

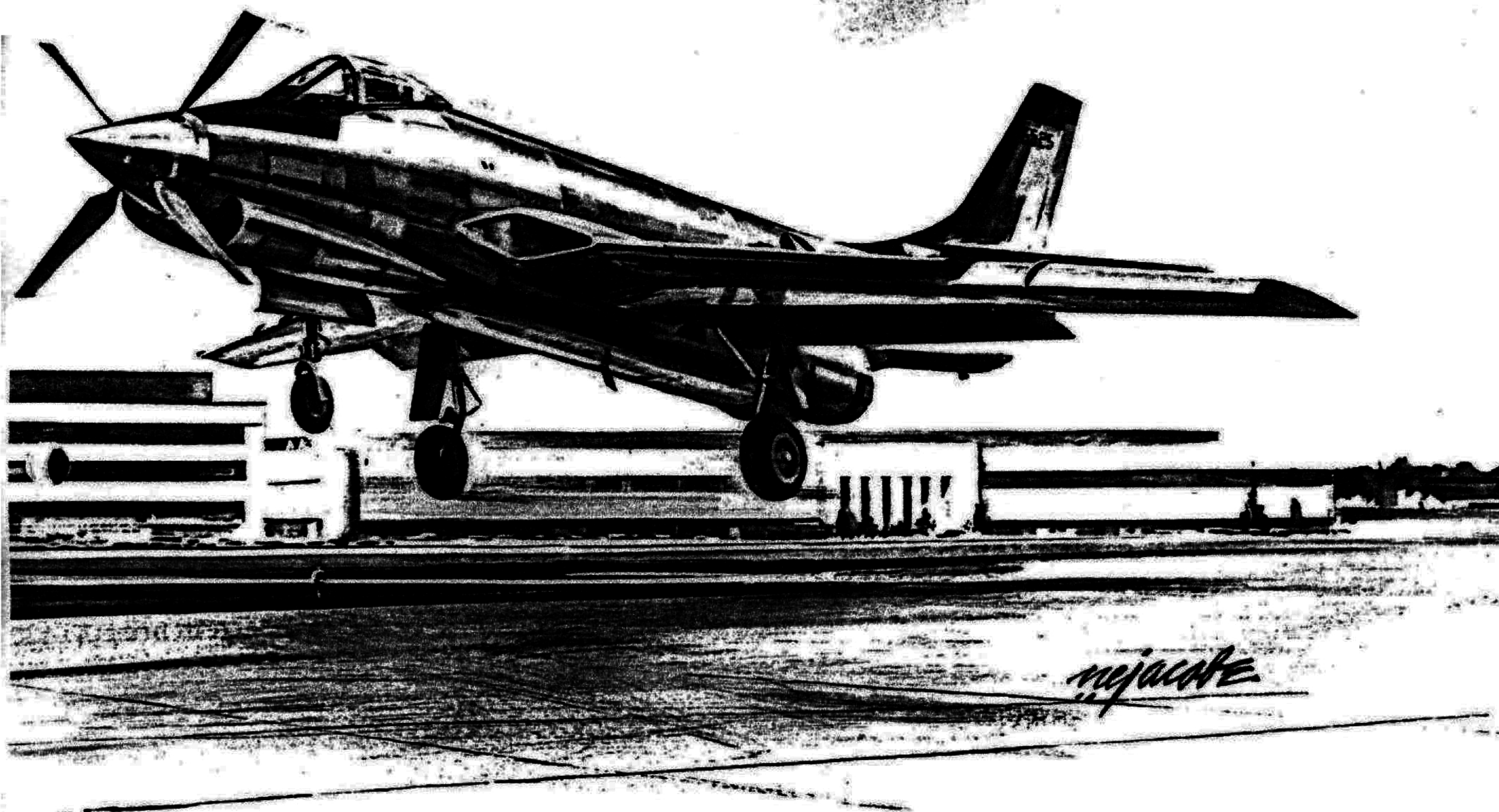
## McDonnell XF-88 Voodoo

Developed for the Air Force as a "Penetration Fighter", the first of a new breed, the XF-88 Voodoo was to serve as a long range bomber escort and fighter bomber. This was the new Air Force concept in bomber protection following the "Parasite Fighter" theory which produced the XF-85 Goblin.

