

# Optical Wavelength Laboratories

## OPERATIONS GUIDE

### ZOOM 2 OPTICAL POWER METER

Model Numbers:

ZO2

ZO2V



Revision 2.1  
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# INTRODUCTION

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# INTRODUCTION

## BEFORE YOU BEGIN

All personnel testing optical fibers should be adequately trained in the field of fiber optics before using any fiber optic test equipment.

If the user is not completely familiar with testing fiber optics, they should seek competent training. Such training can be acquired from a variety of sources, such as local hands-on training classes.

Valuable information about fiber optic testing can also be gathered from reading printed literature carefully or by thoroughly reading supplied operations manuals.

Fiber optic testers vary from other types of test equipment due to issues such as:

- 1) standards-based testing
- 2) proper fiber optic test procedures (FOTPs)
- 3) "zeroing" or referencing of power levels
- 4) determining the correct link budget to pass or fail by

Complete understanding of each of these issues is critical for performing proper fiber optic tests.

## ABOUT THIS MANUAL

Throughout this manual you will find various symbols that assist with understanding the procedures outlined in this manual. Below is a list of these symbols and a short description of their purpose:



Shows a helpful tip that will make a procedure go more smoothly



Tells the user some useful information about the successful completion of a procedure



Warns the operator of a potentially dangerous condition

# INTRODUCTION

## APPLICATIONS

Below is a list of test and measurement applications that can be performed using the ZOOM 2 optical power meter. The procedure for each one of these applications is covered in detail in this manual.

**Active Equipment Optical Power Measurements.** Active equipment should be measured periodically for correct power levels. The transmitters in this equipment have a known power value. The ZOOM 2 can be directly attached to this equipment via a patch cord to check whether the transmitter is within the manufacturer's specified power range.

**Fiber Continuity Testing.** Continuity can be measured with the ZOOM 2 by placing a calibrated light source on one end of the fiber and the ZOOM 2 on the other end. This is also a simple way to measure the attenuation of the fiber.

**Patch Cord Testing.** Fiber links that are producing incorrect results may have bad patch cords. The ZOOM 2 can be used to test the attenuation of a patch cord to see if it is usable, or should be replaced.

**Attenuation (Optical Loss) Measurements.** After a fiber cable has been installed and terminated, it must be tested to determine if the fiber is installed according to standards and specifications. A comparison of the actual power measurement and the reference value determines if the installation will pass or fail.

**Visual Fault Location (optional with model #: ZO-2V).** Visual fault locators (VFLs) are an important and helpful tool for troubleshooting optical fiber links. The two main functions of a VFL are fault location of potential problems in a fiber directly behind a patch panel, and visual fiber identification (helpful for verifying polarity of a system).

## DESCRIPTION

This manual describes the operation of the ZOOM 2 optical power meter. ZOOM stands for Zeroed Output Optical Meter.

The ZOOM 2 is a very economical option for measuring the optical power of both multimode and singlemode fibers. The ZOOM 2 is NIST traceable, and is calibrated 850, 1300, 1310, and 1550nm, as well as 1490nm, one of the key wavelengths used in FTTx PON networks. Reference values used for optical loss readings are stored for each of these wavelengths.

Its user-friendly interface includes two push-buttons: one for power and wavelength selection, and one for setting references and toggling between dBm (optical power) and dB (optical loss).

The ZOOM 2 uses a universal detector port, and includes an adapter cap for 2.5mm ferrule connectors, such as ST, SC, and FC, as well as an adapter cap for 1.25mm ferrule connectors such as LC.

The ZOOM 2 is ideal for fiber optic professionals who need to quickly measure optical power and loss in their fiber optic links and do not require data point storage.

Optionally, the ZOOM 2 can include a precision-coupled visual fault locator optimized for fiber optics. An optical ball lens placed near the laser output focuses the light for optimum input into fiber optic cables, and special current-limiting electronics prevents laser burnout (a common problem with pen-style laser pointers), increasing the life of the VFL.

# INTRODUCTION

## PRECAUTIONS

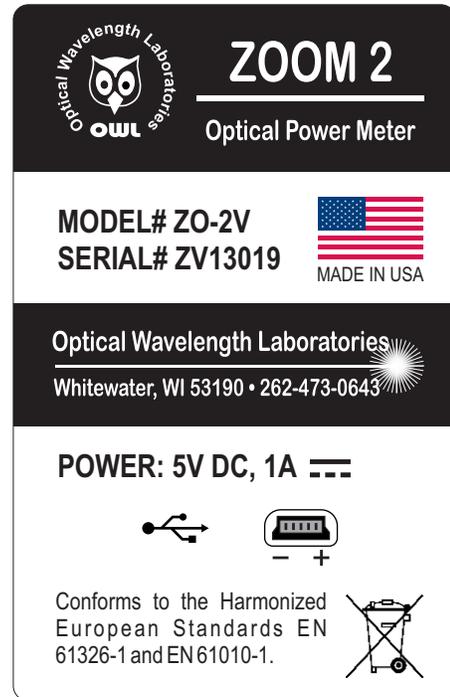
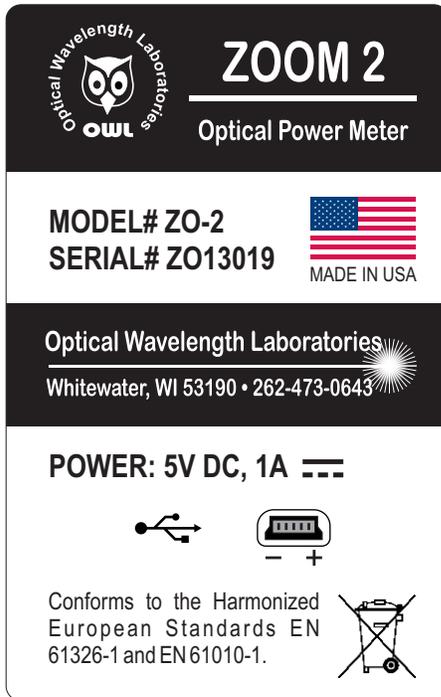
**Safety** - Exercise caution when working with any optical equipment. High-intensity fiber optic laser sources output potentially dangerous high energy invisible light, and could cause serious, irreparable damage to the eye. Thus, it is recommended to **NEVER** look into the connector port of a light source or the end of a fiber.

**Operational** - It is important to keep connector ferrules and optical connector ports clean. If dirt, dust, and oil are allowed to build up inside connector ports, irreparable damage may occur to the optics inside the port. For best results, replace dust caps after each use.

**Connector** - if you have the optional Visual Fault Locator installed, do NOT insert APC (Angled Physical Contact) connectors into the VFL port on your ZOOM 2 as this may damage the angled ferrule on the APC connector.

## PRODUCT LABEL

On the back of each ZOOM 2 series optical power meter is a label similar to the one shown below containing model number, serial number, power requirements, and special cautionary information. If the unit is enclosed in its protective boot, the boot must be removed to view this label.





# TEST PROCEDURES

## ACTIVE EQUIPMENT POWER MEASUREMENT

### Required Accessories

(1 or 2) one-meter patch cable(s) – (ensure proper connector type and fiber type)

### Direct Transmitter Output Power Measurement

To measure the output power from a transmitter, use the following steps:

- 1 Connect the ZOOM 2 to the transmitter port on the active equipment under test, as shown at right.
- 2 Press  to power on the ZOOM 2 optical power meter, if necessary.
- 3 Determine the output wavelength of the active equipment, then press  until the wavelength on the ZOOM 2 matches.
- 4 Power on the transmitter port according to manufacturer instructions, if necessary.
- 5 Monitor the reading on the screen for a few seconds. This reading may fluctuate if the output signal is made up of digital zeroes (0) and ones (1). In this case, estimate the average power level. To calculate maximum output power, add 3 dB to the average power level.

