

The Avro VZ-9 'Flying Saucer'

WILLIAM B. BLAKE

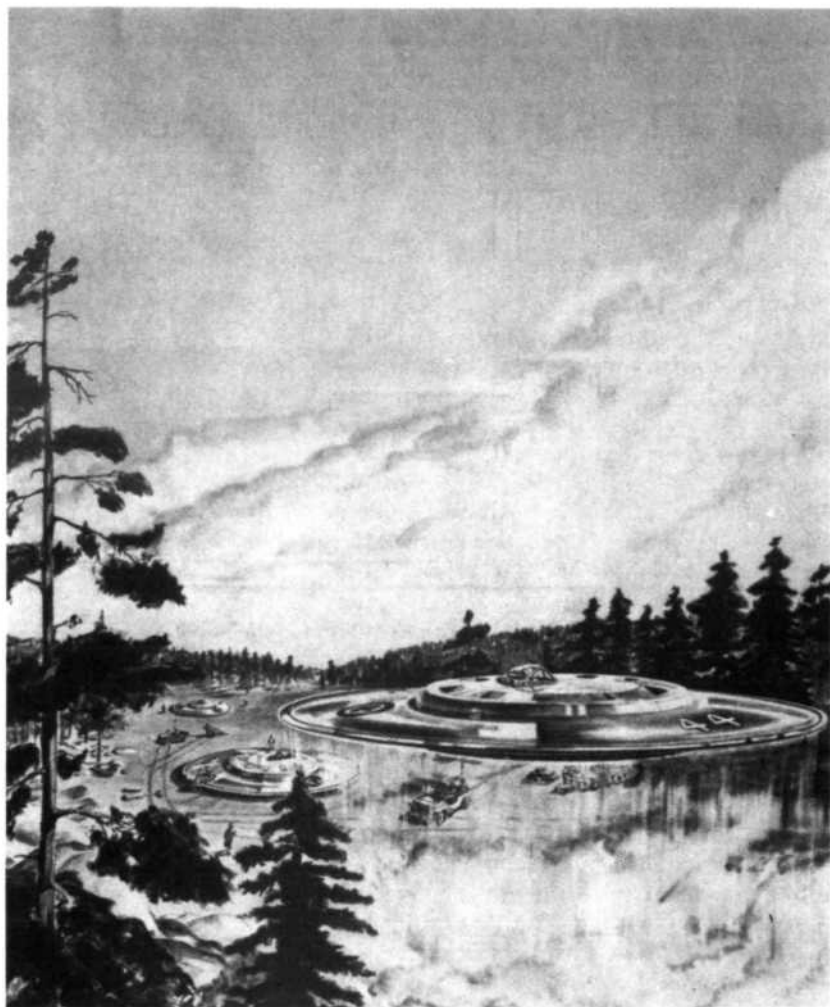
The claims that the U.S. government recovered "crashed flying saucers" in 1947, together with the many "UFO" sightings since that date, raise an interesting question. Did the United States ever attempt to build and fly a manned flying saucer? The answer is yes. In the 1950s the U.S. funded Avro Aircraft Limited of Canada to build a saucer-shaped craft. What follows is a summary of that effort from historical records, including once "secret" photos of an experimental Avro saucer and other concepts for saucer-shaped craft. Because of serious, intrinsic stability problems, the U.S. Air Force/Army flying-saucer effort ended in failure a quarter-century ago.

In 1952, Avro Aircraft Ltd., located near Toronto, began a design study for a supersonic fighter-bomber airplane with a circular wing. The study was funded by a \$400,000 contract from the Canadian government. The vehicle was intended to take off and land vertically, like a helicopter. The idea was to duct the jet exhaust to form a peripheral curtain of air underneath the vehicle. This would create a cushion of air on which the vehicle could "float." To transition from hover to high-speed flight, the jet exhaust would slowly be directed aft. Lift would be provided by the circular wing.

