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VISIBLE FIBER OPTIC FAULT LOCATOR

Features:

- High visibility (up to 6 km with a 1 mW, 635 nm source)
- Higher output up to 30 mW, non-contact style power versions available
- Continuous light or pulse modulation
- Power supply options include alkaline batteries or AC/DC adaptor
- Carrying pouch with belt clip for pocket size version
- 1.25 mm and 2.5 mm ID universal connector receptacles available
- Pen size, pocket size, and bench top versions available
- Low battery indicator for pocket size version
- Low cost, compact, rugged, and lightweight
- 520 nm green fault locator available
- Optional built-in attenuator for controlling power output
- User selectable auto turn off mode

Applications:

- Singlemode and multimode fiber testing
- Fiber identifier applications
- Locating breaks and bends in fibers and connectors
- Identifying fibers and tracing optical signals by using modulated signals
- Optimizing splices

Product Description:

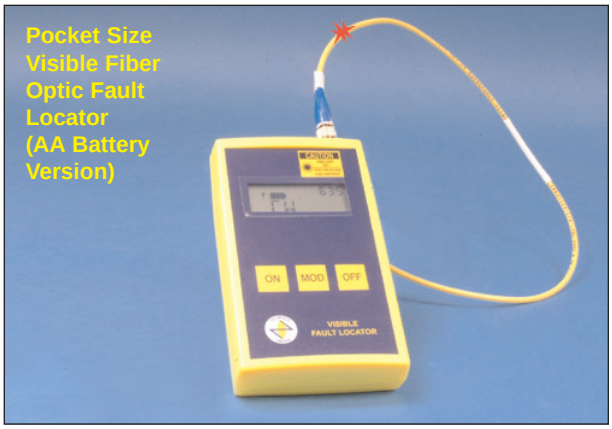
The Visible Fiber Optic Fault Locator launches 520 nm or 635 nm visible laser diode light into the fiber. When light encounters a break or sharp bend, it scatters, and the scattered light can be observed emerging from the cable. Fault locators can locate breaks in short patchcords, which an OTDR cannot detect due to their operating dead zone. A fault locator is also much less expensive than an OTDR. However, they are not recommended for use with dark-colored or armored cables.

Fault locators are available in four sizes: pen size, pocket size, bench top, and a high power non-contact style bench top unit. The pocket size fault locators can be operated in either continuous wave (CW) mode or in pulse modulation mode. Pulse modulation aids in locating faults under high ambient light conditions and improves battery life. 2 Hz modulation is easy to detect by the naked eye, while 270 Hz and 2 kHz pulse modulation modes are used for fiber identification by detectors. The pocket size fault locator comes with a carrying pouch and belt clip. Pen size fault locators are CW and 2 Hz modulation internally, as are high power bench top units, including the non-contact version.

Another use for fault locators is to check connector quality. Often a connector may appear to be perfect, even when viewed with a microscope, but inside the connector ferrule itself, poor gluing or dirt may create a microbend in the fiber. This microbend will produce excess insertion losses or return losses, and may result in premature failure of the connector. If one launches visible light through the fiber, so that it emerges from the connector in question, one can readily see the distortion as a series of rings superimposed on a normal output (See Figure 1). Bending or twisting the fiber may affect the overall intensity pattern, but not the ring pattern itself.

One of the key advantages of OZ Optics' pocket size and bench top model fault locators is that they use singlemode fiber for 633 nm, which has a four micron diameter core instead of a nine micron diameter core. This reduces any potential misalignment errors between the connector on the fault locator and the connector on the fiber. It also ensures that the light launched into the cable being tested matches the fundamental mode as much as possible. The light coming out of the other end will tend to look circular and Gaussian, rather than showing several modes. This makes it easier to identify microbends in connectors.

Pen Size Visible Fiber Optic Fault Locator



Pocket Size Visible Fiber Optic Fault Locator (AA Battery Version)

Non-Contact High Power Visible Fiber Optic Fault Locator

Bench Top High Power Visible Fiber Optic Fault Locator (up to 30 mW)

Caution: Although the pen size fault locator is only rated at 0.5 mW, this is a minimum value for 9/125 fiber.
The output power may be higher. Also, the output power will be higher if using a multimode fiber or no fiber at all. Please use proper safety precautions.

