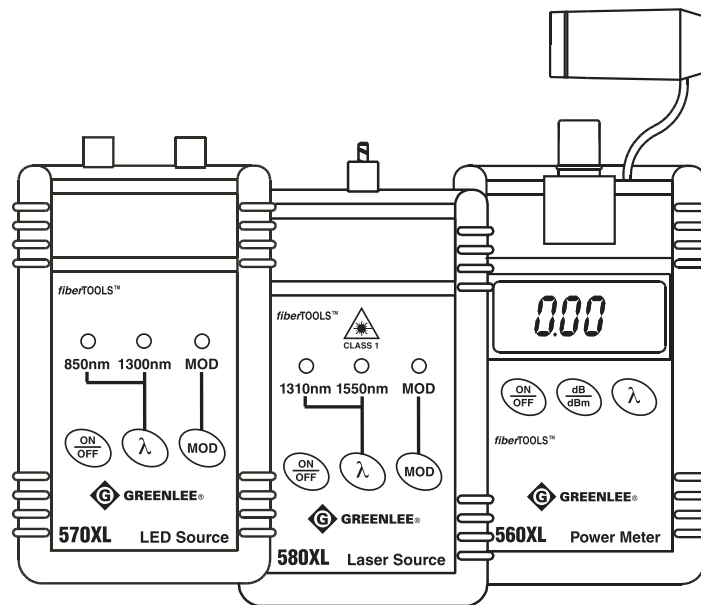


INSTRUCTION MANUAL



560XL

Fiber Optic Power Meter

570XL

850/1300 nm LED Source

580XL

1310/1550 nm Laser Source



Read and understand all of the instructions and safety information in this manual before operating or servicing this tool.

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Description

The Greenlee XL fiberTOOLS™ instruments are handheld fiber optic tools designed to measure optical power levels and link loss on multi-mode and single-mode fiber optic cabling networks.

- The 560XL power meter measures optical power at 850 nm, 1300 nm, 1310 nm, and 1550 nm and can store reference power levels. The snap on connector (SOC) interface adapts to FC, SC, and ST connectors.
- The 570XL LED source provides a light source to measure insertion loss on multi-mode fiber optic cabling. It is configured for FC, SC, and ST connectors.
- The 580XL laser source provides a light source to measure insertion loss on single-mode fiber optic cabling. It is configured for FC, SC, and ST connectors.

Safety

Safety is essential in the use and maintenance of Greenlee tools and equipment. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

Purpose of This Manual

This instruction manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the Greenlee 560XL, 570XL, and 580XL fiberTOOLS instruments.

Keep this manual available to all personnel. Replacement manuals are available upon request at no charge.

All specifications are nominal and may change as design improvements occur. Greenlee Textron Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

fiberTOOLS is a trademark of Greenlee Textron Inc.

KEEP THIS MANUAL

Important Safety Information



SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

DANGER

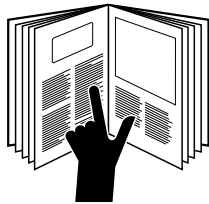
Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

WARNING

Hazards which, if not avoided, **COULD** result in severe injury or death.

CAUTION

Hazards or unsafe practices which, if not avoided, **MAY** result in injury or property damage.

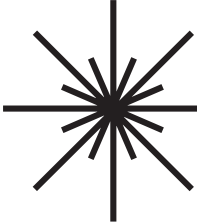


WARNING

Read and understand this material before operating or servicing this equipment. Failure to understand how to safely operate this tool could result in an accident causing serious injury or death.

Important Safety Information

	⚠ WARNING
	Electric shock hazard: Contact with live circuits could result in severe injury or death.

CAUTION	
	LASER LIGHT DO NOT STARE INTO BEAM
	CLASS I LASER PRODUCT

The 580XL instrument is a laser device conforming to the requirements of CDRH, CFR 1040, Subchapter J. While there is no potential for eye damage due to unaided direct exposure, users should always avoid looking directly into the output port. The use of optical viewing instruments, such as microscopes, magnifiers, etc., should always be avoided. The use of such devices around active fibers can focus an intense beam of light energy onto the retina of the eye, which can result in permanent damage.

⚠ CAUTION
Laser hazard: • When performing measurements on fiber optic systems, avoid eye exposure to any open-ended fibers, optical connectors, optical interfaces, or other sources because they may be connected to active laser transmitters. • Do not look into the optical port when a source is turned on. • Avoid looking at the free end of a test fiber, i.e., the end not connected to the instrument. If possible, direct the free end toward a non-reflective surface. Failure to observe these precautions may result in injury.

Important Safety Information

CAUTION

Electric shock hazard:

- Do not insert batteries with the polarity reversed. Do not mix batteries of different manufacturers or types, e.g., alkaline and non-alkaline.
- Do not open the case of the unit for any reason. It contains no user-serviceable parts.
- Use this unit for the manufacturer's intended purpose only, as described in this manual. Any other use can impair the protection provided by the unit.

Failure to observe these precautions may result in injury and may damage the unit.

CAUTION

Instrument damage hazard:

- Do not leave the unit in direct sunlight or near direct sources of heat.
- Protect the unit from strong impacts or shock.
- Do not immerse the unit in water or store in areas with high humidity.
- When necessary, clean the case, front panel, and rubber cover with a damp cloth. Do not use abrasives, harsh chemicals, or solvents.
- Replace the interface dust cap(s) when the unit is not in use.
- Store the unit and interface adapters in a cool, dry, and clean place.

Failure to observe these precautions may result in injury and may damage the unit.

Introduction

Model Designations

The XL fiberTOOLS instruments incorporate several different types of interfaces and must be used with compatible adapters.

XL fiberTOOLS Individual Instruments

560XL	InGaAs Optical Power Meter; requires a SOC adapter for connector interface (see below)
570XL-FC	850/1300 nm LED Source with FC connector
570XL-SC	850/1300 nm LED Source with SC connector
570XL-ST	850/1300 nm LED Source with ST connector
580XL-FC	1310/1550 nm Laser Source with FC connector
580XL-SC	1310/1550 nm Laser Source with SC connector
580XL-ST	1310/1550 nm Laser Source with ST connector
170XL	635 nm Visual Fault Locator

Greenlee SOC Adapters

1020	FC/PC SOC Adapter
1030	SC/PC SOC Adapter
1062	ST/PC SOC Adapter

Unpacking and Inspection

All XL fiberTOOLS instruments have been carefully inspected before shipment. When received, the shipping carton should contain the items listed below:

- 1 XL fiberTOOLS instrument
- 1 rubber boot with stand
- 1 instruction manual
- 2 AA-size alkaline batteries
- SOC adapter for power meter

Please account for and inspect each item while unpacking and preparing the instrument for use.

If the instrument received is damaged, contact Greenlee. Refer to the instructions under “Warranty.”

Keep the shipping carton in case re-shipment is required for any reason, e.g., annual recalibration.

Specifications

570XL Series 850/1300 nm Dual-Wavelength LED Sources*

Center wavelength (FWHM)		
Nominal	850 nm	1300 nm
Range	840 to 880 nm	1270 to 1345 nm
Max. spectral width (FWHM)	55 nm	150 nm
Stability, 1 hour	±0.05 dB	±0.05 db
Power output, 62.5/125 µm GI MM**	-13 dBm	-20 dBm
Power output uncertainty	±0.5 dB	±0.5 dB
Optical connector interface	FC, SC, or ST	FC, SC, or ST
Functions	MOD: Modulated output mode CW: Continuous Wave output mode FREQ: Selectable modulation frequency	
Modulation frequencies	270 Hz, 1 kHz, and 2 kHz (±0.5%) using switch inside battery compartment	
Power requirements	Two AA-size alkaline batteries	
Battery life	> 24 hours	
Environment		
Operating temperature	-15 °C to 55 °C	
Storage temperature	-35 °C to 70 °C	
Humidity, non-condensing	0% to 95%	
Dimensions	7.2 x 14.2 x 3.5 cm (2.8 x 5.6 x 1.4 in)	
Weight		
Single	215 g (7.6 oz)	
Dual	241 g (8.5 oz)	

* Within specified operating environment of 20 °C to 25 °C.

