



Modeling the NF-104A is possible with the excellent Hasegawa kit and Cutting Edge conversion. Pat Hawkey photo

# Building Chuck Yeager's ROCKET-BOOSTED NF-104A

## An easy conversion for a near-space Starfighter

By Pat Hawkey

The ultimate Starfighter was the rocket-assisted NF-104A. The N prefix indicates a permanent change in configuration for test purposes. The aircraft was developed as a low-cost pilot trainer for the U.S. Air Force's planned X-20 Dynasoar space re-entry vehicle.

To control the NF-104A in the nearly airless edge of the atmosphere, the Air Force added reaction controls – little rockets on the nose and wings that puffed gasses to control pitch, yaw, and roll.

Although the X-20 concept was cancelled in the mock-up stage, test pilots completed 302 flights in NF-104As. Perhaps the most famous flight (depicted in the movie "The Right Stuff") ended with Chuck Yeager's flat-spin ejection in which he was burned by the seat's escape rocket.

**Cutting plastic.** Cutting Edge makes a resin NF-104A conversion to fit the superb Hasegawa 1/48 scale F-104. The conversion set (No. CEC48264) includes a new nose, instrument boom, intake cones, wing tips, and a vertical stabilizer with the rocket fairing. With Cutting Edge's cockpit set (CEC48263) and decal sheet (CEC48142), building an accurate model of an NF-104A is within the reach of most modelers.

Curiously, the instructions that come with the conversion kit suggest using the Hasegawa F-104G/J as the basis for the

job. I suggest starting with an F-104A/C kit instead, because the G/J had bulged main-gear doors to accommodate wider wheels and tires. NF-104As were modified A models with original wheels and tires and flush gear doors.

Though the conversion is straightforward, I made some substitutions and improvements. Follow along as we reach out to the edge of space.

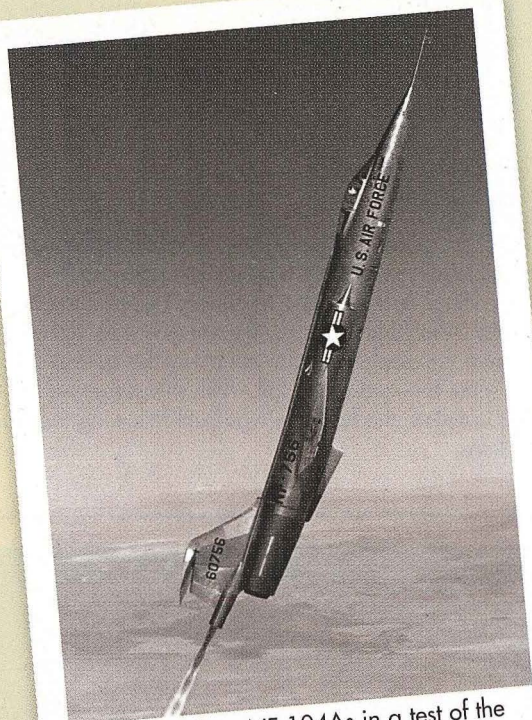
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**F-104G/J Starfighter, Lock On No. 1** The Verlinden Team, Verlinden Publications, Lier, Belgium, 1983  
**Wings of Fame Vol. 2** "Lockheed F-104 Starfighter," John Fricker and Paul Jackson, AIRtime Publishing Inc., Westport, Conn., 1996  
**F-104 Starfighter in Action** Lou Drendel, Squadron/Signal Publications, Carrollton, Texas, 1976

### SOURCES

**Conversion set, cockpit set, decals** Cutting Edge Modelworks from Meteor Productions, 703-971-0500, [www.meteorprod.com](http://www.meteorprod.com)





One of the three NF-104As in a test of the rocket booster. The climb to 100,000 feet was nearly vertical.



Chuck Yeager (in pressure suit) chats with fellow test pilot Herman "Fish" Salmon near the business end of an NF-104A. Lockheed photos

## To the edge of space in the NF-104A

One of the test pilots in the NF-104A program was (then) Col. Charles "Chuck" Yeager, perhaps the most famous test pilot of all time.

