

# Fall of the ARROW

## Conclusion Part III

### In An Effort To Save Money With The Cancellation Of The Avro CF-105 Arrow, Canada's Government Destroyed Its Aviation Industry Establishment!

By Murray Peden

**Editor's Note:** We have been proud to bring to light the incredible facts behind the short life and untimely death of what might have been one of the world's greatest combat aircraft. The cancellation of the Arrow program twenty years ago contains many lessons for aviation enthusiasts in particular and the overall population in general. And that is simply this: The price of defending liberty does not come cheaply. However, if one is not prepared to pay it, he may end up with two dismal alternatives... an inferior weapon and no liberty at all. In Canada's case, she not only lost the leadership in combat aviation that the CF-105 gave her, but after the program's cancellation she expended even more money for inferior products to defend her borders, systems that eventually proved both disappointing and unsatisfactory. They have since disappeared and with them went the Canadian military aviation industry, which never recovered from the Arrow's demise.

While it is true that not all new designs are worthwhile and that some new aircraft projects should be cancelled or curtailed, Canada's CF-105 Arrow in no way fell into that category. Here was an aircraft that should have been built strictly on its merits. It wasn't, and, because it wasn't, no other aircraft like it will ever be constructed in Canada.

There had been suggestions made by the Opposition—and by Avro as well, so the rumor ran—that the Company be allowed to complete Arrow No. 6 and fly it, to demonstrate before the world the performance it was capable of with its incomparable Iroquois engines. One gathers this was the last thing the government wanted. If the Iroquois Arrow performed in accordance with its builders' projections—and its five predecessors had met or exceeded all test demands—its marked superiority to anything then flying would have made the government's considerable embarrassment unbearable.

Thus, after the debate had been in progress only a few weeks, the government made efforts to transfer the Arrows to the Royal Aeronautical Establishment in England for the purposes of flying research. The government's effort in this connection was not exposed to public measurement, for they refused to reveal the terms on which they had been prepared to transfer the aircraft to Farnborough; but whatever the scale of effort, it was unsuccessful. In an incredibly stupid and vandalistic move, the government thereupon dispatched workmen to Malton with acetylene torches and put the possibility of future constructive suggestions regarding the Arrows beyond reach. Under express instructions the workmen torched into ugly and smoking debris ten sleek white machines that represented the most sophisticated objects of the aircraft designer's art. Apparently the thought of handing the finished aircraft over to the R.C.A.F. was never seriously considered. The fact that such a disposition had been the sole object of all effort to date was somehow lost sight of. The Arrows were cut to junk.

Challenged to explain this incredible waste, and the barring of all photographers from the scene at the plant, the government tried to assure Parliament that it really had no alternative, that this was the course any government would have been forced to follow by the rigid demands of national security. The Minister of Defense Production, Mr. O'Hurley, pointed out that under the terms of the agreement with the Americans, i.e., the contract governing the security on the Hughes Weapons System, the Canadian government was justified in refusing to permit any photographers to witness the "dismantling" of the Arrows. Pressed to explain why secrecy was necessary after removal of the weapons systems, Mr. O'Hurley created the impression that the Arrow was so sophisticated that it was adorned with classified systems and accoutrements virtually from nose to tail. This differed markedly from the government's earlier portrait of the Arrow as a piece of obsolete junk.

"This was an aircraft constructed not only by Canadian engineers and the Canadian Air Force but also by the United States. It was classified. It could not have been sold on an open market. I do not see any other

solution available to the Minister of National Defence but to turn it to scrap. That is the way the situation was."

"That does not answer my question. I assumed there could not have been very much classified material about the plane, because we were told in this House it was obsolescent and that it would not have been useful at the time it was put into squadron service.... What parts of the plane were classified?"

"One would practically have to go over the whole plane—hydraulics, fire control, engine, electronic equipment. With the experience which the Hon. Member has with regard to planes he will certainly know that there are hundreds of parts in that plane which were classified. I am certainly not versed enough to give him a complete list of the classified materials in the CF-105 this afternoon."

"It must have been a good aircraft if there were hundreds of classified parts in it."

Having lent sufficient emphasis to this preliminary point, Mr. Hellyer was challenging the Minister a moment later to tell the House how many of the Arrows had actually had fire control apparatus installed in them, and Mr. O'Hurley was retreating with the qualification that if the weapons system was not actually installed "it was definitely there in the plant with other classified material when the cancellation started". Crowded further, he admitted that there was no fire control apparatus installed on Aircraft No. 6 and the other aircraft nearing completion behind it on the production line.

People who purport to know have stated flatly that none of the Arrows had the fire control system actually installed. The point is not really material, for even if they had, there would have been no reason in the world why, once it had been removed, the ten aircraft could not have been flown by the R.C.A.F. when they had been completed. That point became crystal clear once the government admitted it had made overtures to the Royal Aeronautical Establishment at Farnborough. If security would not have been prejudiced by turning the Arrows over to the Royal Aeronautical Establishment, there was clearly no reason why they could not have been turned over to the R.C.A.F. for testing and research purposes in Canada.

