Rover's 90 h.p. Turboprop

THE CURRIE WOT AS TEST-BED: PRODUCTION PROSPECTS

By MARK LAMBERT

TWO years ago I flew and wrote about the Currie Wot, built by the Hampshire Aeroplane Club at Eastleigh. It was a curious pre-war biplane ultra-light which was great fun to fly; and it was also at that time well started on a pretty variegated life story. It first flew with a little JAP engine; then it was fitted with a 65 h.p. Walter Mikron which gave it pretty hot performance—and it was called the "Hot Wot." Next it was equipped with floats—and became the "Wet Wot," for a while. After that, Hampshire cast their eye on the Rover gas turbine, which has run for years in a car, but is only produced in numbers for industrial applications and aircraft APUs (for the Vulcan B.2 and Argosy). Rover Gas Turbines Ltd took up the challenge, fitted a propeller to one of their S.60 turbines and installed it in the Wot. So now we have the "Turbo Wot," more powerful than ever, but just as pleasant to fly, and probably the smoothest, quietest light aircraft anywhere.

The Rover turboprop, giving 70 h.p. at take-off, makes just a little high-pitched whistle and a busy rushing noise; and the two-blade propeller, turning at 2,325 r.p.m. at cruising power, hums like a contented bee. Starting is completely automatic, using the aircraft's own 12V battery, and j.p.t. is automatically held within the limit. The throttle can be slammed open or the whole engine switched off and relit in the air with impunity. It can run inverted for 15sec, so the Turbo Wot is still very aerobatic.

Now, Rover plan a more powerful turboprop, the T.P./90.1 which will give 120 h.p. for 5min and 90 h.p. continuously, putting it right in the bracket of the present range of 100-130 h.p. piston engines. The great question, which Rover are asking themselves with some trepidation, is whether there is a market for this power unit to warrant serious production.

Although the hard commercial figures do not seem to give the T.P./90.1 a clear-cut advantage over competing piston engines, it has some very great attractions as an alternative powerplant for such aircraft as the older (and noisier) Austers, Morane Rallyes, Jodel Ambassadeurs, Piper Colts, Cessna 150s and even Piper Caribbeans. Most important attraction of all, it is smoother and quieter than any piston engine could be. Even in the open cockpit of the Currie Wot there is little more than wind noise to be heard at full power. There is only the faintest vibration. Engine management is no problem, except for rather slow throttle response which will be eliminated in later engine controls.

Replacing the normal Cirrus engine, the T.P./90.1 could make an Auster a really smooth, pleasant aircraft to fly in. In fact, Hampshire Aeroplane Club feel that the initial market for a considerable number of Rover turboprops would be in Austers.

Another attractive feature is low maintenance requirements and very long overhaul life, for which the APU experience provides a firm foundation. Already the industrial engines run for 1,000hr between overhauls and several engines have run beyond 3,000hr. One was stripped after no less than 3,600hr and was found to have an accretion of fish meal—such was its environment—on the compressor vanes. It had lost power slightly, but otherwise required only new gaskets, O-rings and standard balance checking. After initial probationary trials at 300hr life in aircraft, there is no reason why the T.P./90.1 should not also go rapidly to 1,000hr.

