

SECRET

- 3 -

Feb 4/59

CF-105 Arrow Programme
(Previous reference Feb. 3)

6. The Minister of National Defence reported on the present state of the CF-105 Arrow programme. He stated that the information he had given previously, that, from the end of September 1958, until the end of January 1959, \$60 million had been spent on development of this aircraft and that, if development continued until March 31st, \$45 million more would be required. The average cost per weapons system for a fleet of 100 operational aircraft was now estimated at \$7.81 million. This excluded termination charges for the Astra/Sparrow from September 1st, 1958, which were estimated to be \$28 million. Although the cost was reduced from \$12.6 million to this figure, the Minister considered that the production of 100 such aircraft could not be justified at this price. The Chiefs of Staff were, as directed last September, urgently studying requirements, if any, for additional air missile installations in Canada, and for interceptors of the nature of the CF-105 or alternative

He recommended that development of the programme be discontinued and that the Chiefs of Staff report at an early date the recommendation they had reached to make.

An explanatory memorandum was circulated, dated 1st February, 1959, (Mr. Pearson's memorandum, Jan. 30).

7. Mr. Pearkes added that, at the moment, it did not appear to be anything in the U.S. inventory of aircraft that would justify a decision to purchase. The Chiefs of Staff were considering the possibility of moving some Bomarc squadrons moved from south of the border in the central U.S. to areas in western Canada. It was felt that the manned bomber threat was increasing, then it was obviously preferable to concentrate on offensive missiles rather than to continue with the production of interceptors.

8. The Prime Minister said it would be necessary to have a meeting of the Cabinet Defence Committee before making the final decision on the Arrow.

9. During the discussion the following points emerged:

(a) If a question on the future of the Arrow were raised when the estimates are tabled, it should be answered in a way which would show that a decision on the programme would be taken before March 31st. There was sufficient money in the estimates to pay for cancellation charges or to continue

SECRET

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(b) If the Arrow development were cancelled and no alternative interceptors were produced in Canada or purchased elsewhere, then, in the event of a war, and when the CF-100 was no longer in service, Canada might have to rely on the U.S. to provide manned fighter defence. Under the terms of the NORAD agreement, U.S. squadrons could be stationed temporarily on Canadian airfields.

(c) The personnel in the R.C.A.F. which would have otherwise been employed in flying the CF-105 and servicing it would be absorbed in work in connection with S.A.G.E., additional radars and on other duties.

(d) The re-equipping of the Air Division in Europe was a separate problem. At the moment, the most urgent aspect of the situation was a replacement, if any, for the F-86 Sabre which was obsolete. The Cabinet Defence Committee would be considering this problem and would make recommendations in the near future to the Cabinet about it. Replacing the Sabres overseas would cost at least \$350 million.

10. The Cabinet noted the report of the Minister of National Defence on the CF-105 Arrow programme and the ensuing discussion, and agreed that the matter be considered by the Cabinet Defence Committee the following day.

As reproduced from photocopies
of cabinet minutes in Arrow Scrapbook

THE PARTY LINE IN ANTICIPATION OF QUESTIONS

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#EL651W 4597



ArrowAntiICBM.jpg

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Ironclads and Arrows . . .

FOLLOWING publication of J. M. Bruce's book *British Aeroplanes 1914-18*, the naval amateurs have been similarly rewarded with the issue by Seeley Service, of Dr. Oscar Parkes' *British Battleships*. Therein the ironclads, monitors, turret-ships and Dreadnoughts pass in majestic review; and we ourselves are especially interested to note the tenacity of sail (and, for that matter, the ram also) even after the seal of Admiralty had been set on the steam engine. From the 1840s on into the 1890s both canvas and screw were being applied in combination to enhance the seagoing and warlike qualities of the old "battlewaggon"—in picturesque, if hardly shipshape, forms.

There was no weapon-system concept in the development of these vessels; no insistence on steam for steam's sake. Merely a gradual process of integration and of evolution. And we are wondering if some similar process could not yet emerge in the development of military aircraft and missiles.

It might be supposed, for example, that in every aspect of employment the anti-missile missile would prove to be very far removed from the manned fighting aeroplane. Yet the possibility is already seen that, in order to achieve its maximum kill potential, the "anti" missile may actually form an alliance with the manned fighter.

The feasibility of this rather bewildering departure has been expounded by Jim Floyd, Avro Aircraft's vice-president engineering, in an address designed to reassure his colleagues that "whereas the launching of the Russian sputnik satellites was a very significant event in the annals of aviation, its effect on the Arrow programme should be singularly positive." Mr. Floyd considers that even when the ICBM comes along the Arrow interceptor will be one of the most potent weapons in combating it. "If you think about it for a minute," he says, "the normal launching platforms for anti-missile missiles are stationary. The Russians can find out where they are and destroy them. On the other hand, an airborne missile mothership (which could be the Arrow) can be rapidly moved from one place to another carrying an anti-ICBM missile . . ."

It might be imagined that a missile suitable for carrying an anti-missile warhead would prove a formidable load even for the mighty Arrow; but Mr. Floyd had looked into the matter with a "quick specific calculation" on an ICBM approaching at Mach 10 at 200 miles above the earth. He finds that if an "anti" is launched from an aircraft flying at Mach 1.5 at 60,000ft, its thrust need be only about one-third of that required for a ground-launched weapon carrying the same size of warhead to a given point in approximately the same time. And dividends would accrue in range and accuracy.

. . . Missiles and Axes

If the manned fighter might yet be applied as an aid to the defensive missile, so might its classic powerplant, the turbojet, find a niche of its own in the missile edifice. We have remarked that the anti-missile might be expected to depart in all respects from the traditional formula of the manned fighting aeroplane; and equally it has hitherto been thought that the air-breathing turbojet would find its ultimate application in manned aircraft, or in "cruise" missiles of elementary form. But here again we are presented—by Charles G. Dibble of General Electric's Flight Propulsion Laboratory—with a new and significant possibility: namely, the application of specially developed turbojets for the initial boosting of advanced missiles. Other important missile applications are in prospect.

There are people who will not be slow to remark that both Mr. Floyd and Mr. Dibble have pretty expensive battleaxes to grind preparatory to getting them accepted into the armoury of the future. And indeed they have. But the most rabid concept-planner could hardly deny that their proposals might well affect the evolution of weapons to come—and that the grinding of the axe might defer for many a year the axing of the aeroplane and turbojet.

Accession 4598

27A.02

Bomarc1956/sensEqpt.jpg

3 May Ontario.
29 Apr 57

Air Member,
Canadian Joint Staff,
2450 Massachusetts Ave. N.W.,
Washington 8, D.C. USA

BOMARC - Liaison Activities

1 Please refer to the following:

- (a) Our 81920-105-4 (AMTS), dated 12 Nov 56;
- (b) Your 825-14-2 (AFCS), dated 3 Jan 57;
- (c) Your 25-14-2 (O Staff O), dated 25 Jan 57.

2 As indicated in reference 1(a) above, consideration of the many factors associated with activating BOMARC squadrons in the North Bay and Ottawa areas is continuing. Because these bases are essentially to accommodate the requirements of the integrated defence system of North America and because present US regulations preclude Canada from having sole custody of atomic and other sensitive equipment, a mutual USAF-RCAF effort is now favoured over the original concept of Canadian manufacture. In this latest proposal, the RCAF would supply all base facilities including shelters, launching equipment, and personnel while the USAF would supply missiles and special test equipment. In this way the bases would be assigned a priority suitable to COMAD and the USAF would be able to maintain direct custody of the sensitive equipment. It would be necessary for the RCAF to procure in the US and/or have manufactured in Canada the necessary installed and ground support equipment. Also, the USAF would be required to absorb the training of RCAF personnel.

3 The CAC has obtained the approval of the Cabinet Defence Committee to negotiate the introduction of BOMARC into the RCAF and the USAF are generally aware of and agree with the above concept. However, until our operational and planning staffs have completed the detailed requirements, decided upon the best weapons deployment, and formulated the associated programme, little detail can be discussed with the USAF. Similarly, pending the foregoing, technical effort beyond maintaining current data on the system is also being held in abeyance.

4 Because the demand for current technical information is now at a peak for planning purposes, the course of action proposed in references 1 (b) and 1 (c), above, is concurred in and should be completed as soon as possible. In the absence of a firm programme, your suggestion of a single Canadian authority or project office for handling BOMARC information and liaison is considered premature, except as now practiced unofficially within AFHQ.

5 The presently conceived limited RCAF provided equipment will decrease the number of agencies and personnel who will require direct liaison with the USAF and BOMARC contractors. Initially, this can be restricted to a very few CJS (W) and AFHQ staff members; a list of those involved at AFHQ can be provided as you have suggested at any time the present clearance procedure appears inadequate or cumbersome.

ACCESSION 4599

27A.03



NATIONAL AERONAUTICAL ESTABLISHMENT
CANADA

DE OF THE DIRECTOR

**MONTREAL ROAD
OTTAWA, ONT.**

SECRET

28 September, 1953

Air Vice Marshal D.M. Smith,
Air Member for Technical Services,
Royal Canadian Air Force Headquarters,
Ottawa, Ontario.

Dear Air Vice Marshal Smith:

A.V. Roe C/105 Design Study

In reply to your letters of 15 July and 18 September, 1953, and Group Captain Footitt's request on Thursday, September 22, we have not yet finished our assessment of the C/105 design proposal, but our preliminary comments on the Cornell wind tunnel tests are:

Although the measurements extended only to a Mach number of 1.2, and although we disagree with the claim that shock wave reflections are entirely cancelled at the wind tunnel walls, we consider that the tests were well done and that, within their range, they bear out the A.V. Roe estimates of most of the Aerodynamic parameters affecting the aircraft performance. It is important that wind tunnel measurements be extended to higher Mach numbers as soon as possible.

For Mach numbers above 1.2, we have extrapolated the Cornell data using the A.V. Roe estimates as a guide. With RB-106 engines, the attainable sustained load factor at $M = 1.5$ and 50,000 ft. altitude under combat conditions with half fuel gone is found to be very close to the required value of 2.0. (Actually it was found to be 2.05 using the A.V. Roe estimate for minimum drag coefficient and 1.85 for the corresponding NAE estimate, which was 20 percent higher at this Mach number). The calculations show that the load factor is extremely sensitive to the elevator effectiveness

Suggests the later joint letter on their visit to NACA Langley, which was much more negative towards Avro's projections, was influenced negatively by NACA Langley staff, including the legendary Dr. Richard Whitcomb.

SESSION 4600
27A.04

- 3 -

Feb 14/57

Arrow (CF-105) aircraft; undertaking to pay development costs; decision to terminate development
(Previous reference Feb. 10)

5. Mr. Green, as Acting Minister of Defence Production, stated that it was necessary to reach a decision as to whether or not a clear undertaking should be given to the Avro Aircraft Company that the government would meet the expenses involved in continuing development until notice of termination of the contract was given. The company had noted that the costs of this development were, in fact, likely to exceed the financial limitations that had been previously set on the program, and that, unless these financial limitations were increased, it would be necessary for them now to begin laying off personnel until such time as the contract was extended or terminated. The Minister proposed to reply saying that the company would be paid reasonable and proper costs incurred under the development contract until it was terminated.

6. The Minister of Finance said the Treasury Board had withheld approval of proposals of this kind in recent weeks and should not be over-ridden in this matter but should be allowed to consider it again. He noted that the board was confronted with too many such facts accomplished by ministers or departments in taking on commitments that exceeded the financial limitations that had been previously established.

- 4 -

7. In the discussion of this proposal, the opinion was expressed that, if this undertaking were now given to Avro, it would increase the government's expenditure undesirably on this contract; no such undertaking should be given but, instead, a decision should be taken forthwith on the termination of the development contract. On this latter proposal it was noted that the Cabinet was clearly of one mind that work on the Arrow should be discontinued. A decision on the matter had practically been taken weeks ago, but it had been thought that the Cabinet Defence Committee should meet and discuss it again with the military advisers of the government. This had now been done and the committee had recommended termination.

8. In further discussion the following points emerged:

(a) When a decision was announced it would be desirable to say as much as possible about arrangements with the United States on production sharing. It was not clear why the statement on that subject had been delayed. It should be recognized, however, that it was not possible to give Parliament any firm assurance as to the scale of the orders that the United States would, in fact place under the production sharing arrangements, even though the Secretary of Defence and others in the U.S. administration were well disposed to place such orders.

(b) No member of Cabinet present was opposed to the termination of the development of the Arrow, although it was recognized that the Minister of Labour, who was not present, was impressed with the employment problem that such action would create.

(c) In the statement on this matter in September, it had been said that development would be continued until March. It was noted, however, that the circumstances which had been spoken of in that statement had changed in the meantime, particularly in regard to the crisis over Quemoy, and the government, in the present circumstances,

- 5 -

(d) It was pointed out that the government faced a serious decision in regard to the equipment of the Air Division of the R.C.A.F. in Europe. The replacement for the F-86 in the Air Division might cost over \$500 million. In fact, no decision had yet been taken by the Chiefs of Staff or the Minister of National Defence to recommend replacement, and it might be that missiles would be used instead, or some other course followed.

(e) It was also pointed out that the government faced the possibility that the R.C.A.F. might be using interceptor aircraft to defend Europe but not to defend Canada itself, which would be defended by American interceptors. This would create quite a political issue. On the other hand, it was noted that the R.C.A.F. would be using Bomarcas to defend Canada, and no decision was being proposed now to use aircraft in Europe. This issue was not directly related to the decision on the Arrow.

(f) It was agreed that other ministers should be present for this major decision, particularly the Minister of Defence Production. The final decision should therefore be taken on Tuesday next and Mr. O'Hurley be asked to be present, even at the cost of having to cancel his appointment in Halifax that day.

(g) A statement should be made in the House of Commons at the same time that the company was notified of the termination, and that statement should be ready when the final decision was taken on Tuesday.

9. The Cabinet agreed that the final decision on discontinuing the development of the Arrow (CF-105) aircraft should be taken at a meeting of the Cabinet on Tuesday, February 17th, and the decision when made should be announced forthwith to Parliament at the same time that the company was informed of it.

As reproduced from photocopies of cabinet minutes in Arrow Scrapbook

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27A-05

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JOINT REPORT ON AN RCAF-DNB-NAE VISIT
TO N.A.C.A. LANGLEY LABORATORIES TO DISCUSS AERODYNAMIC
PROBLEMS OF AVRO CF-105 AIRCRAFT - 19 NOVEMBER 1954

SUMMARY

N.A.C.A. comments on CF-105 design problems are summarized as follows:

Avro's estimate turned out to be conservative.

(a) The Company's estimate of zero lift drag at subsonic and supersonic speeds should be increased by 50 percent or more.

The Arrow conformed exceptionally well to this theory in fact Avro was ahead of the US.

(b) Substantial reductions in drag throughout the supersonic speed range should be possible by proper application of the area rule.

(c) Present intake lip design is likely to result in prohibitive drag penalties at supersonic speeds.

It turned out to be the best intake design at the time, and the F-4 Phantom was modified to use one virtually identical to the Arrow... right down to the ramp and diffusion angles.

(d) The high drag due to lift associated with low aspect ratio delta wings makes them poor planforms for high endurance and long range.

(e) The high drag due to lift is not improved by the negative camber proposed by the firm. Correctly designed positive camber should be used to reduce substantially both drag due to lift and trim drag.

Was incorporated to reduce trim drag, which is what Dr. Whitcomb, present at these meetings, later realised when he "invented" the supercritical wing. The Arrow had one in 1957!

(f) A wind tunnel programme would be required to develop the means proposed by A.V. Roe to ensure intake stability.

Cured by negative camber inboard and droop outboard, plus the notch and saw-tooth on the leading edge.

(g) The CF-105 wing planform is of the type which gives serious pitch-up tendencies. Cures developed in wind tunnels do not always work out in flight.

Not true, the F-102 was worse, and REQUIRED a non-redundant tube technology directional stabilization system.

(h) The directional stability characteristics of the CF-105 are poorer than had been experienced in the United States. A wind tunnel programme should be pursued.

(i) All steps should be taken to ensure aerodynamic stability before resorting to electronic means.

(j) It is possible that the use of elevons rather than separate elevators and ailerons would result in lower trim drag and higher reversal speed.

Not true since Avro planned to add aileron trimming to the fly by wire system and be able to trim the wing across-span with speed range, not just longitudinally.

Accession 4602

27A-06

MEMORANDUM TO: Honourable Raymond O'Hurley

FROM: G.W. Hunter
Assistant Deputy Minister

Re: Arrow Terminations - Status Report

Generally, progress in terminating the Arrow Programme is satisfactory. Problems of a serious nature have been overcome and those of a minor nature are disappearing rapidly. The following report indicates the status of the termination in specific areas:

1. Plant Clearance

At Avro 90% of the work-in-process has been cleared by Crown Assets Disposal Corporation. Work-in-process at Orenda Engines Limited cannot be declared surplus because the company has been instructed to retain the engines, components and tooling. Completed engines and some of the tooling are stored in the test cells at Malton. The balance of the tooling is located at various contractors' plants pending a decision on disposal of the engines. One engine will be loaned to Bristol Siddeley in the United Kingdom, for further research and testing. The studies by Bristol Siddeley may result in the ultimate use of the engine as a power plant for supersonic jet transport. A decision by Bristol Siddeley to adopt the Iroquois Engine may result in a production programme in Canada. Convair (U.S.A.) has also expressed an interest in the engine. The tooling, complete engines and components will be retained until these two enquiries are concluded.

Engines intact after Arrow destruction, this should mean engines up to number 20 were built, or nearly built.

How could the gov't refuse since Orenda and Bristol-Siddeley were both in the Hawker Siddeley Group, which had invested in the Iroquois?

Convair, Avro's number one competitor in interceptors, express an interest in the Iroquois. They'd been looking at the J-58 and J-93 previously.

Olympus was adapted to include Iroquois technology. This engine equipped Concorde.

Accession 4603
Box 27A.07

MB1 Genie 1956.jpg

5

Proves the BOMARC was programmed since at least 1950, and so was the Genie nuclear air to air missile, which the Arrow was initially, and finally, designed for. This disproves an assumption included in the briefing notes to the Minister of National Defence as prepared by CCSC Gen. Charles Foulkes. These briefing notes were used in discussion of Air Defence with Diefenbaker and Eisenhower when, apparently, it was agreed to kill the Arrow in favour of US Canadian joint-procurement and production.

TOP SECRET

As reproduced in Requiem for a Giant by Palmiro Campagna

**THE DEVELOPMENT OF THE INTRODUCTION OF THE BOMARC
GROUND TO AIR GUIDED MISSILE AND THE MB-1 AIR TO AIR
GUIDED MISSILE ON CANADIAN MANNED INTERCEPTORS FOR THE
RCAF FOR THE DEFENCE OF CANADA**

In 1953 the Chiefs of Staff of the U.S. and Canada set up a Joint Study Group of Military and Scientific Experts to keep in constant study the problems of air defence on this continent, and in particular, to study those aspects of the North American air defence system in general, and the Early Warning System which are of mutual concern to Canada and the U.S.

With the emergence of the soviet thermonuclear weapons and long range jet bombers an Air Defence Planning Group of the U.S. Continental Air Defence and RCAF Air Defence Command were actively participating in plans for the air defence of this continent. This Air Defence Planning Group proposed to introduce a line of Bomarc guided missile bases from coast to coast crossing the U.S. and Eastern Canada at roughly the 48th parallel of latitude. To the north of this and entirely within Canada the proposal was for a line of all weather interceptor squadrons, nine of which were already in existence. Further, in order to control these weapons the adoption of the necessary ground radars and computing systems. To do this an extension was proposed of the ground environment in Canada northward to increase the depth of the combat zone for tracking; and intercepting hostile raids.

As a result of this, the Cabinet Defence Committee agreed at its 110th meeting on 13 June 1956 to recommend that site surveys be authorized in 1956 for additional heavy radars and gap fillers for this purpose. At that meeting it was also stated that further operation and evaluation of

Accession 4604
Box 27A.08

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(g) The truth was that no one could forecast with reasonable precision what the requirement might be a year hence. Each of the military services had their own special reasons for the views they held. The Navy and the Army were particularly concerned that going ahead with the CF-105 might mean less money for them in the future. However, it would be unwise to look for reductions in these two services, even with the CF-105, unless some very drastic steps were taken.

abandoned on
September 7th

(h) The Conservative Party, right from Confederation, had always been a vigorous protagonist of the theory that Canada's needs should be met from within Canada. To abandon the CF-105 even though it was so expensive and might be obsolete would be hard to explain. On the other hand, it would be equally hard to explain, in three or four years, why the government had spent vast sums of money on a relatively small number of aircraft which might by then be virtually useless.

5. The Minister of Finance reported on the representations made to him by Mr. Tory and Mr. Smye of Avro. The CF-105 programme supported 25,000 persons in employment. If it were abandoned, the highly skilled pool of talent drawn together for the project would be dispersed and many of the people concerned would go to the United States, never to return. No portion of Avro's profits had been invested in other sectors of the group of which Avro was now a part except in the aircraft industry. Although controlled by the Hawker-Siddeley group, Avro was in large part owned by Canadians. They had stated that the R.C.A.F. made a major mistake three years ago by recommending the adoption of SPARROW and ASTRA. A great deal of money could be saved by using the FALCON and the Hughes fire control system. Finally, they said that, if the programme with their proposed modification were continued, their company would have a reasonable opportunity before the end of 1962 to look for other business. If they found little or none, then Avro would be in real difficulties.

Mr. Fleming said he had pointed out to Messrs. Tory and Smye that their arguments, that the Falcon missile and Hughes fire control system developed by the United States should be good enough for Canada, could also be used against them in regard to the airframe and engines which they wanted produced in Canada by their own firm. Mr. Smye, in particular, had been very critical of some R.C.A.F. decisions and officers.

3 September, 1958 Cabinet minutes, page 2
Cabnt3Sept58pt2.jpg

SECRET

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6. The Minister of National Defence felt bound to say that the R.C.A.F. had conscientiously made the recommendations they thought would be the best in the interests of the defence of Canada. The government of the day was responsible for the decisions reached and the present government would be responsible for any decision on the future of the CF-105. He also said that the figures on savings mentioned by Mr. Smye should be treated with reserve. The latter had not been aware, for example, that there were a number of types of FALCON.

7. The Cabinet deferred decision on the recommendations of the Cabinet Defence Committee regarding air defence requirements, including the future of the CF-105 programme.

And they kept deferring, over and over again, until February 14th, 1958, despite pressure from Pearson, Fleming and Blakenhake. DDP minister O'Hurley was conspicuously absent from these minutes.

R. B. Bryce,
Secretary to the Cabinet.

Accession 4605
Box 27A-09

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UNLIMITED

Meeting to Discuss CP-106 Problems
20 and 21, 1964National Advisory Committee for Aeronautics
1818 H Street, Northwest, Washington, D. C.Introduction

A meeting was held at NACA Headquarters on December 20 and 21, 1964, between Canadian officials, representatives of A. V. Roe (Canada) Ltd., and NACA staff members to discuss technical problems in connection with the CP-106 airplane design. The following were in attendance:

Abbott, Dr. H. - Headquarters, National Advisory Committee for Aeronautics (Chairman)
Ames, M. B., Jr. - Headquarters, National Advisory Committee for Aeronautics (part time)
Armstrong, A. W. - Squadron Leader, Royal Canadian Air Force (part time)
Chamberlain, J. A. - A. V. Roe (Canada) Ltd.
Cremley, John W. - Headquarters, National Advisory Committee for Aeronautics (part time)
DeBorja, J. - Squadron Leader, Royal Canadian Air Force (part time)
Dryden, Hugh L. - Headquarters, National Advisory Committee for Aeronautics (part time)
Fligot, J. C. - A. V. Roe (Canada) Ltd.
Goodrich, R. B. - Group Captain, Royal Canadian Air Force
Frick, Charles W. - Ames Aeronautical Laboratory, NACA
Gilchrist, A. W. R. - Defence Research Board
Green, J. J. - Defence Research Board
Lindley, R. H. - A. V. Roe (Canada) Ltd.
Lund, J. H. - A. V. Roe (Canada) Ltd.
Macphail, D. C. - National Aeronautical Establishment, Canada
Morris, J. - A. V. Roe (Canada) Ltd.
Pearson, E. O. - Headquarters, National Advisory Committee for Aeronautics (part time)
Plant, J. L. - Vice Marshal, Royal Canadian Air Force
Runge, P. T. - A. V. Roe (Canada) Ltd.
Temple, R. J. - National Aeronautical Establishment, Canada
Toll, Thomas A. - Langley Aeronautical Laboratory, NACA
Whitcomb, Richard - Langley Aeronautical Laboratory, NACA
Woodward, P. A. - A. V. Roe (Canada) Ltd.
Wyatt, D. D. - Lewis Flight Propulsion Laboratory, NACA

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2

Design

The following paragraphs summarize the discussion.

It was basically agreed that, in line with the area distribution curves at Mach 1.5 submitted by AVRO, and provided that (a) the intake and ramp bleed areas be investigated and cleaned up where necessary, and (b) the airbody is well faired in after the nacelles, the zero lift drag at Mach 1.5 may be as low as .020. This value may be approached by further model investigations. The AVRO estimate from area distribution and skin friction considerations was .0184. The configuration is considered to be generally reasonable with regard to drag.

JOINT PAPER produced after Avro's engineers visit NACA to discuss their earlier, harsh, condemnation of the Arrow design.

High Dryden claimed, the NASA Dryden Flight Research Center at Edwards Air Force Base is named after him. Jack Ames was also there, and the NASA Ames Research Center is named after him. Richard Whitcomb was there, and he had invented the "area rule" theory, and later the supercritical wing. Avro's Jim Chamberlain had an excellent knowledge of the concept, and the Arrow wing was actually a supercritical airfoil, the negative camber being designed to reduce trim drag, just as the underside curve of Whitcomb's much later supercritical airfoil did.

WingPositive Camber

It was agreed that there is little to be gained by convex positive camber for the particular mission of this aircraft, i.e. Mach 1.5 at 50,000 feet, and there might be some loss of maximum supersonic speed. It was agreed, however, that to get the maximum flexibility in the aircraft, it would be a good thing to provide structurally for the possible future application of positive camber at the leading edge in case the emphasis shifted from the supersonic mission to a long-range type of mission, provided that the structural penalties are not too severe. AVRO's reasons for going to negative camber were also understood and appeared reasonable.

Pitch-up

It was agreed that the notch or leading edge extension proposed by AVRO should allowable pitch-up, and that there would be a drag increment of between .001 and .002 at supersonic speeds to be added to the above estimate.

Intakes

It was generally agreed that the amount of diffusion and the diffusion angle involved at the intake were not excessive. AVRO pointed out that if tests later showed that a parallel section of duct was necessary to provide stabilization, this could be done without extensive structural modification.

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This problem of intake instability was agreed to be difficult and even vicious, and this required extensive test work prior to flight since it could have catastrophic effects in flight.

Stability

It was generally agreed that while artificial lateral stabilization is undesirable in itself, the obvious aerodynamic curves such as a large increase in the area could be unacceptable so far as performance of the aircraft is concerned. A concentrated test program was recommended to explore aerodynamic means of providing lateral stability, particularly the and rudder effectiveness.

It was particularly suggested that AVRO examine the effect of low directional stability. AVRO is doing a dynamic analysis. It was recommended that the degree of freedom should be examined since the side of the air has now reached a point where the dynamic behavior of aircraft cannot be predicted from a cursory examination of the configuration and derivatives. AVRO agreed and is checking those areas of the flight envelope which are considered to be critical. It was noted that problems of this type are not peculiar to the CP-106 configuration but appear to be associated with the mass distributions of modern high performance fighters.

12/22/64

Assignment Director for Research
National Advisory Committee for Aeronautics

Circ

Y903 MA01

ACCESSION 4606

Box 27A.10

1955 CSC Arrow.jpg

SECRET

MEMORANDUM TO THE CABINET DEFENCE COMMITTEE

CF 105 Development Programme

OCT 3 1955
1138CF105-FO
CAG:dt

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-2-

1 The Committee will recall that at the 104th Meeting on 3 May 1955, consideration was given to a preproduction programme and the development of a power plant for the supersonic all-weather fighter aircraft (CF105). At that time it was pointed out that, to meet the threat of Russian bombers as then envisaged, the Cabinet Defence Committee, at its 97th Meeting of 2 December, 1953, had approved a development programme for the CF105 and the building of two prototype aircraft as the first phase of this programme. In the interval, the unexpectedly early emergence of the Russian long-range jet bombers and nuclear weapons had greatly accentuated the threat to North America, both in point of time and scale of attack.

2 It was further pointed out that from the commencement of the CF105 programme, the Defence Department had carefully scrutinized all aircraft and guided missile projects under development in the United States and the United Kingdom, with the object of modifying or discontinuing the CF105 programme if such action appeared justified by virtue of the project being overtaken or duplicated by the efforts of our Allies. Because of the accentuated threat, adoption of new procedures which would accelerate the entire project was recommended. The new plan envisaged the fabrication of 40 preproduction aircraft for testing purposes in the early stages of the programme, resulting in a very much earlier entry of the aircraft into operational service to counter the threat. By this method the development and testing time of the aircraft could be reduced from 8½ years to roughly 2½ years. While this would entail higher initial expenditures the overall cost would be reduced. The plan called for an initial order of 11 preproduction aircraft and a second order at a later date for an additional 29 preproduction aircraft. The total expenditure for the 40 CF105 preproduction aircraft including engines, spares for aircraft and engines, and the necessary tooling, would be approximately \$191,000,000. At the same time consideration was given to the proposal to develop a power plant for the CF105 supersonic aircraft by the Oranda Engines, Limited, of Toronto, and the estimated cost of the engine development programme (14 engines), plus production tooling to be \$69,933,879; the production costs of the engine to be somewhere in the vicinity of \$200,000 each.

3 The Committee agreed to recommend:

- (a) that a preproduction programme for 40 CF105 aircraft in controlled phases be approved, at a total estimated cost of \$191 million, the expenditure to be allocated as submitted, from 1954-1960, and to be met from defence estimates presently contemplated for the next few years; and
- (b) that a development and tooling programme for the PS13 engine amounting to 14 units at a cost of \$70 million, to be spread over 1954-58, be approved; the cost also to be met from defence estimates presently contemplated for the next few years;

It being understood that the programme for both the air frame and the engine could be halted or abandoned at appropriate stages if this was found to be expedient or necessary.

Disposal of
CAG:dt
27 Sep 55 Jm

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4 Subsequent to the 104th meeting of Cabinet Defence Committee, certain developments have occurred which I wish to bring to the Committee's attention.

Increased Costs

5 Cabinet approval for the forty CF105 aircraft provided 191 million dollars additional to that which had already been provided for the development and production of two prototypes. The presently approved programme totals 211 million. The Company has now submitted a reassessment involving an additional 59 million dollars, related in the main to increased labour and raw material costs, additional engineering hours to provide for the installation of the Canadian PS 13 engine which was approved subsequent to the original estimate, and in part to an under-estimation in the original estimate for the engineering and test programmes required to produce such an advanced type of aircraft as the CF105.

