

# SERIES 3000 LIGHT SOURCE

# OPERATION MANUAL



**TRILITHIC**

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## TRILITHIC

TRILITHIC, Inc., one of the fastest growing privately held companies in the U.S. (Inc. 500, #10), is a leading supplier of test equipment to the CATV Industry. Through the years, we have introduced a range of products to make CATV maintenance simpler, faster and more precise. Our contributions include the first practical CATV sweep system (1976), the first CATV return adjustment system (1981), the SEARCHER PLUS for leakage measurement (1989) and the SUPER PLUS for overbuilt leakage and ingress measurement (1994).

Among our most popular products are the TRICORDER series of CATV analyzers (led by the new TRICORDER III, the most versatile member of the popular TRICORDER family).

TRILITHIC is especially well known for its leakage products. More than 15,000 SEARCHER PLUSs are in daily use as well as the SUPER PLUS and SUPER CT measurement devices (which take leakage measurement into the new era of overbuilds and digital services).

In addition to developing instrumentation for the CATV industry, TRILITHIC produces RF and microwave components and equipment for aerospace and wireless communications, as well as computer controlled assemblies for automated test systems, headend automation and communications signal routing.

TRILITHIC products are designed and manufactured at our facility in Indianapolis, Indiana. These products are distributed by sales agents in over 40 countries.

Should you have any questions or need our service, please contact us at the address or telephone numbers below:

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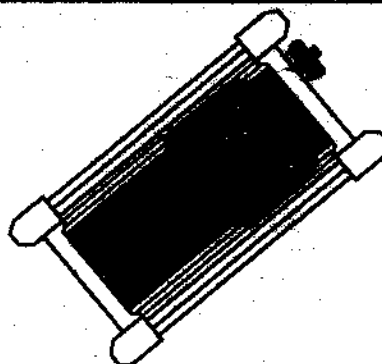
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When performing attenuation tests on fiber links, it is necessary to have a stable source of light on which to base measurements. The **3000 Series** of light sources from Trilithic provide the stability needed to allow accurate testing.

A perfect compliment to the TR-2040 Optical Power Meter, the Series 3000 extends notable quality and extreme durability. The full featured source incorporates impact absorbing bumpers, weather resistant

membrane switches, and a durable powder coat finish. The Series 3000 is available in LED or Laser form and can be of single or dual wavelength design. Additionally, the Unit includes an emergency quick charge mode, CW (continuous wave) and three modulation modes for use with fiber identifiers, and an efficient two-port design (on dual wavelength models only).

- LED or Laser operation
- Minimum - 8 dBm into Singlemode (Laser)
- Available in single or dual wavelength
- Available 850nm, 1300nm, 1550nm and 665nm
- Two-port design on dual wavelength units
- CW, 30 Hz, 270Hz, 2kHz modulation
- Temperature or feedback stabilized operation
- 4-AA, replaceable NiCad, Alkaline, or AC power
- Available in ST Type, FC, SC, D4, SMA, others
- Emergency quick change mode
- Extra rugged packaging



**OPTICAL**

Calibration Wavelength	
LED Emitter	850, 1300, and dual
Laser Emitter	1300, 1550, 665, and dual
Spectral BW (nm)	
LED Emitter	35nm, 170nm
Laser Emitter	5nm
Stability	
LED Emitter	.05dB/8 hrs. @ 25 C.
Laser Emitter	0.1dB/8 hrs. @ 25 C.

**Minimum Power Output**

LED Emitter	- 17 dBm
Laser Emitter	- 8 dBm

**GENERAL**

Operating Temperature	- 5°C to + 50°C
Storage Temperature	- 10°C to + 60°C
Humidity (Non-cond.)	10% to 90%
Battery Life	8 hrs. to 10 hrs. continuous
Trickle Charge Time	12 hrs. to 14 hrs.
Quick Charge Time	60 min. typical
Outer Dimensions	7" x 3.5" x 1.3"
Weight (w/batteries)	< 1 lb.

Included with each Series 3000 is an AC power pack and an operation manual. Each individual unit may be shipped in an optional soft-sided carry case. Power meter/light source combinations may be shipped in a hard-sided, waterproof transit case. Other accessories available include patch

cables, mating (bulkhead) adaptors, meter adaptor caps, and bare fiber adapters.



Hard Case



Soft Case



Patch Cables



Bare Fiber Adapters

## FRONT PANEL TOUR

### Wavelength Indicator:

Shows current emitter selected. In dual wavelength units, both emitters can be enabled simultaneously.

### Modulation Indicator:

Shows current modulation status for use with fiber identifiers. CW mode is the default and is used for loss tests.

### ON/OFF Button:

Turns Unit ON and OFF. (Emitters are OFF until WVL is pressed.)



### Power Status:

Indicates meter power status, battery charge mode and battery condition.

### WVL (Wavelength Select Button):

Turns ON emitter or selects emitter(s) on dual wavelength units.

