

F-108 Rapier

1955-10-06 USAF issues call for design of long range all weather interceptor. Designated LR1.X (F-108 Rapier)

1957-06-00 North American Aircraft receives letter contract for design & development of two flyable F-108^{Rapier} aircraft

1959-09-23 USAF cancels F-108 Rapier interceptor contract prior to a flying aircraft being built. "because of a shortage of funds and priorities in the Airforce programming"

NORTH American Aircraft Press Release

1958-05-30

"In the future, we believe that a manned long range interceptor has an important role in Air Defense --"

USAF LT General Donald L. Patt - Deputy Chief of Staff/Sec. speaking on proposed F-108 Rapier Interceptor

1958-11-07

"We have under development the North American long range interceptor --"

USAF General Roscoe C. Wilson - Deputy Chief of Staff/Sec. speaking on proposed F-108 Rapier interceptor

1958-10-00

"The F-108 manned interceptor is now under development... combines the unmatched flexibility of the human brain with a mobile launching platform. --" (MISSILE)

North American Aircraft Press Release

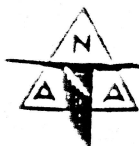
59-02-06

North American completed mockups of F-108 Rapier

59.02.06

USAF Chief of Staff Thomas White Told Senate Armed Services Committee That manned interceptors are required for long range attack on the enemy ---
"In this function nothing has yet been developed with the flexibility and intelligence of the man in the cockpit"

North American Aircraft Press Release



NORTH AMERICAN AVIATION, INC.

LOS ANGELES DIVISION
INTERNATIONAL AIRPORT
LOS ANGELES 45, CALIFORNIA

PUBLIC RELATIONS OREGON 8-3011 — EXT. 2079

PRESS
RELEASE

U. S. AIR FORCE F-108 RAPIER

Designed to launch an atomic missile 1000 miles away from its base and be back on the ground half an hour later, the F-108 manned interceptor is under development at North American Aviation's Los Angeles Division for the Air Defense Command.

The airplane has been described as a mobile missile launching platform that moves three times faster than the speed of sound at altitudes above 70,000 feet. It will result in a defense system for the United States that will permit the atomic destruction far offshore of enemy aircraft or missiles approaching from sea-level to extremely high altitudes.

A major milestone in the development of the F-108 has been passed with completion of the mockup conference in January. Development of the 2000 mile an hour (Mach 3) interceptor began in 1957 with the award of a design study contract to North American's Los Angeles Division as Weapon System Manager.

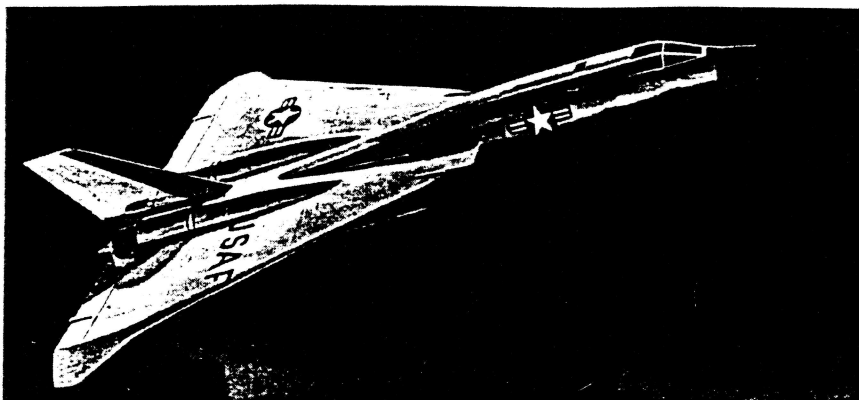
The F-108 will be powered by two General Electric J-93 engines and will be equipped with a new radar and fire control system developed by the Hughes Aircraft Co. Several other major defense firms, including Convair, wing; AiResearch, Central Air Data Computing system; Marquardt, Air Induction Control system; Hamilton Standard, air conditioning and pressurization; Federal Division of the International Telephone & Telegraph Co., mission and traffic control system; Electronic Specialty Co., antenna system; Sundstrand Machine Tool Co., secondary power; Cleveland Pneumatic Industries, landing gear; and General Electric, engines, are members of the F-108 development team. Approximately 70% of the development and manufacturing will be performed by companies outside North American, including many small businesses from coast to coast. The airplane will be assembled at North American's Los Angeles plant.

In testimony recently before the Senate Armed Services Committee, Air Force Chief of Staff Thomas White said manned interceptors are required for long range attack on the enemy and are necessary for identification and air policing. "In this function nothing has yet been developed with the judgment, flexibility and intelligence of the man in the cockpit," the general said.

He pointed out that interesting features of the F-108 included its clean aerodynamic design, two engines, construction of stainless steel rather than aluminum, its ability to carry guided missiles with nuclear warheads, and that it has a two-man crew.

"The long range radar of the F-108 will have greatly improved capabilities over the radar in our current operational interceptors," General White stated.

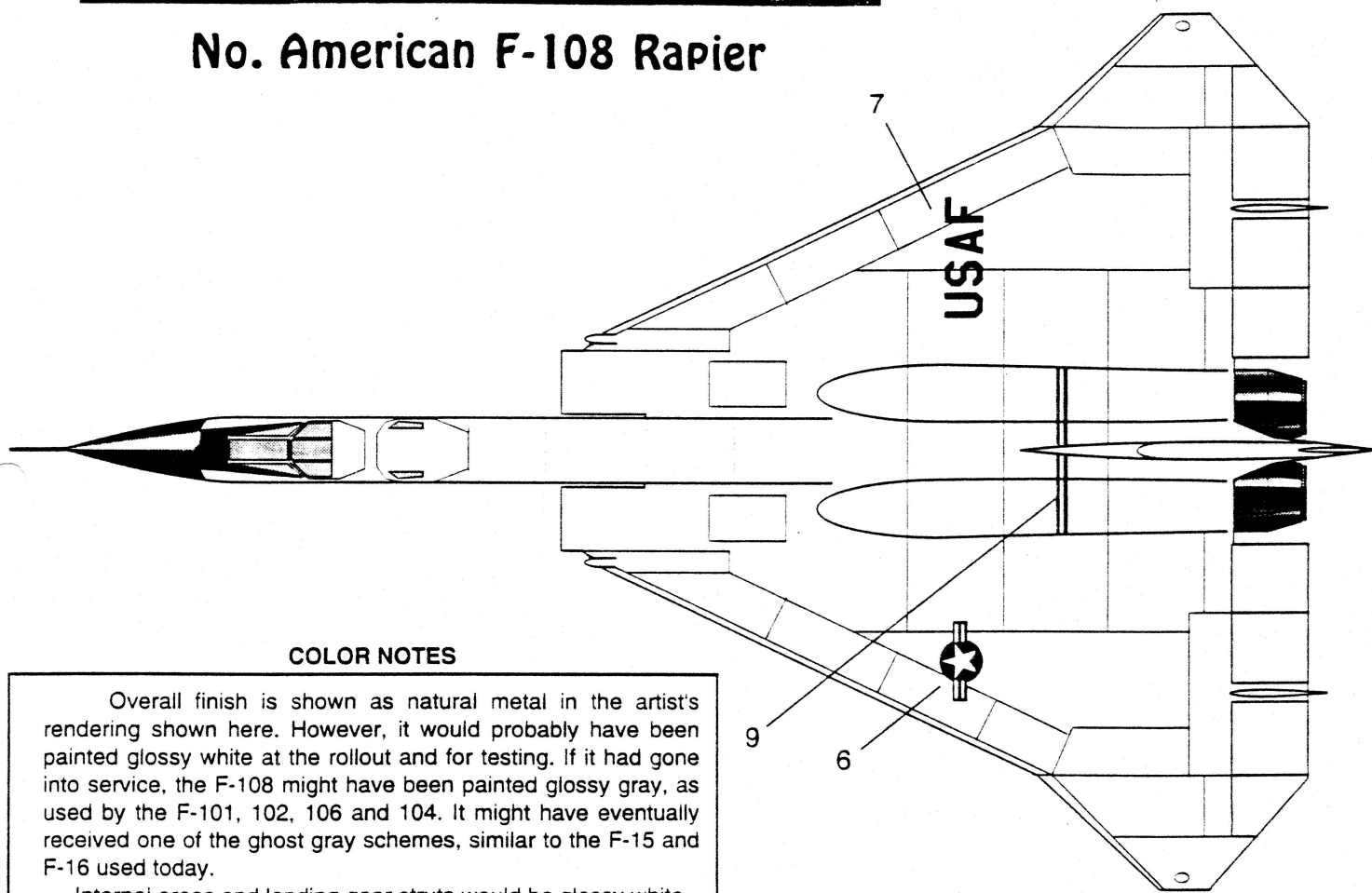
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NORTH AMERICAN
F-108

Rapier

No. American F-108 Rapier



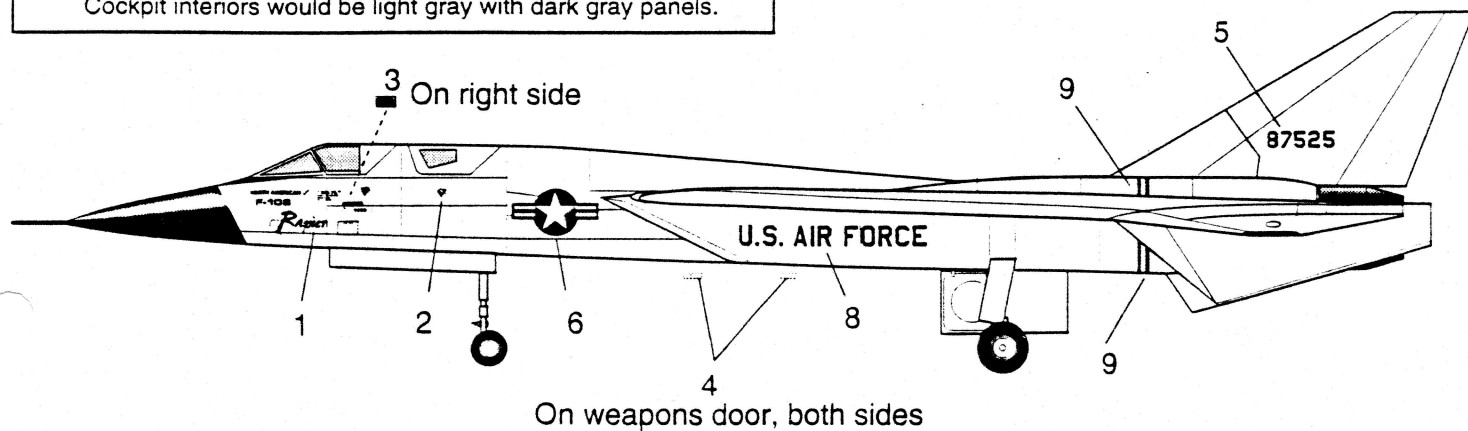
COLOR NOTES

Overall finish is shown as natural metal in the artist's rendering shown here. However, it would probably have been painted glossy white at the rollout and for testing. If it had gone into service, the F-108 might have been painted glossy gray, as used by the F-101, 102, 106 and 104. It might have eventually received one of the ghost gray schemes, similar to the F-15 and F-16 used today.

Internal areas and landing gear struts would be glossy white.

The radome and anti-glare panels would be black.

Cockpit interiors would be light gray with dark gray panels.



LT. GENERAL DONALD L. PUTT, Deputy Chief of Staff/Development,
Status Report to AWA, May 30, 1958

"In the future, we believe that the manned long range interceptor has an important role in air defense as indicated by the development of the North American F-108.

"This aircraft, which is being built by North American, will be able to reach out over extremely long distances at Mach 3 and above and seek out and destroy enemy bombers long before they reach targets in the United States and Canada. It will have guided air to air missile with an atomic warhead."

LT. C. S. IRVINE, Deputy Chief of Staff for Material
National Defense Transport Assn., Washington, D. C.

"The F-108 long range interceptor to be built by North American Aviation in Los Angeles will have 'greater speed, range and altitude capabilities than any interceptor type now in production'.

"It is to be equipped with the very long airborne radar and will carry enough guided atomic warhead missiles for multiple kills," he declared. "It will be effective against manned bombers and certain types of unmanned delivery vehicles."

General Irvine disclosed that the F-108 will be in "the over Mach 3 category with altitude capabilities exceeding 75,000 feet".

LT. GENERAL ROSCOE C. WILSON, Deputy Chief of Staff/Development
Reserve Forces Seminar, Washington, D. C., November 7, 1958

"We have under development the North American F-108 long range interceptor. With speeds of Mach 3 and ranges greatly extended over present interceptors, the F-108 will be able to reach out and destroy enemy air breathing bombers or missiles long before they reach their designated targets in the United States. Not only will the F-108 have a greatly improved electronic guidance system to enable it to seek out the target, but it will be equipped with a Falcon-type guided aircraft rocket with a nuclear warhead. The missile itself will be able to reach out at much greater distances than any other current guided air to air missile."

GENERAL THOMAS WHITE, Chief of Staff, "Air Force Weapons Systems"
Senate Armed Services Committee

The F-108 is being developed as our long range interceptor. Interesting features of the F-108 are its clean aerodynamic design, its two engines, its construction of stainless steel rather than aluminum, its ability to carry guided missiles with nuclear warheads, and that it is manned by a two-man crew. It will cruise at a speed of Mach 3 (about 2000 miles per hour) and its combat ceiling will be well over 60,000 feet.

Remarks by General Thomas White (cont).

The long range of the F-108 makes it an important element in our concept of forward defense. With it, we will be able to police the Distant Early Warning Line, to go out and obtain intelligence on an enemy attack and to begin destruction of attacking aircraft long before they reach our borders or the population centers of Canada.

The F-108 will be armed with an accurately guided missile which can carry either a nuclear warhead or, if denied, a high-explosive warhead.

The long range radar of the F-108 will have greatly improved capabilities over the radar in our current operational interceptor.

The development of the F-108 and its component parts is proceeding satisfactorily.

NEWS RELEASE - NAA - 5/16/57

Development of a long range manned interceptor airplane has begun with a U.S. Air Force announcement today that a design study contract has been awarded North American Aviation, Inc., with the Los Angeles division as weapons system manager. No details of the airplane were given in the Air Force announcement.

NEWS RELEASE - NAA - 10/7/58

The F-108 manned interceptor now under development for the Air Defense Command can launch an atomic missile 1,000 miles away from its base and be back on the ground half an hour later, an engineer from the company building it declared here.

Warren Swanson, Manager of Research and Development for North American Aviation's Los Angeles Division, said the F-108 "combines the unmatched flexibility of a human brain with a mobile missile launching platform that moves three times faster than the speed of sound". "The result will be a defense system for the United States that will permit the atomic destruction far offshore of enemy aircraft or missiles approaching from sea level to extremely high altitudes," he said.

Swanson spoke at a special briefing for newsmen covering the Sixth Annual World-wide Rocketry Competition at this Air Defense Command base near the west coast of Florida.

"Because of some rather astounding characteristics of the human being, we should take full advantage of him to achieve the utmost from any weapon system," Swanson stated. "It would take a structure as large as the Empire State Building to store electronic computers that have the same capacity as the average Air Force jet pilot whose brain contains approximately ten billion binary decision elements."

The Mach 3 F-108, which can fly at altitudes 14 miles above the earth, can seek out and destroy an enemy independent of a ground radar station. The Hughes Aircraft Company will supply the atomic missile.

NEWS RELEASE - NAA - 11/11/58

Named to the industrial team developing the long range Air Force F-108 interceptor that can outspeed a high velocity rifle bullet is the Marquardt Aircraft Co. of Van Nuys, California, it was announced today.

Raymond H. Rice, vice president of North American Aviation, Inc., and general manager of the company's Los Angeles Division, which is prime weapon system contractor for the F-108, said Marquardt was selected from six companies submitting proposals to develop and manufacture the Air Induction Control Subsystem.

"Marquardt won an extensive evaluation on the basis of the company's technical design and capability, ability to produce, probable cost and program management," Rice stated.

He explained that the Air Induction Control System will automatically regulate the inlet air supply to the engine of the 2000 mile-an-hour interceptor under development for the Air Defense Command.

Under the Air Force Weapon System Management concept, North American will head an industrial team developing the advanced interceptor that has been described as a mobile missile launching platform capable of intercepting an enemy aircraft or missile 1000 miles offshore at altitudes from sea level to 70,000 feet. An estimated 70 percent of the development and manufacturing will be performed by companies outside North American, including thousands of small businesses from coast to coast.

Roy E. Marquardt, president of the Van Nuys firm, said "a large percentage of the work would be subcontracted by Marquardt to small businesses".

NEWS RELEASE - NAA - 11/21/58

The highly sensitive nerve center that will feed data to the pilot and other systems of the Air Force F-108 interceptor while flying three times faster than the speed of sound will be developed and manufactured by the Garrett Corporation's AiResearch Manufacturing Division of Los Angeles.

Selection of AiResearch for the Central Air Data Computing system was announced by North American Aviation, Inc., Weapon System Manager of the new interceptor under development for the Air Defense Command.

AiResearch was selected after an intensive evaluation of proposals submitted by several companies.

General K. B. Wolfe, executive vice president of the Garrett Corporation, said the AiResearch system will serve as a central pickup for important data such as pressure, temperature, acceleration, and angle of attack. This information will be processed and fed to the pilot and other airplane systems to enable the F-108 to carry out its mission of destroying attacking enemy aircraft hundreds of miles from its base.