6 A detailed examination is now being carried out between the Departments of Defence Production and National Defence and the Company to determine the possibility that some reduction may be achieved in the new total cost without seriously affecting the programme.

Comparable U.S. and British Aircraft

7 Close attention continues to be paid to achievements and intentions of the U.S. and Britain in comparable types of fighter aircraft, with the object of determining whether changes to the Canadian program would appear to be justified. The U.S. has made appreciable progress with its F102 all-weather fighter and a close study of it as compared to the Canadian CF105 is under way.

Both rejected, they were, literally, half the aircraft in terms of range, concept and performance.

8 A recent decision of the USAF to modify and adapt its F101 long range escort fighter to the all-weather role as a stop gap measure is also being closely studied, particularly a comparison of our aircraft with it.

9 It is significant that, four years after our concentration on this particular type of aircraft to meet our future requirements, the U.S. and Britain have both recently drawn up requirements for a supersonic all-weather 2 seater fighter closely similar to the Canadian CF105. This would appear to substantiate the wisdom of our course of action. We now propose to further investigate with the U.S. and British authorities what steps might usefully be taken to avoid unnecessary duplication of effort and cost, and to determine in what way our Canadian programme could be fitted in.

Improvements planned for the CF100 aircraft

10 Certain improvements in altitude performance and guided missile weapon capability for our existing CF100 sub-sonic fighter are under urgent study, with the object of giving it some capability against the future Russian bomber threat. The degree of success of these measures may have some influence on our future decisions with respect to the CF105 programme.

Documents show that the RAF and Ministry of Supply investigation of the Arrow stunned British designers and resulted in the abandonment of many projects, and the hurried conception of many more. One of these was the Pegasus Delta III, eventually selected, albeit briefly, to become the RAF's new high performance interceptor. It, like the American F-106, was a virtual copy of the Arrow. Both were used to justify, by forces of both parties in both nations, decisions by those nations not to buy the Arrow.

.....3

261 million in 1954 dollars. The program cost roughly that up to the budget year mentioned, Astra and Sparrow not being included in either estimate. Arrow's "enormous cost over-runs" are largely myth, due to what happened to the budget estimates when ASTRA-Sparrow spun out of control, - which were not Arrow products.

7

ACCESSION 4607

Bot 27A.11

SECRET
 8 107800-105-100 (A/CN/OTM)

REPORT OF A MEETING
TO REVIEW A BRITISH ATTACHMENT OF THE CFVOS
HELD AT THE AIRCRAFT. DIVISION
AT 0900 HRS - 3 NOV 55

OTTAWA, Ontario
 3 November, 1955.

PRESENT:

USAF Team:

Maj. Gen. G.E. Price	Director of Requirements and Deputy Chief of Staff (Development) USMAF
Colonel A.S. Kelley	Chief of Air Defense Division Directorate of Requirements HQ, USAF
Brig. Gen. D.R. Gutzmer	ANDC HQ
Colonel E. Ljunggren	Directorate of Air Weapons Systems ANDC HQ
Major J.C. Bowman	Directorate of Air Weapons Systems ANDC HQ
Colonel C.B. Dwyer	Air Defense Group, R & D, HQ USAF
LA-Col. J.W. Bennett	" " " " " "
Major W.B. Barrow	" " " " " "
LA-Col. E.F. Elm	Chief of Propulsion Branch, Aero- nautical Division, R & D, HQ USAF
LA-Col. W.J. Henderson	Fighter Branch, Directorate of Operations, HQ USAF.

RAF Team:

A/VN M.M. Hendrick	AMTS
A/C J.L. Barton	CAIS
A/C F.D. Carpenter	CCPS
C/C E.E. Fostell	AMTS/CAIS
C/C E.M. Alderson	AMTS/CAIS
M/C J.R.D. Brown	DCS/CAIS
S/L A.E. Dutton	CAIS/PSO
M/C E.J. Brough	CC TMS AFHQ

INTRODUCTION:

1. A USAF team had been invited to visit CFVOS to study the CFVOS program and to form an independent opinion on the technical and operational soundness of the project. The USAF and RAF teams met in the morning of 31 Oct. The concept, estimated performance, and schedule for the CFVOS were reviewed, and the CFVOS mock-up, model shop, and tooling type of AFRO Aircraft Limited were visited.

Accession 4608

Box 27A.12

binet minutes, August 25th, 1958

bnt28Aug59.jpg

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- 6 -

air defence requirements, recommendations of Cabinet Defence Committee

14. The Minister of National Defence said that the Cabinet Defence Committee had reviewed the air defence requirements for rounding out the air defence weapons system against the manned bomber. The committee had agreed to recommend that two BOMARC bases be created in the Ottawa and North Bay area, and no additional heavy radars installed in Northern Ontario and Quebec with associated gap-filler radars. It was also proposed that negotiations be started with the U.S. for the cost-sharing and production-sharing of the BOMARC bases and equipment and the heavy radars and related equipment. The committee had referred to the cabinet for consideration proposals to cancel the CF-105 programme and to investigate additional missile installations and a possible alternative interceptor to the CF-105.

Last October the Cabinet had approved continuation for another twelve months of the CF-105 development programme, which included the ordering of 29 pre-production aircraft, improvements in tooling, acceleration of the development of the Iroquois engine, and the continuation of the necessary related programmes. On a project such as this there were two main phases: development and pre-production and, then, production or operational service. These overlapped. The first as now well advanced and a decision was therefore urgently required as to whether or not to go into production.

The R.C.A.F. now had nine all-weather squadrons and the present programme called for their re-equipment with the CF-105, requiring a production order of 169 in number. These, together with aircraft recovered from the development and pre-production order for 37, would provide sufficient aircraft for nine squadrons. The total cost would be \$2 billion spread from 1959-60 to 1963-64.

AHA! Foulkes and he the culprits.

Why did this drop to 69 later?

NOT TRUE

A study of the implications of continuing this programme, its impact on the whole defence programme and the necessity of considering future requirements, such as defence against intercontinental ballistic missiles, had necessitated a review of the air defence programme. The Chiefs of Staff had undertaken such a review. The main points that were considered were the following:

The assessment of the threat to North America had changed. In the 1960's, the main threat would probably be from ballistic missiles with the manned bomber decreasing in importance after 1962-63. However, a combination of the two might be the threat until Soviet manned bombers were depleted. The rapid strides in technology were such that to provide a suitable manned fighter to cope with heavy jet bombers was extremely expensive. Furthermore, ground-to-air missiles had now reached the point where they were at least as effective as a manned fighter, and cheaper. The original requirements in 1953 for between 500 and 600 aircraft of the CF-105 fighter had been drastically reduced. Subsequently, thought had been given to reducing it still further now that the BOMARC missile would probably be introduced into the Canadian air defence system. Finally, the cost of the CF-105 programme as a whole was now of such a magnitude that the Chiefs of Staff felt that, to meet the modest requirement of manned aircraft presently considered advisable, it would be more economical to procure a fully developed interceptor of comparable performance in the U.S.

The Minister proposed that the recommendations of the Cabinet Defence Committee on the BOMARC bases, the heavy radars, the gap fillers, and on negotiating with the U.S. regarding cost-sharing and production-sharing be approved, and that consideration be given to abandoning the CF-105 and to authorizing the Chiefs of Staff to investigate an alternative for it and to consider any additional missile installations that might be required. He himself recommended cancelling the CF-105 programme in its entirety and deferring for a year any decision to order interceptor aircraft from the U.S.

An explanatory memorandum had been circulated, (Minister's memorandum, Aug. 22, 1958 - Cab. Doc. 247-58).

Shows he knew interceptors still required.

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15. Mr. Pearkes explained that the CF programme consisted of four major projects; the air development of which was being undertaken by AVRO in Toronto; the Iroquois engine at Orenda Engine Ltd., also in Toronto; the fire control system (on which Westinghouse in Hamilton was co-operating with a U.S. company, and the weapon (SPARROW) of Canadair in Montreal was co-operating with a U.S. company. There were, of course, several sub-contractors in many parts of Ontario and Quebec. He outlined some limitations of the aircraft, some details of the costs involved, and some of the difficulties that had been encountered since the programme's inception. Not long ago he had been disposed to recommend that it go ahead and aircraft be ordered for squadron service. However, the change in the nature of the threat and the very great cost of development and production had brought him to make the recommendation he had. He was fully aware of its seriousness but he had made it after very careful study of all the factors involved.

He went on to describe the semi-automatic ground environment (S.A.G.E.) system and the steps that had to be taken to introduce it, whether or not the government decided to proceed with the CF-105. He also described the U.S. intentions on BOMARC and how they related to Canada. In addition to installing two such missile sites in central Canada, it might also be desirable to install one base in the Vancouver area and one in the Maritimes. There were considerable advantages in adopting BOMARC. It was cheaper than the CF-105 in terms of men and money, and just as effective. The missile could be fitted with an atomic warhead and the U.S. would probably supply heads on the same basis ("key-to-the-cupboard"), as they made atomic weapons available to the U.K.

As regards aircraft, the U.S. authorities had made it quite clear that they did not intend to buy any CF-105s. Their own F-106C was comparable in performance to the CF-105, it would be available for squadron service several months earlier, and it cost less than half as much. The U.S. was also developing the F-108, a huge aircraft with a range of approximately 1,000 miles.

His recommendation to abandon the CF-105 and investigate other aircraft and missile possibilities meant that the government would have a year to decide whether it should re-equip air defence fighter forces wholly with the BOMARC, or an alternative aircraft, or a combination of both. Within that time there should be a better understanding of Soviet intentions as to whether they were likely to introduce more or better bombers, or go completely into missiles.

FOULKES opinion, NOT the CSC

ACCESSION 4609

Box 27A.13

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THE DEPUTY SECRETARY OF DEFENSE
WASHINGTON 25, D. C.

75 MR. DOUGLAS

June 1, 1960



5

**MEMORANDUM ON PRODUCTION SHARING PROGRAM --
UNITED STATES AND CANADA**

The current program dates back at least to 1941 and the Hyde Park Agreement. This agreement provided generally that Canada and the U. S. should attempt to coordinate activities so that each would produce in areas of greatest capability. In 1950 a Statement of Principles of Economic Cooperation was issued by the Truman Administration. It advocated, among other things, a coordinated program of requirements, production and procurement; the exchange of technical knowledge and productive skills; the removal of barriers impeding the flow of essential defense goods. In 1950 a DCD Directive on Defense Economic Cooperation with Canada was issued. A Presidentially approved NSC paper, 5822/1, dated 30 December 58, reaffirmed the Statement of Economic Principles and provided for equal consideration to be accorded the business communities of both countries.

Prior to the NSC paper, and following a visit of the President to Canada in July 1958, Canada took the following actions with the understanding that her defense industry depended largely upon the U. S. canceling defense business into Canada: Cancelled the CF 105 and related systems contracts; decided to make maximum use of U. S. developed weapons, integrated into NORAD; worked with the U. S. toward a fully integrated continental air defense.

The U. S. in turn established a Production/Development Sharing Program with Canada with the first quarterly meeting in October 1958. Since then, policy obstacles impeding a free flow of business have been modified in a number of areas such as: Buy American Act; duty free entry of defense goods; security requirements; etc. Also, working groups have been set up on programs of mutual interest (for example, BOMARC); cost sharing agreements have been worked out; and possible joint development programs are being explored.

The last quarterly meeting of the Production Sharing Policy Group was held on 25 May. Despite all efforts, over the period 1 January 59 through 31 March 60, Canadian defense business in the United States almost doubled that placed in Canada. Canada is not satisfied with these results, nor do they appear acceptable from our view.

We must: re-emphasize the program of development sharing activities; encourage American industry to subcontract in Canada; and seek out other legitimate techniques to stimulate the program. Canada should be encouraged to energize her industry which has not displayed the necessary aggressiveness.

SEE
1960 BETRAYED.JPG



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ACCESSION 4610

Box 27A. 14

Cabnet 28 AUG 58.jpg

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Decisions could be taken in the light of the then existing information. Abandoning the CP-105 would of course be a rude shock to the aircraft industry, but it would not mean its complete cessation. DeHavilland would not be affected nor would the transport and marine aircraft sections at Canadair.

points emerged: 16. During the long discussion the following

(a) It was doubtful if the BOMARC missile or components could be manufactured in Canada. However, the launchers might be.

Why? Avro made a proposal for just that in 1957.

(b) Layoffs involved in abandoning the CP-105 would amount to well over 25,000 and there was some doubt as to whether these workers could obtain alternative employment. This would have an extremely adverse effect on the economy which now needed every push it could get. This was the most serious aspect of the proposal.

Britain tried to buy them in 1956, and were looking again as of winter 1958

(c) It was argued, on the other hand that, surely, in an economy as potentially vigorous as Canada's, employees would soon be absorbed in other jobs. There was no more expensive way of keeping people at work than by the CP-105 programme.

(d) If the CP-105 were not abandoned, it would mean an increase in the defence budget of \$400 million a year for several years. Even without this the deficit in 1959-60 would be as much as in the current year. If it were at all responsible, the government would have no alternative but to increase taxes should the 105 be put into production. Adding it to Avro was planning, the present overall rate of deficit would mean the wrecking of Canada's credit and the stimulation of inflation.

(e) The CP-105 would be of no use against ballistic missiles. It would, however, be effective against air-breathing, unmanned bombers. There was no chance of having an anti-missile missile by 1960 or 1961. The Sparrow, with which the CP-105 was to be equipped, could not be fitted with an atomic warhead.

Not according to Douglas, maker of the Sparrow 2.

SECRET

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ridiculous, Avro was already studying several missile options and had been since 1956 at least.

(f) Although it would be most helpful if the facilities presently used on the CP-105 programme could be converted for the development of missiles, this was highly unlikely. The best possibility for the future was a production programme of partnership with the U.S. The U.S. authorities had indicated they would be willing to allocate a significant share of future missile development to Canada, but this would not occur for some time and would mean considerable discussions with them. The U.S. had not yet reached a decision on the type of anti-missile missile they would require.

(g) The United Kingdom would not buy the CP-105 and it was most unlikely that any other N.A.T.O. country would either. The U.K. was practically out of the interceptor field and was concentrating on missiles, many of which were being acquired from the U.S. Indeed, the whole trend in Europe was towards missiles, but the air defence problem there was different to that in North America.

(h) One means of helping the aircraft industry would be to manufacture transport aircraft, under licence for Trans-Canada Air Lines and possibly other domestic users.

(i) The evidence available indicated that the U.S.S.R. did not intend to match the U.S. with a long range air force similar to the Strategic Air Command, or come anywhere near it. Recently, the U.S. thought the Russian bomber force was bigger than we did. Now this was not the case. The intelligence authorities were coming to the view that the U.S.S.R. would not launch an attack until it was clearly superior in ballistic missiles to the U.S.

Dulles intel, NOT agreed by Britain, RCAF, or USAF.

(j) The U.S. was planning to equip its air defence forces half with missiles and half with aircraft. Should not Canada plan to do roughly the same thing? If the CP-105 were discontinued Canada would be completely dependent on the U.S. for equipment for the R.C.A.F.

(k) The CP-100 would soon be obsolete and there was no demand for it here or from abroad. No help for the industry, therefore, could be expected by way of more orders for it.

NATO had been asking for an improved CF-100 when Peakes took office.

SECRET

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(1) On military or financial grounds it seemed clear that there was no reason to continue the programme. Indeed, many members of the Conservative Party had said in the past that it was quite unwise for a country of Canada's size to attempt to develop an aircraft of this kind in the first place. Instead, they had advocated the manufacture of military aircraft under license. However, to abandon the CP-105 now and undertake to produce the U.S. F-106C, which was physically quite possible, would be a serious political mistake.

17. The Cabinet deferred decision on the recommendations of the Cabinet Defence Committee regarding air defence requirements, including the future of the CP-105 programme.

R.B. Bryce,
Secretary to the Cabinet.

ACCESS/6 A 4611
Box 27A.15

RAForder.jpg

INCOMING CLASSIFIED MESSAGE				STANDARD OFFICE FILE MAR 18 1952
PRECEDENCE - ACTION PRIORITY		PRECEDENCE - INFO PRIORITY	DATE - TIME GROUP 191052	MESSAGE INSTRUCTIONS VCAS
FROM CANAIRLON				SECURITY CLASSIFICATION SECRET
TO CANAIRHED				ORIGINATOR'S NUMBER A121 19 MAR
INFO				
VCAS FROM MARTYN PD LAST NIGHT IN CONVERSATION WITH CAS HE REMARKED THAT THE CESSATION OF THE ARROW PROGRAMME APPEARED TO HIM TO BE A GREAT TRAGEDY AND HE WONDERED WHETHER IT WOULD BE POSSIBLE FOR THE RCAF TO SALVAGE SOME OF THE AIRCRAFT FOR FLYING RESEARCH AND DEVELOPMENT PD HE ADDED THAT AS FAR AS HE WAS CONCERNED HE WOULD LIKE VERY MUCH TO HAVE AT LEAST ONE SQUADRON OF ARROWS IN THE RAF SINCE CMM IN HIS OPINION CMM IT WAS AN OUTSTANDING AIRCRAFT AND FAR IN ADVANCE OF ANYTHING IN EUROPE PD HE REMARKED THAT ONLY TIME WOULD TELL IF CANADA HAD MADE THE RIGHT DECISION BUT TO HIM THE ANNOUNCEMENT APPEARED TO BE BASED PRIMARILY ON REASONS OF ECONOMY AND NOT DEFENCE				
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FORM 5-61 (REV.)
12-5-52

ACTION COPY

ACCESSION 4612

Box 27A.16

This portion of the Aide Memoire given to the Minister of National Defence, Pearson, relates the responses of the Chiefs of Staff to requests from the government to provide alternatives, and their rationale, to the Arrow. It is important to remember that these recommendations were formulated on established criteria, including that Canada had to equip with Bomarc and Sage, and could not afford to pay for Bomarc, Sage and the Arrow. The document pointing this out is referenced here as being generated by the Finance Dept. The other condemning features include the study by the Dept. of Defence Production in cooperation with the Dept. of National Defence, reinforcing those criteria.

Folkers Amdement 1. JTG

AIDE MEMOIRE FOR THE MINISTER

ADVANTAGES AND DISADVANTAGES
OF CONTINUING PRODUCTION OF THE CF105

25 Aug 58

SECRET

- 3 -

SECRET

ADVANTAGES

Political

- (a) Will avoid an awkward announcement of closing down the A.V. Roe and Canada engine plants, which will also involve many subsidiary plants. However it will be realized that even if the CF105 is allowed to proceed, the plants will all have to close down by 1965.
- (b) Will avoid an explanation of the waste of \$400 million (to \$500 million had been spent, \$342 million by cancellation).

250 million

While the responsibility can be placed on the previous government, it should be borne in mind that this government made the decision last October to continue the programme for one year without too close an examination of the future requirements, based mainly on preventing lay-offs in the A.V. Roe and associated industries.

- (c) Will avoid a serious political criticism that the government is giving only lip service to the development of scientific and technical development in Canada and that because of financial considerations the government is now turning its back on further scientific and technical development in the fields of defence, aviation, electricity and defence electronics. Any such action may be interpreted as a serious setback to scientific and technical development and Canadian industrial potential.

This clearly shows that Foulkes is responsible for the content of this document, and it shows what his personal view of the Arrow program was. CDS Campbell and AM Semon and CMC NORAD and USAF Gen. White, and so many others didn't subscribe to this view at all.

2. Defence Production

There appears to be considerable defence production advantage in maintaining the development and production, particularly in the defence electronics and subsidiary fields. While perhaps there is no direct other aviation production in Canada to allow A.V. Roe to close, this is not the case in the defence electronic industry, which is just beginning to take operational field. A shut-down of the newly created electronic and subsidiary development facilities may seriously hamper any participation in the development of the defence against the ECBM, which may be a requirement within the next two years.

3. Labour
O'Hurley

Defence Production points out that the abandonment of this project would mean unemployment in the Toronto area of 26,000 men. There is no alternative production that could be put into A.V. Roe and the Canada engine plants. Even if a substantial aircraft for the CF105 were selected, it would not meet the immediate situation as it would take twelve to eighteen months to obtain necessary manufacturing for tooling, etc., for any other aircraft to replace the A.V. Roe aircraft.

4. Military

Layoffs yes, but a lot of work consuming the production line(s) and shift too. The key people would remain, while the rest could be called back or replaced.

The production of the CF105's would meet the minimum reasonably military requirements for interceptor aircraft but it is not expected that any other interceptor aircraft will be produced in Canada, and new whole reliance is expected to be placed on present-day missiles in the future.

1. Military

The military disadvantages are pointed out in the Cabinet paper already circulated (para. 9):

- (a) The changing threat, where it is estimated that the manned bomber will not be the major threat in the period of the life of this aircraft.
- (b) The rapid advances in technology, where the substitute such as Bomarc will provide a cheaper and more effective type of defence against the manned bomber.
- (c) The diminishing requirements for the manned bomber.

The following further points should also be considered:

The need to keep flexibility in our military structure so that there would be sufficient room to do research and development with the United States on defence against the ECBM.

2. Financial

- (a) A further disadvantage is financial. This is outlined in para. 9 (d) of the Cabinet paper and in the Appendix. It is quite clear that this aircraft will require almost \$500 million to complete development and then it will likely cost between \$10 and \$12 million a copy for production. It should be emphasized that these costs cannot be guaranteed, and in the recent study carried out by the Department of Defence Production and National Defence it was stated:

"The assurance can be given that further increases will not occur. These increases depend on many factors such as, wage increases, application of overhead, and the volume of hardware which may be expected from all defence contracts."

about 200 million per production being made for parts

This price included the preparation of runways to forward deployment bases, their ground handling equipment, electricity, fuel, spare engines, and most other parts, test equipment, a stockpile of weapons, the radar, runway extension and landing at several bases, and much more. It is even believed that development costs to them were rolled into this figure. It was certainly LIGHT YEARS from a PRODUCTION cost.

The facts show the Arrow 2, never mind the Arrow 3, 4, and F-2 ramjet-boosted and titanium skinned versions, would remain the top performing Combat Air Patrol aircraft on earth today.

Accession 4613
Box 27A.17

This memo was composed by Foulkes as an aide-memoire in talks with the US President and Secretary of State. Highlighted areas are incorrect assumptions, some of which were definitely not agreed to willingly by the CAS of the Air Force. In fact AM Hugh Campbell, CAS, let it be known to the CBC as related in their documentary "There Never Was an Arrow", that the Chiefs did not recommend cancellation. I Gen Reg Lane, a personal contact, is also interviewed in the documentary and states that they had been asked, by the government, to develop reasons other than economic, that would justify Arrow cancellation; i.e., operational reasons. He said "We just couldn't do it!"

SECRET

- 4 -

If the pattern of past performances follows in the future, we can expect these costs to rise twenty-five to fifty per cent, especially in the electronic and missile part of this project. The adoption of a limited programme would still require all the overhead and additional facilities required for manned aircraft, such as:

done anyway, as all the airport anyway, and other stuff that had been tacked on to the Arrow price per plane.

Additional facilities on airfields	-	\$ 20 million
Supersonic Drones	-	14 million
Supersonic Flight (Training) Simulators	-	20 million

(b) On the other hand, Appendix 'A' shows very clearly that a programme involving 100 aircraft purchased from the United States could be obtained at much less cost than completing the development of the CF105. It would then be possible to buy spares and replacement equipment from the United States as they are required; whereas if we complete the CF105 we will be required to provide estimated life-time spares as the factories would go out of production on completion of the order. It should be realized, in purchasing a fully developed U.S. aircraft, that the development has been completed and our orders would be tacked onto the end of the U.S. production run. All we would really pay for would be materials and labour costs, as overhead and development would already have been paid for in the U.S. order. Furthermore the United States produce a series of aircraft, which involves anywhere from 600 to 1000 aircraft, and therefore the prices can be much lower.

(c) Considerable savings can be made in the use of missiles instead of manned aircraft:

(1) the numbers required to man a Bomarc battery are between 100 and 200, whereas a squadron of aircraft requires some 400 to 500.

- 5 -

(2) aircraft are required to operate continuously to keep the crews in shape; missiles do not require any operating costs but just maintenance and a few practice missiles.

Therefore economies can be expected in the operational and maintenance fields by the use of missiles.

(4) There is some concern in the Defence Department that a continuation of the CF105 programme would not leave the programme flexible enough to allow for other urgent projects; such as re-arming of the Air Division, defence against ballistic missiles, development of submarines for anti-submarine work, and development of up-to-date equipment for the Army. A careful study which was made last autumn shows very clearly that there is no room in the present defence programme for major economies which would be required to carry out this programme. Therefore an increased budget must be anticipated if this development and production of the CF105 is to continue.

3. Nuclear Warheads

The abandonment or limitation of manned aircraft in the air defence system and more reliance being placed on ground-to-air missiles would bring about a necessity for arrangements to be made for the use of nuclear warheads for air defence. It is not possible to put a nuclear warhead on the Sparrow missile, and therefore the CF105 with Sparrow cannot be said to be the most modern air defence weapon available. However if more reliance is placed on the use of missiles, then arrangements will have to be made for the storage of nuclear warheads for the use of Canadian missile units in Canadian airspace.

Treasury board
i.e., Bankers.

A whopper. Avro doc's show they were developing a nuclear Sparrow, but immaterial anyway, 1956(11) Chiefs of Staff docs refer to planned adoption of the MB-1 missile, which was the nuclear Genie for the Arrow and F-106.

CONCLUSIONS

Therefore I consider that the disadvantages far outweigh the advantages of continuing the CF105 programme. This conclusion has been reached after most thorough study of this problem by the Chiefs of Staff and myself and the considerations can be summed up briefly as follows:

- (1) The decreasing threat may make this aircraft superfluous to requirements before it is completed.
- (2) The rapid progress in missile technology is producing ground-to-air missiles which are cheaper, more efficient and more economical to maintain than the manned aircraft. They can be fitted with nuclear warheads and they are possible of further development. I am convinced that the missile will provide more defence per dollar than the manned interceptor, and now that the range of the missile is reaching the range of the interceptor, the advantage appears to be all with the missile. The use of missiles will also save manpower and allow us to take over more U.S. establishments in Canada.

Costs

As I have pointed out, the cost of completing this development is exorbitant and there is no guarantee that these estimated costs will not increase. The acceptance of this programme would mean a budget of more than \$2 billion for the next three or four years. The Minister of Finance has stated that the strain which would be placed on the national budget by continuing this programme would be intolerable, which indicates that a \$2 billion budget may mean increased taxes.

PERSONAL statement
not the views of the
Chiefs of Staff.

and costs which the plane closely. They estimate that they would not be using \$10 million.

What, no profit?
No using \$10

Accession 4614
Box 27A-18

VOL. III CH. 2 ONE CANADA BY JOHN G. DIEPENBROEK
Photocopy from DND Officer Professional Development study guide.

CHAPTER TWO

GENERAL Charles Foulkes testified, in October 1963, before the House of Commons Special Committee on Defence that, as Chairman of the Chiefs of Staff Committee in 1957, he had "stampeded" the new Conservative government into accepting the North American Air Defence (NORAD) Agreement. Nothing could be further from the facts. I considered the NORAD Agreement a good one, and, for its time, necessary. Indeed, I had no personal consultation with Foulkes on this subject. For him to suggest that we were stampeded in the early weeks of our government is to suggest that I, as Prime Minister, and, more particularly, Major-General George Pearkes, V.C., the Minister of National Defence, had no appreciation of the requirements of North American defence. General Foulkes's admiration for the St. Laurent government was obvious and may explain his decision, following his retirement, to contest a Liberal Party nomination.

Foulkes TESTIFIED under oath that he "stampeded" the Conservatives, fresh into office, into signing the NORAD agreement.

Despite the disavowals of Mr. Pearson, the St. Laurent government should be given credit for the origin and development of the NORAD concept. Without diminishing the value of the NORAD Agreement in any way, the fact is that when we came into office NORAD was virtually a *fait accompli*. In 1951, Canada made its initial commitments to NATO for the defence of Europe and North America. Concomitantly, the St. Laurent government approved plans for the development and co-ordination of the air defence systems of Canada and the United States to provide for mutual protection of contiguous vital areas of the two countries. Further, the St. Laurent administration approved the principle of mutual reinforcement by the air defence forces of Canada and the United States, and agreed that, in the event of war, the Air Defence Commander of each country was to be empowered to authorize the redeployment to bases in his country of air defence forces of the other country.

In June 1954, an official Canadian study recommended the creation of a separate Commander-in-Chief (CINC) for North American Air Defence, with responsibility for planning and an appropriate measure of operational control over air defence forces allocated to the Canada-United States region. It further recommended that Canada take the initiative in discussion with the United States for the appointment of a CINC Air Defence. The Canadian Chiefs of Staff Committee did not accept these recommendations, but did agree that it would be desirable to have personnel from the Royal Canadian Air Force's Air Defence Command stationed at the United States Air Force's Air Defense Command, which had been newly established at Colorado Springs.

RCAF did not want to give up command of Canadian fighters to USAF Command, thereby tying their hands to US policy.

In February 1956, a joint Canada-United States study of the CINC NORAD question was initiated by the United States. A report submitted to the Canadian and United States Chiefs of Staff organizations on 19 December 1956 concluded that, in order to provide the most effective air defence of North America, the *operational* control of the air defence forces of Canada and the United States should be integrated. Indeed, a clear and definite distinction was made between "operational control" of the forces and "command" of the forces. The basic command organization, e.g., training, equipment, logistics, etc., would be controlled by national commanders who would be responsible to their respective national authorities. The Commander-in-Chief's task was to defend North America from air attack in accordance with plans approved by the two governments. Provision was to be made for a fully integrated headquarters staffed by Canadian and United States service personnel. The Deputy Commander was to be a Canadian, who, in the absence of CINC NORAD, was to have *full power*. CINC NORAD was to be responsible to the Chiefs of Staff of both countries. This report was approved by the Canadian Chiefs of Staff Committee on 1 February 1957, having already been approved by the United States Chiefs of Staff.

Nuanced. "You direct your own fighters, we declare war."

After being "stampeded" by Foulkes in particular.

A Cabinet Memorandum on NORAD was prepared for submission to the Cabinet Defence Committee in early April 1957, and again for a meeting scheduled for 13 June 1957, but was not formally

After a hasty visit to NORAD HQ in Colorado Springs by MND Pearkes and MF Fleming? Thereby giving away their best lever in getting the USAF to equip THEMSELVES with Arrows. This might suggest that the Conservatives had planned to cancel the Arrow all along, but not show their hand until after they were re-elected. The CF-100 Mk. 6 episode supports this scenario.