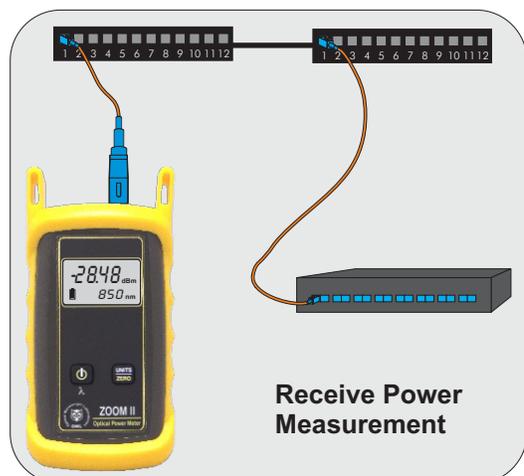
 Some transmitters have a diagnostic mode where the output is continuously at its maximum power. This eliminates the need to compensate 3dB for digital data transmission. Consult the active equipment manufacturer's operations guide for more information.



### Receive Power Measurement

The ZOOM 2 may also be used to measure optical power levels from a transmitter through an installed link to ensure that the Receive power at the far end is within manufacturer specifications.

Follow the same steps as above, except the ZOOM 2 must be connected to the active equipment under test through the installed link as shown at right.



# TEST PROCEDURES

## FIBER CONTINUITY

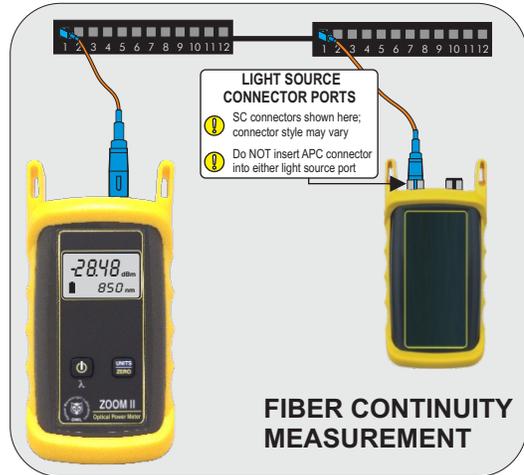
### Required Accessories

(2) one-meter patch cables – (ensure proper connector type and fiber type)

### Checking for Fiber Continuity

The ZOOM 2 can be used to verify continuity of a fiber link, or can be used to trace an optical fiber if the fibers are not properly labeled. Use the following procedure to test either multimode and singlemode cables.

- 1 Connect a fiber optic light source to the network port under test as shown at right. Power on the light source according to manufacturer instructions.
- 2 Press  to power on the ZOOM 2 optical power meter, if necessary.
- 3 Press  until the wavelength on the ZOOM 2 matches the output wavelength of the light source.
- 4 Take the ZOOM 2 optical power meter to the opposite end of the link under test, and connect into the first port. If the ZOOM 2 does not detect any optical power, the display will read "LO". Continue connecting to subsequent optical ports until the ZOOM 2 display shows an optical power reading.



If none of the ports display an optical power reading, then it is likely that there is a major connectivity problem with the link, and further troubleshooting is necessary to determine the nature of the problem.

# TEST PROCEDURES

## PATCH CABLE TESTING

### Required Accessories

- (3) one-meter patch cables – (ensure proper connector type and fiber type)
- (2) fiber optic adapters/couplers – (ensure proper connector type)

### Patch Cable Insertion Loss

Patch cables should be tested periodically to ensure that they are okay to use for testing. Use the following procedure to test both multimode and singlemode patch cables.

 **If testing at more than one wavelength, this procedure must be performed for each wavelength separately.**

**1** Connect the ZOOM 2 to a fiber optic light source using the 3-jumper reference method as shown at right. Power on the light source according to manufacturer instructions.

**2** Press  to power on the ZOOM 2 optical power meter, if necessary.

**3** Press  until the wavelength on the ZOOM 2 matches the output wavelength of the light source.

**4** Press and hold  for approximately 2 seconds to set the reference. The ZOOM 2 will change to show loss in 'dB', and the loss value should be very close to 0.00 dB.

 **Setting a reference is commonly referred to as “zeroing”.**

**5** Remove the center cable as shown at right.

**6** Insert a patch cable under test between the two fiber optic adapters/couplers, then record the loss value in 'dB'.

Repeat steps **5** and **6** for each patch cable being tested.



**3-jumper Reference Method Setup**



**Insertion Loss Test**

# TEST PROCEDURES

## Checking ZOOM 2 Series Optical Power Meters For Proper Operation USING OWL DUAL OWL SERIES MULTIMODE SOURCES

### LIGHT SOURCE MODEL NUMBERS:

DO2xx  
DO2-85xx  
DO2-13xx

### Checking ZOOM 2 Series Optical Power Meters for Proper Operation

#### USING A DUAL OWL MULTIMODE LIGHT SOURCE

**NOTE:** it is recommended to thoroughly clean and inspect all patch cord connectors before making any connection.

#### STEP 1 - Connect ZOOM 2 and Dual OWL

Connect the ZOOM 2 and Dual OWL together with an orange multimode patch cable as shown below.



#### STEP 2 - Power ON the ZOOM 2

Press  to power on the ZOOM 2.

After a few seconds, the ZOOM 2 display should read 'LO', and will appear similar to the diagram shown at right.



**NOTE:** the wavelength and measurement units may be different from the display at right.

#### STEP 3 - Set the ZOOM 2 to 'dBm'

Press  on the ZOOM 2 until the measurement units read 'dBm' as shown at right. You may need to press the button several times.



#### STEP 4 - Set ZOOM 2 to 850nm

Press  on the ZOOM 2 until the wavelength display shows '850nm' as shown at right. You may need to press the button several times.



#### STEP 5 - Power ON the Dual OWL

Press  to power on the Dual OWL.

The 850nm indicator LED should now be lit as shown at right.



#### STEP 6 - Check optical power

The power reading that appears on the ZOOM 2 display will depend upon cable type. Consult the table below for a list of acceptable power readings.



Core Size	Acceptable Power Level	Replace at
62.5/125 $\mu$ M	-19.0 to -21.0 dBm	-21.00 dBm
50/125 $\mu$ M	-22.0 to -24.0 dBm	-24.00 dBm

**NOTE:** the following steps are only required if the optical power reading on the ZOOM 2 is too low.

#### STEP 7 - Replace the patch cable

The easiest way to troubleshoot low power levels is to try another patch cable. Over time, patch cables can wear out or become damaged the more they are used for optical loss testing. Replacing the patch cable usually fixes the problem.

#### STEP 8 - Clean patch cables and optical ports

If the problem still exists after patch cable replacement, there may be some debris, such as dust, dirt, or finger oil, that has collected on the connector endface or in the equipment optical ports.

Thoroughly clean and inspect the optical ports of the ZOOM 2 and the Dual OWL, as well as the fiber connector endfaces, according to the brochures that have been included with this kit. Several cleaning cycles may be required.

If the power level is still too low, even after a thorough cleaning and inspection and patch cable replacement, contact OWL technical support at 262-473-0643 for more information.

# TEST PROCEDURES

## Checking ZOOM 2 Series Optical Power Meters For Proper Operation USING OWL LASER OWL SERIES SINGLEMODE SOURCES

### LIGHT SOURCE MODEL NUMBERS:

LO2xx  
LO2-13xx  
LO2-15xx

### Checking ZOOM 2 Series Optical Power Meters for Proper Operation

#### USING A LASER OWL SINGLEMODE LASER SOURCE

**NOTE:** it is recommended to thoroughly clean and inspect all patch cord connectors before making any connection.

#### STEP 1 - Connect ZOOM 2 and Laser OWL

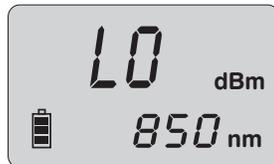
Connect the ZOOM 2 and Laser OWL together with a yellow singlemode patch cable as shown below.



