

MICRONAIR

**AU8500
ULV TREE SPRAYER**

**Operator's Handbook
and
Parts Catalogue**

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AU8500 ULV TREE SPRAYER

Operator's Handbook and Parts Catalogue

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1. INTRODUCTION

The Micronair AU8500 is a tractor-mounted airblast sprayer developed specifically for the control of pests in tall trees using products formulated for Ultra Low Volume (ULV) application. The machine is intended to be used as a ground-based alternative to aerial application in date palms, tropical fruit trees, forestry etc. The sprayer can also be used for broadcast application of ULV pesticides against migrant pests (locust, armyworm etc).

The AU8500 uses a Micronair rotary atomiser to give excellent control of spray droplet size over a wide range of flow rates. Spray droplets are carried upwards into the tree canopy by the air blast from a highly efficient tangential flow fan driven from the Power Take-Off (PTO) shaft of the tractor. The fan is provided with a two-speed gearbox to match the fan speed and air output to the tractor being used. This allows the sprayer to work both with small tractors (32 – 75 HP) and larger types (75 HP and above) for maximum vertical coverage.

The atomiser is mounted at the outlet of a flexible air duct. This is normally directed vertically for optimum coverage of tall trees. However, the angle of the duct can be adjusted for spray application onto smaller trees or bushes or for the control of migrant pests at ground level. The air duct can also be moved to the horizontal position for transport or when driving under obstructions.

The pesticide tank and all pipework and components in contact with the spray liquid are manufactured from materials that are resistant to aggressive solvent-based ULV formulations. The tank has a wide aperture for ease of filling and a drain valve for easy and safe emptying after use. The sprayer incorporates an additional flushing tank to allow the pipework, pump and atomiser to be safely washed out with a non-toxic solvent after use.

The sprayer is operated from a control box inside the tractor cab (where available) for maximum operator safety. The machine incorporates many unique safety features, including an air flow sensor to stop the pesticide pump in the event of the PTO drive being disengaged during operation.

2. SPECIFICATION

Dimensions:	Main frame: Length 1380 mm, width 1100 mm, height 1200 mm (excluding air duct and atomiser) Air duct and atomiser: Height 1500 mm above top of frame.
Atomiser height:	3.2 mm above vehicle ground level (on tractor with category 2 linkage at typical operating height)
Weight:	360 Kg (tanks empty)
Mounting:	ISO standard category 2 3-point linkage
Drive:	From tractor PTO shaft operating at 500 – 540 RPM

Power required	32 HP max at 540 RPM with low fan speed setting 75 HP max at 540 RPM with high fan speed setting
Fan output:	18,500 m ³ /hour at 540 RPM PTO speed with low fan speed setting 22,700 m ³ /hour at 540 RPM PTO speed with high fan speed setting
Air velocity:	57 m/sec (205 km/hr) at air outlet at 540 RPM PTO speed with low fan speed setting 80 m/sec (288 km/hr) at air outlet at 540 RPM PTO speed with high fan speed setting
Vertical coverage:	15 m max at 540 RPM PTO speed with low fan speed setting 20 m max at 540 RPM PTO speed with high fan speed setting
Spray droplet size:	Adjustable 50 – 150 µm VMD for typical ULV pesticide formulations
Output rate:	Adjustable 0 – 3.0 l/min
Output adjustment:	By adjustable valve or interchangeable fixed restrictor orifices
Pesticide tank:	100 litre capacity HDPE construction with 180 mm diameter filling aperture and basket filter
Flushing tank:	10 litre capacity HDPE construction with 100 mm diameter filling aperture and basket filter
Electrical power:	12 VDC @ 7 A (spray pump operating)
Power source:	From 12 V tractor battery
Control box:	Mounted in cab of tractor Switch: Pump on/off Indicators: Power on Blower operating Pump on

3. INSTALLATION

3.1. Preparation

The AU8500 is supplied with the air duct and atomiser disassembled for ease of shipment. The sprayer must be assembled as follows prior to use:

1. Position the square flange at the base of the air outlet duct onto the flange at the top of the blower fan. Rotate the air duct until the adjusting lever is to the front of the sprayer (as viewed from the rear, looking towards the front of the tractor).

2. Secure the air duct to the blower with the M8 x 25 nuts, bolts and washers provided.
3. Locate the pesticide feed hose and attach the free end to the inlet fitting at the bottom of the flow control valve (1 in Fig. 2).
4. Route the hose and secure in position with the cable ties provided. Leave a small loop of hose adjacent to the air duct support hinge to prevent fretting against the hinge pin.

