

OPERATIONAL SECTION

THE PIPER "PAWNEE" 235 AIRCRAFT WITH ADAPTATIONS FOR PRECISION MOSQUITO ABATEMENT SPRAYING

GORDON F. SMITH,¹ AND ROBERT E. PORTER²

In June 1962 the East Side Mosquito Abatement District purchased a Piper PA 25-235 hp aircraft (Fig. 1). This plane has been operated through two seasons, and has sprayed 92,143 acres.

The aircraft has been highly satisfactory for this operation. Normal speeds are 100 mph for ferrying and 95 mph for spraying. Flying is done at 75 percent power and fuel consumption varies from

13 to 14 gallons per hour depending on the load. Oil consumption is minimal. The plane has excellent flight characteristics. It has good stability and is responsive to light control pressures.

It has ample engine power to take off easily from the District's 1500-foot strip with a full load even when the temperature is in the high 90's. At cruising speed, with 75 percent throttle, there is adequate power



FIG. 1.—Pawnee 235 equipped for spraying.

¹ Manager, East Side Mosquito Abatement District, Modesto, California.

² Pilot, A&E East Side Mosquito Abatement District, Modesto, California.

for emergencies. Maintenance requirements have been minimal. The engine has an excellent muffling system and the noise level is very low, which is an advan-

tage when flying over livestock in farm fields.

The plane was purchased with standard spray equipment already installed. However, a number of modifications have been made on the plane itself for ease of main-

tenance and on the spray equipment for ease of loading and greater precision of application.

The major fault found with the plane was the number of machine screws used to fasten the cowling and the side panelling. Time consumed in removing these parts for routine maintenance and repair was unnecessarily long. The machine screws in the top half of the engine cowling and side panelling have been replaced with Dzus fasteners for quick and easy removal.

For ease of loading spray material, a bottom loading unit (Fig. 2) was installed. This equipment, now optionally available from the factory, consists of piping from the bottom of the tank to a port and quick coupling near the lower edge of the fuselage aft of the left wing root. This device speeds loading of the spray tanks materially, practically eliminates contact of the loader with insecticide and greatly reduces the problem of foaming when using emulsifiable concentrate.

An electrically operated spray valve available from Agavenco, Santa Clara, California, has been installed (Fig. 3). This valve is motor-driven with two control buttons in a pistol grip on the control stick. The use of this valve eliminates the necessity of moving the left hand back and forth between the throttle and spray valve control at the critical periods of drop-in and lift-off while spraying. The left hand can be on the throttle at all times and the spray valve is opened and closed simply by pushing the respective buttons.

A 24-hour dial aircraft clock has been mounted on the instrument panel. On this dial there are 4 small dials and a sweep second hand. One of the small dials and the sweep second hand together constitute a stop watch showing seconds and minutes to sixty minutes. Another hand dial is the second hand for the clock; the third is a button-actuated elapsed time indicator, in minutes to 24 hours; and the fourth dial shows the day of the month.

The aircraft spray record form has a place for entering the time the pilot sprayed a field, and the time taken to

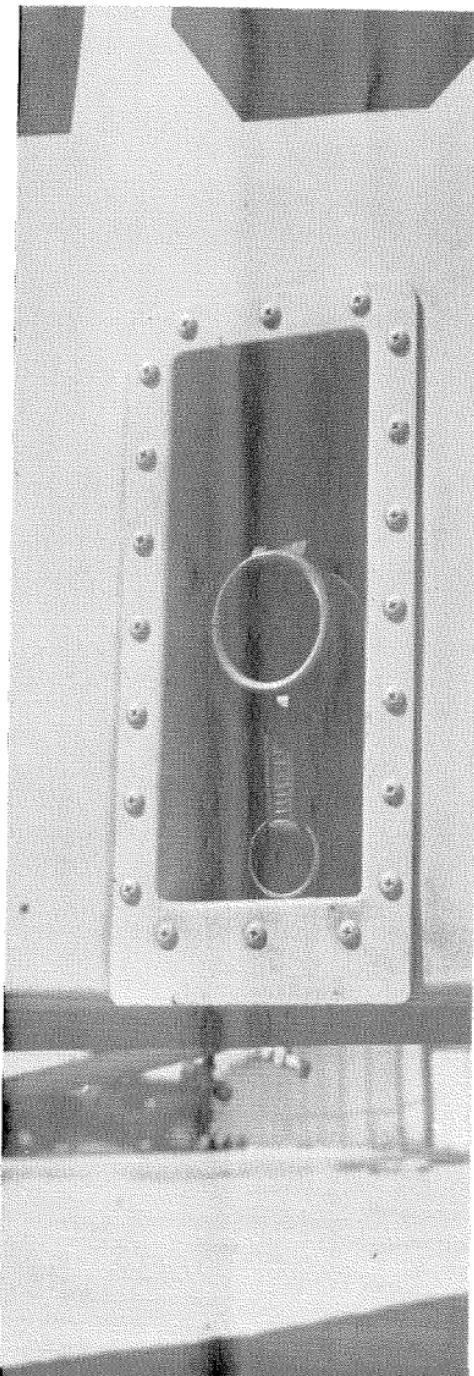


FIG. 2.—Bottom loading unit.

