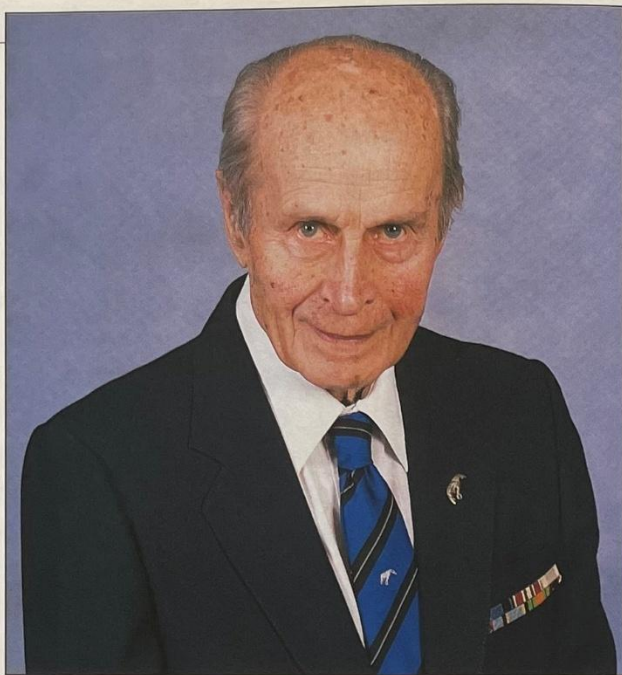


In the third and final part of his biography of legendary test- and display-pilot Janusz Zurakowski, **JOHN PAINTER** recounts Zura's experiences with Avro Canada on the CF-100 interceptor and — until the project was cancelled — the remarkable CF-105 Arrow

TOP Now enjoying a well-earned retirement in Ontario, Canada, Jan Zurakowski was photographed for *Aeroplane* by **GERRY GARDINER** in June last year.

BELOW Avro Canada CF-100 prototype 18101 in its later silver scheme, seen during a wingtip rocket-firing sequence in 1953.



Zura

Turning cartwheels in the sky

BY APRIL 1952, when Zura arrived on the scene as Avro Canada's chief experimental pilot, things were moving fast. He was quickly immersed in the development of the CF-100 Mk 4, which was to replace the Mk 3 in front-line service. On October 12 that year he made the maiden flight of what was essentially a hand-built, first-off Mk 4. It was the beginning of an interesting period of CF-100 history, a couple of events from which are worth relating.

The basic CF-100 was designed to requirements including a maximum speed of Mach 0.85. Zura was always one to push the envelope, so he sought opinions as to what might happen if this speed was exceeded and found that nobody knew, except that windtunnel tests had shown it would probably be uncontrollable. He therefore decided to find out for

himself — after all, any Service pilot might find himself unintentionally in that situation, and should know what to expect and what to do.

So he embarked on a series of test flights at high-subsonic speeds, and by early December 1954 he had dived CF-100 Mk 4 18112 until Mach 1, the speed of sound at his particular altitude, showed on the machmeter. But the instrument had not been specially calibrated and the flight was not observed, so the speed achieved was quite unofficial. On December 16 Zura tried again in the company of an F-86 Sabre with a specially calibrated machmeter, but the Sabre could not hold its position relative to the CF-100 in the dive, so once again no results were forthcoming. Two days later he climbed 18112 to 45,000ft and rolled it into a vertical dive. This time there was no doubt. A sonic boom reverberated around the area of the

Avro plant as he went through Mach 1 at 33,000ft, with a maximum reading of 1.06 showing on the machmeter. The aircraft's controllability remained normal throughout the speed range. This was the first occasion on which a straight-winged aircraft had exceeded the speed of sound without rocket power.

There is an epilogue to this story. Throughout his career as a test pilot, Jan had gained a reputation for taking on some of the scientists and technicians when he felt strongly that their figures or conclusions were suspect, and that his own theories and observations were worthy of consideration. He often backed his contentions with his own figures, for he was no mean performer with a slide rule (there being no pocket calculators in those days), or provided physical proof. In this particular case he found that the design department, believing that the straight-winged CF-100 could not penetrate the "Sound Barrier", was preparing to submit data to the RCAF, without liaising with the flight-test section, in an effort to gain funding for a programme to develop a slightly swept and thinner-winged supersonic version. Jan's flight confounded the design department's theory, and, as it already had enough on its plate, the swept-wing proposal was scrapped.