3.2. Installation on Tractor

The AU8500 is designed for installation on an ISO standard category 2 3-point implement linkage on an agricultural tractor. If necessary, the linkage should be fitted with adaptor balls with the following internal diameters:

Upper ball	25 mm diameter
Lower balls:	28 mm diameter

The user must provide a suitable telescopic PTO drive shaft to connect the shaft of the gearbox to the PTO shaft of the tractor. The length and specification of the shaft will depend upon the tractor being used. The shaft should be specified as follows:

Length:	Select or cut as required to provide a minimum of 25 mm and maximum of 200 mm additional compression (closure) when the shaft is at its shortest length (gearbox shaft and tractor PTO shaft at the same vertical level)
Internal splines:	To suit tractor PTO shaft at tractor end, 33 mm outside diameter, 6 splines at sprayer end

The procedure to mount the sprayer is as follows:

1. Remove the binding wire or bolts securing the sprayer to its shipping pallet.
2. Attach the sprayer to the 3-point implement linkage of the tractor, using the pins and locking clips provided. If necessary, move the pins for the lower attachments to alternative holes in the sprayer frame to suit the geometry of the linkage.

IMPORTANT: If installing the sprayer on a light-weight tractor, it may be necessary to fit balance weights to the front of the tractor. See tractor owner's handbook for further details.

3. Fit the PTO drive shaft between the tractor PTO shaft and gearbox of the sprayer. Ensure that the locating pins are correctly engaged on the splined shafts at each end.
4. Secure the outer safety sleeve of the drive shaft to the structure of the tractor at the tractor end, using a suitable chain. The chain must be adjusted to prevent rotation whilst allowing the necessary vertical movement of the drive shaft.

5. Carefully raise the sprayer on the linkage of the tractor. Check the stability of the sprayer whilst it is being raised and ensure that the PTO drive shaft maintains sufficient free longitudinal movement as it passes through the horizontal position. Continue raising the sprayer until it is at the required working height. This will depend upon the tractor being used, but the bottom of the frame should be at least 300 mm above ground level.
6. Adjust the top link arm until the sprayer is level (top of frame horizontal). If there is insufficient adjustment in the top link arm, lower the sprayer onto the ground and move the lower attachment pins to an alternative position.

3.3. Electrical Installation

1. Identify the black power cable of the sprayer. Unplug the battery cable and fuse assembly from the end of the power cable (note that the black plastic locking tab on one side of the connector must be pressed down before pulling it apart).
2. Route the red and black wires to the tractor battery. Ensure that these wires are secured with cable ties and are protected by plastic or rubber bushes if they pass through holes or adjacent to sharp edges.
3. Connect the ring tag on the red wire of the fuse assembly to the positive (+) battery terminal.
4. Connect the ring tag on the black wire of the fuse assembly to the negative (-) battery terminal or the vehicle ground adjacent to the battery.
5. Plug the connector on the power cable into the socket on the battery cable assembly.
6. Position the control box in the tractor cab. This should be adjacent to the driver's seat. Secure the box in position with the self-adhesive Velcro strips provided or by bolts through the mounting holes in the corners of the box. (Remove the lid of the box to gain access to the mounting holes.)
7. Route the cable from the control box to the rear of the tractor. Whenever possible, pass the cable through existing holes provided for electrical wiring. If necessary, new holes should be drilled for the cable. All holes should be protected with plastic or rubber bushings to prevent chafing of the cable. Ensure that all cables are clear of the PTO shaft and other moving parts. Ensure that there is sufficient free length of cable to allow the sprayer to be raised and lowered on the 3-point linkage.
8. Insert the plug on the control box cable into the socket on the junction box on the left-hand side of the sprayer frame. Secure the plug with its threaded locking ring.
9. Secure all loose cables with the plastic cable ties provided.

4. OPERATION

This section describes the normal operation of the sprayer. It is important that the machine is calibrated prior to use (see Calibration section).

IMPORTANT: Hearing protection must be worn when working within 2 m (6 feet) of the sprayer whilst the blower fan is running – see Health & Safety section.

Item numbers in brackets refer to Fig. 1 and labels of switches and indicator lights are shown in ***bold italics***.

4.1. Before Operation

1. Fit the sprayer to the tractor as described in section 3 above.
2. Adjust the vertical elevation of the air outlet duct to suit the target. Normally, the air tube should be vertical for tall trees, but it may be adjusted to a lower elevation or even horizontally for smaller trees or for broadcast application in open terrain (eg locust or other migrant pest spraying). The head elevation is adjusted by removing the R-clip from the locating pin for the head adjusting arm, disengaging the arm, adjusting the air duct and re-fitting the arm with the locating pin in the appropriate hole. Ensure that the R-clip is replaced after adjustment.

