THE INDUSTRY

Leonides Beaver

A Beaver powered experimentally by an Alvis Leonides engine was flown for the first time during March by The de Havilland Aircraft of Canada. The flight, made from de Havilland's Downsview base, was reported to be highly satisfactory. Pilot on the first flight was de Havilland Chief Test Pilot George Neal.

The Leonides Beaver differs somewhat in appearance from the conventional model, though the structural changes are comparatively slight. Because the Leonides has an overall length some 12 inches greater than that of the Wasp, in addition to being about 4½ inches smaller in diameter, the experimental Beaver has a longer, narrower nose than the Wasp-powered version.

The Leonides, which is rated at 560 hp for take-off (as compared to 450 hp for the Wasp), drives a de Havilland three-blade propeller. The engine is also some 108 lbs. (dry) heavier than the Wasp.

To compensate for the lengthened nose and additional power, the Beaver's fin area has been increased by about 20%.

This development of the Beaver, if it proves satisfactory, is intended to appeal to British users. It is not thought likely that it would be produced in Canada, but instead would probably be built by the parent de Havilland company in the U.K. under license.

M-H Controls

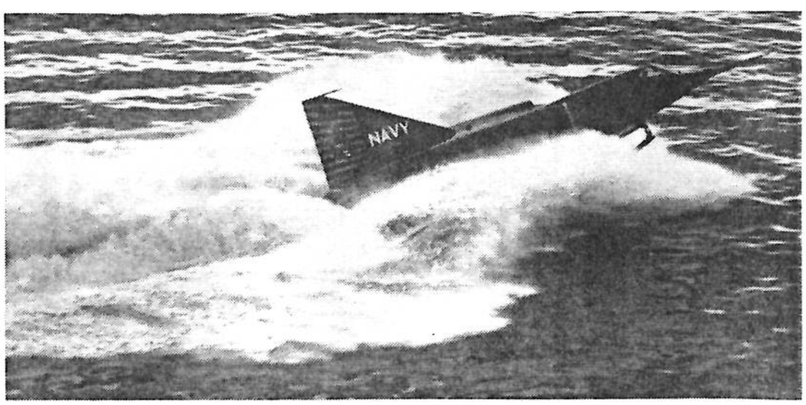
The CF-100 is being equipped with U.S.-built automatic control equipment designed and produced by Minneapolis-Honeywell Regulator Company to increase precision in all-weather interception operations.

The controls include a yaw axis control system, a fuel measurement system, and a sysem for indicating rocket temperatures.

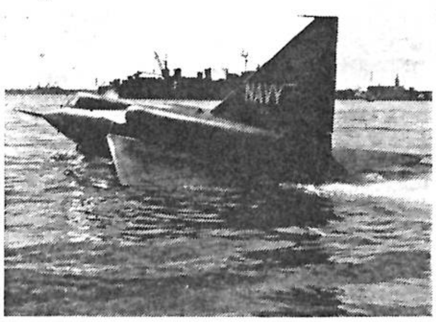
Installation of the equipment on the first of the fighters has already been completed at Honeywell flight operations facilities at Wold-Chamberlin Field in Minneapolis. Prior to the installation, Honeywell pilots closely collaborated with Avro Canada technicians in development work and flight testing .

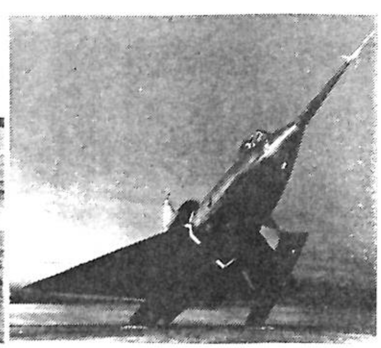
According to Honeywell, the yaw axis control system helps to provide a stable gun platform by damping Dutch Roll not only in steady, but in transient maneuvers.

Precision flying is also facilitated in the accurate electronic fuel measurement system, which incorporates total reading as well as individual readings of each characterized tank system. The totalization feature provides a signal to the aircraft's electronic brain that takes into account the resultant angle of attack changes as fuel is consumed.



