

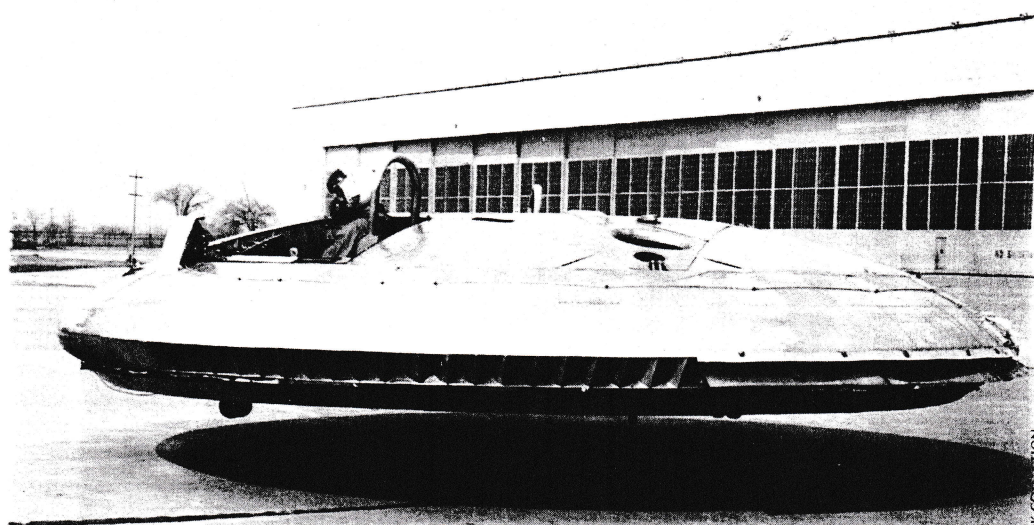
Avrocar test model AV-7055 was evaluated in the 40-foot by 80-foot wind-tunnel at the NASA Ames Research Center, at Moffett Field, California. The Avrocar was mounted on an adjustable device that could be raised to a height of over 12 feet and orient it at various angles. Shown here, the Avrocar model is tilted in the free-flight configuration the aircraft was expected to employ once it had sufficient height and speed to leave ground-effect.

# FLIP FLOP & FLOUNDER:

## *Avro's flying saucer*

BY BILL ZUK

Best known for the remarkable CF-105 Arrow and the CF-100 Canuck, Avro Canada was also responsible for a lesser known — and considerably less impressive — project, the forgettable Avrocar, Canada's very own "flying saucer."



Waldek (Spud) Potocki at the controls of the Avrocar. Potocki flew the majority of the Avrocar test flights.

Most every aircraft manufacturer invests huge sums in research and development. It's the only way to survive. The game is to come up with that next groundbreaking discovery before your competitor does, thus scooping the market. Occasionally these efforts result in something revolutionary like the Boeing 747, but more often the case is results which get forgotten and locked away in some storage facility.



Sometimes, a failed project captures the collective imagination of the aviation world. Occasionally this happens because elements of the design were ahead of its time, or because the project leads to significant breakthroughs later on. But sometimes a vehicle is just such a bizarre failure it commands our fascination. A shining example of this is the Avro VZ-9-AV Avrocar — an experimental aircraft that was largely one man's dream, but also a tantalizing hint of the future.