4.2. Filling

1. Ensure that the ***Drain*** valve (1) is CLOSED, the ***Isolation*** valve (2) is OPEN and the ***Tank Select*** valve (3) is set to MAIN TANK (as shown in the label below the valve).
2. Fill the pesticide tank with the required amount of product. If necessary, this should already have been mixed in accordance with the manufacturer's approved instructions. The filler (basket) filter in the tank should be in position during filling. The quantity of product put into the tank should be limited to the amount required for the spray job or 100 litres, whichever is less.
3. Replace the pesticide tank filler cap firmly after filling.

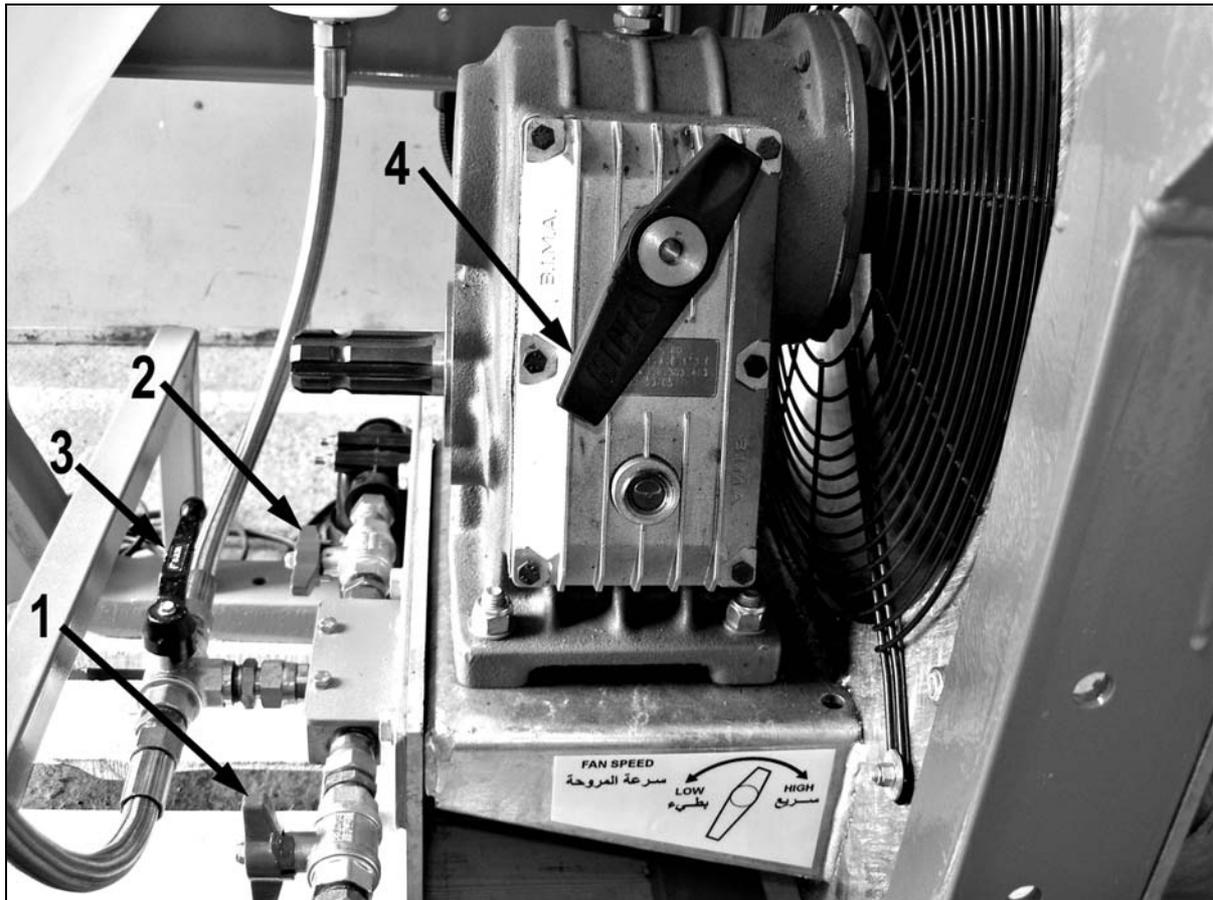


Fig. 1 – Valves & Gearbox Under Tank

4.3. Operation

1. Ensure that the **Pump** switch on the sprayer control box in the cab is set to OFF.
2. Ensure that the **Calibration** switch on the box on the sprayer frame is set to SPRAY.
3. Set the **Fan Speed** lever on the fan drive gearbox to the appropriate position according to the tractor being used:
 - Use the LOW speed setting for tractors of less than 75 HP.
 - Use the HIGH speed setting for tractors of 75 HP or more for maximum air output.
4. Adjust the tractor engine throttle to idle speed. Engage the tractor PTO drive shaft and gradually increase the PTO shaft speed to 500 – 540 RPM (540 RPM is preferred for maximum air output, but the speed may be limited by power available from small tractors). The green **Blower** light on the control box should illuminate to show that there is sufficient airflow from the fan.

