

INDUSTRY '62

By ROBERT G. HALFORD

FOR CANADA's Aircraft Industry, Friday, February 20, 1959, will long remain a prime reference point. It is the most important single date in the postwar history of the Industry, and possibly in the entire 53 years since John McCurdy lifted his Silver Dart from the ice of Baddeck Bay. The fortunes of the Industry are now measured in terms of "before February 1959" and "after February 1959". Melodramatic as this assessment may seem, it is the simple truth.

On February 20, 1959, when the Prime Minister stood up in Commons to announce the cancellation of the Arrow, Canada's Aircraft Industry was at the peak of its powers as a fully integrated design, development, and production organization. It was technically sophisticated in the fullest sense of the term. Man for man and pound for pound it was the equal of any of the other leading aircraft industries of the world. The Arrow was symbolic of this heady, but expensive status.

Forced Feeding: This Industry grew to this happy state of proficiency under the stimulation of hothouse conditions. There is no doubt that the Hon. C. D. Howe looked on the Industry as his child, and a favored one at that, so it is not surprising that there was a strong feeling of rapport between the two. It was a warm father/son relationship that came to an end with shock-

ing suddenness in 1957. The Conservative party took over the Government, and Canada's Aircraft Industry found itself with a new stepfather.

The changes in the Government/Industry relationship that followed in the natural course of events were cumulative, rather than immediate and dramatic. The most important change that gradually manifested itself was the tightening grip on the purse strings brought on by the Government's growing alarm at the Industry's huge appetite for tax dollars. The cozy father/son relationship had become a tough buyer/seller one, with the buyer willing to pay out only what was necessary for hardware, and nothing for ideas.

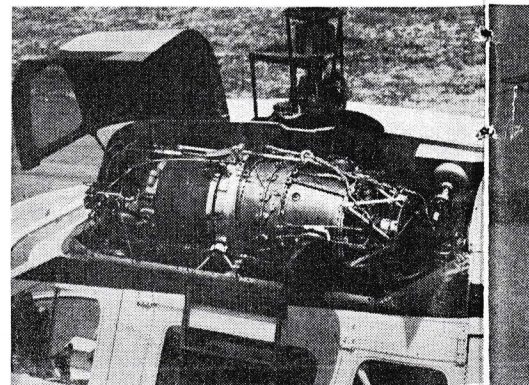
The Industry's original patron, C. D. Howe, clearly understood that it must keep producing ideas if it was to retain its value as a technical resource, but this was a connotation little appreciated by the Conservative Government during its hectic short-pant days in power in 1958. This much was starkly evident in the manner in which the Arrow cancellation was effected. Little effort was made to retain even a small portion of the technical capability that had created the Arrow weapon system.

Turning Point: The Arrow cancellation marked a turning point for Canada's Aircraft Industry because it was clear notice that the Industry was henceforth on its own. For the fore-

seeable future, there would continue to be Government funds for a reasonable level of production orders, but research & development spending was to be cut off at about ankle level. Any good industrial executive knows that elimination or reduction of R & D is like tampering with the life cycle. License production provides day to day sustenance, but R & D programs which assure the continuous renewing of product lines are essential to industrial stability and longevity. Industry can afford some R & D, but not on the scale or at the pace needed to compete in the international markets.

This remained the state of affairs up till about a year ago. On the strength of the one major Government sponsored production program—the CF-104—Industry employment had been maintained at a level that differed from pre-Arrow-cancellation times only by the number that had been employed by Avro Aircraft. Considering the widespread subcontracting of the Arrow, this was remarkable. Nevertheless, in spite of such signs that the Industry was seemingly holding its own, the future continued to be worrisome for Industry executives, who knew that with the high level of production activity being maintained almost entirely by a single program, and no hint of any follow-on, there was real trouble ahead. With R & D at a low ebb, the life cycle was not being renewed.