ACCESSION 4615

Box 27A.19

SECRET

- 3 -

3 September, 1958 Cabinet minutes
Cabnt3Sept58.jpg

SECRET

Air defence requirements; recommendations of
Cabinet Defence Committee
(Previous reference Aug. 28)

3. The Minister of National Defence said that, since this subject had last been discussed, Mr. John Tory, one of the directors of A.V. Roe, and Mr. F.T. Smye, Vice-President of Avro Aircraft Ltd., had discussed the future of the CF-105 with the Prime Minister, the Minister of Finance, and himself. These men recommended that the airframe and Iroquois engine elements of the programme be continued but that the fire control system (ASTRA) and the weapon (SPARROW) projects be dropped and substitutes obtained in the United States. Instead of ASTRA and SPARROW they had suggested the U.S. Hughes MA-1 system and the FALCON, respectively. He had had cost estimates prepared on this suggestion and comparisons made with other alternatives. These were as follows:

Expenditures for 100 aircraft, from
September 1st, 1958:

105/Astra-Sparrow	\$1,261.5 million or \$12.61 million each
105/Hughes MA-1-Falcon	\$ 896 million or \$ 8.96 million each
U.S. 106	\$ 559 million or \$ 5.59 million each
BOMARC (to provide roughly equivalent defensive strength)	\$ 520.3 million

Included ALL money
already spent, NOT
a flyaway cost.

flyaway cost

4 batteries of 60
missiles each (no
cost-sharing with
the U.S.)

4. During the discussion the following 240 missiles could replace
further points emerged: 100 Arrows with 8 missiles
each that could be used
over and over?

(a) If it turned out in a year's time that the U.S.S.R. was going to equip its air force with newer, more modern bombers, then Canada would have to buy BOMARC or an interceptor from the U.S., or both, assuming the CF-105 was abandoned.

Which is why Foulkes wrote aide memoire of
25 August, 1958 that was used to stampede Cabinet.

(b) If, on the other hand, it was clear at that time that the U.S.S.R. was not producing bombers, arrangements would have to be made with the U.S. for defence against missiles. This was never done.

(c) There would be no chance of resuming the CF-105 programme once it was cancelled. It would be better to cancel it now than to be confronted with no more work for Avro, and the other companies involved, after production of 100 aircraft was drawing to an end in 1961 and 1962. It was unwise to encourage the aircraft industry to continue to produce equipment that could quite well be obsolete by the time it was available. O'Hurley from Quebec, had been involved in Duplessis campaigns.

(d) BOMARC might possibly be manufactured in Canada, under licence, by Canadair, which had the closest connections with the company in the U.S. doing this work. Avro and the other companies in the CF-105 programme would probably not be involved in such a project. Why not? They'd already studied it

(e) It had been said by some that not only were manned interceptors becoming obsolete but so also were naval surface vessels. The latter eventuality, however, was further in the future than the first. Nuclear-powered anti-submarine submarines would be the most useful defence against enemy submarines equipped to launch atomic weapons. But they were very expensive. Failing that, the surface ships and the anti-submarine aircraft, with which Canadian forces were being equipped, provided a reasonable defence against possible assaults from the sea. In 1957!

(f) The Chiefs of Staff were divided on the question of the CF-105. The Chief of the Air Staff felt there was a useful role for the manned interceptor, but the specific type of equipment and armament he preferred would depend upon the amount of money that was available. The heads of the other two services felt the nature of the threat was changing so quickly that the situation should be kept under review for a year. They did feel that the CF-105 programme, as it presently stood, was not the best way to spend so much money. The Chairman was of the view that BOMARC would give the best defence for the money likely to be available.

ACCESSION 4616

Box 29A.20

Pearkes finally orders the Chiefs to recommend Arrow termination.

Cabinet minutes for 4 February, 1958

- 3 -

SECRETCF-105 Arrow Programme
(Previous reference Feb. 3)

6. The Minister of National Defence reported again on the present state of the CF-105 Arrow programme. In addition to the information he had given previously, he noted that, from the end of September 1958, until the end of January 1959, \$60 million had been spent on the development of this aircraft and that, if development continued until March 31st, \$45 million more would be expended. The average cost per weapons system for a programme of 100 operational aircraft was now estimated to be \$7.81 million. This excluded termination charges for the Astra/Sparrow from September 1st, 1958, which were estimated to be \$28 million. Although the cost had been reduced from \$12.6 million to this figure, he still considered that the production of 100 such aircraft could not be justified at this price. The Chiefs of Staff were, as directed last September, urgently investigating requirements, if any, for additional air defence missile installations in Canada, and for interceptor aircraft of the nature of the CF-105 or alternative types.

He recommended that development of the CF-105 be discontinued and that the Chiefs of Staff present at an early date the recommendation they had been requested to make.

An explanatory memorandum was circulated, (Minister's memorandum, Jan. 30).

7. Mr. Pearkes added that, at the moment, there did not appear to be anything in the U.S. inventory of aircraft that would justify a decision to purchase. The Chiefs of Staff were considering the possibility of having some Bomarc squadrons moved from south of the border in the central U.S. to areas in western Canada. If it were felt that the manned bomber threat was decreasing, then it was obviously preferable to concentrate on defensive missiles rather than to continue with the production of interceptors.

8. The Prime Minister said it would be necessary to have a meeting of the Cabinet Defence Committee before making the final decision on the Arrow.

9. During the discussion the following points emerged:

(a) If a question on the future of the Arrow were raised when the estimates were tabled, it should be answered in a way which would show that a decision on the programme would be taken before March 31st. There was sufficient money in the estimates to pay for cancellation charges or to continue development for a while.

Diefenbaker recommends the "party line" if someone noticed the Arrow had been deleted from budget estimates. Keeping Avro and the RCAF in the dark!

With an Avro fixed price offer of \$3.5 million each including radar fire-control, with final development of the aircraft and engine to service standard thrown in? This offer, and many, many other things, was never brought up.



Pearkes

In other words, he was going to order them to recommend cancellation, just as he'd asked them to do in August 1958 after meeting with Dulles.

"Promised" by the US in the NORAD and July '58 meetings with Pearkes and John Foster Dulles. Reneged upon TWO months later.



Diefenbaker

ACCESS/AL 4617
BOX 27A.21

(AC)

This was the reply to a CBC correspondent researching the documentary, aired in early 1980, titled There Never Was an Arrow. The document release could have been after any supposed 30 year rule expired.

Edward L. ...
Toronto, Ontario

2125-4 TO 8285- (16345)

National Defence Headquarters
Ottawa, Ontario
K1A 0K2

5 December, 1978

Mr George Robertson
Executive Producer
Canadian Broadcasting
Corporation
Box 500, Terminal A
Toronto, Ontario
M5W 1K6

Dear Mr Robertson:

Further to your letter of the 4th of October 1978 concerning access to the Avro Arrow records, Mr Dixon has asked me to reply on his behalf as he is in Europe for a week or so.

First let me apologize for the delay in replying to your letter. We have had to spend a great deal of time researching the matter and establishing the extent and location of our records. We also have had to review a cross section of the documents in question to determine the extent to which security considerations might preclude their release.

As a result of this review we find that our records fall into two broad categories. First there is the technical category comprising 127 volumes of files dealing with the airframe, engines and armament, navigational, electronic systems, etc. The second category covers the policy aspects and these documents are found in various files dealing with presentations to and discussions within senior bodies such as the Air Council, the Chiefs of Staff Committee, the Cabinet Defence Committee, etc.

Almost all the documents in both categories are highly classified i.e. no lower than SECRET. It is possible that a detailed page by page review of the technical files could result in some or all of this material being declassified. On the other hand, it is highly unlikely that many documents from the second category could be declassified because most form the basis of submissions to Government in the form of Memoranda to Cabinet. In any event, the detailed review that would be required of each document in both categories is well beyond the capability of our staffs because of their involvement in the day to day business of the department.

Declass30yrRule?.jpg

NO "30 YEAR"
RULE, MAYBE
A 30 YEAR REVIEW
LAW FOR STUFF THAT
IS RECORDED. BUT
SOME THINGS AREN'T
RECORDED, & SOME
THINGS THAT ARE, ARE
LATER DESTROYED.
Pg. 2
THIS MAKES IT
CLEAR IT WOULD
COST THE APPLICANT
A FORTUNE & STILL
NOT BE ASSURED OF
ANYTHING!

Accession 4618
Box 27A.22



DMND to Pearkes.jpg

(41)

4 April, 1979.

Major General The Honourable
G.R. Pearkes, VC, PC, CB, DSO, MC,
1268 Tattersal Drive,
Victoria, British Columbia.

Dear Sir:

I am writing to advise that the Canadian Broadcasting Corporation is preparing a special program on the CF105 Avro Arrow and that they have asked the Department of National Defence to grant them access to files on the subject. We have declined their request because the files have not yet been declassified.

They approached us again more recently and asked whether we had anything on record which could serve to verify statements made in the House of Commons in July, 1959 by Mr O'Hurley, the then Minister of Defence Production, to the effect that the order to scrap the prototype aircraft had come from the then Minister of National Defence.

After an extensive search of our files, we did indeed find correspondence dealing with the subject. All of it is unclassified and outlines the considerations that led to the decision that the aircraft should be scrapped. While a case could conceivably be made to release copies of the correspondence to the Canadian Broadcasting Corporation and other interested agencies, it is my judgement that such a move would be a breach of trust. I have therefore sent the Canadian Broadcasting Corporation a letter which provides them with certain information but which also explains why I could not agree to release the correspondence.

PROTECTING HIM!
Nothing to do with
national security.

I thought that, as a matter of courtesy, you should be made aware of these developments and furthermore that you should have a copy of the letter I have sent to the Canadian Broadcasting Corporation. I am also sending you copies of the correspondence we have found in our files in the event that you want to refresh your memory on the subject as it has been twenty years since these events took place.

These files would include those copied in this package, but by no means does it infer that all of them have been released.

- 2 -

I should advise that under the provisions of the proposed Access to Information legislation, the correspondence may eventually have to be released. However, in the meantime I do not propose to make it available to the public.

Obviously his discretion, note expiry of so-called 30 yr. rule in dateline.

In closing, I would like to state that a similar letter along with attachments has been sent to Air Chief Marshal Miller and Air Marshal Campbell.

I take this opportunity to extend my warm regards and best wishes.

Yours truly,

C.R. Nixon

C.R. Nixon

Attachments:

Accession 4619
Box 27A23

DMNDonC3Cdoc.jpg

2125-1
1325-7
1325-500/00

21 April 1980

NOTE TO FILE

CBC Programme on the Avro Arrow

1. Early in 1980 the CBC aired a programme on the Avro Arrow. During research the producer requested access which could not be given into DND files concerning the Arrow. The Deputy Minister did, however, answer some specific questions about the order for destroying the aircraft prototype. This correspondence is to be found on file number 2125-4 TD 8285.
2. The programme itself turned out to be a moderate and relatively accurate interpretation of events. The following observations were made by the Director at the time of the programme.
3. The reason for cancelling the Avro jet liner was not convincing, nor could it be supported by documentation. This is a subject that requires proper historical analysis.
4. The rank of LtGen "Reggie" Lane was consistently given as Brig Gen.
5. The programme argues that it is not known who ordered the destruction of the prototype. In fact the Deputy Minister explained in his letter to the producer that the order for destruction stemmed from advice given by the Chief of Air Staff, the Deputy Minister of National Defence and the Department of Defence Production.
6. The programme left the impression that no opportunity had been given for various agencies to acquire the prototype. As the Deputy Minister's letter pointed out, this is not true.
7. The programme was interesting in that it left the viewer with the feeling that Mr. Crawford Gordon's personality clash with Mr. Diefenbaker was instrumental in bringing about cancellation of the Arrow. This impression could even be interpreted to suggest that Mr. Gordon himself might have ordered the destruction of films and blueprints relating to the Arrow. It must be emphasized that there is no evidence of such actions.
8. The programme concluded that no American interests were involved in the decision. On the face of it this seems a remarkably innocent point of view. Previous accounts have suggested with some reason that the American aviation industry would not have been comfortable with the Arrow as competition and therefore was not likely to give the Canadian firm much opportunity to compete.

W.A.S. Douglas
Ottawa, 21 April 1980

As reproduced in Arrow Scrapbook

ACCESSION 4620

Box 27A.24

Report from Avro Canada's Chief of Technical Design, Frank Brame, to J.C. Floyd to assist with the Hawker Siddeley SST effort - Dated 9 July, 1959. Brame would go on to lead many efforts at Boeing, including their SST design studies.



AVRO AIRCRAFT LIMITED

MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

image © RL Whitcomb 2001

AIRCRAFT:

REPORT NO. TD/M/2

- 8 -

3.0 SUPERSONIC TRANSPORT.

The design studies summarised in this report have concentrated on an aircraft to carry 120 passengers on the North Atlantic route at about $M = 2$. The configuration has been assumed to be a slender delta-type wing with integrated fuselage. This configuration seems to have great promise and is also a logical extension of the company's experience on the Arrow.

Adopted for the HSA.1000 SST design

The inclusion of systems studies at this stage is necessary because:-

- a) The air-conditioning problem is a serious one at these cruise Mach numbers, and
- b) The high fuel/gross weight ratio combined with the slender configuration makes the fuel system design critical.

3.1 PERFORMANCE ANALYSIS

Available engine data was combined with drag estimates of a selected supersonic transport aircraft design, to determine range performance in detail. Range performance was determined for various cruising Mach numbers. From this an appreciation was gained of the fuel used for various stages throughout the flight, including loiter and diversion. Drag estimates were then refined and somewhat optimized which together with estimated greater potential engine cruise performance gave considerably better range performance. A total of 8 range flights were calculated, in which the first four gave a pessimistic result and the last four showed what was achievable under realistically refined conditions. The latter gave more than the desired performance, which should cover any off-design conditions or any over optimistic assumptions.

AERODYNAMIC DESIGN OF SUPERSONIC TRANSPORT

Since the configuration is very slender (aspect ratio less than unity) the design of the aerodynamic shape is based on Adams and Sears "not-so-slender body theory". This is merely a series expansion of linearised theory in terms of a slenderness parameter. It is of course not so accurate as linearised theory, but its simplicity enables the shape to be optimised directly for minimum drag. The design of the aerodynamic shape is of course divided into thickness and lift effects which are treated separately.

3.2.1 Thickness Effects.

The area distribution and cross-section shapes have been computed to give minimum wave drag consistent with the restrictions of internal space required for passengers, fuel, undercarriage, etc. It has been found that considerable drag reductions seem to be possible by a spanwise redistribution of area near the trailing edge, so that the area is concentrated further outboard toward the tips. It is proposed that this drag reduction be checked by a supersonic area rule analysis on the IBM 704. This programme will also be used to check the range of Mach numbers in which the "not-so-slender body theory" is valid.

Avro seems to have been the first to create "computational fluid dynamics" models on an "at the speed of light" computer.

Accession 4621
Box 27A.25

Dec 22/58

Air defence requirements; Arrow aircraft
(Previous reference Dec. 2)

24. The Prime Minister said he had been shocked at the statement Air Marshal Slemon had made about the Arrow. It was not a question of whether Slemon's remarks had been misinterpreted or not but whether he should have made a statement of that kind at all. Avro had put on a tremendous publicity campaign and this played right into their hands. If the government decided to continue development it would be accused of giving in to a powerful lobby. Pressure was coming from other sources in Ontario too. Even if he thought the decision reached last September was wrong, he was determined, because of what had happened since, to adhere firmly to it. The future of the CP-105 would have to be discussed before Parliament opened.

SMOKING GUN!

25. The Minister of National Defence pointed out that it was still his understanding that development would be terminated by March 31st. In Paris, the U.S. Secretary of Defence had made it quite clear that the U.S. was not interested in the CP-105, even if it were equipped with the MA1 fire control system and the Falcon missile. The U.S. had now decided not to proceed with the development of any new interceptor aircraft except for the 108 which was years in the future. This was a long range aircraft of advanced design to be employed from bases in Alaska and Greenland. This U.S. decision would strengthen the government's position in deciding to abandon the CP-105.

→ WHY? THEY WERE GOING TO PRODUCE
A LONG-RANGE INTERCEPTOR IN THE
SAME ROLE AS
THE ARROW!

26. The Cabinet noted the reports of the Prime Minister and the Minister of National Defence on the situation regarding the CP-105 and agreed that a decision be reached on the aircraft's future before Parliament re-opened.

As reproduced from photocopies of released
Cabinet minutes in Arrow Scrapbook.

U.S. PARIS CONF.
REF. U.S. SEC. DEF: USA
NOT INTERESTED IN
ANY ARROW.
IT IS NEVER SHOWN
THAT USAF HAD
ASKED FOR ARROW
PROPOSALS - & HAD
SEEN THE ARROW 3, 4 & PS-2
VERSIONS.

Accession 4622
Box 27A.26

Cahnt Arrow relate. jfs

25 November, 1958 Cabinet Minutes
three months before cancellation.

Defence estimates; assumption re decision on Arrow aircraft

17. The Minister of National Defence noted that there was a problem, in making up his main estimates for 1959-60, as to what assumption should be made about the decision to be taken before the end of March concerning future policy in regard to the Arrow aircraft and the Iroquois engine. He proposed to assume that the contract would be cancelled and to include only the cancellation costs. Should the decision go the other way, a supplementary estimate could be submitted to Parliament.

18. The Cabinet agreed to Mr. Pearkes' suggestions on ~~treatment of~~ Arrow aircraft costs in defence construction.

From Arrow Scrapbook, Appendix

ACCESSION 4023

Box 27A.27

1. The Minister of National Defence reported that the Cabinet Defence Committee had considered the recommendations he had made to the Cabinet that further development of the CF-105 be now discontinued and that the Chiefs of Staff be asked to present soon their recommendations on what requirements, if any, there were for additional air defence missile installations in Canada, and for interceptor aircraft of the nature of the CF-105 or alternate types. During the meeting, the Chairman of the Chiefs of Staff Committee reported that the Chiefs of Staff had reviewed the position concerning the production of the CF-105, and were still of the opinion that the changing threat and the rapid advances in technology, particularly in the missile field, along with the diminishing requirements for manned interceptors in Canada, created grave doubts as to whether a limited number of aircraft of such extremely high cost would provide defence returns commensurate with the expenditures.

The committee concurred in the recommendations and agreed that they be submitted to the Cabinet for consideration at an early meeting.

An explanatory memorandum was circulated, (Memorandum, Secretary, Cabinet Defence Committee, Feb. 6 - Cab. Doc. 46-59).

2. Mr. Pearkes added that it was impossible to give any assurance that manned interceptors for the defence of Canada would not be bought in the United States some time in the future, if the CF-105 programme was discontinued. It was his own opinion that the threat of an attack on North America by manned bombers was rapidly diminishing. He felt that Russia would not consider launching an attack until it had a large arsenal of intercontinental ballistic missiles. Against these, manned interceptors were useless. If, however, new evidence became available that the Soviet Union was developing more modern manned bombers, then interceptors might have to be bought. The question naturally arose as to why Canada was installing Bomarc when it was effective only against manned bombers. The answer was, that some insurance premium had to be paid against the possibility of bomber attack and this premium was cheaper by far than the CF-105. The U.S. had agreed to pay \$91 million out of a total of \$110.8 million for the installation of the two Bomarc squadrons in Northern Ontario and Quebec.

PEARKES
SECRETLY INVITED
USAF INTERCEPTORS
INTO CANADA TO
COVER GAP CREATED
BY ARROW CANCELLATION
ADMITTED IT WAS
KEPT SECRET IN
ROY INTERVIEW

REMARKABLE
FINANCE ENG'D A
WILLING FOOLKES,
FOOLKES STAMPEDED
CSC FOR NEW PAPER
W/ FINANCE TERM OF REF.
THE PAPER ONLY
BROUGHT ABOUT
BY CDC PAPER
REDFINING TERMS
OF REF! CAS
MISSED

3. During the discussion the following points emerged:

(a) At the meeting of the Cabinet Defence Committee, the Chief of the Air Staff had stated that the R.C.A.F. would need 100 to 115 interceptor aircraft for several years ahead. These would have to be bought in the U.S. or, failing that, presumably U.S. squadrons would provide interceptor defence for Canada. This would be particularly awkward when, at the same time, the 1st Canadian Air Division might be in the process of having its F-86 aircraft replaced by more modern machines at a cost of about \$400 million to \$500 million. In effect, Canada would be defending Europe, and the U.S. would be defending Canada.

(b) On the other hand, the role of the Air Division was different from that of the R.C.A.F. in Canada. Furthermore, if the F-86 were not replaced, the Air Division might just as well be withdrawn from Europe, and the implications of this for the N.A.T.O. alliance were very serious indeed. The proposal now being considered was to assign the Air Division a strike-attack role and equip it with aircraft suitable for the purpose.

(c) It was not true to say that the U.S. would be defending Canada if the CF-105 were discontinued. Canada would be manning the Bomarcs, the warning lines, S.A.G.E. and other installations. The U.S. would man the aircraft which, after all, was a steadily decreasing part of the defence, as the nature of the threat changed; this would mean that the presence of U.S. servicemen would be less apparent than if they were employed in different capacities.

(d) The U.S. intended now to develop the long range F-108 interceptor, which would operate from Greenland and Alaska. It was a large aeroplane, less dependent on ground environment, and very expensive. It would be defending Canada just as squadrons of the U.S.A.F. were doing today in complementing the R.C.A.F. squadrons.

4. The Cabinet deferred decision on the recommendation of the Cabinet Defence Committee that the development of the CF-105 Arrow be discontinued.

Accession 4624

Box 27A.28

CabntCxTactics.jpg

Arrow(CF-105) aircraft; report of Cabinet Defence Committee; decision to terminate development
(Previous reference Feb. 14)

12. The Prime Minister said a draft announcement on the termination of the development contract for the Arrow had been prepared. It included a section on arrangements with the United States for production sharing and a section on the acquisition by Canada of nuclear weapons for defence. He had gone over the draft in great detail but it was not yet in the right form to be made that day.

13. The Minister without Portfolio (Mr. Macdonnell) reported that, the previous day in Toronto, the Premier of Ontario had spoken to him in strong terms about the effects of terminating the Arrow contract upon the municipalities in the vicinity of Malton.

14. The Minister of Finance said Mr. Frost had also spoken to him in pungent language about work on the Arrow being stopped. Mr. Frost had complained about so little notice being given to Avro, and had asked why other contracts could not be given to the company. He had replied that the matter had been exhaustively considered, that all possible alternatives had been reviewed, and that the decision would be taken in the light of the best military advice available. He had also told Mr. Frost that, right from the outset, it had never been said that actual production would proceed and that everyone understood that the matter was to be reviewed year by year.

15. During the discussion the following points emerged:

(a) The sooner the announcement could be made the better, because the decision to terminate was bound to leak out and the longer the announcement was delayed the more would be the cost.

(b) The most appropriate time for the announcement appeared to be the following Friday. This, as proposed, should refer not only to the Arrow termination but also to production sharing and to the acquisition of nuclear weapons. The Prime Minister's statement should be followed by one by the Minister of Defence Production, which would deal in greater detail with production sharing. In considering this question of timing, the possibility of a motion to adjourn the house to discuss a matter of urgent public importance should not be overlooked.

(c) It would be desirable that notes be exchanged with the U.S. to implement the agreed arrangements on sharing the costs of the new radars, gap fillers, S.A.G.E. and the two Bomarc stations in Ontario and Quebec.

Supersonic Sentinel
resp. for early Cx
(actually it was just
another lever against
reluctant Cabinet
members)

Statement on the Arrow
(Previous reference Feb. 17)

1. The Prime Minister said that he would make a statement announcing the termination of the Arrow contracts in the house the following day. The C.B.C. Television Service would present a programme on the following Sunday or Monday on the development of the Arrow. It would be well to make the statement before the broadcast.

He had gone over the draft statement several times but thought that it should be redrafted by a committee of ministers. The redraft could be considered by Cabinet before the statement was made in the house.

2. The Cabinet approved the suggestion of the Prime Minister that Messrs. Fleming, Pearkes, Fulton, Smith, and O'Hurley meet that afternoon to revise the draft statement on the Arrow aircraft and related matters.

- 5 -

16. The Cabinet,-

(a) agreed that the development of the Arrow aircraft and Iroquois engine be discontinued, effective as of the time of announcement;

(b) that an announcement concerning this decision, the production sharing with the United States, and the acquisition of atomic weapons be made in the House of Commons, probably on Friday;

(c) that the contractors be notified of the termination of their contracts at the same time; and,

(d) that an agreement be made with the United States, in the form of an exchange of notes, for the implementation of the agreed arrangements on the sharing of the costs of Bomarc and S.A.G.E. installations in Canada and the associated extension of radar coverage.

SECRET

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Feb. 19/59

As reproduced from photocopies of cabinet minutes in Arrow Scrapbook

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As reproduced in Arrow Scrapbook

SECRET

- 2 -

Feb 23/57

Arrow (CF-105); cancellation of development; parliamentary tactics
(Previous reference Feb. 19)

1. The Prime Minister said the opposition were sure to move to adjourn the House to discuss the cancellation of the Arrow development programme. He wondered whether it would be advisable to have the debate that day, or whether it would be helpful to attempt to postpone it for 24 hours by saying that the government would welcome a debate the following day.

2. During the discussion the following points emerged:

(a) It would be wiser to have the debate immediately. The Speaker was sure to rule a motion to adjourn in order. A government suggestion for postponement would be unusual and an indication of weakness. On the other hand, the latter course would provide more time for preparation and enable the government to make the first statement in the debate, which was always an advantage.

(b) During the debate, the history of the project should be outlined with an indication that production had never been approved, and that development had been reviewed year by year to see whether it should be continued.

(c) The two principal points of criticism on the decision to cancel the Arrow programme were, first, that no efforts had been made to provide alternative employment for the Avro workers and, second, that Canada would be still further dominated by the United States.

(d) The lay-offs had been particularly abrupt, the excuse given by Avro being that the company had received no advance notice of the Prime Minister's announcement. This was unfair and misleading. The company officers were well aware, or they should have been, that the contract might be cancelled and should have been making preparations accordingly.

(e) Avro claimed that, since the Prime Minister's announcement of last September, the company had proposed alternative programmes to the government but that the latter had not seen fit to discuss these matters or consult with Avro's officers in any way. This was not true. Avro's officers had spoken to ministers frequently in the past few months. In one instance, the Minister of Transport had informed Mr. Smye of Avro that if the

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company had a reasonable proposal to make, say for production of aircraft for civilian use, the government would consider it most carefully. In fact, during this period no such proposals had been made by the company to the government.

(f) It might be worth making payments which would enable the company to pay employees more than the usual separation and holiday pay provided for by contract. This, however, would be a dangerous precedent and it would not help the sub-contractors. In any event, those being laid off would receive unemployment insurance.

(g) Another possibility was to provide assistance for employees moving away for new jobs. This too had difficulties in that it would require an order of the Governor in Council designating the areas as a surplus labour area. If such action were taken for that region probably to include greater Toronto as a whole, it would also have to be taken for other localities.

(h) There had been a prospect of Canadair obtaining a large U.S. contract for radar picket aircraft but, unfortunately, this seemed to be less and less hopeful in view of the pressure from the aircraft industry in the U.S.

(i) The President of Avro had referred to the company's development of a vertical take-off aircraft. Support for this had been provided mainly by the U.S. A small amount could be made available from National Defence appropriations but, until it could be seen if the project had any possibilities of success, it was not worth allotting much money to it.

(j) In defending the decision it could be said that it had been taken in the light of the best military advice available, and that the cost of the Bomarc, which was to perform the same role as the Arrow, was very much less than that of the Arrow. Emphasis should be placed on the fact that Avro had plenty of notice that the project might be cancelled and that it had made no alternative plans. There was no call to be delicate with the company.

Avro played into their hands by laying off the work force. The government had been warned repeatedly they would have no choice but to lay off the whole workforce due to union seniority provisions.

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These, and many other Avro options, had been discussed with the gov't in September 1958 by Smye and Tory and other Avro executives.

(k) Mr. Plant, one of the Vice-Presidents of Avro, had recently suggested to the Department of Transport that the company might undertake the development of a pure jet, short range aircraft to replace the Viscount in a few years time. Companies in the U.K. and the U.S. were working on bigger, longer-range aircraft, but no one seemed to be developing plans for a shorter-range type for use on inter-city routes in North America or Europe. Government assistance would be needed for such a project, perhaps to the extent of \$15 million or \$20 million. This would be a small amount compared with what would be saved by cancelling the Arrow.

(l) As regards the point that cancellation would mean that Canada would be still further "under the wing of the U.S.", it should be remembered that maintaining freedom from U.S. control was a continuous struggle. It might appear that the present decision was a retrograde step. But there would be other opportunities to assert Canadian sovereignty and independence. For example, it might be necessary in the near future to introduce legislation to ensure the independence of Canadian companies.

(m) It would be unwise to blame the U.S. for the outcome of the Arrow contract.

(n) The Prime Minister and the Minister of National Defence should participate in the afternoon's debate, and other ministers too if there were time. Prior to the debate, the Minister of Defence Production should make the proposed statement on production sharing with the U.S.

3. The Cabinet noted the reports and discussion on the reaction to the cancellation of the CF-105 Arrow contract and on the manner in which the government would proceed in the debate expected to occur in the House of Commons that afternoon.

Tolls on the Welland Canal
(Previous reference Jan. 28)

4. Mrs. Fairclough said the intention to levy tolls on the Welland Canal had aroused serious criticism in the Hamilton and Niagara districts.

Admits killing Avro a blow to CPM independence. Reference to future legislation due in part to Walter Lorthart Gordon's Royal Commission on the Economic Prospects For Canada. Gordon tried to implement such a policy in his first budget with Pearson... SQUASHED by USA causing a secret incident which would have bankrupted the Bank of Canada. As shown in Gordon's autobiography "A Political Moloch".

Strategy for expected questions, not factual responses

So much for Production Sharing

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CharykDPSf101.jpg

May 27, 1960

MEMORANDUM FOR DEPUTY SECRETARY OF DEFENSE

SUBJECT: Combined Procurement with Canada of F-101B and CL-44 Aircraft

1. As we have recently discussed, we have under very serious consideration an arrangement on the above subject which should prove to be of maximum benefit to both the United States and Canada. I believe that our defense position can be greatly enhanced while, as part of the same transaction, we will be able to make a substantial step toward our MATS modernization goal.

2. The proposal is that the Canadians procure 66 F-101B aircraft, 1.59 million each now in U.S. inventory and procured with funds from previous fiscal years, for approximately \$105 million. As part of the transaction, the USAF would procure 35 CL-44 aircraft for \$155 million to be assigned to 1.42 million each. MATS to meet requirements for immediate modernization prior to procurement of the SOR aircraft. On a strictly FY 1961 cash basis, the U.S. would obtain 35 CL-44 aircraft for \$50 million, which is \$1.4 million each. This compares with a figure of \$4.4 million each, the actual program cost including spares. So 1.59 fly away cost for the F-101, but 4.4 million each with spares, ground handling equipment, etc.

3. From our point of view, modern interceptor aircraft will be deployed as far north as practicable with very significant gains to North American defense as an immediate benefit. In addition, the interim modern aircraft needed so badly in MATS, can be obtained on a much more economical basis than is otherwise possible.

4. There are also some significant related benefits to be realized. As I have previously mentioned, a sensitive political situation has arisen in Canada due to a series of events involving the CF-105 cancellation in favor of BOMARC and SAGE joint procurement with the U.S., followed by reductions in BOMARC and SAGE super combat centers. In addition, the production sharing program initiated 18 months ago has not produced the expected results from the Canadian viewpoint. The exchange-procurement discussed above presents an ideal opportunity to improve this situation while simultaneously attaining a significant benefit to the United States. In this regard, it is important to note that neither procurement would be likely to take place without the other also being made. Hmmmmmm(!!)