#### STEP 2 - Power ON the ZOOM 2

Press to power on the ZOOM 2.

After a few seconds, the ZOOM 2 display should read 'LO', and will appear similar to the diagram shown at right.



**NOTE:** the wavelength and measurement units may be different from the display at right.

#### STEP 3 - Set the ZOOM 2 to 'dBm'

Press on the ZOOM 2 until the measurement units read 'dBm' as shown at right. You may need to press the button several times.



#### STEP 4 - Set ZOOM 2 to 1310nm

Press on the ZOOM 2 until the wavelength display shows '1310nm' as shown at right. You may need to press the button several times.



#### STEP 5 - Power ON the Laser OWL

Press to power on the Laser OWL.

The 1310nm indicator LED should now be lit as shown at right.



#### STEP 6 - Check optical power

The power reading displayed on the ZOOM 2 will probably not be exactly -10.00 dBm as shown at right, but should be fairly close.



Repeat this procedure for each additional patch cable that needs testing.

**NOTE:** the following steps are only required if the optical power reading on the ZOOM 2 is -11.00 dBm or below.

#### STEP 7 - Replace the patch cable

The easiest way to troubleshoot low power levels is to try another patch cable. Over time, patch cables can wear out or become damaged the more they are used for optical loss testing. Replacing the patch cable usually fixes the problem.

#### STEP 8 - Clean patch cables and optical ports

If the problem still exists after patch cable replacement, there may be some debris, such as dust, dirt, or finger oil, that has collected on the connector endface or in the equipment optical ports.

Thoroughly clean and inspect the optical ports of the ZOOM 2 and the Laser OWL, as well as the fiber connector endfaces, according to the brochures that have been included with this kit. Several cleaning cycles may be required.

If the power level is still below -11.00 dBm, even after a thorough cleaning and inspection and patch cable replacement, contact OWL technical support at 262-473-0643 for more information.

# QUICK REFERENCE GUIDES

## Optical Power Meter: **ZOOM 2** Fiber Optic Light Source: **Dual OWL Series**

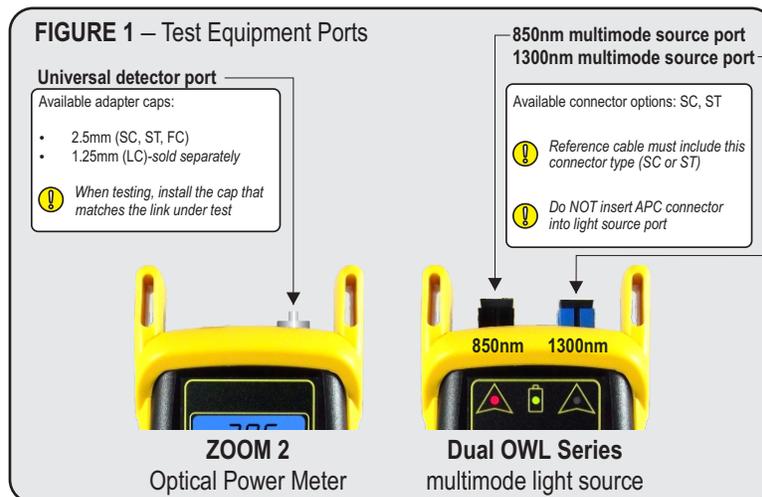
Thank you for your purchase of this OWL fiber optic test kit. Included in this kit is a **ZOOM 2** optical power meter and a **Dual OWL Series** multimode fiber optic light source. This quick reference guide provides instructions for performing a fiber optic insertion loss test.

There are four main parts to performing an insertion loss test:

- PART 1** gather accessories;
- PART 2** set a reference for the wavelength(s) used during fiber link measurement;
- PART 3** check the additional power meter test cable; and
- PART 4** take measurements.

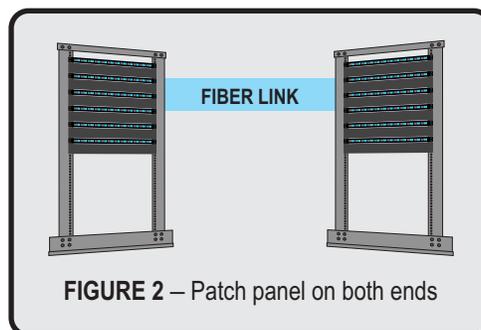
### EQUIPMENT PORTS

Figure 1 shows the ports used during this procedure. These ports may vary depending upon the model of equipment.



### BEFORE YOU BEGIN

Note: this procedure assumes the fiber cable under test is properly installed with a patch panel at each end of the link, which allows technicians to use the industry-recommended 1-jumper reference method.



Other link configurations may require the user to adjust their test procedure accordingly.

# QUICK REFERENCE GUIDES

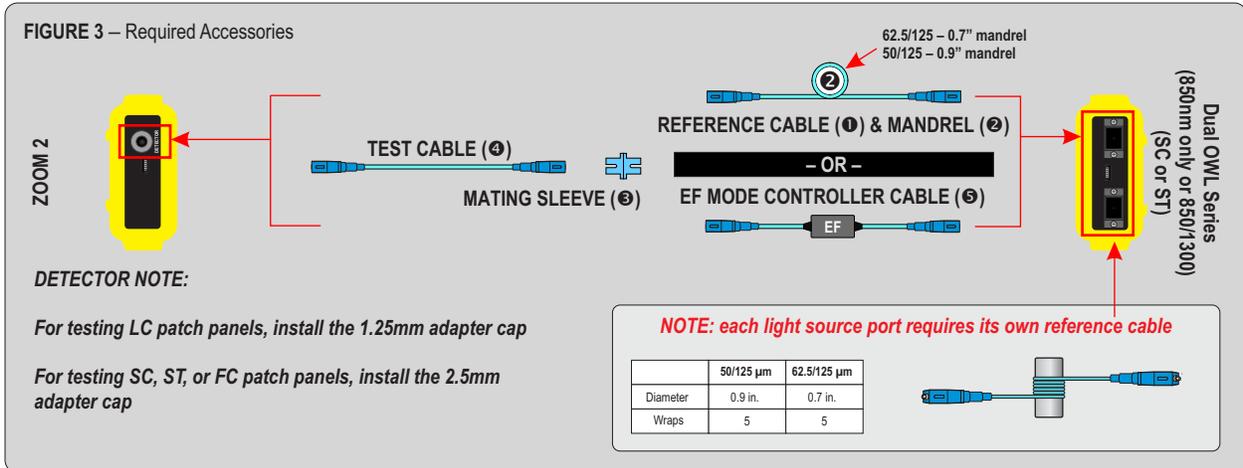
**Optical Power Meter: ZOOM 2**  
**Fiber Optic Light Source: Dual OWL Series**

## PART 1 – ACCESSORIES REQUIRED FOR THIS PROCEDURE

Please note: accessories will vary based on factors such as core size (62.5/125 vs. 50/125), test equipment connector type, and patch panel connector type. The diagram below should help visualize when selecting the correct accessories to use.