Chuck Yeager was a natural for the NF-104A program because he was the first military pilot to fly the F-104. He had 700 hours of time in the airframe going into the NF-104A program. Despite those 700 hours, Yeager had little regard for the jet. "I would not have wanted to dog-fight anyone for keeps in the F-104 in a war" he says.

A typical NF-104A mission for Yeager would have him climb to about 36,000 feet, light the afterburner, and zoom to about 45,000 feet. At this point he would ignite the rocket engine. At about 55,000 ft. the jet engine would quit from oxygen starvation, and the rocket would propel the airplane to the top of its climb. Then he would aim the NF-104A back to earth and when enough air was available, the standard J-79 jet engine would be relit for return to base.

Yeager had completed some 40 test flights in the rocket-boosted Starfighter, but on the afternoon of Dec. 10, 1963, one of the NF-104As (56-0762) malfunctioned, and he came close to losing his life.

As dramatized near the ending of the film *The Right Stuff*, the control thrusters failed at the top of the climb. As

the aircraft came back down, Yeager couldn't point it in the right direction to restart the jet engine. Without the jet, the hydraulic boost for the standard controls wouldn't work either, and the aircraft entered a flat spin. "The only way to get it out of a flat spin was to run the engine up to 100 percent and the gyroscopic effect of the engine would push the nose down," says Yeager. But with his engine dead, he had to get creative.

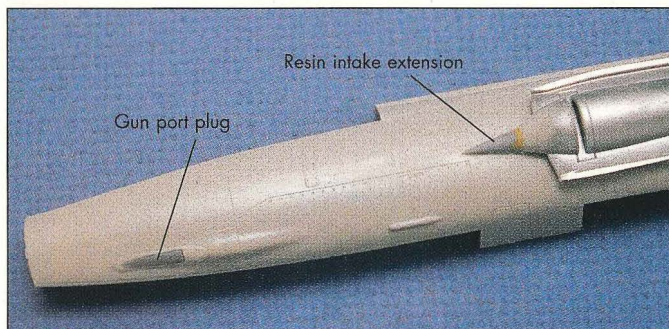
He desperately tried to control the airplane by popping the drag chute. This stabilized the spin and pointed the aircraft straight down, but he still could not get the engine to start. Yeager jettisoned the drag chute, but with the elevator stuck in the up position, the aircraft went back into a flat spin.

At 11,000 feet, Yeager ejected, but after he had separated from the ejection seat, it collided with him, cracking his helmet, and the hot ejector rocket started a small fire – in his oxygen-filled pressure suit! Yeager landed successfully, but suffered burns on his head and neck. Thanks to skin grafts and first class medical treatment, he carries virtually no visible evidence of this close call.

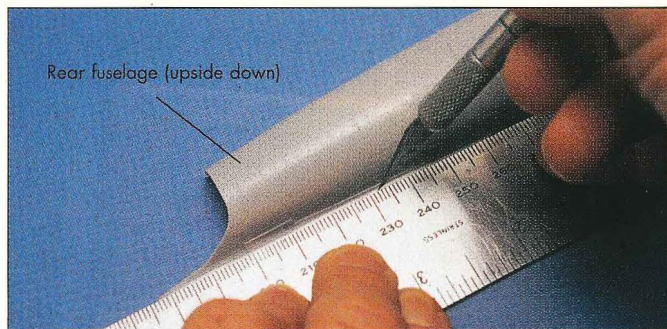
That fateful flight marked the end of the NF-104A program. On the same day, the X-20 spaceplane program was cancelled as well.

