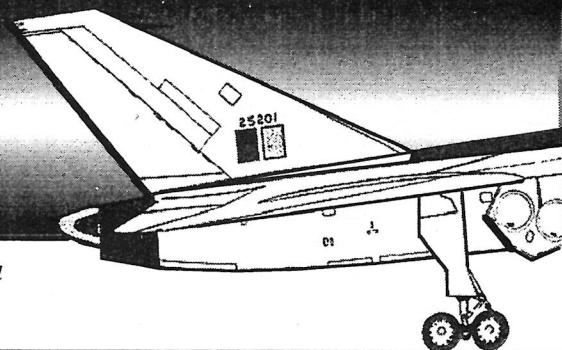


Pre-Flight



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Bill Baker Remembers the Jetliner!



Murray Willer Jim Floyd Don Rogers Bill Baker Mike Cooper-Slipper

Bill Baker was a pilot and flight engineer with a wealth of flying experience long before joining Avro. He had been active in Ferry Command during W.W.II, when at Lord Beaverbrook's request Canadian Pacific Railways had organized a team of young Canadians, Americans and Britons to deliver much-needed aircraft to England, Australia, Asia and Africa. He took part in many notable flights, including a Canso exploration flight over the Pole, when the aircraft, piloted by Don McVicar, caught fire, cutting out the electrics before it was brought under control by Bill. He was already a veteran in the aviation business when the Jetliner was being readied for flight and he was chosen as the flight engineer on the first flight. Bill's recollections cover his time at Avro, during the Jetliner development. After the demise of Avro, he joined McDonnell Douglas and became one of their senior vice-presidents for many years, prior to his well-earned retirement in 1983.

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From the President

I am sad to report the recent passing of Don Rogers, who contributed so much to the testing program of the Avro Jetliner. We extend our condolences to his family.

We now have partners - Arrow Recovery Canada in London ON (www.avroarrow.org) and look forward to continuing cooperation with them in our common goals.

Keep the first weekend in October open for the Gala Events at the Toronto Aerospace Museum. It is the 49th anniversary of the roll-out of the Arrow and the roll-out of their full-scale model.

Frank

Remembering the Jetliner

In 1949 aviation, jobs were hard to find for a pilot/engineer who had been wandering the world's airways in the military and in South America. On returning to Canada I found the only interesting activity was developing at AVRO, so I applied some effort to join the company and did in January 1949. My job was not too clearly defined for the first year. Ostensibly, I was to work in the sales and service department in development of aftersales service capability and in aircraft sales and, oh yes, study the new Jetliner then in design, as I would probably fly on it as flight engineer.

Needless to say I applied myself to the Jetliner project and gave little effort or interest to my other tasks. If I was to fly in this new aircraft I had to know it inside out. So I spent my days and many evenings studying the various systems with each of the systems specialist engineers in the design office. A fine group of knowledgeable engineers, they were always willing to give time to my study and listen to ideas that I occasionally had for improvement, based on experience. When not in the design office I was on the shop floor following each stage of the manufacture of the Jetliner prototype, CF-EJD-X.

In the few months before first flight a team spirit developed which I had never encountered before (or since for that matter). Normal hours of work or workdays were forgotten by everyone and 16-hour days seven days a week became routine, and no overtime was paid by the company. Such dedication and spirit could not be ordered, it had to come from the heart, inspired by the leadership of Jim Floyd.

The jet engine was a new item to me. I had spent 15 years in the business and had quite a few thousand hours with reciprocating engines but not one minute with a jet. My knowledge was hearsay and the odd bit of reading, with a lot of horror stories thrown in - must be handled with care, delicate, slow to accelerate, high fuel consumption, burns the airport grass - the usual stories of the 1940s and the uninitiated. Much of this was dispelled during the engine installation testing and run-ins I carried out under the able guidance of Harry Halstead of Rolls-Royce. He soon taught me to handle the throttle with confidence, and I gained an absolute belief in the future of this new form of power.