### CHG (Quick Charge Button):

Initiates quick charging of NiCad batteries. See **POWER SECTION BEFORE** using this feature.

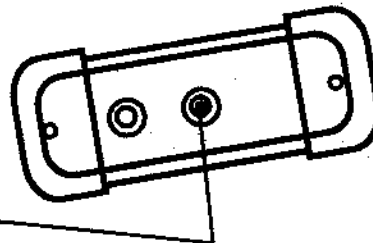
### MOD (Modulation Select Button):

Cycles through modulation modes.

## GETTING STARTED

The Series 3000 is shipped with 4-AA type rechargeable Nickel Cadmium batteries. Although charged partially during lab inspection and calibration, the batteries should be charged fully before field use.

This is accomplished by simply connecting the included AC adapter to the charging socket at the TOP of the unit (refer to the **POWER** section for important details).



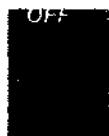
## TURN ON

Depressing the **ON/OFF** button will turn the Unit ON. The **ON** LED will light instantly which indicates that the circuit has been energized. The emitter(s) do not turn ON automatically. You must press the **WVL** button until the desired emitter is turned ON.

The display shown is representing a single wavelength, 1300nm laser, turned on and emitting CW (continuous wave or constant) light.



If you press the **MOD** button, the light will change from CW to one of the three modulations. Modulated light is light pulsed at a given frequency in order to be traced by fiber identifiers.



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We recommend that you allow a 5 minute stabilization time before testing. This allows the internal devices to reach thermal equilibrium.

## LAUNCH CABLE & SOURCE

To properly test for loss in a fiber system, it is necessary to launch not only the correct wavelength of light into the system, but that light must also be conditioned to check the core glass only.

First, when the light sources are powered up, they should be allowed to stabilize for a few minutes to allow accurate reference points to be taken. Next, a launch cable of similar fiber size and performance to the cable under test must be connected to the source. The launch cable will not only connect the source to the system under test but will also provide a fiber core source.

Fiber optic emitters generally fill both the core and the cladding of a fiber. In loss tests, cladding light is not desired since it is not carried well by fiber. Also, in multimode fibers, an equilibrium mode distribution (EMD) must be established. EMD is the illumination of the entire fiber core in the same way it would be lit in a long run of fiber. Both the cladding mode strip and mode scrambling function can be realized through the use of a simple mandrel wrap in the launch cable.

A mandrel wrap is five wraps of fiber around a 1/2" rod under zero tension and is generally wound by hand in the field.



## LOSS MEASUREMENTS

**STEP 1:** Attach launch cable with a 1/2", 5 turn mandrel wrap to source. Turn source ON and allow to stabilize. *If testing two wavelengths, turn on both emitters and use two separate launch cables.*

**STEP 2:** Attach a patch cable to the meter without a mandrel wrap. This will be called the receive cable. Make sure that the free ends of the receive and launch cables have the same connector style or can otherwise be directly mated. Also, make sure to select the proper wavelength on your meter.

**STEP 3:** Connect the free cable ends together with a connector bushing and press **ΔdB** on the meter. The

meter should read 00.00 dB. *For dual wavelength testing, hook to the second launch cable, select the second wavelength on the meter, and zero the second wavelength also.*

**STEP 4:** Disconnect the cable ends hooked together in Step 3. Then take source and meter to opposite ends of the cable to be tested. Do NOT remove the launch and receive cables from the instruments.

**STEP 5:** Hook free ends of the launch and receive cables to the cable under test. The meter will display the loss of the cable under test. *For dual wavelength tests, test all fibers in the link at one wavelength. Next, switch launch cables at the source end, change to the second wavelength at the meter end, and repeat Step 5.*

## BASICS

The Series 3000 can be powered by AC wall pack, Nickel Cadmium batteries or Alkaline batteries.

The unit uses 4 AA size cells (NiCad cells should be 600mAh type or better) which are mounted in the lower half of the power meter's enclosure. Although the included rechargeable cells rarely need changing under normal usage, they are easily replaced. To change the batteries, simply use a small, flat bald screwdriver to gently pull the bumper off. Then pull the exposed tab.

Make sure to note which slot the holder is in. Then remove

the battery holder and install the new cells. Be certain that they are seated well. Next, inspect the battery jumper to ensure that it is selecting the type of battery you just installed.

**WARNING:** If Alkaline cells are used, the jumper **MUST** be in the ALK position.

The jumper (J1) prevents the charging of alkaline cells. Although some protection exists, the charging of alkaline cells will create an explosion or fire hazard.



## MODES

The Series 3000 power supply operates two different ways. If alkaline batteries are installed, the unit will draw its power from the batteries unless the AC power pack is connected. When the wall pack is connected, current will be drawn from the pack instead. Assuming that the battery board jumper is correctly set, no charging of the cells will take place.