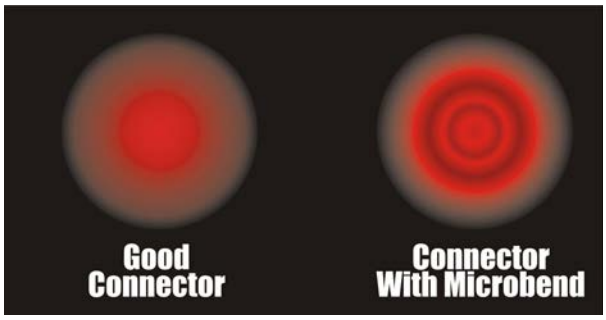


Figure 1: Using a Fault Locator To Find Connector Microbends

Standard Product Specifications:

Parameter		Specification				
		Pen Size	**Pocket Size**		**Bench Top**	**Bench Top non-contact style**
Wavelength		650 nm	635 – 660 nm		520 nm, 635 nm	
Optical power coupled into 9/125µm	Standard	0.5 mW	1 mW	0.3 mW	5 mW	
	Maximum	0.75 mW	1 mW	0.4 mW(1)	15 mW at 520 nm, 30 mW at 635 nm	
Laser Classification (for standard products)		Class 2	Class 2	Class 1	Class 3-B	
Internal modulation mode		CW	CW, 2 Hz, 270 Hz, 2 kHz		CW standard	CW, 2 Hz
Connector receptacles		Super NTT-FC/PC, Angled NTT-FC/PC, SC, AT&T-ST, 2.5 mm ID universal receptacle and 1.25 mm ID universal receptacle				
Temperature	Operating	+5 to 45 °C				
	Storage	-30 to 60 °C	-30 to 60 °C	-20 to 60 °C	-30 to 60 °C	
Humidity		Storage: 95% humidity, non-condensing at -20 to 60 °C				
Power Supply		AAA batteries (two). 22 hours operation.	AA batteries (two). 46 hours operation.(2) 110/220 V AC, 50/60 Hz via an optional 5 V DC adapter.(3)		110/220 V AC, 50/60 Hz via a 5 V DC adapter (included).(3)	
Dimensions (W x L x H)(4)		11 x 110 mm (Ø x L) (0.43 x 4.33 in.)	76 x 127 x 25.4 mm (3.0 x 5.0 x 1.0 in.)		190 x 100 x 60 mm (7.48 x 3.94 x 2.36 in.)	60 x 90 x 190 mm (2.36 x 3.54 x 7.48 in.)
Weight(4)		75 g (0.17 lb.)	225 g (0.50 lb.)		Depends on customer order	< 500 g

Note:
(1) Limit for Class 1 device, as per IEC 60825-1. Higher power levels are available.
(2) Battery lifetime with a 0.3 mW version.
(3) See Standard Parts for power supply adaptors.
(4) For high power versions, the dimensions and weight may change.

Ordering Information For Standard Parts:

Bar Code	Part Number	Description
Pen Size Fault Locators and Accessories		
42203	FODL-02.5U-650-0.5-FL	Pen Size Visible Fiber Optic Fault Locator with 650 nm wavelength, 0.5 mW output, and 2.5 mm ID universal receptacle, and CW/Flashing modes. Uses 2/ "AA" batteries.
High Power Bench Top Fault Locators and Accessories		
13775	FODL-32.5U-635-5	Bench Top Visible Fiber Optic Fault Locator with 635 nm wavelength, 5 mW output, and 2.5 mm ID universal receptacle.
13621	FODL-32.5U-635-10	Bench Top Visible Fiber Optic Fault Locator with 635 nm wavelength, 10 mW output, and 2.5 mm ID universal receptacle.
13776	FODL-33S-635-5	Bench Top Visible Fiber Optic Fault Locator with 635 nm wavelength, 5 mW output, and super FC/PC receptacle.
7918	FODL-33S-635-10	Bench Top Visible Fiber Optic Fault Locator with 635 nm wavelength, 10 mW output, and super FC/PC receptacle.
20127	FODL-32.5U-520-5	Bench Top Visible Fiber Optic Fault Locator with 520 nm wavelength, 5 mW output, and 2.5 mm ID universal receptacle.
Pocket Size Fault Locators and Accessories (2AA Battery Version)		
37113	FODL-43S-635-1	Pocket-Size Visible Fiber Optic Fault Locator with 635 nm wavelength, 0.9 mW output, and FC/PC receptacle. Uses 2 AA batteries or optional AC/DC adaptor.
37540	FODL-43A-635-1	Pocket-Size Visible Fiber Optic Fault Locator with 635 nm wavelength, 0.8 to 1 mW output, and an angle FC/APC receptacle. Uses 2 AA batteries or optional AC/DC adaptor.
27834	AC-5VDC-MULTI-PLUG-Z	Power supply, 10 Watts, 5VDC output, 1.6A, with power cord and multi-plugs for different countries. Output is 2.1mm center positive pin power plug.
24058	BC1	Optional AC adaptor and battery recharger for AA NiMH batteries. Two AA NiMH batteries included. For use with 110/220v AC.

