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Sikorsky's Southern Exposure

The Florida Development Flight Center has tested every Sikorsky helicopter model of the last 45 years.
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The S-102 RaiderX FARA competitive prototype was assembled at the Sikorsky Innovations at West Palm Beach.

Twenty-five miles northwest of West Palm Beach and bordering a 60,000-acre Florida wildlife preserve, the Sikorsky Aircraft Development Flight Center (DFC) still makes vertical flight history. DFC workers in early 2023 were readying the Raider-X competitive prototype for the U.S. Army's Future Attack Reconnaissance Aircraft program. In recent years, they integrated combat rescue helicopter systems on the Air Force Jolly Green II, verified the lifting power of the Marine Corps King Stallion, delivered sling loads with an optionally-piloted Black Hawk, and validated automatic oil rig approaches in the commercial S-92. Sikorsky's Development Flight Center is now the Lockheed Martin Rotary and Mission Systems West Palm Beach Site, and senior fellow and retired chief test pilot Nick Lappos observed, "West Palm Beach is a great development center. I believe Lockheed considers it one of its gems."

Sikorsky helicopter test programs remained largely in Connecticut from the first flight of the VS-300 in September 1939 through the start of S-70 (Army YUH-60) Black Hawk development testing in October 1974. A flight test center in the north corner of the Stratford headquarters had telemetry and data reduction rooms to draw on nearby downlink towers and ground test stands. By the early 1970s, uncontrolled airspace north of the plant still permitted S-61 and S-70 flight testing but crossed growing residential neighborhoods. Lappos joined Sikorsky flight test in 1974 at the start of the S-76 program and recalled, "Our concern was that we were getting a lot of noise complaints though flight intensity was low. There was a concern they would get more complaints with three S-76 prototypes flying and the ground test article running."

In 1974, engineer-test pilot Dave Wright analyzed the noise complaints and looked at new test sites. His findings warned of likely opposition to a busy S-76 flight schedule and counted test days lost to New England weather. An executive committee identified two sparsely populated areas with better weather, one near Paso Robles, California and the other on the United Technologies Corp. (UTC) reservation outside Jupiter, Florida. Florida was a foregone conclusion, acknowledged Lappos. "You can't have your test team three hours off the time zone from your main engineering organization."

Way Down South

Sikorsky Aircraft UTC sister company Pratt & Whitney (P&W) dedicated its Florida Research and Development Center in May 1958 to test

The S-76 flight test program was the first to use the Sikorsky Development Flight Center.

classified turbojets and potentially explosive rocket engines away from prying eyes and sensitive ears. The 7,000 acre spread would later include a 1,500 ft runway, an engineering building, a firehouse and a control tower. Subsequent expansions included a longer runway and passenger terminal.

By early 1975. Sikorsky had plans for a helicopter test campus on the same reservation. According to Nick Lappos, "The flight test engineers laid out what the facility would be. Human factors and facilities engineering helped out." The new Development Flight Center started with an engineering building, a four-spot hangar, and a firehouse with a ground-level air traffic control booth. Engineering offices were ready when the first S-76 was trucked from Stratford to West Palm Beach in March 1977, but the hangar still needed work. "We moved the airplane down there and ended up assembling it in a Pratt & Whitney building right around the corner. We rolled it down the street when the building was ready for it about a week later."

The first S-76 flew on March 13, 1977, and Sikorsky News reported the Florida test team would total about 50 pilots, test engineers, and technicians. "That was my first time on a major test program," recalled Lappos, "and [chief test pilot] John Dixson was my mentor." He added, "The pace was very high. We prepared the aircraft for initial certification from March of '77 to November of '78. That was about 14 months from first flight to certification, an unheard-of pace." Lappos concluded, "The experience with the S-76 proved a couple of things. One was the dedicated [test] team and how well that works all located in one place. The second thing was the tremendous weather. We were losing one in four days in Stratford, regardless of the season, due to inclement weather and low ceilings. That was just gone; we could plan virtually everything."

More programs followed. Vaughan Askue started his engineering career on the Sikorsky advanced development team and counted eight new aircraft flown from 1970 to 1980. He noted, "It was just astounding, you'd turn around every day and something new was coming out of Experimental." The Army Utility Tactical Transport Aircraft System (UTTAS) program moved Black Hawk maturity testing from Connecticut to Florida in spring 1978. In 1980, a Black Hawk with dummy radar pod began flight tests at the DFC for the YEH-60B configuration with its Stand-Off Target Acquisition System (SOTAS). The first SOTAS prototype with functional radar began tests at West Palm Beach in February 1981.

