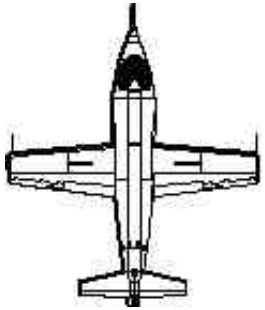
Summary of "X" Experimental Aircraft

AIRCRAFT	FLIGHT DATES	NUMBER OF FLIGHTS	REMARKS
X-1  Manufacturer and # of Airframes: Bell Aircraft built three of the original X-1s, plus an X-1A, an X-1B, an X-1D, and there was also an X-1E rebuilt from the X-1 #2.	1946-1958	214	Joint program among the NACA, the Air Force, and Bell Aircraft. The bullet-shaped, rocket-powered aircraft became the first airplane to break the sound barrier on Oct. 14, 1947. Flight research by the NACA continued through such advanced models as the X-1B and X-1E, providing a wealth of aerodynamic information for use in correlating wind-tunnel data with actual flight data and for designing later high-performance aircraft.
D-558-1 Manufacturer and # of Airframes: Douglas, three	1947-1953	225	Joint program among the NACA, the Navy-Marine Corps., and Douglas Aircraft. The straight-winged, turbojet-powered "Skystreak" collected data in the transonic region and stability, control, loads buffeting, and handling qualities.
D-558-2 Manufacturer and # of Airframes: Douglas, three	1948-1956	312	Joint program among the NACA, the Navy-Marine Corps,. and Douglas Aircraft. The swept-wing aircraft flown with both turbo-jet and rocket power set an altitude record of 83,235 ft. on Aug. 21, 1953, and a speed record on Nov. 20, 1953, when it became the first aircraft to reach Mach 2. The "Skyrocket" collected data about handling qualities, wing loads, and stability and control, especially pitch-up.

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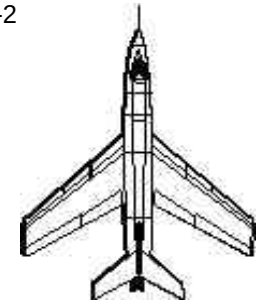
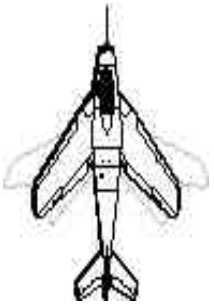
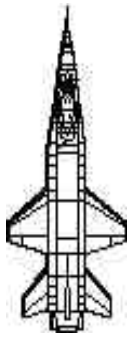
AIRCRAFT	MANUFACTURER	AIRFRAMES	FLIGHT DATES	FLIGHTS	REMARKS
XF-92A	Convair	1	1948-1953 NACA flts.; others by Convair and the Air Force	25	Joint program among the NACA, the Air Force, and Convair to test the country's first delta-wing air-craft. Stability and control, pitch-up, and lift-over drag measurements obtained from this program contributed to the technology used to develop the F-102, F-106, XF2Y-1 Sea Dart, and B-58 aircraft.
X-2 	Bell	2	1954-1956	17	Joint program with the Air Force, although the NACA never flew the swept-wing, rocket-powered aircraft designed to fly Mach 3. The NACA supported the Air Force with advice and data analysis. The X-2 did become the first aircraft to reach Mach 3, recording a Mach 3.2 speed on its last flight, which destroyed the aircraft and killed the Air Force pilot because of inertial coupling. It collected data on aerodynamic heating, stability and control effectiveness at high speeds and altitudes. The X-2 was also the first aircraft to fly higher than 100,000 feet on Sept. 7, 1956, when it reached 126,200 feet 20 days before the aircraft reached Mach 3.2
X-3	Douglas	1	1952-1955	26	This slender, jet-powered aircraft tested such new materials as titanium and collected data on stability and control, pressure, distribution, and flight loads. The X-3 failed to achieve the high speeds for which it was designed but pioneered in the use of titanium and contributed to the development of aircraft tire technology.

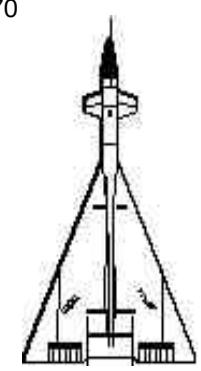
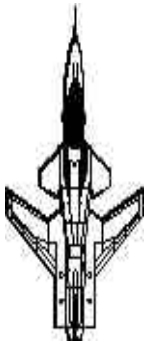
Summary of "X" Experimental Aircraft

AIRCRAFT	MANUFACTURER	AIRFRAMES	FLIGHT DATES	FLIGHTS	REMARKS
X-4 	Northrop	2	1948-1953	90	In a joint program with the Air Force and Northrop, the NACA conducted most of the flights in this semi-tailless aircraft (which had no horizontal stabilizer). Powered by two turbojet engines and featuring swept wings, the X-4 helped demonstrate that tail surfaces are important for proper control effectiveness but that a properly configured semi-tailless airplane was a viable platform for research on dynamic stability and also provided data (from tufts) on airflow anomalies.
X-5 	Bell	2	1951-1953 Air Force-NACA flights plus a few others by Bell and the Air Force	133	The X-5 completed all of the research goals originally set for the first aircraft capable of variably sweeping its wings in flight. Demonstrating wing sweep from 20 to 60 degrees, the aircraft verified NACA wind-tunnel predictions of reduced drag and improved performance resulting from increased wing sweep as it approached Mach 1. Even the vicious spinning characteristics of the X-5 yielded a wealth of data for determining poor aircrafts spin disign.

