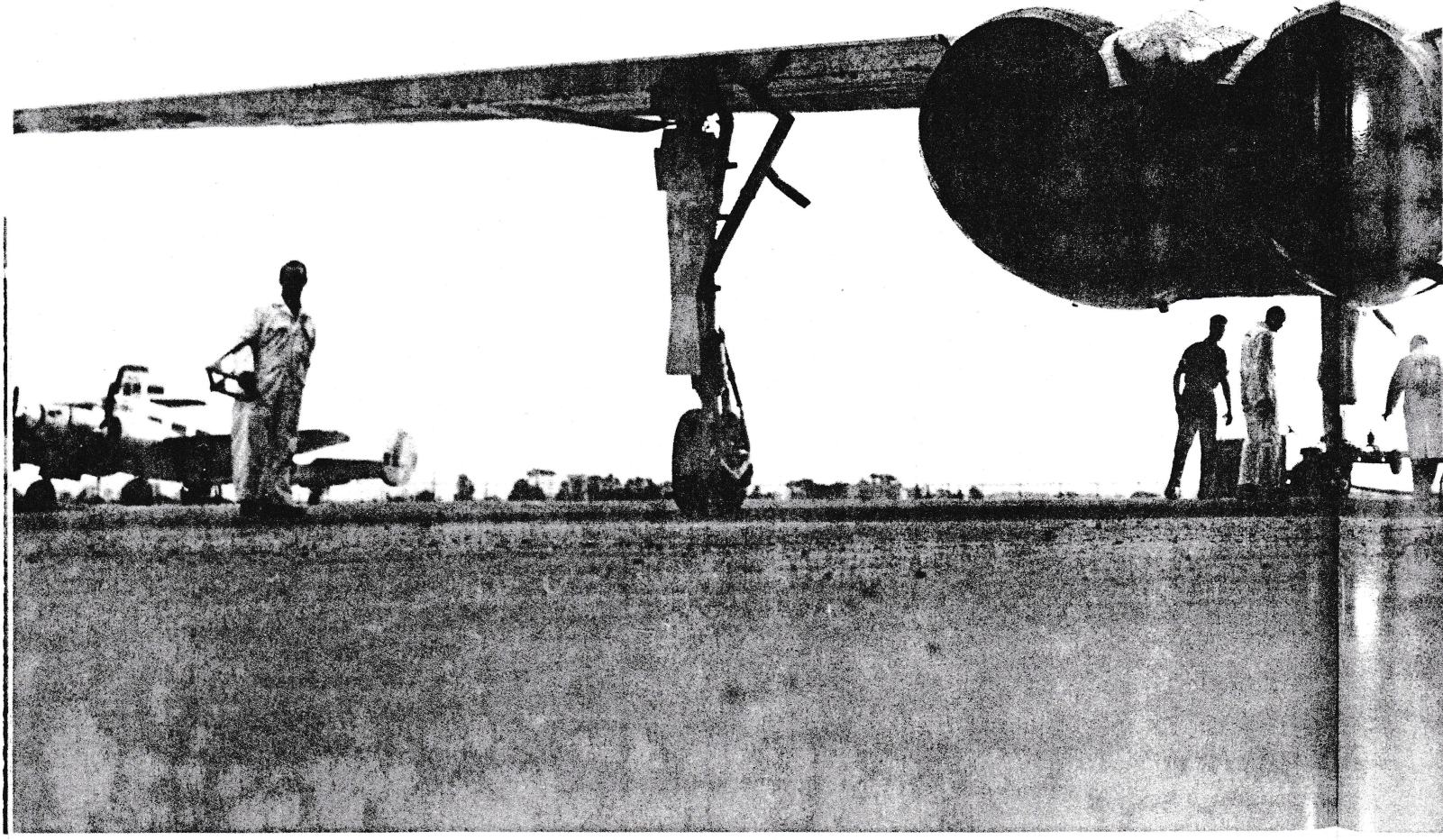
Broken Arrow

Fifty years ago Canada flew the awesome CF-105 Arrow interceptor – a year later the whole project had been terminated

Daniel Ford pays tribute



LONG BEFORE anyone had even heard of the TSR.2 another nation had suffered the trauma of the swift cancellation of a 'super-jet' programme. That country was Canada, and as early as 1958 it had flown a delta-winged, long-range supersonic interceptor – this was the awesome Avro Canada CF-105 Arrow.

