AVRO AIRCRAFT LIMITED

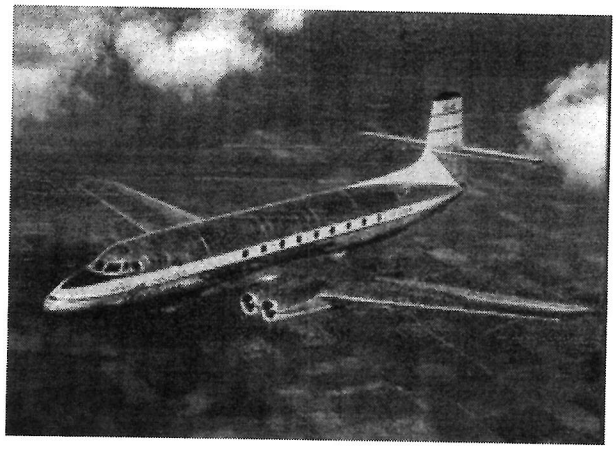
MALTON-ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

SECRET

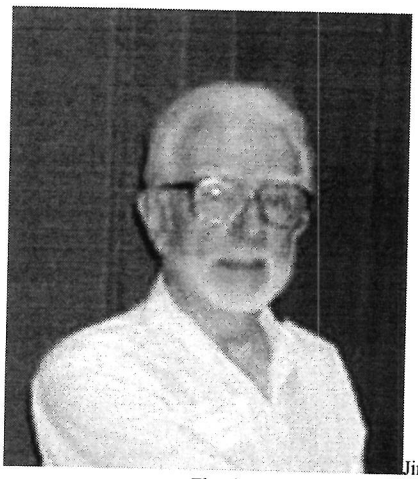
THE AVRO C-

By Randall Whitcomb, author of Avro Aircraft & Cold War Aviation, and Scott McArthur



The first project was for a passenger aircraft. Avro in the UK had been conducting a "think tank" to plot the future of the company and had been looking at some transport aircraft designs. These included turboprop and pure jet planes. The remaining engineers at Victory in Canada had also been doing some design studies including an Anson trainer replacement. This "Shaw Trainer" emerged under the direction of Victory's chief engineer, William Ulysses Shaw. In the first meetings with TCA the Avro representatives recommended a very economical turboprop design, virtually identical to the very successful Vickers Viscount. TCA's top technical man, Jim Bain, had, however, visited Rolls-Royce in the UK and became wildly infatuated with their AJ-65 Avon jet-engine design, even though this engine was still in the design phase and would, ultimately, take a very long time to become a reliable performer. He convinced the TCA management to go for a pure jet transport.

Avro complied and Jim Floyd, one of the Lancaster's designers who had come to Canada to be the Chief Design Engineer on the transport project, and Mario Pesando, Victory's Chief Aerodynamicist, went to TCA headquarters in Winnipeg to firm up the specifications for their aircraft.



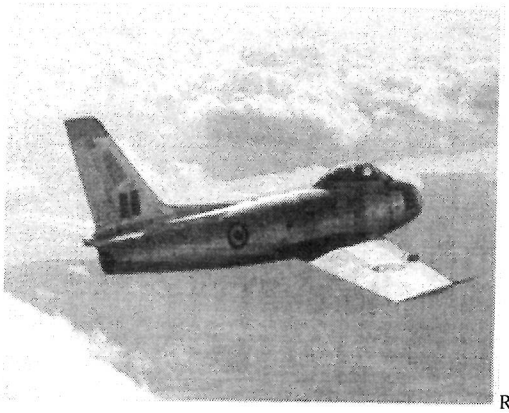
Jim Floyd,
VP Avro Aircraft (Engineering) 2002.

These specifications were:

- Payload of 10,000 lbs including 30 passengers
- Still air range of 1,200 miles
- Full load range of 500 miles against a 20 mph headwind with standard fuel reserves
- A cruising speed of not less than 400 mph.
- Runway requirement not to exceed 4,000 feet under standard conditions.
- Approach, landing, take-off and stall speeds to be comparable to conventional piston-engined
aircraft.
- Reliability and serviceability to be state of the art.
- Operating costs to be competitive with existing designs.

