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Introduction

The Bell X-1, designed to mimic the shape of a .50-caliber projectile, was the first aircraft to explore the transonic region and break the "sound barrier." (AFFTC History Office)

X-Planes, Edwards, and Aerospace Archeology

The Research Airplane Program was a joint effort by the National Advisory Committee for Aeronautics (NACA, the predecessor of the National Aeronautics and Space Administration) and the military services. It was conceived near the end of World War II to perform flight research with a series of specialized aircraft in the then-unexplored realms of transonic and supersonic flight.

Two general categories of aircraft were established for the project: those needed to explore new areas of performance, and those required to investigate the effects of different airplane configurations. The program produced notable increases in knowledge about the dynamics of piloted flight in winged aircraft at speeds up to 4,500 miles per hour and at altitudes exceeding 350,000 feet.

The outstanding contributions of the Research Airplane Program, and subsequent flight research projects, included: providing important information on previously unexplored aircraft characteristics; validating transonic and supersonic wind-tunnel test data and analytical techniques; and providing confidence in the achievement of safe, controllable transonic and supersonic flight.

The first aircraft in the series was specifically designed to explore the transonic region and breach the so-called "sonic barrier" by flying faster than the speed of sound. It was originally designated XS-1 to denote that it would be the first experimental sonic airplane. Later, the designation was shortened to X-1. Many research vehicles with subsequent X designations have since provided important data to scientists and aircraft designers. They have come to be known collectively as the X-planes.

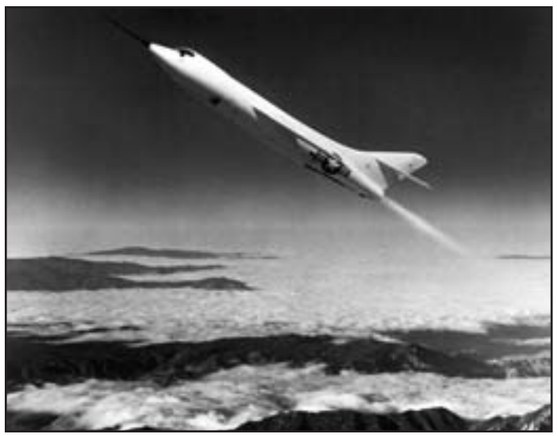
X-Planes Explained

The "X" designation is used to denote piloted, autonomous, or remotely piloted aerospace vehicles designed for testing highly experimental configurations. Numerous piloted and unpiloted X-planes have been designated, including variations of rebuilt and modified airframes.

There are arguably some aircraft that, by their nature, deserved X designations, such as the D-558-I and D-558-II transonic/supersonic research planes, and the M2-F1, M2-F2, M2-F3, and HL-10 wingless lifting body vehicles. For other aircraft, a YF designation (Service Test, Fighter) would seem more appropriate, such as the X-32 and X-35 Joint Strike Fighter technology demonstrators. A few (notably the X-8, X-9, X-11, and X-12) were rockets and missiles, and not easily categorized as "X-planes."

Military Aircraft Designations

X-plane designations are part of the Mission Design Series (MDS) designation system. Assignment of such numbers is regulated by Department of Defense (DoD) Directive 4120.15, "Designation and Naming Defense Military Aerospace Vehicles," and under the same title for each service: Air Force Joint Instruction 16-401, Army Regulation 70-50, and Navy NAVAIRINST 8800.3A.



Although it did not carry an "X" designation, the jet-and-rocket powered Douglas D-558-II was a purely experimental design. It became the first manned aircraft to fly twice the speed of sound. (NASA)

Headquarters Air Force Materiel Command Cataloging and Standardization Center (HQ AFMC/CASC) in Battle Creek, Michigan, serves as the control point for DoD MDS designators and aerospace vehicle popular names and assigns such designations as requested. Headquarters U.S. Air Force (HQ USAF/XPPE) at the Pentagon in Washington, D.C., administers the MDS Designator Program for the DoD and exercises approval authority for all new MDS designations.

