WaveSeries
Operations Guide
WaveSource Light Sources

Optical Wavelength Laboratories

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FIGURES

1.0 GENERAL

Thank you for your purchase of an Optical Wavelength Labs (OWL) WaveSource fiber optic light source.

The various models of the WaveSource contain stabilized multimode and singlemode sources designed for accurate optical power and loss measurements in fiber optic links. Each WaveSource comes with a protective rubber boot, lanyard, CD-ROM based operations manual, and a 9-volt battery.

Most WaveSource light source models are available with ST, SC, or FC connectors. They can also contain sources with 850 and/or 1300 nm for multimode, 1310 and/or 1550 nm for singlemode, and/or visual fault locators. Please see the section at the end of this guide for a complete list of WaveSource configurations.

WaveSource light sources offer two output modes: continuous wave (CW) and modulated. CW mode is used for stabilized fiber optic power and loss tests.

Modulated mode has two functions. First, modulated signals can be used for fiber identification with a clamp-on adapter.

Also, when used with Fiber OWL 4 or WaveTester optical power meters, the modulated signal is used to tell the meter which wavelength is being emitted. Each wavelength has a distinct modulation frequency. When the meter receives a modulated signal, it automatically switches to the corresponding wavelength. This automated test method saves time, especially when testing high fiber count installations, and cuts down on human error.

Typical uses include telecommunications networks, data networks, cable television, and industrial equipment control.

2.0 FUNCTIONAL DESCRIPTIONS

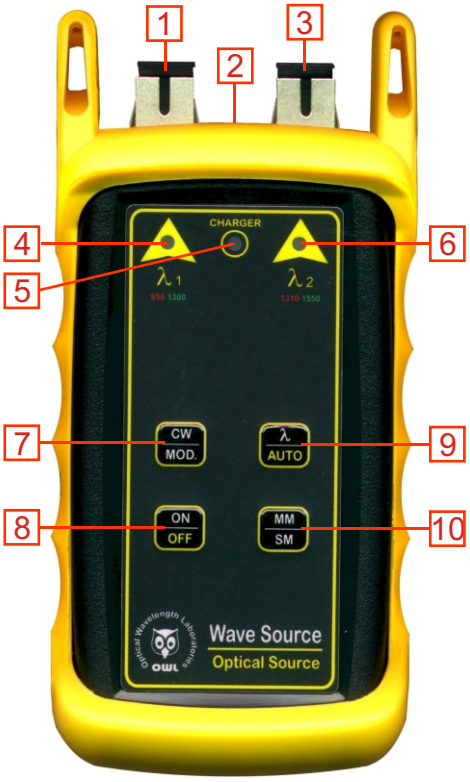

Figure 1 - WaveSource
Fiber Optic Light Source

2.0.1 CONNECTIONS

1. Optical connector (λ1) - This port will typically be either a ST or SC connector, and can house a single- or dual-wavelength source. Other options are available. Please see the section at the end of this guide for a complete list of WaveSource configurations.

2. Battery charging port - If rechargeable 9-volt batteries are used in the WaveSource, the battery charging port is used to re-charge them when used with an approved wall transformer. **NOTE: DO NOT USE BATTERY CHARGING PORT WITH NON-RECHARGEABLE BATTERIES. THERE IS THE POTENTIAL FOR EXPLOSION AND DAMAGE MAY OCCUR TO THE UNIT AND/OR THE USER.**

3. Optical connector (λ2) - This port will typically be either a ST, SC, or FC connector, and can house a single- or dual-wavelength source. Other options are available. Please see the section at the end of this guide for a complete list of WaveSource configurations.

2.0.2 INDICATOR LEDS

4. Wavelength selection LED (λ1) - This LED will either be RED or GREEN depending upon which wavelength is selected.

5. Battery charger LED - This LED will light up when the battery charging port is in use.

6. Wavelength selection LED (λ2) - This LED will either be RED or GREEN depending upon which wavelength is selected.

2.0.3 BUTTONS

7. CW / MOD. button - Pressing this button will toggle the source between CW (continuous wave) and MOD. (modulated) mode.

8. ON / OFF button - Pressing this button while the source is off will power it on. Holding this button while the source is on will power it off.

9. λ / AUTO button - Pressing this button will toggle the unit between wavelengths in the selected port when there are two wavelengths in the same port. Holding this button will place the source into AUTO mode, where the source automatically switches wavelengths for automatic dual wavelength testing.

10. MM / SM button - Pressing this button will toggle the source between ports, usually MM (multimode) and SM (singlemode). Typically, λ1 will be multimode and λ2 will be single-mode; however, other options may be available. Please see the section at the end of this guide for a complete list of WaveSource configurations.

3.0 APPLICATIONS

3.1 PRECAUTIONS

3.1.1 Safety - Exercise caution when working with optical equipment. Most transmission equipment and light sources use light that is invisible to the human eye. High energy light is potentially dangerous, and can cause serious, irreparable damage to the eye. Thus, it is recommended to **NEVER** look into the connector port of a light source or the end of a fiber.

3.1.2 Operational - In order to ensure accurate and reliable readings, it is vitally important to clean ferrules containing optical fibers and optical connector ports. If dirt, dust, and oil is allowed to build up inside connector ports, this may scratch the emitting surface of the light source, producing erroneous results. Replace dust caps after each use.