5. This suggestion has been given to the Canadians informally and their reaction is expected when their Prime Minister visits the President next month. The proposal is also subject to Congressional approval.

JOSEPH V. CHARYK
Acting Secretary of the Air Force

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factories with work only for two. Mr. O'Hurley countered by pointing out that of the 400 millions spent on the F104 by Canada, 150 million was being spent in the United States for components. Mr. Fleming referred to the financial arrangements and it was confirmed by Dave Golden that the arrangements were to be spread over two U.S. fiscal years, which meant over three Canadian fiscal years. General Brown pointed out that the bill for spares would depend on the rate of utilization; that the present bill for 47 million was calculated on 25 hours a month per aircraft, and would amount to 23 million dollars a year; the remainder was for ground handling equipment and simulators and armament.

Mr. Gates said that you must decide the policy first. Do you want the fighters, and then we can argue about price.

Mr. Green stated that they were told two years ago that the manned bomber was on its way out and that is why they cancelled the Arrow. Now they have to go back and say that both are still needed. Mr. Fleming referred to the fact they tried to interest the Americans in buying the Arrow at the Paris Conference but had been turned down flat by Mr. McElroy.

Mr. Pearkes confirmed that the flying rate would be about the same as the Americans and, therefore, there would be no reductions in spares from that cause. He said we did not cancel the F105 because there was no bomber threat but because there was a lesser bomber threat and we got the Bomarc in lieu of more airplanes to look after this. Now he said perhaps the expectation of two years ago that the bomber threat was lessening has not been fulfilled. At the same time he said we expected Bomarc to cover the whole country. These had been reduced, and therefore some more protection to the western part must be made in those areas which were to be protected by Bomarc. It wasn't fair, he said, for Canada to fill this western gap which had been

pressure

ie., told by US government agents

result of US claims

even Fleming felt betrayed

More pressure

unilaterally by the US!

Confirms BOMARC for the west was reneged upon by the US unilaterally.

created by the Americans all by themselves. Mr. Gates

referred once again that we must get this aircraft deal settled if at all possible because they could not afford to stand up to the political pressures at home too long.

Morning Session

The conference reconvened at 9 o'clock on Wednesday, 13 July, and went over the previous day's discussions to some degree.

Aircraft Deal

On aircraft, Mr. Gates offered to split the 47 million dollars for spares on a one-third, two-third ratio which would mean that the U.S. would spend 150 plus 30 million dollars, and the Canadians would spend 122 million dollars. Mr. Fleming appreciated the offer and said he would report this fact to the Cabinet. Mr. Gates suggested that the matter has already been discussed with the press and therefore it would be wise if it could be settled as soon as possible, especially at this meeting. Mr. Fleming said that we now were aware of all the facts and would be able to decide as soon as possible. Mr. Pearkes asked when these aircraft would be available and it was confirmed that they would come off production in the period August through December and would be the last 66 on the production line.

"SKY SHIELD"

Referring to "SKY SHIELD", Mr. Green said that he would have to take back the proposed public relations policy to the Prime Minister. As to the question that the first announcement had been agreed to, the reply was yes. Mr. Irwin pointed out that the proposed policy guidance was for NORAD who would be required to answer questions arising from the first announcement, and Mr. Gates stressed the fact that the intent was to focus all releases through NORAD and to give them this guidance. Mr. Fleming felt that the

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The contract for items in the BOMARC programme would be seriously affected if employment were to decline drastically; and, finally, if Canadair received the airframe contract, the Department of Defence Production would ensure that a reasonable share of work would be given to Canadair's existing sub-contractors.

If de Havilland were the successful bidder, it would have to act as a programme manager, subcontracting the majority of the work because it did not have sufficient space for manufacturing.

If Avro received the contract, the company would have to build up a large labour force again and then reduce again to less than the present levels. Avro had no firm programme for the future. If it, or de Havilland, received the business, the Canadair problem would remain to be solved.

Ideally, requesting the three companies to bid on a fair price basis was the best approach. But firm price bidding was unrealistic in the present circumstances.

As for the engines, there were two possibilities for production: Canadian Pratt Whitney or Orenda Engines Limited. It would, however, be an incompatible situation if a subsidiary of Pratt Whitney were chosen to manufacture a General Electric engine, as the two firms were direct competitors in the United States.

The Minister recommended, -

(a) that the Lockheed F-104G be selected as the replacement for the Sabre squadrons in Europe;

(b) that the airframe contract be allocated to Canadair Limited on an incentive type contract; and,

(c) that the engine contract be allocated to Orenda Engines Limited, on a firm price basis.

An explanatory memorandum was circulated, (Minister's aide memoire, undated).

2. The Minister without Portfolio (Mr. Macdonnell) said that it was the Minister of Finance's understanding that this matter would not be considered in his absence.

3. The Minister of National Defence said it would be very embarrassing to him when his estimates were before the House on Thursday next to announce that the Air Division was being re-equipped but not to be able to say with what aircraft. The Minister of Finance was more concerned with the allocation of contracts and the details involved, not the choice as such.

Precedents and Antecedents: It is clear from this that the Diefenbaker gov't was accustomed to giving implied orders to the Chiefs of Staff on equipment selection. It also demonstrates that they were requesting a policy recommendation from the government that was not justified in military terms, to support a decision that had been politically made.

4. Mr. Pearson added that the Cabinet Defence Committee had had the report of the Minister of Defence Production before it at its last meeting. Since then the Chiefs of Staff had discussed the matter further with Defence Production officials, and had stated that they would be willing to go along with a decision to re-equip the Air Division with the Lockheed F-104G.

5. During the discussion the following points emerged:

(a) If it were decided to acquire the Lockheed, \$14 million worth of work would be placed in Canada in respect of the 66 machines being purchased by Germany. Give it to the ones who don't need it?

(b) It was undesirable for Canadair to be given most of the work, in view of the fact that it was fairly busy now and in the light of Avro's position following the cancellation of the Arrow. The Minister of National Defence, in his opening statement on his estimates, should make it quite clear that the Arrow could not have been used for the strike attack role in Europe.

(c) The implication of the views of the Chiefs of Staff was that they would prefer a better aircraft than the F-104G if more money were available. It would be highly embarrassing if, at some time in the future after the government had announced a decision to purchase the F-104G, it became known that the Chiefs of Staff were, on military grounds, in favour of a different and presumably more efficient type of aircraft. The Chiefs of Staff should be asked to submit a firm recommendation on the F-104G, taking into account all the factors involved, before the Cabinet reached a decision.

(d) Assuming a decision was taken now on the type of aircraft, the Air Division would not be completely re-equipped for five years. It would probably be another five years after that before the Lockheed or the Grumman would cease to be effective.

6. The Cabinet approved the choice of the Lockheed F-104G to re-equip 8 squadrons of the Air Division in Europe, subject to receiving a firm recommendation from the Chiefs of Staff for it, and subject to discussion of the matter with the Minister of Finance before announcement.

WOULD "GO ALONG" WITH
TERMS OF REF. IN F-104
SELECTION FROM
POLITICIANS

> ORDERING THEM
TO MAKE A RECOMMENDATION
ON PAPER.

Allocation of contract for Lockheed F-1040
(Previous reference Aug. 10)

3. The Minister of Defence Production reported that tenders for the manufacture of the Lockheed F-1040 had been received from de Havilland, Canadair and Avro aircraft. The bid of de Havilland was almost 50 per cent higher than the other two who had provided almost identical tenders. De Havilland apparently did not have facilities to manufacture the plane itself and had to go to sub-contract for most of the work. The figure of Avro was slightly lower than that of Canadair but did not appear realistic.

4. Mr. O'Hurle pointed out that the time element was of essence and, of the three companies, Canadair, owing to the fact that it had past experience in producing Lockheed aircraft under licence, was in a more favourable position. A decision had to be reached on the allocation of the contract prior to the 17th of August if contracts in connection with the manufacture of 66 Lockheed aircraft for West Germany were to be obtained.

It was the view of the Department of Defence Production that it would not be possible to support three major aircraft firms in Canada. Canadair Ltd. had been markedly more successful in commercial sales than Avro which seemed to have made no effort in obtaining commercial contracts. If the contract were awarded to Canadair other government contracts would benefit as a result of lower overhead, which would mean a saving up to \$12.5 million over a five-year period; furthermore, the company would be in a position to assign experienced workers to this programme as other contracts phased out. Avro, on the other hand, would have to build up a large labour force again for a short period of time and then reduce to probably less than its present manpower level. On the other hand, an award to Avro would be of benefit to the Canadian government in that the Crown would be relieved of the payment of \$2 million under the terms of the Capital Equipment Agreement. On the overall basis award of the contract to Canadair would result in a saving of approximately \$9,750,000.

5. The Minister of Finance said that allocation of this contract had been carefully examined by the Treasury Board. The Board had come to the conclusion that the proposal by Canadair was the most advantageous to the Crown in terms of cost, realism of the estimate and demonstrated ability to perform generally and to manufacture on a licence arrangement in particular. The Board has also noted that the manufacture of the engine, of almost equal dollar and employment size to the airframe manufacture was being allocated to Orenda Engines of Malton, Ontario. The Board had also agreed that the manufacture of the aircraft by Canadair would provide a more stable aircraft industry, while awarding it to Avro would require a rebuilding of that company's work force with a serious re-adjustment of employment being required once again in a relative short period of time.

He also pointed out that the Board had felt that the main terms of any contract with a successful company should be accepted before the choice was finally made. The firmest possible arrangement should be secured in order to place upon the company the responsibility for successful management of the contract in financial as well as technical terms. The Board had recommended that Canadair be offered the first opportunity to make its proposal a firm bid on the basis that its proposed cost would be a ceiling price, the cost to the Crown to be the actual cost of manufacture up to that amount, with the manufacturer to receive a reasonable proportion of the savings which would arise if the actual cost fell below the ceiling. On such terms, the company would have to accept financial responsibility for completion of the contract on the basis of its own proposal.

6. Mr. Fleming, in addition, pointed out that, in order to limit the incidence of change in design (they had been frequent during the development contracts of the CF-105), the Board had suggested that in its approval of any contract that major changes would have to be approved by the Board or the Cabinet and that the course of the contract be monitored closely by a senior committee of officials from the Department of National Defence, the Department of Defence Production and the Treasury Board Secretariat.

Explanatory memoranda were circulated, (Aide Memoire, Aircraft Branch, Department of Defence Production, Aug. 11, 1959 and Memorandum, Chairman, the Treasury Board, Aug. 12 - Cab. Doc. 243-59).

7. During the discussion the following points were raised:

(a) It would not be profitable to obtain a new figure from de Havilland since they were obliged to sub-contract a very large part of the work. To some, this might have the advantage of spreading the work across the country. This advantage, however, was greatly offset by the fact that the de Havilland's figure was almost 50 per cent higher than its competitors.

(b) By awarding the contract to Canadair, the government would, of course, find itself in a position of having to defend the award to the second lowest bid. The Defence Production Department had added \$3.3 million to the Canadair bid on the assumption that labour costs might rise. However, Canadair had given the assurance that there would be no escalation on labour or material. Therefore, by removing this amount of \$3.3 million the difference between Avro and Canadair had been reduced to \$1.3 million. Canadair had a series of contracts with the government which would cause a reduction in overhead over the life of the proposed contract. Avro on the other hand, had no prospects for future commercial work. This would, of course, cause an increase in overhead.

AVRO CUT
OUT DESPITE
LOWER BID;
NEED FOR
WORK.

14 AUG 1954
SECRET

KIII AvroHypocrisy.jpg

Allocation of contract for Lockheed F-104G airframe
(Previous reference Aug. 13)

12. The Prime Minister suggested that a final review of the considerations affecting the allocation of the contract for the production of the Lockheed F-104G would be useful.

13. During the discussion the following points were raised:

(a) Award to A.V. Roe would make certain the operation of the Malton plant for at least two or three years, and would offset the local disappointment about the abandonment of the Arrow programme.

(b) Disregarding secondary economies, the A.V. Roe proposal had quoted the lowest price. On the other hand, on an overall basis the proposal of Canadair was the lowest by a margin of \$9,350,000. This net saving would be achieved through lower overhead charges on other government work if the award were made to Canadair.

- 5 -

(c) As a matter of policy, it was desirable to divide the work between the competitors in different areas. The contract for the engine had already been awarded to Orenda, a subsidiary of A.V. Roe. This would add some 3,600 workmen to the working force at Orenda. The engine represented 31 per cent of the cost of the aircraft, and the airframe 36 per cent. Therefore, if the airframe were allocated to Canadair the division of the work between the Toronto and the Montreal area would be approximately equal.

(d) If the award were not made to Canadair, up to 8,000 workmen would be laid off there in 1961 unless the plant meanwhile obtained additional orders.

(e) The fundamental question was whether Canada could afford to maintain three major aircraft plants. The industry was overexpanded, and it seemed unlikely that requirements for piloted aircraft or for missiles in the foreseeable future would be sufficient to keep all three plants in full operation.

(f) The Canadair plant, though owned by a U.S. parent company, could reasonably be regarded as a Canadian establishment. It received no orders from the parent company.

(g) Canadair had taken the initiative of seeking private orders, whereas A.V. Roe had failed to do so and had merely disintegrated.

(h) If given the contract, Canadair would give subcontracts on a widely decentralized basis, ranging from the Maritime provinces to Fort William.

(i) An award to A.V. Roe at this time, several months after the cessation of the Arrow programme, would be criticized.

(j) Even if A.V. Roe received the contract it would merely postpone the evil day. It would inflate the working force for a brief period, with a serious readjustment of employment being required once again in a relatively short time. An award to Canadair, on the other hand, would help to provide the basis for a stable aircraft industry.

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14. The Cabinet agreed,-

(a) that the contract for the manufacture of the Lockheed F-104G airframe should be allocated to Canadair;

(b) that a public announcement should be prepared as quickly as possible by the Ministers directly affected, and submitted to the Prime Minister for approval. The release would be made by the Minister of Defence Production; and,

(c) that the announcement should refer to the general policy of spreading government contracts between different geographical areas wherever possible; to the fact that the engine contract had recently been awarded to Orenda, a subsidiary of A.V. Roe; and to the fact that the award of the airframe contract to Canadair would save the Treasury about \$9,350,000.

As reproduced in Arrow Scrapbook

(26)

He authorized me to tell our government... so the next day I went to Mr. O'Hurley with a letter to this effect and I stood there while he read it and that was the last we heard on that.²²

Crayford Gordon came out swinging in the 20 December issue of *Maclean's*. "We should and will go on building Arrows" he wrote in an angry response to Blair Fraser's article. "The day of the manned interceptor is NOT over... The United States department of defense is NOT 'jubilant' over these premature and erroneous conclusions that the Arrow has been abandoned in favor of the Bomarc ground-to-air missile. The Bomarc is NOT a substitute for the manned interceptor... The Arrow will NOT cost twice as much to produce as buying an American substitute."²³

The key to Gordon's argument was the assumption, broadly supported by American and Canadian military experts, that the manned interceptor remained an integral part of continental defence. Total programme costs were not the issue given this assumption: "... what we are now concerned with is the cost from this point on of procuring a supersonic interceptor." Gordon then outlined the offer his company was making to the government.

The realistic approach is to eliminate what has been spent and consider only those costs which would be incurred from now on actually producing Arrows for combat use. On this basis, we estimate the fly away cost per aircraft, complete in every respect, including Iroquois engines and fire-control system, would be \$3.5 million for the first hundred and \$2.8 million for the next hundred. These costs do not include spares or ground-handling equipment or development and tooling costs.²⁴

Details of Avro's offer to the government were given in a letter from the company to D.L. Thompson, director of the aircraft branch of DDP, on 30 December.²⁵ The letter confirmed a *fixed-price* offer of \$346,282,015 for 100 aircraft (25221 to 25320), including Iroquois engines and the Hughes MA-1C electronics systems. Adding applicable sales tax of \$28,717,985 brought the price per aircraft to an even \$3.75 million. The contract proposals attached to the letter covered design and development, tooling and tool maintenance, manufacture of 20 development and 100 squadron aircraft (thus adding a total of 83 to the 37 aircraft programme) and technical support for the squadron aircraft.

No contract proposal was submitted for the Hughes system, but a total of \$50 million — \$500,000 per aircraft — was allotted for this component. Since the government had not obtained a security clearance for Avro personnel to visit Hughes, information on the MA-1C was coming out the back door for the Canadians. The Avro proposal made no reference to the American offer Smye had passed to O'Hurley and it included no amount for missiles.* It did, however, add the comment that with respect to existing contracts, the "funds on the Development contract are now exhausted and the Tooling contract funds will be expended in the very near future." Diefenbaker's web was being drawn tighter.

The Avro Arrow that entered 1959 was on a collision course with the prime minister. At a NATO conference in Paris in December, Pearkes saw the U.S. Secretary of Defence once more and "was

* In the debate that followed cancellation, Pearkes would take the Avro offer and add \$42.6 million for missiles, \$98.4 million for spares and \$295 million for completion of development of some 20 aircraft, thus reaching the sum of \$781 million for 100 Arrows. (Debates, 1959, II, p. 1290.)

This debunks the theory that Avro's final offer

- a) included charity, since it included payment for the Hughes MA-1 fire control system
- b) that Avro's final price didn't include development costs.

This also proves another of Kay Shaw's points true.

AGENTS PROVOCATEUR

George Pearkes



Charles Foulkes

Chairman Chiefs of Staff Canadian Army General Charles Foulkes. He was against the Arrow from the beginning and it was his deciding against the Arrow which also changed the mind of his former colleague, George Pearkes.



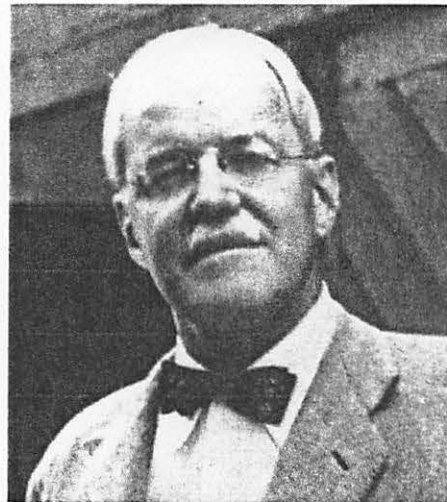
General George R. Pearkes, V.C., Minister of Defence at the end of the Arrow programme. Seemingly all for the Arrow in August 1958 when he circumvented the CSC and CDC to have the Arrow programme continued and even expanded, changed his mind after meeting with US officials, particularly John Foster Dulles.

John Foster Dulles



US Secretary of State under Eisenhower was John Foster Dulles. Dulles had been involved in intelligence and high finance since WW I. He was heavily involved in the Goldman-Sachs stock market pyramid scheme exposed during the Crash of '29, and represented many German interests and sympathetic US financiers of Hitler. He represented Standard Oil, which was found collaborating with the Nazis, particularly with I.G. Farben, with Dulles sitting on their board!

Allen Welsh Dulles



Working with his brother John Foster in the Sullivan Cromwell law firm, who represented many German and American interests allied with the Nazis, Allen Dulles was involved in US intelligence in WW II. He was involved in mysterious negotiations involving German financiers and industrialists before the surrender of the Nazis and was the Director of the CIA for most of the time of Avro Canada's existence. It was on the intelligence provided by the CIA through John Foster Dulles that led Pearkes to break ranks with all his other intelligence agencies and cancel the Arrow.

You state in your book that the manner of the cancellation was scandalous. That, in my opinion, is putting it mildly. You may recall that Diefenbaker endeavoured to hoist the entire responsibility of the layoff onto the company. He said that it was trying to embarrass the Government. This, of course, was utterly ridiculous and untrue. The direction which the company received from the Government was to the effect that all work was to cease forthwith and that no further costs were to be incurred. That seems plain enough. Some people, employed on other work were to be retained, but who? The company had to adhere to the seniority provisions of its various Union contracts which involved some 13,000 people with varied seniority of over twenty years. What was the company to do with 13,000 people with virtually no work on Monday morning? There is also another small item which has never been mentioned and that is, that the company had technically exceeded its financial authority by some \$50,000,000. The Government had forced the company into this position, the alternative to the company being to stop all work and discharge the entire staff on its own volition. In the strictest sense, had it wanted to, and I personally believe it intended to, the Government could have bankrupt the entire A. V. Roe organization.

In the light of these circumstances the company informed the Government that it had no alternative but to lay off virtually the entire staff and would do so at 4:00 p.m. It asked for their advice and assistance at 2:00 p.m. Having heard nothing from the Government it was forced to this disastrous act at 4:00 p.m., Friday, February 20th, 1959.

No warning to gov't as the government suggested they say in Cabinet to Commons and others' questions? They were warned many times.

.....14

8 July 1958 Aide Memoire for MND Pearkes
in his meetings with Eisenhower and Dulles

8JulyAideMemoirePearkes.jpg

- 3 - TOP SECRET

concerned last we spend too much on rounding out the defence against the manned bomber and not have the funds available to participate in the development and production of defence against the ballistic missile.

Our second problem, which is much closer to us, is the rounding out of the defence against the manned bomber. In this field we have been co-operating with the United States for many years and now, with the setting up of the Joint Air Defence Command in Colorado Springs, we should be able to develop a joint system of operational control which will be more effective in an emergency. However this arrangement is not likely to help us in the production and provision of the necessary improvements in the weapons systems to meet the continuing bomber threat.

As you are perhaps aware, we have had under development in Canada a supersonic aircraft known as the CF105, designed to deal with the manned bomber threat after the early 1960's. We have had the greatest possible co-operation with the United States Air Force in the development of a type of aircraft which was considered by both countries to be a requirement for the air defence of North America during the 1960's.

This aircraft is to be equipped with the U. S. Navy weapon the "Sparrow" and a large part of the electronic equipment will have U. S. content. It is expected that the total United States content in the CF105 will be approximately 30% in the development and pre-production aircraft and 10 to 15% if this aircraft goes into production. The development of this aircraft to date has cost \$250 million, and its development will be continued for the next two or three years, to cost about \$550 million, making a total of \$760 million. Our requirements for this aircraft will be relatively small, somewhere around 100, and therefore the individual cost of the aircraft will be about \$5 million, plus the cost of development. If this were the only requirement for our air defence, we could perhaps make provision for it in our succeeding defence budgets but in order that aircraft of this

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UNCLASSIFIED TOP SECRET

type and the type to be used by the United States can operate in Canadian airspace we will be required to introduce a semi-automatic ground environment into Canada. The introduction of SADE in Canada will cost in the neighbourhood of \$107 million. Further improvements are required in the radar and other associated communications which will also bring greater expense within the next few years. NORAD has also recommended the introduction of the Bomarc missile into the Ottawa - North Bay area to supplement the manned interceptor, to round out the U. S. Bomarc chain, and to push the defence 200 miles further north. This development will be a further commitment of some \$144 million.

All these commitments coming at this particular time, between 1960 and 1963, will tend to increase our defence budget by as much as 35 to 50%. (All these projects also contain a very large element of U. S. content, which may give rise to other fiscal problems.) In approaching these joint problems in the past, we have been able to work out cost-sharing arrangements whereby each country contributed a portion of the capital costs and maintenance in Canada of these projects, which are designed for the defence of both countries but which because of geography had to be constructed in Canada. These projects included the Pioneer System, the DEW Line and the Mid Canada Line. We believe that perhaps a wider application of this principle of cost-sharing is now necessary to enable us to continue our joint defence measures without Canada having to shoulder heavy additional defence burdens because of our geographical position. Some approaches have already been made to a solution of these cost-sharing problems in informal discussions with the USAR. Some initial discussions on the cost-sharing of SADE and Bomarc projects have been commenced. Suggestions have also been made in other quarters that perhaps the United States could assist in the production of the CF105 by equipping the U. S. squadrons at Horndon Field and Osceola Bay with this aircraft. These are all very useful approaches which are worthy

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(21)
CabntPurchDrctv.jpg

Government purchasing policy; purchase for defence programme
(Previous reference Sept.7)

6. The Minister of Finance said he had now had a chance to discuss the implications of the new government purchasing policy directive, which had been approved by Cabinet, with the Minister of Defence Production who had not been able to be present when it was considered. The Deputy Minister of Defence Production would be in Washington shortly to carry out negotiations and it would be desirable that he be in a position to explain that the new directive did not affect the pattern of government defence purchases based upon strategic consideration.

He hoped to be able to say something on this subject privately to the United Kingdom and to ask them not to press the Canadian government on this matter. The British had expressed some concern about the "buy in America" policy of the United States. He thought it preferable to soft-pedal the purchasing directive rather than jeopardize negotiations with the United States. Mr. O'Hurley was also of this opinion.

Clearly sensitive
Intergovernmental
Issues were discussed
PRIVATELY, NO PAPER
TRAIL!

7. The Cabinet noted the report of the Minister of Finance on the recent government purchasing policy directive and agreed that it be withheld for some time.

Hush hush!

This is a reproduction of photocopies of cabinet minutes, as reproduced in Arrow Scrapbook, but first released, I believe, to Palmiro Campagna.

TERMS OF REFERENCE for the document of CSC which, like this document, would not take acceptance for a recommendation for Cancellation. The objecting letter to even the later CSC document which this one made necessary, by CAS Campbell, indicates he was resisting being associated with an effort to recommend the abandonment of the CF-105. It is due to this process of the Cabinet Insiders, as REFERENCED in this document, engineering the outcome, to fit an arrangement referred to in several documents, made in the USA in July 1958, by Pearkes and Fleming.

SEE: CSC21AugPearkes.jpg

SEE: CASAUG58Foulkes.jpg

CSCordersCSC.jpg

RECORD OF CABINET DEFENCE COMMITTEE DECISION

121st meeting: Thursday, August 21st, 1958.

Item I

Air Defence Requirements

Memorandum, Minister of National Defence, August 8, Document D9-58; Memorandum, Minister of Defence Production, August 7, 1958, Document D10-58; Memorandum, Secretary of State for External Affairs, August 14, 1958, Document D11-58; Memorandum, Minister of Finance, August 13, 1958, Document D12-58; Report on the Development of the CF-105, August 19, 1958.

The Committee agreed to recommend to Cabinet,-

(a) that approval in principle be given to:

- (i) the installation of two BOMARC bases in the Ottawa-North Bay area; and
- (ii) the installation of two additional heavy radars in Northern Ontario and Quebec and the installation of the associated gap filler radars.

(b) that authority be granted to commence negotiations with the United States for cost-sharing and production on the installation of two BOMARC bases for the Ottawa-North Bay area, the two heavy radars in Northern Ontario and Quebec and the associated gap filler radars;

(c) that consideration be given to:

- (i) abandoning the CF-105 (Arrow) programme and the associated fire control and weapons projects; and
- (ii) authorizing the Chiefs of Staff to investigate and submit proposals for any additional missile installations required and/or any additional interceptor aircraft of a proven, developed type that might be required in place of the CF-105.

CAS - Angus Peakes JPS

MEMORANDUM

CONFIDENTIAL

- 2 -

CONFIDENTIAL

- 3 -

CONFIDENTIAL

21 August 58.

The Minister

CF-105 - Supersonic Interceptor

1 The Air Defence subcommittee, and in particular the CF-105, new being discussed by you with your Cabinet colleagues at Cabinet Defence Committee are of such a nature and import that I feel I should again make clear my recommendations, in order that there may be no misunderstanding.

Suggests he felt the RCAF position might not be reflected in the document released by Foulkes.

2 The Chiefs of Staff have considered at great length and over a long period of time the future of the 105 and associated air defence programmes. The programme initially called for the re-equipping of the nine squadrons from a production run of 189 aircraft, and will decrease. It was clear that this number of aircraft, if ordered, would substantially increase the Defence Budget. If we went into production with at the same time maintaining the present overall pattern of Canadian forces.

3 As a consequence the Chairman, Chiefs of Staff, attempted to get agreement on a programme of 60 front-line aircraft to keep the Budget within two billion dollars. More recently, on your return from Washington, you announced your decision to recommend to Cabinet the cancellation of the 105 programme is the entirety.

4 As I understand it, you would couple with this recommendation to cancel, the introduction of automaticity (SAGE) plus two squadrons of Bomarcas for the Ontario/Quebec area, as well as some additional Bomarcas squadrons which would be the subject of further

The SMOKING GUN yet again.

He is referring to the gov't asking the Chiefs to recommend cancellation to justify a decision Peakes had CLEARLY already made.

CAS21AugPeakesJPS

This reference which occurs in Cabinet Minutes where Peakes is discussing the reasons to officially announce the decision he had already made, to re-equip members of Cabinet (they were split on final cancellation until late in 1958, which prevented Peakes, Fleming and O'Rourke from having it killed outright in late 1958, even though this had obviously been agreed to with the Americans).

Investigation. The degree to which the United States would share the costs of this programme would be the subject of negotiation.

5 In this connection I should state that the requirement for SAGE and the two Bomarcas squadrons to be introduced, as well as a manned interceptor, has been recognized in order to provide a balanced air defence force. I should mention that an air defence system in this time scale requires three main components:

- (a) ground equipment, including SAGE and radars,
- (b) a surface-to-air missile, and
- (c) a supersonic manned interceptor.

6 It is clearly not my responsibility to comment on the Budget reflecting to Fleming's work establishing "Arrow too expensive" criteria for the required Chiefs' conclusions.

7 It is, however, my responsibility to recommend to you the military requirement as I see it in order that the Royal Canadian Air Force may be capable of carrying out its responsibilities. I believe that we must maintain an air defence component of the North American air defence system that will assist in maintaining and preserving our peace. Consequently, I fully support the SAGE programme and the two Bomarcas squadrons. I cannot, however, associate myself with your decision to cancel the 105 programme but must recommend that it proceed as it is presently planned or, alternatively, to couple the cancellation of the 105 with the procurement of a supersonic interceptor to fill the gap. On-the-whole of present plans, as I remember them, may be interesting to note that if no action is taken to replace the CF-100 aircraft with a supersonic interceptor Canada will be the only nation in NATO having an Air Force that is not equipped with such an aircraft.

I could go on at some length and re-reason the requirement putting out the threat as I understood it from the various Intelligence Agencies. I would, however, be covering ground which we have previously discussed on many occasions during the review of this problem. I would simply like to re-state that, as I see it, to help maintain the peace Canada requires a pattern of air defence forces that are efficient, equipped with modern equipment, operationally ready, and the knowledge of its existence should be well known to any would-be aggressor. Consequently, the Royal Canadian Air Force needs the 105 or, alternatively, another supersonic manned interceptor of comparable performance within the time scale in order to continue to assume its responsibilities. and I so recommend.

(Signed) "RICH CAMPBELL"

(Hugh Campbell)
Air Marshal
Chief of the Air Staff

100 Arrows or their equivalent which would involve a higher number of interior planes, which all alternatives were.

THIS IS CAMPBELL OF RCAF
INSISTING, HAVING FINANCIAL
CONSIDERATIONS FORCE HIS HAND
4 BREAKING EVEN WITH THE
CSC DOCUMENT WERE WHICH
ALSO REFUSED TO RECOMMEND
CANCELLATION - FOULKES HAD TO WRITE DOCUMENT
SUMMARY TO DO THAT.