With those Arrows the R.C.A.F. could have carried out a comprehensive program of supersonic flight research with planes that would have ensured the cumulative results of their research giving the R.C.A.F. and Canada's NATO partners the information base to support technology even more advanced. It is true that only the more experienced pilots could have been permitted to fly these aircraft, at least until the organization of an appropriate training program; but such a restriction would apply in the case of most high performance test aircraft! One R.C.A.F. pilot had already flown the Arrow: Flight Lieutenant Jack Woodman, from Saskatoon, had been brought in at an early stage to participate in the test flying program with Jan Zurakowski and "Spud" Potocki, the latter Zurakowski's intended successor as chief test pilot. Woodman flew the Arrow six times?

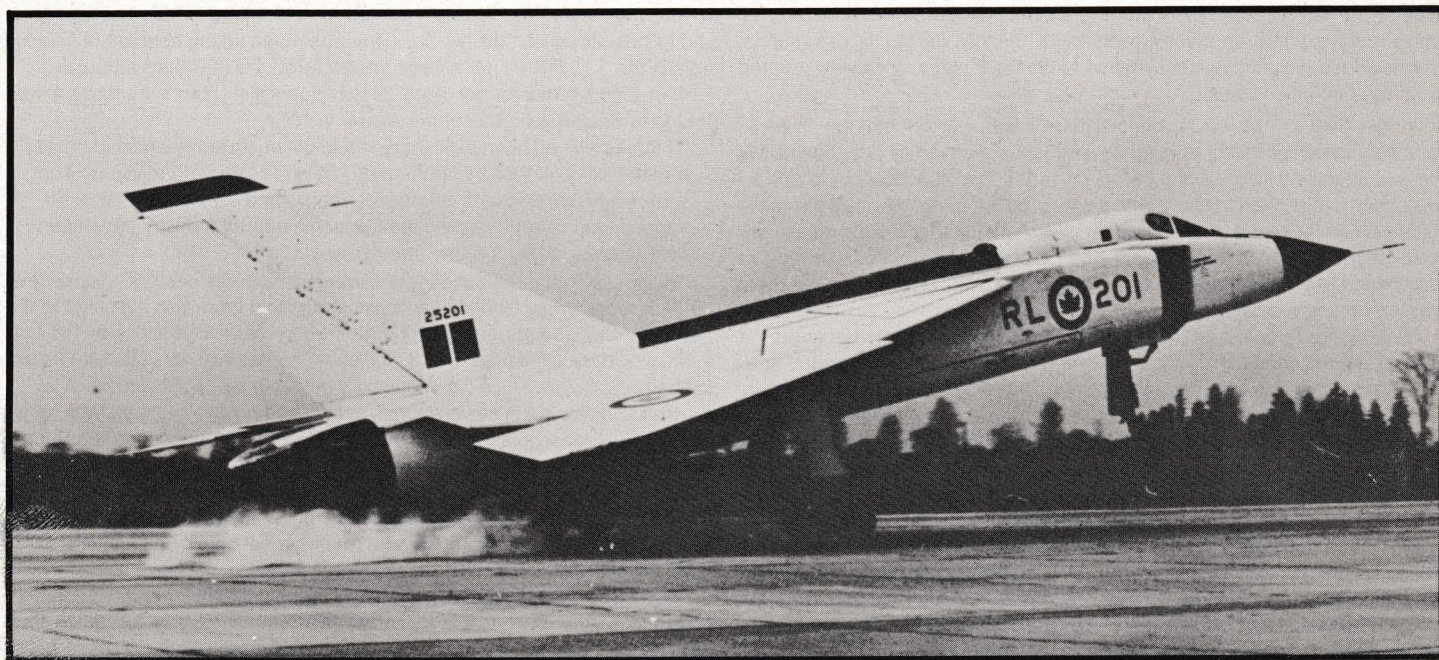
Apart from the facility it would have provided for testing airframe and weapons system development, the Arrows would have provided the ideal test bed on which the R.C.A.F. could have launched further development of the Iroquois engine, enabling engineers to supplement by air testing the new high

<sup>1</sup>In a letter published in May, 1978, Jan Zurakowski said, contradicting the allegation that only a very skilled pilot could land the Arrow without cracking up, "The Arrow was not a difficult aircraft to land. Five development Arrow aircraft were flown by F/L Jack Woodman, "Spud" Potocki, Peter Cope and myself. Two accidents, which occurred during landing runs (I was involved in one of these), were not related to handling difficulties at all."

<sup>2</sup>Jack Woodman is now Director of Flying Operations for Lockheed Aircraft in California. Speaking at a symposium in Winnipeg on May 16th, 1978, he remarked that the Arrow, in 1959, had been 20 years ahead of its time.