Tests of the three-engined S-80 (Marine Corps CH-53E) Super Stallion likewise began at Stratford but moved to Florida. "It actually made a lot of sense," said Askue. "You were invisible; there were no neighbors." More Black Hawk variations were tested at the DFC. The first Navy Seahawk was loaded on a flatbed trailer in Stratford and arrived in West Palm Beach four days later. John Dixson and Richard Mills first flew the S-70B-1 (Navy SH-60B) test aircraft at the DFC on December 12, 1979. The Air Force HH-60D Night Hawk combat search and rescue helicopter made its first flight February 4, 1984. The first Australian S-70B-2 made its maiden flight at the DFC in December 1987.

The second S-69 (Army XH-59A) Advancing Blade Concept (ABC) demonstrator began high-speed tests in Connecticut but went to Florida in November 1978. On February 6, 1980, it reached 227 kt in level flight, and senior vice president of engineering and development William F. Paul

At the DFC, the S-69 (XH-59) attained 263 kt and introduced the Advancing Blade Concept. (NASA via DVIDS)

noted, “This is the highest speed achieved to date by any rotary-wing aircraft without the use of a fixed wing to offload the rotor system. . . We are now confident that the ABC is a low-risk solution to future military and commercial VSTOL requirements.”

“Weight, drag, and vibration nevertheless stalled the Advancing Blade Concept until 2008 when the Sikorsky-funded X2 demonstrator integrated auxiliary propulsion, composite structures, fly-by-wire controls, and active vibration suppression. X2 technologies began ground testing at the Sikorsky-Schweizer Hawk Works near Elmira, New York, but flight test moved to West Palm Beach where project pilot Kevin Bredenbeck took the demonstrator to 253 kt in September 2010.

Other technology testbeds and demonstrators had flown at West Palm Beach. The S-75 built for the Army Advanced Composite Airframe Program flew in Florida in 1985. West Palm Beach also tested the S-76A/B Shadow with single-pilot fly-by-wire cockpit starting in 1986 and the S-76B Fantail with shrouded anti-torque rotor in 1990. Both subsequently went to Stratford to support development of the Light Helicopter Experimental (LHX). Their LHX technologies flew on the first RAH-66 Comanche demonstration-validation helicopter flown at West Palm Beach on January 4, 1996.

The S-76 Fantail and Shadow flew technologies key to the RAH-66 Comanche.

The RAH-66 Propulsion System Testbed tested the drive-train of the stealthy scout before first flight.

The DFC also tested Sikorsky’s Unmanned Air Vehicles. The company-funded Cyberhead coaxial shrouded rotor UAV flown in 1986 led to the Cypher UAV first flown in July 1988. The Lockheed Skunk Works had an industry reputation for advanced engineering with small teams, and the July-August 1988 edition of Sikorsky News quoted then-DFC director Walt Lane, “This is as

The Cypher Unmanned Air Vehicle used Comanche ducted fan technology.

close as we come to a Skunk Works at Sikorsky . . . Because we're located out here in the swamp, we're able to perform tests that we couldn't perform otherwise, like drop tests. We've dropped all sorts of things from helicopters -- 32,000-lb. concrete blocks, torpedoes, mines, missiles, bombs, sonobuoys, and external fuel tanks, for instance. This has provided us with an enormous amount of data on aircraft handling and targeting. You just can't do that in the Stratford area."

The big S-92 with its flaw-tolerant structures and integrated digital avionics first flew at West Palm Beach on December 23, 1998. By the start of harmonized FAA/JAA certification testing in October 2002, four S-92 prototypes had logged about 1,400 flight hours. Florida weather was a powerful testing advantage, but flight test teams sometimes traveled to find the right conditions. The S-92 main and tail rotor ice protection system underwent system tests at West Palm Beach before the helicopter flew to Marquette, Michigan for cold weather in 2004.

The S-92 tested automatic rig approach software at the Development Flight Center.

Military testing at West Palm Beach introduced a new generation of Black Hawks and the first Canadian Maritime Helicopter. On September 17, 2003. Test pilots Kevin Bredenbeck and Chris Geanacopoulos flew the first UH-60M, a recapitalized UH-60A with wide-chord composite main rotor blades and digital cockpit. Test Pilots John Armbrust and Rick Becker made the first test flight in the fly-by-wire CH-148 Cyclone on November 15, 2008.