AiResearch estimated that more than half of the manufacturing will be subcontracted, mostly to small business concerns.

The air conditioning and pressurization systems for both the B-70 Valkyrie bomber and F-108 interceptor will be developed and manufactured by Hamilton Standard Division of United Aircraft Corporation. Although exact dollar figures were not revealed, the contracts involved are in the multi-million dollar range and total the largest for such systems ever awarded to one company.

The two airplanes, to be built for the U.S. Air Force by the Los Angeles Division of North American Aviation, Inc., will be capable of speeds of more than 2,000 miles per hour and will operate at altitudes of more than 70,000 feet.

Hamilton Standard was selected after careful evaluation of several companies on the basis of technical design and capability, financial capacity, management, budgetary control and capability based on past experience, according to North American.

Charles M. Kearns, General Manager of Hamilton Standard, said that his company's function as a major weapons system subcontractor for both airplanes will be "to provide systems which pressurize and automatically cool or warm the crew's quarters and electronic equipment compartments. Temperatures as high as 600 degrees F generated by the airplanes' high speeds make the cooling of the crew and electronic equipment of critical importance."

Hamilton Standard is one of several major systems contractors teamed up to build the new aircraft. The company probably will subcontract to its own suppliers approximately one-half of its work, Mr. Kearns said.

In a recent public statement, North American said of its two aircraft, "No military airplane in the world today even approaches their performance."

The Air Force has pointed out the necessity of maintaining a flexible aerial defense and offense which would consist of manned aircraft utilizing air-launched missiles to accomplish all possible missions, further pointing up the importance of the B-70 and F-108.

North American has announced that the F-108 can seek out any enemy and launch an atomic missile 1,000 miles away from its base. The B-70 is being designed as a successor to the Boeing B-52 and is expected to have intercontinental range while traveling at more than three times the speed of sound.

NEWS RELEASE - NAA - 11/28/58

International Telephone & Telegraph Corporation's Federal Division in Clifton, N.J. has been given go-ahead on a program leading to development and production of a mission and traffic control system for the Air Force F-108 interceptor.

Selection of the eastern firm to develop and manage the multi-million dollar program was announced by the Los Angeles Division of North American Aviation, Inc., F-108 Weapon System Manager. The mission and traffic control system is designed to provide communications, navigation, identification and landing aid functions for the F-108 interceptor.

International Telephone & Telegraph was picked after careful evaluation in several general areas of measurement, including technical design and capability, financial capacity, management, budgetary control and capability, based on past experience.

Delbert L. Mills, president of the company's Federal Division, said his firm has had "extensive and diversified experience in the management of complex leader-follower relationships with other manufacturers in the design, development, and manufacture of airborne and other electronic equipment."

In establishing a subsystem management organization to implement the program, he named Theodore M. Douglas, division vice president, as its head. Mills also stated that specialized services available at International Telephone & Telegraph Laboratories and its Federal Electric Division, together with leading electronic companies, large and small, would be utilized to carry out the objectives and fulfill the requirements of North American and the U. S. Air Force.

The F-108 interceptor will be capable of outspeeding a high velocity rifle bullet while seeking out an enemy aircraft 1000 miles from its base and will be utilized by the Air Defense Command.

NEWS RELEASE - NAA - 12/15/58

Proving that a small company with a lot of ingenuity can compete with the giants of industry, Electronic Specialty Co. (5121 San Fernando Rd., Los Angeles) has been selected to design and build the antenna subsystem for the triple sonic F-108 interceptor, it was announced today.

"The development and manufacture of this important system for the Air Force's long range interceptor could total several million dollars over the next few years," declared Raymond H. Rice, vice president of North American Aviation and general manager of its Los Angeles division which is weapon system manager. "That a small company could win an exhaustive evaluation over five competing companies which included some of the nation's top electronics firms is striking proof that small business plays a vital role in our defense effort."

"Electronic Specialty Co. won an evaluation which covered a wide range of subjects by demonstrating a solution to a knotty technical problem," Rice said. "The F-108, which travels 2000 miles an hour and can intercept an enemy 1000 miles from its base, will be the first airplane in which an integrated antenna system will be used for all communications components."

William H. Burgess, president of the electronics firm, said his company also builds components for the Geni atomic missile and has developed systems for other missile and aircraft programs.

Despite its size the company last year ranked among the top ten percent in gross sales in the West Coast electronic industry.

NEWS RELEASE - NAA - 1/6/59

Three of the nation's leading defense manufacturers have been named to the teams developing the Air Force's long range F-108 interceptor and B-70 intercontinental bomber, the Weapon Systems contractor announced today.

Convair (San Diego), a division of General Dynamics Corporation, was selected from ten competing companies to design and build the wing of the Air Defense Command triple sonic interceptor that is capable of shooting down an enemy 1,000 miles from its base.

Lockheed Corporation's Georgia Division at Marietta will design and build a fuselage section of the Strategic Air Command B-70 Valkyrie bomber, and Chance Vought Aircraft Co. at Dallas, Texas, will design and manufacture the horizontal and vertical stabilizer sections. Twenty-one companies submitted proposals on the B-70 tail section; twelve on the fuselage.

Selections were announced by Raymond H. Rice, vice president of North American Aviation, Inc., and general manager of the company's Los Angeles Division, which is weapon system manager for both aircraft.

Rice said that thousands of small firms throughout the United States also would be utilized in production of the two weapon systems.

An estimated 70 percent of the development and manufacturing will be performed by companies outside North American, including thousands of small businesses from coast to coast.

Each company was selected after an evaluation based on its design and technical capability, ability to produce, probable cost and program management.

NEWS RELEASE - NAA - 2/6/59

A major milestone in the production of the Air Defense Command's F-108 long range manned interceptor has been passed with completion of the mockup conference at North American's Los Angeles Division.

More than 70 U.S. Air Force and civilian personnel made a comprehensive four-day inspection of the mockup, which is a replica of the triple sonic interceptor that will be able to launch atomic missiles 1000 miles from its base.

"The mockup gives the Air Force an opportunity to minutely examine what in effect is a three-dimensional blueprint," Heston Cherry, F-108 Weapon System Manager for North American, explained. "Built to the measurements of the actual airplane, the mockup is an essential step before production of the flying article can begin."

Colonel Linus F. Upson, Jr., Air Research and Development Command, served as chairman of the F-108 Mockup Board, with Colonel Kenneth Chilstrom, also of ARDC, as recorder. Other board members include Colonels Thomas DeJarnette, Marty Martin, Robin Olds, Mortimer Brennan, Headquarters, USAF; Walter E. Chambers, Air Materiel Command; J. B. Murphy, Air Defense Command; and Major J. B. Jackson, Office of the Inspector General.

Air Force Chief of Staff Thomas White told the Senate Armed Services Committee last week in Washington that manned interceptors are required for long range attack on the enemy and are necessary for identification and air policing. "In this function nothing has yet been developed with the judgment flexibility and intelligence of the man in the cockpit," the general said.

The F-108 will be powered by two General Electric J-93 engines and will be equipped with a new radar and fire control system developed by the Hughes Aircraft Co. Several other major aircraft firms, including Convair, AiResearch, Marquardt, Hamilton Standard, and the Federal Division of the International Telephone and Telegraph Co., have been named to the production team developing the startling new weapon system.

NEWS RELEASE - NAA - 4/14/59

Cleveland Pneumatic Industries, Inc. will develop and manufacture the landing gear on the Strategic Air Command triple sonic B-70 bomber and the Air Defense Command F-108 long range interceptor, North American Aviation, Inc., announced today.

Raymond H. Rice, North American vice president and general manager of its Los Angeles Division, which is Weapon System Contractor, said that the award of the multi-million dollar contracts to Cleveland Pneumatic would enable that company to concurrently develop both landing gear systems for these advanced aircraft at a reduced cost. Each system includes both nose and main landing gear.

The Cleveland firm was selected after an extensive evaluation of a total of 5 companies throughout the nation who had submitted bids.

Both the B-70 and F-108, designed to reach speeds of 2000 miles per hour at altitudes of 70,000 feet, have been described by Air Force officers as a major technological breakthrough.

"Every major system on the F-108 and B-70 represents a tremendous advancement in development and responsibility, and all companies participating in the program, including Cleveland Pneumatic, were selected for their managerial, engineering, and production efficiency and initiative," Rice stated.

Twelve other companies already are at work on major subsystems on the F-108 and eight on the B-70.

"Contracting programs on these weapon systems," Rice said, "will eventually encompass some 20,000 suppliers, including many thousands in the small business category, in all parts of the United States."

Sam S. Mullin, president of Cleveland Pneumatic Industries, Inc., said that the landing gear systems projects would involve five Cleveland Pneumatic divisions - Cleveland Pneumatic Tool Company and Special Products Divisions in Cleveland; the National Water Lift Division at Kalamazoo, Mich.; the Instrumentation and Control Division, Grand Rapids, Mich.; and the Advanced Systems and Development Division, El Segundo, Calif.

RAPIER

"Rapier" was selected by the Air Defense Command for the F-108 after a contest in which more than 38,000 names were submitted by pilots and airmen throughout the world.

North American fighters previously have been named "Sabre", the latest being the F-100. "Rapier", another sword, is a narrow, two-edged weapon used for thrusting, and the name aptly fits the long range and tremendous striking power for the F-108, Air Force officials say.

S/Sergeant Charles B. Wyon, stationed at Ent AFB, Colorado, was awarded a \$500 savings bond and a three-day trip to Las Vegas by North American Aviation, Inc., for submitting the winning name.

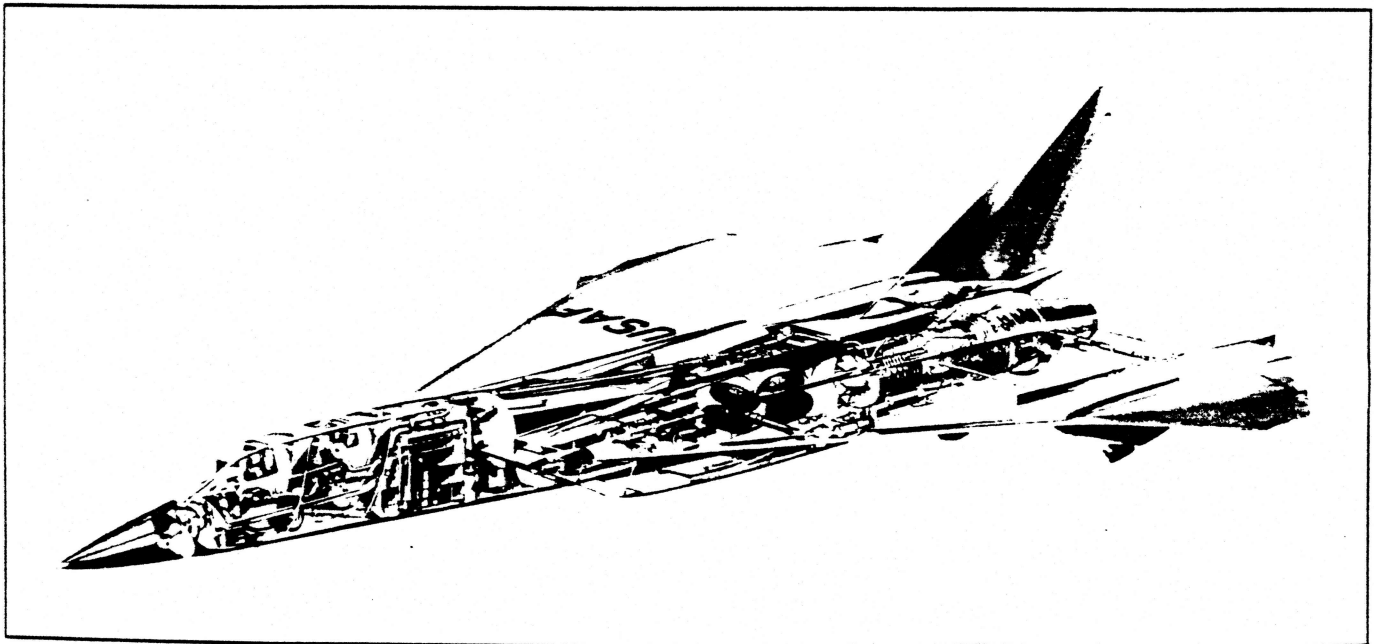
North American F-108 Rapier

Although the North American F-108 carried a subsequent Defense Department F number and was scheduled to follow the North American F-107 (or be produced simultaneously with it), it did not have anything to do with its predecessor. The F-108's mission was totally different than that of the F-107's.

In the late 1940s, USAF planners initiated a search for an advanced robot-like all-weather, all-missile-armed fighter-interceptor. Upcoming fighter-interceptor types like the Northrop F-89H, the Lockheed F-94C and North American's own F-86D were on the immediate horizon—yet already soon to be obsolete. Moreover, they were subsonic fighters and their operational envelopes required good weather and, despite their limited all-weather mission status, daylight.

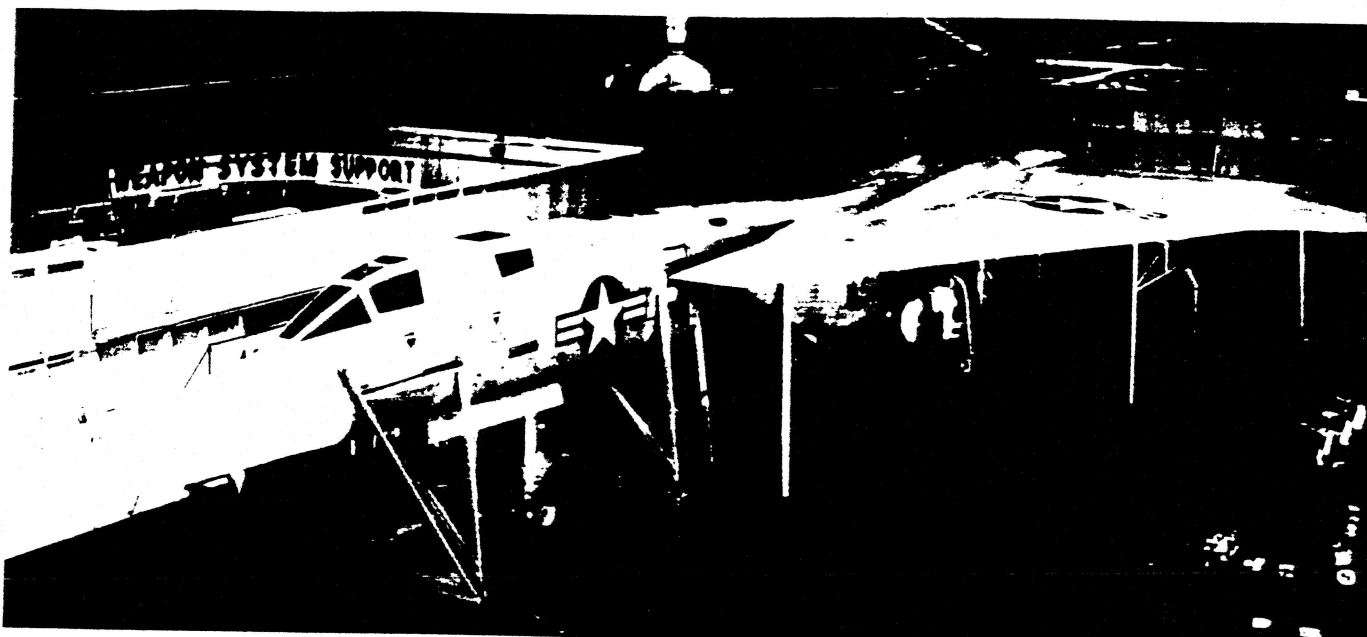
The air force wanted faster fighter-interceptor types that would be capable of operating in any kind of weather, and to accomplish this, advanced air-to-air guided (radar- and infrared-guided) missiles and rockets had to be developed in addition to futuristic missile and rocket fire control systems and long-range all-weather radar. All of these systems would have to be incorporated within a suitable airframe, powered by a suitable powerplant.

This philosophy of the late 1940s and early 1950s created what was known as a weapon system which, when applied to fighters at the time, gave birth to what became known as the Century Series of USAF jet fighter aircraft. Due to this weapon system terminology, several all-weather, all-missile-armed fighter-intercep-



This XF-108 Rapier cutaway shows the plane's large-diameter radar dish, tandem-seat cockpit arrangement, electronic system bay aft of cockpit area, powerplant and so on.

The Rapier was to carry three Hughes AIM-47 (formerly GAR-9) AAMs with nuclear warheads. Rockwell



F-108 mockup for WS-202A as it appeared when it was nearing completion. For its projected triplesonic-plus speed, it was to be powered by two 30,000 lb. thrust class J93 engines

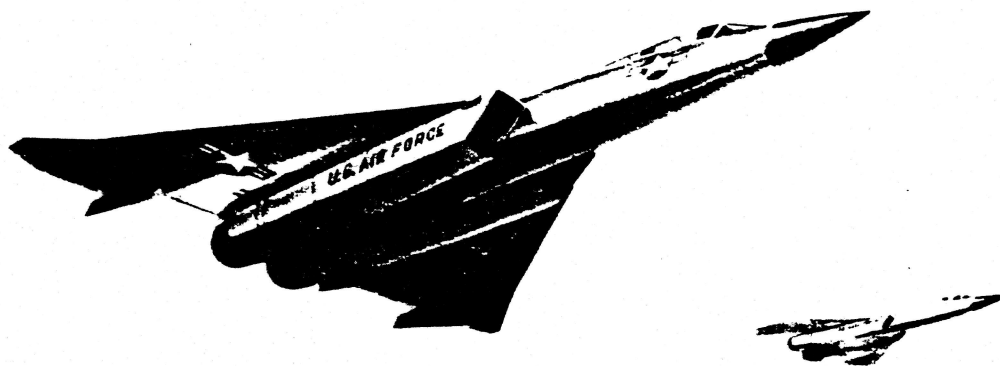
that were designed to be operated continuously in afterburner. Rockwell

tor designs emerged. A weapon system is comprised of an airframe, powerplants, radar, missile and rocket fire control system, missiles and rockets and robot-like ground-to-air guidance to the target; the pilot is the monitor.