The first Arrow at the point of lift off. Real tragedy of CF-105 was that both it and its engine, the Iroquois, were far advanced over all competition, and had already proven themselves and their dependability in one of the most trouble-free test phases ever conducted when project was cancelled. Even more important, the aircraft, which embodied the desire and know-how of the Canadian aircraft industry, had placed Canada in the forefront of world aviation. The CF-105 was so successful that on the strength of this one project alone, Avro, Orenda and Canada, might still be engaged in the manufacture of combat aircraft today, had the government continued to back the project.



altitude test facilities built by Orenda Engines Ltd. There was no doubt whatever that the Iroquois was a winner which warranted much further development and exploitation. Mr. Roy T. E. Hurley, the Chairman and President of Curtiss-Wright, had underlined that fact in 1957 when he signed the contract permitting Curtiss-Wright to manufacture and sell the engine under license in the United States. But all this technological potential, now available for modest expenditure, the government discarded with the aeroplanes it burned.

Not a trace of the Arrow was to be left. Like mindless robots the government ordered every vestige erased, put to the torch—not even one stripped aeroplane was to be allowed to be preserved for posterity in a museum.

The workmen arrived at Malton under peremptory orders, and in an atmosphere appropriate to an execution squad set about their grisly work. They were in the process of lighting their torches when an Avro supervisor warned them that if they did not take proper precautions they might easily injure or kill themselves. He pointed out that many portions of the aircraft were heavily Teflon coated, and that Teflon, when exposed to temperatures of 750°F and upwards, gives off highly toxic fumes of fluorides. Certainly under the nozzle temperatures of 4000°F to 4500°F common with acetylene torches, lethal results could ensue. But for his warning a macabre postscript to the demise of the Arrow might have been written.

As it was, the work was continued, outdoors on the hangar apron. The government's determination that this sorry spectacle not be captured on film is easy to understand. But while it was relatively easy to keep photographers from walking up to the work site at the plant, the government was unable to hide the scene completely. An enterprising photographer flew over the site despite all their strictures and took aerial photographs of the Arrows being nibbled to death, plate-sized pieces of blackened metal lying about their ruined forms like fallen carrion. Not a proud moment in Canada's history.

Within the plant itself some workmen had determined, despite the strenuous efforts of the government and the heavy potential sanctions involved, that something was going to be preserved come hell or high water. So, somehow a complete Arrow nose section was surreptitiously moved off the floor and concealed. Its existence was known to only a few people for years, but now it

sits in the Canadian National Museum in Ottawa, a pathetic reminder of an ignoble deed.

While the hapless Mr. O'Hurley was attempting to justify the atrocity in the name of national security, someone should have asked him to compare his government's concept of security requirements with those of our American ally. Three years earlier, in 1956, when the American government cancelled further development of the North-American F-107 in favor of the competing Republic F-105, it first assigned all three F-107s to useful test work, then later took steps to ensure the aircraft's preservation. As a result, the second F-107 is still on display at the Air Force Museum in Ohio. Like the Arrow, the F-107 was a highly supersonic and sophisticated aircraft. More to the point, a complete integrated fire control system, the classified XMA-12, had been installed in that second aircraft. The American government apparently experienced no difficulty in maintaining security, and the F-107 sits intact as continuing evidence of their designers' response to the current challenges of aerodynamic progress. Canadians have the clandestinely preserved truncated nose-piece of a far superior aircraft to remind them of their countrymen's technical capabilities.

Analysis of Prime Minister Diefenbaker's cancellation decision, as explained in his speech of February 20th, 1959, and in subsequent speeches, reveals that decision to have been a major policy error. In terms of magnitude it must rank among the most serious mistakes made by a Canadian politician in peacetime, and it was based upon a culpably restricted assessment of some of the most important factors in the situation.

Mr. Diefenbaker hinged his whole case on the alleged obsolescence of the Arrow. The program had been "overtaken by events" to use his euphemistic phraseology. He proposed, therefore, to discard the Arrow and to rely upon BOMARC missiles backed up by the much older CF-100 aircraft.

Mr. Diefenbaker's main error lay in a failure to appreciate fully the strict limitations of the BOMARC. Coupled with this was a complementary failure to realize that the Russian bomber threat was neither going to remain static nor oblige us by fading away, and that it could not long be dealt with by aircraft like the aging CF-100s. On this latter point his Minister of Defence, George



Pearkes, told the House quite candidly on February 23rd that if CF-100s had to tackle Russian bombers of the types known as the Bear and the Bison, the results would be "touch and go". One was left to imagine what the situation would be if the Russians continued their aircraft development and we did not.

Reference must also be made to the fact that actual results secured in tests of the BOMARCS had been far from satisfactory. In 1959 the first models were still quite unreliable against high speed targets, although the new models that Canada was to receive showed promise of being considerably better. But the bald fact, which the Prime Minister never seemed to grasp, is that even a fully reliable surface-to-air missile and a manned interceptor are not interchangeable weapons.

Both can attack an intruding aircraft. The problem is that most "intruding" aircraft turn out to be friendly, and a missile, once it has been launched from the ground toward its target, cannot tell the difference and turn harmlessly away at the last minute. The recurring situation is that unidentified aircraft almost always prove on investigation to be friendly civilian or commercial aircraft whose pilots have simply failed to file flight plans, or have wandered far off their intended track.