SEA-DART: The world's first delta wing seaplane, the XF2Y-1 "Sea-Dart", is shown during taxi tests and (lower right) beached. Made for the USN by Consolidated Vultee, the Sea-Dart incorporates retractable hydro skis and is powered by two unidentified Westinghouse turbojets, presumably J-34's of some 3,400 lbs. th. each. Navy thinks this aircraft will equal performance of land-based machines.





Howe on Avro

During mid-February, Minister of Defence Production C. D. Howe delivered to Commons a complete resumé of the engine and airframe development and production programs at Avro Canada. Mr. Howe's statement was the most complete ever to be made on this controversial subject, and consequently *Aircraft* is reproducing most of the text herewith. These are the facts, according to Mr. Howe:

Turbine Development: The Orenda first ran in February, 1949, 30 months from commencement of design. The gas turbine staff was then about 800, and expenditures on the Orenda project to the end of March, 1949, amounted to $3,917,900. With the running of the first engine, the development phase commenced. This has extended over four years, and five distinguishable versions of the engine have now passed the development phase.

These are: Series 1—original design: Series 2—modification to permit three point suspension system, to increase strength, reduce weight, and make fuselage installations easier: Series 8—modified compressor to improve acceleration characteristics: Series 9—version for the CF-100 Mk. 4: Series 10—version for the F-86.

All these engines are in the 6,000-6,500 lb. th. category. In addition, the Series 11 engine (7,500 lb. th.) has run in lash-up form, and the basic scheming on the Series 12 engine, with a further increase in thrust is complete.

The $30,274,199 spent on the Orenda over the last four years is described as a development expense. In fact, however, all engineering expenses, some of which would have been charged to production, have been carried on this contract. The expenditures have supported an engineering department large enough to carry out the production activities, produce the variants of the basic engine, and work on certain more advanced developments. Finally, engineering expenses include the operation of the experimental or model shop, and also the Nobel facility, a laboratory which carries out research and development of turbines, compressors, and combustion systems.

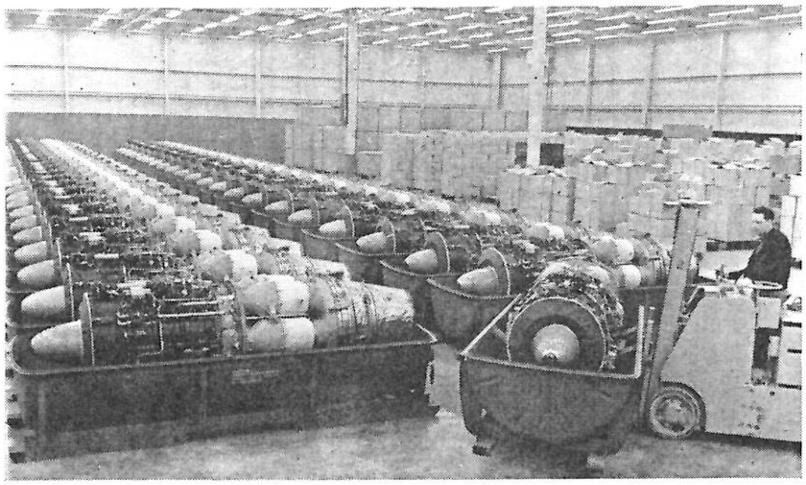
The Orenda Series 11 will be superior to the present production versions of engines designed for similar purposes in other countries. We are satisfied that the Orenda Series 12 will meet our requirements for some years and be competitive with foreign engines.

Turbine Production: Up to December 31, 1952, expenditures on tooling were $15,029,350. This figure covers pre-production and production tooling for all series of the engine. Total expenditures on production have now reached $38,785,500, with $17,839,300 representing the value of engines delivered, $20,946,300 the value of engines in final assembly, parts completed and in process, progress payments to suppliers, materials inventory, and mill supplies. For this expenditure, 96 engines were delivered at December 31, 1952.

The first twelve Orendas were produced in the development shop, on limited tooling, to supply urgently needed engines for early aircraft. In addition two changes in engine production location, first from the experimental shop to the pilot line in the aircraft plant, and then to the new engine plant, have had an adverse effect on costs.

The construction of the engine plant was authorized in October, 1950. An eight-month delay in completion of the plant proper resulted from the shortage of steel at that time. In March, 1952, only 10% of the machine tools were installed. The plant can scarcely be considered to have begun operations before June, 1952, when 60% of the machine tools were installed, while the assembly shops were not moved until July, 1952, and heat treating facilities until November of last year. Under these circumstances, and considering the problems of setting up subcontractors' facilities, the performance has been good.