The first successful fighter-interceptor type weapon system was the Convair F-102 Delta Dagger, or WS-201A, as it was designated under the weapon system classification. Having been derived from Secret Project MX-1554, the F-102 featured the Hughes MG-10 (formerly MG-3) radar and fire control system and was armed with unguided 2 in. diameter FFRs (folding-fin rockets) and up to six guided Hughes AIM-4 Falcon missiles. The FFRs were later deleted.

The interim F-102 evolved into the ultimate interceptor, the Convair F-106 Delta Dart. It featured the advanced Hughes MA-1 radar and fire control system with an armament comprised of three Falcon missiles and one Genie rocket, or instead, up to six Falcon missiles. The F-106 (WS-201B) was the successor to the F-102 and was capable of twice its speed. If produced, the F-108 would have supplemented and ultimately replaced the F-106.

The history of the F-108 traces back to 6 October 1955 when the air force issued GOR 114, which called for the development of an advanced long-range interceptor, experimental (LRI.X). It was to be capable of flying and fighting in any environment, armed exclu-



Artist concept depicts what two operational F-108As might have looked like on an intercept sortie in the Northern Hemi-

sphere. Ventral wing and fuselage fins were for high-speed stability and contributed to compression lift. Rockwell

sively with missiles and/or rockets. Five days later the air force awarded North American an engineering study contract for the proposed LRI,X under GOR 114, and to several other contractors as well. On 1 November, Lockheed, Northrop and North American were all awarded study contracts to advance the state of the art in respect to GOR 114 and continue their respective LRI,X studies. The remaining airframe contractors that had showed an interest in pursuing the interceptor program were eliminated.

During January 1956 USAF evaluation teams visited the three LRI,X contestants to measure their respective progressive efforts. Since there is no available information on Lockheed's and Northrop's LRI,X offerings after that time, it is assumed that North American's entry was most favored by the evaluators. But Lockheed was well into the design of its Blackbird series at that time—the A-12, YF-12, and SR-71. It is believed that the YF-12 was responsible for the demise of the F-108.

North American received a letter contract on 1 June 1957 for development of its LRI,X weapon system now designated WS-202A, North American Model NA-257 (Contract Number AF-33605). It was for the development and construction of wind-tunnel models, a full-scale engineering mockup, engineering data and drawings, a static test article and two flyable LRI,X prototypes.

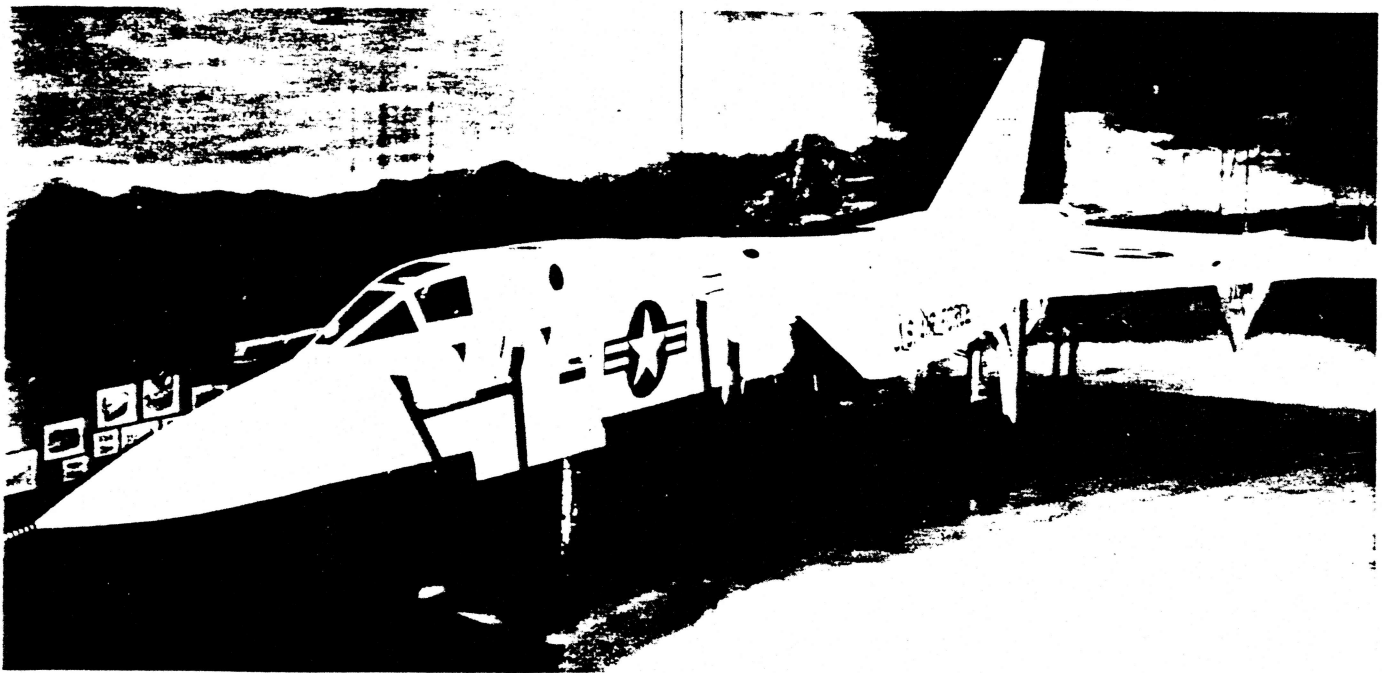
By this time, North American had selected the afterburning General Electric YJ93-GE-1 turbojet engine to propel its proposed long-range interceptor prototypes. They would be powered by two of these 30,000 lb. thrust class engines that were Mach 3-plus

rated. General Electric was awarded its letter contract for J93 development in August 1957.

As a total weapon system, the primary mission of the LRI,X (now designated XF-108) was to protect America's airspace against all airborne threats in the post 1962 time period. This defense function was to be put into practice by the F-108's potential to search out, evaluate and destroy hostiles at ranges beyond the capabilities of other defense systems. The F-108 was designed to operate not only in conjunction with SAGE (semi-automatic ground environment) and in concert with other weapons in the defense inventory, but to rely on its self-contained search, navigation and communications equipment. It would be a highly improved manned interceptor (IMI).

Projected wartime F-108 operations included directed intercepts and organized search missions resulting in repeated attacks with up to three kills by each F-108 scrambled. Operating beyond SAGE, the F-108 could have made positive identification of distant early warning (DEW) line violations, attack and trail hostile raids through remote zones and report directly via long-range radio. With operations within the zone of intercept (ZI), the F-108's performance featured all-weather capability, long-range at Mach 3 cruise and a fifteen-minute turnaround time.

The F-108 was to carry two crewmen (pilot and fire control officer) and internally stowed missile armament on a rotary launcher. It was to cruise and fight at triplesonic speed with a 1,000 nautical mile combat radius on internal fuel, and be capable of in-flight refueling. It would have had a 1.2 g maneuver limit in excess of 77,000 ft. and a zoom-climb ceiling in



Final F-108 configuration as it appeared in mockup form shortly before program cancellation in 1959. Rockwell

excess of 100,000 ft. Under normal loading and weather, it required runway lengths of only 3,200 ft. for takeoff and landing to clear a 50 ft. high obstacle.

The F-108 could have been operated from 6,000 ft. long runways in all weather conditions and loading. From a nominal 70,000 ft. combat ceiling, missile launch could have been accomplished against any target flying at altitudes from sea level to 100,000 ft. Its pulse-Doppler radar, with its 40 in. diameter antenna dish, was to provide target find in excess of 100 nautical miles at all altitudes, and was backed up with infrared search and track equipment. It would carry three Hughes AIM-47 (formerly GAR-9) long-range Falcon air-to-air guided missiles. Its radar and fire control system would have been the Hughes AN/ASG-18.

The F-108 featured a low-aspect-ratio, delta wing planform which employed elevons for pitch and roll control, an all-movable vertical stabilizer and rudder, fixed ventral fins for high-speed stability and increased lift, variable-geometry engine air inlets, speed brakes, and engine thrust reversers (as proposed on the -3 AR version of the J93 engine which was to be employed). Its air-conditioned crew compartment was to provide shirt-sleeve comfort; the crew would have emergency escape capsules instead of ejection seats.

To name the F-108, the USAF held a service-wide name-the-plane contest. Some 38,000 names were submitted by pilots and airmen throughout the world. From them, the air force chose the name, Rapier.

Projected to fly for the first time in March 1961, and to meet its initial operational capability (IOC) in January 1963, the air force abruptly canceled the F-108.

At 2:00 P.M. on 23 September 1959, the USAF announced that it had canceled the F-108 "because of a shortage of funds and priorities in Air Force program-

ming." There were no technical difficulties involved, and all program objectives had been met. The air force said it would continue "at a reduced level" the development of the Hughes AN/ASG-18 radar and fire control system and the AIM-47 Falcon missile which was under development for the F-108 Rapier. These turned up later as part of the YF-12A's weapon system.

F-108 Specifications

Type	Tandem-seat long-range interceptor
Powerplant	Two General Electric J93-GE-3AR (Model 7E) afterburning 30,000 lb. thrust turbojets
Wingspan	57 ft., 4 in.
Wing area	1,879.06 sq-ft
Length	89 ft., 2 in.
Height	22 ft., 1 in.
Empty weight	50,907 lb.
Gross weight	102,533 lb.
Maximum speed	Mach 3.2
Cruising speed	Mach 3
Climb rate	50,000 fpm
Range	2,000 mi.
Armament	Three AIM-47 Falcon AAMs

XF-108 Production

Designation	Serial Number	Comments
XF-108		Canceled; not built
XF-108		Canceled; not built

Note: The F-108 program was canceled before aircraft were issued air force serial numbers.

North American F-108 Rapier

The F-108A Rapier was destined to be the last fighter project carried out by North American Aviation, builders of such immortals as the P-51 Mustang and the F-86 Sabre.

The F-108 project was originally known as the LRIX (Long-Range Interceptor, Experimental) and was initiated by the Air Force on October 6, 1955. On June 6, 1957, North American was issued a letter contract for two prototypes of a long-range, high-performance interceptor to be designated F-108A. The company designation for the aircraft was NA-257. It was to be capable of Mach 3 performance and was intended to serve as a long-range interceptor that could destroy attacking Soviet bombers over the poles before they could get near US territory. It was also to serve as the escort fighter for the XB-70 Valkyrie Mach-3 strategic bomber, also to be built by North American. The Air Force expected that the first F-108A would be ready for service by early 1963. An order for no less than 480 F-108s was anticipated.

The F-108A design that North American ultimately produced called for a large delta-winged aircraft powered by a pair of afterburning General Electric J93-GE-3AR turbojets fed by variable inlets mounted underneath the wing roots. The F-108 aircraft was designed for a maximum speed of 1980 mph at 75,550 feet and for a 1020-mile combat radius. The pilot and radar operator sat in tandem individual ejector capsules in the forward cockpit. The aircraft was to be equipped with an extremely sophisticated avionics system, directed by the Hughes AN/ASG-18 search and tracking radar which was to have a range of over 100 miles.

The F-108A was to be armed with three advanced Hughes GAR-9 Falcon missiles housed in an internal weapons bay. The GAR-9 missile was powered by a Lockheed storable liquid-propellant rocket motor which was capable of driving the missile to hypersonic speeds of up to Mach 6 and achieving ranges of up to 115 miles. The GAR-9 missile used semiactive radar homing for midcourse guidance, with passive infrared homing being used for the final run-in to the target.

A mockup was inspected in January 1959, with the initial flight being planned for March 1961. The popular name *Rapier* was assigned on May 15, 1959.

However, by mid 1959, the Air Force was already beginning to experience some doubts about the high cost of the Rapier program. The primary strategic threat from the Soviet Union was now perceived to be its battery of intercontinental ballistic missiles instead of its force of long-range bombers. Against intercontinental ballistic missiles, the F-108A interceptor would be completely useless. In addition, the Air Force was increasingly of the opinion that unmanned intercontinental ballistic missiles could accomplish the mission of the B-70 Valkyrie / F-108 Rapier combination much more effectively and at far lower cost. Consequently, the F-108A project was cancelled in its entirety on September 23, 1959, before any prototypes could be built. The XB-70 project was also halted, and on December 3, 1959 was cut back to only one prototype.

The work on the Rapier did not entirely go to waste. The work that Hughes did on the AN/ASG-18 radar was later transferred over to the Lockheed YF-12A interceptor project, and the GAR-9 Falcon (redesignated AIM-47A in 1962) missile originally developed for the F-108A was used to arm the YF-12A.

Specification of F-108A Rapier (estimated):

Two General Electric J93-GE-3AR turbojets, 20,900 lb.s.t. dry, 30,000 lb.s.t. with afterburner. Maximum speed: 1980 mph at 76,550 feet. Service ceiling 80,100 feet, combat ceiling 76,550 feet. Initial climb rate

18,000 feet per minute. Climb to 50,000 feet in 5.4 minutes. Combat radius 1020 miles with three missiles. 2488 miles ferry range. Dimensions: wingspan 57 feet 5 inches, length 89 feet 2 inches, height 22 feet 1 inches, wing area 1865 square feet. Weights: 50,907 pounds empty, 76,118 pounds combat, 102,533 pounds gross. Armed with three Hughes GAR-9 Falcon air-to-air missiles.

Sources:

The American Fighter, Enzo Angelucci and Peter Bowers, Orion, 1987.

Fighters of the United States Air Force, Robert F. Dorr and David Donald, Temple Press Aerospace, 1990.

American Combat Planes, Third Enlarged Edition, Ray Wagner, Doubleday, 1982.

Post-World War II Fighters, 1945-1973, Marcelle Size Knaack, Office of Air Force History, 1986.

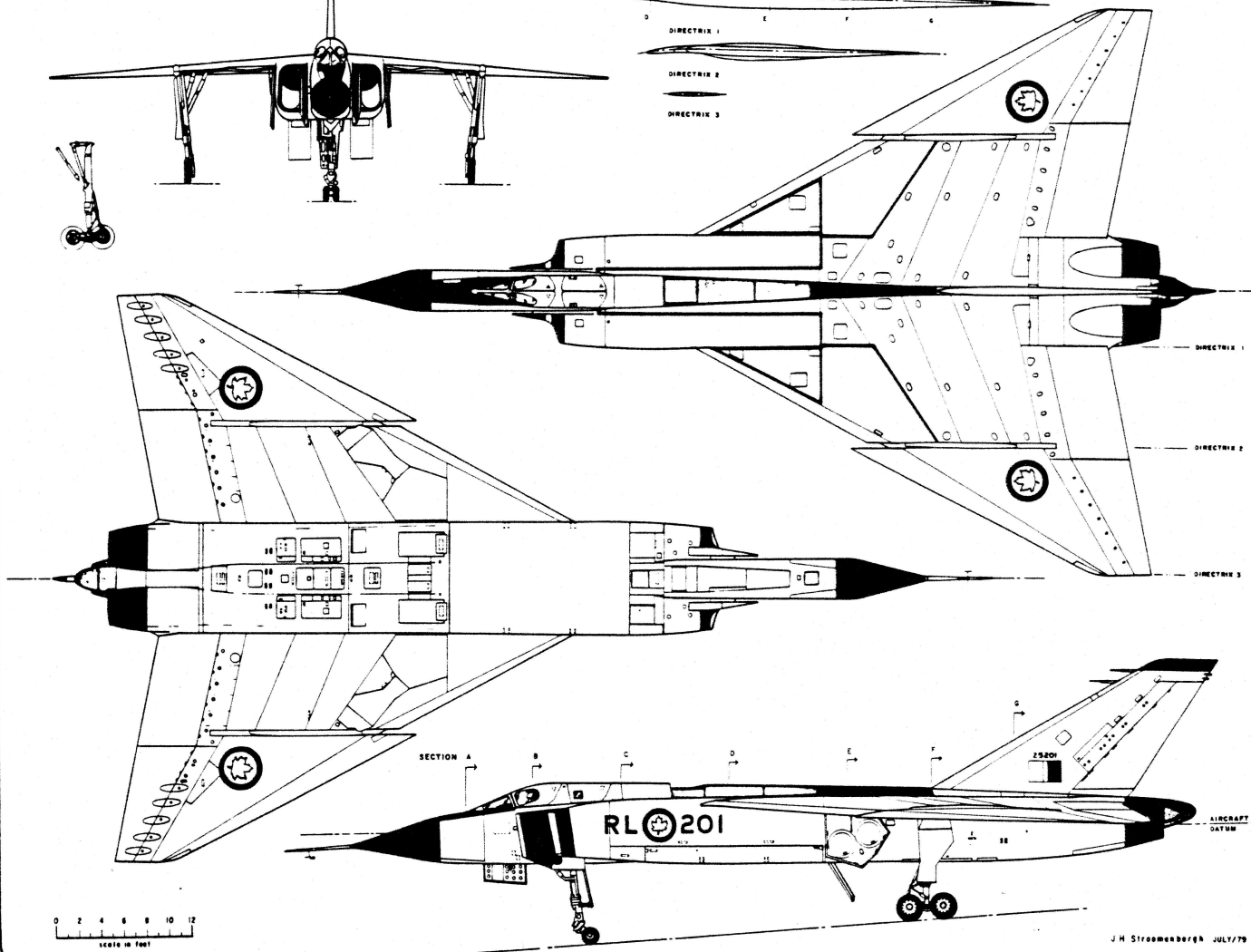
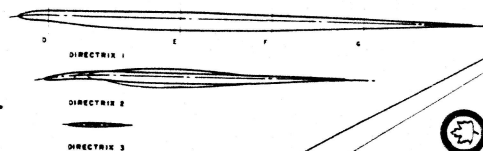
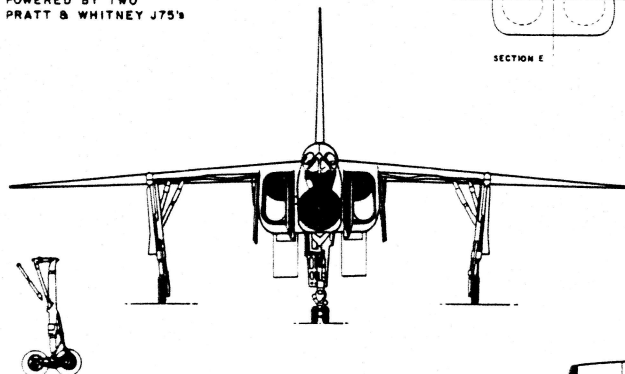
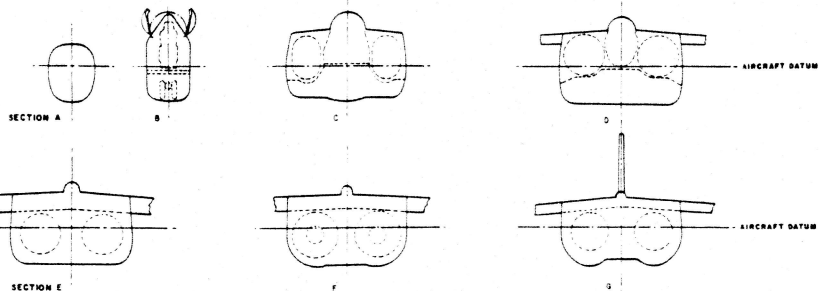
Joe Baugher