At the time of the Arrow cancellation it was not uncommon to have Canadian fighter pilots scrambling several times a day to fly out and visually check unidentified aircraft picked up on radar. This function could not be delegated to missiles. Neither could it safely be left to obsolescent aircraft—which the CF-100 was at that time—that were hard put to make the necessary interceptions against speedy targets, and which could be eluded with relative ease by aircraft whose performance represented only a slight improvement over the enemy's existing inventory.

Even where targets can safely be taken to be hostile, interception by a manned aircraft rather than by a ballistic missile has always imported substantial advantages for the defender attempting to carry out the interception. Firstly, the aircraft normally carries six or eight missiles, not the single warhead of a surface-to-air missile. The crew of the manned interceptor can take steps, should these prove necessary, to neutralize the electronic countermeasures of the target, something no missile is yet capable of doing. Furthermore, the manned interceptor can engage a group of hostile targets in a logical priority, for example, a damaged attacker that had jettisoned its bombs and was turning to flee would automatically be accorded a much lower priority than the nearest inbound undamaged attacker. Similarly, decoys launched by the various target aircraft could be filtered out and ignored by the crew of the manned interceptor and their attack brought to bear upon the real targets.

All these basic points were known in every camp; indeed they were so obvious that airmen everywhere watched the debate in the Canadian House of Commons with certain degree of incredulity. After all, the BOMARC was certainly not an anti-missile missile; that weapon was not in anyone's armory. And yet Mr. Deifenbaker somehow seemed to be implying that by building two BOMARC sites, whose weapons would have a "one-way range" of approximately 400 miles, Canadians were modernizing their defense to match the growing I.C.B.M. threat of the Russians.

Having killed what was probably the best fighter in the western world in 1959, Mr. Deifenbaker soon had his government negotiating for the acquisition of American-designed fighters, namely, F-101 Voodooes and F-104 Starfighters. Canada began to receive them in 1961. As of this date, mid-1978, we are still using them, along with American-designed Northrop F-5s. The Voodooes are scheduled to remain in service in their interceptor role until Canada's new fighter program brings their replacement into squadron service in 1983.

Today, almost twenty years after Prime Minister Deifenbaker announced the demise of manned interceptors, and destroyed Canada's capability to design and build her own, Canada is preparing to spend 2.34 billion dollars to buy manned interceptors from either the United States or Britain. The United States is marketing four or five highly advanced interceptors at the moment, including the Grumman F-14 Tomcat, the McDonnell Douglas F-15 Eagle, General Dynamics' F-16, and two versions of the Northrop-McDonnell F-18 Hornet. Britain, West Germany and Italy have sponsored production of another fighter that can discharge both the interceptor and the ground interdiction role, the Panavia Tornado; and the French firm of D'Assault Breguet is in the process of going into production in the latest of its series of Mirage interceptors—the new Mirage 2000. Until February 1st, 1978, the latter aircraft was another competitor in Canada's new fighter program.

All this activity reflects a strong and growing demand for more and more manned interceptors—to meet a correspondingly enhanced threat from Russian bombers that was supposed to have been practically non-existent 20 years ago. That threat has grown along the lines anticipated back in 1958 by airmen like General Twining. The U.S. is selling interceptors (F-15 Eagles) to

Saudi Arabia and to Israel, supplementing the Northrop F-5s it sold in that area some time ago. The consortium backed by the governments of Britain, West Germany and Italy, is building Panavia Tornados in large numbers for the air forces of those countries, and is energetically marketing the plane elsewhere.

One ironic sidelight: the Panavia Tornado is one of the six aircraft competing for the Canadian government's current contract for 130-150 new fighters for interceptor and ground attack duties. The Tornado is an excellent aircraft by all accounts, equipped with highly advanced avionics equipment. The ironic item of information is that its maximum speed is reputed to be Mach 2.2. If Canada buys the Tornado, we will be buying an aircraft 200 m.p.h. slower than the Mach 2.5 speed projected for the Mark III Arrow in 1959? (For public consumption the F-14 Tomcat has a quoted maximum design speed of Mach 2.3; and General Dynamics' F-16A has a reported maximum speed of Mach 2.2.) The Panavia Tornado is reported to cost approximately 20 million dollars per copy, close to the 17 million quoted for a Northrop F-18L. The Tomcat is said to cost 26 million dollars per copy now. Even taking account of inflation factors, the 3.75 million per aircraft for the Arrow in 1959 looks attractive.

Carl Lindow, the former Avro design specialist, now a consultant with Boeing in Seattle, said this of the Arrow, in 1977:

"If the Arrow had been built, there would not be an aeroplane that could equal it today except the Grumman F-14 with its Phoenix missiles." And with nearly two decades to improve, modify and expand on it, what advanced type of fighter would the Canadian aircraft industry have been able to produce during the intervening years?

In fairness to the Diefenbaker government, however, one has to underline the fact recorded by General Foulkes, namely, that there was a distinct likelihood that the Liberal government, had it been returned to office in 1957 or 1958, would have followed exactly the same course and cancelled the Arrow themselves, particularly if the economics began to look troublesome.