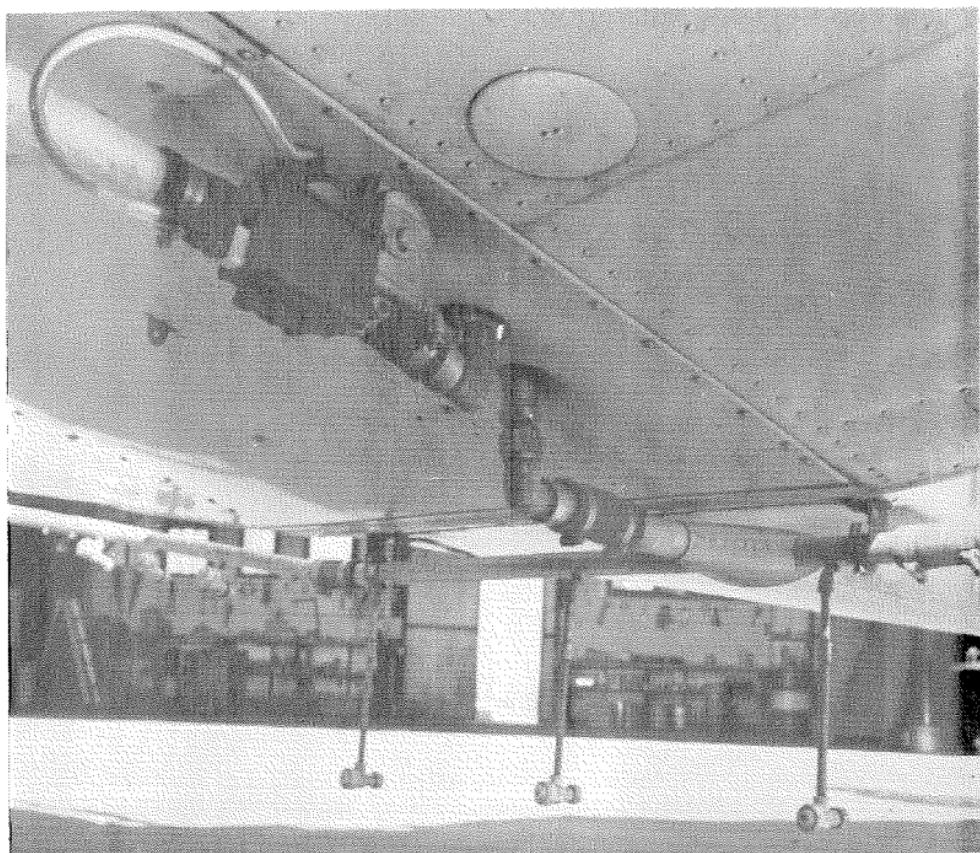


FIG. 3.—Electrically operated spray valve mounted on under side of wing.

spray the field. The elapsed time dial is used to register total flight time for entry in the aircraft log book. The stop watch combination is used to obtain the time taken to spray each field, and is reset to zero after the entry has been made on the form, and before treating the next field.

On the floor of the cockpit to the left of the seat is mounted a flow meter and flow control valve. This unit has two functions:

1. In conjunction with the stop watch, it is possible to control the rate of flow of the insecticide with a high degree of accuracy, thus keeping the spray unit in precise calibration for the desired gallonage per acre. Knowing the swath width, the speed of flight, and the number of gallons applied per minute, the precise rate of application per acre can be cal-

culated. This entire calibration procedure can be carried out in the air without landing for adjustment of the master spray valve. When a field of regular shape and known acreage is flown, use of the meter permits a convenient check of calibration to be made.

2. The equipment is maintained in accurate calibration so that the area of fields of unknown size or irregular shape can be computed from the meter reading, thus providing the data for entry on the airspray records in the columns for "gallons applied" and "acres sprayed."

Since the District applies spray material at only one gallon per acre, and more than ninety percent of the acreage flown is irrigated pasture land, it is essential to have the highest possible degree of precision in the spray operations.