

Air and Space this Week

Item of the Week

THE F8F BEARCAT, DARRYL GREENAMYER, AND HIS F-104

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*The first flight of the Grumman F8F Bearcat prototype interceptor airplane was on **August 21, 1944, eighty years ago this week!** Darryl Greenamyer set the record for piston-driven aircraft (482.464 MPH) on **August 16, 1969, 55 years ago this week,** in his highly-modified F8F-2 Bearcat, Conquest 1, now in the collection of the National Air and Space Museum and on display at NASM's Steven F. Udvar-Hazy Center. And wait until you read about his personal F-104 Starfighter!*

THE GRUMMAN F8F "BEARCAT"

The Pacific War was winding down by October, 1944. The issue was no longer in doubt, but a lot of tough fighting remained. Nimitz's naval forces were steadily advancing eastward, and MacArthur's forces were preparing to re-take the Philippines. American naval task forces were capable of both delivering a heavy aerial attack and defending themselves with carrier air. The Japanese situation was desperate. Something had to be done. Japanese aviation was suffering grievous losses when they sortied against the U.S. task forces. Flying antiquated dive bombers and torpedo planes was almost tantamount to suicide; the few attack planes that reached American ships were shot down after the attack.

If flight crews had to die, might there be a better way to get to, and hit, American warships? The Japanese leaders realized that their only hope was for the attack planes to carry their ordinance directly into American ships, thereby causing losses too great for the Americans to stomach. Piloting a mission when one does not intend to return is a much tougher situation to defend against. Japanese history spoke of a "divine wind" (kamikaze) that sank the attacking Mongol fleet many years before; perhaps a skilled cadre of suicide pilots could be a modern-day version of the earlier turn-around victory.

The initial results were impressive, to both sides. American ships began taking damaging bomb hits their defending planes and guns could not fully stop.

The standard fleet fighter plane at that point in the War was the Grumman F6F "Hellcat." It was an outstanding aircraft, well-suited for providing support for attack planes and defense against conventional enemy aerial attack. It had the most powerful engine then in use, the Pratt & Whitney R-2800 Double Wasp, which produced 2,000 horsepower. It was heavily-

armed, armored, and had a good range. Its only significant drawbacks were that it required a large carrier's flight deck for take-off, and had a relatively-slow rate of climb.

The Hellcat was a really good all-round fighter, but the Navy brass correctly determined that the kamikaze threat required a true interceptor aircraft that could destroy kamikaze aircraft far from its home carriers and could be handled by smaller-decked escort carriers, leaving the Hellcats for large aircraft carriers. Speed and rate-of-climb were more important for an interceptor than was maneuverability and firepower. This wasn't a new idea; some of the heroes of the Battle of Midway, including Jimmy Thach, had met with Grumman officials on June 23, 1942, to point out the need for a ship-borne interceptor with better speed and climb rate than the Hellcat.

Since the Hellcat already carried the most powerful engine in the American arsenal, any improvement in speed and climb would have to come from weight reduction. The aircraft that resulted would be called the "Bearcat." Designers went to work in December, 1943. There is some indication that they were influenced by what was learned from a Focke-Wulf 190 that had been captured in 1942, but the Hellcat basic design was the starting point.

The Bearcat was five feet shorter, and its wingspan was 7 feet less than the Hellcat's. Armor was still retained, but in lesser quantity, and two of the Hellcat's 50-cal. machine guns were removed. Other weight reductions were made, including the installation of a "bubble" cockpit and significantly-reducing the fuel capacity than the Hellcat.

Two prototypes were built. The first XF8F-1 flew on **August 21, 1944, eighty years ago next week**. Its top speed was 424 MPH (slightly slower than the Vought F4U Corsair), but it climbed at 4,800 feet/minute, 30% faster than the Hellcat. The prototypes had a lot of bugs that had to be worked out. The Navy ordered over 2,000 of them. Deliveries started in May, 1945; the order was reduced immediately following VE-Day.

Pilots did not like some of the new airplane's features, having only four machine guns, short range, and a cramped cockpit were three commonly cited. But there was no mistaking that the aircraft was fast and could climb like crazy, **and** it could operate from an escort carrier. And the features sacrificed to make the Bearcat a tiger weren't very important in the Bearcat's envisioned interceptor role.