On Mr. Diefenbaker's own figures, getting 100 Arrows into squadron service by 1962 was going to cost the government 780 million dollars. Since Crawford Gordon had given Avro's figures, according to George Pearkes, as 3.75 million dollars per copy, flyaway cost, Mr. Diefenbaker's figure of 780 million for 100 aircraft obviously included a generous allowance for the extraneous items of weapons and spares, plus the cost of completing the technically important development program. But even on Mr. Diefenbaker's own figures, 780 million dollars over the three years until 1962 meant 260 million dollars per year. With Canada preparing to spend roughly ten times that amount in 1979, to purchase 130-150 new fighters which will have been designed and tested elsewhere, 260 million dollars seems a reasonable amount for 100 home grown fighters of excellent capabilities.

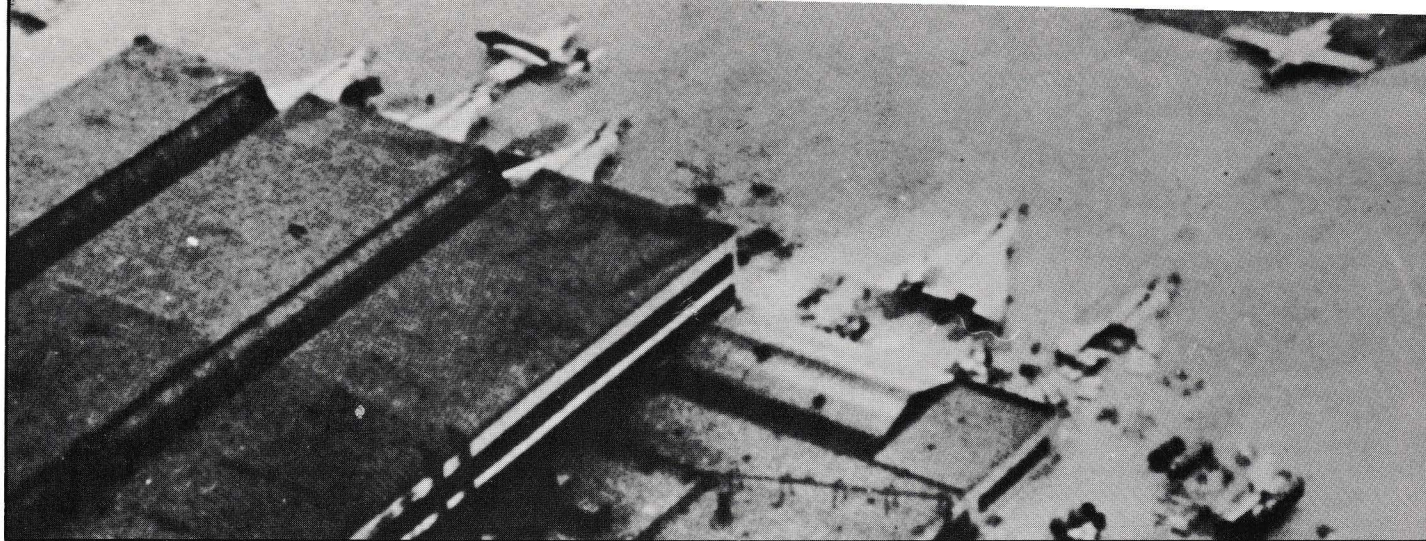
The figure sounds even more reasonable when one considers that more than half of it would quickly be returned to the government, largely in the form of corporate and personal income taxes. (The Financial Post estimated the figure at 65 per cent late in 1958.) If the "net" figure were thus reduced by half, say to a total of 130 million each year for three years, representing the portion to be picked up by taxpayers other than those receiving the government pay-out, the value standards adopted by the government are difficult to appreciate. If that aspect of Canada's national security was not worth an annual amount of 130 million dollars, taking into account also the 30,000 jobs the industry was sustaining while turning out the world's best interceptor, our scale of values seems to require re-examination. But take Mr. Diefenbaker's gross figure of 260 million dollars per year and consider these facts:

Sweden is a country with a population and an economy about one-third the size of Canada's. (Its 1974 population figure is shown as 8.3 million, compared with Canada's 22.7 million. Sweden's estimated G.N.P. in 1974 was \$56.2 billion, Canada's \$150.3 billion.) Yet Sweden, over the years, has maintained its military aircraft industry, and is currently producing both the supersonic Viggen interceptor (Mach 2+) and the Saab 105G twin jet trainer and light attack aircraft. The latter is in use in the Austrian Air Force and the Royal Swedish Air Force.

Israel, truly a Lilliputian by comparison with Canada, is designing an advanced supersonic interceptor as an alternative to the American F-16 built by General Dynamics. While the government of Israel has not yet given a firm commitment to the builder, Israel Aircraft Industries Ltd., the Defense and Foreign Relations Committee of the Knesset has given a strong recommendation that the project receive the go-ahead from the government. At the outset it was estimated that the development of a prototype would cost \$250 million. That estimate has now been revised upwards to \$560 million; still the Defense and Foreign Relations Committee has recommended it in a lopsided vote, recognizing the fact that such weapons are too important to the security of the

<sup>3</sup>Canada has rejected the Tornado as we go to press.





