

**THE AVRO CANADA CF-105 ARROW PROGRAMME:
DECISIONS AND DETERMINANTS.**

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In tackling an episode in Canadian political history as legendary and controversial as the Arrow programme one feels a special responsibility to do the job right. In undertaking this challenge I owe an incalculable debt to the staffs of the following institutions, at which I conducted research, for their efficient, professional, and courteous service: the National Archives of Canada; the National Aviation Museum; and the Directorate of History and Heritage of the Department of National Defence (Ms. Isabel Campbell in particular). The Diefenbaker Canada Centre, University of Saskatchewan, was also utilized. I want to recognize the following organizations with which I corresponded for kindly taking the time to check their collections for material on the Arrow: the Historical Section of the Department of Foreign Affairs and International Trade; the J.H. Parkin Branch Library of the National Research Council of Canada and of the Canadian Institute for Scientific and Technical Information; the John Holmes Library of the Canadian Institute of International Affairs; the Major-General George R. Pearkes, VC, Papers, University of Victoria; Hawker-Siddeley Canada Limited; the Dwight D. Eisenhower Library; the United States National Archives and Records Division; the United States Air Force Historical Research Agency, Department of the Air Force; the Archives Division of the National Air and Space Museum, Smithsonian Institution; and the Main Archives Administration of the Council of Ministers of the Russian Federation.

I count myself fortunate to have been involved in several Arrow-related projects which contributed immensely to the eventual completion of this thesis. I served as a Guest Curator with the Diefenbaker Canada Centre (1992-1994) and the National Aviation Museum (1996-1997) where I worked on a museum exhibit and a multimedia CD-ROM/Internet database respectively. For these contracts I am indebted to Mr. Stan Hanson, former Director of the Diefenbaker Canada Centre, University of Saskatchewan, and Dr. Victoria Dickenson, Director of Public Programmes, National Aviation Museum. I was also privileged to present papers at two conferences. The first, entitled "Flying Blind: The Politics of the Avro Canada CF-105 Arrow Programme," was presented at "The Evolution of Air Power In Canada: 1916 to the Present Day and Beyond" Air Force Historical

conference, organized by Air Command, Canadian Armed Forces, and the Canadian Aviation Historical Society, Southport Aerospace Centre, Portage La Prairie, Manitoba, 17-18 May, 1996. The second, co-authored with Professor Donald C. Story and entitled "The Plane Truth: The Avro Canada CF-105 Arrow Programme," was presented at "The Diefenbaker Legacy: Canadian Law, Politics, And Society Since 1957" conference, organized by the College of Law, the Departments of Political Studies and History, and the Diefenbaker Canada Centre, University of Saskatchewan, Saskatoon, Saskatchewan, March 6-8, 1997. I want to thank the organizers of both conferences for the opportunity to present my research and to publish these papers in the conference proceedings.

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There were moments when I felt that my academic career was in danger of unfolding in a manner analogous to that of the Arrow programme, with the same unfortunate end result. I am truly thankful to everyone mentioned above that I did not meet that fate.

Russell Isinger, 1997

ABSTRACT

The Avro Canada CF-105 Arrow supersonic interceptor programme haunted Canada's national security bureaucracy throughout the 1950s only to achieve a mythological status during the nearly forty years since its cancellation. The popular literature on the project has advanced a techno-nationalistic, conspiratorial viewpoint that the project should have been completed regardless of the financial burden or operational requirement. The Arrow programme's termination is invariably interpreted as an unjustifiable action by an inept Conservative government that was ignorant of defence policy and acting at the behest of the United States. The academic community, believing the lessons of the project to be largely self-evident, has not countered this belief with any studies of significant length or breadth of research.

This thesis examines the civil-military decision-making environment which existed during the Arrow programme and concludes that the widely held conventional wisdom is wrong. A case study of a weapons acquisition process, this thesis is based on declassified government records and personal papers taken together with the secondary literature and government publications. The evidence presented hereinafter demonstrates that the decisions which led to cancellation of the Arrow programme occurred early on by the Liberal government which had initiated the project and allowed it to accelerate and expand beyond salvage. Furthermore, this thesis outlines a chain of command characterized by deference by the political authority, Liberal and Conservative, to the advice proffered by the highest military decision-making body, the Chiefs of Staff Committee. This system of "bottom-up" decision-making, coupled domestically with the financial difficulties of a middle-power procuring modern weapons systems and internationally with the transformation of the "bomber gap" into the "missile gap," doomed the Arrow programme. The project's demise was thus the largely inescapable consequence of three interrelated factors: a flawed weapons acquisition process driven by an overly ambitious Royal Canadian Air Force, dramatic strategic shifts, and harsh financial realities.

DEDICATION

The English novelist A.S. Byatt was once overheard to remark, "I adore myths. But I don't like people who believe them."

I dedicate my thesis to Katherine Smytaniuk, an English literature major who is now, for better or worse, also an Arrow expert in her own right, and who would no doubt wholeheartedly agree with Byatt's sentiment...

...and to my late grandparents, Frederick and Evelyn Russell.

GLOSSARY OF ABBREVIATIONS

ADC - Air Defence Command

ARDC - Air Research and Development Command

BOMARC - Boeing Michigan Aeronautical Research Centre

CAF - Canadian Armed Forces

CARDE - Canadian Armament Research and Development Establishment

CAS - Chief of the Air Staff

CC - Cabinet Conclusions

CDC - Cabinet Defence Committee

CGS - Chief of the General Staff

CNS - Chief of the Naval Staff

CSC - Chiefs of Staff Committee

C3I - Command, Control, Communications, and Intelligence

DEA - Department of External Affairs

DDP - Department of Defence Production

DHH - Directorate of History and Heritage

DM - Deputy Minister

DND - Department of National Defence

DPSA - Defence Production Sharing Agreement

DRB - Defence Research Board

ICBM - Intercontinental Ballistic Missile

MND - Minister of National Defence

MP - Member of Parliament

NACA - National Advisory Committee on Aeronautics

NAE - National Aeronautical Establishment

NASA - National Aeronautics and Space Administration

NATO - North Atlantic Treaty Organization

NFA - New Fighter Aircraft

NIE - National Intelligence Estimates

NORAD - North American Air Defence Command

NRC - National Research Council

RAE - Royal Aeronautical Establishment

RAF - Royal Air Force

RCA - Radio Corporation of America

RCAF - Royal Canadian Air Force

RCN - Royal Canadian Navy

SAC - Strategic Air Command

SAGE - Semi-Automatic Ground Environment

SSEA - Secretary of State for External Affairs

UK - United Kingdom

US - United States

USAF - United States Air Force

CHAPTER ONE

To have command of the air means to be in a position to wield offensive power so great that it defies human imagination. It means to be able to cut an enemy's army and navy off from the bases of operation and nullify their chances of winning the war. It means the complete protection of one's own country, the efficient operation of one's own army and navy, and peace of mind to live and work in safety. In short, it means to be in a position to win. To be defeated in the air, on the other hand, is finally to be defeated and to be at the mercy of the enemy, with no chance at all of defending oneself, compelled to accept whatever terms he sees fit to dictate.

This is the meaning of "command of the air."¹

Introduction.

The Italian military theorist Giulio Douhet wrote these words in his 1921 book on air power, *The Command of the Air*, one of the most influential books on strategy ever written. With the end of the Second World War and the dawning of the atomic age, the question of who would command the air above the 49th parallel took on paramount importance in the minds of Canadians. Suddenly, Canada became, as American Secretary of State John Foster Dulles observed, "a very important piece of real estate."² Since the First World War the

¹ Giulio Douhet, "Command of the Air," in *War*, ed. Lawrence Freedman (Oxford: Oxford University Press, 1994), 231, quoting Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari, 2d ed. (New York: Coward-McCann, 1942), 16.

² Joseph T. Jockel, *Security to the North. Canada-U.S. Defense Relations in the 1990s*, Canadian Series #1 (East Lansing: Michigan State University Press, 1991), 1.

world's air forces had conceded that "the bomber will always get through,"³ but with the advent of the atomic bomb the failure to stop even one bomber would result in untold devastation. Situated as they were between two ideologically and militarily hostile superpowers, Canadians realized that they no longer lived in a fireproof house, far away from inflammable materials: some form of insurance would now be necessary. How to go about safeguarding North America from Armageddon would thus prove to be *the* issue which would vex Canada's civil and military decision-makers throughout the immediate postwar period.⁴ The Avro Canada CF-105 Arrow programme would be the manifestation of Canada's brief commitment to commanding its air.⁵ But what began as a modest venture in supersonic airframe design would become, through profligacy and skyrocketing costs, "the most expensive defence procurement programme underwritten by Ottawa to that time."⁶ And

³ Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1965), 75, quoting a remark attributed to British Prime Minister Lord Baldwin.

⁴ For Canadian strategic thinking during this period see John Gellner, "Problems Of Canadian Defence." *Behind The Headlines* XVIII, no. 5 (September 1958): 1-19; John Gellner and James Jackson, "Modern Weapons And The Small Power," *International Journal* XIII, no. 2 (Spring 1958): 87-99; Andrew Richter, *The Evolution of Strategic Thinking at the Canadian Department of National Defence, 1950-1960*, York Centre for International and Strategic Studies Occasional Paper Number 38, Canadian Defence and International Security Policy Special Issue Number 2 (North York: Centre for International and Strategic Studies, York University, 1996); Ronald S. Ritchie, "Problems of a Defence Policy for Canada," *International Journal* XIV, no.3 (Summer 1959): 202-212; and R.J. Sutherland, "Canada's Long Term Strategic Situation," *International Journal* XVII, no. 3 (Summer 1962): 199-223.

⁵ The CF-105 was officially named Arrow only in 1957, but to avoid confusion it will simply be referred to as the Arrow hereinafter, and concomitantly the Arrow programme will refer to airframe, engine, electronics system, and air-to-air missile armament.

⁶ Danford W. Middlemiss, "Economic Defence Co-operation with the United States 1940-1963," in *An Acceptance of Paradox: Essays on Canadian Diplomacy in Honour of*

despite its death, the ill-starred Arrow programme continues exert a dramatic effect on Canadian popular culture, for “no single event in our history has been so mythologized.”⁷

This thesis is about neither an aircraft company nor aerospace technology, though by necessity any history of an air force will also in part be a history of its airplanes and their manufacturers. Suffice it to say, the Arrow was a magnificent, mighty, and graceful example of aeronautical engineering (see the following photograph). Nothing written in this thesis detracts from the tremendous achievement of the engineers and technicians who worked on the project and who have every reason to be proud of their effort.⁸ Instead, this thesis is a case study of the origins and outcomes of a weapons acquisition process, the weapon in question being the Arrow. For the purposes of this thesis, weapons acquisition “is defined to include the conception, development, and production of technically advanced weapons for ultimate use by the armed forces,”⁹ whereas process “emphasizes the flow of decisions and

John W. Holmes, ed. Kim Richard Nossal (Toronto: Canadian Institute of International Affairs, 1982), 97, also in *Partners Nevertheless. Canadian-American Relations in the Twentieth Century*, ed. Norman Hillmer (Toronto: Copp Clark Pitman Ltd., 1989), 167-193.

⁷ “The legacy of the Avro Arrow,” *The Globe And Mail*, 18 January 1997, A2, quoting J.L. Granatstein.

⁸ On the technical aspects of the Arrow programme see James C. Floyd, “The Canadian Approach to All-Weather Interceptor Development. The Fourteenth British Commonwealth Lecture,” *The Journal of the Royal Aeronautical Society* 62, no. 576 (December 1958): 845-866; K.M. Molson and H.A. Taylor, *Canadian Aircraft since 1909* (Stittsville: Canada’s Wings, Inc., 1982); Les Wilkinson, Don Watson, Ron Page, and Richard Organ, *Avro Arrow: The Story of the Avro Arrow from Its Evolution to Its Extinction* (Erin: The Boston Mills Press, 1983); and Jack Woodman, “Flying The Arrow,” *Canadian Aviation* 51, no. 8 (August 1978): 31-37, 44.

⁹ Merton J. Peck and Frederic M. Scherer, *The Weapons Acquisition Process: An Economic Analysis* (Boston: Division of Research, Graduate School of Business, Harvard University, 1962), 3. See also Frederic M. Scherer, *The Weapons Acquisition Process:*



activities during weapons programs, including the actions, reactions, and interactions of government agencies and defense contractors.”¹⁰

James Kurth, an American political scientist, wrote that, “the problem with questions about weapons procurement is not that there are no answers but that there are too many answers.”¹¹ Nevertheless, Kurth distilled from the academic and journalistic literature four broad, major, and competing explanations of weapons procurement from among this “thicket of theory.”¹² Though drawn exclusively from the American experience, they are, in general, universally applicable. The four explanations are as follows: strategic theory, emphasizing the centrality of the rational calculation of foreign threats or the reciprocal dynamics of arms races; democratic theory, highlighting the importance of the domestic political system (*i.e.*, electoral politics) as a determinant; economic theory, which gives prominence to the character of the domestic economic system (*i.e.*, due to the aggregate economics of capitalism or the role of corporations) as a determinant; and bureaucratic theory, which

Economic Incentives (Boston: Division of Research, Graduate School of Business, Harvard University, 1964).

¹⁰ Peck and Scherer, 3.

¹¹ James R. Kurth, “Aerospace Production Lines and American Defense Spending,” in *Testing the Theory of the Military-Industrial Complex*, ed. Steven Rosen (Lexington, MA: Lexington Books/D.C. Heath and Company, 1973), 135-136. Kurth is developing further arguments presented in his earlier articles “A Widening Gyre: The Logic of American Weapons Procurement,” *Public Policy* XIX (Summer 1971): 373-404, and “Why We Buy The Weapons We Do,” *Foreign Policy* no. 11 (Summer 1973): 33-56.

¹² Kurth, 135.

focuses on the outcomes of competition between bureaucracies (especially armies, navies, and air forces) or the output of bureaucratic processes (*i.e.*, standard operating procedures).¹³

Any of Kurth's four explanations could serve as a lens through which to examine the salient features of the Arrow programme as a case study by providing a model be used in illustrating and interpreting the complex linkages between decision-making inputs, processes, and outputs, an exercise which is critical to understanding policy outcomes.¹⁴ In this vein, and especially within the United States (US) academic environment, such theories of foreign and defence policy behaviour have spawned devotees and critics in vast numbers, and the theoretical literature associated with them is voluminous. Students of Canadian foreign and defence policy, however, have not been as eager to put the "science" in political science, preferring instead, as Denis Stairs wrote, the time-honoured pedagogy of the "highly descriptive and theoretically unadorned case history."¹⁵ It is a tradition where the narrative is influenced by a perspective of place and time and the evidence is chronologically selected and arranged in such a way as to highlight an argument or thesis.¹⁶ Furthermore, it is a

¹³ Kurth, 135-136. Combinations of the four are, of course, possible, and the combination of the bureaucratic and economic explanations yields the well-known "theory of the military-industrial complex, which in its pure form argues that the military and industry are roughly equal in their influence on policy outcomes." Kurth, 136.

¹⁴ Often also referred to as a paradigm or a conceptual framework.

¹⁵ Denis Stairs, *The Diplomacy of Constraint: Canada, the Korean War, and the United States* (Toronto: University of Toronto Press, 1974), 297.

¹⁶ Stairs, 297. In his last chapter, Stairs presents several analytical alternatives in recognition of the fact that many political scientists do believe that "investigations of this sort can have functional utility (as opposed to mere intrinsic interest) only to the extent that they can be made to teach lessons - that is, yield inferences which, for purposes of explanation, and even of prediction, can be translated and applied in original or amended form to similar

tradition wherein "Canadian defence policy making remains a largely neglected and misunderstood area of study."¹⁷

It is within this tradition that this thesis, as a good case history, will provide an account of the Arrow weapons acquisition process. The focus, however, is very much the essence of good political science as well as good history: the civil-military decision-making process during the Arrow programme. Indeed, it will be shown that process was what the Arrow programme was all about.

This thesis gained much insight from the work of Lawrence Aronsen. Aronsen examined the dynamics of the Canada's defence decision-making process in the post-World War Two period; his analysis may be seen to fuse together elements from each of Kurth's four explanations.¹⁸ Aronsen uncovered a key feature of the Canadian defence decision-making process which goes a long way toward explaining why the Arrow programme unfolded as it did. He concluded that rather than having a "military-industrial complex,"

cases elsewhere." Stairs, 297-298.

¹⁷ D.W. Middlemiss and J.J. Sokolsky. *Canadian Defence: Decisions and Determinants* (Toronto: Harcourt Brace Jovanovich Canada Inc., 1989), 2.

¹⁸ Lawrence R. Aronsen, "Canada's Postwar Re-armament: Another Look at American Theories of the Military-Industrial Complex," *Historical Papers/Communications Historiques* (1981): 175-196. See also Lawrence R. Aronsen, *American National Security And Economic Relations With Canada, 1945-1954* (Westport: Praeger Publishers, 1997); "From World War To Limited War: Canadian-American Industrial Mobilization For Defence, *Revue Internationale d'Histoire Militaire* no. 51 (1982): 208-245; "'A Leading Arsenal of Democracy': American Rearmament and the Continental Integration of the Canadian Aircraft Industry, 1948-1953," *The International History Review* XIII, no. 3 (August 1991): 481-501; and "Planning Canada's Economic Mobilization For War: The Origins And Operation Of The Industrial Defence Board, 1945-1951," *American Review of Canadian Studies* XV, no. 1 (1985): 38-58.

such as is purported to exist in the US, Canada had a “national security bureaucracy” composed of high-level officials in the military, bureaucratic, scientific, and political sectors of the government that interacted with (and were dependent for its authority upon) Cabinet and the Prime Minister. Aronsen noted that these important elements of the defence decision-making process in the 1950s were almost seamlessly integrated - notably the Chiefs of Staff Committee (CSC), the Cabinet Defence Committee (CDC), and the Cabinet itself. In Aronsen’s words, the Cabinet was extended into the “labyrinth” of this national security bureaucracy. This thesis will demonstrate that, because of this situation, the national security bureaucracy wielded a near unchallengeable influence on defence policy. Colonel Douglas Bland termed this period the Command Era:

the Command Era was characterized by command authority, military concepts of decision-making and administration, respect for individual responsibilities (but perhaps not always for individuals), an integrative policy process, and a reliance on subjectivity based on experience. The system produced many successes, some failures, and it tended towards “hedging” as a management philosophy. The efficiency of the whole system was often called into question, something that would become central to later reform movements. Efficiency has many definitions that are often oriented to particular professions. The Command Era may have been militarily efficient while at the same time being inefficient in the eyes of accountants.¹⁹

An understanding of the Arrow weapons acquisition process proceeds from an understanding of this decision-making environment as it existed in Canada at the time. Advice on air defence matters came from the Royal Canadian Air Force (RCAF) Air Council to the CSC. The CSC was comprised of the army, navy, and air force chiefs, the Chairman

¹⁹ Douglas L. Bland, *The Administration Of Defence Policy In Canada 1947 to 1985* (Kingston: Ronald P. Frye & Company, Publishers, 1987), 5. See also Douglas L. Bland, *Chiefs Of Defence. Government And The Unified Command Of The Canadian Armed Forces* (Toronto: Canadian Institute of Strategic Studies, 1995).

of the Defence Research Board (DRB, often referred to as “the fourth service”²⁰), and the Chairman of the CSC. The Secretary to the Cabinet, the Deputy Minister (DM) of the Department of National Defence (DND) and the Department of Defence Production (DDP), the Undersecretary of State for External Affairs, and occasionally other bureaucrats and officers also attended CSC meetings, though they could not take part in the decision-making process. Through this procedure officials in interested departments became familiar with all aspects of an issue and were in a position to brief their respective ministers.²¹

It should be noted that though the Chairman of the CSC was preeminent in rank, under *The National Defence Act* he had no overriding authority to make a decision on his own. Because the recommendations of the CSC had to be unanimous, the Chairman’s role was to coordinate the army, navy, and air force and build a consensus.²² Minority viewpoints rarely, if ever, reached the Minister of National Defence (MND), the CDC, or Cabinet. The consensus-building nature of the position of Chairman thus required an individual who was

²⁰ Aronsen, “Canada’s Postwar Re-armament,” 183.

²¹ Directorate of History and Heritage, Department of National Defence (hereinafter DHH/DND), General Charles A. Foulkes Papers (hereinafter Foulkes Papers), file 14-2 Arrow, “The Story Of The CF-105 Avro ‘Arrow,’ 1952-1962,” TD, 15; James Eayrs, *The Art of the Possible. Government and Foreign Policy in Canada* (Toronto: University of Toronto Press, 1961), 99; and House of Commons, *Special Committee on Defence, Minutes of Proceedings And Evidence* (hereinafter Sauvé Committee), No. 15 (22 October 1963), 534. See also Bland, *The Administration Of Defence Policy In Canada*; Bland, *Chiefs Of Defence*; and Middlemiss and Sokolsky.

²² *Report of the Royal Commission on Government Organization* (hereinafter Glassco Commission), vol. 4, *Special Areas of Administration* (Ottawa: Queen’s Printer, 1963), 72.

“more diplomat than a soldier.”²³ As the Royal Commission on Government Organization would later report about the CSC:

The effectiveness of the Chiefs of Staff Committee as an executive authority is, to a large extent, dependent on the personal qualities of its members, each of whom has the virtual power of veto in its deliberations....Although the business of the Chiefs of Staff Committee appears to be conducted with reasonable dispatch, your Commissioners observe that, in general, the system permits procrastination, and the absence of a single commanding voice may spell the difference between success and failure in any matter of joint concern.²⁴

In building a consensus, however, a Chairman of the CSC could wield “immense power,” becoming in many cases “the real arbiter of the advice on defence policy tendered to the Government.”²⁵

If the MND approved the CSC’s submission, he took its recommendations to the CDC. The CDC was usually composed of the Prime Minister, the MND (and the Associate MND under the Liberals), and the Ministers of Defence Production, Finance, the Secretary of State for External Affairs (SSEA), and their respective DMs and undersecretaries (under the Liberals, the Ministers of Justice and of National Health and Welfare also attended, though their DMs did not). Occasionally other ministers (such as Labour) would also attend. The CSC would normally attend CDC meetings, but military and bureaucratic officials took no part in the decision-making process and they normally withdrew before any discussion

²³ Bland, *Chiefs Of Defence*, 49, quoting Brooke Claxton, MND.

²⁴ Glassco Commission, 70. The Commissioners recommended that the position be changed to a Chief of the Defence Staff having authority over the other chiefs. The recommendation was later adopted.

²⁵ Sauvé Committee, No. 1 (27 June 1963), 191-192, quoting Major-General W.H.S. Macklin.

began. If the CDC approved of the CSC's submission as presented by the MND, the CDC recommended that Cabinet give its approval.²⁶

This was the formal hierarchical structure of the civil-military decision-making process as it existed at the time (see the following organizational chart). However, the reality was that the CSC exercised preeminent power through its influence over the MND. In effect, the CSC functioned as "a shadow Cabinet Defence Committee and as a national security council."²⁷ This thesis will assert that throughout the life of the Arrow programme it was the military who were setting the defence priorities for the political authority, rather than *vice-versa*. The CSC's advice to the CDC nearly always laid out what the CDC's recommendations to Cabinet should be, and the CDC effectively approved all the important decisions on the Arrow programme. Cabinet in turn gave near perfunctory approval to the CDC's recommendations. According to Michael Tucker, one reason the military enjoyed such influence because:

The powers of the Chiefs of Staff did not stem only from their organizational means to tender advice to the Cabinet; these powers came from the very nature of the advice itself. The service chiefs were privy to alliance intelligence, derived from their close collaboration with the armed forces of the great powers, those of the United States especially.²⁸

²⁶ DHH/DND, Foulkes Papers, 16; Eayrs, *The Art of the Possible*, 99; and Sauvé Committee, No. 15 (22 October 1963), 526, 534. See also Bland, *The Administration of Defence Policy In Canada*; Bland, *Chiefs of Defence*; and Middlemiss and Sokolsky.

²⁷ Bland, *The Administration Of Defence Policy In Canada*, 151.

²⁸ Michael Tucker, *Canadian Foreign Policy: Contemporary Issues And Themes* (Toronto: McGraw-Hill Ryerson Limited, 1990), 150.

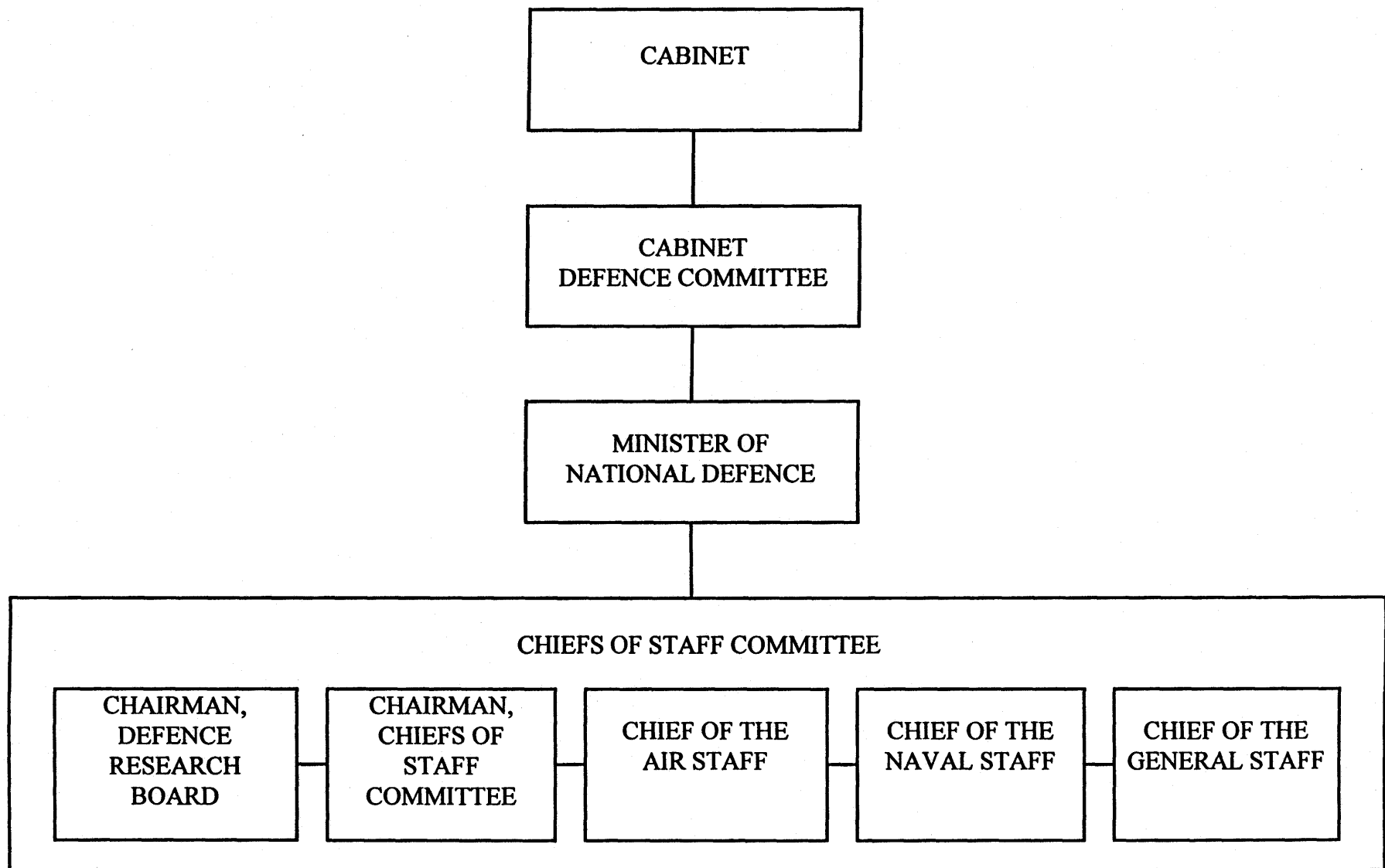


Figure 1. The organization of the civil-military chain of command during the Arrow programme.

James Eayrs captured the nature of the civil-military decision-making process when he wrote:

The layman may be pardoned for his reluctance to express opinions about weapons policy. Everything conspires to produce an attitude of acquiescence in what the authorities decide. The subject is forbiddingly technical. Shrouds of secrecy confront the curious; information is hard to come by and difficult to check. The strategic aspects are esoteric. How then can the ordinary citizen quarrel with decisions made on his behalf? By what prerogative dare he challenge the judgement of the experts. "Complete assessment of the whole field and all factors," he is assured, "is the responsibility of the joint planning committee - Army, Navy, Air Force, and the Defence Research Board - who have available to them all pertinent information. The consideration and ultimate decision is the responsibility of the Chiefs of Staff Committee and finally the Cabinet....This competent and informed body of opinion is in a better position than any layman to decide on the best and most economical means of defending our country."²⁹

Thus the CSC would play the pivotal role in the Arrow weapons acquisition process, but within the CSC it was the RCAF, supported by its allies in the DRB and the DDP, which was the force with which to be reckoned. As David Dewitt and John Kirton concluded:

The influential role of Air Force officers and scientists within [the CSC] and subordinate structures tended to generate military and ministerial perspectives that highlighted the North American region and the air defence task as the dominant elements of Canadian security....Thus, whereas DND would reluctantly defer to External on low-cost involvements beyond Europe and jointly determine policy with it for the North Atlantic, it jealously guarded its primacy in matters within the continent and in Canada itself.³⁰

²⁹ James Eayrs, *Northern Approaches. Canada And The Search For Peace* (Toronto: The Macmillan Company of Canada Limited, 1961), 21, quoting Air Marshal Wilfrid Curtis, "Address to the RCAF Benevolent Association of Ottawa," *Canadian Aviation* 31, no. 6 (June 1958): 34-36, 96, also in "Defending the Realm: (1) 'I Shot an Arrow in the Air...,'" *Canadian Forum*, September 1958, 1, 127-128, 144; "Back to the Drafting Board," *Canadian Forum*, March 1959, 1, 288; and "Defending the Realm: (2) Memo to General Graham," *Canadian Forum*, October 1958, 1, 167-168.

³⁰ David B. Dewitt and John J. Kirton, *Canada As A Principal Power. A Study In Foreign Policy And International Relations* (Toronto: John Wiley & Sons Canada Limited,

This thesis will show that the RCAF, acting through the vehicle of the CSC, largely determined all of the key decisions on the Arrow's technological, tactical, and financial requirements. The MND and the CDC, both Liberal and Progressive Conservative,³¹ in turn deferred to the CSC for the "advice and execution of all matters related to defence policy, strategic appreciations, and military plans."³² This system of "bottom-up" decision-making - the "bottom" in this case study being the highest echelons of the RCAF and the other services - led to a basically uncritical acceptance of the recommendations of the CSC, the acknowledged military experts who were able to present a united front to their bureaucratic and governmental counterparts. Adrian Preston described this milieu in this manner:

Thus, in a curious reversal of British and American experience between 1945 and 1958, in which military power had been steadily eroded by political authority, the Canadian armed profession during roughly the same period exercised in terms of tasks, expertise, and political influence a virtually unbridled control of foreign and defence policy.³³

Over twenty years after the Arrow's cancellation, in their case study of the initial phase of the New Fighter Aircraft (NFA)³⁴ weapons acquisition process, Kim Richard

1983), 201-202. George Ignatieff, a longtime foreign service officer, wrote "General Foulkes [the Chairman, CSC] told me that he wouldn't allow External Affairs eggheads to interfere with defence policy." George Ignatieff, *The Making Of A Peacemonger. The Memoirs Of George Ignatieff* (Markham: Penguin Books Canada Limited, 1987), 187.

³¹ Hereinafter referred to as Conservative.

³² Adrian Preston, "The Profession Of Arms In Postwar Canada, 1945-1970. Political Authority as a Military Problem," *World Politics. A Quarterly Journal of International Relations* XXIII, no. 2 (January 1971): 200.

³³ Preston, "The Profession Of Arms In Postwar Canada," 201.

