Tier 2 and Tier 3 options.

Both these factors can vary with the model of sprayer used and other factors mentioned under step 3.

Example A

A 2-row QM-420 Sprayer to spray vines – using 2 spray fans per Fan Frame, will give a total of 8 spray fans. Each spray fan has 2 spray rings - each with 5 nozzles per ring. That gives a combined total of 40 nozzles per (8 spray rings x 5) per Tier/80 nozzles (both spray sets of rings combined) to spray two rows per pass.

Example B

A 3-row QM-420 Sprayer to spray vines – using 3 spray fans per Fan Frame, will give a total of 18 spray fans. Each spray fan has 2 spray rings - each with 5 nozzles per ring. That gives a combined total of 90 nozzles per (18 spray rings x 5) per Tier/180 nozzles (both spray sets of rings combined) to spray two rows per pass.

The choice of nozzles (step 5 below) will influence decisions regarding the Sprayer's Tier configuration.

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

STEP 5 - DETERMINE THE IDEAL SPRAY PRESSURE

Before determining the correct nozzles, it's best to have an idea of the spray pressure required. As a general rule, a pressure of 5 to 10 bar is considered ideal. Setting up the sprayer around a pressure of say 7 to 8 bar will allow lower pressures (say 5 or 6 bar) to be used in early season and higher pressure (say 9 or 10 bar) for later season without having to change nozzles mid-season. It will also offer some margin around travelling slower or faster than the chosen speed.

The advice provided above is general information only and operators should seek specialised advice from their agronomist/spray manager/someone skilled in the art of spraying.

NOTE; when determining the optimum nozzles for both spray rings (Tiers 1 & 2), all calculations should be done at the same pressure.

STEP 6 - DETERMINE & SELECT CORRECT NOZZLES

Knowing actual travel speed, application rate required, number of rows to be sprayed in one pass, total number of nozzles to be used and ideal spray pressure, we can determine the nozzles required for the sprayer.

The calculation formulation is;

$$\begin{aligned} & \text{Litres/Minute/Nozzle} \\ & \text{(Litres per minute per nozzle)} \\ & = \frac{\text{Litres/Ha} \times \text{Km/hr} \div 600}{\text{total number of nozzles used} \\ & \quad \times \text{row spacing (m)} \\ & \quad \times \text{number of rows in one pass}} \end{aligned}$$

CROPLANDS

Quantum Mist ALBUZ Nozzle Selection Worksheet

Step 1:

Enter data in grey boxes

Formula	
Target rate (L/ha) <input type="text" value="650"/>	Speed (km/hr) <input type="text" value="7.5"/>
Row spacing (m) <input type="text" value="3"/>	Number of rows <input type="text" value="1"/>
Number of nozzles <input type="text" value="40"/>	
Total L/min = 24.375	L/min per nozzle 0.61

Step 2:

Select nozzles from chart

ALBUZ NOZZLE	PART NUMBER	MESH	5 Bar	6 Bar	7 Bar	8 Bar	9 Bar
WHITE	AZ-ATR-WE-80C	100	0.27	0.29	0.32	0.34	0.36
LILAC	AZ-ATR-LC-80C	50	0.36	0.39	0.42	0.45	0.48
BROWN	AZ-ATR-BN-80C	50	0.48	0.52	0.56	0.60	0.64
YELLOW	AZ-ATR-YW-80C	50	0.73	0.80	0.86	0.92	0.97
ORANGE	AZ-ATR-OE-80C	50	0.99	1.08	1.17	1.24	1.32
RED	AZ-ATR-RD-80C	50	1.38	1.51	1.62	1.73	1.83
GREY	AZ-ATR-GY-80C	50	1.5	1.63	1.76	1.87	1.98
GREEN	AZ-ATR-GN-80C	50	1.78	1.94	2.09	2.22	2.35
BLACK	AZ-ATR-BK-80C	50	2	2.18	2.35	2.50	2.64
BLUE	AZ-ATR-BE-80C	50	2.45	2.67	2.87	3.06	3.24

NOTE; it's easiest to make the calculations based on each individual spray ring volume and then combine both rings. Always select nozzles from same pressure.

For example, using Example A from the previous pages

- Row spacing = 3.0m
- Number of rows = 2
- Number of nozzles = 40
- Speed = 7.5 kph
- Ideal pressure 7 ~ 8 bar
- Tier 1 target rate = 300 L/ha
- Tier 2 target rate = 450 L/ha
- Tier 3 target rate = 750 L/ha

Using the above formula

300 (target rate) x **7.5** (speed) ÷ 600 ÷ **40** (number of nozzles) x **3.0** (row spacing) x **2** (no. of rows) = **0.56** Litres per minute per nozzle.

Once the flow rate per nozzle is known select the most appropriate nozzle from a flowrate chart for the nozzle being used. Flowrate charts are available from relevant nozzle suppliers. Croplands supplies and recommends the ALBUZ ATR Hollow Cone Nozzles for the Quantum Mist Sprayers.

Pictured left and overleaf are screenshots taken from a small spreadsheet program freely available from the Croplands Web Site or Croplands Customer Service titled "ALBUZ QM Nozzle Selection Worksheet" which makes it much quicker to calculate nozzle requirements. For more nozzles see the Croplands Optima buyers guide.

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

In the example on previous page the **correct nozzle** for Tier 1 is the ALBUZ Brown operating at 7 Bar.

In the sample below, the **correct nozzle** for Tier 2 is the ALBUZ Yellow operating at 7 bar. Note the formula requires 0.84 L/min, and the nozzle flowchart shows 0.86 L/min. This nozzle with a marginal decrease in pressure will meet our requirements.

