

PURCHASE DESCRIPTION

ANALYZER, OPTICAL TIME DOMAIN REFLECTOMETER

GMG: ANOTDR-15
SCAT: 4310 / TAMCN: A7086
Solicitation No: SPRMM116RYK35

- 1.0 GENERAL** This procurement requires a portable hand-held Optical Time Domain Reflectometer (OTDR) capable of detecting faults, splices, abnormalities and measuring attenuation in Multimode (MM) and Single Mode (SM) fiber links.
- 2.0 CLASSIFICATION** The equipment shall meet the requirements of MIL-PRF-28800F class 3 for Navy shipboard, submarine, shore, and Marine Corps applications.
- 3.0 OPERATIONAL REQUIREMENTS** The specifications provided below are the minimum requirements and accuracies that will meet the Government's need. The OTDR shall at least meet these requirements and accuracies and may provide better performance.
- 3.1 Multimode
- 3.1.1 Wavelength: 850 nm \pm 30 nm and 1300 nm \pm 30 nm.
- 3.1.2 Pulse width: Variable, to achieve the herein specified dead zones and dynamic ranges.
- 3.1.3 Fiber interface: 62.5/125 μ m with ST connector. The connector shall be protected with attached protective cap.
- 3.1.4 Dead zone:
- 3.1.4.1 Attenuation dead zone: 850 nm: \leq 7 m; 1300 nm \leq 10 m (with shortest pulse width and a recovery to within 0.5 dB of linear backscatter for -40 dB reflectance).
- 3.1.4.2 Event dead zone: \leq 1.5 m (1.5 dB recovery from saturated Fresnel reflection)
- 3.2 Single mode
- 3.2.1 Wavelength: 1310 nm \pm 25 nm and 1550 nm \pm 25 nm.
- 3.2.2 Pulse width: Variable, to achieve the herein specified dead zones and dynamic ranges.
- 3.2.3 Fiber interface: 9/125 mm with ST connector. The connector shall be protected with attached protective cap.
- 3.2.4 Dead zone:
- 3.2.4.1 Attenuation dead zone: 1310 nm: \leq 12 m; 1550 nm: \leq 12 m (with shortest pulse width and a recovery to within 0.5 dB of linear backscatter for -40 dB reflectance).
- 3.2.4.2 Event dead zone: \leq 1m (with shortest pulse width and a 1.5 dB recovery from saturated Fresnel reflection)
- 3.3 Vertical axis Seven divisions minimum of attenuation/loss parameters
- 3.3.1 Scale factor: Minimum: 0.5 dB/div or less; Max: 4.0 dB/div or more
- 3.3.2 Dynamic range:
- 3.3.2.1 850 nm: 17 dB to 22 dB
- 3.3.2.2 1300 nm: 15 dB to 22 dB

- 3.3.2.3 1310 nm: 10 dB to 35 dB
- 3.3.2.4 1550 nm: 9 dB to 35 dB
- 3.3.3 Resolution: ≤ 0.05 dB
- 3.3.4 Measurement modes: Loss between two points, loss by Least Square Approximation (LSA), and loss per unit length.

- 3.4 Horizontal axis Ten divisions for distance measurement
 - 3.4.1 Range: MM: ≥ 2 km; SM: ≥ 20 km.
 - 3.4.2 Marker accuracy: $\leq (1.0 \text{ m} + 1.10^{-5} \times \text{distance})$
 - 3.4.3 Marker resolution: ≤ 0.1 m on minimum scale.
 - 3.4.4 Index of refraction:
 - 3.4.4.1 Range: 1.4000 to 1.5999
 - 3.4.4.2 Resolution: 0.0001

- 3.5 Display The OTDR shall present data from measurements in a graphical and alphanumeric formats simultaneously on a high resolution LCD color display. The display shall have a diagonal dimension of 5 inches minimum.
 - 3.5.1 Graphical format: Visual observation of fiber characteristics in dB on the vertical axis versus fiber distance in meters on the horizontal axis. Trace shall show entire characteristic of a magnified portion of range.
 - 3.5.2 Alphanumeric format: Integral part of graphical display. The following parameters shall be displayed.

