



LTS-1500 Fiber Optic Test Set Operating Instructions

Quality Fiber Optic Test Equipment

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1/2016

Contents

Introduction.....	1
Specifications.....	2
Unpacking and Inspection.....	3
Power Considerations.....	3
Instrument Operation.....	4
Operating Considerations.....	7
Service/Warranty Information.....	10

Introduction

The LTS-1500 Fiber Test Set is a convenient hand held instrument that incorporates a sensitive optical power meter containing an InGaAs detector for maximum sensitivity and stability, up to three stabilized laser light sources and the means to make automatic loss measurements at all three wavelengths over a pair of singlemode fibers simultaneously.

The unit also functions as a fiber identifier that permits modulation and detection of the laser sources at three frequencies, 270 Hz, 1000 Hz, 2000 Hz. Each instrument is equipped with adaptors to accommodate FC, ST or SC connectors for both the laser output and the power meter input.

The LTS-1500 is powered by a high capacity lithium polymer rechargeable battery and/or a universal wall mount supply that operates from 95-260 VAC, 50-60 Hz. It is equipped with mains plugs for North America, continental Europe, Great Britain and Australia. Battery life exceeds 15 hours at full charge.

Up to 2000 triple wavelength loss measurements may be stored for later download to a host computer via a USB port. CertSoft reporting software is provided to generate professional test reports.

Specifications

Power Meter Detector Type	InGaAs
Calibrated Wavelengths	850, 1300, 1310, 1490, 1550, 1625 nm
Units of Measurement	dBm, dB
Resolution	0.01
Display Update Rate	Six times per second
Power Input Range	+5 dBm to - 77 dBm
Power Measurement Uncertainty	± 0.18 dB under reference conditions, ± 0.25 dB from 0 to -65 dBm ± 0.35 dB from 0 to +5 dBm and from -65 to -77 dBm,
Laser Output Power	≥ -1.00 dBm
Output Stability	$\pm .05$ dB / 24 hrs @ constant temp., $\pm .02$ dB/C temperature coefficient
Laser Wavelengths Available	850nm, 1300nm, 1310 nm, 1490, or 1550 (± 20 nm) (individual unit wavelengths depends on configuration)
Modulation Modes Provided	CW, 270 Hz, 1000 Hz, 2000 Hz
Autotest Measurement Rate	Five seconds per wavelength
Laser Safety Classification	Class I safety per FDA/CDRH and IEC-825-1 regulations
Autotest Range	0 to - 36 dB
Display	LCD, power reading, 0.4" high digits, .01 dB resolution Power meter, laser wavelength display 0.16" high digits
Annunciators	Fiber ID, - 3, modulation mode - 4, Autotest - 2, Lo Bat, Auto Off
Storage Locations	2000
Battery Supplied	Rechargeable Li Polymer
Operating Time	Approximately fifteen hours following a full charge
Power Supply / Charger Provided	Universal Wall Mount - US, UK, Continental Europe, and Australian Plugs Included
Power Requirements	95-260 VAC, 50-60 Hz, 3 VA Max
Operating Temperature Range	-10 to 45 C
Dimensions with rubber boot	5.9" L x 3.9" W x 1.37" H (150mm L x 100mm W x 35mm H)
Weight	1.15 lbs. (0.52 Kg)
Accessories Provided	FC, ST, SC adaptors for both source and power meter, rubber boot, Battery Power supply/charger, manual on CD, USB Cable, CertSoft PC application software
Standard Warranty	Two years, Components and Workmanship, 30 Day Satisfaction Guarantee
Suggested Calibration Interval	3 yrs.

Unpacking and Inspection

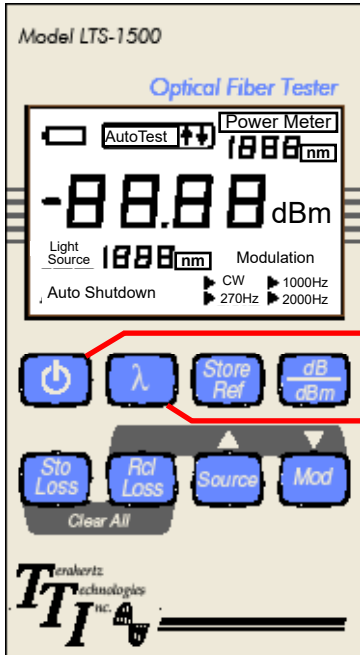
Prior to shipment this instrument was inspected and found to be free of mechanical and electrical defects. Upon acceptance by the carrier he assumes responsibility for its safe arrival. After unpacking, examine the unit for any evidence of shipping damage. Should you receive this instrument in damaged condition, apparent or concealed, it must be noted on the freight bill or express receipt and signed by the carrier's agent. Failure to do so could result in the carrier refusing to honor the claim. Upon filing a claim TTI should be notified.

