Figure 2. Aerial application equipment for dry materials (a) design of a spreader with agitator; (b) illustration of spreader mounted below fuselage of a Thrush ag-plane.

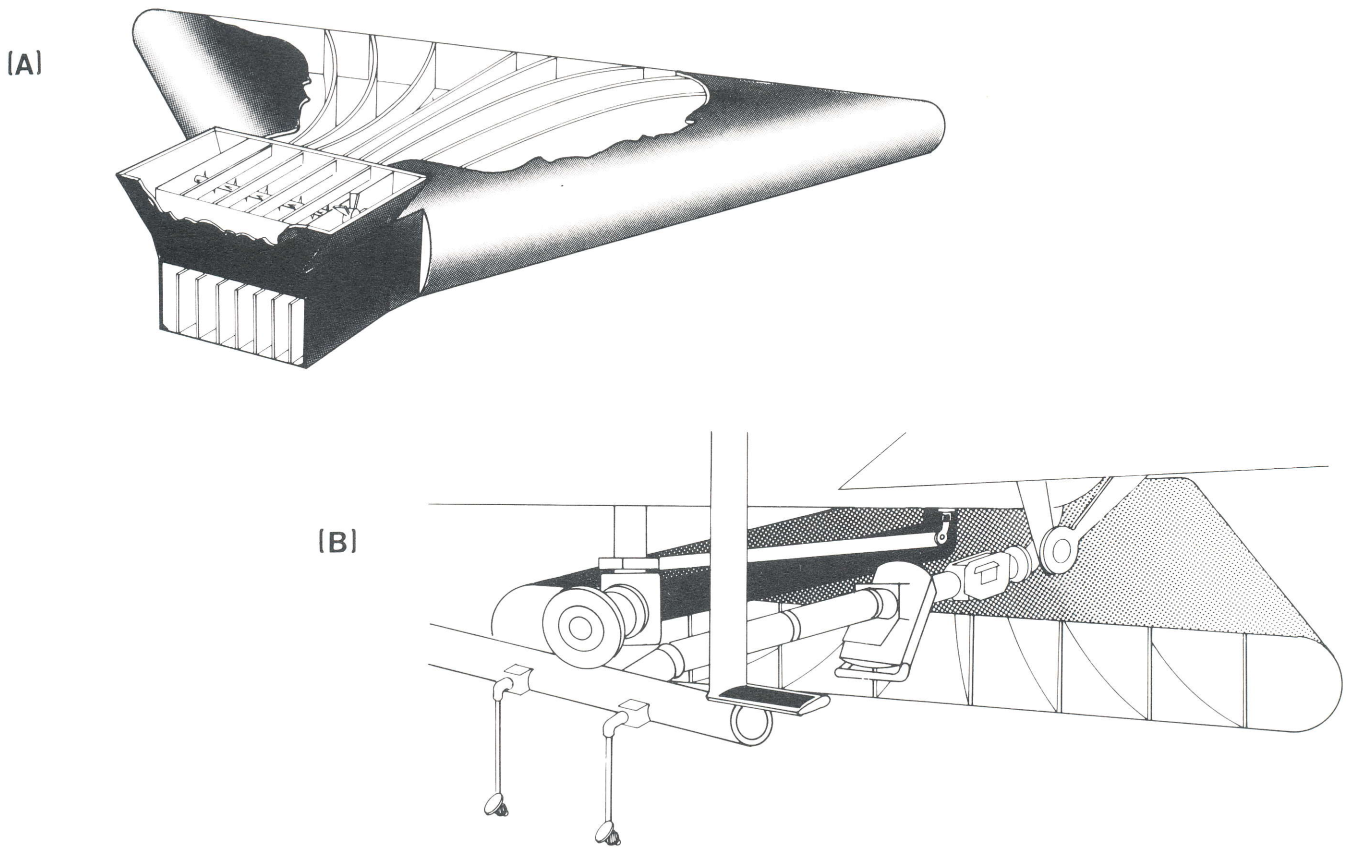
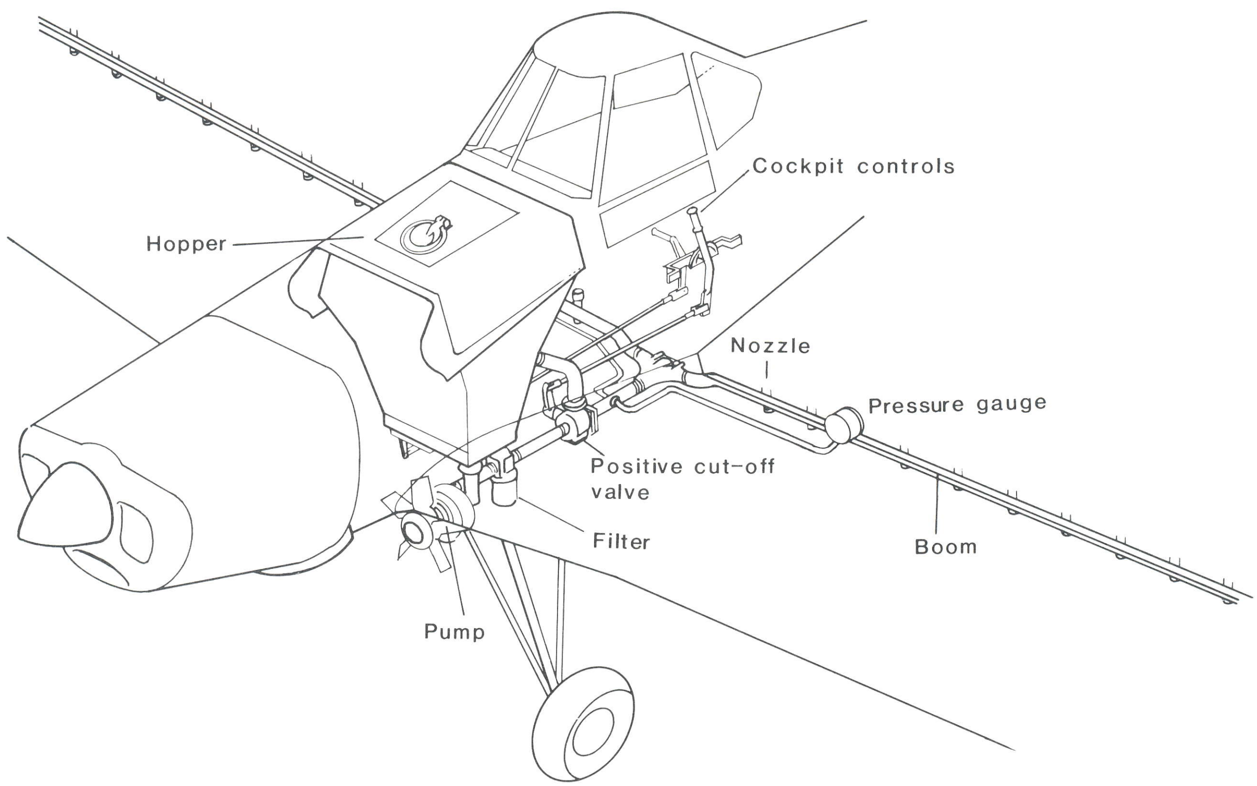