Summary of "X" Experimental Aircraft

AIRCRAFT	MANUFACTURER	AIRFRAMES	FLIGHT DATES	FLIGHTS	REMARKS
X-15 	North American Aviation	3	1959-1968	199	This joint program by NASA, the Air Force, and the Navy operated the most remarkable of all the rocket research aircraft. Composed of an internal structure of titanium and a skin surface of a chrome-nickel alloy known as Inconel X, the X-15 first set speed records in the Mach 4-6 range with Mach 4.43 on Mar 7, 1961; Mach 5.27 on June 23, 1961; Mach 6.04 on Nov. 9, 1961; and Mach 6.7 on Oct 3, 1967. The airplane set an altitude record of 354,200 feet (67 miles) on Aug. 22, 1963, and provided an enormous wealth of data on hypersonic air flow, aerodynamic heating, control and stability at hypersonic speeds, reaction controls for flight above the atmosphere, piloting techniques for reentry, human factors, and flight instrument-ation of relevance not only to aeronautics but to spaceflight.
Lifting bodies					
M2-F1	DFRC	1 of each	1963-1975	223	This joint program between the Air Force and NASA demonstrated the ability of pilots to maneuver and safely land a wingless vehicle de-signed to fly back to Earth from space and be landed like an aircraft at a pre-determined site. The information generated by the lifting body program contributed to the data base led to the development of today's shuttle program, especially its approach and landing techniques The rocket-powered lifting bodies (all but the unpowered M2-F1) have also contributed to the upcoming X-33 space technology demonstrator strator and the X-38.
M2-F1	Northrop				
M2-F3	Northrop			Does not include	
HL-10	Northrop			nearly 400 car	
X-24A & 24B	Martin			tows of the M2-F1	

Summary of "X" Experimental Aircraft

AIRCRAFT	MANUFACTURER	AIRFRAMES	FLIGHT DATES	FLIGHTS	REMARKS
XB-70 	North American	2	1964-1969	129	The joint program among North American Rockwell, the Air Force, and NASA featured the world's largest experimental aircraft with a delta wing and hinged wing tips that could be folded down to a 65° angle to improve stability at the aircraft's supersonic speeds of up to Mach 3, a speed at which the Valkyrie was designed to ride its own shock wave. The program used the Valkyrie to conduct fundamental flight research at high speeds for use in designing future supersonic aircraft, both military and civilian. The aircraft produced a significant quantity of information on supersonic flight at up to Mach 3 speeds in areas such as noise (including sonic booms), potential flight corridors, validation of wind-tunnel data, flight control, operational problems, and clear-air turbulence.
X-29 	Grumman	2	1984-1992	437	In a joint program involving the Defense Advanced Research Projects Agency, the Air Force, NASA, Grumman, and the other contractors, this single-engine jet-powered aircraft investigated the use of advanced composite materials,a forward-swept wing with a thin supercritical airfoil a variable-incidence canard, a computerized fly-by-wire flight control system to overcome the aircraft's inherent instability, behavior at high angles of attack, and a vortex flow-control system (among other technologies). On Dec. 13, 1985, the X-29 became the first forward-swept-wing airplane in the world to exceed Mach 1 in level flight, and flight results showed that a highly unstable aircraft with forward-swept wings could be flown safely with good control response up to about a 40° angle of attack. The flight instructor also added to engineers' understanding of advanced composites, used increaslingly in aircraft construction, and digital flight control systems.

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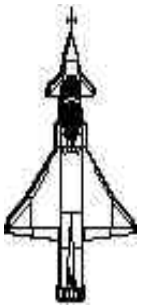
AIRCRAFT	MANUFACTURER	AIRFRAMES	FLIGHT DATES	FLIGHTS	REMARKS
X-30			1986-1994 Only a 1/3 scale concept demonstrator was built, "flown" only in a high-temperature tunnel.		This joint effort by NASA, the Department of Defense, and five major contractors explored development of technologies for a new generation of aerospace vehicles for hypersonic cruise in the atmosphere or single-stage-to-orbit using airbreathing primary propulsion and horizontal takeoff and landing. Although a full-scale aircraft was never built because Congress ended funding in1994, the program had expected such a vehicle to fly at Mach 25. The program developed significant advances in high-temperature, carbon-carbon materials, lightweight titanium and beryllium alloys, and high strength, corrosion-resistant titanium-alloy composites. These technologies and the program's work with supersonic-combustion ramjet propulsion will all be useful to subsequent U.S. aerospace efforts in the hypersonic area.
X-31 	Rockwell Aerospace North American Aircraft Deutsche Aerospace	2	1990-1995	555	In a joint program with the Defense Advanced Research Projects Agency, the U.S. Navy, the German Federal Ministry of Defense, Deutsche Aerospace, Rockwell International, the U.S. Air Force, and NASA, the Enhanced Fighter Maneuverability demonstrator showed the value of using thrust vectoring (by means of carbon-carbon paddles) coupled with advanced flight control systems to provide high maneuverability and controlled flight at high angles of attack. Featuring a delta-shaped, composite, twisted camber wing and strakes on the rear fuselage, the X-31 achieved stabilized flight at 70° angle of attack. With nose strakes added to increase stability, the aircraft exhibited remarkable "post-stall" maneuverability, such as a 180° turn at an extremely high angle of attack, known as the "Herbst maneuver."