

# THE WORLD'S SECOND

## North America's First

*The temptation is always there to dismiss the Avro Canada C102 Jetliner as pipped at the post by the DH Comet. This is far from the truth, the new Avro company was pushing out the boundaries of technology in its own way - the C102 was a regional jetliner not a long-range machine like the Comet. As such it was aimed at a blossoming North American market that is still eyed by manufacturers today. William Mellberg pays tribute to a 'forgotten' pioneer that deserved so much more.*

**H**ISTORY IS OFTEN unkind to those who finish in second place. For example, most aviation buffs know that Charles Lindbergh was the first man to fly from New York to Paris in a Ryan monoplane named the *Spirit of St. Louis*. But few remember the first men to cross the Atlantic in the opposite direction (from Paris to New York) - despite the fact that they were welcomed in New York with a ticker-tape parade and all of the traditional honours. Those daring French airmen, Dieudonné Costes and Maurice Bellonte, left Le Bourget in a Breguet biplane named *Point d'Interrogation* on September 1, 1930. They landed over 37 hours later - succeeding where their famous predecessors, Nungesser and Coli, had failed. Yet, their pioneering feat is rarely mentioned in history books.

It is a fate shared by a Canadian-built transport that, had it flown just two weeks earlier, would still be hailed as the world's first jet airliner. The Avro Canada C102 *did*, however, earn another distinction. Its name became a generic term for all of the jet transports that followed - Jetliner. While the saga of de Havilland's trail-blazing Comet is well-known, the story of the other pioneering jet transport of that era (the one that was making headlines across the Atlantic) is less familiar. Perhaps that is because, in its time, the C102 was frequently vilified by self-serving critics. The Jetliner was, in fact, an outstanding airplane. Its demise was a national tragedy.

### Avro's Canadian Connection

Among the many aircraft to bear the Avro name, perhaps the most famous was the legendary Lancaster heavy bomber of World War Two. Sir Arthur Harris (*Bomber Harris* of the RAF's Bomber Command) cited the aircraft as "a major factor in the defeat of the Nazi enemy". More than 7,000 Lancasters were eventually produced, including over 400 in Canada at the Victory Aircraft plant near Toronto.

Victory Aircraft was a Crown-owned corporation that had its origins in the National Steel Car Corporation which manufactured railway cars, street cars, and steel forgings. With considerable foresight, but without large-scale orders, National Steel Car erected Canada's largest aircraft factory in 1938 at Malton (the site of today's Pearson International Airport). The firm started out building Westland Lysanders. But with the outbreak of war it was soon manufacturing Avro Ansons, as well as parts for Hampdens and Hurricanes, as a member of the Canadian Associated Aircraft consortium.

In 1941, Lancaster production was out-running the capacity of Avro's plants in wartime England. National Steel Car's Malton factory was chosen as the ideal site for Canadian production of the huge, four-engined bomber. The firm was nationalized in 1942, when it was renamed Victory Aircraft Limited. The first Canadian-built Lancasters (Mk.Xs) began rolling down the Victory line in 1943.

Avro's managing director, Roy H Dobson (affectionately known as *Dobbie*), was impressed by the superb workmanship and tooling of the Canadian Lancasters. He went to Malton in 1943, and he was intrigued by what he saw. "It opened my eyes," he later recalled in the booklet *Jet Age* by Scott Young. "If those so and so's can do this during a war, what can they do after? Why shouldn't this country eventually be as important as the US? No reason at all. But

one thing it would need was an aircraft industry of its own - with design and development, not just assembling someone else's stuff. After a while I said to myself, 'Why don't I have a go?'" And eventually, he did.

During his 1943 visit, Roy Dobson met Canada's Minister for Munitions and Supply, the Right Honourable C D Howe, as well as the Director of Aircraft Production, Fred Smye - a very young, but very bright fellow who was responsible for co-ordinating the production of British and American aircraft in Canada. Dobson's focus was still on the war effort. He was not to forget the potential he had seen at Malton. Nor would he forget the competent people he met in Canada.

At the end of the war, activity at Victory Aircraft came to a virtual standstill. The plant had produced one Lincoln bomber and one York transport - both Lancaster derivatives. But the postwar demand for these aircraft did not require a Canadian production line. Meanwhile, back in England, Avro was developing its ill-fated Tudor transports. The firm's Chief Designer, Roy Chadwick, would also be tackling a more ambitious project - a delta-winged, jet-powered bomber that later became known as the Vulcan. That was still some two years in the future. A more immediate concern was the design of an uprated maritime version of the Lincoln which first took to the air in 1949 as the Shackleton.

During the summer of 1945, Sir Roy (he had been knighted earlier that year) was determined to expand Avro's future role in civil aviation. So he set up a 'think tank' at Yeaton in Yorkshire under Stuart Davies - formerly one of Hawkers' top designers. Davies' small team studied all sorts of different concepts. Their primary interest was in the application of turbine engines to civil transports - both pure jets and turboprops. He chose a young man named Jim Floyd to be his chief project engineer at Yeaton.

James C Floyd had joined Avro in 1930, and he was brought into Chadwick's design office in 1934 after completing his studies at the Manchester College of Technology. While in school he worked at Avro in an engineering apprenticeship programme. He also spent some time at Hawkers under Sydney Camm. During his time at Avro, Floyd was involved with the Anson as well as the Manchester. He met his future wife, Irene, in the Avro design office where they were both part of the small team that turned the problem-plagued Manchester into the Lancaster. Floyd possessed both keen engineering insight and sound organisational ability.

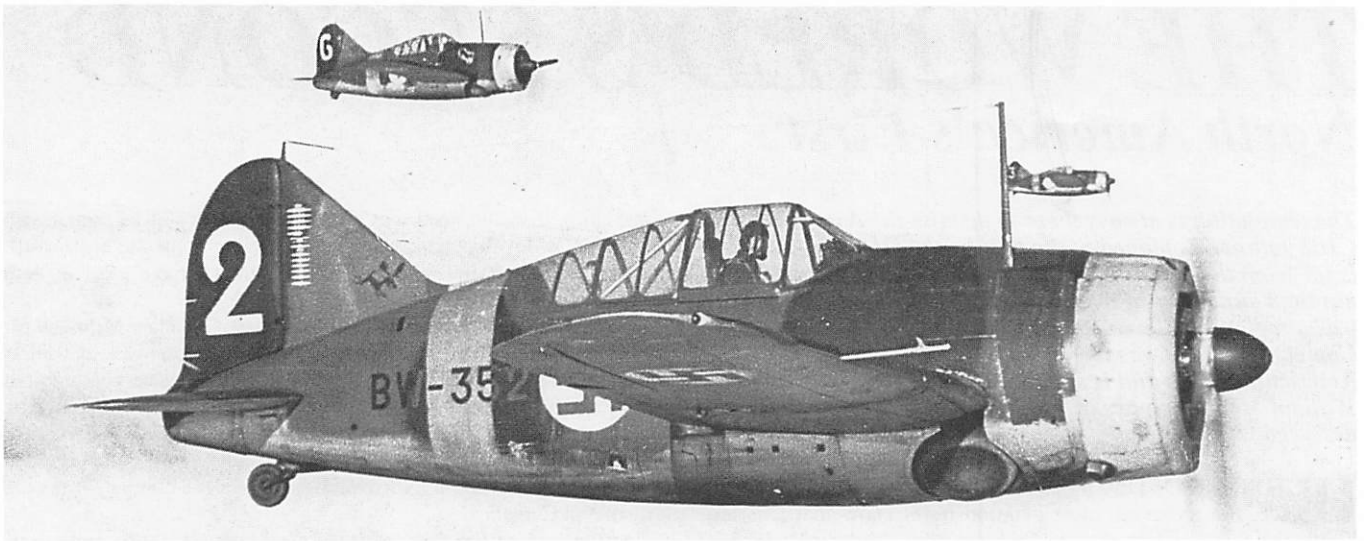
The rapid development of military jet aircraft held the promise of faster, smoother, quieter airliners - not only for long-distance routes, but also the shorter intercity flights. The world was about to enter the 'Jet Age'. And on both sides of the Atlantic, the stage was now set for the fulfilment of *'Dobbie's Canadian Dream'*.