** Calibrated launch level, equilibrium modal distribution.

580XL Series 1310/1550 nm Dual-Wavelength Laser Sources*

Center wavelength (FWHM)		
Nominal	1310 nm	1550 nm
Range	1280 to 1340 nm	1520 to 1580 nm
Spectral width (FMS)	< 5 nm	< 5 nm
Stability, 24 hours max. deviation	±0.2 dB	±0.2 db
Stability vs. temperature, -15 °C to 55 °C**	±0.5 dB	±0.5 db
Typical power output at 100%***†	-7 dBm ±0.5 dB	-7 dBm ±0.5 dB
Power output uncertainty	±0.5 dB	±0.5 dB
Optical connector interface	FC, SC, or ST	FC, SC, or ST
Functions	MOD: Modulated output mode CW: Continuous Wave output mode FREQ: Selectable modulation frequency	
Modulation frequencies	270 Hz, 1 kHz, and 2 kHz (±5%) using switch inside battery compartment	
Power requirements	Two AA-size alkaline batteries	
Battery life	> 50 hours	
Environment		
Operating temperature	-15 °C to 55 °C	
Storage temperature	-35 °C to 70 °C	
Humidity, non-condensing	0% to 95%	
Dimensions	7.2 x 14.2 x 3.5 cm (2.8 x 5.6 x 1.4 in)	
Weight	227 g (8 oz)	
Laser	Class 1	

* Within specified operating environment of 20 °C to 25 °C.

** Temperature is ramped up in 5 °C steps. The instrument is allowed to stabilize at each temperature for 10 minutes. The initial reference power is measured at approximately 25 °C.

*** With return loss > 30 dB.

† Power is 3 dB lower in modulated mode.



560XL Series Optical Power Meters*

Detector size and composition	1 mm InGaAs
Calibrated wavelengths	850, 1300, 1310, 1550 nm
Measurement range	+3 to -60 dBm
Linearity:	
+3 to -3 dBm	±0.5 dB
-3 to -50 dBm	±0.05 dB
-50 to -60 dBm	±0.5 dB
Absolute accuracy	±0.25 dB
Wavelength dependence (typical):	
820 to 880 nm	2.00 dB
975 to 985 nm	0.25 dB
1270 to 1330 nm	0.30 dB
1500 to 1625 nm	0.30 dB
Polarization dependence	< 0.1 dB
Resolution	±0.01dB
Optical connector interface	FC, SC, or ST
Functions	dB: Relative units dBm: Absolute units λ: Select wavelength CAL: Calibrate unit
Power requirements	Two AA-size alkaline batteries
Battery life	> 100 hours
Environment	
Operating temperature	-15 °C to 55 °C
Storage temperature	-35 °C to 70 °C
Humidity, non-condensing	0% to 95%
Dimensions	7.2 x 14.2 x 3.5 cm (2.8 x 5.6 x 1.4 in)
Weight	250 g (8.9 oz)

* Within specified operating environment of 20 °C to 25 °C.

General Information

This section provides general instructions on how to use the XL fiberTOOLS instruments.

If circumstances require that the instruments be serviced and maintained in-house, contact Greenlee for technical assistance.

Battery Installation or Replacement

All XL fiberTOOLS instruments are powered by two AA-size 1.5 volt alkaline batteries. Two batteries are shipped with the instruments and must be installed before the units can be used.

Note: Regular zinc-carbon batteries are not recommended for use in XL fiberTOOLS instruments. Use of such batteries, often marked "heavy duty," will shorten the operating time.

Operating times for the XL fiberTOOLS instruments covered in this manual are listed in the "Specifications" section.

LED and Laser Sources

One of the front panel LED indicators will blink when the batteries are low. The instrument may continue to be operated until the front panel LED shuts off. However, the light output may become unstable after the power drops past this "low battery" threshold.

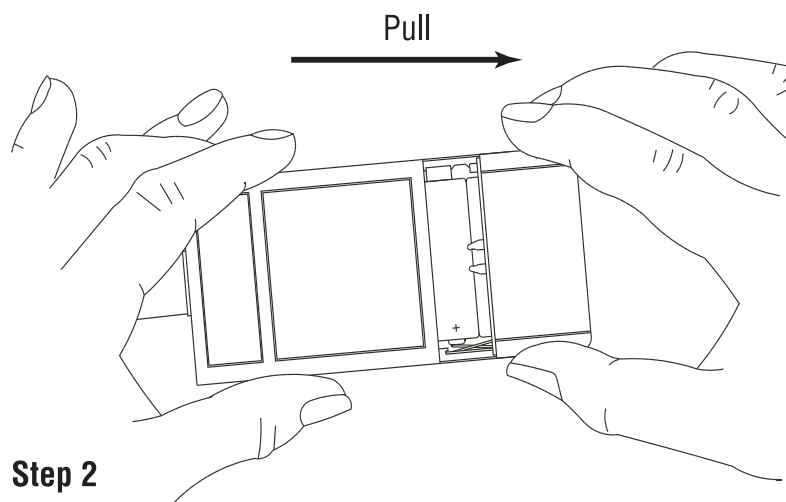
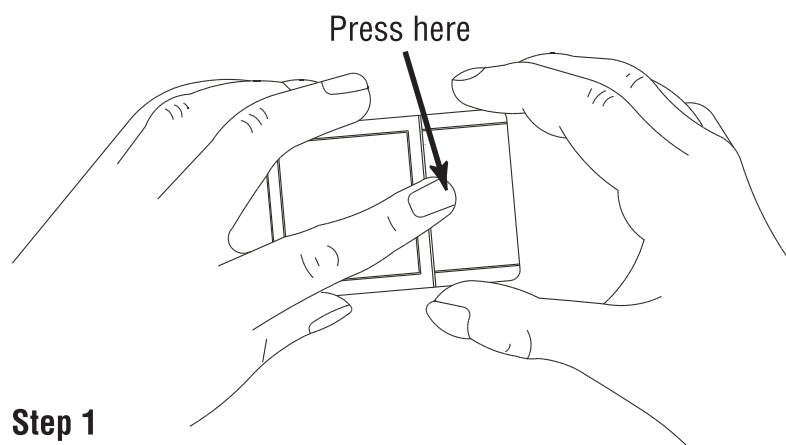
Optical Power Meters

Low battery status is indicated by a "B" annunciator appearing in the upper left-hand corner of the LCD screen. After the "B" appears, the unit may be operated for a minimum of five hours before the batteries are depleted.

Battery Installation or Replacement (cont'd)

To replace the batteries, follow these steps:

1. Carefully remove the protective rubber cover.
2. Turn the instrument onto its front face, then open the battery compartment by pressing on the center of the cover (Step 1 below) while pulling on the sides (Step 2 below).
3. Remove the used batteries and replace them with a fresh pair. Ensure that the polarization of the batteries is correct, as indicated by the markings in the battery compartment. Failure to properly install the batteries may damage the instrument.



Auto-Shutoff Feature

All XL fiberTOOLS instruments in this manual incorporate an auto-shutoff feature to prolong battery life. The instruments shut down automatically if the front-panel keys are not pressed for a certain period of time.