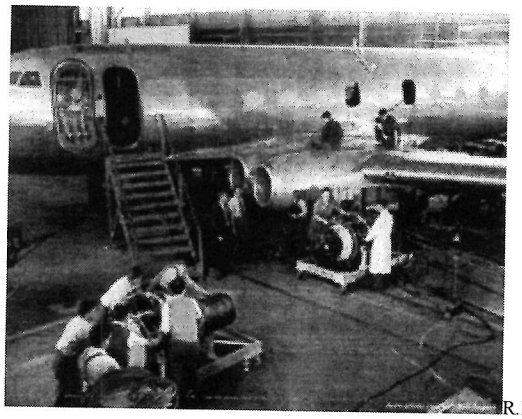
TCA issued an official letter of intent to purchase the aircraft provided it met the specifications. This new aircraft was to cruise at double the speed of TCA's brand new DC-3s and, in fact, was to have a loaded cruising speed better than the maximum speeds attainable by the Spitfires and Bf.109s of the Battle of Britain only six years earlier.

Avro decided to up the performance of the aircraft right from the beginning. Design progressed smoothly until the problems began. Rolls-Royce informed TCA and Avro that the Avon engine would not be available for civil use for "many years". In fact, they were having such severe problems with this engine that it wouldn't be ready for any service for many years. This was probably predictable, in fact, TCA's Bain should have realized that even if it had been successful right off the drawing boards, it would likely be classified and restricted to military use. This, in fact, also occurred. By the time Rolls-Royce's first axial-flow turbojet (the Avon) was a reliable engine, Avro Gas Turbines Division's TR-5 Orenda was already flying in Sabres and CF-100s and was proving an entirely competitive engine. This was, of course, too late for the Jetliner program.



RCAF Sabre Jet equipped with Orenda TR-5

The design was changed to include four Rolls-Royce Derwent turbojets, used on the Meteor fighter. These were proven, and highly reliable engines and added the additional safety of two extra engines. It also slightly increased the fuel consumption specifications. About this time TCA got a new boss, Gordon McGregor, and TCA started to get cold feet over their Jetliner.



R.R.-Derwent

Despite all of this the Jetliner prototype was completed and flew 13 days after the first jet passenger plane to fly in the world, the de Havilland (U.K.) Comet. Bill Baker was the flight engineer of the Jetliner and wrote the following comments about the aircraft on its maiden voyage:

"Fifteen years of flying had established in my mind that noise meant power, that more noise meant more power, and that power was essential for flight. The Jetliner in first flight configuration had minimal sound absorption material installed. When we gradually opened the throttles on the brakes, we could certainly hear those Derwents. As we gained speed, the sound level was obviously dropping. When Jimmy pulled up, the noise seemed to disappear altogether and my heart stopped at the same time. It was hard to accept the airspeed indicator winding up while the rate of climb was demonstrating fighter performance and no noise! What a thrill! Later in the first flight Mike Cooper-Slipper formed up on us with a Mitchell for picture-taking and we were able to advise him that his propellers were out of synchronization! Imagine hearing another aircraft while flying in one yourself–awesome!"

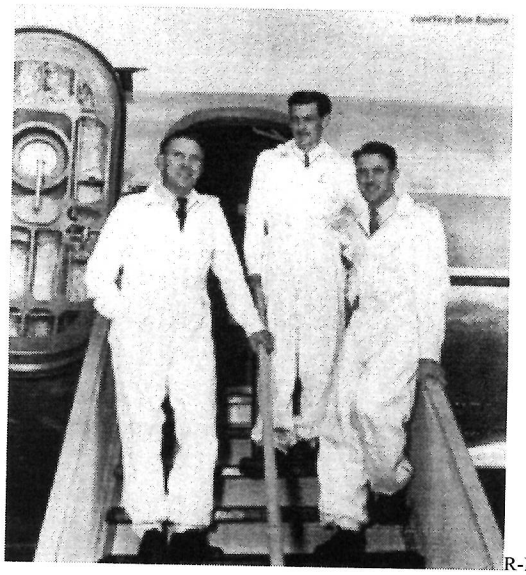
de Havilland Comet

By contrast I have a letter from Mario Pesando, one of the designers of the Jetliner describing flights to and from Britain in TCA Canadair North Star airliners, another aircraft development begun under the guidance of C.D. Howe. He relates that the noise on "the rattler" was so jarring that he walked around like a zombie and couldn't hear properly for days afterward. He further relates that these flights were a couple of the most fatiguing experiences of his life. Don Connelly, a well-known Canadian aviation artist, served as a navigator on RCAF North Stars and to this day reacts with anger over the racket, blaming it for severe hearing loss. Had the Jetliner gone into production Canadair's North Stars would have been utterly forced out of service many years before they were, due to customer demand. This would have destroyed TCA's investment in those aircraft and would not have done Canadair any favours either.