CROPLANDS

Quantum Mist ALBUZ Nozzle Selection Worksheet

Step 1:

Enter data in grey boxes

Formula	
Target rate (L/ha)	650
Speed (km/hr)	7.5
Row spacing (m)	3
Number of rows	1
Number of nozzles	40
Total L/min =	24.375
L/min per nozzle	0.61

Step 2:

Select nozzles from chart

ALBUZ NOZZLE	PART NUMBER	MESH	5 Bar	6 Bar	7 Bar	8 Bar	9 Bar
WHITE	AZ-ATR-WE-80C	100	0.27	0.29	0.32	0.34	0.36
LILAC	AZ-ATR-LC-80C	50	0.36	0.39	0.42	0.45	0.48
BROWN	AZ-ATR-BN-80C	50	0.48	0.52	0.56	0.60	0.64
YELLOW	AZ-ATR-YW-80C	50	0.73	0.80	0.86	0.92	0.97
ORANGE	AZ-ATR-OE-80C	50	0.99	1.08	1.17	1.24	1.32
RED	AZ-ATR-RD-80C	50	1.38	1.51	1.62	1.73	1.83
GREY	AZ-ATR-GY-80C	50	1.5	1.63	1.76	1.87	1.98
GREEN	AZ-ATR-GN-80C	50	1.78	1.94	2.09	2.22	2.35
BLACK	AZ-ATR-BK-80C	50	2	2.18	2.35	2.50	2.64
BLUE	AZ-ATR-BE-80C	50	2.45	2.67	2.87	3.06	3.24

Across the spraying season the variables (such as rates and speeds) may often change. With a well setup system small variations will be easily accommodated. Larger variations may require a change of nozzles.

STEP 7 - FIT & TEST SELECTED NOZZLES

The most important calibration is to test for the actual litres per hectare achieved through your sprayer.

- Use the following method to fit and test the selected nozzles:
- Fit selected nozzles to the sprayer.
- Fill your spray tank to maximum capacity & set the specified pump pressure and operate the sprayer for a short period to make sure all lines are full and nozzles are working properly (no blockages, leaks etc).
- Stop the sprayer and top up the tank with water to maximum capacity again.
- Operate the sprayer in the stationary position at the required pressure for not less than one minute.
- Measure how much water is required to refill the tank to the brim.
- Now, divide the volume measured by the time taken (minutes). The longer the test time the more accurate the figure.

The calculation formulation is;

Output (L/min) =

$$\frac{\text{Output (litres)}}{\text{Time (minutes)}}$$

Example 1, testing Tier 1 of our examples above.

$$\frac{28.5 \text{ litres}}{1.25 \text{ minutes (75 seconds)}} = 22.8 \text{ litres/min.}$$

Which is slightly more than the target of 22.4L/min (0.56 L/min per nozzle x 40 nozzles for 1.0 min)

Example 2, testing Tier 2 of our examples above.

$$\frac{42.1 \text{ litres}}{1.25 \text{ minutes (75 seconds)}} = 33.7 \text{ litres/min.}$$

(note 0.86 L/min per nozzle x 40 nozzles for 1.0 min = 34.4 L/min)

- Excessive output is a sign of worn nozzles. See steps 8 & 9.
- Insufficient output is a sign of blockages. See steps 8 & 9.

STEP 8 - CALCULATE THE ACTUAL APPLICATION RATE

Actual application rate is the objective of setting up and calibrating your sprayer.

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

To calculate actual application rate (litres per hectare), use the following formula:

$$\text{Application Rate (L/ha)} = \frac{\text{Total sprayer output (L/min)} \times 600 \div \text{speed (Km/hr)} \div \text{row spacing (m)} \div \text{number rows in one pass}}{}$$

Example 1 (as per Tier 1 example)

$$\frac{22.8 \text{ (L/min)} \times 600 \div 7.5 \text{ km/hr} \div 3 \text{ m (row spacing)} \div 2 \text{ (rows/pass)}}{=} = 304 \text{ litres/ha}$$

Example 2 (as per Tier 2 example)

$$\frac{33.7 \text{ (L/min)} \times 600 \div 7.5 \text{ km/hr} \div 3 \text{ m (row spacing)} \div 2 \text{ (rows/pass)}}{=} = 449 \text{ litres/ha.}$$

STEP 9 - IF THE TESTED RATE IS UNSATISFACTORY

If your tested application rate does not meet your requirements, your options are:

A) In Auto mode - if the application rate is not being achieved:

- Operating pressure will be excessive if nozzles are too small or blocked or speed is too fast.

Likewise, if your pressure filter is blocked (even partially), you may experience excessive pressure at the pump.

Make adjustments accordingly.

- Operating pressure will fall if nozzles are too large or speed is too slow. Make adjustments accordingly.

B) In Manual mode - the Controller application rate can be altered by:

- Adjusting pressure up or down to increase or decrease rate of application (use +/- keys).
- Adjusting spraying speed up or down to decrease or increase rate of application.

- Changing to a different nozzle capacity.

Repeat necessary testing procedures and calculation of application rate if adjustments or changes are made

LITRES PER 100 METRES / ROW

Many Auto Rate controllers have an option for Litres per 100 metres and is occasionally the unit of preference in some vineyard operations. It's a simpler formula as row width is not relevant.

The calculation requires volume and distance, such as 11 litres per 100 metres (of rows). The operator only needs to follow the chemical label rate for mixing concentrate per 100 L.