### A V Roe Canada Limited

While Avro was busy in England with postwar projects, the Canadian aircraft industry rapidly ground to a halt. At Downsview, just a few miles away from Malton, de Havilland Canada stopped building Mosquitos and re-opened the Fox Moth line. It also began work on the Company's first indigenous design, the DHC-1 Chipmunk primary trainer. However, its payroll had been dramatically reduced. Likewise, whereas Victory Aircraft had employed nearly 10,000 people at Malton during the height of its wartime activities, that number dropped to a mere 300 practically overnight. Elsewhere, the situation was even more grim.

It was in this environment that C D Howe and Sir Roy Dobson got together to strike a deal. Howe offered to sell the Victory plant under very favourable terms, and Sir Roy agreed to buy it. Many people thought it was a gamble - including Sir Roy. But Dobson had a vision, and the faith to pursue it. He was backed by the Hawker Siddeley Group, which had acquired Avro in 1935.

A new Canadian aircraft manufacturer, A V Roe Canada Limited, took possession of the Malton works on December 1, 1945. The Chairman of the Board was J P Bickell, a Toronto industrialist who



BW-352 of 2/LeLv 24 being flown by S/Sgt Eero Kinnunen over Tiiksjärvi in September 1942. The fin carries 12½ victories out of 19 he was to claim on Brewsters, his total reaching 22½ in all. The 2nd Flight emblem, a black elk, is painted on the fin.



BW-388 of 3/LeLv 24 seen in winter camouflage at Kontupohja on February 15, 1942. Lt Osmo Kauppinen (5½ victories on type) used to fly this aircraft. (All photos via Author)

### Towards the truce

At the beginning of the year LeLv 24 had 18 Brewsters serviceable in three Flights at Suulajärvi, commanded by Major Karhunen. The Brewsters were now really obsolete and the saga was about to end. The first few months did not offer many aerial combat chances, only two La-5 fighters having been shot down in March.

On April 2 the Brewsters made their last kill with LeLv 24 when six aircraft of the 1st Flight claimed one La-5. Two days later the first Messerschmitt Bf 109Gs started to replace the worn-out Brewsters and by the end of the month the Squadron was fully equipped. Brewsters were handed over to a sister squadron HLeLv 26, as fighter units were named on February 14.

Lentolaivue 24 claimed 468 confirmed aerial victories while flying Brewsters, losing twelve of their own number in aerial combat. This gives a ratio of 38 to one, which is twice as good as the much acclaimed US Navy Hellcats did in the Pacific Ocean. Other losses consisted of three aircraft to ground fire, two in bombing attacks and four in accidents. Seven pilots were killed in combat and one became a prisoner of war. A further five pilots were killed by other causes and one was made a PoW. These results were possible only by the high standard of training and leadership combined with the suitable characteristics of the Brewster in local conditions.

HLeLv 26 fought with Brewsters in two fights against the odds, normally defending the immediate rearward positions. The Squadron was based at Heinjoki and from June 16 at Käkisalmi, operating in the eastern (and more quiet) part of the Karelian

Isthmus. The Brewsters flew to their last base, Värsilä, on July 26 and operated north of Lake Ladoga.

By the truce on September 4, 1944 HLeLv 26 had scored 18 Soviet aircraft exchanged for four Brewsters and two pilots. A further three aircraft were burned in a bombing attack. According to the truce, the German troops in northern Finland had to be driven away and the Brewsters were once more needed, having a long endurance and being more suitable to arctic conditions in Lapland. The Germans offered very little aerial opposition, but on the other hand had very accurate (radar-controlled) and widespread anti-aircraft artillery.

On October 2, HLeLv 26 possessed ten Brewsters in one Flight and moved to Vaala and two weeks later to Kemi at the bottom of the Gulf of Bothnia close to the Arctic Circle.

The last victories of Brewsters anywhere were scored on October 3, 1944, when four aircraft jumped a 12-ship Junkers Ju 87D formation about to attack Finnish shipping. Two Stukas were shot down and the rest driven away. Another four-aircraft division flew out to sea and shot down a lone Junkers Ju 88 bomber.

After this no Germans were met in the air until the last Germans left Finnish soil on April 27, 1945. Four Brewsters were lost to anti-aircraft artillery and two in flying accidents with two pilots being killed in Lapland.

After World War Two, seven Brewsters were flown by the Air Force Headquarters Flight until September 14, 1948, when all were put into storage and later scrapped.





*The Jetliner seen at Malton during the early 1950s. Note the de-icing strips on the tail surfaces and the 'white top' fuselage (see front cover). Also, note how accessible the engines were to the mechanics on the ground. (Don Rogers via Jim Floyd)*

guaranteed the financing of the company. Dobson became President (later Chairman). Walter Deisher, former head of Fleet Aircraft, was named Vice President and General Manager. Fred Smye was hired as Assistant General Manager - and the first employee. He brought a great deal of enthusiasm with him. Now all they needed was a contract!

To generate some revenue early on, Avro Canada picked up whatever work that it could. This included the overhaul and modification of aircraft for the Royal Canadian Air Force and the Royal Canadian Navy. In addition, the Company even produced saucepans and hairbrushes. But Sir Roy had much bigger plans in mind. Two projects he had already discussed with Canadian officials were an all-weather jet fighter for the RCAF, and a jet transport for Trans-Canada Airlines (TCA). He also acquired the Crown-owned Turbo Research Ltd, which had been formed during the war to develop axial-flow jet engines. Turbo Research was now a part of Avro Canada and Dobson assembled an experienced team of engineers, including some of Britain's best and brightest. Chadwick named Edgar Atkin as Chief Designer. Later, John Frost was brought in from de Havilland as project engineer on the fighter programme (the CF-100). There was no shortage of outstanding Canadian engineers in the new organization. Among them were: Mario Pesando, Carl Lindow, Jim Chamberlin, and, from Turbo Research, Paul Dilworth.

By 1946, Avro Canada was proceeding with both of its jet projects simultaneously. Stuart Davies had visited Malton the previous autumn, and together with Fred Smye, he discussed the transport design with Jim Bain, TCA's superintendent of engineering and maintenance. Working with a small group of ex-Victory engineers, Davies came up with a layout for a 30-seat airliner powered by four Armstrong-Siddeley Mamba turbo-props. But Bain was only interested in a twin-engined design powered by the new Rolls-Royce AJ65 straight jet. Unfortunately, this engine (the Avon) was still on the military secrets list and unavailable for commercial use.

Davies returned to England in late December where he asked Jim Floyd to work as chief engineer on the transport project under Edgar Atkin. Floyd left for Canada in early February on a TCA Lancaster XPP - essentially a Canadian-built Lancastrian. Arriving at Malton, Floyd faced twin challenges: breaking new ground with the design of a jet airliner, and trying to pull together a fresh team of young engineers to get the job done. He lost no time in doing



*Usually avoiding camera, Howard Hughes voluntarily posed for Captain Don Rogers when the Jetliner flew to California in 1952. (Don Rogers via Jim Floyd)*





*The C102 at Chicago's Midway Airport in 1951. The Jetliner was the first jet transport to land at many North American airports, but it was the only jetliner able to land at Midway for well over a decade. (Don Rogers via Jim Floyd)*

both, and within a month Fred Smye was submitting a brochure to TCA outlining Avro Canada's ideas for a jet transport.

By April 9, 1946, TCA had signed a letter of intent after laying out their specifications for the airliner. It was to seat 30 passengers, have a still air range of 1,200 miles (1,930km), a cruising speed of 400mph (643km/h), the ability to use 4,000ft (122m) runways, and approach and stalling speeds comparable to piston-engined transports, have reliability and maintainability so as to assure operational regularity, and be economical. In fact the aircraft's cost of operation was to be at least comparable with existing transports.

This was a formidable list - especially in 1946. After all, it was only six years after the Battle of Britain when the top speed of the fastest fighters was slower than the cruising speed of this new airliner. And jet engines were still basically unproven. Although a somewhat conservative approach was used to decrease its development time, the new jet transport would be pushing the state of the art.

