
The Avro Canada Archives



The Avro Canada C-102 Jetliner



In the National Aviation Museum in Ottawa, this scale model of the Avro Canada C-102 Jetliner is one of only a very few artifacts remaining of one of the most exciting chapters in the history of Canadian aviation.

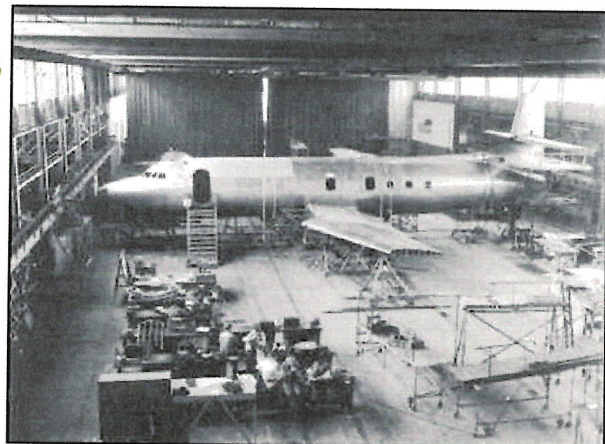
The Jetliner was conceived, designed and built in Malton, Ontario, and first flew on Wednesday, August 10th, 1949. It was the first jet airliner to fly in North America, and some would say first in the world.

The British de Havilland Comet has claimed the title of world's first but, in fact, its first "flight" was more of a hop off the runway. The Jetliner's first flight was of more than an hour's duration and reached altitudes above 10,000 feet.

Like another of Avro Canada's high tech projects - the Arrow - the Jetliner came to a sad end when it was cut up and disassembled in 1956. (On the left in the photo above can be seen one of the main landing gear struts from one of the Arrows.)

Although the Jetliner's life span was short, it was busy and, in many ways, very successful. Its demise came about because of a lack of willingness by our politicians, our bureaucrats, and our "national" airline, to be the first and the best in a race to produce a new generation of civil transport aircraft.

Spring, 1949, and in the experimental hangar at Avro Aircraft Limited in Malton, just outside of Toronto, a new aircraft takes shape. It will become known as the Avro Canada C-102 Jetliner (CF-EJD-X). Like any radical new design, the Jetliner had its problems during the developmental stages. The first major hurdle to overcome was the news that Rolls Royce (England) had cancelled production of the RR AJ65 engines around which the aircraft had originally been designed. This necessitated a re-



design from the two-engine AJ65 to a four engine design utilizing the RR Derwent jet engines. This was not a major setback, but did delay production of the first prototype and result in some specification changes. This revolutionary aircraft was flown for the first time just two years following the commencement of the design in mid-1947. That short time period, compared to other comparable aircraft, and the fact that there was no historical information to draw from, is quite a testament to everyone involved in the project. ⁽¹⁾

The History...

Immediately following the end of the second world war, Canada was in a position to really graduate into full-fledged industrialism. Plants and factories had sprung up all over the country during the course of the war. One of these companies, one which was owned by the federal government, was Victory Aircraft in Malton, just outside Toronto.

Victory had turned out a large number of aircraft for the R.A.F. and the R.C.A.F. for use in the European theatre of operations. Following the cessation of hostilities, an enterprising Englishman named Sir Roy Dobson made arrangements for the British Hawker Siddeley Group to purchase the company and the sprawling plant near the Toronto Airport.



That was the birth of A.V. Roe Canada Limited. Mr. Dobson and the Avro Canada management had great plans for the company and the country. The company's first project was a jet transport aircraft designed for Trans Canada Airlines (now Air Canada). The original submission for the as yet unnamed aircraft was sent to TCA in March, 1946. Design engineers from Avro and TCA met to develop the actual requirements to TCA specifications. TCA were adamant in their view that this should be a twin jet aircraft, utilizing the as yet still secret Rolls Royce AJ65 jet engine.

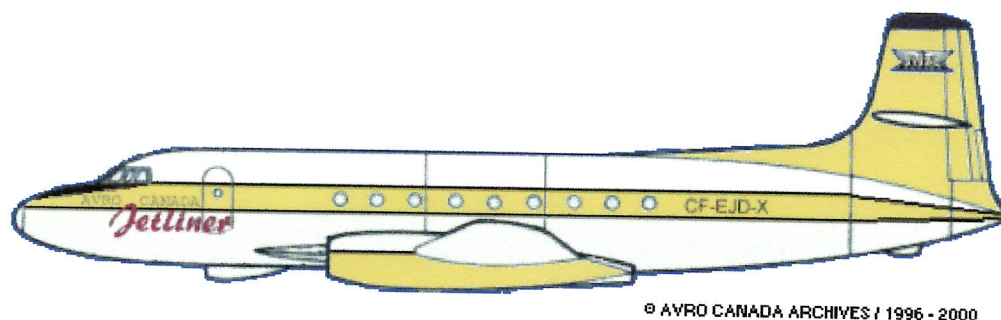
Unknown to Avro or TCA at the time, this requirement would result in delays in completing the prototype. Design of the aircraft was progressing, and a wooden mockup was being built in the Avro hangars. Then, in late spring 1947, Rolls Royce advised Avro that the AJ65 would not be made available for civilian use for some years. This necessitated a re-design from the two-engine AJ65 to a four engine design utilizing the Rolls Royce Derwent - a proven jet engine. The Derwent was a civil version of the Derwent 5 used in the British Meteor jet fighter (the only allied jet to see active service in WW II).