Now, one year later, the situation at

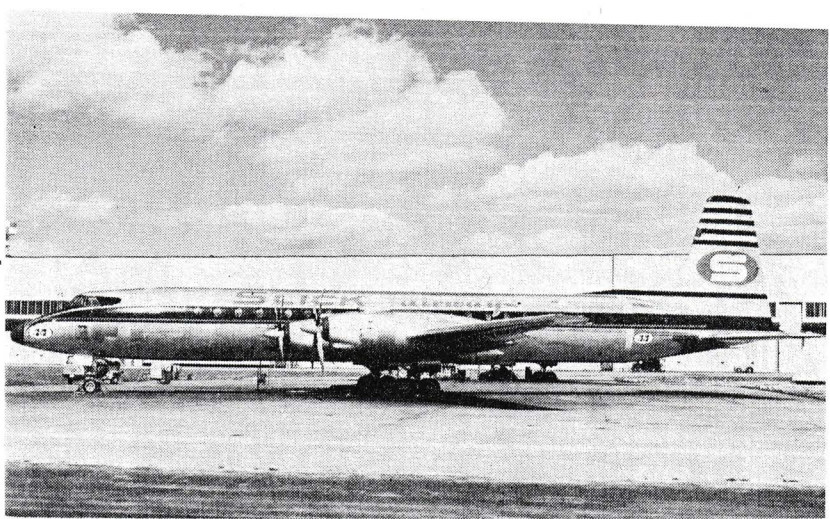


L-R, the Found FBA-2, the Avian 2/180, and the P & W PT6 are new products which may win important business.

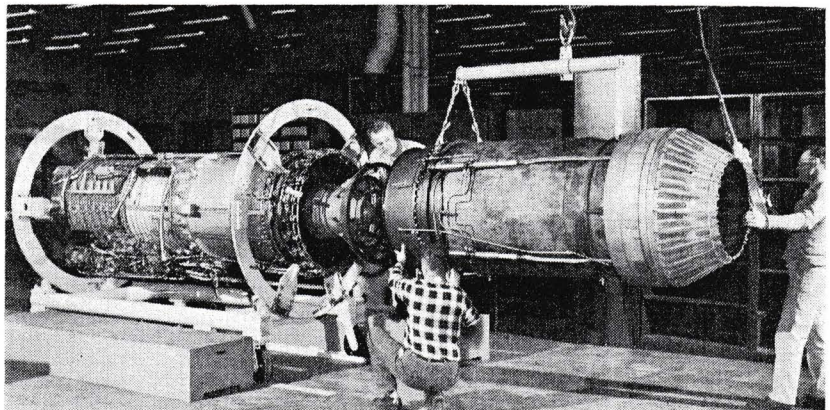
first inspection appears largely unchanged. Employment among the hard core companies is up slightly by about 1500, to some 32,000, though employment in the five main manufacturing plants remains at approximately 18,500. The Industry's main bread and butter program is still the CF-104. Government spending for purchases of aircraft and equipment and repairs and upkeep of equipment is about the same. U.S. purchases under the production sharing agreement do, however, appear to be on the rise.

Significant Changes: But during the past twelve months important changes *have* taken place that have deep and long term significance for the health of the Aircraft Industry. The most important of these is the Government's growing appreciation of the importance of R & D, and the consequent establishing of Government assistance schemes designed to promote industrial R & D—for peaceful as well as defence purposes. Though the sums of money involved at this time are not large, there is reason to believe that the Government is prepared to go to considerable lengths to ensure that no worthy program dies for want of funds.

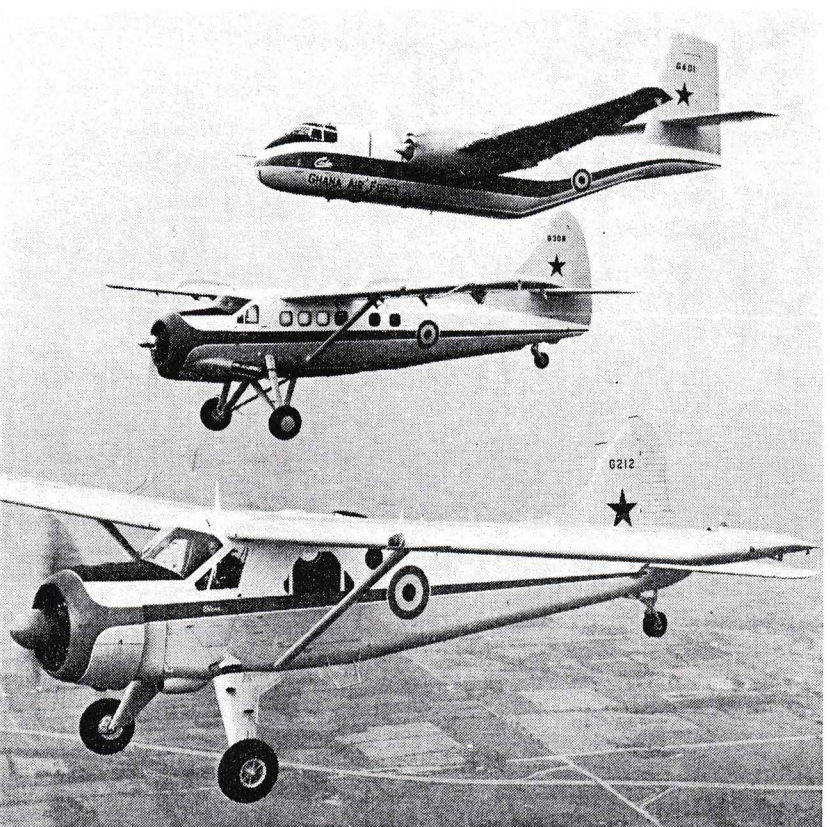
A recent event that will also have long term effects on the future course of the Industry, is the splitting of the AITA into separate industrial and air transport associations. Because of the necessity for the AITA to present a