Preliminary specifications called for a combat radius of 900 miles and performance over the target to surpass any aircraft in existence at the

time. Also, it was to be in the transonic range. To achieve the desired speed, swept wings were a 'must'. Little knowledge on swept wings existed in the U.S. during the 40's. The Germans had done considerable research on the problem during WW II and microfilm data was made available to McDonnell. From this data and their own research, a thin tapered wing and tail swept 35° were designed. This proved to be an excellent choice, for most later aircraft utilized the 35° angle.

The wing also featured leading edge flaps which could be lowered 30° and conventional



trailing edge flaps. Also, a new item called a 'stall plate' or 'slip fence' made its appearance on this and subsequent swept wings. It consisted of a 3"-high metal plate running from the leading edge of each wing aft to the aileron hinge. It was set about two-thirds of the semi-span and parallel with the fuselage to improve wing tip stalling at high Mach speeds.

Power was supplied by two Westinghouse J34 jet engines rated at 3600 lb thrust. These were placed side-by-side in the lower fuselage in the wing area. Each engine was attached by three quick-disconnect fittings. Engine removal was

expedited by built-in tracks on which the engines could be rolled aft in the fuselage and lowered on bomb trailers. This was a great innovation in a day when fighters were pulled apart in the middle to remove an engine.

Air intake ducts were located in the wing roots and channelled to each engine by a gently-curved "S" duct. Exhaust gases were expelled from the lower aft fuselage much the same as in the current F-4 aircraft.

A year or so after the start of the XF-88 development program it was deemed desirable to incorporate afterburners for increased takeoff

and climb performance. By this time the design was 'frozen' and 52 inches was all the length available for the installation. No afterburner of that size existed and no engine manufacturer was interested in developing one, so McDonnell did the job.

When completed, the McDonnell afterburner surpassed all expectations in performance for such a diminutive sized unit. It measured only 30 inches long and featured a variable-diameter iris nozzle. Like the variable pitch propeller, it helped achieve optimum performance in all flight conditions. Tests conducted at Muroc AFB, California in October 1949 showed a 40% thrust increase from the J34 engines, with afterburners ignited. The J34 engines, initially rated at 3600 lbs thrust, produced 4000 lbs in later models and up to 6500 lbs with afterburners. This gave the XF-88 a total thrust of 13,000 lbs, equal to 26,000 hp at 750 mph. This was roughly one horsepower per pound of gross weight!

Armament consisted of six 20-mm cannons with 250 rounds of ammunition per gun. Ammunition cans were built into the structure, and an automatic loading device fed the ammo belts from a ground cart backward through the feed chutes into the boxes. With this system, two men could reload and prepare the six guns for firing in twelve minutes. Other armament included provisions for carrying 5-inch rockets and the usual assortment of bombs and other external stores.

The XF-88 was one of the first fighters to employ completely irreversible power controls with artificial control load feel. No actual flight loads were felt by the pilot. In case of hydraulic failure, bypass valves permitted the pilot to fly the aircraft at reduced speeds. This system also reduced control surface buffeting at high speeds to an absolute minimum, making the F-88 a very stable gun platform.