However, the Bearcat was too late for combat in the Pacific.

The Bearcat was still a powerful interceptor, and found a role in the post-War decade. An unmodified production model of the F8F-1 in a 1946 test was able to take-off after only a 115-foot run and climb to 10,000 feet in only 94 seconds. The F8F-2 model of the Bearcat, introduced in 1948, had a number of improvements, including an even-larger R-2800-30W engine that produced 2,240 hp.

The Navy had created the Navy Flight Exhibition Team in April, 1946, with the goal of "showcase(ing) the pride and professionalism of the United States Navy and Marine Corps by inspiring a culture of excellence and service to the country through flight demonstrations and community outreach." LtCdr "Butch" Voris, who had flown in support of the invasion of

Guadalcanal, and in the [Battle of the Santa Cruz Islands](#), the Battle of Tarawa, and the Battle of the Philippine Sea, was selected to lead the Team, and he picked several other Pacific War vets to join him. They flew the F6F-5 Hellcat, and their first public show was on June 15, 1946. Their precision formation flying and aerobatics thrilled the public.

One of Voris' pilots had heard of a nightclub in New York City called the "Blue Angel." [Check it out – it was [quite a place](#)! A 19-year-old Barbara Streisand sang there, and many other stars appeared there, too.] A word to Voris and the name stuck, and during a series of shows in Omaha in July, the team was introduced as the "Blue Angels." Voris was pleased with the program, but wanted planes with more speed, so on August 25, 1946, the Blue Angels converted to Bearcats.

[A post-War pilot who liked the Bearcat was one Neil Armstrong, who flew it early in his flight training days and remembered it as the plane he most enjoyed flying!]

Others wanted to get their hands on the Bearcat, too, especially those involved in air racing. The same qualities that made the Bearcat a great interceptor made the Bearcat an ideal starting point for air racers intent on performing in the "unlimited class." Some surplus Bearcats were made available, and they were snapped up and souped up, hot to make records. The first Reno Air Race (1964) was won by Mira Slovak, flying an unmodified Bearcat.

Two other heavily-modified civilian Bearcats garnered considerable fame. One was the *Rare Bear*, a highly-modified Bearcat owned by Lyle Shelton and flown by Bill Stead, which dominated the air racing scene and set many performance records. It set the record for piston-engine aircraft in 1989 (528.33 MPH), although it had a definitely non-standard engine, a Wright R-3350 that produced over 4,000 horsepower.

Another Bearcat was bought by a former Lockheed Skunk Works test pilot by the name of...

DARRYL GEORGE GREENAMYER

... who was born on **August 13, 1936**; he would have been **88 years old** this week.

Young Darryl was an indifferent student, but his need-for-speed developed at an early age. He grew up in Monrovia, California, and was much more interested in hot rods than textbooks. That changed when he joined the Air Force and learned to fly. He went back to school and earned a mechanical engineering degree from the University of Arizona.

Greenamyer then went to work for Lockheed, ultimately becoming a Skunk Works test pilot and working on projects like the forerunner of the SR-71 Blackbird, in which he flew 2,000 MPH, and other hot aircraft. He really liked going fast and low, in aircraft and in dragsters.

When the Navy made some Bearcats available for purchase, he grabbed one and enlisted some of his Skunk Works buddies to help him turn it into an air racer, inspired by the Reno Air Race and Mira Slovak's Unlimited-class victory in a Bearcat. Darryl and his "Greenamyer Bearcat" won the Reno Unlimited title in 1965. He acquired Smirnoff as a sponsor, and renamed his Bearcat the "Smirnoff" (also the name of his dragster) and won Reno again in 1966 and 1967.

He won again in 1968, and re-christened his Bearcat "Conquest 1" in 1969, winning Reno that year and then again in 1971, and again in 1977.

One of Greenamyer's long-held goal was to break the FAI Class C-1 Group 1 speed record, which required four low-altitude passes over a measured course of 3 km length, two in each direction, without stopping. The record at the time had been set back in 1939, by Fritz Wendel flying an Me-209 (the fuselage of which presently resides in the Polish Air Museum in Krakow). Wendel had been a test pilot in the development program of the Me-262, the first operational jet fighter. Problems with the *Conquest 1* had prevented an attempt to break the record in 1966, and a second attempt, in 1968, was stopped by a blown piston. But on **August 16, 1969, 55 years ago** this week, he managed to fly the record course with an average speed of 483 MPH, going considerably faster on the downwind passes (510 and 508 MPH). See the documentary film cited in the References section for more information about this amazing flight.