### **Jetliner described**

After receiving TCA's letter of intent, the go-ahead was given to proceed with the detailed design and development of what was

officially designated the Avro Canada C102. The first aircraft was scheduled for completion in October 1948. Jim Floyd decided to design the C102 to a somewhat higher specification than TCA required, increasing the cruising speed to 425-450mph (683-724km/h) extending the range to 1,500 miles (2,413km) and increasing the passenger capacity to 40-50 seats. A straight wing was chosen to meet the runway requirements, and the horizontal stabilizer was raised to mid-fin height so as to reduce the effects of the jet wake. The engines were positioned in the wings - similar to the configuration used for the Gloster Meteor.

By early 1947, a wooden mock-up of the fuselage had been built, and tooling and assembly fixtures were being produced to build the prototype. Bad news arrived that spring from Rolls-Royce. The AJ65 would not be available for civil use anytime in the foreseeable future - certainly not for the C102. Rolls-Royce suggested replacing the twin AJ65s with four Derwent 5 engines. Jim Floyd recalled the Manchester experience, and the horrendous problems Avro had encountered with the unproven Vulture engines. Once again, he was being asked to substitute four engines for two.

The Derwent 5 was a derivative of the engine used on the Meteor.



*The Jetliner taxis past a TCA North Star at the old Malton terminal in 1949. The C102 represented the greatest single increase in speed of any transport aircraft ever built in North America. (National Aviation Museum)*

It had a centrifugal compressor as opposed to the axial compressor on the AJ65. Although four Derwents would offer a 1,400lb (635kg) increase in total thrust over two AJ65s, their fuel burn was greater as was their weight per pound of thrust. This meant increasing the C102's fuel capacity, as well as redesigning the engine nacelles and landing gear. However four engines also offered greater reliability and less control problems in an engine-out situation. Moreover, the Derwent was already a proven engine with an established performance record.

The modified, four-engined C102 was a very sleek-looking machine with two engines mounted neatly in twin pods slung under each wing near the root. These pods resulted in the shortest and simplest landing gear ever seen on a large transport - which also allowed for easy access to the C102. The wing on the prototype was fitted with split-type flaps, although the second aircraft was to be equipped with double-slotted flaps. A wing root fillet extended ahead of the leading edge and along the fuselage to reduce the stall speed. The fuselage was ten feet in diameter, and the cabin was pressurized to sea level up to 21,250ft (6,480m) [4,000ft (122m) at 30,000ft (915m)]. Seating could be four or five-abreast, to carry from 40 to 50 passengers in ten rows at 38 inch (965mm) pitch.

The C102's flight deck was laid out in a very functional manner, and the windscreen provided plenty of visibility. A single, main entrance door was located behind the cockpit on the port side. There were nine circular windows on each side of the prototype (12 were planned for the somewhat longer production aircraft).

It is important to note that even with the Derwent 5 powerplants, the C102 still exceeded the specifications set by TCA in April of 1946. However, by 1947 the negotiations with TCA were taking a nasty turn. The airline was adding some truly outrageous clauses to its agreement - including what could only be described as a 'give away' price tag.

Sir Roy Dobson arrived in Malton on April 8, 1947, to review the situation. The engine TCA wanted for the C102 was now unavailable. The airline had withdrawn its letter of intent before signing a contract. And there were no other customers in sight. However, the decision was made to continue development work on the C102. The problems with TCA were regarded as financial and contractual difficulties that could hopefully be ironed-out by the

time the airliner was flying. With the C102 in the air, other customers would no doubt become interested in the project.

Unfortunately, while the prototype was taking shape in the Experimental Department, the negotiations with TCA were becoming even more convoluted. Politics had got in the equation, and it was growing more and more clear that TCA had no genuine interest in the C102. Perhaps the airline was simply hesitant to be the first carrier in North America to introduce jet transports. In any case, Avro Canada began to focus its sales efforts on the American market.

Meanwhile, Jim Floyd and his team were working seven days a week to complete the C102 prototype. The Hawker Siddeley Group still backed the programme, and the Canadian government also provided funds (the eventual cost was \$9.4 million).

### Flight Testing

Avro Canada knew that de Havilland was developing its own jet transport in England, but the Comet was designed to fly over BOAC's long-range routes. The C102, on the other hand, was tailored to intercity routes - the type that dominated air traffic in North America. Joe Morley, Avro Canada's manager of sales and service, together with his assistants Murray Willer and Gil Dunkin, was eager to demonstrate the C102's capabilities on those routes. As the first aircraft neared completion during the Spring of 1949, everyone was anxious to see it fly, and to show the world Avro Canada's marvellous new airliner - a jet airliner!

Indeed, when the prototype was rolled out for its first taxi tests in July, it bore the name Jetliner in bold red script on its nose. The prototype was also known as 'EJD' from its identification letters - CF-EJD-X (the 'X' being for 'experimental' prior to certification). A bright yellow stripe running the length of the fuselage, together with a yellow tail and yellow-trimmed engine pods, complemented the Jetliner's overall polished aluminium finish. By every standard, the Jetliner was a modern-looking aircraft that seemed absolutely fantastic when compared to contemporary transports such as the DC-6 and CV-240. Moreover, this new Canadian-built airliner would be nearly twice as fast as its American competitors. The Jetliner represented the greatest single increase in speed of any transport built and flown in North America - a record that stands to



*All that remains of the Avro Canada C102 Jetliner is the nose section - now on display at the National Aviation Museum in Ottawa. The nose section of the sixth CF-105 Arrow is also on display - all that remains of that fabulous project. (Fred Matthews)*



this day.

Unfortunately, some of the Jetliner's thunder was stolen by the de Havilland Comet which first took to the air on the evening of July 27, 1949. However, this did not dampen the enthusiasm of the Jetliner's flight crew as they boarded 'EJD for its maiden flight on August 10, 1949. An attempt two days earlier had been aborted due to a short runway (repairs were being made on the main runway) and high temperatures (it had risen to a record-breaking 100° Fahrenheit). The same conditions prevailed that hot Wednesday morning. Captain Jimmy Orrell, Avro's chief test pilot, decided to take off regardless of the heat. He was joined by Avro Canada's chief test pilot, Don Rogers. Bill Baker was the flight engineer. Mike Cooper-Slipper, a wartime Spitfire pilot, was back-up co-pilot, and Tommy Thomson, a former Victory flight engineer, was Baker's back-up.

The Jetliner lifted-off after a relatively short run, and Orrell flew the aircraft for over an hour. The veteran test pilot described the flight as "a piece of cake". Don Rogers said, "It handled like a feather; you wouldn't believe how well she behaved." And Bill Baker added, "I was amazed ... everything was so sweet, so perfect." Jim Floyd cabled his wife, who was on vacation with their family, "Our beautiful bird has flown". Actually, many of the people who had built the Jetliner were on vacation at that time. Those who witnessed the first flight celebrated for all of them!

Six days later, 'EJD took-off on its second flight. This time, with most of the employees back from their summer vacations, there was a huge crowd on hand to watch Jimmy Orrell take the C102 through its paces. The onlookers were in for a dramatic finish - the main gear could not be lowered. Orrell decided to land the Jetliner with the nose gear down and the main gear up. The C102 landed safely with only slight damage to the underside of the nacelles and rear fuselage. The cause of the problem was quickly traced and corrected. Within five weeks, the Jetliner was back in the air, and this was the only serious mishap the aircraft would experience during its seven-year flying career.

Jimmy Orrell returned to England at the end of October after making sixteen test flights - leaving the flight test programme in Don Rogers' capable hands. A few weeks earlier, on October 4, Orrell had flown the Jetliner during its first public demonstration.

The press and media were there, together with government officials, airline personnel, and other VIPs. C D Howe was on hand, and described the first official flight of the C102 as "an epic-making event in the story of Canadian aviation".