Meanwhile, TCA was demanding unrealistic contractual guarantees as far as the aircraft and a fixed price per plane. One clause called for a fixed-price quotation on an aircraft which, at the time, was pushing the state of the art - despite the fact that TCA was not prepared to disclose how many aircraft they were likely to buy! They were also demanding that Avro (or Hawker Siddeley) *could not sell the aircraft, or any modification to it, to any other airline in the world for a period of three years after delivery of the first aircraft to TCA.*

The company requested from TCA, on many occasions, some idea of a quantity of aircraft that they at least might require. TCA flatly refused to commit themselves and suggested that "it might be better for all concerned if the project be abandoned". So much for any kind of mutually rewarding and cooperative venture in making it possible for Canada to be the first in the field to design, produce and operate a jet transport! In spite of the difficulties with TCA, Avro did in fact design and produce a world-beating jet transport.

The Aircraft...



The Jetliner: CF - EJD-X

QUEEN OF THE AIRWAYS 1949 - 1956

The enthusiasm of the designated flight crew for the maiden flight of the Jetliner, including Avro workers not on holidays clustered on the tarmac at Malton, was not lessened by the successful flight of the de Havilland Comet just two weeks prior. It was as high as ever; they knew that their aircraft was a superb machine. This faith in the Jetliner remained firm and constant even when the first attempt had to be aborted. On that day, August 8th, the secondary runway was too short and the day was too hot.

They were elated when the maiden flight of CF-EJD-X went without a hitch. With the exception of that one-time main gear problem that lasted barely five weeks to full correction, the Jetliner remained trouble-free through-out its flight test programme. This was in marked contrast to the Comet which was beset by one trouble after another. However, the Jetliner encountered problems, not of design or technology but of a more formidable nature. They were managerial and political, overlaid with a generous modicum of power and influence. The result: the technical portion of the equation came through; the human did not. The people in power, the ones who would decide which way it would go, should have known better. Perhaps they could have taken the words of an early aircraft designer-builder who insisted that, all things being equal, if an airplane looked good, it would fly successfully.

And the Jetliner looked good. It looked sharp, with white upper surfaces, bold gold stripes sweeping down each line of windows, beginning from the nose and onto the tail, and the glistening silver lower portion of the fuselage and all the empennage. The colour scheme was striking for aircraft of the day. To top it off, its name was emblazoned on both sides of the nose in red, with the striping extending to the tail. It was truly a beautiful bird to behold.

The individuals in power also could have paid attention to the performance figures, especially when the Jetliner flew at a speed in excess of 840 km/h on November 22, 1949. Don Rogers was in the left seat, Mike Cooper-Slipper in the right, and Bill Baker was the monitoring flight engineer. Jim Floyd was an observer, of course. You can be sure that he made many spontaneous expressions of satisfaction to Mario Pesando, who was onboard with him. The design specifications followed a template from Trans-Canada Airlines (TCA). Yet in spite of the demonstrated airworthiness and potential of the Jetliner, TCA rejected it for use on its routes. By its own admission, it eventually confirmed that it could not show any inclination toward CF-EJD-X because of political implications, whatever that meant. Avro, to its credit, did not give up. From time to time, someone from Avro would drop into TCA headquarters, just in case.

Others were more than impressed with the Jetliner. Dixon Speas of American Airlines quit to head an Avro Canada marketing office in New York City. He decided to contact every US airline and tell them about the Jetliner and flying twice as fast and comfortable as anything in the air at the time. Recall too the interest of Howard Hughes and the US Air Force for its high-altitude navigational program. By early autumn, National Air Lines was hooked and Avro was looking at the potential sale of at least ten Jetliners. United Air and Eastern were standing in line. In fact, knowing the competitive nature of air travel in the US, Speas realistically gestimated that the total run for the Jetliner could reach as high as 500 aircraft over time.

TCA did not stand by idly, especially when servicing of routes would prove to be a piece of cake once they would be determined. There was the expected ongoing complaining about small prototype shortcomings. This was backed up by general criticisms of the slings and arrow kind. The media did not help; on the contrary would often get their sources and facts mixed and tangled, resulting in a negative image projected before the public. The politicians were negatively active, probably because they looked at a skewed picture and did not get down to the veracity of sources. DoT demanded as a sine qua non for any demonstration flights, that the passengers sign a release form. This was hardly an endorsement of the product, no matter how well C-102 performed. At a time when image was so important, the message was "Caveat emptor!"

