NASA Facts

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B-52 Launch Aircraft

The B-52 used by the NASA Dryden Flight Research Center, Edwards, CA, as an air launch and research aircraft is the oldest B-52 in flying status and has been used on some of the most significant projects in aerospace history.

The NASA B-52, carrying a tail number of 008, is a "B" model that first flew in June 1955. It was the eighth B-52 to come off the Boeing assembly line and was an Air Force test aircraft for four years before it was assigned to the NASA/Air Force/Navy X-15 rocket research aircraft program at Dryden.

X-15 Mothership

NASA 008 was one of two B-52s used as "motherships" to air launch the three X-15 aircraft for research flights. It was the launch aircraft on 106 of the X-15 flights and flew a total of 161 captive-carry and launch missions in 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 spaceflight programs, and also the Space Shuttle program.

The other B-52 used in the X-15 program, NASA 003, was retired in 1969 and is at the Pima County Air Museum, Tucson, AZ.

Lifting Bodies

Between 1966 and 1975, 008 was the launch aircraft for 128 of the 144 flights of the wingless lifting bodies that contributed to development of the space shuttle.

Lifting bodies obtained 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.

Varied Projects

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 1977 in an Air Force project to certify an extension of the operational life of the parachute recovery system of the F-111 crew escape module. The tests are expected to conclude in 1995. The tests, using 008 as the airdrop vehicle for the parachute test articles, are part of a continuing Air Force program to improve the recovery system's operational capability.

Pegasus

NASA 008 was used as the air launch platform for the first six Pegasus space boosters.

Pegasus is a commercially developed three-stage rocket 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 Advanced Research Projects Agency (ARPA) as part of the agency's Advanced Space Technology Program. Six Pegasus launches from the NASA B-52 were carried out under the original support agreement with ARPA, all successfully.

The first Pegasus launch from NASA 008 was on April 5, 1990, over the Pacific Ocean, about 60 miles southwest of Monterey, CA. It was the first time a payload had been put into earth orbit by a commercial rocket. The second launch was on July 17, 1991, using the same drop point off the California coast, while the third was on Feb. 9, 1993, off the Florida coast. The fourth, fifth, and sixth Pegasus launches were also off the California coast, with the final mission on Aug. 3, 1994.

Orbiter Drag Chute Tests

From July to October of 1990, the veteran B-52 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 (140 to 200 knots) 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 orbiter to receive the drag chute system was Endeavour, newest of the space shuttle fleet. First operational use of the drag chute system was on Endeavour's first landing, May 16, 1992.

Modifications

A major structural modification to the B-52 when it became a NASA air-launch aircraft was the large notch cut into its right inboard wing flap to accommodate the vertical tails on the three X-15 aircraft.

A second major modification was installation of the wing pylon used to carry research vehicles and test articles to be air dropped. Located on the right wing, between the inboard engine pylon and fuselage, it was subjected to extensive drag, airflow, and loads testing before it could be used.

With the conclusion of B-52 support to the Pegasus program in 1994, the wing notch was filled in and the pylon was removed to accommodate requirements for another project. If the need for air-launch capabilities arose in the future, the pylon could be reattached.

Special instrumentation has been installed in the aircraft to record and transmit test and research data and video to the Dryden Mission Control Room or other receivers during research missions.

Aircraft Specifications

The NASA B-52 is powered by eight Pratt and 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 wing span of 185 feet.

Heaviest load 008 has carried since it become the NASA launch aircraft was 53,100 pounds -- the No. 2 X-15 with external fuel tanks used during its fastest flights. Second heaviest load, 48,400 pounds, during tests of the Space Shuttle's solid rocket booster recovery system, while the third heaviest load is the Pegasus vehicle, at 41,400 pounds.

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Cover Picture: Takeoff of NASA 008 on a mission to launch the Pegasus space booster suspended from the right wing pylon.