

# Dryden Historical Milestones

- Sept. 30, 1946 Five NACA engineers, headed by Walt Williams, arrive at Muroc Army Airfield (now Edwards AFB) from Langley Memorial Aeronautical Laboratory, Va., to prepare for X-1 supersonic research flights in joint NACA-Army Air Forces program. First NACA-NASA presence is established at the Mojave Desert site. (Note: Some sources report the arrival of thirteen individuals on Sept. 30, but an early chronology shows only the original five, with a total of thirteen NACA people not present at Muroc until December.)
- Dec. 9, 1946 The first successful rocket-powered flight of the X-1 (then designated XS-1), flown by Bell pilot Chalmers Goodlin.
- Aug. 20, 1947 D-558-1 establishes world speed record of 640.7 miles per hour.
- Sept. 7, 1947 NACA Muroc Flight Test Unit receives permanent status from Hugh L. Dryden, NACA's Director of Research. Now numbers 27 people.
- Oct. 14, 1947 X-1 exceeds the speed of sound in history's first supersonic flight.
- Nov. 25, 1947 Howard C. Lilly is first NACA pilot to fly jet-powered D-558-1 Skystreak.
- Mar. 10, 1948 Herb Hoover is first NACA pilot and first civilian to fly supersonic in X-1.
- Nov. 14, 1949 NACA's Muroc unit, with about 100 people, designated NACA High-Speed Flight Research Station (HSFRS). Walt Williams remains director.
- Sept. 25, 1950 John Griffith is first NACA pilot to fly the X-4 aircraft studying flying qualities of tailless vehicles.
- Mar. 4, 1952 Joe Walker is first to fly variable sweep wing X-5 to full 60 degree angle. Concept used today on F-14, F-111 and B-1 aircraft.

Apr. 9, 1953 First NACA Flight of XF-92A, a delta-wing aircraft to study the problem of pitching up during maneuvering caused by the delta configuration.

Oct. 14, 1953 Last NACA flight of XF-92A. The flight research with this aircraft shows the desirability of low horizontal tail surface. That configuration later used on such supersonic sweptwing fighters as the F-100 Super Saber and F-8U Crusader.

Nov. 20, 1953 Scott Crossfield, in rocket-powered D-558-2 Skyrocket, is first to fly twice the speed of sound.

June 26, 1954 NACA personnel move from old South Base site to new headquarters, Bldg. 4800, the original core of today's Dryden complex. Cost to build the new complex then: \$3.8 million. Personnel number over 200.

July 1, 1954 NACA HSFRS redesignated the NACA High-Speed Flight Station.

Aug. 23, 1954 Joe Walker makes first of 26 NACA research flights in the X-3 "Flying Stiletto" supersonic program.

Jun. 11, 1955 B-52 No. 008 makes its first flight at Boeing Aircraft, Seattle, Wash., and is turned over to USAF to become a NASA air-launch aircraft at Dryden and a national asset.

Aug. 27, 1956 NACA research pilot Joe Walker makes first NACA flight in an F-104A aircraft (the number seven F-104 aircraft off the assembly line).

Oct. 1, 1958 NACA (National Advisory Committee for Aeronautics) becomes NASA (National Aeronautics and Space Administration).

Oct. 15, 1958 First of three X-15 rocket research aircraft arrive at NASA High Speed Flight Station as preparations move ahead for the highly successful NASA-Air Force-Navy program that lasts 10 years to investigate hypersonic flight.

Nov. 7, 1958 Jack McKay makes last flight in the X-1E, final model flown of the X-1 series. Now on display in front of Dryden headquarters building.

June 8, 1959 First unpowered glide flight of the X-15, with Scott Crossfield at the controls, is made from NASA's B-52 launch aircraft.

Sept. 15, 1959 Paul F. Bikle succeeds Walt Williams as director of NASA High Speed Flight Station.

Sept. 27, 1959 NASA High Speed Flight Station at Edwards is redesignated NASA Flight Research Center. NASA personnel number about 340.

Mar. 25, 1960 First NASA flight in an X-15 aircraft. Pilot is Joe Walker.