Greenamyer donated *Conquest 1* to the Smithsonian National Air and Space Museum after his final Reno Unlimited win 1977, where it is on display at the Steven F. Udvar-Hazy Center.

But his thirst for speed was by no means slaked. Not by dragsters, not by airplanes, not even by the prototype of the SR-71 Blackbird. You see, he had his eye on an outrageously-wild mount, the ...

F-104 STARFIGHTER "RED BARON"

Darryl Greenamyer had flown a number of very fast aircraft as an Air Force pilot and as a Skunk Works test pilot. One that he really liked was the "missile with a man in it," the Lockheed F-104 Starfighter.

He wanted one of his very own. What an air racer it would be! What a record setter it would be! But really, one of his very own?

What happened next is the stuff of aeronautical engineering superstardom and a case study in tenacity.

Greenamyer spent over 13 years scouring various aviation junkyards, crash site remnants, and other out-of-the-way places for pieces of various Starfighters. Some came from the very first production F-104A, which had crashed at Palmdale 22 years previously. Other key bits were found in junkyards in Ontario (California), Tucson, Homestead AFB, and Edwards AFB; other parts came from aviation enthusiasts and other sources. He had to buy a 25-ton pile of junk from Eglin AFB to get some of the parts he needed, a purchase that set him back \$7,500. All told, dozens of individual aircraft furnished parts for his Franken-fighter F-104.

Greenamyer got a J79-Ge-10 engine from the U.S. Navy. He contacted Pratt & Whitney for specification and other engineering data, hoping to find out the results of their extensive testing. No deal. So he experimented on his own with injecting nitromethane into the fuel, thereby exceeding the design manifold pressure. In so doing, he blew up three engines, two in

flight, and one of those was at 10,000 feet altitude. He had to dead-stick it from there, covering 40 miles laterally, reaching an airstrip with only 1,000 feet to spare.

Finally, Greenamyer was finished. He owned his own operational Starfighter! He painted his visually-stunning F-104 bright red and white, and named it the *Red Baron*.

His goals with the *Red Baron* were to set a low-level speed record that would last for decades, if not forever, and then to set an altitude record, a feat that no American jet had held since 1961. His F-104 might be just the plane to do it in, since an F-104 had once held the altitude record before Soviet dominance, at 103,400 feet. And since he had personally flown over 100 F-104s while test piloting at Lockheed, he had plenty of experience with the potential performance of the *Red Baron*.

October 2, 1977, was the day for the speed record run; the place was the not-so-nobly-named Mud Lake of western Nevada. Greenamyer needed four runs averaging over 906 MPH to break the record. That day, his four passes averaged over 1010 MPH, but the timing camera failed, negating its “official” status. He tried again on October 24, and this time the cameras worked; his four-pass average was a “mere” 988 MPH!

Next up was the altitude record.

Greenamyer’s flight plan was extraordinarily-aggressive, even for him. He would take off and climb to an altitude of 38,000 feet, increasing his speed to Mach 2.6 (~1,550 MPH). He’d then climb with a 12° angle of attack (pulling over 3 g’s), until he was in a 60° climb, which he would hold until he got back to the 12° angle of attack until he “went over the top” at an altitude of 140,000 feet or so. He was using a fuel additive of his own formula to give his engine some extra oomph, and a water-injection system to cool the air intake, which also increased usable power.

Four test flights from the Mojave Airport were planned to test the water-injection system. There is some difference of opinion on when those tests actually were made, but two things are sure: all four tests showed that the water injection systems worked as planned, and the final test was late in the day on February 26, 1978.

The final test showed that all of the *Red Baron*’s systems were ready for the assault on the altitude record. And Darryl was very ready, too! When the final test was completed, an exhilarated Greenamyer turned and made a low-and-slow pass over the airfield for the throng assembled there to get photographs, then, with 20 minutes of fuel remaining, he turned on approach and lowered his landing gear.

