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Historical and Operational Overview

Edwards Air Force Base, located in California's Antelope Valley, is the premier flight-test and flight-research center in the world, with a proven record of accomplishments and contributions to the development of the aerospace sciences.

Edwards was the scene of supersonic breakthroughs from 1947 through 1967. On October 14, 1947, USAF Capt. Charles E. "Chuck" Yeager became the first pilot to exceed the speed of sound while flying the rocket-powered Bell X-1 research airplane from Muroc Army Air Field (as Edwards Air Force Base was then known). On October 3, 1967, almost exactly twenty years later, USAF Capt. William J. "Bill" Knight became "the fastest man alive" when he flew the rocket-powered North American X-15 to more than six-and-one-half times the speed of sound from Edwards AFB.

All of the postwar Century Series of USAF fighters, the F-100, F-101, F-102, F-104, F-105, F-106, F-107, F-110 (later redesignated F-4C), and the first practical swing-wing airplane, the F-111, were extensively tested at Edwards AFB during the 1950s and 1960s. The Lockheed C-5 Galaxy, North American's XB-70, and Lockheed's YF-12 and SR-71 were also tested there during the 1960s. Moreover, new generations of attack, bomber, fighter, and transport aircraft--the A-10, B-1, F-15 and F-16, and the YC-15--flew at Edwards during the 1970s. In total, more than 100 types of aircraft have made either their first flight or first landing at Edwards AFB.

Edwards AFB has also played a vital role in the nation's space program. The NASA space shuttle has utilized the Air Force Flight Test Center as its landing and ferrying site following missions in space. This use of the center follows a long tradition of space-related research undertaken at the base. In the 1960s, the rocket-powered X-15 research airplane operated on the fringes of space after being air-launched on missions from Edwards. The Air Force Rocket Propulsion Laboratory at Edwards developed and validated the design of rocket engines for the Apollo-Saturn V launch vehicle, which placed a total of twelve men on the moon. A group of wingless lifting bodies, culminating in the X-24B, demonstrated that these air vehicles could make powerless precision approaches and landings, helping to pave the way for the present-day space shuttles.

In January 1979, a major, new range and test facility known as the Utah Test and Training Range was activated under the Air Force Flight Test Center, managed by the USAF Materiel Command. The Utah Test and Training Range consolidated under single management the Hill and Wendover Air Force Test Ranges, a portion of the Dugway Proving Grounds, the airspace over Hill, Wendover, and Dugway ranges (restricted airspace), and adjoining military operating areas and air traffic control assigned airspace.

The Utah Test and Training Range has served as the test area for many unmanned aerospace air vehicles of various sizes and shapes at several locations since its formation. Unmanned aerospace vehicles tested at the Utah Test and Training Range were used in the Vietnam War, Israel, Operations Desert Shield and Desert Storm, and elsewhere. It was the prime test and training range for unmanned cruise missiles as well.

The Air Force Flight Test Center is tasked to support the USAF Materiel Command mission by conducting and supporting tests of manned and unmanned aerospace vehicles; conducting flight evaluation and recovery of research

vehicles; performing development testing of an aerodynamic decelerator; operating the USAF Test Pilot School; developing, operating, and managing the Edwards Flight Test Range and the Utah Test and Training Range; supporting and participating in test and evaluation programs for the USAF, Defense Department, and other government agencies, as well as for airframe and powerplant contractors and foreign governments; and conducting flight tests for the deployment of nuclear weapons in support of the USAF Weapons Laboratory.

Edwards Flight Test Center is known for its ability to conduct aerodynamic tests such as performance and flying qualities evaluations. The capability to test and evaluate subsystems and to perform total weapons system evaluations has also existed since the mid-1950s. Total weapons system evaluations have been developed as a quantitative capability in the past ten to twelve years. Each subsystem is evaluated to determine whether it will perform as designed, whether it will perform its function in conjunction with other systems in a mission environment without interference, and its effects on the total system. Each weapons system is also evaluated under climatic extremes using the Climatic Laboratory at Eglin AFB in addition to arctic, desert, and tropical test sites. The reliability and maintainability of each subsystem, as well as the operational capability of the total weapons system, is assessed with eight phases (refer to Appendix B).

Additionally, the Flight Test Center performs development testing of mid-air retrieval systems for unmanned air vehicles. As part of the evolving capability to perform total weapons system evaluations, the Flight Test Center has developed the ability to conduct structural and flutter tests. A capacity to test and evaluate operational flight simulation trainers and to conduct the human factors evaluation likewise exists. The Flight Test Center also conducts research and development necessary for the improvement and modernization of ranges, facilities, and test techniques, as well as supporting the space shuttle program and evaluating its ability to support the Defense Department mission. Development of the capability to test and evaluate the atmospheric flight aspect of future manned air vehicles, such as the proposed National Aerospace Plane, is a continuing effort.

Edwards Flight Test Range is located on the western edge of the Mojave Desert, approximately 100mi north of Los Angeles, California, by highway. The range includes parts of San Bernardino, Kern, and Los Angeles Counties. Edwards Flight Test Range management's headquarters are located in the Ridley Mission Control Center at Edwards AFB. The location of Edwards AFB is vital to the accomplishment of its test and evaluation role in the aerospace industry. Natural attributes of the 470 sq-mi (301,000 acres) base include its climate, terrain, weather, visibility, and sparse population. At an elevation of about 2,300 ft, it has a typical desert climate and averages about 4 in of rainfall per year. Edwards averages 345-plus sunny days per year, with low humidity and moderate temperatures the majority of the year.

