CL-84 Progress

REPORT ON THE CANADIAN V/STOL AIRCRAFT

Principal features of the CL-84 are noted in the illustration on the right. The aircraft has changed substantially since its existence was revealed last February.

DETAIL design of the CL-84 twin-engined vertical or short take-off and landing (V/STOL) aircraft is now well advanced at Canadair Ltd, Montreal. This aircraft which rotates its wing through 90° for vertical flight, and employs a combination of partly tilted wing and flap-deflected slipstream for short-run take-offs. It was first announced in our issue dated February 21, 1963. The CL-84 programme is being financed jointly by Canadair and the Canadian Government. First flight is scheduled for mid-1965, with a further year of flight-testing to reach "sales demonstrator" status.

Canadair has accumulated several thousand hours of V/STOL model testing, propeller research and flight simulation. Various V/STOL layouts were considered by Canadair including four-engines, two pairs of coupled engines and two single engines. From this group of related designs for tilt-wing/deflected-slipstream aircraft, the twin-engined CL-84 project was chosen for development as the most reasonable means of obtaining hardware experience.

The programme was planned in two phases, involving the design and engineering of prototype aircraft which would emerge from development testing with sales-demonstrator status. The CL-84 was initially conceived as a small utility transport with two 500 s.h.p. United Aircraft of Canada PT6B engines, but further analysis and model testing indicated greater potential applications for a larger and more versatile aircraft with two 1,400 s.h.p. Lycoming T53 engines.

This configuration was submitted to the Canadian Government early in 1963. Canadair proposed that the prototype should be designed not only for demonstration as a utility transport but also in combat air support roles such as a helicopter escort. This scheme met with official approval and work is now proceeding rapidly on a $10m (£3.57m) shared-cost programme with the Canadian Government. This programme covers design and construction of one prototype aircraft. It also includes the building of a second set of components to be used either as flight spares or to be assembled as a second aircraft. The present target schedule sets the first flight in July 1965, with a further 15 months to complete 150 hours in the air.

Since 1958 the company has expended about 250,000 engineering man-hours and some 2,500 hours of model testing for V/STOL design. About half of the cost has been borne by the Canadian Government. Almost all this effort has been devoted to tilt-wing/deflected-slipstream aircraft, which Canadair engineers consider to have optimum efficiency for V/STOL transport on stage-lengths up to about 350 miles.

Having settled on this layout, preliminary design investigation showed that there were certain areas where no adequate basic knowledge existed. In particular, there was—say Canadair—virtually no information on the static thrust of propellers; and there were obvious limitations to testing models in a conventional wind-tunnel because of the flow-reflection effects of the tunnel walls. The company therefore set out to gain the necessary knowledge. In parallel with conventional tunnel testing for data on the forward-flight case, three other programmes were started. A propeller test-rig was built to measure static thrust; a mobile model test-rig to assess vertical and transitional flight characteristics was developed; and a flight simulator was devised to study handling problems in the non-conventional phases of flight.

In recent months, airborne VTOL simulation has been performed with a variable-stability helicopter to investigate control cross-coupling and other effects. This work is being carried out in co-operation with the National Aircraft Establishment at Ottawa, using a specially modified Bell 47 flown by Canadair engineers.

This half-model of the CL-84 is being used to measure aerodynamic forces and investigate airflow characteristics in STOL and forward-flight conditions. It is being tested in the low-speed tunnel of Convair in San Diego (like Canadair, a member of General Dynamics Corp).

---

See canadair cl-84 v/stol performance table for more detailed specifications.