

AVRO CANADA

CF-105 ARROW

● High-speed interceptor ● Missile armament ● Project cancelled



WARPLANES
OF THE 1950s,
1960s AND 1970s



Designed to intercept Soviet bombers flying over the North Pole to launch supersonic attacks, the CF-105 was an ambitious aircraft. It was required to have two engines, two seats, long range, a high supersonic speed and an all-missile armament. The missiles were to be carried internally, which dictated a large fighter with a high wing making room in the fuselage for the missile bay, and resulted in unusually

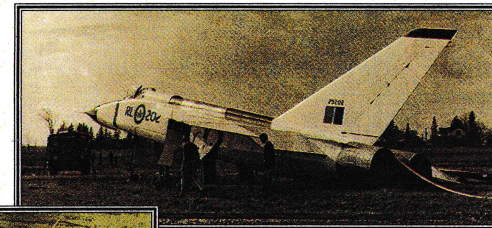
▲ When unveiled, the spectacular Arrow was unfortunately overshadowed by the launch of the Soviet satellite Sputnik 1. After five Mk 1 development machines, the project was cancelled, days before the Mk 2 was scheduled to fly.

PHOTO FILE

AVRO CANADA CF-105 ARROW

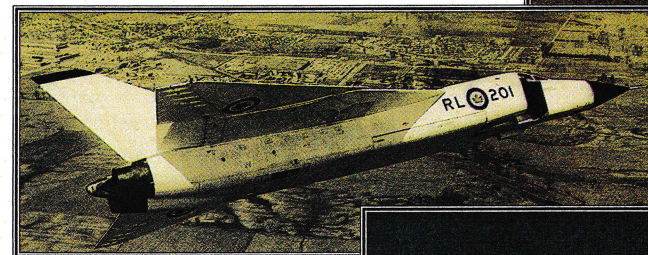
Landing accidents ►

During flight tests, the aircraft was involved in two incidents. In June 1958 the port undercarriage leg failed to extend on 25201, needing four months to repair. In November, 25202 suffered brake seizure on landing, causing an undercarriage leg to collapse. Repairs were never fully completed.



◀ Weapons bay

Like other ultra-high-performance interceptors of its day, the Arrow carried its weapons internally to reduce drag.



Revolutionary wing ►

Among advanced features was the CF-105's machined-plate wing skin with internal fuel tanks.

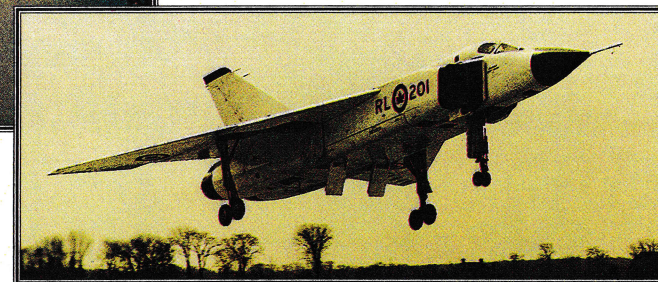


▼ Mission profile

The definitive Arrow Mk 2 was intended to fly a high-speed mission, cruising at Mach 1.5, with fuel provision for five minutes of combat at 58,500 feet.

▲ Public unveiling

Hopes for the Arrow program were high when 12,000 spectators witnessed 25201 being rolled out on October 4, 1957, at Malton.



FACTS AND FIGURES

- The projected Mk 3 was to use Iroquois 3 engines, new intakes and nozzles, more fuel to reach Mach 2.5 speed.
- No fewer than 16 wind-tunnel models were used during the final design stages.
- The two underfuselage speed brakes could be held open during Mach 1 flights.
- The CF-105's advanced hydraulic system remained unique until Rockwell flew the B-1A strategic bomber in 1974.
- For servicing, the Mk 2's engines were slid out of the Arrow on special rails.
- A B-47 with a rear-mounted nacelle was used to test the Orenda Iroquois engine.

