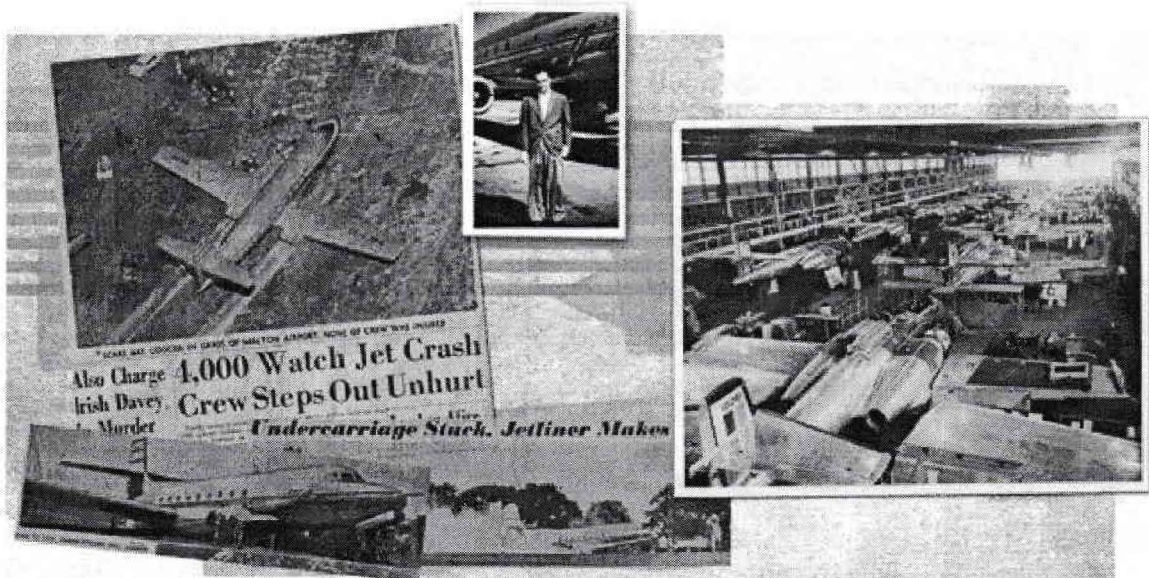


Woe Canada

The only thing that kept Canada from beating the U.S. to a jet airliner was Canada.

- By Graham Chandler
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Even though the rugged airplane had survived an emergency nosewheel landing on its second test flight, the Jetliner's days were numbered. Not even interest from Howard Hughes (opposite, top) was enough to save it. Instead, Avro ramped up production of its CF-100 fighters (left).

Collage: Ted Lopez; photographs and newspapers courtesy Mabel Baker family, George Evans, Avro of Canada

Jet Aircraft

Airliners and airfreight carriers

Cold War Era

Thermometers were nudging 100 at Malton Airport in Toronto, Canada, when North America's first jet airliner lifted off in a stiff crosswind. The aircraft flew for 65 minutes that day, August 10, 1949, just two weeks after Britain's Comet jetliner had become the world's first and five years before the United States would fly its first, the Boeing 707.

The Avro Canada C102 Jetliner could out-climb and out-cruise any airliner on North American drawing boards. It also needed less runway than anything the airlines had in their fleets and could fly higher, faster, and, a cost analysis later found, cheaper. The airplane was coveted by at least six

airlines, the U.S. Air Force and Navy, the U.S. Civil Aviation Authority, and even billionaire Howard Hughes. Yet despite all the interest, seven years later the jet was put to the cutting torches. Its nose section sits forlornly at the Canada Aviation Museum in Ottawa, and the rest of the pieces were long ago sold to an Ontario scrap dealer.

What happened?

When World War II ended, Avro Canada was an independently managed subsidiary of British-based Hawker-Siddeley Group and, capitalizing on former wartime talent and labor, soon had several advanced designs under way. By the end of the 1950s, Avro had created not only the first North American jet airliner, but also an exceptionally capable Mach 2 interceptor, the CF-105 Arrow. Both fell to the fickle politics of national defense (see "Fallen Arrow," Apr./May 1998). Avro's greatest success was the CF-100, the Canadian fighter that flew under the U.S./Canadian North American Air Defense Command (NORAD) during the cold war to protect North American airspace from Soviet intruders. More than 700 were sold to the air forces of Canada and Belgium.