5. Drive into the downwind edge of the spray area. When ready to spray, set the **Pump** switch to ON. The green Pump light should illuminate.

IMPORTANT: The pump will only operate (and the pump light illuminate) when there is sufficient airflow from the blower. This is a safety feature to prevent pesticide from being discharged from the atomiser when there is insufficient airflow to rotate the atomiser.

IMPORTANT: Pesticide must only be sprayed whilst the tractor is moving within the spray area.

6. At the end of each spray pass, set the **Pump** switch to OFF before turning onto the next spray pass.

IMPORTANT: The pump must always be turned off at the end of each spray pass before the tractor turns onto the next pass.

4.4. Spraying Technique

The AU8500 tree sprayer uses a combination on a vertical airblast and the wind to ensure even distribution of spray droplets within the tree canopy. The following points should be noted in for safe and effective application:

- Spraying should never be carried out whilst there are people or animals in the spray area.
- The sprayer should not be used if the wind speed exceeds 5 m/sec. High wind speeds will reduce the maximum height reached by the spray droplets.
- The sprayer should preferably not be used in completely calm conditions. A wind speed of greater than 1 m/sec is recommended. This ensures a sufficiently wide swath of spray droplets in the tree canopy and also carries the spray clear of the tractor and operator. This is particularly important if the tractor is not fitted with a closed cab.
- The direction of each spray pass should be at right-angles to the wind.
- Spraying should start along the upwind edge of the spray area and successive passes should be downwind of the first pass. This ensure that the sprayer is always operating in an area that has not already been sprayed.

4.5. Emptying of Pesticide Tank

Whenever possible, only the amount of pesticide required for a job should be put into the tank and all pesticide should be used within the spray area. However, if pesticide remains at the end of a job, it should not be left in the tank. The procedure to empty the tank is as follows:

1. Release the drain hose from its securing bracket.

2. Position a container of adequate capacity below the level of the bottom of the pesticide tank and put the free end of the drain hose into the container.
3. Ensure that the **Isolation** valve (2) is OPEN.
4. OPEN the **Drain** valve (1) until all pesticide has been drained from the sprayer.
5. CLOSE the **Drain** valve and remove the drain hose if required.
6. Store or dispose of the pesticide drained from the sprayer according to the instructions on the label and statutory requirements.

4.6. Flushing of Sprayer After Use

The sprayer is fitted with a 10 litre capacity tank to hold solvent for flushing the pump, hoses and atomiser after use. Diesel fuel is suitable for flushing most ULV formulations. Water should not normally be used. The sprayer should only be flushed out in the working area. The procedure to flush the sprayer is as follows:

1. Drain the main pesticide tank if necessary.
2. Put about 5 – 10 l of diesel fuel into the flushing tank. And close the lid.
3. Set the **Tank Select** valve (3) to FLUSH.
4. Operate the sprayer in the spray area and spray 1 – 2 l of diesel. Note that some pesticide will also be discharged from the sprayer, so it is important that the same procedures are followed as during normal spraying.
5. Set the **Tank Select** valve to SPRAY.

5. HEALTH & SAFETY

Legislation regarding the application of pesticides that are potentially harmful to individuals or the environment varies considerably between countries. Operators using pesticides and equipment must ensure they are working within the regulations applicable to their area.

Irrespective of legislation, Micron Sprayers Limited advise the users of their equipment that all possible care must be taken to ensure the health and safety of the user and personnel in the vicinity of the spraying operation.

The following recommendations are for guidance only and do not exclude any statutory requirement:

1. The application of each pesticide should follow the recommendations of the manufacturer. Extreme care should be taken to prevent pesticide reaching the operator or any target where contamination could have an adverse effect.

2. Ensure that the equipment is correctly calibrated for the product being used.
3. Suitable clothing, gloves, eye protection and masks must be worn when mixing or working with or near toxic products and operators must adhere to all relevant handling precautions and regulations.
4. Hearing protection must be worn whilst standing within 2m (6 feet) of the sprayer when the blower fan is running.
5. The doors and windows of the tractor cab (where provided) should be kept closed whilst the sprayer is operating.
6. The sprayer should never be operated whilst the tractor is travelling downwind (ie wind blowing from behind).
7. The entire spray system and all ancillary equipment must be thoroughly flushed out after use or before maintenance.
8. All pesticide residues must be safely stored or disposed of.
9. All used pesticide containers must be safely disposed of in accordance with local regulations and requirements.
10. First aid and washing facilities must always be available and personnel must be trained in their use.

6. CALIBRATION

6.1. Calculation of Output from Sprayer

The output (flow rate) from the sprayer must be calculated according to the average distance between spray passes (track spacing) and the speed of the tractor. These must be determined in advance.