A helpful video regarding choosing patch cables is available on OWL's website:

<https://owl-inc.com/videos/html/concepts/c1011.htm>

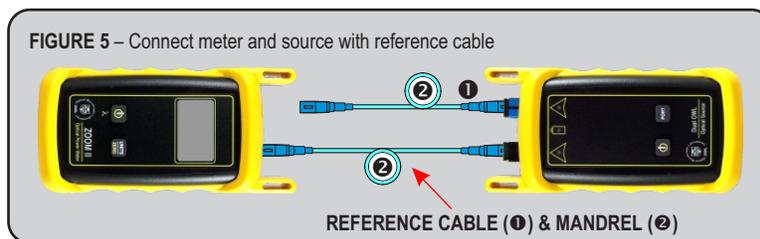


## PART 2 – SET REFERENCE

- 1 Connect the ZOOM 2 and Dual OWL together using the mandrel-wrapped patch cable (1 & 2) as shown in Figure 5.

*Note: if Encircled Flux compliance is required, use Encircled Flux Mode Controller Cables instead (3).*

**NOTE: each light source port requires its own reference cable**



- 2 Press **⏻** to power on the ZOOM 2.
- 3 Press **⏻** to power on the Dual OWL. The 850nm indicator LED should be lit by default.
- 4 Press **⏻** to set the ZOOM 2 to the 850nm wavelength.  
 The ZOOM 2 should read approximately -20.00 dBm for 62.5/125 OM1 fibers, or around -23.00 dBm for 50/125 OM2/3/4 fibers (Figure 6).
- 5 Press and hold **UNIT/REF** to set the reference for 850nm.

The ZOOM 2 display should change to show readings in 'dB', and the power reading should be approximately 0.00 dB (Figure 7). This indicates that the meter and light source have been successfully "zeroed" at 850nm.

**NOTE: If also testing at 1300nm, connect the 1300nm reference cable to the ZOOM 2, set both units to 1300nm, then repeat this step.**



FIGURE 6



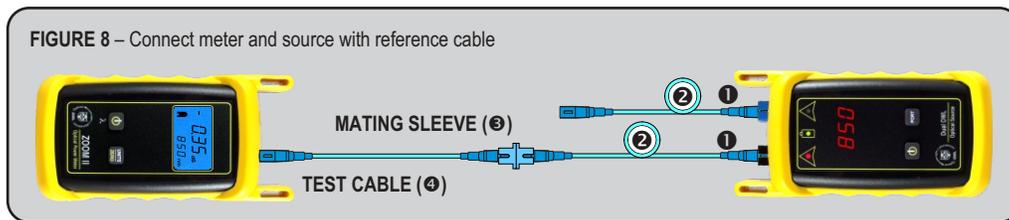
FIGURE 7

# QUICK REFERENCE GUIDES

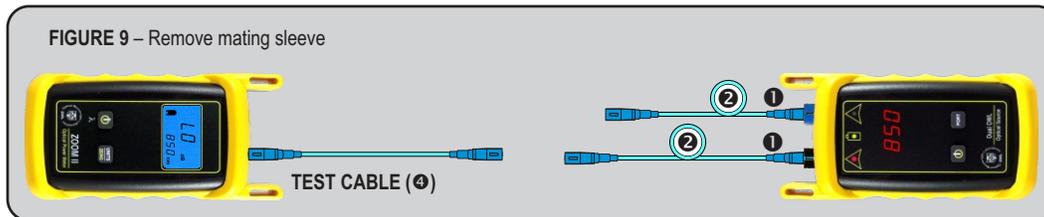
Optical Power Meter: **ZOOM 2**  
Fiber Optic Light Source: **Dual OWL Series**

## PART 3 – CHECK ADDITIONAL TEST CABLE

- 6 Disconnect the mandrel-wrapped reference cable from the detector port on the ZOOM 2.
  - ⚠ **Do NOT disconnect the reference cable from the Dual OWL light source until testing is complete**
  - ⚠ **Do NOT allow the reference cable to unwrap from the mandrel until testing is complete**
- 7 Connect the mating sleeve (③) to the reference cable, then connect the additional test cable (④) between the mating sleeve (③) and the ZOOM 2 (Figure 8).



- 8 Verify the insertion loss of the patch cable and mating sleeve. This number should be as low as possible, but in ideal conditions should not exceed 0.5 dB.
- 9 Remove the mating sleeve (③) from between the test cables. **NOTE: the meter will read LO or a very low power level when disconnected from the source.**



## PART 4 – TAKE READINGS

- 10 Take the Dual OWL with its mandrel-wrapped cable(s) to one end of the link under test, and take the ZOOM 2 and its cable to the other end.
- 11 Connect the ZOOM 2 and Dual OWL with the 850nm reference cable to the link under test (Figure 10).
- 12 Record the reading for the current fiber under test.
- 13 Disconnect the patch cables from both ends of the patch panel and move to the next port on the patch panel.
- 14 Repeat 12 and 13 for each fiber in the cable under test until all fibers have been tested.

**NOTE: if testing at both 850nm and 1300nm, it is recommended to test all of the fibers at 850nm first.**

**Then switch both testers to 1300nm, and repeat the tests for 1300nm (using the 1300nm reference cable).**



# QUICK REFERENCE GUIDES

## Optical Power Meter: **ZOOM 2** Fiber Optic Light Source: **Laser OWL Series**

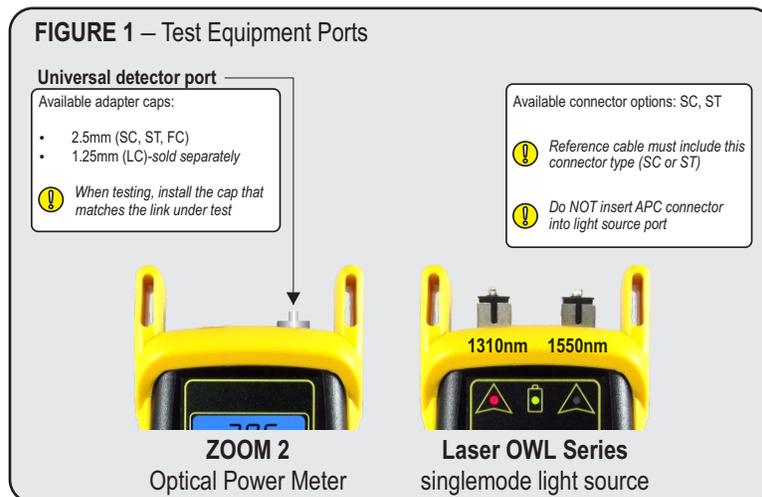
Thank you for your purchase of this OWL fiber optic test kit. Included in this kit is a **ZOOM 2** optical power meter and a **Laser OWL Series** singlemode fiber optic light source. This quick reference guide provides instructions for performing a fiber optic insertion loss test.

There are four main parts to performing an insertion loss test:

- PART 1** gather accessories;
- PART 2** set a reference for the wavelength(s) used during fiber link measurement;
- PART 3** check the additional power meter test cable; and
- PART 4** take measurements.

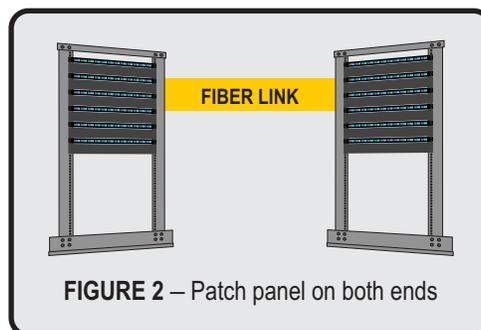
### EQUIPMENT PORTS

Figure 1 shows the ports used during this procedure. These ports may vary depending upon the model of equipment.



### BEFORE YOU BEGIN

Note: this procedure assumes the fiber cable under test is properly installed with a patch panel at each end of the link, which allows technicians to use the industry-recommended 1-jumper reference method.



Other link configurations may require the user to adjust their test procedure accordingly.