Just as with the TSR.2, wounds from the axing of the Ontario-based project are still raw. In both cases there seemed to be an almost unseemly rush to obliterate all traces and move on – as if it had never existed.

The termination of the British strike fighter, the BAC TSR.2, was announced in Parliament on April 6, 1965. Only one aircraft – XR219 – had flown, doing so for the first time on September 27, 1964. The last of just 24 flights took place on March 31, 1965. This prototype had 'clocked' only 13 hours 5 minutes.

At Avro Canada's plant at Malton, no less than *five* Arrows had flown when testing and production was aborted on February 20, 1959. These machines had amassed nearly 90 hours of testing over a year. They were well into proving the CF-105 as a fighter capable of defending Canada from Soviet strategic bombers.

REPLACING THE 'CLUNK'

On January 19, 1950 Canada's first indigenous jet fighter took to the air at Malton. This was the prototype twin-engined all-weather Avro Canada CF-100 Canuck. Of conventional design with a non-swept wing, a development batch was followed by 70 operational examples for the Royal Canadian Air Force. Additionally, 53 were supplied to the Belgian Air Force.

RCAF pilots liked what they affectionately called the 'Clunk' and it entered service in 1953. From 1961 the CF-100 gave way to the McDonnell CF-101 Voodoo as an interceptor, but the type soldiered on in other roles until 1984.

Initial sketches of what became the Canuck appeared in early 1946. Such was the pace of aeronautical development, and changes in the perceived threat to the post-war world from the Soviet Union, that during the summer of 1949 Canadian industry started to ponder a replacement for the CF-100.

With the 'Cold War' intensifying and the threat of long-range nuclear bombers striking at North America from over the polar ice-cap, a much more sophisticated, supersonic long-range interceptor was needed to provide a viable deterrent. This requirement crystallized as RCAF Specification AIR 7-3 in April 1954, but Avro Canada was already on the case.

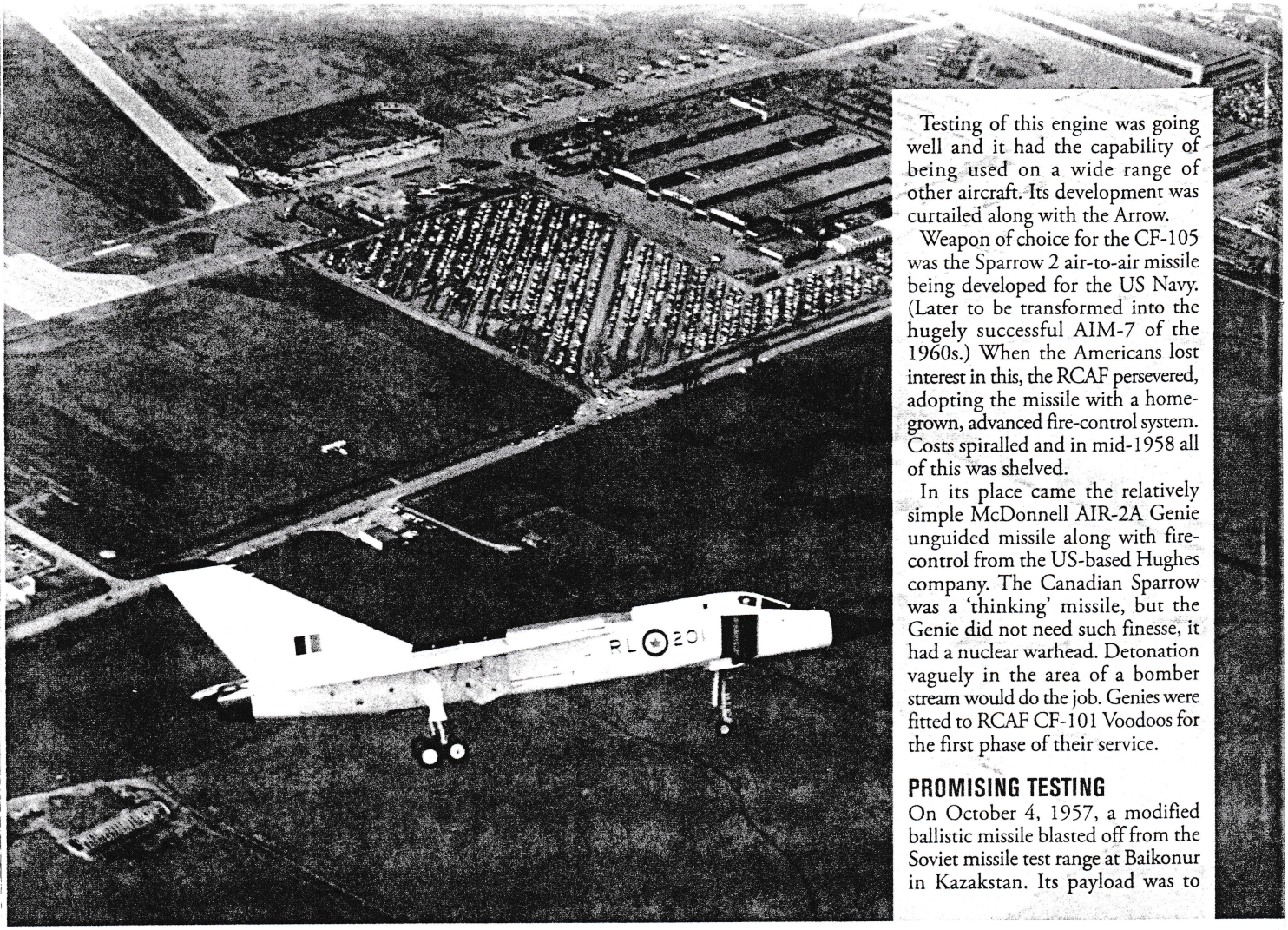
"They were well into proving the CF-105 as a fighter capable of defending Canada from Soviet strategic bombers."

