

## Air and Space this Week

### Item of the Week

# Test Pilot Bruce Peterson: *The Real "Six Million Dollar Man"*

Originally appeared November 2, 2020

[KEY WORDS: Bruce Peterson, Fred Haise, M2-F1, M2-F2, HL-10, NT-33A, Milt Thompson]

The topic for this Week's Item comes to us somewhat indirectly.

Fred Haise was the Lunar Module Pilot for the ill-fated Apollo 13 mission. He is on my radar because his birthday is next week, on November 14 (1933). Haise trained as a Naval Aviator in the mid-1950's, and served as a Marine Corps fighter pilot. After service, he went back to school, earned a BS in aeronautical engineering, while still flying fighters for the Oklahoma National Guard. He then became a NASA test pilot at Lewis Research Center (since renamed for John Glenn) before going for post-graduate work at Edwards AFB, with a stint of service in the Air Force for the 1961 Berlin Crisis in between. At Edwards, he flew a variety of aircraft and continued his studies, before being selected as NASA Astronaut in 1966. He served as backup Lunar Module Pilot for both Apollo 8 and Apollo 11, before becoming prime Lunar Module Pilot on Apollo 13. He was slated to be the sixth person to walk on the Moon, but, like James Lovell, he lost that opportunity when Apollo 13's mission was aborted. He thrice flew the Space Shuttle *Enterprise* atmospheric test vehicle, now at the Intrepid Museum in NYC. He also was slated to fly the second Space Shuttle mission, designed to boost the *Skylab* space station to a higher orbit, but *Skylab's* orbit decay rate was too fast, and that mission was repurposed. In 1973, he suffered serious injuries flying a Convair BT-13 modified to resemble a Japanese "Val" dive bomber during the filming of *Tora, Tora, Tora* several years earlier. He never made Space again after Apollo 13, but he was recognized with a large number of awards for his fine career.

BTW: Bill Paxton played Haise in *Apollo 13* (the movie).

One of the aircraft Haise flew during his post-Apollo work for the Space Shuttle was the [NT-33A Variable Stability Trainer](#), an aircraft designed to investigate control issues for the X-15 and other experimental aircraft of the time.

Aerodynamic research into missile nose cone design conducted at the Ames Aeronautical Laboratory (now the NASA Ames Research Center) in the late 1950's by Alfred J. Eggers showed that a blunt nose was better than a very sharp nose in resisting frictional heating. Further, if the nose were a bit flattened on one side, it could produce a significant amount of lift. Not only did this research show that the best shape of a capsule for reentry into Earth's atmosphere was a blunt, forward-pointing bottom, but it also gave Eggers the idea of using the shape of a high-speed aircraft's fuselage rather than large wings to produce lift. This triggered a lot of

additional research into planning for a reusable Space “plane” that could use its high reentry speed and shape to return from orbit more like an airplane. One of the test aircraft that resulted was the [NT-33A Variable Stability Trainer](#), which would [provide data](#) for Shuttle planning and for the control of the X-15 and other high-speed research aircraft.

Fred Haise flew the NT-33A during this period. So did test pilot Bruce Peterson.

NASA build several aircraft called “lifting bodies” since most of their lift came from their shape, not their wings. They also continued aerodynamic testing at both Ames and Langley Research Centers.

The first true lifting body was the *M2-F1*, and its flights out of Dryden Flight Research Facility (later renamed for Neil Armstrong) showed the validity of the lifting body concept. The [M2-F1](#) was a simple affair, initially designed by engineers at NASA Ames Research Center. It had a tubular steel frame surrounded by a plywood shell and, since it was to be used for glide testing only, it had no engine. A local glider manufacturing company built it, with the assistance NASA Dryden (one of their craftsmen had earlier helped build the [Spruce Goose](#)! **And BTW, the Goose made its one and only flight 73 years ago TODAY (11/2)!).**

The first tests run with the *M2-F1* was a towing exercise on Edwards’ Rogers Dry Lake. A new ’63 Pontiac Catalina was the first tow vehicle, but that tank didn’t have the oomph needed to get the *M2-F1* off the ground, in spite of its 348 hp (the driver’s “foot was blue, like lead to the floor, but (that’s all the Cat) had, and there ain’t no more,” my homage to the [Lost Planet Airmen](#)). This was the early Sixties in southern California, so NASA had no difficulty getting the Pontiac souped up (more than) a bit. The end result, produced by famed hot-rodder Bill Straub, had a specially-modified 421 cubic inch “Tri-power” V-8 with well over 400 horses and a passenger seat facing backwards for the tow observer. [A new 1963 Catalina the same as the initial tow vehicle cost less than \$3K!] The driver ([would you believe](#) his name was Commander Cody?) of the new tow car “wound it up to 110” and off the ground went the *M2-F1*. It rose to 20 feet as planned, then dropped the cable and glided smoothly to a landing, paving the way for towing tests by a C-47. The *M2-F1* was on display at the U.S. Air Flight Test Museum at Edwards; a new version of that museum is [presently under construction](#).

The *M2-F1* was equipped with a rocket ejection seat (imagine that, a glider fitted with such a thing!) and rockets to extend its glide path should that prove necessary. Towing flights began on August 16, 1963. The *M2-F1* was towed up to 12,000 feet then released to glide back to Rogers. Senior NASA test pilot [Milt Orville Thompson](#) had the first flight; he would fly the *M2-F1* a total of 47 times, and flew another five missions on the *M2-F2*. He would later fly the X-15 right after these flights, and would have piloted the Dyna-Soar spacecraft had that program not been cancelled (I think the namers of that project went to the same PR school as the guys who came up with the “Boeing 737 MAX NG” moniker! Hey Congress, how about funding this dynasoar!). Others who flew the *M2-F1* included Fred Haise (one of the ground tow tests), Chuck Yeager, and future Shuttle commander Joe Engel.