– Pat Hawkey

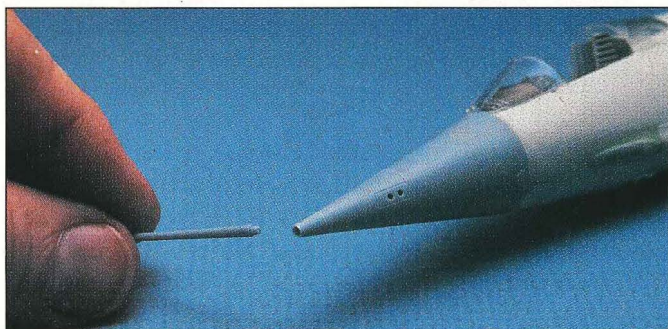




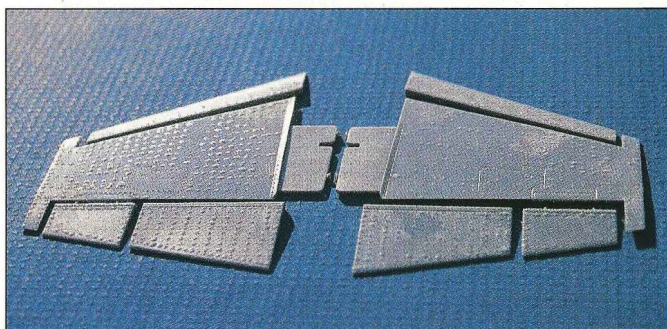
**1** I glued the resin intake cone extensions and gun port plugs in place and blended them into the airframe with epoxy putty and gap-filling super glue. Construction photos by Pat Hawkey



**2** The kit tail was removed by heavily scribing a few times across its base with a reversed No. 11 blade. I guided my blade with a steel ruler. After a few passes, the tail was easy to bend and separate from the airframe. I also cut away the curved section of the raised spine forward of the tail. With this surgery done and the cockpit installed, the fuselage was built following the Hasegawa instructions.



**6** I wanted to make the boom removable, but because it had to blend seamlessly to the nose, that wouldn't work. I carefully drilled out the tip of the resin conversion nose to accept the shaft at the end of the boom. This thinned down the end of the brittle resin piece to a dangerous degree. Since the slightest bump would probably cave in the hollow tip, I temporarily attached a piece of plastic tubing to protect it.



**7** An F-104's wings are smooth, with flush rivets. Therefore, the recessed rivets on Hasegawa's kit are overstated. I carefully dabbed gap-filling super glue onto every rivet, then sanded it smooth and repeated until the detail was gone. Separate control surfaces are sometimes a plus, but on parked Starfighters they are nearly always in the neutral position. The speed brakes in the aft fuselage are nearly always closed, too, so that's how I set up my model.

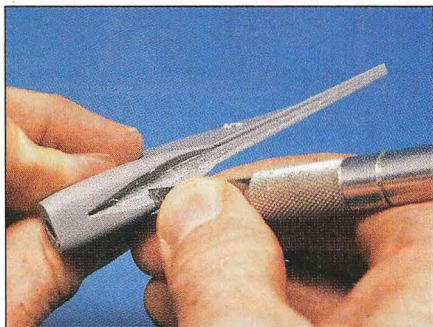


**10** At this stage the model was ready to paint. The masked canopy parts fit snugly enough that they could serve to mask the cockpit. Here you can see my styrene tube protecting the fragile nose cone.

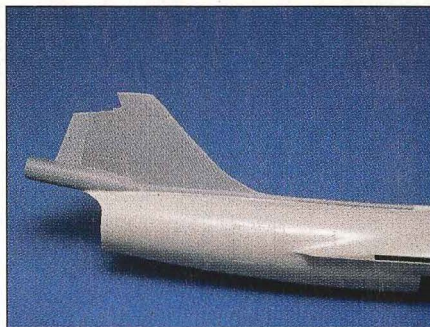


**11** I couldn't find a 1/48 scale pilot figure in the high-altitude pressure suit, so I modified a Monogram F-4 pilot figure by giving it a new right arm. I painted it with a base of acrylic and shaded with oils. A bit of Blue Tack on its foot allows it to stand anywhere near the airplane.

