

A Rare Bird: the Sparrow

CANADA'S SEVEN-YEAR-OLD MISSILE PROGRAM IS LABORING MIGHTILY TO BRING FORTH A SPARROW

CANADA'S stop and start missile "program" is slowly wrestling itself free of the bog of confusion, uncertainty and good intentions in which it has been mired since the Velvet Glove project came to a whimpering end.

But because the program did bog down, the Government was provided with a ready excuse to scrub the development of the Mk. 6 missile-carrying version of the CF-100. The Sparrow 2 air-to-air guided missile that was selected as a successor to the Velvet Glove required some two years of negotiation at the government and the industrial levels before the Canadian Government was successful in obtaining the necessary licenses and clearances to produce the Sparrow and its guidance system and other essential hardware.

A U.S. report of last year also said there was a further delay pending a decision on the type of guidance to be used.

Barriers Breached: Events of the last few weeks would indicate that most of the paper barriers barring the way of the Sparrow 2 have been cleared away. A recent news report from Ottawa quotes Government authorities as saying that the necessary licenses have now been obtained. Industry spokesmen are credited with statements to the effect that tooling preparatory to production of the Sparrow 2 and its systems has already started in the several Canadian Aircraft Industry plants concerned.

And from the RCAF, in mid-January, came the announcement that a team of Avro Aircraft and RCAF personnel, with two CF-100/5's, had arrived at the USN Air Missile Test Centre at Point Mugu, Calif., to carry out test firings of the Sparrow 2.

The facilities of the USN base, and a number of Sparrow 2 missiles (the Sparrow 2 is not being produced in numbers in the U.S.) have been made available to the Canadian team, which

is to remain at Point Mugu for six months or more. The test firing program is intended to enable the Canadian personnel to familiarize themselves with the missile, and will also serve to test fire control and auxiliary equipment.

The two CF-100's, both modified Mk. 5's, are being flown by Avro Aircraft test pilots. In this regard, it might be mentioned in passing that although the development of the Mk. 6 missile-carrying version of the CF-100 has been washed out at Avro by the Government, the missile-firing development aspects of that program are being continued.

Family Tree

THE SPARROW 2 traces its lineage to the Sparrow 1, though it differs considerably in appearance, dimensions, and internal workings from its predecessor. In fact about the only thing in common the two missiles have, is that Douglas Aircraft Co. is responsible for the design and manufacture of the airframe in both cases. The Sparrow 1 originated with the Sperry Gyroscope Co., working on behalf of the USN. Sperry acted as prime contractor for this development program, with Douglas supplying the airframe and Aerojet the powerplant. Sperry was also responsible for the guidance system. Before the Sparrow 1 reached operational status, its development had consumed four million engineering man-hours spread out over ten years.

The Sparrow 2 was developed by Douglas, using the Sparrow 1 design as a jumping off point, and incorporating a Bendix powerplant and a Bendix guidance system. Douglas was responsible for the airframe, in addition to being prime contractor. The Sparrow 2 was originally developed specially for the Douglas F5D Skylancer naval interceptor, but when this airplane was cancelled, the Sparrow 2 also came to

an untimely end.

Number Three: The Sparrow 3 is known as the Raytheon Sparrow, Raytheon Mfg. Co. of Waltham, Mass., being responsible as prime contractor for its development. Raytheon is also credited with the production of airframe and the guidance system, while Aerojet is supplying the powerplant, a solid sustainer motor. The Sparrow 3 incorporates the Douglas-developed airframe of the Sparrow 2 and a new all-weather radar system, thought to be of the fully-active type. This type is said to assure extremely good guidance through rain, clouds, and other atmospheric phenomena. The missile is now in full production for the USN.

In appearance, the Sparrow 1 had a long pointed nose, fixed tail fins and a moving wing cruciform. Both tail and wing surfaces were delta shaped. Length was 12 ft. 6 in.; wing span, 27 in.; body diameter, 8 in.; firing weight, 295 lb. By way of comparison, the Sparrow 3 has a much blunter nose, and though the configuration of the main wing and tail surfaces is generally the same, they are much larger in area, a change intended to improve performance at altitude. Length is about 12 ft.; wing span, 38.5 in.; firing weight, 350 lb.