(1) Date	(8) Marker distance
(2) Title (manual entry)	(9) Pulse width
(3) Distance range	(10) Index of refraction
(4) Horizontal scale (m/div)	(11) Distance between markers (m/km)
(5) Vertical scale (dB/div)	(12) Splice loss (dB)
(6) Horizontal trace start distance	(13) Loss between markers (dB)
(7) Optical wavelength	(14) Fiber loss (dB/km)

- Alphanumeric data shall appear with data recalled from storage.

- 3.5.2.1 Annotation of display: A method of display annotation shall be provided, whereby additional alphanumeric data can be added to the display by the operator. The capability shall exist to add a minimum of thirty consecutive alphanumeric characters.
- 3.5.2.2 Markers: At least two movable on-screen indicators capable of being positioned at any point on graphical trace.
- 3.5.2.3 Attenuation/loss measurement:
 - 3.5.2.3.1 Two point: Loss in dB between any two points.
 - 3.5.2.3.2 Least squares approximation.
 - 3.5.2.3.3 Slope: Fiber loss per unit distance (dB/km).
- 3.5.3 Signal averaging: Noise reduction shall be provided by sequential averaging of fiber signature trace. Parameters of 3.3 and 3.4 shall be achieved with in three minutes of signal averaging.
- 3.5.4 Environment: The information on the display shall be legible as required in MIL-PRF 28800F in indoor and outdoor conditions.

- 3.6 Test result management
- 3.6.1 Test result storage: The equipment shall be capable of storing at least 100 test results with both graphical and alphanumeric data in nonvolatile memory.
- 3.6.2 Test result upload: The equipment shall provide the capability to upload stored test results to a computer running Microsoft® Windows 7 operating system for analyzing and printing. The software and associated accessories for uploading, viewing, and printing shall be provided.
- 3.6.3 Test result recall: The equipment shall be capable to recall (from memory or USB thumb drive) and display at least one trace for comparison with the trace of the system under test in real-time.
- 3.6.4 Digital interfaces: The equipment shall be provided with an Ethernet RJ-45 port and an USB (or RS-232) port for remote control and test result upload to a computer running Microsoft® Windows 7 operating system. Ethernet RJ-45 and USB (or RS-232) cables and software needed for interfacing with external computer shall be provided.

4.0 GENERAL REQUIREMENTS

- 4.1 Temperature
- 4.1.1 Operating temperature: 0°C to +45°C
- 4.1.2 Non-operating temperature: -20°C to +60°C
- 4.2 Power The equipment shall be operational with internal DC battery.
- 4.2.1 Internal DC battery: Internal rechargeable batteries shall be provided for portable operation. The batteries minimum operating time shall be at least 6 hours with typical usage following a maximum recharge time of 8 hours. A charger accepts 110/220 ±10% Volt @ 50/60 Hz single phase shall be provided for each unit. The equipment shall be operational while the batteries being recharged.
- 4.2.2 Battery indicator: A battery life indicator shall be incorporated into the display.
- 4.2.3 Auto power off: The equipment shall automatically turn off or go into sleep mode for power saving when absence of keyboard activity exceeds a set interval (10 to 20 minutes nominal). This feature shall be enabled/disabled with ON/OFF options.
- 4.3 Battery Restrictions Per MIL-PRF-28800F, Lithium and Mercury batteries are prohibited without prior authorization. A request for approval for the use of Lithium and Mercury batteries shall be submitted with production lot delivery, after contract award. Approval shall apply only to the specific model proposed.

Exceptions: Per Naval Ordnance Safety and Security Activity (NOSSA), the use of Lithium primary (non-rechargeable) coin cell batteries meeting the following criteria is authorized for Naval personnel and on Naval activities, surface ships, submarines, and aircrafts:

- Commercially available coin cell batteries, unmodified, and used in the device recommended by the application manufacturer.
- Coin cell batteries shall only be used in single cell configurations.
- Coin cell batteries shall not be rated for more than 1 Ampere-Hour nameplate capacity.

The coin cell manufacturer and model identification/part number shall be provided at the time of submission of proposals.