LED and Laser Sources

These instruments power down if the front-panel keys are not pressed for 15 minutes. To disable the auto-shutoff feature, do the following:

1. Press the **[ON/OFF]** and **[MOD]** keys simultaneously while turning the instrument on. A wavelength LED indicator will blink several times, signaling that the auto-shutoff feature has been disabled.
2. To re-enable the auto-shutoff feature, cycle the power off and on.

Optical Power Meters

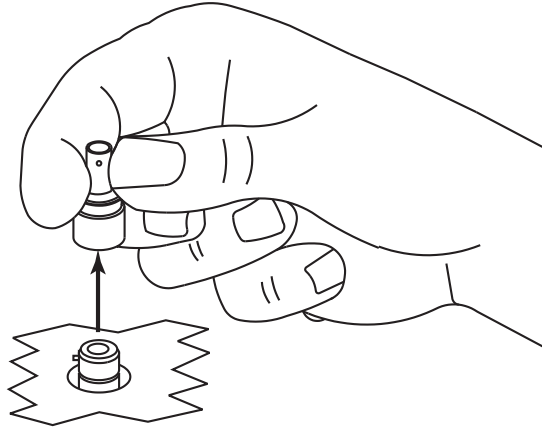
The optical power meters power down if the front-panel keys are not pressed for 70 minutes. To disable the auto-shutoff feature, do the following:

1. Press the **[ON/OFF]** and **[dB/dBm]** keys simultaneously while turning the instrument on. The auto-shutoff feature is now disabled.
2. To re-enable the auto-shutoff feature, cycle the power off and on.

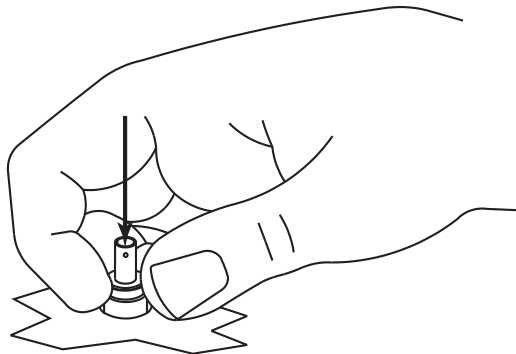
Snap-On Connector (SOC) Interface for 580XL

SOC interfaces and adapters offer superior repeatability and are compatible with most industry standard fiber optic connectors. SOC adapters can also be quickly removed from the interface to permit cleaning of the detector window in accordance with the following instructions.

**Pulling the adapter
off the interface**



**Pushing the adapter
onto the interface**



Removing a SOC Adapter

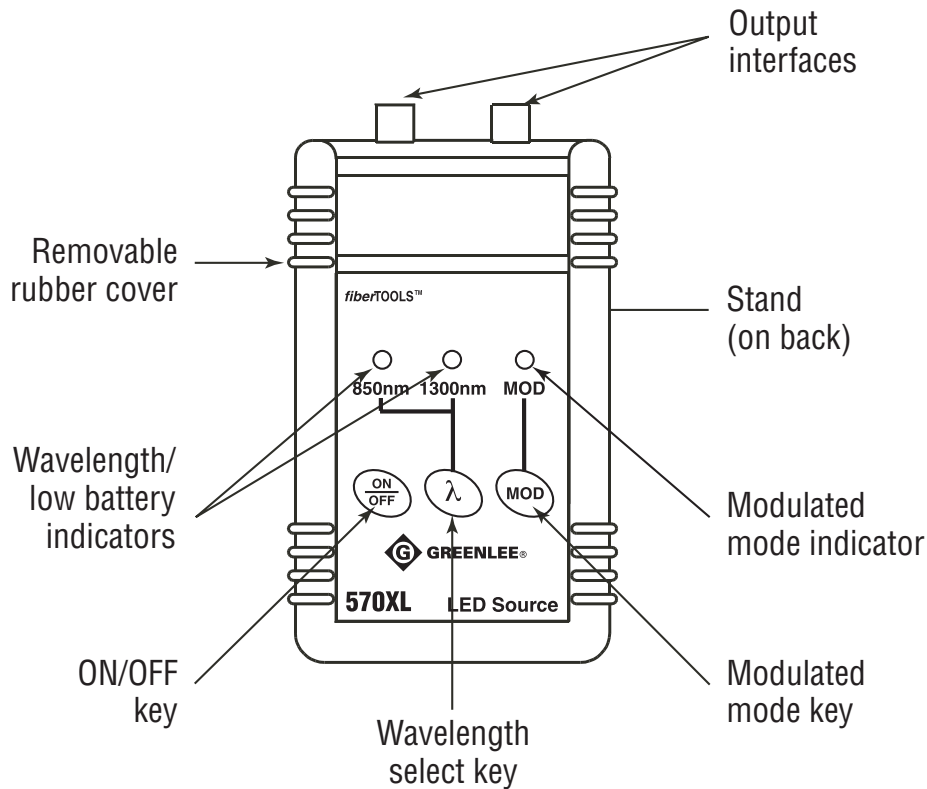
1. Grasp the sides of the SOC adapter and pull it off the interface, as shown above. SOC adapters require considerable force to remove. Do not attempt to pry the adapter off the interface or damage will result.
2. Put the adapter in a clean place.

Installing a SOC Adapter

1. Locate the anti-rotation key on the interface.
2. With the keyway properly aligned, push the adapter over the interface until it snaps in place, as shown above.

Operation

570XL Series Dual-Wavelength LED Sources



[ON/OFF] key: This key turns the instrument on and off.

[λ] key: This key determines which LED is active.

850 nm indicator: This indicator illuminates when the 850 nm LED is active. It blinks when the battery power is low.

1300 nm indicator: This indicator illuminates when the 1300 nm LED is active. It also blinks when the battery power is low.

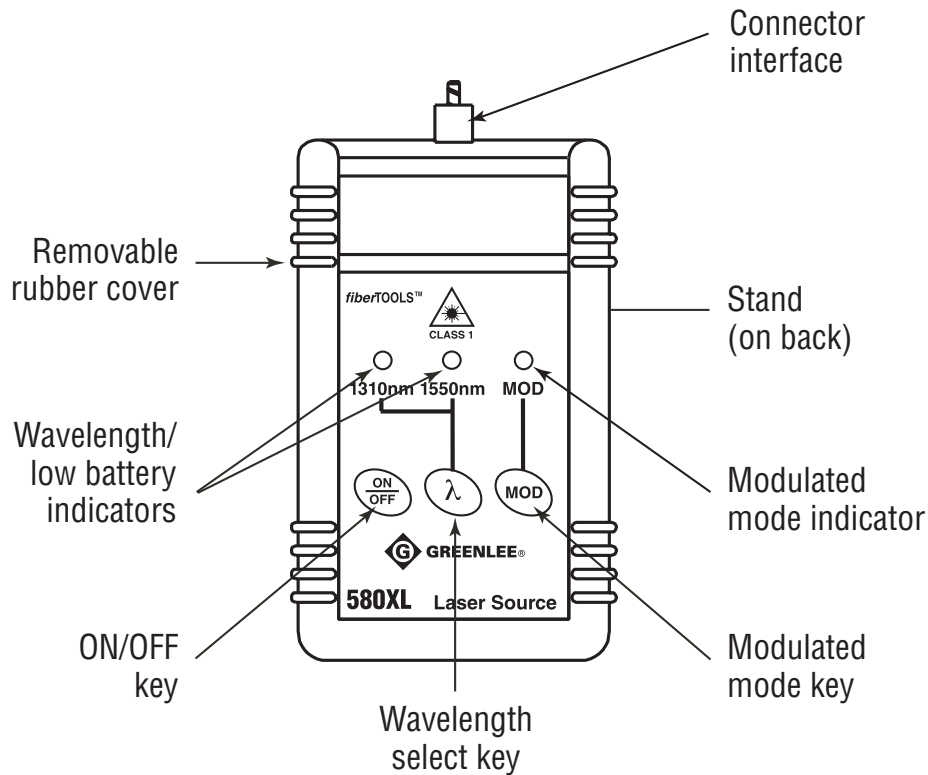
[MOD] key: This key toggles the light output between the continuous wave (CW) and modulated modes.