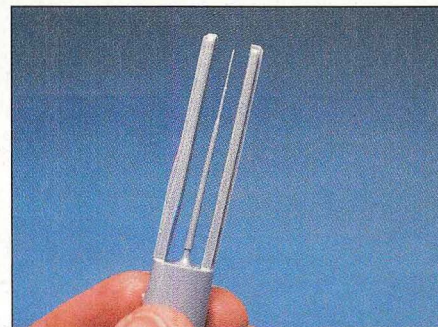




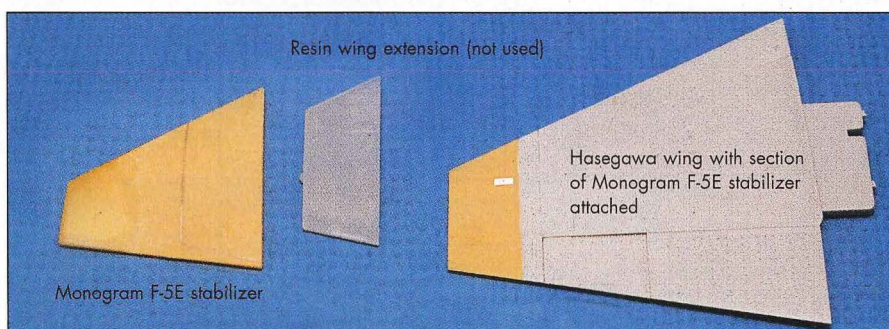
**3** Dry-fitting indicated the resin tail had to be trimmed for a good fit. This, along with fine-tuning the Hasegawa fuselage with a sanding stick, produced a tight fit.



**4** I closed gaps and smoothed contours with epoxy putty. Some of the fine recessed surface detail suffered as a result of the surgery and transplant. Because the model would eventually wear an aluminum finish, I devoted a lot of effort into filling nicks and scratches, and restored rivet detail with a needle.

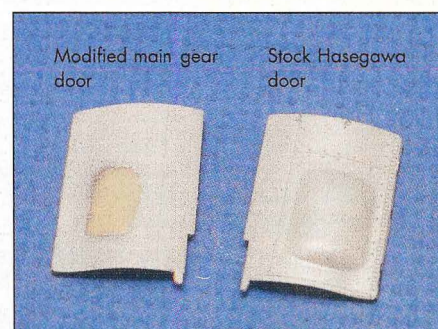


**5** The NF-104 had an extended instrument boom. The one in Cutting Edge's conversion kit is straight as an arrow and protected by flanking resin bars. It was flawless, yet brittle, so to avoid breakage, it would be the last part added to the model.



**8** Cutting Edge's wingtip extensions looked rough, and I figured that new ones made from styrene would bond better with the kit wings. Rummaging through my model boneyard, I found a Monogram F-5 with horizontal stabilizers that would provide good stock to make my own wingtips. I thinned them with coarse sandpaper on a sanding block to nearly match the 104's wingtip chord, then laid the resin pieces on top and traced their outline with pencil.

Trimming just beyond the lines for a fudge factor, I finished shaping and thinning with sanding sticks. I attached the new extensions to the wings with a good dose of liquid cement, filled the seams with super glue, and sanded them flush with the rest of the wing. The thruster panels were made from rectangles of .010" styrene with holes drilled for the nozzles. I positioned them using the Cutting Edge parts as guides.



**9** The next step was to fix the main gear doors. If you have the F-104C kit, you can skip this step. Fortunately, these doors are nearly closed when the aircraft is at rest, so I didn't have to restore detail on the insides. I sawed the bulges from the G/J kit doors and backfilled the resulting holes with epoxy putty. After it had set, I sanded the outside smooth and re-scribed the lost panel lines.



**12** I used Testor Model Master chrome silver for my natural-metal finish. For a more varied effect, I tinted individual panels with black, brown, or blue. After the overall paint job, I gingerly attached the instrument boom with super glue and used a Flex-I-File to smooth the seam. The tip of the nose was touched up with chrome silver, then Post-it notes were used to mask for the flat black anti-glare panel.



**13** The delicate yaw and pitch indicators were made from fine stretched sprue and .005" sheet styrene. I dared not try to drill holes in the boom to mount the indicators, so with the tiniest dabs of super glue, I stuck them to the boom with tweezers. I added internal canopy bracing from bent wire and Evergreen styrene rod. **FSM**