NASA Facts

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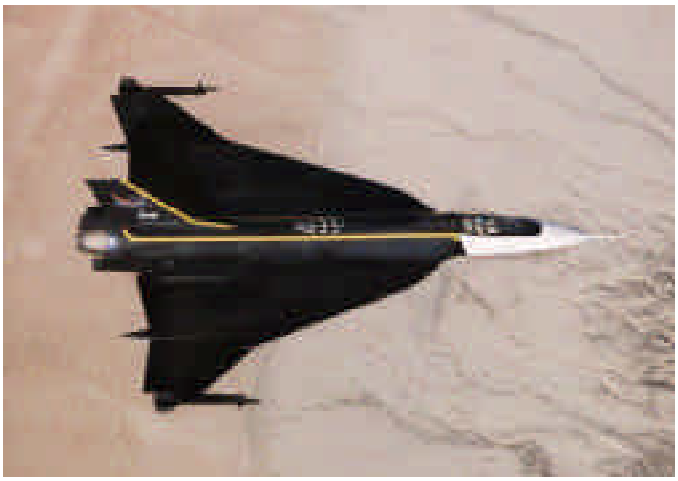
F-16XL-1 Testbed Aircraft



NASA's F-16XL-1 over the desert. NASA photo EC97 44354-3

NASA Dryden Flight Research Center's F-16XL-1 aircraft (tail number 849) testbed aircraft supported several flight research projects during the 1990s. The XL-1 aircraft was upgraded with a new Digital Flight Control System (DFCS) in 1997. The DFCS utilized an electronic flight control system coupled with a digital computer, replacing the F-16XL-1's original analog computer. The DFCS modification was equivalent to the U.S. Air Force F-16 upgrade known as Block 40. The aircraft's fly-by-wire flight control system remained intact.

The DFCS upgrade allowed NASA's F-16XL-1 the flexibility needed to perform experiments which required major new flight control functions or capabilities. The initial flight test objectives for the modified aircraft verified that the DFCS functioned properly and that the performance and handling qualities were acceptable throughout the flight envelope.

The added flexibility of the DFCS increased the versatility of this aircraft as a testbed for aerodynamic research and investigation of other advanced technologies. The aircraft's instrumentation system monitored control system operations, and was capable of supporting additional measurements.

The digital flight control system was compatible with a Research Flight Control System (RFCS) which could be installed when necessary. RFCS capability provided a flexible, reliable and safe means to modify the aircraft control system. The RFCS computer significantly increased computational speed and computer memory.

The XL-1 aircraft was previously used in NASA's Cranked-Arrow Wing Aerodynamics Project, or CAWAP, which provided aerodynamic data for NASA's High Speed Civil Transport (HSCT) research program. The unique cranked-arrow wing shape provided better low-speed lift and handling characteristics than the modified "double-delta" wing used on the Concorde supersonic transport (SST).

The XL-1 participated in NASA's 1995 sonic boom study, in which the aircraft flew 200 feet behind a NASA SR-71 to probe the boundary of the SR-71's supersonic shock wave. These tests measured and recorded the shape and intensity of the shock waves. The studies helped HSCT engineers to better understand supersonic shock waves in order to reduce sonic boom intensity near populated areas.

NASA's XL-1 aircraft is in flyable storage at Dryden.