MOD indicator: This indicator illuminates when the unit is in modulated mode.

Frequency select: This switch, located inside the battery compartment, sets the modulation frequency. See “Setting the Source Modulation Frequency” section.

Output interfaces: Light output is emitted from these interfaces.

580XL Series Dual-Wavelength Laser Sources



[ON/OFF] key: This key turns the unit on and off. When the unit is first turned on, the 1310 nm laser is automatically selected in continuous wave mode.

[λ] key: This key toggles the instrument between the 1310 nm and 1550 nm lasers. Only one source can be on at a time.

1310 nm indicator: This indicator illuminates when the 1310 nm laser is active. It blinks when the battery power is low.

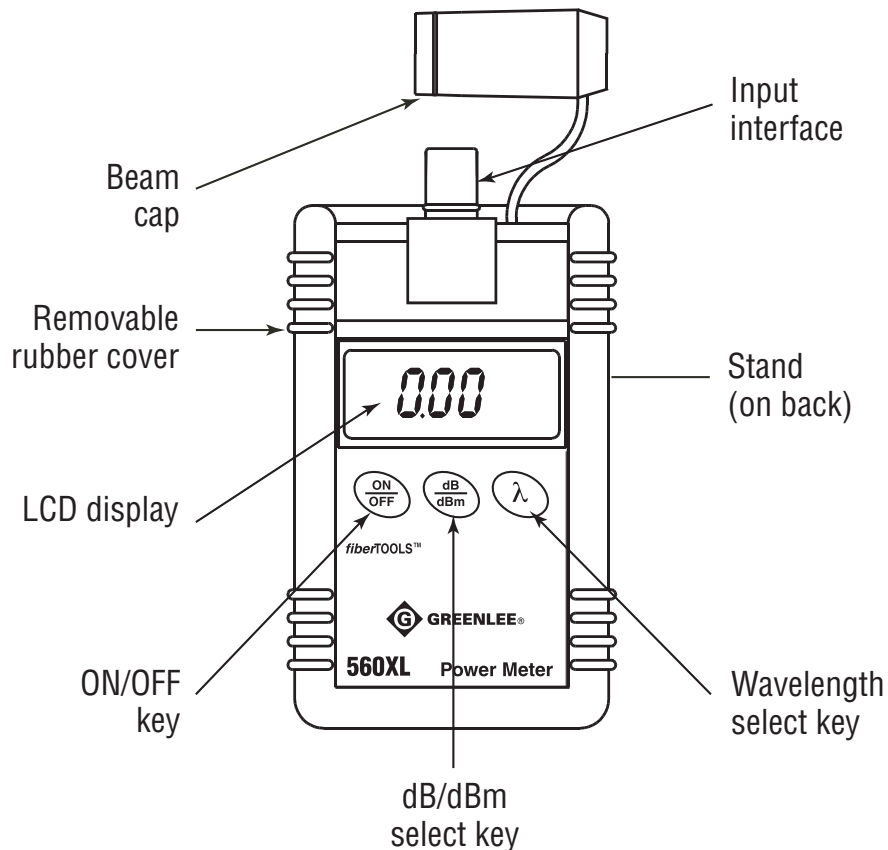
1550 nm indicator: This indicator illuminates when the 1550 nm laser is active. It also blinks when the battery power is low.

[MOD] key: This key toggles between the continuous wave (CW) and modulated modes.

Frequency select: This switch, located inside the battery compartment, sets the modulation frequency. See "Setting the Source Modulation Frequency" section.

Output interface: Light output is emitted from these interfaces.

560XL Series Optical Power Meters



[ON/OFF] key: This key turns the unit on and off.

[dB/dBm] key: This key controls the following modes:

- Toggles between absolute dBm and relative dB readouts, without changing the internally stored reference level, when pressed momentarily.
- Selects a new 0 dB reference level when held down for three seconds. This is indicated by the “r” annunciator appearing in the lower right-hand corner of the LCD screen.

Note: The 560XL Series optical power meters incorporate multi-wavelength reference storage capability. This enables a 0 dB reference value to be stored in non-volatile memory for each calibrated wavelength. The reference values will be stored in memory until a new 0 dB reference is established for a wavelength by holding down the [dB/dBm] button as described above.

560XL Series (cont'd)

[λ] **key:** This key controls two modes:

- Selects the calibration wavelength. Available wavelengths vary by model. See the “Specifications” section for details.
- When the [λ] key is held down at the desired wavelength, pressing the [dB/dBm] key sets this wavelength as the new power-on default stored in non-volatile memory.

CAL/OP switch: This switch, located inside the battery compartment behind a tamper-evident label, is used when recalibrating the instrument. Calibration is recommended every 12 months. Contact Greenlee for more information regarding periodic recalibration.

NOTE: FOR NORMAL OPERATION, THE CAL/OP SWITCH SHOULD ALWAYS BE SET TO THE “OP” POSITION. TAMPERING WITH THE CAL/OP SWITCH WILL VOID CALIBRATION OF THE INSTRUMENT.

Input interface: This is the optical input connector. All 560XL Series optical power meters are equipped with a SOC interface.

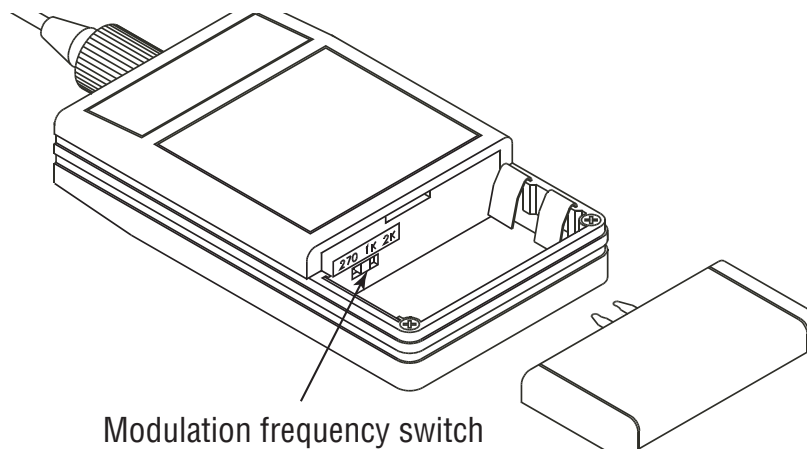
Setting the Source Modulation Frequency

All 570XL Series LED sources and 580XL Series laser sources are shipped with the modulation frequency switch set at 1 kHz.

To change this setting, remove the batteries and set the switch shown in the figure below to the desired position using the tip of a pencil or small screwdriver.

The user may select among 270 Hz, 1 kHz, and 2 kHz square wave modulated outputs. Replace the batteries, battery cover, and rubber instrument cover after selecting the modulation frequency.

Note: The average modulated power output will be 3 dB less than the average power in continuous wave (CW) mode.