After the initial contract, the Canadian government abandoned the project as being too costly. Enough progress had been made, however, to interest the U.S. government. In July 1954, the first of two Air Force contracts totaling \$1.9 million was awarded to Avro for further study. Avro added \$2.5 million of company funds to the effort and completed a series of design studies and small-scale tests on a vehicle designated the P.V. 704 (U.S. designation, System 606A). The 606A design was



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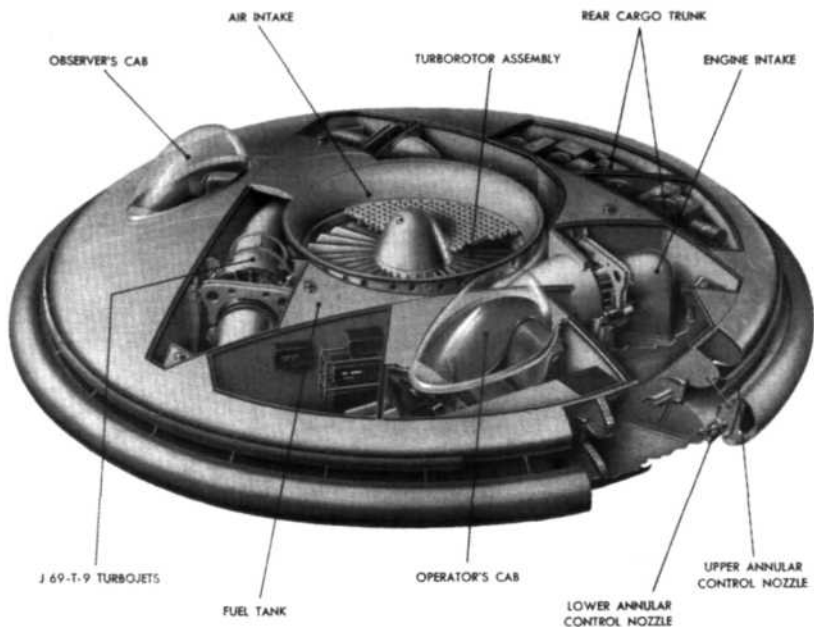
Artist's conception, formerly "secret," of Project 1794, an early Avro design for saucer-shaped manned flying disks.

almost 30 ft. in diameter with a maximum weight of 27,000 lbs. and design speed over 1,000 mph.

The Army became interested in the circular-wing concept and convinced the Air Force to redirect its effort in 1958. The Army felt that the circular wing could fit in with its plans to develop a "flying jeep" for improved battlefield survivability. The Air Force agreed because it felt a small, subsonic research vehicle could be used to

demonstrate the design features of the 606A concept in a shorter time with much lower costs. The resulting craft was named Avrocar and given the Army designation VZ-9AV (ninth in a series of vertical take-off research aircraft). Most of the VZ-series aircraft looked like props from a James Bond movie.

The Avrocar was a saucer-shaped disk 18 ft. in diameter and 3 ft. thick. It was designed to go 300 mph and



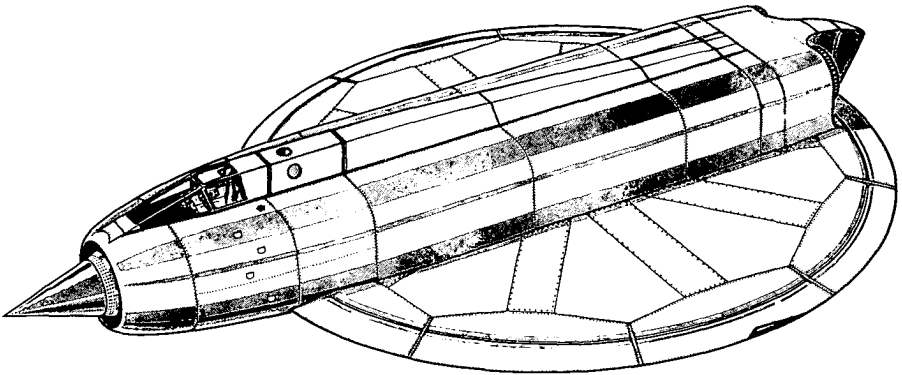
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Cutaway drawing of the Avrocar vehicle, a saucer-shaped disk 18 feet in diameter, showing separate cockpits for two crew members.