3.2 REQUIRED ACCESSORIES

3.2.1 Cleaning Supplies - It is recommended to clean fiber ferrules before each insertion with 99% or better isopropyl alcohol and a lint free cloth. A can of compressed air should be available to dry off the connector after wiping, and to blow out dust from bulkheads.

3.2.2 Patch Cords - Patch cords may be needed to connect the WaveSource to the system under test. The connector styles on the patch cord must match the type on the WaveSource and the type of the system under test.

3.2.3 Optical Fiber Adapters - Optical fiber adapters are used to connect two connectorized fibers together, and may be necessary to adapt your patch cords to the system under test.

3.3 TYPICAL APPLICATIONS

WaveSource light sources can be used as diagnostic and measurement tools of optical transmission systems and fiber optic links. These applications can be found in several industries, including premise, LAN, CATV, and Telco.

WaveSource fiber optic light sources are designed to emit a temperature-stabilized source of light to be used for optical loss measurement. The WaveSource serves as an optical reference, which is otherwise known as the “zero” point when a power meter is “zeroed”. Optical loss measurements are useful for measuring the attenuation, or loss, of a fiber link. The loss value can then be compared to a pre-calculated link budget, which is used to determine if the fiber link will operate within the parameters of the transmission equipment.

The formula for calculating loss in a fiber link is: $\mathbf{L = P_a - P_r}$

where **L** is the amount of optical loss in dB, $\mathbf{P_a}$ is the absolute power in dbm, and $\mathbf{P_r}$ is the reference power in dBm.

Optical loss measurements can also be used for fiber optic link certification. Link certification is a process where optical loss measurements are compared to a link budget calculated using fiber optic cabling standards.

4.0 MAINTENANCE / CALIBRATION

4.0.1 Repair of this unit by unauthorized personnel is prohibited, and will void any warranty associated with the unit.

4.0.2 The battery compartment is covered by a sliding plate on the back of the unit. Remove the rubber boot to expose the back of the unit. One 9v battery is required for operation.

4.0.3 For accurate readings, the optical connectors on the WaveSource and the connectors on the patch cords should be cleaned prior to attaching them to each other. Minimize dust and dirt buildup by replacing the dust caps after each use.

4.0.4 It is recommended to have Optical Wavelength Laboratories calibrate the WaveSource once per year.

5.0 WARRANTY

5.0.1 Optical Wavelength Labs products have a **two-year** factory warranty, which covers manufacturer defect and workmanship only, valid from the date of shipment to the original customer.

5.0.2 Products found to be defective within the warranty will be either repaired or replaced, at the option of Optical Wavelength Labs.

5.0.3 This warranty does not apply to units that have been repaired or altered by anyone other than Optical Wavelength Labs, or have been subjected to misuse, negligence, or accident.

5.0.4 In no way will Optical Wavelength Labs liabilities exceed the original purchase price of the unit.

5.0.5 To return equipment under warranty, please contact Optical Wavelength Labs for a RMA number. To ensure quick turnaround, please include a short description of the problem and a phone number where you can be reached during normal business hours.

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6.0 SPECIFICATIONS

Optical Specifications	Multimode	Singlemode	VFL
Source Type	LED	Laser	Laser
Calibrated Wavelengths	850, 1300nm	1310, 1550nm	650nm
Output Power (CW)	-20 dBm (into MM fiber)	-10 dBm (into SM fiber)	-2 dBm
Accuracy	±0.10 dB @ 25°C	±0.10 dB @ 25°C	
Light Source Drift (1 hour)	±0.05 dB (850nm)	±0.05 dB (1310nm)	
	±0.05 dB (1300nm)	±0.04 dB (1550nm)	
Spectral Width (FWHM)	50nm (850nm)	2nm (1310nm)	
	180nm (1300nm)	3nm (1550nm)	
Modulation Frequencies	300 Hz = 850nm	1 kHz = 1310nm	
	600 Hz = 1300nm	2 kHz = 1550nm	

General Specifications	
Battery Life	35 hours (9-volt)
Optical Connector	varies with model
Operating Temperature	-20°C to +70°C
Storage Temperature	-40°C to +85°C
Dimensions	4.94 x 2.75 x 1.28 in
Weight (with battery)	10 ounces

7.0 CONFIGURATIONS

	Multimode (λ1)		Single-mode (λ2)	
Part Number	Wavelengths	Connectors	Wavelengths	Connectors
WS-MDSD	850, 1300	ST, SC	1310, 1550	ST, SC
WS-MD	850, 1300	ST, SC	N/A	N/A
WS-SD	N/A	N/A	1310, 1550	ST, SC
WS-VSD	***650nm VFL****	ST, SC	1310, 1550	ST, SC
WS-MDV	850,1300	ST, SC	***650nm VFL****	ST, SC

Part Number Legend

WS-(MλV)(SλV)

MλV
(corresponds to port λ1 on the front of the unit)
850/1300nm = MD
VFL = V

SλV
(corresponds to λ2 on the front of the unit)
1310/1550nm = SD
VFL = V

* VFL stands for Visual Fault Locator. VFLs will work in both multimode or single-mode fibers.