# QUICK REFERENCE GUIDES

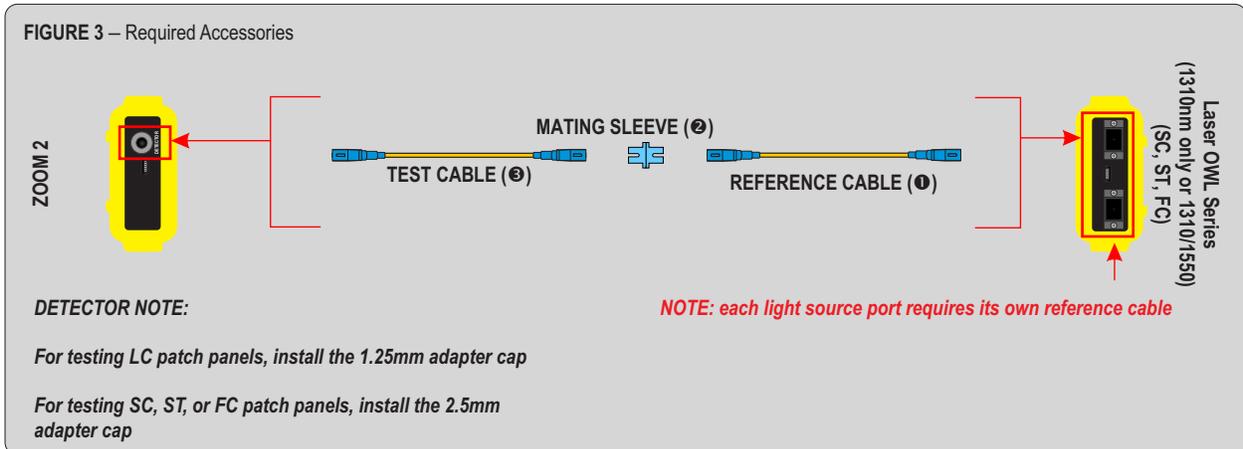
**Optical Power Meter: ZOOM 2**  
**Fiber Optic Light Source: Laser OWL Series**

## PART 1 – ACCESSORIES REQUIRED FOR THIS PROCEDURE

Please note: accessories will vary based on factors such as test equipment connector type, and patch panel connector type. The diagram below should help visualize when selecting the correct accessories to use.

A helpful video regarding choosing patch cables is available on OWL's website:

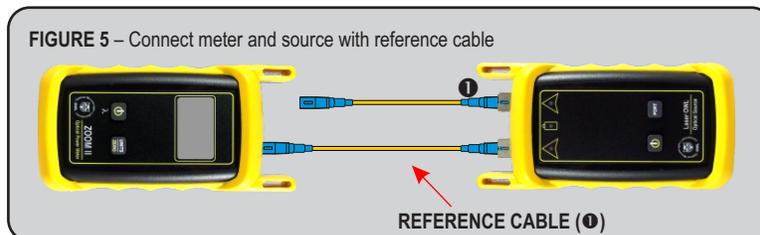
<https://owl-inc.com/videos/html/concepts/c1011.htm>



## PART 2 – SET REFERENCE

- 1 Connect the ZOOM 2 and Laser OWL together using a singlemode patch cable (1) as shown in Figure 5.

**NOTE: each light source port requires its own reference cable**



- 2 Press **⏻** to power on the ZOOM 2.
- 3 Press **⏻** to power on the Laser OWL. The 1310nm indicator LED should be lit by default.
- 4 Press **⏻** to set the ZOOM 2 to the 1310nm wavelength. The ZOOM 2 should read approximately -10.00 dBm (Figure 6).
- 5 Press and hold **WAVELENGTH** to set the reference for 1310nm.

The ZOOM 2 display should change to show readings in 'dB', and the power reading should be approximately 0.00 dB (Figure 7). This indicates that the meter and light source have been successfully "zeroed" at 1310nm.

**NOTE: If also testing at 1550nm, connect the 1550nm reference cable to the ZOOM 2, set both units to 1550nm, then repeat this step.**



**FIGURE 6**



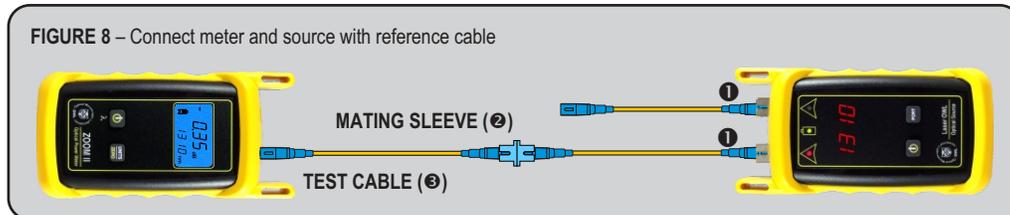
**FIGURE 7**

# QUICK REFERENCE GUIDES

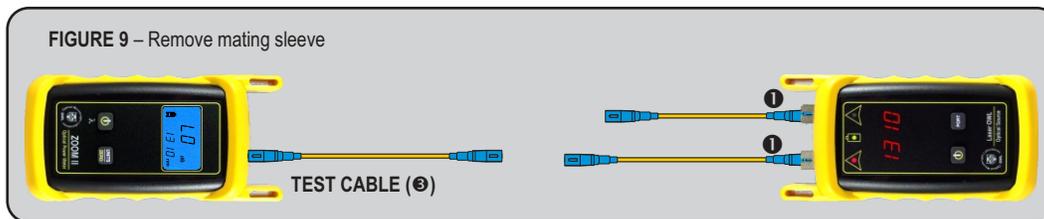
Optical Power Meter: **ZOOM 2**  
Fiber Optic Light Source: **Laser OWL Series**

## PART 3 – CHECK ADDITIONAL TEST CABLE

- 6 Disconnect the reference cable from the detector port on the ZOOM 2.
- 7  **Do NOT disconnect the reference cable from the Laser OWL light source until testing is complete**
- 7 Connect the mating sleeve (②) to the reference cable, then connect the additional test cable (③) between the mating sleeve (②) and the ZOOM 2 (Figure 8).



- 8 Verify the insertion loss of the patch cable and mating sleeve. This number should be as low as possible, but in ideal conditions should not exceed 0.5 dB.
- 9 Remove the mating sleeve (②) from between the test cables. **NOTE: the meter will read LO or a very low power level when disconnected from the source.**

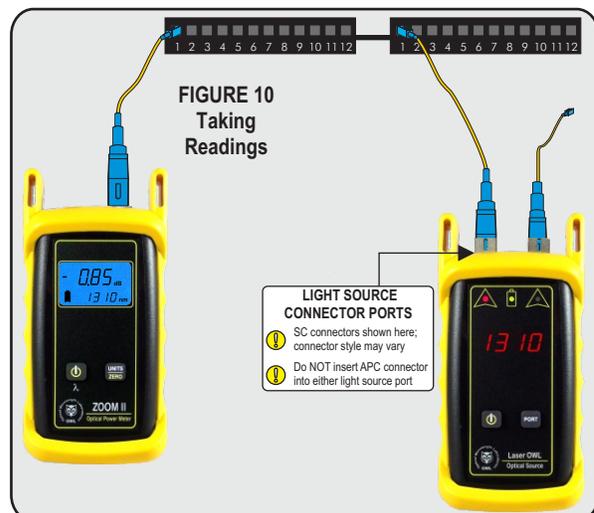


## PART 4 – TAKE READINGS

- 10 Take the Laser OWL with its cable(s) to one end of the link under test, and take the ZOOM 2 and its cable to the other end.
- 11 Connect the ZOOM 2 and Laser OWL with the 1310nm reference cable to the link under test (Figure 10).
- 12 Record the reading for the current fiber under test.
- 13 Disconnect the patch cables from both ends of the patch panel and move to the next port on the patch panel.
- 14 Repeat 12 and 13 for each fiber in the cable under test until all fibers have been tested.

