Table of Contents

Chapter 5

A Rocketdyne XM-34 booster generated 132,000 pounds of thrust for four seconds to loft the F-100 into the sky. The "takeoff run" amounted to three-eighths of an inch, making this one the world's shortest runway. (U.S. Air Force)

The Real "Right Stuff"

During the Cold War, military planners strove to find ways to make combat aircraft more survivable in the event of an enemy first strike. Such aircraft were found to be most vulnerable while on the ground, either parked on an airfield or preparing for takeoff. Runways made inviting targets for enemy bombers. If a runway was damaged or destroyed, it didn't matter how many combat aircraft remained intact at the airfield. An airplane that can't take off can't deliver its weapons to a target.

The obvious solution was to free the airplane from the constraints of being dependent on a runway. The Zero-length Launch (ZEL) project was undertaken in the late 1950s to develop and test a means of launching an armed jet fighter from the bed of a trailer using a powerful rocket booster. By this method, fighters could be transported to virtually any location, and the transport/launch trailer could be concealed or camouflaged until launch time. Vulnerable fixed airfields would be unnecessary, except for landing.

It was an idea born out of a Cold War mentality that considered the imminent threat of nuclear annihilation a very real possibility. A combat aircraft that wasn't restricted to an airfield could be moved anywhere and therefore survive the first moments of a nuclear exchange. An aircraft such as the North American Aviation F-100 Super Sabre was capable of withstanding the necessary launch forces of a ZEL liftoff while carrying an external fuel tank and a single nuclear weapon mounted on wing pylons. The pilot was expected to carry out his combat mission and either attempt to land at a friendly airfield afterward, or eject if no airfield was available.

In 1958, an F-100D (Air Force serial number 56-2904) was bailed to North American Aviation, and modified for participation in the ZEL program. It was modified so that a Rocketdyne XM-34 solid-fuel rocket booster could be mounted on the

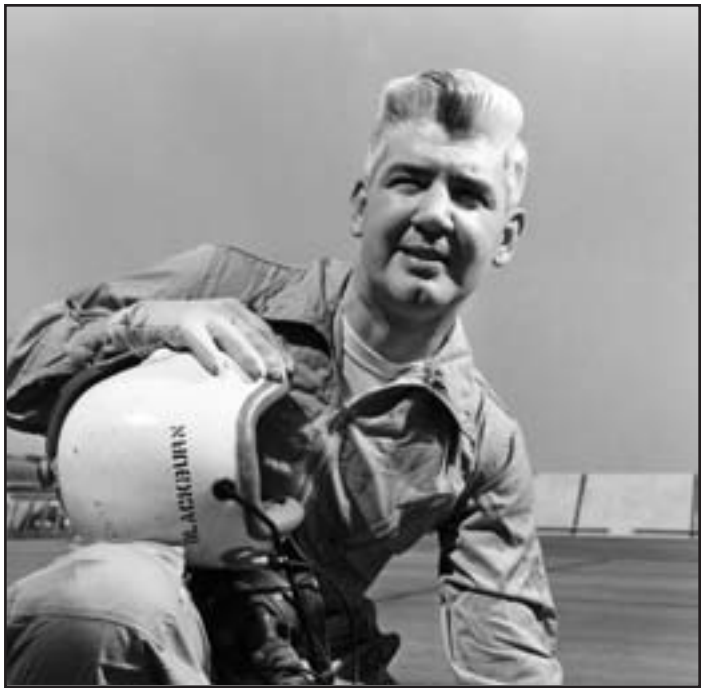
underside of the aircraft. At liftoff, the booster generated 132,000 pounds of thrust for four seconds before burning out when the F-100 reached an altitude of about 400 feet and a speed of 275 mph. The takeoff run (equal to the actual length of the ramp that guided the airplane during the initial instant of its launch) was approximately three-eighths of an inch, making it the world's shortest runway. During launch, the pilot experienced a 4-g maximum acceleration force.

Zero-Length Launch

Albert W. Blackburn of North American Aviation was selected as project pilot for the F-100 ZEL test program. Blackburn graduated from the Naval Academy during World War II and entered service as a Marine Corps aviator. After seeing combat in the Pacific, he returned to the United States, where he continued to serve as a carrier-based fighter pilot. In 1949, he left the service to earn a master's degree in aeronautical engineering from the Massachusetts Institute of Technology. He was recalled to duty during the Korean War and spent a few years as a test pilot at the Naval Air Test Center at Patuxent River, Maryland. In 1954, he joined North American as an engineering test pilot, flying the new F-100. Four years later, he was assigned to check out the F-100D with its rocket-assisted launch system.

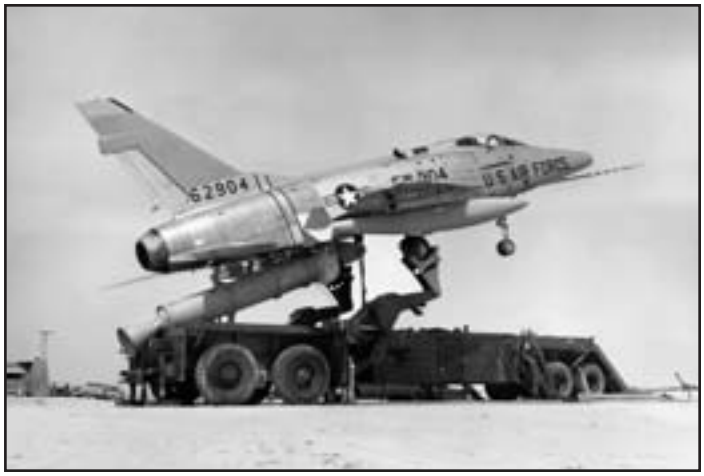
Blackburn made the first ZEL flight on 26 March 1958. The F-100D was positioned on its launch trailer near the south end of Rogers Dry Lake at Edwards. Technicians installed the XM-34 rocket booster below the aft end of the fuselage. The airplane's wing pylons carried a 275-gallon fuel tank and a T-63 (simulated Mk.7 nuclear weapon).