Ordering Examples For Standard Parts:

1. A customer needs a visible fiber optic fault locator with 0.3 mW output power, 2.5 mm ID universal receptacle, modulation function, and AC/DC adaptor for North America.

Bar Code	Part Number	Description
22954	FODL-42.5U-635-0.3	Pocket-size Visible Fiber Optic Fault Locator with 635 nm wavelength, 0.3 mW output, and 2.5 mm ID universal receptacle.
27834	AC-5VDC-MULTI-PLUG-Z	Power supply, 10 Watts, 5VDC output, 1.6A, with power cord and multi-plugs for different countries. Output is 2.1mm center positive pin power plug.

2. A customer needs a visible fiber optic fault locator with 0.5 mW output power, and 2.5 mm ID universal receptacle. Modulation function is not needed.

Bar Code	Part Number	Description
42203	FODL-02.5U-650-0.5-FL	Pen Size Visible Fiber Optic Fault Locator with 650 nm wavelength, 0.5 mW output, and 2.5 mm ID universal receptacle, and CW/Flashing modes. Uses 2/ "AA" batteries.

Ordering Information For Custom Parts:

OZ Optics welcomes the opportunity to provide custom designed products to meet your application needs. As with most manufacturers, customized products do take additional effort so please expect some differences in the pricing compared to our standard parts list. In particular, we will need additional time to prepare a comprehensive quotation, and lead times will be longer than normal. In most cases non-recurring engineering (NRE) charges, lot charges, and a 1 piece minimum order will be necessary. These points will be carefully explained in your quotation, so your decision will be as well-informed as possible. We strongly recommend buying our standard products

Questionnaire For Custom Parts:

1. What is the maximum output power level that you require?
2. Do you prefer pen size, pocket size or a bench top model?
3. What type of receptacle is required on the fault locator?

Visible Fiber Optic Fault Locator:

FODL-*AX*-*W*-*P*

A = Size: 3 = Bench Top Model
4 = Pocket size (AA battery version)
5 = Bench Top, non-contact style

X = Receptacle Code[1]:
3S = Standard, Super and Ultra NTT-FC/PC receptacle
3A = Angled NTT- FC/PC[2]
SC = SC[2]
SCA = Angled SC[2]
8 = AT&T-ST[2]
2.5U = Universal receptacle for 2.5 mm diameter ferrules (FC, ST, SC, etc.)
1.25U = Universal receptacle for 1.25 mm diameter ferrules (LC, MU, etc.)

P = Output Power Level (in mW, coupled into a 9/125 µm fiber):
Up to 0.4 mW for Class I devices
0.8–1 mW for Class II (standard)[3].
Caution: Eye protection must be worn while using fault locators with powers above 1 mW.

W = Wavelength, in nm:
635 = 635 nm
650 = 650 nm
520 = 520 nm (Only available on the bench top model)

Notes:
[1] See Table 6 of the OZ Standard Tables data sheet for other receptacles.
[2] Not available in pen size model.
[3] Contact OZ Optics for non-standard power values.

Ordering Examples for Custom Parts:

A customer needs a bench top non-contact visible fiber optic fault locator with 15 mW output power, and 2.5 mm ID universal receptacle. Modulation function is not needed.

Part Number	Description
FODL-52.5U-635-15	Bench Top non-contact style Visible Fiber Optic Fault Locator with 635 nm wavelength, 15 mW output, and 2.5 mm ID universal receptacle.