Power Considerations

The LTS-1500 is equipped with a 9 V lithium polymer rechargeable battery. It will power the unit for approximately 15 hours following a full charge. For bench top operation, a wall mount power supply/charger is provided. This supply may be operated from 95 - 260 VAC , 50-60 Hz. Four interchangeable mains plugs are supplied. (US, UK, Continental Europe, and Australia)

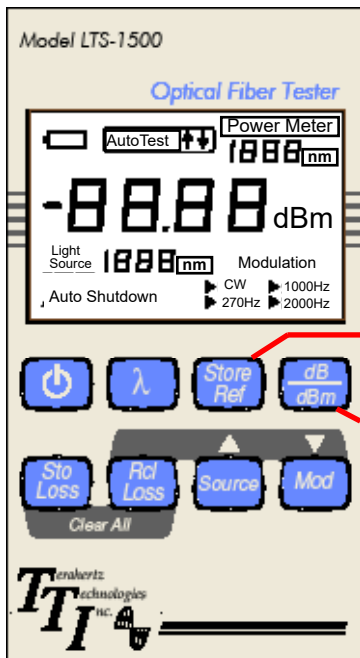
If the supplied battery is discharged in the field and no mains power is available, a 9 V alkaline or other primary battery may be used temporarily. *NEVER attempt to use the charger with any battery other than the one supplied with the unit or severe damage to the instrument may result!*

Instrument Operation



Power, ON/OFF- This control alternately energizes and de-energizes the unit. Auto-Shutdown mode, in which the unit turns itself off following fifteen minutes without a key press, is the default mode. This mode conserves the battery should the user forget to turn the unit off. Holding this key down for at least four seconds at turn-on will de-activate Auto Shutdown.

Power Meter Wavelength Selector- This control selects the calibration factor for the wavelength being measured by the power meter. The progression is as follows: 850 nm → 1300 nm → 1310 nm → 1490 nm → 1550 nm → 1625 nm → 850 nm, etc. The wavelength is displayed in the upper right hand corner of the display.



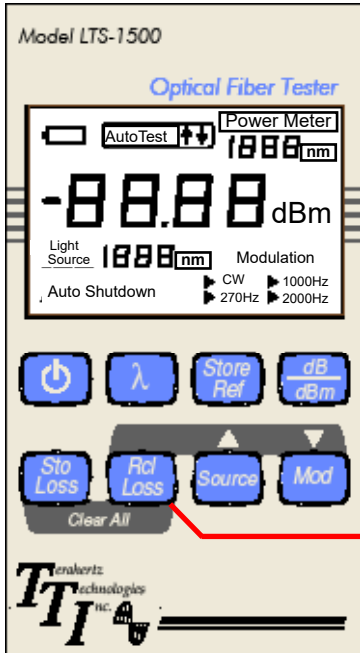
Store Reference Level- This control saves the currently measured power level for the wavelength in use. When in the dB mode, all subsequent readings will be made relative to this power level. A storage location is maintained for each of the six calibrated wavelengths. This reference measurement is volatile, therefore, the instrument should not be power off after taking the reference and prior to testing in relative (dB) mode.

dBm, dB mode Selector- This control alternately switches between comparing the currently measured power to 1.00 milliwatts (dBm mode) or to the stored reference power level. (dB mode) When changing to the dB mode, if no reference level has been previously stored, an error tone will sound and the message "reF ?" will be displayed for a few seconds. The reference values are volatile, that is, they are not saved when the unit is powered down.

If you are in dB mode and attempt to select a wavelength that has no stored reference an error message will appear and the wavelength change will not be accepted until a reference level has been stored for the new wavelength. Return to the dBm mode and store a reference level for the new wavelength.