³⁴ The new fighter aircraft in question was the McDonnell Douglas/Northrop F/A-18 Hornet, designated CF-188 by the Canadian Armed Forces but universally known as the CF-

Nossal and Michael Atkinson acknowledged the danger inherent in such a decision-making process:

Bureaucratic, rather than political control of the [NFA] program was always a serious possibility. An enormous amount of technical information would have to be digested and evaluated and politicians would be obliged to rely heavily on the expertise available in several bureaus. Moreover, because the choice of a fleet of fighter aircraft is a "lumpy" decision, there would be little or no opportunity to combine the best features of each competitor's package.³⁵

Bureaucratic control of a procurement programme was clearly thought to be undesirable from the point of view of the Cabinet in the late 1970s and early 1980s, largely because Cabinet recalled that just such a situation had prevailed during the Arrow programme. The First World War French Premier Georges Clemenceau is famous for warning future generations that war is too serious a business to be left in the hands of the generals. To paraphrase

18. See Kim Richard Nossal and Michael M. Atkinson, "Bureaucratic politics and the new fighter aircraft decisions," *Canadian Public Administration* 24, no. 4 (Winter 1981): 529-562. For a representative sample of the literature on the NFA decision, see also Glen Berg, "Scrambling for Dollars: Resource Allocation and the Politics of Canadian Fighter Aircraft Procurement, 1943-1983," (MA thesis: Royal Military College, 1994); Frank L. Boyd, Jr., "The Politics of Canadian Defence Procurement: The New Fighter Aircraft Decisions," in *Canada's Defence Industrial Base: The Political Economy of Preparedness and Procurement*, ed. David G. Haglund (Kingston: R.P. Frye, 1988), 137-158; Robert M. Campbell and Leslie A. Pal, "The CF-18 Affair," in *The Real Worlds of Canadian Politics. Cases in Process and Policy*, ed. Robert M. Campbell and Leslie A. Pal (Peterborough: Broadview Press, 1989), 19-52; Sister Maureen Cronin, "A Case Of Hornets: The Controversial CF-18A," *American Review of Canadian Studies* 12, no. 2 (Fall 1982): 17-28; Brigadier-General P.D. Manson, "Managing the New Fighter Aircraft," *Canadian Defence Quarterly* no. 7 (Spring 1978): 8-15; and Ralph Allan Shaw, "The Influence of Post-War Continental Air-Defence Strategies and National Economic Development Policies on the Industrial Organization of the Canadian Aerospace Industry," (MA thesis, Queen's University, 1994).

³⁵ Atkinson and Nossal, 533.

Clemenceau, in Canada in the 1950s the CSC thought that the acquisition of war *matériel* was too serious a business to be left in the hands of politicians.

This thesis will present a concise history of the civil-military decision-making during the Arrow's lifespan which led to its confident creation in 1953, fateful expansion by 1956, belated curtailment by 1958, and inescapable termination in 1959. However, by definition, as a critical reassessment this thesis will claim the moniker of a revisionist political history. A revisionist history is long overdue, for as the American political scientist Melvin Conant observed in 1962, "the Arrow affair has had far reaching political repercussions and it will be a long time before the charges and countercharges about the soundness of the decision die down."³⁶ A long time indeed. Weapons acquisition processes in Canada have always shared one common characteristic: controversy. The controversy that the Arrow programme generated came to symbolize the 1950s much like the nuclear weapons issue symbolized the 1960s and the decline of the Canadian Armed Forces (CAF) came to be identified with the 1970s. Such controversy was perhaps inevitable, according to Michael Tucker:

As a necessary element of their professionalism, the Canadian military have always sought the best weapons available, short of suggesting an independent nuclear capability. As soldiers in an alliance, they have sought the best weapons available which accord with alliance strategic theory and practice. This quest has been, since the weapons procurement imbroglios of the Diefenbaker era, a basis for the "struggles" between the Canadian military and their political masters.³⁷

³⁶ Melvin Conant, *The Long Polar Watch. Canada And The Defense Of North America* (New York: Harper Brothers, 1962), 154. See also Melvin Conant, "Canada and Continental Defence: An American View," *International Journal* XV, no. 3 (Summer 1960): 219-228.

³⁷ Tucker, 153.

Melvin Conant's words still reverberate largely because for almost forty years the field was abandoned to a veritable cottage industry of pro-Arrow aviation enthusiasts, generically known as "Arrowheads." They are amateur historians who write - irritatingly, often bestselling - "buff books"³⁸ which have helped to perpetuate an Arrow mythology:

Listening to these laments, you might think that killing the Arrow was a crime against humanity, a kind of technological infanticide. In a debate with words such as beauty and poetry used in the same breath as requiem and tragedy, the stillborn Arrow seems the greatest failure of our nationhood.

To the revisionists and nationalists who have freighted the Arrow with hopes and fears, the airplane was a metaphor. When it soared, it reflected daring, stature and self-confidence. When it crashed, it represented weakness and insecurity. And when those dazzling prototypes were cut up into little pieces, allegedly on the orders of a vengeful prime minister...it gave rise to a delicious conspiracy: that the planes (and plans) were destroyed to ensure

³⁸ For the difference between "buff books" and academic tomes see James P. Stevenson, *The Pentagon Paradox. The Development of the F-18 Hornet* (Annapolis: Naval Institute Press, 1993), ix-x. The Arrow "buff books" and articles vary widely in terms of quality of writing and research. For books see Palmiro Campagna, *Storms Of Controversy. The Secret Avro Arrow Files Revealed*, 2d ed. (Toronto: Stoddart Publishing Co. Limited, 1996); James Dow, *The Arrow*, 2d ed. (Toronto: James Lorimer & Company, Publishers, 1997); Murray Peden, *Fall of an Arrow* (Toronto: Stoddart Publishing Co. Limited, 1987); E.K. Shaw, *There Never Was An Arrow*, 2d ed. (Ottawa: Steel Rail Educational Publishing, 1981); Fred Smye, *Canadian Aviation And The Avro Arrow* (Oakville: Randy Smye, 1989); Greig Stewart, *Shutting Down the National Dream: A.V. Roe and the Tragedy of the Avro Arrow*, 2d ed. (Toronto: McGraw-Hill Ryerson Limited, 1997); and Wilkinson, Watson, Page, and Organ. For articles see Bob Bradford, "Avro's Fallen Arrow," *Air Enthusiast* no. 8 (Winter 1982): 63-73; Palmiro Campagna, "Avro Arrow. An Aviation Chapter in Canadian History." *Engineering Dimensions* (September/October 1988): 46-53; Palmiro Campagna, "The Arrow, The RCAF And Canada," in *Papers Presented at the 1st Air Force Historical Conference, The Evolution of Air Power in Canada: 1916 to the Present Day and Beyond, Air Command Headquarters, Winnipeg, Manitoba, 18-19 November, 1994*, vol.1, ed. William A. March and Robert H. Thompson, (Winnipeg: Department of National Defence, 1997), 100-104; James C. Floyd, "The Avro Canada Story." *Canadian Aviation* 51, no. 7 (June 1978): 54-60, 126-127, 130-131; and William Mellberg, "Too Good To Be True? A Personal View of the Avro CF-105 Arrow," *Air Enthusiast* no. 54 (Summer 1994): 54-57. This thesis will give more weight to the declassified government documents than to the popular literature.

none would end up in a museum where dispossessed romantics would hold monthly vigils....³⁹

Thus "the decision to undertake the Arrow program has not been questioned in Canada," observed Julius Lukasiewicz, "but its abandonment has been widely condemned."⁴⁰ That the cancellation of the Arrow programme was a watershed event for many Canadians of the post Second World War generation is undeniable. As Peter Newman wrote, "the death of the proud plane represented a choice...as fundamental as the decision a decade earlier by the Royal Navy to scrap its capital ships."⁴¹ Denis Smith added:

The saga of the Arrow from inspiration to demise has spawned an unusual mythology, sustained over forty years by an endless flow of newspaper and television features, a cult literature, and a play featuring an on-stage model of the aircraft. Thirty years after its destruction, tales were still told of phantom sightings of the doomed prototypes. The Arrow seems as deeply lodged in English Canadian memory as the Canadian Pacific Railway or the Calgary Stampede.⁴²

In particular, the popular literature spawned by the Arrow myth tends to begin with the premise that technology should be an end in itself, rather than the means to an end. To varying degrees, the amateur historians who have written about the Arrow programme have

³⁹ "The legacy of the Avro Arrow," A2.

⁴⁰ Julius Lukasiewicz, "Canada's Encounter with High-Speed Aeronautics," *Technology and Culture. The International Quarterly Journal of the Society for the History of Technology* 27, no. 2 (April 1986): 252.

⁴¹ Peter C. Newman, *Renegade In Power: The Diefenbaker Years* (Toronto: McClelland and Stewart Limited, 1973), 348.

⁴² Denis Smith, *Rogue Tory. The Life and Legend of John G. Diefenbaker* (Toronto: McFarlane Walter & Ross, 1995), 634. To this list must be added dozens of World Wide Web home pages on the Internet and the highly-fictionalized 1997 Canadian Broadcasting Corporation mini-series *The Arrow*.

adopted a nationalist standpoint that the benefits of the project to Canada far outweighed the costs. A typical recitation of this techno-nationalist viewpoint is that of J.J. Brown:

The paradox that enlivens the history of Canadian invention is that Canada is a great producer of ideas, yet it has virtually no native technical industry. The story of Canadian invention and technology can be seen as a melancholy procession of golden opportunities which we have let slip through our fingers. We have let them go abroad to be developed by other nations because we have not the vision to see their potential.⁴³

Thus, within this literary genre, the mythmakers portray Canada as the victim of its “colonial thinking”⁴⁴ which led to the destruction not only of the Canadian aviation industry but of “the heart and soul of a nation;”⁴⁵ the Conservative government is lambasted for having neither the courage nor the foresight to see the project through to the end, regardless of the financial burden or the operational requirement; the Prime Minister is derided as “a small-time Prairie lawyer...far out of his depth when it came to making decisions about the world military aircraft industry;”⁴⁶ the US military-industrial complex is excoriated for having manipulated and pressured the government into cancelling the finest military aircraft in the world in favour of their own grossly inferior products; and the scrapping of the existing Arrows is reviled as an “appalling act of vandalism.”⁴⁷ The more egregious examples of

⁴³ J.J. Brown. *Ideas In Exile. A History of Canadian Invention* (Toronto: McLelland and Stewart Limited, 1967), 339. As for the cancellation of the Arrow programme, Brown felt that “if a United States president had done it, he would have been impeached, and in Central Europe, he would have been shot.” Brown, *Ideas In Exile*, 310.

⁴⁴ Shaw, *There Never Was An Arrow*, 1.

⁴⁵ Campagna, *Storms Of Controversy*, 1.

⁴⁶ Brown, *Ideas In Exile*, 311.

⁴⁷ Peden, 11.

these works are written by anti-American experts made clever by hindsight and with a gift for hyperbole. These authors invariably focus on the Conservative Cabinet in particular as the locus of decision-making and ignore, misinterpret, or manipulate the facts about the Arrow programme to support their contentions that the government made the wrong decision, most likely at the behest of US. The cancellation of the project is therefore portrayed as unjustifiable under any circumstance. Believing the lessons of the Arrow programme to be glaringly obvious, professional historians and political scientists have rarely felt it necessary to rebut the often unsubstantiated claims of their amateur counterparts.⁴⁸ Though academics have addressed the Arrow programme within the context of other defence and foreign policy issues of the time, there has not been a single academic book, journal article, thesis or dissertation exclusively devoted to the Arrow programme despite its enduring presence in the national psyche.

The Arrow myth as reflected in the popular literature has all of the components of a national mythology, including the celebration of an achievement of greatness and the demonization of enemies. As one editorial put it: "Time has made the Arrow an empty

⁴⁸ One noteworthy exception is historian J.L. Granatstein who has briefly but consistently attacked the widely held conventional wisdom on the Arrow programme in his many works on Canadian political history. See J.L. Granatstein, *Canada 1957-1967: The Years of Uncertainty and Innovation*, the Canadian Centenary Series, ed. Ramsey Cook, vol. 19 (Toronto: McClelland and Stewart Limited, 1986); "Cooperation and Conflict: The Course of Canadian-American Relations since 1945," in *Canada and the United States: Enduring Friendship, Persistent Stress*, ed. Charles F. Doran and John H. Sigler (Englewood Cliffs: Prentice-Hall, Inc., 1985), 45-68; Norman Hillmer and J.L. Granatstein, *Empire To Umpire. Canada and the World to the 1990s* (Toronto: Copp Clark Longman Ltd., 1994); Norman Hillmer and J.L. Granatstein, *For Better Or For Worse. Canada and the United States to the 1990s* (Toronto: Copp Clark Pitman Ltd., 1991); J.L. Granatstein, "The myth of the broken Arrow," *The Globe And Mail*, 11 January 1997, D2; and J.L. Granatstein, *Yankee go home? Canadians and anti-Americanism* (Toronto: HarperCollins, 1996).

vessel, filled it with romance, nostalgia, loss and longing, and cast it adrift on a nation's restless soul."⁴⁹ The great achievement, of course, is the Arrow itself - an undeniably superb example of Canadian technological genius. The twin demons are the US, which conspired to destroy Canada's hopes of realizing both technological and political self-sufficiency; and an incompetent and ignorant Conservative government, led by Prime Minister John George Diefenbaker (1957-1963), which sacrificed those prospects for all time because it did not understand defence issues.

The Arrow myth will endure as long as individuals choose to ignore the historical record. But the tenets of the myth which has captured the hearts and minds of Canadians for so many years merit serious challenge. The government documents and personal papers related to the Arrow programme held by the relevant archives, museums, and other institutions and organizations are now largely declassified and open to the public.⁵⁰ Taken together with the secondary literature and government publications, there are now more than enough information available to provide a detailed record of the historical period which is not dependent on any single source of information. The story can now be told and thus many of the claims made by popular literature rebutted. The purpose of this case study is to examine how decisions were made by the Liberal and Conservative governments during the 1950s pertaining to the Arrow programme. The argument of this thesis is that the Arrow

⁴⁹ "The legacy of the Avro Arrow," A2.

⁵⁰ See the acknowledgment page at the beginning of this thesis for a list of institutions which were consulted during the research for this case study. Corporate documents held by the successor company, Hawker-Siddeley Canada Limited, are not open to the general public. The extent of Hawker-Siddeley's holdings is unknown, apparently even to the company itself, and may in fact be nonexistent.

programme's demise was the consequence of three factors: a flawed weapons acquisition process driven by an overly ambitious RCAF, dramatic strategic shifts, and harsh financial realities.

CHAPTER TWO

Technology, it seems, can be worshipped, enjoyed, respected, admired - even loved. It may provide job opportunities or reasons for not doing the job. As institutions face the confusion of the modern era, their leaders may find it easier to seek after a new bit of hardware rather than confront underlying problems. It is quite clear that many modern organizations find their attention dominated by gadgetry which by-passes consideration of mission or purpose. While in some cases the technology is appropriate, in others what develops is an inappropriate fixation with technology - technomania - with a corresponding technopathology contaminating administrative structures.¹

The Liberal Government of Prime Minister Louis St. Laurent and the Avro Canada CF-105 Arrow Programme.

The Arrow was the product of hard lessons Canada learned - or forgot, depending on your point of view - during the Second World War.² As Cecil Law, George Lindsey, and David Grenville wrote: "During and after the Second World War, Canada developed from an obscure, largely rural British dominion into an industrial and political position which made it a nation, first among the second tier powers."³ In particular, as the wartime

¹ Stevenson, 1, quoting Frederic A. Bergerson, *The Army Gets an Air Force. Tactics Of Insurgent Bureaucratic Politics* (Baltimore: The Johns Hopkins University Press, 1980), 156.

² See Michael Bliss, "Canada's Swell War," *Saturday Night*, May 1995, 39-41, 64.

³ Cecil Law, George Lindsey, and David Grenville, "Foreword," in *Perspectives in Science and Technology. The Legacy of Omond Solandt. Proceedings of a symposium held at the Donald Gordon Centre, Queen's University at Kingston, Ontario, 8-10 May 1994*, ed. C.E. Law, G.R. Lindsey, and D.M. Grenville (Kingston: Queen's Quarterly, 1995), vii.

“aerodrome of democracy,”⁴ Canada’s aviation industry had come of age. In pursuing the war effort, Canada’s largely government-owned aircraft manufacturers produced 16 418 planes and, as the official history of the Department of Munitions and Supply put it, “one of the most dramatic achievements of Canadian wartime industry was the transformation of the country’s small, relatively unimportant peacetime manufacture of aircraft into large scale production of fighters, bombers, and trainers.”⁵

C.D. Howe, Canada’s “Minister of Everything,”⁶ was tasked with the postwar disposal of government-owned war assets. Coincidentally, he also had a longstanding interest in fostering Canada’s aviation industry. Howe wanted to maintain this industrial base as it was his conviction that constructing high technology aircraft was one specialization in which Canada could make a notable contribution to economic development and the defence of North America.⁷ His business philosophy was hardly surprising given that it was “fashionable and prestigious for governments, industries, and universities to involve

⁴ D.J. Goodspeed, *A History Of The Defence Research Board Of Canada* (Ottawa: Queen’s Printer, 1958), 102. Goodspeed notes that the phrase was coined by US President Franklin Delano Roosevelt during a visit to Ottawa in 1942.

⁵ J. de N. Kennedy, *History of the Department of Munitions and Supply. Canada In The Second World War*, vol. I, *Production Branches and Crown Companies* (Ottawa: King’s Printer and Controller of Controller of Stationery, 1950), 25. The industry had not, however, produced a single engine. See also H. Duncan Hall, *North American Supply* (London: His Majesty’s Stationery Office, 1955).

⁶ At various time Howe held the Marine and Railways, Transport, Munitions and Supply, Reconstruction, Industry, Trade, and Commerce, and Defence Production portfolios. See Robert Bothwell and William Kilbourn, *C. D. Howe. A Biography* (Toronto: McClelland and Stewart Limited, 1980).

⁷ Bothwell and Kilbourn, 189-191. A second area of specialization was shipbuilding. Earlier in his ministerial career, Howe had established Trans-Canada Airlines.

themselves in high-speed aeronautics.”⁸ If Canada’s aviation industry could be preserved, Howe believed Canada could avoid a drain on its balance of payments which the purchase of foreign aircraft would generate. Furthermore, employment would be created as programmes like the Arrow “were not to be seen simply in terms of the aviation industry; suppliers of component parts found their skills developed, and their expansion assisted, by the stimulus of airplane sub-contracts.”⁹ Howe also did not want a repetition of the RCAF’s frustrating wartime experience in obtaining aircraft in times of crisis; he was determined to avoid the “grave risks which would necessarily be attendant upon Canada’s being exclusively dependent upon external sources of supply for defensive aircraft.”¹⁰ Thus the government of Prime Minister Louis St. Laurent (1948-1957) set about to develop an aviation industry that could accommodate Canada’s civil and military aircraft needs while at the same time being continentally integrated so as to better compete as an alternate source of supply for the US - albeit on a selective basis. As a result of the St. Laurent government’s decision (and

⁸ Lukasiewicz, 224.

⁹ Trevor Lloyd, *Canada in World Affairs 1957-1959*, vol. 10 (Toronto: Oxford University Press, 1968), 49.

¹⁰ Goodspeed, 103. This attitude appears to be rooted in a single incident which occurred in 1942 when Canada believed it was in danger of Japanese attack. Wilfrid Curtis, then Deputy Commander-in-Chief of the RCAF in England, appeared before an allied allotment board to plead for Canadian-built fighters, but the planes were allotted to the Soviet Union instead. “Maybe they did need the planes more than we did, I don’t know. But I do know that we needed them very badly. And I realized right then, walking out of that meeting and feeling every inch a failure, that until we didn’t have to tip our hats to anyone to get aircraft when we needed them, we’d never have the air force a first rate nation really deserves.” Stewart, 62. As an Air Marshal, Curtis would later command the RCAF (1947-1953) and initiate the preliminary design study for the Arrow. After retirement he would become Vice-Chairman of the Board of A.V. Roe. See W.A. Curtis, “Developing Canada’s Air Defences,” *Saturday Night*, 2 May 1953, 7-9.

US support for it), Canada's aircraft manufacturers would grow and prosper over the next decade.¹¹

But all of Canada's postwar aerospace hopes and dreams would soon be pinned on one aircraft manufacturer. In 1945 and 1946, respectively, Howe sold to Britain's Hawker-Siddeley Group the crown corporations Victory Aircraft Limited and Turbo Research Limited under generous rental-purchase terms. The acquisition by Hawker-Siddeley led to the formation of A.V. Roe Canada Limited,¹² located at Malton, Ontario.¹³ The Arrow would be the brainchild of A.V. Roe's renamed aircraft and engine divisions, Avro Aircraft Limited¹⁴ and Orenda Engines Limited.¹⁵ At the time of the sale, Hawker-Siddeley's Sir Roy

¹¹ Lawrence R. Aronsen, "A Leading Arsenal of Democracy," 481-501; Fred Gaffen, "Canada's Military Aircraft Industry: Its Birth, Growth, and Fortunes," *Canadian Defence Quarterly* 15, no. 2 (Autumn 1985): 51-53; and Danford W. Middlemiss, "The Political Economy of Defence: Dimensions of Government Involvement in the Canadian Aircraft Industry," Paper presented at the 50th Annual Meeting of the Canadian Political Science Association, University of Western Ontario, London, 1978, 6. See also the "buff books" on the Arrow and the theses by Berg; Gregory David Brown, "The Road to the Arrow: A.V. Roe Canada Limited and the Development of the Canadian Aircraft Industry" (MA Thesis, Acadia University, 1979); and Shaw, "The Influence of Post-War Continental Air-Defence Strategies and National Economic Development Policies on the Industrial Organization of the Canadian Aerospace Industry."

¹² Hereinafter referred to as A.V. Roe. A.V. Roe was reorganized in 1954, becoming the parent (or holding) company. It was named for Alliot Verdon Roe, the founder of Britain's A.V. Roe Limited, one of Hawker-Siddeley's aircraft companies. See Bill Gunston, *The Plane Makers* (London: Basinghall Books Limited, 1980).

¹³ Today the site of Toronto's Pearson International Airport.

¹⁴ Hereinafter referred to as Avro. Formed out of Victory Aircraft Limited, Avro was actually known as the Aircraft Division of A.V. Roe until 1954.

¹⁵ Hereinafter referred to as Orenda. Formed out of Turbo Research Limited, Orenda was actually known as the Engine Division of A.V. Roe until 1954.

Dobson, later Chairman of the Board of A.V. Roe, told Howe that Avro's mandate was to be not a mere branch-plant operation simply manufacturing foreign aircraft under licence, but rather, as its corporate logo proudly declared, "Designers and builders of all types of aircraft." Howe replied that Dobson had "more guts than brains."¹⁶

Avro got off to a promising start with a civil aircraft, the Avro Canada C-102 Jetliner.¹⁷ But the Cold War quickly turned hot and the Jetliner, sacrificed on the altar of military expediency, was scrapped in favour of Avro's military aircraft, the Avro Canada CF-100 Canuck, a two-seat, twin-engine, all-weather interceptor. The Cold War was on, as Don Munton wrote, with all of its concomitant effects:

With memories still fresh of the 1948 coup in Czechoslovakia, the Berlin Blockade, the Korean War, and the crushing of the Hungarian revolution, the threat from the Soviet Union was widely perceived and deeply felt. Russia's actions were made all the more menacing by its mounting military capability, successful testing of atomic and hydrogen bombs, and by its development of intercontinental missiles. Canadian governments, Liberal and Conservative, responded. Through the 1950s they expanded the budgets and ranks of the military; sent troops to Europe and supported the introduction of American nuclear weapons to strengthen the North Atlantic Treaty Organization (NATO); and integrated the air defence system of North America in the North American Air Defence Command (NORAD). The final step in this Cold War

¹⁶ Marjorie Earl, "How Roy Dobson pushed us into the jet age," *Maclean's*, 20 July 1957, 13. Dobson once said: "I often used to dream of a little empire in Canada." Earl, 49.

¹⁷ The Jetliner was a commercial transcontinental jet transport. In 1949, the prototype took flight. It missed becoming the first aircraft of its type to fly in the world by only thirteen days. The Jetliner's demise effectively ended any chance Avro had of diversifying into the civilian aviation market. See James C. Floyd, *The Avro C-102 Jetliner* (Erin: The Boston Mills Press, 1986); William Mellberg, "The World's Second, North America's First," *Air Enthusiast* no. 46 (Summer 1992): 52-61; and Molson and Taylor.

rearmament process was to acquire nuclear weapons for the Canadian armed forces and to deploy them on Canadian soil.¹⁸

The West, determined to contain the Communist threat, responded in kind, embarking with the East on a game of brinkmanship which spawned an arms race and a tense international environment where any misstep could lead to mutual destruction. In Canada, the largest peacetime military buildup in Canadian history was begun, and, in the dangerous climate of the times, Canada began to transform itself into a "national insecurity state."¹⁹ In 1952 Brooke Claxton, MND (1946-1954), even remarked that "defence had become the single biggest industry in Canada."²⁰ But Canada was reaping the benefits of an unprecedented economic boom and, therefore, could easily absorb such a defence programme. As John Treddenick observed:

A clearly perceived threat, a desire to play a significant role on the world stage, and the example set by like-minded allies, especially the United States, helped to provide the motive for this expansion, but it was only made possible by favourable, and perhaps unique, fiscal and economic circumstances....High growth rates [had] led to rapidly increasing federal revenues, despite low effective rates of taxation....Large surpluses were the

¹⁸ Don Munton, "Going fission: tales and truths about Canada's nuclear weapons," *International Journal* LI, no. 3 (Summer 1996): 506.

¹⁹ Reg Whitaker and Gary Marcuse, *Cold War Canada: The Making of a National Security State, 1945-1957* (Toronto: University of Toronto Press, 1996), xi. See also Denis Smith, *Diplomacy of fear: Canada and the Cold War, 1941-1948* (Toronto: University of Toronto Press, 1988). In 1951, partially in response to the Korean War, a three-year, \$5 billion defence programme was approved and higher manpower ceiling authorized, which amounted to a tripling of the size of the armed forces and a tenfold increase in the defence budget since 1947. John M. Treddenick, "The Defence Budget," in *Canada's International Security Policy*, ed. David B. Dewitt and David Leyton-Brown (Scarborough: Prentice-Hall Canada Inc., 1995), 429.

²⁰ Aronsen, "Canada's Postwar Re-armament," 176, quoting House of Commons *Debates*, 27 November 1952, 136-137.

order of the day, and the government quickly paid down its short-term wartime debt, thereby reducing its debt service burden and leaving increasing room for other areas of spending. Though it may well have been disposed to supporting major social programs with these new-found riches...none of these...had been initiated in any substantial way and were thus deferrable while priority was attached to defence preparations.²¹

The official history of the Department of Munitions and Supply noted that "it is one of the tragic ironies of history that war, which kills, maims, and ruins millions and causes economic and political confusion even in the countries of the victors, also brings to a certain limited class unparalleled opportunities for profit and even greater wealth."²² Avro and Orenda, like many other Canadian companies, would soon find that heightened Cold War tensions were - temporarily, at least - good for business. And, according to James Dow, "if aircraft design and development was a risky business, [Avro and Orenda] preferred to have the customer bear most of it... [they] would rather do business with the government on a cost-plus basis. This meant a clear preference to depend almost exclusively on military contracts for...profits."²³

However, the priority would quickly be given to continental defence as the immediate threat to Canada was the Soviet atomic bomb and the means to deliver it to North America, the piston-engined Tupelov Tu-4 Bull bomber.²⁴ At this time, "Canada was primarily

²¹ Treddenick, 429-430.

²² de N. Kennedy, 3.

²³ Dow, 43.

²⁴ DHH/DND, Foulkes Papers, 1. The Bull was a copy of the American Boeing Aircraft Company B-29 Superfortress, the bomber which had dropped the atomic bombs "Little Boy" and "Fat Man" on the Japanese cities of Hiroshima and Nagasaki. It had been reverse-engineered from Superfortresses which made forced landings in the Soviet Union

responsible for the air defence of Canada, and while the United States co-operated with Canada, the only arrangement for US support...dealt with reinforcing after the battle had begun.”²⁵ This made the RCAF the first line of defence in North America, and though “the expense would be great, especially given the fact that Canada would not resort to conscription to drive manpower costs down throughout the armed forces,” the necessity of an effective air defence “prompted the Canadian government to ‘unbalance’ defence budgets in favour of the RCAF.”²⁶ To detect and provide early warning of the approach of such bombers, Canada and the US poured hundreds of millions of dollars into building the Pinetree, Mid-Canada, and Distant Early Warning radar lines stretching across Canada.²⁷ To

during the Second World War.

²⁵ DHH/DND, the Raymont Collection, Chairman, Chiefs of Staff Committee (hereinafter CSC Papers), series 1, 73/1223, file 632, CF-105 Aircraft 01/30/58-08/19/58, “Report On The Development Of the CF105 Aircraft And Associated Weapon System 1952-1958,” (hereinafter CSC Report), 19 August 1958, 1.

²⁶ Joseph T. Jockel, “From Demobilization to the New Look: Canadian and American Military Rearmament, 1945-1953,” Paper presented to the Annual Meeting of the Canadian Historical Association, Dalhousie University, Halifax, 1981, 26.

²⁷ The academic literature on Canada-US cooperation in the area of continental defence during this period is voluminous. For a representative sample of the literature see Conant, *The Long Polar Watch*; Conant, “Canada and Continental Defence;” Christopher Conliffe, “The Permanent Joint Board on Defense, 1940-1988,” in *The US-Canada Security Relationship. The Politics, Strategy, and Technology of Defense*, ed. David G. Haglund and Joel J. Sokolsky (Boulder: Westview Press, Inc., 1989), 145-165; David Cox, *Canada and NORAD, 1958-1978: a Cautionary Retrospective*, Aurora Papers 1 (Ottawa: The Canadian Centre for Arms Control and Disarmament, 1985); Brian Crane, *An Introduction to Canadian Defence Policy* (Toronto: Canadian Institute of International Affairs, 1964); Brian Cuthbertson, *Canadian Military Independence in the Age of the Superpowers* (Toronto: Fitzhenry & Whiteside Limited, 1977); General Charles Foulkes, “Canadian Defence Policy in a Nuclear Age,” *Behind The Headlines* XXI (May 1961): 1-19; General Charles Foulkes, “The Complications of Continental Defence,” in *Neighbours Taken For Granted: Canada and the United States*, ed. Livingston T. Merchant (New York: Praeger, 1966), 101-133;

shoot down the bombers before they reached their targets, the RCAF Air Defence Command (ADC) deployed the Canuck. Powered by an Orenda engine, the Canuck took its first flight in 1950 and production commenced in 1952. Despite budgetary and technical problems with the programme attributed to "design flaws and bad management at A.V. Roe,"²⁸ 692 successively improved versions of the Canuck would roll off the assembly line by 1958. The cost of the programme was moderately over budget and the last Canuck would be retired

Granatstein, *Canada 1957-1967*; Commander Peter T. Haydon, *The 1962 Cuban Missile Crisis: Canadian Involvement Reconsidered* (Toronto: The Canadian Institute Of Strategic Studies, 1993); Joseph T. Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945-1958* (Vancouver: The University of British Columbia Press, 1987); Joseph T. Jockel, "The Military Establishments And The Creation Of NORAD," *American Review of Canadian Studies* 12, no. 3 (Fall 1982): 1-16, also in *Canada's Defence. Perspectives On Policy In The Twentieth Century*, ed. B.D. Hunt and R.G. Haycock (Toronto: Copp Clark Pitman Ltd., 1993), 163-178; George Lindsey, "Canada-US Defense Relations in the Cold War," in *Fifty Years Of Canada-United States Defense Cooperation. The Road From Ogdensburg*, ed. Joel J. Sokolsky and Joseph T. Jockel (Lewiston: The Edwin Mellon Press, 1992), 59-82; Lloyd; Jon B. McLin, *Canada's Changing Defence Policy, 1957-1963: The Problems of a Middle Power in Alliance* (Baltimore: The Johns Hopkins Press, 1967; Middlemiss and Sokolsky; James M. Minifie, *Peacemaker or Powdermonkey: Canada's Role in a Revolutionary World*. (Toronto: McClelland & Stewart Limited, 1960);; Desmond Morton, *Canada and War. A Military and Political History*. Political Issues In Their Historical Perspectives Series, ed. George A. Rawlyk and Bruce W. Hodgins (Toronto: Butterworth & Co. (Canada) Ltd., 1981); Desmond Morton, *A Military History of Canada* (Edmonton: Hurtig Publishers Ltd., 1985); Richard A. Preston, "The Cost of Palimony: Canada's Military Dependence on the United States," *War & Society* 1, no. 2 (September 1983): 85-104; Shaw, "The Influence of Post-War Continental Air-Defence Strategies and National Economic Development Policies on the Industrial Organization of the Canadian Aerospace Industry;" Joel J. Sokolsky, "A Seat At The Table: Canada And Its Alliances," *Armed Forces and Society* 16, no. 1 (Fall 1989): 11-35, also in *Canada's Defence. Perspectives On Policy In The Twentieth Century*, ed. B.D. Hunt and R.G. Haycock (Toronto: Copp Clark Pitman Ltd., 1993), 145-162; John W. Warnock, *Partner To Behemoth. The Military Policy of a Satellite Canada* (Toronto: New Press, 1970); Whitaker and Marcuse; and William R. Willoughby, *The Joint Organizations of Canada and the United States* (Toronto: University of Toronto Press, 1979).