After careful preflight preparations, Blackburn ran the fighter's jet engine up to full power and pushed the launch button. With a cloud of black smoke and orange flame, the F-100D surged into the sky. At booster burnout, the airplane was traveling at a speed of nearly 300 mph.



North American Aviation test pilot Al Blackburn served as project pilot for the ZEL F-100 program. (AFFTC History Office)

The Zero-length Launch, or ZEL, F-100 was equipped with a solid-propellant rocket booster and launched from a mobile platform. The airplane carried a T-63 (simulated Mk.7 nuclear weapon) on the left wing. The black-and-white grid on the side of the airplane served as a photo reference. (AFFTC History Office)



The ZEL F-100 carried a 275-gallon fuel tank on the right wing. This offset the weight of the weapon on the opposite wing and simulated the planned operational configuration. Had nuclear-armed ZEL fighters been launched in the event of all-out war, it was expected to be a one-way mission. (AFFTC History Office)

Blackburn concentrated on keeping the wings level. As the rocket engine exhausted its fuel and lost forward thrust, it slipped back out of the attachment points holding it to the fuselage. When the booster dropped away, it struck the underside of the aircraft, causing slight damage. Otherwise, the flight was uneventful, and Blackburn made a successful landing on the Edwards main runway.

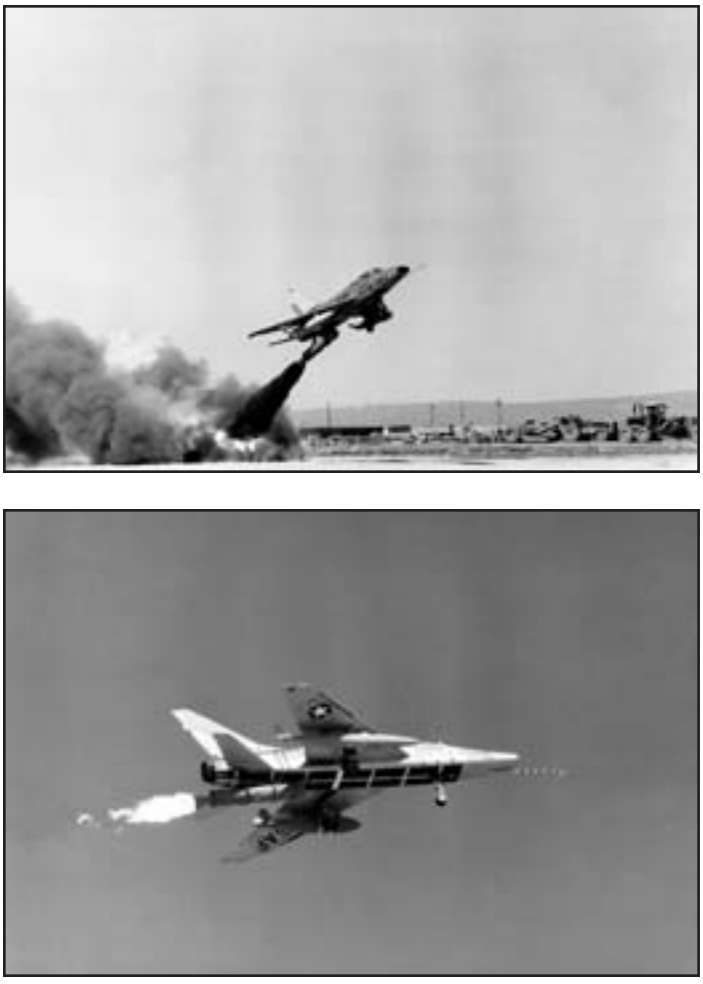
No Other Option

The second flight, on 11 April 1958, was more exciting. Again, Blackburn strapped himself into the cockpit and prepared for launch. The airplane was loaded to a gross weight of 40,064 pounds with one 275-gallon fuel tank on one wing and a T-63 simulated nuclear weapon on the other. Once more the desert silence was split with a thunderous roar as the F-100D blasted skyward.

The rocket booster exhausted its fuel at an altitude of 250 feet. Blackburn waited to feel the XM-34 drop away, but it remained stubbornly attached to the aircraft. This was a real problem since the booster was now essentially a 2,600-pound dead weight, and it extended nearly two feet below the landing gear. There was no way for the pilot to execute a safe landing.

Blackburn flew the F-100D over the remote expanse of Harper Dry Lake, northeast of Edwards. For nearly an hour, he struggled to shake the booster loose without success. Finally, having no other option, Blackburn ejected.

He had always anticipated that if something went wrong, it would occur during the launch sequence. Hence, he had selected a small, fast-opening parachute.



The second ZEL F-100 flight, on 11 April 1958, began with a successful launch. At booster burnout the airplane was traveling 300 mph at an altitude of about 250 feet. Under normal circumstances the booster would separate at this point, but in this case it remained attached to the F-100, making it impossible for the pilot to land safely. (AFFTC History Office)