A desert environment offers several natural assets that make Edwards a premier flight-test facility. Two dry lakes with beds of hardened clay are located on the base and serve as its marked and maintained runway areas. In addition, a number of off-base lake beds are used as both planned and emergency landing areas. Edwards' two primary lake beds are Rogers Dry Lake (formerly Muroc Dry Lake), which has about 60 mi of marked and maintained runways on a dry lake bed that is about 12-1/2 mi long and 5 mi wide, and Rosamond Dry Lake, which has some 8 mi of marked and maintained runways on a dry lake bed that is about 5 mi long and 5 mi wide. During the rainy season, these dry lakes occasionally become wet and retain water. In fact, it can even snow at Edwards, albeit rarely.

The western Mojave Desert has traditionally enjoyed excellent flying visibility--typically 10 mi or more, 98 percent of the time--which is critical for photographic and video tracking, and remotely piloted vehicle operations.

The western desert area in which Edwards resides is sparsely populated, its relative remoteness making it an excellent area for flight-test activities. Special test areas, such as the mid- and high-altitude supersonic test and training corridors, are specifically located to have minimum impact on Edwards' neighbors.

Every major aircraft weapons system test effort for which the U.S. Air Force Flight Test Center is responsible is Managed under the Combined Test Force or CTF concept. This test force is made up of representatives from the Edwards Flight Test Center, participating test organizations, the USAF Operational Test and Evaluation Center, both user and support commands, and contractors. The Combined Test Force is responsible for all aspects of planning; coordinating; managing; flight operations; safety; testing; reporting of development, test, and evaluation (DT&E)

results; and for support of Initial Operational Test and Evaluation test programs. The B-52, B-1, B-2, C-17, F-15, F-16, F-22, and LANTIRN (Low Altitude Navigation and Targeting Infrared for Night) test programs at Edwards were all performed under Combined Test Forces.

The Air Force Flight Test Center test engineering and test capabilities include: propulsion, performance, flying qualities, fuel systems, environmental control systems, aircraft arresting systems, landing gear and brake systems, aircraft electrical and pneumatic systems, human factors, manned aerospace air vehicles, unmanned aerospace air vehicles, reliability and maintainability, flight control systems, structural dynamics and flutter, avionics integration, weapons deliveries, aircraft aerial delivery by parachute, and all-weather/climatic tests.

Edwards Flight Test Range has the capability to receive real-time data and provide the mission control function of any mission being conducted along the 600-nautical-mile Southwest and Pacific West Coast test areas, from the Western Space and Missile Center to the Utah Test and Training Range, or to transfer the display and control to any other Defense Department range mission control center locations.

Ranges

Edwards has a number of weapons development ranges which together are called the Precision Impact Range Area (PIRA). These are critical to ongoing precision strike training for modern aircraft and ordnance.

The PIRA is divided into three ranges: West Range, East Range, and PB-6 Range. Each of these ranges can be scheduled individually or in conjunction with one another depending on mission requirements.

West Range

The West Range contains six precision bombing circles with scoring instrumentation and a dual air-to-ground gunnery range which is a conventional low-altitude air-to-ground gunnery, bombing, and rocket range with defined airspace. Each range consists of a bomb/rocket circle, ten strafe targets, two skip bomb targets, two flank observation towers, and a common range control tower.

East Range

The East Range contains one precision bombing circle and a five-target air-to-ground rocket range. This range is not instrumented with scoring limited to triangulation by use of transits. Future expansion is planned.

Hangar Complexes and Accessible Ranges

Edwards AFB has twenty aircraft hangar complexes, three with two hangar bays include office space for engineering and administrative personnel and shop and laboratory facilities. Thirteen hangars are located on Main Base, four at North Base (ideal for classified programs) and three at South Base. All thirteen Main Base hangars are adjacent to the main taxiways and connected to the 300 ft by 15,000 ft instrumented main runway with easy access to Rogers Dry Lake.

The four hangars at North Base are all located adjacent to taxiways that connect directly to both Rogers Dry Lake and a 150 ft by 6,000 ft asphalt runway; a parking apron for small aircraft is available. The total complex is a relatively self-contained air base with administrative and laboratory facilities and is located on Air Force Flight Test Center property 6 mi north of the Main Base runway.

The hangars at South Base are adjacent to a parking apron and have access to the Main Base concrete runway and the Main Base facilities. Access to Rogers Dry Lake is also available, as is administrative, shop, and storage space.

Eleven ranges within 600 nautical miles of the Air Force Flight Test Center are accessible. These include: the Western Space and Missile Center, Pt. Mugu, Naval Weapons Center, and Utah Test and Training Range. These ranges have a variety of weather conditions, geography, topography, and terrain (including over water) to accommodate many test needs.

In short, Edwards Air Force Base, home of the Air Force Flight Test Center, is ideal for flight-test research and a multitude of other aerospace-related functions whether military or civilian. It has been that way for more than fifty years and, without doubt, will remain that way for many years to come.

