FOR ONLY $250,000
Converting a Mallard

By BOB WELLS

ANGWIN — Convert your Grumman Mallard from piston to turbo engines? Certainly, step right this way. Only $250,000.

J. Fred Frakes and his son Joe, operators of Frakes Aviation Inc. at the Angwin Airport, are doing this type of speciality job and eventually are likely to convert most of the Mallards still flying during the next several years.

It is not like changing wheels on your car, but a highly technical process which had to gain engineering and performance approval from aviation authorities.

The Mallard is a two-engine amphibian put out in post-war years by Grumman, a highly respected firm which built a large share of Navy aircraft for many years.

Only 59 were constructed. Of these, there are about 34 in the United States, maybe 10 in Canada, and the rest serving at places such as Africa, the Amazon, and other remote spots.

Why change to turbos at such a price? Well, when the Mallard was new it had R-1340 Pratt and Whitney radial engines, nine cylinders and putting out about 600 h.p.

—Staff Photo by Jeff Lee

MALLARDS PICK UP NEW ZIP WITH TURBO
J. Fred Frakes and Son, Joe, Operate Frakes Aviation

First and Last

This, by the way, was the "first and the last" piston engine made by the firm, serving all branches of the armed forces and civil aviation.

But when an engine is no longer manufactured, parts are tough to get and overhauls can be repeated only so often on an economic basis.

Turbines, driving props, are more efficient.

When a Mallard is converted at the Frakes hangar, it becomes a Frakes Turbo-Mallard. The engines are designed and produced in Canada by an offshoot of Pratt and Whitney, or United Aircraft which is the parent company turning out Sikorsky helicopters, Hamilton propellers and many other items.

With the conversion, the ship gains about 35 miles an hour crusing speed, making 215 m.p.h. or 185 knots. At that, it runs at power settings 10 to 12 per cent above the piston job.

Turbines operate best at high power settings; pistons, at lower levels where the mixture can be leaned out.

Fuel for the turbine is JP-1, JP-4, or JP-5. It can operate on gasoline for about five per cent of engine life.

In corporate use, the turbine can go 2,500 hours without overhaul. Under commuter (frequent) use, it can go 5,500 hours with inspection of the "burner cans" or "hot section."

Economy

Another limitation is five years without overhaul, and here is the basis of the economy in a $250,000 job. No airplane is any good sitting on the ground, and maintenance work is very costly.

Hence any engine that runs that long is a money-saver. Fuel is cheaper per gallon, too.

When the turbo engine is put on, the engine center-line is one degree positive (up) from the angle of incidence in the wing.

With the old R-1340, the positive angle was four per cent. By lowering the turbo three degrees, the same "feel" is retained in the ship's flying style.

The piston engine's 600 h.p. is topped considerably by the 680 shaft horsepower of the turbo. And about 35 more h.p. is gained from jet affect of the exhaust.

Under conversion, the propeller line is 8½ inches above what is used to be, and 5½ inches forward. All this took some doing by the Frakes men and their crew, who make the special cowlings right in the shop.

The turbos are reverse-flow engines, to reduce danger of ingesting birds or other objects, and the Frakes team developed a special system of doors that alter the flow to avoid icing in the engine.

This door and linkage system was looked over by Pratt and Whitney people and pronounced sound—a point of great pride to Paul Frakes.

Takeoff r.p.m. of the turbo engine is up to 36,000, with the prop whirling at 2,200. At cruise, the prop goes 1,800 to 2,000.

Reversible Props

A great advantage when maneuvering on the water is that the props can be reversed, as they can when landing on a runway. Reversible props means the plane can be backed up, even into the wind, and maneuvered handily to or from docks.

With the old piston engines, they had a positive thrust at all times and the pilot had to allow for it — if he could.

The turbos have a minor difficulty. When the engines stop the blades are in full feather, meaning when they start again they have to go through a high blade angle before they can come back to low angle and hence less pull.

Special "locking hubs" are available for the finicky to avoid this.

Turbo conversions qualify under all the regulations for reaching single-engine control speeds for takeoff and for short landing roll.

Frakes Aviation expects to do about 20 conversions in the next few years, perhaps more.

One of the Mallards is shown in the photos. Two others are a ship belonging to Nordair, at Montreal, Canada, and another owned by Boyne Mountain Lodge in Michigan.

The latter, Mr. Frakes said, has crossed the Atlantic several times and carried the Shah of Iran among other personages.

At that time in its career it was owned by the late Christian Dior, the designer, and decorated as one might expect. Joe Frakes commented: "You just wouldn't believe it."

10 Passengers

The Mallard carries 10 passengers, pilot and co-pilot, but a passenger can ride in the co-pilot seat on some occasions. One person can handle the plane all right, but another pilot is a safety measure.

The right hand seat has all the controls, except for brakes worked by the rudder pedals.

Paul Frakes has worked out another innovation for the planes, to step up the fuel capacity by building in tanks.

Small slots are cut into the wings, in front of the main spar, and fiberglas panels are fitted in, something like "building a ship in a bottle" as old sailors do.

When the end pieces and some other components are in place, a final rolled segment, with glue on the edges, is put into place to hold everything together.

An air blast is put into the tank and the parts are forced together so the glue can set and make a tight fit. This type tank fits snugly so there is no "working" or vibration.

This process also has the approval of aviation authorities.