The Sparrow 2, by token of the fact that it uses the same airframe as the Sparrow 3, is much the same as the latter in general appearance.

Canadian contractors employed on adapting and producing the Sparrow 2 as an operational weapon for the CF-105 Arrow include Avro Aircraft Ltd., Canadair Ltd., and Canadian Westinghouse Co. Ltd., as well as Computing Devices of Canada Ltd. and The de Havilland Aircraft of Canada Ltd.

Homing Torpedo: Only other development work in the guided missile line known to be going on in Canada at this time, is the air-launched homing

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moved from Montreal to new quarters in Hamilton with 10,000 sq. ft. of plant area. In their new location, the Simmonds firms plan gradually to expand repair and service facilities, eventually manufacturing a selection of suitable components, for which they are Canadian licensees, that are now manufactured elsewhere to Simmonds specifications. Included in line of proprietary aircraft accessories which Simmonds supplies and services in Canada is fuel gauging equipment used in TCA aircraft.

•**Daystrom Ltd.:** Formed recently at Toronto to handle sales, service assembly and manufacture of Daystrom Inc. electronic products in Canada. Manufacture of gyros and accelerometers for aircraft and guided missiles is planned at Canadian subsidiary's new plant.

•**Rotaire Ltd.:** An affiliate of Genaire Ltd., Rotaire specializes in helicopter repair, overhaul, maintenance and engineering, catering to needs of Canadian operators of military and civil rotary wing aircraft. Firm is supported by Genaire's shop facilities at St. Catharines and Malton. Working

parties provide technical service in the field.

SPARROW

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torpedo that has been developed by the Canadian Armament Research & Development Establishment. Practically nothing has been said officially about this weapon, but it is slated for service with both the RCN and the RCAF, presumably as armament for the CS2F-1 Tracker and the CP-107 Argus.

Although there is now some evidence of progress in the Canadian missile program, there is still little indication as to what the next step might be. As C. F. Hembery, president of Computing Devices of Canada, said at the 1957 AITA general meeting:

"Canada's place in missile development is not yet clear. The basic question is this: Can Canada afford to support a full scale development program on one or more types of guided missiles specifically adapted to Canadian defence, or must we rely on American and British developments? We have

tried both ways, with the Velvet Glove and the Sparrow 2. If we attempt to manufacture foreign developments, we must accept the delays which this approach entails. If we try to do our own research and development, we must be prepared to bear the costs.

"The costs of development are considerable, and it is inevitable that much work already done elsewhere must be duplicated because of security restrictions. The argument in favor of manufacturing under license is mainly economy. We avoid duplication of effort, and we save engineering man hours. On the other hand, we may lose up to two or three years in getting a missile into operational use.

"In favor of developing our own missiles, it is said that against the money cost must be balance the value of building up a reservoir of experienced personnel which we can use if we find ourselves unable to obtain equipment from our allies."

FOOTIT

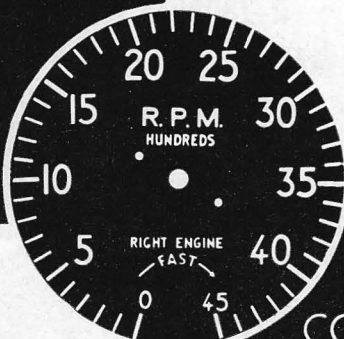
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(10%). In this way it was possible to finance the deal privately. A new company has been formed called "Aircraft Manufacturing Co. Ltd.," or "Aircor". Rolls-Royce, in their usual manner, are financing the engines. It was recently announced that the Government had given British European Airways the go-ahead to negotiate with de Havillands and their associates for the D.H. 121 jet transport. So in the end it looks as though de Havillands have won the race. And the British Government has achieved a measure of success in their prodding for an integration of industry.