²⁸ David Jay Bercuson, *True Patriot. The Life of Brooke Claxton 1898-1960* (Toronto: University of Toronto Press, 1993), 246.

from service in 1981. The Canuck was an outstanding interceptor, but there were no export sales. Fifty-three were purchased by Belgium through the Mutual Defence Assistance Programme, but the US paid three-quarters of the cost and Canada one-quarter.²⁹ As Lester Pearson, SSEA (1948-1957), would later state:

I know also from my own experience in the past that when we tried to get the US interested in the CF-100 some years ago, at a time when the CF-100 was admitted in Washington to be certainly the best all-weather fighter on this continent, we made no progress at all. The aircraft industry down there was not going to allow any interference with its own right to produce its own aircraft for its own government.³⁰

Production of the Canuck had barely commenced when the RCAF issued an operational requirement for an advanced two-seat, twin-engined, all-weather supersonic interceptor to shoot down the anticipated next generation of Soviet turbo-jet supersonic bombers.³¹ In January 1952 an All-Weather Interceptor Requirements Team, consisting of the RCAF, DRB, the National Research Council (NRC), and the National Aeronautical

²⁹ Unlike the Arrow, few Canadians know the Canuck ever existed. See Bob Baglow, *Canucks Unlimited: Royal Canadian Air Force CF-100 squadrons and aircraft, 1952-1963* (Ottawa: Canuck Publications, 1985); Robert Bradford, "Canadian Innovation - CF-100 Story," *Air Enthusiast*, no. 4 (Winter 1981): 152-166; James Eayrs, *In Defence of Canada: Growing Up Allied* (Toronto: University of Toronto Press, 1980); James Eayrs, *In Defence of Canada: Peacemaking And Deterrence* (Toronto: University of Toronto Press, 1972); Don Henley, "Singular Customer. Belgium and the Avro Canada CF-100," *Air Enthusiast*, no. 68 (March/April 1997): 60-63; James Hornick, "The CF-100: Canada's Boldest, Costliest Aircraft Venture," *Saturday Night*, 18 January 1958; Larry Milberry, *The Avro CF-100* (Toronto: CANAV Books, 1981); Molson and Taylor; and Ron D. Page, *Canuck. CF-100 All Weather Fighter* (Erin: The Boston Mills Press, 1981).

³⁰ House of Commons, *Debates*, 12 September 1958, 3230. In air force parlance this is referred to as the NIH syndrome, or "not-invented-here."

³¹ The specification that would lead to the Arrow was designated OR 1/1-63 "Supersonic All-Weather Interceptor Aircraft," and the design study to meet it was designated AIR 7-3 "Design Studies of a Prototype Supersonic All-Weather Aircraft."

Establishment (NAE), was formed. As had been the case with the Canuck, the team studied developments in the US and the United Kingdom (UK) and, as they had with the Canuck, they concluded that no interceptor suited to Canada's needs was in service or on the drawing boards. In June 1952 the RCAF began collaborating with Avro on the preliminary design study for the interceptor which would become the Arrow.³² And, according to James Floyd, who would rise to become Avro's Vice-President of Engineering, the RCAF wanted nothing but the best: "the air staff were asking for the moon....It was small wonder that [the RCAF] team had failed to find any such aircraft on the drawing boards anywhere in the world."³³

In later testimony before the House of Commons Special Committee on Defence Expenditures, Major-General George Pearkes, MND (1957-1960), described the RCAF's rationale for its uniquely Canadian operational requirements as follows:

The main difference was geographical. Canadian air bases were relatively close to the mid-Canada line; therefore, it was necessary for an aircraft to be able to rise quickly from the base, in order to engage a bomber between the time that it came over the mid-Canada line and air stations. Therefore, it had to have supersonic speed from, really, the start out.

Secondly, the geographic condition of sparsely populated territory, with few air strips, required at least a two-seater aircraft, so that there would be control from the crew; whereas the Americans, because they had more warning, because their bases were further south than ours, and because they had many airfields in their more thickly populated country, could rely on an aircraft which would start more slowly and then gain supersonic speed, in order to engage the hostile aircraft. And they could rely on one engine, as opposed to two, because there was not the risk of having a crash in more isolated parts.³⁴

³² DHH/DND, CSC Report, 1; and DHH/DND, Foulkes Papers, 8-9.

³³ Stewart, 180.

³⁴ House of Commons, *Special Committee on Defence Expenditures, Minutes of Proceedings And Evidence* (hereinafter Halpenny Committee), No. 5 (20 May 1960), 127.

However, as the American political scientist Jon McLin observed, "that the peculiarities of the Canadian situation may have been exaggerated was later shown when the RCAF proved quite happy in 1961 to get the [McDonnell CF-101B Voodoo] which it had looked at and rejected in an earlier day [1952]."³⁵

The RCAF optimistically anticipated the Arrow entering ADC service in 1958-1959 in nine regular squadrons and ten auxiliary (*i.e.*, reserve, manned and maintained by part-time RCAF personnel) squadrons which indicated a production run of 500-600 Arrows at \$1.5-2 million each.³⁶ However, Howe, now Minister of Defence Production (1951-1957), was less than thrilled by the prospect of hundreds of new Canadian-made interceptors. In a letter to Claxton in December 1952, he opposed awarding Avro any follow-on contracts:

I understand that your Department is planning a substantial development programme for new supersonic jet engines and for a new fighter aircraft.

Before authorizing these items, I think you should appreciate what has already been spent on the Orenda engine and on the CF-100 to date. I must say that I am frightened for the first time in my defence production experience....

I must tell you that the design staff at Avro is far from competent to undertake work of this importance. Their designing record to date is very bad indeed, measured by any standard. If we must have further development work, let us contract it with a British firm which has the personnel, equipment and experience that qualifies them to do work of this kind. Someone so equipped, can do the work for a fraction of the cost in making the attempt at A.V. Roe.

³⁵ McLin, 63.

³⁶ DHH/DND, CSC Report, 1-2; and DHH/DND, Foulkes Papers, 2-3.

I hope that you will give serious consideration to the dangers inherent in worsening our financial position at A.V. Roe and issue a directive accordingly.³⁷

Indeed, Howe's displeasure with the company extended to arranging in October 1951 for one of his own DDP "dollar-a-year men,"³⁸ Crawford Gordon, Jr., to take over as President and General Manager of A.V. Roe.³⁹ But Claxton - more nationalistic than Howe, more enthusiastic about Avro, and "the standard against which the power and influence of MNDs can be judged"⁴⁰ - was listening to advice proffered by another source - the CSC.⁴¹ In May 1953, the Treasury Board approved formally awarding Avro a \$200 000 (later increased to \$500 000) design study for the Arrow.⁴²

Air Marshal Roy Slemon, Chief of the Air Staff (CAS) (1953-1957), inaugurated high-level discussion on the Arrow programme at the 545th CSC meeting on 6 October

³⁷ National Archives of Canada (hereinafter NAC), Clarence Decatur Howe Papers, MG 27, III, B20 (hereinafter Howe Papers), vol. 48, file 4, A.V. Roe Canada Limited, 1952, C.D. Howe to Brooke Claxton, 19 December 1952. See also DHH/DND, Foulkes Papers, 4.

³⁸ Bothwell and Kilbourn, 131.

³⁹ Dow, 43-44; and Stewart, 137-142. "Aviation technology was costly, Howe learned, as well as slow and quirky. The headaches connected with the production of the CF-100 even caused Howe to dispatch one of his DDP officials, Crawford Gordon, to Malton to see if he could straighten out the mess. He could not; instead of a solution, the heavy-drinking Gordon became in Howe's eyes part of the problem." Bothwell and Kilbourn, 266. See also Crawford Gordon, Jr., "A Brief On The Probable Developments In The Aviation Industry In Canada And Their Effects On The Canadian Economy," *Briefs Prepared For The Royal Commission On Canada's Economic Prospects*, 1956.

⁴⁰ Middlemiss and Sokolsky, 65.

⁴¹ Bothwell and Kilbourn, 267.

⁴² Halpenny Committee, No.3 (17 May 1960), 89.

1953.⁴³ Slemon stated that the RCAF was satisfied with Avro's preliminary design study and that it was now time to proceed with the Arrow. He noted that:

the wisdom of Canada's decision to produce the CF-100 fighter was now being borne out. Canada was at least two years ahead of any other country in the field of all-weather fighters. In developing the CF-105, Canada would not be duplicating any other nation in this field but would keep one step ahead of the present development programmes in other countries.⁴⁴

Expressing doubt, Lieutenant-General Charles Foulkes,⁴⁵ Chairman of the CSC (1951-1960), inquired whether Canada could collaborate with the US or UK in order to pool ideas, share costs, and hasten production. Dr. Omond Solandt, Chairman of the DRB (1947-1956),⁴⁶ clearly supporting Slemon, replied that collaboration would not bring any great saving of money and, moreover, it could result in the dispersal of Avro's highly skilled personnel. In the end, the CSC agreed to seek authority for funds to develop the Arrow. At the 551st CSC meeting on 25 November 1953,⁴⁷ Slemon stated that the Arrow programme could be

⁴³ DHH/DND, CSC, 6 October 1953, 3-4. Although DHH/DND, Defence Council Minutes, Vice-Chiefs of Staff Committee Minutes, and Air Council Minutes were also consulted in the course of researching this case study, only the Air Council Minutes contained relevant discussion on the Arrow programme. However, because the Air Council minutes normally reflect what was presented to the CSC by the CAS, they will not be cited in this thesis.

⁴⁴ DHH/DND, CSC, 6 October 1953, 3.

⁴⁵ Foulkes would be promoted to General shortly thereafter. See David J. Bercuson and J.L. Granatstein, *Dictionary of Canadian Military History* (Toronto: Oxford University Press, 1992).

⁴⁶ On the enormous influence of Solandt on defence research in Canada see also Goodspeed and Law, Lindsey, and Grenville. Oddly, the Arrow is barely mentioned in either book.

⁴⁷ DHH/DND, CSC, 25 November 1953, 3-4.

financed from within the RCAF's estimated defence allocations. Although it was not possible to anticipate fully all costs, Slemon assured the CSC that the RCAF tended to overestimate costs in an attempt to avoid unforeseen expenditures.

The CSC submission was considered at the 97th CDC meeting on 2 December 1953.⁴⁸ Claxton reminded the members (as the CSC had reminded him):

the CF-100, designed in 1947 and now in operational service, was an effective weapon against piston-engined bombers and against existing turbo-prop bombers. By 1958, it was estimated, the enemy would have turbo-jet bombers, which the CF-100 could not adequately engage. The preparation of plans for a new type of all-weather fighter was therefore urgent, but no western country had this problem in hand. The RCAF had studied the matter carefully in consultation with A.V. Roe Canada Ltd., and was confident that an aircraft could be produced to meet the new requirements.⁴⁹

The following points emerged during the meeting: the Arrow programme would not duplicate projects underway or envisaged in the US or UK; funding was within the estimated defence expenditures; and the project might be ended if developments elsewhere or a change in the Soviet threat warranted. Having said that, the CDC recommended the project as "risk insurance."⁵⁰

⁴⁸ NAC, Records of the Privy Council Office, RG2, Cabinet Defence Committee Conclusions (hereinafter referred to as CDC), 2 December 1953, 1-2, with reference to Minister's Memorandum, 30 November 1953, Cabinet Document D49-53. It should be noted that conclusions of the CDC and the CSC rarely attribute recorded comments to a particular minister other those who are making presentations.

⁴⁹ NAC, CDC, 2 December 1953, 1.

⁵⁰ NAC, CDC, 2 December 1953, 2.

The Arrow programme was approved without any recorded discussion at a 17 December 1953 Cabinet meeting.⁵¹ The cost of the development programme was estimated to be \$26 925 000. Foulkes would later write that “the probable costs of the engine and armament system were only very roughly indicated. There was some hesitation in recommending a programme of such complexity and magnitude and with so many unpredictable factors and hidden costs.”⁵² As Jon McLin notes, though civil and military decision-makers believed “there was little danger that the total costs would exceed Canada’s means,” understanding of costs during the formative years of the project would be vague, a situation which was “undoubtedly attributed to the tendency...to confuse ‘fly-away’ costs, which disregarded development expenses, with average unit costs, which did not include such expenses. This technique could be used to support a pro-production or pro-cancellation position by exaggerating or underestimating the airplane’s costs.”⁵³

These initial meetings of the CSC, the CDC, and the St. Laurent Cabinet established a pattern of civil-military decision-making behaviour that would be repeated throughout the Arrow programme. RCAF officers, defence research scientists, defence production officials, and company engineers and technicians brought their requests to the CSC through their representative, the CAS. The CAS presented these ideas to the CSC, a debate might ensue,

⁵¹ NAC, Records of the Privy Council Office, RG2, Cabinet Conclusions (hereinafter CC), 17 December 1953, 13. See also House of Commons, *Sessional Papers* 837, 838, nos. 198, 198a-d (1959); House of Commons, *Standing Committee on Estimates, Minutes of Proceedings And Evidence*, No. 1 (5 June 1958), and No. 12 (7 July 1958); and DHH/DND, CSC Report, for further contractual and financial information on the project.

⁵² DHH/DND, Foulkes Papers, 3.

⁵³ McLin, 67-68.

but in the end the CSC concurred with the CAS and agreed to take the matter up with the CDC. The CSC presented its wish list to the CDC through its representative, the MND, and an exchange over the proposal might follow. However, in the end the CDC deferred to authority of the Minister. The MND then apprised Cabinet as to the CDC's counsel, which would invariably receive approval, often without further consideration.

During 1954, the RCAF and the USAF initiated an ongoing exchange of information relating to the Arrow programme. In June, General Nathan Twining, Chief of Staff of the USAF, wrote the CAS requesting approval for the USAF Air Research and Development Command (ARDC) to evaluate the Arrow programme against the USAF specifications for a long range interceptor. In July, Slemon forwarded a copy of the Arrow's design study and approved the liaison. He also pointed out that Cabinet approval for the Arrow programme had been predicated on the understanding that the US and UK had not embarked on a similar aircraft:

I am more than pleased to have received this invitation from you to exchange information and views concerning the long range interceptor, which is a project of prime importance and joint concern to our own countries for the air defence of the continent. This approach to the problem is certainly in keeping with our agreed aim,...stated [by Twining] as follows: "...to require the enemy to compete in the technological field with the combined brains and resources of the English speaking Allies rather than the three components thereof; and that such collaboration would be superior to the individual and in some cases overlapping efforts."⁵⁴

⁵⁴ NAC, Records of the Department of National Defence, RG24 (hereinafter DND), acc. 83-84/167, box 6426, file S1038-CN-180, CF-105 Arrow Aircraft - General, 1952-1962, pt. 2, General N.F. Twining to Air Marshal C.R. Slemon, 28 June 1954, and Air Marshal C.R. Slemon to General N.F. Twining, 14 July 1954. See also DHH/DND, CSC Report, Appendix G. A team from the RCAF, Avro and Orenda would brief ARDC in August 1954.

Although its existence was occasionally alluded to in the House of Commons after 1953, neither the CSC, CDC, nor Cabinet discussed the Arrow programme during 1954. However, the Soviets had not been idle, surprising the West by exploding a hydrogen bomb, unveiling the turbo-prop Tupelov Tu-95 Bear bomber and the turbo-jet Myasishchev M-4 Bison jet bomber and, in so doing, raising the spectre of a “bomber gap” between the West and the Soviets.⁵⁵ Countering the “bomber gap” now preoccupied the RCAF and the USAF, though Western fears were later proven to be overblown. Lieutenant-General Guy Simonds, the Chief of the General Staff (CGS) (1951-1955), later complained that “it seemed to me over the years that if the Russians showed one or two new airplanes on the May day fly-past, it would almost always be assumed next day that they had a fleet of a thousand.”⁵⁶

At the 574th CSC meeting of 11 February 1955,⁵⁷ Slemon reported that, because of the accentuated Soviet threat, the need for the early development and production of the Arrow was urgent. Slemon requested that, in line with new US and UK aircraft procurement practice, the Arrow programme be accelerated:

This “development batch principle” involved the ordering of a large number of pre-production aircraft instead of the traditional one or two prototypes. By making 11 aircraft initially it was estimated that 8 ½ years of normal contractor testing could be reduced to 2 ¼ years. An additional 29 aircraft would be ordered at about the time of the first flight. Most of these would be

⁵⁵ The Bison was the greater threat as it was a bomber similar, though inferior, to the American Boeing Aircraft Company B-52 Stratofortress. DHH/DND, CSC Report, 1-2; and DHH/DND, Foulkes Papers, 4-5.

⁵⁶ Sauvé Committee, No. 14 (17 October 1963), 447.

⁵⁷ DHH/DND, CSC, 11 February 1955, 1-4.

used for RCAF testing and trials. Of the first 40 aircraft produced perhaps not more than 20 would become fully operational.⁵⁸

There was opposition to this proposal. Simonds answered that he thought the Arrow programme was “wrong in principle.”⁵⁹ He argued that the development of guided and intercontinental ballistic missiles (ICBMs) was proceeding so rapidly that manned aircraft would soon be rendered obsolete. His solution was to purchase a comparable, if slightly inferior, American interceptor and invest the funds thus saved into developing a missile designed to counter both bombers and ICBMs. He concluded by saying that because Western intelligence forecasts had underestimated Soviet capabilities, the forecasts on when the Soviets would deploy ICBMs could be just as faulty. According to Simonds, “a similar amount of money [to the Arrow] spent on research on ballistic missiles and defence against them would be more economically sound.”⁶⁰

Slemon replied that as long as the Soviets still had bombers capable of attacking North America this represented a threat that had to be met even if “the CF-105 may be the last manned fighter to be produced in Canada.”⁶¹ Solandt agreed that there were alternative interceptors available but they would not be available any sooner than the Arrow and the RCAF did not consider them to be suitable. Slemon added “if the development of BOMARC or some similar missile overtook the CF-105 program it may be considered wise

⁵⁸ DHH/DND, CSC, 11 February 1955, 2.

⁵⁹ DHH/DND, CSC, 11 February 1955, 2.

⁶⁰ DHH/DND, CSC, 11 February 1955, 3.

⁶¹ DHH/DND, CSC, 11 February 1955, 2.

to stop or modify further work at that time but in the interim the one should not stop because of the possibilities seen in the other.”⁶²

At the same meeting, Slemon and Solandt reported that when the Arrow programme had been approved in 1953 the RCAF and DDP had anticipated that “the best available engine”⁶³ would be procured from the US or UK. However, no American or British engine project underway or envisaged could match the expected performance of the PS-13 Iroquois, an engine that Orenda had developed as a private venture. Slemon and Solandt therefore requested that the RCAF be allowed to sponsor the Iroquois, adding that by expending this money and effort domestically Canada would remain in the forefront of engine technology.

The CSC agreed, and its submission was made to the 104th CDC meeting on 3 March 1955.⁶⁴ In the ensuing discussion the CDC noted that the Arrow would likely be a superior interceptor, but it was also acutely aware that “it seemed highly doubtful that the US would purchase any CF-105s produced in Canada.”⁶⁵ It also expressed their hope that the Arrow might replace both the Canuck and the Canadair CL-13 Sabre⁶⁶ which were in service with

⁶² DHH/DND, CSC, 11 February 1955, 3. BOMARC refers to the IM-99 surface-to-air missile developed by the Boeing Airplane Company and the University of Michigan’s Aeronautical Research Centre. The RCAF was interested in the “B” version of the BOMARC, which carried a nuclear warhead.

⁶³ DHH/DND, CSC, 11 February 1955, 4. See also DHH/DND, Foulkes Papers, 6-7.

⁶⁴ NAC, CDC, 3 March 1955, 3-5, with reference to Minister’s Memoranda, 1 March 1955, Cabinet Document D6-55, and 25 February 1955, Cabinet Document D7-55.

⁶⁵ NAC, CDC, 3 March 1955, 3.

⁶⁶ The US-designed North American Aviation F-86 Sabre was licence-built in Montreal by Canadair Limited. Designated CL-13 by the RCAF, it was powered by an

ADC and the RCAF Air Division in Europe.⁶⁷ While the CDC believed that the per unit cost of the Arrow would now be \$2.5-3 million, it did not appear to know how many Arrows might eventually be produced: “depending on the success of the US in aircraft and missile development and the decision on rearming of the Air Division, and on the number and types and rate of production of aircraft in the Soviet Union, the production run of the CF-105 might be anywhere from 100 to 500.”⁶⁸ The CDC’s determination to proceed with the project, regardless of the cost, was also very clear; other commitments would be examined and reduced or eliminated if the air defence programme meant increased defence expenditures:

The cost of the programme was exceedingly heavy and if it did not work out well, or if for a variety of reasons it had to be abandoned, embarrassment and criticism would be severe. Nevertheless, the only way to provide for an effective deterrent to aggression was to improve, modernize and develop the warmaking capacity of the free nations. It was to be hoped in five or six years there might be some improvement in the prospects of avoiding suicide otherwise than by the present very expensive means, but there was no

Orenda engine. Canadair would build 1815 Sabres. See Larry Milberry, *The Canadair Sabre* (Toronto: CANAV Books, 1986); Larry Milberry and Ron Pickler, *Canadair: The First 50 Years* (Toronto: CANAV Books, 1995); and Molson and Taylor.

⁶⁷ NAC, CDC, 3 March 1955, 3. At its peak strength the Air Division was composed of eight regular Sabre squadrons and four regular Canuck squadrons, nearly 300 aircraft in total. The CDC also indicated that though the Arrow’s mission was anticipated to be defensive, because of the reduction in size of atomic weapons the aircraft might be convertible to a short-range offensive mission. However, the RCAF never seriously considered replacing the Sabre with the Arrow, and though it did undertake a preliminary design study on the Arrow as a tactical nuclear bomber, that idea went nowhere. See NAC, DND, acc. 83-84/167, box 6426, file S1038CN-180-5187A, CF-105 Arrow Aircraft - General, 1952-1962, pts. 1-6.

⁶⁸ NAC, CDC, 3 March 1955, 3.

guarantee of this and therefore no alternative but to proceed with the maintenance of suitable deterrent strength.⁶⁹

The CDC did, however, conclude the meeting with a warning: “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.”⁷⁰

In the end, the CDC recommended approval of the accelerated and expanded Arrow programme. At the 8 March 1955 Cabinet meeting,⁷¹ approval was given for “a pre-production procurement programme for 40 CF-105 supersonic aircraft at a total estimated cost of \$191 million,” and “a development and tooling programme for the PS-13 engine, including procurement of 14 units, at a cost of \$70 million,”⁷² again without any recorded discussion. Ralph Campney, the Associate MND (1953-1954) was asked whether the anticipated defence budgets would meet the costs of developing the Arrow until 1960. He replied it would be “touch and go.”⁷³ The Arrow was subsequently discussed at the 23 March 1955 Cabinet meeting,⁷⁴ during the course of which a contract with Avro for \$40 000 000 for eleven initial aircraft was approved. Cabinet expressed its hope that the long-term

⁶⁹ NAC, CDC, 3 March 1955, 3.

⁷⁰ NAC, CDC, 3 March 1955, 4.

⁷¹ NAC, CC, 8 March 1955, 13-15.

⁷² NAC, CC, 8 March 1955, 14-15. The first five Arrow I aircraft would be powered by American-built Pratt and Whitney J-75 engines, and the next thirty-five Arrow II aircraft by the initially unavailable Iroquois.

⁷³ NAC, CC, 8 March 1955, 14.

⁷⁴ NAC, CC, 23 March 1955, 19-21.

and expensive commitment to the Arrow programme would not prevent future cuts being made in the overall defence budget if the international situation made such reductions feasible. Having said that, it was also borne in mind that “many million dollars would have to spent before there could be any assurance that the CF-105 was as good in actual operation as it was on the drafting board.”⁷⁵ Showing considerable prescience, Cabinet then indicated that it was cognizant of the fact that the project was going to be an all-Canadian effort and that there was no realistic possibility of export sales:

Good as this aircraft might turn out to be, it was unlikely that other NATO governments would adopt it for their own use. One of the reasons for this was that the aircraft was designed to meet conditions peculiar to northern Canada and might not be entirely suitable for use in western Europe; another was that we could not expect the US and UK to adopt a Canadian plane rather than develop one of this importance themselves.⁷⁶

The decision to accelerate the Arrow programme requires further elaboration. What Cabinet approved was the elimination of the time-consuming process of producing two soft-tooled (*i.e.*, hand-built) prototypes, exhaustively testing them, and then setting up an assembly line after the design was proven. After consulting with Avro, Orenda and the USAF, the RCAF had decided instead to recommend the Cook-Craigie procedure (so-called after its American inventors), according to which the companies would undertake thorough preliminary research on mock-ups as well as wind tunnel and free flight test models.⁷⁷

⁷⁵ NAC, CC, 23 March 1955, 21.

⁷⁶ NAC, CC, 23 March 1955, 20.

⁷⁷ Undertaken at the Canadian Armament Research and Development Establishment (CARDE), the NRC, the NAE, and the US National Advisory Committee on Aeronautics (NACA), the forerunner of the National Aeronautics and Space Administration (NASA).

Production of hard-tooled prototype and pre-production aircraft would subsequently occur on an already established assembly line. The RCAF and Avro believed this would result in the Arrow's deployment by 1960 and "the cost of the whole accelerated program would be about 10 per cent less than the originally estimated cost...although in the early stages the production costs would be sharply increased."⁷⁸

American studies have tended to be critical of the Cook-Craigie procedure. American political scientist Michael Brown wrote that "under the Cook-Craigie procedures, there was no way that one could begin flight testing until after a production commitment had been made and production aircraft were built."⁷⁹ This was, of course, exactly the kind of firm commitment that the national security bureaucracy and Avro and Orenda wanted from the CDC and Cabinet. However, another American political scientist, Richard Coulam, cited a Rand Corporation study on fighter developments in the 1950s which confirms:

the lead-time advantages attributed to concurrency were not borne out by development experience - the lengthy retrofit programs, tooling changes, and design modifications characteristic of concurrent programs tended to consume the time advantages concurrent schedules had promised....Concurrency's emphasis on extensive development planning and on early commitments to production tended to suppress technical uncertainties and to reduce the flexibility of the design process, with notable effects on the cost and quality of operational systems. It is fair to say that the empirical case for concurrency as an efficient means of hastening aircraft development was ambiguous at best in the late 1950s and early 1960s.⁸⁰

⁷⁸ DHH/DND, CSC, 11 February 1995, 2. See also DHH/DND, Foulkes Papers, 5.

⁷⁹ Michael E. Brown, *Flying Blind. The Politics Of The U.S. Strategic Bomber Program* (Ithaca: Cornell University Press, 1992), 177. The procedure is also known as systems engineering or concurrency.

⁸⁰ Robert F. Coulam, *Illusions of Choice. The F-111 and the Problem of Weapons Acquisition Reform* (Princeton: Princeton University Press, 1977), 207-208. See also Glenn

The available evidence suggests that the Cook-Craigie procedure failed to reduce costs and hasten deployment. In retrospect, the adoption of the Cook-Craigie procedure in the Arrow programme, though understandable, was a significant mistake.

The Arrow programme was gaining considerable momentum by the time Howe officially revealed its existence to the House of Commons in June 1955, although his remarks did not inspire much confidence:

I can now say that we have embarked on a programme of development that frankly gives me the shudders - a supersonic plane and a supersonic engine. I believe those weapons are certainly required as soon as they can be produced, to ward off the threat which hon. members opposite insist does not exist....As I have said, we have never missed yet. I think we are the only country that can say that we have developed a fighter aircraft and have developed a powerful jet engine without a miss. I hope we do not miss too much this time. We will not miss if the strength of our industry, of all Canadian industry, is sufficient to achieve the objective. But I shudder to think of the problems of developments.⁸¹

This was indeed a frank admission for a minister who had once promised the army, navy, and air force “gold-plated pianos”⁸² if they wanted them. Though little dissent was heard in the House of Commons upon the announcement of the project, Howe had good reason to be nervous. As Paul Hellyer, a future MND (1963-1967), would later write: “Of all the

E. Bugos, *Engineering The F-4 Phantom II. Parts Into Systems* (Annapolis: Naval Institute Press, 1996); and Bill Gunston, *Early Supersonic Fighters of the West* (Shepperton: Ian Allen Ltd., 1976).

⁸¹ House of Commons, *Debates*, 28 June 1955, 5380.

⁸² Robert Bothwell, “Defense And Industry In Canada, 1935-1970,” in *War, Business, And World Military-Industrial Complexes*, ed. Benjamin Franklin Cooling (Port Washington, New York: Kennikat Press Corp, 1981), 115.

decisions facing a Minister of Defence, few are as fraught with political danger as the choice of a new tactical aircraft.”⁸³

Howe’s unease was justified at the 106th CDC meeting on 27 September 1955.⁸⁴ Campney, now MND (1954-1957), reported that the Arrow programme was behind schedule and that Avro and Orenda had requested an additional \$59 million due to increased labour, engineering, and material costs and an original underestimation.⁸⁵ Concerned, Howe added that the DDP had reviewed the overall cost of the project and estimated that the forty preproduction and 300 production aircraft would probably cost around \$1 billion, “a colossal element of the defence budget.”⁸⁶ In light of these developments, the CDC recommended that the RCAF and representatives from the Department of Finance, DDP, DRB, and NAE, prepare a reappraisal report on the Arrow programme and, additionally, that Cabinet review

⁸³ Paul Hellyer, *Damn The Torpedoes. My Fight To Unify Canada’s Armed Forces* (Toronto: McClelland & Stewart Inc., 1990), 129. Hellyer, who was also briefly Associate MND in 1957, also complains about having to “force the RCAF’s size-twelve budgetary foot into Cinderella’s size-six appropriation shoe.” Hellyer, 131.

⁸⁴ NAC, CDC, 27 September 1955, 1-3, with reference to Minister’s Memorandum, 26 September 1955, Cabinet Document D16-55.

⁸⁵ During 1954 the DRB and NAE had also challenged Avro’s performance calculations. Avro was vindicated after a third-party evaluation by NACA, but this dispute held up the Arrow programme. Disagreements between DRB, NRC, and NAE on the one hand and Avro on the other over the technical aspects of the Arrow would flare up periodically during the early years of the programme. Smye, 66. See also Campagna, *Storms Of Controversy*.

⁸⁶ Howe also noted that if the Arrow programme were ended, there would be \$13 million in cancellation charges. NAC, CDC, 27 September 1955, 2.

the project every six months thereafter.⁸⁷ At a 28 September 1955 Cabinet meeting,⁸⁸ the reappraisal was approved. Adding to the growing worry about the project, Campney also pointed out:

The United Kingdom and the United States were, until recently, not proposing to produce an all-weather fighter similar to the one being in Canada, but now each of them had set out a requirement for a machine comparable to the CF-105. While these nations would be interested in Canadian development in this field, there was little doubt that they would proceed independently with their own plans and this had a bearing on the future of the CF-105.⁸⁹

At the 584th CSC meeting on 1 November 1955,⁹⁰ Slemon tabled the reappraisal report and its single recommendation: "To improve the CF-100, including the fitment of the Sparrow II missile, and to introduce the CF-105 aircraft and the BOMARC missile into the Canadian air defence system at the earliest possible date."⁹¹ The CSC balked; instead

⁸⁷ The team would report to a panel comprised of the CAS (as Chair), the DM, DND, the Chairman of the DRB, and the DM, DDP, as well as representatives from the Privy Council Office, the Departments of Finance and External Affairs, and the NRC. DHH/DND, CSC Report, 4; and DHH/DND, Foulkes Papers 7-8.

⁸⁸ NAC, CC, 28 September 1955, 5-6.

⁸⁹ NAC, CC, 28 September 1955, 5.

⁹⁰ DHH/DND, CSC, 1 November 1955, 1-10.