Litres / Hectare conversion to Litres/100m Table unit = L/100 m																					
	Row Spacing (metres)																				
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.00
250	5.0	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.0	7.3	7.5	7.8	8.0	8.3	8.5	8.8	9.0	9.3	9.5	9.8	10.0
300	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0
350	7.0	7.4	7.7	8.1	8.4	8.8	9.1	9.5	9.8	10.2	10.5	10.9	11.2	11.6	11.9	12.3	12.6	13.0	13.3	13.7	14.0
400	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.8	11.2	11.6	12.0	12.4	12.8	13.2	13.6	14.0	14.4	14.8	15.2	15.6	16.0
450	9.0	9.5	9.9	10.4	10.8	11.3	11.7	12.2	12.6	13.1	13.5	14.0	14.4	14.9	15.3	15.8	16.2	16.7	17.1	17.6	18.0
500	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0
550	11.0	11.6	12.1	12.7	13.2	13.8	14.3	14.9	15.4	16.0	16.5	17.1	17.6	18.2	18.7	19.3	19.8	20	21	21	22
600	12.0	12.6	13.2	13.8	14.4	15.0	15.6	16.2	16.8	17.4	18.0	18.6	19.2	19.8	20	21	22	22	23	23	24
650	13.0	13.7	14.3	15.0	15.6	16.3	16.9	17.6	18.2	18.9	19.5	20	21	21	22	23	23	24	25	25	26
700	14.0	14.7	15.4	16.1	16.8	17.5	18.2	18.9	19.6	20	21	22	22	23	24	25	25	26	27	27	28
750	15.0	15.8	16.5	17.3	18.0	18.8	19.5	20	21	22	23	23	24	25	26	26	27	28	29	29	30
800	16.0	16.8	17.6	18.4	19.2	20	21	22	22	23	24	25	26	26	27	28	29	30	30	31	32
850	17.0	17.9	18.7	19.6	20	21	22	23	24	25	26	26	27	28	29	30	31	31	32	33	34
900	18.0	18.9	19.8	21	22	23	23	24	25	26	27	28	29	30	31	32	32	33	34	35	36
950	19.0	20	21	22	23	24	25	26	27	28	29	29	30	31	32	33	34	35	36	37	38
1000	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1100	22	23	24	25	26	28	29	30	31	32	33	34	35	36	37	39	40	41	42	43	44
1200	24	25	26	28	29	30	31	32	34	35	36	37	38	40	41	42	43	44	46	47	48
1300	26	27	29	30	31	33	34	35	36	38	39	40	42	43	44	46	47	48	49	51	52
1400	28	29	31	32	34	35	36	38	39	41	42	43	45	46	48	49	50	52	53	55	56
1500	30	32	33	35	36	38	39	41	42	44	45	47	48	50	51	53	54	56	57	59	60

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SPRAYING INFORMATION - HORTICULTURE

Flowrate conversion charts are available in the Nufarm SprayWise Horticultural application handbook and the Croplands Optima spray range buyers guide.

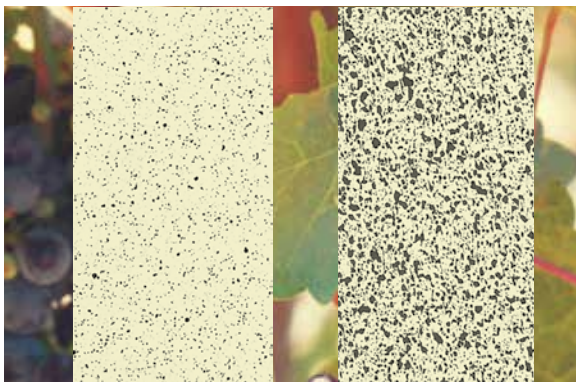
Example 1 (as per Tier 1 example)

Using the chart above, 300 Lt / ha x 3m rows correlates to 9 litres per 100 metres of row.

STEP 10 - COVERAGE ASSESSMENT

Operate your sprayer in the required orchard or vineyard to check the actual spray coverage achieved on foliage.

This is important because it is the only real measure you have of actual coverage and effective penetration of your sprayer.



Coverage checks can be done using:

- Water Sensitive Papers (as pictured) and available through Croplands dealers – see Croplands Optima Buyers guide for further details.

- Clay Markers as available through Croplands dealers – see Croplands Optima Buyers guide for further details.
- Fluorescent Dye system as available through Croplands dealers – see Croplands Optima Buyers guide for further details.

It is recommended to test the unit using water only as a test run, and again when applying your chemical mixture.

Ensure water sensitive papers are strategically placed on both upper and lower surfaces.

Spray testing, evaluation and adjustment to the sprayer (say fan positions) or spray settings (say nozzles, pressures and rates) should be done in conjunction with an agronomist / spray manager / someone skilled in the art of spraying. The best setup might vary significantly from crop to crop, season to season etc.

STEP 11 - ADD THE CORRECT AMOUNT OF CHEMICAL TO THE TANK

For land area rates (Litres or kg per hectare)

Use the following formula:

$$\text{Chemical required (Litres)} = \frac{\text{Tank volume (Litres)} \times \text{recommended chemical rate (L/ha)}}{\text{spray application rate (L/ha)}}$$

For example;

$$\begin{aligned} &2000 \text{ (litre tank)} \times 2.0 \text{ (chemical rate L/ha)} \\ &\div 50 \text{ (spray application rate L/ha)} \\ &= 80 \text{ litres of chemical} \end{aligned}$$

If chemical recommendation is given in water volume rates

Use the following formula:

$$\text{Chemical required (Litres)} = \frac{\text{Tank volume (Litres)} \times \text{recommended chemical rate (L/100 litres)}}{100}$$

For example;

$$\begin{aligned} &2000 \text{ (litre tank)} \times 4 \text{ (chemical rate L/100 litres)} \\ &\div 100 = 80 \text{ litres of chemical} \end{aligned}$$

For tank volume required,

Use the following formula:

$$\text{Tank volume required (Litres)} = \text{Area (ha)} \times \text{spray application rate (L/ha)}$$

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

For example;

20 (hectares) x 50 (application rate, L/ha)
= 1000 litres of spray tank capacity required

STEP 12 - RECORD ALL DATA FOR FUTURE REFERENCE

Record all your calibration data on the work sheets given at the end of this section.