AVRO CF-105 ARROW mk.1

MANUFACTURED BY A.V. ROE CANADA LTD.
MALTON, ONT. 1957-59

SPAN 50 FT. 0 IN.
LENGTH 77 FT. 9.65 IN.
HEIGHT 21 FT. 3 IN.

POWERED BY TWO
PRATT & WHITNEY J75's



0 2 4 6 8 10 12
Scale in feet

J.H. Stronkenburgh JULY 79

AVRO CF-105 ARROW AIRCRAFT DATA

	Arrow 1	Arrow 2	Arrow 2A	Arrow 3
Length	80ft. 10in.	85ft. 6in.	85ft. 6in.	85ft. 6in.
Wing span	50ft.	50ft.	50ft.	50ft.
Empty Weight	49,040 lb.	45,000 lb.	45,000 lb.	45,000 lb.
Normal Gross Weight	57,000 lb.	62,431 lb.	62,431 lb.	62,500 lb.
Max. Gross Weight	68,602 lb.	68,847 lb.	68,847 lb.	70,000 lb.
Fuel capacity	2,897 gal.	3,297 gal.	3,297 gal.	3,297 gal.
Engines-Type	Pratt-Whitney J-75 P-5	Orenda PS-13 Iroquois 2	Iroquois 2	Iroquois 3
Base thrust	12,500 lb.	19,250 lb.	19,250 lb.	21,000 lb.
Thrust with afterburner	18,500 lb.	26,000 lb.	26,000 lb.	30,000 lb.
Max. Speed (40,000 ft.)	1,325mph (M2.0)	1,325mph	1,325mph	2,000mph
Combat Speed	Mach 1.5	Mach 1.5	Mach 1.5	Mach 2.5
Cruise Speed	Mach 0.92	Mach 0.92	Mach 0.92	Mach 1.0
Combat ceiling	53,000ft.	58,500ft.	58,600ft.	68,600ft.
Climb rate — from S.L.	38,450ft./min.	44,500ft./min.	44,500ft./min.	classified
—from 40,000ft.	16,500ft./min.	20,300ft./min.	20,300ft./min.	classified
Combat Radius—high speed	----	264 mi.	575 mi.	487 mi.
—max. range	----	408 mi.	787 mi.	593 mi.

Many of these figures are estimated

F-108 Specifications

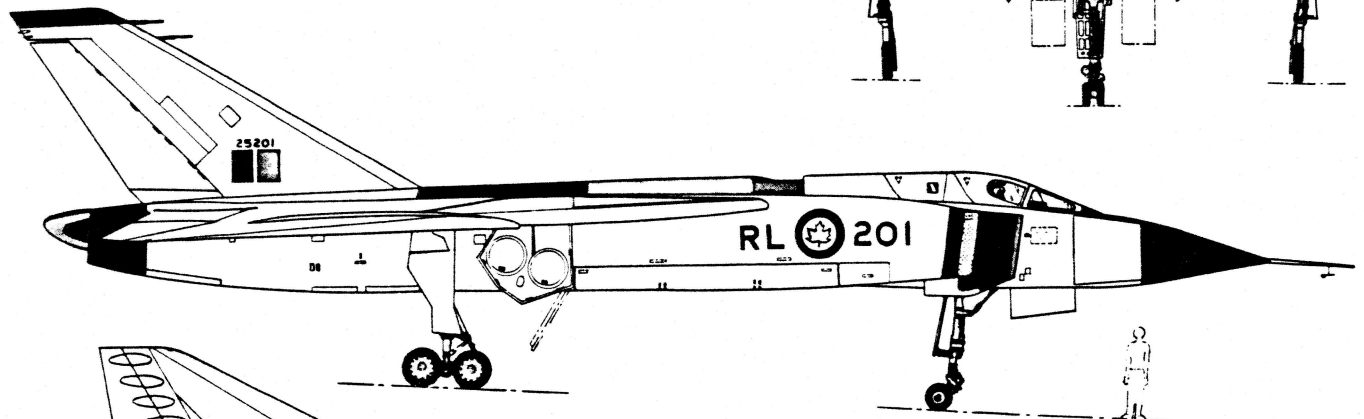
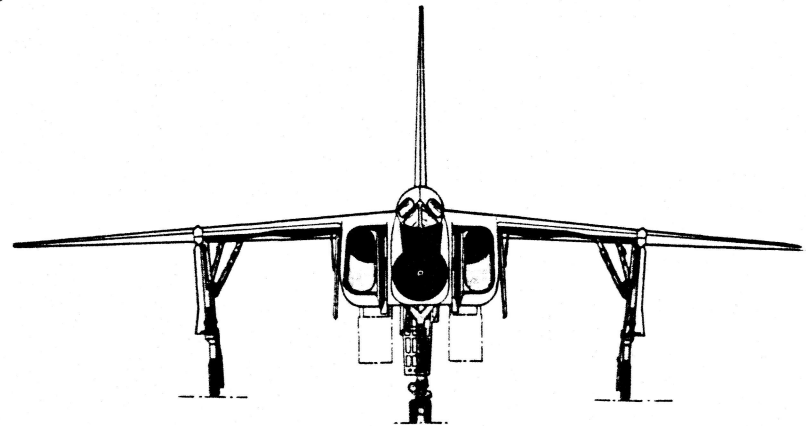
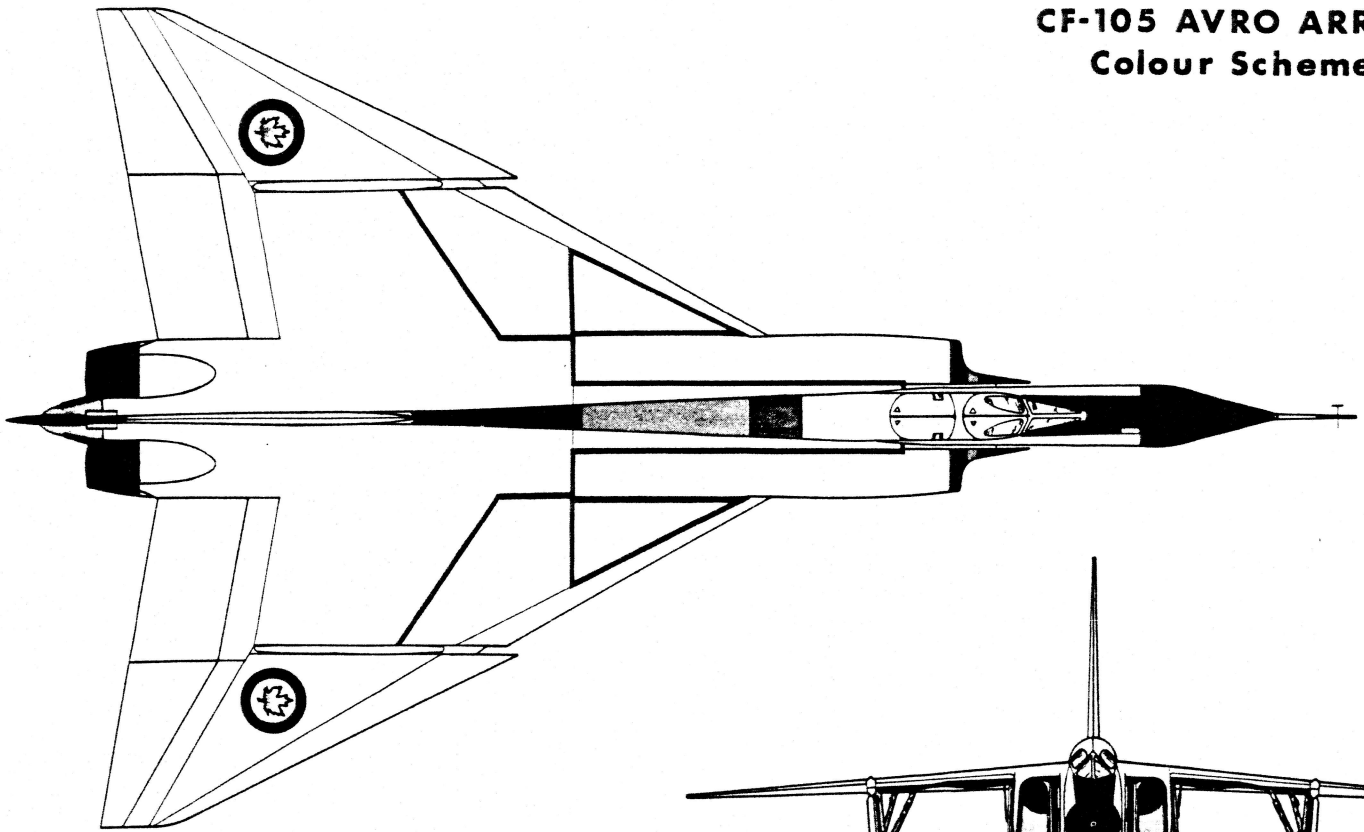
Type	Tandem-seat long-range interceptor
Powerplant	Two General Electric J93-GE-3AR (Model 7E) afterburning 30,000 lb. thrust turbojets
Wingspan	57 ft., 4 in.
Wing area	1,879.06 sq-ft
Length	89 ft., 2 in.
Height	22 ft., 1 in.
Empty weight	50,907 lb.
Gross weight	102,533 lb.
Maximum speed	Mach 3.2
Cruising speed	Mach 3
Climb rate	50,000 fpm
Range	2,000 mi.
Armament	Three AIM-47 Falcon AAMs

XF-108 Production

Designation	Serial Number	Comments
XF-108		Canceled; not built
XF-108		Canceled; not built

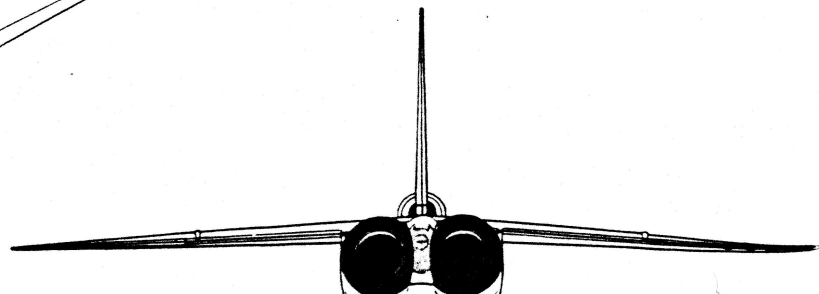
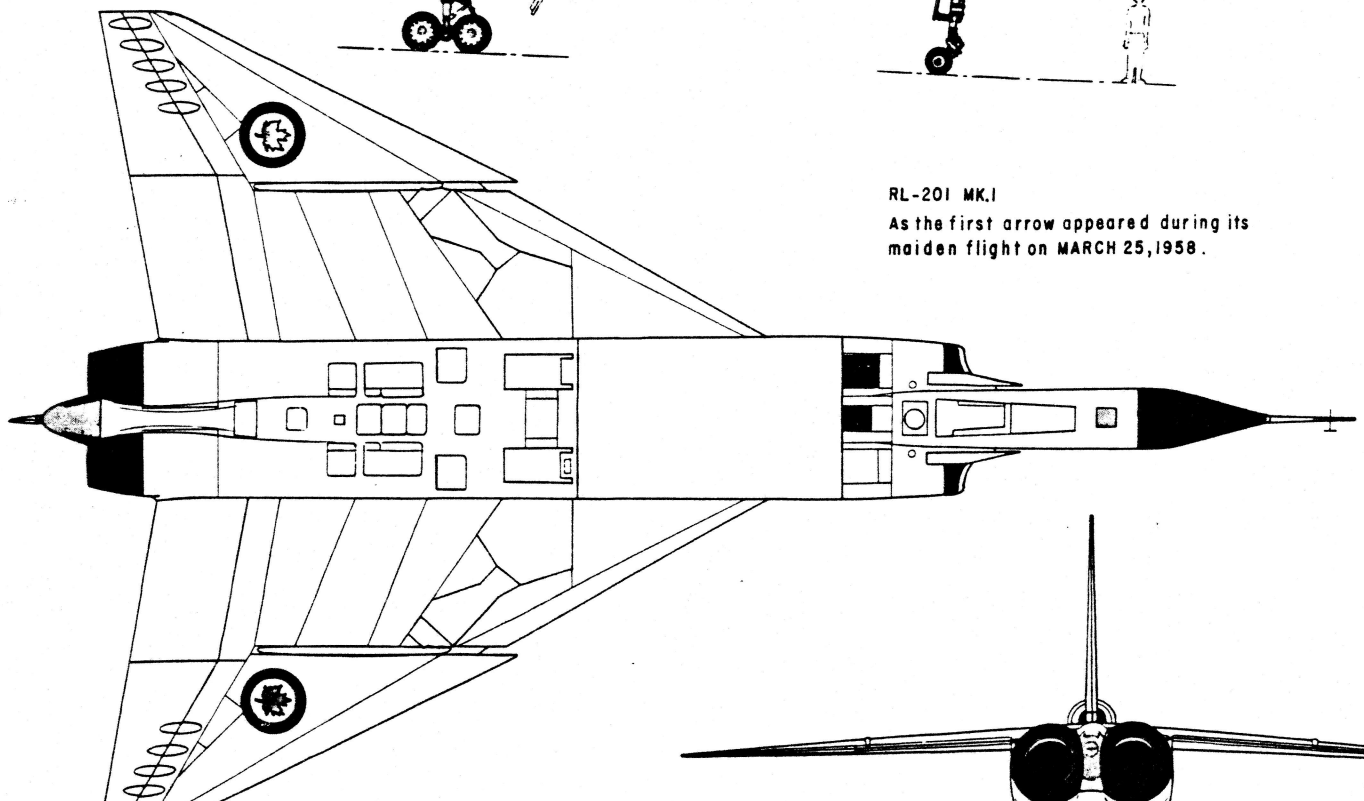
Note: The F-108 program was canceled before aircraft were issued air force serial numbers.

