

Simon Guo
CHC2D - 1
April 14, 2015
Word Count: 1400

Avro Arrow: An Untimely Legend

The Avro Arrow (CF-105) was a interceptor designed by Avro Canada.¹ It was designed as a flying weapon system, to intercept high speed bombers invading North America, under the demands of NATO , NORAD, and the RCAF.² However, it was cancelled by Diefenbaker's Conservative government on 20 February 1959, which also ordered to destroy all aircrafts and research. Arrow was one of the most technically successful product and also one of the greatest mysteries in Canadian history. The reason for the cancellation has been widely discussed by historians, as well as its impact on Canadian aircraft industry and defense policy. The U.S. aerospace industries' awareness, the Bomarc missile threat from U.S., U.S.'s concern of spying mission, Canada's limited budget for defense, failure in finding oversea interests and government's lack of understanding of Arrow, led to its cancellation.

The Arrow development followed the requirement of the Canadian government's defense policy and fulfilled these requirements effectively, and became the best interceptor in the world. Canada and other NORAD countries were focusing on the Soviet manned bombers threat. The RCAF was finding a fighter which could operate at 6000 ft, with a range of 600 miles, accelerate at Mach 1.5, equipped with advanced missiles, able to maneuver at 50,000 ft while pulling 2 G.

¹ Palmiro Campagna. "*AVRO ARROW: An Aviation Chapter in Canadian History.*" Factualarrow.pdf.(September/October1988.), <http://www.avroarrow.org/AvroArrow/factualarrow.pdf>.

² Richard Organ. *Avro Arrow: The Story of the Avro Arrow from Its Evolution to Its Extinction*. (Cheltenham, Ont.: Boston Mills Press, 1980.), 133.

Therefore, in April 1953, AIR 7-3 ("Design Studies of a Prototype Supersonic All-Weather Aircraft") project was assigned to A.V.Roe.³ The Iroquois engine and advanced automatic flying control system were also developed for this project. On March 25th, 1958, the first Arrow (RL201) started flight. In later testing, the Arrow showed it could meet its expectations perfectly. Thus, it became the best interceptor for the RCAF and NORAD requirements, and successfully attracted overseas interests for its worldwide demand.

The U.S. saw Arrow as a threat to its aircraft industry system, which was also developing new interceptors. At first, Canada successfully attracted the U.S.'s interest however Americans didn't believe Arrow could be made. After Arrow showed its amazing ability, the cost of programs were decreasing and became really competitive with others in its class. The Americans decided to destroy it because of the intense lobbying from American aircraft builders who feared to compete with Arrow. For example, only Lockheed Martin was busily developing three interceptors.⁴ The U.S. preferred to show interest at first, so that they could get data from the Arrow and Iroquois. Eventually, they decided not to purchase this.

The Americans introduced the SAGE and Bomarc system and used it to destroy the Arrow project. This system was a supersonic long-range surface-to-air missile, equipped with W40 nuclear warhead for defending manned bombers, but not ballistic missiles. Bomarcs were purely for defence of American Strategic Air Command and not for Canada. Although Canada didn't have strong demand for this unproven weapon to replace the interceptors, the U.S. forced Canada to buy the system. In August 1958, Defence Minister George Pearkes was told Bomarcs would be

³ Organ, 11.

⁴ Palmiro Campagna. *Storms of Controversy: The Secret Avro Arrow Files Revealed*. (Toronto: Stoddart, 1992), 92.

installed just south of Great Lakes if Canada wouldn't accept them, which created nuclear threats over Southern Ontario, the most populated regions of Canada.⁵ Canada had no choice but to buy Bomarc and placed them in Northern Canada. This threat announced the death of the Arrow, because Canada couldn't afford Arrow and the Bomarc with its limited budget. Moreover, the government found that buying Bomarc was a much cheaper way to stop manned bombers, especially since the U.S. was paying 91 of 110.8 million for two squadrons in Canada.⁶ This technology could reduce about 100 aircrafts in the Defence system. Cancelling Arrow would be even better for Canada, which had a limited defence budget.

