



Capabilities Statement - 2020

The F-104 is a remarkable aerial platform, designed during the Cold War at Lockheed's Skunk Works by legendary aircraft designer Kelly Johnson. It served the U.S. Air Force as a supersonic air superiority fighter, strike fighter, and fighter-bomber with up to nine pylons and hardpoints for munitions. The F-104 became a popular export to allied militaries, remaining in production through the mid 1980s and in active service overseas through 2004.

The F-104 was the first combat aircraft capable of sustained Mach 2 flight, and its speed and climb performance remain impressive even by modern standards. It was the first aircraft to simultaneously hold the world speed and altitude records, and still holds the altitude record at 91,243 feet.

NASA and the Air Force used the F-104 for astronaut training during the Mercury program, and as a research platform. The aircraft can put research payloads into microgravity, high altitude, high speed, and high G environments. The jets can also mimic the ascent, descent and flight profiles of spaceflight vehicles and high performance military aircraft, and -- according to NASA calculations -- can provide over 60 seconds of microgravity during parabolic maneuvers.

Recent Research Projects

- ◆ **Launch Vehicle Flight Termination System Test** (NASA)
- ◆ **Electronic Warfare Pod Testing** (DoD customer)
- ◆ **Pressure Suit Design Tests** (Final Frontier Design)
- ◆ **Hyperspectral Imager Test/Validation** (Florida Tech)
- ◆ **Pre-Spaceflight Biological Specimen Test** (University of Florida)



- ◆ **Biological Microgravity Test Instrument Project** (UZH Space Hub)
- ◆ **Air-Launch Orbital Rocket Systems** (Embry-Riddle, CubeCab, others)
- ◆ **Human Factors Physiological / Biometric Measurement** (Infinity Space)
- ◆ **Upper Atmospheric Particulate Sampling** (University of Florida)
- ◆ **High Altitude Radiation Measurement** (Florida Tech)

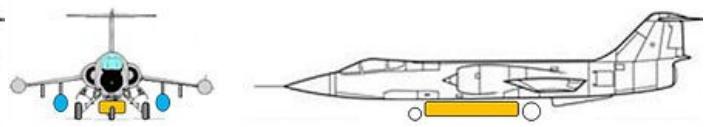
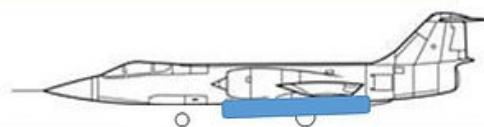
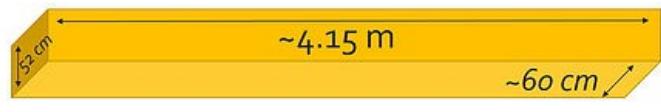
With single-seat and two-seat versions, we can accommodate payloads large and small, in multiple external stations and internal compartments (pressurized and unpressurized), with capabilities for payload power, communications, video, and (backseat) human support.

Our fleet and personnel provide a low-cost alternative to other active-duty military and NASA aircraft for avionics and electronic systems testing, electronic warfare R&D, adversary air services (for military flight training and countermeasures testing), surveillance system testing, captive carry aerodynamic testing, high-G pilot/passenger physiology testing, air-launch for microsatellites, and other military, NASA, and commercial requirements.

Our workforce is comprised of multforce military-background personnel, able to dependably and responsively support classified projects. Our flightline is located behind the NASA and Air Force security gates at the Cape Canaveral Spaceport, but we can also deploy to other locations.



- 1) Fuel/experiment payload pod on wingtip station
- 2) Underwing stations (two per wing)
- 3) Pressurized avionics bay, rear seat, radome stowage
- 4) Cargo/experiment payload pod on underwing station
- 5) Centerline fuselage station
- 6) Air-launch rocket on underwing station



Underwing pylon placement

Carriage weight limit: ~680 kg (1500 lbs)
(May require use of both underwing positions for flight stability)

Centerline (fuselage) placement

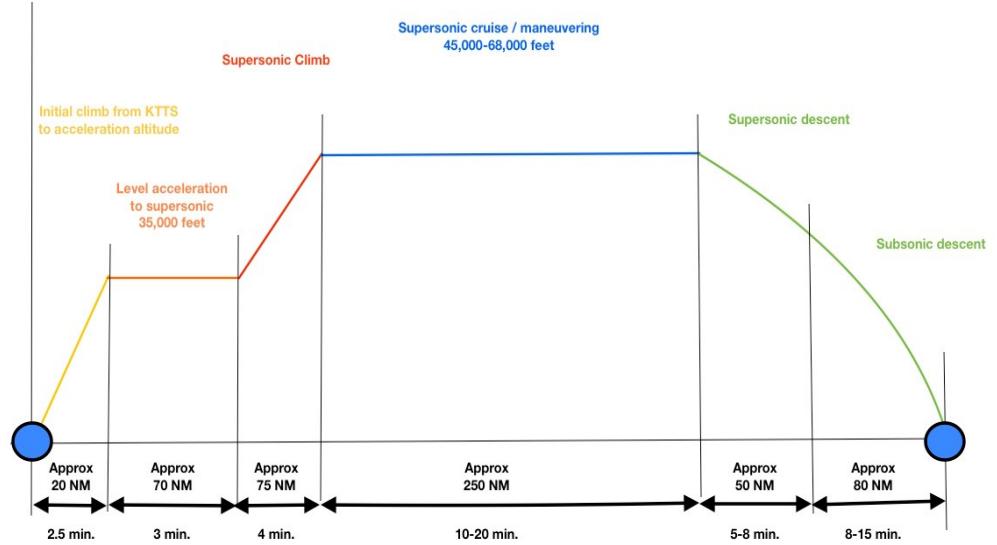
Carriage weight limit: ~1043 kg (2300 lbs)