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Photograph, formerly classified "secret," of the Avrocar Test Vehicle. Its first untethered flight, November 12, 1959, revealed serious instability problems that were never solved.



A design for a circular-wing fighter-bomber that was never built.

fly to an altitude of 10,000 ft. It weighed 5,650 lbs. and had separate cockpits for two crew members. Power was provided by a centrally located fan with a diameter of 5 feet. This was driven by the exhaust from three Continental J-69 turbojet engines. The flow from the fan was ducted to the periphery of the planform. An adjustable ring along the periphery was used to control the direction of the thrust. Two full-scale vehicles were built and were rolled out of the factory in May and August of 1959.

Ground tests of the full-scale propulsion system revealed there was not enough thrust available for hover out of the presence of the ground cushion. This was the first major problem with the program. The primary causes were large losses due to the complicated ducting of the flow and high internal temperatures that degraded the performance of the J-69s. All that could be done was to study the usefulness of the Avrocar as a ground-effect machine. At this point, the first Avrocar was sent to NASA Ames, Moffett Field, California, for wind-tunnel testing. Only here could its potential for forward flight (away from the ground) be assessed. The second vehicle remained

at Avro for flight testing.

The first flight occurred on September 29, 1959. The Avrocar was tied to the ground for safety purposes. This flight lasted only 12 seconds, while the machine wobbled like a giant tiddlywink. The first untethered flight occurred on November 12, 1959. These initial flights revealed a second major problem. At a height of 3 feet above the ground, uncontrollable pitching and rolling motions were encountered. The motion was termed *hubcapping*. The problem resulted from an erosion of the ground cushion as height was increased. Flight above this height was impossible.

Two formal Air Force flight evaluations were conducted at Avro, in April 1960 and June 1961. During these tests, the vehicle reached a maximum speed of 35 mph. All attempts to control the "hubcapping" were unsuccessful. Meanwhile, the Ames wind-tunnel tests had shown that the VZ-9 had insufficient control for high-speed flight and was aerodynamically unstable. The addition of a conventional horizontal tail did not improve the situation. Thus, even if it could escape the ground cushion, the Avrocar would be unable to sustain high-speed flight.

Because the technical problems

were insurmountable, the program was terminated in December 1961. A total of \$10 million had been spent. One VZ-9 was scrapped; the other was given to the Smithsonian Institution. It now resides at the Smithsonian Air & Space Museum Annex in Silver Hill, Maryland.

The VZ-9 was the most ambitious flying-saucer research program, but not the only one. Many ground-cushion vehicle designs of the 1960s were saucer-shaped. The Convair Division of General Dynamics designed a 459-ft.-diameter vehicle with a gross weight of 4 million lbs. This monster was intended to span the oceans for naval operations. A nuclear reactor would provide the 150,000 hp necessary for operation. Obviously, it was never built. The remnants of these early efforts can be seen crossing the English channel today. Modern hovercraft use the same ground-cushion effect that gave early impetus to the flying-saucer research projects.

Source Material

Genesis of the program:

Avro Aircraft Limited, 1959 (declassified 1971). *Pre-phase I Part 1 and Part 2*

Development Program—VTOL Supersonic Aircraft.

Technical aspects:

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Murray, D. C. 1990. *The AVRO VZ-9 Experimental Aircraft—Lessons Learned.* Presented at the AIAA Design, Systems, and Operations Meeting, September 1990, Dayton, Ohio.

Demise of the program:

Deckert, Lt. W. H., and Maj. W. J. Hodgson. 1962. *Avrocar Flight Evaluation.* Air Force Flight Test Center Report FTC-TDR-61-56, January.

Although it contains minor errors, the best generally available technical summary of the VZ-9 effort is given in:

Rogers, M. 1989. *VTOL Military Research Aircraft.* New York: Orion Books.

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