

New fiber-optic support equipment is looking quite FOCSE to the fleet



Art Michon, principal design engineer for the Fiber Optic Common Support Equipment, demonstrates how to use the fiber-optic inspection equipment in a wiring lab on Joint Base McGuire-Dix-Lakehurst, N.J., in July. (U.S. Navy photo)

NAVAL AIR SYSTEMS COMMAND, PATUXENT RIVER, Md. – The Navy has developed new fiber-optic support equipment that will decrease the number of aircraft avionics systems turned in for repair and recertification.

The Fiber Optic Common Support Equipment (FOCSE), which began delivery to the fleet in early September, was developed by engineers with the Aviation Support Equipment Program Office (PMA-260) and allows technicians to check fiber-optic cables, reducing unnecessary replacement of functional avionics equipment.

“Prior to FOCSE, if we had a problem with a fiber-optic connected avionic component or system, we were often led to believe that something was wrong with the avionics,” said Shane Campana, aircraft wiring integrated project team leader at Joint Base McGuire-Dix-Lakehurst, N.J. “This system provides better fault-isolation techniques that work on all platforms and for all maintainers.”

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Fiber-optic systems have been used for years to replace cumbersome copper wiring and cables on everything from modern military aircraft to the wiring bringing cable TV into homes, however, the lighter and faster fiber-optic links require specialized systems to maintain them.

CREATING CONSISTENCY

Campana was among a team of engineers from Lakehurst and here at Pax River who developed the equipment from already available commercial fiber-optic diagnostic components. Using modified commercial-off-the-shelf (COTS) equipment, Campana and his team made the kits more rugged, standardizing it with military labeling and implementing requirements to reduce foreign object and debris. The new kits consist of three component sets: the Fiber Optic Inspection System (FOIS); the Fiber Optic Test Set (FOTS); and the E-2D Fiber Optic Adapter Set (E-2 FOAS).

Prior to the development of FOCSE, there wasn't much consistency in inspection or repair, said FOCSE's principal design engineer, Art Michon. Sometimes maintainers used a flashlight to see if light came through, but found that technique almost useless for finding typical problems, Michon said.

"There was no way to know exactly what was going on within a fiber-optic system [before FOCSE]," the engineer said. "The infrared light signals are not visible and unaided visual inspection was woefully inadequate."

"Before the inspection equipment was fielded, there was no inspection procedure for the fiber termini," said Michon, referring to the ends of the fiber-optic cables. "If the system did have a problem, the maintainer could wipe the terminus – hopefully with an approved wipe or swab – and hope that it fixed the problem. If it did not, then he would replace either the cable or the electronics box, also referred to as the weapons replaceable assembly (WRA)."

While replacing the box is usually easier, it can also be expensive, Michon said.

These issues prompted the E-2D Advanced Hawkeye aircraft platform to procure three sets of COTS Fiber Optic Support Equipment test kits as part of aircraft production, while PMA-260 worked on developing the FOCSE, Campana said. FOCSE will have a significant impact on the aircraft, which has an extensive network of fiber optics.

REAPING BENEFITS

Beyond the E-2D, Campana said other naval aircraft will reap the benefits of FOCSE. Emerging aircraft platforms, including the F-35, MQ-4 and P-8 have already documented their fiber-optic maintenance requirements. Additionally, the MH-60S program recently used the PMA-260 contract to place an order for 23 additional FOIS and FOTS, he said.

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Lack of inspection and test equipment for fiber optics also caused needless cable and WRA replacements for the F/A-18E/F aircraft, Campana said. In 2007 alone, with only five active F/A-18 squadrons, the lack of fiber-optic inspection capability caused the unnecessary removal of 90 WRAs being sent in for repair at a cost of \$3.7 million.

Since fiber-optic links are highly sensitive to dust and dirt, maintainers will use the FOIS, which consists of a camera inspection probe/magnifier and display monitor, to examine the ends of fiber links. If contamination is present, special swabs are used to clear the debris from the end of the fiber.

“As emerging avionics systems demand for speed and data throughput increases, we can expect further requirements and reliance for support of these systems,” Campana said. “PMA-260 has laid the groundwork for support equipment in developing common items that can be used by all platforms. All that is needed is a platform unique adapter kit to mate the inspection and/or test equipment to the aircraft’s peculiar requirement.”