**Not only did the misguided Canadian government of John Diefenbaker kill the Arrow program, but it compounded the insanity by ordering a ghoulish defilement of the corpse. There were ten completed Arrows which could have been used for research, if nothing else. They had been paid for at a cost of 125,000,000 dollars, and were the finest interceptors of their day. Even while the government ordered their termination, it was secretly cutting up the finished aircraft for scrap. However, while it succeeded in keeping photographers off the tarmac at Avro, one enterprising newsman hired a light plane and shot this ghastly photo of the Arrows being hacked to death in front of their hangars. The Arrow at the far right has had its undercarriage cut away, and has collapsed on the concrete with its right mainplane ripped off. The others, await the same fate.**

country to be left to the discretion of outside sources.

Perhaps the most thought-provoking fact, however, in trying to assess Canada's perspective, is that while Canada as a nation could not afford 260 million dollars a year for the Arrow in 1959, the City of Montreal spent one billion, six hundred million dollars in 1976 to host the Olympic Games. That expenditure for sport and entertainment, taking into account the volume discounts quoted by Avro at the beginning of 1959, would have paid for more than 600 Arrows.

Most Canadians do not realize to this day what an asset was lost in the abandonment of the Iroquois engine when it was virtually ready to go through its Type Test. If one were to ask them, however, if they recalled how important a factor the famous Rolls Royce Merlin engines had been to Britain's survival in World War II, a large proportion would remember that fact. Most of them would recall that famous series of engines, and the aircraft they powered to victory: the Spitfires, Hurricanes and Mustangs of Fighter Command, and the Lancasters, Halifaxes and Mosquitos of Bomber Command. And yet, the Orenda Iroquois marked an even more substantial improvement over its immediate predecessors than had the great Rolls Royce Merlins.

Again, a comparison with today's technology, almost twenty years after the death of the Iroquois, brings home the tremendous achievement of Charles Grinyer and his Orenda engineers. The Iroquois was designed to produce 25,000 pounds of thrust with afterburning. The latest Pratt & Whitney engine is the F100-PW-100, two of which power the F-15 Eagle and have given it a clutch of world's climbing records. That engine, Pratt & Whitney says, generates 25,000 pounds of thrust with afterburner augmentation.

To explain its power to laymen in terms they can understand more readily, its builders liken its output to the combined power of a line of 254 diesel locomotives. And yet the first models of the Iroquois, produced almost twenty years ago, were designed to turn out the same awesome power *then*. What would they have been capable of today if they had gone through an evolution of improved and refined models like the great Merlin series? What did Canadians throw away for the lack of an additional ten million dollar investment?

The Canadian government, which had already put \$87,000,000 into the development of the engine, and had seen it progress to the point where it promised almost certainly to be far and away the best jet engine in the world, chose not to volunteer any further assistance of any type whatever. They stood back and watched while the Canadian taxpayers' investment—and an asset that could conceivably have played a vital role in NATO's security—vanished into thin air. If nothing else, the government could have produced the engine for installation in foreign built aircraft.

Another consequence of the Arrow cancellation was that for some time the conduct of the American government in the affair was the subject of consider-

able critical comment. But more than superficial analysis was required on this count; there were several factors to consider, and the American position was not devoid of merit.

It was quite true that the Americans had initially given moral support to Canada's developing a supersonic interceptor with the high performance spectrum ordained for the Arrow. The free use of American testing facilities, and the loan of the B-47 for the air testing of the Iroquois, were but the material manifestations of a strong ground swell of support for the Canadian venture. Behind the scenes there were even more promising trends. Recognizing that a program of this scale imposed a significant financial burden on the Canadian economy, senior American officers had been sympathetic to the idea of the United States buying at least a small number of Arrows to help reduce unit cost. Air Marshal Slemon actually received assurances from the Chief of Staff U.S.A.F. that purchases would be forthcoming. Such assurances were not binding, of course, and were understood not to be; but it appears that the matter had been cleared, at least tentatively, at the level of the U.S. Secretary.

Almost as soon as he had taken office as Prime Minister, Mr. Diefenbaker began undercutting the Canadian position by making extravagant statements regarding his government's intention to effect a realignment of Canadian trade, diverting it away from the United States. blunt projections of a switch of fifteen per cent of Canada's imports, from the U.S. to Britain, were not something the Americans could laugh off, not when they came from America's largest trading partner. Had Mr. Diefenbaker given some thought to the ammunition he was so generously handing to the lobby of the American aircraft industry, he would undoubtedly have been much more circumspect in his utterances.

In short order, in the corridors of power in the United States, enthusiasm for both the Arrow and the Canadian Prime Minister began to wane. The Secretary of the Air Force in the U.S. did not have to have it explained to him that, with Prime Minister Diefenbaker talking about sharply reducing Canadian imports from the U.S., and making other speeches that were easy to construe at anti-American, the President would simply be courting embarrassment were he to send to Congress a Defense appropriation incorporating 200 or 300 million dollars for the purchase of Canadian aircraft.