COMPLEX DELTA

In the summer of 1951, Sir Roy Dobson, at the helm of Avro Canada's Manchester-based UK parent company, examined Malton's varied responses to AIR 7-3. He pressed for a delta-winged, tail-less, planform.

This was understandable given that the Woodford design office was

Personnel gathered around the prototype lend scale to the massive CF-105. ALL AVRO CANADA UNLESS NOTED



Testing of this engine was going well and it had the capability of being used on a wide range of other aircraft. Its development was curtailed along with the Arrow.

Weapon of choice for the CF-105 was the Sparrow 2 air-to-air missile being developed for the US Navy. (Later to be transformed into the hugely successful AIM-7 of the 1960s.) When the Americans lost interest in this, the RCAF persevered, adopting the missile with a home-grown, advanced fire-control system. Costs spiralled and in mid-1958 all of this was shelved.

In its place came the relatively simple McDonnell AIR-2A Genie unguided missile along with fire-control from the US-based Hughes company. The Canadian Sparrow was a 'thinking' missile, but the Genie did not need such finesse, it had a nuclear warhead. Detonation vaguely in the area of a bomber stream would do the job. Genies were fitted to RCAF CF-101 Voodoos for the first phase of their service.

PROMISING TESTING

On October 4, 1957, a modified ballistic missile blasted off from the Soviet missile test range at Baikonur in Kazakstan. Its payload was to mark a step-change in history and to ramp up the 'Cold War' still further. The world's first artificial satellite, Sputnik, was in orbit.

This breaking news rained all over Avro Canada's parade that day. October 4 was also the occasion

working full tilt on the Avro Type 698. The first example of this type flew on August 30, 1952, and took the name Vulcan that October.

Having been faced with what could be called 'Dobson's Choice', the single-seat delta interceptor was initially designated C-104 by the company, but as the design was refined it was termed the C-105. This was accepted for development and trials by the RCAF in March 1954 as the CF-105 Arrow.

The prototype CF-105 Arrow with Avro Canada's Malton plant in the background. Large numbers of CF-100 Canucks are parked out.