Remembering *cont'd*

In early spring 1949 somebody decided that the flight crew should visit with the Institute of Aviation Medicine in Toronto and talk to Dr. Franks and W/C Johnson about the problems of high-altitude flights. I shall never forget Dr. Franks' first review of our projected flight program - he had us all dead in a matter of minutes from a frightening variety of events which were sure to happen when we went over 35,000 ft. It scared the hell out of me and gained my full attention to the problems he foresaw. It must be realized that in 1949 very little knowledge or experience existed about high-altitude flight (over 35,000 ft.) and certainly none with passengers in a jet aircraft. The Institute's view in 1949 was that cabin pressure failure could be expected and that crews must be trained and a method evolved to return the aircraft to 10,000 ft. in the least possible time. A few short years later, the Comet disasters proved the doctor's concerns were correct, the industry took a stronger view, and structures and installed systems safety factors changed significantly.

In the week preceding the first flight we carried out a series of high-speed taxi runs on the single runway available at Malton. That week was the hottest I can remember in Toronto, with daytime temperatures in excess of 90F. The Jetliner air-conditioning system was inoperative, to keep early flights simple, so cockpit temperatures became unbearable. We were required to wear back-type parachutes, for some reason I was never able to fathom, as we were not expecting to fly during the high-speed runs. At the end of the week my parachute was ruined with perspiration and I had lost 12 lbs. The runs allowed some feel of how the aircraft would behave in flight.

They certainly proved the wheel-braking system and the need for anti-skid systems, which came later. On the runs of August 8 we blew all four main tires after accelerating to 100 mph indicated, but we stopped well within the 5,000 ft. runway available. On August 9 we blew the two starboard main tires. The combination of high ambient temperatures, light aircraft weight, high speed and short runway made for a most difficult wheel brake problem for Jimmy Orrell. Aircraft controllability after tire failure at high speed was quite good.

Fifteen years of flying had established in my mind that noise meant power, that more noise meant more

power, and that power was essential for flight. The Jetliner in First Flight configuration had minimal insulation or sound absorption material installed. When we gradually opened the throttles on the brakes, we could certainly hear those Derwents. As we gained speed, the sound level was obviously dropping. When Jimmy pulled up, the noise seemed to disappear altogether and my heart stopped at the same time. It was hard to accept the airspeed indicator winding up while the rate of climb was demonstrating fighter performance and no noise! What a thrill! Later in that first flight, Mike Cooper-Slipper formatted on us with a Mitchell for picture-taking and we were able to advise him that his propellers were out of synchronization! Imagine hearing another aircraft in flight while flying in one yourself - awesome! In later test flying I was able to report that a gyro instrument had a bad bearing - I could hear the roughness in flight in our quiet cockpit. No doubt much will be said of the second-flight troubles but there are a few personal viewpoints to pass on.

The redundancies built into the Jetliner undercarriage retraction system were impressive - four distinct methods to get the gear down, but all failed. Yet in failing, they left us with an aircraft configuration which resulted in the least damage on landing - nosewheel down and locked, wing flaps retracted. I am sure such an arrangement was unplanned.

When the electro-mechanical undercarriage selector didn't work, possibility of electrical circuit failure had to be explored. This required me to carry out circuit tracing and "jumping" on radio instructions from the ground, all this in the main electrical compartment just aft of the co-pilot position. Some turbulence and aircraft flight maneuvers created a few hair-raising moments, as lots of AC power at 208 volts was present. The final undercarriage extension method was to remove the cabin flooring aft of the rear spar and pull on a small lever which would dump hydraulic system pressure and open the undercarriage "up locks," allowing the gear to drop into the slipstream and lock down. I pulled on this lever while lying across the floor frames and nothing happened. On instructions from the ground to "pull harder," I did - breaking a 500 lb. proof load cable and two of my ribs on the floor frame. The nose undercarriage leg dropped down and locked, the mains stayed up and we lost all hydraulic fluid and could not operate wing flaps or aileron boost.

During the first two attempts to belly land the aircraft on the grass, we could not get slowed down enough to land because of the ground effect. At the end of each run, we had to pull up over the airport

... and
very little
knowledge /
experience
existed
about high-
altitude
flight over
35,000 feet

Remembering, cont'd

fence and a great crowd of people watching - this at very slow speed. I found out then that jet engines will accelerate rapidly if pushed, and I was pushing hard on those throttles. On the third pass Jimmy fishtailed enough to finally start dragging on the jetpipes and the aircraft settled gently on the ground out of ground effect. Very smooth.