Photocopy the work sheets to obtain the number of work sheets required.



ALBUZ-ATR HOLLOW CANE NOZZLES

Features:

- Angle of 80° at 5 bar
- Easy dismantling for cleaning
- Hollow cone nozzle producing fin droplets
- AlbuZ durable pink ceramic allows precision high pressure spraying
- Polished ceramics ensure perfect sealing and precise flow rate.

Applications:

- For fungicides and insecticides
- Recommended for orchards and vineyards.

	ALBUZ NOZZLE	PART NUMBER	MESH	5 BAR	6 BAR	7 BAR	8 BAR	9 BAR	10 BAR	11 BAR	12 BAR
	WHITE	AZ-ATR-WE-80C	100	0.27	0.29	0.32	0.34	0.36	0.38	0.39	0.41
	LILAC	AZ-ATR-LC-80C	50	0.36	0.39	0.42	0.45	0.48	0.50	0.52	0.55
CURRENT STANDARD	BROWN	AZ-ATR-BN-80C	50	0.48	0.52	0.56	0.60	0.64	0.67	0.70	0.73
CURRENT STANDARD	YELLOW	AZ-ATR-YW-80C	50	0.73	0.80	0.86	0.92	0.97	1.03	1.07	1.12
	ORANGE	AZ-ATR-OE-80C	50	0.99	1.08	1.17	1.24	1.32	1.39	1.45	1.51
	RED	AZ-ATR-RD-80C	50	1.38	1.51	1.62	1.73	1.83	1.92	2.01	2.09
	GREY	AZ-ATR-GY-80C	50	1.50	1.63	1.76	1.87	1.98	2.08	2.17	2.26
	GREEN	AZ-ATR-GN-80C	50	1.78	1.94	2.09	2.22	2.35	2.47	2.58	2.69
	BLACK	AZ-ATR-BK-80C	50	2.00	2.18	2.35	2.50	2.64	2.78	2.90	3.03
	BLUE	AZ-ATR-BE-80C	50	2.45	2.67	2.87	3.06	3.24	3.40	3.56	3.71

SECTION 6H

SPRAYING INFORMATION - HORTICULTURE

CALIBRATION WORK SHEET

Step 1

Check the Sprayer is in Good Working Order

Step 2

Determine Actual Speed of Travel

Measure and mark a straight path of 100 metres (or more) of travelling conditions similar to the orchard or vine yard you are going to spray.

Half fill the spray tank & record the time (in seconds) to travel the measured distance.

Make sure that the tractor is travelling at spraying speed when you pass the start and finish marks and ensure the fan and pump are at operational speed.

If you have a hectare metre or automatic controller you need to check the speed calibration of the controller.

Tractor model	
Gear	
Range	
Dual power	
Engine RPM	
Speed in Km/h	

Kilometres per Hour = Distance traveled (m) x 3.6

Step 3

Determine Spraying Volume Required

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

Use your own experience or a registered rate calibration consultant to determine effective volume in litres per hectare.

..... litres/ha

Step 4

Determine Sprayer Configuration

Number of row(s) to be sprayed in one pass

Total number of nozzles to be used:

Step 5

Determine & Select Nozzles

Determine nozzle flow rate required:

Litres/Minute/Nozzle

=

**Litres/Ha x Km/hr ÷ 600 ÷ Total
Number of Nozzles Used x Row
Spacing (m) x Number of Rows in
One Pass**

..... x ÷ 600 ÷ x x
= litres/minute/nozzle

Once the flow rate per nozzle is known, select an appropriate nozzle size from the nozzle charts [see pages 4.9-4.11].

Nozzle Selection

Step 6

Fit & Test Selected Nozzles

The most important calibration is to test for **actual litre per hectare**. Fill your spray tank to overflowing and run the sprayer for one minute, at the above operating settings, and record the total litres per minute used.

Output/min (l/min)

=

Output (litres) ÷ Time (minutes)

..... ÷ = litres/min

Step 7

Calculate the Actual Application Rate

To calculate actual application rate (litres per hectare), use the following formula::

Application Rate (l/ha)

=

**Total Sprayer Output (l/min) x 600
÷ Speed (Km/hr) ÷ Row Spacing (m)
÷ Number Rows in One Pass**

..... x 600 ÷ ÷ ÷
= litres/ha

Record your data:

Farm location	
Crop to be sprayed	
Canopy width (m)	
Canopy Height (m)	
Spray Volume litres/ha	
No. Rows in one pass	
No. of nozzles used	
Litres/minute/nozzle	
Nozzle pressure	
Nozzle type	
Nozzle size & colour	
Tested Output in l/min	
Actual Litres/Hectare	

Note: If your sprayer has a flow meter fitted, you should calibrate it regularly. The calibration setting on the tag is a factory setting only and needs to be regularly checked - taking into consideration changes in density and/or viscosity of the product to be sprayed.

SECTION 7

LUBRICATION & MAINTENANCE

NOTE

This GENERAL manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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GREASE POINT DIAGRAMS	48
PUMPS	49
DIAPHRAGMS, STRAPS & FOAM MARKERS	50

SECTION 7

LUBRICATION & MAINTENANCE

GREASING & SERVICE PROCEDURES

1. Clean suction line filter with each tank load.
2. Clean pressure line filter.
3. Check nozzle filters.
4. Check tyre pressure and check wheel nuts, if applicable.