Canada's ill-fated Arrow

Designed with a big, thin delta wing, the Arrow prototypes used Pratt & Whitney J75 engines, but Mk 2 production aircraft were intended to use the new Orenda PS-13 Iroquois. A later version of the Iroquois was expected to give the Arrow Mk 3 a maximum speed of Mach 2.5.

The Arrow was also to have a new Astra radar and fire control system in addition to new Sparrow II long-range missiles. Some eight Falcons would be

carried along with four Sparrow IIs, though the eventual cancellation of the Sparrow II led to one or two nuclear-warhead Genie missiles being specified instead.

The first of five completed prototypes flew for the first time in March 1958. Airborne performance was good, but landing gear failures damaged two of the prototypes on the ground. In September, the radar and Sparrow II missiles were cancelled in favor of cheaper U.S. systems.

Long slender main undercarriage struts were a feature of the CF-105. They were necessary to fit the gear into the Arrow's thin wing section.

The program survived only a few more months. In February 1958 the government ordered all five Mk 1s and the four near-complete Mk 2 prototypes to be destroyed. The Canadian air force ended up with F-101 Voodoos instead.

The Arrow was tailless because there did not seem to be room for one. An artificial damping system was thus needed to give high-speed stability.

CF-105s had a crew of two seated in tandem on Martin-Baker C-5 ejection seats. Fixed air intakes were intended to be replaced on the projected Mk 2A by variable-geometry types.

To retract the undercarriage into the thin wing, it had to both shorten and twist during the retraction cycle. To shorten the oleos, the wing drooped by 4 degrees.

CF-105s 25201 to 25205, designated Mk 1s, were purely test machines and were unarmed. The fourth and fifth aircraft had the shorter radome of the abortive Astra I radar system.

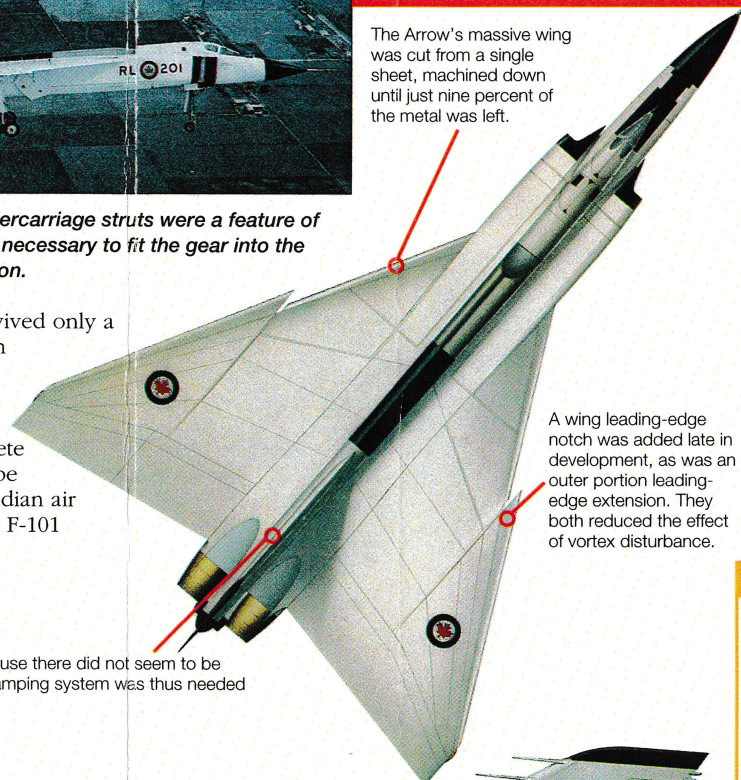
The RCAF demanded a highly sophisticated fire control system. Hughes proposed the MX1179 from the Convair F-106, but RCA was given the contract to construct the Astra I, later abandoned.