**NOTE: if testing at both 1310nm and 1550nm, it is recommended to test all of the fibers at 1310nm first.**

**Then switch both testers to 1550nm, and repeat the tests for 1550nm (using the 1550nm reference cable).**



# OPERATION/MAINTENANCE

## OPTIONAL VFL (visual fault locator) PORT

As an option, a Visual Fault Locator (VFL) can be installed into the ZOOM 2 optical power meter in place of the charger port. The VFL is an invaluable troubleshooting tool with two important uses:

*Visual Fault Location.* Faults, such as breaks or microbends, can be located in the near end of the fiber link under test (within a few feet). When the bright red laser encounters a fault, the light is deflected into the fiber jacket, producing a glow at the point of the fault.

*Visual Fiber Identification.* Optical fibers can be visually identified by connecting the VFL port to the fiber under test, then inspecting the far end for red light exiting the fiber connector.

### Operation of the Optional Visual Fault Locator (VFL) Port

There are three modes for the optional VFL port, which toggle in the following order: off, continuous, and flash. The VFL will be off when the power meter is first powered on.

To toggle the VFL mode:

- 1 Press  several times until 'VFL' appears in the lower right-hand corner of the display. 'VFL' will appear after '1550nm'.
- 2 While 'VFL' is shown on the wavelength display, do not press any buttons for approximately 3 seconds. This will toggle the VFL to the next mode, and then automatically return to the '850nm' wavelength.



To maintain the current VFL mode while scrolling through the list of wavelengths, press  button again before 3 seconds have elapsed.

The VFL port can be turned off two different ways:

- power off the meter completely, or
- toggle through the VFL modes using the above steps until the VFL turns off.

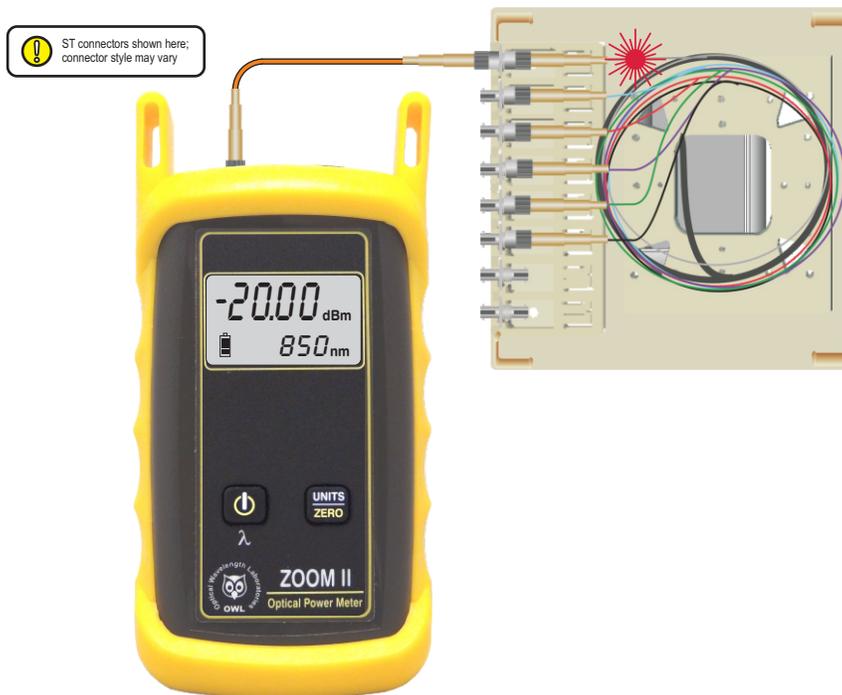
# OPERATION/MAINTENANCE

## VISUAL FAULT LOCATION

The optional VFL port in the ZOOM 2 VFL can be used as a troubleshooting tool to determine if there are breaks, micro-bends, or any other anomalies causing excessive loss within the first few feet of the fiber under test located in the splice tray. The bright red laser injects high-intensity red laser light into the near-end connector. If this light encounters any anomalies, such as a break or a micro-bend, the light is deflected into the fiber jacket, producing a red glow at the point of the anomaly.

Follow the steps below:

- 1 Connect the VFL port to the fiber under test. It is recommended to use a fiber patch cable as shown below to avoid handling the fragile jacketed fiber in the splice tray.  
 **do NOT insert an APC (Angled Physical Contact) connector in to the VFL port as this could damage the angled ferrule on the APC connector.**
- 2 Power on the VFL. See page 18 for instructions on operating the VFL port.
- 3 Inspect the splice tray for anomalies. Optical fiber jackets are differently colored, making it difficult to see red light shining through, so for best results, it is recommended to keep the room light at a minimum.



# OPERATION/MAINTENANCE

## VISUAL FIBER IDENTIFICATION

The optional VFL port in the ZOOM 2 optical power meter can help take the guesswork out of identifying ports in a fiber patch panel or checking polarity of a duplex connector. Connect the VFL port to one end of a fiber link, and the high-intensity, precision-coupled red laser diode will allow the user to visually identify the port by the presence of a red glow emitting from the connector on the other end, allowing for visual port identification of fiber optic links up to 5 kilometers (3.1 miles) away.

Follow the steps below:

1 Connect the VFL port to the fiber under test. It is recommended to use a fiber patch cable as shown below to avoid handling the fragile jacketed fiber in the splice tray.

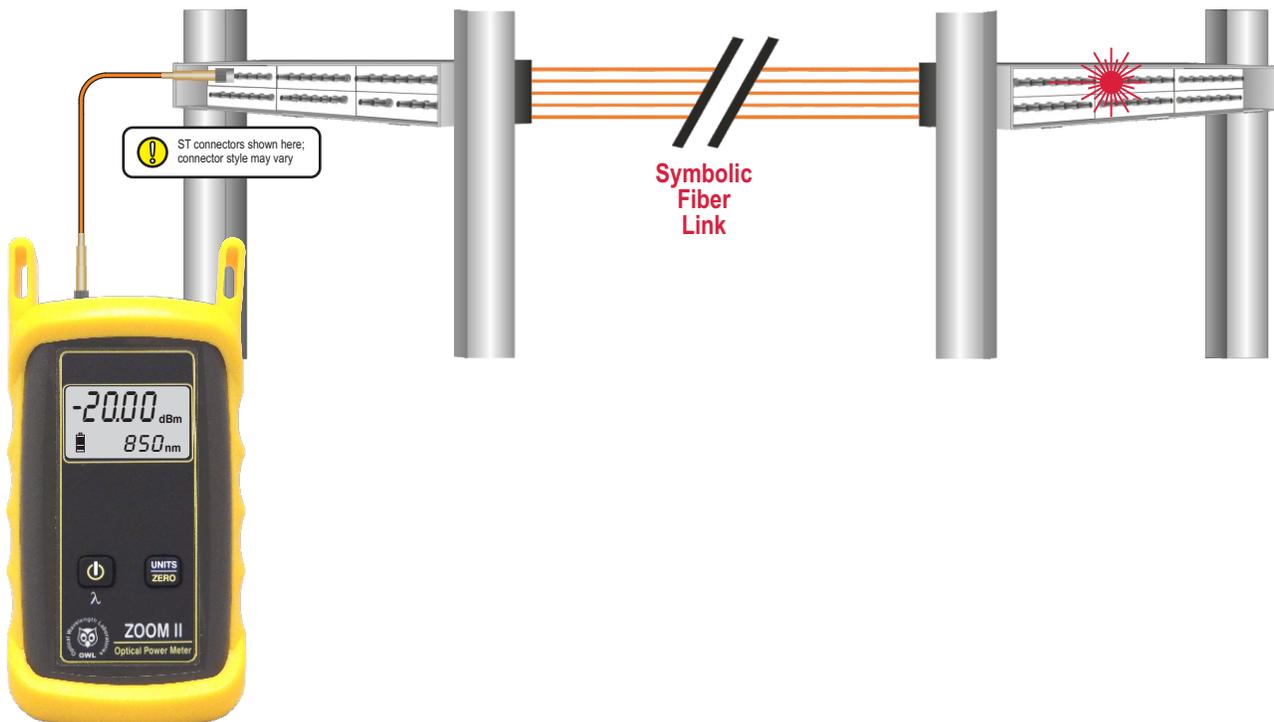
 **do NOT insert an APC (Angled Physical Contact) connector in to the VFL port as this could damage the angled ferrule on the APC connector.**