Perhaps what sealed the fate of the Jetliner was the Korean War and the CF-100: war pressures and design difficulties. Avro did not have the capacity to run a parallel program of the C-102 and the CF-100. In 1952, Hughes tried to get the Jetliner built by Convair. The US government would have none of it and C. D. Howe was adamantly opposed to any sale to Howard Hughes. The last time the

Jetliner was seen by the public was at the CNE Air show. On November 23, 1956 Don Rogers and Peter Cope flew CF-EJD-X for the last time. Jim Floyd received a memo from Fred Smye on November 30, 1956 to dismantle the Jetliner. Quietly. Destruction by decree.

TESTING THE JETLINER

by Don Rogers

(Don Rogers was AVRO'S Chief Test Pilot on the Jetliner)

This was a very interesting and very exciting time for me, and for all of us who were associated with the Jetliner. I was asked to look up some of the details and give a few reminiscent facts from my log book about the many happy and exciting experiences. Unfortunately the story had a sad ending; I can't imagine anything more unpleasant than seeing an airplane that you have lived with for seven years and enjoyed flying - a really beautiful machine - being cut up with saws, axes and hammers, with pieces falling on the hangar floor. I couldn't go in the hangar for a couple of days while they were doing this job because it was a heart-rending experience.



However, before we came to that sad ending we had some very interesting programs and flights and, since I have my log book with dates of historical interest, I am going to give you some background history of the Jetliner.

Let us first go briefly into the Jetliner background. Originally the facility at Malton Airport, as it was called in those days, had rather an odd name. It was the Aircraft Division of National Steel Car, which actually builds railroad cars in Hamilton. I guess they saw the 'writing on the wall' that the aircraft industry was the thing to be in rather than railroads, because in 1939 they set up a factory at Malton.

Initially they were building and assembling other people's airplanes - English Lysanders and Ansons. Also they had a contract to assemble a number of Yales, which some of you will remember were the fixed undercarriage version of the North American Harvard. These had been sitting in crates on a wharf in New York to be shipped to the French Air Force. When France capitulated, the Yales were sent to Malton for assembly. They were somewhat peculiar in that the throttle and mixture controls all operated backwards. I don't know why the French thought that this was the way they should be, but they were a bit of a trick to fly until you got accustomed to it. Eventually, of course, they were changed over to operate in the ordinary

sense, or what we considered correct anyway.

I joined the company in January 1942 and at that time we were building airplanes from scratch rather than assembling them, and during the next two or three years we built about 840 Ansons (Mk.II's) and 150 Lysanders. Then the company became a Crown Company in November 1942, which some of you will recall as Victory Aircraft. The main object of this company was to build the Avro Lancaster.

I well remember when the first Lancaster taxied in. It was flown by Clyde Pangborn from England to the factory at Malton. We were flying Ansons and Lysanders then, and I looked up at this huge machine taxiing in and wondered to myself if I would ever be able to fly such a big aircraft. Now, of course, while the Lancaster is a good-sized, four-engined airplane, it isn't all that big anymore. Everything is relative.

In any case, during the war Victory Aircraft built approximately 432 Lancasters, seven of which were converted into the semi-civil version, called Lancastrians, for Trans-Canada Air Lines. With these aircraft, TCA introduced their transatlantic service during the war for VIP's and high priority material between Canada and the U.K.

In the summer of 1945 the European war wound up and it became obvious that the end was in sight for the production of the Lancasters. As a matter of fact, at this time we built one Lincoln because we thought that the Japanese war was going to continue. Also we built one Avro York, which some of you will remember used the same wings and engines, etc., as the Lancaster, but with a very large, deep fuselage. It was converted into a high wing airplane. We tooled up for 30 of those aircraft, I think, and actually built parts for five with one ultimately being completed about the time the war came to an end.

When it became apparent that this was going to happen, Sir Roy Dobson, who was the Managing Director of Avro in England, made several trips between Canada and the U.K. Sir Roy and C.D. Howe in Ottawa had discussed the possibilities of not abandoning this facility at Malton, since by this time it was quite a large organization. Dobson wanted to use the facilities to produce some type of civil airplane and thus keep the Canadian company going.

A general agreement was reached in the Fall of 1945 for A.V. Roe and Co., in England, to take over the plant. The original idea was to produce a four-engined airliner for use by TCA. The thought at that time was to make an airplane much like the Viscount - a four-engined, propeller-driven turboprops. Meetings were held with Jim Bain and Gord Dymont, of TCA's engineering and financing departments, regarding the operation and production of an airplane of that type.

However it happened that Jim Bain went to England in the Fall of 1945 and, during a visit at Rolls-Royce, had a chance to see the R-R Avon engines which were in an early production stage for military use. He became so enthralled with the potential possibilities of this jet engine for commercial use that he decided on the pure jet rather than the turboprop for TCA.