Microgravity

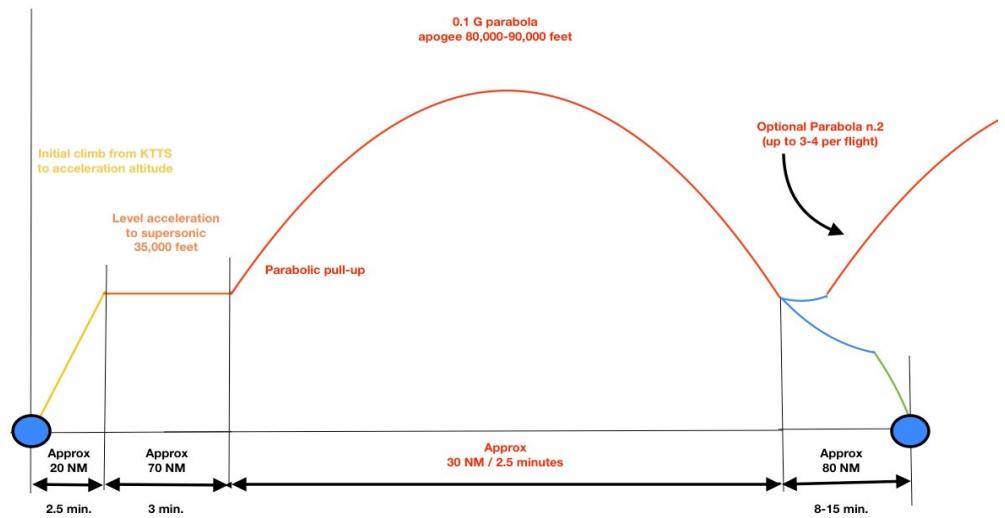
When NASA maintained F-104 aircraft within its fleet, the agency studied their use for microgravity research. Based on NASA estimates, we believe the TF-104G-M (two-seater) would provide a weightless duration between 55 and 75 seconds, with two microgravity parabolas per sortie. The F-104S-ASAM (one-seater) would provide a weightless duration between 65 and 90 seconds with three parabolas per sortie. Starfighters has not yet confirmed these duration estimates in flight operations with our own fleet.



F-104S Typical Supersonic Profile - Sustained Flight



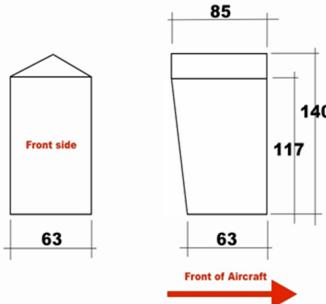
F-104S Typical Parabolic Flight Profile



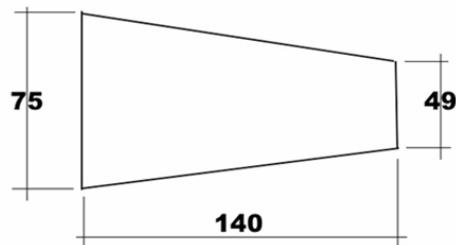
Payload Accommodations

Starfighters is prepared to provide a range of carriage options for experiments, flight test articles, and educational payloads. Below are descriptions of the various locations available in our one- and two-seat models.

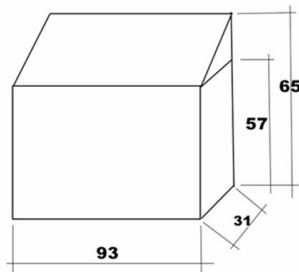
Rear Seat — In addition to carrying test-subject participants in the rear seat, the two seater can carry an experiment rack approximately the size of a small refrigerator, up to five feet in height. The rear ejection seat can be removed and an experiment rack can be attached to the seat's rail system, with access to power. Or, a smaller payload carrier can be strapped to the seat during flight.



Radome — The radome (nose cone) typically contains military radar equipment but the aircraft is no longer used for military missions. With the radar removed, the radome is provides substantial volume for experiments.



Avionics Bay — The avionics bay is situated behind the cockpit and is essentially a rack for removable modular electronic components. Some of these were military so are not currently used, allowing the space to be repurposed for experiments that can plug into the aircraft's power supply. The two-seater aircraft has a smaller avionics bay, to make room for the rear seat.



Wingtip and Underwing Pods — Underwing pods typically used for cargo transport can be repurposed for experiments. And we have modified wingtip auxiliary fuel tanks to carry experiments too.

