

Measurement of tactical fiber-optic cable assemblies

Abstract

In military operations the demand for real-time applications, like video surveillance or video conferencing etc. in C4I systems are increasing enormously. Tactical fiber-optic cable assemblies are today a reliable communication means in the military field, fulfilling these requirements. On one fiber-optic link large data flows of up to 1 GBit/s can easily be transported between different communication centers. To make sure that the fiber connection is in good shape and ready for operation preventive maintenance is recommended and necessary equipment should be available in the field to control such connections.

Introduction

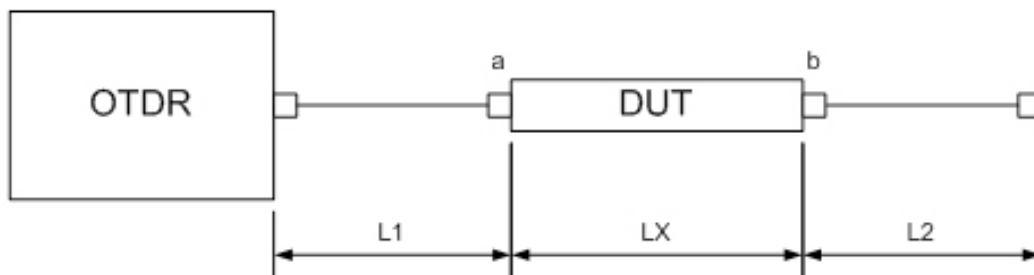
In the harsh environment of military applications more and more tactical fiber-optic cables are used, due to high data rates possible over large distances. These are replacing older copper cables, which are limited in data transmission capacity and distance. The tactical fiber-optic cable assemblies are normally consisting of a tactical cable with expanded beam fiber-optic connectors at both ends, designed to operate in harsh environments. The hermaphroditic tactical connectors according to MIL Standard 83526 are fully sealed mated or unmated and with or without dust-caps fitted. With hermaphroditic connectors there is no requirement for male / female adaptors and therefore both ends can be used equally. Such cables are supplied with hand reels or vehicle reels depending on the length of the cable.

Several reels can be daisy chained together to make a longer link between two points. In case of any connection difficulties or interruption in the cable the fault of such a link has to be found easily and quickly. This can be done with Brugg's Tactical Cable Measuring Case (TCMC), which is based on a commercial available Optical Time-Domain Reflectometer OTDR.

Measurement method

One possible measuring method is the optical time-domain reflectometer, which instead of performing a direct measurement of insertion losses, uses a calculation of the losses based on the back-scattered light.

Single mode fibers, as mainly used in tactical networks, should be measured according to the IEC Norm 61300-3-4. Suppliers of OTDR equipment stringently demand a bidirectional measurement. Additional fiber sections L1 and L2 at sufficient length have to be used in order to overcome the attenuation dead zone of the OTDR measurement device. A correct implementation of the bidirectional measurement yields reliable results. For the ease of maintenance Brugg's Tactical Cable Measuring Case comes with the same connectors, as the tactical cables used in the field.



DUT: Device under test

Recommended Maintenance

The tactical cable assemblies should be tested after each operation, before they are put into storage. By this method faulty cable assemblies can be detected and sorted out for maintenance in due time and forwarded either to the internal maintenance shop for repair or sent back for repair to the supplier. In the next operation only cable assemblies are used, which are operational and therefore faults can be limited to a minimum. To make the measurement of different reels or cable lengths easier for the maintenance staff, the OTDR equipment can be pre-programmed (Macros) for various cable lengths.

In case of rare faults in field connections, with Brugg's Tactical Cable Measuring Device a faulty cable or connector can be quickly detected and either be replaced or in emergency the cable can be repaired in the field with Brugg's repair kits. The measurement allows for the exact localization of the faults, e.g. in case of interruption of a fiber link, the distance of the defect fiber can be very accurately localized and the cable can then be repaired.

Conclusion

To allow for necessary measurements in the field the Tactical Cable Measuring Device of Brugg is built into a water- and dustproof case. The material for cleaning connectors is integrated in the case, so it is automatically at the place, when needed.

The device is custom made, matching customers cable assembly connectors as well as fiber types, either single or multimode or if needed both types. In the pre-programmed mode measuring is easy and can be carried out by trained staff. Test results can be stored for later use.

The OTDR used has a battery backup for the field use, beside mains for using it in the workshop. The whole Tactical Measuring Device packed in the ruggedized case is an ideal solution to maintain your tactical cable assemblies all the time, in the field as well as when returned into storage. This keeps your tactical fiber-optic network operational and reliable.