The second occurrence had a far less satisfactory conclusion. Zura was involved in a flight test programme to improve the range of armament carried by the CF-100. One of these projects was a rocket pack housed in the belly, immediately aft of the gun pack. Flush with the fuselage in its retracted position, it was lowered into the slipstream by a hydraulic jack, the rockets were fired and the pack was then retracted. The whole sequence took less than a second, because the deployed rocket pack acted as a large airbrake and exposure time had to be kept to a minimum. In addition, it was found that at higher airspeeds the lowering of the pack produced an abrupt nose-up trim change which affected rocket aim and also produced considerable vibration. A system was devised which compensated automatically for the trim change when the firing sequence was initiated.

Zura's face as he relates this event shows the pain he still feels about its outcome, even after the passage of so many years. On August 29, 1954, he was airborne in 18112, the machine he had flown supersonically, which now had a belly rocket pack and the pitch-up control system installed. On this flight he was to carry out another test of the pack's operating sequence, though no rocket firing was involved. In the back seat was a young flight-test observer. Over



LEFT Prototype CF-100 18101 being prepared for flight. This and 18102 were finished in black with white trim at the request of Avro Canada.

Ajax, Ontario, east of Toronto, Jan initiated the sequence. There was heavy buffeting while the pack was down, despite the pitch-up control system, and when it retracted the flying controls had seized. Try as he might, he could move nothing, with or without power-assistance.

He realised immediately that the situation was serious, and that he and the observer had to leave the aircraft. Giving the order to bale out, he jettisoned the canopy. At this point he heard an explosion behind him, and assumed the observer had gone. He pulled the face blind on his own Martin-Baker ejection seat, and as the ejection gun fired he felt the seat move sideways, causing his right leg to hit the side of the cockpit hard as he went up and out.

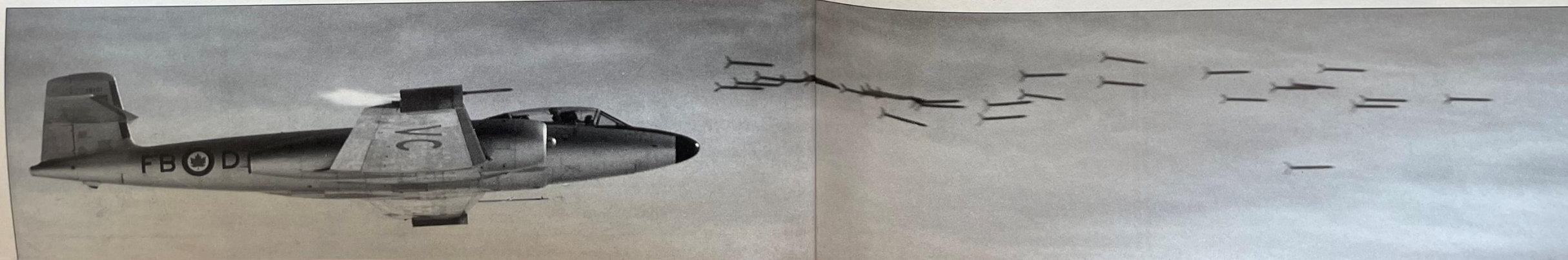
Once clear of the aircraft, the seat separated and his parachute deployed. He looked around as he floated down, but could see no sign of another parachute. Then he suddenly realised that his leg was acting very strangely and he could not control it. "Obviously," he thought, "it is broken." Somehow he managed to land on his good leg without further damaging the injured limb. Sadly, his observer had not ejected. His body was found in the remains of the aircraft, which had crashed in open country.

What had gone wrong? No conclusive explanation was found, but some thought that the young man might have frozen in his seat, or that the slipstream somehow prevented him reaching up for the face blind handle.



ABOVE Zura in typical pose for an Avro Canada publicity picture, about to climb aboard a CF-100.

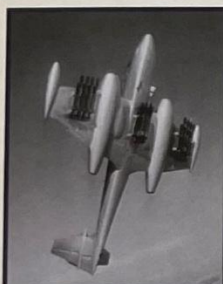
BELOW The second CF-100, 18102, with its chase F-86 Sabre.



PILOT BIOGRAPHY



ABOVE The first production CF-100 Mk 4, 18183, prettily posed outside the Avro Canada factory.



Zura
Turning cartwheels in the sky

RIGHT A batch of factory-fresh CF-100 Mk 4s awaiting their tip-tanks and, in many cases, their radar noses before flight testing.