Throughout the flight-test program the aircraft demonstrated great reliability and serviceability compared to my experience on conventional-powered aircraft of the day. We encountered few problems with engines and basic systems. However, new items in development created some interesting situations. The engine-fire warning systems were a problem throughout the flight-test program and always seemed to go off at the worst moment. Mike Cooper-Slipper and I went off to do a series of engine cuts on takeoff at maximum gross weight. Mike wasn't to know which engine I would cut but was to apply himself to a maximum performance pull-up on three engines. The first time I cut an engine we went airborne at a healthy angle of attack and low airspeed, when the firewarning lights came on and the warning bell sounded for the three remaining engines. What a racket and didn't adrenaline flow! In time we treated the warning system with little concern. The fire-warning system worked on a rate of temperature change principle, but we found that quick start-up, taxi, take-off with the jet could promote very rapid temperature rise in the engine bays and activate the warning system.

We also found the system more critical in low ambient ground temperatures. We proved this in Rockcliffe on March 10, 1950, when we gave a flight demonstration for Governor-General Lord Alexander and Prince Bernard of the Netherlands. It was a very cold day, with several inches of snow on the short runway. Don was to perform a short field take-off as part of the demonstration. We did a fast engine start on the self-contained system, a very short taxi and into the take-off. Don pulled off very steeply and all four engine-fire warnings came on with bells ringing like mad. I pulled power back and Don had to take a more gentle climb until the lights went out.

I have a vivid memory, and an example of how complacency can get you if you let down your guard and concentration. We had by this time carried out many stalls in all flight configurations and found that the Jetliner was a lady. She gave good indication of her stall intentions (buffet) and, while-in and through the stall appeared to be controllable, no bad vices had been evident to date.

We were carrying one of our first passengers, Gordon Wheeler of Dunlop Canada, in the jump seat. I flew co-pilot to Don Rogers. Our task was to carry out

a power-on "dirty" stall at highest possible gross weight. Gordon was understandably nervous, but we reassured him with our carefree approach to the test. Immediately after take-off from Malton, we climbed rapidly out over Lake Ontario to about 6,000 ft. and extended gear and wing flaps. We were hurrying because we wanted highest gross weight, which meant least fuel consumed, so with power on Don pulled up to lose speed. The speed fell off rapidly, we got our heavy buffet, then astonishingly the left wing stalled out and the aircraft rolled over. Don had the interesting problem of getting the nose down to gain speed while rolling upright. Once pitched down the Jetliner really dropped and the airspeed wound up. I had reduced power and initiated undercarriage retraction, but once we pointed down and were gaining speed at a fantastic rate, I switched to retracting the wing flaps, as they were rather fragile at over 200 knots.

We finally leveled out too close to the lake for comfort and initiated a very sedate climb to 30,000 ft. without a word said in the cockpit. After study of data from the flight recorder, it was found that our speed decay approaching the stall was much higher than we had demonstrated in earlier flights (1.5 miles per second). This resulted in a higher angle of attack than expected and produced a much more severe breakaway at the stall. Gordon Wheeler, who floated around some in the roll, never forgave us for the show-offs we were. However, I don't think he realized how close he came to entering cold Lake Ontario as a result of a happy, complacent cockpit crew.

It was a sad day for me when the Jetliner project gradually ran down. However, it really did not hit me hard till many years later. In December 1965 I was hired by the Douglas company to head up their Canadian operation at Malton in the old AVRO plant. My task was to build 25 percent of the structure, wing, empennage floors for all of the new DC9s sold. The DC9 was an American solution to the intercity jet specification, essentially the same requirement the Jetliner was designed and built to solve. I was to become a team member in the American jet project 15 years after being a team member on the Canadian Jetliner project, and both roles in the same plant at Malton. This hurt!

The Jetliner was years ahead of the competition, but it apparently doesn't pay to be first, and as we can't afford to be last, we have to be somewhere in-between - middle-of-the-road Canadians!

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