Figure 3. The various components of a liquid dispersal system on a Piper Brave ag-plane



ing apm when swath width and speed are known.

2. Calculate the gpm required. In the example, gpm = gpa × apm, or gpm = 3 × 10 = 30.

3. Select nozzles based on the gpm per nozzle specified by the manufacturer. The number of nozzles on the boom can be variable, but assume 30 nozzles for this example:

$$\text{gpm per nozzle} = \frac{\text{gpm desired (30)}}{\text{number of nozzles (30)}} = 1.0$$

Use the manufacturer's catalog to select a nozzle that is rated closest to 1.0 gpm at a pressure of 40 psi. Minor differences in output can be accommodated by slight pressure adjustments.

4. Make a trial run to check the system. Fill the tank to a known level. Fly the aircraft at 100 mph for 60 seconds, land, and measure the amount of water needed to fill the tank to the previous level. Then,

$$\frac{\text{gallons used}}{\text{acres treated}} = \text{gpa sprayed}$$

The amount actually sprayed should be close to the calculated value. Make adjustments by varying pressure or air speed as needed.

5. Calculate the amount of chemical needed per tank. At 1 lb/A as a recommended rate, 100 acres x 1 = 100 lb of chemical. If the recommendation is given in pints, simply multiply 100 acres x the pint per acre recommendation to give the amount of chemical needed per tank.

Calibration for Solids

Give as much attention to calibrating equipment for dispensing solids as for liquids. The type of spreader, type of granular or other solid material, the rate per acre, and the amount of swath overlap will all affect the calibration accuracy. If one condition changes, the calibration procedure will have to be repeated to ensure accuracy.

Use the following procedure to determine and check equipment calibration:

1. Screen granules before putting them into the hopper.

2. Check the distribution pattern over the entire width of the application.

3. Determine the effective swath based on the distribution pattern, recognizing that overlap will be required to give uniform distribution — 50 percent overlap is common.

The distribution pattern can be determined only by setting out pans across a line of flight. The pans should be at least 4 inches deep with an inside area of about 1 square foot. Place them at 2-foot intervals for 20 feet on each side of the swath centerline and at 5-foot intervals for an additional 30 feet on each side (Figure 18). This procedure should be done on flat ground for a total distance that exceeds the expected swath width.

