

TFS-290 Series Optical Tracer Sources

TFS-290 Optical Tracer Source (+5 dBm)

TFS-291 Optical Tracer Source (+15 dBm)

Operation Manual



think ahead.

 TRILITHIC

Trilithic Company Profile

Trilithic is a privately held manufacturer founded in 1986 as an engineering and assembly company that built and designed customer-directed products for telecommunications, military, and industrial customers. From its modest beginnings as a two-man engineering team, Trilithic grew over the years and broadened its offerings of RF and microwave components by adding broadband solutions to its product line. This was accomplished with the acquisition of components manufacturer Cir-Q-Tel and instruments manufacturer Texscan.

Today, Trilithic is an industry leader providing telecommunications solutions for major broadband, RF, and microwave markets around the world. As an ISO 9000:2001 certified company with over 40 years of collective expertise in engineering and custom assembly, Trilithic is dedicated to providing quality products, services, and communications solutions that exceed customer expectations.

Trilithic is comprised of five major divisions:

- **Broadband Instruments and Systems**
Offers test, analysis, and quality management solutions for the major cable television systems worldwide.
- **Telecom Solutions**
Offers affordable, easy-to-use instruments for testing and measurement of Telecom networks.
- **RF Microwave Components**
Provides components and custom subsystems for companies specializing in cellular, military, and other wireless applications.
- **Emergency Alert Systems**
Leading supplier of government-mandated emergency alert systems used by broadcast TV, cable TV, IPTV, DBS, and radio stations.
- **XFTP**
Offers a specialty line of field technical products for cable operators and technicians, as well as a line of products for installing electronics in the home of the future.

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Chapter 1

General Information

Helpful Website

The following website contains general information which may be of interest to you:

<http://www.trilithic.com>

Trilithic's website contains product specifications and information, tips, release information, marketing information, Frequently Asked Questions (FAQs), bulletins and other technical information. You can also check this website for product updates.

Where to Get Technical Support

Trilithic technical support is available Monday through Friday from 8:00 AM to 5:00 PM EST. Callers in North America can dial 317-895-3600 or 800-344-2412 (toll free). International callers should dial 317-895-3600 or fax questions to 317-895-3613. You can also e-mail technical support at techsupport@trilithic.com.

For quicker support response when calling or sending e-mail, please provide the following information:

- Your name and your company name.
- The technical point of contact (name, phone number, e-mail).
- Product name, model number, and serial number.
- A detailed description of the problem you are having, including any error or information messages.

How this Manual is Organized

This manual is divided into the following chapters:

- Chapter 1, “General Information” provides Trilithic contact information and describes how this operation manual is structured.
- Chapter 2, “TFS-290 Features & Operation” describes the purpose, features, and operation of the TFS-290™ Optical Tracer Source.
- Chapter 3, “TFS-291 Features & Operation” describes the purpose, features, and operation of the TFS-291™ Optical Tracer Source.
- Chapter 4, “Appendix” describes the troubleshooting procedures and lists the technical specifications of the TFS-290™ Series Optical Tracer Sources.

Conventions Used in this Manual

This manual has several standard conventions for presenting information.

- Connections, menus, menu options, and user-entered text and commands appear in **bold**.
- Section names, web and e-mail addresses appear in *italics*.



A **WARNING** alerts you to any condition that could cause personal injury.



A **CAUTION** alerts you to any condition that could cause a mechanical failure or potential loss of data.



A **NOTE** is information that will be of assistance to you related to the current step or procedure.

Precautions



Do not look into the output ports when the source is turned on. Although the unit is designed to emit only eye safe infrared radiation, Trilithic recommends a safety first approach when working with fiber optics. Keep in mind that infrared light is invisible to the naked eye.



When working with any fiber optic test equipment or in an area with active fiber optic links, be aware there can be infrared optic energy present.



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



Cover all the unused ports when not in use. This is not only to protect the eyes but to protect the optical outputs from damage or contamination.



The TFS-290™ Series Optical Tracer Sources are precision instruments. Clean all connectors before engagement 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 to clean the optics.



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

TFS-290 Features & Operation

This chapter:

- Describes the TFS-290™ Optical Tracer Source's purpose and features
- Describes the TFS-290™ Optical Tracer Source's operation

Purpose

The TFS-290™ Optical Tracer Source, when used with TFS-FS1™ Optical Leakage Detector, allow technicians to perform leak detection and long distance optical tracing. The sources provide the specific tone modulated light output required by the TFS-FS1 and some fiber identifiers.