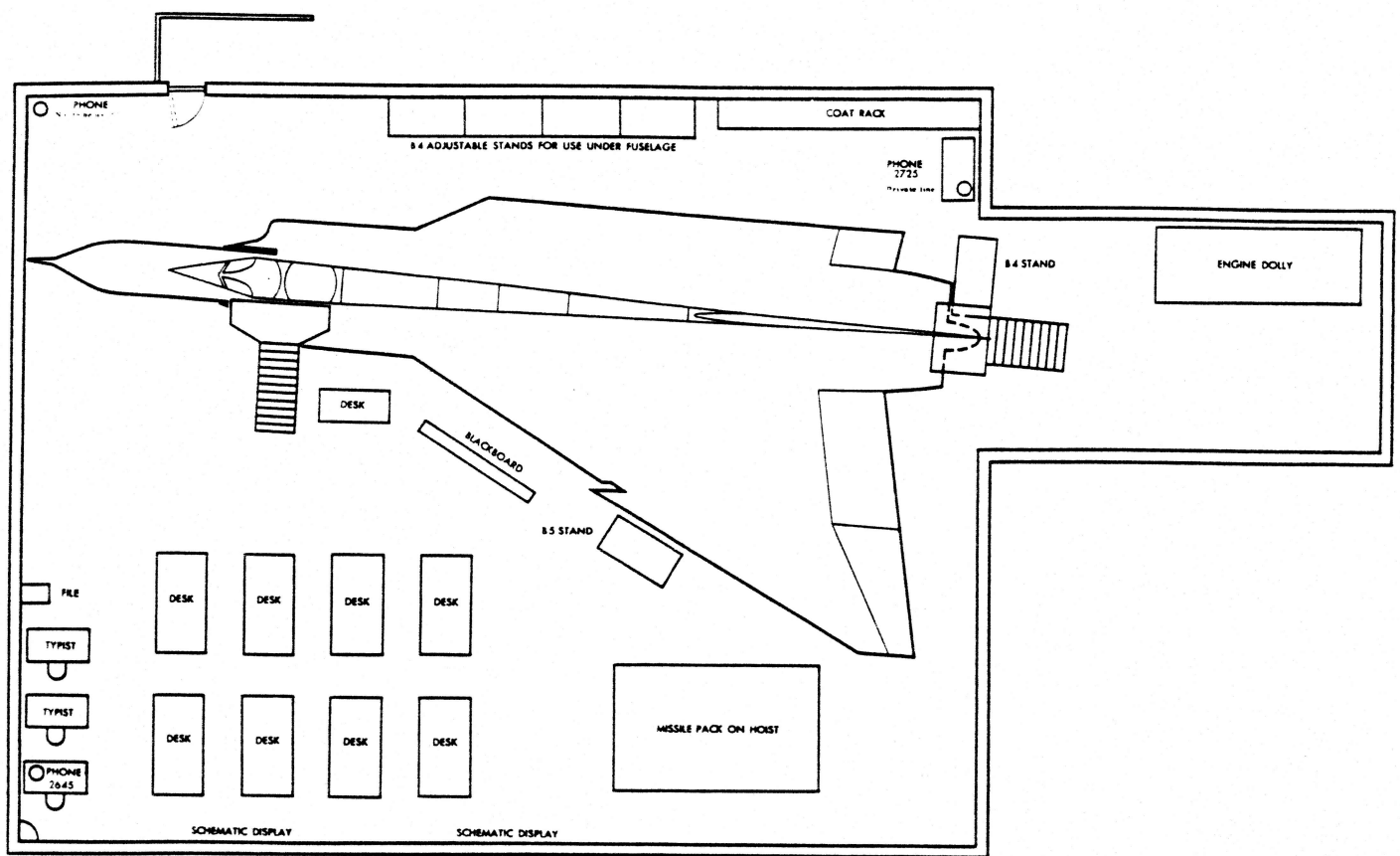
CF-105 AVRO ARROW Colour Scheme



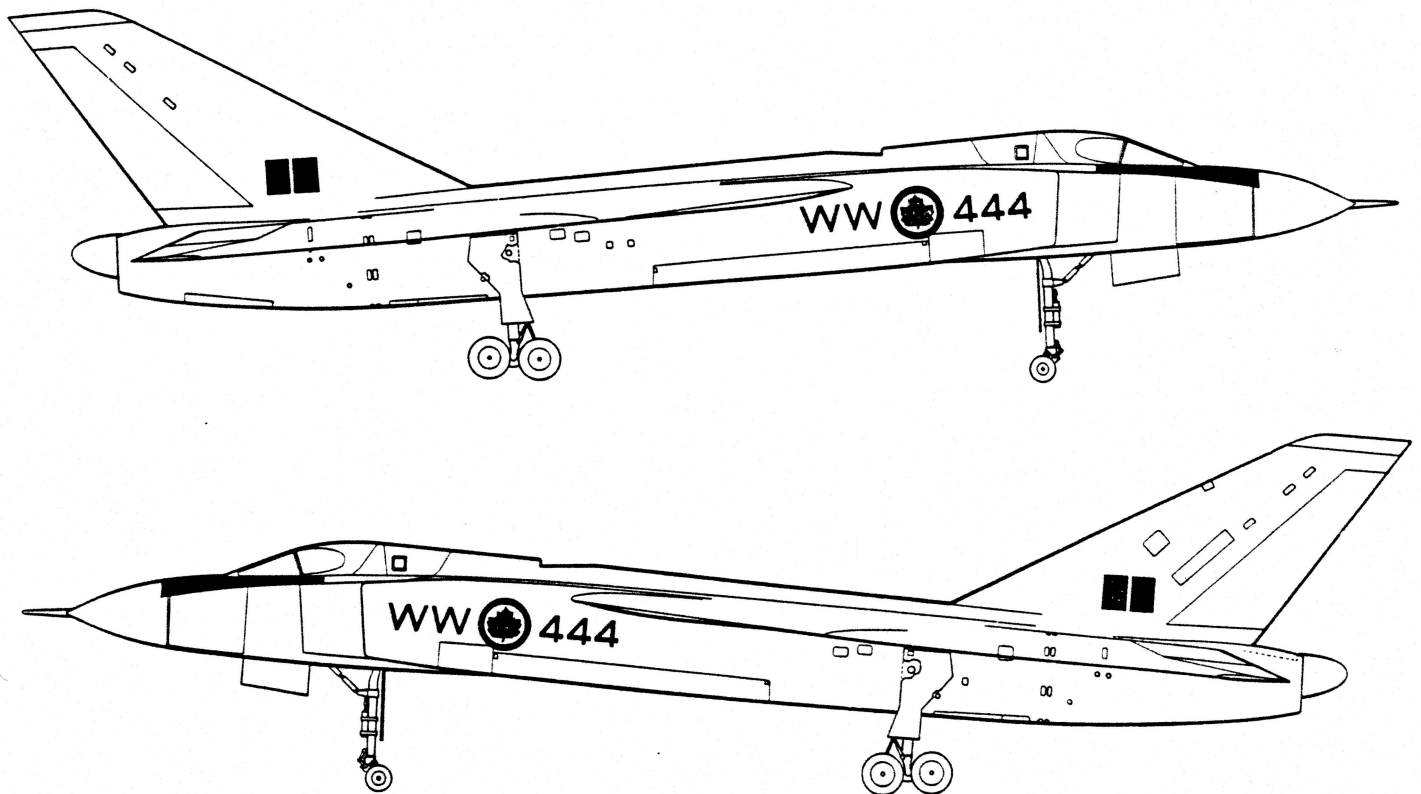
RL-201 MK.1

As the first arrow appeared during its
maiden flight on MARCH 25, 1958.

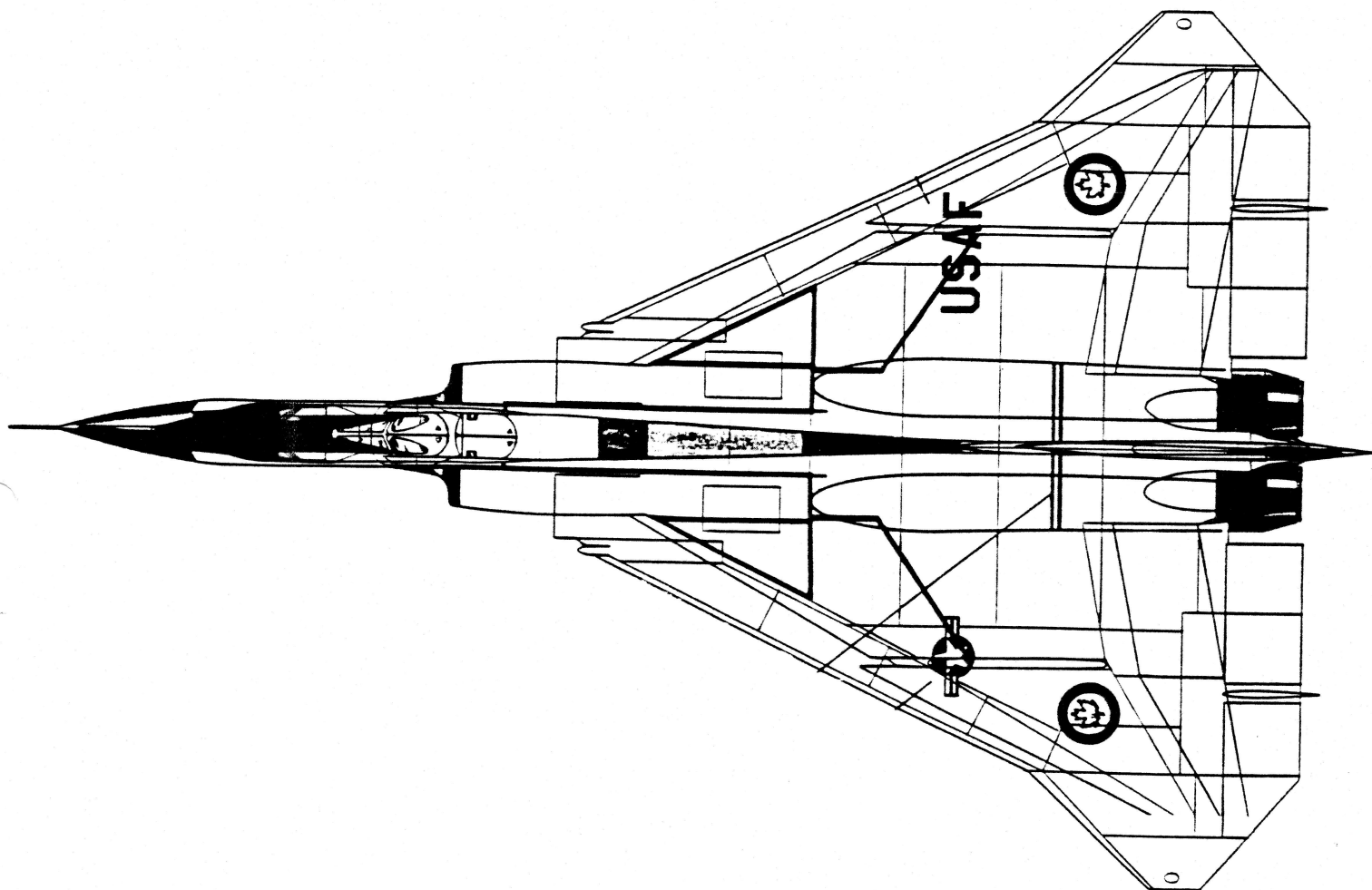


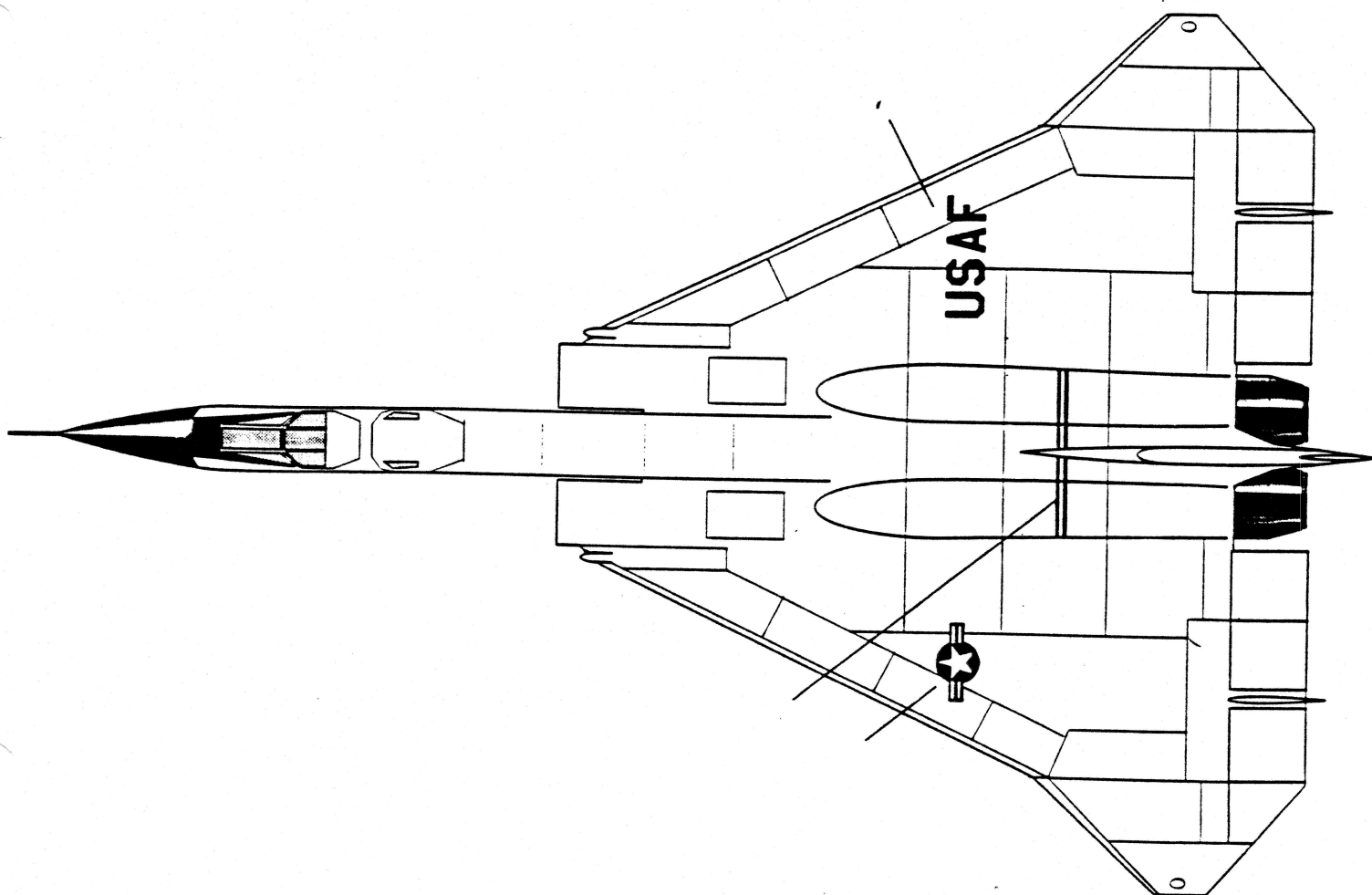
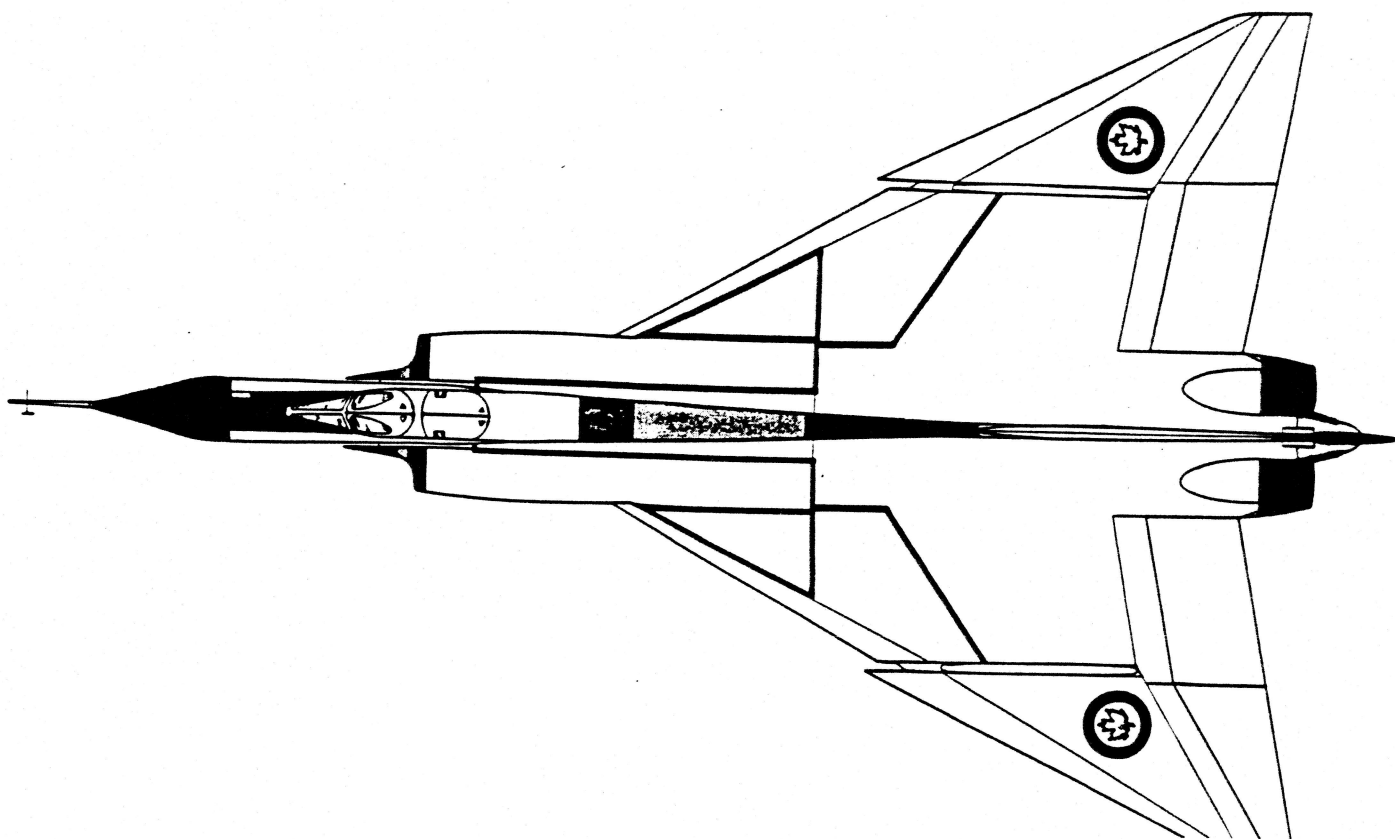