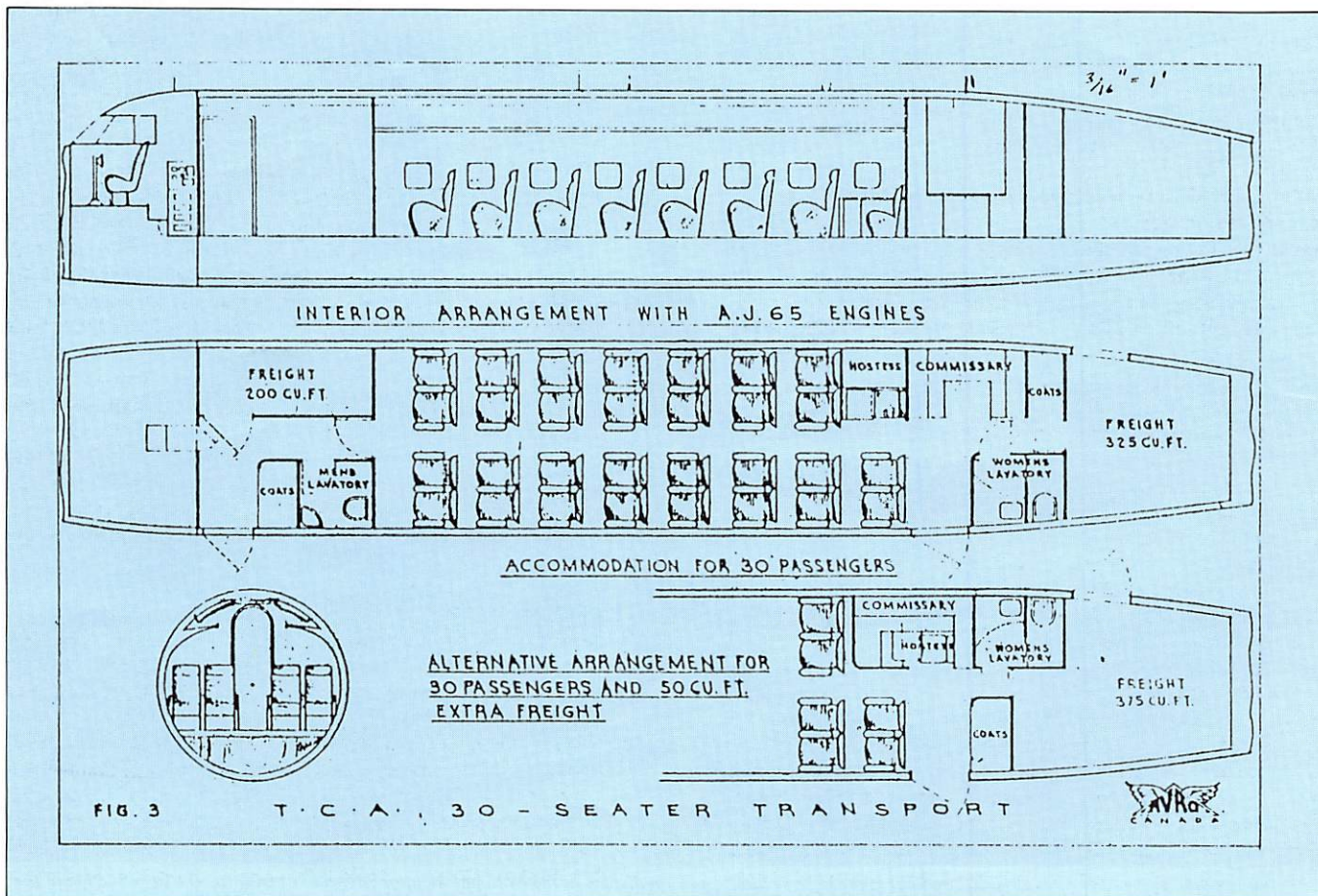
On November 22, 1949, with Don Rogers as captain, Mike Cooper-Slipper as co-pilot, Bill Baker as flight engineer, and Mario Pesando and Jim Floyd as observers, the Jetliner made headlines by passing the 500mph (804km/h) mark. It was constantly in the news thereafter, breaking one record after another. The test flights combined engineering with public relations in order to attract the attention of the airline executives. Avro Canada also wanted to find out what changes needed to be built into the second prototype.

### Proving the Jetliner

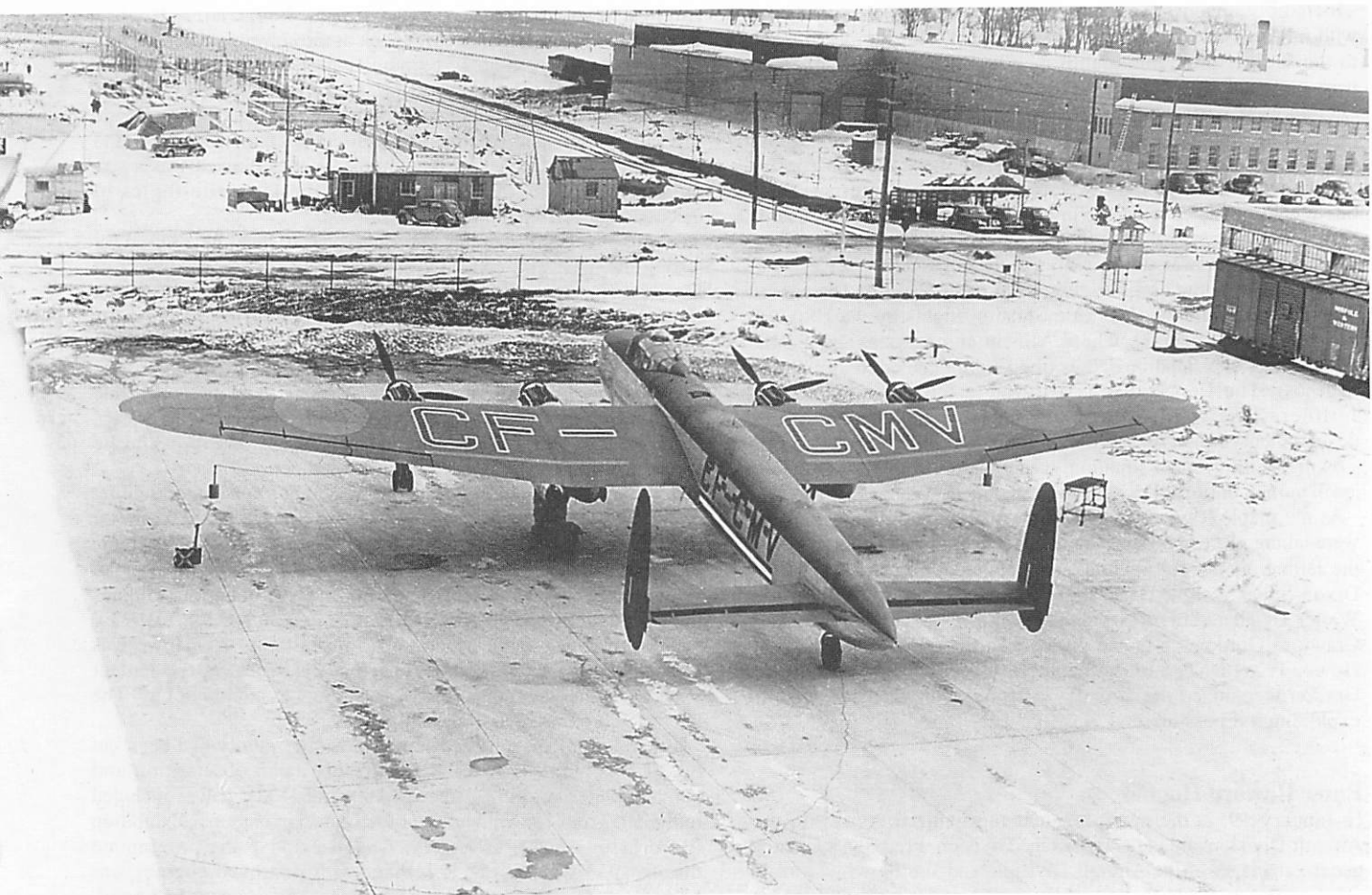
The first Jetliner had been produced around TCA's design specifications, but these were quite different from the requirements of the average American carrier. The sales people were anxious to clear the C102 for demonstration flights so they could get more input from the airlines south of the border. Yet, they were still courting TCA. In order to justify its rejection of the C102, the Canadian carrier could not, politically-speaking, show any enthusiasm for the Jetliner. Nevertheless, TCA's President, Gordon McGregor, was invited to be the "passenger of honour" on the Jetliner's first trip to New York. McGregor accepted the invitation.