Dec 22/58

Air defence requirements: Arrow aircraft
(Previous reference Dec. 2)

24. The Prime Minister said he had been shocked at the statement Air Marshal Slemon had made about the Arrow. It was not a question of whether Slemon's remarks had been misinterpreted or not but whether he should have made a statement of that kind at all. Avro had put on a tremendous publicity campaign and this played right into their hands. If the government decided to continue development it would be accused of giving in to a powerful lobby. Pressure was coming from other sources in Ontario too. Even if he thought the decision reached last September was wrong, he was determined, because of what had happened since, to adhere firmly to it. The future of the CF-105 would have to be discussed before Parliament opened.

25. The Minister of National Defence pointed out that it was still his understanding that development would be terminated by March 31st. In Paris, the U.S. Secretary of Defence had made it quite clear that the U.S. was not interested in the CF-105, even if it were equipped with the MA1 fire control system and the Falcon missile. The U.S. had now decided not to proceed with the development of any new interceptor aircraft except for the 108 which was years in the future. This was a long range aircraft of advanced design to be employed from bases in Alaska and Greenland. This U.S. decision would strengthen the government's position in deciding to abandon the CF-105.

26. The Cabinet noted the reports of the Prime Minister and the Minister of National Defence on the situation regarding the CF-105 and agreed that a decision be reached on the aircraft's future before Parliament re-opened.

As reproduced from photocopies of released
Cabinet minutes in Arrow Scrapbook.

THE DEPUTY SECRETARY OF DEFENSE
WASHINGTON 25, D. C.

MR. DOUGLAS

June 1, 1960



5

MEMORANDUM ON PRODUCTION SHARING PROGRAM --
UNITED STATES AND CANADA

The current program dates back at least to 1941 and the Hyde Park Agreement. This agreement provided generally that Canada and the U. S. should attempt to coordinate activities so that each would produce in areas of greatest capability. In 1950 a Statement of Principles of Economic Cooperation was issued by the Truman Administration. It advocated, among other things, a coordinated program of requirements, production and procurement; the exchange of technical knowledge and productive skills; the removal of barriers impeding the flow of essential defense goods. In 1956 a DCD Directive on Defense Economic Cooperation with Canada was issued. A Presidentially approved NSC paper, 5822/1, dated 30 December 58, reaffirmed the Statement of Economic Principles and provided for equal consideration to be accorded the business communities of both countries.

Prior to the NSC paper, and following a visit of the President to Canada in July 1958, Canada took the following actions with the understanding that her defense industry depended largely upon the U. S. channelling defense business into Canada: Cancelled the CF 105 and related systems contracts; decided to make maximum use of U. S. developed weapons, integrated into NORAD; worked with the U. S. toward a fully integrated continental air defense.

The U. S. in turn established a Production/Development Sharing Program with Canada with the first quarterly meeting in October 1958. Since then, policy obstacles impeding a free flow of business have been modified in a number of areas such as: Buy American Act; duty free entry of defense goods; security requirements; etc. Also, working groups have been set up on programs of mutual interest (for example, BOMARC); cost sharing agreements have been worked out; and possible joint development programs are being explored.

The last quarterly meeting of the Production Sharing Policy Group was held on 25 May. Despite all efforts, over the period 1 January 59 through 31 March 60, Canadian defense business in the United States almost doubled that placed in Canada. Canada is not satisfied with these results, nor do they appear acceptable from our view.

We must: re-emphasize the program of development sharing activities; encourage American industry to subcontract in Canada; and seek out other legitimate techniques to stimulate the program. Canada should be encouraged to energize her industry which has not displayed the necessary aggressiveness.



Government purchasing policy; purchase for defence programme
(Previous reference Sept.7)

6. The Minister of Finance said he had now had a chance to discuss the implications of the new government purchasing policy directive, which had been approved by Cabinet, with the Minister of Defence Production who had not been able to be present when it was considered. The Deputy Minister of Defence Production would be in Washington shortly to carry out negotiations and it would be desirable that he be in a position to explain that the new directive did not affect the pattern of government defence purchases based upon strategic consideration.

He hoped to be able to say something on this subject privately to the United Kingdom and to ask them not to press the Canadian government on this matter. The British had expressed some concern about the "buy in America" policy of the United States. He thought it preferable to soft-pedal the purchasing directive rather than jeopardize negotiations with the United States. Mr. O'Hurley was also of this opinion.

7. The Cabinet noted the report of the Minister of Finance on the recent government purchasing policy directive and agreed that it be withheld for some time.

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- 2 -

Feb. 11

CF-105 Arrow programme; report of Cabinet
Defence Committee
(Previous reference Feb. 4)

1. The Minister of National Defence reported that the Cabinet Defence Committee had considered the recommendations he had made to the Cabinet that further development of the CF-105 be now discontinued and that the Chiefs of Staff be asked to present soon their recommendations on what requirements, if any, there were for additional air defence missile installations in Canada, and for interceptor aircraft of the nature of the CF-105 or alternate types. During the meeting, the Chairman of the Chiefs of Staff Committee reported that the Chiefs of Staff had reviewed the position concerning the production of the CF-105, and were still of the opinion that the changing threat and the rapid advances in technology, particularly in the missile field, along with the diminishing requirements for manned interceptors in Canada, created grave doubts as to whether a limited number of aircraft of such extremely high cost would provide defence returns commensurate with the expenditures.

The committee concurred in the recommendations and agreed that they be submitted to the Cabinet for consideration at an early meeting.

An explanatory memorandum was circulated, (Memorandum, Secretary, Cabinet Defence Committee, Feb. 6 - Cab. Doc. 46-59).

2. Mr. Pearkes added that it was impossible to give any assurance that manned interceptors for the defence of Canada would not be bought in the United States some time in the future, if the CF-105 programme was discontinued. It was his own opinion that the threat of an attack on North America by manned bombers was rapidly diminishing. He felt that Russia would not consider launching an attack until it had a large arsenal of intercontinental ballistic missiles. Against these, manned interceptors were useless. If, however, new evidence became available that the Soviet Union was developing more modern manned bombers, then interceptors might have to be bought. The question naturally arose as to why Canada was installing Bomarc when it was effective only against manned bombers. The answer was, that some insurance premium had to be paid against the possibility of bomber attack and this premium was cheaper by far than the CF-105. The U.S. had agreed to pay \$91 million out of a total of \$110.8 million for the installation of the two Bomarc squadrons in Northern Ontario and Quebec.

- 3 -

3. During the discussion the following points emerged:

(a) At the meeting of the Cabinet Defence Committee, the Chief of the Air Staff had stated that the R.C.A.F. would need 100 to 115 interceptor aircraft for several years ahead. These would have to be bought in the U.S. or, failing that, presumably U.S. squadrons would provide interceptor defence for Canada. This would be particularly awkward when, at the same time, the 1st Canadian Air Division might be in the process of having its F-86 aircraft replaced by more modern machines at a cost of about \$400 million to \$500 million. In effect, Canada would be defending Europe, and the U.S. would be defending Canada.

(b) On the other hand, the role of the Air Division was different from that of the R.C.A.F. in Canada. Furthermore, if the F-86 were not replaced, the Air Division might just as well be withdrawn from Europe, and the implications of this for the N.A.T.O. alliance were very serious indeed. The proposal now being considered was to assign the Air Division a strike-attack role and equip it with aircraft suitable for the purpose.

(c) It was not true to say that the U.S. would be defending Canada if the CF-105 were discontinued. Canada would be manning the Bomarcs, the warning lines, S.A.G.E. and other installations. The U.S. would man the aircraft which, after all, was a steadily decreasing part of the defence, as the nature of the threat changed; this would mean that the presence of U.S. servicemen would be less apparent than if they were employed in different capacities.

(d) The U.S. intended now to develop the long range F-108 interceptor, which would operate from Greenland and Alaska. It was a large aeroplane, less dependent on ground environment, and very expensive. It would be defending Canada just as squadrons of the U.S.A.F. were doing today in complementing the R.C.A.F. squadrons.

4. The Cabinet deferred decision on the recommendation of the Cabinet Defence Committee that the development of the CF-105 Arrow be discontinued.

[2021]

Estimates 1959-60: possible announcement on the CP-105
Arrow aircraft
(Previous reference Jan. 28)

12. The Prime Minister said that, when the estimates for 1959-60 were tabled, questions would probably be asked about production of the Arrow aircraft. In the circumstances, it might be advisable to make a final decision now, and announce it when the estimates were tabled. He had discussed the Arrow and other defence matters with the Chiefs of Staff a few days ago, and they had said that no new military factors regarding either the manned bomber threat or developments to meet the threat had emerged since September which would have a

bearing on the Arrow decision. He had raised with the Chiefs the possibility of the United Kingdom "Blackburn" replacing existing equipment in the Air Division. If this were a suitable aircraft, then the work might be given to AVRO. However, they favoured U.S. equipment.

13. During the discussion the following points emerged:

(a) It was not vital to make a statement immediately. The wiser course would be for the Cabinet Defence Committee and the Cabinet to consider what steps might be taken to maintain employment at AVRO and then announce a programme at the time the final word was given on the Arrow.

(b) It was impracticable to think of providing other work for AVRO as soon as the Arrow programme was halted. It would take many months before any contracts could be awarded.

(c) The sooner the decision was made on the Arrow, the more money would be saved on cancellation charges and could be made available for other purposes. It was quite evident what the decision would be. Nothing would be gained by deferring it any longer.

14. The Cabinet deferred decision on the future of the CP-105 Arrow aircraft programme to the next meeting.

*considering the "standardize on U.S. equipment" policy directive given to the Canadian forces in September of 1958, this appears

COPY

Casa Duquesa,
Serra e Mar, 18,
8600 Portimão,
PORTUGAL

THIS WAS FRED'S NICKNAME FOR ME
i.e. (J.C.)

March 29/84.

Dear "Lace"

When I saw the enclosed, I wanted to throw up and almost did but instead wrote the enclosed letter to the Globe & Mail to get some of it off my chest. Apparently the Govt is going to write off C\$1.74 billion and for my money, that's not all. That's at Canadair and apparently they are going to write off another chunk at the Box Factory. I do not know what factor should be applied to make the figures reasonably comparable but I guess it would be pretty high. Nor do I know the empty weight of the two aircraft or the factor for the relative complexity. Regardless of the details, the picture which evolves is a national disgrace, in spades!

The adjoining article is another real dilly. C.D.C. was set up by Parliament "to buy Canada back from the foreigners", mainly Yanks. Now the C.D.C. has bailed out U.S. Savin Corp. to the

Portion of letter sent to J.C. Floyd by Fred Smye in 1984.

AMS
Orig
Date
Local (1)
Local (2)
File

2-0540
F. J. Thompson/JH

(H.M. Foots) a/c
for CAM
(H. M. Foots) a/c

4 An interim report on the progress of negotiations is requested.

3 Although there has been no decision, as yet, on the Arrow program continuation the RCAF is proceeding with all necessary planning as though the project was continuing. You are therefore requested to arrange for the necessary authority from USAF which will permit the RCAF and AWC to obtain relevant flight test data, analyze and results immediately the Arrow program goes ahead.

2 The matter of obtaining F-106 data from Canada was discussed with the F-106 WFO at WADC on 5 Dec 58 by representatives of this Headquarters. The F-106 WFO stated that they required authority from USAF to release Canada F106 flight test data and analysis to the Canadian government and contractors. Further, the F106 WFO stated that, upon obtaining USAF authority, they would hold a meeting, with representation from MAC, Canada, AWC and the RCAF to define Canadian data and analysis requirements.

1 Stage 1 of the Arrow Flight Test Program, as detailed in reference (1), is intended to clear the Arrow Weapon System to a minimum standard in a predominant portion of its combat envelope by an early date. The basic assumption underlying this "minimum" approach to flight testing is that use can be made of the extensive data and analysis which have resulted from the USAF F-106 programs.

Arrow Flight Test Program
Data Required from Canada
Air Materiel
Canadian Joint Staff,
2450 Massachusetts Ave. NW,
Washington 8, D.C., USA.

Ref (1) CAC Report No. 21, Issue 2, dated 12 Jan 59 - "General Policy and Program for the Development, Demonstration and Evaluation of the Arrow Weapon System" (sent to CAC(W) on 9-11 dated 6 Feb 59).

Ottawa Ont
18 Feb 59

TOP SECRET

As reproduced in Requiem for a Giant by Palmiro Campagna

THE DEVELOPMENT OF THE INTRODUCTION OF THE BOMARC
GROUND TO AIR GUIDED MISSILE AND THE NB-1 AIR TO AIR
GUIDED MISSILE ON CANADIAN MANEUVER INTERCEPTORS FOR THE
NECAP FOR THE DEFENCE OF CANADA

In 1953 the Chiefs of Staff of the U.S. and Canada set up a Joint Study Group of Military and Scientific Experts to keep in constant study the problems of air defence on this continent, and in particular, to study those aspects of the North American air defence system in general, and the Early Warning System which are of mutual concern to Canada and the U.S.

With the emergence of the soviet thermonuclear weapons and long range jet bombers an Air Defence Planning Group of the U.S. Continental Air Defence and RCAF Air Defence Command were actively participating in plans for the air defence of this continent. This Air Defence Planning Group proposed to introduce a line of Bomarc guided missile bases from coast to coast crossing the U.S. and Eastern Canada at roughly the 48th parallel of latitude. To the north of this and entirely within Canada the proposal was for a line of all weather interceptor squadrons, nine of which were already in existence. Further, in order to control these weapons the adoption of the necessary ground radars and computing systems. To do this an extension was proposed of the ground environment in Canada northward to increase the depth of the combat zone for tracking, and intercepting hostile raids.

As a result of this, the Cabinet Defence Committee agreed at its 110th meeting on 13 June 1956 to recommend that site surveys be authorized in 1956 for additional heavy radars and gap fillers for this purpose. At that meeting it was also stated that further operation and evaluation of

Ottawa, Ontario
30 Nov 60

Air Member
Canadian Joint Staff
2450 Massachusetts Ave NW
Washington 8 DC

Iroquois - Engine History & Status

As requested by W/C W Armstrong the history and status of the Iroquois engine have been prepared. The status was taken in Feb 59 but was recently checked and has not varied appreciably. Engine X116 has been shipped to the United Kingdom for inspection by Bristol/Siddeley. All other engines and parts have been stored and preserved. Engine X106 was, of course, removed from the B47 before the aircraft was returned to the USAF.

It is estimated the 50 hour PFI engine could be prepared in 2 months and the test completed to clear the mechanical configuration in 3 to 4 months. Should a slightly more advanced configuration be required, such as an additional stage to the HP spool as Orenda proposed to the USAF, the timing would be in the order of 8 months.

The six new test cells, with simultaneous data recording instrumentation, could be employed for Iroquois development. The altitude test tunnel could be completed in approximately 8 months.

The engine history as tabled is a frank and factual resume and, although many problems and errors are mentioned, it is a CAAT technical opinion the engine had overcome the major mechanical difficulties. The aerodynamic configuration, as stated in the historical summary, was cleared by a 50 Mr PFI before the program terminated.

MLL
(W/C Cole) W/C
AFM 5

W/C W/C Cole/DB
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As reproduced in Requiem for a Giant by Palmiro Campagna

Termination, Speculation, and the End of A.V. Roe Canada

following the American requirements, that were creating delays and cost escalations — only now it was in the Astra program.

There was another complication to the Genie development in addition to its classified specifications. Avro had stated that its engineers, like those of RCA, would require security clearances in order to be able to work with the American classified data on the Genie. Even with RCAF help, clearances for their staff could take up to a month, thereby making it very difficult to meet the necessary deadlines. If, for any reason, Avro was not allowed full access to the information required, the deadline could never be met. These were not unlike the comments RCA had made when Genie use was still a lower priority. For all intents and purposes, given the American requirement for nuclear missiles on Canadian aircraft, Avro and RCA could not produce in the time allotted without vast sums of money and fewer security complications.

On September 21, 1958, the Canadian government finally cancelled the ill-fated, ill-conceived Sparrow/Astra system. Approval to obtain and install the Hughes MA-1 electronic fire control system, with Falcon and nuclear Genie missiles, was finally granted by the Minister of National Defence on November 5, 1958. The option was discussed with the USAF and agreed to, and soon work began to acquire and install the system in Arrow RL-202. This had the effect of substantially lowering the cost of the Arrow.

There remained the question of incorporating Genie, although this no longer presented the problem it had with Astra. For one thing, the Hughes fire control was already adapted for the Genie in American aircraft. It also meant not having to disclose classified information to anyone other than Avro engineers. But use and handling of American nuclear weapons by Canadians was still somewhat problematic and needed to be sorted out. Overshadowing this was the higher priority being accorded the Bomarc.

Thus the reasons expressed by Bill Turner were not that far off. Inclusion of the Genie requirement by NORAD created more design difficulties for both RCA and Avro. This had the added effect of causing schedule delays and a tremendous increase in cost, in order to satisfy the imposed RCAF deadlines. There was also no guarantee that Avro and RCA engineers would be provided with sensitive information con-

BUT THEY
SECRETLY DELETED
ARROW FROM
FISCAL BUDGET EST'S
FOR COMING YEAR
THAT MONTH!
(SEE

~~SECRET~~

4.

CABINET PAPER—PRIVILEGED

Property of the White House—For Authorized Persons Only
CURRENT SITUATION

The present strong interest of Canada in production sharing is the result of the decision made by the Canadian government in September to curtail drastically the CF 105 supersonic interceptor aircraft program, and to introduce into the Canadian air defense system the U.S. produced BOMARC missile and SAGE control equipment. This decision recognized the rapid strides being made in missiles by both the U. S. and Russia and the high cost of the CF 105 in relation to its potential contribution to North American defense.

The specially developed Astra fire control and Sparrow missile systems for the CF 105 were terminated in September, with the subsequent cancellation of the complete program 20 February. Reaction to this decision from the press and the opposition has been most unfavorable, and will greatly increase the strong pressures which have existed on production sharing.

With over \$300 million already expended in the development of this system and a potential production program of another \$1.25 billion for 100 aircraft, this was a heavy blow to Canadian industry and the pride of their people. The implications on the Canadian economy can be measured in terms of their defense budget, which is in the order of \$1 billion annually.

The decision to terminate the CF 105 was predicated in part on the agreements to provide Canada with better chances to share in production of defense items of mutual interest. The Deputy Minister of Defense Production has stated in effect that if production sharing does not work, Canada has no alternative but to use her limited defense budget for whatever items she is able to produce, whether or not it makes a maximum contribution to North American defense.

Since September negotiations have been underway on the basis of Canada paying one-third of the cost of two 30 missile BOMARC sites, one SAGE super combat center and a radar improvement program. The Canadian share of \$125 million would be associated with site construction and unit equipment, with the United States share of about \$250 million applied to the procurement of BOMARC and SAGE technical equipment. It has been agreed that this is the only practical way to make the split, however, the Canadians fear it will not give them any assurance of sharing in the production of the electronic and missile hardware. Since construction on Canadian soil is normally done by Canadian contract, Canadians are assured that substantially all of their \$125 million will be spent in Canada in any event. However, they do not want to become a "brick and mortar" economy.

The Air Force has consistently opposed any agreement to assure Canada a given share of the production, based on the conviction that technical competence, cost and delivery considerations must be the deciding criteria. If Canadian competence can be demonstrated and reasonable decisions agreed to on individual items, it is our position that the end result will be a reasonable share for the Canadians.

From the recent statement by the Prime Minister to Parliament it is assumed that the Canadians have accepted the U. S. position on this matter.

Dated April 3, 1959

As reproduced in Requiem for a Giant by Palmiro Campagna

CABINET PAPER

For Information

~~SECRET~~

CJ-59-59

3-5-59

Secret

310880N-183 (AA48)

Ottawa Ont
18 Feb 59

Ref (1) CAE Report No. 21, Issue 2, dated 12 Jan 59 - "General Policy and Programme for the Development, Demonstration and Evaluation of the Arrow Weapon System" (sent to CJS(W) on G-11 dated 6 Feb 59.

Air Member,
Canadian Joint Staff,
2450 Massachusetts Ave. NW,
Washington 8, D.C., USA.

Arrow Flight Test Programme
Data Required from Convair

1 Stage 1 of the Arrow Flight Test Programme, as detailed in reference (1), is intended to clear the Arrow Weapon System to a minimum standard in a predominant portion of its combat envelope by an early date. The basic assumption underlying this "minimum" approach to flight testing is that use can be made of the extensive data and analysis which have resulted from the USAF F-106 programme.

2 The matter of obtaining F-106 data from Convair was discussed with the F-106 WSFO at WADC on 5 Dec 58 by representatives of this Headquarters. The F-106 WSFO stated that they required authority from USAFHQ to release Convair F106 flight test data and analysis to the Canadian government and contractors. Further, the F106 WSFO stated that, upon obtaining USAFHQ authority, they would hold a meeting, with representation from MAC, Convair, AVRO and the RCAF to define Canadian data and analysis requirements.

3 Although there has been no decision, as yet, on the Arrow program continuation the RCAF is proceeding with all necessary planning as though the project was continuing. You are therefore requested to arrange for the necessary authority from USAFHQ which will permit the RCAF and AVRO to obtain relevant flight test data, analysis and results immediately the Arrow program goes ahead.

4 An interim report on the progress of negotiations is requested.

(H. R. FOOTITT) G/C

(H.H. Footitt) G/C
for CAS


F. L. A. Thomassen/JM
2-0548

AMTS
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Local (1)
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File

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Allocation of contract for Lockheed F-104G airframe
(Previous reference Aug. 13)

12. The Prime Minister suggested that a final review of the considerations affecting the allocation of the contract for the production of the Lockheed F-104G would be useful.

13. During the discussion the following points were raised:

(a) Award to A.V. Roe would make certain the operation of the Malton plant for at least two or three years, and would offset the local disappointment about the abandonment of the Arrow programme.

(b) Disregarding secondary economies, the A.V. Roe proposal had quoted the lowest price. On the other hand, on an overall basis the proposal of Canadair was the lowest by a margin of \$9,350,000. This net saving would be achieved through lower overhead charges on other government work if the award were made to Canadair.

(c) As a matter of policy, it was desirable to divide the work between the competitors in different areas. The contract for the engine had already been awarded to Orenda, a subsidiary of A.V. Roe. This would add some 3,600 workmen to the working force at Orenda. The engine represented 31 per cent of the cost of the aircraft, and the airframe 36 per cent. Therefore, if the airframe were allocated to Canadair the division of the work between the Toronto and the Montreal area would be approximately equal.

(d) If the award were not made to Canadair, up to 8,000 workmen would be laid off there in 1961 unless the plant meanwhile obtained additional orders.

(e) The fundamental question was whether Canada could afford to maintain three major aircraft plants. The industry was overexpanded, and it seemed unlikely that requirements for piloted aircraft or for missiles in the foreseeable future would be sufficient to keep all three plants in full operation.

(f) The Canadair plant, though owned by a U.S. parent company, could reasonably be regarded as a Canadian establishment. It received no orders from the parent company.

(g) Canadair had taken the initiative of seeking private orders, whereas A.V. Roe had failed to do so and had merely disintegrated.

(h) If given the contract, Canadair would give subcontracts on a widely decentralized basis, ranging from the Maritime provinces to Fort William.

(i) An award to A.V. Roe at this time, several months after the cessation of the Arrow programme, would be criticized.

(j) Even if A.V. Roe received the contract it would merely postpone the evil day. It would inflate the working force for a brief period, with a serious readjustment of employment being required once again in a relatively short time. An award to Canadair, on the other hand, would help to provide the basis for a stable aircraft industry.

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14. The Cabinet agreed, -

(a) that the contract for the manufacture of the Lockheed F-104G airframe should be allocated to Canadair;

(b) that a public announcement should be prepared as quickly as possible by the Ministers directly affected, and submitted to the Prime Minister for approval. The release would be made by the Minister of Defence Production; and,

(c) that the announcement should refer to the general policy of spreading government contracts between different geographical areas wherever possible; to the fact that the engine contract had recently been awarded to Orenda, a subsidiary of A.V. Roe; and to the fact that the award of the airframe contract to Canadair would save the Treasury about \$9,350,000.

As reproduced in Arrow Scrapbook

The contract for items in the BOMARC programme would be seriously affected if employment were to decline drastically; and, finally, if Canadair received the airframe contract, the Department of Defence Production would ensure that a reasonable share of work would be given to Canadair's existing sub-contractors.

If de Havilland were the successful bidder, it would have to act as a programme manager, subcontracting the majority of the work because it did not have sufficient space for manufacturing.

If Avro received the contract, the company would have to build up a large labour force again and then reduce again to less than the present levels. Avro had no firm programme for the future. If it, or de Havilland, received the business, the Canadair problem would remain to be solved.

Ideally, requesting the three companies to bid on a fair price basis was the best approach. But firm price bidding was unrealistic in the present circumstances.

As for the engines, there were two possibilities for production: Canadian Pratt Whitney or Orenda Engines Limited. It would, however, be an incompatible situation if a subsidiary of Pratt Whitney were chosen to manufacture a General Electric engine, as the two firms were direct competitors in the United States.

The Minister recommended, -

- (a) that the Lockheed F-104G be selected as the replacement for the Sabre squadrons in Europe;
- (b) that the airframe contract be allocated to Canadair Limited on an incentive type contract; and,
- (c) that the engine contract be allocated to Orenda Engines Limited, on a firm price basis.

An explanatory memorandum was circulated, (Minister's aide memoire, undated).

2. The Minister without Portfolio (Mr. Macdonnell) said that it was the Minister of Finance's understanding that this matter would not be considered in his absence.

3. The Minister of National Defence said it would be very embarrassing to him when his estimates were before the House on Thursday next to announce that the Air Division was being re-equipped but not to be able to say with what aircraft. The Minister of Finance was more concerned with the allocation of contracts and the details involved, not the choice as such.

 **Precedents and Antecedents:** It is clear from this that the Diefenbaker gov't was accustomed to giving implied orders to the Chiefs of Staff on equipment selection. It also demonstrates that they were requesting a policy recommendation from the government that was not justified in military terms, to support a decision that had been politically made.

4. Mr. Pearkes added that the Cabinet Defence Committee had had the report of the Minister of Defence Production before it at its last meeting. Since then the Chiefs of Staff had discussed the matter further with Defence Production officials, and had stated that they would be willing to go along with a decision to re-equip the Air Division with the Lockheed F-104G.

5. During the discussion the following points emerged:

(a) If it were decided to acquire the Lockheed, \$14 million worth of work would be placed in Canada in respect of the 66 machines being purchased by Germany. Give it to the ones who don't need it?

(b) It was undesirable for Canadair to be given most of the work, in view of the fact that it was fairly busy now and in the light of Avro's position following the cancellation of the Arrow. The Minister of National Defence, in his opening statement on his estimates, should make it quite clear that the Arrow could not have been used for the strike attack role in Europe.

(c) The implication of the views of the Chiefs of Staff was that they would prefer a better aircraft than the F-104G if more money were available. It would be highly embarrassing if, at some time in the future after the government had announced a decision to purchase the F-104G, it became known that the Chiefs of Staff were, on military grounds, in favour of a different and presumably more efficient type of aircraft. The Chiefs of Staff should be asked to submit a recommendation on the F-104G, taking into account all the factors involved, before the Cabinet reached a decision.

(d) Assuming a decision was taken now on the type of aircraft, the Air Division would not be completely re-equipped for five years. It would probably be another five years after that before the Lockheed or the Grumman would cease to be effective.

6. The Cabinet approved the choice of the Lockheed F-104G to re-equip 8 squadrons of the Air Division in Europe. Subject to receiving a recommendation from the Chiefs of Staff for it, and subject to discussion of the matter with the Minister of Finance before announcement.

Allocation of contract for Lockheed F-104G
(Previous reference Aug. 10)

3. The Minister of Defence Production reported that tenders for the manufacture of the Lockheed F-104G had been received from de Havilland, Canadair and Avro aircraft. The bid of de Havilland was almost 50 per cent higher than the other two who had provided almost identical tenders. De Havilland apparently did not have facilities to manufacture the plane itself and had to go to sub-contract for most of the work. The figure of Avro was slightly lower than that of Canadair but did not appear realistic.

4. Mr. O'Hurle pointed out that the time element was of essence and, of the three companies, Canadair, owing to the fact that it had past experience in producing Lockheed aircraft under licence, was in a more favourable position. A decision had to be reached on the allocation of the contract prior to the 17th of August if contracts in connection with the manufacture of 60 Lockheed aircraft for West Germany were to be obtained.

It was the view of the Department of Defence Production that it would not be possible to support three major aircraft firms in Canada. Canadair Ltd. had been markedly more successful in commercial sales than Avro which seemed to have made no effort in obtaining commercial contracts. If the contract were awarded to Canadair other government contracts would benefit as a result of lower overhead, which would mean a saving up to \$12.5 million over a five-year period; furthermore, the company would be in a position to assign experienced workers to this programme as other contracts phased out. Avro, on the other hand, would have to build up a large labour force again for a short period of time and then reduce to probably less than its present manpower level. On the other hand, an award to Avro would be of benefit to the Canadian government in that the Crown would be relieved of the payment of \$2 million under the terms of the Capital Equipment Agreement. On the overall basis award of the contract to Canadair would result in a saving of approximately \$9,750,000.

5. The Minister of Finance said that allocation of this contract had been carefully examined by the Treasury Board. The Board had come to the conclusion that the proposal by Canadair was the most advantageous to the Crown in terms of cost, realism of the estimate and demonstrated ability to perform generally and to manufacture on a licence arrangement in particular. The Board has also noted that the manufacture of the engine, of almost equal dollar and employment size to the airframe manufacture was being allocated to Orenda Engines of Malton, Ontario. The Board had also agreed that the manufacture of the aircraft by Canadair would provide a more stable aircraft industry, while awarding it to Avro would require a rebuilding of that company's work force with a serious re-adjustment of employment being required once again in a relative short period of time.

He also pointed out that the Board had felt that the main terms of any contract with a successful company should be accepted before the choice was finally made. The firmest possible arrangement should be secured in order to place upon the company the responsibility for successful management of the contract in financial as well as technical terms. The Board had recommended that Canadair be offered the first opportunity to make its proposal a firm bid on the basis that its proposed cost would be a ceiling price, the cost to the Crown to be the actual cost of manufacture up to that amount, with the manufacturer to receive a reasonable proportion of the savings which would arise if the actual cost fell below the ceiling. On such terms, the company would have to accept financial responsibility for completion of the contract on the basis of its own proposal.

6. Mr. Fleming, in addition, pointed out that, in order to limit the incidence of change in design (they had been frequent during the development contracts of the CF-105), the Board had suggested that in its approval of any contract that major changes would have to be approved by the Board or the Cabinet and that the course of the contract be monitored closely by a senior committee of officials from the Department of National Defence, the Department of Defence Production and the Treasury Board Secretariat.

Explanatory memoranda were circulated, (Aide Memoire, Aircraft Branch, Department of Defence Production, Aug. 11, 1959 and Memorandum, Chairman, the Treasury Board, Aug. 12 - Cab. Doc. 243-59).