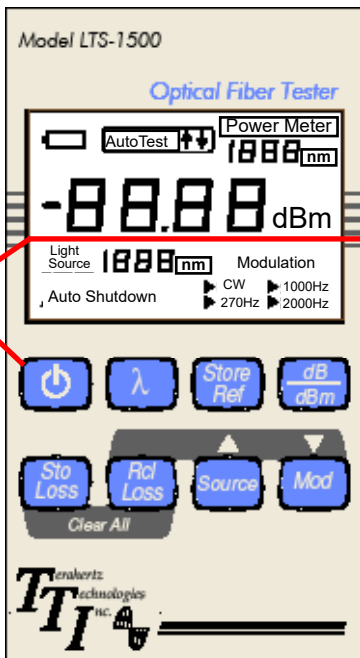
Instrument Operation

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Rcl Loss - When pressed, the unit enters Recall Mode which displays a memory location and the value(s) stored in it. **If the memory location is empty, four horizontal lines will appear in the main display as well as the power meter wavelength display.** In this mode the user may access any memory location by using the up and down controls (Source and Mod) Holding one of these buttons down will cause it to accelerate through the memory locations so that any of the 2000 locations can be accessed quickly. When a location contains an AutoTest measurement all three loss measurements will be shown in a repeating sequence. An Auto Test measurement will be indicated by the presence of the Auto Test annunciator on the display without the up or down arrows. **To exit the Recall mode simply press Rcl Loss again.**

To erase only one memory location: Recall the memory location. Simultaneously press the **Sto Loss** and the **Rcl Loss** buttons for at least one second. When the buttons are released the selected location will have been erased.

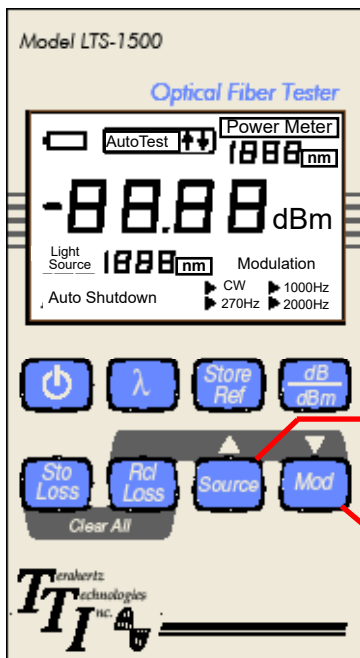


Store Loss - This control saves the current measurement value(s) to non-volatile memory for later downloading. This may be a dBm measurement or a three wavelength dB loss measurement. When the button is activated the memory location is flashed on temporarily. The memory locations will begin at address 000 and auto increment as each new value is stored. Locations may be skipped if so desired by invoking the Recall mode and advancing the memory pointer. The next storage location will be incremented from this point. Upon filling memory location 1999 no more data may be stored and the screen will indicate "FULL" even though some locations may have been skipped. The memory must then be cleared before new data can be stored. **Be sure to download any desired data before clearing the memory.** Clearing memory is accomplished by holding down the Sto Loss and Rcl Loss buttons simultaneously for at least four seconds. Note that the unit must be in the measurement mode and not in Recall mode. The display will indicate "CLr" while the memory is being erased. The memory address display will indicate progress of the operation.

If ERR1 is displayed during a store operation, the power meter has detected that the optical signal is still settling to its final value. Wait until the signal has stabilized before attempting to save it.

