

The Diefenbaker Government wants to scrap the Avro Arrow in favor of the U.S. F-108, a chemically powered interceptor still in the early stages of development.

The plan is part of a drastic redistribution of continental air defense costs and responsibilities between Canada and the United States, involving the introduction into Canada of U.S. interceptor squadrons in substantial numbers.

Whether the RCAF will retain any manned interceptor role at all will depend, according to current cabinet thinking, on whether the United States pays for and permits manufacture under license of the F-108 in Canada.

Otherwise, the role of the RCAF in air defense will turn almost entirely into that of operating the ground radar detection system and squadrons of ground-to-air missiles of the Bomarc type.

The Government is understood to have received assurances from U.S. Defense Secretary Neil McElroy that the problems of cost and manufacture will be worked out to Canada's satisfaction.

But such assurances may be rather academic in view of the fact that production of the F-108 is still some time away. Estimates vary from three to five years, but Mr. McElroy is said to have promised the work will

be expedited and the aircraft may be available during 1961.

The F-108 is a development of the North American Aviation Co. at Inglewood, Cal. A twin-jet aircraft burning chemical fuel, its specifications call for it to fly at 75,000 feet in excess of 2,200 mph, with an operational range of 1,000 miles. It will be equipped with the Hughes fire control system and the Gar-9 air-to-air missile, which is the latest nuclear-tipped version of the Falcon.

The F-108 will carry radar powerful enough to direct the aircraft on to target once the aircraft has left the ground control electronic system. This will be a new feature for U.S. interceptors, although CF-100s, current mainstay of the RCAF, have had such flexibility for some time.

The program outlined above has not yet received cabinet approval. No decision is expected until shortly before March 31, deadline set in September by the Government for deciding the fate of the CF-105 Arrow, now under suspended sentence after five years and almost \$400,000,000 spent on its research and development.

But there is no doubt in Ottawa that the Government is determined to scrap the Arrow and would have done so in September but for two reasons: the fact that winter unemployment would have been increased and the fact that nothing had been

done to fill the vacuum which would have been left by the Arrow's demise.

Hopes that the Arrow will be ordered into production rest on the slight possibility that Prime Minister Diefenbaker will decide in March that the country will not accept the political and economic implications of still further military integration, as cabinet ministers are now calling it, with the United States.

Liberal Leader Pearson intends to move, soon after Parliament opens Thursday, for a special inquiry into Canada's defense policy, with power to call witnesses from inside and outside the Government.

It is understood he will have the support of the CCF. The Government will no doubt vote the proposal down but that will not stop opposition groups from making defense, and the Arrow in particular, the central issue of this session of Parliament.

It is conceivable that political circumstances in March may result in producing the Arrow.

But the odds are strongly against it; the government's determination to ground the CF-105 may be gauged by the following events:

1. Mr. Diefenbaker in his Sept. 23 announcement used astronomical cost figures for the Arrow (\$9,000,000 per aircraft without the Astra fire control system and the Sparrow missile) which were not based on any statistics supplied by the manufacturer and which were about twice as high as they should have been even for the program then under consideration.

2. The Prime Minister's statement said the government had concluded, after receiving detailed advice from its military experts, that the RCAF Air Defense Command's requirement for supersonic interceptor aircraft will be substantially less than expected, "if in fact such aircraft will be required at all in the 1960's." This statement is true only if it means the RCAF Air Defense Command is to get out of the interceptor business and turn its responsibilities in that regard over to someone else. The government has been advised by the chief of the air staff, Air Marshal Hugh Campbell, by the chairman of the chiefs of staff committee, Gen. Charles Foulkes, and by Gen. Earle Partridge and Air Marshal Roy Slemon of the North American Air Defense Command, that the manned interceptor is essential for air defense and that substantial numbers of them will be required for the next 10 years.

3. Defense Minister Pearkes has said publicly and urged privately that the Arrow cannot be operated effectively without being controlled from the ground by an electronic grid system such as SAGE (semi-automatic ground environment), even though he has been told by the RCAF and by Avro that this simply is not so.