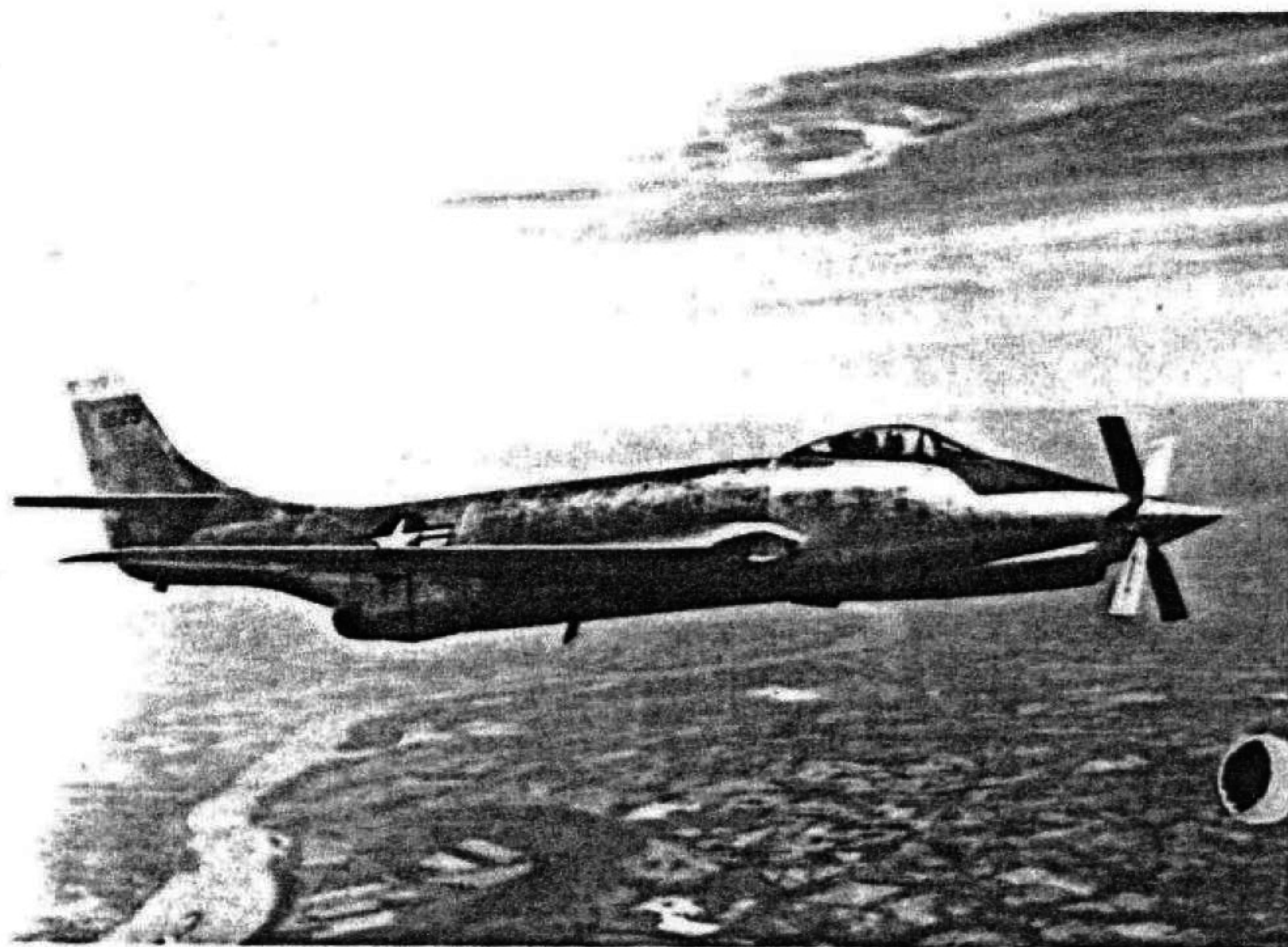
The pilot's compartment was pressurized, air conditioned and bullet-proof. In addition to the six 20 mm cannons, underwing racks carried a variety of rockets and bombs. Fuel capacity of 1400 gallons without wing-tip tanks gave the Voodoo a combat range of 1725 mi. This was nearly double initial design specifications.

The XF-88B lived up to the name "Voodoo" on April 14, 1953. A casual observer seeing it take off from Lambert-St. Louis Municipal Airport that day would have breathed "Magic!" for it leaped into the air with a huge four-bladed propeller on its bullet nose — feathered and motionless. For all appearances, the XF-88B was a prop-driven fighter leaving the ground deadstick.

No magic here though. At the hands of McDonnell test pilot Phil Houghton the XF-88B was making its debut as a test bed for supersonic propeller research. Mounted in its nose was an Allison XT38 turboprop engine powering a Curtiss electric propeller. The 10-ft. diameter prop had only two inches static ground clearance. So takeoffs and landings had