The result of this was that on his return from England, he discussed with C.D. Howe, and with some of the other people in TCA, the possibility of building such an airplane for the airline. Toward the end of 1945, a gentleman by the name of Stewart Davis (called 'Cock' Davis) who was, I think, chief engineer of Avro in England, came over along with Jim Floyd who eventually became the chief designer of the Jetliner. They got into a discussion with TCA and also with the Canadian Government. In conclusion, Mr. Symington, who was President of TCA at that time, sent a letter of intent to A.V. Roe of Canada Ltd., as it became known in 1945, with the intention of building the Jetliner, not with the engines it eventually had but with two Avon engines. The design progressed along those lines and was almost completed - in fact, parts were beginning to be built when Lord Hives of Rolls-Royce became very concerned that the Avon engine wasn't going to achieve civil certification in time for installation in the Jetliner when it was ready to fly. The result was that the design team at the eleventh hour did a lot of redesigning, changing the aircraft to a four-engined version using Rolls-Royce Derwent engines.

The Derwent was a very good engine. It was a good substitute for the Avon for the time being but, because it was an older-style, centrifugal flow compressor rather than axial flow, its specific fuel consumption was not as good. Also it meant four engines for the Jetliner rather than two, in order to provide sufficient thrust. This meant some added complications, of course.

However, this installation did have one advantage from the early certification point of view. Being a four-engined airplane, the loss of one engine meant losing only one-quarter rather than half the power, thus simplifying the certification requirements of the FAA and the DOT. In fact this resulted in a change in the rudder configuration. The original plan of the Jetliner had a dual rudder arrangement. The rear section was operated by the rudder pedals manually, but then maximum application of the normal manual rudder introduced a powered 'follow up' to the system that would move the forward section of the rudder as well and give additional directional control. This design was to meet the 'engine out' control requirements of the twin-engined, Avon-powered aircraft.

As it happened, with the engines located as close to the fuselage as they were in the four-engined configuration, the 'engine out' handling was so satisfactory that in the cockpit you would hardly be aware of an engine cut as far as yawing was concerned. You could cut a throttle on the plane and, with your feet on the floor, it would go along with a very small adjustment of the trim. Eventually the powered portion of the rudder was locked out as only the manual portion was required.

During this time we were having an interesting period at Avro in the test pilot department. Mike was with me at the time and we had such a variety of airplanes to fly that it kept you on your toes. We had everything from Lancasters - on which we were doing conversion work for the RCAF - to B-25's, Venturas, DC-3's and even some Hawker Sea Furies for the Canadian Navy. I was doing some flying on Vampires also, so we had an infinite variety of airplanes.

Also at this time I had a chance to go to England with Des Murphy, who was the

Department of Transport's chief test pilot - in fact, he was their only test pilot at that time. While in England and at Avro's, we flew the jet-engined version of the Avro Tudor, which was a funny kind of airplane because again it was a conversion of the Lancaster using a commercial type of fuselage, still with a tail wheel undercarriage. They had converted this to take four jet engines - Avons, I believe. I flew with Jimmy Orrell, who was the chief test pilot at Avro in England in 1948, prior to our flying the Jetliner.

Finally in 1949 the Jetliner reached a point where it was getting ready to be flown and Jimmy Orrell came over from England. We went over the details of the airplane together and eventually the great day arrived on August 10th, just a little over three-and-a-half years from when the design started, which was pretty good. I should also mention that this was also an exciting time for the engineers, designers, production people and everybody else at Avro, because here was Canada - which hadn't done very much initial design at all before designing the first jet transport on the North American continent. At the same time Avro was designing pure jet engines since we started out with the Chinook as a sort of trial run and then built the Orenda engine which, by the standard of those days, was a very modern design. Then there was the twin-jet, two-place fighter airplane - the CF-100. All these projects were going on together and you can imagine what a very interesting time it was.

The first flight of the Jetliner took place on 10 August 1949 and was a very successful flight. We flew for an hour and five minutes with Jimmy Orrell as captain, Bill Baker as flight engineer, and myself as copilot. This flight occurred during the plant shut-down and management, in their wisdom, decided it would be a good idea to have the second flight with all the plant employees out along the fence to watch the flying as soon as they returned from vacation.

The second flight occurred on 16 August. That was the flight where we ran into a little bit of a problem and the demonstration became more exciting than we had intended. Before we came back to do some flying across the field, we had some test work to do on stalls. We did our tests and the airplane shook and buffeted as it does in the stall. We went through the test program followed by our flight across the field to show the fine performance of the airplane to the employees. We then circled the field and selected the button that lowers the undercarriage, but the main wheels did not come down - only the nosewheel. So we selected the gear up again, but nothing happened at this point. This became discouraging. However, we had three methods of getting the undercarriage down so we were not too concerned as yet. We had the push button (the regular way), an auxiliary hydraulic pump that you could switch on, with another system to operate the foregoing, a hand pump (also hydraulic), and in the main cabin under a panel in the floor was a neat little handle that said 'emergency release'.