The process for requesting MDS designators is as follows:

> *"The Military Departments must submit a written request for assignment of a distinctive MDS designator as early as possible in the development cycle. Coordinate requests with the Military Department point of contact and CASC as soon as possible to have an MDS designator assigned. CASC will assign and reserve the next available consecutive design number within each basic mission for new vehicles. Do not use MDS designators before approval. NOTE: Air Force agencies must coordinate MDS requests through the applicable system program office (SPO). CASC will assign the MDS designator and transmit the request to HQ USAF/XPPE for processing and approval."*

Piloted X-planes include: X-1, X-1A, X-1B, X-1C, X-1D, X-1E, X-2, X-3, X-4, X-5, X-6, X-13, X-14A, X-14B, X-15, X-16, X-18, X-19, X-20, X-21, X-22A, X-24A, X-24B, X-24C, X-25, X-25A, X-25B, X-26A, X-26B, X-27, X-28, X-29, X-30, X-31, X-32A, X-32B, X-35A, X-35B, X-35C, and X-44.

Unpiloted X-planes include: X-7, X-8, X-9, X-10, X-11, X-12, X-17, X-23, X-33, X-34, X-36, X-37, X-38, X-39, X-40A, X-41, X-42, X-43A, X-43B, X-43C, X-43D, X-45A, X-45B, X-46, X-47, X-50, and X-51.

Some X-designations were assigned to planes that were never built. Some reached the mock-up stage while others were only "paper airplanes," never going beyond the design stage. Occasionally an X-designation was applied to an aircraft before that designation was officially assigned, leading to later confusion when an official MDS was assigned. Examples include the X-35 Crew Return Vehicle, which was later officially designated X-38, and the Lockheed Martin X-32 Joint Strike Fighter concept mock-up, which underwent extensive redesign

North American's X-15 is widely considered one of the most successful research aircraft ever built. Three of the hypersonic rocket planes completed 199 flights with only one fatal mishap. (NASA)

before becoming the X-35 while the X-32 designation was later officially assigned to the Boeing JSF design. (Author's note: If you're not confused yet, you haven't been paying attention.)

Edwards Air Force Base

> *"To the north of us, just over the San Bernardino Mountains, was the Mojave Desert; large, unsettled; not good for anything but rattlesnakes and horned toads, or where there was water, for the establishment of desert colonies for the idle rich. It was ideal for a bombing range."*

So wrote Gen. Henry H. "Hap" Arnold in his 1949 memoir, *Global Mission*, describing why he chose Muroc as the site of a bombing and gunnery training range in 1933. Then a colonel commanding the Army's March Field in Riverside, California, Arnold had been denied permission to use the Navy's Pacific Ocean range, so he looked toward the vast Mojave Desert north of Los Angeles. The most logical site was located adjacent to a 44-square-mile dry lakebed in a sparsely populated region best known for borax mining and alfalfa farming.

In September 1933, personnel from March Field established a modest tent camp on the east shore of Rogers Dry Lake, six miles east of Muroc. Residents that described Muroc as a "town" were being overly generous. The small community, settled in 1910, was a collection of wooden buildings and tarpaper shacks that served as a siding for the Santa Fe railway, whose track bisected the lakebed. The largest buildings included the railway station and a general store.

The Army built targets on and off the lakebed, including a moving target on a track, simulated structures, and naval ship outlines. Obsolete Keystone bombers served as targets, as well. In 1935, a second tent camp was established on the west shore of the lakebed, just one mile north of Muroc. The skies above the ancient playa echoed with the throb of piston engines as Army pilots bombed and strafed the desert in all manner of aircraft, from the diminutive Boeing P-26A "Peashooter" to the Martin B-10. The camp population fluctuated according to the size of visiting squadrons, and only 13 Army personnel from March were needed to operate the range. All of this changed in the summer of 1941 as America drew closer to involvement in World War II.

On 10 July 1941, a train arrived carrying 140 troops. They immediately began work on a new Army camp less

The parched bed of Rogers Lake provides 44 square miles of hard surface for aircraft operations. When dry, the clay can easily support the weight of the largest transport in the Air Force inventory. The lakebed has served as the landing site of space shuttles and numerous experimental planes. (NASA)