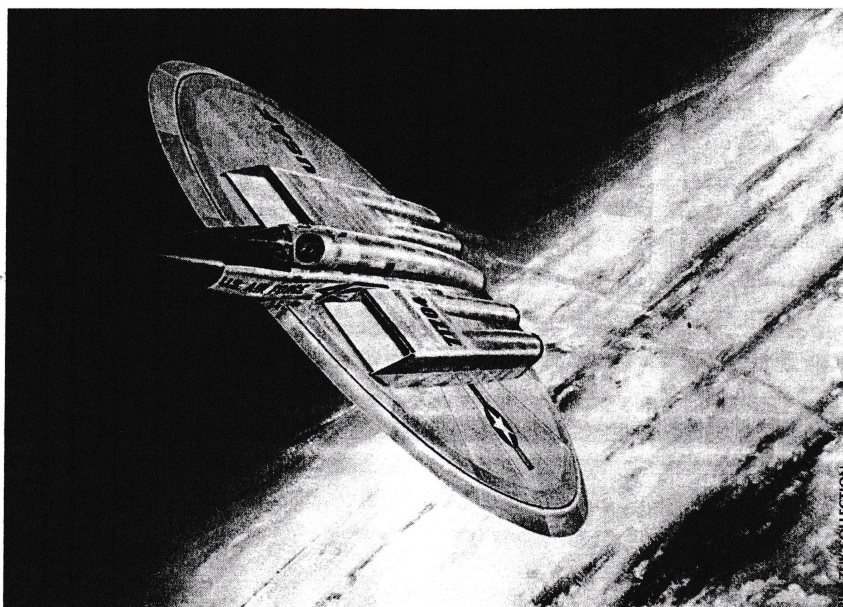
Nowadays, the idea of building a flying saucer seems pretty much crazy, but when viewed through the lens of history it did make some sense at the time. The late 1940s and early 1950s were a time of numerous UFO sightings, so flying saucers were on the minds of many. It was also a time when horizons seemed limitless. The post-war economic boom was underway and technology promised to solve every problem, thus guaranteeing the good life — unless we fell victim to the red menace. At this time the Cold War was in full swing and with it fear of imminent attack by the Soviet Union. In response the U.S. military, awash in resources, was expanding and looking for any advantage over the enemy.

It was in this climate that Avro Canada established its Special Projects Group, which was tasked with developing avant-garde aircraft. Formed in 1952, the group was headed by John C.M. Frost. A freethinking aircraft designer, Frost was hired away from de Havilland (U.K.) by Avro in 1947, along with his fellow engineer and best friend, Desmond (Des) Earl.

Previously, Frost had been responsible for a number of innovative design ideas including the radical DH.108 Swallow, one of the world's first supersonic aircraft. (Unfortunately, the DH.108 ended up haunting Frost

for years. Of the three prototypes built, all crashed taking with them the lives of three test pilots, including Geoffrey de Havilland Jr., son of the firm's founder and president.)

At Avro Frost took over the XC-100 project which eventually became Canada's first jet-engined fighter, the CF-100 Canuck. Frost shepherded the prototype aircraft through to its first flight and evaluation trials. However, the discovery of a near-fatal flaw in the wing spar jeopardized the entire program. Even though a fix was found to the problem, Frost was removed from the project in 1951.



An artist's rendition of the Special Projects Group's proposed WS-606A. This craft was supposed to provide VTOL capabilities combined with supersonic performance. A number of engineers and managers at Avro had their doubts.

Undeterred, "Jack Frost," as he was known to friends and foes alike, already had a new project in mind. Fascinated by UFO reports, Frost had a scrapbook bulging with newspaper clippings about sightings. He dismissed nearly all of them as hoaxes, but, nevertheless, he was intrigued by the potential of disk-shaped aircraft. Eventually, he talked Bob Johnson, a production foreman, into building a small rotor. When Johnson looked at the sketchy plans, he asked Frost directly, "What on earth are you planning with this device?"

"Never mind," came the reply. "Build it and chalk it up to the CF-100."

Johnson produced the small toy-like device as requested, and Frost hooked it up

to a pneumatic hose and proceeded to test it by zipping the apparatus around the hangar like a spinning top. What Frost demonstrated was the possibility of a remarkable new engine configuration — a circular, or in his words, "pancake" engine married to a disk shape. Frost was convinced that the next best thing in the air would be a "flying saucer!"

Armed with his new "toy," Frost tasked Des Earl with studying the aerodynamics of circular platforms. Frost then approached Avro's executives with a proposal to establish a design group dedicated to vertical

takeoff research. Intrigued by his ideas, Avro gave him the go-ahead. With a small cadre of engineers, including Earl, Al Wheelband and John Galbraith, Frost set up shop in what the group dubbed the "penthouse" and began to review current theories on all-wing designs.