If Nickel Cadmium rechargeable cells are installed, the internal power manager will behave differently. Battery only operation is the same as in the alkaline configuration but when the AC wall pack is connected, the power is handled differently.

When first connected in the NiCad Mode, power from the AC wall pack is sent not only to the meter circuitry, but to the batteries as well. This is referred to as *slow charge* or *trickle charging* and is indicated by the SLOW CHG LED on the front panel. Slow charging the batteries will generally take between 12 and 15 hours and provides for a full, deep charge. Slow charging is by far the most popular method for recharging batteries due to its simplicity and depth of charge. It is also recommended by Trilithic for general use.

Sometimes, however, situations arise which require immediate use. In these cases, Series 3000 owners can utilize the FAST CHARGE feature.

## FAST CHARGE

Fast charging will NOT take place unless the NiCad position is selected on the battery board jumper, Nickel Cadmium batteries are installed, the AC wall pack is plugged in, the installed batteries are not completely dead and the CHG button is pressed. Once fast charging is initiated, the batteries will charge until a *peak* charge has been reached or approximately one hour has passed. While charging, the SLOW CHG and FAST CHG LEDs will light and the enclosure may warm by a few degrees.

Special circumstances will impact fast charging. First, as mentioned, very dead batteries will need to be slow charged for a few minutes before the fast charger will turn on. This is to prevent damage to the cells. Secondly, after fast charg-

ing is finished, it cannot be re-initiated unless the AC power is removed and then reconnected. This reduces the likelihood of overcharging. Next, if the unit is very hot or very cold, bring the unit to within the recommended operating temperature before fast charging. Since the fast charger utilizes battery temperature fluctuations to determine peak charge, temperature extremes may defeat the sensing circuitry. Finally, next to the jumper on the battery board, a 1A fuse protects the internal circuitry against short circuits. If the fuse is blown, the unit will not charge.

Fast charging will only charge batteries to about an 80% level before switching to slow charge to top the charge off. Overcharging or excessive fast charging may reduce battery life.

#### SOURCE DOES NOT TURN ON:

- Check battery orientation and make sure it is installed fully (not popped up).
- Batteries extremely drained, slow charge for 5 min. and try again.

#### SOURCE DOES NOT FAST CHARGE

- Blown fuse.
- Battery board jumper not set correctly.
- Batteries extremely drained, slow charge for 5 min. and try again.

- Batteries fully charged (if **FAST CHG** LED lights momentarily; then turns off).
- Batteries installed incorrectly or dislodged from holder.

#### OUTPUT UNSTABLE

- Reference cable connection to source has been moved.
- Extreme temperature change has occurred.

#### POOR RUN TIME

- Old or aging batteries.
- Batteries not of AA 600mAh type.
- Batteries are too hot or cold or exposed to damaging conditions.

The **Series 3000** contains no user serviceable parts. Do NOT remove the top bumper or otherwise remove the source's circuitry from its enclosure. This can alter the Unit's calibration and may even damage the device. Also, such removal will void the warranty.

Do NOT look into the output ports when the source is turned ON. Although the **Series 3000** is designed to emit only eye safe infrared radiation, we recommend a **SAFETY FIRST** approach whenever you are working with fiberoptics. Keep in mind that infrared light is invisible to the naked eye.

The **Series 3000** is a precision instrument. Clean all connectors before connecting the to the source. Any contamination on the fiber endface will degrade or damage the output port optics. Use alcohol preps or swabs which are dust and lint free.

When cleaning the output ports or using bare fiber adapters, be careful not to scratch or otherwise contaminate the port optics. They are highly polished glass and can be damaged.

Trilithic, Inc. warrants that each part of this product will be free from defects in material and workmanship, under normal use, operating conditions and service for a period of two (2) years from date of delivery. Trilithic, Inc.'s obligation under this Warranty shall be limited, at Trilithic, Inc.'s sole option, to replacing the product, or to replacing or repairing any defective part F.O.B. Indianapolis, Indiana; provided that the Buyer shall give Trilithic, Inc. written notice.

Batteries are not included in or covered by this Warranty.

The remedy set forth herein shall be the only remedy available to the Buyer under this Warranty and in no event shall Trilithic, Inc. be liable for incidental or consequential damages for any alleged breach of this Warranty. This Warranty shall not apply to any part of the product which, without fault of Trilithic, Inc., has been subjected to alteration, failure caused by a part not supplied by Trilithic, Inc.,

accident, fire or other casualty, negligence or misuse, or to any cause whatsoever other than as a result of a defect.

Except for the warranty and exclusions set forth above, and the warranties, if any, available to the Buyer from those who supply Trilithic, Inc., there are no warranties, expressed or implied (including, without limitation, any implied warranties or merchantability or fitness), with respect to the condition of the product or its suitability for any use intended for it by the Buyer or by the purchaser from the Buyer.

In the event of failure of this product during the Warranty period or a need for alignment or repair after the Warranty period, contact the Trilithic, Inc. Customer Service department for return authorization and shipping instructions.