Frequently Asked Questions (FAQs):

Q: How do I test a fiber with an LC connector if I have a FODL with an FC/PC receptacle? (This question also applies to other connectors)
A: By using following accessories:

1. A singlemode patchcord with an FC/PC connector on one end and a LC connector on the other end
2. A LC to LC Sleeve thru adaptor
   Contact OZ Optics for patchcords and sleeve thru adaptors for your needs.

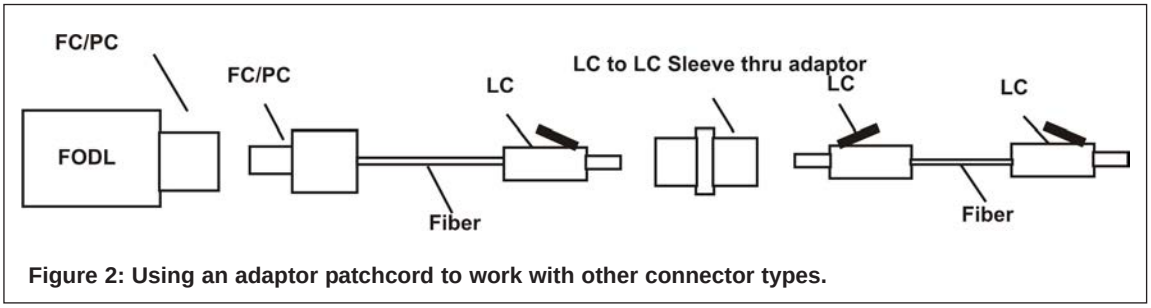


Figure 2: Using an adaptor patchcord to work with other connector types.

Q: How do I test a bare fiber, if I have a FODL with FC/PC receptacle?
A: Warning: Using a bare fiber adaptor directly into a FODL-02.5U, FODL-3X or FODL-4X style fault locator will damage the output of the device. The best solution is to use the FODL-5X non-contact style benchtop fault locator with a bare fiber adapter (see OZ Optics' data sheet on Bare Fiber Adapters http://www.ozoptics.com/ALLNEW_PDF/DTS0003.pdf), to give a quick reliable connection. Otherwise the best approach is to use a intermediate patchcord, with the appropriate connector on one end, and a bare fiber on the other end. The end with the connector is attached to the fault locator, and the bare fiber end is connected to the bare fiber on the device to be tested. Both fibers are first stripped, cleaned and cleaved and then spliced together. This can be done with a fusion splicer, or alternatively, a simple mechanical splice (OZ Bar Code #1933) can be used. Each fiber end is first dabbed into index matching gel (GEL-01, OZ Bar Code 2861) to act as a lubricant. One end is inserted about half way into the splice, while the other end is pushed in until it butts against the first fiber. Losses are typically less than 1 dB, and the parts can be reused.

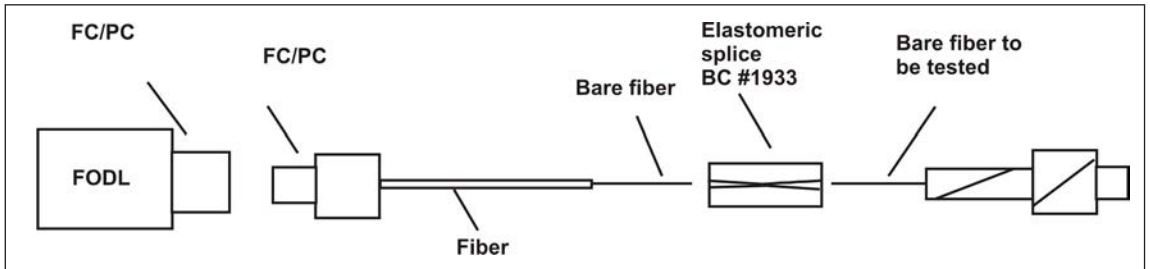


Figure 3: Using an adaptor patchcord to test bare (unterminated) fibers.

Q: What is the maximum output power of the pen size fault locator?
A: It depends on the size of the fiber. Typically 0.5 mW for 9/125 µm single mode fiber. Up to 2 mW for 50/125 MM fiber is possible.

Q: What is the maximum output power of the pocket size fault locator?
A: Standard output for the AA battery version is 0.3 mW or 1 mW. The standard bench top unit can output up to a maximum of 10 mW. Other power levels are possible.