Moreover, the U.S. was concerned about its high-altitude spying mission over enemies being found out by using Arrow's technology. USAF's U-2 spy planes, flew at 70,000 feet, which was their most efficient way to collect information from the Soviets. Arrow at that time, was the only interceptor designed with a 60,000 to 70,000 feet altitude. If this technology was leaked to the Soviets, they could easily identify and shoot down U-2 aircrafts and use it as evidence for a U.S. invasion to their country.⁷ Arrow's cancellation could protect sensitive US installations, therefore Soviets' KGB agents couldn't spy on this technology. The CIA stopped USAF from buying the Arrow in January 1958. The time of cancellation was well considered, which was before any flights with Iroquois engines in order to prevent the altitude and speed records from reaching the U.S. latest spy planes' flying attitude.⁸ Its manufacturing data was already in American hands before it was destroyed, so the Americans could develop more advanced aircrafts.

⁵ Campagna, *Storms of Controversy*, 124.

⁶ Campagna, *Storms of Controversy*, 130.

⁷ Campagna, *Storms of Controversy*, 172.

⁸ *ibid*, 174.

The overpriced unit cost of Arrow without any overseas interests led to its end. Arrow planned to attract U.S. and U.K. interest and both the RAF and USAF were kept updated on the project, and contributed significantly to the pneumatic design.⁹ However, C.D.Howe grossly underestimated the cost of \$100 million. In 1957-58, it already cost \$235 million, and another \$100 million would be required the following year.¹⁰ Later on, it lost all overseas interests and Canada's small requirements for 100 arrows increased the unit cost to about 5 million, twice as much as U.S. aircraft, and a total cost of 780 million. Arrow project used 97% per cent of estimated budget until its cancellation.¹¹ Mr. Pearkes, on Feb 23, 1959, stated that budget considerations were extremely important in the decision to cancel the Arrow.¹² Bomarc system took most of the defence budget which meant Avro must be cancelled, and Bomarc was cheaper for the manned bomber threat. Eventually, Arrow died on the altar of economics.

On 20 February 1959, the "black Friday" in the Canadian aviation industry, Diefenbaker's government ended the program, by explaining that ballistic missiles had become the new threats and Arrows were too expensive to afford. Mr. Pearkes denied cost was the main reason of the cancellation.¹³ The main reason was a lack of understanding of the technology under the intense political pressure from the U.S. By this project, Canada set up an advanced aircraft engineering and industry system. The Arrow could provide NATO countries a first rate interceptor and engine, and Canada would have had a chance to lead the aviation world. Diefenbaker saw the programme as a Liberal government initiative and disliked the corporation. Under the international political

⁹ Organ, 15

¹⁰ Murray Peden. *Fall of an Arrow*. (Stittsville, Ont.: Canada's Wings, 1978.), 79.

¹¹ Organ, 151.

¹² Peden, 124.

¹³ Campagna, *Storms of Controversy*, 163.

and Canada's economic situation, his government didn't realize how precious and innovative this project was, but rather destroyed it.¹⁴ After this decision, Canada was left in the awkward position of having to find a good reason for cancelling Arrow. Diefenbaker knew that his government could be destroyed if he made a flat announcement to cancel Arrow. Instead, he used propaganda to replace manned bomber with ballistic missiles threat, and introduce Bomarc missiles in ways that would overplay their performance. The government cancelled the project right before Arrow 206 (the full-powered Arrow) was assembled. He also ordered the flight test to show the weakness of Arrow, making cancellation more logical.¹⁵ However, history had proved that a high-speed interceptor was needed to block more and more advanced manned bombers, even in a missile age. Ironically, Canada bought U.S. interceptors to face the existing manned bomber threats after the cancellation.