Bill Baker probably wouldn't tell you this, but I will. He actually broke a rib pulling and yanking on that handle and, in fact, eventually broke the cable trying to release the undercarriage. But none of this would avail and finally, in spite of the pleas of the airport manager that we go over the lake and ditch the airplane there rather than on the airport, we eventually landed the craft on the field with no problem at

all.

The nosewheel was down, which people thought was pretty hazardous with the main wheels up, but actually this turned out to be the best situation we could have, because the aircraft rolled along on its nosewheel and the end of the tail-pipes, much like an ordinary landing. There was almost no damage at all. We ran across a taxi-strip as we were coming to a stop which caused some scraping on the bottom of the jet pipes, flaps, and so on. It was a very smooth landing and we suffered no discomfort in the airplane. Afterward people came crowding around wondering if everything was OK, but there was no problem at all as far as we were concerned.

The reason that the undercarriage would not come down was pretty simple. In the course of our stalls, with the nose up and the aircraft shaking in the pre-stall buffet, the undercarriage oleos had shortened and allowed the undercarriage lugs to come back into the up locks to the point where pulling the emergency, or anything else, just wouldn't withdraw the locks enough to free the gear. The remedy to this was so simple that you wonder why you didn't think of it beforehand.

What the engineers did was put a little cam-shaped fitting in the up lock so that, as it came up, the undercarriage pin rode ahead of this cam and couldn't come back too far to prevent the up lock from releasing. It was just that simple, but it caused a lot of heartrending to the people on the ground watching us fly around with the gear half down.

However, the airplane was very little damaged. This happened on the sixteenth of August, and about a month later, on the twentieth of September, we flew the airplane again and the test program began seriously.

On the fourth of October, which was less than a month later, we had the first public demonstration of the Jetliner and we have quite a few pictures of this occasion. We had officials from the government, the Air Force and the airlines come to look at the airplane and see it fly.

By the middle of October, I had done quite a bit of flying on the Jetliner with Jimmy Orrell and Mike Cooper-Slipper. Jimmy returned to England to continue flying for a number of years there. He is now retired and is still living in a beautiful little cottage right on the edge of Woodford aerodrome where he spent so many years as chief test pilot. We correspond occasionally although I haven't seen him for quite a few years.

One interesting flight that occurred during the airplane's life was on the eighteenth of April, 1950. We made the first international air mail flight in North America in a jet transport when we carried air mail from Toronto to New York. Gordon McGregor, who at that time was president of Trans-Canada Air Lines, flew along with us. The mayor of Toronto sent, among other things, a peace pipe that we were to take to the mayor of New York. I don't know which one of us was supposed to puff on the thing to keep it going. I think Bill lighted it just before we landed. Anyway we took this peace pipe along, lots of pictures were taken, air mail letters were carried back and forth and some of you may still have some of the covers that were on that flight.

This flight was interesting from an historical point of view, not only because air mail was carried but it was also the first flight in the United States of a jet transport.

During 1950 and 1951 the test and demonstration program continued. We did demonstrations for the RCAF at Ottawa and St. Hubert, the USAF at Dayton, Ohio, and also some flights for the air force and for other officials at Washington, D.C.; and down to Miami for the airlines there, as well as Chicago.

On the tenth of January 1951, we had an interesting flight that attracted considerable interest in the press. This was a triangular operation from Toronto to Chicago to La Guardia to Toronto. Toronto to Chicago took an hour and thirty minutes, Chicago to New York was an hour and fifty-five, and New York to Toronto was an hour and ten which, by today's standards, is not unusual. But in those days, when they were still flying DC-3's and -4's, this was considered quite spectacular.

While we were happily flying along on our way from Chicago to New York, we didn't realize the commotion that was happening. The airport manager at La Guardia said that he wouldn't have this fire-spitting jet aircraft landing on his fine airport. Our representative at La Guardia was having a terrible time arguing that we weren't going to burn down the terminal and the other aircraft but, fortunately, we didn't know all this arguing was going on. Finally he did get an approval for us to land, with the understanding that we would not taxi anywhere but on the runway. We would stop on the taxi-strip and they would send out a tractor to tow us in if necessary and they'd monitor the burning up of their tarmac. If there was any danger we were to shut down right away! Of course we know now that we can taxi a jet around without causing all this damage. The airport manager didn't know, but fortunately we were able to show him that all was well. It is interesting to think back now to the misunderstandings that existed in those times about the advent of jet transports.

A couple of days later, on the twelfth of January, we flew to Winnipeg and back with Ron Baker who was TCA's chief test pilot. We went out in two hours and forty minutes and back in two hours and thirty-five minutes, which again, is no problem today, but at that time it was quite interesting.