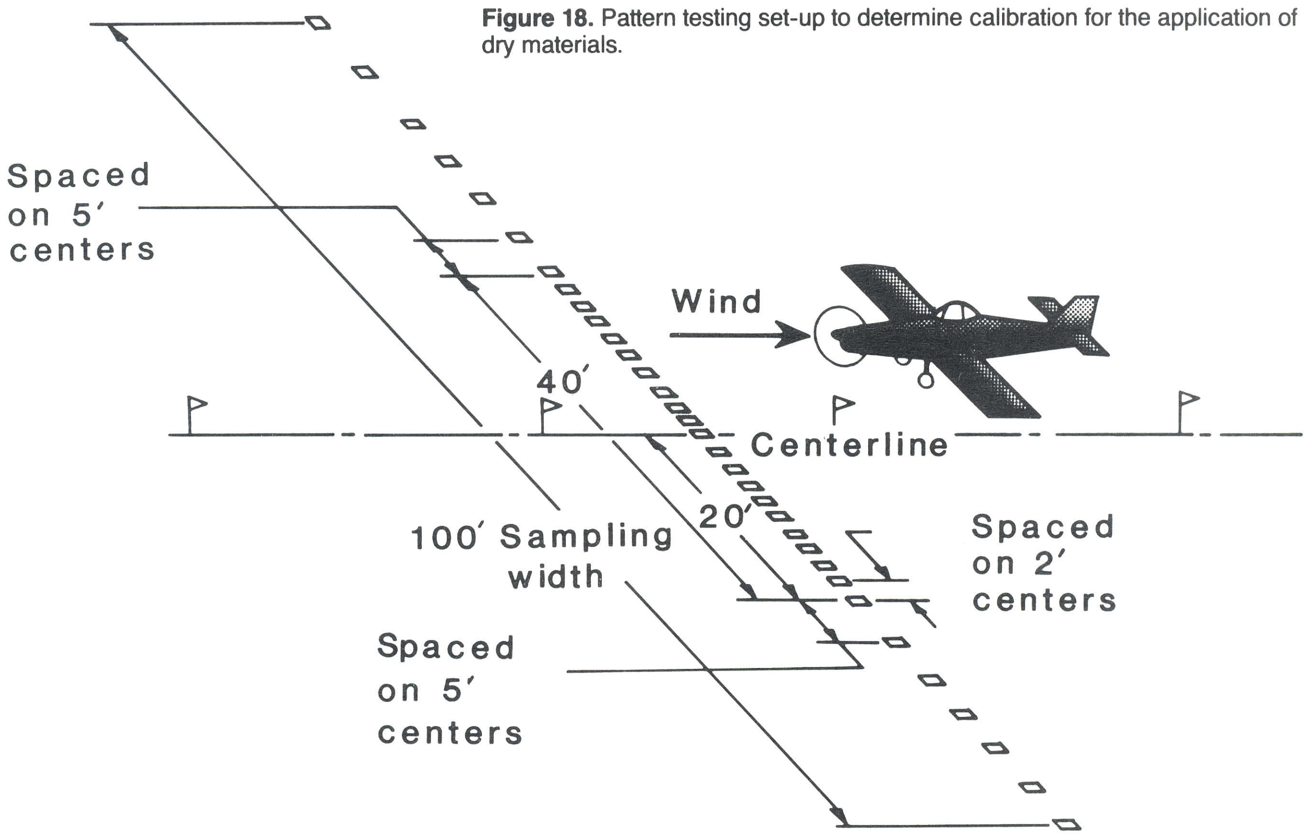


Figure 18. Pattern testing set-up to determine calibration for the application of dry materials.

APPLICATION PROCEDURES

The pilot is the key to successful aerial application because the pilot must decide when and when not to spray, what and what not to spray, and how to spray. Knowledge of all aspects of aerial application is essential to making proper judgements. Equipment should be in good working order and accurately calibrated with a nozzle configuration that provides uniform coverage. Use only the amount of pesticide recommended on the product label and avoid unnecessary exposure to the chemical. Avoid sensitive areas enroute to the spray site. Apply chemicals uniformly and take care to minimize drift. Avoid obstructions while spraying and always consider the location of nearby homes so that lives and property are not threatened nor needlessly antagonized. Spray only when climatic conditions are appropriate. Remember, all of these factors must be evaluated for each job to prevent serious or fatal accidents.

Airstrip Operation Prior to Application

A well organized airstrip will ensure that the aircraft spends the minimum amount of time on the ground and the maximum time spraying (Figure 19). The layout of the airstrip will vary but it must ensure that fuel and pesticide are kept well apart and that both of these potentially hazardous materials are protected from sunlight and other environmental extremes. All ground work should be done on a seamless cement pad constructed so that any accidental spills can be contained, properly recovered and discarded.

Loading the aircraft should be carried out via a closed system from a mixing tank. All ground crews, as well as pilots, should wear appropriate protective clothing to prevent exposure to any chemical(s) being handled. All personnel involved should be trained to carry out emergency procedures in case of an accident.

The aircraft payload may need to be reduced from the manufacturer's maximum specification to compensate for airstrip conditions or the effect of atmospheric conditions on engine performance. Only a mechanically sound aircraft should take-off from an airstrip, and the pilot should be wearing the correct and functional safety equipment for in-flight protection.

Field Operations—Application Methods

The normal procedure is to fly back and forth across the area being treated in straight, parallel lines. In areas too rugged or steep for the pilot to hold a uniform altitude and speed in both directions, the flight lines should follow the contours of the slopes. In mountainous terrain, it may be necessary to make all treatments downslope. Upslope treatments are extremely dangerous—attempt them with extreme caution only. Whenever possible, make the flight lines or swaths crosswind—to assist in overlap and coverage uniformity, and lengthwise to the area—to reduce the number of turnarounds. Begin treatments on the downwind side of the areas so that you can make each successive swath without flying through chemicals suspended in the air from previous swaths. To ensure uniform coverage and to avoid excessive overlap or stripping of the area, mark each swath to guide the pilot.

A race track pattern may be more energy efficient for small fields or more appropriate in situations where it allows the aircraft to avoid sensitive areas.