"The Canadian Sparrow was a 'thinking' missile, but the Genie did not need such finesse, it had a nuclear warhead."

turbojet for the production Mk.2s. This was an advanced engine of considerable technical merit and was flight tested in 1956, strapped to the rear fuselage of a Boeing B-47 Stratojet transferred from the USAF for the purpose.

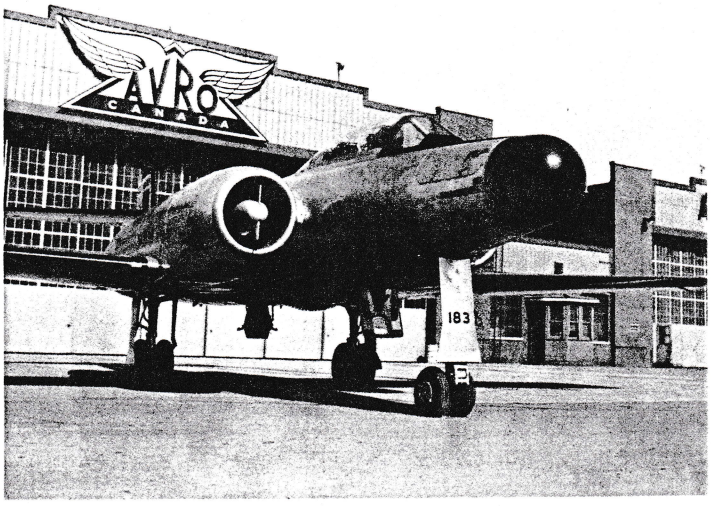
Twelve months, five prototypes

Serial	First Flight	Total Flights	Total Time	Last Flight
25201	Mar 25, 1958	25	21 hours 25 mins	Feb 19, 1959
25202	Aug 1, 1958	22	25 hours 40 mins	Nov 11, 1958
25203	Sep 22, 1958	12	23 hours 40 mins	Feb 19, 1959
25204	Oct 27, 1958	6	7 hours 0 mins	Feb 7, 1959
25205	Jan 11, 1958	1	40mins	Jan 11, 1958

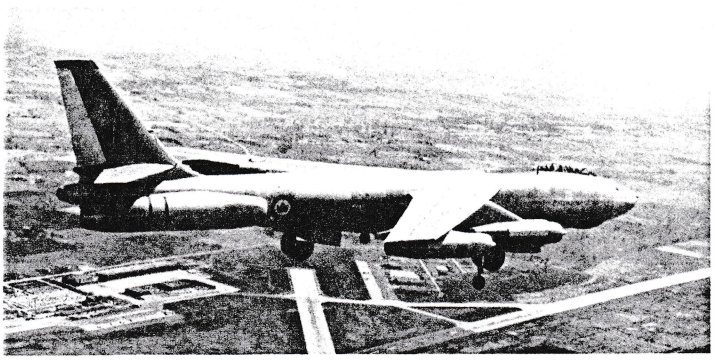
Ambitions ran high, the design was radical enough but Canadian industry was going to show to the world its capabilities. The batch of five prototypes – the Mk.1s – was to be powered by Pratt & Whitney J75 turbojets, but this was just an interim phase.

Along with the wholly Canadian airframe, the Orenda organisation – also based at Malton – was developing the PS.13 Iroquois

Roll-out of the first Canuck Mk.4 at Malton, September 1953.



The first CF-105 is rolled out at Malton as Sputnik orbited overhead, October 4, 1957.



Canadair converted former USAF B-47 51-2051 into a test-bed for the Iroquois turbojet at its Cartierville, Quebec, plant in 1956, under the designation CL-52. CANADAIR

Lines of 'Clunks' outside Avro's Malton factory.

of the roll-out of the prototype CF-105, 25201, which carried the code 'RL-201' on the engine intakes. Publicity photos showed personnel gathered around, emphasizing just how big this massive delta was.

On March 25, 1958, Jan Zurakowski took 25201 on its maiden sortie. Confidence in the new jet was high and on only its third outing (April 3) with 'Zura' again at the controls, 25201 became the first Canadian designed and built aircraft to achieve level supersonic flight, clocking Mach 1.1.

Four other Mk.1s flew in quick succession and were used to explore all elements of handling and performance. The CF-105 was not found lacking, it was showing all the signs of a thoroughbred with great potential.