Applications

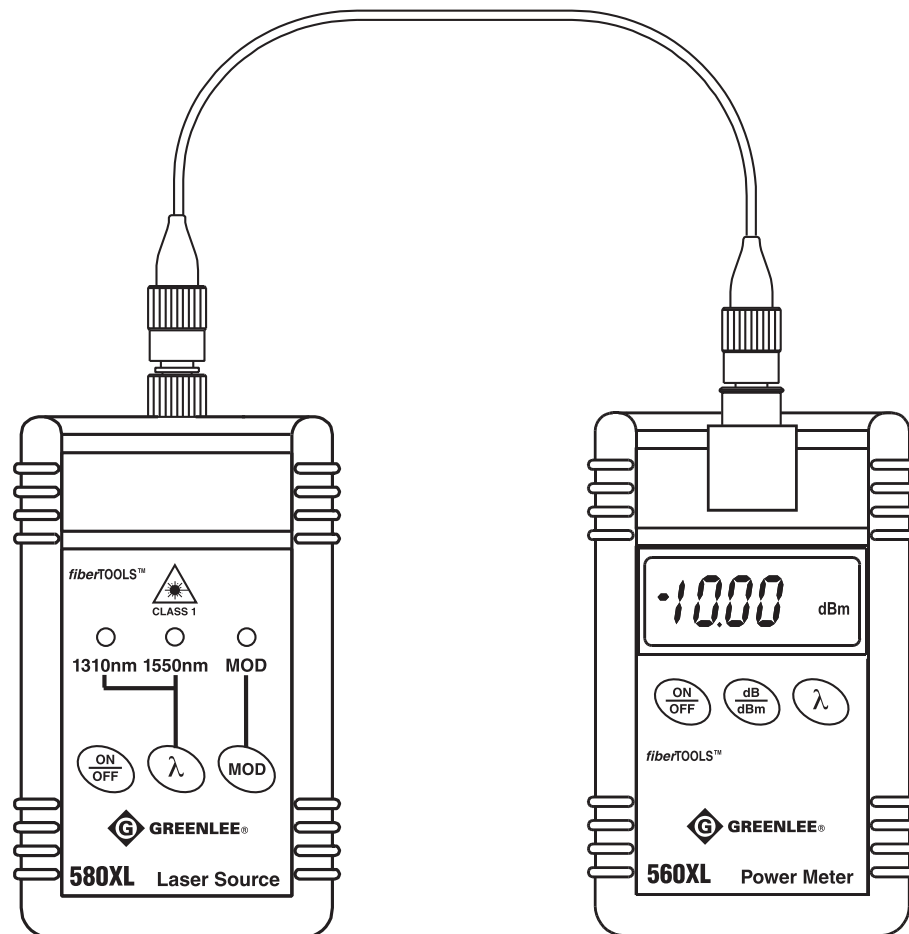
The following applications for the XL fiberTOOLS instruments are described in this manual:

- Connector/cable insertion loss measurements
- Link loss measurements
- Dual-wavelength SM loss measurements

One Test Jumper Method: Connector Loss

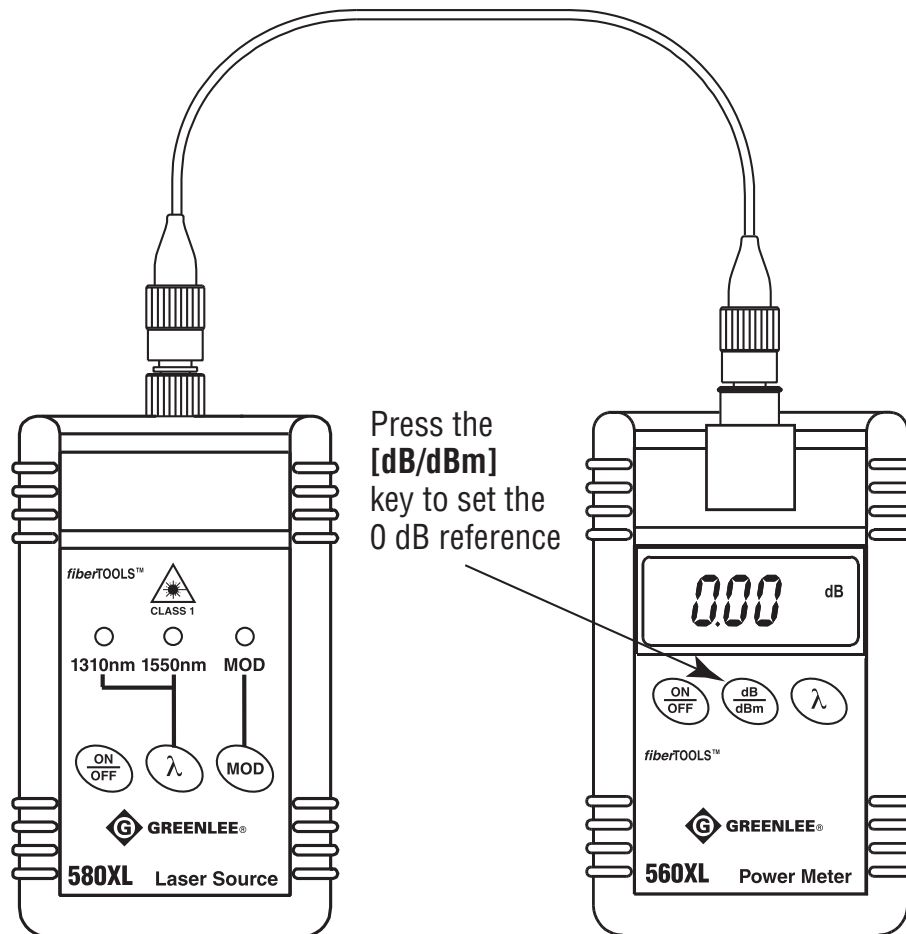
The following procedure conforms to FOTP-171 (Method D), OFSTP-7 (Method B), and OFSTP-14 (Method B).

1. Connect an appropriate light source to the optical power meter using a suitable reference cable with a length of about 2 to 3 meters (6 to 10 feet), as shown below.



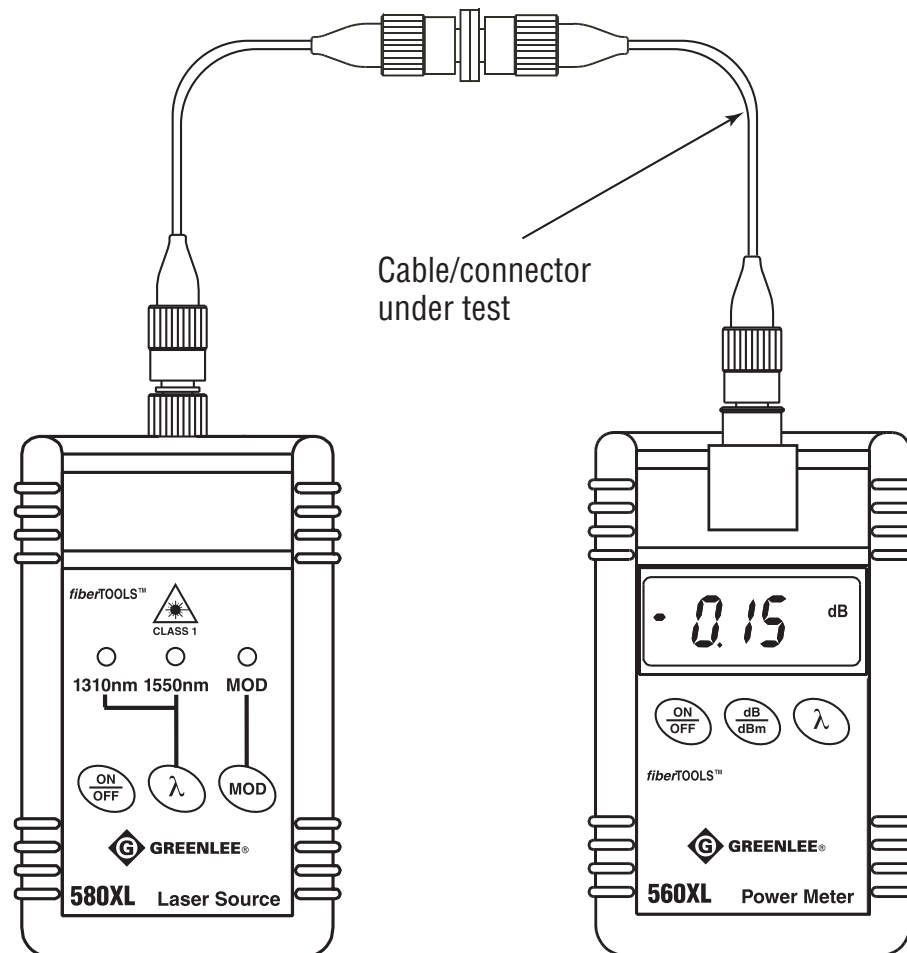
One Test Jumper Method: Connector Loss (cont'd)

