Proteus Icing Trials

The engine division of the Bristol Aeroplane Company have been carrying out extended trials of the Proteus turboprop with an Ambassador test-bed, and we can now present photographs showing a particular series of icing trials in which airborne television has been used to good effect. The whole programme was conducted in connection with the Britannia C. of A., and showed the Proteus to be completely immune from icing.

In order to obviate protracted searches for icing conditions, artificial icing was induced by a water-sprayed grid mounted in front of the port engine, as shown in one of the photographs. Water was supplied from a 135-gal tank in the rear of the aircraft and pumped to the grid, whence it issued from 37 nozzles directed at the spinner and intake. Details of the Proteus ice protection were given in our Britannia description on August 12th. Hot gas is extracted from the turbine section and directed at the spinner and intake. Details of the Proteus craft and pumped to the grid, whence it issued from 37 nozzles fixed external portions of the cowling. A hot-air bleed from the starboard engine was carried round to provide ice protection for the spray grid itself.

The maximum flow from the grid was about 500 lb per hour. Before actual testing began, the effect of the spraying installation on the behaviour of the aircraft was examined, both in normal flight and with one engine inoperative, and the drag was found to be negligible. Another pre-series of tests was conducted with dye-impregnated water to ensure that the droplets were finding their way into and around the engine. It was naturally desired to obtain a pictorial record of ice formation on the interior of the engine. Had a normal cine camera been employed, the programme would have resolved itself into a tedious step-by-step analysis occupying many months, the film recording each stage of the tests having to be processed and examined before proceeding further. By employing TV the whole programme was completed in 20 hours of flying—roughly a tenth of the amount which would otherwise have been needed.

A small fan-cooled Pye camera was flexibly mounted inside the port Proteus and focused on the compressor entry guide vane. It is a remarkable fact that the entire programme was completed without the cathode ray tube of the camera having to be replaced—a testimony to the vibration-free environment and to the durability of the camera. Pictures were relayed to a 14in screen inside the aircraft. It is also worth noting that the camera signal could have been broadcast to the ground below, so that the division's chief engineer, Dr. S. G. Hooker, could have watched the ice formation from the comfort of his office.

Inside the Ambassador the flight test crew were able to obtain a clear picture of the actual build-up of ice at the compressor entry. With the anti-icing inoperative, the camera revealed deposits building up in various forms, the accumulation sometimes forming pieces 3in wide and 31in long. At intervals the deposits would break off and pass through the engine. Years ago this would have been likely to cause damage to the Proteus, but the substitution of steel for light-alloy blades throughout the compressor has rendered the passage of even steel bolts relatively harmless.

At no time did the behaviour of the Proteus give the slightest cause for anxiety and the engine was accelerated and decelerated satisfactorily under these conditions. In the most severe cases, with the anti-icing switched off, ice accretion on the entry guide vanes caused a loss of only 3 per cent power after about 17 min, and the severest deposits were always disposed of a few seconds after the de-icing was switched on. Flying took place at from 10,000 to 30,000ft and temperatures as low as minus 44 deg C were encountered. Testing was carried out at various airspeeds and with the port engine at all powers, including maximum compressor r.p.m. and zero r.p.m. with the airscrew feathered.

Further anti-icing trials are now being carried out with another Proteus powerplant embodying a number of production refinements. In particular, the latter engine can utilize a greater supply of heat for affording ice protection in the region of the entry guide vanes.

Blackburn Interest in Jowett Factory

It is learned that Blackburn and General Aircraft, Ltd., are expected next week to make a firm offer to acquire the whole of the issued share capital of Jowett Cars, Ltd., of Batley, Yorkshire, at 3s 3d a share. The Jowett directors have notified Black-burns of their present view that they will accept the offer for their own shares, and will recommend shareholders to do the same. Jowett Cars, Ltd., was founded 30 years ago, but are not now in production. Presumably, Blackburns' interest is to acquire additional manufacturing capacity in the Yorkshire area.

ICE TO ORDER: Taxying out at Filton, the M.O.S. Ambassador (second prototype G-AKRD) displays its water spray rig (see news story above). The engines are at present Proteus 705s, similar to those used in the Britannia 100.