

Lockheed Martin Demonstrates Telemaintenance Concept Using An F-16

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Lockheed Martin Aeronautics Co., a business area of Lockheed Martin Corp. , demonstrated a new concept for expediting maintenance by reporting faults while the aircraft is still far from home base.

The demonstration was conducted on Sept. 5 at the company's Fort Worth facility during a two-hour flight in an F-16 modified with a commercially based Iridium satellite communications system provided by Honeywell. The purpose was to demonstrate how the maintenance cycle could be reduced, which lends itself to faster and more orderly turnarounds, thus increasing sortie rate potential.

In the demonstration, maintenance faults were artificially introduced into the aircraft's fault reporting system, which is capable of isolating faults down to the card or module level of most equipment, storing the information and reporting it to the pilot. Instead of waiting until after the aircraft has landed for the information to be downloaded or reported by the pilot, the faults were transmitted in bursts well in advance. Standard aircraft VHF/UHF radios are line-of-sight only, which limits them to a couple of hundred miles from high altitude due to the curvature of the earth; satellite communication, however, provides unlimited over-the-horizon transmission.

"We could really use this capability today," said an Air Force official who participated in this exercise. "The Operation Enduring Freedom missions we were flying over Afghanistan last year in our F-16s were up to 10 to 12 hours long, with three to four hours flight time en route each way. If we knew if and what faults there were, we could be very productive on the ground and not wait for the birds to return. It is important to be productive when you have limited personnel supporting sustained, around-the-clock combat operations."

Once the information is received at the home base, the maintenance cycle can begin. The maintenance control activity can order the parts, identify the pertinent instructions and tools, arrange for work space and support equipment, and assign the mechanic. The mechanic then reviews the instructions, gathers the necessary tools, equipment and expendable material, and consults with technical experts as required. Most of this can be done through electronic communications devices.

In addition, the aircraft system can report status of expendables, such as fuel, weapons and defensive countermeasures equipment. This, along with the aircraft status, helps the operations and maintenance schedulers determine if the aircraft will be available for the next launch cycle and what stores need to be reloaded.

Once out of the aircraft in a combat situation, the pilot will usually be able to skip the maintenance debrief and go directly to the intelligence debrief. This helps speed up the intelligence operations cycle as well.

"Real-time reach back to technical experts can improve troubleshooting in the field, thereby reducing unnecessary swaps of line-replaceable units and repair span times," said Troy Miklos, the telemaintenance project lead engineer. "Links to automated and manual inputs could provide data to track repair times, identify maintenance trends and assist maintenance personnel in completing reports."

Lockheed Martin Information Operations engineers have been working the telemaintenance demonstration project as part of the Warfighter and Logistics Information program, an Independent Research and Development activity funded by the company. This is one of several concepts being explored under the umbrella of network centric warfare studies.

"Not only does telemaintenance improve sortie-generation rates, the system can be extended to other network-centric warfare tasks such as time-critical strike and mission planning," said Neil Kacena, deputy of Advanced Development Programs. "We are considering all of these for our F-35 Joint Strike Fighter. However, using commercial off-the-shelf technologies to build the

telemaintenance system results in a capability readily available to a variety of aircraft platforms, including existing fleet aircraft."

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-130, C-130J, P-3, S-3 and U-2.

Lockheed Martin Corp., headquartered in Bethesda, Md., is a global enterprise principally engaged in the research, design, development, manufacture and integration of advanced technology systems, products and services. Employing about 125,000 people worldwide, Lockheed Martin had 2001 sales of \$24 billion.

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