This time the epilogue has three parts. One is that the front seat was found to have been improperly installed. Two plates on the back were fitted incorrectly, allowing the seat to move sideways on its guide rail. Jan believes the seat concerned is still around today, but he is not sure where it is. What was the explosion that led him to believe that the back seat occupant had ejected? Possibly the intense vibration which occurred when the rocket pack lowered caused a fuel pipe to rupture and the fuel ignited. The third part is pure Zurakowski. The mayor of Ajax, the town near which the aircraft crashed, sent him a very pleasant letter offering sympathy for the loss of his observer and thanking him for guiding the disabled aircraft away from the town, where the crash would have been a catastrophe. "Very nice of him," says the pilot, "but he's quite wrong. The controls were frozen solid and I had no control over the direction of the aircraft at all." The RCAF abandoned the rocket pack project.

As mentioned last month, Sir Roy Dobson was a great proponent of A.V. Roe Canada and its products, and as early as 1951 he was pressing to have the CF-100 flown across the Atlantic and displayed in that year's SBAC show at Farnborough. However, a tragic accident in which 18102, the second prototype, suddenly nosedived into the ground in April of that year resulted in plans being abruptly cancelled when the cause was attributed to pressurisation or oxygen system malfunction.

An opportunity to display the aircraft at the SBAC show did not arise again until 1955, when three CF-100 Mk 4Bs which had been flown to the UK were put into storage at the RCAF's UK supply base at Langar, Nottinghamshire, after evaluation by the RAF's Central Fighter Establishment at West Raynham. The aircraft, 18320, 18321 and 18322, had been

taken in sequence from the production line, and had received no special preparation for static or flying exhibition purposes.

I had been recruited in England by A.V. Roe Canada, and joined the company in 1953. Initially I was Avro's representative with 440 Sqn RCAF, which flew CF-100s from Bagotville, Quebec, and I had then been moved to RCAF Air Materiel Command Headquarters in Ottawa. It was from there that the company gave me the chance to lead a small team to provide service support to two of the three Langar aircraft which were to be taken to Farnborough. For me it was a highlight of my life! My account of the events before and after the exhibition, and the role Zura played in the historical event, the first time a Canadian-designed and -manufactured military aircraft and engine combination had ever appeared at the week-long SBAC show, was published in the January and February 1998 issues of *Aeroplane*.

I first met Jan at the railway station in Nottingham, on his arrival from Canada. I took him to Langar to air-test one of the two aircraft I and my team had selected from the three available. All had been in storage for a while, and we had encountered a number of minor problems while restoring them to good flying condition in the very short time available. It was late afternoon by the time I had Jan in his flying gear and on the ramp. It was September, and I well remember the scene when he took off in 18322 in lovely early-evening weather and gave everyone within sight of the airfield what was probably the greatest aerobatic display they had ever seen. And he found only a couple of minor snags with the aircraft!

Glen Lynes, another Avro Canada test pilot, air-tested 18321 the next morning, and shortly afterwards we had the aircraft refuelled and, with a member of our team in each of the rear seats, both were on their way to Farnborough. The rest of us gathered our gear, sent off a lorry loaded with our spare parts, and drove south. It was Saturday, September 3, 1955.

In those days the SBAC show was an annual event, and was limited to exhibitors from the Commonwealth. In 1955 it was celebrating its 16th such display. As related earlier, Zura was no stranger to Farnborough. This was his sixth appearance. In 1946 he had demonstrated the Martin-Baker M.B.5, in 1948 the Meteor F.4, in 1949 the Meteor T.7, the Sapphire-engined Meteor in 1950, and in 1951 the private venture ground-attack Meteor. Now, in 1955, he was to display the CF-100 Mk 4, certainly the



LEFT The next development: an early test flight of the first CF-105 Arrow, 25201, in 1958.

heaviest of the aircraft he had demonstrated.

After I had strapped him in the cockpit and the engines were running on the afternoon of the first day of the show, a "trade" day as opposed to a "public" day, we had time in hand before he was due at the take-off line. I and the other three members of the team stood waiting for the CF-100 to move, wondering how we would fare against the opposition. In the event, the only real competition for pure spectacle came from Wg Cdr Roly Falk, the Avro (Manchester) test pilot, who rolled the huge delta-winged Vulcan bomber across the sky. It was hard to beat, we thought, and Jan, reserved as usual, had given no indication of what he proposed to do. We would soon see.