Check the tank straps

5. Check flush tank straps and tighten if necessary.
6. Clean Rapid-check flowmeter, if fitted.



Clean the Rapid Check Flowmeter (if fitted)

7. Grease tractor to sprayer PTO universal joints every 8 hours.
Grease lightly until grease becomes firm in seals.

Over greasing will break seals and allow dust and moisture to penetrate - increasing wear.



Grease the jack (if fitted)

8. Grease PTO inner tubes every 8 hours.
To lubricate the inner tube, slide PTO shaft apart, clean the telescopic tubes, grease and reassemble.
9. Grease the PTO covers every 20 hours.
10. Check pump air chamber pressure on a regular basis.
As a general guideline it should be 10%-20% of operating pressure (70-100 kPa [10-15 psi]).
11. To ensure trouble free spraying, flush the sprayer with fresh water thoroughly each day, and before changing chemicals. Dispose of tank wash according to chemical manufacturers instructions.



Repack the wheel bearings at 200 hours

12. Grease all boom joints, height adjuster points and other grease points.
13. Grease the jack, if fitted.

Every 200 Hours

1. Lubricate quick release lock pins on PTO shaft.
2. Re-pack wheel bearings with grease.
3. Inspect the bushes & pins on the tandem axle (if fitted).
4. Change air filter for foam marker.
5. Fully flush foam marker.
6. Grease all tank lid seals with vaseline.

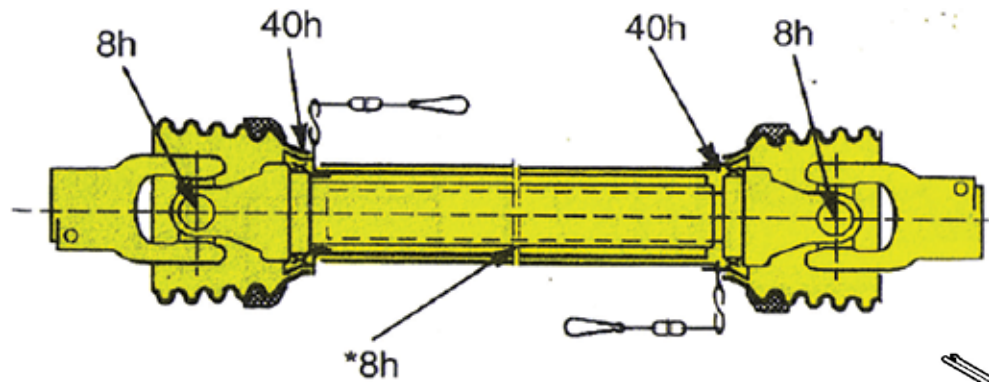
NOTE

Ensure the sliding inner tubes of the PTO are greased every 8 hours (working around the clock equals 3 times/day), especially when doing a lot of tight turning.

SECTION 7

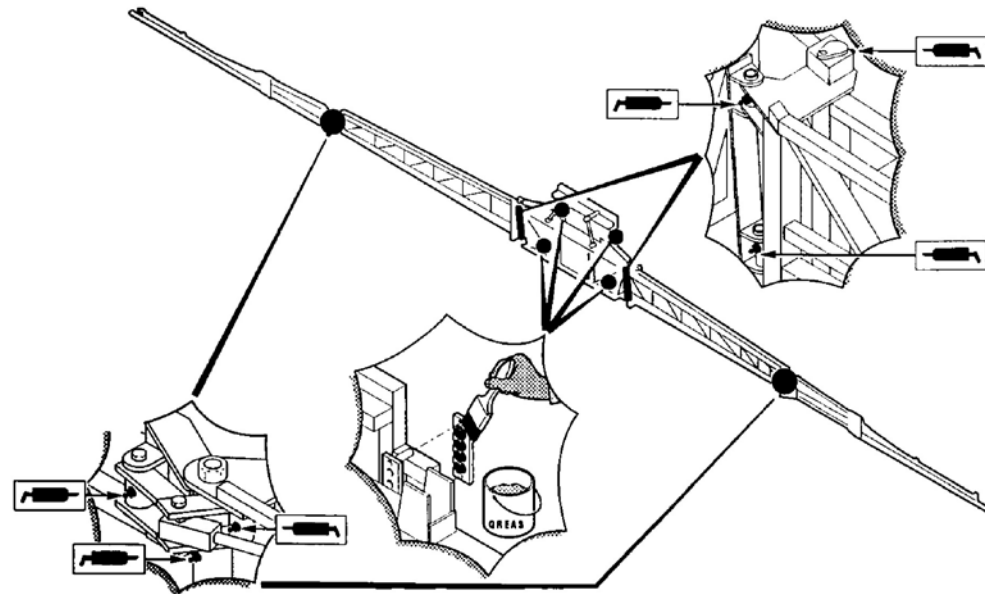
LUBRICATION & MAINTENANCE

GREASE POINT DIAGRAMS



PTO Grease Points

Pull shaft apart - apply grease to inside of outer telescopic profile



Boom Grease Points

SECTION 7

LUBRICATION & MAINTENANCE

PUMPS

Diaphragm Pump Maintenance

Annovi & Reverberi (A&R) pumps are of the piston-diaphragm type. All parts in contact with the spray liquid, which are subject to corrosion, are protected, making them ideal for spraying (herbicides, insecticides, fungicides, fertilisers, etc.), disinfection and washing.

Daily Before Starting the Pump

1. Check that oil is visible in sight glass (between minimum and maximum level indicators) and top up, if necessary, with good clean motor oil 20W/30 or 20W/40.
2. Clean all sprayer filters. Blocked or semi blocked filters place extra stress on diaphragms.
3. Start with zero pressure and the pump will self prime immediately.