Independent Action: What the British Government has done by

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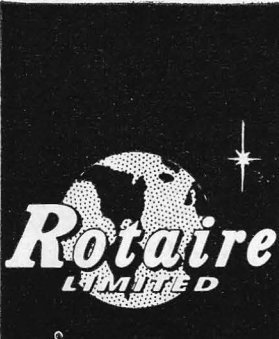
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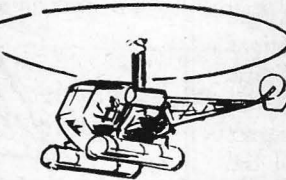
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COMING EVENTS

April 8-11—SAE National Aeronautic Meeting Hotel Commodore, New York City.

April 14-17—Design Engineering Conference, International Amphitheatre, Chicago, Ill.

April 21-22—AITA Semi-Annual Meeting, Empress Hotel, Victoria, B.C.

April 22-25—AGARD Wind Tunnel & Model Testing Panel Meeting on Ballistics, Freiburg, Breisgau, Germany.

April 28-30—IAS/USAF Office of Scientific Research Astronautics Symposium, Denver, Colorado.

May 19-22—Annual National Conference, Soc. of Aeronautical Weight Engineers, Belmont Plaza, New York City.

May 26-27—CAI Annual General Meeting, King Edward Hotel, Toronto.

June 9-10—Canadian Conference for Computing and Data Processing, University of Toronto.

June 14—Air Force Day across Canada.

June 24-26—31st Meeting, Aviation Distributors & Mfrs. Assoc., Mt. Washington Hotel, Bretton Woods, N.H.

October 8-10—IRE 1958 Convention & Exposition, Automotive Bldg., Exhibition Park, Toronto.

veiled coaxing, some American companies are now doing on their own. North American Aviation and Phillips Petroleum have formed a joint company called Astrodyne Incorporated. This firm will specialize in the development and production of solid propellents which would be suitable for such missiles as the Redstone and the Thor. There is no indication yet that this new company will propose a new missile project. But some of the ingredients for such a course are certainly there. Similarly the well known Aerojet Corporation has formed a partnership agreement with the Stauffer Chemical Company to work on boron based propellents. And other mergers and alliances seem to be shaping up on the American scene.

All these integrations of industry have a high note labeled "monopoly"—a word with a sour tone in Western democracies where laws are specifically framed to control such ventures. Yet there are certain advantages. Large companies can efficiently distribute the jobs to their own specialized plants; overhead, packing, shipping, and handling tend to be cheaper; materials can often be purchased in large lots at lower prices; more funds are often available for research. Still the average man fears the power of big concerns. Gertrude Williams pointed out in her book *Economics of Every Day Life* that the unified demands for production in

two world wars tended to bring companies together. Some of them then stayed together "so as to have a representative body capable of negotiating with the Government." In other words, big words can come from big business and the government will sit up and listen. But we worry lest the direction of endeavour they're proposing is in the interest of country or merely in the interest of the company.

Economists recognize that these large firms with only one source of business require a stable and straight forward production run to remain efficient. Since the aircraft industry is noted for its violent ups and downs it will need top rate management to sail a straight course. Moreover, as Gertrude Williams points out, "Every increase in the scale of production puts a bit more strain on the capacity of the men who are in control at the top. Not only does direction become more difficult, but any mistake in judgment is more expensive and more disastrous." The net results of these integrations, then, is a highly tuned company organization that can easily swing to costly discords if the management or the project develop even a slight degree of instability.

The Only Way: Regardless of these disadvantages, I think that the only way we can ever get these complex airplane or missile systems into being—with all their airframes, engines, electronics, specialized equipment, ground support units, systems trainers, crew trainers, ground electronic aids, and a myriad of other gear—is by an integration of industry. This integration does not necessarily have to be a permanent business structure. In fact here are a few indications that it may be better if it isn't. With the proper management, however, I don't think it matters. The basic point is that the contractors, from the first line on paper, must get together as a team. For if the team can't phase in these complex, overlapping developments, to produce the best system in minimum time with minimum cost, then no one can.

As S. Scott Hall of the Ministry of Supply said some time ago, "the aircraft industry is still pioneering." And if they don't get together and pioneer the integration of their industry then some other industrial organization will step in and do it for them. The time is fast running out.



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