TCA North Star

In the end, the restrictions and friction from government and government aligned bodies in Canada led Avro to simply do the test and demonstration flying of the Jetliner in the United States! The Americans were only too happy to allow Avro to do this since the demonstration flying also proved the validity and potential of jet passenger service and proved the routes thereof! Avro, thanks to the pig-headedness of the Canadian government, saved the Americans a great deal of money and useless academic debate over the merits of jet travel!

On 18 April, 1950, the Jetliner became the first jet-passenger aircraft to fly to New York city and did so in 59 minutes. That was nearly half the time taken by TCA scheduled service. Virtually every flight the Jetliner made was a record breaker and Don Rogers, its main test pilot, probably holds more North American speed records than any pilot in history, including the pilots of the Concorde, due to the Jetliner's performance. He is still with us and is too modest to say anything like that, although he will certainly tell you the Jetliner remains his favourite of all the aircraft he's flown– with the Lancaster probably a fairly close second.



R-L, Jimmy Orwell, Bill Baker and Don Rogers.

In no time Avro received literally hundreds of requests for a Jetliner visit. They chose the requests that would generate the most publicity and sales potential. Reproduced in my book is a note discovered by Palmiro Campagna and written by TCA's Jim Bain showing that the production quality of the Jetliner was "unsurpassed" and that evidence existed of the interest in the aircraft from "most of the major airlines on the continent". This glowing letter was written for TCA management and by that time it would have been most unwelcome. There are even more glowing letters from the evaluation teams of the "major airlines on the continent" once they had an opportunity to fly in the revolutionary aircraft. One of the most succinct and thorough is from TWA, at the time owned by the ubiquitous Howard Hughes:

Howard Hughes and the Jetliner

TWA EVALUATION IF THE AVRO C-102 JETLINER:

"The direct operating cost per mile of the Jetliner compares very favorably with that of TWA's present equipment, yet reduces current trip times by as much as 30 percent between major centre's of population.

"Although this analysis was conducted on a conventional aircraft flight plan, which puts the jet transport at a decided economic disadvantage, the Jetliner compares exceptionally well with modern propeller-driven aircraft on a cost per seat-mile basis.

"By making certain changes in the flight plan... the overall economic picture can be improved still further - without any sacrifice in safety.

"The Avro Jetliner, powered by P&W [Pratt & Whitney] J-56 [sic] engines [license-built Rolls-Royce Nenes] can operate safely and efficiently over every TWA internal route except New York/Los Angeles, non-stop.

"The Jetliner's high cruising speed enables it to cut present scheduled operating times by as much as 30 percent. This is undoubtedly the Jetliner's major contribution to air transportation.

"The "Jet Power" aspect of the aircraft ensures consistently higher load factors through its passenger appeal. The absence of fatiguing propeller vibration, the smooth, swift flight and the initial novelty of jet travel collectively indicate an attractive and

profitable operation.

"Existing runways, even at minor airports, are in most cases more than adequate for scheduled Jetliner operation. The approach speed of the aircraft is entirely normal. The simplicity of flying and handling the aircraft reduces problems in pilot training to a minimum.

"The numerous flights conducted to date demonstrated that the Jetliner does not present any severe traffic control problems which some anticipated for it. The fact that it can, if necessary, be operated in a conventional manner in the traffic and holding pattern and still show a profit is indicative of its versatility."

Avro Jetliner over New York City, by Randall Whitcomb.

National Airlines, according to testimony from Dixon Speas, the American chosen to head up marketing of the Jetliner, was on the verge of ordering 10 Jetliners with the understanding that if they performed according to expectations they would expand their order to a full fleet. Had National purchased them, virtually every other carrier would have had no choice but to follow for competitive reasons. Speas, formerly the Executive Assistant to the President of American Airlines, also related that the USAF and US Navy were interested in buying Jetliners and that the USAF had set aside 20 million dollars for their purchase.

And why not? The Jetliner was at least a third faster than other aircraft, it used comparatively cheap jet fuel compared to volatile and expensive AvGas, it flew above the weather giving a much smoother flight with fewer weather delays and was orders of magnitude quieter. Every assessment also marvelled over incredible ease of servicing and how it was to service, replenish and turn around for another flight. Testimony from Avro people said that anytime they wanted to fly it they just dusted it off, grabbed the fuel credit card and went. It never required any serious maintenance.