He could not perform his famous Meteor "cartwheel" in the CF-100, because the engines were set too close to the fuselage to produce any significant turning moment when one engine was at idle and the other wide open. But he had a new idea, perfected as usual by much practice in what I call his "private corner" of the sky. He pulled the CF-100 into a vertical climb, positioned so that the audience on the ground saw the aircraft in planform. At altitude, power was reduced on both engines almost to idle. Speed fell rapidly until all upward motion ceased and the aircraft virtually hung in the sky, nose up, tail down. Then it started to slide backwards, tail-first and under perfect control, for several hundred feet until the nose was pushed down and flying speed picked up. It was like trying to balance a pencil vertically on the end of one's finger while lowering the hand slowly to the floor. "Awesome" is an overused word, but it truly was awesome to see some 30,000lb of metal aircraft falling tail-first down the sky! Jan called it the "tail-slide". It was another classic Zurabatic.

Each day, ceiling conditions permitting, he repeated this feat. And we truly carried the day because the RAF Chief of the Air Staff called for a halt to the Avro Vulcan being rolled! The aviation press loved it, and the public was enamoured of Jan's performance, more than 120,000 passing through the gates on the Saturday of that week alone.

At various times during the week I took him for interview by the air correspondents for various radio and television systems. He was not happy doing that part of his job, and did not respond easily to questions. In the summer 1952 edition of *Jet Age*, Avro Canada's magazine, just after he had arrived in Canada, he said: "Like most pilots, I shrink at putting down my personal feelings and experiences. I recog-

nise, though, that these feelings and experiences might be of interest simply because they are denied to non-flying people." It was an honest statement. There were few people, other than those in his business, with whom he was really at ease. Zura returned to Canada to more recognition by Avro senior management and the public.

On October 12, 1955, he made the first flight of the CF-100 Mk 5, a higher-altitude version, which had extensions to the wings and to the tips of the tailplane, plus a number of weight-reduction modifications. He continued routine test flights on various development programmes associated with the CF-100, but more of his time was being directed towards the Avro CF-105 Arrow all-weather, twin-engine, delta-wing supersonic interceptor, which was being designed and built by Avro to meet performance figures far in advance of any similar category of aircraft anywhere. He had amassed 1,271 flying hours on CF-100s.

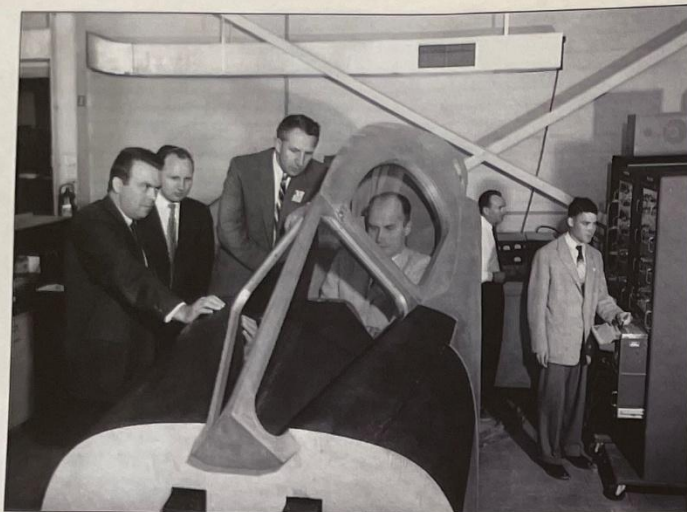
The Arrow was unusual for more than its prospective performance. Tapered wing skins complete with stiffeners, and the skins for the fin and rudder, were milled from solid aluminium alloy billets. Its systems were designed to be wholly automated eventually, from air conditioning to flying controls and fuel-management system. What was essentially the first flight simulator was built to give potential pilots a feel for the flying controls. There was no Arrow prototype, as was then usually the case with new aircraft. Instead of the first one or two being virtually handbuilt, even the first Arrow came from production tooling. These ideas originated in the late 1940s and early 1950s.

The first Arrow, 25201, had its official roll-out on October 4, 1957. It was expected to be a great media event in Canada, but it was not. The Russians stole headlines everywhere by putting up their Sputnik, the first man-made



LEFT The roll-out of the first CF-105 Arrow, at that time the world's largest fighter.

The CF-105 Arrow all-weather, twin-engine, delta-wing supersonic interceptor was designed to meet performance figures far in advance of any similar category of aircraft anywhere



ABOVE Zura in the CF-105 simulator with "Spud" Potocki to the left of the cockpit.