IMPORTANT: The track spacing must always be used when calculating the output from the sprayer. The track spacing must not be confused with the effective swath (distance that spray droplets are carried downwind). The track spacing should always be less than the effective swath to ensure overlap of the spray deposits and to allow for the effects of buildings and other obstructions.

The area treated by the sprayer per minute is calculated from the formula:

$$\text{Coverage (ha/min)} = \frac{\text{Track spacing (m)} \times \text{Tractor speed (Km/hr)}}{600}$$

The coverage for typical operating conditions is shown in Table 1.

The required total output from the sprayer is calculated by multiplying the coverage of the sprayer (ha/min) by the volume application rate for the product being sprayed (l/ha):

$$\text{Flow from sprayer (l/min)} = \text{Coverage (ha/min)} \times \text{Application rate (l/ha)}$$

If the pesticide is diluted before use, the volume application rate refers to the total volume of the diluted mixture, not to the undiluted product.

Example:

Track spacing: 15 m
 Vehicle speed: 10 Km/hr
 Application rate: 2.0 l/ha

$$\begin{aligned} \text{Coverage (ha/min)} &= \frac{\text{Track spacing (m)} \times \text{Tractor speed (Km/hr)}}{600} \\ &= \frac{15 \times 10}{600} = 0.25 \text{ ha/min} \end{aligned}$$

$$\begin{aligned} \text{Flow from sprayer (l/min)} &= \text{Coverage (ha/min)} \times \text{Application rate (l/ha)} \\ &= 0.25 \times 2.0 = 0.5 \text{ l/min (500 ml/min)} \end{aligned}$$

Speed (Km/hr)	Track Spacing (m)									
	2	4	6	8	10	12	14	16	18	20
1	0.003	0.007	0.010	0.013	0.017	0.020	0.023	0.027	0.030	0.033
2	0.007	0.013	0.020	0.027	0.033	0.040	0.047	0.053	0.060	0.067
3	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100
4	0.013	0.027	0.040	0.053	0.067	0.080	0.093	0.107	0.120	0.133
5	0.017	0.033	0.050	0.067	0.083	0.100	0.117	0.133	0.150	0.167
6	0.020	0.040	0.060	0.080	0.100	0.120	0.140	0.160	0.180	0.200
8	0.027	0.053	0.080	0.107	0.133	0.160	0.187	0.213	0.240	0.267
10	0.033	0.067	0.100	0.133	0.167	0.200	0.233	0.267	0.300	0.333
12	0.040	0.080	0.120	0.160	0.200	0.240	0.280	0.320	0.360	0.400
14	0.047	0.093	0.140	0.187	0.233	0.280	0.327	0.373	0.420	0.467

Table 1 – Coverage of Sprayer in Hectares/minute

6.2. Adjustment of Output from Sprayer

The flow of pesticide from the AU8500 sprayer can be adjusted by means of either an adjustable needle valve or by interchangeable fixed restrictor orifices. The procedure to calibrate the sprayer is as follows:

1. Put at least 20 l of the product to be sprayed into the pesticide tank.
2. Adjust the elevation of the air tube to the working position.
3. Set the **Calibration** valve (3 in Fig. 2) on the side of the air outlet behind the atomiser to CALIBRATE.
4. Make the necessary initial adjustments to the flow control (see sections below).
5. Run the engine of the tractor so that the battery is charging.
6. Place or hold a bucket or other large container under the white plastic tube (4 in Fig. 2).connected to the **Calibration** valve