- Feb. 12, 1962 Flight tests begin with the Paraglider Research Vehicle (Paresev). Developed to study ways of returning Gemini and Apollo spacecraft to Earth using a hang glider-type wing. Pilot is Milt Thompson.
- Apr. 5, 1963 M2-F1 lightweight lifting body is towed into the air over Rogers Dry Lake for the first time by a Pontiac convertible tow vehicle with Milt Thompson the pilot. Sets the stage for research with several lifting body designs to study atmospheric reentry of a vehicle like a Space Shuttle.
- Aug. 22, 1963 Joe Walker flies X-15 to unofficial world altitude record of 354,200 feet.
- Oct. 30, 1964 Joe Walker is pilot on the first flight of the Lunar Landing Research Vehicle (LLRV), "Flying Bedstead." LLRV used to develop techniques of landing a spacecraft on the moon's surface.
- Apr. 25, 1967 First NASA flight of the XB-70A with Air Force Col. Joe Cotton and NASA research pilot Fitz Fulton at the controls. The XB-70 flights investigated the stability and handling qualities of large, delta-wing aircraft flying at high rates of speed.
- Oct. 3, 1967 X-15 sets world's absolute speed record for winged aircraft, 4520 mph, with Air Force Maj. William Knight the pilot.
- Oct. 24, 1968 Last X-15 flight, 199th mission, piloted by NASA's Bill Dana. World's first hypersonic aircraft is most successful research aircraft to date.
- Dec. 17, 1968 Last research flight of XB-70 flown by Fitz Fulton and Air Force Lt. Col. Ted Sturmtal, reaching Mach 2.53. Program produced data on sonic booms, flight dynamics and handling qualities associated with large supersonic aircraft. Flight is on 65th anniversary of Wright Brothers flight at Kitty Hawk.
- May 9, 1969 HL-10 becomes first lifting body to fly supersonic. John Manke, later to become Dryden site manager, is pilot.
- March 5, 1970 First NASA checkout flight of YF-12A, Fitz Fulton pilot.
- June 2, 1970 First flight of the M2-F3 lifting body is flown by Bill Dana.
- Oct. 14, 1970 NASA Research pilots Tom McMurtry and Hugh Jackson reach a Dryden single-day record of six missions flown, in an F-104B while deployed to obtain data for the "Big Boom" experiments that sought to focus the energy from a sonic boom over a limited area.
- Mar. 9, 1971 First flight of supercritical wing flown by NASA pilot Tom McMurtry. Unusual wing shape, tested on a modified F-8, increases flight efficiency and lowers fuel usage. Concept now used widely on commercial and military aircraft.

- Oct. 14, 1971 A Piper PA-30 Twin Comanche becomes testbed to develop remotely piloted aircraft techniques from a ground-based cockpit. Concept leads to successful projects such as three-eighths scale F-15 spin research vehicle, HiMAT, and Boeing 720 jetliner purposely flown to a controlled crash landing in FAA test of anti-misting fuel additive.
- May 25, 1972 First flight of aircraft with all-electric fly-by-wire flight control system, the NASA F-8 Digital Fly-By-Wire research aircraft, with Gary Krier the pilot. Concept now used in many aircraft, including Space Shuttles.
- Aug. 16, 1974 747 Shuttle Carrier Aircraft used in wake vortex research program to study ways of reducing the turbulence trailing behind large aircraft.
- Aug. 5, 1975 NASA pilot John Manke lands X-24B lifting body on Edwards runway, showing that a space shuttle-like vehicle can be landed safely on a designated runway after returning from orbit.
- Mar. 26, 1976 NASA Flight Research Center is dedicated in honor of the late Hugh L. Dryden. NASA personnel number more than 560.
- Oct. 26, 1977 Last of 13 captive and free-flight tests with Space Shuttle prototype Enterprise, proving the shuttle glide and landing characteristics.
- Oct. 31, 1979 Last research flight of the NASA YF-12 research program. With Fitz Fulton as pilot, and Victor Horton flight test engineer on a YF-12A, one of three YF-12s flown during the program. Nearly 300 research flights explored high-speed, high-altitude flight, and yielded information on thermal stress, aerodynamics, high-altitude environment, propulsion and flight control systems.
- Apr. 14, 1981 320,000 people at Edwards watch Columbia, the first space shuttle, land. Dryden VIPs number 20,000, and 300,000 are at the East Shore public viewing site.
- Oct. 1, 1981 Dryden is consolidated with Ames Research Center, Moffett Field, Calif., to become the Ames-Dryden Flight Research Facility. Position of Dryden director is renamed site manager and John Manke is selected for the post. NASA personnel number 491.
- July 4, 1982 President Ronald Reagan heads list of 45,000 guests at Dryden watching the fourth Space Shuttle landing. Crowd of 500,000 watches from East Shore public viewing site.
- Oct. 30, 1984 NASA's oldest aircraft, the C-47 that towed the M2-F1 lifting body aloft during that program's early days and was used to support many other projects, is retired.