*Rollout of XF-88, afterburners not installed.*

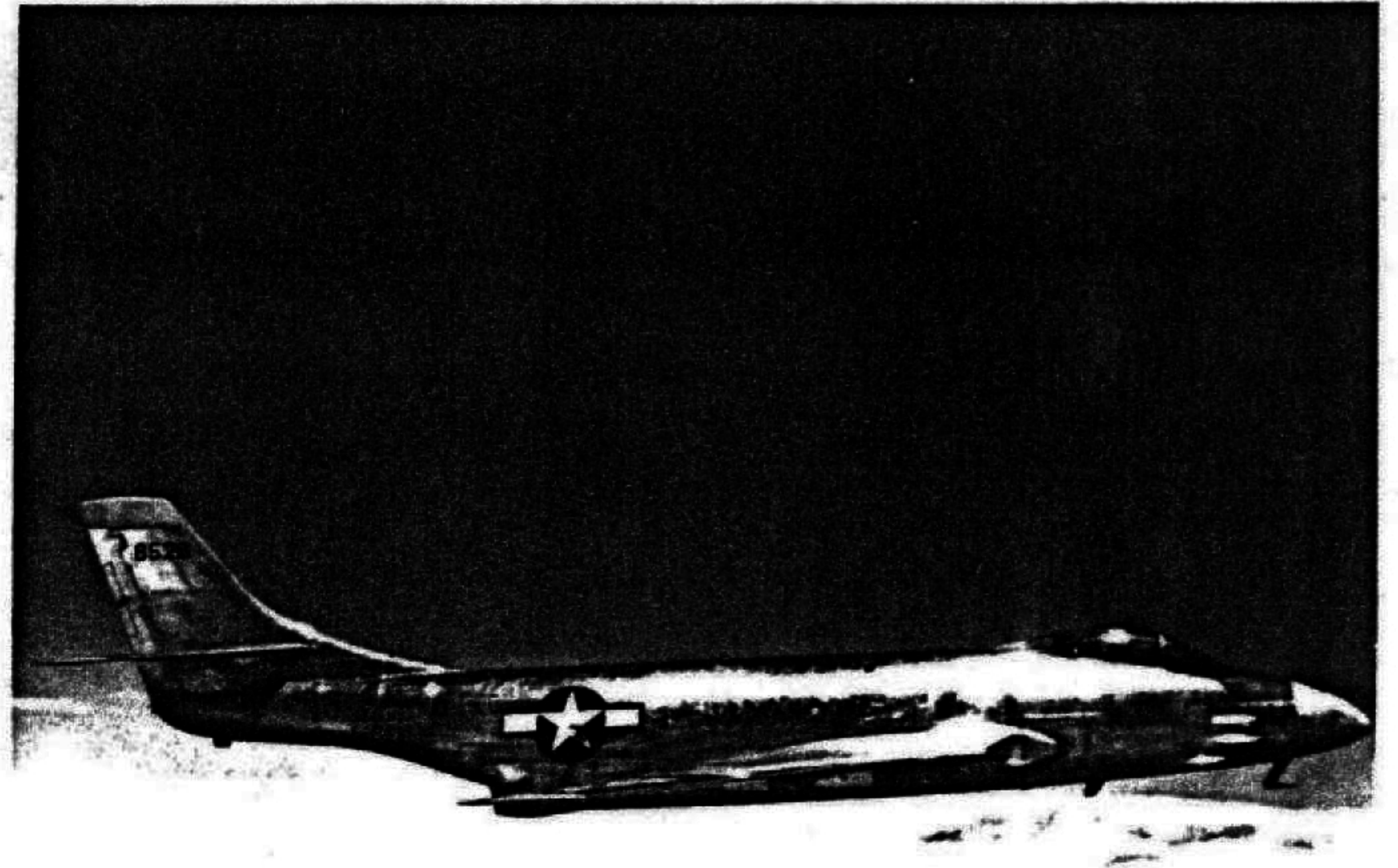


*Same aircraft, now XF-88B with experimental turbo prop installed.*

to be made with it feathered and locked in the 45° mode. The Allison engine was started at 20,000 feet and a definite surge of power could be felt by the pilot.

This was part of an Air Force program to develop a turboprop ground-attack plane, one of the many research programs of the era that died without bearing fruit.

Only two XF-88 Voodoos were built (SN 46-525/526). No. 1 was modified to XF-88B with the installation of the Allison turboprop engine in the nose. Though several inches longer, gross weight was down due to removal of electronics gear in the nose and reduced fuel capacity. No. 2 became XF-88A. Much was learned from their development and use. This knowledge was applied to future aircraft, especially the McDonnell RF/F-101 Voodoo, its illustrious offspring.



No. 2 Voodoo during flight test program. Afterburners and cannons are installed.