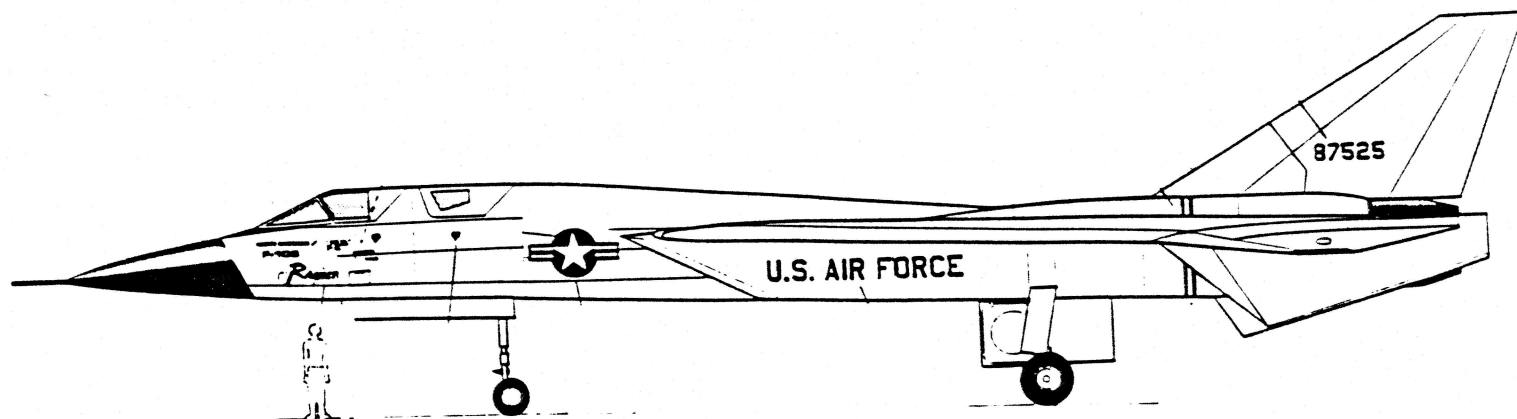
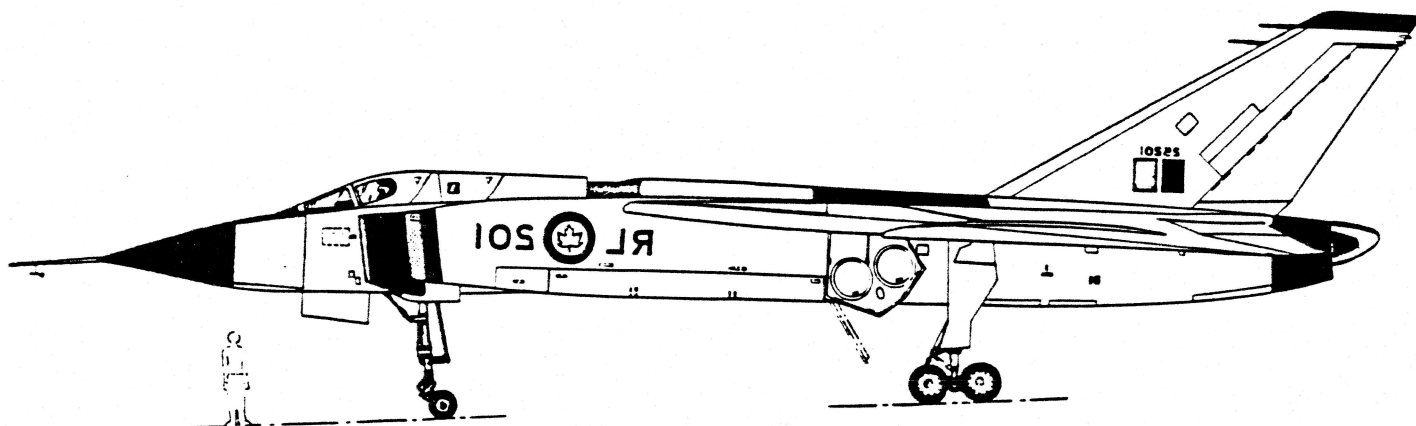
Floor plan of wooden mock-up area

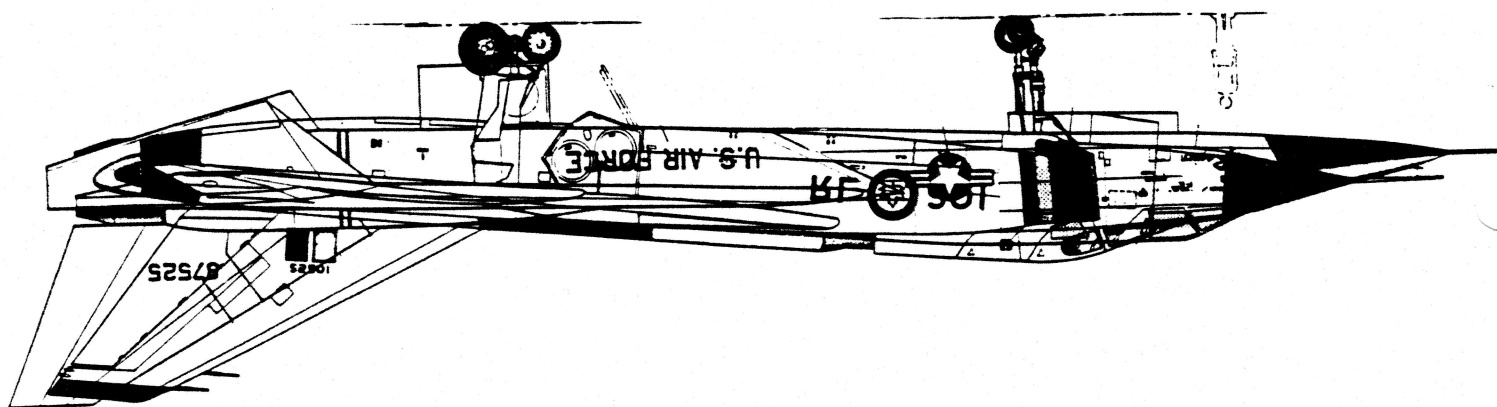


Early wooden mock-up drawing









F-108



Rapier

Instruction Manual

and

Aircraft History

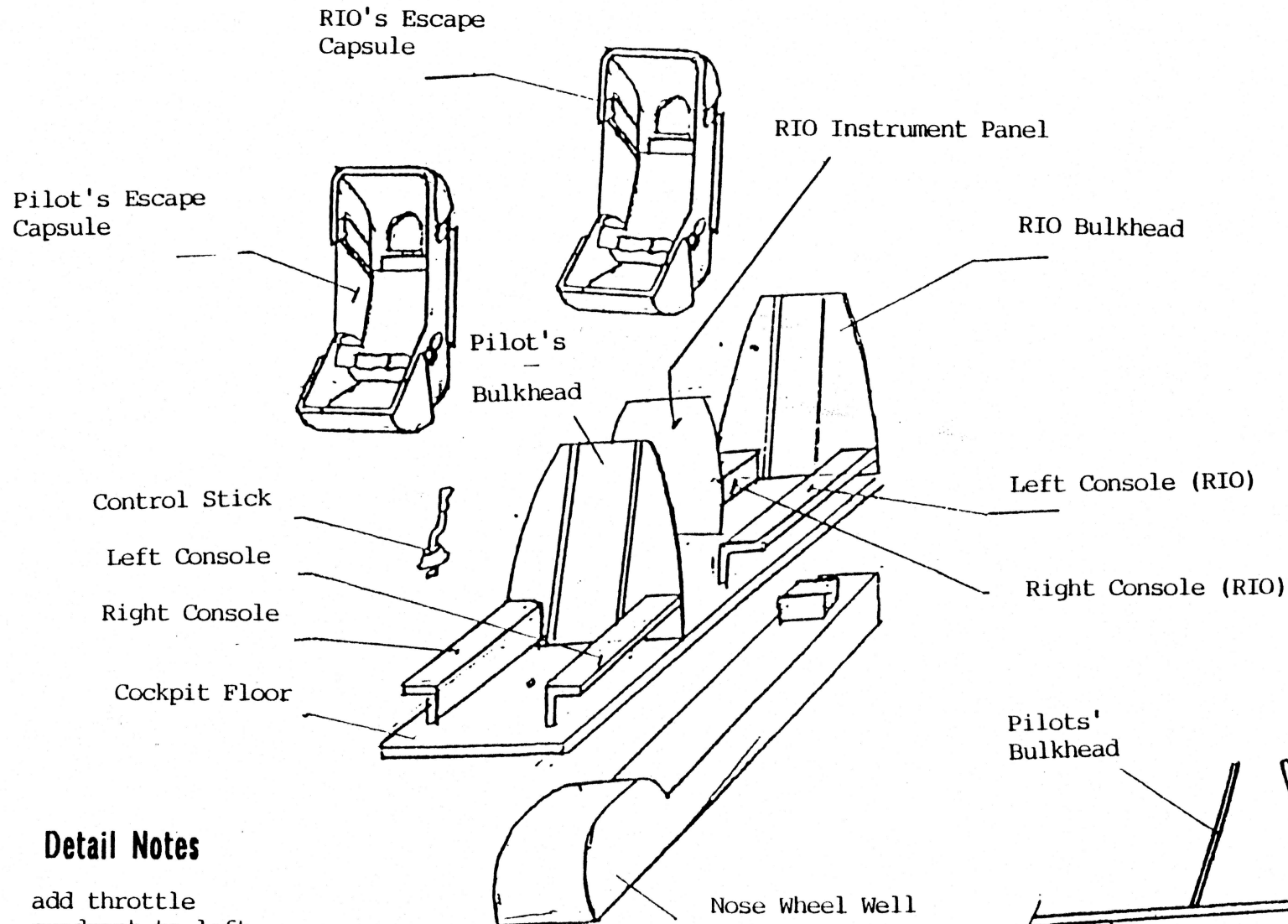
This is a custom, one-of-kind
model by: Collect-Aire Models.
It is one of only 200
produced for world-wide
production

(c) 1995, by
Collect-Aire Models.
all rights reserved.

COCKPIT CONSTRUCTION

COLORS

Basic Interior;
Various Greys;
Seat Cushion,
orange, head-
rest, red; pick
out details on
the instrument
panels, add
colors to dress
it up. Contrast
everything !



Detail Notes

add throttle
quadrant to left
console. perhaps
add circuit breakers
and wiring to bulkheads.

Side View

RIO's Canopy

Pilots Canopy

Pilots Panel

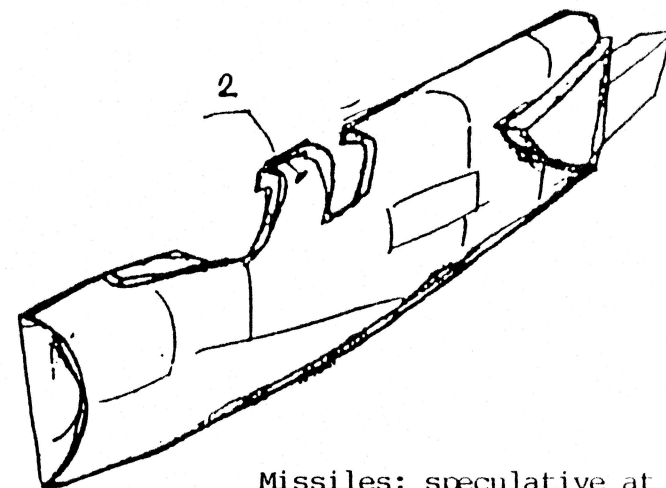
"Be Safe - weight the nose!" Test fit everything!!

Pitot Tube
(metal)

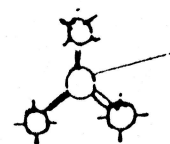
Rotary Missile
Launch Rail

Dress up your open canopies with latches, add mirrors and standby compass, paint vacuform first dark grey, then exterior color. Add 2 hydraulic rams per canopy for open configuration

Forward Fuselage

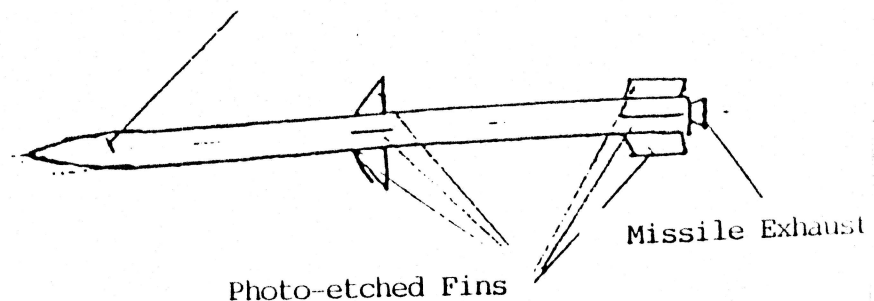


Missiles; speculative at best; some form of Falcon or Sparrow derivative. Would have been long range. Dress them up; tan nose cone, white or grey body, brownish red exhaust nozzle, add stripes and bit n' pieces of decal stenciling

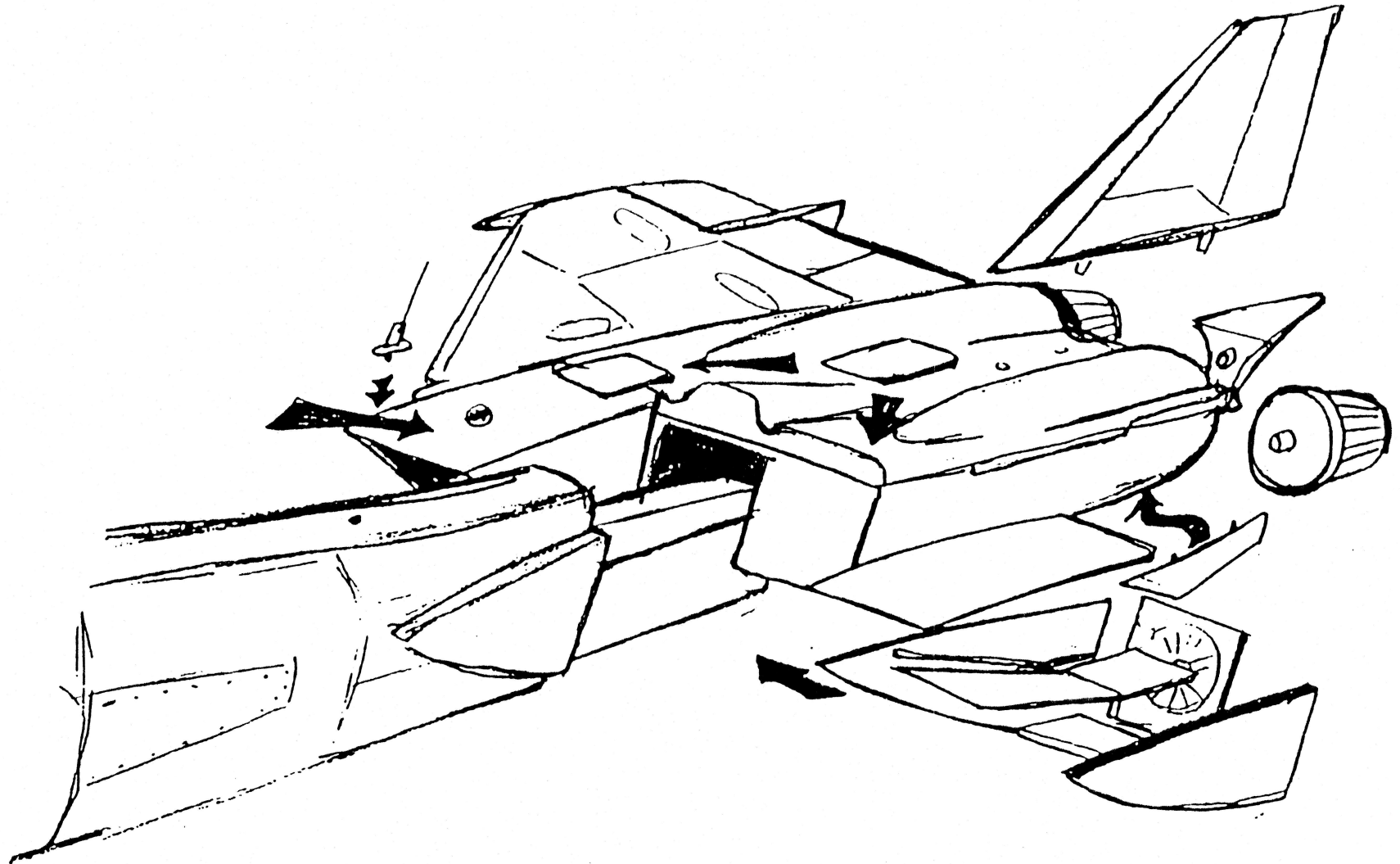


Missile Launcher
(from front)

