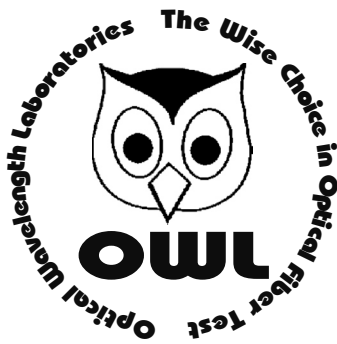


BOLT

Operations Guide

Beaming Optical Length Tester



Optical Wavelength Laboratories

Table of Contents

Unit 1 - Introduction	
Description	1-1
General Features	1-1
Precautions	1-2
Required Accessories	1-2
Applications	1-2
Unit 2 - Operation	
Fiber Length Measurement	2-1
Fiber Identification	2-1
Single-mode Light Source	2-2
Unit 3 - Appendices	
Maintenance and Calibration Procedures	3-1
Specifications	3-1
Contact Information	3-1
Conversion Factors	3-2

Description

This manual describes the operation of the BOLT (Beaming Optical Length Tester). The BOLT is designed to measure the length of single mode and multi-mode fibers in the infrared spectrum. It uses a "round robin" technique for fiber measurement; i.e. it loops back two fibers in the same fiber cable with a patch cord. The round trip time of the optical pulse is converted to kilometers, then divided by two to give the length of the fiber cable. There is no need to measure the length of every fiber; the length will be the same for all fibers in the cable, so this test only needs to be run once for each cable. This technique allows the BOLT to be very accurate (up to ± 2.5 meters).

Many network cabling standards require the fiber cable length to be recorded along with attenuation measurements. Optical measurement of fibers provides a quick and easy alternative to check the fiber jacket for markings or estimating the length by using a measuring wheel, and often provides a greater degree of accuracy.

The BOLT also includes a pulse mode feature for fiber location (when used with a fiber identifier), as well as a continuous wave mode to be used as a stable -10 dBm single mode light source.

General Features

- 1 1310NM FP LASER TRANSMITTER - this ST connector port houses a laser diode that emits invisible light into an optical fiber.
- 2 CONTINUOUS WAVE/TEST SELECTOR SWITCH - this 3-way switch selects between OFF (center), length testing / fiber identification mode (right), and continuous wave / light source mode (left).
- 3 DETECTOR PORT - this ST connector port houses a photodiode detector used to receive light from an optical fiber.
- 4 POWER LED - this LED indicates that the tester is powered on. During normal operation, if this LED is very dim or is not lit, this indicates that the battery may not have sufficient power for accurate testing, and should be replaced.
- 5 LED DISPLAY - this 7-segment LED is used to display the length of the fiber link in kilometers. If the display shows all dashes, the BOLT is not receiving enough light to make a measurement. This means that either the link is either too long to be measured or there is a problem with one of the fibers used for length measurement.



Precautions

Safety. Extreme caution must be exercised when operating the BOLT. It produces an intense beam of invisible light that can cause permanent damage to the eye with prolonged exposure.

NEVER LOOK INTO A LIGHT SOURCE OR THE END OF A FIBER THAT MAY BE ENERGIZED BY A SOURCE!

Operational. In order to insure accurate and reliable readings, it is vitally important to clean the ports on the tester, as well as the ferrules on the patch cords, before each use. If dirt, dust, or oil are allowed to build up inside the connector, the surface of the laser diode may become scratched, producing erroneous results. Replace the dust caps on the tester ports and patch cords when not in use.

Required Accessories

Cleaning Supplies. Fiber ferrules, connector ports and bulkheads should be cleaned with 99% or better isopropyl alcohol and a lint-free cloth. A can of compressed air should be available to dry off the ferrules, and to blow dust from the connector ports and bulkheads.

Patch Cords. Two identical patch cords are required to connect the BOLT to the system under test, and an additional patch cord is required to loop back the two fibers being used for the test. The connector styles on the patch cords must match the type on the BOLT and the type of the bulkheads in the system under test.

Applications

Fiber Length Measurement. The BOLT uses a “round robin” method of length measurement. This method requires two fibers from the same fiber cable to be looped back at one end with a patch cord. Light is injected into one of the fibers by the transmitter and is received by the detector connected to the other fiber. The round trip travel time is converted into length in kilometers and divided by two to arrive at the length of the fiber cable. It is not necessary to test each fiber for length; the length measurement applies to all fibers in the cable.

Fiber Identification. The BOLT provides a pulsed mode for easy fiber identification. Fibers are identified by clamping a fiber identifier onto a jacketed fiber, which produces a tone to indicate presence of a signal. This is useful for locating fibers that are marked incorrectly or not marked at all.

Stabilized Single-mode Light Source. In Continuous Wave Mode, a steady beam of 1310 nm infrared laser light is injected into the fiber. This light is stabilized at -10 dBm, and when used with a power meter, functions as a single-mode light source for fiber attenuation testing.

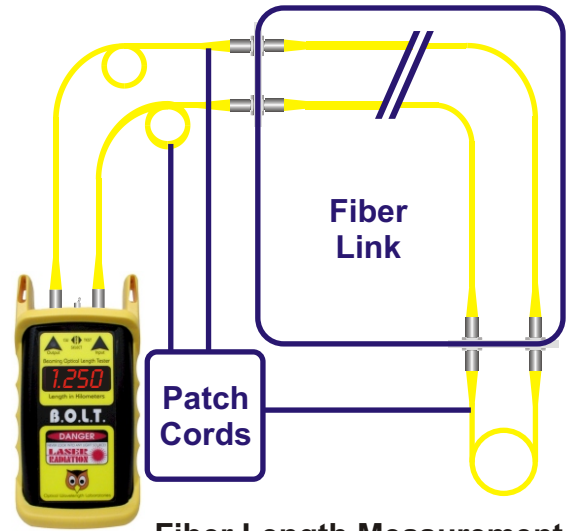
Fiber Length Measurement

1 - On one end of the fiber cable, loop back two of the fibers with one of the patch cords.