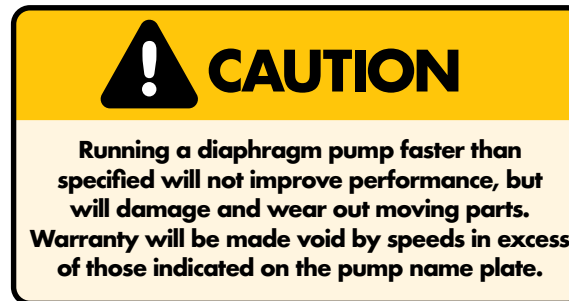
Daily after Use

1. Flush pump with clean water.
2. Drain filters and clean. A high percentage of pump failures are due to blocked filters.

Every 50 Hours

Check surge chamber pressure and adjust as follows:

- Air pressure 70-100kPa (10- 15psi) [Should be 10-20% of operating pressure].



Vibration of the delivery hose usually indicates that the air pressure in the surge chamber is incorrect.

The main cause of surge chamber diaphragm fracture is low pressure in this chamber.

Surge chamber pressure can be checked with an ordinary tyre gauge.

The above pressure range is a guide to the correct pressure.

However, if difficulties recur, adjust the pressure until an even flow is obtained from the pump (no pulsing of liquid at operating RPM). The pressure is best increased with a bicycle pump.

Every 250 hours or Every Season - Whichever Comes Sooner

1. Change oil and refill with 20W/30 oil.

Attention should be made to remove trapped air behind the diaphragms by rocking from side to side as instructed.

It is also good practise to run the pump for 10 minutes without pressure, and then, top up with oil before working the pump.

2. When changing the pump oil, check diaphragms and replace them if they are showing signs of wear.

This is normally a pre-season maintenance procedure which can be done easily as no special tools are required.

You can avoid unnecessary down time in spraying seasons by carrying out the proper maintenance.

3. Also check inlet and outlet valves and replace if worn. Worn valves not only reduce the output of the pump, but may reduce the life of the diaphragms.

Excessive Diaphragm Failure

If you have excessive diaphragm failure check the following points. These will cause failure of diaphragms due to added stress or chemical attack.

1. Most Important - Pump not being flushed out daily with clean water after use.
2. Oil level too low allowing air between piston and diaphragm.
3. Air leaks in suction line.
4. Restricted suction line.
5. Restriction through suction filter.
6. Not cleaning suction filter regularly.
7. Worn suction and discharge valves.
8. Bypass line too small to carry full capacity of pump.
9. In cold climates - frozen suction/discharge lines or water remaining in the pump after flushing.

SECTION 7

LUBRICATION & MAINTENANCE

10. Incorrect air setting or no air in air chamber.
11. Agitator excessively restricting bypass from pump.
12. Diaphragm material construction incorrect for chemical or solution being pumped.
13. Chemicals containing toluene or other aggressive solvents may require viton diaphragms - particularly if the pump is not properly flushed after use.

Pre-Season Servicing

For thorough pre-season servicing - check all aspects of the sprayer and its operating components as outlined in the pre-delivery check list on page 1.7.

Pump Storage and Corrosion Protection

1. Warm Climates

If you operate in a warm climate with no chance of frost in the winter, you will not have any problems with frost damage.

If you are storing your sprayer between seasons, ensure your pump has been thoroughly flushed with clean water. A good idea is to run a mixture of 1% solution of summer mineral spraying oil through the pump and plumbing system. Summer spraying oil is water-soluble oil such as DC-Tron. This will coat and protect all internal pump parts. Ensure this mixture is flushed out before spraying commences in the new season.

2. Cold Climates

For prolonged storage, an anti-freeze mixture can be flushed through the pump. Ensure this is thoroughly flushed out prior to the commencement of spraying again.

If the pump is being stored overnight and a risk of freezing is imminent, drain all liquid from the pump and lines, including boom lines.

Hypro Centrifugal Pump Maintenance

Flush Centrifugal Pump After Use

Always flush the pump as instructed.

To Prevent Corrosion

After cleaning the pump as directed above, flush it with a permanent type automobile antifreeze (Pestone, Zerex, etc) containing a rust inhibitor.

Use a 50% solution - that is half antifreeze and half water, or fill the pump with fluid film and then drain it.

A protective coat of fluid film will remain on the inner pump surfaces. Save excess fluid film for the next application.

Plug the ports of the pump to keep air out during storage. For short periods of idleness, noncorrosive liquids may be left in the pump but **air must be kept out.**



Remove & clean non-drip diaphragms regularly

DIAPHRAGMS, STRAPS & FOAM MARKERS

Non-Drip Diaphragms (if fitted)

Non-drip diaphragms should be cleaned regularly to prevent dripping from nozzles.

To clean the non-drip diaphragms:

1. Completely stop all sprayer functions.
2. Unscrew and remove the diaphragm cap.
3. Remove and clean any sediment Off the diaphragm membrane.
Replace the diaphragm membrane if damaged.
4. Refit the diaphragm.
5. Refit the diaphragm cap and carefully tighten.

NOTE

**Do not over tighten the diaphragm cap.
Over tightening the cap may impede
flow through the diaphragm.**

SECTION 7

LUBRICATION & MAINTENANCE



Regularly check that tank straps are tight

Tank Straps

Any tank straps of the flush tank should be kept tight so that the tank does not slide.

Tank clamps should be checked two or three times a day when the sprayer is new and the tank and frame are bedding-in.

Thereafter the tank clamps should be checked regularly.