Those of you who are pilots will appreciate the fun it was flying cross-country in this airplane because most of the transports operated in the five thousand to fifteen thousand foot level. We were cruising at thirty thousand feet at 420 or 430 miles an hour. Every time we reported over a radio fix and gave our altitude as 30,000 feet and our estimate to the next fix, the ground controller would come back and say "Do you mean three thousand?"... "No, thirty thousand!" And then they would say "We've checked your estimate; there must be a mistake here somewhere ..." The folks in Air Traffic Control were not accustomed to those speeds. So this was all quite fun for us sitting in the cockpit in pressurized comfort flying on autopilot and working the computer across the countryside. Of course this sort of thing is all 'old hat' now, but in those days it was new and exciting.

On the twenty-second of January - we had a busy January that year - we flew to Tampa with Garth Edward of TCA. That was a three-hour flight and we did some

demonstrations for the airlines down there. And from there to La Guardia in two hours and twenty minutes and then to Toronto.

We had one of our few mechanical delays on that landing at La Guardia. The nosewheel anti-shimmy hydraulic jack failed so we had to stay there a day while awaiting a replacement from Toronto.

The airplane was fantastically reliable. I can never remember having an engine failure in the air. We had one foreign object damage to an engine on the ground in Chicago while on demonstration there. We made a three-engine ferry flight to Toronto. (The speaker enquired of Michael Cooper-Slipper if he recalled any in-flight engine failures.) I guess that there may have been one - I know we had fire warnings, but they were false alarms. Anyway, in total we did 425 hours and the aircraft's reliability was outstanding.

In July of 1951 we flew to Washington again and did some more demonstrations for the United States Air Force and the Navy. At about this time there was enough interest on the part of several of the air lines that they were getting serious about writing orders for the Jetliner. United Aircraft in Chicago, C.R. Smith, who was the president of American Airlines, Eddie Rickenbaker, for Eastern, and so on - these folk had all flown with me in the airplane as well as with Mike. Some had come to the point where they were ready to sign a production order for the airplane.

Now this is where the rot set in for the poor old Jetliner and, personally, I think for Avro Canada's future. The Jetliner, of course, was a Government-funded project, as was the CF-100 and Orenda engine. Unfortunately for the Jetliner program, the Korean uproar got going at the wrong time. We were having teething problems at that time getting the new jet fighter and jet engine into production. Since all three programs were government funded, Ottawa decreed that we should stop work on the Jetliner until we got the two military projects underway.

This sounded the death knell of the Jetliner. We couldn't give a production schedule to National Airlines and the whole program was set aside. I personally feel that the company made a very bad decision at that point because, rather than resurrecting this program or keeping it trickling along gently, the lure of military orders for the CF-100 and Orenda, with the possibility of continuing military orders, resulted in the company stopping Jetliner development, and never putting it into production.

Now you must realize that this all happened in 1951 and '52. This was some seven years before the 707 and the DC-8 flew with the airlines in commercial use, and many years before the DC-9. If the Jetliner had gone through its normal development, with a thinner wing using some sweepback and with more powerful engines such as the developed Orenda, perhaps - if it had once got into production, it was such a fine flying airplane and had such good performance and handling that, in its normal course of development, I am sure it would have been a DC-9 type aircraft about ten years before that aircraft eventually arrived on the scene.

It was not in direct competition with the 707 and DC-8. They were intended for

transcontinental and transatlantic routes, but the Jetliner was designed as an intercity transport, and it would have been ideal in this service. I think that if Avro Canada had retained the Jetliner program until their military production was going smoothly, Avro might very well still be in business today in the commercial field. When the basket containing all the military eggs was dropped, the loss of the Arrow program eventually broke the company's back. This is something that I would rather not go into at this or any other time.

Another blow happened to the Jetliner at this time and, oddly enough, this was the result of another airplane which was in Canadian production - the North Star. Some of you will probably remember the tremendous newspaper noise that was going on and the criticism of the Government and Trans-Canada Air Lines over the North Star program. The North Star was a combination DC-4/ DC-6 converted to take Rolls-Royce engines, similar to the Merlin engines that had been in the Lancaster. Now these were very good engines and did a fine job; actually a very fine job for TCA. But the aircraft did have some teething problems, the engines were very noisy, and the old political problem reared its head. The opposition made a tremendous 'song and dance' about TCA having taken on this new project instead of buying DC-6s and '7s. TCA's engineers had been involved in a 11 of the original design specifications and operational characteristics of the Jetliner, but they decided they couldn't face up to introducing such a radical aircraft as a jet transport into their airline at that time. This precluded the prospect of a sale to ICA and I'm sure contributed to the company's decision at that time not to continue into production.

