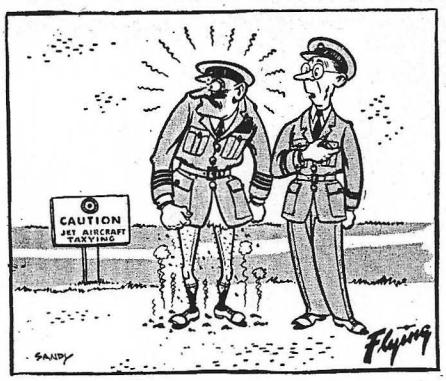
What's In the Air?—

OPERATING PROBLEMS WITH JET AIRLINERS



"Well, suppose we leave the jet flight now, sir, and inspect some of our more orthodox machines!"

ARE such factors as a requirement for aerodynamic cleanliness, new applications of known constructions, rivetless bonding, tapered skins and new types of construction expected to further complicate maintenance of aircraft?

De Havilland has not yet had a spare demand because of failure of the "bonding" (Redux) method of construction. Repair jobs are riveted and no problems at all have developed. There is much less maintenance trouble in both jets and turbo-props because of the absence of vibration. Equipment and instrument life is 30 to 40% longer in turbine and jet.

Are new problems in airframe maintenance likely as a result of more rapid and more extreme changes in operating temperatures and pressures?

In practice, lowest temperatures encountered have been —40 to —50 deg. F. at high altitudes and —60 in test establishments, which are not unusually low. No special maintenance problems have been met in jet which are not familiar in conventional aircraft.

Are troubles likely to arise from the shorter landing gear on turbo-jet aircraft, e.g., slush being thrown into turbine engine intake by nose-wheels?

There has been some trouble with rocks, stones, debris, etc., sucked into the intake. Comet intakes are 7 ft. 6 in. above ground and other large models are likely to have equal clearance The Avro Jetliner, with low undercarriage and slushing conditions at home in Canada, has had no slush trouble. Sand has been taken in up to quite high altitudes and engines show signs of its having gone through, but it seems to do no damage.

Is it possible to use air from turbines or other services to prerotate landing gear?

The idea is advanced to save wear and tear on rubber tires. USAF and Boeing have experimented on conventional aircraft, but have never found it practical. Prerotation flaps on early Constellations were abandoned.

As to the possibility of prerotation in turbine aircraft, manufacturers agreed that they were "bleed happy": they were constantly getting suggestions for use of enough compressed air from turbines to use up their whole output. Air from this source is more expensive than it is worth.

Operational Allowances

What time allowances should be assumed in calculating turbine block to block times? These will include start and warm-up cockpit check, taxiing, take-off, instrument approach, landing, taxiing, etc. What does the above mean in terms of fuel allowances by comparison with piston engines?

The purpose of the question is to fix the amount of time margin between starting engines and take-off. With prop turbines, over-all experience shows that starting and checks take half the time of piston aircraft. Taxiing takes the same amount of time.

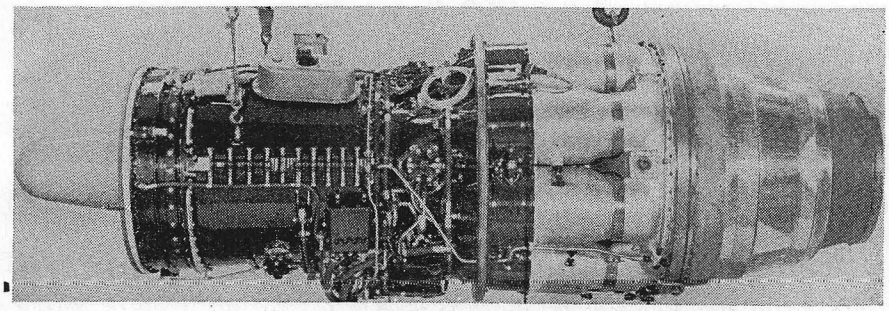
Three-quarters of the check time for piston aircraft is devoted to other matters than engines. There are also variations as between airports, in regard to taxiing time. Some of the checking can be, and is done during the taxiing period. It would take only a few seconds to check turbine engines. Allowance must also be made for clearance wait. Those now testing jets find towing too slow, but at crowded airports, fuel consumption characteristics might require it. (Idling uses about 50 lb. per minute.)

Port of New York Authority suggests that a taxiing parking apron, where planes might wait for take-off clearance, must be a feature of future aircraft. The spacing between aircraft lined up for clearance might have to be greater because of jet blast.

Boeing has found that jet tows are complicated, but get the aircraft out to where they can start up without throwing kerosene. Tows are best when designed for the individual airplane. Designing one to be used by all types is difficult.

There is some difference in starting methods, some starting off the aircraft battery, some individual electrical starting from outside points. An advantage of the tow truck was the fact that it had normally enough power for starting and for heat and other services on the ground. Trucks might cost as much as $30,000, but they might eliminate much weight otherwise carried on board the aircraft.

Starting noises might also make starting remote from apron desirable: fixed power lines at the parking apron to give starting power have been considered as an answer. Boeing and USAF agreed that noise was considerable—a scream in front and a roar in back. Avro and others, however, disagreed. Turbo-prop manufacturers said their engines were quieter than pistons in starting and revving up.



The Rolls-Royce Avon powers the Avro Canuck. Official released rating is 6,000-lb. thrust at sea level. The engine has an axial compressor, eight combustion chambers, approximate weight 2,400 lb.