From the outset, the Special Projects Group had a cloak-and-dagger feel to it. Housed in a Second World War-era structure, across from the company headquarters, the group had all the accoutrements of a top-secret operation, including

security guards, locked doors and special pass cards. Within the confines of this technical fortress, Frost surrounded himself with a collection of like-minded dreamers and maverick engineers. There he encouraged close cooperation and, while ostensibly the boss, he was collegial and very much one of the boys.

Shortly after its formation, the Special Projects Group started researching vertical takeoff and landing capability (VTOL) and how it might be applied to the building of a flying disc or saucer-type aircraft.

All this interest in building a flying saucer was not surprising, really. During the Second World War there were reports that Germany was working on flying saucers. (Some Allied



pilots even reported seeing them, though these reports were generally attributed to tired eyes and battle-weary nerves.) After the war, various companies pursued their own flying saucer projects. Don Whittle, an aerodynamicist who worked with Avro's Special Projects Group recalls: "There were probably 40 to 50 projects like it, looking at VTOL. Some were tail-sitters and others were flat-risers, but none really amounted to anything, except the Harrier."

In the 1950s there were regular reports of flying saucers, and at the same time, scholars began commenting on the possibility of life on other planets. Hollywood, in particular, capitalized on this public fascination with a string of drive-in thrillers about invaders from outer space. Despite being serious engineers and researchers, all this talk could not have been lost on the Special Projects Group.

Nevertheless, the group initially looked at developing a spade-shaped aircraft, intended to be powered by Frost's pancake engine. Named Project Y, this craft was designed to sit on its tail, and promised, in theory at least, VTOL capabilities, climb rates to the tune of 100,000 feet per minute, and speeds up to 1,500 mph.

From the outset, the  
Special Projects Group  
had a cloak-and-dagger  
feel to it

A number of the company's senior engineers and management were skeptical. James (Jim) Floyd, Avro's vice-president of engineering, dismissed the so-called "Flying Saucer Group" as little more than "flirtation with the foolish."

By 1953, with the company having little more than a wooden mockup, paper drawings and promises to show for a \$4-million outlay, a more critical eye was cast on the project. Not surprisingly, the plug got pulled when government funding from the Defence Research Board dried up.

Frost wouldn't lie down though. In addition to being a gifted designer, he was also a talented promoter and salesman. In late 1953 a group of U.S. defence experts visited Avro to view the new CF-100 fighter jet. Somewhere along the way Frost co-opted the tour and rerouted it to the Special Projects area where he proceeded to show off his mock-up, models and drawings (some never before seen by senior company officials) for a completely circular disk-shaped aircraft known as Project Y-2.

"John Frost was a great salesman," recalls project engineer Barry Watson. "He was very



# Aircraft Collection

Specializes in professionally crafted model airplane replicas  
which fulfill the highest standards in the aviation industry.