"It was a heady place to work," recalls Jim Floyd, now 94. "It was a brand-new company. There were so many exciting things going on there." At 32, the Man-

chester-born engineer reported for work at Avro Canada on February 11, 1946, and began organizing a new technical department. By the end of the month, the forward-thinking group was ready to discuss a new proposal: to design and produce a 30-passenger jet for Trans-Canada Airlines (now Air Canada) that could operate from 4,000-foot-long runways, could cruise at 400 mph, and had a 1,200-mile range. The group proposed the C102, and TCA was impressed. By April 9 the airline had sent Avro a letter of intent to purchase "a quantity" of the aircraft.

Back then, jet airliners were pie-in-the-sky ideas. Designing one was more than just mounting jets in place of piston engines. Because a jet becomes efficient at much higher altitudes and airspeeds, entirely new configurations were required, ones that could be controlled over a wide range of speeds and had fuselages able to withstand constant pressurization changes.

Floyd looked even further ahead than the TCA spec. "We decided from the outset...to allow for future development of the type," he wrote in his book *The Avro Canada C102 Jetliner*. The team was hoping eventually to attain cruise speeds of 425 to 450 mph with a 40- to 50-passenger range

of 1,500 miles. Floyd had the ideal engines in mind—two newly designed Rolls-Royce AJ65s, with 6,500 pounds of thrust each—but since those were still restricted to the military, he had to settle for four tried-and-true Rolls-Royce Derwent V engines. In 1945 Derwents had powered Britain's Gloucester Meteor fighter to a world record of 606 mph. The four engines gave the Jetliner more thrust but also increased the airplane's fuel consumption 13 percent.

TCA expressed cautious interest in the Jetliner. But the airline had enough on its plate with getting its new North Star (a Canadian variant of the Douglas C-54/DC-4/DC-6 with Rolls-Royce Merlin V-12 engines) into service and making sure TCA could fill the seats.

"The reality was that the high traffic levels of the early 1940s were artificially inflated by wartime demands, and Canadians were not yet reconciled to flying as the normal way of getting from place to place," says Jonathan Vance, Canada Research Chair in History at the University of Western Ontario. As a result, the airline struggled with budget deficits in the postwar years. "When it came time to upgrade the fleet, there was a fundamental question: Do you do it with a supposedly better version of an aircraft that the traveling public is already familiar with—i.e., a prop-driven aircraft—or do you do it with something new and different? If I had been with TCA at the time, I would have avoided jet technology."

In 1948, TCA's new president Gordon McGregor did just that: Floyd's book reports that at a meeting shortly after his appointment, McGregor said he didn't want the airline to be the first in North America to operate a jet transport. Management began to look for escapes: Since few Canadian airports had the new Instrument Landing Systems that would enable the new aircraft to land, TCA pointed out that the Jetliner would require considerably higher fuel reserves to get to those airports with the necessary equipment. TCA also demanded more stringent specifications, like a 500-mph cruising speed, which would have required a complete redesign to accommodate a swept wing, like the Comet had. "It would have been easier to convert a cow into a crocodile than it would have been to incorporate all TCA's new 'suggestions' into the C102 design," writes Floyd, who points out that unlike the long-range Comet, the Jetliner was optimized for short- to medium-length routes and the ability to operate from shorter runways.

As TCA dithered, Floyd looked for customers elsewhere, especially south of the border, where airlines traditionally worked closely with designers. But in 1947, U.S. airplane manufacturers Douglas, Lockheed, Martin, Convair, and Boeing all posted financial losses and were preoccupied

with new piston designs like the DC-6, Constellation, Martinliner, Convairliner, and Stratocruiser. Years later, Boeing unveiled its 707 prototype, heralding a new jet intended for longer-range, intercontinental travel. The Avro Jetliner, by contrast, had been designed as a regional jet. Still, U.S. interest in Avro's work was high. "In the Avro XC-102, the Dominion of Canada has something brand new in the commercial transport field—a 100 percent jet-powered design with an economical cruising speed 100 mph faster than the newest American types," reported *Aviation Week* magazine on November 1, 1948.

So Floyd and his team pressed on, dedicated to making the Jetliner a success. Despite the loss of key staff to the CF-100 program, morale at Avro was soaring. Engineers, draftsmen, and technicians worked on the project well into the nights, and in the summer of 1949, the Jetliner flew without a hitch. Flight testing went smoothly into the fall.

Soon a second prototype was under construction. But with no firm customer base, what was there to design to? Sales pitches to the United States were stepped up, as "the American market is wide open" for the jetliner, Delos W. Rentzel of the U.S. Civil Aeronautics Administration told Canada's national news magazine, *Maclean's*, in late 1949.

On March 10, 1950, the Jetliner, along with the new CF-100, was flown to Ottawa to show off to government officials, military leaders, and dignitaries. The show was impressive; Toronto's *Globe and Mail* reported "the big Jetliner's performance evoked whistles of amazement."