7. During the discussion the following points were raised:

(a) It would not be profitable to obtain a new figure from de Havilland since they were obliged to sub-contract a very large part of the work. To some, this might have the advantage of spreading the work across the country. This advantage, however, was greatly offset by the fact that the de Havilland's figure was almost 50 per cent higher than its competitors.

(b) By awarding the contract to Canadair, the government would, of course, find itself in a position of having to defend the award to the second lowest bid. The Defence Production Department had added \$3.3 million to the Canadair bid on the assumption that labour costs might rise. However, Canadair had given the assurance that there would be no escalation on labour or material. Therefore, by removing this amount of \$3.3 million the difference between Avro and Canadair had been reduced to \$1.3 million. Canadair had a series of contracts with the government which would cause a reduction in overhead over the life of the proposed contract. Avro on the other hand, had no prospects for future commercial work. This would, of course, cause an increase in overhead.

Arrow(CF-105) aircraft; report of Cabinet Defence
Committee; decision to terminate development
(Previous reference Feb. 14)

12. The Prime Minister said a draft announcement on the termination of the development contract for the Arrow had been prepared. It included a section on arrangements with the United States for production sharing and a section on the acquisition by Canada of nuclear weapons for defence. He had gone over the draft in great detail but it was not yet in the right form to be made that day.

13. The Minister without Portfolio (Mr. Macdonnell) reported that, the previous day in Toronto, the Premier of Ontario had spoken to him in strong terms about the effects of terminating the Arrow contract upon the municipalities in the vicinity of Malton.

14. The Minister of Finance said Mr. Frost had also spoken to him in pungent language about work on the Arrow being stopped. Mr. Frost had complained about so little notice being given to Avro, and had asked why other contracts could not be given to the company. He had replied that the matter had been exhaustively considered, that all possible alternatives had been reviewed, and that the decision would be taken in the light of the best military advice available. He had also told Mr. Frost that, right from the outset, it had never been said that actual production would proceed and that everyone understood that the matter was to be reviewed year by year.

15. During the discussion the following points emerged:

(a) The sooner the announcement could be made the better, because the decision to terminate was bound to leak out and the longer the announcement was delayed the more would be the cost.

(b) The most appropriate time for the announcement appeared to be the following Friday. This, as proposed, should refer not only to the Arrow termination but also to production sharing and to the acquisition of nuclear weapons. The Prime Minister's statement should be followed by one by the Minister of Defence Production, which would deal in greater detail with production sharing. In considering this question of timing, the possibility of a motion to adjourn the house to discuss a matter of urgent public importance should not be overlooked.

(c) It would be desirable that notes be exchanged with the U.S. to implement the agreed arrangements on sharing the costs of the new radars, gap fillers, S.A.G.S. and the two Bomarc stations in Ontario and Quebec.

- 5 -

16. The Cabinet,-

(a) agreed that the development of the Arrow aircraft and Iroquois engine be discontinued, effective as of the time of announcement;

(b) that an announcement concerning this decision, the production sharing with the United States, and the acquisition of atomic weapons be made in the House of Commons, probably on Friday;

(c) that the contractors be notified of the termination of their contracts at the same time; and,

(d) that an agreement be made with the United States, in the form of an exchange of notes, for the implementation of the agreed arrangements on the sharing of the costs of Bomarc and S.A.G.S. installations in Canada and the associated extension of radar coverage.

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Statement on the Arrow
(Previous reference Feb. 17)

1. The Prime Minister said that he would make a statement announcing the termination of the Arrow contracts in the house the following day. The C.B.C. Television Service would present a programme on the following Sunday or Monday on the development of the Arrow. It would be well to make the statement before the broadcast.

He had gone over the draft statement several times but thought that it should be redrafted by a committee of ministers. The redraft could be considered by Cabinet before the statement was made in the house.

2. The Cabinet approved the suggestion of the Prime Minister that Messrs. Fleming, Pearkes, Fulton, Smith, and O'Hurley meet that afternoon to revise the draft statement on the Arrow aircraft and related matters.

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cabinet minutes in Arrow Scrapbook

Feb. 19/59

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Feb 14/57

Arrow (CF-105) aircraft; undertaking to pay development costs; decision to terminate development
(Previous reference Feb. 10)

5. Mr. Green, as Acting Minister of Defence Production, stated that it was necessary to reach a decision as to whether or not a clear undertaking should be given to the Avro Aircraft Company that the government would meet the expenses involved in continuing development until notice of termination of the contract was given. The company had noted that the costs of this development were, in fact, likely to exceed the financial limitations that had been previously set on the programme, and that, unless these financial limitations were increased, it would be necessary for them now to begin laying off personnel until such time as the contract was extended or terminated. The Minister proposed to reply saying that the company would be paid reasonable and proper costs incurred under the development contract until it was terminated.

6. The Minister of Finance said the Treasury Board had withheld approval of proposals of this kind in recent weeks and should not be over-ridden in this matter but should be allowed to consider it again. He noted that the board was confronted with too many such facts accomplished by ministers or departments in taking on commitments that exceeded the financial limitations that had been previously established.

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7. In the discussion of this proposal, the opinion was expressed that, if this undertaking were now given to Avro, it would increase the government's expenditure undesirably on this contract; no such undertaking should be given but, instead, a decision should be taken forthwith on the termination of the development contract. On this latter proposal it was noted that the Cabinet was clearly of one mind that work on the Arrow should be discontinued. A decision on the matter had practically been taken weeks ago, but it had been thought that the Cabinet Defence Committee should meet and discuss it again with the military advisers of the government. This had now been done and the committee had recommended termination.

8. In further discussion the following points emerged:

(a) When a decision was announced it would be desirable to say as much as possible about arrangements with the United States on production sharing. It was not clear why the statement on that subject had been delayed. It should be recognized, however, that it was not possible to give Parliament any firm assurance as to the scale of the orders that the United States would, in fact place under the production sharing arrangements, even though the Secretary of Defence and others in the U.S. administration were well disposed to place such orders.

(b) No member of Cabinet present was opposed to the termination of the development of the Arrow, although it was recognized that the Minister of Labour, who was not present, was impressed with the employment problem that such action would create.

(c) In the statement on this matter in September, it had been said that development would be continued until March. It was noted, however, that the circumstances which had been spoken of in that statement had changed in the meantime, particularly in regard to the crisis over Quemoy, and the government, in the present circumstances,

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(d) It was pointed out that the government faced a serious decision in regard to the equipment of the Air Division of the R.C.A.F. in Europe. The replacement for the F-86 in the Air Division might cost over \$500 million. In fact, no decision had yet been taken by the Chiefs of Staff or the Minister of National Defence to recommend replacement, and it might be that missiles would be used instead, or some other course followed.

(e) It was also pointed out that the government faced the possibility that the R.C.A.F. might be using interceptor aircraft to defend Europe but not to defend Canada itself, which would be defended by American interceptors. This would create quite a political issue. On the other hand, it was noted that the R.C.A.F. would be using Bomarcas to defend Canada, and no decision was being proposed now to use aircraft in Europe. This issue was not directly related to the decision on the Arrow.

(f) It was agreed that other ministers should be present for this major decision, particularly the Minister of Defence Production. The final decision should therefore be taken on Tuesday next and Mr. O'Hurley be asked to be present, even at the cost of having to cancel his appointment in Halifax that day.

(g) A statement should be made in the House of Commons at the same time that the company was notified of the termination, and that statement should be ready when the final decision was taken on Tuesday.

9. The Cabinet agreed that the final decision on discontinuing the development of the Arrow (CF-105) aircraft should be taken at a meeting of the Cabinet on Tuesday, February 17th, and the decision when made should be announced forthwith to Parliament at the same time that the company was informed of it.

As reproduced from photocopies of cabinet minutes in Arrow Scrapbook

SECRET

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Feb 4/57

CF-105 Arrow Programme
(Previous reference Feb. 3)

6. The Minister of National Defence reported again on the present state of the CF-105 Arrow programme. In addition to the information he had given previously, he noted that, from the end of September 1958, until the end of January 1959, \$60 million had been spent on the development of this aircraft and that, if development continued until March 31st, \$45 million more would be expended. The average cost per weapons system for a programme of 100 operational aircraft was now estimated to be \$7.81 million. This excluded termination charges for the Astra/Sparrow from September 1st, 1958, which were estimated to be \$28 million. Although the cost had been reduced from \$12.6 million to this figure, he still considered that the production of 100 such aircraft could not be justified at this price. The Chiefs of Staff were, as directed last September, urgently investigating requirements, if any, for additional air defence missile installations in Canada, and for interceptor aircraft of the nature of the CF-105 or alternative types.

He recommended that development of the CF-105 be discontinued and that the Chiefs of Staff present at an early date the recommendation they had been requested to make.

An explanatory memorandum was circulated, (Minister's memorandum, Jan. 30).

7. Mr. Pearkes added that, at the moment, there did not appear to be anything in the U.S. inventory of aircraft that would justify a decision to purchase. The Chiefs of Staff were considering the possibility of having some Bomarc squadrons moved from south of the border in the central U.S. to areas in western Canada. If it were felt that the manned bomber threat was decreasing, then it was obviously preferable to concentrate on defensive missiles rather than to continue with the production of interceptors.

8. The Prime Minister said it would be necessary to have a meeting of the Cabinet Defence Committee before making the final decision on the Arrow.

9. During the discussion the following points emerged:

(a) If a question on the future of the Arrow were raised when the estimates were tabled, it should be answered in a way which would show that a decision on the programme would be taken before March 31st. There was sufficient money in the estimates to pay for cancellation charges or to continue

SECRET

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(b) If the Arrow development were cancelled and no alternative interceptors were produced in Canada or purchased elsewhere, then, in the event of a war, and when the CF-100 was no longer in service, Canada might have to rely on the U.S. to provide manned fighter defence. Under the terms of the NORAD agreement, U.S. squadrons could be stationed temporarily on Canadian airfields.

(c) The personnel in the R.C.A.F. which would have otherwise been employed in flying the CF-105 and servicing it would be absorbed in work in connection with S.A.G.E., additional radars and on other duties.

(d) The re-equipping of the Air Division in Europe was a separate problem. At the moment, the most urgent aspect of the situation was a replacement, if any, for the F-86 Sabre which was obsolete. The Cabinet Defence Committee would be considering this problem and would make recommendations in the near future to the Cabinet about it. Replacing the Sabres overseas would cost at least \$350 million.

10. The Cabinet noted the report of the Minister of National Defence on the CF-105 Arrow programme and the ensuing discussion, and agreed that the matter be considered by the Cabinet Defence Committee the following day.

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cabinet minutes in Arrow Scrapbook

THE PARTY LINE IN ANTICIPATION OF QUESTIONS

2125-1
1325-7
1325-500/00

21 April 1980

NOTE TO FILE

CBC Programme on the Avro Arrow

1. Early in 1980 the CBC aired a programme on the Avro Arrow. During research the producer requested access which could not be given into DND files concerning the Arrow. The Deputy Minister did, however, answer some specific questions about the order for destroying the aircraft prototype. This correspondence is to be found on file number 2125-4 TD 8285.
2. The programme itself turned out to be a moderate and relatively accurate interpretation of events. The following observations were made by the Director at the time of the programme.
3. The reason for cancelling the Avro jet liner was not convincing, nor could it be supported by documentation. This is a subject that requires proper historical analysis.
4. The rank of LtGen "Reggie" Lane was consistently given as Brig Gen.
5. The programme argues that it is not known who ordered the destruction of the prototype. In fact the Deputy Minister explained in his letter to the producer that the order for destruction stemmed from advice given by the Chief of Air Staff, the Deputy Minister of National Defence and the Department of Defence Production.
6. The programme left the impression that no opportunity had been given for various agencies to acquire the prototype. As the Deputy Minister's letter pointed out, this is not true.
7. The programme was interesting in that it left the viewer with the feeling that Mr. Crawford Gordon's personality clash with Mr. Diefenbaker was instrumental in bringing about cancellation of the Arrow. This impression could even be interpreted to suggest that Mr. Gordon himself might have ordered the destruction of films and blueprints relating to the Arrow. It must be emphasized that there is no evidence of such actions.
8. The programme concluded that no American interests were involved in the decision. On the face of it this seems a remarkably innocent point of view. Previous accounts have suggested with some reason that the American aviation industry would not have been comfortable with the Arrow as competition and therefore was not likely to give the Canadian firm much opportunity to compete.

W.A.B. Douglas
Ottawa, 21 April 1980

As reproduced in Arrow Scrapbook

Certain advantages will accrue to the airline which first employs a jet transport in domestic scheduled transport operations and these are believed to be sufficiently important to warrant a brief examination. Firstly there should be an increase in traffic due to the superiority of turbine-engined aircraft over conventional types, with respect to passenger comfort. Increased speed will also be an attraction. Both these factors assume greater importance as the stage length is increased. The very novelty of such a radical advance in type of equipment will also be of benefit. A temporary advantage in low fuel prices may also go to the first airline to introduce turbine-powered aircraft, though this advantage is expected to disappear as the demand for kerosene increases.

This study suggests that the Jetliner can be operated at a lower direct cost than the North Star for the route and suitable frequencies chosen even though the stage lengths are well below the optimum for the Jetliner. It is quite possible, however, that a comparable analysis of direct cost under the same conditions for a modern twin-engine transport powered by reciprocating engines (such as the Convair 440 or the Martin 404) would show lower direct costs than those estimated for the Jetliner. In comparison with such aircraft the Jetliner might still be more attractive, however if all factors are taken into consideration, since increased revenues are expected to result from the improved standards of comfort and speed which the Jetliner offers.

Conclusions.

Provided that the Jetliner in normal scheduled operations demonstrates the performance submitted by the manufacturer the comparative operating cost analysis of a 40 passenger version of the Jetliner and of the North Star when operated on the triangular route Toronto-Montreal-New York-Toronto with three daily flights in each direction indicates that:

1. The service requires three Jetliners (including one as reserve) as against four North Stars (including one as reserve).
2. The direct operating cost of the Jetliner, with the present price of kerosene in tank cars at Malton, varies between 75% and 81% of the North Star direct operating cost. Assuming the price of kerosene to rise to a level of \$0.08 less per Imp. gal. than the price of high octane aviation fuel, direct operating cost of the Jetliner will still be lower than that of the North Star.
3. An equal indirect cost (as calculated from TGA data) was applied to the Jetliner and the North Star alike. On this basis, which is rather unfavourable to the Jetliner, the total operating cost of the Jetliner varies between 86% and 90% of the total North Star operating cost.
4. The introduction cost of the Jetliner in the proposed service will probably be of the order of \$250,000.
5. Before any jet-engined transport is introduced on a particular route special studies with respect to traffic control and winds at cruising altitudes will have to be made. The calculated maximum wind at 30,000 ft. is indicated by the Meteorological Division, Department of Transport to be of the order of 150 mph. Such a wind will seriously affect

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6. Increased frequency of service, or an increase in stage length up to 900 miles, either of which will result in a larger number of aircraft than specified in para. 1, will have the effect of lowering the direct operating cost of the Jetliner from the levels indicated in para. 2.
7. Due to the improved standards of comfort and speed which the Jetliner can offer, as well as the novelty of such a radically new type of transport, it is very probable that it will generate more revenue traffic than the North Star, so that the difference in net revenue will be appreciably greater than that indicated by the total cost figures given in para. 4.
8. It is very probable that under the basic route and schedule conditions assumed in this study, direct operating costs lower than those for the Jetliner would be achieved through use of a modern twin-engine transport such as the Martin 404 or the Convair 440, since the stage lengths involved are so far below the optimum for the Jetliner. The greater attraction of the Jetliner might, however, even out-weigh the higher cost level, particularly during the initial period during which no other North American operator would have jet transports in operation.



Department of National Defence

CANADIAN JOINT STAFF

1700 MASSACHUSETTS AVE., N.W.
WASHINGTON 4, D.C.

IN REPLY PLEASE QUOTE

No. 8.1038-C.102(A.Staff 0)

14 August, 1951.

Referred to... P. 1.7.5

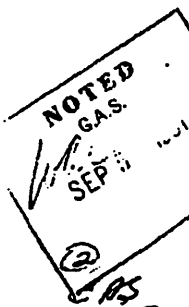
AUG 17 1951

File No. 6.0.3.7

Chief of the Air Staff,
Department of National Defence,
Ottawa, Ontario, Canada.

Avro Jetliner C.102

1. Recently the Avro Jetliner was flown from Toronto to Washington for demonstration. The USAF and the USN are both interested in this aircraft but the only concrete proposal for purchase had come through the US ANG at Wright Field.
2. It is now confirmed that the USAF wish to purchase 12 Jetliners. A recommendation was made to this effect by a specially appointed committee representing all USAF Commands, to the Aircraft and Weapons Board. This Board approved the purchase of 12 aircraft.
3. The USAF intend to use the C.102 as a high-speed bombing trainer.
4. There is another application for the C.102 which is of exciting interest, this being high-speed jet fighter refuelling. It is not known, at present, whether an order has been placed but the Flight Refuelling experimental section at USAF HQ are anxious to get 4 C102s for test in this type of work.



To see pls. I have
inform D.O.P.

Richards
AUG 17
7127

H.G. Richards
(H.G. Richards)
Group Captain
for Air Member
Canadian Joint Staff

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TOP SECRET

concerned lest we spend too much on rounding out the defence against the manned bomber and not have the funds available to participate in the development and production of defence against the ballistic missile.

Our second problem, which is much closer to us, is the rounding out of the defence against the manned bomber. In this field we have been co-operating with the United States for many years and now, with the setting up of the Joint Air Defence Command in Colorado Springs, we should be able to develop a joint system of operational control which will be more effective in an emergency. However this arrangement is not likely to help us in the production and provision of the necessary improvements in the weapons systems to meet the continuing bomber threat.

As you are perhaps aware, we have had under development in Canada a supersonic aircraft known as the CF105, designed to deal with the manned bomber threat after the early 1960's. We have had the greatest possible co-operation with the United States Air Force in the development of a type of aircraft which was considered by both countries to be a requirement for the air defence of North America during the 1960's. This aircraft is to be equipped with the U.S. Navy weapon the "Sparrow" and a large part of the electronic equipment will have U.S. content. It is expected that the total United States content in the CF105 will be approximately 20% in the development and pre-production aircraft and 10 to 15% if this aircraft goes into production. The development of this aircraft to date has cost \$250 million, and its development will be continued for the next two or three years, to cost about \$530 million, making a total of \$780 million. Our requirements for this aircraft will be relatively small, somewhere around 100, and therefore the individual cost of the aircraft will be about \$5 million, plus the cost of development. If this were the only requirement for our air defence, we could perhaps make provision for it in our succeeding defence budgets; but in order that aircraft of this

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8 July, 1958 Aide Memoire for MND Pearkes in his meetings with Eisenhower and Dulles

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The Arrow was designed to rely as little as possible on Ground Control (GCI) like SAGE

Bomarc to fill gap in US chain, interceptors still required.

type and the type to be used by the United States can operate in Canadian airspace we will be required to introduce a semi-automatic ground environment into Canada. The introduction of SAGE in Canada will cost in the neighbourhood of \$107 million. Further improvements are required in the radar and other associated communications which will also bring greater expense within the next few years. NORAD has also recommended the introduction of the Bomarc missile into the Ottawa - North Bay area to supplement the manned interceptor, to round out the U.S. Bomarc chain, and to push the defences 250 miles further north. This development will be a further commitment of some \$164 million.

All these commitments coming at this particular time, between 1960 and 1963, will tend to increase our defence budget by as much as 25 to 30%. (All these projects also contain a very large element of U.S. content, which may give rise to other fiscal problems). In approaching these joint problems in the past, we have been able to work out cost-sharing arrangements whereby each country contributed a portion of the capital costs and maintenance in Canada of these projects, which are designed for the defence of both countries but which because of geography had to be constructed in Canada. These projects included the Pinetree System, the DEW Line and the Mid Canada Line. We believe that perhaps a wider application of this principle of cost-sharing is now necessary to enable us to continue our joint defence measures without Canada having to shoulder heavy additional defence burdens because of our geographical position. Some approaches have already been made to a solution of these cost-sharing problems in informal discussions with the USAF. Some initial discussions on the cost-sharing of SAGE and Bomarc projects have been commenced. Suggestions have also been made in other quarters that perhaps the United States could assist in the production of the CF105 by equipping the U.S. squadrons at Harmon Field and Goose Bay with this aircraft. These are all very useful approaches which are worthy

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TOP SECRET

5 million per ASTRA Arrow!
Not 12.5 million as later
stated to Cabinet.



Charles Foulkes

3. Labour

O'Hurley

Defence Production points out that the abandonment of this project would mean unemployment in the Toronto area of 25,000 men. There is no alternative production that could be put into A.V. Roe and the Orenda engine plants. Even if a substitute aircraft for the CF105 were selected, it would not meet the immediate situation as it would take twelve to eighteen months to obtain licences, make arrangements for royalties, tooling, etc., for any other aircraft to replace the A.V. Roe aircraft.

Why not? Avro had many programs incl. several for missile

Lavoisier yes, but a lot of work changing the production lines and still too. The key people would remain, while the rest could be called back or replaced.

4. Military

The production of the CF105's would meet the minimum foreseeable military requirements for interceptor aircraft but it is not expected that any other interceptor aircraft will be produced in Canada, and our whole reliance is expected to be placed on ground-to-air missiles in the future.

Sold this concept by key USAF and US gov't people, and through the F-103 program, which was merely competitive with the Arrow.

The facts show the Arrow 2, never mind the Arrow 3, 4, and P5-2 ramjet-boosted and titanium skinned versions, would remain the top performing Combat Air Patrol aircraft on earth today.

5. Financial

(a) A further disadvantage is financial. This is outlined in para. 9 (d) of the Cabinet paper and in the appendices. It is quite clear that this aircraft will require almost \$500 million to complete development and then it will likely cost between \$10 and \$12 million a copy for production. It should be emphasized that these costs cannot be guaranteed, and in the recent study carried out by the Departments of Defence Production and National Defence it was stated:

"No assurances can be given that further increases will not occur. These increases depend on many factors; such as, wage increases, application of overhead, and the volume of business which may be expected from all prime contractors."

This price included the preparation of runways in forward deployment bases, their ground handling equipment, simulators, lifetime spare engines, and most other parts, test equipment. A stockpile of weapons, the radar, runway extension and hardening at several bases, and much more. It is even believed that development costs to then were rolled into this figure. It was certainly LIGHT YEARS from a PRODUCTION cost.

about 540 million in production, with 100 million for development and 100 million for ICAF service.

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CONCLUSIONS

Therefore I consider that the disadvantages far outweigh the advantages of continuing the CF105 programme. This conclusion has been reached after most thorough study of this problem by the Chiefs of Staff and myself; and the considerations can be summed up briefly as follows:

- (1) The decreasing threat may make this aircraft superfluous to requirements before it is completed.
- (2) The rapid progress in missile technology is producing ground-to-air missiles which are cheaper, more efficient and more economical to maintain than the manned aircraft. They can be fitted with nuclear warheads and they are possible of further development. I am convinced that the missile will provide more defence per dollar than the manned interceptor, and now that the range of the missile is reaching the range of the interceptor, the advantage appears to be all with the missile. The use of missiles will also save manpower and allow us to take over more U.S. establishments in Canada.

PERSONAL statement, not the views of the Chiefs of Staff.

3. Nuclear Warheads

The abandonment or limitation of manned aircraft in the air defence system and more reliance being placed on ground-to-air missiles would bring about a necessity for arrangements to be made for the use of nuclear warheads for air defence. It is not possible to put a nuclear warhead on the Sparrow missile, and therefore the CF105 with Sparrow cannot be said to be the most modern air defence weapon available. However if more reliance is placed on the use of missiles, then arrangements will have to be made for the storage of nuclear warheads for the use of Canadian missile units in Canadian airspace.

A whopper. Avro doc's show they were developing a nuclear Sparrow, but immaterial anyway; 1956(!) Chiefs of Staff docs refer to planned adoption of the MB-1 missile, which was the nuclear Genie for the Arrow and F-106.

This clearly shows that Foulkes is responsible for the content of his document, and it shows what his personal view of the Arrow program was. CAS Campbell and Air Siemen and CINC NORAD and USAF Gen. White, and so many others didn't subscribe to this view at all.

**Long range strike-recce
Arrow version proposed
to the RAF. The Arrow was
designed to be MULTI-ROLE.**



Cabinet Minutes for 3 February, 1959

Cabnt3Feb59.jpg

Arrow Mk.4 strike variant

Estimates 1959-60: possible announcement on the CF-105
Arrow aircraft
(Previous reference Jan. 28)

12. The Prime Minister said that, when the estimates for 1959-60 were tabled, questions would probably be asked about production of the Arrow aircraft. In the circumstances, it might be advisable to make a final decision now, and announce it when the estimates were tabled. He had discussed the Arrow and other defence matters with the Chiefs of Staff a few days ago, and they had said that no new military factors regarding either the manned bomber threat or developments to meet the threat had emerged since September which would have a

In other words, the RCAF still wanted 178 Arrow Mk.2s, or a superior number of inferior aircraft.

bearing on the Arrow decision. He had raised with the Chiefs the possibility of the United Kingdom "Blackburn" replacing existing equipment in the Air Division. If this were a suitable aircraft, then the work might be given to AVRO. However, they favoured U.S. equipment.

13. During the discussion the following points emerged:

Was Avro ineligible for US contracts?

(a) It was not vital to make a statement immediately. The wiser course would be for the Cabinet Defence Committee and the Cabinet to consider what steps might be taken to maintain employment at AVRO and then announce a programme at the time the final word was given on the Arrow.

Note some felt preservation of Avro was important, but others nixed any consideration of giving them anything, with Diefenbaker himself ruling it out above in his own manner of tongue.

(b) It was impracticable to think of providing other work for AVRO as soon as the Arrow programme was halted. It would take many months before any contracts could be awarded.

(c) The sooner the decision was made on the Arrow, the more money would be saved on cancellation charges and could be made available for other purposes. It was quite evident what the decision would be. Nothing would be gained by deferring it any longer.

Cooler heads resist!

14. The Cabinet deferred decision on the future of the CF-105 Arrow aircraft programme to the next meeting.

Why was Pearkes so intent on killing the Arrow?

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(b) If the Arrow development were cancelled and no alternative interceptors were produced in Canada or purchased elsewhere, then, in the event of a war, and when the CF-100 was no longer in service, Canada might have to rely on the U.S. to provide manned fighter defence. Under the terms of the NORAD agreement, U.S. squadrons could be stationed temporarily on Canadian airfields.

Which was a US offer made in the July 1958 meetings with Dulles, and which Pearkes admitted he had jumped at when offered it as part of a package, as a means to facilitate the cancellation of the Arrow Weapons System.

(c) The personnel in the R.C.A.F. which would have otherwise been employed in flying the CF-105 and servicing it would be absorbed in work in connection with S.A.G.E., additional radars and on other duties.

(d) The re-equipping of the Air Division in Europe was a separate problem. At the moment, the most urgent aspect of the situation was a replacement, if any, for the F-86 Sabre which was obsolete. The Cabinet Defence Committee would be considering this problem and would make recommendations in the near future to the Cabinet about it. Replacing the Sabres overseas would cost at least \$350 million.

Arrow couldn't be considered because the US authorities were adding "low level" to this mission requirement, which made the Arrow not the optimum aircraft.

10. The Cabinet noted the report of the Minister of National Defence on the CF-105 Arrow programme and the ensuing discussion, and agreed that the matter be considered by the Cabinet Defence Committee the following day.

Of course, keeping Canada's all weather interceptor specialty for both NORAD and NATO with the same aircraft made much more sense, -even apart from the moral aspect of switching to nuclear strike roles.



Dulles



Pearkes

Perhaps because he had already agreed to do so?

Cabinet minutes for 28 Jan, 1959

Arrow aircraft; alternative aircraft programme

17. The Minister of Finance said that almost as soon as he tabled the main estimates for 1959-60 it would become known that there was no provision for expenditures on the Arrow beyond April 1st, except cancellation costs.

18. The Prime Minister said he had received suggestions that Avro might be given a contract to produce, under licence, a Blackburn aircraft of United Kingdom design. It was his understanding that this aircraft might be suitable both as an interceptor and for ground attack purposes. Such a development would be helpful in furthering the government's Commonwealth policy.

19. The Minister of National Defence said the Blackburn aircraft was not in existence yet and could not be available for three years. It had been studied as a possible replacement for the F-86 in the R.C.A.F. Air Division in Europe. The N.A.T.O. military authorities had in mind two roles for the Air Division, - all weather reconnaissance and strike. These could be carried out as long as the CF-100 remained in operation. They had suggested, however, that the F-86, with which the Air Division was also equipped, be replaced by an aircraft with a strike capability. The most promising was a Grumman machine. This would have a large measure of Canadian content in it perhaps 70 per cent, and much of the work might be done at the Avro plant at Malton. It would be manufactured under licence from the U.S. company. It was just barely supersonic. At the moment he was inclined towards replacing the F-86's in the Air Division and doing nothing about the CF-100's.

20. The Cabinet noted the brief reports on the Arrow and possible future aircraft programmes and agreed that these matters be discussed again in the near future.

THIS is the source of the RCAF decision not to use the Arrow in Europe. The NATO CINC was a US General. European NATO leaders had privately been asking for the Arrow.

Yet the Arrow had devastating capacity as a strike-reconnaissance aircraft and was being proposed to Britain in that role.

This option on the Grumman Tiger changed to the F-104 Starfighter, and Avro's lower bid was rejected in favour of Canadair, which was US owned.

The RCAF, in lieu of the Arrow for ALL roles actually wanted F-4 Phantoms, which were more expensive than the Arrow and of considerably lower performance.

The Arrow had longer range, half the wing loading, and better thrust to weight. Avro's Bob Lindley, Chief Engineer on the Arrow, went through the F-4 design when he joined McDonnell-Douglas after Arrow cancellation. Over 4,000 Phantoms were sold.

Lindley had also done the first layout drawings for the Avro Vulcan bomber, and would be in charge of the design of the Gemini Capsule, and would go on to an amazing career in the US Space Program and with the European Space Agency.



Luftwaffe Phantom

RL Whitcomb © 2001

3 May Ontario.
 29 Apr 57

Air Member,
 Canadian Joint Staff,
 2450 Massachusetts Ave. N.W.,
 Washington 8, D.C. USA

BOMARC - Liaison Activities

1 Please refer to the following:

- (a) Our 81920-105-4 (AMTS), dated 12 Nov 56;
- (b) Your 825-14-2 (AFCS), dated 3 Jan 57;
- (c) Your 25-14-2 (O Staff O), dated 25 Jan 57.

2 As indicated in reference 1(a) above, consideration of the many factors associated with activating BOMARC squadrons in the North Bay and Ottawa areas is continuing. Because these bases are essentially to accommodate the requirements of the integrated defence system of North America and because present US regulations preclude Canada from having sole custody of atomic and other sensitive equipment, a mutual USAF-RCAP effort is now favoured over the original concept of Canadian manufacture. In this latest proposal, the RCAP would supply all base facilities including shelters, launching equipment, and personnel while the USAF would supply missiles and special test equipment. In this way the bases would be assigned a priority suitable to COMAD and the USAF would be able to maintain direct custody of the sensitive equipment. It would be necessary for the RCAP to procure in the US and/or have manufactured in Canada the necessary installed and ground support equipment. Also, the USAF would be required to absorb the training of RCAP personnel.

