



These sketches by a Canadair artist depict the CL-84 in cruising flight (larger illustration) and in the VTOL configuration. In the latter the wing is tilted through 90° so that the big propellers provide lift equal to about 1.2 times the weight. It appears that hovering control in pitch will be provided by a tail fan, in yaw by the ailerons and in roll by differential propeller pitch. In cruising flight the CL-84 will be controlled like other fixed-wing aircraft

## CL-84

Canadair go Ahead with a V/STOL Transport

**F**ROM Montreal on February 4 came the following announcement from the Canadian subsidiary of General Dynamics Corporation:—

"Details of a new type of twin-engined transport aircraft which can take-off and land vertically, hover like a helicopter and also fly at 350 m.p.h., were revealed here today by Canadair.

"Research on the new aircraft, called the CL-84, began six years ago and has been financed jointly by Canadair, the Defence Research Board and the Department of Defence Production. Canadair and the Canadian Government have now undertaken to go ahead together with further engineering work, and the development and construction of two prototypes to prove out the concept of vertical take-off and establish the effectiveness of this particular design. The total cost of the programme will be \$10m, of which Canadair will invest \$2.5m and the Government the remaining \$7.5m. It is hoped that the project will eventually win production orders in world markets.

"The aircraft has both short-run and vertical take-off capabilities, and is designed to perform a variety of specialized roles for both military and commercial purposes.

"For vertical take-off without the use of any runway, the CL-84's wing, complete with engines and propellers, swings through 90° from the conventional position until it points upward. The aircraft then literally lifts itself straight off the ground by its propeller thrust alone, making no use of the wing for lift purposes. Once aloft, the wing swings down again to the normal forward-flight position. Vertical landing is achieved by reversing the sequence.

"Under conditions where vertical take-off is not essential, the wing of the versatile CL-84 can be set mid-way between the horizontal and the vertical to allow the aircraft to operate from very short, unimproved airstrips and carry even greater payloads.

"Possible military uses of the CL-84 are numerous, and include assault transport, search and rescue, casualty evacuation, close support, surveillance, reconnaissance and liaison work. The aircraft has a particular aptitude for use in areas of 'limited war.'

"For commercial purposes, the CL-84 is well-suited to short-haul passenger transport between city centres or in undeveloped areas such as the Canadian North, for surveying and prospecting, and for 'flying doctor' services.

"Design and construction of two prototype CL-84s will take about 28 months to first flight, with a further 12 months of flight-testing to develop them to 'sales demonstrator' status.

"Canadair has designs for a number of short-run and vertical take-off transport aircraft, and has spent many hundreds of hours on model testing, propeller research and flight simulation."

Even remembering the relatively early stage of the project, this reveals no quantitative data. But the fact that it has been issued at all is significant. Canadair have sought by all means possible to keep their airframe-building capacity intact. Now they have picked one of many possible projects (it appears to be a scaled-down version of their NBMR-4 submission) and, with government help, are going ahead.

Frankly, Canadair must have found it difficult to find a hole to fill. The CL-84 is too small and expensive for most normal commercial operations, and anything much larger would be too great a risk and tend to duplicate the US Army XC-142 by LTV, Hiller and Ryan. The latter has trodden most of the new ground in the tilt-wing field first explored by the Hiller X-18; but Canadair have gained experience with a host of V/STOL transports of this size studied since 1957. Most of the early studies were grouped under the number CL-62.

It is believed that the new Canadair has a design payload of about 1,000lb, and seats six. This enables it to fulfil many rescue and "limited-war" missions, and in the latter it should be much less vulnerable than a helicopter.

Powerplants of the CL-84 are to be a pair of Canadian Pratt & Whitney PT6A turboprops. Each is rated at 550 s.h.p., the free-turbine outputs being arranged at the front, driving a large Curtiss-Wright VTOL-type propeller with four glass-fibre blades. The two outputs will undoubtedly be linked by a cross-shaft, from which a bevel box will drive the tail pitch-control rotor.

Specific mention of 90° tilt is surprising, for a slightly greater angle involves no more complexity or weight and allows the aircraft to hover in a tailwind. Another point is that from the sketches it appears that with the wing in the cruise position the propellers would foul the ground. The tilt-wing arrangement has several drawbacks, but Canadair have for several years considered it the best scheme for aircraft of this character.