That historic flight took place on April 18, 1950. The flying time between Toronto and New York (Idlewild) was just under one hour - nearly half the time required by one of TCA's North Stars. The Jetliner created a sensation in New York. It also carried the world's first 'jetmail' - 15,000 letters officially stamped to commemorate the occasion.

One young man was so impressed with the Jetliner that he left his position as CR Smith's assistant at American Airlines to set up a marketing office for Avro Canada in New York. His name was R Dixon Speas, and within weeks of joining Avro in May of 1950, he had visited the heads of all the major airlines in the United States - promoting the virtues of jet travel. His efforts quickly bore fruit as Miami-based National Airlines took an immediate interest in the Jetliner. By mid-year, they were discussing a contract for up to ten Jetliners.







*Previous 'transport' experience by Victory Aircraft at Malton had been the Lancaster XPP, eight conversions were undertaken. The final six included longer nose and tail fairings and larger fuselage windows, including CF-CMV, illustrated. (Don Hannah Collection)*

However, as with most other potential airline customers, National preferred an engine other than the Derwent. Avro intended to use Rolls-Royce Nenes in the second Jetliner, and offered to install any comparable American engines in production aircraft if desired. The Derwent had never been the Company's first choice, although it was the only engine available for the prototype.

During the autumn of 1950, the Jetliner programme seemed to be moving forward. Flight testing was proceeding smoothly, and the marketing effort was intensifying. Meanwhile, a proposed route-proving demonstration for TCA was creating nothing but headaches. TCA's operations people were stating the obvious in pointing out the prototype's shortcomings, and their endless criticisms were generally considered to be nothing more than "sour grapes" by those in the know. But less-informed people, including political leaders in Ottawa (and some journalists), regarded TCA's negative remarks as the "professional opinion" of a major international airline. The Jetliner became even more entangled in politics, and this created problems with the Department of Transport (DoT). One of the most serious, in terms of sales and demonstration tours, was the DoT's requirement that all passengers sign a release before flying in 'EJD' - not exactly a confidence builder.

An even greater problem was the Korean War. The Company was ordered to concentrate all of its efforts on the CF-100. Work on the second Jetliner came to a virtual standstill as employees were transferred to the military programme.

Despite these difficulties, the marketing effort on the Jetliner continued unabated in the United States. The C102 was flown to Chicago's Midway Airport on November 19, 1950. Not only was the Jetliner the first jet transport to land at what was then the world's busiest airport, but it was also the only jet transport able to use Midway's short runways until the advent of the '727 and DC-9 fifteen years later. At the time, Midway was home to United Air Lines, and its top executives were very favourably impressed by the Jetliner, as were the spectators who lined the fences to see it.

The aircraft was back in Chicago on January 10, 1951 - part of a

'round-trip' demonstration flight from Toronto to Chicago to New York and back to Toronto. Airport officials at La Guardia, unfamiliar with jet operations, expressed fear that heat from the C102's engines would scorch the tarmac or nearby aircraft and buildings. And, as was often the case during cross-country flights, air traffic controllers asked Don Rogers to repeat his altitude and estimated time to the Jetliner's next position checkpoint. "Level at 32,000 feet and estimating the next station in 19 minutes," was not the sort of report they usually received from transport pilots.

Several similar trips were flown that January to Canadian cities, as well as to Tampa and Miami where the aircraft was shown to National Airlines. Each of these flights drew the attention of the press and media, and resulted in headlines all across the continent. One New York newspaper noted, "A commercial jet airliner, built in Canada, has smashed all American speed records for aircraft of that type by flying from Chicago to New York in one hour and 42 minutes. Besides hurtling along at 459mph, the airliner set a new altitude record for transports. This should give our nation a healthful kick in its placidity ... (the) amazing flight of the Canadian plane serves another healthful purpose - a fair and friendly warning that our neighbour is equipped to step into a competitive field". The Jetliner was garnering both attention and respect in the United States.

### **The Jetliner's Demise**

The visit to National Airlines' headquarters resulted in a letter of intent to buy four Jetliners with options on six more. They were to be powered by Allison engines, and the price per aircraft was set at \$1 million. Besides National, United Air Lines was seriously interested in the C102, and American Airlines was also a potential customer. Eastern Air Lines faced the prospect of stiff competition from National. In fact, as soon as any one airline put the Jetliner into service, the others would be virtually forced to follow suit. The United States Air Force also indicated its intent to buy 20 Jetliners as high-altitude navigational trainers. Dixon Speas estimated that the total market for the Jetliner was at least 400-500 aircraft.

Incredibly, against this background of growing optimism, and with C102 production just months away, C D Howe ordered a halt to the Jetliner programme until the CF-100 production line was back on schedule. Unlike the C102, all sorts of problems had been encountered with the CF-100. With the government about to increase its commitment to 720 CF-100s, Avro had a tremendous stake in the fighter project. The demands of the Korean conflict took precedence over the development of a civil transport. Fred Smye had no choice but to follow Howe's directive, and he put an end to the Jetliner marketing effort as well as the second prototype. National Airlines was stunned. So was the USAF.

Nevertheless, the Jetliner flew to Wright Field at Dayton on March 6, 1951, for six days of evaluation flights by the USAF. It went on to Indianapolis where Allison engineers examined the C102's engine installation details (the USAF planned to use Allison engines). The US Navy was also interested in evaluating the Jetliner. This would seem to have justified the continued development of the C102 as a military aircraft. The order held firm - owing to the Korean situation, the Jetliner was to be kept on the 'back burner' until further notice.

As the maple leaves changed colour that autumn, many changes were taking place at Avro Canada. Sir Roy told Jim Floyd to "leave the Jetliner alone" for a while, and appointed him works manager. Dixon Speas resigned and shut down Avro's New York office. Walter Deisher retired as president, and his place was taken by Crawford Gordon - a Howe protégé. But despite his exposure to Howe, TCA, DoT, and the negative reports about the Jetliner, Gordon recognized the aircraft's potential. He was not averse to exploiting it if possible.

### Enter Howard Hughes

In January 1952, the new president reorganized Avro into the Aircraft Division and the Gas Turbine Division. Fred Smye became general manager of the Aircraft Division, and Jim Floyd was made chief engineer. Early that year, Hughes Aircraft was working on the installation of its MG2 fire control system in the CF-100 Mk 4. A suggestion was made that the Jetliner be used as a test aircraft in this programme as its performance was comparable to the CF-100, and there was plenty of room onboard for test equipment and engineers.