As the Americans drew back, and George Pearkes had to return to Ottawa and report his inability to get a firm purchase order, Mr. Diefenbaker further diminished Canada's prospects of success by his press conference statements of September 23rd, 1958. Once he had thus publicly expressed reservations about the Arrow, and, indeed, about the future of all manned interceptors, the chances of selling it to other countries became infinitesimal. To state publicly that the Arrow's development program was being continued only "as a measure of insurance" was hardly a ringing endorsement of the aircraft or an affirmation of his own faith in it. The Americans had every justification, from that point on, for taking the position that if the Canadian government hadn't sufficient faith in the Arrow to put it into production—even limited production—how could *they*, the American government, possibly justify its purchase to their own electorate?

If Canada had gone ahead with a production run of even 50 or 100 aircraft, the chances are that the superlative performance of the Arrow with the Iroquois engine would, in due course, have opened the door for an American order, and perhaps for other orders as well. Admittedly, an extraordinary performance would have been required; but there is every reason for believing that the performance of Arrow No. 6 and its successors would have been spectacular enough that the American government, with some discreet nudging from the NORAD commanders, would have found it easy to justify acquisi-

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# ARROW

(Text continued from page 27)

tion of the Arrow, at least pending the development of an American fighter with matching performance. In spite of the pressures of domestic politics, the American government had in fact established at least one precedent in 1951.

At the time of the war in Korea, the U.S.A.F. had been looking for a high-speed aircraft to discharge the intruder and tactical bomber role. The British twin jet Canberra had a performance that met or exceeded all the American specifications and put that aircraft in a class by itself amongst the other competitors. The American government thereupon made the necessary arrangements for the Canberra to be built under license in the United States (as the B-57). Tactical Air Command received its first B-57s in June, 1954, and these "foreign imports" were still in active service twenty years later in Viet Nam.

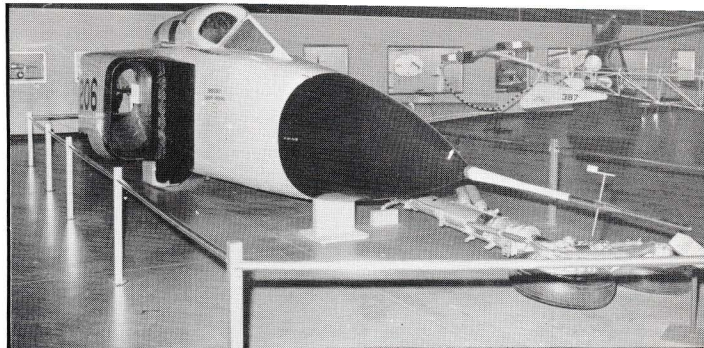
Unfortunately Prime Minister Diefenbaker never acquired any feel for the possibilities of the highly competitive and rapidly advancing aero-space industry. The homespun parallel he drew—in his March 3rd, 1959, speech—between the alleged redundancy of a supersonic interceptor and a change in agricultural technology with which he was familiar, showed little evidence of empathy. Rather, the Prime Minister sounded, uncharacteristically, like a throwback to some bucolic bumpkin of a previous era. "There is no purpose in manufacturing horse collars when horses no longer exist...", he said. As he was saying this, Vladimir Myasishchev, the designer of the latest Russian bomber, the Boudier, was readying the first prototype of that aircraft for the flight trials it actually began in September, 1959<sup>4</sup>.

The BOMARCS, which the Prime Minister had turned to as a bargain basement panacea for the problems of aerial defense, became an albatross around his government's neck. Persuaded by well-meaning idealists in his Cabinet, men like Howard Green, that Canada should adopt a non-nuclear stance and set an example to the world, Mr. Diefenbaker balked at installing nuclear warheads on the weapons, despite what he had said and clearly implied in his Arrow cancellation speech. Somehow the Howard Green contingent seemed to suggest that, with Canada parading about the international scene purer than the driven snow, i.e., carrying only common, garden variety bombs and cannons for killing purposes instead of even deadlier weapons, potentially aggressive middle-powers would recognize their turpitude and hastily forswear anything more damaging than slingshots in their military inventories. The super-powers, too, would be shamed by Canada's virtue, and peace, perfect peace, would descend upon the globe, almost before we could beat the cradles of our non-nuclear BOMARCS into bridge girders.

Lester Pearson, whose Liberal party had been energetically disseminating the same non-proliferation line, neatly reversed his field on the issue, undertook to accept the nuclear warheads—as a temporary expedient only, of course—and after being nosed out in the 1962 election, won the 1963 election almost by default, as the Diefenbaker Cabinet disintegrated in internecine strife.