Q: Why modulate the output?
A: Under high ambient lighting conditions the output of a fault locator is easier for the eye to detect if it is flashing at a 2 Hz rate rather than a steady output.
Similarly, detector circuits can easily differentiate between 270 Hz or 2 KHz signals and ambient background light levels.

Q: What is the maximum length of fiber that can be tested with an FODL?
A: This depends on the type of fiber being tested. Typically, fibers up to 6 km can be tested with a 1mW fault locator.

Q: Can OZ Optics manufacture fault locators with other wavelengths?
A: Yes, we could use 635 to 685 nm laser diodes, or 520 nm LD.

Application Notes:

The OZ Optics Visible Fiber Optic Fault Locator (FODL) is based on a bright, 635 nm laser diode. It is a hand-held, low-cost, pen- or pocket-sized tool that is used to locate breaks in singlemode and multimode fiber, from up to 6 km away. It can be used to optimize splices or connections visually and identify fiber, or it can assist in tracing optical signals with the modulated mode. The fault locator is the perfect companion to an OTDR to locate a fault within a dead zone (typically <10 m) of the OTDR.

Optimizing splices and connectors visually:
Optical splices, especially the mechanical type of splice, are often visible when light from a FODL is transmitted through the fiber. An improperly made splice loses light at the joint between the two fibers. When there is a clear or translucent area near the splice, use the FODL to optimize the splice. The light from the FODL is visible; therefore, the splice loss can be seen while the fiber is pushed, pulled, or rotated to reduce the loss. When the escaping visible light is minimized, the loss is minimized.

Identifying fiber and tracing optical signals:
The FODL is used to find fiber that is broken or to trace a path of a fiber from one end to another, through many connections. Visible signs of damage, such as a broken reel, can easily be seen.
The modulated signal of the FODL can be used to detect a breakpoint or the local loss of the fiber cable with an optical fiber identifier. It allows the isolation of specific fibers in a bundle prior to splicing or rerouting.

Testing fiber with the right cable type:
The most common use of a visible fault locator is to find a fiber break in a patch box or cable, within an exchange. The break is seen as a bright red light that shines through the side of the cable; therefore, the light must get through the cable sheathing. Many 3 mm cables readily allow the light through; however some colors, particularly purple, blue, and black, are opaque to red light. This effect is also apparent with fiber that has stainless steel tubing or armored cable.

Another useful function of the FODL is the ability to see if light can get to a particular point on a cable. To do this, a sharp bend is put into the cable to allow visible light to leak from the side of the cable. Visible fault locators can also be used to test patchcords that may have one faulty connector. The faulty connector glows brightly when light is injected into it.

The human eye responds much better to 635 nm light than to 670 nm light. 635 nm devices appear eight times brighter (9 dB) than 670 nm devices, at the same power level.

Easy to use:
To trace fiber with the FODL, connect the fiber to be traced to the output connector of the unit. The red light output is visible at the other end of the fiber. This application is used to easily find a particular fiber within a multi-fiber cable bundle during installation.

To test for continuity, attach the fiber to be tested to the FODL. If the light is visible at the far end, the fiber is not damaged.

Choosing CW or modulation mode:
Unlike many other visible fault locators, the OZ Optics pocket size visible fault locator features a choice of continuous wave or modulated output. To change the mode, simply press the mode key on the front panel. The default state is CW mode when the device is powered on.

Maintenance:
To ensure the best performance of the FODL, some simple maintenance is required.

Cleaning the connector:
A clean output connector ensures that good connections are made between the FODL and the fiber under test. Failure to clean connectors can cause permanent damage to both the fiber end and the connector of the FODL. When the output light appears circular, with little or no scattering, when projected against a piece of white paper, the connector is clean. If the light is not approximately circular, clean the connector with compressed air or a fresh lint-free tissue and alcohol.

Changing the batteries:

The AA battery version of the pocket-size fault locator can be powered by an optional AC adaptor, two AA alkaline batteries, or two AA rechargeable NiMH batteries. A low battery condition is indicated on the LCD. Continued operation with low batteries can cause the laser output to become unstable, and eventually the unit will shut off.

Auto Turn Off Mode:
The pocket size FODL is equipped with an auto turnoff feature, which will turn the unit off after a preset time. This feature can be disabled by the user.