C.D. Howe Stops the Jetliner Programme

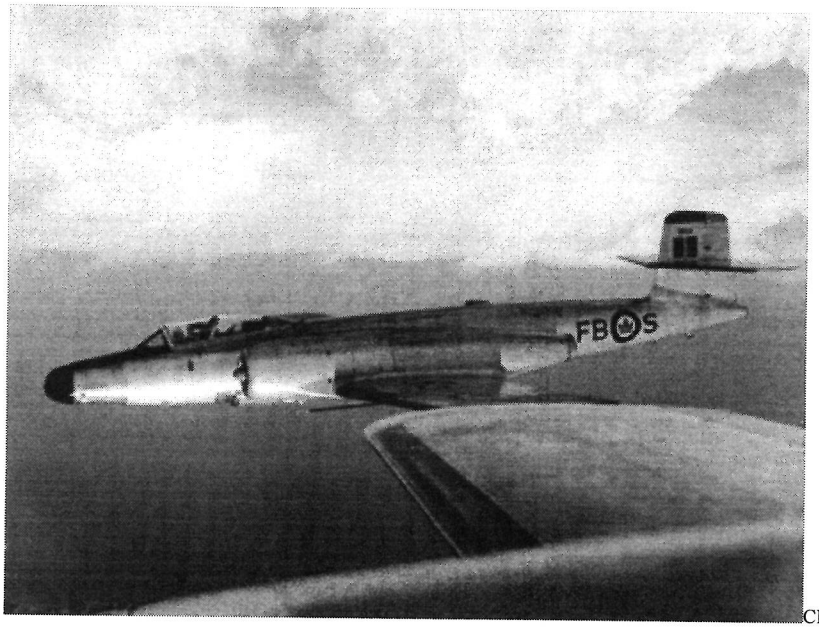
In June, 1950 the Korean War erupted and C.D. Howe ordered Avro to "stop work" on the Jetliner.

Reasons given for the failure of the Jetliner:
1) It had to be halted due to the Korean War and Canada's need for CF-100 interceptors.
2) It was not saleable and was a poor, antiquated design that attracted no serious interest.

The argument for the cancellation of the Jetliner at the time was the fact that the North Koreans had marched past the 38th parallel into the so-called "free" South Korea, starting the Korean War. C.D. Howe ordered Avro to stop working on the Jetliner, move it and its tooling out of productive floor space at Avro and concentrate on the development and subsequent production of the CF-100 all-weather, day or night, radar equipped, long-range interceptor. To this observer this was a dubious choice, killing a sure thing for a half-crippled fighter–after all, the Jetliner certainly had military merit and faced neither costly re-design or critical systems (like propulsion, radar/fire-control, armament etc.) installation and proving in the future.

As of the Jetliner "stop work" date:
1) The CF-100 at that time was not flying with the Orenda engines with which it was to be equipped.
2) As of the beginning of the Korean War the Orenda engine had not flown period (it had only run in the test cell as of February 1950!).
3) The CF-100 at that time didn't have a radar/fire-control system.
4) The CF-100 at that time didn't have weapons.
5) The CF-100 at that time had already revealed itself as having a serious structural defect in the main spar area.
6) No production line existed for either the airframe or engines.

In other words, it was far from ready for production, let alone service. I believe an analysis of the typical time period required in any country in those days to take an aircraft from the prototype stage to production and service was at least two years. This had been true even in the case of the Supermarine Spitfire, an aircraft that was utterly basic compared to the CF-100. In the case looking at the CF-100 program as of June, 1950, I believe that anyone truly experienced in military aircraft research and development back then, and there were plenty from WW II, could and would have advised anyone interested that a combat-capable CF-100 was at least two years development work away–no matter what Avro's most enthusiastic management might be expected to say. There was a critical spar weakness that had already revealed itself at this point. In the end something like 90% of the parts of the plane were redesigned to take the aircraft from the Rolls-Royce powered, unarmed bare airframe to the combat worthy and Orenda-powered Mark 4.


CF-100

Who expected the Korean War to last longer than two years? Who, with any experience in the trade, really expected the CF-100 to be fixed, production lines built and the aircraft fully-equipped in time for the war? Who really thought the RCAF could then devise a training syllabus, tactics, maintenance procedures and logistics to actually place them into service in Asia during this war?

In view of all this, it seems possible that the Korean War may have been a pretext used by C.D. Howe to kill the Jetliner. It is clear from the record that C.D. Howe was extremely proud of, and loyal to, Trans Canada Airlines which was his proudest creation. Jetliners turning brand new North Stars into empty but very expensive noisemakers would not have been in TCA's interests nor Canadair's. McGregor eventually admitted that he didn't want TCA to be the first to initiate jet service on the continent. TCA also did virtually everything in their power to kill the Jetliner. These tactics included:

1) backing out of their original signed letter of intent on the Jetliner.
2) creating "new and improved" specifications for a "suitable" jet passenger plane. These were specifications that appeared to be designed to ensure no reasonable Jetliner modification could meet them. TCA added the caveat that even if the Jetliner was modified to meet their new specifications, that they wouldn't be interested in ordering any! These suitable specifications were part of a "neutral" analysis that C.D. Howe had asked TCA to prepare. Howe had also ordered that this analysis state if the Jetliner as it stood met the original TCA specifications delineated in their letter of intent. TCA's analysis, however, ignored this requirement. The C-102, by the way, did meet the original requirements.
3) drafting a very critical letter regarding the Jetliner and sending it to all kinds of people in the establishments and airline industries of both Canada and the United States!
4) stated that lack of ILS installations at Canadian airports made the Jetliner unsuitable (when it had been purposely designed to operate at the same speeds and from the same runways, with the same airport equipment, as the propliners. This is why it had a straight wing! In fact, the Jetliner operated from a grass strip while on loan to

Howard Hughes.

Of course, TCA was a Crown corporation so while these tactics are political, they also were initiated by a government agency! They were certainly odious, showed a total lack of leadership in their own industry and also displayed an utter disregard for the aerospace industry of Canada, and, ultimately, to the industrial capability of Canada and Canada's place on the world stage.

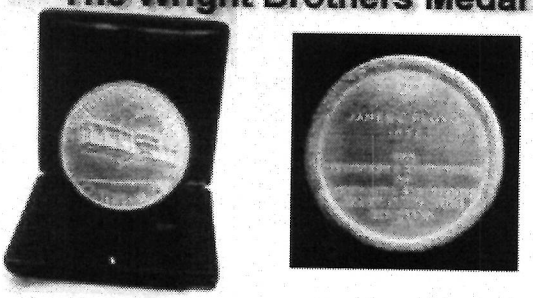
The department of Transport also did Avro no favours where the Jetliner were concerned. I have several documents from various Avro people in my possession showing what can only be described as an abysmal refusal to show leadership or accept responsibility and shocking short-sightedness where the DOT was concerned. A couple of examples:

1) During taxi trials leading up to first flight, DOT (one of C.D. Howe's departments) dug up the main runways at Malton (now Pearson) forcing Avro to test the Jetliner on a short and poorly surfaced auxiliary runway. At this time Avro was competing with de Havilland U.K.'s Comet 1 jet transport for the honour of being the first jet passenger plane to fly. Avro lost this contest by thirteen days.
2) The Jetliner was to be equipped with a safety enhancing braking feature: anti-lock brakes. This is now standard equipment not only on aircraft but on automobiles. DOT would not allow Avro to activate this item since the Americans had not come out with guidelines for their usage.

Despite all of this, Avro didn't entirely give up on the Jetliner. It found its way down to Hughes Aircraft Ltd. in Culver City California in 1952 with the idea of using it to help in the development of the radar/fire-control system for the CF-100. Howard Hughes soon got his hands on it, however, and thereafter had it parked beside his private grass strip and had guards posted around it! He also put up some Avro personnel, including Don Rogers and Fred Matthews, for six months–the length of time that he "kidnapped" the Jetliner. During protracted and frustrating negotiations with Hughes, it seems Crawford Gordon Jr. came to the conclusion that Hughes was not serious and was just pumping Avro for all the design information. (Hughes was known to work with the CIA on occasion. Jim Floyd relates a 13 hour nocturnal marathon at the Beverly Hills Hotel going over drawings with Hughes. It might be added that Hughes was a director of Convair, certainly a competitor of Avro. At any rate, he was sincere and tried to have Avro build him 30 Jetliners for TWA which he owned at the time. Howe would not allow it and became extremely angry when Avro broached the idea to him. Hughes then tried to have Convair build him his coveted Jetliners under license. This idea was killed by the US government through a bill purportedly designed to ensure all new production of aircraft would be for the Korean War. Of course, had they been either thinking or honest (you choose) the Jetliner would have been built as a cargo, medevac, tanker and/or troop-transport aircraft for the Korean War.)

Perhaps the best indicator that the Jetliner did not die a natural death is in the simple fact that C.D. Howe's files on the Jetliner went missing a long time ago according to the archivist responsible for their safekeeping. They were loaned out and never returned. They are actually rumoured, by more than one reliable source, to have been burnt. To avoid a potential law suit, I will only say that the person who is alleged to have burnt them was very, very close to C.D. Howe.

The Wright Brothers Medal



Due to his revolutionary design of the C102 Avro Jetliner. Jim Floyd was awarded the Wright Brothers Gold Medal from the SAE in 1950. This award was cast in solid gold as it was the first awarded to a non American engineer for Aviation Excellence. Jim dedicated this award to his engineering team and companions at Avro Canada.

CLICK HERE TO READ DON ROGERS JETLINER LECTURE

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