By 1963 the "new strategy" of Arrow's opponents had, of necessity, been modified out of recognition. The Diefenbaker government itself had no sooner killed the Arrow, pooh-poohing the need for new supersonic interceptors, then it set about acquiring, in 1961, 66 supersonic F-101 Voodoo interceptors built by McDonnell-Douglas in the United States. There was little stress laid on the fact that the Voodoo was rated at Mach 1.85, as compared with the Mach 2.5 anticipated for the Mark II Arrow. Shortly thereafter, Canada purchased 30 or 40 training-version Starfighters (F-104Cs) from Lockheed, and subsequently paid the necessary license royalties to build 110 of the F-104G version at the Quebec plant of Canadair. Still later, Canadair built a larger number of the strike-reconnaissance version of the Starfighter. These aircraft, inferior in performance to the Arrow, were built primarily for the strike role of Canada's NATO Air Division in Europe—a role for which the Arrow could readily have been modified.

After taking office in 1963, the Pearson government did not wait long to demonstrate that in this field they could at least match the Conservatives in foolishness. Early in its turbulent career the Pearson government made large



**What might have been. All that could be saved from the government's blowtorch squads: The nose section of one Arrow in an Ottawa Museum. Clamshell canopy was made largely from magnesium alloys. Arrow was an enormous fighter, with a belly weapons pack as large as the bomb bay of a Boeing B-29. Pack would drop, missiles would fire and pack would then retract in a rapid, virtually continuous motion. Tests of Arrow were extremely sophisticated and included the firing of large scale models to extremely high altitudes through the use of Nike ground-to-air missiles. At heights over 100,000 feet the model would separate from the missile and continue climbing, telemetering information back to earth. This was expensive, but results proved that Arrow's configuration was correct and the aircraft, as designed, would enjoy a long service life, due to the built-in stretch potential of its configuration.**

expenditures to build, under license, both the single and two-seat versions of Northrop's F-105 Freedom Fighter—again at Canadair's Quebec plant.

The F-5 was specifically designed to be a very low cost, lightweight fighter. Bearing that in mind, one certainly cannot fault Northrop for the fact that its performance, compared with the capabilities of heavier, more expensive fighters, is extremely limited. The engines of the F-5A turn up 4,080 pounds of thrust with afterburner augmentation. The Iroquois produced 25,000 pounds. The F-5A's maximum speed is quoted at Mach 1.43, some 700 m.p.h. slower than the projected speed of the Mark II Arrow. (At the beginning of February, 1978, when President Sadat was apprised of the fact that the United States was prepared to meet his request for modern new fighters by allowing Egypt to purchase 60 of the latest model Freedom Fighters, the F-5Es, he dismissed them contemptuously as "tenth rate".)

On these various models of inferior aircraft Canadian governments have spent hundreds of millions of dollars, after having killed a Canadian-designed interceptor that would have out-performed any of them.

Under Prime Minister Pearson, the BOMARCS were armed with nuclear warheads only briefly—then disarmed. Competing missile technology quickly rendered them obsolete. On the other hand, the logic of events has maintained the vital importance of the manned interceptor, and the latest indications in the murky world of military intelligence are that the importance of the manned interceptor is about to be emphatically underlined.

On June 19th, 1978, the Defense Intelligence Agency of the American government announced publicly, after lengthy closed-door testimony before the U.S. Senate's Armed Services Committee in March, that the Soviets are developing a new nuclear bomber with performance characteristics very similar to those of the highly advanced American B-1 (which President Carter cancelled in 1977, against the advice of many professionals in the U.S. Defense Department). Intelligence estimates are that the new Russian bomber will be operational in the early 1980s.

Looking back over the two decades, there is an old lesson to be re-learned in Canada from the sorry epilogue of the Arrow. National security cannot be procured on the cheap. Political leaders in democratic countries have always tended to shy away from that unpalatable truth. And yet, how many times in recent history have those same politicians, who shrank from asking the electorate to spend money on national security, unhesitatingly and shamelessly asked the country's youth to lay down their lives to restore it? A nation that cannot afford to build the best weapons for its defense forces, but which can afford to spend upwards of a billion and a half dollars for the sports spectacle of the Olympic Games, is in more serious trouble than its political leaders appear to realize.

Another lesson that Canada and all of us will have to re-learn, apparently, is that sophisticated defense industries cannot be erected overnight. When war and mortal danger become imminent, it is too late to set about trying to assemble an aircraft industry, or tank and gun factories, or shipyards. There is a price for keeping these facilities in existence in the piping times of peace. Countries which are not prepared to pay that price will ultimately pay a far higher one.

*For those of you who wish to obtain a hardcover copy of the full Arrow story, you may write to: The Hangar Bookshelf — Box 1513, Belleville, Ontario, Canada K8N 5J2... \$14.95 postpaid.*

<sup>4</sup>Myasishchev had begun his design around 1955, and his hope had been to turn out a bomber with a high payload and a cruising speed approximately 50 per cent better than any bomber then in the air. Had he been wholly successful, highly supersonic interceptors would have been required, urgently, to meet the threat. As it happened, the Boudier did set a number of payload-to-height records, but the first versions fell well short of Myasishchev's ambitious speed objectives.





# ARROW

The Avro CF-105 Arrow on her greatest day, more than 21 years ago, October 4, 1957.  
This series of rare color photographs show first prototype. (Canadian Armed Forces)

