NASA Facts

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B-52B Launch Aircraft

NASA's B-52B launch aircraft, accompanied by a NASA F-18 chase aircraft, cruises to a test range over the Pacific Ocean carrying the second X-43A vehicle attached to a Pegasus rocket on March 27, 2004. NASA Photo EC04-0092-18 by Jim Ross

The B-52B used by NASA's Dryden Flight Research Center, Edwards, Calif., is an air launch and research aircraft that holds the distinction of being NASA's oldest aircraft, as well as being the oldest B-52 on flying status. It has the lowest number of flying hours of any B-52 in operation, having been used exclusively in the role it continues to perform so reliably today.

The B-52B, tail number 52-008, first flew on June 11, 1955, and has been used on some of the most significant projects in aerospace history.

The aircraft was the tenth B-52 to come off the Boeing assembly line and was a U.S. Air Force test aircraft for four years before it was assigned to support the X-15 research aircraft program at Dryden.

Past Project Support

X-15 Program

NASA 008 was one of two B-52s used as "motherships" to air launch the three rocket-powered X-15 aircraft for research flights. Aircraft 008 was the launch aircraft on 106 of the X-15 flights and flew a total of 159 captive-carry and launch missions for the X-15 program.

The X-15 was flown over a period of nearly 10 years - June 1959 to October 1968 - and set the world's unofficial speed and altitude records of 4,520 mph (Mach 6.7) and 354,200 feet in a program to investigate all aspects of manned hypersonic flight. Information gained from the highly successful X-15 program contributed to development of the Mercury, Gemini, and Apollo manned space flight programs, and also the Space Shuttle program.

The other B-52 used in the X-15 program, tail number 003, was retired in 1969 and is on permanent display at the Pima County Air Museum in Tucson, Ariz.

The Lifting Bodies

Between 1966 and 1975, B-52 008 was the launch aircraft for 127 of the 144 flights of the wingless lifting body aircraft that contributed to development of the space shuttle.

NASA's workhorse B-52B 008 flies over research pilot Bill Dana in 1969 following an HL-10 lifting body mission. NASA photo ECN 2203.

Lifting bodies obtain aerodynamic lift from the shape of their bodies. The addition of fins and control surfaces allowed research pilots to stabilize and control the vehicles and maintain a predetermined flight path. Research flights with the vehicles proved that vehicles entering the atmosphere from space could be maneuvered to a safe runway landing - paving the way for full development of the space shuttle.

Miscellaneous Support

NASA 008 was the launch aircraft for several remotely piloted aircraft flown by Dryden in the 1970s and l980s to study spin-stall, high angle of attack, and maneuvering characteristics. They were the sub-scale F-15 spin research vehicle; the HiMAT (Highly Maneuverable Aircraft Technology) research aircraft; and the DAST (Drones for Aerodynamic and Structural Testing), which investigated loads alleviation.

In 1977 and l978, and again in the 1983 - 1985 time period, 008 was used as the launch aircraft to test and develop the parachute recovery system used to recover the space shuttle's solid rocket booster casings.

The first of four lengthy series of test flights began in 1979 for an Air Force project to certify an extension of the operational life of the parachute recovery system on the F-111 crew escape module. The tests concluded in 1992. The tests, using 008 as the airdrop vehicle for the parachute test articles, were part of a continuing Air Force program to improve the recovery system's capability.

From July to October l990, the veteran B-52B was used for a series of eight tests of a drag chute deployment system being installed on space shuttle orbiters.

The drag chutes permit the orbiters to land safely in a shorter distance and also help reduce tire and brake wear. The test unit, consisting of the test drag chute and its attachment and deployment systems, was installed in the tail of NASA 008, along with instrumentation to record loads and pressures on the deployed parachute and also on the structure of the aircraft.

The tests were carried out at landing speeds ranging from 160 to 230 mph on a lakebed runway and also on the main concrete runway at Edwards. They demonstrated the initiation, deployment, inflation, and overall operation of the orbiter drag chute system. Data from the tests were used to validate predicted loads.

First operational use of the drag chute system was on Shuttle Endeavour, newest of the space shuttle fleet, during its first landing, May 16, 1992.

Pegasus

NASA 008 was used as the air launch platform for the first six commercially developed Pegasus rocket boosters.

The three-stage Pegasus is designed to put a payload into Earth orbit after being launched horizontally from a carrier aircraft's wing.

Pegasus was developed by Orbital Sciences Corporation under sponsorship of the Defense Advanced Research Projects Agency (DARPA) as part of the agency's Advanced Space Technology Program.

The first Pegasus launch from NASA 008 was on April 5, 1990, over the Pacific Ocean, about 60 miles southwest of Monterey, Calif.

NASA 008's primary mission for several years was as the launch platform for the X-38 prototype space station crew return vehicle. The maiden free-flight of the X-38 "lifeboat" occurred in March 1998. Mission support continued until the X-38 project was cancelled in 2001.

Current Project Support

Again playing a central role in making history, NASA 008 served as the launch aircraft for the X-43A Hyper-X program. The X-43A research vehicle proved the concept of hypersonic scramjet-powered flight.

On March 27, 2004, NASA 008 carried the second X-43A, mounted on a modified Pegasus booster rocket, up to the launch altitude of about 40,000 feet. The rocket boosted the X-43A up to its test altitude of about 95,000 feet over the Pacific Ocean, where the X-43A separated from the booster and flew freely at its test speed of Mach 7. This was the first time an air-breathing scramjet-powered aircraft has flown freely.

Aircraft Modifications

After coming to NASA, a major structural modification to the B-52B was the cutout of a large notch in the aircraft's its right inboard wing flap to accommodate the vertical tail on the three X-15 aircraft. This notch also served the Pegasus and Hyper-X projects.

Installation of various pylons used to carry research vehicles and test articles to be air dropped has occurred over the years. The pylons have been attached under the right wing between the inboard engine pod and fuselage. Each pylon was subjected to extensive drag, airflow and loads testing before use. On a historical note, the Hyper-X Launch Vehicle pylon used to attach it to the B-52B is the same pylon used for the X-15 program.

Special instrumentation has been installed aboard NASA 008 to record and transmit test and research data and video to the Dryden Mission Control Room or other receivers during research missions. A second Launch Panel Operator position was added to augment the existing one for the Hyper-X project.

Aircraft Specifications

The NASA B-52B is powered by eight Pratt & Whitney J-57-19 turbojet engines, each producing 12,000 pounds of thrust with water injection. The aircraft has a top speed of 390 knots (448 mph) and a maximum operating altitude of more than 50,000 feet. It is 156 feet long, and has a wingspan of 185 feet.

The heaviest load Dryden's B-52B has carried since it become the NASA launch aircraft was 53,100 pounds - the No. 2 X-15 with external fuel tanks used during that aircraft's fastest flights. The second heaviest load, at 47,772 pounds, was the space shuttle solid rocket booster recovery system tests, while the third heaviest load carried was the Pegasus rocket, weighing in at 41,152 pounds.