- Dec. 1, 1984            A remotely-piloted 720 test aircraft used in the joint FAA/NASA Controlled Impact Demonstration erupted in flames as it slid through the impact site on the dry lakebed, demonstrating that, contrary to expectations, an anti-misting fuel additive did not substantially inhibit fuel fires.
- Apr. 2, 1985            Steve Ishmael is first NASA pilot to fly the X-29 research aircraft investigating forward-swept wings, composite construction concepts, and integrated flight controls.
- Sept. 9, 1985          Data Analysis Facility opens as new home for general computer and associated engineering support and flight data operations.
- July 10, 1986          F-111 Mission Adaptive Wing research aircraft flies Mach 1 for the first time, with Rogers Smith part of two-person crew. Program tested wing with no ailerons, flaps, or slats. Camber changed mechanically in flight based on performance and mission.
- Dec. 1, 1987            Groundbreaking held for future \$16.1 million Integrated Test Facility featuring interdependent systems testing, systems troubleshooting, and rapid pre-and post-flight systems checkout on several aircraft simultaneously.
- Sept. 18, 1989        Ed Schneider flies the 100th mission in the F-18 High Angle of Attack Research aircraft in Phase 1 of the three-phase program investigating the high "alpha" regime.
- Dec. 18, 1989        First self-repairing flight control system demonstrated on the F-15 HiDEC (Highly Integrated Digital Electronic Control) aircraft, with Jim Smolka the pilot. System identifies control surface failures or damage then automatically repositions other control surfaces to allow the pilot to continue the mission or land safely.
- Feb. 15, 1990        First of three SR-71s arrive at Dryden for a program to investigate a host of disciplines to help development of future high-speed civil and military aircraft. Two YF-12As, prototypes of the SR-71, and a YF-12C were flown at Dryden from 1969 to 1979 in an earlier high-speed program.
- April 5, 1990          Pegasus space booster is successfully air-launched from NASA's B-52 in one of the first successful flights of a commercially developed space launch vehicle placing a payload into earth orbit. The launch, was off the California coast, with a NASA-Navy payload placed in a polar orbit 320 miles high.
- May 3, 1990            First flight in NASA's first program to investigate laminar flow at supersonic speeds with actively controlled suction. Program is using the only two F-16XL prototypes to investigate passive and active methods of reducing turbulence on wing surfaces at high speeds.