A generous weapons bay 17 feet 9 inches long and 9 feet 7 inches wide was to carry pre-loaded packs of Sparrow 2, GAR-1A Falcon and nuclear-tipped Genie air-to-air missiles.

Several types of engine were considered, but the Orenda Iroquois was chosen for production machines. However, development aircraft like this carried two American Pratt & Whitney J75s.



The Arrow's massive wing was cut from a single sheet, machined down until just nine percent of the metal was left.



A wing leading-edge notch was added late in development, as was an outer portion leading-edge extension. They both reduced the effect of vortex disturbance.

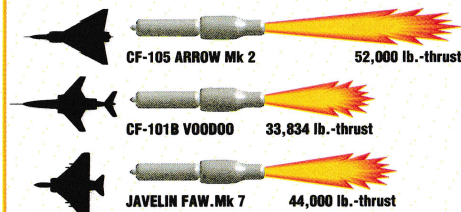
SPECIFICATIONS CF-105 Arrow Mk 2

- Type:** Two-seat long-range interceptor.
- Powerplant:** Two 26,000-lb.-thrust Orenda PS-13 Iroquois 2 afterburning turbojets.
- Maximum speed:** 1,317 m.p.h. at 50,000 ft.
- Combat radius:** 710 mi. with external fuel.
- Range:** 1,500 mi. ferry range with external fuel.
- Service ceiling:** 60,000 ft.
- Weight:** Empty 62,082 lb.
- Weapons:** 6 GAR-1A Falcon air-to-air missiles.
- Dimensions:**
 - Span 50 ft.
 - Length 78 ft.
 - Height 21 ft.
 - Wing area 1,224 sq. ft.

ACTION DATA

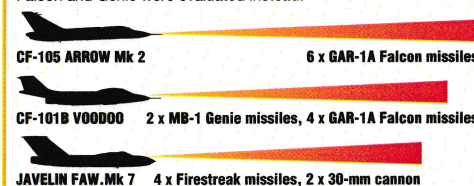
THRUST

For its day, the CF-105 was in a class of its own in terms of thrust provided by its twin Canadian-built Iroquois 2s. The first five development machines had carried less-powerful P&W engines.



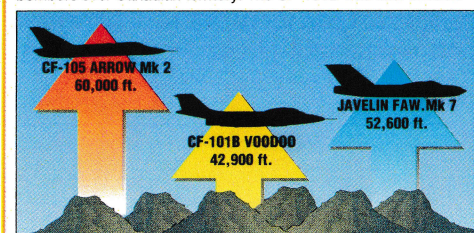
WEAPONS

Throughout its development there was debate over how best to arm the Arrow. Cannon armament was dispensed with, Sparrow 2, Falcon and Genie were evaluated instead.



CEILING

The respectable ceiling of the CF-105 came from its design requirement: to be able to intercept high-flying Soviet turbojet bombers over Canadian territory. The CF-101B was later chosen.



RCAF jet interceptors

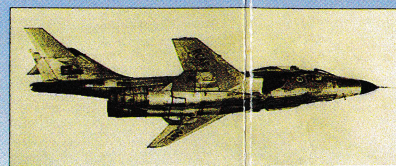
AVRO CANADA CF-100: The CF-100 Canuck long-range interceptor, first military aircraft wholly designed and built in Canada, was intended to be replaced by the CF-105.



CANADAIR CF-104: Lockheed's Starfighter was license-built in Canada, but proved problematic, reverting to strike duties before its retirement in the early 1980s.



MCDONNELL CF-101B: Hastily acquired after the CF-105's cancellation, the Voodoo was a proven front-line interceptor with Falcon and nuclear Genie air-to-air missile armament.



MCDONNELL DOUGLAS CF-118: First delivered in 1982, the CF-118 is Canada's principal air defense asset. Operating a total of 98, Canada was the first Hornet export buyer.