The TFS-290 Series of tracer sources features a high power (+5 dBm) modulated output at 2kHz thereby allowing it to be used as tracer signal generators for use with the TFS-FS1 Optical Leakage Detector and most popular fiber identifiers. The optical tracer source operates at 1550 nm with ST, SC & FC adapters. This source do not operate in CW (continuous wave) mode and may not be suitable for use in loss testing applications with some meters.

Features

- High Power +5 dBm Output
- 1550 nm operation with SC, FC, or ST Style Ports
- 2 kHz modulation
- Temperature Stabilized Output
- Rugged Construction
- Long Battery Life with Quick-Charge Mode

Supplied Equipment

The TFS-290™ Optical Tracer Source includes the following components:

- **TFS-290™** - Portable tracer source used to measure leakage or identify fibers in a fiber optic system.
- **Rechargeable Batteries** - Four (4) "AA" NiMH.
- **AC to DC Power Adapter/Charger** - Power adapter and battery charger for the TFS-290 Optical Tracer Source.
- **Operation Manual** - Full Operation Manual on CD.

Features



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Controls

The TFS-290™ Optical Tracer Source includes the following controls:

1. **Laser Active Indicator** - Shows that the optical source laser is activated.
2. **Power Status** - Indicates the source power status, battery charge mode, and battery condition.
3. **PWR (Power Button)** - Turns the unit on and off. Emitter is off until LAS is pressed.
4. **LAS (Laser Enable Button)** - This button must be depressed to turn the laser on.
5. **CHG (Quick Charge)** - Changes the type of charging between normal and fast for the NiMH (Nickel Metal Hydride) batteries.



Power Supply and Battery Charging

The TFS-290™ Optical Tracer Source is powered by an AC to DC Power Adapter/Charger or NiMH batteries.

The unit uses four AA size NiMH batteries (cells should be 600 mAh type or better) which are mounted in the lower half of the meter enclosure. Although the included rechargeable cells rarely need changing under normal usage, they are easily replaced.

To change the batteries, perform the following steps:

1. Use a small flat blade screwdriver to loosen the two mounting screws which hold the bottom bumper in place and then gently pull the bumper off.
2. Pull the exposed tab to remove the battery holder, taking note of which slot the holder is in.
3. When installing new cells, make sure that they are seated well.



Use only NiMH rechargeable batteries ONLY with the same mAh rating otherwise damage to the product may occur.

AC to DC Power Adapter/Charger

The AC to DC Power Adapter/Charger is used to power the TFS-290™ Series Optical Tracer Sources and to charge the four NiMH batteries required for field use. Plug the power adapter into a standard wall socket and connect the charging plug into the top of the power source. Please read the two charge modes of operation and the specific requirements for each mode in the section that follows.

Slow and Fast Charge Modes

The TFS-290™ Optical Tracer Source operates two different ways.

Slow Charge

When first connected in NiMH mode, power from the AC to DC Power Adapter/Charger is sent not only to the source 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 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 for general use. Sometimes, however, situations arise which require immediate use. In these cases, TFS-291™ Optical Tracer Source owners can utilize the fast charge feature.

Fast Charge

Fast charging will not take place unless the AC to DC Power Adapter/Charger 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. Second, after fast charging is finished, it cannot be re-initiated unless the AC power is removed and connected again. 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. The fast charger utilizes battery temperature fluctuations to determine peak charge and temperature extremes defeat the sensing circuitry. A 1 A 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.

Operation

The TFS-290™ Optical Tracer Source is shipped with four AA type rechargeable NiMH batteries. Although charged partially during lab inspection and calibration, the batteries should be charged fully before field use. This is accomplished by connecting the included AC power adapter to the charging socket at the top of the unit.



When working with any fiber optic test equipment or in an area with active fiber optic links, be aware there can be infrared optic energy present.

Depressing the **PWR** button will turn on the source circuit. Although the **Power** indicator will light instantly (indicating that the circuit has energized), the IR Detector and Internal Laser Source will not turn on until the **LAS** button is depressed.

The display shown below is representing a 1550 nm laser which has been turned on and emitting 2 kHz light. By depressing the **LAS** button, the **Laser Active** indicator will illuminate.