2. Ensure that the light source is in continuous wave (CW) output mode. Set the optical power meter to the appropriate wavelength (using the [λ] key) and to dBm units (using the [dB/dBm] key). Note that the dBm output of the reference cable should be within acceptable limits.
3. To store the reference level, press the [dB/dBm] key on the optical power meter until the "r" annunciator appears on the LCD screen (about 3 seconds). The display should read 0.00 dB. See below.

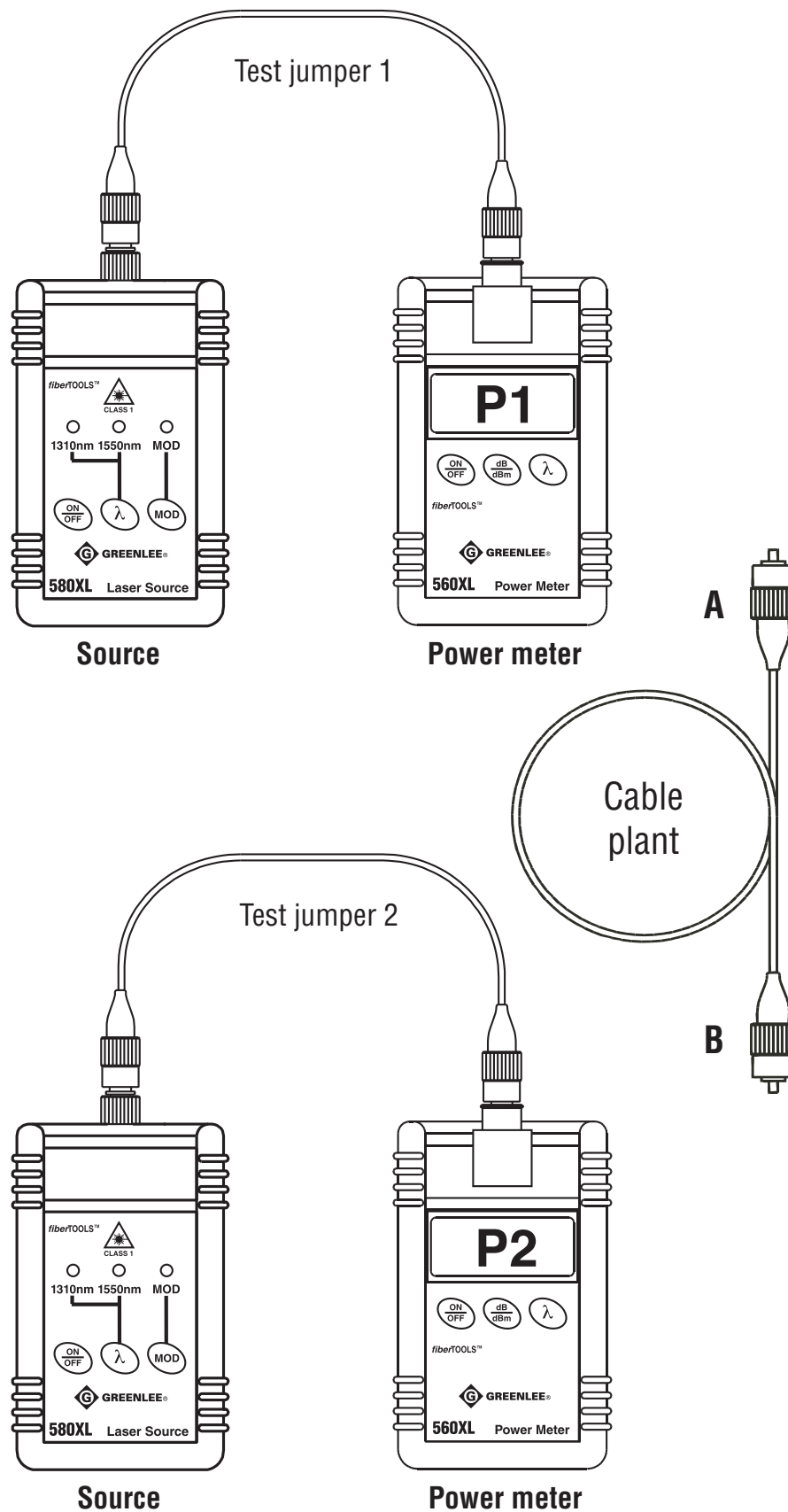


One Test Jumper Method: Connector Loss (cont'd)

4. Disconnect the reference cable end from the optical power meter and insert the cable to be tested using an appropriate mating adapter. The optical power meter reads the connector/cable loss in dB. The example below displays a connector/cable loss of -0.15 dB.