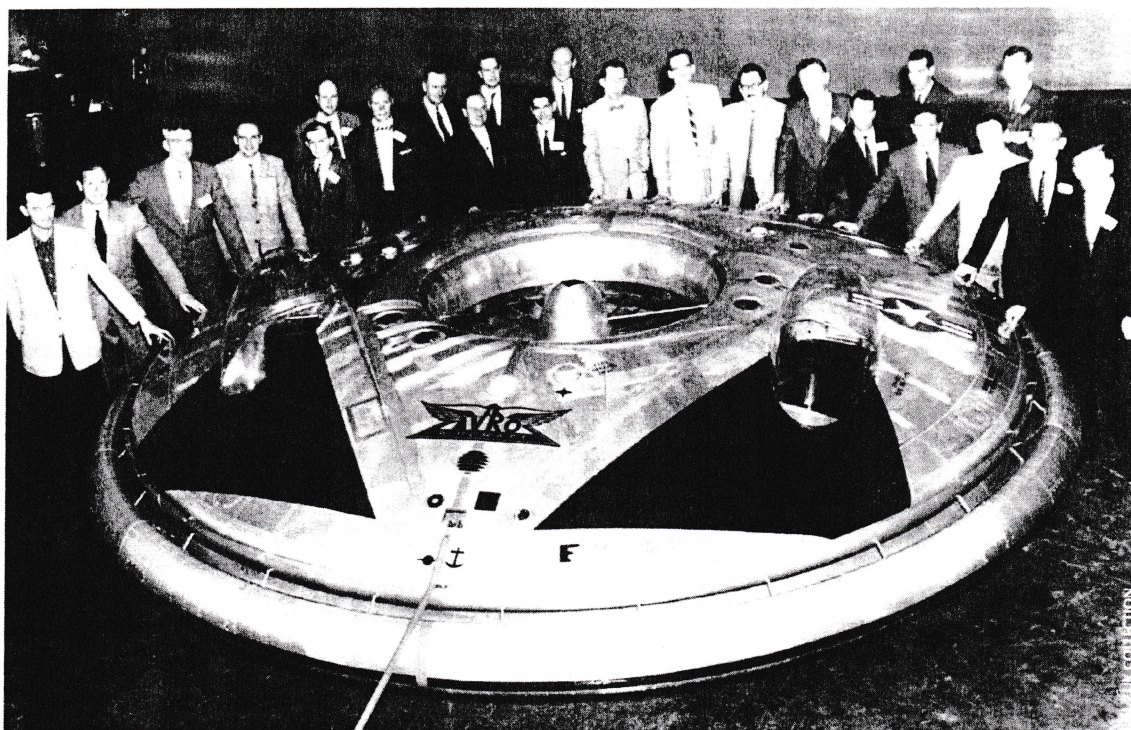
Win a free model

→ Just visit our website and subscribe  
to our mailing list :

**[www.theaircraftcollection.com](http://www.theaircraftcollection.com)**

**P.O. Box 631, Val-Morin, Qc, Canada J0T 2R0 Phone: (819) 322-1957 Fax: (819) 322-3564**





Engineers and workers with Avro's Special Projects Group pose with the first VZ-9-AV Avrocar.

English in manner and I'm sure those American generals were captivated."

Perhaps some were, but not all. Doubts remained whether the craft would ever fly. Still, the promise of supersonic speeds and VTOL capabilities were intoxicating to a military awash in development dollars. In short order, the U.S. Air Force agreed to take over funding for the project.

With American dollars rolling in, Project Y-2 received a new moniker — Project 1794 — and a new lease on life. Frost and his team began pursuing a real flying saucer, one that would have advanced weapon systems and produce speeds in excess of Mach 2. Aircraft like this, it was hoped, would provide the air superiority the U.S. wanted to achieve over the Soviets. With the best money could buy (reputedly receiving CIA funds), the Special Projects Group went to work. Soon, a test model, powered by six Armstrong-Siddeley Viper jet engines driving a central rotor, was ready to go.

Unfortunately, testing was anything but smooth. In fact, it was downright scary. The supersonic test model, PV-704 (PV stood for private venture), which was housed inside a small, brick testing rig, suffered from hazardous oil leaks which resulted in three fires. It eventually got to the point that staff were afraid of the machine, even when safely

ensconced in a booth constructed of bullet-proof glass and quarter-inch-thick steel.

Worst fears were confirmed one day when the team was unable to shut down an engine. With the engine running wild and rpm on the rise, Frost hastily ordered everyone to evacuate the facility. Waiting outside for the inevitable explosion Frost and his team were surprised to hear the engine suddenly powering down.



NASA Ames research engineer and test pilot, Fred J. Drinkwater III (left) with Avro's chief test pilot Waldek (Spud) Potocki.

A quick post-mortem investigation revealed that a fellow engineer had stumbled on the scene and leisurely gone back inside and shut off the fuel supply by pulling off the fuel line. (In true Special Projects spirit the team fashioned an oversized "hero" badge, which the individual was forced to wear for the rest of the day.) That was the last day the test rig was used.

About this time, the U.S. military, receiving nothing but bad reports, began reconsidering its investment in the project,

now renamed WS-606A (WS stood for weapons system). But once again, when all appeared lost, John Frost salvaged the program. He fashioned a small line-control saucer model which he demonstrated to a crowd of U.S. scientists and military representatives at Dayton, Ohio. At dizzying speeds, the crude machine swooped and dived scant metres above their heads. Bernie Lindenbaum, a researcher for Wright Patter-



son Defense Labs, made a beeline for the door shouting, "Shut it off — you are going to kill us all!"