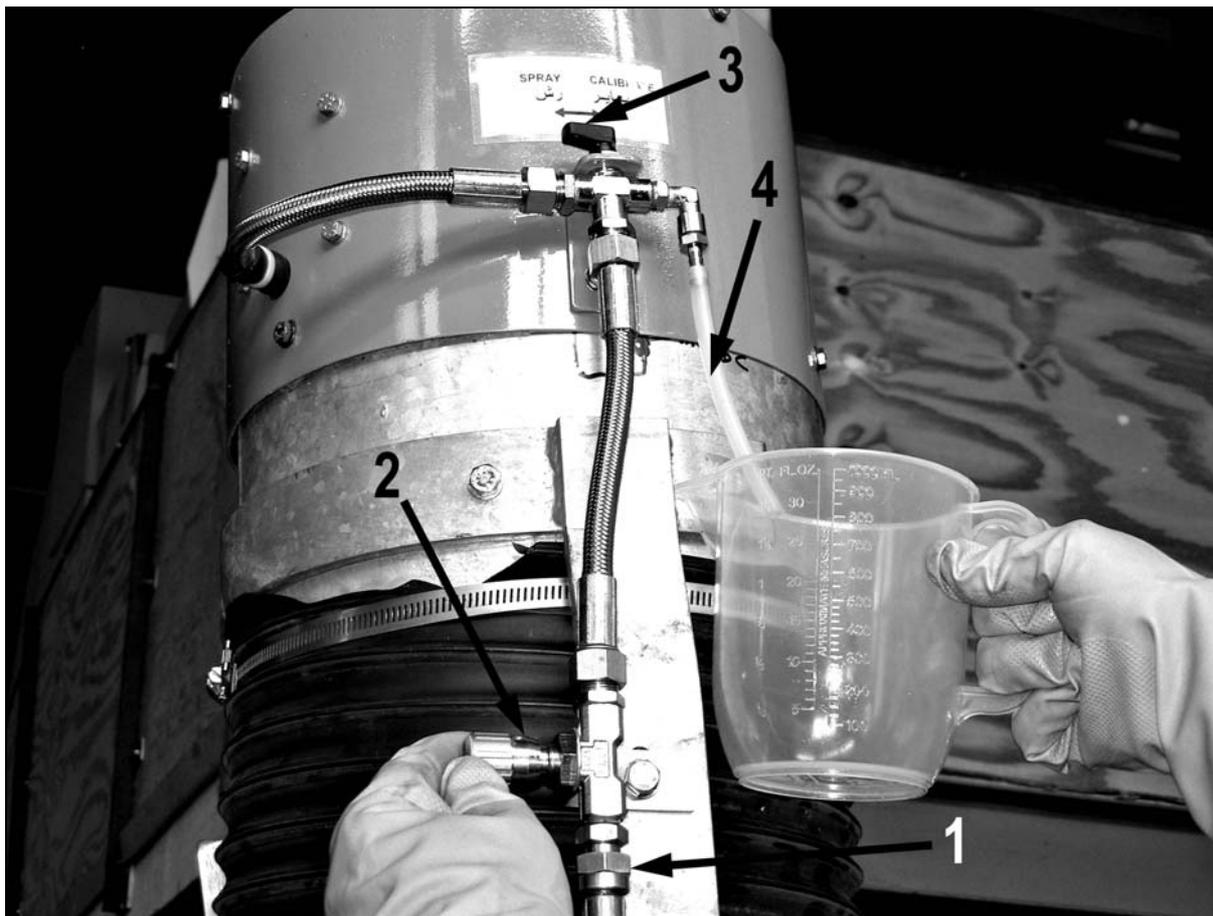


Fig. 2 – Flow Calibration

7. Set the **Pump** switch in the tractor cab to ON. Wait until a steady stream of pesticide flows from the calibration tube.
8. Place a graduated jug or measuring cylinder under the calibration tube and collect pesticide for a measured time (typically 1 or 2 minutes, depending upon the flow rate and the size of the measuring container).
9. Set the **Pump** switch to OFF
10. Check the volume of pesticide collected. Divide this by the time for the measurement to obtain the total flow rate from the sprayer.

IMPORTANT: Wear gloves, protective clothing and eye protection when calibrating the sprayer. Return pesticide collected from the sprayhead to the main tank and wash all measuring containers etc after use.

Example:

Volume collected:	0.9 l
Time to collect measured volume:	2 minutes
Flow rate (l/min) =	$\frac{\text{Volume (l)}}{\text{Time (min)}}$
=	$= \frac{0.9}{2} = 0.45 \text{ l/min (450 ml/min)}$

6.2.1. Calibration with Needle Valve

1. Ensure that there is no orifice disc fitted in the feed to the atomiser (inside housing 1 in Fig. 2).
2. Set the needle valve (2 in Fig. 2) to approximately mid-position.
3. Check the calibration of the sprayer as described in section 6.2 above.
4. If the flow rate is too high, decrease the opening of the valve by turning the adjusting knob in a clockwise direction. If the rate is too low, increase the flow by turning the adjusting knob in an anti-clockwise direction.
5. Repeat steps (3) & (4) until the correct flow rate is obtained.

6.2.2. Calibration with Fixed Flow Restrictor

1. Refer to Table 2 below to determine the size of restrictor orifice disc that gives a flow closest to the required rate.

2. Remove the hose fitting from the restrictor housing (1 in Fig. 2) and fit the appropriate disc inside (ensure that any existing disc is removed first and that the non-return valve remains in position inside the housing).
3. Replace the hose fitting on the restrictor housing and tighten with a spanner.
4. Ensure that the needle valve is fully open.
5. Check the calibration of the sprayer as described in section 6.2 above.
6. If the flow rate is too high, replace the orifice disc with the next smaller size. If the rate is too low, replace the disc with the next larger size. Repeat step (5).

