MICRONAIR AERIAL SPRAY EQUIPMENT FOR ENVIRONMENTAL HEALTH
CONTROLLED DROPLET APPLICATION USING ROTARY ATOMISERS
Controlled Droplet Application (CDA)

- Rotary atomisers produce the narrow, controlled spectrum of spray droplet sizes necessary for the effective application of insecticides and larvicides used in environmental health (EH) spraying
- The droplet size is adjusted by varying the rotational speed of the atomiser
Production of Spray Droplets

Flat fan pressure nozzle

Rotary atomiser
Comparison of Spray Droplets

From standard nozzle

From Micronair Atomiser
Droplet Size & Number

- The volume of a spray droplet is proportional to the cube of its diameter.
- Halving the diameter produces 8x the number of droplets from the same amount of spray liquid.
- Large droplets will settle quickly.
EQUIPMENT
Micronair Atomisers for EH Spraying

AU4000
• Designed specifically for continuous use at high speeds to produce small droplets

AU5000
• Widely used on agricultural aircraft & helicopters
• Can be used when a dedicated EH spray aircraft is not available

AU6539
• Electrically driven atomiser for use on helicopters
AU4000 Atomiser

- Wind driven
- Narrow droplet spectrum
- Variable pitch blades to control rotational speed & droplet size
- Designed for continuous operation at high speed
- Electric brake to stop atomiser when not in use
AU4000 Atomisers
Mosquito Control in Turkey
AU5000 Atomiser

- Wind driven
- Narrow droplet spectrum
- Variable pitch blades to control rotational speed & droplet size
- Mounted on standard booms
- Can be used on helicopters
AU5000 Atomisers
Fly Control in Australia
AU5000 Atomisers
Mosquito Control in Gulf Region
AU6539 Electric Atomiser

- Driven by DC electric motor
- Speed and droplet size adjustable by controller in cockpit
- Narrow droplet spectrum independent of airspeed
- Mounted on standard spray booms
Spray Pod System

- Used on high-wing utility aircraft (e.g., BN-2 Islander)
- Completely self-contained
- Capacity of each pod 50 USG (190 l)
- Fitted with AU4000 atomiser
- Control panel in cockpit
Spray Pod Control Panel
Diaphragm Check Valve

- Prevents leakage of spray liquid when atomiser is not operating
- Opens when control valve is opened and pressure in boom increases
- Installed on atomiser
Variable Restrictor Unit (VRU)

- One VRU used with each atomiser
- Regulates flow rate to atomiser
- Installed on spray boom
- Adjusted on ground
Variable Restrictor Plates

- Fixed restrictor plate drilled with 7 different size holes
- Rotating selector plate exposes one hole in restrictor plate
- Selector plate rotated by knob on VRU
Application Monitor

• Measures flow rate of spray liquid from aircraft with turbine in pipe to booms
• Displays flow and application data
• Measures atomiser rotational speed
• Installed in cockpit
Application Monitor Functions

- Flow rate from aircraft (Litres/Minute)
- Volume sprayed (Litres)
- Application Rate (Litres/Hectare)
- Area sprayed (Hectares)
- Spray time (Minutes : Seconds)
- Work rate (Hectares/Minute)
- Atomiser RPM
Atomiser RPM Indicator

• Measures speed of each atomiser (max 10 units)
• Allows all atomisers to be adjusted to rotate at same speed
• Magnetic transducer installed on each atomiser
Application Printer

- Prints data from application monitor
- Provides permanent record of each spray job
- Installed in cockpit of aircraft
CALIBRATION
Adjustment of Droplet Size

- Droplet size is determined by rotational speed (RPM) of atomiser
- Increasing RPM reduces droplet size
- RPM is controlled by atomiser fan blade angle

![Graph showing the relationship between atomiser RPM and droplet diameter.](image-url)
Adjustment of Atomiser RPM

- Atomiser fan blades must be adjusted on ground before flight.
- Reducing blade angle increases atomiser RPM and produces smaller droplets.
- Atomisers must not exceed 10,000 RPM continuous speed.
Variation in Atomiser RPM

- Some atomisers can rotate faster than others because of:
  - Effect of propeller
  - Effect of fuselage
- RPM indicator can assist adjustment of all atomisers to rotate at correct speed

![RPM Indicator Chart]

ATOMISER NUMBER

RPM

1 2 3 4 5 6 7 8 9 10
Coverage of Aircraft

The coverage of an aircraft whilst spraying depends upon:

- Track Spacing
- Ground Speed

\[
\text{COVERAGE (Ha/Min)} = \frac{\text{TRACK SPACING (m)} \times \text{SPEED (Km/Hr)}}{600}
\]

**Example:**

\[
\begin{align*}
\text{Track} &= 50 \text{ m} \\
\text{Speed} &= 160 \text{ Km/Hr} \\
\text{COVERAGE} &= \frac{50 \times 160}{600} \\
&= 13.3 \text{ Ha/Min}
\end{align*}
\]
Output from Aircraft

• Output from aircraft depends upon:
  – Coverage of aircraft (Ha/Min)
  – Required application Rate (L/Ha)

• Output is set by adjusting VRUs and boom pressure

OUTPUT FROM AIRCRAFT (L/Min) = COVERAGE (Ha/Min) x APP RATE (L/Ha)

Example:

Coverage = 13.33 Ha/Min
Application Rate = 5 L/Ha

OUTPUT FROM A/C = 13.33 x 5 = 66.7 L/Min
Adjustment of VRUs

- VRUs must be adjusted to give correct output from each atomiser
- VRUs have setting numbers 1, 3, 5 … 13
- Higher numbers give higher outputs
- All VRUs should be set to the same number

OUTPUT FROM EACH VRU (L/Min) = \[
\text{OUTPUT FROM AIRCRAFT (L/Min)} \div \text{NUMBER OF ATOMISERS}
\]

Example:

Output from a/c = 66.7 L/Min
Number of atomisers = 10

\[
\text{OUTPUT FROM VRU} = \frac{66.7}{10} = 6.67 \text{ L/Min}
\]
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