The Jetliner arrived at Hughes' airfield in Culver City on April 8, 1952, via Chicago and Denver. The crew was told to wait for Mr

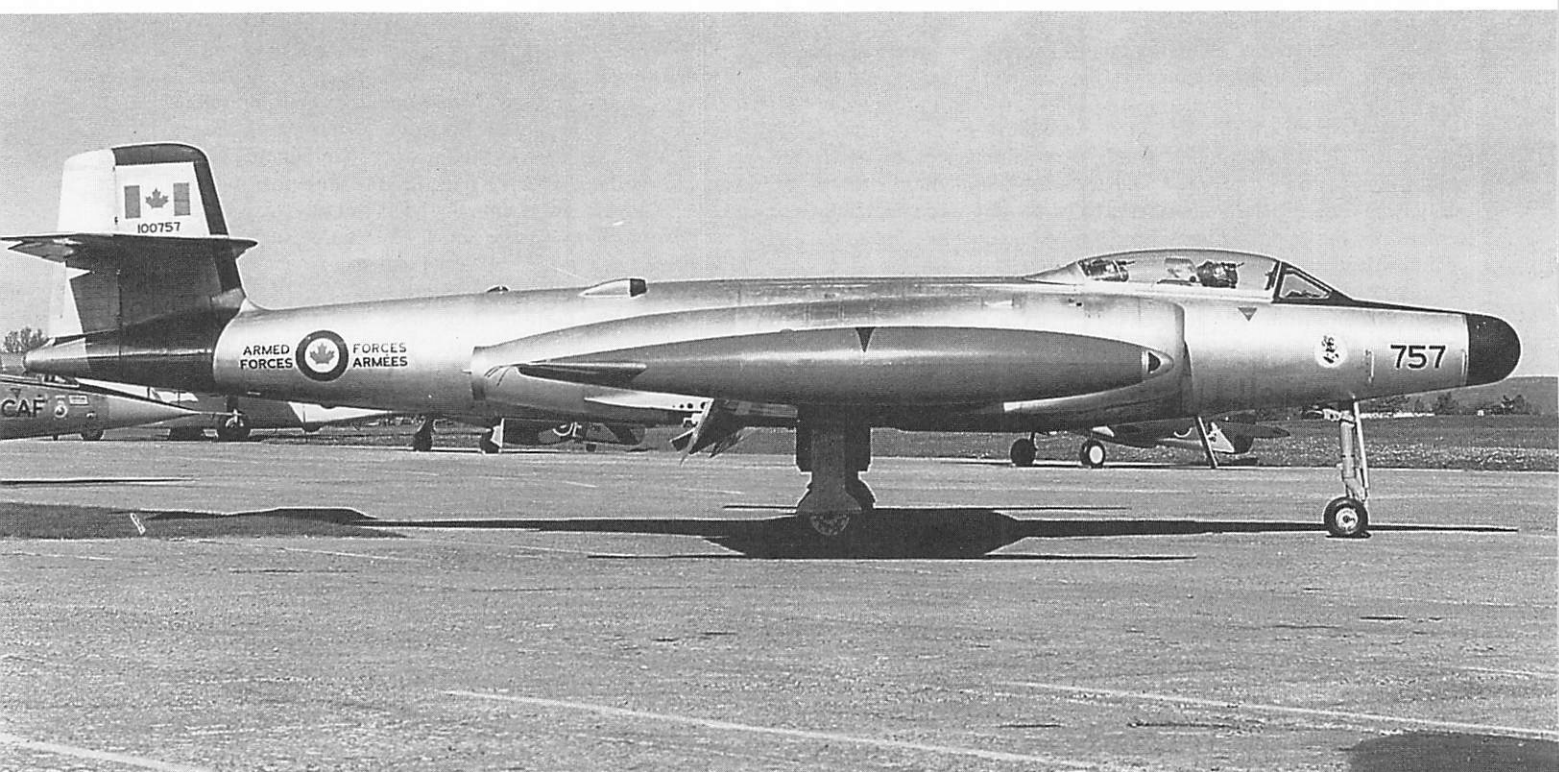
Hughes, who finally showed up several hours later. Hughes boarded the aircraft, took a quick look at the cabin, then settled into the flight deck where he asked numerous technical questions. The next day he returned for a series of demonstration flights. Hughes took the left-hand seat, and with Don Rogers' directions, he made several take-offs and landings. He praised 'EJD's' performance, and was obviously intrigued by the aircraft. What followed was a six-month 'adventure' that is still one of the favourite topics of discussion at Avro reunions.

During its lengthy stay in California, the C102 was never used for testing the MG2 fire control system. Rather, it was the subject of long and frustrating negotiations with Hughes, who wanted to put the Jetliner into service with Trans World Airlines (which he owned at the time). TWA's chief engineer, Bob Rummel, spent many hours with Avro's engineers working out the details of the C102's projected performance on the carrier's route system. While Howard Hughes' personal behaviour was bizarre (to say the least!), Jim Floyd respected his innate engineering ability. And he appreciated Hughes' keen interest in the Jetliner.

That interest resulted in a proposal by Hughes to have the Jetliner built under licence at Convair. He wanted to have the first aircraft delivered by May 1954. Convair was willing to go along with the plan, but the US government put a stop to it - citing the Korean War and Convair's commitment to military production. Hughes then tried to persuade Avro to build 30 Jetliners for TWA by offering to finance the programme himself. But C D Howe was outraged by the suggestion. As much as he wanted it, the Jetliner was one of the few things that Howard Hughes could not buy. The aircraft was returned to Malton in September.

By the end of the year, all funding for the Jetliner had been cut off. It was authorized to be flown *only* as an observation and photographic platform for the CF-100 flight tests. It was included in the 1953 and 1954 airshows at the Canadian National Exhibition in Toronto. And an effort was made to revive the programme during 1953 when a Mk II Jetliner with improved engines was proposed. It offered improved range and increased speed. Production aircraft could have been delivered by late 1956 - still two years ahead of the French Caravelle (nearly a decade ahead of the DC-9). But C D Howe's reaction was predictably negative.

On November 23, 1956, Don Rogers and Peter Cope flew the Jetliner for the last time. Seventeen days later, Fred Smye sent a memo to Jim Floyd ordering the destruction of the Jetliner "as quickly and quietly as can be done, every precaution being taken to



*Avro Canada's CF-100 Canuck fighter programme was to have provided a parallel product line for the Company. Instead, delays with the CF-100 and the pressures of the Korean War made its survival a large part of the decision to kill the C102. (Don Hannal Collection)*





*Avro's Type 706 Ashton was a development of the Tudor airliner, via the Tudor 8 powered by four Nenes, for research purposes for the Ministry of Supply. Erroneously compared with the Jetliner (see page 61), the first example flew on September 1, 1950. Illustrated is Mk 3 WB492 used by the Radar Research Establishment. (Don Hannah Collection)*

attract as little attention as possible, and with the avoidance of any fanfare". Canada's tremendous lead in commercial jet aviation was cut apart on a hangar floor. Only the nose section was preserved.

### **Aftermath**

By that time, the Gas Turbine Division had delivered some 3,000 Orenda engines, and the Aircraft Division had produced nearly 500 CF-100s. Work was underway on another new and exciting project - the supersonic CF-105 Arrow. Jim Floyd led the design of this highly-advanced fighter, and many of the people who had worked on the Jetliner were now helping to give Canada another new state-of-the-art aircraft. It was to be powered by the Company's mighty Iroquois engine. First flown on March 25, 1958, the Arrow would fall victim within a year to the same fate as the Jetliner. The programme was cancelled on February 20, 1959. Six aircraft (five of which had already flown) were cut up and destroyed, together with all tools, jigs, drawings and photographs. It was as if the government wanted to erase any trace that the Arrow had ever existed. Over 14,000 Avro employees lost their jobs. It sealed Avro Canada's fate much as the end of World War Two marked the end of Victory Aircraft.

Douglas Aircraft bought the Malton plant in 1965. It is a rather ironic twist of fate that DC-9 wings were built in the same factory that produced the Jetliner. Moreover, it is equally ironic that 40 years after the C102, Canadair is just now introducing a 50-seat intercity jetliner - the Regional Jet.

Over the years, a number of writers have pointed to all sorts of alleged problems with both the Jetliner and Arrow. But sadly, it was politics, not any technical troubles, that cost Canada its brief, though tremendous lead in aviation. Sadder still is the fact that most of Avro Canada's best engineers left the country to work elsewhere. Shortly after the Arrow was cancelled, two dozen of them went to NASA and took top positions in the manned spaceflight programme. One historian described it as "the luckiest break since Wernher von Braun had surrendered to the Americans". Others went to Boeing, Douglas, Lockheed and McDonnell. Jim Floyd returned to Britain and became a consultant on the Concorde. Like his colleagues, his vision was still focused on the future.

Many of those men and women returned to Malton in 1989 to observe the 40th anniversary of the Jetliner's first flight. They recalled that exciting time - as well as musing about what might have been. Though most people have forgotten the world's second jet transport, the *Avro-ites* all agreed that the years they spent working on the Jetliner were the most memorable years of their lives. They were pioneering a new era. Indeed, *the* Jetliner itself was a pioneer. Its story - *their* story - deserves to be remembered.

