JTEG Technology Forum: Fiber Optic Systems Repair, Test and Training

Fiber Optics Systems Repair, Test, and Training

Abstract

The use of fiber optic technology in military platforms, especially aviation, has dramatically increased over the past 2 decades. Additionally, both the breadth and depth of military fiber optic cable system coverage is considerably more mature than it was a decade ago. The result is that while this technology creates greater effectiveness and efficiencies for the military platforms, it also creates new maintenance issues and increasing demands for improved reliability.

The DoD Joint Fiber Optic Working Group (JFOWG) was created to serve as a forum for today's military fiber optic system maintainers. JFOWG aims to define and implement warfighter-centric common fiber optic maintenance procedures, support equipment, training, and fiber optic acquisition policies, standards and guidelines. JFOWG provides an opportunity for the military Services and support contractors to share experiences and solutions to common problems.

This forum will introduce the JFOWG and discuss topics such as military standards, the fiber optic parts standardization and qualification process, maintenance manual development, training, fiber optic connector inspection, fiber optic inspection and test set support equipment, and the development of next generation fiber optic cable repair and built-in test capability. Please join us and participate in the exchange of information and ideas.

Agenda

1300-1309: Welcome and Overview – Greg Kilchenstein (OSD)

1309-1310: Administrative Notes – Debbie Lilu (NCMS)

1310-1315: Joint Fiber Optic Working Group (JFOWG) – Mark Beranek (NAWCAD)

1315-1340: Fiber Optic Support Equipment for the Fleet – Art Michon (NAWCAD)

1340-1355: Fiber Optic Built-In Test – Mark Beranek (NAWCAD)

1355-1415: Optical Time Domain Reflectometer Enabled Transceiver Applications – Mark Beranek (NAWCAD)

1415-1430: Fiber Optic Cable Mechanical Splicing- Mark Beranek (NAWCAD)

1430-1450: Fiber Optic Connector Saver: Brian McDermott (NAWCAD)

14:50-1500: Wrap Up & JTEG Principals' Comments

Minutes: Fiber Optic System Repair, Test and Training

Event: On 25 October, 2016, the Joint Technology Exchange Group (JTEG), in coordination with the National Center for Manufacturing Sciences (NCMS), hosted a virtual forum on "Fiber Optic System Repair, Test and Training".

Purpose: The purpose of the forum was to introduce the Joint Fiber Optic Working Group (JFOWG) and discuss topics such as military standards, the fiber optic parts standardization and qualification process, maintenance manual development, training, fiber optic connector inspection, fiber optic inspection and test set support equipment, and the development of next generation fiber optic cable repair and built-in test capability.

Welcome: Greg Kilchenstein (JTEG Co-Chair), welcomed everyone to the forum, thanked the presenters and all the listeners for their attendance, briefly described the purpose of the JTEG technology forums, and highlighted the importance of fiber optic system repair, inspection and training in the DoD maintenance community.

Administrative: This was an open forum. The presentations, along with questions and answers, were conducted through Adobe Connect. A separate audio line was used. Approximately 45 participants from across DoD and industry joined in the forum.

Joint Fiber Optic Working Group (JFOWG) – Mark Beranek (NAWCAD) described the JFOWG mission to provide a forum dedicated to standardization and commonality of fiber optic systems across DoD platforms. The JFOWG improves safety, reliability, maintainability, supportability, cost effectiveness and overall readiness of DoD fiber optic systems. Additionally,

lessons learned are used to identify requirements which are addressed through technology development, evaluations, documentation and technical determinations. He also provided JFOWG Updates of Military Fiber Optic Documents and defined supportability and maintainability.

Fiber Optic Support Equipment for the Fleet – Art Michon (NAWCAD) discussed common support equipment (CSE), fiber optic maintenance actions and progress. He described fielded fiber optic systems to include the fiber optic inspection system (FOIS), fiber optic test set (FOTS), and the E2 fiber optic adapter set (E-2FOAS).

Fiber Optic Built-In Test – Mark Beranek (NAWCAD) discussed the avionics fiber optics Built-in Test (BIT) application, the purpose of the built-in test, fiber optic BIT metrics, CONOPS, key fiber optic BIT development elements, false alarms and cannot duplicates, avionics fiber optic malfunction codes, and the MIL-STD-1678 requirement 1201.