At Malton, the first Mk.2, 25206, was completed and should have flown in the early days of March 1959. Like the CF-100 Canuck before it, Avro Canada envisaged a series of staged developments leading to the Mk.3, which was intended to achieve Mach 2. (With Wladyslaw Potocki piloting, the second CF-105 Mk.1, 25202 achieved Mach 1.96 on November 11, 1958.)

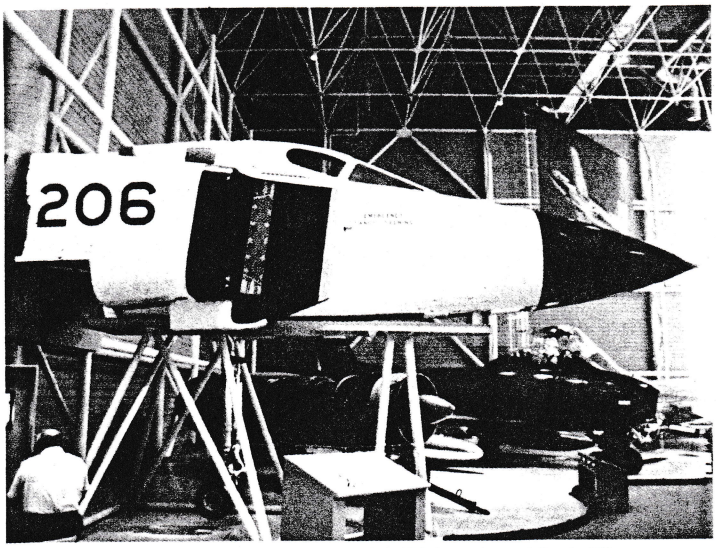
On January 11, 1958, Potocki took the fifth example airborne for the first time on a gear-down 40-minute check-out. It never flew again.

Forty-one days later the whole Arrow adventure was over. This challenging, high-prestige undertaking was gobbling up too much money, and Canadian national pride had to give way to pragmatism.

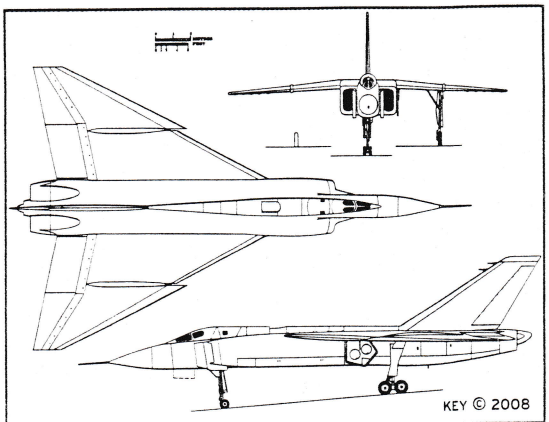
It was not long before the phone lines to St Louis, Missouri, were buzzing. Canada had turned its thoughts to the American McDonnell F-101 Voodoo. The brief era of indigenous Canadian jet warplanes had come to an end.

ARROW HERITAGE

The sole Mk.2, which was ready for test when the CF-105 programme was shut down, became the only substantial survivor of this incredible venture. All of the prototypes, unfinished Mk.2s, jigs and tooling were scrapped.



Forward fuselage of the unflown CF-105 Mk.2 25206 on show at Rockcliffe – Canadair-built Sabre behind. KEY-KEN ELLIS



Avro Canada CF-105 Arrow Mk.1

Powerplant: Two 23,500lb (104.5kN) Pratt & Whitney J75-P3 turbojets.
Dimensions: Span 50ft 0in (15.24m) Length 77ft 9²/₃in (23.71m) Height (21ft 3in (6.48m) Wing Area 1,225ft² (113.8m²)
Weights: Empty 48,920lb (22,190kg) All-up 68,600lb (31,144kg)
Performance: Max speed at sea level with reheat 805mph (1,297km/h) Initial rate of climb with reheat 39,500ft/min (12,040m/min)

Canada's prestigious Institute of Aviation Medicine at Eglinton, near Toronto, was looking for a modern jet to help with pressurisation testing and it expressed a desire for 25206. IAM required only the forward fuselage and in 1965 its 'boffins' had the foresight to pass this on to the nascent National Aeronautical Collection at Rockcliffe, Ottawa.