*(The Author gratefully acknowledges the kindness and generous support of Jim Floyd in the preparation of this article. The contributions of Don Rogers, Fred Matthews, Bob Bradford and Tommy Thomson are also greatly appreciated.)*



Above: The world's first purpose designed passenger jetliner, the DH.106 Comet. Powered by four de Havilland Ghost 50s, the prototype, G-5-1/G-ALVG (illustrated) first flew from Hatfield on July 27, 1949. Early customers were Canadian Pacific Airlines and the Royal Canadian Air Force. (Don Hannah Collection) Below: The world's second purpose-designed passenger jetliner, the C102 Jetliner. Powered by four Rolls-Royce Derwent 5s, the prototype, CF-EJD-X, first flew from Malton on August 10, 1949 – just two weeks after the Comet. (Avro via Jim Floyd)





# Contemporaries Compared

First Flight  
Powerplant

Wingspan  
Overall fuselage Length  
Height

Wing area  
Maximum gross weight  
Maximum landing weight  
Max Cruising Speed  
Maximum payload  
Passenger capacity  
Cruising altitude  
Maximum still air range  
with full payload  
Initial Rate of Climb

## C102 Jetliner

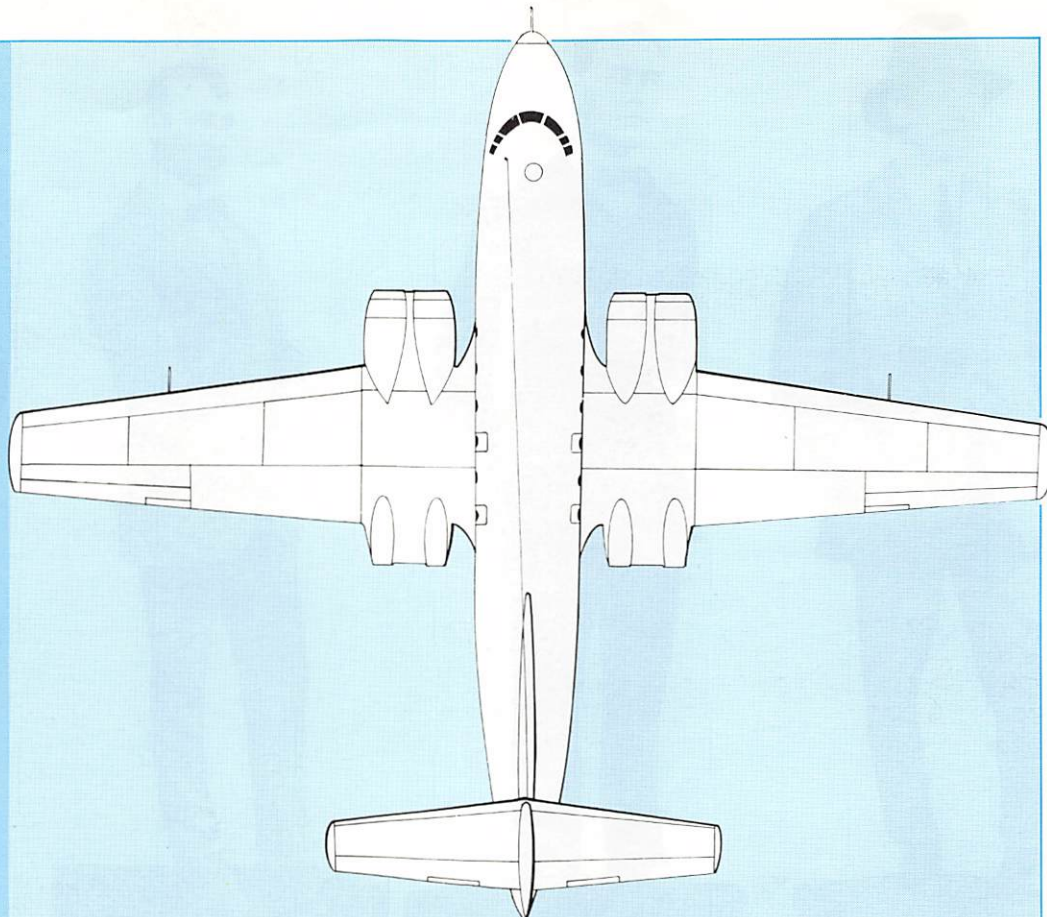
August 10, 1949  
Four 3,600lb (1,634 kg) st  
Rolls Royce Derwent 5  
turbojets  
98ft 1in (30.14m)  
82ft 9in (25.24m)  
26ft 5 1/2in (8.07m)  
1,157ft<sup>2</sup> (107.6m<sup>2</sup>)  
65,000lb (29,510kg)  
52,500lb (23,835kg)  
450mph (724km/hr)  
12,700lb (5,765kg)  
40-50  
30,000ft (9,150m)  
1,400 miles (2,250km)  
2,890ft (881m)/min

## DH Comet 1

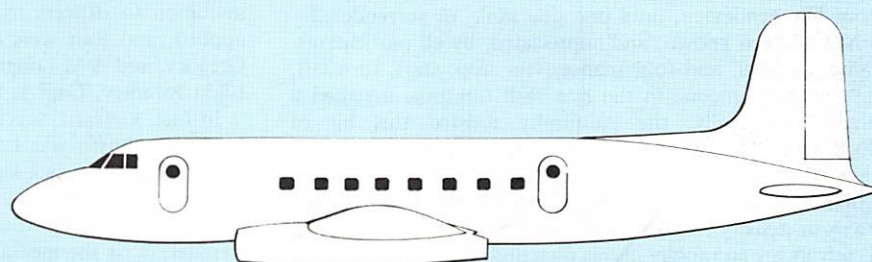
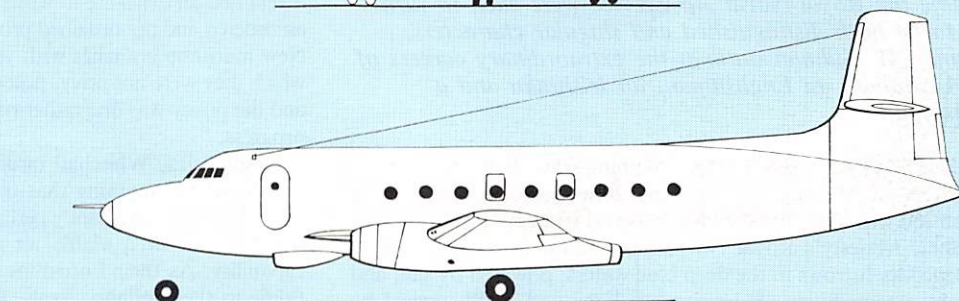
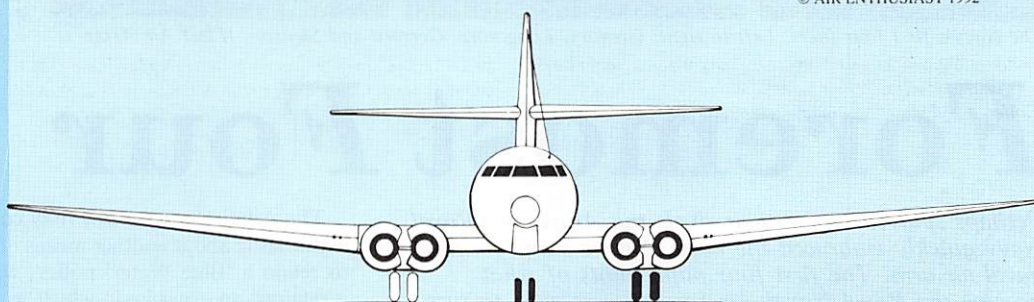
July 27, 1949  
Four 4,450lb (2,020kg) st  
de Havilland Ghost 50  
Mk 1 turbojets  
115ft 0in (35.07m)  
93ft 0in (28.36m)  
28ft 4in (8.64m)  
2,015ft<sup>2</sup> (187.4 m<sup>2</sup>)  
107,000lb (48,578kg)  
?  
490 mph (788km/hr)  
12,000lb (5,448kg)  
36-44  
35,000ft (10,675m)  
1,750 miles (2,815km)  
?