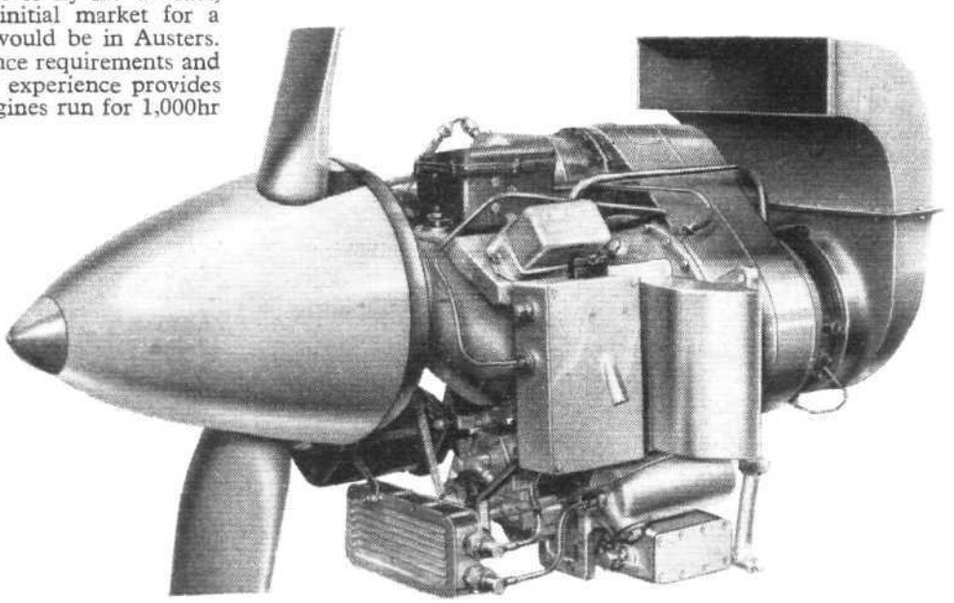
Complete with electrics, oil cooler, pipes, nose cowling, spinner, propeller, throttle controls and instruments, the Rover engine weighs 250lb. A 100 h.p. Continental in the same condition might weigh approximately 350lb. The price for the installation, with propeller, might be in the region of £1,500 to £1,600 at first—a good deal more expensive than the Continental. Power:weight ratio is 0.383 h.p./lb and s.f.c. is given as 1.38lb/b.h.p./hr. It took a matter of days to fit the smaller T.P./70 into the Currie Wot and Hampshire feel they could transfer it to an Auster in about the same time. There are virtually no connections to make—fuel lines to tank and throttle, r.p.m. and j.p.t. gauge leads, starter switch and battery leads. The jet pipe can be rotated to vent beside or beneath the fuselage, or be bifurcated. Residual thrust is a barely measurable 5lb. Lateral intakes can virtually be cut out of existing cowlings. The oil cooler intake forms part of the nose cowling and a very small cooling flow is needed for the car-type 19A, belt-driven generator. The starter is also a car unit modified for opposite rotation, a different drive shaft and connections of flame-proof solder. The Currie Wot has no fuel cock.

Standard output speed of industrial units is 3,000 r.p.m. or 3,600 r.p.m. For the Currie Wot 3,000 r.p.m. was felt to be a bit too high and an extra reduction stage to 2,440 r.p.m. was fitted. But the standard final reduction pinion could be enlarged to give 2,580 r.p.m., which tests so far indicate to be quite satisfactory from the point of view of noise. Some 30lb of gear weight could thereby be saved.

The differences between the 70 h.p. unit in the Wot and the T.P./90.1 are that the latter has Nimonic 105 turbine parts, larger compressor diffuser nozzle and larger turbine throat area giving a somewhat higher mass flow. The new metal allows either higher peak temperatures at the same life or longer life at the same temperatures. It would also have a new hydraulic propeller.

A significant factor is that 75 per cent power for a 130 h.p. piston engine is 97 h.p. and the Rover engine offers a continuous rating of 90 h.p., with 120 h.p. for take-off. The Rover therefore could quite reasonably cope with a Piper Caribbean, although endurance would be somewhat reduced because of higher fuel consumption. The normal optional extra tank of the Caribbean would go some way towards reducing the range penalty. The fuel itself would also be very much cheaper. The engine can indeed accept either kerosine or diesel fuel without any adjustment; and the standard petrol company delivery services would provide fuel anywhere in the country.

I flew the Currie Wot with the 70 h.p. engine twice during a recent visit to Eastleigh and was greatly impressed by the engine. From the pilot's point of view it had several advantages which made it a nicer engine to manage than any reciprocating type.



The Rover T.P./90.1 turboprop for light aircraft. It gives 90 h.p. continuous and 120 h.p. for take-off and weighs approximately 100lb less, with propeller, accessories and fittings, than does a Continental 100 h.p. piston engine. The example shown is a pusher with the jet pipe venting above the engine

"Flight" photograph

The little 70 h.p. Rover turboprop installed in the Currie Wot, flying past "Flight's" photographer at Eastleigh. The main air intakes are beside the cowling, the oil-cooler being located beneath the large spinner