⁹¹ The report considered and rejected two other courses of action which involved improving the Canuck, procuring the BOMARC, and either purchasing an alternative American interceptor or foregoing a supersonic interceptor altogether. NAC, DND, 83-84/226, vol. 20886, file CSC 10:9, pt. 4, Canada, Manufacture of Aircraft, 1948-1964, (Top Secret) 1948-1955, "Report By The Working Group To The Ad Hoc Departmental Committee For The Reappraisal Of The CF105 Development Programme," n.d., 4, 6. Another lengthy and extremely useful report, its appendices contain individual reports from the Plans Analysis and Requirements Group, Comparison Group (Fighters), Comparison Group (Missiles), Cost Analysis Group, a report on US and UK aircraft design and development programmes, and a report on the phasing in of weapons in air defence system

Foulkes, Slemon, and Frank Miller, DM, DND (1955-1960),⁹² revised the submission to the CDC. The revised submission presented the military and economic advantages and disadvantages of five courses of action so that the CDC could assess the impact of each on the anticipated defence budgets and make an intelligent choice. However, one course of action was clearly presented as a compromise solution: it was identical to the single recommendation contained in the reappraisal report that the CAS and the RCAF supported, but purportedly with a decrease in cost, which the CDC, Cabinet, and, increasingly, the CSC desired.⁹³ The CSC added that “the Government should be made fully aware that adoption of the CF-105 program would not in itself settle all defence problems.”⁹⁴ Foulkes would later imply that the CSC should have recommended one of the other courses of action: cancelling the Arrow programme in favour of an American interceptor. He argued:

There would [have been] definite budgetary advantage in purchasing a United States aircraft, since USAF would meet all development charges, take all the risks, and sell to Canada at a reduced price made possible by keeping their production line going a bit longer to satisfy Canadian needs. There was a distinct advantage of being able to assess the cost of Canada's air defence

with relation to the enemy threat.

⁹² Air Vice-Marshal Miller had been Vice-CAS (1951-1955) and as an Air Marshal was later Chairman of the CSC (1960-1964) and Chief of the Defence Staff (1964-1966). See Bercuson and Granatstein.

⁹³ See DHH/DND, CSC Report, Appendix B, Annex I, and Appendix E, Annex I, for the submissions to the CDC, which more or less reflected the five courses of action discussed. The CSC Committee reconvened briefly on 3 November 1955 to consider the revised submission. One of the edits approved was the deletion of the word “cheaper” from references to an alternative American interceptor.

⁹⁴ DHH/DND, CSC, 1 November 1955, 7.

commitment instead of having every few months to face the harassment of the A.V. Roe Company for more and more development funds.⁹⁵

On a similar theme, Lieutenant-General Howard Graham, CGS (1955-1958), picked up where Simonds left off, claiming that the RCAF's air defence programme was unjustified:

It appeared that the suggested program, with all its implications, would consume all the funds that might be available for defence in future years and would have a drastic effect on the other two services. He felt that Canada should work more closely with the United States on the basis that it was continental defence that we were striving for and we should use the same type of equipment as the United States rather than spending tremendous sums on developing an aircraft of our own which would be used in comparatively small numbers.⁹⁶

It is clear that though Slemon and the RCAF were still prevailing in their objective of carrying forward the Arrow programme, they were beginning to face stiffer resistance from Foulkes and the CGS who were increasingly worried about the effect the Arrow programme would have on other rearmament programmes. Rather than increasing steadily, defence budgets had, in the post-Korean war climate, begun to decline moderately in 1953, and the RCAF was receiving nearly half of these budgets. In the face of decreasing portions of a diminishing defence budget, the CGS and the Chief of the Naval Staff (CNS) were growing apprehensive over the Arrow programme.⁹⁷ Graham would later assert that an inter-

⁹⁵ DHH/DND, Foulkes Papers, 8-9.

⁹⁶ DHH/DND, CSC, 1 November 1955, 9.

⁹⁷ The total defence budgets during the Arrow programme were as follows: 1952 - 1953, \$1.882.4 billion; 1953-1954, \$1.805.9 billion; 1954-1955, \$1.666.0 billion; 1955-1956, 1.750.1 billion; 1956-1957, \$1.424.7 billion; 1957-1958, 1.668.5 billion; 1958-1959, \$1.424.7 billion; 1959-1960, \$1.514.9 billion. The defence budget more or less stabilized at this level for the rest of the Conservative government. R.B. Byers, "Canadian Defence and Defence Procurement: Implications for Economic Policy," in *Selected Problems in Formulating Foreign Economic Policy*, Royal Commission on the Economic Union and

service rivalry had been forming between the RCAF on the one hand and the army and the Royal Canadian Navy (RCN) on the other over the Arrow programme:

Air Marshal Slemon, Air Force Chief from 1953 to 1957, and Air Marshal Campbell, who succeeded Slemon in 1957, as one might expect, continued to support the program even at prohibitive costs that consumed the greater part of any reasonable defence budget. The Navy and Army, through their chiefs - Admiral Mainguy (followed by DeWolf) and Lieutenant-General Guy Simonds (followed by Graham) - and the Chairman of the Chiefs of Staff, General Foulkes, argued against it, and so advised the ministers (Campney and Pearkes).⁹⁸

At the 107th CDC meeting on 8 November 1955,⁹⁹ and the 108th CDC meeting on 17 November 1955,¹⁰⁰ the reappraisal report was submitted and the CSC's courses of action considered. Slemon briefed the first meeting:

In reappraising the need for the CF-105 and the programme which had been inaugurated, it had been necessary to consider a large number of important related questions. Air Marshal Slemon described the Soviet threat which existed today and which would develop in the next ten to fifteen years. He went over in detail the proposals for the defence of North America and the kind of air defence system considered desirable, including heavy radars, gap fillers and bases for aircraft and missiles. Types of missiles under development or in contemplation were described and the considerations

Development Prospects for Canada, ed. Denis Stairs, Gilbert R. Winham, vol. 30 (Toronto: University of Toronto Press, 1985), 142. See also DDP, "Defence Expenditure And Its Influence On The Canadian Economy," *Special Studies Prepared For The Special Committee Of The House Of Commons On Matters Relating To Defence, Supplement 1964-1965*, 95-107; and Treddenick.

⁹⁸ Howard Graham, *Citizen And Soldier. The Memoirs of Lieutenant-General Howard Graham* (Toronto: McLelland and Stewart, 1987), 237. See also DHH/DND, Foulkes Papers, 3-4. The CNS was never a particularly vocal member of the CSC when the Arrow programme was on the agenda.

⁹⁹ NAC, CDC, 8 November 1955, 1.

¹⁰⁰ NAC, CDC, 17 November 1955, 1, with reference to Minister's Memorandum, 4 November 1955, Cabinet Document D22-55.

governing the choice of fighter aircraft to cope with the threat were set out. He also explained to the committee some of the characteristics of the CF-105.¹⁰¹

At the second meeting, the CDC deferred further consideration until Campney, who still hoped to avoid a duplication of effort and costs, could discuss with the US Secretary of the Air Force the possibility of the US participating in or assuming the whole Arrow programme.

At the 7 December 1955 Cabinet meeting,¹⁰² Campney summarized the situation Cabinet found itself in:

The deterrent to a Russian attack consisted of two elements - the attacking power of the US Strategic Air Command and a reasonable power to inflict losses on enemy aircraft attacking North America. At the moment, the CF-105 appeared to hold out the most promise as a defence against Russian bombers during the period for which it was planned. If it were not developed in four or five year's time, Canada would have to look to other countries for an all-weather interceptor.¹⁰³

Campney then reported that the CDC recommended the CSC's compromise solution. The Arrow programme would continue but it would be stretched-out. Only eleven Arrows would be ordered before the first had flown, the Arrow's first flight would be delayed until early 1957, and its deployment would consequently be postponed until 1960-1961, all of which (it was claimed) would reduce costs to \$170.4 million (less \$35.5 million already spent) until 1958. In the interim it was felt that the improved Canuck would provide an effective defence. Although the overall costs of the Arrow programme were described as

¹⁰¹ NAC, CDC, 8 November 1955, 1.

¹⁰² NAC, CC, 7 December 1955, 11-15, with reference to Minister's Memoranda, 5 December 1955, Cabinet Document D241-55, and 6 December 1955, Cabinet Document D242-55.

¹⁰³ NAC, CC, 7 December 1955, 13.

“frightening,”¹⁰⁴ Cabinet still believed they could be absorbed within estimated defence expenditures. Thus Cabinet approved the recommendation, noting that: “Abandoning the programme at this stage would be tantamount to an admission that Canada was not capable of providing its share of the common defence or was unwilling to do so. This would have a serious effect on NATO allies as well as being embarrassing domestically.”¹⁰⁵

Campney also reported that he had met with Donald Quarles, the US Secretary of the Air Force,¹⁰⁶ who, while having a high opinion of the Arrow programme and wanting to assist in any way he could, made it clear that “it would be impossible for the US government to participate in developing it, or to commit themselves to buy it, because of the strong influence of the US aircraft industry in Washington.”¹⁰⁷ In spite of the earlier experience with the Canuck and the earlier expressed views of the CSC, CDC, and Cabinet confirming

¹⁰⁴ NAC, CC, 7 December 1955, 13. Campney added that if the Arrow programme was ended there would be \$17.7 million in cancellation charges and the government would then have to explain why it had spent over \$50 million on the project.

¹⁰⁵ NAC, CC, 7 December 1955, 13. Foulkes was sympathetic to Cabinet’s plight as “a \$300 million flop in Canada could be enough to unseat the government.” DHH/DND, Foulkes Papers, 12.

¹⁰⁶ At the request of Slemon and Solandt, on 31 October and 1 November 1955, USAF team visited Avro and Orenda and evaluated the Arrow and the Iroquois in order to offer an independent opinion on their technical and operational soundness. In a letter to Campney, Quarles wrote that the terms of reference given to the team were “should the RCAF proceed with development and production of the CF-105 in the face of a firm US Air Force programme for the development and production of the F-102B medium range interceptor; the F-101B long range interceptor; and the LRIX I, which is being developed to replace the F-101B?” Quarles relayed that the team recommended that the Arrow programme proceed as planned. DHH/DND, CSC Report, Appendix C, Donald A. Quarles to Ralph Campney, 9 November 1955. See also Appendix G, 1-2.

¹⁰⁷ NAC, CC, 7 December 1955, 12.

that this American attitude had always existed, this news still appeared to come as a genuine surprise to some members of Cabinet:

It seemed incredible, in the face of such apparent interest and approval in US official circles, that the US could not find a way of taking some small part in the project. Every effort would continue to exploit US interest in the CF-105 programme but it seemed unlikely that much would be done, particularly just before a presidential election.¹⁰⁸

In 1956, “crushing blows”¹⁰⁹ were delivered to the Arrow programme which made its cancellation all but inevitable. As Foulkes would later observe: “the Air Force clung tenaciously to their original concept of an interceptor which could navigate and control the firing of missiles without the need of a highly developed ground environment.”¹¹⁰ This would lead to two decisions regarding an air-to-air missile and an electronics system (both of which would also require expensive redesigns of the airframe) which proved to be the “major cause of cancellation.”¹¹¹ Overruling contrary advice from Avro, Orenda, the DRB, and the USAF, the RCAF and its DDP allies concluded that existing (and cheap and proven) off-the-shelf technology would not meet their operational requirements, and the CSC, CDC, and Cabinet accepted their advice.¹¹²

¹⁰⁸ NAC, CC, 7 December 1955, 14.

¹⁰⁹ DHH/DND, Foulkes Papers, 12.

¹¹⁰ DHH/DND, Foulkes Papers, 13. Foulkes added that the RCAF’s adherence to this principle “caused the Chiefs of Staff to accept the inflated costs of completing the CF-105, instead of insisting on the acquisition of a fully developed United States aircraft in 1956.” DHH/DND, Foulkes Papers, 41.

¹¹¹ Dow, 95, quoting Fred Smye.

¹¹² McLin, 64-66.

During 1955 the RCAF selected the American Douglas Aircraft Company Sparrow II, a missile under development for the US Navy, as the armament for both the improved Canuck and the Arrow. However, in 1956, the US Navy - the sole US customer - announced that for budgetary reasons it would not procure the Sparrow II after the completion of its development programme. Despite the increased cost and effort, the RCAF and DDP effectively took over the programme.¹¹³ It also became apparent during 1955 that the American Hughes Aircraft Company, with whom the RCAF had contracted, was unwilling to develop an electronics system which could meet the RCAF's standards. Again in 1956, and despite further increased costs and effort, the RCAF and DDP opted to develop their own electronic system designated Astra I.¹¹⁴ Avro and Orenda repeatedly argued that the Astra and Sparrow II decision was "a bad one and said so in no uncertain terms,"¹¹⁵ but to no avail.

¹¹³ DHH/DND, CSC Report, 3-4, and Appendix A, Annex IV; DHH/DND, Foulkes Papers, 7, 11-13; and Smye, 69-70. At the 7 December 1955 Cabinet meeting, \$65 million had been approved for the Sparrow II programme until 1965. Canadair Limited was awarded the contract to produce the Sparrow II and other Canadian companies would be subcontractors. Originally, the NRC/CARDE Velvet Glove missile programme had been the anticipated armament for the Arrow but it was determined that the Sparrow II would be more effective. Velvet Glove was cancelled in 1954 after \$24 million had been spent. DHH/DND, Foulkes Papers, 7. See also Goodspeed; and Milberry and Pickler.

¹¹⁴ Hereinafter referred to as Astra. DHH/DND, CSC Report, Appendix A, Annex III; DHH/DND, Foulkes Papers, 7, 11-13; and Smye 68-69. An electronics system includes a radar fire control, navigation, communications, and flight control system. The Astra contract went to the American Radio Corporation of America (RCA), which had limited experience in the field, and there were also Canadian subcontractors. Astra would also allow the Arrow to carry the Douglas Aircraft Company MB-1 Genie missile, an unguided nuclear air-to-air missile. According to the CSC Report, at the 8 March 1955 Cabinet meeting, \$15 million was allowed for procurement of a US electronic system and \$5 million for its adaptation to the Arrow, but this is not recorded in the CC. DHH/DND, CSC Report, Appendix A.

¹¹⁵ Brown, "The Road to the Arrow," 122, quoting Air Marshal Wilfrid Curtis.

As the noted British aviation historian Bill Gunston lamented: "Time after time the history of military aircraft procurement has recorded a program that could have delivered 99% of the requirement within timescale and budget but which escalated away out of reach in a fruitless chase after the missing 1%."¹¹⁶ Within two years, one programme had expanded to four: the Arrow, the Iroquois, Astra, and Sparrow II. "From Avro's point of view," James Floyd later acknowledged, Astra and Sparrow II "added further risk to the already gigantic task of developing a new aircraft and engine at the same time."¹¹⁷ But the 1950s were "the golden age" of the RCAF: morale and *esprit de corps* were high, it was arguably the best-trained and best-equipped air force in the world, and it received almost fifty per cent of the defence budget and had more personnel than the army.¹¹⁸ The RCAF had, in air force parlance, "the right stuff,"¹¹⁹ and therefore it was bound and determined to have the finest

¹¹⁶ Gunston, 123. Avro personnel wryly suggested that Astra stood for "astronomically expensive." Gunston, 129.

¹¹⁷ Mellberg, "Too Good To Be True?," 54 Floyd, though not unsympathetic to the problems the Arrow programme faced, naturally in condemnatory of the government for its eventual decision to cancel. "The real problem of the cost of the Arrow was that the government of the day knew nothing about the cost or worth of high technology. Anyone who imagines that high technology runs cheap doesn't understand the subject." Mellberg, "Too Good To Be True?," 57.

¹¹⁸ On the RCAF during this postwar period, see Eayrs, *Peacemaking And Deterrence*; Larry Milberry, *Sixty Years. The RCAF and CF Air Command 1924-1984* (Toronto: CANAV Books, 1984); and Jeff Rankin-Lowe, "A Decade of Air Power. Royal Canadian Air Force 1950-1959: Part I and Part II" *Wings Of Fame. The Journal Of Classic Combat Aircraft*, 2 and 3 (1996): 142-157, 142-157

¹¹⁹ See Tom Wolfe, *The Right Stuff* (New York: Farrar, Straus, and Giroux, 1979), on the fighter pilot culture.

aircraft in the world, or, as Dan Middlemiss referred to the Arrow, “an all-singing, all-dancing, gold-plated fighter.”¹²⁰

In 1956 Simonds, now retired (his resignation as CGS in part prompted by the Arrow programme),¹²¹ publicly proclaimed what he had privately stated to the CSC. “‘Power without responsibility,’” Simonds wrote, “is the theme that permeates the whole Canadian organization for the higher direction and control of defense,” and the CSC in particular “is ‘packed’ to protect the government against the receipt of unpalatable advice, rather than

¹²⁰ Danford W. Middlemiss, “A Pattern of Cooperation: The Case of the Canadian-American Defence Production and Development Sharing Agreements, 1958-1963” (PhD diss: University of Toronto, 1975), 188.

¹²¹ Admittedly, Simonds had another axe to grind: he had always believed that he was more worthy of the post of Chairman, CSC, than Foulkes: “More realistic, much more political, Foulkes stayed on as Chairman of the Chiefs of Staff and took Canada into the North American Air Defence Command, masterminded the scrapping of the Avro Arrow, and led John Diefenbaker’s government into its politically fateful decision to accept nuclear weapons. He retired in 1960, more than two years before the controversy over the BOMARC blew up in Diefenbaker’s face and destroyed his government. The tortoise and hare analogy is not inappropriate for the race between Guy Simonds and Charles Foulkes. Simonds clearly outdistanced Foulkes in wartime, but Foulkes more than made up the ground and retained his lead in the postwar years. For all his undoubted military ability, Simonds lacked Foulkes’ political sense, and it was Foulkes, not Simonds, who became Canada’s most powerful military mandarin and the creator of the postwar Canadian armed forces.” J.L. Granatstein, *The Generals. The Canadian Army’s Senior Commanders In The Second World War* (Toronto: Stoddart Publishing Co. Limited, 1993), 177-178. See also Dominick Graham, *The Price of Command. A Biography of General Guy Simonds* (Toronto: Stoddart Publishing Co. Limited, 1993).

present the military case objectively and fearlessly on its merits.”¹²² He then took direct aim at the logic underlying the Arrow programme:

Distant early warning to secure Strategic Air Command against a surprise attack is militarily sound; the effort to build an effective defense based on the radar-controlled, winged, manned fighter, is not. An *adequate* [italics in original] defense that can reduce the effects of attack to bearable proportions is not attainable....It *may* [italics in original] be possible in the near future to produce a defense that would be effective against the ultimate winged bomber plane, but by the time this result can be achieved we shall be confronted with the new challenge of the intercontinental ballistic missile.

All our efforts in the field of research and development should NOW [emphasis in original] be directed to seeking an effective defense against the ballistic missile.¹²³

It would have been more sensible and economical to have adopted a fighter developed by the US or Britain as a gap-filler rather than embark on an expensive venture of our own, the product of which will have a very short life. The combined vested interests of the air force, the aircraft industry and defence research scientists, burning with zeal to participate in a project they could call their own, coupled with the known desire of ministers to maintain a defence effort with a strict manpower ceiling, swept aside any opposition to this venture.¹²⁴

Simonds concluded that “the incessant propaganda of air forces and a massive and powerful aircraft industry are leading the public and the political leadership along dangerous strategic

¹²² Lieutenant-General Guy Simonds, “Where We’ve Gone Wrong On Defense,” *Macleans*, 23 June 1956, 66. Simonds was not the only disgruntled general. See also Major-General W.H.S. Macklin, “The costly folly of our defense policy,” *Macleans*, 18 February 1956, 21-22, 50-56. Their attitudes reflected a missile-versus-manned aircraft debate which was raging within the American, British, Soviet, and other militaries at the time.

¹²³ Lieutenant-General Guy Simonds, “We’re wasting millions on an obsolete air force,” *Macleans*, 4 August 1956, 39.

¹²⁴ Simonds, “Where We’ve Gone Wrong On Defense,” 66. Simonds’ military instincts were sharp, but he also advocated conscription, proving that his political instincts were considerably duller.

paths.”¹²⁵ “In vain,” John Warnock wrote, “the Army generals in the West warned of the futility and waste of spending money to build a defence against bombers when the future threat would be missiles.”¹²⁶

Meanwhile, Howe mounted his own sales campaign with the UK. As the USAF had done earlier, in January 1956 the Royal Air Force (RAF) and the Royal Aeronautical Establishment (RAE) evaluated the Arrow programme. However, in a June 1956 letter, Sir Reginald Maulding, the British Minister of Supply, dashed the already slim hope of selling the Arrow to the UK:

As you have taken such a close and sympathetic personal interest in the possibility of our adopting the CF-105 for the RAF, I thought I should write and let you know that after very long and thorough consideration we have decided not to go ahead with the proposal.

The CF-105 is a most imaginative project. When I visited Malton last December I was very much impressed both by the exceptional quality of the organization that has been built up by Avro there. I therefore arranged straight away for a highly competent team of experts from London to visit Malton and report on the project in detail. Since then we have been studying its suitability for RAF purposes, but in the rather changing circumstances, and particularly in the present financial stringency, the conclusion we have finally reached was that the CF-105 is not really suitable for our purposes.

Roy Dobson has kept me in touch with the discussions he has had with you on this subject and I should like particularly to thank you for the very generous offer that you made to get over the financial difficulties involved. All my colleagues share this appreciation of your efforts to assist us.¹²⁷

¹²⁵ Simonds, “We’re wasting millions on an obsolete air force,” 38.

¹²⁶ Warnock, 128.

¹²⁷ NAC, Howe Papers, vol. 49, file 7, A.V. Roe Canada Limited, 1955-1956, Sir Reginald Maulding to C.D. Howe, 19 June 1956. See also DHH/DND, CSC Report, Appendix G, 2-4.

Thus by 1956 the Arrow programme had been studied by the US and the UK and, though each offered its encouragement of and expressed its admiration for the project, both clearly indicated they were not interested in purchasing the Arrow. Despite wishful thinking on the part of some within the RCAF, Avro, and Orenda, Canada's high level military and political leaders were, by 1956, under no delusions about foreign sales.

At the 603rd CSC meeting on 9 and 11 January 1957,¹²⁸ Slemon informed the CSC that the cost of the Arrow programme had again increased and that there had been further time slippage, delaying the Arrow's first flight until late 1957. However, only eight of the initial eleven Arrows would now be needed, and this would limit the cost increase to \$46.39 million for a total of \$216.79 million by 1958. He added that development was reaching the stage where the CDC had to decide whether to proceed with production. The CSC did not think that this decision could be taken before the next scheduled CDC meeting in September, but it agreed to seek authority at that time for the additional funds.¹²⁹

¹²⁸ DHH/DND, CSC, 11 January 1957, 4.

¹²⁹ At a Special Meeting of the CSC on 28 January 1957, held to review their submission to the CDC, Slemon moderated his stance on the Arrow somewhat, emphasizing that "it was no part of RCAF thinking that the CF-105 project must be continued simply because of the large expenditures already incurred. The decision to proceed with the aircraft must rest on its merits alone." DHH/DND, CSC, 28 January 1957, 3. Although not included in the submission, the overall cost of the thirty-seven Arrows was estimated to be \$500-\$600 million. DHH/DND, CSC Report, Appendix A.

At the 113th CDC meeting on 6 and 7 February 1957,¹³⁰ the CSC's submission was approved, and at the 17 February 1957, Cabinet meeting,¹³¹ it was recorded:

The CF-105 fighter and PS-13 (Iroquois) engine programmes had been reviewed and reports made on the stage reached. Technical progress had been satisfactory but development of the aircraft would take longer than had originally been thought, and would be more expensive. By March 31st, 1958, it was expected that an additional \$46.39 million would have been spent in addition to the amount previously authorized. The [CDC] was of the view that the programme should continue and recommended the development and procurement of eight aircraft.¹³²

The Liberal government would not discuss the Arrow programme again. However, it is clear that by 1957, the high-level consensus on the Arrow programme within the CSC and the CDC had begun to break down as the cost of the programme skyrocketed and the importance of missiles grew. However, it would have been politically inopportune for the St. Laurent government to end the project in 1957, an election year; that would have to await the anticipated Liberal election victory. But when Canadians went to the polls in June 1957, to everyone's surprise, including that of the Liberals and the Conservatives, the twenty-two year Liberal dynasty collapsed. A Conservative minority government was formed, and John George Diefenbaker became Prime Minister.

¹³⁰ NAC, CDC, 6 and 7 February 1957, 1-4, with reference to Minister's Memorandum, 30 January 1957, Cabinet Document D3-57.

¹³¹ NAC, CC, 17 February 1957, 6.

¹³² NAC, CC, 17 February 1957, 6.

CHAPTER THREE

There are really only two phases to a big military program: Too early to tell, and too late to stop. Program advocates like to keep bad news covered until they have spent so much money that they can advance the sunk-cost argument; that it's too late to cancel the program because we've spent too much already.¹

The Conservative Government of Prime Minister John Diefenbaker and the Avro Canada CF-105 Arrow Programme.

Prime Minister John George Diefenbaker and his MND, Major-General George Pearkes,² inherited three thorny defence problems from the Liberals: the NORAD agreement; a NATO request that the RCAF Air Division in Europe be re-assigned from air defence to nuclear strike-reconnaissance; and the air defence of Canada and the role of the Arrow programme in it.³ As John Treddenick wrote, "all of their choices - or non-choices - were

¹ Stevenson, 305.

² Pearkes had served as Conservative defence critic while in Opposition. Despite his army background, Pearkes viewed the RCAF as Canada's first line of defence and he supported the idea that the RCAF introduce advanced interceptors and surface-to-air missiles. Reginald Roy, *For Most Conspicuous Bravery: A Biography of Major General George R. Pearkes, V.C., Through Two World Wars* (Vancouver: University of British Columbia Press, 1977), 277-278.

³ DHH/DND, Foulkes Papers, 14. The newly elected Conservatives would not have been informed as to the deliberations of the Liberals as "it is an essential tradition that, on a change of Government, the minutes of meetings of the outgoing Cabinet are not made available to the Ministers forming the new Cabinet. In forming its appreciation of any inherited problem, a new ministry is therefore dependent upon whatever position papers departmental officials may prepare for their new Minister, and upon the judgement of individual Ministers and Privy Council advisers in bringing points before council meetings."

to turn out to be controversial; all involved unduly high political costs, leading to a serious erosion in the working relationships between government and the military, and ultimately, to the defeat of the government itself.”⁴ But it would be the Arrow programme in particular, as J.L. Granatstein remarked, that “caused the Diefenbaker government no end of heartache and no end of political unpleasantness.”⁵

The CSC was particularly anxious that the Conservative government approve the already negotiated NORAD agreement as soon as possible because it feared a deterioration in Canada-US relations if it was not. However, as General Charles Foulkes, Chairman of the CSC, would later comment, the new government:

particularly the Prime Minister, was allergic to the procedures used by the previous administration. It would appear that it suspected senior officials, many of whom had served the Liberal administration for a number of years, of being out of sympathy with the new regime. Consequently, there was a tendency to avoid the usual methods and procedures for dealing with defence matters. In fact it was some time before the Prime Minister would agree to set up a Cabinet Defence Committee. Although the Committee was eventually set up, the Prime Minister continued to display a lack of enthusiasm for discussing problems with the Chiefs of Staff, even though, as at times became quite obvious, their defence implications were not fully understood. Political aspects were given much higher priority. The impression remained that the Prime Minister preferred to work out his own solution and, without seeking military advice from the Chiefs of Staff, to take it straight to Cabinet.⁶

Patrick Nicholson, *Vision and Indecision* (Don Mills: Longmans Canada Limited, 1968), 198-199.

⁴ Treddenick, 431.

⁵ Granatstein, *Canada 1957-1967*, 105.

⁶ DHH/DND, Foulkes Papers, 16-17. Foulkes’ opinion of the Conservatives was not shared by every officer. “The changeover from a Liberal to a Conservative government in mid-1957 resulted in no alterations to our defence policy or our commitments under that

Diefenbaker's initial lack of enthusiasm for constituting a CDC was confirmed by Pearkes: "Diefenbaker didn't want these committee meetings....He didn't want to discuss in front of the Chiefs of Staff all the various problems. He hated talking in front of generals and he had never been a strong committee man."⁷

Under these circumstances, in July 1957, Foulkes (who coincidentally served under Pearkes during the Second World War), brought the CSC's recommendation on the NORAD agreement straight to Pearkes who in turn took it directly to Diefenbaker. Acting solely on Pearkes' recommendation and without consulting the Department of External Affairs (DEA) or Cabinet, Diefenbaker approved the NORAD agreement.⁸ As Foulkes later admitted in testimony before the House of Commons Special Committee on Defence: "I am afraid that we stampeded the incoming government with the NORAD agreement, and as it had a very rough passage in the House, the administration was very chary at taking on some of the other tough military problems."⁹

Diefenbaker had casually committed Canada not only to joint planning for continental defence with the US but also to a joint command, and, consequently, to the supranational integration of the RCAF and the USAF ADCs. An American would command NORAD,

policy. However, it did involve a considerable amount of extra work in briefing the new Minister on details." Graham, 236.

⁷ Roy, 340-341.

⁸ Diefenbaker was also serving as SSEA. DHH/DND, Foulkes Papers, 14; and Jockel, 104-106. See also John Meisel, "Guns And Butter: Foreign Affairs In Canada's Twenty-Third Parliament," *International Journal* XIII (Summer 1958): 184-203.

⁹ Sauvé Committee, No. 15 (22 October 1963), 510.

while a Canadian would serve as deputy commander, the first of whom was Air Marshal Roy Slemon (1957-1964). In reality, this merely formalized a situation that had existed for years and which the RCAF and the CSC had long advocated.¹⁰ This was not a surprising state of affairs given that the respective civil and military authorities in both countries viewed the national security of Canada and the US as virtually inseparable.¹¹ Consequently, as Joseph Jockel observed:

The two air forces had every reason to co-operate. They were faced with a common military threat. As airmen, they shared an outlook which created a similar identity and even an emotional bond. They were interested in convincing civilians of the danger to the continent. Both the RCAF and the USAF were locked in struggles with their sister services for defence funds. Finally, for the RCAF, the USAF was a source of funding for radar stations and a source of pressure on Ottawa to recognize the importance of air defence.¹²

Thus "junior partnership," as David Cox confirmed, "operationally speaking, was an extraordinarily valuable status that the RCAF was zealously committed to maintaining."¹³

Nevertheless, a storm of criticism over the hasty manner of the approval of the NORAD agreement (rather than the agreement itself) erupted in the House of Commons. Diefenbaker's response, stated Jon McLin, was "an early example of a Diefenbaker trait which was to show itself on later occasions: he found it easier and/or more congenial to

¹⁰ See J.L. Granatstein, "The American Influence On The Canadian Military, 1939-1963," *Canadian Military History* 2 (Spring 1993): 69-70, also in *Canada's Defence. Perspectives On Policy In The Twentieth Century*, ed. B.D. Hunt and R.G. Haycock (Toronto: Copp Clark Pitman Ltd., 1993), 129-139.

¹¹ Cox, 22; and Richter, 2-3.

¹² Jockel, *No Boundaries Upstairs*, 56.

¹³ Cox, 22.

attack the former government or the Opposition than to explain what his own government was doing.”¹⁴ But this unanticipated and unwelcome political backlash had one lasting effect: it accentuated the Diefenbaker’s intensely partisan suspicion of the “Pearsonalities”¹⁵ - those who had served the previous Liberal governments. Unfortunately for the Arrow programme, counted amongst the “Pearsonalities” were the members of the CSC¹⁶ and the management at A.V. Roe whose corporate ranks included former CAS Air Marshal Wilf Curtis and former Air Vice-Marshal John Plant.¹⁷ Donald Fleming, Minister of Finance and

¹⁴ McLin, 47-48.

¹⁵ Foulkes, 16; and John F. Hilliker, “The Politicians and the ‘Pearsonalities’: The Diefenbaker Government and the Conduct of Canada’s External Relations,” in *Historical Papers/Communications Historiques* (1984):151-167, also in *Canadian Foreign Policy. Historical Readings*, rev. ed., ed. J.L. Granatstein (Toronto: Copp Clark Pitman Ltd., 1993), 223. See also John Hilliker and Donald Barry, *Canada’s Department of External Affairs. Volume II. Coming of Age, 1946-1968* (Montreal and Kingston: McGill-Queen’s University Press, 1995). Of course, as Diefenbaker later pointed out, Foulkes’ “admiration for the St. Laurent government was obvious and may explain his decision, following his retirement, to contest a Liberal Party nomination.” John G. Diefenbaker, *One Canada Memoirs of the Right Honourable John G. Diefenbaker. The Tumultuous Years. 1962-1967*, vol. 3 (Toronto: Macmillan of Canada Limited, 1977), 17.