4. Mr. Pearkes told representatives of workers in the aircraft industry last Friday that the government had still not received a final formal proposal from Avro on costs, but it appeared that to produce 100 operational Arrows would cost the government another \$5,000,000 per aircraft. In point of fact, F. T. Smye, chairman of the board of Avro Aircraft and executive vice-president of A. V. Roe Ltd., handed Mr. Pearkes a letter last October

wherein the company undertook to deliver 100 operational Arrows at about \$3,750,000 each. This letter was followed up, at the request of the Defense Production Department, by submission by Avro on Dec. 30 of all the contractual papers required by the government within the meaning of the term "formal proposal."

5. A wide gulf of mutual distrust and suspicion now separates the Prime Minister and the defense minister from their military advisers. Military chiefs and their subordinates have been instructed not to see the press. In part, this atmosphere is due to Air Marshal Slemon's outspoken, pro-Arrow remarks at NORAD headquarters last November, but it is also due to Mr. Diefenbaker's effort to control the flow of information from Ottawa on the Arrow issue and on defense problems in general. The cabinet did not even discuss the question when it met morning and afternoon last week to prepare for the opening of Parliament; the cabinet defense committee has not sat since September.

This breakdown in the normal processes of government procedure may explain the gigantic confusion which surrounds costs and capabilities of the Arrow. Some Ottawa observers believe the Prime Minister and the defense minister have simply misunderstood or misinterpreted the information they have received.

Others offer the more sinister explanation that there is a deliberate effort to distort the facts because the government's financial position—a record deficit of \$1,000,000,000 is likely this fiscal year—will not allow it the added expense of ordering the Arrow into production.

The fact remains that Mr. Diefenbaker's Sept. 23 statement—which he drafted himself while fishing before breakfast one morning on Harrington Lake in the Gatineau—gives a false picture of the Arrow's costs.

Appearing before the Commons defense estimates committee last July 7, Mr. Pearkes agreed that the production cost of the Arrow for operational use would be approximately \$4,500,000 per aircraft. Further on in his testimony, he suggested this was the upper limit of the estimate and the unit cost might be \$4,000,000, depending on the number produced.

Whether this figure included the Astra fire control system and the Sparrow missile was not made clear. This Canadian-designed and developed equipment was cancelled in September. However, \$4,500,000 was the unit figure generally used in the Defense Department, in the Defense Production Department, and at Avro aircraft as an estimate of the Arrow's production cost with a fire control and missile system.

To produce 100 aircraft would therefore cost about \$450,000,000. Research and development costs by March 31 will total almost \$400,000,000 (this figure includes work on the Astra and Sparrow which were cancelled in September, but the saving will be virtually negated by the resulting modifications in the airframe).

To this figure must be added perhaps \$50,000,000 in further development costs by the time 100 aircraft would be operational, for a total of \$450,000,000.

Thus, the taxpayer's investment in 100 operational Arrows would be about \$900,000,000, but half of this has already been spent. It would not cost another \$9,000,000 per aircraft, as the Prime Minister said, but another \$4,500,000 per unit. The only explanation appears to be that when Mr. Diefenbaker was doing his arithmetic, he added development costs a second time.

That was in September, when the program was still in the perfectionist stage. Since then, the frills—the result of RCAF specifications as well as scientific zeal—have been cut out. Technical manuals which were to have cost about \$7,000,000 in four colors were reduced to \$700,000 in black and white.

The Hughes fire control system has been negotiated with Hughes Aircraft Co. at about \$500,000 per aircraft—less than one-sixth the cost of the Astra system, on the basis of the Prime Minister's arithmetic.

The cost of producing the Arrow could be reduced by \$500,000 per aircraft if the U.S. Air Force supplied the Hughes fire control system free. The USAF, which is eager to see the Arrow produced, has indicated to Avro its willingness to do so, but so far the Canadian Government has shown no inclination to pursue the suggestion.

Avro's commitment to build 100 Arrows at \$3,750,000 each includes the Iroquois engine, spare parts and fire control system but not the Falcon air-to-air missile. According to senior company officials, it is a bare-boned figure on which Avro could suffer heavy losses if material and labor costs increase beyond expectations.