This was about 1951 and from then on the aircraft was in a state of decline, but one of the most interesting programs for the crew actually happened in 1952. We took the airplane down to Hughes Aircraft at Culver City near Los Angeles, with the idea of Hughes using it for the development of the MG 2 Fire-Control System. As you will probably recall, the CF-100 that we were building was to have the MG 2 system and Hughes Aircraft was designing and building this new project. When you think back to the new ground that Canada was getting into and exploring with the development of all these projects at the same time, it really is remarkable. It's a pity to think of all the engineering skills that eventually had to leave the company and the country, when some of the projects fell through.

Anyway, to get back to the story. We took the Jetliner to Hughes Aircraft in California with the idea of their using the aircraft as a test bed, because of course they could pop up to thirty thousand feet in a few minutes in pressurized comfort - a very fine test bed for them. Bill Wildfong was the engineer on that flight, and a chap named Sid Holland was the co-pilot. Mike we left at home to look after the shop, flying the production aircraft at Toronto.

The second day we were there I gave Howard Hughes a flight in the airplane. He was so intrigued with it that he, in his usual unique manner, had the airplane moved away from Hughes Aircraft over to the far side of the field with guards put around it. Then no one, including the crew, could get to the airplane without his say so. He did this with various other airplanes, too. He had a Lockheed Constellation, a Boeing Stratocruiser, a Convair and a Martin 404 parked here and there around the

countryside under guard. Occasionally he would go and fly them. We went down with the idea of being there for ten days or so, but we were there for six months and only flew thirteen-and-a-half hours total time during that six-month period.

Most of the time we stayed in a hotel. My wife and the engineer's wife were brought down. Later they returned home, but still later all my family was brought to California and we were put up in a beautiful house in Beverley Hills. However, you were seldom really free because Howard Hughes' office would phone us in the mornings and say "Mr. Hughes will probably want to fly this afternoon." After sitting by the phone all day, the office would finally call and say "Very sorry, but Mr. Hughes wasn't able to get away today but perhaps he will fly tomorrow." So we were never off the hook. All of a sudden he would decide that he wanted to go over to Palm Springs and would come out and climb aboard.

When I had checked him out on the Jetliner, which took only a short time, he went around and did, I think, nine takeoffs and landings in a row on his beautiful nine-thousand-foot grass strip. He was a perfectionist on takeoffs and landings, although he tended to come in a little fast in order to make a nice smooth landing. When we taxied in, I mentioned to a Hughes Aircraft pilot that we'd done nine landings and takeoffs. He said, "That's nothing! When he got his Boeing Stratocruiser, he did thirty-seven!" I guess he figured the Jetliner was pretty easy to fly, which it was.

After I checked Mr. Hughes out, I was immediately relegated to co-pilot duties because he did all the flying from then on, with a complete and utter disregard for air traffic control. We would climb up VFR through the fog and smog of Los Angeles and out of the area, and he'd say "Don't worry about that."

Mr. Hughes kept the airplane in California with the idea of selling it to TWA, since I think at the time he was chairman of the airline. But no TWA people ever flew the aircraft. This was a funny habit he had; he'd lock an airplane and put it under guard just as if it was his own personal property. Eventually Fred Smye got fed up with this procrastination and, after many phone calls and visits to Hughes, the airplane was recalled. Only the engineer and myself were in California by this time since all the other staff had gone home long before. This had been an interesting interlude for me as I had met and flown with a most outstanding man who was an expert pilot, and had seen something of a way of life much different than that to which I was accustomed.

Once the Jetliner was back in Toronto in late 1952, all serious work on the aircraft ended, but I was surprised when I looked in my log book to find out how long it went on flying. It was actually the Fall of 1956 when the last flight took place. In other words, for another four years the airplane did a little bit of test flying once in a while, primarily as a photographic platform for observing rocket firing and other development work on the CF-100. We did a few demonstration flights; we flew in the Toronto air show for two years, and we took the Jetliner to Ottawa for an RCAF show there.

All these flights were made to keep the Jetliner flying, but without doing any development work on the aircraft. One of the most interesting flights on the Jetliner,

which many of you, especially those employed by Avro will remember, was on 26 May 1955, when we flew Mr. Martin of the Martin-Baker Company, which pioneered in the development of the ejection seat. This flight was for photographing the first live ejection from the CF-100. He brought a man over from England to demonstrate the seat by making a live ejection. I think Jan Zurakowski was flying the CF-100 and we flew the Jetliner alongside over the flat area near Camp Borden and photographed the rear seat ejection. We then landed at Camp Borden to pick up the jumper and take him and the seat back to Malton.

Then, sadly, I note from my log book the last flight of the Jetliner on 23 November 1956, which was just about seven years from the time that it first flew. Flight time totalled approximately 440 hours with very little trouble; a fine airplane, and a dream to fly. It was so quiet in the cockpit that we never used a headset. It was so much in advance of any aircraft of the time that it is a pity that it didn't continue.