Missile Body

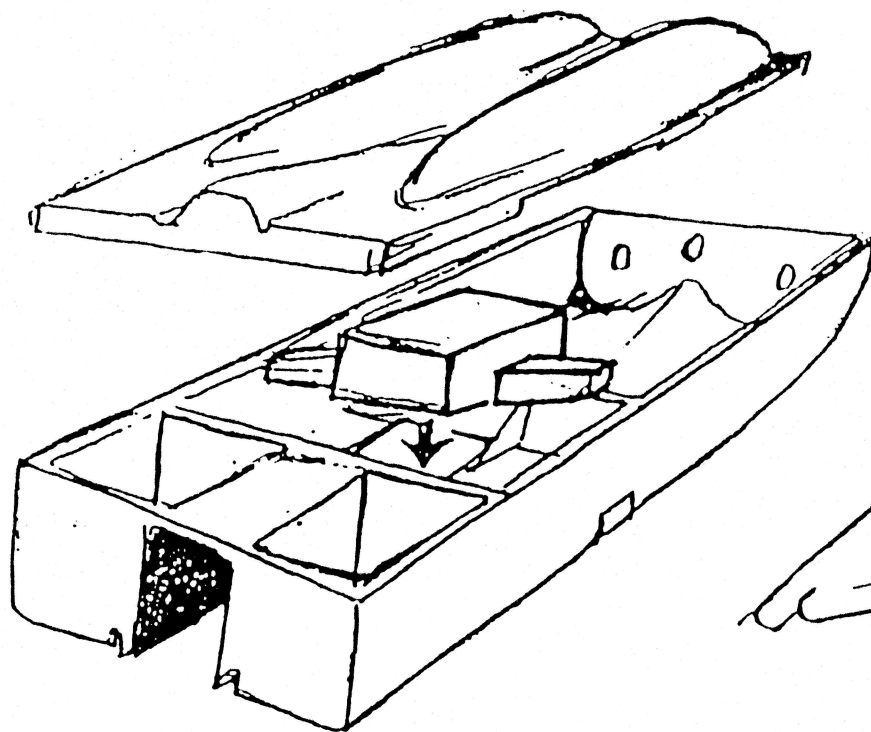


Fuselage Center Section

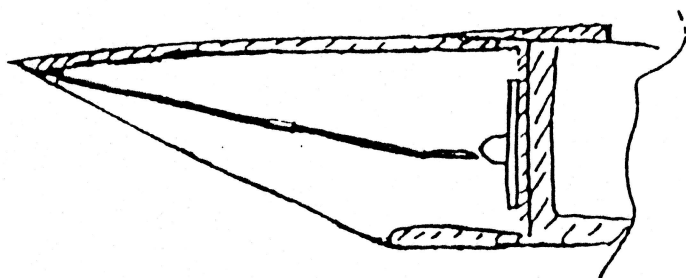
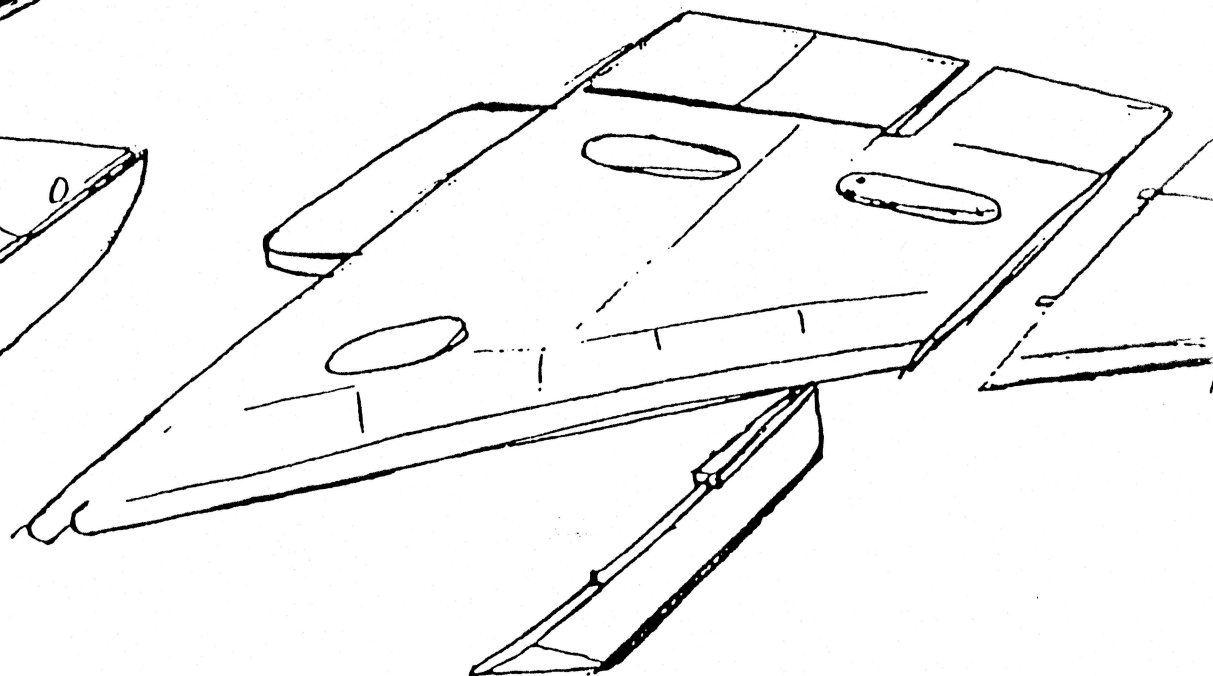


Parts placement in this area is pretty much self explanatory. As always, test fit, putty as needed. We realize, if you are building this kit, you are an experienced modeler. There is no right or wrong way!

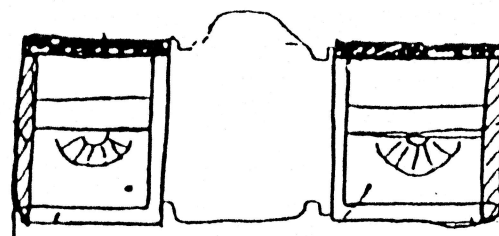
Center Section



Wing Const.

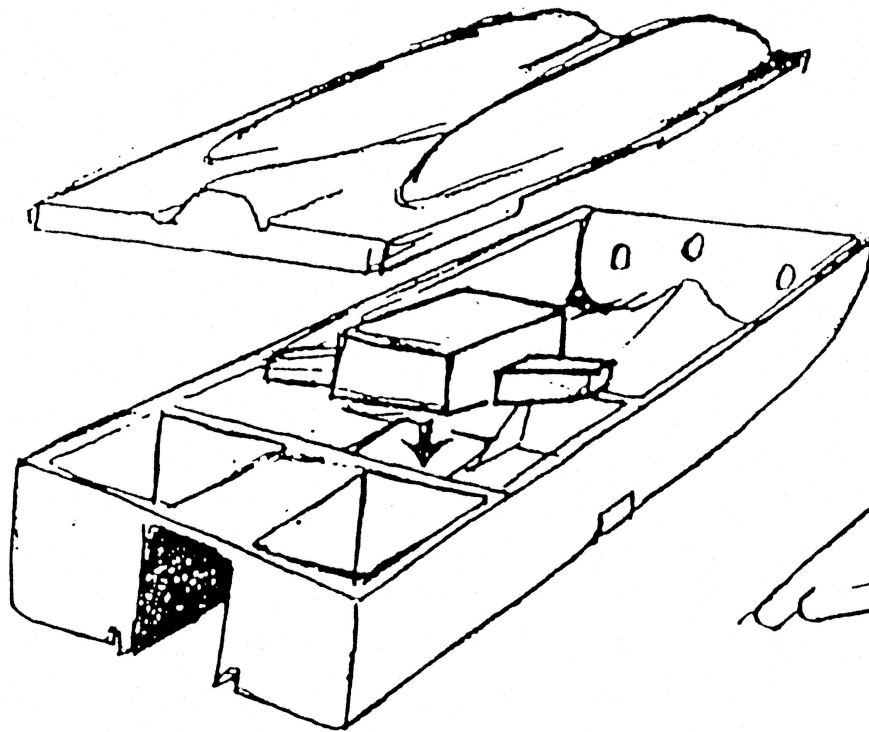


Inlet Alignment

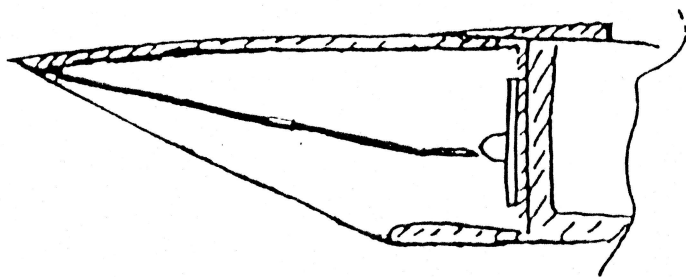
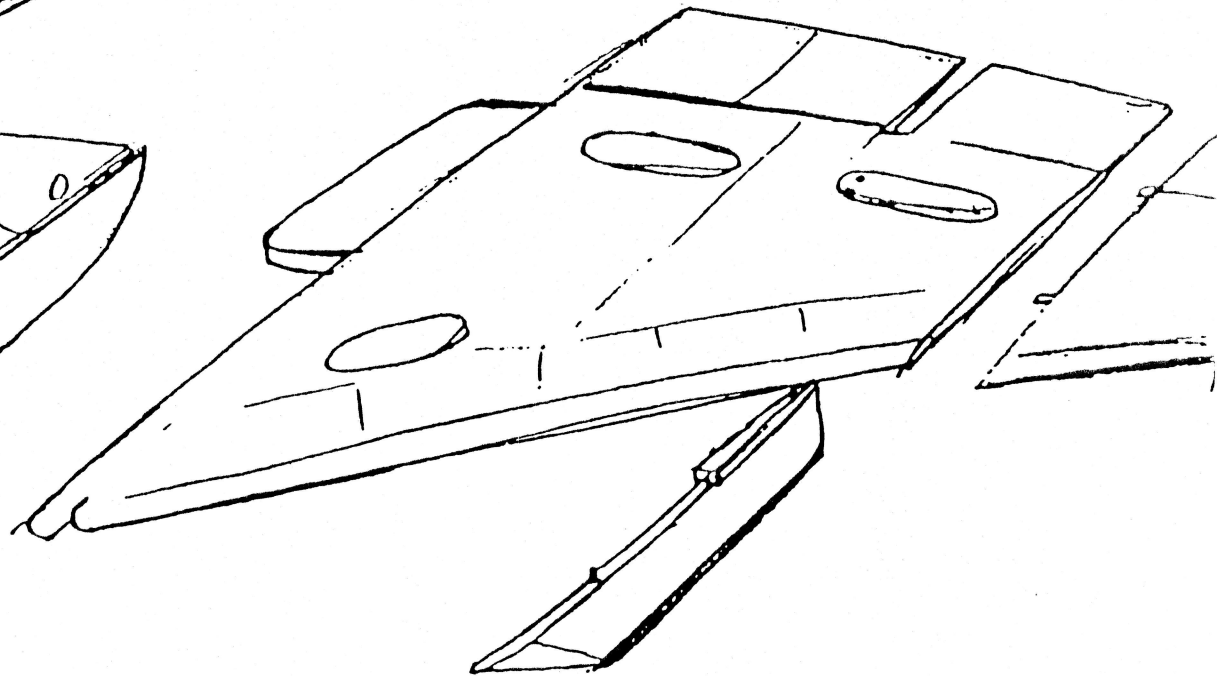


Intake Forward View

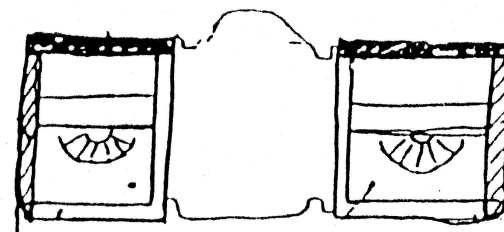
Center Section



Wing Const.



Inlet Alignment



Intake Forward View

THE F-108 RAPIER

In 1955, with supersonic fighters in service and Mach 2 fighters on the drawing board, the Air Force let it be known that it was planning to take the next logical step toward the development of a Mach 3 interceptor to match the potential development of Mach 3 Soviet bombers. By the end of the year, North American, Lockheed and Northrop had been awarded study contracts to develop proposals for the aircraft then known only as 'Weapons System 202.'

In June 1957, soon after cancellation of the YF-107 program, North American was given a contract to develop their proposal under the designation F-108. The mock-up was presented on 20 January 1959 and the name Rapier was adopted soon after. The name was selected by the Air Defense Command for the F-108 after a contest in which more than 38,000 names were submitted by pilots and airmen throughout the world. North American jet fighters had previously been given names, including Sabre. A 'Rapier' is a narrow, two-edged weapon used for thrusting, and the name 'aptly fits the long range and tremendous striking power of the F-108,' Air Force officials said. Sergeant Charles Wyon, stationed at Ent AFB, Colorado, was awarded a \$500 savings bond and a three-day trip to Las Vegas by NAA for submitting the winning name.

Designed to launch a nuclear missile 1000 miles away from its base and be back on the ground half an hour later, the F-108 was described by North American as 'a mobile missile launching platform that moves three times faster than the speed of sound at altitudes above 70,000 feet. It will result in a defense system for the United States that will permit the destruction far offshore of enemy aircraft or missiles approaching from sea level to extremely high altitudes.'

The F-108 was to have been powered by two General Electric J-93 engines and equipped with a new radar and fire control system developed by the Hughes Aircraft Company. Approximately 70 percent of the development and manufacturing would have been performed by several small businesses from coast to coast, but the airplane would have been assembled at North American's Inglewood plant.

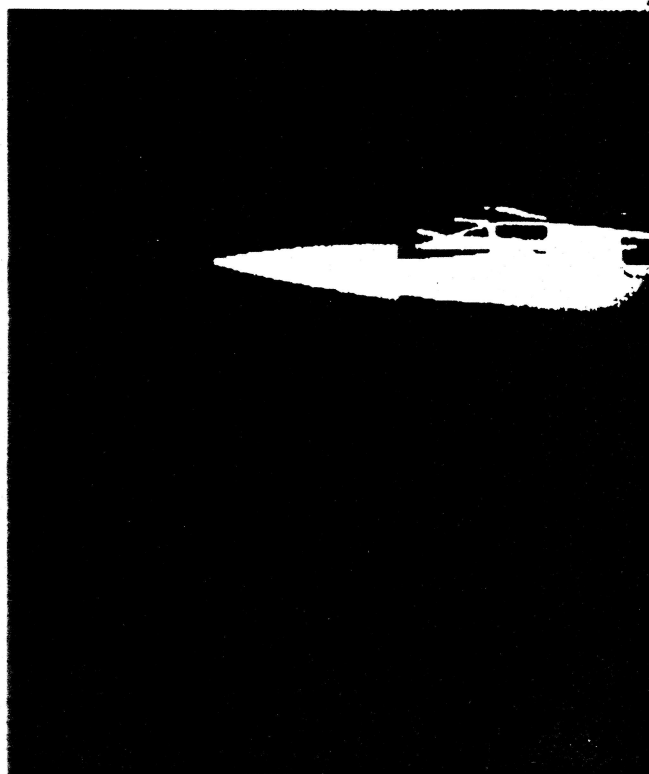
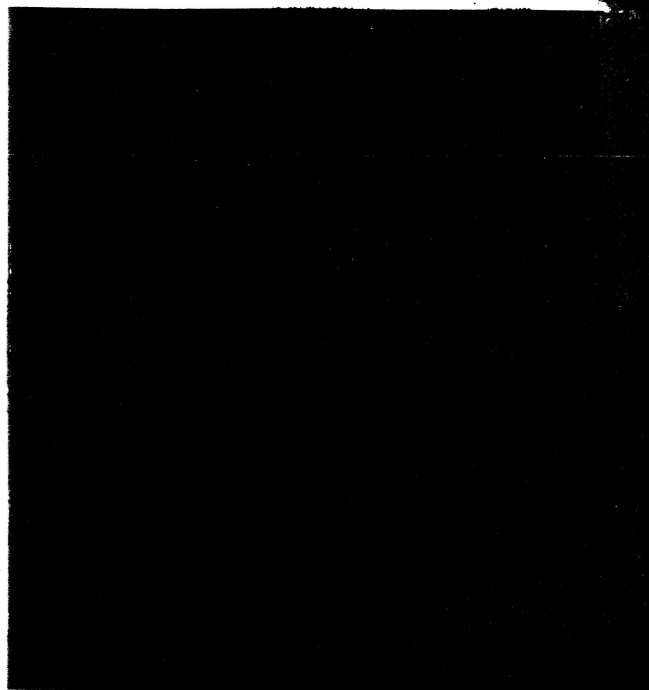
In testimony before the Senate Armed Services Committee, Air Force Chief of Staff Thomas White said that manned interceptors were required for long range attack on the enemy and were necessary for identification and air policing. 'In this function nothing has yet been developed with the judgment, flexibility and intelligence of the men in the cockpit,' the general said. He went on to point out that interesting features of the F-108 included its clean aerodynamic design, two engines, construction of stainless steel rather than aluminum, its ability to carry guided missiles with nuclear warheads, and the fact it carried a two man crew. 'The long range radar of the F-108 will have greatly improved capabilities over the radar in our current operational interceptors,' White added.