To keep the ball rolling, Avro invited TCA's McGregor along on a flashy marketing and demo trip to New York. On April 18, the Jetliner made what was probably the most widely publicized airliner flight in North American history: leaving Toronto and blowing into New York City 59 minutes later. Scores of newspapers, including the *New York Times*, carried headlines like "Canadian Jet Liner Makes Air History" and "Jet Airliner Cuts Flying Time in Half." Recognizing Canada's huge jump on U.S. airline manufacturers, some U.S. newspapers blasted the lagging state of the American industry.

The tour set the industry abuzz. TCA warmed a little, sending their operations manager and their chief test pilot for flights. Dixon Speas, assistant to the president of American Airlines, defected to Avro to head up a new marketing office in New York. He began calling on Capital, United, National, American, Eastern, and TWA airlines, as well as the U.S. Navy. National discussed a

contract to purchase four Jetliners with an option for six more. The second Jetliner would incorporate the airline's requirements: longer fuselage for 60 passengers, increased range, double-slotted flaps, and a provision for whatever engine a customer wanted.

Meanwhile, the Air Transport Board released a study of the TCA route. The board said that running the Jetliner on the popular Toronto-Montreal-New York route, despite each leg being well short of the Jetliner's design range, would be 20 percent cheaper than using North Stars. Not only that, the Jetliner could do the routes in two-thirds the time with three airplanes—one fewer than the number of North Stars required. And, the board wrote, as the lengths of the legs along a route grew, costs would improve, producing even greater net revenues.

So by mid-July 1950, less than a year after its first flight, the prospects for the Jetliner looked bright. But 1950 was another war year: Korea. The United States and Canada were gearing up in case it escalated into a wider conflict. Avro was committing more workers and nearly all of its space to CF-100 production. Avro's commitment soon grew to 720 CF-100s—25 a month—and the second Jetliner was squeezed into a hangar corner.

Floyd pressed on. Through early 1951 several demonstrations were run carrying airline executives as far south as Miami and as far west as Los Angeles, confounding air traffic controllers along the way as they reported unheard-of airliner speeds and altitudes. Even the U.S. Air Force got into the picture, inviting the Avro team to come to Wright Field in Dayton, Ohio. With its high speed and cruise altitude, the Jetliner was the closest thing out there to the new bombers, so the Air Force thought the airplane would make the ideal crew training platform.

But the priority both nations put on building warplanes was leading to the Jetliner's demise.

One hundred years ago, Clarence Decatur Howe left the land his ancestors settled in the 1630s near Waltham, Massachusetts, and crossed the Canadian border to take his first job: professor of civil engineering at Halifax's Dalhousie University. By 1935, he was a member of Parliament, and soon after rose to become Canada's wartime Minister of Munitions and Supply. A go-getter, he was dubbed in 1947 "our new dictator" by an opposition member when Howe got a new cabinet post as the country's first Minister of Transport. From there, he would drive the final nails in the Jetliner's coffin.

Although Howe oversaw TCA, he never warmed to the Jetliner. With the overwhelming CF-100 commitment, he ordered Avro to withdraw the airliner from consideration by National, end promotions to other U.S. airlines, and stop work on a second aircraft. Floyd continued courting U.S. Air Force interest, and had the jet flown to the Wright Air Development Center for a thorough trial by Air Force engineers, pilots, bombardiers, and maintenance crews. A month later, they submitted a report card: eminently suitable as a multi-jet-engine trainer for pilots and bombardiers, with a bonus idea—air refueling tanker. Speas heard from the sales manager for the Allison division of General Motors, who said the Air Force told him it had put aside \$20 million to buy 20 Jetliners; according to Floyd's book, the U.S. Navy was also interested.

But back home at Malton, all was not so rosy. The second CF-100 prototype had crashed, and production of the fighter and its engines was way behind schedule. Avro management continued to shift workers from the jetliner to the fighter program, and transferred Floyd's chief aerodynamicist to a new, secret, all-weather, supersonic interceptor project to replace the CF-100; the interceptor would evolve into the Arrow. Floyd's team didn't even have the manpower to engineer the installation of the Allison J33 engines the Air Force wanted. Worse, Floyd himself was asked to leave the Jetliner project to troubleshoot the fighter production line—"not the happiest period of my career," he wrote. Twisting the knife was a visit to the plant by Howe, who told Floyd, "I suggest you forget that airplane and put your energy into getting the CF-100s out." Soon afterward, a senior civil servant named Crawford Gordon, who had worked under Howe, was made Avro's president.