Evidently, Frost's display succeeded in getting everyone's attention long enough for him to pitch a new idea. This time he proposed a simpler and less ambitious VTOL project called the VZ-9-AV Avrocar, which could hover and demonstrate subsonic performance capabilities.

With this proposal, the Avrocar began generating interest with a potential new funding agency — the U.S. Army. The army had announced a requirement for a "flying jeep," so the Avro Special Projects group rapidly redrew their submission to qualify. The fanciful brochure created in-house by Avro showed illustrations of the Avrocar armed with recoilless rifles and capable of dropping torpedoes.

Aeronautical engineer Doug Garland, an aerodynamicist on the project, remembers: "It was to be a replacement for the helicopter, that would supposedly, if it ever worked, have flown twice the speed of a helicopter — roughly 300 mph, rather than 150."

Always the promoter, Frost devised a sales package, complete with drawings and a wooden mock-up which military brass got to sit in and have their photos taken. The sales job worked and the U.S. military eagerly invested in the new project.

The Avrocar which ultimately resulted was a disc-shaped craft resembling those flying saucers popular in the movies of the period.

Measuring 18 feet across, it was designed for an empty weight of 3,000 pounds, with a crew of two. Power was supplied by three Continental J69-T9 jet engines. Maximum speed was anticipated to be around 300 mph with an estimated range of 79 miles. The thrust from the jet engines turned a central rotor, which vented air through a series of vanes and ducts under the aircraft, thus propelling it and providing directional control.

Just as the first working test models were being produced, disaster struck. The CF-105

Avro Arrow program was cancelled on "Black Friday," February 20, 1959, by the Diefenbaker government. The ensuing result was the layoff of almost all Avro Canada employees, including those with the Special Projects Group.

However, three days following the announcement of the Arrow cancellation, many of the Special Projects employees were rehired and back in business. But it wasn't quite business as usual. The team now included people from the CF-100 and CF-105 teams. And the Special Projects Group was moved into the main building, which was now nearly empty. As well, company brass became more involved in the group's operations.

Realizing that Avro was in trouble, Capt. Daniel C. Murray, the officer in charge of the USAF Project Office devoted to the Avro projects, recom-

mended that the WS-606A and all related work be cancelled. A "stop/go" work order came down and Frost was forced once more to try to rescue the project.

In an elaborate effort, Frost laid out the design parameters of the vehicle and made a resounding case for continuation of U.S. military funding. Fred J. Drinkwater III, a NASA test pilot who was present at the hearing, remembers that Frost was convincing and "made it sound that magic was at work." Late in May 1959, the USAF authorized Avro to continue the "flying saucer" program.

When the first of two prototype Avrocars was finished on May 27, 1959, Frost personally took charge of testing, while Tom Higgins, a former Arrow engineer, was assigned the supersonic saucer program. Testing began at the Avro plant and at the NASA Ames wind tunnel in California.

Despite his flamboyant pitch to the American military, Frost knew there were serious problems. Testing went poorly from the start. The jet engines didn't produce enough thrust to lift the aircraft more than about three feet off the ground. Furthermore, the hapless Avrocar proved to be nearly uncontrollable. And the problems didn't end there: excessive

**Despite his flamboyant pitch to the American military, Frost knew there were serious problems**

## AVRO Insurance Managers Ltd.

**Toll Free:**  
1-800-599-0069

**Fax:** 1-604-608-3384

David Blair  
david@avroins.com  
(604) 857-0771

Brenda Rorvik  
brenda@avroins.com  
(604) 881-2232

Box 789  
Fort Langley, BC  
V1M 2S2



YOUR LOCAL  
AVIATION BROKER

## Charting new Territory...

## ...Canada's Premiere Aviation Shopping Destination

We stock over 7,000 book titles, a wide selection of pilot supplies, collectibles, kits & hobby supplies, and MUCH more...

2 Canadian Locations:  
in Toronto:

195 Carlingview Drive  
and now in Vancouver:  
105-6080 Russ Baker Way

toll-free. **1.800.668.1987**  
net. [www.aviationworld.ca](http://www.aviationworld.ca)



**Aviation World**  
books, hobbies & pilot supplies



engine temperatures made for oppressive cockpit temperatures which caused instruments to burn brown after only a few hours. When Avro test pilot Waldek (Spud) Potocki made the first test flights he wore a special lightweight asbestos flight suit to combat the high cockpit temperatures.