The F-108 had an overall appearance that was vaguely similar to that of the A3J Vigilante heavy attack bomber that North American was already building for the Navy, and it had many components—such as stainless steel honeycomb construction—in common with NAA's Mach 3 XB-70 Valkyrie.

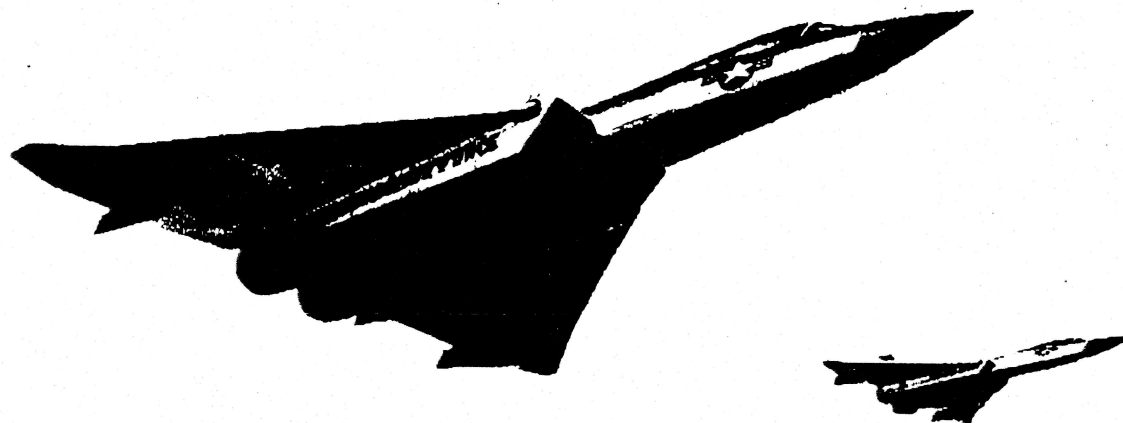
Unfortunately, like the XB-70, the F-108 also had a huge price tag and a paucity of friends among those who held the government's purse strings. The late 1950s, unlike the earlier part of the decade, were an era of tightened budgets. It was also a time when unmanned missiles presented an ever more serious competition to manned bombers. It was against this backdrop that both the XB-70 and F-108 came under fire. Subsequently, the XB-70 would be cut as a bomber and built only as a test aircraft, and the F-108 wouldn't be built at all.

On 23 September 1959 North American's three decade legacy of building the cream of the Air Force fighter fleet came to an end with a terse statement from the Air Force which stated that: '... The development of the F-108 long range interceptor is being terminated... The

decision to discontinue the F-108 development was reached... completion of a study which discloses that the already great rapidly rising cost and the personnel and material requirements advanced weapons systems dictates revision of certain existing projects... The F-108 was to be a long range fighter capable of three times the speed of sound (Mach 3). Its development was to precede, but closely integrated with, that of the Mach 3 B-70 bomber, also to be developed by North American. The two weapons systems had a number of major components in common and accordingly a portion of the \$150 million expended to date on the F-108 has been of direct application and of great value to the B-70 program.'

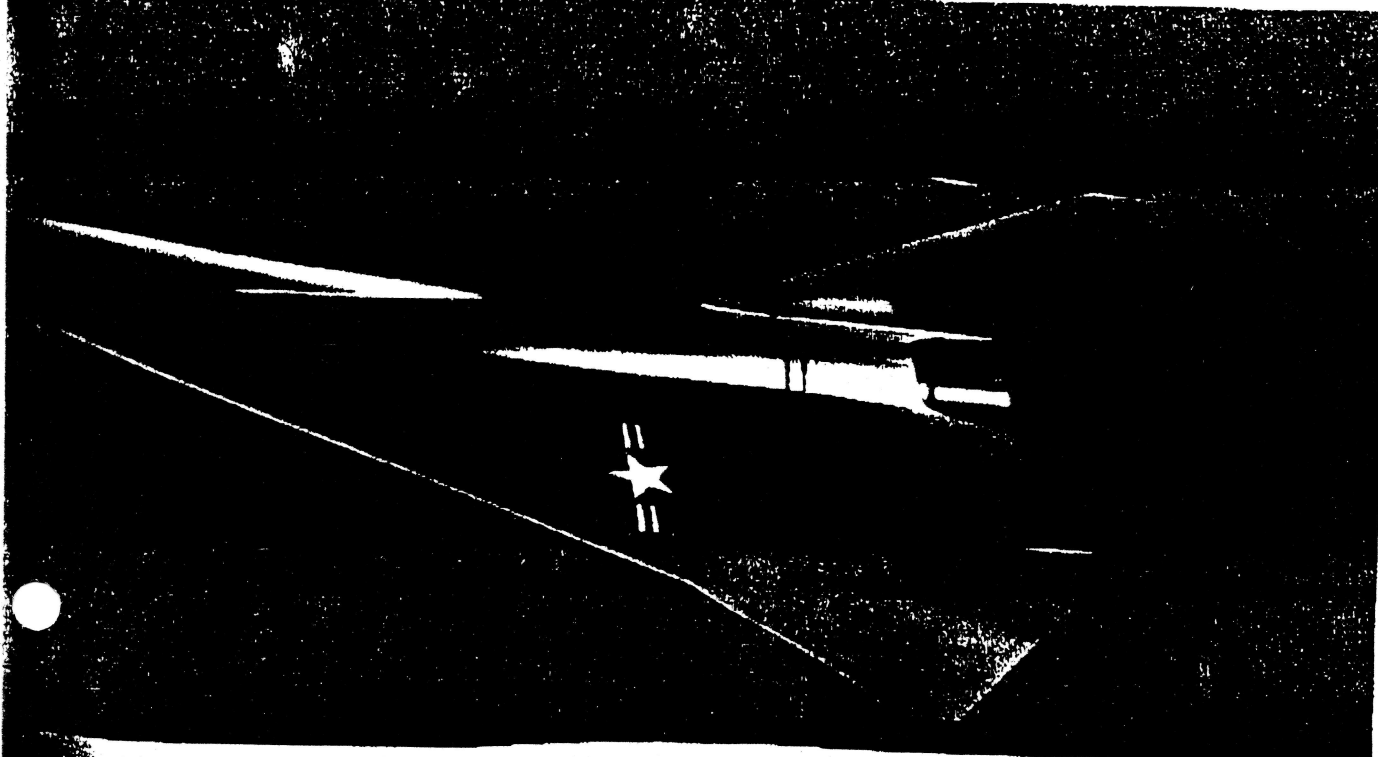


Rockwell; The Heritage of North American
Bill Yenne
London, Bison Books, 1989



Below: A once-secret model of the F-108 Rapier. Above: An artist's conception of Air Defense Command Rapiers on patrol. Three decades later the USSR had

Mach 3 Blackjack bombers and the US Air Force had no Rapiers with which to counter them.

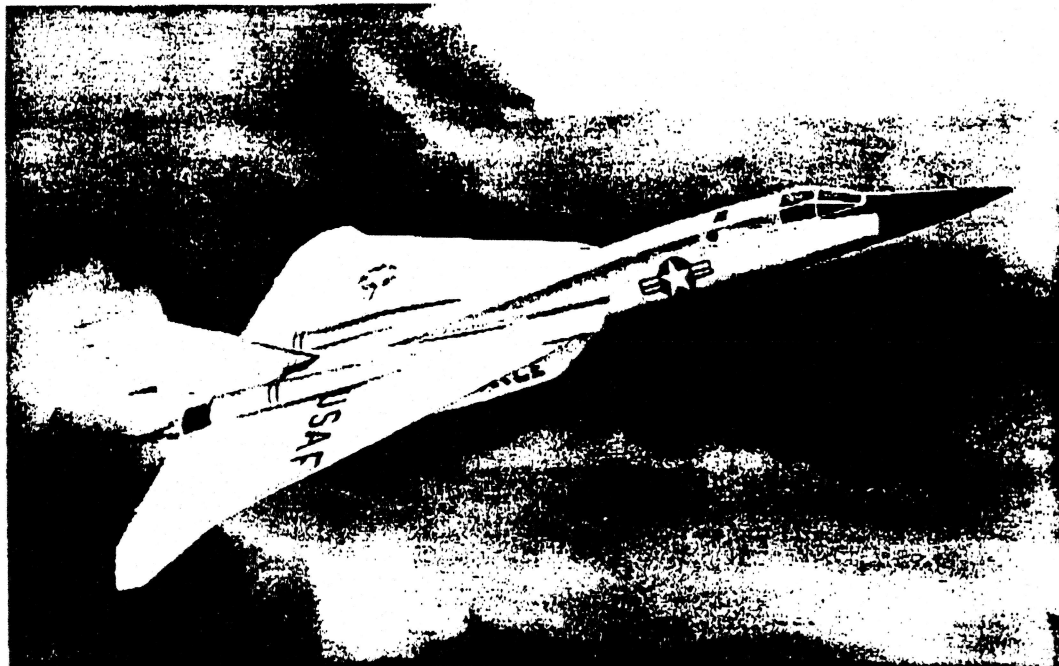


U.S. Fighters

Lloyd S. Jones

NORTH AMERICAN
F-108 RAPIER

NA-257



This drawing illustrates one of the configurations evaluated for the F-108 Rapier program. The three-view drawing shows the final configuration.

A competition in 1957, which cleared the way for design of the advanced XB-70 Valkyrie supersonic bomber, led to the creation of three other significant aircraft designs based on the same canard-delta configuration. In addition to the XB-70, North American built the aerodynamically-similar X-10 research craft and the XSM-64 Navaho intercontinental ramjet-powered missile. To this trio was added the unbuilt triple-sonic F-108 Rapier design.

The proposed F-108, which actually reached the mock-up stage, was a twin-engine, two place aircraft which was to weigh up to some 48,000 pounds empty and have a combat weight of more than 73,000 pounds. Maximum design gross weight was 102,000 pounds, a great deal of this poundage coming from the 7,100 gallons of internal fuel to be carried.

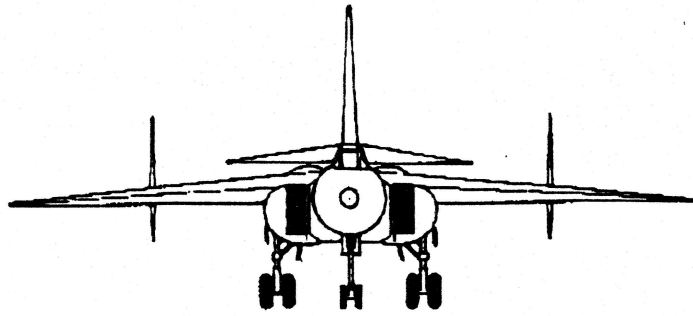
The configuration of the Rapier indicates that it was basically a half-scale Valkyrie, using only two of the General Electric J93-GE-3 engines mounted in the six-jet bomber. With each engine providing up to 30,000 lbs. of thrust with afterburning, the F-108 was to hurtle through the air at a

speed of more than 2,000 mph (Mach 3). It would have been an appropriate escort for its giant sister, the XB-70, had the two reached the operational stage as originally intended. But this was not to be, as only a pair of XB-70's were constructed and further development of the F-108 was cancelled on September 23, 1959.

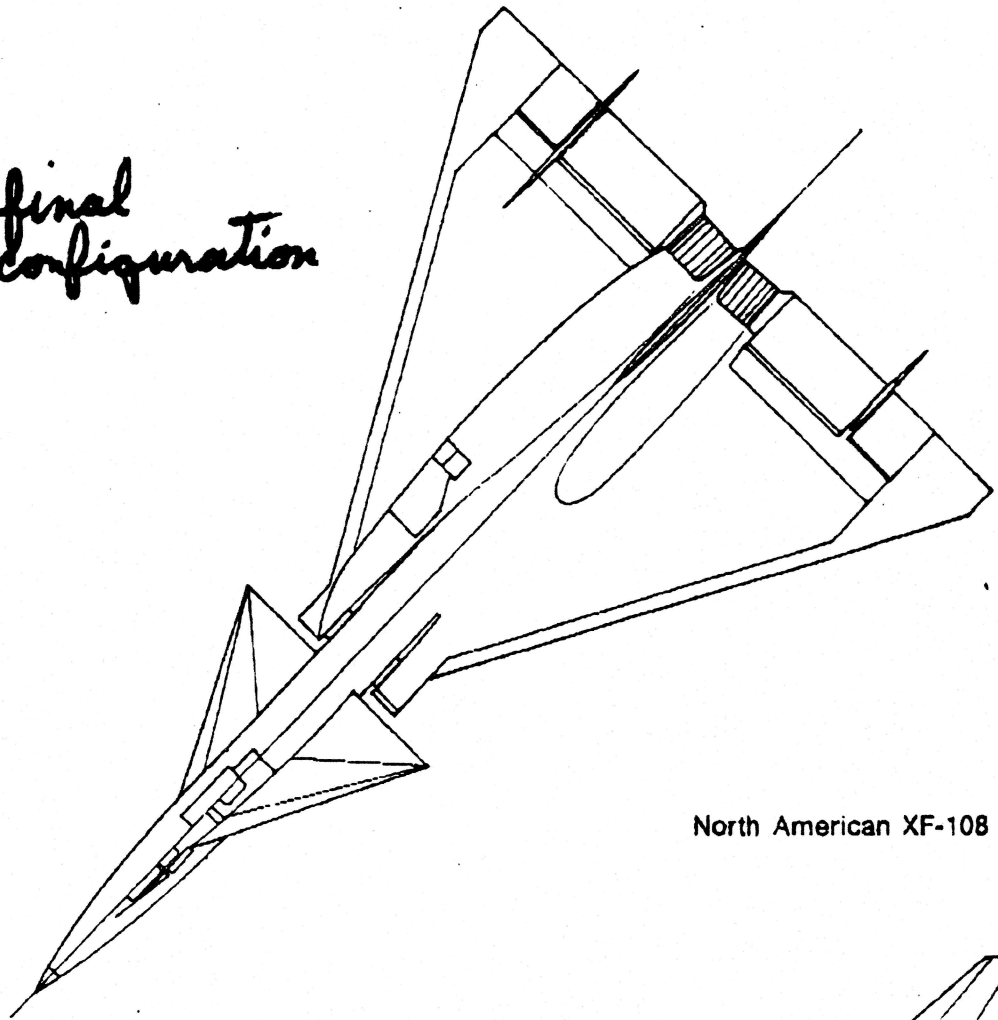
The Rapier's 52 foot 10½ inch span delta wing had an area of 1,400 square feet. A pair of vertical stabilizers was attached to the wings to provide the necessary stabilizing area when the fighter's speed exceeded Mach 2. Overall length was 84 feet 10½ inches and height was 22 feet 1 inch. Range of the F-108 was to be 1,150 miles at Mach 3. The Rapier design also provided for loiter missions in which the fighter would take-off and fly to a point 280 miles from its base, remain in the area for one hour, then proceed to intercept a target 750 miles away.

The two crewmen were to ride in individual ejection capsules of the type developed for the XB-70. If a prototype had been built, the scheduled first flight was to be in March 1961.

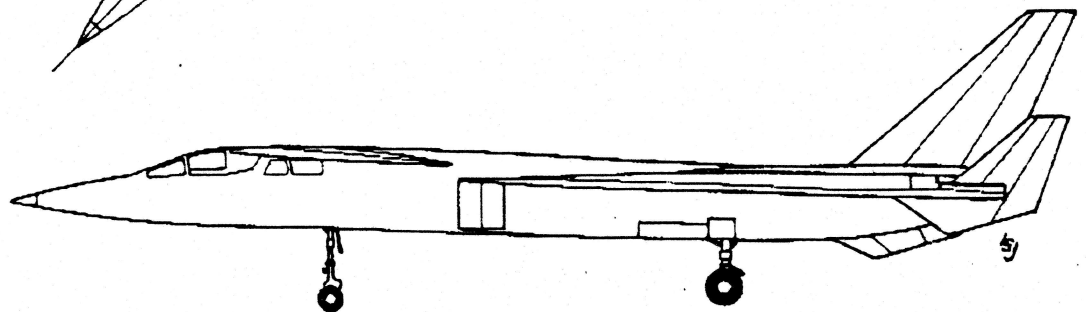
Fallbrook, Calif. 291 Aero Publishers, 1975



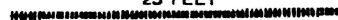
*final
configuration*



North American XF-108



25 FEET



Specs copied from Yenne's book

Span 57' 5"
Length 89' 2"
Height 22' 1"

Length 237 ft
Diameter 53.5 ft
Thrust 20,900 lbs each (dry?)
approx. 30,000 lbs each (with afterburner)
J93 is a single-shaft turbojet with variable-stator
compressor and fully variable nozzle; 2-stage turbine
Weight empty 50,907 lbs
gross 102,533 lbs

developed for the F-108
3 AIM-47A missiles (a larger derivative of the Falcon series)
interchangeable HE or nuclear warhead
formerly called GAR-9
an all-weather missile with infrared + pulsed Doppler radar guidance
Range, max 2488 mi
12 ft long
liquid fuelled
Lockheed Propulsion engine
Speed, max 1980 mph
Mark 3

? Operating altitude 80,100 ft