Ironically, it was the CF-100 work that spawned a potential revival for the Jetliner. Avro was proposing to use the

Hughes MG2 fire control system for the Mark IV version of the CF-100. In a 2005 interview, Floyd told me: "Crawford Gordon got the idea that Howard Hughes is good for new projects, and so why don't we get him interested in the Jetliner?" The idea was that the Jetliner would make a good flying testbed for the fighter program. "The Jetliner was nearly as fast as a CF-100, so we could put all the equipment in there and try it out," Floyd said. Hughes was well aware of the record-breaking Jetliner—his airline TWA had already evaluated it, and he was anxious to fly it.

So on April 7, 1952, the Jetliner departed Malton for Culver City, California. Among those on board were Floyd, who brought along reams of Jetliner drawings, and chief test pilot Don Rogers.

After stops for fuel in Chicago and Denver, the crew arrived at Hughes' airfield the following afternoon. The next day, the billionaire arranged to meet them at their airplane.

"My first impression was: Here was someone who was almost, what shall we say, a phantom," Floyd told me. "He drove up in a car, and stayed in the car about two hours talking to somebody." Finally the car door opened and Hughes walked over to meet the team. He had a quick look inside, and seemed especially interested in the cockpit layout.

The next day, Hughes wanted to fly. Rogers sat him in the copilot's seat. "He didn't say very much," Rogers told me in a 2005 interview. "He just took the ride in the right-hand seat for a few circuits, then I put him in the left seat for a few circuits." Rogers recounted that Hughes was a fast learner, very careful, and applied just the right inputs to the Jetliner's flight controls. He remembered Hughes tended to make his approaches faster than necessary, in order to "feel" the airplane. The entrepreneur had a cavalier disregard for flight plans and radio instructions. "Flight plans weren't mandatory in those days," Rogers said. "He'd just take off on his own private strip and I'd be searching the sky very carefully for other aircraft."

After they landed, Hughes immediately ordered the Jetliner parked on the far side of his airfield, under a tree with guards around it. No one else was allowed near it. "His pilots never did get to fly the airplane," Rogers said. Besides wanting to feel how the airplane performed,

Hughes wanted to understand its design and engineering details, so he asked Floyd to sit down with him at a suite in the Beverly Hills Hotel. "We stretched all the drawings out on the dining room table, starting off about seven o'clock at night," Floyd recalled. "I hadn't had my dinner and it went on till about six o'clock the next morning."

In the course of talking with Hughes for 11 hours about nothing but the Jetliner, Floyd came to admire the man's engineering acumen. "My God, he really asked the questions that should be asked," he said. "He was absolutely at home with the drawings and all the things we were talking about. He came across as a very knowledgeable engineer." Floyd later got a photograph of the Jetliner that Hughes had autographed: "To Jim, with commendation for this very good design."

The airplane spent six months at Culver City, most of the time parked.

Hughes rented for Rogers and his family a former ambassador's house in Coldwater Canyon with a swimming pool and fruit trees. While Rogers and the crew occasionally enjoyed a little of Hughes' renowned Hollywood party life with the ever-present starlets, Hughes made a proposal for Convair to manufacture 20 or 50 Jetliners under license for TWA's more prestigious routes. Convair completed detailed plans that summer to deliver the first airplane by May 1954. Some say Howe intervened to quash the deal, but historian Jonathan Vance isn't so sure. "I suspect it was equal parts economic nationalism and a kind of tit-for-tat because the U.S. had put restrictions on out-of-country, defense-related manufacturing," he says. The Convair license from Avro would certainly have qualified as "out-of-country" manufacturing. Floyd said the plan was killed when the U.S. government decided that its own military commitments must take priority in Convair's plants.

Hughes' final attempt was offering to finance Avro to build him 30 Jetliners. Howe would have no part of that. According to Floyd's book, Howe wrote to Avro, "...any such use of your floor space cannot be tolerated." The Hughes MG2 fire control system never did get installed, and Rogers was told to bring the airplane back to Toronto.

For the next few years the Jetliner became Avro's house airplane, photographing CF-100 weapons tests or pilot ejection tests. But before long, the lack of spares and the long-term maintenance issues made the Jetliner increasingly useless.

On November 23, 1956, Rogers signed out the Jetliner and took off with three passengers for a 35-minute hop out of Malton. It was his only trip that day, and before he left the office, he sat at his desk and made his logbook entry. Seventeen days later Floyd received an interoffice memo from Avro's president, ordering with great regret that "the Jetliner is to be dismantled, in an appropriate fashion, as quickly and as quietly as can be done, every precaution being taken to attract as little attention as possible, and with the avoidance of any fanfare." That day, Rogers updated his recent logbook entry, adding in the Remarks column "Last Flight."

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