Two Test Jumper Method: Link Loss

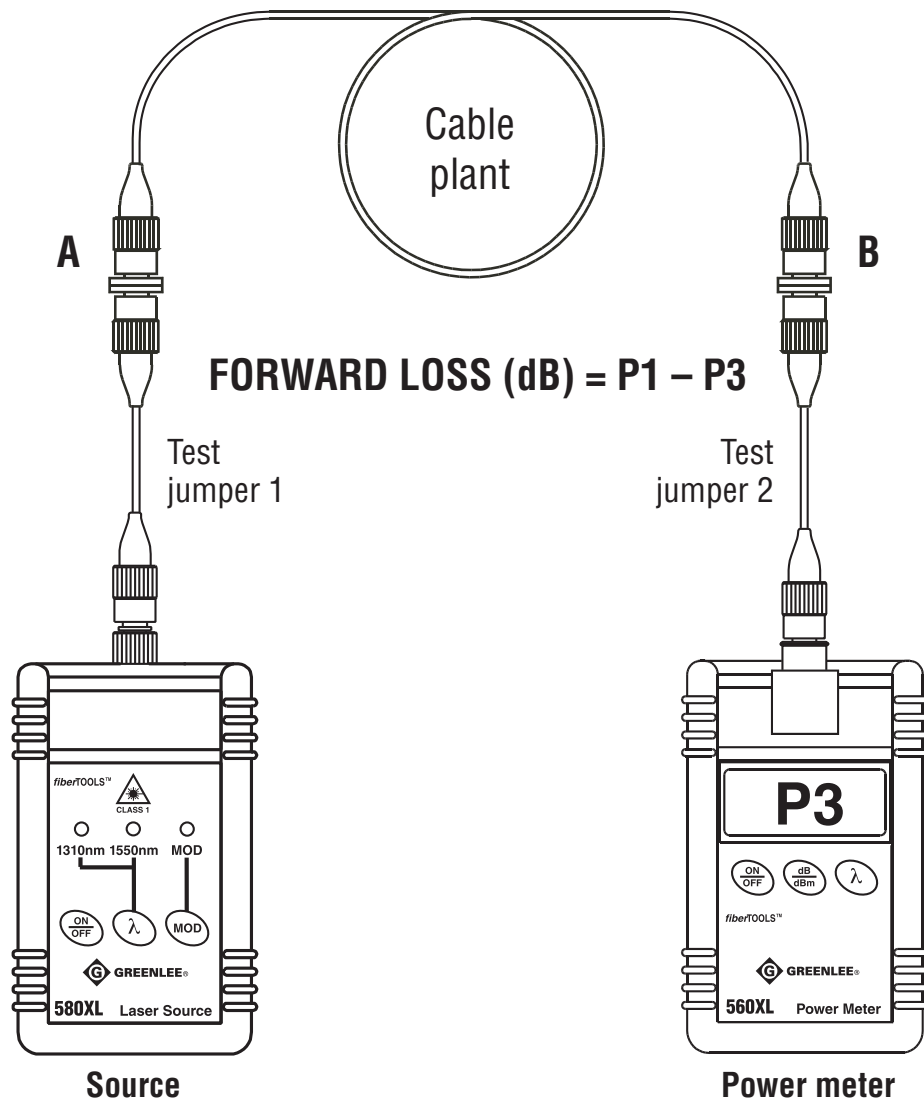


Two Test Jumper Method: Link Loss (cont'd)

The following procedure conforms to FOTP-171 (Method B), OFSTP-7 (Method A), and OFSTP-14 (Method A).

1. If a complete test set (light source and optical power meter) is available at each end, it is advisable to test the output power of the sources and the condition of the test jumpers before commencing measurement of the link.

Connect each source and optical power meter with a test jumper, as shown above. The sources should be set to continuous wave (CW) output mode. The power meters should be set to the correct wavelength and to dBm measurement units. Note the P1 and P2 dBm readings. For example, a 580XL 1310 nm laser source should read between -6.5 and -7.5 dBm on the optical power meter.

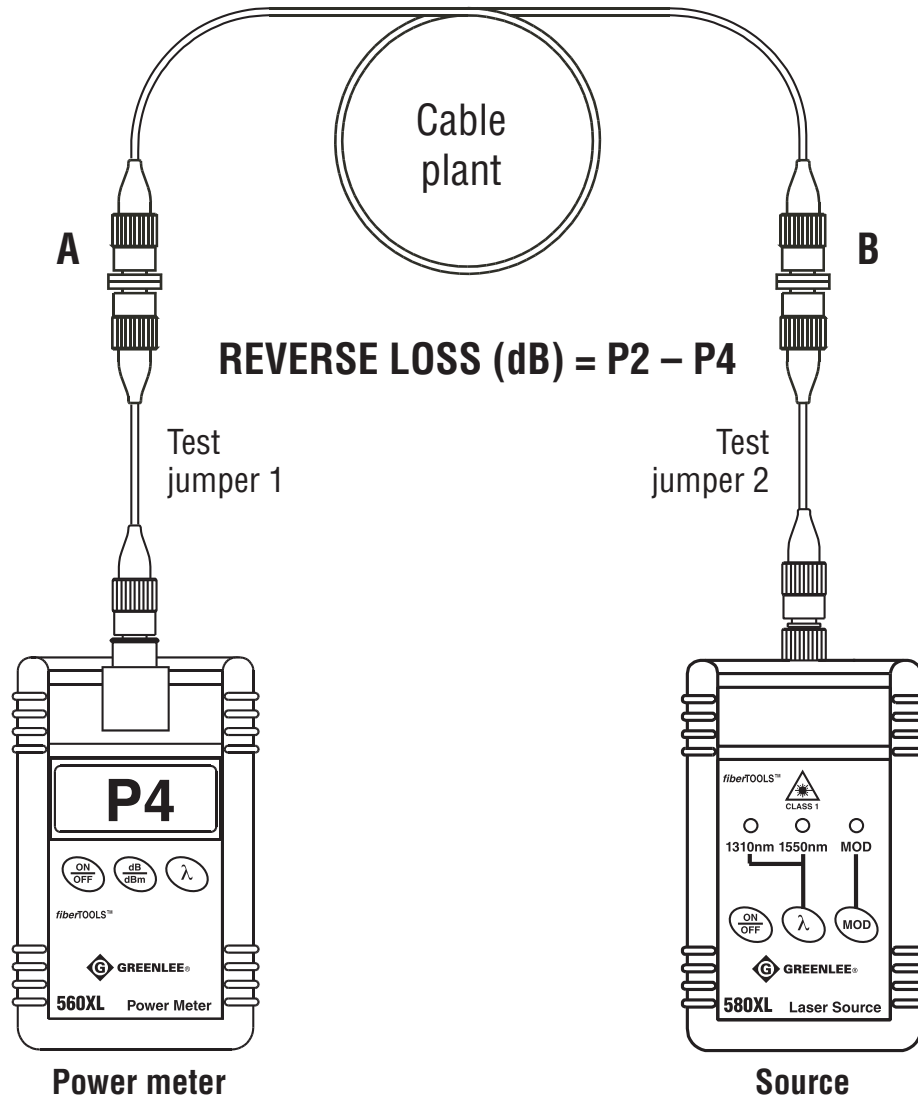


2. Connect a light source and optical power meter to the respective patch panel ports using the test jumpers, as shown above.

Two Test Jumper Method: Link Loss (cont'd)

- Using the formula shown above, take the dBm reading on the optical power meter (P3) and the nominal source output value, corresponding to the light source in use.

Note: Make sure the optical power meter supports the wavelength of the light source in use.



- It is advisable to measure the loss in both directions. Reverse the source and optical power meter connections, as shown above. Calculate the reverse loss using the formula shown above.
- Report both forward and reverse loss values.

Dual-Wavelength SM Loss Measurements

The 580XL dual laser is used to measure the attenuation of single-mode fiber optic links.