¹⁶ “One of [Diefenbaker’s] favourite targets was Air Marshal Hugh Campbell....During one cabinet session which I was asked to attend Diefenbaker attacked Campbell so viciously [the MND] finally intervened and said that this kind of abuse of a senior air officer was unacceptable.” Ignatieff, 187.

¹⁷ Roy, 324. “Air Marshal Curtis who was the innovator and principal proponent of the Arrow program, retired in 1953 as Chief of the RCAF and immediately went to work for Avro as Vice-President (I always questioned, in my mind, the propriety of this action).” Graham, 237. Avro, however, knew why he had been hired: “Curtis had built the post-war air force. He had fought tooth and nail for the lion’s share of the defence budget...Those donkeys in the Chiefs of Staff Committee were anti-air force and were all former colleagues of Pearkes. Curtis had ridden all over them.” Stewart, 181, quoting Fred Smye.

Chairman of the Treasury Board (1957-1962), later confirmed this hostility on the part of Diefenbaker toward the military:

I saw these officers [of the CSC] frequently, and never had the slightest reason to doubt their fitness for the high positions they held. I never understood why, but Diefenbaker in his dealings with these senior officers in the Defence Committee meetings and outside always acted as though he had a chip on his shoulder. In my opinion, they showed him proper respect; equally, in my opinion, he did not show them proper respect, and this I regarded as unnecessary and lamentable.¹⁸

However, Foulkes' opinion of the organizational abilities of the Conservative government was perhaps too harsh: differences between the Liberals and the Conservatives were, at least initially, more about style than substance. The influence the CSC enjoyed through the MND throughout 1957-1958 continued more or less unabated, albeit in an atmosphere of political mistrust and administrative inexperience on the part of the government. But Patrick Kyba later confirmed the existence of a Cabinet which was destined to become more and more hobbled by an environment of consensus decision-making:

there is a great deal of evidence to indicate that Diefenbaker did not have firm opinions on everything he wanted his government to do, and that he was

¹⁸ Donald M. Fleming, *So Very Near. The Political Memoirs Of The Honourable Donald M. Fleming. The Rising Years* (Toronto: McClelland and Stewart Limited, 1985), 414. Unfortunately, the memoirs of other Conservative ministers and insiders are less than informative. See the following works for brief mentions of the Arrow programme: Ellen Louks Fairclough, *Saturday's Child: Memoirs of Canada's First Female Cabinet Minister* (Toronto: University of Toronto Press, 1995); Heath Macquarrie, *Red Tory Blues. A Political Memoir* (Toronto: University of Toronto Press, 1992); Erik Nielsen, *The House Is Not A Home* (Toronto: University of Toronto Press, 1989); Pierre Sevigny, *This Game Of Politics* (Toronto: McClelland and Stewart, 1965); Dick Spencer, *Trumpets and Drums. John Diefenbaker on the Campaign Trail* (Vancouver, Greystone Books, 1994); and David Jones Walker, *Fun Along The Way: Memoirs of David Walker* (Toronto: Robertson Press, 1987).

prepared to accept the guidance of his colleagues on many matters. The documents for the period show items of all sorts recurring on the cabinet agenda month after month, referrals of the most important issues to standing or special committees of cabinet, and deferrals of many decisions until after further deliberation. The record also indicates that the prime minister seldom tried to impose his views on cabinet and that decisions on most matters of import were made by the entire cabinet, almost always after study by and recommendation from a committee or subcommittee of cabinet. The process should have worked better than it did. The use of small committees to investigate issues and report back to cabinet should have provided the information and direction required to make decisions quickly and efficiently. However, as witnessed by the long delays over the Avro Arrow, the BOMARC...and many other important questions, this simple did not occur.¹⁹

The Conservative government first discussed the Arrow at the 115th CDC meeting on 19 September 1957.²⁰ There was one theme to this meeting: "Pearkes recommended that consideration be given to all areas where economies were possible so that progress could be made in preparing defence estimates for the next fiscal year."²¹ The Arrow programme was not scheduled for review until the next month, but the improved Canuck and the eleven existing auxiliary squadrons did not escape the CDC's attention. The improved Canuck could not enter service before the Arrow was deployed because the Sparrow II programme was behind schedule. Therefore, the CDC recommended the cancellation of the improved

¹⁹ Patrick Kyba, *Alvin: A Biography of the Honourable Alvin Hamilton, P.C.* (Regina: Canadian Plains Research Centre, 1989), 201.

²⁰ NAC, CDC, 19 September 1957, 1-8, with reference to Minister's Memorandum, 18 September 1957, Cabinet Document D12-57

²¹ NAC, CDC, 19 September 1957, 6. Pearkes added that "having in mind the order of magnitude of the defence budget that might be available for the next few years, he had grave doubts whether these previously announced commitments could be met and Canadian forces continue to be equipped with modern weapons." NAC, CDC, 20 September 1957, 3. See also Treddenick.

Canuck, an action which the CSC described as calculated risk. At the 20 September 1957²² Cabinet meeting, the CDC's recommendations were approved.

The issue of the auxiliary squadrons requires further explanation. By 1955, the RCAF had determined that interceptors such as the Canuck and the Arrow were too technologically advanced for the auxiliary squadrons to operate. A joint RCAF-USAF ADC plan recommended disbanding the auxiliary squadrons and expanding to eighteen regular squadrons and bases. The CSC, however, thought fifteen regular squadrons and bases were sufficient, of which several could be equipped with BOMARC, all to be funded within the anticipated defence budget. The plan was predicated, however, on a cost-shared extension northward of the existing American ground environment,²³ requiring additional heavy radars, gap filler radars, and related command, control, communication, and intelligence (C3I)

²² NAC, CC, 20 September 1957, 1-6. However, even though the Mark VI version (as the improved Canuck was designated) was cancelled, it was still necessary to order thirty-five additional Mark V versions for the RCAF to meet operational requirements until the Arrow was deployed.

²³ A ground environment is an electronic system which controls interceptors and missiles.

facilities. The CDC considered the plan at the 109th CDC meeting on 9 April 1956²⁴ and the 110th CDC meeting on 13 June 1956,²⁵ whereupon it was approved in principle.

However, at the CDC meeting in February 1957, Slemon reported that the US could not participate because of financial and manpower limitations. The plan was shelved, but the disbanding of the auxiliary squadrons would proceed. This was confirmed at the September CDC and Cabinet meetings. The impact of this decision on the Arrow programme was immediate: the number of Arrows required had dropped from an original estimate of a minimum of 500-600 to a maximum requirement of approximately 169 in nine regular squadrons at five existing bases. Due to economies of scale, as the number of Arrows required dropped the per unit cost of production rose, and, with the cancellation of the improved Canuck, the costs of the Sparrow II programme were now be charged entirely against the Arrow programme.²⁶

²⁴ NAC, CDC, 19 April 1956, 1-2. The RCAF originally stated a minimum requirement for twenty-one squadrons and bases, but Slemon "recognized that even this minimum requirement of the air defence system might be beyond the capabilities of Canada. As practically every element of air defence in Canada was a direct contribution to the air defence of the United States, there are good arguments in favour of sharing the cost, and there was reason to believe the United States authorities would continue to share this view." The CSC tended to downplay the fact that the US air defence bases in Alaska and Greenland contributed likewise to the air defence of Canada. The CSC considered this plan at the CSC meeting on 1 November 1955, and the amended version was part of Slemon's briefing to the CDC meeting on 8 November 1955.

²⁵ NAC, CDC, 13 June 1956, 1-2, with reference to Minister's Memorandum, 16 April 1956, Cabinet Document D2-56. There is no record of the plan coming before Cabinet, possibly because it was only approved in principle.

²⁶ DHH/DND, CSC, 6 and 7 February 1957, 1-2.

On 4 October 1957, Pearkes unveiled the first Arrow prototype, "a symbol of a new era for Canada in the air,"²⁷ at a roll-out ceremony in Malton. His speech to the gathered crowd must have sounded reassuring to the RCAF, Avro, and Orenda:

Much has been said of late about the coming missile age and there have been suggestions from well-intentioned people that the era of the manned aeroplane is over and that we should not be wasting our time and energy producing an aircraft of the performance, complexity, and cost of the Avro Arrow. They suggest that we should put our faith in missiles and launch straight into the era of push-button war. I do not feel that missiles and manned aircraft have, as yet, reached the point where they should be considered as competitive. They will, in fact, become complementary. Each can do things which the other cannot do, and for some years both will be required in the inventory of any nation seeking to maintain an adequate "deterrent" to war. However, the aircraft has this one great advantage over the missile. It can bring the judgement of a man into the battle and closer to the target where human judgement, combined with the technology of the aircraft, will provide the most sophisticated and effective defence that human ingenuity can devise.²⁸

As if to emphasize the opposing point of view, on the same day as the roll-out the Soviet Union launched *Sputnik* into orbit. A complacent West reacted with shock and disbelief and, symbolically, *Sputnik* drove the Arrow programme from the headlines. If the Soviets had the capability to launch a satellite into orbit, they could also launch an ICBM at targets in the West. Overnight fears of a "missile gap" between the West and the Soviets replaced fears of a "bomber gap," and the Central Intelligence Agency's National Intelligence Estimates (NIE) began to confirm that the Soviet bomber threat was indeed diminishing

²⁷ NAC, DND, vol. 20054, file Arrow 2, DND Public Relations File, "Address by the Hon. George R. Pearkes, VC, Minister of National Defence, Avro Arrow Roll Out Ceremony, Avro Aircraft Ltd., Malton, Ontario," 4 October 1957, 5.

²⁸ NAC, DND, vol. 20054, file Arrow 2, DND Public Relations File, "Address by the Hon. George R. Pearkes, VC, Minister of National Defence, Avro Arrow Roll Out Ceremony, Avro Aircraft Ltd., Malton, Ontario," 4 October 1957, 3-4.

rapidly.²⁹ In response, the strategic rationale behind Western defence policy shifted from an emphasis on defence to deterrence.

Though there would never be any doubt that the Arrow and the Iroquois were state-of-the-art, from this point on the RCAF faced increasing criticism from those who believed, as Simonds had earlier declared, that manned aircraft would soon be rendered obsolete. Duncan Sandys, the British Minister of Defence,³⁰ had not aided the RCAF's case any when he released an influential UK White Paper supporting this viewpoint.³¹ In the Soviet Union,

²⁹ NIEs were largely based on American Lockheed California Company U-2 spyplane overflights of the Soviet Union. See Donald P. Steury, ed., *Intentions And Capabilities Estimates On Soviet Strategic Forces, 1950-1983* (Washington: Centre For The Study Of Intelligence, Central Intelligence Agency, 1996); and DHH/DND, 73/1223, series 1, file 10, "Air Defence Requirements, 11/30/55-07/29/58, "Estimates of Soviet Threat to North America from Aircraft and Missiles," 20 August 1958.

³⁰ Sandys wholehearted embrace of the missile over the manned aircraft can be traced to his wartime experience with the "Crossbow" Committee. Sandys was Parliamentary Secretary to the Minister of Supply when he was charged by Prime Minister Winston Churchill in April 1942 with chairing the Committee. The Committee's mandate was to investigate all available intelligence on the German V-1 and V-2 rocket programmes and to devise countermeasures against attack by such rockets. The memory of the RAF's inability to defend against the V-2s which rained down on London until their launch sites were overrun in 1944 exerted a heavy influence on Sandys when he became Minister of Defence - much to the detriment of the British aircraft industry. See Dieter Hölsken, *V-Missiles Of The Third Reich. The V-1 And V-2* (Sturbridge: Monogram Aviation Publications, 1994).

³¹ *Defence: Outline of Future Policy*, Cmnd. 124 (April 1957). In 1957, the USAF announced that "as readily as missiles become operationally suitable, they will be placed into units either to completely or partially substitute for manned aircraft according to military requirements." G. R. Simonson, "Missiles and Creative Destruction in the American Aircraft Industry, 1956-1961," in *The History of the American Aircraft Industry. An Anthology*, ed. G.R. Simonson (Cambridge: The MIT Press, 1968), 229, quoting USAF, "The Guided Missile," *The Air Reservist* IX (December 1957), 4.

Premier Nikita Khrushchev made a similar pronouncement about the manned bomber.³² Though rumours of the death of both the manned bomber and the manned fighter proved to be somewhat exaggerated, such was the prevailing contemporary opinion. "All over the capitalist world," Robert Bothwell, Ian Drummond, and John English wrote, "the smaller airframe makers and the 'national' airframe industries were in trouble"³³ as the US, UK, and other NATO countries cancelled aircraft programmes and the aircraft manufacturers that could shifted their resources into missiles. This is a situation that American economist Joseph Schumpeter termed "creative destruction."³⁴

Incredibly, five years after development began, in October 1957 the RCAF finally set up a special project office to monitor and coordinate all aspects of the Arrow programme. Prior to this event, there had been no single body overseeing the project. As the head of the special project office, Group Captain Ray Footitt, Assistant for the Arrow Weapons System, later stated:

³² Cox, 13. "It is now generally accepted that the Soviet long-range bomber force was maintained as a hedge against failure of the ballistic missile program and that, for both political and strategic reasons, Khrushchev chose to downgrade the role of the bomber, an area where the Soviets were much inferior to the Americans, and to emphasize missile development, in which, at least for negotiating purposes, the Kremlin could claim to be technologically more advanced." Cox, 13.

³³ Robert Bothwell, Ian Drummond, and John English, *Canada since 1945: Power, Politics, and Provincialism* (Toronto: University of Toronto Press, 1981), 244.

³⁴ Schumpeter's definition of the term was that "the 'creation' of a new and superior product may form the basis for growth and success of the business involved in its production and sale, while at the same time 'destroying' in part or totally those businesses whose products have been surpassed." Simonson, 228, quoting Joseph A. Schumpeter, *Capitalism, Socialism, and Democracy*, 3d ed. (New York: Harper & Row, 1950), 84.

Until they set up the Arrow weapon system office, costing was done by somebody in somebody's else's place, equipment was purchased someplace else, contracts were all let separately...these things were all being done by all kinds of people in the government, it was never co-ordinated. Now, one lesson that came out of the Second World War was that you had to have project management. Project management is now something everybody knows and everybody does but within the air force in the early days it was parcelled out in different directorates and with different people doing different things.³⁵

At the 613th CSC meeting on 24 and 25 October 1957,³⁶ the new CAS, Air Marshal Hugh Campbell (1957-1962), recommended that the twenty-nine remaining Arrows be ordered and that the Sparrow II programme continue. Despite doubts, Foulkes concurred, adding that every effort should now be made to speed up the much delayed project, otherwise "a great deal of money was being spent on an aircraft and its associated missile system and ground environment which could be outmoded before it became fully operational."³⁷ However, Lieutenant-General Howard Graham, CGS, and Vice-Admiral Harry DeWolf, CNS (1956-1960), wanted the RCAF and the DRB to conduct a study of the Soviet threat, the RCAF's and NORAD's air defence programme and their impact on anticipated defence budgets, and any air defence alternatives. Foulkes replied that the CSC did not have the time

³⁵ Dow, 114-115. In 1952, as a Wing Commander, Footitt had headed the All-Weather Interceptor Requirements Team.

³⁶ DHH/DND, CSC, 24-25 October 1957, 3-5. The submission was scheduled to be reviewed one more time at a Special Meeting of the CSC on 29 October 1957. However, as there are no records for this meeting, it may not have taken place. The submission now estimated the overall cost of completing the thirty-seven Arrows to be \$646 million. DHH/DND, CSC Report, Appendix A.

³⁷ DHH/DND, CSC, 24-25 October 1957, 4.

to undertake such a study. The CSA and the CNS acquiesced, and the CSC agreed to seek authority to continue the Arrow and Sparrow II programmes.

In an unusual turn of events, the CSC's recommendation appears to have gone directly to Cabinet as there is no record of a CDC meeting. Cabinet, in the meantime, had been dealing with the fallout from its previous decision at meetings on 24 and 25 October 1957.³⁸ At the latter meeting, Pearkes reported that he, Fleming, Raymond O'Hurley, the Minister of Defence Production (1957-1963), and the Minister of Transport had met with Avro and Orenda management who had informed the ministers that 3000 employees (out of almost 15 000)³⁹ would be layed-off over the next six months, of which about one-third were the result of the cancellation of the improved Canuck. Furthermore, Avro and Orenda "declared that they were almost entirely dependent on defence contracts for their operation. They were waiting for a decision with respect to the CF-105. If this programme were also cancelled, both companies would have to go into liquidation."⁴⁰ Cabinet was worried about the political repercussions of such unemployment being attributed to the government's actions, especially since they were a minority government and "the three Conservative Members of Parliament involved had been elected on a programme that there would be no

³⁸ NAC, CC, 24 October 1957, 4-6; and NAC, CC, 25 October 1957, 2-4.

³⁹ Pearkes also reported to Cabinet that subcontractors would also lay-off additional workers.

⁴⁰ NAC, CC, 25 October 1957, 2-3.

lay-offs.”⁴¹ The Minister of Labour in particular thought the companies’ attitude was “vindictive.”⁴²

At the Cabinet meeting on 29 October 1957,⁴³ Cabinet approved Pearkes’ solution. The Arrow programme would continue until 1959 at a cost of \$172 612 000, in addition to the \$226 260 000 which would be spent by 1958. As well as the twenty-nine remaining Arrows, twenty extra Canucks were ordered, the Iroquois programme accelerated, and additional work transferred to Avro and Orenda from other divisions of A.V. Roe and Hawker-Siddeley. This reduced the lay-offs to 1525, largely handled through attrition.⁴⁴ It was as much a political decision by Cabinet as a military one by the CSC, and “a tremendous gamble. \$400 million would have been spent before it was known if the aircraft could be put in the RCAF. However, there was no time to study and weigh the programme in its entirety. Meanwhile, the situation could be closely watched and the programme stopped if necessary.”⁴⁵

⁴¹ NAC, CC, 24 October 1957, 5.

⁴² NAC, CC, 24 October 1957, 4.

⁴³ NAC, CC, 29 October 1957, 10-12, with reference to a Memorandum, unsigned, undated, undocumented.

⁴⁴ As the RCAF had no operational requirement for another twenty Canucks, Cabinet suggested that they be given to a NATO ally. They were not. The non-Arrow related work for Avro and Orenda cost the RCAF \$21.55 million over the next two years. At the 25 October 1957 meeting a minister had pointed out “that in some parts of the country an expenditure of \$25 million to save the seats of three Members of Parliament and the jobs of 2000-3000 persons would be considered out of all proportion.” NAC, CC, 24 October 1957, 4.

⁴⁵ NAC, CC, 29 October 1957, 11.

Avro and Orenda had skilfully used their strong bargaining position to their advantage. As Denis Smith stated: "This was expensive damage control. Above all, it indicated to A.V. Roe that the Diefenbaker government was politically sensitive and that it capitulated easily under pressure."⁴⁶ However, Smith also noted that while Avro and Orenda may have been reassured, Pearkes was not:

I am having a study made of the nature of the threat. Present indications are that it is quite possible we may have to make radical changes. For instance, it is not at all clear that we need to proceed with the construction of the CF-105. If next summer we have to cancel development of this aircraft, the aircraft industry at the Avro plant will be seriously dislocated with possible large-scale layoffs of personnel. This would of course affect our Members who represent constituencies in that area.⁴⁷

In January 1958, an interesting meeting occurred between Norman Robertson, Canadian Ambassador to the US, who had been engaged in a desperate campaign to interest the Americans in the Arrow, and senior American officials, who proved to be more than sympathetic to Canada's defence conundrums. Robertson opened the meeting by mentioning that the ultimate fate of the Arrow programme was linked to the joint Canada-US evaluation of the Soviet bomber threat, the rate of development of newer and superseding weapons, and the question as to "whether it made sense for us to commit such a major portion of our resources and money to a weapons system which would become virtually obsolescent by the time it was operational."⁴⁸ In response, James Douglas, the US Secretary of the Air Force,

⁴⁶ Smith, 293.

⁴⁷ Smith, 309.

⁴⁸ DHH/DND, CSC Report, Appendix G, Annex I, 1. See also J.L. Granatstein, *A Man of Influence. Norman A. Robertson and Canadian Statecraft 1929-1968* (Toronto: Deneau Publishers & Company, Ltd., 1981) 318-320; and Granatstein, "The myth of the

reiterated that the US would like to see the Arrow deployed by the RCAF's NORAD squadrons, perhaps in even greater strength than anticipated. But he quickly added that there was no place for the Arrow within the USAF as the US had comparable interceptors in their inventory. Douglas added that the USAF was going ahead with its F-108, an aircraft interceptor even more advanced than the Arrow, the cost of which made the latter "look like something which might be picked up in a department store"⁴⁹

However, Douglas then suggested that the US could possibly purchase several squadrons worth of Arrows and give them to the RCAF for NORAD deployment. It was hypothesized that this might be accomplished through NORAD indicating an essential requirement for more RCAF squadrons than those presently planned. The Arrows to equip these extra RCAF squadrons could then be purchased outright by the US or swapped in exchange for Canada undertaking to finance other NORAD installations such as Strategic Air Command (SAC) refuelling bases. Despite the fact that Canada had and would continue to insist upon similar cost-sharing arrangements for the purpose of continental defence, this intriguing proposal was immediately rejected by Robertson as being politically unacceptable

broken Arrow;" D2.

⁴⁹ DHH/DND, CSC Report, Appendix G, Annex I, 1. The North American Aviation F-108 Rapier would be cancelled in September 1959 for much the same reasons as the Arrow programme. For a comparison of the F-108 and the Arrow, see Bill Gunston, *Fighters of the Fifties* (Cambridge: Patrick Stephens Limited, 1981), 18-21, 178-179. Ironically, the F-108 would help kill the Arrow programme because Pearkes could point to its future role in the defence of North America: "The US 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 US decision would strengthen the government's position in abandoning the CF-105." NAC, CC, 22 December 1958, 7.

because "this would pose certain problems against the background of Canada having remained aloof from Lend Lease and from the acceptance of aid from the US or any other country."⁵⁰ He added that Canada wanted to participate in the common defence as a participant, not a beneficiary. Thus this generous American offer was pursued no further, no doubt in part due to another unstated reason: a few extra squadrons worth of Arrows would not result in a production run sufficient to substantially reduce costs.

On 25 March 1958, the Arrow finally took its first flight, proving its airworthiness (though hundreds of hours of testing and evaluation were still required). Six days later voters returned the Diefenbaker government to office with the largest electoral mandate in Canadian history. Shortly thereafter, the established pattern of decision-making behaviour between the military and their Liberal and Conservative political masters which had existed since the Arrow programme was initiated began to fall apart, and the CSC would never again enjoy such influence over the CDC and the Cabinet. The breakdown would commence at the 623rd CSC meeting on 10 June 1958,⁵¹ when Campbell informed the CSC that, to ensure project continuity, work on the thirty-seven preproduction Arrows should continue and production initiated before the end of 1958. The CSC agreed to seek such authority from the CDC, but before this could be done the CGS, who had been absent from the meeting, intervened. In a July letter to Foulkes, Graham complained that no action had ever been taken on his requests for a study of the air defence programme in general and the Arrow programme in particular:

⁵⁰ DHH/DND, CSC Report, Appendix G, Annex I, 2.

⁵¹ DHH/DND, CSC, 10 June 1958, 6.

I am convinced that it would be a grave mistake to continue the development of the CF-105 and I again urge that a tri-service group be set up at once, probably under the chairmanship of a representative of the Defence Research Board, to examine alternative plans for our contribution to the air defence of North America. My reason for urging that all three services and DRB be included is because, first, each could make a valuable contribution to such a study and, secondly, because I believe that if one service (no matter which) assumes the responsibility, there will be a natural tendency to be biased toward the weapon with which they are most familiar.⁵²

Graham's letter proved to be a catalyst for opposition to the Arrow programme within the CSC. An ad hoc committee was immediately formed, and it tabled its review at a Special meeting of the CSC on 15 July 1958.⁵³ The CGS, CNS, and Chairman of the CSC concluded from the review that if the Arrow programme proceeded as envisaged by the RCAF there would not be sufficient funds to acquire new frigates for the RCN or new armoured vehicles and surface-to-surface tactical nuclear missiles for the army. Furthermore, the CAS was now concerned that its estimated defence allocations would be inadequate to re-equip the NATO Air Division for the nuclear strike-reconnaissance role and build NORAD BOMARC bases if the Arrow programme continued. The CSC's consensus on the project collapsed in the face of this inter-service - and intra-service, in the case of the RCAF's NATO and NORAD officers - rivalry.⁵⁴

⁵² DHH/DND, series 1, file 10, Air Defence Requirements, 11/30/55-07/29/58, Lieutenant-General H.D. Graham to the Chairman, CSC, CNS, CAS, the Chairman, DRB, and the DM, DND, 4 July 1958.

⁵³ DHH/DND, CSC, 15 July 1958, 1-5. The CSC considered Graham's letter and formed the ad hoc committee at a Special meeting of the CSC on 8 July 1958. The committee was chaired by a brigadier-general and each service and the DRB appointed two other members of equivalent rank.

⁵⁴ DHH/DND, Foulkes Papers, 20; and Roy 314-315, 321-322. As Pearkes recalled, "many [RCAF] officers would like to have seen the Arrow developed. On the other hand,

The CSC was clearly divided over the Arrow programme, and at this Special meeting it was agreed to present Pearkes with a number of alternative air defence programmes outlining the military, financial, and even political advantages and disadvantages of cancelling the Arrow programme or proceeding with it (with or without the Astra and Sparrow II programmes) in quantities of thirty-seven, sixty, or 169. Foulkes later wrote that “in order to cover up dissension”⁵⁵ between the CAS and the rest of the CSC, no recommendation was made as to which was the preferred alternative. But even if it was not explicitly stated, it was implicit that cancellation was favoured course of action. After considerable discussion between Pearkes and the CSC over the next month, both agreed that the cost of the Arrow programme was too high. Pearkes would recommend the cancellation of the project to the CDC even though, as Foulkes later acknowledged, he and the CSC knew that this was “a very bitter pill for the government to swallow.”⁵⁶

In the face of such a consensus between the other members of the CSC and Pearkes, the CAS finally acquiesced. However, the reason for Campbell’s initial dissension was made clear in an August 1958 letter from Campbell to Pearkes: RCAF reluctance to support abandonment of the project stemmed not from any unflinching commitment to the Arrow programme but rather from the RCAF’s concern that the need for an alternative interceptor -

there were others who felt as I did...that perhaps we should concentrate more on missiles.” Roy, 321.

⁵⁵ DHH/DND, Foulkes Papers, 27.

⁵⁶ DHH/DND, Foulkes Papers, 21.

as opposed to alternatives to interceptors - be accepted and explicitly stated by the government:

It is clearly not my responsibility to comment on the Budget or its size. 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....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....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.⁵⁷

The RCAF would not do itself any favours, however, when Slemon subsequently publicly reaffirmed this operational requirement for interceptors like the Arrow from his post as Deputy Commander of NORAD. Diefenbaker was "shocked"⁵⁸ when this occurred, adding:

It was not a question of whether Slemon's remarks have 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.⁵⁹

⁵⁷ DHH/DND, 73/1233, series 1, file 11, Air Defence Requirements, 31/07/58-30/09/58, Air Marshal Hugh Campbell to Major-General George Pearkes, 21 August 1958, 2. For a summary of the CSC point of view, see DHH/DND, 73/1233, series 1, file 11, Air Defence Requirements, 31/07/58-30/09/58, General Charles Foulkes, "Aide Memoire for the Minister. Advantages and Disadvantages of Continuing Production of the CF-105," 25 August 1958.

⁵⁸ NAC, CC, 22 December 1958, 7.

⁵⁹ NAC, CC, 22 December 1958, 7.

At the 120th CDC meeting on 15 August 1958,⁶⁰ Pearkes outlined the various scenarios the CSC had examined:

The present programme, which called for the re-equipping of the nine RCAF all-weather squadrons in Canada with CF-105 aircraft, presented a requirement, with training and backup, for a production order of 169 CF-105 aircraft at a forecast total expenditure of over two billion dollars during the period 1959-1960 to 1963-1964. In consideration of the heavy costs of this programme, and of the need for making provision for such future requirements as defence against inter-continental ballistic missiles, the Chiefs of Staff had given consideration to several alternative plans. They had advised that production of 60 CF-105 aircraft for the equipping of five squadrons was unacceptable because the costs per aircraft for this smaller number would be increased to \$9 or \$10 millions, not including amortization of development and preproduction costs. Consideration had also been given to the hope that a return could be obtained from the funds already spent on the project, but this plan was considered unacceptable because even at a cost of about \$475 millions not enough aircraft would be provided to form and maintain one effective operational squadron.⁶¹

Pearkes then stated that he and the CSC agreed that the only feasible course of action left was to cancel the Arrow programme in favour of an alternative American interceptor and to begin negotiations with the US to site two of its projected chain of BOMARC bases in Canada along with its complementary Semi-Automatic Ground Environment (SAGE) C3I system,⁶² and additional heavy and gap-filler radars, all cost-shared with the US. It was explained that such negotiations would necessarily also include an arrangement whereby the US would

⁶⁰ NAC, CDC, 15 August 1958, with reference to Minister's Memorandum, 8 August 1958, Cabinet Document D9-58.

⁶¹ NAC, CDC, 15 August 1958, 3.

⁶² "Force multipliers [such as SAGE] were necessary, as it became obvious that the services were never going to get the kind of forces it would take to thoroughly defend North America, at least not in peacetime. But SAGE allowed American air defenders to maximize what resources were available." James D. Crabtree, *On Air Defense* (Westport: Praeger Publishers, 1994), 125.

supply nuclear weapons for the BOMARCs and the interceptors. Pearkes added that the decision to recommend cancellation had been influenced by a number of factors: the heavy financial burden of the project; the rapid Soviet shift of resources from bombers to ICBMs; the availability of comparable American interceptors at approximately half the cost of the Arrow; the cheaper and more efficient nature of missiles versus aircraft; and the lack of any foreign interest, especially from the US, in purchasing the Arrow.⁶³ Denis Smith confirms the existence of these influences and adds several unstated ones:

There were now at least five compelling influences on the decision: escalating costs that seemed beyond the capacity of the Canadian government; doubts about the technical nature of the Soviet threat, whether bomber or missile; a military preference for tactical atomic weapons for defence as well as attack; an interest - both economic and political - in maintaining a large and sophisticated Canadian aircraft industry; and an overriding American influence on the shape of Canadian defence policy. The government responded by simultaneously inching sideways and forwards. In the process, the prime minister preferred not to sort out too clearly what policies the government was actually pursuing.⁶⁴

Foulkes later described this CDC meeting as “acrimonious,”⁶⁵ and they culminated with Diefenbaker ordering the preparation of a second reappraisal report:

The Prime Minister questioned and cross-examined the Chiefs of Staff and Defence Production officials for prolonged periods. The Chiefs of Staff were

⁶³ The ongoing American disinterest in purchasing the Arrow had once again been confirmed at an August meeting between Pearkes and Neil McElroy, US Secretary of Defence. At that meeting McElroy also urged Canada to adopt BOMARC and SAGE. There is no evidence that Pearkes challenged this advice, which is not surprising as it was identical to that being proffered by the RCAF. NAC, CDC, 15 August 1958, 4, 6; and Smith 310. Pearkes had also met with US Secretary of State John Foster Dulles in July, and received much the same response. Roy, 316-317.

⁶⁴ Smith, 310.

⁶⁵ DHH/DND, Foulkes Papers, 23.

accused of not providing all the relevant information. It was alleged that the officials were holding back to cover up the shortcomings of the previous Administration in failing to curb the expansion of this enterprise which had become so completely out of hand before the present Government had assumed responsibility. The Prime Minister demanded that the Chairman of the Chiefs of Staff Committee immediately produce a dossier on the whole project from 1952 to date, showing a complete documentation of all decisions, studies, reports, cut-backs, submissions and yearly expenditures. The document was prepared without delay, but with some qualms about the propriety of furnishing confidential information of the previous administration; this was contrary to normal practice.⁶⁶

This reappraisal report was duly prepared and tabled at the 121st CDC meeting on 21 August 1958.⁶⁷ Graham was still not entirely happy, however, and he had one more complaint to make about the RCAF. He demanded a further clarification as to just who the Arrow was supposed to defend - Canadian citizens or SAC:

one is left with the impression that our air defence plan is designed for the defence of Canada. My understanding is that our air defence plan is not for "the Defence of Canada," but is a part of a Canada-US plan for the defence of North America. This Canada-US plan places first priority on the defence of SAC bases, second priority on certain other installations, and only third priority on certain centres of population in North America, of which four are in Canada, namely Montreal, Toronto, Hamilton, and Vancouver.