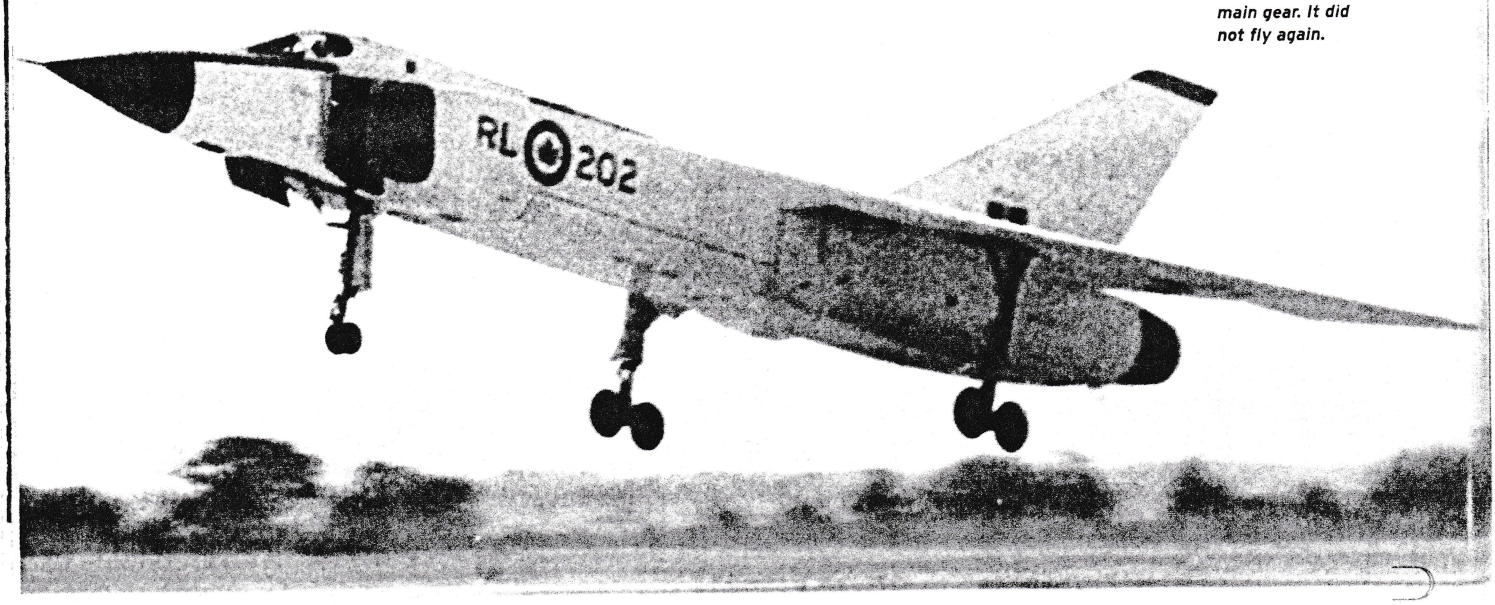
Mounted on a jig, the forward fuselage of 25206, complete with nose undercarriage, is on display in what today is called the Canada Aviation Museum. Along with the nose is an example of the CF-105's main gear. Until 2006, these artefacts represented the best way to appreciate this 'super fighter'.

Resplendent in gloss white overall, with red nose, wingtips, fin and rudder, a CF-105 was rolled out at Downsview, Ontario on October 8, 2006. Eight years of work had culminated in the completion of a full-size replica for the Toronto Aerospace Museum.

Despite the passage of all that time, emotions were running high as the generations that experienced 'the Arrow affair' were confronted once again with what-might-have-been. For those too young to have seen the CF-105 in the air, the sight of this mighty delta showed just what wonders the relatively young Canadian aircraft industry was capable of.

For an amazingly detailed, level-headed, appraisal of all things CF-105, take a look at www.avroarrow.org

A pleased Jan Zurakowski after the first flight, March 25, 1958. KEC



The second CF-105, 25202, was damaged on November 11, 1958 when a landing incident resulted in a collapsed main gear. It did not fly again.