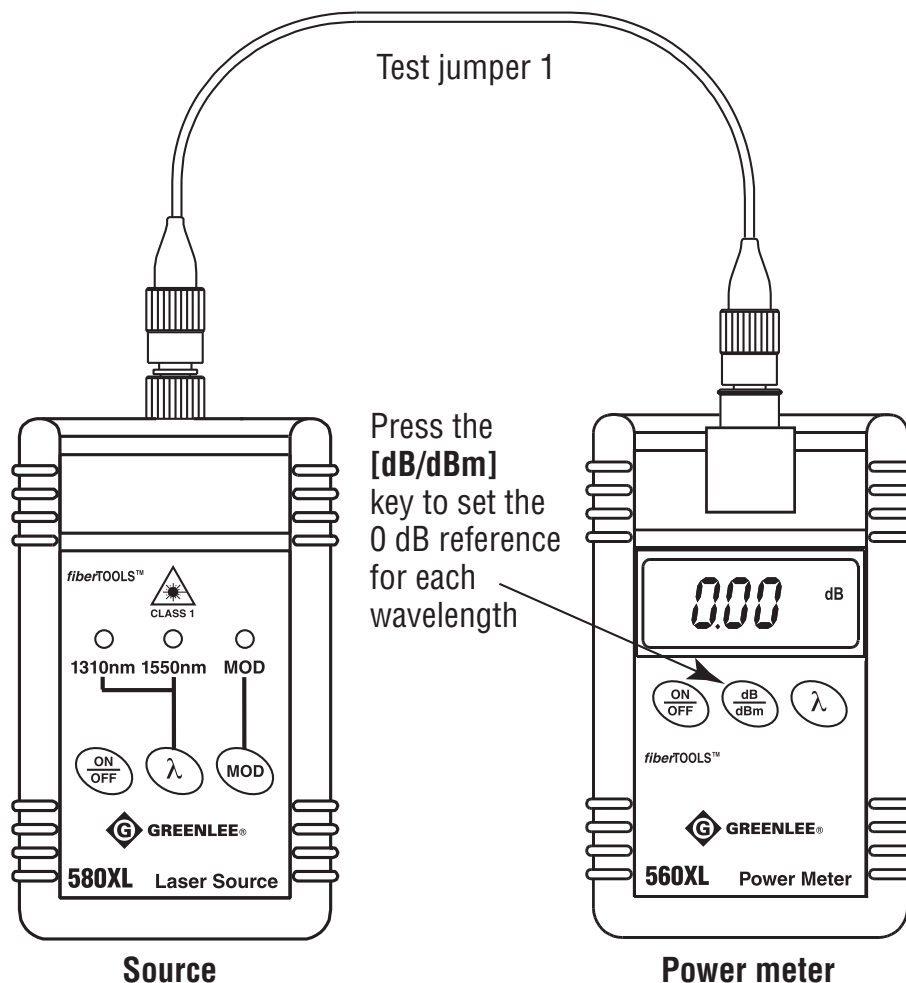
Dual-wavelength testing at both the 1310 nm and 1550 nm transmission windows is required when the following conditions are encountered:

- Telephony systems now operating in the 1310 nm transmission window are likely to be upgraded for operation at 1550 nm in the future. Consequently, it is important to validate any newly installed link at both 1310 nm and 1550 nm now to ensure that all specifications can be met in the future. Unless measured and verified at the time of installation, unexpected fiber attenuation and excessive bend losses may render the link useless for later commissioning at 1550 nm. While fiber attenuation decreases at longer wavelengths, microbend and macrobend losses increase.
- The telecommunication system is now operating in both the 1310 nm and 1550 nm transmission windows. Therefore, dual-wavelength acceptance testing is required to be performed at the present time.

The following test procedure complies with TIA/EIA-526-7 (OFSTP-7, Method A), Attenuation of Installed Single-mode Fiber Link.

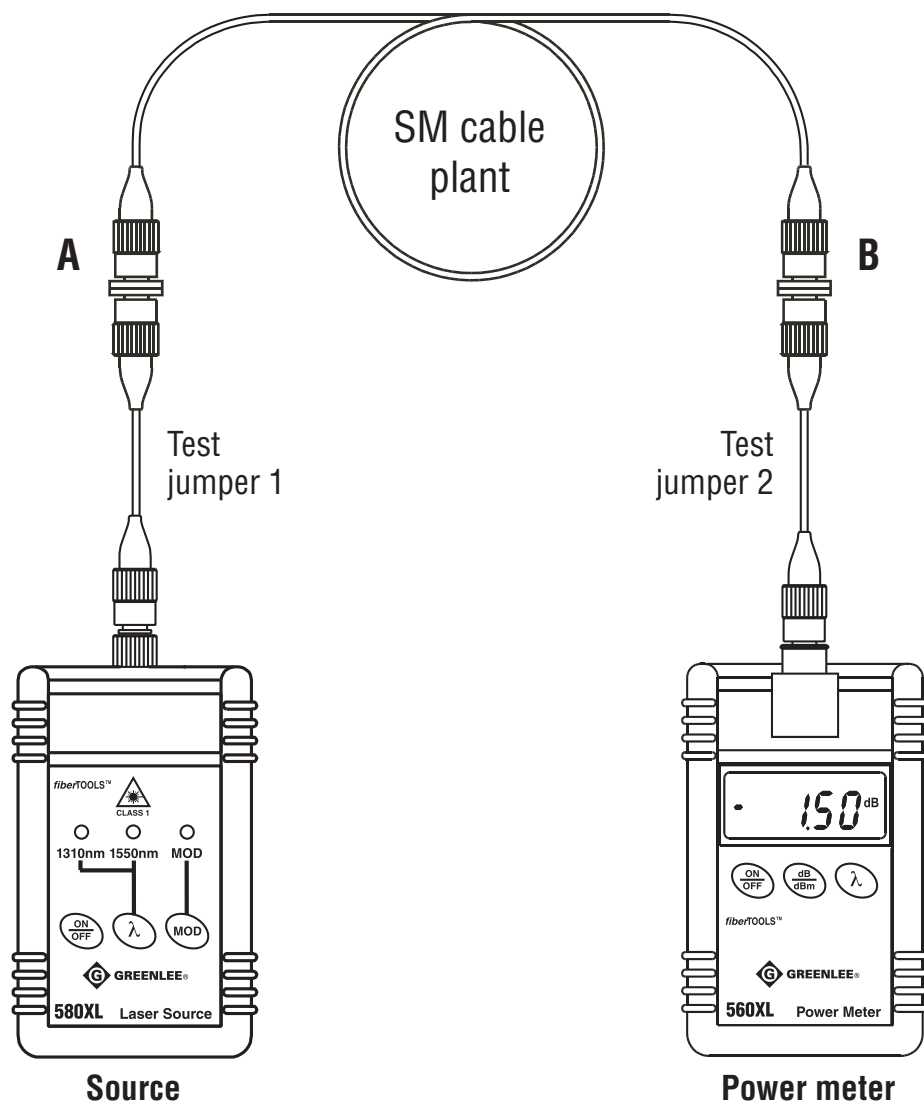
Dual-Wavelength SM Loss Measurements (cont'd)

1. Connect the 580XL dual laser source to the 560XL optical power meter using a suitable reference cable at least 3 meters (10 feet) long. Turn on both instruments and set the wavelength to 1310 nm on the dual laser source, and 1310 nm on the optical power meter.
2. Press the **[dB/dBm]** key on the optical power meter until the “r” annunciator appears and the display reads 0.00 dB. See figure below.
3. Set the dual laser source and optical power meter to 1550 nm. The expected reading on the optical power meter is -6.25 dBm to -7.75 dBm.
4. Press the **[dB/dBm]** key on the optical power meter until the “r” annunciator appears and the display reads 0.00 dB. See figure below.



Dual-Wavelength SM Loss Measurements (cont'd)

5. Connect the dual laser source and optical power meter to opposite ends of the link under test. Use suitable reference cables to connect the instruments to the patch panel. See figure below.
6. Set the dual laser source to 1310 nm and the optical power meter to 1310 nm. Record the dB reading on the optical power meter. This is the link loss at 1310 nm.
7. Now set the dual laser source and optical power meter to 1550 nm. Record the dB reading on the optical power meter. This is the link loss at 1550 nm.
8. Go to the next fiber and repeat from Step 1.



Lifetime Limited Warranty

Greenlee Textron Inc. warrants to the original purchaser of these goods for use that these products will be free from defects in workmanship and material for their useful life, excepting normal wear and abuse. This warranty is subject to the same terms and conditions contained in Greenlee Textron Inc.'s standard one-year limited warranty.

For all Test Instrument repairs, contact Customer Service at 800-642-2155 and request a Return Authorization. An Approved Authorization including shipping label and instructions will be sent.

For items not covered under warranty (such as items dropped, abused, etc.), a repair cost quote is available upon request.

Note: Prior to returning any test instrument, please check replaceable batteries or make sure the battery is at full charge.



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A Textron Company

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