Things only got worse. On one test flight the group decided to find out how the aircraft would fly while sitting over a hole in the ground. Potocki positioned the aircraft over the hole but the jet exhaust kicked up so much dirt that the controls were damaged and the Avrocar was completely obscured from view. Not wanting to shut down, Potocki decided to try to fly the Avrocar back to the plant. In the process, he veered onto an active runway forcing a Trans Canada Airlines flight to overshoot. (One can only imagine the discussion on the TCA flight deck as the flight crew speculated about the vehicle which had forced them to go around.)

The Avrocar's control problems seemed insurmountable. Former NASA Ames chief



Eager to secure funding from the U.S. Army, Avro's Special Projects Group redrew the Avrocar as a "flying jeep," complete with recoilless rifles.

test pilot Fred Drinkwater III described flying the Avrocar as being like "riding a beach ball." He confided that the "magic wasn't there after all, it was merely a dead-end."

Attempts were made to modify the aircraft by changing the control ring and ducting and even adding a tail fin. Eventually, improvements made it possible for Potocki to fly the Avrocar hands-off, but, ultimately, this was to no avail. When Avro engineer Tom Higgins proposed a new design for a look-alike Avro Arrow with "jump-jet" characteristics Capt. Murray and his U.S. Design Office had seen enough. He cast his vote to cancel "Tom's Folly" (as some Avro wag dubbed it) and let the Avrocar funding run out. By December 1961 the ill-fated project was finally dead.

Only two Avrocars were ever produced and because the U.S. military had paid for the work it now owned them both. The first was retained by NASA Ames in storage until 1966 when the wind-tunnel model was donated to the National Air and Space Museum. Presently, it is scheduled for display at the newly constructed Steven F. Udvar-Hazy Center, located at Washington Dulles International Airport. The second example returned to Canada briefly for display in Montreal at Expo '67; it is now under restoration at the U.S. Army Transportation Museum in Fort Eustis, Virginia.

John Frost left Avro, eventually ending up in New Zealand, where he worked first for the Civil Aviation Administration and later Air New Zealand as a technical services engineer. He continued to have the fertile mind of the inventor for the rest of his life. At the time of his death in 1979, at age 63, he had completed work on a manpowered flying machine — the Frost/EMME 1.

The Avrocar was certainly a peculiar endeavour and, in retrospect, it appears to have been foolhardy. Some might argue that the aircraft was the product of one man's fertile imagination, large amounts of ready cash, stubbornness and a society that thought anything was possible. But the Avrocar experience, in its own strange way, also demonstrated the no-holds-barred approach to engineering, not to mention the buccaneering salesmanship, of Avro at a time when it sat atop the aviation world. Such an enterprising spirit was bound to produce both great success and poignant failures.

For a detailed history, check out Avrocar: Canada's Flying Saucer by Winnipeg-based author Bill Zuk. Additionally, in 2003, the television documentary Avrocar: Flying Saucer Secrets from the Past debuted on Discovery Canada. It featured a life-size Avrocar replica that is now part of the collection of the Western Canada Aviation Museum in Winnipeg. 人

NO NUMBERED RUNWAYS

COVER PHOTO BY RICH HULINA

Fans of Aviator Magazine's founder and retired editor, Jack Schofield, will find the histories and anecdotes in his latest book, *No Numbered Runways* to be an important record of West Coast pioneer floatplane operators. A beautiful hard cover mate for Jack's earlier, *Flights of a Coast Dog*. Published by Sono Nis Press, *No Numbered Runways* is illustrated with many never before published photos and drawings.

**No Numbered Runways:**  
*Floatplane Pioneers of the West Coast*  
 ISBN 1-55039-146-1 • hardcover • \$35.00

**To Order Call: SONO NIS PRESS**  
 1-800-370-5228 • Fax: 1 (250) 226-0074  
 books@sononis.com • www.sonoris.com  
 P.O. Box 160, Winlaw B.C., Canada V0G 2J0