His landing gear indicator showed that the left wheel did not lock in place.

Greenamyer cycled his landing gear several times. No joy. He changed out the bulb in the gear indicator. No joy. He made a very low pass over the airport so one of his team could try to see if the locking pin was in place. No joy. He even flew the thirty miles to Edwards AFB and flew down the strip and bounced the right gear on the runway to see if the impact would cause the left gear to lock. No joy. He even tried a quick touch-and-go with the left gear, and it felt “spongy” to him, as it would if the gear weren’t locked.

Greenamyer was in a real quandary, and he was rapidly running out of time.

The F-104's wings are a mere six inches above the bottom of the fuselage, making a wheels-up landing an unpleasant form of certain flaming suicide. He was deeply emotionally involved in the creation of the *Red Baron* and would never be able to build another, and understandably was wracking his brain to come up with a way to save the aircraft. He was drawing a blank, in spite of having personally tested every system aboard.

Except one.

The only recourse Greenamyer had was to make the short flight over to Edwards Ejection Area and eject. He would have to rely on his ejection seat to save him, even though it was the only untested system in *Red Baron*, and was made by himself out of junkyard scraps.

Hobson's Choice!

Only five minutes of fuel remained. He throttled back to 200 MPH, grabbed the ejection seat ring, and pulled. His seat and parachute worked perfectly. He watched with a level of sadness you and I can only imagine as his labor of love flew on, straight and level, slowly turning left and passing beneath him on its way to total destruction.

Sigh.

AFTERMATH

The Society of Experimental Test Pilots established the Iven C. Kincheloe Award in 1958, to be awarded for "outstanding professional accomplishment in the conduct of flight testing." Darryl Greenamyer won the 1970 Kincheloe Award for his record speed in *Conquest 1*, an honor he shared with three other people – the crew of *Apollo 11*! By the way, Kincheloe, a very experienced test pilot, was killed in the crash of an F-104A. He was taking off from Edwards on July 26, 1958, when a small cable failed, causing his engine to lose most of its power. His wheels were up, and his plane was dropping fast, so he pulled the ejection ring. Alas, the ejection seat for the early models of the F-104 fired downward.

Darryl Greenamyer won the Reno Air Race Unlimited Class again in 1977 (although finding information about this is difficult).

Reno Air Race added the "Sport Class" for smaller planes in 1998. By then the unlimited class had been limited to only a few super-expensive aircraft like the *Conquest 1*. But the Sport Class offered much more old-school racing, and has proved to be quite popular. Greenamyer became intrigued by a Sport aircraft that was coming out in kit form, the Lancair. The Lancair people were ecstatic over his interest in their product, and allowed him to buy Kit #1 in 2000. Finding records about the early Reno Sport class is tough, but Greenamyer did outduel his nemesis, Rick Vandam, flying his [Nemesis](#) aircraft (now on display at the Smithsonian National Air and Space Museum's Steven F. Udvar-Hazy Center) to win the 2003 National Champion Air Race, Sport Class. The popsci reference in the Reference list states that Greenamyer won at Reno a total of nine times. Seven were in the Unlimited class with *Conquest 1*, one was the

2003 Sport class, as was the ninth one. He is the third most successful competitor in Reno Air Race history.

The pilotweb source in the Reference list says that Greenamyer won the Reno Sport class race in 2002, 2003, 2004, and 2005, which would make his Reno total 11 wins. The AvWeb obit confirms the total of 11, and has a video of Greenamyer talking about his Reno exploits.

And if that weren't enough, Greenamyer's other hobby was his two high-performance Ferraris!

Darryl Greenamyer was inducted into the Motorsport Hall of Fame of America in 1997. He was a very rare exception to the old aviation adage, "There are bold pilots, and there are old pilots, but there are no old bold pilots." He passed away at age 82 in Indio, California, on October 1, 2018.

BONUS: Greenamyer played an instrumental role in the attempted recovery of the B-29 *Kee Bird* from a frozen lake bed in Greenland back in 1995. He actually got the Superfort's engines running, but during taxiing it to take-off position, the B-29's auxiliary power unit overheated and caught fire. There was no way to extinguish it, and the aircraft burned up. For an interesting take on that effort and better, their wild ride to return home, see:

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