Optical Time Domain Reflectometer (OTDR) Enabled Transceiver – Mark Beranek (NAWCAD) provided an introduction to OTDR and described legacy OTDR support equipment for fiber optic cable plant fault isolation. He also provided a BIT capable transceiver S&T overview, discussed OTDR ASIC, and described network end-to-end data link evaluation system high-resolution optical reflectometry.

Fiber Optic Cable Mechanical Splicing – Mark Beranek (NAWCAD) listed aerospace fiber optic cable repair challenges and why cable splicing is needed. He described the MIL-PRF-24623/7 requirements, the MIL-PRF-24623/7 qualification, and the details of mechanical splice performance verification and validation. Mark then concluded with a description of the kSARIA tip shaper tool.

Fiber Optic Connector Saver – Brian McDermott (NAWCAD) provided a background of the multi-fiber connector to include benefits and challenges, and detailed the standards and technology for backplane interfaces. He described three problems: MT air gap, self-contamination, and vibration & shock damage. Brian then described two MT connector SBIR solutions: temporary film present only during manufacture of cables and/or modules; and permanent coating present during manufacturing and in-service use, and concluded with test results.

Closing Comments: Greg Kilchenstein thanked the presenters for their contributions and the audience for their participation. He commented on the quality of the presentations and the great variety of capabilities discussed by the presenters.

Action Items:

- Greg Kilchenstein to introduce Mark Beranek to Greg's OSD Systems Engineering counterparts (Greg Kilchenstein)
- Greg Kilchenstein to forward possible BIT CONOPS funding venue to JFOWG team for consideration
- Schedule a government only teleconference to discuss and increase the awareness of

the fiber optic cable mechanical splicing tool (OSD/NAVAIR)

- Obtain “public release” versions of the presentations and post to the JTEG website. These meeting minutes, the Q&A, and those briefing slides approved for public release, will be posted on the JTEG website at http://jteg.ncms.org/ . (All presenters, LMI, NCMS)

Next JTEG Meeting: The next JTEG virtual forum is 29 November, 1:00 – 3:00 pm EST. The topic is “Technology Enhanced Workforce Development”.

POC this action is Ray Langlais, rlanglais@lmi.org , (571) 633-8019

Q&A: Fiber Optic Systems Repair, Test & Training

JFOWG

Mark Beranek (NAWCAD)

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Q1. How do we ensure that the standards are cited in acquisition contracts?

A1. MILSTD 1678 which is updated by the JFOWG. To invoke 1678 in contracts we need to get the PMs to agree to put them into the requirements. How are we doing? MILSTD 1678 was not finished in time for some systems. Greg Kilchenstein said he would introduce Mark to Greg’s Systems Engineer counterparts in OSD.

Q2. Do the military services use joint FO manual directly or do they each tailor it to their own purposes?

A2. The general maintenance manual is the back-up in case the Services have no pubs for their systems.

Q3. Do you have metrics that support your S&T list needs?

A3. Yes, we have metrics

Support Eqpt

Art Michon

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Q1. Are the “sets” applicable to all military services? How do they acquire them?

A1. The general set is applicable to all Services. They have a NIIN to order through the federal supply system.

Q2. Are these items covered under SCAT codes?

A2. No

Q3. Are the test sets in the Individual Materiel Readiness List (IMRL) requirements for Maintenance activities that support Fiber Optics?

A3. Yes

Q4. When will the solicitation for the OTDR be issued?

A4. It comes out in FY18 and is scheduled for an FY19 start.

Fiber Optic Built-in Test

Mark Beranek

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Q1. Are there any BIT provided by industry during acquisition of new FO systems?

A1. No. None by industry. They are available, and can be purchased, but it is DoD heavy.

Q2. What about the commercial aircraft industry?

A2. Not sure, but I don’t think they use this BIT. There is a commercial STD 8475 – aerospace version.

Q3. Is the JFOWG the venue to develop a BIT CONOPS?

A3. Yes and no. Yes, because we can get the feedback from the Services. No, because I think it is a separate stand-alone program. It’ll need a system picture….bigger picture of a strategic nature is needed.

OTDR Enabled Transceiver Applications

Mark Beranek

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Q1. What is the estimated cost of the OTDR transceiver?

A1. That depends on the volume being purchased.

FO Cable Mechanical Splicing

Mark Beranek

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Q1. How do widen the acceptance of the splice?

A1. It is a fairly recent innovation. We haven’t published the details or demonstrated that it can be used on multiple cable types yet. We are very receptive to scheduling a call with government representatives.

Fiber Optic Connector Saver

Brian McDermott

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No Questions