In summer 2009, the Development Test Center had 18 helicopters in test including the fly-by-wire Cyclone, UH-60M upgrade, and X2 demonstrator. By that July, the instrumented S-92 test aircraft No. 3 had flown more than 100 simulated oil rig approaches on targets in nearby Lake Okeechobee. The first militarized, marinized CH-148 with integrated mission system flew in August.

The first UH-60M flown at West Palm Beach in 2003 was a recapitalized UH-60A.

The first S-70i Black Hawk built by Sikorsky Mielec in Poland began flight tests at West Palm beach

The S-70i built by Sikorsky Mielec in Poland was first flown at West Palm Beach.

The X2 high-speed compound helicopter flew at the DFC with its S-76 chase aircraft.

in July 2010, and the first S-76D commercial helicopter began certification flight testing in Florida at the end of the year. Tests of the S-76 SARA (Sikorsky Autonomous Research Aircraft) were flown largely in the northeast to give the Matrix autonomy system a mix of terrain cues. However, in March 2014, a fly-by-wire UH-60M upgrade helicopter with the Matrix system delivered sling cargo directed by a DFC engineer on the ground. By that time, the Development Flight Center was recording 1,500 to 1,600 test hours a year. "That is not engineering flight testing or production flight testing," then-general manager John Fischetti told Aerospace Testing International. "This is purely high-risk developmental flight testing."

Digging In, Spreading Out

Sikorsky News in March 1978 announced plans by company president Gerald Tobias to build a $5 million S-76 Delivery and Service center adjacent to the Development Flight Center. By 1979, the two-story, 50,000 ft^2 facility was completing S-76s built in Bridgeport. In 1982, Florida craftsmen turned the commercial S-76 into the armed AUH-76 Eagle.

S-76 completions ultimately moved from West Palm Beach to Stratford and later Coatesville, Pennsylvania, but a ribbon-cutting ceremony in February 2008 opened additional assembly and office space for Florida Final Assembly and Flight Operations Center (FAFO). Then-Sikorsky President Jeffrey Pino told the audience, "We now have the capacity in Florida to build some of the most sophisticated and exciting helicopters Sikorsky Aircraft has ever developed," In 2010, the Florida FAFO delivered its 100th UH-60M Black Hawk.

Developmental test facilities at West Palm Beach continued to grow. In April 1980, ground was broken on a hangar and administration building for the William P. Gwinn Airport, named for the former United Aircraft Corporation chairman and chief executive officer. Subsequent expansions gave the original development test hangar four more aircraft spots and stretched the runway to 7,000 ft. Sikorsky test engineers commuted between Connecticut and Florida. The Comanche program sponsored a Tempest-Secure facility with telemetry rooms upstairs and shielded workspace below.

A slope landing pad opened in January 2010 gave DFC pilots inclines up to 15 degrees to fly ADS-33 mission task elements. Sikorsky broke ground for a new Florida Assembly and Flight Operations production hangar in March 2012 and assembled the CH-53K ground test vehicle and four King Stallion flight test aircraft in West Palm Beach. The CH-53K made its first flight at West Palm Beach in October 2015.

The CH-53K ground test vehicle at West Palm Beach tested the heavy lift helicopter drivetrain and structures.

The S-76 was the last Sikorsky development program to use tiedown stands in Stratford. The S-76B with Pratt & Whitney Canada PT6B-36 engines began ground tests at West Palm Beach in 1982, and the DFC went on to host propulsion system testbeds (PSTBs) for the RAH-66 Comanche, CH-53K King Stallion, S-97 Raider and S-100 Defiant helicopters. The Defiant PSTB with compound helicopter engines and drivetrain first turned its rigid, coaxial rotors and tail-mounted thruster in November 2018.

The HH-60W Jolly Green II made its first flight at the Sikorsky Development Flight Center in 2019.

Lockheed Martin announced plans to shut down FAFO in 2018, but the Development Flight Center continued cutting-edge test work. On May 17, 2019, DFC test pilots John Biscaino and Bob Arenault made the first flight in the HH-60W combat rescue helicopter. The Air Force 413th Flight Test Squadron announced the first HH-60W flight with an Air Force test pilot on July 11, beginning integrated government-contractor flight tests of the Jolly Green II. On May 29, 2019, a company-owned Black Hawk optionally-piloted vehicle (OPV) made its first flight at West Palm Beach, part of the Defense Advanced Research Projects Agency Aircrew Labor In-cockpit Automation System (ALIAS) program.