Canadair CL-44's are now in service as commercial and military transports.



Production of the GE J47 for the Starfighter is in full swing at Orenda.



Important industry production aircraft are the newcomer CL-41 and the well-established Beaver, Otter and Caribou.

common front of unanimity, the long-standing and considerable conflict of interest between the industrial and air transport elements of the Association was not readily apparent to the outsider. Consequently, AITA was effective in representing the Industry only when the interests of the carriers were not involved in any way. It may be expected that with the new Aircraft Industries Association charting its own course henceforth, the Industry will be much more militant in protecting the interests of its member companies, collectively and individually.

These two developments alone will not provide for the salvation of the Industry, but they mark important and interesting changes in attitude of both Government and Industry. In summary, these are:

- The Government has become aware that assistance in the area of industrial R & D is not subsidization, but an investment that can pay future dividends; that such assistance speeds up the development of Canada's technical resources and makes it possible for the country to hold its own in the highly competitive international markets.

- The Industry, for its part, has realized that from now on it is going to have to fight for every piece of business and every concession it gets; the establishing of its own association puts it in a strong position to do this. The acceptance by the Industry of the fact that changes in military requirements make defence contracts an uncertain source of business, at best, is a healthy sign.

Meanwhile, the existing programs on the Aircraft Industry's books are unchanged in total, but individually several of them have shown considerable improvement. Unfortunately, these gains are offset by the failure of the CL-44 to win more orders. If new CL-44 sales are forthcoming this year, and Canadair seems confident that this will happen, then the Industry will have a strong and diversified production program working for it. Following are capsule comments on the Industry's current major projects.

- CF-104 Starfighter:** Over 50 CF-104's have now been completed out of an order for 200 for the RCAF. Under the U.S. Mutual Assistance program, Canadair Ltd. will also build 130 F-104G's for service with NATO air forces. In addition, there has been a substantial volume of complementing business in the supply of F-104G major components to other plants building the Starfighter in the U.S. and Europe.

- Beaver:** This year the DHC-2 will complete its 15th year in production and some time later in the year the delivery of the 1500th aircraft in the series will be celebrated. Actually, 1515 Beavers have come off the line to date. Current production is mainly against commercial orders.

- Otter:** DHC-3 production has now reached the 440 mark and like the smaller Beaver is being carried on mainly against commercial orders.

- Caribou:** Sales of the DHC-4 have climbed to 127 and deliveries are proceeding on schedule. The bulk of the orders (114) so far has been from the U.S. Army, which has indicated a long term requirement for approximately 300.

- CL-44 Freighter:** Sales of this ambitious Canadair venture are still stalled at 34, though production of 39 seems guaranteed. Work in the shops is now concentrated mainly against the five aircraft ordered by the DDP "against a future requirement", and the five aircraft being built by Canadair on spec.

- General Electric J79:** Deliveries are being made on schedule by Orenda Engines Ltd., which is building this turbojet under licence for installation in the Canadair CF-104, the U.S. MAP F-104G's which Canadair is to build, and the CF-104D trainer which Lockheed is building.

- Pratt & Whitney R-1340:** This familiar powerplant continues in low level production at Canadian Pratt & Whitney Aircraft Co. Ltd., in both the geared and direct drive version.

- Canadian P & W PT6:** A \$25 million private venture by Canadian Pratt & Whitney Aircraft Co. Ltd., this small 500 hp turboprop/turboshaft aircraft, cum industrial engine, is to complete its 150-hour type test this year.