3 The CAS has obtained the approval of the Cabinet Defence Committee to negotiate the introduction of BOMARC into the RCAP and the USAF are generally aware of and agree with the above concept. However, until our operational and planning staffs have completed the detailed requirements, decided upon the best weapons deployment, and formulated the associated programs, little detail can be discussed with the USAF. Similarly, pending the foregoing, technical effort beyond maintaining current data on the system is also being held in abeyance.

4 Because the demand for current technical information is now at a peak for planning purposes, the course of action proposed in references 1 (b) and 1 (c), above, is concurred in and should be completed as soon as possible. In the absence of a firm program, your suggestion of a single Canadian authority or project office for handling BOMARC information and liaison is considered premature, except as now practiced unofficially within AFHQ.

5 The presently conceived limited RCAP provided equipment will decrease the number of agencies and personnel who will require direct liaison with the USAF and BOMARC contractors. Initially, this can be restricted to a very few CJS (W) and AFHQ staff members; a list of those involved at AFHQ can be provided as you have suggested at any time the present clearance procedure appears inadequate or cumbersome.

Jan 28/57

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(g) The truth was that no one could forecast with reasonable precision what the requirement might be a year hence. Each of the military services had their own special reasons for the views they held. The Navy and the Army were particularly concerned that going ahead with the CF-105 might mean less money for them in the future. However, it would be unwise to look for reductions in these two services, even with the CF-105, unless some very drastic steps were taken.

abandoned on
September 7th

(h) The Conservative Party, right from Confederation, had always been a vigorous protagonist of the theory that Canada's needs should be met from within Canada. To abandon the CF-105 even though it was so expensive and might be obsolete would be hard to explain. On the other hand, it would be equally hard to explain, in three or four years, why the government had spent vast sums of money on a relatively small number of aircraft which might by then be virtually useless.

5. The Minister of Finance reported on the representations made to him by Mr. Tory and Mr. Smye of Avro. The CF-105 programme supported 25,000 persons in employment. If it were abandoned, the highly skilled pool of talent drawn together for the project would be dispersed and many of the people concerned would go to the United States, never to return. No portion of Avro's profits had been invested in other sectors of the group of which Avro was now a part except in the aircraft industry. Although controlled by the Hawker-Siddeley group, Avro was in large part owned by Canadians. They had stated that the R.C.A.F. made a major mistake three years ago by recommending the adoption of SPARROW and ASTRA. A great deal of money could be saved by using the FALCON and the Hughes fire control system. Finally, they said that, if the programme with their proposed modification were continued, their company would have a reasonable opportunity before the end of 1962 to look for other business. If they found little or none, then Avro would be in real difficulties.

Mr. Fleming said he had pointed out to Messrs. Tory and Smye that their arguments, that the Falcon missile and Hughes fire control system developed by the United States should be good enough for Canada, could also be used against them in regard to the airframe and engines which they wanted produced in Canada by their own firm. Mr. Smye, in particular, had been very critical of some R.C.A.F. decisions and officers.

3 September, 1958 Cabinet minutes, page 2
Cabnt3Sept58pt2.jpg

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6. The Minister of National Defence felt bound to say that the R.C.A.F. had conscientiously made the recommendations they thought would be the best in the interests of the defence of Canada. The government of the day was responsible for the decisions reached and the present government would be responsible for any decision on the future of the CF-105. He also said that the figures on savings mentioned by Mr. Smye should be treated with reserve. The latter had not been aware, for example, that there were a number of types of FALCON.

7. The Cabinet deferred decision on the recommendations of the Cabinet Defence Committee regarding air defence requirements, including the future of the CF-105 programme.

And they kept deferring, over and over again, until February 14th, 1958, despite pressure from Peckes, Fleming and Diefenbaker. DDP minister O'Hurley was conspicuously absent from these minutes.

R. B. Bryce,
Secretary to the Cabinet.

CABINET PAPER—PRIVILEGED

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CURRENT SITUATION

The present strong interest of Canada in production sharing is the result of the decision made by the Canadian government in September to curtail drastically the CF 105 supersonic interceptor aircraft program, and to introduce into the Canadian air defense system the U.S. produced BOMARC missile and SAGE control equipment. This decision recognized the rapid strides being made in missiles by both the U. S. and Russia and the high cost of the CF 105 in relation to its potential contribution to North American defense.

The specially developed Astra fire control and Sparrow missile systems for the CF 105 were terminated in September, with the subsequent cancellation of the complete program 20 February. Reaction to this decision from the press and the opposition has been most unfavorable, and will greatly increase the strong pressures which have existed on production sharing.

With over \$300 million already expended in the development of this system and a potential production program of another \$1.25 billion for 100 aircraft, this was a heavy blow to Canadian industry and the pride of their people. The implications on the Canadian economy can be measured in terms of their defense budget, which is in the order of \$1 billion annually.



The decision to terminate the CF 105 was predicated in part on the agreements to provide Canada with better chances to share in production of defense items of mutual interest. The Deputy Minister of Defense Production has stated in effect that if production sharing does not work, Canada has no alternative but to use her limited defense budget for whatever items she is able to produce, whether or not it makes a maximum contribution to North American defense.

Since September negotiations have been underway on the basis of Canada paying one-third of the cost of two 30 missile BOMARC sites, one SAGE super combat center and a radar improvement program. The Canadian share of \$125 million would be associated with site construction and unit equipment, with the United States share of about \$250 million applied to the procurement of BOMARC and SAGE technical equipment. It has been agreed that this is the only practical way to make the split, however, the Canadians fear it will not give them any assurance of sharing in the production of the electronic and missile hardware. Since construction on Canadian soil is normally done by Canadian contract, Canadians are assured that substantially all of their \$125 million will be spent in Canada in any event. However, they do not want to become a "brick and mortar" economy.

The Air Force has consistently opposed any agreement to assure Canada a given share of the production, based on the conviction that technical competence, cost and delivery considerations must be the deciding criteria. If Canadian competence can be demonstrated and reasonable decisions agreed to on individual items, it is our position that the end result will be a reasonable share for the Canadians.

From the recent statement by the Prime Minister to Parliament it is assumed that the Canadians have accepted the U. S. position on this matter.

Dated April 3, 1959

As reproduced in Requiem for a Giant by Palmiro Campagna

CABINET PAPER

For Information

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MEMORANDUM TO THE CABINET DEFENCE COMMITTEE

A Power Plant for the CF105 Supersonic Fighter Aircraft

1 When the Canadian Government decided in December 1953 to support the CF105 aircraft development, it was anticipated that we could procure a suitable engine from an external source and build it under license. The Rolls Royce RB106 was the most promising engine in the thrust range required. However, since that time the development of this engine has been retarded, and more important, has received only lukewarm support from the British Ministry of Supply. It is now very doubtful if this engine will go beyond the prototype stage and Rolls Royce is continuing the work on low priority.

2 These circumstances made it necessary to make a careful analysis of all other promising engine development programs in the United Kingdom and in the United States to see whether some other engine would meet the performance requirements of the CF105. This analysis which was completed in August 1954, included the investigation of all engines approaching the required power output. These were, Curtiss-Wright J67, Pratt and Whitney J57 and J75, DeHavilland Gyron and the Bristol Olympus. Of these engines the J75 will most nearly meet our requirements on time.

3 In the meantime, Orenda Engines Limited of Toronto had proceeded with the design and development of their PS13 engine as a private venture investing some \$9,000,000 in the project up to the present time. This endeavour indicates clearly the confidence of the management in its design staff. The RCAF has now completed a careful study of the engine, particularly with respect to its design features as compared with those of other engines. This study indicates that the engine is more advanced in design concept than any engine being developed in the U.K. or U.S.A. The engine was supersonic in concept from the beginning. The design incorporates a transonic first-stage compressor producing an exceptionally high mass flow. Design emphasis on mechanical simplicity coupled with the extensive use of titanium, has produced prototype engines which are about 1000 pounds lighter than other engines in the same power class. An accepted way of comparing engine performance is the thrust produced per pound of engine weight. The PS13 at its 20,000 lb. rating exceeds the Gyron by 22% and the J67, J75 and RB106 by over 50%. These comparative figures are of great importance, particularly with respect to the increased performance at high altitudes of a supersonic aircraft such as the CF105. In fact, the PS13 is the only engine likely to be available on time to give the CF105 its required performance. The first of these prototype engines has run and indicates that the predicted high performance will be met. The other two prototype engines will run before June 1st, 1955.

4 Studies carried out indicate that there is little or no advantage either in time or in money in building an engine under license as opposed to Canadian design. This stems from the fact that a licensing agreement can only be undertaken safely when the engine has been type-tested and modified to a point where its detail configuration is comparatively static. The comparative costs are a matter of statistics but general information and experience indicates that there is no significant difference in costs where the design staff, development facilities, and production capacity are available at home. Furthermore, the advantages of expending this money and effort in Canada rather than in another country places the PS13 engine in a very favourable light.

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② AE 4 Off the
for your information
28 Aug 57

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RAEng Local

③ RAEng 4

In other words the M&C is
undoubtedly into C&S advice
saying that there is no panic
about, even if M&C has
been estimating it we need
any M&C's or maybe S's
to support the Arrow. When we
go from here is very vague.

① Notes on Air Council Meeting

To Consider S981-111 (CCR) d/22 Aug 57.

Comparison of Air Defence Weapons Combination

Held at 1415 Hrs. 27 Aug 57

1. VCAS - Under great pressure to make decisions re Sparrow, Arrow and Canuck 6.
2. CAS - Things are moving quickly in an alarming way.

Gov't has told us, this week, to cut back expenditures in 58/59 and not to expect any increase in following years. This cuts Canuck 6 out.

Trend is to reduce expenditures in defence to balance budget and keep election promises.

The job is to save money on frills and on lesser operationally important things. Must keep ourselves as operationally effective as we can with available money.

While the 58/59 cut takes Canuck 6 out we still have freedom of action to trade it for something else.
3. CAS - Drop consideration of Canuck 6 with SP. II and concentrate on Arrow armament. Then come back to Canuck, i.e. the Canuck situation is not to influence Arrow armament.

COR PAPER

4. CAS - re Sp.II being twice as effective as Falcon.

Can't believe USAF stays tied to such an inferior weapon. Personal letter from USAF CAS this week saying they are now quite pleased with Falcon.
- AMTS - does not believe paper since so much judgement went into arithmetic to show 2:1 favour for Sp.II.
- CAS - Even if little brother, the RCAF, is so much smarter than big brother, the USAF, in choosing a superior weapon - an orphan Sp.II, is it worth the price?

No decision reached on problem.

5. CAS - concluded meeting by saying

"Whether or not we stay with 105 depends largely on getting the US to come in with us during the next two months - before November when we go to the Gov't."

JB

Pearkes 12 July 1967

Requiem for a Giant

Victoria, in a series of taped interviews in 1967. From Pearkes's comments, only Hugh Campbell is mentioned as having had knowledge of the deal. What about Cabinet or the Prime Minister? Following are the salient excerpts:

Pearkes: I took chances. We were defenceless against the high power bomber where we had the old CF-100. It couldn't compete with the modern Russian bombers. We had no supersonic fighter but the Americans emphasized the fact that they had lots of them. Now ... one thing I had to face was, if you scrap the Arrow you've got nothing. What will you do? Will you buy American aircraft to fill this gap? ... Or, say here, you can rely on American aircraft, not having bought them, but putting your pride in your pocket and saying here, we will give facilities [to] American fighter squadrons to come and be stationed in Canada, so that they can get the advantage there or, if not actually stationed in there, when the situation deteriorates they can move forward and operate from Canadian airfields ... I said let us make full arrangements for these American fighter squadrons to come in, to practice from our airfields. Let them store equipment and aircraft if they want to, at places such as Cold Lake and various other points all across Canada, and they came there and then carried out training exercises, moving a squadron up at short notice to one of these airfields. Now, that was how I filled in this defenceless gap during those times. He [name of another author which is not clear on the tapes] doesn't bring that out and I don't know how he would have known ...

The Arrow: The Pearson Perspective

Dr. Roy: No, he probably wouldn't. It certainly wouldn't be something that would be advertised [that the Americans were not just carrying out exercises but were also to defend us, something that Pearson was unaware of].

Pearkes: It was not anything which was advertised at all ... I had the assurance that the Americans at this time had lots of fighters. That was when I was talking to [the] Undersecretary of Defense. I flew out from Washington to Colorado Springs the first time I went to see NORAD. On that aircraft he told me, "We have got lots of fighters." [Pearkes pounds the table with each word, for emphasis] We were sitting together like this talking. He said to me, and we can't quote this [his voice goes soft here], "If I was you I wouldn't put all that money into that aircraft. If you don't want to buy aircraft from us you may rest assured that we have got lots of them [emphasis in voice here] which we can use to help in the defence of the North American continent if a crisis comes." That's what convinced me more than anything else [bolding mine]."

MORE SECRETS,
HCAF dependent
on USAF for
defence and
command.

WHO
WHERE
WHEN

WHY

RESULT

Not only does Pearkes reveal the arrangement and the fact that it was not well advertised, he also reveals the persuasion he received from the United States. He was prepared to flush Canadian pride down the toilet for a free American defence. Knowledge of this arrangement would have been political dynamite for Pearson had he been made aware of it. Without knowing of the arrangement, Pearson nevertheless provides his perspective. Pearson writes, "In this respect, at least — that is in the most important field of manned interceptors — it is not exaggerated to say that the Canadian air defence system has been assigned to the U.S. air force."

Frank Lowe, associate editor of *Weekend Magazine*, had made a similar observation shortly after the cancellation in 1959. His article,

Hendricks Oct 57 jfg

Diary for 29th Oct 57

8

Avro Engineering docs show they were suggesting an Interim Arrow with American J-75 engines, also proving that Avro didn't really support the Mk.5 CF-100 and that Avro wasn't against equipping early Arrows with J-75s.

ELECTION TIME! This sets to rest allegations that Avro blackmailed the Govt. It was the gov't trying to avoid bad publicity and worsening winter unemployment.

The Cabinet this morning approved one year further development of the 105, and the Sparrow which meant to initiate procurement of 29 pre-production aircraft, and to continue the preproduction programme for the Sparrow. Total amount of \$176,000,000 for 58-59 with commitment authority for the programme in future years is understood to have been authorized. This approval went on at the same time as the Chiefs of Staff Committee were solemnly debating whether or not they should recommend the programme. The facts which lead to this unusual circumstance are as follows:

The Air Force recommended the cancellation of the Mark 6 when under direction from the Minister to reduce their budget to \$850,000,000 in 58-59. They did this reluctantly pointing out the operational risk, and the affect on AVRO's production. The reaction from AVRO and Orenda was immediate that this would cause unemployment after the 1st of Nov and personal representations were made to the Ministers. This lead to an extra ordinary unofficial Cabinet Meeting on Saturday, the 25 Oct attended by McLaughlin of Orenda, and Smye of AVRO, the Deputy Minister, and five Ministers including Mr. Green and Mr. Pearkes and Mr. Flemming. A great many half-baked ideas were tossed around to try and improve, and relieve the unemployment situation. Mr. Green stated that the critical time was between now and April during which no announced layoffs could possibly be allowed to take place. AVRO recommended our ordering of 20 additional Mark 5's as a stop gap over and above the 35 additional Mark 5's which we asked for on the cancellation of the Mark 6. The companies were promised an answer by Tues. 29th of Oct.

The Arrow already was a missile defence program. Avro was working on adapting the NIKE ZEUS system, already in development in the USA at Douglas Aircraft as a natural extension to their already operational NIKE-AJAX and NIKE-HERCULES anti-aircraft systems. Avro said any Arrow could launch this weapon against ICBMs, but had ultra-high performance versions of the Arrow on the drawing boards as well. NIKE-ZEUS is the only ABM system the Americans have so far acknowledged deploying and it was considered an effective weapon. Using it on the Arrow really only involved removing a stage and a half from the missile's rocket section.



AVM Hendricks
Chief of RCAF
Technical Services

In the meantime during the week of the 21st a briefing to the Chiefs of Staff was presented by the CAS, outlining the reasons why the Arrow Programme should continue (at the Army's request) this was followed by an additional briefing by DRB purporting to show the relative cost per kill of various alternative systems. This briefing was most inadequate, and gave the Chiefs of Staff very little to go on. The Chiefs of Staff had tacitly agreed to the 105 Programme, although the Army felt that it was improper and we should cancel the aeroplane forthwith launch on a missile defence programme. The Army did not specify what kind of missile particularly, but merely had the feeling that the development had been so rapid in the last few years that we were backing an obsolete system. The Air Force contended in rebuttal that we were not turning our backs on missiles we were adopting the BOMARC as fast as it became operationally useful, and in the meantime we had to cover ourselves with the manned fighter. Furthermore, both fighter and missile were complementary, neither one could do the whole task by itself. On the Tuesday the Chiefs of Staff assembled to hear the CAS briefing once more, with a view to approving it for presentation to the Cabinet Defence Committee. On the previous evening the Minister became impatient, realizing his undertaking to give an answer on the following day, and accordingly held a long interview with the CAS that evening, wrote his own paper, and agreed to put to Cabinet the proposal for one year continuation of the programme. He would not go along with an accelerated programme, costing an additional \$27,000,000 in 58-59 although this alternative had been put before Chiefs of Staff at the request of Gen. Folkes to meet the criticism that the Arrow would be late. This accelerated programme could advance the matter by 6 months.

Mr. Pearkes went before the Cabinet with his own paper, got the approval for the programme and in addition 20 extra Mark 5 aeroplanes and announced the fact in answer to questions that afternoon in the house.

The presentation of this whole programme was fraught with great confusion during the 10 day period prior to this decision. Part of this was due to continuing adjustments of figures and drafts against a deadline. A Committee A/C's Cornblat, Hodgson, were made the focal points to do the writing chiefly because Chief of Plans was ill. Four papers were finally made available as optional for presentation to the Chiefs, one the Arrow Programme by itself, two the Sparrow by itself, three, a combined programme of both on original timing and four a combined programme of both accelerated by 6 months. In addition to these four papers, it was necessary to table the general costs of Air Defence, including, Arrow, Sparrow, BOMARC, ground environment between, over the next ten years in broad terms for the information of the Chiefs of Staff.

Shows that every option has a paper behind it to justify the option. These are established with certain terms of reference established by the different ministries such as finance and defence.

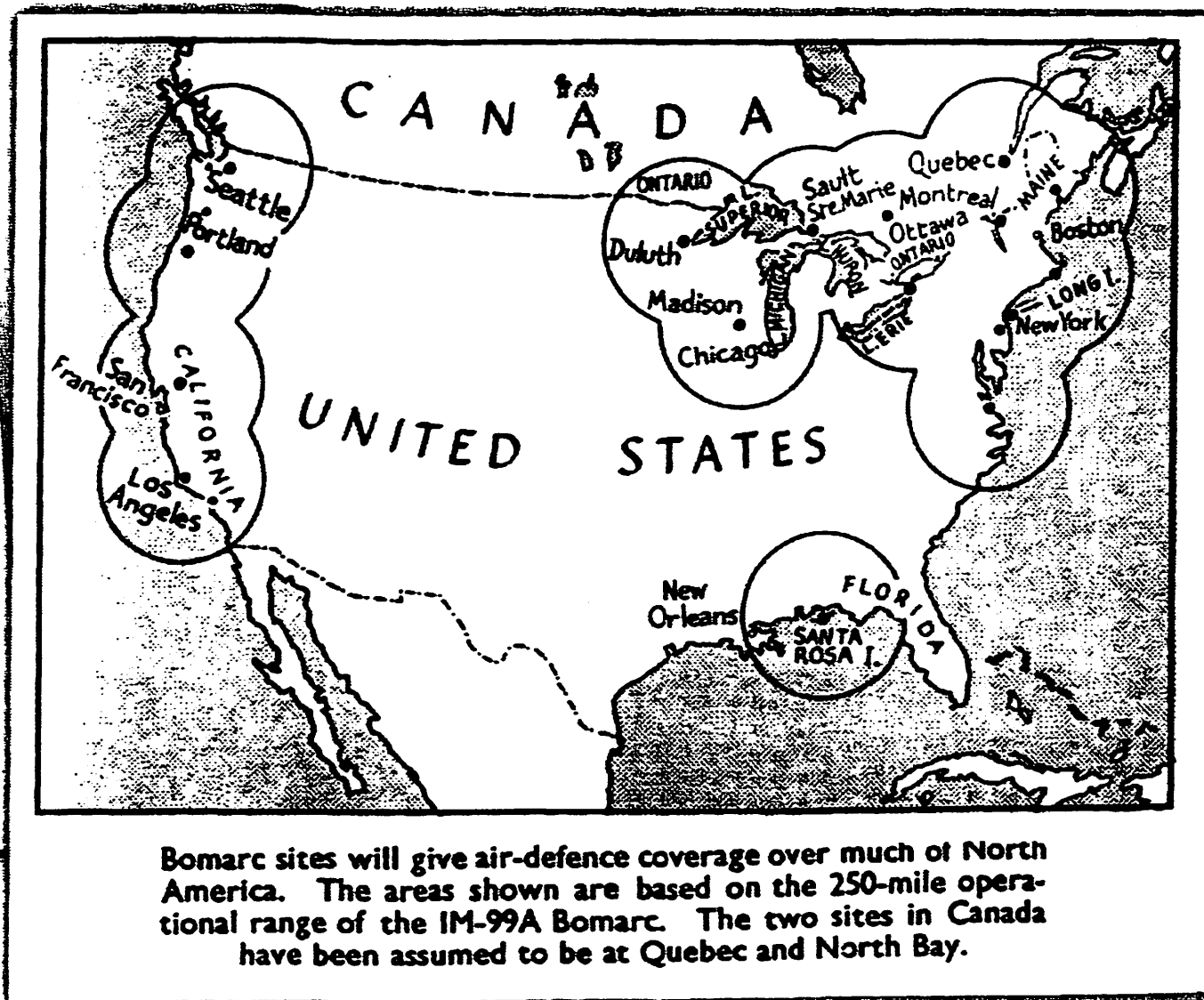
Thereby circumventing the Cabinet Defence Committee, which they did with NORAD acceptance too.

PEARKES PRECEDENT.

Diary notes oct 57

What nobody ever mentioned, was that even Canadian Bomarc missiles would explode their nuclear warheads over Canadian cities if the launch order was delayed.

Clearly even with Canadian Bomarc sites, American Bomarcs would still detonate over Canadian cities IF launched at their optimum time.



Liberals Planned To Cancel Arrow

OTTAWA — Gen. Charles Foulkes, chairman of the chiefs of staff committee from 1951 to 1960, testified yesterday that the Liberal Government of Prime Minister St. Laurent decided in 1957 it would cancel the Arrow interceptor program as soon as it was returned to power in that year's election.

As it turned out, a Conservative Government under Prime Minister Diefenbaker was elected and the "unfortunate" Defence Minister George Pearkes was faced with the awkward decision.

Gen. Foulkes told the Commons defence committee that in the summer of 1957 the chiefs of staff "stamped" the new Government into the NORAD agreement with the United States.

The Government had run into trouble with the NORAD agreement in the Commons and as a result it was hesitant about making early decisions on the Arrow and the CF-104 low-level jet bomber program.

The Arrow was finally cancelled in February, 1959.



GEN. FOULKES

Gen. Foulkes confirmed the 1959 statement of Mr. Diefenbaker that the chiefs of staff had recommended cancellation of the Arrow.

Gen. Foulkes said the chiefs concluded it didn't make sense to produce an \$8,000,000 interceptor in Canada when one could be obtained in the U.S. for \$2,000,000. They couldn't see where the money would come from.

He said the decision to proceed with the CF-104 program was delayed more than two years because of the delay in the decision of the Arrow.

Gen. Foulkes said the first loyalty of a chief of staff is to his service. This loyalty often came in conflict with a viable defence policy.

"But you can't expect the chiefs to cut their own throats," he said. Decisions on defence policy must be imposed by Government.

Foulkes Stamped: jpg

Montreal Star, Oct. 23, 1963

CAS Campbell denied this to the CBC for the 1979 documentary, There Never Was an Arrow, and LGen Reg Lane, attached to the Arrow program at the time and later DCINC NORAD, also said the chiefs did not recommend cancellation, and so does the document trail. They were manoeuvred, cornered, and ultimately ordered to recommend cancellation of the Arrow. HE stamped again, with Pearkes and Fleming.

... If we are to continue to have with the United States a continental system of air defence on a co-operative basis, it was clearly the responsibility of the U.S. government to buy the CF-105 to meet its own requirements and it was the duty of the Canadian government to use all possible ways and means to so convince our American friends.⁷²

Scanned from Requiem for a Giant, pg. 117
This is from Lester Pearson's diary at the time of Arrow cancellation regarding how he would have handled the Arrow situation with the USA.

R-PD-050-006/PG-600

VOL. III CH. 2 ONE CANADA BY JOHN G. DIEFENBAKER

Photocopy from DND Officer Professional Development study guide.

CHAPTER TWO

GENERAL Charles Foulkes testified, in October 1963, before the House of Commons Special Committee on Defence that, as Chairman of the Chiefs of Staff Committee in 1957, he had "stampeded" the new Conservative government into accepting the North American Air Defence (NORAD) Agreement. Nothing could be further from the facts. I considered the NORAD Agreement a good one, and, for its time, necessary. Indeed, I had no personal consultation with Foulkes on this subject. For him to suggest that we were stampeded in the early weeks of our government is to suggest that I, as Prime Minister, and, more particularly, Major-General George Pearkes, V.C., the Minister of National Defence, had no appreciation of the requirements of North American defence. General Foulkes's admiration for the St. Laurent government was obvious and may explain his decision, following his retirement, to contest a Liberal Party nomination.

Foulkes TESTIFIED under oath that he "stampeded" the Conservatives, fresh into office, into signing the NORAD agreement.

1 Gen. Wald Putt was a true friend of Avro, and was in fact largely responsible for the USAF trying to buy jetliners during the Korean War, and was certainly trying, with some success, to have the USAF support, or even buy, some version of the Arrow.

ANNEX I to APPENDIX Q

DEPARTMENT OF DEFENCE PRODUCTION

V-3.4

MEMO TO FILE:

30th January, 1958.

The Ambassador was the luncheon guest of Secretary James H. Douglas, Department of the Air Force, who brought along Lt. Gen. D. L. Putt, Deputy Chief of Staff, Research and Development, U.S.A.F., and Major Gen. H. M. Estes, Assistant Chief of Staff for Air Defence Systems, and Dudley C. Sharp, Assistant Secretary (Material), Department of the Air Force.

The Secretary chatted generally over a wide range of topics including the budgetary position of U.S.A.F. in FY1958 and 1959, the high cost of programs, the defensive and offensive postures of the U.S.A.F., and the difficult decisions which must be taken with respect to types and quantities of new and complex equipments. He also spoke of the philosophy of the U.S.A.F. which discounts any major build-up after an outbreak and dictates reliance on forces in being and those which can be mobilised within a matter of weeks.

He led into what was obviously the purpose of the get-together by enquiring concerning the progress of the Canadian CF-105 program. The Ambassador outlined the position and laid some emphasis on the fact that with our smaller resources we did not have the choice of alternatives which an organisation as large as U.S.A.F. could elect. The CF-105, he mentioned, was related to the evaluation of the manned bomber threat, the rate of development of newer and superseding weapons, and indeed, whether it made sense for us to commit such a major portion of our resources and money to a weapons system which could become virtually obsolescent by the time it is operational.

The Secretary said that recently they had been looking over their manned interceptor programs and that the possibilities of the utilisation of the CF-105 in a continental defence role had not escaped them. The U.S.A.F. problem in its simplest terms, with respect to the CF-105, is that they have in production the F-101B and F-106 manned interceptors which they consider to be pretty good and to which he alluded as being more or less in the CF-105 class as to performance. The decisions had been taken within the parameters of the FY59 budget for a decrease in both tactical air squadrons and interceptor strength in favour of emphasizing other programs. (In this connection he spoke of the never ceasing problem of trying to maintain the proper balance of various types of equipments in order to be able to meet the different capabilities of the potential enemy.) There was no place in the U.S.A.F. system that he could see for the CF-105. He mentioned the F-106 and stated very firmly that they were going ahead with it, and that its cost would make the CF-105 "look like something which might be picked up in a department store." Quite clearly, the Secretary and his advisors view the F-106 as being of a much more advanced design and capability than the CF-105.

Despite the U.S.A.F. inability to absorb CF-105's into their interceptor system, the Secretary said that in the context of continental defence he had been thinking in terms of the possibility of greater utilisation of the CF-105 on the basis of some form of U.S. participation. He elaborated by saying that it was his personal view that one form which this participation might conceivably take would be for the Department of the Air Force to purchase CF-105's in squadron strength, to be integrated into the continental defence system, to operate from Canadian bases, and to be manned and maintained by R.C.A.F. personnel.

CONFIDENTIAL

- 2 -

The Ambassador commented that this would pose certain problems against the background of Canada having remained aloof from Lend Lease and from the acceptance of aid from the U.S. or any other country. The traditional position has been for Canada to participate in programs associated with the common defence as a contributor rather than a beneficiary, and we had hoped that the CF-105 might contribute something to interceptors of that capability. He mentioned also that

there would be political and other problems associated with the suggestion made by the Secretary. The Secretary immediately said that he could understand that to try to implement such an arrangement would lead to many, many problems. He then dropped the CF-105 subject and talked about the encouraging possibilities of Bomarc and its increasing potential as an unmanned interceptor in the U.S. defence plans.

After a spate of general conversation, he returned to the subject of the Canadian interceptor. He reiterated his personal view that he would like to see CF-105's employed in squadron strength in Canada in greater numbers than was currently being planned for. He also reiterated that there was no place for the Canadian weapons system in the U.S.A.F. ~~who had not participated up to this point (as had none of the others), whom he considered to be at the end could be achieved through NORAD indicating the desired disposition of U.S. and Canadian interceptor strength on the continent and, on this basis, showing immediate requirements for a number of squadrons based in Canada~~ considerably greater than those presently planned for commitment ~~to the continental defence by the U.S.A.F.~~ If it could be presented in this light, ~~Putt would agree~~ the fact of ~~the U.S.A.F. position~~ of the aeroplanes ~~might not be as great in the terms of overall continental defence~~ and thus be more acceptable to Canada. ~~He also mentioned that something in the order of \$100 million in the program were being discussed for installation on Canadian bases, and that possibly some "saw-off" or "swap" arrangement might be worked out, i.e. purchase of CF-105's in exchange for work which might be done by Canadian firms, giving the refueling bases to give SAC a longer reach.~~

(Incidental to the discussion of the CF-105, it was mentioned to the Secretary that a sizeable portion of the initial 250 millions or so being spent on the CF-105 (Arrow Astra System) was actually being expended in the U.S., including the development program for the I.E.S. the license for the Sparrow II, the initial hardware for the Sparrow II, and odds and ends under Reimbursable Aid. It was also intimated that, particularly on the I.E.S. portion, there would probably be a continuing U.S. content in the nature of GPAP not manufactured in Canada.)