- Oct. 25, 1990 Final test in a series of eight using B-52 No. 008 to validate drag chute deployment system for use on space shuttles to improve their landing efficiency. The tests with 008 were on the lakebed and main runway.
- Dec. 3, 1990 Position of Dryden site manager redesignated as director in reorganization that strengthens Dryden's role as a national flight research installation, with Ken Szalai, chief of Dryden's Research Engineering Division, named to new position. Dryden personnel number 430.
- May 15, 1991 Full-scale X-30 structural test component, representing a wing control surface, arrives at Dryden's Thermostructural Research Laboratory for loads and temperature testing.
- Jul. 12, 1991 First flight of F-18 High Angle-of-Attack Research Vehicle (HARV) with thrust vectoring system engaged to enhance control and maneuvering at high angles of attack; 104th flight of the HARV, which arrived at Dryden Oct. 22, 1984.
- Aug. 14, 1991 First all-NASA SR-71 flight with research pilots Steve Ishmael and Rogers Smith in the cockpit. It was the first Mach 3 mission flown at Dryden since the last YF-12 flight Oct. 31, 1979.
- Sept. 30, 1991 Seven-year X-29 Advanced Technology Demonstrator program ends after 362 research missions with the two forward-swept wing aircraft. No. 1 aircraft was flown 242 times to validate design concepts. X-29 No. 2 was flown 140 times in high angle of attack studies. USAF later flies No. 2 in vortices control study.
- Oct. 3, 1991 Dryden aeronautical engineer Marta Bohn-Meyer becomes first-ever female crewmember to fly in an SR-71.
- Nov. 1, 1991 Tests of pressure sensitive luminescent paint end, opening door for a new method of measuring surface pressures on aircraft.
- Dec. 2, 1991 Dryden's F-16XL No. 849 achieves laminar flow over a swept-wing at supersonic speeds for the first time. Research may help produce wing designs that increase fuel savings by reducing natural aerodynamic drag.
- Dec. 12, 1991 F-18 high angle of attack research aircraft, with pilot Ed Schneider, achieves design point of 70 degrees angle of attack.
- April 23, 1992 First flight of an X-31 aircraft from Dryden following relocation of X-31 International Test Organization from Air Force Plant 42, Palmdale, in a DOD study of thrust vectoring for air combat at high angles of attack.
- May 16, 1992 Maiden landing of the space shuttle Endeavour, built to replace Challenger. Landing is viewed by an estimated 125,000 people, including 2500 school students.

- July 1, 1992        Single-day Dryden record of six missions tied by X-29 No. 2 after the aircraft returns to flight for a 60-flight Air Force study using vortex flow controls on nose to study improved control at high angles of attack.
- Oct. 24, 1992 Integrated Test Facility (ITF) officially opened, giving Dryden a unique capability to carry out interdependent systems testing, systems troubleshooting, and rapid pre-and post-flight systems checks on several aircraft simultaneously.
- Dec. 22, 1992        Flights begin with Dryden's CV-990 Landing Systems Research Aircraft, equipped with a space shuttle landing gear fixture that later lead to increased orbiter cross wind landing limits at the Kennedy Space Center, and aided in the decision to resurface the Kennedy runway.
- Jan. 4, 1993        Judy Janisse Child Development Center is dedicated. The \$700,000 facility is named after former NASA employee, killed in a commercial airline accident, who was instrumental in the development of the JJCDC.
- Mar. 9, 1993 NASA SR-71 flies on first science mission, taking a JPL ultraviolet camera to 85,000 feet for night photo studies. Flight was also first SR-71 night mission.
- Apr. 21, 1993        The F-15 HiDEC is landed using only engine power to turn, climb, and descend. Gordon Fullerton is pilot on milestone event.
- Apr. 29, 1993        The thrust-vectoring X-31 executes a minimum radius 180-degree turn -- the "Herbst Maneuver" -- while flying at more than 70-degrees angle of attack, well beyond the aerodynamic limits of any other aircraft.
- May 21, 1993        First research flight with Dryden's F-18 Systems Research Aircraft checks out an electric actuator that monitors and controls one of the aircraft's ailerons, and becomes a testbed for advanced electric and fiber optics components.
- June 15, 1993        Modified F-15 called ACTIVE -- Advanced Control Technology for Integrated Vehicles -- replaces the HiDEC as Dryden's integrated systems aircraft. The ACTIVE F-15 features forward canards and will be fitted with thrust vectoring nozzles to study their use for pitch and yaw control.
- June 24, 1993        Replica of X-15 rocket research aircraft, displayed at the corner of Lilly and Lakeshore Dr., is dedicated.
- Nov. 1, 1993        The space shuttle Columbia, on mission STS-58, lands at 7:06 a.m. (PST), the last planned landing of a shuttle at Edwards. Nearly 35,000 people, including about 5000 Dryden guests, view the morning event.