I think it is wrong to leave the impression with the Minister and the Government that our air defence plan is primarily for the defence of Canadian territory when, in fact, any defence of Canadian territory is but a by-product

⁶⁶ DHH/DND, Foulkes Papers, 23. See also DHH/DND, CSC Report. A lengthy and extremely useful report, its appendices reproduce various letters and memoranda and extracts from Hansard as well as containing summaries of the expenditures on the Arrow programme, of decisions of the CSC, the CDC, and Cabinet, and of discussions with the US and UK regarding the Arrow.

⁶⁷ NAC, CDC, 21 August 1958, 2-4, with reference to Minister of Defence Production's Memorandum, 7 August 1958, Cabinet Document D10-58; Secretary of State for External Affairs' Memorandum, 14 August 1958, Cabinet Document D11-58; and Minister of Finance's Memorandum, 13 August 1958, Cabinet Document D12-58.

or extra dividend to the main purpose, which is the defence of SAC bases and Northeastern United States.⁶⁸

The reappraisal report had the desired effect of confirming for the CDC the bleak situation that Pearkes had previously outlined. But the CDC proved to be as reluctant to explicitly support termination as the CSC had earlier been. The CDC agreed to recommend that Cabinet approve Pearkes' and the CSC's recommendations - with one exception. Rather than recommending the cancellation of the Arrow programme, the CDC only tendered their advice that "consideration be given to...abandoning the CF-105 (Arrow) programme and the associated fire control and weapons projects."⁶⁹ Cabinet would have to decide the ultimate fate of the project for themselves.

Cabinet discussed this issue at six meetings in August and September 1958.⁷⁰ Approval was given to the CDC's recommendation on BOMARC, SAGE, and the additional heavy and gap filler radars without much debate.⁷¹ As for the Arrow programme, there was extensive discussion at every meeting, but at no time did Cabinet challenge the military and

⁶⁸ DHH/DND, 73/1233, series 1, file 11, Air Defence Requirements, 31/07/58-30/09/58, Lieutenant-General H. D. Graham, Chief of the General Staff to Chairman, Chiefs of Staff, 21 August 1958.

⁶⁹ NAC, CDC, 21 August 1958, 4.

⁷⁰ NAC, CC, 28 August 1958, 6-11, with reference to Minister's Memorandum, 22 August 1958, Cabinet Document 247-58; 3 September 1958, 2-5; 7 September 1958, 16-18; 8 September 1958, 6-7; 21 September 1958, 9-12; and 22 September 1958, 2-3.

⁷¹ All would be cost-shared on the same basis as previous joint projects, on a one-third Canadian, two-thirds US basis. The BOMARC bases were built in North Bay, Ontario, and La Macaza, Quebec. For a representative sample of the literature on the BOMARC see Robert H. Clark, "Canadian Weapons Acquisition: A Case Study Of The BOMARC Missile," (MA thesis, Royal Military College, 1983); DHH/DND, Foulkes Papers; McLin; and Munton.

financial logic which led to Pearkes' and the CSC's recommendation to the CDC. The country was in an economic downturn, and for a government elected on the promise of expanded social programmes, reduced public expenditures, and lower taxes, the costs of the Arrow programme were appalling. Fleming was blunt in his recitation of the financial implications of continuing the Arrow programme:

If the CF-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 1959-1960 would be as much as 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 the present overall rate of deficit would mean the wrecking of Canada's credit and the stimulation of inflation.⁷²

Another unique opinion expressed during the extensive discussion was that the Arrow programme might actually be harming the cause of Western defence: "The USSR 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."⁷³

At another meeting Pearkes also reported that he, Diefenbaker, Fleming, and O'Hurley had met several times with Avro and Orenda management. The latter had recommended, not surprisingly, that the Arrow and Iroquois programmes be continued but that an existing Hughes MA-1 electronics system and the Douglas Falcon missile replace Astra and Sparrow II. This substitution was supposed to reduce the cost of 100 production Arrows from \$1 261.5 million to \$896 million. Pearkes pointed out that this lower figure did

⁷² NAC, CC, 28 August 1958, 9.

⁷³ NAC, CC, 7 September 1958, 17.

not include cost of completing the development programme and that it was still almost twice as much as comparable American interceptors. Fleming added that if an American electronics system and missile were good enough for Canada, an American airframe and engine should be as well. Cabinet concluded:

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 or 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.⁷⁴

Foulkes would later confirm that it was not only the government that did not believe Avro and Orenda's claims that costs could be reduced: "The RCAF did not repose much confidence in the A.V. Roe Company's proposal to develop a relatively cheaper version of the CF-105."⁷⁵

Though it is clear that Cabinet readily accepted the military and financial arguments against the Arrow programme, it was preoccupied with the short-term ramifications termination would have for the economy, particularly but not exclusively in southern Ontario, and thus for the government's ongoing political fortunes. The adverse effects of cancelling the Arrow programme were listed as the cessation of operations at Avro and Orenda, the potential lay-off of 25 000 workers at the two companies and their subcontractors, the dispersal of their team of skilled engineers and technicians, and the

⁷⁴ NAC, CC, 3 September 1958, 3. There were series of meetings between Avro and Orenda management and ministers in September 1958. At one meeting Fleming was asked "whether or not the Government would be interested in a \$350 000 000 reduction in the program's cost of 100 aircraft [if Astra and Sparrow II were cancelled]...Mr. Fleming replied that he would be interested in a reduction of 350 cents." Smye, 80.

⁷⁵ DHH/DND, Foulkes Papers, 25.

psychological factor of damage to national pride and prestige. Cabinet also saw the abandonment the Arrow programme in favour of an American interceptor as potentially being "a serious political mistake."⁷⁶

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 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.⁷⁷

Cabinet clearly knew what had to be done, but could not agree on how to go about doing it until Diefenbaker proposed a compromise solution which Cabinet quickly seized upon. The Astra and Sparrow II programmes were cancelled in favour of their existing American counterparts. However, because of a severe unemployment problem in the Toronto area and the danger of a recession, work on the thirty-seven Arrows that had been authorized would continue and a decision on the cancellation of the Arrow programme deferred until the end of March 1959. Barring any radical change in the international situation or the Soviet threat, Cabinet believed the project would be terminated at that time, although this was not publicly stated. In the interim, the CSC was instructed to "investigate and report upon the 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."⁷⁸ The

⁷⁶ NAC, CC, 28 August 1958, 11.

⁷⁷ NAC, CC, 3 September 1958, 4.

⁷⁸ NAC, CC, 21 September 1958, 12. The CSC would continue to meet and prepare submissions and reports on the issue of an alternative to the Arrow throughout the rest of 1958 and 1959, but from this point on it operated on the assumption that the Arrow

public was informed of this revision of Canada's air defence requirements through a press release on 23 September 1958 (see appendix I).⁷⁹

Fleming later wrote of the one year extension and the six month deferral that "as an unemployment measure it must be one of the most costly on record,"⁸⁰ adding:

Had we grasped the nettle in September 1957 we would have saved \$200 million. We bought time, but at a heavy price. The A.V. Roe Company had nothing to lose by delay, for they were enjoying the benefit of a cost-plus contract, which had been awarded them by C.D. Howe. Nothing, however, was solved. The mammoth problem remained. There was to be no escape from making one of the most difficult decisions the cabinet ever faced.⁸¹

This postponement of the inevitable may also have been due in part to the lobbying of Toronto-area Conservative MPs and Conservative shareholders of A.V. Roe stock. As well, Ontario's Conservative Premier Leslie Frost, whose provincial organization had proven invaluable to the federal Conservatives during the 1958 election, had also weighed into the debate by writing to Diefenbaker expressing his concern about the impact of cancellation on Malton.⁸²

programme was finished. Richter, 31-34.

⁷⁹ Diefenbaker's statement is also reproduced in McLin, 225-228.

⁸⁰ Fleming, *The Rising Years*, 416. Apparently, Avro and Orenda management were informed by John Pallett, the local MP for Peel and the Conservative Whip, that unemployment was sole the reason behind the deferral. Campagna, *Storms Of Controversy*, 120.

⁸¹ Donald M. Fleming, *So Very Near. The Political Memoirs Of The Honourable Donald M. Fleming. The Summit Years. Volume Two* (Toronto: McClelland and Stewart Limited, 1985), 9-10.

⁸² Frost wrote repeatedly to Diefenbaker on the issue. He would later conclude that "the decision to terminate...was completely sound but its execution was really indescribable," adding that "it was the beginning of the decline of the Diefenbaker government. The method

No doubt well-informed through leaks from the military and the government, in the aftermath of Diefenbaker's press release the media largely acted as if the decision to cancel the Arrow programme had already been announced. And the most vocal press critic of all was Blair Fraser of *Maclean's*. In an article entitled "What led Canada to junk the Arrow," Fraser argued the project was far too expensive and that the entire defence picture had changed since 1953 due to the missile. Fraser concluded that the advice governments the world over should heed was that "the manned aircraft is as dead as the muzzle-loading musket."⁸³ He then lauded the government for its decision:

The plain truth is, nobody thought the government would have the courage to make such a painful decision. The fact that the decision was right didn't carry enough weight. It meant an early end to more than twenty thousand jobs, most of them in the very heartland of the Conservative Party. It went against the emotional urges of all Canadian air-force men, and of most air-force veterans. It disappointed a big Canadian industry with many big Conservative shareholders. In short, it was political poison of a kind to scare any politician out of one year's growth.⁸⁴

Crawford Gordon Jr., A.V. Roe's President and General Manager, reacted angrily to Fraser's pronouncement in an article entitled "We should and will go on building Arrows." Gordon condemned publications and self-appointed experts who, "in their eagerness to see this

adopted completely lost the confidence of business and industry....In a space of ten months, the overwhelming vote of confidence of March 1958 was completely lost. Roger Graham, *Old Man Ontario: Leslie H. Frost* (Toronto: University of Toronto Press, 1990), 357-358, quoting Premier Leslie Frost. Fleming would later report to Cabinet that Frost had spoken to him in "pungent language" about the decision to stop the Arrow programme. NAC, CC, 17 February 1959, 5.

⁸³ Blair Fraser, "What led Canada to junk the Arrow," *Maclean's*, 25 October 1958, 2. See also Blair Fraser, "Our Airborne Maginot Line." *Maclean's*, 8 November 1958, 18-19, 87-88, 90.

⁸⁴ Fraser, "What led Canada to junk the Arrow," 2.

admittedly costly (though essential) program abandoned...maintained that it already *has been* [italics in original] abandoned; and if by any chance it has not been abandoned, they contend it should be abandoned because, according to their dicta, it is already obsolete."⁸⁵ He then pointed out that the missiles were not intended to be a substitute for interceptors, but rather a complement, and that the RCAF (and the USAF) wanted both in their inventories.

But Fraser was correct in his analysis of the government's announcement; Gordon was simply attempting damage control. There is little doubt that Cabinet had determined in September that the Arrow programme would be cancelled as soon as it was politically expedient to do so. However, Cabinet also erroneously assumed that the deferral would be a signal to Avro and Orenda to prepare for the contingency of cancellation. Instead, though all of the signs clearly pointed toward the project's demise, the companies saw what they wanted and acted as if they had been granted a reprieve. And, despite the fact that Avro and Orenda's future was precariously staked on one military contract, the parent company continued to prosper. By 1959 A.V. Roe had assembled a giant industrial empire - according to Michael Bliss, "a single-company military-industrial complex"⁸⁶ - becoming the third

⁸⁵ Crawford Gordon, Jr., "We should and will go on building Arrows," *Maclean's*, 20 December 1958, 8, 54-55. For the argument in favour of interceptors in general see John Gellner "The defence of Canada," *Canadian Commentator*, December 1958, 12; and John Gellner, "Musing over the Debris," *Canadian Commentator*, March 1959, 3. Gellner was a retired RCAF Wing Commander and a prominent defence commentator. See Bercuson and Granatstein. For the argument against interceptors see Eayrs, "Back to the Drafting Board; "Defending the Realm: (1);" and "Defending the Realm: (2)."

⁸⁶ Michael Bliss, *Northern Enterprise. Five Centuries of Canadian Business* (Toronto: McClelland and Stewart Limited, 1987), 475.

largest corporation in Canada, a diversified conglomerate comprising thirty-nine companies and directly employing over 41 000.⁸⁷

Meanwhile, in December 1958, Pearkes and Fleming made the last in a long series of attempts to sell the Arrow to the UK and the US during a meeting of the NATO Ministerial Council in Paris - and failed again.⁸⁸ "Had the Soviet Union itself come through with an offer," James Eayrs later joked, "the Canadian Government might have been tempted to accept."⁸⁹ Pearkes' distress over the project was only compounded when he discovered from the British that they were rather anxious to interest Canada in their own ill-fated TSR-2 aircraft for the RCAF Air Division in Europe.⁹⁰ The truth was that when the St. Laurent and

⁸⁷ John Porter, *The Vertical Mosaic. An Analysis Of Social Class And Power In Canada* (Toronto: University of Toronto Press, 1965), 259-263, 550-552; and Dow, vii-viii.

⁸⁸ NAC, CC, 22 December 1958, 7. On 15 December 1958, a meeting of the newly created Canada-US Ministerial Committee on Joint Defence was convened in Paris. During the meeting Secretary of State Dulles and Secretary of the Treasury Robert Anderson once again stated that the US had no interest in purchasing the Arrow. Roy, 320; and Fleming, *The Summit Years*, 14. Fleming also claims that one or two unnamed NATO allies offered to accept the Arrow as a gift, "but we were not prepared to play Santa Claus with such costly presents." Fleming, *The Summit Years*, 14.

⁸⁹ James Eayrs, "Canadian Defence Policies Since 1867," *Special Studies Prepared For The Special Committee Of The House Of Commons On Matters Relating To Defence, Supplement 1964-1965*, 20.

⁹⁰ McLin, 70. "At one stage [the British Aircraft Corporation] proposed an [air-to-air] equipped version of the TSR-2 for [Canada], to serve as a long-range interceptor after Canada's own CF-105 Arrow was cancelled." Bill Gunston, "Beyond The Frontiers. BAC TSR-2," *Wings of Fame. The Journal Of Classic Combat Aircraft* 4 (1996): 131. This statement should indicate the level of desperation which existed in the TSR-2 programme at the time. The TSR-2 is to Britain what the Arrow is to Canada, and the project unfolded in a manner strangely analogous to that of the Arrow. For a representative sample of the literature on the TSR-2 see also Frank Barnett-Jones, "Concept versus Reality. A detailed assessment of the TSR-2," *Aeroplane Monthly* 25, no. 7, and 25, no. 8 (July 1997 and August 1997): 56-61 and 64-71; Charles Gardner, *British Aircraft Corporation. A History* (London:

Diefenbaker governments endeavoured to sell the Arrow to the Americans or the British or other NATO allies, they came up against the same logic that led Canada to develop its own aircraft industry in the first place: these countries had their own unique operational requirements to satisfy and their own aircraft manufacturers to support. There is no convincing evidence (as is often claimed by "Arrowheads") that the US administration conspired with the American aircraft industry to exert pressure the Diefenbaker government to cancel the Arrow programme in favour of their own products. This lack of direct American intervention can in part be explained by the fact that the Arrow never represented an export threat which could compete with American aircraft. Few countries had any need for an interceptor like the Arrow, and fewer still could have afforded the Arrow even if they had. Foreign interest in the project was never more than academic in nature. As J.L. Granatstein wrote, that "if Canada wanted to fly the Arrow, it would have to pay the shot,"⁹¹

B.T. Batsford Ltd., 1981); Bill Gunston, *Attack Aircraft of the West* (New York: Charles Scribner's Sons, 1974); Stephen Hastings, *The Murder of TSR2* (London: Macdonald & Co. (Publishers), Ltd., 1966); John Law, "The Anatomy of a Socio-Technical Struggle: The Design of the TSR-2," in *Technology And Social Process*, ed. Brian Elliot (Edinburgh: Edinburgh University Press, 1988), 44-69; John Law and Michel Callon, "Engineering and Sociology in a Military Aircraft Project: A Network Analysis of Technological Change," *Social Problems* 35, no. 3 (June 1988): 284-297; Geoffrey Williams, Frank Gregory, and John Simpson, *Crisis In Procurement: A Case Study Of The TSR-2* (London: Royal United Service Institution, 1969); Geoffrey Williams, "The Strategy of the TSR-2," *International Journal* XXV, no. 4 (Autumn 1970): 726-744; and Derek Wood, *Project Cancelled. A searching criticism of the abandonment of Britain's advanced aircraft projects* (London: Macdonald and Jane's, 1975). For a recent weapons acquisition process analogous to the Arrow programme, see Dov S. Zakheim, *Flight Of The Lavi. Inside a U.S.-Israeli Crisis* (Washington: Brassey's, Inc., 1996) and Galen Roger Perras, "Israel and the Lavi Fighter-Aircraft: The Lion Falls To Earth," in *The Defence Industrial Base And The West*, ed. David G. Haglund (New York: Routledge, 1989), 189-233.

⁹¹ Granatstein, *Canada 1957-1967*, 107. "The lesson for Canada, as for other countries, is plain: the key to effective participation in the aerospace enterprise is industrial

a situation which Pearkes later confirmed in testimony before the House of Commons

Special Committee on Defence Expenditures:

at no time did the United States make any firm commitment that they were going to purchase this aircraft. They expressed interest in it; they liked it. But never at any time was any firm commitment given.

That applies to the United Kingdom and France, and any other country....It was a purely Canadian project.⁹²

Being wise after the event, I think in 1958 I would have said it would have been highly desirable had it been possible to have arranged for the sale of this aircraft to other countries before the operation had started, or to have got other countries to share in the cost of the development; but that is being wise after the event.⁹³

With the coming of 1959 the end of the six month extension was fast approaching.

During this time, H. Basil Robinson later wrote, Diefenbaker "carried the worry [about the Arrow] with him around the world - he always hoped that postponements might beget miracles - but the inevitable could not be stemmed."⁹⁴ Diefenbaker later confirmed his state of mind in his memoirs: "I had listened to the views of various experts; I had read everything I could find on the subject; I thought about it constantly; and, finally, I prayed for

collaboration on an international level. And, ideally, such collaboration should involve Canadian firms over the whole cycle of research, development, manufacturing, and worldwide marketing for a component or range of products." Lukasiewicz, 257.

⁹² Halpenny Committee, No.4 (18 May 1960), 98.

⁹³ Halpenny Committee, No. 5 (20 May 1960), 135.

⁹⁴ H. Basil Robinson, *Diefenbaker's World: A Populist in Foreign Affairs* (Toronto: University of Toronto Press, 1989), 85. Robinson was the DEA's representative in the Prime Minister's Office, and he may have been the only DEA official that Diefenbaker trusted.

guidance.”⁹⁵ At the 28 January 1959 Cabinet meeting,⁹⁶ Fleming pointed out that as soon as he tabled the main estimates for 1959-1960 it would be the Opposition and the press would know that there was no provision for expenditures on the project beyond 1 April 1959, except for cancellation costs. In light of Fleming’s warning, at the next Cabinet meeting Diefenbaker suggested that it might be advisable to make an early decision on the Arrow programme. Cabinet agreed, noting that “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.”⁹⁷

At the 122nd CDC meeting on 5 February 1959,⁹⁸ Pearkes reported that the CSC had confirmed that there were no new military factors regarding the international situation, the Soviet threat, or the means to defend against it that would have any bearing on the Arrow programme. Foulkes also took the opportunity to reiterate the position of the CSC:

[The CSC] were still of the opinion that the changing threat and the rapid advances in technology, particularly in the missile field, along with the decreasing requirements for manned interceptors in Canada, created grave doubts as to whether a limited number of aircraft of such extraordinarily high cost would provide a defence return commensurate with the expenditures. Therefore, the Chiefs of Staff went along with the recommendation that had

⁹⁵ Diefenbaker, 36.

⁹⁶ NAC, CC, 28 January 1959, 6. Pearkes had earlier been instructed to assume the Arrow programme would be cancelled when making up his main estimates for 1959-1960. NAC, CC, 25 November 1958, 7.

⁹⁷ NAC, CC, 3 February 1959, 4-5.

⁹⁸ NAC, CDC, 5 February 1959, 2-5, with reference to a Minister’s Memorandum, 30 January 1959, unreferenced.

been made, on the understanding that they should present at an early date their recommendations for air defence requirements, based on the investigations which they were now making....⁹⁹

In reply to a question as to whether interceptors would be needed in addition to BOMARCs, Campbell answered that the RCAF definitely needed both and that he was still "thinking in terms of 100 to 115 aircraft, which would provide the necessary fighters for six squadrons and the usual back up. Where they would be obtained was the big question."¹⁰⁰ Ominously for the RCAF, the CDC then complained that Canada should not be expected to provide every type of defence for its territory:

The defence of North America was a matter of mutual defence and Canada was making her contribution by the provision of air space, expenditures on warning systems, communications, BOMARCs, and with respect to a share in the ballistic missile early warning system. The NORAD agreement would enable US squadrons of interceptors to be stationed temporarily in Canada, but if the risk of attacks from manned bombers was declining quickly, as many believed it was, such stationing might never be required, let alone the provision of interceptors by Canada itself.¹⁰¹

Pearkes then informed the CDC that from September 1958 to January 1959 the Arrow programme had cost \$60 000 000, and if development was continued until March 1959, a minimum of an additional \$45 000 000 would have to be spent. However, if the Arrow project were abandoned by mid-February, a saving of \$15 000 000 would be realized once cancellation charges were factored in. Pearkes also noted:

⁹⁹ NAC, CDC, 5 February 1959, 3.

¹⁰⁰ NAC, CDC, 5 February 1959, 4. In the course of the discussion it was also suggested that consideration be given to increasing the number of BOMARC bases in Canada by moving two or more of the American chain north of the border in the Western, Atlantic, and Pacific regions. The idea was not pursued.

¹⁰¹ NAC, CDC, 5 February 1959, 4.

The Avro Aircraft Company had now submitted a new proposal which estimated the cost of 100 operational aircraft at being \$781 million, or \$7.81 million per aircraft. This excluded termination charges for the Astra/Sparrow system from September 1st, which was estimated at \$28 million. Although these costs had been reduced from \$12.6 million per aircraft to this figure, it was still considered that the production of 100 such aircraft could not be justified at this price.¹⁰²

The fact that the re-equipping of the RCAF Air Division might cost “in the neighbourhood of \$500 million”¹⁰³ also did not escape the attention of the cost-conscious CDC. At the conclusion of the meeting, the CDC recommended that Cabinet make a decision to discontinue the Arrow programme before the end of March.

For many ministers the final Cabinet deliberations over halting the project was the most difficult experience of their political careers. “I am sure,” Fleming later admitted, “few decisions ever taken by a Canadian government have been so meticulously examined in every detail and from every angle.”¹⁰⁴ Cabinet, seemingly unwilling to confirm a decision it had in effect already taken, met again and again throughout January and February 1959,

¹⁰² NAC, CDC, 5 February 1959, 2. These figures are in part based upon an offer from Avro to enter into a fixed price contract for 100 Arrows complete with Iroquois engines and the MA-1 electronics system for \$3 750 000, not including development costs. The range of the Arrow had also been increased, its deployment date moved forward, and Avro estimated that only twenty of the thirty-seven preproduction aircraft were needed for evaluation and testing. DHH/DND, 73/1233, series 1, file 12, Air Defence Requirements, 10/28/58-11/09/59, Fred T. Smye to The Hon. George R. Pearkes, VC, 21 October 1958. Smye also claims in his memoirs that at a meeting between Avro management and US officials the Americans offered to make a gift of the MA-1 electronics system and the Falcon missile to Canada, which would have further reduced project costs. Smye, 88. Though there is no reason to doubt that this occurred, there is no record of any high-level discussion of the offer, and undoubtedly such a gift would have been viewed as a form of military aid and, therefore, would have been rejected as politically unacceptable.

¹⁰³ NAC, CDC, 5 February 1959, 4.

¹⁰⁴ Fleming, *The Summit Years*, 12.

agonizing over the effect their decision would have on the RCAF, on the aircraft industry, on unemployment, on the economy, and on Canada's sense of national achievement and pride.¹⁰⁵ Robert Bryce, the Clerk of the Privy Council and "almost the only mandarin Diefenbaker trusted,"¹⁰⁶ described these Cabinet meetings as "frustrated, not heated, but not entirely calm."¹⁰⁷ At every meeting Pearkes repeated what he and the CSC had told the CDC. When the question as to whether both BOMARCs and alternative interceptors were necessary was asked again, Pearkes was more equivocal than Campbell. He answered that this was dependent on the nature of the Soviet bomber and ICBM threat, but that in the case of the BOMARC bases "some insurance premium had to be paid against the possibility of bomber attack and this premium was cheaper by far than the CF-105."¹⁰⁸ Cabinet was also

¹⁰⁵ NAC, CC, 13 January 1959, 8-9; 28 January 1959, 6; 3 February 1959, 4-5; 4 February 1959, 3-4, with reference to Minister's Memorandum, 30 January 1959, unreferenced; 10 February 1959, 2-3, with reference to Minister's Memorandum, 6 February 1959, Cabinet Document 46-59; 14 February 1959, 3-5; 17 February 1959, 4-5; 19 February 1959, 2; and 23 February 1959, 2-4.

¹⁰⁶ J.L. Granatstein, *The Ottawa Men. The Civil Service Mandarins 1935-1957* (Toronto: Oxford University Press, 1982), 270.

¹⁰⁷ R.B. Bryce, Ottawa, Ontario, to Russell Isinger, LS, 17 August 1991, 1. Bryce, once a strong supporter of the Arrow programme, by September 1958 had come to the same conclusions as the CSC and the MND - that the cost of the project outweighed the benefits. However, his advice that the government announce that an alternative American interceptor would be procured instead of the Arrow was not taken. See Diefenbaker Canada Centre, John G. Diefenbaker Papers, MG01 (hereinafter Diefenbaker Papers), VI, PMO Numbered Series, 1957-1963, vol. 55, file 171, Arrow Conf., Defence Expenditures - Aircraft - Arrow - Confidential, 1958, 1960, R.B. Bryce, "Memorandum For The Prime Minister. Re: The 105 Problem," 5 September 1958.

¹⁰⁸ NAC, CC, 10 February 1959, 2. One member of Cabinet worried that if Canada spent \$500 000 000 to reequip the RCAF Air Division in Europe but allowed USAF squadrons to defend Canada, it would create an inexplicable situation where "in effect, Canada would be defending Europe, and the US would be defending Canada." NAC, CC,

informed that Avro and Orenda were asking for more money, having informed the government that costs were “likely to exceed the financial limitations that had been previously set for 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.”¹⁰⁹ Another particularly sensitive topic of discussion was that the abandonment of the Arrow programme in favour of American BOMARCs and interceptors would lead to accusations that Canada was dominated by the US:

As regards the point that cancellation would mean that Canada would be still further “under the wing of the US,” it should be remembered that maintaining freedom from US 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.....

It would be unwise to blame the US for the outcome of the Arrow contract.¹¹⁰

In the end, however, the cold hard financial and strategic facts coming from Pearkes and the CSC buried any nationalistic viewpoints, and “no member of Cabinet present was opposed to the termination of the development of the Arrow.”¹¹¹

10 February 1959, 3.

¹⁰⁹ NAC, CC, 14 February 1959, 3.

¹¹⁰ NAC, CC, 23 February 1959, 4. In contrast, James Eayrs wrote that “in fact, we are less dependent on the United States without the Arrow than with it. Having liberated a major fortune from a useless undertaking, we may now devote resources to projects strengthening our powers of independent decision.” Eayrs, *Northern Approaches*, 28.

¹¹¹ NAC, CC, 14 February 1959, 4. There were, however, dissenters amongst Diefenbaker’s officials. Dr. Merrill Menzies, an economic advisor in the Prime Minister’s Office, argued against the cancellation, believing that the cancellation was “sold to the government without adequate consideration of the economic and political implications.... This was bad enough, but if that had been all, one could have possibly accepted it, but reluctantly. However, tied to that was the related BOMARC decision, which ironically by a chain of

On 20 February 1959 - "Black Friday" as it known to "Arrowheads" - Diefenbaker announced to the House of Commons the cancellation of the Arrow and Iroquois programmes (see appendix II).¹¹² Cancellation charges brought the total costs of the project to \$470 million. Avro and Orenda were ordered to cease work immediately; they responded by laying-off 14 000 workers, which Diefenbaker later described as "a callous act."¹¹³ Though it was a bonus for Avro and Orenda's management that the sheer magnitude of the firings served to embarrass the government, they knew that the cancellation was irreversible.¹¹⁴ Cabinet, however, was infuriated:

events led to the final break-up of the government... What really happened economically from that decision was again -even if localized - massive unemployment, and of very highly skilled people. We destroyed a whole industry. It was one of the major reasons for the total disaffection of the Toronto area which showed up, obviously, at the next election." Peter Stursberg, *Diefenbaker: Leadership Gained 1956-1962*. Toronto: University of Toronto Press, 1975, 119.

¹¹² Diefenbaker's statement is reproduced in McLin, 229-239; and House of Commons, *Debates*, 20 February 1959.

¹¹³ Diefenbaker, 41. Several thousand workers were quietly called back to work in the following weeks. Harry McDougall, "Black Friday: Five Years Later," *Saturday Night*, March 1964, 14. At Cabinet meetings on 26 and 27 February 1959, Cabinet agreed to meet the payroll for a nucleus of technicians and engineers for a six-month period, with the costs shared equally between the government and Avro and Orenda. Government liability was limited to \$1 650 000. NAC, CC, 26 February 1959, 5-6, and 27 February 1959, 2-4. Cabinet, however, was less than impressed with Avro and Orenda's handling of their business affairs, noting also that "Avro had warned the government several months ago that it would be in difficulties in the not too distant future, notwithstanding the Arrow contract." NAC, CC, 27 February 1959, 3. See also Diefenbaker Papers, VI, PMO Numbered Series, 1957-1963, file 162, Defence Production - Defence Orders, 1958-1961, A.V. Roe Canada Limited, "Economic Position Of Avro Aircraft Limited And Orenda Engines Limited," 31 July 1958.

¹¹⁴ A confrontational meeting did occur in the Prime Minister's Office between a possibly intoxicated and certainly bellicose Gordon and Diefenbaker in the wake of the announcement. In response to Gordon's corporate complaints, Diefenbaker reportedly

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.

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 fact, during this period no such proposals had been made by the company to the government.¹¹⁵

In the emergency House of Commons debate that followed Diefenbaker's announcement, the Liberals, led by Opposition Leader Lester Pearson (1957-1963) and defence critic Paul Hellyer, attacked the Diefenbaker government on how the decision was executed (rather than the decision itself) in that no effort had been made to provide alternative projects for Avro and Orenda.¹¹⁶ Hellyer, a Toronto-area MP, found this to be a particularly onerous task, as he later admitted:

The cancellation of the Avro Arrow provided my first major test in the role. Mike [Pearson] insisted that I speak for the party in the House, which would

slammed his fist onto his desk and said "My shareholders are eighteen million Canadians." Thomas Van Dusen, *The Chief* (Toronto: The McGraw-Hill Company of Canada Limited, 1968), 92. After this meeting Avro management "sought to keep Gordon out of the capital for fear he would only further antagonize the Prime Minister." Brown, "The Road to the Arrow," 155, quoting Air Marshal Wilfrid Curtis.

¹¹⁵ NAC, CC, 23 February 1959, 2-3.

¹¹⁶ For representative sample of the debate surrounding the cancellation see House of Commons, *Debates*, 23 February 1959 (Labour Crisis in the Aircraft Industry); 2 March 1959 (Defence Policy, Planning, and Production); 3 March 1959 (Defence Policy, Planning, and Production); 2 July 1959 (Supply - National Defence); and 8 July 1959 (Supply - Defence Production). See also the debates of the Senate and of the Ontario legislature for 23 February 1959 and thereafter.

have been fine if he had let me take a clear and unequivocal stand. I wanted to condemn the government outright. Both the Arrow airframe and its Iroquois engine were monumental, world-leading achievements, and throwing in the towel on their production was a national disgrace. But [Pearson] would neither condemn nor condone. He wanted to keep our options open by planting one foot firmly in each camp. So for half an hour I had the dubious honour of viewing with alarm, pleading for generosity to the workers, and saying all the obvious things that fence-straddling politicians do. My Liberal colleagues seemed pleased, and the subsequent press reaction was quite favourable; but for me it was a most uncomfortable assignment.¹¹⁷

The reason for Pearson's line of attack is clear - the Liberals believed the cancellation to be justified and they would have terminated the project themselves had they been re-elected. In planning the Liberals' response to the likely cancellation, Pearson had sought the advice C.D. Howe (who had been defeated in the election of 1957). In a private letter to Howe in January 1959, Pearson inquired:

Would it be too much to ask you to send me a note of your views on the CF-105 question? It would certainly be of great help to me in making up my own mind as to the course we adopt when this question comes before the House for discussion.