In 2023, the Lockheed Martin West Palm Beach Site had five S-92s in assembly and remained a focal point of Sikorsky helicopter testing. The original P&W passenger terminal is the Sikorsky Innovations rapid prototyping workshop that assembled the S-97 Raider and S-100 Defiant coaxial compound helicopters. Sikorsky and Boeing teamed up on the S-100 (SB>1) Defiant in January 2013 and flew the Joint Multi-Role Technology Demonstrator at West Palm Beach in March 2019. Over the course of testing, the Defiant dashed at 247 kt in cruising flight, hauled a 3,400 lb sling load at 100 kt, and flew slalom maneuvers at 60 to 100 kt on the ADS33 handling course.

The S-97 exceeded 200 kt in level flight at the DFC and continues to give Sikorsky testers an 80% risk reduction model of the S-102 Raider-X Future Attack Reconnaissance Aircraft (FARA) now in assembly. “It serves as a testbed for all of our X2 capabilities, but particularly for the FARA program,” Sikorsky President Paul Lemmo told a 2023 HAI Heli-Expo press event. “We’re learning something every time we fly...”

The S-100 (SB>1) Joint Multi Role Technology Demonstrator assembled at the DFC applied X2 technologies to the Army Future Vertical Lift Initiative.

The company-funded S-97 Raider reduced risk for the S-102 Raider-X Future Attack Reconnaissance Aircraft.

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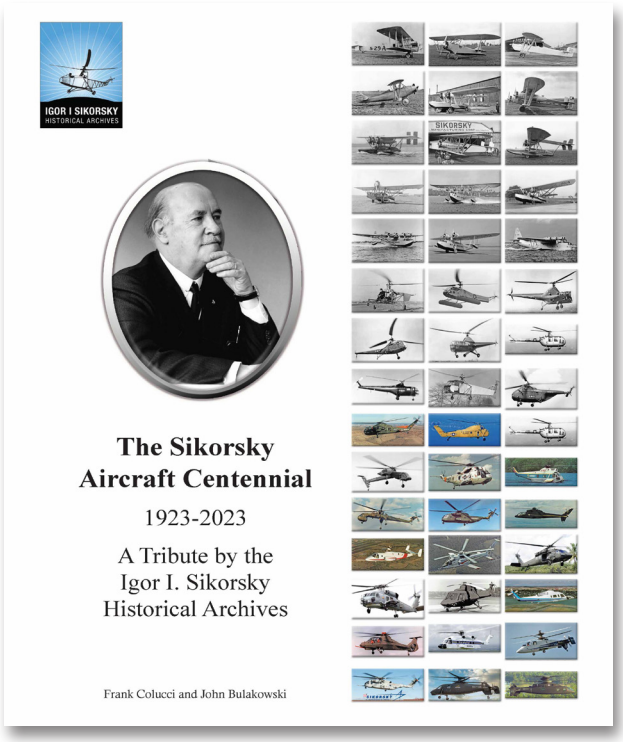

The Sikorsky Aircraft Centennial 1923-2023, a Tribute by the Igor I. Sikorsky Historical Archives, documents the work of a helicopter pioneer and the company he founded.This book traces the growth of Sikorsky Aircraft from a struggling fixed-wing aviation concern to a world-leading helicopter manufacturer. From Sikorsky's first American fixed-wing aircraft, the S-29A, to the latest helicopter design, the S-102 Raider-X, it tells the story of every model produced by Sikorsky Aircraft. Richly illustrated with more than 400 unique photos, The Sikorsky Aircraft Centennial 1923-2023 will be a fascinating read for every aviation enthusiast and for those looking to learn more about Igor Sikorsky's history in America.

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Available on Amazon: Paperback $24.95; Hard cover $49.99; Kindle $7.99. All proceeds benefit the Igor I. Sikorsky Historical Archives.

"To invent a flying machine is nothing; to build it is little; to make it fly is everything."– attributed to French aviator Louis Ferdinand Ferber.

"In French, the last of the three phrases would read: 'L'essuyer c'est tout,' which means 'to test it out is everything.'"

Igor Sikorsky — *The Story of the Winged-S*