## Avro Ashton

September 1, 1950  
Four 5,000lb (2,270kg) st  
Rolls Royce Nene 5  
turbojets  
120ft 0in (36.6m)  
89ft 6 1/2in (27.31m)  
31ft 3in (9.52m)  
1,421ft<sup>2</sup> (132.15m<sup>2</sup>)  
82,000lb 937,228kg)  
74,000lb (33,596kg)  
399mph (642km/hr)  
—  
Up to 40,000ft (18,160m)  
1,725 miles (2,775km)  
2,900ft (885m)/min



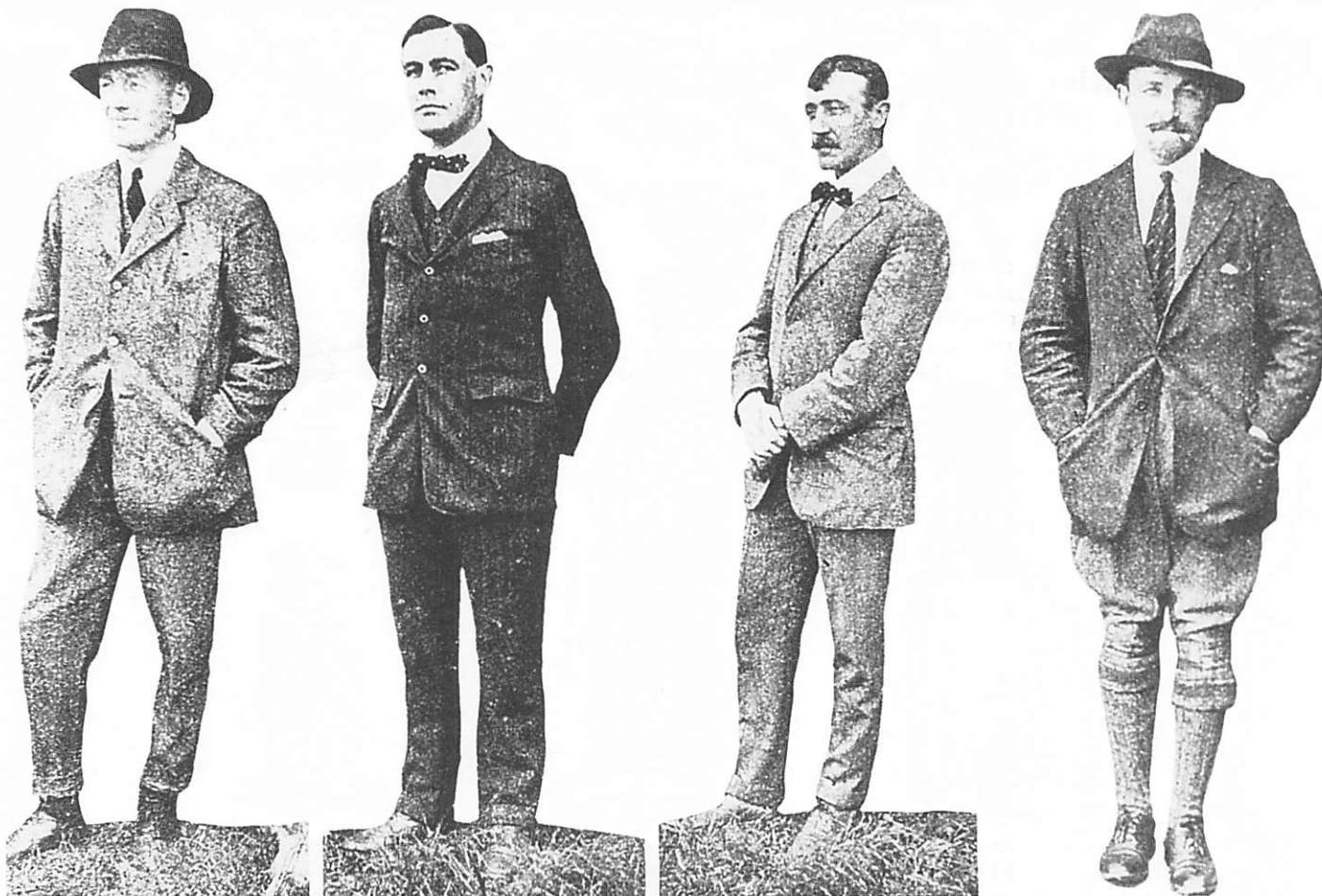
© AIR ENTHUSIAST 1992



6 FEET  
6 METRES

Three-view of the C102 Jetliner with (above) provisional side-view of the C102 as at April 1946 with AJ.65 engines. (Pete West)





The Navy's first four fliers. Left to right: Gregory, Longmore, Gerrard and Samson. (Fleet Air Arm)

# Foremost Four

*Perhaps spurred on by their rivals the Army, the Royal Navy quickly embraced the need to have some form of naval air arm. The first four pupil pilots of what became the Royal Naval Air Service were each to turn out to be both distinguished and singular characters. Norman W Gillman outlines the extraordinary careers of an Australian, an Englishman, an Irishman and a Scotsman.*

**T**IMES WERE CHANGING. Nothing was what it used to be. Here, at the beginning of the 20th Century, yet another dimension was likely to be added to Naval strategy. For years, His Britannic Majesty's Royal Navy, the greatest in the world, had ploughed its furrows in the deep blue waters, powered by sail, and then by steam. Ships of destruction, large and small, owned by various sovereign powers, roamed the oceans, and if in hostile mood, shot it out like gentlemen, until one side sank, or surrendered.

That had all been known, and appreciated, by all participants. One plane, sea level, and four manoeuvres stop, start, turn left, turn right. Then someone in the late 18th Century, invented a submarine. Successfully, the Admiralty resisted this bit of technology, until 1901, when events forced them to order Holland boats, and acquire a new dimension. Now it was on and under.

Less than a decade later they were being forced to consider yet a *third* axis of activity — flying over the sea, and the state of the arts was advancing so rapidly in this direction that it was doubtful if *Perplexed of Portsmouth* or *Worried of Whitehall* were going to be able to dissimulate for another century before accepting the new weapon. Interestingly, when the subs came on the scene, the young and ambitious of the Service opted for the underwater branch, and there were a lot of them, from the Gosport base, who enthusiastically took up the new idea of flying. John Porte, of flying-boat fame was prominent among them.

The Admiralty were not fully convinced. They were not overly enthusiastic about another means of warfare, and would have liked to retain a 'Blue Water' policy, which was advantageous in that it retained an expertise in which senior people were proficient, and an ordered and pre-ordained promotion pattern could be maintained. New maritime branches with young officers having learnt skills to which they were not privy, posed threats to an established hierarchy, and the policy was one rather of staying in touch than of innovating progress.

Despite this, Whitehall tardiness was tempered by a reluctance to fall behind anything that the Army was doing, and that body was taking steps, hesitantly perhaps, but still relatively positive, which would result in a viable air arm, backed by a manufacturing capability. As their Lordships would be unwilling to play second fiddle to their military rivals, for prestige, position, and funding, some moves had, perforce to be made. So, in 1911, they issued an invitation to officers to learn to fly. Hundreds, some say 500, applied, and four were chosen. They were Lts C R Samson, R Gregory, and A M Longmore, all RN, and from the Royal Marine Light Infantry, Capt E L Gerrard.

In fact, Gerrard, was a second choice. The Royal Marine man originally chosen was Lt G V Wildman Lushington, but he was unavailable — on sick leave, but did subsequently become a pilot. In fact he gave tuition to Mr Winston Churchill, then First Lord of the Admiralty, on November 29, 1913. This was hailed with some trepidation by the media, who felt that the First Lord was taking unacceptable risks. And possibly with more than a little justification, for three days later Lushington was killed coming in to land.

## Dedicated benefactor

This Admiralty tutorial was pretty casual, insofar as they allowed the officers to fly, and continued paying them while they did so, but the provision of aircraft, location and expert tuition was by