So far, although I have said a good deal about it, I have been completely non-committal as to the decision which the Government should make and have confined my remarks to attacking them for their tactic and fumbling words.¹¹⁸

Howe wrote a letter to Pearson the next day:

There is no doubt in my mind that the CF-105 should be terminated - costs are completely out of hand. The electronic equipment, which is an essential part of the project, has never been ordered. This by Government decision taken several months ago.

¹¹⁷ Hellyer, 19. Foulkes characterized Hellyer's statements as sarcastic, caustic, inaccurate, and filled with "exaggerated and irresponsible charges." DHH/DND, Foulkes Papers, 28.

¹¹⁸ NAC, Howe Papers, vol. 109, file 75-7, Political - General, Mike Pearson to C.D. Howe, 21 January 1959.

The proper line of attack should be directed to the Government's temporizing and fumbling with this decision. You will recall that when the matter was last discussed by our Defence Committee in 1957, it was decided to continue the project for the time being, and have a complete review of the matter in September 1957. I had then recommended that the project be terminated due to runaway costs, but there were obvious reasons then why the decision should be deferred until autumn. Since then, costs have continued to mount, and the results of the test flights have been far from conclusive, both as to the aircraft and its jet engine, which is also a development project.

I think you have been right in being completely non-committal as to the decision to continue or terminate, which is obviously one for the Government of the day, but you have a wide open field for showing the cost to the country of the delay in the decision, should the decision be to terminate.

I would suggest the question on the order paper asking the expenditures on the Arrow project and its jet engine from the beginning of this Government's first Session of Parliament to the date of termination, including estimated termination costs. The reply to such a question will give you a basis for your criticism about delay in the decision. You can also point out that it is a very expensive way to prevent unemployment of the staff involved in the threatened layoff.

You can also point out that when the Government decided not to proceed with the fire control and electrical equipment for this aeroplane, the Government had then decided not to proceed with the aircraft and engine. Subsequent expenditures on both aircraft and engine were definitely an unemployment relief measure, and an expensive one.¹¹⁹

Pearson would later summarize his opinion of the Arrow programme, perhaps more diplomatically than Howe:

¹¹⁹ NAC, Howe Papers, vol. 149, file 75-7 Political - General, C.D. Howe to Mike Pearson, 22 January 1959. In a subsequent letter Howe went even further: "Confidentially, I think the Arrow contract had to be cancelled. Costs have been completely out of hand, and there is a two or three year delay in the completion date. The method of cancellation however is completely cock-eyed. The company should have been given a definite notice six months in advance to plan for an orderly reduction in staff. This may well have been Crawford Gordon's fault." NAC, Howe Papers, vol. 149, file 75-7 Political - General, C.D. Howe to Senator W.A. Fraser, 29 February 1959.

It was not in the area of foreign affairs, however, but in domestic administration that we were able in these early years to exploit mistakes made by the government. Notable among these was the decision to abandon the Canadian-built and designed fighter, the famous Avro Arrow.... There were reasons of defence and economics that could have been advanced to justify this decision but none to justify the way it was done. Suddenly, on February 20, 1959, without any effort to keep together the fine professional team of scientists and engineers which had been assembled, Mr. Diefenbaker pronounced his government's policy.¹²⁰

In the press, most of the Toronto-area media not surprisingly condemned the Conservative government. Theirs was the story of the ruination of two companies on the cutting edge of aerospace technology, the disbandment of a team of the world's finest engineers and technicians, and the untimely end of a great national project. Outside of the Toronto, however, editorial and public opinion was largely in favour of cancellation, applauding Diefenbaker for his political courage in finally killing the obsolete and costly boondoggle. The latter publications were joined by the national magazines, *Maclean's* and *Saturday Night*, which had never been fans of the Arrow programme. The Arrow myth that would later enthrall Canadians had not yet arisen; in 1959, its termination was a southern Ontario story of little concern to other Canadians. Diefenbaker could thus console himself with the fact that the further he travelled away from southern Ontario, the more muted the

¹²⁰ Lester B. Pearson, *Mike. The Memoirs Of The Right Honourable Lester B. Pearson, PC, CC, OM, OBE, MA, LLD. Volume 3. 1957-1968*, ed. John A. Munro and Alex I. Ingalls (Toronto: University of Toronto Press, 1975), 47. Pearson also noted "There was even an apparent vindictiveness in the decision to scrap the five completed planes and the others half completed so that no museum of science and technology would ever be able to show what we could design and produce. It was on this irrational element in the decision that we centred our attack, thus reflecting the feelings of most Canadians." Pearson, 47-48. See also John English, *The Worldly Years. The Life Of Lester Pearson. Volume II: 1949-1972* (Toronto: Vintage Books Canada, 1993).

criticism became.¹²¹ But the Arrow would have its revenge. According to Douglas Harkness, who succeeded Pearkes as MND (1960-1963), the manner in which the Arrow programme was handled “really started the lack of credibility in the decisiveness and the ability of the government.”¹²²

The Arrow weapons acquisition process had finally come to an end - much to the relief of the CSC, CDC, and Cabinet. In the end, and despite the interminable debate, the decision to abandon the Arrow programme was, according to Denis Smith:

not a particularly troubling one. [Diefenbaker] had a united cabinet and caucus, and faced an opposition reluctant to criticize the government's logic. The press, too, was broadly sympathetic and took the prime minister's cue in calling for real American concessions on the sharing of defence contracts. Diefenbaker was in good spirits, still exhilarated by his mastery of parliament and his command of the headlines.¹²³

The RCAF and the CSC, however, were less than enthused by the ramifications of the decision. In the RCAF's opinion, though the Soviet bomber threat had lessened, it still existed and represented an enemy which had to be met by interceptors as well as BOMARCs. After all, the missile was intended to serve alongside of, not instead of, the interceptor. However, according to Foulkes, the government always appeared “intrigued by the possibility that the relatively cheap BOMARC offer by the United States might reduce if not eliminate the need for additional interceptor aircraft.”¹²⁴ Thus the RCAF and the CSC were

¹²¹ Stewart, 269-272.

¹²² Stursberg, 122.

¹²³ Smith, 326.

¹²⁴ DHH/DND, Foulkes Papers, 18.

ill at ease that Diefenbaker, in his misleading September and February statements, had relied on military arguments emphasizing the diminishing Soviet bomber threat and the advent of the missile - arguments the CSC had specifically opposed - to justify the cancellation rather than economic arguments emphasizing the extraordinary costs of the Arrow programme. Jon McLin believed such disingenuousness over the course of the Conservative government's involvement with the project was a part of a strategy to associate its military advisors with the decision:

All of this could have been avoided, and a considerable saving achieved of mental gymnastics needed to defend contradictory arguments, by a frank admission of the fact that the Arrow was cancelled because it was too expensive for Canada to buy. Such an admission, however, required the recognition, psychologically and politically difficult, that Canada could no longer pay the price which advancing technology exacted to remain a producer of the more sophisticated military equipment. Unwilling to recognize the loss of power and prestige involved, the politically-sensitive Diefenbaker government obscured the issue. This made the future adjustment more difficult and lengthy without rendering it less painful.¹²⁵

Campbell in particular had demanded that the cancellation of the Arrow programme be coupled with an announcement that a comparable American interceptor would be quickly procured. However, the RCAF's and the CSC's worst fears were soon realized: the procurement of an alternative US interceptor immediately following the cancellation of the

¹²⁵ McLin, 84. Foulkes reportedly referred to Diefenbaker's February statement as a "masterpiece of subterfuge." Smye, 2.

project proved to be politically unacceptable to the Cabinet.¹²⁶ As Diefenbaker stated almost a year later:

If the [CDC] reported that security demanded the acquisition of these aircraft, then that would have to be the decision. To purchase them, however, would cause great difficulties. It would place him and the Minister of National Defence in impossible positions. On the other hand, failure to re-equip would be bad for the morale of the RCAF. He thought the public had been convinced of the wisdom of the government's decision to cancel the Arrow. To obtain other aircraft now in the face of statements that the threat of the manned bomber was diminishing and that the day of the interceptor would soon be over would be most embarrassing unless a reasonable explanation could be given. Additional BOMARCs in Canada might be an alternative. The [CDC] should first examine carefully what had been said publicly by himself and other Ministers about cancelling the Arrow and, in the light of that, consider what was possible. In any event, the safety of the nation should be the paramount consideration no matter what the consequence. He had been against cancelling the Arrow but had been persuaded otherwise.¹²⁷

The decision on an alternative US interceptor was thus delayed, and it would be July 1961 before the RCAF's five remaining NORAD squadrons were re-equipped with sixty-six surplus ex-USAF Voodoos.¹²⁸

¹²⁶ Slemon even took the step of outlining the RCAF's bitterness over the government's inaction in a letter to his American superior, although he recognized that the cancellation of the Arrow programme left the government with "a major political headache." DHH/DND, series 1, file 13, Air Defence Requirements, 12/03/59-05/01/60, Air Marshal C. R. Slemon, Deputy Commander-in-Chief, to Commander-in-Chief, NORAD, 28 January 1960.

¹²⁷ NAC, CC, 6 February 1960, 2. The Voodoo procurement was discussed over the course of several CSC, CDC, and Cabinet meetings. The CCs do not support Diefenbaker's statement that he had been opposed the cancellation, and he should not be taken seriously. However, there is little doubt that Diefenbaker "always felt that we had been jockeyed into the position of cancelling the Avro Arrow by the military...and some other senior advisers of the government." Roy, 324, quoting E. Davie Fulton, Minister of Justice in the Conservative government.

¹²⁸ The US initially offered to give the Voodoos to Canada, but this was rejected as a form of military aid. In the end they were traded to Canada as part of a complex exchange

As for Avro, its last chance for survival was the contract to licence-build the aircraft which had been chosen to re-equip the Air Division, the Lockheed California Company's CF-104G Starfighter.¹²⁹ At a 14 August 1959 Cabinet meeting,¹³⁰ Cabinet observed that the "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." However, Cabinet acknowledged that "Canadair had taken the initiative of seeking private orders, whereas A.V. Roe had failed to do so and had merely disintegrated."¹³¹ Moreover, Cabinet believed:

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.¹³²

of defence responsibilities and orders. It is ironic that this is a similar arrangement to that proposed by the Americans in 1958 with regard to the Arrow. McLin, 100-105. Diefenbaker would later refuse to negotiate with the US to accept nuclear warheads for the weapons Canada had purchased after the cancellation of the Arrow programme, thereby spending hundreds of millions of dollars "for the most impressive collection of blank cartridges in the history of military science." Newman, 354. See also Granatstein, *Canada 1957-1967*; and Lawrence Martin, *The Presidents & The Prime Ministers. Washington and Ottawa Face to Face: The Myth of Bilateral Bliss 1867-1982* (Toronto: PaperJacks Ltd., 1982).

¹²⁹ See David L. Bashow, *Starfighter. A loving retrospective of the CF-104 era in Canadian fighter aviation 1961-1986* (Stoney Creek: Fortress Publications Inc., 1991); Milberry, *Sixty Years*; and Molson and Taylor.

¹³⁰ NAC, CC, 14 August 1959, 4-6. The Starfighter procurement had previously been discussed at several CSC, CDC, and Cabinet meetings.

¹³¹ NAC, CC, 14 August 1959, 5.

¹³² NAC, CC, 14 August 1959, 5.

Cabinet considered Canada's aerospace industry to be over-expanded. Therefore, Canadair, having submitted a lower bid, received the contract, although Orenda did receive the contract to licence-build the Starfighter's engine.

A kind of natural selection had occurred within Canada's aviation industry. During the six-month extension, Avro and Orenda engaged in an exercise of wishful thinking and did little to prepare for possibility of the Arrow programme's cancellation. Indeed, much of what they had done was counterproductive, such as blackmailing the government with threats of massive lay-offs and hiring Cockfield, Brown, and Company (a Liberal advertising firm) to conduct a high-profile and very public lobbying campaign.¹³³ Pearkes later recollected that the government felt "besieged by the A.V. Roe people,"¹³⁴ and Diefenbaker told the House of Commons that "no one will ever know the strength of the pressure that was brought against the cabinet to force it to do that which was not fair to the Canadian people."¹³⁵

Essentially, Avro and Orenda conducted their business, at best, as if they were still wartime crown corporations, at worst, as if they were an arm of the RCAF. Fred Smye, the President and General Manager of Avro, claimed that "Avro and Orenda were the industrial

¹³³ DHH/DND, Foulkes Papers, 19; Smith, 313; and Diefenbaker, 40. Foulkes later wrote that Diefenbaker "suspected the military, particularly the Air Force, of leaking information to the Company and of urging them to exert pressure on the Government.... There were perhaps some grounds for the Government's suspicion, as there had to be a close liaison between the airforce and the operating branches of the company." DHH/DND, Foulkes Papers, 19.

¹³⁴ Roy, 318.

¹³⁵ Newman, 348.

arm of the RCAF and servants of the government, as is any purely defence contractor. The companies had fulfilled this role solely from their inception and for a period of fifteen years."¹³⁶ Thus Diefenbaker may have been correct when he noted "the company seemed horror-struck at ever having to compete in a normal marketplace situation."¹³⁷ Michael Bliss was harsher than Diefenbaker in his judgement of the companies: "The evidence suggests that A.V. Roe was a classic promotional company...built on wild optimism, taxpayers' money, media gullibility, and Canadians naive patriotism."¹³⁸ And Julius Lukasiewicz was critical of everyone involved in the Arrow weapons acquisition process:

Canada's venture into high-speed aeronautics was characterized by technical and managerial incompetence, inept organization, and bureaucratic inefficiency. But the failure of the enterprise resulted from a more fundamental cause: the unrealistic goal of achieving industrial and military sovereignty and self-sufficiency in military aviation. Throughout the 1950s, Canadian decision makers in the military, political, and bureaucratic domains allowed themselves to be swayed by visions of prestige and national pride. They failed adequately to assess and appreciate the resources, experience, and large markets necessary to pay for research and development costs. Erroneously, the country's record as a wartime manufacturer of aircraft was regarded as significant foundation for original design work. Even private ventures such as Avro - a new company with imported talent and generous government funding - badly misjudged the extent of the task before them.¹³⁹

Both companies now suffered the consequences for gambling their future on a single defence order.

¹³⁶ Smye, 83. Fleming later wrote that management at Avro and Orenda informed the government that they wanted to be looked upon as "the government's arsenal." Fleming, *The Summit Years*, 11.

¹³⁷ Diefenbaker, 38.

¹³⁸ Bliss, *Northern Enterprise*, 475-476.

¹³⁹ Lukasiewicz, 253.

In Avro and Orenda's defence, however, they were not solely at fault for the poor state of relations between the companies and the government. Cabinet had a hostile attitude toward company management (though the feeling was mutual) which did not facilitate proper communication. In addition, despite Diefenbaker's later belief that "in effect, [we] gave Avro a year and one-half's notice for what, in hindsight, was the inevitable,"¹⁴⁰ the government had sent a mixed message to Avro and Orenda by delaying production for six months and asking them to explore the substitution of American electronics and missile systems. Though the tone of the government's September announcement indicated to the House of Commons, the press, and most of the public that the Arrow programme was about to be ended, it did not say so conclusively enough for Avro and Orenda, who continued to operate as if the excellence of their product alone guaranteed its production and their corporate future.¹⁴¹

Between 1959-1962, Avro's operations wound down, its management and workforce personnel departing for positions with other Canadian, British, but mostly American companies or agencies, with many making an invaluable contribution to prestige projects such as the Anglo-French *Concorde* programme and NASA's space programme.¹⁴² "They're

¹⁴⁰ Diefenbaker, 34.

¹⁴¹ "The Avro Nettle Patch," *The Economist*, 28 February 1959, 790. See also "Dilemma for Canada's Defence Industry, *The Economist*, 11 April 1959, 136, 139. Though the author of these two pieces is simply identified as "Our Ottawa Correspondent," there is evidence to suggest that the author was Norman Robertson, Canadian Ambassador to the US and a former Undersecretary of State for External Affairs. Campagna, *Storms Of Controversy*, 152.

¹⁴² McDougall, 13-15. "The Canadian government unintentionally gave the American space program its luckiest break....The Canadians never gained much public

hanging crepe at Malton and ringing their bells at Boeing,”¹⁴³ wrote James Minifie of the end of the Arrow programme and the departure of the technicians and engineers. But though Avro died, taking with it almost twenty-five per cent of employment in the aerospace sector, the diversified parent company, A.V. Roe, survived.¹⁴⁴ In 1962 it was renamed Hawker-Siddeley Canada Limited, the name under which it still operates.¹⁴⁵

“Ironically,” Dan Middlemiss wrote, “it was the failure of the centrepiece of this ‘go-it-alone’ defense industrial strategy - the CF-105 Arrow jet interceptor program - that prompted the Canadian government to seek another accommodation with the United States in the defense economic field.”¹⁴⁶ In 1958-1959, the Diefenbaker government negotiated with the US the Defence Production Sharing Agreement (DPSA), acknowledging that in the case of major modern weapons systems, Canadian research and development would thereafter be integrated with - and in compliance with the strategic principles of - Canada’s

recognition for their contribution to the manned space program, but to the people within the program their contribution was incalculable....They had it all over us, in many areas...just brilliant guys....They were more mature and they were bright as hell and talented and professional, to a man.” Campagna, *Storms Of Controversy*, 195, quoting Charles Murray and Catherine Bly-Cox, *Apollo: The Race to the Moon* (New York: Simon and Schuster, 1969).

¹⁴³ Minifie, 153, quoting Professor Norman Mackenzie.

¹⁴⁴ Shaw, “The Influence of Post-War Continental Air-Defence Strategies and National Economic Development Policies on the Industrial Organization of the Canadian Aerospace Industry,” 84.

¹⁴⁵ Orenda became a division of Hawker-Siddeley Canada.

¹⁴⁶ Dan Middlemiss, “The Road From Hyde Park: Canada-US Defense Economic Cooperation,” in *Fifty Years Of Canada-United States Defense Cooperation. The Road From Ogdensburg*, ed. Joel J. Sokolsky and Joseph T. Jockel (Lewiston: The Edwin Mellon Press, 1992), 184.

closest ally, the US. Colonel Charles P. Stacey, the great Canadian military historian, put it another way: "This dramatic affair made it painfully clear to the Canadian public that in the future Canada, whether she liked it or not, was likely to be militarily dependent on the United States to an extent unknown in the past."¹⁴⁷ Melvin Conant summed up the reason for this dependency:

Canadians have been victims of the sweeping and extraordinary rapid revolution in weapon systems, a change so extensive and of such headlong pace that no nation lacking an enormous industrial capacity, sizable reservoirs of technical skills, great wealth and technological and research facilities of impressive number can ever hope to contribute in a significant manner towards the requirements of strategic air or missile defence. A nation not so endowed, and associated with a global power, can hope only to make a moderately useful and modest contribution towards their common defence. In weapon development Canadians became subject not to the whims of the US Defense Department but to the scope of the American effort...No one would ever deride the *quality* of Canadian research and weapons development, but the *scale* on which these programmes must be conducted precludes most nations, including Canada, from participating meaningfully in the race.¹⁴⁸

With the DPSA, Canada effectively abandoned the independent design of complete weapons systems such as the Canuck and the Arrow, accepted the reality of procurement reliance on the US, and profited through guaranteed access to the enormous and lucrative US defence marketplace in a manner analogous to the Canada-US Auto Pact of 1965.¹⁴⁹ And,

¹⁴⁷ C.P. Stacey, "Twenty-one years of Canadian-American Military Co-operation, 1940-1961," in *Canada-United States Treaty Relationships*, Duke University Commonwealth-Studies Centre Publication Number 19, ed. David R. Deener (Durham: Duke University Press, 1963), 116.

¹⁴⁸ Conant, "Canada and Continental Defence," 226.

¹⁴⁹ The academic literature on Canada-US cooperation in the area of defence production during this period is vast. For a representative sample see Byers, "Canadian Defence and Defence Procurement;" Conant, "Canada and Continental Defence;" Conant,

in no large part due to the DPSA, Canada's remaining aircraft manufacturers survived by producing components of American weapons systems. In the end, as Robert Bothwell observed, "Canadian defence needs were satisfied with less costly American aircraft, and Canadian defence industrial needs were met by the conclusion of a defence production-sharing agreement with the United States, and by the stipulation that weapons bought by Canada involve some manufacturing in Canada."¹⁵⁰ Defence policy, like foreign policy, turned out to be the art of the possible. But the survival of the aviation industry led to a state

The Long Polar Watch; Crane; Alistair Edgar and David Haglund, *The Canadian Defence Industry in the New Global Environment* (Montreal and Kingston: McGill-Queen's University Press, 1995); John Gellner, "The Place Of Defence In The Economic Life of Canada," in *The Canadian Military. A Profile*, ed. Hector J. Massey (Toronto: The Copp Clark Publishing Company, 1972), 119-137; John J. Kirton, "The Consequences of Integration: The Case Of The Defence Production Sharing Agreements," in *Continental Community? Independence and Integration in North America*, ed. W. Andrew Axline, James E. Hyndman, Peyton V. Lyon, and Maureen A. Molot (Toronto: McLelland and Stewart Limited, 1974), 116-136; McLin; Middlemiss and Sokolsky; Dan Middlemiss, "Canada And Defence Industrial Preparedness: A Return To Basics?," *International Journal* XLII, no.4 (Autumn 1987): 707-730, also in *Canada's Defence. Perspectives On Policy In The Twentieth Century*, ed. B.D. Hunt and R.G. Haycock (Toronto: Copp Clark Pitman Ltd., 1993), 242-257; Dan Middlemiss, "Defence Procurement In Canada," in *Canada's International Security Policy*, ed. David B. Dewitt and David Leyton-Brown (Scarborough: Prentice-Hall Canada Inc., 1995), 391-412; Middlemiss, "Economic Defence Co-operation with the United States 1940-1963; Middlemiss, "A Pattern of Cooperation: The Case of the Canadian-American Defence Production and Development Sharing Agreements, 1958-1963;" Morton, *A Military History Of Canada*; Morton, *Canada and War*; Shaw, "The Influence of Post-War Continental Air-Defence Strategies and National Economic Development Policies on the Industrial Organization of the Canadian Aerospace Industry;" Stacey; Robert Van Steenburg, "An Analysis Of Canadian-American Defence Economic Cooperation: The History And Current Issues," in *Canada's Defence Industrial Base: The Political Economy of Preparedness and Procurement*, ed. David G. Haglund (Kingston: R.P. Frye, 1988), 189-219; Warnock; and Willoughby.

¹⁵⁰ Bothwell, 117-118. "It was in this way [the DPSA] that the Diefenbaker government defended Canada against the horrors of continentalism." Bothwell, Drummond, and English, 244.

of affairs in Canada where, in 1997, "if it no longer makes the world's best warplane, it makes the world's best commuter airplane."¹⁵¹

The six existing Arrows were offered to the NAE, NACA, and the RAE for research purposes, but they were rejected because it was deemed simply too expensive to keep such a small number of aircraft flying. These six Arrows and thirty-one others in various stages of completion on the assembly line were stripped of all classified material and scrapped by DDP, not out of Diefenbaker's vindictiveness as "Arrowheads" have often claimed, but simply due to bureaucratic standard operating procedure for reasons of national security and - on a very small scale - partial cost-recovery.¹⁵²

¹⁵¹ "The legacy of the Avro Arrow," A2.

¹⁵² Diefenbaker always stated that "I had no knowledge whatsoever of this action." Diefenbaker, 42. The evidence supports this claim as the orders to scrap the existing Arrows were issued after correspondence between Pearkes, Campbell, Miller, and David Golden, DM, DDP (1954-1962). See Campagna, *Storms Of Controversy*; and the memoranda in NAC, DND, acc.83-84/167, box 6428, file S1038-CN-180, CF-105 Arrow Aircraft - General, 1952-1962, pt.26; and DHH/DND, file 79/333, NDHQ, DHIST, March 13, 1959 - January 11, 1980, Eyes Only - Director, DHIST, re. responsibility for scrapping Arrow prototypes. There was an additional reason why DDP was assigned the task: "Declaring as surplus material to Crown Assets Disposal agency. This course is not recommended for the reason that this agency has the prerogative of selling this material in its original state. This course could lead to subsequent embarrassment, that is, airframe and engine could conceivably be placed on public view or even, in fact, used as a roadside stand. This, I am sure, you will agree is most undesirable." DHH/DND, file 79/333, NDHQ, DHIST, March 13, 1959 - January 11, 1980, Eyes Only - Director, DHIST, re. responsibility for scrapping Arrow prototypes, Air Marshal Hugh Campbell, Chief of the Air Staff, "Memorandum. The Minister (Through The Deputy Minister). Arrow Cancellation - Disposal of Material," 26 March 1959.

CHAPTER FOUR

The Second World War gave us delusions of grandeur. There would someday be a reckoning. Part of it would come when our military-industrial complex's war-bred fantasies about all-Canadian armaments were shot down by a prairie populist. John Diefenbaker was right to kill the Avro Arrow because Canada could not afford its out-of-control costs. But then the myth-makers got to work and convinced our politicians never to dare tamper with another sterling Canadian megaproject. Hence the CANDU reactor; hence the Canadair Challenger; hence Hibernia - even as we systematically starved our military.¹

Conclusion.

In his lecture *The Battle For History. Re-Fighting World War Two*, the eminent British military historian John Keegan remarked:

The history of the Second World War has not yet been written. Perhaps in the next century it will. Today, though fifty years have elapsed since it ended, the wounds it inflicted still cut too deep, and the unresolved problems it left still bulk too large for any one historian to strike an objective balance."²

Perhaps the same could be said about the "dogfight" (to use an aviation term) surrounding the history of the Arrow programme. "No incident in the history of Canadian foreign relations," opined Donald Story, "has produced such vitriol, heated emotion, prejudice, and

¹ Bliss, "Canada's Swell War," 64.

² John Keegan, *The Battle For History. Re-Fighting World War Two* (Toronto: Vintage Books, 1995), 30.

unforgiving blame than the Arrow affair.”³ In the popular literature surrounding the Arrow programme, responsibility for the Arrow’s cancellation is invariably ascribed to the Conservative government and, more often than not, John George Diefenbaker himself is held personally responsible: “He was condemned as if he had left all Canadians naked before armed aggressors.”⁴ Even James Floyd, Vice-President of Engineering at Avro, recognized this imbalance in this literary genre: “Blame for the cancellation of the Arrow has, almost without exception, been laid squarely on Diefenbaker, but he was in some ways only the Pontius Pilate in the crucifixion of both the Arrow and the company.”⁵ Defeat in the election of 1957 evidently saved the Liberals from having to accept any responsibility for the Arrow programme, and thus the role of the government of Louis St. Laurent in this weapons acquisition process is under-emphasized or ignored altogether. As Michael Bliss wrote:

If C.D Howe had had to scrap the Arrow, his reputation as a dynamic builder might have been permanently tarnished. Since it was Diefenbaker, the bumbling Prairie lawyer, who had done the deed, Howe’s role in the Arrow débâcle - it developed almost directly from his over-rating of his own, the government’s, and the nation’s accomplishments during the war - could be largely forgotten. The fact that it was a wasteful sacrifice of Canadian taxpayers’ money on suspect altars of economic nationalism and high technology could be forgotten. Then a whole new Arrow mythology could develop: the world’s greatest fighter plane cruelly and mistakenly brought down by Canadian’s lack of enterprise and vision. If Dief had only had the faith to stand by Crawford Gordon and the Avro team...just a few more million....

³ Donald C. Story, “Canadian Defence Policy: The Case Of The Avro Arrow,” (MA paper, University of Toronto, 1970), 35.

⁴ Nicholson, 318.

⁵ Floyd, “The Avro Story,” 130.

The Arrow myth, like the Howe legends, flourished in the 1960s and afterwards because Canadians became so confident of their country's wonderful wealth and boundless future that they had trouble understanding that there were limits to the capacity of the northern economy. All those resources, all that growth, surely meant that government was doing something right. It must have succeeded. Canada was a land of big developments, big accomplishments. Unless they were frustrated by little men, disbelievers.⁶

Though Diefenbaker, as Prime Minister, is ultimately responsible for the decision to cancel the Arrow programme, this thesis has shown that the widely held conventional wisdom about the project is neither a fair nor objective assessment of the historical record. The decisions which led inevitably to the cancellation of the project were made during the Liberal's tenure in office. "If the Liberal administration had been obliged to face up to an additional \$800 million to complete the project," General Charles Foulkes, the Chairman of the CSC, later recalled, "the chances of the survival of the programme [would] have been very slender."⁷ John Holmes came to a similar conclusion:

When the Conservative party came to power in 1957 they proceeded without question to the culmination of a continental defence association by hastily approving NORAD, and when they had buried the great nationalist Liberal adventure in aircraft building, the Arrow, they promptly sought in Washington a new agreement of defence production sharing....A Liberal government would almost certainly have done all the same things.⁸

But even Diefenbaker appeared to have understood that he alone would bear the judgement of history when he was asked about the Arrow programme in later years:

⁶ Bliss, *Northern Enterprise*, 477.

⁷ DHH/DND, Foulkes Papers, 39.

⁸ John W. Holmes, *The Shaping of Peace: Canada and the search for world order, 1943-1957*, vol. 2 (Toronto: University of Toronto Press, 1983), 284.

The responsibility finally rests with the Prime Minister. No one else. He takes the best advice he can get. But decision on all vital matters must finally receive his approval. The Cabinet Minister who heads the portfolio directly concerned with the decision made by the Cabinet often speaks about what he has done with a tone of subdued personal adulation. But when things turn out badly "the old man," they said, "was always responsible."

To use the words of Harry Truman, over each Prime Minister's desk there is an imaginary plaque. It carries the message, "The buck stops here." Take for example the Avro Arrow decision....The Cabinet took the decision on ending production of the Avro Arrow. That decision should have been taken before the Liberals left office. Indeed, St. Laurent and Howe decided they would close it out...but decided not to do so before an election. That was a very hard decision to make for my colleagues and me. The responsibility for the decision finally rested on the Prime Minister. No one else....That decision had to be made even though I realized that there would be the strongest opposition. When hard decisions conscientiously arrived at have to be made, leaders must make them.⁹

Undeniably, the Arrow programme will be forever linked in the public's mind with an administration that has itself been judged harshly by many political scientists and historians. As Richard Gwyn quipped, "in almost everything Diefenbaker did, farce was inseparable from tragedy."¹⁰

The purpose of this case study was to examine how the civil-military decision-making process unfolded during the Arrow programme. As Dan Middlemiss wrote, "the major determinants of Canadian defence procurement fall into two general categories:

⁹ Thomas A. Hockin, "Three Canadian Prime Ministers Discuss The Office," in *Apex Of Power. The Prime Minister and Political Leadership in Canada*, 2d ed., ed. Thomas A. Hockin (Scarborough: Prentice-Hall of Canada, Ltd., 1977), 249-250. About the opposition, Diefenbaker went on to say that "Naturally, the attack on the decision was concentrated in the area particularly affected." Hockin, 250.

¹⁰ Richard Gwyn, *49th Paradox. Canada in North America*. (Toronto: McLelland and Stewart Limited, 1985), 110.

external and domestic.”¹¹ This thesis has indeed demonstrated that the cancellation of the Arrow programme was due to an external military factor - dramatic strategic shifts internationally - and a domestic political-economic factor - the harsh financial realities the project faced and a flawed weapons acquisition process driven by an overly ambitious RCAF.