The next test pilot up after Thompson was our hero, [Bruce A. Peterson](#). He joined NASA in 1960 as an engineer at (what would become) Dryden FRC. He transferred to Flight Operations

in 1962, and his first piloting assignment was on the Rogallo paraglider research vehicle ([Paresev](#)) program. The idea behind Paresev was to have capsules reenter Earth's atmosphere using an inflatable flexible hang-glider-esque wing (**Attention NASM UHC Docents** – this is the same type of [Rogallo wing](#) you have on display in Space Hall!). Peterson attended the Air Force Test Pilot School, and became NASA's first graduate. He also maintained active in the Marine Corps Air Reserve.

As an Edwards test pilot, Peterson flew a wide variety of aircraft, including several of the F-100 series, the F-111 swing-wing bomber, the *NT-33A Variable Stability Trainer* that Fred Haise flew, and many more.

I found two different sources that disagree on who flew the first flight of the *M2-F2* successor to the *M2-F1*. One source says it was Peterson, another says Milt Thompson. I'm going with the latter, because he was very senior and did make a few flights in the *M2-F2* before retiring from flight test in 1966. In any case, Peterson ended up making 42 flights in the *M2-F1*.

Peterson also made the first test flight of the Langley-designed *HL-10* lifting body test plane on December 22, 1966. Alas, the shape of the aircraft caused a separation of air flow over the wing, rendering his flight controls largely useless. Peterson was a superb pilot, and it was on his skills only that the *HL-10* did not crash out of control. His flight generated the data needed to make modifications to the *HL-10*, which afterward was one of the most successful lifting body designs, much of which made it into the Space Shuttle.

Peterson became the NASA project pilot for the lifting body program after Thompson's departure. On May 10, 1967, he made his fourth glide flight in the *M2-F2*, the 16<sup>th</sup> flight in its test program. Dropped from the B-52 mothership at almost 45,000 feet, he descended quickly to 7,000 feet at over 400 MPH, and began to level out. The *M2-F2* began to "Dutch roll," an oscillation around the roll axis that shows clearly in the film record of the incident that followed. Peterson raised the nose of the *M2-F2* and correctly damped out the oscillation, but the action also took him away from the proper glide path. He almost hit an out-of-position rescue helicopter coming in, and ended up over a part of the lake bed without visual references to tell pilots how high they were flying (the dry lake bed has no relief, so it is difficult to judge its distance). Distracted by the recovery from the Dutch roll and dodging the helo, he was running out of sky. The *M2-F2*, like its predecessor, was equipped with an ejection seat and rockets. He stayed with the plane, but did fire the rockets in a vain attempt to extend his glide and make a smooth landing. He hit the lake bed just as he was lowering the landing gear, and the *M2-F2* summersaulted, rolling over six times before ending upside-down, on its canopy.

Pilot Peterson was badly injured in the crash. He had a fractured skull, broken bones in his hand, several teeth knocked out, and was partially scalped. He was in the hospital for a lengthy stay, and while there, he developed a secondary infection that cost him his right eye. This guy was tough, tough, tough, however, and continued to fly after his recovery (support missions, not flight test), and held a number of senior positions at Dryden and elsewhere through the mid-1990s.

The *M2-F2* was not scrapped; *it* was re-built. An additional vertical fin was added to increase stability, and the “new” version made a total of 27 flights before being [given to NASM](#) in December, 1973.

Famed aviation historian and novelist, Martin Caidin, personally witnessed the crash of the *M2-F2*. He was inspired by it to write a novel, [Cyborg](#), about a test pilot who, after a serious crash, was rebuilt with “bionic” parts. *Cyborg* became the basis for the made-for-TV movie and later series, “The Six Million Dollar Man.” A [film recording](#) of the *M2-F2* crash was used in the opening credits of the show. NOTE: You can see in the film the Dutch roll oscillations as the *M2-F2* descended, and the rockets firing to extend the flare, before the crash and rolls. It’s hard to see how Peterson could have survived, but he did. [I bet some of you are hearing in your head the special noise made whenever Steve Austin did his thing!]

“We can rebuild” the *M2-F2*, but there was an eye patch, not bionics, for Bruce Peterson. He received many well-deserved accolades and awards, and passed away on May 1, 2006.

Major references:

<https://www.nasa.gov/centers/armstrong/about/biographies/pilots/bruce-peterson.html>

<https://theaviationist.com/2020/05/10/53-years-ago-today-beginning-of-the-real-six-million-dollar-man-the-m2-f2-crash> (this has a link to the crash video)

[https://www.youtube.com/watch?v=JrETaU9wfho&ab\\_channel=AIRBOYD](https://www.youtube.com/watch?v=JrETaU9wfho&ab_channel=AIRBOYD) (M2-F2 crash video, you can see the wayward rescue helo at the end of the film). Stay with it for the next video, it’s about the lifting body program; it’s very good info resource!

[http://www.check-six.com/Crash\\_Sites/NASA-803-1967.htm](http://www.check-six.com/Crash_Sites/NASA-803-1967.htm)

Last Edited on 02 November 2020