Finally, it is recommended that a 5 minute stabilization time be allowed before testing to let the internal devices reach thermal equilibrium.



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TFS-291 Features & Operation

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Purpose

The TFS-291™ Optical Tracer Source, when used with TFS-FS1™ Optical Leakage Detector, allow technicians to perform leak detection and long distance optical tracing. The sources provide the specific tone modulated light output required by the TFS-FS1 and some fiber identifiers.

The TFS-290 Series of tracer sources features a very high power (+15 dBm) modulated output at 2kHz thereby allowing it to be used as tracer signal generators for use with the TFS-FS1 Optical Leakage Detector and most popular fiber identifiers. The optical tracer source operates at 1550 nm with ST, SC & FC adapters. This source do not operate in CW (continuous wave) mode and may not be suitable for use in loss testing applications with some meters.

Features

- Very High Power +15 dBm Output
- 1550 nm operation with SC, FC, or ST Style Ports
- 2 kHz modulation
- Temperature Stabilized Output
- Rugged Construction
- Long Battery Life with Quick-Charge Mode

Supplied Equipment

The TFS-291™ Optical Tracer Source includes the following components:

- **TFS-291™** - Case Mounted portable tracer source used to measure leakage or identify fibers in a fiber optic system.
- **Control Keys** - Two (2) Control Keys used to activate the instrument.
- **Rechargeable Batteries** - Twelve (12) "C" NiMH.
- **AC to DC Power Adapter/Charger** - Power adapter and battery charger for the TFS-291 Optical Tracer Source.
- **Operation Manual** - Full Operation Manual on CD.



TOP VIEW



LEFT SIDE VIEW

Features

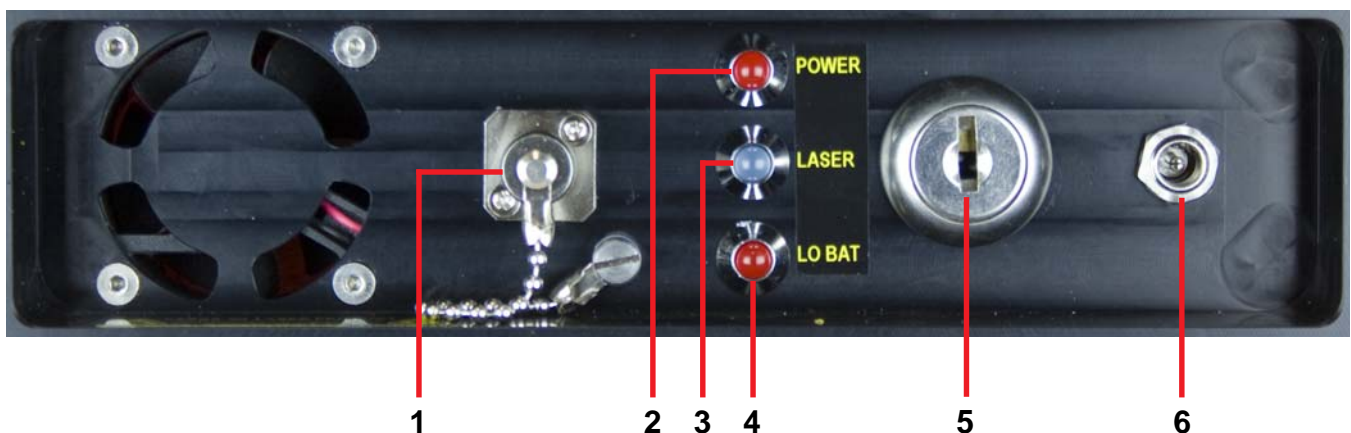


Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Controls

The TFS-291™ Optical Tracer Source includes the following controls located on the left side of the case:

1. **Laser Output** - This port is a 1550 nm, +15 dBm laser output.
2. **Power Indicator** - Shows that the instrument is currently actived.
3. **Laser Active Indicator** - Shows that the optical source laser is activated.
4. **Low Battery Indicator** - Shows that the instrument has low battery charge.
5. **Key Switch** - Use the included control key to turn the unit on and off.
6. **Charge Port** - This port is used to connect the AC to DC Power Adapter/Charger to charge the included NiMH batteries.