This case study has shown that *the* decisive factor leading to the cancellation of the Arrow programme was the escalating overall cost of the project, largely attributable to the acceleration and expansion of the project from one to four systems - the Arrow airframe, the Iroquois engine, the Sparrow II missile, and the Astra electronics system. These costs were only vaguely calculated during the initial phase of the project, but concern over the costs increasingly became an obsession of the civil and military decision-makers as the project unfolded and as defence budgets shrank. What was certainly feasible in the budgetary environment of 1952-53 was proven uneconomic in the fiscal climate of 1958-1959. Given the financial implications of the project, J.L. Granatstein concluded that the decision to cancel the project was the correct one and “the only one possible in the circumstances. Despite arguments then and later about the CF-105's technological sophistication, Canada could simply not afford to pay the costs involved in creating a modern weapons system....The only error in the government's decision was that it had not been made earlier.”¹² Desmond Morton concurred, writing that the cancellation was “the right choice made the wrong way”¹³

¹¹ Middlemiss, “Defence Procurement In Canada,” 394.

¹² Granatstein, *Canada 1957-1967*, 109.

¹³ Morton, *A Military History Of Canada*, 243.

and further noting that it is “easy to blame politicians for the confusion of the Diefenbaker government but when ministers look bad, departments share the responsibility.”¹⁴

According to John Porter “the Arrow signified a coming of age of the Canadian aircraft industry. It proved to be an extraordinarily costly symbol.”¹⁵ Unlike the US, where until the end of the Cold War security considerations and procurement decisions were almost always driven by strategic factors, in Canada procurement decisions have invariably been driven by economic factors.¹⁶ With the cancellation of the Arrow programme, Canada began to experience “structural disarmament,” a phrase coined by Thomas Callaghan, Jr.:

Structural disarmament occurs when the market represented by a nation’s defence budget plus exports (the “structure”) is too small to bring armament development and production costs down “to a level either politically acceptable for governments or, equally, affordable to industry.”

The most celebrated explication of this trend comes from Norman R. Augustine, chairman and chief executive officer of Martin Marietta Corporation in the United States, who observed in 1980 that the unit cost of high-technology equipment seemed to be increasing by a factor of four every decade (by a factor of two in the case of ships and tanks)....The problem, as Augustine pointed out, was that “other relevant parameters, *e.g.* the defence budget” either did not grow at an equal rate or have actually declined.¹⁷

¹⁴ Morton, *Canada and War*, 181. “Within the Department of National Defence, the RCAF had suffered the most humiliation.” Morton, *Canada and War*, 181.

¹⁵ Porter, 551.

¹⁶ R.B. Byers, *Canadian Security and Defence: The Legacy and the Challenges*, Adelphi Papers No. 214 (London: International Institute for Strategic Studies, 1986), 5; and Van Steenburg, 196. Byers further added that “in effect, the concept of “security policy” has been alien to Canada’s approach to international affairs [even though] Canada’s security interests would be better served if this situation were rectified.” Byers, *Canadian Security and Defence*, 5.

¹⁷ Alistair and Edgar, 45. “Hypothetically - in Augustine’s perhaps not entirely facetious example - the result of constantly rising unit costs, measured against defence

According to Alistair Edgar and David Haglund, Canada became “the first of the larger defence industrial countries of the postwar era to succumb to Augustine’s Law, effectively abandoning domestic development of all major weapons systems or platforms.”¹⁸ From the late 1950s onward, the proportion of the federal budgets devoted to defence would decline sharply in relation to the burgeoning expenditures on health and welfare programmes; “the welfare state,” Reg Whitaker and Gary Marcuse concluded, “decisively won out over the warfare state.”¹⁹

The harsh financial reality of “structural disarmament” due to the skyrocketing costs of developing modern weapons systems had the most detrimental effect on the Arrow programme. But another factor which made the project unviable was the “creative destruction” it suffered due to dramatic strategic shifts driven by the rapid pace of development of other kinds of modern weapons. As has been shown, by the late 1950s a market had been created for a new technology - the guided missile - which partially destroyed the market for an old technology - the manned interceptor. The steady growth in the strategic and tactical significance of the missile, both as a threat in the form of the ICBM supplanting bombers and as a means of defence in the form of the BOMARC replacing

procurement budgets that increase more modestly or even decline, could be that by the year 2054 (based on 1980 budget projections) the entire US defence budget would allow the purchase of just *one* tactical aircraft. For other NATO countries, however, the impact of such trends ceased to be a laughing matter long ago.” Edgar and Haglund, 45, quoting Thomas A. Callaghan, Jr., *Pooling Allied and American Resources to Produce a Credible, Collective Conventional Deterrent* (Washington: United States Department of Defence, 1988), 23, 31-32.

¹⁸ With the exception of ships for the RCN. Edgar and Haglund, 45.

¹⁹ Whitaker and Marcuse, 155.

interceptors, concomitantly had a negative impact on the Arrow programme. The inclusion of ICBMs in the Soviet arsenal and BOMARCs in the RCAF's arsenal came at the expense of the Arrow programme as both deployments led inexorably to a RCAF operational requirement for interceptors in 1959 one-tenth of what had been anticipated in 1952. As Jon McLin noted, the "story of the gradual expansion of this program is a classic case of the difficulties which all but the greatest Powers have in the missile age of keeping up with armaments technology."²⁰

This thesis has also revealed that the key to understanding why the Arrow programme unfolded as it did is an appreciation of the weapons acquisition process itself. Though the project was allowed to accelerate and expand beyond salvage while the Liberal government was in power, it did so not at the direction of those at the "top" of the decision-making process - the MND, the CDC, and the Cabinet - but rather at the direction of those at the "bottom" - the RCAF acting through the CSC. However, though the RCAF was good at advancing its organizational interests, the RCAF's best laid air defence plans came to nought in the end:

The RCAF proved to be far better at the political gamesmanship involved in weapons acquisition than either of the other services...Ironically, however the RCAF's insistence of a defence system embodying both the BOMARC and the CF-105 Arrow without an appreciation of the government's ability to financially support both programs ultimately undermined that service's plans....this was remarkably shortsighted of the RCAF; indeed [it was] self-destructive to its top priority - a new manned interceptor.²¹

²⁰ McLin, 63.

²¹ Clark, 45.

Thus, until the demise of the Arrow programme, the defence decision-making structure functioned in such a manner that defence procurement largely determined defence policy, rather than *vice-versa*. Dan Middlemiss confirms the existence of this feature of the defence decision-making process:

Over time...each service developed a professional ethos tightly wedded to the continued acquisition of major weapons systems suited to largely alliance-driven doctrinal norms and roles. So long as the main organizational pillars of Canadian defence policy remained unchanged, each service continued to advocate procurement of those systems which protected and advanced its own conception of its organizational essence.

Thus defence procurement became infused with an equipment replacement syndrome, whereby major weapons were replaced with improved versions of essentially the same weapons on roughly a one-for-one basis. Accordingly, Canadian defence policy became largely a matter of defence procurement, with existing equipment generally determining the numbers and type of weapons to be procured. This closed loop of defence procurement made it very difficult for politicians, had they been disposed, to propose significant changes in Canadian defence policy.²²

"Generals, it is often said," wrote R.J. Sutherland, "prepare for the last war rather than the next."²³ It was this kind of tactical and strategic logic which led to the Arrow programme. To use another aviation term, the RCAF and the CSC were "flying blind" when they initiated the project. The emerging threat posed by Soviet bombers and ICBMs was far from clear when the RCAF set the performance and operational requirements for an interceptor designed solely to meet massed bomber attacks of the kind familiar to those officers who had served during World War Two. The romance of a single pilot in his Spitfire flying sortie after sortie against the *Luftwaffe* during the Battle of Britain remained

²² Middlemiss, "Defence Procurement In Canada," 395.

²³ Sutherland, 199.

a powerful institutional memory for the RCAF, but the reality of aerial warfare in the atomic age was that there would likely be no protracted warfare and an interceptor would likely only be used only once. The real value of modern weapons systems like the Canuck, the Arrow, the BOMARC *et al*, was in deterrence, not in defence - *i.e.*, protecting the retaliatory capability of SAC. As James Eayrs rightly surmised, "a battle over North America could under no imaginable circumstances promote the national interest of either country of the continent. The role of fighter interception in the 1960s will be to help insure that such a battle is never fought, not to take part in it."²⁴ Other than for identification purposes of unidentified and unresponsive aircraft, in the atomic world the utility of an advanced interceptor such as the Arrow over a less advanced interceptor or a cheap and efficient missile was certainly debatable. But the RCAF, "devoted to their aeroplanes like cavalry to its horses,"²⁵ chose to fiercely support the procurement of both missiles and the world's finest interceptor, inopportunistly at a time of financial, political, and strategic uncertainty. The RCAF's dual procurement goals, wrote David Cox, reflected the fact that air defence questions in the 1950s were contentious and paradoxical: "Prudence and tradition required an air defence capability, but strategic doctrine suggested there was little point to extensive anti-bomber defences."²⁶

In addition to tactical and strategic concerns, the technological possibilities for weapons system development were rarely well understood by those involved in the Arrow

²⁴ Eayrs, *Northern Approaches*, 24.

²⁵ "The Avro Nettle Patch," 790.

²⁶ Cox, 6.

programme because the RCAF decision-makers generally failed to make a thorough assessment of the technological horizon before they launched their new venture. The RCAF routinely compounded the unknowns the project faced by setting performance requirements far beyond the state of the art. The RCAF was also “flying blind” when it imposed concurrency on a project that was intended to make a great leap forward technologically. In the final analysis, the RCAF rushed headlong into a project that needed to proceed in a more orderly and thoughtful manner. If the RCAF and the CSC were “flying blind,” so to were the MND, CDC, and Cabinet in that they were overly reliant on the flow of information and advice on a body which had made neither rational strategic nor manageable fiscal plans. As a result, the Arrow programme was “a weapons acquisition accident waiting to happen.”²⁷ The Arrow programme was, therefore, poorly served by the formal “Command Era” national security bureaucracy decision-making structure that existed in the post Second World War period: “misplaced priorities, missed opportunities, and an aversion to decision have been common characteristics of the history of Canadian aircraft acquisition.”²⁸ This point of view is confirmed by Major-General D.G. Loomis:

the gap between military programming and budgeting left the Minister of National Defence and the Government with no alternative but to cut-back military programs each year in the course of the budget review. The choices and decisions in forces and major weapons systems acquisition often had to be made without adequate information as their future cost implications or their cost effectiveness relationships in terms of the missions they were designed to perform, and all within the few weeks allotted to the budget

²⁷ The preceding two paragraphs are in part a paraphrasing of Brown’s own conclusion about the US strategic bomber programme. Brown, *Flying Blind*, x, 14, 312-313.

²⁸ Byers, *Canadian Security and Defence*, 2, quoting C.R. Nixon, a DM, DND, during Liberal Prime Minister Pierre Trudeau’s years in government.

review process. Consequently, choices with important long range resource implications were often forced to decision prematurely or without adequate consideration of all the major alternatives, and the limited time for decision often led to over-commitment. Later these decisions frequently resulted in uneconomical program "stretch outs" or outright cancellation of projects on which large sums had already been invested....²⁹

The Arrow programme, though the largest in sheer scale, was also not the last flawed weapons acquisition process that the CAF and the government would suffer.³⁰ Dan Middlemiss wrote that all that followed - airforce, army, and navy - would have elements in common with the Arrow programme:

There are some common threads underlying these cases. First, a lack of realistic, full-scope, initial cost estimates did not allow for the design changes inevitable in risky military development projects. Second, and related to this, inadequate project management controls and reviews permitted development costs to balloon. Third, the export potential of projects was not explored fully and carefully at the outset. Fourth, and most important of all, costly (and sometimes fatal) delays often resulted from weak government support for pursuing projects vigorously and expeditiously to a successful conclusion.³¹

²⁹ Bland, *The Administration Of Defence Policy In Canada*, 153, quoting D.G. Loomis, "Managing the Defence Services Program," *Canadian Defence Quarterly* no.7 (Spring 1978): 79-80.

³⁰ And Canada certainly was not unique in its experience with the Arrow programme: middle powers like Argentina, Egypt, Israel, India, Switzerland *et al* cancelled similar projects. Sweden represents a notable exception, but of course Sweden's neutralist foreign policy imperative is considerably different that of Canada. Lukasiewicz, 255-256. See also Michael K. Hawes, "The Swedish Defence Industrial Base: Implications for the Economy," in *The Defence Industrial Base And The West*, ed. David G. Haglund (New York: Routledge, 1989), 163-188.

³¹ Middlemiss, "Defence Procurement In Canada," 400.

Because of the Arrow and other weapons acquisition processes, “Canadianization” is something the CAF now endeavours to avoid or at least curtail. As General Paul Manson, the NFA project manager, observed:

When it comes to buying military equipment, the Canadian Armed Forces have traditionally been perfectionists. “Nothing but the best” has been the guiding principle and this has certainly contributed to the high level of performance of our forces over the years. But more and more the propensity to have our equipment tailor-made to our own rigid requirements has cost us dearly. This “Canadianization” of large military systems, particularly aircraft, is becoming a luxury we can scarcely afford, because it tends to be very expensive nowadays. Thus, it is now an established principle that, in proposing equipment buys to Cabinet, DND will not ask for more than we really need in terms of numbers and performance. With this in mind, and in the knowledge that many of the fighter aircraft on the market today are truly multi-role, highly capable machines, DND has decided to accept what is available “off-the-shelf,” (i.e. a standard model off an existing production line), keeping changes to an absolute minimum. “Canadianization” will be allowed only where it can be clearly justified on a cost effectiveness basis.³²

And thus the Avro Canada CF-105 Arrow passed into myth, where it will probably soldier on far longer than if it had actually entered service. As James Eayrs suggested:

For a force for which the sky was the environment, rather than the limit, nothing seemed impossible....The cancellation of this project seven years later, after the aircraft had reached the prototype stage of development and more than a billion dollars [would have to be] spent on it, dealt to the prestige and morale of the Air Force a blow from which it never fully recovered. Pride led to *hubris*, *hubris* to the CF-105.³³

³² Manson, 10. Manson would go on to become commander of Air Command (1983-1985) and Chief of the Defence Staff (1986-1989). After his retirement from the Canadian Armed Forces, he became president of the Montreal-based Paramax Systems Limited. Manson would himself become a victim of a cancelled programme when, in 1993, the Liberal government of Prime Minister Jean Chretien cancelled the European Helicopter Industries Limited EH-101 programme on which Paramax was the prime contractor. See Bercuson and Granatstein.

³³ Eayrs, *Peacemaking And Deterrence*, 123.

APPENDIX I¹

The Prime Minister, the Right Honourable John Diefenbaker, announced today that in recent weeks the government has fully reviewed the Canadian air defence programme in the light of the rapid development that has taken place during the past year in missiles for both defence and attack. In doing so it has had detailed advice from its military experts on the nature of attacks on North America that might be expected should a major war take place. A number of changes in the air defence programme have now been decided upon.

The government has concluded that missiles should be introduced into the Canadian air defence system and that the number of supersonic interceptor aircraft required for the RCAF air defence command will be substantially less than could have been foreseen a few years ago, if in fact such aircraft will be required at all in the 1960s, in view of the rapid strides being made in missiles by both the United States and the USSR. The development of the Canadian supersonic interceptor aircraft, the CF-105 or the "Arrow" was commenced in 1953, and even under the best of circumstances it will not be available for effective use in squadrons until late in 1961. Since the project began, revolutionary changes have taken place which have made necessary a review of the programme in the light of anticipated conditions when the aircraft comes into use. The preponderance of expert opinion is that by the 1960s manned aircraft, however outstanding, will be less effective in meeting the threat than previously expected.

It has therefore been decided to introduce the BOMARC guided missile into the Canadian air defence system, to be used in defence against hostile bombers. This is a long range, anti-aircraft missile guided from the ground with the aid of the same radar system as that used in guiding interceptor aircraft. It can be used with either a conventional high explosive warhead or a nuclear warhead. Two Canadian bases for firing such missiles will be established in the general northern Ontario and Quebec areas. The use of this missile will be in accord with the approved policy of NORAD for the air defence of the North American continent. Other BOMARC bases may be located in Canada in the later development of the programme but priority is being given to the two mentioned. Most of the industrial areas in Canada considered to be potential targets of air attack will be within the defensive range of the two projected BOMARC bases or others under NORAD control and located in the Northern United States.

Negotiations are under way with the United States to work out arrangements for obtaining these BOMARC missiles and the necessary equipment for maintaining, testing and launching them. Discussions will also be held on the best way for Canadian industry to share in the production programmes related to such missiles and associated equipment.

The government has also approved the extension and strengthening of the Pinetree radar control system, which was constructed, and is being operated, jointly by the United

¹ Diefenbaker Papers, VI, PMO Numbered Series, 1957-1963, vol. 55, file 171, Defence Expenditures - Aircraft 1958-1962, "Office Of The Prime Minister. Press Release. Revision Of The Canadian Air Defence Programme," 23 September 1958.

States and Canada. Several additional large radar stations will be constructed. These and the existing stations will be supplemented by a considerable number of small intervening stations.

In order that the Pinetree radar system may be able to deal more effectively with the increased speed and numbers of aircraft to be controlled and with the introduction of the BOMARC guided missiles, the government has decided to install the "SAGE" electronic control and computing equipment in the Canadian air defence system. This will be integrated as a part of the North American SAGE system under NORAD. Discussions are being initiated with the US authorities for the supply of the large electronic computers needed for the operation of this system and to arrange for Canadian industry to share in the production of the equipment required for the expansion of the radar network and the introduction of these semi-automatic communication and control operations.

The nine Canadian air defence squadrons already equipped with the CF-100 aircraft will continue in their present role pending their replacement with BOMARC weapons or squadrons with later types of aircraft. The whole complex of missiles and aircraft defence will be worked out, as changes are made, on an integrated North American basis under NORAD operational control.

In view of the introduction of missiles into the Canadian air defence system and the reduction in the expected need for manned, supersonic, interceptor aircraft, the government has decided that it would not be advisable at this time to put the CF-105 into production. The government believes, however, that to discontinue abruptly the development of this aircraft and its engine, with its consequent effects upon the industry, would not be prudent with the international outlook as uncertain and tense as it is. As a measure of insurance with present tensions as they are, therefore, the government has decided that the development programme for the Arrow aircraft and Iroquois engine should be continued until next March, when the situation will be reviewed again in the light of all the existing circumstances at that time.

Although both the Arrow aircraft and the Iroquois engine appear now to be likely to be better than any alternatives expected to be ready by 1961, it is questionable whether in any event their margin of superiority is worth the very high cost of producing them by reason of the relatively small numbers likely to be required.

As a further consequence of the reasons given above, the government has decided that it would be clearly unwise to proceed with the development of a special flight and re control system for the CF-105 aircraft known as the Astra and of a special air-to-air missile to be used as its armament known as the Sparrow. The contracts for the development of the Astra fire control system and of the Sparrow missile are now being terminated. In the meantime, modifications of the CF-105 will be made during its development to permit the use of a fire control system and weapon already in production for use in US aircraft engaged in North American defence. The important savings achieved by cancelling the Astra and Sparrow programmes and substituting these alternatives now in production would amount to roughly \$330 million for a completed programme of 100 aircraft.

The total cost to the Canadian government of developing the Arrow aircraft and its associated elements up to the beginning of September has been \$303 million. To finish this

development of the CF-105 and its components, including Astra and Sparrow, and to produce enough to have about 100 aircraft for squadron use would cost about another billion and a quarter dollars - approximately \$12.5 million per usable aircraft. By substituting the alternative fire control system and missile for the Astra and Sparrow the cost could be reduced to about \$9 million each.

Commenting on these announcements, Mr. Diefenbaker said that the government had to make highly difficult decisions on the basis of the best judgement as to probabilities in matters of uncertainty and importance, and opinions of military and other experts. Ensuring peace by the maintenance of an effective deterrent against aggression just clearly have priority over other considerations including cost but in working out a defence programme regard must be had to the relative effectiveness and cost of various means of achieving the essential objective.

While Canada's role in the coming age of missiles is entirely a defensive one, it will clearly involve this country in considerable disruption from time to time in production as well as in changes of the role of the defence forces. The government regrets the difficulties incident to such changes but finds them inescapable if regard is to be had to the changing needs which result from the rapid evolution in weapons.

It now seems evident that in the larger weapon systems now required for air forces, Canadian work in the design, development and production of defence equipment will have to be closely integrated with the major programmes of the United States. The US government recognizes this and they are now prepared to work out production sharing arrangements with us. To accomplish effective integration of defence production resources of Canada and the United States will require time and continuing efforts in cooperation.

"Canadians are proud of what the Canadian aircraft industry has accomplished for defence," Mr. Diefenbaker stated. "The Arrow supersonic plane has already thrilled us with its performance, its promise and its proof of ability in design and technology. The Iroquois engine too is a fine technical achievement and its development has led to many industrial advances. Excellent scientific and technical teams had been created for these projects. However, it will be recognized, I believe, that as the age of missiles appears certain to lead to a major reduction in the need for fighter aircraft, Canada cannot expect to support a large industry developing and producing aircraft solely for diminishing Canadian defence requirements.

The government deeply regrets the unemployment that will be involved in the termination of the Astra and Sparrow projects and in the Avro plant at Malton. It is hoped that our defence industry will be able to share effectively with the United States industry in one part or another of the major programmes in the air defence of the North American Continent and thereby provide alternative employment in the field of missiles and electronics.

In common with Canadians, the Government recognizes the accomplishments and technical quality of the work done, but to continue vast expenditures on aircraft and equipment which military and other expert opinion does not support as the best way to achieve the defence essential to our security would not only be wasteful but unjustifiable.

It is regrettable that in Canada's contribution to a full and effective part in the air defence of the North American Continent adaptation to changing techniques and the nature of potential threat to this Continent makes necessary from time to time changes in the requirements of deterrent power."

APPENDIX II¹

Mr. Speaker:

I wish to announce the decision relating to air defence which was foreshadowed in the statement given to the press on September 23rd.

The Government has carefully examined and re-examined the probable need for the Arrow aircraft and Iroquois engine - known as the CF-105 - the development of which has been continued pending a final decision. It has made a thorough examination in the light of all the information available concerning the probable nature of the threats to North America in future years, the alternative means of defence against such threats, and the estimated costs thereof. The conclusion arrived at is that the development of the Arrow aircraft and Iroquois engine should be terminated now.

Formal notice of termination is being given now to the contractors. All outstanding commitments will of course be settled equitably.

In reaching this decision the Government has taken fully into account the present and prospective international situation, including the strategic consequences of weapon development, and the effects of the decision I have just announced upon Canada's ability to meet any emergency that may arise.

Work on the original concept of the CF-105 commenced in the Air Force in 1952, and the first government decision to proceed with the development and with the production of two prototypes was taken late in 1953. The plane was designed to meet the requirements of the RCAF for a successor to the CF-100 to be used in the defence of Canada. At that time it was thought some five or six hundred aircraft would be needed by the RCAF and their cost was forecast at about \$1.5 or \$2 million each. From the beginning however, it was recognized by the previous Government, and subsequently by this Government, that the development of an advanced supersonic aircraft, such as the 105, and its complicated engine and weapon system was highly hazardous and therefore all decisions to proceed with it were tentative and subject to change in the light of experience. This was known to the contractors undertaking the development, to the Air Force and to Parliament.

The development of the Arrow aircraft and the Iroquois engine has been a success although, for various reasons, it has been much behind the original schedule. The plane and its engine have shown promise of achieving the high standard of technical performance intended and are a credit to those who conceived and designed them and translated the plans into reality.

Unfortunately these outstanding achievements have been overtaken by events. In recent months it has come to be realized that the bomber threat against which the CF-105

¹ Diefenbaker Papers, XXI, Speech Series, 1920-1979, vol. 27, file 751s, "Statement On Defence By The Prime Minister The Rt. Hon. John G. Diefenbaker In The House Of Commons," 20 February 1959.

was intended to provide defence has diminished, and alternative means of meeting the threat have been developed much earlier than was expected.

The first modern long-range bombers with which Canada might be confronted came into operation over five years ago, but the numbers produced now appear to be much lower than was previously forecast. Thus the threat against which the CF-105 could be effective has not proved to be as serious as forecast. During 1959 and 1960 a relatively small number of modern bombers constitutes the main airborne threat. It is considered that the defence system of North America is adequate to meet this threat. Potential aggressors now seem more likely to put their effort into missile development than into increasing their bomber force. By the middle of 1962 the threat from the intercontinental ballistic missile will undoubtedly be greatly enhanced, in number, size and accuracy and the ICBM threat may be supplemented by submarine-launched missiles. By the middle sixties the missile seems likely to be the major threat and the long-range bomber relegated to supplementing the major attack by these missiles. It would be only in this period, namely after mid-1962, that the CF-105 could be fully operational in the RCAF.

The United States Government, after full and sympathetic consideration of proposals that the US Air Force use the Arrow, reached the conclusion that it was not economical to do so. Already the US Air Force has decided not to continue with the further development and production of US aircraft having the same general performance as the Arrow. The development of interceptor aircraft that is now proceeding in the United States and abroad is on different types.

Since my announcement of last September, much work has been done on the use of a different control system and weapon in the Arrow. These changes have been found to be practical. Although the range of the aircraft has been increased it is still limited. It is estimated that with these changes the total average cost per unit for 100 operational aircraft could be reduced from the figure of about \$12.5 million each to about \$7 800 000 each, including weapons, spare parts and the completion of development, but not including any of the sum of \$303 million spent on development prior to September last.

The Government has taken no decision to acquire other aircraft to replace the CF-100, which is still an effective weapon in the defence of North America against the present bomber threat. The Minister of National Defence and the Chiefs of Staff are now engaged in further studies of the various alternatives for the improvement of our defences.

Canadian requirements for civilian aircraft are very small by comparison with this huge defence operation and frankness demands that I advise that at present there is no other work that the Government can assign immediately to the companies that have been working on the Arrow and its engine.

This decision is a vivid example of the fact that a rapidly changing defence picture requires difficult decisions, and the Government regrets the inevitable impact of it upon production, employment and engineering work in the aircraft and related industries.

As will be appreciated this decision has been a very hard one for the Government to take, not only because of the immediate disturbance it is bound to cause to those who have been working on the Arrow and related items, but because it means terminating a project on which Canada has expended a very large amount of money and in which Canadians have

demonstrated the high level of their technical work. However much I might hope that the project be continued in the sense of pride of achievement to avoid immediate dislocations which are regrettable, defence requirements constitute the sole justification for defence procurement.

Having regard to the information and advice we received, however, there is no other feasible or justifiable course open to us. We must not abdicate our responsibility to assure that the huge sums which it is our duty to ask to provide for defence are being expended in the most effective way to achieve that purpose.

Now I wish to turn to another aspect of defence.

As previously announced the Government has decided to introduce the BOMARC guided missile and the SAGE electronic control and computing equipment into the Canadian air defence system and to extend and strengthen the Pinetree Radar Control system by adding several additional large radar stations and a number of small gap filler radars. Canadians will be glad to know that agreement in principle with the United States Defence Department has now been reached on the sharing of the costs of this programme.

Under this arrangement, Canada will assume financial responsibility for approximately one-third of the cost of these new projects. The Canadian share will cover the cost of construction of bases and unit equipment, while the America share of approximately two-thirds of the cost will cover the acquisition of technical equipment. Such division of functions is necessary for the reason that the United States is well advanced in the planning and implementation of this programme and the development of the technical equipments required for it. In so dividing the sharing of costs uniformity of construction will be ensured and the dangers of differences in technical equipment will be avoided.

In respect of construction of these bases in Canada, work will be carried out as a practical matter by Canadian construction companies employing Canadian labour and material.. It is intended that the bases when complete will be manned by Canadian military personnel.

As for the technical equipment which is to be financed by the United States, both Governments recognize the needs for Canada to share in the production of this equipment. Within the principles of production sharing, the United States Government and the Canadian Government expect that a reasonable and fair share of this work will, in fact, be carried out by Canadian industry. To that end a number of groups of officials representing both countries have been established to initiate the production sharing activities and to deal with the problems involved.

While time is required to work out all the necessary details between our Governments, considerable progress has already been made and several contracts have been placed.

The production sharing concept also covers the broad range of development and production of military equipment for North American defence generally. Procedures are currently being evolved between officials of the two Governments whereby greater opportunities than have existed in the past will be afforded Canadian industry to participate in the production of technical equipment related to programmes of mutual interest.

Under the irresistible dictates of geography, the defence of North America has become a joint enterprise of both Canada and the United States. In the partnership each country has its won skills and resources for the most effective defence of our common interests is the essence of production sharing.

Believing that Parliament and the people of Canada are determined that this nation shall play its full part, in terms of both quantity and quality, in deterring and resisting aggression, the Government intends that the Canadian Forces will be well-equipped and well-trained for the Canadian share of these tasks in a balanced, collective defence.

In keeping with that determination careful thought is being given to the principles that, in our opinion, are applicable to the acquisition and control of nuclear weapons.

The Government's decisions of last autumn to acquire BOMARC missiles for air defence and Lacrosse missiles for the Canadian Army were based on the best expert advice available of the need to strengthen Canada's air defence against the threat to this continent and on its determination to continue an effective contribution to the NATO shield.

The full potential of these defensive weapons is achieved only when they are armed with nuclear warheads. The Government is, therefore, examining with the United States Government questions connected with the acquisition of nuclear warheads for BOMARC and other defensive weapons for use by the Canadian forces in Canada and the storage of warheads in Canada. Problems connected with the arming of the Canadian Brigade in Europe with short range nuclear weapons for NATO's defence tasks are also being studied.

We are confident that we shall be able to reach formal agreement with the United States on appropriate means to serve the common objective. It will of course be some time before these weapons will be available for use by Canadian forces. The Government, when able to so, will inform the House, within the limits of security, of the general terms of understanding which are reached between the two Governments on this subject.

I wish at this time, however, to give the House an indication of certain basic considerations in the Government's thinking on the question of the acquisition and control of nuclear weapons.

The first important consideration is the Government's firm belief in the importance of limiting the spread of nuclear weapons at the independent disposal of national governments. The Secretary of State for External Affairs said in the External Affairs Committee on July 29th last, that it took but little imagination to envisage the dangers of the situation if the know-how with respect to the production of nuclear weapons were disseminated in numerous countries of the world. The prospect of further dissemination of such techniques continues to be a matter of fundamental concern to the Government. As a contribution to this important objective, it is policy of the Canadian Government not to undertake the production of nuclear weapons in Canada, though we believe Canadian scientists and technicians are quite capable of producing them.

The second consideration is the Government's determination to leave no avenue unexplored in the search for an acceptable agreement on disarmament with the Soviet Union, even though we must reluctantly admit the need in present circumstances for nuclear weapons of a defensive nature. The objective of disarmament must ever be kept in view, even though it may be capable of only partial realization, as for example in agreed zones of

inspection in the Arctic, or agreed measures to guard against surprise attack. Canadians will continue to support effective measures for disarmament but in the meantime, we cannot minimize the importance of providing the strongest deterrent to aggression and of protecting the deterrent power against surprise attacks.

Another basic consideration is the Government's commitments to support the collective security of the NATO Alliance. Whether Canada's effort is made directly in continental defence - the defence of the Canada-United States region of NATO - or whether it is made on the continent of Europe, Canada's contribution will be made in concert with the efforts of our NATO partners, and it is the Government's intention to provide Canadian forces with modern and efficient weapons to enable them to fulfill their respective roles.

Believing that the spread of nuclear weapons at the independent disposal of individual nations should be limited, we consider it is expedient that ownership and custody of the nuclear warheads should remain with the United States. The requirements of Canadian and United States legislation on atomic energy will continue to apply and there will be no change in Canada's responsibility for regulating all flights of aircraft over Canadian territory.

The Canadian and United States Governments have assumed joint responsibility for the air defence of Canada and the continental United States (including Alaska) and have implemented their responsibilities through the establishment of the North American Air Defence Command. The Canadian Government exercises with the United States Government joint responsibility for the operations of the Command including the use of defensive nuclear weapons, if necessary. In the event that these defensive weapons are made available for use by NORAD, they could be used only in accordance with procedures governing NORAD's operations as approved in advance by the two Governments. Such weapons, therefore, would be used from Canadian territory or in Canadian air space only under conditions previously agreed to by the Canadian Government.

Decisions as to the procedures concerning custody and control of nuclear warheads for use by Canadian forces operating under the Supreme Allied Commander in Europe and the Supreme Allied Commander in the North Atlantic Ocean will be subject to negotiation with appropriate NATO partners and those Commanders.

I feel sure that Honourable Members will recognize the gravity of the decisions that we in Parliament are called upon to make in these defence matters by reason of the almost unbelievable nature of the world in which we live. I would like to emphasize the Government's desire to ensure the security of Canada by all efficient and reasonable means at our disposal and in concert with our strong and trustworthy allies.

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