The Ambassador commented that he had certainly been given considerable food for thought, and was grateful for the opportunity of hearing the Secretary's views. The Secretary in turn said that he had been wanting to present his personal view on the employment of the CF-105.

It was obvious that the Secretary had been thoroughly briefed on the Canadian-built weapons system and had also discussed it more than casually with his top military people. In addition, he showed a familiarity with a variety of subjects associated with continental defence which indicated a knowledge of U.S.A.F.'s interests in Canada. He also gave evidence of an understanding of associated Canadian problems, both political and economic. He gave the impression of being a very capable person.

.....3

CONFIDENTIAL

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While a discussion of this sort could not be anything but inconclusive, it would appear that, on the basis of the personal views of the Secretary (as contrasted with an agreed Government view, or even an agreed Department of the Air Force position), the opportunity is afforded for discussion, and even possibly negotiation, which might lead to an acceptable arrangement for greater utilisation of the CF-105 based on U.S. participation.

N. R. Chappell

cc. H.E. The Ambassador
Mr. D. A. Golden, DDP(O)
A/C R. A. Cameron, CJS(W)
Dr. J. J. Green, DRB(W)

(=)

innocentsfinal.jpg

SEL 1955 CSC Arrow.jpg

SYNOPSIS OF COSTS APPLICABLE TO CP-105 PROGRAMME

1959.

SERIAL NO.	SUBJECT	C.D.	F.Y.	COL. 5 ESTIMATE OF PER- TERMINATION EXPENDITURES FROM SEPT. 23/58 TO FEB. 20/59.				
				COL. 1 PROGRESS CLAIMS AT SEPT. 23/58	COL. 2 PROGRESS CLAIMS AT FEB. 20/59	COL. 3 EXPENDITURE SEPT. 23/58 TO FEB. 20/59.	COL. 4 ESTIMATED PER- TERMINATION EXPEND.	COL. 5 ESTIMATE OF PER- TERMINATION EXPENDITURES FROM SEPT. 23/58 TO FEB. 20/59.
ACDA-E	Airframe Development	DEV/AIR/ DEV. 67	19368	\$ 8,276,632	\$ 8,276,632	\$ Nil	\$ 8,276,632	\$ Nil
2-B-5-109	Airframe Development Sub-Total	DEV/AIR/ DEV. 67	19368	52,372,003 \$ 60,648,640	59,043,852 \$ 67,320,484	6,671,844 \$ 6,671,844	59,500,368 \$ 67,777,000	7,128,360 \$ 7,128,360
2-B-4-585	Airframe Tooling	462043	462043	\$ 27,788,583	\$ 30,137,453	\$ 2,348,870	\$ 30,300,000	\$ 2,511,517
2-B-4-715	8 Aircraft Production	462043	462043	42,579,988	50,450,109	7,870,121	51,500,000	\$ 8,920,012
2-BK-7-1455	29 Aircraft Production	462043	462043	10,808,893	24,135,496	13,326,603	27,500,000	15,691,107
2-BK-8-27	A/S.B. Representatives	462043	462043	Nil	Nil	Nil	24,000	24,000
Misc.	Miscellaneous Airframe Spares	462043	462043	290,789	290,789	Nil	290,789	Nil
	Sub-Total			\$ 81,468,253	\$ 105,013,847	\$ 23,545,594	\$ 109,614,789	\$ 28,146,536
2-BK-8-14	Blanket Airframe Spares	772778	772778	\$ 30,497	\$ 53,835	\$ 23,338	\$ 75,000	\$ 44,503
2-BK-8-149	Repair & Overhaul Airframes	872801	872801	Nil	382,663	382,663	407,663	407,663
2-BK-8-146	Repair & Overhaul Airframe Components	872802	872802	Nil	Nil	Nil	65,651	65,651
2-BK-8-147	Repair & Overhaul Airframe Spares	872803	872803	Nil	29,288	29,288	50,000	50,000
2-BK-8-28	Airframe Electrical Systems	872476	872476	Nil	Nil	Nil	198,000	198,000
	Sub-Total			\$ 30,497	\$ 465,786	\$ 435,289	\$ 796,314	\$ 765,817
	Total: Airframe Portion:			\$ 142,147,390	\$ 172,600,117	\$ 30,652,727	\$ 178,182,103	\$ 36,040,713
2-B-4-717	Iroquois Development	DEV/AIR/ DEV. 109	21060	\$ 46,699,165	\$ 49,438,033	\$ 2,738,868	\$ 53,919,125	\$ 7,219,960
2-B-5-846	D-47 Conversion	DEV/AIR/ DEV. 109	21060	1,595,240 \$ 48,294,405	1,595,240 \$ 51,033,273	Nil \$ 2,738,868	1,630,000 \$ 55,549,125	24,760 \$ 7,254,720
	Sub-Total			\$ 48,294,405	\$ 51,033,273	\$ 2,738,868	\$ 55,549,125	\$ 7,254,720
2-B-5-585	Iroquois Tooling	562022	562022	\$ 10,796,082	\$ 13,233,958	\$ 2,437,876	\$ 13,500,000	\$ 2,703,918
2-B-2-263	20 Iroquois Prototype Production	562023	562023	\$ 38,278,292	\$ 42,854,312	\$ 4,576,020	\$ 44,721,372	\$ 6,443,080
2-BD-7-1484	87 Iroquois Pre-Production	562023	562023	5,837,022	13,546,912	7,709,890	13,848,000	\$ 8,010,978
2-B-7-1015	Iroquois Publications	562023	562023	94,099	99,000	4,901	99,000	4,901
	Sub-Total			\$ 44,209,413	\$ 56,500,224	\$ 12,290,611	\$ 58,668,372	\$ 14,458,959
	Total: Engine Portion:			\$ 103,299,900	\$ 120,767,455	\$ 17,467,555	\$ 127,717,497	\$ 24,417,597
2-USV-5-48	J 75 Engines (G.F.A.E.)	462044	462044	\$ 8,859,522	\$ 8,859,522	Nil	\$ 8,859,522	Nil
2-USV-7-111	J 75 Spares (G.F.A.E.)	462044	462044	33,806	33,806	Nil	33,806	Nil
2-USV-7-166	J 75 Spares (G.F.A.E.)	462044	462044	9,900	9,900	Nil	9,900	Nil
	Sub-Total			\$ 8,903,228	\$ 8,903,228	Nil	\$ 8,903,228	Nil
2-USV-8-336	MA-1 Electronic Systems (G.F.A.E.)	862021	862021	Nil	Nil	Nil	\$ 1,750,000	\$ 1,750,000
	Overall Total			\$ 254,350,518	\$ 304,470,800	\$ 48,120,282	\$ 316,558,828	\$ 62,224,310

Legend

Column 3 equals column 2 minus column 1.
Column 5 equals column 4 minus column 1.

THIS WAS LESS THAN PROJECTED IN 1955 DOLLARS FOR 40 AIRCRAFT
SEL 1957 CSC Arrow.jpg estimated at 201 million.
before design for MA-17A1 on changed to ASTRA Sparrow, then back again.

With inflation and expenses due
to RCAF changes to the program,
Arrow's cost over-runs were moderate.

6. MILLION TEXT ON ARROW/SPARROW PROJECT CONCEPTUAL
1. FOR 1957 1957 "NOTES ON THE ARROW" 1. 10.1957 DOWNTOWN

42

SECRETSECRET

- 17 -

SECRET

- 18 -

Air defence requirements; recommendations of Cabinet Defence Committee
(Previous reference Sept. 3)

42. The Prime Minister opened the further discussion of the proposal of the Minister of National Defence to cancel the CP-105 programme by stating that although ministers were relatively well agreed on the purely defence aspects, the serious problem still requiring consideration was the effect on employment and the general economic situation.

43. The Minister of Finance said that in considering matters of defence he naturally put the safety of the country ahead of finance. When it had been recommended a year ago that the CP-105 programme be continued, he supported the recommendation. Now, however, the military view was that the programme should be cancelled. In these circumstances, he did not see how the government could decide not to discontinue it. The arguments for continuing were that Canadian military requirements should be found in Canada, that cancelling the programme would throw upwards of 25,000 men out of work with serious effects on the economy, and that national prestige should be taken into account.

As regards the first, other things being equal or nearly so, military equipment should be produced in Canada. But in this case the cost per aircraft was twice as much as the cost of a comparable unit which could be obtained in the U.S., and, more important, the military authorities had now decided that the aircraft was not necessary. On the employment aspect, while a decision to discontinue would undoubtedly be painful, nevertheless, the workers involved would in time be absorbed in the national economy. There would still be an important aircraft industry in Canada without the CP-105. Finally, one had to agree that not going ahead would be a blow to national prestige. But no one even knew now what the price for maintaining this aspect of our prestige might be.

44. Mr. Fleming said he had asked himself if there was a middle course between cancelling the programme and going into production. Unfortunately, there was not. Once production was ordered the government would be committed. There was no time that was the right time for a decision like this one. He was sure, however, that it would be better to cancel now than be faced with a final shut down of the plants three or four years hence. Another factor to be kept in mind was that, by deferring cancellation, the programme, in effect, become the present government's programme, whereas in cancelling now it could be said that the government had considered all aspects of a project started by the previous administration and had come to the conclusion that the best course was to abandon it. Finally, one had to keep in mind that by going ahead, and thereby adding approximately \$400 million a year for four years to the defence appropriation, air defence would assume a disproportionate share in the defence budget. This was nearly the value of a year's wheat crop. An increase in railway freight rates, which was being considered, was a trifle by comparison. A good deal of northern development could be undertaken for much less. In short, cancelling the programme would be of much greater help to the economy as a whole than continuing it.

45. During the discussion the following further points emerged:

(a) In the forthcoming winter, unemployment would be higher than it was last year. Cancelling now, apart from the effect on the employees concerned, might well be the one psychological factor which would result in a break in the economy and lead to a drastic down-turn from which recovery would be extremely difficult. The programme should be allowed to continue over the winter and a decision taken then as to its future. During that period, management could consider what their plants might do in the future.

(b) On the other hand, continuing the programme, even for only six months, meant that orders had to be placed now for materials for production. Did this proposal mean that the pre-production order of 37 should be completed? If this were the case, only a few planes for identification purposes would be available and the individual costs would be astronomical.

(c) The U.S.S.R. had always said that western economies would ultimately collapse. Carrying on a project like this involving so much of the taxpayers' money and whose returns were questionable was surely only playing into Russian hands. The money could be put to better use elsewhere.

(d) On the other hand, while cancellation might be sound in theory, it might result in a recession. If employment prospects were better, the project could be dropped quickly. Continuing, even for only a few months, involved insignificant amounts compared with what would have to be spent during a real depression.

(e) If the project were abandoned, arrangements could quite probably be made with the U.S. to purchase 106Cs and also to secure atomic heads for the weapon with which they would be equipped. The U.S. authorities had also indicated in the last few days that they would be prepared to consider seriously cost-sharing and production sharing of defence equipment. They had also said they would be prepared to relocate northwards some of their proposed Bomarc installations. These Bomarc bases hardly seemed to cover Canada at all. They were most concerned at the moment over improvements to the warning system.

(f) Surely the Canadian public would give credit to the government in the long run for good housekeeping and it appeared that on defence and on sound economic grounds it was good housekeeping to discontinue the programme now.

46. The Cabinet deferred decision on the recommendations of the Cabinet Defence Committee regarding air defence requirements, including the future of the CP-105 programme.

R.B. Bryce,
Secretary to the Cabinet.

Contradiction

They reneged later.

Interesting logic.

No F-106 info 1459. JFG

Ottawa Ont
18 Feb 59

Ref (1) CAS Report No. 21, Issue 2, dated 12 Jan 59 - "General Policy and Programme for the Development, Demonstration and Evaluation of the Arrow Weapon System" (sent to CJS(W) on G-11 dated 6 Feb 59.

Air Member,
Canadian Joint Staff,
2450 Massachusetts Ave. NW,
Washington 8, D.C., USA.

Arrow Flight Test Programme
Data Required from Convair

1 Stage 1 of the Arrow Flight Test Programme, as detailed in reference (1), is intended to clear the Arrow Weapon System to a minimum standard in a predominant portion of its combat envelope by an early date. The basic assumption underlying this "minimum" approach to flight testing is that use can be made of the extensive data and analysis which have resulted from the USAF F-106 programme.

2 The matter of obtaining F-106 data from Convair was discussed with the F-106 WSFO at WADC on 8 Dec 58 by representatives of this Headquarters. The F-106 WSFO stated that they required authority from USAFHQ to release Convair F106 flight test data and analysis to the Canadian government and contractors. Further, the F106 WSFO stated that, upon obtaining USAFHQ authority, they would hold a meeting, with representation from MAC, Convair, AVRO and the RCAF to define Canadian data and analysis requirements.

3 Although there has been no decision, as yet, on the Arrow program continuation the RCAF is proceeding with all necessary planning as though the project was continuing. You are therefore requested to arrange for the necessary authority from USAFHQ which will permit the RCAF and AVRO to obtain relevant flight test data, analysis and results immediately the Arrow program goes ahead.

4 An interim report on the progress of negotiations is requested.

1958 RCAF LETTER
TO DCINC NORAD:
RCAF A/M SLEMON,
SAID RE: F-106 DATA,
"IT WOULD ALMOST
APPEAR THEY ARE
DECIBERSTELY WITHOLD
THIS DATA."

(L. B. FOOTITT) O/C

(H.M. Footitt) O/C
for CAS

F. L. Thomassen/JM
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The Arrow: The Pearson Perspective

shadowed that of the Arrow and shifted the focus from aircraft to missile defences. Like the "bomber gap" earlier, this was likely the start of the "missile gap." The Soviets had beaten America into space, and this meant the feasibility of ICBMs dropping down on American cities was now very real.

It was also in 1957 that the Central Intelligence Agency declared that the bomber threat from Russia had been exaggerated. The earlier fly-pasts of a multitude of bombers were in fact the same group of aircraft just circling the parade route. The Russian bomber force "consisted of between ninety and one hundred and fifty planes."¹ Further, the CIA added that the Russian industry was not capable of mass production for a number of technical reasons. The threat now was the missile. For its part, the U.S. Air Defence Command believed there still remained a bomber gap and now had the missile gap to deal with as well.

In Canada, the Department of National Defence was quoting Khrushchev, the Russian premier, as saying the manned bomber was obsolete because Russia now had missiles. In a report on the Arrow development dated August 19, 1958, Charles Foulkes stated that the advent of Sputnik had a profound effect on the whole air defence concept. American missile development for Bomarc was accelerated as it became obvious the main threat to North America would come from the ICBM. Unfortunately, the Bomarc would have done nothing against the ICBM. It was an anti-aircraft missile.

Author Jon McLin notes that Canada was highly dependent on American intelligence estimates for bombers and missiles. In 1958-59 these estimates downplayed the manned bomber threat and gave rise to the USAF's revised air defence plan. Writing in the April 1962 edition of *Foreign Affairs*, a U.S. quarterly review, writer Melvin Connant observed that as a result of this change in threat, the USAF urged the Canadian government to accept the Bomarc and to consider the phasing out of the interceptor aircraft force. This was something Canadian Defence Minister Pearkes took seriously.

Documents from the archives show that in fact, Canada and the U.S. intelligence services eventually released a document called simply CANUS 59, in which they mutually agreed the manned threat was diminishing. NORAD continued to doubt this interpretation. While

Arrow reviewed then and continued.

Yeah, right.

But did Dulles tell Pearkes that figure was based on U-2 overflights? These were hardly comprehensive of the Soviet Union and differed from both NORAD and NATO opinion, RAF opinion, and subsequent fact. In fact Pearkes knew the Soviets were into the development of the Boudier bomber.

They had been working on that as prioritised in 1946, and the Arrow was being designed to carry an anti-ICBM missile.

No gap, but an increasing Soviet bomber threat nonetheless. And they most certainly had the ability to manufacture anything, some things better than the Americans, like submarines.

CFR!

The house organ of The Council on Foreign Relations, the source of virtually all US Secretaries of State and created by the Rockefeller Trust.

Dulle: Tel. July 58: jfg

Requiem for a Giant

It was not the cost of the Arrow alone but rather the combined costs of the SAGE/Bomarc and additional gap-filler radar that was going to be too expensive for Canada. George Pearkes's top-secret brief of July 1958 supports this. In that brief, Pearkes stated very clearly that Canada could perhaps make provision for the Arrow in succeeding defence budgets, but that the problem was the cost of all the NORAD defensive requirements (American requirements as discussed above), all coming now at the same time. His top-secret brief reads in part as follows:

The introduction of SAGE in Canada will cost in the neighborhood of \$107 million. Further improvements are required in the radar and other associated communications which will also bring greater expenses ... NORAD has also recommended the introduction of the Bomarc missile ... will be a further commitment of some \$164 million ... All these commitments coming at this particular time ... will tend to increase our defence budget by as much as 25 to 30 percent. All these projects also contain a very large element of U.S. content, which may give rise to other fiscal problems."

Recently, this author obtained additional files from the Eisenhower Library concerning this meeting. The Americans quote Pearkes:

He stated that the problem of developing a defence against missiles while at the same time [holding mine] completing and rounding out defence measures against manned bombers posed a serious problem for Canada from the point of view of expense ... He also stressed that these heavy additional defence burdens were placed on Canada because of its geographic position."

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In this brief, Pearkes went on to suggest more in-depth arrangements for production sharing with the U.S., for this extra American

NORAD

required equipment. He also made the rather weak suggestion that perhaps the Americans would share in the costs of the Avro Arrow by purchasing it and equipping the American bases at Harmon Field and Goose Bay with it. Secretary of State John Foster Dulles countered with his own remarks concerning missiles and the need for the Arrow:

The Secretary concluded his remarks by pointing out that missiles which were now becoming available would be obsolete in a few years and that they were merely a stop-gap until much improved missiles were available. He also thought it might be well for the military people on both sides to exchange views on Soviet bomber capabilities, as one way of assessing the need for the fighter plane production effort which Mr. Pearkes had discussed [holding mine]."

JULY 8-11
MEMO (LAW)
USA RE
DOE TRIP
TO CANADA
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It would be the arguments of a diminished manned bomber threat, utilization of missiles, and the alleged high costs of the Arrow that would spell its doom.

Many have argued that the Americans should not be blamed for not having purchased the Arrow. After all, the Americans had never said they would buy it; they had merely strongly encouraged its initial development. One must then ask why Canada should have been expected to purchase SAGE/Bomarc at all, given that it was an American requirement. Was it the soon-to-be-obsolete system the Secretary spoke of? Since Canada was being expected to meet American NORAD requirements for Bomarc, why was not the Arrow considered part of that contribution?

General Putt of the U.S. Air Force Research and Development Command had argued in favour of purchasing Arrows for the NORAD inventory on January 29, 1958, at a meeting between the Canadian ambassador to Washington, Norman Robertson, and Secretary of the Air Force James H. Douglas. Douglas squashed the idea, as did Secretary of State John Foster Dulles, at subsequent meetings with George Pearkes.

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than Clarence Decatur Howe, the energetic New Englander who built within the Canadian government a personal empire which eventually encompassed two large ministries and eighteen Crown corporations. He was fond of explaining to doubtful assistants that "nothing is administratively impossible," and during World War II he virtually brought the government to its knees by threatening to quit unless troops were dispatched to seize the strike-bound aluminum plant at Arvida, Quebec. When an opposition M.P. once reminded Howe that the establishment of Trans-Canada Air Lines was a step toward socialism, the angry minister shot back: "That's not public enterprise; that's *my* enterprise." On May 21, 1951, during a House debate on trade agreements, Howard Green, the Vancouver Conservative, expressed concern over government action, indicating that it was trying to escape previous commitments. "Who would stop us?" Howe replied. "Don't take yourself too seriously. If we wanted to get away with it - who would stop us?" During a question on April 21, 1953, concerning an Order-in-Council banning all Canadian shipping to North Korean and Chinese ports, Howe answered Opposition criticism by saying: "If we have overstepped our powers, I make no apology for having done so."

The first time that the Conservatives managed to demonstrate Howe's contempt for parliamentary procedure to the country at large was during the Defence Production Act debates in the summer of 1955. The government had moved an innocent-sounding motion, entitled "An Act to amend the Defence Production Act" which included the clause: "Section 41 of the said Act is repealed." Section 41 happened to be the provision which stated that the entire Act, passed during the Korean War, was to expire on July 31, 1956. In other words, Howe was demanding that the extraordinary powers he had wielded during a national emergency should become a permanent part of the Law. Under the provisions of the Act, the Minister of Defence Production had, among other things, the right to compel

IroquoisOKbyRCAF.jpg

Ottawa, Ontario
30 Nov 60

Air Member
Canadian Joint Staff
2450 Massachusetts Ave NW
Washington 8 DC

Iroquois - Engine History & Status

As requested by W/C W Armstrong the history and status of the Iroquois engine have been prepared. The status was taken in Feb 59 but was recently checked and has not varied appreciably. Engine XII6 has been shipped to the United Kingdom for inspection by Bristol/Siddeley. All other engines and parts have been stored and reserved. Engine XI06 was, of course, removed from the B47 before the aircraft was returned to the USAF.

It is estimated the 50 hour PFI engine could be prepared in 2 months and the test completed to clear the mechanical configuration in 3 to 4 months. Should a slightly more advanced configuration be required, such as an additional stage to the HP spool as Orinda proposed to the USAF, the timing would be in the order of 8 months.

The six new test cells, with simultaneous data recording instrumentation, could be employed for Iroquois development. The altitude test tunnel could be completed in approximately 8 months.

The engine history as tabled is a frank and factual resume and, although many problems and errors are mentioned, it is a RCAF technical opinion the engine had overcome the major mechanical difficulties. The aerodynamic configuration, as stated in the historical summary, was cleared by a 50 Hr PFI before the program terminated.

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(WHL Cole) W/C
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Cabinet minutes for 21 September, 1958
Cabnt21Sept58.jpg

Government purchasing policy; purchase for defence programme
(Previous reference Sept. 7)

6. The Minister of Finance said he had now had a chance to discuss the implications of the new government purchasing policy directive, which had been approved by Cabinet, with the Minister of Defence Production who had not been able to be present when it was considered. The Deputy Minister of Defence Production would be in Washington shortly to carry out negotiations and it would be desirable that he be in a position to explain that the new directive did not affect the pattern of government defence purchases based upon strategic consideration.

He hoped to be able to say something on this subject privately to the United Kingdom and to ask them not to press the Canadian government on this matter. The British had expressed some concern about the "buy in America" policy of the United States. He thought it preferable to soft-pedal the purchasing directive rather than jeopardize negotiations with the United States. Mr. O'Hurley was also of this opinion.

7. The Cabinet noted the report of the Minister of Finance on the recent government purchasing policy directive and agreed that it be withheld for some time.

Part of the preparations for the Defence Production Sharing negotiations was, obviously, having purchasing agents for the DND directed to consider U.S. options as a first resort.

Soft pedal it in negotiations with the US, and privately ask the British not to object publicly.

Keep the purchasing policy directive secret!

Air defence requirements; recommendations of Cabinet
Defence Committee
(Previous reference Sept. 7)

21. The Prime Minister reported that he had seen Mr. Crawford Gordon, President of A.V. Roe Company, who had also interviewed Mr. Pearson and Mr. Fleming. Mr. Gordon had recommended that production of the Arrow aircraft and the Iroquois engine be undertaken but the programmes for the Astra fire control equipment and the Sparrow missile be cancelled. There was nothing essentially new in his proposal.

22. The Minister of National Defence and the Minister of Finance reported on their conversations with Mr. Gordon and noted that he had made certain assertions in regard to the willingness of the U.S. government to provide fire control and missiles that would be suitable for the Arrow aircraft. He had mentioned some large figures of possible savings that might be made by obtaining such equipment from the United States but had been unable to be precise about these and the figures appeared to be exaggerated.

If it was a blow-out meeting why isn't the tone pointed out in minutes? It was on other occasions for lesser sins than what Gordon has been accused of: by only one man, whose testimony conflicts another's.

23. In the course of a further long discussion on this matter, the following points emerged:

(a) Few ministers had changed their minds on the desirability of cancelling the contracts for the Arrow and its associated equipment. The Cabinet was clearly divided in its view on the central question.

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(b) The chief concern of those who wished to have the Arrow contracts continued was the probable shock to the employment situation of such a major termination of work as would be involved in the cancelling of these contracts. It was recognized that the major impact would be psychological, not simply financial and it was very difficult to judge just how important an economic factor it would be.

(c) Some ministers felt, on the other hand, that the effect of continuing this work would be to impose an unnecessarily high cost upon the Canadian economy, which would contribute to the inflationary dangers and the high cost of exports that were handicapping Canada in securing and maintaining export markets. A decline in employment on these projects would be inevitable several years from now in any event, and that might be a worse time to suffer it than this year.

(d) If production of the Arrow and its associated equipment went forward, it was likely to become publicly known that this was done contrary to military advice and there was a danger that the government would be accused of wasting many hundreds of millions of dollars for what were political or economic reasons. That might seriously shake the confidence in the government of the man in the street.

The only source telling them interceptors were obsolete were the CIA and John Foster Dulles.

(e) There was some question as to just what the views of the Chiefs of Staff really were on this issue and how much reliance should be placed upon them. Their recommendation for termination of the programme now appeared to be at variance with their views earlier, although it should be noted that only the Chairman of the Chiefs of Staff Committee was a member of that committee at the time the original recommendations were made. The Chief of the Air Staff recommended that the R.C.A.F. should have interceptor aircraft but preferred to purchase U.S. aircraft if the amount of money available to him for aircraft were fixed.

Some weren't buying the story.

It was actually the same.

Two opposed, one for, and the Navy somewhere in between.

(f) The current international tension would make it hardly to cancel an important development programme such as that of the Arrow and Iroquois, although it was noted that, in fact war broke out, it would be necessary to use current types of aircraft and possibly to concentrate on the CF-105 rather than proceed with the CP-105.

Another member of Cabinet objects.

Cabinet minutes for 22 September, 1958

Cabnt22Sept58.jpg

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(g) To carry on the development of the Arrow aircraft and the Iroquois engine until next March would cost in the neighborhood of \$86 million; the economy might be better able to stand the shock of cancellation of the programme in March than at present and the international situation might be less tense at that time.

24. The Prime Minister suggested that a compromise should be considered on which possibly the Cabinet could agree. He thought such a compromise might involve carrying on the development programme until March but not beginning the production programme on the Arrow or the Iroquois at this time. This continuation of development might be regarded as a form of insurance in the present tense situation.

25. During the discussion of the compromise proposal, consideration was given to whether or not it would be possible to carry on only the Canadian elements in the development of the Astra and Sparrow, and it was recognized that further consideration would have to be given to that possibility bearing in mind the undesirability of spending large amounts to continue development work in the United States and also the undesirability of terminating all this advanced work on electronics and missiles in Canada.

26. The Cabinet.

(a) approved in principle, the installation of two Bomarc bases in northern Ontario and Quebec and the installation of two additional heavy radars in northern Ontario and Quebec and associated gap-filler radars in the Pinetree system;

(b) decided that the development programme for the Arrow aircraft and the Iroquois engine should be continued until March 31st, 1959, within the scope made possible by the amounts available for it in the estimates for the current fiscal year;

(c) decided that production of the Arrow aircraft and Iroquois engine should not be ordered at the present time;

(d) agreed that a careful and comprehensive review of the requirements for the Arrow aircraft and Iroquois engine should be made before March 31st, 1959, in order to reach a decision before that date as to whether development should be continued or production ordered;

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Air defence requirements; Astra and Sparrow (Previous reference Sept. 21)

1. The Minister of National Defence referred to the decisions of the preceding day concerning the continuation of development of the Arrow aircraft and Iroquois engine, and in particular the proposal to continue the development of the Astra fire control equipment and Sparrow missile in so far as that could be done within Canada. He said that investigation of the latter proposal this morning indicated that it was necessary either to continue the development programme in toto for these items or to cancel them, as it was not possible to continue the Canadian portions alone. The major portion of the expenses this winter would be in the United States, particularly in respect of the Astra.

2. During the discussion:

(a) Various suggestions were made for continuation or expansion of electronic work of one kind or another in Canada, including the possibility of a rapid development of the electronic equipment under consideration for the Post Office, and on which some \$3 million had already been spent.

(b) It was agreed that any decision on this matter should be deferred until later in the day when the Minister of Defence Production could be present after returning from the Commonwealth Conference in Montreal.

3. The Minister of Defence Production noted, on resumption of the meeting in the afternoon, that, if the development of the Arrow aircraft were to be carried on, there was great advantage in deciding forthwith about the future of the Astra. He noted that one alternative was to stop development of both Astra and Sparrow and switch to the American counterparts already developed, making the necessary modifications in the air-frame development. Another alternative would be to transfer the whole development of the Astra immediately to Canada, adapt the Falcon missile to it, and close out the development of the Sparrow.

4. The Minister of National Defence expressed the view that if, as seemed likely, the development of the Arrow would be terminated at the end of March, the sensible thing to do would be to terminate the development of the Astra and Sparrow at the present time. Even if it were decided to continue with the production of a small number of the Arrow aircraft, it would still appear sensible to terminate the highly expensive Astra development. The electronic engineers and other technical personnel would be better employed to get to work on missiles and receive special training rather than continue the expensive work on the Astra and Sparrow. It would be necessary to modify the Arrow to use the alternative fire control system in it.

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5. The Cabinet agreed that the programme for the development of the Astra fire control equipment and the Sparrow II missile should be terminated forthwith, and that this decision should be announced the following day along with those decisions on the air defence programme taken the preceding day.

Binding of rates of duty under the British preferential tariff (Previous reference Sept. 21)

6. The Prime Minister suggested that the recommendation of the Minister of Finance that the government agree to bind the present British preferential rates of duty on the list of tariff items attached to his memorandum might now be approved, and the decision might be made public in such manner and at such time as the Minister of Finance might decide.

7. The Cabinet, after further discussion, agreed to bind the British preferential rates of duty, in the manner provided by the General Agreement on Tariffs and Trade, on the list of tariff items attached to the memorandum of the Minister of Finance on this subject, dated September 19th (Cab. Doc. 269-58).

Lisbon Conference on the revision of the Convention for the Protection of Industrial Property (Previous reference Sept. 8)

8. The Secretary of State reported that it would be in order for Mr. Christopher Robinson, O.C., to be technical advisor and alternate delegate at the diplomatic conference for the revision of the Convention for the Protection of Industrial Property to be held in Lisbon beginning October 6th. He himself was planning to be present at this conference on or about October 15th. Dr. Philippe Panneton, the Canadian Ambassador to Lisbon, would act as head of delegation until he arrived in Lisbon.

9. The Cabinet noted with approval the report of the Secretary of State concerning the Canadian delegation at the forthcoming conference in Lisbon on the revision of the Convention for the Protection of Industrial Property.

Income Tax Appeal Board; appointments

10. The Cabinet approved the recommendations of the Minister of National Revenue,-

(a) that Mr. Cecil L. Snyder, Q.C., Assistant Chairman of the Income Tax Appeal Board, be appointed Chairman of the board for the period September 22nd, 1958, to January 31st, 1964; and,