Lockheed Martin And U.S. Air Force Complete Flight-Testing Of F-16 Conformal Fuel Tanks

Lockheed Martin Corp. , with the help of the U.S. Air Force, recently completed the development flight-testing of new conformal fuel tanks (CFTs) for its F-16 multirole fighter.

CFTs are external, pod-like fuel reservoirs attached on the upper surface of the F-16's fuselage, with the tank's lower surface conforming to the aircraft shape.

"Adding CFTs is a major improvement in the F-16's already-legendary combat capability," said John L. Bean, vice president of F-16 programs. "The CFTs add significantly to the F-16's unrefueled mission radius, patrol persistence and payload. CFTs have become a popular option on our advanced F-16 versions -- the advanced Block 50/52 and Block 60, which are in development and initial production.

"Addition of large conformal tanks to the F-16 without impacting its superb aerodynamics and handling qualities was a major technical achievement. The CFTs are designed for the full F-16 flight envelope -- up to 9 g's, maximum angle of attack and sideslip and maximum roll rate. These points were demonstrated repeatedly during the flight test program."

Developmental flight-testing of the CFTs was conducted on an F-16C by the U.S. Air Force's 40th Flight Test Squadron, Air Armament Center, Eglin Air Force Base, Fla., from January 2001 through October 2002. A total of 54 test flights and 135 flight test hours were accomplished. Testing included fuel system functional operation, air refueling, loads, flutter, stability and control, and vibration.

"The F-16 CFT testing at the Air Armament Center at Eglin was a unique arrangement," said Rich Beausoleil, lead USAF project test engineer at Eglin. "We mostly do weapons development and testing for stores certification for the U.S. Air Force here. But in this case, we were the contractor to Lockheed Martin for a major airframe subsystem intended primarily for foreign sales. We had an excellent working relationship."

"The CFTs have very little adverse effect on the F-16's renowned performance," said Maj. Timothy S. McDonald, U.S. Air Force project pilot for CFT testing at Eglin. "You could hardly tell they were there. A set of CFTs carries 50 percent more fuel than the centerline external fuel tank, but has only 12 percent of the drag."

Tests included maneuvers and fuel-flow rates expected throughout the operational flight envelope to verify the gravity feed transfer concept. Multiple aerial refuelings were included both to verify transfer functions and to reduce the number of test sorties required.

"We were extremely pleased with the results of the flight-testing in validating the design, analysis and ground-testing," said Thomas H. Clark, F-16 CFT program manager at Lockheed Martin. "Flight test measurements were very close to predictions. The quality of the Air Force test facilities and services at Eglin are top-notch, the expertise of the Eglin test center staff was indispensable and the teamwork has been extraordinary."

The flights, conducted with and without undersurface external tanks and with a variety of air-to-air and air-to-surface weapons, will permit clearance of approximately two thirds of the F-16's thousands of combinations of stores loadings. Additional clearance testing is planned.

A shipset of two CFTs provides about 450 gallons, or approximately 3,050 pounds of additional fuel for the F-16. The extra fuel can significantly extend mission range, time on station or time engaged in combat. This range/persistence enhancement is valuable for countries without aerial tankers. For countries with tankers, CFTs reduce tanker offload demand and extend the fighter's penetration distance.

CFTs can eliminate the need for wing tanks on most medium-range air-to- surface missions, doubling the F-16's primary weapon capacity. Mounting the CFTs on the upper fuselage surface minimizes their effect on underwing stores, which significantly reduces stores recertification requirements and associated costs.

The tanks are attached in a manner that keeps them independent of aircraft bending loads, and they do not have to support external stores, allowing the CFTs to be of lightweight construction. The CFTs do not interfere with daily inspections and servicing and can be removed or installed in approximately two hours.

Lockheed Martin began flight demonstration of an initial CFT shape in 1994 to investigate performance and handling-quality characteristics. Subsequent wind tunnel testing led to the current external lines, which were initially

validated in flight-testing of high angle-of-attack handling characteristics at Edwards Air Force Base, Calif., in 2000.

The first production F-16 CFTs are being delivered to the Hellenic Air Force. These tanks are for Greece's advanced Block 52 F-16s, which begin delivery late this year.

The F-16, the choice of 23 countries, is the world's most sought-after fighter. More than 4,000 aircraft have been delivered, hundreds more are on order for the United States and seven other countries, and production is expected to continue beyond 2010. Major upgrades for all F-16 versions are being incorporated to keep the fleet modern and fully supportable over the aircraft's long service life.

Lockheed Martin Aeronautics Co., headquartered in Fort Worth, Texas, is a leader in the design, development, systems integration, production and support of advanced military aircraft and related technologies. Its customers include the military services of the United States and allied countries throughout the world. Products include the F-16, F/A-22, F-35 JSF, F-117, T-50, C-5, C-130J, P-3, S-3 and U-2.

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Photo accompanies this news release and can be downloaded at:

http:/// www.lmaeronautics.com/news/programnews/combat_air/f16/f16_02/f16pr021127.html

PHOTO CAPTION: Lockheed Martin completes flight-testing of the production design F-16 conformal fuel tank. The tanks significantly improve F-16 range/persistence/payload capability with little impact on flying qualities. Testing was conducted at Eglin Air Force Base, Fla.

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