Spread over a delivery program ending in 1963, it would mean an annual government expenditure of about \$90,000,000. This would be well within the nation's economic capacity, but it is still a dirty word to the finance minister.

The unit cost of producing the Arrow would decrease substantially if larger quantities were ordered. Crawford Gordon, president of A. V. Roe, has said the second 100 Arrows would cost \$2,600,000 each. But the numbers required are limited as long as the defense minister insists the Arrow is ineffective without electronic ground control.

Where Mr. Pearkes got this idea, both the RCAF and Avro Aircraft are at a loss to say. In the minister's view, the CF-105 cannot be used effectively unless it is directed from radar control stations on the ground, which means its range is limited to the range of the prime radar stations in the Pinetree system, or about 300 miles.

This means, Mr. Pearkes is known to argue, that the Arrow is inferior in range compared to the Bomarc guided missile, since missile bases can be built further north than aircraft bases and distance is immaterial in firing and directing the missiles from a central control point.

Senior air force officers complain privately that this negates the whole purpose of the long-range, all-weather, two-seater interceptor. They admit that the Arrow has been designed to operate within the SAGE system, the virtually automatic electronic grid which now covers the United States and is being extended into Ontario and Quebec.

As part of that system, its direction from ground radar will be limited to about 300 miles. But by adding an R-theta computer, an inexpensive device now used in the CF-100, the Arrow can search out and lock on to targets with its own radar. Its operational range is therefore limited by its fuel capacity, or about 2,000 miles.

The issue goes far to explain why research and development of the Arrow has been so expensive. No other western country has felt Canada's re-

quirement for a long-range, two-seater interceptor; the result has been the CF-105 and the Orinda Iroquois, undoubtedly the strongest airframe and jet engine in production.

For the RCAF, it meant also the best radar fire control system that could be devised, resulting in a 40-inch radar disc in the aircraft itself.

The Hughes Aircraft Co., which enjoys something of a monopoly on aircraft fire control systems in the United States, was not prepared to produce a 40-inch disc because it would have been too big for U.S. interceptors then being developed. The Canadian Government then set out to make its own from scratch, despite—according to company sources—strenuous objections from Avro Aircraft.

The result was expensive. Of the \$400,000,000 now committed to the Arrow program, almost \$100,000,000 was spent on the Astra fire control system and the Sparrow, the discarded U.S. navy missile it was designed to fire. According to Mr. Diefenbaker's calculations, it would have cost another \$380,000,000 to complete the system and produce enough for 100 aircraft.

Meanwhile, the U.S. Air Force developed a requirement, in the later versions of the F-106, for larger radar and the Hughes company produced it. At the same time, it was perfecting its missile component, the Falcon, to the point where target aircraft have been destroyed by Falcons carrying no warhead, either nuclear or conventional.

Had Canada not gone into the fire control and missile business, it is probable that research and developments costs of the Arrow and its engine would have been well below \$300,000,000. Avro officials say they had to make between 50 and 60 modifications in airframe design because of the Astra project.

Once the Astra program is stripped away, company officials say it has cost less to develop the Arrow than similar aircraft in the United States and elsewhere. They say development programs no longer start with hand-made, soft-tooled prototypes. The money spent on the Arrow thus far includes tooling up and setting up a production line; this has saved as much as two years in getting the aircraft ready for production, and it is cheaper in the long run if—as was once expected—substantial numbers of aircraft are required.

But this clearly is not in the cards. The United States has refused to buy the Arrow, and has recently cancelled further production of the F-106C and the F-106D, the U.S. equivalent of the Arrow. There is a requirement for long-range, two-seater interceptors to succeed current equipment used by NATO air forces in Europe, but it will not be filled until an integrated ground control system has been established.

The desire to jump ahead to the F-108 apparently stems from progress made in chemical fuels, which will permit bombers to fly at or above 2,000 miles per hour. The Arrow, it is learned, will be able to hit that speed with the Iroquois engine but only for a very short period of time.

But the Government's intentions will leave a vacuum of several years in the country's defenses which the military experts say cannot be filled by Bomarc missiles alone, and which are certain to lead to radical changes in the Canadian military establishment.

Article 1. By Harold Greer.

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