The Orenda Series 2 was the first production engine. This passed its type test in February, 1952, and is now out of production. The Series 8 and Series 10 passed their type tests in January of this year and these are the engines presently in production. The Series 9 is to be introduced during the summer of 1953.



SIGHT FOR SORE EYES: Avro Canada describes this line-up of 45 Orendas as "just part of a month's production" at the company's Gas Turbine Division at Malton. Types of engine currently in production are the Series 8 and Series 10, the former being for installation in the CF-100-3 and the latter for the Sabre 5. Soon to go into production is the Series 9, for installation in the CF-100-4.

Airframe Development: In October, 1946, a contract was executed with A. V. Roe for the design and construction of two prototypes of the CF-100, plus one static test airframe. In January, 1950, the first prototype flew. This was a Mk. 1 airplane, fitted with Rolls-Royce Avons. Cumulative expenditures to March 31, 1950, were $5,131,754. To the present, cumulative expenditures on development of the airframe have amounted to $11,784,400, an increase of $6,652,646 since March, 1950.

Variants of the airplane obtained for this expenditure are: (1) Mk. 2—powered by Orenda Series 1, no armament; (2) Mk. 3—powered by Orenda Series 2 and Series 8, and armed with eight .50 machine guns and APG 33 radar; (3) Mk. 4—powered by Orenda Series 9 and armed with .50 machine guns, air-to-air rockets, and APG 40 radar.

The development of the Mk. 4 control system for firing the armament is not yet completed.

I have already mentioned two of the differences between these four marks of the CF-100. One is the different series of engines and the other is the different weapon systems. Externally, all marks are similar. The structure has undergone considerable development, beginning with the first static test in March, 1950. It is expected that the final proving of the structure to Mk. 4 loads will be complete in March, 1953. This long time results from the growth of all-up weight (about 50%), as well as from deficiencies in the original design. In addition, systems have been altered; for example, the control system has been changed to obtain improved flying qualities; hydraulic and electrical systems were altered as a result of increased demands and a desire to clean up the original design.

I have mentioned the deficiency in the original design, a subject that has been given a great deal of publicity. The facts were than in November, 1951, during RCAF proving flights, a failure developed in the ring connecting the fuselage to the front spar. This necessitated a re-design of this structure which has now been successfully accomplished. Vigorous rectification commenced with the reorganization of the engineering department, and progress since then has been good.

No time has been lost on the delivery schedule of the Mk. 4, as the delivery date of this aircraft is determined by the weapons system, which is being produced in the U.S.

The delay in the Mk. 3 program amounted to 4-6 months. It is not possible to separate out the costs of this element of the CF-100 development program. The only other two seat fighters in the same class as the CF-100 have also suffered structural deficiencies which have caused serious delays.

Airframe Production: In May, 1949, seven months before the flight of the first development prototype, a contract was issued for ten pre-production fighter aircraft. In June, 1951, the first of these aircraft flew, the last in October, 1952. The first five of the aircraft were Mk. 2, the next four were Mk. 3, and the tenth was the Mk. 4 weapons systems prototype.

The first production order for the CF-100 was given in October, 1950. The first production airplane was delivered in November, 1952, 25 months from the placing of the contract. This length of time resulted primarily from the difficulties encountered with the structure of the airplane. The Mk. 3 airplane is now in production and 70 fighters of this mark, fitted with .50 guns, will be produced. Volume production of the Mk. 4 will begin late this summer.

Tooling expenditures to the present have amounted to $15,882,450. Total production cost of the 16 aircraft delivered up to December 31, 1952, against the pre-production and production program, is divided as follows: (1) aircraft manufactured — $27,248,300; (2) mill supply inventory—raw material inventory, work in process—$25,788,800; (3) payments to subcontractors and suppliers — $4,183,500; (4) Ground handling equipment; maintenance tools, publications, etc.—$2,582,400.

At the present time, there are approximately 14,000 persons employed at A. V. Roe, and it is not expected that this number will increase significantly during the course of the present program. Last summer there was some concern that there were more people on the A. V. Roe payroll than production warranted. I think probably that, to some extent, this was true. I am satisfied that this condition no longer exists.