Instrument Operation

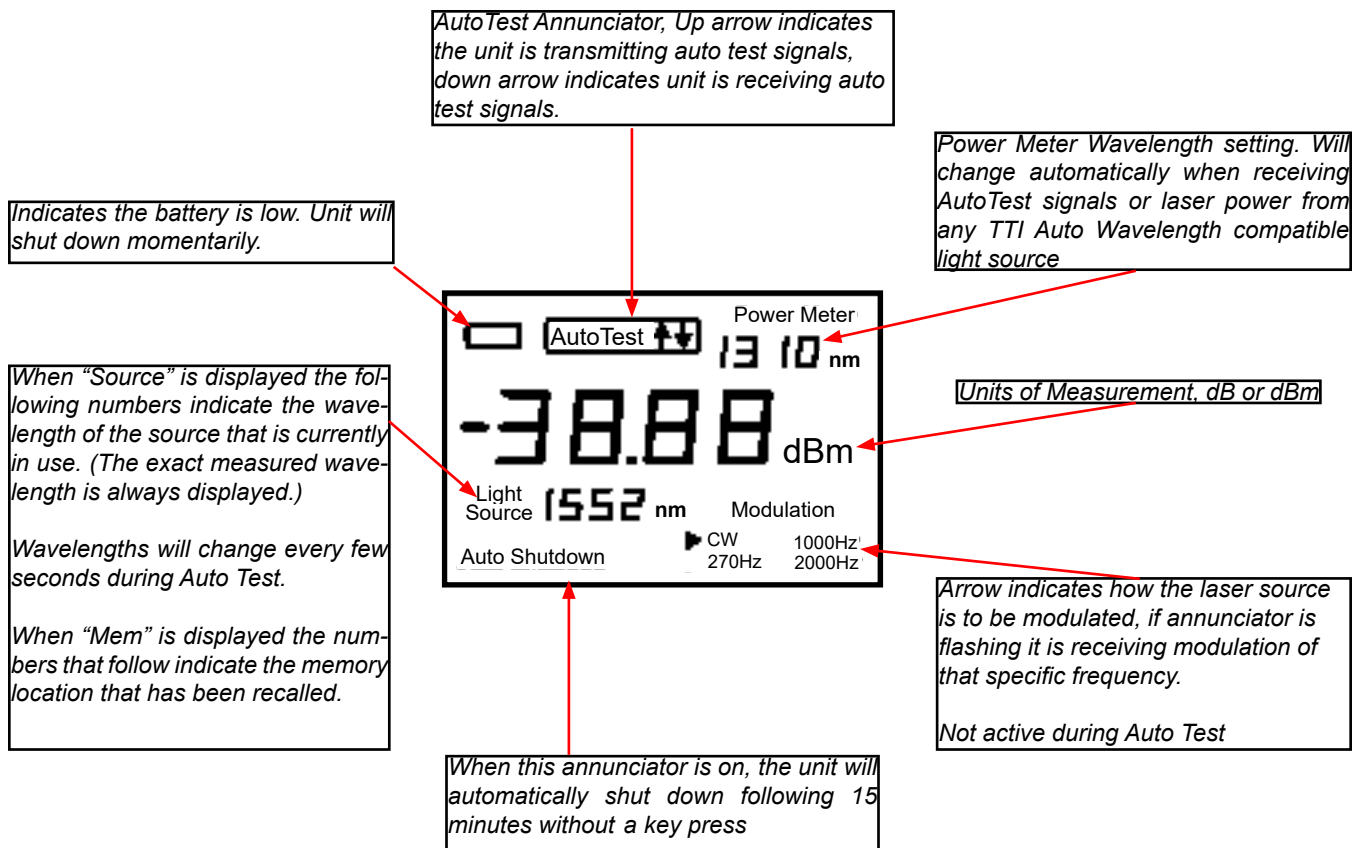
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Source Selector - This control selects the laser wavelength to be used. The lasers are initially turned off when the instrument powers up. Pressing the Source button powers the individual lasers in sequence, activates Auto Test (in which the lasers are activated in a sequence of 5 seconds each) and returns to the off state. When transmitting in Auto Test mode, the Annunciator will appear at the top of the display with an up-pointing arrow. The source wavelength display will automatically change in accordance with the laser in use. When changing source wavelength in *non*-Autotest mode, the transmitting unit will briefly modulate the signal to cause the receiving power meter to change its wavelength setting to match the transmitted signal. The receiving Auto-test arrow will turn on for a short time.

Modulation Selector- This control selects the modulation of the laser source. This feature permits using the instruments to identify one particular fiber in a cable. The sequence is as follows: Continuous Wave (CW) → 270 Hz → 1000 Hz → 2000 Hz → CW. The modulation is a 50 % duty cycle square wave. An arrow points to the modulation mode selected. When the power meter detects light modulated at one of these frequencies the associated annunciator will flash.

Operating Considerations



Operating Considerations

(Continued)

Optical Power Measurements

Connect the fiber carrying the optical power to be measured to the LTS-1500 detector utilizing the adaptor that mates with the fiber connector style in use. Energize the unit. Select the wavelength calibration factor that matches the wavelength of the light being measured by pressing the lambda (λ) key repeatedly until the desired wavelength setting appears on the display. The power reading will now indicate the optical power in units of dBm. If the power level is greater than +5 or less than -77 dBm the display will indicate an out-of-range condition by a series of dashes across the main display.