Zura Turning cartwheels in the sky

satellite to orbit Earth. The maiden flight of the Arrow came five months later, on March 25, 1958. At the controls that day was Jan Zurakowski, who had prepared for the event with infinite care and practice. He had already had experience with a delta-winged aircraft, the Javelin, while at Glosters, but he also went to the USA and flew two models of the Convair F-102 in February and October 1957. He had also spent time on the company-built simulator, but even with his experience he could maintain control for only three seconds! In the end it was decided that, regardless of the simulator, Zura would decide when the actual aircraft flying control system felt right for a first flight.

I was in a car beside the runway on that fateful March morning. I had never witnessed a maiden flight before, and certainly not one on which the hopes, not only of the RCAF but of thousands of Avro and subcontractor people, depended. Zura had made all the usual taxiing tests at various speeds, and it was not difficult to reach out to him in thought in his high cockpit as he performed all his checks at the end of the runway and decided whether or not to go.

Two aircraft were already airborne. One was a Sabre flown by Flt Lt Jack Woodman, with a cine-camera on top of his helmet, who would be the only RCAF pilot to fly the Arrow. The other was a CF-100 with a fellow countryman of Jan's at the controls, "Spud" Potocki, a very accomplished test pilot who carried a photographer in the back seat. Zura has often been asked if he was nervous in those moments just before he opened up the engines. "No, I wasn't," he always says, "I was much too busy!"

So Arrow 25201, the big white delta, thundered past me down the runway and lifted easily into the air, flanked by the two chase aircraft. The flight lasted 35min before the Arrow, after a long, steady approach, touched down firmly and the brake parachute streamed from the tailcone. Back at the company ramp there was jubilation as Zura taxied in, shut down the engines and descended the tall cockpit ladder to be hoisted high on the shoulders of applauding Avro workers. The snag list was very short; it must have been one of his more satisfying days. On the seventh flight in this aircraft he exceeded 1,000 m.p.h., a milestone for the type.

Zura took the second Arrow on its first flight on August 1, 1958, and the third, 25203, on

September 22. That day he reached Mach 1.89, his seventh flight and highest speed in an Arrow. These Arrows, like all of the first five, were powered by Pratt & Whitney J-75 engines. The Orenda Iroquois engines designed and built by Avro's sister company were to be installed in 25206 and subsequent aircraft.

Like the Arrow, the Iroquois was of advanced design. It was 35 per cent lighter than the J-75 and produced 43 per cent greater thrust. Imagine the excitement at Avro about the performance potential of 25206 when Potocki pushed a J-75 engined Arrow to Mach 1.96.

But no-one will ever know what might have been achieved with that aircraft/engine combination. On Friday, February 20, 1959, the Prime Minister of Canada rose to his feet at 1100hr in the House of Commons in Ottawa and announced that, as of 1700hr that day, the Arrow aircraft and Iroquois engine contracts were cancelled. The Arrows built had flown a total of 68hr. The shockwave from the news rolled across the country. Some 15,000 people in the two main factories, plus thousands more in subcontractors' plants, were laid off that afternoon. The effect was devastating. Worse was to come. In an unprecedented act of government-sponsored vandalism, everything connected with the programmes was ordered to be destroyed; drawings, photographs, jigs and test rigs, right up to the finished and unfinished aircraft and engines themselves, the latter being cut into pieces with saws and flame torches and carted away. Few of us who remained could bring ourselves to visit the graveyard as the carnage went on. This infamous act has passed into Canadian folklore.

It is rather strange in some respects that, at this juncture, Zura had left the flying scene. In September the previous year he had reached the age of 44 and was getting rather old, he says, for high-speed test flying. So he had transferred from Avro's flight-test operations to the engineering department, where everyone knew that, with his experience, he could play a very useful role as the Arrow flight-test programme continued to evolve. But with the cancellation his job, of course, disappeared. He was offered



positions, as were so many skilled Avro people, in the USA's aviation industry.

It might sound strange, but understandably, I suppose, Zura felt the Arrow cancellation was yet another failure in his life which, like others, was attributable to forces beyond his control. He had lost his career in Poland; been demobilised from the RAF in Britain; found an unhappy situation at Glosters; and had moved to Canada only to have government action again cause him to lose his livelihood. He and Anna discussed their options and decided they did not wish to start yet another new life in the USA. Instead, they opted for a lifestyle where they could control their own destiny.