2 Power on the VFL. See page 18 for instructions on operating the VFL port.

3 Inspect the far-end connectors for the red light exiting the connector.

 **the laser light exiting the fiber is very bright and could cause damage to your eye if viewed directly!**

 **To assist with viewing of the light exiting the connector, hold a piece of white paper in front of the connectors. This will sufficiently diffuse the light for safe viewing.**



# OPERATION/MAINTENANCE

## UNIVERSAL PORT

### Universal Port

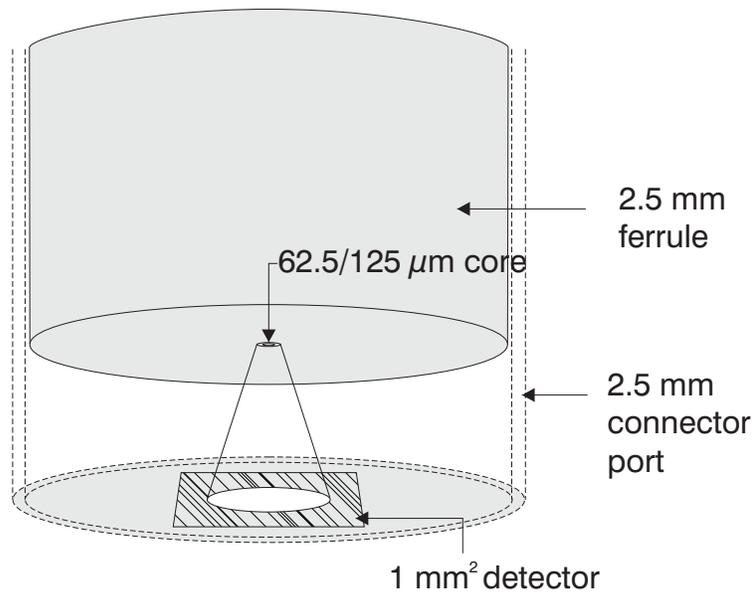
The ZOOM 2 optical power meter contains a universal connector port which allows for coupling to any fiber optic connector that uses a 2.5mm ferrule (e.g. ST, SC, FC, etc.).

What gives this port its flexibility is that only the ferrule is inserted into the port. Since there is no latching mechanism to speak of, any 2.5mm ferrule connector can be inserted into the same port without having to swap adapter ports. There is no longer the need to purchase or maintain additional adapter caps for each different connector type.

This detector port is designed so that the cone of acceptance falls completely onto the detector, regardless of how the connector may turn, twist, or wiggle in the port. Because of this, you can be assured that the connection will always produce an accurate reading as long as it is inserted completely into the port (see the diagram below).

Additionally, some connectors use a 1.25mm ferrule. The flexible universal port system on the ZOOM 2 allows the user to remove the 2.5mm adapter and place a 1.25mm adapter (which can be purchased separately as an option) for connection to LC, MU, and other SFF connectors which use the 1.25mm ferrule.

Please call 262-473-0643 with any questions you may have about the universal port, or any other of our fiber optic test products.



### Use of SC Connectors with 2.5mm Universal Port

Take extra care when inserting SC connectors into the 2.5mm universal port as the spring-loading action of the SC connector may cause improper insertion. Call OWL at (262) 473-0643 with any questions.

# OPERATION/MAINTENANCE

## CLEANING THE DETECTOR PORT

### Required accessories:

A) Isopropyl Alcohol (91% or better)

B) Round **wooden** toothpick with sharp point

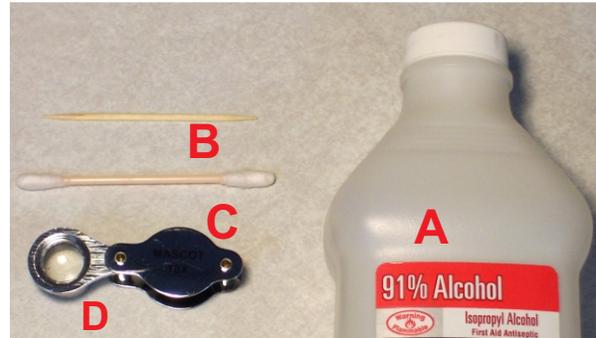


**(NOTE: do not use a metal pin or needle since metal will scratch the surface of the detector)**

C) Cotton swab

D) Jeweler's loupe (10x magnification recommended)

E) Compressed Air (not shown)



1 Place a small amount of cotton from the swab onto the wooden toothpick as shown at right.



2 Wet the cotton toothpick tip with the isopropyl alcohol.

3 Remove the adapter cap from the power meter detector port.



4 **USING GREAT CARE**, gently insert the cotton toothpick tip into the detector port.



**WARNING! BE VERY CAREFUL WHEN INSERTING THE TOOTHPICK INTO THE DETECTOR PORT. THERE IS A VERY THIN GLASS WINDOW THAT WILL EASILY BREAK WITH TOO MUCH PRESSURE.**



5 Using as little pressure as possible, rotate the cotton toothpick tip in the detector port to clear away any dust or dirt that has accumulated on the detector.

6 Using light pressure from the compressed air, blow out the detector port.

7 Use the jewelers loupe to inspect the detector end face.



If dust or dirt are still present, repeat steps 5 6 7 until the detector port is free of debris.

If no dust or dirt is found, replace the adapter cap on the detector port and cover the detector port with the dust cap.

# OPERATION/MAINTENANCE

## CLEANING THE OPTIONAL VFL PORT

This cleaning procedure applies to the optional VFL port on the ZOOM 2 optical power meter. For more information about cleaning the DETECTOR port on the ZOOM 2, see page 23.

### Required Accessories:

- › Isopropyl alcohol (91% or better)
- › In-adapter fiber optic cleaning accessories, such as 2.5mm cleaning swabs or 2.5mm HUXCleaner™
- › In-adapter fiber optic inspection scope (200x magnification or greater recommended)
- › Compressed Air (optional)

Below are procedures for “wet” cleaning and “dry” cleaning. For best results, a combination of these cleaning methods is recommended.



**IMPORTANT SAFETY NOTE: WHEN INSPECTING AN OPTICAL PORT, NEVER LOOK DIRECTLY OR INDIRECTLY INTO THE PORT WITHOUT SUFFICIENT EYE PROTECTION. THE OPTICAL PORT MAY BE ENERGIZED WITH POWERFUL INVISIBLE RADIATION THAT IS HARMFUL TO THE HUMAN EYE.**

**INVISIBLE LIGHT IS ESPECIALLY DANGEROUS SINCE THE EYE IS NOT AWARE OF EXPOSURE TO HARMFUL INVISIBLE ENERGY, AND BECOMES INCREASINGLY DANGEROUS WITH PROLONGED EXPOSURE.**

**TO AVOID ACCIDENTAL EXPOSURE TO OPTICAL ENERGY, IT IS HIGHLY RECOMMENDED TO POWER OFF EQUIPMENT BEFORE INSPECTING OPTICAL PORTS.**

**IT IS ALSO HIGHLY RECOMMENDED TO USE AN LCD-BASED FIBER INSPECTION SCOPE, WHICH CAN INSPECT OPTICAL PORTS AND FIBER ENDFACES WITHOUT EXPOSING THE EYE TO HARMFUL OPTICAL RADIATION.**

### “WET” CLEAN PROCEDURE

- 1 Wet the tip of a 2.5mm cleaning swab with isopropyl alcohol.
- 2 Carefully insert the wet tip of the swab into the optical port.
- 3 Clean out the optical port according to the directions provided with the swabs.
- 4 Blow dry the optical port with the compressed air. If compressed air is not available, allow 2 minutes for the alcohol to evaporate.
- 5 Inspect the optical port with the in-adapter fiber optic inspection scope to ensure the port is clear of obstructions.