2 - On the other end of the fiber cable, connect one patch cord to each of the fibers being used for the test. Connect the other end of the patch cords to the receiver and transmitter ports on the BOLT. It does not matter which patch cord connects to which fiber.

3 - Power on the BOLT into length test mode by flipping the switch to TEST. In a few seconds, the display will show the length of the fiber in kilometers. In the example at right, the link is 1.250 kilometers.

NOTE: If the green indicator LED does not light up, this means that the battery power is insufficient for a valid test. The battery must be replaced before continuing.



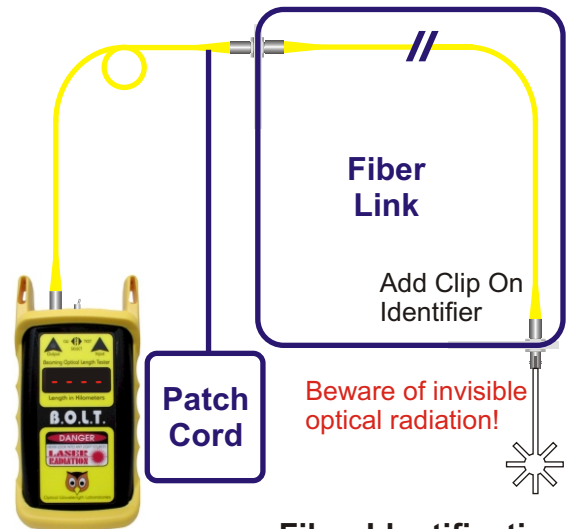
Fiber Length Measurement

Fiber Identification

1 - Connect the BOLT to the fiber you are testing via a patch cord as shown at right.

2 - Power on the BOLT into fiber identification mode by flipping the switch to TEST. This mode emits a flashing beam of invisible light into the fiber.

3 - Identify the fiber by clamping a fiber identifier to the fibers until you locate the fiber being tested. Many identifiers produce an audible tone.



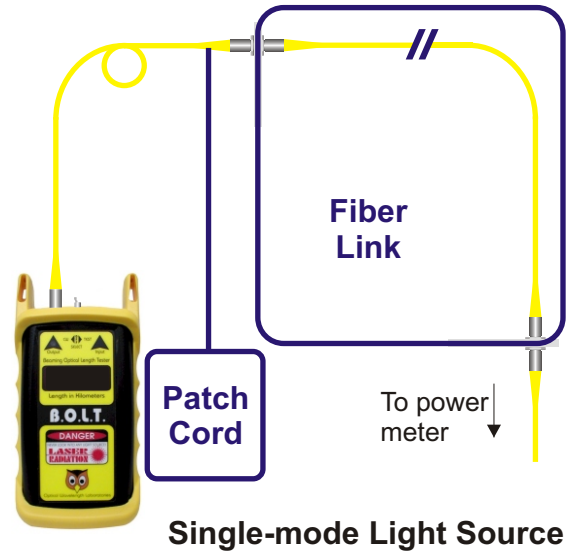
Fiber Identification

Single-mode Light Source

1 - Connect the BOLT to the fiber you are testing via a patch cord as shown at right.

2 - Connect a power meter (such as the Fiber OWL) to the other end of the fiber you are testing via a patch cord as shown at right.

3 - Power on the BOLT to continuous wave / light source mode by flipping the switch to CW. Allow the BOLT to stabilize for 2 minutes before taking measurements with the power meter.



Maintenance and Calibration Procedures

Repair. Repair of this unit by unauthorized personnel is prohibited, and will void any warranty associated with the unit.

Battery Replacement. The battery compartment is covered by a sliding plate on the back of the unit. One 9v battery is required for operation.

Cleaning. For accurate readings, the optical connectors on the BOLT and the connectors on the patch cords should be cleaned prior to attaching them to one another. Minimize dust and dirt buildup by replacing the dust caps after each use.

Re-calibration. It is recommended to re-calibrate the BOLT every 12 months to maintain the light source stability at -10 dBm.

Warranty. The BOLT comes standard with a one-year factory warranty, which covers manufacturer defects and workmanship only.

Specifications

Launch Method:	FP Laser
Output Power (62.5 μm core):	0.1 milliwatts
Resolution:	up to 0.001 kilometers
Accuracy:	± 2.5 meters
Measurement Range:	25 kilometers
Battery Life:	10 hours
Operating Temperature:	0 to 55° C
Storage Temperature:	0 to 75° C
Low Battery Indicator:	Yes
Connector Style:	ST
Width:	2.75 inches
Height:	4.94 inches
Depth:	1.28 inches
Weight (with battery):	154 grams

Contact Information

Address:
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Conversion Factors

The BOLT displays fiber length in kilometers. At times it may be necessary to convert the fiber length to a different unit of measurement. The table below provides conversion factors for various units of measurement.

To calculate the units you need, multiply the number on the BOLT display by the conversion factor listed in the table below:

1 kilometer	1000 meters
1 kilometer	0.6214 miles
1 kilometer	3281 feet

Here are some examples of converting the BOLT display into different units of measurement. For these examples, let us assume a fiber length of 1.25 kilometers as shown by the display at right.

Distance in Kilometers



kilometers to meters

$$1.250 \times 1000 \text{ meters} = 1250 \text{ meters}$$

kilometers to miles

$$1.250 \times 0.6214 \text{ miles} = 0.777 \text{ miles}$$

kilometers to feet

$$1.250 \times 3281 \text{ feet} = 4101.25 \text{ feet}$$