After the cancellation of Arrow, Canada stopped producing high-tech aircrafts, and let the American dictate its weapon development, which lost incalculable experts in engineering. In signing NORAD agreement and the defence-sharing arrangements, Canada had essentially agreed never to develop high-tech aircraft again. Since the cancellation, RCAF had to depend on U.S. equipment, such as purchasing 2.34 billion dollars American or British fighters.¹⁶ The cancellation forced a mass exodus of highly skilled professionals to the aerospace industry in the US. Canada once briefly led the world in military aircraft designing, but the cancellation almost destroyed its aerospace industry system, and reverted Canada to its former humble role. Canada's aircraft industry would never embark on such an ambitious project again.¹⁷

¹⁴ Campagna, *Storms of Controversy*, 164.

¹⁵ Campagna, *AVRO ARROW*, 12.

¹⁶ Peden, 156

¹⁷ Campagna, *Storms of Controversy*, 1.

This amazing interceptor was destroyed by political and economic pressures. Because of its excellence, the U.S. aerospace industries were aware, Bomarc missile threat was created, the U.S. worried about its spying mission, but together with Canada's limited budget for defense, with no overseas interests, and the lack of understanding of new technology, Arrow was cancelled. National security can never be procured on the cheap, and an industry system can never be formed overnight. Arrow's tragedy taught Canada a profound lesson. Avro arrow, the untimely hero, its excellence caused both its greatness and failure.

Annotated bibliography

Campagna, Palmiro. *"AVRO ARROW: An Aviation Chapter in Canadian History."*

Factualarrow.pdf. September/October 1988.

<http://www.avroarrow.org/AvroArrow/factualarrow.pdf>.

This book/website gives official information for the Avro Arrow from the retired A.V.Roe. engineers. It gives objective and brief summary of the background, design, testing, cancellation, and reason for cancellation. This is from the official A.V.Roe. engineers, with very little personal perspective which could be compared with other sources to evaluate their value.. This source is mentioned and highly recommended in the end of Richard Organ's book.

Campagna, Palmiro. *Storms of Controversy: The Secret Avro Arrow Files Revealed.*

Toronto: Stoddart, 1992

This book discusses different theories about the reason of Arrow's cancellation. It specifically focused on the US-Canada defence politics relation and how that affects the Arrow project. It lists all the important documents and speech from the defense meetings between two countries. It is more objective than Murray Peden's "Fall of an Arrow", and seems more reliable. Its detailed facts and strong arguments explains the reason really clearly and well. Campagna is a professional engineer with the Department of National Defence in Ottawa. He had wrote books about classified Secret and Top Secret file related to aerospace industry in Canadian government. (UCC MacIntosh Library, 300s - 358.43 CAM)

Organ, Richard. *Avro Arrow: The Story of the Avro Arrow from Its Evolution to Its Extinction.*

Cheltenham, Ont.: Boston Mills Press, 1980.

This book gives some lesser known facts about Avro Arrow's design studies, flight test, advanced proposals for the development of future versions. There are a lot of pictures and accurate drawing. It includes many taped interviews with test pilots and various company officials. All the precise data and pictures it listed can help understand the design and testing process better. It gives an objective background and explanation about Arrow's cancellation. It does not have very personal points about the cancellation. Mr. Richard C. Organ, serves as Aviation Operating Executive at Resilience Capital Partners LLC. This gave him a better understanding about aerospace engineering.

(UCC MacIntosh Library, 300s - 358.43 ORG)

Peden, Murray. *Fall of an Arrow.* Stittsville, Ont.: Canada's Wings, 1978.

This books discusses the Canadian government's attitude and position for the Arrow project. It starts from the background of Arrow project until the effect to Canada after its cancellation. It mainly focuses on the Canadian government's effectiveness in supporting such complicated military projects. It also mentioned the US pressure on this project. The source use

specific documents to support its argument. It also contains some satire and criticism to the government decisions.

(UCC MacIntosh Library, 300s - 358.43 PED)