Power Supply and Battery Charging

The TFS-291™ Optical Tracer Source is powered by an AC to DC Power Adapter/Charger or NiMH batteries. When the battery charge is low, the **Low Battery Indicator** will illuminate.

The unit uses twelve C size NiMH batteries (cells should be 5000 mAh type or better) which are mounted in the lower right side of the case. Although the included rechargeable cells rarely need changing under normal usage, they are easily replaced.

To change the batteries, perform the following steps:

1. Unscrew the battery retaining cap from each battery holder by turning counter-clockwise.
2. Remove three batteries from each battery holder.
3. When installing new cells, make sure that they are inserted in the proper orientation with the plus (+) side facing out toward the retaining cap.



Use only NiMH rechargeable batteries ONLY with the same mAh rating otherwise damage to the product may occur.

AC to DC Power Adapter/Charger

The AC to DC Power Adapter/Charger is used to power the TFS-291™ Series Optical Tracer Sources and to charge the twelve NiMH batteries required for field use. Plug the power adapter into a standard wall socket and connect the charging plug into the charge port on the left side of the case. Please read the two charge modes of operation and the specific requirements for each mode in the section that follows.

When first connected, power from the AC to DC Power Adapter/Charger is sent not only to the source circuitry, but to the batteries as well. This is referred to as slow charge or trickle charging. Slow charging the batteries will generally take between 12 and 15 hours and provides a full, deep charge.

Operation

The TFS-291™ Optical Tracer Source is shipped with twelve C type rechargeable NiMH batteries. Although charged partially during lab inspection and calibration, the batteries should be charged fully before field use. This is accomplished by connecting the included AC power adapter to the charging socket on the left side of the case.



When working with any fiber optic test equipment or in an area with active fiber optic links, be aware there can be infrared optic energy present.

To turn on the source circuit, insert the provided **Control Key** into the **Key Switch** and turn the key clockwise. The **Power Indicator** will light instantly, indicating that the circuit has energized.

After a short initialization period, the IR Detector and Internal Laser Source will turn on and the **Laser Active** Indicator will illuminate.

Finally, it is recommended that a 5 minute stabilization time be allowed before testing to let the internal devices reach thermal equilibrium.

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TFS-290 Troubleshooting

Before You Begin Troubleshooting

- A low battery may cause the detector to not turn on or operate incorrectly. Make sure you have properly charged NiMH batteries installed before troubleshooting the unit.

Optical Tracer Source Does Not Turn On

- Batteries are installed incorrectly. Check the batteries orientation and make sure they are properly seated.

Optical Tracer Source Does Not Fast Charge

- Fuse blown. Change the fuse.
- Batteries are drained. Slow charge the batteries for five minutes and try again.
- Batteries are fully charged (if FAST CHG LED lights momentarily then turns off).
- Batteries are installed incorrectly or dislocated from holder. Reinstall the batteries correctly.

Poor Optical Tracer Source Run Time

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

Optical Tracer Source Output Unstable

- The reference cable to the source has been moved.
- An extreme temperature change has occurred.

TFS-291 Troubleshooting

Before You Begin Troubleshooting

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Specifications

Optical

Emitter	Laser
Port Style	ST, FC, SC, others available
Fiber Size (MAX)	100/140
Wavelength	1550 nm
Power	TFS-290: +5 dBm TFS-291: +15 dBm
Modulation	2 kHz
Stability	+/- 0.10 dB/8hr typical
Bandwidth	5 nm



General

Operating Temperature	0°C to +50°C
Storage Temperature	-10°C to +60°C
Humidity	10% to 90%, non-condensing
Power	TFS-290: 4 x AA NiMH Batteries, 120 VAC / 60 Hz TFS-291: 12 x C NiMH Batteries, 120 VAC / 60 Hz
Battery Life	TFS-290: 8 - 10 hours typical TFS-291: ?????????? hours typical
Charge Time	Trickle Charge - 16 hours typical (TFS-290, TFS-291) Quick-Charge - 1 hour typical (TFS-290)
Size	TFS-290: 7" x 3.5" x 1.3" TFS-291: 16.14" x 12.60" x 6.69"
Weight	TFS-290: < 1 lb. TFS-291: 14.00 lb.

Warranty Information

Trilithic, Inc. warrants that each part of this product will be free from defects in materials and workmanship, under normal use, operating conditions and service for a period of one (1) year 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 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 subject 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 of merchantability of 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.



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