Some unkind remarks were made to explain its cancellation by TCA. I really don't understand the purported press report of C.D. Howe saying that-it didn't fly properly and that it had to have sand ballast in the rear of the fuselage. This, of course, was not correct. We did use ballast on many occasions for certification work, in order to position the centre of gravity just where we wanted it for a particular test, but this certainly was not a requirement for normal operations. The aircraft was beautiful to fly. We had hydraulic assist on the ailerons, manual rudder and elevators, with an electrically-operated horizontal stabilizer to adjust for different loadings.

Many humorous things happened during the time we were flying the Jetliner. One development program we did was on the de-icing system, which was new at that time. It was an electrically-heated de-icing system with rubber boots on wings and tail; the same kind of boots that are common on propellers nowadays. But this is the first installation I know of where it was used for surface de-icing. They were Goodyear boots with electric elements in them and sometimes, because the material was quite thin and the engineers weren't sure what voltage was needed in them the surface of the boot would burn through and that, combined with the moisture getting in, would cause great sparks to flash out on the wing.

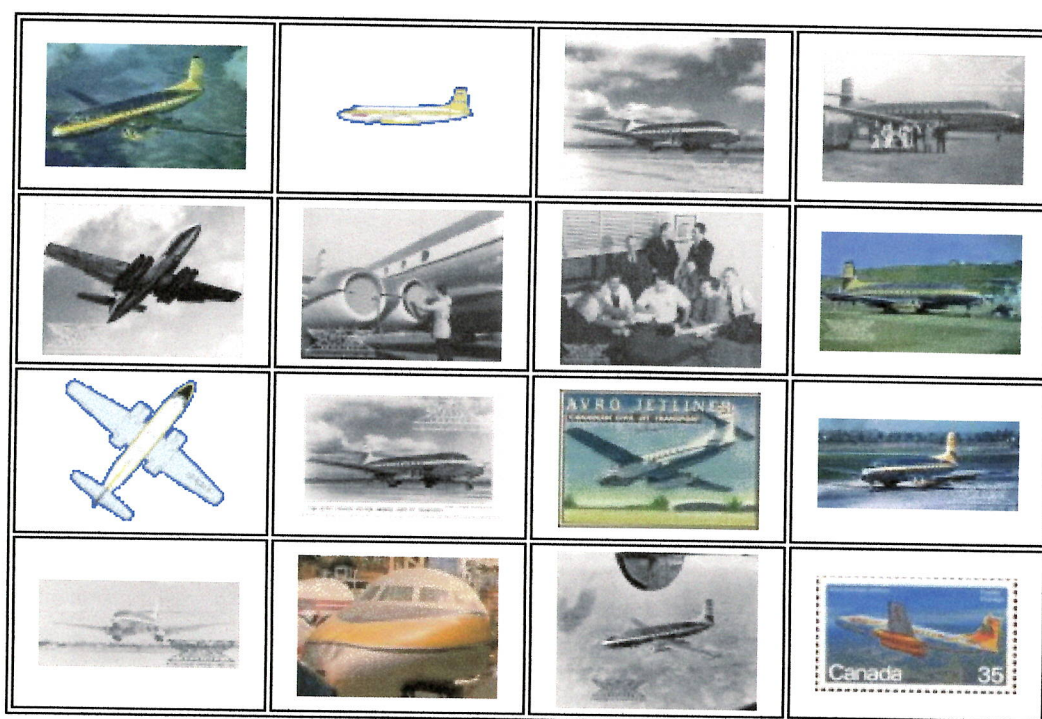
We had an engineering observer who sat at a test panel back in the airplane. This man was not in love with flying and I don't know why he chose to be a flight observer, but in any case, he was sitting back at his panel where a red light would come on to indicate that we had entered an icing condition. This ice sensor would let us know that it was time to start operating the boots. When he saw this red light come on for the first time, he jumped up so fast he almost knocked himself out on the overhead baggage rack. So, from that flight on, he wore a hard hat - in case he jumped up too fast again. On another occasion, with Mike flying the Jetliner on a stability test, we had large water tanks forward and aft in the cabin with a pumping system so one could, by pumping the water from tank to tank, change the cg for certification work. A few minutes after takeoff, one sense antenna mounting on the nose broke off and started to bang against the fuselage. Mike realized that it would only be a matter of time before it banged a hole in the fuselage and decided to come back in. Of course the airplane was very heavy with the water ballast, so he gave the order to the same observer to 'dump' the water. Our friend heard the word

'dump' and thought he said "jump". Another engineer had to go back and rest this observer from jumping overboard, rather than dumping the water.

Well, so much for the saga of the Jetliner from my log book. I'm surprised that my talk has been so long but there were so many interesting episodes that I have only been able to skim over the high spots. The aircraft was so advanced, and such an ambitious adventure for the Canadian company in 1949 and the early 1950's that I think it has earned a significant place in the history of Canadian Aviation.

Jetliner Photo Gallery

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