- Canadair CL-41:** The pay-off for Canadair's gamble in developing this two-place jet trainer came this year

when an order of 190 for the RCAF was announced. The Air Force will buy versions for both pilot training and systems training. Efforts are also being made to sell the CL-41 abroad.

- Found FBA-2:** The first six production models of this new private-venture bushplane have already been bought by Georgian Bay Airways and work is going ahead against this initial order. Found Bros. Aviation Ltd. expects a C of A later this year.

- Avian 2/180:** Several hundred flights have now been made with the unique two-place gyroplane which Avian Aircraft Ltd. has had under development for the private market since 1959. Three of the aircraft have now been completed (the first one was destroyed in an accident) and the existing two will be used to get the C of A this year.



Brunswick of Canada has \$500,000 contract to fabricate fibreglass reinforced radomes for the CF-104.

Canadian P & W

CANADIAN Pratt & Whitney Aircraft Co. Ltd. is a versatile engine company whose customers and products are so many and diversified that it is not particularly sensitive to fluctuations in the Canadian defence budget, unlike most other member companies of the Canadian Aircraft Industry. The export market for Pratt & Whitney spares alone brings Canadian P & W \$23 million per year.

Broadly, activities at the company's plants at Jacques Cartier and nearby Longueuil are divided into (1) production of spares for Pratt & Whitney piston engines, (2) aircraft engine repair & overhaul, and (3) small gas turbine research & development. There are, of course, other lesser activities, such as propeller repair & overhaul, Sikorsky helicopter repair & overhaul, etc., but by far the greatest portion of the company's 850,000 sq. ft. of plant space, and of the energies of its 2600 employees are devoted to the first three programs mentioned.

In spite of the ascendancy of the gas turbine engine in airline circles, piston engines, and particularly Pratt & Whitney piston engines, continue to be responsible for a very large part of the flying time being logged around the world. It appears that this is a situation that will prevail for an unpredictable number of years, thus making an enviable one Canadian Pratt & Whitney's position as the world's sole source for a wide range of P & W piston engine spares.

The most important, and certainly the most interesting project on which Canadian P & W is currently working is the PT6 gas turbine for aircraft and other applications. Started in 1958, the \$25 million PT6 design and development program will reach a climax in the first half of this year when the 150 hour qualification test is scheduled for completion. The engine has already been selected to power the Hiller Ten99 six-place utility helicopter and the Piasecki 16H five-place high speed helicopter, both of which are now flying.

As sort of a shakedown exercise for

the Canadian P & W design department (now numbering about 350 engineers) when it was first established a few years ago, United Aircraft Corp. assigned to the Jacques Cartier firm the responsibility for the preliminary design work on the JT12 small turbojet engine.

The JT12 is the powerplant for the Canadair CL-41 prototype and it is Canadian P & W's hope that it will be retained in the production version of the aircraft, 190 of which have been ordered for the RCAF. If the JT12 is in fact the selection for the production CL-41, it is probable that Canadian P & W will build the engine.

de Havilland Canada

WHEN THE development bill for the de Havilland DHC-4 Caribou began to mount to unexpected heights a few years ago, the directors of The de Havilland Aircraft of Canada Ltd. must have wondered whether or not they had made the right choice in deciding to proceed with such an ambitious project. If such doubts did in fact ever exist, they must now be quickly fading into the special limbo to which the human mind consigns distasteful thoughts. With 127 Caribou now on order or delivered, and production seemingly assured through to the end of this decade at least, de Havilland Canada appears to be in a position of strength, to say the least.

It has long rankled this Toronto company that it has not been the recipient of more defence contracts. In both relative and absolute terms, de Havilland Canada comes out on the short end when its share of the military aircraft production defence dollar is compared with that of Canadair and Avro.

However much this lack of a fair share of defence orders bothers de Havilland Canada, it has had the salutary effect of forcing the company to rely almost entirely on its own resources. Just how successfully these resources have been utilized is illustrated by the DHC design record since the end of World War II: four original designs started and completed, all successful. Four out of four is a pretty good record in any man's league.