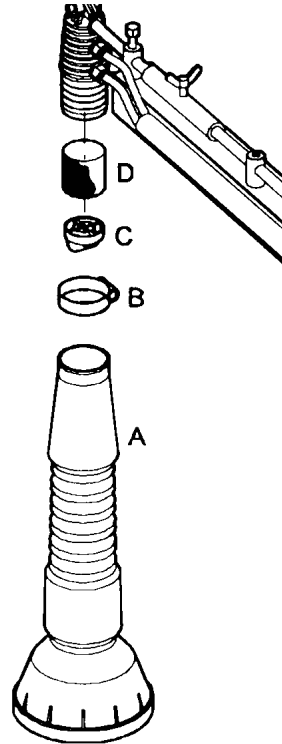
Foam Marker Maintenance

Arag Double Sided Foam Markers (Option)

Pressure relief valve

The pressure relief valve on the tank cap needs no maintenance.

Operating the pressure discharge ring under the tank cap prevents incrustations forming on the pressure relief valve at the same time checks its efficiency.



Weekly Cleaning (Figure 11)

Machine Down for Up to 7 Days

For periods of inactivity of at most 7 days, carry out the following operations:

- Slacken the band "B" and remove the diffuser "A".
- Remove the grid "C" turning it anticlockwise.
- Take the sponge "D" out of the foam nozzle.

- Carefully wash the foam diffusers and sponge with water.
- Reassemble the parts, taking care when inserting the sponge that must go freely into its seat without crushing that would alter the operation of the foam marker.
- Repeat the above operations for the other foam nozzle as well.

SECTION 8

TROUBLESHOOTING

NOTE

This GENERAL manual is a generic overview to a variety of spray operations. It contains information relating to Broadacre and/or Horticulture operations. Some features and options explained in this manual may not be installed on your sprayer.

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SECTION 8

TROUBLESHOOTING

DIAPHRAGM PUMP PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
A. Pump does not draw or deliver liquid. Pressure gauge fluctuates badly	<ol style="list-style-type: none"> 1. One or more valves are not seating properly. 2. The pump is sucking in air through suction line. 3. Air has not been entirely evacuated from the pump. 4. Blocked suction filter. 5. Damaged or worn suction valves. 	<ol style="list-style-type: none"> 1. Clean valve seating. 2. Examine the suction hose and ensure it is firmly secured. 3. Rotate the pump with outlet hose and taps open. 4. Clean suction filter. 5. Replace suction valves.
B. Liquid flow is irregular (Also check items under A)	<ol style="list-style-type: none"> 1. The air in the air chamber of the pump is incorrectly set. 2. Diaphragm split. 3. Damaged or worn valves. 4. Foreign matter holding valves open. 	<ol style="list-style-type: none"> 1. Check pressure in air chamber of pump. Set at 210-280Kpa (30-40 psi), or 10% of you average spraying pressure. 2. Replace diaphragm. 3. Replace valves. 4. Clean valves.
C. Pump delivers insufficient pressure	<ol style="list-style-type: none"> 1. Regulating valve: <ul style="list-style-type: none"> • Sticking open • Not set for pressure • Damaged or worn seat or spring. 2. Cylinder diaphragm ruptured. 3. Pump valves blocked, worn or damaged. 4. Spray nozzles worn, missing or exceed pump capacity. 	<ol style="list-style-type: none"> 1. Fix the regulator: <ul style="list-style-type: none"> • Unstick the valves • Set the pressure • Replace the spring. 2. Replace diaphragms. 3. Unblock valves and or replace. 4. Replace spray nozzles with appropriate size.
D. Output drops & pump is noisy	<ol style="list-style-type: none"> 1. Oil level is too low. 	<ol style="list-style-type: none"> 1. Top up with oil to correct level (1/2 way up the sump sight glass).
E. Oil being discharged through delivery line or discoloured oil in sight glass of pump	<ol style="list-style-type: none"> 1. One or more diaphragms split or ruptured. 	<ol style="list-style-type: none"> 1. Immediately drain oil from pump and flush to remove all spray residues from sump. Remove pump heads & fit new diaphragms. Fill to correct level with motor oil 20W/30.

SECTION 8

TROUBLESHOOTING

DIAPHRAGM PUMP PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
SUCTION SIDE OF PUMP		
F. Suction hose vibration	1. Air getting into suction.	1. Seal all joints securely with tape or sealant. Firm up clamps.
G. Pump valves hammering	1. Suction tap partly turned off. 2. Suction strainer(s) blocked.	1. Turn tap fully on. 2. Clean filters.
H. No water flow on suction hose	1. Obstruction in tank or suction line.	1. Clean foreign material from tank & suction line.
DISCHARGE SIDE OF PUMP		
I. Pressure gauge pointer swings violently	1. Pressure control valve spindle doesn't move easily.	1. Lubricate with light oil or C.R.C.
J. Control valve leaking from spindle	1. Split diaphragm or O-rings.	1. Remove 4 body set screws, replace diaphragm and O-rings.
K. Pressure gauge showing correct working pressure no pressure at nozzle.	1. Burst discharge line. 2. Blocked pressure filter where fitted. 3. O-ring(s) jamming flow in discharge line. 4. Ants, wasps build nests in discharge line or nozzles.	1. Replace discharge line. 2. Clean pressure filter. 3. Clean discharge line of foreign materials. 4. Clean nozzles of foreign materials with tooth brush