- Dec. 21, 1993 The Perseus remotely piloted aircraft flies for the first time in a project to develop technologies to be used to construct and fly unpowered vehicles on high-altitude science missions.
- Feb. 3, 1994 Final flight of an F-104 at Dryden, a symbolic farewell with NASA 826, is piloted by Tom McMurtry, Chief, Flight Operations Division. First acquired in 1956, 11 F-104s flew at Dryden over a 38-year period as chase and research aircraft. Last research mission with NASA 826 was Jan. 31, 1994. The other remaining F-104, NASA 825, was flown on its last research mission Jan 24, 1994.
- Mar. 1, 1994 Dryden named a Center again. Transition period to institute independent administrative functions ends Sept. 30, 1994.
- Mar. 18, 1994 10,000th research mission is logged by Dryden's Western Aeronautical Test Range, a flight with the F-18 HARV. Facility was developed in the 1950s to support the X-15 program.
- July 20, 1994 25th anniversary of Apollo 11 features salute to Dryden's Lunar Landing Research Vehicle (LLRV), used to develop moon-landing training techniques.
- Aug. 3, 1994 Sixth and last Pegasus mission using NASA's B-52 "008" as the launch vehicle is successful. Future airborne launches to be with an L-1011 owned and operated by Pegasus developer, Orbital Sciences Corp.
- Aug. 4, 1994 X-31 logs 438th flight, new record for experimental aircraft. Record holder had been X-29, set on its last flight in 1992.
- Oct. 1, 1994 Dryden assumes full Center status, as NASA's Center of Excellence in Flight Research. NASA personnel number 465.
- May 13, 1995 X-31 completes final research flights, making a total of 555 for the program.
- June 11, 1995 NASA's B-52, No. 008, becomes forty years old. Based at Dryden since mid-1959, it is the oldest B-52 still flying.
- Aug. 11, 1995 CV-990 Landing Systems Research Aircraft completes study of space shuttle landing gear, with a total of 155 research flights. Final tests subjected orbiter wheels to total failure modes on lakebed surface and concrete runway.
- Aug. 29, 1995 Aided by NASA-developed propulsion controlled aircraft (PCA) system, a McDonnell-Douglas MD-11 makes first-ever, safe landings of an actual transport aircraft using only engine power for control.
- Sept. 11, 1995 Pathfinder sets new altitude record for solar-powered aircraft. The remotely controlled, unpowered prototype attained an altitude 50,567 feet during a nearly 12 hour flight. Solar cells on the top

surface of the all-wing aircraft power six electric, propeller-turning motors for propulsion. Pathfinder is part of NASA's Environmental Research Aircraft and Sensor Technology (ERAST) program.

Oct. 13, 1995 First flight of the two-seat F16-XL with the active glove installed.

The F16-XL was piloted by Dana Purifoy, and begins a program researching laminar flow at supersonic speeds using a suction panel that covers 60% of the wing chord. Previous studies with the single-seat F16-XL used a glove that covered only 20% of the chord. Laminar flow research is important for proposed high-speed civil transport (HSCT).

Nov. 17, 1995 Center Director Ken Szalai renamed the ITF as the Walter C. Williams Research Aircraft Integration Facility.

Nov. 30, 1995 Improved software enables a McDonnell-Douglas MD-11 to make a final landing at Edwards without the need for the pilot to manipulate the flight controls while using only engine power for control.

May 29, 1996 F-18 High Angle-of-Attack Research Vehicle (HARV) makes final flight in 383-flight research program that investigated improved maneuverability of tactical aircraft at high angles of attack.

Jul. 2, 1996 NASA announces award of X-33 contract to Lockheed-Martin Corp. to design, build, and fly a vehicle that will demonstrate advanced technologies to dramatically increase reliability and lower the cost of putting a pound of payload in space. The test vehicle is projected to fly from the DFRC between March and December 1999.

Nov. 1, 1996 F-15 ACTIVE (Advanced Controls Technology for Integrated Vehicles) research aircraft conducts first thrust vectoring of engine exhaust at speeds approaching Mach 2.

Nov. 26, 1996 Year-long Supersonic Laminar-Flow Control program concludes with 45th flight on highly modified F-16XL research aircraft. Program proves that laminar--or smooth--airflow can be obtained over an aircraft wing at speeds of Mach 2 by use of a suction system pulling turbulent boundary-layer air through tiny holes in the wing skin.

Nov. 24, 1996 First flight of Tu-144LL flying laboratory inaugurates year-long flight test program in support of NASA's High Speed Research program.