To save the power measurement press Sto Loss. The Mem: annunciator will flash on briefly and indicate the memory location to which it is being saved.

To make a relative power measurement you must first save the reference power level by pressing the Store Ref button. Then press the dB/dBm button. The units of the display will now change to dB. Subsequent readings will now be displayed in terms of dB relative to the stored reference value. A reference memory location is provided for each calibrated wavelength. These stored reference values will be lost once the unit is turned off.

Stored power level measurements may be recalled and displayed by pressing Rcl Loss.

The memory location will be displayed following the Mem: annunciator. Use the arrows (Source, Mod respectively) to access any desired memory location. Holding these buttons down will cause the memory location to advance automatically. When the limits are reached, (0 and 1999) the memory location will roll over from 1999 to 0 and from 0 to 1999.

An Auto Test loss measurement will be displayed as follows: The Auto Test annunciator will be displayed without the Up, Down arrows. The stored loss values and the wavelength at which they were measured will be displayed sequentially for a period of 5 seconds each so that they may be copied down if so desired.

If simple power levels were stored they are displayed along with the wavelength at which they were measured.

To exit the Mem: mode, simply press the Rcl Loss button again. The unit will now revert back to the active measurement mode.

Operating Considerations

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Using the Laser Source

The laser source is equipped with interchangeable adaptors that accommodate connection to FC, ST, and SC style fiber optic connectors. It is located at the top left of the unit when facing the display. To change adaptors, remove the two Philips head screws that retain the adaptor, remove the old adaptor by gently pulling straight up and away from the unit and replace it with the desired adaptor ensuring the alignment pin on the bottom side of the replacable adapter mates with the hole on the units adapter. If replacing an adapter that had an attached chain, it is necessary to exchange the long screw which holds the chain in place with the supplied shorter screw.

The lasers are initially turned off when the instrument powers up. Pressing the Source button powers the individual lasers in sequence, activates Auto Test (in which the lasers are activated in a sequence of 5 seconds each) and returns to the off state.

When changing source wavelength in non-Autotest mode, the transmitting unit will briefly modulate the signal to cause the receiving power meter to change its wavelength setting to match the transmitted signal. The receiving Autotest arrow will turn on for a short time.

When transmitting in Auto Test, the Annunciator will appear at the top of the display with an up-pointing arrow. The source wavelength display will automatically change in accordance with the laser in use.

The laser wavelength display shows the actual measured wavelength of the laser in use.

In the non-auto test mode the lasers may be used in the CW (continuous mode) or they may be modulated by a square wave of 270 Hz, 1000 Hz, or 2000 Hz. An arrow next to these values on the screen indicates the modulation mode in use. Note that when measuring average power of the lasers the output will drop by exactly 3.01 dB as the source is off precisely half of the time.

(This is also true of the laser output when in the Auto Test mode however the unit receiving this signal automatically compensates for the loss in average power and this is transparent to the user.)

When switching the source wavelength in the CW mode, the transmitting unit automatically communicates its wavelength to the receiving unit which then changes its power meter wavelength setting to correspond to the wavelength it is receiving.

The modulation function is useful for fiber identification and for general purpose optical component testing. The unit that receives one of the modulated frequencies will flash the appropriate frequency annunciator, that is, 270 Hz, 1000 Hz, or 2000 Hz..

Service / Warranty Information

Service Information

Products manufactured by Terahertz Technologies Inc.(TTI) are designed and fabricated to provide reliable performance. However, in the event that service is required, both technical assistance and factory repair services are available using the contact information below.

All products being returned to TTI must be accompanied by a Return Materials Authorization number (RMA number). All products are to be returned to TTI with freight charges pre-paid. Those products sent under warranty will be returned to our customers pre-paid. OUT-OF-WARRANTY repairs, services are billable for both time and materials return shipment is the responsibility of the customer.

We cannot be responsible for returned products that do not reference the TTI RMA number.

Please use this contact information to obtain technical information or an RMA number

Toll Free Phone:	(888) TTI-TEAM (876-8377)
International Phone:	(315) 736-3642
Website RMA Request:	http://teratec.us/rma.asp
Website Technical Assistance:	http://teratec.us/support.asp

Limited Warranty

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