### “DRY” CLEAN PROCEDURE

- 1 Carefully insert a dry 2.5mm cleaning swab or a 2.5mm HUXCleaner™ into the optical port.
  - 2 Clean out the optical port according to the directions that came with the cleaning accessories.
  - 3 Inspect the optical port with the in-adapter fiber optic inspection scope to ensure the port is clear of obstructions.
- If the port is still dirty, another round of cleaning will be necessary. You may also want to use a combination of “wet” and “dry” cleaning to achieve best results.

If the port is still dirty, another round of cleaning will be necessary. You may also want to use a combination of “wet” and “dry” cleaning to achieve best results.

# OPERATION/MAINTENANCE

## AUTO MODE

AUTO mode is used to perform simultaneous dual-wavelength optical power and loss measurements. Simultaneously measuring two wavelengths simultaneously cuts testing time in half and prevents wavelength mismatch errors between the power meter and light source during reference setting and power/loss measurement.



**NOTE: AUTO mode is only usable with OWL WaveSource light sources:**

**Model numbers: WS-MDxx, WS-MDVxx, WS-SDxx, WS-VSDxx, and WS-MDSDxx**

### SETTING UP AUTO MODE IN THE ZOOM 2 TO PERFORM DUAL-WAVELENGTH MEASUREMENTS

- 1 Connect the ZOOM 2 optical power meter to the appropriate WaveSource light source port – either multimode or singlemode – using a 1-meter patch cable that matches the fiber under test.
  - 2 With the ZOOM 2 powered off, hold down , then press . Once the ZOOM 2 is powered on, release . The wavelength display will then begin to alternate between a wavelength and “AUO”.
-  **NOTE: while in AUTO mode, do not press  on the ZOOM 2 as this will disable AUTO mode.**
- 3 Press  to power on the WaveSource.
  - 4 If necessary, press  to set the WaveSource to the appropriate light source port, depending upon the fiber type of the fiber under test.
  - 5 On the WaveSource, press and hold  until the appropriate indicator LED begins flashing, then immediately release the button.

Once the WaveSource has been successfully set to AUTO mode, the appropriate indicator LED will begin alternating between green and red, and solid and flashing. Also, the wavelength display on the ZOOM 2 will begin alternating between the two appropriate wavelengths: i.e. 850/1300nm for multimode or 1310/1550nm for singlemode.

Optical loss measurements can now be taken as normal by taking the ZOOM 2 and WaveSource to opposite ends of the fiber under test.



**NOTE: do not disconnect the patch cable from the WaveSource port.**



**NOTE: during the time that the ZOOM 2 and WaveSource are not connected, such as connecting to the next fiber under test, the ZOOM 2 wavelength display will alternate between a wavelength and “AUO”. This is normal. When the ZOOM 2 and WaveSource are re-connected to the next fiber under test, they will resume auto-switching of wavelengths.**

# APPENDICES

## SPECIFICATIONS

Detector Type:	_____	1mm InGaAs
Calibrated Wavelengths:	_____	850, 1300, 1310, 1490, 1550nm
Measurement Range:	_____	+5 to -60 dBm
Measurement Units:	_____	dBm; uW (absolute) dB (relative)
Accuracy:	_____	± 0.20 dB <sup>1</sup>
Linearity:	_____	± 0.20 dB <sup>1</sup>
Resolution:	_____	0.01 dB
Battery Life:	_____	up to 1000 hours (Lithium Polymer)
Connector Type:	_____	2.5mm/1.25mm Universal
Operating Temperature:	_____	-10 to 55° C
Storage Temperature:	_____	-30 to 70° C
Size:	_____	2.75"W x 4.94"H x 1.28"D
Weight:	_____	116g
Low Battery Indicator:	_____	Yes
NIST Traceable:	_____	Yes

1) 0 to -45 dBm

## MAINTENANCE AND CALIBRATION INFORMATION

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

*Cleaning.* For accurate readings, the optical connectors on the ZOOM 2 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.

*Calibration.* It is recommended to have Optical Wavelength Laboratories calibrate this unit once per year.

*Warranty.* The ZOOM 2 comes standard with a two-year factory warranty, which covers manufacturer defect and workmanship only.

## CONTACT INFORMATION

**Address:**

Optical Wavelength Laboratories, Inc.  
N9623 US Hwy 12  
Whitewater, WI 53190

**Phone:**

262-473-0643

**Internet:**

OWL-INC.COM

# APPENDICES

## OPTIONAL UPGRADE INFORMATION

### Visual Fault Locator Port Upgrade

The ZOOM 2 optical power meter may be upgraded to include an optional visual fault locator (VFL), useful for locating bends, breaks, and other anomalies in the near-end splice tray, as well as visual fiber identification up to 5km away!

## LINK BUDGET CALCULATION WORKSHEET

Operating Wavelength  Fiber Type

### Calculate System Attenuation

Fiber Loss at Operating Wavelength (Distance x Fiber Loss)

Total Cable Distance \_\_\_\_\_  km  
 Individual Fiber Loss (at operating wavelength) \_\_\_\_\_  dB/km  
 Total Fiber Loss \_\_\_\_\_  dB  
 Connector Loss (Connector Loss x Connector Pairs)  
 Individual Connector Loss \_\_\_\_\_  dB  
 Number of Connector Pairs \_\_\_\_\_   
 Total Connector Loss \_\_\_\_\_  dB  
 Splice Loss (Splice Loss x Splices)  
 Individual Splice Loss \_\_\_\_\_  dB  
 Number of Splices \_\_\_\_\_   
 Total Splice Loss \_\_\_\_\_  dB  
 Other Components \_\_\_\_\_  dB  
 Total System Attenuation \_\_\_\_\_  dB

### Calculate Link Loss Budget

Determine System Gain (Avg. Transmitter Power - Receiver Sensitivity)

Average. Transmitter Power \_\_\_\_\_  dBm  
 Receiver Sensitivity \_\_\_\_\_  dBm @ 10<sup>-9</sup> BER  
 System Gain \_\_\_\_\_  dB

Power Penalties (Operating Margin + Receiver Power Penalties + Repair Margin # Splices at 0.3dB each)

Operating Margin \_\_\_\_\_  dB  
 Receiver Power Penalties \_\_\_\_\_  dB  
 Repair Margin \_\_\_\_\_  dB  
 Total Power Penalty \_\_\_\_\_  dB

Determine Link Loss Budget (System Gain - Power Penalty)

System Gain \_\_\_\_\_  dB  
 Total Power Penalty \_\_\_\_\_  dB  
 Total Link Loss Budget \_\_\_\_\_  dB

### Verify Performance

Verify Adequate Power (Total Link Loss Budget - Total System Attenuation)

Total Link Loss Budget \_\_\_\_\_  dB  
 Total System Attenuation \_\_\_\_\_  dB  
 System Performance Margin\* \_\_\_\_\_  dB

\* System Performance Margin must be greater than 0 dB in order for the system to operate using the specified electronics.