Production and sales of the Beaver and the Otter continue to make an important contribution to the com-

pany's trading picture, but obviously the Caribou is now the most important single program under way at Downsview. The most recent Caribou order from the U.S. Army is for 53 aircraft worth some \$30 million. In all, the 127 DHC-4's on order or delivered since production was initiated in 1959 have a total value of approximately \$79 million. Besides the U.S. Army, which is the most important single customer with 114 Caribou, the aircraft has also been sold to the RCAF (5) and the Ghanaian Air Force (8). In the U.S. budget for Fiscal Year 1963, there is an item of \$24 million for further purchases of Caribou; this would buy about 40 aircraft.

Employment in de Havilland Canada's 1,000,000 sq. ft. facility at Downsview Airport, near Toronto, is holding at about 4000, of which some 500 are rated as scientific and engineering personnel.

A. V. Roe Canada

FOR THE PAST year, A. V. Roe Canada Ltd. has been quietly reorganizing the management, engineering resources, and plant facilities of the aeronautical group companies. As most of these—Avro Aircraft, Orenda Engines, Canadian Applied Research—are no longer independent subsidiaries, all having been reduced to operating divisions of A. V. Roe Canada Ltd., the action amounts in effect to consolidation.

In all of these divisions, the highest official is a general manager; it is perhaps a measure of the level of activity at both Avro Aircraft and Canadian Applied Research that they now share the same general manager. The engineering requirements of all the divisions in the Toronto area are also being met on a share basis by a newly organized division called Engineering (Toronto) Division.

The one company closely associated with the aeronautical field which has not reverted to divisional status, is Canadian Steel Improvement Ltd.

Summations of the aeronautical activities of relevant A. V. Roe Canada divisions follow:

- Avro Aircraft Div.:** Main aircraft activity in this sprawling Malton plant is the fabrication of CF-104/F-104G wing tip and pylon tanks for the RCAF, West Germany, SABCA, and Lockheed, and the manufacture of

CF-104 scoops and ducts for RCAF Starfighters.

•**Orenda Engines Div.:** Insofar as the production side is concerned, Orenda Engines has, more than any of the A. V. Roe Canada divisions, maintained a relatively high rate of activity. Under licence from General Electric, Orenda is producing the J79 turbojet and associated spares for the CF-104 program. Additional orders are also assured as a result of the production sharing agreement between Canada and the U.S. whereby the U.S. will order 130 F-104G's from Canada for supply to NATO allies. Thus, Orenda is in the comparatively happy position of having a substantial bread and butter contract while it seeks for new outlets for its gas turbine and other skills.

•**Canadian Applied Research Div.:** Canadian Applied Research is active in the design and manufacture of electro-mechanical instruments and systems, including magnetometers, aircraft ice detection equipment, film processors, and sound computers, and in the repair and overhaul of instrumentation

equipment. The division's first portable magnetometer was recently delivered to the USN and follow-up is continuing for DDP and RCN portable magnetometer sales.

•**Canadian Car Div.:** CanCar's aircraft work is concentrated at the Fort William plant and comprises a considerable program involving the production of CF-104/F-104G major components and sub-assemblies. In terms of dollar value, Fort William's CF-104/F-104G contracts are believed to be higher than those held by the much larger Avro Aircraft plant at Malton.

•**Canadian Steel Improvement Ltd.:** CSI is a major supplier of specialized engine and structural forgings. Development has continued in the field of precision forging of compressor and turbine blading, and forgings of very close dimensional tolerances are being successfully produced in the high temperature alloys used for turbine blades. CSI is also manufacturing on a large scale the 7079 T65 aluminum alloy used on major structural items for supersonic aircraft.

The Supporting Industry

•**Avian Aircraft Ltd.:** Formed by several ex-Avro engineers in February 1959 at Georgetown, Ont., under the name Avian Industries Ltd., this company's aim was to design and produce a VTOL gyroplane for personal and business use. This aircraft was to be as simple to fly as any conventional light aircraft by fixed wing pilots without a helicopter endorsement.

Within a year of the formation of the company, a prototype Avian 2/180 had been built. During taxi trials, this prototype was unfortunately destroyed. Work started on a second prototype, which was completed a year ago, and it is this 2/180 that has been undergoing exhaustive taxi trials and initial flights toward DoT certification.

At the present time, Avian Aircraft has 23 employees, most of them former Avro designers and technicians. The prototype 2/180 has flown over 200 times from the Waterloo-Wellington Airport, near Kitchener, Ont. The



Representatives of the RCAF's IAM check out the crew compartment motion system of Canadian Aviation Electronics' CF-104 simulator which, along with F-104G simulator, is being produced for the RCAF and several NATO countries.