Disc Number	Flow from Sprayer (l/min)
24	0.175
30	0.230
39	0.430
49	0.625
59	0.840
80	1.380
98	1.850

Table 2 – Approximate Flow Rates Through Restrictor Orifice Discs

6.3. Spray Droplet Size

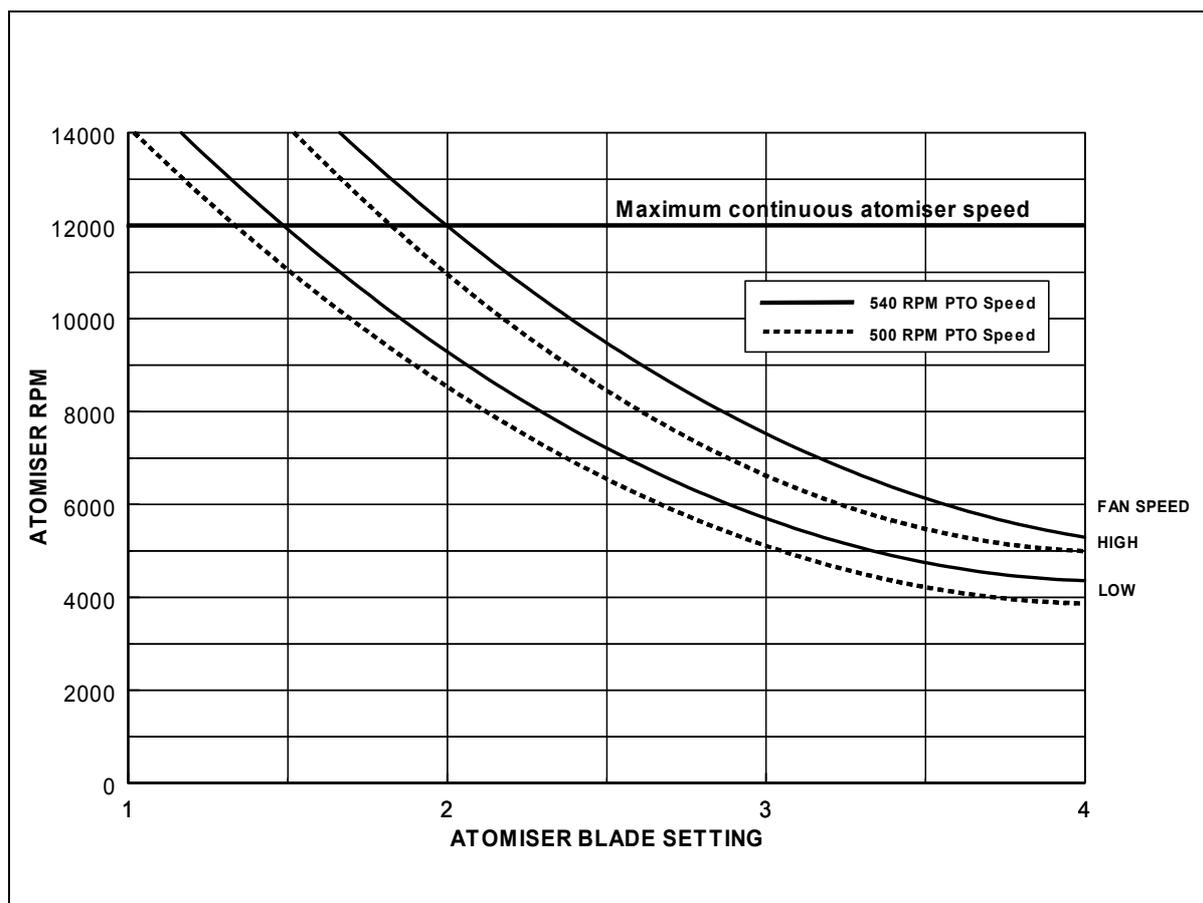
The size of spray droplets produced by the AU8500 depends upon the physical properties of the pesticide being sprayed and the rotational speed of the atomiser.

The rotational speed of the atomiser is determined by the velocity of air from the fan and by the angle of the atomiser fan blades.

Graph 1 shows the rotational speed of the atomiser against PTO speed and the fan drive gearbox speed setting.

Refer to the Micronair AU8120 atomiser handbook for information on spray droplet size against atomiser RPM.

IMPORTANT: The maximum continuous rotational speed of the atomiser is 12,000 RPM. Do not use an atomiser fan blade setting of less than 1½ at the low fan speed or 2 at the high fan speed.