- 4.4 Calibration interval The calibration interval shall be 12 months minimum. At the end of this interval, a minimum of 85% of the equipment shall remain in tolerance.
- 4.5 Calibration Procedure The procedure, software, and special interfaces/adapters that are needed for the equipment calibration shall be provided
- 4.6 Accessories Each patch cord shall be labeled for identifying fiber type and connector type. Connectors on each patch cord shall be protected with attached protective caps.
- 4.7 Size 30 cm x 24 cm x 12 cm (12" x 9.5" x 4.7") nominal.
- 4.8 Weight 6 kg (13 lbs).
- 4.9 Carrying case A soft carrying case according to MIL-PRF- 28800F shall be provided for carrying the equipment in the operational environment. The soft carrying case shall be capable to accommodate the equipment, accessories, and the operator's manual.
- 4.10 Wireless Connectivity Any capability of the equipment to communicate wirelessly, including but not limited to Wi-Fi and Bluetooth, shall be disabled.
- 4.11 Technical Manual The maintenance philosophy for this unit shall be level 2 (per MIL-PRF-28800F) and require maintenance to the module level of the unit. The technical manual shall conform to the level 2 maintenance philosophy. This level would be used for most equipment where maintenance and repair is an expected phase of equipment lifecycle. Board level maintenance and troubleshooting information is required. A Use and Installation manual (Operator's Manual) shall be provided separately. Maintenance and Servicing manual shall be provided to two levels of maintenance, unit operational verification level and the module level.

Information required for performance verification shall include:

- Instructions to verify equipment performance,
- List the equipment required for verification tests,
- Step-by-step instructions for test connections,
- Acceptable result criteria,
- Calibration information,
- Self-test routines.

Maintenance information shall include:

- Parts lists to the component level,
- Schematics and component layout drawings,
- Block and schematic diagrams.
- List of required test equipment and connection diagrams, and
- Sequential instructions for disassembly, repair, replacement, and

reassembly shall be provided.

- Board level maintenance and troubleshooting information,
- Step-by-step instructions for troubleshooting and fault isolation,
- Expected signal levels,
- Test data sheets will be included, and as required,
- The instructions will define localizing a defective circuit card.

Parts lists shall include:

- Parts lists shall be shown on illustrations or a separate listing that includes an index or reference to other illustrations.
- Part number, cage code, and generic description.

The technical manual shall be provided in both printed and electronic formats. The printed format shall be otherwise normally provided. The electronic format shall be in Portable Document Format (PDF) - ISO 32000-1:2008. Two separate CD/DVDs are required, one shall contain the Use and Installation manual and one shall contain the Maintenance and Service manual.

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shall be printed in the first two pages of each technical manual and on the surface of the CD/DVD supplied.

- 4.12 Training Materials Training materials that demonstrate the features, detailed operations and procedures with step-by-step instructions for using the equipment shall be provided. The training material shall be delivered in technical manual format or interactive CD-ROM formats.
- 4.13 Additional Requirements
- 4.13.1 Human Readable Identification Labeling:
- 4.13.1.1 Equipment: Per MIL-PRF-28800F, a human readable label shall be provided for all production lot units conforming with MIL-STD-130N and permanently affixed on the equipment in an easily readable location. Required fields on the label are; CAGE, part number, and serial number. Size of the label shall conform to the size of the equipment.
- 4.13.1.2 Case: Per MIL-PRF-28800F, a human readable metal plate shall be provided for all production lot units conforming with MIL-STD-130N and permanently affixed to the front of the transit case. Required fields on the label are; CAGE, part number, and serial number. Size of the label shall conform to the size of the case. Pressure sensitive adhesive transfer tape is required to hold the plate to the hard transit case such as 3M™ 9472LE. Soft transit cases also require labeling with permanent placement such as a metal plate affixed with rivets, screws or adhesives.
- 4.13.2 Shipping container: For production lot units the package or carton containing the equipment for shipment shall be marked per MIL-STD-129P.
- 4.13.3 Other Additional Requirements: Shall be specified in the CDRL of the solicitation.