SECTION 8

TROUBLESHOOTING

GENERAL SPRAYER PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
1. No spray when turned on	<ol style="list-style-type: none"> 1. Filter on the inlet side of the pump blocked. 2. Faulty pump. 	<ol style="list-style-type: none"> 1. Dismantle, clean & re-assemble. 2. Change pump.
2. Sprays for short time only	<ol style="list-style-type: none"> 1. Air inlet to tank blocked. 2. Filter on suction side of pump blocking or blocked. 	<ol style="list-style-type: none"> 1. Clean air vent. 2. Dismantle, clean & re-assemble the filter. If filter problem persists, clean out the tank & start again.
3. Spray is uneven around the spray-head	<ol style="list-style-type: none"> 1. Some nozzle filters or tips are blocked. 2. Nozzle tips worn. 3. Different pressure along the boom. 	<ol style="list-style-type: none"> 1. Remove, clean & check. Check output & for streaks. 2. Check nozzle output, replace worn nozzles. 3. Remove a nozzle in each section & check that flow rate is the same. If different, check for blockages.
4. Pressure going up - output going down	<ol style="list-style-type: none"> 1. Nozzle filters blocking. 	<ol style="list-style-type: none"> 1. Dismantle, clean & refit. Check pressure returns to normal. Check all filters and spray mixture.
5. Pressure falling	<ol style="list-style-type: none"> 1. Filter on suction side blocked. 2. Nozzle tips worn. 3. Pressure gauge faulty. 4. Pump worn. 	<ol style="list-style-type: none"> 1. Dismantle & clean the filter. 2. Check nozzle output, replace worn nozzles. 3. Check with new pressure gauge. 4. Repair or replace the pump.
6. Spray pattern narrow	<ol style="list-style-type: none"> 1. Pressure too low. 2. Pressure too low & spluttering. 	<ol style="list-style-type: none"> 1. Check that the correct nozzles are being used. 2. Check that the tank is not empty. If not, there is an air leak between the pump & tank or in the pump. Check plumbing & repair.
7. Foam in the tank	<ol style="list-style-type: none"> 1. Too much agitation. 	<ol style="list-style-type: none"> 1. Check that the return line is at the bottom of the tank. Partly close agitation and valve.
8. Spray pattern streaky	<ol style="list-style-type: none"> 1. Nozzle partly blocked. 	<ol style="list-style-type: none"> 1. Remove & clean. If it continues, the nozzle is damaged. Replace with same size tip, check flow rate of replacement nozzle.

SECTION 8

TROUBLESHOOTING

HYDRAULIC PUMP DRIVE PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
A. A Low discharge	<ol style="list-style-type: none"> 1. Pump not primed. 2. Air leaks in suction line. 3. Blocked or clogged line filter. 4. Impeller plugged. 5. Undersized or collapsed suction hose. 6. Improperly sized hydraulic motor. 7. Bypass adjustment screw not properly set. 8. Eye of impeller rubbing on volute. 	<ol style="list-style-type: none"> 1. Remove top most vent plug from face of pump and run pump to expel trapped air. 2. Check and reseal inlet fittings. 3. Inspect filter & clear any debris from screen. 4. Inspect and clear obstruction. 5. Suction line should be the same diameter as inlet port of pump or larger. 6. Refer to pump selection guide to determine proper size. 7. Adjust bypass screw on the side of the hydraulic motor. 8. Remove volute (front cover) and inspect the impeller. If wear is detected, sand the impeller eye O.D. with emery cloth.
B. Hydraulic system overheating	<ol style="list-style-type: none"> 1. Improper hydraulic motor size. 2. Bypass adjustment screw set to bypass too much oil. 3. Improper metering orifice installed in pressure port. 4. Insufficient hydraulic hose size. 	<ol style="list-style-type: none"> 1. Refer to pump selection guide to determine proper size for your system. 2. Close adjustment screw on side of hydraulic motor to lessen the amount of bypassing oil. 3. Install proper size orifice. Refer to Hypro Manual. 4. Check hydraulic hose size. Hose should be at least ½". For large open-centre systems ¾".

SECTION 8

TROUBLESHOOTING

FOAM MARKER PROBLEMS - ARAG MARKER

PROBLEM	PROBABLE CAUSE	REMEDY
The electric compressor will not work, the pilot lights fail to come on	1. No current reaches the control unit.	1. Check the fuse. 2. Check the electrical connections of the control box.
The electric compressor will not work, the pilot lights come on	1. Electrical connection between control unit and electric compressor broken.	1. Check the connections between the control box and the electric compressor.
No foam comes out of dark the foam nozzles	1. The tank will not pressurize. 2. Break in the pneumo/hydraulic circuit.	1a. Close the tank cap properly. 1b. Check the tightness of the pipes connecting the compressor with the cap. 2a. Check there are no cracks in the dark the blue pipe inside the tank (from the filter to the plug) and on the outer pipes. 2b. Clean the bottom filter of liquid. 2c. Check for any constrictions along the pipes.
Foam formation is not good	1. Sponge dirty or hardened. 2. Water-foaming agent mix old. 3. Flow-rate adjustment wrong. 4. Constrictions in pipes.	1. Clean or replace the sponge inside the foam nozzle. 2. Redo the water-foaming agent mix. 3. Use the flow-rate regulator on the tank cap to obtain a sufficiently dense foam. 4. Check the pipes towards the foam.
Foam continues to be formed in the foam nozzle not selected	1. Solenoid valve jammed.	1. Disconnect the pipes going from the compressor unit to the foam node, then blow with compressed air into the unions of the solenoid valves towards.
Air bleeds from the safety valve on the cap	1. Constrictions in the pipes. 2. Solenoid valve jammed.	1. Check the pipes towards the foam nozzles. 2. Clean the relevant solenoid valve of liquid by blowing compressed air through the union leading to the foam nozzle.
Air or liquid leaks from the fittings	1. Incorrect fitting seal.	1. At the quick connections or threaded fittings, uncouple the pipe and shorten it by approximately 10 rpm to eliminate the defects of deformation at the seal.

For problems not specified, call your Dealer.

SECTION 9

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

ALL PARTS INFORMATION is now listed on the Croplands website:

- Go to croplands.com.au
- Search in the Parts Information section linked to the home page.

NOTE

Contact Croplands Technical Support
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