Graph 1 – Atomiser Rotational Speed

7. MAINTENANCE

7.1. General

The sprayer is constructed from durable, chemical resistant materials and will give long service if it is correctly used and maintained. In addition to the specific maintenance instructions in the sections below, the following procedures must be followed:

1. The pesticide tank must be emptied after use if the sprayer is not to be used again within a period of 12 hours. See Operation section.
2. All external surfaces of the sprayer should be cleaned after use to remove any chemical residues, dust etc. The machine should normally be cleaned with a cloth soaked with water and detergent. In the event of severe contamination with oil-based formulations, a cloth soaked in kerosene or diesel can be used first. Do not use a high-pressure hose or steam cleaner as this could force water into electrical and other vulnerable components.

IMPORTANT: Wear gloves and eye protection when cleaning the sprayer and dispose of contaminated cleaning cloths and washing liquid safely.

3. The sprayer should be protected from rain and prolonged direct sunlight when not in use, either by leaving the machine under cover or by covering it with a protective sheet.

7.2. Fan Gearbox

The fan gearbox is filled with SAE 90 gear oil. The oil level is shown in the oil level indicator at the side of the gearbox.

The oil in the gearbox should be changed after the first 50 hours of use and every 500 hours thereafter. The oil capacity of the gearbox is approximately 1.5 litres.

7.3. Pump, Pipework and Filter

The pesticide pump used on both the sprayer is a centrifugal pump magnetically coupled to an electric motor. As the pump has a magnetic coupling there is no shaft seal to wear or leak. The pump contains no user serviceable parts and should be replaced as a complete assembly.

All hoses have a PTFE lining with a braided stainless steel outer covering and crimped end fittings. Hoses cannot be repaired if they are damaged and must be replaced with the appropriate Micronair spare parts.

There is a 50 mesh filter in the pesticide pipe between the tank and the pump. This should be checked and cleaned after the first month (or 20 hours) use of the sprayer and then every three months or after each 50 hours of operation, whichever occurs first. The procedure to clean the filter is as follows:

1. CLOSE the **Filter Isolating** valve (2 in Fig. 1).
2. Place a shallow container with at least 0.5 l capacity under the bowl of the filter.
3. Unscrew the filter bowl and remove the filter screen.
4. Clean the filter screen and inside the inside of the filter bowl
5. Fit the screen inside the bowl and screw them back onto the filter body. Do not over-tighten the thread.
6. OPEN the **Filter Isolating** valve.

IMPORTANT: Wear gloves and eye protection when working on the pump, filter or pipework. Re-use any clean pesticide drained from the system and dispose of any contaminated residues, cleaning cloths etc safely.

7.4. Atomiser

See Micronair AU8120 Atomiser Handbook for full maintenance instructions.

8. CONVERSION FACTORS

1 yard	= 3 feet	= 0.91 metre
1 metre	= 39.37 inches	= 1.09 yards
1 statute mile	= 0.87 nautical mile	= 1.61 kilometres
1 nautical mile	= 1.15 statute mile	= 1.85 kilometres
1 kilometre	= 0.62 statute mile	= 0.54 nautical mile
1 statute mile	= 1760 yards	= 5280 feet
1 nautical mile	= 2027 yards	= 6081 feet
1 kilometre	= 1094 yards	= 3282 feet
1 metre/sec	= 2.237 miles per hr	= 196.9 ft/min
1 acre	= 43560 sq feet	= 4840 sq yards
1 acre	= 4047 sq metres	= 0.40 hectare
1 hectare	= 107600 sq feet	= 11955 sq yards
1 hectare	= 10000 sq metres	= 2.47 acres
1 sq mile	= 640 acres	= 259 hectares
1 sq kilometre	= 247 acres	= 100 hectares
1 US gal	= 0.83 Imp gal	= 3.78 litres
1 Imp gal	= 1.20 US gals	= 4.54 litres
1 litre	= 0.26 US gal	= 0.22 Imp gal
1 US pint	= 16 US fl ounces	= 0.47 litres
1 Imp pint	= 20 Imp fl ounces	= 0.57 litre
1 US gal/acre	= 8 US pint/acre	= 9.45 litres/hectare
1 Imp gal/acre	= 8 Imp pints/acre	= 11.35 litres/hectare
1 litre/hectare	= 0.11 US gal/acre	= 0.081 Imp gal/acre
1 pound	= 16 ounces	= 0.45 kilogram
1 kilogram	= 2.20 pounds	= 35.3 ounces
1 ounce	= 28.35 grams	
1 pound/sq inch	= 0.068 atmosphere	= 0.067 bar
1 atmosphere	= 14.70 pounds/sq in	= 1.01 bar
1 bar	= 14.50 pounds/sq in	= 0.98 atmosphere
1 kilopascal	= 0.01 bar	= 0.145 pounds/sq in

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Every care has been taken in the design of this equipment and the preparation of this Handbook. However, Micron Sprayers Limited cannot accept responsibility for errors or the consequences thereof. The user must satisfy himself that the equipment is suited to his needs, is performing according to his requirements and that all statutory requirements and regulations are being complied with.