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MISSION ADAPTIVE WING SOARS AT NASA FACILITY

A new type wing that may well multiply the capabilities of future aircraft is being flight tested on a high performance jet aircraft at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif. Called a Mission Adaptive Wing, or MAW for short, it changes its curvature to the best shape for the type of flying that has to be done, whether it is all subsonic, transonic or supersonic speeds.

The leading and trailing edges of the jet's wing can be drooped in flight so that the wing is highly curved, raised so the wing is nearly flat, or adjusted to mid-way position. The movable parts of the wing are covered with continuous fiberglass skins so that the airflow over the wing is smooth and relatively drag free. This is in contrast to most airplanes that use lift enhancing or lift altering devices like conventional flaps, slats or spoilers that produce energy-robbing drag.

Research pilots have flown the MAW aircraft, a highly modified F-111 jet fighter, from subsonic speeds up to Mach 1.4 in initial tests from the NASA flight test facility. The initial test flights are "clearing the envelope" with the wings flexed at various curvatures. This process allows further research data to be safely gathered so that designers of future variable camber wing airplanes have the best information possible. So far the altitude envelope has been cleared from 27,500 down to 7,500 ft. where denser air can cause more stress on the aircraft.

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Testing with the aircraft has been conducted with wing sweep angles of 26 and 58 degrees and in a manual mode where the MAW system operator selects the various deflection angles of the leading and trailing edges through the aircraft's MAW computers.

Within the cleared flight envelope, performance data will be gathered at both 26 and 58 degree wing sweep. These data will substantiate the feasability to apply this new technology to future airplane design. At the conclusion of the performance tests in the manual configuration, the system will be reconfigured for automatic mode tests which are expected to be concluded early next spring. Flight testing with both manual and automatic modes will continue through the remainder of 1987.

The limited automatic modes include maneuver camber control where the wings are deflected automatically to the best lift versus drag combination for a particular speed; cruise camber control which constantly adjusts for maximum speed; maneuver load control which can help protect the aircraft from high G stresses; and maneuver enhancement/gust alleviation which is designed to improve the aircraft's up and down movement response to the pilot's commands and reduce the aircraft's response to turbulence.

The MAW is a joint program of NASA's Ames-Dryden Flight Research Facility and the U.S. Air Force Flight Dynamics Laboratory, Wright Patterson AFB, Ohio. Flight testing is conducted jointly by NASA Ames-Dryden and the Air Force Flight Test Center from Ames-Dryden. The Boeing Military Airplane Company is the manufacturer of the Mission Adaptive Wing.

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