

# **DIT-MCO Delivers First Production Fiber Optic Tester**

*Boeing-Mesa using integrated electrical/fiber test system on F/A-18 Super Hornet*

Testing a fiber optic assembly is as different as night and day when compared to testing a cable assembly, electrical component, or an entire aircraft:

- At 100 microns in diameter, an optical fiber makes the average electrical wire look monstrous.
- The glass threads are highly susceptible to dirt, nicks, and precise centering of their microscopic cross-sections.
- Fiber optic cables are prone to breaking if they are bent – unlike their electrical counterparts, which often are draped across fixtures and pulled into tight spaces.

However, testing fiber optic systems is right up DIT-MCO's alley because these tests measure the precision of a pathway from one point to another, and find errors for correction.

Under the direction of Jim Stone, Program Manager, DIT-MCO delivered an analyzer that integrates fiber optic testing in an electrical analyzer to Boeing's wiring shop in Mesa, AZ. The Fiber Optic Analyzer will be used during production of F/A-18 Super Hornets. Fiber is also being used in F-22 prototype aircraft.

## **Test Fiber & electrical wires with one instrument?**

“The aerospace industry is even mixing fiber and electrical lines in the same cable,” says Stone. This is primarily for non-flight-critical systems, such as weaponry communication and video. He points out that one fiber can carry many signals, weighs less than its electrical counterpart, and features highly desirable “stealth” characteristics. “Radar can't detect fiber the way it can metal wires.”

A single fiber can be 200 microns in size, but the trend is even smaller, down to 50 or 62 microns. The analyzer emits a very high frequency light signal, which is transmitted over the fiber to a receiver. The light signal is converted into an electrical signal, and the analyzer measures the loss of light power across the fiber. This power loss is known as attenuation.

DIT-MCO's tester makes a power measurement in decibels, or dBs, Stone explains. "A fiber optic system has a 'power budget' – a threshold of power put out by the source, and you can't drop below a certain point," he says. "We're generally looking for power losses less than 0.1 dB per fiber, or 1.5 dB across the system. With all the variables that impact the fiber, you can lose a lot of power quickly." A 3 dB drop translates to a 50 percent loss of power, and losing 10 dBs converts to a 90 percent power loss.

DIT-MCO's Fiber Optic tester features:

- A fiber optic chassis that contains 16 modules for a total to 32 bi-directional ports.
  - Bi-directional ports allow transmission of light in either direction. "You can measure attenuation, or dB loss, without having to physically change the cable connection," says Stone.
  - Systems are expandable. A 144-point test covers most final assemblies, though the system can accommodate up to 500 points.
- TestExecutive® to control and record loss measurements – these are the same tools used in DIT-MCO electrical wire analyzers.
  - A single test file may contain both types of tests.
  - ACT files support fiber optic switching addresses exactly the same as electrical switching addresses. A single ACT file may contain both optical and electrical information.
  - Programmers and technicians use the same interface and test instructions to set up test parameters for a fiber test as for an electrical test.

- Spring-loaded connectors to “butt” the fiber end within very tight tolerances for physical alignment. (Fiber connections are the not standard male/female connections used in electrical assemblies.)
- Launch conditions specified by the customer, either fully filled or AS-100 standard.

Customers can install components to accomplish field retrofits to Model 2500 analyzers in a day. “There’s really a minimal cost and effort to upgrade to fiber,” says Stone.