In the course of his work, while flying over Ontario's lakes and forests, Zura had been attracted to a piece of land in the Madawaska Valley area on the shore of Barry's Bay, a tourist area some 150 miles north of Kingston. Some inner sense had led him to buy the property about a year before the Arrow cancellation. It was here that he and Anna carved out, literally, a new life for themselves for the first time under their own control. They have been there now 40 years. Zura started from scratch, learning new trades all the time. For one of slight build he has large and powerful hands, and he used them to good effect. He felled trees, carved out and built roads, did electrical and plumbing work and designed and built a lodge and a series of guest cottages along the shoreline of the lake. It is a delightful spot.

The area is one in which many people of Polish extraction have settled over many years, and the language is widely spoken. Polish people come to Kartozy Lodge in summer from all over North America, but year-round visitors are the Zurakowskis' sons, George and Mark, with their families. Something of an inventor, Zura has designed and built boats, which the families use, and vehicles for travelling over snow and ice that long preceded today's snowmobiles. He has not flown an aircraft since "Black Friday", as the day of the Arrow programme cancellation is still widely known.

In the years since his retirement from flying, Zura has been in constant demand to address various organisations and to receive individuals and groups interested in various aspects of aviation. To prevent him being overwhelmed by these activities, Anna serves as "gate guardian". Acclaim has also come in more tangible form from a number of other sources. Recognition began in his Service days, during which he was awarded the Polish Military Cross "Virtuti Militari" and the Polish Cross of Valour with two bars. He was also Mentioned in Despatches four times for "Valuable Services in the Air". In 1959 he received the TransCanada Trophy Award, and in 1973 he was inducted into Canada's Aviation Hall of Fame in Ottawa. The year 1990 saw him accepting The James C. Floyd Award. Quite different recognition came his way in 1996, when the Royal Canadian Mint struck a special \$20 coin to commemorate the CF-100 exceeding the speed of sound. The reverse of the coin has the CF-100 in flight with a cameo portraying a likeness of Jan, who was at the controls on that occasion. The obverse has an effigy of HM Queen Elizabeth II. I believe he is particularly proud of that com-



PILOT BIOGRAPHY

LEFT Zura's certificate as an Honorary Member of the Society of Experimental Test Pilots (USA) was delivered to his home by helicopter. Left to right, younger son Mark, wife Anna, Shawn Coyle of Transport Canada, and Zura.



LEFT The Janusz Zurakowski Building at Cold Lake, Alberta, with a full-scale CF-105 replica for use in a Canadian TV programme (see *Outrageous Fortune*, December 1999 *Aeroplane*).

mendation. The next year he was named a "Pioneer of Canadian Aviation" by the Western Canada Museum.

Two more tributes to Zura's contribution to aviation came in 2000. On March 20 the Aerospace Engineering Test Establishment's Canadian Flight Test Centre building at Canadian Forces Base Cold Lake, Alberta, was named the Janusz Zurakowski Building. The naming of such buildings is controlled by National Defence Headquarters in Ottawa, whose official release said: "... the stipulation that only deceased distinguished persons may be so honoured is waived in this circumstance, given the truly exceptional nature of Squadron Leader Zurakowski's historic contribution to Canada". Zura thought that was very nice of them.

Towards the end of the year the Society of Experimental Test Pilots in Los Angeles, California, inducted Zura as an honorary member. He was unable to attend the ceremony in person, so the official citation was brought to his home from Ottawa by Department of Transport helicopter — a fitting end to what many people consider to be the last year of the 20th Century.

The heart of Janusz Zurakowski's exceptional story is told in a short video made by White Pine Pictures, one in a series named *A Scattering of Seeds*, produced to "celebrate the grit and character of unsung immigrants". Anna gave me a copy. It includes several of the highlights of Jan's life and in one scene shows him with his granddaughter, Krysia, who may well be the one to carry on the aviation tradition. She wanted to learn to fly, so joined the Air Cadets. She has her Glider Pilot's Licence and in August 2001, after a seven-week course, qualified for her Private Pilot's Licence and also won a top cadet flying scholarship. Zura was on hand to present the licence to her. It was a happy and satisfying moment for him. When Krysia's fellow cadets hear her name they ask her if she is related to the Zurakowski. "I'm proud to tell them he is my grandfather", she says. To me, that is a very appropriate conclusion to the story so far of a very special man and his remarkable life. And the title of the video itself puts into words my own lingering thought about him: it is called *Straight Arrow*. **A**

In September 1958 Zura had reached the age of 44 and was getting rather old, he says, for high-speed test flying

■ The author would like to acknowledge the help in preparing this manuscript provided by a range of websites, books and newspaper and magazine articles, but most of all by the material and the unstinting assistance and kindness given to me by Janusz and Anna Zurakowski, both in person and by written response to my never-ending questions